

**ATTACHMENT 1: INFORMATION TO SUPPORT AMENDMENT OF
CPS 8248/1**

1. BACKGROUND

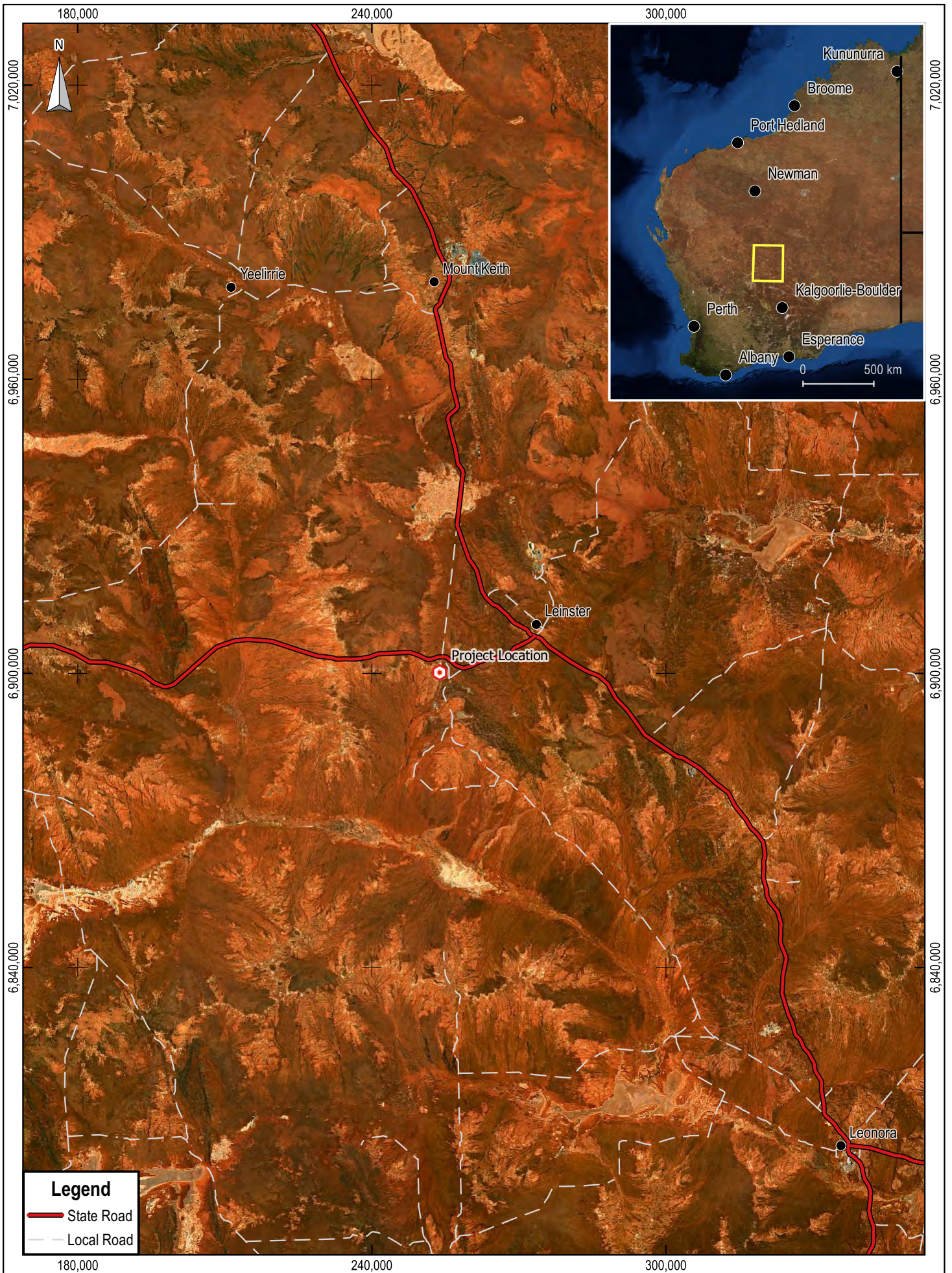
Agnew Gold Mining Company Pty Ltd (AGMC), a wholly owned subsidiary of Gold Fields Australia Pty Ltd (GFA), own and operate the Agnew Gold Mine (AGM), within the Northern Goldfields Region of Western Australia (WA). AGM is located 630 km northeast of Perth within the Shire of Leonora in Western Australia and 26 km southwest of Leinster (Figure 1).

A Native Vegetation Clearing Permit (NVCP) application was submitted by AGMC to clear up to 65.7 hectares (ha) of native vegetation within a boundary of approximately 203 ha. CPS 8248/1 was granted on 7 February 2019, to clear vegetation for the purpose of constructing an 'Alternative Power Project' (APP) comprising a power station, wind farm and supporting infrastructure to support current and future operations at AGM. The APP is located on tenements M36/32, M36/53, M36/149, M36/174 and M36/314.

The original application for 65.7 ha of clearing within the approved Purpose Permit Area (PPA) was assessed by Stantec in November 2018 against the ten Clearing Principles as defined in the Department of Water and Environmental Regulation's (DWER) *Guide to Assessment: Clearing of Native Vegetation (2014)* and listed under Schedule 5 of the *Environmental Protection Act 1986* (EP Act). The assessment determined that clearing for the APP was not at variance with any of the Clearing Principles (Stantec 2018).

To inform and support potential future development of the solar farm and energy storage infrastructure, Stantec also completed a Reconnaissance flora and vegetation survey and Basic fauna survey in 2021 on three potential locations for the APP expansion. The total area surveyed was approximately 35.62 ha located on tenement M36/53, adjacent to the approved PPA (CPS 8248/1) (Figure 2).

The purpose of this document is to support amendment of CPS 8248/1 under Part IV of the EP Act to expand the PPA and allow an additional 40 ha of clearing of native vegetation within a revised PPA boundary of approximately 22 ha increase to the PPA to further develop renewable energy infrastructure. The proposed amendment includes increasing the PPA boundary from approximately 203 ha up to 225 ha with proposed authorised clearing extent up to approximately 81 ha within that boundary. The proposed expansion will maintain a minimum 50 m buffer from any water courses and known heritage sites. This document provides supporting information on the environmental values within the PPA and assessment of the expansion and additional 22 ha of clearing against the 10 Clearing Principles.



Legend

- State Road
- - - Local Road

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 Original Size: A4
 Image: Copernicus Sentinel Data 2020
 Grid: GDA94 / MGA zone 51

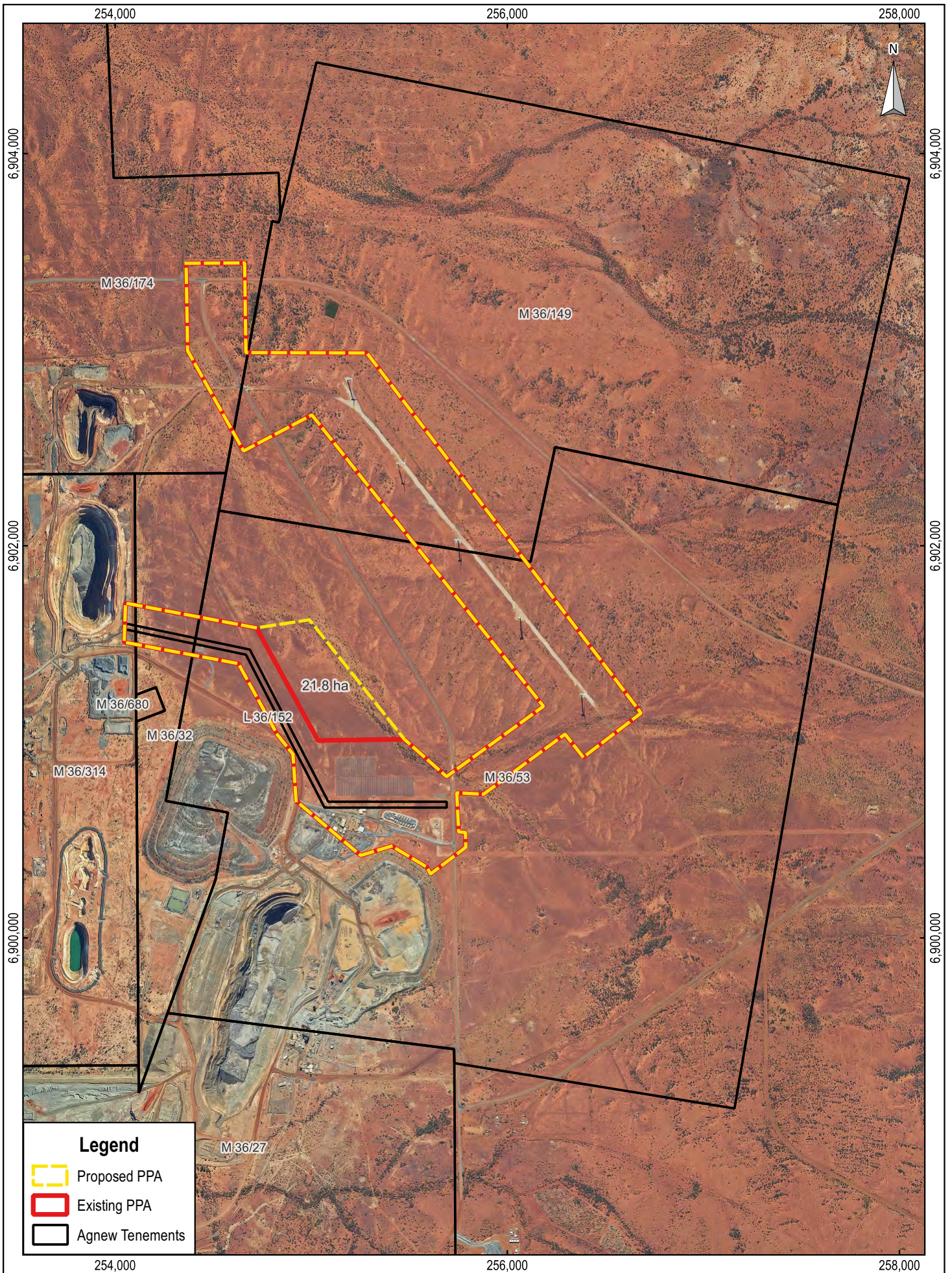
0 10 20 km

Agnew Gold Mining Pty Ltd
Agnew Gold Mine

Figure 1

Location Plan

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Scale: 1: 25,000
 Original Size: A4
 Aerial Imagery Date: 2022
 Grid: GDA94 / MGA zone 51

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Figure 2
Approved and Proposed Clearing Areas

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2. ENVIRONMENTAL VALUES

Desktop assessments and field surveys focussed within a Survey Area of 203 ha were completed by Stantec in 2018 to support the original NVCP application (Appendix 1). Results of these surveys and desktop analysis formed the basis for assessment for the original NVCP application. An additional survey was completed by Stantec in 2021 across three separate survey areas as potential locations for the APP expansion. To support the future expansion of the solar farm and other renewable energy infrastructure, this assessment report focuses on results from the *Agnew Renewable Energy Expansion: Reconnaissance Flora and Vegetation and Basic Fauna Survey 2022* (Appendix 2) to support proposed additional clearing of 15 ha within a PPA boundary of 22 ha.

2.1 FLORA AND VEGETATION

The 2021 Stantec assessment identified no Threatened, or Priority flora species and no Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), or *Biodiversity Conservation Act 2016* (BC Act) have been identified within 5 km of the Expansion Survey Area. The nearest PEC is located approximately 38 km north of the Expansion Survey Area (Stantec 2022).

Stantec identified four vegetation types within the Expansion Survey Area, all of which are representative of the Eastern Murchison subregion, broadly consisting of flat colluvium and alluvial plains, and low mulga (*Acacia aneura* complex) woodlands. Floristic diversity and composition were typical of the Eastern Murchison subregion and consistent with previous surveys undertaken in close proximity to the Expansion Survey Area (Appendix 2). Two remnant vegetation associations were identified by Stantec (2022) within the PPA and Expansion Survey Area including Wiluna (18) and Laverton (18). Both are well represented, with more than 99% of their pre-European extent remaining within the Murchison bioregion and Eastern Murchison subregion (Stantec 2018).

Stantec (2022) noted that vegetation condition within the Expansion Survey Area ranged from 'Poor' to 'Completely Degraded', with the majority (86.5%) of vegetation described as being in 'Poor' condition. Disturbances were predominantly associated with livestock grazing, partial clearing and weed invasion (Stantec 2022).

The proposed additional clearing (15 ha) within the PPA expansion area (22 ha) is unlikely to result in any changes to the original assessment outcome for flora and vegetation for CPS 8248/1 (Table 1).

2.2 VERTEBRATE FAUNA

Stantec identified six broad habitat types during the initial assessment of the PPA (Stantec 2018) and four during assessment of the Expansion Survey Area (Stantec 2022), all considered widespread and well represented and did not form significant areas of habitat for native fauna. No conservation significant species were observed during the 2018 field survey and, although six conservation significant species were considered 'Possible' to occur, none were found to be dependent upon habitat within the PPA (Stantec 2018).

The 2021 desktop fauna assessment identified 12 conservation significant vertebrate fauna species, however, post-field survey only three species of significance were considered 'possible' to occur within the Expansion Survey Area (Stantec 2022). These species included:

- Fork-tailed swift (*Apus pacificus*).
- Conservation status: Migratory Species under both the BC Act and EPBC Act.
- Peregrine falcon (*Falco peregrinus*).
- Conservation status: OS / S7 - fauna requiring Special Protection under the BC Act.
- Northern shield-backed trapdoor spider (*Idiosoma clypeatum*).
- Conservation status: P3 -poorly known species under the BC Act.

During the 2021 field survey, Stantec opportunistically recorded 12 terrestrial vertebrate fauna species either through direct observations or indirect evidence (diggings, foraging evidence, tracks etc.). These comprised seven birds, three mammal, and two reptiles (Appendix 2). No fauna species of significance were recorded in the Expansion Survey Area and none expected to occur based on previous records in the area and the habitats present (Stantec 2022).

The proposed additional clearing within the PPA is unlikely to result in any changes to the assessment outcome for vertebrate fauna (Table 1).

2.3 WATER AND LAND SYSTEMS

The Expansion Survey Area is located approximately 23 km from the nearest weather station (Leinster Aero: #12314), which recorded approximately 251.6 mm annual mean rainfall for the area, with the majority falling during the months of January to March (BoM 2022). The general topography of the area is very flat and site drainage is via a combination of sheet flow (with shallow flow depths and low velocities) and poorly defined drainage lines (Stantec 2018). Drainage lines within the PPA are not considered regionally prominent and do not contain vegetation communities or species that are confined to watercourses or wetlands, nor are they groundwater dependant (Stantec 2018).

As described by Stantec (2022), the Expansion Survey Area does not intersect any wetlands or waterbodies. The nearest ephemeral lake, Lake Miranda, occurs approximately 26 km north, an unnamed non-perennial lake system also occurs approximately 32 km south and the nearest nationally important wetland is the Lake Barley System, 112 km southwest of the Expansion Survey Area (Stantec 2022). There are no public drinking water areas within 10 km of the Expansion Survey Area.

The Expansion Survey Area coincides with the Tiger and Nubev Land Systems which are described as undulating stony and gravelly hardpan plains and sandy banks with mulga and halophytic shrublands and wanderie grasses (Stantec 2022). One geologic unit 'colluvium 38491' occurs across the entire Expansion Survey Area comprising residual deposits, sheetwash, talus, scree; boulder, gravel and sand, and may include minor alluvial or sand plain deposits, local calcrete and reworked laterite (Stantec 2022).

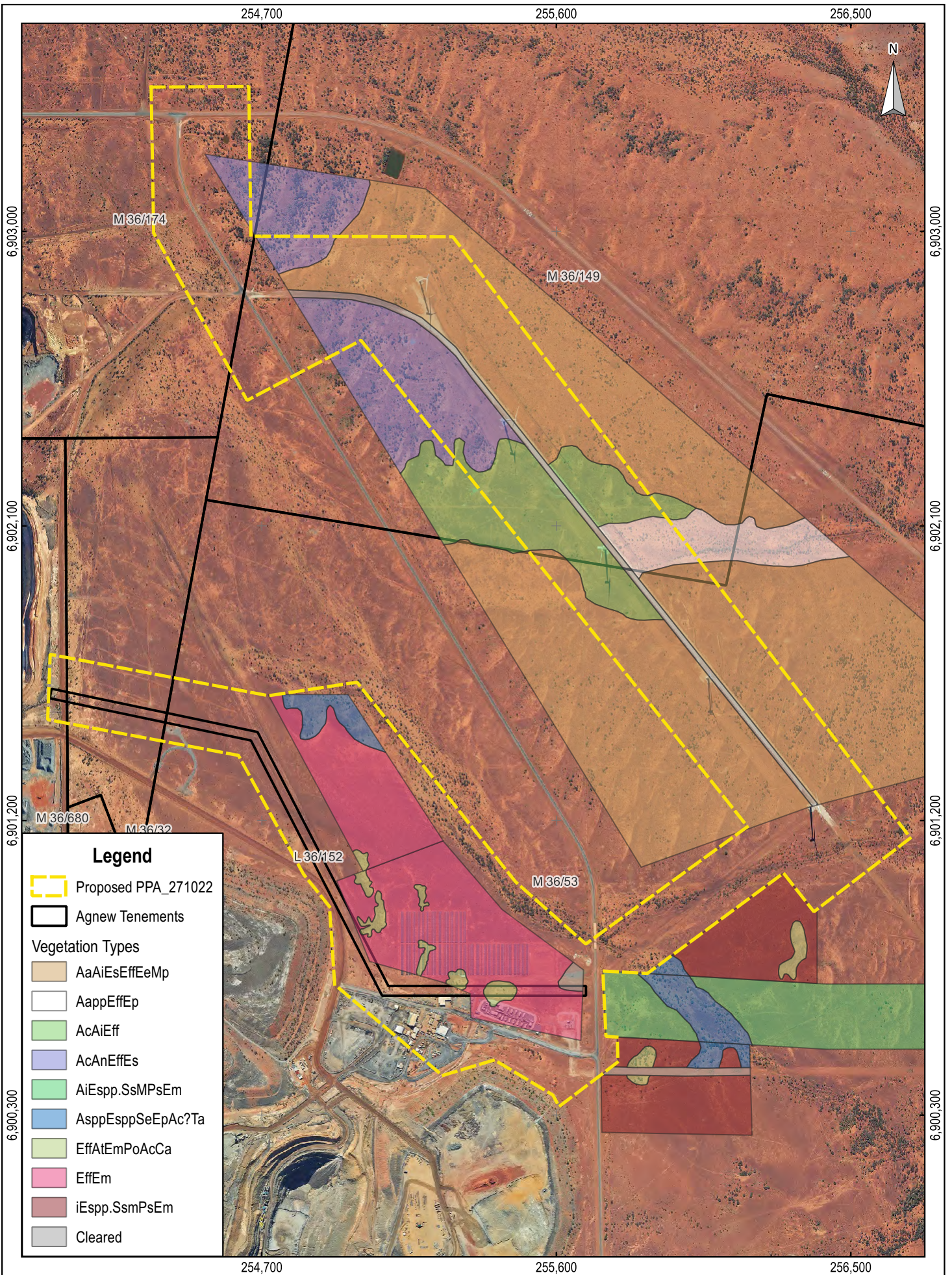
No Environmentally Sensitive Areas (ESA's) were identified in the Expansion Survey Area (Stantec 2022).

The proposed additional clearing within the PPA is unlikely to result in any changes to the assessment outcome of impacts to water and soil values (Table 1).

3. ASSESSMENT OF CLEARING PRINCIPLES

Clearing applications and amendments are assessed against the 10 Clearing Principles outlined in Schedule 5 of the EP Act. These principles aim to ensure that potential impacts resulting from removal of native vegetation are assessed in an integrated method and consistently apply to all lands throughout Western Australia. The principles address the four environmental areas of biodiversity significance, land degradation, conservation estate and ground and surface water quality.

Assessment of the potential impacts associated with proposed additional clearing within the approved PPA was undertaken and is summarised in Table 1. Table 1 also states any change in the status of an assessed outcome from the original assessment for CPS 8248/1



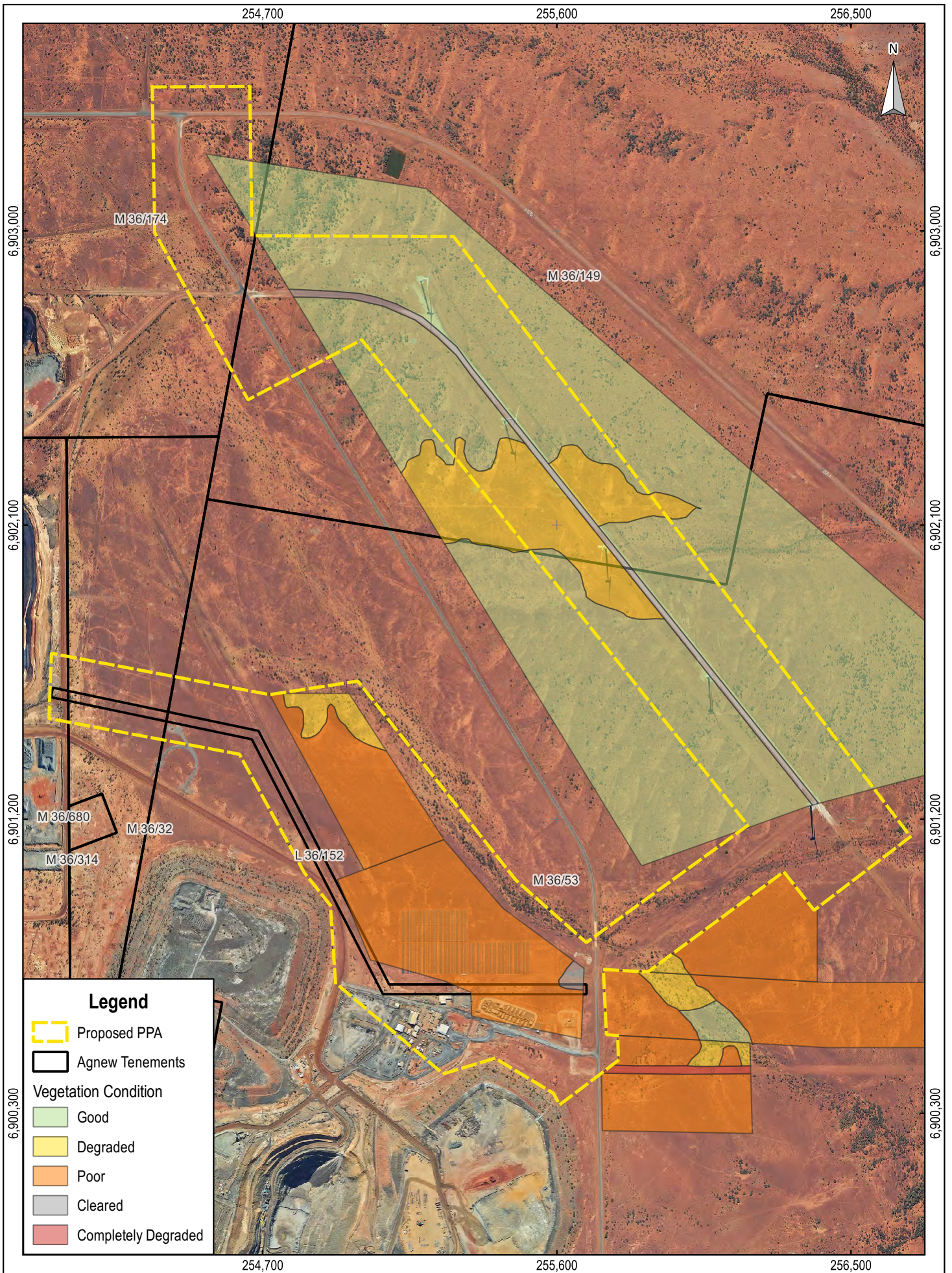
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 Aerial Imagery Date: 2022
 Grid: GDA94 / MGA zone 51
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Figure 3
Vegetation Types

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Legend

- Proposed PPA
- Agnew Tenements

Vegetation Condition

- Good
- Degraded
- Poor
- Cleared
- Completely Degraded

Scale: 1: 15,000
 Original Size: A4
 Aerial Imagery Date: 2022
 Grid: GDA94 / MGA zone 51

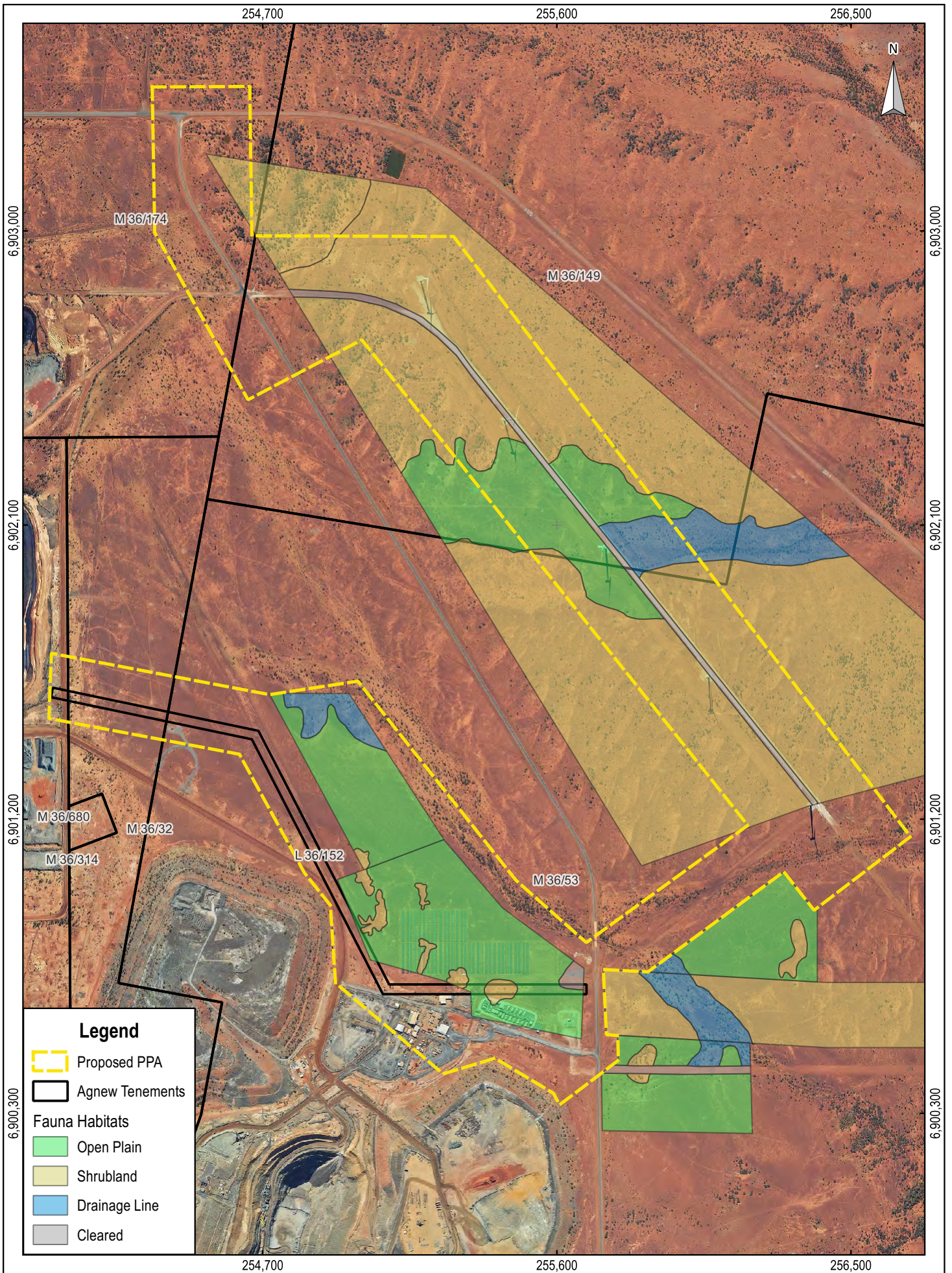
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Figure 4
 Vegetation Condition

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Legend

- Proposed PPA
- Agnew Tenements
- Fauna Habitats**
- Open Plain
- Shrubland
- Drainage Line
- Cleared

Scale: 1: 15,000
 Original Size: A4
 Aerial Imagery Date: 2022
 Grid: GDA94 / MGA zone 51

0 250 500 m

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Figure 5

Fauna Habitats

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Table 1: Assessment Against the 10 Clearing Principles

Evidence	Assessment Outcome	Status after amendment
Principle (a) Biodiversity – <i>Native vegetation should not be cleared if it compromises a high level of biological diversity</i>		
<p>The desktop assessment and field surveys for the PPA completed by Stantec in 2018 and for the Expansion Area completed by Stantec in 2021 identified:</p> <ul style="list-style-type: none"> • No fauna species of conservation significance. • No Threatened flora species. • No Threatened or Priority Ecological Communities. • No Priority flora. • Fauna habitat types considered widespread and of limited significance. • Generalist fauna assemblages are widely distributed. • Vegetation condition was mainly in Poor to Completely Degraded. 	<p>Based on the desktop and field surveys in the Expansion Area, native vegetation adjacent to the previously approved PPA does not comprise a high level of biological diversity.</p> <p>The proposed amendment is unlikely to be at variance with this principle.</p>	No change
Principle (b) Significant Fauna Habitat – <i>Native vegetation should not be cleared if it compromises the whole or a part of, or is necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia.</i>		
<p>The desktop assessment and field surveys for the PPA completed by Stantec in 2018 identified:</p> <ul style="list-style-type: none"> • Six broad habitat types which are widespread and well represented within the bioregion. • Six conservation significant fauna species considered 'possible' to occur, which are mobile in nature. <p>Additional desktop assessments and field surveys completed by Stantec in 2021 for the Expansion Survey Area identified:</p> <ul style="list-style-type: none"> • Four habitat types, widespread and of limited significance to potential fauna species. • Three species of significance considered 'possible' to occur in the post survey likelihood assessment, although none were recorded during the 2021 field survey. 	<p>Additional clearing of 15 ha of native vegetation in the Expansion Survey Area north of the PPA will not significantly impact habitat for fauna of conservation significance, or significant habitat for fauna. Potential impacts to significant fauna are expected to be minimal as none were found to be dependent upon habitat within the PPA or Expansion Survey Area (Stantec 2022).</p> <p>The proposed amendment is unlikely to be at variance with this principle.</p>	No change

Evidence	Assessment Outcome	Status after amendment
Principle (c) Rare Flora and Priority Flora – <i>Native vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora.</i>		
<p>A desktop and field survey assessment of the Expansion Survey Area identified:</p> <ul style="list-style-type: none"> • No conservation significant or Priority species. • No Threatened flora species. • No TECs or PECs. 	<p>As no Threatened and/or Priority flora species were identified within the approved PPA or the Expansion Survey Area, additional clearing will not impact rare flora.</p> <p>The proposed amendment will not be at variance with this principle.</p>	No change
Principle (d) Threatened Ecological Communities – <i>Native vegetation should not be cleared if it comprises the whole or a part of or is necessary for the maintenance of a Threatened Ecological Community (TEC).</i>		
<p>No TECs and no PEC's were recorded during the 2018 or 2021 field surveys nor are any likely to occur.</p>	<p>The additional clearing will not impact TECs or PECs as none were identified during surveys of the approved PPA and Expansion Survey Area.</p> <p>The proposed amendment is unlikely to be at variance with this principle.</p>	No change
Principle (e) Remnant Vegetation – <i>Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.</i>		
<p>Two broad vegetation associations (Wiluna 18 and Laverton 18) comprising Low woodland; mulga (<i>Acacia aneura</i>) were identified mapped by Stantec in 2018 and 2021 as occurring in the PPA and Expansion Survey Area, both are well represented in WA.</p>	<p>Additional clearing will not reduce the current extent of the remnant vegetation associations identified within the original PPA and Expansion Survey Area to below the 30% threshold where species loss increases as determined by the EPA (2000).</p> <p>The proposed amendment is unlikely to be at variance with this principle.</p>	No change
Principle (f) Watercourse or Wetland Environments – <i>Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.</i>		
<p>Assessments by Stantec in 2018 and 2022 identified:</p> <ul style="list-style-type: none"> • No permanent water features within the PPA or Expansion Survey Area. • Drainage line habitat representing less than 6% of Survey Expansion Area. The drainage lines are not considered regionally prominent. 	<p>Additional clearing will be minimised within and adjacent to drainage lines, with a minimum 50 m buffer applied to all watercourses.</p> <p>Standard drainage control strategies will be implemented so natural hydrological regimes are maintained via the construction of nominal bunds and allowing sheet flow to pass around infrastructure.</p>	No change

Evidence	Assessment Outcome	Status after amendment
<ul style="list-style-type: none"> The drainage line does not contain vegetation communities or species that are confined to watercourses or wetlands, nor are they groundwater dependant. 	<p>The proposed amendment may be at variance with this principle, but only if clearing occurs across these water courses.</p>	
<p>Principle (g) Land Degradation – <i>Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.</i></p>		
<p>Stantec identified the following within the PPA and Expansion Survey Area:</p> <ul style="list-style-type: none"> The surface layer of soil is typically comprised of sandy gravel, gravelly sand, or silty sand which may be prone to some structure decline and variable stability and may experience dispersion/erosion with wetting following disturbance. 30.65 ha of the approved PPA is recognised as having existing disturbance. The Expansion Survey Area is considered disturbed, with shallow, sandy and infertile soils overlaying siliceous hardpan. 	<p>Clearing up to 15 ha for the proposed expansion of renewable energy infrastructure within a boundary of up to 22 ha is unlikely to increase the soil erosion potential as the Expansion Survey Area is classified as 'Poor' to 'Degraded' (Stantec 2022) with low density of vegetation.</p> <p>Localised erosion will be managed during operations through diversion bunds, surface water controls and sedimentation controls to prevent heavy sediment loads in surface water flows.</p> <p>The proposed amendment is unlikely to be at variance with this principle.</p>	No change
<p>Principle (h) Conservation Estate – <i>Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.</i></p>		
<p>The PPA and Expansion Survey Area do not intersect any conservation estates.</p> <p>No ESAs were identified in proximity of the PPA and Expansion Survey Area. The closest is located approximately 56 km north of the PPA and 36 km north of the Expansion Survey Area (Stantec 2022).</p>	<p>No conservation estates areas are situated within or near the Expansion Survey Area.</p> <p>The proposed amendment is unlikely to be at variance with this principle.</p>	No change

Evidence	Assessment Outcome	Status after amendment
Principle (i) Surface and Groundwater Quality – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.		
<ul style="list-style-type: none"> • No permanent surface water features were observed. • Potential impacts to surface or groundwater quality that have the potential to occur as a result of the clearing include: • Sediment loss from disturbed areas. • Minor hydrocarbon spills. <p>Given that soils are hardpan, creeks are ephemeral and a 50 m buffer is applied to watercourses, the likelihood of spills and/or impacts to ground or surface water will be low.</p>	<p>Additional clearing and construction of the renewable energy infrastructure in the Expansion Survey Area is unlikely to impact drainage or surface water quality, as sediments will be controlled by implementing standard management procedures and engineering controls.</p> <p>Any spills will be controlled, contained and cleaned up and disposed appropriately.</p> <p>The proposed amendment is unlikely to be at variance with this principle.</p>	No change
Principle (j) Flooding Potential – <i>Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.</i>		
<p>The general topography of the area is very flat and site drainage is via a combination of sheet flow (with shallow flow depths and low velocities) and poorly defined drainage lines.</p>	<p>Clearing is unlikely to impact on drainage as existing drainage systems are in place and where required, surface water bunds and channels will be installed.</p> <p>The implementation of standard surface water management strategies will mitigate any likelihood of flooding.</p> <p>The proposed amendment is unlikely to be at variance with this principle.</p>	No change

4. MANAGEMENT MEASURES

AGMC will apply management measures to clearing activities within the PPA and the Expansion Survey Area to minimise the risk of impacts to flora and fauna and other environmental values.

As outlined in CPS 8248/1 Part II Management Conditions, AGMC will implement weed control measures to minimise the risk of the introduction and spread of weeds in accordance with the following:

- i. *clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;*
- ii. *ensure that no weed-affected soil, mulch, fill or other material is brought into the area to be cleared; and*
- iii. *restrict the movement of machines and other vehicles to the limits of the areas to be cleared.*

Weed hygiene measures will be in place to minimise the risk of spread or introduction of new weed species in line with GFA procedures including:

- Vehicle hygiene procedures will be implemented in accordance with AGM-ENV-PR001 Weed Management Procedure.
- Off-road vehicle use will be strictly controlled, with no driving permitted off designated routes.
- Disturbed areas will be minimised, and any areas of disturbance will be rehabilitated to avoid colonisation by weed species.
- Rehabilitation programs will include the use of provenance seeds, preferably sourced from the immediate area.
- All personnel will complete a site induction to reinforce awareness of the AGMC Weed Management Procedure to prevent the spread of weeds.

Clearing of up to 15 ha for the proposed expansion of the solar farm and energy storage infrastructure within a boundary 22 ha (adjacent to and north of the approved PPA) is unlikely to result in any changes to the assessment outcomes of impacts to environmental values (Table 1).

5. CONCLUSION

Assessment of the proposed additional clearing against the 10 Clearing Principles determined the proposed additional clearing is unlikely to be at variance with any of the Clearing Principles. This aligns with the assessment outcomes determined for the original assessment of CPS 8248/1.

6. REFERENCES

360 Environmental, 2019. Native Vegetation Clearing Permit Supporting Document. Prepared for Gold Fields Limited, 2 August 2019.

Bureau of Meteorology (BoM). 2021. *Monthly climate data statistics: Leinster Aero #12314*. Available at: www.bom.gov.au/climate/data. Accessed August 2019.

Stantec, A. 2018. Native Vegetation Clearing Permit Application Supporting Document.

Stantec, A. 2022. Agnew Renewable Energy Expansion: Reconnaissance Flora and Vegetation and Basic Fauna Survey.

APPENDIX 1: STANTEC 2018 - ALTERNATIVE POWER PROJECT NVCP SUPPORTING DOCUMENTATION



FLORA AND FAUNA SURVEY: AGNEW GOLD
MINE CAMP, POWER PLANT, AIRPORT, WIND
FARM AND PIPELINE

PREPARED FOR GOLD FIELDS AUSTRALIA PTY LTD

21 June 2018

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This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

QUALITY STATEMENT

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REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
V1.0	08/06/18	Draft for comment	SL & LT	AB	AB	PB
V2.0	21/06/18	Final Report	SL		SL	PB

Executive Summary

The Agnew Gold Mining Company Pty Ltd, a wholly owned subsidiary of Gold Fields Australia Pty Ltd, has appointed Stantec Australia Pty Ltd (Stantec) to complete a flora, vegetation and fauna assessment of six Project Survey Areas for the Agnew Gold Mine. The Study Area is located approximately 630 kilometres north-east of Perth and 26 kilometres south-west of Leinster. The six survey areas comprise:

- Pipeline Area 1 – a proposed 200 metre (m) wide buried gas pipeline corridor (116.18 ha);
- Pipeline Area 2 – two adjacent areas for proposed camp facilities in the eastern area of the Project, approximately 530 m long, between 50 m and 100 m wide (7.43 ha);
- Camp (63.15 ha);
- Wind Farm (210.41 ha);
- Power Station (23.69 ha); and
- Lawler's Airstrip (75.12 ha).

The assessment involved a Detailed flora and vegetation and Level 1 fauna survey for the Pipeline 1 PSA and a Reconnaissance flora and vegetation survey and Level 1 fauna survey for the remaining five PSA's. The field survey took place between the 8th and 14th of May 2018 and involved the sampling of 19 quadrats and four mapping notes across the Pipeline 1 PSA, as well as 16 relevés and six mapping notes across the remaining five PSA's.

A total of 121 flora taxa were identified from the Study Area, from 28 families and 58 genera, including three putative hybrids and one variant. The field survey confirmed the presence of two priority-listed flora: *Eremophila pungens* (Priority 4) and *Grevillea inconspicua* (Priority 4). Both of the priority-listed taxa were identified within the Pipeline 1 PSA.

A total of 23 vegetation types were identified in the Study Area, including seven in the Pipeline 1 PSA, one in the Pipeline 2 PSA, four in the Camp PSA, four in the Wind Farm PSA, two in the Power Station PSA and five in the Lawlers Airstrip PSA. None of the vegetation types are analogous to any listed Threatened or Priority Ecological Communities. The vegetation types occurring on the plains and low hills can generally be described as mixed mulga shrublands, of mostly *Acacia incurvaneura* and *Acacia aneura*, over a mixed shrubland layer comprised largely of *Eremophila* and *Senna* spp. over open tussock grassland. The vegetation occurring within ephemeral water courses and drainage lines were characterised by an upper canopy consisting of *Eucalyptus lucasii* and *Eucalyptus kingsmillii*.

The vegetation condition of the Study Area ranged from 'Excellent' to 'Completely Degraded'. Just over 10% of the Study Area was considered to be in 'Degraded' or 'Completely Degraded' condition as a result of historical disturbance, including ground disturbing activities such as borrow pits, tracks and exploration drilling. Weed diversity and density was low and none of the four introduced species recorded (**Bidens bipinnata*, **Malvastrum americanum*, **Cynodon dactylon* and **Citrus colocynthis*) represent a declared pest or Weed of National Significance. All four species were recorded within Lawlers Airstrip PSA.

Six fauna habitats were identified within the Study Area; shrubland, drainage line, rocky/outcropping, acacia over spinifex, open plain and cleared. Of these, rocky/outcropping was considered limited extent and rocky/outcropping and acacia over spinifex were considered to have the highest potential significance to fauna. This is owing to the limited extent of the complex and unique habitat provided by rocky outcrops, and the potential for these habitats to support conservation significant fauna possibly occurring within the Study Area. These include the Great Desert Skink (Vu, S3), Long-tailed Dunnart (P4) and Brush-tailed Mulgara (P4).

A total of 12 species of vertebrate fauna were recorded during the field survey, none of which were of conservation significance. Five species of conservation significance were considered to possibly occur based on habitat suitability, species range and previous records; the Brush-tailed Mulgara (P4), Long-tailed Dunnart (P4), Fork-tailed Swift (Mi S5), Peregrine Falcon (S7) and *Idiosoma clypeatum*, a trapdoor spider formerly recognised as *Idiosoma nigrum* (P3).

The flora, vegetation and fauna diversity was found to be consistent with the results of similar assessments completed in the general vicinity of the Study Area and to the habitats expected in the Murchison region.

Gold Fields Australia Pty Ltd

Flora and Fauna Survey: Agnew Gold Mine Camp, Power Plant, Airport, Wind Farm and Pipeline

CONTENTS

Executive Summary	i
1. Introduction	1
1.1 Project Background and Location	1
1.2 Report Scope and Objectives	1
2. Existing Environment	5
2.1 Climate	5
2.2 Landforms, Geology and Soils	6
2.3 Biogeographic Region	6
2.4 Land Systems	6
2.5 Pre-European Vegetation	9
2.6 Land Use and Conservation Reserves	13
3. Desktop Assessment	14
3.1 Database Searches	14
3.2 Literature Review	14
3.3 Likelihood of Occurrence of Flora and Fauna	19
4. Survey Methodology	19
4.1 Survey Timing	19
4.2 Survey Team and Licensing	20
4.3 Flora and Vegetation Assessment	20
4.4 Terrestrial Fauna Assessment	21
5. Results and Discussion	21
5.1 Survey Limitations and Constraints	21
5.2 Desktop Results	24
5.3 Flora	26
5.4 Vegetation	30
5.5 Terrestrial Fauna	56
6. Discussion	69
7. References	70

LIST OF TABLES

Table 2-1: Land systems and their extent within the Study Area	7
Table 2-2: Vegetation system associations and extent within the Study Area	10

Table 2-3: Extent of vegetation system associations remaining extent across four scales (State, Bioregion, Subregion and Local Government Area)	11
Table 3-1: Database searches conducted for the desktop assessment.....	14
Table 3-2: Key findings of flora and vegetation studies conducted within the vicinity of the Study Area	15
Table 3-3: Key findings of fauna studies conducted within the vicinity of the Study Area	17
Table 4-1: Survey effort across the Project Survey Areas	21
Table 5-1: Potential limitations and constraints of the field survey.....	22
Table 5-2: Fauna of conservation significance identified during the desktop assessment	25
Table 5-3: Flora of conservation concern identified in the Study Area.....	27
Table 5-4: Introduced flora taxa recorded from the Study Area	30
Table 5-5: Vegetation types recorded within the Pipeline 1 Survey Area	31
Table 5-6: Vegetation types recorded within the Pipeline 2 Survey Area	33
Table 5-7: Vegetation types recorded within the Camp Survey Area	34
Table 5-8: Vegetation types recorded within the Wind Farm Survey Area	36
Table 5-9: Vegetation types recorded within the Power Station Survey Area	38
Table 5-10: Vegetation types recorded within the Lawlers Airstrip Survey Area.....	39
Table 5-11: Vegetation condition extents across the Study Area	49
Table 5-12: Fauna habitats recorded within the Study Area	57
Table 5-13: Vertebrate fauna species recorded from the Study Area during the field survey	66
Table 5-14: Fauna of conservation significance potentially occurring within the Study Area	67

LIST OF FIGURES

Figure 1-1: Regional location of the Study Area	3
Figure 1-2: Project Survey Areas of the Study Area	4
Figure 2-1: Long-term climate data recorded at Leinster Aero station (012314, 1994 – 2018) (BoM 2018).	5
Figure 2-2: Land systems associated with the Study Area	8
Figure 2-3: Pre-European vegetation associations of the Study Area	12
Figure 4-1: Monthly rainfall data for six months prior to survey at Leinster Aero station (012314) (BoM 2018) 20	
Figure 5-1: Conservation Significant Flora Recorded within the Study Area	29
Figure 5-2: Vegetation Types of the Study Area – Pipeline 1	42
Figure 5-3: Vegetation Types of the Study Area – Pipeline 2	43
Figure 5-4: Vegetation types of the Study Area - Camp	44
Figure 5-5: Vegetation Types of the Study Area – Wind Farm.....	45
Figure 5-6: Vegetation Types of the Study Area – Power Station	46
Figure 5-7: Vegetation Types of the Study Area – Lawler's Airstrip	47
Figure 5-8: Vegetation Condition of the Study Area – Pipeline 1	50
Figure 5-9: Vegetation Condition of the Study Area – Pipeline 2.....	51
Figure 5-10: Vegetation Condition of the Study Area - Camp	52
Figure 5-11: Vegetation Condition of the Study Area – Wind Farm	53
Figure 5-12: Vegetation Condition of the Study Area – Power Station	54

Figure 5-13: Vegetation Condition of the Study Area – Lawlers Airstrip	55
Figure 5-14: Fauna habitats within the Camp Study Area.....	60
Figure 5-15: Fauna habitats within the Lawlers Airstrip Study Area	61
Figure 5-16: Fauna habitats within the Pipeline 1 Study Area	62
Figure 5-17: Fauna habitats within the Pipeline 2 Study Area	63
Figure 5-18: Fauna habitats within the Power Station Study Area.....	64
Figure 5-19: Fauna habitats within the Wind Farm Study Area	65

APPENDICES

Appendix A	Codes and Terms Used to Describe Species of Conservation Significance
Appendix B	Vegetation Condition Scale: Eremaean Province
Appendix C	Vegetation Structure Scale
Appendix D	Conservation Significant Flora Identified in the Desktop Assessment, and likelihood of occurrence within the Study Area
Appendix E	Vertebrate Fauna Identified in the Desktop Assessment
Appendix F	Inventory of Vascular Flora Recorded
Appendix G	Floristic Data - Flora Sampling Sites

1. Introduction

1.1 Project Background and Location

The Agnew Gold Mining Company Pty Ltd (AGMC) is a wholly owned subsidiary of Gold Fields Australia Pty Ltd (Gold Fields Australia). AGMC operate Agnew Gold Mine (the Project), located approximately 630 kilometres (km) northeast of Perth and 26 kilometres (km) southwest of Leinster (**Figure 1-1**). Stantec Australia Pty Ltd (Stantec) were commissioned by AGMC to document the flora and fauna values to inform project planning and environmental approvals processes for six Project Survey Areas (PSAs) (the Study Area) totalling approximately 495.92 hectares (ha) (**Figure 1-2**). These comprise of:

- Pipeline Area 1 – a proposed 200 metre (m) wide buried gas pipeline corridor, including an additional area that was identified by AGMC during the field survey and was incorporated into the Pipeline 1 PSA (116.18 ha);
- Pipeline Area 2 – two adjacent areas for proposed camp facilities in the eastern area of the Project, approximately 530 m long, between 50 m and 100 m wide (7.43ha);
- Camp – a proposed accommodation camp and waste water treatment facility (63.15 ha);
- Wind Farm (210.41 ha);
- Power Station (23.69 ha); and
- Lawler's Airstrip (75.12 ha).

A Detailed flora and vegetation and Level 1 fauna survey was undertaken for the Pipeline 1 PSA. For the remaining five PSAs a Reconnaissance flora and vegetation survey and Level 1 fauna survey was undertaken.

1.2 Report Scope and Objectives

The principal objectives of the Detailed flora and vegetation survey, the Reconnaissance flora and vegetation survey and the Level 1 fauna survey were to investigate and define the environmental values of the Study Area and to describe their conservation significance in relation to the Project. The specific scope is detailed below:

- complete a desktop review (database searches and literature review), to develop a list of flora and fauna species and vegetation communities that have been previously recorded in the vicinity of the Project, including species and communities with the potential to be of conservation significance;
- conduct a field survey to identify, describe and map vegetation units, vegetation condition and fauna habitats within the Study Area;
- conduct targeted searches for flora, vegetation communities and fauna of conservation significance, including species and communities of local and regional significance;
- develop a list of flora and fauna species recorded as occurring within the Project, including introduced flora and fauna species and
- assess the survey findings in a local and regional context by comparing them with available data from other localities within the bioregion.

The objectives and methods adopted for these surveys are aligned with the following relevant regulatory guidelines:

- Environmental Protection Authority (EPA) Factor Guideline (EPA 2016e), Environmental Factor Guideline: Flora and Vegetation;
- EPA Technical Guide (EPA 2016f), Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment;
- EPA Factor Guideline (EPA 2016a), Environmental Factor Guideline: Terrestrial Fauna;
- EPA Technical Guide (EPA 2016d), Technical Guidance – Terrestrial Fauna Surveys;

- EPA Factor Guideline (EPA 2016c), Sampling Methods for Terrestrial Vertebrate Fauna;
- Department of Environment Regulation (DER) (DER 2014), A guide to the assessment of applications to clear native vegetation; and
- Department of the Environment (DoE) (DoE 2013), Matters of National Environmental Significance - Significant Impact Guidelines 1.1 EPBC Act.

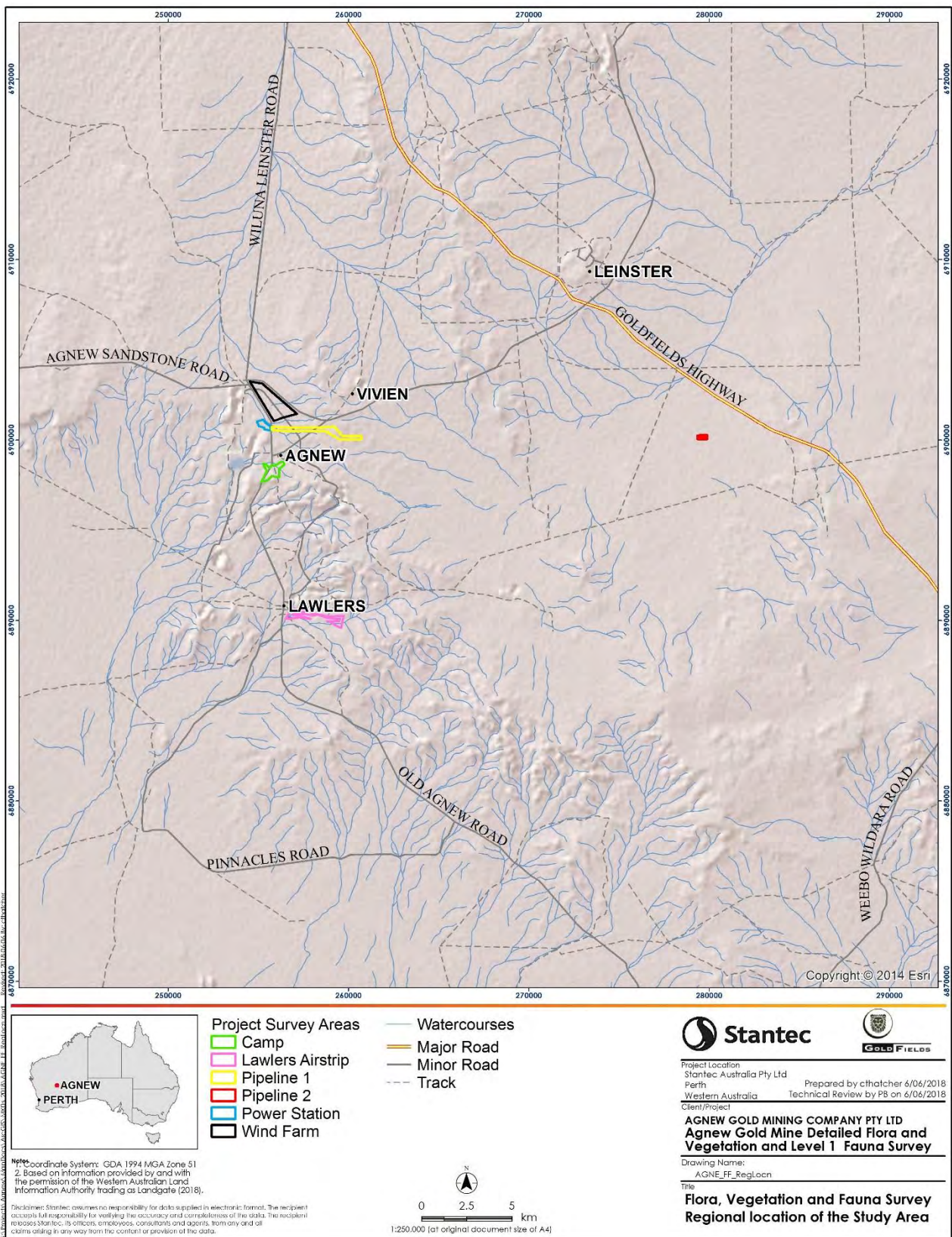


Figure 1-1: Regional location of the Study Area

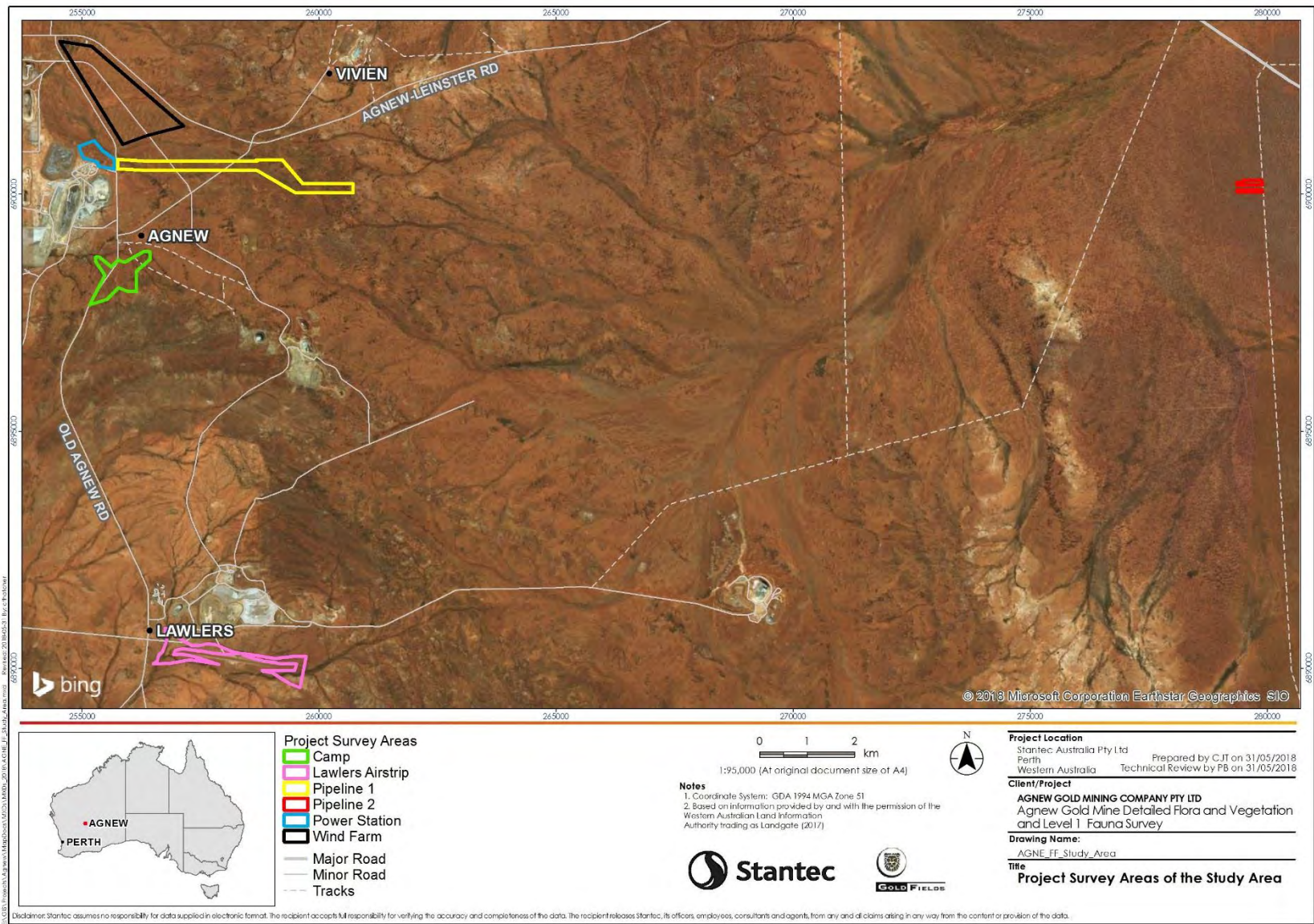


Figure 1-2: Project Survey Areas of the Study Area

2. Existing Environment

2.1 Climate

The Study Area is located within the Goldfields region of WA, which is classed as being arid to semi-arid, and is considered to be within the bioclimatic category of 'desert; summer and winter rainfall', where the months of the year are not reliably wet, zero rainfall can be recorded within any month and rainfall is typically erratic (Pringle et al. 1994).

The nearest Bureau of Meteorology (BOM) weather station to the Study Area, with relevant long-term and recent climatic data, is Leinster Aero weather station (012314), located approximately 23 km north east of the Study Area. The long-term annual rainfall is 266.2 millimetres (mm) (1994 to 2018), with the majority falling during the months of January to March (**Figure 2-1**). The hottest three months are December to February, with daily maximum temperatures regularly exceeding 30°C, whilst the coolest three months occur between June and August, with minimum temperatures frequently falling below 10°C (**Figure 2-1**) (BoM 2018).

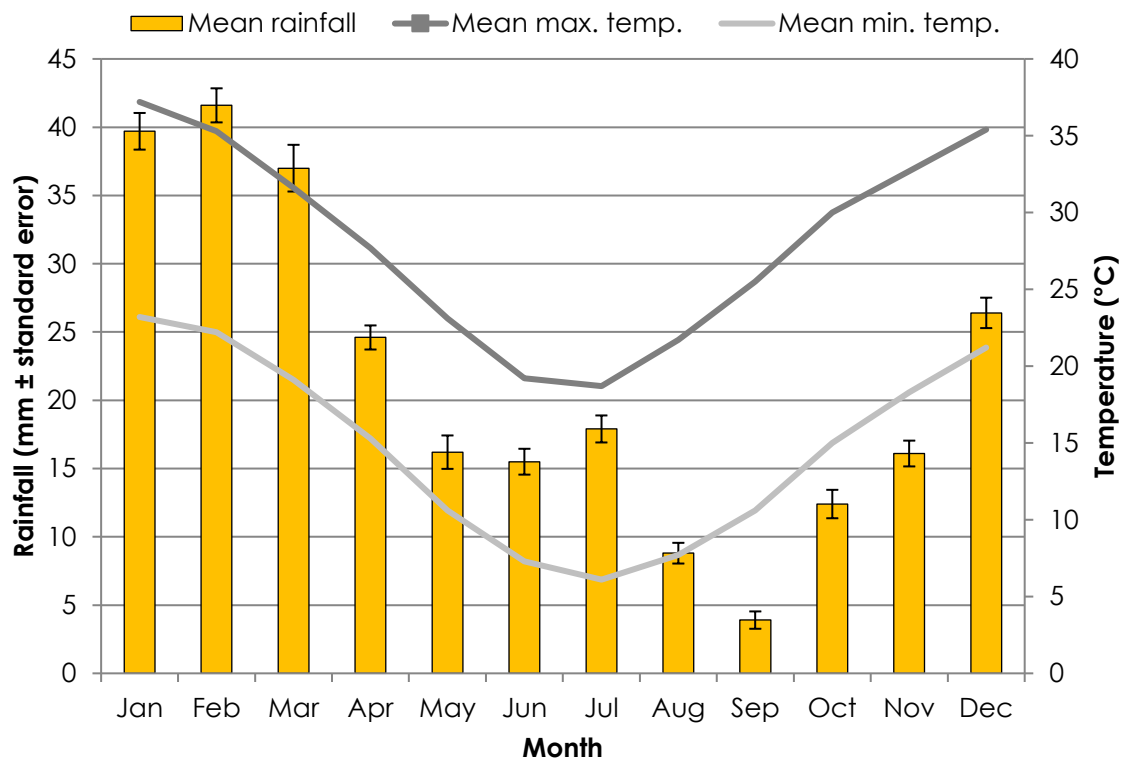


Figure 2-1: Long-term climate data recorded at Leinster Aero station (012314, 1994 – 2018) (BoM 2018).

