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REFERRAL OF PROPOSED ACTION
Gingin Regional Landfill
Wannamal Road South, Cullalla

Prepared For: Cityscore Pty Ltd

Date: 9 December 2015

Referral of proposed action

Project title: Gingin Regional Landfill, Fernview Farms

1 Summary of proposed action

1.1 **Short description**

Aurigen proposes to construct a landfill facility within the Shire of Gingin. The proposal presents an opportunity for future waste management in Western Australia, which is technologically advanced, reliable, cost effective and environmentally responsible. The proposal will require the clearance of re-growth Banksia woodland on the Fernview Farm property, Wannamal Road South, Cullalla in the Shire of Gingin.

1.2 **Latitude and longitude**

Position	Latitude	Longitude
NW	31°12'38.72"S	115°58'19.35"E
NE	31°12'39.01"S	115°59'6.53"E
E	31°12'55.85"S	115°59'43.00"E
SE1	31°13'2.52"S	115°59'51.82"E
SE2	31°13'13.22"S	115°59'5.53"E
SW	31°13'12.43"S	115°58'20.49"E

1.3 **Locality and property description**

The proposed landfill is located in Cullalla, approximately 16km northeast of Gingin, within the Shire of Gingin (**Figure 1**) on Lot 98 Wannamal Road South. Lot 98 is a privately owned property (referred to as Fernview Farm).

1.4 **Size of the development footprint or work area (hectares)** The landfill footprint area is 66.6ha (**Figure 2**).

1.5 **Street address of the site** Lot 98 Wannamal Road South, Cullalla, Western Australia

1.6 **Lot description**

Lot 98 Wannamal Road South, Wannamal on Deposited Plan 75926

1.7 **Local Government Area and Council contact (if known)**

Shire of Gingin, Western Australia. The Shire contact is: Jeremy Edwards, Chief Executive Officer

1.8 **Time frame**

Construction of the landfill is expected to commence in 2016 following completion of development approval and will have an estimated operational life of 15 years.

1.9	**Alternatives to proposed action** Were any feasible	X	No

	alternatives to taking the proposed action (including not taking the action) considered but are not proposed?		Yes, you must also complete section 2.2
1.10	**Alternative time frames etc** Does the proposed action include alternative time frames, locations or activities?	X	No
			Yes, you must also complete Section 2.3. For each alternative, location, time frame, or activity identified, you must also complete details in Sections 1.2-1.9, 2.4-2.7 and 3.3 (where relevant).
1.11	**State assessment** Is the action subject to a state or territory environmental impact assessment?		No
		X	Yes, you must also complete Section 2.5
1.12	**Component of larger action** Is the proposed action a component of a larger action?	X	No
			Yes, you must also complete Section 2.7
1.13	**Related actions/proposals** Is the proposed action related to other actions or proposals in the region (if known)?	X	No
			Yes, provide details:
1.14	**Australian Government funding** Has the person proposing to take the action received any Australian Government grant funding to undertake this project?	X	No
			Yes, provide details:
1.15	**Great Barrier Reef Marine Park** Is the proposed action inside the Great Barrier Reef Marine Park?	X	No
			Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

Proposal

The proposed action is the clearing of approximately 42.5ha of regrowth remnant native vegetation within the 66.6ha project footprint (**Figure 2**) to enable the construction and operation of a landfill facility (**Figure 3**) within the Shire of Gingin. The regrowth vegetation present on the site is of highly variable quality, with an area of 2.2ha of native vegetation that is in Good or better condition proposed to be cleared.

The 66.6ha project footprint (**Figure 2**) includes an allowance for a future expansion of the site, providing greater flexibility into the future with site management. The proposed landfill will be designed as a staged, engineered, valley landfill which will incorporate an engineered liner and capping system and active landfill leachate and gas management system. Ten cells will be constructed. Post-completion, the landfill will be capped and revegetated.

Justification

The available landfill capacity in Perth is diminishing. Based upon the remaining landfill capacity in the Perth region, if landfill diversion targets are not met, there insufficient capacity for putrescible landfill by early 2020's and insufficient capacity for inert landfill by the mid-2020's (Waste Authority of Western Australia, 2013). The development of new regional landfill facilities is an urgent priority for the Perth region.

The facility proposed for the Fernview Farm site will provide an environmentally responsible approach to managing a segment of the waste stream generated in the Perth metropolitan area while also providing the Shire of Gingin and surrounding shires with the opportunity of utilising a technically advanced facility. These communities are generally currently served by small unlined, unstaffed landfills with limited recycling and recovery services.

The Shire of Gingin is one of the fastest growing rural shires in Western Australia, with a current population of approximately 3,000 people (WAPC, 2006). Over the next 25 years, population growth along what is known as the 'Gingin Coast' alone is expected to increase from between 7,500 (low growth) and 16,000 (high growth) permanent residents (WAPC, 2006). The Gingin Coast extends along a 50km stretch of the coastline west of the Brand Highway. Increases in population have likewise been projected for the surrounding shires of Chittering, Wanneroo, Victoria Plains. Additional seasonal fluctuations of non-permanent residents may increase the total serviceable population well beyond these figures, and as such an increase in infrastructure and services will be required to support this population growth.

The total Gingin Shire area currently generates approximately 3,500t of solid waste annually or just over 1t per person within the shire (WAPC, 2006). The Shire provides domestic waste, public litter and inert waste, trailer and car drop-off services as well as a number of landfill facilities licensed by the DER, the largest of which is located at Lancelin, approximately 76km (by road) from the Gingin town centre.

It is apparent that with the rapidly expanding population within the Shire of Gingin and the adjacent Shire of Chittering, there will be an increased requirement for appropriately managed waste facilities within the region. This proposal offers such a facility in a manner that is efficient, economically viable and environmentally responsible.

2.2 Alternatives to taking the proposed action

The construction and operation of the landfill site and the retention of native vegetation is mutually exclusive and therefore the proposed action is unavoidable.

The former project proponent (Veolia Environmental Services) thoroughly explored options to reduce the area of native vegetation to be cleared. This has resulted in several redesigns of potential landfill layouts. The proposal approved by the Western Australian Minister for the Environment specified that vegetation clearing is to not exceed more than 61ha for infrastructure and internal access roads. A further redesign was undertaken

by Veolia after pre-referral briefing with the former Department of Sustainability, Environment, Water, Population and Communities.

The proposed landfill layout that is the subject of this referral represents the optimal solution from an environmental perspective. The final landfill re-design significantly reduced the area of Good quality (or better) black cockatoo habitat to be cleared (now approximately 2.2ha compared with the previous 26ha). The majority of native vegetation to be removed, in the most part, is either cleared or highly degraded and therefore offers little foraging value to Black Cockatoo species.

The do nothing scenario is not a feasible option. The Western Australian State Government has adopted a Strategy aimed at progressing towards Zero Waste to Landfill by the year 2020 (WMB, 2004). The achievement of zero waste to landfill will require major investments in Alternative Waste Treatment (AWT) technologies which are capable of recovering resources from domestic and commercial waste streams. These AWT technologies are still being developed and demonstrated at a commercial scale and involve very major capital investments in the order of tens of millions of dollars. As a result, implementation of AWT's will occur progressively and slowly over the next 15 years and there will be an ongoing need to ensure that sufficient landfill capacity exists to provide for the safe management of those wastes that cannot be recovered from the waste stream.

2.3 Alternative locations, time frames or activities that form part of the referred action

A detailed site selection process was undertaken to identify potential sites for the landfill. Various sites were discounted due to potential groundwater and/or vegetation constraints. Fernview Farms was preferentially selected as the proposed location for the landfill facility due to its topography, distance from sensitive receptors and waterways, geological suitability, depth to groundwater, proximity to the Perth metropolitan region and access to key transport routes.

A further factor that influenced in identifying the area around Fernview Farm as being prospective for the development of a waste management facility were the recommendations of a study commissioned by the Shire of Gingin (Parsons Brinckerhoff, 2003). This study identified two zones within the Shire as being suitable for the development of waste management facilities:

- Zone A: within the north-east of the Shire and centred on Cullalla Road and Wannamal Road South; and
- Zone B: bordered by the Brand Highway and Shire's northern boundary.

Zone B has some limitations with respect to distance and road access to Brand Highway.

The landfill site within Fernview Farms was selected because it had historically been cleared and is being used for agricultural purposes. The proposed landfill will not conflict with the existing farming operations.

The clearing of regrowth native vegetation within the landfill site is unavoidable. As indicated in Section 2.2, alternative landfill layouts were examined to avoid or minimise disturbance to native vegetation. The proposed landfill layout represents an optimal solution with respect to environmental impacts. The revised layout significantly reduces the impacts on vegetation identified as providing good (or better) foraging habitat for the Black Cockatoo.

2.4 Context, planning framework and state/local government requirements

The site is zoned 'Rural' and designated as 'Special Use Zone 5: Waste Management Facility' in the Shire of Gingin's Local Planning Scheme No. 9 (Shire of Gingin, 2012). Special Use Zone 5 permits the construction and operation of a landfill at the discretion of the Shire (Shire of Gingin, 2012). This will be pursuant to the Special Conditions that are contained in Schedule 4 of the Scheme Text. The conditions have been included as **Attachment A**.

A Development Application has been submitted and is currently undergoing its assessment and approval.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

State Assessment

An Environmental Protection Statement (EPS) was assessed by the Western Australian EPA under Part IV of the *Environmental Protection Act 1986* and subsequently approved by the Minister for the Environment on 10 June 2009 subject to the implementation of conditions outlined in Ministerial Statement 796 (**Attachment B**).

A request to extend the time limit of authorisation was approved by the EPA in 2014. The extension requires the proponent to commence the implementation of the proposal before 11 June 2017 (**Attachment C**).

A Works Approval was granted for the landfill facility under Part V of the *Environmental Protection Act 1986* on 27 September 2012 and amended on 18 June 2015 (**Attachment D**).

Commonwealth Assessment

The project has previously been referred under the EPBC Act (EPBC 2011/6012) by the former project proponent (Veolia Environmental Services). The referral was determined to be a controlled action and assessed under Preliminary Documentation.

The referral and additional supporting information was advertised for public comment in March 2012. Three submissions were received during the advertising period. The referral, the additional supporting information and the former proponent's responses to the public submissions were advertised for Public Notice in July 2012.

After this the former proponent was in the process of negotiating an offsets package for the project. However, the project was put on hold by former the Proponent prior to the finalisation of the offsets package. During 2014 the former proponent notified the Department that it was withdrawing the application, which effectively terminated the assessment process for EPBC 2011/6012.

2.6 Public consultation (including with Indigenous stakeholders)

Aurigen has entered into an arrangement with Veolia to enable the commencement of construction of the Fernview Landfill. Development of the landfill is also the subject of a Deed of Agreement between Veolia and the Shire of Gingin. Aurigen will enter into a Deed of Assignment with the Council to transfer the obligations and conditions of the Deed from Veolia to Aurigen.

As Aurigen has recently acquired the Project, the company has not conducted any specific consultation, other than to establish contact with relevant government agencies. However, as there was extensive consultation previously completed for the project no additional consultation has been planned given that the project details remain unchanged. The specific modes of communication used previously in relation to the proposed operation included:

- Letters inviting personal briefings were sent to State and Federal MPs who represent the residents in the Shire of Gingin, as well neighbouring landowners and key interest groups;
- Informal and formal meetings;
- Telephone conversations;
- Distribution of information packages within the community containing:
    - Question and answer sheet;
    - List of project participants with contact details;
    - Map of proposed Fernview site;
    - Photos of site and existing landfill facilities on the Swan Coastal Plain; and
    - Company brochure
- E-mail correspondence.

A series of briefings were held by the former proponent at the Gingin Hotel with identified stakeholders to inform them about the proposal. Information provided at these briefings included details on the nature of the facility, timing of the project and the approval process.

The former proponent conducted a second stage of community consultation involving continued liaison with engaged stakeholders and distribution of information on the project through the local media. A public meeting

was held when the proposal was been formally submitted to the EPA. Following the public meeting, a newsletter was prepared for general distribution within the community and email briefings to key stakeholders to provide additional information and updates. Table 1 lists the relevant stakeholders that were included during the consultation process.

Table 1:
List of Relevant Stakeholders

GOVERNMENT AND PARLIAMENTARY STAKEHOLDERS	NON-GOVERNMENT STAKEHOLDERS
Department of Environment and Conservation (now DER)	Neighbouring landowners
EPA	Local community
Shire of Gingin	Wider community
Shire of Chittering	Gingin Land Conservation District Committee
Judi Moylan Federal MP	Friends of Gingin Brook
Kim Chance MLC, Minister for Agriculture and Food, Forestry, the Midwest and Wheatbelt	Concerned Citizens Against Waste
Gary Snook MLA	Gingin Group for Property Rights
Murray Criddle MLC	Action Group Against Stable Fly
Bruce Donaldson MLC	Frogmoor Commercial Association
Anthony Fels MLC	WA Farmers Federation
Margaret Rowe MLC	Moore Catchment Council
Landskills WA (Ag Department)	Ellen-Brockman Integrated Catchment Group
	Lower Moore River Working Group Inc

In addition to the above, the previous EPBC Referral (EPBC 2011/6012) was advertised for public comment. Three submissions were received during the advertising process

2.7 A staged development or component of a larger project

Not applicable.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

There are no World Heritage Properties located on the site.

Nature and extent of likely impact

Not relevant.

3.1 (b) National Heritage Places

Description

There are no National Heritage Places located on the site.

Nature and extent of likely impact

Not relevant.

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

There are no wetlands of international importance located on or near (within 20km) of the site.

Nature and extent of likely impact

Not relevant.

3.1 (d) Listed threatened species and ecological communities

Description

A search of the Protected Matters Search Tool (**Attachment E**) was undertaken to identify matters of national environmental significance that may be relevant to the site (Table 2).

Table 2:
Potential Matters of National Environmental Significance

Species	Status	Comment
Flora		
Banksia mimica (Summer Honeypot)	Endangered	Species not identified during flora and vegetation survey, and are highly unlikely to be present on site due to previous clearing and grazing activities.
Caladenia huegelii (King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid)	Endangered	
Centrolepis caespitosa	Endangered	
Chamelaucium sp. Gingin (Gingin Wax)	Endangered	
Conospermum densiflorum subsp. *unicephalatum* (One-headed Smokebush)	Endangered	
Diuris drummondii (Tall Donkey Orchid)	Vulnerable	

Eucalyptus balanites (Cadda Road Mallee, Cadda Mallee)	Endangered	Species not identified during flora and vegetation survey, and are highly unlikely to be present on site due to previous clearing and grazing activities.
Eucalyptus leprophloia, (Scaly Butt Mallee, Scaly-butt Mallee)	Endangered	
Grevillea curviloba subsp. *incurva* (Narrow curved-leaf Grevillea)	Endangered	
Thelymitra manginii	Endangered	
Thelymitra stellata (Star Sun-orchid)	Endangered	
Birds		
Calyptorhynchus latirostris (Carnaby's Black-Cockatoo)	Endangered	Regrowth vegetation present on the site provides degraded foraging habitat. No breeding or roosting values are present in the project area. This species may be an occasional visitor to the site.
Leipoa ocellata (Malleefowl)	Vulnerable	Unlikely to be present in the project area due to current land use and potential presence of feral predators.
Rostratula australis (Australian Painted Snipe)	Endangered	Unlikely to be present as no suitable habitat exists in the project area. The species is found in shallow inland wetlands.
Mammals		
Dasyurus geoffroii (Chuditch, Western Quoll)	Vulnerable	Unlikely to be present on the site. The species prefers a dense understorey to provide adequate cover and den sites such as hollow logs. The site has a denuded understorey which is open due to past clearing.

Nature and extent of likely impact

Based on the results of database searches and field investigations, only one threatened fauna species listed under the EPBC Act is likely to occasionally utilise the project area. The potential impacts to Carnaby's Cockatoo are addressed below.

On the Swan Coastal Plain, *Banksia attenuata, Banksia menziesii, Banksia grandis, Banksia ilicifolia, Banksia sessilis* and *Banksia prionotes* have been identified as common native food resources for Carnaby's Black Cockatoo.

The total project footprint is 66.6ha, but will require the clearing of 42.5ha of regrowth vegetation that provides limited foraging value for Carnaby's Black Cockatoos. Of this, 2.2ha has been assessed as being good (or better) quality from a foraging value perspective. As a result of clearing and grazing, the foraging values of the site are highly variable, ranging from Very Poor to High Quality habitat (**Figure 4**). Table 3 shows the areas of the site divided into habitat quality.

Table 3:
Areas of Different Habitat Quality on the Site

Habitat Quality	Area (ha)
Cleared	18.8
Very Poor	30.1
Poor	15.5
Good	1.6
High	0.6
Total	66.6

The site does not offer any potential for breeding or roosting due to the immaturity of trees as a result of the site being completely cleared on multiple occasions in the past.

Significance of Impacts

In order to determine if the Project will have a significant impact on Carnaby's Cockatoo, an assessment was undertaken against the Significant Impact Guidelines (DoE 2013), as presented in Tables 4 and 5. The outcome of this assessment concluded that the Project may have a significant impact on the Carnaby's Cockatoo.

Table 4:
Assessment Against Significant Impact Criteria for Carnaby's Cockatoo

Significant Impact Criteria	**Impact Outcome**
An action is likely to have a significant impact on an endangered or vulnerable species if there is a real chance or possibility that it will:	
Lead to a long-term decrease in the size of a population or important population of a species.	**Unlikely** – The proposal involves the clearance of 42.5ha of mostly poor quality foraging habitat within the modelled distribution of the Carnaby's Cockatoo. No evidence of suitable breeding or roosting trees in the project are has been found. Substantial areas of high quality foraging habitat exists in close proximity to the site, including the Boonanarring Nature Reserve (9,250ha) and lands recently acquired by the Department of Parks and Wildlife to the south of the project area. The presence of native vegetation in secure tenure means that there will be foraging resources for the species in perpetuity in the immediate locality of the project area.
Reduce the area of occupancy of the species	**Minor** - The Project is will reduce the area of occupancy of the population of Carnaby's Cockatoo within the local area or region by a minor amount (42.5ha). The species is known to occur throughout the greater locality, and the wider Swan Coastal Plain region. It is highly mobile and is able to move freely between sites for foraging. The foraging value of the vegetation in the project area is considered to be poor, with much higher quality habitat (under secure tenure) in close proximity to the site.
Fragment an existing	**Unlikely** – The Project is unlikely to fragment the population into two or more

important population or population into two or more populations.	populations. The species is highly mobile and the project will not create any form of barrier that prevents the movement of the species across the landscape. High quality foraging habitat remains in close proximity to the site within the conservation estate.
Adversely affect habitat critical to the survival of a species	**Unlikely** – The Project is unlikely to affect habitat critical to the survival of Carnaby's Cockatoo. The habitat located within the Project area does not consist of habitat described by the recovery plan as being critical for the survival of the Carnaby's Black Cockatoo.
Disrupt the breeding cycle of a population or important population.	**Unlikely** – The project area does not contain habitat suitable for Carnaby's Cockatoo breeding.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Unlikely** – The Project will involve clearing 42.5ha of poor quality foraging habitat for Carnaby's Cockatoo, but not to the point that this species would decline. Substantial areas of higher quality foraging habitat are located in very close proximity to the project area and are protected in the conservation estate.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat.	**Minor** – Landfill projects increase the risk of attracting more feral predators such as foxes and feral cats which in turn could potentially predate on native species. With appropriate management measures in place such as fencing and daily covering, the Project is not likely to increase the number of feral predators that already exist in the project area. Aurigen will implement feral animal control procedures to manage the risk posed by feral predators.
Introduce disease that may cause the species to decline	**Unlikely** – Disease is not a known threat to Carnaby's Cockatoo.
Interfere with the recovery of the species.	**Unlikely** – The Project is unlikely to interfere substantially with the recovery of Carnaby's Cockatoo as it is unlikely to interfere with the recovery actions outlined in the recovery plans for these species (DPaW 2013, DEC 2008).

Table 5:
Risk of Significant Impact for Carnaby's Cockatoo

Actions Leading to a Risk of Significant Impact	**Assessment**	**Comment**
Clearing of any known nesting tree.	No impact	No nesting trees in the project area.
Clearing or degradation of any part of a vegetation community known to contain breeding habitat.	No impact	No breeding habitat in the project area.

Actions Leading to a Risk of Significant Impact	Assessment	Comment
Clearing of more than 1 ha of quality foraging habitat.	Risk of impact	Removal of 42.5ha potential foraging habitat. Only 2.2ha is in a Good or better condition with the remaining habitat being in poor condition or worse.
Clearing or degradation (including pruning the top canopy) of a known night roosting site.	No impact	No known roosting sites in the project area.
Creating a gap of greater than 4km between patches of Black Cockatoo habitat (breeding, foraging or roosting).	No impact	Large areas of Black Cockatoo habitat are present immediately adjacent to the project area.

3.1 (e) Listed migratory species

Description

A search of the Protected Matters Search Tool (**Attachment E**) was undertaken to identify migratory species protected under the EPBC Act that may be relevant to the site (Table 6).

Table 6:
Migratory Species - Potential Matters of National Environmental Significance

Species	Status	Comment
Migratory Marine / Wetland / Terrestrial Birds		
Apus pacificus (Fork Tailed Swift)	Migratory	This species is almost exclusively aerial, flying from less than 1m to at least 300m above ground. It may be present on occasions in the region, though it is highly unlikely that species relies on the project site for its survival.
Ardea alba (Great Egret, White Egret)	Migratory	The site does not provide suitable habitat for this species.
Ardea ibis (Cattle Egret)	Migratory	The site does not provide suitable habitat for this species.
Haliaeetus leucogaster (White-bellied Sea-Eagle)	Marine	This species may be present on occasions in the region, though it is highly unlikely that species relies on the project site for its survival.
Merops ornatus (Rainbow Bee-eater)	Migratory	This species may be present on occasions in the region, though it is highly unlikely that species relies on the project site for its survival.
Pandion halietus (Osprey)	Migratory	This species occupies as large range and is highly mobile. It is unlikely to rely upon the project area for its survival. It generally inhabits areas around shallow waters which are not present in the project area.
Rostratula benghalensis (sensu lato)	Marine	Unlikely to be present in the project area as this

(Painted Snipe)		species inhabits coastal and wetland areas.
Thinornis rubricollis (Hooded Plover)	Marine	Unlikely to be present in the project area as this species inhabits sandy beaches and coastal lakes.

Nature and extent of likely impact

No migratory species will be impacted.

3.1 (f) Commonwealth marine area

Description

Not relevant

Nature and extent of likely impact

Not relevant

3.1 (g) Commonwealth land

(If the action is on Commonwealth land, complete 3.2(d) instead. This section is for actions taken outside Commonwealth land that may have impacts on that land.)

Description

Not relevant

Nature and extent of likely impact

Not relevant

3.1 (h) The Great Barrier Reef Marine Park

Description

Not relevant

Nature and extent of likely impact

Not relevant

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

Description

Not relevant

Nature and extent of likely impact

Not relevant

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	**Is the proposed action a nuclear action?**	X	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment

3.2 (b)	**Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?**	X	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment		

3.2 (c)	**Is the proposed action to be taken in a Commonwealth marine area?**	X	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))		

3.2 (d)	**Is the proposed action to be taken on Commonwealth land?**	X	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))		

3.2 (e)	**Is the proposed action to be taken in the Great Barrier Reef Marine Park?**	X	No
			Yes (provide details below)
	If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))		

3.3 Other important features of the environment

3.3 (a) Flora and fauna

FLORA

A preliminary flora and vegetation survey of the area was conducted by botanists, on 31 May 2006 (ATA Environmental, 2006), with a supplementary spring survey conducted on 11 November 2006 to target annual and ephemeral species. A further spring survey was conducted in September 2007 to assess vegetation quality in an area to the north-east of the main landfill footprint. The results of the surveys are provided in **Attachment F**. A summary of the results of the surveys is provided below:

Flora Species Recorded

A total of 151 species were recorded within the survey area from the May and November 2006 and September 2007 survey. This included 127 native species and 24 introduced species. The dominant families were the Myrtaceae (Eucalypt family – 14 species), Proteaceae (Banksia family – 21 native species) and Papilionaceae (Pea family – 12 species, 1 introduced species).

Conservation Significance of Flora/Vegetation

No Threatened Flora or Priority Flora was recorded from the site during the 2006 or 2007 site visits, nor were any Threatened Ecological Communities (TECs) recorded.

Vegetation Condition

The vegetation condition was of variable quality due to previous and current land management practices. The site had been previously cleared and was regenerating. The site forms a part of an active farm, carrying livestock (cattle) for grazing. Vegetation quality was originally assessed in 2006 and then again in 2007.

A Banksia density study was commissioned by Veolia in 2010. This study conducted an assessment of the vegetation on the site to determine the foraging value. The study concluded that the habitat had been substantially degraded through previous clearing and on-going farming practices.

Due to the poor condition of the vegetation, a 'habitat quality start rating' of 3 was assigned in consultation with the Department when completing the offsets calculator. Aurigen acknowledges that the habitat condition will have improved since the last assessment in 2010. Due to time constraints, a follow up assessment has not been conducted. However, Aurigen has assumed that the habitat value has improved. In doing so, a revised habitat start quality rating has been adopted and assigned as a value of 6.

FAUNA

Coffey Environments conducted a level 1 fauna assessment which consisted of desktop research and a site reconnaissance visit on 18 September 2007 to identify the available habitat types and a search for small reptiles and mammals as well as searching for any evidence of Black Cockatoo feeding (such as chewing, scarring or scratch marks) and searches for Quenda scats and scratchings.

A search of the DPaW's Threatened and Priority Species database was undertaken to identify Scheduled and Threatened species and Priority species previously recorded in the region. A search of the Commonwealth Protected Matters online database was also undertaken. Results are provided in **Attachment E**.

