CORUNNA DOWNS INTERSECTION WORKS

Flora and Vegetation Assessment

ATLAS IRON LTD

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Corunna Downs Intersection Works – Flora and Vegetation Assessment

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1 INTRODUCTION

Atlas Iron Ltd (Atlas Iron) is proposing to mine iron ore at Corunna Downs, located approximately 20 km south south-west of Marble Bar in the Pilbara Region of Western Australia. To support the Corunna Downs Project, public road upgrades at a number of intersections (this Project) are being investigated:

- A2 intersection (east of the current Abydos mine haul road and Marble Bar intersection), to allow trucks to travel between Corunna Downs and Abydos;
- Corunna Down Road and Limestone-Marble Bar Road (Halse Road) intersection (east of Marble Bar), to allow for turning and acceleration lanes to support truck movements to and from Corunna Downs minesite; and
- Widening of the road near Marble Bar town sculptures (Halse Road) to allow tourists to pull off the road away from trucks.

Woodman Environmental Consulting Pty Ltd (Woodman Environmental) were contracted by Atlas Iron to undertake a Level 1 flora and vegetation assessment, and assessment of impacts against the 10 Clearing Principles, for the proposed intersection works as described above. Woodman Environmental previously have undertaken flora and vegetation surveys, and associated impact assessments for other Atlas projects in the vicinity of these works, including:

- Level 2 Flora and Vegetation assessment of the original Corunna Downs Project Area (survey area approximately 19,095 ha) (Woodman Environmental 2014);
- Level 2 Flora and vegetation assessment of the expanded Corunna Downs Project Area (total survey area 26,022 ha, including the study area as described above and the Corunna Downs Public Road Upgrade), incorporating results from both surveys in 2015 and 2014 (Woodman Environmental 2016a);
- Environmental Impact Assessment of the Corunna Downs Project (Woodman Environmental 2016b);
- Environmental Impact Assessment of the Corunna Downs Public Road Upgrade (Woodman Environmental 2017); and
- Level 1 Flora and vegetation assessment of the Proposed Acceleration Lanes on the Marble Bar Road to support the Abydos Direct Shipping Ore (Abydos DSO) project, including assessment against the 10 Clearing Principles (Woodman Environmental 2012).

1.1 Aim and Objectives

The aim of the assessment is to determine the impacts of the proposed intersection works against the 10 Clearing Principles (Government of Western Australia, 2014), to support a Native Vegetation Clearing Permit application.

1.2 Survey Location

Figure 1 presents the location of the three survey areas associated with this project, these are:

- The A2 intersection survey area (here after referred to as Area 1) is located on the Marble Bar Road, approximately 100 km south east of the town of Port Hedland, and is located immediately adjacent to an area previously surveyed by Woodman Environmental (Woodman Environmental (2012) on behalf of Atlas. Area 1 covers an area of 9.29ha, and is approximately 770m in length, encompassing both sides of the Marble Bar Road, and includes an existing turn around area and extends to the Shaw River.

- The intersection of Corunna Downs Road and Limestone Road survey area (here after referred to as Area 2) is located on the Marble Bar Road, approximately 1 km from the township of Marble Bar, covering approximately 2.24 ha and extending for approximately 500m in length. It encompasses both sides of the Road, and is positioned immediately adjacent to the Corunna Downs PRU survey area (Woodman Environmental 2016a).
- The Towns Sculpture survey area (here after referred to as Area 3) is located on the Marble Bar Road, approximately 2.7 km east of the township of Marble Bar, and covers an area approximately 1.98ha. It encompasses the southern side of the road only, extending for approximately 600m.

2 BACKGROUND

2.1 Context of Regional Biodiversity

The Survey Areas are located within the Pilbara 1 (PIL1) Chichester IBRA Subregion (Kendrick & McKenzie 2001; Commonwealth of Australia 2012). The PIL1 Chichester Subregion is comprised of undulating Archaean granite and basalt plains, with significant areas of basaltic ranges. Plains support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges. Grazing of native pastures by stock and impacts from mining are the main impacts on biodiversity within the region (Kendrick & McKenzie 2001).

Furthermore, the Survey Areas are located within the Pilbara Region (Fortescue Botanical District) within the Eremaean Province, as mapped and described by Beard (1990). The vegetation of this district comprises tree- and shrub-steppe communities with *Eucalyptus* trees, *Acacia* shrubs, *Triodia pungens* (sic) and *T. wiseana*, with some mulga (*A. aneura*) occurring in valleys and short-grass plains on alluvia (Beard 1990). The geology of the area is a basement of Archaean granite and volcanics, overlain by massive deposits of Proterozoic sediments and volcanics, with the soils being chiefly hard alkaline red soils on plains and pediments, with skeletal soils on the ranges.

Areas 1 and 3 are wholly located on the Abydos Plain of the Fortescue Botanical District, which was described by Beard (1975) as quaternary alluvium near the coast, Archaean granite further inland and other Archaean rocks outcropping in small hills and dykes. Area 2 is located partly on the George Ranges and partly on the Abydos Plain of the Fortescue Botanical District. The vegetation of the George Ranges was described by Beard (1975) as shrub-steppe in lower valleys with a flora similar to that of the Abydos Plain, with tree-steppe on the higher rocky ranges.

Table 1 and Figures 2a and 2b present the extent of vegetation system associations mapped within each of the survey areas, as presented by the Government of Western Australia (2015) based on mapping by Shepherd *et al.* (2002). Table 1 also presents the percentage of pre-European extent remaining and percentage of current extent reserved of each vegetation system association within the region (in Department of Parks and Wildlife (DPaW) estate, for each of these vegetation system associations.

Table 1: Extent of Vegetation System Associations within the Survey Area (Shepherd *et al.* 2002; Government of Western Australia 2015)

Vegetation System Association	Description	Current Extent (ha)	Percentage of Pre-European Extent Remaining	Percentage of Current Extent Reserved for Conservation *	Survey Area
Abydos Plain 93	Hummock grasslands, shrub steppe; kanji over soft spinifex	414,171.20	99.94	0	2; 3
Abydos Plain 589	Mosaic: Short bunch grassland - savanna/grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex	4,237.97	99.81	4.38	1
Abydos Plain 619	Medium woodland; river gum (*Eucalyptus camaldulensis*)	10,485.21	100.00	0	1

Vegetation System Association	Description	Current Extent (ha)	Percentage of Pre-European Extent Remaining	Percentage of Current Extent Reserved for Conservation *	Survey Area
George Ranges 82	Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*	316,855.10	99.90	0	2

*Note: proportion of current extent reserved in IUCN classified reserves I - IV

Van Vreeswyk *et al.* (2004) undertook landsystem mapping of the Pilbara Region (2004); Table 2 presents a description of the Landsystems mapped within each of the study areas.

Table 2: Landsystems of the Survey Areas

Landsystem	Description	Survey Area
River Land System	Active flood plains, major rivers and banks supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands	1
Uaroo Land System	Broad sandy plains supporting shrubby hard and soft spinifex grasslands	1
Rocklea Land System	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands	2; 3
Granitic Land System	Rugged granitic hills supporting shrubby hard and soft spinifex grasslands	3

2.2 Local Biodiversity

2.2.1 Sources of Information

The following sources have been used to provide local context for both flora and vegetation:

- Department of Environment and Energy – Protected Matters Search Tool (PMST) (DoE 2017a; b). Presents data in relation to matters protected under the EPBC Act; 10km radius search area.
- Department of Parks and Wildlife (DPaW) – *NatureMap* Search Tool (DPaW 2017a; b). Presents data housed through specimens lodged in the Western Australian Herbarium (WAHerb), and recorded in the Threatened and Priority Flora Database (TPRF database); 20km radius search areas surrounding centre points.
- Department of Parks and Wildlife (DPaW) – *FloraBase* (DPaW 2017c).
- Department of Parks and Wildlife (DPaW) – search of DPaW's TEC and PEC database was undertaken for Area 1 Survey Area (2017d).
- Department of Parks and Wildlife (DPaW) – search of DPaW's Threatened and Priority Flora databases was undertaken for Area 1 Survey Area (DPaW 2017e).
- Woodman Environmental flora and vegetation survey data (2012; 2014; 2016a)
- Mattiske Consulting Pty Ltd (2007)

2.2.2 Flora

Area 1

A total of 33 flora taxa are listed on NatureMap (DPaW 2017a) as occurring within a 20km radius of Area 1, which shows a distinct lack of specimens collected directly from this area lodged at the WAHerb rather than the area being particularly species-poor. This total includes a total of 29 native taxa, of which one (*Acacia glaucocaesia*) is a listed Priority 3 taxon, and one is listed as endemic to the search area (*Euphorbia inappendiculata*). Four introduced taxa were returned, none of which

are listed as Weeds of National Significance (WoNS) or are listed as Declared Plants (*Biosecurity and Agriculture Management Act 2007* (BAM Act).

A formal search requested of the Threatened and Priority Flora database through DPaW (DPaW, 2017e), over a 50km radius buffer surrounding Area 1, recorded the following known listed Conservation Significant (CS) flora taxa:

- *Acacia cyperophylla* var. *omearana* (P1)
- *Acacia glaucocaesia* (P3)
- *Bulbostylis burbidgeae* (P4)
- *Eragrostis crateriformis* (P3)
- *Euphorbia clementii* (P2)
- *Euphorbia inappendiculata* var. *inappendiculata* (P2)
- *Heliotropium murinum* (P3)
- *Heliotropium muticum* (P3)
- *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4) (T)
- *Ptilotus mollis* (P4), and
- *Rothia indica* subsp. *australis* (P1)

None of the CS flora taxa recorded from the Threatened and Priority Flora database search was known to occur in the Area 1 survey area.

No flora taxa protected under the EPBC Act were returned as being known to occur, likely or potentially occurring in the search area; the invasive weed taxon, or habitat supporting the taxon **Cynodon dactylon* (couch grass) was listed as being likely to occur in the search area (DoEE 2017a).

Woodman Environmental undertook a Level 1 flora survey of the proposed acceleration lanes survey area for Atlas Iron, located immediately west of the A2 study area in 2012. During this survey the area was traversed at 10m spacing to determine the location of any flora taxa listed as either Threatened (under the WC Act and/or the EPBC Act), or flora listed as Priority flora (as listed by DPaW); no such flora taxa were identified. Three relevés were also assessed in this area, with a total of 71 flora taxa (including two introduced taxa) recorded.

Appendix A presents a description of conservation code rankings used by the Department of Parks and Wildlife (DPaW 2015). Appendix B lists the flora taxa identified in DPaW (2017a), and Woodman Environmental (2012), for areas in the proximity of Area 1. Appendix C presents the results of the PMST search for Area 1.

<u>Areas 2 and 3</u>

A total of 115 flora taxa, including 110 native taxa, are listed on NatureMap (DPaW 2017b) as occurring within a 20km radius of Areas 2 and 3. This includes three Priority listed taxa (*Acacia* sp. Marble Bar (J.G. & M.H. Simmons 3499) (P1); *Gomphrena leptophylla* and *Heliotropium murinum* (both P3)). *Acacia* sp. Marble Bar (J.G. & M.H. Simmon 3499) is also endemic to the search area. No introduced flora taxa listed as WoNS or otherwise under the BAM Act are known to occur as a result of this search.

No flora taxa protected under the EPBC Act were returned as being known to occur, likely or may occur in Areas 2 and 3 (DoEE 2017b). The invasive weed taxa, or habitat supporting the taxa **Cenchrus ciliaris* (buffel grass) and **Parkinsonia aculeata* were listed as being likely to occur in the search area (DoEE 2017b).

Woodman Environmental undertook a flora and vegetation survey of the Corunna Project, including the proposed Public Road Upgrade (PRU) survey area, on behalf of Atlas (Woodman Environmental 2016a); a total of 15 vegetation units were mapped and described. The northern boundary of the PRU survey area abuts the southern and south-western boundaries of Area 2; in addition, the vegetation within an area proposed for gravel extraction was mapped (located approximately 0.5km to the east of Area 3). Two relevés were assessed in the area proposed for gravel extraction; no taxa of conservation significance were recorded in this area, or are otherwise known as a result of this survey within three kilometres of Area 2. A total of 29 flora taxa were recorded within the gravel extraction area, none of which are listed as being of conservation significance.

Appendix D lists the flora taxa identified in the proximity of Areas 2 and 3 by DPaW (2017b), and within the proposed gravel extraction area Woodman Environmental (2016a). Appendix E presents the results of the PMST search for Areas 2 and 3.

2.2.3 Vegetation

Area 1

A search using the NatureMap database (DPaW 2017a) within 20km radius of Area 1 returned no known TECs or PECs.

A search of DPaW's TEC and PEC database was undertaken to identify the presence of any DPaW-classified TECs and/or DPaW-classified PECs that coincide with the Survey Area (DPaW 2017d). The search used the Study Area with a 20 km buffer. No DPaW-classified TECs or PECs coincide with the Survey Area.

Woodman Environmental undertook a flora and vegetation assessment of the acceleration lane survey area associated with the Abydos Direct Shipping Ore (DSO) Project in 2012, including surveying vegetation within an area directly to the west of the A2 survey area (Woodman Environmental 2012). Three relevés were assessed within this area, with one plant community being described:

> Isolated clumps of trees of *Corymbia hamersleyana* and *Corymbia zygophylla* over tall isolated clumps of shrubs of mixed species dominated by *Acacia ancistrocarpa* and *Acacia sericophylla* over low shrubland to isolated clumps of shrubs of *Acacia stellaticeps* over low closed hummock grassland to hummock grassland of *Triodia epactia* and/or *Triodia lanigera* over low open tussock grassland to isolated clumps of tussock grasses of mixed species dominated by *Aristida inaequiglumis* and *Eulalia aurea*

Three vegetation alliances mapped by Mattiske Consulting Pty Ltd (Mattiske Consulting 2007 within the Panorama Project Area, extending south from Area 1 (south of the Marble Bar Road), were mapped within Area 1:

1a: Open forest to open woodland of *Eucalyptus camaldulensis, Melaleuca argentea* and *Eucalyptus victrix* with scattered tall shrubs of *Indigofera monophylla* over *Schoenus falcatus, Cyperus vaginatus* and *Triodia longiceps* sedgeland/grasslands in river beds.
4a: *Acacia tumida* high shrubland to low open forest in creeklines
6a: *Corymbia hamersleyana* scattered low trees to low open woodland over tall shrubs to open shrubland of *Acacia* spp. and *Grevillea wickhamii* over hummock grasslands on creek banks, flood banks and distributing fans.

