

1 INTRODUCTION

1.1 Background

PGV Environmental has been commissioned by the Schaffer Corporation to undertake an Environmental Assessment of Lots 101, 103 and 104 Jandakot Road, Jandakot that is under investigation for future development and requires rezoning (Appendix 1). Currently the site is zoned as 'Rural – Water Protection' under the Perth Metropolitan Region Scheme (MRS) and 'Resource' under the City of Cockburn Local Planning Scheme No. 3 (WAPC, 2002).

The site contains approximately 0.5ha of native vegetation located to the west of the existing Urban Stone facilities and adjacent to the unmade Launderers Street road reserve. A triangular area, about 0.3ha in size, to the west and 25ha of revegetated sand quarry (Appendix 1).

Some of the adjoining native vegetation to the west of the lot has been approved for clearing to construct Launderers Street. These works are anticipated to occur in 2016 and construction of firebreaks will be required in the Balance Lot.

1.2 Site Location

The site is located in Jandakot in the City of Cockburn approximately 14km south of the Perth Central Business District. The site is bounded by Jandakot Road and Special Rural lots to the south, the Urban Stone factory site to the west, Bush Forever Site 388 'Jandakot Airport, Jandakot' to the north and Special Rural lots to the east.

The portion of Bush Forever Site 388 that occurs on Lots 101, 103 and 104 remains in the ownership of Schaffer Corporation but is not part of this Environmental Assessment.

1.3 Scope of Works

PGV Environmental was commissioned to undertake an Environmental Assessment of Lots 101, 103 and 104 Jandakot Road, Jandakot. The assessment includes information on the following environmental factors.

- Physical characteristics including a description of:
 - Landform of the site;
 - Drainage and water bodies;
 - Geological, hydrogeological and hydrological characteristics; and
 - Acid Sulphate Soil Risk Mapping.
- Recent and present land use including:
 - Surrounding land uses; and
 - Assessment of current and historical activities on the subject site and surrounding areas which have the potential to result in contamination issues at the site
- Flora and Vegetation including:

- A Level 1 Flora and Vegetation Survey undertaken in accordance with Guidance Statement 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* and includes:
 - Desktop search and review of the Department of Parks and Wildlife's (DPaW's) Declared Rare and Priority Flora database and Threatened Ecological Communities database;
 - Examination of recent aerial photography and contour maps to provisionally identify vegetation types and condition;
 - A thorough site walkover, recording of any significant plant species using a hand-held GPS;
 - Description of vegetation types and vegetation condition; and
 - Compilation of a preliminary flora list.
- Fauna including:
 - A Level 1 fauna survey undertaken in accordance with Guidance Statement 56: *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004b) including:
 - The results from Declared Rare and Priority Fauna searches of the DPaW Databases;
 - Results from the Commonwealth Protected Matters Search Tool which will identify possible matters of Environmental Significance listed under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) that may occur on the sites;
 - A thorough site walkover to describe fauna habitats and condition on the site; and
 - An assessment of the likelihood of conservation significant fauna being present on the sites.

The impact of the proposed rezoning has been assessed in the context of impacts on the above factors.

2 EXISTING ENVIRONMENT

2.1 Land Use

2.1.1 Previous Land Use

According to historic aerial photography available on-line (Landgate, 2012a) the site remained fully vegetated until sometime after 1981 (Plate 1) (Landgate, 2012a). The 1985 aerial photograph (Plate 2) shows that the south-western part of the site was cleared as part of sand quarrying operations on the larger landholding. A buffer strip of native vegetation adjacent to Jandakot Road remained uncleared as is normal practice for sand quarries in the Perth Metropolitan Region. Plate 3 shows the revegetation in the previously cleared area establishing in 2011. The photo also shows small pockets of remnant native vegetation that are described later in the report.

Plate 1: 1981 – The site is fully vegetated



Plate 2: 1985 – The site has been cleared in the northern half



Plate 3: 2011 – The previously cleared eastern area has been replanted.