2.2 Landforms, Geology and Soils

The geology of the Murchison region mainly consists of granite greenstone terrain of the Archean Yilgarn Craton, and is characterised by hill ranges separated by large flat colluvial and alluvial plains (Curry *et al.* 1994). Granitic rocks contain quartz veins and dolerite dykes (Tille 2006). The greenstone belts have a north-west orientation, become more common in the east Murchison, and tend to be associated with areas of gneiss (Tille 2006). Soils are typically shallow, sandy and infertile and lie over red-brown siliceous hardpan in lower areas of the Murchison (Curry *et al.* 1994). Tille (2006) describes soils according to:

- **Wash Plains:** red loamy earths and red-brown hardpan shallow loams with some red shallow loams. Red sandy earths and red deep sands occur on sandy banks.
- **Sandplains:** red sandy earths and red deep sands, with some red loamy earths and calcareous loamy earths occurring in low lying areas. Yellow deep sands occur in the south-west.
- **Mesas:** dominated by red shallow loam, red shallow sandy duplexes and red shallow sands with some stony soils and red/brown non-cracking clay.
- **Hilly terrain:** dominated by red shallow loams, stony soils and red shallow sands with some bare rock and red shallow sandy duplexes. Stony Plains are dominated by red shallow loams with red shallow sandy duplexes with red shallow sand on plains over granite. Red-brown hardpan shallow loams, calcareous loamy earths and red loamy earths are also present.
- **Valley floors:** mainly salt lake soils with some deep red sand with some red deep sandy duplexes, red/brown non-cracking clays, red shallow sandy duplexes and red-brown hardpan shallow loams mainly occurring on north-west floodplains. Calcareous shallow loams occur on calcrete platforms.

2.3 Biogeographic Region

The Interim Biogeographic Regionalisation for Australia (IBRA) is a bioregional framework that divides Australia into 89 biogeographic regions and 419 subregions on the basis of climate, geology, landforms, vegetation, and fauna (Thackway and Cresswell 1995). It was developed through collaboration between state and territory conservation agencies with coordination by the Commonwealth Department of the Environment, Water, Heritage and the Arts (now the Commonwealth Department of the Environment and Energy, DoEE).

The Study Area is located within the Eastern Murchison subregion (MUR1) of the Murchison bioregion, within the Eremaean Botanical Province of WA. The Murchison bioregion is characterised by low hills and mesas separated by flat colluvium and alluvial plains, and low mulga (*Acacia aneura* complex) woodlands. The MUR1 subregion comprises 7,847,996 ha, encompassing an internal drainage system and areas of extensive elevated red desert sand plains with reduced dune development, and broad plains of red-brown soils and breakaway complexes (Cowan *et al.* 2001). Most landscapes are dominated by mixed arid shrubland/scrubland, with few or no trees or perennial grasses, with shrubs apparently randomly scattered or loosely aggregated, and with large amounts of bare ground and shallow red soils exposed between the shrubs (Curry *et al.* 1994). Vegetation of the subregion is predominantly low mulga woodland over ephemeral species including hummock grasses, and saltbush and samphire shrublands. This subregion exhibits a rich and diverse suite of flora and fauna, although most species occur across wide ranging distributions encompassing adjacent subregions (Cowan *et al.* 2001).

2.4 Land Systems

Land systems are defined as an area or group of areas throughout which there is a recurring pattern of topography, soils and vegetation (Tille 2006). An assessment of land systems provides an indication of the occurrence and distribution of fauna habitats and vegetation within and surrounding the Study Area (Pringle *et al.* 1994). Land systems across the Murchison have been mapped by the Natural Resources Assessment Group of the Department of Primary Industries and Regional Development (formerly the Department of Agriculture). This mapping provides a comprehensive description of biophysical resources within the area (Pringle *et al.* 1994). The Study Area lies largely within the Tiger, Nubev, Bevon and Violet Land Systems, with minimal areas intersecting the Jundee and Bullimore Land Systems (**Table 2-1, Figure 2-2**).

Table 2-1: Land systems and their extent within the Study Area

Land System	Description	Land System Extent in Western Australia (ha)	Extent within Study Area (ha)	Proportion in Study Area (%)
Tiger Land System	Gravelly hardpan plains and sandy banks with mulga shrublands and wanderrie grasses.	2611111.26	242.98	0.009
Nubev Land System	Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga and bowgada shrublands and occasionally chenopod shrublands.	216500.24	128.87	0.060
Bevon Land System	Dominated by gentle stony and lateritic Plains and hills/ hillslopes on greenstone with <i>Acacia aneura</i> shrublands.	407741.27	28.00	0.007
Violet Land System	Undulating gravelly plains, low stony rises and minimal saline plains, dominated by mulga and bowgada shrubland with patchy halophyte shrublands.	94441.34	68.19	0.072
Jundee Land System	Largely hardpan/ stony plains and narrow drainage tracts with scattered <i>Acacia aneura</i> shrubland.	145674.26	0.60	0.000
Laverton Land System	Dominated by gentle hillslopes with scattered <i>Maireana sedifolia</i> , as well as low hills and ridges with minor outcrops and stony Mulga plains.	109873.46	19.85	0.018
Bullimore Land System	Mallee, Acacia, Spinifex Shrubland on sandplains, with infrequent low dunes and poorly developed drainage areas.	328646.24	7.43	0.002
Total	-	3913988.07	495.92	0.169

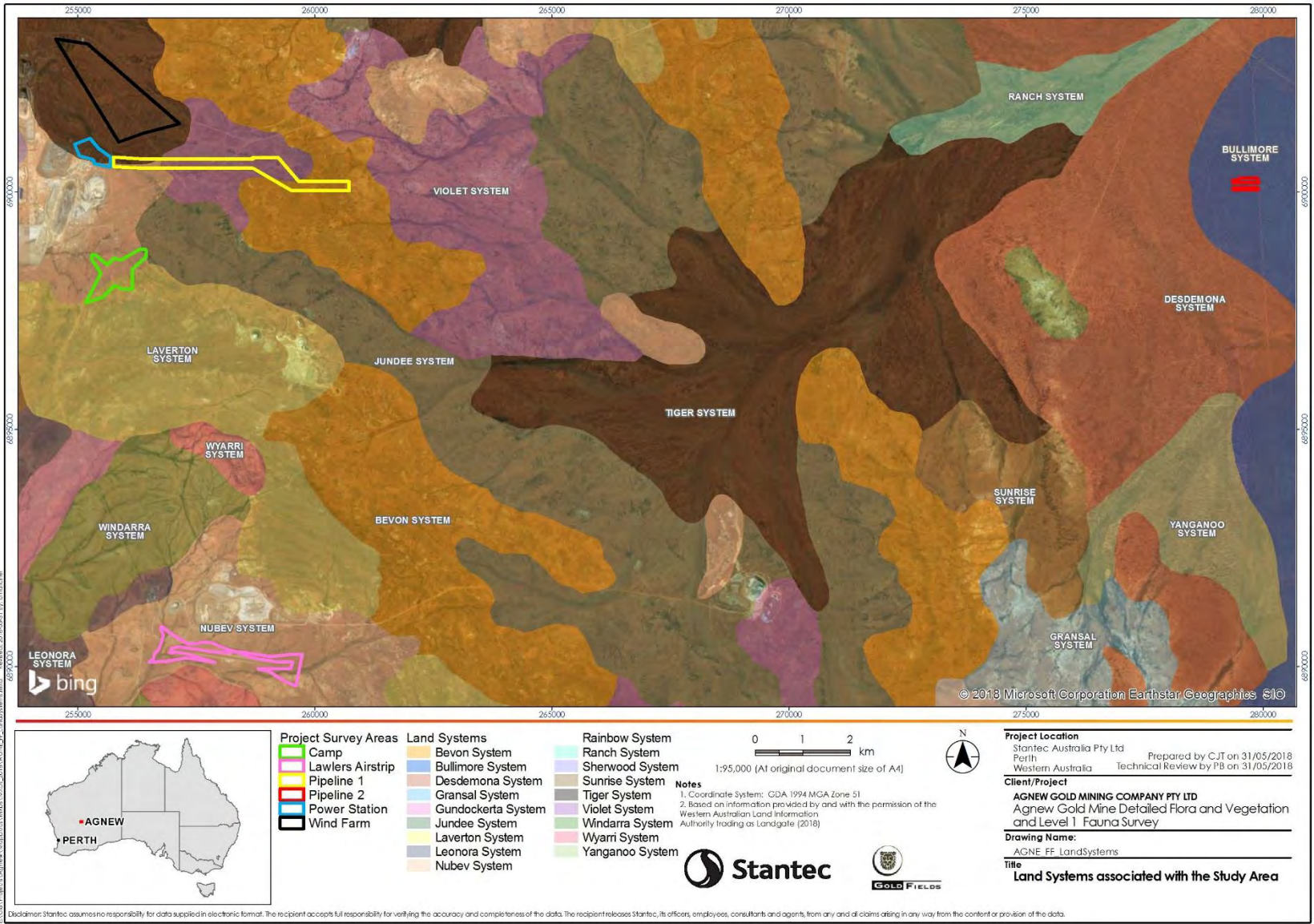


Figure 2-2: Land systems associated with the Study Area

2.5 Pre-European Vegetation

The vegetation of WA was mapped on a broad scale (1:1,000,000 and 1:250,000) by Beard (1975), who characterised and described a state wide mapping and vegetation classification system based on geographic, geological, soil, climate, structure, life form and vegetation characteristics. Beard's vegetation associations were re-assessed by Shepherd *et al.* (2002) to account for clearing in the intensive land use zone, and to divide some larger vegetation units into smaller units. Vegetation system associations described by Shepherd *et al.* (2002) correspond with that of Beard (1975). Five vegetation associations intersect the Study Area (**Table 2-2, Figure 2-3**). The current extent remaining of the pre-European extent of each vegetation association is presented in

Table 2-3 at state-wide to local government area (LGA) scales.

Table 2-2: Vegetation system associations and extent within the Study Area

System	System Code	Description	Extent within Study Area (ha)
Wiluna	18	Low woodland; mulga (<i>Acacia aneura</i>)	313.29
Laverton	18	Low woodland; mulga (<i>Acacia aneura</i>)	36.93
	28	Open low woodland; mulga	24.66
	39	Shrublands; mulga scrub	113.61
	109	Hummock grasslands, shrub steppe; <i>Eucalyptus youngiana</i> over hard spinifex	7.43
Total	-	-	495.92

Table 2-3: Extent of vegetation system associations remaining extent across four scales (State, Bioregion, Subregion and Local Government Area)

System	Scale	Pre-European Extent (ha)	Current Extent (ha)	Proportion Remaining (%)	Current extent within IUCN Class I-IV Reserves (ha)	Proportion of current extent protected within IUCN Class I-IV Reserves (%0
Wiluna 18	Statewide	4,308,335.74	4,290,594.35	99.59	45,238.20	1.05
	Bioregional (IBRA)	4,307,945.84	4,290,204.46	99.59	45,030.45	1.05
	Bioregional (IBRA sub-region)	4,273,509.56	4,256,038.03	99.59	45,030.45	1.06
	LGA	544,286.05	540,574.35	99.32	34,075.15	6.30
Laverton 18	Statewide	2,353,508.46	2,342,961.37	99.55	0	0
	Bioregional (IBRA)	2,349,882.23	2,339,335.14	99.55	0	0
	Bioregional (IBRA sub-region)	2,349,882.23	2,339,335.14	99.55	0	0
	LGA	1,220,057.18	1,216,592.19	99.72	0	0
Laverton 28	Statewide	133,739.72	131,531.31	98.35	0	0
	Bioregional (IBRA)	133,739.72	131,531.31	98.35	0	0
	Bioregional (IBRA sub-region)	133,739.72	131,531.31	98.35	0	0
	LGA	126,344.70	124,136.29	98.25	0	0
Laverton 39	Statewide	155,416.64	151,580.18	97.53	0	0
	Bioregional (IBRA)	155,416.64	151,580.18	97.53	0	0
	Bioregional (IBRA sub-region)	155,416.64	151,580.18	97.53	0	0
	LGA	141,819.94	138,361.04	97.56	0	0
Laverton 109	Statewide	153,184.64	152,223.38	99.37	0	0
	Bioregional (IBRA)	153,184.64	152,223.38	99.37	0	0
	Bioregional (IBRA sub-region)	153,184.64	152,223.38	99.37	0	0
	LGA	45,098.53	45,097.19	100.00	0	0

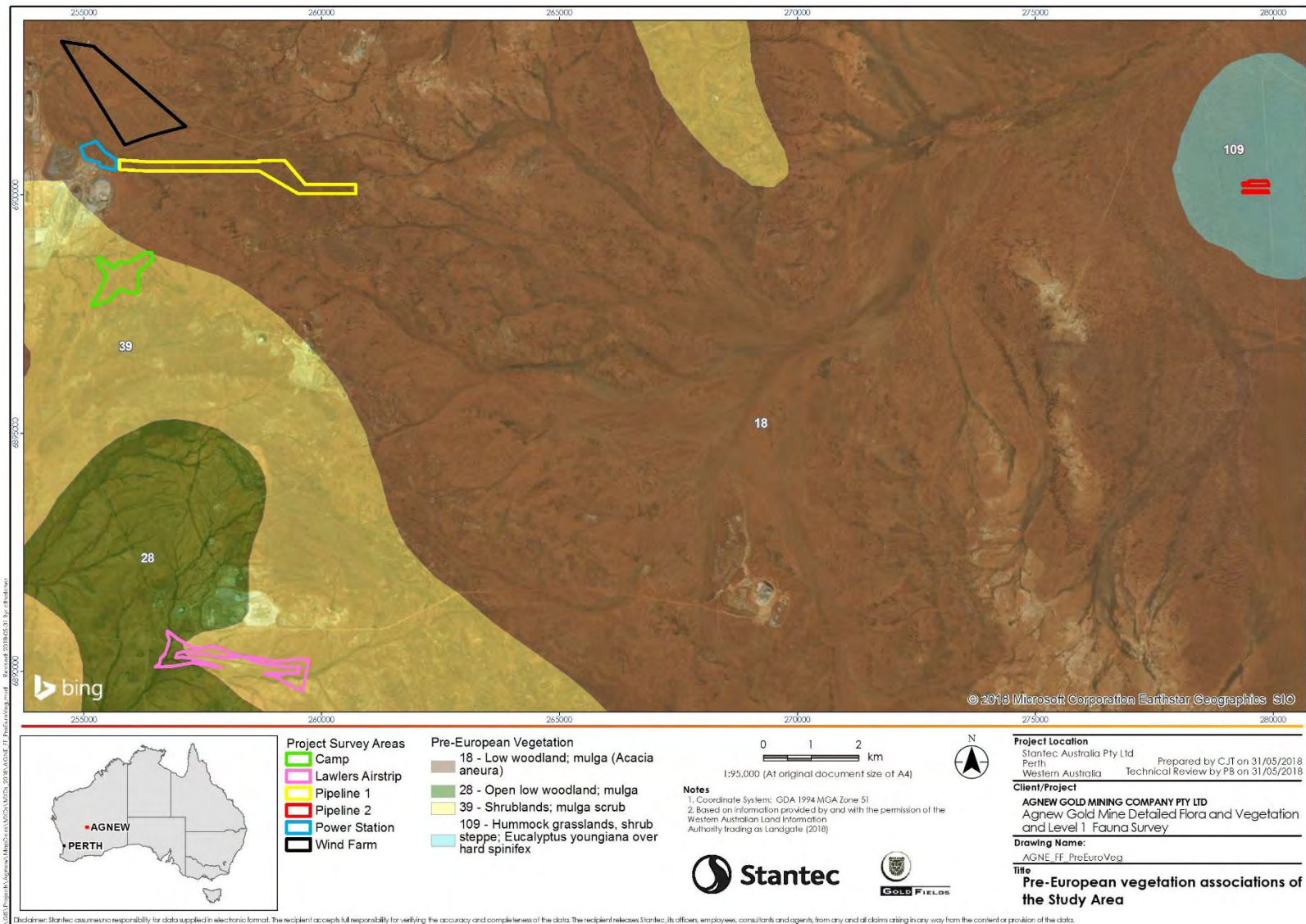


Figure 2-3: Pre-European vegetation associations of the Study Area

2.6 Land Use and Conservation Reserves

2.6.1 Land Use

The majority of land within the East Murchison is utilised for grazing (85.47%), with smaller areas comprising Unallocated Crown Land (UCL), Crown Reserves and mining leases (Cowan et al. 2001). Mining activity within the region is considerable and dominated by nickel and gold mining (Cowan et al. 2001, Water and Rivers Commission 1999). Most mining leases adhere to the pastoral land act, and are required to support stock (Cowan et al. 2001). The western section of the Study Area is located on the Leinster Downs Station.

2.6.2 Conservation Reserves and Environmentally Sensitive Areas

The Study Area does not intersect any conservation reserves listed by the Department of Biodiversity, Conservation and Attractions (DBCA) or the Parks and Wildlife Service. No Environmentally Sensitive Areas (ESAs) declared by the Minister for Environment under Section 51B of the EP Act are associated with the Study Area. The closest conservation reserve, which is classified as an ESA, is Wanjarri A Class Nature Reserve (R 30897), located approximately 56 km north of the Study Area. Wanjarri Nature Reserve covers an area of approximately 758 ha and largely comprises mulga and spinifex grasslands over a landscape dominated by undulating sandplains and dunes in addition to breakways and low granite hills (CALM 1996). The reserve represents an area of high conservation values of flora and fauna, and particularly for significant rangeland fauna, including the Striated Grasswren (P4), Brush-tailed Mulgara (P4), Peregrine Falcon (S7), Moriarty's Trapdoor Spider (P2), Malleefowl (Vu, S3), Great Desert Skink (S3, Vu) and Princess Parrot (P4, Vu) (DBCA 2018a). Several former leaseholds currently proposed for conservation are located within 100 km of the Study Area, the nearest being (ex) Bulga Downs, located approximately 46 km to the southwest.

3. Desktop Assessment

A desktop assessment, comprising database searches and a literature review, was undertaken prior to the field survey to gather contextual information on the Study Area. The purpose of the desktop assessment was to identify flora, vegetation and terrestrial fauna potentially occurring in the Study Area, in particular species of conservation significance. Conservation significance and conservation rankings used under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Biodiversity Conservation Act 2016* (BC Act), as well as by the DBCA, are defined in **Appendix A**.

3.1 Database Searches

Database searches were completed to generate a list of vascular flora, vegetation communities and vertebrate fauna previously recorded within, and in the vicinity of the Study Area, with an emphasis on species and communities of conservation significance and introduced species. Conservation codes for flora, fauna and ecological communities of conservation significance are provided in **Appendix A**. Six database searches were conducted from a central coordinate (51 J, 265862.43 m E, 6900093.39 m S) with appropriate search buffers selected for the technical capabilities of the databases and the ecological features of the area (**Table 3-1**).

Table 3-1: Database searches conducted for the desktop assessment

Custodian	Database	Ecological Group	Reference	Buffer (km)
DoEE	Protected Matters Search Tool (PMST)	Mattera of National Environmental Significance (MNES) flora and fauna	DoEE (2018a)	75
DBCA	NatureMap	Flora and fauna	(DBCA 2018a)	50 (flora); 75 (fauna)
DBCA	Threatened and Priority Ecological Communities	Vegetation communities	(DBCA 2018b)	50
DBCA	Threatened and Priority Flora (TPFL, TP, WAHerb) and Fauna	Flora and fauna	(DBCA 2018c) (DBCA 2018d)	50
Birdlife Australia	Birdlife Bird data	Fauna	(Birdlife Australia 2018)	75

Introduced flora species were compared to the Western Australian Organisms List (WAOL) (Department of Agriculture and Food WA (DAFWA)) to determine if any have been listed as declared pest and the Weeds of National Significance (WoNS) list. Categories of introduced flora are defined in **Appendix A**.

3.2 Literature Review

Background information on the Study Area and surrounds was compiled prior to conducting the field survey. Historic vegetation mapping (Beard 1975, Shepherd *et al.* 2002), soil and landform mapping and characteristics (Curry *et al.* 1994, Pringle *et al.* 1994, Tille 2006) and IBRA classification system information (Cowan *et al.* 2001, Thackway and Cresswell 1995) were reviewed to identify broad contextual information. The literature review also considered 15 previously completed surveys of relevance to the Study Area, comprising eight flora and vegetation surveys (**Table 3-2**) and seven terrestrial fauna surveys (**Table 3-3**). In addition, a targeted Night Parrot Survey of the Mount Keith Mine Site (~56km north of the Study Area) was included (Biota 2017a). The survey comprised 56 recording nights across nine sites and 9.7 hours of listening surveys within suitable habitat, however no evidence of the Night Parrot was recorded. Surveys were considered if they were publically available, recently conducted, and located within or in close proximity to the Study Area.

Table 3-2: Key findings of flora and vegetation studies conducted within the vicinity of the Study Area

Reference	Study Details	Proximity to Study Area	Vegetation Types	Flora Recorded	Vegetation Condition	Species and communities of conservation significance# (conservation status current at time of survey)
Astron (2012)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Detailed flora and vegetation survey <u>Survey Date:</u> October, 2012	Overlaps Study Area (intersects with Pipeline 1 PSA)	12 vegetation types described, comprising of: <ul style="list-style-type: none"> • <i>Acacia ?sibirica</i> low open woodland over <i>A. ?fuscaeneura</i> and <i>A. sp.</i> 'resinous margins' tall shrubland over <i>A. ?fuscaeneura</i> shrubland over <i>Aristida contorta</i> very open tussock grassland. • <i>Acacia ?fuscaeneura</i> and <i>A. quadrimarginea</i> tall open shrubland over <i>A. ?fuscaeneura</i> open shrubland over <i>Aristida contorta</i> open tussock grassland. • <i>Acacia ?fuscaeneura</i> (<i>A. caesaneura</i>) scattered low open woodland to scattered low trees over <i>A. ?fuscaeneura</i> tall open shrubland over <i>A. ?fuscaeneura</i>, <i>A. ?sibirica</i>, <i>A. ?macraneura</i>, and <i>Eremophila forrestii</i> subsp. <i>?forrestii</i> open shrubland <i>?Eriachne sp.</i> and <i>Aristida contorta</i> very open tussock grassland. • <i>Acacia ?macraneura</i> or <i>Acacia ?sibirica</i> low open woodland to scattered low trees to tall open shrubland to scattered tall trees over <i>A. ?macraneura</i>, <i>A. ?sibirica</i>, and <i>A. tetragonophylla</i> tall open shrubland over <i>Eremophila fraseri</i> subsp. <i>fraseri</i> open shrubland to scattered shrubs over <i>Aristida contorta</i> very open tussock grassland. • <i>Acacia ?fuscaeneura</i> low woodland over <i>Eremophila ?forrestii</i> scattered shrubs over <i>E. latrobei</i> subsp. <i>latrobei</i> scattered shrubs over <i>A. ?macraneura</i> and <i>A. sp.</i> 'resinous margins' open shrubland over <i>Aristida contorta</i> open tussock grassland. • <i>Acacia ?caesaneura</i> and <i>A. sp.</i> 'resinous margins' tall open shrubland over <i>A. ?sibirica</i> and <i>Eremophila forrestii</i> subsp. <i>?forrestii</i> open shrubland. • <i>Eucalyptus kingsmillii</i> scattered trees over <i>Acacia ?caesaneura</i> and <i>A. ?fuscaeneura</i> tall open shrubland over <i>Triodia basedowii</i> hummock grassland. 	<ul style="list-style-type: none"> • 57 species (and 5 that could only be identified to genus) • 36 genera • 18 families 	Excellent to Completely Degraded	None identified.
Onshore Environmental Consultants (2008b)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Detailed flora and vegetation survey <u>Survey Date:</u> February, 2008	Overlaps Study Area (intersects with Pipeline 1 and Wind Farm PSAs)	29 vegetation types described, grouped within broad habitat types. See Table 5-9 of Onshore Environmental Consultants (2008b).	<ul style="list-style-type: none"> • 136 species (including varieties and subspecies) • 65 genera • 31 families 	Excellent to Completely Degraded	<u>Taxa:</u> <ul style="list-style-type: none"> • <i>Thryptomene sp.</i> Leinster (B.J. Lepschi & L.A. Craven 4362) (P1); • <i>Baeckea sp.</i> Melita Station (H. Pringle 2738) (P3); • <i>Calytrix erosipetala</i> (P3); • <i>Hybanthus floribundus</i> subsp. <i>chloroxanthus</i> (P3); • <i>Eremophila pungens</i> (P4) and, • <i>Grevillea inconspicua</i> (P4).
Woodman Environmental Consulting (2006)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Flora and fauna review and gap analysis <u>Survey Date:</u> May, 2006	Overlaps Study Area (intersects with Pipeline 1 PSA)	<ul style="list-style-type: none"> • Mosaic of Low Forest to Open Low Woodland of <i>Acacia aneura</i> var. <i>?fuliginea</i> and <i>Acacia aneura</i> var. <i>aneura</i> over mixed shrub species on red sandy silt with exposed quartz and/or laterite; and Open Dwarf Scrub on red sandy silt with exposed laterite and/or quartz. • Low Forest to Open Woodland of <i>Acacia aneura</i> var. <i>aneura</i> over mixed shrubs dominated by <i>Eremophila spp.</i>, and grasses on red sandy silt with occasional lateritic gravel. • Low Woodland of <i>Acacia aneura</i> var. <i>aneura</i> and <i>Acacia ramulosa</i> var. <i>linophylla</i> over mixed shrubs on red clayey silt in a gully. • Low Woodland dominated by <i>Acacia spp.</i> on red clay in creeklines. • Open Scrub dominated by <i>Acacia aneura</i>, <i>Acacia quadrimarginea</i> and <i>Senna sp.</i> Meekatharra (E. Bailey 1-26) on red silt with laterite. • Low Scrub of mixed shrubs and grasses on red silty clay. <p>Low Grass of <i>Eriachne flaccida</i> and <i>Elytrophorus spicatus</i> over sedges and herbs on brown cracking clay in sumps.</p>	<ul style="list-style-type: none"> • 137 species • 35 families 	Excellent	<u>Taxa:</u> <ul style="list-style-type: none"> • <i>Baeckea sp.</i> Melita Station (H. Pringle 2738) (P3); • <i>Calytrix erosipetala</i> (P3) and, • <i>Grevillea inconspicua</i> (P4) was also located outside of survey area; not within survey period.
Jims Seeds Weeds and Trees (2004)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Level 1 flora and vegetation survey <u>Survey Date:</u> September, 2004	Overlaps Study Area (intersects with all PSAs except Pipeline 2)	8 broad vegetation types described, comprising of: <ul style="list-style-type: none"> • Granite Sand Flats. • Granite Outcrops. • Breakaways and Rises. • Mulga Flats. 	<ul style="list-style-type: none"> • 165 species • 86 genera • 49 families 	Not specified	<ul style="list-style-type: none"> • <i>Baeckea sp.</i> Melita Station (H. Pringle 2738) (P3); • <i>Eremophila pungens</i> (P4) and, • <i>Grevillea inconspicua</i> (P4).

Reference	Study Details	Proximity to Study Area	Vegetation Types	Flora Recorded	Vegetation Condition	Species and communities of conservation significance# (conservation status current at time of survey)
			<ul style="list-style-type: none"> Basalt Hills. Granite Creek Lines. Mulga Creek Lines. <i>Eucalyptus striatocalyx</i> Community. 			
Onshore Environmental Consultants (2008a)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Detailed flora and vegetation survey <u>Survey Date:</u> March-April, 2008	Adjacent to Study Area (small intersect with Camp PSA)	28 vegetation types described, grouped within broad habitat types. See Table 4-7 of Onshore Environmental Consultants (2008a).	<ul style="list-style-type: none"> 138 species (including varieties and subspecies) 37 families 59 genera 	Very Good to Completely Degraded	<u>Taxa:</u> <ul style="list-style-type: none"> <i>Hybanthus floribundus</i> subsp. <i>chloroxanthus</i> (P3) and, <i>Eremophila pungens</i> (P4).
Rapallo Environmental (2017a)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Level 1 flora, vegetation, and fauna survey <u>Survey Date:</u> September, 2016	0.8 km west and 10.2 km east of Study Area	47 vegetation types described across three PSAs. <ul style="list-style-type: none"> See Appendix 8 of Rapallo Environmental (2017a). 	<ul style="list-style-type: none"> 171 species 40 families 	Pristine to Degraded	<u>Taxa:</u> <ul style="list-style-type: none"> <i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (P3) (recorded 10.2 km from Lawlers Airstrip PSA); <i>Thryptomene</i> sp. Leinster (B.J. Lepschi & L.A. Craven 4362) (P3) (recorded 0.8 km from Power Station PSA) and, <i>Eremophila pungens</i> (P4) (recorded 0.8 km from Power Station PSA).
Jims Seeds Weeds and Trees (2006)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Flora and fauna review and gap analysis <u>Survey Date:</u> May, 2006	Adjacent to Study Area	Numerous vegetation types described in early work at the Agnew Gold Mine in previous surveys were summarised and presented. <ul style="list-style-type: none"> See Table 1-2 of (Jims Seeds Weeds and Trees 2006) 	<ul style="list-style-type: none"> 201 species 85 genera 38 families recorded to May, 2006 in previous surveys of Agnew Gold Mine leases		<u>Taxa:</u> <ul style="list-style-type: none"> <i>Calytrix erosipetala</i> (P3).
Minesite Rehabilitation Services (2003)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Detailed flora survey <u>Survey Date:</u> April, 2003	~14 km southwest of Study Area	<ul style="list-style-type: none"> Creek system comprised of <i>Eucalyptus camuldulensis</i> upper storey. Drainage flats comprised of <i>Eucalyptus camuldulensis</i> upper storey over <i>Acacia</i> tall shrubs over <i>Eremophila</i> mid shrubs. Gibber flats comprised of Mulga and associated taxa and <i>Acacia tetragonophylla</i> over <i>Eremophila</i> spp., <i>Grevillea berryana</i> over <i>Senna artemisioides</i> subsp. <i>×coriacea</i>, <i>Ptilotus obovatus</i>, <i>Solanum lasiophyllum</i> over <i>Eragrostis eriopoda</i>, <i>Rytidosperma caespitosum</i>, <i>Aristida contorta</i> grasses. Levee Bank Mulga and <i>Eremophila longiflora</i> tall shrubland over <i>Psyrax suaveolens</i>, <i>Eremophila compacta</i>, <i>Rhagodia eremaea</i> mid shrubs over <i>Senna artemisioides</i> subsp. <i>×artemisioides</i>, <i>Solanum lasiophyllum</i> low shrubs over <i>Eragrostis eriopoda</i>, <i>Aristida contorta</i>, <i>Monochather paradoxa</i> grassland. Mulga wash comprised of Mulga, <i>Eremophila oldfieldii</i>, <i>Grevillea berryana</i>, <i>Hakea lorea</i>, <i>Acacia grasbyi</i>, <i>Acacia tetragonophylla</i> over <i>Eremophila</i> spp. and <i>Acacia</i> spp. mid shrubland over <i>Eremophila</i> spp. and <i>Senna</i> spp. mid shrubland over <i>Eriachne flaccida</i>, <i>Eragrostis</i> spp., <i>Aristida contorta</i>, <i>Enneapogon caeruleus</i>, <i>Thyridolepis multiculmis</i> grassland. 	<ul style="list-style-type: none"> 120 species 54 genera 27 families 	Not specified	None identified.

#Several conservation significant taxa recorded in previous surveys which overlap or were conducted near the Study Area have subsequently de-listed and are currently not listed as conservation significant flora. These are: *Baeckea* sp. Melita Station (H. Pringle 2738), *Calytrix erosipetala*, and *Calytrix uncinata* (formerly Priority 3), and *Eucalyptus striatocalyx* (formerly Priority 1). Additionally, *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362), previously listed as Priority 1, has been reassessed as a Priority 3 taxon. For current conservation rankings see **Appendix D**.

Table 3-3: Key findings of fauna studies conducted within the vicinity of the Study Area

Reference	Study details	Proximity to Study Area	Fauna habitats	Fauna assemblages recorded	Species of conservation significance	
Astron (2012)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Level 1 <u>Survey Date:</u> October, 2012	Overlaps Study Area (intersects with Pipeline PSA)	<ul style="list-style-type: none"> Plain with <i>Acacia aneura</i> Open Woodland over Tussock Grassland Plain with <i>Acacia aneura</i> Groves over Hummock Grassland Breakaway/hill with Open <i>Acacia aneura</i> Woodland over Tussock Grassland 	<ul style="list-style-type: none"> 22 species 20 families 22 genera 	<ul style="list-style-type: none"> None identified. 	
(Rapallo Environmental 2017a)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Level 1 <u>Survey Date:</u> September, 2016	~1 km of Study Area	<p><u>Hidden Secret</u></p> <ul style="list-style-type: none"> Breakaway Plateau Breakaway Slope Minor Drainage Rocky Gully Stony Plain Chenopod Stony Plain Samphire Stony Plain Stony Rise Disturbed <p><u>Songvang</u></p> <ul style="list-style-type: none"> Mulga Shrubland on Drainage Open Mulga Shrubland Plain Sparse Mulga Shrubland/ Woodland on Stony Plain Sparse Mulga Shrubland/ Woodland on Minor Drainage Sparse Mulga Shrubland/ Woodland on Stony Rise 	<p><u>Leviathan</u></p> <ul style="list-style-type: none"> Open Mulga Woodland Sparse Mulga Shrubland over Chenopod Plain Open Mulga Drainage Open Tussock Grassland Plain Open Acacia Shrubland Open Acacia Shrubland over Saltbush on Drainage Sparse Acacia Shrubland on Drainage 	<ul style="list-style-type: none"> 46 species 28 families 37 genera 	<ul style="list-style-type: none"> None identified.
ENV (2008)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Level 2 <u>Survey Date:</u> April, 2008	~9 km southwest of Study Area	<ul style="list-style-type: none"> Hilltop Riverine Minor Drainage Line Alluvial Plain 	<ul style="list-style-type: none"> 62 species 36 families 54 genera 	<ul style="list-style-type: none"> None identified. 	
Minesite Rehabilitation Services (2003)	<u>Location:</u> Agnew Gold Mine <u>Study Type:</u> Level 1 <u>Survey Date:</u> April, 2003	~14 km southwest of Study Area	<ul style="list-style-type: none"> Creek System Drainage Flat Gibber Flats Levee Bank Mulga Wash Mulga Woodland Open Pit Open Woodland Rocky Hill 	<ul style="list-style-type: none"> 54 species 34 families 46 genera 	<ul style="list-style-type: none"> None identified. 	
(Biota 2017b)	<u>Location:</u> Mt Keith <u>Study Type:</u> Review of level 2 vertebrate fauna surveys <u>Survey Date:</u> 2005 – 2006	~56 km north of Study Area	<ul style="list-style-type: none"> Hills and Slopes, Sclerophyll Shrublands Undulating Plains, Sclerophyll Shrubland Drainage tract, Mulga Undulating Plains Grass Dominated Undulating Plains, Chenopod Shrublands Areas of Internal Drainage, Mulga Drainage Line, Eucalypt Shrubland/Woodlands Hills and Slopes, Chenopod Shrublands 	<ul style="list-style-type: none"> 130 species 48 families 90 genera 	<ul style="list-style-type: none"> Brush-tailed Mulgara (P4) and, Great Desert Skink (Vu, S3). 	
Craig and Chapman (2003)	<u>Location:</u> Wanarri Nature Reserve <u>Study Type:</u> Avifauna survey <u>Survey Date:</u> 30 August – 4 September 1994	~60 km northeast of Study Area	<ul style="list-style-type: none"> Mulga Grove and Creepline Open Mulga Spinifex Other, including Eucalyptus Riverbeds, Chenopod Flats, Stony Plains and Breakaways 	<ul style="list-style-type: none"> 36 species 20 families 28 genera 	None identified.	

Reference	Study details	Proximity to Study Area	Fauna habitats	Fauna assemblages recorded	Species of conservation significance
Bamford Consulting Ecologists (2011)	<u>Location</u> : Yeelirrie <u>Study Type</u> : Level 2 <u>Survey Date</u> : March, July and November 2009, May 2010	~110 km northwest of the Study Area	<ul style="list-style-type: none"> • Granite Outcrops and Breakaways • Scattered Shrubs over Spinifex Sandplain • Mulga Over Spinifex Sandplain • Acacia Woodland over Sparse Spinifex • Hardpan Mulga • Calcrete • Calcrete Outwash • Chenopod Shrubland over Sandplain 	<ul style="list-style-type: none"> • 159 species • 60 families • 112 genera 	<ul style="list-style-type: none"> • Brush-tailed Mulgara (P4); • Black-footed Rock-wallaby (En, S2 [secondary signs]); • Greater Long-eared Bat (P4); • Malleefowl (Vu, S3 [secondary signs]) and, • Peregrine Falcon (S7).

3.3 Likelihood of Occurrence of Flora and Fauna

The likelihood of occurrence of each species of conservation significant flora and vertebrate fauna in the Study Area was assessed and ranked. The rankings were assigned using the following definitions:

Confirmed – the presence of the species in the Study Area has been recorded unambiguously during the last ten years (i.e. during recent surveys of the Study Area or from reliable records obtained via database searches);

Very Likely – the Study Area lies within the known distribution of the species and is likely to contain suitable habitat(s), the species generally occurs in suitable habitat and has been recorded nearby within the last 20 years;

Likely – the Study Area lies within the known distribution of the species and the species has been recorded nearby within the last 20 years; however, either:

- the Study Area is likely to contain only a small area of suitable habitat, or habitat that is only marginally suitable; or
- the species is generally rare and patchily distributed in suitable habitat;

Possible – there is an outside chance of occurrence, because:

- the Study Area is just outside the known distribution of the species, but is likely to contain suitable and sufficient habitat (the species may be common, rare, or patchily distributed); or
- the Study Area lies within the known distribution of the species, but the species is very rare and/or patchily distributed; or
- the Study Area lies on the edge of, or within, the known distribution and is likely to contain suitable habitat, but the species has not been recorded in the area for over 20 years;

Unlikely – the Study Area lies outside the known distribution of the species, the Study Area is unlikely to contain suitable habitat, and the species has not been recorded in the area for over 20 years.

4. Survey Methodology

4.1 Survey Timing

The EPA (EPA 2016f) recommends that flora and vegetation surveys be undertaken following the season of highest rainfall to optimise the likelihood of encountering flowering and fruiting taxa and capturing ephemeral species. The recommended survey timing for the Eremaean botanical province, within which the Study Area lies, is six to eight weeks following the wet season (March to June). The field survey was undertaken between the 8th and 14th of May 2018, which falls within the recommended survey season for the region.

A total of 130 mm of rainfall was received at Leinster in the six months prior to field survey, 55.4 mm below the long term average of 185.4 mm for the same time period (**Figure 4-1**) (BoM 2018). The first significant rainfall event for the season occurred on 11 February 2018, three months prior to the field survey, with 34 mm of rainfall received (**Figure 4-1**).

The flowering periods for the majority of the conservation significant taxa from the database search results (**Appendix D**) fall outside of the March to June period; however, those considered 'Likely' to occur (see **Appendix D**) are identifiable vegetatively.

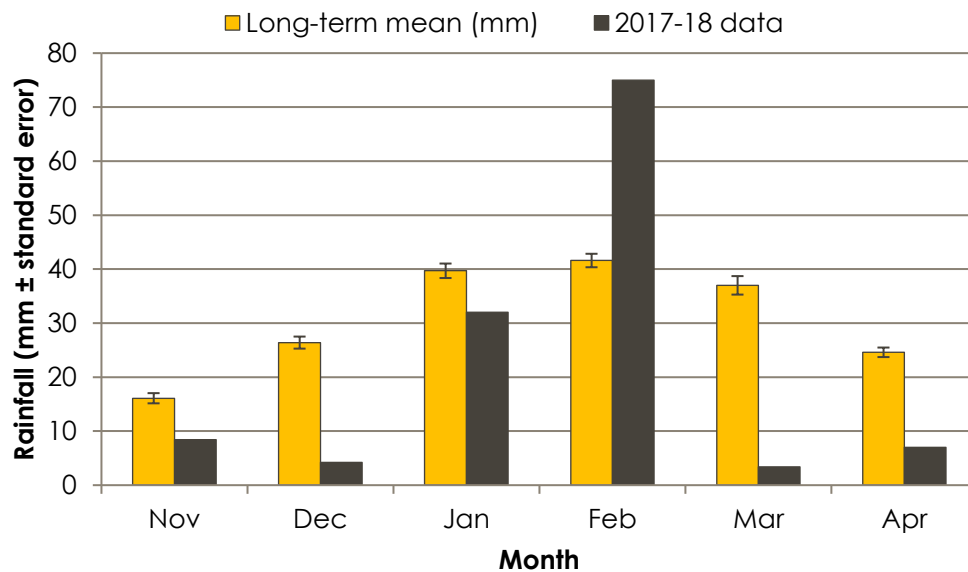


Figure 4-1: Monthly rainfall data for six months prior to survey at Leinster Aero station (012314) (BoM 2018)

4.2 Survey Team and Licensing

The field survey was undertaken by Stantec botanists Alice Bott and Laura True, who both have knowledge and experience in the Goldfields-Murchison Region, and experience in undertaking biological assessments throughout WA.

All plant collections were taken under flora collecting permit SL012377 pursuant to the WC Act (Section 23C and Section 23F). In addition, Alice holds a permit to take Declared Rare Flora (145A-1718) for herbarium identification purposes. Taxonomic identifications of the vascular flora specimens collected were undertaken at the WA Herbarium (WAH) by Stantec botanists Alice Bott, Crystal Heydenrych and Laura True.

4.3 Flora and Vegetation Assessment

Prior to the field survey, broad vegetation habitats were mapped on aerial imagery based on vegetation signatures and landscape features of the PSAs. Proposed quadrat (for Detailed flora and vegetation survey at Pipeline 1 PSA) and relevé (for Reconnaissance flora and vegetation surveys at all remaining PSAs) locations were identified prior to the field survey and according to the estimated number of vegetation types within the PSAs.

Quadrats were established by measuring a square of 20 m x 20 m (400 m²) and permanently marked with a galvanised steel fence dropper in the north-western corner. Relevés were sampled in an unbounded area and estimated to be approximately 400 m². The number of quadrats, relevés and mapping notes for each of the PSA's is represented in **Table 4-1** and the raw data is represented in **Appendix G**.

The following information was recorded at each quadrat and relevé:

- Quadrat/relevé number;
- Survey date;
- Personnel;
- GPS coordinates at north-west corner (GDA 94);
- Site photograph – taken from the north-west corner, facing south-east;
- Soil characteristics (texture and colour);
- Geology (type, size and nature of any rocks, stones, gravel, or outcropping);
- Topography (landform type and aspect);
- Vegetation condition (based on (Trudgen 1988); **Appendix B**);

- Vegetation structure description (based on ESCAVI 2003) (**Appendix C**);
- Details of disturbance (if present); and
- Approximate time since last fire.

Table 4-1: Survey effort across the Project Survey Areas

Project Survey Area	Survey Effort
Pipeline 1	19 Quadrats, 4 mapping notes
Pipeline 2	1 Relevé, 1 mapping note
Camp	3 Relevés, 4 mapping notes
Wind Farm	4 Relevés
Power Station	2 Relevés
Lawlers Airstrip	6 Relevés and 1 mapping note

All vascular flora taxa within each quadrat were recorded along with their corresponding height and percentage foliage cover (PFC).

4.3.1 Targeted Survey

Targeted searches were conducted for conservation significant flora identified from the desktop assessment (**Section 3**). Field personnel familiarised themselves with photographs, reference samples and descriptions of these taxa before the survey and actively searched for them in and around quadrats, relevés and while traversing the PSAs. Additionally, known locations or preferred habitat was also targeted. Given that populations of the Priority 4-listed species, *Grevillea inconspicua* and *Eremophila pungens*, had previously been identified in, and in close proximity to, the Pipeline 1 PSA, habitat suitable that support these taxon was specifically targeted. Where flora of conservation significance were identified a record was collected. The following information was collected for each population of conservation significant flora identified in the field:

- Location
- Population size;
- Density;
- Reproductive status

4.4 Terrestrial Fauna Assessment

Broad fauna habitat assessments were undertaken at the flora sampling locations. At each location, the following key habitat parameters were recorded:

- description of broad vegetation community;
- hollow bearing trees and dead stag trees (average size and abundance);
- presence of fauna refuges such as burrows;
- substrate (description of composition, presence of algal crust and percentage cover of leaf litter); and
- wetland habitats and water courses including drainage lines, sumplands, floodplains, etc.

The Study Area was traversed on foot with searches undertaken for fauna taxa of conservation significance and to develop a fauna species list for the Study Area.

5. Results and Discussion

5.1 Survey Limitations and Constraints

There are a number of possible limitations and constraints that can impinge on the adequacy of vegetation, flora and fauna surveys (DPaW 2016a, EPA 2016). These are summarised in **Table 5-1**, with respect to the survey of the Study Area.

Table 5-1: Potential limitations and constraints of the field survey

Factor	Constraint	Comments
Level and intensity of survey	No	The level and intensity of the survey met the requirements of appropriate guidelines (EPA 2016b). A dual method approach combining the techniques of both a Detailed and Reconnaissance flora and vegetation survey, and Level 1 Fauna survey, in addition to opportunistic sampling, was determined the most appropriate survey approach based on the condition and nature of the Study Area. A total of 19 quadrats, 16 relevés and nine mapping points were established and sampled across the Study Area. The intensity of the survey is considered to be adequate. The intensity of the fauna survey is considered adequate to compile a representative species list and describe and map the broad fauna habitats of the Study Area.
Scope	No	The scope And lora, vegetation, fauna and their habitats were surveyed using standardised and well-established techniques. Relevant databases and previous studies surrounding the Study Area were reviewed.
Competency/experience of the team carrying out the survey	No	The field personnel have appropriate qualifications and experience, with over 12 years' combined experience in biological assessments in WA.
Proportion of species identified	POTential minor	The field species richness is considered comparable to counts obtained during previous surveys of a similar size and scope and for the Murchison region (Section 14). It is possible that the timing of the survey (May) did not allow for all potential annual and ephemeral species to be identified, due to seasonal conditions preceding field survey. Of the specimens collected from the Study Area, 32 could not be identified to either genus, species or infraspecies level. All vertebrate fauna encountered were identified and habitats were assessed for their importance to vertebrate fauna and fauna of conservation significance.
Information sources (e.g. historic or recent)	No	Stantec has extensive experience in conducting surveys in the Murchison region and contextual information ((Thackway and Cresswell (1995), Pringle <i>et al.</i> (1994) and Beard (1975)) and previous studies (Section 14) were available for review during the assessment.
Proportion of task achieved, and further work which might be needed	No	Planned survey works were conducted and completed according to scope, with an additional area identified and incorporated into survey during the field visit.
Timing / weather / season / cycle	Potential minor	The field survey timing was in alignment with the guidance for surveys in the Eremaean province (EPA 2016b), as it took place during May. The months (February, March and April) preceding the may survey experienced below average rainfall. This did not place a significant limitation on the field survey, since all flora of conservation concern that had a likelihood of occurrence in the Study Area were identifiable from vegetative growth. A Level 1 fauna assessment was appropriate to identify the habitat and conservation significant fauna values of the Study Area.
Disturbances (e.g. fire, accidental human intervention)	No	Some of the Study Area (7.6ha) was mapped as 'cleared', owing to the presence of numerous tracks and borrow pits.

Factor	Constraint	Comments
Completeness	No	The survey was undertaken across six days and the Study Area is considered to have been adequately surveyed.
Resources	No	Resources were adequate to carry out the survey and the survey participants were competent in identification of species present. WAH specimens, taxonomic guides, and the FloraBase database were all used to prepare for the survey and for the identification of species.
Remoteness / access problems	No	All survey sites were easily accessible by vehicle and on foot.

5.2 Desktop Results

5.2.1 Flora

No species listed as Threatened have been recorded within 50 km of the Study Area (DBCA 2018c). Of the 29 Priority flora taxa returned from the database searches as occurring within 50 km of the Study Area, five are Priority 1, two are Priority 2, 19 are Priority 3 and three are Priority 4 (**Appendix D**).

The pre-survey likelihood of occurrence of these taxa within the Study Area was assessed based on the criteria detailed in **Section 3.3**.

The following priority flora taxa were identified in previous surveys of the Study Area and were considered as 'very likely' to occur: *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362) (P1), *Hybanthus floribundus* subsp. *chloroxanthus* (P3), *Eremophila pungens* (P4) and *Grevillea inconspicua* (P4).

5.2.2 Vegetation

No Threatened Ecological Communities (TEC's) were identified from the DBCA database search or the Department of the Environment and Energy's (DoEE) Protected Matters Database Search (DoEE 2018a) as occurring within or near to the Study Area. In addition, no terrestrial PECs were recorded within or in close proximity to the Study Area.

5.2.3 Terrestrial Fauna

The desktop study identified a total of 280 species of vertebrate fauna, which have been recorded and/or have the potential to occur within the Study Area (**Appendix E**). This total comprises 35 native mammal, nine introduced mammal, 156 native bird, two introduced bird, 69 native reptile, and nine native amphibian species. Many of these species are unlikely to occur in the Study Area because, as leading practice, these records have been collected from a large area encompassing a wide range of habitats, many of which do not occur within the Study Area. Furthermore, some small, common, ground-dwelling reptile and mammal species tend to be patchily distributed even where appropriate habitats are present, and many species of bird can occur as regular migrants, occasional visitors or vagrants.

Of the 280 species of vertebrate fauna identified during the desktop, 28 species are listed as conservation significant taxa, comprising eight mammals, 19 birds and one reptile (**Table 5-2**). Additionally, two conservation significant invertebrate species were identified; Moriarty's trapdoor spider (*Kwonkan moriartii*) and *Idiosoma clypeatum* (formerly considered analogous with the Shield-back Spider, *Idiosoma nigrum*).

Table 5-2: Fauna of conservation significance identified during the desktop assessment

Species	Common Name	Conservation Status	
		EPBC	WA
<i>Dasyercus blythi</i>	Brush-tailed Mulgara		P4
<i>Dasyercus cristicauda</i>	Crest-tailed Mulgara	Vu	P4
<i>Dasyurus geoffroii</i>	Chuditch	Vu	S3
<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart		P4
<i>Macrotis lagotis</i>	Bilby	Vu	S3
<i>Bettongia lesueur graii</i>	Burrowing Bettong	Ex	S4
<i>Petrogale lateralis lateralis</i>	Black-footed Rock-wallaby	En	S2
<i>Nyctophilus major tor</i>	Greater Long-eared Bat		P4
<i>Leipoa ocellata</i>	Malleefowl	Vu	S3
<i>Calonectris leucomelas</i>	Streaked Shearwater	Mi	S5
<i>Charadrius veredus</i>	Oriental Plover	Mi	S5
<i>Pluvialis fulva</i>	Pacific Golden Plover	Mi	S5
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi	S5
<i>Calidris canutus</i>	Red Knot	En; Mi	S5
<i>Calidris ferruginea</i>	Curler Sandpiper	Cr; Mi	S3; S5
<i>Calidris melanotos</i>	Pectoral Sandpiper	Mi	S5
<i>Tringa glareola</i>	Wood Sandpiper	Mi	S5
<i>Tringa hypoleucos</i>	Common Sandpiper	Mi	S5
<i>Tringa nebularia</i>	Common Greenshank	Mi	S5
<i>Sterna nilotica</i>	Gull-billed Tern	Mi	S5
<i>Apus pacificus</i>	Fork-tailed Swift	Mi	S5
<i>Falco peregrinus</i>	Peregrine Falcon		S7
<i>Pezoporus occidentalis</i>	Night Parrot	En	S1
<i>Polytelis alexandrae</i>	Princess Parrot	Vu	P4
<i>Amytornis striatus striatus</i>	Striated Grasswren		P4
<i>Motacilla cinerea</i>	Grey Wagtail	Mi	S5
<i>Motacilla flava</i>	Yellow Wagtail	Mi	S5
<i>Liopholis kintorei</i>	Great Desert Skink	Vu	S3
<i>Kwonkan moriartii</i>	Moriarty's trapdoor spider		P2
<i>Idiosoma clypeatum*</i>			P3

*Formerly the Shield-back Spider, *Idiosoma nigrum*

5.3 Flora

5.3.1 Floristic Composition

A total of 121 flora taxa were identified from the Study Area, from 28 families and 58 genera¹, including three putative hybrids and one variant. Of the 121 flora taxa recorded, 32 could not confidently be identified to genus, species or infraspecies level due to lack of characteristic features including fruit and flowers. The most represented families were Fabaceae (25), Poaceae (16), Scrophulariaceae (12) and Chenopodiaceae (12) and the most represented genera were Acacia (17), Eremophila (12), Senna (7) and Maireana (5). Four introduced taxa were identified, as detailed in **Section 5.3.3**.

Seventeen of the identified flora taxa belong to the Acacia genus, 11 of which are part of the Western Australia Mulga Flora Group (*Acacia aneura* F.Muell. ex Benth. and its close relatives) (Maslin and Reid 2012). The Mulga association is predominant in the mid to upper shrub strata of the Mulga shrublands of the Murchison region. These shrublands typically consist of a tall shrub layer of *Acacia aneura* and its close relatives over undershrubs (typically *Senna* spp. and/or *Eremophila* spp.), sparse perennial and annual grasses and a ground layer of ephemeral herbs, which may be closed in a favourable season (Beard 1990).

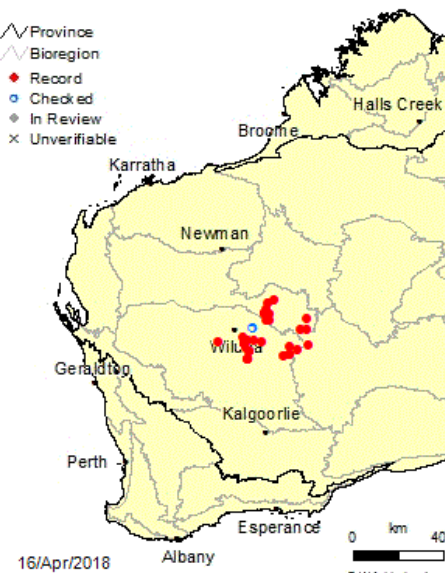

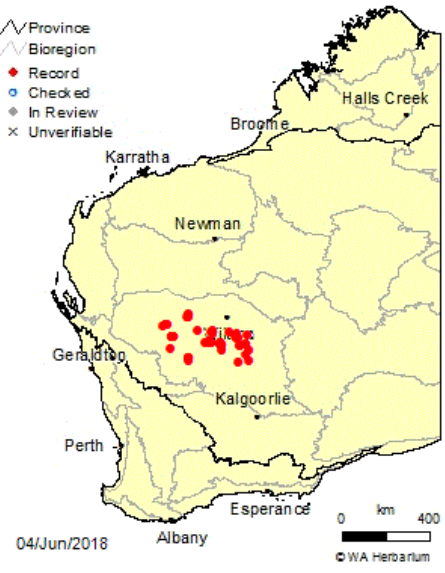

5.3.1 Flora of Conservation Significance

The field survey confirmed the presence of two priority-listed taxa: *Eremophila pungens* (P4) and *Grevillea inconspicua* (P4) (**Table 5-3**). **Figure 5-1** represents the number of individuals counted of both *E. pungens* and *G. inconspicua* in the Study Area. *E. pungens* is an erect, viscid shrub, 0.5-1.5m tall, and is restricted to stony slopes of hills and breakaways east of Wiluna to the edge of the Great Victoria Desert and south to Bandy Station (Chinnock 2007). It is distinguished from similar species due to its distinct rigid, erect, leaves that terminate in well-developed spines. *E. pungens* was identified from vegetative collections from the Study Area and was not in flower at the time that the flora field survey was completed. This taxon is typically found on plains, ridges and breakaways on sandy loam and clayey sand soils, associated with *Acacia pruinocarpa*, *Acacia aneura* and *Acacia tetragonophylla* (DBCWA 2018c). This taxon was recorded from within the Pipeline 1 PSA growing in association with vegetation type Aspp.EoaDrSsPoAc (**Figure 5-2**).

Grevillea inconspicua is an intricately branched, spreading shrub that grows 0.6-2 m high and has white/pink-white flowers (WAH 2018). It is typically found along drainage lines on rocky outcrops, creeklines. It was found on the edge of lateritic ridges and breakaways during the field survey in the Pipeline 1 PSA growing in association with vegetation type AqAsppC?dEffAc (**Table 5-5, Figure 5-2**).

¹ Eight taxa could not be confidently identified to genus level.

Table 5-3: Flora of conservation concern identified in the Study Area

Taxon	Distribution in WA	Photograph
<p><i>Eremophila pungens</i> (P4)</p> <p><u>Flowering time:</u> Jun-Oct.</p>	<p><i>Eremophila pungens</i></p> 	
<p><i>Grevillea inconspicua</i> (P4)</p>	<p><i>Grevillea inconspicua</i></p> 	

References: Distribution maps obtained from Western Australian Herbarium, Department of Biodiversity, Conservation and Attractions (<https://florabase.dpaw.wa.gov.au/help/copyright>)

5.3.1.1 Flora of Other Significance

The (EPA 2016b) advises that flora species, subspecies, varieties, hybrids and ecotypes may be considered significant for reasons other than listing as a Threatened or Priority Flora taxa, and may include the following:

- a keystone role in a particular habitat for Threatened taxa, or supporting large populations representing a significant proportion of the local regional population of a species;
- relic status;

- anomalous features that indicate a potential new discovery;
- being representative of the range of a species (particularly at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- the presence of restricted subspecies, varieties, or naturally occurring hybrids;
- local endemism/a restricted distribution; and/or
- being poorly reserved.

Based on these parameters, none of the native vascular flora taxa recorded from the Study Area are of "other" significance. The native vascular flora taxa recorded from the Study Area are represented in the local and regional area and no unique or unusual taxa were recorded.

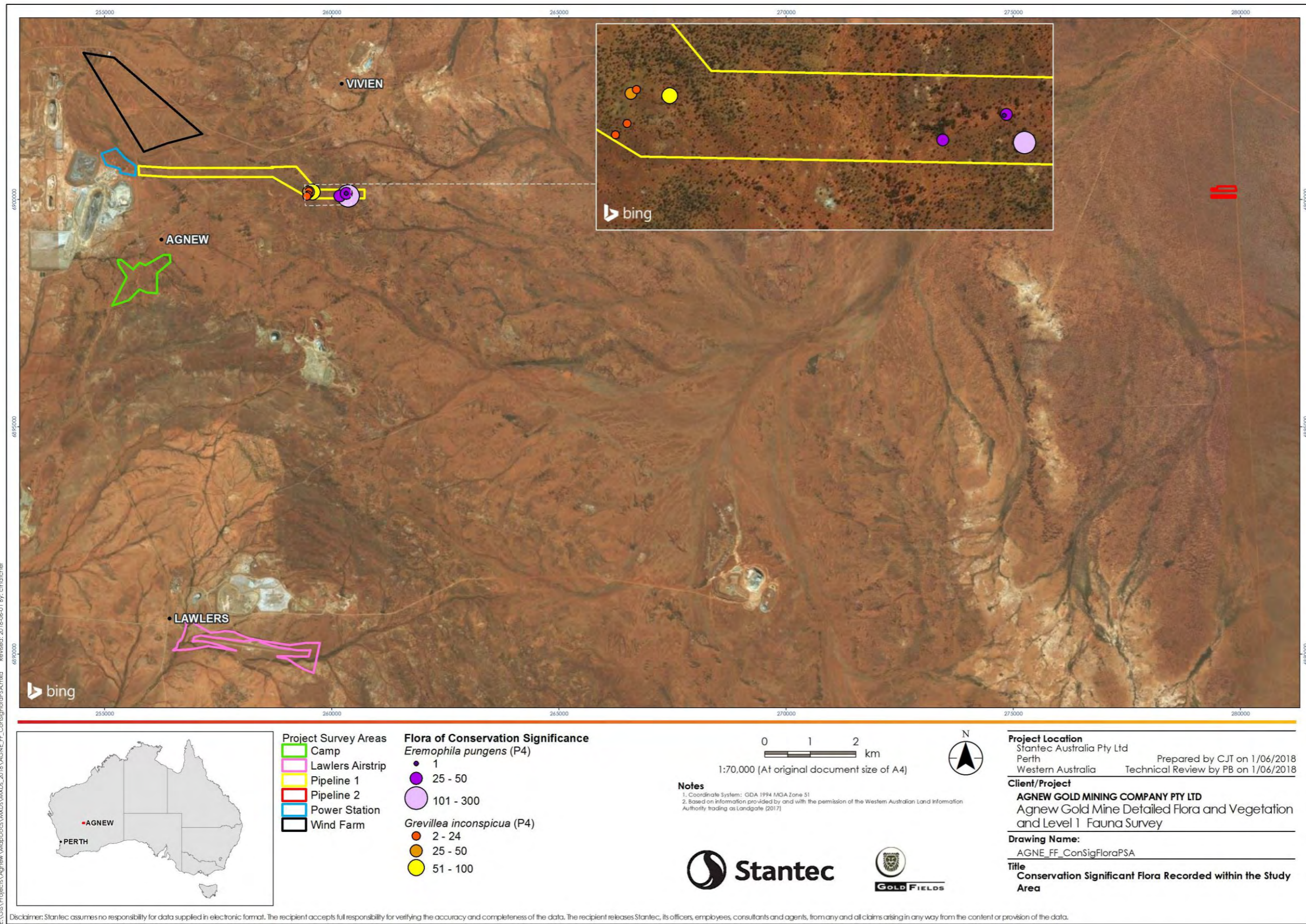


Figure 5-1: Conservation Significant Flora Recorded within the Study Area

5.3.2 Post-survey Likelihood of Occurrence of Conservation Significant Flora

Following the field survey, with a greater understanding of the habitat types that occur within the Study Area, four taxa are 'very likely' to occur within the Study Area, *Baeckea* sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963) (P3), *Hybanthus floribundus* subsp. *chloroxanthus* (P3), *Thryptomene* sp. Leinster (B.J. Lepschi & L.A. Craven 4362) (P4) and *Verticordia jamesonii* (P3) but were not recorded during the field survey (**Appendix D**). Each of these taxa represent erect shrubs growing to over half a metre tall and if present, may have been detected from vegetative growth. The field survey took place outside of the flowering time for each of these taxa, however, and juvenile individuals may have gone unnoticed. All four species have previously been recorded within 10 km of the Study Area and suitable habitat for these species was identified. In addition, seven taxa were listed as 'likely' to occur and one taxon was assessed as 'possible' to occur in the Study Area. If present, none of these species would be restricted to the Study Area, as indicated by the vouchers records listed with the WAH (WAH 2018).

