BUNBURY - HARVEY
Regional Council

STANLEY ROAD WASTE MANAGEMENT FACILITY

ANNUAL ENVIRONMENTAL REPORT 2017

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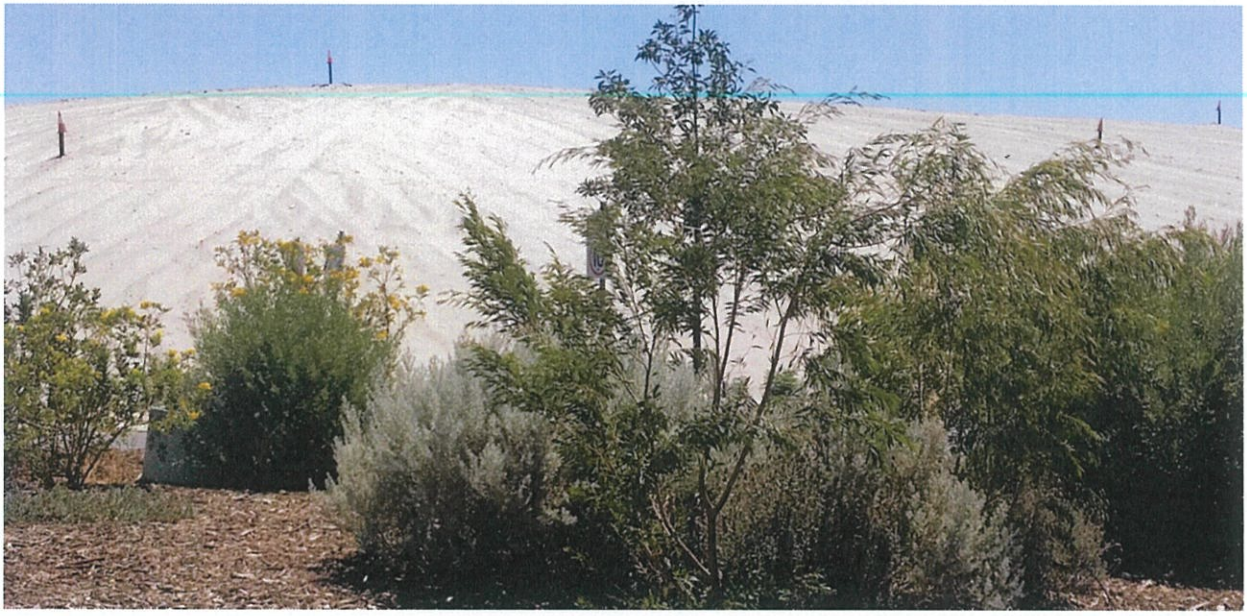
1. Introduction

The Stanley Road Waste Management Facility (SRWMF) is a regional Class II landfill located on the Swan Coastal Plain, 20 km northeast of Bunbury. The site was previously used as a sand mine with landfilling commencing in 1990 following the establishment of the Bunbury-Harvey Regional Council (BHRC), a joint venture between the City of Bunbury and the Shire of Harvey.

SRWMF holds a Department of Water and Environment Regulation Licence which was issued on 22nd January 2016 and took effect on 25th January 2016 with an expiry date of 24th January 2020.

Licence Number: L8949/2016/1.



** The Stanley Road Waste Management Facility will be referred to as the 'Site' for the remainder of this report.*

The site is located within the Kemerton Industrial Park bushland buffer zone; however since operations commenced residential density has increased with the closest receptors located ~800 m to the west.

The site accepts domestic and commercial waste from Bunbury, Australind and surrounds and allows for an annual throughput of 100,000 tonnes. Accepted waste is landfilled on a large mound type landfill and covered with *in situ* sand mined on the site.

In March 2014, BHRC submitted a Landfill Closure Management Plan (LCMP) which detailed the staged progression of closure and rehabilitation works on the current and past landfilling site. Work is continuing on the LCMP and as such, improvement conditions were added to the licence by the DWER requiring assessment and management of landfill gases and leachate.

BHRC is fully dedicated to the closure and rehabilitation of the Site in accordance with the Victoria Environmental Protection Agency (EPA) Best Practice Environmental Management – Siting, Design, Operation and Rehabilitation of Landfills (2014) (Best Practice Landfill Guidelines) and work has begun on the installation of a Landfill Gas Monitoring system. Phase 1 of the system is due to be commissioned by November 2018 with the final phase completed by 2021 for Phases 1, 2 & 3.

