Reconnaissance Flora/Vegetation & Fauna Survey East Locations 40, 39, 37, 36, 35, and 32

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Version 1

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Glossary

Acronym	Description
ANCA	Australian Nature Conservation Agency.
BA	Birdlife Australia (Formerly RAOU, Birds Australia).
BAM Act	Biosecurity and Agriculture Management Act 2007, WA Government.
BC	Botanica Consulting.
BoM	Bureau of Meteorology.
CAMBA	China Australia Migratory Bird Agreement 1998.
DAFWA	Department of Agriculture and Food (now DPIRD), WA Government.
DBCA	Department of Biodiversity, Conservation and Attractions (formerly DPaW), WA Government.
DEC	Department of Environment and Conservation (now DBCA), WA Government.
DER	Department of Environment Regulation (now DWER), WA Government.
DMIRS	Department of Mines, Industry Regulation and Safety (formerly DMP), WA Government
DMP	Department of Mines and Petroleum (now DMIRS), WA Government.

Acronym	Description
DotEE	Department of the Environment and Energy (formerly DSEWPaC), Australian Government.
DoW	Department of Water (now DWER), WA Government.
DPaW	Department of Parks and Wildlife (now DBCA), WA Government.
DPIRD	Department of Primary Industries and Regional Development, WA Government
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DotEE,), Australian Government.
DWER	Department of Water and Environmental Regulation (formerly EPA, DER and DoW), WA Government
EP Act	Environmental Protection Act 1986, WA Government.
EP Regulations	Environmental Protection (Clearing of Native Vegetation) Regulations 2004, WA Government.
EPA	Environmental Protection Authority, WA Government.
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999, Australian Government.
ESA	Environmentally Sensitive Area.
Ha	Hectare (10,000 square meters).
IBRA	Interim Biogeographic Regionalisation for Australia.
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.
JAMBA	Japan Australia Migratory Bird Agreement 1981.
Km	Kilometer (1,000 meters).
MVG	Major Vegetation Groups.
NSR	Northern Star Resources Limited.
NVIS	National Vegetation Information System.
OEPA	Office of the Environmental Protection Authority (now DWER), WA Government.
PEC	Priority Ecological Community.
RAOU	Royal Australia Ornithologist Union.
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement 2007.
SRE	Short Range Endemic.
SSC	Species Survival Commission, International.
Survey Area	East Locations 40, 39, 37, 36, 35, and 32.
TEC	Threatened Ecological Community.
WA	Western Australia.
WAHERB	Western Australian Herbarium.
WAM	Western Australian Museum, WA Government.
WC Act	Wildlife Conservation Act 1950, WA Government.

Executive Summary

Botanica Consulting (BC) was commissioned by Northern Star Resources Limited (NSR) to undertake a reconnaissance flora/vegetation survey and fauna survey of the East Locations 40, 39, 37, 36, 35, and 32 (referred to as the 'survey area'). The survey area is located within Hamptons Leases (freehold land), located approximately 86km east of Kalgoorlie-Boulder. The survey was conducted in spring (20th to 24th October 2018), covering an area of 17,221 ha.

Sixteen vegetation types were identified within the survey area. These vegetation types were located within six different landform types and comprised of five major vegetation groups, which were represented by a total of 22 Families, 37 Genera and 101 Taxa. The broad scale terrestrial fauna habitats within the survey area have been identified as comprising a mosaic of clay-loam plain, rocky hillslopes, sand-loam plains, open depressions, closed depressions and sand dunes.

Results of the literature review identified 38 mammals (including 12 bat species), 124 birds, 87 reptiles and five frog species that have previously been recorded in the general area, some of which have the potential to occur, subject to the identified habitats being suitable.

No Threatened Flora, Threatened Fauna, Migratory Fauna or Threatened Ecological Communities (TEC) as listed under the Western Australian *Wildlife Conservation (WC) Act 1950*[1] or Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* were identified within the survey area. No Priority Flora, Fauna or Priority Ecological Communities (PEC) as listed by the Department of Biodiversity, Conservation and Attractions (DBCA) were identified within the survey area.

A review of the EPBC Act threatened fauna list, DBCA's Threatened Fauna Database and Priority List, unpublished reports and scientific publications identified a number of specially protected, migratory or priority fauna species as having been previously recorded or as being potentially present in the general vicinity of the survey area. At this stage it is not possible to determine likely impacts on specific species as the position and scale of any proposed development within each location is unknown. For any small scale development, it is however concluded that no fauna of conservation significance is likely to be significantly impacted on. This conclusion is primarily based on the the relatively small size of the likely impact footprints and the extensive habitat connectivity with adjoining areas. Impacts on fauna and fauna habitat are therefore anticipated to be localised, small/negligible and as a consequence manageable. This conclusion should be reviewed when development plans for each location become available.

The survey area does not contain any world or national heritage places and does not occur within a Bush Forever site. There are no wetlands of international importance (Ramsar Wetlands), national importance (Australian Nature Conservation Agency (ANCA) Wetlands) or conservation category wetlands within the survey area.

The survey area does not contain any Environmentally Sensitive Areas (ESA) listed under the *Environmental Protection (EP) Act 1986*. However, each Hampton Location (entire survey area) is located is listed as a Schedule 1 Area under the EP Act. The survey is not located within DBCA managed land. The closest conservation reserve is the Wallaby Rocks Timber Reserve, which is located approximately 12 km south-east of the survey area.

[1] *Biodiversity Conservation Act 2016* received assent on 21 September 2016 with Parts of the Act coming into effect on 3 December 2016. Once fully enacted with enabling subsidiary regulations, it will replace the *Wildlife Conservation Act 1950*.

Based on the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988 (ranging from ‘pristine’ to ‘completely degraded’) vegetation ranged from ‘‘good’ to ‘very good’. Three introduced taxa identified within the survey area. According to the *Biosecurity and Agriculture Management (BAM) Act 2007* none of these taxa are listed as a Declared Plant.

1 Introduction

1.1 Project Description

Botanica Consulting (BC) was commissioned by Northern Star Resources Limited (NSR) to undertake a reconnaissance flora/vegetation survey and fauna survey of the East Locations 40, 39, 37, 36, 35, and 32 (referred to as the 'survey area'). The survey area is located within Hamptons Leases, approximately 86km east of Kalgoorlie-Boulder (Figure 1-1). The survey was conducted in spring (20th to 24th October 2018), covering an area of 17,221 ha.

1.2 Objectives

The flora and vegetation survey was conducted in accordance with the requirements of a reconnaissance flora survey as defined in *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016* (EPA, 2016a). The objectives of the assessment were to:

- gather background information on flora and vegetation in the local area (literature review, database and map-based searches);
- conduct a field survey to verify / ground truth the desktop assessment findings through reconnaissance survey;
- Define and map vegetation communities of the survey area to a scale appropriate for the bioregion and described according to the National Vegetation Information System (NVIS) classification (NVIS Level V – Association);
- Record all vascular plant taxa and dominant taxa of each vegetation community within the survey area and compile a species list for the survey area by vegetation type;
- Determine the local and regional conservation significance of flora and vegetation within the survey area;
- Identify and record the locations of any conservation significant flora/vegetation within the survey area;
- Identify and record the locations of any introduced flora species (including Declared Plants) within the survey area;
- Provide a map showing the distribution of conservation significant flora/vegetation within the survey area;
- Define and map the condition of vegetation within the survey area in accordance with the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988;
- Determine the State legislative context of environmental aspects required for the assessment; and
- Assess Matters of National Environmental Significance (MNES) and indicate whether potential impacts on MNES as protected under the EPBC Act are likely to require referral of the project to the Commonwealth DotEE.

The fauna survey was conducted in accordance with the requirements of a reconnaissance terrestrial fauna survey as defined in *Technical Guidance - Terrestrial Fauna Surveys for Environmental Impact Assessment – December 2016* (EPA, 2016b). The objectives of the assessment were to:

- Gather background information on fauna in the survey area (literature review, database and map-based searches);
- Delineate and characterise the faunal assemblages and fauna habitats present in the survey area;
- Document and map locations of any Threatened or Priority listed fauna species located;

- Assess the regional and local conservation status of fauna species and fauna habitats within the survey area;
- Report on the conservation status of species present using the Western Australian Museum and EPBC Act databases for presence of threatened species within the designated works area/future development site; and
- Using the most up to date information, comment on the EPBC criteria and present the data in table format.

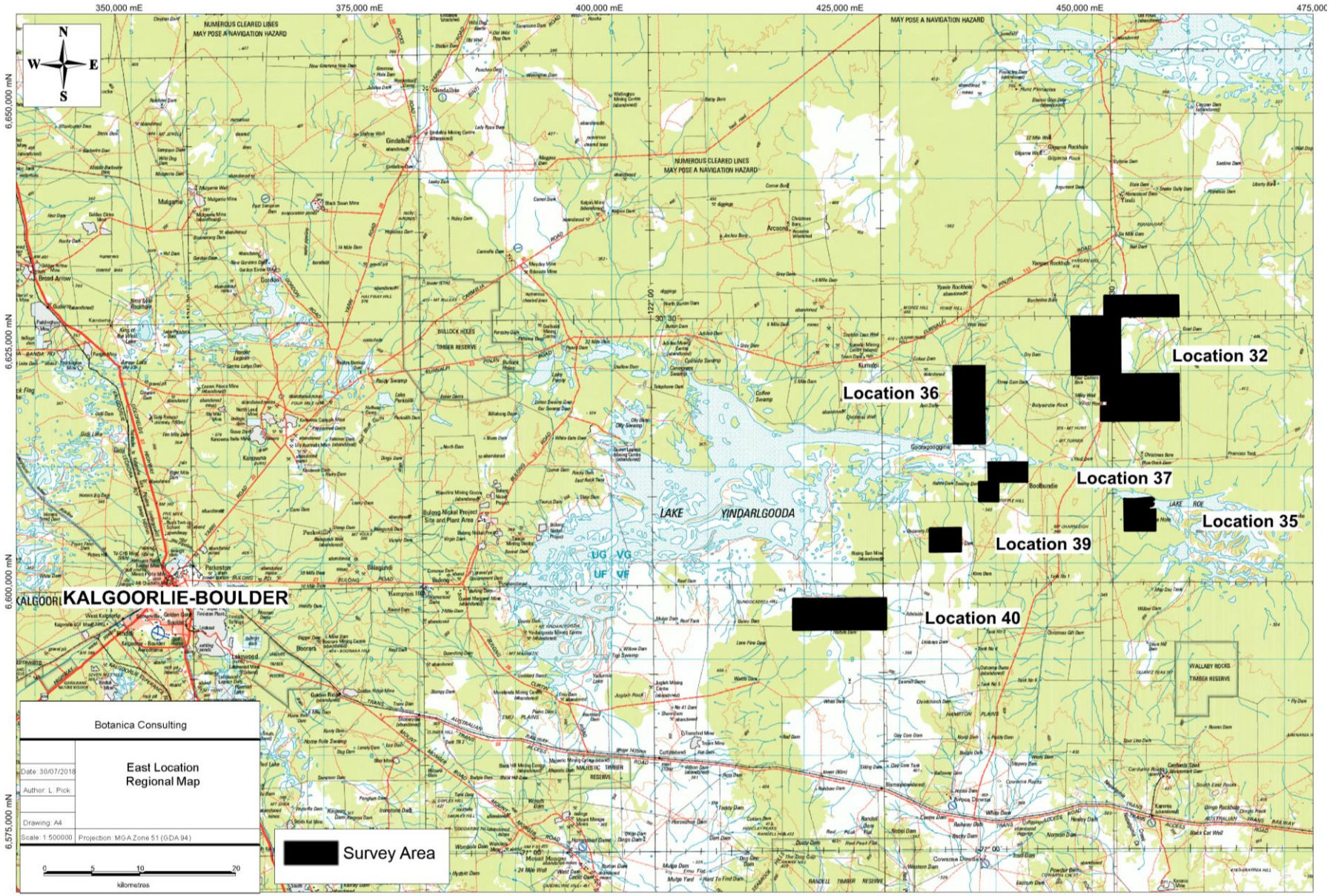


Figure 1-1: Regional map of the survey area

2 Regional Biophysical Environment

2.1 Regional Environment

The northern portion of the survey area (Lot 32, 36 and 37) lies within the Murchison Region of the Eremaean Province of WA. The southern portion of the survey area (Lot 35, 39 and 40) lies within the Coolgardie Region of the South-West Interzone of WA. These regions are further divided into subregions, based on the Interim Biogeographic Regionalisation of Australia (IBRA), with the survey area located within the Eastern Murchison (MUR1) and the Eastern Goldfields (COO3) subregions as shown in Figure 2-1.

The landscape of the Murchison bioregion comprises low hills, mesas of duricrust separated by flat colluvium and alluvial plains (Commonwealth Government, 2008). It is dominated by the Archaean (over 2500 million years ago) granite greenstone terrain of the Yilgarn Craton (Commonwealth Government, 2008). Alluvial soils and sands mantle the granitic and greenstone units of the Yilgarn Craton. These soils are shallow, sandy and infertile. Underlying the soils in low areas is a red-brown siliceous hard pan (Curry et al. 1994). The soils in the eastern half of the bioregion are typically red sands, calcareous red earth soil, duplex soil and clays. There are 41 vegetation associations (hummock grasslands, succulent steppe or low woodlands) that have at least 85 per cent of their total area in the bioregion. The bioregion is rich and diverse in both its flora and fauna but most species are wide ranging and usually occur in adjoining regions (McKenzie, May and McKenna, 2002).

The Eastern Murchison comprises the northern parts of the craton's Southern Cross and Eastern Goldfields Terrains and is characterised by internal drainage and extensive areas of elevated red desert sandplains with minimal dune development. Salt Lake systems are associated with the occluded paleodrainage system. Broad plains of red-brown soils and breakaways complexes as well as red sandplains are widespread.

The Coolgardie bioregion is within the Yilgarn Craton. Its granite basement includes Archaean Greenstone intrusions in parallel belts. Drainage is occluded. The climate is arid to semi-arid warm Mediterranean with 250-300mm of mainly winter rainfall (McKenzie, May & McKenna, 2002). Diverse woodlands, rich in endemic eucalypts, occur on low greenstone hills, on alluvial soils on the valley floors, around the saline playas of the region's occluded drainage system, and on broad plains of calcareous earths (McKenzie, May & McKenna, 2002).

The Eastern Goldfields subregion comprises gently undulating plains interrupted in the west by low hills and ridges of Archaean greenstones and in the east by a horst of Proterozoic basic granulite. The underlying strata are eroded flat and covered with Tertiary sand and gravel soils, scattered exposures of bedrock, and plains of calcareous earths. (Cowan, 2001).

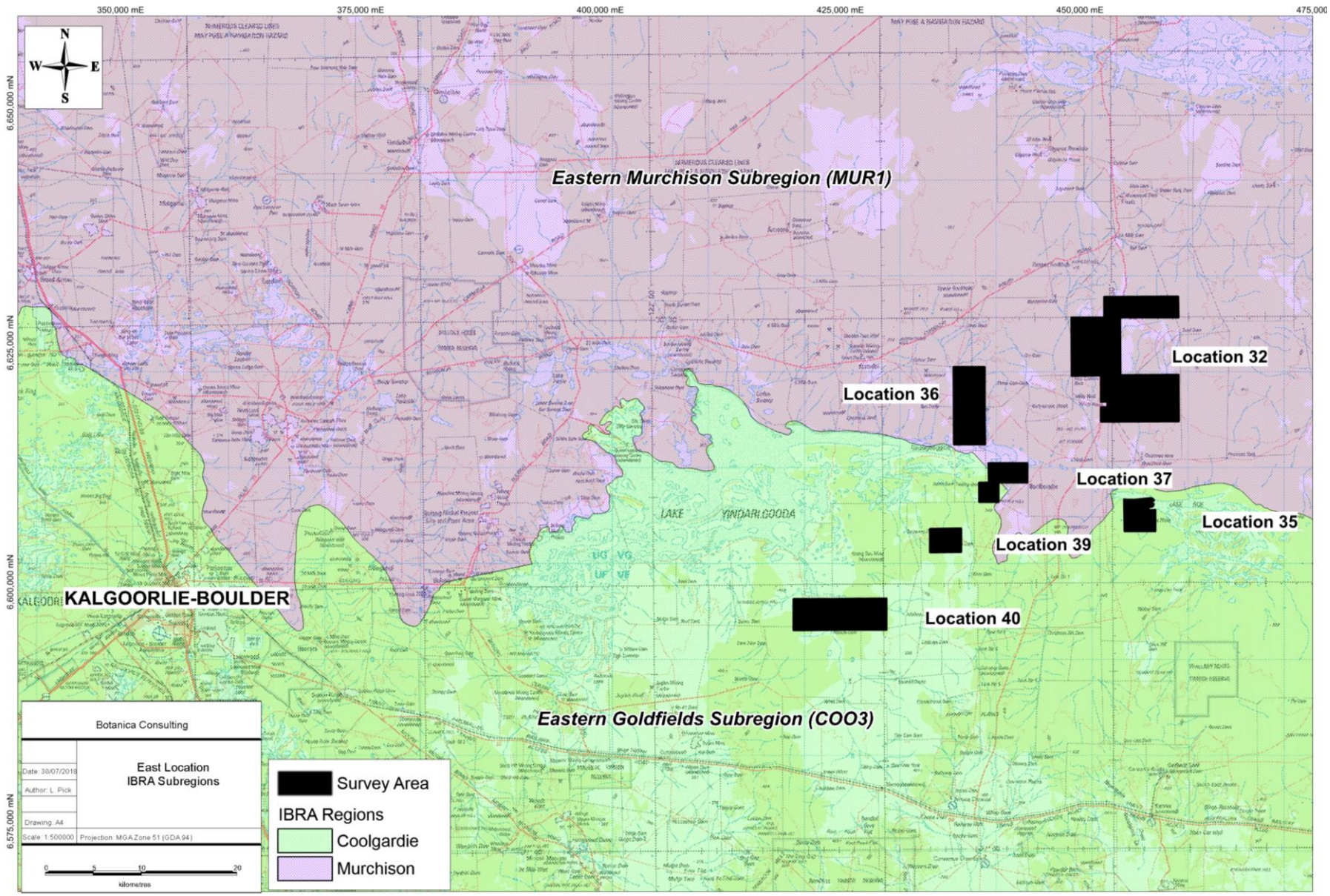


Figure 2-1: Map of IBRA Subregions in relation to the survey area

2.2 Soils and Landscape Systems

The survey area lies within the Kalgoorlie Province, which consists of undulating plains (with some sandplains, hills and salt lakes) on granitic rocks and greenstone of the Yilgarn Craton. Soils comprise of calcareous loamy earths and red loamy earths with some salt lake soils, red deep sands, yellow sandy earths, shallow loams and loamy duplexes. Vegetation includes Eucalypt woodlands with some Acacia-Casuarina thickets, mulga shrublands, halophytic shrublands and spinifex grasslands. This Province is located within the southern Goldfields between Payne's Find, Menzies, Southern Cross and Balladonia (Tille, 2006).

The Kalgoorlie Province is located on the central eastern portion of the Yilgarn Craton, mostly overlying Archaean rocks of the Southern Cross Domain and the Eastern Goldfields Superterrane. To the north-west is the Murchison Domain. The basement rocks are a mix of granite, gneiss and greenstone. Even-grained porphyritic granitic rocks (intruded by quartz veins and dolerite dykes) are most common across the north as well as in the western half and the north-east. The largest areas of migmatite and gneiss are found in the south-west (Tille, 2006).

The Kalgoorlie Province is further divided into seven soil-landscape zones, with the assessment area located within the Kambalda Zone (265). This zone is characterised by flat to undulating plains (with hills, ranges and some salt lakes and stony plains) on greenstone and granitic rocks of the Yilgarn Craton. Soils include calcareous loamy earths and red loamy earths with salt lakes soils and some red-brown hardpan shallow loams and red sandy duplexes. Vegetation comprises of red mallee blackbutt- salmon gum-gimlet woodlands with mulga and halophytic shrublands (and some spinifex grasslands). This zone is located in the south-eastern Goldfields between Menzies, Norseman and the Fraser Range (Tille, 2006). The Kambalda Zone is further divided into soil landscape systems with the soil landscape systems of the survey area described in Table 2-1 and Figure 2-2 below.

Table 2-1: Soil Landscape Systems within the survey area

Soil Landscape System	Mapping Unit Code	Description
AC1	265AC1	Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps
Bevon System	265Bv	Irregular low ironstone hills with stony lower slopes supporting mulga shrubland
Bunyip System	265By	Gilgaied drainage tract, draining greenstone hills supporting mixed halophytic shrublands occasionally with a black oak overstorey.
Carnegie System	265Ca	Salt lakes with fringing saline alluvial plains, kopi dunes and sandy banks, supporting halophytic shrublands and acacia tall shrublands.
Campsite System	265Cm	Alluvial plains supporting eucalypt woodlands with halophytic understoreys and acacia shrublands.
Deadman System	265De	Calcareous plains supporting acacia, black oak and mallee shrublands/woodlands adjacent to salt lake systems.
Graves System	265Gr	Basalt and greenstone rises and low hills supporting eucalypt woodlands with prominent saltbush and bluebush understoreys.
Gransal System	265Gs	Stony plains and low rises based on granite supporting mainly halophytic low shrublands.
Gundockerta System	265Gu	Extensive, gently undulating calcareous stony plains supporting bluebush shrublands.

Soil Landscape System	Mapping Unit Code	Description
Leonora System	265Le	Low greenstone hills and stony plains supporting mixed chenopod shrublands.
Latimore System	265Lm	Gently undulating gravelly plains and low rises on laterite with acacia tall shrublands and occasional eucalypts.
Laverton System	265Lv	Greenstone hills and ridges with acacia shrublands.
Moriarty System	265Mo	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys.
Mx43	265Mx43	Gently undulating valley plains and pediments; some outcrop of basic rock.
SV15	265SV15	Salt lakes and their associated areas.
Yilgangi System	265Yi	Low breakaways with saline gravelly lower plains supporting predominately halophytic low shrublands.
Yowie System	265Yo	Sandy plains supporting tall shrublands of mulga and bowgada with patchy wanderrie grasses.