2.1.2 Surrounding Land Use

To the north of the site is Bush Forever Site 388 which abuts Jandakot Airport and to the east are existing 'Rural' lots. The current Urban Stone operations are located within the western part of the proposed rezoning area. On the western boundary is the unconstructed Launderers Street which has a Clearing Permit approval (CPS 4399/1) for the road reserve. To the south is Jandakot Road.

2.2 Topography

The site is flat to gently sloping with a few steeper areas of batter slopes between the area previously mined and the unmined areas. The western side of the site is approximately 8m higher than the low point in the centre of the site (Appendix 1). The elevation of the site varies between approximately 40-28m Australian Height Datum (AHD). Most of the site has been disturbed and there are some small piles of sand present.

2.3 Geomorphology and Soils

The geology of the area is described as basement rocks of the Leeuwin Complex which are granitic with an overlying weathering profile overlain by coastal limestone (DoW, 2012a). The soils on the site are part of the Bassendean Dune System and are very sandy, leached, infertile and mildly acidic.

The soils on the site has been described by the Department of Agriculture and Food Western Australia (DAFWA) as:

- Bassendean B1 Phase (212Bs_B1) which are described as deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2m. These soils occur on extremely low to very low relief dunes, undulating sandplain and discrete sand rises; and
- Bassendean B2 Phase (212Bs_B2) which are located on flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan 1-2m (DAFWA, 2016).

2.4 Hydrology

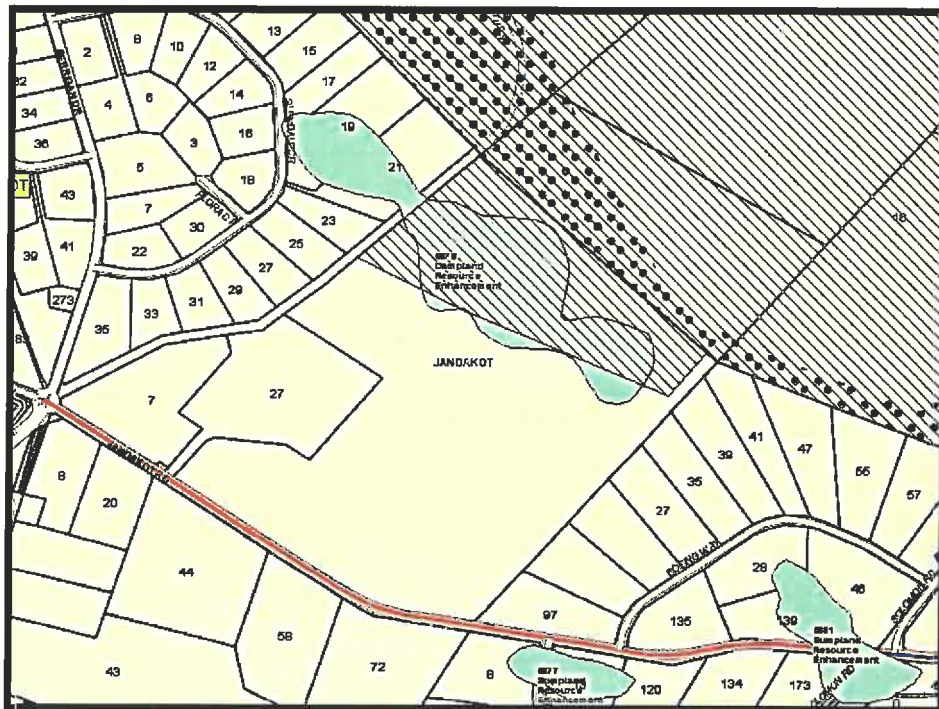
2.4.1 Groundwater

The Perth Groundwater Atlas shows the top of the groundwater table at 23 to 24mAHD which is approximately 3m to 11m below the ground surface. Groundwater is generally flowing to the west (DoW, 2012b).