New landfilling phases are still awaiting approval notices from the DWER with work continuing in this area.

A gabion wall is to be constructed to control erosion issues and will commence in January 2018. The construction of a new Stormwater Management System is also to be implemented in 2018 with preliminary works having commenced.

Waste disposal is limited to the boundary outlined in the licence agreement which includes Phase 1, 2, 3 and the North Phase. See **Attachment 1**

The Site is currently unlined with no engineered leachate management system. Groundwater monitoring results indicate that the landfill has been leaching contaminants into the shallow groundwater. This has been noted as historical leachate and was originally identified in May 2007 with a classification of *Possible Contamination, Investigation Required*. In March 2017 this classification was reviewed as more information became available. At this time the site was reclassified as a *Source Site* for contamination and extra investigation was requested from the DWER.

While BHRC is compliant with the DWER licence conditions, a plume of contaminated groundwater has been identified in the shallow aquifer and has now extended off site along the south-western boundary.

** It should be noted that there appears to be a spike in the ground water monitoring readings and may not be an accurate measure of contaminants. Confusion in bore numbers had been identified and all bores were re-surveyed and numbered and more accurate readings commenced in the July monitoring round. At this stage there is no way of knowing how long the bores were being monitored under the incorrect numbers.*

BHRC has engaged an accredited Contaminated Sites Auditor and an Independent consultant to commence a thorough review of all data with the intent of being able to fully characterise and delineate the lateral and vertical extent of potential groundwater contamination beneath the site. During this time a risk assessment will be completed to assess the risk to human health and the environment both onsite and offsite.

A Detailed Site Investigation and a Mandatory Auditors report are due to be completed mid-2018.

2. Scope of Work

The following scope of works was undertaken in line with the Landfill Licence L8949/2016/1, issued 21st October 2016 reporting conditions as stated in Table 4.2.1.

Table 4.2.1: Annual Environmental Report		
Condition or table (if relevant)	Parameter	Format or Form
	Summary of any limit exceeded.	
Table 2.2.1	Volume of waste accepted/rejected for each waste type which must include: a) Data in table format for the annual period; b) Comment on annual input and output volumetric trends; and c) The volumetric tonnage conversion rates used for each waste type.	None specified
Table 2.3.1	Monitoring of ambient stormwater quality which must include: a) Data in a table format for the annual period; b) Data in graphical format for trend analysis to include at least the last four years data where available	
Table 2.3.2	Monitoring of ambient stormwater quality which must include: a) Data in a table format for the annual period; b) Data in graphical format for trend analysis to include at least the last four years data where available	
Table 2.3.3	Monitoring of ambient landfill gas which must include: c) Data in a table format for the annual period; d) Data in graphical format for trend analysis to include at least the last four years data where available	
	Complaints Summary	None specified

3.2.2 The licensee shall ensure that the Annual Environmental Report also contains:

a) An assessment of the information contained within the report against previous monitoring results and Licence limits; and

b) A list of any original monitoring reports submitted to the Licensee from third parties for the annual period and makes these reports available on request.

3. Site Description

3.1 Site Identification and Overview

The BHRC, which comprises the City of Bunbury and the Shire of Harvey, was established to oversee and manage the development of a regional landfill located at Stanley Road. The Site commenced operation in 1990 and has operated as a licensed Class II Landfill since January 1997, with its license renewed annually.

The Stanley Road landfill Site is located approximately 160km south of Perth and approximately 500m to the east of the Australind Bypass Road, , 2km south of Marriott Road, and is accessed via Stanley Road, as shown at **Attachment 2**.

3.2 Land Use

The landfill was opened in January 1990 by BHRC. Prior to becoming a landfill, the site consisted of vacant land (ATA, 2007) and was previously used as a sand mine.

3.3 Surrounding Land Use

The land uses of the sites that surround the BHRC landfill include:

- A Class 1 landfill operated by JW Cross & Sons on the western two thirds of the southern site boundary, with partially cleared bushland on the remainder of the southern boundary
- Previously farmland cleared for grazing to the east of the Site
- Land adjoining the northern boundary consists of remnant vegetation
- Located to the west of the site is an industrial premise (used for the storage and distribution of coking coal) and a sand mine operated by Catalano Pty Ltd

The closest residence is located approximately 800metres to the west of the Site. The Kemerton Industrial Area is located approximately 1.7 km north of the Site and its vegetated buffer zone extends the 1.7 km distance.

