Annual Environmental Management Report

For Woodlawn Waste Expansion Project & Woodlawn Alternative Waste Technology Project

December 2019

Quality Information

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0	Draft for internal review	• Woodlawn Eco-Precinct Site Management • Veolia NSW SHEQ Team	November 2019
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Contents

Definitions/Abbreviations

AEMR	Annual Environmental Management Report
BMS	Business Management System
BTT	Banksmeadow Transfer Terminal
CTT	Clyde Transfer Terminal
DPIE	NSW Department of Planning, Industry and Environment
EMP	Environmental Management Plan
EIS	Environmental Impact Statement
EP & A	Environmental Planning and Assessment Act 1979 (and Regulations)
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
IEA	Independent Environmental Audit
IMF	Crisps Creek Intermodal Facility
LEMP	Landfill Environment Management Plan
LMP	Leachate Management Plan
MBT	Woodlawn Mechanical Biological Facility
MWOO	Mixed Waste Organic Output
NMP	Noise Management Plan
OEMP	Operational Environmental Management Plan (MBT)
PA	Project Approval
POEO	Protection of the Environment Operations Act 1997 (and Regulations)
SWMP	Soil Water and Management Plan
TADPAI	Tarago and District Progress Association Inc
TPA	Tonnes per annum
Veolia	Veolia Australia and New Zealand
WHS	Work Health and Safety Act 2011 (and Regulation)
CoR	Chain of Responsibility
LTP	Leachate Treatment Plant
LFG	Landfill Gas

Executive Summary

This Annual Environmental Management Report (AEMR) has been prepared in accordance with the Woodlawn Waste Expansion Project under Project Approval (PA) 10_0012 and the Alternative Waste Technology Project under PA 06_0239, as well as relevant legislative requirements and industry best practices .

On instruction from the Department of Planning, Infrastructure and Environment (DPIE), the requirements under each PA as per Schedule 7, Condition 5 of PA 10_0012 and Schedule 4, Condition 5 of PA 06_0239 have been combined in this AEMR to comprise collectively the 2018 - 2019 reporting period (9 September 2018 to 8 September 2019) respectively for the Woodlawn Bioreactor (the Bioreactor) which incorporates the Woodlawn Bioenergy Power Station and Leachate Treatment Plant, Crisps Creek Intermodal Facility (IMF) and the Woodlawn Mechanical Biological Treatment Facility (MBT).

This AEMR details the environmental performance of Bioreactor, IMF and MBT for the reporting period as a summary of environmental monitoring conducted in keeping with the PAs, as well as corrective actions resulting from any non-compliances identified and/or other findings from regulatory inspections, external and internal audit programs.

1 Introduction

1.1 Eco-Precinct Overview

Veolia Australian and New Zealand (Veolia) own and operate the Woodlawn Eco Precinct (the Eco Precinct), which is located approximately 40 km south of Goulburn and 50 km north of Canberra and comprises of the Woodlawn Bioreactor (the Bioreactor), which also incorporates the Woodlawn Bio Energy Power Station (the Power Station) andLeachate Treatment Plant (LTP), , the Crisps Creek Intermodal Facility (IMF) and the Woodlawn Mechanical Biological Treatment Facility (MBT) as depicted in **Appendix 1**.

1.1.1 Woodlawn Bioreactor and Crisps Creek Intermodal Facility

The Bioreactor, where waste landfilling and landfill gas extraction occurs in the void of a remnant open cut mine, is approximately 33 million cubic metres (m^3) in capacity. Originally approved to accept a maximum of 500,000 tonnes per annum (tpa) of putrescible waste, the Bioreactor is now approved to accept a maximum input of 1.13 million tpa.

The Bioreactor has been operating since September 2004, with the collection of landfill gas from landfilled waste to extract methane for energy generation commencing in 2008. This occurs at the adjacent the Power Station. Waste to the Bioreactor from Sydney is transported in shipping containers via rail and unloaded onto road trucks at the IMF, also owned and operated by Veolia and located approximately 8 km away in the township of Tarago. Local waste from neighboring councils and businesses is transported to the Bioreactor via road.

In addition to the above operations, the DPIE has granted approval (December 2017) to modify the Bioreactor's PA for the construction and operation of an LTP. Construction of the LTP commenced following approval and was commissioned on 4th October 2018. Since in operation, it has facilitated an improvement in environmental and operational performance by:

- allowing the extraction and treatment of greater volumes of leachate from the landfill void
- helping reduce the generation of odour from untreated leachate, and
- enabling more efficient gas extraction to maximise the waste to energy benefits of the Power Station.

1.1.2 Woodlawn Mechanical Biological Treatment Facility (MBT)

The MBT PA was granted in November 2007. Changes to site layout, technology and operating hours were approved by the DPIE as a modification to the PA in 2014. The facility has been designed to process municipal solid waste (MSW) received from a collective of Sydney-based councils to extract recyclable materials and produce mixed waste organic outputs (MWOO) from the organic fraction. The MWOO is produced with the intent of rehabilitating the former mine site on which the Bioreactor is situated, however with the ban imposed by the NSW Environment Protection Authority in October 2018 for the application to land of this type of material, Veolia is currently investigating other opportunities to utilise the product elsewhere within the Eco-Precinct.

The MBT facility currently comprises six building/processing areas (waste reception area, BRS drums, refining building, buffer storage area, fermentation hall and maturation/storage areas.

Permitted to accept 240,000 tpa of mixed waste and 40,000 tpa of garden waste from Sydney, the first stage of the MBT commenced commissioning in March 2017 and operation in July 2017, processing up to 144,000 tpa of mixed waste.

In June 2019, Veolia commissioned a 2.3MW Solar Farm adjacent to the MBT Facility. The electricity generated from this facility will be directly utilised by Veolia's MBT operation, and excess will be used by the bioreactor operations. This infrastructure follows Veolia's commitment towards resource recovery and energy efficiency.

1.2 Legislative Requirements

The main legislative instruments governing the environmental performance and activities undertaken at the Terminal include the *Environmental Planning and Assessment Act 1979* (the EP&A Act) regulated by the DPIE, and the *Protection of the Environment Operations Act 1997* (POEO Act) regulated by the EPA, as well as their respective associated regulations.

In addition to the PAs, Environment Protection Licences (EPLs) issued by the EPA, under the POEO Act, regulate the operational activities conducted at the Bioreactor, IMF and MBT. Monitoring activities undertaken at both facilities are reflected in the EPLs, consistent with PA requirements

Environmental Management Plans (EMP) have been prepared to reflect the requirements of the PAs for the operation of the Bioreactor, IMF and MBT respectively as follows:

- *Landfill Environmental Management Plan for the Woodlawn Bioreactor* (LEMP) (Veolia, August 2018)
- *Environmental Management Plan for Crisps Creek Intermodal Facility* (EMP) (Veolia, September 2016)
- *Operational Environmental Management Plan for Woodlawn Mechanical Biological Treatment Facility* (OEMP) (Veolia, January 2017)

These 3 documents concentrate on key environmental issues identified in the environmental assessment undertaken for the 3 facilities and set out the criteria for managing and monitoring environmental parameters such as water quality, waste, traffic, air quality, greenhouse gases, noise, landscape and vegetation and emergency response.

The above requirements stipulate the performance standards that need to be met to maintain compliance at the 3 sites, and those relevant to the preparation of this AEMR are provided in **Table 1.2.1** and **Table 1.2.2** below.

Table 1.2.1: Bioreactor and IMF conditions relevant for the preparation of this AEMR

Relevant Condition	Requirement
Schedule 7 - Environmental Management, Reporting and Auditing	
Annual Environment Management Review	

5	One (1) year after the commencement of expanded operations, and annually thereafter, the Proponent shall prepare an Annual Environmental Management Report (AEMR) to review the environmental performance of the project to the satisfaction of the Director-General. This review must: a) describe the operations that were carried out in the past year; analyse the monitoring results and complaints records of the Project over the past year, which includes a comparison of these results against the ● relevant statutory requirements, limits or performance measures/criteria; ● monitoring results of previous years; and ● relevant predictions in the EA; b) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance; c) identify any trends in the monitoring data over the life of the Project; and d) describe what measures will be implemented over the next year to improve the environmental performance of the Project.

Table 1.2.2: MBT conditions relevant for the preparation of this AEMR

Relevant Condition	Requirement
Schedule 4 - Reporting	
Annual Reporting	
5	Every year from the date of this approval, unless the Director-General agrees otherwise, the Proponent shall submit an AEMR to the Director-General and relevant agencies. The AEMR shall: e) identify the standards and performance measures that apply to the development; f) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years; g) include a summary of the monitoring results for the development during the past year; h) include an analysis of these monitoring results against the relevant: ● Impact assessment criteria; ● Monitoring results from previous years; and ● Predictions in the EIS; i) identify any trends in the monitoring results over the life of the development; j) identify any non-compliance during the previous year; and g) describe what actions were, or are being taken to ensure compliance.

Table 1.2.3 summarises the list of environmental approvals in place for the Bioreactor, IMF and MBT.

Table 1.2.3: Environmental Approvals

Description	Permit Number
Conditions of Development Consent: The Woodlawn Waste Management Facility (issued by DPIE)	31-02-99
Project Approval: *Woodlawn Waste Expansion Project* (issued by DPIE)	10_0012
Bioreactor Environment Protection Licence (issued by EPA)	11436
Special (Crown & Private Lands) Lease 20 (SML 20) (issued by the Department of Primary Industries)	SML 20
Water Access Licence: Willeroo Borefield (issued by Water NSW)	40WA411642
IMF Environment Protection Licence (issued by EPA)	11455
MBT Environment Protection Licence (issued by EPA)	20476
Project Approval: *Woodlawn Alternative Waste Technology Project* (issued by DPIE)	PA 06_0239

1.3 Accountabilities

- Environmental monitoring for the Bioreactor and IMF was undertaken and/or supervised by Ark Du (Landfill Engineer) and Harneet Puarr (Woodlawn Environmental Officer)
- Environmental monitoring for the MBT was undertaken and/or supervised by Christian Chang (MBT Process Engineer).
- Analysis of collected samples were performed at Australian Laboratory Services Pty Ltd (ALS), a NATA accredited laboratory.
- The Odour Unit Pty Ltd (TOU) was appointed in January 2018 to conduct odour audits for the Bioreactor and IMF.
- An Independent Environmental Audit (IEA) for the Bioreactor/IMF was conducted by Ramboll Environ Australia Pty Ltd in the previous reporting period, the findings of which and corrective actions implemented in this reporting period are presented in this AEMR. The audit team associated with the Bioreactor IEA included Victoria Sedwick (Lead Auditor), David Ford (Auditor) and Ronan Kellaghan (Reviewed). The audit team was approved by the DPIE.
- An Independent Environmental Audit (IEA) for the Woodlawn Mechanical Biological Treatment Facility (MBT) was conducted by Ramboll Environ Australia Pty Ltd covering the period from the issue of the MBT Notice of Modification (June 2014) to the date of the Audit, 21 March 2019. The audit team associated with the IEA comprised Victoria Sedwick (Lead Auditor), Emily Rowe (Auditor) and Vanessa White (Auditor). The audit team was approved by the DPIE.
- An Independent Noise Audit was conducted by SLR Consulting Australia Pty Ltd (SLR) in October 2017 for MBT. The audit team associated with this noise assessment included Mark Blake and John Sleeman. The audit team was approved by the DPIE.

2 Environmental Assessment Criteria

Based on the risk predictions in the environmental assessments undertaken for the 3 facilities, the implemented control measures described in the EMPs became the assessment criteria to determine the environmental performance of the respective operations. These are summarised in **Table 2.1** and results of the monitoring measures in this reporting period are described in subsequent sections of this AEMR.

Table 2.1: Assessment Criteria

Issue	Environmental Risk	Likelihood of Occurrence	Control Measure	AEMR Section Reference
Air quality (dust and odour)	Emission of air pollutants and odour above the EPA guidelines.	Low level of risk due to: Large buffer distance between the MBT, Bioreactor and sensitive receptors Sealed containers only at the IMF and full containers not stored	Monthly Dust monitoring and daily use of water cart Annual Independent Odour Audits including leachate samples for odour assessment Evaporation LTP treating all leachate extracted from the void	Section 3.4
Greenhouse gas emissions and energy use	Excessive energy consumption and related GHG emissions compared to similar facilities.	Known consequences with significant offset through generation of electricity from methane produced at the site.	Extraction & monitoring of the gas for green energy generation Compliance reporting under the National Greenhouse and Energy Scheme	Section 3.4
Surface Water	Contamination of surface water due to; Leachate Stored Chemicals	Possible without control measures, but unlikely due to existing approved Surface Water Management Scheme.	Ongoing Surface and Groundwater monitoring, Leachate monitoring Dam integrity inspections Dam freeboard control Leachate Barrier system 3 monitoring bores were added to the	Section 3.5
Groundwater	Contamination of groundwater.	Possible without control measures, however unlikely due to the use of leachate barrier systems and existing		

		Groundwater Management Scheme.	existing groundwater monitoring network and schedule to mitigate any risk from dam leakage Stormwater management system	
Noise	Increased noise impacts above the EPA guidelines. Impacts on local residents.	Rare due to the large buffer distance between the Bioreactor sensitive receivers.	In the event a noise complaint is received , Noise monitoring is carried out at the site All waste processing carried out indoors at MBT Facility	Section 3.2
Pest, disease and agriculture related impacts	Introduction of pests and the spread of disease as a result of the proposed expansion.	Possible without control measures, however unlikely due to existing approved, operational management measures.	Routine Site Inspections Vermin control measures in place for Bioreactor, MBT & IMF	Section 3.7
Traffic and transport	Significant impacts on local Tarago community, impacting levels of service and traffic flow.	The risk is rare due to the relatively low level of truck movements.	Limit the transfer of waste within approved operational hours and implementation of a Transport Code of Conduct All drivers trained in National Heavy Vehicle Regulatory CoR modules	Section 3.2
Socio economic	Negative impact on existing social conditions and on the economic vitality of the Tarago district.	Rare as the Project will generate additional employment demand, while amenity impacts are low.	Veolia has well established mechanisms for addressing community concerns and engaging with the community to manage any issues raised. A 24hr feedback line exists. Veolia aims to employ locally.	N/A

			Veolia has also implemented the Veolia Mulwaree Trust which provide grant funding to a Not for Profit organisation in the local region.	
Hazard and risk	Increased risk to human health and the environment from expansion, especially from dangerous materials and gases.	Rare as hazardous substances may not received at the Bioreactor and IMF. Possible as LTP has stores of hazardous substances but unlikely due to controls in place	All known hazards are understood and managed by Veolia with any incidents dealt with as part of the Emergency Response Plan (ERP) All hazardous substances stored according to Australian Standards	N/A

3 Environmental Monitoring

3.1 Monitoring Requirements

This section presents the monitoring undertaken at the Bioreactor, IMF and MBT throughout the reporting period in accordance with the requirements of the PAs, as detailed in the respective EMPs. Where specific monitoring requirements or locations were not stipulated by the PAs, the monitoring requirements under the respective EPLs have been adopted to measure performance of implemented site controls to manage the environmental risks parameters assessed for the Eco Precinct sites.

The Environmental Monitoring Programs (EMP) are used to facilitate monitoring requirements, which enable the continuous measuring and assessment of suitability, adequacy and effectiveness of on-site environmental management measures. These requirements are summarised in **Table 3.1.1**, **Table 3.1.2** and **Table 3.1.3** and discussed in the subsections below. A monitoring location plan is included in **Appendix 3**.

