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Main Roads Western Australia

Report for Material Source Area:
Geraldton Mt Magnet Road SLK
222.45 Biological Survey

May 2012



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Executive Summary

Main Roads Western Australia (MRWA) is currently searching for strategic material sources around the Mid West network and have identified a past material source area approximately 13 km north east of Yalgoo as a potential expansion area.

The potential expansion area (the Project Area) is to include borrow and gravel pits, base course and sub-base pits, spoil sites, proposed works camp and compound areas, stockpile sites and other areas to be disturbed.

GHD Pty Ltd (GHD) undertook a biological assessment of the Project Area in March 2012:

- ▶ No permanent wetlands or watercourses were identified during the field survey; however, a number of ephemeral drainage lines crossed the Project Area. None of the ephemeral creeklines contain riparian vegetation;
- ▶ The vegetation in the Project Area is broadly consistent with Beard's (1976) Vegetation Association description: "Vegetation Association 420; Shrublands; bowgada & jam scrub". During the field survey the Project Area was further mapped and classified into nine vegetation types;
- ▶ The majority of the vegetation in the Project Area can be described as in a *Pristine or Nearly So – Excellent* condition. Approximately 108.5 ha of vegetation in *Good* (Condition 4) or better (Condition 1-3) occurs within the Project Area. Previous mining and ground work operations occurred in certain areas. These areas are recovering, and have a vegetation condition rating of *Degraded to Completely Degraded*;
- ▶ No Threatened Ecological Communities were recorded in the Project Area. The database searches indicated that the Project Area lies within the buffer area of two Priority Ecological Communities, but these communities were not recorded during the field survey, nor will they be impacted by the proposed works;
- ▶ Vegetation within the Project Area is considered to be of *Least Concern* with greater than 90% of its pre-European extent remaining. The Project Area occurs in a location with relatively unaltered vegetation and associated ecological linkages;
- ▶ No Threatened (Declared Rare) Flora taxa were recorded from the Project Area;
- ▶ The field survey recorded one Priority Three flora species, *Acacia subsessilis*, at one locality within the Project Area. This taxon was also noted outside the Project Area. The location can be avoided;
- ▶ A total of 16 vertebrate fauna species from 16 families, including 12 birds, three mammals and one reptile species were recorded from within the Project Area during the field survey;
- ▶ The fauna habitats present in the Project Area are considered to be common in the local and regional area. Due to historical disturbance from mining and/or material extraction, these habitats are considered to be in better condition in areas away



from the Project Area. No significant fauna habitats are considered likely to be impacted by the proposed works; and

- ▶ The Project was assessed against the Ten Clearing Principles and the assessment found that the Project is not at variance with the clearing principles.

This Report is subject to, and must be read in conjunction with, the limitations set out in section 2 and the assumptions and qualifications contained throughout the Report.



1. Introduction

1.1 Background

Main Roads Western Australia (MRWA) is currently searching for strategic material sources around the Mid West network and have identified a past material source area approximately 13 km north east of Yalgoo as a potential expansion area.

The potential expansion area (the Project Area) is to include borrow and gravel pits, base course and sub-base pits, spoil sites, proposed works camp and compound areas, stockpile sites and other areas to be disturbed.

MRWA requires a biological survey for the above project. The purpose of the survey is to provide an appropriate examination and description of the receiving environment to ensure that all aspects of biological and ecological significance are identified and recorded.

1.2 Project Area

The Project Area is located in the Shire of Yalgoo, approximately 13 km north-east of Yalgoo. It is located approximately 7.5 km north of the Geraldton – Mt Magnet Road at SLK 222.45. The Project Area is approximately 125 ha in size and includes areas of native vegetation, rocky breakaways, areas of historical disturbance and a number of vehicular tracks. The Project Area is indicated in Figure 1, Appendix A.

1.3 Scope of Works

MRWA has commissioned GHD Pty Ltd (GHD) to undertake a biological survey of a proposed materials source expansion location at SLK 222.45 between Geraldton and Mt Magnet. The biological survey includes the following:

- ▶ desktop assessment of the Project Area;
- ▶ field study of all relevant biological aspects and issues including reserves and other relevant land use;
- ▶ assessment of the project against the *Environmental Protection Act's 1986* Ten Clearing Principles (Schedule 5);
- ▶ consultation and liaison with relevant statutory authorities or specialists as required; and
- ▶ an indication and discussion of the requirement for referral to statutory authorities or for other clearances for the project.



2. Methodology

2.1 Desktop Assessment

The desktop assessment was carried out prior to the field survey in order to consider biological constraints, which may be in, or adjoining the Project Area. This included a literature search to identify information pertaining to the Project Area and to provide information on any aspects of ecological significance. The following factors were examined:

- ▶ adjoining land use including conservation reserves or other listed areas;
- ▶ broad vegetation types shown in existing mapping (e.g. Beard, 1976);
- ▶ the presence or absence of Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs);
- ▶ a review of Threatened (Declared Rare) and Priority Flora and Threatened Fauna databases;
- ▶ remnant vegetation clearing in relation to statutory requirements;
- ▶ assessment against the Ten Clearing Principles, as outlined in Schedule 5 of the *Environmental Protection Act 1986*;
- ▶ listed wetlands;
- ▶ public drinking water catchment areas and;
- ▶ other databases of significant biological aspects.

2.1.1 Desktop Assessment Limitations

Desktop assessments use a variety of online resources where the responsibility for the accuracy of such data remains with the issuing authority, not with GHD. The Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) Protected Matters database is used to identify species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This database draws on various sources to report on the potential of the species occurrence within the area. It should be noted that some species that appear in an EPBC Act Protected Matters Search results are often not likely to occur within the specified area, as the search provides an approximate guidance to matters of national significance that require further investigation. The DSEWPaC search tool is broad-scale in its reporting and often the specific habitat requirements of the species do not occur within project sites and are unlikely to occur within the area. For this reason not all species reported by the search tool need to be considered in management decisions.

The Department of Environment and Conservation (DEC) and Western Australian Museum (WAM) *NatureMap* database reports on actual records of the species within the designated area and can provide more accurate information of the likelihood of species presence. However, GHD notes that some of the records of the *NatureMap* database are historical and some of the recorded species may now be locally extinct.



Additionally these records may include species that are vagrants or present in the general area but not present within the study area due to lack of suitable habitat.

2.2 Field Assessment

The field survey sought to confirm the desktop assessment and provide a detailed examination of the existing environment in the Project Area. The survey and subsequent report included an examination of the physical environment, vegetation and flora and fauna within the Project Area. Two experienced qualified GHD ecologists undertook a biological survey of the Project Area between 15 and 16 March, 2012.

To assist in the collation of environmental aspects relevant to the proposed Project, the field investigation included examination of the physical environment, wetlands and drainage, vegetation and flora and fauna, as detailed below.

2.2.1 Physical Environment

The field survey examined the physical environment of the Project Area, including:

- ▶ A description and summary of the climatic data and how it may have affected the outcomes of the field survey;
- ▶ An examination of soil, including a review of the presence of acid sulphate soils and, the relationship to topography and plant communities.

2.2.2 Wetlands and Drainage

The field survey including a recording of the following information:

- ▶ A description of existing surface drainage patterns with respect to topography, and to flora and fauna communities; and
- ▶ An inventory and brief description of any wetlands and their conservation value.

2.2.3 Vegetation and Flora

The field survey was conducted with reference to the Environmental Protection Authority (EPA) Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004a).

The flora and vegetation survey was conducted by undertaking walking transects within the survey area and the investigation of five quadrats and one unbounded releve. The recording of flora species, mapping of vegetation types, vegetation condition and weed status was undertaken.

Where field identification of plant taxa was uncertain, a sample was collected for later identification through the use of taxonomic keys, online databases and comparison of specimens held at the Western Australian Herbarium. The presence of Threatened (Declared Rare) and Priority Flora was assessed. Vegetation was also assessed to determine the presence of TECs within the surveyed area.



Suitable habitat for Threatened (Declared Rare) and Priority Flora species was searched during the survey to determine the presence of previously unrecorded threatened flora.

The vegetation and flora survey included:

- ▶ a description and location of the vegetation communities within the Project Area;
- ▶ an assessment of the significance of the vegetation communities in a regional context, with emphasis on TECs;
- ▶ a rating of the vegetation condition with reference to Keighery (1994, as modified by the Government of Western Australia, 2000);
- ▶ a discussion of the presence, location, extent and any impact of plant pests or diseases within the Project Area;
- ▶ whether the Project Area is within an Environmentally Sensitive Area;
- ▶ an inventory of the vascular flora species recorded in the surveyed area;
- ▶ a review of, and search for any Threatened (Declared Rare) and/or Priority Flora identified in the desktop assessment;
- ▶ a review of other flora taxa of conservation significance, including an examination of those outlying their known range;
- ▶ a review of dominant exotic weed species and declared noxious plants and environmental weed species, including the provision of advice as to whether such species are likely to spread and result in harm to areas adjacent; and
- ▶ assessment against the Ten Clearing Principles, as outlined in Schedule 5 of the *Environmental Protection Act 1986*;

Nomenclature

Nomenclature used in this report follows that used by the DEC's online *FloraBase* program (<http://florabase.dec.wa.gov.au/>) and online *NatureMap* program (<http://naturemap.dec.wa.gov.au/default.aspx>) as they are deemed to contain the most up to date species information for Western Australia.

2.2.4 Fauna Survey

The fauna survey was undertaken in conjunction with the flora and vegetation survey.

The survey consisted of a Level 1 survey in regard of the requirements of the EPA's Guidance Statement No. 56 *Assessment of Environmental Factors for Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004b) and the DEC and the EPA's Technical Guide *Terrestrial Biological Surveys as an Element of Biodiversity Protection: Position Statement No. 3* (EPA, 2002).

Opportunistic area searches of major habitats within the surveyed area were undertaken to search for the presence or signs of fauna species. Searches included investigating burrows, scats, tracks and other traces, turning rocks and fallen timber.



Habitat assessments were conducted and included targeting the known habitat preferences of threatened vertebrate species listed under the relevant Commonwealth and State Acts, including Priority Fauna listed by the DEC which are suspected to occur in the general area. The aim of the habitat assessment was to determine the likelihood of any threatened species utilising the areas that will be impacted upon as a consequence of the proposed works.

2.2.5 Field Survey Limitations

Flora Survey Limitations

Complete flora and vegetation surveys can require multiple surveys, at different times of year, and over a period of a number of years, to enable observation of all species present. Some flora species, such as annuals, are only available for collection at certain times of the year and others are only identifiable at certain times (such as when they are flowering). Additionally, climatic and stochastic events (such as fire) may affect the presence of plant species. Species that have a very low abundance in the area are more difficult to locate, due to above factors.

Flora composition changes over time, with flora species having specific growing periods, especially annuals and ephemerals (some plants lasting for a markedly brief time, some only a day or two). Therefore, the results of future botanical surveys in this location may differ from the results of this survey.

This field survey was not conducted at the optimum time of year to record certain flora species, such as annuals, or to obtain the necessary flowering and fruiting material required to identify certain plants. Further surveys undertaken after the rainy season would be expected to record plants that could not be identified during this survey.

Fauna Survey Limitations

The fauna assessment undertaken was a reconnaissance survey only and thus only sampled those species that can be easily seen, heard or have distinctive signs, such as tracks, scats, diggings, etc. Many cryptic and nocturnal species would not have been identified during a reconnaissance survey.

The fauna assessment was chiefly aimed at identifying habitat types within the study area. In addition, terrestrial vertebrate fauna utilising the Project Area were identified. Trapdoor spider nests (specifically those of *Idiosoma nigrum* and *Aganippe castellum*) were searched for. No other invertebrate surveys were undertaken. The information available on the identification, distribution and conservation status of invertebrates is generally less extensive than that of vertebrate species.

This survey was carried out during only one season and in one year. Complete faunal surveys often require multiple surveys, at different times of year, and over a period of a number of years, to enable full survey of all species present.



2.3 Consultation and Liaison

Consultation with relevant government regulatory authorities and/or specialists was undertaken to ensure that the most up-to-date information on protection policies, species and areas of significance was obtained.

Databases searches included:

- ▶ NatureMap;
- ▶ *FloraBase*;
- ▶ EPBC Act Protected Matters Search Tool;
- ▶ EPBC Act Species Profile and Threats (SPRAT) database;
- ▶ Weeds of National Significance database;
- ▶ Natural Resource Management (NRM) Shared Land Information Portal (SLIP) Maps;
- ▶ DEC Databases:
 - Threatened Flora Database (DEFL), the Declared Rare Flora and Priority Flora Database (DPL Access database) and the Western Australian Herbarium Specimen (WAHERB) database for Threatened and Priority Flora taxa located within 10 km of the Project Area;
 - TEC and Priority Ecological Community database;
- ▶ Department of Agriculture and Food:
 - Declared Plants database; and
- ▶ Australian Soil Resource Information System (ASRIS) soil database.

3. Desktop Assessment

3.1 Land Use

The Project Area is on leased land (L3114/632). The land surrounding the Project Area is pastoral leasehold (Carlaminda Station) and sheep grazing is the main land use. Mining is also an important activity in the area. The Project Area is zoned Rural/Mining in the Shire of Yalgoo Town Planning Scheme No. 2 (Department of Planning, 2011).

The Project Area straddles an east-west boundary of an active mining lease to the south (M59/725) and an active exploration lease (located to north – E59/1097). Evidence of historical mining activity is present within the Project Area with a number of collapsed mining shafts and associated spoil mounds observed.

The Department of Water's *Geographic Data Atlas* indicates that there is a Public Drinking Water Source Area to the west of the Project Area (Figure 1, Appendix A).

The Project Area has previously been used as a material source and as such the area has modified geology, soils and vegetation. The Project Area contains rehabilitated vegetation.

3.2 Environmentally Sensitive Areas and Conservation Reserves

Environmentally Sensitive Areas (ESAs) are subject to definition under Section 51B of the *Environmental Protection Act 1986* and may include areas requiring special management attention to protect important scenic values, fish wildlife resources, historical and cultural values, and other natural systems or processes.

The DEC's *Native Vegetation Map Viewer* was used to determine the location of any ESAs within the vicinity of the Project Area. This search did not indicate the presence of any ESAs within the vicinity of the Project Area.

The desktop searches did not indicate any conservation reserves managed by the DEC within the vicinity of the Project Area.

3.3 Climate

The Yalgoo area has an arid inland climate, with two distinct seasons; a hot dry summer from October to April and a mild winter from May to September. However, this area can also be impacted by incursions of moist air (often associated with tropical cyclones) from the northern sections of the state which can bring infrequent rainfall events during the summer periods (Payne, *et al.*, 1998).

The closest Bureau of Meteorology (BoM) weather station to the Project Area is located at Yalgoo townsite (Station number 7091). A summary of the climatic data (BoM, 2012) for this weather station is summarised below:

- The mean annual rainfall is approximately 260 mm with the most rainfall occurring from May to July;

- ▶ Temperatures range from:
 - Mean Maximum: 37.2 °C in January to 18.2 °C in July; and
 - Mean Minimum: 20.7 °C in January and February to 6.2 °C in July.

