Appendix C



Shamrock Station Irrigation Project

Operational Environmental Management Plan

Prepared under Part IV of the *Environmental Protection Act* 1986

MS 1086

Document ID: ShamrockEMP, V0.1

Argyle Cattle Company Pty Ltd

1

Document control

Version	Prepared by	Authorised by	Signature	Date
V0.1	K. Crews	H. Sale (ACC)	Byl de	17/01/2020
V1.0	K. Crews	H. Sale (ACC)	And sale,	16/03/2020
			1	

Document ID: ShamrockEMP_V0.1

Scanned with CamScanner

Contents

1	CON	NTEXT, SCOPE AND RATIONALE	1	
1	L.1	Proposal	1	
ź	L.2	Key environmental factors	4	
1	L.3	Condition requirements	6	
2	L.4	Rationale and approach	8	
	1.4.1	1 Survey and study findings	8	
	1.4.2	2 Key assumptions and uncertainties	19	
	1.4.3	3 Management approach	19	
	1.4.4	4 Rationale for choice of provisions	19	
2	EMP	P PROVISIONS	22	
3	ADA	APTIVE MANAGEMENT AND REVIEW OF THE EMP	28	
4	CON	MPLIANCE REPORTING	28	
5	STAKEHOLDER CONSULTATION			
RE	EREN	ICES	29	
AP	PENDI	ICES		

List of Figures

Figure 1-1	Location of the Shamrock Station Irrigation Project 2
Figure 1-2	Development envelope and indicative work area
Figure 1-3	Tephrosia andrewii
Figure 1-4	Polymeria sp. Broome
Figure 1-5	Triodia caelestialis
Figure 1-6	Bonamia oblongifolia
Figure 1-7	Priority flora locations
Figure 1-8	Bilby records and habitat
Figure 1-9	Locations of Bilby records from the La Grange regional Bilby survey (figure from DBCA 2018a) 15
Figure 1-10	Shamrock Station in relation to modelled habitat suitability for Bilbies in the La Grange region
(figure from D	BCA 2018a)
Figure 1-11	Water values and groundwater monitoring bores

List of Tables

Table 1-1	Key environmental factors and Project activities that may affect each factor			
Table 1-2	Condition requirements of Ministerial Statement 1086 relevant to EMP			
Table 1-3	Conservation significant terrestrial fauna species potentially occurring in the development			
envelope	13			
Table 1-4	Existing groundwater users in the vicinity of the development envelope (IGS 2017) 17			
Table 1-5	Staging of bore construction			
Table 2-1	Flora and vegetation provisions to meet legal requirements of Condition 6 of Ministerial			
Statement 1	1086			
Table 2-2	Terrestrial fauna provisions to meet legal requirements of Condition 6 of Ministerial Statement			
1086	24			
Table 2-3	Hydrological processes and inland waters environmental quality provisions to meet legal			
requirements of Condition 6 of Ministerial Statement 1086				

List of Appendices

- Appendix 1 Detailed Water Resource Operating Strategy
- Appendix 2 Priority flora populations to be protected
- Appendix 3 Introduced animal monitoring and control program
- Appendix 4 Compliance Assessment Plan

1 CONTEXT, SCOPE AND RATIONALE

This environmental management plan (EMP) describes the environmental management measures to be implemented by Argyle Cattle Company (ACC) during operation of the Shamrock Station Irrigation Project (the Project) so that impacts on the environment are acceptable.

The EMP has been prepared to satisfy condition 6-1 and 6-2 of Ministerial Statement 1086 (see section 1.3). The EMP has also taken into consideration comments raised by the Commonwealth Department of the Environment and Energy (DoEE, now Department of Agriculture, Water and the Environment, DAWE) during the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) assessment of the Project (EPBC Ref: 2017/8004) in relation to Bilby (*Macrotis lagotis*) as a Matter of National Environmental Significance.

1.1 PROPOSAL

The Project is situated within Shamrock Station Pastoral lease on the Great Northern Highway in the locality of La Grange, Western Australia. It is located 64 km south of Broome or approximately 130 km by road (Figure 1-1).

The Project entails the production of irrigated fodder with circular irrigation pivots that will be used to produce irrigated fodder for Shamrock Station, principally as a Rhodes Grass stand and graze operation. Supplementary crops of oats and forage sorghum or maize may also be grown depending on seasonal conditions and livestock demand. Hay may also be produced depending on seasonal conditions and demand, which will be used within the aggregation of Kimberley stations owned by Consolidated Australian Pastoral Holdings Pty Ltd (CAPH), of which ACC is a subsidiary company.

The Project involves the construction of approximately 12 centre-pivot irrigation areas and surrounding vegetation buffers, 12 groundwater abstraction bores, 17 monitoring bores (11 already established), one surface water monitoring site, access tracks and supporting infrastructure. Water supply to the pivots will be sourced from the Broome Sandstone Aquifer.

The site layout will be confined to the development envelope shown in Figure 1-2. An indicative site layout is provided in Figure 1-2; final site layout will be influenced by pivot design and surface hydrology but will be confined to the indicative work area as far as practicable to minimise disturbance to significant flora records and fauna habitat (Figure 1-2).



4	400000	and the second se	405000
	Sand -		and the second
			It will be the
		A Real Providence of the Provi	
			a strange
	\$/////////////////////////////////////		
		Septice Layer Credite	Source Esp. Provansioner, Persere restricted to bographics
Argyle Cattl	e Company Pty Ltd		Figure 1-2
BROOME Shamrock S	tation Irrigation Project		Development envelope
Date Drawn by	16-Jan-20 AL		and indicative work area
Map author I	кс 🖉	Shamrock station boundary	

1

GDA 1994 MGA Zone 51

0.5 I Kilometres

0

1:40,000 (at A4)

All information within this map is current as of 16.1.a.20. This product is subject to COPYRIGHT and is property of Phoenix Environmental Sciences (Phoenix). While Phoenix has taken care to ensure the accuracy of this product, Phoenix make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.

PERTH





1.2 KEY ENVIRONMENTAL FACTORS

The key environmental factors relevant to the Project and activities that may affect the factors are described in Table 1-1.

