Annual Environmental Management Report 2019-20

For Woodlawn Waste Expansion Project & Woodlawn Alternative Waste Technology Project

December 2020

Quality Information

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Contents

Definitions/Abbreviations

AEMR	Annual Environmental Management Report
BTT	Banksmeadow Transfer Terminal
CoR	Chain of Responsibility
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
ERP	Emergency Response Plan
IEA	Independent Environmental Audit
IMF	Crisps Creek Intermodal Facility
IOA	Independent Odour Audit
LEMP	Landfill Environment Management Plan
LFG	Landfill Gas
LMP	Leachate Management Plan
LTP	Leachate Treatment Plant
LWMS	Leachate and Water Management System
MBT	Woodlawn Mechanical Biological Facility
MWOO	Mixed Waste Organic Output
MOP	Mining Operations Plan
NMP	Noise Management Plan
NMMP	Noise Monitoring Management Plan
OEMP	Operational Environmental Management Plan (MBT)
PA	Project Approval
POEO	Protection of the Environment Operations Act 1997 (and Regulations)
RRO	Resource Recovery Order
RRE	Resource Recovery Exemption
SWMP	Soil Water and Management Plan
TADPAI	Tarago and District Progress Association Inc
TPA	Tonnes per annum
Veolia	Veolia Australia and New Zealand
WIP	Woodlawn Infrastructure Plan

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 2019-20 reporting period 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 the Woodlawn 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.

This Report covers the period of 9 September 2019 to 8 September 2020.

Part 1 Introduction

1.1 Eco-Precinct Overview

Veolia Australia 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) and Leachate 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

The Bioreactor was the first stage of the Eco-Precinct developed by Veolia and has been in operation since September 2004, with the collection of landfill gas from landfilled waste to extract methane for energy generation commencing in 2008. 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.

Waste is deposited into the Bioreactor and with the use of optimal moisture and temperature conditions, achieves enhanced degradation to produce landfill gas, collected through a vast network of infrastructure within the Bioreactor.

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. Methane is extracted from the landfill gas within the Power Station for conversion and supply as electricity into the energy grid.

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. Local waste from neighboring councils and businesses is transported to the Bioreactor via road.

1.1.2 Crisps Creek Intermodal Facility

The Crisps Creek IMF forms an integral part of the logistical operations of the Eco-Precinct, and is located 8km from the Bioreactor in the township of Tarago, adjacent to the Goulburn- Bombala Railway line.

Waste containers transported from the Sydney region via rail are unloaded and transferred onto road trailers at the IMF for transport to the Bioreactor. The IMF was approved to accept 1,180,000 tpa from Sydney when the Bioreactor was granted expanded operations.

1.1.3 Woodlawn Leachate Treatment Plant (LTP)

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, with the first discharge of treated leachate from the LTP to ED1 Coffer Dam on 26 April 2019.

The LTP facilitates better environmental and operational performance by allowing Veolia to extract and treat greater volumes of leachate from the Bioreactor and minimise and reduce the generation of odour, and enable more efficient gas extraction maximizing the waste to energy benefits of the Bioreactor.

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.

1.1.4 Woodlawn Mechanical Biological Treatment Facility (MBT)

The MBT Facility which is located to the north-west of the Bioreactor was approved in 2007 to receive up to 280,000 tpa of mixed waste (240,000 tpa of mixed waste and 40,000 tpa of garden waste). Changes to site layout, technology and operating hours were approved in 2014. The first stage of the MBT completed commissioning in March 2017 and commenced operation in July 2017. Currently approximately 143,000 tpa of mixed waste is accepted from an amalgamation of councils in the Sydney Metropolitan Area, namely Southern Sydney and Northern Sydney Region of Councils.

The incoming waste is processed to extract recyclable materials or produce compost. The compost is matured on site with the intention to rehabilitate the remnant Woodlawn mine. A ban imposed by the NSW Environment Protection Authority (EPA) in October 2018 forbids the application to land of this type of material. Consequently, Veolia was granted a Resource Recovery Order and Exemption permitting Veolia to trial the use of Woodlawn organic outputs in the rehabilitation of tailings dams at the Heron Resources, Woodlawn Zinc Copper mine from 14 May 2020. The trial is due to commence during the next reporting period.

In June 2019, Veolia commissioned a 2.3MW Solar Farm adjacent to the MBT Facility. The electricity generated from this facility is 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 Key Personnel

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1.3 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 1.3.1** and **Table 1.3.2** below.

Table 1.3.1 **Bioreactor and IMF conditions relevant for the preparation of this AEMR**

Schedule 7 - Environmental Management, Reporting and Auditing	
Condition	**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; **b)** 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; **c)** identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance; **d)** identify any trends in the monitoring data over the life of the Project; and **e)** describe what measures will be implemented over the next year to improve the environmental performance of the Project.

Table 1.3.2 **MBT conditions relevant for the preparation of this AEMR**

Schedule 4 - Environmental Management, Reporting and Auditing	
Condition	**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: **a)** identify the standards and performance measures that apply to the development; **b)** include a summary of the complaints received during the past year, and compare this to the complaints received in previous years; **c)** include a summary of the monitoring results for the development during the past year; **d)** include an analysis of these monitoring results against the relevant: ● Impact assessment criteria; ● Monitoring results from previous years; and

	• Predictions in the EIS; **e)** identify any trends in the monitoring results over the life of the development; **f)** identify any non-compliance during the previous year; and **g)** describe what actions were, or are being taken to ensure compliance.

Table 1.3.3 summarises the list of environmental approvals in place for the Bioreactor, IMF and MBT.

***Table 1.3.3* 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) and subsequent modifications.	10_0012
Project Approval: *Woodlawn Alternative Waste Technology Project* (issued by DPIE) and subsequent modifications.	PA 06_0239
Special (Crown & Private Lands) Lease 20 (SML 20) (issued by the Department of Primary Industries)	SML 20
Woodlawn Bioreactor Environment Protection Licence (issued by EPA)	11436
Crisps Creek IMF Environment Protection Licence (issued by EPA)	11455
Woodlawn MBT Environment Protection Licence (issued by EPA)	20476
Woodlawn Organic Outputs Acid Mine Tailings Trial Exemption 2020 (issued by EPA)	20476
Woodlawn Organic Outputs Acid Mine Tailings Trial Order 2020 (issued by EPA)	20476
Water Access Licence: Willeroo Borefield (issued by Water NSW)	40WA411642

1.4 Responsibilities

- Environmental monitoring for the Bioreactor, IMF and MBT was undertaken and/or supervised by Ark Du (Landfill Engineer), Marea Rakete (Woodlawn Environmental Officer) and Christian Chang (MBT Process Engineer).
- Environmental reporting for the Bioreactor, IMF and MBT was undertaken and/or supervised by Marea Rakete (Woodlawn Environmental Officer), Christian Chang (MBT Process Engineer) and Tobias Stanley (Woodlawn Bioreactor and Bioenergy Manager).
- 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 to conduct the annual Independent Odour Audit for the Bioreactor, IMF and MBT during the reporting period. The audit team was approved by the DPIE.
- SLR Consulting Australia Pty Ltd (SLR) was appointed and endorsed by the DPIE to conduct the annual Independent Leachate and Water Management System Audit for the Bioreactor, IMF and MBT during the reporting period. The audit team was approved by the DPIE.

Part 2 Environmental Monitoring and Management

2.1 Environmental Management

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 2.1.1**, **Table 2.1.2** and **Table 2.1.3** and discussed in the subsections below.

Table 2.1.1 **Bioreactor Monitoring Plan**

PA/EMP Reference	Type of Monitoring	Frequency	Commentary
Schedule 4, Condition 3	Site Inspection	Daily	Ongoing basis
Schedule 4, Condition 7	Odour Audit	Annually	Condition satisfied , independent odour audit conducted February 2020
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 2.1.2 **Crisps Creek IMF Monitoring Requirements**

PA/EMP Reference	Type of Monitoring	Frequency	Commentary
Schedule 5, Condition 5	Litter control	Daily	Ongoing basis
Schedule 5 Condition 6/ Pest ,Vermin & Noxious Weed Management Plan	Site Inspections	Weekly housekeeping	Ongoing basis
Schedule 5, Condition 9	Odour Audit	Annually	Condition satisfied , independent odour audit conducted February 2020
Schedule 5, Condition 15	Noise Monitoring	As required	Not triggered

Table 2.1.3 **MBT Monitoring Requirements**

PA/EMP 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
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

2.2 Environmental Performance Measurement

Based on the risk predictions in the environmental assessments undertaken for the 3 facilities, the implemented control measures described in the EMPs have become the criteria to determine the environmental performance of the respective operations. These are summarised in **Table 2.2.1.**

***Table 2.2.1* Performance Criteria**

Environmental Parameter	Issue	Risk	Control Measure(s)
Air quality (dust and odour)	Emission of air pollutants and odour above the EPA guidelines.	Low level of risk for MBT based on EIS modelling Large buffer distance between the MBT, Bioreactor and sensitive receptors Moderate - High risk for IMF and Bioreactor 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 Systems LTP treating all leachate extracted from the void
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
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 existing groundwater monitoring network and scheduled to mitigate any risk from dam leakage Stormwater management system
Groundwater	Contamination of groundwater.	Possible without control measures, however unlikely due to the use of leachate barrier systems and existing Groundwater Management Scheme.	
Noise	Increased noise impacts above the EPA guidelines.	Rare due to the large buffer distance between the	In the event a noise complaint is received, noise

	Impacts on local residents.	Bioreactor sensitive receivers.	monitoring is carried out at the site All waste processing carried out indoors at MBT Facility Permitted Operational Hours
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
Traffic and transport	Significant impacts on the 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
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 has implemented the Veolia Mulwaree Trust which provides grant funding to a Not for Profit organisation in the local region.
Hazardous Substances	Increased risk to human health and the environment from expansion, especially from dangerous materials and gases.	Rare, as hazardous substances may not be 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) including PIRMP Dangerous Goods and Hazardous Substance Register/Inventory. All hazardous substances stored according to Australian Standards

2.3 Environmental Monitoring

Veolia undertakes an environmental monitoring program in accordance with the requirements in EPL's 11436, 11455 and 20476. Environmental monitoring is completed in accordance with Veolia's environmental monitoring procedures, which specify the relevant standards and methodologies. A monitoring location plan is included in **Appendix 3**.

All monitoring data collected during this reporting period is summarised in **Sections 3.1, 4.1 and 5.1** and tabulated in **Appendix 4**. Graphs of data collected have been developed to assist in the assessment of trends and depict any variability within the monitoring results are presented in **Appendix 5**.