Coffey Environments used the data collected during September 2007 site visit, vegetation association mapping, floristic data and photographs to provide an indication of the fauna habitats that are available within the site. Most of the area contains *Eucalyptus todtiana*, with a variety of shrubs providing undergrowth. The undergrowth includes *Adenanthos cygnorum*, *Nuytsia floribunda*, *Banksia menziesii*, *B. prionotes*, and *Xanthorrhoea preissii*. There is no surface water, streams or wetlands.

Of the identified species Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is the only species listed under the EBPC Act that is likely to frequent portions of the site for foraging due to the presence of *Banksia* species. The vegetation present at the site does not provide suitable breeding habitats for this species of cockatoo.

3.3 (b) Hydrology, including water flows

Regional Hydrogeological Setting

The site lies above a subdued synclinal structure of Upper Cretaceous sediments of the Coolyena Group, on the southern toe of the Swan Syncline. The Upper Cretaceous sediments – referred to as a minor aquifer - are not well understood, as little investigation of these has been carried out (Moncrieff, 1989; Kay and Diamond., 2001) and groundwater in these areas is not used apart from on isolated rural developments.

Local Hydrogeology

Drilling local to the site has been carried out and reported in Diamond (2000) where deep bores were emplaced to investigate groundwater in the Leederville Formation, as well as into the unconfined Upper Cretaceous aquifer at the same location some 1km south of the proposed landfill. More recent drilling by ATA Environmental in 2006 was also carried out as part of an assessment of the proposed landfill site. Both sets of information have been used to assist with definition of local groundwater conditions within the regional context.

In the vicinity of the proposed landfill, the unconfined Poison Hill aquifer is not in hydraulic continuity with the main groundwater yielding unit of the Leederville aquifer – the Wanneroo Member. The latter is confined by a considerable thickness of Kardinya Shale of the Osborne Formation and Pinjar Shale of the Leederville Formation. Thus the main focus for assessing potential impacts from the proposed landfill is groundwater in the unconfined Poison Hill Aquifer.

The Upper Cretaceous sediments (Poison Hill Greensand) are clearly weathered to the drilled depth in each hole, as described by Kay and Diamond (2001), and it is unclear from the bore logs where the boundary is between the Surficial Deposits and the weathered Greensand. Indeed, as the Surficial Deposits are themselves weathered and reworked Upper Cretaceous (Moncrieff, 1989), it seems likely that the boundary between the two is gradational and not easily determined. Certainly there is no obvious change in lithology or geophysical logs which define a stratigraphic boundary as such. The absence of any boundary indicates that the Surficial Deposits and upper weathered Poison Hill Greensand form a single vadose zone for the unconfined aquifer beneath the proposed landfill site.

Surface Hydrology

There is no surface water present on the site, with the nearest major water bodies being the Gingin Brook approximately 4.5 km to the south, Boonanarring Brook which extends into the Boonanarring Nature Reserve, abutting the western boundary of the site, Red Gully Creek, some 15km to the northwest, and the Moore River 25km directly to the north. Lake Beermullah and White Lake are approximately 15km to the east, with Wannamal Lake lying approximately 15km to the northeast.

3.3 (c) Soil and Vegetation characteristics

SOIL

The proposed site is situated on the southern part of the Dandaragan Plateau, a gently undulating, sand and laterite covered plateau 140 to 260m AHD (Moncrieff, 1989). The Gingin Scarp lies to the west of the site, with the Muchea and Darling Faults to the east. There is little runoff from the Dandaragan Plateau due to the permeable surface cover (Moncrieff, 1989). The site lies above a subdued synclinal structure of the Upper Cretaceous sediments of the Coolyena Group, on the southern toe of the Swan Syncline (Kay & Diamond, 2001).

Regional geology is mapped as comprising Unit Qpo and Unit Czl (GSWA, 1978). Unit Qpo is described as soil and undifferentiated sand over laterite of the Coastal Plain. The sand is largely colluvial, with some minor alleviated areas. Unit Czl is described as laterite material which is largely massive in form, but includes overlying pisolithic gravel and laterized sands.

VEGETATION

Heddle *et al.* (1980) identified the vegetation within the site as part of the Cullalla Complex. This vegetation complex occurs on the Dandaragan Plateau and consists predominantly of a mixture of Low Open Forest of Banksia species – *Eucalyptus todtiana* and Open Woodland of C*orymbia calophylla* with a second storey of *E. todtiana – Banksia attenuata – B. menziesii – B. ilicifolia*. Full descriptions and results of the survey are in **Attachment F**.

Approximately 40% of the estimated pre-European extent of the Cullalla vegetation complex is remaining and 3% is currently protected within in secure reserves.

Further details about the vegetation characteristics is presented in Section 3.3(e).

3.3 (d) Outstanding natural features

There are no outstanding natural features on the site.

3.3 (e) Remnant native vegetation

VEGETATION ASSOCIATIONS

The vegetation survey confirmed that the vegetation on the site is part of the Cullalla Complex identified by Heddle (1980). Ten vegetation associations were mapped (**Figure 5**) on the site during the 2006 and September 2007 surveys, and are described below.

EtLOW

Low Open Woodland of *Eucalyptus todtiana* to 4m with scattered *Nuytsia floribunda* over a mixed Shrubland. Other common species include *Xanthorrhoea preissii*, *Eremaea beaufortioides*, and *Stirlingia latifolia*. This

vegetation association is located in the central portion of the site to the north of the sandy track and is natural regrowth of previously cleared vegetation. According to the vegetation condition rating scale as described in Bush Forever (Government of Western Australia, 2000) this vegetation association was classified as being in Good condition.

BaBmEtLOW1

Low Open Woodland of *Eucalyptus todtiana*, *Banksia menziesii* and *Banksia attenuata* to 5m over a Tall Shrubland of *Jacksonia sternbergiana* over an Open Mixed Shrubland. Other common species include *Allocasuarina humilis*, *Xanthorrhoea preissii*, *Petrophile brevifolia* and *Eremaea beaufortioides*. The most obvious difference from this vegetation association and the other two BaBmEtLOW associations is the condition of the vegetation which was classified as being in Very Good to Excellent condition with few obvious signs of human disturbance This vegetation association is located in the eastern and southern sections of the site. To the north of the sandy track the vegetation comprises regrowth from more recent clearing while the vegetation to the south of the track is in significantly better condition.

BaBmEtLOW2

Low Open Woodland of *Banksia attenuata*, *Banksia menziesii* and *Eucalyptus todtiana* to 3m in height over *Adenanthos cygnorum* Shrubland to 1.5m in height over Low Heath dominated by *Xanthorrhoea preissii*, *Stirlingia latifolia* and *Eremaea pauciflora*. Other associated species include *Allocasuarina humilis*, *Caustis dioica*, *Conospermum stoechadis* and *Jacksonia floribunda*. This vegetation association which was similar in general structure and dominant species to the other BaBmEtLOW associations but in a poorer condition, was recorded from the north-western portion of the site and has been regularly cleared. There was also evidence of recent grazing activities in the area and as a consequence the vegetation condition rating scale as described in Bush Forever (Government of Western Australia, 2000) of this vegetation association was classified as being in Good condition.

BaBmEtLOW3

Low Open Woodland of *Banksia attenuata, Banksia menziesii* and *Eucalyptus todtiana* to 4m in height over a Low Heath of *Allocasuarina humilis, Xanthorrhoea preissii, Eremaea pauciflora* and *Stirlingia latifolia*. Other associated species recorded include *Conospermum stoechadis, Conostephium pendulum, Hakea preissii* and *Jacksonia sternbergiana*. This vegetation association is located within the northeast portion of the site and is natural regrowth of previously cleared vegetation. The area appears to have been cleared less recently than the BaBmEtLOW2 association and as a consequence the condition was considered to be in Good to Very Good condition.

BaBmLOF

Low Open Forest of *Banksia attenuata* and *Banksia menziesii* to 4m in height over a Low Open Shrubland of *Allocasuarina humilis, Xanthorrhoea preissii, Regelia ciliata, Stirlingia latifolia, Verticordia nitens, Eremaea pauciflora* and *Conospermum stoechadis*. Other species recorded from this association include *Leucopogon capitellatus, Philotheca spicata* and *Conostephium pendulum*. This association was recorded from the central eastern portion of the site and while the aerial photography indicates that it has obviously been cleared in the recent past, the condition of the regrowth vegetation was considered to be in Very Good condition.

BmBpJsCTS

Closed Tall Scrub of *Banksia menziesii, Banksia prionotes* and *Jacksonia sternbergiana* to 3m in height with scattered *Eucalyptus todtiana* over *Melaleuca huegelii, Allocasuarina humilis, Adenanthos cygnorum* and *Ptilotus polystachyus* Open Shrubland over *Eremaea pauciflora, Acacia pulchella* and *Stirlingia latifolia* Low Open Heath. Other common species recorded from this association include *Eremaea beaufortioides, Hakea costata, Stirlingia latifolia* and *Xanthorrhoea preissii*. This association was recorded from a small area in the central western portion of the site and while it had obviously been cleared in the past 10 or so years and there was evidence of recent grazing by stock, the condition was considered to be Good to Very Good.

AcTS

Tall Shrubland of *Adenanthos cygnorum* with scattered *Nuytsia floribunda* and *Eucalyptus todtiana* to 3m over a Low Open Shrubland of *Eremaea beaufortioides* and *Xanthorrhoea preissii*. Other common species include *Stirlingia latifolia* and *Hibbertia hypericoides*. This vegetation association is located in the south-western portion of the site and comprises regrowth from previously cleared native vegetation.

JsTOS

Tall Open Shrubland of *Jacksonia sternbergiana* to 3.5m in height over a Mixed Open Heath of *Jacksonia floribunda*, *Melaleuca huegelii*, *Adenanthos cygnorum*, *Hibbertia hypericoides* and *Synaphea spinulosa*. Other common species recorded from this vegetation association include *Adenanthos cygnorum*, *Eremaea beaufortioides*, *Pimelea angustifolia* and *Synaphea spinulosa*. This association was recorded from a very small area along the north-western boundary of the site and has obviously been previously cleared (~ 10 years prior to survey) the condition was considered to range from Good to Very Good.

MhS

Shrubland of *Melaleuca huegelii* to 1.5m in height with scattered *Eucalyptus todtiana*, *Banksia attenuata* and *Corymbia calophylla* over Low Heath of *Xanthorrhoea preissii*, *Hibbertia hypericoides* and *Synaphea spinulosa*. Other species recorded from this vegetation type include *Adenanthos cygnorum*, *Daviesia decurrens* and *Lechenaultia biloba*. This association was recorded from the crest of the hill in the central northern portion of the site. The area had previously been largely cleared with only scattered Marri and Prickly Bark trees retained as shade trees for grazing stock. As a consequence the condition of this association was considered to be Good.

MLCH

Low Closed Heath of *Xanthorrhoea preissii, Allocasuarina humilis, Eremaea pauciflora, Leucopogon capitellatus* and *Synaphea spinulosa* to 1m in height. Other species associated with this vegetation association include *Eremaea beaufortioides, Leucopogon capitellatus, Petrophile linearis, Philotheca spicata* and *Stirlingia latifolia*. This association was recorded from the central eastern portion of the site and was relatively species rich with 42 species recorded from a single 10m x 10m quadrat sampled. While it is evident from recent aerial photography of the area that this vegetation association has previously been cleared the regrowth was considered to be in Very Good condition.

In addition to native vegetation within the site, an area of pasture is located along the western boundary of the site. This area has been subject to clearing and intense grazing and comprises of pasture grass species.

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

Not relevant

3.3 (g) Current state of the environment

The majority of the site has previously been cleared for farming operations. The vegetation present is regrowth remnant *Banksia* woodland with cleared pasture areas and sandy tracks/firebreaks.

The condition of the vegetation was assessed using the condition rating scale of Keighery published in Bush Forever (Government of Western Australia, 2000). Keighery's condition rating scale ranges from Pristine (which the vegetation exhibits no visible signs of disturbance) to Completely Degraded (where the vegetation structure in no longer intact and without native plant species). The vegetation of the site ranged from pasture vegetation with a condition of Completely Degraded to native vegetation in Very Good to Excellent condition (**Figure 6**). The rating scale for vegetation condition (**Figure 6**) differs from that used to assess the foraging value (or habitat condition) as represented in **Figure 4**.

As indicated in Section 3.3(a), time constraints have not permitted a follow up assessment of habitat condition. However, Aurigen has assumed that the habitat start quality is higher than originally assessed during the previous referral. The previous assessment assigned a start rating of 3. Aurigen has assumed this value to be a 6.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

There are no Commonwealth Heritage Places on the site or any places recognised as having heritage values.

3.3 (i) Indigenous heritage values

A search of the Register of Aboriginal Sites database maintained by the Department of Aboriginal Affairs (search date: 27 August 2015) did not find any significant sites in the area.

3.3 (j) Other important or unique values of the environment

There are no national parks, conservation reserves or wetlands of national significance that will be affected by this proposal.

3.3 (k) Tenure of the action area (eg freehold, leasehold)

Freehold

Aurigen has entered into a binding conditional offer to purchase the property from the current owners.

3.3 (l) Existing land/marine uses of area

The property has been used for farming and horticultural purposes, including the proposed landfill site. A feedlot for Kimberley cattle is located near the Fernview Farm residence, with the majority of the remainder of the property utilised for grazing. Some areas have been previously used for wildflower production, with evidence of Geraldton Wax plantations previously killed by frost.

The proposed landfill footprint is located in the northern most part of Lot 98 and is predominantly cleared grazing land. The heaviest foliage is native scrub regrowth in an area cleared approximately 15 years ago. This regrowth covers some of the south-eastern most section of the footprint. North of the existing track which bisects the footprint, exists low scrub and pasture used for wild flower production and cattle grazing. The nearest residence is Fernview Farm located approximately 1.95km to the south of the proposed facility. Beyond Lot 98, the nearest residence to the facility is approximately 2.3km to the north east.

3.3 (m) Any proposed land/marine uses of area

Not relevant

4 Environmental outcomes

Aurigen is committed to the delivery of the Fernview Landfill project in a manner that minimise its impact upon the environment. To achieve this, Aurigen is committed to constructing an operating the landfill in accordance with its environmental approvals.

As a result of implementing the project, the following outcomes are expected:

Habitat Clearing

- The project footprint will not exceed 66.6ha.
- No more than 42.5ha of clearing will be undertaking within the project footprint.

Offsets / Habitat Retention / Management

- Approximately 225ha of habitat (**Figure 7**) will be retained in perpetuity.
- The method of protecting the proposed conservation area will be resolved prior to the commencement of site works. The options to consider include the transfer of land to the State Conservation Estate, or for a covenant to be placed over the habitat to ensure that it is protected in perpetuity.
- Conduct a habitat assessment of the retention area prior to the commencement of site works to establish baseline habitat condition.
- The proposed retention area is managed in such a way that the habitat condition does not deteriorate over the life of the project (excluding naturally caused events). Aurigen will monitor and manage the interface between the project and the retained vegetation.
- Areas of habitat in the retention area that are mapped as 'Good' or lower are to be rehabilitated using native species so that the habitat is in a 'Very Good' condition at the completion of the project.
- Rehabilitated areas and the project interface to the conservation area are to be monitored annually.
- Aurigen to implement feral animal control procedures in the project footprint to mitigate risks associated with feral animals.

Landfill Closure

- Upon cessation of the landfill operations, Aurigen will ensure that the landfill is capped appropriately and the surface is revegetated using species that provide foraging resources. The minimum area to be revegetated is 42.5ha.

Reporting

- Aurigen will undertake annual compliance reporting to demonstrate compliance with the above outcomes for the previous year. Reporting will be published on their website by 30 June of each year after the commencement of the action. Non-compliance with the above outcomes will be reported to the Department.
- Any variance from the above outcomes will be undertaken following written approval from the Federal Minister for the Environment.

5 Measures to avoid or reduce impacts

The measures to be implemented by Aurigen follow the sequence of Avoid, Minimise and Mitigate.

Avoidance

The former project proponent initiated a comprehensive site selection process that discounted potential alternative sites due to potential groundwater and/or vegetation constraints. The current project site was considered the preferred location as the site characteristics are suitable for the landfill operation. These characteristics included topography, distance from sensitive receptors and waterways, geological suitability, depth to groundwater, proximity to the Perth metropolitan region and access to key transport routes. The vegetation present on the site was seen as being degraded due to past clearing activities for agricultural purposes.

The project design has previously been re-modelled on several occasions to modify the footprint with a view to reducing the impact to remnant vegetation in the project area and in doing so reduce the potential impacts to Carnaby's Cockatoo. The construction and operation of the landfill will require the clearance of approximately 42.5ha of regrowth native vegetation. Of this, it is estimated that only 2.2ha of regrowth vegetation in good or better condition will be cleared. In comparison, the previous footprint required the removal of up to 61ha of regrowth native vegetation of which 26ha was considered to be of good quality (or better) from the perspective of Black Cockatoo foraging value. The redesign process has contributed significantly to reducing the potential environmental impact of its proposed Gingin Regional landfill operation.

A section of vegetation to the south of the landfill site was identified during the vegetation surveys as being in excellent condition, and the recommendation was made that consideration be given to retaining this portion of vegetation for conservation purposes. The original landfill footprint was shifted further north to avoid this area of Excellent vegetation which remains external to the proposed site operations. Impacts to this vegetation will be minimised by the construction of a 1.8m mesh security fence along the existing fence line. Aurigen will implement a weed monitoring and management programme in this area prior to the commencement of operations.

On-site Mitigation

The site will be designed and operated to the highest possible standard to minimise impact on surrounding vegetation. Strategies to be employed to minimise the impacts on vegetation include:

- Clearing boundaries will be clearly marked and identified, including the use of fencing where appropriate. Personnel will be educated on the importance of adhering to clearing limits in order to minimise disturbance to existing vegetation.
- Cleared soil and/or vegetation will be stockpiled for potential use as daily cover and/or capping material.
- Site disturbance is to be minimised, with vegetation retained where possible in between infrastructure with regard to Health, Safety and Operational requirements.
- Roads and tracks will be developed along existing easements where possible.
- Vegetation in Very Good to Good condition south of the proposed footprint will be fenced to minimise disturbance. The proponent will develop and implement a weed monitoring and management programme in this area prior to the commencement of operations.
- Vehicle use will be restricted to designated tracks with parking in allocated areas.
- A Fire Management Plan has been prepared and will be implemented as part of the project's Environmental Management Plan to minimise the risk of fire.

The following fauna management strategies will be implemented during and after the development of the site:

- Vehicles and machinery will be parked in designated locations only to minimise habitat damage.
- Traffic will be restricted to established roads and parking areas, to again minimise habitat destruction.
- Site traffic speed limits will be lowered to minimise fauna death on roads.
- Ensuring putrescible wastes are covered with soil at the end of each day. This will minimise the potential for night time foraging by birds and feral and native animals.

- Ensuring housekeeping procedures such as litter removal at the perimeter of the site are maintained to discourage fauna from the site.
- Applying the odour control strategies to minimise the attraction of fauna to the site.
- Site environmental inductions will raise employee awareness in relation to conservation of fauna (particularly rare, threatened or vulnerable fauna) and their habitats.
- Direct contact with fauna will be avoided whenever possible.

These management measures are designed to minimise direct impacts and the potential for predators and other feral animals to proliferate in the area causing indirect impacts on the Carnaby's Black Cockatoo.

On completion of the landfill operation, the intention is to cap and rehabilitate the site with native vegetation.

Proposed Off-sets

Details relating to proposed offsets are provided in Section 4 of this referral. However, in summary Aurigen will:

- Set aside approximately 225ha of habitat on Lot 98 (**Figure 7**) for conservation purposes in perpetuity.
- Assess the condition of habitat in the proposed conservation area to establish a baseline.
- Manage the interface between the project area and the conservation area to ensure that the habitat condition does not deteriorate from baseline condition.
- Rehabilitate any areas in the proposed conservation area that are assessed as being of Good condition or lower to achieve a level of Very Good or higher by the completion of the project.
- Undertake annual monitoring of the interface and rehabilitation areas.
- Implement feral animal control procedures in the project area.
- Ensure appropriate closure of the landfill facility including the revegetation of the at least 42.5ha using plant species to provide foraging resources.

6 Conclusion on the likelihood of significant impacts

6.1 Do you THINK your proposed action is a controlled action?

	No, complete section 5.2
X	Yes, complete section 5.3

6.2 Proposed action IS NOT a controlled action.

6.3 Proposed action IS a controlled action

	Matters likely to be impacted
	World Heritage values (sections 12 and 15A)
	National Heritage places (sections 15B and 15C)
	Wetlands of international importance (sections 16 and 17B)
X	Listed threatened species and communities (sections 18 and 18A)
	Listed migratory species (sections 20 and 20A)
	Protection of the environment from nuclear actions (sections 21 and 22A)
	Commonwealth marine environment (sections 23 and 24A)
	Great Barrier Reef Marine Park (sections 24B and 24C)
	A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
	Protection of the environment from actions involving Commonwealth land (sections 26 and 27A)
	Protection of the environment from Commonwealth actions (section 28)
	Commonwealth Heritage places overseas (sections 27B and 27C)

Although the proposal has been re-designed to reduce the scale of impact on foraging resources, the implementation of the project will initially result in the net loss of 42.5ha, part of which is re-growth *Banksia* woodland. The vegetation to be cleared has been degraded through past clearing and current farming practices. If left over time, the woodland will regenerate to provide further foraging resources for the species. The project area is within the modelled foraging area for Carnaby's Black Cockatoo. No suitable breeding trees are present in the area to be cleared. The species is known to breed in the nearby Boonanarring Nature Reserve.

7 Environmental record of the responsible party

NOTE: If a decision is made that a proposal needs approval under the EPBC Act, the Environment Minister will also decide the assessment approach. The EPBC Regulations provide for the environmental history of the party proposing to take the action to be taken into account when deciding the assessment approach.

		Yes	No
7.1	**Does the party taking the action have a satisfactory record of responsible environmental management?** **Provide details** Aurigen Group Ltd is an unlisted public company that owns a number of autonomous subsidiary companies specialising in the operation and maintenance of waste treatment and material recovery facilities, resource recovery from waste, commodity aggregation and trading and waste logisitics. The Company is founded upon the core business values of Integrity and Honesty and on the pillars of Professionalism, Excellence and Commitment. Aurigen provides waste management and resource recovery solutions as well as logistical and operational support to its clients. The Company's personnel have significant practical experience in the area of waste management throughout Australia. Aurigen currently owns and operates two resource recovery facilities: a Construction and Demolition (C&D) waste recycling facility, and a Commercial and Industrial (C&I) Waste recycling facility. The C&D recovery facility was constructed and commissioned in 2007. The C&I facility was completed in late 2013 and commissioned in early 2014. The operation of these facilities is conducted in an environmentally responsible manner.	✓	
7.2	**Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources?** **If yes, provide details**		✓
7.3	**If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework?** **If yes, provide details of environmental policy and planning framework** A Works Approval for the Fernview Landfill has been granted by the DER. The construction and operation of the landfill facility will be conducted in accordance with the management commitments specified by Aurigen and in accordance with relevant approvals.	✓	
7.4	**Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?** **Provide name of proposal and EPBC reference number (if known)**		✓

8 Information sources and attachments

8.1 References

(ATA) ATA Environmental (2006) *Flora and Vegetation Assessment, Lot 7778 Wannamal Road South, Cullalla.* Report No. 2006/170 Version 2. December, 2006.

Bamford Consulting Ecologists (2004*)* *Roe Highway Stage 7 Project: Fauna Plan.* Unpublished report prepared for Roe 7 Alliance

Cooper, C.E., P.C. Withers, P.R. Mawson, S.D. Bradshaw, J. Prince and H. Roberston (2002) Metabolic Ecology of Cockatoos in the South-west of Western Australia. Published in *Australian Journal of Zoology*, 2002, **50**, 67-76

Diamond, R (2000) *Red Gully Monitoring Bores, Gingin: RG1-3 Bore Completion Report*. Waters and Rivers Commission, Hydrogeology Report No. HR 174. Western Australia, Perth.

(DoE) Department of Environment (2005a) *Landfill Waste Classification and Waste Definitions, 1996 (As Amended)*. Contaminated Sites Management Series, Department of Environment, Perth.

(DoE) Department of Environment (2005b) Draft Siting, Design, Operation and Rehabilitation of Landfills. November 2005.

(EPA) Environmental Protection Authority (2009) Draft Environmental Assessment Guideline No.2 Changes to Proposals After Assessment - Section 45C of the Environmental Protection Act 1986 November 2009

Government of Western Australia, (2000) Bush Forever - Keeping the Bush in the City. Volume 1: Policies Principles and Processes, Western Australian Planning Commission, Perth.

Griffin E.A., (1992) *Floristic Survey of Remnant Vegetation in the Bindoon to Moora Area, Western Australia*. Resource Management Technical Report No. 142. Prepared for the National Land & Water Resource Audit Dryland Salinity Theme Project 3.Western Australian Department of Agriculture, June 1992.

(GSWA) Geological Survey of Western Australia (1978) *Perth Sheet 50-14 and Part of Sheet 50-13*. 1:250,000 Geological Map Series.

Heddle, E.M., Loneragan, O.W. and Havell, J.J., (1980) *Vegetation of the Darling System. IN: Atlas of Natural Resources, Darling System, Western Australia,* Department of Conservation and Environment, Perth, Western Australia.

Kay, T & Diamond, R (2001) A Hydrogeological Assessment of the Victoria Plains, Red Gully, Gingin Townsite and Eclipse Hill Sub areas of the Gingin Groundwater Area. Water and Rivers Commission, Hydrogeology Report No. HR 156. Western Australia, Perth.

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Parsons Brinckerhoff (2003) *Landfill Site Selection – Fatal Flaw Analysis*. Unpublished report prepared for the Shire of Gingin.

Shire of Gingin (2012) *Local Planning Scheme No. 9; Scheme Text*. Shire of Gingin.

