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# **Main Roads Western Australia**

**Shire Pit 9**

**Preliminary Environmental  
Impact Assessment**

**December 2010**



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## Executive Summary

Main Roads Western Australia (Main Roads) Great Southern Region has been requested by the Department of Premier and Cabinet to undertake significant improvement works to the roads within and adjoining the Fitzgerald River National Park. This proposal is to be undertaken in conjunction with the Department of Environment and Conservation and the Shire of Jerramungup.

The proposal, known as 'Swamp Road Upgrade', forms a stage of the Bremer Bay to Point Ann road upgrade project and comprises of widening and sealing the existing unsealed road from the start of Swamp Road near Bremer Bay to the Fitzgerald River National Park boundary. Three gravel pits will be required as part of the works. Shire Pit 9 is the subject of this Preliminary Environmental Impact Assessment (PEIA). Shire Pit 9 is located on the southern side of Devils Creek Road approximately 300 m south of the intersection of Devils Creek Road and Collets Road and has an approximate area of 6.65 ha.

Shire Pit 9 is to be developed in two stages as shown in Figure 2. 2.43 ha of the pit is located within road reserve and this will be developed as Stage 1. A further 4.22 ha is located on vacant crown land and is subject to the Native Title Act 1993 and will be developed as Stage 2. 1.37 ha along the eastern edge of Stage 2 development has not been surveyed or reported on in this PEIA. Further survey and reporting is required before Stage 2 development can commence.

GHD was commissioned by Main Roads to undertake a PEIA for Shire Pit 9 to assess the environmental impacts of the use of this pit for the upgrade. The PEIA included an environmental risk assessment, identification of the environmental constraints and issues associated with the proposed works and determination of any environmental approvals required before works begin. The more significant outcomes of this PEIA are:

- ▶ No Declared Rare Flora species as listed by the DEC (2010a) or species of national conservation significance listed under the EPBC Act were recorded from the Study Area. One P2 Priority Flora species *Hibbertia acrotichion* was identified as occurring within the Shire Pit 9 survey area.
- ▶ Site vegetation consisted of three vegetation types
  - Vegetation Type 1: *Eucalyptus falcata*  
Open Tree Mallee of *E. falcata* and *E. incrassata* over Tall Shrubs of *Lambertia inermis* over Open Low Heath dominated by *Banksia pteridifolia* with mixed Proteaceae, Fabaceae and Myrtaceae species over an Open Sedgeland with *Harperia lateriflora*, *Harperia confertospicata* and *Mesomelaena stygia*.
  - Vegetation Type 2: Dque  
Open Mallee of *Eucalyptus buprestium* and *Eucalyptus pleurocarpa* over Tall Shrubs dominated by *Banksia heliantha*, *Banksia falcata*, *Lambertia inermis* over Open Low Heath of mixed Proteaceae, Myrtaceae and Fabaceae species over a Very Open Sedgeland with *Mesomelaena stygia*, *Schoenus brevicultmis*, *Caustis dioica*, *Lepidosperma* sp. Dunns Swamp (R Davis 724) and *Desmocladius castaneus*.
  - Vegetation Type 3: Dcir  
Very Open Tree Mallee of *Eucalyptus falcata*, *Eucalyptus pleurocarpa* and *Eucalyptus buprestium* over Heath dominated by *Banksia cirsiodes* heath with mixed Proteaceae,





Myrtaceae and Fabaceae species over Open Sedgeland with *Harperia lateriflora*, *Harperia confertospicata* and *Mesomelaena stygia* and mixed herbs.

- ▶ The bushland condition of Gravel Pit 9 was considered to be Excellent (2) with no weeds within the pit area.
- ▶ The project is unlikely to impact any protected fauna species.
- ▶ Noise and dust emissions will require management as per Environmental Protection Regulations (Government of Western Australia, 2004).
- ▶ There are no Threatened Ecological Communities or Environmentally Sensitive Areas located within the study area.
- ▶ No indigenous artefacts were found or ethnographic sites identified within the pit site.
- ▶ The section of the Pit located on vacant crown land is subject to the Native Title Act 1993. Negotiations should be conducted with The South West Aboriginal Land and Sea Council.
- ▶ The proposal is not at variance with any of the "Ten Clearing Principles" for clearing native vegetation. Clearing can therefore take place under Main Roads Statewide Purpose Clearing Permit CPS818/5.



# 1. Introduction

## 1.1 Background

Main Roads Western Australia (Main Roads) Great Southern Region has been requested by the Department of Premier and Cabinet to undertake significant improvement works to the roads within and adjoining the Fitzgerald River National Park. This proposal is to be undertaken in conjunction with the Department of Environment and Conservation (DEC) and the Shire of Jerramungup. The work forms part of an economic boost for the Shire of Ravensthorpe after the closure of the BHP Billiton Ravensthorpe Nickel Mine. It is intended to provide improved access to the Fitzgerald River National Park for tourists and also to reduce the risk of spreading *Phytophthora* disease by sealing the road.

The proposal, known as 'Swamp Road Upgrade', forms a stage of the Bremer Bay to Point Ann road upgrade project and comprises of widening and sealing the existing unsealed road from the start of Swamp Road near Bremer Bay to the Fitzgerald River National Park boundary. The roadworks will be conducted by the Shire of Jerramungup. Three gravel pits will be required as part of the upgrade works. Shire Pit 9 is one of the identified pits and is the subject of this Preliminary Environmental Impact Assessment (PEIA).

Shire Pit 9 is 6.65 ha in total and will be developed in two stages as shown in Figure 2. Stage 1 consists of 2.43 ha and is located within road reserve. Stage 2 is 4.22 ha and is positioned on vacant crown land and is subject to the Native Title Act 1993. Along the east section of the Stage 2 development there is an area of the pit (1.37 ha) that has not been surveyed or reported. This land has been identified as a contingency and is not covered in this PEIA. Further survey and reporting would be required prior to development of this section.

GHD was commissioned by Main Roads to undertake a PEIA for the gravel pits to be used for the upgrade works to assess any potential environmental impacts. The PEIA includes an environmental risk assessment, identification of the environmental constraints and issues associated with the proposed works and determination of any environmental approvals required before works begin.

## 1.2 Study Area

This report relates to the surveyed section of Shire Pit 9, that is, all of Stage 1 and 2.85 ha of Stage 2. Shire Pit 9 is located on the southern side of Devils Creek Road approximately 300 m south of the intersection of Devils Creek Road and Collets Road (Figure 1). Shire Pit 9 is 6.65 ha in total; however, this report only relates to the 5.28 ha which has been surveyed and does not cover the 1.37 ha along the eastern edge of the pit (Figure 2). Further survey and reporting is required before Stage 2 development can commence.

## 1.3 Scope

The preparation of this PEIA included:

- ▶ A search of the Department of Environment and Conservation (DEC) *Threatened Flora Database's Declared Rare and Priority Flora List*;
- ▶ A search of the DEC *Threatened Ecological Communities* (TECs) database;
- ▶ A search of the DEC *Threatened Fauna* database;



- A search of the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) *Protected Matters* Search Tool;
- Assessment against the “Ten Clearing Principles”;
- A review of the Department of Agriculture Western Australia’s (DAFWA) *Natural Resource Management Information* Tool;
- An Aboriginal Heritage Survey of the site, including both an ethnographic and archaeological survey; and
- A site visit during October and November 2010 by a GHD Environmental Scientist, which included:
  - An assessment of vegetation type and condition as well as opportunistic flora and fauna observations.
  - Notes of any additional significant impacts.

This PEIA addresses the following aspects related to the proposed gravel pit planning and development:

- Land use;
- Groundwater;
- Surface water (including wetlands);
- Public drinking water source areas;
- Environmentally Sensitive Areas;
- Acid sulfate soils;
- Contaminated sites;
- Vegetation and flora;
- Threatened Ecological Communities;
- Fauna;
- European Australian heritage;
- Indigenous heritage;
- Visual amenity; and
- Noise and dust.