Woodman Environmental (2012) considered the vegetation mapped within the acceleration lane survey area to be equivalent to vegetation alliance 6a as mapped by Mattiske Consulting (2007). Mattiske Consulting considered vegetation alliances 1a and 6a to be locally significant:

1a: Locally significant due to its structure as a wetland area and potential for habitat trees; also, *Schoenus falcatus* is uncommon in the Pilbara;
6a: Locally significant due to the presence of areas of priority flora taxa and other species of conservation significance.

Neither of the vegetation communities/alliances described above are considered to be representative of Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs), as listed under the EPBC Act or WC Act.

Areas 2 and 3

A search using the NatureMap database (DPaW 2017b) presented no known TECs or PECs within 20km radius of the Areas 2 and 3.

Woodman Environmental undertook a flora and vegetation survey of the Corunna Project, including the proposed PRU survey area, on behalf of Atlas (Woodman Environmental 2016a); a total of 15 vegetation units were mapped and described. The northern boundary of the PRU survey area abuts the southern and south-western boundaries of Area 2; in addition, the vegetation within an area proposed for gravel extraction was mapped (located approximately 0.5km to the east of Area 3). Three vegetation types (VTs), and areas mapped as Cleared Land (cleared) were mapped in close proximity (within three kms) to Area 2, as well as in the area proposed for gravel extraction:

VT 11: Low isolated trees of *Corymbia hamersleyana* over tall sparse shrubland dominated by *Acacia inaequilatera* and often *Grevillea pyramidalis* subsp. *leucadendron* over low sparse shrubland dominated by *Corchorus parviflorus*, *Indigofera monophylla* and *Senna glutinosa* subsp. *glutinosa* over low hummock grassland dominated by *Triodia wiseana* and/or *Triodia epactia* on red to brown clay loam often with dolerite or occasionally quartz or metamorphosed granite outcropping, on low hills, ridges and occasionally undulating plains
VT 12: Low open woodland of *Corymbia hamersleyana* over mid sparse shrubland dominated by *Acacia bivenosa* over low sparse shrubland of mixed species including *Corchorus parviflorus*, *Heliotropium cunninghamii*, *Indigofera monophylla* and *Pluchea ferdinandi-muelleri* over low hummock grassland dominated by *Triodia wiseana* and/or *Triodia angusta* or *Triodia longiceps* on brown clay loam on stony undulating plains and low rises often with calcrete outcropping
VT 14: Mid open woodland of mixed species including *Eucalyptus victrix* and *Corymbia hamersleyana* over tall open to sparse shrubland of mixed species including *Acacia coriacea* subsp. *pendens*, *Acacia trachycarpa*, *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis* and *Melaleuca glomerata* over low sparse shrubland of mixed species including *Pluchea ferdinandi-muelleri*, *Cajanus pubescens* and *Stemodia grossa* over mid open grassland and sedgeland of mixed species dominated by **Cenchrus ciliaris*, *Triodia longiceps*, *Triodia epactia* , *Chrysopogon fallax* and *Cyperus vaginatus* on red to brown sand to sandy loam with riverstones in minor to medium drainage lines

None of these three VTs were considered to represented listed TECs or PECs; or otherwise be of local or regional significance (Woodman Environmental 2016a).

3 METHODS

3.1 Timing and Personnel

The survey was undertaken on the 5th – 6th April 2017, inside the normal optimum time for flora and vegetation surveys in terms of plant identification in the Pilbara, being during the months after the main rainfall season (December – March). Chart 1 presents the rainfall received at Marble Bar (Station 004106) in the months prior to the survey (September 2016 – March 2017) against the long-term average (using available data over years 2000 – 2017). The monthly rainfall received in each of the months January – March 2017 was double the long-term average, and therefore it is considered that the survey has been conducted under optimal seasonal conditions.

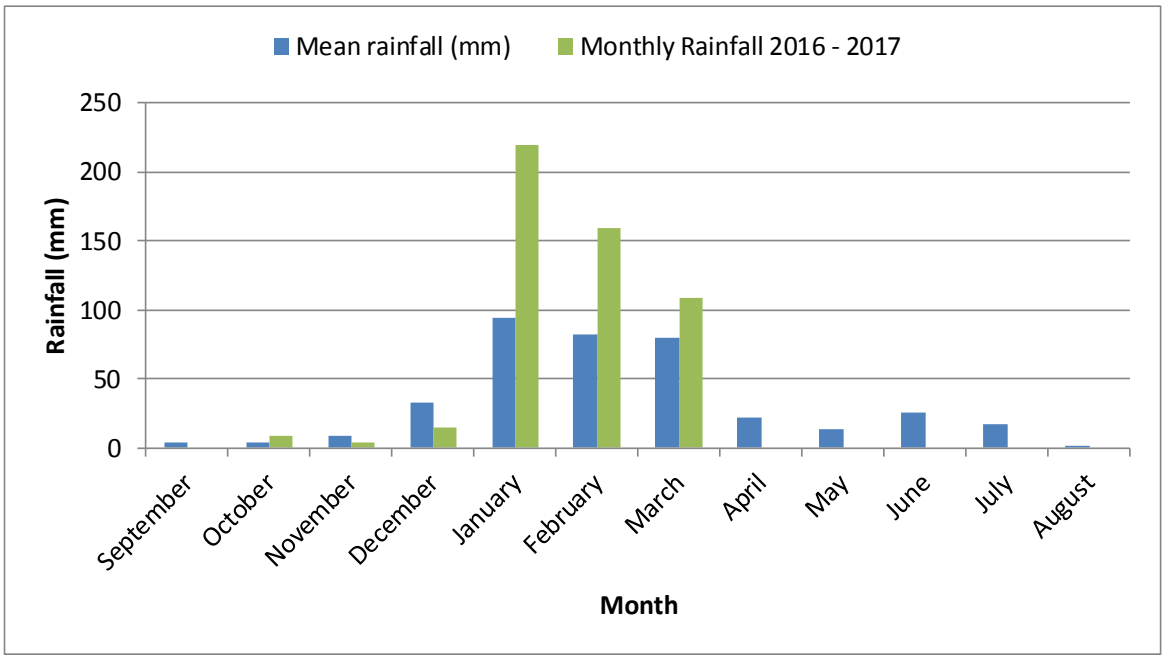

Chart 1: Rainfall Statistics for Marble Bar

The field survey was undertaken by two experienced botanists, with previous experience within the Pilbara Region (Table 3). Plant identifications were undertaken by Beth Loudon, who has extensive experience in plant identifications in this Pilbara Region.

Table 3: Woodman Environmental Personnel and Applicable Licenses for Field Survey

Personnel	Task	License for Scientific of Other Prescribed Purposes (Section 23C under the WC Act 1950)	Permit to Take Declared Rare Flora (Section 23F under the WC Act 1950)
[redacted]			

3.2 Field Survey

A Level 1 flora and vegetation survey / reconnaissance survey was undertaken within each of the three survey areas, as per the guidelines prepared by the Environmental Protection Authority (EPA) and DPaW (2016). Each survey area was surveyed on foot, to determine the presence of conservation significant flora taxa, and to delineate vegetation types. A total of 12 relevés were assessed during the survey:

Area 1: 6 relevés
Area 2: 4 relevés
Area 3: 2 relevés

The relevés were located in all vegetation types discernible through aerial photography interpretation, in combination with on-ground inspection. The following information was recorded within a 20m radius of each relevé:

- Date
- Field personnel
- GPS location (GDA 94)
- Representative photograph
- Topography
- Soils (type and colour)
- Condition (vegetation condition scale – Table 3 of EPA and DPaW (2016))
- Disturbance factors in the area (including time since fire)
- Vascular plant species – including height and approximate foliage cover

Additional flora taxa were recorded opportunistically in the survey areas via a search around the general vicinity of each relevé, and during traverses on foot between relevés.

Mapping notes of vegetation type boundaries and distribution were taken while traversing on foot and by vehicle. This was to aid in mapping polygons of vegetation types that were not allocated relevés.

Samples of plant taxa which were unable to be identified in the field were taken for identification at the WA Herbarium, with experts consulted where necessary to complete identifications. All data was entered into the Woodman Environmental bespoke database VegMonitor, which allows processing of the data for appendices.

Mapping of vegetation types was undertaken through interpretation of aerial photography and review of field notes and relevé data, with the boundaries digitised using ARCGis.

Vegetation types were defined based on structure similarity of dominant taxa recorded at each relevé. Vegetation type descriptions have been adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 6.0 (ESCAVI 2003). This model follows nationally-agreed guidelines to describe and represent vegetation units, so that comparable and consistent data is produced nation-wide. For the purposes of this report, a vegetation type is equivalent to a NVIS vegetation association as described in ESCAVI (2003).

Vegetation condition was recorded at all relevé sites, and also opportunistically within the survey areas where areas of disturbance to vegetation were noted (e.g. weed infestations, road grading, cattle trampling and grazing etc.). Vegetation condition was described using a vegetation condition

scale from Table 3 of EPA and DPaW (2016)). This scale is presented in Appendix D. Vegetation condition polygon boundaries for the survey areas were developed using this information in conjunction with aerial photography interpretation, and were digitised as for vegetation type mapping polygon boundaries.

An assessment of the potential impact of clearing associated with the project has been undertaken against both the background review data and the flora and vegetation survey undertaken within the survey areas has been undertaken, and is presented in Section 5.

4 RESULTS

4.1 Area 1

A total of 69 flora taxa were recorded within Area 1, of which 64 were native taxa, and five were introduced taxa. These taxa represent 21 families and 51 genera. The most well-represented families were Fabaceae (16 taxa), Poaceae (15 taxa) and Malvaceae (7 taxa). Appendix G presents a list of taxa recorded in Area 1 and Appendix H presents a list of all taxa recorded within all of the project survey areas. No historically known locations of conservation significant flora taxa are known within Area 1 (DPaW, 2017e) and none were recorded during the survey.

Four Vegetation Types (VTs) were mapped within Area 1:

VT 1: Tall isolated clumps of shrubs of mixed species dominated by *Acacia trachycarpa* over low isolated clumps of shrubs of *Acacia stellaticeps* over low hummock grassland of *Triodia epactia* and *Triodia lanigera* on red-brown sandy clay/sandy loam on low plain.

VT 2: Low open shrubland of mixed species dominated by *Acacia stellaticeps*, *Pluchea tetranthera* and *Sesbania cannabina* over low open grassland of **Cenchrus ciliaris* and *Eragrostis tenellula* on red clay on low depressions.

VT 3: Mid isolated trees of *Eucalyptus camaldulensis* subsp. *refulgens* and *Eucalyptus victrix* over tall isolated clumps of shrubs of *Acacia trachycarpa* over low open shrubland of mixed species dominated by **Aerva javanica*, *Cleome viscosa* and *Corchorus* ?*incanus* over low isolated clumps of hummock grasses of *Triodia angusta* on brown sandy loam on floodplain.

VT 4: Low isolated clumps of shrubs of mixed species on red-brown sand in river beds.

Figure 3a presents the distribution of these VTs in Area 1.

None of the VTs are considered to represent any TECs (DPaW 2016a), or as listed under the EPBC Act (DoE 2017a). None of the VTs are considered to represent any PECs (DPaW 2016b). As previously mentioned, no known locations of any DPaW-classified TECs, TECs listed under the EPBC Act, or PECs, coincide with Area 1 (DoE 2017a; DPaW 2016a & b, DPaW 2017d).

The vegetation condition in the Area 1 varied from 'Very Good' to 'Poor', depending on the levels of vehicle activities, road maintenance activities, aggressive introduced taxa, grazing and trampling impacts recorded from cattle. **Aerva javanica* and **Cenchrus ciliaris* often occurred at moderate densities within the lower stratum at a number of relevé sites and reflected the level of disturbance caused by cattle and road maintenance.

The areas mapped as 'Cleared' were not allocated condition scores, as they were either cleared areas such as the Marble Bar- Port Hedland Road or access tracks into private property or essentially completely cleared, with some regrowth occurring in the intervening years between road maintenance along the Marble Bar- Port Hedland Road and adjoining truck parking bay.

The vegetation condition mapping is presented in Figure 4a.

4.2 Area 2

A total of 60 flora taxa were recorded within Area 2, of which 57 were native taxa, and three were introduced taxa. These taxa represent 21 families and 43 genera. The most well-represented families were Fabaceae (14 taxa,) and Poaceae (7 taxa). Appendix G presents a list of taxa recorded within Area 2, and Appendix H presents a list of all taxa recorded within the project survey areas. No historically known locations of conservation significant flora taxa are known within Area 2 and none were recorded during the survey.

Four VTs were mapped within Area 2:

VT 5: VT 5 aligns with VT 11 from the proposed PRU survey area (Woodman Environmental 2016a).
Low isolated trees of *Corymbia hamersleyana* over tall sparse shrubland dominated by *Acacia inaequilatera* and often *Grevillea pyramidalis* subsp. *leucadendron* over low sparse shrubland dominated by *Corchorus parviflorus*, *Indigofera monophylla* and *Senna glutinosa* subsp. *glutinosa* over low hummock grassland dominated by *Triodia wiseana* and/or *Triodia epactia* on red to brown clay loam often with dolerite or occasionally quartz or metamorphosed granite outcropping, on low hills, ridges and occasionally undulating plains.

VT 6: Mid isolated clumps of shrubs of *Grevillea wickhamii* subsp. *hispidula* over low hummock grassland of *Triodia epactia* over low sparse grassland of *Sporobolus australasicus* on red sandy loam on stony low rises.

VT 7: Tall sparse shrubland of *Acacia eriopoda* over low isolated clumps of shrubs of **Aerva javanica* and *Boerhavia coccinea* over low closed grassland of **Cenchrus ciliaris* on red clay in drainage lines.