5.3.3 Introduced Flora

Four introduced flora taxa were recorded within the Study Area (**Table 5-4**), none of which are considered to be a declared pests listed under Section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM Act) or to be a WoNS identified by the Commonwealth Government. All four of the introduced taxa were identified in disturbed areas of the Lawlers Airstrip PSA.

Table 5-4: Introduced flora taxa recorded from the Study Area

Scientific Name	Common Name
* <i>Bidens bipinnata</i>	Bipinnate Beggartick
* <i>Citrullus colocynthis</i>	Wild watermelon
* <i>Cynodon dactylon</i>	Couch Grass
* <i>Malvastrum americanum</i>	Spiked Malvastrum

5.4 Vegetation




5.4.1 Vegetation Types




A total of 23 vegetation types identified in the Study Area, including seven in the Pipeline 1 PSA (**Table 5-5; Figure 5-2**), one in the Pipeline 2 PSA (**Table 5-6, Figure 5-3**), four in the Camp PSA (**Table 5-7, Figure 5-4**), four in the Wind Farm PSA (**Table 5-8, Figure 5-5**), two in the Power Station PSA and five in the Lawlers Airstrip PSA (**Table 5-10, Figure 5-6**). The proportion of vegetation types recorded within each PSA is listed in Tables **Table 5-5** to **Table 5-10** below, along with the proportion of the vegetation types in relation to the Study Area.


The most extensive vegetation type was AaAiEsEffEeMp, identified in the Wind Farm Survey Area, occupying just under 30% of the total Study Area. Further to this, the AiAspp.AsEfEeEm vegetation type in Pipeline Survey Area 1 comprised just over 10% of the entire Study Area.

The vegetation types occurring on the plains and low hills can generally be described as mixed mulga shrublands, of mostly *Acacia incurvaneura* and *Acacia aneura*, over a mixed shrubland layer comprised largely of *Eremophila* and *Senna* spp. over open tussock grassland. The vegetation occurring within ephemeral water courses and drainage lines were characterised by an upper canopy consisting of *Eucalyptus lucasii* and *Eucalyptus kingsmillii*.

Table 5-5: Vegetation types recorded within the Pipeline 1 Survey Area


Code	Vegetation Description & Associated Species	Quadrats, Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
AqAsppC?dEffAc	<p><u>Vegetation description:</u> <i>Acacia quadrimarginea</i> open shrubland to tall shrubland over <i>A. sibirica</i>, <i>A. ayersiana</i> (narrow phyllode variant) and <i>A. ramulosa</i> subsp. <i>ramulosa</i> open shrubland over <i>Calytrix ?desolata</i> and <i>Eremophila forrestii</i> subsp. <i>forrestii</i> open low shrubland over <i>Aristida contorta</i> very open tussock grassland.</p> <p><u>Associated species:</u> <i>Acacia aneura</i>, <i>Acacia tetragonophylla</i>, <i>Eremophila ?exillifolia</i>, <i>Eremophila fraseri</i> subsp. <i>fraseri</i>, <i>Eremophila latrobei</i> subsp. <i>?latrobei</i>, <i>Senna</i> sp. Meekatharra (E. Bailey 1-26), <i>Grevillea inconspicua</i> (P4), <i>Scaevola spinescens</i>, <i>Dodonaea rigida</i>, <i>Solanum lasiophyllum</i>, <i>Ptilotus obovatus</i>, <i>Eragrostis eriopoda</i> and <i>Eriachne mucronata</i>.</p>	Pi-Q-03 Pi-Q-12 Pi-Q-19	6.42	5.52	1.29	
AiAspp.AsEfEeEm	<p><u>Vegetation description:</u> <i>Acacia incurvaneura</i> (<i>A. craspedocarpa</i> (hybrid) and <i>A. caesaneura</i>) tall shrubland over <i>A. sibirica</i> open shrubland to shrubland over <i>Eremophila forrestii</i> low shrubland over <i>Eragrostis eriopoda</i> and <i>Eriachne mucronata</i> open tussock grassland.</p> <p><u>Associated species:</u> <i>Eremophila forrestii</i> subsp. <i>?forrestii</i>, <i>Eremophila latrobei</i> subsp. <i>?latrobei</i>, <i>Eremophila spectabilis</i>, <i>Solanum lasiophyllum</i> and <i>Monachather paradoxus</i>.</p>	Pi-MN-01 Pi-Q-04 Pi-Q-05 Pi-Q-06	49.73	42.80	10.03	
Aspp.EoaDrSsPoAc	<p><u>Vegetation description:</u> <i>Acacia quadrimarginea</i>, <i>A. aneura</i>, <i>A. macraneura</i> and <i>A. burkittii</i> tall open shrubland to tall shrubland over <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>, <i>Dodonaea rigida</i> and <i>Scaevola spinescens</i> open shrubland over <i>Ptilotus obovatus</i> low open shrubland over <i>Aristida contorta</i> very open tussock grassland.</p> <p><u>Associated species:</u> <i>Acacia incurvaneura</i>, <i>Santalum lanceolatum</i>, <i>Eremophila latrobei</i> subsp. <i>?latrobei</i>, <i>Sida ectogama</i>, <i>Solanum lasiophyllum</i>, <i>?Enchylaeana tomentosa</i>, <i>Maireana ?tomentosa</i>, <i>Maireana tritera</i>, <i>Ptilotus schwartzii</i>, <i>Eragrostis eriopoda</i> and <i>Eriachne mucronata</i>.</p>	Pi-Q-13 Pi-Q-14 Pi-Q-15	9.45	8.13	1.91	

Code	Vegetation Description & Associated Species	Quadrats, Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
AiEspP.SsMPsEm	<p><u>Vegetation description:</u> <i>Acacia incurvaneura</i> tall open shrubland over <i>Eremophila fraseri</i> subsp. <i>?fraseri</i>, <i>Senna</i> sp. Meekatharra, <i>E. latrobei</i> subsp. <i>?latrobei</i>, <i>Ptilotus schwartzii</i> and <i>E. ?margarethae</i> open shrubland over <i>Eriachne mucronata</i> very open tussock grassland.</p> <p><u>Associated species:</u> <i>Acacia aneura</i>, <i>Acacia caesaneura</i>, <i>Acacia quadrimarginea</i>, <i>Solanum lasiophyllum</i>, <i>Sida ectogama</i>, <i>Ptilotus obovatus</i>, <i>Ptilotus aervoides</i>, <i>Maireana ?tomentosa</i>, <i>Aristida contorta</i> and <i>Eragrostis eriopoda</i>.</p>	Pi-Q-07 Pi-Q-08 Pi-Q-09	33.84	29.12	6.82	
AsppEspPSeEpAc?Ta	<p><u>Vegetation description:</u> <i>Acacia quadrimarginea</i>, <i>A. caesaneura</i> and <i>A. tetragonophylla</i> tall open shrubland over <i>Eremophila fraseri</i> subsp. <i>fraseri</i> open shrubland over <i>E. serrulata</i> and <i>Sida ?ectogama</i> low open shrubland over <i>Enneapogon polyphyllus</i> and <i>Aristida contorta</i> very open to open tussock grassland and <i>?Tragus australianus</i> very open grasses.</p> <p><u>Associated species:</u> <i>Acacia aneura</i>, <i>Acacia ayersiana</i> (narrow phyllode variant), <i>Acacia incurvaneura</i> x <i>mulganeura</i>, <i>Santalum lanceolatum</i>, <i>Eremophila ?platycalyx</i>, <i>Eremophila forrestii</i> subsp. <i>?forrestii</i>, <i>Eremophila latrobei</i> subsp. <i>?latrobei</i>, <i>Rhyncharrhena linearis</i> and <i>Senna</i> sp. Meekatharra (E. Bailey 1-26)</p>	Pi-MN-02 Pi-Q-10 Pi-Q-11	3.26	2.81	0.66	
AnEoaPoSIMtSeAcEc	<p><u>Vegetation description:</u> <i>Acacia aneura</i> tall shrubland over <i>Eremophila oldfieldii</i> subsp. <i>?angustifolia</i> open shrubland to shrubland over <i>Ptilotus obovatus</i> and <i>Solanum lasiophyllum</i> low shrubland over <i>Maireana triptera</i> and <i>Sclerolaena eriacantha</i> low chenopods over <i>Aristida contorta</i> and <i>Enneapogon caeruleascens</i> open tussock grassland.</p> <p><u>Associated species:</u> <i>Acacia quadrimarginea</i>, <i>Acacia sibirica</i>, <i>Eremophila ?exilifolia</i>, <i>Eremophila forrestii</i> subsp. <i>?forrestii</i>, <i>Eremophila fraseri</i> subsp. <i>fraseri</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Santalum lanceolatum</i>.</p>	Pi-Q-01 Pi-Q-02 Pi-Q-16	5.61	4.83	1.13	

Code	Vegetation Description & Associated Species	Quadrats, Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
AiArElEsEm	<p><u>Vegetation description:</u> <i>Acacia incurvaneura</i> and <i>Acacia ramulosa</i> subsp. <i>linophylla</i> (<i>Acacia caesaneura</i> and <i>Acacia aneura</i>) tall shrubland to open scrub over <i>Eremophila latrobei</i> subsp. <i>latrobei</i> and <i>E. spectabilis</i> low shrubland to open low heath over <i>Eriachne mucronata</i> open grassland.</p> <p><u>Associated species:</u> <i>Eremophila forrestii</i> subsp. <i>?forrestii</i>, <i>Solanum lasiophyllum</i>, <i>Solanum ferocissimum</i>, <i>Psyrax suaveolens</i>, <i>Psyrax rigidula</i>, <i>?Enchylaeana tomentosa</i>, <i>Cheilanthes</i> sp., <i>Eragrostis eriopoda</i>, <i>Monacather paradoxus</i> and <i>Thyriolepis multiculmis</i>.</p>	Pi-Q-17 Pi-Q-18	4.26	3.67	0.86	
C	Cleared	Pi-Mn-03	3.63	3.12	0.73	
Total			116.18	100	23.43	



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



Table 5-6: Vegetation types recorded within the Pipeline 2 Survey Area

Code	Vegetation Description & Associated Species	Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% Study Area	
Eke?AsppTbMp	<p><u>Vegetation description:</u> <i>Eucalyptus kingsmillii</i> and <i>E. lucasii</i> very open shrub mallee over <i>Acacia caesaneura</i> (<i>A. ayersiana</i> (hybrid)) tall shrubland over <i>A. ramulosa</i> var. <i>linophylla</i> (<i>A. ramulosa</i> var.?) open shrubland over <i>Triodia basedowii</i> hummock grassland and <i>Monacather paradoxus</i> very open tussock grasses.</p> <p><u>Associated species:</u> <i>Psyrax suaveolens</i>, <i>Eremophila forrestii</i> subsp. <i>?forrestii</i>, <i>Eremophila homoplastica</i>, <i>Grevillea nematophylla</i> subsp. <i>supraplana</i>, <i>Solanum lasiophyllum</i>, <i>Ptilotus obovatus</i>, <i>Enneapogon polyphyllus</i>, <i>Eragrostis eriopoda</i> and <i>Monacather paradoxus</i>.</p>	P2r-01 P2-Mn-01	7.43	1.50	1.50	
Total			7.43	100	1.50	

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



Table 5-7: Vegetation types recorded within the Camp Survey Area



Code	Vegetation Description & Associated Species	Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
AqGbAiEspEe	<p><u>Vegetation description:</u> <i>Acacia quadrimarginea</i> and <i>Grevillea berryana</i> low open woodland over <i>A. incurvaneura</i> open tall shrubland over <i>Eremophila spectabilis</i> and <i>E. latrobei</i> subsp. <i>latrobei</i> open shrubland over <i>Eragrostis eriopoda</i> very open tussock grassland.</p> <p><u>Associated species:</u> <i>Acacia sibirica</i>, <i>Psyrax rigidula</i>, <i>Ptilotus obovatus</i>, <i>Ptilotus schwartzii</i>, <i>Solanum lasiophyllum</i>, <i>Maireana</i> sp., and <i>Cheilanthes</i> sp.</p>	Cr-03	8.59	13.60	1.73	
AcSafPoSeM spp.	<p><u>Vegetation description:</u> <i>Acacia caesaneura</i> open tall shrubland over <i>Senna artemisioides</i> subsp. <i>filifolia</i> open shrubland over <i>Ptilotus obovatus</i> low open shrubland over <i>Sclerolaena eriacantha</i>, <i>Maireana triptera</i> and <i>M. melanocoma</i> open chenopods.</p> <p><u>Associated species:</u> <i>Acacia burkittii</i>, <i>Solanum lasiophyllum</i>, <i>Ptilotus obovatus</i> and <i>Maireana</i> ?<i>tomentosa</i>.</p>	C-MN-04	2.37	3.75	0.48	

Code	Vegetation Description & Associated Species	Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
AiEm	<p><u>Vegetation description:</u> <i>Acacia incurvaneura</i> and <i>A. macraneura</i> tall shrubland to tall open shrubland over <i>Eriachne mucronata</i> very open tussock grassland.</p> <p><u>Associated species:</u> <i>Eremophila spectabilis</i>, <i>Solanum lasiophyllum</i> and <i>Eragrostis eriopoda</i>.</p>	C-MN-02 Cr-01	32.25	51.07	6.50	
Aspp.Espp.SeDvmEe	<p><u>Vegetation description:</u> <i>Acacia aneura</i>, <i>A. incurvaneura</i> and <i>A. caesaneura</i> tall shrubland over <i>Eremophila forrestii</i> subsp. <i>forrestii</i>, <i>Sida ectogama</i>, <i>E. spectabilis</i> and <i>Dodonaea viscosa</i> subsp. <i>mucronata</i> over <i>Eragrostis eriopoda</i> open tussock grassland.</p> <p><u>Associated species:</u> <i>Acacia ayersiana</i> (narrow phyllode variant), <i>Acacia quadrimarginea</i>, <i>Eremophila latrobei</i> subsp. <i>latrobei</i>, <i>Psyrax latifolia</i>, <i>Psyrax rigidula</i>, <i>Psyrax suaveolens</i>, <i>Solanum lasiophyllum</i>, <i>Ptilotus obovatus</i> and <i>Thyriolepis</i> sp.</p>	Cr-02	8.11	12.84	1.64	
Cleared		C-Mn-01 C-Mn-03	11.83	18.73	2.39	
		Total	63.15	100	12.73	

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



Table 5-8: Vegetation types recorded within the Wind Farm Survey Area

Code	Vegetation Description & Associated Species	Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
AaAiEsEffEeMp	<p><u>Vegetation description:</u> <i>Acacia aneura</i> and <i>Acacia incurvaneura</i> open tall shrubland over <i>Eremophila spectabilis</i> (<i>E. forrestii</i> subsp. <i>forrestii</i>) open shrubland over <i>Eragrostis eriopoda</i> (<i>Poaceae</i> sp. and <i>Monochather paradoxus</i>) very open grassland.</p> <p><u>Associated species:</u> <i>Eremophila latrobei</i> subsp. <i>latrobei</i>, <i>Solanum lasiophyllum</i>, <i>Ptilotus schwartzii</i>, <i>Psyrax rigidula</i> and <i>Eriachne mucronata</i>.</p>	Wr-04	147.52	70.10	29.75	
AappEffEp	<p><u>Vegetation description:</u> <i>Acacia aneura</i> and <i>A. ayersiana</i> (narrow phyllode variant) tall shrubland over <i>Acacia craspedocarpa</i> (hybrid) and <i>Eremophila fraseri</i> subsp. <i>fraseri</i> low shrubland over <i>Enneapogon polyphyllus</i> very open tussock grassland</p> <p><u>Associated species:</u> <i>Acacia incurvaneura</i>, <i>Acacia tetragonophylla</i>, <i>Eremophila latrobei</i> subsp. <i>latrobei</i>, <i>Eremophila forrestii</i> subsp. <i>forrestii</i>, <i>Eremophila serrulata</i>, <i>Eremophila platycalyx</i>, <i>Ptilotus obovatus</i>, <i>Solanum lasiophyllum</i>, <i>Aristida contorta</i>, <i>Eragrostis eriopoda</i> and <i>Sporobolus australasicus</i>.</p>	Wr-03	9.03	4.29	1.82	

Code	Vegetation Description & Associated Species	Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
AcAiEff	<p><u>Vegetation description:</u> <i>Acacia craspedocarpa</i> (hybrid) and <i>A. incurvaneura</i> tall open shrubland over <i>Eremophila fraseri</i> subsp. <i>fraseri</i> open low shrubland to open shrubland.</p> <p><u>Associated species:</u> <i>Acacia tetragonophylla</i>, <i>Eremophila</i> ?<i>platycalyx</i>, <i>Solanum lasiophyllum</i>, <i>Ptilotus obovatus</i>, <i>Aristida contorta</i>, <i>Cymbopogon ambiguus</i>, <i>Enneapogon polyphyllus</i> and <i>Sclerolaena</i> spp.</p>	Wr-02	21.45	10.20	4.33	
AcAnEffEs	<p><u>Vegetation description:</u> <i>Acacia caesaneura</i> open low woodland over <i>Acacia aneura</i> (?<i>Santalum lanceolatum</i>) tall shrubland over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> shrubland over <i>E. spectabilis</i> low open shrubland .</p> <p><u>Associated species:</u> <i>Acacia incurvaneura</i>, <i>Acacia tetragonophylla</i>, <i>Eremophila forrestii</i> subsp. ?<i>forrestii</i>, <i>Eremophila latrobei</i> subsp. ?<i>latrobei</i>, <i>Psyrax suaveolens</i>, <i>Ptilotus obovatus</i> and <i>Solanum lasiophyllum</i>.</p>	Wr-01	28.20	13.41	5.69	
C	Cleared		4.20	2.00	0.85	
Total			210.4	100	42.43	



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



Table 5-9: Vegetation types recorded within the Power Station Survey Area



Code	Vegetation Description & Associated Species	Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
EffAtEmPoAcCa	<p><u>Vegetation description:</u> <i>Eremophila fraseri</i> subsp. <i>fraseri</i> and <i>Acacia tetragonaphylla</i> open shrubland over <i>Eremophila ?margerathae</i> and <i>Ptilotus obovatus</i> open low shrubland over <i>Aristida contorta</i> and <i>Cymbopogon ambiguus</i> open tussock grassland.</p> <p><u>Associated species:</u> <i>Eremophila forrestii</i> subsp. <i>?forrestii</i>, <i>Eremophila latrobei</i> subsp. <i>?latrobei</i>, <i>Senna</i> sp. Meekatharra (E. Bailey 1-26), <i>Solanum lasiophyllum</i>, <i>Sida ectogama</i> and <i>Eriachne mucronata</i>.</p>	Pr-01	2.01	8.51	0.41	
EffEm	<p><u>Vegetation description:</u> <i>Eremophila fraseri</i> subsp. <i>fraseri</i> open shrubland over <i>E. margerathae</i> open low shrubland</p> <p><u>Associated species:</u> <i>Senna</i> sp. Meekatharra (E. Bailey 1-26), <i>Solanum lasiophyllum</i>, <i>Sida ectogama</i>, <i>Ptilotus obovatus</i>, <i>Ptilotus aevoides</i>, <i>Ptilotus schwartzii</i>, <i>Maireana tritera</i>, <i>Cymbopogon ambiguus</i>, <i>Eragrostis eriopoda</i> and <i>Eriachne mucronata</i>,</p>	Pr-02	21.13	89.42	4.26	
C	Cleared		0.49	2.07	0.10	
Total			23.69	100	4.76	

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

Table 5-10: Vegetation types recorded within the Lawlers Airstrip Survey Area

Code	Vegetation Description & Associated Species	Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
AaAcSafPoTt	<p><u>Vegetation description:</u> <i>Acacia aneura</i> (<i>A. incurvaneura</i>) open forest over <i>A. craspedocarpa</i> open tall shrubland over <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Ptilotus obovatus</i> open low shrubland over <i>Themeda triandra</i> very open grassland.</p> <p><u>Associated species:</u> <i>Acacia tetragonophylla</i>, <i>Senna artemisioides</i> subsp. <i>artemisioides</i>, <i>Dodonaea viscosa</i> subsp. <i>mucronata</i>, <i>Eremophila fraseri</i> subsp. <i>fraseri</i>, <i>Hakea lorea</i> subsp. <i>lorea</i>, <i>Rhagodia drummondii</i> and <i>Sida ectogama</i>.</p>	Lr-02	12.64	16.83	2.55	
AiAcEffSgAc	<p><u>Vegetation description:</u> <i>Acacia incurvaneura</i> and <i>A. caesaneura</i> tall open shrubland over <i>Eremophila fraseri</i> subsp. <i>fraseri</i> and <i>Senna glaucifolia</i> open shrubland over <i>Aristida contorta</i> very open tussock grasses.</p> <p><u>Associated species:</u> <i>Eremophila latrobei</i> subsp. <i>latrobei</i>, <i>Eremophila margarethae</i>, <i>Solanum lasiophyllum</i>, <i>Ptilotus obovatus</i>, <i>Rhagodia drummondii</i>, <i>Enchylaeana tomentosa</i> and <i>Monachather paradoxus</i>.</p>	Lr-01 Lr-MN-01	19.73	26.26	4.00	

Code	Vegetation Description & Associated Species	Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
EIAaAcAt	<p><u>Vegetation description:</u> <i>Eucalyptus lucasii</i> woodland over <i>Acacia aneura</i> low open woodland over <i>A. craspedocarpa</i> and <i>A. tetragonophylla</i> tall shrubland.</p> <p><u>Associated species:</u> <i>Eremophila longifolia</i>, <i>Enchylaeana tomentosa</i>, <i>Salsola australis</i>, <i>Atriplex codonocarpa</i> and <i>Citrullus colocynthis</i>.</p>	Lr-06	2.73	3.63	0.20	
EIASppSafAtPoTt	<p><u>Vegetation description:</u> <i>Eucalyptus lucasii</i> woodland over <i>Acacia aneura</i> open low woodland over <i>A. aneura</i> (<i>A. craspedocarpa</i>) tall open shrubland over <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>A. tetragonophylla</i> open shrubland over <i>Ptilotus obovatus</i> low open shrubland over <i>Themeda triandra</i> (<i>Cynodon dactylon</i>) very open grassland.</p> <p><u>Associated species:</u> <i>Acacia burkittii</i>, <i>Acacia craspedocarpa</i>, <i>Acacia incurvaneura</i>, <i>Acacia quadrimarginea</i>, <i>Eremophila fraseri</i> subsp. <i>fraseri</i>, <i>Eremophila serrulata</i>, <i>Hakea lorea</i> subsp. <i>lorea</i>, <i>Senna artemisioides</i> subsp. <i>artemisioides</i>, <i>Senna artemisioides</i> subsp. <i>X sturtii</i> and <i>Senna glutinosa</i> subsp. <i>chatelainiana</i>.</p>	Lr-05	5.13	6.83	1.03	

Code	Vegetation Description & Associated Species	Relevés & Mapping Notes	Extent			Photograph
			ha	% of PSA	% of Study Area	
PoSafMpEpEc	<p><u>Vegetation description:</u> <i>Ptilotus obovatus</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Maireana pyramidata</i> low open shrubland over <i>Enneapogon polyphyllus</i> and <i>Enneapogon caerulescens</i> very open grassland.</p> <p><u>Associated species:</u> <i>Acacia tetragonophylla</i>, <i>Hakea preisii</i>, <i>Sida calyxhymenia</i>, <i>Enchylaeana tomentosa</i>, <i>Solanum lasiophyllum</i>, <i>Salsola australis</i>, <i>Sclerolaena drummondii</i>, <i>Euphorbia drummondii</i> and <i>Enneapogon polyphyllus</i>.</p>	Lr-03 Lr-04	33.86	45.07	6.83	
Cleared	Areas cleared for access tracks	C-MN-01 C-MN-03 Pi-MN-03	1.03	1.37	0.21	
Total			75.12	100	15.15	

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

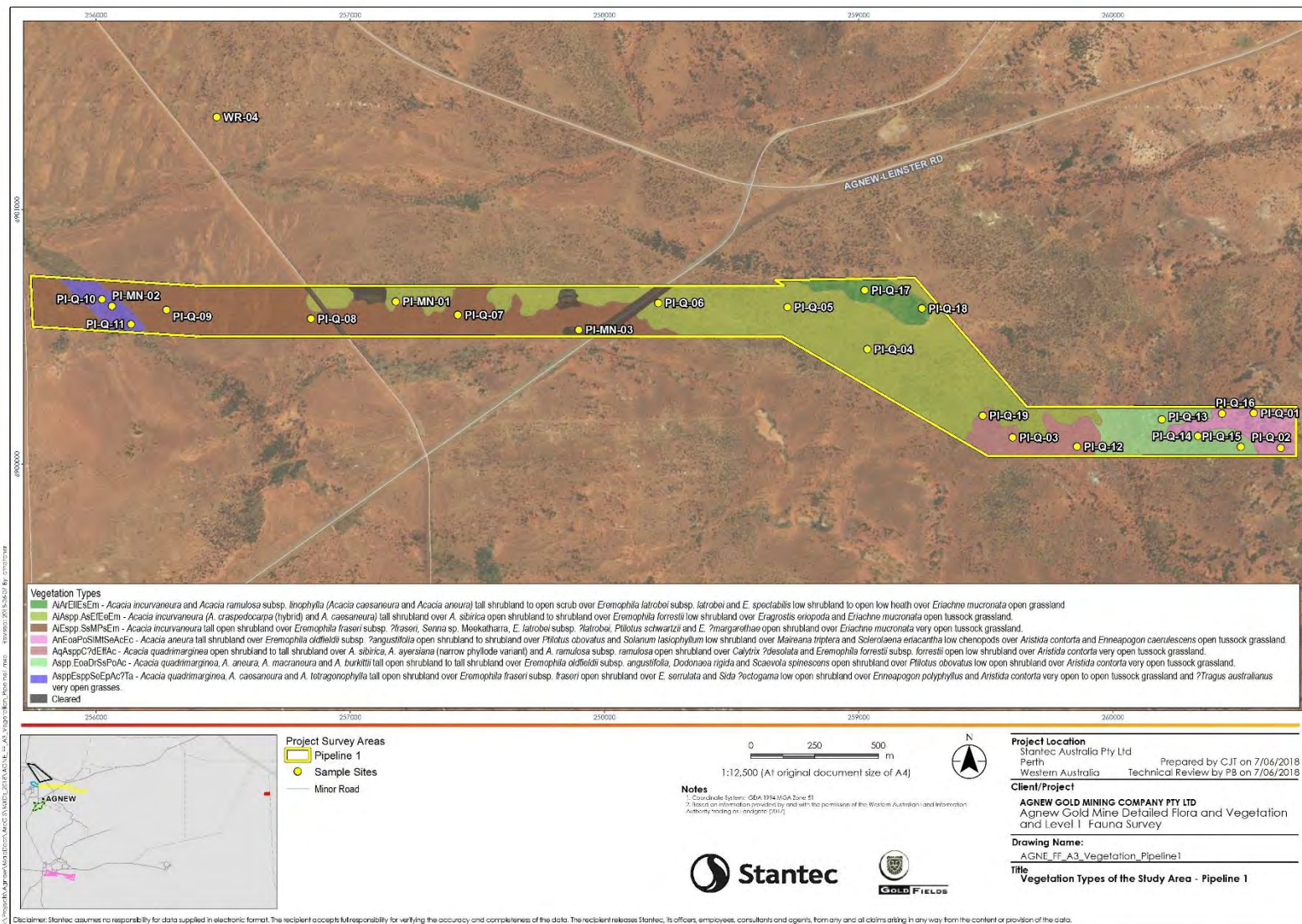


Figure 5-2: Vegetation Types of the Study Area – Pipeline 1

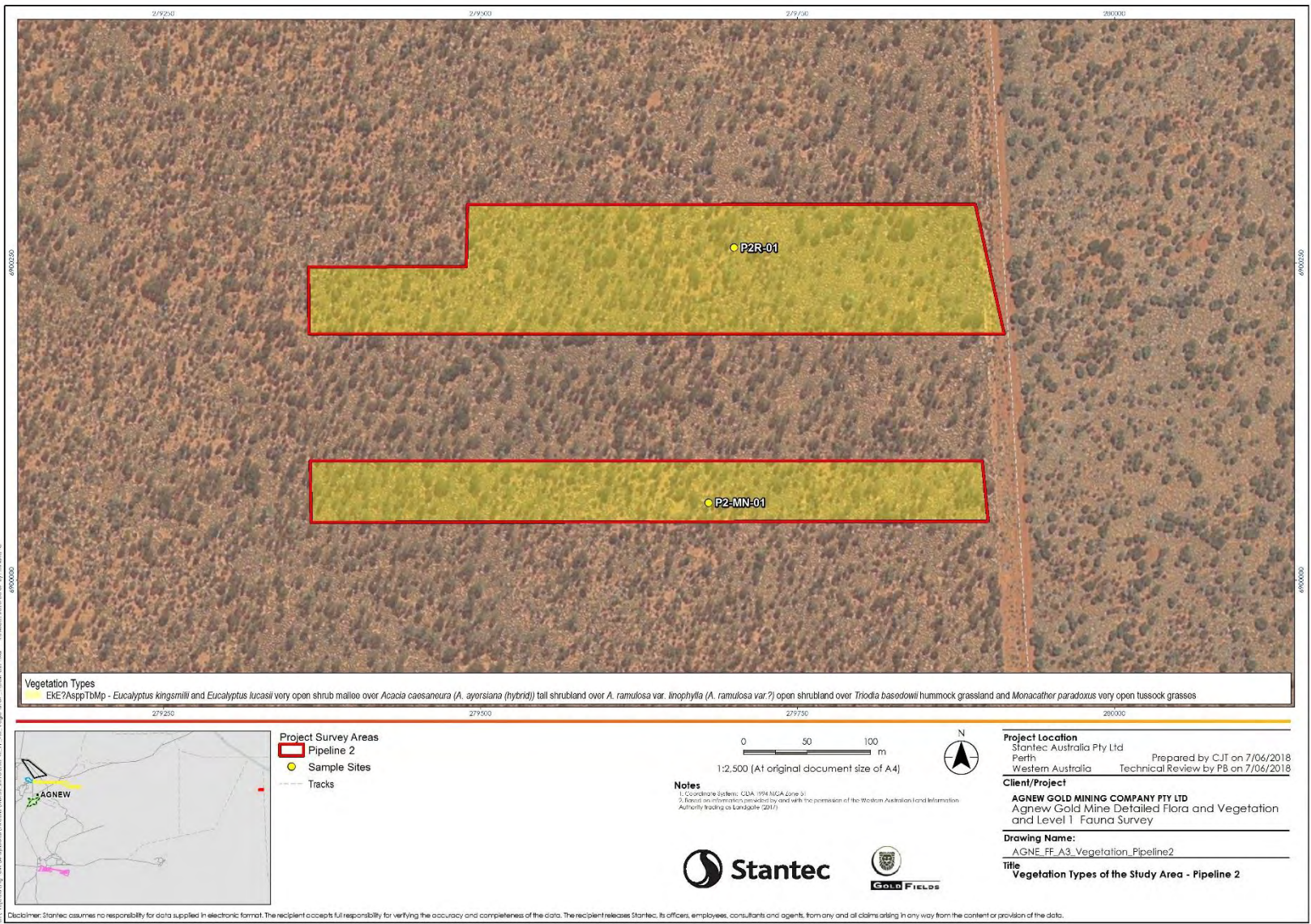


Figure 5-3: Vegetation Types of the Study Area – Pipeline 2

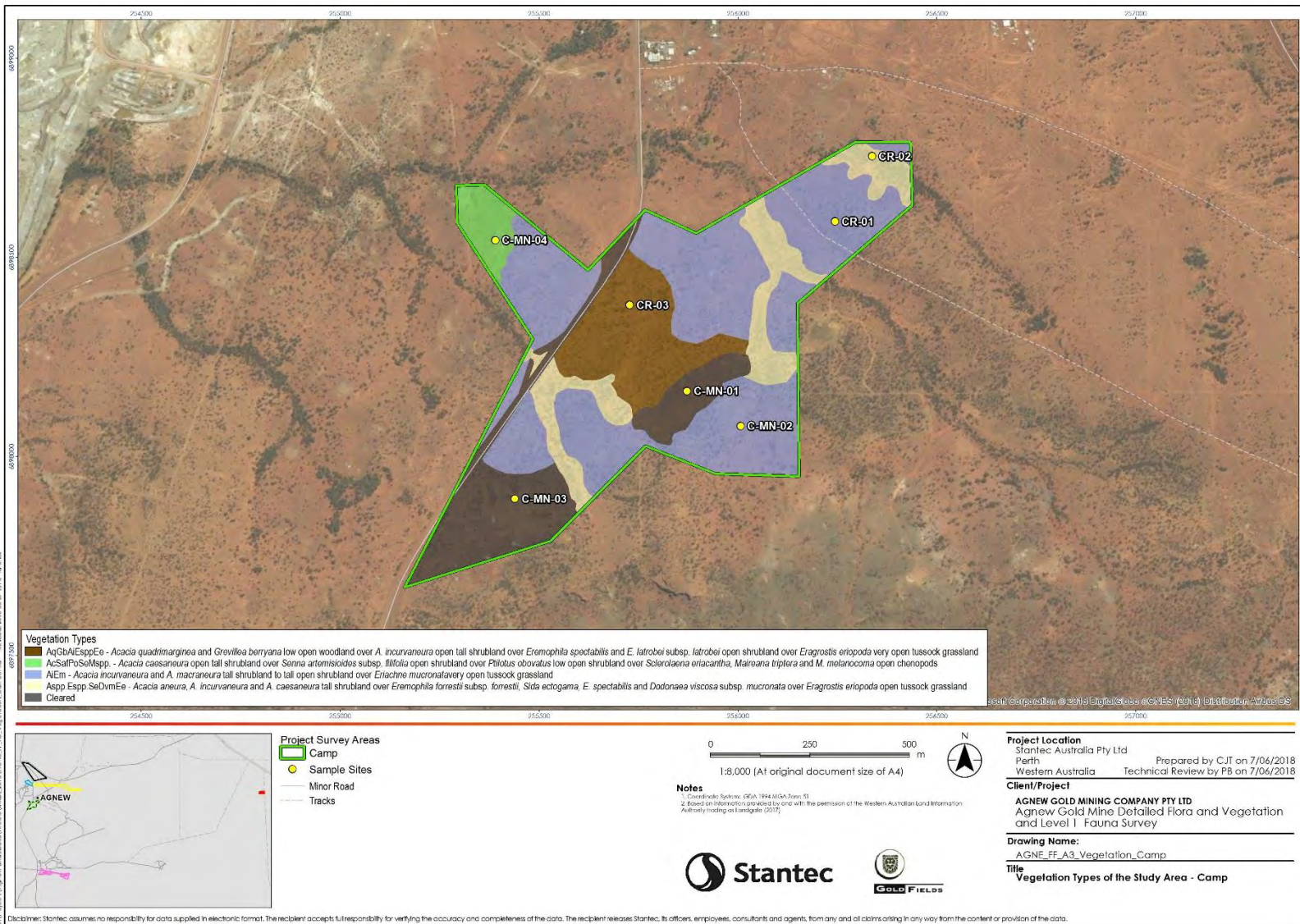


Figure 5-4: Vegetation types of the Study Area - Camp

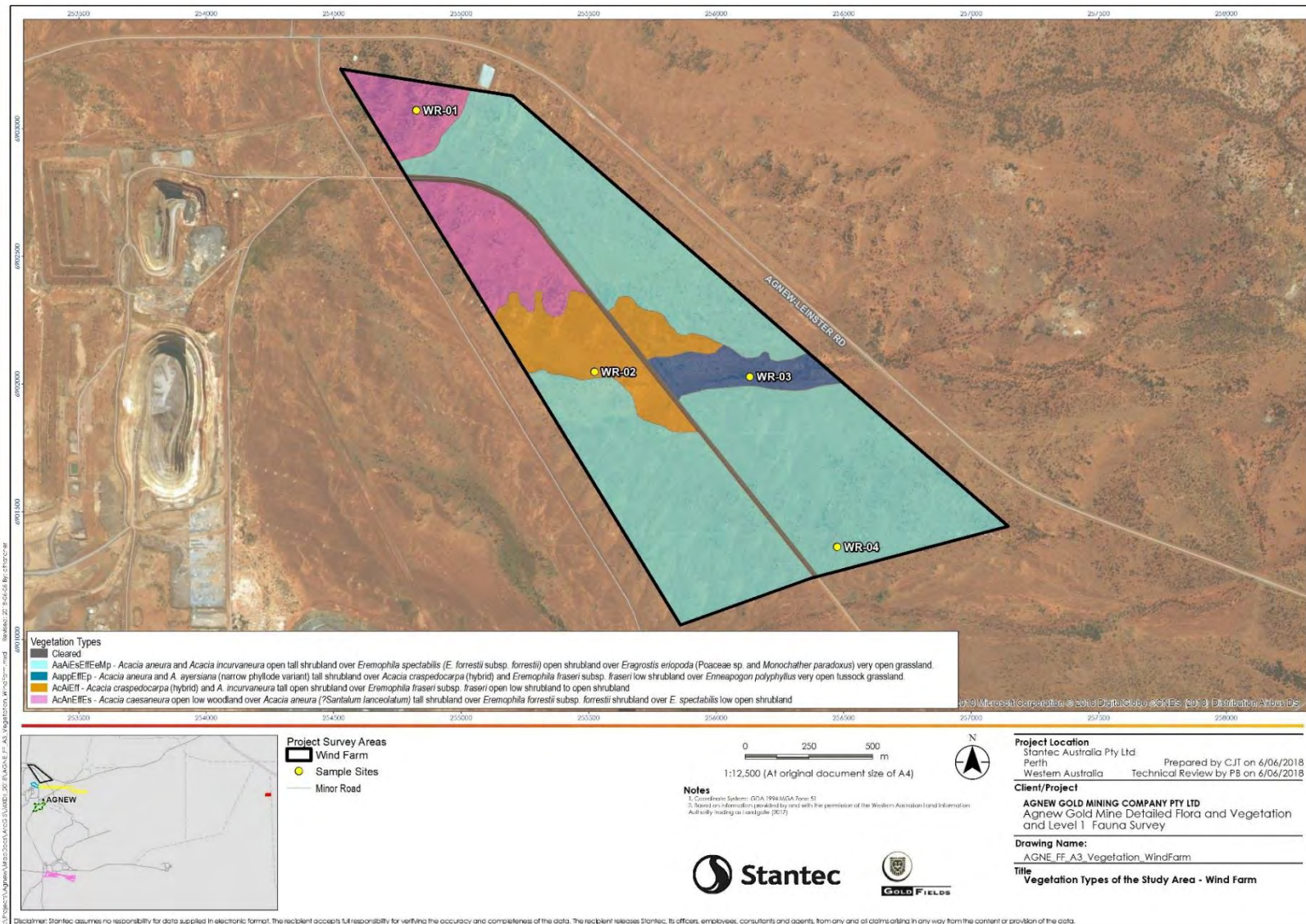


Figure 5-5: Vegetation Types of the Study Area – Wind Farm

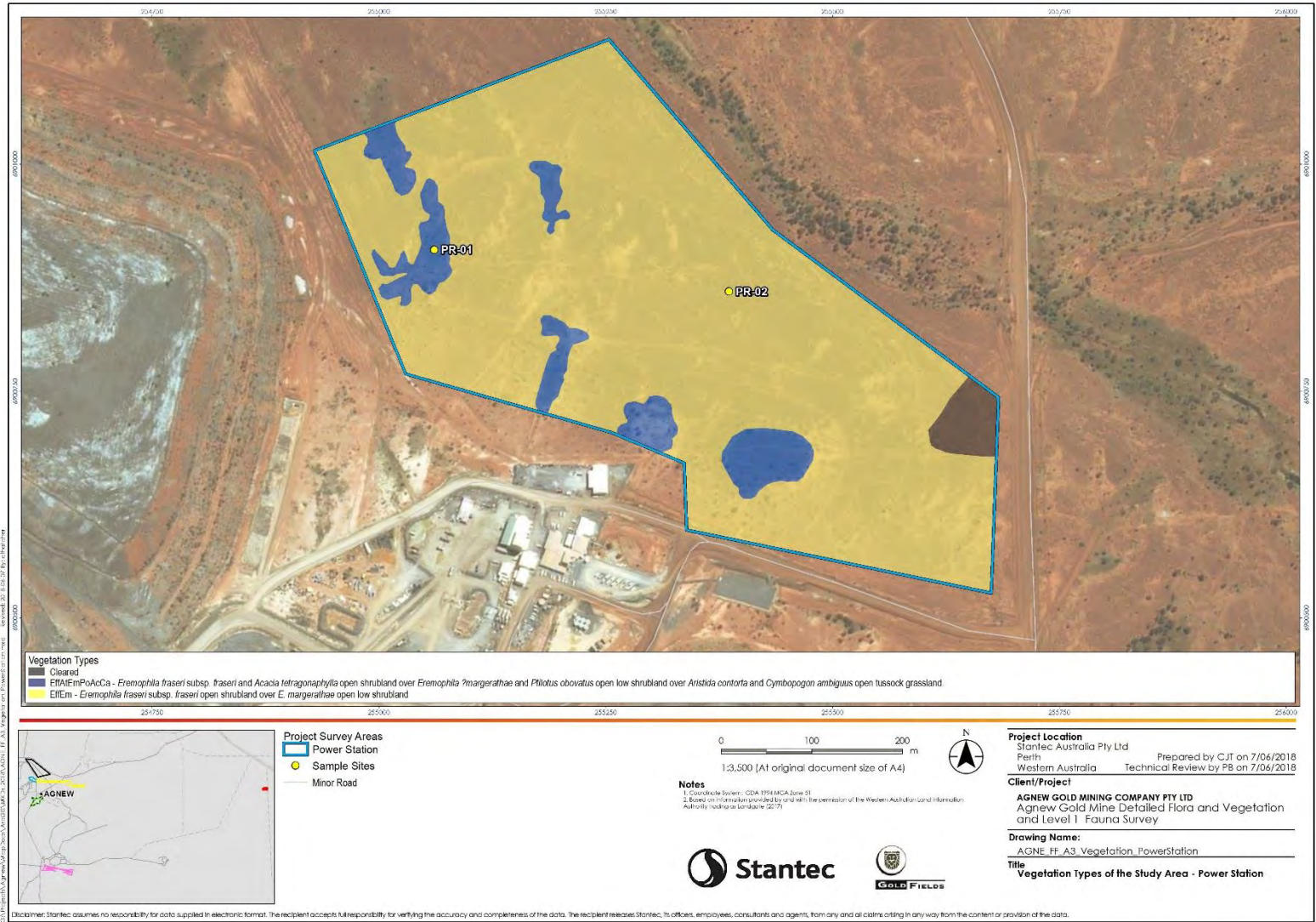


Figure 5-6: Vegetation Types of the Study Area – Power Station

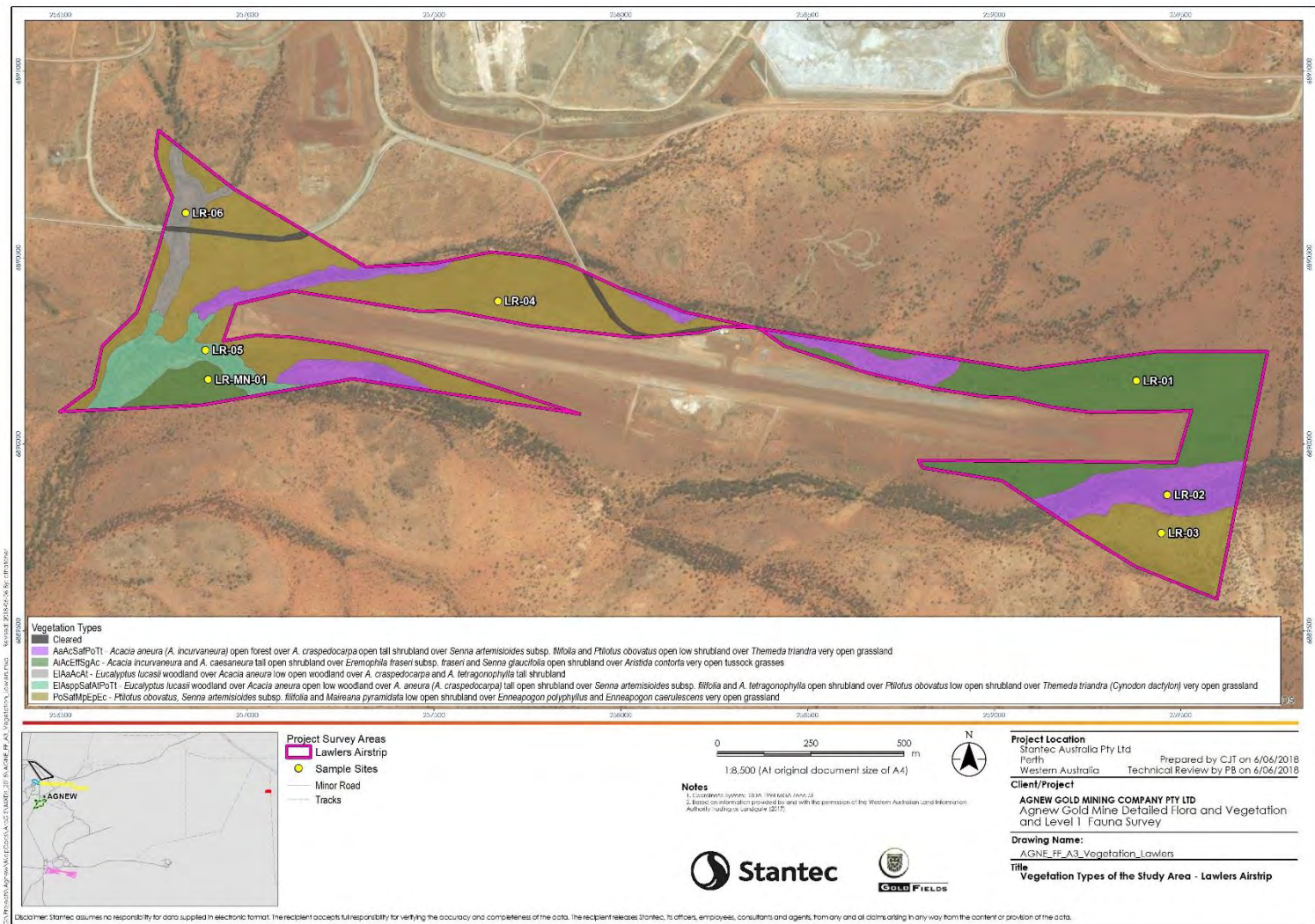


Figure 5-7: Vegetation Types of the Study Area – Lawler’s Airstrip

5.4.1 Vegetation Condition

The vegetation condition of the Study Area ranged from 'Excellent' to 'Completely Degraded'. The vegetation condition assessed at each PSA along with the proportion of each condition rating within each PSA and the Study Area is presented in **Table 5-11**.

Just over 10% of the Study Area was considered to be in 'Degraded' or 'Completely Degraded' condition. The primary impacts to vegetation condition across the Study Area was in relation to previous ground disturbing activities including, borrow pits, tracks and exploration drilling.

Weed diversity and density was considered low, with only four species recorded within Lawlers Airstrip PSA. Three of the weed species (**Bidens bipinnata*, **Malvastrum americanum* and **Cynodon dactylon*) were recorded in association with drainage lines that had been impacted by current and historical pastoral activities. **Citrullus colocynthis* was recorded in association with an old track where the ground had been disturbed.

Table 5-11: Vegetation condition extents across the Study Area

Condition rating	Pipeline 1			Pipeline 2			Camp			Wind Farm			Power Station			Lawler's Airstrip		
	ha	% PSA	% Study Area	ha	% PSA	% Study Area	ha	% PSA	% Study Area	ha	% PSA	% Study Area	ha	% PSA	% Study Area	ha	% PSA	% Study Area
Excellent	-	-	-	7.43	100.00	1.50	-	-	-	-	-	-	-	-	-	-	-	-
Very Good	82.67	71.16	16.67	-	-	-	1.72	2.72	0.35	-	-	-	-	-	-	17.60	23.43	3.55
Good	7.27	6.26	1.47	-	-	-	46.77	74.06	9.43	184.76	87.81	37.26	-	-	-	22.13	29.46	4.46
Poor	21.02	18.09	4.24	-	-	-	2.83	4.48	0.57	-	-	-	22.73	97.93	4.66	20.08	26.73	4.05
Degraded	1.59	1.37	0.32	-	-	-	-	-	-	21.45	10.19	4.33	-	-	-	14.28	19.01	2.88
Completely Degraded	1.74	1.50	0.35	-	-	-	11.83	18.73	2.39	-	-	-	-	-	-	-	-	-
Cleared	1.89	1.63	0.38	-	-	-	-	-	-	4.20	2.00	0.85	0.9	2.07	0.10	1.03	1.37	0.21
Subtotal	116.18	100	23.43	7.43	100	1.50	63.15	100.00	12.73	210.41	100	42.43	23.63	100	4.76	75.12	100	15.15
Total	495.2 ha																	