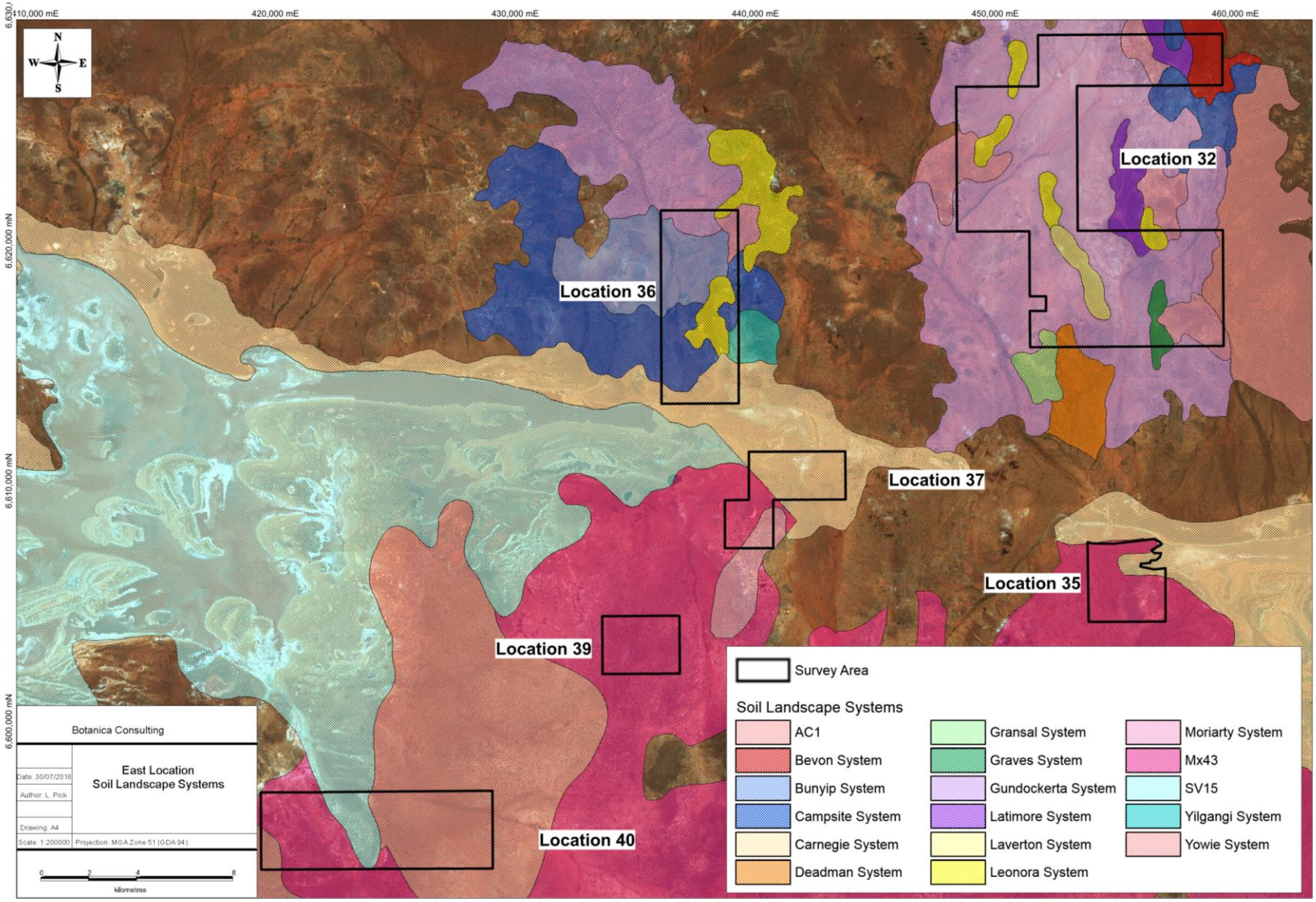


Figure 2-2: Map of Soil Landscape Systems within the survey area

2.3 Remnant Vegetation

Vegetation of the Eastern Murchison subregion is dominated by Mulga woodlands and is often rich in ephemerals, hummock grasslands, saltbush shrublands and Samphire shrublands (McKenzie *et. al.,* 2002). The Eastern Murchison subregion comprises diverse mulga woodlands, which occur on low greenstone belts. The sand plains have red loamy earths and red deep sands are found on the sandy banks. Vegetation of the Eastern Goldfields subregion is comprised of Mallee's, Acacia thickets and shrub heaths on sandplains. Diverse Eucalyptus woodlands occur around salt lakes, on ranges, and in valleys. Salt lakes support dwarf shrublands of samphires and the area is rich in endemic Acacias (Cowan, 2001).

The Department of Agriculture and Food Western Australia (DAFWA) GIS file (2011) indicates that the survey area is located within nine Pre-European Beard vegetation associations. The extent of these vegetation associations, as specified in the 2015 Statewide Vegetation Statistics (DPaW, 2015) is provided in Table 2-2 and Figure 2-3. Areas retaining less than 30% of their pre-European vegetation extent generally experience exponentially accelerated species loss, while areas with less than 10% are considered "endangered" (EPA, 2000). Development within the survey area will not significantly reduce the extent of pre-European vegetation.

Table 2-2: Pre-European Vegetation Associations within the survey area

IBRA Subregion	Vegetation Association	Pre-European extent remaining (%)	% of Current extent within DBCA managed lands	Vegetation Description (Beard, 1990)
Eastern Murchison (MUR1)	Barlee 20	99.78	15.54	Low woodland; mulga mixed with *Casuarina pauper* & *Eucalyptus* sp.
	Barlee 125	99.99	7.16	Bare areas; salt lakes
	Barlee 529	99.84	4.47	Succulent steppe with open low woodland; mulga & sheoak over bluebush
	Barlee 540	99.90	0.23	Succulent steppe with open low woodland; sheoak over saltbush
Eastern Goldfields (COO3)	Barlee 540	99.76	0.00	Succulent steppe with open low woodland; sheoak over saltbush
	Zanthus 125	99.83	0.00	Bare areas; salt lakes
	Zanthus 480	100	0.00	Succulent steppe with open low woodland; mulga & sheoak over salt bush
	Zanthus 481	99.99	5.27	Mosaic: Medium woodland; salmon gum & red mallee / Hummock grasslands, mallee steppe; red mallee over spinifex *Triodia scariosa*
	Zanthus 506	99.96	10.25	Succulent steppe with woodland; salmon gum & bluebush
	Zanthus 540	100	0.00	Succulent steppe with open low woodland; sheoak over saltbush

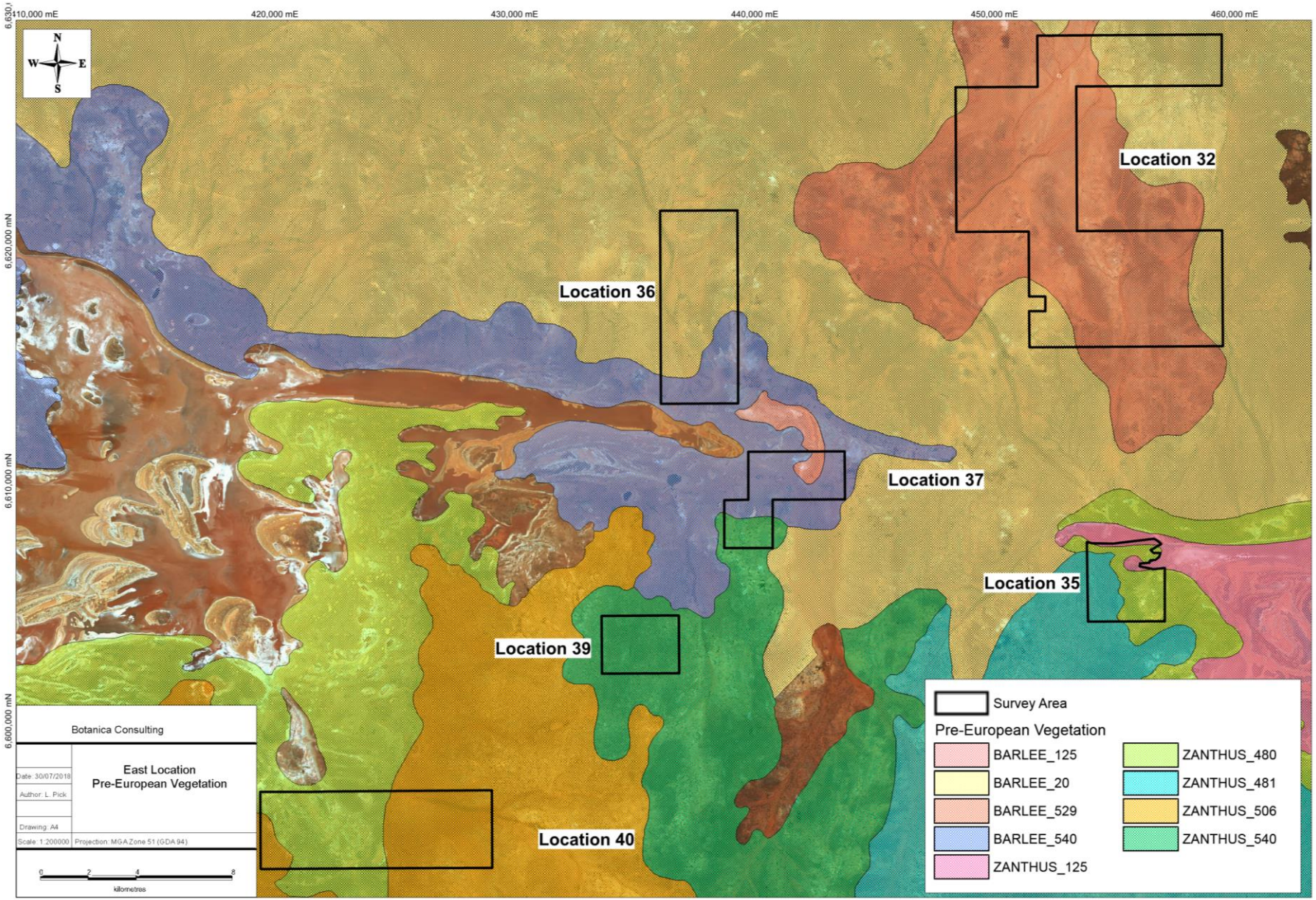
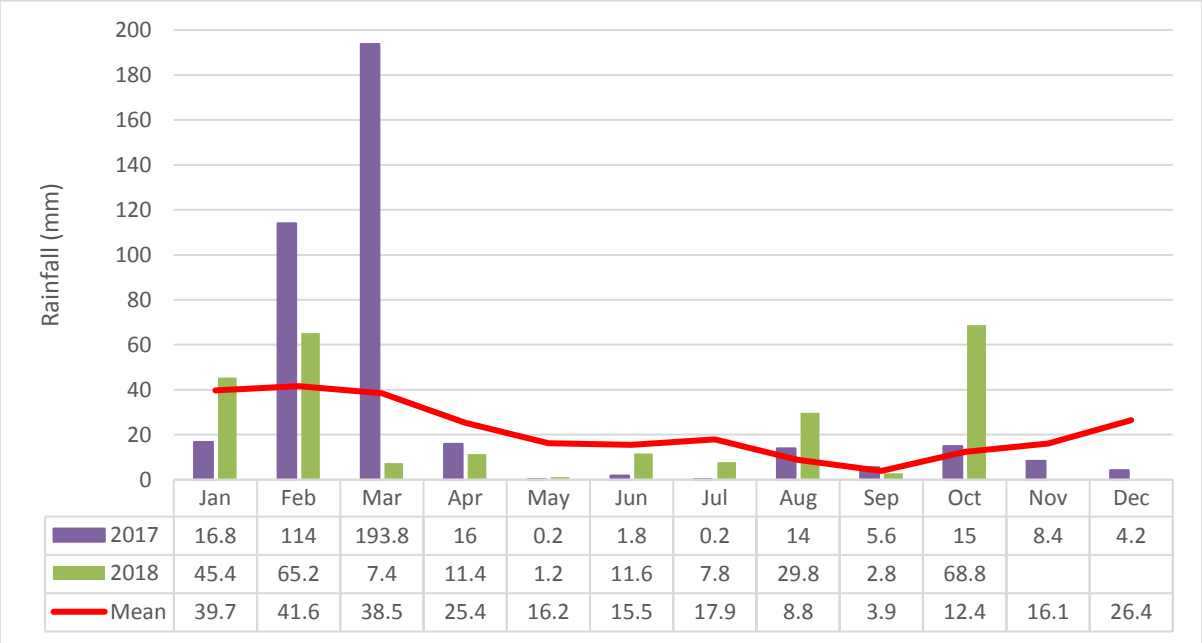


Figure 2-3: Pre-European Vegetation Associations within the survey area

2.4 Climate

The climate of the Eastern Murchison subregion is characterised as an arid climate with mainly winter rainfall and annual rainfall of approximately 200 mm (Beard, 1990; Cowan, 2001). The climate of the Eastern Goldfields subregion is characterised as an arid to semi-arid climate with rainfall sometimes in summer but mainly winter rainfall and annual rainfall of approximately 200-300mm (Beard, 1990; Cowan, 2001). Rainfall data for the Kalgoorlie-Boulder Airport weather station (#12038), located approximately 86 km west of the survey area, is shown in Figure 2-4 and the average climate data for Kalgoorlie-Boulder is shown in Figure 2-5 (BoM, 2018).



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2017	16.8	114	193.8	16	0.2	1.8	0.2	14	5.6	15	8.4	4.2
2018	45.4	65.2	7.4	11.4	1.2	11.6	7.8	29.8	2.8	68.8		
Mean	39.7	41.6	38.5	25.4	16.2	15.5	17.9	8.8	3.9	12.4	16.1	26.4

Figure 2-4: Monthly rainfall (Jan 2017 to October 2018) for the Kalgoorlie – Boulder Airport weather station (#12038) (BoM, 2018)

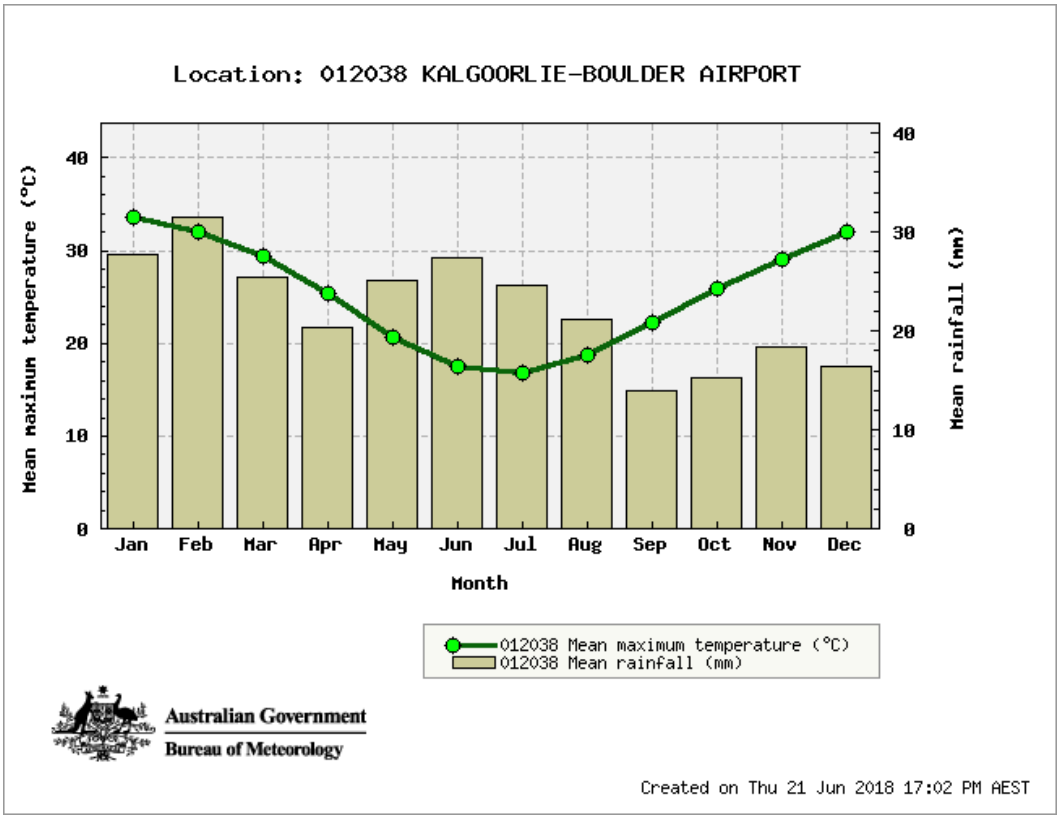


Figure 2-5: Average Climate Data for the Kalgoorlie – Boulder Airport weather station (BoM, 2018)

2.5 Hydrology

According to the Geoscience Australia database (2001) there are multiple non-perennial drainage lines within the survey area (excluding Location 39). The survey area also intercepts the boundaries of two inland waters (non-perennial salt lakes); Lake Yindarlgooda (Location 36 and 37) and Lake Roe (Location 35).

According to the Bureau of Meteorology (2018b) *Groundwater Dependent Ecosystem Atlas,* there are no aquatic Groundwater Dependent Ecosystems (GDE) within the survey area or within the local area (within 100km of the survey area). Potential terrestrial GDEs may occur within the survey area (excluding Location 39 and 40).

A map showing the regional surface hydrology and potential terrestrial GDEs in the local region is provided in Figure 2-6.

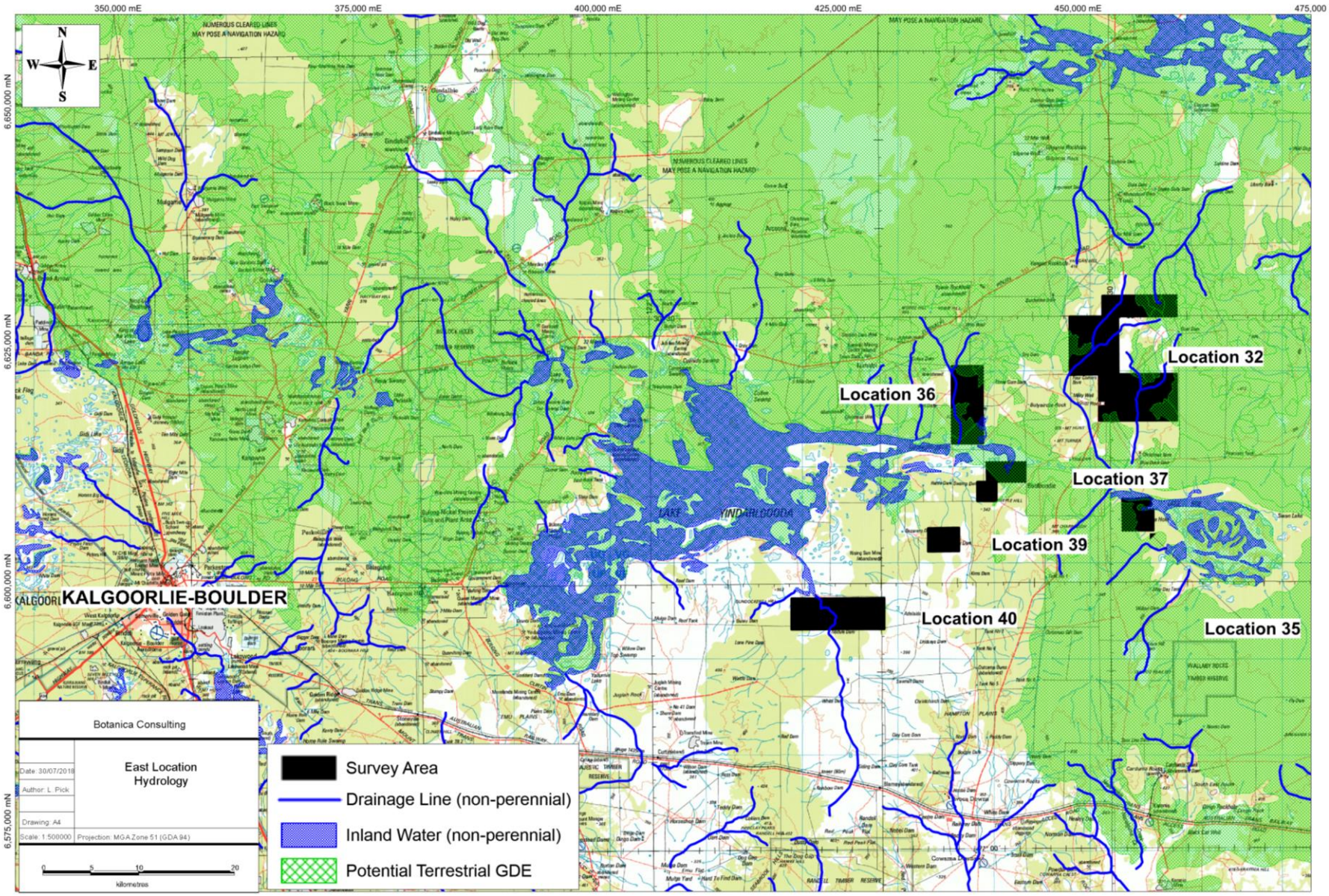


Figure 2-6: Hydrology of the survey area (data obtained from Geoscience Australia, 2001)

2.6 Land Use

The dominant land uses of the Eastern Murchison subregion include grazing native pastures (85.47%), unallocated crown reserves (11.34%), conservation (1.4%) and mining (1.79%) (Cowan, 2001). The dominant land uses of the Eastern Goldfields subregion include Unallocated Crown Land and Crown Reserves, grazing-native pastures-leasehold, freehold, conservation and mining leases (Cowan, 2001). The survey area is located within Hamptons Leases (freehold land) (Figure 1-1).

3 Survey Methodology

3.1 Desktop Assessment

Prior to the field assessment a literature review was undertaken of previous flora and fauna assessments conducted within the local region. Documents reviewed included:

- Barrick Gold Corporation (2011). Miscellaneous Fauna Survey Records 2006 - 2011. Kanowna Belle Area. Unpublished internal data. Acquired May 2011.
- BC (2009) Bellevue Flora and Vegetation Survey (M24/804, M24/231, M24/255, M24/403, M24/303). Botanica Consulting
- BC (2011a), *Level 1 Flora and Vegetation Survey: Bullant,* Botanica Consulting
- BC (2011b), *Level 1 Flora and Vegetation Survey: Proposed Anthill open pit operation,* Botanica Consulting
- BC (2011c), *Level 2 Flora and Vegetation Survey: Kurnalpi Project.,* Botanica Consulting
- BC (2013a) Golden Flag Level 1 Flora and Vegetation survey. Botanica Consulting
- BC (2013b), *Level 2 Flora and Vegetation Survey for the Castle Hill Project.* Botanica Consulting
- BC (2014), *Level 2 Flora and Vegetation Survey for the Burgundy Project survey area,* Botanica Consulting
- BC (2015) Level 1 Flora and Vegetation Survey Racetrack, Mulgarrie Well & Mt Jewell Western/ Eastern Haul Road. Botanica Consulting
- BC (2016a), *Level 1 Flora & Vegetation Survey of the Carbine Mining Area*. Botanica Consulting.
- BC (2016b), *Level 1 Flora and Fauna Survey of the Glandore Project.* Botanica Consulting.
- BC (2018), *Reconnaissance Flora & Fauna survey Kurnalpi Project*. Botanica Consulting.
- GHD (2009) Paddington Gold Pty Ltd – Enterprise Development Activities Flora and Fauna Assessment
- Harewood G (2010a). Terrestrial Fauna Survey (Level 1) of the proposed Isabella Mine Area. Unpublished report for Barrick (Kanowna) Ltd. January 2010.
- Harewood G (2010b). Terrestrial Fauna Survey (Level 1) of the proposed Golden Valley Mine Area. Unpublished report for Barrick (Kanowna) Ltd. January 2010.
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- Harewood, G. (2015b). Fauna Assessment - 6 Mile Project Area. Unpublished report for Northern Star Resources.
- Jim's Seeds Weeds and Trees (2005), *Carbine and Paradigm Flora and Vegetation survey.* Prepared for Barrick
- KLA (2009a). Barrick (Kanowna) Shamrock Project Level 1 Fauna Survey. Unpublished report for Barrick (Kanowna) Ltd. January 2009.
- KLA (2009b). Barrick (Kanowna) Crossroads Project Level 1 Fauna Survey. Unpublished report for Barrick (Kanowna) Ltd. January 2009.
- KLA (2009c). Barrick (Kanowna) Moonlight Project Level 1 Fauna Survey. Unpublished report for Barrick (Kanowna) Ltd. March 2009.
- McKenzie, N.L. and Hall, N.J. (1992). The Biological Survey of the Eastern Goldfields of WA - Pt 8: Kurnalpi – Kalgoorlie study area. Records of the WAM, Supplement 41: 1 – 125.