VT 8: Low isolated clumps of trees of *Corymbia hamersleyana* over tall open shrubland of *Acacia bivenosa*, *A. eriopoda* and *A. trachycarpa* over low closed grassland of **Cenchrus ciliaris* on red clay on lowerslopes.

Figure 3b presents the distribution of these VTs in the Survey Area.

None of the VTs mapped in Area 2 are considered to represent any TECs as classified by DPaW (DPaW 2016a), or as listed under the EPBC Act (DoE 2017b). None of the VTs mapped in Area 2 are considered to represent any PECs (DPaW 2016b). As previously mentioned, no known locations of any DPaW-classified TECs, TECs listed under the EPBC Act, or PECs, coincide with Area 2 (DoE 2017b; DPaW 2016a & b).

The vegetation condition in Area 2 varied from 'Good' to 'Degraded', depending on the levels of vehicle activities, road maintenance activities and aggressive introduced taxa. **Cenchrus ciliaris* dominated the lower stratum at a number of relevé sites where the condition score was recorded as degraded, to the extent that native perennial grass taxa were almost entirely absent. **Aerva javanica* was also often dense in the shrub layer. **Cenchrus ciliaris* was recorded at very high densities within the lower stratum at a number of sites and reflected the level of disturbance caused by road maintenance activities and previous stocking of cattle in the area.

The areas in Area 2 mapped as 'Cleared' were not allocated condition scores, as they were either cleared areas such as Halse Road and the Corunna Downs – Limestone Road intersection or access

tracks into private property or essentially completely cleared, with some regrowth occurring in the intervening years between road maintenance along Halse Road

The vegetation condition mapping is presented in Figure 4b.

4.3 Area 3

A total of 45 flora taxa were recorded within Area 3, of which 43 were native taxa, and two were introduced taxa. These taxa represent 16 families and 32 genera. The most well-represented families were Fabaceae (14 taxa) and Poaceae (8 taxa). Appendix G presents a list of taxa recorded within Area 3 and Appendix H presents a list of all taxa recorded within the survey areas. No historically known locations of conservation significant flora taxa are known within Area 3 and none were recorded during the survey.

Two VTs were mapped within Area 3:

VT 9: Low isolated clumps of shrubs of **Aerva javanica* over low isolated clumps of hummock grasses of *Triodia epactia* over sparse grassland of **Cenchrus ciliaris*, *Enneapogon caerulescens* and *Sporobolus australasicus* on red sandy loam on midslopes.

VT 10: Tall open shrubland of mixed species dominated by *Acacia ancistrocarpa* and *A. inaequilatera* over mid to low isolated clumps of hummock grasses of mixed species dominated by *Triodia angusta* and *T. epactia* over low closed grassland of **Cenchrus ciliaris* on red clay on lowerslopes.

Figure 3c presents the distribution of these VTs in Area 3.

None of the VTs mapped in Area 3 are considered to represent any TECs as classified by DPaW and endorsed by the Western Australian Minister for Environment (DPaW 2016a), or as listed under the EPBC Act (DoE 2017b). None of the VTs mapped in Area 3 are considered to represent any DPaW-classified PECs (DPaW 2016b). As previously mentioned, no known locations of any DPaW-classified TECs, TECs listed under the EPBC Act, or DPaW-classified PECs, coincide with Area 3 (DoE 2017b; DPaW 2016a & b).

The vegetation condition in the Area 3 survey area varied from 'Poor' to 'Degraded', depending on the levels of vehicle activities, road maintenance activities and aggressive introduced taxa. **Cenchrus ciliaris* dominated the lower stratum at one relevé site where the condition score was recorded as degraded, to the extent that native perennial grass taxa were almost entirely absent. **Aerva javanica* was also often frequent in the shrub layer in such detailed recording sites. **Cenchrus ciliaris* was recorded at very high densities within the lower stratum at relevé site and reflected the level of disturbance caused by road and culvert maintenance activities and previous stocking of cattle in the area.

The areas in Area 3 mapped as 'Cleared' were not allocated condition scores, as they were either cleared areas such as Halse Road and the Corunna Downs – Limestone Road intersection or access tracks into private property or essentially completely cleared, with some regrowth occurring in the intervening years between road maintenance along Halse Road

The vegetation condition mapping is presented in Figure 4c.

4.4 Proposed Impacts to Vegetation

Table 4 presents the area and percentage of impact to vegetation types mapped in Areas 1, 2 and 3, based on proposed impact polygons provided by Atlas.

Table 4: Proposed Impact on Vegetation Types

Area	Vegetation Type	Total Area Mapped (ha)	Proposed Clearing (ha)	Percentage Impact
1	VT 1	4.12	1.19	28.9%
	VT 2	0.33	0.33	100.0%
	VT 3	1.35	0.64	47.4%
	VT4	0.34	0	0.0%
	Cl	3.16	-	-
2	VT 5	0.22	0.02	9.1%
	VT 6	0.25	0.11	44.0%
	VT 7	0.06	0.01	16.7%
	VT 8	0.33	0.08	24.2%
	Cl	1.37	-	-
3	VT 9	0.3	0.3	100.0%
	VT 10	0.72	0.72	100.0%
	Cl	0.97	-	-

5 ASSESSMENT AGAINST THE 10 CLEARING PRINCIPLES

5.1 Area 1

Principle (a): Native vegetation should not be cleared if it comprises a high level of biological diversity.

A total of 65 native flora taxa were recorded within Area 1; in addition, only 33 native taxa are known to occur within 20km radius of Area 1 (specimens lodged within the WA Herbarium). The species richness in relevés ranged from 31 (CRU-03) to six (CRU-06) (native taxa only), with introduced taxa present in five of six relevés. No flora taxa of conservation significance, or introduced taxa listed as WoNS or otherwise as Declared Weeds (BAM Act 2007) were recorded. Of the five introduced taxa recorded in Area 1, three (*Aerva javanica*; *Calotropis procera*; *Cenchrus ciliaris*) are significant due to their rating of High for prioritizing of control due to a combination of their invasiveness, distribution and environmental impact (CALM 1999).

A total of four vegetation types were mapped within Area 1, which is moderately diverse given the size of the survey area (9.29 ha). However, this is a result of the location of the survey area, extending upslope from a major riverine system, with two vegetation types associated with the riverine system (river beds and floodplain), and two vegetation types mapped on the adjoining plains.

Approximately half of Area 1 was mapped as Cleared or in Poor condition; the remaining area was mapped as Very Good or Good Condition. The vegetation has been impacted by road building and maintenance, and by cattle trampling and grazing.

Area 1 does not comprise a high level of biodiversity with respect to flora taxa or vegetation, and the proposal is not at variance with Principle (a).

Principle (b): Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Not considered part of the scope of this survey.

Principle (c): Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

The DPaW threatened flora databases, including the Western Australian Herbarium (WAHerb) specimen database (DPaW 2017c), NatureMap (DPaW 2017a) and the Threatened and Priority Flora database (DPaW 2017e) were searched for conservation significant taxa known from within or in the immediate vicinity of the survey. The search of the Department of Environment and Energy (DoEE) database was also undertaken (DoEE 2017a). No Threatened Flora taxa (as listed under EPBC 1999 or WC Act) are known to occur in the vicinity of Area 1. The closest known record of conservation significant flora is *Acacia glaucocaesia* (P3), which is known to occur within 20km of Area 1.

In addition to searches of state and federal databases, a field survey to determine conservation significant flora taxa occurrence on site was undertaken. No conservation significant taxa (including Threatened flora taxa) were recorded within Area 1.

As no Threatened Flora (Declared Rare Flora) and Priority Flora was previously known from, or recorded within Area 1 under optimal seasonal conditions, the native vegetation present within Area

1 is not necessary for the continued existence of rare flora, and the proposal is not at variance with Principle (c).

Principle (d): Native vegetation comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.

Search results of DPaW's Threatened and Priority Ecological Community (TEC/PEC) database search results (DPaW 2017d) and NatureMap (DPaW 2017a) indicates that no TECs are known to occur within or near the Area 1 survey area. Only two TECs are known from the Pilbara Region (TEC 46 – *Themeda* Grasslands and TEC 78 – Ethel Gorge Aquifer Stygobiont Community) (DPaW 2016a). Both of these TECs are associated with the Hamersley Range area, therefore it is highly unlikely that either of these TECs would occur within Area 1.

Likewise, the search of the DoEE database (DoEE 2017a) indicated that no nationally-listed TECs are known from Area 1 (Appendix C).

A review was also conducted of the recently updated list of PECs for Western Australia (Version 26), produced by the Species and Communities Branch of DPaW (released 30th November 2016), to determine if the vegetation type description from Area 1 aligned with any listed PECs. No PECs align with the vegetation type from the Area 1 survey area.

As searches of state and federal databases show that there are no TECs or PECs known from within the Area 1 survey area, and none were identified during the survey, the vegetation of Area 1 does not comprise any threatened ecological communities, and the proposal is not at variance with Principle (d).

Principle (e): Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Area 1 is located within pre-European vegetation system associations 589 and 619 (Abydos Plain) (Government of Western Australia 2015). These vegetation system associations currently have 99.8 and 100% respectively of their pre-European extent remaining within the PIL-1 (Chichester) IBRA Subregion.

Area 1 occurs outside of the 'agricultural area' (Intensive Land Use zone) where remnant vegetation has been extensively cleared (Government of Western Australia 2015).

Area 1 is not located within a significant remnant of native vegetation in an area which has been extensively cleared, and the proposal is not at variance with Principle (e).

Principle (f): Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Of the vegetation in Area 1 associated with a watercourse (VTs 3 and 4), VT 3 is proposed to be impacted. Therefore, the proposal is at variance with Principle (f).

Principle (g): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Although clearing in Area 1 is proposed to occur on flat plains and floodplain areas, the impact area is adjacent to and incorporates the existing road alignment (Marble Bar Road) and will not increase

fragmentation to the area or any existing corridors. Some land degradation may occur if appropriate construction and rehabilitation techniques are not followed, however the extent of such land degradation is likely to be minor given the scale of the clearing. The proposal will not be at variance with Principle (g) if appropriate management is undertaken.

Principle (h): **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.**

There are no gazetted conservation areas, or other DPaW tenure located within a 20km radius of Area 1 (DPaW 2017a). Therefore there will be no impact on any environmental values of any adjacent or nearby conservation areas, and the proposal is not at variance with Principle (h).

Principle (i): **Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or groundwater**.

The impact area is located within the floodplain adjacent to the Shaw River, and as such some deterioration of surface water may occur if aspects of the project such as hydrocarbon management and sedimentation are not properly managed. The proposal may be at variance with Principle (i) and will require management.

Principle (j): **Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding**.

Area 1 is located within and on the floodplain of the Shaw River, which by nature is prone to flooding during times of high rainfall within the catchment area. However, given the scale of the project, it is highly unlikely that the proposal would cause or exacerbate such flooding events. The proposal is not at variance with Principle (j).

5.2 Area 2

Principle (a): **Native vegetation should not be cleared if it comprises a high level of biological diversity.**

A total of 57 native flora taxa were recorded within Area 2; in addition, only 110 native taxa are known to occur within 20km radius of Areas 2 and 3 (specimens lodged within the WA Herbarium). The species richness in relevés ranged from 42 (CRU-07) to 12 (CRU-10) (native taxa only), with introduced taxa present all four relevés assessed. No flora taxa of conservation significance, or introduced taxa listed as WoNS or otherwise as Declared Weeds (BAM Act 2007) were recorded. Of the three introduced taxa recorded in Area 2, two (*Aerva javanica*; *Cenchrus ciliaris*) are significant due to their rating of High for prioritizing of control due to a combination of their invasiveness, distribution and environmental impact (CALM 1999).

Four vegetation types were mapped, which is moderately diverse given the size of the survey area (2.24ha). This diversity is a result of the varying topography and soils of the survey area.

Approximately three quarters of Area 2 was Cleared or in Degraded condition; the remaining area was in Good condition. The vegetation has been impacted historically by road building and maintenance activities, and by cattle trampling and grazing.

Area 2 does not comprise a high level of biodiversity with respect to flora taxa or vegetation, and the proposal is not at variance with Principle (a).

Principle (b): Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Not considered part of the scope of this survey.

Principle (c): Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

The DPaW threatened flora databases, including the Western Australian Herbarium (WAHerb) specimen database and the Threatened and Priority Flora database were searched regarding conservation significant taxa known from within or in the immediate vicinity of the survey area using NatureMap (DPaW 2017b). The search of the Department of Environment and Energy (DoEE) database was also undertaken (DoEE 2017b). As a result of these desktop searches, no Threatened Flora taxa (as listed under EPBC 1999 or WC Act) are known to occur in the vicinity of Area 2. The closest known records of conservation significant flora are *Acacia* sp. Marble Bar (J.G. & M.H. Simmons 3499) (P1), *Gomphrena leptophylla* (P3) and *Heliotropium muticum* (P3) which are known to occur within 20km of Area 2.

In addition to searches of state and federal databases, a field survey to determine conservation significant flora taxa occurrence on site was undertaken. No conservation significant taxa (including Threatened flora taxa) were recorded within Area 2.

As no Threatened Flora (Declared Rare Flora) and Priority Flora was previously known from, or recorded within Area 2, the native vegetation present within Area 2 is not necessary for the continued existence of rare flora, and the proposal is not at variance with Principle (c).

Principle (d): 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.

Search results of DPaW's Threatened Ecological Community (TEC) database using NatureMap (DPaW 2017b) indicates that no TECs are known to occur within or near Area 2. Only two TECs are known from the Pilbara Region (TEC 46 – *Themeda* Grasslands and TEC 78 – Ethel Gorge Aquifer Stygobiont Community) (DPaW 2016a). Both of these TECs are associated with the Hamersley Range area, therefore it is highly unlikely that either of these TECs would occur within Area 2.

Likewise, the search of the DoEE database (DoEE 2017b) indicated that no nationally-listed TECs are known from Area 2 (Appendix C).

A review was conducted of PECs for Western Australia (Version 26), produced by the Species and Communities Branch of the DPaW (released 30th November 2016), to determine if the vegetation type description from Area 2 aligned with any listed PECs. No PECs align with the vegetation types from the Area 2 survey area.