Table 3.1.1: Bioreactor Monitoring Requirements

PA Reference	Type of Monitoring	Frequency	Commentary
Schedule 4, Condition 3	Site Inspection	Daily	Ongoing basis
Schedule 4, Condition 7	Odour Audit	Annually	Condition satisfied , odour audit conducted 02/02/17
Schedule 4, Condition 11	Dust Monitoring	Monthly	Ongoing basis
Schedule 4,Condition 12/ Air Quality and Greenhouse management Plan	Odour – Site inspections	Daily or as required	Ongoing basis
Schedule 4,Condition 17/ Soil and Water management Plan/EPL	Surface water monitoring Groundwater monitoring Dam Level Survey	Quarterly/ Annually/ Monthly	Ongoing basis
Schedule 4, Condition 18/ Leachate Management Plan	Leachate pond monitoring and Leachate recirculation monitoring	Annually	Ongoing basis
Schedule 4, Condition 19/ Noise Management Plan	Noise Monitoring	As required	Not triggered
Schedule 4, Condition 22	Meteorological monitoring	Continuous	Ongoing basis
Schedule 4, Condition 23/ Landscaping and Vegetation Management Plan	Site Inspections	Weekly housekeeping	Ongoing basis

Schedule 4 Condition 24/ Pest ,Vermin & Noxious Weed Management	Site Inspections	Weekly housekeeping	Ongoing basis
Schedule 4, Condition 3	Site Inspection	Daily	Ongoing basis

Table 3.1.2: Crisps Creek IMF Monitoring Requirements

PA Reference	Type of Monitoring	Frequency	Commentary
Schedule 5, Condition 5	Litter control	Daily	Ongoing basis
Schedule 5 Condition 6/ Pest ,Vermin & Noxious Weed Management	Site Inspections	Weekly housekeeping	Ongoing basis
Schedule 5, Condition 9	Odour Audit	Annually	Condition satisfied , odour audit conducted January 2018
Schedule 5, Condition 15	Noise Monitoring	As required	Not triggered

Table 3.1.3: MBT Monitoring Requirements

PA Reference	Type of Monitoring	Frequency	Commentary
Schedule 3, Condition 29 EPL Condition M4	Meteorological monitoring	Continuous	Ongoing basis
Schedule 3, Condition 23 & 24 EPL Condition M2.2	Depositional Dust Monitoring	Monthly	Ongoing basis
Schedule 3, Condition 25 & 26 EPL Condition L4	Operational noise monitoring	As required	Condition satisfied, monitoring conducted: 2 – 3 October 2017
Schedule 3, Condition 20 EPL Condition M2.3	Surface Water Monitoring	Quarterly	Ongoing basis
EPL Condition L2.4	Discharge Monitoring	Daily during any discharge	Ongoing basis
Schedule 3, Condition 20 EPL Condition M2.3	Groundwater Quality Monitoring	Quarterly	Ongoing basis
Schedule 3, Condition 20 EPL Condition M2.3	Leachate Monitoring	Six monthly	Ongoing basis
EPL Condition O5.3	Leachate Level	Weekly or as required	Ongoing basis
Schedule 3, Condition 6 EPL Condition L3.1	Waste volume monitoring	Daily	Ongoing basis
Schedule 3, Condition 9	Site Inspection and Housekeeping	Weekly	Ongoing basis
Schedule 3, Condition 10	Pest and Vermin Checks	Every two months	Ongoing basis

Schedule 3, Condition 29 EPL Condition M4	Meteorological monitoring	Continuous	Ongoing basis

3.2 Noise

3.2.1 Bioreactor & IMF Noise Monitoring

Operational activities at the Woodlawn Bioreactor & Crisps Creek were restricted to within the approved operating hours described in **Table 3.2.1** as per Conditions of Bioreactor PA.

Table 3.2.1: Bioreactor & IMF Approved Hours of Operation

Activity	Day	Hours
Operations	Monday - Saturday	6:00am - 10:00pm
	Sunday & Public Holiday	Nil

No noise complaints were received during this reporting period indicating that noise at the Bioreactor was likely maintained within the 35 dB(A) LAeq (15 minute) criteria at the nearest residential receiver. Noise monitoring will be undertaken by Veolia on the receipt of any such complaints.

3.2.2 MBT Noise Monitoring

SLR Consulting was engaged to conduct a Noise Audit of the MBT in November 2017, to determine if any impact of operational activities on nearby receivers occurs in regards to the emission of nuisance noise. A copy of the Noise Audit report was submitted to the DPIE on the 6 December 2017.

The performance of the facility in managing potential noise emissions was also assessed on the receipt of any noise complaints. No noise complaints were received in this reporting period.

Operational activities at the MBTare restricted within the approved operating hours described in **Table 3.2.2.** as per Schedule 3, Condition 27 of the MBT PA, as well as all processing confined to enclosed areas.

Table 3.2.2: Agreed Hours of Construction & Operation

Activity	Day	Hours
Operation Hours	Monday - Saturday	6:00am – 10:00pm
Emergency Hours	Monday - Sunday	Anytime

Note: Operation of BRS Drums and associated infrastructure is permitted over 24 hours.

Noise limits are stipulated in the MBT PA to ensure the site does not generate nuisance noise emissions as a result of operational activities.

3.2.2.1 Operational Noise

Ambient noise measurements were conducted at the two locations as identified as the nearest residences on privately owned land, as specified in Condition 25 of the MBT PA. The results of the operator-attended measurements confirm the noise impact assessment criteria (Refer to **Table 3.2.2.1**) is complied with at the nearest residences on privately-owned land, with LAeq (15minute) noise levels recorded below 35 dBA at both locations. The operator-attended measurements also recorded levels higher than LAeq (15minute) 35 dBA, and in these instances the ambient noise environment was due to natural sounds such as birds, insects and frogs.

Table 3.2.2.1: Noise Impact Assessment Criteria dB(A)

Parameter	Performance Measure	Standards	Statutory Requirement
Residences on privately owned land (during construction)	Laeq (15min) = 40dB	NSW Industrial Noise Policy (EPA)	Schedule 3, Condition 25
Residences on privately owned land (during operations)	Laeq (15min) = 35 dB		
Traffic Noise on privately owned land	Laeq (1 hour) = 60dB	Environmental Criteria for Road Traffic Noise (DECC)	Schedule 3, Condition 26

3.2.2.2 Traffic Noise

Traffic noise levels were calculated at the nearest residence to the road between the Crisps Creek Intermodal Terminal and Woodlawn MBT, for comparison with the Traffic Noise Impact Assessment Criteria specified in the approval. The results of the operator-attended measurements and calculation confirm the Project Approval (06_0239) noise criteria is complied with at the nearest residence on privately-owned land.

3.3 Bioreactor Landfill Gas Monitoring

Veolia operate the Bioreactor to maximise the production of landfill gas for generation of renewable energy at the Power Station, where 7 generators have been installed and commissioned, with 2 auxiliary flares as back up treatment of landfill gas emissions captured. The generators and flares satisfy the design, installation and operational requirements within the Bioreactor PA and EPL.

The landfill gas extraction and utilisation infrastructure in the Bioreactor has been designed to meet the conditions of the landfill including settlement.

The findings from Landfill gas monitoring required under the Bioreactor PA and EPL is summarised in **Table 3.3.1** below and **Table 3** (refer to **Appendix 4**).

Table 3.3.1: Bioreactor Landfill Gas Monitoring Results

<table>
<tr><th>Parameter</th><th>Results/Discussion</th></tr>
<tr><td>Subsurface Gas</td><td>Monitoring of 3 subsurface gas monitoring bores (GMB) was undertaken on a quarterly basis as per EPL requirements and is summarised in Table 3.3.1A below:
Table 3.3.1.A: Subsurface Gas Monitoring Result
<table><tr><th rowspan="2">Gas Monitoring Bore ID</th><th colspan="4">Purged Methane Reading (%)</th></tr><tr><th>13/11/18</th><th>27/2/19</th><th>15/7/19</th><th>15/8/19</th></tr><tr><td>GMBH1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>GMBH2</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>GMBH4</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>The results show that the gas collection network is effectively capturing and controlling landfill gas within the landfill void. Engineered impermeable barriers and the natural subsurface of the void wall also minimises the potential movement of landfill gas from the Bioreactor, allowing for maximum extraction through the gas collection system.
The extraction of biogas reduces emissions to the atmosphere, which is a key strategy for the development of the Bioenergy business at the precinct.</td></tr>
<tr><td>Landfill Gas Extraction Booster</td><td>The data reported for the landfill gas extraction booster at the Power Station is consistent to the historical average since 2016 as summarised in Table 3.3.1B below:
Table 3.3.1B: Landfill Gas Extraction Booster Monitoring Results Summary
<table><tr><th>Parameter</th><th>Historical Average</th><th>2018/2019 Result</th></tr><tr><td>Temperature (° C)</td><td>2.7</td><td>8.7</td></tr><tr><td>Volumetric Flow (m3/hr)</td><td>2157</td><td>3986</td></tr><tr><td>Methane (%)</td><td>53.4</td><td>52.04</td></tr></table>The detailed data for each of the parameters required under the EPL for the gas extraction booster is provided in Table 1 (refer to Appendix 4).</td></tr>
<tr><td>Landfill Gas Flare</td><td>The landfill gas flares are manufactured to a residence time of 0.3 seconds with a destruction efficiency of 98% for methane and non methanogenic organic compounds to meet the requirements of the EPL. Monitoring was continuously performed during this reporting period, an average of which is summarised in Table 3.3.1D below.
Table 3.3.1D: Landfill Gas Flare Monitoring Results
<table><tr><th>Parameter</th><th>Units</th><th>Result</th></tr><tr><td>Temperature</td><td>°C</td><td>1000</td></tr><tr><td>Residence Time</td><td>Seconds</td><td>< 0.3</td></tr></table></td></tr>
<tr><td>Landfill Gas Engine Exhaust Point(s)</td><td>Monitoring of a landfill gas engine exhaust point was completed during the reporting period. The results are consistent with the previous monitoring period and presented in Tables 3.1 to Table 3.5 (refer to Appendix 4).
Concentration limits for each of the following pollutants are stipulated in the EPL, all of which were below the threshold for the exhaust point test within this reporting</td></tr>
</table>

<table>
<tr><td></td><td>period and consistent with previously reported levels, as demonstrated in Figures 3.3.1A - 3.3.1C (refer to Appendix 5)
Nitrogen Oxides;
Hydrogen Sulphide;
Sulphuric Acid Mist; and
Sulphur Trioxide.
Note: Only required to sample one engine exhaust due to sample type of engine.</td></tr>
<tr><td>Surface Gas</td><td>Surface gas monitoring was completed on a quarterly basis as per EPL requirements, which are summarised in Table 3.3.1C below. The detailed tabulated data is available in Table 2 (refer to Appendix 4).

Table 3.3.1C: Surface Gas Monitoring Results Summary<table><tr><th>Parameter</th><th>Minimum</th><th>Maximum</th><th>Average</th></tr><tr><td>Methane (%)</td><td>0.0002</td><td>0.0649</td><td>0.004</td></tr></table>Methane was detected in varying amounts over the waste surface with a decreasing overall average of 0.004% during this reporting period compared to 0.009% last reporting period.

The emission threshold concentration for methane detected in surface gas emission testing is 500 parts per million (0.05%), as recommended in (Environmental Guidelines for Solid Waste Landfills, Second Edition 2016).

Surface gas monitoring enables site operational personnel to investigate and apply corrective actions where any high concentrations of methane has been detected to maintain the effectiveness of the landfill cap and prevent migration of landfill gas through preferential pathways to the surface.

This can include application of cover material in areas of the void demonstrating settlement cracking, commissioning and rebalancing of gas extraction wells and installing additional gas collection infrastructure. During this reporting period vegetation mulch bio-cover was implemented around wells which have assisted in mitigating odour and reducing surface gas emissions.</td></tr>
</table>

3.4 Air Quality

Air quality monitoring, pertaining to odour and dust emissions, was undertaken in accordance with the PAs to determine whether activities conducted at the Bioreactor, Crisps Creek IMF and MBT affected ambient air quality.

All operations and activities were carried out at the Bioreactor in a manner to minimise dust at the boundary of the premises. These included all access roads from the IMF to the Bioreactor and the haul road used for ancillary operations being sealed, the use of water trucks for dust suppression as required and monthly sampling to monitor for the presence and quantity of depositional dust.

The active tipping face in the waste void is kept to a minimum surface area possible to reduce potential fugitive odour emissions.

Landfill gas (LFG) capture network has been installed and expanded in accordance with the Woodlawn Infrastructure Plan. Biofiltration system is installed along the rock/waste interface to minimize odour emission. Leachate extraction from the waste is maintained to reduce the impact of leachate on LFG capture. Maintain evaporation of stored leachate on site to reduce the odour footprint. All leachate from the void is treated via the LTP to achieve higher effluent quality and minimize odour potential.

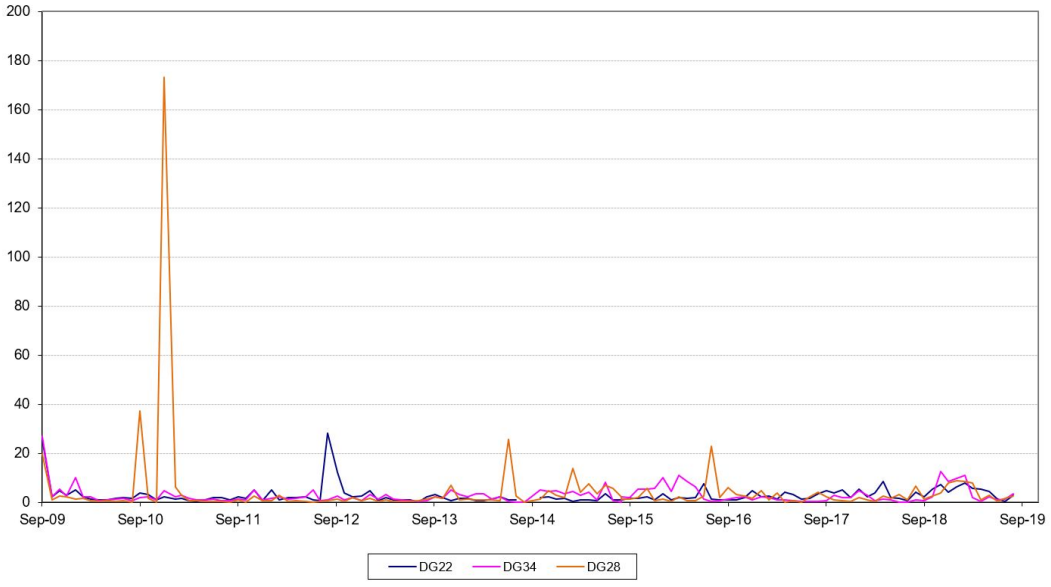
3.4.1 Bioreactor Air Quality Monitoring Results

Table 3.4.1: Bioreactor Air Quality Monitoring Results

Parameter	Results/Discussion
Meteorological Station	Veolia operates an onsite meteorological station as required by the Bioreactor PA to continuously monitor climatic data listed in the EPL. Meteorological data recorded includes (but is not limited to): • Wind speed at 10m; • Wind direction at 10m; • Temperature at 2m; • Temperature at 10m; • Rainfall; • Solar radiation; and • Sigma theta at 10m Meteorological data is logged in 15 minute and 24 hour intervals and can be made available for the 2018/2019 reporting period upon request. Servicing and calibration of the meteorological station is carried out quarterly by Hydrometric Consulting Services (calibration reports can be provided upon request).
Odour Monitoring	32 odour complaints were received at the premises during this reporting period which is lower than the last reporting period (41). An annual independent odour audit is used to assess the effectiveness of odour control measures and to identify improvements to existing odour management practices at the site. The odour audit report indicated Veolia has implemented all recommendations from the previous odour audit. Veolia will continue to implement recommended actions from the odour audit in combination with improving current odour control measures identified by Veolia. Veolia reduces the surface area of stored leachate by evaporation and emptying (combing) dams as freeboard allows and aims to empty the ED3N dams (lagoon 1 - 4) by the end of 2022. All leachate extracted from the void will be treated via the LTP to further reduce the odour potential. Effluent from the LTP will be managed separately from the existing stored leachate.
Particulates/Dust Monitoring	Monitoring of 3 depositional dust gauges (DG) was completed on a monthly basis as required under the Bioreactor PA and EPL, the results of which are generally consistent with previously reporting periods as depicted in **Figure 3.4.1A**. The results of total insoluble solids found within the depositional dust samples are summarised for each of the monitoring locations in **Table 3.4.1A** below, with the detailed results tabulated in **Tables 4.1 to 4.3** (refer to **Appendix 4**).

	Table 3.4.1A: Dust Monitoring Results **Dust Gauge** / **Summary Total insoluble Solids (g/m2/month)** **Minimum** / **Maximum** / **Average** **DG22** 0.5 8 4.47 **DG34** 0.4 12.6 4.57 **DG28** 0.4 8.8 4.12 The maximum dust level recorded in this reporting period was 12.6 g/m2/month at DG34 which is located on the West side of the Bioreactor in November 2018. The high level of total insoluble solid reflects the dust storm event that occurred in the months of November 2018 and January 2019, it is also noted that it has been a dry year with the average rainfall being 336mm. Overall dust suppression is generally consistent with previous years and a measure of the dust control measures that the site has in place.
PM10/TSP Monitoring	Results taken in 2016/2017 show that there were no exceedance both on and offsite. The maximum PM10 level was 21.7µg/m3 onsite, which was under the limit. (Note: Monitoring for the month November started 11/11/2016) Note: Heron Resources, as part of their construction activities, have begun PM10/TSP monitoring at the Pylara monitoring site and started on the 17 October 2017.