In addition to the literature review, searches of the following databases were undertaken to aid in the compilation of a list of flora and fauna taxa within the survey area:

- DBCA's NatureMap Database (DBCA, 2018a);
- DotEE Protected matters search tool (DotEE, 2018a); and
- DBCA's Threatened and Priority Flora search (DBCA, 2018b).

The searches were conducted for an area encompassing a 40 km radius of the centre coordinates -30.68139 122.41611. It should be noted that these lists are based on observations from a broader area than the survey area (40km radius) and therefore may include taxon not present. The databases also often included very old records that may be incorrect or in some cases the taxa in question have become locally or regionally extinct. Information from these sources should therefore be taken as indicative only and local knowledge and information also needs to be taken into consideration when determining what actual species may be present within the specific area being investigated.

Prior to the field survey, a combined search of the DBCA's Flora of Conservation Significance databases (DBCA, 2018b) was undertaken within a 40km radius of the survey area. These significant flora species were examined on the Western Australian Herbarium's (WAHERB) web page prior to the survey, to familiarise staff with their appearance. Locations of Threatened Flora and Priority Flora were overlaid on aerial photography of the area. Vegetation descriptions and available images of the Priority Flora were also obtained from Florabase.

The conservation significance of flora and fauna taxa was assessed using data from the following sources:

- EPBC Act. Administered by the Australian Government (DotEE);
- WC Act. Administered by the WA Government (DBCA);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List – the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and
- Priority Flora/ Fauna list. A non-legislative list maintained by DBCA for management purposes (DBCA).

The EPBC Act also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA)[2];
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

All migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as Matters of National Environmental Significance (MNES) under the EPBC Act.

Table 3-1 and Table 3-2 below provide the definitions of conservation significant flora and fauna.

Table 3-1: **Definitions of Conservation Significant Flora**

Code	Category
State categories of threatened and priority species	
T	Threatened Flora "flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F (2) of the Wildlife Conservation Act."
Schedule 1	Critically Endangered – Flora that are considered likely to become extinct or rare, as critically endangered flora
Schedule 2	Endangered – Flora that are considered likely to become extinct or rare, as endangered flora
Schedule 3	Vulnerable – Flora that are considered likely to become extinct or rare, as vulnerable flora
Schedule 4	Extinct-Flora presumed to be extinct
P1	Priority One – Poorly Known Taxa "Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat. Such taxa are under consideration for declaration as 'rare flora' but are in urgent need of further survey."
P2	Priority Two – Poorly Known Taxa "Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey."

[2] Species listed under JAMBA are also specially protected under Schedule 5 of the WC Act.

Code	Category
P3	Priority Three – Poorly Known Taxa "Taxa which are known from several populations and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but needs further survey."
P4	Priority Four – Rare Taxa "Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years."
Commonwealth categories of threatened species	
Extinct	Taxa where there is no reasonable doubt that the last member of the species has died.
Extinct in the wild	Taxa where it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically endangered	Taxa that are facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	Taxa which are not critically endangered and is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	Taxa which are not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Conservation dependent	Taxa which are the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Table 3-2: Definitions of Conservation Significant Fauna

Code	Category
State categories of threatened and priority species	
T	Threatened Fauna "is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the Wildlife Conservation Act".
Schedule 1	Critically Endangered – Threatened species considered to be facing an extremely high risk of extinction in the wild.
Schedule 2	Endangered – Threatened species considered to be facing a very high risk of extinction in the wild.
Schedule 3	Vulnerable – Threatened species considered to be facing a high risk of extinction in the wild.
Schedule 4	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died.
Schedule 5	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), and the Bonn Convention, relating to the protection of migratory birds.
Schedule 6	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Schedule 7	Fauna otherwise in need of special protection to ensure their conservation.
P1	Priority One – Poorly Known Taxa 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

Code	Category
	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.
P2	Priority Two – Poorly Known Taxa 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.
P3	Priority Three – Poorly Known Taxa 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.
P4	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.
Commonwealth categories of threatened species	
Extinct	Taxa where there is no reasonable doubt that the last member of the species has died.
Extinct in the wild	Taxa where it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	Taxa that are facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	Taxa which are not critically endangered and is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	Taxa which are not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Near Threatened	Taxa which has been evaluated but does not qualify for CR, EN or VU now but is close to qualifying or likely to qualify in the near future.
Least Concern	Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future.
Data Deficient	Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.

A search of the DBCA PEC and TEC database was also conducted within a 40 km radius of the survey area (DBCA, 2018c). Table 3-3 represents the definitions of Threatened and Priority Ecological Communities.

Table 3-3: Definition of conservation significant communities

Category Code	Category
State categories of Threatened Ecological Communities (TEC)	
PTD	**Presumed Totally Destroyed** An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies: records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or; all occurrences recorded within the last 50 years have since been destroyed.
CE	**Critically Endangered** An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria: The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; The ecological community is highly modified with potential of being rehabilitated in the immediate future.
E	**Endangered** An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria: The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short-term future, or is unlikely to be substantially rehabilitated in the short-term future due to modification; The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; The ecological community is highly modified with potential of being rehabilitated in the short-term future.
V	**Vulnerable** An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria: The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.
Commonwealth categories of Threatened Ecological Communities (TEC)	
CE	**Critically Endangered** If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).
E	**Endangered** If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).
V	**Vulnerable** If, at that time, an ecological community is not critically endangered or endangered, but is facing a high risk of extinction in the wild in the medium–term future (indicative timeframe being the next 50 years).

Category Code	Category
Priority Ecological Communities (PEC)	
P1	**Poorly-known ecological communities** Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.
P2	**Poorly-known ecological communities** Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.
P3	**Poorly known ecological communities** Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	**Ecological communities that are adequately known, rare but not threatened** or meet criteria for near threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.
P5	**Conservation Dependent ecological communities** Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

3.2 Field Assessment

Botanica conducted a reconnaissance flora/vegetation and fauna survey covering an area of 17,221 ha. The survey was conducted in spring 2018 (20th to 24th October 2018), with the area traversed on foot and 4WD by two staff members.

3.2.1 Flora Assessment

Prior to the commencement of field work, aerial photography was inspected and obvious differences in the vegetation assemblages were identified. The different vegetation communities identified were then inspected during the field survey to assess their validity. A handheld GPS unit was used to record the coordinates of the boundaries between existing vegetation communities. At each sample point, the following information was recorded:

- GPS location;
- Photograph of vegetation;
- Dominant taxa for each stratum;
- All vascular taxa (including annual taxa);
- Landform classification;
- Vegetation condition rating;
- Collection and documentation of unknown plant specimens; and
- GPS location, photograph and collection of flora of conservation significance if encountered.

Unknown specimens collected during the survey were identified with the aid of samples housed at the BC Herbarium and WAHERB. Vegetation was classified in accordance with NVIS classifications.

3.2.2 Fauna Assessment

Vegetation and landform units identified during the flora assessment have been used to define broad fauna habitat types across the site. This information has been supplemented with observations made during the fauna assessment.

The main aim of the fauna habitat assessment was to determine if it was likely that any species of conservation significance would be utilising the areas that maybe impacted on as a consequence of development at the site. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

As part of the desktop literature review, available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area was researched. During the field survey, the habitats within the study area were assessed and specific elements identified, if present, to determine the likelihood of listed threatened species utilising the area and its significance to them.

Opportunistic observations of fauna species were made during all field survey work which involved a series of transects across the study area during the day while searching microhabitats such as logs, rocks, leaf litter and observations of bird species with binoculars. Secondary evidence of a species presence such as tracks, scats, skeletal remains, foraging evidence or calls were also noted if observed/heard.

3.2.3 Personnel involved

Jim Williams - Environmental Consultant/ Director (Diploma of Horticulture)
Lauren Pick- Environmental Consultant (Bachelor of Science-Zoology/Conservation Biology)
Greg Harewood- Zoologist (Bachelor of Science-Zoology)

3.2.4 Scientific licences

Table 3-4: Scientific Licences of Botanica Staff coordinating the flora survey

Licensed staff	Permit Number	Valid Until
Jim Williams	SL012116	27-05-19
Lauren Pick	SL012117	27-05-19

3.3 Survey limitations and constraints

It is important to note that flora/vegetation and fauna surveys will entail limitations notwithstanding careful planning and design. Potential limitations are listed in Table 3-5.

The conclusions presented in this report are based upon field data and environmental assessments and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. Also, it should be recognised that site conditions can change with time. Information not available at the

time of this assessment which may subsequently become available may alter the conclusions presented.

Some species are reported as potentially occurring based on there being suitable habitat (quality and extent) within the survey area or immediately adjacent. The habitat requirements and ecology of many of the species known to occur in the wider area are however often not well understood or documented. It can therefore be difficult to exclude species from the potential list based on a lack of a specific habitats or microhabitats within the survey area. As a consequence of this limitation, the potential species list produced is most likely an overestimation of those species that actually utilise the survey area for some purpose.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any flora and fauna species that would possibly occur within the survey area (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the author, has been listed as having the potential to occur.

Table 3-5: Limitations and constraints associated with the survey

Variable	Potential Impact on Survey	Details
Access problems	Minor constraint	The survey was conducted via 4WD and on foot. Access tracks within the survey area were limited and due to high rainfall received in October, access to playa areas were limited.
Competency/ Experience	Not a constraint	The BC personnel that conducted the survey were regarded as suitably qualified and experienced. **Coordinating Botanist/ Zoologist:** Jim Williams, Lauren Pick & Greg Harewood **Data Interpretation:** Jim Williams, Lauren Pick & Greg Harewood.
Timing of survey, weather & season	Minor constraint	Fieldwork was completed within the EPA's recommended primary survey time period for the South-West Interzone (Spring; September – November) and following the primary survey time period for the Eremaean Province (i.e. 6-8 weeks post wet season). Despite above average rainfall received in August and October, much of the vegetation was dry and showed signs of stress as a result of below average rainfall received in Autumn and Winter.
Area disturbance	Minor constraint	The area has been previously disturbed from historical mining, exploration and pastoral land use with portions of the survey area used for cattle grazing.
Survey Effort/ Extent	Not a constraint	Survey intensity was appropriate for the size/significance of the area with a reconnaissance survey completed to identify vegetation types/fauna habitats and conservation significant species/communities.
Availability of contextual information at a regional and local scale	Not a constraint	Threatened flora database searches provided by the DBCA were used to identify any potential locations of Threatened/Priority taxa. BoM, DWER, DPIRD, DBCA and DotEE databases were reviewed to obtain appropriate regional desktop information on the biophysical environment of the local region. BC was able to obtain information about the area from previous flora/fauna assessments conducted within the region which provided context on the local environment.
Completeness	Minor constraint	In the opinion of BC, the survey area was covered sufficiently in order to identify vegetation assemblages. Despite above average rainfall received in August and October, much of the vegetation was dry and showed signs of stress as a result of below average rainfall received in Autumn and Winter. Few of the plants during the survey were in flower, however some annual species present. It is

Variable	Potential Impact on Survey	Details
		estimated that approximately 80% of the flora within the survey area were able to be fully identified. The vegetation types for this study were based on visual descriptions of locations in the field. The distribution of these vegetation communities/ fauna habitats outside the study area is not known, however vegetation types identified were categorised via comparison to vegetation distributions throughout WA specified in the NVIS Major Vegetation Groups (DotEE, 2017b).

4 Results

4.1 Desktop Assessment

4.1.1 Literature Review

Flora and fauna surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publicly available and could not be referenced. The most significant of those available have been used as the primary reference material for the current assessment (Table 4-1).

Table 4-1: Previous surveys within the surrounding area

Author and Year	Vegetation/Landforms/Fauna Habitats	Flora/Fauna of Conservation Significance
Keighery, Milewski & Hnatiuk, 1992	Between January 1980 and August 1983, a biological survey of the Kurnalpi-Kalgoorlie region covering approximately 26,500km² was conducted. Vegetation comprised mainly of trees (5-10 m high) which were only absent on parts of granite exposures, hills, salt lakes and sandplains in the northern half of the study area. Mallees (2-4 m high) and hummock grasslands occur on sandplains and sandy situations on other landforms.	No Threatened Flora.
Botanica Consulting, 2009	Five vegetation groups were identified within the survey area: 1. *Eucalyptus salmonophloia* Woodland 2. Open *Eucalyptus clelandii* Woodland 3. *Acacia acuminata* Woodland 4. Open *Eucalyptus salubris* Woodland Open Chenopod Shrubland	No Threatened or Priority Flora taxa were identified within the survey area.
GHD, 2009	The Study Area is considered to be dominated by eucalypt –*Casuarina* woodlands, interspersed with *Acacia* shrublands. The vegetation of the survey area was classified into ten vegetation types. Vegetation within the Study Area is considered to be moderately diverse. A total of 148 taxa from 41 families were recorded from the Study Area. Of these, 137 taxa were native plant species.	No Threatened Flora taxa were identified. One Priority Flora *Gnephosis intonsa* (P3)[3] was identified within the survey area
Botanica Consulting, 2011a	Seven vegetation communities were identified within the survey area: 1. Mixed *Eucalyptus* woodland over *Eremophila scoparia* and *Olearia muelleri* 2. *Eucalyptus clelandii* woodland over *Maireana sedifolia* 3. *Eucalyptus salubris* woodland over mixed shrubs 4. *Casuarina pauper* woodland over *Acacia colletioides* 5. *Eucalyptus salmonophloia* woodland over *Eremophila alternifolia* 6. *Eucalyptus clelandii* woodland over *Triodia scariosa* *Eucalyptus ravida* thicket	No Threatened or Priority Flora taxa were identified within the survey area.
Botanica Consulting, 2011b	Three vegetation communities and one sub-community were identified within the survey area; 1. Mixed *Eucalyptus* woodland over *Eremophila interstans* subsp. *interstans* 2. *Eucalyptus salmonophloia* woodland over *Eremophila scoparia* 3. *Eucalyptus ravida* woodland over mixed shrubs sub-community *Eucalyptus salubris* / *Eucalyptus clelandii* thicket.	No Threatened or Priority Flora taxa were identified within the survey area.
Botanica	The findings of the report revealed that there was no Declared Rare	No Threatened or

[3] *Gnephosis intonsa* (P3) has been revised and is currently listed as *Notisia intonsa* (P3) on Florabase (WAHERB, 2018).

Author and Year	Vegetation/Landforms/Fauna Habitats	Flora/Fauna of Conservation Significance
Consulting, 2011c	Flora or Priority Flora species found to occur with the Kurnalpi project area.	Priority Flora taxa were identified within the survey area.
Botanica Consulting, 2011d	Twelve broad vegetation communities were identified within the survey area: 1. Scrub of *Acacia aneura*/*Acacia burkittii*/*Acacia ramulosa* over low scrub of *Dodonaea lobulata* 2. Low woodland of *Eucalyptus lesouefii* over low mixed scrub 3. Low woodland of *Eucalyptus salmonophloia*/*Eucalyptus salubris* over heath of mixed chenopods 4. Low woodland of *Eucalyptus salmonophloia*/*Eucalyptus salubris* over low mixed scrub 5. Low woodland of *Eucalyptus salmonophloia*/*Eucalyptus salubris* over low scrub of *Maireana sedifolia* 6. Scrub of *Acacia ramulosa* over low scrub of *Senna artemisioides subsp. filifolia*/*Senna artemisioides subsp. x artemisioides* 7. Very open mallee of *Eucalyptus oleosa* over low woodland of *Acacia aneura*/ *Acacia oswaldii*/*Acacia ramulosa*/*Acacia* sp. narrow phyllode 8. Mallee of *Eucalyptus concinna*/*Eucalyptus oleosa* over low scrub of *Senna artemisioides subsp. filifolia* and dwarf scrub of *Ptilotus obovatus* 9. Open low woodland of *Casuarina pauper* over low scrub of *Senna artemisioides subsp. filifolia* and dwarf scrub of *Ptilotus obovatus* 10. Low woodland of *Casuarina pauper* over low scrub of *Maireana sedifolia* and dwarf scrub of *Ptilotus obovatus* 11. Low woodland of *Acacia aneura*/*Acacia burkittii*/*Acacia ramulosa* in drainage area; and 12. Low woodland of *Eucalyptus lesouefii* over low scrub of *Maireana sedifolia* on rocky rise These vegetation communities were represented by a total of 26 Families, 46 Genera and 100 Species. One introduced species was identified within the survey area *Centaurea melitensis.*	No declared rare flora. No Threatened or Priority Flora taxa were identified within the survey area.
Botanica Consulting 2012	Six broad vegetation communities were identified within the survey area: 1. Low woodland of *Acacia aneura* over mixed low shrub and dwarf scrub of *Ptilotus obovatus*; 2. Low woodland of *Eucalyptus salmonophloia/Eucalyptus salubris* over open mallee of *Eucalyptus oleosa* and mixed low scrub; 3. Open mallee of *Eucalyptus salubris* over low woodland of *Acacia aneura* and scrub of *Acacia* sp. Narrow phyllode 4. Open low woodland of *Acacia aneura* over scrub of Acacia sp. narrow phyllode/*Acacia quadrimarginea* 5. Low woodland of *Eucalyptus lesouefii* over low scrub of *Maireana sedifolia;* and 6. Open low woodland of *Eucalyptus salmonophloia* over low scrub of *Atriplex nummularia/ Maireana sedifolia*. These vegetation communities were represented by a total of 25 Families, 57 Genera, and 103 Species. Six introduced species were present within the survey area: *Agave americana, Carrichtera annua, Centaurea melitensis, Malva parviflora, Salvia verbenaca* and *Solanum nigrum*	No Threatened or Priority Flora taxa were identified within the survey area.
Botanica Consulting, 2013a	Three vegetation communities were identified within the survey area: 1. Open low woodland of *Eucalyptus salmonophloia* and *Eremophila longifolia* over low scrub of *Cratystylis subspinescens, Maireana pyramidata* and *Senna artemisioides* subsp. filifolia in drainage line; 2. Low woodland of *Casuarina pauper* over low scrub of *Maireana pyramidata* and *Maireana sedifolia;* and 3. Low woodland of *Eucalyptus salmonophloia* over low scrub of *Scaevola spinescens* and *Senna artemisioides* subsp. *filifolia.*	No Threatened or Priority Flora taxa were identified within the survey area.
Botanica Consulting, 2013b	Twelve vegetation communities were identified within the survey area: 1. Scrub of *Acacia* sp. narrow phyllode over low scrub of	No Threatened or Priority Flora taxa

Author and Year	Vegetation/Landforms/Fauna Habitats	Flora/Fauna of Conservation Significance
	Eremophila alternifolia; 2. Low woodland of *E. campaspe* and *E. salmonophloia* over low scrub of *Atriplex nummularia, Eremophila dempsteri* and dwarf scrub of *Atriplex vesicaria*; 3. Open low woodland of *E. campaspe* over low scrub of *Eremophila dempsteri* and dwarf scrub of *Atriplex vesicaria*; 4. Low woodland of *E. clelandii* over scrub of *Acacia* sp. narrow phyllode and low scrub of *Acacia erinacea, Atriplex vesicaria* and *Eremophila pustulata*; 5. Low woodland of *E. campaspe* over low scrub of *Eremophila scoparia* and dwarf scrub of *Atriplex vesicaria*; 6. Very open shrub mallee of *E. griffithsii* over low scrub of *Dodonaea lobulata* and *Eremophila scoparia* over dwarf scrub of *Scaevola spinescens*; 7. Scrub of *Allocasuarina acutivalvis/Casuarina pauper* over low scrub of *Philotheca brucei* and dwarf scrub of *Prostanthera grylloana*; 8. Low woodland of *Acacia quadrimarginea* over scrub of *Acacia* sp. narrow phyllode, low scrub of *Dodonaea lobulata* and dwarf scrub of *Ptilotus obovatus*; 9. Low woodland of *E. ravida* over low scrub of *Atriplex nummularia/Eremophila scoparia* over dwarf scrub of *Atriplex vesicaria*; 10. Low woodland of *Eucalyptus clelandii/Eucalyptus torquata* over low scrub of *Eremophila interstans* subsp. *virgata*; 11. Low scrub of *Atriplex nummularia* subsp. *spatulata* and *Eremophila dempsteri* over open low grass of *Austrostipa nitida*; and 12. Low woodland of *Eucalyptus clelandii* over low scrub of *Eremophila interstans* subsp. *virgata/Eremophila scoparia.*	were identified within the survey area.
Botanica Consulting, 2014	Five vegetation communities were identified within the survey area: 1. Low Woodland of *Eucalyptus salmonophloia* over open low scrub of *Atriplex nummularia* subsp. *spatulata* and dwarf scrub of *Tecticornia disarticulata*; 2. Low Woodland of *Eucalyptus clelandii* over open low scrub of *Atriplex nummularia* subsp. *spatulata* and dwarf scrub of *Atriplex vesicaria/ Maireana pentatropis* and *Olearia muelleri*; 3. Low Woodland of *Eucalyptus griffithsii* over low scrub of *Acacia acuminata/ Dodonaea lobulata* and dwarf scrub of *Olearia muelleri* and *Ptilotus obovatus*; 4. Low woodland of *Eucalyptus campaspe* and *E. salmonophloia* over low scrub of *Atriplex nummularia* subsp. *spathulata, Eremophila dempsteri* and dwarf scrub of *Atriplex vesicaria*; and 5. Open Low Woodland of *Eucalyptus clelandii/ E. griffithsii/ Casuarina pauper* over low scrub of *Dodonaea lobulata/ Scaevola spinescens/ Eremophila oldfieldii* subsp. *angustifolia* and *Hakea kippistiana* and dwarf scrub of *Olearia muelleri* and *Ptilotus obovatus* on breakaway.	No Threatened or Priority Flora taxa were identified within the survey area.
Botanica Consulting, 2015	Level 1 Reconnaissance Flora Survey was completed in March 2015 for an area of 1,260 ha, of which 4 ha had previously been cleared. A total of 28 vegetation communities were identified within the four survey areas. These were represented by a total of 26 Families, 56 Genera and 130 Taxon including sub-species and variants.	*Ricinocarpos* sp. Eastern Goldfields (A. Williams 3) (P1)
Botanica Consulting, 2016a	Level 1 Reconnaissance Flora Survey was completed in July 2016 for an area of 2,776 ha, located 53 km north-west of Kalgoorlie-Boulder. A total of 19 broad vegetation communities were identified within the survey area. These communities comprised of five different landform types and three major vegetation groups. The communities were represented by a total of 24 Families, 47 Genera and 112 Taxa (including subspecies and variants)	No Threatened Flora or Priority Flora were identified within the survey area.