2.3.1 Air Quality

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

All operations and activities were carried out in a manner to minimise dust at the boundary of the premises. These included all access roads from the IMF to the Bioreactor and MBT, 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.

All operational buildings at the Woodlawn MBT facility are enclosed and equipped with Odour Control ducting connected to Biofilters. The Biofilters are inspected on a regular basis in accordance with the O&M manuals to maintain suitable moisture, air flow rate and pressure of the air from the buildings for maximum air quality and odour control.

Veolia operates 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.

2.3.2 Noise

Any noise emissions from the site with the potential to impact on nearby sensitive receivers remain within the criteria specified in the Projects Consent Conditions. Veolia have implemented a number of noise minimising measures below:

- Waste filling operations below the ground levels
- Road Transport – Code of Conduct
- Waste operations within the approved specified hours
- Acoustic enclosures
- Use of hearing protection in restricted areas

Any noise emission incidents or complaints received will be managed and the appropriate corrective actions applied as outlined in the noise monitoring and management protocol within the NMMP.

2.3.3 Soil, Water & Leachate

The processes and management of water quality is documented and implemented on site in accordance with each facility's respective EMP. The EMPs provide 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 and MBT Projects Approvals.

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 collected from the Bioreactor and MBT aeration pond is treated using the 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.

Soil monitoring is not undertaken as there is minimal risk of further contamination from water sources given the degraded nature of the disturbed mine site. However, erosion and sediment control measures have been implemented onsite to ensure storage water storages are protected from contaminated run-off.

2.3.4 Waste Management

All waste received as part of the expanded operations was in accordance with the waste types permitted in the Bioreactor and MBT PA and EPL. Acceptance and screening of waste prior to final disposal was in accordance with the requirements of the Woodlawn Receipt of Non-Conforming Waste Work Instruction 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.

2.3.5 Meteorological Monitoring

Monitoring meteorological data during this reporting period provided an understanding of the ambient air (such as dust and odour) and rainfall conditions at the Eco-Precinct, which was utilised to manage environmental performance, as well as investigate potential impact to nearby sensitive receivers.

An onsite automated meteorological monitoring station was operated during the reporting period to monitor weather conditions representative of the site. 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

The meteorological data for the reporting period is detailed in **Table 11.1** (refer **Appendix 4**).

Part 3 Woodlawn Bioreactor

3.1 Bioreactor Monitoring Results

3.1.1 Bioreactor Landfill Gas Monitoring Results

Gas monitoring is a critical component of the Bioreactor's landfill and subsurface gas monitoring regime. Portable gas monitors (PGM's) and analysers such as the GEM5000 and TDL Landfill Gas Analyser are used to take spot readings, showing landfill conditions moment-to-moment as well as fulfill quarterly surface and subsurface gas monitoring as required by the EPL.

The findings from Landfill gas monitoring required under the Bioreactor PA and EPL is summarised in **Table 3.1.1** below.

***Table 3.1.1* 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 3.1.1.1 below:
Table 3.1.1.1: Subsurface Gas Monitoring Result
<table>
<tr><th rowspan="2">Gas Monitoring Bore ID</th><th colspan="4">Purged Methane Reading (%)</th></tr>
<tr><th>16/01/20</th><th>25/02/20</th><th>20/05/20</th><th>26/08/20</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 monitoring data for each of the subsurface gas monitoring bores is provided in Tables 1.1 to 1.3 (refer Appendix 4).</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 as summarised in Table 3.1.1.2 below:
Table 3.1.1.2: Landfill Gas Extraction Booster Monitoring Results Summary
<table>
<tr><th>Parameter</th><th>Historical Average</th><th>2019/2020 Result</th></tr>
<tr><td>Temperature (°C)</td><td>2.7</td><td>2</td></tr>
<tr><td>Volumetric Flow (m³/s)</td><td>0.67</td><td>1</td></tr>
<tr><td>Carbon Dioxide (%)</td><td>38.8</td><td>38.4</td></tr>
</table>
The detailed data for each of the parameters required under the EPL for the gas extraction booster is provided in Table 2.1 (refer Appendix 4).</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 3.1.1.3 below. The detailed tabulated data is available in Tables 3.1 to 3.4 (refer Appendix 4).
Table 3.1.1.3: Surface Gas Monitoring Results Summary</td></tr>
</table>

	<table><tr><th>Parameter</th><th>Minimum</th><th>Average</th><th>Maximum</th></tr><tr><td>Methane (%)</td><td>0.0002</td><td>0.0089</td><td>0.0950</td></tr></table> Methane was detected in varying amounts over the waste surface with a slightly increased overall average of 0.0089% during this reporting period, compared to 0.004% last reporting period. The slight increase in methane detected is likely due to the extended dry period that caused some cracking of the cover material in localised areas. Identified through surface gas monitoring, areas where higher methane levels were recorded had additional cover material added to maintain the average methane emissions below the threshold concentration in surface gas emission testing of 500 parts per million (0.05%), as per the *Environmental Guidelines for Solid Waste Landfills* (EPA, 2016). 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 were methods used to reduce surface gas emissions. During this reporting period mulch bio-cover was also implemented around wells, which has assisted in mitigating odour and reducing surface gas emissions.
Landfill Gas Flare	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 3.1.1.4** below. *Table 3.1.1.4: 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>
Landfill Gas Engine Exhaust Point(s)	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 4.1** and **4.2** (refer **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 period and consistent with previously reported levels, as demonstrated in **Figures 3.1.1.1**– **3.1.1.4**. ● Nitrogen Oxides; ● Hydrogen Sulphide; ● Volatile Organic Compounds ● Sulphuric Acid Mist; and ● Sulphur Trioxide Note: Only required to sample one engine exhaust due to sample type of engine.

Figure 3.1.1.1 **Landfill Gas Engine Exhaust Point - Nitrogen Oxide Flow**

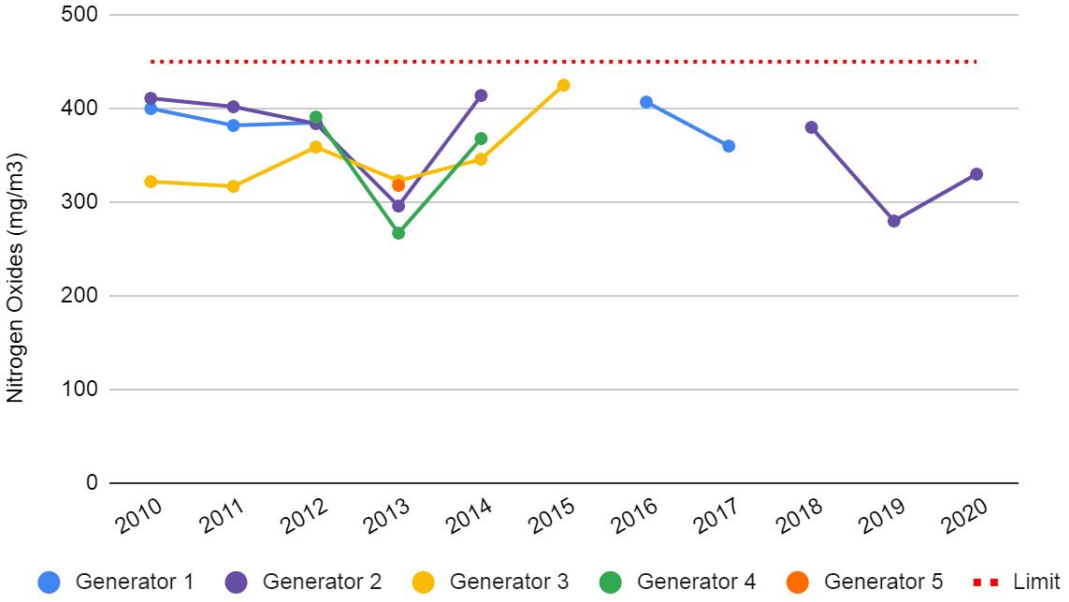


Figure 3.1.1.2 **Landfill Gas Engine Exhaust Point - Hydrogen Sulphide Flow**

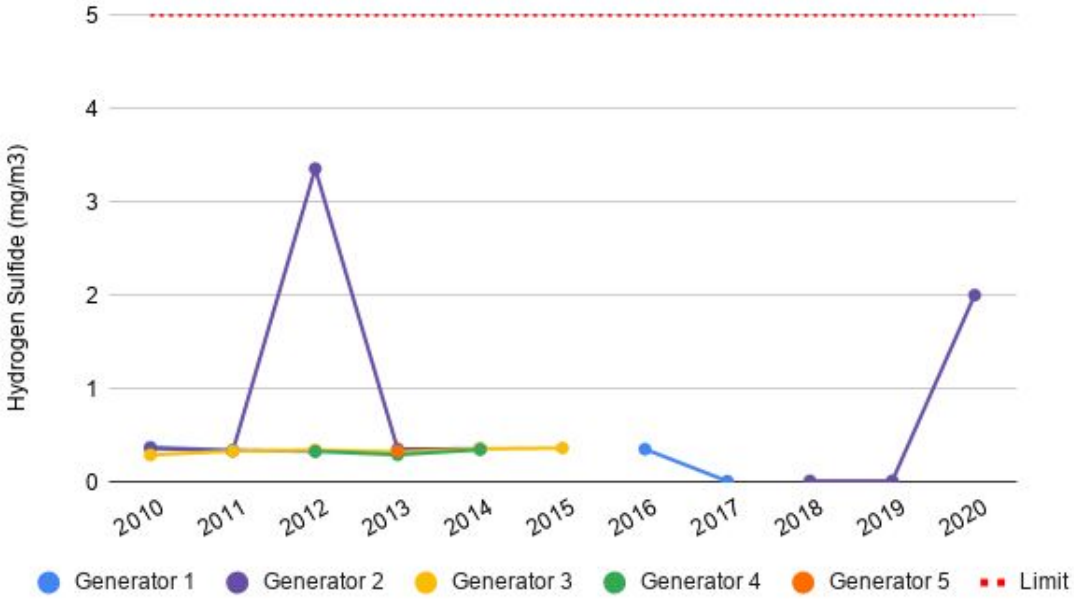


Figure 3.1.1.3 **Landfill Gas Engine Exhaust Point - Sulphuric Acid Mist & Sulphur Trioxide**