Figure 3.4.1A: Bioreactor Depositional Dust Levels (g/m2/month)



3.4.2 IMF Air Quality Monitoring Results

Dust monitoring is undertaken monthly at 1 location at the IMF in accordance with the Bioreactor PA. A summary of this reporting period is provided in **Table 3.4.2** and detailed in **Table 10** (refer to **Appendix 4**)

Table 3.4.2: IMF Air Quality Monitoring Results

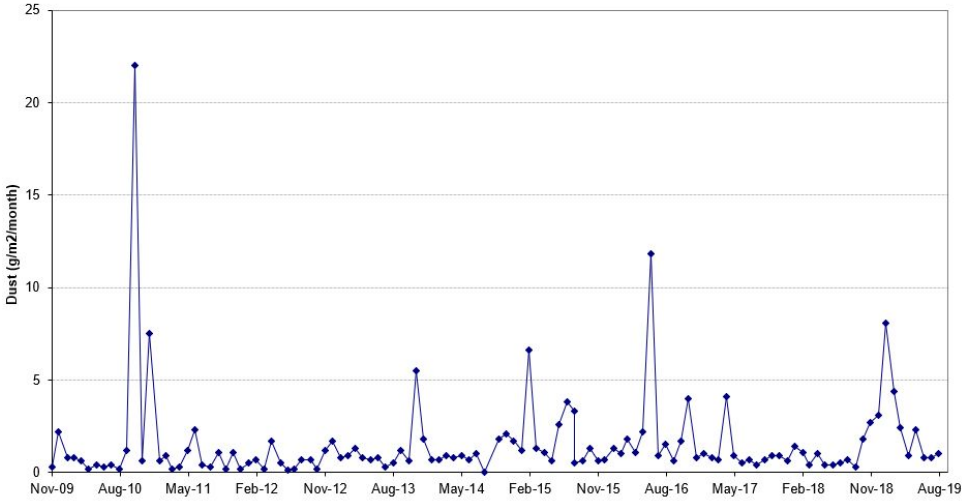
<table>
<tr><th>Parameter</th><th>Results/Discussion</th></tr>
<tr><td>Particulates/ Dust Monitoring</td><td>The results at DG18 indicate an average level of total insoluble solid matter is 2.38 g/m^2/month, which is slightly higher compared to overall historical trends as seen in the subsequent graph in Figure 3.4.2A.

Table 3.4.2A: Dust Monitoring Results
<table><tr><th rowspan="2">Dust Gauge</th><th colspan="3">Summary Total Insoluble Solids (g/m2/month)</th></tr><tr><th>Minimum</th><th>Maximum</th><th>Average</th></tr><tr><td>DG18</td><td>0.3</td><td>8.1</td><td>2.38</td></tr></table>
The high level of total insoluble solid of 8.1 g/m2/month for January 2019 reflects the dust storm event that occurred in the months of December 2018 and January 2019, it is also noted that it has been a dry year with the average rainfall being 336mm. The handling of waste and associated operational activities at the IMF are undertaken in a manner to ensure minimal emissions of dust. This includes no opening of containerised waste on unloading and operating on hardstand site.</td></tr>
<tr><td>Odour Monitoring</td><td>An annual independent odour audit is used to assess the effectiveness of odour control measures and to identify improvements to existing odour management practices at the site. The odour audit report indicated Veolia has implemented all recommendations from the previous odour audit and is further discussed in Section 5 of this AEMR.

Veolia will continue to implement recommended actions from the odour audit in combination with improving current odour control measures identified by Veolia.

No odour complaints were received for the IMF during this reporting period.</td></tr>
</table>

Figure 3.4.2A: IMF Depositional Dust Levels – DG18



3.4.3 MBT Air Quality Monitoring Results

Dust monitoring is undertaken monthly at the MBT facility in accordance with the MBT PA and EPL. A summary of this reporting period is provided in **Table 3.4.3** and detailed in **Table 11** (refer to **Appendix 4**).

Table 3.4.3: MBT Air Quality Monitoring Results

<table>
<tr><th>Parameter</th><th>Results/Discussion</th></tr>
<tr><td>Particulates/Dust Monitoring</td><td>Monitoring of 3 depositional dust gauges (DG) was completed on a monthly basis as required under the MBT PA and EPL, the results of which are generally consistent with previously reporting periods as depicted in Figure 3.4.1A & 3.4.2A.

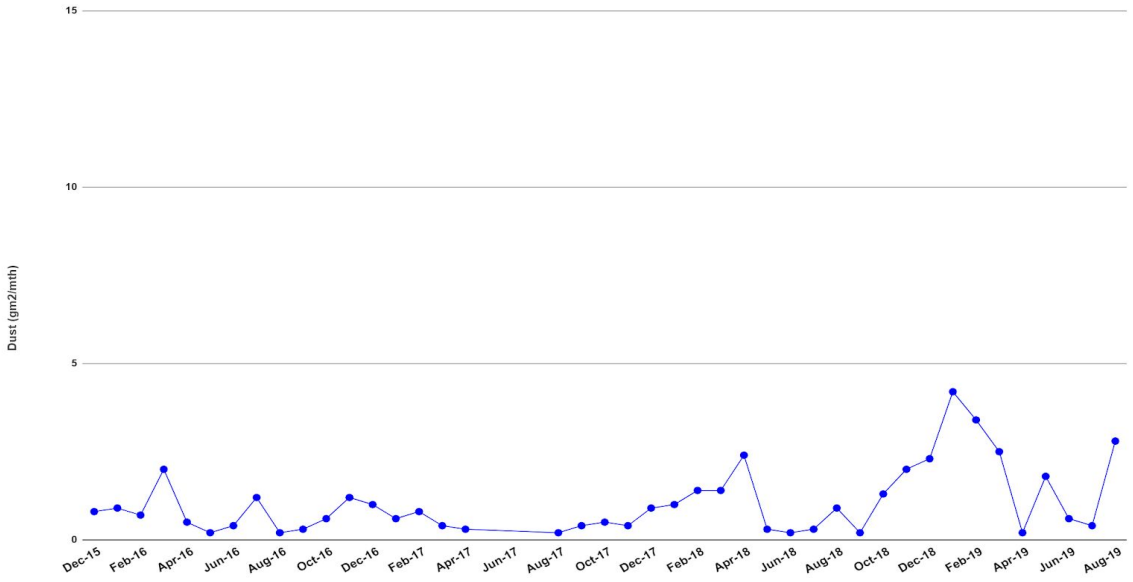
MBT shares 2 depositional dust gauges with the Bioreactor, which include Pylara (DG28) and West Void (DG 34), which are summarised in section 3.4.1. In addition, there is a dust gauge (DG 33) close to the MBT facility. A summary of this reporting period at the dust gauge is provided in Table 3.4.3A and detailed in Table 11 (refer to Appendix 4).
Table 3.4.3A: Dust Monitoring Results
<table>
<tr><th rowspan="2">Dust Gauge</th><th colspan="3">Summary Total Insoluble Solids (g/m2/month)</th></tr>
<tr><th>Minimum</th><th>Maximum</th><th>Average</th></tr>
<tr><td>DG 33 (Point 7)</td><td>0.2</td><td>4.2</td><td>1.8</td></tr>
</table>

The average level of total insoluble solid matter is 1.8 g/m2.month, which is generally consistent with overall historical trends as seen in the Figure 3.4.3A. The maximum dust level recorded in this reporting period was 4.2 g/m2/month at DG 33. The maximum dust level observed is related to the dry weather condition during this period. In addition, the maximum dust observed at the area is lower than background dust level in other monitoring points.</td></tr>
<tr><td>Odour Monitoring</td><td>The air quality impact assessment (AIA) prepared by SLR, predicted that MBT Facility operations would comply with relevant air quality goals and are not expected to generate offensive or nuisance odours at nearby sensitive receivers.

The adopted odour criterion of 6 OU was predicted to be achieved at all receptors with the exception of the TriAusMin (now Heron) administration building, which was predicted to experience a 99th percentile odour concentration of 8.5 OU. This concentration was predicted to be dominated by the existing source of the Bioreactor, rather than the operation of the Facility, which was predicted to result in a 99th percentile concentration of 1.7 OU when modelled alone.
Table 3.4.3B: Odour Emission Performance Criteria
<table>
<tr><th>Parameter</th><th>Measure</th><th>Standards</th><th>Statutory Requirement</th></tr>
<tr><td>Odour Emissions</td><td>6 OU</td><td>German Standard VDI 3940 ‘Determination of Odorants in Ambient Air by Field Inspections’</td><td>OEMP</td></tr>
</table></td></tr>
</table>

	The management of odour emissions from each of the proposed processing stages is maintained by the use of biofilters. Biofilters are pollution control mechanisms which use living material to biologically degrade and filter pollutants which may cause odours. These pollutants are absorbed into the biofilter material whereby it is broken down by microorganisms. Two biofilter odour control systems (OCS) are located adjacent to the processing areas at the Site. The two biofilter systems are maintained regularly to ensure the odour control system is working with the best performance. No odour complaints were received in this reporting period.

Figure 3.4.3A: MBT Depositional Dust Levels – DG33



3.5 Water Monitoring

The processes and management of water quality is documented and implemented on site in accordance with the LEMP for the Bioreactor. The LEMP provides guidance on the management of surface and stormwater systems such as drainage and pumping networks to divert clean water from any water that has come in contact with waste or leachate, as required under the Bioreactor PA and EP.

Clean surface and stormwater collected from within the void is pumped to Evaporation Dam 3 South (ED3S) for evaporation.

Stormwater coming into contact with the waste or leachate is collected and treated using existing leachate treatment dam and LTP. Treated leachate is transferred to Evaporation Dams, including ED 3 North (ED3N),

ED3SS and ED1 cofferdam for evaporation. Mechanical evaporators may be used to assist evaporation and are controlled by wind direction sensors to prevent the drifting of sprayed liquids from the premises.

The wash bay, used for cleaning of containers and equipment associated with Bioreactor operations, collects sediment in a drainage sump. This sump is periodically drained and the resultant waste deposited in the Bioreactor.

The findings from water quality monitoring of surface water locations required under the Bioreactor PA and EPL is summarised in **Table 3.5.1** below with detailed data provided in **Tables 5.1 to 5.10** (refer to **Appendix 4**). Key quality indicators selected to identify likely impacts from the Bioreactor include:

- pH,
- Electrical conductivity (EC),
- Ammonia (NH3),
- Total organic carbon (TOC),
- Iron (Fe),
- Sulphate (SO4), and
- Zinc (Zn).

3.5.1 Bioreactor Surface Water Monitoring Results

The findings from water quality monitoring of surface water locations required under the Bioreactor PA and EPL is summarised in **Table 3.2.3** below with detailed data provided in **Tables 5.1 to 5.11** (refer to **Appendix 4**). Key quality indicators selected to identify likely impacts from the Bioreactor include:

- pH
- Electrical conductivity (EC)
- Ammonia (NH_3)
- Total organic carbon (TOC)
- Iron (Fe)
- Sulphate (SO_4, and
- Zinc (Zn)

These are depicted in the trend graphs (**Figures 3.5.1A – 3.5.1K**) provided in **Appendix 5**.
All the surface water levels are recorded according to the monthly survey. This information is used to determine freeboard and assess for leakage.

Table 3.5.1: Bioreactor Surface Water Monitoring Results

Parameter	Results/Discussion
Site 115 – Allianoyonyiga Creek	Site 115 is situated downstream of the evaporation dams. 3 out of 4 quarterly monitoring events were undertaken in this monitoring period due to insufficient flow. Based on the results provided in **Table 5.1** (refer to **Appendix 4**), the pollutant concentration trends from previous monitoring periods are generally consistent. • Mean pH at 7.58 for this location indicates slightly alkaline water. • EC at 3343.3 µS/cm, indicating fresh to brackish water.

	• NH_3 at 1.67mg/L and TOC at mean of 33.7 mg/L concentrations recorded in this monitoring period remain consistent with historical monitoring results • Heavy metal concentrations are of low magnitude for this reporting period – less than 0.02 mg/L for Pb and less than 0.5mg/L for Zn, indicating no contaminated runoff is impacting surface water at this monitoring location. Note: Heron Resources have pumped out the water in ED2 cell closest to the creek and lined it with a plastic membrane
Spring 2	Spring 2 is located upstream of the Bioreactor and adjacent to Crisps Creek. The site therefore provides background water quality information to site operations. The spring naturally overflows to Crisps Creek during rainfall events. 4 out of 4 quarterly monitoring events required under the EPL were undertaken in this monitoring period. Water quality trend in Spring 2, based on the results provided in **Table 5.2** (refer to **Appendix 4**), is consistent with water quality from historical monitoring records. • pH is consistent with previous years (average 6.8) and reflective of the overall range of 3.5 – 8.5 for this location; • EC (average 540 µS/cm) for this reporting period is indicative of fresh water. • SO_4 (average 170 mg/L) shows an identical trend to conductivity, again indicating a direct effect on EC. • Pb (average 0.01mg/L) and Zn (average 6.9mg/L) concentrations continue to show slow decline from overall averages with some variability likely due to dilution following wet weather periods and concentration during drier periods. • NH_3 (average 0.2mg/L) and TOC (average 19mg/L) concentrations recorded in this monitoring period were consistent with historical monitoring results.
Site 105 – Crisps Creek	Site 105 is located downstream of the Bioreactor and tailings dams. 1 out of 4 quarterly monitoring events were undertaken in this monitoring period due to insufficient flow. Water quality trends in Site 105, based on the results provided in **Table 5.3** (refer to **Appendix 4**) are consistent with previous monitoring results. • pH (7.4) is within the overall range of 5.4 – 8.6 for this location, indicating relatively neutral water; • EC (916 µS/cm) is consistent with historical results, reflecting brackish water. • TOC (14 mg/L) and NH_3 (0.1 mg/L) was consistent with historical trends. • Zn and Pb remain consistent and average 0.19 mg/L and 0.03 mg/L respectively consistent with historical results.
WM200 Raw Water Dam	The Raw Water Dam is located to the west of the dolerite stockpile and collects uncontaminated water. Quarterly monitoring events were undertaken in accordance with EPL conditions. Based on the results provided in **Table 5.4** (refer to **Appendix 4**), the results for WM200 remain generally consistent with the previous reporting periods. • pH (average 8.1) indicates slightly alkaline water; • EC (average 1570 µS/cm) is consistent with historical results; • SO_4 level (average 81 mg/L) is lower than the previous reporting period; • Zn and Fe levels were lower at averages of 1.3 mg/L and 0.13mg/L respectively than the previous reporting period;

	• TOC was an average of 4.5 mg/L in this reporting period which is consistent with historical results. This could be reflective of the presence of organic matter from riparian zone vegetation surrounding the dam. • NH_3 at an average of 0.3 mg/L is consistent with historical results.
WM201 – Entrance Road Culvert	The Entrance Road Culvert collects surface water runoff from the Woodlawn Bioreactor administration office and workshop areas. No samples were obtained in this reporting period due to insufficient flow and being a dry year the past two years, the results of which are provided in **Table 5.5** (refer to **Appendix 4**). Veolia will continue monitoring this location in the next reporting period for any likely contaminant run off impacts.
ED3SS – Lagoon 5	Evaporation Dam 3 South-South (ED3SS) is a new storage point to manage treated leachate by evaporation. Quarterly monitoring events were undertaken in accordance with the EPL. Based on the water quality results provided in **Table 5.6** (refer to **Appendix 4**), for ED3SS, the following can be confirmed: • pH (average 8.4) appears to be fairly consistent with the existing treated leachate quality • EC average 24400 µS/cm appears to be generally consistent with the existing treated leachate quality • SO_4 averages (1151 mg/L) appears to be fairly consistent with the existing treated leachate quality • Fe levels (average 18.8mg/L) Zn levels (average 6.4mg/L) are lower than previous monitoring periods • NH_3 concentrations (average 452.5 mg/L) remained stable over the course of the reporting period • TOC (average 2825 mg/L) appears to be fairly consistent with the existing treated leachate quality
WM203 – Evaporation Dam 3 North	Evaporation Dam 3 North (ED3N) is a storage point to manage treated leachate by evaporation. Quarterly monitoring events were undertaken in accordance with the EPL. Based on the water quality results provided in **Table 5.7** (refer to **Appendix 4**), for WM203, the following can be confirmed: • pH (average 8.4) appears to be generally consistent with previous reporting periods. • EC average (35525 µS/cm) appears to be fairly consistent with previous reporting periods; • SO_4 averages (6217.5 mg/L) appears to be fairly consistent with previous reporting periods; • Fe levels (average 53.8 mg/L) are slightly higher than previous years whilst Zn levels (average 133.25) reflect a downward trend. • NH_3 concentrations (average 546 mg/L) remained stable over the course of the reporting period (508 – 581mg/L). • TOC is trending upward (average 3310 mg/L) from the previous reporting period.
Pond 5	Pond 5 is situated on a bench within the landfill void and acts as a transfer point to capture stormwater from the walls of the landfill void to Evaporation Dam 3 South.