Author and Year	Vegetation/Landforms/Fauna Habitats	Flora/Fauna of Conservation Significance
Botanica Consulting, 2016b	Level 1 Reconnaissance Flora Survey was completed in September 2016 for an area of 390 ha, located 36 km east of Kalgoorlie-Boulder. A total of 17 broad vegetation communities were identified within the survey area. These communities comprised of six different landform types and five major vegetation groups according to the NVIS definition. These communities were represented by a total 34 Families, 73 Genera and 138 Taxa, (including sub-species and variants).	No Threatened Flora or Priority Flora were identified within the survey area.
Botanica Consulting, 2018	Level 1 Reconnaissance Flora Survey was completed in May 2018 for an area of 4795 ha, located 90 km north-east of Kalgoorlie-Boulder. A total of nine vegetation types were identified within the survey area. These vegetation types were located within three different landform types and comprised of five major vegetation groups, which were represented by a total of 18 Families, 31 Genera and 83 taxa. The broad scale terrestrial flora habitats within the survey area have been identified as comprising a mosaic of clay-loam plain, open depression, and rocky hillslopes. Forty-six fauna species were recorded during the field surveys.	No Threatened Flora/Fauna or Priority Flora/Fauna were identified within the survey area.

4.1.2 Flora of Conservation Significance

The results of the literature review, combined search of the DBCA's Flora of Conservation Significance databases (DBCA, 2018b) and DotEE protected matters search recorded no Threatened Flora or Priority Flora within the survey area. Two Threatened Flora and a total of 17 Priority Flora taxa were listed on the databases as occurring within a 40km radius of the survey area (map of flora locations provided in Appendix 1). These taxa were assessed and ranked for their likelihood of occurrence within the survey area (Table 4-2).

. The rankings and criteria used were:

- Unlikely: Area is outside of the currently documented distribution for the species/no suitable habitat (type, quality and extent) was identified as being present during the field/desktop assessment.

- Possible: Area is within the known distribution of the species in question and habitat of at least marginal quality was identified as being present during the field/desktop assessment, supported in some cases by recent records being documented from within or near the area.

- Known to Occur: The species in question was positively identified as being present during current or previous field surveys.

Table 4-2: Likelihood of occurrence for Flora of Conservation Significance within the survey area

Taxon	EPBC Act	WC Act	DBCA Priority	Description (WAHERB, 2018)	Likelihood of Occurrence
Allocasuarina eriochlamys subsp. *grossa*			P3	Dioecious or monoecious shrub, 1-3m high, bracteoles prominently exceeding cone. Stony loam, laterite clay. Granite outcrops.	Unlikely
Austrostipa blackii			P3	Tufted perennial, grass-like or herb, 1 m high. Fl. Sep to Nov.	Possible
Darwinia sp. Gibson (R.D. Royce 3569)			P1	Compact shrub, to 0.4 m high. Fl yellow/orange, Jun to July, Grey-brown sandy clay, white sand. Margins salt lakes, road verges.	Possible

Taxon	EPBC Act	WC Act	DBCA Priority	Description (WAHERB, 2018)	Likelihood of Occurrence
Dicrastylis cundeeleensis			P4	Woolly shrub, 0.2-0.5 m high. Yellow sand, red or reddish-yellow sand. Sandplains.	Unlikely
Eremophila praecox			P1	Broom-like shrub, 1.5-3 m high. Fl. purple, Oct or Dec. Red/brown sandy loam. Undulating plains.	Possible
Eucalyptus kruseana			P4	Straggly mallee, 2-3.5 m high, bark smooth. Fl. yellow, Jun to Sep. Sandy loam. Granite outcrops & hills.	Unlikely
Eucalyptus x brachyphylla			P4	Mallee or tree, to 4 m high, bark rough, flaky. Fl. white, Jun. Sandy loam. Granite outcrops.	Unlikely
Eucalyptus jutsonii subsp. *jutsonii*			P4	(Mallee), 4-7 m high, bark rough over most stems, grey to light grey-brown. Red to pale orange deep sands. Undulating areas and on dunes.	Possible
Gastrolobium graniticum	EN	EN		Erect open shrub, to 2.5m high. Fl, yellow & orange & red, Aug to Sep, Sand, sandy loam, granite, Margins of rock outcrops, along drainage lines	Possible
Grevillea phillipsiana			P1	Prickly shrub, 0.8-1.5 m high. Fl. red/red & orange, Jul to Sep. Red sand, stony loam. Granite hills.	Unlikely
Jacksonia lanicarpa			P1	Shrub, to 2 m high. Fl. orange, Nov. Red sand.	Possible
Lepidosperma lyonsii			P4	Tufted rhizomatous, perennial, herb (sedge), leaves 0.31-0.53 m high, culms and leaves distichous. Pale orange skeletal sandy loam with banded ironstone gravel & rock, well-drained shallow stony loamy with quartz. Gentle hill slopes, upper slopes of large hill.	Possible
Micromyrtus serrulata			P3	Erect or somewhat spreading shrub, 0.4-1.5 m high. Fl. white, Jun to Nov. Brownish sandy and clayey soils over granite.	Unlikely
Ptilotus rigidus			P1	No Description available from WAHERB	Possible
Ptilotus procumbens			P1	Spreading procumbent annual, herb, ca 0.1 m high, Fl pink-white, Nov Red clay.	Possible
Styphelia sp. Great Victoria Desert (N. Murdoch 44)			P2	No Description available from WAHERB	Possible
Tecticornia flabelliformis	VU		P1	Erect shrub, to 0.2 m high. Clay. Saline flats.	Possible
Thryptomene eremaea			P2	Erect open shrub, 0.5-1.5 m high. Fl. pink/white, Jul to Sep. Red or yellow sand. Sandplains.	Unlikely
Trachymene pyrophila			P2	Annual, herb, 0.1-0.5 m high, indumentum of patent glandular hairs. Fl. white, Nov to Dec or Jan to Mar. Yellow or orange sand. Sandplains; germinating after fire or other disturbances such as mining	Possible

4.1.3 Fauna of Conservation Significance

Fauna of conservation significance identified during the literature review as previously being recorded in the general area were assessed and ranked for their likelihood of occurrence within the survey area itself (Table 4-3). The rankings and criteria used were:

- Would Not Occur: There is no suitable habitat for the species in the survey area and/or there is no documented record of the species in the general area since records have been kept and/or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records).
    - Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 10 or 20km of the survey area. Populations do however persist outside of this area.
    - Regionally Extinct: Populations no longer occur in a large part of the species natural range, in this case within the eastern goldfields region. Populations do however persist outside of this area.
- Unlikely to Occur: The survey area is outside of the currently documented distribution for the species in question, or no suitable habitat (type, quality and extent) was identified as being present during the field assessment. Individuals of some species may occur occasionally as vagrants/transients especially if suitable habitat is located nearby but the site itself would not support a population or part population of the species
- Possibly Occurs: Survey area is within the known distribution of the species in question and habitat of at least marginal quality was identified as likely to be present during the field survey and literature review, supported in some cases by recent records being documented in literature from within or near the survey area. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.
- Known to Occur: The species in question has been positively identified as being present (for sedentary species) or as using the survey area as habitat for some other purpose (for non-sedentary/mobile species) during field surveys within or near the survey area. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. tracks, foraging debris, scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

Table 4-3: Likelihood of Occurrence – Fauna Species of Conservation Significance

Species	Conservation Status			Potential Habitats Within Survey Area			Likelihood of Occurrence
	EPBC Act	WC Act	DBCA Priority	Foraging Habitat	Breeding Habitat	Total Potential Habitat Extent (%)	
Malleefowl *Leipoa ocellata*	VU	S3	-	Clay-Loam Plains/ Open Depressions/Rocky Hillslopes/Sand-loam Plains	Open Depressions	90.5%	Possibly Occurs. Some scattered records in the general area Breeding habitat possibly marginal.
Peregrine Falcon *Falco peregrinus*	-	S7	-	Air space above all habitats.	Large open spouts in eucalyptus trees	100%	Possibly Occurs but probably only rarely. Unlikely to breed in the area.
Migratory Shorebirds (Various species)	Mig	S5	-	Closed Depressions when inundated	None Identified	8.2%	Unlikely to Occur. Very occasional vagrants only for very brief periods.
Grey Wagtail *Motacilla cinerea*	Mig	S5	-	None Identified		0%	Would Not Occur. Never recorded in goldfields region.
Fork-tailed Swift *Apus pacificus*	Mig	S5	-	Air space above all habitats.	None Identified	100%	Unlikely to Occur. Very occasional vagrants only for very brief periods.
Night Parrot *Pezoporus occidentalis*	EN	S1	-	Closed Depressions (Chenopod/samphire Shrublands)	None Identified	8.2%	Possibly Occurs. No recent records nearby and possibly locally extinct but area under-surveyed. Limited area of habitat
Princess Parrot *Polytelis alexandrae*	VU	-	P4	Clay-Loam Plains/ Open Depressions/Rocky Hillslopes/Sand-loam Plains/Sand Dunes	Eucalyptus trees with large hollows	91.8%	Possibly Occurs but probably only rarely.
Chuditch *Dasyurus geoffroii*	VU	S3	-	Clay-Loam Plains/ Open Depressions/Rocky Hillslopes/Sand-loam Plains/Sand Dunes		91.8%	Would not Occur. Generally considered to be regionally extinct
Central Long-eared Bat *Nyctophilus major tor*	-	-	P4	Air space above all habitats.	Eucalyptus trees with hollows	100%	Possibly Occurs. No recent records nearby but area under-surveyed.

The current status of some species on site and/or in the general area is difficult to determine, however, based on the habitats present and, in some cases recent nearby records, the following species of conservation significance can be regarded as possibly utilising the survey area for some purpose at times, these being:

- **Malleefowl *Leipoa ocellata* – S3 (*WC Act*), VU (*EPBC Act*)**
  The current status of this species the various surveys areas is difficult to determine without a detailed assessment, but it must be assumed to be present given a number of scattered records in the general area and the presence of at least marginal habitat. May breed in denser shrubland areas though most areas observed appear marginal. .

- **Peregrine Falcon *Falco peregrinus* – S7 (*WC Act*)**
  The species potentially utilises some sections of the survey area as part of a much larger home range, though records in this area are rare and therefore it is likely to be present occasionally.

- **Night Parrot *Pezoporus occidentalis* – S1 (WC Act), EN (EPBC Act)**
  The current status of this species the various surveys areas is difficult to determine without a detailed assessment. Most areas do not however contain suitable habitat (e.g. chenopod/samphire shrublands) but it must be assumed to possibly occur where this vegetation unit occurs.

- **Princess Parrot *Polytelis alexandrae* – P4 (DBCA Priority Species), VU (EPBC Act)**
  The current status of this species the various surveys areas is difficult to determine without a detailed assessment though it is only likely to occur occasionally even where habitat is suitable. Also some potential for suitable breeding habitat in areas where trees with large hollows occur.

- **Central Long-eared Bat *Nyctophilus major tor* – P4 (DBCA Priority Species)**
  The current status of this species the various surveys areas is difficult to determine without a detailed assessment but must be assumed to occur at least in some areas in particular areas containing suitable roosting habitat (hollow bearing trees).

It should be noted that while habitats onsite for one or more of the species listed above are considered possibly suitable, some or all may be marginal in extent/quality and therefore the fauna species considered as possibly occurring may in fact only visit the area for short periods as infrequent vagrants.

A number of other species of conservation significance, while possibly present in the general area and/or the Murchison region are not listed as potential species due to the survey area being outside of their currently recognised range, a lack of suitable habitat or known/very likely local or regional extinction (and no subsequent recruitment from adjoining areas).

4.2 Field Assessment

4.2.1 Vegetation Types

Sixteen vegetation types were identified within the survey area. These vegetation types were identified within six different landform types and comprised of five major vegetation groups according to the NVIS, Major Vegetation Group (MVG) definition (Table 4-4). These vegetation types were represented by a total of 22 Families, 37 Genera and 101 Taxa as listed in Appendix 2. A map showing the vegetation types present in the survey area is provided in Figure 4-1. Additional vegetation maps are provided in Appendix 3.

Table 4-4: Summary of vegetation types within the survey area

Landform	Major Vegetation Group	Vegetation Code	Vegetation Type	Area (ha)	Area (%)
Clay-Loam Plain	Acacia Forests and Woodlands (MVG 6)	CLP-AFW1	Low woodland of *Acacia caesaneura/ A. incurvaneura* over mid open shrubland of *Senna artemisioides* subsp. *filifolia/ Dodonaea lobulata* and low shrubland of *Ptilotus obovatus* on clay-loam-plain	2038	11.8
	Casuarina Forests and Woodlands (MVG 8)	CLP-CFW1	Mid woodland of *Casuarina pauper* over mid chenopod shrubland of *Maireana sedifolia* and low chenopod shrubland of *Atriplex vesicaria* on clay-loam plain	1214	7.0
	Chenopod and Samphire Shrubland (MVG 22)	CLP-CS1	Low chenopod shrubland of *Maireana sedifolia/ M. pyramidata* over low forb shrubland on clay-loam-plain	1895	11.0
	Eucalypt Woodlands (MVG 5)	CLP-EW1	Low woodland of *Eucalyptus salmonophloia* over open shrubland of *Senna artemisioides* subsp. *filifolia* and low chenopod shrubland of *Atriplex vesicaria/ Maireana sedifolia* on clay-loam-plain	3004	17.4
		CLP-EW2	Low woodland of *Eucalyptus oleosa*over open shrubland of *Senna artemisioides* subsp. *filifolia* and low chenopod shrubland of *Atriplex vesicaria/ Maireana sedifolia* on clay-loam-plain	509	3.0
	Mallee Woodlands and Shrublands (MVG 14)	CLP-MWS1	Mid open mallee shrubland of *Eucalyptus concinna* over shrubland of *Senna artemisioides* subsp. *filifolia* and low open shrubland of *Ptilotus obovatus* on clay-loam-plain	33	0.2
Closed Depression	Chenopod and Samphire Shrubland (MVG 22)	CD-CSSSF1	Low shrubland of *Cratystylis subspinescens* over low samphire shrubland of *Tecticornia doliiformis/ T. pruinosa* on playa edge	711	4.1
		CD-CSSSF2	Low samphire shrubland of *Tecticornia doliiformis/ T. pruinosa* on playa edge	665	3.9
Open Depression	Acacia Forests and Woodlands (MVG 6)	OD-AFW1	Low woodland of *Acacia caesaneura* and shrubland of *Acacia ramulosa* var. *ramulosa* over low shrubland of *Senna artemisioides* subsp. *filifolia* in open depression	1999	11.6
	Mallee Woodlands and Shrublands (MVG 14)	OD-MWS1	Mid mallee shrubland of *Eucalyptus concinna* over low woodland of *Acacia caesaneura* and shrubland of *Acacia ramulosa* var. *ramulosa* over low shrubland of *Ptilotus obovatus* in open depression	137	0.8
Rocky Hillslope	Acacia Forests and Woodlands (MVG 6)	RH-AFW1	Mid open woodland of *Acacia caesaneura/ A. mulganeura/ A. quadrimarginea* over open shrubland of *Acacia ramulosa* var. *ramulosa/ Dodonaea lobulata* and low open shrubland of *Ptilotus obovatus* on rocky-hillslope	1174	6.8

Landform	Major Vegetation Group	Vegetation Code	Vegetation Type	Area (ha)	Area (%)
	Casuarina Forests and Woodlands (MVG 8)	RH-CFW1	Mid woodland of *Casuarina pauper* over mid shrubland of *Scaevola spinescens/ Dodonaea lobulata* and low shrubland of *Ptilotus obovatus* on rocky-hillslope	1960	11.4
	Eucalypt Woodlands (MVG 5)	RH-EW1	Mid woodland of *Eucalyptus lesouefii* over open low shrubland of *Scaevola spinescens/ Eremophila parvifolia* and *Ptilotus obovatus* on a rocky-hillslope	1232	7.2
	Mallee Woodlands and Shrublands (MVG 14)	RH-MWS1	Mid mallee shrubland of *Eucalyptus celastroides* over low shrubland of *Acacia ramulosa* var. *ramulosa* and low hummock grassland of *Triodia scariosa* on rocky-hillslope	374	2.2
Sand Dune	Acacia Forests and Woodlands (MVG 6)	SD-AFW1	Low woodland of *Acacia incurvaneura/ A. ramulosa* over mid shrubland of *Eremophila miniata* and low chenopod shrubland of *Atriplex vesicaria* on sand dune	222	1.3
Sand-Loam Plain	Mallee Woodlands and Shrublands (MVG 14)	SLP-MWS1	Mid mallee woodland of *Eucalyptus yilgarnensis* over low open shrubland of *Senna artemisioides* subsp. *filifolia* and low hummock grassland of *Triodia scariosa* on sand-loam plain	10	0.1
N/A	N/A	Playa	Playa	44	0.3
Total				**17,221**	**100**

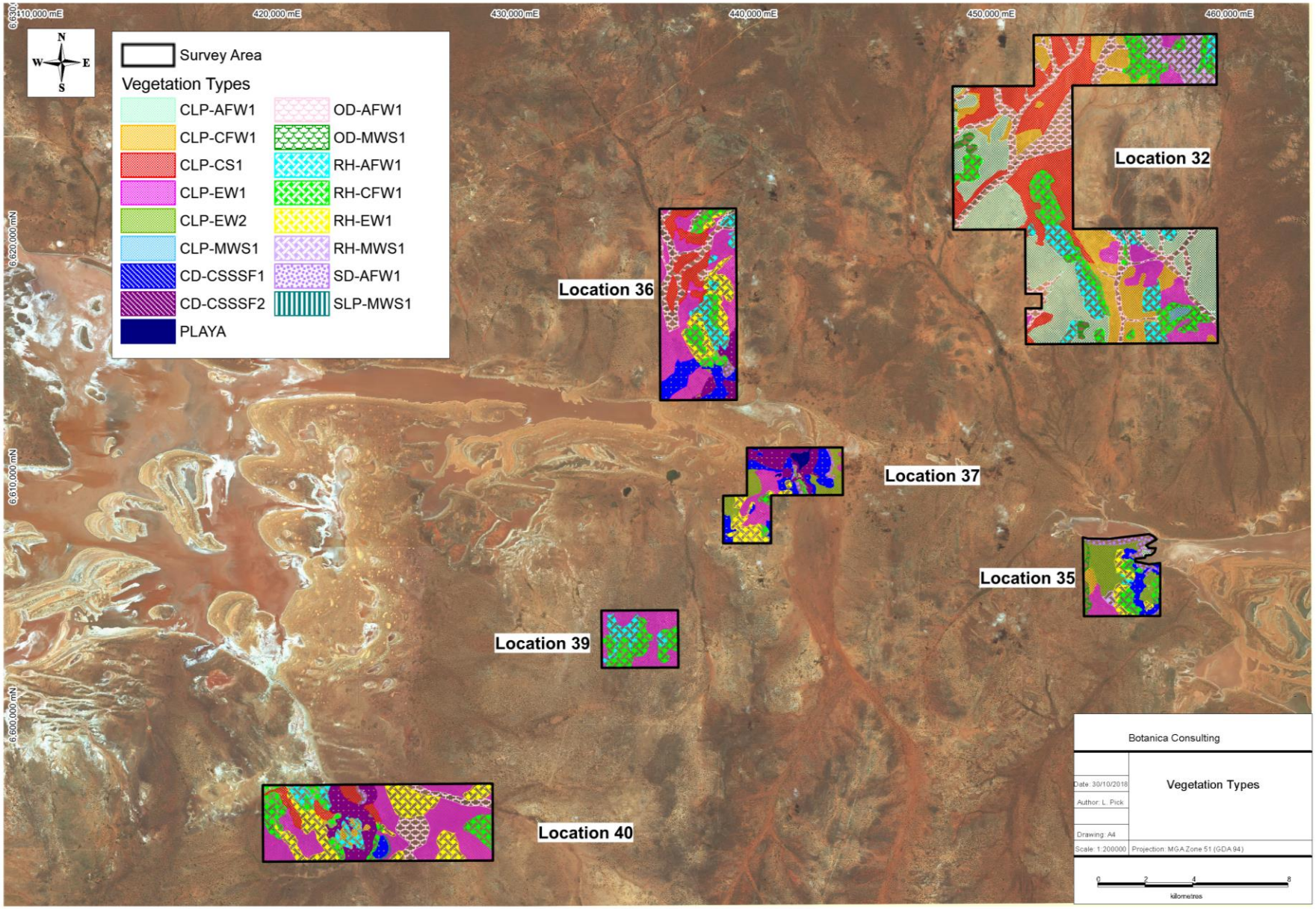

Figure 4-1: Vegetation types within the survey area

Clay-Loam Plain: Acacia Forests and Woodlands

4.2.1.1 Low woodland of *Acacia caesaneural A. incurvaneura* over mid open shrubland *Senna artemisioides* subsp. *filifolia/ Dodonaea lobulata* and low shrubland of *Ptilotus obovatus* on clay-loam-plain (CLP-AFW1)

The total flora recorded within this vegetation type was represented by a total of 13 Families, 15 Genera and 28 Taxa (Plate 4-1). Dominant taxa are shown in Table 4-5. According to the NVIS, this vegetation type is best represented by the MVG 6-Acacia Forests and Woodlands (DotEE, 2017b).

Table 4-5: Low woodland of *Acacia caesaneural A. incurvaneura* over mid open shrubland *Senna artemisioides* subsp. *filifolia/ Dodonaea lobulata* and low shrubland of *Ptilotus obovatus* on clay-loam-plain (CLP-AFW1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree <10m	10-30%	*Acacia caesaneura* *Acacia incurvaneura*
Shrub 1-2m	10-30%	*Senna artemisioides* subsp. *filifolia* *Dodonaea lobulata*
Shrub <1m	10-30%	*Ptilotus obovatus*

Plate 4-1: Low woodland of *Acacia caesaneural A. incurvaneura* over mid open shrubland *Senna artemisioides* subsp. *filifolia/ Dodonaea lobulata* and low shrubland of *Ptilotus obovatus* on clay-loam-plain (CLP-AFW1)

Clay-Loam Plain: Casuarina Forests and Woodlands

4.2.1.2 Mid woodland of *Casuarina pauper* over mid chenopod shrubland of *Maireana sedifolia* and low chenopod shrubland of *Atriplex vesicaria* on clay-loam plain (CLP-CFW1)

The total flora recorded within this vegetation type was represented by a total of 15 Families, 21 Genera and 36 Taxa (Plate 4-2). Dominant taxa are shown in Table 4-6. According to the NVIS, this vegetation type is best represented by the MVG 8-Casuarina Forests and Woodlands (DotEE, 2017b).