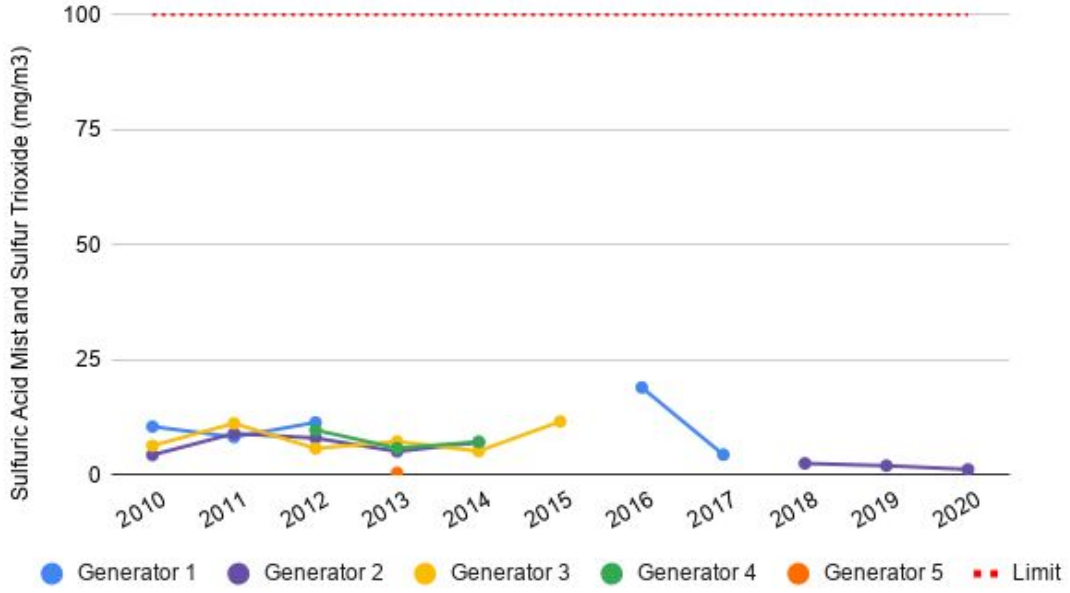
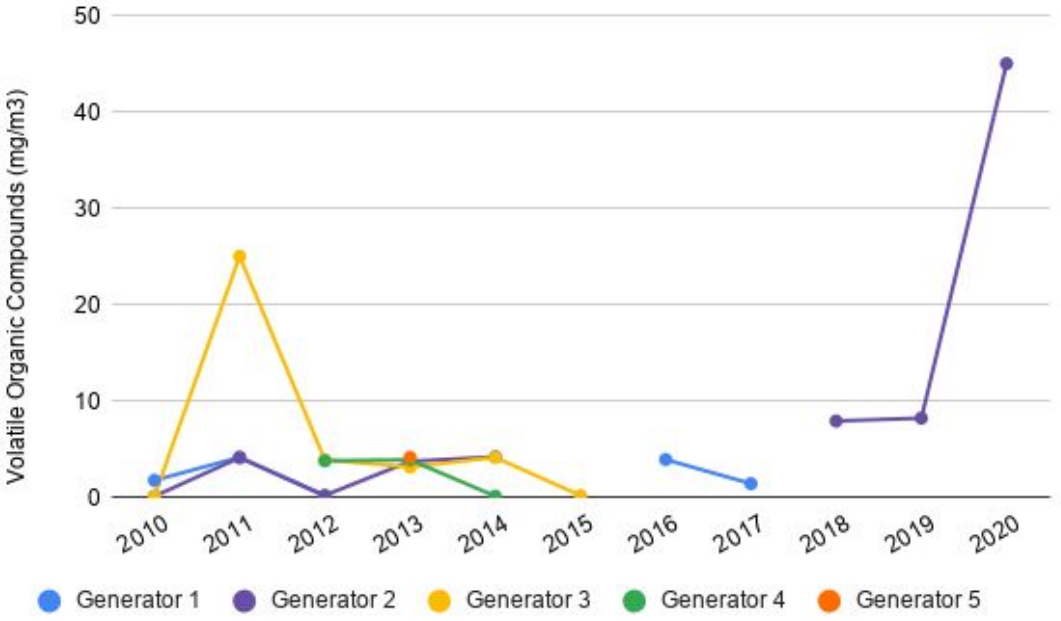


Figure 3.1.1.4 **Landfill Gas Engine Exhaust Point - Volatile Organic Compound**



3.1.2 Bioreactor Dust Monitoring Results

Air quality monitoring was carried out as required to determine whether activities conducted at the site impacted ambient air quality. All operations were carried out in a manner that would minimise emissions of dust from the premises.

There are currently three dust deposition gauges associated with the Woodlawn operation. DG22 on the eastern side of the void, DG34 behind the core shed, and DG28 located at Pylara. These are sampled each month as shown in **Table 3.1.2.2**.

***Table 3.1.2.2* Bioreactor Dust Monitoring Results**

<table>
<tr><th>Parameter</th><th>Results/Discussion</th></tr>
<tr><td>Particulates/ Dust Monitoring</td><td>The results of total insoluble solids found within the depositional dust samples are summarised for each of the monitoring locations in Table 3.1.2.1 below, with the detailed results tabulated in Tables 5.1 - 5.3 (refer Appendix 4).
Table 3.1.2.1: 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>Average</th><th>Maximum</th></tr>
<tr><td>DG22</td><td>0.3</td><td>5.1</td><td>15.8</td></tr>
<tr><td>DG34</td><td>0.3</td><td>4.6</td><td>16.6</td></tr>
<tr><td>DG28</td><td>0.4</td><td>4.1</td><td>10.5</td></tr>
</table>
The maximum dust level recorded in this reporting period was 16.6 g/m^2/month at DG34 which is located on the West side of the Bioreactor in November 2019.
All monitoring points reached averages exceeding the long term criteria for deposited dust during the reporting period. It should be noted that this is in direct relation to bushfire and dust storm events occurring between November 2019 and January 2020.</td></tr>
</table>

3.1.3 Bioreactor Surface Water Monitoring Results

A surface water monitoring program is established to detect potential pollution of offsite surface water by leachate or sediment-laden stormwater from the landfill. Monitoring points are located upstream and downstream of the site to identify any impacts the Woodlawn operations may be having on surface waters and equally, eliminate impacts to surface waters that are not a result of the landfill operation. There are 11 surface water monitoring sites in total consisting of four creeks and seven dam locations.

The findings from water quality monitoring of surface water locations required under Bioreactor PA and EPL is summarised in **Table 3.1.3** below with detailed data provided in **Tables 6.1 - 6.11** (refer **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),
- Potassium (K)
- Sulphate (SO_4), and
- Zinc (Zn).

These are depicted in the trend graphs **(Figures 1.5.3.1 – 1.5.3.11)** provided in **Appendix 5.**

Table 3.1.3 **Bioreactor Surface Water Monitoring Results**

Parameter	Results/Discussion
Site 115 – Allianoyonyiga Creek	Site 115 is situated downstream of the evaporation dams. All four quarterly monitoring samples were undertaken in this monitoring period. Based on the results provided in **Table 6.1** (refer **Appendix 4**), the pollutant concentration trends from previous monitoring periods are generally consistent. • Mean pH at 8.1 for this location indicates slightly alkaline water. • EC at 3833 µS/cm, indicating fresh to brackish water. • NH_3 at less than 0.1 mg/L and TOC at mean of 14 mg/L concentrations recorded in this monitoring period remain consistent with historical monitoring results • Mineral and heavy metal concentrations are of fairly low magnitude at 2.5 mg/L for K and 0.44mg/L for Zn, indicating no contaminated runoff is impacting surface water at this monitoring location. While the indicator trends for this location indicate some variability over time, this is not uncommon when sampling intermittent streams.
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, and have been documented in the Annual Return. Water quality trend in Spring 2, based on the results provided in **Table 6.2** (refer **Appendix 4**), is consistent with water quality from historical monitoring records. • pH is consistent with previous years (average 6.4) and reflective of the overall range of 5.9 – 7.4 for this location; • EC (average 579 µS/cm) for this reporting period is indicative of fresh water. • SO_4 (average 253 mg/L) shows an identical trend to conductivity, again indicating a direct effect on EC. • K (average 19.2mg/L) and Zn (average 1.79mg/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 0.3mg/L) and TOC (average 10mg/L) concentrations recorded in this monitoring period are consistent with historical monitoring results. No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.
Site 105 – Crisps Creek	Site 105 is located downstream of the Bioreactor and tailings dams. All quarterly monitoring requirements were undertaken in this monitoring period. Water quality trends in Site 105, based on the results provided in **Table 6.3** (refer **Appendix 4**) are consistent with previous monitoring results. • pH (7.4) is within the overall range of 6.6 – 7.9 for this location, indicating relatively neutral water; • EC (2176 µS/cm) is consistent with historical results, reflecting brackish water. • TOC (21 mg/L) and NH_3 (0.3 mg/L) was consistent with historical trends.

	• Zn and K remain consistent averaging 0.68 mg/L and 2.4mg/L respectively, consistent with historical results. The higher than average EC recorded in May and July 2020 is most likely associated with accumulation of salts in the environment associated with the extraordinarily dry conditions experienced across the region during the 2 years prior. EC and TDS concentrations returned to normal levels in August 2020 during the final quarter of the reporting period after a significant rain event.
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 6.4** (refer **Appendix 4**), the results for WM200 remain generally consistent with the previous reporting periods. • pH (average 8.1) indicates slightly alkaline water; • EC (average 1463 µS/cm) is consistent with historical results; • SO_4 level (average 38 mg/L) is lower than previous reporting period; • Zn level was lower at an average of .22 mg/L than previous reporting period; • TOC was an average of 4 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 0.2 mg/L is consistent with historical results. No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.
WM201 – Entrance Road Culvert	The Entrance Road Culvert collects surface water runoff from the Woodlawn Bioreactor administration office and workshop areas. 2 of 4 monitoring quarters were sampled during the 2019-20 reporting period. Water quality trends for WM2011, based on the results provided in **Table 6.5** (refer **Appendix 4**). • pH (6.29) is within the overall range of 6.06 – 6.53 for this location, indicating relatively neutral water; • EC (393 µS/cm) is consistent with historical results, reflecting brackish water; • TOC (7.5mg/L) remains consistent with previous reporting periods; • NH_3 (0.2mg/L) concentration are consistent with historical trends; • K (average 1.85mg/L) is consistent with historical levels Veolia will continue monitoring this location in the next reporting period for any runoff impacts.
ED3SS – Lagoon 5	Evaporation Dam 3 South-South (ED3SS) 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 6.6** (refer **Appendix 4**), for ED3SS, the following can be confirmed: • pH (average 8.7) appears to be fairly consistent with the existing treated leachate quality • EC average (26800 µS/cm) indicates a slight increase from previous reporting periods; • SO_4 averages (820 mg/L) appears to be fairly consistent with the existing treated leachate quality • Zn levels (average 6.4mg/L) are lower than previous monitoring periods