As searches of state and federal databases show that there are no TECs or PECs known from within Area 2, and none were identified during the survey, the vegetation of Area 2 does not comprise any threatened ecological communities, and the proposal is not at variance with Principle (d).

Principle (e): Native vegetation should not be cleared if is significant as a remnant of native vegetation in an area that has been extensively cleared.

Area 2 is located within pre-European vegetation system associations 93 (Abydos Plain) and 82 (George Range) (Government of Western Australia 2015). These vegetation system associations currently have 99.94 and 99.90% respectively of their pre-European extent remaining within the PIL-1 (Chichester) IBRA Subregion.

Area 2 occurs outside of the 'agricultural area' (Intensive Land Use zone) where remnant vegetation has been extensively cleared (Government of Western Australia 2015).

Area 2 is not considered to be located within a significant remnant of native vegetation in an area which has been extensively cleared, and the proposal is not at variance with Principle (e).

Principle (f): Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Vegetation type 7 as mapped within Area 2 is a minor drainage line, flowing in a south-westerly direction. Vegetation type 7 contained 13 native taxa and three introduced taxa, with the introduced taxa **Cenchrus ciliaris* dominating the lower stratum. There is some clearing proposed in this vegetation type (Figure 3b), with the vegetation condition in this area mapped as Degraded (Figure 4b) due to the high density of introduced taxa. It appears that this vegetation type is growing in association with an artificial water source related to a mine water discharge area associated with mineshaft dewatering to the north (which starts north of the road and travels south of the road, via a culvert). Clearing associated with this area is potentially at variance with Principle (f).

Principle (g): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Area 2 incorporates the existing road alignment and intersection (Halse Road and Limestone Road) and will not increase fragmentation to the area or any existing corridors. The condition of the vegetation across most of the area is Cleared or Degraded, and has historically been impacted by human activities. Clearing associated with the proposal in Area 2 is not at variance with Principle (g).

Principle (h): 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.

The closest conservation area (ex-pastoral station Meentheena, managed by DPaW) is located approximately 40km to the east of Area 2. As such, there will be no impact on any environmental values of adjacent or nearby conservation areas, and the proposal at Area 2 is not at variance with Principle (h).

Principle (i): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or groundwater.

One minor drainage line is located and will be impacted by the proposal in Area 2. Given the clearing associated with the proposal is located immediately adjacent to the existing road and it is likely that such impacts to surface water quality would be relatively minor. The proposal will not be at variance to Principle (i).

Principle (j): **Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding**.

Due to the small scale of the proposal, it is highly unlikely that clearing associated with Area 2 would cause or exacerbate the incidence of flooding in the area based on vegetation type present and the limited area that will be cleared. The proposal at Area 2 is not at variance with Principle (j).

5.3 Area 3

Principle (a): **Native vegetation should not be cleared if it comprises a high level of biological diversity.**

A total of 43 native flora taxa were recorded within Area 3; in addition, 110 native taxa are known to occur within 20km radius of Areas 2 and 3 (specimens lodged within the WAHerb). The species richness in relevés ranged from 31 (CRU-11) to 25 (CRU-12) (native taxa only), with introduced taxa present at both relevés. No flora taxa of conservation significance, or introduced taxa listed as WoNS or otherwise as Declared Weeds (BAM Act 2007) were recorded in Area 3. Both of the introduced taxa recorded (*Aerva javanica*; *Cenchrus ciliaris*) are significant due to their rating of High for prioritizing of control due to a combination of their invasiveness, distribution and environmental impact (CALM 1999).

Two vegetation types were mapped within Area 2, and therefore the vegetation is not diverse.

The vegetation condition of Area 3 was Cleared, Degraded or Poor. The vegetation has been impacted historically by road building and maintenance activities, and by cattle trampling and grazing.

Area 3 does not comprise a high level of biodiversity with respect to flora taxa or vegetation, and the proposal is not at variance with Principle (a).

Principle (b): **Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia**.

Not considered part of the scope of this survey.

Principle (c): **Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.**

The DPaW threatened flora databases, including the Western Australian Herbarium (WAHerb) specimen database and the Threatened and Priority Flora database were searched for conservation significant taxa known from within or in the immediate vicinity of the survey area using NatureMap (DPaW 2017b). The search of the Department of Environment and Energy (DoEE) database was also undertaken (DoEE 2017). No Threatened Flora taxa (as listed under EPBC 1999 or WC Act) are known to occur in the vicinity of Area 3. The closest known record of conservation significant flora is *Acacia* sp. Marble Bar (J.G. & M.H. Simmons 3499) (P1), *Gomphrena leptophylla* (P3) and *Heliotropium muticum* (P3) which are all known to occur within 20km of Area 3.

In addition to searches of state and federal databases, a field survey to determine conservation significant flora taxa occurrence on site was undertaken. No conservation significant taxa (including Threatened flora taxa) were recorded within Area 3.

As no Threatened Flora (Declared Rare Flora) and Priority Flora was previously known from, or recorded within Area 3 under optimal seasonal conditions, the native vegetation is not necessary for the continued existence of rare within the Area 3, and the proposal is not at variance with Principle (c).

Principle (d): 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.

Search results of DPaW's Threatened Ecological Community (TEC) database using NatureMap (DPaW 2017b) indicates that no TECs are known to occur within or near the Area 3 survey area. Only two TECs are known from the Pilbara Region (TEC 46 – *Themeda* Grasslands and TEC 78 – Ethel Gorge Aquifer Stygobiont Community) (DPaW 2016a). Both of these TECs are associated with the Hamersley Range area, therefore it is highly unlikely that either of these TECs would occur within Area 3.

Likewise, the search of the DoEE database (DoEE 2017b) indicated that no nationally-listed TECs are known from Area 3 (Appendix C).

A review was conducted of PECs for Western Australia (Version 26), produced by the Species and Communities Branch of the DPaW (released 30th November 2016), to determine if the vegetation type description from Area 3 aligned with any listed PECs. No PECs align with the vegetation type from the Area 3 survey area.

As searches of state and federal databases show that there are no TECs or PECs known from within the Area 3 survey area, and none were identified during the survey, the vegetation of Area 3 does not comprise any threatened ecological communities, and the proposal is not at variance with Principle (d).

Principle (e): Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Area 3 is located within pre-European vegetation association 93 (Abydos Plain) (Government of Western Australia 2015). This vegetation association currently has 99.94% of the pre-European extent remaining within the PIL-1 (Chichester) IBRA Subregion.

Area 3 occurs outside of the 'agricultural area' (Intensive Land Use zone) where remnant vegetation has been extensively cleared (Government of Western Australia 2015).

Area 3 is not located within a significant remnant of native vegetation in an area which has been extensively cleared, and the proposal is not at variance with Principle (e).

Principle (f): Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland

Neither of the vegetation types mapped in Area 3 is associated with watercourses or wetlands. Clearing associated with the proposal in Area 3 is not at variance with Principle (f).

Principle (g): **Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.**

Area 3 incorporates the existing road alignment (Halse Road) and will not increase fragmentation to the area or any existing corridors. The condition of the vegetation throughout the area has been mapped as Cleared, Degraded or Poor, and has historically been impacted by human activities. Clearing associated with the proposal in Area 3 is not at variance with Principle (g).

Principle (h): **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.**

The closest conservation area (ex-pastoral station Meentheena, managed by DPaW) is located approximately 39km to the east of Area 3. As such, there will be no impact on any environmental values of adjacent or nearby conservation areas, and the proposal at Area 3 is not at variance to Principle (h).

Principle (i): **Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or groundwater**.

No drainage lines or other watercourses are present in Area 3. Given also that the clearing associated with the proposal is located immediately adjacent to the existing road, it is unlikely that there would be any impact to quality of surrounding surface waters. The proposal will not be at variance to Principle (i).

Principle (j): **Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding**.

It is highly unlikely that clearing associated with Area 3 would cause or exacerbate the incidence of flooding in the area based on vegetation type present and the limited area that will be cleared. The proposal at Area 3 is not at variance with Principle (j).

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Appendix A: Conservation Codes for Western Australian Flora and Fauna (DPaW 2015)

Specially protected fauna or flora are species* which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.

Categories of specially protected fauna and flora are:

T Threatened species
Published as Specially Protected under the *Wildlife Conservation Act* 1950, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

Threatened fauna is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the Wildlife Conservation Act.

Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the Wildlife Conservation Act.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically Endangered Species: Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EN Endangered Species: Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

VU Vulnerable Species: Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EX Presumed extinct species
Listed as Specially Protected under the *Wildlife Conservation Act 1950,* published under Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed

Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora (which may also be referred to as Declared Rare Flora).

Species which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.

IA Migratory birds protected under an international agreement
Listed as Specially Protected under the Wildlife Conservation Act 1950, listed under Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice.

Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), relating to the protection of migratory birds.

CD Conservation dependent fauna
Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.

OS Other specially protected fauna
Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1: Priority One: Poorly-known species
Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well

known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2: Priority Two: Poorly-known species
Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3: Priority Three: Poorly-known species
Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4: Priority Four: Rare, Near Threatened and other species in need of monitoring
(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

*Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies, variety or forma).

Current as of 11th November 2015

Appendix B: Flora Taxa Known to Occur in Proximity Area 1

Species Name	DPaW Conservation Code	NatureMap (DPaW 2017a)	Woodman Environmental (2012)
Acacia acradenia		*	
Acacia ancistrocarpa			*
Acacia colei			*
Acacia elachantha		*	
Acacia glaucocaesia	P3	*	
Acacia hilliana		*	
Acacia inaequilatera			*
Acacia orthocarpa			*
Acacia sericophylla		*	*
Acacia sphaerostachya		*	
Acacia stellaticeps			*
Acacia synchronicia		*	
Acacia tumida var. *pilbarensis*		*	*
Aristida contorta			*
Aristida holathera			*
Aristida inaequiglumis			*
Boerhavia gardneri			*
Bonamia linearis			*
Bonamia rosea			*
Bulbostylis barbata			*
Calandrinia quadrivalvis		*	
Cassytha sp.			*
**Cenchrus ciliaris*			*
Chrysopogon fallax			*
Cleome viscosa			*
Corymbia hamersleyana		*	*
Corymbia zygophylla			*
Crotalaria cunninghamii		*	
Cucumis maderaspatanus			*
Cullen leucanthum		*	
Cullen pogonocarpum		*	
Cymbopogon ambiguus			*
**Cynodon dactylon var. dactylon*		*	
Dodonaea coriacea			*
Dysphania rhadinostachya subsp. *rhadinostachya*		*	
Eragrostis cumingii			*
Eragrostis eriopoda			*
Eragrostis pergracilis		*	
Eragrostis tenellula			*
Eriachne aristidea			*

Species Name	DPaW Conservation Code	NatureMap (DPaW 2017a)	Woodman Environmental (2012)
Eriachne mucronata			*
Eriachne obtusa			*
Eulalia aurea			*
Euphorbia alsiniflora			*
Euphorbia australis			*
**Euphorbia hirta*		*	
Euphorbia inappendiculata		*	
Fimbristylis dichotoma			*
Gomphrena affinis			*
Gomphrena affinis subsp. *pilbarensis*		*	
Goodenia forrestii		*	
Goodenia microptera		*	*
Goodenia stobbsiana			*
Gossypium australe		*	
Grevillea pyramidalis subsp. *leucadendron*		*	
Grevillea wickhamii			*
Hakea lorea		*	*
Hibiscus sturtii			*
Hybanthus aurantiacus			*
Indigofera monophylla			*
Isotropis atropurpurea			*
Melaleuca argentea		*	
Mollugo molluginea			*
Paraneurachne muelleri			*
Petalostylis labicheoides			*
Pimelea ammocharis			*
Pluchea dentex			*
Pluchea tetranthera			*
Polycarpaea corymbosa			*
Polymeria ambigua			*
Portulaca conspicua		*	
Portulaca oleracea			*
**Portulaca pilosa*		*	
Pterocaulon sphaeranthoides			*
Ptilotus aervoides			*
Ptilotus astrolasius			*
Ptilotus fusiformis			*
Rhynchosia minima			*
Salsola australis			*
Schizachyrium fragile			*
Senna notabilis			*
Senna venusta		*	

Species Name	DPaW Conservation Code	NatureMap (DPaW 2017a)	Woodman Environmental (2012)
Sida fibulifera			*
Sida sp. Pilbara (A.A. Mitchell PRP 1543)			*
Sida spinosa		*	
Solanum phlomoides		*	
Sporobolus actinocladus			*
Sporobolus australasicus			*
Stemodia grossa			*
Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601)			*
Trichodesma zeylanicum			*
Trigastrotheca molluginea		*	
Triodia brizoides			*
Triodia epactia			*
Triodia lanigera		*	
Triodia schinzii			*
**Vachellia farnesiana*		*	
Yakirra australiensis			*

Appendix C: Results of Protected Matters Search for Area 1 (DoEE 2017a)