Table 4-6: Mid woodland of *Casuarina pauper* over mid chenopod shrubland of *Maireana sedifolia* and low chenopod shrubland of *Atriplex vesicaria* on clay-loam plain (CLP-CFW1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree <10m	10-30%	*Casuarina pauper*
Chenopod Shrub 1-2m	10-30%	*Maireana sedifolia*
Chenopod Shrub <1m	10-30%	*Atriplex vesicaria*

Plate 4-2 Mid woodland of *Casuarina pauper* over mid chenopod shrubland of *Maireana sedifolia* and low chenopod shrubland of *Atriplex vesicaria* on clay-loam plain (CLP-CFW1)

Clay-Loam Plain: Chenopod Shrubland

4.2.1.3 Low chenopod shrubland of *Maireana sedifolia/ M. pyramidata* over low forb shrubland on clay-loam-plain (CLP-CS1)

The total flora recorded within this vegetation type was represented by a total of 15 Families, 21 Genera and 36 Taxa (Plate 4-3). Dominant taxa are shown in Table 4-7. According to the NVIS, this vegetation type is best represented by the MVG 2 – Chenopod Shrubland (DotEE, 2017b).

Table 4-7: Low chenopod shrubland of Low chenopod shrubland of *Maireana sedifolia/ M. pyramidata* over low forb shrubland on clay-loam-plain (CLP-CS1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Chenopod Shrub 1-2m	30-70%	*Maireana sedifolia* *Maireana pyramidata*
Forb <1m	10-30%	*Sclerolaena cuneata* *Sclerolaena diacantha*

Plate 4-3: Low chenopod shrubland of *Maireana sedifolia/ M. pyramidata* over low forb shrubland on clay-loam-plain (CLP-CS1)

Clay-Loam Plain: Eucalypt Woodlands

4.2.1.4 Low woodland of *Eucalyptus salmonophloia* over open shrubland of *Senna artemisioides* subsp. *filifolia* and low chenopod shrubland of *Atriplex vesicaria/ Maireana sedifolia* on clay-loam-plain (CLP-EW1)

The total flora recorded within this vegetation type was represented by a total of 11 Families, 16 Genera and 34 Taxa (Plate 4-4). Dominant taxa are shown in Table 4-8. According to the NVIS, this vegetation type is best represented by the MVG 5 – Eucalypt Woodland (DotEE, 2017b).

Table 4-8: Low woodland of *Eucalyptus salmonophloia* over open shrubland of *Senna artemisioides* subsp. *filifolia* and low chenopod shrubland of *Atriplex vesicaria/ Maireana sedifolia* on clay-loam-plain (CLP-EW1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree <10m	10-30%	*Eucalyptus salmonophloia*
Shrub 1-2m	10-30%	*Senna artemisioides* subsp. *filifolia*
Chenopod Shrub <1m	30-70%	*Maireana sedifolia*
Chenopod Shrub <1m	30-70%	*Atriplex vesicaria*

Plate 4-4: Low woodland of *Eucalyptus salmonophloia* over open shrubland of *Senna artemisioides* subsp. *filifolia* and low chenopod shrubland of *Atriplex vesicaria/ Maireana sedifolia* on clay-loam-plain (CLP-EW1)

4.2.1.5 Low woodland of *Eucalyptus oleosa* over open shrubland of *Senna artemisioides* subsp. *filifolia* and low chenopod shrubland of *Atriplex vesicaria/ Maireana sedifolia* on clay-loam-plain (CLP-EW2)

The total flora recorded within this vegetation type was represented by a total of 12 Families, 17 Genera and 40 Taxa (Plate 4-5). Dominant taxa are shown in Table 4-9. According to the NVIS, this vegetation type is best represented by the MVG 5 – Eucalypt Woodland (DotEE, 2017b).

Table 4-9: Low woodland of *Eucalyptus oleosa* over open shrubland of *Senna artemisioides* subsp. *filifolia* and low chenopod shrubland of *Atriplex vesicaria/ Maireana sedifolia* on clay-loam-plain (CLP-EW2)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree <10m	10-30%	*Eucalyptus oleosa*
Shrub 1-2m	10-30%	*Senna artemisioides* subsp. *filifolia*
Chenopod Shrub <1m	30-70%	*Maireana sedifolia*
Chenopod Shrub <1m	30-70%	*Atriplex vesicaria*

Plate 4-5: Low woodland of *Eucalyptus oleosa* over open shrubland of *Senna artemisioides* subsp. *filifolia* and low chenopod shrubland of *Atriplex vesicaria/ Maireana sedifolia* on clay-loam-plain (CLP-EW2)

Clay-Loam Plain: Mallee Woodlands and Shrublands

4.2.1.6 Mid open mallee shrubland of *Eucalyptus concinna* over shrubland of *Senna artemisioides* subsp. *filifolia* and low open shrubland of *Ptilotus obovatus* on clay-loam plain (CLP-MWS1)

The total flora recorded within this vegetation type was represented by a total of 14 Families, 20 Genera and 46 Taxa (Plate 4-6). Dominant taxa are shown in Table 4-10. According to the NVIS, this vegetation type is best represented by the MVG14 – Mallee Woodlands and Shrublands (DotEE, 2017b).

Table 4-10: Mid open mallee shrubland of *Eucalyptus concinna* over shrubland of *Senna artemisioides* subsp. *filifolia* and low open shrubland of *Ptilotus obovatus* on clay-loam plain (CLP-MWS1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Shrub Mallee <10m	10-30%	*Eucalyptus concinna*
Shrub 1-2m	10-30%	*Acacia ramulosa* var. *ramulosa* *Senna artemisioides* subsp. *filifolia*
Shrub <1m	10-30%	*Ptilotus obovatus*

Plate 4-6: Mid open mallee shrubland of *Eucalyptus concinna* over shrubland of *Senna artemisioides* subsp. *filifolia* and low open shrubland of *Ptilotus obovatus* on clay-loam plain (CLP-MWS1)

Closed Depression: Chenopod and Samphire Shrubland

4.2.1.7 Low shrubland of *Cratystylis subspinescens* over low samphire shrubland of *Tecticornia doliiformis/ T. pruinosa* on playa edge (CD-CSSSF1)

The total flora recorded within this vegetation type was represented by a total of 9 Families, 12 Genera and 19 Taxa (Plate 4-7). Dominant taxa are shown in Table 4-11. According to the NVIS, this vegetation type is best represented by the MVG22 – Chenopod and Samphire Shrubland (DotEE, 2017b).

Table 4-11: Low shrubland of *Cratystylis subspinescens* over low samphire shrubland of *Tecticornia doliiformis/ T. pruinosa* on playa edge (CD-CSSSF1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Shrub 1-2m	30-70%	*Cratystylis subspinescens*
Samphire Shrub <1m	30-70%	*Tecticornia doliiformis* *Tecticornia pruinosa*

Plate 4-7: Low shrubland of *Cratystylis subspinescens* over low samphire shrubland of *Tecticornia doliiformis/ T. pruinosa* on playa edge (CD-CSSSF1)

4.2.1.8 Low samphire shrubland of *Tecticornia doliiformis/ T. pruinosa* on playa edge (CD-CSSSF2)

The total flora recorded within this vegetation type was represented by a total of 2 Families, 3 Genera and 10 Taxa (Plate 4-8). Dominant taxa are shown in Table 4-12. According to the NVIS, this vegetation type is best represented by the MVG22 – Chenopod and Samphire Shrubland (DotEE, 2017b).

Table 4-12: Low samphire shrubland of *Tecticornia doliiformis/ T. pruinosa* on playa edge (CD-CSSSF2)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Samphire Shrub <1m	30-70%	*Tecticornia doliiformis* *Tecticornia pruinosa*

Plate 4-8: Low samphire shrubland of *Tecticornia doliiformis/ T. pruinosa* on playa edge (CD-CSSSF2)

Open Depression: Acacia Forests and Woodlands

4.2.1.9 Low woodland of *Acacia caesaneura* and shrubland of *Acacia ramulosa* var. *ramulosa* over low shrubland of *Senna artemisioides* subsp. *filifolia* in open depression (OD-AFW1)

The total flora recorded within this vegetation type was represented by a total of 13 Families, 18 Genera and 41 Taxa (Plate 4-9). Dominant taxa are shown in Table 4-13. According to the NVIS, this vegetation type is best represented by the MVG6 – Acacia Forests and Woodlands (DotEE, 2017b).

Table 4-13: Low woodland of *Acacia caesaneura* and shrubland of *Acacia ramulosa* var. *ramulosa* over low shrubland of *Senna artemisioides* subsp. *filifolia* in open depression (OD-AFW1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree <10m	10-30%	*Acacia caesaneuera*
Shrub >2m	30-70%	*Acacia ramulosa* var. *ramulosa*
Shrub <1m	30-70%	*Senna artemisioides* subsp. *filifolia*

Plate 4-9: Low woodland of *Acacia caesaneura* and shrubland of *Acacia ramulosa* var. *ramulosa* over low shrubland of *Senna artemisioides* subsp. *filifolia* in open depression (OD-AFW1)

Open Depression: Mallee Woodlands and Shrublands

4.2.1.10 Mid mallee shrubland of *Eucalyptus concinna* over low woodland of *Acacia caesaneura* and shrubland of *Acacia ramulosa* var. *ramulosa* over low shrubland of *Ptilotus obovatus* in open depression (OD-MWS1)

The total flora recorded within this vegetation type was represented by a total of 12 Families, 17 Genera and 40 Taxa (Plate 4-10). Dominant taxa are shown in Table 4-14. According to the NVIS, this vegetation type is best represented by the MVG14 – Mallee Woodlands and Shrublands (DotEE, 2017b).

Table 4-14: Mid mallee shrubland of *Eucalyptus concinna* over low woodland of *Acacia caesaneura* and shrubland of *Acacia ramulosa* var. *ramulosa* over low shrubland of *Ptilotus obovatus* in open depression (OD-MWS1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Shrub Mallee 3-10m	10-30%	*Eucalyptus concinna*
Tree <10m	10-30%	*Acacia caesaneura*
Shrub 1-2m	10-30%	*Acacia ramulosa* var. *ramulosa*
Shrub <1m	10-30%	*Ptilotus obovatus*

Plate 4-10: Mid mallee shrubland of *Eucalyptus concinna* over low woodland of *Acacia caesaneura* and shrubland of *Acacia ramulosa* var. *ramulosa* over low shrubland of *Ptilotus obovatus* in open depression (OD-MWS1)

Rocky Hillslope: Acacia Forests and Woodlands

4.2.1.11 Mid open woodland of *Acacia caesaneura/ A. mulganeura/ A. quadrimarginea* over open shrubland of *Acacia ramulosa* var*. ramulosa/ Dodonaea lobulata* and low open shrubland of *Ptilotus obovatus* on rocky-hillslope (RH-AFW1)

The total flora recorded within this vegetation type was represented by a total of 11 Families, 15 Genera and 24 Taxa (Plate 4-11). Dominant taxa are shown in Table 4-15. According to the NVIS, this vegetation type is best represented by the MVG 6- Acacia Forests and Woodlands (DotEE, 2017b).

Table 4-15: Mid open woodland of *Acacia caesaneura/ A. mulganeura/ A. quadrimarginea* over open shrubland of *Acacia ramulosa* var*. ramulosa/ Dodonaea lobulata* and low open shrubland of *Ptilotus obovatus* on rocky-hillslope (RH-AFW1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree <10m	10-30%	*Acacia quadrimarginea* *Acacia caesaneura* *Acacia mulganeura*
Shrub >2m	10-30%	*Acacia ramulosa* var. *ramulosa*
Shrub 1-2m	10-30%	*Dodonaea lobulata*
Shrub <1m	10-30%	*Ptilotus obovatus*

Plate 4-11: Mid open woodland of *Acacia caesaneura/ A. mulganeura/ A. quadrimarginea* over open shrubland of *Acacia ramulosa* var*. ramulosa/ Dodonaea lobulata* and low open shrubland of *Ptilotus obovatus* on rocky-hillslope (RH-AFW1)

Rocky Hillslope: Casuarina Forests and Woodlands

4.2.1.12 Mid woodland of *Casuarina pauper* over mid shrubland of *Scaevola spinescens/ Dodonaea lobulata* and low shrubland of *Ptilotus obovatus* on rocky-hillslope (RH-CFW1)

The total flora recorded within this vegetation type was represented by a total of 15 Families, 22 Genera and 37 Taxa (Plate 4-12). Dominant taxa are shown in Table 4-16. According to the NVIS, this vegetation type is best represented by the MVG 8 – Casuarina Forests and Woodlands (DotEE, 2017b).

Table 4-16: Mid woodland of *Casuarina pauper* over mid shrubland of *Scaevola spinescens/ Dodonaea lobulata* and low shrubland of *Ptilotus obovatus* on rocky-hillslope (RH-CFW1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree <10m	10-30%	*Casuarina pauper*
Shrub 1-2m	30-70%	*Scaevola spinescens* *Dodonaea lobulata*
Shrub <1m	30-70%	*Ptilotus obovatus*

Plate 4-12: Mid woodland of *Casuarina pauper* over mid shrubland of *Scaevola spinescens/ Dodonaea lobulata* and low shrubland of *Ptilotus obovatus* on rocky-hillslope (RH-CFW1)

Rocky Hillslope: Eucalypt Woodlands

4.2.1.13 Mid woodland of *Eucalyptus lesouefii* over open low shrubland of *Scaevola spinescens/ Eremophila parvifolia* and *Ptilotus obovatus* on a rocky-hillslope (RH-EW1)

The total flora recorded within this vegetation type was represented by a total of 9 Families, 14 Genera and 22 Taxa (Plate 4-13). Dominant taxa are shown in Table 4-17. According to the NVIS, this vegetation type is best represented by the MVG 5- Eucalypt Woodlands (DotEE, 2017b).

Table 4-17: Mid woodland of *Eucalyptus lesouefii* over open low shrubland of *Scaevola spinescens/ Eremophila parvifolia* and *Ptilotus obovatus* on a rocky-hillslope (RH-EW1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree <10m	10-30%	*Eucalyptus lesouefii*
Shrub 1-2m	5-10%	*Scaevola spinescens*
Shrub <1m	10-30%	*Eremophila parvifolia* *Ptilotus obovatus*

Plate 4-13: Mid woodland of *Eucalyptus lesouefii* over open low shrubland of *Scaevola spinescens/ Eremophila parvifolia* and *Ptilotus obovatus* on a rocky-hillslope (RH-EW1)

Rocky Hillslope: Mallee Woodlands and Shrublands

4.2.1.14 Mid mallee shrubland of *Eucalyptus celastroides* over low shrubland of *Acacia ramulosa* var*. ramulosa* and low hummock grassland of *Triodia scariosa* on rocky-hillslope (RH-MWS1)

The total flora recorded within this vegetation type was represented by a total of 11 Families, 14 Genera and 20 Taxa (Plate 4-14). Dominant taxa are shown in Table 4-18. According to the NVIS, this vegetation type is best represented by the MVG 14 – Mallee Woodlands and Shrublands (DotEE, 2017b).

Table 4-18: Mid mallee shrubland of *Eucalyptus celastroides* over low shrubland of *Acacia ramulosa* var*. ramulosa* and low hummock grassland of *Triodia scariosa* on rocky-hillslope (RH-MWS1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Shrub Mallee 3-10m	10-30%	*Eucalyptus celastroides*
Shrub >2m	10-30%	*Acacia ramulosa* var. *ramulosa*
Hummock Grassland <1m	30-70%	*Triodia scariosa*

Plate 4-14: Mid mallee shrubland of *Eucalyptus celastroides* over low shrubland of *Acacia ramulosa* var*. ramulosa* and low hummock grassland of *Triodia scariosa* on rocky-hillslope (RH-MWS1)

Sand Dune: Acacia Forests and Woodlands

4.2.1.15 Low woodland of *Acacia incurvaneura/ A. ramulosa* over mid shrubland of *Eremophila miniata* and low chenopod shrubland of *Atriplex vesicaria* on sand dune (SD-AFW1)

The total flora recorded within this vegetation type was represented by a total of 9 Families, 11 Genera and 15 Taxa (Plate 4-15). Dominant taxa are shown in Table 4-19. According to the NVIS, this vegetation type is best represented by the MVG 6 – Acacia Forests and Woodlands (DotEE, 2017b).

Table 4-19: Low woodland of *Acacia incurvaneura/ A. ramulosa* over mid shrubland of *Eremophila miniata* and low chenopod shrubland of *Atriplex vesicaria* on sand dune (SD-AFW1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree <10m	10-30%	*Acacia incurvaneura*
Shrub >2m	10-30%	*Acacia ramulosa* var. *ramulosa*
Shrub 1-2m	10-30%	*Eremophila miniata*
Chenopod Shrub <0.5m	10-30%	*Atriplex vesicaria*

Plate 4-15: Low woodland of *Acacia incurvaneura/ A. ramulosa* over mid shrubland of *Eremophila miniata* and low chenopod shrubland of *Atriplex vesicaria* on sand dune (SD-AFW1)

Sand-Loam Plain: Mallee Woodlands and Shrublands

4.2.1.16 Mid mallee woodland of *Eucalyptus yilgarnensis* over low open shrubland of *Senna artemisioides* subsp. *filifolia* and low hummock grassland of *Triodia scariosa* on sand-loam plain (SLP-MWS1)

The total flora recorded within this vegetation type was represented by a total of 9 Families, 11 Genera and 15 Taxa (Plate 4-16). Dominant taxa are shown in Table 4-20. According to the NVIS, this vegetation type is best represented by the MVG 6 – Acacia Forests and Woodlands (DotEE, 2017b).

Table 4-20: Mid mallee woodland of *Eucalyptus yilgarnensis* over low open shrubland of *Senna artemisioides* subsp. *filifolia* and low hummock grassland of *Triodia scariosa* on sand-loam plain (SLP-MWS1)

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree Mallee <10m	10-30%	*Eucalyptus yilgarnensis*
Shrub 1-2m	10-30%	*Senna artemisioides* subsp. *filifola*
Hummock Grassland <1m	30-70%	*Triodia scariosa*

Plate 4-16: Mid mallee woodland of *Eucalyptus yilgarnensis* over low open shrubland of *Senna artemisioides* subsp. *filifolia* and low hummock grassland of *Triodia scariosa* on sand-loam plain (SLP-MWS1)

4.2.2 Vegetation Condition

Based on the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988 (Appendix 4), seven of the sixteen vegetation types were rated as 'good' (Table 4-21). 'Good' condition depicts that vegetation structure has been altered by obvious more obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing, very frequent fires, partial clearing or slightly to very aggressive weeds. The remaining eleven vegetation types were rated as 'very good' (Table 4-21) which depicts that vegetation has some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.

The most notable disturbance within the survey area was from cattle grazing and clearing for pastoral tracks/ infrastructure. A map showing the condition rating across the survey area is provided in Figure 4-2.

Table 4-21: Vegetation Condition Rating of vegetation types within the survey area

Landform	Major Vegetation Group	Vegetation Code	Vegetation Type	Vegetation Condition
Clay-Loam Plain	Acacia Forests and Woodlands (MVG 6)	CLP-AFW1	Low woodland of *Acacia caesaneura/ A. incurvaneura* over mid open shrubland of *Senna artemisioides* subsp. *filifolia/ Dodonaea lobulata* and low shrubland of *Ptilotus obovatus* on clay-loam-plain	Good
	Casuarina Forests and Woodlands (MVG 8)	CLP-CFW1	Mid woodland of *Casuarina pauper* over mid chenopod shrubland of *Maireana sedifolia* and low chenopod shrubland of *Atriplex vesicaria* on clay-loam plain	Good
	Chenopod and Samphire Shrubland (MVG 22)	CLP-CS1	Low chenopod shrubland of *Maireana sedifolia/ M. pyramidata* over low forb shrubland on clay-loam-plain	Good
	Eucalypt Woodlands (MVG 5)	CLP-EW1	Low woodland of *Eucalyptus salmonophloia* over open shrubland of *Senna artemisioides* subsp. *filifolia* and low chenopod shrubland of *Atriplex vesicaria/ Maireana sedifolia* on clay-loam-plain	Very Good
		CLP-EW2	Low woodland of *Eucalyptus oleosa*over open shrubland of *Senna artemisioides* subsp. *filifolia* and low chenopod shrubland of *Atriplex vesicaria/ Maireana sedifolia* on clay-loam-plain	Good
	Mallee Woodlands and Shrublands (MVG 14)	CLP-MWS1	Mid open mallee shrubland of *Eucalyptus concinna* over shrubland of *Senna artemisioides* subsp. *filifolia* and low open shrubland of *Ptilotus obovatus* on clay-loam-plain	Good
Closed Depression	Chenopod and Samphire Shrubland (MVG 22)	CD-CSSSF1	Low shrubland of *Cratystylis subspinescens* over low samphire shrubland of *Tecticornia doliiformis/ T. pruinosa* on playa edge	Very Good
		CD-CSSSF2	Low samphire shrubland of *Tecticornia doliiformis/ T. pruinosa* on playa edge	Good

Landform	Major Vegetation Group	Vegetation Code	Vegetation Type	Vegetation Condition
Open Depression	Acacia Forests and Woodlands (MVG 6)	OD-AFW1	Low woodland of *Acacia caesaneura* and shrubland of *Acacia ramulosa* var. *ramulosa* over low shrubland of *Senna artemisioides* subsp. *filifolia* in open depression	Very Good
	Mallee Woodlands and Shrublands (MVG 14)	OD-MWS1	Mid mallee shrubland of *Eucalyptus concinna* over low woodland of *Acacia caesaneura* and shrubland of *Acacia ramulosa* var. *ramulosa* over low shrubland of *Ptilotus obovatus* in open depression	Very Good
Rocky Hillslope	Acacia Forests and Woodlands (MVG 6)	RH-AFW1	Mid open woodland of *Acacia caesaneura/ A. mulganeura/ A. quadrimarginea* over open shrubland of *Acacia ramulosa* var. *ramulosa/ Dodonaea lobulata* and low open shrubland of *Ptilotus obovatus* on rocky-hillslope	Very Good
	Casuarina Forests and Woodlands (MVG 8)	RH-CFW1	Mid woodland of *Casuarina pauper* over mid shrubland of *Scaevola spinescens/ Dodonaea lobulata* and low shrubland of *Ptilotus obovatus* on rocky-hillslope	Very Good
	Eucalypt Woodlands (MVG 5)	RH-EW1	Mid woodland of *Eucalyptus lesouefii* over open low shrubland of *Scaevola spinescens/ Eremophila parvifolia* and *Ptilotus obovatus* on a rocky-hillslope	Very Good
	Mallee Woodlands and Shrublands (MVG 14)	RH-MWS1	Mid mallee shrubland of *Eucalyptus celastroides* over low shrubland of *Acacia ramulosa* var. *ramulosa* and low hummock grassland of *Triodia scariosa* on rocky-hillslope	Very Good
Sand Dune	Acacia Forests and Woodlands (MVG 6)	SD-AFW1	Low woodland of *Acacia incurvaneura/ A. ramulosa* over mid shrubland of *Eremophila miniata* and low chenopod shrubland of *Atriplex vesicaria* on sand dune	Good
Sand-Loam Plain	Mallee Woodlands and Shrublands (MVG 14)	SLP-MWS1	Mid mallee woodland of *Eucalyptus yilgarnensis* over low open shrubland of *Senna artemisioides* subsp. *filifolia* and low hummock grassland of *Triodia scariosa* on sand-loam plain	Very Good
N/A	N/A	CV	Cleared Vegetation	Completely Degraded