	• NH_3 concentrations (average 427 mg/L) remained stable over the course of the reporting period • TOC (average 3573 mg/L) continues to trend upwards from previous reporting periods. The progressively increasing trend in EC and TDS evident in monitoring results is directly associated with the increase in concentration of salts as the water component on leachate evaporates from this dam.
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 6.7** (refer **Appendix 4**), for WM203, the following can be confirmed: • pH (average 8.6) appears to be generally consistent with previous reporting periods. • EC average (45425 µS/cm) indicates a slight increase from previous reporting periods; • SO_4 averages (5690 mg/L) is consistent with previous reporting periods; • Zn levels (average 163 mg/L) is also consistent with historical levels; • NH_3 concentrations (average 181 mg/L); • TOC average (4675 mg/L) has increased from the previous reporting period. The progressively increasing trend in EC and TDS evident in monitoring results is directly associated with the increase in concentration of salts as the water component on leachate evaporates from this dam. While the indicator trends for this location indicate some variability this is not uncommon after extended periods of dry weather.
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. All quarterly monitoring events required under the EPL were undertaken in this monitoring period, the results of which are tabulated in **Table 6.8** (refer **Appendix 4**). These water quality results are consistent 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 3333 µS/cm) is generally consistent with previous results; • SO_4 trends upwards (average 7000 mg/L) from the previous reporting period. • K average of 10.8 mg/L is generally consistent with previous results • Zn (average 179 mg/L) is generally consistent with previous results; • NH_3 (average 9.2 mg/L) and TOC (average 36 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 6.9** (refer **Appendix 4**). • pH levels indicate an acidic, yet stable trending result with the average pH of 3.6 appearing to be generally consistent with previous reporting periods; • Zn at an average of 902 mg/L is consistent with previous reporting periods; • SO_4 (average 8970 mg/L) is consistent with previous reporting periods • EC (average 17783 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 99.5 mg/L) which is consistent with previous reporting periods. No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.
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 6.10** (refer **Appendix 4**), for ED1, the following can be confirmed: • pH (average 2.8) which is consistent with previous reporting periods • EC (average 29645 µS/cm) is slightly higher previous reporting periods • Zn levels (average 6020 mg/L) shows a slight increase from the previous reporting period • NH_3 concentrations (average 40.15 mg/L) showed higher than usual result over the reporting period; • TOC averages 24 mg/L remains consistent with previous reporting periods Due to inconsistent Conductivity, TDS and Nitrogen concentrations reported in May 2020, we believe this may be a result of an analysis issue at the laboratory. Veolia notes that post this date, sample results have returned to averages consistent with historical data.
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. Based on the water quality results provided in **Table 6.11** (refer **Appendix 4**), for ED1 coffer dam, the following can be confirmed: • pH (average 8.89) is slightly lower than previous reporting period; • EC (average 463167 µS/cm), BOD (average 37.2 mg/L) and COD (5662 mg/L) is consistent with monthly and previous reporting period results • NH_3 concentrations (average 6.9 mg/L) remained stable over the reporting period • Chloride averages (8698 mg/L) remained stable over the reporting period. No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.

3.1.4 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.

The findings from this reporting period are summarised in **Table 3.1.4** below with the detailed data provided in **Tables 7.1** and **7.2** (refer **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 also depicted in the subsequent trend graphs **Figures 1.5.4.1** and **1.5.4.2** (refer **Appendix 5).**

Table 3.1.4 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 7.1** (refer **Appendix 4**), the characteristics of the leachate are: • pH (8.55) is consistent with the previous reporting period EC (34400 µS/cm) is consistent with the previous reporting period; • SO_4 one of the dominant anions, (502 mg/L) is consistent with previous reporting readings; • Pb (0.151 mg/L) and Zn (3.35 mg/L)) is consistent with the previous reporting period • NH_3 (2900 mg/L) is consistent with previous reporting; • TOC (5850 mg/L) is consistent with previous reporting No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.
Leachate Recirculation System	An annual round was completed during this reporting period in accordance with the EPL, the results of which are detailed in **Table 7.2** (refer **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 (8.61) is generally consistent with previous reporting period; • EC (44500 µS/cm) is consistent with the previous reporting period and is generally consistent with the overall annual average for this location; • SO_4 (328 mg/L) is lower than previous reporting period;

	• Both Pb and Zinc are consistent with the previous reporting period, .0753 mg/L and 1.85 mg/L respectively. • TOC (9140 mg/L) is consistent with historical monitoring results. No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.
Effluent from LTP	The effluent from the Leachate Treatment Plant is located at the ultrafiltration membrane shed at the Leachate treatment Plant. Water quality is tested on the agreed 7 day assessment and provided to the NSW EPA on a monthly basis as part of the Commissioning process. Based on the results provided in **Table 8.1** (refer **Appendix 4**), the water quality at this location can be described as: • pH (average 7.94) consistent with throughout reporting period and meets proposed Targets; • EC (average 23742 µS/cm) remains stable, consistent with throughout the reporting period; • NH_3 (average 2.19 mg/L) is well below proposed Targets; • BOD (4 mg/L) is well below proposed targets; No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.

3.1.5 Bioreactor Groundwater Monitoring Results

Groundwater quality monitoring at 20 locations was undertaken in this reporting period as required by the EPL, comprising 1 annual and 3 quarterly rounds of monitoring for 17 of the 20 locations. The results of which are summarised in **Table 3.1.5** below. Detailed data is provided in Tables **9.1** – **9.20** (refer **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).
- Copper (Cu)

These are depicted in the trend graphs **(Figures 1.5.5.1 to 1.5.5.19)** provided in **Appendix 5**.

Table 3.1.5 **Bioreactor Groundwater Monitoring Results**

Parameter	Results/Discussion
MB1	MB1 is located down gradient of the landfill void. Based on the results provided in **Table 9.1** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 776.1 m RL) was slightly lower than previous reporting periods due to insufficient rainfall events; • pH (average 7.78) neutral – to slightly alkaline consistent with previous reporting period; • EC (average 1599 µS/cm) is lower than but generally consistent with previous readings representing fresh water; • SO_4 (average 247 mg/L) is generally consistent with previous periods; • Pb and Zn (average 0.0368 mg/L and 0.258 mg/L respectively) are generally consistent with previous periods. • NH_3 (average 0.1) is consistent with previous reporting periods. • TOC (2 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 9.2** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 776.6 m RL) was consistent with long term average since 2004; • pH (average 7.3) neutral, consistent with previous reporting period; • EC (average 7845 µS/cm) and SO_4 (average 3985 mg/L) is consistent with previous periods; • Pb (average 0.0005 mg/L) indicates a stable trend consistent with the previous reporting period. • Zn (average 0.01 mg/L) is generally consistent with previous reporting periods. • NH_3 (0.2 mg/L) is consistent with previous monitoring periods of non detection rates; • TOC (2 mg/L) shows a slight decline 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 9.3** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 789.9 m RL) was consistent with long term average since 2004; • pH (average 7.4) near neutral is consistent with previous reporting period; • EC (average 1902 µS/cm) is consistent with previous readings representing fresh water; • SO_4 (average 26.9 mg/L) is stable;

	• Pb (average 0.0002 mg/L) and Zn (average 0.016 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 (1 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 9.4** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 772.56 m RL) was consistent with long term average since 2004; • pH (average 5.76) slightly acidic, consistent with previous reporting period; • EC (average 1597 µS/cm) represents fresh water salinity and is consistent with previous period. This trend is reflected in SO_4 (average 165 mg/L) results for this period; • Pb (average 0.0051 mg/L) remains stable while Zn (average 0.921 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 9.5** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 774.6m RL) was consistent with historical results; • pH (average 6.21) slightly acidic consistent with previous reporting period; • EC (average 3563 µS/cm) represents brackish water and the trend is mirrored by SO_4 (average 461 mg/L) consistent with previous periods; • Pb (average 0.001 mg/L) and Zn (average 7.7 mg/L) is consistent with previous periods; • TOC (5.0 mg/L) and NH_3 average of 0.1 mg/L is consistent with previous monitoring periods. This bore was not sampled in Quarter 2 of the reporting period due to being dry.
MB7	MB7 is located upstream of Evaporation Dam 3. Based on the results provided in **Table 9.6** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 783.5 m RL) was consistent with long term average since 2004; • pH (average 7.5) neutral is consistent with the previous reporting period; • EC (average 8785 µS/cm) and SO_4 (average 142.5 mg/L) follow a similar stable trend to previous reporting periods ; • Pb (average 0.0169 mg/L) is consistent throughout the reporting period whilst Zn (average 0.3 mg/L) shows a fluctuating trend consistent with historical cycles;

	• NH_3 (0.076 mg/L) is consistent with previous monitoring periods of non detection rates; • TOC (5 mg/L) is fairly 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 9.7** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 780.3m RL) was consistent with previous monitoring periods; • pH (average 7.4) neutral is consistent with previous reporting periods; • EC (average 9147 µS/cm) is of brackish quality consistent with previous readings; • SO_4 (average 3577 mg/L) mirrors EC and is generally consistent with previous periods; • Pb (average 0.0002 mg/L) is stable while Zn (average 0.007 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 (2 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 9.8** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 783.3 mRL) was consistent with previous monitoring periods; • pH (average 7.4) is neutral – slightly alkaline and consistent with previous reporting period; • EC (average 7669 µS/cm) indicating brackish water and SO_4 (average 973 mg/L) follow similar trends consistent with previous periods; • Pb (0.0146 mg/L) remains stable while Zn (6.19 mg/L) is consistent with previous monitoring periods. • NH_3 (0.1 mg/L) is at non detection rates; • TOC (6 mg/L) is lower than 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 9.9** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 742.3m RL) is consistent with previous monitoring periods; • pH (average 7.6) neutral – to slightly alkaline consistent with previous reporting period; • EC (average 3254 µS/cm) represents slightly brackish water, and is consistent with previous historical records; • SO_4 (average 1802 mg/L) is similar in trend to EC and demonstrating a long term upward trend;