2.4.2 Surface Water and Wetlands

There is a small portion of Resource Enhancement Wetland mapped on the site with the remainder in Bush Forever Site 388 on the northern boundary. There are no other wetlands on the site as mapped in the Geomorphic Wetlands of the Swan Coastal Plain Database (Landgate, 2016) (Plate 4).

Plate 4: Wetland Mapping on the site



A site inspection by PGV Environmental on 1 June 2016 showed the areas of wetland mapped within the site are part of the area mined as a sand quarry and do not have the wetland species or soil typical of wetlands. Therefore, it is PGV Environmental's assessment that the wetland boundary has not been accurately mapped on the site. The wetland does not appear to extend beyond the boundary of Bush Forever site 388. Accurate determination of the wetland boundary will be required as part of the rezoning process.

2.5 Flora

2.5.1 Flora Desktop Studies

A search of the DPaW Threatened Flora Database, the WA Herbarium database and the Declared Rare and Priority Flora Species List identified 3 Threatened and 18 Priority plant species that have been located in the vicinity of the site (Table 1 and Appendix 2). The three Threatened species under the *Wildlife Conservation Act 1950* are also listed as Endangered under the EPBC Act. Three additional Endangered species were identified by the EPBC Act Protected Matters Search Tool (Appendix 3) and the Naturemap database search (Appendix 4).

Table 1: List of Flora Species Identified from Database Searches.

Species	Common Name	Status under Wildlife Cons. Act	Status under EPBC Act
<i>Andersonia gracilis</i>	Slender Andersonia	Threatened	Endangered
<i>Caladenia huegelii</i>	Grand Spider Orchid	Threatened	Endangered
<i>Diuris purdiei</i>	Purdie's Donkey Orchid	Threatened	Endangered
<i>Drakaea elastica</i>	Glossy-leaved Hammer Orchid	Threatened	Endangered
<i>Drakaea micrantha</i>	Dwarf Hammer Orchid	Threatened	Endangered
<i>Lepidosperma rostratum</i>		Threatened	Endangered
<i>Thelymitra dedmaniarum</i>	Cinnamon Sun Orchid	Threatened	Endangered
<i>Dampiera triloba</i>		Priority 1	
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant (GJ Keighery 5026)	Panjang	Priority 1	
<i>Amanita carneiphylla</i>	Pink-gilled Amanita (fungus)	Priority 2	
<i>Amanita griseibrunnea</i>	(fungus)	Priority 2	
<i>Thelymitra variegata</i>	Queen of Sheba	Priority 3	
<i>Amanita drummondii</i>	Drummond's Grisette	Priority 3	
<i>Amanita fibrilloses</i>		Priority 3	
<i>Amanita wadjukiorum</i>		Priority 3	
<i>Byblis gigantea</i>	Rainbow Plant	Priority 3	
<i>Eryngium pinnatifidum</i> subsp. <i>palustre</i>	Blue Devils	Priority 3	
<i>Jacksonia gracillima</i>		Priority 3	
<i>Stylidium paludicola</i>		Priority 3	
<i>Cyathochaeta teretifolia</i>		Priority 3	
<i>Phlebocarya pilosissima</i> subsp. <i>pilosissima</i>		Priority 3	
<i>Dodonaea hackettiana</i>	Hackett's Hopbush	Priority 4	
<i>Thysanotus glaucus</i>		Priority 4	
<i>Microtis quadrata</i>		Priority 4	
<i>Ornduffia submersa</i>		Priority 4	
<i>Grevillea thelemanniana</i> subsp. <i>thelemanniana</i>	Spider Net Grevillea	Priority 4	

Species	Common Name	Status under Wildlife Cons. Act	Status under EPBC Act
<i>Microtis quadrata</i>	South Coast Mignonette Orchid	Priority 4	
<i>Stylidium longitubum</i>	Jumping Jacks	Priority 4	
<i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234) (also listed as <i>Tripterococcus paniculatus</i> in Database Searches)		Priority 4	
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		Priority 4	

A list of the Conservation codes is in Appendix 5.