Key environmental factor	Flora and vegetation			
Proposal activities that may affect factor	 Direct clearing of up to 650 ha of remnant vegetation – loss of vegetation and priority flora 			
	 Intensive grazing of cattle in up to 550 ha of vegetation buffers – degradation of vegetation and priority flora 			
	 Use of introduced crop species – risk of spread to adjacent remnant vegetation 			
	 Irrigation and changes to surface drainage – potential damage to nearby Priority flora populations 			
Environmental values that may	Priority flora			
be affected	Vegetation in excellent condition			
Ecosystem health condition	The development envelope:			
	 has been subject to disturbance from cattle grazing 			
	 contains existing tracks and other disturbed areas 			
	 contains relatively intact vegetation rated in excellent condition 			
	 was subject to a wildfire in 2016 which damaged much of the vegetation 			
	 is not known to contain any weed species 			
Existing and/or potential uses	Pastoral grazing			
Key environmental factor	Terrestrial fauna			
Proposal activities that may affect factor	 Clearing of up to 650 ha of remnant vegetation – loss terrestrial fauna habitat 			
	 Intensive grazing of cattle in up to 550 ha of vegetation buffers – degradation of fauna habitat 			
	 Crop establishment and irrigation – potential increase in competitive herbivores 			
	 Machinery/vehicle use – risk of fauna mortality 			
Environmental values that may	Terrestrial fauna habitat			
be affected	Greater Bilby			
	Potential impacts to the Greater Bilby include:			
	 Loss of Bilby individuals during clearing. Bilby live and reproduce in burrows and are therefore vulnerable to mortality if active burrows are located in clearing areas 			
	 An increase in the abundance of competitive herbivores (e.g. wallabies and rabbits) due to increased food availability may lead to degradation of Greater Bilby habitat and increase the competition for resources. 			
	• An increase in the numbers of prey species may, in turn, increase the abundance of introduced predators, which may increase predation threat to Greater Bilby.			
Ecosystem health condition	The development envelope:			

has been subject to disturbance from cattle grazing

 Table 1-1
 Key environmental factors and Project activities that may affect each factor

.

	 contains existing tracks and other disturbed areas 		
	contains relatively intact fauna habitat		
	was of variable quality for Greater Bilby		
	 was subject to a wildfire in 2016 which damaged much of the vegetation 		
Existing and/or potential uses	Pastoral grazing		
	Habitat for native fauna		
Key environmental factor	Hydrological processes and inland waters environmental quality		
Proposal activities that may affect factor	 Groundwater abstraction – potential impact on Broome Sandstone aquifer, Injudinah Swamp, other users 		
	 Nutrient and chemical use – potential decline in groundwater quality 		
Environmental values that may	Groundwater quality of Broome Sandstone aquifer		
be affected	 Broome Sandstone aquifer hydrological regime and location of saltwater interface 		
	 Groundwater dependent vegetation (offsite – Injudinah Swamp) 		
Ecosystem health condition	 Groundwater from the Broome Sandstone aquifer generally has a NA-CL dominated composition (IGS 2017). Groundwater in the aquifer is generally fresh but there are several areas where it is more saline, such as coastal areas towards the Mandorah Marsh wetland system (Paul <i>et al.</i> 2013). 		
	 Groundwater salinity underlying the development envelope ranges from 90 – 940 mg/L TDS (or 16 – 171 mS/m) (IGS 2017). 		
	 One bore sampled in the development envelope recorded a boron concentration elevated above the long-term trigger level (0.5 mg/L) and five bores recorded elevated iron concentrations exceeding the long-term trigger level (0.2 mg/L). 		
	 All samples from the Broome Sandstone aquifer within the development envelope are slightly enriched with NA, CA and HCO₃ relative to marine aerosols, possibly due to calcite weathering (IGS 2017). 		
	• The toe of the saltwater interface of the Broome Sandstone aquifer is located approximately 10 km west of the development envelope		
	Injudinah Swamp:		
	 contains groundwater dependent vegetation (tree species Sesbania formosa and Melaleuca cajuputi subsp. cajuputi) 		
	has been subject to disturbance from cattle grazing		
Existing and/or potential uses	Other groundwater users in vicinity		
	Groundwater dependent ecosystems		

1.3 CONDITION REQUIREMENTS

Relevant condition requirements of Ministerial Statement 1086 to this EMP and the section of the EMP that addresses each are outlined in Table 1-2.

Table 1-2	Condition requirements of Ministerial Statement 1086 relevant to EMP
	condition requirements of Ministerial Statement 1000 relevant to EMI

	Condition	EMP section
6-1	Prior to the commencement of ground disturbing activities or as otherwise agreed in writing by the CEO, the proponent shall prepare and submit an Operational Environmental Management Plan to the CEO, to demonstrate that the following environmental objectives will be met:	This EMP
(1)	Avoid, where possible, and minimise impacts to the Greater Bilby within the development envelope as defined in Figure 2 of Schedule 1.	
(2)	Avoid, where possible, and minimise direct and indirect impacts so that the proposal does not cause long term impacts to the environmental values of the Injudinah Swamp and on the hydrological regime and water quality of the Broome Sandstone Aquifer.	
(3)	Avoid, where possible, and minimise direct and indirect impacts so that the proposal does not cause significant change in the location of the saltwater interface due to the abstraction of water for the proposal.	
(4)	Avoid, where possible, and minimise direct and indirect impacts so that the proposal does not cause long term impacts on Aboriginal heritage values.	
6-2	The Operational Environmental Management Plan shall:	
(1)	specify the environmental objectives to be achieved, as specified in condition 6- 1	Section 2
(2)	specify risk-based management actions that will be implemented to demonstrate compliance with the environmental objectives specified in 6-1. Failure to implement one or more of the management actions represents non-compliance with these conditions	Section 2
(3)	specify measurable management target(s) to determine the effectiveness of the risk-based management actions	Section 2
(4)	specify monitoring to measure the effectiveness of management actions against	Section 2
	management targets, including but not limited to, parameters to be measured, baseline data, monitoring locations, and frequency and timing of monitoring	Appendix 1
		Appendix 3
(5)	specify a process for revision of management actions and changes to proposal activities, in the event that the management targets are not achieved. The process shall include an investigation to determine the cause of the management target(s) being exceeded	Section 3
(6)	provide the format and timing to demonstrate that condition 6-1 have been met for the reporting period in the Compliance Assessment Report required by condition 4-6 including, but not limited to:	Section 2
	a. verification of the implementation of management actions; and	
	 reporting on the effectiveness of management actions against management target(s). 	