Strategen (2009) *Kwinana Refinery Residue Storage Area Site Postans Road Kwinana.* Unpublished report prepared for Alcoa World Alumina Australia

Valentine, L.E and W. Stock (2008) *Food Resources of Carnaby's Black-Cockatoo (Calyptorhynchus latirostris) in the Gnangara Sustainability Strategy Study Area*. Unpublished report prepared for the Forest Products Commission

(WMB) Waste Management Board (2004) *Statement of Strategic Direction for Waste Management in Western Australia – Vision and Priorities*. Department of Environment, Western Australia.

(WAPC) Western Australian Planning Commission (2006) *Gingin Coast Structure Plan*. Perth, February 2006.

Waste Authority of Western Australia (2013). Strategic Waste Infrastructure Planning Project – Update. Available online - http://www.wasteauthority.wa.gov.au/media-working-groups/SWIP/Planning_Sites_Dec13.pdf. Accessed 17/8/15.

8.2 Reliability and date of information

The information contained in this referral is current and to the best of our knowledge is true and accurate. It is based on extensive research and field investigation as referenced throughout the referral.

8.3 Attachments

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	✓	See list below
	GIS file delineating the boundary of the referral area (section 1)		
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environments (section 3)	✓	See list below
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)	✓	See list below
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)	✓	See list below
	copies of any flora and fauna investigations and surveys (section 3)	✓	See list below
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)	✓	See list below
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		

List of Attachments

Figure 1: Regional Location

Figure 2: Project Footprint

Figure 3: Indicative Landfill Design

Figure 4: Foraging Value

Figure 5: Vegetation Types

Figure 6: Vegetation Condition

Figure 7: Proposed Offset Area

Attachment A: Shire of Gingin's Local Planning Scheme No. 9 – Special Use Area 5 Special Conditions

Attachment B: Ministerial Statement 796

Attachment C: EPA Extension Letter

Attachment D: Works Approval

Attachment E: Search Results – Protected Matters Search Tool

Attachment F: Flora, Vegetation and Fauna Assessment

9 Contacts, signatures and declarations

NOTE: Providing false or misleading information is an offence punishable on conviction by imprisonment and fine (s 489, EPBC Act).

Under the EPBC Act a referral can only be made by:

- the person proposing to take the action (which can include a person acting on their behalf); or
- a Commonwealth, state or territory government, or agency that is aware of a proposal by a person to take an action, and that has administrative responsibilities relating to the action[1].

Project title:

9.1 Person proposing to take action

1. Name and Title:	Tom Rudas
2. Organisation (if applicable):	Aurigen Group Ltd Organisation name should match entity identified in ABN/ACN search
3. EPBC Referral Number (if known):	
4: ACN / ABN (if applicable):	67 602 668 486 (ABN)
5. Postal address	Unit 9/48 Kelvin Road, Maddington WA 6109
6. Telephone:	(08) 9452 2000
7. Email:	info@aurigen.com.au
8. Name of designated proponent (if not the same person at item 1 above and if applicable):	
9. ACN/ABN of designated proponent (if not the same person named at item 1 above):	

COMPLETE THIS SECTION ONLY IF YOU QUALIFY FOR EXEMPTION FROM THE FEE(S) THAT WOULD OTHERWISE BE PAYABLE

I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

□ an individual; OR

□ a small business entity (within the meaning given by section 328-110 (other than subsection 328-119(4)) of the *Income Tax Assessment Act 1997*); OR

☑ not applicable.

[1] *If the proposed action is to be taken by a Commonwealth, state or territory government or agency, section 8.1 of this form should be completed. However, if the government or agency is aware of, and has administrative responsibilities relating to, a proposed action that is to be taken by another person which has not otherwise been referred, please contact the Referrals Gateway (1800 803 772) to obtain an alternative contacts, signatures and declarations page.*

If you are small business entity you must provide the Date/Income Year that you became a small business entity:

Note: You must advise the Department within 10 business days if you cease to be a small business entity. Failure to notify the Secretary of this is an offence punishable on conviction by a fine (regulation 5.23B(3) *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth)).

COMPLETE THIS SECTION ONLY IF YOU WOULD LIKE TO APPLY FOR A WAIVER

I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations. Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made:

□ not applicable.

Declaration

I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.
I understand that giving false or misleading information is a serious offence.
I agree to be the proponent for this action.
I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature [signature] Date 1/12/15

9.2 Person preparing the referral information (if different from 8.1)

Individual or organisation who has prepared the information contained in this referral form.

Name	Paul Zuvela
Title	Manager – Environmental Impact Assessment
Organisation	Aurora Environmental (Perth) Pty Ltd
ACN / ABN (if applicable)	25 892 985 809
Postal address	Dilhorn House, 2 Bulwer Street PERTH WA 6000
Telephone	(08) 9227 2600
Email	paul.zuvela@auroraenvironmental.com.au

Declaration

I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.

I understand that giving false or misleading information is a serious offence.

Signature [signature] Date 1/12/15

ATTACHMENT A

Shire of Gingin Local Planning Scheme No. 9 – Special Use Area 5 Special Conditions

	PARTICULARS OF LAND	SPECIAL USES	SPECIAL CONDITIONS
SU5	Portion of Lot 7778 situated north of the Boonanarring Road reserve and Wannamal Road South reserve (east of the intersection with Boonanarring Road). *AMD 104 GG 17/08/10*	1. Waster Management Facility for the Disposal, Recovery and Re-processing of Class II wastes only and incidental infrastructure. 2. Activities associated with the downstream processing and utilisation of Class II waste only. 3. Such Land Use Classes as are permitted or permitted subject to the discretion of the Council in Column 7, Rural Zone of the Zoning Table.	1. All development of the site shall be subject to the application to the Local Authority for Approval to Commence Development. 2. Development of the Waste Management Facility is to be generally in accordance with the shire of Gingin TPS 8 Amendment No 104 Scheme Amendment Report September 2009, the Design and Hydrology Assessment Report December 2009 and the Statement of Conditions No 796 issued by the Minister for the Environment; or in such other manner as may be approved by Council and the Minister for Environment. 3. Except as otherwise approved by the Council, the Development Application will be required to address the Fernview Regional Waste Management Facility – "Future Actions" as identified in the Report titled : Fernview Regional Waste Management Facility – Design and Hydrology Assessment Report prepared by IW Projects Pty Ltd, Final, December 2008 and, as a minimum, shall also address the following: • Provide a Stability and Settlement Assessment carried out by a competent stability expert to the satisfaction of the Chief Executive Officer at the Shire of Gingin. • Confirm that the detailed landfill design includes adequate localised stormwater diversion particularly around the perimeter of the landfill and the leachate evaporation ponds. • Confirm that the final detailed design for the leachate collection system adequately

	PARTICULARS OF LAND	SPECIAL USES	SPECIAL CONDITIONS
			acceptability of linear slopes, leachacte sump configuration, extraction systems, consistency with landfill staging, and the need or otherwise for separate leachate sump configuration, extraction systems, consistency with landfill staging, and the need or otherwise for separate leachate sumps for each landfill stage. • Include a detailed design of the proposed Geosynthetic Clay Liner (GLC) and consider the impact of construction the GCL layer on the 200mm sand later and Geomembrane Linear below and the construction methodology of the Geomembrane Liner to consider the stablitiy and constructability issues when placing the Geomembrane. • Groundwater extraction bores will be required immediately downstream of the landfill leachate sumps and sediment pond. • Include provision for groundwater rest levels to be measured regularly and the groundwater contours be updated and flow directions repositioned. • Groundwater monitoring to be provided to the Shire on a bi-annual basis. • Require that any future Development Application for the re-mining and re-processing of inert waste shall consider the overall impacts on the landfill operation, liner and leachate collection, detection systems and the environment including:

	PARTICULARS OF LAND	SPECIAL USES	SPECIAL CONDITIONS
			○ The long term stability of the waste mass; ○ Potential for damage to the liner and leachate collection systems from mining and re-filling with new waste; ○ Leachate management during mining; ○ Adequacy of the existing leachate collection system to collect leachate from new waste; ○ The composition of the mined and re-processed material; and ○ The need, or otherwise, for any liner system to the Inert Spoil Dump to prevent contamination of the local groundwater. 4. All development that includes uses incompatible with sensitive land uses will be located such that the 500m buffer is fully accommodated within the boundaries of the Portion of Lot 7778 zoned "Special Use". 5. No Sensitive Land Use as provided for under the Statement of Planning Policy No. 4 – State Industrial Buffer Policy of the Western Australian Planning Commission shall be permitted. 6. As a condition of future subdivision or development on Lot 7778, a notification pursuant to Section 70a of the Transfer of Land act 1893 (as amended), or a similar legal instrument, is to be registered on the Certificates of Titles of Lot 7778 to advise that amenity may be affected by activity associated with the Waste Management Facility. 7. As a condition of development or subdivision approval, a Fire Management Plan for Lot 7778 will be required to be prepared and implemented to the satisfaction of the

	PARTICULARS OF LAND	SPECIAL USES	SPECIAL CONDITIONS
			Local Government and the Fire and Emergency Services. 8. Arrangements being made with the Local Government and / or Main Roads for the upgrading and / or construction of Wannamal Road West and Wannamal Road South and the Wannamal Road West / Brand Highway intersection. 9. Prior to subdivision or development of the lot, a Local Water Management Plan is to be prepared and implemented to the specifications of the Department of Water.

ATTACHMENT B

Ministerial Statement 796

Published on 11 June 2009 Statement No: 796

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE *ENVIRONMENTAL PROTECTION ACT 1986)*

CLASS II LANDFILL, LOT 7778 DIAGRAM 209805, 1189 WANNAMAL ROAD SOUTH, CULLULA, SHIRE OF GINGIN

Proposal:	To construct and operate a landfill accepting Class II-type waste. Six cells will be constructed with a total operational lifetime of not more than 30 years. A landfill gas collection system and utilisation plant facility will also be constructed.
Proponent:	Veolia Environmental Services (Australia) Pty Ltd (ABN 20 051 316 584)
Proponent Address:	4-6 Rivers Street, BIBRA LAKE WA 6163
Assessment Number:	1736

Report of the Environmental Protection Authority: Bulletin 1287

The proposal referred to in the above report of the Environmental Protection Authority may be implemented. The implementation of that proposal is subject to the following conditions and procedures:

1 Proposal Implementation

1-1 The proponent shall implement the proposal as assessed by the Environmental Protection Authority and described in schedule 1 of this statement subject to the conditions and procedures of this statement.

1-2 The proponent shall implement the proposal within the boundary delineated by the AMG coordinates in schedule 2.

1-3 The proponent shall refer any changes to the type of waste intended for acceptance to the Environmental Protection Authority.

2 Proponent Nomination and Contact Details

2-1 The proponent for the time being nominated by the Minister for Environment under sections 38(6) or 38(7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal.

2-2 The proponent shall notify the Chief Executive Officer of the Department of Environment and Conservation (CEO) of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.

3 Time Limit of Authorisation

3-1 The authorisation to implement the proposal provided for in this statement shall lapse and be void within five years after the date of this statement if the proposal to which this statement relates is not substantially commenced.

3-2 The proponent shall provide the CEO with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.

4 Compliance Reporting

4-1 The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the CEO of the Department of Environment and Conservation.

4-2 The proponent shall submit to the CEO of the Department of Environment and Conservation, the compliance assessment plan required by condition 4-1 at least 6 months prior to the first compliance report required by condition 4-6. The compliance assessment plan shall indicate:

1. frequency of compliance reporting;
2. approach and timing of compliance assessments;
3. retention of compliance assessments;
4. reporting of potential non-compliances and corrective actions taken;
5. table of contents of compliance reports; and
6. public availability of compliance reports.

4-3 The proponent shall assess compliance with conditions in accordance with the compliance assessment plan required by condition 4-1.

4-4 The proponent shall retain reports of all compliance assessments described in the compliance assessment plan required by condition 4-1 and shall make those reports available when requested by the CEO of the Department of Environment and Conservation.

4-5 The proponent shall advise the CEO of the Department of Environment and Conservation of any potential non-compliance as soon as practicable.

4-6 The proponent shall submit a compliance assessment report annually from the date of issue of this Implementation Statement addressing the previous twelve month period or as agreed by the CEO of the Department of Environment and Conservation. The compliance assessment report shall:

1. be endorsed by the proponent's Managing Director or a person, approved in writing by the Department of Environment and Conservation, delegated to sign on the Managing Director's behalf;

2. include a statement as to whether the proponent has complied with the conditions Review;

3. identify all potential non-compliances and describe corrective and preventative actions taken;

4. be made publicly available in accordance with the approved compliance assessment plan; and

5. indicate any proposed changes to the compliance assessment plan required by condition 4-1.

5 Performance Review and Reporting

5-1 The proponent shall submit to the CEO a Performance Review Report at the conclusion of the first, second, fourth, sixth, eighth and tenth years after the start of implementation and then, at such intervals as the CEO may regard as reasonable, which addresses:

1. the major environmental risks and impacts; the performance objectives, standards and criteria related to these; the success of risk reduction/impact mitigation measures and results of monitoring related to management of the major risks and impacts;

2. the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable; and

3. significant improvements gained in environmental management which could be applied to this and other similar projects.

5-2 The proponent shall make the Performance Review Reports required by condition 5-1 publicly available in a manner approved by the CEO.

6 Ground and Surface Water

6-1 The proponent shall construct the landfill cells and leachate storage ponds to include as a minimum, a double-lined containment system consisting of a minimum 2.0 millimetre high-density polyethylene flexible membrane liner and a clay based liner with a performance equivalent or greater than that of a compacted clay liner one metre thick and a hydraulic conductivity less than 1×10^{-9} metres per second. The lining system shall also incorporate a leakage detection and recovery system beneath the double liner consisting of a permeable layer underlain by a further 2.0 mm thick high-density polyethylene flexible membrane.

6-2 The proponent shall ensure that at all times landfill and waste mining activities preserve the quality of ground and surface water consistent with ANZECC* requirements, taking into consideration natural background water quality, so that existing and potential uses, including ecosystem maintenance, are protected.

* - *Australian Water Quality Guidelines for Fresh and Marine Waters*, ANZECC (November 1992, and its updates).

6-3 The proponent shall monitor the quality of groundwater on and in proximity to the proposal area shown in Figure 2 in Schedule 1. This monitoring shall be done in accordance with the works approval and licensing provisions of Part V of the *Environmental Protection Act 1986*.

6-4 The proponent shall submit the results of the monitoring to the CEO of the Department of Environment and Conservation in accordance with the timing and requirements of condition 6-3.

6-5 In the event that the requirements of condition 6-2 are not met, the proponent shall provide proposed management measures to the CEO of the Department of Environment and Conservation.

6-6 The proponent shall make the results of monitoring required by condition 6-4 publicly available in a manner approved by the CEO.

7 Flora and Vegetation

7-1 The proponent shall implement the proposal to avoid disturbance of areas south of line from Map Grid of Australia coordinate 402075mE, 6545552mN to Map Grid of Australia coordinate 403252mE, 6545552mN where ‘Very Good’ to ‘Excellent’ condition vegetation has been recorded.

8 Landfill Decommissioning and Post-closure Management Plan.

8-1 Prior to the commencement of construction, the proponent shall prepare a draft Landfill Decommissioning and Post-closure Management Plan in accordance with the requirements of the CEO of the Department of Environment and Conservation.

8-2 At least two years prior to the anticipated date of closure, the proponent shall submit a final Landfill Decommissioning and Post-closure Management Plan designed to ensure that the site is left in an environmentally acceptable condition in accordance with the requirements of the CEO of the Department of Environment and Conservation.

The Landfill Decommissioning and Post-closure Management Plan shall address:

1. Progressive rehabilitation to pre-development condition or better through re-vegetation of capped landfill cells with selected local native species;
2. Choice of capping materials which are consistent with Best Practice Guidelines, which shall include a low permeability layer, followed by a sub-soil layer and a final layer of soil suitable for vegetation establishment;
3. Ongoing operational practice to ensure that the final landfill surface will be constructed to a predetermined crossfall to enhance surface water runoff while safeguarding against erosion and to ensure that final contours of the site will blend into the surrounding environment;
4. Monitoring and management of ground and surface water; and
5. Response, mitigation and contingency measures to be implemented if ground and surface water quality is affected to an unacceptable level as determined by the CEO of the Department of Environment and Conservation.

8-3 The proponent shall implement the final Landfill Decommissioning and Post-closure Management Plan required by conditions 8-2 until such time as the Minister for Environment determines, on advice of the CEO of the Department of Environment and Conservation, that the proponent's post-closure responsibilities are complete.

8-4 The proponent shall make the draft and final Landfill Decommissioning and Post-closure Management Plans required by conditions 8-1 and 8-2 publicly available in a manner approved by the CEO of the Department of Environment and Conservation.

9 Financial assurance

9-1 As security for the due and punctual observance and performance by the proponent of the requirements of conditions 6-1, 6-2 and 8-3, the proponent shall, prior to the commencement of construction, provide to the CEO of the Department of Environment and Conservation, a financial assurance for the benefit of both the Minister and the CEO and which is in the form of an unconditional and irrevocable bank guarantee, from a guarantor acceptable to the CEO and in a form acceptable to the CEO, in the initial amount of AU$3.5 million.

9-2 Prior to the commencement of landfilling, the proponent shall prepare and submit to the CEO of the Department of Environment and Conservation an assessment of the risk covered by the financial assurance.

9-3 The amount of the financial assurance shall be reviewed and as necessary replaced every three years in accordance with condition 9-2.

9-4 In the event that the guarantor referred to in condition 9-1 terminates its liability under the bank guarantee by paying to the Minister or the CEO the balance of the financial assurance remaining unpaid, the CEO will hold the financial assurance (being the amount paid by the guarantor upon termination), as security for the due and punctual observance and performance by the proponent of the requirements of conditions 6-1, 6-2 and 8-3, in an interest bearing account nominated by the CEO, with the interest accruing for the benefit of the Minister or the CEO.

9-5 The financial assurance may be called on or used in accordance with section 86E of the *Environmental Protection Act 1986* if the proponent fails to implement the proposal in accordance with conditions 6-1, 6-2 and 8-3.

9-6 The financial assurance shall be discharged by the CEO and the Minister when the CEO has given the proponent written notice pursuant to section 86F(1) of the *Environmental Protection Act 1986*.

Notes

1. Where a condition states “on advice of the Environmental Protection Authority”, the Environmental Protection Authority will provide that advice to the Department of Environment and Conservation for the preparation of written notice to the proponent.

2. The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment and Conservation.

3. The Minister for Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment and Conservation over the fulfilment of the requirements of the conditions.

4. The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the *Environmental Protection Act 1986.*

Hon Donna Faragher JP MLC
MINISTER FOR ENVIRONMENT; YOUTH

Schedule 1

The Proposal (Assessment No. 1736)

General Description

The proposal is to construct and operate a landfill accepting Class II-type waste and associated landfill gas collection and utilisation plant. The proposal is located in the Shire of Gingin (Figure 1) on the northeast corner of Lot 7778 Wannamal Road South (Figure 2).

From Brand Highway, site access would be through Wannamal Road West, Wannamal Road South and initially through a previously cleared easement to the south of the footprint, shown as 'Existing Light Vehicle Access' on Figure 2. The proposed long-term access roads are Wannamal Road West, Wannamal Road South and an internal access road to the east of the landfill footprint, shown as 'Main Access Road' on Figure 2.

The proposal is described in the following document – *Proposed Regional Landfill, Fernview Farm, Gingin: Environmental Approval Supporting Documentation, Version 10* (30 April 2008).

Summary Description

A summary of the key proposal characteristics is presented in Table 1.

Table 1: Summary of key proposal characteristics

Element	Description
General	
Project life	Not more than 30 years
Operating hours for waste acceptance	Monday to Friday – 0700 to 1700 Saturday – 0700 to 1600 Public holidays – Open except for Good Friday and Christmas
Development boundary	Delineated by AMG Coordinates in Schedule 2
Total vegetation clearing	Not more than 61 hectares for infrastructure and internal access roads
Waste acceptance and transport	
Waste acceptance rate	Not more than 150,000 tonnes per annum of Class II-type waste[1]
External access roads to landfill site from Brand Highway	Wannamal Road West and Wannamal Road South
Infrastructure	
Landfill area	Not more than 30 hectares
Internal access roads	As shown in Figure 2
Leachate storage ponds	Two ponds lined with same lining system as landfill cells
Other facilities	Landfill gas extraction and utilisation plant, weighbridge, administration office, utilities, equipment storage yard, fencing.
Landfill design	
Landfill design and construction	In accordance with the Department of Environment's 2005 *Draft Best Practice Environmental Management on Siting, Design, Operation and Rehabilitation of Landfill* for a Class II landfill[1] as a minimum.

Post-capping contours	Not more than 225 metres Australian Height Datum

[1]Class II-type waste and Class II landfill as defined in the Department of Environment *Landfill Waste Classification and Waste Definitions 1996 (As amended).*

Figures (attached)

Figure 1 – Regional location of proposal
Figure 2 – Proposal footprint

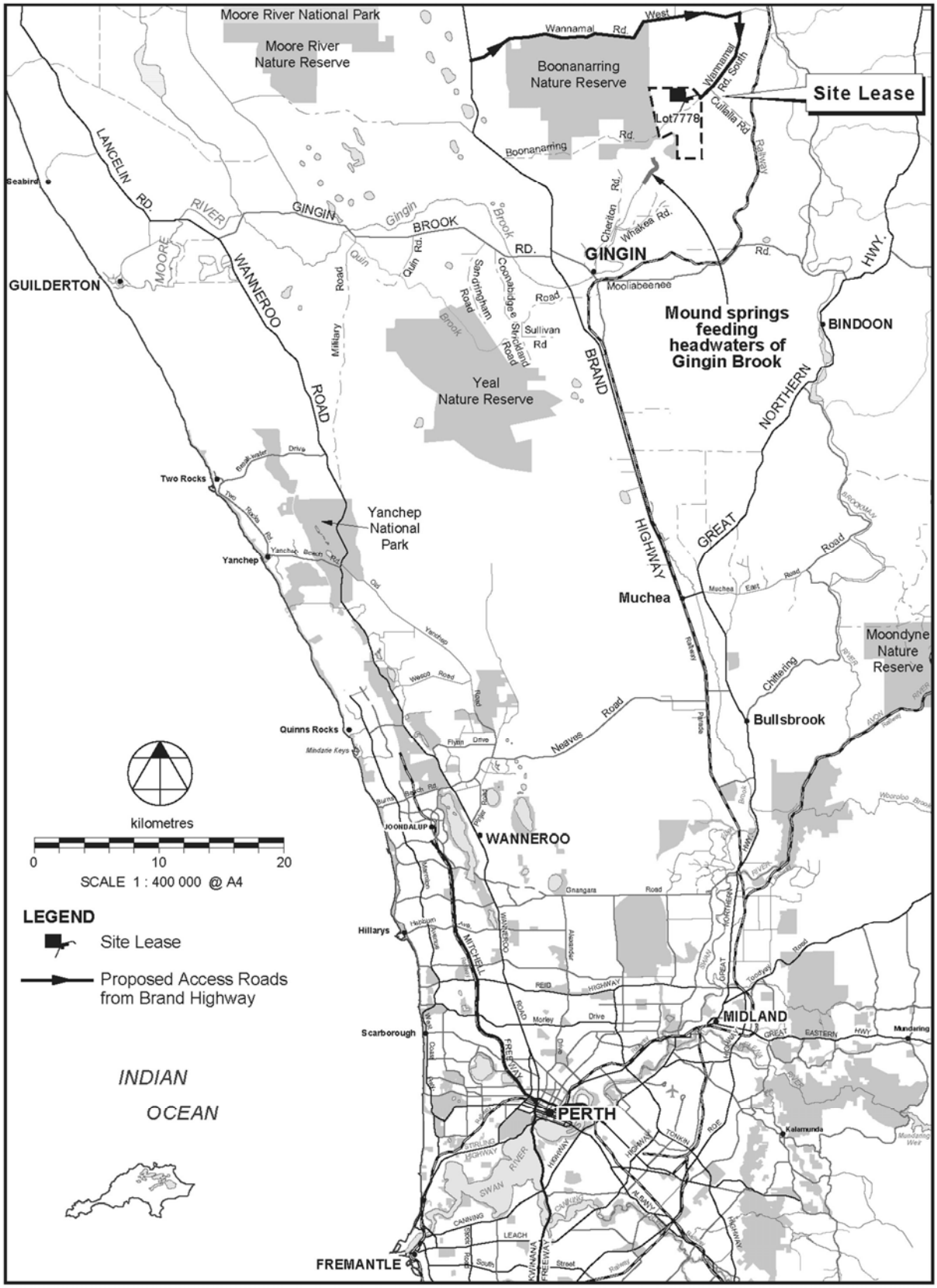


Figure 1: Regional location of proposal

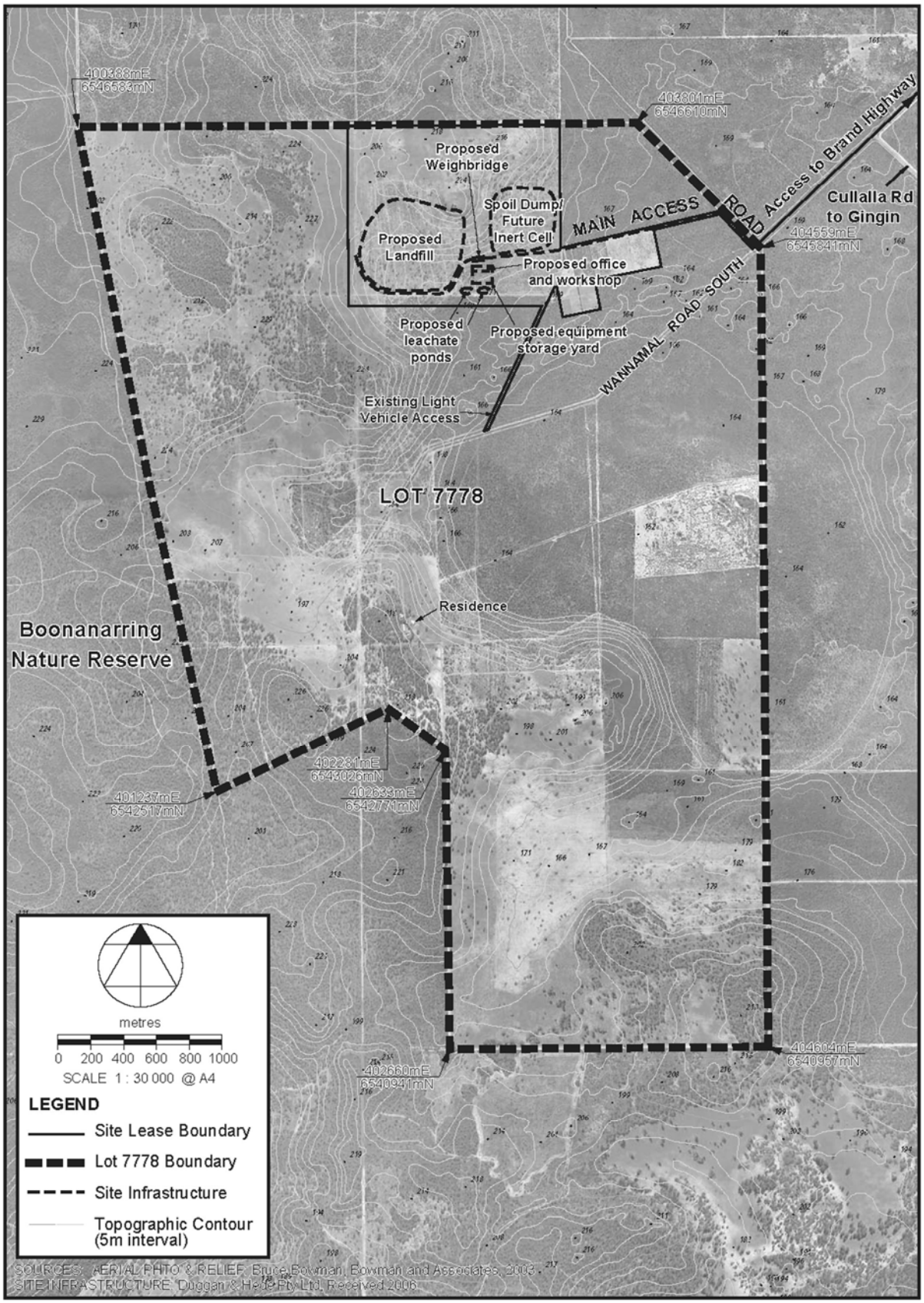


Figure 2: Proposal footprint

Schedule 2

The Proposal (Assessment No. 1736)

AMG coordinates to delineate boundary of proposal development area.