The species identified in the database searches have been examined to rate the likelihood of their presence on the site (Table 2).

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

Species	Preferred Habitat*	Likelihood to occur on the site
<i>Andersonia gracilis</i>	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Highly Unlikely – no wetland habitat on the site
<i>Caladenia huegelii</i>	Sand or clay loam. Does not survive in disturbed areas.	Possible
<i>Diuris purdiei</i>	Grey-black sand, moist. Winter-wet swamps	Highly Unlikely – no wetland habitat on the site
<i>Drakaea elastica</i>	Low-lying situations adjoining winter-wet swamps. Does not survive in disturbed areas	Highly Unlikely – no wetland habitat on the site
<i>Drakaea micrantha</i>	Grey sands over dark, grey to blackish, sandy clay-loam substrates in winter wet depressions or swamps	Highly Unlikely – no suitable soils on the site
<i>Lepidosperma rostratum</i>	Peaty and clay soils	Highly Unlikely – no wetland habitat on the site
<i>Thelymitra dedmaniarum</i> (<i>Thelymitra manginii</i>)	Cinnamon sun orchid is known from only two locations in the Gidgegannup area. It is confined to open wandoo woodland on red-brown sandy loam associated with dolerite and granite outcropping (DEC, 2012).	No
<i>Dampiera triloba</i>	Damp peaty sand	Highly Unlikely – no Dampland habitat on the site
<i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant (GJ Keighery 5026)	Grey or black sand over clay. Swampy areas, winter-wet lowlands.	Highly Unlikely – no wetland habitat on the site
<i>Amanita carneiphylla</i>	Deep rooting in sandy soils with Eucalyptus Banksia and Sheoak	Possible
<i>Amanita griseibrunnea</i>	Sandy soil with Jarrah and pine trees	Unlikely – No pines present

Species	Preferred Habitat*	Likelihood to occur on the site
<i>Thelymitra variegata</i>	Sandy clay, sand, laterite. Does not survive in disturbed areas	No – no lateritic sand present
<i>Amanita drummondii</i>	Solitary to gregarious in leaf litter in association with <i>Agonis flexuosa</i> , <i>A. theiformis</i> , <i>Allocasuarina fraseriana</i> , <i>Corymbia calophylla</i> , <i>Eucalyptus marginata</i> , <i>E. patens</i> , <i>E. staeri</i> , <i>Jacksonia furcellata</i> , <i>Kunzea glabrescens</i> , <i>Melaleuca</i> sp., <i>Podocarpus drouynianus</i> , <i>Taxandria parviceps</i> . (Davidson et al., 2015) growing in sandy soil (Amanitaceae Org, 2015)	Unlikely – Dominant Banksia is not preferred by this species
<i>Amanita fibrilloses</i>	Grey sand on track	Possible
<i>Amanita wadjukiorum</i>	Solitary to gregarious, in sandy soil in degraded native vegetation of <i>Allocasuarina fraseriana</i> , <i>Corymbia calophylla</i> , <i>C. citriodora</i> and <i>Brachychiton</i> sp. (Davidson et al., 2013)	Unlikely due to vegetation types
<i>Byblis gigantea</i>	Sandy-peat swamps in seasonally wet areas	Highly Unlikely – no wetland habitat on the site
<i>Eryngium pinnatifidum</i> subsp. <i>palustre</i>	Clay, sandy clay. Claypans, seasonally wet flats	Highly Unlikely – no wetland habitat on the site
<i>Jacksonia gracillima</i>	Grey and brown well-drained sand	Unlikely – not recorded during the thorough site walkover
<i>Stylidium paludicola</i>	Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	Highly Unlikely – no wetland habitat on the site
<i>Cyathochaeta teretifolia</i>	Grey sand, sandy clay. Swamps, creek edges	Highly Unlikely – no wetland habitat on the site
<i>Phlebocarya pilosissima</i> subsp. <i>pilosissima</i>	White or grey sand and lateritic gravel	Unlikely – no laterite on the site
<i>Dodonaea hackettiana</i>	Sandy soils with outcrops of limestone.	Unlikely – no outcropping limestone
<i>Thysanotus glaucus</i>	White, grey or yellow sand, sandy gravel	Unlikely -
<i>Microtis quadrata</i>	Black, peaty soil	Highly Unlikely – no wetland habitat on the site
<i>Ornduffia submersa</i>	Pools, lakes, swamps, winter-wet depressions, claypans	No – no suitable habitat on the site
<i>Grevillea thelemanniana</i> subsp. <i>thelmanniana</i>	Sand or clay, occupying swamps, heathland	Highly Unlikely – no wetland habitat on the site
<i>Stylidium longitubum</i>	Sandy clay, clay. Seasonal wetlands	Highly Unlikely – no wetland habitat on the site