6-3		After receiving notice in writing from the CEO that the Operational Environmental Management Plan satisfies the requirements of condition 6-2 for condition 6-1, the proponent shall:	This EMP			
	(1)	implement the provisions of the Operational Environmental Management Plan; and				
1	(2)	continue to implement the Operational Environmental Management Plan until the CEO has confirmed by notice in writing that the proponent has demonstrated the objectives specified in condition 6-1 have been met.				
6-4		In the event that monitoring, tests, surveys or investigations indicate exceedance Section 4 of management target(s) specified in the Operational Environmental Management Plan, the proponent shall:				
1	(1)	report the exceedance in writing to the CEO within twenty-one (21) days of the exceedance being identified;				
	(2)	investigate to determine the cause of the management targets being exceeded;				
	(3)	provide a report to the CEO within 90 days of the exceedance being reported as required by condition 6-4(1). The report shall include:				
		a. cause of management targets being exceeded;				
		b. the findings of the investigation required by conditions 6-4(2);				
		 c. details of revised and/or additional management actions to be implemented to prevent exceedance of the management target(s); and 				
		d. relevant changes to proposal activities.				
6-5		In the event that monitoring, tests, surveys or investigations indicate that one or more management actions specified in the Operational Environmental Management Plan have not been implemented, the proponent shall:	Section 4			
	(1)	report the failure to implement management action/s in writing to the CEO within seven (7) days of identification;				
	(2)	investigate to determine the cause of the management action(s) not being implemented;				
	(3)) investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to the failure to implement management actions				
	(4)	provide a report to the CEO within twenty-one (21) days of the reporting required by condition 6-5(1). The report shall include:				
		a. cause for failure to implement management actions				
		b. the findings of the investigation required by conditions 6-5(2) and (3):				
		c. relevant changes to proposal activities; and				
		d. measures to prevent, control or abate the environmental harm which may have occurred.				
6-6		The proponent:	Section 3			
	(1)	may review and revise the Operational Environmental Management Plan, or				
	(2)	shall review and revise the Operational Environmental Management Plan as and when directed by the CEO.				
6-7	T E V	he proponent shall implement the latest revision of the Operational nvironmental Management Plan, which the CEO has confirmed by notice in vriting, satisfies the requirements of condition 6-2.	This EMP			

1.4 RATIONALE AND APPROACH

1.4.1 Survey and study findings

1.4.1.1 Flora and vegetation

A single season detailed flora and vegetation survey was undertaken within and in the vicinity of the development envelope in April–May 2017 (Phoenix 2017). A subsequent targeted flora survey was conducted for the Priority flora *Polymeria* sp. Broome and the Threatened species *Seringia exastia* in November 2017 (Phoenix 2018a, b).

Key environmental values identified were:

- A total of 114 species and subspecies representing 32 families and 78 genera were recorded in the detailed survey.
- Six vegetation types were recorded in the study area of which five are present in the development envelope. The majority of the development envelope (91%) is represented by a woodland of *Corymbia hamersleyana* and *C. zygophylla* over tall shrubland dominated by *Acacia eriopoda* over tussock grassland dominated by *Triodia schinzii*. The remainder was mapped as four shrublands, all dominated by *Acacia eriopoda* with mixed species mid to low shrublands over mixed tussock grasslands.
- The vegetation in the development envelope is generally representative of the broad Pindan vegetation association 699, *Acacia* thicket with scattered low trees over spinifex *Acacia eriopoda*, *Corymbia dichromophloia*, *Triodia pungens*, *T. bitextura* covering the majority of the study area which is extensively represented in the correspondingly Pindanland subregion.
- Condition of vegetation within the majority of the development envelope was rated as excellent according to the condition scale of Trudgen (1988, in EPA 2016b)
- No threatened ecological communities (TECs) or priority ecological communities (PECs) are present in the development envelope.
- No flora species listed as Threatened under the *Wildlife Conservation Act 1950* (WC Act) or EPBC Act were recorded.
- Four Priority Flora species were recorded in the study area: *Tephrosia andrewii* (P3), *Polymeria* sp. Broome (P3), *Triodia caelestialis* (P3), *Bonamia oblongifolia* (P3).
- No introduced flora species were recorded in the surveys.

Tephrosia andrewii

Tephrosia andrewii is a perennial shrub to 0.8 m with orange flowers in April and October and fruits April and August (Figure 1-3). Over 370 plants were recorded in the study area from 18 locations ranging from 1 to >100 individuals (Figure 1-7). Two large populations of 100+ plants were recorded; both locations are outside the development envelope (Figure 1-7). The location of populations to be protected is provided in Appendix 2.





Polymeria sp. Broome

Polymeria sp. Broome is a prostrate herb 10 cm high x 30 cm wide, trailing herb with greyish green leaves and mauve flowers (Figure 1-4). *P.* sp. Broome was collected from seven locations in the study area (Figure 1-7). Six of the seven locations are within the development envelope. A large number of plants was recorded at five of the locations in the targeted survey with each of population extending hundreds of metres along wandering transects. This species appears to be a post-fire ephemeral as all populations occurred in areas burnt since the initial detailed survey and plants could not be relocated at one previous record which had not been burnt.



Figure 1-4 *Polymeria* sp. Broome

Triodia caelestialis

Triodia caelestialis perennial bunchgrass forming compact tussocks 40 cm tall x 60 cm wide (Figure 1-5). *Triodia caelestialis* was recorded from 16 locations, with numbers ranging from 1 to 25 plants (Figure 1-7). Two records are outside the development envelope, four records are within the development envelope but outside the indicative work area, ten records are within the indicative work area.



Figure 1-5 Triodia caelestialis

Bonamia oblongifolia

Bonamia oblongifolia is a perennial herb or shrub with mauve flowers (Figure 1-6). *B. oblongifolia* was recorded from three locations in the development envelope (Figure 1-7).



Figure 1-6 Bonamia oblongifolia



50 ph	Argyle Cattle Company Pty Lto Shamrock Station Irrigation P	ject	Development envelope	Priority flora records	Figure 1-7
RRBATHA	Project No 1230 Date 16-Jan-20 Drawn by AL Map author KC 0 1 L I		Significant flora	 Polymeria sp. Broome Tephrosia andrewii Triodia caelestialis 	Priority flora locations
PERTH All information within this map is current as of 16-Ja Environmental Sciences (Phoenix). While Phoenix h representations or warranties about its accuracy, co	Kilometres 1:50,000 (at A4) GD4 -70. This product is subject to COPYRIGHT and is past aken care to ensure the accuracy of this product, mpleteness or suitability for any particular purpose. Subject and the subject and th	994 MGA Zone 51 perty of Phoenix loenix make no	-		PHOENIX ENVIRONMENTAL SCIENCES

1.4.1.2 Terrestrial fauna

A baseline terrestrial fauna assessment was conducted within and in the vicinity of the development envelope in April–May 2017 (Phoenix 2017) which identified:

- the study area contains one broad fauna habitat type; tall shrubland thicket with scattered eucalypt trees, with variable density of understorey; this habitat is widely represented in the Pindanland subregion
- part of the study area was considered suitable for the Greater Bilby (*Macrotis lagotis*), which is listed as Vulnerable under the EPBC Act and *Biodiversity Conservation Act 2016* (BC Act), in particular along the eastern edge and northern part of the study area, mostly outside the development envelope, where understory was less dense than the remainder of shrubland and some open areas were present (Figure 1-8). The denser areas of shrubland thicket elsewhere in the study area were mostly not considered optimal for Greater Bilby movement and occurrence.
- evidence of Bilby presence was recorded at five locations in the study area, north and south of the development envelope (Figure 1-8).
- based on the fauna habitat present within the development envelope, eight additional conservation significant species are considered to have potential to occur as occasional visitors only.

In July 2017, a wildfire burnt through part of the development envelope which dramatically reduced vegetation cover (Figure 1-8). Habitat suitability for Bilby is likely to change over time as the burnt areas recover.