	• Both Pb (average 0.351 mg/L) and Zn (average 5.3 mg/L) remain consistent with previous reporting periods. • NH_3 (average 0.1 mg/L) is close to, or within, non-detection rates; • TOC (2 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 9.10** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 783.2mRL) is consistent with long term averages; • pH (average 7.67) neutral is consistent with the previous period. • EC (average 12741 µS/cm) is representative of saline water and consistent with the previous reporting period; • SO_4 (average 333 mg/L) is consistent with previous monitoring periods. • Pb (average 0.0035 mg/L) and Zn (average 0.055mg/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 (4 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 9.11** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 785.82 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 14986 µS/cm) represents brackish to slightly saline water, consistent with previous reporting period; • SO_4 (average 303.7 mg/L) mirrors EC's stable trend; • Pb (average 0.0367 mg/L) and Zn (average 0.668 mg/L) are both similar to the previous reporting period and generally consistent with historical fluctuations. • NH_3 (average 0.086 mg/L) is close to, or within, non-detection rates; • TOC (4 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. Only 1 of the 4 quarterly monitoring samples were obtained due to the bore being dry from Quarter 2 onwards of the reporting period. Based on the results provided in **Table 9.12** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 783.38 m RL) is shallower than previous reporting periods; • pH (average 4.25) shows slight acidification from previous reporting periods; • EC (average 17700 µS/cm) shows a slight increase from previous reporting period results;

	• SO_4 (average 5640 mg/L) continues to show a slight increase but is generally consistent with previous periods; • NH_3 (average 0.1 mg/L) is close to, or within, non-detection rates; • Pb, Zn and TOC were not analysed due to lack of water during the monitoring period. A spike in Potassium, consistent with an increase in EC and TDS might indicate that the sample extracted was muddy due to water level being very low to dry. The lower than usual pH remains unclear, but possibly related to dewatering of ED3N. The water quality in the bore will continue to be monitored quarterly to identify a trend and potential causes.
MW8D	MW8D is located adjacent to MW8S. Based on the results provided in **Table 9.13** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 783.79m RL) was consistent with long term average since 2004; • pH (average 7) slightly acidic to neutral consistent with previous reporting period. • EC (average 5181 µS/cm) represents brackish water which is consistent with previous readings; • SO_4 (average 1189 mg/L) mirrors EC consistent with previous periods; • Pb (average 0.0245 mg/L) and Zn (average 4.4 mg/L) are both consistent with previous periods; • NH_3 (0.1 mg/L) is at non detection rates; • TOC (4 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 9.14** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 785.76m RL) was consistent with previous reporting period; • pH (average 7.13) consistent with previous reporting period; • EC (average 10972 µS/cm) remains stable, consistent with previous reporting period for brackish water; • SO_4 (average 4092 mg/L) is consistent with previous periods; • Pb (average 0.015 mg/L) and Zn (average 0.374 mg/L) were both generally consistent with historical results. • NH_3 (0.078mg/L) is at non detection rates; • TOC (4 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 9.16** (refer **Appendix 4**), the groundwater quality at this location can be described as:

	• SWL (average 780m RL) was consistent throughout this reporting period; • pH (average 7.5) is neutral; • EC (average 12757 µS/cm) remains stable, throughout the reporting period; • SO_4 (average 735.8 mg/L) is consistent; • Pb (average 0.072 mg/L) and Zn (average 13.5 mg/L) were both generally consistent in this reporting period. • NH_3 (0.1 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.
MB33	In October 2019, Veolia collaborated with E2W to install MB33, a 75m deep groundwater monitoring bore to replace a waste covered well (WM4) in the Void. This bore was added to the EPL sampling regime in March 2020, and sampled from Quarter 2 of this reporting period. Based on the results provided in **Table 9.17** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 749.16m RL) was consistent throughout this reporting period; • pH (average 11.4) showing consistent alkalinity; • EC (average 1858 µS/cm) remains stable, throughout the reporting period; • SO_4 (average 400 mg/L) is consistent; • Pb (average 0.21 mg/L) and Zn (average 2.1 mg/L) were both generally consistent in this reporting period. • NH_3 (0.4 mg/L) is close to, or within, non-detection rates; • TOC (6 mg/L) reflecting natural conditions is consistent throughout this reporting period. The alkalinity of this monitoring bore is likely due to the construction method involving gravel packing and cement grouting, cement of which is largely made up of calcium oxide. Veolia has engaged a suitably qualified contractor to carry out a flushing of this bore prior to the first quarterly sampling of the 2020-21 reporting 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. Based on the results provided in **Table 9.18** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 777.58m); • pH (average 7.34) being neutral, was consistent throughout the reporting period; • EC (average 3330 µS/cm) remains stable, consistent with for fresh to brackish water; • SO_4 (average 392 mg/L) is consistent with the previous reporting period; • Pb (average 0.0002 mg/L) and Zn (average 0.381 mg/L) were both generally consistent in this reporting period. • Cu (0.003mg/L) reflected low to non-detectable; No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period. *Please note that the fluctuation in metals concentrations evident in Quarter 3 of the reporting period is due to being analysed in “total” as opposed to “dissolved”, due to an COC oversight. All concentrations returned to normal level in Quarter 4.

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. Based on the results provided in **Table 9.19** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 778.01m); • pH (average 8.0) consistent throughout this reporting period; • EC (average 5853 µS/cm) remains stable, throughout the reporting period; • SO_4 (average 254 mg/L) is consistent with the previous reporting period; • Pb (average 0.0002 mg/L) and Zn (average 0.152mg/L) were both generally consistent and reflected low to non-detectable. • Cu (0.005 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. *Please note that the fluctuation in metals concentrations evident in Quarter 3 of the reporting period is due to being analysed in "total" as opposed to "dissolved", due to an COC oversight. All concentrations returned to normal level in Quarter 4.
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. Based on the results provided in **Table 9.20** (refer **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 780.62m); • pH (average 6.98) consistent throughout this reporting period; • EC (average 1678 µS/cm) remains stable for fresh to brackish water; • SO_4 (average 636mg/L) is consistent with the previous reporting period; • Pb (average 0.0002 mg/L) and Zn (average 2.042 mg/L) were both generally consistent and reflected low to non-detectable. • Cu (0.013 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. *Please note that the fluctuation in metals concentrations evident in Quarter 3 of the current reporting period is due to being analysed in "total" as opposed to "dissolved", due to an COC oversight. All concentrations returned to normal level in Quarter 4.

3.1.6 Bioreactor Piezometers Level Monitoring Results

Measurements for groundwater standing water levels (SWL) in the vicinity of the Bioreactor were undertaken at 6 out of 6 piezometers around the landfill void in accordance with the EPL and have been documented in the Annual Return.

The primary purpose is to monitor the groundwater hydraulics in the Void. Each location consists of a shallow (reference A) and deep (reference B) piezometer.

The findings of the monitoring are summarised in **Table 3.1.6** below and detailed quarterly levels are provided in **Tables 10.1 – 10.5** (refer **Appendix 4**).

Table 3.1.6 **Bioreactor Piezometers Level Monitoring Results**

Parameter	Results/Discussion
P38A & P38B	P38 is located east of the void. Standing water levels are presented in **Table 10.1** (refer **Appendix 4**). • SWL in P38A (shallow aquifer) indicated a stable standing water level ranging from 776.04 m RL to 776.18 m RL during this reporting period. • SWL in P38B (deep) ranged from 770.45 m RL to 770.78 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 10.2** (refer **Appendix 4**). • SWL in P200A (shallow) showed a range of 752 m RL to 756.5m RL and is stable. • SWL in P200B (deep) showed a range of 751.6 m RL to 756.5 m RL and is stable.
P58A & P58B	P58 is located west of the void. Standing water levels are presented in **Table 10.3** (refer **Appendix 4**). • SWL in P58A (shallow) showed a range of 764.05 m RL to 764.15 m RL and is stable. • SWL in P58B (deep) is similar to previous reporting period fluctuating between 738.65 m RL and 741.91 m RL.
P59A & P59B	P59 is located west of the void and to the south of P58. Standing water levels are presented in **Table 10.4** (refer **Appendix 4**). • SWL in P59A (shallow) ranged from 782.53 m RL to 785.38 m RL in this reporting period, consistent with previous reporting period. • SWL in P59B (deep) ranged between 782.31 m RL and 784.98 m RL, consistent with previous reporting period.
P100A & P100B	P100 is located northeast of the void. Standing water levels are presented in **Table 10.5** (refer **Appendix 4**). • SWL in P100A (shallow) is consistent with the previous reporting period measuring 735.68 m RL in quarter one. It was found to be Dry for the remainder of the monitoring period (Quarters 2 to 4). • P100B (deep) averaged between 700.16 m RL and 700.81 m RL which indicates water above the base level of 698.29 m RL which has been recorded in previous periods. Based on the recent review of the Groundwater well network in the void (undertaken by E2W), it is intended that P100B is developed by flushing, as monitoring results indicate potential silting has occurred.

3.1.7 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. Water levels are taken monthly as detailed in **Table 3.1.7**, which shows that the dam levels and required freeboard requirements. At no point did the water level in each dam exceed the free board limit.

Table 3.1.7 **Bioreactor Evaporation Dam Volume Monitoring Results (RLs AHD)**

	ED3 South		ED3 North				ED1	ED1N
Date	**ED3S**	**ED3S-S**	**ED3N -1**	**ED3N - 2**	**ED3N - 3**	**ED3N - 4**	**Coffer Dam**	**Legacy**
24/09/2019	790.78	792.13	790.03	790.93	790.07	791.10	786.96	785.80
23/10/2019	790.65	792.02	787.40	791.07	791.03	791.05	786.99	785.85
25/11/2019	790.42	791.82	Empty	790.72	790.89	790.86	786.91	785.85
17/12/2019	790.25	791.66	Empty	790.28	790.79	790.71	786.90	785.67
28/01/2020	790.11	791.41	Empty	790.08	789.91	790.53	786.77	785.40
27/02/2020	790.42	791.63	Empty	790.21	789.55	790.55	786.93	785.50
26/03/2020	790.65	791.64	Empty	790.19	789.47	790.52	787.02	785.41
28/04/2020	790.73	791.75	Empty	790.12	789.46	790.48	787.15	785.44
27/05/2020	790.8	791.77	Empty	789.86	789.57	790.50	787.31	785.49
22/06/2020	790.88	791.78	Empty	789.53	789.71	790.55	787.45	785.51
31/07/2020	790.17	791.57	Empty	789.51	789.81	790.54	787.64	785.54
25/08/2020	790.87	792.15	Empty	790.28	790.28	790.62	787.98	785.96
Minimum	790.11	791.41	787.40	789.51	789.46	790.48	786.77	785.40
Mean	790.56	791.78	788.72	790.23	790.05	790.67	787.17	785.62
Maximum	790.88	792.15	790.03	791.07	791.03	791.10	787.98	785.96
Max Freeboard	791.2	793.6	791.2	791.2	791.2	791.2	789.92	788.8

Veolia has the capacity to move water if required in the event that water levels rise. Also outlined in the Project approval MP 10_0012 as modified, water can be moved from ED3S to ED2, as ED2 is now HDPE lined by Heron Resources Ltd. Additional monitoring is conducted for other dams managed by Veolia.