Species	Preferred Habitat*	Likelihood to occur on the site
<i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234) (also listed as <i>Tripterococcus paniculatus</i> in Database Searches)	Grey, black or peaty sand. Winter-wet flats	Highly Unlikely – no wetland habitat on the site
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	Grey, black or peaty sand. Winter-wet depressions	Highly Unlikely – no wetland habitat on the site

* sourced from Florabase as well as the DPaW database searches unless otherwise denoted

The Grand Spider Orchid (*Caladenia huegelii*) is the only Threatened or Endangered species considered to potentially occur on the site in the areas of native vegetation remaining on the site outside of the Bush Forever area. There is also a small possibility that the orchid could occur in the vegetated buffer along Jandakot Road. The remainder of the Threatened or Endangered species are not likely to occur due either to the inappropriate soil types, the previous clearing of a large portion of the site or the high density of weeds in the native vegetation buffer.

Two priority species of fungi were considered to possibly be present on the site *Amanita carneiphylla* and *Amanita fibrilloses*.

2.5.2 Preliminary Flora List

A Level 1 Flora and Vegetation survey does not require a full spring flora survey to be conducted, however a site walkover was undertaken by Dr Paul van der Moezel of PGV Environmental on 6 May 2016. Opportunistic recordings were made of the native species observable during the site inspection. The list of species recorded in the native bushland on the site is contained in Appendix 6.

The preliminary flora list recorded in areas of remnant vegetation included 42 native and 3 introduced species. Given the high quality of the vegetation, many additional annual and ephemeral species would be expected to be recorded in spring and early summer.

None of the species recorded in May 2016 is a Threatened (Declared Rare) or Priority listed species. Of the conservation significant species that have been recorded in the vicinity of the site the Threatened orchid species *Caladenia huegelii* could potentially occur due to the presence of Banksia woodland on dry sandy soils in very good condition. The likelihood of the species occurring, however, is considered very low due to the very small size of the remnant vegetation, around 1ha. *Caladenia huegelii* can only be positively identified in the field when it is in flower from mid-September to mid-October.

A spring (mid-September to mid-October) survey will be undertaken in 2016 to identify whether the Grand Spider Orchid, or any other conservation significant plant species occurs on the site.

2.5.3 Threatened or Priority Ecological Communities Database Searches

A search of DPaW's Threatened (TEC) and Priority Ecological Communities (PEC) database was conducted for the site (11-0212EC). There are no known occurrences of any TECs or PECs on the site.

There are occurrences of the following Priority Ecological Communities within 1km of the site. These are:

- The 'Priority 3' ecological community – 'Low lying *Banksia attenuata* woodlands or shrublands (SCP21c)'
- The 'Priority 2' ecological community – 'Wooded wetlands which support colonial waterbird nesting areas'.

Neither of these two ecological communities is expected to occur on the site due to the absence of suitable site conditions.

