Flora & Vegetation Surveys

TELLUS

SANDY RIDGE PROJECT,
EXPLORATION TENEMENT E16/440

LEVEL 1 FLORA AND VEGETATION SURVEY

Prepared for:	Tellus Holdings P/L
Report Date:	7 November 2016
Version:	4
Report No.	2015-205

pgv ENVIRONMENTAL

CONTENTS

LIST OF ATTACHMENTS

Tables

Plates

Figures

Appendices

1 INTRODUCTION

1.1 Background

Tellus Holdings Ltd is proposing to develop a kaolin mine with complimentary storage and waste disposal business on Exploration Tenement E16/440, (the site). The site is located in the Shire of Coolgardie and is approximately 140km north-west of Kalgoorlie and 75km north-east of Koolyanobbing. The site boundary is shown in Figure 1.

The site is zoned Rural/Mining in the Shire of Coolgardie Town Planning Scheme No. 4 (District Scheme) Consolidated Scheme (TPS4) (WAPC, 2003).

1.2 Proposed Mining Operation

The potential development envelope for the proposed mining operation is 875ha (Figure 1). Within the development envelope there is a maximum of approximately 52ha that is proposed to be cleared for the Mine Pit (37.2ha), Mine Infrastructure (11.8ha), Accommodation Camp (2.5ha) and Class II Waste Disposal Facility (0.258ha) (Figure 1).

The end use for the pit, once mining has ceased will be to accommodate a waste storage facility.

1.3 Scope of Works

The report is required to accompany environmental impact assessment documentation and referral documentation for submission to the Environmental Protection Authority (EPA) and Department of the Environment (DoE).

The Level 1 Flora and Vegetation Survey was undertaken in accordance with the Environmental Protection Authority (EPA) Guidance Statement 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004) and included the following:

- Desktop search and review of the Department of Parks and Wildlife's (DPaW) Declared Rare and Priority Flora database and Threatened Ecological Communities database;
- A search of DPaW's NatureMap database for Threatened and Priority Species;
- A search of the Department of Environment's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool to identify any species protected under the EPBC Act;
- Examination of recent aerial photography and contour maps to provisionally identify vegetation types and condition;
- Desktop searches to determine land use, topography, geology and soils and hydrology. These desktop searches will be undertaken using Department of Water (DoW), DPaW and Department of Agriculture and Food Western Australia (DAFWA) databases and online resources;
- Review of other flora and vegetation survey reports in the vicinity of the site.

2 METHODOLOGY

Desktop studies were undertaken to identify potential threatened species and communities that may occur on the site. The searches were for an area with a 20km radius from the approximate centre of the proposed development area. The databases used were:

- DPaW Flora databases (Appendix 1):
  - Threatened Flora Database (DEFL) (Appendix 1);
  - WA Herbarium database (WAHerb); and
  - Declared Rare and Priority Flora Species List (TFPL).
- DPaW Naturemap Database (Appendix 2);
- *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (Appendix 3); and
- DPaW's Threatened (TEC) and Priority Ecological Communities (PEC) database (Appendix 4).

The preferred habitat of each species and community identified on the database searches was examined to determine the likelihood of that species being located on the site and therefore impacted by the proposal.

The vegetation was also examined using photographs as supplied by the proponent and aerial photography (Nearmap, Landgate Map Viewer and Google Earth). The appearance of the vegetation was correlated with the known locations of where the photographs were taken.

3 RESULTS

3.1 Past and Existing Land Use

The site is vegetated with some basic camp infrastructure installed. No other development has been undertaken on the site.

3.2 Topography

The site is undulating between approximately 460m Australian Height Datum (AHD) to 480mAHD. . The site generally slopes up to the north-east.

3.3 Geology and Soils

The site is located on the Yilgarn Craton and based on granitoid rock. The soil system on the site is the Norseman Zone (266) on which the soils are described as calcareous loamy earths, yellow sandy and loamy earths, red loamy earths, red deep sands and salt lake soils (DAFWA, 2015).

The soils on the site are predominately a deep yellow sand over clay as mapped by Landloch (2015). There is an area in the western part of the site being described as red sandy duplex soils (Appendix 5).

3.4 Hydrology

3.4.1 Surface Water

The area lies just to the south of one of the driest regions in Western Australia. The site is in the Raeside-Ponton Catchment Basin in the Salt Lake Sub-catchment (Landgate, 2015). Surface water drains to lower lying areas. There is one lake on the western boundary of the tenement but outside of the proposed development envelope. There are no wetlands or surface expressions of groundwater on the site.

3.4.2 Groundwater

The site is situated in an area that does not have a regional water table as any rain falling in the region is either evaporated, evapo-transpirated or runs off at the surface through minor ephemeral drainage and watercourses. The lack of groundwater is also due to the thickness and permeability of the geologic profile, which includes 2m to 5m of impermeable silcrete and up to 40m of low permeability clay. Monitoring wells in the area have been tested for more than 20 years and have always been dry (Aurora, 2015).

3.5 Bioregional Data

The site is located in the Coolgardie Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion which covers the interzone between mulga and spinifex country, and eucalypt environments (DoE, 2015) over an area of 129,117km^2.

Within the Coolgardie Bioregion, the site is located in the Southern Cross IBRA sub-region that is 60,108 km^2 in size (DoE, 2015). The Southern Cross Sub-Region comprises the western section of the Yilgarn Craton and is comprised of gently undulating uplands dissected by broad valleys with bands of

low greenstone hills (Cowan *et al.* 2001). The granite strata of the Yilgarn Craton are interrupted by parallel intrusions of Archaean Greenstone. Diverse Eucalyptus woodlands (*Eucalyptus salmonophloia, Eucalyptus salubris, Eucalyptus transcontinentalis* and *Eucalyptus longicornis*) are common in the region. Granite basement outcrops occur at mid-levels in the landscape and support swards of *Borya constricta*, with stands of *Acacia acuminata* and *Eucalyptus loxophleba*. Upper levels in the landscape are the eroded remnants of a lateritic duricrust yielding yellow sandplains, gravelly sandplains and laterite breakaways. Mallees (*Eucalyptus leptopoda*, *Eucalyptus platycorys* and *Eucalyptus scyphocalyx*) and scrub-heaths (*Allocasuarina corniculata*, *Callitris preissii*, *Melaleuca uncinata* and *Acacia beauverdiana*) occur on these uplands (Cowan *et al*. 2001).

3.6 Flora Database Searches

There are 50 species that are listed as Endangered, Threatened or Priority that have been located within a 20km radius of the site. The results from the database searches are shown in Table 1.

Table 1: Conservation significant flora known to occur near the site

Species	Common Name	Conservation Status WA	Status Under EPBC Act 1999
Myriophyllum lapidicola	Chiddarcooping Myriophyllum	Threatened	Endangered
Ricinocarpos brevis		Threatened	Endangered
Tetratheca paynterae	Paynter's Tetratheca	Threatened	Endangered
Cryptandra polyclada subsp. *aequabilis*		Priority 1	
Cyathostemon sp. Mt Dimer (C. McChesney TRL 4/72) PN		Priority 1	
Dampiera sp. Jaurdi (D. Angus DA 268) PN		Priority 1	
Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)		Priority 1	
Leucopogon sp. Yellowdine (M. Hislop & F. Hort MH 3194)		Priority 1	
Phebalium appressum		Priority 1	
Tecticornia flabelliformis		Priority 1	
Xanthoparmelia fumigata		Priority 1	
Baeckea sp. Jaurdi Station (L.W. Sage & F. Hort 2229)		Priority 2	
Daviesia sarissa subsp. *redacta*		Priority 2	
Elachanthus pusillus		Priority 2	
Goodenia jaurdiensis		Priority 2	
Hakea rigida		Priority 2	
Hemigenia tenelliflora		Priority 2	
Lissanthe scabra		Priority 2	
Malleostemon sp. Adelong (G.J. Keighery 11825)		Priority 2	
Acacia cylindrica		Priority 3	
Acacia desertorum var. *nudipes*		Priority 3	
Austrostipa blackii	Crested Spear-grass	Priority 3	
Banksia lullfitzii		Priority 3	
Bossiaea celata		Priority 3	

Species	Common Name	Conservation Status WA	Status Under EPBC Act 1999
Calytrix creswellii		Priority 3	
Cyathostemon verrucosus		Priority 3	
Eucalyptus exigua		Priority 3	
Eutaxia actinophylla		Priority 3	
Gastrolobium semiteres		Priority 3	
Gnephosis intonsa	Shaggy Gnephosis	Priority 3	
Gnephosis sp. Norseman (K.R. Newbey 8096)		Priority 3	
Gompholobium cinereum		Priority 3	
Grevillea georgeana		Priority 3	
Hibbertia lepidocalyx subsp. *tuberculata*		Priority 3	
Homalocalyx grandiflorus		Priority 3	
Labichea eremaea		Priority 3	
Lepidium genistoides		Priority 3	
Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)		Priority 3	
Mirbelia ferricola		Priority 3	
Stenanthemum newbeyi		Priority 3	
Stylidium choreanthum	Dancing Triggerplant	Priority 3	
Verticordia mitodes		Priority 3	
Verticordia stenopetala		Priority 3	
Banksia arborea	Yilgarn Dryandra	Priority 4	
Eremophila caerulea subsp. *merrallii*		Priority 4	
Eucalyptus formanii		Priority 4	
Grevillea erectiloba		Priority 4	
Haegiela tatei		Priority 4	
Lepidosperma lyonsii		Priority 4	
Sowerbaea multicaulis	Many Stemmed Lily	Priority 4	

Definitions of the Conservation Codes are in Appendix 6.

Table 2 examines the preferred habitat of each species and the likelihood of the species listed in Table 1 to occur on the site given the characteristics of soil type and landform.

Table 2: Likelihood of identified significant flora species occurring on the site

Scientific Name	Preferred Habitat*	Likelihood of Presence on Site
Myriophyllum lapidicola	Ephemeral pools 20 to 50 cm deep on granite outcrops +	Unlikely
Ricinocarpos brevis	Shallow sandy soils on rocky banded ironstone outcrops ®	Unlikely
Tetratheca paynterae	Rock crevices, in shallow pockets of soil of rich red loam	Unlikely
Cryptandra polyclada subsp. *aequabilis*	Sand	Possible

Scientific Name	Preferred Habitat*	Likelihood of Presence on Site
Cyathostemon sp. Mt Dimer (C. McChesney TRL 4/72) PN	Yellow sand	Possible
Dampiera sp. Jaurdi (D. Angus DA 268) PN	Associated species: *Allocasuarina corniculata, Gyrostemon racemiger, Acacia sibina, Eucalyptus leptopoda subsp. subluta, Calytrix creswellii* ~ Interpreted habitat: Yellow sand, gravel, sandplains	Possible
Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)	Recorded on ridge/slope. Well-drained. Dry brown clay loam over granite. 10-30% of loose rock on soil surface #	Unlikely
Leucopogon sp. Yellowdine (M. Hislop & F. Hort MH 3194)	Recorded on Flat. Moist yellow sand. Burnt >5 years ^	Unlikely
Phebalium appressum	Yellow sandplain	Possible
Tecticornia flabelliformis	Clay. Saline flats.	Highly Unlikely
Xanthoparmelia fumigata	Recorded on ridge with bare to littered, stoney crusted brown clayey sand <	Unlikely
Baeckea sp. Jaurdi Station (L.W. Sage & F. Hort 2229)	Light brown-yellow sand. Sandplains	Possible
Daviesia sarissa subsp. *redacta*	Yellow sand. Plains	Possible
Elachanthus pusillus	Open depression in plain system. Sandy clay loam &	Unlikely
Goodenia jaurdiensis	Red clayey loam with laterite or banded ironstone gravel or quartz pebbles. Low-lying plains and lower slopes	Unlikely
Hakea rigida	Sandy soils, yellow sand	Possible
Hemigenia tenelliflora	Sandplain @	Possible
Lissanthe scabra	Dry, white to orange-brown clay, sandy gravel loams, granite. Breakaways, uplands	Unlikely
Malleostemon sp. Adelong (G.J. Keighery 11825)	Red sand, mid-slope, interdunal$^{\beta}$	Unlikely
Acacia cylindrica	Yellow/brown sand, gravelly soils. Undulating plains, flats	Possible
Acacia desertorum var. *nudipes*	Yellow sand, lateritic gravel. Sandplains, flats.	Possible
Austrostipa blackii	Recorded on a gentle upper North slope. Brown loam over red loam with granite fragments at 5 cm %	Unlikely
Banksia lullfitzii	Yellow sand. Sandplains.	Possible
Bossiaea celata	Deep sand. Open mallee	Possible
Calytrix creswellii	Yellow sand, sometimes with lateritic gravel. Sandplains	Possible
Cyathostemon verrucosus	Flat yellow sandy clay plain >	Unlikely
Eucalyptus exigua	Sandy loam, white sand. Sandplains	Possible
Eutaxia actinophylla	Red-brown clay loam, red clay loam over granite, gravel. Small depressions	Unlikely

Scientific Name	Preferred Habitat*	Likelihood of Presence on Site
Gastrolobium semiteres	Deep yellow sand, yellow to brown sandy clay, gravel, granite. Broad sand dunes, around rocks, undulating plains	Possible
Gnephosis intonsa	Red/brown clay, stony saline loam	Unlikely
Gnephosis sp. Norseman (K.R. Newbey 8096)	Sub-saline loam. Moderately exposed flat	Unlikely
Gompholobium cinereum	Yellow sand, clayey sand, brown loam, sandy gravel, laterite. Well-drained open sites, slopes, plains, roadsides	Possible
Grevillea georgeana	Stony loam/clay. Ironstone hilltops and slopes.	Highly Unlikely
Hibbertia lepidocalyx subsp. *tuberculata*	Yellow-orange loam, ironstone gravel	Possible
Homalocalyx grandiflorus	Yellow sand. Sandplains.	Possible
Labichea eremaea	Red sand.	Unlikely
Lepidium genistoides	Sandy loam	Possible
Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)	Yellow sandplain [=]	Possible
Mirbelia ferricola	Recorded on skeletal red loam soils on massive banded iron formation [“]	Unlikely
Stenanthemum newbeyi	Clayey sand, clay or loam over laterite or ironstone. Hillslopes	Unlikely
Stylidium choreanthum	White/yellow or red sand. Plains	Possible
Verticordia mitodes	Yellow sand. Undulating plains	Possible
Verticordia stenopetala	Yellow sand, sometimes with gravel. Undulating plains.	Possible
Banksia arborea	Stony loam. Ironstone hills.	Unlikely
Eremophila caerulea subsp. *merrallii*	Sand, clay or loam. Undulating plains.	Possible
Eucalyptus formanii	Red sand. Ironstone slopes	Unlikely
Grevillea erectiloba	Gravelly loam. Lateritic ridges	Unlikely
Haegiela tatei	Clay, sandy loam, gypsum. Saline habitats.	Unlikely
Lepidosperma lyonsii	Orange skeletal sandy loam with banded ironstone gravel and rock, well-drained shallow stony loamy with quartz. Gentle hill slopes, upper slopes of large hill.	Unlikely
Sowerbaea multicaulis	Yellow-brown sand.	Possible

* Sourced from Florabase (DPaW, 2015) unless otherwise annotated as per the list below.

[®] DoE SPRAT Database (DoE, 2015)
[+] Patten and Brown (2004)
[~] Western Australian Herbarium (2015a)
[#] Western Australian Herbarium (2015b)
[^] Western Australian Herbarium (2015c)
[<] Western Australian Herbarium (2015d)
[@] Western Australian Herbarium (2015e)
[=] Western Australian Herbarium (2015f)
[β] Western Australian Herbarium (2015g)
[&] State Herbarium of South Australia (2015a)
[%] State Herbarium of South Australia (2015b)
[>] Australian National Herbarium (2015)
[“] National Herbarium of New South Wales (2015)

Of the 50 species identified in the database searches 25 are considered to be possibly present on the site. There are four species ranked as Priority 1, four as Priority 2, fifteen as Priority 3 and two as Priority 4 in the list of species that potentially could occur on the site.

A total of 23 species identified in the database searches are considered to be 'Unlikely' to be present on the site as they are usually located on Banded Ironstone Formations. All three species listed as Threatened under the *Wildlife Conservation Act 1950* (WC Act) and Endangered under the EPBC Act are considered 'Unlikely' to be present on the site. There are two species considered Highly Unlikely to occur on the site

3.7 Vegetation Types

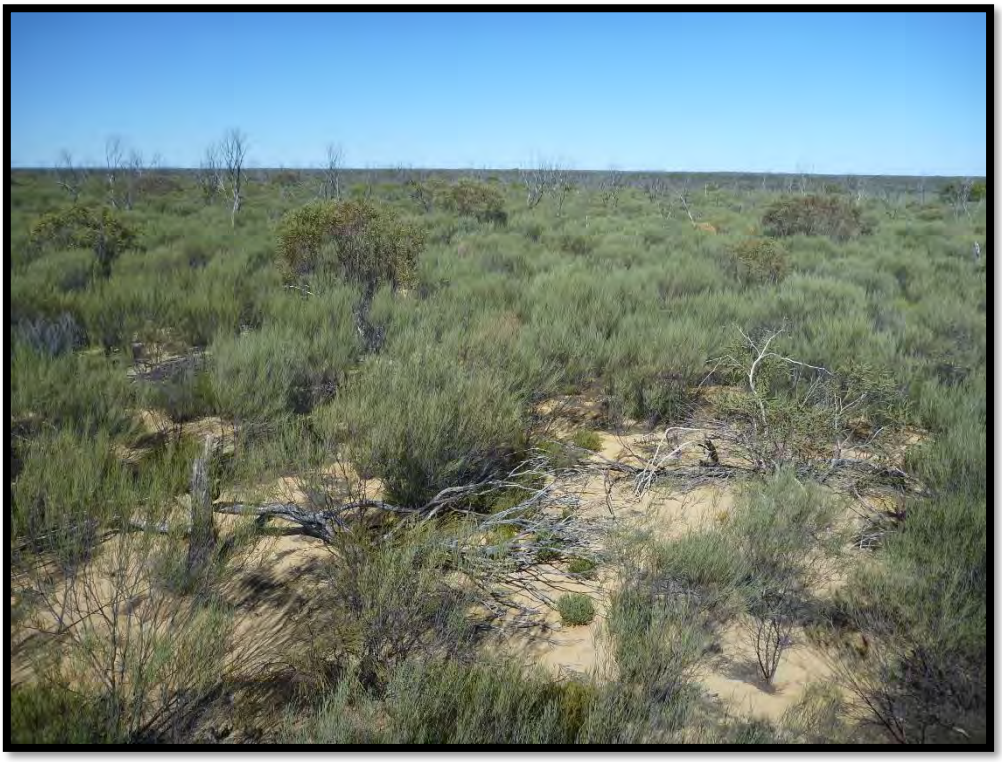
Vegetation as shown in on-site photography and using aerial photographs has been described as three broad vegetation types.

The sandy ridge areas that are in the proposed mine area are dominated by *Triodia* sp. (Spinifex) (Plate 1) and is described as *Triodia* Open Grassland.

Plate 1: *Triodia* Open Grassland

There are large areas on the site that are dominated by *Acacia* and *Allocasuarina* species with scattered Mallee *Eucalyptus* common (Plate 2).

Plate 2: *Acacia /Allocasuarina* Open Heath with Scattered *Eucalyptus* sp.



On the western side of the site there is an area that is most likely to be dominated by Eucalypts. The understorey is likely to consist of *Melaleuca uncinata* and *Allocasuarina* sp. Plate 3 shows the woodland.

Plate 3: Open Woodland

3.8 TEC/PEC Database Searches

A search of DPaW's Threatened (TEC) and Priority Ecological Communities (PEC) database was conducted for the site (02-0415EC) (Appendix 4). Three Priority 1 ecological communities were found to potentially occur within the vicinity of the site as described below:

- Finnerty Range/Mt Dimer/Yendilberin Hills vegetation complexes (banded ironstone formation);
- Hunt Range vegetation complexes (banded ironstone formation); and
- Lake Giles vegetation complexes (banded ironstone formation).

None of these ecological communities are likely to occur on the site. These communities are all associated with a Banded Iron Formation which does not occur on the proposed mining site. The interpreted vegetation types are not representative of these PECs.

3.9 Vegetation Condition

The site has very few disturbance factors. The Mount Walton East Intractable Waste Disposal Facility (IWDP) which is located approximately 7km to the east contains very similar vegetation types to the study area. No weeds were recorded on the IWDF site during a flora survey in 2014 (PGV, 2015). Therefore if the condition of the vegetation were to be assessed according to the system devised by Keighery and described in Bush Forever (Government of Western Australia, 2000) (Table 3) the vegetation would most likely be in Pristine condition over most of the site.

Table 3: Vegetation Condition Rating Scale

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

Source: Government of Western Australia, 2000.

3.10 Conservation Significance of Flora and Vegetation

Flora

A total of 25 Priority species were determined from the desktop database search as possibly occurring on the site due to the sandy soil types in which they occur. None of these species are listed as Threatened under the State *Wildlife Conservation Act, 1950* (WC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act).

Vegetation

The vegetation on the site belongs to the Southern Cross sub-region that is 60,108 km^2in size (DoE, 2015) and at this stage is largely undisturbed. Therefore the vegetation is not bio-regionally significant.

The vegetation is also highly unlikely to be representative of any Threatened Ecological Community listed under the WC Act or the EPBC Act or any Priority Ecological Community.

Linkages

The area surrounding the site is vegetated and the proposed mining and waste storage operations will result in a small area of localised clearing which will not impact on the linkage of the surrounding vegetation.