3.4 Geology, Landform and Soils

The bioregion is within the Archaean (2500+ million years ago) granite and greenstone belts of the Yilgarn Craton. The region is characterised by sand and alluvial plains, lateritic breakaways, low ranges and salt lakes. Broad alluvial valleys separate the breakaways and low ranges (Payne *et al.*, 1998).

Red sandy to earth soils cover the Yilgarn Craton. The soils are shallow, sandy to stony and infertile. In low areas the red earth soils are underlain by red-brown siliceous hardpan. Calcareous and saline soils occur on the flood plains (Payne *et al.*, 1998).

The mapping tool GeoVIEW.WA (Department of Mines and Petroleum, 2012) identifies bands of the following 1:500,000 geology within the Project Area:

- ▶ Gabbro, anorthositic gabbro, anorthosite; may include vanadiferous magnetite;
- ▶ Sedimentary rocks, undivided, metamorphosed; and
- ▶ Gabbro and dolerite, may include layered sills.

The state regolith layer within this dataset is identified as “exposed rock, saprolite and saprock”. There may also be occurrences of “slope deposits; includes colluvium and sheetwash” (Department of Mines and Petroleum, 2012).

3.4.1 Acid Sulphate Soils

Acid sulphate soils (ASS) as naturally occurring soils and sediments containing sulphide minerals, predominantly pyrite (an iron sulphide). In an undisturbed state below the water table, these soils are benign and not acidic. However, if the soils are drained, excavated or exposed by lowering of the water table, the sulphides will react with oxygen to form sulphuric acid.

Inappropriate disturbance of these soils can generate large amounts of sulphuric acid and leaching of contaminants that naturally occur in soils. Flushing of acidic leachate to groundwater and surface waters can cause off-site impacts including:

- ▶ Ecological damage to aquatic and riparian ecosystems;
- ▶ Effects on estuarine fisheries and aquaculture projects;
- ▶ Contamination of groundwater with arsenic, aluminium and heavy metals;
- ▶ Reduction in agricultural productivity through metal contamination of soils; (predominantly by aluminium); and
- ▶ Damage to infrastructure through the corrosion of concrete and steel pipes, bridges and other sub- surface assets.

Mapping of ASS by the Western Australian Planning Commission has been prepared for the Perth Metropolitan Region and the southwest region of the state, where the impact of ASS has been assessed as being more significant.

Mapping prepared by the Australian Soil Resource Information System (CSIRO, 2012) indicates the Project Area occurs in an area that has “*Extremely Low Probability*” of ASS occurring, but with a “*Very Low Confidence*” level of the accuracy of this statement due to the lack of surveys in the area.

3.5 Hydrology

3.5.1 Watercourses and Wetlands

The broadscale drainage pattern for the general area is disorganised and internal and flows into saline lake systems (Payne *et al.*, 1998).

No wetlands listed on the Register of the National Estate, in the Directory of Important Wetlands or as Ramsar-listed, internationally-recognised wetland of importance occur within 10 km of the Project Area (DSEWPac, 2012; PMST_CGQJFT).

A number of wetlands are located to the south of the Project Area, south of the Geraldton -Mt Magnet Road. However, these lakes are at least 10 km from the Project Area and will not be impacted by the project. A number of minor ephemeral drainage lines flow through the Project Area, and these have been mapped in Figure 1, Appendix A.

3.6 Vegetation

3.6.1 Broad Vegetation Types

The Project Area is situated within the Eremaean Botanical Province (Beard, 1990) and within the Talling subregion of the Yalgoo, Interim Biogeographic Regionalisation of Australia (IBRA) region of Western Australia. The Yalgoo bioregion is characterised by sand and alluvial plains, low ranges and lakes. Mulga or bowgada shrublands dominate in the east. Western parts include sand plains, heathlands and some eucalypt shrublands. The area is rich in ephemeral species with an arid to semi-arid warm Mediterranean climate.

Broad scale vegetation mapping of the area undertaken by Beard (1976) indicates that a single vegetation association is present within the Project Area:

- Vegetation Association 420; Shrublands; bowgada & jam scrub.

3.6.2 Broad Vegetation Extent

The extent of remnant native vegetation has been assessed by Government of Western Australia (2011). The remaining extent of the vegetation associations present within the Project Site, for the State, Local Government Area (LGA), IBRA region and Sub-IBRA regions detailed in Table 1. Based on the current extent of the vegetation

association, all of the community types identified within the Project Site are classified as *Least Concern*.

A vegetation type is considered under-represented if there is less than 30% of its original distribution remaining. From a purely biodiversity perspective, and not taking into account any other land degradation issues, there are several key criteria now being applied to vegetation (EPA, 2000). These are detailed below:

- ▶ The “threshold level” below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at 30% of the pre-European/pre-1750 extent for the vegetation type;
- ▶ 10% of the pre-European/pre-1750 extent for the vegetation type is regarded as being a level representing *Endangered*; and
- ▶ Clearing which would put the threat level into the class below should be avoided.

Such status can be delineated into five (5) classes:

- *Presumed Extinct*: Probably no longer present in the bioregion
- *Endangered**: <10% of pre-European extent remains
- *Vulnerable**: 10-30% of pre-European extent exists
- *Depleted**: >30% and up to 50% of pre-European extent exists
- *Least Concern*: >50% pre-European extent exists and subject to little or no degradation over a majority of this area.

* Or a combination of depletion, loss of quality, current threats and rarity gives a comparable status

Table 1 Broad Vegetation Types and Extent

Vegetation Association	Association Description	Area	Pre-European extent (ha)	Current extent (ha)	% remaining
420	Shrublands: bowgada & Jam Scrub	State	859632	829977	96.55
		LGA	549363	548406	99.83
		IBRA	621396	620051	99.78
		Sub-IBRA	615816	614471	99.78

The Project Area has been intensively mined and much of the surrounding vegetation has been modified and consists of a mosaic of disturbed and transformed vegetation communities.

3.6.3 Threatened and Priority Ecological Communities

Ecological communities are defined as 'naturally occurring biological assemblages that occur in a particular type of habitat' (English and Blythe, 1997). TECs are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. *Presumed Totally Destroyed, Critically Endangered, Endangered, Endangered and Vulnerable*.

The DEC maintains a list of TECs which have been endorsed by the Minister for the Environment (April 2012). Some of these TECs are protected under the EPBC Act. DEC listed ecological communities are given special consideration in environmental impact assessments and have special status under the land clearing regulations of the *Environmental Protection Act 1986* (EP Act). The EPA's position on TECs states that proposals that result in the direct loss of TECs are likely to require formal assessment.

Possible TECs that do not meet survey criteria are added to the DEC's PEC Lists under Priorities 1, 2 and 3. These are ecological communities that are adequately known; are rare but not threatened, but do not meet criteria for *Near Threatened*. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. *Conservation Dependent* ecological communities are placed in Priority 5.

An EPBC Act Protected Matters Search was undertaken for the Project Area (DSEWPaC, 2012; PMST_CGQJFT). No EPBC Act listed TECs were indicated to occur within the search area.

A DEC TEC database search indicated that no TECs are likely to occur within the area. The DEC search indicated that the Project Area lies within the buffer area of two PECs.

There are two occurrences of each of these PECs within the general area, and the buffered area of these PECs is very large, which means that the entire Project Area is covered by the buffers of these PECs (Figure 1).

The PECs are described as:

- ▶ 'Wagga Wagga and Yalgoo Calcrete': Wagga Wagga and Yalgoo calcrete groundwater assemblage type on Yalgoo palaeodrainage on Wagga Wagga Station and Moore Palaeodrainage on Yoweragabbie Station - Priority 1; and
- ▶ 'Yalgoo vegetation complexes BIF (banded ironstone formation)' - Priority 1.

Additionally, two PECs are located within 15 km of the Project Area and are described as:

- ▶ 'Gabyon calcrete groundwater assemblage type on Moore palaeodrainage on Gabyon Station' - Priority 1; and
- ▶ 'Muralgarra calcrete groundwater assemblage type on Murchison palaeodrainage on Muralgarra Station' - Priority 1.

3.7 Flora

3.7.1 Existing Flora Records

A *NatureMap* search (DEC, 2012a) indicated 201 flora taxa previously collected within 10 km of the Project Area (Appendix C). The *NatureMap* records show that Fabaceae (22 taxa), Asteraceae (18 taxa) and Poaceae (12 taxa) are the most diverse families within this area.

3.7.2 Significant Flora

Flora species considered to be significant are listed under the EPBC Act and the *Wildlife Conservation Act 1950* (WC Act). Any activities that are deemed to have a significant impact on species that are recognised by the WC Act and/or the EPBC Act can trigger referral to the EPA and/or the DSEWPaC (Table 6, Appendix B).

The DEC also maintains a list of Priority Listed Flora species which are species not currently protected under the WC Act (Table 7, Appendix B). Priority flora may be rare or threatened, but cannot be considered for declaration as rare flora until adequate surveys have been undertaken of known sites and the degree of threat to these populations have been clarified. Special consideration is often given to sites that contain Priority flora species, despite them not having formal legislative protection.

Desktop searches of the EPBC Act Protected Matters database (DSEWPaC, 2012; PMST_CGQJFT), DEC's rare flora databases and the *NatureMap* database with a 10 km buffer (DEC, 2012a) indicate that there are no known Threatened (Declared Rare) Plant Species recorded within the general vicinity of the Project Area. However, these searches identified the presence/potential presence of 8 conservation significant flora species within the area. These species are:

- ▶ *Acacia speckii*; Priority 4;
- ▶ *Acacia subsessilis*; Priority 3;
- ▶ *Dodonaea amplisemina*; Priority 4;
- ▶ *Goodenia berringbinensis* Priority 4;
- ▶ *Goodenia neogoodenia*; Priority 4;
- ▶ *Gunniopsis rubra*; Priority 3;
- ▶ *Labichea obtrullata* Priority 1;
- ▶ *Micromyrtus trudgenii* Priority 3;
- ▶ *Polianthion collinum* Priority 3;
- ▶ *Psammomoya implexa* Priority 3;
- ▶ *Rhodanthe collina* Priority 1;
- ▶ *Triglochin protuberans*; Priority 3; and
- ▶ *Verticordia jamiesonii* Priority 3

A likelihood of occurrence assessment, which takes into account the habitat requirements, known species distribution and previous records, was completed for all conservation significant flora identified in the desktop queries (Table 12, Appendix D). This assessment indicated that six of the species “possibly” occur, two are “likely” to occur and the rest are either “unknown”, “unlikely” or “highly unlikely” to occur in the Project Area (see Table 11, Appendix D for a definition of the likelihood descriptors).

3.7.3 Invasive Flora Species

The spread of weeds across a range of land uses or ecosystems is important in the context of socio-economic and environmental values. A Commonwealth initiative has led to the creation of a list of 20 Weeds of National Significance (WONS). The assessment used in determining the WONS was based on four major criteria:

- ▶ Invasiveness;
- ▶ Impacts;
- ▶ Potential for spread; and
- ▶ Socio-economic and environmental values.

Additionally, weeds that are, or may, become a problem to agriculture or the environment can be formally classified as Declared Plants under the *Agriculture and Related Resources Protection Act, 1976* (ARRP Act). The Department of Agriculture and Food and the Agriculture Protection maintains a list of Declared Plants for Western Australia. If a plant is declared for the whole of the State or for particular Local Government Areas, all landholders are obliged to comply with the specific category of control. Declarations specify a category, or categories, for each plant according to the control strategies or objectives which the Agriculture Protection Board believes are appropriate in a particular place. These Declared Plants are divided into five classes, which are detailed in Table 8, Appendix B.

A desktop search of the EPBC Act Protected Matters database (DSEWPaC, 2012; PMST_CGQJFT) and the DEC's *NatureMap* search (DEC, 2012a) indicated the presence or potential presence of seven invasive flora species within 10 km of the Project Area. These include:

- ▶ **Cleretum papulosum* subsp. *papulosum*;
- ▶ **Hypochaeris glabra* (Smooth Catsear);
- ▶ **Cenchrus ciliaris* (Buffel Grass);
- ▶ **Cuscuta epithymum* (Lesser Dodder);
- ▶ **Rostraria pumila*;
- ▶ **Emex australis* (Doublegee); and
- ▶ **Portulaca oleracea* (Purslane).

None of these previously recorded invasive flora species are classified as WONS or Declared Plants within the Shire of Yalgoo.

3.7.4 Diseases or Pathogens

Phytophthora cinnamomi ('Dieback') disease is generally restricted to areas of the South of the State, south of the 26th parallel of latitude, in areas receiving annual rainfall of greater than 400 mm.

The Project Area is not considered to be susceptible to the development of the *Phytophthora cinnamomi* pathogen.

3.8 Fauna

3.8.1 Existing fauna records

A *NatureMap* search (DEC, 2012) indicated 47 fauna taxa previously collected within 10 km of the Project Area (Appendix C). The *NatureMap* records show that Meliphagidae (5 taxa), Campephagidae (3 taxa) and Acanthizidae (5 taxa) are the most rich families that have been recorded within this area (Table 14, Appendix E).

3.8.2 Significant fauna

The conservation of fauna species and their significance status is currently assessed under both Commonwealth and State Acts. The Acts include the Commonwealth EPBC Act and State WC Act.

The significance levels for fauna used in the EPBC Act are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN). A description of Conservation Categories delineated under the EPBC Act and the circumstances under which a project will trigger referral to the DSEWPaC are described in Table 6, Appendix B.

The EPBC Act also protects migratory species that are listed under international agreements (see Table 6, Appendix B) and marine species on Commonwealth lands and waters.

The WC Act uses a set of schedules, but also classifies species using some of the IUCN categories. These Schedules are described in Table 9, Appendix B.

In Western Australia the DEC also produces a supplementary list of Priority Fauna, these being species that are not considered Threatened under the Western Australian WC Act but for which the Government feels there is a cause for concern. These species have no special legislative protection, but their presence would normally be considered. Such taxa need further survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna. Levels of Priority are described in Table 10, Appendix B.

From the searches of the *NatureMap* database (DEC, 2012a) and the EPBC Act Protected Matters Search Tool (DSEWPaC, 2012; PMST_CGQJFT) a number of protected fauna species were identified as potentially occurring within vicinity of the Project Area (Table 14, Appendix E).

It should be noted that some species that appear in the EPBC Act Protected Matters Search Tool are often not likely to occur within the specified area, as the search provides a general guidance to matters of national significance that require further investigation. The records from the DEC searches of threatened fauna provide more accurate information for the general area; however some records of sightings or trappings can be dated and often misrepresent the current range of threatened species.

A search of EPBC Act and DEC databases indicated the potential for the following significant vertebrate species to occur in the Project Area:

- ▶ *Acanthiza iredalei* subsp. *iredalei* (Slender-billed Thornbill); *Vulnerable* (EPBC Act); and
- ▶ *Leipoa ocellata* (Malleefowl); *Vulnerable*, Migratory (EPBC Act), Schedule 1 (WC Act)

The *NatureMap* search indicated the presence of *Pomatostomus superciliosus* (White-browed Babbler). The Western Wheatbelt subspecies, *Pomatostomus superciliosus* subsp. *ashbyi*, is a Priority 4 listed species; however, the Project Area is outside the range of this subspecies and it would be unlikely to occur in the Project Area (G. Gaikhorst, *pers. comm.*).