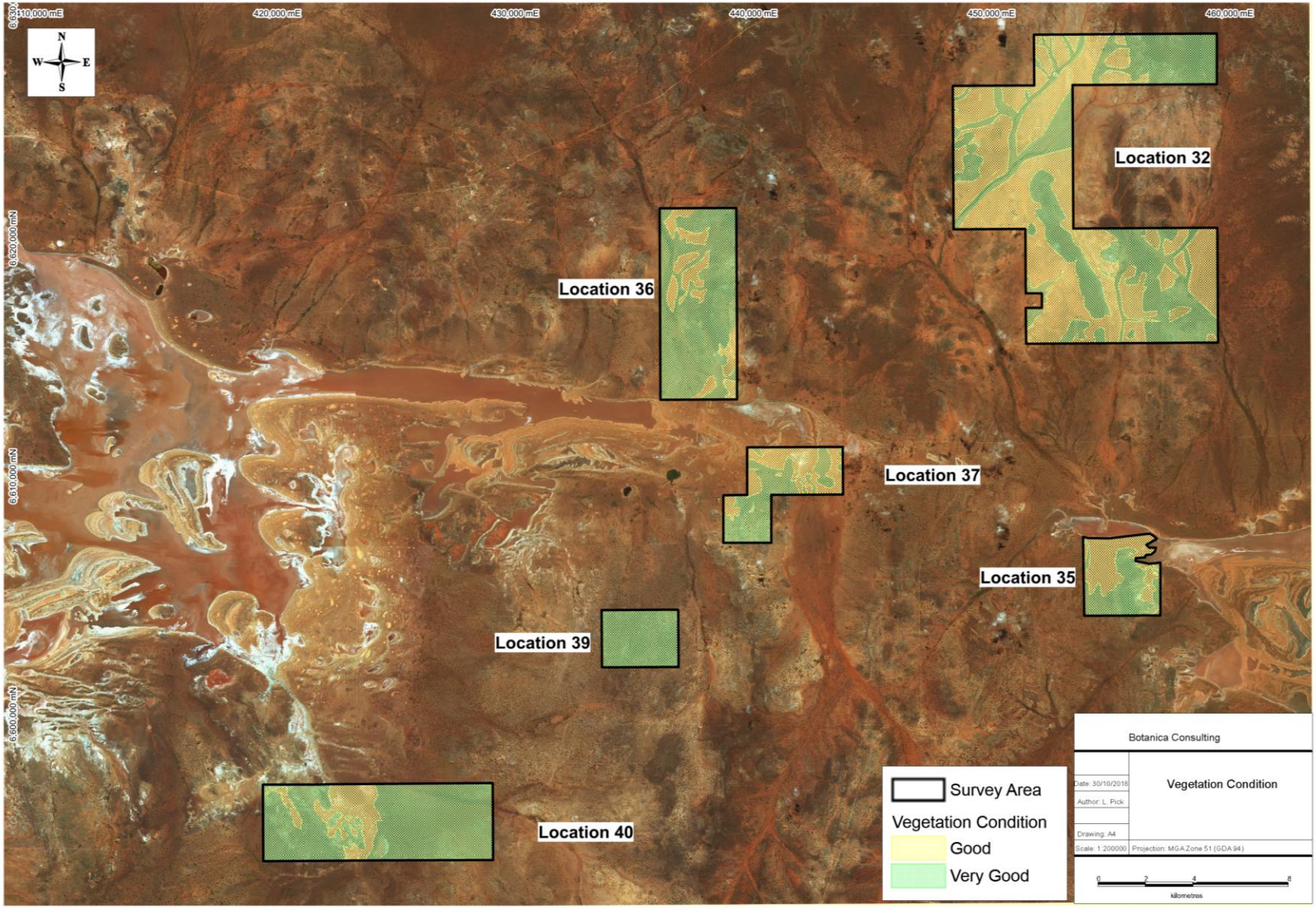

Figure 4-2: Vegetation condition within the survey area

4.2.3 Fauna Habitat

The broad scale terrestrial fauna habitats within the survey area presented below are based on vegetation and associated landforms identified during the flora and vegetation assessment. The extent of the identified fauna habitats and a summary description of each are provided in Table 4-22 below.

Table 4-22: Main Terrestrial Fauna Habitats within the survey area

Fauna Habitat Description	Example Image
Clay-Loam Plains Acacia Forests and Woodlands Casuarina Forests and Woodlands Chenopod and Samphire Shrublands Eucalypt Woodlands Mallee Woodlands and Shrublands (approximate area = 8693 ha; 50.5%).	
Closed Depression/ Playa Chenopod and Samphire Shrublands (approximate area = 1420 ha; 8.2%).	
Open Depression Acacia Forests and Woodlands Mallee Woodlands and Shrublands (approximate area = 2136 ha; 12.4%).	

Fauna Habitat Description	Example Image
Rocky Hillslopes Acacia Forests and Woodlands Casuarina Forests and Woodlands Eucalypt Woodlands Mallee Woodlands and Shrublands (approximate area = 4740 ha; 27.5%).	
Sand Dunes Acacia Forests and Woodlands (approximate area = 222 ha; 1.3%).	
Sand-Loam Plains Mallee Woodlands and Shrublands (approximate area = 10 ha; 0.1%).	

A list of expected vertebrate fauna species likely to occur in the survey area was compiled from information obtained during the literature review and is presented in Appendix 5. The results of some previous fauna surveys carried out in the general area are also summarised in this species listing as are the DBCA NatureMap database search results.

Table 4-23 summarises the numbers of potential species based on vertebrate class considered likely to be present in the general vicinity of the survey area based on the complete list held Appendix 5.

Not all species listed in existing databases and publications as potentially occurring within the region (i.e. *EPBC Act* Threatened Fauna and Migratory species lists, DBCA NatureMap Fauna Database and various publications) are considered likely to be present within the survey area. The list of potential fauna takes into consideration that firstly the species in question is not known to be locally/regionally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the survey area, though compiling an accurate list has limitations (see **Section 3.3 Survey limitations and constraints**).

Table 4-23: Summary of Potential Vertebrate Fauna Species

Group	Total number of potential species	Potential number of specially protected species	Potential number of migratory species	Potential number of priority species
Amphibians	5	0	0	0
Reptiles	87	0	0	0
Birds	124	4	1	0
Non-Volant Mammals	26[10]	0	0	1
Volant Mammals (Bats)	12	0	0	1
Total	**254[10]**	**4**	**1**	**2**

Superscript = number of introduced species included in the total. Note: Where a species state and federal conservation status is different, the highest category is used.

Despite the omission of some species it should be noted that the list provided is still very likely an over estimation of the fauna species utilising the survey area (either on a regular or infrequent basis) as a result of the precautionary approach adopted for the assessment. At any one time only, a subset of the listed potential species is likely to be present within the bounds of the study area.

4.2.4 Introduced Species

Three introduced species were recorded during the survey:

1. *Citrullus lanatus* (Pie Melon);
2. *Cucumis myriocarpus* (Prickly Paddy Melon); and
3. *Salvia verbenaca (*Wild Sage).

According to the DPRID, none of these taxa are listed as a Declared Plant under Section 22 of the *BAM Act 2007* (DPIRD, 2018). A map showing the introduced species locations recorded during the survey is provided in Figure 4-3. All introduced species were recorded within Location 32.

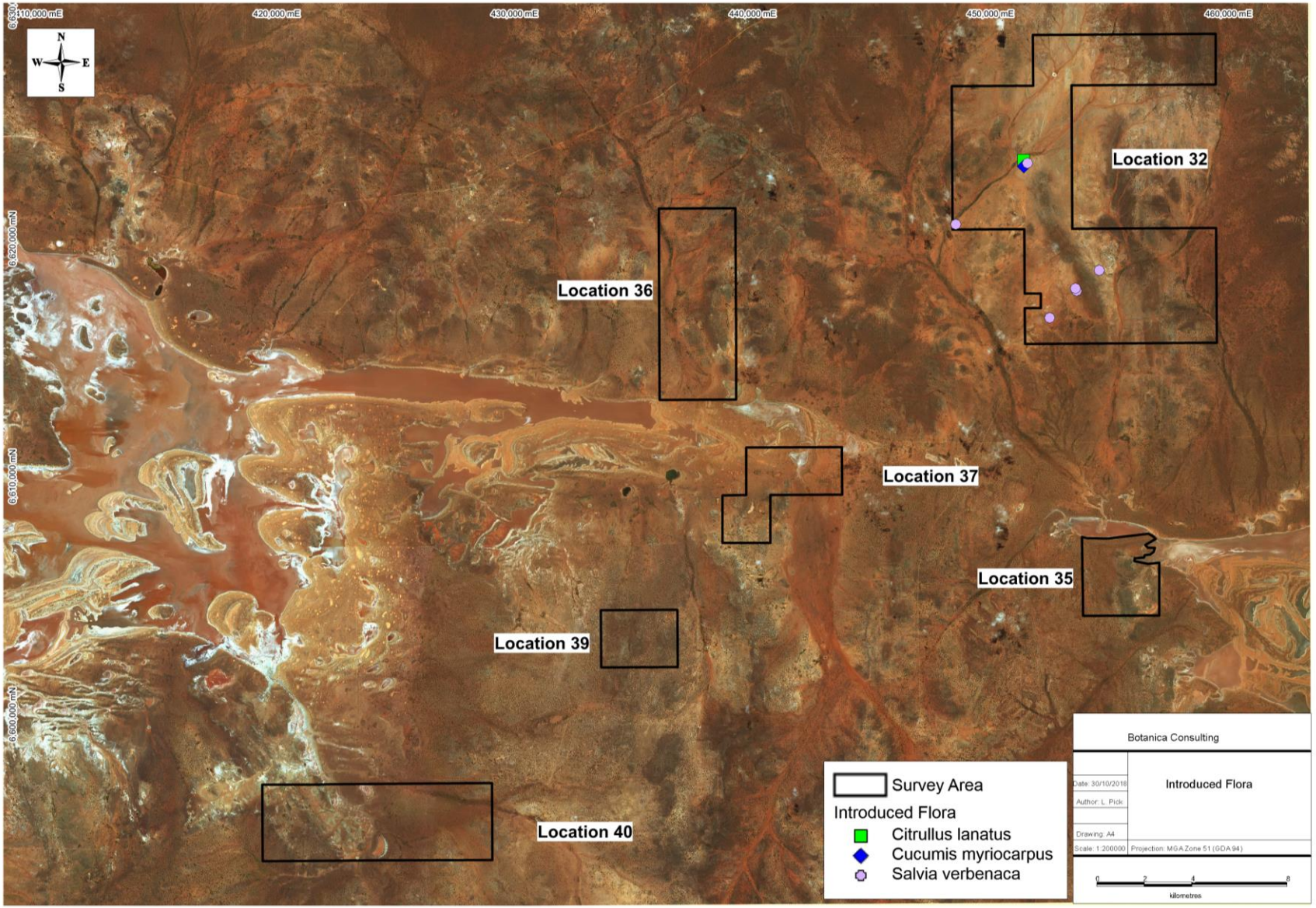

Figure 4-3: Introduced species recorded within the survey area

4.2.4.1 *Citrullus lanatus* (Pie Melon)

This taxon is described as a trailing annual, herb or climber. It produces yellow flowers from January to December (Plate 4-17). It occurs on sandy gravelly soil, loam and clay soils of plains, river banks, centers of dry lakes, drainage areas and disturbed areas (WAHERB, 2018). This taxon was identified in one vegetation type; CLP-CS1.

Plate 4-17: *Citrullus lanatus* (Pie Melon)

4.2.4.2 *Cucumis myriocarpus* (Prickly Paddy Melon)

This species is described as a prostrate, annual herb. It produces yellow flower from January to February, or April to May (Plate 4-18). It is found in disturbed areas (WAHERB, 2018). This taxon was identified in one vegetation type; CLP-CS1.

Plate 4-18: *Cucumis myriocarpus* (Prickly Paddy Melon)

4.2.4.3 *Salvia verbenaca* (Wild Sage)

This species is described as a slightly aromatic perennial, herb which grows to 1m high. It produces blue, pink and purple flowers from April to October (Plate 4-19). This species often occurs along road verges (WAHERB, 2018). This taxon was identified in six vegetation types; CL-AFW1, CLP-CFW1, CLP-CS1, CLP-EW1, CLP-EW2 and OD-AFW1.

Plate 4-19: *Salvia verbenaca* (Wild Sage)

4.2.5 Significant Flora

According to the EPA *Environmental Factor Guideline for Flora and Vegetation* (EPA, 2016b), significant flora includes:

- Flora being identified as threatened or priority species
- Locally endemic flora or flora associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)
- New species or anomalous features that indicate a potential new species
- Flora representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- Unusual species, including restricted subspecies, varieties or naturally occurring hybrids
- Flora with relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

No significant flora were identified within the survey area. A map showing DBCA Threatened/ Priority Flora records in relation to the survey area is provided in Appendix 1.

4.2.6 Significant Fauna

According to the EPA *Environmental Factor Guideline for Terrestrial Fauna* (EPA, 2016d), significant fauna includes:

- Fauna being identified as a threatened or priority species
- Fauna species with restricted distribution
- Fauna subject to a high degree of historical impact from threatening processes
- Fauna providing an important function required to maintain the ecological integrity of a significant ecosystem.

No significant fauna were observed within the survey area.

4.2.7 Significant Vegetation

According to the EPA *Environmental Factor Guideline for Flora and Vegetation* (EPA, 2016b) vegetation of conservation significance includes:

- Vegetation being identified as threatened or priority ecological communities
- Vegetation with restricted distribution
- Vegetation subject to a high degree of historical impact from threatening processes
- Vegetation which provides a role as a refuge
- Vegetation providing an important function required to maintain ecological integrity of a significant ecosystem.

No significant vegetation was identified within the survey area.

4.2.8 Matters of National Environmental Significance

None of the following matters of national environmental significance as defined by the Commonwealth EPBC Act were identified within the survey area:

- world heritage properties
- national heritage places
- wetlands of international importance (often called ‘Ramsar’ wetlands after the international treaty under which such wetlands are listed)
- nationally threatened species and ecological communities
- Commonwealth marine areas
- the Great Barrier Reef Marine Park

- nuclear actions (including uranium mining) a water resource, in relation to coal seam gas development and large coal mining development.

4.2.9 Matters of State Environmental Significance

There are no wetlands of national importance (ANCA Wetlands) or conservation category wetlands within the survey area. The survey area does not contain any TEC as listed under the WC Act or EP Act. No Threatened taxa listed under the WC Act were recorded within the survey area. The survey area does not contain any ESA listed under the EP Act. No DBCA managed lands are located within the survey area. The closest conservation reserve is the Wallaby Rocks Timber Reserve, which is located approximately 12 km south-east of the survey area. A map showing areas of conservation significance in relation to the survey area is provided in Appendix 1.

4.3 Native Vegetation Clearing Principles

Based on the outcomes from the survey undertaken, as presented in this report, Botanica provides the following comments regarding the native vegetation clearing principles listed under Schedule 5 of the EP Act (Table 4-24).

Table 4-24: Assessment of development within the survey area against native vegetation clearing principles

Letter	Principle	Assessment	Outcome
Native vegetation should not be cleared if it:			
(a)	comprises a high level of biological diversity.	Vegetation identified within the Project area is not considered to be of high biological diversity and is well represented in the local area.	Clearing is unlikely to be at variance to this principle
(b)	comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA.	No significant fauna habitat identified within the project area. Fauna habitats are well represented outside of the survey area.	Clearing is unlikely to be at variance to this principle
(c)	includes, or is necessary for the continued existence of rare flora.	No Threatened Flora taxa, pursuant to subsection (2) of section 23F of the WC Act 1950 and the EPBC Act 1999 were identified within the Project area.	Clearing is unlikely to be at variance to this principle
(d)	comprises the whole or part of or is necessary for the maintenance of a threatened ecological community (TEC).	No TEC listed under State and Commonwealth legislation occur within the Project area.	Clearing is unlikely to be at variance to this principle
(e)	is significant as a remnant of native vegetation in an area that has been extensively cleared	The pre-European Beard vegetation associations within the survey area retain >99% of the original pre-European vegetation extent.	Clearing is unlikely to be at variance to this principle
(f)	is growing, in, or in association with, an environment associated with a watercourse or wetland	According to the Geoscience Australia database (2001) there are multiple non-perennial drainage lines within the survey area (excluding Location 39). The survey area also intercepts the boundaries of two inland waters (non-perennial salt lakes); Lake Yindarlgooda (Location 36 and 37) and Lake Roe (Location 35).	Clearing may be at variance to this principle
(g)	Native vegetation should not be cleared if the	The pre-European Beard vegetation associations within the survey area retain	Clearing is unlikely to be at variance to this

Letter	Principle	Assessment	Outcome
Native vegetation should not be cleared if it:			
	clearing of the vegetation is likely to cause appreciable land degradation.	>99% of the original pre-European vegetation extent. Clearing within these vegetation associations is not likely to lead to land degradation issues such as salinity, water logging or acidic soils.	principle
(h)	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The survey area is not located within any current or proposed Conservation Reserves managed by DBCA and listed by the EPA.	Clearing is unlikely to be at variance to this principle
(i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	There are no permanent watercourses/ wetlands within the survey area (any drainage lines and playas are non-perennial/ intermittent). Most rainfall is lost by evaporation or surface runoff. Only a small portion infiltrates the soil and recharges the groundwater.	Clearing is unlikely to be at variance to this principle
(j)	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding	Rainfall is unreliable and highly variable with an average rainfall of 200mm and an evaporation rate of 2461mm. The region is not prone to flooding and does not contain riparian vegetation.	Clearing is unlikely to be at variance to this principle

5 Summary

Sixteen vegetation types were identified within the survey area. These vegetation types were located within six different landform types and comprised of five major vegetation groups, which were represented by a total of 22 Families, 37 Genera and 101 Taxa. The broad scale terrestrial fauna habitats within the survey area have been identified as comprising a mosaic of clay-loam plain, rocky hillslopes, sand-loam plains, open depressions, closed depressions and sand dunes.

No Threatened Flora, Threatened Fauna, Migratory Fauna or TECs as listed under State and Commonwealth legislation were identified within the survey area. No Priority Flora, Fauna or PECs as listed by the DBCA were identified within the survey area.

A review of the EPBC Act threatened fauna list, DBCA's Threatened Fauna Database and Priority List, unpublished reports and scientific publications identified a number of specially protected, migratory or priority fauna species as having been previously recorded or as being potentially present in the general vicinity of the survey area. At this stage it is not possible to determine likely impacts as the position and scale of any proposed development within each location is unknown. For any small scale development, it is however concluded that no fauna of conservation significance is likely to be significantly impacted on. This conclusion is primarily based on the relatively small size of the likely impact footprints and the extensive habitat connectivity with adjoining areas. Impacts on fauna and fauna habitat are therefore anticipated to be localised, small/negligible and as a consequence manageable. This conclusion should be reviewed when development plans for each location become available.

The survey area does not contain any world or national heritage places and does not occur within a Bush Forever site. There are no wetlands of international importance (Ramsar Wetlands), national importance (ANCA Wetlands) or conservation category wetlands within the survey area.

The survey area does not contain any ESA; however, each Hampton Location (entire survey area) is located is listed as a Schedule 1 Area under the EP Act. The survey is not located within DBCA managed land. The closest conservation reserve is the Wallaby Rocks Timber Reserve, which is located approximately 12 km south-east of the survey area.

Vegetation ranged from ''good' to 'very good' condition. Three introduced taxa identified within the survey area, none of these taxa are listed as a Declared Plant.

5.1 Recommendations

- Implement weed management/ vehicle hygiene procedures during clearing/ site access to prevent introduction and spread of invasive species.
- Avoid clearing of mature Eucalypts (in particular those with hollows) and vegetation associated with drainage lines/ playas
- Prior to clearing conduct target searches for Priority/ Threatened Flora and Malleefowl within proposed clearing footprint.