The Wellesley River is approximately 600 m to the southeast of the Site and the Indian Ocean lies approximately 3 km to the west.

3.4 Method of Operation

The site currently operates as a Class II landfill facility and under the terms of the current Licence is permitted to accept the following wastes:

- Clean fill
- Inert Waste Type 1
- Inert Waste Type 2
- Special Waste Type 1 (Asbestos)
- Contaminated Solid Waste
- Putrescible Waste

4. Site Conditions and Surrounding Environment

4.1 Geological Setting

Mapping by the Geological Survey of Western Australia (GSWA, 1982) indicates that the local geology consists of superficial deposits of sand associated with the Tamala Limestone (unit Qts) overlying Tamala Limestone (unit Qtl) at varying depths. The Guildford Formation underlying the superficial deposits is described as mainly alluvial sandy clays (GSWA, 1982).

The stratigraphy of the site has been inferred from records of drilling, which show that the dune sands extend to a depth of 3í10m below ground level (mBGL) depending on local topography. The surface sand layer is grey in colour due to the presence of organic matter.

The underlying sands are leached fine to medium grained white sands. A clay horizon of between 0.5m and 5m thickness underlies the sand unit.

The land generally slopes downward to the east where it forms a low plain consisting of alluvial clay that drains into the Wellesley River and is subject to partial inundation during winter. The land also slopes downward to the west towards the Leschenault Inlet.

4.2 Hydrogeological Setting

The Site is underlain by an unconfined superficial formation and a series of confined aquifers resulting from alternating sand and clay layers. This overlies a shale unit at a depth of approximately 38m bgl, which caps the Leederville formation. The site is also underlain by the Yaragadee aquifer at a greater depth, although the overlying confining clay layers and the confined nature of the Yaragadee aquifer with its upward head mean that the operation of the landfill is unlikely to impact on this important regional water source.

The depth to the surface of the superficial aquifer varies with topography. In low-lying areas the depth to groundwater can be as shallow as 4m bgl. The superficial aquifer extends to an underlying confining clay layer at approximately 10m bgl, giving a typical saturated thickness of approximately 6m (ATA, 2006).

Regionally, the direction of groundwater flow is westerly, towards the Leschenault Inlet. Locally, groundwater flow is inferred to be south westerly as a result of the influence of the Wellesley River.

4.3 Groundwater Use

A production bore is on site and is used for purposes other than drinking water, primarily dust suppression and fire control.

The location/construction log of the bore can be found at **Attachment 3**.

Rain water is collected on site in a 250,000 litre tank.

The Rust PPK (1995) report indicates that a bore is present in the industrial site to the west of the landfill facility and is used for purposes other than drinking water and thus is probably a production bore. This bore may be drawing from a deeper aquifer unit which extends beneath the landfill facility, although this has not been confirmed. This bore is in the process of being decommissioned.

4.4 Surface Hydrology

The Wellesley River, which flows into the Brunswick River, is located approximately 600m southeast of the Site. The Leschenault Inlet is located approximately 3 km west of the site, receiving water from numerous rivers and connected to the Indian Ocean.

5. Summary of Failure or Malfunctions

From the 1st of January 2017 to 31st December 2018, inclusive, there were no failures or malfunction of the pollution control equipment on site.

6. Notification

As per licence condition 3.3.1, BHRC shall ensure that the parameters listed in Table 4.3.1 are notified to the CEO in accordance with the notification requirements of the Table 4.3.1.

Table 4.3.1: Notification Requirements

Condition or table	Parameter	Notification requirement	Format or form
-	Any limit exceeded or any occurrence of a fire at the landfill.	Part A: As soon as practicable, but no later than 5pm of the next usual working day. Part B: As soon as practicable.	N1

One (1) small fire located at the North Eastern corner of Cell 4 landfill operations area of the site was noticed late in the afternoon on the 3rd of January. The area was unmanned at the time. Possible cause was a contractor delivering waste to site may have been smoking at the tip face although there is no way of proving this. May also been caused by the weather (approx. 36° day with little wind.) The fire was quickly extinguished with the help of the local Fire Brigade and machinery and man power from the adjacent site. The area was monitored by BHRC staff for 3 hours after closing. No further flare ups noted.