Additionally, while it was not recorded in any of the desktop searches GHD zoologists identified the Project Area to be within the range of the threatened species *Egernia stokesii* subsp. *badia* Western Spiny-tailed Skink (*Endangered* – EPBC Act; Schedule 1 – WC Act).

A number of the species identified from the desktop assessment as potentially occurring in the project area were listed migratory or marine species (Table 14, Appendix D). There is the potential for a number of these species to occur occasionally within the Project Area.

3.8.3 Feral Animals

The *NatureMap* search (DEC, 2012) and the EPBC Act Protected Matters Search Tool (DSEWPac, 2012; PMST_CGQJFT) indicated that a number of feral animals may occur within 10 km of the Project Area. These include:

- ▶ **Capra hircus* (Goat);
- ▶ **Felis catus* (Feral Cat);
- ▶ **Oryctolagus cuniculus* (European Rabbit); and
- ▶ **Vulpes vulpes* (Red Fox).



4. Field Investigation

4.1 Physical Environment

4.1.1 Weather Conditions

GHD's qualified ecologists conducted the field survey on 15 and 16 March 2012. The nearest Bureau of Meteorology Station that had weather information available for these dates was the Morawa Airport (Station number 8296). This station recorded 31.6 mm of rainfall for the three month period prior to the survey (December-February) (BoM, 2012). The summer rainfall received during this period was less than some of the previous years that have been heavily influenced by cyclonic rainfall; however, it was higher than a typically dry summer period. As such, the summer rainfall is considered to have had influenced the growth and germination of some of the flowering plants that respond to the summer rains.

During the field investigation the daily maximum temperature at Morawa Airport was 31.8 °C and 31.6 °C, with zero mm of rainfall recorded (BoM, 2012).

4.1.2 Geology, Landforms and Soil

Within the Project Area, there are a number of different geological features. To the western end of the Project Area is a north-south running lateritic breakaway, which is typically overlain by lateritic gravelly soils. Small hills of similar geology are scattered throughout the Project Area. To the south-east and west of the Project Area, small areas of banded iron formation (BIF) are present. The majority of the eastern third of the Project Area contains disturbed soils.

4.1.3 Hydrology

No permanent wetlands or watercourses were identified during the field survey; however, a number of ephemeral drainage lines crossed the Project Area. These drainage lines were dry at the time of survey and would only be expected to flow during periods of high intensity rainfall. None of the ephemeral creeklines contains riparian vegetation.

4.2 Vegetation

4.2.1 Vegetation Types

Vegetation types were determined within the Project Area during the March 2012 survey using field surveys and aerial photography. Field data was analysed and sites grouped together according to similar species composition, structure and dominance at the stratum level. The vegetation in the Project Area is broadly consistent with Beard's (1976) Vegetation Association description : "Vegetation Association 420; Shrublands; bowgada & jam scrub"; however, due to the smaller scale of the survey the Project

Area has been further mapped and classified into nine vegetation types. These vegetation types have been described in Table 3 and mapped in Figure 2.

The vegetation types were described based on Specht's (1970) structural formations in Australia with modification by Aplin (1979) and Trudgen (2002). These vegetation types occur in areas adjacent and/or vicinity to the Project Area.

4.2.2 Vegetation Condition

The vegetation condition of the Project Area was assessed using the vegetation condition rating scale developed by Keighery (1994) that recognises the intactness of vegetation and is defined by the following:

- ▶ Completeness of structural levels;
- ▶ Extent of weed invasion;
- ▶ Historical disturbance from tracks and other clearing or dumping; and
- ▶ The potential for natural or assisted regeneration.

The scale, therefore, consists of six rating levels as outlined in Table 2.

Table 2 Vegetation Condition Rating Scale

Vegetation Condition Rating	Vegetation Condition	Description
1	<i>Pristine or Nearly So</i>	No obvious signs of disturbance.
2	<i>Excellent</i>	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species.
3	<i>Very Good</i>	Vegetation structure altered, obvious signs of disturbance.
4	<i>Good</i>	Vegetation structure significantly altered by very obvious signs of multiple disturbances retains basic vegetation structure or ability to regenerate it.
5	<i>Degraded</i>	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not in a state approaching good condition without intensive management.
6	<i>Completely Degraded</i>	The structure of the vegetation is no longer intact and the area is completely or almost without native species.

The vegetation condition at the Project Area was mapped from the field survey information and is represented in Figure 3. The majority of the vegetation in the Project Area can be described as in a *Pristine or Nearly So - Excellent* (Condition 1-2). Previous mining and ground work operations occurred in certain areas and these areas are recovering. Rehabilitated areas of old groundwork are still in a *Degraded*




(Condition 5) condition and areas around old mine shafts are still *Completely Degraded* (Condition 6).

Approximately 108.5 ha of vegetation in *Good* (Condition 4) or better (Condition 1-3) occurs within the Project Area.

Vegetation occurs in a similar or better condition in areas adjacent and/or within the vicinity of the Project Area.



Table 3 Project Area Vegetation Types

Vegetation Type	Vegetation Description	Photograph	Vegetation Condition
Breakaway	High Shrubland of <i>Acacia aulacophylla</i> , <i>A. acuminata</i> and <i>Hakea recurva</i> over Open to Low Open Shrubland of <i>Ptilotus obovatus</i> and <i>Solanum lasiophyllum</i> over Scattered Tussock Grasses of <i>*Pentameris aervoides</i> and <i>Eragrostis dielsii</i> with Scattered Herbs of <i>Podolepis capillaris</i> on lateritic breakaways	 A photograph showing a landscape with a prominent, reddish-brown, eroded lateritic breakaway in the foreground. The breakaway has a rough, cracked texture. Sparse, low-lying vegetation, including small shrubs and grasses, is scattered across the breakaway and the surrounding flat ground. The background shows a clear blue sky and distant, hazy hills.	1-2



Rehabilitated
Community

Mixed Shrubland dominated by shrubs of *Senna* spp., *Ptilotus* spp., *Acacia* spp., *Eremophila* spp. over a Mixed Low Shrubland of *Solanum* spp., *Maireana* spp. over grasses of *Eriachne* spp. and *Aristida contorta*. Flora taxa are colonising modified soils and terrain where material has been removed.



5

Low Open
Heath

Low Open Heath to Low Open Shrubland of *Thryptomene decussata*, *Eremophila latrobei*, *E. exilifolia* over Very Open Tussock Grassland of *Eriachne pulchella*, *Aristida contorta*, with Scattered Herbs of *Gnephosis arachnoidea*.



1-2

Mixed Acacia
Scrub

High Shrubland of *Acacia ramulosa* var. *ramulosa*, *A. tetragonophylla*, *A. caesaneura* x *incurvaneura*, *A. burkitii* over Shrubland of *Eremopila forrestii* subsp. *forrestii* *E. galeata* over Low Open Shrubland of *E. latrobei*, *E. exilifolia*, *Sida ?ectogama* over Tussock Grassland of *Aristida contorta*, *Eriachne pulchella*, *Eragrostis dielsii*, **Pentameris airoides* on broad loamy plains.



1-2

Mixed Scrub
on Laterite

High Shrubland to High Open Shrubland of *Acacia* c.f. *hopperiana*, *A. ramulosa* var. *ramulosa*, *A. aulacophylla*, with *Hakea recurva* *A. tetragonophylla*, *Eremophila oppositifolia* subsp. *angustifolia* over Shrubland of *Eremophila georgei*, *E. latrobei* subsp. *latrobei*, *Thryptomene decussata* with *Senna* sp. *Austin*, *Sida ?ectogama* over Low Shrubland to Low Open Shrubland of *Ptilotus schwartzii*, *Maireana* spp., over Very Open Tussock Grassland of *Aristida contorta*, **Pentameris airoides*, *Eragrostis dielsii* with Scattered Mixed Herbs growing on shallow soils over a thick duricrust.



1-2

“Snakewood
Plains”

Low Open Woodland/High Open Shrubland of *Acacia eremaea* with *A. incurvanaeura* over Scattered *Sclerolaena* spp, over Open Tussock Grassland of *Aristida contorta*.



1-2

Low Stony Hills

Open Shrubland of *Acacia tetragonophylla*, *A. umbraculiformis* *A. aulacophylla* with *Eremophila galeata* and isolated *Brachychiton gregorii* over Low Open Shrubland *Ptilotus obovatus*, *Salsola* sp., *Maireana* sp. Over Tussock Grassland of *Aristida contorta* growing on stony soils



1-2



Calcareous
Mosaic

Mixed Low Open Woodland of *Acacia incurvaneura*, *A. mulganeura* over Open Shrubland of *Rhagodia eremaea*, *Santalum spicatum*, *Scaevola spinescens* over Low Shrubland of *Ptilotus obovatus*, *Sclerolaena* spp., over *Aristida contorta* with *Nicotiana* sp. growing on shallow calcareous soils overlaying a duricrust of calcrete with extensive fluctuations in water availability.



1-2

Mine Impacted
Open Low
Scrub

Similar to 'Mixed Acacia Scrub' but with majority of species removed by historical mining activities, leaving vegetation dominated by disturbance response species *Aristida contorta*, *Maireana* spp., *Sclerolaena* spp., *Ptilotus obovatus*, *Salsola* sp. and *Solanum lasiophyllum* growing on disturbed stony soils.



4-6

'Mixed *Acacia* Scrub' dominates the landscape. The 'Mine Impacted Low Open Scrub' is most probably a degraded form of this vegetation type. The 'Mixed Scrub on Laterite' also appears to be related to the 'Mixed *Acacia* Scrub' in a broad sense and differs in the geology in that it occurs on a duricrust of ferricrete, that limits root penetration and increases aridity. Breakaways act as refugia for plants and animals in that they provide extra niches for development, shelter and protect against exposure to fire.

4.2.3 Threatened and Priority Ecological Communities

The vegetation of the Project Area was assessed during the field survey to determine the potential presence of any significant communities. No TECs or PECs were identified during the field survey.

The PECs that were identified in the desktop survey as occurring within the general area were assessed to determine the likelihood of their occurrence in the Project Area. This assessment is presented in Table 4 and indicates that the PECs are unlikely to occur within the Project Area and will not be impacted by the Project.

Table 4 Priority Ecological Communities Identified Within the Vicinity of the Project Area

PEC	Description (Source: DEC, 2012b)	Likelihood of Occurrence
Wagga Wagga and Yalgoo Calcrete' Wagga Wagga and Yalgoo calcrete groundwater assemblage type on Yalgoo palaeodrainage on Wagga Wagga Station and Moore Palaeodrainage on Yoweragabbie Station	Unique assemblages of invertebrate have been identified in the groundwater calcretes. Threats: Mining	Project Area does not occur on Yoweragabbie Station. Impacts to this PEC are considered unlikely.
Yalgoo BIF (banded ironstone formation): Yalgoo vegetation complexes	No description Threats: Mining	No banded ironstone formation vegetation occurs in the Project Area. Impacts to this PEC are considered unlikely.
'Gabyon calcrete groundwater assemblage type on Moore palaeodrainage on Gabyon Station'	Unique assemblages of invertebrate have been identified in the groundwater calcretes. Threats: Mining	Project Area does not occur on Gabyon Station. Impacts to this PEC are considered unlikely.
'Muralgarra calcrete groundwater assemblage type on Murchison palaeodrainage on Muralgarra Station'	Unique assemblages of invertebrate have been identified in the groundwater calcretes. Threats: Mining	Project Area does not occur on Muralgarra Station. Impacts to this PEC are considered unlikely.

4.3 Flora

4.3.1 Flora Diversity

The March 2012 field survey of the Project Area recorded 95 plant taxa (including subspecies and varieties), representing 24 families. This total comprised 93 native species and 2 introduced (exotic) species. The Project Area is considered to be of moderate biodiversity.

Dominant families recorded from the Project Area included:

- ▶ Fabaceae (20 taxa);
- ▶ Scrophulariaceae (11 taxa); and
- ▶ Chenopodiaceae (12 taxa).

Dominant taxa recorded from the Project Area included:

- ▶ *Acacia* (15 taxa);
- ▶ *Eremophila* (11 taxa); and
- ▶ *Maireana* (seven taxa).

A complete flora list of the Project Area (Table 13) and recorded quadrat data is provided in Appendix D.

Two of the quadrats (Quadrat 4 and 5) utilised two quadrats installed and surveyed in 2007 by the DEC during the Yilgarn Ranges (BIF) surveys. The DEC quadrat data collected in 2007 was undertaken during a time of drought. This survey in 2012 recorded more annual and short-lived taxa, despite the Autumn survey date.

There were a number of species that could not be identified due to lack of vegetative and flowering material. A survey conducted in Spring would be expected to record great numbers of annuals, such as taxa in the Asteraceae family and other herbs, where their growth responds to winter rainfall.

4.3.2 Conservation Significant Flora

No Threatened (Declared Rare) Flora species, as managed by the DEC, or species of national conservation significance, listed under the EPBC Act were identified within the Project Area.

One Priority Three flora species, *Acacia subsessilis*, was recorded within the Project Area during the field survey.

The field survey recorded *Acacia subsessilis* at one locality within the Project Area. This taxon was also noted outside the Project Area. The recorded location is mapped in Figure 2. *Acacia subsessilis* is described below:

Acacia subsessilis A.R.Chapm. & Maslin, *Nuytsia* 12: 490 (1999)

A rounded or trumpet-shaped, straggly shrub up to 2 m tall. Branchlets with raised stem-projections where phyllodes have fallen, lenticular. Phyllodes sessile to subsessile, mostly narrowly linear, flat to terete, 1–3 cm long, 1–1.5

mm wide, sharp pointed, stiff, with 8 nerves in all, 3 nerves per face when phyllodes flat; gland to 0–2 mm above base. Inflorescences simple, 1 per axil; peduncles 2–6 mm long, glabrous or sparsely puberulous; heads obloid to short-cylindrical, 7–15 mm long, 4–6 mm diam., subdense. Pods submoniliform, to 8 cm long, 5–6 mm wide, thinly leathery. Seeds not well known.

Occurs in disjunct localities from Mount Farmer homestead to Yalgoo, Western Australia. This taxon is reported to grow in shallow red sand and stony gravel, often on rocky slopes in open shrubland.

Superficially resembles *A. colletioides* and *A. chapmanii* subsp. *chapmanii* but these two are readily distinguished by their globular to subglobular heads, consistently terete phyllodes and strongly curved to coiled pods.



Plate 1 ***Acacia subsessilis* (specimen SPJF017)**

4.3.3 Other Conservation Significant Flora Taxa

Significant flora may include habitat of rare, uncommon or restricted flora species and/or species outside or at the limit of their range. No taxa with significant range extensions were recorded during the field survey.'