A regional La Grange Bilby survey undertaken by the Department of Biodiversity, Conservation and Attractions (DBCA 2018a) recorded evidence of Bilby presence throughout the La Grange region, including at five records at scattered locations on Shamrock Station, one close to the development envelope (Figure 1-9). Habitat suitability modelling conducted as part of the DBCA study indicated suitable habitat for the species is present across La Grange but with several broad categories of higher habitat suitability, specifically:

- 1. a thin coastal strip particularly along Eighty Mile Beach
- 2. a broad mid-coastal strip further inland running parallel to the coast
- 3. areas surrounding Mandora Marsh / Walyarta
- 4. areas inland to the south-west which span extensive sand dunes of the northern Great Sandy Desert.

The second category intersects the very western part of Shamrock Station (Figure 1-10).

Species	EPBC Act status	WA status	Summary
Fork-tailed Swift (Apus pacificus)	Migratory	Schedule 5 (Migratory) ¹	Occasional foraging visitor
Cattle Egret (Ardea ibis)	Migratory	Schedule 5 (Migratory) ¹	Occasional visits to small dam at eastern edge of study area
Eastern Great Egret (Ardea modesta)	Migratory	Schedule 5 (Migratory) ¹	Occasional visits to small dam at eastern edge of study area
Grey Falcon (Falco hypoleucos)		Schedule 3 (Vulnerable) ¹	Occasional foraging visitor
Peregrine Falcon (Falco peregrinus)		Schedule 7 (Other specially protected fauna) ¹	Occasional foraging visitor
Princess Parrot (Polytelis alexandrae)	Vulnerable	Priority 4 ²	Occasional foraging visitor after rainfall
Greater Bilby (<i>Macrotis</i> lagotis)	Vulnerable	Schedule 3 (Vulnerable)	Occurrence likely to be influenced by regrowth in vegetation following fire
Spectacled Hare Wallaby (Lagorchestes conspicillatus nudicluniatus)		Priority 3 ²	Occasional foraging visitor
Short-tailed Mouse (Leggadina lakedownensis)		Priority 4 ²	Occurrence and abundance likely to be influenced by rainfall

Table 1-3	Conservation significant terrestrial fauna species potentially occurring in the development
	envelope

¹Under the BC Act. ²DBCA listing.



	Argyle Cattle Company Pty Ltd Shamrock Station Irrigation Project				Development envelope	
BROOME	Project No	1230			Indicative work area	
KARRATHA	Date Drawn by	16-Jan-20 AL	an-20		Burnt areas (July 2017 burn)	
	Map author	КС			🔺 Bilby, <i>Macrotis lagotis</i> , Foraging e	
	0	1		2	Suitability of habitat for Bilby (plots)	
	1:50,000 (at /	A4)	GDA 1994 M	GA Zone 51	High	
thin this map is current as of 16-Ja ciences (Phoenix). While Phoenix h	n-20. This product is as taken care to ens	subject to COPYRIG ure the accuracy of the	HT and is property of F his product, Phoenix m	Phoenix ake no	Low	

PERTI







Figure 1-9 Locations of Bilby records from the La Grange regional Bilby survey (figure from DBCA 2018a)



malian within this map is current as of 16-1 ans 20. This product is subject to COPYRIGHT and is grouped of Phoeniu mental Sciences (Phoenia) While Phoenia has taken care to ensure the accuracy of this product, Phoenia make no indions or waranties about its accuracy, completeness or sublability for any particular purpose.

1.4.1.3 Hydrological processes and inland waters environmental quality

With respect to hydrological processes, environmental values are either in-situ (i.e. water dependent wetlands or groundwater ecosystems) or extractive (i.e. consumptive use for public water supply, agriculture and industry) (EPA 2016a).

A H3 hydrogeological assessment was conducted in 2017 to support the water licence application for the Project (IGS 2017). The assessment modelled the hydrological changes in the Broome Sandstone Aquifer based on an abstraction rate of approximately 9.5 GL/year within the potential impact zone, including predicted drawdown at Injudinah Swamp and locations of other groundwater users; and predicted movement of the saltwater interface.

In-situ environmental values

Injudinah Swamp, located approximately 10 km south-west of the development envelope, is the closest potential groundwater dependent ecosystem (GDE) and the only one identified within the potential zone of impact from the Project (IGS 2017). It represents a wetland situated along the contact zone of the Pindan woodlands and the tidal marshes of La Grange Bay. The wetland is maintained by seepage of freshwater from regional aquifers interfacing with the muds of the tidal zone (V & C Semeniuk Research Group 2000).

Two potentially groundwater dependent PECs are within approximately 10–15 km south-west of the development envelope, both associated with Injudinah Swamp (), "Kimberley Vegetation Association 37" (Priority 3) and "Roebuck Land System" (Priority 3) (DBCA 2017). Both systems feature teatree (*Melaleuca* sp.) thickets that may be susceptible to changes in groundwater levels.

At the ocean interface, a saltwater toe penetrates the base of Broome Sandstone aquifer due to the higher density of saltwater (Figure 1-11). This toe interface occurs approximately between 3.5–4.2 km from the coast at the closest point to the Project (IGS 2017).

Extractive values

Twelve existing groundwater users were identified in the La Grange area that may be of relevance for the Project (Figure 1-11). The nine closest were subject to hydrological modelling to assess the potential impact by groundwater abstraction for the Proposal (~9.5 GL/annum; Table 1-4).

User	Licensed volume/year	Average use
Shamrock Gardens	2.5 GL	ca. 620–720 ML/year (total of four bores)
Ryall Pty Ltd (Port Smith CP)	19 ML	
Janice Bell (Barn Hill)	40 ML	
Frank Hamlett	10 ML	
Nygah Nygah (aboriginal settlement)		Pop. 4 (two houses)
Yardoogarra (aboriginal settlement)		Seasonal site (one house)
Pelling Pelling and Kalyadayan (aboriginal settlements)		Unknown (not necessarily permanent)
Wanamulnyndong (aboriginal settlements)		Pop. 20 (five houses)

Table 1-4	Existing groundwater users	in the vicinity of the	e development envelop	e (IGS 2017)
-----------	----------------------------	------------------------	-----------------------	--------------



1.4.2 Key assumptions and uncertainties

Several assumptions were made in the groundwater modelling for the H3 hydrogeological assessment, including:

- modelling was based on theoretical crop water requirements for Rhodes Grass grown under historical climate conditions (Bidyandanga Bureau of Meteorology station) and assumed 80% irrigation efficiency based on discussions with DAFWA.
- modelling was based on use of continuous pumping rates across all production bores and using
 potential locations for 17 production bores; running alternative pumping schedules or different bore
 locations would have immeasurable impact on the predictions made in the assessment because the
 distance from receptors is large compared with the size of the footprint.

DBCA data for the PEC boundaries at Injudinah Swamp was assumed to be accurate.