The following aspects are not considered relevant to the operations of Shire Pit 9:

- Air quality; and
- Salinity

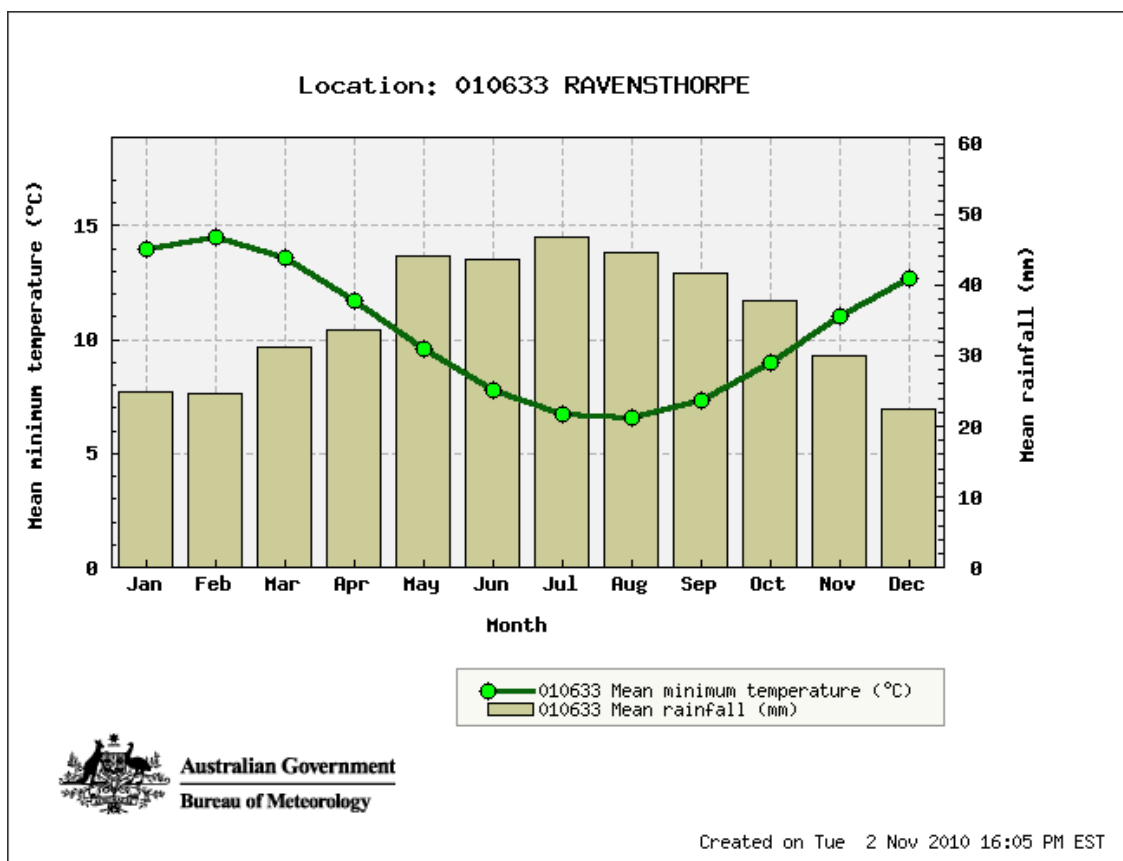
## 2. Existing Environment

The following section describes the existing environment of Shire Pit 9. Possible social and environmental constraints that may have some influence on the project, and recommendations are provided in Section 4.

### 2.1 Climate

The Project Area is located in the Esperance Plains region of Western Australia. The nearest climate data to the Project Area was sourced from the Ravensthorpe Meteorology weather station.

The Esperance Plains area has a warm Mediterranean climate with winter rains averaging 500 mm to 700 mm per annum and 5-6 dry months per annum. The area experiences a wide range of temperatures, as indicated by the mean annual maximum and minimum temperature range. During the three months prior to the field investigation 114 mm of rainfall was received in Ravensthorpe. The average long term rainfall for the corresponding three month period is 133 mm. The average monthly rainfall and temperature and monthly rainfall Ravensthorpe is shown in (Plate 1).



**Plate 1 Average monthly rainfall and minimum temperatures for Ravensthorpe (Source: Australian Government, Bureau of Meteorology, 2010)**



## **2.2 Topography and Geology**

Shire Pit 9 is located within the Yilgarn geological region. The Australian Soil Resource Information System (ASRIS, 2010) describes the landforms of this region as '*Sand plains; low hills and ridges; breakaways; salt lakes; dune fields*'.

The Department of Agriculture and Food, WA (DAFWA) NRM information tool describes the soil system of Shire Pit 9 as the Jonacoonack System. This system is described as '*Deeply incised valleys with breakaways, cliffs and wide valley floors on colluvium and alluvium over Tertiary sediments in the Fitzgerald River National Park between Bremer Bay and Hopetoun. Soils are highly variable ranging from duplexes to loams, clays and earths. Wet soils, calcareous soils and deep sands*' (DAFWA, 2010).

## **2.3 Land Use**

The northwest section of Shire Pit 9 is located within Devils Creek Road reserve. The remaining southern half and the eastern edge of the pit is located within vacant crown land. The section within the road reserve will be developed as Stage 1 and the section on vacant crown land will be developed as Stage 2.

## **2.4 Hydrogeology and Hydrology**

### **2.4.1 Groundwater**

Shire Pit 9 is not located within any groundwater areas that are protected under the *Rights in Water and Irrigation (RiWI) Act 1914* according to the Department of Water (DoW) Groundwater Proclamation Areas.

### **2.4.2 Surface Water**

Shire Pit 9 is located within the Gairdner River surface water allocation sub-area. This area is not managed under the *RiWI Act 1914*.

Wetlands of International Significance are listed under the Ramsar Convention which is an International treaty that covers the conservation of internationally important wetlands. The EPBC Protected Matters Search Tool indicated that there are no Ramsar listed sites located within the study area.

Gairdner River is located approximately 1 km to the west of Shire Pit 9 and flows from the north-west to the south-east discharging into Gordon Inlet.

## **2.5 Public Drinking Water Source Areas**

The DoW, Geographic Data Atlas identified no Public Drinking Water Source Areas (PDWSA) located within Shire Pit 9.

## **2.6 Environmentally Sensitive Areas**

The DEC's online Native Vegetation Viewer was searched to determine if any Environmentally Sensitive Areas (ESAs) are located within Shire Pit 9. The search found that there were no ESAs located within the gravel pit area; however an ESA is located approximately 150 m to the west of the pit. The Fitzgerald River National Park, which is classified as an ESA, is located approximately 1.5 km to the east of the gravel pit.



## 2.7 Acid Sulfate Soils

A review of the Australian Soil Resource Information System (ASRIS, 2010) indicates that Shire Pit 9 has a 'low probability of ASS occurring with very low confidence'.

## 2.8 Contaminated Sites

A search of the online DEC Contaminated Sites Database shows that Shire Pit 9 does not contain any registered contaminated sites. During the site visit no activities that are likely to result in contamination were observed.

## 2.9 Vegetation and Flora

### 2.9.1 Vegetation – Regional Context

Shire Pit 9 is situated within the Esperance Interim Biogeographic Regionalisation of Australia (IBRA) region, sub-region Fitzgerald. The Esperance bioregion is characterised by myrtaceous and proteaceous scrub and mallee heaths on sandplain, overlying Eocene sediments; rich in endemics. Herbfields and heaths occur on abrupt granite tors and quartzite ranges that rise from the plain. Eucalypt woodlands occur in gullies and alluvial foot-slopes.

Vegetation within Western Australia has been surveyed, mapped and described by Beard (1979). The broad scale vegetation association of the Study Area is described as Scrub – heath and mallee – heath on sandplain with tallerack (*Eucalyptus tetragona*) as characteristic species (Beard 1979).

### 2.9.2 Vegetation Extent and Status

A vegetation type is considered underrepresented 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, where:

- |                             |   |
|-----------------------------|---|
| – <i>Presumed Extinct</i> : | Probably no longer present in the bioregion   |
| – <i>Endangered*</i> :      | <10% of pre-European extent remains   |
| – <i>Vulnerable*</i> :      | 10-30% of pre-European extent exists  |
| – <i>Depleted*</i> :        | >30% and up to 50% of pre-European extent exists  |
| – <i>Least Concern</i> :    | >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



The native vegetation type represented in the survey area; its regional extent and reservation status are drawn from Shepherd, *et al.* (2002), and Shepherd pers. comm. (2005) (refer Table 1).