4.3.4 Introduced Plants

A total of two weed species were recorded from the Project Area during the field survey. These weeds were **Cleretum papulosum* subsp. *papulosum* and **Pentameris airoides* (False Hair Grass), both species which are widespread and common in the area.



No WONS or Declared Plants listed by the Federal Government were recorded in the Project Area.

The Project Area is fairly remote and isolated from many of the disturbance factors that have the potential to introduce weeds. The area has previously been used for mining and as a material pit, but these impacts have not resulted in the introduction of many weed species. As such, it is considered that existing weed species are unlikely to spread beyond the Project Area boundary as a result of project activities.

4.4 Fauna

4.4.1 Fauna Diversity

During the March 2012 field survey a total of 16 species from 16 families, including 12 birds, three mammals and one reptile species were recorded from within the Project Area. The survey only provides a brief snapshot of those species present at the time of sampling (daytime), in one season, in one year. Not all potentially occurring species would be recorded during a single survey due to spatial and temporal variations in fauna population numbers.

The results of the field surveys (as well as the desktop searches) are compiled in Table 14, Appendix E.

4.4.2 Fauna Habitat

The dominant habitat types located at the Project Area are likely to be:

- ▶ Acacia shrublands / woodlands;
- ▶ Breakaways and rocky outcrops; and
- ▶ Ephemeral creeklines.

These habitats are considered to be common in the local and regional area. Due to historical disturbance from mining and/or material extraction, these habitats are considered to be in better condition in areas away from the Project Area.

4.4.3 Conservation Significant Fauna

The desktop investigation indicated that a number of protected fauna may occur within the project area. The habitat requirements of these species and the likelihood of their occurrence in the Project Area (with information from the field survey) are considered in Table 5 (below).



Table 5 Assessment of the habitat requirements and likelihood of occurrence of conservation significant fauna identified from desktop assessment.

Species	Status	Habitat Requirements	Likelihood of Occurrence and Impact
<i>Acanthiza iredalei</i> (Slender-billed Thornbill);	<i>Vulnerable</i> (EPBC Act)	The western subspecies of the Slender-billed Thornbill occupies treeless chenopod shrubland across arid and semi-arid southern Western Australia. In central and western Western Australia it favours saline flats associated with salt lakes (DSEWPaC, 2012b)	Unlikely The Project Area does not contain optimal habitat for this species. The Slender-billed Thornbill is listed under the federal EPBC Act as it has suffered a contraction of range in the east but it is not listed under the state WC Act and is unlikely to be a concern in Western Australia.
<i>Leipoa ocellata</i> (Malleefowl);	<i>Vulnerable</i> , Migratory (EPBC Act), Schedule 1 (WC Act)	The Malleefowl generally occurs in semi-arid areas of Western Australia, from Carnarvon to south east of the Eyre Bird Observatory (south-east Western Australia). It occupies shrublands and low woodlands dominated by mallee vegetation (DSEWPaC, 2012c). The Malleefowl uses areas of eucalypt or native pine, <i>Callitris</i> woodlands, acacia shrublands, Broombush (<i>Melaleuca uncinata</i> complex) vegetation or coastal heathlands.	Possible No evidence of Malleefowl nests were recorded in the field survey, while the Malleefowl may occasionally use the Project Area they are unlikely to be impacted by the Project.
<i>Egernia stokesii</i> subsp. <i>badia</i> Western Spiny-tailed Skink	<i>Endangered</i> (EPBC Act), Schedule 1 (WC Act)	The Western Spiny-tailed Skink occurs in two populations in the central Wheatbelt and the central Carnarvon Basin. Most of the populations of the brown form occur in York Gum woodland in the Wheatbelt and require hollow logs as refuge sites. The black form was previously recorded near Yalgoo in stony hills and rocky crevices (DSEWPaC, 2012d).	Unlikely While this species occurs within the general area, the survey did not record any sign (latrine piles) of this species. Few log piles were present in the Project Area due to historical disturbance from mining utilising many of these for mine shaft shoring.



4.4.4 Marine and/or Migratory Species

The Australian Kestrel (*Falco cenchroides*), listed as Marine under the EPBC Act (Bonn Convention), was recorded during the field survey, and the desktop survey indicated that a number of other bird species listed as Marine or Migratory (also as Schedule 3 under the WC Act) have the potential to occur within the Project Area. These species are considered to be common and widespread in their range and the Project Area is not deemed critical habitat for the survival of these species. Therefore, these species have not been included in the likelihood of occurrence table (

Table 5).

4.4.5 Introduced Species

The presence of two introduced species, the Goat (**Capra hircus*) and the European Rabbit (**Oryctolagus cuniculus*), was recorded during the field survey. It is likely that a number of other introduced species may also occasionally occur in the Project Area, including the Cat (**Felis catus*) and the Red Fox (**Vulpes vulpes*).

5. Clearing of Native Vegetation

Any clearing of native vegetation requires a permit under Part V of EP Act, except where an exception applies under Schedule 6 of the Act or is prescribed by regulation in the *Environmental Protection (Clearing Native Vegetation) Regulations 2004*.

Main Roads has been granted a state-wide vegetation clearing permit (Purpose Permit CPS 818/6), under section 51E of the EP Act. The Purpose Permit allows Main Roads to clear native vegetation for project activities. Any clearing of native vegetation must be assessed against the ten clearing principles outlined in the permit.

Native vegetation describes all indigenous aquatic and terrestrial vegetation (living or dead). The term does not include vegetation that was intentionally sown, planted or propagated unless it was required under a statutory condition.

5.1 Avoiding, Minimising and Reducing the Impact of Clearing

In accordance with Main Roads State Purpose Permit CPS 818/6, the following measures are recommended in order to avoid, minimise and reduce the impact of clearing associated with the Project:

- ▶ All efforts should be made during clearing activities to avoid any unnecessary impacts to native vegetation (e.g. marking of clearing lines, parking of machinery in already cleared areas etc.);
- ▶ Cleared vegetation should be mulched and respread in redundant cleared areas in order to help prevent weed establishment and land degradation as well as provide habitat and encourage natural regeneration of the redundant areas;

5.2 Assessment Against the Ten Clearing Principles

Clearing permit applications are assessed against the Ten Clearing Principles outlined in Schedule 5 of the EP Act. An assessment of this Project against the Ten Clearing Principles has been based on the information presented in Sections 3 and 4 and is detailed in Appendix F. The assessment found that the Project is not at variance with the clearing principles.

6. Environmental Approvals

6.1 Commonwealth Approval

6.1.1 Referral to the Department of Sustainability, Environment, Water, Populations and Communities

Referral to the DSEWPaC under the EPBC Act is triggered if a proposed action has/or potentially has a significant impact on Matters of National Environmental Significance.

Referral to the DSEWPaC under the EPBC Act as a result of biological issues is not considered necessary at this time as no significant impacts are likely to occur to any Matters of National Environmental Significance.

Other non-biological aspects may require referral but these have not been considered as part of this assessment.

6.2 State Approvals

6.2.1 Referral to the Environmental Protection Authority

Impacts on biological issues (flora, vegetation and fauna) are not considered significant to warrant referral of the Project to the EPA under Part IV of the EP Act.

Other non-biological aspects may require referral but these have not been considered as part of this assessment.

6.2.2 Department of Environment and Conservation

On the basis of this assessment the Project was found not at variance with the clearing principles (Appendix F). It is therefore considered that clearing is permissible in accordance with Main Roads Purpose Permit CPS 818/6.

The main conditions of the Permit are:

- ▶ Avoiding and minimising clearing impacts;
- ▶ Not exceeding any of the annual regional clearing limits;
- ▶ Preparing a PEIA (assessing clearing impacts against the “Ten Clearing Principles”);
- ▶ Undertaking stakeholder consultation (where variance with the “Ten Clearing Principles” occurs);
- ▶ Provision of offsets (where variance with the “Ten Clearing Principles” occurs);
- ▶ Preparing an Environmental Impact Assessment (EIA) (may be done instead of PEIA) (where variance occurs);
- ▶ Preparing an Environmental Management Plan (EMP) (where variance occurs);



- ▶ Preparing a revegetation plan for temporary clearing (and submit to DEC if temporary clearing is >0.5 ha);
- ▶ Implementing weed and dieback management;
- ▶ Recording;
- ▶ Auditing and/or reporting; and/or
- ▶ Upholding regional limits on the amount of clearing.

7. Conclusions and Recommendations

7.1 Conclusions

GHD undertook a biological assessment of the Project Area in March 2012.

- ▶ No permanent wetlands or watercourses were identified during the field survey; however, a number of ephemeral drainage lines crossed the Project Area. None of the ephemeral creeklines contain riparian vegetation.
- ▶ The vegetation in the Project Area is broadly consistent with Beard's (1976) Vegetation Association description: "Vegetation Association 420; Shrublands; bowgada & jam scrub". During the field survey the Project Area was further mapped and classified into nine vegetation types.
- ▶ The majority of the vegetation in the Project Area can be described as in a *Pristine or Nearly So – Excellent*. Approximately 108.5 ha of vegetation in *Good* (Condition 4) or better (Condition 1-3) occurs within the Project Area. Previous mining and ground work operations occurred in certain areas. These areas are recovering, and have a vegetation condition rating of *Degraded* to *Completely Degraded*.
- ▶ No Threatened Ecological Communities were recorded in the Project Area. The database searches indicated that the Project Area lies within the buffer area of two Priority Ecological Communities, but these communities were not recorded during the field survey.
- ▶ Vegetation within the Project Area is considered to be of *Least Concern* with greater than 90% of its pre-European extent remaining. The Project Area occurs in a location with relatively unaltered vegetation and associated ecological linkages.
- ▶ No Threatened (Declared Rare) Flora taxa were recorded from the Project Area.
- ▶ The field survey recorded one Priority Three flora species, *Acacia subsessilis*, at one locality within the Project Area. This taxon was also noted outside the Project Area.
- ▶ A total of 16 vertebrate fauna species from 16 families, including 12 birds, three mammals and one reptile species were recorded from within the Project Area during the field survey.
- ▶ The fauna habitats present in the Project Area are considered to be common in the local and regional area. Due to historical disturbance from mining and/or material extraction, these habitats are considered to be in better condition in areas away from the Project Area. No significant fauna habitats are considered likely to be impacted by the proposed works.



7.2 Recommendations

To minimise risk to impact on Priority Flora taxa recorded from the Project Area, GHD recommends that the known Priority Flora location be avoided during the proposed Project.

Management measures should be implemented during construction to reduce impacts on the flora and fauna of the Project Area.

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Appendix A

Figures

Figure 1 Project Area and Environmental Constraints

Figure 2 Vegetation Type

Figure 3 Vegetation Condition

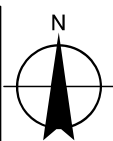


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0 0.25 0.5 1 1.5 2

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50



LEGEND Declared Rare & Priority Species

- ▲ (T) Threatened Flora - Extant Taxa
- ▲ Priority 1 - Poorly Known Taxa
- ▲ Priority 2 - Poorly Known Taxa
- ▲ Priority 3 - Poorly Known Taxa
- ▲ Priority 4 - Rare Taxa
- ▲ Priority 5 - Conservation Dependent Taxa

- Road
- Hydrology
- ▭ Project Area
- ▭ Public Drinking Water Source Areas
- ▭ Protection Area-NA

Map Extent is covered by a
Priority Ecological Community



CLIENTS | PEOPLE | PERFORMANCE

Main Roads WA
Geraldton - Mount Magnet Road
Material Pit SLK 222.45 Biological Survey

Job Number | 61-27976
Revision | 0
Date | 07 May 2012

Project Area Location
and Environmental Constraints

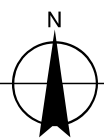
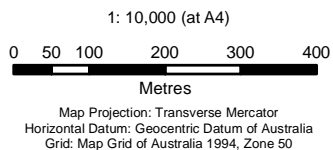
Figure 1

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Data source: GHD: Project Area - 20120307; DEC Threatened and Priority Flora - 20120320; Landgate: Yalgoo 2241 Nov 2007 Mosaic - 20120506; Roads - 20120412; Hydrology - 20120412; DOW: Public Water Source Drinking Areas - 20120412; GA: 250k Australian Topographic Series - 2006 Created by: erice, cagilbert

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LEGEND

- ▼ Priority Flora
- Quadrat
- Releve

Vegetation Type

- Breakaway
- Calcareous Mosaic
- Low Open Heath
- Low Stony Hills
- Mixed Acacia Scrub
- Snakewood
- Mining Impacted
- Open Low Scrub
- Mixed Scrub on Laterite
- Rehabilitated Areas
- Project Area



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Main Roads WA
Geraldton - Mount Magnet Road
Material Pit SLK 222.45 Biological Survey

Job Number 61-27976
Revision 0
Date 08 May 2012

Project Area Vegetation Type

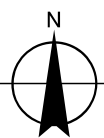
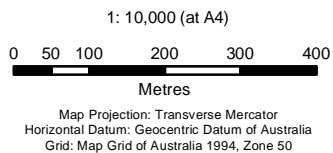
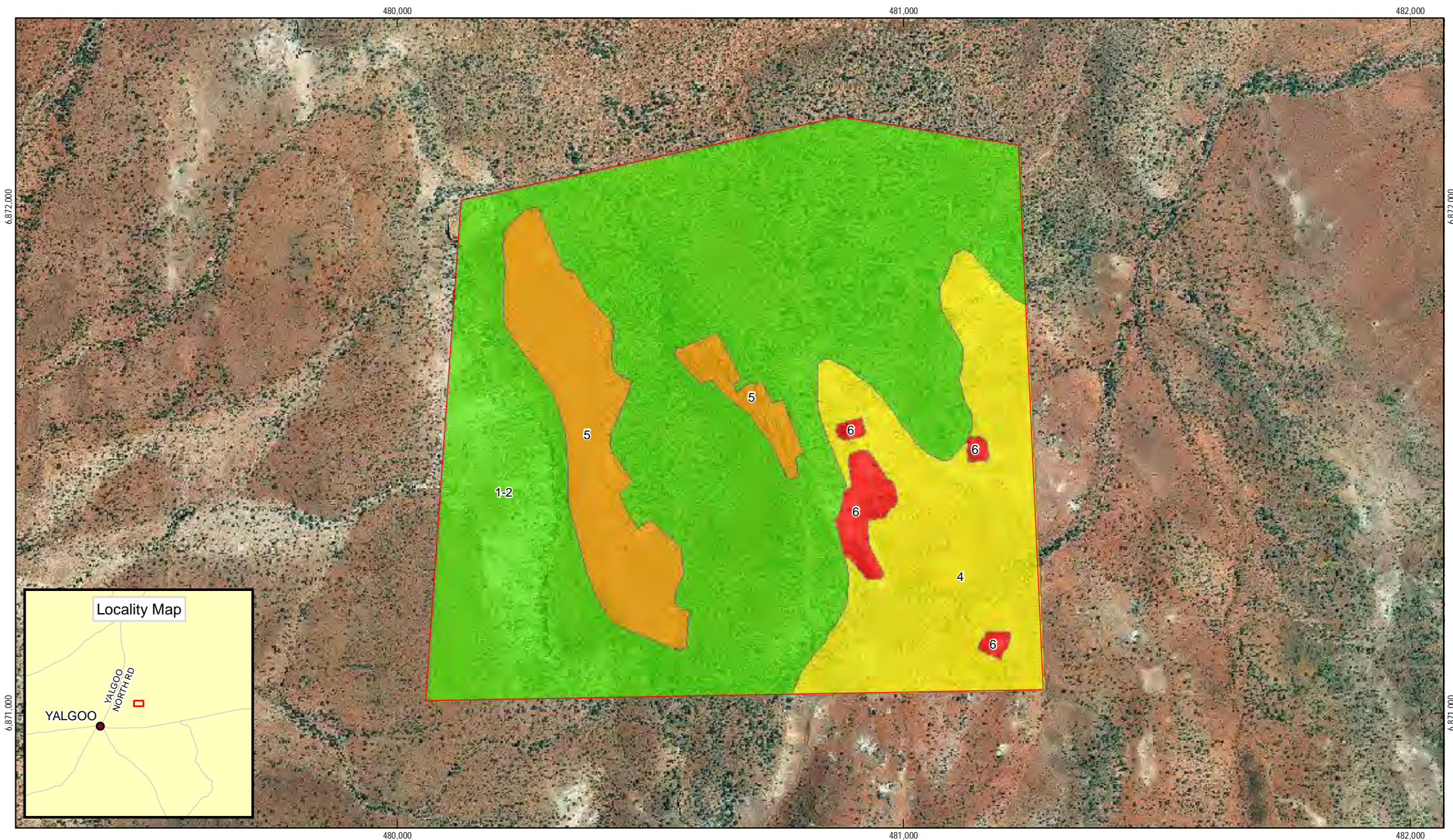
Figure 2