Australian Government
Department of the Environment and Energy

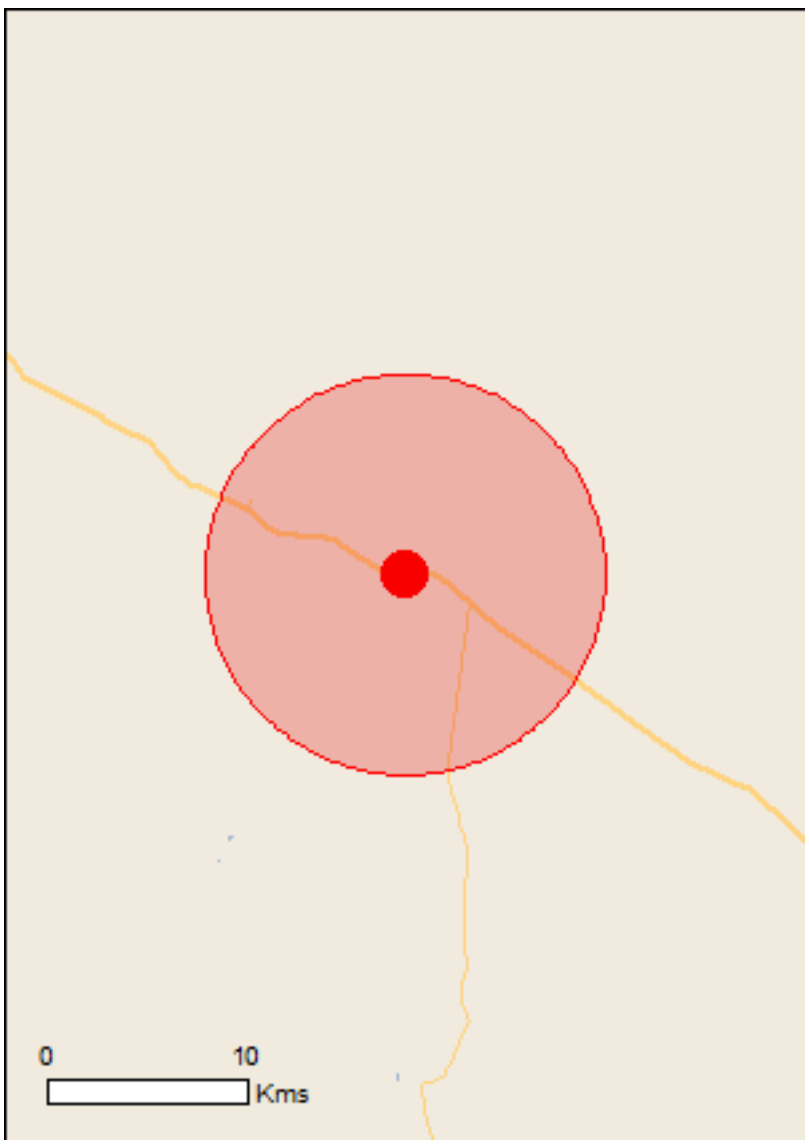
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 24/04/17 15:29:01



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
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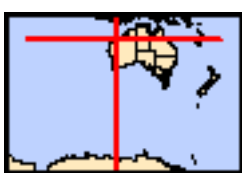

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	9
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	7
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
[Glareola maldivarum](#) Oriental Pratincole [840]		Species or species habitat may occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat may occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat likely to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-20.71 119.32556

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix D: Flora Taxa Known to Occur in Proximity Areas 2 and 3

Species Name	DPaW Conservation Code	NatureMap (DPaW 2017b)	Woodman Environmental (2016a)
Acacia acradenia		*	
Acacia ampliceps		*	
Acacia ancistrocarpa			*
Acacia bivenosa		*	*
Acacia eriopoda		*	
Acacia eriopoda x *trachycarpa*		*	
Acacia inaequilatera			*
Acacia maitlandii			*
Acacia orthocarpa		*	
Acacia ptychophylla		*	
Acacia pyrifolia var. *pyrifolia*			*
Acacia trachycarpa		*	
Acacia trachycarpa x *tumida* var. *pilbarensis*		*	
Acacia sp. Marble Bar (J.G. & M.H. Simmons 3499)	P1	*	
Adriana tomentosa var. *tomentosa*		*	
**Aerva javanica*		*	*
**Aloevera* var. *officinalis*		*	
Alternanthera nodiflora		*	
Ammannia baccifera		*	
Ammannia multiflora		*	
Androcalva luteiflora		*	
**Argemone ochroleuca* subsp. *ochroleuca*		*	
Aristida contorta		*	
Boerhavia gardneri		*	
Bonamia pannosa		*	
Bonamia pilbarensis		*	
Byblis filifolia		*	
Calandrinia stagnensis		*	
**Cenchrus ciliaris*			*
Centipeda minima subsp. *macrocephala*		*	
Cleome uncifera subsp. *uncifera*		*	
Cleome viscosa		*	
Corchorus carnarvonensis		*	
Corchorus parviflorus		*	*
Corchorus tridens		*	
Corymbia hamersleyana			*
Crotalaria cunninghamii		*	
Crotalaria medicaginea var. *neglecta*		*	
Crotalaria ramosissima		*	
Cullen badocanum		*	
Cullen lachnostachys		*	
Cullen leucanthum		*	
Cullen pallidum		*	
Cullen stipulaceum		*	
Cyperus hesperius		*	
Cyperus vaginatus		*	
Dichrostachys spicata			*
Dysphania plantaginella		*	
Enneapogon lindleyanus		*	

Species Name	DPaW Conservation Code	NatureMap (DPaW 2017b)	Woodman Environmental (2016a)
Eremophila sp.		*	
Eriachne mucronata			*
Eucalyptus leucophloia subsp. *leucophloia*		*	
Euphorbia australis		*	
Exocarpos sparteus		*	
Ficus aculeata var. *indecora*		*	*
**Flaveria trinervia*		*	
Gompholobium simplicifolium		*	
Gomphrena cunninghamii		*	
Gomphrena leptophylla	P3	*	
Goodenia microptera		*	
Goodenia stobbsiana		*	
Grevillea pyramidalis subsp. *leucodendrum*			*
Helichrysum luteoalbum		*	
Heliotropium chrysocarpum			*
Heliotropium crispatum		*	
Heliotropium cunninghamii		*	
Heliotropium murinum	P3	*	
Hibiscus austrinus var. *austrinus*		*	
Hibiscus leptocladus		*	
Hibiscus sturtii var. *campylochlamys*			*
Hybanthus aurantiacus		*	
Indigofera colutea		*	
Indigofera hirsuta		*	
Indigofera monophylla			*
Isotropis atropurpurea		*	
Josephinia sp. Mt Edgar Station (N.T. Burbidge 1194)		*	
**Leucaena leucocephala*		*	
Ludwigia perennis		*	
Marsdenia angustata		*	
Marsilea sp.		*	
Melaleuca glomerata		*	
Melaleuca linophylla		*	
Melhania oblongifolia			*
Myriophyllum verrucosum		*	
Najas tenuifolia		*	
Nicotiana occidentalis subsp. *occidentalis*		*	
Paraneurachne muelleri			*
Petalostylis labicheoides		*	
Pluchea ferdinandi-muelleri		*	
Pluchea rubelliflora		*	
Pluchea tetranthera		*	
Polycarpaea longiflora		*	
Polymeria ambigua		*	*
Potamogeton tepperi		*	
Pterocaulon sphacelatum		*	
Ptilotus astrolasius		*	
Ptilotus auriculifolius		*	
Ptilotus incanus		*	
Ptilotus nobilis subsp. *nobilis*		*	
Rhodanthe margarethae		*	

Species Name	DPaW Conservation Code	NatureMap (DPaW 2017b)	Woodman Environmental (2016a)
Rhynchosia minima			*
Schoenoplectus laevis		*	
Sclerolaena costata		*	
Sclerolaena hostilis		*	
Senna artemisioides subsp. *oligophylla*			*
Senna glutinosa x *luerssenii*			*
Senna notabilis		*	
Senna venusta		*	
Sesbania cannabina		*	
Sesbania formosa		*	
Setaria surgens		*	
Sida clementii			*
Solanum cleistogamum			*
Solanum diversiflorum		*	
Solanum horridum		*	
Solanum phlomoides		*	
Sporobolus australasicus			*
Streptoglossa decurrens		*	
Streptoglossa odora		*	
Swainsona decurrens		*	
Swainsona formosa		*	
Swainsona stenodonta		*	
Terminalia circumalata		*	
Trianthema cusackianum		*	
Trianthema oxycalyptrum var. *oxycalyptrum*		*	
Trianthema pilosum		*	
Trigastrotheca molluginea		*	
Triodia epactia		*	*
Triodia longiceps		*	*
Triodia wiseana		*	*
Triumfetta chaetocarpa		*	*
Triumfetta maconochieana		*	
Vallisneria annua		*	
Waltheria virgata		*	
Zaleya galericulata subsp. *galericulata*		*	

Appendix E: Results of Protected Matters Search for Areas 2 and 3 (DoEE 2017b)

Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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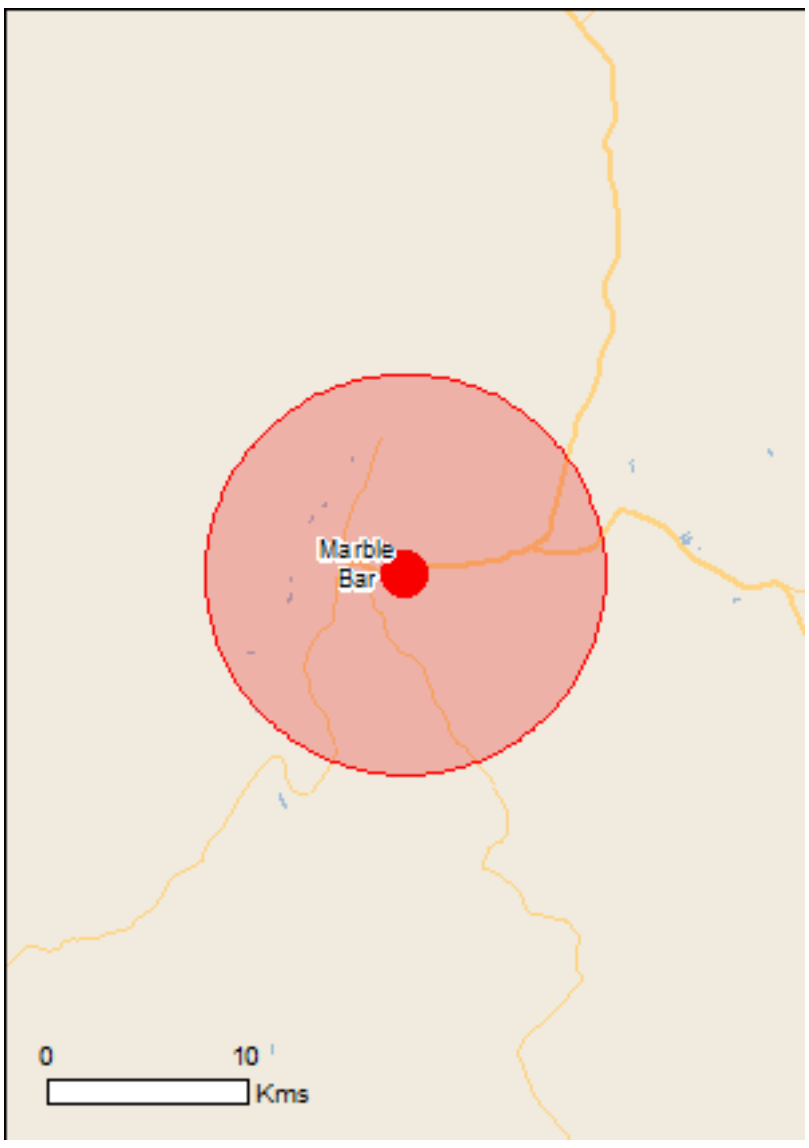
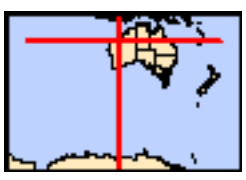


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	8
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	7
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Breeding likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Roosting known to occur within area
Reptiles		
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-21.17472 119.76389

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

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Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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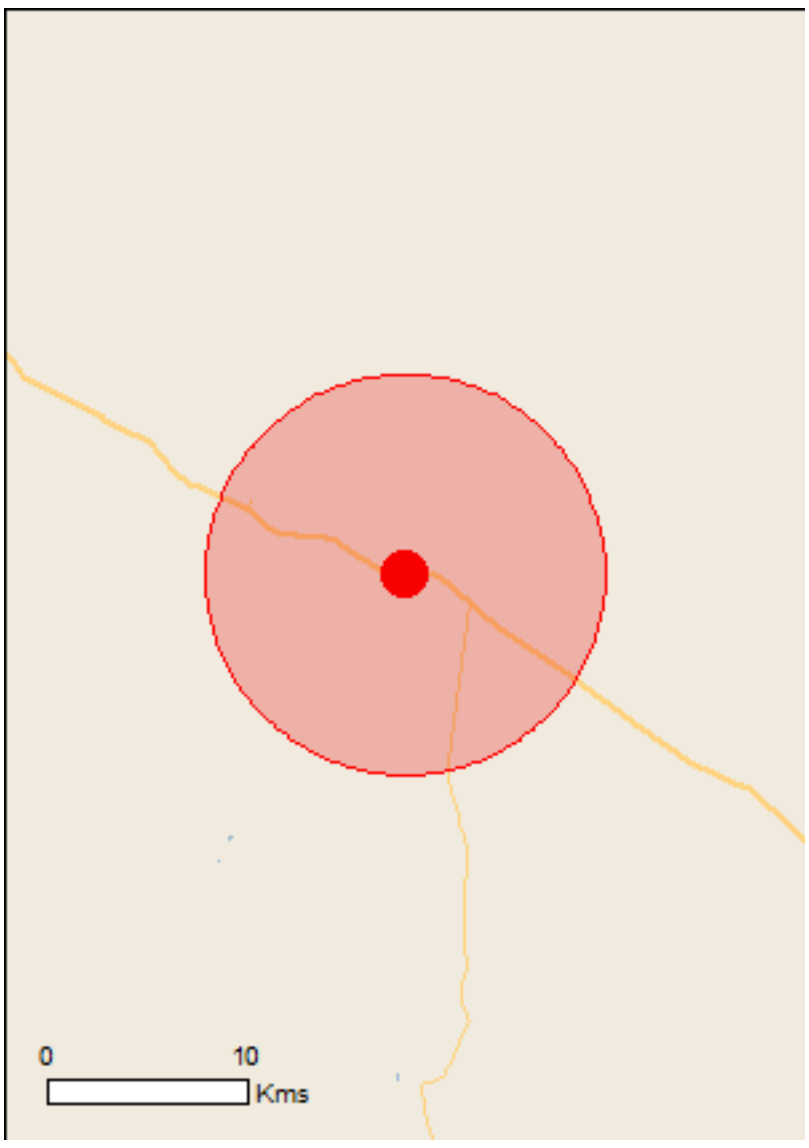
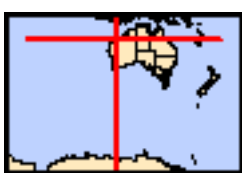


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	9
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

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A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	7
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
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[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
[Glareola maldivarum](#) Oriental Pratincole [840]		Species or species habitat may occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat may occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat likely to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Mammals		
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