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

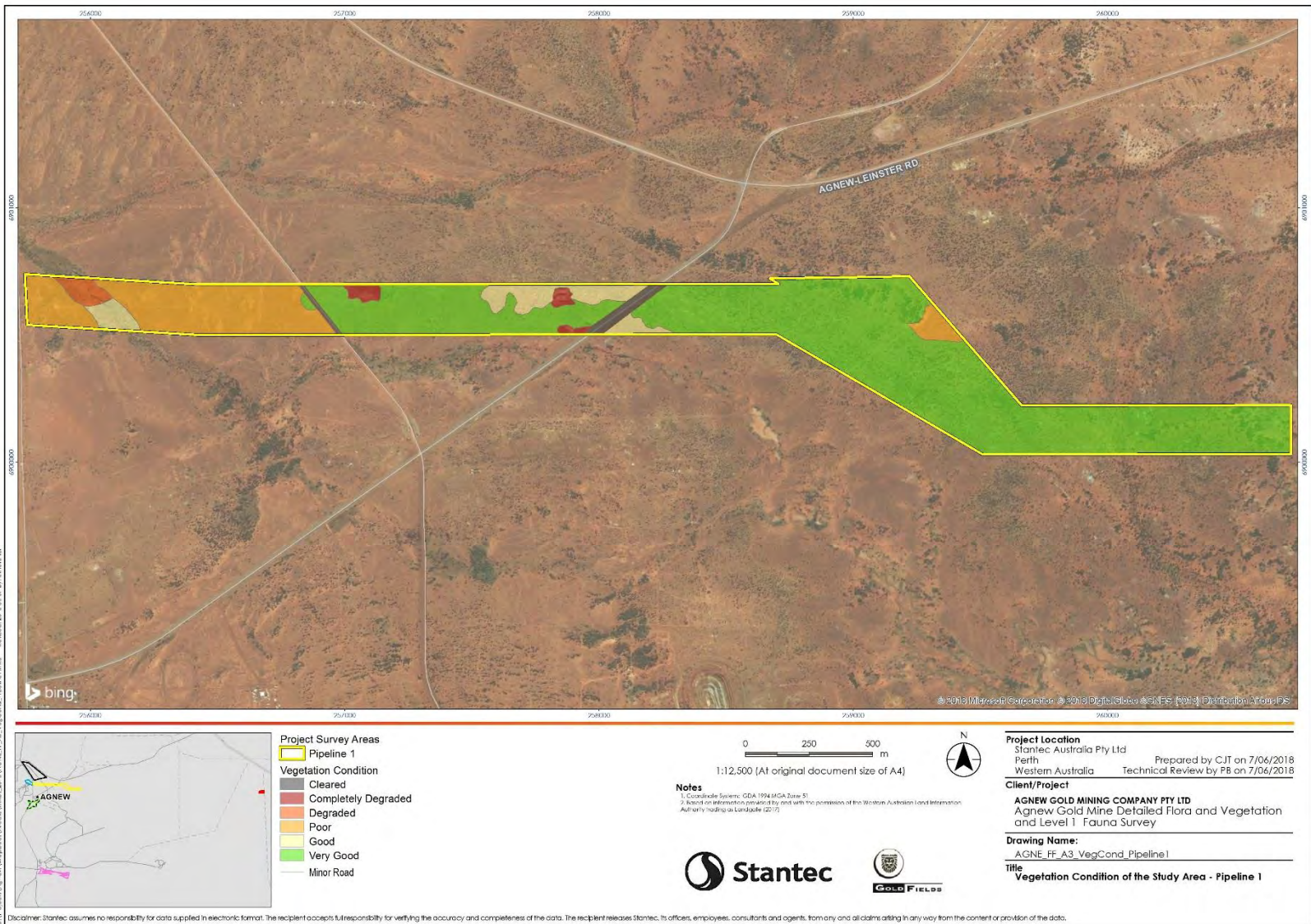


Figure 5-8: Vegetation Condition of the Study Area – Pipeline 1

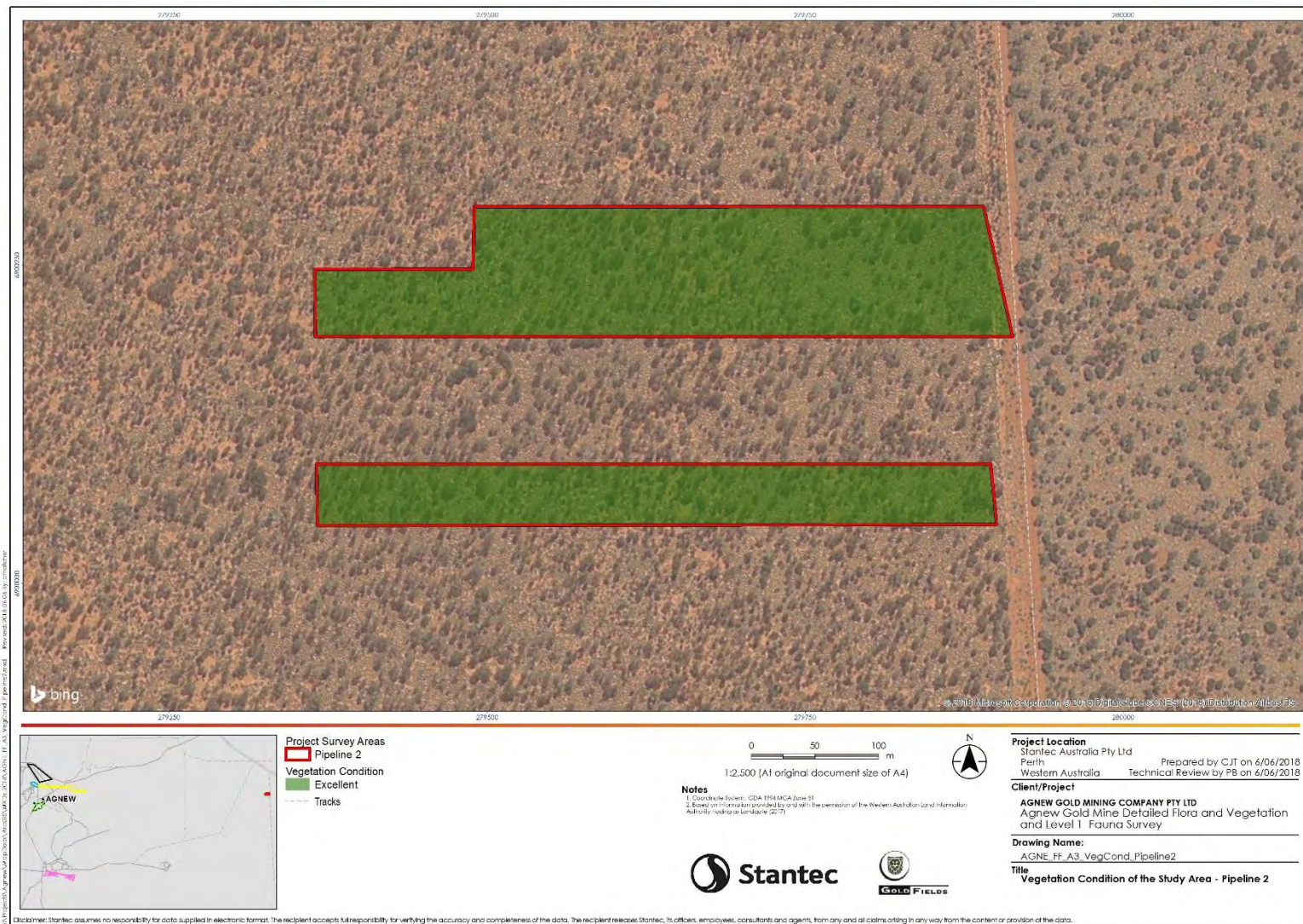


Figure 5-9: Vegetation Condition of the Study Area – Pipeline 2

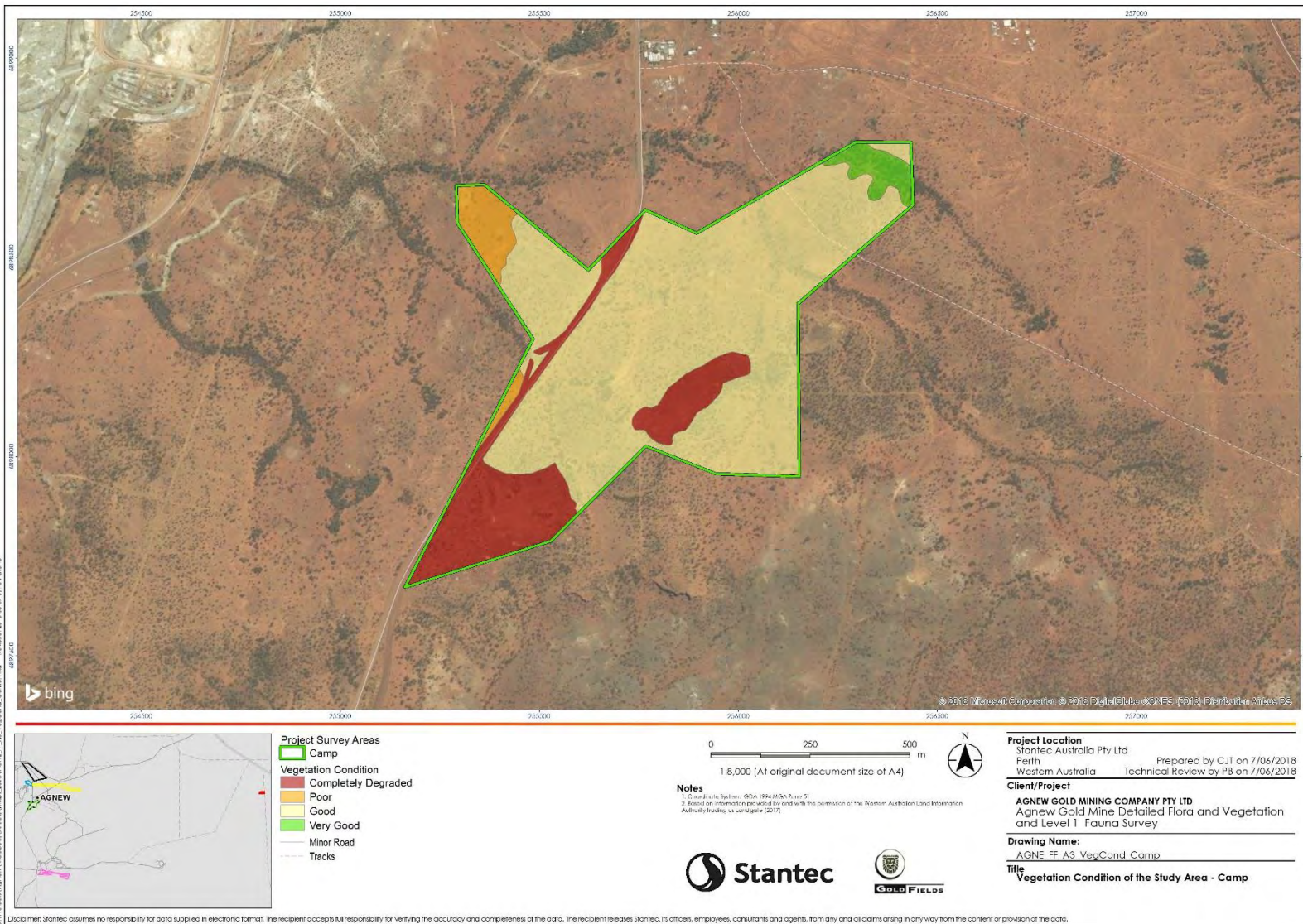


Figure 5-10: Vegetation Condition of the Study Area - Camp

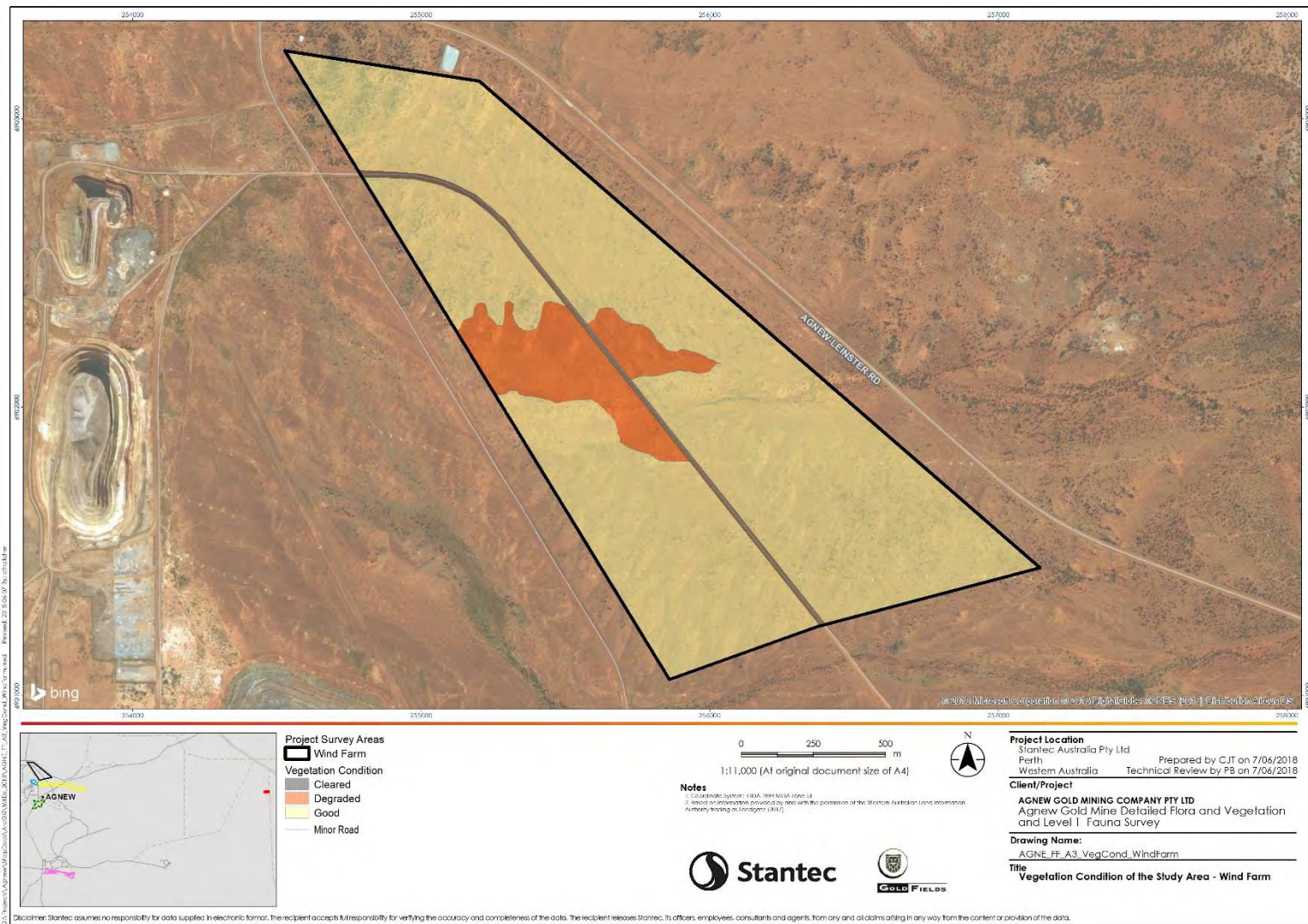


Figure 5-11: Vegetation Condition of the Study Area – Wind Farm

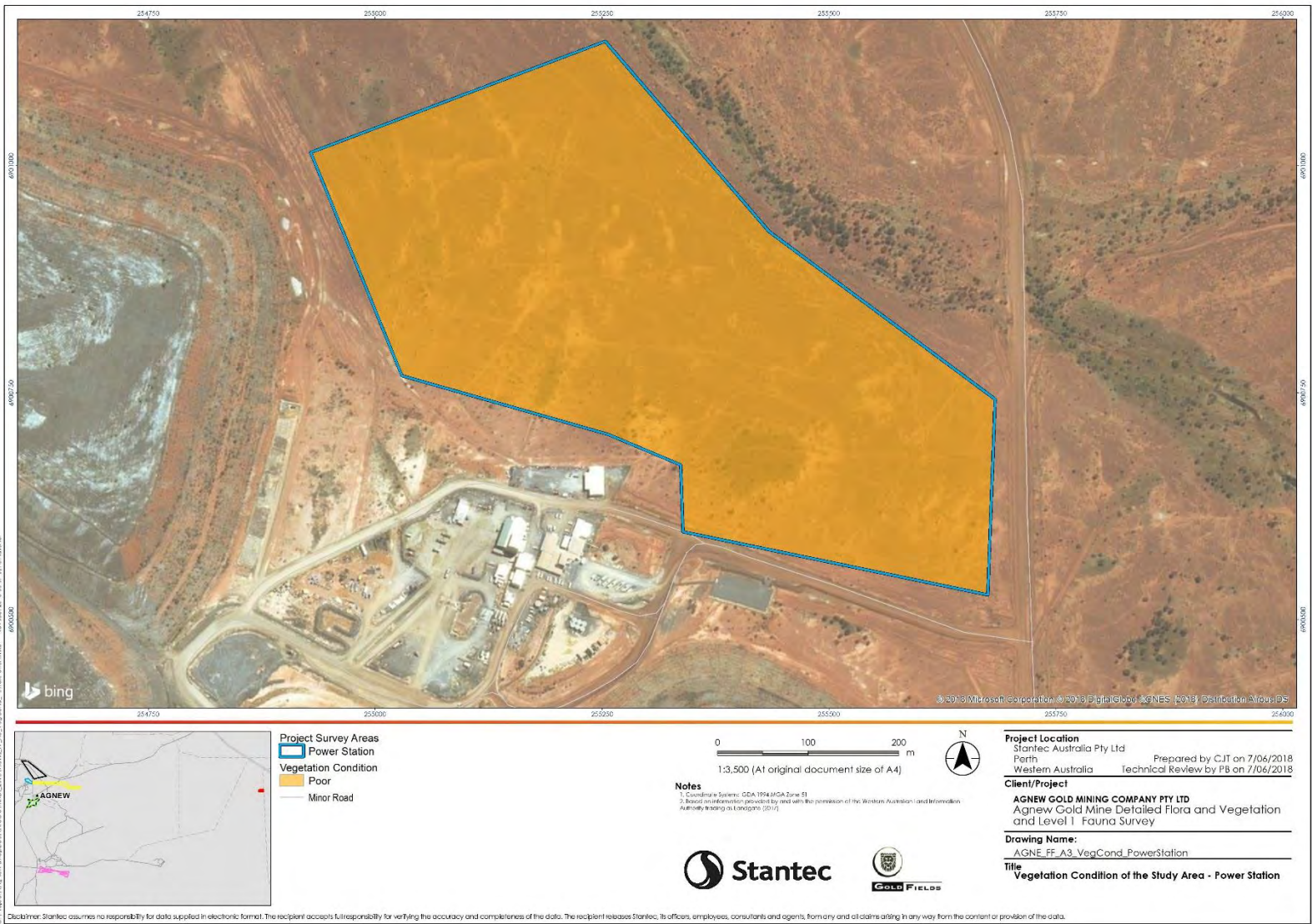


Figure 5-12: Vegetation Condition of the Study Area – Power Station

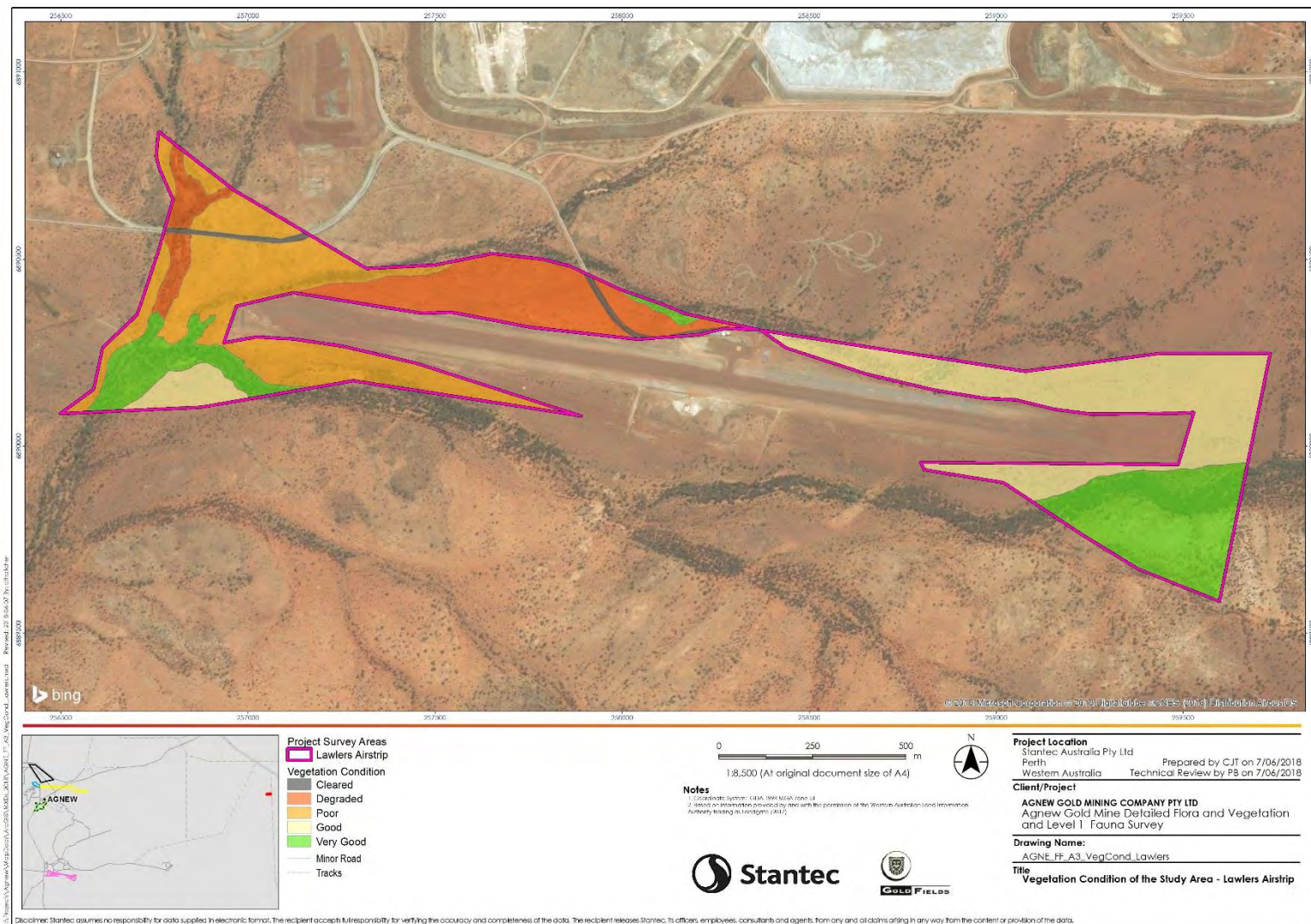


Figure 5-13: Vegetation Condition of the Study Area – Lawlers Airstrip

5.4.2 Vegetation of Conservation Significance

The EPA (EPA 2016b) advises that vegetation may be considered to be of significance for a range of reasons, other than a listing as a TEC or a PEC, including:

- vegetation extent being below a threshold level;
- scarcity;
- unusual species;
- novel combinations of species;
- a role as a refuge;
- a role as a key habitat for Threatened species or large populations representing a significant proportion of the local to regional total population of a species;
- being representative of the range of a unit (particularly a good local and/or regional example of a unit in 'prime' habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range); and/or
- a restricted distribution.

The desktop assessment did not identify any known TECs within the Study Area and the immediate surrounds. None of the vegetation types within the Study Area are analogous to any TECs under the EPBC Act, or listed by Parks and Wildlife, which qualify for special protection and there were no PECs directly related to terrestrial vegetation recorded within the Study Area. Further to this, the vegetation units described from the Study Area are not considered to represent any PECs known to occur in the Murchison bioregion. None of the vegetation units within the Study Area were considered to be of conservation significance on a local or regional scale.

5.5 Terrestrial Fauna

5.5.1 Fauna Habitat



Six broad fauna habitats were identified and delineated from fauna habitat assessments conducted across the Study Area (**Table 5-12, Figure 5-14 – Figure 5-19**). These comprised:







- Shrubland;
- Drainage line;
- Rocky/ outcropping;
- Acacia over spinifex;
- Open plain; and
- Cleared.



These habitats differed primarily in the composition of their vegetation and structure, in particular vegetation condition, the presence of large rocky outcrops and upper storey density. The habitat types in the Study Area were assessed on their extents and levels of significance according to the following criteria:

- **Distribution:** those habitats widespread and common within the surrounding regions were categorised as widespread; otherwise they were categorised as being of limited extent. The Rocky/ outcropping areas were considered to be of limited extent.
- **Significance:** those habitats considered important to species of conservation significance or distinct fauna assemblages are deemed significant; otherwise they were categorised as being of limited significance. The rocky/ outcropping and acacia over spinifex habitats were considered significant owing to their potential to support conservation significant species.

Table 5-12: Fauna habitats recorded within the Study Area

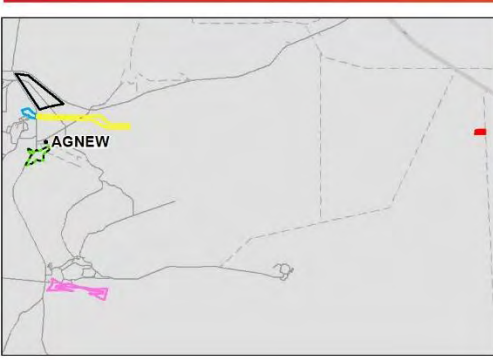
Habitat type	Proportion of Study Area		Veg. Assoc.	Condition	Value to fauna	Reference Photograph
	ha	%				
Shrubland <ul style="list-style-type: none"> Widespread Limited significance 	343.55	69.28	AcSafPoSeM spp. AiEm AqGbAiEspEe AiAcEffSgAc AiAspp.AsEfEeEm Aspp.EoaDrSsPoAc AiEsp.SsMPsEm AnEoaPoSImtSeAcEc AiArElEsEm EffAtEmPoAcCa AcAnEffEs AaAiEsEffEeMp	Poor – Very Good	Vegetation varied from relatively open, sparse tall shrubs over minimal lower storey cover (largely within the windfarm, power station and western side of pipeline west, pictured right) to areas with dense <i>Acacia</i> sp. over a relatively high cover of lower shrubs and grasses (pictured left). The upper storey largely consisted of <i>Acacia</i> sp. including <i>A. aneura</i> , <i>A. incurvaneura</i> , <i>A. caesaneura</i> , <i>A. macraneura</i> , <i>A. tetragonophylla</i> and <i>A. quadrimarginea</i> . The lower storey of most areas included <i>Eremophila</i> sp. such as <i>E. forrestii</i> , <i>E. spectabilis</i> , <i>E. fraseri</i> and <i>E. latrobei</i> as well as <i>Senna</i> sp. and <i>Ptilotus</i> sp. over tussock grasses. This habitat was impacted by clearing, tracks, feral trampling and grazing.	
Drainage line <ul style="list-style-type: none"> Widespread Limited significance 	40.89	8.25	AaAcSafPoTt AappEffEp Aspp.Espp.SeDvmEe AsppEspSsEpAc?Ta ElAaAcAt ElAsppSafAtPoTt	Degraded – Very Good	Drainage lines varied in terms of disturbance and vegetation density, however are all likely to be seasonally flooded. Areas of denser drainage habitat occurred within the camp and airport Study Areas (pictured in top row). Overall, drainage lines tended to comprise an upper storey of tall <i>Acacia</i> sp. such as <i>A. aneura</i> , <i>A. caesaneura</i> and <i>A. tetragonophylla</i> . The lower storey varied between a relatively open layer of largely tussock grasses (bottom row), shorter <i>Acacia</i> sp., and a denser cover of shrub species including <i>Sida</i> , <i>Eremophila</i> , <i>Senna</i> , <i>Ptilotus</i> and <i>Dodonaea</i> sp. (top row). Areas of airport drainage also included <i>Eucalyptus lucasii</i> trees. Of these, a tall stand of trees, one of which contained a hollow, was recorded in degraded habitat in the northwest. Drainage habitat contained relatively high leaf litter cover, and peeling bark and woody debris was common.	

Habitat type	Proportion of Study Area		Veg. Assoc.	Condition	Value to fauna	Reference Photograph	
	ha	%					
Rocky/ outcropping <ul style="list-style-type: none"> Limited extent Significant 	6.42	1.29	AqAsppC?dEffAc	Very Good	<p>Characterised by the presence of coarse rock fragments, including a line of outcropping along the western edge, pictured left. This habitat occurred in the east of the pipeline west area. Vegetation comprised <i>Acacia quadrimarginea</i>, over a lower cover of <i>Acacia sp.</i> and <i>Eremophila forrestii</i> and open <i>Aristida contorta</i> tussock grass. Evidence of cattle trampling/ grazing was observed.</p> <p>Outcropping is likely to provide shelter and unique habitat to fauna species, including conservation significant species such as the long tailed dunnart (P4). The outcropping crevices and pockets may provide shelter to a variety of mammals and reptile species.</p>	 	
Acacia over spinifex <ul style="list-style-type: none"> Widespread Significant 	7.43	1.50	EkE?AsppTbMp	Excellent	<p>Vegetation in this habitat comprised, <i>Eucalyptus kingsmillii</i>, <i>Acacia caesaneura</i> and <i>A. ramulosa</i> over <i>Triodia basedowii</i> hummock grassland and sparse tussock grasses. <i>Triodia</i> hummocks were large and long unburnt, forming rings in some areas. This habitat contained abundant woody debris and peeling bark. Soils were orange-brown loamy sand with high burrowing stability; various foraging diggings and a small burrow with evidence of varanid use were observed. No evidence of disturbance, such as feral animal tracks/ scat or vehicle tracks, was recorded within this habitat.</p> <p>The lack of disturbance within this habitat with the presence of hummocks, woody debris and peeling bark would provide suitable habitat for a variety of small mammal and lizard species. For example, evidence of burrow use by varanids was observed, and peeling bark commonly provides habitat for varanid and gecko species. Long unburnt spinifex may provide habitat for conservation significant species such as the Brush-tailed mulgara (P4).</p>	 	
Open plain <ul style="list-style-type: none"> Widespread Limited significance 	76.44	15.41	EffEm PoSafMpEpEc AcAiEff	Degraded – Very Good	<p>Areas with minimal vegetation, largely comprising bare plains or a sparse cover of low shrubs including <i>Eremophila fraseri</i>, <i>E. margarethae</i> <i>Ptilotus obovatus</i>, <i>Senna artemisioides</i> and <i>Maireana pyramidata</i> over open tussock grasses. Vegetation was typically over bare stony plains, with minimal woody debris and leaf litter. This habitat showed evidence of feral camel and cattle tracks, clearing, rabbit scat, and vehicle tracks.</p> <p>These areas would provide minimal habitat for fauna owing to the lack of shelter and tall vegetation.</p>	 	

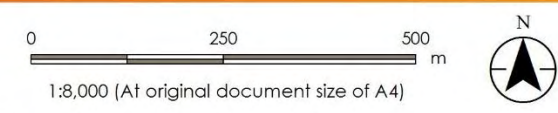
Habitat type	Proportion of Study Area		Veg. Assoc.	Condition	Value to fauna	Reference Photograph	
	ha	%					
Cleared <ul style="list-style-type: none"> • Widespread • Limited significance 	21.19	4.28	C	Completely Degraded	Cleared areas largely comprised completely degraded bare open ground (e.g. along roads) with minimal vegetation, debris and coarse fragments. These open habitats lack shelter and complexity and would provide minimal value to fauna.		



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- Project Survey Areas**
- Camp
- Fauna Habitat**
- Drainage line
 - Open plain/ cleared
 - Shrubland
 - Minor Road
 - Tracks



Notes

1. Coordinate System: GDA 1994 MGA Zone 51
2. Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2017)



Project Location
 Stantec Australia Pty Ltd
 Perth
 Western Australia

Prepared by CJT on 7/06/2018
 Technical Review by PB on 7/06/2018

Client/Project
AGNEW GOLD MINING COMPANY PTY LTD
 Agnew Gold Mine Detailed Flora and Vegetation
 and Level 1 Fauna Survey

Drawing Name:
 AGNE_FF_A3_Habitat_Camp

Title
 Fauna Habitats of the Study Area - Camp

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Figure 5-14: Fauna habitats within the Camp Study Area

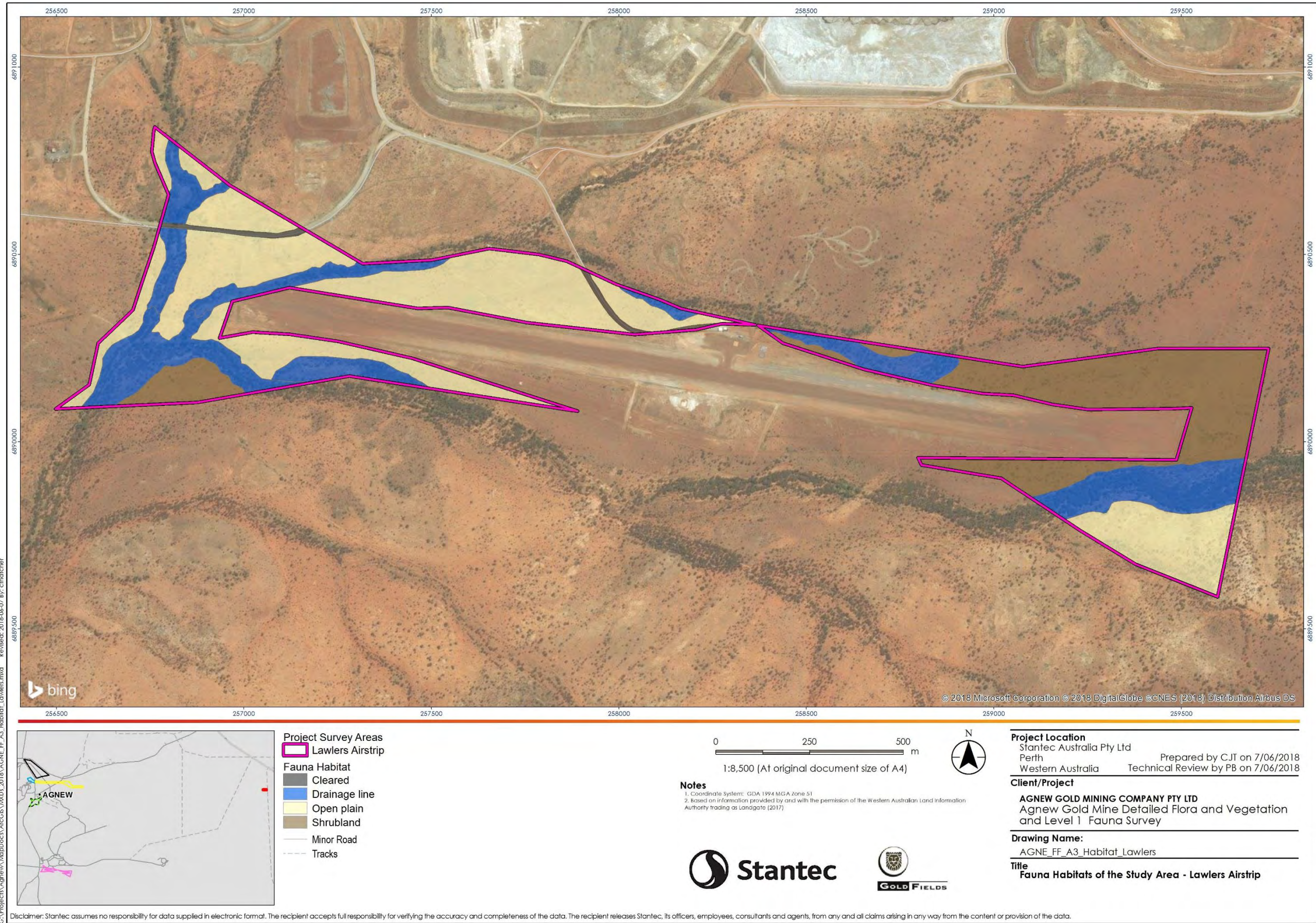
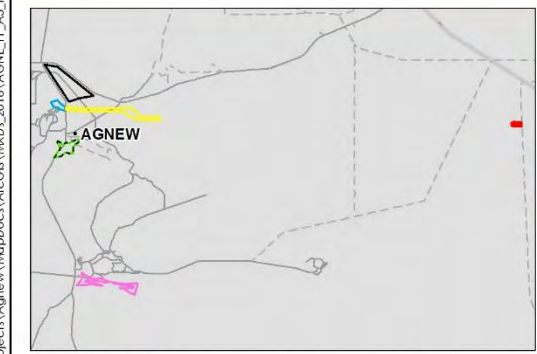
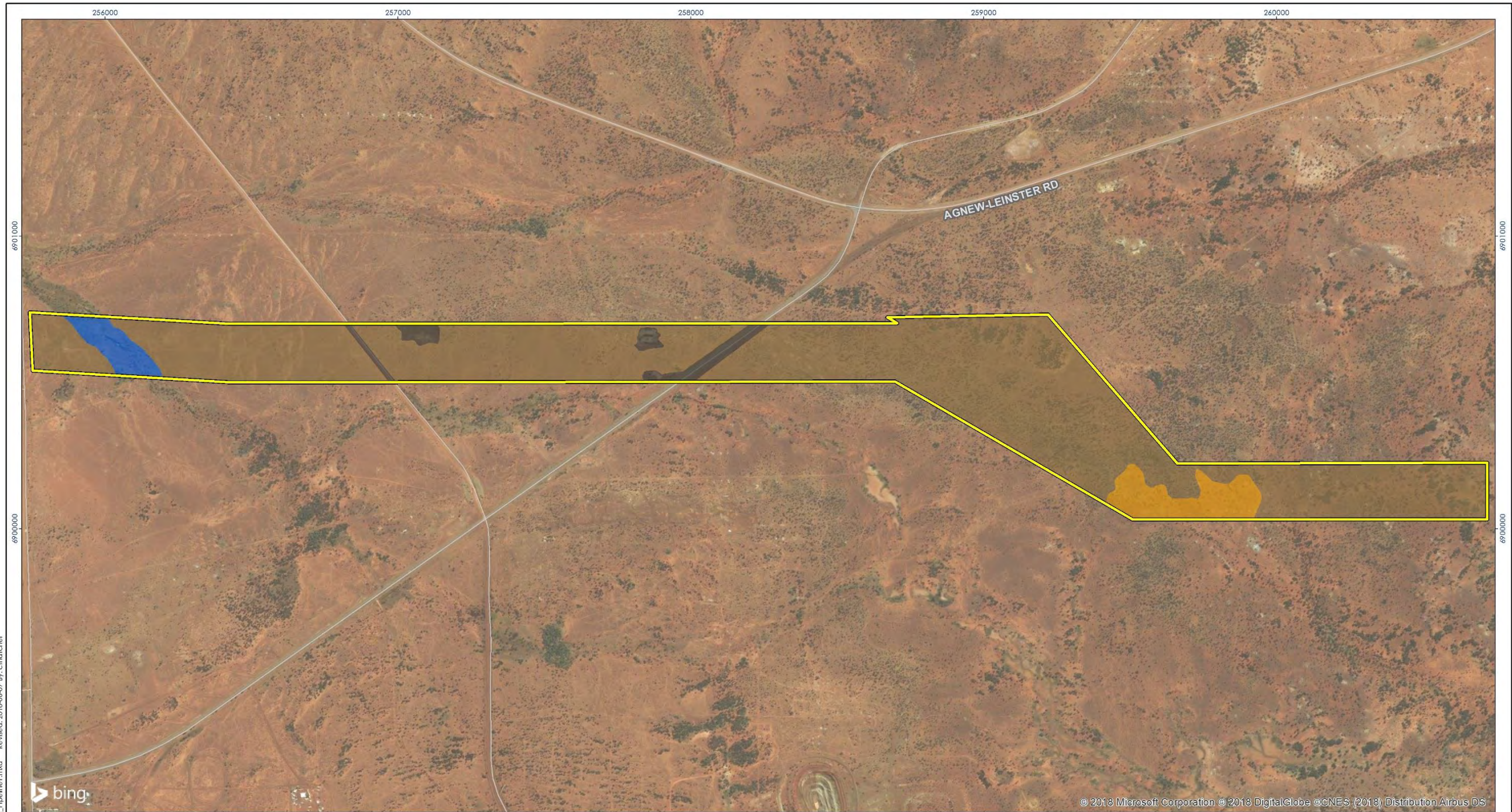


Figure 5-15: Fauna habitats within the Lawlers Airstrip Study Area



- Project Survey Areas**
- Pipeline 1
- Fauna Habitat**
- Cleared
 - Drainage line
 - Rocky/outcropping
 - Shrubland
 - Minor Road

0 250 500 m
 1:12,500 (At original document size of A4)

Notes

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 Agnew Gold Mine Detailed Flora and Vegetation
 and Level 1 Fauna Survey

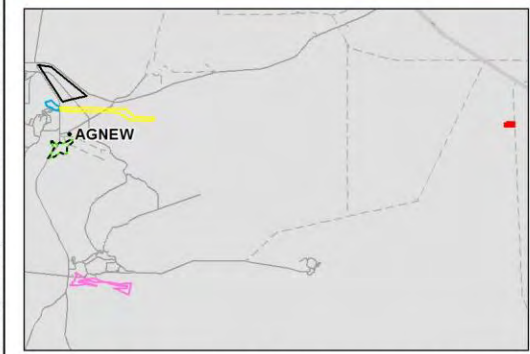
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 AGNE_FF_A3_Habitat_Pipeline1

Title
 Fauna Habitats of the Study Area - Pipeline 1



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Figure 5-16: Fauna habitats within the Pipeline 1 Study Area



Project Survey Areas
 Pipeline 2

Fauna Habitat
 Acacia over spinifex

Tracks

0 50 100 m
 1:2,500 (At original document size of A4)



Notes
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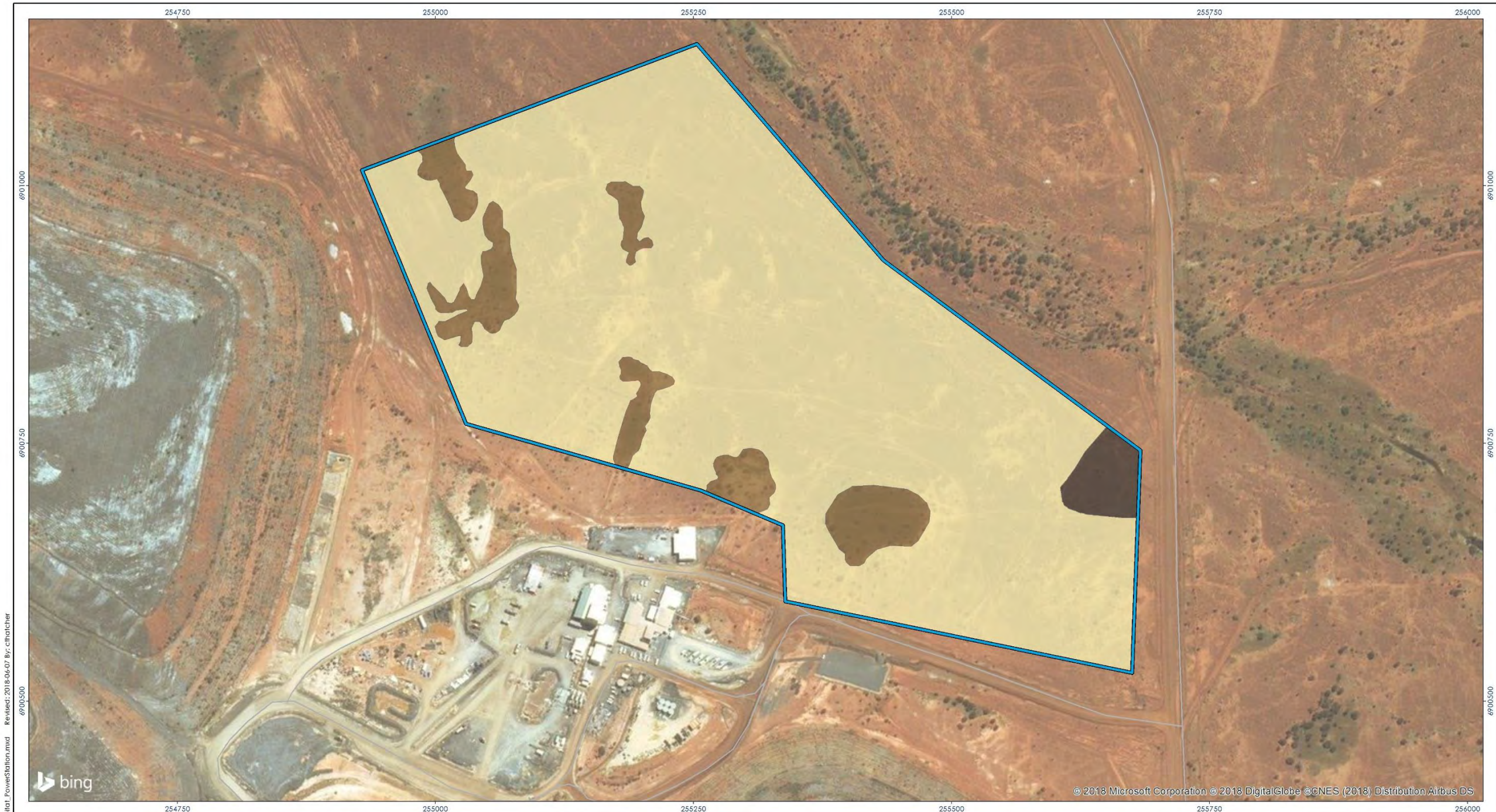
Client/Project
 AGNEW GOLD MINING COMPANY PTY LTD
 Agnew Gold Mine Detailed Flora and Vegetation
 and Level 1 Fauna Survey

Drawing Name:
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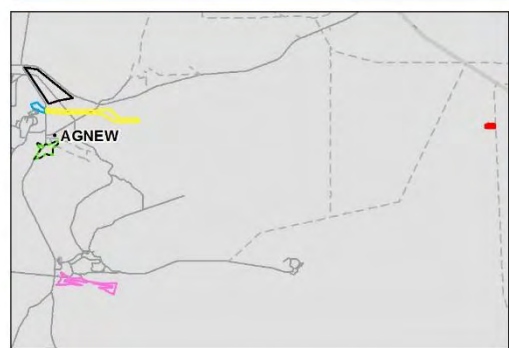
Title
 Fauna Habitats of the Study Area - Pipeline 2

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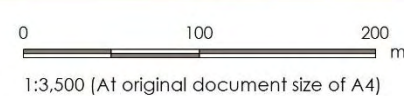
Figure 5-17: Fauna habitats within the Pipeline 2 Study Area



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- Project Survey Areas**
- Power Station
- Fauna Habitat**
- Cleared
 - Open plain
 - Shrubland
 - Minor Road



Notes

1. Coordinate System: GDA 1994 MGA Zone 51
2. Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2017)



Project Location
 Stantec Australia Pty Ltd
 Perth
 Western Australia

Prepared by CJT on 7/06/2018
 Technical Review by PB on 7/06/2018

Client/Project
AGNEW GOLD MINING COMPANY PTY LTD
 Agnew Gold Mine Detailed Flora and Vegetation
 and Level 1 Fauna Survey

Drawing Name:
 AGNE_FF_A3_Habitat_PowerStation

Title
 Fauna Habitats of the Study Area - Power Station

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Figure 5-18: Fauna habitats within the Power Station Study Area

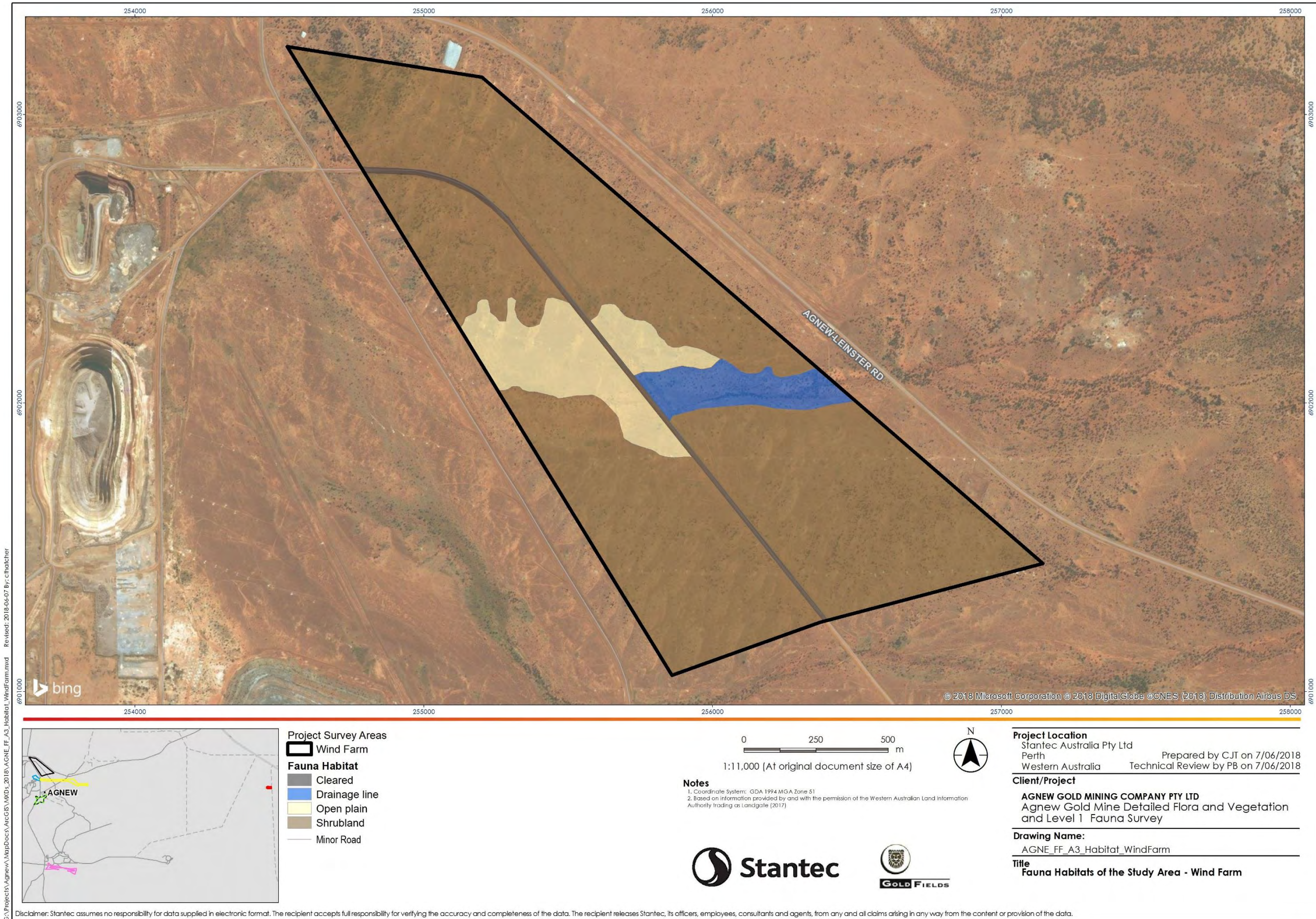


Figure 5-19: Fauna habitats within the Wind Farm Study Area

5.5.2 Fauna Assemblages

The field survey recorded a total of 12 species of vertebrate fauna, of which six were mammals, five were birds and one was a reptile (**Table 5-13**). No species of conservation significance was recorded. Four introduced species were recorded; the rabbit, dog, camel and European cattle.

Table 5-13: Vertebrate fauna species recorded from the Study Area during the field survey

Species Name	Common Name	EPBC	WA
<i>Osphranter robustus</i>	Euro		
<i>Osphranter rufus</i>	Red Kangaroo		
<i>Oryctolagus cuniculus</i>	*Rabbit		
<i>Canis lupus</i>	*Dog		
<i>Camelus dromedarius</i>	*Camel		
<i>Bos taurus</i>	*European Cattle		
<i>Aquila audax</i>	Wedge-tailed Eagle		
<i>Ocyphaps lophotes</i>	Crested Pigeon		
<i>Pomatostomus superciliosus</i>	White-browed Babbler		
<i>Oreoica gutturalis</i>	Crested Bellbird		
<i>Rhipidura leucophrys</i>	Willie Wagtail		
<i>Varanus panoptes rubidus</i>			

5.5.3 Fauna of Conservation Significance

Of the 280 species of vertebrate fauna identified during the desktop, 28 species are listed as being of conservation significance, comprising eight mammals, 19 birds and one reptile (**Table 5-14**). In addition, two invertebrate species of conservation significance, Moriarty's trapdoor spider (*Kwonkan moriartii*) and *Idiosoma clypeatum* (formerly identified as the Shield-back Trapdoor Spider, *Idiosoma nigrum*) were identified. Of the 28 vertebrate species in the desktop study:

- 10 are listed as Threatened under the EPBC Act and/or BC Act;
- Six are recognised by DBCA as Priority fauna. DBCA recognises several species that are not listed under the BC Act or the EPBC Act but for which there is some conservation concern, and has produced a supplementary list of Priority fauna;
- One species is recognised by the state (BC Act) to be in need of special protection;
- 14 species are listed as Migratory under the EPBC Act and/or Schedule 5 under the BC Act; and
- One species, the Burrowing Bettong (*Bettongia lesueur graii*), is considered to be extinct in the Murchison. This was only included as a moderately certain record of secondary signs from the DBCA database search and is likely to be remnants of an old burrow system that was created prior to the species going extinct. As this species only persists in translocated or island populations in areas with fox and feral cat exclusion (van Dyck and Strahan 2008), the species is not considered to occur in the area and has been excluded from the likelihood table.

Some of the species referred to above, listed as Threatened, Migratory and/or Priority fauna, may be included in multiple groups. The likelihood for species of conservation significance occurring in the Study Area was assessed and ranked based on the definitions described in the methodology. No conservation significant vertebrate fauna were recorded within the Study Area during field survey.

Six species of conservation significance were considered to possibly occur within the Study Area and the remaining 24 were considered unlikely to occur (**Table 5-14**).

Table 5-14: Fauna of conservation significance potentially occurring within the Study Area

Common name (Scientific name)	Conservation status		Broad habitat type	Likelihood of occurrence Reason for likelihood
	EPBC Act	In WA		
Mammals				
Brush-tailed Mulgara (<i>Dasyercus blythi</i>)	-	P4	Inhabit spinifex grass plains within the arid zone (van Dyck and Strahan 2008).	Possible The Study Area lies within the species range, however only contains a small amount of suitable habitat within the pipeline east area (van Dyck and Strahan 2008). Most species records occur ~80 km north of the Study Area, with the closest recent records from 2004 and 2006 occurring 49 km and 67 km north respectively (Bamford Consulting Ecologists 2011, Biota 2017b, DBCA 2018d).
Crest-tailed Mulgara (<i>Dasyercus cristicauda</i>)	Vu	P4	Sand dunes with sparse Sandhill Canegrass and salt lakes with Nitre Bush (van Dyck and Strahan 2008).	Unlikely Although two species of Mulgara are known to occur in Australia, it is now recognised that only the Brush-tailed Mulgara (<i>Dasyercus blythi</i>) (Priority 4 DBCA) occurs within Western Australia (DoEE 2018, (DoEE 2018b, van Dyck and Strahan 2008). The Crest-tailed Mulgara (<i>Dasyercus cristicauda</i>) (Vulnerable EPBC Act) is restricted in its distribution to the eastern portion of the Northern Territory, South Australia and potentially Queensland (DoEE 2018, (DoEE 2018b, van Dyck and Strahan 2008).
Long-tailed Dunnart (<i>Sminthopsis longicaudata</i>)	-	P4	Rocky, hilly areas, occasionally open areas with a stony, rocky mantle (van Dyck and Strahan 2008).	Possible The Study Area occurs within the species range, contains some suitable rocky areas and lies in close proximity (2km) to suitable outcropping habitat (van Dyck and Strahan 2008). The closest recent nearby records of the species comprise several during 2011 and 2012 ~90 km southwest of the Survey Area in Mt Forrest (DBCA 2018d). Owing to the distance of the records, the species is considered to possibly occur.
Chuditch(<i>Dasyurus geoffroii</i>)	Vu	S3	Inhabits a range of forest, shrub and desert habitats, currently inhabits sclerophyll forest, dry woodland, heath and mallee shrubland in southwest Australia (van Dyck and Strahan 2008).	Unlikely The Study Area occurs outside the species range and does not contain suitable habitat (van Dyck and Strahan 2008). Furthermore, the species has not been recorded nearby. The species was only included as 'may occur' by the Protected Matter Search Tool (DoEE 2018a) and as such is considered unlikely to occur.
Bilby (<i>Macrotis lagotis</i>)	Vu	S3	Occupy a range of habitats including sandplains and dune fields with spinifex, acacia shrubland on red soils and stony downs and Mitchell Grass near cracking clay (van Dyck and Strahan 2008).	Unlikely While the Study Area contains suitable habitat, it occurs outside the species current range (van Dyck and Strahan 2008). The species has not been recorded recently nearby (DBCA 2018d), and is therefore considered unlikely to occur.
Black-footed Rock-wallaby (<i>Petrogale lateralis lateralis</i>)	En	S2	Occupies a wide range of habitats including rocky areas, spinifex on rocky hills, sandstone gorges and temperate rocky islands (van Dyck and Strahan 2008).	Unlikely The Study Area occurs within the species range, contains some suitable rocky habitat and lies in close proximity (2 km) to suitable outcropping habitat (van Dyck and Strahan 2008). However only secondary signs (e.g. scats) of the species have been recorded on three occasions, the closest and most recent of which is 88 km northwest of the Study Area during 2015 (Bamford Consulting Ecologists 2011, DBCA 2018d). Due to this, the species is considered unlikely to occur.
Greater Long-eared Bat (<i>Nyctophilus major tor</i>)		P4	Commonly inhabits Eucalypt woodlands with a shrub storey, particularly within areas with she-oak and wattle vegetation surrounding granite outcrops and dams (van Dyck and Strahan 2008). Roosts in tree crevices, loose bark and foliage (van Dyck and Strahan 2008).	Unlikely The Study Area contains areas of Eucalyptus trees over shrubs that may provide suitable habitat (van Dyck and Strahan 2008). However only one tree within degraded habitat in the northwest airport area contained a hollow (van Dyck and Strahan 2008). The Study Area lies to the north of the species expected range (van Dyck and Strahan 2008), however the distribution remains unclear and the species was recorded north of the Study Area (105 km northwest) during a 2009/2010 survey (Bamford Consulting Ecologists 2011). As this is the only record of the species within the area, the species is considered unlikely to occur.
Birds				
Night parrot (<i>Pezoporus occidentalis</i>)	En	S1	Known to inhabit treeless or sparsely wooded long unburnt spinifex hummock plains often interspersed with chenopods (Pyke and Ehrlich 2014).	Unlikely The Study Area only contains small areas of long unburnt spinifex, in some cases forming rings, within pipeline east however the hummocks were generally low in size (approx. 30cm) and therefore unlikely to form suitable shelter DPaW 2017. Additionally, the species is extremely rare and has not been recorded nearby (DBCA 2018d, Pizzey and Knight 2007).
Princess Parrot (<i>Polytelis alexandrae</i>)	Vu	P4	Often found far from fresh water, inhabits areas with spinifex under Eucalypts, acacias, desert oaks and poplars, hakeas and mistletoes or vegetation near saltlakes (Pizzey and Knight 2007).	Unlikely The species has not been recorded recently nearby, and the Study Area lies within the irregular species range (Pizzey and Knight 2007). Furthermore, the species is typically nomadic and rare (Pizzey and Knight 2007).
Striated Grasswren (<i>Amytornis striatus striatus</i>)	-	P4	Inhabits areas with Acacia and mallee over spinifex and inland and coastal scrubs (Pizzey and Knight 2007). Nests in spinifex domes (Pizzey and Knight 2007).	Unlikely While the Study Area contains suitable habitat, particularly the long unburnt spinifex within pipeline east, it lies outside of the species range (Pizzey and Knight 2007). The species has only been recently recorded nearby once in Wanjarri Nature Reserve with moderate certainty, ~74 km from the Study Area in 2016 (DBCA 2018d).
Malleefowl (<i>Leipoa ocellata</i>)	Vu	S3	Mainly scrubs and thickets of mallee, boree and bowgada, but also other litter forming shrublands (Johnstone and Storr 1998).	Unlikely The Study Area lies within the species range (Pizzey and Knight 2007). Most recent species records include a substantial number between 2011 and 2013 near Mt Forrest (~90 km southwest of the Survey Area) and a mound with evidence of activity within the last 10 years recorded during a 2009/2010 survey ~105 km from the Study Area (Bamford Consulting Ecologists 2011, DBCA 2018d). However the Study Area tended to contain open areas of scrub with minimal litter aside from denser drainage lines, which does not comprise ideal habitat (Johnstone and Storr 1998). As such the species is considered unlikely to occur.

Common name (Scientific name)	Conservation status		Broad habitat type	Likelihood of occurrence Reason for likelihood
	EPBC Act	In WA		
Fork-tailed Swift (<i>Apus pacificus</i>)	Mi	S5	Aerial species, which forages high above the tree canopy and rarely lower (Johnstone and Storr 1998). Occurs over a range of habitats including islands, open country, coasts, semi-deserts, urban, forests (Pizzey and Knight 2007).	Possible The Study area occurs within the species range and the species utilises a wide range of habitats (Pizzey and Knight 2007). However, the only recent nearby records of the species were recorded ~83 km northwest of the Study Area in 2015 and ~119 km west of the Study Area during 2009 (DBCA 2018d)., and the species tends to be uncommon unless weather conditions result in occasional mass movements (Pizzey and Knight 2007). Due to this, the species is considered to possibly occur.
<ul style="list-style-type: none"> Yellow Wagtail (<i>Motacilla flava</i>) Grey Wagtail (<i>Motacilla cinerea</i>) 	Mi	S5	Yellow and Grey Wagtails are listed as rare vagrants to the Australian continent from the North. Inhabit areas associated with water including running water/ streams, sewage ponds, swamp margins and saltmarshes and lawns, ploughed fields and airfields (Pizzey and Knight 2007).	Unlikely The species tend to mainly occur near the Australian coast and have not been recorded nearby. The Study Area does not contain suitable habitat (Pizzey and Knight 2007), and as such the species is considered unlikely to occur. The species were identified as the 'species or species habitat may occur in the area' (DoEE 2018a).
Ten Shearwater, Plover, Sandpiper, Knot and Greenshank species from the families: <ul style="list-style-type: none"> Scolopacidae Charadriidae 	Mi, En, Cr	S5, S3	Small to large sized shore birds. Inhabit shallow aquatic areas on coasts, mudflats, saltmarshes, estuaries, lake margins and other inland waters and bore or grassy plains (Johnstone and Storr 1998).	Unlikely The species have not been recorded nearby within the last 20 years (DBCA 2018d). This is with the exception of the Common Greenshank, which was observed in suitable lake habitat ~123 km southeast of the Study Area in 2009, and the streaked shearwater, observed in 2012 ~114 km south of the Study Area (DBCA 2018d). The Study Area does not contain suitable habitat (Pizzey and Knight 2007) and therefore the species are considered unlikely to utilise the Study Area.
Gull-billed Tern (<i>Sterna nilotica</i>)	Mi	S5	Shallow sheltered seas close to land, estuaries, tidal creeks; and inundated sapphire flats, flooded salt lakes, clay pans and watercourses in the interior (Johnstone and Storr 1998). Tends to breed on islands in inland lakes (Pizzey and Knight 2007).	Unlikely The Study Area occurs within the species range however does not contain suitable habitat (Pizzey and Knight 2007). The species has only been recorded three times nearby; twice ~33 km north of the Study Area at Lake Miranda and ~88 km northwest of the Study Area, all during 2015 (Birdlife Australia 2018, DBCA 2018d). Due to this, the species is considered unlikely to utilise the Study Area.
Peregrine Falcon (<i>Falco peregrinus</i>)	-	S7	The species occurs along cliffs, gorges, wooded rivers, wetlands, plains and open woodlands, as well as in association with pylons and buildings (Pizzey and Knight 2007). Nests on cliffs, in crevices, large tree hollows or on building ledges (Pizzey and Knight 2007).	Possible The species has been recorded in the area during 2000, 2005 and 2011 >75km from the Study Area and ~42 km west of the Study Area during 2006 (Birdlife Australia 2018, DBCA 2018a). The Study contains suitable habitat and occurs within the species range, however does not contain nesting habitat and the species tends to be uncommon (Pizzey and Knight 2007). Due to this, the Peregrine Falcon is considered to possibly occur.
Reptiles				
Great Desert Skink (<i>Liopholis kintorei</i>)	Vu	S3	Arid areas with spinifex sandflats and clay/ loamy soils (Wilson and Swan 2013).	Unlikely The Study Area contains a small area of suitable habitat within pipeline east, however the species has not been recorded in the region since the 1960s (DBCA 2018d).
Invertebrates				
<i>Idiosoma clypeatum</i>		P3	Widely distributed throughout arid areas of the Murchison and Yalgoo bioregions (Rix <i>et al.</i> 2018).	Possible The <i>Idiosoma</i> genus has recently undergone taxonomic revision. <i>Idiosoma clypeatum</i> (formerly known by WAM identification code 'MYG018') is now recognised as a distinct species from <i>Idiosoma nigrum</i> . <i>Idiosoma nigrum</i> was identified by the Threatened Fauna DBCA database search as occurring in the vicinity of the Study Area, however it is now recognised as only occurring in the central and central-western Wheatbelt bioregion (DBCA 2018b, d, Rix <i>et al.</i> 2018). <i>Idiosoma clypeatum</i> has recently been classified as P3, with a range extending "from near Paynes Find, the Blue Hill Range, Kadji Kadji Nature Reserve, and Karara in the south, north and north-east to at least Coolcalalaya Homestead, Jack Hills, Albion Downs, Yakabindie, and Yeelirrie" (Rix <i>et al.</i> 2018). The Study Area lies within this range, and the species was recorded on eleven occasions during a 2015 survey ~101 – 130km north west of the Study Area. As such, the species is considered to possibly occur.
Moriarty's trapdoor spider (<i>Kwonkan moriartii</i>)	-	P2	-	Unlikely There are two records of the species collected ~52 km and 54 km north of the Study Area in 1962 (DBCA 2018d). Given that the date of collection (13/01/1962) is the same for both specimens, it is possible that one of the records is erroneous. There are no other records of this species. Given that there has not been any records of the species within the last 50 years, it is unlikely the species occurs within the Study Area.

6. Discussion

The total number of flora taxa recorded from the quadrats and opportunistic sampling amounted to 121, which is comparable to similar surveys undertaken in the vicinity of the Study Area and within the region. None of the species recorded represent a Threatened flora species, however two are listed as Priority four species: *Eremophila pungens* and *Grevillea inconspicua*. Both *E. pungens* and *G. inconspicua* were recorded from the Pipeline 1 PSA, in the Aspp.EoaDrSsPoAc and AqAsppC@dEffAc vegetation types, respectively.

The vegetation types recorded within the Study Area are generally representative of what would be expected from similar landforms in the Murchison bioregion. A total of 23 vegetation types were recorded within the Study Area, none of which are analogous to any listed TECs or PECs. Although vegetation types Aspp.EoaDrSsPoAc and AqAsppC@dEffAc supported conservation significant species, neither of these species are considered to be restricted to these vegetation types and are represented outside of the survey area, in both the local area and within the broader region.

The vegetation condition of the Study Area ranged from 'Excellent' to 'Completely Degraded'. Just over 10% of the Study Area was considered to be in 'Degraded' or 'Completely Degraded' condition and a minor extent (1.5%) has been cleared for roads and access tracks. Weed diversity and density was considered low, with only four species recorded within Lawlers Airstrip PSA: **Bidens bipinnata*, **Malvastrum americanum* and **Cynodon dactylon*, **Citrullus colocynthis*. These species were recorded growing in association with ephemeral creeks and drainage lines that had been impacted by current and historical pastoral activities. None of the weed species recorded represent a declared pest or Weed of National Significance.

Six fauna habitats were identified within the Study Area; shrubland, drainage line, rocky/outcropping, *Acacia* over spinifex, open plain and cleared. Of these, rocky/outcropping was considered limited extent and rocky/outcropping and *Acacia* over spinifex were considered to have the highest potential significance to fauna. This is owing to the limited extent of the complex and unique habitat provided by rocky outcrops, and the potential for these habitats to support conservation significant fauna possibly occurring within the Study Area. These include the Great Desert Skink (Vu, S3), Long-tailed Dunnart (P4) and Brush-tailed Mulgara (P4).

A total of 12 species of vertebrate fauna were recorded during the field survey, none of which were of conservation significance. Five species of conservation significance were considered to possibly occur based on habitat suitability, species range and previous records; the Brush-tailed Mulgara (P4), Long-tailed Dunnart (P4), Fork-tailed Swift (Mi S5), Peregrine Falcon (S7) and *Idiosoma clypeatum*, a trapdoor spider formerly recognised as *Idiosoma nigrum* (P3).

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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 (Cwlth) (EPBC Act) and/or the Biodiversity Conservation Act 2016 (WA) (BC 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 BC 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

Appendix B Vegetation Condition Scale: Eremaean Province

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.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires, or aggressive weeds.
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 C Vegetation Structure Scale

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							

Growth Form	Height ranges (m)	Structural Formation Classes						
heath shrub	>2 Tall	closed heathland	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrubs
	1-2 Mid							
	<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

Appendix D Conservation Significant Flora Identified in the Desktop Assessment, and likelihood of occurrence within the Study Area

Taxon	Priority List	WC Act	EPBC Act	Flowering time	Habitat	Nearest (km)	Locality	Likelihood of occurrence in Study Area
<i>Eremophila pungens</i>	4			Jun. - Aug.	Sandy loam, clayey sand over laterite. Plains, ridges, breakaways.	In adjoining pipeline (Astron 2012)		Confirmed
<i>Grevillea inconspicua</i>	4			Jun. - Aug.	Loam, gravel. Along drainage lines on rocky outcrops, creeklines.	Coincident with Pipeline 1 PSA (Woodman Environmental Consulting 2006)		Confirmed
<i>Verticordia jamiesonii</i>	3			Sep. - Aug.	Sandy clay soils. Lateritic breakaways.	7.64		Very likely: The Study Area is located within the distribution range of this taxon and contains suitable habitat.
<i>Thryptomene</i> sp. <i>Leinster</i> (B.J. Lepschi & L.A. Craven 4362)	3			-	Upper slopes of low granitic hills. Quartzitic pebbles.	8.24		Very likely: The Study Area is located within the distribution range of this taxon and contains suitable habitat.
<i>Baeckea</i> sp. <i>Sandstone</i> (C.A. Gardner s.n. 26 Oct. 1963)	3			Oct.	Flat. Dry orange sand/loam. Fire history: less than 4 years.	8.5		Very likely: The Study Area is located within the distribution range of this taxon and contains suitable habitat.
<i>Hemigenia exilis</i>	4			Sep. - Nov.	Laterite. Breakaways, slopes.	17.24		Likely: The Study Area lies close to the known location, and contains suitable habitat
<i>Phyllanthus baeckeoides</i>	3			Jul. - Sep.	Red lateritic & sandy clay soils. Granite outcrops.	21.28		Likely: The Study Area lies close to the known location, and contains suitable habitat
<i>Thryptomene nealensis</i>	3			Oct.	Lateritic breakaways. On duricrust breakaway, skeletal soils.	23.28		Likely: The Study Area lies close to the known location, and contains suitable habitat
<i>Micromyrtus chrysodema</i>	1			-	Flat plain. Red loamy sand to red sand.	26.88		Likely: The Study Area lies close to the known location, and contains suitable habitat
<i>Eremophila arachnoides</i> subsp. <i>arachnoides</i>	3			Sep.	Shallow loam over limestone.	34.55		Likely: The Study Area lies close to the known location, and contains suitable habitat
<i>Goodenia modesta</i>	3			Dec.	Red loam, sand.	37.85		Likely: The Study Area lies close to the known location, and contains suitable habitat

<i>Stenanthemum patens</i>	1			-	Slope. Dry red sand/loam. Mid to lower slopes of hill with orange stony, sandy loam and decomposing gabra. Banded ironstone and basalt (midslopes).	44.88	Possible: The Study Area is located north of a known location of this taxon, outside of its distribution range, however, contains suitable habitat.
<i>Austroparmelina macrospora</i>	3			-	Growing on living and dead Casuarina sp. On edge of salt depression.	45	Unlikely: Salt pans and clay depressions were not identified in the Study Area.
<i>Rhagodia</i> sp. Yeelirrie Station (K.A. Shepherd et al. KS 1396)	1			-	Calcrete. Red cracking clay over calcrete. Claypans.	50.35	Unlikely: The Study Area is located outside of the known distribution of this taxon and does not contain suitable habitat.
<i>Calytrix praecipua</i>	3			Sep. - Nov.	Skeletal sandy soils over granite or laterite. Breakaways, outcrops.	59	Unlikely: The Study Area is located outside of the known distribution of this taxon.
<i>Hybanthus floribundus</i> subsp. <i>chloroxanthus</i>	3			Aug. - Oct.	Dark red-brown soil, never sandy, rich in iron oxide, laterite. Rocky areas, creek banks, along drainage lines.	Within Study Area	Very Likely: The Study Area is located outside of the known distribution of this taxon.
<i>Eremophila simulans</i> subsp. <i>megacalyx</i>	3			Aug. - Sep.	Rangeland plain. Road verge with red, sandy gravel laterite.	86.9	Unlikely: The Study Area is located outside of the known distribution of this taxon.
<i>Eremophila</i> sp. long pedicels (G. Cockerton 1975) PN	2			Sep.	Dark red hardpans over paleochannel. Mulga woodland.	88.3	Unlikely: The Study Area is located outside of the known distribution of this taxon and does not contain suitable habitat.
<i>Pityrodia canaliculata</i>	1			Jun. - Sep.	Flat sandy/loam plain. Red/brown soil.Roadsides.	89.96	Unlikely: The Study Area is located outside of the known distribution of this taxon.
<i>Labichea eremaea</i>	3			Aug.- Sep.	Sandplain, sandy loam. At base of sand dunes.	95.6	Unlikely: The Study Area is located outside of the known distribution of this taxon and does not contain suitable habitat.
<i>Sauropus</i> sp. Woolgorong (M. Officer s.n. 10/8/94)	3			Jun.	Red sand. Plains. Red sandy clay loam with granitic pebbles. Slightly rocky banded ironstone, weathered banded ironstone outcrop with red	99.53	Unlikely: The Study Area is located outside of the known distribution of this taxon.

					orange shallow sandy loam soils.		
<i>Cratystylis centralis</i>	3			-	Red sandy loam with ironstone gravel. Flat plains, breakaway country.	104.46	Unlikely: The Study Area is located outside of the known distribution of this taxon and does not contain suitable habitat.
<i>Baeckea</i> sp. London Bridge (M.E. Trudgen 5393)	3			Oct. - Nov.	Gravel, sandstone. Rocky breakaways & hills.	113.4	Unlikely: The Study Area is located outside of the known distribution of this taxon.
<i>Dampiera plumosa</i>	1			Oct.	Red sand. In swale at base of sand dune.	131.72	Unlikely: The Study Area is located outside of the known distribution of this taxon.
<i>Mirbelia stipitata</i>	3			Aug.	In red sandy loam under mulga.	137.09	Unlikely: The Study Area is located outside of the known distribution of this taxon.
<i>Bossiaea eremaea</i>	3			Jul. - Sep.	Sandplain, red sand.	138.4	Unlikely: The Study Area is located outside of the known distribution of this taxon.
<i>Eremophila annosocaulis</i>	3			-	Rocky sloping plain in rangeland with brown loam / rocky soil.	142.44	Unlikely: The Study Area is located outside of the known distribution of this taxon.
<i>Calytrix verruculosa</i>	3			Aug.- Oct.	Sandy red clayey loam. Mid slope of small hill with small rocks on surface.	254.46	Unlikely: The Study Area is located outside of the known distribution of this taxon and does not contain suitable habitat.
<i>Hibbertia</i> sp. Sherwood Breakaways (R.J. Cranfield 6771)	2			-	On breakaway. Around creek crossing. Clayey sand over laterite.	-	Unlikely: The Study Area is located outside of the known distribution of this taxon and does not contain suitable habitat.