	3 out of 4 quarterly monitoring events required under the EPL were undertaken in this monitoring period, due to insufficient flow, the results of which are tabulated in **Table 5.8** (refer to **Appendix 4**). These water quality results consistent results with previous reporting periods. • pH average of 5.6 confirms acidic nature of water that comes in contact with the void walls and is generally consistent with previous results • EC (average 2740 µS/cm) is generally consistent with previous results; • SO_4 trends (average 1405.7 mg/L) is generally consistent with previous results • Pb average of 0.4 mg/L is generally consistent with previous results • Zn (average 180.1 mg/L) is generally consistent with previous results; • NH_3 (average 10.3 mg/L) and TOC (average 16.7 mg/L) both mirror a similar trend which appears quite variable over historical monitoring results. These results and trends are deemed representative of the stormwater quality captured from the walls of the void.
WM202 – ED3S	Evaporation Dam 3 South is a storage point to manage stormwater from the void by evaporation. Quarterly monitoring events were undertaken in accordance with EPL conditions. Water quality results indicated a similar trend to previously reported data as seen in **Table 5.9** (refer to **Appendix 4**). • pH levels indicate an acidic, yet stable trending result with the average pH of 3.5 appears to be generally consistent with previous reporting periods; • Fe (average 16.5 mg/L) is lower compared to previous reporting periods; • Zn at an average of 1075.25 mg/L is consistent with previous reporting periods; • SO_4 (average 10142.5 mg/L) is consistent with previous reporting periods • EC (average 12000 µS/cm) remains within the overall average. Both SO_4 and EC concentrations reflect the signature for Acid Mine Drainage (AMD) contaminated waters from remnant mining operations stored in Evaporation Dam 3 South. • NH_3 concentrations (average 168.5 mg/L) which is consistent with previous reporting periods.
ED1 – Evaporation Dam 1	Evaporation Dam 1 (ED1) is a storage point to manage runoff stormwater from its external catchment including dolerite stockpile area. Quarterly monitoring events were undertaken in accordance with the EPL. Based on the water quality results provided in **Table 5.10** (refer to **Appendix 4**), for ED1, the following can be confirmed: • pH (average 2.7) which is consistent with previous reporting periods • EC average 24325 µS/cm which is consistent with previous reporting periods • SO_4 (averages 31025 mg/L) and Fe levels (average 526.8 mg/L) is greater than the previous reporting period • Zn levels (average 2587 mg/L) is lower than the previous reporting period • NH_3 concentrations (average 17.85 mg/L) remained stable over the course of the reporting period. • TOC averages 13.2 mg/L remains consistent with previous reporting periods

	Fe and Zn levels were noted significantly higher in quarter 4 this reporting period as Heron Resources were pumping into ED1 from the tailings dam at that time as part of the overall management of water across the site. Water will be progressively evaporated.
ED1 Coffer Dam	Evaporation Dam 1 (ED1) coffer dam is a storage point to manage treated leachate from the Leachate Treatment Plant. Monthly monitoring events were undertaken in accordance with the EPL. Note: samples were only collected in July and August 2019 this reporting period as the sufficient level in the dam filled at the start of July 2019. Permeate was first discharged into the coffer dam on 29th April 2019. Based on the water quality results provided in **Table 5.11** (refer to **Appendix 4**), for ED1 coffer dam, the following can be confirmed: • pH (average 9.37) which is meets proposed reporting requirements • EC average 21800 µS/cm, Biochemical oxygen demand average 48.5 mg/L and Chemical oxygen demand 2640 mg/L meet reporting threshold • NH_3 concentrations (average 0.4 mg/L) remained stable over the couple samples taken of the reporting period. • Chloride averages 4060 mg/L remained stable over the couple samples in the reporting period

3.5.2 IMF Surface Water Monitoring Results

Surface water quality monitoring at 3 monitoring locations was undertaken as required by the EPL, the findings of which are summarised in **Table 3.5.2**. Detailed quality results are provided in **Tables 9.1 to 9.4** (refer to **Appendix 4**). The key quality indicators selected to identify any contamination in the receiving surface waters from site operations include:

- pH
- Electrical Conductivity (EC)
- Sulphate (SO_4)
- Iron (Fe)
- Zinc (Zn)
- Ammonia ($NH_{3)}$ and
- Total Organic Carbon (TOC)

These are depicted in trend graphs **Figures 3.5.2A - 3.5.2D** (refer to **Appendix 5**).

Table 3.5.2: IMF Surface Water Monitoring Results

Parameter	Results/Discussion
Site 110 - Upstream	Site 110 is located upstream of the IMF in Crisps Creek. It is approximately 8 km downstream of the Bioreactor. Results provided in **Table 9.1** (refer to **Appendix 4**) indicate the following trends: • pH is close to neutral (average 7.03), consistent with previous reporting periods;

	• EC (average 40 µS/cm) is consistent with the previous period and representative of fresh water salinity; • SO_4 (average 18.2 mg/L) is lower than previous reporting periods;
Site 130 - Upstream	Site 130 is located upstream of the IMF in the Mulwaree River. Results provided in **Table 9.2** (refer to **Appendix 4**) indicate the following trends: • pH is close to neutral (average 7.87), consistent with the previous reporting period; • EC (average 442 µS/cm) is consistent with the previous reporting period and representative of fresh water salinity; • SO_4 (average 18.5 mg/L) is consistent with previous reporting period; • Fe and Zn, average 2.01 mg/L and 0.003 mg/L respectively indicate consistency with fluctuating cycles in previous reporting periods; • NH_3 (<0.1 mg/L) continued to be undetectable during this reporting period. • TOC (average 11 mg/L) is consistent with previous reporting periods. • Fe (average 0.49 mg/L) is consistent with previous reporting periods, whilst Zinc indicates a fluctuating trend (average 0.62mg/L), consistent with historical cyclic results; • NH_3 (average 0.1 mg/L) is consistent with previous reporting periods and continues to be at non-detection levels. • TOC (average 4 mg/L) is slightly lower than the previous reporting period and is generally reflective of natural organic matter in streams. While the indicator trends for this location indicate some variability over time, this is not uncommon when sampling intermittent streams.
Site 150 – Mulwaree River	Site 150 is located 2 km downstream of the IMF on the Mulwaree River, which is also downstream of a railway bridge and Braidwood Road. Results provided in **Table 9.3** (refer to **Appendix 4**) indicate the following trends: • pH (average 8.03) is slightly alkaline, consistent with the previous reporting period; • EC (average 703 µS/cm) shows a fluctuating trend and is generally consistent with previous periods and fresh water salinity; • SO_4 (average 26 mg/L) reflecting EC trend, is generally consistent with previous reporting period; • Fe and Zn, average 0.49 mg/L and 0.04 mg/L respectively indicate consistency with fluctuating cycles in previous reporting periods. • NH_3 (< 0.1mg/L) continued to be not detected during this reporting period. • TOC (average 10 mg/L), is generally consistent with previous reporting periods; These results are consistent with the trends for Site 110.
First Flush Stormwater Outlet	The IMF First Flush is located at the surface water outlet point of the site, prior to runoff into Crisps Creek. Results provided in **Table 9.4** (refer to **Appendix 4**) indicate the following trends: • pH (average 7.29) is close to neutral, consistent with the previous reporting period;

	• EC (average 180.25 µS/cm) shows a slight downward trend but is generally consistent with the previous period and representative of fresh water salinity; • SO_4 (average 18.95 mg/L) is also slightly higher but generally consistent with previous reporting period; • Fe and Zn, average 0.85 mg/L and 0.22 mg/L are generally consistent with the previous period but reflective of fluctuating cycles. • NH_3 an average of (0.2 mg/L) is also slightly higher but generally consistent with previous reporting period; TOC (average 8.75 mg/L) which is consistent with previous reporting period reporting periods.

3.5.3 MBT Surface Water Monitoring Results

Quarterly surface water monitoring is carried out to monitor any potential surface water impacts of the project on the surrounding area. Baseline data for surface water has been obtained from historical water quality monitoring undertaken for monitoring location Site 115 - Allianoyonyiga Creek.

For results of the surface water monitoring point Site 115, refer to **Table 3.5.1**.

3.5.3.1 Discharge Monitoring Results

Surface water discharge monitoring is conducted at the MBT facility to determine whether surface water flowing off site could be contaminated as a result of operational activities. The results of discharge monitoring are assessed against discharge limits stipulated within the MBT PA and EPL 20476, which are described in **Table 3.5.3.1**.

Table 3.5.3.1 - Discharge Parameters and Performance Measures

Parameter	Performance Measure	Standards	Statutory Requirements
pH	6.5-8.5	Approved Methods for the Sampling and Analysis of Water Pollutants in NSW	EPL Condition L2.4
Total Suspended Solids (TSS)	50 mg/L		

Condition 19 of the MBT PA states the stormwater retention pond must capture and store all stormwater runoff generated at the premises during a 24-hour duration 1-in-100-year Average Recurrence Interval (ARI) rainfall event. Following the commencement of operations the Facility must ensure it maintains a closed water management system, which ensures no discharge to the downstream environment.

Since the start of the reporting period, no discharge events were recorded at Site 140. This is indicating compliance with this condition. This is due to low rainfall during this reporting period.

3.5.4 Bioreactor Leachate Monitoring Results

Leachate quality monitoring is undertaken annually at 2 monitoring locations in the Bioreactor as required by the EPL. Effluent quality from the Leachate Treatment Plant is also monitored and sampled to meet the requirements of the Bioreactor PA. The findings from this reporting period are summarised in **Table 3.5.4** below with the detailed data provided in **Tables 6.1 and 6.2** (refer to **Appendix 4**). The key quality indicators selected to characterize the leachate and identify any migration into groundwater or surface water monitoring locations include:

- pH
- Electrical Conductivity (EC)
- Sulphate (SO_4),
- Lead (Pb)
- Zinc (Zn)
- Ammonia (NH_3) and
- Total Organic Carbon (TOC)

These are depicted in the subsequent trend graphs **Figures 3.5.4A and 3.5.4C**

Table 3.5.4: Bioreactor Leachate Monitoring Results

Parameter	Results/Discussion
Leachate Dam	The leachate dam is located at the northwest rim of the landfill void where leachate collected and extracted from the void is treated by aeration to oxidise organic compounds. An annual monitoring round was completed during this reporting period as per the requirements of the EPL. Based on the results provided in **Table 6.1** (refer to **Appendix 4**), the characteristics of the leachate are: • pH (8.78) is consistent with the previous reporting period EC (31900 µS/cm) is consistent with the previous reporting period; • SO_4, one of the dominant anions, (1430 mg/L) is consistent with previous reporting readings; • Pb (0.166 mg/L) and Zn (1.82 mg/L)) is consistent with the previous reporting period • NH_3 (2100 mg/L) is consistent with previous reporting; • TOC (5940 mg/L) is consistent with previous reporting
Leachate Recirculation System	The leachate recirculation system is located within the landfill void, comprised of a network of drainage sumps, pipes, pumps and wells that are used to collect and extract leachate from the waste mass. An annual round was completed during this reporting period in accordance with the EPL, the results of which are detailed in the **Table 6.2** (refer to **Appendix 4**). Based on these results, the leachate collected directly from the recirculation system displays similar characteristics to the leachate pond, with some exceptions as summarised below: • pH (8.56) is generally consistent with previous reporting period; • EC (46,200 µS/cm) is consistent with the previous reporting period and is generally consistent with the overall annual average for this location;

	• SO_4 (2720 mg/L) is consistent with previous reporting period; • Both Pb and Zinc are consistent with previous reporting period, 3.7 mg/L and 48.2 mg/L respectively. • TOC (24200mg/L) is consistent with historical monitoring results.
Effluent from Leachate Treatment Plant	The effluent from the Leachate Treatment Plant is located at the ultrafiltration membrane shed at the Leachate treatment Plant. Based on the results provided in **Table 6.3** (refer to **Appendix 4**), the water quality at this location can be described as: • pH (average 7.95) consistent with throughout reporting period and meets proposed limits; • EC (average 24029.2 µS/cm) remains stable, consistent with throughout the reporting period; • NH_3 (average 2 mg/L) is well below proposed limits; • BOD (3.35 mg/L) is well below proposed limits; No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.