3.1.8 Bioreactor Extraction of Water

Table 3.1.8 below provides the volume of the water extracted from the Willeroo Borefield of which an annual allocation of 600ML is available. Water Access Licence (Veolia Environmental Services (Australia) Pty Ltd) 28983 Lachlan Fold Belt Mdb Groundwater Source.

Table 3.1.8 **Willeroo Bore Field Extraction Volume**

Month	Usage Volume (kL)	Month	Usage Volume (kL)
September 2019	36446	March 2020	34102
October 2019	19099	April 2020	25490
November 2019	20474	May 2020	17122
December 2019	14806	June 2020	18883
January 2020	28225	July 2020	16369
February 2020	10182	August 2020	6118
TOTAL		**247,316 kL**	

Heron Resources used the borefield as a primary source of water during the commissioning phase of their processing plant using approximately 159,939m^3 of water during the reporting period, with their consumption dramatically reducing with the commissioning of the reverse osmosis (RO) plant, followed by the suspension of operations on 25 March 2020.

3.8.1.1 Leachate Extraction and Treatment from Bioreactor Landfill

Leachate extracted from the Bioreactor for the water year (1 July 2019 to 30 June 2020) was 61,512 m^3. It is treated through the existing Leachate Treatment Dam and Leachate Treatment Plant before being transferred to the ED1 CofferDam for evaporation.

3.1.9 Bioreactor Noise Monitoring

Operational activities at the Woodlawn Bioreactor is restricted to within the approved operating hours described in **Table 3.1.9** as per Conditions of Bioreactor PA.

Table 3.1.9 **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.

3.1.10 Bioreactor 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.

The Bioreactor PA stipulates that the expanded operations must not exceed the maximum annual input rates in **Table 3.1.10.1**.

Table 3.1.10.1 **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 +200,000m^3 of Bushfire Impacted material

All waste received is recorded in the Systems, Applications and Products in Data Processing (SAP) software including details such as vehicle registration, 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.

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 3.1.10.2** indicates that the Woodlawn Bioreactor has remained within the annual waste limit stipulated within the Bioreactor PA of 1.13Mtpa.

Table 3.1.10.2 **Incoming waste tonnage via rail and road per calendar month for Woodlawn Bioreactor, MBT facility and Crisps Creek (IMF) during 2019/2020 reporting period**

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) (*Including Bushfire impacted waste)
Sep 2019	53,153.000	10,885.660	8,853.250	12,049.290
Oct 2019	59,376.719	9,874.280	9,041.420	11,685.870
Nov 2019	54,779.560	9,462.663	8,296.790	12,079.170
Dec 2019	59,785.900	8,206.352	8,476.360	10,533.200
Jan 2020	58,064.240	9,785.830	9,322.940	10,220.200
Feb 2020	57,462.040	8,683.040	8,371.480	10,295.930
Mar 2020	56,850.544	9,711.900	6,412.580	10,540.390
Apr 2020	47,453.080	9,532.632	6,872.820	17,556.518
May 2020	44,795.840	9,194.460	5,533.940	36,227.748
Jun 2020	49,672.900	9,869.370	9,204.940	33,134.700
Jul 2020	46,254.570	12,736.825	10,927.500	26,992.630
Aug 2020	42,966.560	10,225.020	9,468.440	15,892.360
TOTAL	**630,575.373**	**118,168.032**	**100,782.460**	**207,208.006**

Residual Waste to the bioreactor was impacted due to the NSW EPA imposed revocation of Mixed Waste Organic Outputs Order (MWOO) and exemption, preventing the application of MBT's MWOO to the degraded Woodlawn Mine site. Thus a total of *35,525 tonnes of MWOO was landfilled during the reporting period, which would have otherwise been recovered.

Regional Waste. In March 2020, Condition 7A, Schedule 3 of SSD 10_0012 permitted the acceptance of up to 200,000m^3 of bushfire impacted waste material from regional areas of NSW between March 2020 and 30 September 2020, which was subsequently extended until 31 March 2021.

Veolia received *64,455t of bushfire impacted waste material from regional areas of NSW during the reporting period. No Regional waste was received and processed at the MBT, as the NSW EPA MWOO revocation limited the opportunity to focus on mixed waste processing from non Sydney waste sources.

The regional waste received from bushfire impacted areas is excluded from the maximum annual input rates specified in Condition 7A, Schedule 3 of the PA, however is included in the regional inputs section of **Table 3.1.10.2**.

The forecasted tonnage (tpa) for the following reporting period is outlined in **Table 3.1.10.3**.

Table 3.1.10.3 Forecast waste tonnages for the 2020/2021 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) at the Bioreactor	Forecast regional waste received by road (tonnes) at the Bioreactor
2020/2021	650,000 tpa	143,000 tpa	80,000 tpa	130,000 tpa Plus estimated. 30,000t of Bushfire impacted material (#).

DPIE issued extension to the Project Approval to accept bushfire impacted material until 31 March 2021

Part 4 Crisps Creek Intermodal Facility

4.1 Crisps Creek IMF Monitoring Results

4.1.1 IMF Surface Water Monitoring Results

Upstream and downstream monitoring is undertaken at nearby surface water bodies to identify any degradation of water quality caused by landfilling operations.

Surface water quality monitoring at 3 monitoring locations was undertaken as required by the EPL, the findings of which are summarised in **Table 4.1.1**. Detailed quality results are provided in **Tables 12.1** to **12.3** (refer **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),
- Zinc (Zn),
- Ammonia ($NH_{3)}$, and
- Total Organic Carbon (TOC).

These are depicted in trend graphs **(Figures 2.4.1.1 to 2.4.1.3)** provided in **Appendix 5**.

Table 4.1.1 **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. Three out of four quarterly monitoring requirements were fulfilled this reporting period due to lack of flow. Results provided in **Table 12.1** (refer **Appendix 4**) indicate the following trends: • pH is close to neutral (average 7.54, consistent with previous reporting periods; • EC (average 1115 µS/cm) is consistent with the historical data and representative of fresh water salinity; • SO_4 (average 101.4 mg/L) is consistent with previous reporting periods; • Fe (average 0.6 mg/L) is consistent with previous reporting periods, whilst Zinc indicates a fluctuating trend (average 0.3mg/L), consistent with historical cyclic results; • NH_3 (average 0.2 mg/L) is consistent with previous reporting periods and continues to be at non-detection levels. • TOC (average 13 mg/L) shows a slight increase 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. Veolia will continue to endeavour to obtain samples when flow occurs during a rainfall event for low flow surface water points.
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. Three out of four quarterly monitoring requirements were fulfilled this reporting period due to lack of flow. Results provided in **Table 12.2** (refer **Appendix 4**) indicate the following trends: ● pH (average 7.91) is slightly alkaline, consistent with the previous reporting period; ● EC (average 804 µS/cm) shows a fluctuating trend and is generally consistent with previous periods and fresh water salinity; ● SO_4 (average 40 mg/L) reflecting EC trend, is generally consistent with previous reporting periods; ● Fe and Zn, average 0.44 mg/L and 0.063 mg/L respectively indicate consistency with fluctuating cycles in previous reporting periods. ● NH_3 (0.2mg/L) continued to be not detected during this reporting period. ● TOC (average 9 mg/L), is generally consistent with previous reporting periods; These results are consistent with the trends for Site 110. Veolia will continue to endeavour to obtain samples when flow occurs during a rainfall event for low flow surface water points.
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 12.3** (refer **Appendix 4**) indicate the following trends: ● pH (average 7.39) is close to neutral, consistent with the previous reporting period; ● EC (average 136 µS/cm) shows a slight downward trend but is generally consistent with the previous period and representative of fresh water salinity; ● SO_4 (average 14 mg/L) is also slightly lower but generally consistent with previous reporting period; ● Fe and Zn, average 0.60 mg/L and 0.08 mg/L are generally consistent with the previous period but reflective of fluctuating cycles. ● NH_3 an average of (0.20 mg/L) is also is consistent with previous reporting period; ● TOC (average 8 mg/L) which is consistent with previous reporting period reporting periods. No significant variations or anomalies were recorded for any analyte tested at this location during this monitoring period.

4.1.2 IMF Dust Monitoring Results

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 a hardstand which aids in the mitigation of dust emissions due to the sealed surface.

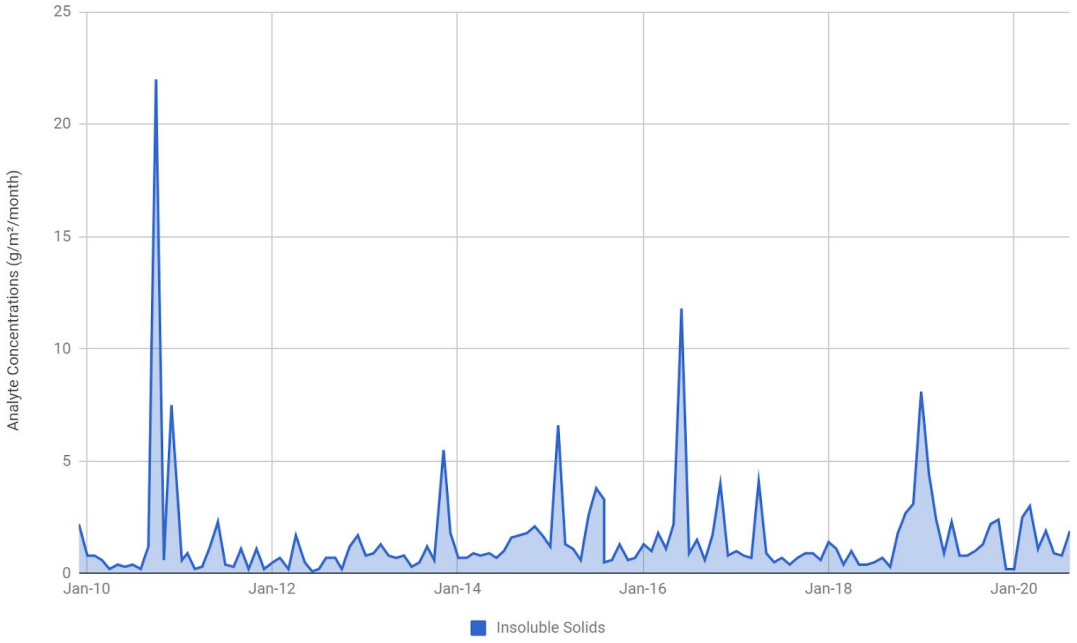
Dust monitoring is undertaken monthly at 1 location at the IMF in accordance with the EPL. A summary of this reporting period is provided in **Table 4.1.2** and detailed in **Table 13.1** (refer **Appendix 4**).