2.6 Vegetation

2.6.1 Vegetation Types

Revegetated Sand Mine

The types of vegetation in the revegetated sand mine varies across the site, presumably indicating different rehabilitation methods at each stage following sand mining operations.

A central portion of the site, adjacent to the eastern boundary of the Urban Stone laydown area, contains a denser stand of trees than elsewhere on the site. The trees mostly consist of species not local to the Jandakot area such as *Eucalyptus camaldulensis* (River Red Gum) and WA Peppermint (*Agonis flexuosa*) (Plate 5). Other taller species in this area include *Acacia rostellifera*, *Banksia menziesii* and a few *Eucalyptus gomphocephala* (Tuart).

The native understorey in this area is almost completely lacking and consists of Annual Veldtgrass (*Ehrharta calycina*) and Couch Grass (*Cynodon dactylon*).

Plate 5: *Eucalyptus camaldulensis* planted east of the Urban Stone lay down area.



The remainder of the rehabilitation area contains a broader mix of native shrub and tree species, planted in a random fashion. Common species include *Agonis flexuosa*, *Eucalyptus camaldulensis*, *Corymbia calophylla* (Marri) in an area close to the Bush Forever site, *Eucalyptus rudis* (Flooded Gum), *Acacia rostellifera*, *Eucalyptus decipiens*, *Callistemon* sp. (Bottlebrush) and *Jacksonia furcellata* (Plate 6).

Plate 6: Replanted vegetation



A number of native understorey species are present throughout this part of the rehabilitated area, presumably self-seeded rather than planted or seeded by hand, including *Leucopogon conostephioides*, *Leschenaultia floribunda* and *Scholtzia involucrata*. Weed species in these areas are uncommon. The woody weed species Victorian Tea Tree (*Leptospermum laevigatum*) is common on some batter slopes.

Remnant Native Vegetation

Several small areas of remnant native vegetation occur on the site. One area is a triangular-shaped stand and is located to the north west of the existing Urban Stone facilities and adjacent to the unmade Launderers Street road reserve. Another area is also adjacent to the unmade Launderers Street road reserve to the north east of the Urban Stone facilities.

Another area of native vegetation is located on the southeastern end of the Bush Forever site and forms a narrow strip of vegetation about 0.4ha in size between the Bush Forever site and the property boundary.

Some native vegetation is also likely to occur between the southwestern boundary of the Bush Forever site and the rehabilitated sand quarry. The extent of this is subject to further on-ground verification.

The remnant vegetation is predominantly a *Banksia attenuata*/*B. menziesii* Low Open Woodland to 5m over an *Allocasuarina humilis*/*Acacia pulchella* Open Low Heath (Plate 7) on dry sand soils.

Eucalyptus tottiana is common in parts of the vegetation (Plate 8) and Marri (*Corymbia calophylla*) may also occur as a natural stand adjacent to the Bush Forever site.

Other common native understorey species include *Lyginia barbata*, *Beaufortia elegans*, *Amphipogon turbinatus* and *Leucopogon conostephioides*.

Plate 7: Remnant Banksia Woodland in the Triangular Stand



Plate 8: Banksia Woodland with *Eucalyptus tottiana*



The vegetated buffer is described as *Banksia attenuata*/ *B. menziesii* Woodland over *Eremaea pauciflora*/ *Hibbertia hypericoides*/ *Lyginia barbata* and *Allocasuarina humilis* shrubland (Plate 9).

Plate 9: Buffer vegetation



Based on the species recorded during the site inspection, the areas of native vegetation are most likely representative of FCT 23a “Central *Banksia attenuata* – *B. menziesii* Woodlands”.

2.6.2 Vegetation Condition

The vegetation condition over the site ranged from Completely Degraded in the eastern part of the site that had been previously cleared and planted with exotic species to Good to Degraded for the strip of native buffer vegetation adjacent to Jandakot Road. The other areas of remnant native vegetation are mostly in Very Good to Excellent condition. The definitions of the ratings are outlined in Table 3.