**Table 1 Vegetation extent and status**

Vegetation Association Number	Association Description	Pre-European Extent (ha)	Current Extent (ha) in Fitzgerald IBRA sub-region	% Remaining	% Current Extent in Conservation Reserves
47	Shrublands; tallerack mallee-heath	1033061	269230	35.6	48.4

The extent of Vegetation Association 47, is considered of *Depleted*.

### 2.9.3 Vegetation and Condition

The vegetation of the Shire Pit 9 is represented by three vegetation units which are described as:

#### Vegetation Type 1: *Eucalyptus falcata*

Open Tree Mallee of *E. falcata* and *E. incrassata* over Tall Shrubs of *Lambertia inermis* over Open Low Heath dominated by *Banksia pteridifolia* with mixed Proteaceae, Fabaceae and Myrtaceae species over an Open Sedgeland with *Harperia lateriflora*, *Harperia confertospicata* and *Mesomelaena stygia*.

#### Vegetation Type 2: Dque

Open Mallee of *Eucalyptus buprestium* and *Eucalyptus pleurocarpa* over Tall Shrubs dominated by *Banksia heliantha*, *Banksia falcata*, *Lambertia inermis* over Open Low Heath of mixed Proteaceae, Myrtaceae and Fabaceae species over a Very Open Sedgeland with *Mesomelaena stygia*, *Schoenus breviculmis*, *Caustis dioica*, *Lepidosperma* sp. Dunns Swamp (R Davis 724) and *Desmocladius castaneus*.

#### Vegetation Type 3: Dcir

Very Open Tree Mallee of *Eucalyptus falcata*, *Eucalyptus pleurocarpa* and *Eucalyptus buprestium* over Heath dominated by *Banksia cirsiodes* heath with mixed Proteaceae, Myrtaceae and Fabaceae species over Open Sedgeland with *Harperia lateriflora*, *Harperia confertospicata* and *Mesomelaena stygia* and mixed herbs.

The bushland condition of Shire Pit 9 was considered to be 'Excellent' (2) with no weeds within the pit area. Deaths and poor health of some proteaceous shrubs in the northern section of the site may indicate the presence of dieback. This was not confirmed.

### 2.9.4 Flora Species

A total of 115 plant taxa (including subspecies and varieties) representing 25 families and 65 plant genera were recorded in the survey area (Appendix B). This total is comprised of 115 native species and no introduced (exotic) species.

Dominant families recorded from the Study Area include:

- Proteaceae 32 taxa,
- Myrtaceae 18 taxa,



- ▶ Fabaceae 15 taxa, and
- ▶ Ericaceae 8 taxa.

### 2.9.5 Conservation Significant of Flora

No Declared Rare flora species as listed by the DEC (2010a) or species of national conservation significance listed under the EPBC Act were recorded from the Study Area. One P2 Priority Flora species *Hibbertia acrotichion* was identified as occurring within the Shire Pit 9 survey area. P2 flora species are poorly known taxa that are known from one or a few populations some of which are not under immediate threat.

### 2.9.6 Weeds

No weeds were noted in this gravel pit.

### 2.9.7 Clearing

The vegetation of Shire Pit 9 is regionally well represented and clearing for the pit development will not have a significant impact on this vegetation. Clearing impacts will be remediated in the longer term by rehabilitation and revegetation of the pit at the completion of materials extraction.

### 2.9.8 Plant Pathogens

Dieback surveys were undertaken by the DEC during December 2010. Preliminary advice provided to Main Roads by the DEC was that Shire Pit 9 is dieback free. However, hygiene management practices are recommended to prevent future risk of spreading the disease to the pit site.

## 2.10 Threatened Ecological Communities

No listed Threatened or Priority Ecological Communities were found during the field survey for the scope of this report (GHD 2010).

## 2.11 Fauna

### 2.11.1 Significant Fauna Species

Desktop assessments identified 18 conservation significant fauna species which have been previously recorded and/or may potentially occur in the vicinity (i.e. within 10km search radius) of Shire Pit 9.

Evidence of two significant fauna species was recorded from within Shire Pit 9 during the October 2010 survey. Species observations included:

- ▶ A disused Malleefowl (*Leipoa ocellata*) mound/nest that was recorded at Shire Pit 9. The mound appeared to not have been used for possibly over 100 years as it had a mature Mallee tree growing up through the mound. No evidence of more recent activity was observed. The Malleefowl is listed under the EPBC Act as both a Vulnerable and as a Migratory species. It is also listed as a threatened species under the WC Act; and
- ▶ A Western Whipbird (western mallee) (*Psophodes nigrogularis oregon*) was also recorded. Although not visually observed, the calls were distinctive. The Western Whipbird has been de-listed as a





threatened species by both State and Commonwealth governments though it still has Priority 4 status (taxa in need of monitoring) in WA.

A brief description of the habitat preference and the likelihood of occurrence of conservation significant fauna species occurring within Shire Pit 9 are examined in Table 2. However, some of these species once may have ranged throughout the area but may now be extinct or locally extinct. Other species maybe nomadic or have large home ranges and only opportunistically or infrequently utilise the pit area.

Although no feral species were recorded during the October 2010 survey, the following species may occur in the study area:

- ▶ Foxes
- ▶ Rabbits
- ▶ Cats
- ▶ Kookaburras
- ▶ Feral bees



**Table 2 Conservation significant fauna identified by desktop assessment as occurring or potentially occurring near Shire Pit 9**

Species	Status	Habitat Requirements	Likelihood of Occurrence	Source
<b>Birds</b>				
Australian Bustard ( <i>Ardeotis australis</i> )	Priority 4 (DEC)	The Bustard ranges over much of Australia and utilises habitats such as grasslands, Spinifex and arid scrub with bluebush and saltbush. Also open woodland of mulga, mallee and heath (Morcombe, 2004).	<b>Possible</b>  Habitat present. Although species is not common in the area.	<i>NatureMap</i>
Bush-stone Curlew ( <i>Burhinus grallarius</i> )	Priority 4 (DEC)	The Bush Stone Curlew is found in a variety of habitats, including: open woodland; dry watercourses with fallen branches and leaf litter; and, sand plains with Spinifex and mallee.	<b>Possible</b>  Habitat present. Although species is not common in the area.	<i>NatureMap</i>
Baudin's Cockatoo ( <i>Calyptorhynchus baudinii</i> )	Endangered (WC) Vulnerable (EPBC)	Baudin's Cockatoo, also known as the Long-billed Black-Cockatoo, is found in the south-west of Western Australia in the forest and woodlands of Jarrah ( <i>Eucalyptus marginata</i> ), Karri ( <i>E. diversicolor</i> ) and Marri ( <i>Corymbia calophylla</i> ). The primary food source of this cockatoo is the seeds of the Marri (Garnett and Crowley, 2000). This species has been impacted by the removal of large Marri throughout its range as this tree is its principal food source.	<b>Unlikely</b>  Cockatoo species may occasionally fly through the survey area. No feeding habitat was observed within the survey areas and there are no breeding opportunities. Impacts from clearing would be minimal.	<i>NatureMap</i>
Carnaby's Black Cockatoo ( <i>Calyptorhynchus latirostris</i> )	Endangered (WC) Endangered (EPBC)	Carnaby's Black Cockatoo, listed as Endangered under the EPBC Act and Endangered under the WC Act, is distributed across the south-west of Western Australia in uncleared or remnant areas of Eucalyptus Woodland and Shrubland or kwongan heath. Breeding usually occurs in the Wheatbelt region of Western Australia, with flocks moving to the higher rainfall coastal areas to forage after the breeding season. These Cockatoos feed on the seeds of a variety of native plants, including Allocasuarina, Banksia, Eucalyptus, Grevillea and Hakea, and some introduced plants. They will also feed on the nectar from flowers of a number of species, and on insect larvae.	<b>Unlikely</b>  Cockatoo species may occasionally fly through the survey area. Potential feeding habitat was observed within the survey areas. However, the available feeding habitat is a considerable distance from any potential breeding or nesting opportunities. Impacts from clearing would be minimal.	EPBC Search  <i>NatureMap</i>