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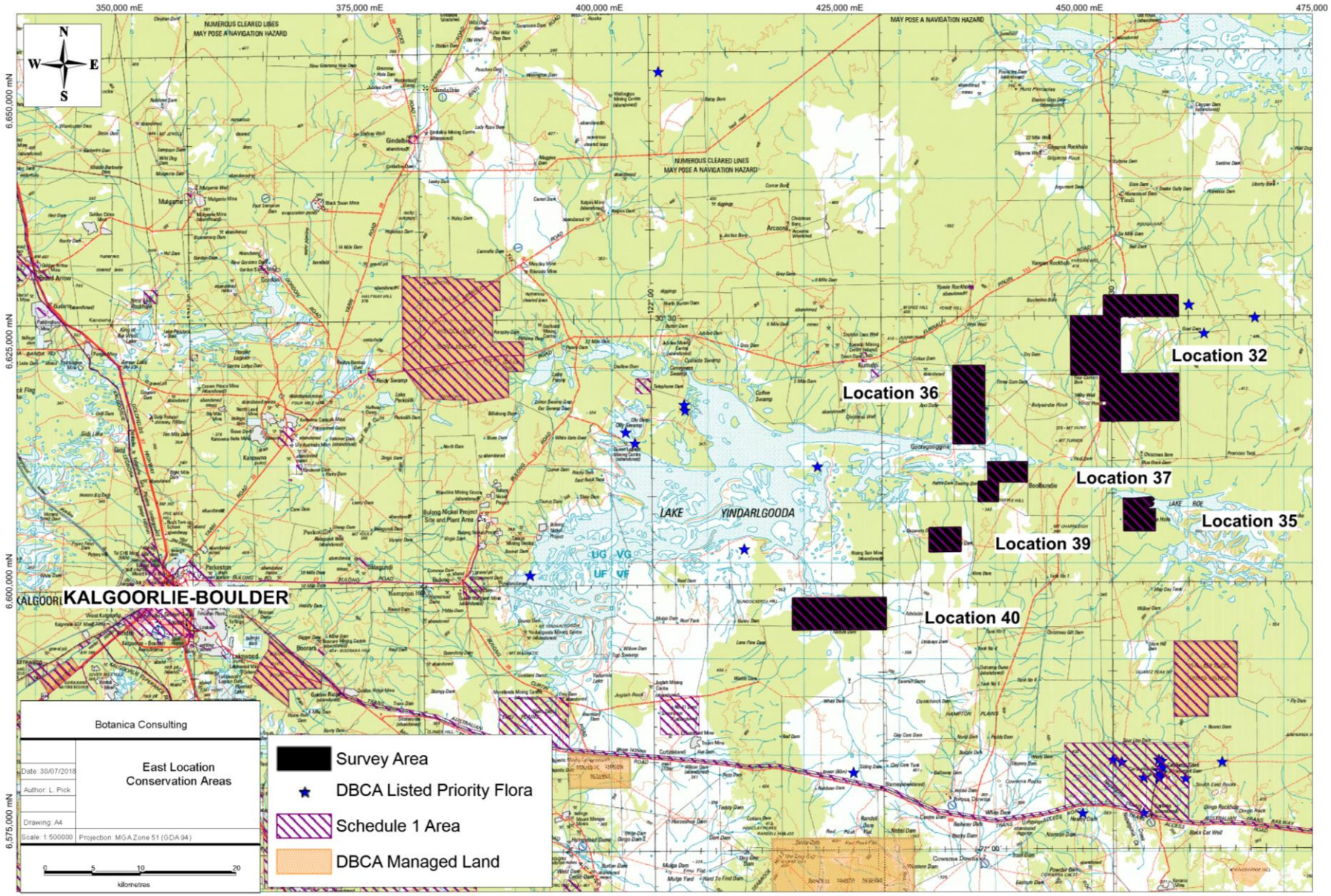
Appendix 1: Regional map of the survey area and Conservation Areas



Appendix 2: List of species identified within each vegetation type

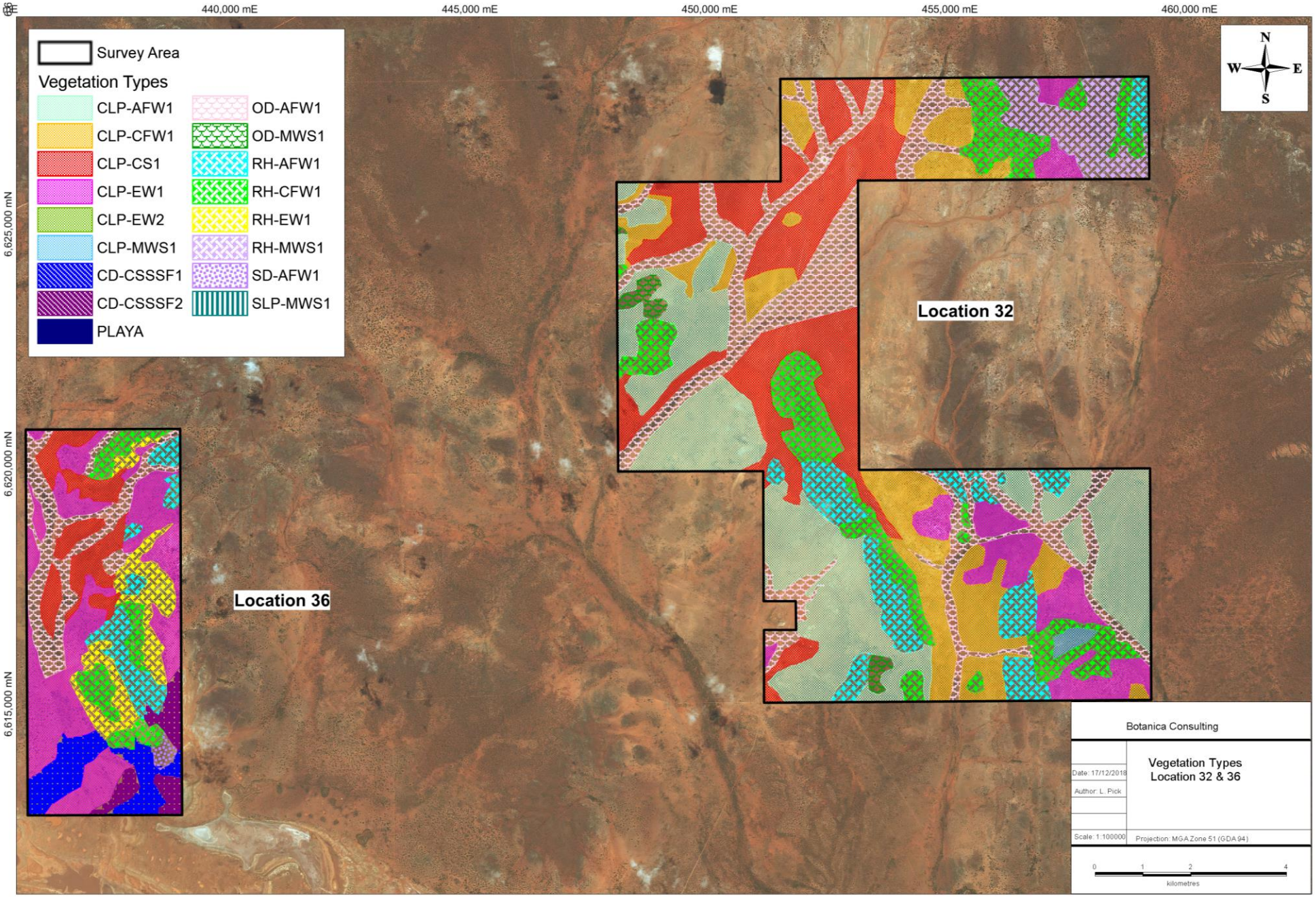
Blue text (A)-annual species; Green text (W)-Introduced species (WAHERB, 2018)

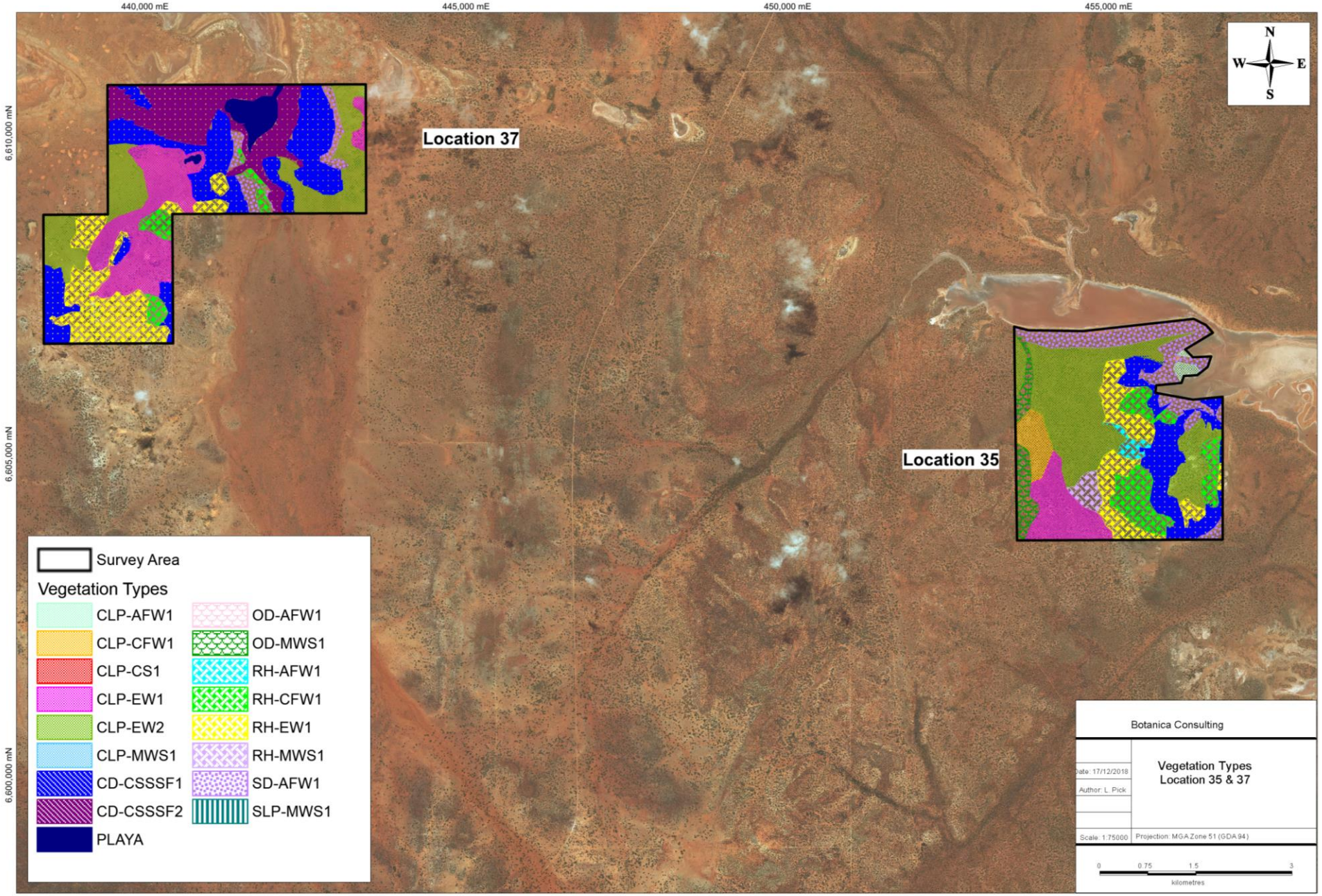
Family	Genus	Taxon	CLP-AFW1	CLP-CFW1	CLP-CS1	CLP-EW1	CLP-EW2	CLP-MWS1	CD-CSSSF1	CD-CSSSF2	OD-AFW1	OD-MWS1	RH-AFW1	RH-CFW1	RH-EW1	RH-MWS1	SD-AFW1	SLP-MWS1
Fabaceae	*Acacia*	*aptaneura*														*		
Fabaceae	*Acacia*	*caesaneura*	*					*			*	*	*	*		*		
Fabaceae	*Acacia*	*hemiteles*				*	*	*			*	*				*		*
Fabaceae	*Acacia*	*incurvaneura*	*	*	*			*			*	*					*	
Fabaceae	*Acacia*	*mulganeura*	*					*			*	*	*					
Fabaceae	*Acacia*	*murrayana*												*				
Fabaceae	*Acacia*	*quadrimarginea*	*					*			*	*	*				*	
Fabaceae	*Acacia*	*ramulosa* var. *ramulosa*	*					*			*	*	*	*		*	*	*
Fabaceae	*Acacia*	*tetragonophylla*	*	*	*	*	*	*	*		*	*	*	*	*	*		*
Apocynaceae	*Alyxia*	*buxifolia*																*
Loranthaceae	*Amyema*	*preissii*						*			*	*						
Chenopodiaceae	*Atriplex*	*nummularia* subsp. *spathulata*	*	*	*	*	*	*	*		*	*		*	*			
Chenopodiaceae	*Atriplex*	*bunburyana*				*	*	*			*	*						
Chenopodiaceae	*Atriplex*	*codonocarpa* (A)		*	*													
Chenopodiaceae	*Atriplex*	sp. (sterile)						*			*	*						
Chenopodiaceae	*Atriplex*	*stipitata*																*
Chenopodiaceae	*Atriplex*	*vesicaria*	*	*		*	*		*						*		*	
Poaceae	*Austrostipa*	*elegantissima*												*		*		
Poaceae	*Austrostipa*	*nitida (A)*	*	*				*	*		*	*	*					
Malvaceae	*Brachychiton*	*gregorii*											*	*				
Cupressaceae	*Callitris*	*columellaris*																*
Casuarinaceae	*Casuarina*	*pauper*	*	*	*		*	*			*	*	*	*		*		*
Asteraceae	*Chrysocephalum*	*puteale*											*					
Cucurbitaceae	*Citrullus*	*lanatus (W)*			*													
Asteraceae	*Cratystylis*	*microphylla*													*		*	*
Asteraceae	*Cratystylis*	*subspinescens*		*	*			*	*					*				
Cucurbitaceae	*Cucumis*	*myriocarpus (W)*			*													
Aizoaceae	*Disphyma*	*crassifolium*		*					*									
Sapindaceae	*Dodonaea*	*bursariifolia*												*				
Sapindaceae	*Dodonaea*	*lobulata*	*	*	*			*			*	*	*	*	*	*		
Sapindaceae	*Dodonaea*	*viscosa* subsp. *angustissima*											*				*	*
Chenopodiaceae	*Enchylaena*	*tomentosa*				*	*								*			
Poaceae	*Enneapogon*	*caerulescens*		*	*			*			*	*	*	*				
Scrophulariaceae	*Eremophila*	*alternifolia*	*	*	*			*			*	*		*	*			
Scrophulariaceae	*Eremophila*	*caperata*																*

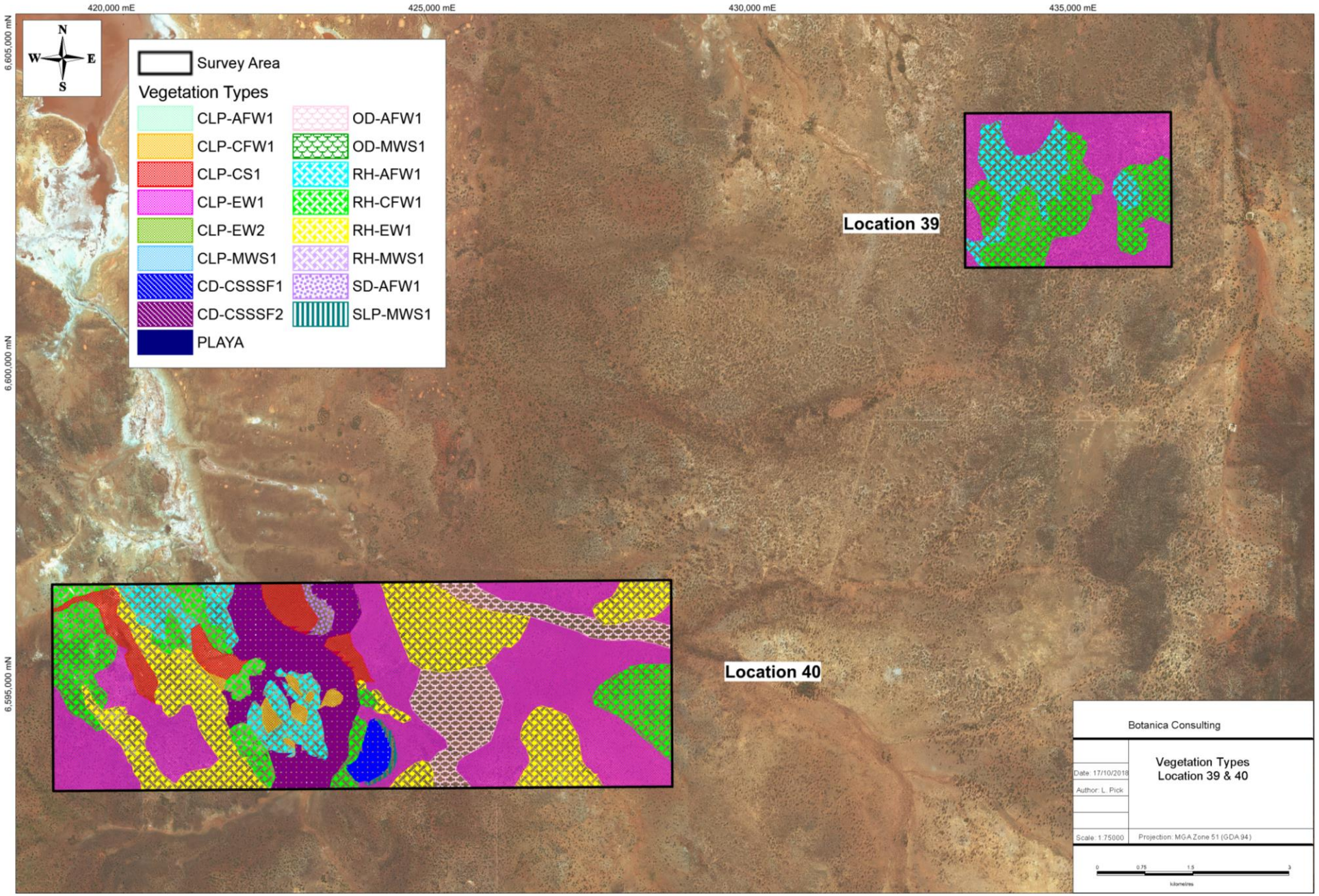
Family	Genus	Taxon	CLP-AFW1	CLP-CFW1	CLP-CS1	CLP-EW1	CLP-EW2	CLP-MWS1	CD-CSSSF1	CD-CSSSF2	OD-AFW1	OD-MWS1	RH-AFW1	RH-CFW1	RH-EW1	RH-MWS1	SD-AFW1	SLP-MWS1
Scrophulariaceae	*Eremophila*	*decipiens*						*			*	*		*	*	*		
Scrophulariaceae	*Eremophila*	*forrestii* subsp. *forrestii*					*											
Scrophulariaceae	*Eremophila*	*glabra*						*			*	*						
Scrophulariaceae	*Eremophila*	*interstans*				*	*											
Scrophulariaceae	*Eremophila*	*longifolia*				*	*											
Scrophulariaceae	*Eremophila*	*miniata*		*					*								*	
Scrophulariaceae	*Eremophila*	*oldfieldii* subsp. *angustifolia*	*			*	*	*			*	*	*	*		*		
Scrophulariaceae	*Eremophila*	*oldfieldii subsp. oldfieldii*	*					*			*	*						
Scrophulariaceae	*Eremophila*	*parvifolia*					*	*			*	*		*	*			
Scrophulariaceae	*Eremophila*	*pustulata*													*			
Scrophulariaceae	*Eremophila*	*scoparia*		*		*	*	*	*		*	*		*	*			
Scrophulariaceae	*Eremophila*	sp. (sterile)	*												*			
Myrtaceae	*Eucalyptus*	*ewartiana*											*	*				
Myrtaceae	*Eucalyptus*	*celastroides*														*		
Myrtaceae	*Eucalyptus*	*concinna*	*					*			*	*						
Myrtaceae	*Eucalyptus*	*lesouefii*				*	*							*	*			
Myrtaceae	*Eucalyptus*	*oleosa*					*	*			*	*				*		
Myrtaceae	*Eucalyptus*	*salmonophloia*		*	*	*	*											
Myrtaceae	*Eucalyptus*	*salubris*				*	*											
Myrtaceae	*Eucalyptus*	*yilgarnensis*																*
Santalaceae	*Exocarpos*	*aphyllus*				*	*							*	*	*		*
Frankeniaceae	*Frankenia*	*interioris*		*	*				*	*							*	
Proteaceae	*Grevillea*	*acuaria*																*
Aizoaceae	*Gunniopsis*	*quadrifida*		*					*								*	
Chenopodiaceae	*Maireana*	*amoena*		*					*	*								
Chenopodiaceae	*Maireana*	*brevifolia*		*					*	*								
Chenopodiaceae	*Maireana*	*georgei*		*	*			*			*	*		*	*	*		
Chenopodiaceae	*Maireana*	*glomerifolia*							*	*							*	
Chenopodiaceae	*Maireana*	*oppositifolia*		*	*	*	*										*	
Chenopodiaceae	*Maireana*	*pentatropis*												*				
Chenopodiaceae	*Maireana*	*pyramidata*		*	*	*	*		*	*								
Chenopodiaceae	*Maireana*	*sedifolia*	*	*	*		*	*	*	*	*	*		*	*			
Chenopodiaceae	*Maireana*	*tomentosa*		*	*	*	*											
Chenopodiaceae	*Maireana*	*trichoptera*													*			
Chenopodiaceae	*Maireana*	*triptera*	*	*	*	*	*	*			*	*		*				
Asteraceae	*Olearia*	*muelleri*	*					*					*	*	*	*		*
Asteraceae	*Olearia*	*pimeleoides*												*				
Pittosporaceae	*Pittosporum*	*angustifolium*												*				
Amaranthaceae	*Ptilotus*	*aervoides (A)*											*					

Family	Genus	Taxon	CLP-AFW1	CLP-CFW1	CLP-CS1	CLP-EW1	CLP-EW2	CLP-MWS1	CD-CSSSF1	CD-CSSSF2	OD-AFW1	OD-MWS1	RH-AFW1	RH-CFW1	RH-EW1	RH-MWS1	SD-AFW1	SLP-MWS1
Amaranthaceae	*Ptilotus*	*nobilis (A)*				*	*											
Amaranthaceae	*Ptilotus*	*obovatus*	*	*	*	*	*	*			*	*	*	*	*	*		*
Chenopodiaceae	*Salsola*	*australis* (A)						*			*	*						
Lamiaceae	*Salvia*	*verbenaca* (W)	*	*	*	*	*				*							
Santalaceae	*Santalum*	*acuminatum*																*
Santalaceae	*Santalum*	*spicatum*												*		*		*
Goodeniaceae	*Scaevola*	*diacantha*						*			*	*		*				
Goodeniaceae	*Scaevola*	*spinescens*	*	*		*	*	*	*		*	*	*	*	*	*	*	*
Chenopodiaceae	*Sclerolaena*	*cuneata*		*	*	*	*	*			*	*					*	
Chenopodiaceae	*Sclerolaena*	*diacantha*	*	*	*	*	*	*			*	*			*		*	
Chenopodiaceae	*Sclerolaena*	*eurotioides*	*			*	*	*			*	*						
Chenopodiaceae	*Sclerolaena*	*parvifolia*					*											
Chenopodiaceae	*Sclerolaena*	*uniflora*				*	*											
Fabaceae	*Senna*	*artemisioides* subsp. *filifolia*		*	*	*	*	*			*	*	*	*	*	*		*
Fabaceae	*Senna*	*artemisioides* subsp. x *artemisioides*											*					
Malvaceae	*Sida*	*calyxhymenia*	*	*	*	*	*	*			*	*	*					
Malvaceae	*Sida*	Golden calyces glabrous (H.N. Foote 32)	*			*	*	*			*	*	*	*				
Malvaceae	*Sida*	*intricata*	*					*			*	*						
Solanaceae	*Solanum*	*lasiophyllum*	*	*	*	*	*	*	*		*	*	*	*				
Solanaceae	*Solanum*	*orbiculatum*				*	*	*			*	*	*	*				
Chenopodiaceae	*Tecticornia*	*disarticulata*				*	*			*								
Chenopodiaceae	*Tecticornia*	*doliiformis*		*					*	*								
Chenopodiaceae	*Tecticornia*	*indica* subsp. *bidens*				*	*			*								
Chenopodiaceae	*Tecticornia*	*peltata*		*					*	*								
Poaceae	*Triodia*	*scariosa*												*		*		*
Lamiaceae	*Westringia*	*rigida*																*

Appendix 3: Vegetation Maps




440,000 mE
445,000 mE
450,000 mE
455,000 mE
6,610,000 mN
6,605,000 mN
6,600,000 mN
N
W
E
S
Location 37
Location 35
Survey Area
Vegetation Types
CLP-AFW1
CLP-CFW1
CLP-CS1
CLP-EW1
CLP-EW2
CLP-MWS1
CD-CSSSF1
CD-CSSSF2
PLAYA
OD-AFW1
OD-MWS1
RH-AFW1
RH-CFW1
RH-EW1
RH-MWS1
SD-AFW1
SLP-MWS1
Botanica Consulting
Vegetation Types
Location 35 & 37
Date: 17/12/2018
Author: L. Pick
Scale: 1:75000
Projection: MGA Zone 51 (GDA 94)
0
0.75
1.5
3
kilometres


420,000 mE
425,000 mE
430,000 mE
435,000 mE
6,605,000 mN
6,600,000 mN
6,595,000 mN
N
W
E
S
Survey Area
Vegetation Types
CLP-AFW1
CLP-CFW1
CLP-CS1
CLP-EW1
CLP-EW2
CLP-MWS1
CD-CSSSF1
CD-CSSSF2
PLAYA
OD-AFW1
OD-MWS1
RH-AFW1
RH-CFW1
RH-EW1
RH-MWS1
SD-AFW1
SLP-MWS1
Location 39
Location 40
Botanica Consulting
Vegetation Types
Location 39 & 40
Date: 17/10/2018
Author: L. Pick
Scale: 1:75000
Projection: MGA Zone 51 (GDA 94)
0
0.75
1.5
3
kilometres

Appendix 4: Vegetation Condition Rating

Vegetation Condition Rating	South West and Interzone Botanical Provinces	Eremaean and Northern Botanical Provinces
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.	
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor		Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or ‘parkland cleared’ with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix 5: Potential Fauna Species List

Fauna Potentially Present in Survey Area

Northen Star Resources Ltd - East Locations - WA

Compiled by Greg Harewood - Dec 2018

Recorded (Sighted/Heard/Signs) = X

Approximate centroid = 30.68139° S and 121..41611° E

A = Harewood G (2015). Fauna Survey (Level 2 - Phase 1 and 2). Proposed TSF Expansion KCGM Pty Ltd Kalgoorlie Unpublished report for KCGM.