4 SUMMARY AND CONCLUSIONS

This Level 1 Flora and Vegetation Survey concludes the flora and vegetation on the proposed development envelope of the Sandy Ridge Kaolin Mine Project has the following characteristics:

- The vegetation is highly unlikely to have been disturbed in the past.
- The site is located within the Coolgardie IBRA Bioregion, in the Southern Cross sub-region;
- A total of 50 species were identified on the database searches that are known to occur within a 20km radius of the site. Of these 25 species were considered to potentially occur on the site given the soil and landform characteristics;
- None of the species identified as possibly present on the site identified are listed as Threatened under the State *Wildlife Conservation Act, 1950* (WC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act);
- Based on inference from site photographs, soil type and aerial photography three broad vegetation types occur on the site:
  - *Triodia* Open Grassland;
  - *Acacia / Allocasuarina* Open Heath with Scattered *Eucalyptus* sp; and
  - *Eucalyptus* Low Woodland over *Melaleuca uncinata / Allocasuarina* sp Open Shrubland
- Three PECs were identified in the database searches but are highly unlikely to be present on the site as they are associated with the Banded Ironstone Formation. No TECs were identified as occurring in the region as likely to occur on the site.
- Based on studies undertaken at Mount Walton East Intractable Waste Disposal Facility and photographs of the site most of the vegetation is expected to be in Pristine Condition due to the lack of disturbance.
- The clearing of the vegetation for the proposed mine and infrastructure will not impact on any regional ecological linkage.
- A targeted survey for the priority species possibly present in the development envelope should be undertaken prior to the commencement of development to determine the presence and abundance of any conservation significant species.

5 REFERENCES

Aurora Environmental (2015) Sandy Ridge Project EPBC Referral http://www.environment.gov.au/cgi-bin/epbc/epbc_ap.pl?name=current_referral_detail&proposal_id=7478 Accessed June, 2015 Perth Western Australia

Australian National Herbarium (2015) Australian Virtual Herbarium Record on The Atlas of Living Australian Accessed April, 2015 http://biocache.ala.org.au/occurrences/98cebeab-9829-4b7b-b556-f9a54abc9c5f Australia

Cowan, M., Graham, G., and McKenzie, N. (2001) Coolgardie 2 (COO2 - Southern Cross subregion). *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002*. Report for the Department of Parks and Wildlife Perth Western Australia

Department of Agriculture and Food Western Australia (DAFWA) (2015) Natural Resource Management Shared Land Information Platform. Accessed April 2015 http://maps.agric.wa.gov.au/nrminfo/framesetup.asp Government of Western Australia, Perth.

Department of Parks and Wildlife (DPaW) (2015) The Western Australian Herbarium. *FloraBase*. Accessed November 2014 http://florabase.dpaw.wa.gov.au/ Government of Western Australia, Perth.

Department of the Environment (DoE) (2015) Species Profile and Threats (SPRAT) Database. Accessed April 2015 http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl Commonwealth of Australia.

Department of the Environment (DoE) (2015) Coolgardie Bioregion Accessed April, 2015 http://www.environment.gov.au/system/files/resources/a8015c25-4aa2-4833-ad9c-e98d09e2ab52/files/bioregion-coolgardie.pdf Australia

Environmental Protection Authority (EPA) (2004) *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* - Guidance Statement No. 51. Perth, Western Australia.

Environmental Protection Authority (EPA) (2008) *Environmental Guidance for Planning and Development* – Guidance Statement No. 33. Perth, Western Australia.

Government of Western Australia (2000) Bush Forever - *Keeping the Bush in the City. Volume 2: Directory of Bush Forever Sites*. Perth, Western Australia.

Landgate (2014b) WA Atlas Shared Land Information Platform. Accessed November 2014 https://www2.landgate.wa.gov.au/bmvf/app/waatlas/ Government of Western Australia, Perth.

Landloch Pty Ltd (2015) Sandy Ridge Soil Assessment Draft Report prepared for Tellus Holdings. Project Number: 2216.15a Perth, Western Australia

National Herbarium of New South Wales (2015) Australian Virtual Herbarium Record on The Atlas of Living Australian Accessed April 2015 http://biocache.ala.org.au/occurrences/d7b97fb1-b17c-4280-8c01-2f0629b6b179 Australia

Patten, J. and Brown, A (2004) *Interim Recovery Plan No. 187 Chiddarcooping Myriophyllum (Myriophyllum lapidicola) Interim Recovery Plan 2004-2009* For the Department of Conservation and Land Management Perth Western Australia

PGV Environmental (2015) Intractable Waste Disposal Facility Mt Walton East Flora and Vegetation Survey of Future Operations Area and Rehabilitation Monitoring. Report No. 2015-199. Perth, Western Australia

State Herbarium of South Australia (2015a) Australian Virtual Herbarium Record on The Atlas of Living Australian Accessed April, 2015 http://biocache.ala.org.au/occurrences/7f6b124f-c781-4770-bd57-bb3f720d3c6f Australia

State Herbarium of South Australia (2015b) Australian Virtual Herbarium Record on The Atlas of Living Australian Accessed April, http://biocache.ala.org.au/occurrences/1fd8840f-778b-424b-8b71-faa03f9f97d1 Australia

Western Australian Herbarium (2015a) Australian Virtual Herbarium Record on The Atlas of Living Australian Accessed April, 2015 http://biocache.ala.org.au/occurrences/c53b4128-f1e0-46df-aa2c-74d55c144ce6 Australia

Western Australian Herbarium (2015b) Australian Virtual Herbarium Record on The Atlas of Living Australian Accessed April, 2015 http://biocache.ala.org.au/occurrences/5b3cd77b-ba28-4675-aec6-83e31577682e Australia

Western Australian Herbarium (2015c) Australian Virtual Herbarium Record on The Atlas of Living Australian Accessed April, 2015 http://biocache.ala.org.au/occurrences/1dad94b3-d2c4-4fe7-ad11-a608f22e648a Australia

Western Australian Herbarium (2015d) Australian Virtual Herbarium Record on The Atlas of Living Australian Accessed April, 2015 http://biocache.ala.org.au/occurrences/e7f1a403-d0e8-461c-b608-3cd7c2eb7f3d Australia

Western Australian Herbarium (2015e) Holotype of *Hemigenia tenelliflora* G.R.Guerin [family LAMIACEAE] on JStor Global Plants Accessed April, 2015 http://plants.jstor.org/stable/history/10.5555/al.ap.specimen.perth06202969 United States of America

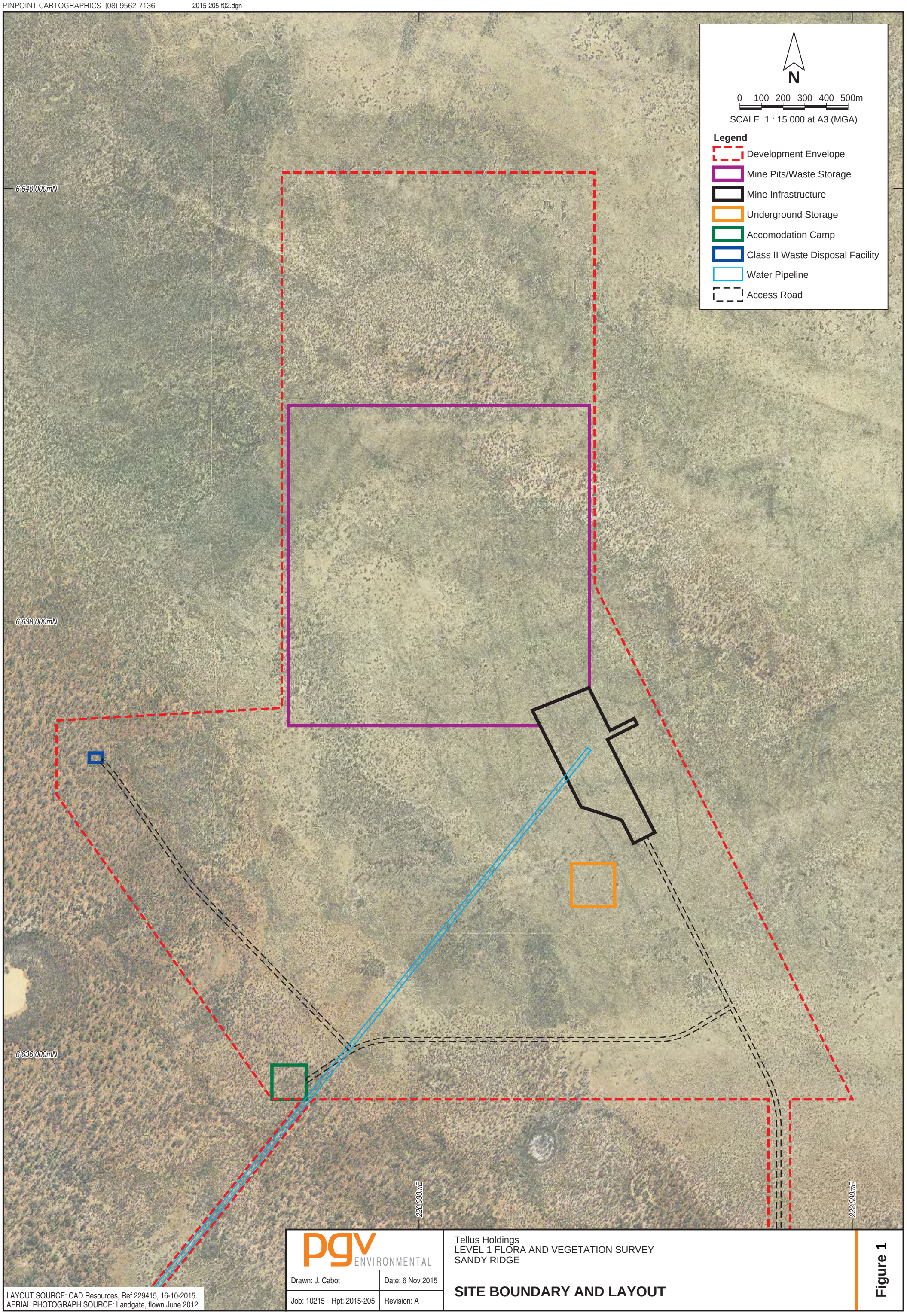
Western Australian Herbarium (2015f) Australian Virtual Herbarium Record on The Atlas of Living Australian Accessed April 2015, http://biocache.ala.org.au/occurrences/b9a46603-f0be-459a-bedd-ca76e7030d24 Australia

Western Australian Herbarium (2015g) Australian Virtual Herbarium Record on The Atlas of Living Australian Accessed April 2015, http://biocache.ala.org.au/occurrences/813225fa-74e1-4aa8-b94a-dfc7c8175241 Australia

Western Australian Planning Commission (WAPC) (2003) Shire of Coolgardie Town Planning Scheme No. 4 (District Scheme) Consolidated Scheme Government of Western Australia, Perth

FIGURES

PINPOINT CARTOGRAPHICS (08) 9562 7136 2015-205-f02.dgn



LAYOUT SOURCE: CAD Resources, Ref 229415, 16-10-2015.
AERIAL PHOTOGRAPH SOURCE: Landgate, flown June 2012.

pgv ENVIRONMENTAL

Tellus Holdings
LEVEL 1 FLORA AND VEGETATION SURVEY
SANDY RIDGE

Drawn: J. Cabot | Date: 6 Nov 2015

Job: 10215 Rpt: 2015-205 | Revision: A

SITE BOUNDARY AND LAYOUT

Figure 1

APPENDIX 1

DPaW Flora Database Searches

FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Des	Site_Descr	Vegetation	Frequency	Notes	Locality
	8284873	16621	Phebalium appressum	1	Shrub, 40 cm tall. Mostly with flower buds, some plants with few white flowers.	Flat. Dry yellow sand. Fire ca 5 years ago.	Open Eucalyptus rigidula mallee over Acacia nigripilosa subsp. nigripilosa, Acacia inaequiloba and mixed shrubs over Triodia.	5 plants seen locally.		Adjacent to the Mount Dimer - Mount Walton Waste Facility track ca 18 km ESE of Mount Dimer
	5642701	5448	Calytrix creswellii	3	Low shrub 20-60 cm.	Yellow-brown sand. Slope.	Allocasuarina/Acacia resinomarginea shrubland-Eucalyptus woodland. Associated species: Acacia resinomarginea, Allocasuarina acutivalvis, A. corniculata, Eucalyptus loxophleba, Euc. transcontinentalis.			Mount Walton Intractable Waste Disposal compound, 100 km NE Koolyanobbing,
	1153536	2009	Grevillea georgeana	3		Banded ironstone.				Mount Dimer, Jaurdi Station
	1362704	2009	Grevillea georgeana	3	Shrub to 2 m high.	On Banded Ironstone.	With Acacia quadrimarginea.			Jaurdi Station, Mount Walton
	6296467	2009	Grevillea georgeana	3	Perennial shrub ca 1.5 m high. Red flowers.	Hill. Crest and slopes of rocky ridge. Skeletal red soil. Banded chert and laterite. Banded ironstone.	Low Woodland B. Acacia/Grevillea thicket with scattered trees and shrubs over shrubs and herbs.	frequent.		Site J1-7. Banded ironstone hill, ca 1 km E on Mount Dimer mine access road from the Jaurdi - Mount Manning track, Jaurdi Station
	7683170	2009	Grevillea georgeana	3		Rocky outcrop. Silica rich. Dry, light brown loam over sheet boulder.	Open Tall Shrubland over moderate Baeckea elderiana dominated low shrubland over rocky outcrops and stony soils. Acacia acuminata, Allocasuarina acutivalvis subsp. acutivalvis, Melaleuca hamata, Baeckea elderiana, Acacia acuminata, Leucopogon breviflorus			Mt Finnerty Project Area, 70 km N of Southern Cross
	8088683	2009	Grevillea georgeana	3	180 cm high.	Flat. Red-brown clay. Low disturbance. Fire > 10 years prior to collection.	Malleostemon roseus, Grevillea zygoloba, Leucopogon breviflorus, Phebalium canaliculatum, Prostanthera grylloana.			Bungalbin - Kooyanobbing
	8589801	2009	Grevillea georgeana	3	Shrub.	Low slope. Ironstone gravel on red sand.	Acacia burkittii, Prostanthera grylloeana, Grevillea obliquistigma, Santalum spicatum, Prostanthera campbellii, Eremophila granitica.			S of Mount Manning, 105 km NE of Southern Cross
	8600694	2009	Grevillea georgeana	3	Perennial shrub to 80 cm high.	Mid slope in mining lease site. Red clay.	Mixed shrubs with low emergent eucalypts. Associated species: Eucalyptus clelandii, Scaevola spinescens, Allocasuarina campestris, Eremophila oppositifolia subsp. angustifolia, Olearia muelleri, Melaleuca leiocarpa.		Reproductive stage: fruit.	Bungalbin, c. 105 km NE of Southern Cross
	8629625	2009	Grevillea georgeana	3	Shrub 2-3 m. Flowering.	Banded Iron formation over BIF.	Eremophila, Banksia arborea.			59 km N-E of Taipan Hill

FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Des	Site_Descr	Vegetation	Frequency	Notes	Locality
	8284946	3666	Labichea eremaea	3	Shrub, 80 cm tall. Yellow flowers.	Undulating sandplain. Dry yellow sand.	Open mallee of Eucalyptus rigidula over Acacia shrubs over Triodia.	1 plant seen.		Adjacent to the Mount Dimer - Mount Walton Waste Facility track ca 21 km ESE of Mount Dimer
	8285055	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)	3	Small shrub, 30 cm tall. Red/pink flowers.	Flat. Dry yellow orange sand. Fire: ca 5 years ago.	Open shrubland of Acacia resinimarginea with Acacia sibina.	ca 70 plants locally in 50 x 50 m.		Ca 14.5 km S-E of Mount Dimer. Ca 12.7 km N of Mount Walton. Just S of E-W track that runs from old Mount Dimer mine site to the Mount Walton track
	1102257	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)	3						16 km NE of Yendilberin Hills (NE of Southern Cross)
	1102265	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)	3						16 km NE of Yendilberin Hills (NE of Southern Cross).
	5645166	6121	Verticordia stenopetala	3	Low shrub.	Yellow sand-gravel over laterite. Slope.	Sparse Eucalyptus transcontinentalis over moderately dense Acacia signata. Associated species: Acacia resinomarginea, Phebalium canaliculatum, Grevillea paradoxa, Astroloma microphyllum, Thryptomene urceolaris.			Mount Walton Retractable Waste Storage Facility, 100 km NE Koolyanobbing,
	6163092	32685	Banksia arborea	4	Tree. Ca 3 m high. Yellow flowers. Fruiting.	Hill. Crest and slopes of rocky ridge. Skeletal red soil. Banded chert and laterite. Banded ironstone.	Low Woodland B. Acacia/Grevillea thicket with scattered trees and shrubs over shrubs and herbs.	locally abundant.		Site J1-7. Banded ironstone hill, ca 1 km E on Mount Dimer mine access road from the Jaurdi - Mount Manning track, Jaurdi Station
	1804243	32685	Banksia arborea	4	Tree, to 3 m, flowers yellow.	Ironstone ridges.		common.		Mount Dimer, S end Hunt Ranges
	6163106	32685	Banksia arborea	4	Tree. Ca 3.5 m high. Yellow flowers. Fruiting.	Hill. Crest and slopes of rocky ridge. Skeletal red soil. Banded chert and laterite. Banded ironstone.	Low Woodland B. Acacia/Grevillea thicket with scattered trees and shrubs over shrubs and herbs.	locally abundant.		Site J1-7. Banded ironstone hill, ca 1 km E on Mount Dimer mine access road from the Jaurdi - Mount Manning track, Jaurdi Station
	8629528	32685	Banksia arborea	4	Tree. Flowering, fruiting, covered in black scale (common at this locality).	Banded Iron formation over BIF.	Grevillea georgeana, Eremophila.			59 km N-E of Taipan Hill

FID_	PopId	Nameid	Taxon	ConsStatus	WARank	PopNumber	SubPop Code	PopStatus	Location	District	Vesting	Purpose 1	Purpose 2	CountDate	Method	MatureCoun	LiveTotal	inFlower
	96399	32685	Banksia arborea	4		9			UCL, Lot 131. Ex Jaurdi Station. Exploration Lease E77/1418. Site J1-7, Banded Ironstone hill ca. 1km E on Mt Dimer mine access Rd from the Jaurdi-Mt Manning Track. [Ca. 5.6km S of Mt Dimer].	KALGOORLIE	NON	UCL	EPL	5/10/1999 0:00		0	0	N
	96359	32685	Banksia arborea	4		14			UCL, Lot 131, Exploration Lease. Ex Jaurdi Station. Mount Dimer, S end of Hunt Range.	KALGOORLIE	NON	UCL	EXL	13/05/1978 0:00		0	0	N
	87651	5448	Calytrix creswellii	3		8			Intractable Waste Storage Site (CR42001), Lot 73. Mt Walton Intractable Waste Disposal compound, 100km NE of Koolyanobbing. [Ca. 49km E of Bungalbin Hill].	KALGOORLIE	RDL	OTH		20/11/1996 0:00		0	0	N
	87640	5448	Calytrix creswellii	3		10			UCL. Ca. 14km SE of Mt Walton Waste Facility. Ca. 18km ENE of Mt Walton, ca. 80km NE of Koolyanobbing.	KALGOORLIE	NON	UCL		23/09/2010 0:00	ACT_IND	348	348	N
	87642	5448	Calytrix creswellii	3		12			UCL. Ca. 11.5km S of Mt Walton Waste Disposal Facility, east of Yendilberin Hills. Ca. 11.5km ENE of Mt Walton. Near north-south track that runs south from the Mt Walton Waste Disposal (not the main access track).	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	60	60	N
	87643	5448	Calytrix creswellii	3		13			UCL. Ca. 13.5km S of Mt Walton Waste Disposal Facility, east of Yendilberin Hills. Ca. 10.5km ENE of Mt Walton. Near north-south track that runs south from the Mt Walton Waste Disposal (not the main access track).	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	21	21	N
	85544	2009	Grevillea georgeana	3		17			UCL, Lot 131. Ex-Jaurdi Station. Exploration Lease E77/1418. 5km SW of Mt Dimer. [Just E of Taipan Mine].	KALGOORLIE	NON	UCL	EPL	4/10/1991 0:00	ESTMT	70	70	Y
	85545	2009	Grevillea georgeana	3		18			UCL, Lot 131. Ex-Jaurdi Station. Exploration Lease E77/1418. On Hill NMF 398 in Yendilberin Hills. Site J1-7, banded ironstone hill, ca. 1km E on Mt Dimer Mine Access Rd from the Jaurdi-Mt Manning track.	KALGOORLIE	NON	UCL	EPL	5/10/1999 0:00		0	0	Y
	85546	2009	Grevillea georgeana	3		19			UCL, Lot 131. Ex-jaurdi Station. Exploration Lease E77/1418. Ca. 105km NE of Southern Cross. [Ca. 2.7km S of Mt Dimer]. [Ca. 26.8km E of Bungalbin Hill].	KALGOORLIE	NON	UCL	EPL	22/08/2007 0:00		0	0	N
	85548	2009	Grevillea georgeana	3		20			UCL, Lot 131. Ex-jaurdi Station. Exploration Lease E77/1418. Mount Dimer.	KALGOORLIE	NON	UCL	EPL	7/11/1989 0:00		0	0	N
	85549	2009	Grevillea georgeana	3		21			UCL, Lot 131. Ex-jaurdi Station. Mining Lease M77/1244. Carina Prospect, Yendilberin Hills. [Ca. 14.5km SE of Mt Dimer].	KALGOORLIE	NON	UCL	EPL	30/03/2009 0:00		0	0	Y
	85555	2009	Grevillea georgeana	3		27			UCL, Lot 131, Ex-Jaurdi Station. Exploration Lease E77/1115. Chameleon Prospect, 105km NE of Southern Cross. [Yendilberin Hills]. [Ca. 1.2km N of Mt Walton].	KALGOORLIE	NON	UCL	EXL	29/05/2008 0:00		5	5	N
	85556	2009	Grevillea georgeana	3		28			UCL, Lot 131, Ex-Jaurdi Station. Mt Finnerty Project Area, [105km NE of Southern Cross]. [Ca. 2.3km SE of Mt Walton].	KALGOORLIE	NON	UCL		25/09/2004 0:00		0	0	N
	88113	5811	Homalocalyx grandiflorus	3		12			UCL. Ca. 14km SE of Mt Walton Waste Facility. Ca. 18km ENE of Mt Walton. Ca. 80km NE of Koolyanobbing.	KALGOORLIE	NON	UCL		23/09/2010 0:00	ACT_IND	2	2	N