Species	Status	Habitat Requirements	Likelihood of Occurrence	Source
Cattle Egret ( <i>Ardea ibis</i> )	Migratory wetlands / marine (EPBC)	The Cattle Egret is found over most of Australia except it is excluded from the central deserts and much of the semi arid areas of Western Australia. The preferred habitat is shallow open wetlands and margins, moist pastures of tall grass and mudflats (Morcombe, 2004).	<b>Unlikely</b>  Suitable habitat is not present.	EPBC Search
Great Egret ( <i>Ardea alba</i> )	Migratory wetlands / marine (EPBC)	The Great Egret is found over most of Australia except it is excluded from the central deserts of Western Australia. The preferred habitat is wetlands, flooded plains of crops, pasture, dams and roadside ditches, estuarine mudflats, mangrove and reef (Morcombe, 2004).	<b>Unlikely</b>  Suitable habitat is not present.	EPBC Search
Fork-tailed Swift ( <i>Apus pacificus</i> )	Migratory marine (EPBC)	The Fork-tailed Swift is a summer migrant that can be found over most of Australia. This species prefers high airspace over most habitat types and rarely utilizes land surface. (Morcombe, 2004).	<b>Likely</b>  This species is an aerial spp. therefore habitat is not necessary for the species to be present.	EPBC Search
Malleefowl ( <i>Leipoa ocellata</i> )	Threatened (WC) Vulnerable (EPBC) Migratory terrestrial (EPBC)	On the south coast of Western Australia, the Malleefowl generally occurs in semi-arid and arid habitats between the Nullarbor and Albany. Habitat consists of shrublands and low woodlands that are dominated by mallee vegetation (Pizzey <i>et al.</i> 2007).	<b>Possible</b>  Habitat present. Evidence of an old disused nest was recorded within Shire Pit 9. However, nest was no longer in use and did not appear to have been used for many years.	EPBC Search  <i>NatureMap</i>
Rainbow Bee-eater ( <i>Merops ornatus</i> )	Migratory terrestrial (EPBC)	The Rainbow bee-eater ranges over much of Australia with southern populations migrating to northern regions. The bee-eater prefers woodlands, open forest, semi-arid scrub, grasslands, farmland and clearings in dense forest areas (Morcombe, 2004).	<b>Likely</b>  Habitat present; Most suitable on plains.	EPBC Search
Western Bristlebird ( <i>Dasyornis longirostris</i> )	Vulnerable (WC) Vulnerable (EPBC)	The Western Bristlebird is found in a variety of heathland habitats including: dense, low closed coastal heaths; open heaths with dense stands of eucalypt thickets; and also tall swampy heaths (Pizzey <i>et al.</i> 2007).	<b>Possible</b>  Habitat present.	EPBC Search



Species	Status	Habitat Requirements	Likelihood of Occurrence	Source
Western Ground Parrot ( <i>Pezoporus wallicus flaviventris</i> )	Critically Endangered (WC) Endangered (EPBC) Migratory terrestrial (EPBC)	The Western Ground Parrot is very rare but has been previously recorded in low heath with open mallee vegetation communities and swamps in the Fitzgerald River National Park, South Western Australia.	<b>Unlikely</b>  Habitat present.	EPBC Search
Western Whipbird (western mallee) ( <i>Pseudocheirus occidentalis</i> )	Priority 4 (DEC) Delisted from Vulnerable (EPBC)	The Western Whipbird (western mallee) occurs on the South Coast of Western Australia and is usually observed in open mallee vegetation with a dense, tall shrub layer up to 1.5 m tall, and dominated by such species as Hakea, Lambertia, Dryandra or Banksia (Higgins & Peter 2002).	<b>Present</b>  Habitat present; individuals recorded during October 2010 survey.	Observed <i>in-situ</i> .
White-bellied Sea-Eagle ( <i>Haliaeetus leucogaster</i> )	Migratory terrestrial (EPBC)	The White-bellied Sea-Eagle is usually found in coastal habitats and/or areas that are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, the sea). Birds have been recorded in (or flying over) a variety of terrestrial habitats (Marchant & Higgins 1993).	<b>Unlikely</b>  This species may occasionally fly through the survey area. However, habitat is not suitable for nesting as there are no adjacent large waterbodies.	EPBC Search  <i>NatureMap</i>
<b>Mammals</b>				
Chuditch ( <i>Dasyurus geoffroyi</i> )	Vulnerable (WC) Vulnerable (EPBC)	The Chuditch currently occurs in sclerophyll forests and heath and mallee shrublands of the southwest region of Western Australia, and the southern Wheatbelt. The Chuditch occurs at low densities, even in quality habitats of coastal areas.	<b>Unlikely</b>  This habitat is not suitable for the long-term survival of the Chuditch.	EPBC Search
Dayang (Heath Rat) ( <i>Pseudomys shortridgei</i> )	Vulnerable (WC) Vulnerable (EPBC)	The heath mouse is known to occur in a variety of habitats. In Western Australia, it prefers mature stands of scrub mallee and mixed scrub with Banksia on loamy soils, unburnt for at least 30 years (Strahan 1995).	<b>Possible</b>  Habitat present in the northern portion of the survey area.	EPBC Search
Dibbler ( <i>Parantechinus apicalis</i> )	Endangered (WC) Endangered (EPBC)	Dibblers usually prefer dense long unburnt (i.e. >10 years) vegetation with a thick litter layer and sandy soils. They typically occur in heath and mallee vegetation communities along the South Coastal areas of Western Australia.	<b>Possible</b>  Habitat present in the northern portion of the survey area.	EPBC Search



Species	Status	Habitat Requirements	Likelihood of Occurrence	Source
Red-tailed Phascogale ( <i>Phascogale calura</i> )	Endangered (WC) Endangered (EPBC)	The Red-tailed Phascogale prefers vegetation that has remained unburnt for at least 20 years. Habitat typically consists of <i>Allocasuarina</i> woodlands with hollow-containing eucalypts (e.g. <i>Eucalyptus wandoo</i> ) and <i>Gastrolobium</i> spp. (Maxwell <i>et al.</i> 1996).	<b>Unlikely</b> Suitable habitat is not present.	EPBC Search
Western Brush Wallaby ( <i>Marcopus irma</i> )	Priority 4 (DEC)	The Western Brush Wallaby occurs throughout South Western Australia and is found in some areas of mallee and heath, however, is more commonly observed in open forests and woodlands with grassy areas and scrubby thickets (Cronin 2008).	<b>Likely</b> Not observed within Shire Pit 9, however, was observed in other similar nearby (i.e. within 5km) survey areas.	<i>NatureMap</i>



### 2.11.2 Fauna Species

A total of 10 birds, two mammals and one reptile species were recorded during the October 2010 survey within Shire Pit 9 (Appendix B). This 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 are likely to be recorded due to the spatial and temporal variations in fauna population numbers and the nature of this survey.

Of the species that were observed, only one reptile species (Dugite, *Pseudonaja a. affinis*) and one bird species (Western Whipbird, *Psophodes nigrogularis Oberon*) were not identified as part of the desktop assessment.

A breakdown of the fauna species previously recorded in the surrounding area (within a 10 km search area) and during the survey event for Shire Pit 9 is provided in Table 3 below.

**Table 3 Summary of fauna species diversity at Shire Pit 9**

Results	Number of Fauna Species				
	Mammals	Birds	Reptiles	Amphibians	Introduced
GHD October 2010 Survey	2	10	1	0	0
Chapman Biological Survey Site (1987)	NA	NA	NA	NA	NA
NatureMap (10km radius)	6	111	4	0	1
DEWHA (10km radius)	4	4	0	0	0

### 2.11.3 Fauna Summary

The habitat at Shire Pit 9 has high value for vertebrate fauna as evidenced by the presence of the Western Whipbird and former presence of Malleefowl. Malleefowl were no longer considered to be present in the study area and are therefore unlikely to be impacted by the proposal. Given the condition and extent of vegetation adjacent to Shire Pit 9, the Western Whipbird is also unlikely to be impacted upon by the proposed gravel extraction.

## 2.12 Heritage and Social Issues

### 2.12.1 European Australian Heritage

No European heritage sites within Shire Pit 9 were identified under the Commonwealth register (EPBC Protected Matters Search, 2010). A search of the Heritage Council of Western Australia did not identify any heritage sites within the pit area.

### 2.12.2 Indigenous Heritage

Ethnographic and archaeological surveys of 5.28 ha of the pit site were carried out by Brad Goode and Associates (Goode, 2010) and David Guilfoyle of Applied Archaeology Australia. These surveys also included a site visit and consultation with representatives of the Aboriginal Community. These representatives did not raise any objections or concerns regarding development of Shire Pit 9.