402075mE, 6545552mN
403252mE, 6545552mN
402868mE, 6544720mN
402895mE, 6544730mN
403299mE, 6545607mN
403350mE, 6545422mN
403579mE, 6545470mN
403546mE, 6545646mN
403951mE, 6545727mN
403905mE, 6545953mN
404308mE, 6546047mN
404507mE, 6545836mN
404522mE, 6545849mN
404315mE, 6546069mN
403338mE, 6545841mN
403330mE, 6546598mN
402070mE, 6546588mN

ATTACHMENT C

EPA Extension Letter

Published on: 2 July 2014 Statement No: 975

STATEMENT TO AMEND CONDITIONS APPLYING TO A PROPOSAL (PURSUANT TO THE PROVISIONS OF SECTION 46 OF THE *ENVIRONMENTAL PROTECTION ACT 1986*)

CLASS II LANDFILL, LOT 7778 DIAGRAM 209805, 1189 WANNAMAL ROAD SOUTH, CULLALLA, SHIRE OF GINGIN

Proposal: To construct and operate a landfill accepting Class II-type waste. Six cells will be constructed with a total operational lifetime of not more than 30 years. A landfill gas collection system and utilisation plant facility will also be constructed.

The proposal is further documented in Schedule 1 of Ministerial Statement 796.

Proponent: Veolia Environmental Services (Australia) Pty Ltd (ACN: 051 316 584)

Proponent Address: 4-6 Rivers Street, BIBRA LAKE WA 6163

Assessment Number: 2010

Previous Assessment Number: 1736

Report of the Environmental Protection Authority Number: Report 1510

Previous Report of the Environmental Protection Authority: Bulletin 1287

Previous Statement Number: Ministerial Statement 796

The implementation of the proposal to which the above report of the Environmental Protection Authority relates is subject to the conditions and procedures contained in Ministerial Statement No. 796, as amended by the following:

Condition 3 of Ministerial Statement 796 is deleted and replaced with:

3 Proposal Implementation

3-1 The proponent shall not commence implementation of the proposal after the 11 June 2017, and any commencement, prior to this date, must be substantial.

3-2 Any commencement of implementation of the proposal, on or before 11 June 2017, must be demonstrated as substantial by providing the Chief Executive Officer* with written evidence, on or before 11 June 2017.

* The Chief Executive Officer of the Department of the Public Service which is responsible for the administration of section 48 of the *Environmental Protection Act 1986*, or his delegate.

[Signed 1 July 2014]

HON ALBERT JACOB MLA
MINISTER FOR ENVIRONMENT; HERITAGE

ATTACHMENT D

Works Approval

Government of **Western Australia**
Department of **Environment Regulation**

Your ref: W5031/2011/1
Our ref: 2011/004890
Enquiries: Rebecca Griffiths
Phone: 9333 7510
Fax: 9333 7550
Email: Rebecca.griffiths@der.wa.gov.au

Marc Churchin
Group General Manager – WA
Veolia Environmental Services (Australia) Pty Ltd
4-6 Rivers St
BIBRA LAKE WA 6163

Dear Mr Churchin

***ENVIRONMENTAL PROTECTION ACT 1986* – AMENDMENT TO WORKS APPROVAL**

Works approval: W5031/2011/1
Premises: Fernview Landfill

Further to my letter dated 15 June 2015 please find enclosed your amended *Environmental Protection Act 1986* works approval.

If you have any questions or objections relating to the works approval, please do not hesitate to contact the enquiries officer above on 9333 7510 for clarification or discussion of any grievances you have.

If you are concerned about, or object to any aspect of the amendment you may lodge an appeal with the Minister for the Environment within 21 days from the date on which this works approval is received. The Office of the Appeals Convenor can be contacted on 6467 5190 to find out the procedure and fee.

Members of the public may also appeal the amendments. The Appeals Registrar at the Office of the Appeals Convenor can be contacted after the closing date of appeals to check whether any appeals were received.

Yours sincerely

Rebecca Kelly
Officer delegated under Section 20
of the *Environmental Protection Act 1986*

18 June 2015

enc: Works Approval W5031/2011/1
copy to: Shire of Gingin

Government of Western Australia
Department of Environment Regulation

WORKS APPROVAL
Environmental Protection Act 1986

WORKS APPROVAL NUMBER: W5031/2011/1 **FILE NUMBER:** 2011/004890

WORKS APPROVAL HOLDER:
Veolia Environmental Services (Australia) Pty Ltd
Level 4/65 Pirrama Road,
PYRMONT NSW 2009

ACN: 051 316 584

PREMISES
Fernview Landfill
Lot 7778 on Plan 209805 Wannamal Road South
CULLALLA WA 6503

(as depicted in Attachment 1)

Environmental Protection Regulations 1987
PRESCRIBED PREMISES CATEGORY

Category 64: Class II or III putrescible landfill site

COMMENCEMENT DATE OF WORKS APPROVAL: Monday, 1 October 2012

EXPIRY DATE OF WORKS APPROVAL: Sunday, 11 June 2017

CONDITIONS OF WORKS APPROVAL
Subject to the conditions of works approval set out in the attached pages.

DEFINITION(S) (13)
GENERAL CONDITION(S) (3)
WATER POLLUTION CONTROL CONDITION(S) (4)
ATTACHMENT(S) (2)

Rebecca Kelly
Officer delegated under Section 20
of the *Environmental Protection Act 1986*

Date of Issue: Thursday, 27 September 2012

Date of Amendment: Thursday, 18 June 2015

CONDITIONS OF WORKS APPROVAL

DEFINITIONS

In these conditions of works approval, unless inconsistent with the text or subject matter:

"AS/NZS 5667.1" means the Australian Standard AS/NZS 5667.1 *Water Quality – Sampling – Guidance of the Design of sampling programs, sampling techniques and the preservation and handling of samples;*

"AS/NZS 5667.11" means the Australian Standard AS/NZS 5667.11 *Water Quality – Sampling – Guidance on sampling of groundwaters;*

'CEO' means Chief Executive Officer of the Department of Environment Regulation;

'CEO' for the purpose of correspondence means;

Manager Licensing (Waste Industries)
Department of Environment Regulation
Locked Bag 33
CLOISTERS SQUARE WA 6850
Telephone: (08) 9333 7510
Facsimile: (08) 9333 7550
Email: industry.regulation@der.wa.gov.au;

"Code of Practice for the Storage and handling of dangerous goods" means the Storage and handling of dangerous goods, Code of Practice, Dept of Mines and Petroleum, Government of Western Australia;

"Commissioning" means the placement of waste within a landfill cell;

"Construction Specification" means the document that forms Appendix 13.12 of the document referenced in condition 1(a)(i) of this works approval;

"Construction Quality Assurance Plan" means the document referenced in condition 1(a)(i) of this works approval;

"dangerous goods" has the meaning defined in the Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007;

"environmentally hazardous material" means material (either solid or liquid raw materials, materials in the process of manufacture, manufactured products, products used in the manufacturing process, by-products and waste) which if discharged into the environment from or within the premises may cause pollution or environmental harm;

"landfill infrastructure" means any specified element of the:

- Sub-grade including side wall sub-grade;
- Lining and contaminant systems;
- Leachate collection, extraction, transfer, storage and recirculation systems;
- Separation bund(s); and

- Surface water drainage systems.

"NATA" means the National Association of Testing Authorities, Australia;

"NATA accredited" means the submission of a sample to a laboratory which is NATA accredited for the analysis specified at the time of the analysis;

"Stage 1" means landfill Cell 1 as depicted in Attachment 2 , the leachate collection system, stormwater management system, above ground waste water treatment process, weighbridge earthworks and the associated infrastructure.

GENERAL CONDITIONS

GENERAL CONSTRUCTION AND OPERATIONAL DESCRIPTION

1(a) The works approval holder shall construct Stage 1 of the works in accordance with the works approval application form and the following documentation:

(i) document entitled *Veolia Environmental Services, Works Approval Fernview Landfill, Class II Landfill, Wannamal Road South, Cullalla, Shire of Gingin,* dated 21 December 2010 Volume 1, 2 and 3, including all attached Drawings and Appendices of those documents respectively;

(ii) document entitled *Veolia Environmental* Services Construction Quality Assurance Plan, Fernview Regional Landfill, Version 3, 28 June 2012;

(iii) correspondence authored by Bowman & Associates dated, 3 April 2012 containing responses to referenced Department of Environment and Conservation correspondence dated 8 March 2012; and

(iv) correspondence authored by Bowman & Associates dated, 28 November 2011 containing responses to referenced Department of Environment and Conservation correspondence dated 8 March 2012 and 6 December 2012.

1(b) The works approval holder shall ensure that independent construction quality assurance of all landfill infrastructure is performed and recorded in accordance with the Construction Quality Assurance Plan

Where the details and commitments of the documents listed in condition 1 above are inconsistent with any other condition of this Works Approval, the latter shall prevail.

SUBMISSION OF COMPLIANCE DOCUMENT

2(a) The works approval holder shall submit a Compliance Document to the CEO following the completion of construction of Stage 1 prior to its commissioning.

2(b) The works approval holder shall ensure that the compliance document certifies that Stage 1 was constructed in accordance with condition 1 of this works approval.

2(c) The works approval holder shall ensure that the compliance document is signed by an authorised officer of Veolia Environmental Services Ltd with the printed name and position of that person within the company, and will contain the company seal.

CONSTRUCTION QUALITY ASSURANCE REPORT

3 The works approval holder shall submit to the CEO Construction Quality Assurance Reports following the completion of construction and prior to commissioning of Stage 1, that conforms with the following:
(i) is written and certified by a suitably qualified professional engineer;
(ii) demonstrates compliance with condition 1(b); and
(iii) demonstrates compliance with the Construction Specification.

WATER POLLUTION CONTROL CONDITIONS

4 The works approval holder shall undertake the baseline water monitoring specified in Table 1 commencing no more than one month after the issue of this works approval.

Table 1: Monitoring of groundwater quality

Monitoring point reference	**Parameter**	**Frequency**	**Method**
MB2, MB3 and FLV4 as detailed in section 8.4.2 of the *Works Approval Fernview Landfill, Class II Landfill, Wannamal Road South, Cullalla, Shire of Gingin,* dated 21 December 2010	Electrical Conductivity Ammoniacal Nitrogen Arsenic Cadmium Chemical Oxygen Demand Chloride Chromium Copper Iron Lead Manganese Mercury Nickel Nitrite/Nitrate (NO_x) pH Sulphate Total Nitrogen Total Petroleum Hydrocarbons Total Phosphorous Zinc	Once every four months until submission of a compliance document in accordance with condition 2	AS/NZS 5667.1

5 The works approval holder shall ensure that all groundwater sampling is conducted in accordance with AS/NZS 5667.11.

BASELINE MONITORING SUMMARY REPORT

6 The works approval holder shall prepare and submit to the CEO prior to commissioning Stage 1 of the works, a Baseline Monitoring Summary Report from monitoring data collected in accordance with condition 4 of this works approval that includes:
(i) tabulation of results including comparison to relevant guidelines or standards for water quality;
(ii) time series graphical representation of results; and

(iii) interpretation and discussion of the results including baseline averages and observed fluctuations in natural variation.

CHEMICAL AND FUEL STORAGE

7 The works approval holder shall ensure that any vessels, compounds or structures constructed for the storage of more than 250 kg or 250 litres of any substance that is classed as dangerous goods below placard quantities or environmentally hazardous materials not classified as dangerous goods complies with the following:

(i) the Code of Practice for the Storage and handling of dangerous goods; and

(ii) where secondary containment is required, it is constructed and maintained to:

(a) contain not less than 110% of the volume of the largest storage vessel or inter-connected system; and

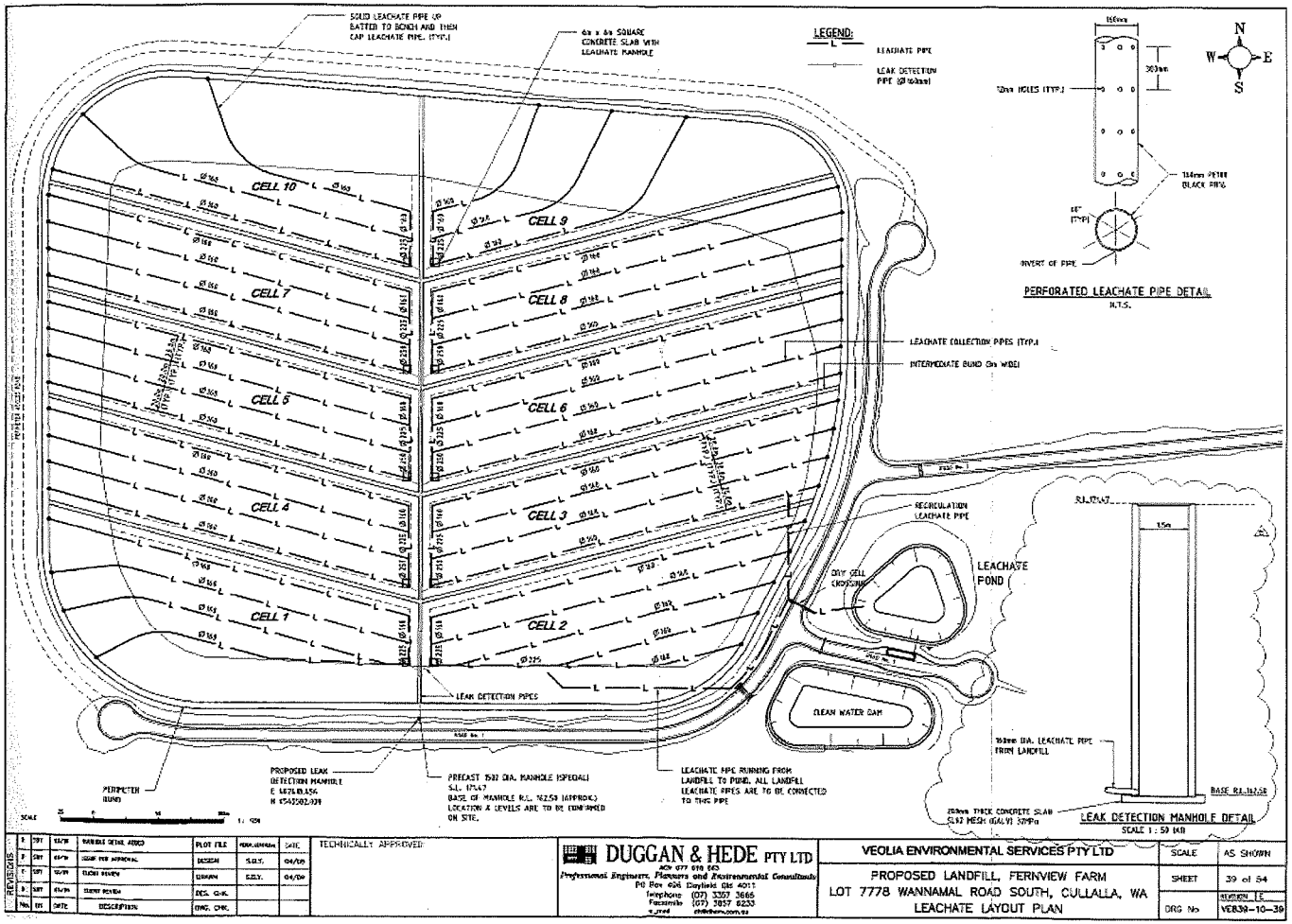
(b) contain at least 25% of the total volume of vessels stored in the compound; and

(c) have a low permeability (10^{-9} m/s or less).

CONDITIONS OF WORKS APPROVAL
Environmental Protection Act 1986

WORKS APPROVAL NUMBER: W5031/2011/1 **FILE NUMBER:** 2011/00935

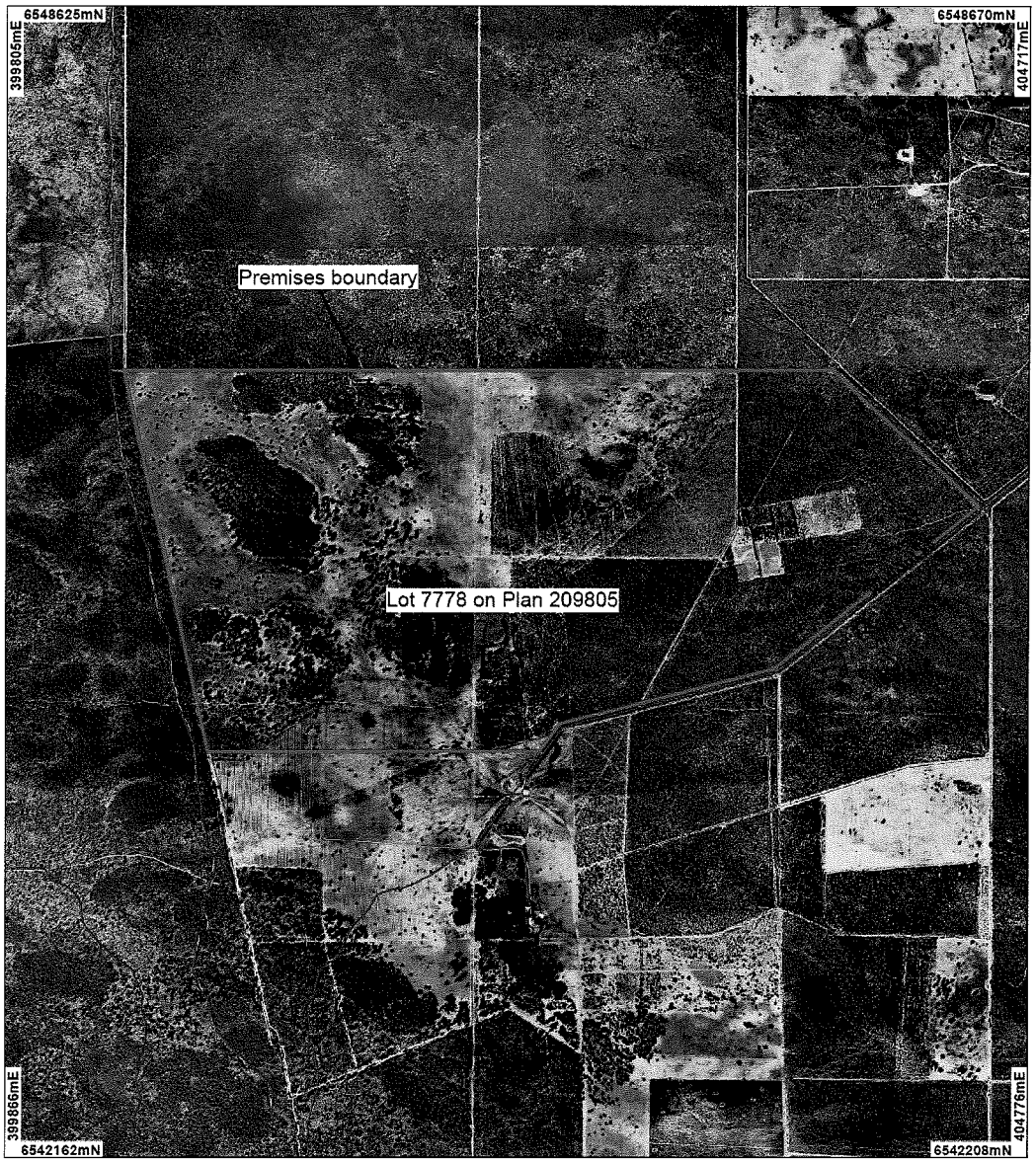
ATTACHMENT 2 – LANDFILL LAYOUT



CONDITIONS OF WORKS APPROVAL
Environmental Protection Act 1986

WORKS APPROVAL NUMBER: W5031/2011/1 **FILE NUMBER:** 2011/000935

ATTACHMENT 1 - PLAN OF PREMISES



LEGEND

Road Centrelines
Gingin 50cm Orthomosaic - Landgate 2008

N

0 ~750 m

Scale 1:29974
(Approximate when reproduced at Letter)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

Prepared by: lukecl
Prepared for:
Date: 5/09/2011 3:47:06 PM

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.

Department of Environment and Conservation
Our environment, our future

Government of **Western Australia**
Department of **Environment Regulation**

Decision Document

Environmental Protection Act 1986, Part V

Proponent: Veolia Environmental Services (Australia) Pty Ltd

Works Approval: W5031/2011/1

Registered office:	Level 4/65 Pirrama Road, PYRMONT NSW 2009
ACN:	051 316 584
Premises address:	Fernview Landfill Lot 7778 on Plan 209805 Wannamal Road South CULLALLA WA 6503
Issue date:	Thursday, 27 September 2012
Commencement date:	Monday, 1 October 2012
Expiry date:	Sunday, 11 June 2017

Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER) has decided to issue a works approval. DER considers that in reaching this decision, it has taken into account all relevant considerations and legal requirements and that the Works Approval and its conditions will ensure that an appropriate level of environmental protection is provided.

Decision Document prepared by:	Rebecca Griffiths Licensing Officer
Decision Document authorised by:	Rebecca Kelly Manager Licensing

Contents

1 Purpose of this Document

This decision document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986*. Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

Works approval and licence conditions
DER has three types of conditions that may be imposed on works approvals and licences. They are as follows;

Standard conditions (SC)

DER has standard conditions that are imposed on all works approvals and licences regardless of the activities undertaken on the Premises and the information provided in the application. These are included as the following conditions on works approvals and licences:

Works approval conditions: 1.1.1-1.1.4, 1.2.1, 1.2.2, 5.1.1 and 5.1.2.

Licence conditions: 1.1.1-1.1.4, 1.2.1-1.2.4, 5.1.1-5.1.4 and 5.2.1.

For such conditions, justification within the Decision Document is not provided.

Optional standard conditions (OSC)

In the interests of regulatory consistency DER has a set of optional standard conditions that can be imposed on works approvals and licences. DER will include optional standard conditions as necessary, and are likely to constitute the majority of conditions in any licence. The inclusion of any optional standard conditions is justified in Section 4 of this document.

Non-standard conditions (NSC)

Where the proposed activities require conditions outside the standard conditions suite DER will impose one or more non-standard conditions. These include both premises and sector specific conditions, and are likely to occur within few licences. Where used, justification for the application of these conditions will be included in Section 4.

2 Administrative summary

Administrative details		
Application type	Works Approval ☐ New Licence ☐ Licence amendment ☐ Works Approval amendment ☒	
Activities that cause the premises to become prescribed premises	**Category number(s)**	**Assessed design capacity**
	Category 64: Class II or III putrescible landfill site	150 000 tonnes per year
Application verified Application fee paid	Date: 09/08/2011 Date: 31/08/2011	
Works Approval has been complied with Compliance Certificate received	Yes☐ No☐ N/A☒ Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☐ No☒	
Commercial-in-confidence claim outcome		
Is the proposal a Major Resource Project?	Yes☐ No☒	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*?	Yes☒ No☐	Referral decision No: 1287 Managed under Part V ☒ Assessed under Part IV ☒
Is the proposal subject to Ministerial Conditions?	Yes☒ No☐	Ministerial statement No: 796 & 975 EPA Report No: 1287
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the *Environmental Protection Act 1986*)?	Yes☐ No☒ Department of Water consulted Yes ☒ No ☐	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes☐ No☒		
Is the Premises subject to any EPP requirements? Yes☐ No☒		

3 Executive summary of proposal and assessment

Works approval W5031/2011/1 was issued to Veolia Environmental Services (Australia) Pty Ltd on 27 September 2012. The works approval is for the construction of Stage 1 of a Class II putrescible landfill at Lot 7778 on Plan 209805 Wannamal Road South, Cullalla. Stage 1 works includes establishing site infrastructure, bulk earth works, leachate storage ponds and the construction of the first landfill cell (cell 1). Additional works approvals will be required for any additional landfill cells.