Figure 3.5.4A: Leachate Trends – Leachate Dam

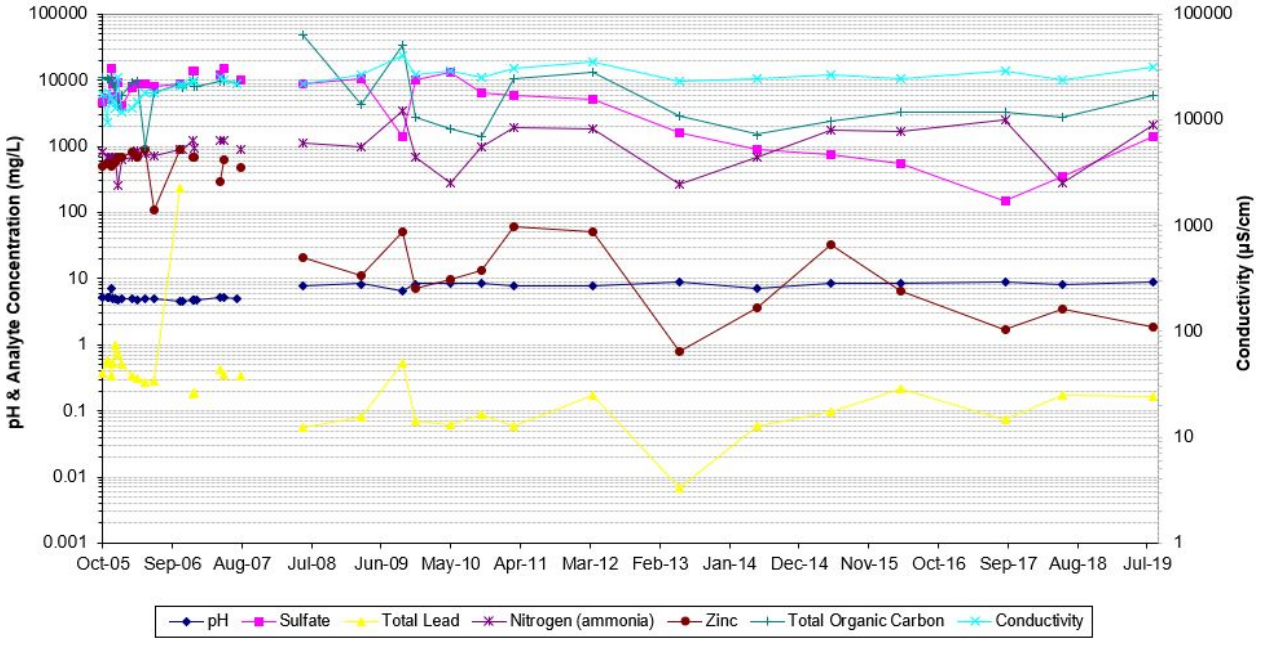


Figure 3.5.4B: Leachate Trends – Leachate Reticulation System

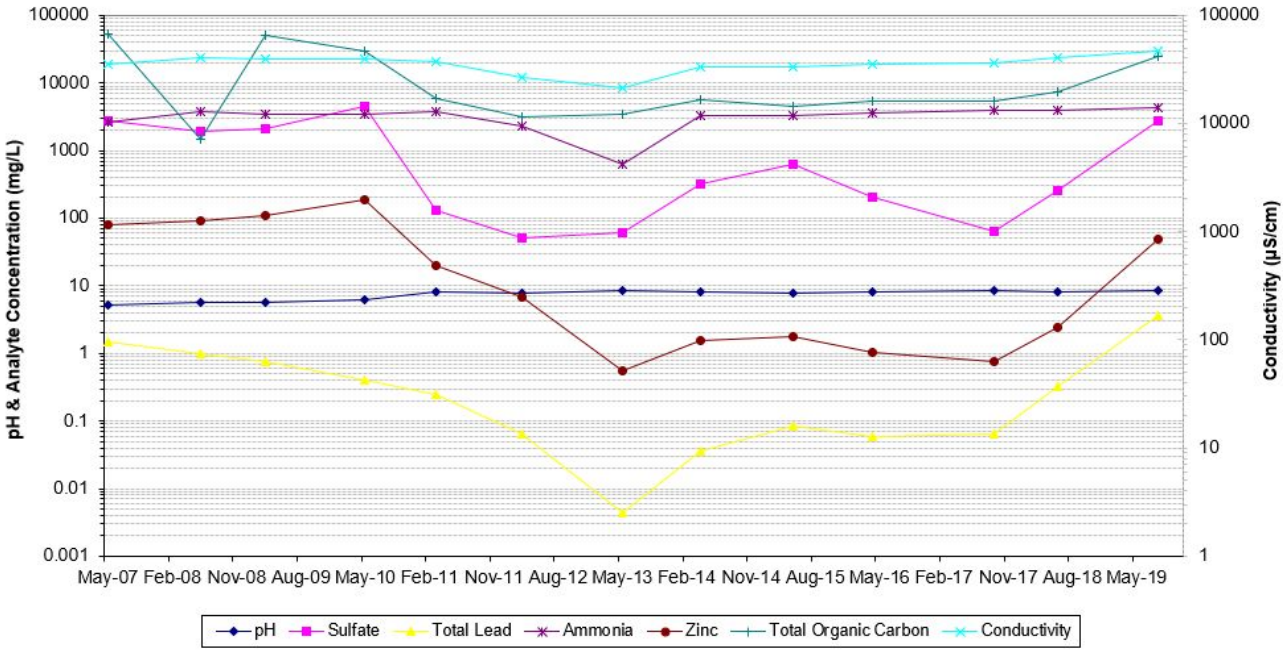
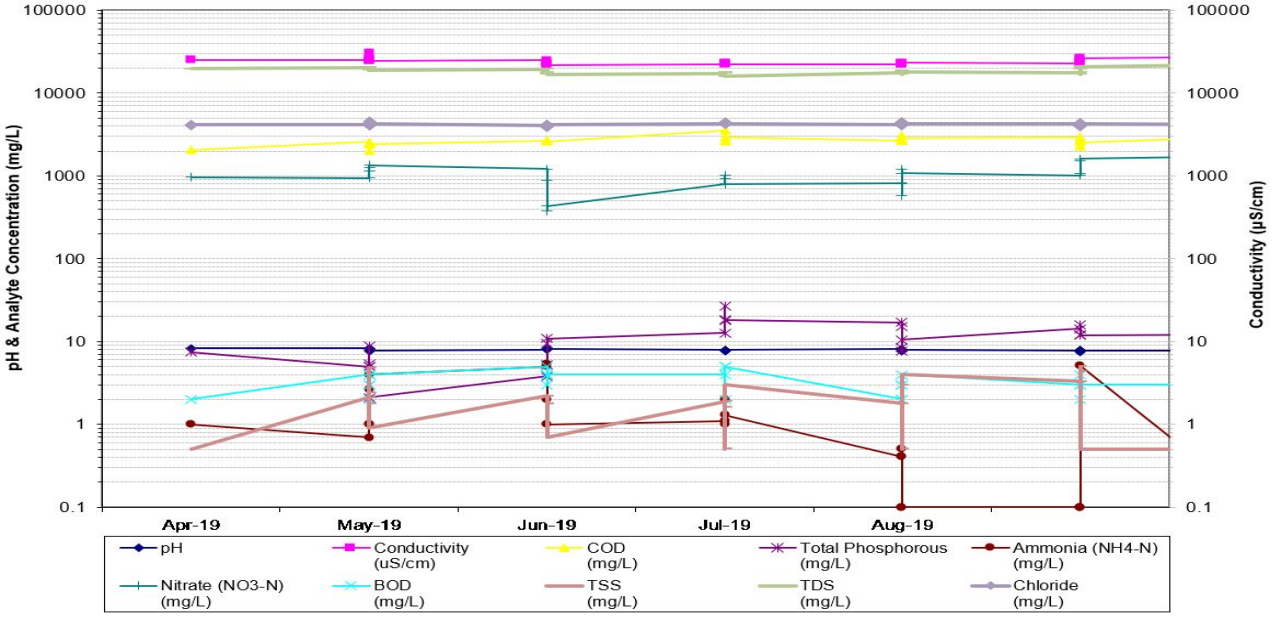


Figure 3.5.4C: Leachate Trends – Effluent for Leachate Treatment Plant



3.5.5 MBT Leachate Monitoring Results

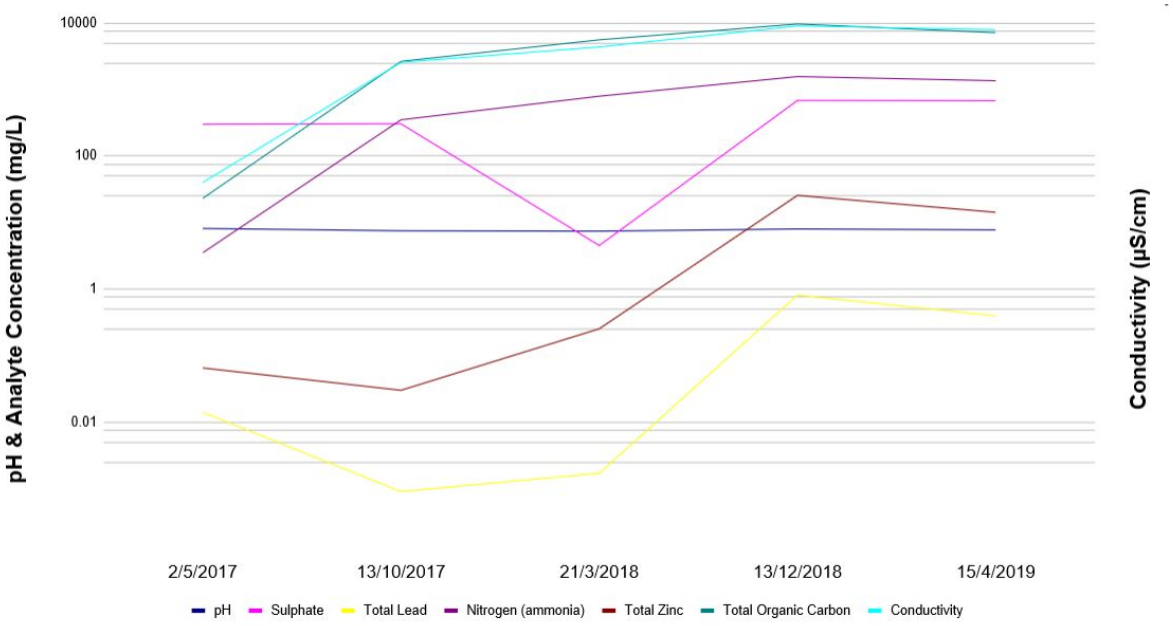
Leachate quality monitoring is undertaken half-yearly at the MBT leachate aeration dam as detailed in the OEMP. The findings from this reporting period are summarised in **Table 3.5.5** below with the detailed data provided in **Table 13** (refer to **Appendix 4**). Same key quality indicators are used as per section 3.4.5 and are depicted in **Figure 3.5.5**.

In addition to chemical testing, the level of the water in the leachate aeration dam is also monitored on a weekly basis and after every rainfall event to ensure the freeboard is not exceeded as per Condition O5.3 of the EPL.

Table 3.5.5: MBT Leachate Monitoring Results

Parameter	Results/Discussion
MBT Leachate Aeration Dam	The leachate aeration dam is located at the northern side of the MBT facility where leachate collected from the facility is treated by aeration to oxidise organic compounds in leachate. Based on the results provided in **Table 13** (refer to **Appendix 4**), the characteristics of the leachate are: • pH average (7.86) is showing an increasing alkaline state from the previous reporting period result of 7.44. • EC average (22,800 µS/cm) has increased from the previous reporting period (13,800 µS/cm) due to increased organic load. • SO_4 average (678.5 mg/L) is higher than the previous reading (154 mg/L). • Pb average increased from 0.0013 mg/L to 0.6 mg/L and Zn average increased from 0.141 mg/L to 19.85 mg/L from the previous reporting period. This can be due to leachate concentration was not reached a steady state concentration in the past. These analytes will be continuously monitored for any changes. • NH_3 average (1455 mg/L) is higher compared to previous reporting reading (570 mg/L). • TOC average (8375 mg/L) is higher compared to previous reporting reading (4100 mg/L). The leachate concentration has increased in general compared to the previous reporting period. The leachate aeration dam was initially accumulated by storm water. The leachate collected in the current reporting period can increase the concentration of leachate in the pond. As a result, a higher concentration of analytes were shown in this reporting period.

Figure 3.5.5 - Leachate Trends - MBT Leachate Pond



3.5.6 Bioreactor Groundwater Monitoring Results

Groundwater quality monitoring at 19 locations was undertaken in this reporting period as required by the Bioreactor PA and EPL, comprising 1 annual and 3 quarterly rounds of monitoring, the results of which are summarised in **Table 3.5.6** below. Detailed data is provided in **Tables 7.1 to 7.18** (refer to **Appendix 4**).

The groundwater monitoring well network allows for an assessment of potential impacts from the waste operations at the Bioreactor, evaporation dams and tailing dams. The key quality indicators selected to detect any pollutants in groundwater samples are the same as those deemed characteristic for leachate and are as follows:

- pH
- Electrical Conductivity (EC)
- Sulphate (SO_4)
- Lead (Pb)
- Zinc (Zn)
- Ammonia ($NH_{3)}$ and
- Total Organic Carbon (TOC)

These are depicted in the trend graphs **Figures 3.5.6D - 3.5.6T** (refer to **Appendix 5)**. In addition to water quality monitoring, standing water levels (SWL) of the wells are also measured in metres relative to sea level (m RL) and are depicted in the subsequent graphs **Figures 3.5.6A, 3.5.6B and 3.5.6C.**

Table 3.5.6: Bioreactor Groundwater Monitoring Results

Parameter	Results/Discussion
MB1	MB1 is located down gradient of the landfill void. Based on the results provided in **Table 7.1** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 776.5 m RL) was slightly lower than previous reporting periods due to insufficient rainfall events; • pH (average 7.4) neutral – to slightly alkaline consistent with previous reporting period; • EC (average 1645 µS/cm) is slightly lower than but generally consistent with previous readings representing fresh water; • SO_4 (average 303.75 mg/L) is generally consistent with previous periods; • Pb and Zn (average 0.0004 mg/L and 2.6 mg/L respectively) are generally consistent with previous periods. • NH_3 (average 0.13) is consistent with previous reporting periods. • TOC (7 mg/L) is consistent with the previous reporting period and historical trends. The concentration is indicative of natural conditions. Veolia will continue to monitor this parameter in the future to ensure water quality at this location is preserved. All trends at this location indicate fairly stable concentration and there is no indication of contamination from mining or Bioreactor activities. No significant variations or anomalies were recorded for any analyte tested during this monitoring period.
MB2	MB2 is located upstream of Evaporation Dam 2. Based on the results provided in **Table 7.2** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 778.37 m RL) was consistent with long term average since 2004; • pH (average 7.06) neutral, consistent with previous reporting period; • EC (average 6395 µS/cm) and SO_4 (average 4075 mg/L) is consistent with previous periods; • Pb (average 0.0002 mg/L) indicates a stable trend consistent with the previous reporting period. • Zn (average 0.04 mg/L) is generally consistent with previous reporting periods. • NH_3 (0.1 mg/L) same as previous monitoring periods of non detection rates; • TOC (4 mg/L) is consistent with previous reporting periods. All trends indicate fairly stable concentration and there is no indication of contamination from mining or Bioreactor activities. No significant variations or anomalies were recorded for any analyte tested during this monitoring period.
MB3	MB3 is located upstream of the Bioreactor and mine site. Based on the results provided in **Table 7.3** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 790.71 m RL) was consistent with long term average since 2004; • pH (average 6.9) near neutral is consistent with previous reporting period;

	• EC (average 2955 µS/cm) is consistent with previous readings representing fresh water; • SO_4 (average 1073 mg/L) is stable and consistent with previous periods; • Pb (average 0.0002 mg/L) and Zn (average 0.0014 mg/L) are stable and consistent with previous periods. • NH_3 (0.1 mg/L) is consistent with previous monitoring periods of non detection rates; • TOC (5 mg/L) result is consistent with historical results. The concentration is indicative of natural conditions. Veolia will continue monitoring this parameter in the future to ensure water quality at this location is preserved. All trends indicate fairly stable concentration and provide an indication of background groundwater concentrations.
MB4	MB4 is located downstream of the Bioreactor. Based on the results provided in **Table 7.4** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 773.19 m RL) was consistent with long term average since 2004; • pH (average 5.4) slightly acidic, consistent with previous reporting period; • EC (average 1612.5 µS/cm) represents fresh water salinity and is consistent with previous period. This trend is reflected in SO_4 (average 190 mg/L) results for this period; • Pb (average 0.005 mg/L) remains stable while Zn (average 0.9 mg/L) is seen to fluctuate which appears consistent with historical cyclic trends; • NH_3 (0.1 mg/L) is consistent with previous monitoring periods of non detection rates; • TOC (2 mg/L) result is consistent with historical results. The concentration is indicative of natural conditions. Veolia will continue monitoring this parameter in the future to ensure water quality at this location is preserved. All trends indicate fairly stable concentrations and there is no indication of contamination from mining or Bioreactor activities.
MB6	MB6 is located downstream of Evaporation Dam 3 and upstream of the Bioreactor. Based on the results provided in **Table 7.5** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 784 m RL) was consistent with historical results; • pH (average 6.22) slightly acidic consistent with previous reporting period; • EC (average 4097.5 µS/cm) represents brackish water and the trend is mirrored by SO_4 (average 630.5 mg/L) consistent with previous periods; • Pb (average 0.001 mg/L) and Zn (average 9.8 mg/L) is consistent with previous periods; • TOC (4.3 mg/L) and NH3 average of 0.35 mg/l is lower than the previous reporting period. Due to Heron Resources underground mining activities, Veolia expects this bore to become dry in the next reporting period.