Surveys of Shire Pit 9 showed that the area is clear of any ethnographic site issues and no isolated artefacts were recorded (Goode, 2010, Guilfoyle, 2010).

Land tenure for part of this pit is vacant crown land. As a result, access to this section is subject to the Native Title Act 1993. Negotiations should be conducted with the South West Aboriginal Land and Sea Council.

### **2.13 Visual Amenity**

Shire Pit 9 is located adjacent to Devils Creek Road which is a local unsealed road, thus the works that are to be conducted will be clearly visible to any passing traffic. However, this impact will not be permanent and the pit area will be revegetated at the end of the project resulting in no change to the visual amenity in the long term.

### **2.14 Noise and Dust**

There are residential and commercial properties within 5 km of Shire Pit 9. These residents are unlikely to be impacted during construction and operation due to the distance between the properties and the pit. Works will be required to comply with the *State Environmental Protection Noise Regulations (1997)*.

As the works will be conducted close to Devils Creek Road, there may be an impact from dust on passing traffic as excessive dust generation could limit the visibility for passing motorists. Dust should be addressed by compliance with the Pit Management Plan prepared for the extraction site.



### 3. Assessment Against the Ten Clearing Principles

The clearing of any native vegetation is regulated by the DEC and requires a permit under Part V of the *Environmental Protection Act (1998)*. Main Roads has been issued with a Statewide Clearing Permit (CPS 818/5) which provides for clearing for roadworks to occur under certain conditions and prescribes specific management and offset requirements.

CPS 818/5 requires an assessment to clear native vegetation for roadworks against the “Ten Clearing Principles”. The clearing required for this project has been assessed against the “Ten Clearing Principles”, as can be seen in Table 4. The table shows that the project clearing is not at variance.

A map showing the area of vegetation to be cleared at Shire Pit 9 and also the vegetation type and condition is included in Figure 2.

**Table 4 Assessment Against the Ten Clearing Principles**

Principle Number	Principle	Assessment	Outcome
(a)	Native vegetation should not be cleared if it comprises a high level of biological diversity.	The study area is not considered to be of higher biodiversity than the surrounding area, and the proposed clearing is unlikely to have any significant impact on the biodiversity of the region. One P2 Priority Flora species <i>Hibbertia acrotichion</i> was identified as occurring within the Gravel Pit 3b survey area. P2 flora species are poorly known taxa that are known from one or a few populations some of which are not under immediate threat.	The proposal is unlikely to be at variance with the principle.
(b)	Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia.	No specific habitats are evident that were not present in the local area. Native vegetation on the site is already disturbed and degraded and unlikely to present significant native habitat.	The proposal is not at variance with the principle.
(c)	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of rare flora.	No Declared Rare Flora species were recorded from the study area.	The proposal is not at variance with the principle.
(d)	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for	No TECs were identified within the study area.	The proposal is not at variance with the principle.





Principle Number	Principle	Assessment	Outcome
	the maintenance of, a threatened ecological community.		
(e)	Native vegetation should not be cleared if it is significant as a remnant vegetation in an area that has been extensively cleared.	The native vegetation in this area is remnant and is largely undisturbed, however, the patch is not isolated and is within a larger patch of similar healthy vegetation.	The proposal is not at variance with the principle.
(f)	Native vegetation should not be cleared if it is growing in or in association with a watercourse or wetland.	There are no watercourses or wetlands within the study area. There is a minor drainage line which runs through Shire Pit 9.	The proposal is not at variance with the principle.
(g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The vegetation within this area is largely undisturbed and not degraded. However, clearing around the drainage line which runs through Shire Pit 9 may exacerbate gully erosion and result in some degradation of the land. In order to minimise potential for any erosion a Pit Management Plan will be prepared and applied.	The proposal is not at variance with the principle.
(h)	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The Fitzgerald River National Park is within 5 km of Shire Pit 9. All works will be undertaken in accordance with the relevant FRNP management plans. As a result, clearing of this area is not expected to impact on the environmental values of the Park.	The proposal is not at variance with the principle.
(i)	Native vegetation should not be cleared if the clearing is likely to cause deterioration in the quality of the surface or underground water.	The clearing of native vegetation is not considered likely to alter the quality of surface or ground waters within the project area.	The proposal is not at variance with the principle.
(j)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the intensity of flooding.	The clearing of vegetation is unlikely to cause or exacerbate flooding due to the small area of the site.	The proposal is not at variance with the principle.



## 4. Conclusion and Recommendations

The aim of this PEIA was to identify possible social and environmental constraints that may have some influence on the project as well as the environmental approvals that will be required before Gravel Pit 9 can be constructed. Notwithstanding any further EPA or Environmental Agency advice, GHD is of the view that provided the management measures herein are employed, the impacts of the development and operation of Shire Pit 9 will be limited to the pit area.

### 4.1 Recommendations

The following discussion and accompanying recommendations are presented to manage the social and environmental impacts in constructing and operating Shire Pit 9 adjacent to Devils Creek Road at Bremer Bay. These are also summarised in Table 5.

#### 4.1.1 Environmental Protection Authority

It is GHD's opinion that this project does not require referral to the EPA for further assessment. This is due to the very low and readily managed expected impact of the proposed works on native vegetation, protected flora and fauna and other natural resources. Should the scope and extent of the works be changed, Main Roads should review this recommendation.

#### 4.1.2 Waterways

The proposed Shire Pit 9 will not have any impact on waterways or wetlands.

#### 4.1.3 Acid Sulfate Soils

The risk of ASS being present in the study area is low. As a result, it is assumed there is no need for specific ASS management.

#### 4.1.4 Weed Management

No weeds were noted in Pit 9.

Vehicle hygiene practices to be implemented to minimise the potential spread of weeds to the site.

#### 4.1.5 Fauna

Schedule any vegetation clearing in late summer/autumn to minimise the risk of disturbing nesting birds.

All state native fauna are protected under the Western Australian *Wildlife Conservation Act 1950*, therefore any native fauna disturbed by site clearing should not be handled and be allowed to make its own way to adjacent vegetated areas. Should any fauna be injured, DEC should be contacted for advice.

#### 4.1.6 Dieback management

A Dieback survey has been undertaken for the site and the area has been found to be Dieback free. This data is valid for three years and must be rechecked if any work is to occur after one year of this survey.



Vehicle hygiene practices to be implemented to minimise the potential spread of dieback to the site.

#### **4.1.7 Indigenous Heritage**

No artefacts or significant ethnographic sites were found at Shire Pit 9. However, if material likely to be of interest to the Aboriginal community is uncovered during construction works they should immediately cease works within 50 m of the material and the DIA should be advised.

If skeletal material is uncovered during works then the WA Police Service is to be advised immediately.

#### **4.1.8 Noise and Dust**

Pit operation should be managed to comply with the *Environmental Protection (Noise) Regulations 1997*. The risk created by dust generation and its possible impact on traffic on Devils Creek Road or Collets Road should be managed, it is therefore recommended that dust management be incorporated into pit operations to minimise dust generation.

#### **4.1.9 Clearing of Native Vegetation**

An assessment against the "Ten Clearing Principles" found that the proposal is not at variance with any of the principles. It is therefore recommended that clearing is undertaken in accordance with Clearing Permit CPS 818/5 granted to the Commissioner of Main Roads under section 51E of the *Environmental Protection Act 1986*.



**Table 5 PEIA Recommendations**

<b>Constraint</b>	<b>Risk</b>	<b>Recommendation</b>
EPA Referral	Risk of environmental harm is minimal and manageable by compliance with a Pit Management Plan	Project does not require referral to EPA.  Decision to be reviewed if existing proposal is altered.
Waterways	No wetlands or significant waterways are present within the pit area.*	No action is required.
Acid Sulfate Soils	Low risk of ASS	No action is required.
Weed Management	Spread of weeds	Vehicle hygiene practices to be implemented to minimise the potential spread of weeds to the site.
Fauna	Potential	Site clearing occurs during summer/autumn period to minimise impact on nesting birds.
Dieback Management	Site is Dieback free	Vehicle hygiene practices to be implemented to minimise the potential spread of dieback to the site.
Indigenous Heritage	No Indigenous Heritage sites were identified within the pit area*	No action is required.
Visual amenity	Reduced visual amenity	Revegetation plan.
Noise and dust	Construction will generate noise and dust emissions	Noise complies with <i>Environmental Protection (Noise) Regulations 1997</i> .  Dust management will be incorporated into pit operations.*
Clearing of Native Vegetation	The proposal is not at variance with any of the "Ten Clearing Principles"	Clearing can be undertaken in accordance with Clearing Permit CPS 818/5.