1.4.3 Management approach

The management approach in this EMP is based on relevant government policy and review of current leading practice for managing similar issues within the Kimberley region. Importantly, the EMP takes an adaptive management approach as baseline and monitoring data will continue to be collected, building on the existing environmental datasets for the Project and this data will inform management requirements.

Monitoring data will be collected from a series of onsite and regional sites. The two-tiered groundwater monitoring plan is designed to provide for early warning and response indicators.

1.4.4 Rationale for choice of provisions

1.4.4.1 Flora and vegetation

There are no conditioned environmental objectives for flora and vegetation. Provisions for flora and vegetation are based on proponent commitments.

1.4.4.2 Terrestrial fauna

The following activities have been identified as having potential to increase the existing introduced animal pressure on Bilby:

- Vegetation clearing will remove potential Greater Bilby habitat.
- Vegetation clearing may attract predators to the area.
- Irrigated cropping may result in an increase in the abundance of competitive herbivores (wallabies, rabbits) due to increased food availability which may lead to degradation of Greater Bilby habitat and increase the competition for resources.
- An increase in the numbers of prey species may, in turn, increase the abundance of introduced predators (cats, foxes), which may increase predation threat to Bilby.

Accordingly, a key provision of this EMP relates to the monitoring and control of introduced animal species, specifically feral cats, foxes and rabbits.

Feral cats are established in the Kimberley (DSEWPaC 2011a) and the regional La Grange Bilby survey by DBCA (2018a) recorded evidence of extensive feral cat presence in the La Grange region, including Shamrock Station. The difficulty in undertaking effective feral cat monitoring and control is well known. Shooting cats and trapping with leg-hold traps are both effective management techniques but both require substantial time and labour (Fisher *et al.* 2015). Aerial broadcast of sausage baits containing the toxin 1080 (sodium fluoroacetate)

is currently the most cost-efficient management tool for reducing feral cat numbers (Doherty & Algar 2015) and the only tool which is effective over large areas (Comer *et al.* 2018).

Leg-hold trapping can provide an effective complement to aerial baiting, in particular targeting large male cats which may disproportionately impact mammal prey (>1 kg) and are difficult to remove using baits (Moseby *et al.* 2015). Leg-hold trapping is not currently permitted as a management technique for feral cats in Western Australia except via a research permit from DBCA.

A variety of research and development projects are underway to improve both monitoring and control methods for feral cats. For example, motion camera trapping is increasingly being used to monitor feral cat abundance. While difficulties in using this technique have been noted in some environments (Stokeld *et al.* 2015), other programs have specifically used camera trapping to evaluate the efficacy of feral cat control programs (Comer *et al.* 2018; Doherty & Algar 2015; Robley *et al.* 2010). A novel camera trap design, the Felixer grooming trap, is being trialled at several locations with, to date, high success for cats (Read *et al.* 2019). This trap detects target species (cats and foxes) and ejects a dose of poison onto the fur which is in turn ingested. The cost per unit for this trap however is very high and approval of its use outside of research contexts is uncertain.

The development envelope is at the northern extent of European red fox distribution in Western Australia (Pestsmart 2011). The DBCA La Grange survey (DBCA 2018a) confirmed foxes are present in the region, mainly closer to the coast (west of the Great Northern Highway), but with occasional records further inland. Evidence of fox presence was recorded sparsely on Shamrock Station in the DBCA survey.

Following desktop review and consultation with experts, it is considered that rabbits are unlikely to move into and persist in the La Grange region. The species is not prevalent in the Kimberley (EPA & DEC 2007) most likely due to climatic factors because the rabbit is a Mediterranean species. DSEWPaC (2011b) shows a satellite population in the southern Kimberley to the east of Shamrock Station; however, this is based on 2008 mapping for the National Land and Water Resource Audit and there is no current data to substantiate this satellite population. Rabbit Scan (PestSmart 2018) shows some penetration into the south eastern Kimberley, although no sightings are recorded in this area on the mapping tool. There are no records of rabbits in the Kimberley on NatureMap except for one old record for Koolan Island (DBCA 2018c). Rabbit Scan shows their distribution along the coast extending to Port Hedland, roughly 400 km south of the project area. The Department of Primary Industries and Regional Development (pers. comm. Richard Watkins, Manager, Pest and Disease Information Service) has also advised that rabbits are unlikely to move into the region.

Wild dog control is already undertaken on Shamrock Station as part of a regional control program. Therefore, wild dogs are not proposed to be included in this EMP. Control measures within this EMP will supplement the existing wild dog control program.

Taking the above considerations into account, the introduced animal monitoring and control provisions are based on the following approach:

- 1. undertaking initial risk mitigation to Bilbies through implementation of an initial feral cat and fox trapping survey
- 2. determining baseline activity or abundance of each introduced animal species (feral cats, foxes and rabbits) in the control area
- 3. if absent, continuing surveillance to detect movement of species into the control area
- 4. if present, undertaking control actions and monitoring abundance levels in the control area
- 5. review and update to the introduced animal monitoring and control program to allow for an adaptive management approach, for example, incorporation of more effective control methods for the target species as they become available.

Commitments in the Section 38 referral were to undertake introduced animal control in the vicinity of the project area if an increase in abundance was detected. However, to address concerns of the DoEE raised during the EPBC Act assessment of the Project regarding potential effects of introduced animals on Bilby, the

following changes are proposed and represent the environmental offset for the Project under the EPBC Act assessment (EPBC Ref: 2017/8004):

- **Redact:** [feral cat and fox control will be undertaken on an annual basis for a period of 20 years regardless of trend in abundance, unless pre-control monitoring detects no evidence of feral cat or fox presence for a period of four consecutive years]
- Insert:
 - if after a minimum of four consecutive years, feral cats (Felis catus) and foxes (Vulpes vulpes) have been demonstrated to be absent from the control area, surveillance monitoring, capable of detecting if any individual of these species has returned to the control area, must be conducted at least once every two years; and
 - if subsequently, surveillance monitoring (as required under condition 3a) detects feral cats (Felis catus) and/or foxes (Vulpes vulpes) within the control area, annual control and monitoring measures, undertaken in accordance with the program methods, must be resumed for at least 20 years or until both feral species have again been demonstrated to be absent for a minimum of four consecutive years.
- the control area has been expanded significantly to cover approximately 40% of Shamrock Station (71,500 ha; Appendix 3). This area covers the DBCA (2018a) modelled areas of higher value habitat value within Shamrock Station (Figure 1-10) and is roughly 28 times the size of the development envelope.

Further to this, ACC recognises that an even wider landscape scale approach to controlling feral cat and fox populations in the La Grange region is going to be more effective than site specific efforts. To this end, ACC will investigate opportunities to expand the program through collaboration with other introduced animal control initiatives in the region. For example, the regional wild dog control program could potentially be expanded to target feral cats and foxes in addition to wild dogs through bait substitution.