The works approval is subject to Ministerial Statement 769. Condition 3 of the Ministerial Statement was amended in 1 July 2014 to allow an extension to the implementation of the proposal (Statement No. 975).

This amendment is the result of a request from the occupier to extend the expiry date of the works approval. It is for the purpose of finalising approvals and to commercially position the company for the development of the facility. DER has extended the works approval (expiry 11 June 2017) to be in line with the amended Ministerial Statement 769.

Veolia advised DER that there have been no changes since the original approval (including no changes to sensitive receptors). Based on this information, the risk has not changed since the issue of the works approval and an extension has been approved.

Emissions and discharges have not been reassessed as part of this amendment.

4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987*, DEC's Policy Statement - Limits and targets for prescribed premises (2006), and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE				
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**OSC or NSC**	**Justification (including risk description & decision methodology where relevant)**	**Reference documents**
Works approval duration	N/A	N/A	The expiry date of the Works Approval has been extended to 11 June 2017, which is also the expiry date of Ministerial Statement 769. The extension is required as Veolia Environmental Services (Australia) Pty Ltd have not begun the construction of the landfill.	Environmental Assessment Report dated 25 July 2015 Application Supporting documentation for duration extension

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
15/06/2015	Proponent sent a copy of draft instrument	No comments received	N/A

6 Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

ATTACHMENT E

Search Results – Protected Matters Search Tool

Australian Government

Department of the Environment

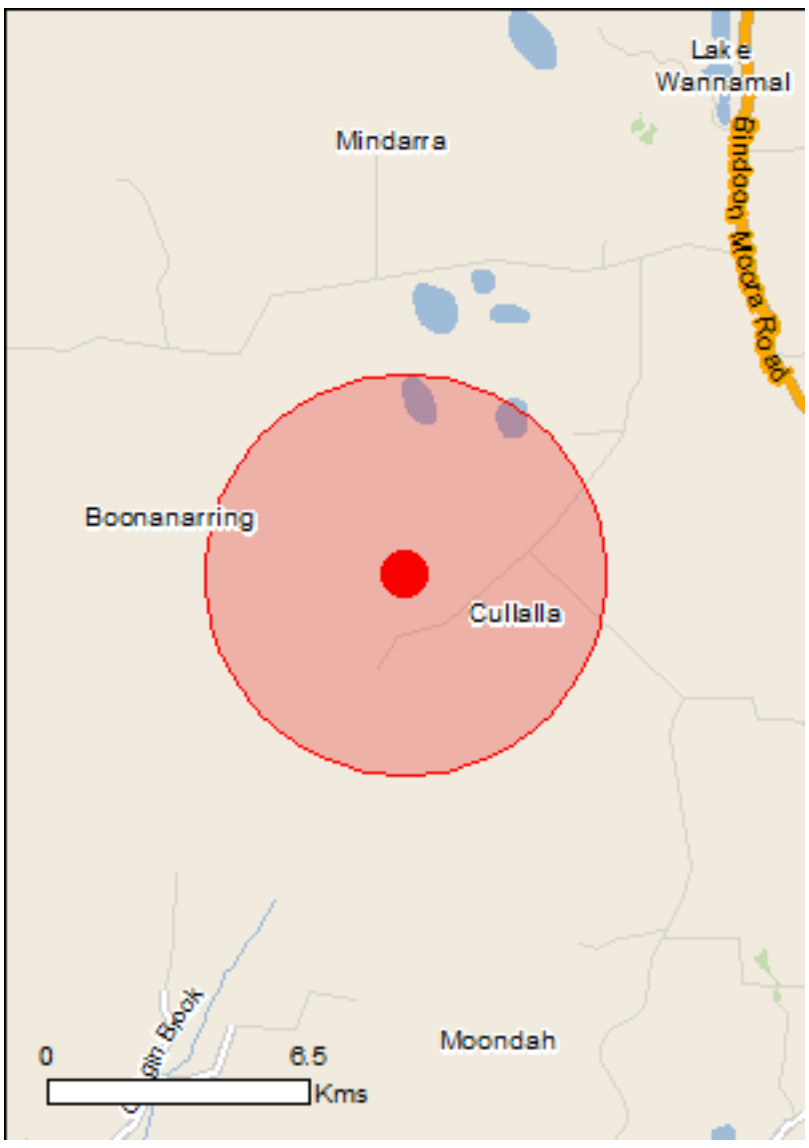
EPBC Act Protected Matters Report

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

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

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

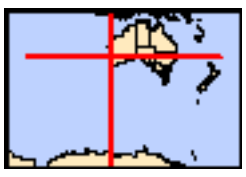
Report created: 19/08/15 19:35:13



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	15
Listed Migratory Species:	5

Other Matters Protected by the EPBC Act

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

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

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	8
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	15
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calyptorhynchus latirostris		
Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Banksia mimica		
Summer Honeypot [82765]	Endangered	Species or species habitat likely to occur within area
Caladenia huegelii		
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area
Centrolepis caespitosa		
[6393]	Endangered	Species or species habitat may occur within area
Chamelaucium sp. Gingin (N.G.Marchant 6)		
Gingin Wax [64649]	Endangered	Species or species habitat likely to occur within area
Conospermum densiflorum subsp. unicephalatum		
One-headed Smokebush [64871]	Endangered	Species or species habitat may occur within area
Diuris drummondii		
Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus balanites		
Cadda Road Mallee, Cadda Mallee [24264]	Endangered	Species or species habitat may occur within area
Eucalyptus leprophloia		
Scaly Butt Mallee, Scaly-butt Mallee [56712]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat likely to occur within area
Thelymitra manginii K.Dixon & Batty ms. [67443]	Endangered	Species or species habitat likely to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis		
Hooded Plover [59510]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Boonanarring	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia chinensis		
Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis		
Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris		
Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris		
Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-31.21601 115.97804

Acknowledgements

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

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

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

Please feel free to provide feedback via the Contact Us page.

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

ATTACHMENT F

Flora, Vegetation and Fauna Assessment

coffey environments
SPECIALISTS IN LIVING AND WORKING PLACES

FLORA, VEGETATION AND FAUNA ASSESSMENT LOT 7778 WANNAMAL ROAD SOUTH CULLALLA

Prepared for:

Veolia Environmental Services Australia Pty Ltd
2-6 Rivers Steet
Bibra Lake WA 6163

Report Date: 17 October 2007
Project Ref: 2007/249

Written/Submitted by:	Reviewed/Approved by:
Shaun Grein Manager Field Ecology	Noel Davies Manager Environmental Services (WA)

Coffey Environments Pty Ltd ABN 45 090 522 759
Dilhorn House, 2 Bulwer Street Perth WA 6000 Australia
T (+61) (8) 6462 7900 F (+61) (8) 6462 7936 www.coffey.com/environments
COP-2006-002_VEG3_001_sg_V1

coffey environments
SPECIALISTS IN LIVING AND WORKING PLACES

17 October 2007

Veolia Environmental Services Australia Pty Ltd
2-6 Rivers Steet
Bibra Lake WA 6163

Attention: Chris Griffin

Dear Chris

RE: Flora, Vegetation and Fauna Assessment, Lot 7778 Wannamal Rd South, Cullalla

Please find attached three (3) copies of the Flora, Vegetation and Fauna Assessment Lot 7778 Wannamal Rd South, Cullalla.

For and on behalf of Coffey Environments Pty Ltd.

Shaun Grein
Manager Field Ecology

Attachment A: Attachments

CONTENTS

No. of copies	Report File Name	Report Status	Date	Prepared for:	Initials
3	COP-2006-002_VEG3_001_sg_V1	Version 1	17 October 2007	Veolia Environmental Services	SG

CONTENTS

CONTENTS

LIST OF ATTACHMENTS

Tables

Figures

Appendices

ABBREVIATIONS

AHD	Australian Height Datum
CALM	Department of Conservation and Land Management
DEW	Department of Environment and Water Resources
DEC	Department of Environment and Conservation
EPA	Environmental Protection Authority
TEC	Threatened Ecological Community
VES	Veolia Environmental Services Australia Pty Ltd

1 INTRODUCTION

1.1 Background

Veolia Environmental Services Australia Pty Ltd (VES) proposes to construct and operate a bioreactor landfill facility within the Shire of Gingin. The proposed site for the facility is approximately 16km northeast of the Gingin townsite, in an area zoned 'Rural' under the Shire of Gingin's Town Planning Scheme No. 8 (Shire of Gingin, 1997). This zoning permits for noxious industries at the discretion of the Shire (Shire of Gingin, 1997).

Coffey Environments (formerly ATA Environmental) was commissioned by VES in 2006 to undertake a flora and vegetation assessment of part of Lot 7778 Wannamal Road South in the locality of Cullalla. The assessment formed part of the site investigations for VES's proposal to construct and operate a bioreactor landfill facility within the Shire of Gingin.

The purpose of the initial 2006 assessment was to provide a detailed description of the flora and vegetation within the study area and to determine the conservation significance of vegetation and flora identified. Subsequent to review of the referral documentation supporting the proposal submitted to the Environmental Protection Authority (EPA), a request was made by the EPA in 2007 to undertake additional flora and vegetation investigations of the site to enable a more detailed assessment of the composition, condition and significance of the remaining vegetation on the site and to provide sufficient information on the fauna assemblage of the site to enable an assessment of the significance of the site for fauna to be made.

1.2 Objectives and Scope of Works

The main objectives of the flora, vegetation and fauna assessment are to provide the following information:

- A list of all native and non-native plant species recorded from the site including at least one 10m x 10m quadrat located within representative vegetation associations from the site;
- Mapping of vegetation types (and condition using the Bush Forever condition scale rating) using a combination of recent aerial photography supplemented with field surveys to groundtruth;
- A list of significant species recorded on the Department of Environment & Conservation (DEC) (formerly CALM) database occurring on or in the vicinity of the site. The location of any significant species (DRF and Priority) identified within the site recorded using a Global Positioning System (GPS);
- A description of the vegetation types, floristic community types and presence of any Threatened Ecological Community (TEC) occurring on the site;
- Recommendations for the management of flora and vegetation in regards to any future use of the study area;
- An assessment of the potential impacts of clearing on significant flora and vegetation;
- A description of fauna habitat types and characteristics present;
- The presence of any Specially Protected Fauna; and
- Opportunities proposal area to retain fauna habitat of environmental value.

2. EXISTING ENVIRONMENT

2.1 Location

Lot 7778 is located approximately 100km north of Perth and 20km north-east of Gingin in the Shire of Gingin. The regional location is shown in Figure 1. The study area forms part of Lot 7778 Wannamal Rd South which is bounded by remnant vegetation and farmland to the north, south and east and Boonanarring Nature Reserve to the west.

2.2 Existing Land Use

The majority of the study area has previously been cleared and contains regrown remnant vegetation, cleared pasture areas and a sandy track. The majority of Lot 7778 is utilised for farming purposes with farm infrastructure, a residence and pasture areas for sheep and cattle.

2.3 Geological and Physiographic Context of Survey Area

2.3.1 Climate

The climate of the Gingin area is characterised as Warm Mediterranean; with winter precipitation of 600mm-1000mm and five to six dry months per year (Beard, 1990). The temperature ranges from an average maximum of 34°C in the hottest months of January and February to an average of 6.5°C in the colder months of July and August (Bureau of Meteorology, 2005).

2.3.2 Landforms and Soils

The study area is located near the southern end of the Dandaragan Plateau. The Dandaragan Plateau consists primarily of Tertiary laterites outcropping in Pleistocene to Recent sands over flat lying partially laterized Cretaceous rocks (Burbidge *et al.,* 1996). The soils typically belong to the Cullalla Association which consists of aeolian sandplain with some low dunes and occasional swamps (Churchward and McArthur, 1977).

The study area is undulating with a rounded hill present along the centre of the northern boundary. The remainder of the study area generally decreasing in elevation from the western and northern boundaries with a low point in the southeast. Elevation ranges from approximately 165mAHD in the south-eastern portion of the study area to approximately 220mAHD along the northern and western boundaries.

2.3.3 Hydrology

Groundwater at the site is located within the unconfined Poison Hill aquifer, comprising of Poison Hill Greensand, Gingin Chalk and Molecap Greensand stratigraphic units. Groundwater within the Poison Hill aquifer beneath the study area is generally at 143mAHD which is between 20m-70m below ground level (Crisalis International, 2006). Regional groundwater flow within the Poison Hill aquifer is generally to the southwest and there is no direct connection between the Poison Hill aquifer sediments and Leederville aquifer within the region (Crisalis International, 2006).

2.4 Biological Context of Survey Data

2.4.1 Bioregional Data

Western Australia supports 53 biogeographical subregions. The study area is located in the Perth Subregion of the Swan Coastal Plan bioregion. The Swan Coastal Plan Bioregion is a low-lying coastal plain, mainly covered with woodlands. The Perth subregional is composed of colluvial and aeolian sands, alluvial river flats and coastal limestone (McKenzie *et al*., 2003).

2.4.2 Vegetation Complexes

Heddle *et al*. (1980) identified the vegetation within the survey area as part of the Cullalla Complex. This vegetation complex occurs on the Dandaragan Plateau and consists predominantly of a mixture of Low Open Forest of *Banksia* species – *Eucalyptus todtian*a and Open Woodland of *Corymbia calophylla* with a second storey of *E. todtiana – Banksia attenuata – B. menziesii – B. ilicifolia*. The vegetation survey confirmed that the vegetation is part of the Cullalla Complex

Approximately 40% of the estimated pre-European extent of the Cullalla vegetation complex is remaining and 3% is currently protected within secure reserves. This is below the minimum 10% target established in Bush Forever (Government of Western Australia, 2000)

3. FLORA AND VEGETATION SURVEY

3.1 Methodology

An initial flora survey of the area was conducted by Ms Gaby Martinez and Ms Edith O'Shea, qualified botanists from ATA Environmental, on 31 May 2006. The survey was undertaken to determine if any of the significant species identified by the Department of Environment & Conservation (DEC) actually occur or are likely to occur on the site. This was based on sampling within quadrats of six non-permanent 10m x 10m dimension located within representative vegetation types, as well as a thorough site walkover to record all plant species present at the time of the survey. The timing of the initial survey was not considered optimal for the identification of the annual and ephemeral species occurring within the survey area and a follow-up survey was conducted by Ms Jenifer Alford on 11 November 2006, who sampled the same non-permanent quadrats surveyed in the May 2006 survey. Following advice from the EPA in August 2007 that they considered the previous flora and vegetation surveys may both understate the condition of the vegetation and inaccurately portray the vegetation associations occurring on the site further flora and vegetation investigations of the site were undertaken by Mr Shaun Grein, an experienced botanist from Coffey Environments, on 18 September 2007. An additional seven permanent 10m x 10m quadrats were established within representative vegetation types within the study area and sampled for floristic data, with most additional quadrats concentrated along the eastern boundary of the study area and in areas where comprehensive floristic sampling wasn't conducted during the previous two surveys.

The following information was recorded for each 10m x 10m quadrat sampled:

Location: AMG coordinated (equivalent of GDA94) were taken from the centre point of each 10m x 10m quadrat using a hand held Magellan Global Position System (GPS) to an accuracy of 2m;

Vegetation Description: broad description based on the height and estimated cover of the dominant species after Muir (1977);

Disturbance Details: vegetation condition based on the condition rating scale used in Bush Forever (Government of Western Australia, 2000);

Percentage Foliage Cover: cover was estimated visually for each species recorded from each quadrat. Estimates were made to the nearest percent where possible; and

Soil: Colour, texture and soil moisture within in each quadrat was recorded.

This timing of the 2007 complies with the EPA's guidelines for flora surveys as outlined in the Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004) and *Terrestrial Biological Surveys as an Element of Biodiversity Protection Position Statement No. 3* (EPA, 2002)

Vehicle access was limited to the sandy track traversing the site and the survey was conducted by traversing the area by foot. The major vegetation associations and associated flora were surveyed and delineated using a colour aerial photograph. The vegetation was described and mapped according to the structure and species composition of the dominant stratum using the system adopted from Muir (1977) and Aplin (1979).

Prior to conducting the field surveys, a search of the DEC Declared Rare and Priority Flora database was undertaken to identify significant flora that could potentially occur in the survey area. This investigation encompassed a review of the following databases:

- DEC's *'Threatened (Declared Rare) Flora'* database; and
- DEC's *'Declared Rare and Priority Flora List'* which contain species that are Declared Rare (Conservation code R or X for those presumed to be extinct) poorly known (Conservation codes 1, 2 or 3) or require monitoring (Conservation Code 4).

The results of the DEC database search are presented below in Table 1.

TABLE 1

SIGNIFICANT FLORA RECORDED IN THE VICINITY OF THE STUDY AREA

Species	Conservation Status	Preferred Habitat	Flowering Period
Acacia drummondii subsp. *affinis*	P3	Lateritic gravely soils	Jul - Aug
Acacia pulchella var. *reflexa* acuminate bracteole variant (RJ Cumming 882)	P3	Sandy loan or sandy clay over laterite	Jul - Sep
Banksia chamaeophyton	P4	Grey white sand over laterite	Oct - Dec
Calytrix sylvana	P4	Lateritic soils, sand, sandplains and ridges	Aug - Oct
Darwinia acerosa	R	Granitic outcrops, gravely soil	Sep - Nov
Daviesia epiphyllum	P3	Lateritic soils, breakaways, stony hills	Apr - July
Dryandra kippistiana var. *paenepeccata*	P3	Lateritic gravely soils	Oct - Nov
Dryandra platycarpa	P4	Laterite boulders, dry yellow/grey sand	May - Aug
Dryandra polycephala	P4	Loam and laterite gravel	Jul - Oct
Dryandra pteridifolia subsp. vernalis	P3	White/grey sand over laterite	Sep - Oct
Grevillea saccata	P4	Yellow brown sand with lateritic gravel	Apr - Nov
Hibbertia glomerata sub sp. *ginginensis*	P1	Brown clay lateritic soil	July - Sep
Hibbertia miniata	P4	Flat, dry yellow/white/grey sand	Aug - Nov
Hypolaena robusta	P4	Flat, dry	Sept - Oct

Species	Conservation Status	Preferred Habitat	Flowering Period
		yellow/white/grey sand	
Persoonia sulcata	P3	Lateritic or granitic soils	Sep - Nov
Petrophile plumosa	P3	Red/brown laterite, loam, sandplains, hills	Jul - Nov
Platysace ramosissima	P3	Sandy soils	Oct - Nov
Ptychosema pusillum	R	Sandy soils	Aug - Oct
Synaphea grandis	P4	Laterite	Oct - Nov
Thomasia sp. Gingin (F & J Hort 1511)	P3		
Verticordia paludosa	P4	White/grey sand	Jan - May

A search of DEC's Threatened Ecological Communities (TECs) database was also conducted for the survey area prior to undertaking the field assessment. No TECs were listed as occurring in the geographical range of the survey area.

The major vegetation types and associated flora were surveyed and delineated using a recent 1:10,000 colour aerial photograph. The vegetation was described and mapped according to the structure and species composition of the dominant stratum using the system adopted from Muir (1977) and Aplin (1979).and the condition rating scale from Bush Forever (Government of Western Australia, 2000).

Plant specimens were identified by using local and regional flora keys and by comparison with specimens on the Department of Environment and Conservation's *FloraBase*.

The conservation status of all recorded flora was also compared against the current lists published in the Government Gazette and available from the Department of Environment and Conservation (DEC) and Department of Environment and Water Resources (DEW).

3.2 Vegetation

3.2.1 Vegetation Associations

Vegetation associations are vegetation units that can be described and mapped at a finer level than the vegetation complexes.

A total of ten vegetation associations were identified and delineated within the study area during the 2006 and September 2007 surveys. These vegetation associations are mapped in Figure 2 and described below.

EtLOW

Low Open Woodland of *Eucalyptus todtiana* to 4m with scattered *Nuytsia floribunda* over a mixed Shrubland. Other common species include *Xanthorrhoea preissii, Eremaea beaufortioides*, and *Stirlingia latifolia.* This vegetation association is located in the central portion of the study area to the north of the sandy track and is natural regrowth of previously

cleared vegetation. According to the vegetation condition rating scale as described in Bush Forever (Government of Western Australia, 2000) this vegetation association was classified as being in Good condition.

BaBmEtLOW1

Low Open Woodland of *Eucalyptus todtiana, Banksia menziesii* and *Banksia attenuata* to 5m over a Tall Shrubland of *Jacksonia sternbergiana* over an Open Mixed Shrubland. Other common species include *Allocasuarina humilis, Xanthorrhoea preissii, Petrophile brevifolia* and *Eremaea beaufortioides*. The most obvious difference from this vegetation association and the other two BaBmEtLOW associations is the condition of the vegetation which was classified as being in Very Good to Excellent condition with few obvious signs of human disturbance This vegetation association is located in the eastern and southern sections of the study area. To the north of the sandy track the vegetation comprises regrowth from more recent clearing while the vegetation to the south of the track is in significantly better condition.

BaBmEtLOW2

Low Open Woodland of *Banksia attenuata*, *Banksia menziesii* and *Eucalyptus todtian*a to 3m in height over *Adenanthos cygnorum* Shrubland to 1.5m in height over Low Heath dominated by *Xanthorrhoea preissii, Stirlingia latifolia* and *Eremaea pauciflora*. Other associated species include *Allocasuarina humilis, Caustis diocia, Conospermum stoechadis* and *Jacksonia floribunda*. This vegetation association which was similar in general structure and dominant species to the other BaBmEtLOW associations but in a poorer condition, was recorded from the northwestern portion of the study area and has been regularly cleared. There was also evidence of recent grazing activities in the area and as a consequence the vegetation condition rating scale as described in Bush Forever (Government of Western Australia, 2000) of this vegetation association was classified as being in Good.

BaBmEtLOW3

Low Open Woodland of *Banksia attenuata, Banksia menziesii* and *Eucalyptus todtiana* to 4m in height over a Low Heath of *Allocasuarina humilis, Xanthorrhoea preissii, Eremaea pauciflora* and *Stirlingia latifolia.* Other associated species recorded include *Conospermum stoechadis, Conostephium pendulum, Hakea preissii* and *Jacksonia sternbergiana*. This vegetation association is located within the north east portion of the study area and is natural regrowth of previously cleared vegetation. The area appears to have been cleared less recently than the BaBmEtLOW2 association and as a consequence the condition was considered to be in Good to Very Good condition.

BaBmLOF

Low Open Forest of *Banksia attenuata* and *Banksia menziesii* to 4m in height over a Low Open Shrubland of *Allocasuarina humilis, Xanthorrhoea preissii, Regelia ciliata, Stirlingia latifolia, Verticordia nitens, Eremaea pauciflora a*nd *Conospermum stoechadis*. Other species recorded from this association include *Leucopogon capitellatus, Philotheca spicata* and *Conostephium pendulum.* This association was recorded from the central eastern portion of the survey area and while the aerial photography indicates that it has obviously been cleared in the recent past, the condition of the regrowth vegetation was considered to be Very Good.

BmBpJsCTS

Closed Tall Scrub of *Banksia menziesii, Banksia prionotes* and *Jacksonia sternbergiana* to 3m in height with scattered *Eucalyptus todtiana* over *Melaleuca huegelii*, *Allocasuarina humilis, Adenanthos cygnorum* and *Ptilotus polystachyus* Open Shrubland over *Eremaea pauciflora, Acacia pulchella* and *Stirlingia latifolia* Low Open Heath. Other common species recorded from this association include *Eremaea beaufortioides, hakea costata, Stirlingia latifolia* and *Xanthorrhoea preissii*. This association was recorded from a small area in the central western portion of the study area and while it had obviously been cleared in the past 10 or so years and there was evidence of recent grazing by stock, the condition was considered to be Good to Very Good.

AcTS

Tall Shrubland of *Adenanthos cygnorum* with scattered *Nuytsia floribunda* and *Eucalyptus todtiana* to 3m over a Low Open shrubland of *Eremaea beaufortioides* and *Xanthorrhoea preissii*. Other common species include *Stirlingia latifolia* and *Hibbertia hypericoides.* This vegetation association is located in the south western portion of the study area and comprises regrowth from previously cleared native vegetation.

JsTOS

Tall Open Shrubland of *Jacksonia sternbergiana* to 3.5m in height over a Mixed Open Heath of *Jacksonia floribunda, Melaleuca huegelii, Adenanthos cygnorum, Hibbertia hypericoides* and *Synaphea spinulosa*. Other common species recorded from this vegetation association include *Adenanthos cygnorum, Eremaea beaufortioides, Pimelea angustifolia* and *Synaphea spinulosa*. This association was recorded from a very small area along the northwestern boundary of the survey area and while is has obviously been previously cleared (~ 10 years prior to survey) the condition was considered to range from Good to Very Good.

MhS

Shrubland of *Melaleuca huegelii* to 1.5m in height with scattered *Eucalyptus todtiana, Banksia attenuata* and *Corymbia calophylla* over Low Heath of *Xanthorrhoea preissii, Hibbertia hypericoides* and *Synaphea spinulosa*. Other species recorded from this vegetation type include *Adenanthos cygnorum, Daviesia decurrens* and *Lechenaultia biloba.* This association was recorded from the crest of the hill in the central northern portion of the survey area. The area had previously been largely cleared with only scattered Marri and Prickly Bark trees retained as shade trees for grazing stock. As a consequence the condition of this association was considered by be Good.