\* Pit area refers to Pit 9 Stage 1 and 2.85 ha of Stage 2.



## 5. Limitations

This report presents the results of desktop data searches and site reconnaissance surveys. The site assessments were opportunistic. Complete biological assessments may take several seasons to complete and different times of the day. The conclusions of this report were based on the information gathered during these investigations and thus reflect the environment of the study area at the time of survey. GHD accepts no responsibility for any variation in the flora and fauna present at the site due to natural and seasonal variability.

The data and advice provided herein relate only to the study area described herein and must be reviewed by a competent scientist before being used for any other purpose. GHD accepts no responsibility for other use of the data or edits made to the report or any of its contents (as submitted) to the client without prior agreement with GHD.

Where reports, searches, any third party information and similar work have been performed and recorded by others the data is included and used in the form provided by others. The responsibility for the accuracy of such data remains with the issuing authority, not with GHD.



## 6. Consultation

### 6.1 Database Searches

A number of database search requests were completed over the study area by the DEC to gain information necessary to complete the PEIA. The results of these are noted within this report. The agencies contacted and the information provided / discussed included the following:

- ▶ DEC-Declared Rare and Priority Flora database search;
- ▶ DEC-WA Herbarium Specimens database search;
- ▶ DEC-Threatened and Priority Fauna database search;
- ▶ DEC-TEC database search;
- ▶ DEC-Contaminated sites database search;
- ▶ DoW-Public drinking water source search;
- ▶ A search of the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool; and
- ▶ A relevant literature and database review.



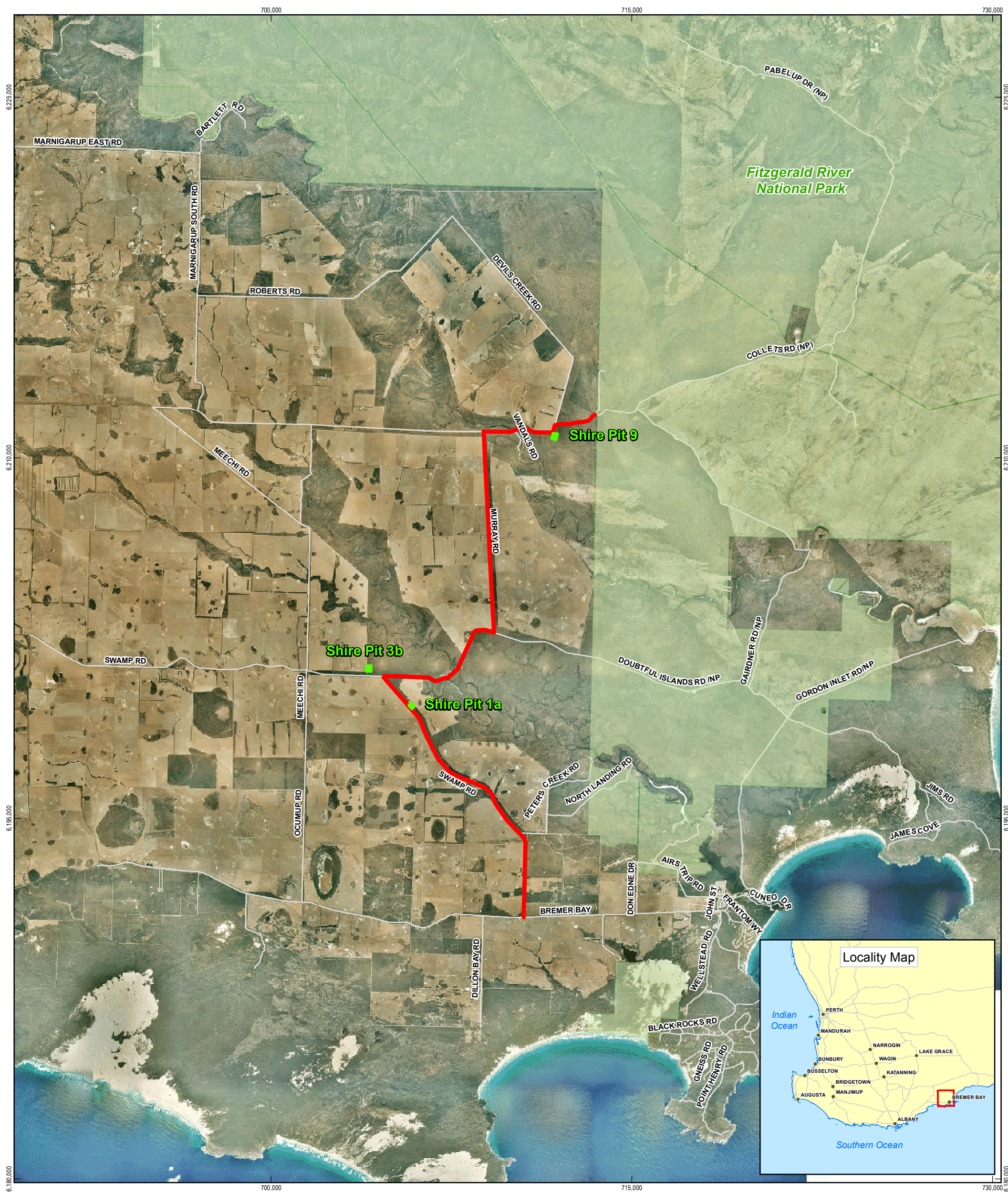
## 7. References

- ASRIS. (2010). Australian Soil Resource Information System, [Online], available from <http://spatial.agric.wa.gov.au/slip/>, accessed November 2010.
- Department of Agriculture and Food. WA (2010). NRM Info. [Online], available from: <http://spatial.agric.wa.gov.au/slip>. Accessed November 2010.
- Department of Environment and Conservation (2010a). Contaminated Sites database. [Online], available from: <https://secure.dec.wa.gov.au/idelve/css/>, accessed November 2010.
- Department of Environment and Conservation (2010b). Native Vegetation Map Viewer. . [Online], available from: <http://maps.dec.wa.gov.au/idelve/nv/index.jsp>, accessed ,November 2010.
- Department of Environment, Water, Heritage and the Arts (2010) *EPBC Protected Matters Search tool* [Online] available from: <http://www.environment.gov.au/erin/ert/epbc/>, accessed November 2010
- Department of Water (2010). Geographic Data Atlas [Online], available from <http://www.water.wa.gov.au/idelve/dowdataext/index.jsp>, accessed November 2010
- GHD (2010). Flora and Fauna Survey Report – Fitzgerald River National Park Road Upgrade. Unpublished Report. Prepared on Behalf of Main Roads Albany. October 2010.
- Goode, B (2010) Ethnographical survey of Swamp Road Shire Gravel Pits 1a, 3b and 9. Unpublished Report. Prepared on Behalf of Main Roads Albany.
- Government of Western Australia (2004). Environmental Protection Regulations. State Law Publisher. Perth, Western Australia.
- Guilfoyle, D. (2010) Archaeological survey of Swamp Road Shire Gravel Pits 1a, 3b and 9. Unpublished Report. Prepared on Behalf of Main Roads Albany.
- Landgate (2010). Landgate Map Viewer, [Online], available from <http://www.landgate.wa.gov.au/>. Accessed November 2010.