Monitoring and control methods have been developed with input from Dr. David Algar, Principal Research Scientist (DBCA). Determining accurate abundance measures of multiple introduced animal species can be extremely costly and difficult, particularly in vegetation typical of the Shamrock Station (dense Pindan vegetation). The proposed monitoring approach utilises track counts which are considered to produce reliable indices of abundance for cats and foxes that may be used to detect changes in populations (Mitchell & Balogh 2007a, b). Track counts are also considered to be useful for rabbits where vegetation or terrain make other counting methods (e.g. spotlighting, warren counts) difficult (Mitchell & Balogh 2007c). Monitoring methods are adapted from Read and Eldridge (2010) and based on a similar program being conducted at Matua (ex-Lorna Glen Station, now managed for conservation) (Algar *et al.* 2013) but scaled in proportion to the control area.

1.4.4.3 Hydrological processes and inland waters environmental quality

A comprehensive framework for monitoring and management of groundwater abstraction is outlined in the Detailed Water Resource Operating Strategy (DWROS) for the Project, under water licence GWL203109(1). The DWROS defines key issues that are to be managed in relation to groundwater abstraction, the management objectives related to each key issue and detailed monitoring program (refer to Appendix 1). Management triggers, as described in the DWROS Monitoring and Management Plan (Appendix 1) will be adopted following an assessment of natural variation during the first year of operation to establish a reliable baseline.

The DWROS has been prepared in accordance with Department of Water and Environment Regulation (DWER) Operational Policy 5.08: *Use of operating strategies in the water licencing process* (DoW 2011). Accordingly, overarching management-based provisions for hydrological processes and inland waters environmental quality are provided in this EMP, based on the management framework of the DWROS, while the detailed trigger values and responses will be specified in the DWROS.

As the project will be subject to staged development, installation and operation of the monitoring bore network will also be phased in commensurate with project staging (Table 1-5).

Sub-stage	No. production bores	Locations	Monitoring
1A	1 - 4	PB1, S1PB001, S1PB02, S1PB03	all existing monitoring bores
18	5 - 8	S1PB04, S1PB05, S1PB06, S1PB09	as above + MB001S/MB001I + 17MB003S/MB003I + MB004
1C	9 - 12	S1PB07, S1PB08, S1PB10, S1PB11	as above + "Injudinah Swamp Claypan"

Table 1-5Staging of bore construction

2 EMP PROVISIONS

This section of the EMP describes the provisions that will be implemented to manage impacts to the key environmental factors (Table 2-1).

Table 2-1 Flora and vegetation provisions to meet legal requirements of Condition 6 of Ministerial Statement 1086

FPA	factor	Flora and vegetatio	n				
EPA objective		To protect flora and	a vegetation so that biological diversity and e	cological integrity are maintained			
Outc	ome	There are no outco	me conditions in MS 1086 specifically for flor	a and vegetation.			
Proje	ect specific objectives	– To minimise impa	acts to Priority flora within the development e	envelope as far as practicable			
		– To avoid impacts	on native vegetation and Priority flora outsid	e the development envelope			
Key e	environmental values	Priority flora; veget	ation in excellent condition				
Key i	mpacts and risks	Spread of introduce	ed cropping species to adjacent remnant vege	etation, degradation of adjacent remnant	vegetation and Priority flora populations		
Man	agement-based provision	ns					
ID	Managemer	nt actions	Management targets	Monitoring	Reporting		
	Condition 6-2 (2)		Condition 6-2 (3)	Condition 6-2 (4)	Condition 6-4, 6-5		
FV1	EV1Demarcate and provide GPS co-ordinates of the development envelope and areas to be cleared to the clearing contractor prior to clearingDemarcate and provide GPS co-ordinates of Priority Flora populations to be protected (Appendix 2) to the clearing contractor prior to clearing		No clearing of vegetation to occur outside the development envelope Clearing of native vegetation within the development envelope will not exceed 650 ha Retain six populations of significant flora: <i>Tephrosia andrewii</i> population 1-4, <i>Polymeria</i> sp. Broome population 1-2 (as referred to in Appendix 2)	Weekly inspection along clearing boundaries during clearing to confirm that there is no exceedance of the identified targets	Written correspondence to DWER if management target not met and/or failure to implement management action Annual Compliance Assessment Report (CAR)		
FV2	V2 Demarcate and establish 100-200 metre square fenced vegetation buffers around each pivot		Establishment of fenced vegetation buffers will not exceed 550 ha	Weekly inspection of buffer boundaries and extent during construction to confirm that there is no exceedance of the identified target	Written correspondence to DWER if management target not met and/or failure to implement management action Annual CAR		
FV3	FV3 Undertake monitoring of crop and weed species outside of irrigation areas to detect spread into adjacent native vegetation If monitoring identifies outbreaks of crop species, undertake weed control with a DBCA/DPIRD approved herbicide		Spread of Rhodes Grass, other irrigation crops or weeds into remnant vegetation is limited to isolated occurrences of non- vigorous plants, no more than 300 m from pivots	Annual wet/post-wet season weed monitoring along buffer boundaries and within adjacent native vegetation	Monitoring records Written correspondence to DWER if management target not met and/or failure to implement management action Annual CAR		

Table 2-2 Terrestrial fauna provisions to meet legal requirements of Condition 6 of Ministerial Statement 1086

EPA Factor Terrestrial fauna					
EPA objective To protect terrestrial fauna		so that biological diversity and ecological integrity are maintained			
Project specific objective Condition 6-1 (1) Avoid, wh			ere possible, and minimise impacts	to the Bilby within the development envelo	ope as defined in Figure 2 of Schedule 1
Key	environmental values	Bilby			
Key i	impacts and risks	Loss of Bilby habitat, loss o	f individuals during clearing, habitat	degradation and increased competition fro	om other herbivores, increase in feral
		predators			
Man	agement-based provision	S			
ID	Manager	nent actions	Management targets	Monitoring	Reporting
	Condition 6-2 (2)		Condition 6-2 (3)	Condition 6-2 (4)	Condition 6-4, 6-5
TF1	F1 Minimise clearing of Bilby habitat as far as practicable and avoid clearing of high value habitat Demarcate and provide GPS co-ordinates of the development envelope and areas to be cleared to the clearing contractor prior to clearing		No clearing of Bilby habitat to occur outside the development envelope No clearing within 100 m of Bilby plots rated as high value habitat	Weekly inspection along clearing boundaries during clearing to confirm that there is no exceedance of the identified targets	Written correspondence to DWER if management target not met and/or failure to implement management action Annual CAR
 TF2 Undertake a pre-clearance survey for Bilby using an experienced fauna specialist in accordance with DBCA's Guideline for the survey and relocation of Bilby in Western Australia (DBCA 2018b) Undertake searches for Bilby burrows and signs If potentially occupied burrows are identified, monitor burrows to determine occupancy. Undertake displacement at any burrows determined to be occupied If unoccupied burrows are identified, fill in to prevent potential for use prior to clearing If displacement is unsuccessful, undertake capture and relocate Bilby individuals to suitable habitat on Shamrock Station outside the development envelope 		No Bilby mortality or active burrow destruction during clearing	Visual observations for Bilby burrows and Bilby signs during pre-clearance survey Pre-clearance survey within two weeks prior to clearing Motion camera trapping for up to three nights at suspected occupied burrows	Written correspondence to DWER if management target not met and/or failure to implement management action. Annual CAR	