G:\61\27976\GIS\Maps\MXD\6127976_G004_Fig2_Rev0.mxd

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Data source: GHD: Project Area - 20120307, Vegetation Description - 20120329, Priority Flora - 20120418, Quadrat - 20120418, Releve - 20120418; Landgate: Yalgoo 2007 Mosaic - 20120411; GA: 250K Australian Topographic Series - 2006. Created by: cagilbert

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LEGEND

Project Area

Vegetation Condition

1. Pristine or Nearly So
 2. Excellent

3. Very Good
 4. Good
 5. Degraded
 6. Completely Degraded



CLIENTS | PEOPLE | PERFORMANCE



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Main Roads WA
Geraldton - Mount Magnet Road
Material Pit SLK 222.45 Biological Survey

Job Number 61-27976
Revision 0
Date 07 May 2012

Project Area Vegetation Condition Figure 3

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Data source: GHD: Project Area - 20120307; Vegetation Condition - 20120329; Landgate: 2007 Yalgoo Mosaic - 20120411; GA: 250K Australian Topographic Series - 2006. Created by: cagilbert

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Appendix B

Conservation Categories

EPBC Act Conservation Categories

WC Act Conservation Categories

DEC Conservation Categories



Table 6 Categories and Definitions for EPBC Act Listed Flora and Fauna Species

Conservation Category	Definition
<i>Extinct</i>	Taxa not definitely located in the wild during the past 50 years.
<i>Extinct in the Wild</i>	Taxa known to survive only in captivity.
<i>Critically Endangered</i>	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
<i>Endangered</i>	Taxa facing a very high risk of extinction in the wild in the near future.
<i>Vulnerable</i>	Taxa facing a high risk of extinction in the wild in the medium-term.
<i>Near Threatened</i>	Taxa that risk becoming Vulnerable in the wild.
<i>Conservation Dependent</i>	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened.
<i>Data Deficient (Insufficiently Known)</i>	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
<i>Least Concern</i>	Taxa that are not considered Threatened.

Table 7 Conservation Codes and Descriptions for Threatened (Declared Rare) and Priority Flora Species.

Code	Conservation Category	Definition
X	Presumed Extinct Flora (Declared Rare Flora – Extinct)	Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 under the Wildlife Conservation Act 1950).
T	Threatened Flora (Declared Rare Flora – Extant)	<p>Taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the Wildlife Conservation Act 1950).</p> <p>Threatened Flora are further ranked by the Department according to their level of threat using IUCN Red List criteria:</p> <ul style="list-style-type: none"> ▸ CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild; ▸ EN: Endangered – considered to be face a very high risk of extinction in the wild; and ▸ VU: Vulnerable – considered to be facing a high risk of extinction in the wild.

P1	Priority 1 – Poorly Known Taxa	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes
P2	Priority 2 – Poorly Known Taxa	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3	Priority 3 – Poorly Known Taxa	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4	Priority 4 – Rare, Near Threatened and other taxa in need of monitoring	<p><u>Rare</u>. Taxa 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 taxa are usually represented on conservation lands.</p> <ul style="list-style-type: none"> ▸ <u>Near Threatened</u>. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. ▸ Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
P5	Priority 5 – Conservation Dependent Taxa	Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.



Table 8 Department of Agriculture and Food Declared Plant Control Classes

Priority Class	Description
P1	Prohibits movement of plants or their seeds within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P2	Eradicate infestation to destroy and prevent propagation each year until no plants remain. The infested area must be managed in such a way that prevents the spread of seed or plant parts on or in livestock, fodder, grain, vehicles and/or machinery.
P3	Control infestation in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants.
P4	Prevent the spread of infestation from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set on all plants.
P5	Infestations on public lands must be controlled.

Fauna

EPBC Act Fauna Conservation Categories

Listed threatened species and ecological communities

An action will require approval from the Environment Minister if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:

- ▶ *extinct in the wild,*
- ▶ *critically endangered,*
- ▶ *endangered, or*
- ▶ *vulnerable.*

Critically endangered and endangered species

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered species if it does, will, or is likely to:

- ▶ lead to a long-term decrease in the size of a population, or
- ▶ reduce the area of occupancy of the species, or
- ▶ fragment an existing population into two or more populations, or
- ▶ adversely affect habitat critical to the survival of a species, or
- ▶ disrupt the breeding cycle of a population, or
- ▶ modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- ▶ result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*, or



- ▶ interfere with the recovery of the species.

**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a critically endangered or endangered species by direct competition, modification of habitat, or predation.*

Vulnerable species

An action has, will have, or is likely to have a significant impact on a vulnerable species if it does, will, or is likely to:

- ▶ lead to a long-term decrease in the size of an important population of a species, or
- ▶ reduce the area of occupancy of an important population, or
- ▶ fragment an existing important population into two or more populations, or
- ▶ adversely affect habitat critical to the survival of a species, or
- ▶ disrupt the breeding cycle of an important population, or
- ▶ modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- ▶ result in invasive species that are harmful a vulnerable species becoming established in the vulnerable species' habitat*, or
- ▶ interferes substantially with the recovery of the species.

An important population is one that is necessary for a species' long-term survival and recovery. This may include populations that are:

- ▶ key source populations either for breeding or dispersal,
- ▶ populations that are necessary for maintaining genetic diversity, and/or
- ▶ populations that are near the limit of the species range.

**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation.*

Listed migratory species

An action will require approval from the Environment Minister if the action has, will have, or is likely to have a significant impact on a listed migratory species. Note that some migratory species are also listed as threatened species. The criteria below are relevant to migratory species that are not threatened.

An action has, will have, or is likely to have a significant impact on a migratory species if it does, will, or is likely to:

- ▶ substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species, or
- ▶ result in invasive species that is harmful to the migratory species becoming established* in an area of important habitat of the migratory species, or
- ▶ seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.



An area of important habitat is:

1. habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, or
2. habitat utilised by a migratory species which is at the limit of the species range, or
3. habitat within an area where the species is declining.

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an ecologically significant proportion of the population varies with the species (each circumstance will need to be evaluated).

**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a migratory species by direct competition, modification of habitat, or predation.*

*Translocating or introducing a pest species may result in that species becoming established.

Table 9 Western Australian Wildlife Conservation Act 1950 Conservation Codes

Conservation Code	Description
Schedule 1	"...fauna that is rare or likely to become extinct, are declared to be fauna that is in need of special protection."
Schedule 2	"... fauna that is presumed to be extinct, are declared to be fauna that is in need of special protection."
Schedule 3	"... birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction are declared to be fauna that is in need of special protection."
Schedule 4	"... fauna that is in need of special protection, otherwise than the reasons mentioned [in Schedule 1-3]".



Table 10 DEC Priority Fauna Codes

Conservation Category	Description
Priority 1	Taxa with few, poorly known populations on threatened lands.
Priority 2	Taxa with few, poorly known populations on conservation lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown Land , water reserves, etc.
Priority 3	Taxa, which are known from few specimens or sight records, some of which are on lands not under immediate threat of habitat destruction or degradation.
Priority 4	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.
Priority 5	Taxa is in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.



Appendix C

Desktop Search Reports

EPBC Act Protected Matters Search
NatureMap Search



EPBC Act Protected Matters Report

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

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

Information about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

Report created: 13/03/12 14:17:44

[Summary](#)

[Details](#)

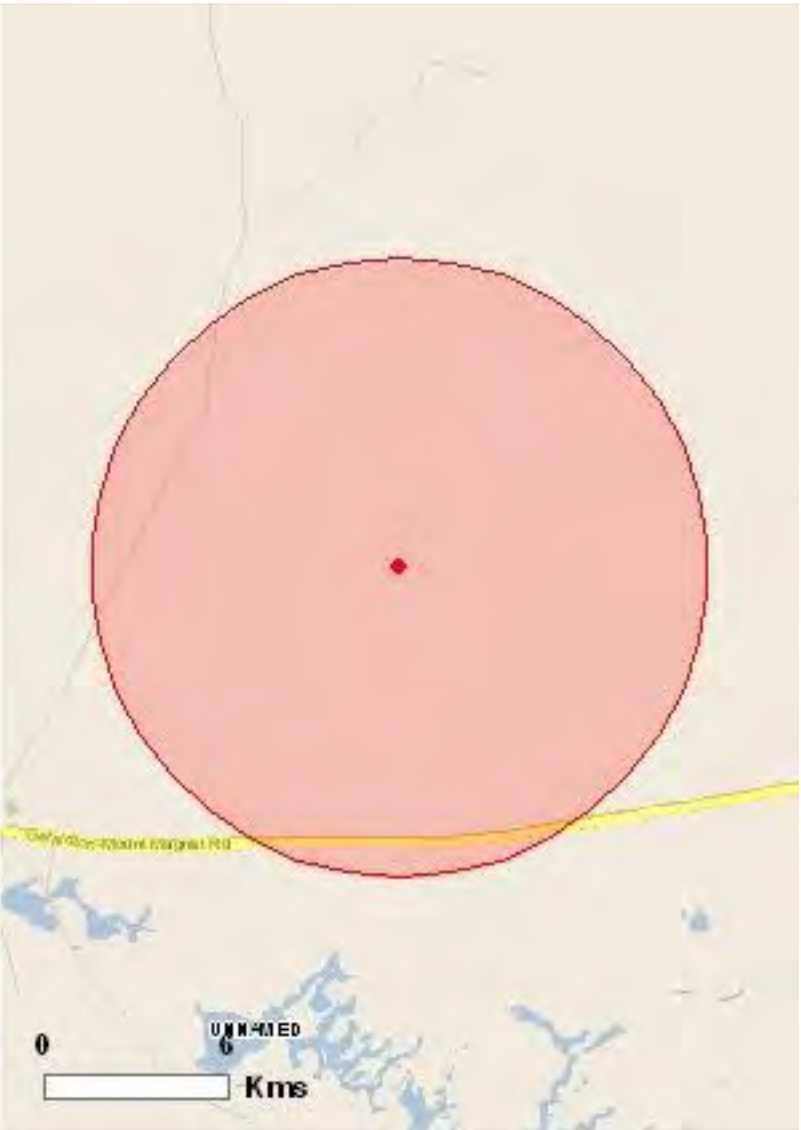
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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[Coordinates](#)

[Buffer: 10.0Km](#)



Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see <http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html>

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	2
Migratory Species:	7

Other Matters Protected by the EPBC Act

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

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

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

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov>.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	4
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

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

Place on the RNE:	1
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	5
Nationally Important Wetlands:	None

Details

Matters of National Environmental Significance

Threatened Species		[Resource Information]
Name	Status	Type of Presence
BIRDS		
Acanthiza iredalei iredalei		
Slender-billed Thornbill (western) [25967]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species	[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.	
Name	Type of Presence
Birds	
Apus pacificus Fork-tailed Swift [678]	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret [59541]	Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]	Species or species habitat may occur within area

Extra Information

Places on the RNE	[Resource Information]
-------------------	--------------------------

Note that not all Indigenous sites may be listed.

Name	State	Status
Historic		
Carlaminda Station Homestead	WA	Indicative Place

Invasive Species	[Resource Information]
------------------	--------------------------

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

Name	Status	Type of Presence
Mammals		
Capra hircus		
Goat [2]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area

Plants	
Cenchrus ciliaris	
Buffel-grass, Black Buffel-grass [20213]	Species or species habitat may occur within area

Coordinates

-28.26957 116.80429

Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Acknowledgements

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

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- Other groups and individuals

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

[Please feel free to provide feedback via the Contact Us page.](#)

NatureMap Species Report

Created By Guest user on 23/02/2012

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116°47' 49" E, 28°16' 40" S
Buffer 10km
Group By Family

Family	Species	Records
Acanthizidae	5	12
Agamidae	2	4
Aizoaceae	3	6
Amaranthaceae	6	31
Anatidae	1	1
Apiaceae	1	1
Apocynaceae	3	16
Araliaceae	2	10
Artamidae	2	5
Asparagaceae	3	20
Asteraceae	18	126
Boraginaceae	1	2
Brassicaceae	2	11
Campephagidae	3	9
Caprimulgidae	1	1
Carphodactylidae	1	1
Celastraceae	1	1
Charadriidae	1	2
Chenopodiaceae	11	70
Cinclosomatidae	1	1
Colchicaceae	1	7
Columbidae	2	5
Convolvulaceae	2	8
Corvidae	2	3
Cracticidae	2	4
Crassulaceae	2	5
Dicruridae	2	5
Diplodactylidae	1	1
Droseraceae	1	1
Elapidae	1	1
Euphorbiaceae	2	8
Fabaceae	22	117
Falconidae	2	2
Geraniaceae	1	14
Goodeniaceae	6	26
Hemerocallidaceae	1	2
Hirundinidae	1	2
Lamiaceae	2	6
Loranthaceae	2	2
Maluridae	2	3
Malvaceae	7	46
Meliphagidae	5	16
Myrtaceae	2	4
Neosittidae	1	1
Pachycephalidae	2	2
Petroicidae	1	4
Plantaginaceae	2	5
Poaceae	12	64
Podicipedidae	1	1
Polygalaceae	1	6
Polygonaceae	1	1
Pomatostomidae	2	2
Portulacaceae	4	15
Proteaceae	6	17
Psittacidae	1	1
Pteridaceae	3	17
Rutaceae	2	8
Santalaceae	2	2
Sapindaceae	2	4
Scrophulariaceae	11	48
Solanaceae	4	39
Sylviidae	2	2
Thymelaeaceae	1	2
Zygophyllaceae	1	1
TOTAL	201	860