1 – Source codes – A: (DBCA 2018a); B: (DBCA 2018c); (DoEE 2018a).

2 – See **Appendix A** for terms and descriptions for conservation codes.

Appendix E Vertebrate Fauna Identified in the Desktop Assessment

Legend:

A Current Survey

Database searches:

B Threatened and Priority Fauna Search (DBCA 2018d)

C Protected Matters Search Tool (DoEE 2018c)

D NatureMap Database (DBCA 2018a)

E Birdata: Custom Atlas Bird List (Birdlife Australia 2018)

Literature Review

F Agnew Pipeline Vegetation, Flora and Fauna Survey (Astron 2012)

G Vertebrate Fauna Assessment Yeelirrie Project. Baseline Report (Bamford Consulting Ecologists 2011)

H Mt Keith Satellite Proposal Vertebrate Fauna Review (Biota 2017b)

I Effects of short-term drought on the avifauna of Wanjarri Nature Reserve: What do they tell us about drought refugia? (Craig and Chapman 2003)

J Agnew Fauna Survey (ENV 2008)

K Environmental Appraisal for the Flora and Fauna at the Proposed Songvang Open Cut Mine (Minesite Rehabilitation Services 2003)

L Level 1 Flora and Fauna Survey of the Hidden Secret, Leviathan and Songvang Corridor Project Areas (Rapallo Environmental 2017b)

Family	Species Name	Common Name	EPBC	WA	A	B	C	D	E	F	G	H	I	J	K	L
Mammals																
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna								X	X	X				
Dasyuridae	<i>Antechinomys laniger</i>	Kultarr						X								
	<i>Dasyercus blythi</i>	Brush-tailed Mulgara		P4		X					X	X				
	<i>Dasyercus cristicauda</i>	Crest-tailed Mulgara	Vu	P4		X										
	<i>Dasyurus geoffroi</i>	Chuditch	Vu	S3			X									
	<i>Ningau ridei</i>	Wongai Ningau						X			X	X				
	<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus									X					
	<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart											X			
	<i>Sminthopsis dolichura</i>	Little long-tailed Dunnart											X		X	
	<i>Sminthopsis hirtipes</i>	Hairy-footed Dunnart										X				
	<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart		P4		X										
	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart									X	X			X	
<i>Sminthopsis ooldea</i>	Ooldea Dunnart									X						
Thylacomyidae	<i>Macrotis lagotis</i>	Bilby	Vu	S3		X										
Potoroidae	<i>Bettongia lesueur graii</i>	Burrowing Bettong	Ex	S4		X										
Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo												X		
	<i>Osphranter robustus</i>	Euro			X						X					X
	<i>Osphranter robustus erubescens</i>											X		X		
	<i>Osphranter rufus</i>	Red Kangaroo			X					X	X			X	X	
	<i>Petrogale lateralis lateralis</i>	Black-footed Rock-wallaby	En	S2		X					X					
Muridae	<i>Mus musculus</i>	*House Mouse					X	X				X				
	<i>Notomys alexis</i>	Spinifex Hopping-mouse								X	X					
	<i>Pseudomys bolami</i>	Bolam's Mouse										X				
	<i>Pseudomys desertor</i>	Desert Mouse										X				
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse						X				X				
Leporidae	<i>Oryctolagus cuniculus</i>	*Rabbit			X		X			X	X			X		X
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat									X					
	<i>Taphozous hilli</i>	Hill's Sheathtail-bat												X		
Molossidae	<i>Austronomus australis</i>	White-striped Freetail-bat									X			X		X
	<i>Ozimops petersi</i>	Inland Free-tailed Bat									X			X		
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat									X			X		X
	<i>Chalinolobus morio</i>	Chocolate Wattled Bat														X
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat									X			X		X
	<i>Nyctophilus major tor</i>	Greater Long-eared Bat		P4							X					
	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat									X	X		X		
	<i>Vespadelus baverstocki</i>	Inland Forest Bat									X					
	<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat								X				X		
Canidae	<i>Canis lupus</i>	*Dog			X					X	X			X		X
	<i>Vulpes vulpes</i>	*Red Fox					X				X					
Felidae	<i>Felis catus</i>	*Cat					X				X					X
Equidae	<i>Equus asinus</i>	*Donkey					X									
Camelidae	<i>Camelus dromedarius</i>	*Camel			X						X					
Bovidae	<i>Bos taurus</i>	*European Cattle			X					X						X
	<i>Capra hircus</i>	*Goat					X							X		X

Family	Species Name	Common Name	EPBC	WA	A	B	C	D	E	F	G	H	I	J	K	L
Birds																
Dromaiidae	<i>Dromaius novaehollandiae</i>	Emu						X	X	X	X	X			X	
Anatidae	<i>Anas gracilis</i>	Grey Teal						X	X							
	<i>Anas superciliosa</i>	Pacific Black Duck							X							
	<i>Chenonetta jubata</i>	Australian Wood Duck						X	X							
	<i>Cygnus atratus</i>	Black Swan						X	X							
	<i>Tadorna tadornoides</i>	Australian Shelduck						X	X		X	X				
Megapodiidae	<i>Leipoa ocellata</i>	Malleefowl	Vu	S3		X	X	X			X					
Procellariidae	<i>Calonectris leucomelas</i>	Streaked Shearwater	Mi	S5		X										
Podicipedidae	<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe							X					X		
Ardeidae	<i>Ardea modesta</i>	Eastern Great Egret					X									
	<i>Ardea novaehollandiae</i>	White-faced Heron							X							
	<i>Ardea pacifica</i>	White-necked Heron							X							
Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant										X				
Accipitridae	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk							X		X	X				
	<i>Accipiter fasciatus</i>	Brown Goshawk							X			X			X	
	<i>Aquila audax</i>	Wedge-tailed Eagle			X			X	X	X	X	X		X	X	X
	<i>Elanus caeruleus axillaris</i>	Australian Black-shouldered Kite						X								
	<i>Circus assimilis</i>	Spotted Harrier							X		X					
	<i>Haliastur sphenurus</i>	Whistling Kite							X		X	X			X	
	<i>Hamirostra isura</i>	Square-tailed Kite							X							
	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard						X	X							
	<i>Hieraaetus morphnoides</i>	Little Eagle									X	X				
<i>Milvus migrans</i>	Black Kite								X							
Otididae	<i>Ardeotis australis</i>	Australian Bustard							X		X					
Rallidae	<i>Tribonyx ventralis</i>	Black-tailed Native-hen							X							
Turnicidae	<i>Turnix velox</i>	Little Button-quail							X							
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew							X		X					
Recurvirostridae	<i>Cladorhynchus leucocephalus</i>	Banded Stilt						X	X							
	<i>Himantopus himantopus</i>	Black-winged Stilt						X								
	<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet						X	X							
Charadriidae	<i>Charadrius melanops</i>	Black-fronted Dotterel						X	X			X		X		
	<i>Charadrius ruficapillus</i>	Red-capped Plover						X	X							
	<i>Charadrius veredus</i>	Oriental Plover	Mi	S5			X									
	<i>Erythrogonys cinctus</i>	Red-kneed Dotterel						X	X			X				
	<i>Pluvialis fulva</i>	Pacific Golden Plover	Mi	S5		X										
	<i>Vanellus tricolor</i>	Banded Lapwing						X	X		X				X	
Scolopacidae	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi	S5		X	X									
	<i>Calidris canutus</i>	Red Knot	En; Mi	S5		X										
	<i>Calidris ferruginea</i>	Curlew Sandpiper	Cr; Mi	S3; S5		X										
	<i>Calidris melanotos</i>	Pectoral Sandpiper	Mi	S5			X									
	<i>Tringa glareola</i>	Wood Sandpiper	Mi	S5		X										
	<i>Tringa hypoleucos</i>	Common Sandpiper	Mi	S5			X									
	<i>Tringa nebularia</i>	Common Greenshank	Mi	S5		X										
Laridae	<i>Sterna nilotica</i>	Gull-billed Tern	Mi	S5		X			X							

Family	Species Name	Common Name	EPBC	WA	A	B	C	D	E	F	G	H	I	J	K	L
Columbidae	<i>Columba livia</i>	*Domestic Pigeon					x									
	<i>Geopelia cuneata</i>	Diamond Dove							x	x						
	<i>Ocyphaps lophotes</i>	Crested Pigeon			x			x	x		x	x		x	x	x
	<i>Phaps chalcoptera</i>	Common Bronzewing						x	x	x	x	x	x		x	
	<i>Streptopelia senegalensis</i>	*Laughing Turtle-Dove					x									
Cuculidae	<i>Cacomantis pallidus</i>	Pallid Cuckoo						x	x		x	x				
	<i>Chrysococcyx basalis</i>	Horsfield's Bronze Cuckoo							x		x	x				
	<i>Chrysococcyx osculans</i>	Black-eared Cuckoo							x							
Tytonidae	<i>Tyto alba</i>	Barn Owl							x							
Strigidae	<i>Ninox boobook</i>	Boobook Owl							x		x					
Podargidae	<i>Podargus strigoides</i>	Tawny Frogmouth							x		x	x	x			
Caprimulgidae	<i>Eurostopodus argus</i>	Spotted Nightjar						x	x		x					
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar							x		x	x				
	<i>Aegotheles cristatus cristatus</i>							x								
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift	Mi	S5		x	x									
Alcedinidae	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher							x		x	x			x	
	<i>Todiramphus sanctus</i>	Sacred Kingfisher														x
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater					x		x	x	x	x			x	
Falconidae	<i>Falco berigora</i>	Brown Falcon						x	x		x	x	x		x	x
	<i>Falco berigora berigora</i>							x						x		
	<i>Falco cenchroides</i>	Australian Kestrel						x	x	x	x	x	x		x	x
	<i>Falco cenchroides cenchroides</i>													x		
	<i>Falco longipennis</i>	Australian Hobby						x	x		x					x
	<i>Falco peregrinus</i>	Peregrine Falcon		S7				x	x		x					
Cacatuidae	<i>Cacatua roseicapilla</i>	Galah						x	x	x	x	x	x	x	x	x
	<i>Nymphicus hollandicus</i>	Cockatiel						x	x		x	x			x	
Psittacidae	<i>Melopsittacus undulatus</i>	Budgerigar						x	x		x	x				
	<i>Neophema bourkii</i>	Bourke's Parrot						x	x							
	<i>Neophema elegans</i>	Elegant Parrot									x					
	<i>Pezoporus occidentalis</i>	Night Parrot	En	S1			x									
	<i>Platycercus varius</i>	Mulga Parrot						x	x		x	x		x	x	
	<i>Platycercus zonarius</i>	Australian Ringneck						x	x		x	x	x		x	
	<i>Platycercus zonarius zonarius</i>	Port Lincoln Parrot												x		
	<i>Polytelis alexandrae</i>	Princess Parrot	Vu	P4		x	x									
Ptilonorhynchidae	<i>Ptilonorhynchus maculatus guttatus</i>	Western Bowerbird						x	x		x	x		x	x	
Climacteridae	<i>Climacteris affinis</i>	White-browed Treecreeper						x	x			x	x			
	<i>Climacteris affinis superciliosus</i>							x								
Maluridae	<i>Amytornis striatus</i>	Striated Grasswren							x				x			
	<i>Amytornis striatus striatus</i>	Striated Grasswren		P4		x										
	<i>Malurus lamberti</i>	Variiegated Fairy-wren							x		x	x			x	x
	<i>Malurus leucopterus</i>	White-winged Fairy-wren						x	x		x	x				
	<i>Malurus splendens</i>	Splendid Fairy-wren							x		x	x				x
	<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren											x			
Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater						x	x		x	x		x	x	x
	<i>Anthochaera carunculata</i>	Red Wattlebird							x							

Family	Species Name	Common Name	EPBC	WA	A	B	C	D	E	F	G	H	I	J	K	L
	<i>Certhionyx variegatus</i>	Pied Honeyeater							X			X			X	
	<i>Epthianura albifrons</i>	White-fronted Chat							X							
	<i>Epthianura aurifrons</i>	Orange Chat						X	X							
	<i>Epthianura tricolor</i>	Crimson Chat							X		X			X		
	<i>Gavicalis virescens</i>	Singing Honeyeater						X	X		X	X	X	X	X	X
	<i>Lacustroica whitei</i>	Grey Honeyeater										X				
	<i>Lichenostomus leucotis</i>	White-eared Honeyeater							X							
	<i>Lichmera indistincta</i>	Brown Honeyeater						X	X		X			X		
	<i>Manorina flavigula</i>	Yellow-throated Miner						X	X	X	X	X	X	X	X	X
	<i>Ptilotula penicillatus</i>	White-plumed Honeyeater							X		X	X				
	<i>Ptilotula plumulus</i>	Grey-fronted Honeyeater							X			X	X			
	<i>Purnella albifrons</i>	White-fronted Honeyeater						X	X		X	X	X	X		
	<i>Sugomel niger</i>	Black Honeyeater							X			X				
Pardalotidae	<i>Pardalotus rubricatus</i>	Red-browed Pardalote							X							
	<i>Pardalotus striatus</i>	Striated Pardalote						X	X		X	X			X	
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill						X	X	X	X	X	X	X		X
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill						X	X		X	X	X			X
	<i>Acanthiza iredalei</i>	Slender-billed Thornbill													X	
	<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill						X	X		X	X	X			
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill						X	X		X	X	X		X	X
	<i>Aphelocephala leucopsis</i>	Southern Whiteface							X		X	X	X			X
	<i>Aphelocephala nigricincta</i>	Banded Whiteface							X							
	<i>Calamanthus campestris</i>	Rufous Fieldwren						X	X							
	<i>Gerygone fusca</i>	Western Gerygone						X	X		X				X	
	<i>Pyrrholaemus brunneus</i>	Redthroat						X	X		X					
	<i>Smicronis brevirostris</i>	Weebill						X	X	X	X	X	X	X	X	
Pomatostomidae	<i>Pomatostomus superciliosus</i>	White-browed Babbler			X			X	X		X	X	X			X
	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler							X		X	X	X	X		
Psophodidae	<i>Cinclsoma clarum</i>	Western Chestnut Quail-thrush							X							
	<i>Cinclsoma castaneothorax</i>	Chestnut-breasted Quail-thrush						X			X	X	X			
	<i>Psophodes occidentalis</i>	Western Wedgebill						X	X			X				
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow						X	X		X	X	X	X	X	X
	<i>Artamus minor</i>	Little Woodswallow							X			X		X		X
	<i>Artamus personatus</i>	Masked Woodswallow							X		X	X		X		
Cracticidae	<i>Cracticus nigrogularis</i>	Pied Butcherbird						X	X		X	X	X	X	X	X
	<i>Cracticus tibicen</i>	Australian Magpie						X	X		X	X	X	X	X	X
	<i>Cracticus torquatus</i>	Grey Butcherbird						X	X		X	X	X		X	
	<i>Strepera versicolor</i>	Grey Currawong						X	X		X	X			X	
Campephagidae	<i>Coracina maxima</i>	Ground Cuckoo-shrike						X	X		X	X				
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike						X	X		X	X			X	
	<i>Coracina novaehollandiae subpallida</i>													X		
	<i>Lalage tricolor</i>	White-winged Triller							X		X	X				
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella							X		X		X			
	<i>Daphoenositta chrysoptera pileata</i>	Varied Sittella (Black-capped Sittella)						X								

Family	Species Name	Common Name	EPBC	WA	A	B	C	D	E	F	G	H	I	J	K	L
Oreoicidae	<i>Oreoica gutturalis</i>	Crested Bellbird			x			x	x	x	x	x	x		x	x
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush						x	x		x	x	x	x		x
	<i>Pachycephala rufiventris</i>	Rufous Whistler						x	x		x	x	x		x	x
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail									x					
	<i>Rhipidura leucophrys</i>	Willie Wagtail			x			x	x	x	x	x	x	x	x	x
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark						x	x	x	x	x		x	x	
Corvidae	<i>Corvus bennetti</i>	Little Crow						x	x		x	x	x		x	
	<i>Corvus coronoides</i>	Australian Raven							x	x		x				
	<i>Corvus orru</i>	Torresian Crow						x	x		x	x	x	x	x	
Petroicidae	<i>Eopsaltria australis griseogularis</i>	Western Yellow Robin														x
	<i>Melanodryas cucullata</i>	Hooded Robin							x		x	x	x		x	
	<i>Microeca fascians</i>	Jacky Winter							x		x					
	<i>Petroica goodenovii</i>	Red-capped Robin						x	x		x	x	x		x	x
Hirundinidae	<i>Cheramoeca leucosternus</i>	White-backed Swallow						x	x		x			x		
	<i>Hirundo neoxena</i>	Welcome Swallow						x	x		x	x		x		x
	<i>Petrochelidon ariel</i>	Fairy Martin							x		x	x				
	<i>Petrochelidon nigricans</i>	Tree Martin						x	x		x	x		x	x	x
Locustellidae	<i>Megalurus cruralis</i>	Brown Songlark							x							
	<i>Megalurus mathewsi</i>	Rufous Songlark							x			x				
Zosteropidae	<i>Zosterops lateralis</i>	Silvereye							x							
Dicaeidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird							x			x			x	
Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch						x	x	x	x	x	x		x	x
Motacillidae	<i>Anthus australis</i>	Australian Pipit							x		x	x		x	x	x
	<i>Motacilla cinerea</i>	Grey Wagtail	Mi	S5			x									
	<i>Motacilla flava</i>	Yellow Wagtail	Mi	S5			x									
Reptiles																
Typhlopidae	<i>Anilius bicolor</i>										x					
	<i>Anilius hamatus</i>										x					
Carphodactylidae	<i>Nephrurus vertebralis</i>							x			x					
	<i>Underwoodisaurus milii</i>	Southern Barking Gecko						x						x		
Diplodactylidae	<i>Diplodactylus conspicillatus</i>	Variable Fat-tailed Gecko									x	x				
	<i>Diplodactylus granariensis rex</i>							x			x			x		
	<i>Diplodactylus pulcher</i>										x	x			x	
	<i>Lucasium bungabinna</i>	Southern Sand Plain Gecko						x								
	<i>Lucasium squarrosum</i>							x				x				
	<i>Rhynchoedura ornata</i>	Western Beaked Gecko									x	x		x		
	<i>Strophurus assimilis</i>	Goldfields Spiny-tailed Gecko						x								
	<i>Strophurus elderi</i>										x	x				
	<i>Strophurus strophurus</i>							x			x	x				
Gekkonidae	<i>Gehyra variegata</i>							x			x	x		x	x	x
	<i>Heteronotia binoei</i>	Bynoe's Gecko						x			x	x		x	x	x
Pygopodidae	<i>Delma butleri</i>							x			x					
	<i>Delma nasuta</i>										x					
	<i>Lialis burtonis</i>										x	x				

Family	Species Name	Common Name	EPBC	WA	A	B	C	D	E	F	G	H	I	J	K	L
	<i>Pygopus nigriceps</i>							x			x	x				
Agamidae	<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon									x				x	x
	<i>Ctenophorus isolepis</i>	Military Dragon									x	x				x
	<i>Ctenophorus isolepis gularis</i>							x						x		
	<i>Ctenophorus nuchalis</i>	Central Netted Dragon									x				x	
	<i>Ctenophorus salinarum</i>	Salt Pan Dragon						x								
	<i>Ctenophorus scutulatus</i>										x					
	<i>Diporiphora amphiboluroides</i>										x					
	<i>Moloch horridus</i>	Thorny Devil						x				x				
	<i>Pogona minor</i>											x				
	<i>Tympanocryptis cephalus</i>	Coastal Pebble-mimic dragons							x				x		x	
Scincidae	<i>Cryptoblepharus buchananii</i>										x					
	<i>Cryptoblepharus plagiocephalus</i>										x					
	<i>Ctenotus ariadnae</i>							x			x	x				
	<i>Ctenotus calurus</i>											x				
	<i>Ctenotus grandis</i>										x					
	<i>Ctenotus grandis grandis</i>							x								
	<i>Ctenotus hanloni</i>										x					
	<i>Ctenotus helenae</i>							x			x	x				
	<i>Ctenotus leonhardii</i>										x	x				
	<i>Ctenotus pantherinus</i>	Leopard Ctenotus									x	x				
	<i>Ctenotus quattuordecimlineatus</i>											x				
	<i>Ctenotus schomburgkii</i>										x					
	<i>Ctenotus uber uber</i>											x				
	<i>Egernia depressa</i>	Southern Pygmy Spiny-tailed Skink										x	x			
	<i>Egernia formosa</i>												x			
	<i>Eremiascincus richardsonii</i>	Broad-banded Sand Swimmer										x	x			
	<i>Lerista bipes</i>												x			
	<i>Lerista desertorum</i>								x			x	x			x
	<i>Lerista muelleri</i>														x	x
	<i>Lerista timida</i>								x				x			
	<i>Liopholis inornata</i>								x			x	x			
	<i>Liopholis kintorei</i>	Great Desert Skink		Vu	S3		x									
	<i>Liopholis striata</i>	Night Skink										x	x			
	<i>Menetia greyii</i>								x			x	x			
	<i>Morethia butleri</i>											x	x		x	
<i>Tiliqua multifasciata</i>	Central Blue-tongue										x	x				
<i>Tiliqua occipitalis</i>	Western Bluetongue										x					
Varanidae	<i>Varanus caudolineatus</i>							x			x	x				
	<i>Varanus eremius</i>	Pygmy Desert Monitor						x			x					
	<i>Varanus giganteus</i>	Perentie									x	x				
	<i>Varanus gouldii</i>	Sand Monitor									x			x	x	x
	<i>Varanus panoptes</i>	Yellow-spotted Monitor									x	x				
	<i>Varanus panoptes rubidus</i>					x		x						x		
Elapidae	<i>Furina ornata</i>	Moon Snake						x								

Family	Species Name	Common Name	EPBC	WA	A	B	C	D	E	F	G	H	I	J	K	L
	<i>Parasuta monachus</i>							x				x				
	<i>Pseudonaja modesta</i>	Ringed Brown Snake									x	x		x		
	<i>Pseudonaja nuchalis</i>	Gwardar; Northern Brown Snake									x	x				
	<i>Simoselaps bertholdi</i>	Jan's Banded Snake						x			x					
	<i>Suta fasciata</i>	Rosen's Snake						x								
Amphibians																
Hylidae	<i>Cyclorana maini</i>	Sheep Frog									x	x				
	<i>Cyclorana platycephala</i>	Western Water-holding Frog									x	x				
	<i>Litoria rubella</i>	Little Red Tree Frog									x			x	x	
Limnodynastidae	<i>Neobatrachus aquilonius</i>	Northern Burrowing Frog						x								
	<i>Neobatrachus kunapalari</i>	Kunapalari Frog						x								
	<i>Neobatrachus sutor</i>	Shoemaker Frog						x								
	<i>Neobatrachus wilmorei</i>	Plonking Frog						x								
	<i>Platyplectrum spenceri</i>	Centralian Burrowing Frog						x				x				
Myobatrachidae	<i>Pseudophryne occidentalis</i>	Western Toadlet						x			x					

*Denotes introduced species

Appendix F Inventory of Vascular Flora Recorded

Family	Taxon
Aizoaceae	<i>Aizoaceae</i> sp.
Amaranthaceae	<i>Alternanthera nana</i>
	<i>Ptilotus aevroides</i>
	<i>Ptilotus drummondii</i>
	<i>Ptilotus obovatus</i>
	<i>Ptilotus schwartzii</i>
Apocynaceae	<i>Marsdenia australis</i>
	<i>Rhyncharrhena linearis</i>
Asteraceae	* <i>Bidens bipinnata</i>
	<i>Asteraceae</i> sp.
	<i>Brachyscome ciliaris</i>
	<i>Brachyscome</i> sp.
	<i>Pterocaulon sphacelatum</i>
	<i>Sonchus</i> sp.
	‡ <i>Vittadinia</i> sp.
Chenopodiaceae	‡ <i>Atriplex codonocarpa</i>
	‡ <i>Enchylaena tomentosa</i>
	<i>Maireana</i> ‡ <i>tomentosa</i>
	<i>Maireana</i> ‡ <i>villosa</i>
	<i>Maireana pyramidata</i>
	<i>Maireana</i> sp.
	<i>Maireana triterra</i>
	<i>Rhagodia drummondii</i>
	<i>Rhagodia eremaea</i>
	<i>Salsola australis</i>
	<i>Sclerolaena drummondii</i>
	<i>Sclerolaena ericantha</i>
	Cleomaceae
Convolvulaceae	<i>Duperreya commixta</i>
Cucurbitaceae	* <i>Citrullus colocynthis</i>
Cyperaceae	<i>Fimbristylis dichotoma</i>
Euphorbiaceae	<i>Euphorbia drummondii</i>
	<i>Euphorbia</i> sp.
Fabaceae	<i>Acacia aneura</i>
	<i>Acacia ayersiana</i>
	<i>Acacia ayersiana</i> (narrow phyllode variant)
	<i>Acacia burkittii</i>
	<i>Acacia caesaneura</i>
	<i>Acacia craspedocarpa</i>
	<i>Acacia craspedocarpa</i> (hybrid)
	<i>Acacia incurvaneura</i>
	<i>Acacia incurvaneura</i> x <i>mulganeura</i>
	<i>Acacia macraneura</i>
	<i>Acacia quadrimarginea</i>
	<i>Acacia ramulosa</i> ‡ var.

Family	Taxon
	<i>Acacia ramulosa</i> var. ? <i>linophyla</i>
	<i>Acacia rhodophloia</i>
	<i>Acacia sibirica</i>
	<i>Acacia</i> sp. indeterminate
	<i>Acacia tetragonophylla</i>
	<i>Glycine canescens</i>
	<i>Senna artemisioides</i> subsp. <i>artemisioides</i>
	<i>Senna artemisioides</i> subsp. <i>filifolia</i>
	<i>Senna artemisioides</i> subsp. <i>helmsii</i>
	<i>Senna artemisioides</i> subsp. X <i>sturtii</i>
	<i>Senna glaucifolia</i>
	<i>Senna</i> sp. Meekatharra
	<i>Senna glutinosa</i> subsp. ? <i>chatelainiana</i>
	<i>Swainsona</i> sp.
Goodeniaceae	<i>Scaevola spinescens</i>
Hemerocallidaceae	<i>Dianella revoluta</i> var. <i>divaricata</i>
Juncaceae	<i>Juncus aridicola</i>
Lamiaceae	Lamiaceae sp.
	<i>Teucrium teucriiflorum</i>
	<i>Prostanthera althoferi</i>
Lauraceae	<i>Cassytha</i> sp.
Malvaceae	<i>Abutilon fraseri</i>
	<i>Brachychiton gregorii</i>
	Malvaceae sp.
	* <i>Malvastrum americanum</i>
	<i>Sida calyxhymenia</i>
	<i>Sida ectogama</i>
Marsileaceae	<i>Marsilea drummondii</i>
Myrtaceae	<i>Calytrix</i> ? <i>desolata</i>
	<i>Calytrix</i> ? <i>uncinata</i>
	<i>Eucalyptus kingsmillii</i>
	<i>Eucalyptus lucasii</i>
Poaceae	<i>Aristida contorta</i>
	* <i>Cynodon dactylon</i>
	<i>Dactyloctenium radulans</i>
	<i>Enneapogon caeruleus</i>
	<i>Enneapogon polyphyllus</i>
	<i>Eragrostis eriopoda</i>
	<i>Eriachne mucronata</i>
	<i>Eriachne pulcella</i>
	<i>Monachather paradoxus</i>
	Poaceae sp.
	Poaceae sp.
	<i>Sporobolus australasicus</i>
<i>Themeda triandra</i>	

Family	Taxon
	<i>Thyriolepis multiculmis</i>
	‡ <i>Tragus australianus</i>
	<i>Triodia basedowii</i>
Proteaceae	<i>Grevillea berryana</i>
	<i>Grevillea inconspicua</i> (P4)
	<i>Grevillea nematophylla</i> subsp. <i>supraplana</i>
	<i>Hakea leucoptera</i> subsp. <i>sericipes</i>
	<i>Hakea lorea</i> subsp. <i>lorea</i>
	<i>Hakea preissii</i>
Pteridaceae	<i>Cheilanthes</i> sp.
Rubiaceae	<i>Psyrax latifolia</i>
	<i>Psyrax rigidula</i>
	<i>Psyrax suaveolens</i>
Santalaceae	<i>Santalum lanceolatum</i>
Sapindaceae	<i>Dodonaea lobulata</i>
	<i>Dodonaea rigida</i>
	<i>Dodonaea viscosa</i> subsp. <i>mucronata</i>
Scrophulariaceae	<i>Eremophila</i> ‡ <i>margarethae</i>
	<i>Eremophila</i> ‡ <i>exilifolia</i>
	<i>Eremophila</i> ‡ <i>pantonii</i>
	<i>Eremophila</i> ‡ <i>serrulata</i>
	<i>Eremophila forrestii</i> subsp. ‡ <i>forrestii</i>
	<i>Eremophila fraseri</i> subsp. <i>fraseri</i>
	<i>Eremophila homoplastica</i>
	<i>Eremophila latrobei</i> subsp. ‡ <i>latrobei</i>
	<i>Eremophila oldfieldii</i> subsp. ‡ <i>angustifolia</i>
	<i>Eremophila pungens</i> (P4)
	<i>Eremophila</i> sp.
	<i>Eremophila spectabilis</i>
Solanaceae	<i>Solanum ferocissimum</i>
	<i>Solanum lasiophyllum</i>

Appendix G Floristic Data - Flora Sampling Sites

Agnew Gold Mine – C-MN-01

Site Details:

Described by: LT, AB

Date: 5/8/2018

Type: Mapping note

Environmental Variables:

Landform:-

Slope:-

Soils:

Soil Texture: Gravel borrow pit

Soil Colour: Orange

Rock Type: Laterite, Gravel

Coarse Surface Particles:

Site coverage: 50-90

Size: 20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion: -

Human disturbance: Erosion, Feral trampling, Grazing, Historical, Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: Very open low hummock grasses of *Eragrostis eriopoda*

Veg Condition: Completely Degraded

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – C-MN-02

Site Details:

Described by: LT, AB

Date: 5/8/2018

Type: Mapping note

Environmental Variables:

Landform: Slope

Slope: Gently inclined (3-5°)

Soils:

Soil Texture: Sandy clay loam

Soil Colour: Orange-brown

Rock Type: Laterite, Quartzite

Coarse Surface Particles:

Site coverage: 2-10

Size:

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura*, *Acacia macraneura* tall open shrubland over *Eragrostis eriopoda* very open tussock grassland

Veg Condition: Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – C-MN-03

Site Details:

Described by: LT, AB

Date: 5/8/2018

Type: Mapping note

Environmental Variables:

Landform: Low rise

Slope: Level (0-3°)

Soils:

Soil Texture: Gravel borrow pit

Soil Colour: Orange

Rock Type: Laterite, Gravel

Coarse Surface Particles:

Site coverage: 50-90

Size: 20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing, Tracks, Weeds

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: Very open low hummock grasses of *Eragrostis eriopoda*

Veg Condition: Completely Degraded

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – C-MN-04

Site Details:

Described by: LT, AB

Date: 5/8/2018

Type: Mapping note

Environmental Variables:

Landform: Low rise

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type:

Coarse Surface Particles:

Site coverage: 2-10

Size:

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia caesaneura* open tall shrubland over *Senna artemisioides* subsp. *filifolia* open shrubland over *Ptilotus obovatus* low open shrubland over *Sclerolaena eriacantha*, *Maireana triptera*, *Maireana melanocoma* open chenopods.

Veg Condition: Degraded

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Cr-01

Site Details:

Described by: LT, AB

Date: 5/8/2018

Type: Relevé

Environmental Variables:

Landform: Stony Hill

Slope: Gently inclined (3-5°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Laterite, Quartzite

Coarse Surface Particles:

Site coverage: 20-50

Size: 20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never
g:

Inundation: -

Flooding: -

Erosion: -

Human disturbance: Changed hydrology, Clearing, Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura* tall shrubland over *Eriachne mucronata* very open tussock grassland

Species List

Species Name	Cover (%)	Height (m)
<i>Acacia incurvaneura</i>	4	8
<i>Acacia incurvaneura</i>	4	20
<i>Acacia sibirica</i>	1.5	0.1
<i>Brachyscome ciliaris</i>	0.5	0.1
<i>Calytrix ? uncinata</i>	0.5	0.1
<i>Eragrostis eriopoda</i>	0.3	0.2
<i>Eremophila spectabilis</i>	0.5	0.1
<i>Eriachne mucronata</i>	0.2	2
<i>Grevillea berryana</i>	3	0.1
<i>Psydrax suaveolens</i>	4	0.1
<i>Ptilotus schwartzii</i>	0.5	0.5
<i>Solanum lasiophyllum</i>	0.1	0.1

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
6	12	30

Veg Condition: Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Cr-02

Site Details:

Described by: LT, AB

Date: 5/8/2018

Type: Relevé

Environmental Variables:

Landform: Drainage Line

Slope: Level (0-3°)

Soils:

Soil Texture: Sandy clay loam

Soil Colour: Orange

Rock Type: Laterite, Quartzite

Coarse Surface Particles:

Site coverage: 2-10

Size: 2-6,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Erosion: -

Inundation: -

Human disturbance: Feral scats ,Feral trampling, Grazing, Weeds

Flooding: -

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia aneura*, *Acacia incurvaneura*, *Acacia caesaneura* tall shrubland over *Eremophila forrestii* subsp. *forrestii*, *Sida ectogama*, *Eremophila spectabilis*, *Dodonaea viscosa* subsp. *mucronata* over *Eragrostis eriopoda* open tussock grassland

Species List

Species Name	Cover (%)	Height (m)
<i>Acacia aneura</i>	5	15
<i>Acacia ayersiana</i>	0.7	1
<i>Acacia caesaneura</i>	4	5
<i>Acacia incurvaneura</i>	1.4	5
<i>Acacia quadrimarginea</i>	1.1	0
<i>Dodonaea viscosa</i> subsp. <i>mucronata</i>	1.2	2
<i>Eragrostis eriopoda</i>	0.3	12
<i>Eremophila forrestii</i> subsp. ? <i>forrestii</i>	1.2	8
<i>Eremophila latrobei</i> subsp. ? <i>latrobei</i>	1	0.1
<i>Eremophila</i> sp.	1.5	0.1
<i>Eremophila spectabilis</i>	1.1	5
<i>Psyrdrax latifolia</i>	1	0

Species Name	Cover (%)	Height (m)
<i>Psydrax rigidula</i>	1.3	0.1
<i>Psydrax suaveolens</i>	2	0.1
<i>Ptilotus obovatus</i>	0.6	0
<i>Sida ectogama</i>	1.3	8
<i>Solanum lasiophyllum</i>	0.2	0
? <i>Thryolepis</i> sp.	0.4	0

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
5	15	55

Veg Condition: Very Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Cr-03

Site Details:

Described by: LT, AB

Date: 5/8/2018

Type: Relevé

Environmental Variables:

Landform: Low rise - stony

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 20-50

Size: 2-6,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Erosion, Feral scats, Feral trampling, Grazing, Tracks, Weeds

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia quadrimarginea*, *Grevillea berryana* low open woodland over *Acacia incurvaneura* open tall shrubland over *Eremophila spectabilis*, *Eremophila latrobei* subsp. *latrobei* open shrubland over *Eragrostis eriopoda* very open tussock grassland

Species List

Species Name	Cover (%)	Height (m)
<i>Acacia incurvaneura</i>	2.5	20
<i>Acacia quadrimarginea</i>	4.5	1
<i>Acacia sibirica</i>	1.3	0.1
<i>Cheilanthes</i> sp.	0.1	0.1
<i>Eragrostis eriopoda</i>	0.4	3
<i>Eremophila latrobei</i> subsp. ? <i>latrobei</i>	0.5	2
<i>Eremophila spectabilis</i>	0.5	2
<i>Grevillea berryana</i>	3	1
<i>Maireana</i> sp.	0.5	0.1
<i>Psyrax rigidula</i>	0.3	0.1
<i>Psyrax rigidula</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.2	0.1

Species Name	Cover (%)	Height (m)
<i>Ptilotus schwartzii</i>	0.3	1
<i>Solanum lasiophyllum</i>	0.1	0.1

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
25	3	25

Veg
Condition:

Degraded

Fire Age: Unknown (no evidence)

Weeds:

-

Fire
Notes: N/A



Agnew Gold Mine – Lr-01

Site Details:

Described by: LT, AB

Date: 5/11/2018

Type: Relevé

Environmental Variables:

Landform: Stony plain

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange-brown

Rock Type: Ironstone, Laterite, Quartzite

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging No - Never
g:

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura*, *Acacia caesaneura* tall open shrubland over *Eremophila fraseri* subsp. *fraseri*, *Senna glaucifolia* open shrubland over *Aristida contorta* very open tussock grasses

Species List

Species Name	Cover (%)	Height (m)
? <i>Enchylaena tomentosa</i>	2	0.1
<i>Acacia caesaneura</i>	2.5	4
<i>Acacia incurvaneura</i>	4.5	2
<i>Acacia incurvaneura</i>	2.5	3
<i>Aristida contorta</i>	0.2	5
<i>Eremophila</i> ? <i>margarethae</i>	0.4	0.2
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	1.1	1.5
<i>Eremophila latrobei</i> subsp. ? <i>latrobei</i>	0.9	0.5
<i>Maireana</i> ? <i>tomentosa</i>	0.1	0.1
<i>Maireana</i> sp.	0.2	0.2
<i>Malvaceae</i> sp.	0.3	0.1
<i>Monachather paradoxus</i>	0.2	0.5

Species Name	Cover (%)	Height (m)
<i>Ptilotus aervoides</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.6	1.5
<i>Rhagodia drummondii</i>	0.6	0.1
<i>Senna glaucifolia</i>	0.3	0.5
<i>Solanum lasiophyllum</i>	0.3	0.2

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
0.5	0.5	18

Veg Very Good
Condition:

Fire Age: Unknown (no evidence)

Weeds: -

Fire N/A
Notes:



Agnew Gold Mine – Lr-02

Site Details:

Described by: LT, AB

Date: 5/11/2018

Type: Relevé

Environmental Variables:

Landform: Drainage Line

Slope: Level (0-3°)

Soils:

Soil Texture: Alluvial sands

Soil Colour: Beige

Rock Type: Ironstone, Laterite, Quartzite

Coarse Surface Particles:

Site coverage: 10-20

Size: 2-6,20-60,6-20,60-200

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats ,Feral trampling, Grazing

Introduced species: Cattle

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
25	5	66
<u>Veg Condition:</u>	Very Good	<u>Fire Age:</u> > 15
<u>Weeds:</u>	-	<u>Fire Notes:</u> N/A

FLORA AND VEGETATION DATA

Description: *Acacia aneura*, (*Acacia incurvaneura*) open forest *Acacia craspedocarpa* open tall shrubland over *Senna artemisioides* subsp. *filifolia*, *Ptilotus obovatus* open low shrubland over *Themeda triandra* very open grassland

Species List

Species Name	Cover (%)	Height (m)	Species Name	Cover (%)	Height (m)
<i>Acacia aneura</i>	50	9	<i>Hakea lorea</i> subsp. <i>lorea</i>	2.5	4.5
<i>Acacia craspedocarpa</i>	4	5	<i>Indigofera</i> sp.	0.1	0.5
<i>Acacia craspedocarpa</i> (hybrid)	0.7	4	<i>Lamiaceae</i> sp.	0.3	0.7
<i>Acacia incurvaneura</i>	0.5	1.3	<i>Malvastrum americanum</i>	0.1	0.3

<i>Acacia tetragonophylla</i>	0.3	0.6	<i>Poaceae</i> sp.	0.1	0.5
<i>Alternanthera nana</i>	0.1	0.1	<i>Ptilotus obovatus</i>	1	0.7
<i>Bidens bipinnata</i>	0.1	0.2	<i>Rhagodia</i> ? <i>drummondii</i>	0.1	0.3
<i>Brachyscome ciliaris</i>	0.1	0.2	<i>Senna artemisioides</i> subsp. <i>artemisioides</i>	0.5	0.9
<i>Dodonaea viscosa</i> subsp. <i>mucronata</i>	0.2	1.1	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	3	1.3
<i>Duperreya commixta</i>	2	0	<i>Sida ectogama</i>	0.2	0.6
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.1	0.4	<i>Themeda triandra</i>	2	0.5
<i>Eremophila</i> sp.	0.1	0.4	? <i>Vittadinia</i> sp.	0.3	0.2
<i>Glycine canescens</i>	0.2	0	-	-	-



Agnew Gold Mine – Lr-03

Site Details:

Described by: LT, AB

Date: 5/11/2018

Type: Relevé

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Loamy sand

Soil Colour: Beige

Rock Type: Granite, Ironstone, Quartzite

Coarse Surface Particles:

Site coverage: 10-20

Size: 2-6,20-60,6-20,60-200

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation:

Flooding:

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Ptilotus obovatus*, (*Senna artemisioides* subsp. *filifolia*) low shrubland over *Enneapogon polyphyllus*, *Enneapogon caerulescens* very open grassland

Species List

Species Name	Cover (%)	Height (m)
<i>Acacia tetragonophylla</i>	0.1	0.2
<i>Aristida contorta</i>	0.1	0.2
<i>Enneapogon caerulescens</i>	0.5	0.1
<i>Enneapogon polyphyllus</i>	1.5	0.2
<i>Eremophila ?platycalyx</i>	0.2	0.6
<i>?Enchylaeana tomentosa</i>	0.1	0.2
<i>Euphorbia drummondii</i>	0.1	0.1
<i>Hakea preisii</i>	0.1	3
<i>Maireana pyramidata</i>	0.5	0.7
<i>Ptilotus obovatus</i>	20	0.4
<i>Salsola australis</i>	0.1	0.1
<i>Sclerolaena drummondii</i>	0.1	0.1

<i>Senna artemisioides</i> subsp. <i>artemisioides</i>	0.1	0.6
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	2	0.8
<i>Sida calyxhymenia</i>	0.1	0.5
<i>Solanum lasiophyllum</i>	0.1	0.1

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
2	0.5	25

Veg Condition: Very Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Lr-04

Site Details:

Described by: LT, AB

Date: 5/11/2018

Type: Relevé

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Granite, Ironstone, Quartzite, Shale

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,20-60,6-20

Outcropping: <2

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats ,Feral trampling, Grazing

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Ptilotus obovatus*, *Senna artemisioides* subsp. *filifolia*, *Maireana pyramidata* low open shrubland over *Enneapogon polyphyllus* and *Enneapogon caerulescens* very open grassland

Species List

Species Name	Cover (%)	Height (m)
<i>Brachyscome</i> sp.	0.1	0.1
<i>Enneapogon caerulescens</i>	0.5	0.1
<i>Enneapogon polyphyllus</i>	3	0.15
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.4	0.8
? <i>Enchylaeana tomentosa</i>	0.1	0.1
<i>Euphorbia drummondii</i>	0.1	0.1
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.5	4.5
<i>Hakea preisii</i>	0.1	2
<i>Maireana pyramidata</i>	2	0.7
<i>Ptilotus obovatus</i>	5	0.6
<i>Rhagodia eremaea</i>	0.5	1.3
<i>Salsola australis</i>	0.1	0.2

Species Name	Cover (%)	Height (m)
<i>Scaevola spinescens</i>	0.2	3.5
<i>Sclerolaena drummondii</i>	1	0.3
<i>Sclerolaena eriacantha</i>	0.2	0.2
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	3	0.7
<i>Senna glaucifolia</i>	0.1	0.2
<i>Sida calyxhymentia</i>	0.5	1.1
<i>Solanum lasiophyllum</i>	0.1	0.3
<i>Swainsona</i> sp.	0.1	0.1

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
2	0.1	17

Veg Condition: Degraded

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Lr-05

Site Details:

Described by: LT, AB

Date: 5/11/2018

Type: Relevé

Environmental Variables:

Landform: Drainage Line

Slope: Level (0-3°)

Soils:

Soil Texture: Deep alluvial sands

Soil Colour: Beige

Rock Type: Laterite/?Limestone, Quartzite

Coarse Surface Particles:

Site coverage: <2

Size: 2-6

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Eucalyptus lucasii* woodland over *Acacia aneura* open low woodland over *Acacia aneura* (*Acacia craspedocarpa*) tall open shrubland over *Senna artemisioides* subsp. *filifolia*, *Acacia tetragonophylla* open shrubland over *Ptilotus obovatus* low open shrubland over

Species List

Species Name	Cover (%)	Height (m)	Species Name	Cover (%)	Height (m)
<i>Abutilon fraseri</i>	0.1	0.2	<i>Juncus aridicola</i>	0.5	0.8
<i>Acacia aneura</i>	20	8	<i>Lamiaceae</i> sp.	0.5	1
<i>Acacia aneura</i>	0.7	0.9	<i>Maireana pyramidata</i>	0.2	0.4
<i>Acacia burkittii</i>	0.2	1	<i>Malvastrum americanum</i>	0.1	0.1
<i>Acacia craspedocarpa</i>	2	1.5	<i>Marsilea drummondii</i>	0.5	0.1
<i>Acacia craspedocarpa</i> (hybrid)	0.5	0.9	<i>Ptilotus obovatus</i>	2	0.3
<i>Acacia incurvaneura</i>	0.5	0.4	<i>Rhagodia eremaea</i>	0.2	1.2
<i>Acacia quadrimarginea</i>	0.3	0.4	<i>Santalum lanceolatum</i>	1.5	4.5
<i>Acacia tetragonophylla</i>	2	4	<i>Senna artemisioides</i> subsp. <i>artemisioides</i>	0.1	0.2
<i>Alternanthera nana</i>	0.1	0.1	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	2	1.2
<i>Cynodon dactylon</i>	1	0.1	<i>Senna artemisioides</i> subsp. <i>X sturtii</i>	0.1	0.5

Species Name	Cover (%)	Height (m)	Species Name	Cover (%)	Height (m)
<i>Duperreya commixta</i>	1	0	<i>Senna glutinosa</i> subsp. <i>chatelainiana</i>	0.2	0.7
<i>Eremophila serrulata</i>	0.5	1.2	<i>Sonchus</i> sp.	0.1	0.1
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.4	0.8	<i>Themeda triandra</i>	2.5	0.6
<i>Eucalyptus lucasii</i>	25	12	<i>Vittadinia</i> sp.	0.1	0.2
<i>Hakea lorea</i> subsp. <i>lorea</i>	0.1	3	-	-	-

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
25	30	65

Veg Condition: Very Good

Fire Age: > 15

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Lr-06

Site Details:

Described by: LT, AB

Date: 5/11/2018

Type: Relevé

Environmental Variables:

Landform: Drainage Line

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Brown

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 0

Size: N/A

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion: -

Human disturbance: Clearing

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Eucalyptus lucasii* woodland over *Acacia aneura* low open woodland over *Acacia craspedocarpa*, *Acacia tetragonophylla* tall shrubland

Species List

Species Name	Cover (%)	Height (m)
<i>Acacia aneura</i>	8	7
<i>Acacia craspedocarpa</i>	0.5	1.5
<i>Acacia craspedocarpa</i> (hybrid)	12	4.5
<i>Acacia tetragonophylla</i>	1	4
<i>Aizoaceae sp.</i>	0.1	0.1
<i>Alternanthera nana</i>	0.1	0.1
<i>Asteraceae sp.</i>	0	0.1
? <i>Atriplex codonocarpa</i>	0.1	0.2
<i>Citrullus colocynthis</i>	0.1	0.1
<i>Cleome viscosa</i>	0.1	0.1
<i>Dysphania sp.</i>	0.1	0.1
? <i>Enchylaeana tomentosa</i>	0.1	0.1
<i>Eremophila longifolia</i>	0.5	1.8

<i>Eucalyptus lucasii</i>	35	12
<i>Euphorbia drummondii</i>	0.1	0.1
<i>Salsola australis</i>	0.1	0.1
<i>Sonchus sp.</i>	0.1	0.1

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
10	40	50

Veg Condition: Degraded

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Lr-MN-01

Site Details:

Described by: LT, AB

Date: 5/11/2018

Type: Mapping note

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange-brown

Rock Type: Ironstone, Laterite, Quartzite

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging No - Never
g:

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura*, *Acacia caesaneura* tall open shrubland over *Eremophila fraseri* subsp. *fraseri*, *Senna glaucifolia* open shrubland over *Aristida contorta* very open tussock grasses



Agnew Gold Mine – P2-MN-01

Site Details:

Described by: LT, AB

Date: 5/12/2018

Type: Mapping note

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange-brown

Rock Type: Ironstone, Laterite, Quartzite

Coarse Surface Particles:

Site coverage: <2

Size: 2-6

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Eucalyptus kingsmillii*, *Eucalyptus lucassii* very open shrub mallee over *Acacia caesaneura* (*Acacia ayersiana* (hybrid)) tall shrubland over *Acacia ramulosa* var. *linophylla* (*Acacia ramulosa* var.?) open shrubland over *Triodia basedowii* hummock grassland.

Veg
Condition: Excellent

Fire Age: > 15

Weeds: -

Fire
Notes: N/A



Agnew Gold Mine – P2r-01

Site Details:

Described by: LT, AB

Date: 5/12/2018

Type: Relevé

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Loamy sand

Soil Colour: Orange-brown

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: <2

Size: 2-6

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Eucalyptus kingsmillii*, *Eucalyptus lucassii* very open shrub mallee over *Acacia caesaneura* (*Acacia ayersiana* (hybrid)) tall shrubland over *Acacia ramulosa* var. *linophylla* (*Acacia ramulosa* var.?) open shrubland over *Triodia basedowii* hummock grassland.

Species List

Species Name	Cover (%)	Height (m)
<i>Acacia ayersiana</i> (hybrid)	0.5	2.5
<i>Acacia caesaneura</i>	10	3.5
<i>Acacia caesaneura</i>	8	5
<i>Acacia ramulosa</i> ?var.	1	1.7
<i>Acacia ramulosa</i> ?var. <i>linophylla</i>	8	1.6
<i>Enneapogon polyphyllus</i>	0.1	0.2
<i>Eragrostis eriopoda</i>	0.1	0.3
<i>Eremophila forrestii</i> subsp. ? <i>forrestii</i>	0.5	0.6
<i>Eremophila homoplastica</i>	0.5	0.5
<i>Eucalyptus lucassii</i>	2	6
<i>Eucalyptus kingsmillii</i>	2	6
<i>Grevillea nematophylla</i> subsp. <i>supraplana</i>	0.1	5
<i>Monacather paradoxus</i>	2	0.6
<i>Psyrax suaveolens</i>	0.1	1.5

<i>Ptilotus obovatus</i>	0.1	0.3
<i>Solanum lasiophyllum</i>	0.1	0.2
<i>Triodia basedowii</i>	45	1.1

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
5	8	75

Veg Condition: Excellent

Fire Age: > 15

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-MN-01

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Mapping note

Environmental Variables:

Landform: Low rise

Slope: Gently inclined (3-5°)

Soils:

Soil Texture: Sandy clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 20-50

Size: 2-6,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura*, *Acacia caesaneura* tall shrubland over *Acacia sibirica*, *Acacia rhodofloia* shrubland over *Eremophila forrestii* subsp. *forrestii* low shrubland over *Eragrostis eriopoda*, *Eriachne mucronata* open tussock grassland

Veg Condition: Very Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-MN-02

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Mapping note

Environmental Variables:

Landform: Drainage Line

Slope: Level (0-3°)

Soils:

Soil Texture: Light clay

Soil Colour: Brown

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 0

Size: N/A

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia quadrimarginea*, *Acacia aneura*, *Acacia tetragonophylla* tall open shrubland over *Eremophila serrulata*, *Acacia incurvaneura* x *mulganeura* over *Enneapogon polyphyllus* tussock grassland and *Tragus australianus* very open grasses.