MLCH

Low Closed Heath of *Xanthorrhoea preissii, Allocasuarina humilis*, *Eremaea pauciflora*, *Leucopogon capitellatus* and *Synaphea spinulosa* to 1m in height. Other species associated with this vegetation association include *Eremaea beaufortioides, Leucopogon capitellatus, Petrophile linearis, Philotheca spicata* and *Stirlingia latifolia*. This association was recorded from the central eastern portion of the survey area and was relatively species rich with 42 species recorded from a single 10m x 10m quadrat sampled. While it is evident from recent aerial photography of the area that this vegetation association has previously been cleared the regrowth was considered to be in Very Good condition.

In addition to native vegetation within the survey area, an area of pasture is located along the western boundary of the study area. This area has been subject to clearing and intense grazing and comprises of pasture grass species.

3.2.2 Vegetation Condition

The condition of the vegetation was assessed using the condition rating scale of Keighery published in Bush Forever (Government of Western Australia, 2000). Keighery's condition rating scale ranges from Pristine (which the vegetation exhibits no visible signs of disturbance) to Completely Degraded (where the vegetation structure in no longer intact and without native plant species). The vegetation of the study ranged from pasture vegetation with a condition of Completely Degraded to vegetation in Very Good to Excellent condition. Vegetation condition for the survey area is mapped in Figure 2

Descriptions of the vegetation condition ratings in *Bush Forever* (Government of Western Australia 2000) are outlined in Table 2.

TABLE 2

VEGETATION CONDITION RATING SCALE

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

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

Source: Government of Western Australia, 2000.

3.2.3 Conservation Significance of Vegetation

A search of DEC's TEC database was undertaken prior to conducting the initial May 2006 survey. No TECs were listed by the DEC as occurring in the geographical range of the survey area and this was confirmed from data collected from the May and November 2006 and September surveys of the study area.

Using the floristic data collected from each of the 10m x 10m quadrats and referencing the species to those mapped in Griffin (1992), the vegetation within the survey area is inferred as corresponding most closely with Vegetation Types 1a and 1b. These vegetation types are distinct from the Floristic Community Types described by Gibson *et al.* (1994).

According to Griffin (1992), Vegetation Types 1a – Low and Open Low Woodlands dominated by *Banksia attenuata* and *Banksia menziesii* and 1b –Shrubland of *Adenanthos cygnorum* are poorly reserved within the Bindoon to Moora area. Griffin (1992) does state that this vegetation type is probably conserved within Boonanarring Reserve to the west of the study area. This was confirmed in an assessment of the Reserve undertaken in 1996 which indicated that *Banksia* and *Adenanthos* vegetation types occur on Cullalla soils within the Reserve boundaries.

3.3 Flora

3.3.1 Species Recorded

A total of 151 species were recorded within the survey area from the May and November 2006 and September 2007 survey. This included 127 native species and 24 introduced species.

The dominant families were the Myrtaceae (Eucalypt family – 14 species), Proteaceae (*Banksia* family – 21 native species) and Papilionaceae (Pea family – 12 species, 1 introduced species).

The majority of species recorded within the study area were also recorded within the nearby Boonanarring Nature Reserve (Burbidge *et al*., 1996). No Declared Plants (i.e. weeds) were identified during the May and November 2006 or September 2007 surveys.

A list of the flora recorded within the survey area during the May and November 2006 and September 2007 surveys is presented in Appendix A. Quadrat data collected from the three surveys is included in Appendix B.

3.3.2 Significant Flora

No species of Declared Rare or Priority Flora were recorded from the site during the 2006 and 2007 surveys.

4 FAUNA SURVEY

4.1 Methodology

A search of DEC's Threatened and Priority Species database (Appendix C) was undertaken to identify Scheduled and Threatened species and Priority species previously recorded in the region. Details of how species are classified in both lists are shown in Appendix B. A search of the Commonwealth *Environment Protection and Biodiversity Conservation* (*EPBC*) *Act 1999* online database was also undertaken.

Dr Annabelle Stewart, a qualified zoologist of Coffey Environments, conducted a level 1 fauna assessment including a site visit on 18 September 2007. Dr Stewart examined the site for available habitat types and searched for small reptiles and mammals. Any significant trees that contained hollows that may be suitable for breeding Black-Cockatoos were recorded using a hand-held GPS. Signs of feeding such as chewing, scarring or scratch marks were noted. Carnaby's Black-Cockatoos have a short upper mandible and leave characteristic chewing marks on discarded Marri nuts and Banksia sp. cones. Searches for Quenda scats and scratchings were made across the site.

The weather was fine with occasional light rainfall during the site visit.

4.2 Fauna Assessment Results

4.2.1 Significant Vertebrate Species Recorded or Predicted to Occur Near Lot 7778 Wannamal Road, South Cullalla

Several conservation significant fauna species have been identified by the DEC as potentially occurring within the study area (Table 3).

TABLE 3

POTENTIAL THREATENED AND PRIORITY FAUNA OCCURRING IN THE VICINITY OF LOT 7778 WANNAMAL RD SOUTH

SPECIES	COMMON NAME	CONSERVATION STATUS		Comment
		Wildlife Conservation Act*/DEC priority list	EPBC Act	
Dasyurus geoffroii	Chuditch, Western Quoll	Schedule 1	Vulnerable	Species *unlikely* to be present as habitat is not suitable
Pseudocheirus occidentalis	Western Ringtail Possum	Schedule 1	Vulnerable	Species *highly unlikely* to be present as habitat is not suitable and it is disjunct from the known current populations

SPECIES	COMMON NAME	CONSERVATION STATUS		Comment
		Wildlife Conservation Act*/DEC priority list	EPBC Act	
Pseudomys shortridgei	Heath Mouse (Dayang)	Schedule 1	Vulnerable	Species *unlikely* to be present as habitat is not suitable
Calyptorhynchus latirostris	Carnaby's Black Cockatoo	Schedule 1	Endangered	Species *likely* to forage on site but unlikely to rely on the area for survival
Calyptorhynchus sp	White-tailed Black Cockatoo	Schedule 1		Species *likely* to forage on site but unlikely to rely on the area for survival
Pseudemydura umbrina	Western Swamp Tortoise	Schedule 1	Critical	Species *highly unlikely* to be present as there are no wetlands on site
Cacatua leadbeateri	Major Mitchell's Cockatoo	Schedule 4		Species *potentially present* in region but unlikely to rely on the area for survival
Macropus irma	Western Brush Wallaby	Priority 4		Species *unlikely t*o be present as there are no wetlands or lakes on site
Charadrius rubricollis	Hooded Plover	Priority 4		Species *potentially* present in region
Hylacola cauta whitlocki	Shy Heathwren (western ssp)	Priority 4		Species *potentially* present in region but unlikely to rely on the area for survival
Galaxiella munda	Western Mud Minnow	Priority 4		Species *highly unlikely* to be present as there are no wetlands on site
Isoodon obesulus fusciventer	Southern Brown Bandicoot or Quenda	Priority 5		Species *unlikely* to be present in region

NB:

i) *Wildlife Conservation Act, 1950*

Schedule 1= Fauna that is rare or is likely to become extinct

Schedule 4 = Other specially protected fauna

DEC Priority List

Priority 4 = Taxa in need of monitoring

Priority 5 = Taxa in need of monitoring (conservation dependent)

ii) EPBC Act: *Commonweatlh Environmental Protection and Biodiversity Conservation Act, 1999*

Coffey Environments has used the data collected during September 2007 site visit, vegetation association mapping, floristic data and photographs to provide an indication of the fauna habitats that are available within the site. Most of the area contains *Eucalyptus todtiana*, with a variety of shrubs providing undergrowth. The undergrowth includes *Adenanthos cygnorum*, *Nuytsia floribunda*, *Banksia menziesii*, *B. prionotes*, and *Xanthorrhoea preissii*. There is no surface water, streams or wetlands.

Several conservation significant fauna species have been identified by DEC as potentially occurring within the region. However, limited habitat types on site, including the lack of any surface water reduces the likelihood of several of these species occurring at the site. Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) which are listed as Schedule 1 species ('Fauna that is rare or likely to become extinct') under the *Western Australian Wildlife Conservation Act 1950* is likely to frequent portions of the site that contain Banksias as these provide favourable foraging areas. No Black-Cockatoo's were sighted during the sight visit, although potential feeding habitat are present in areas of Low Open Woodland of *Eucalyptus todtiana, Banksia menziesii* and *Banksia attenuate*, particularly to the south of the site.

However, Coffey Environments is of the opinion that the site n\has no particular conservation significance for this species of cockatoo given the extensive availability of similar woodland and heath habitat present within the region. This includes the Boonanarring Nature Reserve which is located 1km from site and has 9,250ha in reserve. The study areas location is not considered strategic as there are extensive vested reserves with high quality feeding habitat both adjacent to the site and in close proximity to the site. Furthermore, the vegetation present at the site does not provide suitable breeding habitats for these species of cockatoo, and no suitable breeding hollows were recorded during the site visit.

Of the Schedule 1 listed by a DEC desktop search, four are unlikely to occur at the site. The Western Swamp Tortoise requires wetland habitats which are not present, and its current distribution is restricted to a series of wetlands in the Ellenbrook region. The Heath Mouse has a very limited distribution in the south-eastern Wheatbelt through to the south coast and is unlikely to occur at the site. Western Ringtail Possum's are now only found within the south coastal regions between Bunbury and Albany. There are a few outlying populations however these populations are well south of Perth. Western Ringtail Possums typically inhabit Peppermint (*Agonis flexuosa*) dominated woodlands however are also found in Eucalypt Woodlands, shrublands and urban environments. The Chuditch preferred habitat is a dense understorey which provides adequate cover and den sites (usually hollow logs). The proposed bioreactor site is vegetated by low open woodlands, which have regrown from previously cleared vegetation. The site does not provide the dense understorey or den sites required by the Chuditch, and as such Coffey Environments believes that the site is not one of significance for the Chuditch.

During the site visit no scats, diggings or scratchings from mammal species listed as Schedule or Priority species were recorded. However, a number of scats and tracks from the Western Grey Kangaroo were recorded. The Western Grey Kangaroo is not protected under Commonwealth legislation but is protected under the *Wildlife Conservation Act 1950*. Rabbit scats and diggings were also present on tracks and in the vegetation.

4.3 Potential Impacts

The fauna habitats which may potentially be contained within the study area are likely to provide foraging habitat for a limited number of threatened species known or considered to potentially occur within the region. Impacts on native fauna may potentially occur as a result of the destruction of habitat through vegetation clearing. However, there were no particular features or specific habitat at Lot 7778 Wannamal Rd South that would indicate it has ecological functional significance that is different to other sites within the region including the adjacent Boonanarring Nature Reserve.

Coffey Environments believes that the site does not have special significance for threatened species identified by the DEC as potentially occurring in the region given the extensive availability of similar woodland and heath habitat present within the region. This includes the Boonanarring Nature Reserve which abuts the western boundary of the property and has 9,250ha in reserve. However, the presence of feeding habitats for the Black-Cockatoo species is an important consideration for development and any potential impacts to these species should be minimised. The clearing of vegetation from the site may result in the loss of potential feeding habitat for the Carnaby's Black Cockatoo, Major Mitchell's Cockatoo, Hooded Plover, Shy Heathwren and Western Mud Minnow.

From a fauna perspective, areas of the vegetation to the north of the site could be described as 'good' quality, while areas to the south of the site could be described as 'excellent' quality. The habitat supports the normal range of vertebrate species found in similar habitats in the region. It is Coffee Environments view that clearing portions of the vegetation from north of the site would not impact on a significant or important functional ecosystem that should be preserved. However, areas of 'excellent' quality vegetation to the southeast of the site should be retained for conservation purposes.

Other potential impacts include increased species mortality due to the heightened volumes of traffic associated with the project, and increased predation on native fauna by feral animals which may increase as a result of inadequate landfill management.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Flora and Vegetation

The following conclusions have been made regarding the flora and vegetation assessed within the surveyed portion of Lot 7778 Wannamal:

- No TECs were listed by DEC as occurring in the geographical range of the survey area and this was confirmed during the 2006 and September 2007 flora and vegetation surveys;
- No species of Declared Rare or Priority Flora were recorded from the site during the 2006 and September 2007site visits.
- The study area contains vegetation of the Cullalla Complex and while approximately 40% of the pre-European extent remains, the reservation status of the Complex is below the Bush Forever target of 10% pre-European extent in secure reserves;
- The study area contains inferred vegetation associations that are not generally well reserved in the Bindoon to Moora area but that are well reserved within the nearby Boonanarring Nature Reserve; and
- Vegetation in Very Good to Excellent condition is present within the southern portion of the study area. It is recommended that consideration be given to retaining vegetation in this portion of the study area for conservation purposes.

5.2 Fauna

A section of vegetation to the southern portion of the study area identified during the vegetation surveys as being in Very Good to Excellent condition should be considered reservation for conservation purposes. VES, has amended its original landfill footprint to ensure that there are no direct impacts from the proposal and will fenced off and exclude area from any site operations.

Several fauna species of conservation significance have been identified by the DEC as potentially occurring within the region (Section 2.2.2). However, limited habitat types on site, including the lack of any surface water reduces the likelihood of several of these species occurring at the site. Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) which is listed as a Schedule 1 species ('Fauna that is rare or likely to become extinct') under the Western Australian *Wildlife Conservation Act 1950*, is likely to frequent portions of the site that contain banksias as these provide favourable foraging areas.

Coffey Environments believes that the site does not have special significance for this species of cockatoo given its cleared state and the extensive availability of similar woodland and heath habitat present within the region. This includes the Boonanarring Nature Reserve which abuts the western boundary of the property and has 9,250ha in reserve. VES is committed to monitoring the impact of fauna-related transport incidents along the Wannamal Road West. As part of this commitment they will record all fauna deaths (e.g. kangaroos) and the approximate location of the incident. All incidents, including those not related to staff from the bioreactor landfill will be recorded. If the number of incidents is at an unacceptable level (e.g. more than 10 strikes per week) management strategies will be implemented to reduce the rate of deaths. Speed limits on access roads within the site will be kept at a maximum speed limit of 60km/hr.

Strategies to be employed to minimise the impacts on fauna include:

- Clearing of vegetation will be restricted to the minimum necessary to implement the project, with clearing boundaries clearly marked and identified.
- Vegetation in Excellent condition south of the proposed footprint will be fenced off to minimise disturbance. VES will develop a weed monitoring and management programme in this area prior to the commencement of operations.
- Vehicles and machinery will be parked in designated locations only to minimise habitat damage.
- Traffic will be restricted to established roads and parking areas, to again minimise habitat destruction.
- Site traffic speed limits will be lowered to minimise fauna death on roads.
- Ensuring putrescibles wastes are covered with soil at the end of each day. This will minimise the potential for night time foraging by birds and feral and native animals.
- Ensuring house keeping procedures such as litter removal at the perimeter of the site are maintained to discourage fauna from the site.
- Applying the odour control strategies outlined in Section 5.4 to minimise the attraction of fauna to the site.
- Site environmental inductions will raise employee awareness in relation to conservation of fauna (particularly rare, threatened or vulnerable fauna) and their habitats.
- Direct contact with fauna will be avoided whenever possible.

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7 DISCLAIMER

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Figures

Flora, Vegetation and Fauna Assessment,
Lot 7778 Wannamal Rd South Cullalla

PRINTED: Wed 17 Oct 07 CHECKED: SG 17-10-07 DRAWN: 17-10-07 DATUM: MGA COP-2006-002/VEG/27_249f1.dgn

coffey environments
SPECIALISTS IN LIVING AND WORKING PLACES

REGIONAL LOCATION
FIGURE 1

VEGETATION ASSOCIATIONS

EtLOW
Low Open Woodland of *Eucalyptus todtiana* to 4m with scattered *Nuytsia floribunda* over a mixed Shrubland. Other common species include *Xanthorrhoea preissii*, *Eremaea beaufortioides*, and *Stirlingia latifolia*.

BaBmEtLOW1
Low Open Woodland of *Eucalyptus todtiana*, *Banksia menziesii* and *Banksia attenuata* to 5m over a Tall Shrubland of *Jacksonia sternbergiana* over an Open mixed Shrubland. Other common species include *Allocasuarina humilis*, *Xanthorrhoea preissii*, *Petrophile brevifolia* and *Eremaea beaufortioides*.

BaBmEtLOW2
Low Open Woodland of *Banksia attenuata*, *Banksia menziesii* and *Eucalyptus todtiana* to 3m in height over *Adenanthos cygnorum* Shrubland to 1.5m in height over Low Heath dominated by *Xanthorrhoea preissii*, *Stirlingia latifolia* and *Eremaea pauciflora*

BaBmEtLOW3
Low Open Woodland of *Banksia attenuata*, *Banksia menziesii* and *Eucalyptus todtiana* to 4m in height over a Low Heath of *Allocasuarina humilis*, *Xanthorrhoea preissii*, *Eremaea pauciflora* and *Stirlingia latifolia*

BaBmLOF
Low Open Forest of *Banksia attenuata* and *Banksia menziesii* to 4m in height over a Low Open Shrubland of *Allocasuarina humilis*, *Xanthorrhoea preissii*, *Regelia ciliata*, *Stirlingia latifolia*, *Verticordia nitens*, *Eremaea pauciflora* and *Conospermum stoechadis*

BmBpJsCTS
Closed Tall Scrub of *Banksia menziesii*, *Banksia prionotes* and *Jacksonia sternbergiana* to 3m in height with scattered *Eucalyptus todtiana* over *Melaleuca huegelii*, *Allocasuarina humilis*, *Adenanthos cygnorum* and *Ptilotus polystachyus* Open Shrubland over *Eremaea pauciflora*, *Acacia pulchella* and *Stirlingia latifolia* Low Open Heath

AcTS
Tall Shrubland of *Adenanthos cygnorum* with scattered *Nuytsia floribunda* and *Eucalyptus todtiana* to 3m over a Low Open shrubland of *Eremaea beaufortioides* and *Xanthorrhoea preissi*i.

JsTOS
(Q8) Tall Open Shrubland of *Jacksonia sternbergiana* to 3.5m in height over a mixed Open Heath of *Jacksonia floribunda*, *Melaleuca huegelii*, *Adenanthos cygnorum*, *Hibbertia hypericoides* and *Synaphea spinulosa*

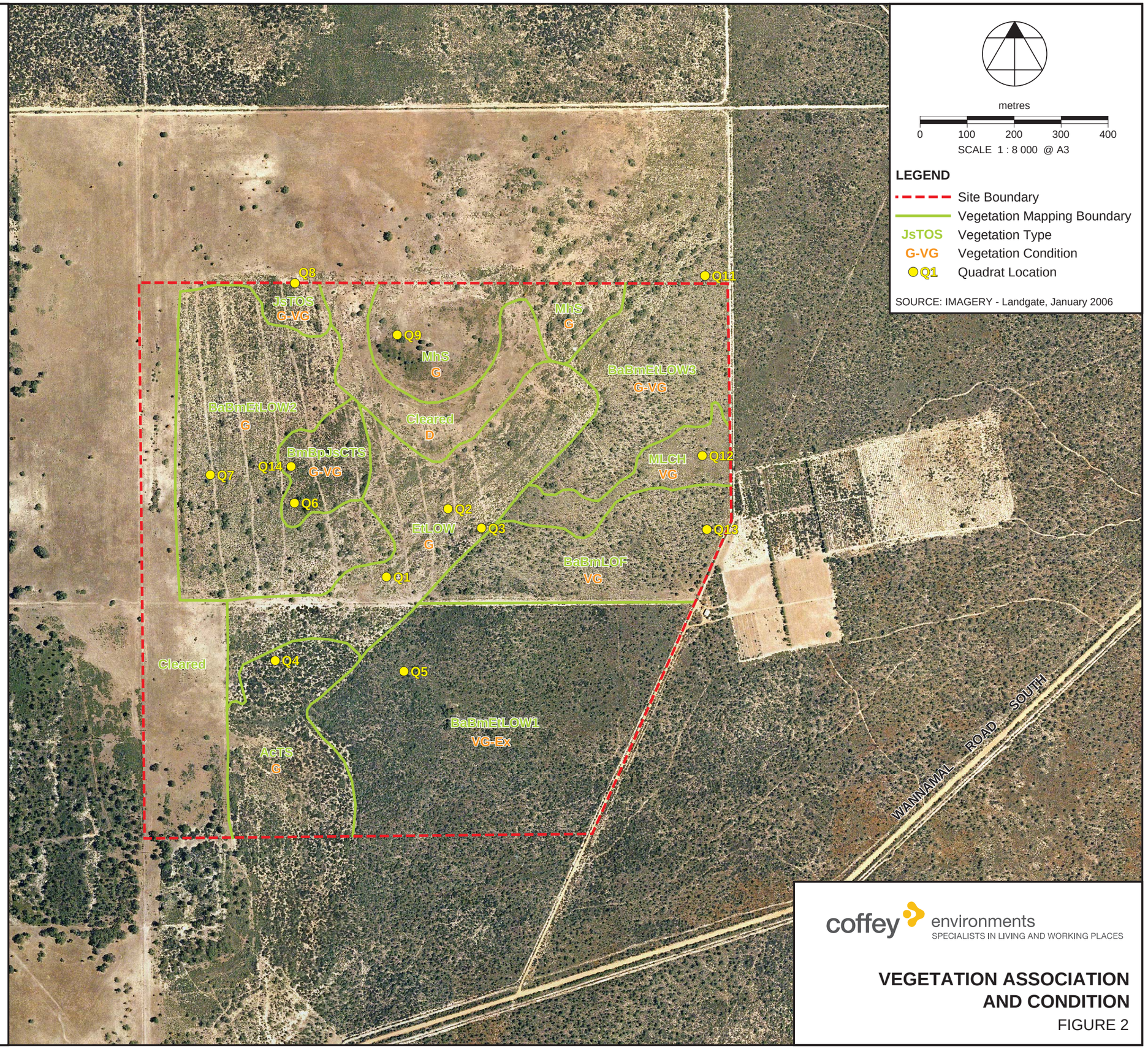
MhS
Shrubland of *Melaleuca huegelii* to 1.5m in height with scattered *Eucalyptus todtiana*, *Banksia attenuata* and *Corymbia calophylla* over Low Heath of *Xanthorrhoea preissii*, *Hibbertia hypericoides* and *Synaphea spinulosa*

MLCH
Low Closed Heath of *Xanthorrhoea preissii*, *Allocasuarina humilis*, *Eremaea pauciflora*, *Leucopogon capitellatus* and *Synaphea spinulosa* to 1m in height

VEGETATION CONDITION
(Legend Source: BUSH FOREVER Govt. of W.A.)

P	Pristine. (Not Applicable)
Ex	Excellent.
VG	Very Good.
G	Good.
D	Degraded.
CD	Completely Degraded. (NA)

NOTE: For full description see text.