Caveat

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The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-20.71 119.32556

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-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
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Appendix F: Vegetation Condition Scale (Environmental Protection Authority and Department of Parks and Wildlife 2016)

Note: Scale used with reference to Eremaean and Northern Botanical Provinces

Vegetation Condition	South West and Interzone Botanical Provinces	Eremaean and Northern Botanical Provinces
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.	
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	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	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	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	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	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	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 composing weed or crop species with isolated native trees and shrubs.	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 G: Flora Taxa Recorded in Areas 1 - 3

Species Name	Area 1	Area 2	Area 3
Abutilon lepidum		*	*
Abutilon otocarpum	*		
Acacia ancistrocarpa			*
Acacia bivenosa		*	*
Acacia eriopoda		*	*
Acacia inaequilatera	*	*	*
Acacia maitlandii		*	*
Acacia ptychophylla		*	
Acacia pyrifolia	*	*	
Acacia stellaticeps	*		
Acacia trachycarpa	*	*	*
**Aerva javanica*	*	*	*
Alysicarpus muelleri	*	*	*
Amaranthus undulatus	*		
Aristida contorta	*		
Boerhavia burbidgeana	*		
Boerhavia coccinea	*	*	
Bonamia aff. *pilbarensis*		*	
Bonamia pilbarensis		*	*
Bulbostylis barbata	*	*	*
**Calotropis procera*	*		
Cassytha filiformis	*	*	
**Cenchrus ciliaris*	*	*	*
**Chloris barbata*	*		
Chloris pumilio	*		
Cleome viscosa	*	*	*
Corchorus ?incanus	*		
Corchorus ?tectus	*		
Corchorus parviflorus	*	*	*
Corymbia hamersleyana		*	
Crotalaria cunninghamii	*		
Crotalaria medicaginea var. *neglecta*		*	*
Cucumis variabilis	*		
Cymbopogon ambiguus	*		
Cyperus vaginatus	*		
Dactyloctenium radulans	*	*	*
Dichrostachys spicata		*	
Dysphania rhadinostachya subsp. *rhadinostachya*		*	
Dysphania sphaerosperma		*	
Enneapogon caerulescens	*	*	*
Eragrostis tenellula	*		
Eriachne aristidea	*		
Eriachne obtusa	*		

Species Name	Area 1	Area 2	Area 3
Eucalyptus camaldulensis subsp. *refulgens*	*		
Eucalyptus victrix	*		
Euphorbia australis var. *subtomentosa*	*	*	
Euphorbia trigonosperma	*	*	*
Euphorbia vaccaria var. *vaccaria*	*	*	*
Evolvulus alsinoides var. *villosicalyx*	*		
**Flaveria trinervia*		*	
Gomphrena cunninghamii		*	*
Goodenia muelleriana		*	*
Goodenia stobbsiana			*
Gossypium australe		*	
Grevillea pyramidalis		*	
Grevillea wickhamii subsp. *hispidula*		*	
Hakea lorea subsp. *lorea*	*		
Hybanthus aurantiacus		*	*
Indigofera colutea	*		*
Indigofera linifolia	*		
Indigofera linnaei	*		
Indigofera monophylla	*	*	*
Ipomoea muelleri	*	*	*
Notoleptopus decaisnei	*	*	
Oldenlandia crouchiana		*	*
Operculina aequisepala		*	
Petalostylis labicheoides	*		
Phyllanthus maderaspatensis	*		
Pluchea ferdinandi-muelleri	*		
Pluchea tetranthera	*		
Polycarpaea corymbosa	*	*	
Polycarpaea holtzei		*	
Polymeria ambigua	*		
Portulaca oleracea	*	*	*
Pterocaulon sphacelatum	*		
Ptilotus auriculifolius		*	*
Ptilotus axillaris	*		
Ptilotus clementii		*	
Ptilotus nobilis		*	*
Ptilotus polystachyus			*
Rhynchosia minima	*	*	*
Salsola australis		*	*
Scaevola amblyanthera var. *centralis*		*	*
Senna ?ferraria	*		
Senna glutinosa subsp. *glutinosa*		*	
Senna notabilis	*	*	*
Senna symonii			*
Sesbania cannabina	*		

Species Name	Area 1	Area 2	Area 3
Sida fibulifera	*		
Sida sp. Pilbara (A.A. Mitchell PRP 1543)	*		
Solanum cleistogamum		*	
Solanum diversiflorum	*		
Sporobolus australasicus	*	*	*
Stemodia grossa		*	*
**Stylosanthes hamata*	*		
Tephrosia supina			*
Trianthema pilosum	*		
Trianthema triquetrum		*	
Tribulus hirsutus	*	*	*
Trigastrotheca molluginea	*	*	*
Triodia angusta	*	*	*
Triodia epactia	*	*	*
Triodia lanigera	*		
Triodia wiseana		*	*
Waltheria indica	*		
Yakirra australiensis	*		*

Appendix H: Total Vascular Plant Taxa Recorded in the Survey Areas

Note: * denotes introduced taxon

FAMILY	TAXON
Aizoaceae	*Trianthema pilosum*
	Trianthema triquetrum
Amaranthaceae	**Aerva javanica*
	Amaranthus undulatus
	Gomphrena cunninghamii
	Ptilotus auriculifolius
	Ptilotus axillaris
	Ptilotus clementii
	Ptilotus nobilis
	Ptilotus polystachyus
Apocynaceae	**Calotropis procera*
Asteraceae	**Flaveria trinervia*
	Pluchea ferdinandi-muelleri
	Pluchea tetranthera
	Pterocaulon sphacelatum
Caryophyllaceae	*Polycarpaea corymbosa*
	Polycarpaea holtzei
Chenopodiaceae	*Dysphania rhadinostachya* subsp. *rhadinostachya*
	Dysphania sphaerosperma
	Salsola australis
Cleomaceae	*Cleome viscosa*
Convolvulaceae	*Bonamia* aff. *pilbarensis*
	Bonamia pilbarensis
	Evolvulus alsinoides var. *villosicalyx*
	Ipomoea muelleri
	Operculina aequisepala
	Polymeria ambigua
Cucurbitaceae	*Cucumis variabilis*
Cyperaceae	*Bulbostylis barbata*
	Cyperus vaginatus
Euphorbiaceae	*Euphorbia australis* var. *subtomentosa*
	Euphorbia trigonosperma
	Euphorbia vaccaria var. *vaccaria*

Fabaceae	*Acacia ancistrocarpa*
	Acacia bivenosa
	Acacia eriopoda
	Acacia inaequilatera
	Acacia maitlandii
	Acacia ptychophylla
	Acacia pyrifolia
	Acacia stellaticeps
	Acacia trachycarpa
	Alysicarpus muelleri
	Crotalaria cunninghamii
	Crotalaria medicaginea var. *neglecta*
	Dichrostachys spicata
	Indigofera colutea
	Indigofera linifolia
	Indigofera linnaei
	Indigofera monophylla
	Petalostylis labicheoides
	Rhynchosia minima
	Senna ?*ferraria*
	Senna glutinosa subsp. *glutinosa*
	Senna notabilis
	Senna symonii
	Sesbania cannabina
	**Stylosanthes hamata*
	Tephrosia supina
Goodeniaceae	*Goodenia muelleriana*
	Goodenia stobbsiana
	Scaevola amblyanthera var. *centralis*
Lauraceae	*Cassytha filiformis*
Malvaceae	*Abutilon lepidum*
	Abutilon otocarpum
	Corchorus ?*incanus*
	Corchorus parviflorus
	Corchorus ?*tectus*
	Gossypium australe
	Sida fibulifera
	Sida sp. Pilbara (A.A. Mitchell PRP 1543)
	Waltheria indica
Molluginaceae	*Trigastrotheca molluginea*

Myrtaceae	*Corymbia hamersleyana*
	Eucalyptus camaldulensis subsp. *refulgens*
	Eucalyptus victrix
Nyctaginaceae	*Boerhavia burbidgeana*
	Boerhavia coccinea
Phyllanthaceae	*Notoleptopus decaisnei*
	Phyllanthus maderaspatensis
Plantaginaceae	*Stemodia grossa*
Poaceae	*Aristida contorta*
	**Cenchrus ciliaris*
	**Chloris barbata*
	Chloris pumilio
	Cymbopogon ambiguus
	Dactyloctenium radulans
	Enneapogon caerulescens
	Eragrostis tenellula
	Eriachne aristidea
	Eriachne obtusa
	Sporobolus australasicus
	Triodia angusta
	Triodia epactia
	Triodia lanigera
	Triodia wiseana
	Yakirra australiensis
Portulacaceae	*Portulaca oleracea*
Proteaceae	*Grevillea pyramidalis*
	Grevillea wickhamii subsp. *hispidula*
	Hakea lorea subsp. *lorea*
Rubiaceae	*Oldenlandia crouchiana*
Solanaceae	*Solanum cleistogamum*
	Solanum diversiflorum
Violaceae	*Hybanthus aurantiacus*
Zygophyllaceae	*Tribulus hirsutus*

Conservation Significant Taxa	= 0
Common Native Taxa	= 100
Introduced Taxa	= 6
Total Taxa	= **106**

740000 750000 760000 770000 780000 790000

7710000 7700000 7690000 7680000 7670000 7660000 7650000

MARBLE BAR RD

Area 1

MARBLE BAR RD

IRONCLAD BATTERY ACCESS RD

LIMESTONE - MARBLE BAR RD

Area 3

Area 2

Marble Bar

Legend

- Places
- Roads
- Survey Area

740000 750000 760000 770000 780000 790000

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N

This map should only be used in conjunction with WEC report Atlas17-12-01.

Location of Survey Areas in Regional Context

Revision: 0 - 12 May 2017 Scale: 1:200,000 (A3)