Table 3: Vegetation Condition Rating Scale

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

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

Source: Government of Western Australia, 2000.

2.6.3 Conservation Significant Vegetation

The areas of native vegetation are likely to be representative of Floristic Community Type 23a which is not a Threatened or Priority Ecological Community. The vegetation does not resemble 'Low lying *Banksia attenuata* woodlands or shrublands (SCP21c)' or 'Wooded wetlands which support colonial waterbird nesting areas' that have been identified within 1km of the site by the DPaW database search.

2.7 Fauna

2.7.1 Fauna Habitats

The site inspection conducted by PGV Environmental on 6 February 2012 identified two fauna habitats on the site, as follows:

- Replanted woodland/shrubland; and
- Banksia woodland.

The replanted woodland/shrubland occurs on the site of the old sand mine. The understorey is sparse (Plate 10).

Plate 10: Replanted woodland/shrubland Habitat



The small areas of remnant native vegetation are described as Banksia woodland and are in Very Good to Excellent condition (Plate 11). The vegetation in the Jandakot Road buffer is Degraded (Plate 12). None of the native trees or tall replanted trees on the site contain hollows.

Plate 11: Banksia Woodland Habitat in Very Good Condition



Plate 12: Banksia Woodland Habitat in Degraded Condition



2.7.2 Habitat Condition

Fauna habitat can be assessed using a number of factors including, the size of the habitat, the level of habitat connectivity, availability of specific resources (e.g. tree hollows) and overall vegetation quality. The habitat was assessed according to the following categories:

High quality fauna habitat – These areas closely approximate the vegetation mix and quality that would have been in the area prior to any disturbance. The habitat has connectivity with other habitats and is likely to contain the most natural vertebrate fauna assemblage.

Very good fauna habitat - These areas show minimal signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) and generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be minimally affected by disturbance.

Good fauna habitat – These areas showed signs of disturbance (e.g. grazing, clearing, fragmentation, weeds) but generally retain many of the characteristics of the habitat if it had not been disturbed. The habitat has connectivity with other habitats and fauna assemblages in these areas are likely to be affected by disturbance.

Disturbed fauna habitat – These areas showed signs of significant disturbance. Many of the trees, shrubs and undergrowth are cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, contain weeds or have been damaged by vehicle or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.

Highly degraded fauna habitat – These areas often have a significant loss of vegetation, an abundance of weeds, and a large number of vehicle tracks or are completely cleared. Limited or no fauna habitat connectivity. Faunal assemblages in these areas are likely to be significantly different to what might have been in the area pre-disturbance (Coffey Environments, 2009).

The revegetated sand mine is considered to be Disturbed Fauna habitat while the areas of Banksia woodland in Very good to Excellent condition are considered to be Good Fauna habitat.

2.7.3 Fauna Database Searches

A search of the DPaW Threatened and Priority fauna database (Appendix 7), the EPBC Act Protected Matters Search Tool (Appendix 2) and search results Naturemap (Appendix 3) identified 20 species that have been recorded in the general vicinity of the site (Table 4). Marine fauna that were identified in the desktop searches have been discarded from further consideration.

Table 4: Conservation Significant Fauna Species Possibly Occurring in the Region

Scientific Name	Common Name	Status under Wildlife Cons. Act	Status under EPBC Act
<i>Botaurus poiciloptilus</i>	Australasian bittern	Schedule 2 - EN	Endangered
<i>Calyptorhynchus latirostris</i>	Carnaby's Black Cockatoo	Schedule 2 - EN	Endangered
<i>Myrmecobius fasciatus</i>	Numbat, Walpurti	Schedule 2 - EN	Vulnerable
<i>Rostratula benghalensis australis</i>	Australian Painted Snipe	Schedule 2 - EN	Endangered / Marine/ Migratory
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	Schedule 3 - VU	Vulnerable
<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	Schedule 3 - VU	Vulnerable