MB7	MB7 is located upstream of Evaporation Dam 3. Based on the results provided in **Table 7.6** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 785.59 m RL) was consistent with long term average since 2004; • pH (average 7.39) neutral is consistent with the previous reporting period; • EC (average 7690 µS/cm) and SO_4 (average 194 mg/L) follow a similar stable trend to previous reporting periods ; • Pb (average 0.0003 mg/L) is consistent throughout the reporting period whilst Zn (average 0.12 mg/L) shows a fluctuating trend consistent with historical cycles; • NH_3 (0.18mg/L) is consistent with previous monitoring periods of non detection rates; • TOC (12 mg/L) appears consistent with the previous reporting period. The concentration is indicative of natural conditions. Veolia will continue monitoring this parameter in the future to ensure water quality at this location is preserved. All trends indicate fairly stable concentration and there is no indication of contamination from mining or Bioreactor activities.
MB10	MB10 is located adjacent to Evaporation Dam 1. Based on the results provided in **Table 7.7** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 780.6 m RL) was consistent with previous monitoring periods; • pH (average 7.3) neutral is consistent with previous reporting periods; • EC (average 8597.5 µS/cm) is of brackish quality consistent with previous readings; • SO_4 (average 3747.5 mg/L) mirrors EC and is generally consistent with previous periods; • Pb (average 0.0002 mg/L) is stable while Zn (average 0.005 mg/L) and is generally consistent with previous reporting periods; • NH_3 (< 0.1 mg/L) is consistent with previous monitoring periods of non detection rates; • TOC (3 mg/L) appears consistent with the previous reporting period. The concentration is indicative of natural conditions. Veolia will continue monitoring this parameter in the future to ensure water quality at this location is preserved. All trends indicate fairly stable concentrations and there is no indication of contamination from mining or Bioreactor activities.
ED3B	ED3B is located downstream of Evaporation Dam 3. Based on the results provided in **Table 7.8** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 784.12 mRL) was consistent with previous monitoring periods; • pH (average 7.6) is neutral – slightly alkaline and consistent with previous reporting period; • EC (average 8282.5 µS/cm) indicating brackish water and SO_4 (average 1320 mg/L) follow similar trends consistent with previous periods;

	• Pb (average 0.0002 mg/L) remains stable while Zn (average 0.17 mg/L) is consistent with previous monitoring periods. • NH_3 (0.35 mg/L) is at non detection rates; • TOC (9 mg/L) is slightly higher but reflective of historical results in previous reporting periods. All trends indicate fairly stable concentrations at this location with no evidence of contamination from mining or Bioreactor activities.
WM1	WM1 is located northeast of the landfill void. Based on the results provided in **Table 7.9** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 741.72 m RL) is consistent with previous monitoring periods; • pH (average 7.4) neutral – to slightly alkaline consistent with previous reporting period; • EC (average 3215 µS/cm) represents slightly brackish water, and is consistent with previous historical records; • SO_4 (average 11630 mg/L) is similar in trend to EC and demonstrating a long term upward trend; • Both Pb (average 0.004 mg/L) and Zn (average 5.23 mg/L) remain consistent with previous reporting periods. • NH_3 (average 0.2 mg/L) is close to, or within, non-detection rates; • TOC (4 mg/L) is consistent with previous monitoring period reflective of natural conditions; All trends indicate fairly stable concentrations at this location with no evidence of contamination from mining or Bioreactor activities.
WM5	WM5 is located to the west of the void near Evaporation Dam 3 South. Based on the results provided in **Table 7.10** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 783.42mRL) is consistent with long term averages; • pH (average 7.5) neutral is consistent with the previous period. • EC (average 11325 µS/cm) is representative of saline water and consistent with the previous reporting period; • SO_4 (average 353.75 mg/L) is consistent with previous monitoring periods. • Pb (average 0.0002 mg/L) and Zn (average 0.19 mg/L) can be seen to be fluctuating which appears consistent with historical cyclic trends; • NH_3 (average 0.1 mg/L) is close to non-detection rates; • TOC (16 mg/L) is consistent with previous monitoring periods reflecting natural conditions; No significant variations or anomalies were recorded for any analyte tested in this location during this monitoring period from the data available.
WM6	WM6 is located to the west of the void adjacent to Evaporation Dam 3 North. Based on the results provided in **Table 7.11** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 785.9 m RL) is consistent with the previous reporting period; • pH (average 6.3) is slightly acidic, but stable and consistent with previous reporting period; • EC (average 14000 µS/cm) represents brackish to slightly saline water, consistent with previous reporting period;

	• SO_4 (average 499.5 mg/L) mirrors EC's stable trend; • Pb (average 0.004 mg/L) and Zn (average 0.14 mg/L) are both similar to the previous reporting period and generally consistent with historical fluctuations. • NH_3 (average 0.1 mg/L) is close to, or within, non-detection rates; • TOC (0.05 mg/L) is consistent with previous monitoring period reflecting natural conditions; All trends are relatively consistent and there is no indication of contamination from mining or Bioreactor activities.
MW8S	MW8S is located on the northern side of ED3N. Based on the results provided in **Table 7.12** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 784.85 m RL) was consistent with long term average since 2004; • pH (average 7.34) is neutral and consistent with previous reporting period; • EC (average 10175 µS/cm) remains stable with previous reporting period results; • SO_4 (average 2565 mg/L) continues to show a declining trend but is generally consistent with previous periods; • Pb (average 0.0039 mg/L) is stable whilst Zn (average 29.8 mg/L) is generally consistent with previous periods. • NH_3 (average 0.3 mg/L) is close to, or within, non-detection rates; • TOC (11 mg/L) is consistent with previous monitoring period reflecting natural conditions; The fluctuations noted could be attributed to the recharging of this well only following significant wet weather events which indicates that this well intercepts the shallow unconfined aquifer. There is no indication of contamination from mining or Bioreactor activities.
MW8D	MW8D is located adjacent to MW8S. Based on the results provided in **Table 7.13** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 785.34 m RL) was consistent with long term average since 2004; • pH (average 6.9) slightly acidic to neutral consistent with previous reporting period. • EC (average 5492.5 µS/cm) represents brackish water which is consistent with previous readings; • SO_4 (average 2157 mg/L) mirrors EC consistent with previous periods; • Pb (average 0.0002 mg/L) and Zn (average 4.25 mg/L) are both consistent with previous periods; • NH_3 (0.2mg/L) is at non detection rates; • TOC (0.05 mg/L) is consistent with previous monitoring period reflecting natural conditions; All trends indicate fairly stable concentrations with no evidence of contamination from mining or Bioreactor activities.
MW9S	MW9S is located on the northwest side of ED3N. Based on the results provided in **Table 7.14** (refer to **Appendix 4**), the groundwater quality at this location can be described as:

	• SWL (average 786.29) was consistent with previous reporting period; • pH (average 7.04) consistent with previous reporting period; • EC (average 10,845 µS/cm) remains stable, consistent with previous reporting period for brackish water; • SO_4 (average 4985 mg/L) is consistent with previous periods; • Pb (average 0.001 mg/L) and Zn (average 0.19 mg/L) were both generally consistent with historical results. • NH_3 (0.3 mg/L) is at non detection rates; • TOC (8 mg/L) reflecting natural conditions is consistent with historical results; No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.
MW10S	MW10S is located on the northeast side of ED3. No sampling of MW10S could be undertaken during the reporting period as this well was continually dry. This has been a consistent observation since the well was commissioned in 2007. No data is available to produce tables or graphs for this monitoring point.
MB28	MB28 is located downstream of ED1. Based on the results provided in **Table 7.15** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 779.10) was consistent throughout this reporting period; • pH (average 7.25) is neutral; • EC (average 11900 µS/cm) remains stable, throughout the reporting period; • SO_4 (average 846.75 mg/L) is consistent; • Pb (average 0.0002 mg/L) and Zn (average 1.36 mg/L) were both generally consistent in this reporting period. • NH_3 (0.2 mg/L) is at non detection rates; • TOC (4 mg/L) reflecting natural conditions is consistent throughout this reporting period; No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.
SP2-MW1	SP2-MW1 is located adjacent to Spring 2. This shallow bore was installed as part of the ED1 and ED2 seepage management scheme. * This bore was installed and ready to be tested from quarter 2 of this reporting period. Based on the results provided in **Table 7.16** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 777.10); • pH (average 7.41) being neutral, was consistent throughout the reporting period; • EC (average 3696.7 µS/cm) remains stable, consistent with for fresh to brackish water; • SO_4 (average 186.73 mg/L) is consistent this reporting period; • Pb (average 0.0003 mg/L) and Zn (average 0.4 mg/L) were both reported as low to non-detectable • Cu (0.004 mg/L) reflected low to non-detectable; No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.
MW-FRC1	MW-FRC1 is located adjacent to the farm road culvert. This shallow bore was installed as part of the ED1 and ED2 seepage management scheme. *This bore

	was installed and ready to be tested from quarter 2 of this reporting period. Based on the results provided in **Table 7.17** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 778.27); • pH (average 7.17) consistent throughout this reporting period; • EC (average 6023 µS/cm) remains stable for brackish water; • SO_4 (average 180.67 mg/L) is consistent this reporting period; • Pb (average 0.0002 mg/L) and Zn (average 0.08 mg/L) were both generally consistent and reflect low to non-detectable. • Cu (0.003 mg/L) reflected low to non-detectable; No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.
MB10S	MB10S is located adjacent to MB10 at the toe end of ED1. This shallow bore was installed as part of the ED1 and ED2 seepage management scheme. *This bore was installed and ready to be tested from quarter 2 of this reporting period. Based on the results provided in **Table 7.18** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 780.13); • pH (average 7.32) consistent throughout this reporting period; • EC (average 2086 µS/cm) remains stable for fresh to brackish water; • SO4 (average 759.3 mg/L) is consistent this reporting period; • Pb (average 0.0002 mg/L) and Zn (average 1.13 mg/L) were both generally consistent and reflect low to non-detectable. • Cu (0.01 mg/L) reflected low to non-detectable; No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.

Figure 3.5.6A – Bioreactor Groundwater Levels – MB1 to MB10 and ED3B

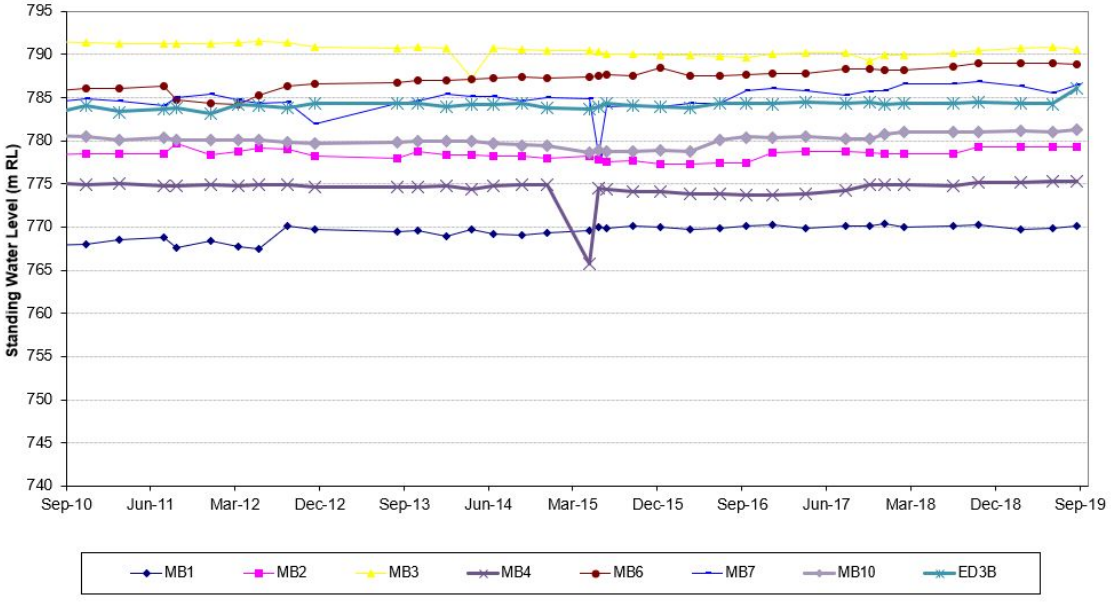


Figure 3.5.6B – Groundwater Levels – WM1 to WM6

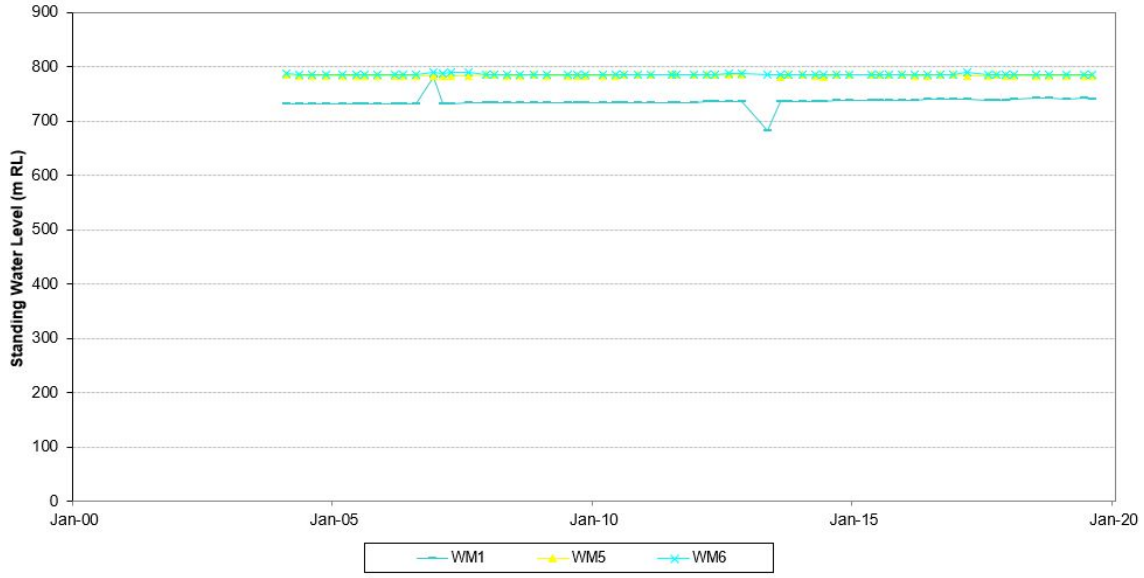
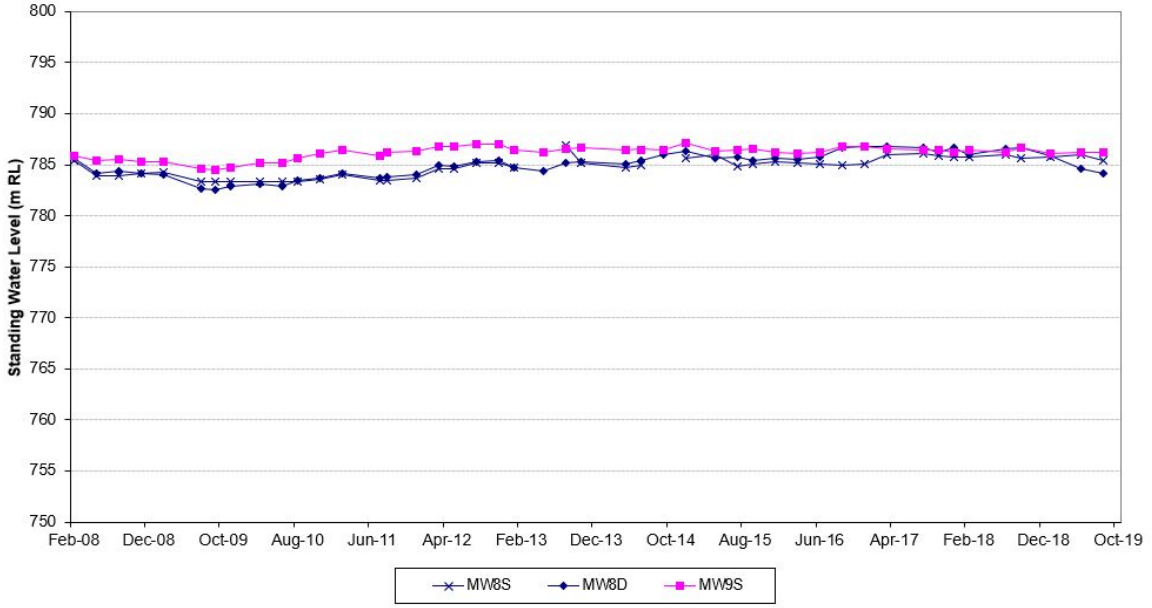


Figure 3.5.6C – Groundwater Levels – MW8S to MW9S



3.5.7 MBT Groundwater Monitoring Results

The groundwater monitoring well was initially installed on 25 January 2017, immediately down gradient of the leachate aeration dam to enable the monitoring and detection of any leachate migration from the dam to the underlying groundwater.

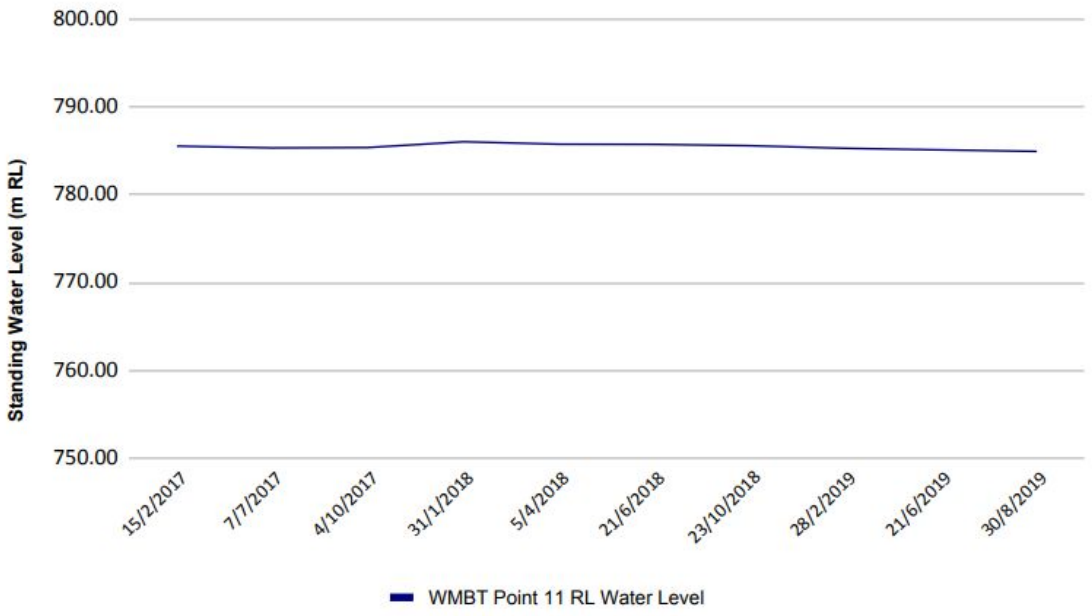
Following the installation of the monitoring well, a baseline monitoring round was conducted in February 2017. The baseline monitoring is to classify the general characteristics of groundwater encountered at the site prior to operations. Four quarterly groundwater quality monitoring at WMBT Point 11 was undertaken in this reporting period as required by the EPL. Results are summarised in **Table 3.5.7** below.