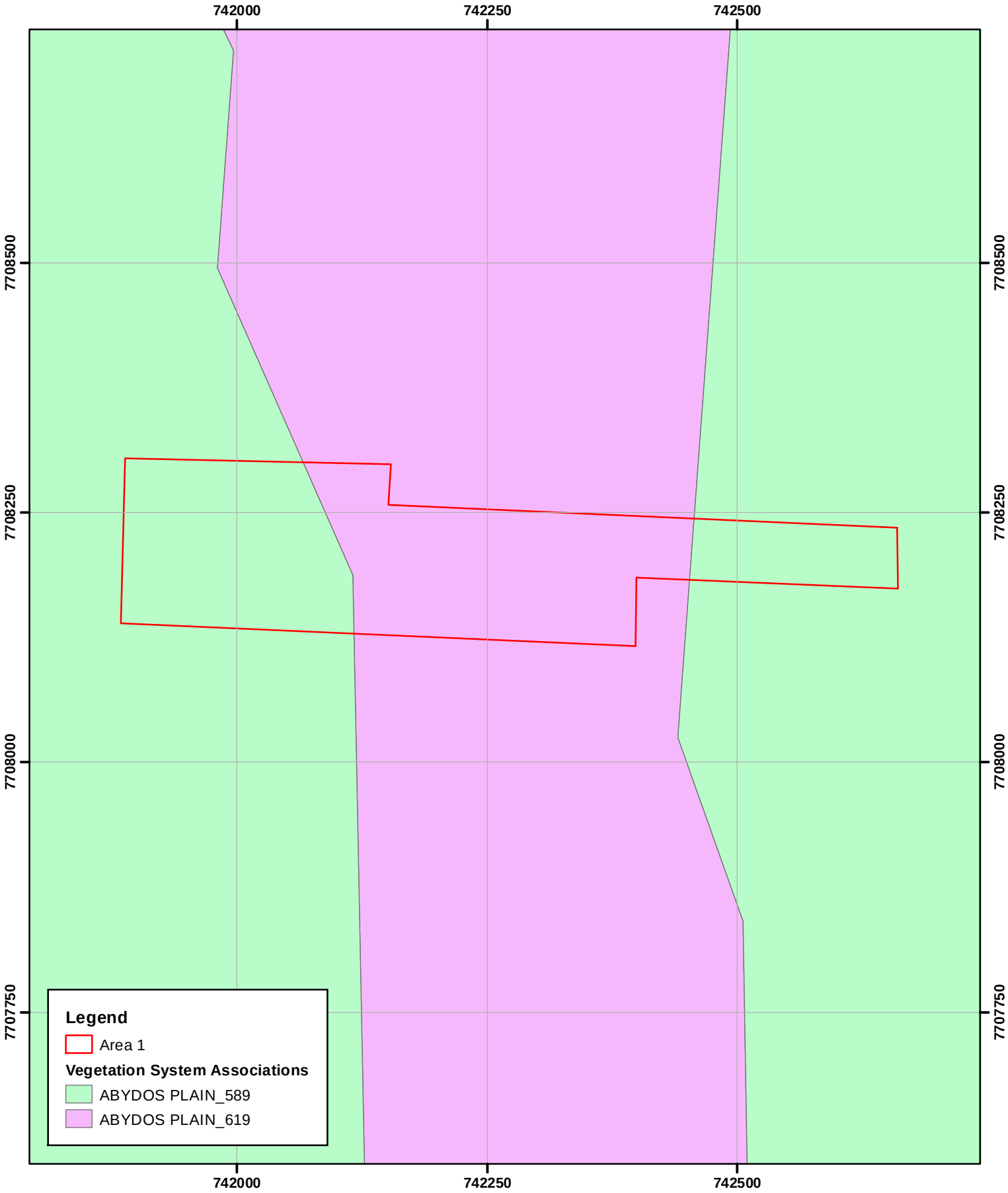
WEC Ref: Atlas17-12-01

Filename: Atlas17-12-01-f01

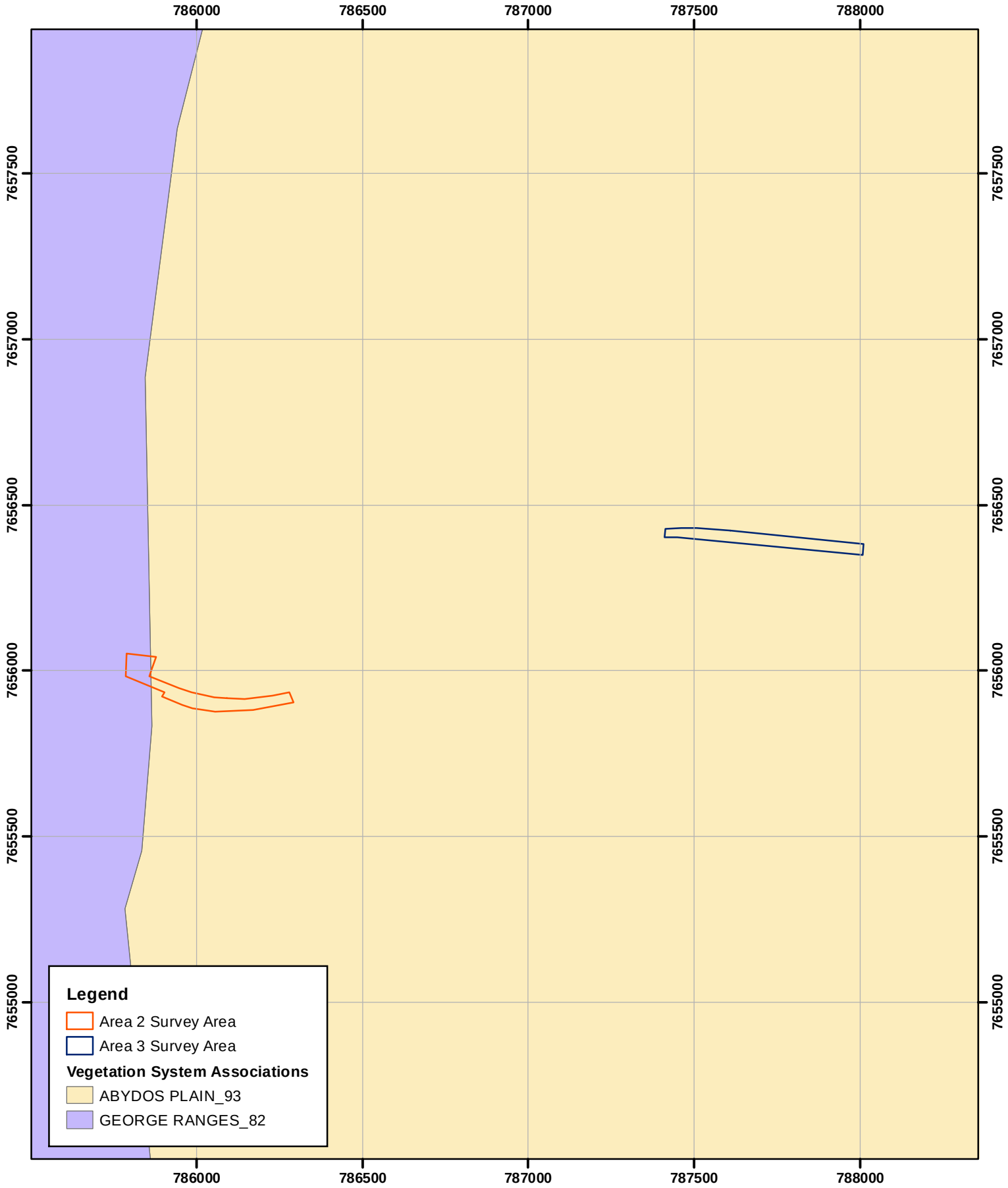
Projection: GDA 1994 MGA Zone 50

Figure

1



Area 1: Vegetation System Associations		
	WEC Ref: Atlas17-12-01	
WOODMAN ENVIRONMENTAL	Filename: Atlas17-12-01-f02a.mxd	**Figure**
	Scale: 1:5,000 (A4)	2a
	Projection: GDA 1994 MGA Zone 50	
This map should only be used in conjunction with WEC report Atlas17-12-01.	Revision: 0 - 12 May 2017	



Area 2 and 3:
Vegetation System Associations

WEC Ref: Atlas17-12-01

WOODMAN ENVIRONMENTAL

Filename: Atlas17-12-01-f02b.mxd

Scale: 1:15,000 (A4)

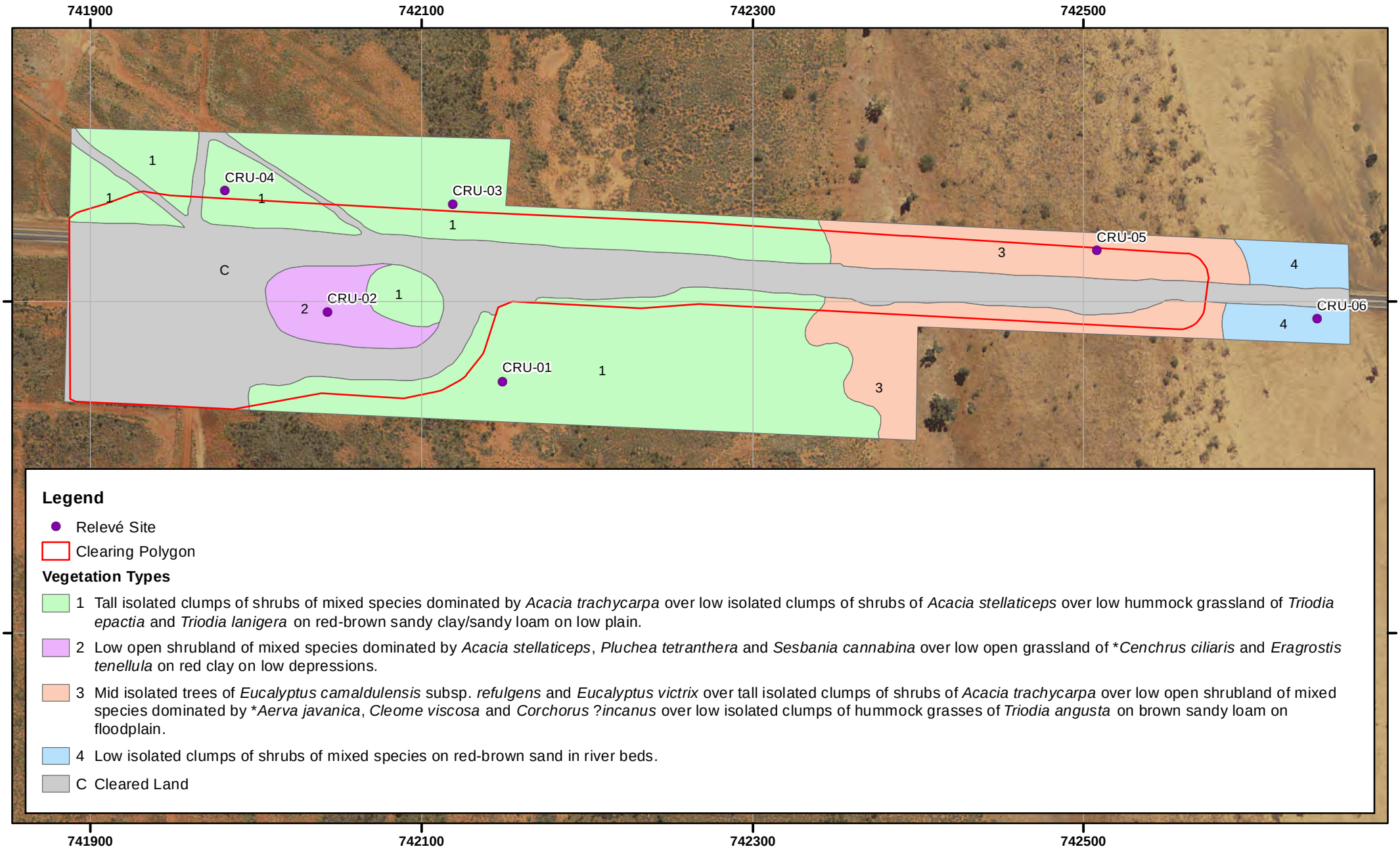
Projection: GDA 1994 MGA Zone 50

Revision: 0 - 12 May 2017

Figure

2b

This map should only be used in conjunction with WEC report Atlas17-12-01.



Legend

- Relevé Site
- Clearing Polygon

Vegetation Types

1 Tall isolated clumps of shrubs of mixed species dominated by *Acacia trachycarpa* over low isolated clumps of shrubs of *Acacia stellaticeps* over low hummock grassland of *Triodia epactia* and *Triodia lanigera* on red-brown sandy clay/sandy loam on low plain.

2 Low open shrubland of mixed species dominated by *Acacia stellaticeps*, *Pluchea tetranthera* and *Sesbania cannabina* over low open grassland of **Cenchrus ciliaris* and *Eragrostis tenellula* on red clay on low depressions.

3 Mid isolated trees of *Eucalyptus camaldulensis* subsp. *refulgens* and *Eucalyptus victrix* over tall isolated clumps of shrubs of *Acacia trachycarpa* over low open shrubland of mixed species dominated by **Aerva javanica*, *Cleome viscosa* and *Corchorus ?incanus* over low isolated clumps of hummock grasses of *Triodia angusta* on brown sandy loam on floodplain.

4 Low isolated clumps of shrubs of mixed species on red-brown sand in river beds.

C Cleared Land

WOODMAN ENVIRONMENTAL

This map should only be used in conjunction with WEC report Atlas17-12-01.

Area 1: Vegetation Map and Relevé Sites

Filename: Atlas17-12-01-f03a.mxd

WEC Ref.: Atlas17-12-01

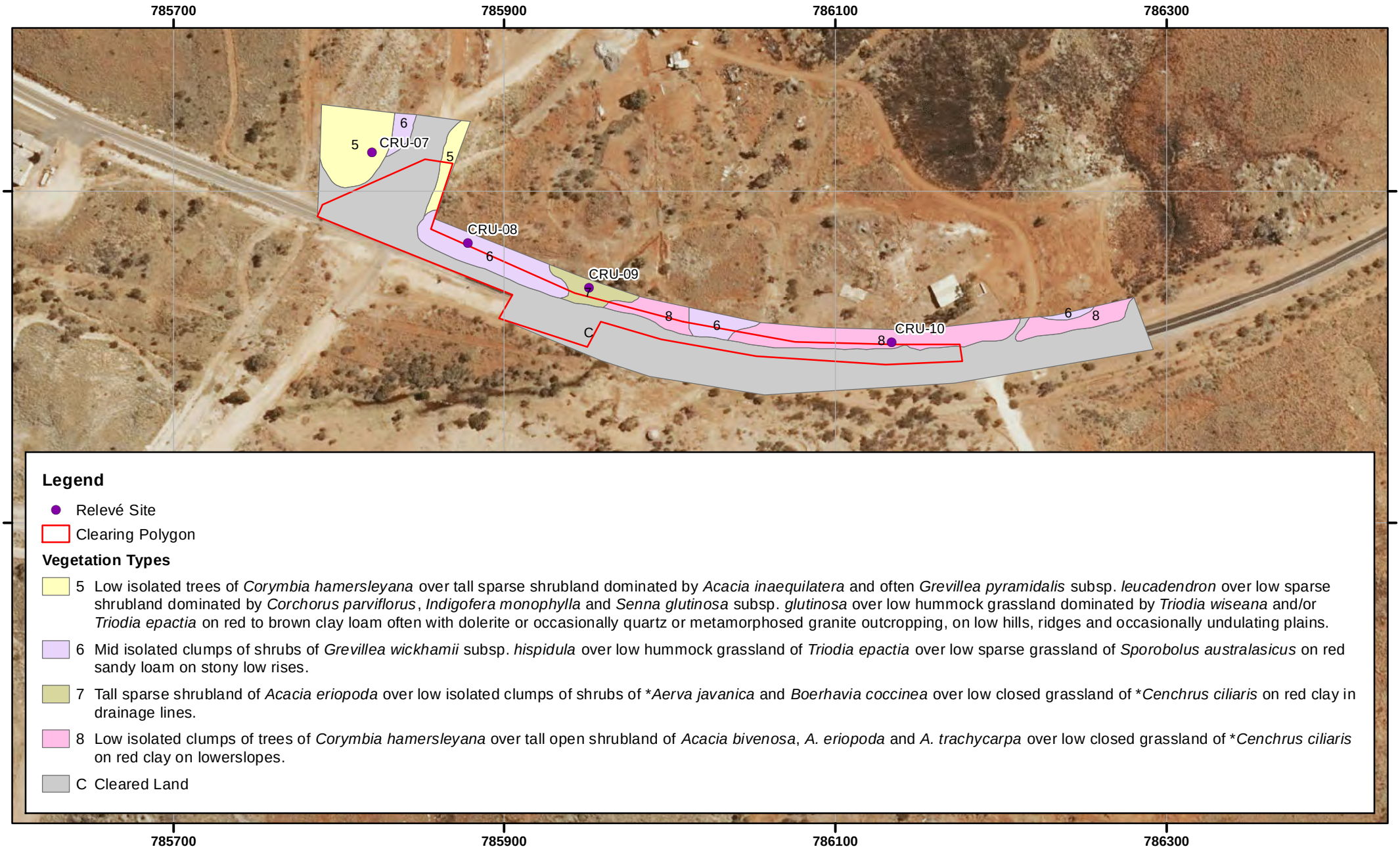
Scale: 3,000 (A4)

Projection: GDA 1994 MGA Zone 50

Revision: 0 - 12 May 2017

Figure

3a



Legend

- Relevé Site
- Clearing Polygon

Vegetation Types

- 5 Low isolated trees of *Corymbia hamersleyana* over tall sparse shrubland dominated by *Acacia inaequilatera* and often *Grevillea pyramidalis* subsp. *leucadendron* over low sparse shrubland dominated by *Corchorus parviflorus*, *Indigofera monophylla* and *Senna glutinosa* subsp. *glutinosa* over low hummock grassland dominated by *Triodia wiseana* and/or *Triodia epactia* on red to brown clay loam often with dolerite or occasionally quartz or metamorphosed granite outcropping, on low hills, ridges and occasionally undulating plains.
- 6 Mid isolated clumps of shrubs of *Grevillea wickhamii* subsp. *hispidula* over low hummock grassland of *Triodia epactia* over low sparse grassland of *Sporobolus australasicus* on red sandy loam on stony low rises.
- 7 Tall sparse shrubland of *Acacia eriopoda* over low isolated clumps of shrubs of **Aerva javanica* and *Boerhavia coccinea* over low closed grassland of **Cenchrus ciliaris* on red clay in drainage lines.
- 8 Low isolated clumps of trees of *Corymbia hamersleyana* over tall open shrubland of *Acacia bivenosa*, *A. eriopoda* and *A. trachycarpa* over low closed grassland of **Cenchrus ciliaris* on red clay on lowerslopes.
- C Cleared Land

WOODMAN ENVIRONMENTAL

This map should only be used in conjunction with WEC report Atlas17-12-01.