Letters were drafted to all contractors that deliver to site explaining that smoking is not permitted outside of the designated smoking areas and extra monitoring controls put in place for extreme weather days.

The Department of Water and Environmental Regulations were notified as per licencing requirements.

7. Monitoring of Inputs and Outputs

7.1 Waste inputs

On 21st October 2016, the Approved Premises production or design capacity was extending from 50,000 tonne on Licence L8949/2016/1 dated 25th January 2016 to 100,000 tonnes per annual period on Licence L8949/2016/1. This will see an increase in volumes accepted.

No limits were exceeded during this time.

From the 1st of January 2017 to 31st December 2017, inclusive, a total of 92, 755 tonnes were received to site with 51,437 tonnes identified for landfilling and 41,317 tonnes received were identified at the gate as recyclable materials. Each type of waste accepted is detailed at **Attachment 4**.

The residential waste delivered to site destined for landfill is separated in the Transfer Station collection area and the following removed for repurposing:

- Electronic Waste
- Cardboard
- Mattresses and Couches
- Household Hazardous Waste
- Tyres
- Used Motor Oil
- Trash & Treasure

7.2 Electronic Waste

Electronic Waste is collected on site in a purpose built bunker and sent off site for recycling. Electronic waste includes:

- Computers (Desktop and Laptop) and Hardware including –
    - Monitors
    - Keyboards
    - Modems etc.
- Printers, Faxes and Scanners
- Fans
- Heaters
- Radio/Stereo Equipment
- Small Kitchen Appliances
- TV's and DVD Players

From the 1st of January 2017 to 31st December 2017, inclusive, 8767 individual items were collected. This equates to 48,800 kg's of Electronic Waste being collected. Of this amount only 368kg's ended up back in landfill with 48,432 KG'S of product being recovered to be re-used.

7.3 Cardboard

Cardboard delivered to site is baled and recycled off site.

7.4 Mattresses and Couches

Mattresses and couches are separated from the general waste and processed to remove the steel components from the stuffing, flock insides. This metal is then recycled off site.

7.5 Household Hazardous Waste

BHRC participates in the Household Hazardous Waste program (HHW) coordinated through Waste Net, a division of WALGA. The program provides Local Governments with funding to assist with the safe collection, storage and disposal of HHW. The Program is administered by the Western Australian Local Government Association (WALGA) and funded by the Waste Authority through the Waste Avoidance and Resource Recovery Levy.

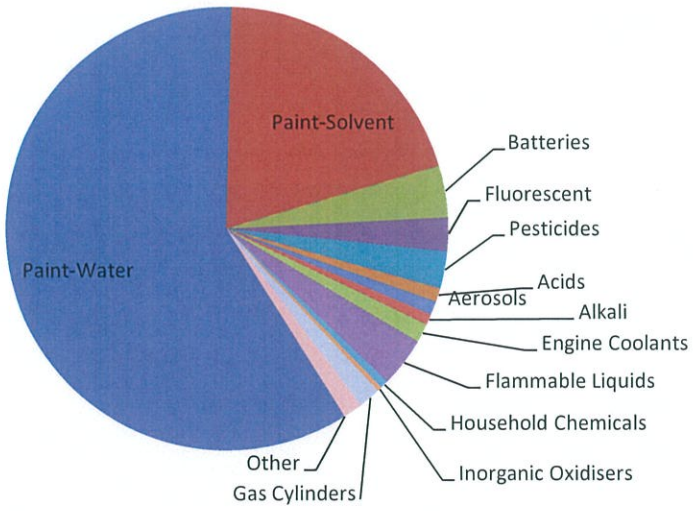
HHW is household products that are no longer needed or have reached their end-of-life, which contain chemicals or substances that can be harmful to you, your children, your pets, or the environment. This may include a broad range of products that are flammable, toxic, reactive or corrosive.

BHRC has a dedicated storage and disposal facility designed in accordance with the DWER *Guidelines for the Design and Operation of Facilities for the Acceptance and Storage of Household Hazardous Waste* and currently accepts HHW from all householders free of charge if delivered to our site.