The key quality indicators selected are the same as listed in section 3.5.6 to detect any pollutants in groundwater samples are the same as those deemed characteristic for leachate. These key quality indicators are depicted in the trend graphs **Figures 3.5.6D - 3.5.6U** (refer to **Appendix 5**). In addition to water quality monitoring, standing water levels (SWL) of the wells are also measured in metres relative to sea level (m RL) and are depicted in the subsequent graph **Figure 3.5.7.**

Table 3.5.7: MBT Groundwater Monitoring Results

Parameter	Results/Discussion
WMBT Point 11	WMBT Point 11 is located down gradient of the MBT leachate aeration dam. Based on the results provided in **Table 12** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 785.25 m RL) was consistent with the previous reporting period of 785.75 m RL. The minimum level measured was 784.76 m RL and maximum level measured was 785.61 m RL. • pH (average 7.7) and is slightly alkaline, which is consistent with previous reporting period; • EC (average 13625 µS/cm) is slightly lower but generally consistent with previous reporting period readings (average 13875 µS/cm); • SO_4 (average 668.0 mg/L) is consistent throughout this reporting period and lower than the average of the previous period (541.5 mg/L); • Pb and Zn (average 0.0002 mg/L and 0.0305 mg/L respectively) are generally consistent with previous period (average 0.00045 mg/L and 0.03775 mg/L respectively) with slight decrease; • NH_3 (average 0.175 mg/L) is slightly higher than the previous reporting periods (average 0.1 mg/L), this is believed to be normal as the baseline reading for ammonia was 0.2 mg/L; • TOC (13 mg/L) is slightly lower than the previous reporting period (14 mg/L). All trends at this location indicate consistent concentration and there is no indication of contamination from leachate or MBT activities. No significant variations or anomalies were recorded for any analyte tested during this monitoring period.

Figure 3.5.7 - WMBT Groundwater Levels - WMBT Point 11



3.5.8 Bioreactor Piezometers Level Monitoring Results

Measurements for groundwater standing water levels (SWL) in the vicinity of the Bioreactor were undertaken at 6 piezometers around the landfill void. Each location consists of a shallow (reference A) and deep (reference B) piezometer.

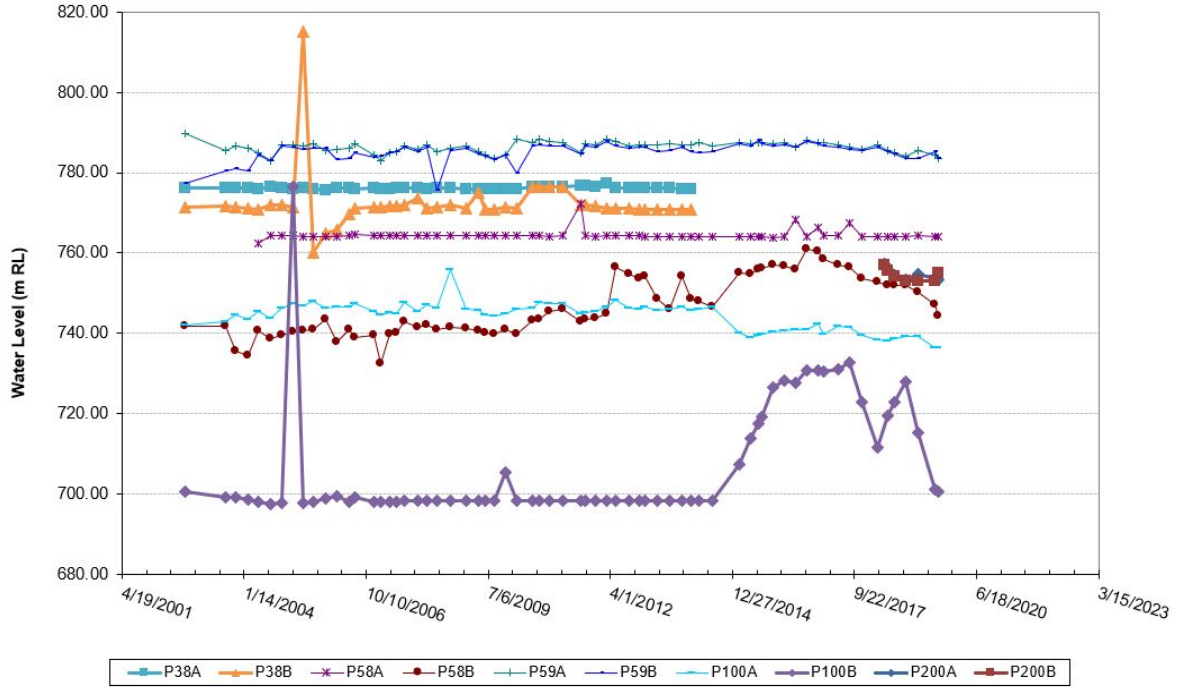
The findings of the monitoring are summarised in **Table 3.5.8** below and detailed quarterly levels are provided in **Tables 8.1 to 8.5** (refer to **Appendix 4**)

Table 3.5.8 Bioreactor Piezometers Level Monitoring Results

Parameter	Results/Discussion
P38A & P38B	P38 is located east of the void. Standing water levels are presented in **Table 8.1** (refer to **Appendix 4**). This monitoring location was deemed unsafe to access due to a rock slip on the Southern side of the Bioreactor void wall in 2010. An application to remove this monitoring point from the licence was submitted to the EPA and rejected during this reporting period. Following this decision, Veolia engaged a geotechnical consultant and earthmoving company to provide safe access. Monitoring re-commenced immediately. SWL in P38A (shallow aquifer)) indicated a stable standing water level ranging from 776 metres Relative Level (m RL) to 776.07 RL during this reporting period. SWL in P38B (deep) ranged from 770.71 m RL to 771.81 m RL in this reporting period, consistent with previous reporting periods.

P200A & P200B	P200 is located east of the void. Standing water levels are presented in **Table 8.2** (refer to **Appendix 4**). SWL in P200A (shallow) showed a range of 753.34 m RL to 754.86 m RL and is stable. SWL in P200B (deep) showed a range of 752.95 m RL to 755 m RL and is stable.
P58A & P58B	P58 is located west of the void. Standing water levels are presented in **Table 8.3** (refer to **Appendix 4**). SWL in P58A (shallow) showed a range of 763.95 m RL to 764.25 m RL and is stable. SWL in P58B (deep) is similar to previous reporting period fluctuating between 744.25 m RL and 751.99 m RL.
P59A & P59B	P59 is located west of the void and to the south of P58. Standing water levels are presented in **Table 8.4** (refer to **Appendix 4**). SWL in P59A (shallow) ranged from 783.60 m RL to 785.50 m RL in this reporting period, consistent with previous reporting period. SWL in P59B (deep) ranged between 783.60 m RL and 785.20 m RL, consistent with previous reporting period.
P100A & P100B	P100 is located northeast of the void. Standing water levels are presented in **Table 8.5** (refer to **Appendix 4**). SWL in P100A (shallow) is consistent with the previous reporting period averaging between 736.33 m RL to 739.25 m RL. P100B (deep) averaged between 700.63 m RL and 727.83 m RL which indicates water above the base level of 698.29 m RL which has been recorded in previous periods. This increase is likely due to the compaction of landfill waste at higher levels within the void preventing water ingress.

Figure 3.5.8 – Piezometer Standing Water Levels – P38 to P200



3.5.9 Bioreactor Evaporation Dam Volume Monitoring Results

The Evaporation Dam 3 (ED3) system comprises extracted (and treated) leachate from the landfill void and captured stormwater. The water volume has to be maintained in all Evaporation Dam 3 (Lagoon systems) below the freeboard level at all times.

Additional monitoring is conducted for other dams managed by Veolia. Note, water levels for ED1N (Mine legacy water) began when the licence condition was established.

Water levels are taken monthly as detailed in **Table 3.5.9**, which shows that the dam Relative Levels (RL) of ED3S, ED3S-S and ED3N Lagoon 4 remained below their respective freeboard levels at all times during the reporting period.

Table 3.5.9: Bioreactor Evaporation Dam Volume Monitoring Results (RLs AHD)

	ED3 SOUTH		ED3 NORTH				LTP Permeate	ED1 (Legacy)
Date	ED3S	ED3S-S	ED3N Lagoon 1	ED3N Lagoon 2	ED3N Lagoon 3	ED3N Lagoon 4	ED1 Coffer Dam	ED1N
	RL	RL	RL	RL	RL	RL		
26/09/2018	790.59	792.86	790.17	790.82	789.92	791.00	786.53	N/A
29/10/2018	790.53	792.77	790.82	790.95	789.84	790.99	786.53	N/A
26/11/2018	790.51	792.67	790.71	791.14	789.73	791.07	786.53	N/A

17/12/2018	790.55	792.69	790.74	791.23	789.76	791.14	786.53	N/A
25/1/2019	790.53	792.5	790.54	791.06	789.74	791.00	786.53	N/A
25/2/2019	790.49	792.36	790.38	790.97	789.89	790.92	786.53	N/A
27/3/2019	790.57	792.26	790.30	790.91	789.89	790.97	786.53	N/A
30/4/2019	790.58	792.18	790.22	790.92	789.95	791.09	786.53	786.38
30/5/2019	790.6	792.14	790.18	790.95	790.01	791.11	786.62	785.80
25/6/2019	790.72	792.13	790.19	791.01	790.11	791.16	786.75	785.86
26/7/2019	790.75	792.18	790.15	791.00	790.12	791.17	786.83	785.82
26/8/2019	790.8	792.17	790.09	790.95	790.10	791.13	786.88	785.77
Minimum	790.49	792.13	790.09	790.82	789.73	790.92	786.53	785.77
Mean	790.60	792.41	790.37	790.99	789.92	791.06	786.61	785.93
Maximum	790.8	792.86	790.82	791.23	790.12	791.17	786.88	786.38
Maximum water level allowed **(with 0.5m freeboard to external dam walls)**	**791.2**	**793.6**	**791.2**	**791.2**	**791.2**	**791.2**	**789.92**	**788.8**

Note: Freeboard exceedance by 3cm in ED3N Lagoon 2 in the survey conducted in 17/12/2019. During 27/11/2018 to 16/12/2018, the Woodlawn weather station recorded 102mm of rain (49 mm from 14/12/2018 to 16/12/2018). This is the preliminary reason for the water level exceeded the 0.5 m freeboard. Upon receiving the survey data, water was pumped to the larger ED3N Lagoon 4. No leachate has been pumped into ED3N system since 19/07/2019.

3.5.10 Extraction of Water

Table 3.5.10.1 below provides the volume of the water extracted from the Willeroo Borefield. Water Access Licence (Veolia Environmental Services (Aust) Pty Ltd) 28983 Lachlan Fold Belt Mdb Groundwater Source

Table 3.5.10.1: Willeroo Bore Field Extraction Volume - 600ML Annual Allocation

Month	Willeroo Bore Field Usage Volume p/month kL
Sep - 18	9377
Oct -18	18971
Nov - 18	37082
Dec - 18	40930
Jan - 19	38501
Feb - 19	38544
Mar - 19	49572
Apr - 19	14030

May - 19	49037
Jun - 19	34503
Jul - 19	38405
Aug -19	34570
TOTAL	**403522**

3.5.10.1 Leachate Extraction and Treatment from Bioreactor Landfill

Leachate extracted from the Bioreactor for the water year (1 July 2018 to 30 June 19) was 72,261 m^3. It is treated through the existing Leachate Treatment Plant before being transferred to the ED3 dams for evaporation. For the monthly ED3 lagoon system Relative Levels refer to **Table 3.5.9**.

3.6 Waste

3.6.1 Waste Conformance

All waste received as part of the expanded operations was in accordance with the waste types permitted in the Bioreactor PA and EPL. Acceptance and screening of waste prior to final disposal was in accordance with the requirements of the Veolia Control of Non-Conforming Waste Procedure and NSW Resource Recovery Screening & Recording of Waste Procedure to ensure only conforming waste is received. Visual assessments of incoming waste were conducted by operators, as tipping/unloading occurred on the landfill surface.

No records of non-conforming waste were recorded during this reporting period. Incoming waste and the waste was received as per the Condition 20, Schedule 5 of project approval 10_0012.

3.6.2 Bioreactor & IMF Waste Volume Monitoring

In July 2019, the DPIE approved an increase in regional waste delivered to the Woodlawn Bioreactor from 90,000 tonnes per annum (tpa) to 125,000 tpa pursuant to Condition 6, Schedule 3 of MP 10_0012. This is reflected in **Tables 3.6.2.1 and 3.6.2.4**.

The Bioreactor PA stipulates that the expanded operations must not exceed the maximum annual input rates in the following **Tables 3.6.2.1 and 3.6.2.2**.

Table 3.6.2.1: Maximum annual input rates for Woodlawn Bioreactor

Putrescible waste received by rail from Sydney	Received as residual waste from Woodlawn AWT	Putrescible regional waste received by road
900,000 tpa	100,000 tpa	125,000 tpa 5,000 tpa MBT

All waste received is recorded in the Systems, Applications and Products in Data Processing (SAP) software. SAP also records vehicle registrations, the date and time of delivery, the gross and tare weight of the vehicle, as well as the nature and origin of the waste delivered by each contractor.

Table 3.6.2.2: Maximum annual input rates for Crisps Creek IMF

Received by Rail from Sydney	Received by rail from Sydney for processing at the Woodlawn MBT
900,000 tpa	280,000 tpa

The data provided by SAP is used to track and monitor the amount of incoming waste in accordance with the limits of the Bioreactor PA. **Table 3.6.2.3** indicates that the Woodlawn Bioreactor has remained within the annual waste limit stipulated within the Bioreactor PA.

Table 3.6.2.3: Incoming waste tonnage via rail and road per month for Woodlawn Bioreactor, MBT facility and Crisps Creek (IMF) during 2018/2019 reporting period

Monitoring Period	Incoming Waste Received at the Woodlawn Bioreactor Via Crisps Creek IMF (tonnes)	Incoming Waste Received at the MBT Via Crisps Creek IMF (tonnes)	Incoming Waste Volumes received at the Woodlawn Bioreactor as Residual from MBT (tonnes) (Including MWOO)	Incoming regional waste received at the Woodlawn Bioreactor by road (tonnes)
Sep - 18	42,904.820	11,398.790	8,257.620	7,911.450
Oct -18	55,338.580	11,874.640	8,091.520	8,647.540
Nov - 18	54,587.310	12,335.360	11,197.000	9,822.930
Dec - 18	55,155.830	11,754.472	9,145.860	7,415.140
Jan - 19	52,832.588	11,489.960	8,714.420	9,656.730
Feb - 19	50,457.020	10,749.710	12,158.760	9,683.660
Mar - 19	50,912.840	10,744.410	9,729.110	8,567.840
Apr - 19	53,395.520	11,477.530	9,671.560	8,910.500
May - 19	56,117.310	9,608.020	9,026.880	9,582.620
Jun - 19	44,443.740	10,957.800	9,772.040	8,468.220
Jul - 19	56,064.110	12,632.100	9,563.360	11,138.280
Aug -19	51,515.280	11,630.350	9,914.880	11,637.930
TOTAL	**623,724.95**	**136,653.14**	**115,243.01**	**111,442.84**

Table 3.6.2.4 outlines the forecasted tonnage (tpa) for the following reporting period.

Table 3.6.2.4: Forecast waste tonnages for the 2019/2020 reporting period

Reporting period	Forecast Waste Received at the Woodlawn Bioreactor Via Crisps Creek IMF (tonnes)	Forecast Waste Received at the MBT Via Crisps Creek IMF (tonnes)	Forecast Waste received residual as waste from MBT (tonnes)	Forecast regional waste received by road (tonnes)
2019/20	650,000 tpa	143,000 tpa	80,000 tpa	130,000 tpa

Note: With the ban imposed by the NSW EPA in October 2018 for the application of MWOO to land, Veolia is currently investigating other opportunities to utilise the product elsewhere within the Eco-Precinct. The forecast disposal of Mixed Waste Organic Outputs Order (MWOO) landfilled into the Woodlawn Bioreactor as per EPA Gazette is 18,096 tonnes from September 2019 to the end of February 2020. This is based on 3,016 tonnes per month.