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LEGEND
- Site Boundary
- Vegetation Mapping Boundary
- JsTOS — Vegetation Type
- G-VG — Vegetation Condition
- Q1 — Quadrat Location

SOURCE: IMAGERY - Landgate, January 2006

coffey environments
SPECIALISTS IN LIVING AND WORKING PLACES

VEGETATION ASSOCIATION AND CONDITION
FIGURE 2

PRINTED: Wed 17 Oct 07
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DATUM: MGA
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Appendix A
Flora Species List

Flora, Vegetation and Fauna Assessment,
Lot 7778 Wannamal Rd South Cullalla

APPENDIX A

Flora Species List

Project: Lot 7778 Wannamal Road South, Cullalla

		# Sites Recorded From
031	**POACEAE**	
*	*Aira caryophyllea*	3
	Austrostipa trichophylla	2
*	*Avena fatua*	1
*	*Briza maxima*	5
*	*Briza minor*	2
*	*Ehrharta calycina*	2
	Neurachne alopecuroidea	3
*	*Poa annua*	1
032	**CYPERACEAE**	
	Caustis dioica	2
	Gahnia sp.	1
	Lepidosperma longitudinale	2
	Lepidosperma tenue	4
	Mesomelaena pseudostygia	6
	Mesomelaena tetragona	6
	Schoenus clandestinus	1
	Schoenus curvifolius	2
	Schoenus sp.	1
039	**RESTIONACEAE**	
	Alexgeorgea nitens	6
	Desmocladus fasciculatus	1
	Desmocladus flexuosus	2
	Desmocladus myriocladus	1
	Lepidobolus preissianus	1
	Lyginia barbata	3
054B	**ASPARAGACEAE**	
*	*Asparagus asparagoides*	3
054C	**DASYPOGONACEAE**	
	Calectasia narragara	3
	Lomandra multiflora	1
	Lomandra suaveolens	1
054D	**XANTHORRHOEACEAE**	
	Xanthorrhoea preissii	13
054F	**ANTHERICACEAE**	
	Chamaescilla corymbosa	1
	Johnsonia pubescens	3
	Laxmannia omnifertilis	1
	Tricoryne elatior	1

	054J COLCHICACEAE	
	Burchardia congesta	4
	055 HAEMODORACEAE	
	Anigozanthos humilis	6
	Anigozanthos humilis subsp. *humilis*	3
	Conostylis aculeata	5
	Conostylis aurea	3
	Conostylis setigera	4
	Conostylis sp.	1
	Haemodorum laxum	2
	Haemodorum spicatum	1
	060 IRIDACEAE	
*	*Gladiolus caryophyllaceus*	2
	Patersonia occidentalis	9
*	*Watsonia meriana* var. *bulbillifera*	2
	066 ORCHIDACEAE	
	Caladenia flava	5
	070 CASUARINACEAE	
	Allocasuarina humilis	6
	090 PROTEACEAE	
	Adenanthos cygnorum	10
	Banksia attenuata	6
	Banksia menziesii	6
	Banksia prionotes	1
	Conospermum sericeum	1
	Conospermum stoechadis	5
	Dryandra lindleyana	7
	Hakea costata	4
	Hakea preissii	1
	Hakea ruscifolia	4
	Hakea smilacifolia	1
	Hakea stenocarpa	1
	Isopogon cuneatus	1
	Lambertia multiflora var. *multiflora*	2
	Petrophile brevifolia	3
	Petrophile linearis	9
	Petrophile macrostachya	1
	Petrophile scabriuscula	1
	Stirlingia latifolia	12
	Synaphea spinulosa	10
	Synaphea spinulosa subsp. *spinulosa*	1
	097 LORANTHACEAE	
	Nuytsia floribunda	5
	106 AMARANTHACEAE	
	Ptilotus polystachyus	3
	110A MOLLUGINACEAE	
	Macarthuria australis	3

	113 CARYOPHYLLACEAE	
*	*Petrorhagia dubia*	2
*	*Petrorhagia velutina*	1
*	*Silene gallica*	1
	131 LAURACEAE	
	Cassytha glabella	2
	Cassytha racemosa	1
	138 BRASSICACEAE	
*	*Brassica napus*	2
*	*Brassica tournefortii*	1
*	*Raphanus raphanistrum*	3
	143 DROSERACEAE	
	Drosera erythrorhiza	8
	Drosera pallida	4
	163 MIMOSACEAE	
	Acacia pulchella	10
	Acacia stenoptera	4
	165 PAPILIONACEAE	
	Bossiaea eriocarpa	10
	Daviesia angulata	1
	Daviesia decurrens	9
	Daviesia nudiflora	2
	Gastrolobium capitatum	8
	Gompholobium confertum	1
	Gompholobium knightianum	2
	Gompholobium tomentosum	4
	Hovea trisperma	6
	Jacksonia floribunda	8
	Jacksonia sternbergiana	7
	Kennedia prostrata	2
*	*Trifolium angustifolium*	1
	167 GERANIACEAE	
*	*Erodium botrys*	1
	175 RUTACEAE	
	Boronia ramosa subsp. *anethifolia*	4
	Philotheca spicata	5
	182 TREMANDRACEAE	
	Tetratheca hirsuta	1
	183 POLYGALACEAE	
	Comesperma calymega	1
	Comesperma integerrimum	2
	202 STACKHOUSIACEAE	
	Stackhousia monogyna	2
	Tripterococcus brunonis	1

215	**RHAMNACEAE**	
	Stenanthemum humile	1
226	**DILLENIACEAE**	
	Hibbertia acerosa	4
	Hibbertia glaberrima	1
	Hibbertia huegelii	6
	Hibbertia hypericoides	7
263	**THYMELAEACEAE**	
	Pimelea angustifolia	4
	Pimelea rosea	1
273	**MYRTACEAE**	
	Baeckea camphorosmae	2
	Calytrix leschenaultii	3
	Corymbia calophylla	2
	Eremaea beaufortioides	9
	Eremaea pauciflora	6
	Eucalyptus todtiana	9
	Leptospermum spinescens	3
	Melaleuca huegelii	4
	Thryptomene baeckeacea	1
	Verticordia acerosa	2
	Verticordia bifimbriata	1
	Verticordia nitens	6
	Verticordia patens	1
	Verticordia sp.	1
281	**APIACEAE**	
	Xanthosia huegelii	4
288	**EPACRIDACEAE**	
	Andersonia heterophylla	4
	Astroloma ciliatum	1
	Conostephium minus	4
	Conostephium pendulum	6
	Leucopogon capitellatus	3
	Leucopogon propinquus	1
	Lysinema ciliatum	3
	Lysinema elegans	3
310	**BORAGINACEAE**	
*	*Echium plantagineum*	1
311A	**CHLOANTHACEAE**	
	Pityrodia bartlingii	1
320	**OROBANCHACEAE**	
*	*Orobanche minor*	1
331	**Rubiaceae**	
	Opercularia vaginata	2
340	**LOBELIACEAE**	
	Lobelia tenuior	1

341	**GOODENIACEAE**	
	Dampiera alata	1
	Dampiera linearis	3
	Goodenia caerulea	1
	Lechenaultia biloba	3
	Scaevola repens	5
343	**STYLIDIACEAE**	
	Stylidium repens	4
345	**ASTERACEAE**	
*	*Arctotheca calendula*	1
*	*Hypochaeris glabra*	3
	Lagenifera huegelii	3
	Podotheca gnaphalioides	7
*	*Pseudognaphalium luteo-album*	1
*	*Taraxacum officinale*	6
*	*Ursinia anthemoides*	8
	Total Species	**151**
	Native Species	**127**
	Introduced Species	**24**

* Introduced Species

Appendix B
Quadrat Data

Flora, Vegetation and Fauna Assessment,
Lot 7778 Wannamal Rd South Cullalla

Appendix B

Flora Quadrat Data

Lot 7778 Wannamal Rd South Cullalla

Site Q1

Described: GMM/JA **Date:** 31/05/06 & 11/11/06 **Type:** Quadrat (10m x 10m)

Location: Lot 7778 Wannamal Rd South, Cullalla

MGA Zone: 50 402599 mE; 6545610 mN

Habitat: Very gently undulating topography; regrowth vegetation

Soil: Deep grey sand

Rock Type: n/a

Vegetation: Low Open Woodland of *Eucalyptus todtiana* to 4 m with scattered *Nuytsia floribunda* over a Mixed Shrubland

Vegetation Condition: Good, obvious signs of previously been cleared

Fire: 10+ years

Species List:

Name
Acacia pulchella
Acacia stenoptera
Adenanthos cygnorum
Aira caryophyllea
Alexgeorgea nitens
Anigozanthos humilis subsp. *humilis*

Bossiaea eriocarpa
Briza maxima
Briza minor
Burchardia congesta
Cassytha glabella
Dampiera alata
Drosera erythrorhiza
Dryandra lindleyana
Eremaea beaufortioides
Eucalyptus todtiana
Gompholobium tomentosum
Hovea trisperma
Hypochaeris glabra
Jacksonia floribunda
Kennedia prostrata
Mesomelaena tetragona
Nuytsia floribunda
Patersonia occidentalis
Petrophile linearis
Petrorhagia dubia
Raphanus raphanistrum
Stirlingia latifolia
Taraxacum officinale
Verticordia nitens
Xanthorrhoea preissii
Xanthosia huegelii

Lot 7778 Wannamal Rd South Cullalla

Site Q2

Described: GMM/JA **Date:** 31/05/06 and 11/11/06 **Type:** Quadrat (10m x 10m)

Location: Lot 7778 Wannamal Rd South, Cullalla

MGA Zone: 50 402730 mE; 6545755 mN

Habitat: south west facing hillslope

Soil: deep grey sand

Rock Type: n/a

Vegetation: Low Open Woodland of *Eucalyptus todtiana* to 4 m over a Shrubland of *Adenanthos cygnorum* over a Mixed Shrubland

Vegetation Condition: Good, obvious signs of having been previously cleared

Fire History: 10 +years

Species List:

Name

Acacia pulchella
Adenanthos cygnorum
Aira caryophyllea
Alexgeorgea nitens
Allocasuarina humilis
Banksia attenuata
Bossiaea eriocarpa
Brassica tournefortii
Briza maxima

Conostephium pendulum
Drosera pallida
Dryandra lindleyana
Ehrharta calycina
Eremaea beaufortioides
Eucalyptus todtiana
Hakea costata
Hibbertia acerosa
Hibbertia hypericoides
Hypochaeris glabra
Jacksonia sternbergiana
Kennedia prostrata
Macarthuria australis
Patersonia occidentalis
Petrophile linearis
Ptilotus polystachyus
Stirlingia latifolia
Taraxacum officinale
Verticordia acerosa
Verticordia nitens
Xanthorrhoea preissii

Lot 7778 Wannamal Rd South Cullalla

Site Q3

Described: GMM/JA **Date:** 31/05/06 and 11/11/06 **Type:** Quadrat (10m x 10m)

Location: Lot 7778 Wannamal Rd South, Cullalla

MGA Zone: 50402801 mE; 6545714 mN

Habitat:crest of foothill

Soil:sandy grey brown soil, yellow subsoil

Rock Type: n/a

Vegetation: Low Open Woodland of *Eucalyptus todtiana, Banksia menziesii* and *Banksia attenuata* to 5m over a Tall Shrubland of *Jacksonia sternbergiana* over an Open Mixed Shrubland.

Vegetation Condition: Good, with obvious signs of having been previously grazed

Fire History: 10+ years

Species List:

Name

Acacia pulchella
Acacia stenoptera
Aira caryophyllea
Alexgeorgea nitens
Allocasuarina humilis
Anigozanthos humilis subsp. *humilis*
Banksia attenuata
Banksia menziesii
Bossiaea eriocarpa
Briza maxima
Conospermum sericeum
Conostylis aurea
Conostylis setigera
Drosera erythrorhiza

Dryandra lindleyana
Eremaea beaufortioides
Eucalyptus todtiana
Gompholobium tomentosum
Hakea ruscifolia
Hovea trisperma
Hypochaeris glabra
Jacksonia sternbergiana
Johnsonia pubescens
Lagenifera huegelii
Lyginia barbata
Lysinema ciliatum
Macarthuria australis
Mesomelaena tetragona
Nuytsia floribunda
Patersonia occidentalis
Petrophile brevifolia
Petrophile linearis
Pimelea rosea
Schoenus clandestinus
Stirlingia latifolia
Stylidium repens
Synaphea spinulosa
Thryptomene baeckeacea
Ursinia anthemoides
Verticordia nitens
Xanthorrhoea preissii
Xanthosia huegelii

Lot 7778 Wannamal Rd South Cullalla

Site Q4

Described: GMM/JA **Date:** 31/05/06 and 11/11/06 **Type:** Quadrat (10m x 10m)

Location: Lot 7778 Wannamal Rd South, Cullalla

MGA Zone: 50402362 mE; 6545432 mN

Soil: Grey brown sand with approximately 30% bare ground.

Rock Type: n/a

Vegetation: Tall Shrubland of *Adenanthos cygnorum* with scattered *Nuytsia floribunda* and *Eucalyptus todtiana* to 3m over a Low Open shrubland of *Eremaea beaufortioides* and *Xanthorrhoea preissii.*

Vegetation Condition: Good

Fire History: 10+ years

Species List:

Name

Acacia stenoptera
Adenanthos cygnorum
Briza maxima
Briza minor
Conostephium minus
Conostylis sp.
Eremaea beaufortioides
Gladiolus caryophyllaceus
Hakea costata
Hibbertia acerosa
Hibbertia hypericoides
Jacksonia sternbergiana
Lyginia barbata
Mesomelaena pseudostygia
Nuytsia floribunda

Petrophile brevifolia
Petrophile linearis
Petrorhagia dubia
Podotheca gnaphalioides
Scaevola repens
Stirlingia latifolia
Stylidium repens
Ursinia anthemoides
Verticordia sp.
Xanthorrhoea preissii

Lot 7778 Wannamal Rd South Cullalla

Site Q5

Described: GMM/JA **Date:** 31/05/06 and 11/11/06 **Type:** Quadrat (10m x 10m)

Location: Lot 7778 Wannamal Rd South, Cullalla

MGA Zone: 50402636 mE; 6545409 mN

Vegetation: Low Woodland of *Eucalyptus todtiana* and *Banksia menziesii* to 4m over a mixed shrubland.

Vegetation Condition: Very Good to Excellent, with signs of human disturbance

Fire History: 10 + years

Species List:

Name

Acacia pulchella
Adenanthos cygnorum
Alexgeorgea nitens
Banksia attenuata
Banksia menziesii
Bossiaea eriocarpa
Burchardia congesta
Calectasia narragara
Cassytha glabella
Conospermum stoechadis
Conostephium pendulum
Conostylis aculeata
Conostylis aurea
Conostylis setigera
Daviesia decurrens
Drosera erythrorhiza
Dryandra lindleyana
Eremaea beaufortioides
Eucalyptus todtiana

Gompholobium confertum
Gompholobium tomentosum
Hakea ruscifolia
Hibbertia acerosa
Hovea trisperma
Johnsonia pubescens
Lyginia barbata
Lysinema elegans
Mesomelaena tetragona
Nemcia capitata
Patersonia occidentalis
Petrophile brevifolia
Petrophile macrostachya
Philotheca spicata
Stirlingia latifolia
Stylidium repens
Synaphea spinulosa
Tricoryne elatior
Verticordia acerosa
Verticordia nitens
Xanthorrhoea preissii

Lot 7778 Wannamal Rd South Cullalla

Site Q6

Described: GMM/JA **Date:** 31/05/06 and 11/11/06 **Type:** Quadrat (10m x 10m)

Location: Lot 7778 Wannamal Rd South, Cullalla

MGA Zone: 50402403 mE; 6545767 mN
Habitat: gentle slope south west
Soil: Brown/grey sand
Rock Type: n/a
Vegetation: Low Open Woodland of *Eucalyptus todtiana* to 4m over a Tall Shrubland of *Banksia prionotes*, *Jacksonia sternbergiana* and *Adenanthos cygnorum* to 2.5m.
Vegetation Condition: Good, with obvious signs of having been previously cleared
Fire History: 10+ years

Species List:

Name

Acacia stenoptera
Adenanthos cygnorum
Alexgeorgea nitens
Anigozanthos humilis subsp. *humilis*
Austrostipa trichophylla
Baeckea camphorosmae
Banksia prionotes
Boronia ramosa subsp. *anethifolia*
Bossiaea eriocarpa
Briza maxima
Burchardia congesta
Comesperma calymega
Comesperma integerrimum
Conostephium pendulum
Conostylis aculeata
Corymbia calophylla
Daviesia decurrens
Daviesia nudiflora

Drosera pallida
Dryandra lindleyana
Ehrharta calycina
Eremaea pauciflora
Erodium botrys
Eucalyptus todtiana
Gladiolus caryophyllaceus
Gompholobium tomentosum
Haemodorum laxum
Hakea costata
Hibbertia hypericoides
Hovea trisperma
Jacksonia floribunda
Jacksonia sternbergiana
Lagenifera huegelii
Mesomelaena tetragona
Nemcia capitata
Opercularia vaginata
Patersonia occidentalis
Petrophile linearis
Petrorhagia velutina
Stirlingia latifolia
Synaphea spinulosa
Tripterococcus brunonis
Xanthorrhoea preissii
Xanthosia huegelii

Lot 7778 Wannamal Rd South Cullalla

Site Q7

Described: SBG **Date:** 18/09/2007 **Type:** Quadrat (10m x 10m) **Season:** Excellent

Location: Lot 7778 Wannamal Rd, Cullalla

MGA Zone:50 402224 mE; 6545827 mN

Habitat: East facing slope of moderately steep hill

Soil:grey/brown sand

Rock Type: n/a

Vegetation: Tall Open Woodland of *Banksia attenuata and Banksia menziesii* to 3m in height over *Adenanthos cygnorum* Shrubland to 1.5m in height over Low Heath dominated by *Xanthorrhoea preissii* , *Stirlingia latifolia* and *Eremaea pauciflora*

Vegetation Condition: Good

Fire History: 10+ years

Species List:

Name	Cover (%)	Height (m)
Adenanthos cygnorum	20	1.8
Allocasuarina humilis	1	1.2
Andersonia heterophylla	<1	0.6
Anigozanthos humilis	<1	0.1
Arctotheca calendula	<1	0.2
Asparagus asparagoides	<1	0.1
Banksia menziesii	5	3
Boronia ramosa subsp. *anethifolia*	<1	0.3
Bossiaea eriocarpa	<1	0.3
Caladenia flava	<1	0.1
Caustis dioica	1	0.3
Conospermum stoechadis	2	0.8
Conostylis aculeata	<1	0.4

Conostylis setigera	<1	0.1
Daviesia decurrens	<1	0.3
Daviesia nudiflora	<1	0.2
Drosera erythrorhiza	<<1	climber
Eucalyptus todtiana	5	6
Gastrolobium capitatum	<1	0.3
Hibbertia acerosa	<1	0.3
Hibbertia hypericoides	1	0.3
Jacksonia floribunda	2	1.2
Lepidosperma tenue	<1	0.1
Melaleuca huegelii	2	1.2
Mesomelaena pseudostygia	<1	0.2
Patersonia occidentalis	<1	0.3
Petrophile linearis	1	1.1
Poa annua	<<1	0.1
Scaevola repens	<1	groundcover
Stirlingia latifolia	1	0.7
Synaphea spinulosa	1	0.4
Taraxacum officinale	<1	0.3
Trifolium angustifolium	<1	0.01
Ursinia anthemoides	<<!	0.2
Xanthorrhoea preissii	2	0.5

Lot 7778 Wannamal Rd South Cullalla

Site Q8

Described: SBG **Date:** 18/09/2007 **Type:** Quadrat (10m x 10m) **Season:** Excellent

Location: Lot 7778 Wannamal Rd South Cullalla

MGA Zone: 50402404 mE; 6546235 mN

Habitat:southeast facing slope of moderately steep hill

Soil: grey brown sand

Rock Type n/a

Vegetation: Tall Open Shrubland of *Jacksonia sternbergiana* to 3.5m in height over a Mixed Open Heath of *Jacksonia floribunda, Melaleuca huegelii, Adenanthos cygnorum, Hibbertia hypericoides* and *Synaphea spinulosa*

Vegetation Condition: Good to Very Good, evidence of recent grazing

Fire History: 10+ years

Species List:

Name	Cover (%)	Height (m)
Acacia pulchella	<1	0.3
Adenanthos cygnorum	5	1.2
Anigozanthos humilis	<1	0.2
Asparagus asparagoides	<1	0.1
Avena fatua	<1	0.5
Bossiaea eriocarpa	<1	0.3
Conostephium minus	<1	0.3
Daviesia decurrens	<1	0.2
Eremaea beaufortioides	1	0.2
Gastrolobium capitatum	<1	0.2
Hibbertia huegelii	<1	0.2
Hibbertia hypericoides	<1	0.3
Jacksonia floribunda	30	1.8
Jacksonia sternbergiana	30	3
Lagenifera huegelii	<1	0.4
Macarthuria australis	<1	0.3
Melaleuca huegelii	20	1.5
Mesomelaena pseudostygia	<1	0.4
Neurachne alopecuroidea	<1	0.2
Pimelea angustifolia	1	0.4
Raphanus raphanistrum	<1	0.2
Stackhousia monogyna	<1	0.2
Stirlingia latifolia	<1	0.4
Synaphea spinulosa	1	0.6
Taraxacum officinale	<1	0.2
Ursinia anthemoides	<<1`	0.2
Watsonia meriana var. *bulbillifera*	<1	0.5
Xanthorrhoea preissii	<1	0.2

Lot 7778 Wannamal Rd South Cullalla

Site Q9

Described: SBG **Date:** 18/09/2007 **Type:** Quadrat (10m x 10m) **Season:** Excellent

Location: Lot 7778 Wannamal Rd South Cullalla

MGA Zone: 50 402622 mE; 6546125 mN

Habitat Crest of hill, southern aspect

Soil: Dark grey sand

Rock Type: n/a

Vegetation: Shrubland of *Melaleuca huegelii* to 1.5m in height with scattered *Eucalyptus todtiana*, *Banksia attenuata* and *Corymbia calophylla* over Low Heath of *Xanthorrhoea preissii, Hibbertia hypericoides* and *Synaphea spinulosa*

Vegetation Condition: Good, with signs of previous clearing and recent grazing

Fire 10+ years

Species List:

Name	Cover (%)	Height (m)
Acacia pulchella	1	0.4
Adenanthos cygnorum	1	0.3
Boronia ramosa subsp. *anethifolia*	<1	0.3
Brassica napus	<1	0.2
Burchardia congesta	<1	0.2
Caladenia flava	<1	0.2
Conostephium minus	<1	0.2
Corymbia calophylla	5	15
Dampiera linearis	<1	0.2
Daviesia decurrens	1	0.3

Drosera pallida	<1	climber
Gompholobium knightianum	<1	0.3
Hibbertia huegelii	<1	0.2
Hibbertia hypericoides	5	0.5
Lechenaultia biloba	1	0.3
Lepidosperma tenue	<1	0.3
Leucopogon propinquus	<1	0.2
Lomandra suaveolens	<1	0.4
Melaleuca huegelii	30	1.5
Neurachne alopecuroidea	<1	0.2
Patersonia occidentalis	<1	0.4
Podotheca gnaphalioides	<1	0.01
Raphanus raphanistrum	<1	0.2
Schoenus curvifolius	<1	0.3
Synaphea spinulosa	<1	0.3
Taraxacum officinale	<1	0.2
Ursinia anthemoides	<1	0.2
Watsonia meriana var. *bulbillifera*	<1	0.3
Xanthorrhoea preissii	5	1.2

Lot 7778 Wannamal Rd South Cullalla

Site Q11

Described: SBG **Date:** 18/09/2007 **Type:** Quadrat (10m x 10m) **Season:** Excellent

Location Lot 7778 Wannamal Rd South, Cullalla

MGA Zone: 50 403277 mE: 6546251 mN

Habitat: North facing base of moderately steep hill

Soil:grey white to grey sand

Rock Type: n/a

Vegetation:*Banksia attenuata*, *Banksia menziesii* and *Eucalyptus todtiana* Low Open Woodland over a Low Heath of *Allocasuarina humilis, Xanthorrhoea preissii, Eremaea pauciflora* and *Stirlingia latifolia*

Vegetation Condition: Good to Very Good

Fire 10+ years

Species List:

Name	Cover (%)	Height (m)
Acacia pulchella	<1	0.3
Allocasuarina humilis	10	1.3
Andersonia heterophylla	<1	0.2
Anigozanthos humilis	<1	0.1
Banksia attenuata	10	3
Banksia menziesii	10	3
Bossiaea eriocarpa	<1	0.2
Caladenia flava	<1	0.2
Calectasia narragara	<1	0.3
Calytrix leschenaultii	<1	0.3
Cassytha racemosa	<1	creeper
Conospermum stoechadis	1	1.3
Conostephium minus	<1	0.2
Conostephium pendulum	1	0.3

Conostylis aculeata	<1	0.2
Dampiera lindleyi	<1	0.3
Daviesia decurrens	<1	0.2
Desmocladus flexuosus	<1	0.2
Drosera erythrorhiza	<1	climber
Dryandra lindleyana	1	0.2
Eremaea beaufortioides	<1	0.2
Eremaea pauciflora	2	0.3
Eucalyptus todtiana	10	4
Gastrolobium capitatum	<1	0.3
Hakea preissii	1	2
Hakea ruscifolia	<1	0.5
Hibbertia acerosa	<1	0.2
Hibbertia huegelii	<1	0.3
Hovea trisperma	<1	0.6
Jacksonia floribunda	<1	0.3
Jacksonia sternbergiana	1	2.5
Lambertia multiflora var. *multiflora*	<1	1.2
Lepidosperma longitudinale	<1	0.6
Leucopogon capitellatus	<1	0.2
Lysinema elegans	<1	0.3
Mesomelaena pseudostygia	<1	0.3
Nuytsia floribunda	<1	3
Petrophile linearis	<1	0.3
Philotheca spicata	<1	0.4
Pimelea angustifolia	<1	0.3
Podotheca gnaphalioides	,1	0.2
Stirlingia latifolia	2	0.3
Stylidium repens	<1	0.1
Synaphea spinulosa	<1	0.2
Ursinia anthemoides	<1	0.2
Verticordia nitens	<1	0.6
Verticordia patens	<1	1.2
Xanthorrhoea preissii	5	0.4

Lot 7778 Wannamal Rd South Cullalla

Site Q12

Described: SBG **Date:** 18/09/2007 **Type:** Quadrat (10m x 10m) **Season:** Excellent

Location: Lot 7778 Wannamal Rd South, Cullalla

MGA Zone: 50 403271 mE: 6545868 mN

Habitat: gently undulating low slope

Soil: pale grey sand

Rock Type: n/a

Vegetation: *Xanthorrhoea preissii, Allocasuarina humilis, Eremaea pauciflora, Leucopogon capitellatus* and *Synaphea spinulosa* Low Closed Heath

Vegetation Condition: Very Good

Fire History: 10+ years

Species List:

Name	Cover (%)	Height (m)
Acacia pulchella	1	0.2
Alexgeorgea nitens	<1	0.2
Andersonia heterophylla	1	0.2
Anigozanthos humilis	<1	0.1
Astroloma ciliatum	<1	0.1
Bossiaea eriocarpa	<1	0.2
Calectasia narragara	<1	0.1
Calytrix leschenaultii	1	0.2
Conostephium pendulum	<1	0.1
Conostylis setigera	<1	0.2
Daviesia decurrens	<1	0.2

Desmocladus flexuosus	<1	0.2
Drosera erythrorhiza	<1	climber
Dryandra lindleyana	<1	0.1
Eremaea beaufortioides	5	0.3
Eremaea pauciflora	10	0.3
Eucalyptus todtiana	<1	2
Gastrolobium capitatum	<1	0.2
Hakea ruscifolia	<1	1.2
Hibbertia huegelii	<1	0.2
Hovea trisperma	<1	0.3
Isopogon cuneatus	<1	0.1
Jacksonia floribunda	<1	0.5
Johnsonia pubescens	<1	0.1
Lechenaultia biloba	<1	0.1
Lepidosperma tenue	<1	0.2
Leucopogon capitellatus	1	0.3
Lomandra multiflora	<1	0.2
Lysinema elegans	1	0.3
Mesomelaena pseudostygia	<1	0.3
Mesomelaena tetragona	<1	0.3
Nuytsia floribunda	<1	3
Patersonia occidentalis	1	0.3
Petrophile linearis	2	0.3
Philotheca spicata	1	0.6
Pimelea angustifolia	<1	0.2
Podotheca gnaphalioides	<1	0.1
Scaevola repens	<1	0.2
Stirlingia latifolia	1	0.4
Synaphea spinulosa	<1	0.3
Ursinia anthemoides	<1	0.2
Xanthorrhoea preissii	10	1.1

Lot 7778 Wannamal Rd South Cullalla

Site Q13

Described: SBG **Date:** 18/09/2007 **Type:** Quadrat (10m x 10m) **Season:** Excellent