Area 2: Vegetation Map and Relevé Sites

Filename: Atlas17-12-01-f03b.mxd

WEC Ref.: Atlas17-12-01

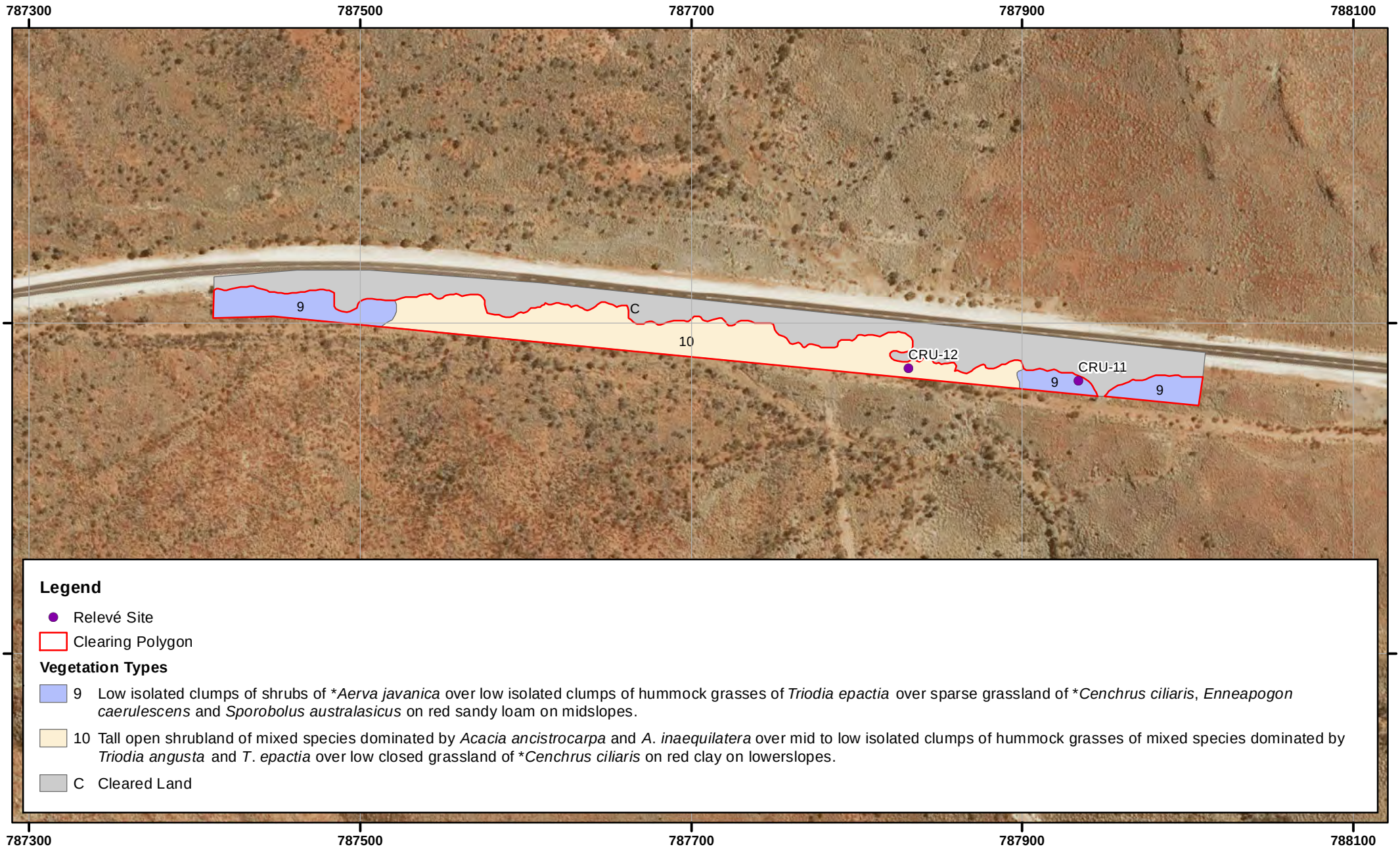
Scale: 3,000 (A4)

Projection: GDA 1994 MGA Zone 50

Revision: 0 - 12 May 2017

Figure

3b



Legend

- Relevé Site
- Clearing Polygon

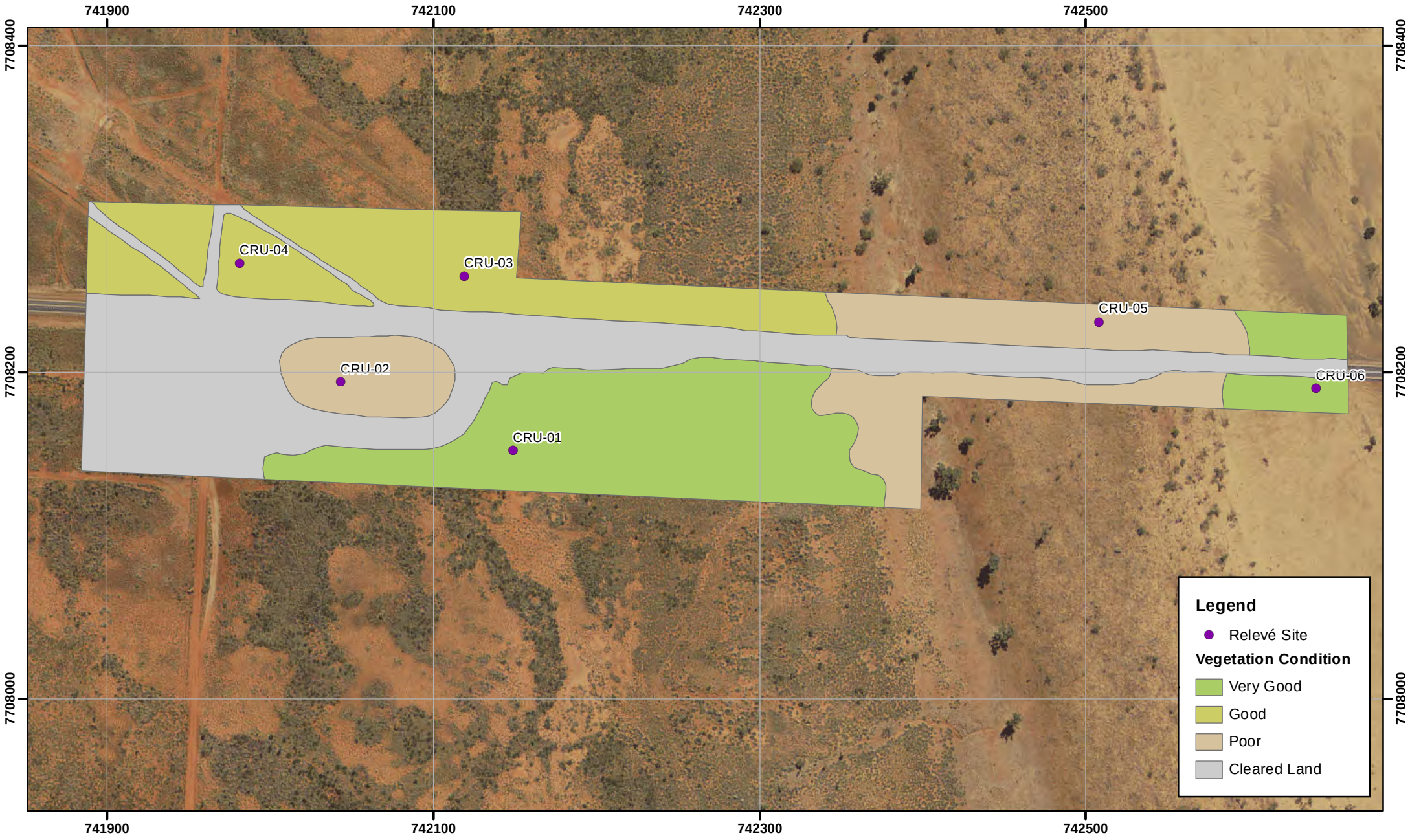
Vegetation Types

- 9 Low isolated clumps of shrubs of **Aerva javanica* over low isolated clumps of hummock grasses of *Triodia epactia* over sparse grassland of **Cenchrus ciliaris*, *Enneapogon caerulescens* and *Sporobolus australasicus* on red sandy loam on midslopes.
- 10 Tall open shrubland of mixed species dominated by *Acacia ancistrocarpa* and *A. inaequilatera* over mid to low isolated clumps of hummock grasses of mixed species dominated by *Triodia angusta* and *T. epactia* over low closed grassland of **Cenchrus ciliaris* on red clay on lowerslopes.
- C Cleared Land

WOODMAN ENVIRONMENTAL

This map should only be used in conjunction with WEC report Atlas17-12-01.

Area 3: Vegetation Map and Relevé Sites	WEC Ref.: Atlas17-12-01	**Figure** 3c
	Scale: 3,000 (A4)	
	Projection: GDA 1994 MGA Zone 50	
Filename: Atlas17-12-01-f03c.mxd	Revision: 0 - 12 May 2017	



WOODMAN ENVIRONMENTAL

This map should only be used in conjunction with WEC report Atlas17-12-01.

Area 1: Condition Map and Relevé Sites

Filename: Atlas17-12-01-f04a.mxd

WEC Ref.: Atlas17-12-01

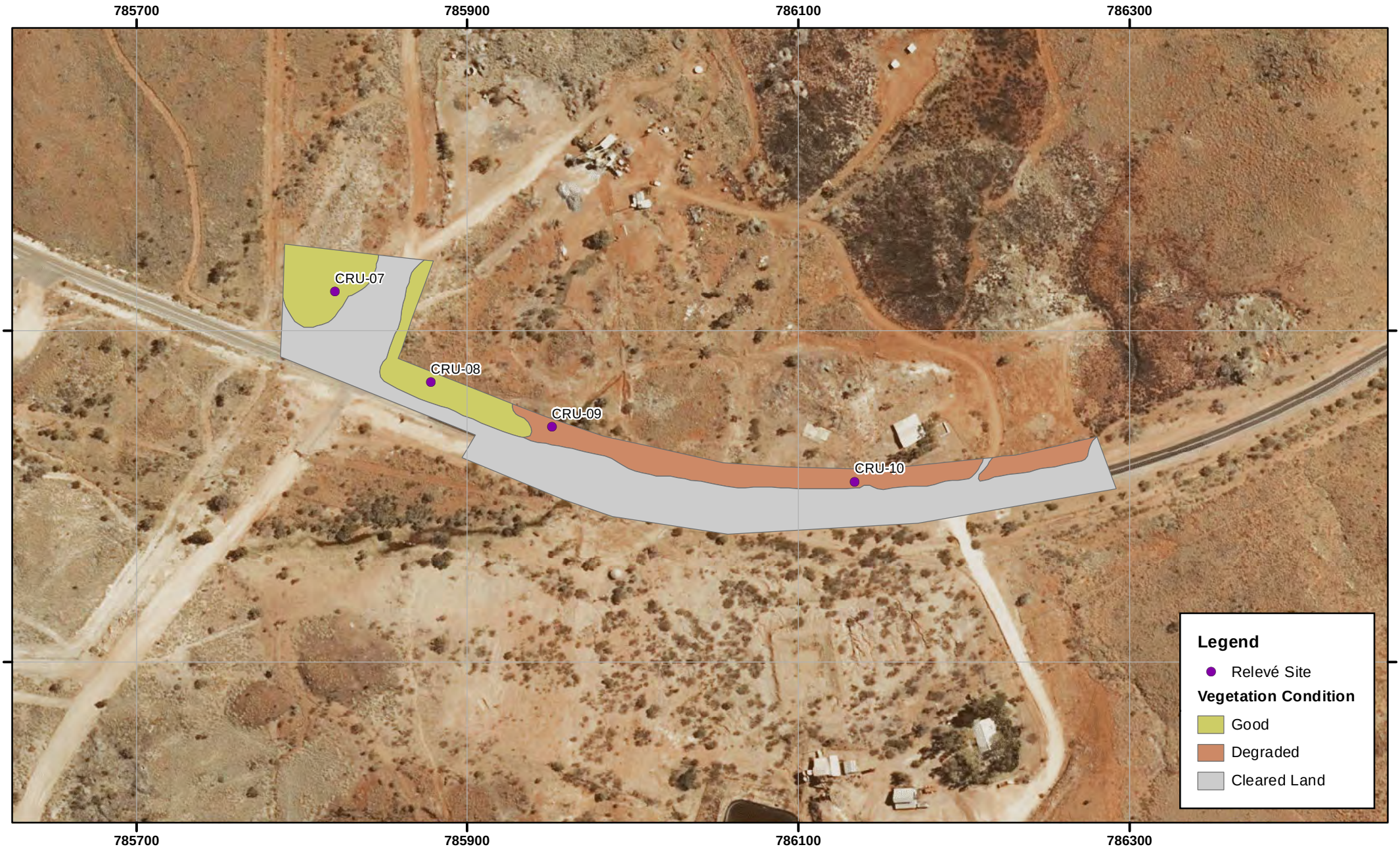
Scale: 3,000 (A4)

Projection: GDA 1994 MGA Zone 50

Revision: 0 - 12 May 2017

Figure

4a



WOODMAN ENVIRONMENTAL

This map should only be used in conjunction with WEC report Atlas17-12-01.

Area 2: Condition Map and Relevé Sites

Filename: Atlas17-12-01-f04b.mxd

WEC Ref.: Atlas17-12-01

Scale: 3,000 (A4)

Projection: GDA 1994 MGA Zone 50

Revision: 0 - 12 May 2017

Figure

4b