Veg Condition: Degraded

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-MN-03

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Mapping note

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: -

Soil Colour: Orange

Rock Type: -

Coarse Surface Particles:

Site coverage: -

Size: -

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation:

Flooding:

Erosion:

Human disturbance: Clearing, Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: Cleared



Agnew Gold Mine – Pi-Q-01

Site Details:

Described by: LT, AB

Date: 5/9/2018

Type: Quadrat

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Light clay

Soil Colour: Orange-brown

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 10-20

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion: -

Human disturbance: Feral trampling, Grazing

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia aneura* tall shrubland over *Eremophila oldfieldii* tall open shrubland over *Ptilotus obovatus* open shrubland over *Maireana triptera*, *Sclerolaena eriacantha* low open chenopods over *Aristida contorta*, *Enneapogon caerulescens* open tussock grassland

Species List

Species Name	Cover (%)	Height (m)
<i>Acacia aneura</i>	28	8
<i>Acacia aneura</i>	0.1	0.5
<i>Acacia craspedocarpa (hybrid)</i>	0.1	2.2
<i>Aristida contorta</i>	15	0.2
<i>Asteraceae sp.</i>	0	0.4
<i>?Enchylaeana tomentosa</i>	0	0.7
<i>Enneapogon caerulescens</i>	1	0.3
<i>Eremophila ?exilifolia</i>	0.1	1.1
<i>Eremophila forrestii</i> subsp. <i>?forrestii</i>	0.1	0.7
<i>Eremophila oldfieldii</i> subsp. <i>?angustifolia</i>	5	2
<i>Eremophila sp.</i>	0.1	0.6
<i>Maireana triterna</i>	2	0.3
<i>Malvaceae sp.</i>	0.1	0.1
<i>Marsdenia australis</i>	0.1	0
<i>Poaceae sp.</i>	8	0.5

<i>Poaceae</i> sp.	0.5	0.6
<i>Ptilotus obovatus</i>	2	0.5

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
20	65	60

Veg Condition: Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-02

Site Details:

Described by: LT, AB

Date: 5/9/2018

Type: Quadrat

Environmental Variables:

Landform: Drainage Line

Slope: Level (0-3°)

Soils:

Soil Texture: Light clay

Soil Colour: Red-brown

Rock Type: Ironstone, Quartzite, Shale

Coarse Surface Particles:

Site coverage: 2-10

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion:

Human disturbance: Clearing, Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia aneura* tall shrubland over *Eremophila oldfieldii* subsp. *?angustifolia* shrubland over *Acacia aneura*, *Ptilotus obovatus*, *Solanum lasiophyllum* low shrubland over *Maireana triptera*, *Sclerolaena eriacantha*, *?Enchylaena tomentosa* low chenopods.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia aneura</i>	15	8
<i>Acacia aneura</i>	5	0.9
<i>Aristida contorta</i>	5	0.4
<i>Asteraceae sp.</i>	0	0.2
<i>Chielanthes sp.</i>	0.1	0.1
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.1	1.1
<i>?Enchylaena tomentosa</i>	1	0.4
<i>Enneapogon caerulescens</i>	2	0.6
<i>Eremophila ?exilifolia</i>	0.1	1.2
<i>Eremophila forrestii</i> subsp. <i>?forrestii</i>	0.1	0.8
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.1	0.8
<i>Eremophila oldfieldii</i> subsp. <i>?angustifolia</i>	2	1
<i>Eremophila sp.</i>	0.1	1.1
<i>Maireana tritera</i>	3	0.6

Poaceae sp.	1	0.6
Poaceae sp.	6	0.6
<i>Ptilotus obovatus</i>	5	1.1
<i>Ptilotus</i> sp.	0	0.2
<i>Salsola australis</i>	0.1	0.2
<i>Santalum lanceolatum</i>	0.5	5
<i>Sclerolaena eriacantha</i>	2	0.2
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	0.2	1.2
<i>Solanum lasiophyllum</i>	1	0.5

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
15	10	15

Veg Condition: Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-03

Site Details:

Described by: LT, AB

Date: 5/9/2018

Type: Quadrat

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite, Quartzite

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia quadrimarginea* open tall shrubland over *Acacia sibirica*, *Acacia ayersiana* (narrow phyllode variant) open shrubland over *Calytrix ?desolata*, *Grevillea inconspicua* (P4) low shrubland

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia ayersiana</i> (narrow phyllode variant)	1	1.6
<i>Acacia quadrimarginea</i>	2	2.5
<i>Acacia sibirica</i>	5	1.5
<i>Acacia tetragonophylla</i>	2	1.2
<i>Aristida contorta</i>	0.1	0.3
<i>Calytrix ?desolata</i>	15	0.8
<i>Cheilanthes</i> sp.	0.1	0.1
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.1	1.1
<i>Eragrostis eriopoda</i>	0.1	0.2
<i>Eremophila ?exilifolia</i>	0.1	0.4
<i>Eremophila forrestii</i> subsp. <i>?forrestii</i>	1	0.3
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.1	0.15
<i>Eremophila latrobei</i> subsp. <i>?latrobei</i>	0.1	1.1
<i>Eremophila</i> sp.	0.1	0.5

<i>Grevillea inconspicua</i>	2	0.8
<i>Indeterminate sp.</i>	1	0.8
<i>Ptilotus aervoides</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.1	0.4
<i>Scaevola spinescens</i>	0.1	0.2
<i>Senna artemisioides subsp. X sturtii</i>	0.2	1.2
<i>Senna sp. Meekatharra (E. Bailey 1-26)</i>	0.8	1.2
<i>Solanum lasiophyllum</i>	0.1	0.3

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
0.5	3	25

Veg Condition: Very Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-04

Site Details:

Described by: LT, AB

Date: 5/9/2018

Type: Quadrat

Environmental Variables:

Landform: Low rise

Slope: Level (0-3°)

Soils:

Soil Texture: Sandy clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 20-50

Size: 2-6,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never
g:

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing, Rubbish/debris, Tracks

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura*, *Acacia caesaneura* tall shrubland over *Acacia sibirica*, *Acacia rhodophloia* shrubland over *Eremophila forrestii* subsp. *forrestii* low shrubland over *Eragrostis eriopoda*, *Eriachne mucronata* open tussock grassland

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia caesaneura</i>	7	3.5
<i>Acacia craspedocarpa</i> (hybrid)	5	5
<i>Acacia incurvaneura</i>	2	2.2
<i>Acacia quadrimarginea</i>	2	6
<i>Acacia rhodofloia</i>	3	2
<i>Acacia sibirica</i>	8	1.5
<i>Cassytha</i> sp.	0.1	0
<i>Eragrostis eriopoda</i>	10.5	0.6
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	20	1.2
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	0.1	0.5
<i>Eriachne mucronata</i>	5	0.3
<i>Malvaceae</i> sp.	0.5	0.2
<i>Monachather paradoxus</i>	0.1	0.1

<i>Solanum lasiophyllum</i>	0.5	0.2
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Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
3	10	60

Veg Condition: Very Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-05

Site Details:

Described by: LT, AB

Date: 5/9/2018

Type: Quadrat

Environmental Variables:

Landform: Low rise

Slope: Level (0-3°)

Soils:

Soil Texture: Sandy clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 20-50

Size: 2-6,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura* tall shrubland over *Acacia sibirica* open shrubland over *Eremophila forrestii* subsp. *forrestii*, *Eremophila spectabilis* low shrubland over *Eragrostis eriopoda*, *Poaceae* sp. indet open tussock grassland

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia incurvaneura</i>	28	3
<i>Acacia sibirica</i>	3	1.5
<i>Cassutha</i> sp.	0.1	0
<i>Eragrostis eriopoda</i>	15	0.4
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	8	0.9
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	0.1	0.5
<i>Eremophila spectabilis</i>	8	0.9
<i>Eriachne mucronata</i>	0.1	0.3
<i>Malvaceae</i> sp.	0.1	0.1
<i>Monachather paradoxus</i>	3	0.5
<i>Psyrax suaveolens</i>	0.1	1.8
<i>Solanum lasiophyllum</i>	0.1	0.3

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
20	20	65

Veg Condition: Very Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-06

Site Details:

Described by: LT, AB

Date: 5/9/2018

Type: Quadrat

Environmental Variables:

Landform: Low rise

Slope: Level (0-3°)

Soils:

Soil Texture: Sandy clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: >90

Size: 2-6,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral trampling, Grazing, Historical drilling, Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura* tall open shrubland over *Eremophila spectabilis*, *Eremophila forrestii* subsp. *forrestii* low shrubland over *Eragrostis eriopoda*, *Poaceae* sp. indet open tussock grassland

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia incurvaneura</i>	8	5
<i>Eragrostis eriopoda</i>	12	0.5
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	4	0.9
<i>Eremophila spectabilis</i>	5	0.9
<i>Eriachne mucronata</i>	0.2	0.2
<i>Malvaceae</i> sp.	0.5	0.4
<i>Monachather paradoxus</i>	2	0.4
<i>Ptilotus schwartzii</i>	0.5	0.6
<i>Solanum lasiophyllum</i>	0.1	0.3

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
0.5	6	33

Veg
Condition: Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire
Notes: N/A



Agnew Gold Mine – Pi-Q-07

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Quadrat

Environmental Variables:

Landform: Plain, Stony plain

Slope: Level (0-3°)

Soils:

Soil Texture: Sandy clay

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Grazing, Tracks

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura*, *Acacia quadrimarginea* tall open shrubland over *Senna* sp. Meekatharra, *Eremophila latrobei* subsp. *?latrobei*, *Eremophila fraseri* subsp. *?fraseri* open shrubland

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia ayersiana</i> (narrow phyllode variant)	0.1	0.4
<i>Acacia incurvaneura</i>	8	3.5
<i>Acacia quadrimarginea</i>	2	2.5
<i>Aristida contorta</i>	0.5	0.2
<i>Cheilanthes</i> sp.	0.1	0.1
<i>?Enchylaeana tomentosa</i>	0.1	0.2
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.5	1.1
<i>Eremophila latrobei</i> subsp. <i>?latrobei</i>	0.5	0.9
<i>Eremophila</i> sp.	1	0.4
<i>Eriachne mucronata</i>	0.1	0.2
<i>Eriachne pulcella</i>	0.1	0.06
<i>Ptilotus aevoides</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.1	0.4
<i>Ptilotus schwartzii</i>	0.2	0.3

<i>Rhyncharrhena linearis</i>	0.1	0
<i>Senna artemisioides</i> subsp. <i>X sturtii</i>	0	0.2
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)	1	1.2
<i>Sida ectogama</i>	0.3	0.6
<i>Solanum lasiophyllum</i>	0.1	0.1
<i>Teucrium teucriiflorum</i>	0.1	0.3

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
2	1	9

Veg Condition: Very Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-08

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Quadrat

Environmental Variables:

Landform: Stony plain

Slope: Level (0-3°)

Soils:

Soil Texture: Sandy clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never
g:

Inundation: -

Flooding: -

Erosion:

Human disturbance: Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura*, *Acacia caesaneura*, *Acacia aneura* open shrubland over *Ptilotus schwartzii*, *Eremophila ?margarethae* low open shrubland over *Eriachne mucronata*, (Poaceae sp. indet) over *Eriachne mucronata*, *Eragrostis eriopoda* very open tussock grassland.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia aneura</i>	2	2.5
<i>Acacia caesaneura</i>	2	4.5
<i>Acacia incurvaneura</i>	3	2
<i>Aristida contorta</i>	0.2	0.3
<i>Eragrostis eriopoda</i>	0.2	0.3
<i>Eragrostis eriopoda</i>	0.5	0.2
<i>Eremophila ?margarethae</i>	1	0.5
<i>Eremophila forrestii</i> subsp. <i>?forrestii</i>	0.2	0.4
<i>Eremophila latrobei</i> subsp. <i>?latrobei</i>	0.1	0.1
<i>Eriachne mucronata</i>	2	0.2
<i>Euphorbia</i> sp.	0.1	0.1
<i>Maireana ?tomentosa</i>	0.1	0.1
<i>Monachather paradoxus</i>	0.5	0.2

<i>Ptilotus aervoides</i>	0.1	0.1
<i>Ptilotus drummondii</i>	0.2	0.5
<i>Ptilotus obovatus</i>	0.2	0.2
<i>Ptilotus schwartzii</i>	2	0.4
<i>Ptilotus sp.</i>	0	0.2
<i>Senna sp. Meekatharra</i> (E. Bailey 1-26)	0.5	1.2
<i>Sida ectogama</i>	0.2	0.5
<i>Solanum lasiophyllum</i>	0.3	0.6

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
5	1	12

Veg Condition: Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-09

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Quadrat

Environmental Variables:

Landform: Stony plain

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion: -

Human disturbance: Feral scats, Grazing, Tracks

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Eremophila fraseri* subsp. *fraseri* very open low shrubland over *Eriachne mucronata*, (*Aristida contorta*) very open tussock grassland

Species List

Species Name	Cover (%)	Height (%)
<i>Aristida contorta</i>	0.5	0.2
<i>Eremophila ?margarethae</i>	0.7	0.5
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	2	0.9
<i>Eriachne mucronata</i>	2	0.2
<i>Maireana ?tomentosa</i>	0.1	0.1
<i>Poaceae</i> sp.	0.1	0.2
<i>Ptilotus aervoides</i>	0.2	0.1
<i>Ptilotus schwartzii</i>	0.1	0.3
<i>Sclerolaena eriacantha</i>	0.2	0.2
<i>Solanum lasiophyllum</i>	0.1	0.1

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
2	0.5	5

Veg Good
Condition:

Fire Age: Unknown (no evidence)

Weeds: -

Fire N/A
Notes:



Agnew Gold Mine – Pi-Q-10

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Quadrat

Environmental Variables:

Landform: Drainage Line

Slope: Level (0-3°)

Soils:

Soil Texture: Light clay

Soil Colour: Brown

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 0

Size: N/A

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral trampling, Grazing

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia quadrimarginea*, *Acacia aneura*, *Acacia tetragonophylla* tall open shrubland over *Eremophila serrulata*, *Acacia incurvaneura* x *mulganeura* over *Enneapogon polyphyllus* tussock grassland and ?*Tragus australianus* very open grasses

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia aneura</i>	2	6
<i>Acacia incurvaneura</i> x <i>mulganeura</i>	0.5	1.6
<i>Acacia quadrimarginea</i>	3	4.5
<i>Acacia tetragonophylla</i>	4	2.2
<i>Alternanthera nana</i>	0.1	0.1
<i>Aristida contorta</i>	0.2	0.1
<i>Asteraceae</i> sp.	0.1	0.1
<i>Chielanthes</i> sp.	0.2	0.1
<i>Enneapogon polyphyllus</i>	25	0.1
<i>Enneapogon polyphyllus</i>	0.1	0.1
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.3	0.5
<i>Eremophila serrulata</i>	4	1.2
<i>Rhyncharrhena linearis</i>	0.1	0
<i>Santalum spicatum</i>	0.4	2.4

<i>Sporobolus sp.</i>	0.5	0.2
? <i>Tragus australianus</i>	5	0.1

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
1.5	5	45

Veg Condition: Degraded

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-11

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Quadrat

Environmental Variables:

Landform: Drainage Line

Slope: Level (0-3°)

Soils:

Soil Texture: Sandy clay loam

Soil Colour: Orange

Rock Type: Ironstone

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion: -

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia quadrimarginea*, *Acacia caesaneura*, *Acacia ayersiana* (narrow phyllode variant) shrubland over *Acacia caesaneura*, *Eremophila fraseri* subsp. *fraseri*, *Sida ?ectogama* open shrubland over *Eremophila serrulata* low open shrubland over *Enneapogon polyphyllus*.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia ayersiana</i> (narrow phyllode variant)	3	5
<i>Acacia caesaneura</i>	2	1.1
<i>Acacia caesaneura</i>	2	5
<i>Acacia quadrimarginea</i>	20	4.5
<i>Acacia</i> sp. indeterminate	0.5	0.6
<i>Acacia tetragonophylla</i>	1	0.5
<i>Aristida contorta</i>	2	0.2
<i>Chielanthes</i> sp.	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.1	0.6
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.5	1
<i>Enneapogon polyphyllus</i>	5	0.2
<i>Enneapogon polyphyllus</i>	0.1	0.1
<i>Eremophila ?platycalyx</i>	0.5	0.7
<i>Eremophila forrestii</i> subsp. <i>?forrestii</i>	0.8	1.1

<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	2	1.1
<i>Eremophila latrobei</i> subsp. <i>?latrobei</i>	0.5	1.1
<i>Eremophila serrulata</i>	2	0.9
<i>Eremophila</i> sp.	0.1	0.2
<i>Poaceae</i> sp.	0.1	0.6
<i>Ptilotus obovatus</i>	0.3	0.3
<i>Rhyncharrhena linearis</i>	0.05	0.1
<i>Santalum lanceolatum</i>	0.1	2.2
<i>Sclerolaena eriacantha</i>	0.2	0.2
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)	1	1.5
<i>Sida ectogama</i>	1.5	1.2
<i>Solanum lasiophyllum</i>	0.1	0.3

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
1.5	10	35

Veg Condition: Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-12

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Quadrat

Environmental Variables:

Landform: Stony plain

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite, Chert

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion: -

Human disturbance: Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia ramulosa* var. *ramulosa* (*Acacia tetragonophylla*) open shrubland over a *Callytrix ?desolata*, *Eremophila forrestii* subsp. *forrestii* low open shrubland over *Aristida contorta* very open tussock grassland

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia aneura</i>	0.1	0.3
<i>Acacia ramulosa</i> ?var.	8	1.2
<i>Acacia tetragonophylla</i>	2	0.8
<i>Aristida contorta</i>	2	0.2
<i>Callytrix ?desolata</i>	8	0.4
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.2	1
<i>Dodonaea rigida</i>	0.1	0.6
? <i>Enchylaeana tomentosa</i>	0.4	0.3
<i>Eragrostis eriopoda</i>	0.2	0.2
<i>Eremophila ?exilifolia</i>	0.5	0.8
<i>Eremophila forrestii</i> subsp. ? <i>forrestii</i>	1	0.8
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.4	0.6
<i>Eremophila latrobei</i> subsp. ? <i>latrobei</i>	0.8	1.2
<i>Eriachne mucronata</i>	0.2	0.2

<i>Maireana ?tomentosa</i>	0.1	0.2
<i>Malvaceae</i> sp.	0.1	0.3
<i>Marsdenia australis</i>	0.1	0
<i>Ptilotus aervoides</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.2	0.3
<i>Ptilotus schwartzii</i>	0.2	0.3
<i>Santalum lanceolatum</i>	0.4	1.5
<i>Scaevola spinescens</i>	0.5	1.1
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)	0.3	0.5
<i>Solanum lasiophyllum</i>	0.1	0.2

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
1	4	25

Veg Condition: Very Good

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-13

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Quadrat

Environmental Variables:

Landform: Low rise/Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Silty clay

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: >90

Size: 2-6,20-60,6-20,60-200

Outcropping: <2

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Grazing

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Hakea leucoptera* subsp. *sericipes* low open woodland over *Acacia quadrimarginea*, *Acacia macraneura* tall open shrubland over *Eremophila oldfieldii* subsp. *angustifolia*, *Dodonaea lobulata* low open shrubland.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia caesaneura</i>	0.1	1.6
<i>Acacia macraneura</i>	5	5
<i>Acacia quadrimarginea</i>	4	3.2
<i>Aristida contorta</i>	0.2	0.2
<i>Dodonaea lobulata</i>	1	0.7
<i>Dodonaea rigida</i>	0.1	0.9
<i>Eremophila ?exilifolia</i>	0.1	0.4
<i>Eremophila ?pantonii</i>	0.2	0.7
<i>Eremophila latrobei</i> subsp. <i>?latrobei</i>	0.2	0.6
<i>Eremophila oldfieldii</i> subsp. <i>?angustifolia</i>	2	1.5
<i>Eriachne mucronata</i>	0.3	0.2
<i>Hakea leucoptera</i> subsp. <i>sericipes</i>	6	6
<i>Maireana ?tomentosa</i>	0.2	0.2
<i>Ptilotus obovatus</i>	0.4	0.2

<i>Rhyncharrhena linearis</i>	0.1	0
<i>Santalum lanceolatum</i>	1	2.4
<i>Scaevola spinescens</i>	0.1	0.5
<i>Sida ectogama</i>	0.4	1.3
<i>Solanum lasiophyllum</i>	0.1	0.2

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
0.2	2	20

Veg Condition: Very Good

Fire Age: > 15

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-14

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Quadrat

Environmental Variables:

Landform: Low rise

Slope: Gently inclined (3-5°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: >90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Clearing, Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia quadrimarginea*, *Acacia burkittii*, *Acacia aneura*, *Acacia macraneura* shoots tall shrubland over *Eremophila oldfieldii* subsp. *angustifolia*, *Dodonaea rigida* open shrubland over *Eremophila pungens* (P4), *Ptilotus obovatus*, *Scaevola spinescens* low open shrubland.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia ayersiana</i> (narrow phyllode variant)	0.4	1.3
<i>Acacia burkittii</i>	4	2.5
<i>Acacia incurvaneura</i>	3	5
<i>Acacia macraneura</i>	2	4
<i>Acacia quadrimarginea</i>	8	4
<i>Acacia sibirica</i>	0.6	1.2
<i>Aristida contorta</i>	2	0.2
<i>Dodonaea rigida</i>	5	2.2
? <i>Enchylaeana tomentosa</i>	0.2	0.5
<i>Eragrostis eriopoda</i>	0.5	0.3
<i>Eremophila latrobei</i> subsp. ? <i>latrobei</i>	0.5	0.6
<i>Eremophila oldfieldii</i> subsp. ? <i>angustifolia</i>	0	2.6
<i>Eremophila pungens</i>	1	7
<i>Eremophila</i> sp.	0.3	1.6

<i>Eriachne mucronata</i>	0.1	0.2
<i>Maireana ?tomentosa</i>	0.2	0.2
<i>Maireana tritera</i>	0.4	0.3
<i>Poeaceae sp.</i>	0.1	0.4
<i>Ptilotus obovatus</i>	2.5	0.9
<i>Ptilotus schwartzii</i>	0.2	0.3
<i>Santalum lanceolatum</i>	0.3	1.7
<i>Scaevola spinescens</i>	1.5	1.6
<i>Sclerolaena eriacantha</i>	0.1	0.2
<i>Senna artemisioides</i> subsp. <i>X sturtii</i>	0.2	0.5
<i>Sida ectogama</i>	0.2	0.6
<i>Solanum lasiophyllum</i>	0.2	0.3

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
0.5	5	27

Veg Condition: Very Good

Fire Age: > 15

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-15

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Quadrat

Environmental Variables:

Landform: Low rise

Slope: Gently inclined (3-5°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: >90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral trampling, Grazing, Tracks

Introduced species: Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia aneura*, *Acacia burkittii* tall shrubland over *Scaevole spinescens*, *Eremophila forrestii* subsp. *forrestii* open shrubland over *Ptilotus obovatus* low open shrubland over *Aristida contorta* very open grasses.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia burkittii</i>	10	5
<i>Acacia incurvaneura</i>	8	4
<i>Acacia macraneura</i>	0.4	0.6
<i>Acacia quadrimarginea</i>	0.3	0.8
<i>Acacia tetragonophylla</i>	0.4	1.1
<i>Aristida contorta</i>	2.5	0.2
? <i>Enchylaeana tomentosa</i>	0.1	0.8
<i>Eragrostis eriopoda</i>	0.2	0.3
<i>Eremophila forrestii</i> subsp. ? <i>forrestii</i>	1	1.4
<i>Eremophila oldfieldii</i> subsp. ? <i>angustifolia</i>	0.5	0.7
<i>Eremophila</i> sp.	0.1	0.25
<i>Maireana</i> ? <i>tomentosa</i>	0.2	0.3
<i>Maireana tritera</i>	0.3	0.3
<i>Ptilotus aevoides</i>	0.1	0.1

<i>Ptilotus obovatus</i>	2	0.7
<i>Ptilotus schwartzii</i>	0.1	0.3
<i>Ptilotus sp.</i>	0.1	0.2
<i>Scaevola spinescens</i>	2	1.5
<i>Senna artemisioides subsp. filifolia</i>	0.2	0.6
<i>Senna sp. Meeekatharra</i> (E. Bailey 1-26)	0.2	0.5
<i>Solanum lasiophyllum</i>	0.2	0.4

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
0.5	6	27

Veg Condition: Very Good

Fire Age: > 15

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-16

Site Details:

Described by: LT, AB

Date: 5/10/2018

Type: Quadrat

Environmental Variables:

Landform: Drainage Line

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 10-20

Size: 2-6,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion: -

Human disturbance: Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia aneura*, *Acacia ramulosa* tall shrubland over *Eremophila ?exilifolia*, *Eremophila forrestii* subsp. *forrestii*, *Sida ?ectogama* low open shrubland over *Aristida contorta* very open grassland.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia aneura</i>	1	0.8
<i>Acacia aneura</i>	25	6
<i>Acacia quadrimarginea</i>	1.5	3
<i>Acacia sibirica</i>	4.5	2
<i>Aristida contorta</i>	6	0.2
<i>Enneapogon polyphyllus</i>	0.1	0.1
<i>Eremophila ?exilifolia</i>	8	0.7
<i>Eremophila forrestii</i> subsp. <i>?forrestii</i>	1.5	0.8
<i>Eremophila latrobei</i> subsp. <i>?latrobei</i>	0.4	0.7
<i>Eremophila</i> sp.	0.3	0.9
<i>Maireana ?tomentosa</i>	0.2	0.2
<i>Poaceae</i> sp.	0.1	0.5
<i>Psyrax suaveolens</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.5	0.5
<i>Rhagodia</i> sp.	0.3	1.1

<i>Rhyncharrhena linearis</i>	0.3	0
<i>Santalum lanceolatum</i>	0.3	1.5
<i>Sclerolaena eriacantha</i>	0.2	0.2
<i>Sida ectogama</i>	1	0.6
<i>Solanum lasiophyllum</i>	1	4

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
3	8	50

Veg Condition: Very Good

Fire Age: > 15

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-17

Site Details:

Described by: LT, AB

Date: 5/13/2018

Type: Quadrat

Environmental Variables:

Landform: Alluvial Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Loamy sand

Soil Colour: Orange-brown

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 0

Size: N/A

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion:

Human disturbance: Clearing, Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura*, (*Acacia caesaneura*, *Acacia ramulosa* var. *?linophylla*) open scrub over *Eremophila spectabilis*, (*Eremophila latrobei* subsp. *latrobei*) open low heath over *Eriachne mucronata* open grassland.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia caesaneura</i>	3	4
<i>Acacia incurvaneura</i>	55	4.5
<i>Acacia ramulosa</i> ?var. <i>linophylla</i>	2	2.5
<i>Brachychiton gregorii</i>	0.1	1.2
<i>Cheilanthes</i> sp.	0.1	0.1
<i>Dianella revoluta</i> var. <i>divaricata</i>	0.2	0.8
? <i>Enchylaeana tomentosa</i>	0.1	0.1
<i>Eragrostis eriopoda</i>	0.7	0.4
<i>Eremophila forrestii</i> subsp. ? <i>forrestii</i>	0.9	0.6
<i>Eremophila latrobei</i> subsp. ? <i>latrobei</i>	1.5	0.7
<i>Eremophila spectabilis</i>	35	0.9
<i>Eriachne mucronata</i>	0.5	0.3
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Maireana</i> sp.	0.1	0.2

<i>Malvaceae</i> sp.	0.1	0.2
<i>Monacather paradoxus</i>	0.5	0.4
<i>Psyrax latifolia</i>	0.5	0.9
<i>Psyrax rigidula</i>	0.3	1.2
<i>Psyrax suaveolens</i>	0.1	0.6
<i>Senna artemisioides</i> subsp. <i>filifolia</i>	0.4	1.5
<i>Solanum ferocissimum</i>	0.1	0.3
<i>Solanum lasiophyllum</i>	0.2	0.3
<i>Thyriolepis multiculmis</i>	25	0.5

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
0.5	20	95

Veg Condition: Very Good

Fire Age: > 15

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-18

Site Details:

Described by: LT, AB

Date: 5/13/2018

Type: Quadrat

Environmental Variables:

Landform: Alluvial Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Loamy sand

Soil Colour: Orange

Rock Type: Ironstone, Quartzite

Coarse Surface Particles:

Site coverage: <2

Size: 2-6,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia incurvaneura*, *Acacia aneura* open scrub over *Acacia ramulosa* var. *linophylla* shrubland to tall shrubland over *Eremophila latrobei* subsp. *latrobei* open tall shrubland over *Eremophila spectabilis* low shrubland over *Eriachne mucronata* open grassland.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia aneura</i>	15	3
<i>Acacia incurvaneura</i>	30	3.5
<i>Acacia ramulosa</i> ?var. <i>linophylla</i>	20	2.2
<i>Cheilanthes</i> sp.	0.2	0.1
? <i>Enchylaeana tomentosa</i>	0.1	0.1
<i>Eragrostis eriopoda</i>	0.5	0.3
<i>Eremophila forrestii</i> subsp. ? <i>forrestii</i>	0.5	0.6
<i>Eremophila latrobei</i> subsp. ? <i>latrobei</i>	2.5	1.2
<i>Eremophila spectabilis</i>	20	0.9
<i>Eriachne mucronata</i>	0.5	0.2
<i>Maireana</i> sp.	0.1	0.1
<i>Malvaceae</i> sp.	0.1	0.2
<i>Monacather paradoxus</i>	0.7	0.4
<i>Psyrax rigidula</i>	0.2	1

<i>Psudras suaveolens</i>	0.1	1.6
<i>Ptilotus schwartzii</i>	0.5	0.3
<i>Rhyncharrhena linearis</i>	0.1	0
<i>Solanum ferocissimum</i>	0.1	0.5
<i>Solanum lasiophyllum</i>	0.2	0.3
<i>Teucrium teucriiflorum</i>	0.7	0.7
<i>Thyriolepis multiculmis</i>	15	0.4

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
25	15	70

Veg Condition: Very Good

Fire Age: > 15

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Pi-Q-19

Site Details:

Described by: LT, AB

Date: 5/13/2018

Type: Quadrat

Environmental Variables:

Landform: Low rise at base of lateritic ridge

Slope: Gently inclined (3-5°)

Soils:

Soil Texture: Sandy clay loam

Soil Colour: Orange-brown

Rock Type: Ironstone, Laterite, Quartzite

Coarse Surface Particles:

Site coverage: >90

Size: 2-6,20-60,6-20

Outcropping: <2

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Changed hydrology, Erosion, Feral scats, Feral trampling, Grazing, Tracks

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia quadrimarginea*, *Dodonaea rigida* (*Acacia aneura*) open shrubland over *Callytrix ?desolata* (*Eremophila forrestii* subsp. *forrestii*) open low shrubland over *Aristida contorta* (*Eragrostis eriopoda*) open tussock grassland

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia aneura</i>	0.8	1.1
<i>Acacia quadrimarginea</i>	2	1.5
<i>Acacia sibirica</i>	1	1.1
<i>Aristida contorta</i>	25	0.2
<i>Callytrix ?desolata</i>	3	0.6
<i>Dodonaea rigida</i>	2	1.9
<i>Eragrostis eriopoda</i>	1	0.3
<i>Eremophila ?exilifolia</i>	0.5	0.7
<i>Eremophila forrestii</i> subsp. <i>?forrestii</i>	0.5	0.9
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	0.5	0.3
<i>Eremophila latrobei</i> subsp. <i>?latrobei</i>	0.1	0.3
<i>Eremophila</i> sp.	1	0.5
<i>Eriachne mucronata</i>	0.3	0.2
<i>Grevillea inconspicua</i>	0.1	0.2

<i>Ptilotus obovatus</i>	0.4	0.2
<i>Senna artemisioides subsp. helmsii</i>	0.1	0.2
<i>Senna glaucifolia</i>	0.5	0.6
<i>Solanum lasiophyllum</i>	0.2	0.3

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
0.1	0.5	35

Veg Condition: Very Good Fire Age: > 15
Weeds: - Fire Notes: N/A



Agnew Gold Mine – Pr-01

Site Details:

Described by: LT, AB

Date: 5/8/2018

Type: Relevé

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Quartzite

Coarse Surface Particles:

Site coverage: 0

Size: N/A

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Eremophila fraseri* subsp. *fraseri*, *Acacia tetragonophylla* open shrubland over *Eremophila ?margerathae*, *Ptilotus obovatus* open low shrubland over *Aristida contorta*, *Cymbopogon ambiguus* open tussock grassland.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia tetragonophylla</i>	2	2
<i>Aristida contorta</i>	15	0.2
<i>Cymbopogon ambiguus</i>	10	0.7
<i>Eragrostis eriopoda</i>	1	0.2
<i>Eremophila forrestii</i> subsp. <i>?forrestii</i>	0.1	0.7
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	8	1.2
<i>Eremophila latrobei</i> subsp. <i>?latrobei</i>	0.5	0.8
<i>Eremophila</i> sp.	0.1	0.1
<i>Eriachne mucronata</i>	0.2	0.2
<i>Eriachne pulchella</i>	0.1	0.15
<i>Ptilotus obovatus</i>	1	0.3
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)	0.1	0.5
<i>Sida ectogama</i>	0.1	0.1
<i>Solanum lasiophyllum</i>	0.1	0.2

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
25	5	15

Veg Poor
Condition:

Fire Age: Unknown (no evidence)

Weeds: -

Fire N/A
Notes:



Agnew Gold Mine – Pr-02

Site Details:

Described by: LT, AB

Date: 5/8/2018

Type: Relevé

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Ironstone

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never
g:

Inundation: -

Flooding: -

Erosion: -

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Eremophila fraseri* subsp. *fraseri* open shrubland over *Eremophila margerathae* open low shrubland.

Species List

Species Name	Cover (%)	Height (%)
<i>Aristida contorta</i>	0.1	0.2
<i>Cymbopogon ambiguus</i>	0.2	0.3
<i>Eragrostis eriopoda</i>	0.5	0.2
<i>Eremophila ?margarethae</i>	2	0.5
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	2	1.2
<i>Eremophila</i> sp.	0.1	0.7
<i>Eriachne mucronata</i>	0.1	0.2
<i>Eriachne pulchella</i>	0.1	0.2
<i>Maireana tritera</i>	0.1	0.2
<i>Poeaceae</i> sp.	0.1	0.2
<i>Ptilotus aervoides</i>	0.1	0
<i>Ptilotus obovatus</i>	0.1	0.3
<i>Ptilotus schwartzii</i>	0.1	0.3
<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)	0.2	0.5

<i>Sida ectogama</i>	0.1	0.2
<i>Solanum lasiophyllum</i>	0.1	0.1

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
5	0.2	4

Veg Poor
Condition:

Fire Age: Unknown (no evidence)

Weeds: -

Fire N/A
Notes:



Agnew Gold Mine – Wr-01

Site Details:

Described by: LT, AB

Date: 5/12/2018

Type: Relevé

Environmental Variables:

Landform: Low plain

Slope: Level (0-3°)

Soils:

Soil Texture: Sandy clay loam

Soil Colour: Orange-brown

Rock Type: Ironstone

Coarse Surface Particles:

Site coverage: <2

Size: 2-6

Outcropping: N/A

Impacts:

Waterlogging: No - Never

Inundation:

Flooding:

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia caesaneura* open low woodland over *Acacia aneura*, (?*Santalum lanceolatum*) tall shrubland over *Eremophila forrestii* subsp. *forrestii* shrubland over *Eremophila spectabilis* low open shrubland

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia aneura</i>	20	6.5
<i>Acacia caesaneura</i>	8	5
<i>Acacia incurvaneura</i>	0.5	1.9
<i>Acacia tetragonophylla</i>	0.5	4
<i>Chenopodaceae sp.</i>	0.3	0.1
<i>Eragrostis eriopoda</i>	0.5	0.3
<i>Eremophila forrestii</i> subsp. ? <i>forrestii</i>	18	1.6
<i>Eremophila latrobei</i> subsp. ? <i>latrobei</i>	0.2	0.5
<i>Eremophila spectabilis</i>	4	0.8
<i>Indeterminate sp.</i>	0.7	0
<i>Marsdenia australis</i>	0.1	0
<i>Psyrax rigidula</i>	0.5	3
<i>Psyrax suaveolens</i>	0.1	1.7
<i>Ptilotus obovatus</i>	0.3	0.6

<i>Rhagodia drummondii</i>	0.2	1.3
<i>Santalum lanceolatum</i>	2	4.5
<i>Solanum lasiophyllum</i>	0.1	0.2
<i>Teucrium teucriflorum</i>	0.9	0.3

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
20	8	60

Veg Condition: Good

Fire Age: > 15

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Wr-02

Site Details:

Described by: LT, AB

Date: 5/12/2018

Type: Relevé

Environmental Variables:

Landform: Stony plain

Slope: Level (0-3°)

Soils:

Soil Texture: Clay loam

Soil Colour: Orange

Rock Type: Ironstone, Quartzite

Coarse Surface Particles:

Site coverage: 50-90

Size: 2-6,20-60,6-20

Outcropping: N/A

Impacts:

Waterlogging: No - Never
g:

Inundation:

Flooding:

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia craspedocarpa* (hybrid), *Acacia incurvaneura* tall open shrubland over *Eremophila fraseri* subsp. *fraseri* open low shrubland to open shrubland

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia craspedocarpa</i>	0.2	1.5
<i>Acacia craspedocarpa</i> (hybrid)	4	4.5
<i>Acacia incurvaneura</i>	3	4
<i>Acacia tetragonophylla</i>	0.3	0.6
<i>Aristida contorta</i>	0.1	0.1
<i>Cymbopogon ambiguus</i>	0.1	0.6
<i>Enneapogon polyphyllus</i>	0.1	0.2
<i>Eremophila</i> ? <i>platycalyx</i>	0.1	0.5
<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	2	1
<i>Maireana</i> ? <i>villosa</i>	0.1	0.1
<i>Ptilotus aervoides</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.1	0.2
<i>Sclerolaena drummondii</i>	0.1	0.1
<i>Sclerolaena eriacantha</i>	0.1	0.1

<i>Solanum lasiophyllum</i>	0.1	0.2
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Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
1	0	10

Veg Condition: Degraded

Fire Age: Unknown (no evidence)

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Wr-03

Site Details:

Described by: LT, AB

Date: 5/12/2018

Type: Relevé

Environmental Variables:

Landform: Alluvial Plain, Drainage Line

Slope: Level (0-3°)

Soils:

Soil Texture: Loamy sand

Soil Colour: Orange

Rock Type: Ironstone, Laterite, Quartzite

Coarse Surface Particles:

Site coverage: <2

Size: 2-6,6-20

Outcropping: N/A

Impacts:

Waterlogging No - Prone to Flooding
g:

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle

FLORA AND VEGETATION DATA

Description: *Acacia aneura*, *Acacia ayersiana* (narrow phyllode variant) tall shrubland over *Acacia craspedocarpa* (hybrid), *Eremophila fraseri* subsp. *fraseri* low shrubland over *Enneapogon polyphyllus* very open tussock grassland

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia aneura</i>	15	4.5
<i>Acacia ayersiana</i> (narrow phyllode variant)	6	2.2
<i>Acacia craspedocarpa</i> (hybrid)	0.5	1.9
<i>Acacia craspedocarpa</i> (hybrid)	1.5	2.5
<i>Acacia incurvaneura</i>	0.9	0.9
<i>Acacia tetragonophylla</i>	0.5	1.5
<i>Alternanthera nana</i>	0.1	0.1
<i>Aristida contorta</i>	0.2	0.1
<i>Asteraceae</i> sp.	0	0.1
<i>Enneapogon polyphyllus</i>	2	0.3
<i>Eragrostis eriopoda</i>	0.2	0.3
<i>Eremophila</i> ? <i>platycalyx</i>	0.1	0.3
<i>Eremophila forrestii</i> subsp. ? <i>forrestii</i>	0.1	0.5

<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	2	1.1
<i>Eremophila latrobei</i> subsp. ? <i>latrobei</i>	0.1	0.5
<i>Eremophila serrulata</i>	0.2	0.6
<i>Eremophila</i> sp.	0.1	0.7
<i>Fimbristylis dichotoma</i>	0.1	0.1
<i>Ptilotus obovatus</i>	0.1	0.3
<i>Solanum lasiophyllum</i>	0.1	0.2
<i>Sporobolus australasicus</i>	0.1	0.2
<i>Teucrium teucriiflorum</i>	0.2	0.7

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
40	6	30

Veg Condition: Good

Fire Age: > 15

Weeds: -

Fire Notes: N/A



Agnew Gold Mine – Wr-04

Site Details:

Described by: LT, AB

Date: 5/12/2018

Type: Relevé

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Soils:

Soil Texture: Loamy sand

Soil Colour: Brown

Rock Type: Ironstone, Laterite

Coarse Surface Particles:

Site coverage: 0

Size: N/A

Outcropping: N/A

Impacts:

Waterlogging: No - Prone to Flooding

Inundation: -

Flooding: -

Erosion:

Human disturbance: Feral scats, Feral trampling, Grazing

Introduced species: Cattle, Rabbit

FLORA AND VEGETATION DATA

Description: *Acacia aneura* and *Acacia incurvaneura* open tall shrubland over *Eremophila spectabilis* (*Eremophila forrestii* subsp. *forrestii*) open shrubland over *Eragrostis eriopoda* (Poaceae sp. and *Monochather paradoxus*) very open grassland.

Species List

Species Name	Cover (%)	Height (%)
<i>Acacia aneura</i>	4	4
<i>Acacia incurvaneura</i>	3	3.5
<i>Acacia incurvaneura</i>	0.1	1.8
? <i>Enchylaeana tomentosa</i>	0.1	0.3
<i>Eragrostis eriopoda</i>	2	0.25
<i>Eremophila forrestii</i> subsp. ? <i>forrestii</i>	0.5	0.9
<i>Eremophila latrobei</i> subsp. ? <i>latrobei</i>	0.1	0.4
<i>Eremophila spectabilis</i>	3	0.6
<i>Eriachne mucronata</i>	0.1	0.2
<i>Monochather paradoxus</i>	0.5	0.3
Poaceae sp.	0.5	0.4
<i>Prostanthera althoferi</i>	0.1	0.3
<i>Psyrax rigidula</i>	0.1	0.6
<i>Ptilotus schwartzii</i>	0.1	0.25

<i>Solanum lasiophyllum</i>	0.1	0.4
<i>Teucrium teucriiflorum</i>	0.1	0.15

Ground Cover (percent)

Bare soil	Litter	Perennial ground cover
50	1	45

Veg Very Good
Condition:

Fire Age: > 15

Weeds: -

Fire N/A
Notes:



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APPENDIX 2: AGNEW RENEWABLE ENERGY EXPANSION: RECONNAISSANCE FLORA AND VEGETATION AND BASIC FAUNA SURVEY

Agnew Renewable Energy Expansion: Reconnaissance Flora and Vegetation and Basic Fauna Survey

PREPARED FOR GOLD FIELDS PTY LTD | February 2022

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Quality Statement

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Revision Schedule

Rev No	Date	Description	Signature of Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
1.0	24/02/2022	Draft issued for review	JM & SR	PB	AB	AB
2.0	30/03/2022	Final issued to client	JM & SR	AB	AB	AB

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Status: Draft | **Project No:** 300003403

Executive Summary

The Agnew Gold Mining Company Pty Ltd, a wholly owned subsidiary of Gold Fields Australia Pty Ltd, has appointed Stantec Australia Pty Ltd (Stantec) to complete a Reconnaissance flora and vegetation survey and Basic fauna survey as part of the renewable infrastructure expansion at Agnew Mine. The Survey Area is approximately 35.62 hectares and located approximately 630 kilometres north-east of Perth and 26 kilometers south-west of Leinster.

Field work was undertaken between 22 and 23 November 2021, and comprised quadrat sampling, fauna habitat assessments, targeted searches, and opportunistic collections of flora and fauna. Due to the small size of the Survey Area and consistency in vegetation type, survey effort comprised three quadrats, three fauna habitat assessments and targeted searches for significant flora and fauna species throughout the Survey Area. Seasonal conditions and survey timing were adequate to detect fauna species identified in the desktop assessment, with above average rainfall recorded within six weeks of the field survey. The survey was conducted outside the recommended timing for flora and vegetation surveys in the Eremaean Province. However, above average rainfall (44.8 mm) recorded in the six weeks preceding the survey provided suitable seasonal conditions to detect most flora species identified in the desktop assessment.

Floristic diversity and composition were considered typical of the Eastern Murchison subregion and largely consistent with previous surveys undertaken in close proximity to the Survey Area. A total of 45 confirmed flora species were recorded from the Survey Area. No Commonwealth or State-listed Threatened or Priority flora species were recorded within Survey Area. An additional species, *Goodenia modesta* (P3), is considered 'possible' to occur within the Survey Area based on the post-survey likelihood assessment. No species of other significance were recorded in the Survey Area.

The vegetation of the Survey Area was assigned to an existing vegetation type described previously during surveys within the vicinity of the Survey Area by Stantec, to maintain consistency. Four vegetation types were delineated for the Survey Area, all of which are representative of the Eastern Murchison subregion, broadly consisting of flat colluvium and alluvial plains, and low mulga (*Acacia aneura* complex) woodlands. Vegetation within the Survey Area was not considered to represent a threatened or priority ecological community.

Vegetation condition ranged from Poor to Completely Degraded within the Survey Area, with the majority (86.5 percent) of vegetation described as being in Poor condition. Disturbances were predominantly associated with livestock grazing, partial clearing and weed invasion.

Introduced flora diversity and density within the Survey Area was considered low, with two weed species recorded; **Citrullus colocynthis* and **Rumex vesicarius*. Neither species is listed as a declared pest under Section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM Act), or represent a Weed of National Significance.

Four fauna habitats were identified within the Survey Area. The dominant habitat described as 'Open Plain' (82.4 percent) was widespread in the region and of limited significance to potential fauna species. A total of 12 terrestrial vertebrate fauna species were opportunistically recorded during the survey either through direct observations or indirect evidence (diggings, foraging evidence, tracks etc.). These comprised seven birds, three mammal, and two reptiles. No fauna species of significance were recorded in the Survey Area or are expected to occur based on previous records in the area and the habitats present. The post survey likelihood assessment identified three species of significance that were 'possible' to occur: Fork-tailed swift (MI, MI), Peregrine falcon (OS), and Northern shield-backed trapdoor spider (P3).

Contents

1.	Introduction.....	1
1.1.	Project Background and Location	1
1.2.	Project Scope and Objectives	1
1.3.	Regulatory Guidance and Legislation.....	1
2.	Existing Environment	3
2.1.	Biogeographical location	3
2.2.	Land systems.....	5
2.3.	Geology and Soils.....	7
2.4.	Surface Water and Hydrology	8
2.5.	Climate	8
2.6.	Pre-European Vegetation.....	8
2.7.	Environmentally Sensitive Areas and Conservation Reserves	11
3.	Desktop Assessment.....	12
3.1.	Approach	12
3.2.	Methods.....	12
3.2.1.	Database Searches	12
3.2.2.	Literature Review	12
3.2.3.	Likelihood of occurrence of significant species.....	16
3.3.	Results.....	17
3.3.1.	Flora	17
3.3.2.	Vegetation.....	17
3.3.3.	Terrestrial fauna.....	17
3.3.4.	Significant Fauna	17
4.	Survey Methods	19
4.1.	Survey timing and Seasonal Conditions.....	19
4.2.	Survey team and licencing	19
4.3.	Reconnaissance Flora and Vegetation Survey.....	19
4.3.1.	Quadrats.....	19
4.3.2.	Vegetation Type and Condition Mapping	20
4.3.3.	Targeted Searches	20
4.3.4.	Opportunistic Records	22
4.3.5.	Specimen Identification and Nomenclature	22

4.4.	Basic Fauna Survey	22
4.4.1.	Habitat Assessment	22
4.4.2.	Targeted Searches	23
4.4.3.	Taxonomy and Nomenclature	23
5.	Results & Discussion	24
5.1.	Flora	24
5.1.1.	Floristic Composition.....	24
5.1.2.	Flora of Other Significance.....	24
5.1.3.	Post-survey likelihood of Occurrence	24
5.1.4.	Introduced Flora.....	24
5.2.	Vegetation.....	25
5.2.1.	Vegetation Types	25
5.2.2.	Vegetation Condition.....	29
5.3.	Fauna	31
5.3.1.	Fauna Assemblages	31
5.3.2.	Fauna Habitats	31
5.3.3.	Significant Fauna	35
6.	Survey Limitations and Constraints	36
7.	Summary	37
8.	References	38

List of Tables

Table 2-1:	Land systems of the Survey Area.	5
Table 2-2:	Surface geology of the Survey Area.....	7
Table 2-3:	Pre-European vegetation associations and extent within the Survey Area.	9
Table 2-4:	Extent of pre-European vegetation associations Wiluna_18 and Laverton_18 remaining across four scales (State, Bioregion, Subregion and Local Government Area).	9
Table 3-1:	Database searches conducted for the desktop assessment.	12
Table 3-2:	Summary of the relevant flora and vegetation surveys in the vicinity of the Survey Area.	13
Table 3-3:	Summary of the relevant fauna in the vicinity of the Survey Area.	15
Table 3-4:	Criteria for assessing the likely presence of significant species in the Survey Area.....	16
Table 3-6:	Vertebrate fauna of conservation significance identified during the desktop assessment.....	17
Table 4-1:	Summary of data recorded at each quadrat site.	20
Table 4-2:	Summary of data recorded at each fauna habitat assessment site.....	23
Table 5-1:	Most represented vascular plant families and genera for the Survey Area.	24
Table 5-2:	Classification of introduced flora taxa identified in the Survey Area.	25
Table 5-3:	Vegetation condition recorded in the Survey Area.	29
Table 5-4:	Vertebrate fauns species recorded from the Survey Area during the field survey.....	31
Table 5-5:	Fauna habitats recorded with the Survey Area.	32
Table 6-1:	Potential limitations and constraints of the field survey.....	36

List of Figures

Figure 1-1: Regional location of the Survey Area	1
Figure 1-2: Survey area locality.....	2
Figure 2-1: The Survey Area in relation to the IBRA subregion and bioregion.....	4
Figure 2-2: Land systems associated with the Survey Area.....	6
Figure 2-3: Long-term (1995 - 2022) rainfall (mm) and long-term (1995-2022) temperature (°C) data recorded at Leinster Aero weather station (012314).....	8
Figure 2-4: Pre-European vegetation associations within the Survey Area.....	10
Figure 4-1: Long-term (1995-2021) mean monthly rainfall (mm) and actual monthly rainfall (mm) received in the 12 months preceding the field survey (orange arrow) at Leinster Aero station.....	19
Figure 4-2: Survey effort within the Survey Area.....	21
Figure 5-1: Vegetation type mapping for the Survey Area.....	28
Figure 5-2: Vegetation condition recorded with the Survey Area.	30
Figure 5-3: Fauna habitats of the Survey Area.....	34

Appendices

Appendix A Environmentally Sensitive Area Criteria	A.1
Appendix B Codes and Terms Used to Describe Species of Conservation Significance ...	B.1
Appendix C Likelihood of Occurrence of Significant Flora in the Survey Area.....	C.3
Appendix D Vertebrate Fauna Identified in the Desktop Assessment.....	D.1
Appendix E Significant Fauna Likelihood of Occurrence	E.1
Appendix F NVIS Vegetation Structural Classification	F.1
Appendix G Vegetation Condition Scale for the Eremaean Botanical Province	G.1
Appendix H Inventory of Vascular Flora Recorded.....	H.3
Appendix I Sample Site Data.....	I.6

1. Introduction

1.1. Project Background and Location

The Agnew Gold Mining Company Pty Ltd (AGMC) is a wholly owned subsidiary of Gold Fields Australia Pty Ltd (Gold Fields Australia). AGMC operate the Agnew Gold Mine (the Project), located approximately 630 kilometres (km) northeast of Perth and 26 km southwest of Leinster (**Figure 1-1**). AGMC is proposing to expand the solar farm and possibly implement energy storage infrastructure at its Agnew mine.

To inform and support potential future development of the solar farm and energy storage infrastructure, AGMC require a Reconnaissance flora and vegetation survey (previously referred to as Level 1), and basic fauna Survey (previously referred to a Level 1) survey. Stantec Australia Pty Ltd (Stantec) was commissioned by AGMC to undertake the required surveys within a Survey Area of 35.62 ha (The Survey Area) (**Figure 1-2**).

1.2. Project Scope and Objectives

The overarching objective was to provide a comprehensive understanding of the flora, vegetation and fauna within the Survey Area through a desktop assessment and by conducting targeted surveys within the Survey Area.

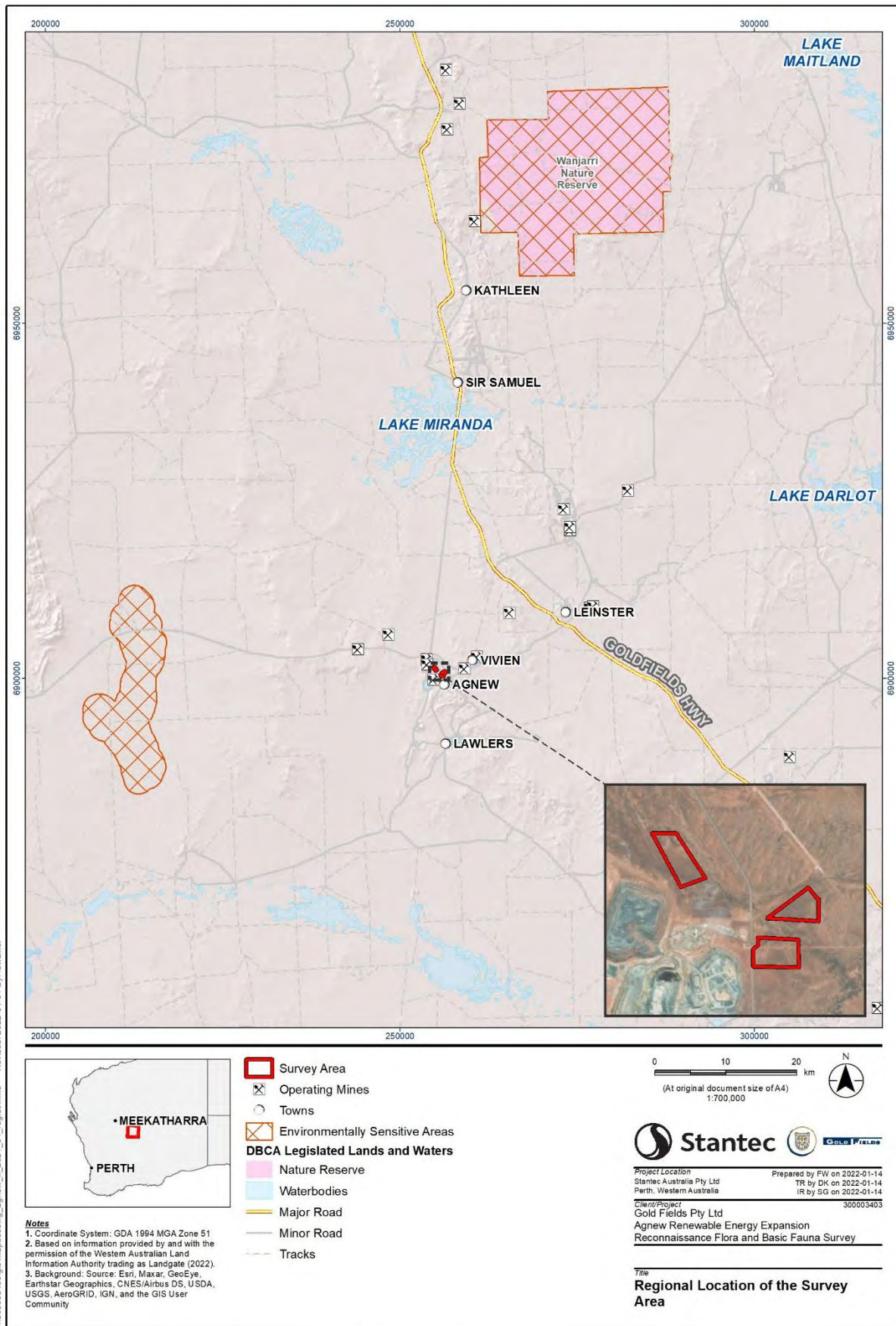
The specific objectives of this work were to:

- Conduct a desktop assessment, including:
 - database searches and literature review to develop a list of flora and fauna species and vegetation communities that have been previously recorded within, or in the vicinity of, the Survey Area, including a likelihood of occurrence for species of significance;
- Undertake a field survey to:
 - describe and map the vegetation types, vegetation condition and fauna habitats of the Survey Area;
 - develop a list of vascular flora and vertebrate fauna species recorded within the Survey Area; and
 - determine the presence of flora, vegetation communities and fauna of significance through targeted searches.

1.3. Regulatory Guidance and Legislation

The survey was undertaken in accordance with the following regulatory guidance;

- (EPA 2016c); Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment;
- (EPA 2016d); Environmental Factor Guideline – Flora and Vegetation
- (EPA 2020); Technical Guidance: Terrestrial Invertebrate Fauna Surveys for Environmental Impact Assessment;
- (EPA 2016a); Environmental Factor Guideline – Terrestrial Fauna;
- (EPA 2016d); Environmental Protection Authority (EPA) Statement of Environmental Principles, Factors and Objectives EPA Environmental Factor Guideline – Flora and Vegetation;
- (DotE 2013); Department of Agriculture, Water and the Environment (2013), Matters of National Environmental Significance – significant impact guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).



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Figure 1-1: Regional location of the Survey Area.

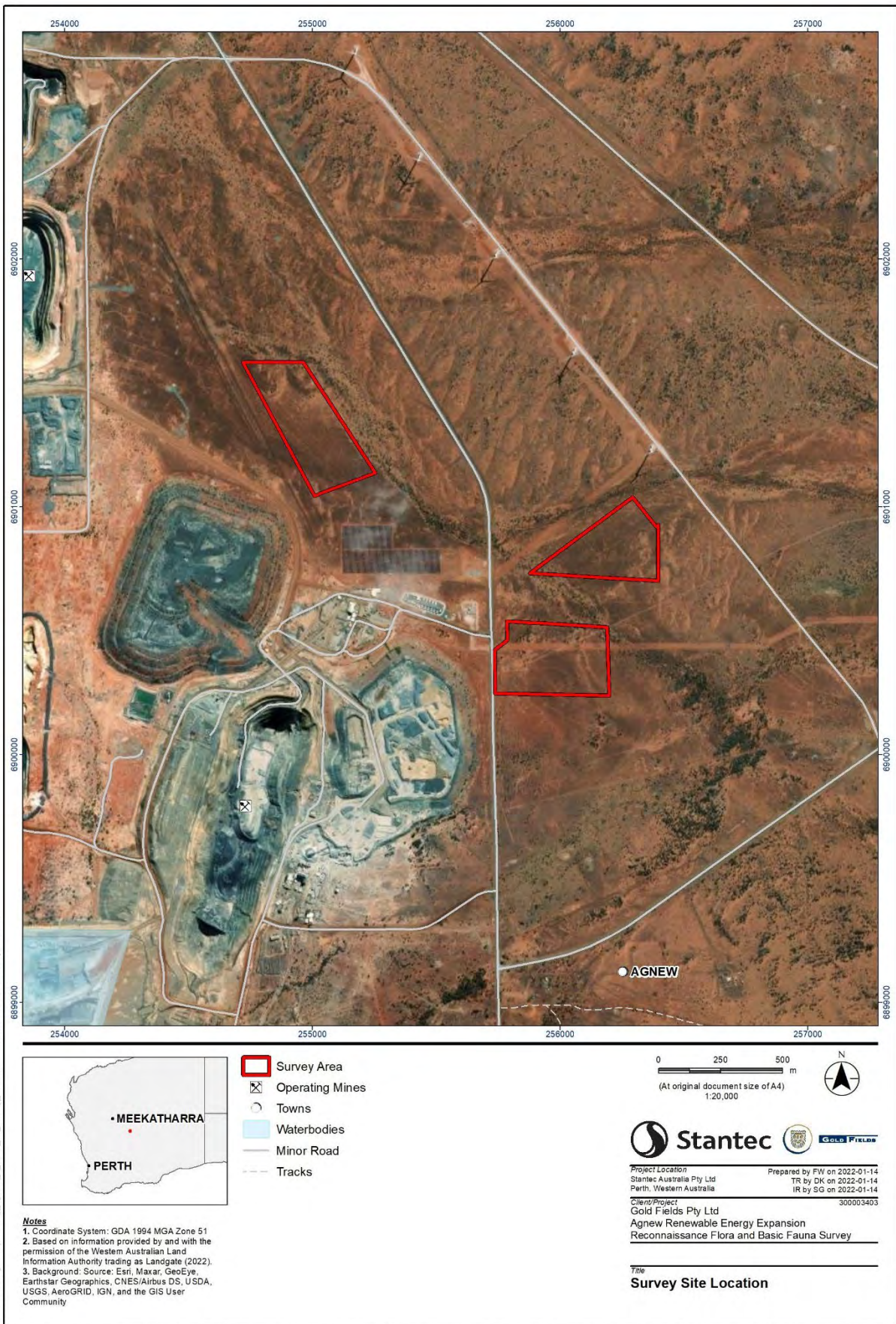


Figure 1-2: Survey area locality.

2. Existing Environment

2.1. Biogeographical location

The Interim Biogeographic Regionalisation for Australia (IBRA) is a bioregional framework that divides Australia into 89 biogeographic regions and 419 subregions on the basis of climate, geology, landforms, vegetation, and fauna (Thackway and Cresswell 1995). It was developed through a collaboration between state and territory conservation agencies with coordination by the Commonwealth Department of the Environment, Water, Heritage and the Arts (now the Commonwealth Department of Agriculture, Water and the Environment, DoAWE). The bioregions and subregions are the reporting unit for the systematic development of a comprehensive, adequate and representative National Reserve System. The Survey Area is located within the Eastern Murchison subregion (MUR1) of the Murchison bioregion, within the Eremaean Botanical Province of WA (**Figure 2-1**).

The Murchison bioregion is characterised by low hills and mesas separated by flat colluvium and alluvial plains, and low mulga (*Acacia aneura* complex) woodlands. The MUR1 subregion comprises 7,847,996 ha, encompassing an internal drainage system and areas of extensive elevated red desert sand plains with reduced dune development, and broad plains of red-brown soils and breakaway complexes (Cowan *et al.* 2001).. Vegetation of the subregion is predominantly low mulga woodland over ephemeral species including hummock grasses, and saltbush and samphire shrublands. This subregion exhibits a rich and diverse suite of flora and fauna, although most species occur across wide ranging distributions encompassing adjacent subregions (Cowan *et al.* 2001).



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- Notes**
1. Coordinate System: GCS GDA 1994
 2. Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2022).
 3. Background: Copyright (c) 2014 Esri

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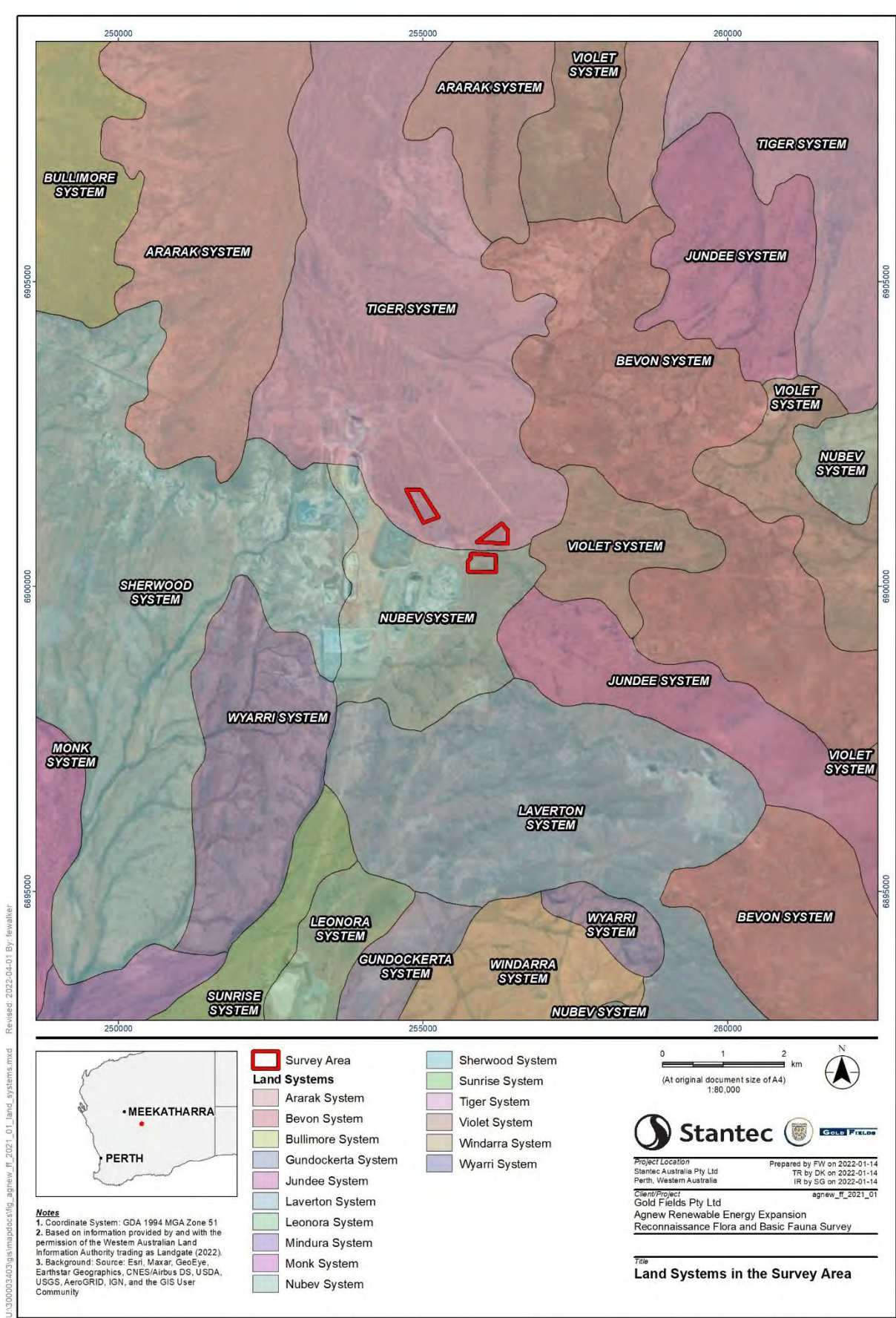
Figure 2-1: The Survey Area in relation to the IBRA subregion and bioregion.

2.2. Land systems

Land systems are defined as an area or group of areas throughout which there is a recurring pattern of topography, soils and vegetation (Tille 2006). An understanding of land systems provides an indication of the occurrence and distribution of vegetation types and fauna habitats within and surrounding the Survey Area (Pringle *et al.* 1994). Land systems across the Murchison have been mapped by the Natural Resources Assessment Group of the Department of Primary Industries and Regional Development (formerly the Department of Agriculture). This mapping provides a comprehensive description of biophysical resources within the area (Pringle *et al.* 1994). The Survey Area coincides with the Nubev and Tiger Land Systems (**Table 2-1**).

Table 2-1: Land systems of the Survey Area.

System	Description	Extent within survey area (ha)	Proportion of the Survey Area (%)
Nubev System	Gently undulating stony plains, minor limonitic low rises and drainage floors supporting mulga and halophytic shrublands.	23.08	64.79
Tiger System	Gravelly hardpan plains and sandy banks with mulga shrublands and wanderrie grasses.	12.54	35.21
Total		35.62	100



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Notes
 1. Coordinate System: GDA 1994 MGA Zone 51
 2. Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2022).
 3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Figure 2-2: Land systems associated with the Survey Area.

2.3. Geology and Soils

The geology of the Murchison region mainly consists of granite greenstone terrain of the Archean Yilgarn Craton, and is characterised by hill ranges separated by large flat colluvial and alluvial plains (Curry *et al.* 1994). Granitic rocks contain quartz veins and dolerite dykes (Tille 2006). The greenstone belts have a north-west orientation and become more common in the east Murchison, and tend to be associated with areas of gneiss (Tille 2006). One geologic unit 'colluvium 38491' occurs across the entire Survey Area (**Table 2-2**) (Geoscience Australia 2012).

Table 2-2: Surface geology of the Survey Area.

Code	Description	Extent within survey area (ha)	Proportion of the Survey Area (%)
Qrc	Colluvium and/or residual deposits, sheetwash, talus, scree; boulder, gravel, sand; may include minor alluvial or sand plain deposits, local calcrete and reworked laterite	35.62	100

Soils are typically shallow, sandy and infertile and lie over red-brown siliceous hardpan in lower areas of the Murchison (Curry *et al.* 1994). Tille (2006) describes soils according to:

- **Wash Plains:** red loamy earths and red-brown hardpan shallow loams with some red shallow loams. Red sandy earths and red deep sands occur on sandy banks;
- **Sandplains:** red sandy earths and red deep sands, with some red loamy earths and calcareous loamy earths occurring in low lying areas. Yellow deep sands occur in the south-west;
- **Mesas:** dominated by red shallow loam, red shallow sandy duplexes and red shallow sands with some stony soils and red/brown non-cracking clay;
- **Hilly terrain:** dominated by red shallow loams, stony soils and red shallow sands with some bare rock and red shallow sandy duplexes. Stony Plains are dominated by red shallow loams with red shallow sandy duplexes with red shallow sand on plains over granite. Red-brown hardpan shallow loams, calcareous loamy earths and red loamy earths are also present; and
- **Valley floors:** mainly salt lake soils with some deep red sand with some red deep sandy duplexes, red/brown non-cracking clays, red shallow sandy duplexes and red-brown hardpan shallow loams.