3.6.3 MBT Waste Volume Monitoring

3.6.3.1 Waste Acceptance and Screening

Waste is screened at the Clyde Transfer Terminal and Banksmeadow Transfer Terminal sites before the loading of waste into containers for the transportation to the Facility. If any waste is detected that is not acceptable through the screening process, it is rejected and cannot be loaded into the containers.

Once received at the facility, the operator of the grapple crane inspects the waste as it is discharged from the vehicle to check for non-conforming waste. In the event that any easily extractable, bulk recyclable waste is detected, it is separated from the general waste stream and set aside for removal from the facility to another facility licensed to receive this type of waste for processing or recycling. This includes waste types identified as less desirable to processing operations. No records of non-conforming waste were recorded during this reporting period. marea said stop

3.6.3.2 Waste Volume Monitoring

Schedule 3, Condition 2 of the MBT PA stipulates that the facility must not receive or process more than 240,000 TPA of mixed waste and 40,000 TPA of garden waste. Under the facility operations (Stage 1), the site is approved to accept and treat 184,000 TPA, which includes 144,000 TPA of mixed waste and 40,000 TPA of garden waste. The WRVCP details the Waste Monitoring Program used to monitor and record incoming waste at the fFacility. The performance measures for the waste volumes are detailed in **Table 3.6.3.2A**.

Table 3.6.3.2A: Stage 1 Waste Parameters and Performance Measures

Parameter	Performance Measure	Standards	Statutory Requirement
Mixed waste	240,000 tpa	NSW EPA Waste Classification Guidelines	Schedule 3, Condition 2
Garden waste	40,000 tpa		

Veolia utilises the data provided by PWS to track and monitor the amount of incoming waste transported by rail to Crisps Creek Intermodal Facility and transferred to the MBT Facility. **Table 3.6.3.2B** indicates that the MBT Facility has remained within the annual waste limit stipulated within the MBT PA. Veolia shall continue to monitor incoming waste tonnages at the facility for the following operational year.

Table 3.6.3.2B: Incoming Waste Tonnages during Operations (Sep 2018 – Aug 2019) at MBT

Source	Waste Type	Total TPA
Banksmeadow Transfer Terminal	Mixed Waste	51,510.412
Clyde Transfer Terminal	Mixed Waste	85,142.730
	TOTAL	**136,653.142**

During the reporting period, the NSW EPA revoked the Mixed Waste Organic Outputs Order (MWOO) and exemption, preventing the application of MBT's MWOO to the degraded Woodlawn Mine site, which was the intended use of the product. All MWOO produced from the MBT was landfilled in the Bioreactor. 28,912 tonnes of MWOO was landfilled during the 2018-19 reporting period.

3.7 Pests and Vermin

The management of pests and vermin at the Bioreactor and IMF were maintained through preventative and responsive mitigation measures as per the Landscaping Management Plan in the LEMP. Such measures included:

- Inspection of the site by a registered pest controller every two months;
- Weekly Site inspections to record site conditions such as evidence of vermin and pests; and
- Placement of rodent bait stations at various locations around the site

No pest and/or vermin complaints or management issues were reported during the operation of the Bioreactor during the reporting period.

3.8 Rehabilitation

Rehabilitation of the mine void through landfilling is a continuous process. Final rehabilitation works shall be completed in accordance with the closure and rehabilitation plan. The areas to be rehabilitated include:

- The Bioreactor
- Former Mineral Processing Area - Plant Area
- Evaporation Dam 3
- Evaporation Dam 1
- Power Station; and
- Office and car park areas

In 2008 to 2010, Veolia commissioned Golder Associates Pty Ltd to do a detailed contamination assessment of the Former Mineral Processing Area. Veolia post this assessment transported the main contaminants to the tailings dam area, which included the lead reverse tailings dam, which was located in the southern part. Landscaping and reshaping the current area will begin post construction activities by Heron Resources.

Veolia will consult with EPA on the final rehabilitation plans and plant species to be adopted within the rehabilitation areas, once a suitable rehabilitation design is selected and additional detail is developed.

Other areas of the mine site are subject to a current development approval by Heron Resources Limited Pty Ltd (Heron). Under the approved development, Heron have begun underground mining and reprocessing over various areas of the mine site. Rehabilitation of other areas, will be the responsibility as identified in Heron Mining Operations Plan (MOP).

On the ongoing basis, Veolia has undertaken vegetation monitoring and tree planting programs at the Eco-Precinct site. Tree planting aims to increase native species, which in turn creates new habitats for native fauna. Tree planting programs may include the following activities:

- Identification of suitable locations for planting;
- Assessment of existing vegetation and trees;
- Purchase of native saplings;
- Planting of saplings, generally with local volunteer groups
- Funding of tree planting program
- Installation of sapling tubes / tree guards
- Application of fertiliser and/or mulch as required

Extensive amount of tree planting was conducted during the reporting period, located downstream of the bioreactor on Crisps Creek, revegetation of the water course was conducted. Longer term rehabilitation process will be dependant on the future of the Mixed Waste Organic Output produced from the MBT. The along with the general MWOO exemption and order, the Woodlawn site specific exemption was revoked by the NSW EPA in October 2018, preventing the application of MWOO to the degraded areas of the Woodlawn mine site. Veolia will be intended to liaise with the NSW EPA on the future of the MBT and the

type and quality of organic outputs. Consideration by Veolia on a new site specific exemption for the tailings dams is being explored. At the end of the reporting year, all MWOO produced by the MBT is being landfilled at the bioreactor.

4 Environmental Performance

The environmental performance of the expanded operations was assessed through the results of environmental monitoring, internal inspections, as well as external environmental audits.

4.1 Audit Findings

4.1.1 Bioreactor & IMF Non-Compliances and Corrective Actions

An Independent Environmental Audit (IEA) carried out for the Bioreactor and IMF in the previous reporting period (2017-2018) determined non-compliances against the PA. These are summarised in **Table 4.1.1** below, together with the status of corrective actions to resolve/manage these non-compliances.

Table 4.1.1: 2017/2018 Audit Findings and Corrective Actions

Item No.	Criteria	Audit Finding	Target/ Action Date	2018-19 Action Status
Community Liaison Committee	Schedule 7, Condition 2 of Project Approval 10_0012	Verify that all current members of the CLC have been endorsed by the DPIE	Seek endorsement from DPIE	Completed 22/05/2018
Train movements at IMF – Veolia received an official caution on the 13/07/18	Schedule 5, Condition 20 of Project Approval 10_0012	Clarify with DPIE whether approval is required for continued splitting of the second train each day at Goulburn into two movements to the IMF until the Tarago rail upgrade works are complete	Veolia wrote to DPIE in June 2018 outlining the proposed long term strategy of the Tarago Loop extension. DPIE responded to Veolia with an Official Caution in July 2018. DPIE noted the Tarago Rail Siding development project being carried out by Transport for NSW.	Tarago Loop Extension works are expected to be commissioned in November 2019. Once commissioned there will no longer be a need to split Train 2. At this point in time the entire Train 2 will access the IMF at around 11:45am and depart at 4.30pm. Note: splitting of train has not caused any operational interruptions or environmental harm and no complaints have been received at the CC IMF.

4.1.2 MBT Non-Compliances and Corrective Actions

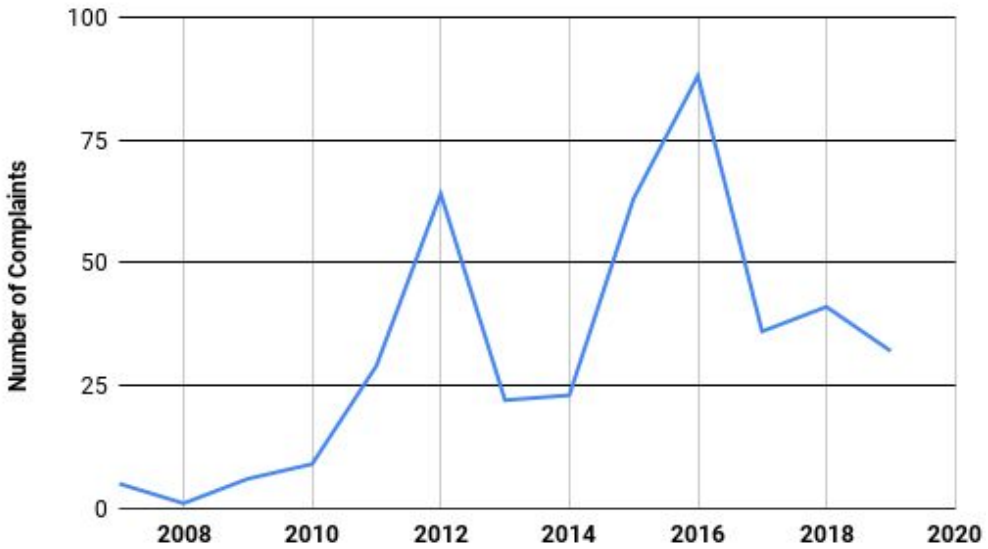
The first Independent Environmental Audit (IEA) was carried out for the MBT, covering the period from the issue of the Notice of Modification (June 2014) to the date of the Audit, 21 March 2019. It identified three (3) non-compliances all of which had no recommended actions as they had occurred prior to, or during construction, and corrective actions had already been carried out at the time of the occurrence, or shortly thereafter. However, opportunities for improvement were identified and are detailed in **Tables 5.1.1 and 5.1.2** of section 5.1 of this AEMR.

4.2 Complaints

Veolia operates a telephone complaints line that enables the receipt of complaints from members of the public, as required under the Bioreactor and MBTPAs. Other complaints that were received off site during this reporting period were logged by the EPA. Veolia recorded a total of 32 complaints, relating only to odour, during this reporting period. Upon receipt of an odour complaint, Veolia recorded all the details into the site complaints register and Site Management followed up with the complainant to determine the nature (and scale) of the odour.

In order to proactively engage in effective odour management, Veolia participates in regular community liaisons to encourage and gather feedback from the local residents regarding the odour performance at the Bioreactor, IMF and MBT. These liaisons are facilitated through the Community Liaison Committee (CLC) to voice their concerns with the Bioreactor site. Community concerns may also be raised at meetings attended by local community representatives, committee members/executives from the Tarago & District Progress Association Inc. (TADPAI) and local councilors from Goulburn Mulwaree Council. Veolia continues to attend such meetings and implement activities to eliminate and minimise odour sources at the site based on annual odour audit recommendations.

Figure 4.2: Odour Complaints Trend



5 Conclusion

Based on the results of monitoring undertaken at the Bioreactor, IMF and MBT sites, in accordance with the respective PA conditions and EPLs, the overall environmental performance of the Woodlawn Eco-Precinct in this reporting period can be demonstrated to be well managed.

5.1 Improvement Actions

A number of improvements to the environmental management of the Woodlawn Eco-Precinct have been implemented during this reporting period. Refer to **Table 5.1.1**. These improvements were identified as a result of the recommendations and findings identified by independent environmental audits, regulatory inspections as well as Veolia's internal assurance program.

Table 5.1.1: Improvements Implemented 2018/2019 Period

Item No.	Implemented Improvements	Status
1.	Groundwater and surface water assessment around ED1 as part of the Evaporation Dam Seepage Management Strategy for ED1	Installation of new monitoring bores where installed downstream of ED1. These have been included in the Environmental Protection Licence 11436.
2.	Construct a series of buffer/collection ponds in different catchment areas around the void as part of the new stormwater management in the Void	Construction of new stormwater system started in 2018. Works are ongoing and will be completed by December 2019.
3.	Leachate minimisation strategy	Regrading void benches, new pipe work and pumps were installed during the reporting period. Waste profiling continues to be a core operational strategy to manage and divert stormwater to minimise the production of leachate. Veolia's Leachate Treatment Plant was also commissioned during the reporting period.
4.	Commission and operation of the new Leachate Treatment Plant to extract and treat leachate more efficiently	Commission in October 2018, and processing proving period underway. Monthly reporting provided to EPA outlining progress and performance.
5.	Further assessment of the west side of the Bioreactor to further improve the groundwater monitoring network as WM4 was decommissioned during the previous reporting period	New monitoring location assessed by Earth2Water. Drilling contractor and program will be conducted in the next reporting period (October 2019)
6.	MBT odour control system humidification recirculation system to improve moisturisation of biofilter medium and reduce wastewater generation	The odour control humidification recirculation system was completed (January 2019). The modified system was able to recirculate process

		water for odour control's humidification. It has also reduced the wastewater generation on site.
7.	Install and commissioning additional aerator inside of MBT aeration dam to improve leachate quality and reduce potential odour	The additional aerator was installed and commissioned (March, 2019).
8.	In consultation with the NSW EPA, re-establish site specific exemption at Woodlawn Eco-Precinct and Woodlawn Mine for the ongoing use of MWOO	Veolia actively sought clarification during the reporting period from the EPA about the future usage options of MWOO. By the end of the reporting period, Veolia had not received clarification from the EPA.
9.	Veolia implemented a monthly check into its integrated management system that acts as a prompt to check the functionality of the website links, ensuring that all the required documents are available and continually maintained on the website for interested parties to access.	Process to check the functionality of the links has been implemented and is carried out on a monthly basis.

Veolia intends to improve their community and environmental performance in the next reporting period by implementing the following improvements proposed for the 2019/2020 as outlined in **Table 5.1.2**.

Table 5.1.2: Improvements Proposed for 2019/2020 Period

Item No.	Proposed Improvements
1.	Veolia should continue the current community liaison program (including the Woodlawn Community Liaison Committee and the Tarago and District Progress Association Inc.) to notify affected/nearby residents of works and address concerns.
2.	Veolia should continue to improve landfill gas capture, management of fugitive emission and waste placement of the Bioreactor, including the continuous monitoring of performance. Re develop the Woodlawn infrastructure Plan for 2020.
3.	Veolia will continue to develop and optimise the operation of the Woodlawn Leachate Treatment plant, achieving consistent treatment target of 4l/sec.
4.	Veolia to engage a suitably qualified person to revise the site water balance to provide a more accurate assessment of how the leachate / water management system is tracking against its key objectives given that many of the assumptions from the 2017 water balance have changed. Water Balance to encompass Heron Resources water management objectives and ensure that the updated water balance is more accurate and continues to monitor all leachate / water flows around the site. (ED1 evaporation, ED3N Lagoon system evaporation plan)
5.	Veolia will review evaporation systems of ED1 mine legacy water and asses capabilities of the existing system and modify as required to meet the requirements of the PAs.
6.	Veolia will continue to seek measures that will reduce the volume of leachate produced including the containment of runoff from the existing void batters/benches.

7.	Veolia will review the complaints handling procedure and associated records to ensure that the information required under Condition M5.2, including not only Odour related complaints but all potential types of complaints, is fully captured and recorded.
8.	Veolia will rReview the scope for Woodlawn Bioreactor odour audits ensuring that the Woodlawn MBT is assessed as a potential source for odour.
9.	In consultation with the NSW EPA, Veolia will re-establish site specific exemption at Woodlawn Eco-Precinct and Woodlawn Mine for the ongoing use of MWOO.

Reference and Related Documents

Document Name
Veolia Environmental Services Environment Assessment: Woodlawn Expansion Project Volume 1 – Main Report, URS Australia Pty Ltd, August 2010
Veolia Environmental Services Environment Assessment: Woodlawn Expansion Project Volume 2 – Appendices, URS Australia Pty Ltd, August 2010
Waste Classification Guidelines Part 1: Classifying Waste, NSW Environment Protection Authority, November 2014;
Environmental Guidelines: Solid Waste Landfills Second Edition, April 2016.
SLR Consulting Condition 28 Noise Audit Woodlawn Mechanical Biological Treatment Facility, November 2017
Ramboll 2018 Independent Environmental Audit Woodlawn Bioreactor and Crisps Creek Intermodal Facility May 2018 Ref: 318000403
Ramboll 2019 Independent Environmental Audit Woodlawn Veolia MBT Facility May 2019 Ref: 318000689

Appendices

Appendix 1 Eco-Precinct Location Plan

Appendix 2 Site Location Plan

Appendix 3 Eco-Precinct Boundary Map

Appendix 4 Tabulated Monitoring Data

Appendix 5 Figures

Appendix 6 Complaints Register