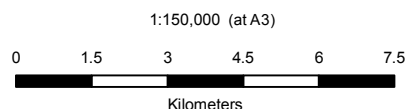
## Figures



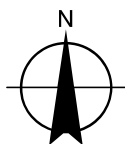


LEGEND

- Swamp Road Upgrade
- Shire Pits 1a, 3b & 9
- DEC Estates



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



Main Roads WA - ETS  
Fitzgerald River National Park  
– Permits and Approvals

Job Number 61-26414  
Revision 0  
Date 09 DEC 2010

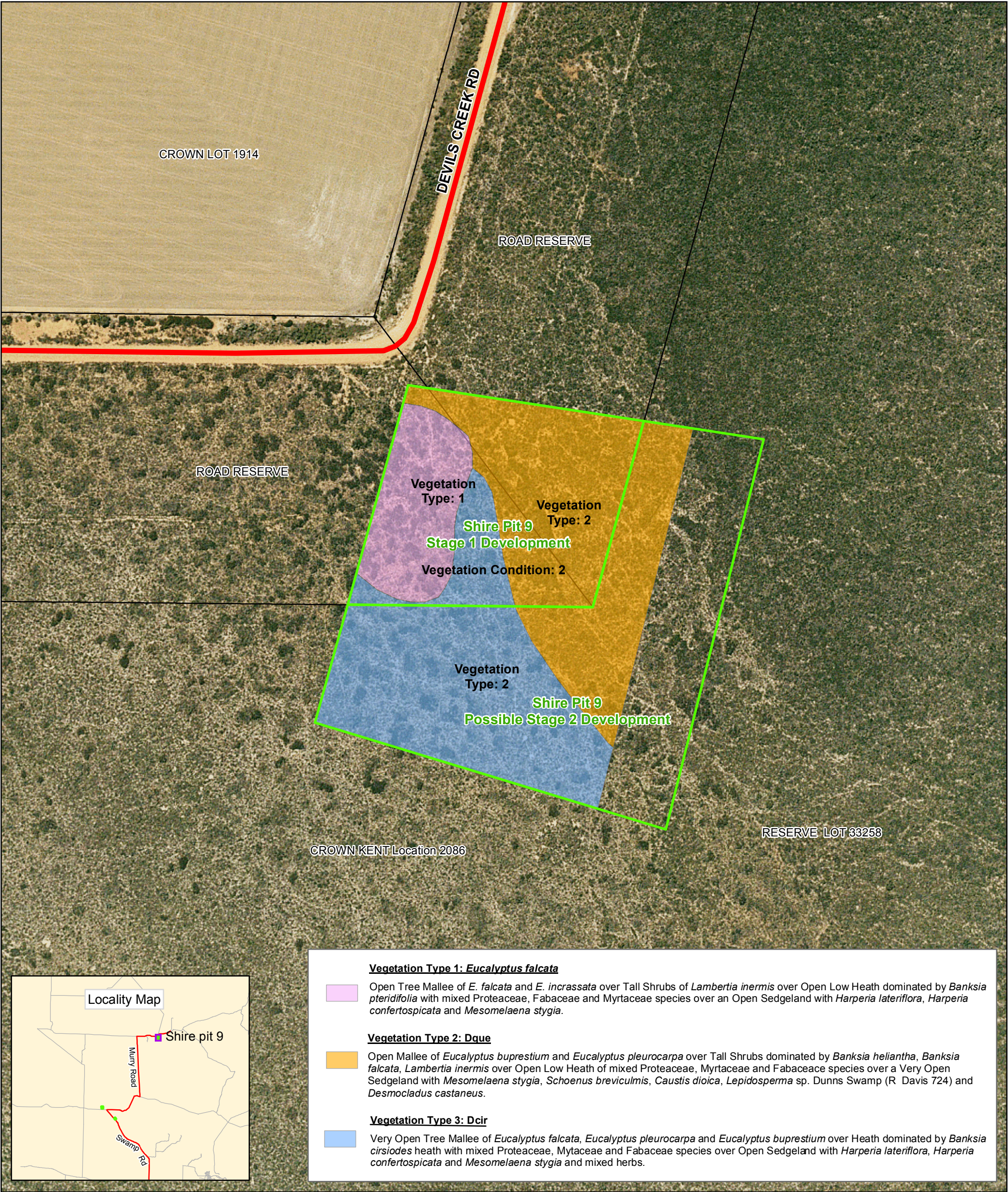
Locality Map

Figure 1

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239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au  
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Data Source: Landgate: Bermer and Extents 2729 2728 Feb 2008, Reserve - 201011; GHD: Swamp Road Upgrade, Shire Pits, 1a, 3b, 9 - 20101130. Commonwealth of Australia: NatMap Geodata Topo 250K Series3\_GA - 2006. Created by: jhchen





LEGEND

▲ (R) Declared Rare Flora - Extant Taxa

Swamp Road Upgrade

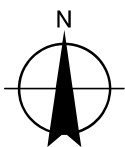
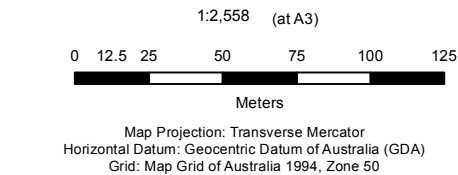
Shire Pits 9

Cadastral Boundary

The Bushland Condition: 2 - Excellent

Clearing Area Stage 1 = 2.43 ha

Clearing Area Stage 2 = 4.22 ha



Main Roads WA - ETS  
Fitzgerald River National Park  
– Permits and Approvals

Job Number 61-26414  
Revision 0  
Date 15 DEC 2010

Shire Pit 9 PEIA  
Proposed Clearing Area

Figure 2





## Appendix A

# Flora and Fauna Glossary.



## Conservation 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



## Conservation Codes and Descriptions for DEC Declared Rare and Priority Flora Species

Conservation Code	Description
R: Declared Rare Flora – Extant Taxa	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.
P1: Priority One – Poorly Known Taxa	Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P2: Priority Two – Poorly Known Taxa	Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P3: Priority Three – Poorly Known Taxa	Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.
P4: Priority Four – Taxa in need of monitoring	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.



#### Bush Forever (Government of WA, 2000) 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.



## **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:

- 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
- habitat utilised by a migratory species which is at the limit of the species range, or
- 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.

### ***The Commonwealth marine environment***

An action will require approval from the Environment Minister if:

- the action is taken in a Commonwealth marine area and the action has, will have, or is likely to have a significant effect on the environment, or





- ▶ the action is taken outside a Commonwealth marine area and the action has, will have, or is likely to have a significant effect on the environment in a Commonwealth marine area.

An action has, will have or is likely to have a significant impact on the environment in a Commonwealth marine area if it does, will, or is likely to:

- ▶ result in a known or potential pest species becoming established in the Commonwealth marine area\*, or
- ▶ modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results, or
- ▶ have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (eg breeding, feeding, migration behaviour, and life expectancy) and spatial distribution, or
- ▶ result in a substantial change in air quality\*\* or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity, social amenity or human health, or
- ▶ result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected.

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

\*\*The Commonwealth marine area includes any airspace over Commonwealth waters.



#### **Western Australian Threatened Fauna Categories**

<b>Category</b>	<b>Code</b>	<b>Description</b>
Schedule 1	S1	Fauna which is rare or likely to become extinct.
Schedule 2	S2	Fauna which is presumed extinct.
Schedule 3	S3	Birds which are subject to an agreement between the governments of Australia and Japan (JAMBA) relating to the protection of migratory birds and birds in danger of extinction.
Schedule 4	S4	Fauna that is otherwise in need of special protection.



#### DEC Priority Fauna Codes

Conservation Code	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 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.

(Species not listed under the *Wildlife Conservation Act 1950*, but for which there is some concern).