Chemicals accepted and temporarily stored on site include:

Acids	*General household chemicals*
Aerosols	*Heavy metal compounds*
Alkalis	*Inorganic oxidising agents*
Batteries (household only)	*Smoke detectors*
Compact fluorescent lamps (CFLs) and Fluorescent tubes	*Mercury (e.g. thermometers)*
Cyanides	*Organic peroxides*
Engine coolants and glycols	*Paint*
Fire extinguishers - non-halon (red)	*PCB materials*
Flammable liquids	*Pesticides (including Schedule X pesticides)*
Flammable solids	*Solvents*
Flares	*Toxics*
Gas cylinders (small household cylinders)	

From the 1st of January 2017 to 31st December 2017, inclusive BHRC diverted 44,570kg of HHW away from landfill and sent it to be recycled or disposed of according to legislative requirements.



7.6 Tyres

During this reporting period, 1,766 tyres ranging from motorbike to heavy vehicle tyres were removed from site and recycled through our recycling contractor. This equates to approx. 32 tonnes of hazardous waste being removed from site.

7.7 Used Motor Oil

Used motor Oil received on site is collected to be refined and reused offsite.

From the 1st of January 2017 to 31st December 2017, inclusive, 22,950 litres of used oil was collected and removed.

7.8 Trash and Treasure Store

BHRC Transfer Station staffs are responsible for managing the waste that is delivered to site by the general public. Waste is separated by the public into purpose built bins and then items of value are collected to be repurposed through the Trash and Treasure Store.

Items are sold by price therefore there is no accurate way to measure the tonnage of waste saved from being landfilled. It is estimated that approx. 40,000 tonnes of waste has been repurposed this way.

7.9 Waste Outputs

From the 1st of January 2017 to 31st December 2017, inclusive, no waste was rejected at the gate. Phone enquiries regarding disposal of waste contrary to our licence, were rejected at the time of the call.

No waste was disposed of in skip bins contrary to our disposal guidelines.

8. Monitoring of Ambient Surface Water

Monitoring of Surface Water Ponds 1 and 2 were introduced in the amended licence L8949/2016/1 dated 21st October 2016 with the requirement being two (2) sampling events between June and September.

Samples are in accordance to Licence Condition 2.3 and shown below in Table 2.3.1.

Table 2.3.1: Monitoring of ambient surface water quality

Monitoring point reference and location	Parameter	Units	Averaging period	Frequency
Pond 1 and 2 (as depicted in the Active Landfill area map in Schedule 1)	pH	None specified	Instantaneous and spot sample	Two sampling events between the months of June and September separated by at least 30 days
	Electrical conductivity	µS/cm		
	Metals: Arsenic (total), cadmium, chromium, copper, iron (total), lead, manganese, mercury, molybdenum, nickel, selenium, zinc	Mg/l		
	Nutrients: Ammoniacal, nitrogen, nitrate-nitrogen, total nitrogen, total phosphorus			
	Cations and anions: Total potassium, chloride and sulfate			
	Total soluble solids: total organic carbon and chemical oxygen demand			

The first year of Data Results are detailed in **Attachment 5.**

9. Monitoring of Groundwater

Groundwater monitoring is in accordance with Licence L8949/2016/1, Table 2.3.2 as below

Table 2.3.2 Monitoring of ambient groundwater quality				
Monitoring point reference and location	Parameter	Units	Averaging Period	Frequency
GQ1-GQ10	Standing Water Level	M(AHD)	Spot Sample	Quarterly
	pH			
	Electrical Conductivity	µS/cm		
	Redox Potential	Eh		
	Chemical Oxygen Demand	Mg/L		
	Nitrate-Nitrogen			
	Ammonia-Nitrate			
	Total Nitrogen			
	Total Phosphorus			
	Total Dissolved Solids			
	Total Organic Carbon			
	Dissolved Oxygen			
	Major Cations and Anions: Calcium, Magnesium, Potassium, Sodium, Chloride, Bicarbonate and Sulphate			
	Heavy Metals: Aluminium, Arsenic, Cadmium, Chromium, Copper, Iron (total), Lead, Manganese, Mercury, Nickel, Selenium and Zinc			
	Organics: Phenols, Polyaromatic hydrocarbons (PAH), Organochlorine pesticides, Organophosphate pesticides (Demeton-S-Methyl, Diazinon, Dimethoate, Fenamiphos, Fenthion, Malathion and Parathion) Polychlorinated biphenyls (PCB), Atrazine, BTEX (Benzene, Toluene, Ethylbenzene, Xylens) Total Petroleum Hydrocarbons and Trichloroethylene/Perchloroethylene			Annual

BHRC commissioned Hydro Solutions to undertake groundwater monitoring at the Stanley Road Landfill Facility for the quarterly monitoring rounds for 2017. Unfortunately there was a discrepancy in the bores identification which, when noticed was rectified. All bores were re-surveyed and numbered for consistent results.