2.4. Surface Water and Hydrology

The Survey Area does not intersect any waterbodies and the nearest non-perennial lake, Lake Mirander, occurs approximately 26 km north of the Survey Area. Another unnamed non-perennial lake system also occurs approximately 32 km south of the Survey area. An unnamed minor creek line intersects the survey area, which is part of the overall Lake Carey catchment. The nearest nationally important wetland is the Lake Barley System, 112 km southwest of the Survey Area. No public drinking water areas occur within 10 km of the Survey Area, the nearest being Leonora Water Reserve approximately 110 km southeast of the Survey Area (Government of Western Australia 2021).

2.5. Climate

The Survey Area is located within the Goldfields region of WA, which is classed as being arid to semi-arid, and is considered to be within the bioclimatic category of 'desert; summer and winter rainfall', where the months of the year are not reliably wet, zero rainfall can be recorded within any month and rainfall is typically erratic (Pringle *et al.* 1994).

The nearest Bureau of Meteorology (BOM) weather station to the Survey Area, with relevant long-term and recent climatic data, is Leinster Aero weather station (012314), located approximately 23 km north-east of the Survey Area. The long-term annual rainfall is 251.6 millimetres (mm) (1995 to 2022), with the majority falling during the months of January to March (**Figure 2-3**). The hottest three months are January to March, with daily maximum temperatures regularly exceeding 30°C, whilst the coolest three months occur between June and August, with minimum temperatures frequently falling below 10°C (BoM 2021).

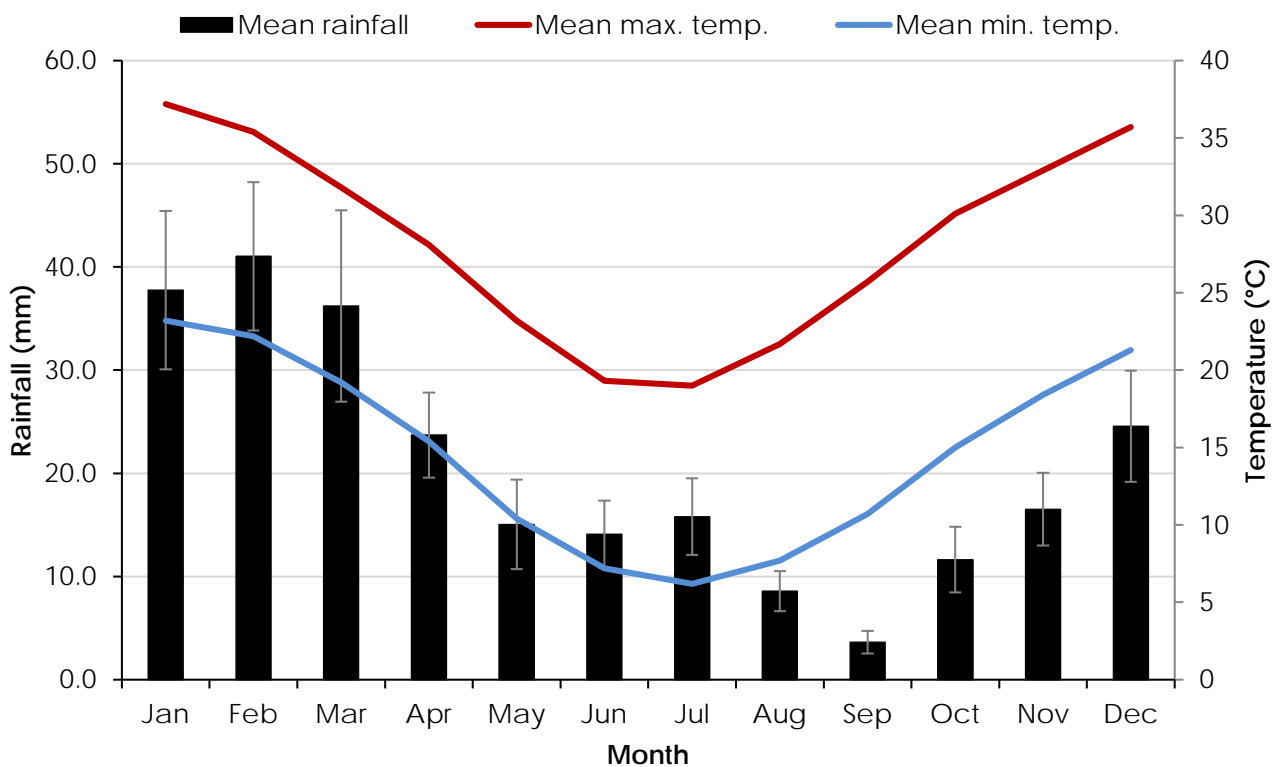


Figure 2-3: Long-term (1995 - 2022) rainfall (mm) and long-term (1995-2022) temperature (°C) data recorded at Leinster Aero weather station (012314) (BoM 2021).

2.6. Pre-European Vegetation

The vegetation of Western Australia was mapped on a broad scale (1:1,000,000 and 1:250,000) by Beard (1975), who characterised and described a state wide mapping and vegetation classification system based on geographic, geological, soil, climate, structure, life form and vegetation characteristics. Beard's vegetation associations were re-assessed by Shepherd *et al.* (2002) to account for clearing in the intensive land use zone, and to divide some larger vegetation units into smaller units. Vegetation system associations described by Shepherd *et al.* (2002) correspond with that of Beard (1975). Two vegetation associations intersect the Survey Area, both described as mulga (*Acacia aneura*) woodlands (**Table 2-3, Figure 2-4**). The current extent remaining of the pre-European extent of each vegetation association is presented in **Table 2-3** at state-wide to local government area (LGA) scales.

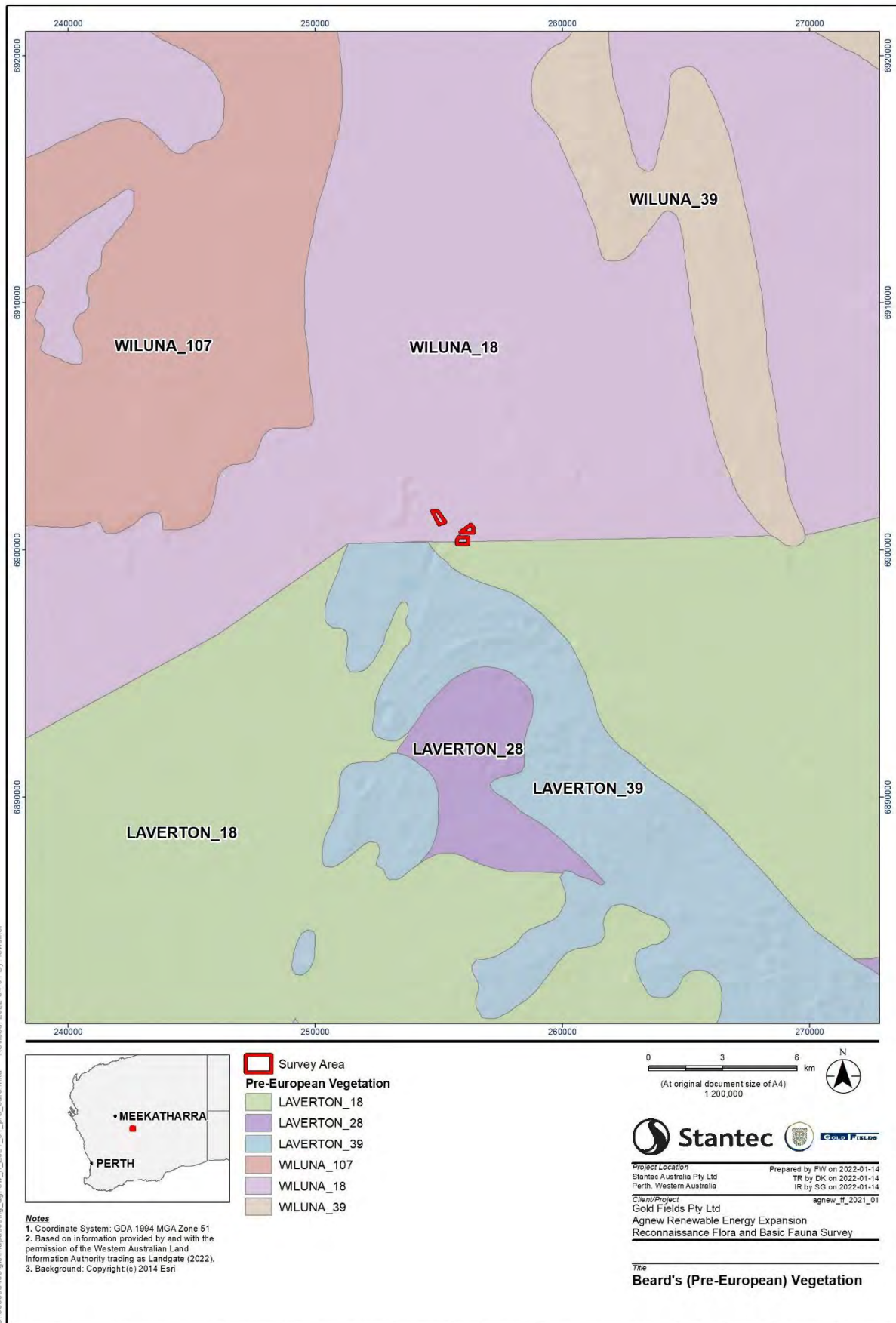
The significance of clearing a particular vegetation association can be determined by comparing current and pre-European extents. A 30% threshold level of the pre-European extent of a vegetation type is designated by the EPA's Position Statement No. 2 (EPA 2000), as a required retention threshold; below which clearing is considered to compromise species diversity at an ecosystem level. The current extent of the vegetation associations is below the 30% threshold across all four scales of assessment (State, bioregion, subregion and Local Government Area) (**Table 2-4**) (Government of Western Australia 2018). Given the small size of the Survey Area, it is unlikely that additional clearing on such a small scale will significantly reduce the overall extent.

Table 2-3: Pre-European vegetation associations and extent within the Survey Area.

System	System Code	Description	Extent within Survey Area (ha)
Wiluna	18	Low woodland; mulga (<i>Acacia aneura</i>)	30.85
Laverton	18	Low woodland; mulga (<i>Acacia aneura</i>)	4.77
Total			35.62

Table 2-4: Extent of pre-European vegetation associations Wiluna_18 and Laverton_18 remaining across four scales (State, Bioregion, Subregion and Local Government Area).

System	Scale	Pre-European Extent (ha)	Current Extent (ha)	Proportion Remaining (%)	Current extent within IUCN Class I-IV Reserves (ha)	Proportion of current extent protected within IUCN Class I-IV Reserves (%)
Wiluna_18	Statewide	4,308,335.74	4,290,594.36	99.59	45,238.20	1.05
	Bioregional (IBRA)	4,307,945.85	4,290,204.46	99.59	45,030.45	1.05
	Bioregional (IBRA sub-region)	4,273,509.57	4,256,038.04	99.59	45,030.45	1.06
	LGA	544,286.06	540,574.35	99.32	34,075.15	6.30
Laverton_18	Statewide	2,353,508.44	2,342,961.36	99.55	0	0
	Bioregional (IBRA)	2,349,882.21	2,339,335.13	99.55	0	0
	Bioregional (IBRA sub-region)	2,349,882.21	2,339,335.13	99.55	0	0
	LGA	1,220,057.16	1,216,592.18	99.72	0	0



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Figure 2-4: Pre-European vegetation associations within the Survey Area.

2.7. Environmentally Sensitive Areas and Conservation Reserves

Under Section 51B of the *Environmental Protection Act (1986)*, Environmentally Sensitive Areas (ESAs) are declared by the Minister for Environment (Government of Western Australia 2017). The aim is to protect these areas from degradation of environmental values which may include declared rare flora, Threatened Ecological Communities (TECs), Bush Forever sites, national parks or significant wetlands. Criteria for the declaration of ESAs are presented in **Appendix A** and do not include State-listed Priority Ecological Communities (PECs) which are protected under the *Biodiversity Conservation Act 2016* (BC Act).

The Survey Area does not occur within an ESA or a Conservation Reserve. The nearest ESAs to the Survey Area include:

- the 'Depot Springs stygofauna community' (Vu) TEC, located approximately 40 km west of the Survey Area;
- the 'Lake Barlee System' ANCA located approximately 110 km south of the Survey Area;
- the buffer around two threatened flora species, *Seringia exastia* (Cr, T) and *Atriplex yeerlirrie* (En. T), which have been recorded approximately 20 km and 80 km from the Survey Area, respectively; and
- the Class A Wanjarri Reserve (R 30897) listed on the Register of the National Estate, located approximately 55 km north of the Survey Area.

The Survey Area does not intersect or occur within Department of Biodiversity and Conservation (DBCA) managed land, with the nearest DBCA managed land being the Class A Wanjarri Nature Reserve (R 30897), located approximately 55 km north-east of the Survey Area and also listed as an ESA (**Figure 1-1**). The Wanjarri Nature Reserve comprises 52,490 ha and is gazetted for the purpose of conservation of flora and fauna.

3. Desktop Assessment

3.1. Approach

A desktop assessment, comprising database searches and a literature review, was undertaken to gather contextual information on the Survey Area. The purpose of the desktop assessment was to identify terrestrial flora and fauna potentially occurring within, and in the vicinity of the Survey Area, particularly species of conservation significance.

Conservation significance and rankings used under EPBC Act, BC Act, as well as the DBCA Priority list, are defined in **Appendix B**.

3.2. Methods

3.2.1. Database Searches

Database searches were completed to generate a list of vascular flora, vegetation communities and fauna previously recorded within, and in the vicinity of, the Survey Area. Five searches were conducted based on either the Survey Area, or a central Survey Area coordinate of -27.993335, 120.514172 (**Table 3-1**).

Table 3-1: Database searches conducted for the desktop assessment.

Custodian/Reference	Database name	Ecological focus group	Buffer (km)
Department of Biodiversity, Conservation and Attractions (DBCA 2021b)	TEC and Priority Ecological Community (PEC)	Flora	80
Department of Biodiversity, Conservation and Attraction (DBCA 2021c, e)	Threatened and Priority Flora database (TPFL)	Threatened and Priority Flora	80
	Western Australian Herbarium Specimen database (WAHerb)		80
Department of Agriculture, Water and the Environment (DoAWE 2021)	Protected Matters Search Tool (PMST)	Flora and fauna	40 (fauna); 20 (flora)
Department of Biodiversity, Conservation and Attractions (DBCA 2021d)	NatureMap	Flora and fauna	40 (fauna) 40 (flora)
Department of Biodiversity, Conservation and Attractions (DBCA 2021a)	Threatened and Priority Fauna Database	Fauna	40
Birdlife (Birdlife Australia 2021)	Birdata Atlas Bird List Database	Aves	70

3.2.2. Literature Review

Background information relating to the Survey Area and surrounds was compiled, including historic vegetation mapping (Beard 1975), soil and landform mapping and characteristics (Pringle *et al.* 1994), and the IBRA classification system information (Thackway and Cresswell 1995). The literature review also examined 13 publicly available survey reports of relevance to the Survey Area, comprising nine flora and vegetation surveys and eight terrestrial fauna surveys (**Table 3-2, Table 3-3**).

Table 3-2: Summary of the relevant flora and vegetation surveys in the vicinity of the Survey Area.

Reference	Study details	Size of Survey Area	Proximity to Survey Area	Vegetation types	Flora recorded	Vegetation condition	Significant or Threatened species and communities (nomenclature/conservation status current at time of original survey)
(Mattiske Consulting 2020)	Location: Eastern Goldfields region, 60 km east of Leinster Study Type: Detailed flora and vegetation survey Survey Date: June 2020	1002 ha	Approximately 74 km east of Survey Area	<ul style="list-style-type: none"> 10 vegetation types Identified. 	<ul style="list-style-type: none"> 63 flora species 20 families 	<ul style="list-style-type: none"> No weed species were recorded. Vegetation condition ranged from 'very good' to 'completely degraded' with the majority of vegetation ranging from 'good' to 'degraded'. 	<p>TECs: 0</p> <p>PECs: 0</p> <p>Threatened Species: 0</p> <p>Priority Species: 1</p> <ul style="list-style-type: none"> <i>Grevillea inconspicua</i> (P4)
(Stantec 2018b)	Location: Agnew Gold Mine Study Type: Detailed flora and vegetation survey. Survey Date: May 2018	495.92 ha (Six Project Survey Areas)	Adjacent to the Survey Area	<ul style="list-style-type: none"> 23 vegetation types identified. 	<ul style="list-style-type: none"> 121 species 28 families 	<ul style="list-style-type: none"> Four introduced flora species The vegetation condition of the Study Area ranged from 'Excellent' to 'Completely Degraded' with the majority of the vegetation ranging from 'good' to 'very good'. 	<p>TECs: 0</p> <p>PECs: 0</p> <p>Threatened Species: 0</p> <p>Priority Species: 2</p> <ul style="list-style-type: none"> <i>Eremophila pungens</i> (P4); and <i>Grevillea inconspicua</i> (P4)
(Stantec 2018a)	Location: Agnew Gold Mine Study Type: Detailed Flora and Vegetation Survey Survey Date: May and September 2018	585.04 ha	Adjacent to the Survey Area	<ul style="list-style-type: none"> 8 additional vegetation types described within the Alternate Power Project survey area. All other vegetation types within the remaining survey areas are the same as found in Stantec (2018b). 	<ul style="list-style-type: none"> 137 species 28 Families 	<ul style="list-style-type: none"> Five introduced flora species The vegetation condition of the Study Area ranged from 'Excellent' to 'Completely Degraded' with the majority of vegetation ranging from 'poor' to 'good' 	<p>TECs: 0</p> <p>PECs: 0</p> <p>Threatened Species: 0</p> <p>Priority Species: 2</p> <ul style="list-style-type: none"> <i>Eremophila pungens</i> (P4); and <i>Grevillea inconspicua</i> (P4)
(Rapallo Environmental 2017)	Location: Agnew Gold mine Study Type: Basic flora survey Survey Date: September 2016	490 ha	800 m west, 25 km east and 11 km south	<ul style="list-style-type: none"> 47 vegetation communities identified. See figures 10, 11 and 12 in Rapallo Environmental (2017). 	<ul style="list-style-type: none"> 171 flora species 40 families 	<ul style="list-style-type: none"> Eight introduced flora species 	<p>TECs: 0</p> <p>PECs: 0</p> <p>Threatened Species: 0</p> <p>Priority Species: 3</p> <ul style="list-style-type: none"> <i>Calotis sp. Perrinvale Station</i> (R.J. Cranfield 7096) (P3); <i>Thryptomene sp. Leinster</i> (B.J. Lepschi & L.A. Craven 4362) (P3); and <i>Eremophila pungens</i> (P4)
(Astron 2012)	Location: Agnew Gold mine Study Type: Detailed flora and vegetation survey Survey Date: October 2012	248.68 ha	400 m south to 23.5 km east of the Survey Area	<ul style="list-style-type: none"> 7 vegetation types identified. 	<ul style="list-style-type: none"> 57 flora species 18 families 	<ul style="list-style-type: none"> One introduced flora species was recorded Vegetation condition ranged from 'excellent' to 'completely degraded' 	<p>TECs: 0</p> <p>PECs: 0</p> <p>Threatened Species: 0</p> <p>Priority Species: 0</p>

Reference	Study details	Size of Survey Area	Proximity to Survey Area	Vegetation types	Flora recorded	Vegetation condition	Significant or Threatened species and communities (nomenclature/conservation status current at time of original survey)
(Onshore Environmental Consultants 2008a)	Location: Agnew Gold Mine Study Type: Detailed flora and vegetation survey Survey Date: March-April, 2008	N/A	2 km southwest	<ul style="list-style-type: none"> 28 vegetation types described, grouped within broad habitat types. See Table 4-7 of (Onshore Environmental Consultants 2008a). 	<ul style="list-style-type: none"> 138 species (including varieties and subspecies) 37 families 59 genera 	<ul style="list-style-type: none"> Very Good to Completely Degraded 	<p>TECs: 0</p> <p>PECs: 0</p> <p>Threatened Species: 0</p> <p>Priority Species: 2</p> <ul style="list-style-type: none"> <i>Hybanthus floribundus</i> subsp. <i>chloroxanthus</i> (P3); and <i>Eremophila pungens</i> (P4)
(Onshore Environmental Consultants 2008b)	Location: Agnew Gold Mine Study Type: Detailed flora and vegetation survey Survey Date: February, 2008	N/A	Adjacent to survey area.	<ul style="list-style-type: none"> 29 vegetation types described, grouped within broad habitat types. See Table 5-9 of (Onshore Environmental Consultants 2008b) 	<ul style="list-style-type: none"> 136 species (including varieties and subspecies) 65 genera 31 families 	<ul style="list-style-type: none"> Excellent to Completely Degraded 	<p>TECs: 0</p> <p>PECs: 0</p> <p>Threatened Species: 0</p> <p>Priority Species: 4</p> <ul style="list-style-type: none"> <i>Thryptomene</i> sp. <i>Leinster</i> (B.J. Lepschi & L.A. Craven 4362) (P1); <i>Hybanthus floribundus</i> subsp. <i>chloroxanthus</i> (P3); <i>Eremophila pungens</i> (P4); and <i>Grevillea inconspicua</i> (P4)
(Jims Seeds Weeds and Trees 2004)	Location: Agnew Gold Mine Study Type: Level 1 flora and vegetation survey Survey Date: September, 2004	N/A	N/A	<ul style="list-style-type: none"> 8 broad vegetation types described. 	<ul style="list-style-type: none"> 165 species 86 genera 49 families 	<ul style="list-style-type: none"> Not specified 	<p>TECs: 0</p> <p>PECs: 0</p> <p>Threatened Species: 0</p> <p>Priority Species: 2</p> <ul style="list-style-type: none"> <i>Eremophila pungens</i> (P4); and <i>Grevillea inconspicua</i> (P4)
(Minesite Rehabilitation Services 2003)	Location: 15 kilometres south-south-east from the townsite of Agnew. Study Type: Survey Date:	N/A	16 km south	<ul style="list-style-type: none"> 8 vegetation types were identified. 	<ul style="list-style-type: none"> Approximately 40 species 	<ul style="list-style-type: none"> Two introduced flora species 	<p>TECs: 0</p> <p>PECs: 0</p> <p>Threatened Species: 0</p> <p>Priority Species: 0</p>

Table 3-3: Summary of the relevant fauna in the vicinity of the Survey Area.

Reference	Survey details	Proximity to Survey Area	Fauna Habitats			Terrestrial Fauna species	Significant species and communities (nomenclature/conservation status current at time of original survey)
(Stantec 2018a)	Title: Flora and Fauna Survey: Agnew Gold Mine Camp, Power Plant, Airport, Wind Farm and Pipeline Location: Agnew Gold Mine Survey Type: Basic Survey Date: May- September 2018	Adjacent to Survey Area (all sites border with indicative quadrats except Pipeline 2 and Camp)	<ul style="list-style-type: none"> Six broad habitats identified: <ul style="list-style-type: none"> Shrubland Drainage line Rocky/ outcropping Acacia over spinifex Open plain Cleared 			<ul style="list-style-type: none"> 12 vertebrate species 11 families 11 genera 	<ul style="list-style-type: none"> None identified
(Astron 2012)	Title: Agnew Pipeline Vegetation, Flora and Fauna Survey Location: Agnew Gold Mine Survey Type: Basic Survey Date: October, 2012	Overlaps Survey Area	<ul style="list-style-type: none"> Plain with <i>Acacia aneura</i> Open Woodland over Tussock Grassland Plain with <i>Acacia aneura</i> Groves over Hummock Grassland Breakaway/hill with Open <i>Acacia aneura</i> Woodland over Tussock Grassland 			<ul style="list-style-type: none"> 22 species 20 families 22 genera 	<ul style="list-style-type: none"> None identified
(Rapallo Environmental 2017)	Title: Level 1 Flora and Fauna Survey of the Hidden Secret, Leviathan and Songvang Corridor Project Areas Location: Agnew Gold Mine Survey Type: Basic Survey Date: September, 2016	~1 km of Survey Area	Hidden Secret <ul style="list-style-type: none"> Breakaway Plateau Breakaway Slope Minor Drainage Rocky Gully Stony Plain Chenopod Stony Plain Samphire Stony Plain Stony Rise Disturbed 	Songvang <ul style="list-style-type: none"> Mulga Shrubland on Drainage Open Mulga Shrubland Plain Sparse Mulga Shrubland/Woodland on Stony Plain Sparse Mulga Shrubland/Woodland on Minor Drainage Sparse Mulga Shrubland/Woodland on Stony Rise 	Leviathan <ul style="list-style-type: none"> Open Mulga Woodland Sparse Mulga Shrubland over Chenopod Plain Open Mulga Drainage Open Tussock Grassland Plain Open Acacia Shrubland Open Acacia Shrubland over Saltbush on Drainage Sparse Acacia Shrubland on Drainage 	<ul style="list-style-type: none"> 46 species 28 families 37 genera 	<ul style="list-style-type: none"> None identified
(ENV 2008)	Title: Agnew Fauna Survey Location: Agnew Gold Mine Survey Type: Level 2 Survey Date: April, 2008	4 km southwest of Survey Area	<ul style="list-style-type: none"> Hilltop Riverine Minor Drainage Line Alluvial Plain 			<ul style="list-style-type: none"> 62 species 36 families 54 genera 	<ul style="list-style-type: none"> None identified
(Minesite Rehabilitation Services 2003)	Title: Environmental Appraisal for the Flora and Fauna at the proposed Songvang Open Cut Mine Location: Agnew Gold Mine Survey Type: Level 1 Survey Date: April, 2003	~15 km southwest of Survey Area	<ul style="list-style-type: none"> Creek System Drainage Flat Gibber Flats Levee Bank Mulga Wash Mulga Woodland Open Pit Open Woodland Rocky Hill 			<ul style="list-style-type: none"> 54 species 34 families 46 genera 	<ul style="list-style-type: none"> None identified
(Craig and Chapman 2003)	Title: Effort of short-term drought on the avifauna of Wanjarri Nature Reserve: What do they tell us about drought refugia? Location: Wanjarri Nature Reserve Survey Type: Avifauna census Survey Date: August-September 1994	~60 km northeast of Survey Area	<ul style="list-style-type: none"> Mulga Grove and Creekline Open Mulga Spinifex Eucalypt Riverbeds Chenopod Flats Stony Plains Breakaways 			<ul style="list-style-type: none"> 36 species 20 families 28 genera 	<ul style="list-style-type: none"> None identified

3.2.3. Likelihood of occurrence of significant species

Prior to undertaking the field survey, the significant flora and fauna species identified from the database searches and literature review were assessed for their likelihood of occurrence within the Survey Area. This assessment was based on the interpretation of habitat types from aerial imagery, known preferred habitat and the nearest known location of each species. Each species of significance was categorised according to the criteria presented in **Table 3-4**.

Following the field survey, the significant flora species identified from the database searches, were re-assessed to determine their likelihood of occurrence within the Survey Area.

Table 3-4: Criteria for assessing the likely presence of significant species in the Survey Area.

Likelihood: Confirmed
The species has been recorded unambiguously (i.e. during recent surveys of the Survey Area, from reliable records obtained via database searches or from current vouchered specimen at WA Herbarium) in the Survey Area.
Likelihood: Likely
There is a medium to high likelihood that the species occurs in the Survey Area, as the Survey Area occurs within the known distribution of the species, contains suitable habitat and the species has been recorded recently nearby.
Likelihood: Possible
There is potential for the species to occur in the Survey Area, as: <ul style="list-style-type: none">• The species has been recorded recently nearby, however;<ul style="list-style-type: none">○ the species may not have been detectable during current or previous surveys (e.g. rare, patchily distributed, non-optimal survey timing).○ the species is known to be cryptic and may not have been detectable despite extensive surveys.• The species has been recorded recently nearby and species presence cannot be ruled out due to factors such as species ecology or distribution, however;<ul style="list-style-type: none">○ doubt remains over taxonomic identification.○ the majority of habitat does not appear suitable.○ coordinates are doubtful.
Likelihood: Unlikely
The species is unlikely to occur in the Survey Area as: <ul style="list-style-type: none">• the species has not been recorded locally through DBCA database searches;• the Survey Area lacks potential habitat, having at best marginally suitable habitat, and/or being severely degraded;• only recorded from a few historic record/s and no other collections in the area; and• the species has not been recorded in the survey area despite adequate survey efforts, such as a standardised methodology or targeted searching within potentially suitable habitat.

3.3. Results

3.3.1. Flora

The results of the desktop assessment identified 31 vascular flora of significance potentially occurring within a 80 km search radius of the Survey Area (DBCA 2021c, e). Two of these species are listed as Threatened under the provisions of both the EPBC Act and the BC Act, with the remaining 29 flora species listed as Priority by the DBCA. Of these, seven are P1, two are P2, 16 are P3 and four are P4 (**Appendix C**). The pre-survey likelihood of occurrence of these taxa within the Survey Area was assessed, with two significant species considered 'likely' to occur and a further nine species considered 'possible' to occur. Twenty species were assessed as 'unlikely' to occur in the Survey Area (**Appendix C**).

Four species of significance, *Hybanthus floribundus* subsp. *chloroxanthus* (P3), *Thryptomene* sp. Leinster (P3), *Eremophila pungens* (P4) and *Grevillea inconspicua* (P4) have been recorded during previous surveys recently undertaken within 5 km of the Survey Area (Onshore Environmental Consultants 2008a, b, Rapallo Environmental 2017, Stantec 2018a, b).

3.3.2. Vegetation

No Commonwealth or State-listed TECs and PECs are known to occur within the Survey Area (DBCA 2021b). The nearest mapped significant terrestrial community to the Survey Area is the Violet Range (Perseverance Greenstone Belt) vegetation assemblages (banded ironstone formation) (P1) PEC, located approximately 38 km north of the Survey Area (DBCA 2021b). No previous surveys completed within 5 km of the current Survey Area have recorded the presence of any TEC or PEC.

3.3.3. Terrestrial fauna

The desktop assessment identified a total of 179 species of terrestrial vertebrate fauna which were recorded within 40 km of the Survey Area (**Appendix D**). These comprise the following:

- 15 native mammals;
- 8 introduced mammals;
- 97 native birds;
- 2 introduced birds;
- 50 native reptiles; and
- 7 amphibians.

Many of these species are unlikely to occur in the Survey Area because, as leading practice, these records have been collected from a large area encompassing a wide range of habitats, many of which do not occur within the Survey Area. Furthermore, some small, common, ground-dwelling reptile and mammal species tend to be patchily distributed, even where appropriate habitats are present, and many species of bird can occur as regular migrants, occasional visitors or vagrants.

3.3.4. Significant Fauna

Of the 179 species of terrestrial vertebrate fauna species identified from the desktop assessment, 12 were listed as significant, comprising 3 mammals, 6 birds and 1 reptile (**Table 3-5**). Additionally, two significant invertebrate species, the *Idiosoma clypeatum* (Northern shield-backed trapdoor spider) (P3) and the *Kwonkan moriartii* (Moriarty's trapdoor spider) (P2) were also identified from the desktop assessment.

Table 3-5: Vertebrate fauna of conservation significance identified during the desktop assessment

Species	Common Name	Conservation Status	
		EPBC	WA
Mammalia			
<i>Dasyercus blyth</i>	Brush-tailed mulgara		P4
<i>Petrogale lateralis lateralis</i>	Black-flanked rock-wallaby	EN	EN
<i>Sminthopsis longicaudata</i>	Long-tailed dunnart		P4
Aves			
<i>Amytornis striatus striatus</i>	striated grasswren (sandplain)		P4
<i>Apus pacificus</i>	Fork-tailed swift	MI	MI

Species	Common Name	Conservation Status	
		EPBC	WA
<i>Falco peregrinus</i>	Peregrine falcon	OS	
<i>Gelochelidon nilotica</i>	Gull-billed tern	MI	MI
<i>Leipoa ocellata</i>	Malleefowl	VU	VU
<i>Tringa nebularia</i>	Common greenshank	MI	MI
Reptilia			
<i>Liopholis kintorei</i>	Great desert skink	VU	VU
Invertebrate			
<i>Idiosoma clypeatum</i>	Northern shield-backed trapdoor spider		P3
<i>Kwonkan moriartii</i>	Moriarty's trapdoor spider		P2

4. Survey Methods

4.1. Survey timing and Seasonal Conditions

The EPA (2016b) recommends that flora and vegetation surveys be undertaken following the season of highest rainfall to optimise the likelihood of encountering flowering and fruiting taxa and capturing ephemeral species. The recommended survey timing for the Eremaean Province is six to eight weeks following the wet season (March to June).

The recommended timing for fauna surveys to be undertaken in the Eremaean Province is between September to April for reptiles; immediately after significant rain events for amphibians; immediately after rain events for birds and there is no preferred time for mammals (DotE 2020).

The field survey was undertaken between 22 and 23 November 2021 (**Figure 4-1**). Rainfall recorded at the Leinster Aero station (012313) in the 12 months preceding the survey (212.2 mm) was 40.8 mm lower than the long-term mean of 253.0 mm (1995 to 2021) (**Figure 4-1**) (BoM 2021). Despite this, above average rainfall (44.8 mm) was recorded in the six weeks preceding the survey, 16.7 mm higher than the long-term mean of 28.1 mm (1995-2021) for the same period. The majority of this rainfall occurred on the 10 and 22 November (within two weeks of the field survey), during two significant rainfall events recording 14.8 mm and 18.2 mm respectively (BoM 2021).

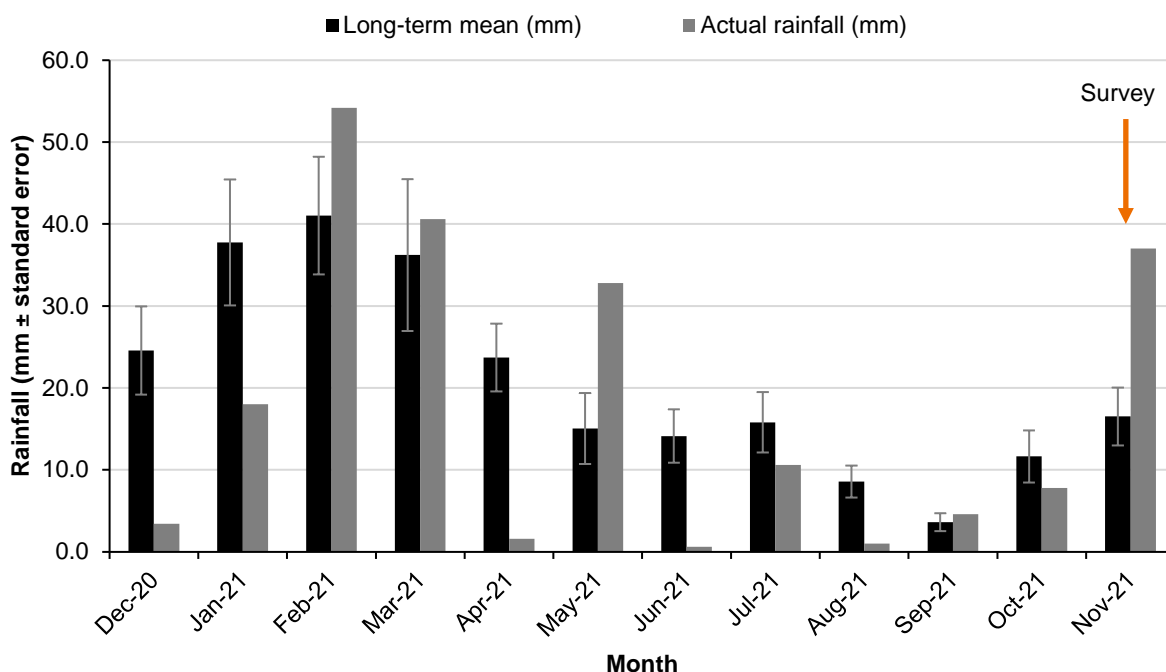


Figure 4-1: Long-term (1995-2021) mean monthly rainfall (mm) and actual monthly rainfall (mm) received in the 12 months preceding the field survey (orange arrow) at Leinster Aero station (012314) (BoM 2021).

4.2. Survey team and licencing

The field survey was undertaken by Stantec employee Sam Girvan (Zoologist) and sub-contractor Jeni Alford (Senior Botanist). Both team members have knowledge and experience in the Goldfields-Murchison Region, and experience in undertaking biological assessments throughout WA.

All plant collections were taken under flora taking license FB62000326, pursuant to the Wildlife Conservation Act 1950 (Section 23C and Section 23F). In addition, Jeni holds a permit to take Declared Rare Flora (145A-1718) for herbarium identification purposes. Taxonomic identifications of the vascular flora specimens collected were undertaken at the WA Herbarium (WAH) by senior botanist Jeni Alford with assistance from Stantec botanist's Jonas Mitchell and Kyle Wood.

4.3. Reconnaissance Flora and Vegetation Survey

4.3.1. Quadrats

The flora and vegetation field survey was conducted in accordance with the requirements of the EPA guidance document; Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016b). Information acquired during the desktop assessment assisted in the field survey design. Prior to the field survey, aerial imagery was

examined to assist in delineating potential vegetation types and landscape features. Indicative quadrat sampling locations were also selected, based on the estimated number of vegetation types within the Survey Area.

Despite the current survey being a Reconnaissance flora and vegetation survey, three quadrats were sampled to characterise the vegetation types present and to compile a representative species list. This was done to allow for resampling should a Detailed flora and vegetation survey be required in the future. Quadrats were established by measuring a square of 20 m x 20 m (400 m²); the recommended size for quadrats in the Murchison bioregion, and permanently marking the north-western corner with a fencing marker. The information collected at each quadrat is summarised in **Table 4-1** below. Quadrat locations are presented in **Figure 4-2**.

Table 4-1: Summary of data recorded at each quadrat site.

Parameter	Description
Quadrat ID	The unique name that was assigned to the site that was sampled
Recorder and Date	The recorder(s) involved in sampling the quadrat/ and date
Coordinates	Measured using a handheld GPS device (in GDA94 format) from the north-west corner
Site photograph	At least one representative photograph taken of the site
Soil description	A description of the soil colour and type based on the guide in the Australian Soil and Land Survey Field Handbook (McDonald <i>et al.</i> 1998)
Geology type	A description of the outcropping geology (if present) and coarse fragments
Habitat type	A description of the landform type and aspect
Vegetation condition	Assessed according to the vegetation condition scale described by Keighery (1994), in accordance with EPA Technical Guidance (EPA 2016b)
Vascular flora species	A record of each flora species present
Height	The average height of each species in meters
Percent foliar cover (PFC)	An estimate of the PFC for each species (%)
Vegetation structure	A description of the vegetation in accordance with the National Vegetation Information System (NVIS), Level 5 – Association (NVISTWG 2017) based on height and foliar cover of strata (Appendix F)
Disturbances	A list of any disturbances in the quadrat, if present
Time since fire	An estimation of the time since the vegetation was last burnt

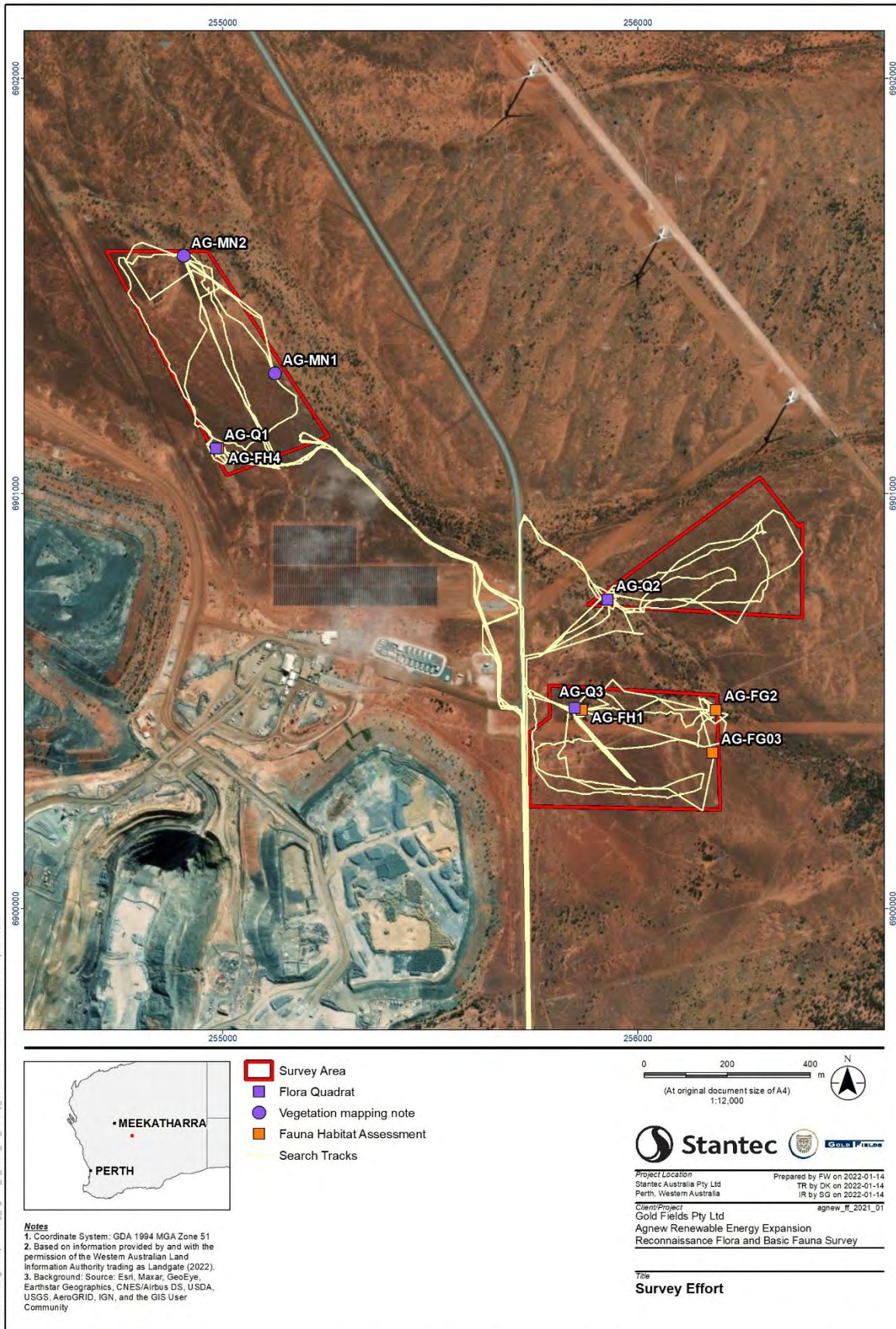
4.3.2. Vegetation Type and Condition Mapping

Vegetation types were described and delineated using quadrat data and, where possible, the vegetation of the Survey Area was assigned to an existing vegetation type from Stantec 2018a and Stantec 2018b, to maintain consistency. The vegetation type descriptions were aligned with Level V (Vegetation Association) in the NVIS hierarchical structure (NVISTWG 2017) and classified according to the Aplin (1979) modification of the vegetation classification system of Specht (1970) (**Appendix F**).

Vegetation condition was mapped using a combination of quadrat data and opportunistic observations. Vegetation condition ratings were assigned based on the six categories described by Trudgen (1998), and as prescribed by EPA (2016b) (**Appendix G**).

4.3.3. Targeted Searches

Previous significant flora records (**Section 3.3**) and each species habitat preferences were reviewed to assist in identifying vegetation types and habitat within the Survey Area that has the potential to support Threatened and Priority flora. These areas were then targeted in the field, as a priority, to comprehensively search for the presence of significant flora. Search effort, in the form of GPS tracklogs, are presented in **Figure 4-2**.



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Figure 4-2: Survey effort within the Survey Area.

4.3.4. Opportunistic Records

Opportunistic flora records of additional species beyond those recorded from quadrats, were collected to maximise the floristic inventory of the Survey Area. Each opportunistic collection was recorded electronically.

4.3.5. Specimen Identification and Nomenclature

Flora specimens that were not identified in the field were identified at the Western Australian herbarium by senior botanist Jenifer Alford. Species nomenclature was assigned according to the current listing of scientific names recognised by the WAH. Where specimens were lacking in diagnostic characteristics, or were in poor condition, they were assigned the 'sp.' epithet, indicating that identification could not be confirmed beyond genus level.

Introduced flora species were compared to the list of declared pests listed under Section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM Act) and the Weeds of National Significance list (WoNS) maintained by the Commonwealth Government.

4.4. Basic Fauna Survey

4.4.1. Habitat Assessment

The Survey Area was traversed on foot with vegetation types being aligned and grouped based on characteristics that would support similar fauna assemblages (**Figure 4-2**). Fauna habitat assessments were undertaken in representative areas of each vegetation type to capture additional key habitat parameters relevant for fauna, particularly significant species. Key information collected at each fauna habitat assessment is provided in **Table 4-2** below.

Additionally, the habitat was assessed on the extent and level of significance according to the following criteria:

- Distribution: whether the habitat was widespread and common within the surrounding region; or whether the habitat was categorised as being limited extent; and
- Significance: whether the habitat was considered important to species of significance, or distinct fauna assemblages were deemed significant; or whether the habitat was categorised as being of limited significance.

Table 4-2: Summary of data recorded at each fauna habitat assessment site

Parameter	Description
Habitat assessment ID	The unique name that was assigned to the site that was sampled
Recorder and Date	The recorder(s) involved in sampling the site and date
Coordinates	Measured using a handheld GPS device (in GDA94 format)
Site photograph	At least one representative photograph taken of the site
Tree presence	A comment on any hollow-bearing trees and stag (dead) trees
Refuges	A comment on the presence of any fauna refuges e.g. burrows
Substrate	A description of the composition of the substrate and percentage of leaf litter
Wetland habitat	Whether the site is part of any wetland habitat such as drainage lines, sumplands or floodplain
Habitat assessment ID	The unique name that was assigned to the site that was sampled
Recorder and Date	The recorder(s) involved in sampling the site and date
Coordinates	Measured using a handheld GPS device (in GDA94 format)

4.4.2. Targeted Searches

The Survey Area was traversed on foot with searches undertaken for fauna taxa of conservation significance and to develop a fauna species list for the Survey Area (**Figure 4-2**). Specifically, targeted searches included:

- Searches for scats, tracked and carcasses;
- Searches for denning habitat;
- Avifauna surveys.

4.4.3. Taxonomy and Nomenclature

Fauna taxonomy is dynamic due to the ongoing description and revision of new species, and the increased understanding of the relationships of taxa through genetic and morphological studies. The nomenclature and taxonomy of reptiles, mammals and amphibians follows the Checklist of the Vertebrates of Western Australia (WAM 2021) and the nomenclature and taxonomy of birds follows the Australian Faunal Directory (DotE 2021) in this report, aligning with technical guidance (EPA 2020).

Vertebrate fauna species were identified in the field, as required, using standard field guides or scientific publications for:

- Mammals (Menkhorst and Knight 2014, van Dyck *et al.* 2013, van Dyck and Strahan 2008);
- Birds (Menkhorst *et al.* 2019, Pizzey and Knight 2012);
- Reptiles (Wilson and Swan 2021); and
- Amphibians (Cogger 2014, Tyler and Doughty 2009).

5. Results & Discussion

5.1. Flora

5.1.1. Floristic Composition

A total of 45 vascular flora taxa, representing 17 families and 27 genera, were recorded within the Survey Area (**Appendix H**). Eleven specimens were unable to be confidently identified beyond genus level due to a lack of diagnostic characteristics. These are likely to represent additional species within the survey area, however, it is unlikely these additional species represent significant flora.

The dominant plant families were Fabaceae and Poaceae, with six confirmed taxon, while *Acacia* was the most frequently recorded genus (**Table 5-1**).

No Commonwealth or State-listed Threatened or Priority flora were recorded within the Survey Area.

Table 5-1: Most represented vascular plant families and genera for the Survey Area.

Family	Number of taxa
Fabaceae and Poaceae	6
Malvaceae	5
Amaranthaceae	4
Genus	Number of taxa
<i>Acacia</i>	5
<i>Ptilotus</i>	4
<i>Eragrostis</i> , <i>Eremophila</i> and <i>Psyrax</i>	3

5.1.2. Flora of Other Significance

The EPA (2016b) advises that flora species, subspecies, varieties, hybrids and ecotypes may be considered significant for reasons other than listing as a threatened or priority flora species, and may include the following:

- a keystone role in a habitat for Threatened species or supporting large populations representing a significant proportion of the local regional population of a species;
- relic status;
- anomalous features that indicate a potential new discovery;
- being representative of the range of a species (particularly at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- the presence of restricted subspecies, varieties, or naturally occurring hybrids;
- local endemism/a restricted distribution; and/or
- being poorly reserved.

Based on these parameters, none of 45 vascular flora taxa recorded from the Survey Area are of 'other' significance. The native vascular flora taxa recorded from the Survey Area are represented in the local and regional area and no unique or unusual taxa were recorded.

5.1.3. Post-survey likelihood of Occurrence

The pre- and post-survey likelihood of occurrence assessments are presented in **Appendix C**. Post-survey assessment was based on a greater understanding of the habitats and following targeted searches of the Survey Area. One species is considered 'possible' to occur based on the post-survey likelihood assessment: *Goodenia modesta* (P3). Despite suitable habitat being identified, this species was not recorded during the field survey. If present, it may have been undetected due to a likely absence of flowers or fruit at the time of survey as a result of suboptimal seasonal conditions. Other significant flora recorded in proximity to the Survey Area were considered 'unlikely' to occur as most were perennial shrubs that would have been detectable at the time of the field survey.

5.1.4. Introduced Flora

Two introduced flora (weed) species were recorded within the Survey Area: **Citrullus colocynthis* and **Rumex vesicarius* (**Table 5-2**). Neither species is listed as a declared pest under the BAM Act (DPIRD 2022), or represent a WoNS (Commonwealth of Australia 2022). Within the Survey Area, each species was considered to have a low abundance, with only one and two records of *C. colocynthis* and *R. vesicarius*, respectively. The ecological impact and invasiveness classifications for both weed species recorded are provided in (**Table 5-2**) (DBCA 2022).

Table 5-2: Classification of introduced flora taxa identified in the Survey Area.

Taxon	Common name	Declared Pest	WoNS	DBCA Classification	
				Ecological Impact	Invasiveness
<i>Citrullus colocynthis</i>	Colocynth	-	-	Medium	Rapid
<i>Rumex vesicarius</i>	Ruby Dock	-	-	High	Rapid

5.2. Vegetation



5.2.1. Vegetation Types



The vegetation of the Survey Area was assigned to an existing vegetation type described previously during surveys within the vicinity of the Survey Area by Stantec (Stantec 2018a, b). There were four vegetation types identified and described for the Survey Area (**Table 5-3**). Vegetation type mapping is presented in **Figure 5-1**, while the data collected from each quadrat is provided in **Appendix I**. Vegetation within the Survey Area was not considered to be analogous with any TECs or PECs.

The dominant vegetation type in the Survey Area was AiEspp.SsmPsEm, which occupied over half (51.9 %) of the total area. The vegetation type EffEm also occupied approximately one third (30.5 %) of the survey area.

The pattern of vegetation within the Survey Area is considered typical for the Mulga Woodlands often rich in ephemerals; hummock grasslands, saltbush shrublands and *Tecticornia* shrublands, common throughout the East Murchison subregion (Cowan *et al.* 2001).

Table 5-3: Vegetation types within the Survey Area

Vegetation code	type	Vegetation type description	Sample sites	Extent within Survey Area		Representative photograph
				Hectares (ha)	Proportion (%)	
EffAtEmPoAcCa		<i>Eremophila fraseri</i> subsp. <i>fraseri</i> and <i>Acacia tetragonophylla</i> open shrubland over <i>Eremophila ?margerathae</i> and <i>Ptilotus obovatus</i> var. <i>obovatus</i> open low shrubland over <i>Aristida contorta</i> and <i>Cymbopogon ambiguus</i> open tussock grassland.	AG-Q1 AG-Q3	1.46	4.10	
AsppEspSeEpAc?Ta		<i>Acacia quadrimarginea</i> , <i>A. caesaneura</i> and <i>A. tetragonophylla</i> tall open shrubland over <i>Eremophila fraseri</i> subsp. <i>fraseri</i> open shrubland over <i>E. serrulata</i> and <i>Sida ?ectogama</i> low open shrubland over <i>Enneapogon polyphyllus</i> and <i>Aristida contorta</i> very open to open tussock grassland and <i>?Tragus australianus</i> very open grasses.	AG-Q2	3.72	10.44	

Vegetation code	type	Vegetation type description	Sample sites	Extent within Survey Area		Representative photograph
				Hectares (ha)	Proportion (%)	
AiEspP.SsmPsEm		<i>Acacia incurvaneura</i> tall open shrubland over <i>Eremophila fraseri</i> subsp. ? <i>fraseri</i> , <i>Senna</i> sp. Meekatharra, <i>E. latrobei</i> subsp. ? <i>latrobei</i> , <i>Ptilotus schwartzii</i> subsp. <i>schwartzii</i> and <i>E. ?margarethae</i> open shrubland over <i>Eriachne mucronata</i> very open tussock grassland.		18.50	51.94	
EffEm		<i>Eremophila fraseri</i> subsp. <i>fraseri</i> open shrubland over <i>E. margerathae</i> open low shrubland	-	10.86	30.49	
Cleared		Disturbed unvegetated areas	-	1.08	3.03	-
Total				35.62	100	-



Survey Area

Vegetation Mapping

AiEspP.SsmPsEm: *Acacia incurvaneura* tall open shrubland over *Eremophila fraseri* subsp. *?fraseri*, *Senna* sp. Meekatharra, *E. latrobei* subsp. *?latrobei*, *Ptilotus schwartzii* subsp. *schwartzii* and *E. ?margarethae* open shrubland over *Eriachne mucronata* very open tussock grassland.

AsppEspPSeEpAc?Ta: *Acacia quadrimarginea*, *A. caesaneura* and *A. tetragonophylla* tall open shrubland over *Eremophila fraseri* subsp. *fraseri* open shrubland over *E. serrulata* and *Sida ?ectogama* low open shrubland over *Enneapogon polyphyllus* and *Aristida contorta* very open to open tussock grassland and *?Tragus australianus* very open grasses.

EffAtEmPoAcCa: *Eremophila fraseri* subsp. *fraseri* and *Acacia tetragonophylla* open shrubland over *Eremophila ?margarethae* and *Ptilotus obovatus* var. *obovatus* open low shrubland over *Aristida contorta* and *Cymbopogon ambiguus* open tussock grassland.

EffEm: *Eremophila fraseri* subsp. *fraseri* open shrubland over *E. margarethae* open low shrubland

Cleared

Notes

1. Coordinate System: GDA 1994 MGA Zone 51
2. Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2022).
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Client/Project
Gold Fields Pty Ltd
Agnew Renewable Energy Expansion
Reconnaissance Flora and Basic Fauna Survey

Project Location
Stantec Australia Pty Ltd
Perth, Western Australia

Prepared by FW on 2022-01-14
TR by DK on 2022-01-14
IR by SG on 2022-01-14

File
agnew_ft_2021_01

Vegetation Mapping

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Figure 5-1: Vegetation type mapping for the Survey Area.

5.2.2. Vegetation Condition

Vegetation within the Survey Area ranged from Poor to Completely Degraded condition (**Table 5-4** and **Figure 5-2**). The majority (30.82 ha or 86.5%) of the Survey Area was rated as Poor. This represented areas where basic vegetation structure remained, but these areas were impacted by grazing and previous exploration activities. The rest of the Survey Area was mapped as Degraded (3.72 ha or 10.5%) or Completely Degraded (1.08 ha or 3.0%) and represented areas where native vegetation was either severely impacted or completely cleared by disturbances such as grazing, weed invasion and/or partial clearing.

Weed diversity and density within the Survey Area was considered low. Two species were recorded, both of which were noted as having less than one percent cover.

Table 5-4: Vegetation condition recorded in the Survey Area.

Vegetation Condition	Total mapped area within the Survey Area (ha)	Proportion of the Survey Area (%)
Poor	30.82	86.52
Degraded	3.72	10.45
Completely Degraded	1.08	3.03
Total	35.62	100

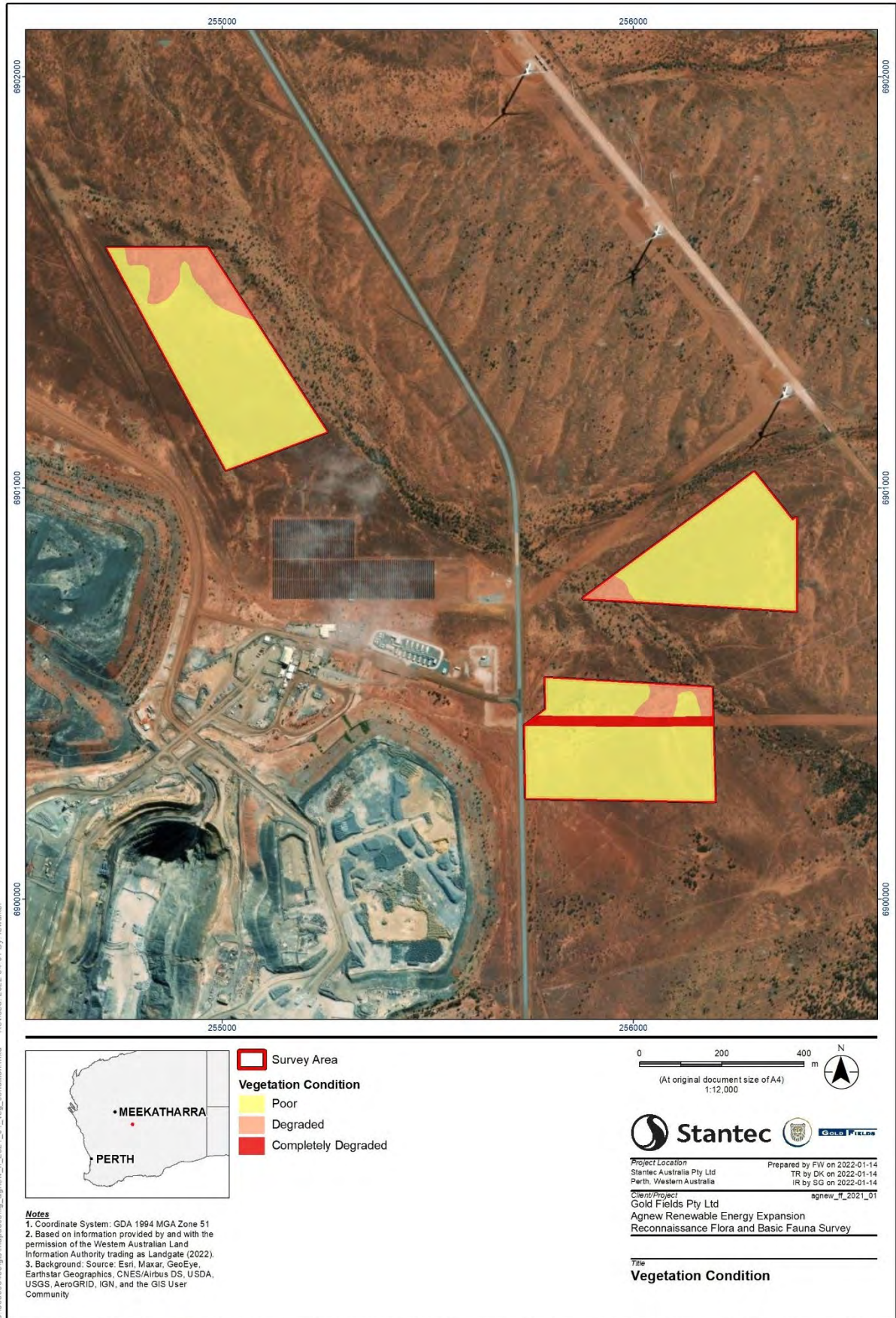


Figure 5-2: Vegetation condition recorded with the Survey Area.

5.3. Fauna

5.3.1. Fauna Assemblages

The field survey recorded a total of 12 species of vertebrate fauna, of which three were mammals, seven were birds and two were reptiles (**Table 5-5**). No species of conservation significance were recorded. One introduced species was recorded: European cattle.

Table 5-5: Vertebrate fauns species recorded from the Survey Area during the field survey

Species	Common Name	Conservation Status	
		EPBC	WA
Mammalia			
<i>Osphranter rufus</i>	Red kangaroo		
<i>Osphranter robustus</i>	Euro		
<i>Bos taurus</i>	European cattle		
Aves			
<i>Gavicalis virescens</i>	Singing honeyeater		
<i>Colluricincla harmonica</i>	Grey shrikethrush		
<i>Grallina cyanoleuca</i>	Magpie lark		
<i>Oreoica gutturalis</i>	Crested bellbird		
<i>Epthianura tricolor</i>	Crimson chat		
<i>Artamus cinereus</i>	Black-faced woodswallow		
<i>Taeniopygia guttata</i>	Zebra finch		
Reptilia			
<i>Varanus gouldii</i>	Sand goanna		
<i>Ctenophorus caudicinctus</i>	Ring-tailed dragon		

5.3.2. Fauna Habitats



Four broad fauna habitats were identified and delineated from fauna habitat assessments conducted across the Survey Area (**Table 5-6**). These comprise;



- Shrubland;
- Drainage line;
- Open plain;
- Cleared

These habitats differed primarily in the composition of their vegetation and structure, in particular vegetation condition, the presence of large rocky outcrops and upper-storey density. The habitat types in the Survey Area were assessed on their extents and levels of significance according to the following criteria:

- Distribution: those habitats widespread and common within the surrounding regions were categorised as widespread; otherwise they were categorised as being of limited extent. The Rocky/ outcropping areas were considered to be of limited extent.
- Significance: those habitats considered important to species of conservation significance or distinct fauna assemblages are deemed significant; otherwise they were categorised as being of limited significance. The rocky/ outcropping and acacia over spinifex habitats were considered significant owing to their potential to support conservation significant species.