FID_	PopId	Nameid	Taxon	ConsStatus	WARank	PopNumber	SubPop Code	PopStatus	Location	District	Vesting	Purpose 1	Purpose 2	CountDate	Method	MatureCoun	LiveTotal	inFlower
	88115	5811	Homalocalyx grandiflorus	3		14			UCL. Ca. 13km S of Mt Walton Waste Disposal facility, E of Yendilberin Hills. Ca. 11km ENE of Mt Walton. Near N-S track that runs south of the Mt Walton Waste Disposal facility (not the main access track).	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	10	10	N
	88116	5811	Homalocalyx grandiflorus	3		15			UCL. Ca. 13.5km S of Mt Walton Waste Disposal facility, E of Yendilberin Hills. Ca. 10.5km ENE of Mt Walton. Near N-S track that runs south of the Mt Walton Waste Disposal facility (not the main access track).	KALGOORLIE	NON	UCL		22/09/2010 0:00	ACT_IND	38	38	N
	86566	3666	Labichea eremaea	3		9			UCL. Ca. 21km ESE of Mt Dimer. Ca. 15km NNE of Mt Walton. Ca. 5km SW of Mt Walton Waste Facility. Near east-west track that runs from Mt Dimer minesite to the Mt Walton track.	KALGOORLIE	NON	UCL		22/09/2010 0:00	ACT_IND	1	1	Y
	96768	36059	Leucopogon sp. Yellowdine (M. Hislop & F. Hort MH 3194)	1		3			UCL. Ca. 13km S of Mt Walton Waste Disposal faciility. E of Yendilberin Hills. Ca. 11km ENE of Mt Walton. Near the N-S track that runs south from the Mt Walton Waste Disposal facility (not the main access track).	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	30	30	N
	94445	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069) PN	3		19			UCL. Ca. 15.5km SSE of Mt Walton Waste Facility. Ca. 18km ENE of Mt Walton. Ca. 80km NE of Koolyanobbing.	KALGOORLIE	NON	UCL		23/09/2010 0:00	ACT_IND	5	5	N
	94447	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069) PN	3		20			UCL. Ca. 14km SE of Mt Walton Waste Facility. Ca. 18km ENE of Mt Walton. Ca. 80km NE of Koolyanobbing.	KALGOORLIE	NON	UCL		23/09/2010 0:00		2	2	N
	94448	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069) PN	3		21			UCL. Ca. 16km SE of Mt Dimer. Ca. 12.5km NNE of Mt Walton. Near east-west track that runs from Mt Dimer minesite to the Mt Walton track.	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	600	600	Y
	94449	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069) PN	3		22			UCL. Ca. 14.5km SE of Mt Dimer. Ca. 12.7km N of Mt Walton. Just south of east-west track that runs from Mt Dimer minesite to the Mt Walton track.	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	70	70	Y
	93376	16621	Phebalium appressum	1		3			UCL. Ca. 18km ESE of Mt Dimer. Ca. 12.5km NNE of Mt Walton. Near E-W track that runs from Mt Dimer minesite to the Mt Walton track [Mt Walton Rd].	KALGOORLIE	NON	UCL		22/09/2010 0:00	ACT_IND	5	5	Y
	88246	6121	Verticordia stenopetala	3		3			UCL, Mount Walton intractable waste storage facility (R 42001), [S of southern boundary of reserve], 100km NE of Koolyanobbing. Shire of Coolgardie.	KALGOORLIE	NON	UCL		8/11/1996 0:00		0	0	N

Taxon	Status	Rank	IUCNCriteria	EPBC	DPaWRegion	DPaWDistrict	Distribution	FloweringPeriod	RecoveryPlan
Acacia cylindrica	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Southern Cross, Mt Correll, Kulja, Hunt Range, Kalannie, Chiddarcooping N.R., Mollerin N.R., Mt Manning Range, Ennuin Stn.		
Acacia desertorum var. nudipes	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Ghooli, Southern Cross, Yellowdine, Mt Dimer		
Austrostipa blackii	3				GOLD,MWST,WHTB	KALGOORLIE,GERALDTON,GREAT SOUTHERN,CENTRAL WHEATBELT	Merredin, Dalwallinu, Jaurdi, Widgiemooltha, eastern States, Tutanning Nature Reserve, Beverley, Blue Hills Range, Yandanoo Hills,Mt Manning Range, Barcooting Hill		
Baeckea sp. Jaurdi Station (L.W. Sage & F. Hort 2229)	2				GOLD	KALGOORLIE	Jaurdi Station	Oct	
Banksia arborea	4				GOLD	KALGOORLIE	Koolyanobbing, Die Hardy Range, Jaurdi Stn., Mt Elvire Stn., Diemals Stn., Helena and Aurora Range, Hunt Range, Bungalbin Hill, Mt Jackson, Manning Range	Mar-May, Sept-Oct	
Banksia lullfitzii	3				GOLD,SCST,WHTB	ESPERANCE,KALGOORLIE,GREAT SOUTHERN,CENTRAL WHEATBELT	Southern Cross, Frank Hann N.P., Coolgardie, Mt Manning Range, Ravensthorpe	Mar-May	
Bossiaea celata	3				GOLD	KALGOORLIE	Duri, Boorabbin	Sep,Oct	
Calytrix creswellii	3				GOLD	KALGOORLIE	Helena & Aurora Range,Credo Stn., Mt Manning Range, Wallaroo Rock	Nov-Dec	
Cryptandra polyclada subsp. aequabilis	1				GOLD	KALGOORLIE	Boorabbin	Oct	
Cyathostemon sp. Mt Dimer (C. McChesney TRL 4/72) PN	1				GOLD	KALGOORLIE	Mt Dimer		
Cyathostemon verrucosus	3				GOLD	KALGOORLIE	Bungalbin Hill, Helena & Aurora Ranges, Queen Victoria Rocks, Kalgoorlie, Boorabbin	Sep-Dec,Mar	
Dampiera sp. Jaurdi (D. Angus DA 268) PN	1				GOLD	KALGOORLIE	Jaurdi	Sep	
Daviesia sarissa subsp. redacta	2				GOLD	KALGOORLIE	Boorabbin	Sep	
Elachanthus pusillus	2				GOLD,SCST	ESPERANCE,KALGOORLIE	Orchid Rock, Cocklebiddy, Kalgoorlie, Jaurdi Stn	Oct	
Eremophila caerulea subsp. merrallii	4				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Bruce Rock, Jilbadji, Hunt Range, Burra Rock	Aug-Jan	
Eucalyptus exigua	3				GOLD,SCST,WHTB	ESPERANCE,KALGOORLIE,GREAT SOUTHERN,CENTRAL WHEATBELT	Lake Cronin, Hyden, Mt Day, Middle Ironcap, Lake Varley, Narembeen, Benari,Moorine Rock, Yellowdine, Jaurdi Stn., Mt Holland	-	
Eucalyptus formanii	4				GOLD	KALGOORLIE	Mt Jackson, Pigeon Rock, Diemals, Die Hardy Rg, Mt Dimer	Dec-Apr	
Eutaxia actinophylla	3				GOLD,SCST,WHTB	ESPERANCE,KALGOORLIE,CENTRAL WHEATBELT	Norseman, Salmon Gums, Mt Newmont, Bruce Rock, Wallaroo Rock, Mt Willgonarinya	Sep-Dec	
Gastrolobium semiteres	3				GOLD,SCST,WHTB	ESPERANCE,KALGOORLIE,CENTRAL WHEATBELT	Boorabbin Rock, Southern Cross, Koorarawalyee, Disapponitment Rock	Aug-Oct	
Gnephosis intonsa	3				GOLD,SCST,WHTB	ALBANY,ESPERANCE,KALGOORLIE,CENTRAL WHEATBELT	Gibraltar, Boorabbin, Dundas, Ravenshtorpe, North Ironcap, Ora Banda, Lake Cowan, Parker Range	Sep	
Gnephosis sp. Norseman (K.R. Newbey 8096)	3				GOLD,SCST	ESPERANCE,KALGOORLIE	Jaurdi Stn, Norseman	Sep,Oct	
Gompholobium cinereum	3				GOLD,MWST,WHTB	KALGOORLIE,GERALDTON,CENTRAL WHEATBELT	Wongan Hills, Mullewa, Wilroy, Mt Burges, Merredin, Koolyanobbing, Boorabbin, Maya	Sep-Oct	
Goodenia jaurdiensis	2				GOLD	KALGOORLIE	Jaurdi, Helena-Aurora Range	Sep-Oct	
Grevillea erectiloba	4				GOLD	KALGOORLIE	Bungalbin Hill, Mt Jackson, Mt Dimer	Sep	
Grevillea georgeana	3				GOLD	KALGOORLIE	Die Hardy Range, Mt Manning, Mt Correll, Helena and Aurora Range, Bungalbin Hill	Jul	
Haegiela tatei	4				GOLD,MWST,SCST,WHTB	ESPERANCE,KALGOORLIE,GERALDTON,GREAT SOUTHERN	Grass Patch, Lake Lockhart, Lake King, Badja Station, Peak Charles N.P., Lake Grace, Lake Magenta N.R., Lake Lockhart, Lake Cronin, Jaurdi Stn.	-	
Hakea rigida	2				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Campion, Bullfinch, Wallaroo Rock, Mt Burges	Sep	
Hemigenia tenelliflora	2				GOLD	KALGOORLIE	Jaurdi	Oct	
Hibbertia lepidocalyx subsp. tuberculata	3				GOLD	KALGOORLIE	Hunt Range, Helena and Aurora Range, Koolyanobbing Range	Jul	
Homalocalyx grandiflorus	3				GOLD	KALGOORLIE	Bungalbin, Comet Vale, Goongarrie Stn., Mt Manning N.R.	Dec	
Lepidium genistoides	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Walyahmoning Rock, Boorabbin, (Cowcowing), Marvel Loch, (Mukinbudin), Koorda, Ennuin Stn, Merredin	Oct-Dec	
Lepidosperma lyonsii	4				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Jaurdi, Karonie, Charles Gardner N.R., Totadgin Conservation Park		
Lissanthe scabra	2				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Jaurdi Stn, Marvel Loch, Southern Cross, Frog Rock Nature Reserve	Aug,Sep	
Malleostemon sp. Adelong (G.J. Keighery 11825)	2				GOLD	KALGOORLIE	Adelong Stn, Mt Manning, Johnston Range	Oct	
Mirbelia ferricola	3				GOLD,MWST,SCST	ESPERANCE,KALGOORLIE,GERALDTON	Helena and Aurora Range, Jaurdi Stn, Coorara Soak, Mt Manning N.R, Bremer Range, Koolanooka Hills, Perenjori Hills, Diemals Stn.,	Sep	
Sowerbaea multicaulis	4				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Bullfinch, Karroun Hill, Lake Deborah (Bremer Range - Lake Hope, Lake Cronin)	Nov	
Stenanthemum newbeyi	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Bungalbin Hill, Koolyanobbing, Die Hardy Range, Ennuin Stn, Mt Manning,Helena and Aurora Range, Mt Jackson	Au-Sep,De-Ja	
Stylidium choreanthum	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Helena & Aurora Range, Ghooli, Southern Cross, Kambalda, Koolyanobbing, Jaurdi Station, Ennuin Stn	Sep-Oct	
Tecticornia flabelliformis	1				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Lake Yindarlgooda, Lake Deborah, Widgiemooltha, Eastern States		
Verticordia mitodes	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Chiddarcooping, Moorine Rock to Mt Holland, Boorabbin NR, bungalbin Hill, Marvel Loch, Bootraan, Koorarawalyee, Wogarl	Dec	
Verticordia stenopetala	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Mt Holland, Moorine Rock, Queen Victoria Rock, Marvel Loch, Carrabin, Mt Walton, Holleton	Oct	
Xanthoparmelia fumigata	1				GOLD	KALGOORLIE	Boorabbin, South Australia		

APPENDIX 2

NatureMap Report

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Jackalyn Hams on 28/04/2015

Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	120°05' 20" E,30°22' 19" S
Buffer	20km
Group By	Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	208	479
Priority 1	3	4
Priority 2	1	3
Priority 3	6	35
Priority 4	2	8
Rare or likely to become extinct	1	1
TOTAL	**221**	**530**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rare or likely to become extinct					
1.	24557	*Leipoa ocellata (Malleefowl)*		T	
Priority 1					
2.	30438	*Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)*		P1	
3.	36059	*Leucopogon sp. Yellowdine (M. Hislop & F. Hort MH 3194)*		P1	
4.	16621	*Phebalium appressum*		P1	
Priority 2					
5.	20860	*Goodenia jaurdiensis*		P2	
Priority 3					
6.	5448	*Calytrix creswellii*		P3	
7.	2009	*Grevillea georgeana*		P3	
8.	5811	*Homalocalyx grandiflorus*		P3	
9.	3666	*Labichea eremaea*		P3	
10.	41785	*Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)*		P3	
11.	6121	*Verticordia stenopetala*		P3	
Priority 4					
12.	32685	*Banksia arborea (Yilgarn Dryandra)*		P4	
13.	31763	*Lepidosperma lyonsii*		P4	
Non-conservation taxon					
14.	3200	*Acacia acuminata (Jam, Mangard)*			
15.	3324	*Acacia erinacea*			
16.	3366	*Acacia hemiteles*			
17.	3393	*Acacia jennerae*			
18.	3545	*Acacia sibina*			
19.	23525	*Acacia steedmanii subsp. steedmanii*			
20.	3577	*Acacia tetragonophylla (Kurara, Wakalpuka)*			
21.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
22.	24265	*Acanthiza uropygialis (Chestnut-rumped Thornbill)*			
23.	1720	*Allocasuarina acutivalvis*			
24.	13904	*Allocasuarina acutivalvis subsp. acutivalvis*			
25.	13906	*Allocasuarina eriochlamys subsp. eriochlamys*			
26.	6565	*Alyxia buxifolia (Dysentery Bush)*			
27.	12025	*Amphipogon caricinus var. caricinus*			
28.	2369	*Amyema benthamii*			
29.		*Aname tepperi*			
30.	24561	*Anthochaera carunculata (Red Wattlebird)*			
31.	24285	*Aquila audax (Wedge-tailed Eagle)*			
32.	207	*Aristida contorta (Bunched Kerosene Grass)*			
33.	210	*Aristida holathera*			
34.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
35.	2451	*Atriplex bunburyana (Silver Saltbush)*			
36.	2452	*Atriplex cinerea (Grey Saltbush)*			
37.	2469	*Atriplex nummularia (Old Man Saltbush)*			
38.	11516	*Atriplex nummularia subsp. spathulata (Old Man Saltbush)*			
39.	2481	*Atriplex vesicaria (Bladder Saltbush)*			
40.	17237	*Austrostipa elegantissima*			
41.	17247	*Austrostipa platychaeta*			
42.	17252	*Austrostipa scabra subsp. scabra*			
43.	5344	*Baeckea elderiana*			
44.	5375	*Balaustion pulcherrimum (Native Pomegranate)*			
45.	11201	*Boronia ternata var. ternata*			
46.	3722	*Bossiaea walkeri*			
47.	4999	*Brachychiton gregorii (Desert Kurrajong, Ngalta)*			
48.	7413	*Brunonia australis (Native Cornflower)*			
49.	2848	*Calandrinia corrigioloides (Strap Purslane)*			
50.	7903	*Calotis hispidula (Bindy Eye)*			
51.	7916	*Centaurea melitensis (Maltese Cockspur)*	Y		
52.		*Cethegus fugax*			
53.	31	*Cheilanthes austrotenuifolia*			
54.	3168	*Cheiranthera filifolia*			
55.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
56.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
57.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
58.	25595	*Cracticus tibicen (Australian Magpie)*			
59.	25596	*Cracticus torquatus (Grey Butcherbird)*			
60.	3137	*Crassula colorata (Dense Stonecrop)*			
61.	7951	*Cratystylis subspinescens (Australian Sage, Spiny Grey Bush)*			
62.	24873	*Ctenophorus fordi (Mallee Sand Dragon)*			
63.	13158	*Dampiera tenuicaulis var. curvula*			
64.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
65.	41025	*Dasymalla terminalis (Native Foxglove)*			
66.	6218	*Daucus glochidiatus (Australian Carrot)*			
67.	3836	*Daviesia purpurascens (Purple-leaved Daviesia)*			
68.	1259	*Dianella revoluta (Blueberry Lily)*			
69.	24929	*Diplodactylus granariensis subsp. granariensis*			
70.	4769	*Dodonaea lobulata (Bead Hopbush)*			
71.	4770	*Dodonaea microzyga*			
72.	24470	*Dromaius novaehollandiae (Emu)*			
73.	3106	*Drosera macrantha (Bridal Rainbow)*			
74.	399	*Eragrostis xerophila (Knotty-butt Neverfail)*			
75.	7180	*Eremophila alternifolia (Poverty Bush)*			
76.	13807	*Eremophila caperata*			
77.	7189	*Eremophila clarkei (Turpentine Bush)*			
78.	14895	*Eremophila decipiens subsp. decipiens*			
79.	7211	*Eremophila georgei*			
80.	7219	*Eremophila granitica (Thin-leaved Poverty Bush)*			
81.	15112	*Eremophila interstans subsp. interstans*			
82.	7226	*Eremophila ionantha (Violet-flowered Eremophila)*			
83.	16363	*Eremophila maculata subsp. brevifolia (Native Fuchsia)*			
84.	15003	*Eremophila oldfieldii subsp. angustifolia*			
85.	7247	*Eremophila oppositifolia (Weeooka)*			
86.	18570	*Eremophila oppositifolia subsp. angustifolia*			
87.	7267	*Eremophila scoparia (Broom Bush ()*			
88.	4333	*Erodium cicutarium (Common Storksbill)*	Y		
89.	4335	*Erodium cygnorum (Blue Heronsbill)*			
90.	14377	*Erymophyllum ramosum subsp. ramosum*			
91.	5592	*Eucalyptus clelandii (Cleland's Blackbutt)*			
92.	5641	*Eucalyptus ewartiana (Ewart's Mallee)*			
93.	12886	*Eucalyptus flavida (Yellow-flowered Mallee)*			
94.	5665	*Eucalyptus griffithsii (Griffith's Grey Gum)*			
95.	5673	*Eucalyptus horistes*			
96.	13037	*Eucalyptus loxophleba subsp. lissophloia*			
97.	20091	*Eucalyptus oleosa subsp. oleosa*			
98.	12380	*Eucalyptus ravida (Silver-topped Gimlet)*			
99.	5766	*Eucalyptus salmonophloia (Salmon Gum, Wurak)*			
100.	5767	*Eucalyptus salubris (Gimlet)*			
101.	5793	*Eucalyptus transcontinentalis (Redwood, Pungul)*			
102.	34775	*Eucalyptus vittata*			
103.	5802	*Eucalyptus yilgarnensis (Yorrell)*			
104.	10977	*Exocarpos aphyllus (Leafless Ballart)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
105.	5204	*Frankenia interioris*			
106.	24735	*Glossopsitta porphyrocephala (Purple-crowned Lorikeet)*			
107.	7495	*Goodenia berardiana*			
108.	7527	*Goodenia mimuloides*			
109.	7531	*Goodenia occidentalis*			
110.	1949	*Grevillea acuaria*			
111.	13453	*Grevillea didymobotrya subsp. didymobotrya*			
112.	19314	*Grevillea hookeriana subsp. apiciloba*			
113.	8834	*Grevillea incrassata*			
114.	2051	*Grevillea obliquistigma*			
115.	15981	*Grevillea obliquistigma subsp. obliquistigma*			
116.	2057	*Grevillea paradoxa (Bottlebrush Grevillea)*			
117.	2104	*Grevillea teretifolia (Round Leaf Grevillea)*			
118.	15982	*Grevillea zygoloba*			
119.	2182	*Hakea minyma*			
120.	6174	*Haloragis gossei*			
121.	6180	*Haloragis trigonocarpa*			
122.	5122	*Hibbertia eatoniae*			
123.	5124	*Hibbertia exasperata*			
124.	5165	*Hibbertia rostellata*			
125.		*Hogna pexa*			
126.	12742	*Hyalosperma demissum*			
127.	5220	*Hybanthus epacroides (Spiny Hybanthus)*			
128.	19892	*Keraudrenia velutina subsp. velutina*			
129.	13284	*Lawrencella rosea*			
130.	13260	*Leucochrysum fitzgibbonii*			
131.	16049	*Leucopogon sp. Clyde Hill (M.A. Burgman 1207)*			
132.	25659	*Lichenostomus leucotis (White-eared Honeyeater)*			
133.	25661	*Lichmera indistincta (Brown Honeyeater)*			
134.	2396	*Lysiana casuarinae*			
135.	2544	*Maireana georgei (Satiny Bluebush)*			
136.	2567	*Maireana tomentosa (Felty Bluebush)*			
137.	2568	*Maireana trichoptera (Downy Bluebush)*			
138.	5866	*Malleostemon tuberculatus*			
139.	41544	*Malva weinmanniana*			
140.	24583	*Manorina flavigula (Yellow-throated Miner)*			
141.	5929	*Melaleuca leiocarpa*			
142.	9183	*Melaleuca nematophylla (Wiry Honey-myrtle)*			
143.	25693	*Microeca fascinans (Jacky Winter)*			
144.	8106	*Millotia tenuifolia (Soft Millotia)*			
145.	490	*Monachather paradoxus*			
146.	24970	*Nephrurus stellatus*			
147.	6976	*Nicotiana occidentalis (Native Tobacco)*			
148.	25748	*Ninox novaeseelandiae (Boobook Owl)*			
149.	8140	*Olearia muelleri (Goldfields Daisy)*			
150.	8145	*Olearia pimeleoides (Pimelea Daisybush, Burrobunga)*			
151.	8151	*Olearia stuartii*			
152.	24618	*Oreoica gutturalis (Crested Bellbird)*			
153.	24619	*Pachycephala inornata (Gilbert's Whistler)*			
154.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
155.	25682	*Pardalotus striatus (Striated Pardalote)*			
156.	40424	*Pentameris airoides subsp. airoides*	Y		
157.	24409	*Phaps chalcoptera (Common Bronzewing)*			
158.	18537	*Philotheca brucei subsp. brucei*			
159.	18519	*Philotheca coccinea*			
160.	18506	*Philotheca tomentella*			
161.	11910	*Pimelea suaveolens subsp. flava*			
162.	34760	*Plantago cunninghamii*			
163.	7299	*Plantago debilis*			
164.	7300	*Plantago drummondii (Sago Weed)*			
165.	8173	*Podolepis capillaris (Wiry Podolepis)*			
166.	8177	*Podolepis lessonii*			
167.	25722	*Polytelis anthopeplus (Regent Parrot)*			
168.	24683	*Pomatostomus superciliosus (White-browed Babbler)*			
169.	4691	*Poranthera microphylla (Small Poranthera)*			
170.	6912	*Prostanthera campbellii*			
171.	6916	*Prostanthera grylloana*			
172.	6917	*Prostanthera incurvata*			
173.	12702	*Prostanthera sericea*			
174.	13255	*Pterochaeta paniculata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
175.	2707	*Ptilotus carlsonii*			
176.	2727	*Ptilotus gaudichaudii*			
177.	2732	*Ptilotus holosericeus*			
178.	2746	*Ptilotus nobilis (Tall Mulla Mulla)*			
179.	41001	*Ptilotus nobilis subsp. nobilis (Yellow Tails)*			
180.	2747	*Ptilotus obovatus (Cotton Bush)*			
181.	42344	*Purnella albifrons (White-fronted Honeyeater)*			
182.	2581	*Rhagodia drummondii*			
183.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
184.	13301	*Rhodanthe floribunda*			
185.	13294	*Rhodanthe laevis*			
186.	13253	*Rhodanthe rubella*			
187.	13254	*Rhodanthe stricta*			
188.	6599	*Rhyncharrhena linearis (Bush Bean, Wintjulanypa)*			
189.	6018	*Rinzia carnosa*			
190.	40425	*Rytidosperma caespitosum*			
191.	2356	*Santalum acuminatum (Quandong, Warnga)*			
192.	2359	*Santalum spicatum (Sandalwood, Wilarak)*			
193.	7644	*Scaevola spinescens (Currant Bush, Maroon)*			
194.	8200	*Schoenia cassiniana (Schoenia)*			
195.	1002	*Schoenus nanus (Tiny Bog Rush)*			
196.	2609	*Sclerolaena diacantha (Grey Copperburr)*			
197.	2615	*Sclerolaena fusiformis*			
198.	17645	*Senna artemisioides*			
199.	12276	*Senna artemisioides subsp. filifolia*			
200.	19712	*Sida sp. dark green fruits (S. van Leeuwen 2260)*			
201.	30948	*Smicrornis brevirostris (Weebill)*			
202.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
203.	44484	*Spartothamnella canescens*			
204.	16200	*Stenanthemum stipulosum*			
205.	3076	*Stenopetalum filifolium*			
206.	25597	*Strepera versicolor (Grey Currawong)*			
207.	8238	*Streptoglossa liatroides*			
208.	4258	*Templetonia sulcata (Centipede Bush)*			
209.	1701	*Thelymitra antennifera (Vanilla Orchid)*			
210.	1338	*Thysanotus manglesianus (Fringed Lily)*			
211.	6279	*Trachymene ornata (Spongefruit)*			
212.	7658	*Velleia discophora (Cabbage Poison)*			
213.	7664	*Velleia rosea (Pink Velleia)*			
214.	8265	*Vittadinia eremaea*			
215.	8275	*Waitzia acuminata (Orange Immortelle)*			
216.	13331	*Waitzia acuminata var. acuminata*			
217.	4385	*Zygophyllum apiculatum (Gallweed)*			
218.	4389	*Zygophyllum eremaeum*			
219.	4391	*Zygophyllum glaucum (Pale Twinleaf)*			
220.	4392	*Zygophyllum iodocarpum*			
221.	4394	*Zygophyllum ovatum (Dwarf Twinleaf)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