## Appendix B

# Site Visit Observations

Flora List

Fauna List



### Pit 9 observed Fauna List

Scientific Name	Common Name
<b>Birds</b>	
<i>Leipoa ocellata</i>	Malleefowl
<i>Smicrornis brevirostris</i>	Weebill
<i>Anthochaera carunculata</i>	Red Wattlebird
<i>Anthochaera lunulata</i>	Western Little Wattlebird
<i>Lichmera indistincta</i>	Brown Honeyeater
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater
<i>Phylidonyris melanops</i>	Tawny-crowned Honeyeater
<i>Psophodes nigrogularis oregon</i>	Western Whipbird (western mallee)
<i>Strepera versicolor</i>	Grey Currawong
<i>Zosterops lateralis</i>	Silvereye
<b>Mammals</b>	
<i>Tachyglossus aculeatus</i>	Echidna
<i>Macropus fuliginosus</i>	Western Grey Kangaroo
<b>Reptiles</b>	
<i>Pseudonaja a. affinis</i>	Dugite



**Flora occurring in Gravel Pit 9 survey area.**

Family	Species	Status	Releve 8	Releve 9	Opportunitistic
Anarthriaceae	<i>Anarthria humilis</i>				x
Asparagaceae	<i>Chamaexeros serra</i>			x	
Asparagaceae	<i>Laxmannia brachyphylla</i>		x		
Asparagaceae	<i>Lomandra mucronata</i>				x
Casuarinaceae	<i>Allocasuarina humilis</i>		x	x	
Casuarinaceae	<i>Allocasuarina microstachya</i>			x	
Casuarinaceae	<i>Allocasuarina thuyoides</i>				x
Celastraceae	<i>Tripterococcus brunonis</i>				x
Cyperaceae	<i>Caustis dioica</i>		x		
Cyperaceae	<i>Lepidosperma</i> sp. Dunns Swamp (R Davis 724)		x	x	
Cyperaceae	<i>Lepidosperma</i> sp. Mt Burdett (M.A. Burgman & C. Layman MAB 3287)				x
Cyperaceae	<i>Mesomelaena stygia</i>		x	x	
Cyperaceae	<i>Schoenus breviculmis</i>		x		
Dasypogonaceae	<i>Calectasia gracilis</i>		x		
Dasypogonaceae	<i>Calectasia grandiflora</i>				x
Dilleniaceae	<i>Hibbertia acrotrichion</i>	P2	x		
Dilleniaceae	<i>Hibbertia gracilipes</i>		x	x	
Droseraceae	<i>Drosera paleacea</i> subsp. <i>trichocaulis</i>				x
Ericaceae	<i>Andersonia parvifolia</i>		x	x	
Ericaceae	<i>Astroloma prostratum</i>		x		
Ericaceae	<i>Coleanthera myrtoides</i>			x	
Ericaceae	<i>Leucopogon crassifolius</i>		x		
Ericaceae	<i>Leucopogon gibbosus</i>		x	x	
Ericaceae	<i>Leucopogon</i> sp. GFC&MT 8999			x	
Ericaceae	<i>Leucopogon tammieasis</i> var <i>australis</i>				x
Ericaceae	<i>Lysinema ciliatum</i>		x		
Ericaceae	<i>Styphelia intertexta</i>		x		
Euphorbiaceae	<i>Stachystemon polyandrus</i>				x



Family	Species	Status	Releve 8	Releve 9	Opportunisti
Fabaceae	<i>Acacia leioderma</i>				x
Fabaceae	<i>Acacia</i> sp. GFC&MT 8985		x		
Fabaceae	<i>Acacia sulcata</i> var. <i>platyphylla</i>				x
Fabaceae	<i>Chorizema glycinifolium</i>		x		
Fabaceae	<i>Daviesia abnormis</i>		x		
Fabaceae	<i>Daviesia emarginata</i>		x		
Fabaceae	<i>Daviesia striata</i>			x	
Fabaceae	<i>Daviesia teretifolia</i>				x
Fabaceae	<i>Eutaxia neurocalyx</i>				x
Fabaceae	<i>Gastrolobium densifolium</i>			x	
Fabaceae	<i>Gastrolobium latifolium</i>				x
Fabaceae	<i>Gompholobium venustum</i>				x
Fabaceae	<i>Hovea trisperma</i>		x		
Fabaceae	<i>Jacksonia grevilleoides</i>				x
Fabaceae	<i>Pultenaea</i> sp. GFC&MT 8990		x		
Fabaceae	<i>Templetonia retusa</i>				x
Goodeniaceae	<i>Dampiera juncea</i>		x		
Goodeniaceae	<i>Goodenia scapigera</i>				x
Haemodoraceae	<i>Conostylis setigera</i>		x		
Iridaceae	<i>Patersonia lanata</i>				x
Loganiaceae	<i>Logania micrantha</i>				x
Malvaceae	<i>Lasiopetalum compactum</i>				x
Malvaceae	<i>Lasiopetalum quinquenervium</i>				x
Myrtaceae	<i>Baeckea preissiana</i>		x	x	
Myrtaceae	<i>Beaufortia micrantha</i>			x	
Myrtaceae	<i>Beaufortia schaueri</i>		x		
Myrtaceae	<i>Calytrix leschenaultii</i>				x
Myrtaceae	<i>Darwinia vestita</i>				x
Myrtaceae	<i>Eucalyptus buprestium</i>		x		
Myrtaceae	<i>Eucalyptus falcata</i>			x	



Family	Species	Status	Releve 8	Releve 9	Opportunisti
Myrtaceae	<i>Eucalyptus incrassata</i>			x	
Myrtaceae	<i>Eucalyptus pleurocarpa</i>		x		
Myrtaceae	<i>Eucalyptus uncinata</i>				x
Myrtaceae	<i>Leptospermum spinescens</i>			x	
Myrtaceae	<i>Melaleuca pungens</i>		x		
Myrtaceae	<i>Melaleuca rigidifolia</i>			x	
Myrtaceae	<i>Melaleuca striata</i>		x		
Myrtaceae	<i>Melaleuca subtrigona</i>		x	x	
Myrtaceae	<i>Melaleuca uncinata</i>				x
Myrtaceae	<i>Taxandria spathulata</i>			x	
Myrtaceae	<i>Verticordia acerosa</i> var. <i>preissii</i>				x
Myrtaceae	<i>Verticordia grandiflora</i>		x	x	
Olacaceae	<i>Olax benthamiana</i>				x
Poaceae	<i>Amphipogon turbinatus</i>		x		
Poaceae	<i>Neurachne alopecuroides</i>				x
Polygalaceae	<i>Comesperma volubile</i>				x
Proteaceae	<i>Adenanthos cuneatus</i>				x
Proteaceae	<i>Adenanthos flavidiflorus</i>			x	
Proteaceae	<i>Banksia arctotidis</i>				x
Proteaceae	<i>Banksia baueri</i>				x
Proteaceae	<i>Banksia cirsioides</i>			x	
Proteaceae	<i>Banksia falcata</i>		x		
Proteaceae	<i>Banksia gardneri</i> var. <i>hiemalis</i>		x		
Proteaceae	<i>Banksia heliantha</i>		x		
Proteaceae	<i>Banksia nutans</i>				x
Proteaceae	<i>Banksia obovata</i>				x
Proteaceae	<i>Banksia plumosa</i>				x
Proteaceae	<i>Banksia pteridifolia</i>		x	x	
Proteaceae	<i>Banksia pulchella</i>				x
Proteaceae	<i>Banksia sessilis</i>		x		





Family	Species	Status	Releve 8	Releve 9	Opportunisti
Proteaceae	<i>Calothamnus gracilis</i>				x
Proteaceae	<i>Calothamnus quadrifidus</i>		x	x	
Proteaceae	<i>Grevillea nudiflora</i>				x
Proteaceae	<i>Hakea corymbosa</i>		x		
Proteaceae	<i>Hakea ferruginea</i>			x	
Proteaceae	<i>Hakea laurina</i>				x
Proteaceae	<i>Hakea nitida</i>				x
Proteaceae	<i>Hakea pandanica</i> subsp. <i>crassifolia</i>				x
Proteaceae	<i>Hakea trifurcata</i>		x		
Proteaceae	<i>Isopogon formosus</i>				x
Proteaceae	<i>Isopogon polycephalus</i>				x
Proteaceae	<i>Isopogon</i> sp. Fitzgerald River (D.B. Foreman 813)				x
Proteaceae	<i>Isopogon trilobus</i>		x		
Proteaceae	<i>Lambertia inermis</i>		x		
Proteaceae	<i>Persoonia striata</i>				x
Proteaceae	<i>Petrophile rigida</i>		x		
Proteaceae	<i>Petrophile seminuda</i>		x	x	
Proteaceae	<i>Petrophile squamata</i>		x	x	
Proteaceae	<i>Synaphea petiolaris</i>		x		
Restionaceae	<i>Desmocladius castaneus</i>		x		
Restionaceae	<i>Harperia confertospicata</i>			x	
Restionaceae	<i>Harperia lateriflora</i>			x	
Restionaceae	<i>Lepidobolus chaetocephalus</i>				x
Rhaminaceae	<i>Spyridium micropcephalum</i>		x		
Rutaceae	<i>Boronia crassifolia</i>			x	
Rutaceae	<i>Boronia spathulata</i>		x		
Xanthorrhoeaceae	<i>Xanthorrhoea platyphylla</i>		x		



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