Name ID Species Name

Naturalised

Conservation Code

¹Endemic To Query Area

Acanthizidae

1. 24260 *Acanthiza apicalis* (Broad-tailed Thornbill)

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
2.	24261	<i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
3.	24265	<i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
4.	25528	<i>Aphelocephala leucopsis</i> (Southern Whiteface)			
5.	24278	<i>Pyrrholaemus brunneus</i> (Redthroat)			

Agamidae

6.	24886	<i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
7.	24889	<i>Ctenophorus scutulatus</i>			

Aizoaceae

8.	20522	<i>Cleretum papulosum</i> subsp. <i>papulosum</i>	Y		
9.	2809	<i>Gunniopsis rubra</i>		P3	
10.	2819	<i>Tetragonia cristata</i>			

Amaranthaceae

11.	2690	<i>Ptilotus aervoides</i>			
12.	2721	<i>Ptilotus exaltatus</i> (Tall Mulla Mulla)			
13.	12001	<i>Ptilotus gaudichaudii</i> var. <i>parviflorus</i>			
14.	2731	<i>Ptilotus helipteroides</i> (Hairy Mulla Mulla)			
15.	2747	<i>Ptilotus obovatus</i> (Cotton Bush)			
16.	2757	<i>Ptilotus schwartzii</i>			

Anatidae

17.	24316	<i>Anas superciliosa</i> (Pacific Black Duck)			
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Apiaceae

18.	6218	<i>Daucus glochidiatus</i> (Australian Carrot)			
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Apocynaceae

19.	12949	<i>Marsdenia australis</i>			
20.	16538	<i>Marsdenia graniticola</i>			
21.	6599	<i>Rhyncharhena linearis</i> (Bush Bean)			

Araliaceae

22.	6268	<i>Trachymene cyanopetala</i>			
23.	6279	<i>Trachymene ornata</i> (Spongefruit)			

Artamidae

24.	25566	<i>Artamus cinereus</i> (Black-faced Woodswallow)			
25.	24356	<i>Artamus personatus</i> (Masked Woodswallow)			

Asparagaceae

26.	1266	<i>Arthropodium dyeri</i>			
27.	1346	<i>Thysanotus pyramidalis</i>			
28.	1352	<i>Thysanotus speckii</i>			

Asteraceae

29.	7817	<i>Actinobole uliginosum</i> (Flannel Cudweed)			
30.	7872	<i>Brachyscome ciliocarpa</i>			
31.	7903	<i>Calotis hispidula</i> (Bindy Eye)			
32.	7922	<i>Cephalopterum drummondii</i> (Pompom Head)			
33.	7933	<i>Chthonocephalus pseudevax</i> (Woolly Groundheads)			
34.	12721	<i>Dielitzia tysonii</i>			
35.	7988	<i>Gnephosis arachnoidea</i> (Cobwebby-headed Gnephosis)			
36.	8045	<i>Helipterum craspedioides</i> (Yellow Billy Buttons)			
37.	8086	<i>Hypochaeris glabra</i> (Smooth Catsear)	Y		
38.	8087	<i>Isoetopsis graminifolia</i> (Cushion Grass)			
39.	13284	<i>Lawrencella rosea</i>			
40.	12628	<i>Lemooria burkittii</i>			
41.	12734	<i>Olearia humilis</i>			
42.	8172	<i>Podolepis canescens</i>			
43.	8173	<i>Podolepis capillaris</i> (Wiry Podolepis)			
44.	8177	<i>Podolepis lessonii</i>			
45.	13238	<i>Rhodanthe maryonii</i>			
46.	8253	<i>Triptilodiscus pygmaeus</i>			

Boraginaceae

47.	6723	<i>Omphalolappula concava</i> (Burr Stickseed)			
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Brassicaceae

48.	3033	<i>Lepidium oxytrichum</i>			
49.	3074	<i>Stenopetalum anfractum</i>			

Campephagidae

50.	24361	<i>Coracina maxima</i> (Ground Cuckoo-shrike)			
51.	25568	<i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
52.	24367	<i>Lalage tricolor</i> (White-winged Triller)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Caprimulgidae				
53.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
Carphodactylidae				
54.	24971 <i>Nephurus vertebralis</i>			
Celastraceae				
55.	4734 <i>Stackhousia muricata</i>			
Charadriidae				
56.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
Chenopodiaceae				
57.	2476 <i>Atriplex semilunaris</i> (Annual Saltbush)			
58.	33597 <i>Dysphania melanocarpa</i> forma <i>melanocarpa</i> (Black Goosefoot)			
59.	2538 <i>Maireana carnosus</i> (Cottony Bluebush)			
60.	2556 <i>Maireana planifolia</i> (Low Bluebush)			
61.	2566 <i>Maireana thesioides</i> (Lax Bluebush)			
62.	2568 <i>Maireana trichoptera</i> (Downy Bluebush)			
63.	2582 <i>Rhagodia eremaea</i> (Thorny Saltbush)			
64.	18599 <i>Salsola tragus</i>			
65.	2607 <i>Sclerolaena densiflora</i>			
66.	2611 <i>Sclerolaena eriantha</i> (Tall Bindii)			
67.	8877 <i>Sclerolaena gardneri</i>			
Cinclosomatidae				
68.	25580 <i>Cinclosoma castaneothorax</i> (Chestnut-breasted Quail-thrush)			
Colchicaceae				
69.	31272 <i>Wurmbea</i> sp. Paynes Find (C.J. French 1237)			
Columbidae				
70.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
71.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
Convolvulaceae				
72.	6663 <i>Cuscuta epithymum</i> (Lesser Dodder)	Y		
73.	31274 <i>Duperreya commixta</i>			
Corvidae				
74.	24416 <i>Corvus bennetti</i> (Little Crow)			
75.	25592 <i>Corvus coronoides</i> (Australian Raven)			
Cracticidae				
76.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
77.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
Crassulaceae				
78.	3137 <i>Crassula colorata</i> (Dense Stonecrop)			
79.	11709 <i>Crassula colorata</i> var. <i>acuminata</i>			
Dicruridae				
80.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
81.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
Diplodactylidae				
82.	24976 <i>Oedura marmorata</i> (Marbled Velvet Gecko)			
Droseraceae				
83.	14298 <i>Drosera macrantha</i> subsp. <i>macrantha</i>			
Elapidae				
84.	25263 <i>Pseudonaja modesta</i> (Ringed Brown Snake)			
Euphorbiaceae				
85.	4620 <i>Euphorbia boophthona</i> (Gascoyne Spurge)			
86.	12097 <i>Euphorbia tannensis</i> subsp. <i>eremophila</i> (Desert Spurge)			
Fabaceae				
87.	3248 <i>Acacia burkittii</i> (Sandhill Wattle)			
88.	3273 <i>Acacia craspedocarpa</i> (Hop Mulga)			
89.	3321 <i>Acacia eremaea</i>			
90.	3330 <i>Acacia exocarpoides</i>			
91.	36781 <i>Acacia fuscaneura</i>			
92.	3355 <i>Acacia grasbyi</i> (Miniritchie)			
93.	32117 <i>Acacia incognita</i>			
94.	3419 <i>Acacia ligulata</i> (Umbrella Bush)			
95.	19499 <i>Acacia ramulosa</i> var. <i>ramulosa</i>			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
96.	13078	<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>			
97.	14615	<i>Acacia speckii</i>		P4	
98.	14147	<i>Acacia subsessilis</i>		P3	
99.	3577	<i>Acacia tetragonophylla</i> (Kurara)			
100.	3586	<i>Acacia tysonii</i>			
101.	3587	<i>Acacia ulicina</i>			
102.	31071	<i>Acacia umbraculiformis</i>			
103.	12279	<i>Senna artemisioides</i> subsp. <i>helmsii</i>			
104.	12283	<i>Senna artemisioides</i> subsp. <i>x sturtii</i>			
105.	18444	<i>Senna charlesiana</i>			
106.	12305	<i>Senna glutinosa</i> subsp. <i>chatelainiana</i>			
107.	14579	<i>Senna</i> sp. <i>Austin</i> (A. Strid 20210)			
108.	14577	<i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26)			

Falconidae

109.	25621	<i>Falco berigora</i> (Brown Falcon)			
110.	25622	<i>Falco cenchroides</i> (Australian Kestrel)			

Geraniaceae

111.	4335	<i>Erodium cygnorum</i> (Blue Heronsbill)			
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Goodeniaceae

112.	7495	<i>Goodenia berardiana</i>			
113.	7531	<i>Goodenia occidentalis</i>			
114.	7644	<i>Scaevola spinescens</i> (Currant Bush)			
115.	7656	<i>Velleia cynopotamica</i>			
116.	7661	<i>Velleia hispida</i> (Hispid Velleia)			
117.	7664	<i>Velleia rosea</i> (Pink Velleia)			

Hemerocallidaceae

118.	11636	<i>Dianella revoluta</i> var. <i>divaricata</i>			
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Hirundinidae

119.	24491	<i>Hirundo neoxena</i> (Welcome Swallow)			
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Lamiaceae

120.	6827	<i>Spartothamnella teucriflora</i>			
121.	6936	<i>Teucrium racemosum</i> (Grey Germander)			

Loranthaceae

122.	2372	<i>Amyema fitzgeraldii</i> (Pincushion Mistletoe)			
123.	2396	<i>Lysiana casuarinae</i>			

Maluridae

124.	25651	<i>Malurus lamberti</i> (Variegated Fairy-wren)			
125.	25654	<i>Malurus splendens</i> (Splendid Fairy-wren)			

Malvaceae

126.	4889	<i>Abutilon cryptopetalum</i>			
127.	4902	<i>Abutilon oxycarpum</i> (Flannel Weed)			
128.	4999	<i>Brachychiton gregorii</i> (Desert Kurrajong)			
129.	4970	<i>Sida calyxhymenia</i> (Tall Sida)			
130.	31759	<i>Sida ectogama</i>			
131.	31857	<i>Sida</i> sp. <i>Golden calyces glabrous</i> (H.N. Foote 32)			
132.	19712	<i>Sida</i> sp. <i>dark green fruits</i> (S. van Leeuwen 2260)			

Meliphagidae

133.	24559	<i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
134.	24564	<i>Certhionyx variegatus</i> (Pied Honeyeater)			
135.	24570	<i>Epthianura tricolor</i> (Crimson Chat)			
136.	24581	<i>Lichenostomus virescens</i> (Singing Honeyeater)			
137.	24583	<i>Manorina flavigula</i> (Yellow-throated Miner)			

Myrtaceae

138.	6003	<i>Micromyrtus sulphurea</i>			
139.	6054	<i>Thryptomene decussata</i>			

Neosittidae

140.	25673	<i>Daphoenositta chrysoptera</i> (Varied Sittella)			
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Pachycephalidae

141.	25675	<i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
142.	25680	<i>Pachycephala rufiventris</i> (Rufous Whistler)			

Petroicidae

143.	24659	<i>Petroica goodenovii</i> (Red-capped Robin)			
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Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Plantaginaceae				
144.	7299 <i>Plantago debilis</i>			
145.	12487 <i>Stemodia florulenta</i>			
Poaceae				
146.	207 <i>Aristida contorta</i> (Bunched Kerosene Grass)			
147.	17237 <i>Austrostipa elegantissima</i>			
148.	17246 <i>Austrostipa nitida</i>			
149.	17251 <i>Austrostipa scabra</i>			
150.	17255 <i>Austrostipa trichophylla</i>			
151.	279 <i>Cymbopogon ambiguus</i> (Scentgrass)			
152.	357 <i>Enneapogon caeruleus</i> (Limestone Grass)			
153.	378 <i>Eragrostis dielsii</i> (Mallee Lovegrass)			
154.	16485 <i>Eriachne pulchella</i> subsp. <i>dominii</i>			
155.	490 <i>Monachather paradoxus</i>			
156.	11151 <i>Rostraria pumila</i>	Y		
157.	674 <i>Thyridolepis mitchelliana</i> (Mulga Grass)			
Podicipedidae				
158.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe)			
Polygalaceae				
159.	4555 <i>Comesperma integerrimum</i>			
Polygonaceae				
160.	2409 <i>Emex australis</i> (Doublegee)	Y		
Pomatostomidae				
161.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
162.	25706 <i>Pomatostomus temporalis</i> (Grey-crowned Babbler)			
Portulacaceae				
163.	30397 <i>Calandrinia crispisepala</i>			
164.	2853 <i>Calandrinia eremaea</i> (Twining Purslane)			
165.	31132 <i>Calandrinia</i> sp. <i>Truncate capsules</i> (A. Markey & S. Dillon 3474)			
166.	2884 <i>Portulaca oleracea</i> (Purslane)	Y		
Proteaceae				
167.	1986 <i>Grevillea deflexa</i>			
168.	13430 <i>Grevillea hakeoides</i> subsp. <i>stenophylla</i>			
169.	15981 <i>Grevillea obliquistigma</i> subsp. <i>obliquistigma</i>			
170.	2196 <i>Hakea preissii</i> (Needle Tree)			
171.	17556 <i>Hakea recurva</i> subsp. <i>arida</i>			
172.	17557 <i>Hakea recurva</i> subsp. <i>recurva</i>			
Psittacidae				
173.	24736 <i>Melopsittacus undulatus</i> (Budgerigar)			
Pteridaceae				
174.	12796 <i>Cheilanthes adiantoides</i>			
175.	32 <i>Cheilanthes brownii</i>			
176.	12818 <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>			
Rutaceae				
177.	18537 <i>Philotheca brucei</i> subsp. <i>brucei</i>			
178.	18508 <i>Philotheca sericea</i>			
Santalaceae				
179.	10977 <i>Exocarpos aphyllus</i> (Leafless Ballart)			
180.	2359 <i>Santalum spicatum</i> (Sandalwood)			
Sapindaceae				
181.	31881 <i>Dodonaea amplisemina</i>		P4	
182.	4779 <i>Dodonaea rigida</i>			
Scrophulariaceae				
183.	7205 <i>Eremophila exilifolia</i>			
184.	7208 <i>Eremophila forrestii</i> (Wilcox Bush)			
185.	15052 <i>Eremophila forrestii</i> subsp. <i>forrestii</i>			
186.	16696 <i>Eremophila fraseri</i> subsp. <i>fraseri</i>			
187.	29532 <i>Eremophila galeata</i>			
188.	7211 <i>Eremophila georgei</i>			
189.	17576 <i>Eremophila latrobei</i> subsp. <i>latrobei</i>			
190.	17168 <i>Eremophila oldfieldii</i> subsp. <i>oldfieldii</i>			
191.	18570 <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			
192.	15058 <i>Eremophila platycalyx</i> subsp. <i>platycalyx</i>			
193.	7257 <i>Eremophila punicea</i> (Crimson Eremophila)			

Name	ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Solanaceae					
194.	11734	<i>Nicotiana rosulata</i> subsp. <i>rosulata</i>			
195.	7006	<i>Solanum ellipticum</i> (Potato Bush)			
196.	7018	<i>Solanum lasiophyllum</i> (Flannel Bush)			
197.	7023	<i>Solanum nummularium</i> (Money-leaved Solanum)			
Sylviidae					
198.	24833	<i>Cincloramphus cruralis</i> (Brown Songlark)			
199.	24834	<i>Cincloramphus mathewsi</i> (Rufous Songlark)			
Thymelaeaceae					
200.	5245	<i>Pimelea forrestiana</i>			
Zygophyllaceae					
201.	4389	<i>Zygophyllum eremaeum</i>			

Conservation Codes

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

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



Appendix D

Flora

Significant Flora Likelihood of Occurrence Assessment
Project Area Flora Species List



Table 11 Definitions for Significant Flora Likelihood of Occurrence Assessment

Likelihood of occurrence	Definition
Known	Species definitely recorded within the Project Area either from previous records or field survey results.
Likely	Species previously recorded within 10 km and suitable habitat occurs at the Project Area.
Possible	Species previously recorded within 10 km with marginally suitable habitat occurring at the Project Area. OR Species not previously recorded within 10 km, but suitable habitat occurs at the Project Area.
Unlikely	Species previously recorded within 10 km but suitable habitat does not occur at the Project Area.
Highly Unlikely	Species not previously recorded within 10 km, suitable habitat does not occur at the Project Area and/or Project Area is outside the natural distribution of the species.