APPENDIX 3

Protected Matters Search Tool Report

Australian Government
Department of the Environment

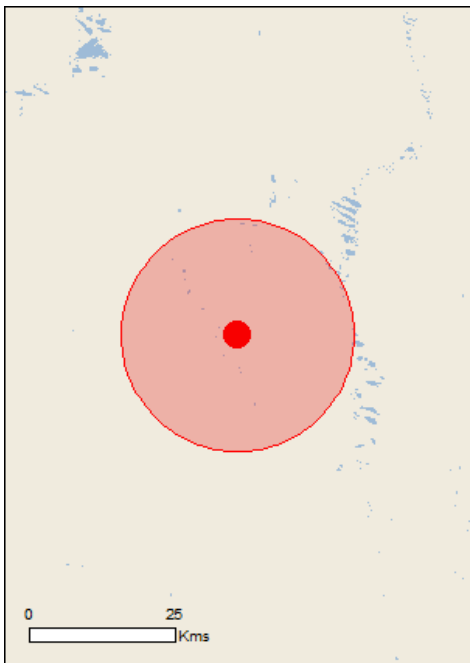
EPBC Act Protected Matters Report

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.

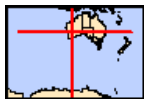
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 28/04/15 15:35:51



Coordinates
Buffer: 20.0Km



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:	5
Listed Migratory Species:	4

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/index.html

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:	5
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:	1
Regional Forest Agreements:	None
Invasive Species:	10
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		
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Plants		
Myriophyllum lapidicola Chiddarcooping myriophyllum [55940]	Endangered	Species or species habitat known to occur within area
Ricinocarpos brevis [82879]	Endangered	Species or species habitat likely to occur within area
Tetratheca paynterae Paynter's Tetratheca [66451]	Endangered	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		
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may 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		
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 likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Mount Manning Range	WA

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
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur

Name	Status	Type of Presence 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
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		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		
Carrichtera annua Ward's Weed [9511]		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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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

-30.34459 120.08838

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:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA 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, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-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.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

APPENDIX 4

DPaW TEC and PEC Database Search

OBJECTID	OCC_UNIQUE	COM_ID	COM_NAME	CT_DESC	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	OCC_CONFID	BDY_ID	Shape_Leng	Shape_Area
2479	5238	Finnerty Range/Mt Dimer/Yendilberin Hills BIF	Finnerty Range/Mt Dimer/Yendilberin Hills vegetation complexes (banded ironstone formation)	Priority 1	1	Yendiberin1		500	No	2935	0.14591331988	0.00110327027
2480	5239	Finnerty Range/Mt Dimer/Yendilberin Hills BIF	Finnerty Range/Mt Dimer/Yendilberin Hills vegetation complexes (banded ironstone formation)	Priority 1	1	Yendiberin2		500	No	2936	0.16651421023	0.00146249346
2481	5240	Finnerty Range/Mt Dimer/Yendilberin Hills BIF	Finnerty Range/Mt Dimer/Yendilberin Hills vegetation complexes (banded ironstone formation)	Priority 1	1	Yendiberin3		500	No	2937	0.05886183862	0.00023600915
2482	5241	Finnerty Range/Mt Dimer/Yendilberin Hills BIF	Finnerty Range/Mt Dimer/Yendilberin Hills vegetation complexes (banded ironstone formation)	Priority 1	1	MtDimer1		500	No	2938	0.16921418512	0.00125621746
2483	5242	Finnerty Range/Mt Dimer/Yendilberin Hills BIF	Finnerty Range/Mt Dimer/Yendilberin Hills vegetation complexes (banded ironstone formation)	Priority 1	1	MtDimer2		500	No	2939	0.07977504842	0.00037015595
2484	5243	Finnerty Range/Mt Dimer/Yendilberin Hills BIF	Finnerty Range/Mt Dimer/Yendilberin Hills vegetation complexes (banded ironstone formation)	Priority 1	1	MtDimer3		500	No	2940	0.07956326810	0.00039137607
2485	5245	Finnerty Range/Mt Dimer/Yendilberin Hills BIF	Finnerty Range/Mt Dimer/Yendilberin Hills vegetation complexes (banded ironstone formation)	Priority 1	1	MtDimer5		500	No	2942	0.10611341008	0.00054104484
14421	5244	Finnerty Range/Mt Dimer/Yendilberin Hills BIF	Finnerty Range/Mt Dimer/Yendilberin Hills vegetation complexes (banded ironstone formation)	Priority 1	1	MtDimer4		500	No	2941	0.18543806994	0.00155993717
14441	2582	Hunt Range BIF	Hunt Range vegetation complexes (banded ironstone formation)	Priority 1	1	Mount Dimer		500	No	1275	0.50314667890	0.00581675185
14477	2618	Lake Giles (northern Yerilgee Hills) BIF	Lake Giles vegetation complexes (banded ironstone formation)	Priority 1	1	Lake Giles		500	No	1193	1.79401781058	0.04145420920

APPENDIX 5

Soil Mapping

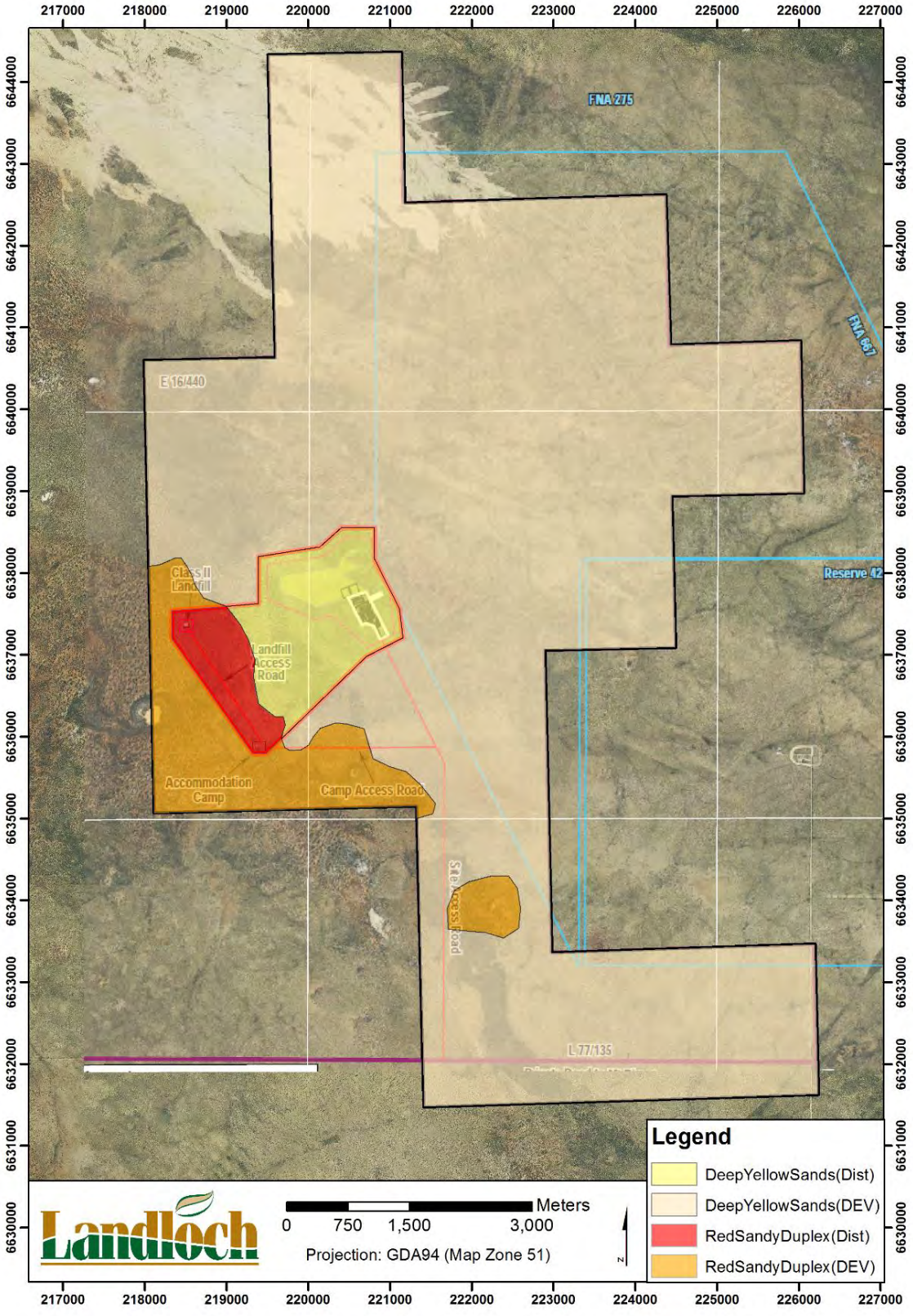


Figure 6: Map of the soil types found at the Sandy Ridge Mine Site. Note that soils in the development area (DEV) are inferred and have a lower confidence level than the soils mapped in the disturbance area (Dist).

APPENDIX 6

Conservation Codes

Conservation Codes for Western Australian Flora and Fauna

T Threatened species

Listed as Specially Protected under the Wildlife Conservation Act 1950, published under Schedule 1 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).

- Fauna that is rare or likely to become extinct are declared to be fauna that is in need of special protection
- Flora that are extant and considered likely to become extinct, or rare and therefore in need of special protection, are declared to be rare flora

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. The assessment of the conservation status of these species is based on their national extent.

X 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.

S Other specially protected fauna

Listed as Specially Protected under the Wildlife Conservation Act 1950. Fauna declared to be in need of special protection, otherwise than for the reasons mentioned for Schedules 1, 2 or 3, are published under Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice.

Threatened Fauna and Flora are ranked according to their level of threat using IUCN Red List categories and criteria. For example: Carnaby's Cockatoo (*Calyptorynchus latirostris*) is listed as 'Specially Protected' under the Wildlife Conservation Act 1950, published under Schedule 1, and referred to as a 'Threatened' species with a ranking of 'Endangered'.

CR Critically Endangered - considered to be facing an extremely high risk of extinction in the wild.

EN Endangered - considered to be facing a very high risk of extinction in the wild.

VU Vulnerable - considered to be facing a high risk of extinction in the wild.

A list of the current rankings can be downloaded from the Parks and Wildlife Threatened Species and Communities webpage at http://dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/

P Priority species

Species that maybe threatened or near threatened but are data deficient, have not yet been adequately surveyed to be listed under the Schedules of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice, 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 list for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Conservation dependent species that are subject to a specific conservation program are placed in Priority 5.

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.

5: Priority Five: Conservation Dependent species

Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

*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).

Commonwealth of Australia Conservation Codes

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* has the following nine conservation codes for Flora and Fauna.

Extinct
Taxa not definitely located in the wild during the past 50 years

Extinct in the Wild
Taxa known to survive only in captivity

Critically Endangered
Taxa facing an extremely high risk of extinction in the wild in the immediate future

Endangered
Taxa facing a very high risk of extinction in the wild in the near future

Vulnerable

Taxa facing a high risk of extinction in the wild in the medium-term

Near Threatened

Taxa that risk becoming Vulnerable in the wild

Conservation Dependent

Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened.

Data Deficient (Insufficiently Known)

Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.

Least Concern

Taxa that are not considered Threatened

SANDY RIDGE PROJECT,
EXPLORATION TENEMENT E16/440

FLORA AND VEGETATION SURVEY

Prepared for:	Tellus Holdings P/L
Report Date:	2 November 2016
Version:	5
Report No.	2015-224

pgv ENVIRONMENTAL

CONTENTS

LIST OF ATTACHMENTS

Tables

Plates

Figures

Appendices

1 INTRODUCTION

1.1 Purpose

Tellus Holdings Ltd is proposing to develop a kaolin mine with complimentary storage and waste disposal business on Exploration Tenement E16/440 (the site). The site is located in the Shire of Coolgardie and is approximately 140km north-west of Kalgoorlie and 75km north-east of Koolyanobbing. The site boundary is shown in Figure 1.

The site is zoned Rural/Mining in the Shire of Coolgardie Town Planning Scheme No. 4 (District Scheme) Consolidated Scheme (TPS4) (WAPC, 2003).

The potential development envelope for the proposed mining operation is 921.6ha (Figure 1). The site currently is undeveloped and consists of native vegetation. The mining operation is proposed to consist of the following elements:

- Mine Pit and disposal cells (202.3ha)
- Mine Infrastructure area (17.2ha)
- Accommodation Camp (2.5ha)
- Class II Waste Disposal Facility (0.25ha)
- Water Pipeline from the Carina Minesite (11km)
- Site access road (3.75km)
- Internal roads (approx. 5km)
- Potential widening of the Mt Dimer Road (4.5km)

PGV Environmental was commissioned by Tellus Holdings Ltd to undertake a Level 2 Flora and Vegetation Survey of the parts of the site that will or may require clearing of native vegetation.

1.2 Scope of Works

The Level 2 Flora and Vegetation Survey was undertaken in accordance with Guidance Statement 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004) and included the following:

- Desktop search and review of Department of Parks and Wildlife's (DPaW's) Declared Rare and Priority Flora database and Threatened Ecological Communities database;
- Examination of recent aerial photography and contour maps to provisionally identify vegetation types and condition;
- Field survey in spring using quadrats to record native and introduced species as well as a site walkover of any areas of native vegetation;
- Recording of any significant plant species using a hand-held GPS;
- Description and mapping of vegetation types and vegetation condition; and
- Compilation of a flora list.

2 EXISTING ENVIRONMENT

2.1 Land Use

The site is vegetated with some basic camp infrastructure installed. No other development has been undertaken on the site.

2.2 Topography

The site is undulating between approximately 460m Australian Height Datum (AHD) to 480m AHD (DAFWA, 2015). The site generally slopes up to the north-east.

2.3 Geology and Soils

The site is located on the Yilgarn Craton and based on granitoid rock. The soil system on the site is the Norseman Zone (266) on which the soils are described as calcareous loamy earths, yellow sandy and loamy earths, red loamy earths, red deep sands and salt lake soils (DAFWA, 2015).

The soils on the site are predominately a deep yellow sand over clay as mapped by Landloch (2015). There is an area in the western part of the site being described as red sandy duplex soils.

2.4 Hydrology

2.4.1 Surface Water

The area lies just to the south of one of the driest regions in Western Australia. The site is in the Raeside-Ponton Catchment Basin in the Salt Lake Sub-catchment (Landgate, 2015). Surface water drains to lower lying areas. There is one lake on the western boundary of the tenement but outside of the proposed development envelope. There are no wetlands or surface expressions of groundwater on the site.

2.4.2 Groundwater

The site is situated in an area that does not have a regional water table as any rain falling in the region is either evaporated, evapo-transpired or runs off at the surface through minor ephemeral drainage and watercourses. The lack of groundwater is also due to the thickness and permeability of the geologic profile, which includes 2m to 5m of impermeable silcrete and up to 40m of low permeability clay. Monitoring wells in the area have been tested for more than 20 years and have always been dry (Aurora Environmental, 2015).

3 FLORA AND VEGETATION

3.1 Methodology

A flora and vegetation survey of the site was conducted by Dr Paul van der Moezel and assistant over 3 days from 30 September 2015 to 2 October 2015. The survey included sampling from 25 non-permanent 20m x 20m quadrats as well as several traverses through the area on proposed road and pipeline alignments.

The survey focussed on the parts of the site that are likely to have some degree of vegetation disturbance including the following:

- Mine Pit and disposal cells (202.3ha)
- Mine Infrastructure area (17.2ha)
- Accommodation Camp (2.5ha)
- Class II Waste Disposal Facility (0.25ha)
- Water Pipeline from the Carina Minesite (11km)
- Site access road (3.75km)
- Internal roads (approx. 5km)
- Potential widening of the Mt Dimer Road (4.5km)

The total area of potential disturbance is around 276ha of the 949ha development envelope as well as 3.7km of a new access road and 11km water pipeline route.

Site coverage was moderate due to the large size of the site, remoteness and paucity of tracks.

Access to the mine pit and disposal cells area, mine infrastructure and underground storage areas was relatively easy on the network of tracks cleared to access drilling locations. The tracks were all open and readily trafficable at the time of the survey. Access to the Class II Waste Disposal Facility and Accommodation Camp areas was on foot using GPS navigation. Most of the proposed access roads and all of the water pipeline route were walked the entire length.

The vegetation of the areas not surveyed was inferred by cross-referencing the on-ground results with the patterns observed on aerial photography. The impact of old fire scars on the aerial photography made interpretation difficult.

3.2 Desktop Searches

A search of the Department of Parks and Wildlife's (DPaW's) Threatened Flora Database, WA Herbarium database and Declared Rare and Priority Flora Species List (Parks and Wildlife, 2015) (Appendix 1), the Naturemap database (Appendix 1) and the Protected Matters Search Tool (Appendix 1) identified 50 Endangered, Threatened or Priority plant species that have been recorded within 20km of the site (Table 1).