B = Terrestrial Ecosystems (2012a). Fauna Assessment for the Santa Project. Unpublished report for Integra Mining Limited.

C = Terrestrial Ecosystems (2012b). Level 2 Fauna Assessment for the Aldiss Area. Unpublished report for Integra Mining Limited.

D = Terrestrial Ecosystems (2010). Fauna Assessment for the Majestic Gold Project. Unpublished report for Integra Mining Limited.

E = Outback Ecology Services (2009). Integra Mining Limited Randalls Gold Project, Terrestrial Fauna Assessment. Unpublished report for Integra Mining Limited.

F = Ninox Wildlife Consulting (1998). A Vertebrate Fauna Survey of the Randell Timber Reserve (1997and 1998).

G = McKenzie, N.L. and Hall, N.J. (1992). The Biological Survey of the Eastern Goldfields of WA - Pt 8: Kurnalpi – Kalgoorlie study area. Records of the WAM, Supplement 41: 1 – 125.

H = DBCA (2018). NatureMap Database search. “By Circle" 122° 24' 58" E, 30° 40' 53" S; Accessed 19/10/2018.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Amphibia										
Myobatrachidae Ground or Burrowing Frogs										
Neobatrachus kunapalari	Kunapalari Frog	LC	X							X
Neobatrachus pelobatoides	Humming Frog	LC								
Neobatrachus sutor	Shoemaker Frog	LC	X						X	X
Neobatrachus wilsmorei	Plonking Frog	LC							X	
Pseudophryne occidentalis	Western Toadlet	LC	X					X	X	

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Reptilia										
Carphodactylidae Knob-tailed Geckos										
Nephrurus laevissimus	Smooth Knob-tail						X			
Nephrurus milii	Barking Gecko		X							
Diplodactylidae Geckoes										
Crenadactylus ocellatus	Clawless Gecko									
Diplodactylus conspicillatus	Fat-tailed Gecko									
Diplodactylus granariensis	Western Stone Gecko			X	X	X	X	X	X	X
Diplodactylus granariensis	Western Stone Gecko		X							X
Diplodactylus pulcher	Western Saddled Ground Gecko		X	X	X	X	X	X	X	X
Lucasium maini	Main's Ground Gecko		X	X	X	X	X	X	X	
Oedura reticulata	Reticulated Velvet Gecko		X	X	X	X	X	X	X	
Rhynchoedura ornata	Beaked Gecko		X				X		X	X
Strophurus assimilis	Goldfields Spiny-tailed Gecko		X			X	X			X
Strophurus elderi	Jewelled Gecko						X		X	
Strophurus strophurus	Ring-tailed Gecko									

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Gekkonidae Geckoes										
Christinus marmoratus	Marbled Gecko									
Gehyra purpurascens	Purple Arid Dtella		X	X		X	X	X		X
Gehyra variegata	Variegated Dtella		X	X	X	X	X	X	X	X
Heteronotia binoei	Bynoe's Gecko		X	X	X	X	X	X	X	X
Nephrurus milii	Barking Gecko			X	X	X	X	X	X	
Pygopodidae Legless Lizards										
Delma australis	Marble-faced Delma		X	X	X	X	X	X	X	
Delma butleri	Unbanded Delma									X
Delma fraseri	Fraser’s Legless Lizard									
Lialis burtonis	Burton’s Legless Lizard						X		X	X
Pygopus lepidopodus	Common Scaly Foot				X					X
Pygopus nigriceps	Hooded Scaly Foot									X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Agamidae Dragon Lizards										
Caimanops amphiboluroides	Mulga Dragon								X	
Ctenophorus caudicinctus	Ring-tailed Dragon		X				X			
Ctenophorus cristatus	Bicycle Dragon		X	X	X	X	X	X	X	X
Ctenophorus fordi	Mallee Sand Dragon						X		X	X
Ctenophorus isolepis	Crested Dragon									
Ctenophorus maculatus	Spotted Military Dragon						X			
Ctenophorus nuchalis	Central Netted Dragon									
Ctenophorus ornatus	Ornate Crevice Dragon									
Ctenophorus reticulatus	Western Netted Dragon			X	X	X	X	X	X	X
Ctenophorus salinarum	Salt Pan Dragon									
Ctenophorus scutulatus	Lozenge-marked Bicycle Dragon							X	X	X
Moloch horridus	Thorny Devil								X	X
Pogona minor	Western Bearded Dragon			X	X	X	X	X	X	X
Tympanocryptis cephalus	Pebble Dragon				X					

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Varanidae Monitor's or Goanna's										
Varanus caudolineatus	Stripe-tailed Pygmy Monitor		X					X	X	X
Varanus gouldii	Bungarra or Sand Monitor		X	X	X	X	X		X	X
Varanus tristis	Racehorse Monitor			X	X			X		

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Scincidae Skinks										
Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink		X	X	X	X	X	X	X	
Ctenotus atlas	Southern Mallee Ctenotus						X		X	X
Ctenotus impar	Odd-striped Ctenotus									
Ctenotus leonhardii	Leonhardi's Skink							X	X	X
Ctenotus pantherinus ocellifer	Leopard Skink									
Ctenotus schomburgkii	Barred Wedge-snout Ctenotus			X	X		X	X	X	X
Ctenotus severus	Stern Rock Ctenotus									
Ctenotus uber	Spotted Ctenotus		X	X	X		X		X	X
Cyclodomorphus melanops elongatus	Eastern Slender Blue-tongue								X	
Egernia depressa	Pygmy Spiny-tailed Skink							X		X
Egernia formosa	Goldfields Crevise Skink			X	X			X	X	X
Egernia multiscutata	Bull Skink									
Egernia richardi	Woodland Crevice Skink									
Eremiascincus richardsonii	Broad-banded Sand Swimmer			X	X					
Hemiergis initialis initialis	Sth Five-toed Mulch Skink		X			X		X		
Hemiergis peronii peronii	Four-toed Earless Skink									
Lerista distinguenda	SW Four-toed Lerista									

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Lerista kingi	King's Three-toed Slider				X					X
Lerista muelleri	Common Mulch Skink			X		X	X	X	X	
Lerista picturata	Goldfields Robust Lerista		X	X	X	X	X	X	X	
Lerista timida	Dwarf Three-toed Slider									X
Lerista timidia	Dwarf Three-toed Slider		X							
Lerista tridactyla	Dark-backed Mulch Slider						X			
Liopholis inornata	Desert Skink					X	X		X	X
Menetia greyii	Dwarf Skink		X	X	X	X	X	X	X	X
Morethia adelaidensis	Saltbush Flecked Morethia								X	X
Morethia butleri	Woodland Dark-flecked Morethia			X	X	X	X	X	X	X
Morethia obscura	Shrubland Pale-flecked Morethia							X		
Tiliqua occipitalis	Western Bluetongue		X							X
Tiliqua rugosa	Bobtail		X	X	X	X	X	X	X	X
Typhlopidae Blind Snakes										
Anilios australis	Southern Blind Snake			X	X	X	X	X		
Anilios bicolor	Dark-spined Blind Snake					X				
Anilios bituberculatus	Prong-snouted Blind Snake			X		X	X	X		
Anilios hamatus	Northern Hook-snouted Blind Snake				X		X			

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Boidae Pythons, Boas										
Morelia spilota imbricata	Southern Carpet Python	LC								
Elapidae Elapid Snakes										
Brachyurophis fasciolata	Narrow-banded Shovel-nosed Snake		X							
Brachyurophis semifasciata	Southern Shovel-nosed Snake			X		X	X			
Demansia psammophis	Yellow-faced Whipsnake		X							
Furina ornata	Moon Snake					X	X			
Parasuta gouldii	Gould's Hooded Snake							X	X	
Parasuta monachus	Monk Snake			X	X			X	X	X
Pseudechis australis	Mulga Snake		X	X	X		X	X		
Pseudonaja modesta	Ringed Brown Snake							X	X	X
Pseudonaja nuchalis	Gwardar		X			X			X	
Simoselaps bertholdi	Jan's Banded Snake		X	X		X	X	X	X	X
Suta fasciata	Rosen's Snake			X				X		

Aves

Casuariidae Emus, Cassowarries										
Dromaius novaehollandiae	Emu	LC	X				X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Megapodiidae Moundbuilders										
Leipoa ocellata	Malleefowl	S3 VU VU A2bce+3ce+							X	X
Anatidae Geese, Swans, Ducks										
Anas gracilis	Grey Teal	LC	X	X					X	X
Anas superciliosa	Pacific Black Duck	LC	X			X				X
Chenonetta jubata	Australian Wood Duck	LC	X	X		X		X		X
Tadorna tadornoides	Australian Shelduck	LC	X				X	X		
Accipitridae Kites, Goshawks, Eagles, Harriers										
Accipiter cirrocephalus	Collared Sparrowhawk	LC					X	X		
Accipiter fasciatus	Brown Goshawk	LC			X			X	X	X
Aquila audax	Wedge-tailed Eagle	LC	X	X	X	X	X	X	X	X
Aquila morphnoides	Little Eagle	LC								
Circus assimilis	Spotted Harrier	LC							X	X
Elanus caeruleus	Black-shouldered Kite	LC	X							
Haliastur sphenurus	Whistling Kite	LC					X	X	X	
Hamirostra isura	Square-tailed Kite	LC			X					
Hamirostra melanosternon	Black-breasted Buzzard	LC								

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Falconidae Falcons										
Falco berigora	Brown Falcon	LC	X	X	X	X	X	X	X	X
Falco cenchroides	Australian Kestrel	LC	X		X	X	X	X	X	X
Falco longipennis	Australian Hobby	LC	X		X			X		X
Falco peregrinus	Peregrine Falcon	S7 LC						X		X
Otididae Bustards										
Ardeotis australis	Australian Bustard	LC			X	X				
Turnicidae Button-quails										
Turnix velox	Little Button-quail	LC								X
Charadriidae Lapwings, Plovers, Dotterels										
Charadrius melanops	Black-fronted Dotterel	LC		X			X			
Charadrius ruficapillus	Red-capped Plover	LC				X	X			
Peltohyas australis	Inland Dotterel						X			
Vanellus tricolor	Banded Lapwing	LC								X

WC Act Status - S1 to S7, EPBC Act Status - EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions - LC =Least Concern, see Appendix A and http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria for others

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Columbidae Pigeons, Doves										
Ocyphaps lophotes	Crested Pigeon	LC	X	X	X			X	X	X
Phaps chalcoptera	Common Bronzewing	LC	X	X	X			X	X	X
Psittacidae Parrots										
Cacatua roseicapilla	Galah	LC	X	X	X		X	X	X	X
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	LC	X	X	X			X	X	
Melopsittacus undulatus	Budgerigar	LC			X				X	
Neophema splendida	Scarlet-chested Parrot	LC								X
Nymphicus hollandicus	Cockatiel	LC						X	X	
Pezoporus occidentalis	Night Parrot	S1 CR EN B2ab(iii)c(ii,i								
Platycercus varius	Mulga Parrot	LC	X				X		X	
Platycercus zonarius	Australian Ringneck	LC	X	X	X	X		X	X	
Polytelis alexandrae	Princess Parrot	P4 VU NT C2a(ii)								
Polytelis anthopeplus	Regent Parrot	LC			X		X			

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Cuculidae Parasitic Cuckoos										
Cacomantis flabelliformis	Fan-tailed Cuckoo	LC								X
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	LC	X		X		X	X	X	
Chrysococcyx osculans	Black-eared Cuckoo	LC				X			X	
Cuculus pallidus	Pallid Cuckoo	LC						X	X	
Strigidae Hawk Owls										
Ninox novaeseelandiae	Boobook Owl	LC			X				X	
Tytonidae Barn Owls										
Tyto alba	Barn Owl	LC								
Podargidae Frogmouths										
Podargus strigoides	Tawny Frogmouth	LC	X	X	X		X	X	X	X
Caprimulgidae Nightjars										
Eurostopodus argus	Spotted Nightjar	LC			X					X
Aegothelidae Owlet-nightjars										
Aegotheles cristatus	Australian Owlet-nightjar	LC		X					X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Apodidae Swifts, Swiftlets										
Apus pacificus	Fork-tailed Swift	S5 Mig CA JA RK LC								
Halcyonidae Tree Kingfishers										
Todiramphus pyrrhopygia	Red-backed Kingfisher	LC	X					X	X	
Todiramphus sanctus	Sacred Kingfisher	LC					X			
Meropidae Bee-eaters										
Merops ornatus	Rainbow Bee-eater	A LC	X			X		X	X	X
Climacteridae Treecreepers										
Climacteris affinis	White-browed Treecreeper	LC							X	X
Climacteris rufa	Rufous Treecreeper	LC		X	X			X	X	
Maluridae Fairy Wrens, GrassWrens										
Malurus lamberti	Variegated Fairy-wren	LC							X	
Malurus leucopterus	White-winged Fairy-wren	LC	X	X	X		X	X	X	X
Malurus pulcherrimus	Blue-breasted Fairy-wren	LC								
Malurus splendens	Splendid Fairy-wren	LC	X							X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Acanthizidae Thornbills, Geryones, Fieldwrens & Whitefaces										
Acanthiza apicalis	Broad-tailed Thornbill	LC	X	X	X		X	X	X	X
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	LC	X	X	X			X	X	X
Acanthiza iredalei	Slender-billed Thornbill	LC								X
Acanthiza uropygialis	Chestnut-rumped Thornbill	LC	X	X	X		X	X	X	X
Aphelocephala leucopsis	Southern Whiteface	LC	X		X			X	X	X
Calamanthus campestris	Rufous Fieldwren	LC								
Gerygone fusca	Western Gerygone	LC								
Hylacola cauta whitlocki	Shy Heathwren (western)	LC								
Pyrrholaemus brunneus	Redthroat	LC	X	X	X		X	X	X	X
Smicrornis brevirostris	Weebill	LC	X	X	X		X	X	X	X
Pardalotidae Pardalotes										
Pardalotus punctatus	Spotted Pardalote	LC						X		
Pardalotus striatus	Striated Pardalote	LC	X	X	X		X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Meliphagidae Honeyeaters, Chats										
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	LC	X	X	X		X	X	X	X
Anthochaera carunculata	Red Wattlebird	LC	X	X	X	X	X	X	X	X
Anthochaera lunulata	Western Little Wattlebird	LC								
Certhionyx niger	Black Honeyeater	LC			X		X			
Certhionyx variegatus	Pied Honeyeater	LC								
Epthianura albifrons	White-fronted Chat	LC					X	X		X
Epthianura aurifrons	Orange Chat	LC								X
Epthianura tricolor	Crimson Chat	LC						X		X
Lichenostomus cratitius	Purple-gaped Honeyeater	LC								
Lichenostomus leucotis	White-eared Honeyeater	LC	X	X	X			X	X	X
Lichenostomus ornatus	Yellow-plumed Honeyeater	LC	X	X	X	X	X	X	X	
Lichenostomus plumulus	Grey-fronted Honeyeater	LC	X						X	
Lichenostomus virescens	Singing Honeyeater	LC	X	X	X		X	X	X	
Lichmera indistincta	Brown Honeyeater	LC	X	X	X		X	X	X	X
Manorina flavigula	Yellow-throated Miner	LC	X	X	X		X	X	X	X
Melithreptus brevirostris	Brown-headed Honeyeater	LC	X	X	X		X	X	X	X
Phylidonyris albifrons	White-fronted Honeyeater	LC	X	X	X			X	X	

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Phylidonyris nigra	White-cheeked Honeyeater	LC							X	
Petroicidae Australian Robins										
Drymodes brunneopygia	Southern Scrub-robin	LC		X						X
Microeca fascinans	Jacky Winter	LC	X	X	X		X	X	X	X
Petroica cucullata	Hooded Robin	LC			X			X	X	
Petroica goodenovii	Red-capped Robin	LC	X	X	X			X	X	X
Pomatostomidae Babblers										
Pomatostomus superciliosus	White-browed Babbler	LC	X		X	X		X	X	X
Cinclosomatidae Whipbirds, Wedgebills, Quail Thrushes										
Cinclosoma castanotus	Chestnut Quail-thrush	LC	X		X			X		
Neosittidae Sitellas										
Daphoenositta chrysoptera	Varied Sittella	LC	X		X		X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Pachycephalidae Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers										
Colluricincla harmonica	Grey Shrike-thrush	LC	X	X	X		X	X	X	X
Oreoica gutturalis	Crested Bellbird	LC	X	X	X	X	X	X		X
Pachycephala inornata	Gilbert's Whistler	LC	X					X		X
Pachycephala rufiventris	Rufous Whistler	LC	X		X		X	X	X	X
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo										
Grallina cyanoleuca	Magpie-lark	LC	X			X	X	X	X	X
Myiagra inquieta	Restless Flycatcher	LC								
Rhipidura fuliginosa	Grey Fantail	LC							X	
Rhipidura leucophrys	Willie Wagtail	LC	X	X	X	X	X	X	X	X
Campephagidae Cuckoo-shrikes, Trillers										
Coracina maxima	Ground Cuckoo-shrike	LC						X	X	X
Coracina novaehollandiae	Black-faced Cuckoo-shrike	LC	X	X	X	X	X	X	X	X
Lalage tricolor	White-winged Triller	LC	X						X	

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Artamidae Woodswallows, Butcherbirds, Currawongs										
Artamus cinereus	Black-faced Woodswallow	LC		X	X			X	X	X
Artamus cyanopterus	Dusky Woodswallow	LC	X	X	X		X	X	X	X
Artamus personatus	Masked Woodswallow	LC			X					X
Cracticidae Currawongs, Magpies & Butcherbirds										
Cracticus nigrogularis	Pied Butcherbird	LC	X	X		X	X	X	X	X
Cracticus tibicen	Australian Magpie	LC	X	X	X	X	X	X	X	X
Cracticus torquatus	Grey Butcherbird	LC	X	X	X			X	X	X
Strepera versicolor	Grey Currawong	LC	X		X	X	X	X	X	X
Corvidae Ravens, Crows										
Corvus bennetti	Little Crow	LC						X		X
Corvus coronoides	Australian Raven	LC	X	X	X		X	X	X	X
Corvus orru	Torresian Crow	LC								X
Motacillidae Old World Pipits, Wagtails										
Anthus australis	Australian Pipit	LC	X	X	X	X	X	X	X	

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Estrilidae Grass Finches & Mannikins										
Taeniopygia guttata	Zebra Finch	LC							X	X
Dicaeidae Flowerpeckers										
Dicaeum hirundinaceum	Mistletoebird	LC	X		X			X	X	X
Hirundinidae Swallows, Martins										
Cheramoeca leucosternus	White-backed Swallow	LC	X		X			X		
Hirundo ariel	Fairy Martin	LC		X						
Hirundo neoxena	Welcome Swallow	LC	X	X	X		X		X	X
Hirundo nigricans	Tree Martin	LC	X		X		X	X	X	
Sylviidae Old World Warblers										
Cincloramphus cruralis	Brown Songlark	LC				X				
Cincloramphus mathewsi	Rufous Songlark	LC						X		
Zosteropidae White-eyes										
Zosterops lateralis	Silvereye	LC						X		

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Mammalia										
Tachyglossidae Echidnas										
Tachyglossus aculeatus	Echidna	LC	X	X	X	X	X		X	
Dasyuridae Carnivorous Marsupials										
Ningaui ridei	Wongai Ningaui	LC		X					X	X
Ningaui yvonneae	Southern Ningaui	LC					X			
Sminthopsis crassicaudata	Fat-tailed Dunnart	LC		X			X	X	X	X
Sminthopsis dolichura	Little long-tailed Dunnart	LC	X	X		X		X	X	X
Sminthopsis gilberti	Gilbert's Dunnart	LC		X	X					
Sminthopsis ooldea	Ooldea Dunnart	LC	X							
Burramyidae Pygmy Possums										
Cercartetus concinnus	Western Pygmy-possum	LC	X	X	X	X		X	X	
Macropodidae Kangaroos, Wallabies										
Macropus fuliginosus	Western Grey Kangaroo	LC	X	X			X	X	X	
Macropus robustus	Euro	LC		X	X	X	X	X	X	
Macropus rufus	Red Kangaroo	LC	X	X	X			X		X

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Emballonuridae Sheath-tailed Bats										
Taphozous hilli	Hill's Sheathtail-bat	LC	X							
Molossidae Freetail Bats										
Mormopterus planiceps	Inland Freetail-bat	LC	X		X	X	X		X	
Tadarida australis	White-striped Freetail-bat	LC	X		X	X	X		X	
Vespertilionidae Ordinary Bats										
Chalinolobus gouldii	Gould's Wattled Bat	LC	X		X	X	X	X		X
Chalinolobus morio	Chocolate Wattled Bat	LC	X			X	X	X	X	X
Nyctophilus geoffroyi	Lesser Long-eared Bat	LC	X					X	X	X
Nyctophilus gouldi	Gould's Long-eared Bat	LC							X	
Nyctophilus major tor	Central Long-eared Bat	P4								
Scotorepens balstoni	Inland Broad-nosed Bat	LC	X			X			X	X
Vespadelus baverstocki	Inland Forest Bat	LC	X		X					X
Vespadelus finlaysoni	Finlayson's Cave Bat	LC	X							
Vespadelus regulus	Southern Forest Bat	LC	X					X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D	E	F	G	H
Muridae Rats, Mice										
Mus musculus	House Mouse	Introduced	X	X	X	X		X	X	X
Notomys alexis	Spinifex Hopping-mouse	LC								
Notomys mitchellii	Mitchell's Hopping-mouse	LC							X	
Pseudomys bolami	Bolam's Mouse	LC	X				X	X	X	X
Pseudomys hermannsburgensis	Sandy Inland Mouse	LC		X	X				X	X
Canidae Dogs, Foxes										
Canis lupus	Dog/Dingo	Introduced	X		X	X				X
Canis lupus dingo	Dingo	LC								
Vulpes vulpes	Red Fox	Introduced					X	X	X	
Felidae Cats										
Felis catus	Cat	Introduced	X	X	X	X		X		
Equidae Horses										
Equus caballus	Horse	Introduced						X		

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Bovidae Horned Ruminants										
Bos taurus	European Cattle	Introduced	X							
Capra hircus	Goat	Introduced	X	X	X		X	X		
Ovis aries	Sheep	Introduced	X			X	X			
Camelidae Camels										
Camelus dromedarius	Dromedary Camel	Introduced								
Leporidae Rabbits, Hares										
Oryctolagus cuniculus	Rabbit	Introduced	X	X	X	X	X			

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