Scientific Name	Common Name	Status under Wildlife Cons. Act	Status under EPBC Act
<i>Leipoa ocellata</i>	Mallee Fowl	Schedule 3 - VU	Vulnerable
<i>Setonix brachyurus</i>	Quokka	Schedule 3 - VU	Vulnerable
<i>Merops ornatus</i>	Rainbow Bee-eater	Schedule 5 - IA	Marine/ Migratory
<i>Phascogale calura</i>	Red-tailed Phascogale, Kenngoor	Schedule 6 - CD	Endangered
<i>Falco peregrinus</i>	Peregrine Falcon	Schedule 7 - OS	Marine/ Migratory
<i>Throscodectes xiphos</i>	Cricketer	Priority 1	
<i>Lerista lineata</i>	Perth Slider, Lined Skink	Priority 3	
<i>Neelaps calonotos</i>	Black-striped Snake	Priority 3	
<i>Falsistrellus mackenziei</i>	Western False Pipistrelle	Priority 4	
<i>Isodon obesulus fusciventer</i>	Southern Brown Bandicoot, Quenda	Priority 4	
<i>Macropus eugenii derbianus</i>	Tammar Wallaby	Priority 4	
<i>Macropus irma</i>	Western Brush Wallaby	Priority 4	
<i>Synemon gratiosa</i>	Graceful Sun-moth	Priority 4	
<i>Thinornis rubricollis</i> (also listed as <i>Charadrius rubricollis</i>)	Hooded Plover	Priority 4	Marine

2.7.4 Likely Occurrence of Significant Species

Outlined below is a short description of each of the species that were identified in the DPaW database searches and Protected Matters Search Tool search in Table 4. The preferred habitat has been compared to the habitats on the site described above and the likelihood of each species to be present on the site (Table 5).

Table 5: Likelihood of Conservation Significant species being present on the site

Scientific Name	Common Name	Habitat	Likelihood to occur on the site
<i>Botaurus poiciloptilus</i>	Australasian bittern	The Australasian Bittern occurs mainly in densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands.	Highly Unlikely – No wetland habitat

Scientific Name	Common Name	Habitat	Likelihood to occur on the site
<i>Calyptrorhynchus latirostris</i>	Carnaby's Black Cockatoo	Carnaby's Cockatoo is found in the south-west of Australia from Kalbarri through to Ravensthorpe. It has a preference for feeding on the seeds of Banksia, Dryandra, Hakea, Eucalyptus, Grevillea, Pinus and Allocasuarina spp. It is nomadic often moving toward the coast after breeding. It breeds in tree hollows that are 2.5 - 12m above the ground and have an entrance 23-30cm with a depth of 1-2.5m. Nesting mostly occurs in smooth-barked trees (e.g. Salmon Gum, Wandoo, Red Morrell) (SEWPaC, 2012)	Likely
<i>Myrmecobius fasciatus</i>	Numbat, Walpurti	Numbats occur in eucalypt forests and woodlands dominated by <i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> and <i>Eucalyptus wandoo</i> .	Highly Unlikely – Habitat not a Eucalypt Woodland
<i>Rostratula benghalensis australis</i>	Australian Painted Snipe	The Australian Painted Snipe has been recorded at wetlands in all states of Australia but is most common in eastern Australia. It generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. It also uses inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include a cover of vegetation, including grasses.	Highly Unlikely – No wetland habitat
<i>Calyptrorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	Forest Red-tailed Black Cockatoos frequent the humid to sub-humid south-west of Western Australia from Gingin in the north, to Albany in the south and west to Cape Leeuwin and Bunbury (SEWPaC, 2012). It nests in tree hollows with a depth of 1-5m, that are predominately Marri (<i>Corymbia calophylla</i>), Jarrah (<i>Eucalyptus marginata</i>) and Karri (<i>E. diversicolor</i>) and it feeds primarily on the seeds of Marri.	Possible – limited foraging on the site