Table 12 Significant Flora Likelihood of Occurrence Assessment (information from *FloraBase*)

Family	Name	Status	Description (after <i>FloraBase</i>)	Habitat Requirements	Record	Likelihood of Occurrence
Aizoaceae	<i>Gunnionsia rubra</i>	P3	Prostrate annual, herb, 0.01-0.03 m high. Fl. green, Sep	Sandy loam.	DEC/ <i>NatureMap</i>	Possible
Asteraceae	<i>Rhodanthe collina</i>	P1	Erect, bushy annual, herb, 0.1-0.25 m high. Fl. white & yellow, Aug to Oct.	Rocky hills.	DEC	Possible
Celastraceae	<i>Psammomoya implexa</i>	P3	Large, spreading, much-branched shrub, to 1 m high. Fl. white, Aug to Oct.	Stony rises.	DEC	Possible



Family	Name	Status	Description (after FloraBase)	Habitat Requirements	Record	Likelihood of Occurrence
Fabaceae	<i>Acacia speckii</i>	P4	Bushy, rounded shrub or tree, 1.5-3 m high.	Rocky soils over granite, basalt or dolerite. Rocky hills or rises.	DEC/ <i>NatureMap</i>	Likely
Fabaceae	<i>Acacia subsessilis</i>	P3	Rounded, straggly, pungent shrub, 1-2 m high. Flowers yellow, Jul to Aug.	Red sand or stony gravel over ironstone. Rocky hills.	DEC/ <i>NatureMap</i>	Likely
Fabaceae	<i>Labichea obrullata</i>	P1	Shrub, leaves 3-foliolate, lateral leaflets mostly very broadly obrullate. Flowers Oct.		DEC	Unlikely. Only known from Gabyon Station, west of Yalgoo
Goodeniaceae	<i>Goodenia berringbinensis</i>	P4	Ascending annual, herb, 0.1-0.3 m high. Flowers yellow, Oct.	Red sandy loam. Along watercourses.	DEC	Unlikely
Goodeniaceae	<i>Goodenia neogoodenia</i>	P4	Prostrate annual, herb, flowers minute. Flowers brown/brown & yellow, Aug to Sep.	Red loam or clay. Near water.	DEC	Unlikely
Juncaginaceae	<i>Triglochin protuberans</i>	P3	Annual, herb, 0.03-0.13 m high.	Red loam, grey mud over clay. Winter-wet sites, claypans, near salt lakes, margins of pools.	DEC	Highly Unlikely
Myrtaceae	<i>Micromyrtus trudgenii</i>	P3	Erect, open shrub, 1-2 m high.	Red-brown loamy clay, yellow-brown soils, gravel, siltstone, quartz, basalt, banded ironstone, dolerite. Tops and slopes of hills and ridges.	DEC	Possible



Family	Name	Status	Description (after <i>FloraBase</i>)	Habitat Requirements	Record	Likelihood of Occurrence
Myrtaceae	<i>Verticordia jamiesonii</i>	P3	Shrub, 0.2-0.6 m high. Flowers white/pink, Sep to Oct.	Lateritic breakaways.	DEC	Possible
Rhamnaceae	<i>Polianthion collinum</i>	P3	Rounded shrub, to 1.25 m high. Flowers white-cream, May to Jul	Red clay loam between blocks of banded ironstone. Low hills and slopes	DEC	Unlikely
Sapindaceae	<i>Dodonaea amplisemina</i>	P4	Dioecious, multi-stemmed shrub, 0.3-1 m high.	Red-brown sandy clay on basalt and gabbro and banded ironstone or on dolerite and quartzite. Rocky hills.	<i>NatureMap</i>	Possible



Table 13 Flora Species List Recorded in the Project Area

Family	Genus	Species	Common Name	Status	Q1	Q2	Q3	Q4	Q5	R1	Incidentals
Aizoaceae	<i>Cleretum</i>	<i>papulosum</i> subsp. <i>papulosum</i>			x			x			
?Asparagaceae	? <i>Arthropodium</i>	<i>dyeri</i>		*				x	x		
Amaranthaceae	<i>Ptilotus</i>	<i>exaltatus</i>	Tall Mulla Mulla					x		x	
Amaranthaceae	<i>Ptilotus</i>	<i>obovatus</i>	Cotton Bush			x				x	
Amaranthaceae	<i>Ptilotus</i>	<i>schwartzii</i>							x		
Amaranthaceae	<i>Ptilotus</i>	sp. (insufficient material)				x					
Asteraceae	<i>Actinobole</i>	<i>uliginosum</i>	Cobwebby-headed Gnephosis								x
Asteraceae	? <i>Gnephosis</i>	<i>arachnoidea</i>	Flannel Cudweed						x		
Asteraceae	<i>Gnephosis</i>	sp. (insufficient material)			x			x	x		
Asteraceae	<i>Lemooria</i>	<i>burkittii</i>				x		x			
Asteraceae	<i>Olearia</i>	<i>humilis</i>							x		
Asteraceae	<i>Podolepis</i>	<i>capillaris</i>	Wiry Podolepis								x
Asteraceae		sp. (insufficient material)			x	x			x		
Boryaceae	<i>Borya</i>	<i>sphaerocephala</i>	Pincushions								x
Chenopodiaceae	<i>Atriplex</i>	sp. (insufficient material)						x			
Chenopodiaceae	<i>Dysphania</i>	<i>rhadinostachya</i>									x
Chenopodiaceae	<i>Enchylaena</i>	<i>tomentosa</i>	Barrier Saltbush								x
Chenopodiaceae	<i>Maireana</i>	<i>carcosa</i>	Cottony Bluebush			x		x		x	
Chenopodiaceae	<i>Maireana</i>	<i>pyramidata</i>	Sago Bush								x
Chenopodiaceae	<i>Maireana</i>	sp. (insufficient material)						x		x	
Chenopodiaceae	<i>Maireana</i>	<i>thesioides</i>	Lax Bluebush			x		x			



Family	Genus	Species	Common Name	Status	Q1	Q2	Q3	Q4	Q5	R1	Incidentals
Chenopodiaceae	<i>Maireana</i>	<i>trichoptera</i>	Downy Bluebush					x			
Chenopodiaceae	<i>Maireana</i>	<i>triptera</i>	Threewinged Bluebush								x
Chenopodiaceae	<i>Maireana</i>	<i>planifolia</i>	Low Bluebush								x
Chenopodiaceae	<i>Rhagodia</i>	<i>eremaea</i>	Thorny Saltbush								x
Chenopodiaceae	<i>Salsola</i>	sp. (insufficient material)								x	
Convolvulaceae	<i>Duperreya</i>	<i>?sericea</i>									x
Crassulaceae	<i>Crassula</i>	<i>colorata</i>	Dense Stonecrop					x			
Crassulaceae	<i>Crassula</i>	sp. (insufficient material)			x	x					
Fabaceae	<i>Acacia</i>	<i>acuminata</i>	Jam								x
Fabaceae	<i>Acacia</i>	<i>aulacophylla</i>			x					x	
Fabaceae	<i>Acacia</i>	<i>burkittii</i>	Sandhill Wattle			x					
Fabaceae	<i>Acacia</i>	<i>caesaneura x incurvaneura</i>				x					
Fabaceae	<i>Acacia</i>	<i>eremaea</i>									x
Fabaceae	<i>Acacia</i>	<i>exocarpoides</i>							x		
Fabaceae	<i>Acacia</i>	<i>grasbyi</i>	Miniritchie								x
Fabaceae	<i>Acacia</i>	<i>cf. hopperiana</i>						x	x		
Fabaceae	<i>Acacia</i>	<i>incurvaneura</i>					x				
Fabaceae	<i>Acacia</i>	<i>mulganeura</i>	Hop Mulga								x
Fabaceae	<i>Acacia</i>	<i>ramulosa var. ramulosa</i>	Horse Mulga		x	x		x	x	x	
Fabaceae	<i>Acacia</i>	<i>sclerosperma</i>	Limestone Wattle								x
Fabaceae	<i>Acacia</i>	sp. (insufficient material)				x					
Fabaceae	<i>Acacia</i>	<i>subsessilis</i>		P3							x



Family	Genus	Species	Common Name	Status	Q1	Q2	Q3	Q4	Q5	R1	Incidentals
Fabaceae	<i>Acacia</i>	<i>tetragonophylla</i>	Kurara			x		x		x	
Fabaceae	<i>Acacia</i>	<i>umbraculiformis</i>			x					x	
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>filifolia</i>									x
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>helmsii</i>								x	
Fabaceae	<i>Senna</i>	sp. Austin (A. Strid 20210)						x		x	
Fabaceae	<i>Senna</i>	sp. Meekatharra (E. Bailey 1-26)								x	
Goodeniaceae	<i>Goodenia</i>	sp. (insufficient material)			x	x					
Goodeniaceae	<i>Scaevola</i>	<i>spinescens</i>	Currant Bush								x
Hemerocallidaceae	<i>Dianella</i>	<i>revoluta</i>	Blueberry Lily								x
Lamiaceae	<i>Hemigenia</i>	sp. Yalgoo (A.M. Ashby 2624)									x
Lamiaceae	<i>Prostanthera</i>	sp. (insufficient material)									x
Malvaceae	<i>Abutilon</i>	<i>oxycarpum</i>	Flannel Weed								x
Malvaceae	<i>Brachychiton</i>	<i>gregorii</i>	Desert Kurrajong							x	
Malvaceae	<i>Sida</i>	<i>?ectogama</i>			x	x		x	x		
Myrtaceae	<i>Melaleuca</i>	<i>uncinata</i>	Broom Bush								x
Myrtaceae		sp. (insufficient material)									x
Myrtaceae	<i>Thryptomene</i>	<i>decussata</i>			x		x		x		
Pittosporaceae	<i>Pittosporum</i>	<i>angustifolium</i>									x
Poaceae	<i>Aristida</i>	<i>contorta</i>	Bunched Kerosene Grass		x	x	x	x	x	x	
Poaceae	<i>Aristida</i>	<i>?holathera</i>				x					
Poaceae	<i>Austrostipa</i>	<i>elegantissima</i>						x			
Poaceae	<i>Enneapogon</i>	sp. (insufficient material)									x



Family	Genus	Species	Common Name	Status	Q1	Q2	Q3	Q4	Q5	R1	Incidentals
Poaceae	<i>Eragrostis</i>	<i>dielsii</i>	Mallee Lovegrass			x		x			
Poaceae	<i>Eriachne</i>	<i>?helmsii</i>	Buck Wanderrie Grass		x	x			x		
Poaceae	<i>Eriachne</i>	<i>pulchella</i>	Pretty Wanderrie		x		x				
Poaceae	<i>Pentameris</i>	<i>airoides</i>	False Hairgrass	*		x		x			
Portulacaceae	<i>Calandrinia</i>	<i>eremaea</i>	Twining Purslane					x			
Proteaceae	<i>Grevillea</i>	<i>hakeoides</i> subsp. <i>stenophylla</i>									x
Proteaceae	<i>Grevillea</i>	<i>obliquistigma</i> subsp. <i>obliquistigma</i>									x
Proteaceae	<i>Hakea</i>	<i>preissii</i>	Needle Tree					x			
Proteaceae	<i>Hakea</i>	<i>recurva</i>	Djarnokmurd						x		
Rubiaceae	<i>Psydrax</i>	<i>latifolia</i>									x
Rubiaceae	<i>Psydrax</i>	<i>suaveolens</i>									x
Rutaceae	<i>Philothea</i>	<i>brucei</i>									x
Santalaceae	<i>Exocarpos</i>	<i>aphyllus</i>	Leafless Ballart					x			
Santalaceae	<i>Santalum</i>	<i>spicatum</i>	Sandalwood								x
Sapindaceae	<i>Alectryon</i>	<i>oleifolius</i>									x
Scrophulariaceae	<i>Eremophila</i>	<i>exilifolia</i>				x	x			x	
Scrophulariaceae	<i>Eremophila</i>	<i>forrestii</i>	Wilcox Bush							x	
Scrophulariaceae	<i>Eremophila</i>	<i>forrestii</i> subsp. <i>forrestii</i>			x						
Scrophulariaceae	<i>Eremophila</i>	<i>galeata</i>				x				x	
Scrophulariaceae	<i>Eremophila</i>	<i>georgei</i>				x		x	x		
Scrophulariaceae	<i>Eremophila</i>	<i>latrobei</i> subsp. <i>latrobei</i>	Warty Fuchsia Bush		x	x	x		x		
Scrophulariaceae	<i>Eremophila</i>	<i>longifolia</i>	Berrigan								x



Family	Genus	Species	Common Name	Status	Q1	Q2	Q3	Q4	Q5	R1	Incidentals
Scrophulariaceae	<i>Eremophila</i>	<i>oldfieldii</i> subsp. <i>oldfieldii</i>						x			
Scrophulariaceae	<i>Eremophila</i>	<i>oppositifolia</i>						x			
Scrophulariaceae	<i>Eremophila</i>	<i>oppositifolia</i> subsp. <i>angustifolia</i>									x
Scrophulariaceae	<i>Eremophila</i>	sp. (insufficient material)									x
Solanaceae	<i>Nicotiana</i>	sp. (insufficient material)									x
Solanaceae	<i>Solanum</i>	<i>ellipticum</i>	Potato Bush			x					
Solanaceae	<i>Solanum</i>	<i>lasiophyllum</i>	Flannel Bush			x				x	
Solanaceae	<i>Solanum</i>	<i>orbiculatum</i>	Wild Tomato		x						

Legend

* Introduced species

Q quadrat

R releve

P Priority



Appendix E

Fauna

Project Area Fauna Species List



Table 14 Project Area Fauna List from Database Searches and List of Recorded Fauna