Table 5-6: Fauna habitats recorded with the Survey Area.

Habitat Type	Proportion of Survey Area		Condition	Value to fauna	Reference Photograph
	ha	%			
Open plain <ul style="list-style-type: none"> widespread limited significance 	29.36	82.43	Poor-Degraded	<p>Areas with minimal vegetation, largely comprising bare plains or a sparse cover of low shrubs including <i>Eremophila fraseri</i> subsp. <i>fraseri</i> and <i>E. margerathae</i>. Vegetation was over bare stony plains with minimal woody debris and leaf litter. This habitat showed evidence of European cattle tracks, clearing and vehicle tracks.</p> <p>These areas showed evidence of reptile burrows but would otherwise provide minimal habitat for fauna given the lack of shelter including tall vegetation and woody debris.</p>	
Drainage line <ul style="list-style-type: none"> Widespread Limited significance 	3.72	10.44	Poor-Good	<p>The drainage line held water at the time of the season and is likely to flood infrequently in response to seasonal rainfall. The vegetation comprised an upper story of <i>Acacia</i> sp. such as <i>Acacia quadrimarginea</i>, <i>A. caesaneura</i> and <i>A. tetragonophylla</i>. The lower story comprised a variation of <i>Eremophila fraseri</i> subsp. <i>fraseri</i>, <i>E. serrulata</i> and <i>Sida ?ectogama</i>. Drainage habitat contained relatively high leaf litter cover, and peeling bark and woody debris was common.</p> <p>Increased upper and lower vegetation cover, tree hollows and leaf litter/debris would provide shelter for a range of mammal's birds and reptiles. When seasonally flooded the drainage areas may also provide habitat for amphibians and wetland birds.</p>	

Habitat Type	Proportion of Survey Area		Condition	Value to fauna	Reference Photograph
	ha	%			
Shrubland <ul style="list-style-type: none"> • Widespread • Limited significance 	1.46	4.10	Poor-Good	<p>Vegetation varied from relatively open, sparse tall shrubs over minimal lower storey cover to areas of dense <i>Acacia</i> sp. over relatively high cover of lower shrubs and grasses. The upper story largely consisted of <i>Acacia</i> spp. including <i>A. tetragonophylla</i> and <i>A. incurvaneura</i>. The lower storey included <i>Eremophila fraseri</i> subsp. <i>?fraseri</i>, <i>Senna</i> sp. Meekatharra, <i>E. latrobei</i> subsp. <i>?latrobei</i>, <i>Ptilotus schwartzii</i> subsp. <i>schwartzii</i> <i>E. ?margerathae</i>, <i>Ptilotus obovatus</i> var. <i>obovatus</i> and <i>E. ?margarethae</i> over tussock grasses. The habitat was impacted by European cattle trampling and grazing.</p> <p>Densely vegetated areas contained leaf litter and woody debris, which may serve as shelter for mammals and reptiles. Areas with tall shrubs would provide roosting and nesting habitat for birds. However, relatively open, and heavily disturbed areas would provide minimal habitat for vertebrate fauna.</p>	 
Cleared	1.08	3.03	Completely Degraded	-	-
Total	35.62	100	-	-	-

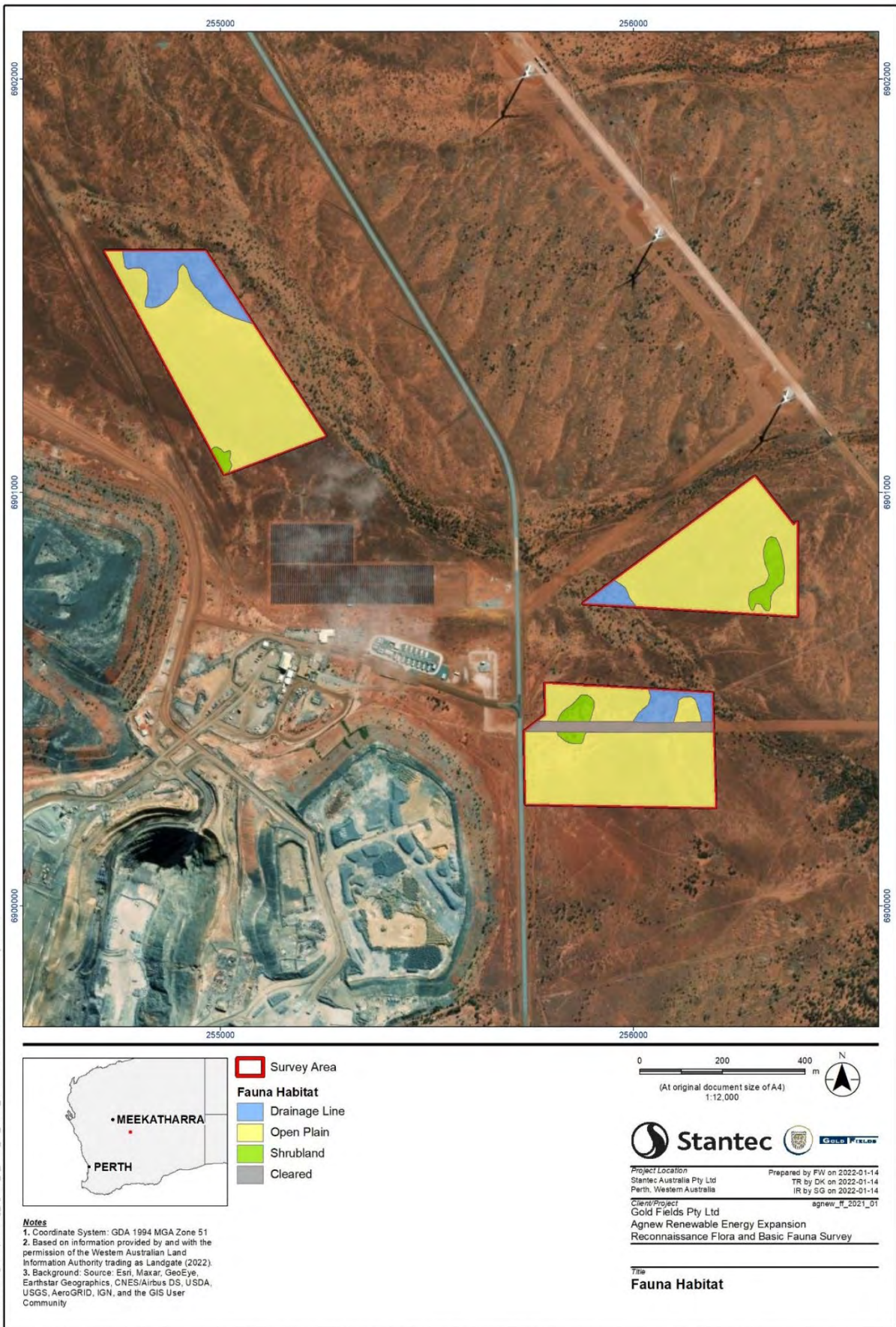


Figure 5-3: Fauna habitats of the Survey Area

5.3.3. Significant Fauna

Of the 179 species of vertebrate fauna identified during the desktop, 12 species are listed as being of conservation significance, comprising 3 mammals, 6 birds and 1 reptile (**Appendix E**). In addition, two invertebrate species of conservation significance, the *Idiosoma clypeatum* (Northern shield-backed trapdoor spider) (P3) and the *Kwonkan moriartii* (Moriarty's trapdoor spider) (P2) were identified. Of the 12 significant vertebrate species in the desktop study:

- Four threatened species under the EPBC Act and/or the BC Act;
- Six priority species in Western Australia;
- Three species listed under the EPBC Act and/or BC Act as migratory (including species also listed as threatened or priority), in alignment with applicable international agreements; and
- One species are listed as Conservation Dependent or Specially Protected fauna under the BC Act.

Some of the species referred to above, listed as Threatened, Migratory and/or Priority fauna, may be included in multiple groups. The likelihood for species of conservation significance occurring in the Survey Area was assessed and ranked based on the definitions described in the methodology. No conservation significant vertebrate fauna was recorded within the Survey Area during field survey. Three species of conservation significance were considered to possibly occur with the Survey Area and the remaining 9 were considered unlikely to occur (**Appendix E**).

6. Survey Limitations and Constraints

There are a number of possible limitations and constraints that can affect the adequacy of flora, vegetation and fauna surveys (EPA 2016b, 2020). These are summarised in **(Table 6-1)** with respect to this survey.

Table 6-1: Potential limitations and constraints of the field survey.

Factor	Constraint	Comments
Competency and experience of consultants	No	The field personnel, Jenifer Alford and Sam Girvan have appropriate qualifications and experience to undertake the relevant components of the flora, vegetation and fauna survey. The flora specimen identifications were overseen by senior botanist Jenifer Alford who has extensive experience identifying flora from Western Australia.
Scope	No	The scope was well-defined. Flora, vegetation, fauna and their habitats were surveyed using standardised and well-established techniques. The desktop study was undertaken prior to the surveys to inform field personnel of the potential occurrence of factors of environmental significance.
Proportion of species identified	No	Given the small size of the Survey Area, as well as the uniformity of the landforms within it, the total confirmed flora taxa count of 45 species from 17 families is considered to adequately represent the floristic values of the Survey Area. Of the specimens collected, eleven could not be confidently identified beyond genus level due to poor material and/or lack of diagnostic characteristics. Based on the results of the database searches and literature review, specimens that could not be confidently identified beyond genus level are not likely to represent species of significance. All vertebrate fauna encountered were identified and habitats were assessed for their importance to vertebrate fauna and fauna of conservation significance.
Information sources (e.g. historic or recent)	No	Regional contextual information was obtained from historic vegetation mapping conducted by (Beard 1975) and Shepherd <i>et al.</i> (2002), soil and landform mapping (Pringle <i>et al.</i> 1994), IBRA classification system (Thackway and Cresswell 1995) and several flora, vegetation and fauna surveys previously conducted in the wider region.
Completeness and intensity	No	Field staff went beyond the requirements of a Reconnaissance flora and vegetation survey, installing and sampling three quadrats, undertaking targeted searches for priority flora, recording opportunistic species and describing vegetation types and condition. Fauna habitat assessments and opportunistic fauna observations were also recorded throughout the survey. Survey intensity was sufficient to adequately sample the flora, vegetation types and fauna within the Survey Area.
Timing / weather / season / cycle	yes	The field survey took place outside the optimal season for flora and vegetation surveys, which for the Eremaean Province is six to eight weeks following the wet season (March to June) (EPA 2016b). Rainfall received for the Survey Area was below the long-term average for the 12 months preceding the field survey. However, rainfall in the six weeks preceding the field survey was higher than the long-term average for the same period. The number of families and genera recorded during the survey was generally comparable to other surveys conducted in the area.
Disturbances	No	No disturbances limited the outcomes of the Survey or this report. Disturbances within the Survey Area were considered moderate throughout and were primarily associated with livestock grazing and trampling.
Resources	No	Resources were adequate to carry out the survey and the field personnel were competent in identification of species present. WAH specimens, taxonomic guides, DBCA database searches and the FloraBase database were all used to prepare for the survey and used for the confirmation of any flora or fauna species where identification was uncertain. Multiple publicly available reports from areas adjacent to the Survey Area were also available as resources to verify and compare findings.
Remoteness / access problems	No	All survey sites were easily accessible by vehicle and on foot.

7. Summary

Field work was undertaken between 22 and 23 November 2021, and comprised quadrat sampling, targeted searches, opportunistic collections of flora, fauna habitat assessments and opportunistic records of fauna. Due to the small size of the Survey Area and consistency in vegetation type, survey effort comprised three quadrats, three fauna habitat assessments and targeted searches for significant species throughout the Survey Area. The survey was conducted outside the recommended timing for flora and vegetation surveys in the Eremaean Province (March to June) (EPA 2016b). However, above average rainfall (44.8 mm) recorded in the six weeks preceding the survey provided suitable seasonal conditions to detect most flora species identified in the desktop assessment as having potential to occur. Seasonal conditions and survey timing were adequate to detect fauna species with the potential to occur.

A total of 45 vascular flora taxa, representing 17 families and 27 genera, were recorded within the Survey Area. No Commonwealth or State-listed Threatened or Priority flora were recorded within the Survey Area. One species is considered 'possible' to occur based on the post-survey likelihood assessment: *Goodenia modesta* (P3). Despite suitable habitat being identified, this species was not recorded during the field survey. If present, it may have been undetected due to a likely absence of flowers or fruit at the time of survey as a result of suboptimal seasonal conditions. Eleven specimens were unable to be confidently identified beyond genus level due to a lack of diagnostic characteristics. None of these additional specimens are likely to represent conservation significant flora. No species of other significance were recorded within the survey area.

The vegetation recorded within the Survey Area was representative of the Eastern Murchison subregion and broadly consisted of flat colluvium and alluvial plains, and low mulga (*Acacia aneura* complex) woodlands. The vegetation of the Survey Area was assigned to an existing vegetation type described previously during surveys within the vicinity of the Survey Area by Stantec in 2018, to maintain consistency. A total of four vegetation types were identified and described for the Survey Area, the largest of which (AiEspP.SsmPsEm) occupied approximately one half (51.9%) of the total area. None of the vegetation types were considered to represent any Commonwealth or State-listed TEC or PEC.

Two introduced flora (weed) species were recorded within the Survey Area, **Citrullus colocynthis* and **Rumex vesicarius*. Neither taxon is listed as a declared pest under Section 22 of the BAM Act, or represent a Weed of National Significance (WoNS).

Vegetation condition ranged from Poor to Completely Degraded, with the majority (86.5%) of vegetation in Poor condition. Disturbances included grazing, weed invasion and partial clearing.

Four fauna habitats were identified within the Survey Area. The dominant habitat described as 'Open Plain' (82.4 percent) was widespread in the region and of limited significance to potential fauna species. A total of 12 terrestrial vertebrate fauna species were opportunistically recorded during the survey either through direct observations or indirect evidence (diggings, foraging evidence, tracks etc.). These comprised seven birds, three mammal, and two reptiles. No fauna species of significance were recorded in the Survey Area or are expected to occur based on previous records in the area and the habitats present. The post survey likelihood assessment identified three species of significance that were 'possible' to occur: Fork-tailed swift (MI, MI), Peregrine falcon (OS), and Northern shield-backed trapdoor spider (P3).

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Appendices

We design with community in mind



Appendix A Environmentally Sensitive Area Criteria

The following areas are declared to be ESAs:

- a declared World Heritage property as defined in section 13 of the Environment Protection and Biodiversity Conservation Act 1999 of the Commonwealth;
- an area that is included on the Register of the National Estate, because of its natural heritage value, under the Australian Heritage Council Act 2003 of the Commonwealth;
- a defined wetland and the area within 50 metres of the wetland. Defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands;
- the area covered by vegetation within 50 metres of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located;
- the area covered by a threatened ecological community;
- a Bush Forever site listed in "Bush Forever" Volumes 1 and 2 (2000), published by the Western Australia Planning Commission, except to the extent to which the site is approved to be developed by the Western Australia Planning Commission;
- the areas covered by the Environmental Protection (Gnangara Mound Crown Land) Policy 1992;
- the areas covered by the Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002;
- the areas covered by the lakes to which the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 applies; and
- protected wetlands as defined in the Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998.

Appendix B 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 Biodiversity Conservation Act 2016 (WA) (BC 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 BC Act			
Status	Code	Schedule	Description
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

Appendix C Likelihood of Occurrence of Significant Flora in the Survey Area

Species name	Conservation code		Broad habitat/habit	Flowering period	Nearest known location (km)	Database/s Survey Report	Likelihood of occurrence within the Survey Area	
	EPBC Act	BC Act					Pre-survey	Post-survey
<i>Atriplex yeelirrie</i>	EN	T	Cracking red clays over calcrete. Flat, seasonally waterlogged salt lake complex with shallow medium self-mulching clay over Gypsum. Silty sand.	Flowers April to May	78.74	WAHerb TPFL	Unlikely: The Survey Area is located outside of the known distribution of this species and is unlikely to contain suitable habitat.	Unlikely: The Survey Area is located outside of the known distribution of this species and if present in the Survey Area, it is likely this perennial shrub would have been detectable at the time of the survey.
<i>Seringia exastia</i>	CR	T	Rangeland. Plain. Dry red sand.	Flowers mauve, purple, April, May, June, July, August, September, October, November or December.	18.18	WAHerb	Possible: The Survey Area is within the distribution range of the species and contains suitable habitat. However, the species has not been recently recorded in close proximity to the Survey Area.	Unlikely: The Survey Area is within the range of this species, however if present in the Survey Area, it is likely this tufted perennial grass-like herb would have been detectable at the time of the survey.
<i>Anacampseros</i> sp. Eremaean (F. Hort, J. Hort & J. Shanks 3248)		P1	Sand patches inside rocks, brown sandy clay, granite. Depressions in rock outcrops, breakaways, flats.	Flowers white, September.	58.36	WAHerb TPFL	Unlikely: The Survey Area is located outside of the known distribution of this species.	Unlikely: The Survey Area is located outside of the known distribution of this species and did not contain suitable habitat.
<i>Frankenia georgei</i>		P1	Rocky slopes, or soft red sandy clay.	Flowers pink or white, June or December.	77.31	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species and is unlikely to contain suitable habitat.	Unlikely: The Survey Area is located outside of the known distribution of this species and if present in the Survey Area, it is likely this perennial shrub would have been detectable at the time of the survey.
<i>Korthalsella leucothrix</i>		P1	Aerial, parasitic shrub on <i>Acacia acuminata</i> and <i>A. craspedocarpa</i> .	Flowers white, August.	33.07	WAHerb TPFL	Possible: The Survey Area is within the distribution range of the species.	Unlikely: The Survey Area is within the range of this species and suitable host species were present, however, if present in the Survey Area, it is likely this parasitic shrub would have been detectable at the time of the survey.
<i>Micromyrtus chrysodema</i>		P1	Flat plains. Red loamy sand to red sand.		47.05	WAHerb TPFL	Unlikely: The Survey Area is located outside of the known distribution of this species, and it is only known from a singular record.	Unlikely: The Survey Area is located outside of the known distribution of this species and if present in the Survey Area, it is likely this perennial shrub would have been detectable at the time of the survey.
<i>Philothea tubiflora</i>		P1	Rocky rises & hills, outcrops.	Flowers pink or white, June to October.	76.28	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species, and it hasn't been recently recorded near the Survey Area.	Unlikely: The Survey Area is located outside of the known distribution of this species and if present in the Survey Area, it is likely this perennial shrub would have been detectable at the time of the survey.
<i>Stenanthemum patens</i>		P1	Rocky hillside, red loamy sand.	Flowers white, April, August or October.	58.69	WAHerb TPFL	Unlikely: The Survey Area is located outside of the known distribution of this species, and is unlikely to contain suitable habitat.	Unlikely: The Survey Area is located outside of the known distribution of this species and if present in the Survey Area, it is likely this perennial shrub would have been detectable at the time of the survey.
<i>Swainsona katjarra</i>		P1	Plains, depressions and gorge creek banks, along drainage lines. Stony red brown sandy clay.	Flowers purple, August or December.	46.20	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species.	Unlikely: The Survey Area is located outside of the known distribution of this species and it is likely this large spreading herb would have been detectable at the time of the survey.
<i>Calytrix warburtonensis</i>		P2	Rocky hills, breakaways.	Flowers white, March or September to October.	52.80	TPFL	Unlikely: The Survey Area is located outside of the known distribution of this species and is unlikely to contain suitable habitat.	Unlikely: The Survey Area is located outside of the known distribution of this species and did not contain suitable habitat.
<i>Hibbertia</i> sp. Sherwood Breakaways (R.J. Cranfield 6771)		P2	Weathered granite breakaways. Coarse siliceous silty sand. Flat.	Flowers Yellow, June.	63.64	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species and is unlikely to contain suitable habitat.	Unlikely: The Survey Area is located outside of the known distribution of this species and did not contain suitable habitat.
<i>Acacia</i> sp. Marshall Pool (G. Cockerton 3024)		P3	Low basalt hill. Dry brown clayey sand.	Flowers yellow, May	53.47	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species.	Unlikely: The Survey Area is located outside of the known distribution of this species and if present in the Survey Area, it is likely this perennial shrub would have been detectable at the time of the survey.

Species name	Conservation code		Broad habitat/habit	Flowering period	Nearest known location (km)	Database/s Survey Report	Likelihood of occurrence within the Survey Area	
	EPBC Act	BC Act					Pre-survey	Post-survey
Angianthus prostratus		P3	Red clay or loamy soils. Saline depressions.	Fl. white-yellow, Jul to Sep.	75.88	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species.	Unlikely: The Survey Area is located outside of the known distribution of this species.
Baekkea sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963)		P3	Orange sand. Flats.	Flowers white, October.	8.26	WAHerb TPFL	Likely: Species previously recorded within close proximity to the Survey Area and suitable habitat is likely to occur.	Unlikely: The Survey Area contains suitable habitat, however, if present in the survey area it is likely this upright shrub would have been detectable at the time of the survey.
Bossiaea eremaea		P3	Deep red sand.	Flowers red, yellow, purple and brown, July to September.	62.64	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species.	Unlikely: The Survey Area is located outside of the known distribution of this species and if present in the Survey Area, it is likely this perennial shrub would have been detectable at the time of the survey.
Calytrix praecipua		P3	Skeletal sandy soils over granite or laterite. Breakaways, outcrops.	Flowers pink or white, June to July, or September to November.	76.28	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species, and the species hasn't been recently recorded near the Survey Area.	Unlikely: The Survey Area is located outside of the known distribution of this species and if present in the Survey Area, it is likely this perennial shrub would have been detectable at the time of the survey.
Eremophila arachnoides subsp. arachnoides		P3	Shallow loam over limestone.	Flowers white blue, and purple, September.	36.39	WAHerb	Possible: The Survey Area is within the distribution range of the species.	Unlikely: The Survey Area is within the distribution range of this species, however, if present in the survey area it is likely this broom-like shrub would have been detectable at the time of the survey.
Goodenia modesta		P3	Red loam, sand.	Flowers yellow, January to December.	36.35	WAHerb TPFL	Possible: The Survey Area is within the distribution range of the species and likely contains suitable habitat.	Possible: The Survey Area is within the distribution range of the species and contains suitable habitat. If present in the Survey Area, this annual herb may not have been detectable as the survey was conducted outside of its known flowering/fruiting time.
Homalocalyx echinulatus		P3	Breakaways, sandstone hills.	Flowers pink, June to September.	52.97	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species and is unlikely to contain suitable habitat.	Unlikely: The Survey Area is located outside of the known distribution of this species and is unlikely to contain suitable habitat. If present in the Survey Area, it is likely this perennial shrub would have been detectable at the time of the survey.
Hybanthus floribundus subsp. chloroxanthus		P3	Rocky areas, creek banks, along drainage lines.	Flowers blue and white, August to October.	62.36	WAHerb	Unlikely: The Survey Area may contain suitable habitat, however, it is located outside of the known distribution of this species.	Unlikely: The Survey Area contains suitable habitat, however, it is outside the known distribution of the species. If present in the survey area it is likely this multi-stemmed shrub would have been detectable at the time of the survey.
Mirbelia ferricola		P3	Slope. Ironstone. Brown sandy loam.	Flowers yellow, August to October.	25.23	WAHerb	Possible: The Survey Area is within the distribution range of the species and may contain suitable habitat. However, the species is known from only one record in the area.	Unlikely: The Survey Area is within the distribution range of this species, however, if present in the survey area it is likely this broom-like shrub would have been detectable at the time of the survey.
Phyllanthus baeckeoides		P3	Red lateritic & sandy clay soils. Granite outcrops.	Flowers white, yellow, green, July to September.	25.93	WAHerb TPFL	Possible: The Survey Area is within the distribution range of the species and may contain suitable habitat.	Unlikely: The Survey Area is within the distribution range of this species, however, if present in the survey area it is likely this shrub would have been detectable at the time of the survey.
Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)		P3	Red sand. Plains.	Flowers yellow, June.	27.68	WAHerb	Possible: The Survey Area is within the distribution range of the species and may contain suitable habitat.	Unlikely: The Survey Area is within the distribution range of this species, however, if present in the survey area it is likely this shrub would have been detectable at the time of the survey.
Tecticornia cymbiformis		P3	Saline soils. Along the edge of creeklines.	Flowers November or June.	75.17	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species and is unlikely to contain suitable habitat.	Unlikely: The Survey Area is located outside of the known distribution of this species and if present in the Survey Area, it is likely this erect perennial shrub would have been detectable at the time of the survey.

Species name	Conservation code		Broad habitat/habit	Flowering period	Nearest known location (km)	Database/s Survey Report	Likelihood of occurrence within the Survey Area	
	EPBC Act	BC Act					Pre-survey	Post-survey
<i>Thryptomene nealensis</i>		P3	Lateritic breakaways.	Flowers pink, October	35.37	WAHerb	Unlikely: The Survey Area is within the distribution range of the species but is unlikely to contain suitable habitat.	Unlikely: The Survey Area is located outside of the known distribution of this species and did not contain suitable habitat.
<i>Thryptomene</i> sp. Leinster (B.J. Lepschi & L.A. Craven 4362)		P3	Ironstone outcrops. Rocky, red, sandy loam soil over ironstone.	Flowers Pink, September.	19.33	WAHerb TPFL	Possible: The Survey Area is within the distribution range of the species and may contain suitable habitat.	Unlikely: The Survey Area contains suitable habitat and is within the known distribution of the species. However, if present in the survey area it is likely this shrub would have been detectable at the time of the survey.
<i>Verticordia jamiesonii</i>		P3	Sandy clay soils. Lateritic breakaways.	Flowers white and pink, September to October.	19.59	WAHerb	Unlikely: The Survey Area is within the distribution range of the species but is unlikely to contain suitable habitat.	Unlikely: The Survey Area is within the distribution range of this species, however, if present in the survey area it is likely this shrub would have been detectable at the time of the survey.
<i>Eremophila pungens</i>		P4	Sandy loam, clayey sand over laterite. Plains, ridges, breakaways.	Flowers purple and violet, June to August.	25.27	WAHerb	Possible: The Survey Area is within the distribution range of the species and may contain suitable habitat.	Unlikely: The Survey Area is within the distribution range of this species, however, if present in the survey area it is likely this erect shrub would have been detectable at the time of the survey.
<i>Grevillea inconspicua</i>		P4	Loam, gravel. Along drainage lines on rocky outcrops, creeklines.	Flowers white and pink, June to August.	9.83	WAHerb	Likely: Species previously recorded within close proximity to the Survey Area and suitable habitat is likely to occur.	Unlikely: The Survey Area is within the distribution range of this species and contains suitable habitat. However, if present in the survey area it is likely this erect shrub would have been detectable at the time of the survey.
<i>Hemigenia exilis</i>		P4	Laterite. Breakaways, slopes.	Flowers blue, purple and white, April or September to November.	22.16	WAHerb TPFL	Unlikely: The Survey Area is within the distribution range of the species but is unlikely to contain suitable habitat.	Unlikely: The Survey Area is within the distribution range of this species, however, if present in the survey area it is likely this erect shrub would have been detectable at the time of the survey.
<i>Olearia arida</i>		P4	Red or yellow sand. Undulating low rises.	Flowers white, July to September	78.20	WAHerb	Unlikely: The Survey Area is located outside of the known distribution of this species.	Unlikely: The Survey Area is located outside of the known distribution of this species. If present in the Survey Area, it is likely this perennial shrub would have been detectable at the time of the survey.

Appendix D Vertebrate Fauna Identified in the Desktop Assessment

Legend:

A Current Survey

Database searches:

B Threatened and Priority Fauna Search (DBCA 2021a)

C Protected Matters Search Tool (DoAWE 2021)

D NatureMap Database (DBCA 2021b)

E Birdata: Custom Atlas Bird List (Birdlife Australia 2021)

Literature Review:

F Agnew Pipeline Vegetation, Flora and Fauna Survey (Astron 2012)

G Agnew Fauna Survey (ENV 2008)

H Level 1 Flora and Fauna Survey of the Hidden Secret, Leviathan and Songvang Corridor Project Areas (Rapallo Environmental 2017)

I Flora and Fauna Survey: Agnew Gold Mine Camp, Power Plant, Airpot, Wind Farm and Pipeline (Stantec 2018)

J Effort of short-term drought on the avifauna of Wanjarri Nature Reserve: What do they tell us about drought refugia?(Craig and Chapman 2003)

K Environmental Appraisal for the Flora and Fauna at the proposed Songvang Open Cut Mine (Minesite Rehabilitation Services 2003)

Family	Species	Common Name	BC	EPBC	A	B	C	D	E	F	G	H	I	J	K
Mammals															
Bovidae	<i>Bos taurus</i>	*European Cattle			x			x		x		x	x		
	<i>Capra hircus</i>	*Goat					x				x	x			
Camelidae	<i>Camelus dromedarius</i>	*Camel					x	x						x	
Canidae	<i>Canis lupus</i>	*Dog					x			x	x	x	x		
	<i>Vulpes vulpes</i>	*Red Fox					x								
Dasyuridae	<i>Antechinomys laniger</i>	Kultarr						x							
	<i>Dasyercus blythi</i>	Brush-tailed Mulgara	P4			x									
	<i>Dasyercus cristicauda</i>	Crest-tailed Mulgara	P4	Vu				x							
	<i>Dasyurus geoffroii</i>	Chuditch	S3	Vu			x								
	<i>Ningauai ridei</i>	Wongai Ningauai						x							
	<i>Pseudantechinus woolleyae</i>	Woolley's Pseudantechinus													
	<i>Sminthopsis dolichura</i>	Little long-tailed Dunnart										x			
	<i>Sminthopsis hirtipes</i>	Hairy-footed Dunnart							x						
	<i>Sminthopsis longicaudata</i>	Long-tailed Dunnart	P4				x								
	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart							x			x			
	<i>Sminthopsis ooldea</i>	Ooldea Dunnart							x						
	<i>Sminthopsis psammophila</i>	Sandhill Dunnart	S2	En				x							
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat													
	<i>Taphozous hilli</i>	Hill's Sheathtail-bat										x			
Equidae	<i>Equus asinus</i>	*Donkey					x								
Felidae	<i>Felis catus</i>	*Cat					x	x					x		
Leporidae	<i>Oryctolagus cuniculus</i>	*Rabbit					x	x		x	x	x	x		
Macropodidae	<i>Macropus fuliginosus</i>	Western Grey Kangaroo									x				
	<i>Osphranter robustus</i>	Euro				x		x			x	x	x		
	<i>Osphranter rufus</i>	Red Kangaroo				x		x		x	x		x		x
	<i>Petrogale lateralis lateralis</i>	Black-footed Rock-wallaby	S2	En		x		x							
Molossidae	<i>Austronomus australis</i>	White-striped Freetail-bat									x	x			
Muridae	<i>Mus musculus</i>	*House Mouse					x								
	<i>Notomys alexis</i>	Spinifex Hopping-mouse						x		x					

	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse								x								
Tachyglossidae	<i>Tachyglossus aculeatus</i>	Short-beaked Echidna								x		x						
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat								x			x	x				
	<i>Chalinolobus morio</i>	Chocolate Wattled Bat												x				
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat								x				x				
	<i>Nyctophilus major tor</i>	Central Long-eared Bat	P4															
	<i>Nyctophilus timoriensis</i>	Greater Long-eared Bat												x				
	<i>Ozimops petersi</i>	Inland Free-tailed Bat													x			
	<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat									x				x			
	<i>Vespadelus baverstocki</i>	Inland Forest Bat																
	<i>Vespadelus finlaysoni</i>	Finlayson's Cave Bat									x				x			
Birds																		
Acanthizidae	<i>Acanthiza apicalis</i>	Inland Thornbill								x	x	x	x	x			x	
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill								x	x			x			x	
	<i>Acanthiza iredalei</i>	Slender-billed Thornbill									x						x	
	<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western)								x								
	<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill								x	x						x	
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill								x	x			x			x	x
	<i>Aphelocephala leucopsis</i>	Southern Whiteface								x	x			x			x	
	<i>Calamanthus campestris</i>	Rufous Fieldwren								x								
	<i>Gerygone fusca</i>	Western Gerygone								x	x							x
	<i>Pyrrholaemus brunneus</i>	Redthroat								x	x							
	<i>Sericornis maculatus</i>	Spotted Scrubwren								x								
	<i>Smicronis brevirostris</i>	Weebill								x	x	x	x				x	x
Accipitridae	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk																
	<i>Accipiter fasciatus</i>	Brown Goshawk								x							x	
	<i>Aquila audax</i>	Wedge-tailed Eagle								x	x	x	x	x	x		x	
	<i>Circus assimilis</i>	Spotted Harrier									x							
	<i>Haliastur sphenurus</i>	Whistling Kite								x	x						x	
	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard									x							
	<i>Hieraaetus morphnoides</i>	Little Eagle																

	<i>Elanus axillaris</i>	Black-shouldered Kite								x						
Aegothelidae	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar								x	x					
Alcedinidae	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher								x	x					x
	<i>Todiramphus sanctus</i>	Sacred Kingfisher								x			x			
Anatidae	<i>Anas gracilis</i>	Grey Teal								x	x					
	<i>Aythya australis</i>	Hardhead														
	<i>Chenonetta jubata</i>	Australian Wood Duck								x	x					
	<i>Cygnus atratus</i>	Black Swan									x					
	<i>Tadorna tadornoides</i>	Australian Shelduck								x	x					
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift	S5	Mi		x	x	x								
Ardeidae	<i>Egretta novaehollandiae</i>	White-faced Heron									x					
	<i>Ardea pacifica</i>	White-necked Heron									x					
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow				x			x	x		x	x		x	x
	<i>Artamus minor</i>	Little Woodswallow							x			x	x			
	<i>Artamus personatus</i>	Masked Woodswallow							x			x				
	<i>Cracticus nigrogularis</i>	Pied Butcherbird							x	x		x	x	x	x	x
	<i>Gymnorhina tibicen</i>	Australian Magpie							x	x		x	x		x	x
	<i>Cracticus torquatus</i>	Grey Butcherbird							x	x					x	x
	<i>Strepera versicolor</i>	Grey Currawong							x	x						x
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew							x							
Cacatuidae	<i>Eolophus roseicapilla</i>	Galah							x	x	x	x	x		x	x
	<i>Nymphicus hollandicus</i>	Cockatiel							x	x						x
	Campephagidae															
	<i>Coracina maxima</i>	Ground Cuckoo-shrike							x	x						
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike							x	x		x				x
	<i>Lalage tricolor</i>	White-winged Triller								x						
Caprimulgidae	<i>Eurostopus argus</i>	Spotted Nightjar							x							
Casuariidae	<i>Dromaius novaehollandiae</i>	Emu							x	x	x					x
Charadriidae	<i>Charadrius melanops</i>	Black-fronted Dotterel								x		x				
	<i>Charadrius ruficapillus</i>	Red-capped Plover							x	x						
	<i>Charadrius veredus</i>	Oriental Plover	S5	Mi			x						x			
	<i>Erythrogonys cinctus</i>	Red-kneed Dotterel								x						

	<i>Thinornis cucullatus</i>	Hooded Plover	P4					x									
	<i>Vanellus tricolor</i>	Banded Lapwing							x	x							x
Cinclosoma	<i>Cinclosoma castaneothorax</i>	Chestnut-breasted Quail-thrush															
	<i>Cinclosoma marginatum</i>	Western Quail-thrush							x	x			x			x	
Climacteridae	<i>Climacteris affinis</i>	White-browed Treecreeper							x	x						x	
Columbidae	<i>Columba livia</i>	*Domestic Pigeon						x									
	<i>Geopelia cuneata</i>	Diamond Dove							x			x					
	<i>Ocyphaps lophotes</i>	Crested Pigeon							x	x		x	x	x			x
	<i>Phaps chalcoptera</i>	Common Bronzewing							x	x	x					x	x
	<i>Streptopelia senegalensis</i>	*Laughing Turtle-Dove						x									
Corvidae	<i>Corvus bennetti</i>	Little Crow							x	x						x	x
	<i>Corvus coronoides</i>	Australian Raven								x	x						
	<i>Corvus orru</i>	Torresian Crow							x	x		X			x	x	x
Cuculidae	<i>Heteroscenes pallidus</i>	Pallid Cuckoo							x	x							
	<i>Chalcites basalis</i>	Horsfield's Bronze Cuckoo							x	x							
	<i>Chalcites osculans</i>	Black-eared Cuckoo						x	x	x							
Dicaeidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird							x	x							x
Estrildidae	<i>Taeniopygia guttata</i>	Zebra Finch					x		x	x	x		x			x	x
Falconidae	<i>Falco berigora</i>	Brown Falcon							x	x		x	x			x	x
	<i>Falco cenchroides</i>	Australian Kestrel							x	x	x	x	x	x	x	x	x
	<i>Falco hypoleucos</i>	Grey Falcon	S3	Vu				x									
	<i>Falco longipennis</i>	Australian Hobby							x	x			x				
	<i>Falco peregrinus</i>	Peregrine Falcon	S7				x		x	x							
Hirundinidae	<i>Cheramoeca leucosternus</i>	White-backed Swallow							x	x		x					
	<i>Hirundo neoxena</i>	Welcome Swallow							x	x		x	x	x			
	<i>Petrochelidon ariel</i>	Fairy Martin															
	<i>Petrochelidon nigricans</i>	Tree Martin							x	x		x	x	x			x
Laridae	<i>Gelochelidon nilotica</i>	Gull-billed Tern		Mi			x										
Locustellidae	<i>Megalurus cruralis</i>	Brown Songlark								x							
	<i>Megalurus mathewsi</i>	Rufous Songlark								x							
Maluridae	<i>Amytornis striatus</i>	Striated Grasswren															x
	<i>Amytornis striatus striatus</i>	Striated Grasswren (sandplain)						x									

	<i>Malurus lamberti</i>	Variegated Fairy-wren							x	x			x			x
	<i>Malurus leucopterus</i>	White-winged Fairy-wren							x	x						
	<i>Malurus splendens</i>	Splendid Fairy-wren							x	x			x			
	<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren														x
Megapodiidae	<i>Leipoa ocellata</i>	Malleefowl	S3	Vu		x	x	x								
Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater							x	x		x	x			x
	<i>Anthochaera carunculata</i>	Red Wattlebird								x						
	<i>Certhionyx variegatus</i>	Pied Honeyeater							x							x
	<i>Epthianura albifrons</i>	White-fronted Chat							x							
	<i>Epthianura aurifrons</i>	Orange Chat								x						
	<i>Epthianura tricolor</i>	Crimson Chat				x			x	x		x				
	<i>Gavicalis virescens</i>	Singing Honeyeater				x				x		x	x		x	x
	<i>Lichmera indistincta</i>	Brown Honeyeater							x	x		x				
	<i>Manorina flavigula</i>	Yellow-throated Miner							x	x	x	x	x		x	x
	<i>Phylidonyris albifrons</i>	White-fronted Honeyeater										x				
	<i>Ptilotula penicillatus</i>	White-plumed Honeyeater								x						
	<i>Ptilotula plumulus</i>	Grey-fronted Honeyeater								x						x
	<i>Purnella albifrons</i>	White-fronted Honeyeater							x	x						x
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater						x	x		x					x
Monarchidae	<i>Grallina cyanoleuca</i>	Magpie-lark				x			x	x	x	x				x
Motacillidae	<i>Anthus australis</i>	Australian Pipit							x	x		x	x			x
	<i>Motacilla cinerea</i>	Grey Wagtail	S5	Mi				x								
	<i>Motacilla flava</i>	Yellow Wagtail	S5	Mi				x								
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella							x	x						x
Oreoicidae	<i>Oreoica gutturalis</i>	Crested Bellbird				x			x	x	x		x	x	x	x
Otididae	<i>Ardeotis australis</i>	Australian Bustard							x	x						
	Pachycephalidae															
	<i>Colluricincla harmonica</i>	Grey Shrike-thrush				x			x	x		x	x		x	
	<i>Pachycephala rufiventris</i>	Rufous Whistler							x	x			x		x	x
Pardalotidae	<i>Pardalotus rubricatus</i>	Red-browed Pardalote								x						
	<i>Pardalotus striatus</i>	Striated Pardalote							x	x						x

	<i>Tringa nebularia</i>	Common Greenshank	S5	Mi		x	x										
Strigidae	<i>Ninox boobook</i>	Boobook Owl									x						
	Threskiornithidae																
	<i>Threskiornis spinicollis</i>	Straw-necked Ibis									x						
Turnicidae	<i>Turnix velox</i>	Little Button-quail									x						
Reptiles																	
Agamidae	<i>Ctenophorus caudicinctus</i>	Ring-tailed Dragon				x				x				x			x
	<i>Ctenophorus caudicinctus mensarum</i>	Ring-tailed Dragon subsp.								x							
	<i>Ctenophorus isolepis</i>	Military Dragon								x			x	x			
	<i>Ctenophorus isolepis gularis</i>	Military Dragon subsp.								x							
	<i>Ctenophorus nuchalis</i>	Central Netted Dragon								x							x
	<i>Ctenophorus reticulatus</i>	Western Netted Dragon								x							
	<i>Ctenophorus scutulatus</i>									x							
	<i>Diporiphora amphiboluroides</i>	Mulga Dragon											x				
	<i>Moloch horridus</i>	Thorny Devil									x						
	<i>Pogona minor</i>										x						
	<i>Tympanocryptis cephalus</i>	Coastal Pebble-mimic dragons									x			x			
Carphodactylidae	<i>Nephurus vertebralis</i>										x						
	<i>Underwoodisaurus milii</i>	Southern Barking Gecko												x			
Diplodactylidae	<i>Diplodactylus conspicillatus</i>	Variable Fat-tailed Gecko															
	<i>Diplodactylus granariensis</i>																
	<i>Diplodactylus granariensis rex</i>													x			
	<i>Diplodactylus pulcher</i>																x
	<i>Lucasium squarrosum</i>										x						
	<i>Lucasium stenodactylus</i>	Western Sandplain Gecko									x						
	<i>Rhynchoedura ornata</i>	Western Beaked Gecko									x			x			
	<i>Strophurus elderi</i>										x						
	<i>Strophurus strophurus</i>										x						
<i>Strophurus wellingtonae</i>										x			x				
Elapidae	<i>Acanthophis pyrrhus</i>	Desert Death Adder									x						
	<i>Brachyuropsis semifasciata</i>	Southern Shovel-nosed Snake															

	<i>Lerista timida</i>								x								
	<i>Liopholis inornata</i>								x								
	<i>Liopholis kintorei</i>	Great Desert Skink	S3	Vu		x											
	<i>Liopholis striata</i>	Night Skink															
	<i>Menetia greyii</i>								x								
	<i>Morethia butleri</i>								x		x						
	<i>Tiliqua multifasciata</i>	Central Blue-tongue							x								
	<i>Tiliqua occipitalis</i>	Western Bluetongue							x								
Typhlopidae	<i>Anilos bicolor</i>																
	<i>Anilos hamatus</i>																
Varanidae	<i>Varanus caudolineatus</i>								x								
	<i>Varanus eremius</i>	Pygmy Desert Monitor															
	<i>Varanus giganteus</i>	Perentie							x								
	<i>Varanus gouldii</i>	Sand Monitor				x			x		x	x					x
	<i>Varanus panoptes</i>	Yellow-spotted Monitor							x		x		x				
Amphibians																	
Hylidae	<i>Cyclorana maini</i>	Sheep Frog							x								
	<i>Cyclorana occidentalis</i>	Western Water-holding Frog															
	<i>Litoria rubella</i>	Little Red Tree Frog							x		x						x
	Limnodynastidae																
	<i>Neobatrachus aquilonius</i>	Northern Burrowing Frog							x								
	<i>Neobatrachus sutor</i>	Shoemaker Frog							x								
	<i>Platylectrum spenceri</i>	Centralian Burrowing Frog							x								
Myobatrachidae	<i>Pseudophryne occidentalis</i>	Western Toadlet							x								
Invertebrates																	
Idiopidae	<i>Idiosoma clypeatum</i>	Northern sheild-backed trapdoor spider							x								
Nemesiidae	<i>Kwonkan moriartii</i>	Moriarty's trapdoor spider							x								

Appendix E Significant Fauna Likelihood of Occurrence

Common Name (Scientific name)	Conservation Status		Broad Habitat Type	Likelihood of occurrence
	EPBC Act	WA		
Mammals				
Brush-tailed mulgara (<i>Dasycercus blythi</i>)	-	P4	Inhabit spinifex grasslands within the arid zone (van Dyck and Strahan 2008).	Unlikely The Survey Area is within the species range however the Survey Area does not contain suitable spinifex grasslands habitat. Most records occur ~80 km north of the Survey Area, with the closest recent records from 2004 and 2006 occurring 49 km and 67 km north respectively (DBCA 2017, 2021a)
Black-flanked rock-wallaby, black-footed rock-wallaby (<i>Petrogale lateralis lateralis</i>)	EN	EN	Occupies a wide range of habitats including spinifex on rocky hills, sandstone gorges and temperate rocky islands (van Dyck and Strahan 2008).	Unlikely Closest record ~85 km north of the Survey Area and suitable habitat does not occur in the Survey Area. The nearest potentially suitable outcropping habitat is located 3km south of the Survey Area.
Long-tailed dunnart (<i>Sminthopsis longicaudata</i>)	-	P4	Rocky, hilly areas, occasionally open areas with stony, rocky mantle (van Dyck and Strahan 2008).	Unlikely The Survey Area occurs within the species however lacks suitable outcropping habitat (van Dyck and Strahan 2008). The closest recent nearby records of the species comprise several during 2011 and 2012 ~90 km southwest of the Survey Area in Mt Forrest (DBCA 2018d). Owing to the distance of the records, the species is considered to unlikely occur.
Reptile				
Great desert skink (<i>Liopholis kintorei</i>)	VU	VU	Arid areas with spinifex sandflats and clay/loamy soils (Wilson and Swan 2013)	Unlikely The Survey Area is unlikely to contain suitable spinifex habitat. The species has not been recorded in the region since 1964 (DBCA 2021a).
Birds				
Striated grasswren (sandplain) (<i>Amytornis striatus striatus</i>)	P4		Inhabits areas with Acacia and mallee over spinifex and inland and coastal scrubs (Pizzey and Knight 2007). Nests in spinifex domes (Pizzey and Knight 2007).	Unlikely While the Survey Area is within contains suitable habitat, with dense spinifex habitat recorded by Stantec in 2018, it lies outside the species range. The species is also currently under revision (Menkhorst <i>et al.</i> 2019) The species has only been recently recorded nearby once in Wanjarri Nature Reserve with moderate certainty, ~74 km from the Survey Area in 2016 (DBCA 2021a).
Fork-tailed swift (<i>Apus pacificus</i>)	MI	MI	Aerial species, which forages high above the tree canopy and rarely lower (Johnstone and Storr 1998). Occurs over a range of habitats including islands, open country, coasts, semi-deserts, urban, forests (Pizzey and Knight 2007).	Possible The Survey Area occurs within the species range and the species utilises a wide range of habitats (Pizzey and Knight 2007). However, the only recent nearby records of the species were recorded ~83 km northwest of the Survey Area in 2015 and ~119 km west of the Survey Area during 2009 (DBCA 2021a). The species tends to be uncommon unless weather conditions result in occasional mass movements (Pizzey and Knight 2007). Due to this, the species is considered to possibly occur.
Peregrine falcon (<i>Falco peregrinus</i>)	OS		The species occurs along cliffs, gorges, wooded rivers, wetlands, plains and open woodlands, as well as in association with pylons and buildings (Pizzey and Knight 2007). Nests on cliffs, in crevices, large tree hollows or on building ledges (Pizzey and Knight 2007).	Possible The species was last recorded within the area in 2000 (Birdlife Australia 2021), 42 km west of the Survey Area. The Survey Area contains suitable habitat and occurs within the species range, however does not contain suitable nesting habitat and the species tend to be uncommon (Pizzey and Knight 2007).
Gull-billed tern (<i>Gelochelidon nilotica</i>)	MI	MI	Shallow sheltered seas close to land, estuaries, tidal creeks; and inundated samphire flats, flooded salt lakes, clay pans and watercourses in the interior (Johnstone and Storr 1998). Tends to breed on islands in inland lakes (Pizzey and Knight 2007).	Unlikely The Survey Area occurs within the species range however does not contain suitable habitat (Pizzey and Knight 2007). The species has only been recorded ~88 km northwest of the Survey Area in 2015 (DBCA 2021a). Due to this, the species is considered unlikely to utilise the Survey Area.
Malleefowl (<i>Leipoa ocellata</i>)	VU	VU	Mainly scrubs and thickets of mallee, boree and bowgada, but also other litter forming shrublands (Johnstone and Storr 1998).	Unlikely The Survey Area is within the species range (Pizzey and Knight 2007). Most recent species records include a substantial number between 2011 and 2013 near Mt Forrest (~90 km southwest of the Survey Area) and a mound with evidence of activity within the last 10 years recorded during a 2009/2010 survey ~105 km from the Survey Area (Bamford Consulting Ecologists 2011 (DBCA 2021a). However, the Survey Area tended to contain open areas of scrub with minimal litter aside from denser drainage lines, which does not comprise ideal habitat (Johnstone and Storr 1998). As such the species is considered unlikely to occur.

Common Name (Scientific name)	Conservation Status		Broad Habitat Type	Likelihood of occurrence
	EPBC Act	WA		
Princess parrot (<i>Polytelis alexandrae</i>)	P4	VU	Often found far from fresh water, inhabits areas with spinifex under Eucalypts, acacias, desert oaks and poplars, hakeas and mistletoes or vegetation near salt lakes (Pizzey and Knight 2007).	Unlikely The species has not been recorded recently nearby, and the Survey Area lies within the irregular species range. Furthermore, the species is typically nomadic and rare (Pizzey and Knight 2007).
Common greenshank, greenshank (<i>Tringa nebularia</i>)	MI	MI	Inhabits mudflats, estuaries, saltmarshes, margins of lakes; wetlands, claypans, fresh and saline; commercial salt-fields and sewage ponds. Mostly coastal but can be found inland with suitable habitat.	Unlikely Last record in 1979 ~56km south east of the Survey Area. Migrates to Australia from Sept to April and can be found inland within suitable habitat (Pizzey and Knight 2007).
Invertebrates				
Northern shield-backed trapdoor spider (<i>Idiosoma clypeatum</i>)		P3	Widely distributed throughout arid areas of the Murchison and Yalgoo bioregions (Rix <i>et al.</i> 2018).	Possible The <i>Idiosoma</i> genus has recently undergone taxonomic revision. <i>Idiosoma clypeatum</i> (formerly known by WAM identification code 'MYG018') is now recognised as a distinct species from <i>Idiosoma nigrum</i> . <i>Idiosoma nigrum</i> was identified by the Threatened Fauna DBCA database search as occurring in the vicinity of the Survey Area, however it is now recognised as only occurring in the central and central-western Wheatbelt bioregion (DBCA 2021a, Rix <i>et al.</i> 2018). <i>Idiosoma clypeatum</i> has recently been classified as P3, with a range extending "from near Paynes Find, the Blue Hill Range, Kadji Kadji Nature Reserve, and Karara in the south, north and north-east to at least Coolcalalaya Homestead, Jack Hills, Albion Downs, Yakabindie, and Yeelirrie" (Rix <i>et al.</i> 2018). The Survey Area lies within this range, and the species was recorded in 2011 ~61 km north west of the Survey Area. As such, the species is considered to possibly occur.
Moriarty's trapdoor spider (<i>Kwonkan moriartii</i>)		P2	Unknown	Unlikely There are two records of the species collected ~54km north of the Survey Area in 1962 (DBCA 2021a). Given that the date of collection (13/01/1962) is the same for both specimens, it is possible that one of the records is erroneous. There are no other records of this species. Given that there has not been any records of the species within the last 50 years, it is unlikely the species occurs within the Survey Area.

Appendix F NVIS Vegetation Structural Classification

Table G.1: Height classes for specific growth forms defined for the NVIS adapted from NVISTWG (2017).

Height	Growth Form					
Height Class	Height Range	tree, vine (M & U), palm (single-stemmed)	shrub, heath shrub, chenopod shrub, ferns, samphire shrub, cycad, treefern, grass-tree, palm (multi-stemmed)	Tree mallee, mallee shrub	tussock grass, hummock grass, other grass, sedge, rush, forbs, vine (G)	bryophyte, lichen, seagrass, aquatic
8	>30	tall	NA	NA	NA	NA
7	10-30	mid	NA	tall	NA	NA
6	<10	low	NA	mid	NA	NA
5	<3	NA	NA	low	NA	NA
4	>2	NA	tall	NA	tall	NA
3	1-2	NA	mid	NA	tall	NA
2	0.5-1	NA	low	NA	mid	tall
1	<0.5	NA	low	NA	low	low

Table G.2: NVIS Structural Formation Terminology adapted from NVISTWG (2017).

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	<10,10-30, >30	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
tree mallee	<3, <10, 10-30	closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	mallee trees
shrub, cycad, grass-tree, fern	<1,1-2,>2	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs
mallee shrub	<3, <10, 10-30	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrubs
heath shrub	<1,1-2,>2	closed heath shrubs	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrubs
chenopod shrub	<1,1-2,>2	closed chenopod shrubland	Chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs
samphire shrub	<0.5,>0.5	closed samphire shrubland	Samphire shrubland	open samphire shrubland	sparse samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs
hummock grass	<2,>2	closed hummock grassland	Hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses
tussock grass	<0.5,>0.5	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grasses	isolated clumps of tussock grasses	tussock grasses
other grass	<0.5,>0.5	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses
sedge	<0.5,>0.5	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges
rush	<0.5,>0.5	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes
forb	<0.5,>0.5	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forbs
fern	<1,1-2,>2	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumps of ferns	ferns

Table G.3: Vegetation Classification System (Specht 1970) as modified by (Aplin 1979).

Height Class	Canopy Cover (%)				
	100 – 70%	70 -30%	30 -10%	10 – 2%	<2%
Trees > 30 m	Tall Closed Forest	Tall Open Forest	Tall Woodland	Tall Open Woodland	Scattered Tall Trees
Trees 10-30 m	Closed Forest	Open Forest	Woodland	Open Woodland	Scattered Trees
Trees < 10 m	Low Closed Woodland	Low Open Forest	Low Woodland	Low Open Woodland	Scattered Low Trees
Mallee	Closed Mallee	Mallee	Open Mallee	Very Open Mallee	Scattered Mallees
Shrubs > 2 m	Closed Scrub	Open Scrub	High Shrubland	High open Shrubland	Scattered Tall Shrubs
Shrubs 1-2 m	Closed Heath	Open Heath	Shrubland	Open Shrubland	Scattered Shrubs
Shrubs < 1 m	Low Closed Heath	Low Open Heath	Low Shrubland	Low Open Shrubland	Scattered Low Shrubs
Hummock Grasses	Closed Hummock Grassland	Hummock Grassland	Open Hummock Grassland	Very Open Hummock Grassland	Scattered Hummock Grasses
Tussock Grass	Closed Tussock Grassland	Tussock Grassland	Open Tussock Grassland	Very Open Tussock Grassland	Scattered Tussock Grass
Bunch Grass	Closed Bunch Grassland	Bunch Grassland	Open Bunch Grassland	Very Open Bunch Grassland	Scattered Bunch Grass
Sedges	Closed Sedges	Sedges	Open Sedges	Very Open Sedges	Scattered Sedges
Herbs	Closed Herbs	Herbs	Open Herbs	Very Open Herbs	Scattered Herbs

Appendix G Vegetation Condition Scale for the Eremaean Botanical Province


Code	Description
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.


Appendix H Inventory of Vascular Flora Recorded

Family	Species
Amaranthaceae	<i>Ptilotus aervoides</i>
	<i>Ptilotus schwartzii</i> subsp. <i>schwartzii</i>
	<i>Ptilotus exaltatus</i>
	<i>Ptilotus obovatus</i> var. <i>obovatus</i>
Apocynaceae	<i>Leichhardtia australis</i>
Asteraceae	<i>Gnephosis arachnoidea</i>
	<i>Gnephosis tenuissima</i>
	<i>Rhodanthe ?floribunda</i>
	<i>Rhodanthe ?sp.</i>
	<i>Siemssenia capillaris</i>
Chenopodiaceae	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>
	<i>Maireana pyramidata</i>
	<i>Sclerolaena obliquicuspis</i>
Cucurbitaceae	* <i>Citrullus colocynthis</i>
Euphorbiaceae	<i>Euphorbia drummondii</i>
	<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>
Fabaceae	<i>Acacia aneura</i>
	<i>Acacia aptaneura</i>
	<i>Acacia ayersiana</i> (narrow phyllode variant)
	<i>Acacia caesaneura</i>
	<i>Acacia ?pteraneura</i>
	<i>Acacia ?quadrimarginea</i>
	<i>Acacia tetragonophylla</i>
	<i>Senna artemisioides</i> subsp. <i>helmsii</i>
	<i>Senna artemisioides</i> subsp. <i>petiolaris</i>
Hemerocallidaceae	<i>Dianella revoluta</i>
Malvaceae	<i>Abutilon cryptopetalum</i>
	<i>Brachychiton gregorii</i>
	<i>Hibiscus burtonii</i>
	<i>Hibiscus ?sp.</i>
	<i>Sida fibulifera</i>
	<i>Sida intricata</i>
	<i>Sida ?sp.</i>
Montiaceae	<i>Calandrinia ?translucens</i>
Plantaginaceae	<i>Plantago debilis</i>
Poaceae	<i>Aristida contorta</i>
	<i>Eragrostis dielsii</i>
	<i>Eragrostis eriopoda</i>
	<i>Eragrostis kennedyae</i>
	<i>Eriachne benthamii</i>
	<i>Eriachne mucronata</i>
	<i>Paraneurachne ?muelleri</i>
Polygonaceae	* <i>Rumex vesicarius</i>
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>
Rubiaceae	<i>Psydrax latifolia</i>
	<i>Psydrax rigidula</i>
	<i>Psydrax suaveolens</i>

Santalaceae	<i>Santalum lanceolatum</i>
Scrophulariaceae	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>
	<i>Eremophila forrestii</i> ?subsp.
	<i>Eremophila fraseri</i> ?subsp.
	<i>Eremophila margarethae</i>
	<i>Eremophila</i> ? <i>metallicorum</i>
	<i>Eremophila serrulata</i>
Solanaceae	<i>Salsola australis</i>
	<i>Solanum lasiophyllum</i>

Appendix I Sample Site Data

Site Type	Site Name	Date	Site Photograph
Quadrat	AG-Q1	23/11/2021	
Dimensions	20 m by 20 m		
Described by	Jenifer Alford, Sam Girvan		
Location (UTM)			
Easting	254983	mE	
Northing	6901108	mN	
Site Characteristics			
Landform	Sand Plain		
Slope	Low (1-20°)		
Aspect	South-east		
Condition			
Vegetation Condition	Good		
Disturbance Type	Cattle grazing, rubbish/litter		
Disturbance Fauna	N/A		
Fire Age	Unknown (no evidence)		
Fire Notes	N/A		
Water Presence	No		
Soils			
Soil Texture	Sandy Loam		
Soil Colour	Red/Brown		
Rock Type	Ironstone		
Coarse Surface Particles			
Dominant Size Range	Negligible		
Abundance	Moderate		
Exposed Bedrock (%)	Negligible (<5%)		
Exposed Bedrock (%)	Negligible (<5%)		
Vegetation Description	<p><i>Eremophila forrestii</i> ?subsp. and <i>Acacia tetragonophylla</i> shrubland over ?<i>Paraneurachne muelleri</i> and <i>Eragrostis eriopoda</i> open tussock grassland</p>		

Site Type	Site Name	Date	Site Photograph
Quadrat	AG-Q2	23/11/2021	
Dimensions	20 m by 20 m		
Described by	Jenifer Alford, Sam Girvan		
Location (UTM)			
Easting	255927	mE	
Northing	6900744	mN	
Site Characteristics			
Landform	Minor Drainage Line		
Slope	Low (1-20°)		
Aspect	North-west		
Condition			
Vegetation Condition	Good		
Disturbance Type	Cattle grazing, rubbish/litter		
Disturbance Fauna	N/A		
Fire Age	Unknown (no evidence)		
Fire Notes	N/A		
Water Presence	Yes		
Soils			
Soil Texture	Sandy Loam		
Soil Colour	Red/Brown		
Rock Type	Ironstone		
Coarse Surface Particles			
Dominant Size Range	Negligible		
Abundance	Rare		
Exposed Bedrock (%)	Negligible (<5%)		
Vegetation Description	<p><i>Acacia aneura</i> and <i>Acacia tetragonophylla</i> tall shrubland over <i>Eremophila fraseri</i> ? subsp. and <i>Eremophila serrulata</i> open shrubland over <i>Abutilon cryptopetalum</i> open low shrubland over <i>Eragrostis dielsii</i> open tussock grassland with <i>Rhodanthe</i> ?sp. open herbland.</p>		

Site Information			Site Photograph
Site Type	Site Name	Date	
Quadrat	AG-Q3	23/11/2021	
Dimensions	20 m by 20 m		
Described by	Jenifer Alford, Sam Girvan		
Location (UTM)			
Easting	255848	mE	
Northing	6900483	mN	
Site Characteristics			
Landform	Sandy/stony plain		
Slope	Low (1-20°)		
Aspect	South-east		
Condition			
Vegetation Condition	Good		
Disturbance Type	Cattle grazing, rubbish/litter		
Disturbance Fauna	N/A		
Fire Age	Unknown (no evidence)		
Fire Notes	N/A		
Water Presence	No		
Soils			
Soil Texture	Sandy loam		
Soil Colour	Red/Brown		
Rock Type	Ironstone		
Coarse Surface Particles			
Dominant Size Range	Negligible		
Abundance	Common		
Exposed Bedrock (%)	Negligible (<5%)		
Vegetation Description	<p><i>Acacia aptaneura</i> tall shrubland over <i>Eremophila latrobei</i> subsp. <i>latrobei</i> open shrubland with <i>Dianella revoluta</i> open herbland.</p>		



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