Table 4.1.2 **Dust Monitoring Results**

Dust Gauge	Summary Total Insoluble Solids (g/m²/month)		
	Minimum	Average	Maximum
DG18	0.2	1.5	3

The results at DG18 indicate an average level of total insoluble solid matter is 1.5 g/m^2/month, which is lower compared to overall historical trends as seen in the subsequent graph in **Figure 4.1.2.**

Figure 4.1.2 **Crisps Creek IMF Depositional Dust Levels**



4.1.3 IMF Waste Volume Monitoring

Schedule 3, Condition 8 stipulates that the facility must not exceed the annual throughout rate outlined to **Table 4.1.3** below.

Table 4.1.3 **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

Veolia uses data provided by PWS to track and monitor the amount of incoming waste transported by rail from Sydney to Crisps Creek Intermodal Facility for processing at the Woodlawn Bioreactor and MBT Facilities. The Crisps Creek IMF has remained within the annual waste limit stipulated within the Bioreactor PA during the 2019-20 reporting year.

Part 5 Woodlawn MBT Facility

5.1 MBT Monitoring Results

5.1.1 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 **Section 3.1.3** and **Table 6.1** (refer **Appendix 4**).

5.1.1.1 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 5.1.1**.

***Table 5.1.1* 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.

There have been no discharge events recorded at Site 140 during the reporting period.

5.1.2 MBT Groundwater Water Monitoring Results

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 5.1.2** below and depicted in **Figure 5.1.2.1** (refer **Appendix 5**).

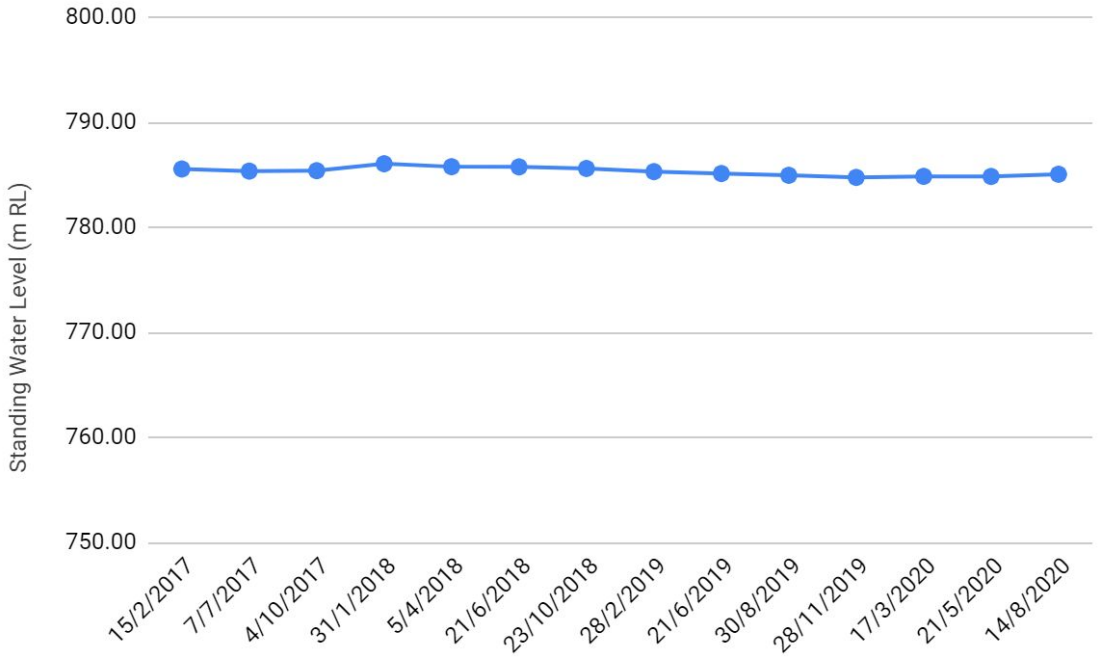
The key quality indicators selected are the same as listed in **Section 3.1.5** to detect any pollutants in groundwater samples are the same as those deemed characteristic for leachate.

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 5.1.2.**

Table 5.1.2 **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 14.1** (refer to **Appendix 4**), the groundwater quality at this location can be described as: • SWL (average 784.88 m RL) is fairly consistent with the previous reporting period of 785.25 m RL. • pH (average 7.83) and is slightly alkaline, which is consistent with previous reporting period; • EC (average 14300 µS/cm) is slightly higher but generally consistent with previous reporting period readings (average 13625 µS/cm); • SO_4 (average 546.0 mg/L) is consistent throughout this reporting period and lower than the average of the previous period (668 mg/L); • Pb and Zn (average 0.0003 mg/L and 0.083 mg/L respectively) are generally consistent with the previous period; • NH_3 (average 0.225 mg/L) is slightly higher than the previous reporting period, but the concentration was below the detection limit (0.1 mg/L) towards the end of the reporting period; • TOC (10.3mg/L) is consistent with previous reporting periods with a slight decrease in concentration. 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 5.1.2 **MBT Groundwater Levels - WMBT Point 11**



5.1.3 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 5.1.3** below with the detailed data provided in **Table 15** (refer to **Appendix 4**). The trends are also depicted in **Figure 5.1.3.1** (refer **Appendix 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 5.1.3 **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 15.1** (refer to **Appendix 4**), the characteristics of the leachate are: • pH average (7.62) is showing an decrease in alkaline state from the previous reporting period result. • EC average (22,700 µS/cm) is consistent with the previous reporting period (22,800 µS/cm). • SO_4 average (711 mg/L) is higher than the previous reading (678.5 mg/L). • Pb average decreased from 0.6 mg/L to 0.338 mg/L, Zn also decreasing from 19.85 mg/L to 10.91 mg/L from the previous reporting period. • NH_3 average (987 mg/L) is lower compared to previous reporting reading (1455 mg/L). • TOC average (10305 mg/L) is higher compared to previous reporting reading (8375 mg/L). The leachate concentration levels in the aeration dam show no significant changes compared to the previous reporting period. Affected by weather conditions during this reporting period, a slight increase in concentration was observed during the reporting period due to the potential drought experienced at the start of the period. The concentration then reduced in the second half of the reporting period, potentially due to higher rainfall. The observation of concentration variation can be related to weather conditions experienced for this period.

5.1.4 MBT Dust 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 5.1.4** below and detailed in **Table 5** and **Table 15** (refer to **Appendix 4**).

Table 5.1.4 **MBT Air Quality Monitoring Results**

Parameter	Results/Discussion
Particulates/ Dust Monitoring	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.

<table>
<tr><td></td><td>
MBT shares 2 depositional dust gauges with the Bioreactor, which include Pylara (DG28) and West Void (DG 34), which are summarised in Section 3.1.2.

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 5.1.4A and detailed in Table 16.1 (refer to Appendix 4).

Table 5.1.4A: 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>0.3</td><td>6.8</td><td>2.1</td></tr>
</table>
The average level of total insoluble solid matter is 2.1 g/m²/month, and is generally consistent with overall historical trends. The maximum dust level recorded during the reporting period was 6.8 g/m²/month in January 2020. It should be noted that this is in direct relation to bushfire and dust storm events occurring between November 2019 and January 2020.
</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.

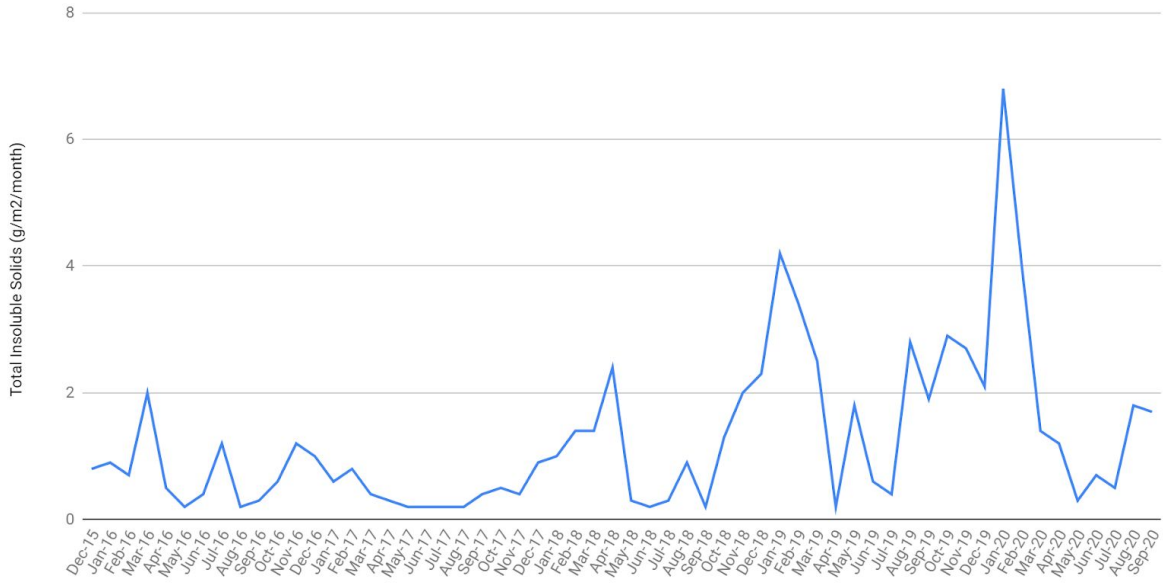
This concentration was predicted to be dominated by the existing source of the Bioreactor, rather than the operation of the Facility, which was predicted to result in a 99th percentile concentration of 1.7 OU when modelled alone.

Table 5.1.4B: 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>
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.
</td></tr>
</table>

Figure 5.1.4 **MBT Depositional Dust Levels – DG33**



5.1.5 MBT Noise Monitoring Results

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

Operational activities at the MBT are restricted within the approved operating hours described in **Table 5.1.5** as per Schedule 3, Condition 27 of the MBT PA, as well as all processing confined to enclosed areas.

Table 5.1.5 **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.

5.1.5.1 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 5.1.5.1**) 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 5.1.5.1 **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

5.1.5.2 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.

5.1.6 MBT Waste Volume Monitoring

5.1.6.1 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 MBT 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.

5.1.6.2 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 in accordance with the EPA licence. The WRVCP details the Waste Monitoring Program used to monitor and record incoming waste at the facility.

The performance measures for the waste volumes are detailed in **Table 5.1.6.2A**.