Type	Family	Genus	Species	Common Name	Status	Source		
						EPBC Search	NatureMap	Field Survey
birds	Acanthizidae	<i>Acanthiza</i>	<i>chrysorrhoa</i>	Yellow-rumped Thornbill			x	
birds	Acanthizidae	<i>Acanthiza</i>	<i>uropygialis</i>	Chestnut-rumped Thornbill			x	
birds	Acanthizidae	<i>Acanthiza</i>	<i>apicalis</i>	Broad-tailed Thornbill			x	
birds	Acanthizidae	<i>Acanthiza</i>	<i>iredalei</i> subsp. <i>iredalei</i>	Slender-billed Thornbill	Vu (EPBC Act);	x		
birds	Acanthizidae	<i>Aphelocephala</i>	<i>leucopsis</i>	Southern Whiteface			x	
birds	Acanthizidae	<i>Pyrrholaemus</i>	<i>brunneus</i>	Redthroat			x	
birds	Accipitridae	<i>Aquila</i>	<i>audax</i>	Wedge-tailed Eagle				x
birds	Anatidae	<i>Anas</i>	<i>superciliosa</i>	Pacific Black Duck			x	
birds	Artamidae	<i>Artamus</i>	<i>cinereus</i>	Black-faced Woodswallow			x	
birds	Artamidae	<i>Artamus</i>	<i>personatus</i>	Masked Woodswallow			x	
birds	Artamidae	<i>Artamus</i>	<i>sp.</i>	Woodswallow				x
birds	Campephagidae	<i>Coracina</i>	<i>maxima</i>	Ground Cuckoo-shrike			x	
birds	Campephagidae	<i>Coracina</i>	<i>novaehollandiae</i>	Black-faced Cuckoo-shrike	Ma (EPBC Act)		x	
birds	Campephagidae	<i>Lalage</i>	<i>tricolor</i>	White-winged Triller			x	
birds	Caprimulgidae	<i>Eurostopodus</i>	<i>argus</i>	Spotted Nightjar	Ma (EPBC Act)		x	x
birds	Casuariidae	<i>Dromaius</i>	<i>novaehollandiae</i>	Emu				x
birds	Charadriidae	<i>Vanellus</i>	<i>tricolor</i>	Banded Lapwing			x	
birds	Cinclosomatidae	<i>Cinclosoma</i>	<i>castaneothorax</i>	Chestnut-breasted Quail-thrush			x	
birds	Columbidae	<i>Ocyphaps</i>	<i>lophotes</i>	Crested Pigeon			x	x



Type	Family	Genus	Species	Common Name	Status	Source		
						EPBC Search	NatureMap	Field Survey
birds	Columbidae	<i>Phaps</i>	<i>chalcoptera</i>	Common Bronzewing			x	
birds	Corvidae	<i>Corvus</i>	<i>bennetti</i>	Little Crow			x	
birds	Corvidae	<i>Corvus</i>	<i>coronoides</i>	Australian Raven			x	
birds	Corvidae	<i>Corvus</i>	<i>orru</i>	Torresian Crow				x
birds	Cracticidae	<i>Cracticus</i>	<i>tibicen</i>	Australian Magpie			x	
birds	Cracticidae	<i>Cracticus</i>	<i>torquatus</i>	Grey Butcherbird			x	
birds	Dicruridae	<i>Grallina</i>	<i>cyanoleuca</i>	Magpie-lark			x	
birds	Dicruridae	<i>Rhipidura</i>	<i>leucophrys</i>	Willie Wagtail			x	x
birds	Estrildidae	<i>Taeniopygia</i>	<i>guttata</i>	Zebra Finch				x
birds	Falconidae	<i>Falco</i>	<i>berigora</i>	Brown Falcon			x	
birds	Falconidae	<i>Falco</i>	<i>cenchroides</i>	Australian Kestrel	Ma (EPBC Act)		x	x
birds	Hirundinidae	<i>Hirundo</i>	<i>neoxena</i>	Welcome Swallow			x	
birds	Maluridae	<i>Malurus</i>	<i>lamerti</i>	Variegated Fairy-wren			x	
birds	Maluridae	<i>Malurus</i>	<i>splendens</i>	Splendid Fairy-wren			x	
birds	Maluridae	<i>Malurus</i>	sp.	Fairy-wren				x
birds	Meliphagidae	<i>Acanthagenys</i>	<i>rufogularis</i>	Spiny-cheeked Honeyeater			x	
birds	Meliphagidae	<i>Certhionyx</i>	<i>variegatus</i>	Pied Honeyeater			x	
birds	Meliphagidae	<i>Epthianura</i>	<i>tricolor</i>	Crimson Chat			x	
birds	Meliphagidae	<i>Lichenostomus</i>	<i>virescens</i>	Singing Honeyeater			x	
birds	Meliphagidae	<i>Manorina</i>	<i>flavigula</i>	Yellow-throated Miner			x	
birds	Neosittidae	<i>Daphoenositta</i>	<i>chrysoptera</i>	Varied Sitella			x	



Type	Family	Genus	Species	Common Name	Status	Source		
						EPBC Search	NatureMap	Field Survey
birds	Pachycephalidae	<i>Colluricincla</i>	<i>harmonica</i>	Grey Shrike-thrush			x	
birds	Pachycephalidae	<i>Pachycephala</i>	<i>rufiventris</i>	Rufous Whistler			x	
birds	Petroicidae	<i>Petroica</i>	<i>goodenovii</i>	Red-capped Robin			x	x
birds	Podicipedidae	<i>Tachybaptus</i>	<i>novaehollandiae</i>	Australasian Grebe			x	
birds	Pomatostomidae	<i>Pomatostomus</i>	<i>superciliosus</i>	White-browed Babbler			x	x
birds	Pomatostomidae	<i>Pomatostomus</i>	<i>temporalis</i>	Grey-crowned Babbler			x	
birds	Psittacidae	<i>Melopsittacus</i>	<i>undulatus</i>	Budgerigar			x	
birds	Sylviidae	<i>Cincloramphus</i>	<i>cruralis</i>	Brown Songlark			x	
birds	Sylviidae	<i>Cincloramphus</i>	<i>mathewsi</i>	Rufous Songlark			x	
birds	Apodidae	<i>Apus</i>	<i>pacificus</i>	Fork-tailed Swift	Mi, Ma (EPBC Act); S3 (WC Act)	x		
birds	Ardeidae	<i>Ardea</i>	<i>alba</i>	Great Egret, White Egret	Mi, Ma (EPBC Act); S3 (WC Act)	x		
birds	Ardeidae	<i>Ardea</i>	<i>ibis</i>	Cattle Egret	Mi, Ma (EPBC Act); S3 (WC Act)	x		
birds	Megapodiidae	<i>Leipoa</i>	<i>ocellata</i>	Malleefowl	Vu, Mi (EPBC Act); S1 (WC Act)	x		
birds	Meropidae	<i>Merops</i>	<i>ornatus</i>	Rainbow Bee-eater	Mi, Ma (EPBC Act); S3 (WC Act)	x		
mammals	Bovidae	<i>Capra</i>	<i>hircus</i>	Goat	*	x		x
mammals	Cuidae	<i>Vulpes</i>	<i>vulpes</i>	Red Fox	*	x		
mammals	Felidae	<i>Felis</i>	<i>catus</i>	Feral Cat	*	x		
mammals	Leporidae	<i>Oryctolagus</i>	<i>cuniculus</i>	European Rabbit	*	x		x
mammals	Macropodidae	<i>Macropus</i>	<i>robustus</i> subsp. <i>erubescens</i>	Euro				x



Type	Family	Genus	Species	Common Name	Status	Source		
						EPBC Search	NatureMap	Field Survey
reptiles	Agamidae	<i>Ctenophorus</i>	<i>reticulatus</i>	Western Netted Dragon			x	
reptiles	Agamidae	<i>Ctenophorus</i>	<i>scutulatus</i>				x	
reptiles	Carphodactylidae	<i>Nephrurus</i>	<i>vertebralis</i>				x	
reptiles	Diplodactylidae	<i>Oedura</i>	<i>marmorata</i>	Marbled Velvet Gecko			x	
reptiles	Elapidae	<i>Pseudonaja</i>	<i>modesta</i>	Ringed Brown Snake			x	
reptiles	Varanidae	<i>Varanus</i>	<i>panoptes</i> subsp. <i>rubidus</i>	Yellow Spotted Monitor				x

Abbreviations:

Mi	Migratory
Ma	Marine
Vu	Vulnerable (Table 6)
S1/S3	Schedule 1/Schedule 3 (Table 9)
P4	Priority 4 (



Table 10)

*	Introduced Species
EPBC Search	EPBC Act Protected Matters Search Tool (DSEWPaC, 2012; PMST_CGQJFT)
<i>EPBC search and NatureMap search used 10 km buffer</i>	



Appendix F

Assessment Against the Ten Clearing Principles



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

Methodology	Desktop Assessment of available information and field survey results
Survey Results	<p>Plant Species</p> <ul style="list-style-type: none"> Total Vascular Plant Taxa A total of 95 flora taxa from 24 families were recorded from the Project Area, representing a moderate level of diversity, with 2 weed species. Vascular plant taxa diversity in the Project Area is considered to be comparable to that found in the local area. Conservation Significant Flora No Threatened (Declared Rare) Flora taxa were recorded from the Project Area. Priority and Significant Flora One Priority Three flora species, <i>Acacia subsessilis</i>, was recorded in the Project Area at one location. This location can be avoided. <p>Fauna Species</p> <ul style="list-style-type: none"> Total Fauna Taxa The reconnaissance fauna survey recorded 12 bird species, one reptile and three mammal species. <p>Ecosystem Diversity</p> <ul style="list-style-type: none"> Vegetation types in the Project Area are also present in the local and regional area. Variety of Soil Types/Geological Formations Soil types or geological formations in the Project Area are also present in the local and regional area.
Assessment	Considered to be “not at variance” with clearing principle.



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

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Significant Fauna</p> <ul style="list-style-type: none"> Threatened Fauna The desktop assessment indicated that threatened fauna may potentially utilise the Project Area. Significant Habitat for threatened fauna was not recorded within the Project Area. No Threatened Fauna taxa were recorded from the Project Area. Priority Fauna No DEC- listed Priority Fauna was recorded from the Project Area. Other Significant Fauna The desktop assessment indicated that significant fauna may occur in the Project Area. A number of EPBC Act Marine and/or Migratory Listed Species were recorded from the Project Area. These species are considered common in Western Australia and are not under threat. <p>Habitat</p> <ul style="list-style-type: none"> Significant Habitat/Habitats of Significance No habitat deemed to be significant occurs in the Project Area. Habitat in the Project Area also occurs in the local area in similar or better condition. Habitat Extent and Retention Habitats recorded in the Project Area are also found in the local area in similar or better condition. The proposed Project will not significantly diminish the extent of these habitats. Ecological Corridors The habitat in the Project Area occurs in a region with relatively disturbed ecological corridors. Existing corridors are not considered to be significantly modified by the proposed project.
Assessment	Considered to be “not at variance” with clearing principle.



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

Methodology	Desktop assessment of available information and field survey results
Survey Results	Rare Flora <ul style="list-style-type: none"> ▸ No Threatened (Declared Rare) Flora taxa were recorded in the Project Area during the field survey. The Project Area is not considered to support habitat for Threatened Flora.
Assessment	Considered to be “not at variance” with clearing principle.

- (d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Methodology	Desktop assessment of available information and field survey results
Survey Results	Vegetation <ul style="list-style-type: none"> ▸ There are no known TECs within the vicinity of the Project Area. A number of PECs are known to occur within the general area and the Project Area is within the buffer of two PECs. ▸ No Environmentally Sensitive Areas occur within or immediately adjacent to the Project Area.
Assessment	Considered to be at “not at variance” with this clearing principle.

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

Methodology	Desktop assessment of available information and field survey results
Survey Results	Vegetation <ul style="list-style-type: none"> ▸ Extent and Status Vegetation within the Project Area is considered to be of <i>Least Concern</i> with greater than 90% of its pre-European extent remaining. ▸ Regionally Significant Areas No regionally significant areas are known to occur within the vicinity of the Project Area.
Assessment	Considered to be “not at variance” with clearing principle.



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

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Watercourses and Wetlands</p> <ul style="list-style-type: none"> ▶ Vegetation No permanent wetlands or watercourses were identified during the field survey; however, a number of ephemeral drainage lines crossed the Project Area. None of the ephemeral creeklines contain riparian vegetation ▶ Groundwater Dependent Ecosystems No groundwater dependent ecosystems occur within or adjacent to the Project Area.
Assessment	Considered to be “not at variance” with clearing principle.

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

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Land Degradation</p> <ul style="list-style-type: none"> ▶ Soil Erosion Alteration to the existing soil erosion regime is considered to be negligible. Potential adverse impacts should be able to be mitigated through the implementation of appropriate management measures. ▶ Soil Acidity Databases searched indicated that the Project Area occurs in an area that has “<i>Extremely Low Probability</i>” of ASS occurring, but with a “<i>Very Low Confidence</i>” level of the accuracy of this statement due to the lack of surveys in the area. ▶ Salinity The clearing of vegetation is not considered to significantly alter the hydrological balance and cause a change in the salinity as the Project.
Assessment	Considered to be “not at variance” with clearing 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.

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Conservation Areas</p> <p>There are no Conservation Areas within the vicinity of the Project Area.</p> <ul style="list-style-type: none"> ▸ Fragmentation <p>The project is not considered likely to significantly increase the fragmentation of the existing remnant vegetation.</p> <ul style="list-style-type: none"> ▸ Ecological Linkages <p>Ecological linkages are not considered to be impacted by the proposed works.</p>
Assessment	Considered to be “not at variance” with clearing 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.

Methodology	Desktop assessment of available information and field survey results
Survey Results	<p>Water Quality</p> <ul style="list-style-type: none"> ▸ Catchment Areas <p>There is a Public Drinking Water Source Area to the west of the Project Area, but this Project is not expected to impact on this area.</p> <ul style="list-style-type: none"> ▸ Groundwater <p>The clearing of vegetation is not considered to cause an alteration to the quality of groundwater in or adjacent to the Project Area.</p> <p>No groundwater dependent ecosystems occur in or adjacent to the Project Area.</p> <ul style="list-style-type: none"> ▸ Surface water <p>The clearing is not considered to cause an alteration to the quality of surface in or adjacent to the Project Area.</p> <p>Incorporation of engineering controls should be included in the design of the proposed alignment option to mitigate impacts on the quality and flow of surface or underground water.</p>
Assessment	Considered to be “not at variance” with clearing principle.



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

Methodology	Desktop assessment of available information and field survey results
Survey Results	Water Quantity <ul style="list-style-type: none">▸ Flooding <p>The clearing of native vegetation is not expected to cause, or exacerbate the incidence or intensity of flooding.</p> <p>Appropriate drainage design should mitigate potential impacts.</p>
Assessment	Considered to be “not at variance” with clearing principle.



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