Table 1: List of Flora Species Identified from Database Searches within 20km of the Site

Species	Common Name	Conservation Status WA	Status Under EPBC Act 1999
Myriophyllum lapidicola	Chiddarcooping Myriophyllum	Threatened	Endangered
Ricinocarpos brevis		Threatened	Endangered
Tetratheca paynterae	Paynter's Tetratheca	Threatened	Endangered
Cryptandra polyclada subsp. *aequabilis*		Priority 1	
Cyathostemon sp. Mt Dimer (C. McChesney TRL 4/72) PN		Priority 1	
Dampiera sp. Jaurdi (D. Angus DA 268) PN		Priority 1	
Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)		Priority 1	
Leucopogon sp. Yellowdine (M. Hislop & F. Hort MH 3194)		Priority 1	
Phebalium appressum		Priority 1	
Tecticornia flabelliformis		Priority 1	
Xanthoparmelia fumigata		Priority 1	
Baeckea sp. Jaurdi Station (L.W. Sage & F. Hort 2229)		Priority 2	
Daviesia sarissa subsp. *redacta*		Priority 2	
Elachanthus pusillus		Priority 2	
Goodenia jaurdiensis		Priority 2	
Hakea rigida		Priority 2	
Hemigenia tenelliflora		Priority 2	
Lissanthe scabra		Priority 2	
Malleostemon sp. Adelong (G.J. Keighery 11825)		Priority 2	
Acacia cylindrica		Priority 3	
Acacia desertorum var. *nudipes*		Priority 3	
Austrostipa blackii	Crested Spear-grass	Priority 3	
Banksia lullfitzii		Priority 3	
Bossiaea celata		Priority 3	
Calytrix creswellii		Priority 3	
Cyathostemon verrucosus		Priority 3	
Eucalyptus exigua		Priority 3	
Eutaxia actinophylla		Priority 3	
Gastrolobium semiteres		Priority 3	
Gnephosis intonsa	Shaggy Gnephosis	Priority 3	
Gnephosis sp. Norseman (K.R. Newbey 8096)		Priority 3	
Gompholobium cinereum		Priority 3	
Grevillea georgeana		Priority 3	
Hibbertia lepidocalyx subsp. *tuberculata*		Priority 3	
Homalocalyx grandiflorus		Priority 3	
Labichea eremaea		Priority 3	
Lepidium genistoides		Priority 3	
Lepidosperma lyonsii		Priority 3	
Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)		Priority 3	
Mirbelia ferricola		Priority 3	
Stenanthemum newbeyi		Priority 3	

Species	Common Name	Conservation Status WA	Status Under EPBC Act 1999
Stylidium choreanthum	Dancing Triggerplant	Priority 3	
Verticordia mitodes		Priority 3	
Verticordia stenopetala		Priority 3	
Banksia arborea	Yilgarn Dryandra	Priority 4	
Eremophila caerulea subsp. *merrallii*		Priority 4	
Eucalyptus formanii		Priority 4	
Grevillea erectiloba		Priority 4	
Haegiela tatei		Priority 4	
Sowerbaea multicaulis	Many Stemmed Lily	Priority 4	

Table 2 examines the preferred habitat of each species and the likelihood of the species listed in Table 1 to occur on the site given the characteristics of soil type and landform.

Table 2: Likelihood of Identified Significant Flora Species occurring on the Site

Scientific Name	Preferred Habitat*	Likelihood of Presence on Site
Myriophyllum lapidicola	Ephemeral pools 20 to 50 cm deep on granite outcrops +	Unlikely
Ricinocarpos brevis	Shallow sandy soils on rocky banded ironstone outcrops ®	Unlikely
Tetratheca paynterae	Rock crevices, in shallow pockets of soil of rich red loam	Unlikely
Cryptandra polyclada subsp. *aequabilis*	Sand	Possible
Cyathostemon sp. Mt Dimer (C. McChesney TRL 4/72) PN	Yellow sand	Possible
Dampiera sp. Jaurdi (D. Angus DA 268) PN	Associated species: *Allocasuarina corniculata, Gyrostemon racemiger, Acacia sibina, Eucalyptus leptopoda subsp. subluta, Calytrix creswellii* ~ Interpreted habitat: Yellow sand, gravel, sandplains	Possible
Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)	Recorded on ridge/slope. Well-drained. Dry brown clay loam over granite. 10-30% of loose rock on soil surface #	Unlikely
Leucopogon sp. Yellowdine (M. Hislop & F. Hort MH 3194)	Recorded on Flat. Moist yellow sand. Burnt >5 years ^	Unlikely
Phebalium appressum	Yellow sandplain	Possible
Tecticornia flabelliformis	Clay. Saline flats.	Highly Unlikely
Xanthoparmelia fumigata	Recorded on ridge with bare to littered, stoney crusted brown clayey sand <	Unlikely
Baeckea sp. Jaurdi Station (L.W. Sage & F. Hort 2229)	Light brown-yellow sand. Sandplains	Possible
Daviesia sarissa subsp. *redacta*	Yellow sand. Plains	Possible
Elachanthus pusillus	Open depression in plain system. Sandy clay loam &	Unlikely
Goodenia jaurdiensis	Red clayey loam with laterite or banded ironstone gravel or quartz pebbles. Low-lying plains and lower slopes	Possible on pipeline route

Scientific Name	Preferred Habitat*	Likelihood of Presence on Site
Hakea rigida	Sandy soils, yellow sand	Possible
Hemigenia tenelliflora	Sandplain @	Possible
Lissanthe scabra	Dry, white to orange-brown clay, sandy gravel loams, granite. Breakaways, uplands	Unlikely
Malleostemon sp. Adelong (G.J. Keighery 11825)	Red sand, mid-slope, interdunal β	Unlikely
Acacia cylindrica	Yellow/brown sand, gravelly soils. Undulating plains, flats	Possible
Acacia desertorum var. *nudipes*	Yellow sand, lateritic gravel. Sandplains, flats.	Possible
Austrostipa blackii	Recorded on a gentle upper North slope. Brown loam over red loam with granite fragments at 5 cm %	Unlikely
Banksia lullfitzii	Yellow sand. Sandplains.	Possible
Bossiaea celata	Deep sand. Open mallee	Possible
Calytrix creswellii	Yellow sand, sometimes with lateritic gravel. Sandplains	Possible
Cyathostemon verrucosus	Flat yellow sandy clay plain >	Unlikely
Eucalyptus exigua	Sandy loam, white sand. Sandplains	Possible
Eutaxia actinophylla	Red-brown clay loam, red clay loam over granite, gravel. Small depressions	Unlikely
Gastrolobium semiteres	Deep yellow sand, yellow to brown sandy clay, gravel, granite. Broad sand dunes, around rocks, undulating plains	Possible
Gnephosis intonsa	Red/brown clay, stony saline loam	Unlikely
Gnephosis sp. Norseman (K.R. Newbey 8096)	Sub-saline loam. Moderately exposed flat	Unlikely
Gompholobium cinereum	Yellow sand, clayey sand, brown loam, sandy gravel, laterite. Well-drained open sites, slopes, plains, roadsides	Possible
Grevillea georgeana	Stony loam/clay. Ironstone hilltops and slopes.	Possible on pipeline route
Hibbertia lepidocalyx subsp. *tuberculata*	Yellow-orange loam, ironstone gravel	Possible
Homalocalyx grandiflorus	Yellow sand. Sandplains.	Possible
Labichea eremaea	Red sand.	Unlikely
Lepidium genistoides	Sandy loam	Possible
Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)	Yellow sandplain =	Possible
Mirbelia ferricola	Recorded on skeletal red loam soils on massive banded iron formation "	Possible on pipeline route
Stenanthemum newbeyi	Clayey sand, clay or loam over laterite or ironstone. Hillslopes	Possible on pipeline route
Stylidium choreanthum	White/yellow or red sand. Plains	Possible
Verticordia mitodes	Yellow sand. Undulating plains	Possible
Verticordia stenopetala	Yellow sand, sometimes with gravel. Undulating plains.	Possible
Banksia arborea	Stony loam. Ironstone hills.	Possible on pipeline route

Scientific Name	Preferred Habitat*	Likelihood of Presence on Site
Eremophila caerulea subsp. *merrallii*	Sand, clay or loam. Undulating plains.	Possible
Eucalyptus formanii	Red sand. Ironstone slopes	Possible on pipeline route
Grevillea erectiloba	Gravelly loam. Lateritic ridges	Unlikely
Haegiela tatei	Clay, sandy loam, gypsum. Saline habitats.	Unlikely
Lepidosperma lyonsii	Orange skeletal sandy loam with banded ironstone gravel and rock, well-drained shallow stony loamy with quartz. Gentle hill slopes, upper slopes of large hill.	Possible on pipeline route
Sowerbaea multicaulis	Yellow-brown sand.	Possible

* Sourced from Florabase (DPaW, 2015) unless otherwise annotated as per the list below.

® DoE SPRAT Database (DoE, 2015)
+ Patten and Brown (2004)
~ Western Australian Herbarium (2015a)
# Western Australian Herbarium (2015b)
^ Western Australian Herbarium (2015c)
< Western Australian Herbarium (2015d)
@ Western Australian Herbarium (2015e)
= Western Australian Herbarium (2015f)
β Western Australian Herbarium (2015g)
& State Herbarium of South Australia (2015a)
% State Herbarium of South Australia (2015b)
> Australian National Herbarium (2015)
“ National Herbarium of New South Wales (2015)

Of the 50 species identified in the database searches 25 are considered to be possibly present on the tenement site and a further 7 could occur on the pipeline route where soil mapping indicates the presence of some ironstone soils. There are four species ranked as Priority 1, five as Priority 2, eighteen as Priority 3 and five as Priority 4 in the list of species that potentially could occur on the site and pipeline route.

All three species listed as Threatened under the *Wildlife Conservation Act 1950* (WC Act) and Endangered under the EPBC Act are considered ‘Unlikely’ to be present on the site.

A search of DPaW’s Threatened (TEC) and Priority Ecological Communities (PEC) database was conducted for the site (02-0415EC) (Appendix 1). Three Priority 1 ecological communities were found to potentially occur within the vicinity of the site as described below:

- Finnerty Range/Mt Dimer/Yendilberin Hills vegetation complexes (banded ironstone formation);
- Hunt Range vegetation complexes (banded ironstone formation); and
- Lake Giles vegetation complexes (banded ironstone formation).

None of these ecological communities are likely to occur on the site. These communities are all associated with a Banded Iron Formation which does not occur on the proposed mining site or pipeline route. The interpreted vegetation types are not representative of these PECs.

3.3 Survey Conditions

The conditions that the survey was undertaken in are presented in Table 3 in order to assess the adequacy of the survey. In summary, there were some constraints to the survey due to the remoteness and large size of the site. Most of the vegetation was recovering from a fire that appears

to have occurred less than 5 years ago. These constraints were considered unlikely to have a significant impact on the results.

Table 3: Statement of Botanical Survey Conditions

ISSUE	CONSTRAINTS (YES/NO); SIGNIFICANT, MODERATE OR NEGLIGIBLE	COMMENT
Competency/experience of the consultant conducting the survey	No constraints	Dr Paul van der Moezel has botanical survey experience in the Goldfields region including a recent 2014 survey of the adjoining IWDF site.
Proportion of the flora identified	No constraints	The timing of the survey in early October should have identified most of the native species on the parts of the site surveyed. The uniformity of the vegetation on the lease site means it is unlikely that many more species would have been recorded outside surveyed areas of the lease.
Sources of information (historic/recent or new data)	No constraints	Florabase and other flora and vegetation surveys nearby on similar landforms
Proportion of the task achieved and further work that may need to be undertaken	No constraints	Follow-up surveys required for any clearing outside of surveyed areas.
Timing/weather/season/cycle	No constraints	Early October survey ideal for identifying maximising flowering of most species, including ephemerals.
Intensity of survey (e.g. In retrospect was the intensity adequate)	No constraints	Relevant areas to be cleared surveyed adequately.
Completeness (e.g. was relevant area fully surveyed)	No constraints	
Resources (e.g. degree of expertise available for plant identification)	No constraints	Experienced botanist undertook plant identifications on site and at Perth Reference Herbarium.
Remoteness and/or access problems	No constraints	Remote site, access to most areas through a network of easily driven tracks. Walking other areas easy through open woodland understorey and open heath and shrublands.
Availability of contextual (e.g. bioregional) information for the study area.	No constraints	A Biodiversity Audit of WA (DPaW)

Fungi and nonvascular flora (e.g. algae, mosses and liverworts) were not specifically surveyed for during the survey.

3.4 Results

3.4.1 Flora

A total of 97 species from 27 Families and 50 Genera were recorded in the flora survey (Appendix 2). The most common Families were the Myrtaceae (21 species), Fabaceae (13 species), Proteaceae (8 species) and Asteraceae (8 species). The Genera with the most species were *Acacia* (11), *Eucalyptus*

(8), *Grevillea* (7) and *Melaleuca* (5). These same four Genera were the top genera recorded in the flora survey of the nearby Carina Iron Ore Project: Mt Walton Siding Vegetation (Recon Environmental, 2010).

No introduced species were recorded on the site.

No Threatened (Declared Rare) species listed under the *Wildlife Conservation Act 1950* or *Environment Protection and Biodiversity Act 1999* were recorded on the site.

One Priority 3 species, *Calytrix creswellii*, was recorded at one location in *Acacia resinimarginea* Open Heath on loamy sand in the middle of the Mine Pits/Cells area (Figure 2). Numerous plants were recorded in the quadrat and nearby.

Plate 1 Calytrix creswellii (P3). Source: FloraBase.

Calytrix creswellii is currently known to occur within the Coolgardie and Murchison bioregions of the Eremaean province (Florabase). It has previously been recorded on nearby sites including the IWDF site (Ecologia, 1997), the Mt Walton access road (Mattiske Consulting, 2012) and the Carina Iron Ore Project site (Recon Environmental, 2010). The Mattiske Consulting survey recorded many separate populations of the species with population sizes greater than 50 common. *Calytrix creswellii* is a small shrub 0.25-1m high with white flowers from September to December (Florabase).

One Priority 4 species, *Lepidosperma lyonsii*, was recorded on the proposed pipeline route between the Mt Dimer Road and the tenement (Figure 2). Several plants were recorded in *Eucalyptus pileata/Acacia resinimarginea* Shrub Mallee/Open Heath vegetation. *Lepidosperma lyonsii* is a sedge species up to 50cm high and is known to occur in several locations in the Coolgardie Botanical District and has previously been recorded on the Carina Iron Ore Project Site (Recon Environmental, 2010) and the Mt Walton access road (Mattiske Consulting, 2012).

Five populations of the undescribed sedge species, *Lepidosperma* sp., were recorded in *Acacia resinimarginea* dominated vegetation on the site (Figure 2). The species is likely to be more widespread on the site than the populations recorded. The species was not able to be identified to specific level but was not considered to be any of the three Priority species previously recorded in the

vicinity of the site (Table 1). In their survey of the yellow sandplain vegetation on the Mt Walton Road to the south of the site Mattiske Consulting Pty Ltd (2012) recorded 13 species of *Lepidosperma* which were not able to be identified to species level mostly due to the species being undescribed. The taxonomy of *Lepidosperma* is being reviewed by the Western Australian Herbarium staff (R. Barrett) and until those results are published the *Lepidosperma* recorded on the site should be treated as potentially having some conservation value.

3.4.2 Vegetation

Regional Vegetation

The site is located in the Coolgardie 2 COO2 – Southern Cross Biogeographic subregion (DPaW, 2002). The sub-region contains banded-ironstone hill flora, sandplain Acacias and Myrtaceae and Goldfields woodlands.

Most of the vegetation in the tenement area belongs to Beard vegetation association 437 'Shrublands; mixed acacia thicket on sandplain' with the southwestern area belonging to association 141 'Medium woodland; York gum, salmon gum and gimlet' (Figure 4). The vegetation in the pipeline and access road areas is also mostly association 437 with some 141. The southwestern end of the pipeline contains Beard association 538 'Eucalyptus open woodland/Triodia open hummock grassland' and a small area of 435 'Acacia sparse shrubland/Cryptandra mixed sparse heath'.

Vegetation Types

A range of different vegetation types were described and mapped on the site (Figure 2 and 3). Many of the vegetation types intergrade and could be considered variations of the main types. The impact of a fire around 5 years ago has affected the structure of large parts of the dominant *Acacia resinimarginea* Open Heath. *Callitris preissii* shrubs which were clearly evident as a dead shrub up to 2-3m high were killed by the fire and the regenerating seedlings are growing very slowly at less than 0.3m tall.

Vegetation descriptions are provided below. Quadrat data for each vegetation type are provided in Appendix 3.

Ar *Acacia resinimarginea* Open Heath

This is one of the most dominant vegetation types in the tenement site. *Acacia resinimarginea* is consistently 1-1.2m high and 40-50% cover. Other common species include *Phebalium filifolium, Phebalium canaliculatum, Homalocalyx thryptomenoides, Melaleuca uncinata* and *Callitris preissii* although the *Callitris* plants are small seedlings 0.2-0.3m high regenerating after a fire. Spinifex (*Triodia scariosa*) is also common in part but at low density. The soils are light yellow to orange-brown loamy sands. Quadrats SR 3, 6, 8, 9 and 10A are representative of this vegetation type.

CpAr *Callitris preissii/Acacia resinimarginea* Tall Shrubland

This vegetation type is essentially a variety of the Ar vegetation type that escaped the fire of several years ago. As a result the *Callitris preissii* trees are up to 3-4m high and the *Acacia resinimarginea* and *Melaleuca uncinata* can be up to 2-2.5m high. *Homalocalyx thryptomenoides* is a common small

shrub. The soils are light yellow-brown loamy sands. Quadrats SR 12 and 14 are representative of this vegetation type.

ArAa *Acacia resinimarginea/Allocasuarina acutivalvis* Open Heath

A small pocket of this vegetation type was recorded at the northern end of the mine pit/cell area. It is very similar in structure and composition to the Ar vegetation type but contains *Allocasuarina acutivalvis* which is virtually absent from the Ar vegetation. The presence of ironstone pebbles at the surface of the loamy sand may be a reason for the *Allocasuarina* in this area. Quadrat SR 1 is representative of this vegetation type.

ArMu *Acacia resinimarginea/Melaleuca uncinata* Open Low Heath

This vegetation type occurs on the water pipeline route just north of the Mt Dimer Road. *Acacia resinimarginea* and *Melaleuca uncinata* co-dominate at around 1m and 20-25% each. The vegetation is slightly more species rich than the Ar vegetation and sub-units on the tenement site. The soils area light orange-brown loamy sand with ironstone pebbles at the surface. Quadrat SR 18 is representative of this vegetation type.

Lr *Leptospermum roei* Open Heath

Several stands of *Leptospermum roei* occur up to 1.8m high and 50% cover with little to no *Acacia resinimarginea* present. The composition of the smaller shrubs is, however, similar to the Ar vegetation type with *Homalocalyx thryptomenoides* common. The soils are yellow loamy sand. Quadrat SR 13 is representative of this vegetation type.

ArEpTs *Acacia resinimarginea* Open Heath with scattered *Eucalyptus pileata* over *Triodia scariosa* Open Grassland

This is another widespread vegetation type occurring on the yellow loamy sand soils, particularly in the central and northern parts of the site. The shrub cover is less dense at 25-40% which has allowed the Spinifex (*T. scariosa*) to grow in higher densities, around 20-25%. The small mallee *Eucalyptus pileata* occurs sporadically throughout this unit. Other common species include *Phebalium filifolium, Homalocalyx thryptomenoides* and *Keraudrenia integrifolia. Callitris preissii* was present as seedlings in some areas but curiously only occurred as old dead plants with no seedlings evident in large areas. The soils are light orange-brown loamy sand. Quadrats SR 2.1, 4, 5 and 7 are representative of this vegetation type.

EpMuTs *Eucalyptus pileata* Open Shrub Mallee over *Melaleuca uncinata* Open Shrubland over *Triodia scariosa* Open Grassland

This vegetation type occurred in the south-east part of the tenement site and was similar to the ArEpTs except that *Acacia neurophylla* was the dominant *Acacia* and several other species not commonly recorded elsewhere on the site such as *Melaleuca eleuterostachya, Hakea francisiana* and *Podolepis capillaris* were present and indicated a transition from the vegetation on the site to that further east. *Acacia neurophylla* was the dominant species in the sandplain heath and shrubland vegetation survey of a part of the IWDF site a short distance to the east (PGV Environmental, 2015). The soils are light orange-red sand. Quadrat SR 15 was representative of this vegetation type.

Eg *Eucalyptus gracilis* Shrub Mallee over *Acacia nigripilosa* subsp. *nigripilosa/Acacia burkittii* Low Shrubland

This vegetation type occurs on harder sandy loam soils on slightly more elevated land in the western and northern parts of the tenement. *Eucalyptus gracilis* is the main tree or mallee species present in densities around 10-40%. *Acacia* species including *A. burkittii* and *A. nigripilosa* subsp. *nigripilosa* are common shrubs as is *Melaleuca uncinata, Alyxia buxifolia, Olearia muelleri* and *Scaevola spinescens.* These areas have a large percentage of bare ground. The soils are hard, red-orange sandy loam. Quadrats SR 2 and 11 are representative of this vegetation type.

EgAaEo *Eucalyptus gracilis* Open Shrub Mallee over *Acacia acuminata/Eremophila oppositifolia* Open Shrubland

This vegetation type occurs at the southern end of the water pipeline route close to the Carina Mine northern pit. The vegetation is located in a slight depression which may lead to slightly moister surface soils after rain. The shrub mallees are up to 4m high and open over an open shrub layer consisting of *Acacia acuminata* and *A. tetragonophylla* as well as *Eremophila oppositifolia, E. maculata* and *Senna artemisioides*. The soils are orange-red sandy loam with ironstone pebbles with a large percentage of bare ground. Quadrat SR 20 is representative of this vegetation type.

Ab *Acacia burkittii* Tall Shrubland

A small band of this vegetation type occurs near the southern end of the water pipeline in a low valley. *Acacia burkittii* is the dominant taller shrub up to 3m high and averaging 20% although it can be denser in places. *Grevillea eriostachya* up to 1.3m is also present. Common smaller shrubs include *Leucopogon* sp. Clyde Hill and *Homalocalyx thryptomenoides*. The soils are orange-red sandy loam with ironstone pebbles at the surface. Quadrat SR 21 is representative of this vegetation type.

ErMuAa *Eucalyptus ?rigidula* Very Open Shrub Mallee over *Melaleuca uncinata/Acacia acuminata* Open Low Heath

This vegetation type occurs on top of a small rise on perhaps the highest part of the water pipeline route between the Carina Mine pit and Mt Dimer Road. *Eucalyptus ?rigidula* (no buds or fruit) commonly occurs as a shrub mallee in very low densities. The shrub layer is dominated by *Melaleuca uncinata* with *Acacia acuminata* and *Senna artemisioides* common. The soils are orange-red sandy loam. Quadrat SR 23 is representative of this vegetation type.