9.1 Location

There are eighteen (18) monitoring bores onsite. The bore locations are shown in **Attachment 6**.

9.2 Methodology

Quarterly Groundwater Events were completed as per licence condition 2.3 Ambient Environmental quality monitoring as above table 2.3.2.

All bores were dipped to measure the depth to the water table below datum (top of casing, TOC). The bores were plumbed to determine that they remained open to Total Depth (TD).

The pump and riser were decontaminated prior to and following purging, using a Decon-90 solution and a rinse in clean water. Pumps used comprised either 12-volt sampling pumps equipped with low-flow controllers, (bores GQ16, 17, 18s/d), or a Grundfoss MP1 electric submersible pump with a variable rate controller.

All bores were re-surveyed in August 2018 and all information passed onto Hydro Solutions.

For monitoring, a pump was lowered with its intake depth at the mid-point of the screened section. The pump was turned on and the flow-rate adjusted to the lowest possible flow rate to provide a continual discharge, to approximate 0.5Lpm (for low-flow sampling), however this rate was not always achievable. This was done in order to minimise drawdown, and promote horizontal flow in the aquifer.

Water quality parameters, including Electrical Conductivity (EC), Total Dissolved Solids (TDS), pH, Temperature, Redox potential (Eh) and Dissolved Oxygen (DO) were measured at the wellhead discharge in a flow-through cell using calibrated meters. When steady readings (<10% change) in the wellhead measurements were observed, usually within 5-12L of discharge, water samples were taken.

Clean sample bottles were provided by the NATA accredited Laboratory (SGS) and all samples were placed in eskies and maintained at approximately 4°C using frozen ice-bricks or ice.

The samples were accompanied by Chain of Custody forms which also specified the laboratory determinants.

9.3 Third Party Monitoring Reports

Hydro Solutions	Groundwater Monitoring Event January 2017
Hydro Solutions	Groundwater Monitoring Event April 2017
Hydro Solutions	Groundwater Monitoring Event July 2017
Hydro Solutions	Groundwater Monitoring Event October 2017

* All reports available on request

See groundwater monitoring results at **Attachment 7.**

10. Monitoring of Landfill Gas

Landfill Gas Monitoring wells are to be installed as part of the Works Specifications Table 1.2.1 section3, as below.

Table 1.2.1: Works specifications Column 1 Infrastructure1	Column 2 Specifications (design and construction)
Infrastructure	Specifications (design and construction)
1. Stormwater Ponds 1 and 2 as depicted in Schedule 1 Maps	The construction of Ponds 1 and 2 at the locations specified in Schedule 1 'Landfill Area Map' must conform to the following specifications: (a) Lined with at least 300 mm of clay, in situ compact soil or other material to achieve a permeability of no greater than $1x10^{-9}$ m/s or equivalent; (b) Designed to contain stormwater produced as a result of a 1:20 year storm event; and (c) Designed so that a minimum top of embankment freeboard of 500 mm is able to be maintained during operation.
2. Gabion Wall	(a) Situated in the area marked in green in Schedule 1 Active Landfill Area Map; (b) Situated such that the waste body is not in contact with the wall; and (c) Backfilled and separated from the waste body with Clean Fill.
3. Aspiration wells as depicted in schedule 3.	(a) constructed in accordance with Schedule 3, Figure 1 of this licence; and (b) spaced at densities no greater than 25 metres between wells.
4. Perimeter landfill gas monitoring wells[2]	(a) Situated at locations specified in Schedule 1 of this licence; (b) Constructed in accordance with the document: Department of Environment Regulation 2014, Assessment and management of contaminated sites: contaminated sites guidelines.