Argyle Cattle Company Shamrock Station Irrigation Project – Operational Environmental Management Plan

ID	Management actions	Management targets	Monitoring	Reporting
	Condition 6-2 (2)	Condition 6-2 (3)	Condition 6-2 (4)	Condition 6-4, 6-5
TF3	If recent Bilby activity is identified in the clearing area, engage a fauna spotter to traverse the project area ahead of clearing machinery during clearing. The fauna spotter will have appropriate training in fauna handling techniques and hold a permit to relocate fauna in accordance with the <i>Biodiversity</i> <i>Conservation Regulations 2018</i>	No Bilby mortality or active burrow destruction during clearing	Fauna clearance survey	Contractor records Written correspondence to DWER if management target not met and/or failure to implement management action Annual CAR
TF4	Undertake an initial feral cat and fox trapping survey within the control area (see Appendix 3) to mitigate risk to Bilbies and inform future feral cat and fox control Undertake annual monitoring of feral cats, foxes and rabbits within the control area (see Appendix 3) to assess presence and abundance/activity level of each species Undertake feral cat and fox control within the control area Undertake rabbit control within the control area if monitoring detects presence	Demonstrated decrease in introduced predators (feral cats, or foxes) in the control area compared with the baseline No introduction of rabbits to the control area as a result of the Project	Annual monitoring and control program Monitoring and control methods as outlined in Appendix 3	Annual monitoring reports. Written correspondence to DWER if management target not met and/or failure to implement management action Annual CAR

Table 2-3Hydrological processes and inland waters environmental quality provisions to meet legal requirements of Condition 6 of Ministerial Statement1086

EPA Factor		Hydrological processes and inland waters environmental quality					
EPA o	bjective	To maint	tain the hydrological regimes of grou	ndwater and surface water so that environmental values a	re protected		
		To maint	tain the quality of groundwater and s	surface water so that environmental values are protected			
Project specific objective		Conditio environr Conditio location	Condition 6-1 (2) Avoid, where possible, and minimise direct and indirect impacts so that the proposal does not cause long term impacts to the environmental values of the Injudinah Swamp and on the hydrological regime and water quality of the Broome Sandstone Aquifer. Condition 6-1 (3) Avoid, where possible, and minimise direct and indirect impacts so that the proposal does not cause significant change in the location of the saltwater interface due to the abstraction of water for the proposal.				
Key er	nvironmental values	Injudina	h Swamp and associated PECs and we	etlands, Broome Sandstone Aquifer and saltwater interface	2		
Key in	npacts and risks	Impacts abstract	to groundwater dependent commun ion and/or fertiliser application	ities/vegetation/wetlands as a result of groundwater abstration	action; changes to water quality due to		
Mana	gement-based provisions	5					
ID	Management actions		Management targets ¹	Monitoring ²	Reporting		
	Condition 6-2 (2)		Condition 6-2 (3)	Condition 6-2 (4)	Condition 6-4, 6-5		
HP1 Manage abstraction so that groundwater allocation is not exceeded		that is not	No exceedance of annual licensed groundwater allocation	Monthly flowmeter readings and volume calculations at all operating production bores, any new/replacement production bores	Annual groundwater monitoring report to DWER Written correspondence to DWER if management target not met and/or failure to implement management action Annual CAR		
HP2 Manage abstraction so that groundwater use does not impact GDEs (Injudinah Swamp)		Groundwater drawdown to be within acceptable limits so as not to impact ecological function of identified GDEs (Injudinah Swamp)	Quarterly monitoring of groundwater levels at monitoring bore 17MB003S&I (Stage 1B) (Dec/Jan, Mar/Apr, Jun/Jul, Sep/Oct) Quarterly monitoring of surface water levels at Injudinah Swamp Claypan (Stage 1C) (Dec/Jan, Mar/Apr, Jun/Jul, Sep/Oct) Hourly pressure transducer, electrical conductivity and pH monitoring at Injudinah Swamp Claypan (Stage 1C) (ongoing)	Annual groundwater monitoring report to DWER Vegetation monitoring report Written correspondence to DWER if management target not met and/or failure to implement management action Annual CAR			

Argyle Cattle Company Shamrock Station Irrigation Project – Operational Environmental Management Plan

ID	Management actions	Management targets ¹	Monitoring ²	Reporting
	Condition 6-2 (2)	Condition 6-2 (3)	Condition 6-2 (4)	Condition 6-4, 6-5
HP2 cont.			Quarterly (for first year) comprehensive water quality analysis of surface water quality and Injudinah Swamp Claypan (Stage 1C) (Dec/Jan, Mar/Apr, Jun/Jul, Sep/Oct) Vegetation monitoring of established transects (potential impact and control sites) at Injudinah Swamp, bi-annually if water level triggered, end of dry season and during irrigation season (e.g. July)	
НРЗ	Manage fertiliser application and abstraction so that groundwater quality is not impacted	Maintain groundwater quality and salinity	 Annual comprehensive water quality analysis of pumped groundwater sampled from production bores - which production bores to be annually sampled will be agreed upon once bores have been constructed - at a minimum all westernmost pivots must be sampled monitoring bores 15LAG8S&I, 15LAG7S&I, 17MB002S (Stage 1A) and 17MB001S&I (Stage 1B) (Sept/Oct) Field pH measured quarterly in monitoring bores for the first year of operation 17MB002S, 15LAG7S&I and 15LAG8S&I (Stage 1A), 17MB001S&I and 7MB003S&I (Stage 1B) 	Annual groundwater monitoring report to DWER Written correspondence to DWER if management target not met and/or failure to implement management action Annual CAR
HP4	Manage abstraction so that saline wedge movement does not impact GDEs (Injudinah Swamp) and other users' water supply	Movement of saltwater interface to remain within predicted range	 Monitoring of electrical conductivity all operating production bores monthly logged data in 15LAG8S&I, 15LAG7S (Stage 1A), 17MB001S, 17MB001I (Stage 1B) and 17MB003S, 17MB003I (Stage 1C) Quarterly monitoring of water level in monitoring bores 17MB002D, 17MB004 and 15LAG06D 	Annual groundwater monitoring report to DWER Written correspondence to DWER if management target not met and/or failure to implement management action Annual CAR

¹Level 1 and 2 trigger values and responses are outlined in the DWROS (Appendix 1).