EcAt *Eucalyptus corrugata* Low Woodland over *Acacia tetragonophylla* Tall Open Shrubland

The southwestern part of the tenement is mapped as being in a different Beard vegetation association from the rest of the site. The vegetation confirms this difference with the vegetation consisting of large tracts of typical Goldfields Eucalypt Woodland with *Eucalyptus corrugata* the dominant species up to 8m high and with an open canopy cover of 10-25%. Common understorey species include *Acacia tetragonophylla, Santalum acuminatum, Exocarpos aphyllus, Scaevola spinescens, Acacia colletioides, Phebalium filifolium* and *Austrostipa nitida*. The soils are orange-brown loamy sand. Quadrats SR 10 and 16 are representative of this vegetation type.

EsAt *Eucalyptus salmonophloia* Woodland over *Acacia tetragonophylla* Tall Open Shrubland

This vegetation type also occurs in the southwestern part of the tenement mixed in with the EcAt type. Salmon Gum (*E. salmonophloia*) is sparse and up to 12m high over a tall open shrubland containing similar common species to the EcAt vegetation type such as *Acacia tetragonophylla, Acacia colletioides, Scaevola spinescens* and *Olearia muelleri.* The soils are orange-red sandy loam. Quadrat SR 17 is representative of this vegetation type.

EsEo *Eucalyptus salmonophloia* Woodland over *Eremophila oppositifolia* Open Heath

This species is common at the southern half of the water pipeline route. Superficially this vegetation type looks structurally the same as the EsAt type with Salmon Gum the main species present up to 12m high and 20% cover over an open understorey. However, the understorey composition is quite different and contains Chenopod species (*Atriplex vesicaria, Maireana georgei, Sclerolaena densiflora*) that are absent from the tenement site. *Eremophila* species (*E. oppositifolia, E. pantonii*) are common in the understorey. The soils are orange-red sandy loam. Quadrat SR 22 is representative of this species.

EsalMu *Eucalyptus salubris* var. *salubris* Open Shrub Mallee over *Melaleuca uncinata* Open Shrubland

A small stand of Gimlet (*Eucalyptus salubris* var. *salubris*) occurs on the water pipeline route south of Mt Dimer Road. The Gimlet mallees are up to 5m high and in low density. *Melaleuca uncinata, Senna artemisioides* and *Acacia resinimarginea* are common shrub species and the native grasses *Aristida contorta* and *Austrostipa nitida* occur together. Grass species are very sparse throughout the survey area.

3.4.3 Vegetation Condition

The vegetation condition over the site was assessed using the condition scale adopted in Bush Forever (Table 4). The vegetation was rated as all being in Excellent condition. While there were no weed species recorded on the site the presence of numerous tracks, both old and new, meant that a rating of Pristine was not warranted.

Table 4: Vegetation Condition Rating Scale

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

Condition	Description
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Source: Government of Western Australia, 2000.

3.4.4 Conservation Significance of Flora and Vegetation

Flora

Two Priority 3 species (*Calytrix creswellii* and *Lepidosperma lyonsii*) were recorded in the survey area in low numbers.

Priority 3 species are those 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.

Priority species are considered to be under threat but do not have legislative protection under the *Wildlife Conservation Act 1950* or *Environment Protection and Biodiversity Conservation Act 1999*.

Both species were recorded in low numbers and have been recorded in nearby sites (Mt Walton East IWDF site, Mt Walton Access Road and the Carina Mine site). Given the low site coverage in the survey additional populations are likely to occur in the areas that might be cleared and the areas not surveyed outside of the proposed clearing.

Barrett (2007) noted that while *Lepidosperma lyonsii* was a poorly known species it may be more widespread than current herbarium collections suggest.

Another species of *Lepidosperma,* yet to be described, was recorded at several locations throughout the site and is highly likely to occur in numerous locations which will not be impacted by the project in the tenement site.

The other 30 species that were identified as possibly occurring in the survey area were not recorded. Six of those species were identified as possibly occurring due to the expected presence of ironstone included on soil maps on a section of the pipeline route. As it turned out, the survey of the pipeline route did not record any ironstone or ironstone-derived soils or their associated flora species.

Vegetation

The site is located in the Coolgardie 2 COO2 – Southern Cross Biogeographic subregion (DPaW, 2002). The sub-region does not contain any Threatened Ecological Communities. A total of 19 'ecosystems

at risk' occur in the sub-region, most of which occur on hills and ridges. None of the vegetation types in the survey area is listed as an 'ecosystem at risk'.

Most of the vegetation in the survey area belongs to Beard vegetation associations 437 'Shrublands; mixed acacia thicket on sandplain' and association 141 'Medium woodland; York gum, salmon gum and gimlet'. The south-west end of the pipeline route also contains associations 538 'Eucalyptus open woodland/Triodia open hummock grassland' and a small amount of 435 'Acacia sparse shrubland/Cryptandra mixed sparse heath'. All vegetation associations have a Low reservation priority for ecosystems (DPaW, 2002).

4 SUMMARY AND CONCLUSIONS

The Level 2 Flora and Vegetation Survey of the Sandy Ridge Project exploration tenement E16/440 and proposed access roads and water pipeline routes resulted in the following:

- The survey targeted the areas of proposed disturbance, totalling around 276ha of the 959ha development envelope plus 3.7km of a new site access road and 11km for a water pipeline from the Carina Mine site to the south-west;
- The vegetation in the tenement area is mapped as comprising two Beard vegetation associations: Association 437 'Shrublands; mixed acacia thicket on sandplain' and Association 141 'Medium woodland; York gum, salmon gum and gimlet'. The south-west end of the proposed pipeline route contained Beard associations 538 'Eucalyptus open woodland/Triodia open hummock grassland' and a small amount of 435 'Acacia sparse shrubland/Cryptandra mixed sparse heath'. The on-ground survey confirmed the boundaries of the broad associations;
- A total of 97 species from 27 Families and 50 Genera were recorded in the survey. No introduced species were recorded on the site.
- Small populations of two Priority 3 species (*Calytrix creswellii* and *Lepidosperma lyonsii*) were recorded in the tenement and pipeline route respectively. Several populations of an undescribed *Lepidosperma* were also recorded which may have conservation significance. The Priority species and *Lepidosperma* species should not be an impediment to the proposed development as they are highly likely to occur elsewhere in the development envelope and areas surrounding the site;
- None of the other 30 Priority species that were identified as possibly being present in the survey area were recorded. These species therefore will not be impacted by the development;
- A total of 15 vegetation types were described and mapped on the site. The main vegetation types were *Acacia resinimarginea* Open Heath with variations, *Acacia resinimarginea/Eucalyptus pileata/Triodia scariosa* Open Heath and Open Grassland; Mallee shrublands; and *Eucalyptus* woodlands (*E. corrugata, E. salmonophloia, E. salubris*);
- All of the vegetation was considered in Excellent condition;
- No Threatened or Priority Ecological Communities were recorded on the site. No vegetation types listed as an 'ecosystem at risk' in the 2002 WA Biodiversity Audit'. The two Beard vegetation types are listed as Low priority for reservation by DPaW;
- Clearing should attempt to avoid any of the large trees in the southwestern part of the tenement site and along the water pipeline route. The density of the main tall tree species, Salmon Gum and *Eucalyptus corrugata*, should be sufficiently widely spaced to be able to construct low speed access tracks through these areas as well as the alignment of the water pipeline route and any associated maintenance track alongside the pipe. Particular attention should be given to the design of the proposed Accommodation Camp and Class II Waste Disposal Facility to avoid the clearing of tall trees; and
- Any proposed clearing of vegetation outside the area surveyed should be required to have a level 2 flora and vegetation survey over those areas.

5 REFERENCES

Aurora Environmental (2015) Sandy Ridge Project EPBC Referral. Accessed June 2015 http://www.environment.gov.au/cgi-bin/epbc/epbc_ap.pl?name=current_referral_detail&proposal_id=7478 Perth, Western Australia.

Australian National Herbarium (2015) Australian Virtual Herbarium Record on The Atlas of Living Australian. Accessed April 2015 http://biocache.ala.org.au/occurrences/98cebeab-9829-4b7b-b556-f9a54abc9c5f Australia.

Department of Agriculture and Food Western Australia (DAFWA) (2014) Natural Resource Management Shared Land Information Platform. Accessed April 2015 http://maps.agric.wa.gov.au/nrminfo/framesetup.asp Government of Western Australia, Perth.

Department of Parks and Wildlife (DPaW) (2002) *A Biodiversity Audit of Western Australia 53 Biogeographic Sub-regions.*

Department of Parks and Wildlife (DPaW) (2015) The Western Australian Herbarium. *FloraBase*. Accessed April 2015 http://florabase.dpaw.wa.gov.au/ Government of Western Australia, Perth.

Department of the Environment (DoE) (2015) Species Profile and Threats (SPRAT) Database. Accessed April 2015 http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl Commonwealth of Australia.

ecologia Environmental Consultants (1997) *Mt Walton East Intractable Waste Disposal Facility – Floristic Assessment.* Report prepared for the Department of Environmental Protection Waste Management Division.

Environmental Protection Authority (EPA) (2004) *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* - Guidance Statement No. 51. Perth, Western Australia.

Government of Western Australia (2000) Bush Forever - *Keeping the Bush in the City. Volume 2: Directory of Bush Forever Sites*. Perth, Western Australia.

Landgate (2015) WA Atlas Shared Land Information Platform. Accessed April 2015 https://www2.landgate.wa.gov.au/bmvf/app/waatlas/ Government of Western Australia, Perth.

Landloch Pty Ltd (2015) *Sandy Ridge Soil Assessment Draft Report*. Prepared for Tellus Holdings. Project Number: 2216.15a. Perth, Western Australia.

Mattiske Consulting Pty Ltd (2012) *Threatened and Priority Flora Survey of the Yellow Sandplain Vegetation – Mt Walton Road.* Prepared for Polaris Metals Pty Ltd. Report PMN1105/001/12

National Herbarium of New South Wales (2015) Australian Virtual Herbarium Record on The Atlas of Living Australian. Accessed April 2015 http://biocache.ala.org.au/occurrences/d7b97fb1-b17c-4280-8c01-2f0629b6b179 Australia.

Parks and Wildlife (2015) Threatened and Priority Flora Database Search for Mining Tenement E16/440, Shire of Coolgardie accessed on March 2015. Prepared by the Species and Communities Branch for PGV Environmental for a Flora and Vegetation Survey.

Patten, J. and Brown, A. (2004) *Interim Recovery Plan No. 187 Chiddarcooping Myriophyllum (Myriophyllum lapidicola) Interim Recovery Plan 2004-2009.* For the Department of Conservation and Land Management. Perth, Western Australia.

PGV Environmental (2015). *Intractable Waste Disposal Facility Mt Walton East. Flora and Vegetation Survey of Future Operations Area and Rehabilitation Monitoring.* Prepared for Clayvault WA 21 March 2015. Report No. 2015-199.

Recon Environmental (2010). *Carina Iron Ore Project: Mt Walton Siding Vegetation*. Prepared for Polaris Metals NL, February 2010.

State Herbarium of South Australia (2015a) Australian Virtual Herbarium Record on The Atlas of Living Australian. Accessed April 2015 http://biocache.ala.org.au/occurrences/7f6b124f-c781-4770-bd57-bb3f720d3c6f Australia.

State Herbarium of South Australia (2015b) Australian Virtual Herbarium Record on The Atlas of Living Australian. Accessed April 2015 http://biocache.ala.org.au/occurrences/1fd8840f-778b-424b-8b71-faa03f9f97d1 Australia.

Western Australian Herbarium (2015a) Australian Virtual Herbarium Record on The Atlas of Living Australian. Accessed April 2015 http://biocache.ala.org.au/occurrences/c53b4128-f1e0-46df-aa2c-74d55c144ce6 Australia.

Western Australian Herbarium (2015b) Australian Virtual Herbarium Record on The Atlas of Living Australian. Accessed April 2015 http://biocache.ala.org.au/occurrences/5b3cd77b-ba28-4675-aec6-83e31577682e Australia.

Western Australian Herbarium (2015c) Australian Virtual Herbarium Record on The Atlas of Living Australian. Accessed April 2015 http://biocache.ala.org.au/occurrences/1dad94b3-d2c4-4fe7-ad11-a608f22e648a Australia.

Western Australian Herbarium (2015d) Australian Virtual Herbarium Record on The Atlas of Living Australian. Accessed April 2015 http://biocache.ala.org.au/occurrences/e7f1a403-d0e8-461c-b608-3cd7c2eb7f3d Australia.

Western Australian Herbarium (2015e) Holotype of *Hemigenia tenelliflora* G.R.Guerin [family LAMIACEAE] on JStor Global Plants. Accessed April 2015 http://plants.jstor.org/stable/history/10.5555/al.ap.specimen.perth06202969 United States of America.

Western Australian Herbarium (2015f) Australian Virtual Herbarium Record on The Atlas of Living Australian. Accessed April 2015 http://biocache.ala.org.au/occurrences/b9a46603-f0be-459a-bedd-ca76e7030d24 Australia.

Western Australian Herbarium (2015g) Australian Virtual Herbarium Record on The Atlas of Living Australian. Accessed April 2015 http://biocache.ala.org.au/occurrences/813225fa-74e1-4aa8-b94a-dfc7c8175241 Australia.

Western Australian Planning Commission (WAPC) (2003) Shire of Coolgardie Town Planning Scheme No. 4 (District Scheme) Consolidated Scheme. Government of Western Australia, Perth.

FIGURES

2015-224-f01.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136

pgv ENVIRONMENTAL

Tellus Holdings
FLORA AND VEGETATION SURVEY
SANDY RIDGE

Drawn: P. van der Moezel | Date: 10 Dec 2015

Job: 10215 Rpt: 2015-224 | Revision: A

REGIONAL LOCATION

Figure 1

N

0 100 200 300 400 500m

SCALE 1 : 15 000 at A3 (MGA)

Legend

- Development Envelope
- Mine Pits/Waste Storage
- Mine Infrastructure
- Underground Storage
- Accomodation Camp
- Class II Waste Disposal Facility
- Water Pipeline
- Access Road
- Quadrat Location
- Vegetation Type Boundary
- Eg — Vegetation Type
- *Priority Flora Location*

Vegetation Types

Ar
Acacia resinimarginea Open Heath

CpAr
Callitris preissii/Acacia resinimarginea Tall Shrubland

ArMu
Acacia resinimarginea/Melaleuca uncinata Open Low Heath

Lr
Leptospermum roei Open Heath

ArEpTs
Acacia resinimarginea Open Heath with scattered *Eucalyptus pileata* over *Triodia scariosa* Open Grassland

Eg
Eucalyptus gracilis Shrub Mallee over *Acacia nigripilosa* subsp. *nigripilosa/Acacia burkittii* Low Shrubland

EgAaEo
Eucalyptus gracilis Open Shrub Mallee over *Acacia acuminata/Eremophila oppositifolia* Open Shrubland

Ab
Acacia burkittii Tall Shrubland

EpMuTs
Eucalyptus pileata Open Shrub Mallee over *Melaleuca uncinata* Open Shrubland over *Triodia scariosa* Open Grassland

ErMuAa
Eucalyptus ?rigidula. Very Open Shrub Mallee over *Melaleuca uncinata/Acacia acuminata* Open Low Heath

EcAt
Eucalyptus corrugata Low Woodland over *Acacia tetragonophylla* Tall Open Shrubland

EsAt
Eucalyptus salmonophloia Woodland over *Acacia tetragonophylla* Tall Open Shrubland

EsEo
Eucalyptus salmonophloia Woodland over *Eremophila oppositifolia* Open Heath

EsalMu
Eucalyptus salubris var. *salubris* Open Shrub Mallee over *Melaleuca uncinata* Open Shrubland

ArEpTs
Eg
SR1
SR2.1
SR2
Eg
Calytrix creswellii (P3)
SR3
Ar
SR4
6 638 000mN
Lepidosperma sp.
SR5
Lepidosperma sp.
ArEpTs
SR6
SR10
EcAt
SR10A
Eg
SR7
SR8
SR9
Ar
SR11
EpMuTs
Ar
SR12
SR13
Lepidosperma sp.
SR14
CpAr
Lr
CpAr
Eg
Lr
EcAt
Ar
6 636 000mN
EcAt
SR16
SR17
EsAt
220 000mE
222 000mE

LAYOUT SOURCE: CAD Resources, Ref 229415, 16-10-2015.
AERIAL PHOTOGRAPH SOURCE: Landgate, flown June 2012.

pgv ENVIRONMENTAL

Tellus Holdings
FLORA AND VEGETATION SURVEY
SANDY RIDGE

Drawn: P. van der Moezel | Date: 14 Dec 2015
Job: 10215 Rpt: 2015-224 | Revision: A

VEGETATION TYPES
- EXPLORATION TENEMENT

Figure 2

Vegetation Types

Ar
Acacia resinimarginea Open Heath

CpAr
Callitris preissii/Acacia resinimarginea Tall Shrubland

ArMu
Acacia resinimarginea/Melaleuca uncinata Open Low Heath

Lr
Leptospermum roei Open Heath

ArEpTs
Acacia resinimarginea Open Heath with scattered *Eucalyptus pileata* over *Triodia scariosa* Open Grassland

Eg
Eucalyptus gracilis Shrub Mallee over *Acacia nigripilosa* subsp. *nigripilosa/Acacia burkittii* Low Shrubland

EgAaEo
Eucalyptus gracilis Open Shrub Mallee over *Acacia acuminata/Eremophila oppositifolia* Open Shrubland

Ab
Acacia burkittii Tall Shrubland

EpMuTs
Eucalyptus pileata Open Shrub Mallee over *Melaleuca uncinata* Open Shrubland over *Triodia scariosa* Open Grassland

ErMuAa
Eucalyptus ?rigidula. Very Open Shrub Mallee over *Melaleuca uncinata/Acacia acuminata* Open Low Heath

EcAt
Eucalyptus corrugata Low Woodland over *Acacia tetragonophylla* Tall Open Shrubland

EsAt
Eucalyptus salmonophloia Woodland over *Acacia tetragonophylla* Tall Open Shrubland

EsEo
Eucalyptus salmonophloia Woodland over *Eremophila oppositifolia* Open Heath

EsalMu
Eucalyptus salubris var. *salubris* Open Shrub Mallee over *Melaleuca uncinata* Open Shrubland

215 000mE
220 000mE
6 635 000mN

N
0 500 1000 1500 2000m
SCALE 1 : 40 000 at A3 (MGA)

EsAt
Lepidosperma lyonsii (P3)
Lepidosperma sp.
ArEpTs
ArEpTs
ArMu
SR18
SR15
EpMuTs
Lepidosperma sp.
SR19
ArEpTs
ArEpTs
EsalMu
ArEpTs
SR23
ErMuAa
EsEo
S22
SR21
SR20
Ab
EgAaEo

Legend
- Development Envelope
- Mine Pits/Waste Storage
- Mine Infrastructure
- Underground Storage
- Accomodation Camp
- Class II Waste Disposal Facility
- Water Pipeline
- Access Road
- Quadrat Location
- Vegetation Type Boundary
- Eg Vegetation Type
- *Priority Flora Location*

LAYOUT SOURCE: CAD Resources, Ref 229415, 16-10-2015.
AERIAL PHOTOGRAPH SOURCE: Landgate, flown June 2012.

PINPOINT CARTOGRAPHICS (08) 9562 7136 2015-224-f03.dgn

pgv ENVIRONMENTAL

Tellus Holdings
FLORA AND VEGETATION SURVEY
SANDY RIDGE

Drawn: P. van der Moezel | Date: 14 Jan 2016
Job: 10215 Rpt: 2015-224 | Revision: A

VEGETATION TYPES
- WATER PIPELINE AND ACCESS ROAD

Figure 3

Vegetation Associations

8	Allocasuarina mixed sparse shrubland / Acacia mixed sparse shrubland / Caladenia mixed open forbland
128	Senna mixed sparse shrubland
141	Eucalyptus open woodland / Hakea mixed sparse shrubland
435	Acacia sparse shrubland / Cryptandra mixed sparse heath
437	Acacia woodland / Eremophila mixed sparse shrubland / Ptilotus mixed sparse forbland
538	Eucalyptus open woodland / Triodia open hummock grassland

215 000mE

220 000mE

6 635 000mN

6 630 000mN

N

0 500 1000 1500 2000m

SCALE 1 : 50 000 at A3 (MGA)

Legend

- Development Envelope
- Mine Pits/Waste Storage
- Mine Infrastructure
- Underground Storage
- Accomodation Camp
- Class II Waste Disposal Facility
- Water Pipeline
- Access Road
- Pre-European Vegetation Association Boundary
- 437 Pre-European Vegetation Association

LAYOUT SOURCE: CAD Resources, Ref 229415, 16-10-2015.
AERIAL PHOTOGRAPH SOURCE: Landgate, flown June 2012.
PRE-EUROPEAN VEGETATION SOURCE: Dept. of Agriculture, April 2004.