Installation deadlines as per Licence Condition 1.2.6:

The Licensee must ensure Item 4 in Table 1.2.1 (Landfill gas perimeter monitoring wells) as required in Condition 1.2.1 are installed at the following time intervals:

a) Phase 1 commissioned by 30 November 2018
b) Phase 2 commissioned by 30 December 2019 and
c) Phase 3 commissioned by 30 February 2021

Phase one of the construction commenced late 2017. 11 wells have been installed with the location as shown in **Attachment 8.**

10.1 Third Party Monitoring Reports

Run Energy	
Run Energy	

* Reports available on request

11. Pest Control

BHRC maintains a Feral Animal Control Program for the site which includes a bi-annual inspection for feral cat and fox control. The primary objective of the control program is to reduce the negative impact on the native fauna population caused by foxes and feral cats through predation.

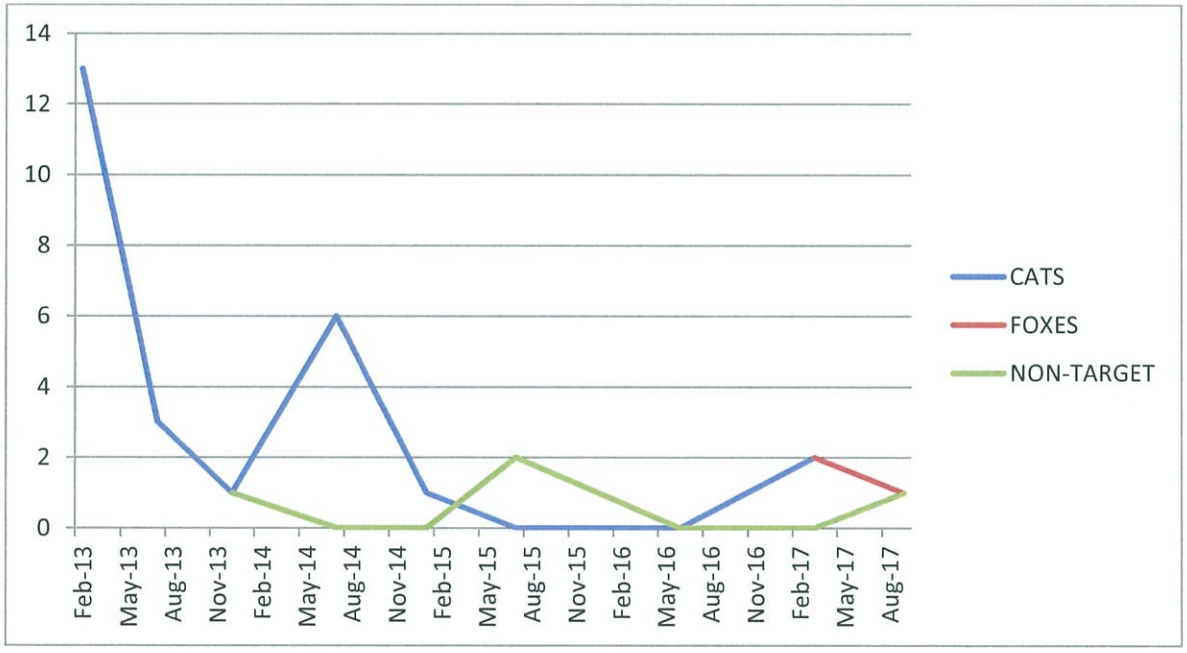
Historical information indicates that the control program was in place prior to 2013 although no statistical information was found.

Over the last five (5) years there has been a significant reduction in the number of feral cats located on site, although the cats caught have been noted as healthy. Over the year only 3 feral cats were caught. These were assessed for domestication such as collar, microchip, tattoo or even domestic tendencies or behavioural traits. Cats which were deemed feral were removed and humanely euthanized.

Two (2) male foxes were caught in the March 2017 program and in September 2017 only one (1) female was trapped. No juveniles have been sighted.

Although we conduct trapping programs to reduce capturing non-target species, Quenda have been captured on four (4) separate occasions. This may be a good indication that native fauna is still present within site and not adversely affected by the feral cats or foxes.

The table below details the total capture for the last five (5) years.



12. Complaints

From the 1st of January 2017 to 31st December 2017, inclusive, no complaints were made or received.

13. New Licence details

L8949/2016/1 issued 21st October 2016.

Tony Battersby
Chief Executive Officer