Location: Lot 7778 Wannamal Rd South, Cullalla

MGA Zone: 50 403281 mE: 6545711 mN

Habitat: woodland at base of gently sloping hill

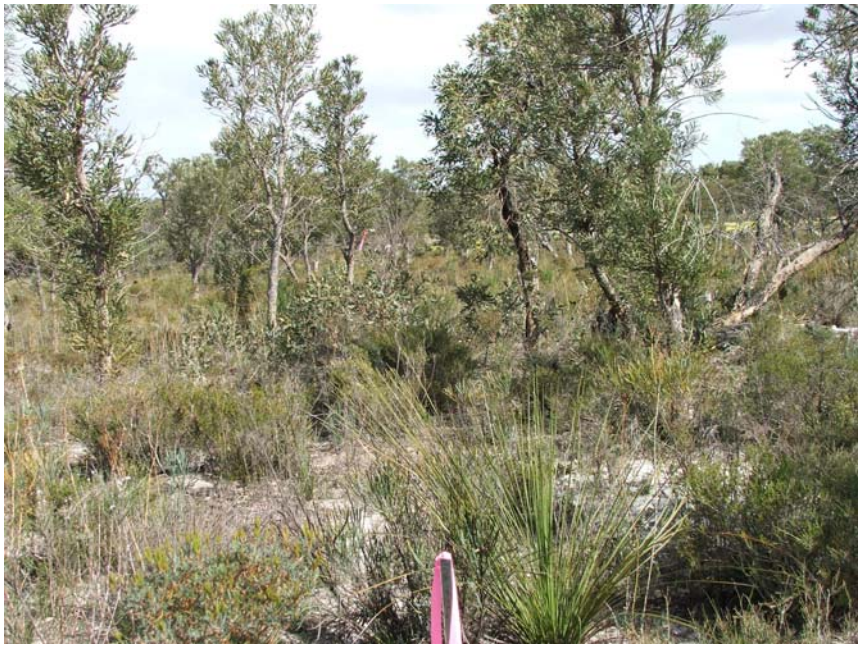
Soil: white grey to creamy white sand

Rock Type n/a

Vegetation *Banksia attenuata* and *Banksia menziesii* Low Woodland over a Low Open Shrubland of *Allocasuarina humilis, Xanthorrhoea preissii, Regelia ciliata, Stirlingia latifolia, Verticordia nitens, Eremaea pauciflora* and *Conospermum stoechadis*

Vegetation Condition: Very Good

Fire 10 + years



Species List:

Name	Cover (%)	Height (m)
Acacia pulchella	<1	0.3
Adenanthos cygnorum	<1	0.5
Allocasuarina humilis	2	0.6
Anigozanthos humilis	<1	0.2
Banksia attenuata	30	4
Banksia menziesii	20	4
Bossiaea eriocarpa	<1	0.3
Brassica napus	<1	0.4
Caladenia flava	<1	0.2
Conospermum stoechadis	<1	0.6

Conostephium pendulum	<1	0.3
Conostylis aurea	<1	0.2
Dampiera linearis	<1	0.3
Drosera erythrorhiza	<1	climber
Eremaea pauciflora	2	0.4
Eucalyptus todtiana	<1	0.3
Gastrolobium capitatum	<1	0.4
Hibbertia huegelii	<1	0.3
Hibbertia hypericoides	<1	0.3
Jacksonia floribunda	<1	0.3
Leptospermum spinescens	<1	0.3
Leucopogon capitellatus	1	0.3
Lysinema ciliatum	<1	0.6
Petrophile linearis	<1	0.3
Philotheca spicata	1	0.3
Podotheca gnaphalioides	<1	0.1
Scaevola repens	<1	groundcover
Stirlingia latifolia	5	0.4
Synaphea spinulosa	<1	0.3
Verticordia nitens	2	0.8
Xanthorrhoea preissii	5	0.3

Lot 7778 Wannamal Rd South Cullalla

Site Q14

Described: SBG **Date:** 18/09/2007 **Type:** Quadrat (10m x 10m) **Season:** Excellent

Location: Lot 7778 Wannamal Rd South, Cullalla

MGA Zone: 50 402396 mE; 6545845 mN

Habitat:south facing slopes, regrowth Banksia shrubland

Soil:pale grey sand

Rock Type: n/a

Vegetation:*Banksia menziesii, Banksia prionotes* and *Jacksonia sternbergiana* Closed Tall Scrub with scattered *Eucalyptus todtiana* over *Melaleuca huegelii, Allocasuarina humilis, Adenanthos cygnorum* and *Ptilotus polystachyus* Open Shrubland over *Eremaea pauciflora, Acacia pulchella* and S*tirlingia latifolia* Low Open Heath

Vegetation Condition: Good to Very Good

Fire 10+ years

Species List:

Name	Cover (%)	Height (m)
Acacia pulchella	2	0.3
Adenanthos cygnorum	1	1.2
Allocasuarina humilis	2	1
Anigozanthos humilis	<1	0.1
Asparagus asparagoides	<1	0.2
Banksia attenuata	10	3
Banksia menziesii	5	3
Boronia ramosa subsp. *anethifolia*	<1	0.3
Caladenia flava	<1	0.1
Calytrix leschenaultii	<1	0.5
Caustis dioica	<1	0.3
Conospermum stoechadis	<1	1.2
Conostylis aculeata	<1	0.2
Daviesia decurrens	<1	0.2
Drosera erythrorhiza	<1	climber
Drosera pallida	<1	climber
Eremaea beaufortioides	1	0.4
Eremaea pauciflora	2	0.4
Gastrolobium capitatum	<1	0.3
Hakea costata	1	1.2
Jacksonia floribunda	<1	0.3
Jacksonia sternbergiana	2	2
Leptospermum spinescens	<1	1.5
Lobelia tenuior	<1	0.2
Melaleuca huegelii	10	1.5
Mesomelaena pseudostygia	<1	0.3
Patersonia occidentalis	<1	0.3
Philotheca spicata	<1	0.4
Podotheca gnaphalioides	<1	0.05
Ptilotus polystachyus	<1	0.5
Scaevola repens	<1	groundcover
Stirlingia latifolia	1	<1
Synaphea spinulosa	<1	0.3
Taraxacum officinale	<1	0.2
Ursinia anthemoides	<1	0.2
Xanthorrhoea preissii	1	0.5

Appendix C
DEC Threatened Fauna Database Search Results

Flora, Vegetation and Fauna Assessment,
Lot 7778 Wannamal Rd South Cullalla

31.1038 °S 115.844 °E / 31.3666 °S 116.108 °E Wannamal South Road (plus ~10km buffer)

*	Date	Certainty	Seen	Location Name	Method

Schedule 1 - Fauna that is rare or is likely to become extinct

Dasyurus geoffroii — Chuditch — *1 records*

This carnivorous marsupial occupies large home ranges, is highly mobile and appears able to utilise bush remnants and corridors.

1969	1	1	GINGIN	Dead

Pseudocheirus occidentalis — Western Ringtail Possum — *1 records*

This species occurs in areas of forest and dense woodlands and requires tree hollows and/or dense canopy for refuge and nesting.

	1		Ginginiup	Subfossil material

Pseudomys shortridgei — Heath Mouse (Dayang) — *1 records*

This species inhabits long unburnt heath and mallee scrub on sandy soils. It has a very limited distribution in the southeastern wheatbelt through to the south coast. It is unlikely to occur in the area in question.

	1		Ginginiup	Subfossil material

Calyptorhynchus latirostris — Carnaby's Black-Cockatoo — *1 records*

This species moves around seasonally in flocks to feeding areas in proteaceous scrubs and heaths and eucalypt woodlands as well as pine plantations. Breeding occurs in winter/spring, mainly in the eastern forests and wheatbelt where they can find mature hollow-bearing trees to nest in.

2000	1	6	Mooliabeenee	Day sighting

Calyptorhynchus sp — White-tailed Black Cockatoo — *1 records*

These records pertain to either Baudin's Black-Cockatoo or Carnaby's Black-Cockatoo.

1984	1	75	Betts Nature Reserve	Day sighting

Pseudemydura umbrina — Western Swamp Tortoise — *1 records*

This species has very specific habitat requirements and has a very restricted distribution.

2001	1	2	Mogumber	Dead

Schedule 4 - Other specially protected fauna

Cacatua leadbeateri — Major Mitchell's Cockatoo — *1 records*

This species is sporadically distributed through arid and semi-arid Australia and may occur in sparsely timbered grasslands and shrublands and rocky outcrops.

1983	1	3	Lake Wannamal Nature Reserve	Day sighting

Priority Four: Taxa in need of monitoring

Macropus irma — Western Brush Wallaby — *1 records*

This species occurs in areas of forest and woodland supporting a dense shrub layer.

1954	1		Gingin	

Charadrius rubricollis — Hooded Plover — *3 records*

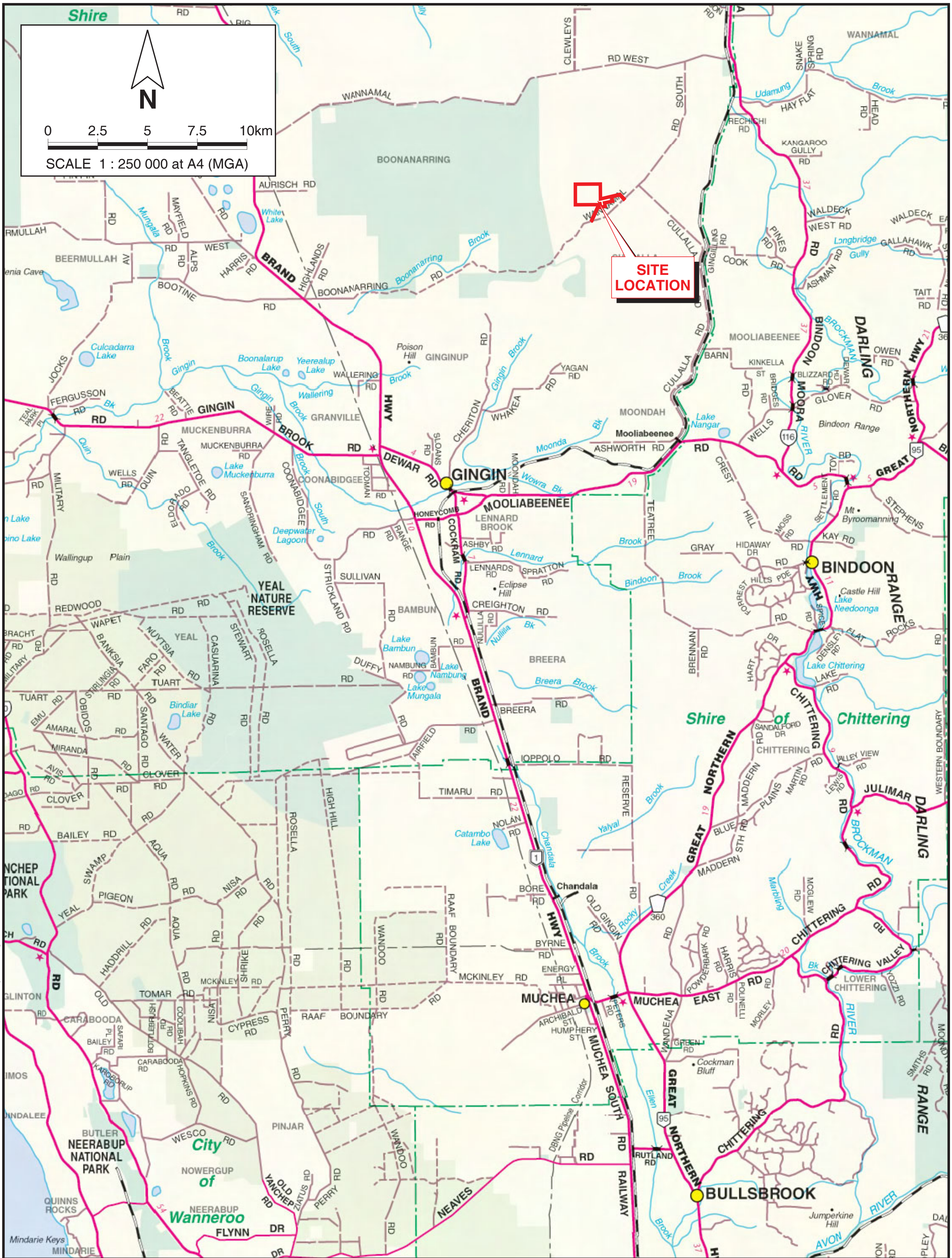
This species frequents the margins and shallows of salt lakes, also along coastal beaches, where it forages for invertebrates along the water's edge.

1987	1	1	Football Lake	Day sighting
1987	1	1	Gingin	Day sighting
1989	1	1	Wannamal	Day sighting

31.1038 °S 115.844 °E / 31.3666 °S 116.108 °E Wannamal South Road (plus ~10km buffer)

*	Date	Certainty	Seen	Location Name	Method
Hylacola cauta whitlocki				**Shy Heathwren (western ssp)**	*1 records*
This species is an uncommon resident in mallee undergrowth.					
	1983	1	2	Wannamal Lake Nature Reserve	Day sighting
Galaxiella munda				**Western Mud Minnow**	*1 records*
This species typically occurs in shallow pools of streams and peat flats. An isolated population occurs at Gingin.					
	2003	1	10	Gingin	Caught or trapped
Priority Five: Taxa in need of monitoring (conservation dependent)					
Isoodon obesulus fusciventer				**Quenda**	*1 records*
This species prefers areas with dense understorey vegetation, particularly around swamps and along watercourses, that provides ample protection from predators.					
		1		Ginginiup	Subfossil material

***** Information relating to any records provided for listed species:-
Date: date of recorded observation
Certainty (of correct species identification): 1=Very certain; 2=Moderately certain; and 3=Not sure.
Seen: Number of individuals observed.
Location Name: Name of reserve or nearest locality where observation was made
Method: Method or type of observation



Aurora environmental

Aurigen Group Ltd
EPBC REFERRAL
FERNVIEW FARMS, GINGIN

Figure 1

SITE LOCATION

Drawn: P. Zuvela | Date: 6 Dec 2015 | Job: CIS2015-001

CIS2015-001-EPBC-001_pz-f01.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136

402 000mE
403 000mE
404 000mE
7779
7850
111
98
102
6 546 000mN
6 545 000mN
WANNAMAL ROAD SOUTH

N

0 50 100 150 200 250m

SCALE 1 : 8 000 at A3 (MGA)

Legend

- Referred Area Boundary
- Cadastral Boundary
- Easement Boundary
- Proposed Footprint Boundary

CADASTRAL SOURCE: Landgate, December 2015.
AERIAL PHOTOGRAPH SOURCE: Nearmap, flown February 2009.

Aurora environmental

Aurigen Group Ltd
EPBC REFERRAL
FERNVIEW FARMS, GINGIN

PROJECT FOOTPRINT

Figure 2

Drawn: P. Zuvela | Date: 6 Dec 2015 | Job: CIS2015-001

PINPOINT CARTOGRAPHICS (08) 9562 7136 CIS2015-001-EPBC-001_pz-f02.dgn

402 000mE
403 000mE
404 000mE
7779
7850
6 546 000mN
6 545 000mN
Spoil Dump
Bund
Landfill
Proposed Leachate Ponds
Proposed Weighbridge
Proposed Office and Workshop
Proposed Equipment Storage Yard
WANNAMAL ROAD SOUTH
98
102
111
N
0 50 100 150 200 250m
SCALE 1 : 8 000 at A3 (MGA)

Legend
- Referred Area Boundary
- Cadastral Boundary
- Easement Boundary
- Proposed Footprint Boundary
- Proposed Infrastructure

CADASTRAL SOURCE: Landgate, December 2015.
AERIAL PHOTOGRAPH SOURCE: Nearmap, flown February 2009.

CIS2015-001-EPBC-001_pz-f03.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136

Aurora environmental

Aurigen Group Ltd
EPBC REFERRAL
FERNVIEW FARMS, GINGIN

INDICATIVE LANDFILL DESIGN

Figure 3

Drawn: P. Zuvela | Date: 6 Dec 2015 | Job: CIS2015-001

402 000mE
403 000mE
404 000mE
6 546 000mN
6 545 000mN
7779
7850
111
98
102
N
0 50 100 150 200 250m
SCALE 1 : 8 000 at A3 (MGA)
CI
VP
G
H
P
WANNAMAL ROAD
SOUTH

Legend

- Referred Area Boundary
- Cadastral Boundary
- Easement Boundary
- Proposed Footprint Boundary
- Foraging Value Boundary

Foraging Value

- H High Quality
- G Good Quality
- P Poor Quality
- VP Very Poor Quality
- CI Cleared

CADASTRAL SOURCE: Landgate, December 2015.
AERIAL PHOTOGRAPH SOURCE: Nearmap, flown February 2009.

CIS2015-001-EPBC-001_pz-f04.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136

Aurora environmental

Aurigen Group Ltd
EPBC REFERRAL
FERNVIEW FARMS, GINGIN

FORAGING VALUE

Figure 4

Drawn: P. Zuvela | Date: 6 Dec 2015 | Job: CIS2015-001

N

0 50 100 150 200 250m

SCALE 1 : 8 000 at A3 (MGA)

402 000mE 403 000mE 404 000mE

6 546 000mN

6 545 000mN

7779 7850 98

Legend

- Referred Area Boundary
- Cadastral Boundary
- Easement Boundary
- Proposed Footprint Boundary
- Quadrat Location
- Vegetation Type Boundary

Cleared

BaBmLOF

MhS

Q8

JsTOS

Q11

Q9

BaBmEtLOW3

BaBmEtLOW2

Cleared

Q12

BmBpJsCTS

Q14

Q7

MLCH

Q6

Q2

EtLOW

Q3

Q13

Q1

BaBmLOF

Q4

Q5

Cleared

BaBmEtLOW1

AcTS

Banksia Woodland

Cleared

Area previously cleared for cut flower production

WANNAMAL ROAD SOUTH

VEGETATION ASSOCIATIONS

EtLOW
Low Open Woodland of *Eucalyptus todtiana* to 4m with scattered *Nuytsia floribunda* over a mixed Shrubland. Other common species include *Xanthorrhoea preissii*, *Eremaea beaufortioides*, and *Stirlingia latifolia*.

BaBmEtLOW1
Low Open Woodland of *Eucalyptus todtiana*, *Banksia menziesii* and *Banksia attenuata* to 5m over a Tall Shrubland of *Jacksonia sternbergiana* over an Open mixed Shrubland. Other common species include *Allocasuarina humilis*, *Xanthorrhoea preissii*, *Petrophile brevifolia* and *Eremaea beaufortioides*.

BaBmEtLOW2
Low Open Woodland of *Banksia attenuata*, *Banksia menziesii* and *Eucalyptus todtiana* to 3m in height over *Adenanthos cygnorum* Shrubland to 1.5m in height over Low Heath dominated by *Xanthorrhoea preissii*, *Stirlingia latifolia* and *Eremaea pauciflora*

BaBmEtLOW3
Low Open Woodland of *Banksia attenuata*, *Banksia menziesii* and *Eucalyptus todtiana* to 4m in height over a Low Heath of *Allocasuarina humilis*, *Xanthorrhoea preissii*, *Eremaea pauciflora* and *Stirlingia latifolia*

BaBmLOF
Low Open Forest of *Banksia attenuata* and *Banksia menziesii* to 4m in height over a Low Open Shrubland of *Allocasuarina humilis*, *Xanthorrhoea preissii*, *Regelia ciliata*, *Stirlingia latifolia*, *Verticordia nitens*, *Eremaea pauciflora* and *Conospermum stoechadis*

BmBpJsCTS
Closed Tall Scrub of *Banksia menziesii*, *Banksia prionotes* and *Jacksonia sternbergiana* to 3m in height with scattered *Eucalyptus todtiana* over *Melaleuca huegelii*, *Allocasuarina humilis*, *Adenanthos cygnorum* and *Ptilotus polystachyus* Open Shrubland over *Eremaea pauciflora*, *Acacia pulchella* and *Stirlingia latifolia* Low Open Heath

AcTS
Tall Shrubland of *Adenanthos cygnorum* with scattered *Nuytsia floribunda* and *Eucalyptus todtiana* to 3m over a Low Open shrubland of *Eremaea beaufortioides* and *Xanthorrhoea preissii*.

JsTOS
(Q8) Tall Open Shrubland of *Jacksonia sternbergiana* to 3.5m in height over a mixed Open Heath of *Jacksonia floribunda*, *Melaleuca huegelii*, *Adenanthos cygnorum*, *Hibbertia hypericoides* and *Synaphea spinulosa*

MhS
Shrubland of *Melaleuca huegelii* to 1.5m in height with scattered *Eucalyptus todtiana*, *Banksia attenuata* and *Corymbia calophylla* over Low Heath of *Xanthorrhoea preissii*, *Hibbertia hypericoides* and *Synaphea spinulosa*

MLCH
Low Closed Heath of *Xanthorrhoea preissii*, *Allocasuarina humilis*, *Eremaea pauciflora*, *Leucopogon capitellatus* and *Synaphea spinulosa* to 1m in height

CADASTRAL SOURCE: Landgate, December 2015.
AERIAL PHOTOGRAPH SOURCE: Nearmap, flown February 2009.

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FERNVIEW FARMS, GINGIN

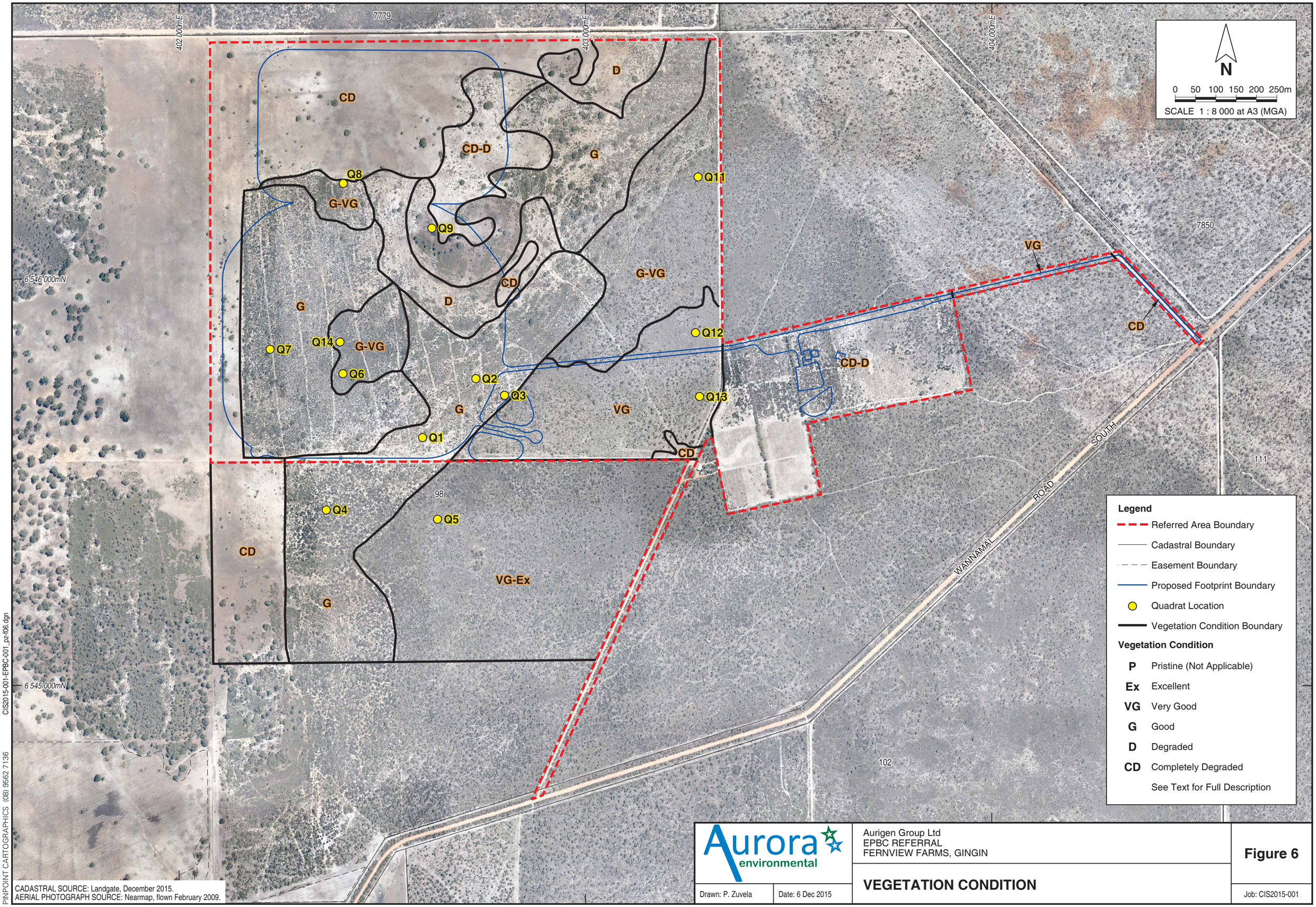
Figure 5

VEGETATION TYPES

Drawn: P. Zuvela | Date: 6 Dec 2015 | Job: CIS2015-001

CIS2015-001-EPBC-001_pz-105.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136



CADASTRAL SOURCE: Landgate, December 2015.
AERIAL PHOTOGRAPH SOURCE: Nearmap, flown February 2009.

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Figure 6

VEGETATION CONDITION

Drawn: P. Zuvela | Date: 6 Dec 2015 | Job: CIS2015-001

PINPOINT CARTOGRAPHICS (08) 9562 7136 CIS2015-001-EPBC-001_pz-f06.dgn

402 000mE
403 000mE
404 000mE
7779
7850
111
98
102
6 546 000mN
6 545 000mN
N
0 50 100 150 200 250m
SCALE 1 : 8 000 at A3 (MGA)
WANNAMAL ROAD
SOUTH

Legend

- Referred Area Boundary
- Cadastral Boundary
- Easement Boundary
- Proposed Footprint Boundary
- Proposed Offset Area

CADASTRAL SOURCE: Landgate, December 2015.
AERIAL PHOTOGRAPH SOURCE: Nearmap, flown February 2009.

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PROPOSED OFFSET AREA

Figure 7

Drawn: P. Zuvela | Date: 6 Dec 2015 | Job: CIS2015-001

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