PINPOINT CARTOGRAPHICS (08) 9562 7136 2015-224-f04.dgn

pgv ENVIRONMENTAL

Tellus Holdings
FLORA AND VEGETATION SURVEY
SANDY RIDGE

Drawn: P. van der Moezel | Date: 14 Jan 2016

Job: 10215 Rpt: 2015-224 | Revision: A

PRE-EUROPEAN VEGETATION MAPPING

Figure 4

APPENDIX 1

DPaW Database Searches

Taxon	Status	Rank	IUCNCriteria	EPBC	DPaWRegion	DPaWDistrict	Distribution	FloweringPeriod	RecoveryPlan
Acacia cylindrica	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Southern Cross, Mt Correll, Kulja, Hunt Range, Kalannie, Chiddarcooping N.R., Mollerin N.R., Mt Manning Range, Ennuin Stn.		
Acacia desertorum var. nudipes	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Ghooli, Southern Cross, Yellowdine, Mt Dimer		
Austrostipa blackii	3				GOLD,MWST,WHTB	KALGOORLIE,GERALDTON,GREAT SOUTHERN,CENTRAL WHEATBELT	Merredin, Dalwallinu, Jaurdi, Widgiemooltha, eastern States, Tutanning Nature Reserve, Beverley, Blue Hills Range, Yandanoo Hills,Mt Manning Range, Barcooting Hill		
Baeckea sp. Jaurdi Station (L.W. Sage & F. Hort 2229)	2				GOLD	KALGOORLIE	Jaurdi Station	Oct	
Banksia arborea	4				GOLD	KALGOORLIE	Koolyanobbing, Die Hardy Range, Jaurdi Stn., Mt Elvire Stn., Diemals Stn., Helena and Aurora Range, Hunt Range, Bungalbin Hill, Mt Jackson, Manning Range	Mar-May, Sept-Oct	
Banksia lullfitzii	3				GOLD,SCST,WHTB	ESPERANCE,KALGOORLIE,GREAT SOUTHERN,CENTRAL WHEATBELT	Southern Cross, Frank Hann N.P., Coolgardie, Mt Manning Range, Ravensthorpe	Mar-May	
Bossiaea celata	3				GOLD	KALGOORLIE	Duri, Boorabbin	Sep,Oct	
Calytrix creswellii	3				GOLD	KALGOORLIE	Helena & Aurora Range,Credo Stn., Mt Manning Range, Wallaroo Rock	Nov-Dec	
Cryptandra polyclada subsp. aequabilis	1				GOLD	KALGOORLIE	Boorabbin	Oct	
Cyathostemon sp. Mt Dimer (C. McChesney TRL 4/72) PN	1				GOLD	KALGOORLIE	Mt Dimer		
Cyathostemon verrucosus	3				GOLD	KALGOORLIE	Bungalbin Hill, Helena & Aurora Ranges, Queen Victoria Rocks, Kalgoorlie, Boorabbin	Sep-Dec,Mar	
Dampiera sp. Jaurdi (D. Angus DA 268) PN	1				GOLD	KALGOORLIE	Jaurdi	Sep	
Daviesia sarissa subsp. redacta	2				GOLD	KALGOORLIE	Boorabbin	Sep	
Elachanthus pusillus	2				GOLD,SCST	ESPERANCE,KALGOORLIE	Orchid Rock, Cocklebiddy, Kalgoorlie, Jaurdi Stn	Oct	
Eremophila caerulea subsp. merrallii	4				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Bruce Rock, Jilbadji, Hunt Range, Burra Rock	Aug-Jan	
Eucalyptus exigua	3				GOLD,SCST,WHTB	ESPERANCE,KALGOORLIE,GREAT SOUTHERN,CENTRAL WHEATBELT	Lake Cronin, Hyden, Mt Day, Middle Ironcap, Lake Varley, Narembeen, Benari,Moorine Rock, Yellowdine, Jaurdi Stn., Mt Holland	-	
Eucalyptus formanii	4				GOLD	KALGOORLIE	Mt Jackson, Pigeon Rock, Diemals, Die Hardy Rg, Mt Dimer	Dec-Apr	
Eutaxia actinophylla	3				GOLD,SCST,WHTB	ESPERANCE,KALGOORLIE,CENTRAL WHEATBELT	Norseman, Salmon Gums, Mt Newmont, Bruce Rock, Wallaroo Rock, Mt Willgonarinya	Sep-Dec	
Gastrolobium semiteres	3				GOLD,SCST,WHTB	ESPERANCE,KALGOORLIE,CENTRAL WHEATBELT	Boorabbin Rock, Southern Cross, Koorarawalyee, Disapponitment Rock	Aug-Oct	
Gnephosis intonsa	3				GOLD,SCST,WHTB	ALBANY,ESPERANCE,KALGOORLIE,CENTRAL WHEATBELT	Gibraltar, Boorabbin, Dundas, Ravenshtorpe, North Ironcap, Ora Banda, Lake Cowan, Parker Range	Sep	
Gnephosis sp. Norseman (K.R. Newbey 8096)	3				GOLD,SCST	ESPERANCE,KALGOORLIE	Jaurdi Stn, Norseman	Sep,Oct	
Gompholobium cinereum	3				GOLD,MWST,WHTB	KALGOORLIE,GERALDTON,CENTRAL WHEATBELT	Wongan Hills, Mullewa, Wilroy, Mt Burges, Merredin, Koolyanobbing, Boorabbin, Maya	Sep-Oct	
Goodenia jaurdiensis	2				GOLD	KALGOORLIE	Jaurdi, Helena-Aurora Range	Sep-Oct	
Grevillea erectiloba	4				GOLD	KALGOORLIE	Bungalbin Hill, Mt Jackson, Mt Dimer	Sep	
Grevillea georgeana	3				GOLD	KALGOORLIE	Die Hardy Range, Mt Manning, Mt Correll, Helena and Aurora Range, Bungalbin Hill	Jul	
Haegiela tatei	4				GOLD,MWST,SCST,WHTB	ESPERANCE,KALGOORLIE,GERALDTON,GREAT SOUTHERN	Grass Patch, Lake Lockhart, Lake King, Badja Station, Peak Charles N.P., Lake Grace, Lake Magenta N.R., Lake Lockhart, Lake Cronin, Jaurdi Stn.	-	
Hakea rigida	2				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Campion, Bullfinch, Wallaroo Rock, Mt Burges	Sep	
Hemigenia tenelliflora	2				GOLD	KALGOORLIE	Jaurdi	Oct	
Hibbertia lepidocalyx subsp. tuberculata	3				GOLD	KALGOORLIE	Hunt Range, Helena and Aurora Range, Koolyanobbing Range	Jul	
Homalocalyx grandiflorus	3				GOLD	KALGOORLIE	Bungalbin, Comet Vale, Goongarrie Stn., Mt Manning N.R.	Dec	
Lepidium genistoides	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Walyahmoning Rock, Boorabbin, (Cowcowing), Marvel Loch, (Mukinbudin), Koorda, Ennuin Stn, Merredin	Oct-Dec	
Lepidosperma lyonsii	4				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Jaurdi, Karonie, Charles Gardner N.R., Totadgin Conservation Park		
Lissanthe scabra	2				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Jaurdi Stn, Marvel Loch, Southern Cross, Frog Rock Nature Reserve	Aug,Sep	
Malleostemon sp. Adelong (G.J. Keighery 11825)	2				GOLD	KALGOORLIE	Adelong Stn, Mt Manning, Johnston Range	Oct	
Mirbelia ferricola	3				GOLD,MWST,SCST	ESPERANCE,KALGOORLIE,GERALDTON	Helena and Aurora Range, Jaurdi Stn, Coorara Soak, Mt Manning N.R, Bremer Range, Koolanooka Hills, Perenjori Hills, Diemals Stn.,	Sep	
Sowerbaea multicaulis	4				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Bullfinch, Karroun Hill, Lake Deborah (Bremer Range - Lake Hope, Lake Cronin)	Nov	
Stenanthemum newbeyi	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Bungalbin Hill, Koolyanobbing, Die Hardy Range, Ennuin Stn, Mt Manning,Helena and Aurora Range, Mt Jackson	Au-Sep,De-Ja	
Stylidium choreanthum	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Helena & Aurora Range, Ghooli, Southern Cross, Kambalda, Koolyanobbing, Jaurdi Station, Ennuin Stn	Sep-Oct	
Tecticornia flabelliformis	1				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Lake Yindarlgooda, Lake Deborah, Widgiemooltha, Eastern States		
Verticordia mitodes	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Chiddarcooping, Moorine Rock to Mt Holland, Boorabbin NR, bungalbin Hill, Marvel Loch, Bootraan, Koorarawalyee, Wogarl	Dec	
Verticordia stenopetala	3				GOLD,WHTB	KALGOORLIE,CENTRAL WHEATBELT	Mt Holland, Moorine Rock, Queen Victoria Rock, Marvel Loch, Carrabin, Mt Walton, Holleton	Oct	
Xanthoparmelia fumigata	1				GOLD	KALGOORLIE	Boorabbin, South Australia		

FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Des	Site_Descr	Vegetation	Frequency	Notes	Locality
	8284873	16621	Phebalium appressum	1	Shrub, 40 cm tall. Mostly with flower buds, some plants with few white flowers.	Flat. Dry yellow sand. Fire ca 5 years ago.	Open Eucalyptus rigidula mallee over Acacia nigripilosa subsp. nigripilosa, Acacia inaequiloba and mixed shrubs over Triodia.	5 plants seen locally.		Adjacent to the Mount Dimer - Mount Walton Waste Facility track ca 18 km ESE of Mount Dimer
	5642701	5448	Calytrix creswellii	3	Low shrub 20-60 cm.	Yellow-brown sand. Slope.	Allocasuarina/Acacia resinomarginea shrubland-Eucalyptus woodland. Associated species: Acacia resinomarginea, Allocasuarina acutivalvis, A. corniculata, Eucalyptus loxophleba, Euc. transcontinentalis.			Mount Walton Intractable Waste Disposal compound, 100 km NE Koolyanobbing,
	1153536	2009	Grevillea georgeana	3		Banded ironstone.				Mount Dimer, Jaurdi Station
	1362704	2009	Grevillea georgeana	3	Shrub to 2 m high.	On Banded Ironstone.	With Acacia quadrimarginea.			Jaurdi Station, Mount Walton
	6296467	2009	Grevillea georgeana	3	Perennial shrub ca 1.5 m high. Red flowers.	Hill. Crest and slopes of rocky ridge. Skeletal red soil. Banded chert and laterite. Banded ironstone.	Low Woodland B. Acacia/Grevillea thicket with scattered trees and shrubs over shrubs and herbs.	frequent.		Site J1-7. Banded ironstone hill, ca 1 km E on Mount Dimer mine access road from the Jaurdi - Mount Manning track, Jaurdi Station
	7683170	2009	Grevillea georgeana	3		Rocky outcrop. Silica rich. Dry, light brown loam over sheet boulder.	Open Tall Shrubland over moderate Baeckea elderiana dominated low shrubland over rocky outcrops and stony soils. Acacia acuminata, Allocasuarina acutivalvis subsp. acutivalvis, Melaleuca hamata, Baeckea elderiana, Acacia acuminata, Leucopogon breviflorus			Mt Finnerty Project Area, 70 km N of Southern Cross
	8088683	2009	Grevillea georgeana	3	180 cm high.	Flat. Red-brown clay. Low disturbance. Fire > 10 years prior to collection.	Malleostemon roseus, Grevillea zygoloba, Leucopogon breviflorus, Phebalium canaliculatum, Prostanthera grylloana.			Bungalbin - Kooyanobbing
	8589801	2009	Grevillea georgeana	3	Shrub.	Low slope. Ironstone gravel on red sand.	Acacia burkittii, Prostanthera grylloeana, Grevillea obliquistigma, Santalum spicatum, Prostanthera campbellii, Eremophila granitica.			S of Mount Manning, 105 km NE of Southern Cross
	8600694	2009	Grevillea georgeana	3	Perennial shrub to 80 cm high.	Mid slope in mining lease site. Red clay.	Mixed shrubs with low emergent eucalypts. Associated species: Eucalyptus clelandii, Scaevola spinescens, Allocasuarina campestris, Eremophila oppositifolia subsp. angustifolia, Olearia muelleri, Melaleuca leiocarpa.		Reproductive stage: fruit.	Bungalbin, c. 105 km NE of Southern Cross
	8629625	2009	Grevillea georgeana	3	Shrub 2-3 m. Flowering.	Banded Iron formation over BIF.	Eremophila, Banksia arborea.			59 km N-E of Taipan Hill

FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Des	Site_Descr	Vegetation	Frequency	Notes	Locality
	8284946	3666	Labichea eremaea	3	Shrub, 80 cm tall. Yellow flowers.	Undulating sandplain. Dry yellow sand.	Open mallee of Eucalyptus rigidula over Acacia shrubs over Triodia.	1 plant seen.		Adjacent to the Mount Dimer - Mount Walton Waste Facility track ca 21 km ESE of Mount Dimer
	8285055	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)	3	Small shrub, 30 cm tall. Red/pink flowers.	Flat. Dry yellow orange sand. Fire: ca 5 years ago.	Open shrubland of Acacia resinimarginea with Acacia sibina.	ca 70 plants locally in 50 x 50 m.		Ca 14.5 km S-E of Mount Dimer. Ca 12.7 km N of Mount Walton. Just S of E-W track that runs from old Mount Dimer mine site to the Mount Walton track
	1102257	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)	3						16 km NE of Yendilberin Hills (NE of Southern Cross)
	1102265	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069)	3						16 km NE of Yendilberin Hills (NE of Southern Cross).
	5645166	6121	Verticordia stenopetala	3	Low shrub.	Yellow sand-gravel over laterite. Slope.	Sparse Eucalyptus transcontinentalis over moderately dense Acacia signata. Associated species: Acacia resinomarginea, Phebalium canaliculatum, Grevillea paradoxa, Astroloma microphyllum, Thryptomene urceolaris.			Mount Walton Retractable Waste Storage Facility, 100 km NE Koolyanobbing,
	6163092	32685	Banksia arborea	4	Tree. Ca 3 m high. Yellow flowers. Fruiting.	Hill. Crest and slopes of rocky ridge. Skeletal red soil. Banded chert and laterite. Banded ironstone.	Low Woodland B. Acacia/Grevillea thicket with scattered trees and shrubs over shrubs and herbs.	locally abundant.		Site J1-7. Banded ironstone hill, ca 1 km E on Mount Dimer mine access road from the Jaurdi - Mount Manning track, Jaurdi Station
	1804243	32685	Banksia arborea	4	Tree, to 3 m, flowers yellow.	Ironstone ridges.		common.		Mount Dimer, S end Hunt Ranges
	6163106	32685	Banksia arborea	4	Tree. Ca 3.5 m high. Yellow flowers. Fruiting.	Hill. Crest and slopes of rocky ridge. Skeletal red soil. Banded chert and laterite. Banded ironstone.	Low Woodland B. Acacia/Grevillea thicket with scattered trees and shrubs over shrubs and herbs.	locally abundant.		Site J1-7. Banded ironstone hill, ca 1 km E on Mount Dimer mine access road from the Jaurdi - Mount Manning track, Jaurdi Station
	8629528	32685	Banksia arborea	4	Tree. Flowering, fruiting, covered in black scale (common at this locality).	Banded Iron formation over BIF.	Grevillea georgeana, Eremophila.			59 km N-E of Taipan Hill

FID_	PopId	Nameid	Taxon	ConsStatus	WARank	PopNumber	SubPop Code	PopStatus	Location	District	Vesting	Purpose 1	Purpose 2	CountDate	Method	MatureCoun	LiveTotal	inFlower
	96399	32685	Banksia arborea	4		9			UCL, Lot 131. Ex Jaurdi Station. Exploration Lease E77/1418. Site J1-7, Banded Ironstone hill ca. 1km E on Mt Dimer mine access Rd from the Jaurdi-Mt Manning Track. [Ca. 5.6km S of Mt Dimer].	KALGOORLIE	NON	UCL	EPL	5/10/1999 0:00		0	0	N
	96359	32685	Banksia arborea	4		14			UCL, Lot 131, Exploration Lease. Ex Jaurdi Station. Mount Dimer, S end of Hunt Range.	KALGOORLIE	NON	UCL	EXL	13/05/1978 0:00		0	0	N
	87651	5448	Calytrix creswellii	3		8			Intractable Waste Storage Site (CR42001), Lot 73. Mt Walton Intractable Waste Disposal compound, 100km NE of Koolyanobbing. [Ca. 49km E of Bungalbin Hill].	KALGOORLIE	RDL	OTH		20/11/1996 0:00		0	0	N
	87640	5448	Calytrix creswellii	3		10			UCL. Ca. 14km SE of Mt Walton Waste Facility. Ca. 18km ENE of Mt Walton, ca. 80km NE of Koolyanobbing.	KALGOORLIE	NON	UCL		23/09/2010 0:00	ACT_IND	348	348	N
	87642	5448	Calytrix creswellii	3		12			UCL. Ca. 11.5km S of Mt Walton Waste Disposal Facility, east of Yendilberin Hills. Ca. 11.5km ENE of Mt Walton. Near north-south track that runs south from the Mt Walton Waste Disposal (not the main access track).	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	60	60	N
	87643	5448	Calytrix creswellii	3		13			UCL. Ca. 13.5km S of Mt Walton Waste Disposal Facility, east of Yendilberin Hills. Ca. 10.5km ENE of Mt Walton. Near north-south track that runs south from the Mt Walton Waste Disposal (not the main access track).	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	21	21	N
	85544	2009	Grevillea georgeana	3		17			UCL, Lot 131. Ex-Jaurdi Station. Exploration Lease E77/1418. 5km SW of Mt Dimer. [Just E of Taipan Mine].	KALGOORLIE	NON	UCL	EPL	4/10/1991 0:00	ESTMT	70	70	Y
	85545	2009	Grevillea georgeana	3		18			UCL, Lot 131. Ex-Jaurdi Station. Exploration Lease E77/1418. On Hill NMF 398 in Yendilberin Hills. Site J1-7, banded ironstone hill, ca. 1km E on Mt Dimer Mine Access Rd from the Jaurdi-Mt Manning track.	KALGOORLIE	NON	UCL	EPL	5/10/1999 0:00		0	0	Y
	85546	2009	Grevillea georgeana	3		19			UCL, Lot 131. Ex-jaurdi Station. Exploration Lease E77/1418. Ca. 105km NE of Southern Cross. [Ca. 2.7km S of Mt Dimer]. [Ca. 26.8km E of Bungalbin Hill].	KALGOORLIE	NON	UCL	EPL	22/08/2007 0:00		0	0	N
	85548	2009	Grevillea georgeana	3		20			UCL, Lot 131. Ex-jaurdi Station. Exploration Lease E77/1418. Mount Dimer.	KALGOORLIE	NON	UCL	EPL	7/11/1989 0:00		0	0	N
	85549	2009	Grevillea georgeana	3		21			UCL, Lot 131. Ex-jaurdi Station. Mining Lease M77/1244. Carina Prospect, Yendilberin Hills. [Ca. 14.5km SE of Mt Dimer].	KALGOORLIE	NON	UCL	EPL	30/03/2009 0:00		0	0	Y
	85555	2009	Grevillea georgeana	3		27			UCL, Lot 131, Ex-Jaurdi Station. Exploration Lease E77/1115. Chameleon Prospect, 105km NE of Southern Cross. [Yendilberin Hills]. [Ca. 1.2km N of Mt Walton].	KALGOORLIE	NON	UCL	EXL	29/05/2008 0:00		5	5	N
	85556	2009	Grevillea georgeana	3		28			UCL, Lot 131, Ex-Jaurdi Station. Mt Finnerty Project Area, [105km NE of Southern Cross]. [Ca. 2.3km SE of Mt Walton].	KALGOORLIE	NON	UCL		25/09/2004 0:00		0	0	N
	88113	5811	Homalocalyx grandiflorus	3		12			UCL. Ca. 14km SE of Mt Walton Waste Facility. Ca. 18km ENE of Mt Walton. Ca. 80km NE of Koolyanobbing.	KALGOORLIE	NON	UCL		23/09/2010 0:00	ACT_IND	2	2	N

FID_	PopId	Nameid	Taxon	ConsStatus	WARank	PopNumber	SubPop Code	PopStatus	Location	District	Vesting	Purpose 1	Purpose 2	CountDate	Method	MatureCoun	LiveTotal	inFlower
	88115	5811	Homalocalyx grandiflorus	3		14			UCL. Ca. 13km S of Mt Walton Waste Disposal facility, E of Yendilberin Hills. Ca. 11km ENE of Mt Walton. Near N-S track that runs south of the Mt Walton Waste Disposal facility (not the main access track).	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	10	10	N
	88116	5811	Homalocalyx grandiflorus	3		15			UCL. Ca. 13.5km S of Mt Walton Waste Disposal facility, E of Yendilberin Hills. Ca. 10.5km ENE of Mt Walton. Near N-S track that runs south of the Mt Walton Waste Disposal facility (not the main access track).	KALGOORLIE	NON	UCL		22/09/2010 0:00	ACT_IND	38	38	N
	86566	3666	Labichea eremaea	3		9			UCL. Ca. 21km ESE of Mt Dimer. Ca. 15km NNE of Mt Walton. Ca. 5km SW of Mt Walton Waste Facility. Near east-west track that runs from Mt Dimer minesite to the Mt Walton track.	KALGOORLIE	NON	UCL		22/09/2010 0:00	ACT_IND	1	1	Y
	96768	36059	Leucopogon sp. Yellowdine (M. Hislop & F. Hort MH 3194)	1		3			UCL. Ca. 13km S of Mt Walton Waste Disposal faciility. E of Yendilberin Hills. Ca. 11km ENE of Mt Walton. Near the N-S track that runs south from the Mt Walton Waste Disposal facility (not the main access track).	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	30	30	N
	94445	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069) PN	3		19			UCL. Ca. 15.5km SSE of Mt Walton Waste Facility. Ca. 18km ENE of Mt Walton. Ca. 80km NE of Koolyanobbing.	KALGOORLIE	NON	UCL		23/09/2010 0:00	ACT_IND	5	5	N
	94447	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069) PN	3		20			UCL. Ca. 14km SE of Mt Walton Waste Facility. Ca. 18km ENE of Mt Walton. Ca. 80km NE of Koolyanobbing.	KALGOORLIE	NON	UCL		23/09/2010 0:00		2	2	N
	94448	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069) PN	3		21			UCL. Ca. 16km SE of Mt Dimer. Ca. 12.5km NNE of Mt Walton. Near east-west track that runs from Mt Dimer minesite to the Mt Walton track.	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	600	600	Y
	94449	41785	Melichrus sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069) PN	3		22			UCL. Ca. 14.5km SE of Mt Dimer. Ca. 12.7km N of Mt Walton. Just south of east-west track that runs from Mt Dimer minesite to the Mt Walton track.	KALGOORLIE	NON	UCL		22/09/2010 0:00	ESTMT	70	70	Y
	93376	16621	Phebalium appressum	1		3			UCL. Ca. 18km ESE of Mt Dimer. Ca. 12.5km NNE of Mt Walton. Near E-W track that runs from Mt Dimer minesite to the Mt Walton track [Mt Walton Rd].	KALGOORLIE	NON	UCL		22/09/2010 0:00	ACT_IND	5	5	Y
	88246	6121	Verticordia stenopetala	3		3			UCL, Mount Walton intractable waste storage facility (R 42001), [S of southern boundary of reserve], 100km NE of Koolyanobbing. Shire of Coolgardie.	KALGOORLIE	NON	UCL		8/11/1996 0:00		0	0	N

APPENDIX 2

Species List

SPECIES LIST – Sandy Ridge Project (September 2015)

GYMNOSPERMS

CUPRESSACEAE
Callitris preissii

MONOCOTYLEDONS

ASPARAGACEAE
Thysanotus patersonii

CYPERACEAE
Lepidosperma lyonsii **(P4)**
Lepidosperma sp.
Schoenus hexandrus

HEMEROCALLIDACEAE
Dianella revoluta var. *divaricata*

POACEAE
Aristida contorta
Austrostipa nitida
Triodia rigidissima
Triodia scariosa

XANTHORRHOEACEAE
Xanthorrhoea thorntonii

DICOTYLEDONS

AMARANTACEAE
Ptilotus obovatus
Ptilotus sp.