²All monitoring measures are in accordance with the DWROS. Any update to the monitoring and management plans in the DWROS will require review and update to the EMP provisions. Bore sampling is subject to land access permission.

3 ADAPTIVE MANAGEMENT AND REVIEW OF THE EMP

ACC will implement adaptive management practices based on learnings gained from the implementation of management actions and monitoring. This will include:

- annual review of monitoring data and information gathered over the review period
- annual evaluation against management targets
- review of management actions as the Project progresses and new management measures and technologies become available that may be more effective.

The EMP will be reviewed annually and updated based on review outcomes, for example, if monitoring indicates that management targets are not being achieved, or not likely to be achieved, and /or new information becomes available that may improve the efficiency and/or effectiveness of the management actions.

Early response indicators and actions (Level 1 triggers and responses) have been established for managing groundwater abstraction as part of the Project; these are outlined in the DWROS (refer to Appendix 1).

4 COMPLIANCE REPORTING

ACC is required to report against its compliance with this EMP in an annual Compliance Assessment Report, prepared in accordance condition 4-6 and 6-3 of Ministerial Statement 1086. The Compliance Assessment Report is required to be submitted to DWER by 19 February each year in accordance with the approved Compliance Assessment Plan for the Project (Appendix 4).

An Index of Biodiversity Surveys for Assessment (IBSA) data package will be submitted with all biological monitoring reports.

In accordance with condition 6-4 of Ministerial Statement 1086:

- written notification is to be provided to the CEO of DWER within twenty-one (21) days of any exceedance of management targets in this EMP being identified
- an investigation report is to be provided to the CEO of DWER within 90 days of any exceedance being reported.

In accordance with condition 6-5 of Ministerial Statement 1086:

- written notification is to be provided to the CEO of DWER within seven (7) days of any failure to implement management action/s being identified by monitoring, tests, surveys or investigations
- an investigation report is to be provided to the CEO of DWER within 21 days of any failure to implement management action/s being identified.

5 STAKEHOLDER CONSULTATION

ACC has undertaken consultation with DoEE and DBCA for input to this EMP. Further consultation with both agencies will be undertaken as required during implementation and review of the EMP.

REFERENCES

- Commonwealth of Australia. 2015. *Threat abatement plan for predation by feral cats 2015*. Department of the Environment,, Canberra, ACT.
- DBCA. 2017a. *Greater Bilby Survey: La Grange Project Area*. Department of Biodiversity, Conservation and Attractions, Perth, WA.
- DBCA. 2017b. *Priority Ecological Communities for Western Australia version 27*. Department of Biodiversirty, Conservation and Attractions, Kensington, WA. Available at: <u>https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities</u>
- DBCA. 2018. NatureMap. Department of Biodiversity, Conservation and Attractions. Available at: https://naturemap.dpaw.wa.gov.au/default.aspx
- DoW. 2011. Operational Policy 5.08: Use of operating strategies in the water licencing process June 2011. Department of Water, Perth.
- DSEWPaC. 2011. Feral European Rabbit (Oryctolagus cuniculus). Department of Sustainability, Environment, Water, Population and Communities, Canberra, ACT. Available at: <u>https://www.environment.gov.au/system/files/resources/7ba1c152-7eba-4dc0-a635-</u> 2a2c17bcd794/files/rabbit.pdf
- EPA. 2016a. Environmental Factor Guideline: Hydrological processes. Environmental Protection Authority, Perth, WA. Available at: <u>http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Hydrological-Processes-131216_3.pdf</u>
- EPA. 2016b. Technical Guidance: Flora and vegetation surveys for Environmental Impact Assessment.EnvironmentalProtectionAuthority,Perth,WA.Availablehttp://www.epa.wa.gov.au/sites/default/files/PoliciesandGuidance/EPA%20Technical%20Guidance%20-%20Flora%20and%20Vegetation%20survey_Dec13.pdf
- EPA & DEC. 2007. *State of the environment report: Western Australia 2007 Overview*. Environmental Protection Authority, Department of Environment and Conservation, Perth, WA.
- IGS. 2017. Shamrock Station irrigation development. Stage 1 hydrogeological assessment. Innovative Groundwater Solutions, Middleton, SA. Unpublished report prepared for Argyle Cattle Company Pty Ltd.
- Mitchell, B. & Balogh, S. 2007a. *Monitoring techniques for vertebrate pests feral cats*. Bureau of Rural Sciences, Orange, NSW.
- Mitchell, B. & Balogh, S. 2007b. *Monitoring techniques for vertebrate pests foxes*. Bureau of Rural Sciences, Orange, NSW.
- Mitchell, B. & Balogh, S. 2007c. *Monitoring techniques for vertebrate pests rabbits*. Bureau of Rural Sciences, Orange, NSW.
- Paul, R. J., George, R. J. & Gardiner, P. 2013. *A review of the Broome Sandstone aquifer in the La Grange area*. Department of Agriculture and Food, Perth, WA. Report 387.
- Pestsmart. 2011. European Red Fox (Vulpes vulpes). Pestsmart. Available at: <u>https://www.pestsmart.org.au/wp-content/uploads/2018/04/PSFox-fs1_web.pdf</u>
- PestSmart. 2018. *Rabbit Scan*. Available at: <u>https://www.feralscan.org.au/rabbitscan/map.aspx</u>
- Phoenix. 2017. Flora and vegetation survey and terrestrial fauna survey for the Shamrock irrigation Project. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Argyle Cattle Company Pty Ltd.
- Phoenix. 2018a. Injudinah Swamp baseline vegetation assessment and installation of vegetation health monitoring transects for the Shamrock Station Irrigation Project. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Argyle Cattle Company.
- Phoenix. 2018b. *Targeted flora survey for Shamrock Station Irrigation Project*. Phoenix Environmental Sciences, Balcatta, WA. Unpublished report prepared for Argyle Cattle Company.
- Read, J. & Eldridge, S. 2010. An optimised rapid detection technique for simultaneously monitoring activity of rabbits, cats, foxes and dingoes in the rangelands. *The Rangeland Journal* **32**: 389-394.

- Read, J. L., Bowden, T., Hodgens, P., Hess, M., McGregor, H. & Moseby, K. 2019. Target Specificity of the Felixer Grooming "Trap". *Wildlife Society Bulletin* **TBC**: TBC.
- Stokeld, D., Frank, A. S. K., Hill, B., Choy, J. L., Mahney, T., Stevens, A., Young, S., Rangers, D., Rangers, W. & Gillespie, G. R. 2015. Multiple cameras required to reliably detect feral cats in northern Australian tropical savanna: an evaluation of sampling design when using camera traps. *Wildlife Research* **42**: 642–649.
- V & C Semeniuk Research Group. 2000. Wetlands of the northwestern Great Sandy Desert in the La Grange hydrological sub-basin. V & C Semeniuk Research Group, Perth, WA. Unpublished report prepared for the Water and Rivers Commission.