APOCYNACEAE
Alyxia buxifolia

ASTERACEAE
Calocephalus knappii
Olearia elaeophila
Olearia exiguifolia
Olearia incana
Olearia muelleri
Olearia pimeleoides
Podolepis capillaris
Rhodanthe citrina

BORAGINACEAE
Halgania andromedifolia

BRASSICACEAE
Stenopetalum filifolium

CASUARINACEAE
Allocasuarina acutivalvis subsp. *acutivalvis*
Allocasuarina corniculata

CHENOPODIACEAE
Atriplex vesicaria
Maireana georgei
Sclerolaena densiflora

ERICACEAE
Leucopogon sp. Clyde Hill

EUPHORBIACEAE
Bertya dimerostigma
Beyeria calycina
Beyeria sulcata var. *sulcata*

FABACEAE
Acacia acuminata
Acacia burkittii
Acacia colletioides
Acacia enervia subsp. *enervia*
Acacia kempeana
Acacia multispicata
Acacia neurophylla
Acacia nigripilosa subsp. *nigripilosa*
Acacia resinimarginea
Acacia tetragonophylla
Acacia verricula
Daviesia benthamii subsp. *acanthoclona*
Senna artemisioides

GOODENIACEAE
Coopernookia strophiolata
Scaevola spinescens

LAMIACEAE
Cyanostegia angustifolium
Prostanthera microphylla
Westringia rigida

MALVACEAE
Keraudrenia velutina subsp. *velutina*

MYRTACEAE
Balaustion pulcherrimus
Calytrix birdii
Calytrix creswellii **(P3)**
Calytrix violacea
Eucalyptus gracilis
Eucalyptus corrugata
Eucalyptus kochii subsp. *plenissima*
Eucalyptus leptopoda
Eucalyptus pileata
Eucalyptus ?rigidula
Eucalyptus salmonophloia
Eucalyptus salubris var. *salubris*
Eucalyptus yilgarnensis
Homalocalyx thryptomenoides
Leptospermum roei
Malleostemon peltiger
Malleostemon roseus
Melaleuca calyptroides
Melaleuca cordata
Melaleuca eleuterostachya
Melaleuca laxiflora
Melaleuca uncinata

PROTEACEAE
Grevillea beardiana
Grevillea eriostachya
Grevillea hookeriana subsp. *apiciloba*
Grevillea obliquistigma
Grevillea paradoxa
Grevillea teretifolia
Grevillea zygoloba
Hakea francisiana

RUTACEAE
Phebalium canaliculatum
Phebalium filifolium
Phebalium tuberculosum
Philotheca brucei subsp. *brucei*
Philotheca rhomboidea

SANTALACEAE
Exocarpos aphyllus
Exocarpos sparteus
Santalum acuminatum

SAPINDACEAE
Dodonaea stenozyga

SOLANACEAE
Solanum hoplopetalum

SCROPHULARIACEAE
Eremophila decipiens subsp. *decipiens*
Eremophila ionantha
Eremophila maculata
Eremophila oppositifolia
Eremophila pantonii

STYLIDIACEAE
Stylidium repens

APPENDIX 3

Quadrat Data

QUADRAT SR1

51 219959 E 6638802 N

Vegetation: *Acacia resinimarginea/Allocasuarina acutivalvis* Open Heath

Condition: Excellent
Soil Type: Light yellow-brown loamy sand, pebbly ironstone
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Acacia resinimarginea	1	50
Allocasuarina acutivalvis	1	2
Grevillea paradoxa	0.6	<1
Phebalium canaliculatum	0.5	<1
Phebalium filifolium	0.4	<1
Phebalium tuberculosum	0.3	<1
Aristida contorta	0.3	<1

QUADRAT SR2

51 220378 E 6638790 N

Vegetation: *Eucalyptus gracilis* Shrub Mallee over *Acacia nigripilosa* subsp. *nigripilosa* Low Shrubland

Condition: Excellent

Soil Type: Red-orange sandy loam

Landform: Top of broad ridge

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus gracilis	4	40
Melaleuca uncinata	1.1	<1
Acacia nigripilosa 2subsp. *nigripilosa*	1	10
Senna artemisioides	1	<1
Phebalium filifolium	0.6	1
Alyxia buxifolia	0.4	<1
Coopernookia strophiolata	0.4	<1
Scaevola spinescens	0.4	<1
Olearia muelleri	0.3	<1
Acacia colletioides	0.3	<1
Triodia scariosa	0.3	<1

QUADRAT SR2.1

51 220262 E 6638790 N

Vegetation: *Acacia resinimarginea* Open Heath over *Triodia scariosa* Open Grassland
Condition: Excellent
Soil Type: Light orange-brown loamy sand
Landform: Upper slope of low dune

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Acacia resinimarginea	1.2	40
Eucalyptus yilgarnensis	1.2	<1
Eucalyptus kochii subsp. *plenissima*	1	<1
Acacia nigripilosa 3subsp. *nigripilosa*	0.8	1
Phebalium filifolium	0.4	2
Triodia scariosa	0.3	25
Callitris preissii	Dead, no seedlings	

QUADRAT SR3

51 220026 E 6638408 N

Vegetation: *Acacia resinimarginea* Open Heath
Condition: Excellent
Soil Type: Yellow-brown loamy sand
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Acacia resinimarginea	1.1	40
Calytrix creswellii **P3**	0.5	2
Grevillea beardiana	0.5	2
Homalocalyx thryptomenoides	0.4	2
Phebalium filifolium	0.4	<1
Triodia scariosa	0.4	<1
Phebalium canaliculatum	0.3	<1

QUADRAT SR4

51 219952 E 6638091 N

Vegetation: *Acacia resinimarginea* Shrubland over *Triodia scariosa* Open Grassland
Condition: Excellent
Soil Type: Light orange-brown loamy sand
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Acacia resinimarginea	1.1	25
Acacia kempeana	1	<1
Grevillea beardiana	0.6	2
Triodia scariosa	0.3	25
Homalocalyx thryptomenoides	0.3	1
Keraudrenia integrifolia	0.2	<1

QUADRAT SR5

51 219681 E 6637892 N

Vegetation: *Acacia resinimarginea* Shrubland over *Triodia scariosa* Open Grassland
Condition: Excellent
Soil Type: Light orange-brown loamy sand
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Acacia resinimarginea	1.2	30
Xanthorrhoea thorntonii	1	<1
Lepidosperma sp.	0.5	<1
Phebalium filifolium	0.4	<1
Triodia scariosa	0.3	20
Homalocalyx thryptomenoides	0.3	10
Grevillea beardiana	0.3	1
Phebalium tuberculosum	0.3	1
Callitris preissii	Dead, no seedlings	

QUADRAT SR6

51 220632 E 6637591 N

Vegetation: *Acacia resinimarginea* Open Heath
Condition: Excellent
Soil Type: Light orange-brown loamy sand
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Acacia resinimarginea	1.2	40
Grevillea beardiana	0.7	<1
Melaleuca uncinata	0.6	<1
Phebalium filifolium	0.4	4
Phebalium canaliculatum	0.4	2
Homalocalyx thryptomenoides	0.3	10
Triodia scariosa	0.2	<1
Callitris preissii	0.2 (dead shrubs 3m)	<1

QUADRAT SR7

51 220389 E 6636956 N

Vegetation: *Acacia resinimarginea/Eucalyptus pileata* Shrubland over *Triodia scariosa* Open Grassland
Condition: Excellent
Soil Type: Light orange-brown loamy sand
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus pileata	2	2
Exocarpos sparteus	1.8	<1
Hakea francisiana	1.4	<1
Acacia resinimarginea	1.2	25
Triodia scariosa	0.4	25
Phebalium filifolium	0.4	4
Phebalium canaliculatum	0.4	1
Homalocalyx thryptomenoides	0.3	2
Callitris preissii	0.3 (dead shrubs 3m)	<1
Keraudrenia integrifolia	0.2	<1

QUADRAT SR8

51 220804 E 6636999 N

Vegetation: *Acacia resinimarginea* Open Heath
Condition: Excellent
Soil Type: Light orange-brown loamy sand
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Acacia resinimarginea	1.2	40
Phebalium canaliculatum	0.4	<1
Grevillea beardiana	0.4	<1
Homalocalyx thryptomenoides	0.3	25
Phebalium filifolium	0.3	<1
Balaustion pulcherrimum	0.3	<1
Callitris preissii	0.3 seedling	<1
Triodia scariosa	0.2	<1

QUADRAT SR9

51 221043 E 6636957 N

Vegetation: *Acacia resinimarginea* Open Heath
Condition: Excellent
Soil Type: Light orange-brown loamy sand
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus pileata	1.6	1
Acacia resinimarginea	1.2	50
Melaleuca uncinata	0.8	<1
Phebalium filifolium	0.5	4
Phebalium canaliculatum	0.4	<1
Acacia multispicata	0.4	<1
Homalocalyx thryptomenoides	0.3	2
Callitris preissii	0.3 (dead shrubs 3m)	<1

QUADRAT SR10A

51 220916 E 6637212 N

Vegetation: *Acacia resinimarginea* Open Heath
Condition: Excellent
Soil Type: Light orange-brown loamy sand
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Acacia resinimarginea	1.2	40
Eucalyptus pileata	1.2	1
Melaleuca uncinata	1.1	<1
Phebalium canaliculatum	0.5	5
Homalocalyx thryptomenoides	0.3	5
Phebalium tuberculosum	0.3	<1
Leptospermum roei	0.3	<1
Aristida contorta	0.2	<1
Callitris preissii	0.2	<1

QUADRAT SR10

51 218493 E 6637372 N

Vegetation: *Eucalyptus corrugata* Low Woodland over *Acacia tetragonophylla* Tall Open Shrubland
Condition: Excellent
Soil Type: Orange-red sand
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus corrugata	8	25
Eucalyptus gracilis	4	2
Santalum acuminatum	3	<1
Acacia tetragonophylla	2.5	10
Acacia verricula	1.2	<1
Alyxia buxifolia	1.1	1
Exocarpos aphyllus	1.1	<1
Senna artemisioides	1	1
Phebalium filifolium	1	1
Austrostipa nitida	1	<1
Acacia colletioides	0.7	1
Scaevola spinescens	0.4	<1
Olearia muelleri	0.3	1

QUADRAT SR11

51 219078 E 6636778 N

Vegetation: *Eucalyptus gracilis* Very Open Shrub Mallee over *Acacia burkittii* Tall Open Shrubland over *Melaleuca uncinata* Open Shrubland

Condition: Excellent

Soil Type: Red hard loamy sand

Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus gracilis	5	10
Acacia burkittii	3	5
Alyxia buxifolia	2.1	1
Melaleuca uncinata	1.8	5
Exocarpos aphyllus	1.8	<1
Senna artemisioides	1.5	1
Allocasuarina corniculata	1.1	<1
Beyeria sulcata subsp. *sulcata*	1.1	<1
Phebalium filifolium	1	1
Scaevola spinescens	0.5	<1
Eremophila pantonii	0.4	<1
Olearia muelleri	0.4	<1
Acacia colletioides	0.3	1

QUADRAT SR12

51 219838 E 6636414 N

Vegetation: *Callitris preissii/Acacia resinimarginea* Tall Shrubland
Condition: Excellent
Soil Type: yellow loamy sand
Landform: Slight rise

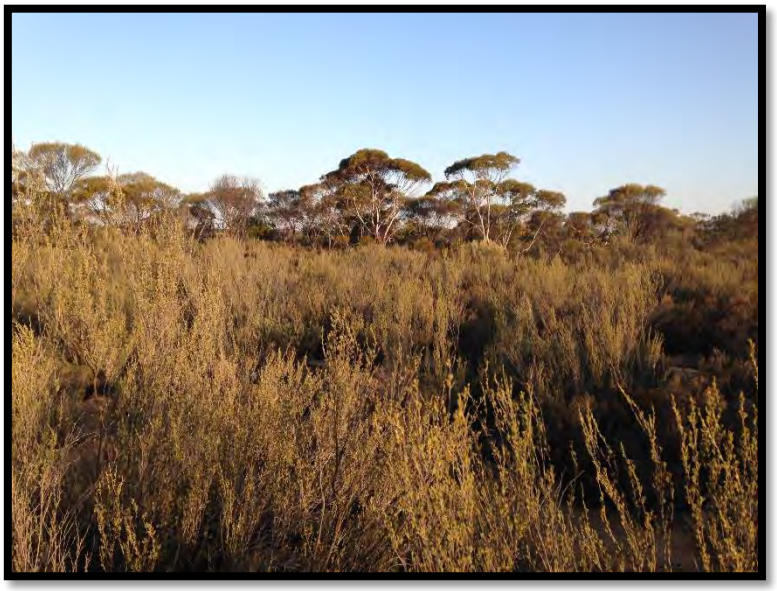
QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Callitris preissii	4	5
Acacia resinimarginea	2.5	10
Melaleuca uncinata	2.1	1
Eucalyptus pileata	2	<1
Leptospermum roei	1.5	5
Homalocalyx thryptomenoides	1	15
Phebalium canaliculatum	0.7	1
Triodia scariosa	0.3	1

QUADRAT SR13

51 220578 E 6636369 N

Vegetation: *Leptospermum roei* Open Heath
Condition: Excellent
Soil Type: Yellow loamy sand
Landform: Flat



QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Melaleuca uncinata	2	<1
Leptospermum roei	1.8	50
Grevillea beardiana	1	<1
Phebalium canaliculatum	0.6	<1
Homalocalyx thryptomenoides	0.5	20

QUADRAT SR14

51 221283 E 6636388 N

Vegetation: *Callitris preissii/Acacia resinimarginea* Tall Shrubland
Condition: Excellent
Soil Type: Light yellow-brown loamy sand
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Callitris preissii	3	5
Eucalyptus pileata	2.1	<1
Acacia resinimarginea	1.2	10
Leptospermum roei	1.2	5
Melaleuca uncinata	0.6	<1
Allocasuarina corniculata	0.6	<1
Lepidosperma sp	0.5	<1
Balaustion pulcherrimum	0.4	<1
Grevillea beardiana	0.4	<1
Acacia enervia subsp. *enervia*	0.4	<1
Homalocalyx thryptomenoides	0.3	4
Triodia scariosa	0.2	<1

QUADRAT SR15

51 221674 E 6632228 N

Vegetation: *Eucalyptus pileata* Open Shrub Mallee over *Melaleuca uncinata* Open Shrubland over *Triodia scariosa* Open Grassland

Condition: Excellent

Soil Type: Light orange-red sand

Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus pileata	2	25
Acacia neurophylla	1.8	1
Hakea francisiana	1.5	1
Melaleuca uncinata	1.1	5
Melaleuca eleuterostachya	1	1
Phebalium filifolium	0.7	<1
Triodia scariosa	0.3	20
Podolepis capillaris	0.3	<1
Bertya dimerostigma	0.2	1

QUADRAT SR16

51 219424 E 6635881 N

Vegetation: *Eucalyptus corrugata* Low Woodland over *Acacia tetragonophylla* Tall Open Shrubland

Condition: Excellent

Soil Type: Light orange-brown loamy sand

Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus corrugata	8	10
Acacia tetragonophylla	3	5
Eremophila decipiens subsp. *decipiens*	2.5	1
Santalum acuminatum	2	<1
Exocarpos aphyllus	2	<1
Scaevola spinescens	1	4
Phebalium filifolium	0.8	<1
Acacia colletioides	0.7	<1
Austrostipa nitida	0.6	<1
Triodia scariosa	0.3	<1
Triodia rigidissima	0.3	<1
Philotheca rhomboidea	0.3	<1
Aristida contorta	0.2	<1

QUADRAT SR17

51 219599 E 6635801 N

Vegetation: *Eucalyptus salmonophloia* Woodland over *Acacia tetragonophylla* Tall Open Shrubland
Condition: Excellent
Soil Type: Orange-red sandy loam
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus salmonophloia	12	10
Acacia tetragonophylla	2.5	10
Santalum acuminatum	1.9	<1
Eremophila decipiens subsp. *decipiens*	1.8	<1
Eremophila pantonii	1.6	<1
Acacia colletioides	1	10
Scaevola spinescens	0.8	5
Senna artemisioides	0.6	<1
Acacia nigripilosa subsp. *nigripilosa*	0.5	<1
Eremophila maculata	0.5	<1
Olearia muelleri	0.3	<1
Triodia scariosa	0.3	<1

QUADRAT SR18

51 216759 E 6632407 N

Vegetation: *Acacia resinimarginea/Melaleuca uncinata* Open Low Heath
Condition: Excellent
Soil Type: Light orange-brown loamy sand with ironstone
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus pileata	2	<1
Acacia resinimarginea	1	25
Acacia kempeana	1	<1
Melaleuca uncinata	0.9	20
Grevillea paradoxa	0.8	<1
Allocasuarina corniculata	0.5	<1
Triodia scariosa	0.4	1
Acacia enervia subsp. *enervia*	0.4	<1
Phebalium filifolium	0.4	<1
Phebalium canaliculatum	0.3	<1
Schoenus hexandrus	0.3	<1
Grevillea beardiana	0.3	<1
Thysanotus patersonii	Climber	<1

QUADRAT SR19

51 216284 E 6631694 N

Vegetation: *Eucalyptus salubris* var. *salubris* Open Shrub Mallee over *Melaleuca uncinata* Open Shrubland

Condition: Excellent

Soil Type: Orange-red sandy loam with ironstone pebbles

Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus salubris var. *salubris*	5	10
Melaleuca uncinata	1.1	20
Eremophila ionantha	1	1
Senna artemisioides	0.8	4
Acacia resinimarginea	0.8	2
Acacia tetragonophylla	0.8	<1
Phebalium filifolium	0.6	<1
Austrostipa nitida	0.6	<1
Olearia pimelioides	0.4	<1
Scaevola spinescens	0.3	1
Acacia colletioides	0.2	<1
Aristida contorta	0.2	<1

QUADRAT SR20

51 212191 E 6626740 N

Vegetation: *Eucalyptus gracilis* Open Shrub Mallee over *Acacia acuminata/Eremophila oppositifolia* Open Shrubland
Condition: Excellent
Soil Type: Orange-red sandy loam with ironstone pebbles
Landform: Slight depression

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus gracilis	4	15
Acacia acuminata	2.5	5
Acacia tetragonophylla	1.7	1
Eremophila oppositifolia	1.1	5
Senna artemisioides	1.1	2
Eremophila maculata	1	<1
Alyxia buxifolia	1	<1
Austrostipa nitida	1	<1
Prostanthera microphylla	0.6	<1
Olearia elaeophila	0.4	<1
Olearia muelleri	0.3	<1

QUADRAT SR21

51 212321 E 6626873 N

Vegetation: *Acacia burkittii* Tall Shrubland
Condition: Excellent
Soil Type: Orange-red sandy loam with ironstone pebbles
Landform: Bottom of low valley

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Acacia burkittii	3	20
Grevillea eriostachya	1.3	<1
Homalocalyx thryptomenoides	1	25
Prostanthera microphylla	1	<1
Leucopogon sp. Clyde Hill	0.6	5
Senna artemisioides	0.4	<1
Rhodanthe citrina	0.1	<1
Calocephalus knappii	<0.1	<1
Thysanotus patersonii	Climber	<1

QUADRAT S22

51 212796 E 6627468 N

Vegetation: *Eucalyptus salmonophloia* Woodland over *Eremophila oppositifolia* Open Heath
Condition: Excellent
Soil Type: Orange-red sandy loam
Landform: Flat

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus salmonophloia	12	20
Eucalyptus gracilis	4	<1
Santalum acuminatum	3	<1
Eremophila oppositifolia	1.2	15
Eremophila pantonii	1.1	1
Exocarpos aphyllus	1	<1
Atriplex vesicaria	0.8	2
Senna artemisioides	0.6	1
Alyxia buxifolia	0.5	<1
Olearia muelleri	0.3	<1
Acacia colletioides	0.3	<1
Acacia tetragonophylla	0.2	1
Maireana georgei	0.2	<1
Ptilotus obovatus	0.2	<1
Sclerolaena densiflora	0.1	<1

QUADRAT SR23

51 214904 E 6630126 N

Vegetation: *Eucalyptus ?rigidula* Very Open Shrub Mallee over *Melaleuca uncinata/Acacia acuminata* Open Low Heath

Condition: Excellent

Soil Type: Orange-red sandy loam

Landform: Top of small rise

QUADRAT (20 x 20m)

SPECIES	HEIGHT (m)	COVER (%)
Eucalyptus ?rigidula	4	5
Acacia acuminata	1.2	5
Senna artemisioides	1	2
Eremophila ionantha	1	<1
Allocasuarina acutivalvis	1	1
Melaleuca uncinata	0.8	50
Dodonaea stenozyga	0.7	<1
Phebalium filifolium	0.5	1
Philotheca brucei subsp. *brucei*	0.4	1
Scaevola spinescens	0.4	<1
Callitris preissii	0.3	<1