Table 5.1.6.2A **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 the onsite Paperless Weighbridge System (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 5.1.6.2B** 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 5.1.6.2B **Incoming Waste Tonnages during Operations (Sep 2019 – Aug 2020) at MBT**

Source	Waste Type	Total TPA
Banksmeadow Transfer Terminal	Mixed Waste	85,104.604
Clyde Transfer Terminal	Mixed Waste	33,063.428
	TOTAL	**118,168.032**

Due to the NSW EPA imposed revocation of Mixed Waste Organic Outputs Order (MWOO) and exemption, preventing the application of MBT's MWOO to the degraded Woodlawn Mine site, all MWOO produced from the MBT was landfilled in the Bioreactor. A total of 35,525 tonnes of MWOO was landfilled during the reporting period as reflected in **Table 3.1.10.2** of **Section 3.1.10**.

Part 6 Environmental Performance

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

6.1 Independent Audit Findings

In consultation with both the New South Wales Environment Protection Authority (NSW EPA) and Department of Planning, Industry and Environment (DPIE) the Independent Audits below were conducted during the reporting period.

6.1.1 Leachate and Water Management System (LWMS) Audit

In accordance with Condition 18R, Schedule 2 of Project Approval MP 10_0012, as modified, Veolia is required to carry out an Independent Audit of the Leachate and Water Management System.

The 2020 LWMS Audit covered the period from the day after the last audit ended (21 March 2019), and the last day of SLR Consulting Australia's onsite auditing (11 March 2020).

A number of mandatory and non-mandatory recommendations were developed as a result and discussed in **Table 6.1.1** below.

***Table 6.1.1* 2020 Independent LWMS Audit Findings and Corrective Actions**

Item	Recommendation	Implemented/Proposed Action
1.	Develop a long-term water usage plan with Heron following development of their site Water Balance. Seek to integrate the Veolia and Heron Water Balances as best as possible in future iterations.	Awaiting the restart of operations at Heron to actively pursue this strategy. Until this occurs, Veolia is focussed on the effective evaporation of all site waters.
2.	Continue to seek opportunities to optimise the dam evaporation systems to maximise the removal of leachate from the system (e.g. positioning of mechanical evaporators, evaporator maintenance etc).	Veolia continues to optimise dam evaporation systems through new installations as well as the maintenance and improvement of existing systems.
3.	Continue to improve and optimise the LTP operation with the assistance of suitably qualified experts (as required).	Improvement projects are currently underway in order to reach the target throughput of 4L/s.
4.	Continue upgrades to the foam management system at the LTP and monitor the aeration tanks to ensure that a foaming incident does not occur again.	A Deluge system was constructed and was commissioned in November 2020. Antifoam injection through the deluge system will provide additional control.

5.	Continue to monitor the impact of the Bioreactor on the surrounding community through an analysis of complaints registered with the site, to be included in the next Annual Review.	Veolia continues to engage with the community and individual complainants. Veolia is committed to minimising impacts on the local community. An analysis has been included in **Section 6.2.4** of this report.
6.	Continue to seek opportunities for leachate minimisation as the operation progresses and changes in the future.	Leachate minimisation strategies are continually reviewed as leachate generation affects gas generation and results in additional cost to treat and evaporate.

6.1.2 Odour Audit

In accordance with the requirements of Condition 7 of Schedule 4 of MP 10_0012, Veolia is required to carry out an annual independent odour audit.

This was the eighth Independent Odour Audit (IOA) commissioned by Veolia since the Woodlawn Waste Expansion project approval was granted.

A number of mandatory and non-mandatory recommendations were developed as a result and discussed in **Table 6.1.2** below.

***Table 6.1.2* 2020 Independent Odour Audit Findings and Corrective Actions**

Item	Recommendation	Implemented/Proposed Action
1.	Continue to improve landfill gas capture from the Bioreactor.	Veolia will continue to optimize landfill gas (LFG) extraction and leachate management according to the strategies stated in the Woodlawn Infrastructure Plan (WIP) 2020 to minimize the fugitive gas/odour emission.
2.	Continue to adequately maintain and manage the upgraded LMS to ensure it is operating in an optimum state and meeting leachate quality monitoring targets.	Veolia continues to upgrade the LMS in order to meet the desired leachate extraction rate from the Void, as well as meeting leachate quality monitoring targets.
3.	Continue to develop strategies for the minimising of the exposed active tipping face surface area. It should also proceed and continue with the details in the WIP 2020.	GPS assisted tipping will be continuously conducted according to WIP 2020.
4.	Refine investigation of odour issues in the community and continue active engagement with the community through its existing odour complaints and response management strategy.	Veolia will continue to manage the odour complaints in-line with the complaints procedures.

5.	Continue to review aspects relating to the use of the IMF and waste transport activities to further improve its odour performance.	Veolia will continue to maintain and monitor the operation of the container and truck wheel washing practices on site.
6.	Develop a heightened awareness of the operability and maintenance of the biofilter-based odour control system at the MBT Facility,	Veolia will continue to make continuous improvements to the MBT Biofilter System in accordance with the Biofilter Operation and Maintenance manual for optimised performance. Install additional Biofilter duct inside of the Refining Building to improve the extraction of odour from more locations inside of the Refining Building.

6.2 Community Engagement

6.2.1 Community Liaison

In accordance with Condition 1 and 2 of Schedule 7 (PA 10_0012), a Community Liaison Committee (CLC) operates for the Woodlawn Project consisting of an Independent Chair, representatives from Goulburn Mulwaree and Queanbeyan Palerang Regional Council, a TADPAI representative, and five community members. The CLC aims to meet up to four times per year.

The Project held three CLC meetings during the reporting period. The first in February 2020 (after a delay in appointing a Committee), the second in June 2020, and the third one in August 2020. A fourth CLC meeting originally scheduled for April this year, was cancelled due to challenges with COVID-19.

The key focus areas of the 2019-20 reporting year's meetings included:

- Progress of the Woodlawn Eco-Precinct, specifically around gas capture initiative, leachate treatment plant and, MBT future and Tailings Trial;
- Tarago Village Plan;
- Bushfire Waste Inputs;
- Tarago Lead Contamination investigation; and
- Ongoing funding efforts.

Community concerns are also raised at other meetings attended by local community representatives, such as the Tarago & District Progress Association Inc. (TADPAI), regularly attended by the Woodlawn Eco-Precinct Manager as part of the Woodlawn PA requirement.

6.2.2 Community Projects

In consultation with the Goulburn Mulwaree Council and directly with the local community, Veolia implemented a complimentary local waste collection service for the Tarago Village during the reporting period. The service includes a fortnightly collection of putrescible waste from residential, commercial and select public places within the village of Tarago. A 240L wheelie bin was supplied as part of the programme. It is anticipated that the service will run for an initial period of 2 years.

Veolia continues to sponsor the monthly Tarago Times newsletter, and regularly participates in and supports the local community groups and activities.

6.2.3 Veolia Mulwaree Trust

The Veolia Mulwaree Trust has and continues to support numerous organisations through its grants and donations since 2005, including distribution of some $11.5 million to date. A website (https://www.veolia.com/anz/about/about-veolia/corporate-social-responsibility/veolia-mulwaree-trust) has also been established to provide information about the Veolia Mulwaree Trust's Community Grants Program.

Through the Trust, Veolia has supported local schools and preschools, sporting facilities, parks and playgrounds, emergency services, charities and community service organisations.

6.2.4 Complaints

Veolia operates a 24-hr telephone complaints line that enables the receipt of complaints from members of the public, as required under the Bioreactor and MBT PAs and EPLs. Other complaints that were received off site during this reporting period were logged by the EPA.

Upon receipt of an odour complaint, Veolia records the details of the complaint into the Eco-Precinct complaints register as follows:

- Date and time of complaint
- Method by which the complaint was made
- Personal details of the complainant if available
- Nature of the complaint
- Action taken by Veolia is relation to the complaint ie. investigation
- If no action was required, the reason why no action was undertaken

After investigating the odour complaint and implementing any remedial action, a report is submitted to the NSW EPA as per condition R4.2 of the EPL, and made publicly available on the Veolia website.

Veolia recorded a total of 20 complaints relating only to odour during this reporting period which is significantly lower than the previous reporting period (32). Where verified, the source of odour was attributed to emissions from Bioreactor operations. No odour complaints were received in Spring or Summer of 2019/2020, the majority occurring in the Winter and Autumn seasons of the reporting period.

Significant improvements in landfill gas extraction and leachate management through optimisation of surface water catchments, landfill gas infrastructure design, and increased leachate treatment capacity (via the LTP) have proven the benefits of the continuous improvements implemented at the Eco-Precinct with the recent odour complaint trends.

Wind speed, direction and sigma theta (which are used to calibrate turbulence) are logged at 60-minute intervals by the Woodlawn Weather Station, the data from which is used to respond to odour and noise complaints, on receipt.

Complaints received during the reporting period are detailed in **Table 6.1** (refer **Appendix 6**).

In order to proactively engage in effective odour management, Veolia also participates in regular community liaisons to encourage and gather feedback from the local residents regarding the odour performance at the Bioreactor.

6.3 Rehabilitation

6.3.1 Woodlawn Mine

Rehabilitation of the mine void through landfilling is a continuous process. Final rehabilitation works shall be completed in accordance with the Rehabilitation and Closure Plan.

The areas to be rehabilitated include but is not limited to:

- The Bioreactor
- Former Mineral Processing Area - Plant Area
- Evaporation Dam 3
- Evaporation Dam 1
- Power Station
- Office and car park areas
- Crisps Creek IMF and Mulwaree River
- MBT Facility

Other areas of the site are subject to a current development approval by Heron Resources Limited Pty Ltd (Heron). Under the approved development, Heron is proposing to undertake further 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) (refer to **Section 6.3.1)**.

Veolia has undertaken vegetation monitoring and tree planting programs at the Eco-Precinct site and continues to seek out ways to continuously improve and rehabilitate the overall natural amenity of the site.

6.3.2 Woodlawn Tailings Dams

Heron Resources (Heron) operate the Woodlawn Zinc-Copper Project within Special (Crown and Private Lands) Lease 120, issued pursuant to the NSW Mining Act 1992. Several conditions exist under their Lease to prevent, minimise and/or offset adverse environmental impacts, and to ensure that areas disturbed by mineral production and exploration activities are appropriately rehabilitated.

Developed under the approval conditions Heron's Mining Operations Plan (MOP) includes a Rehabilitation Strategy which describes the proposed rehabilitation strategy for the four tailings dams on site.

In May 2020, the Environment Protection Authority (EPA) through a NSW Resource Recovery Exemption, permitted the application of the Woodlawn organic outputs (WOO) (MBT organic output derived from mixed waste) to land for trials for the rehabilitation of acid mine tailings in the tailings dams of the Woodlawn Zinc-Copper Project Mine site.

The trial had not started during the reporting year due to the current Care & Maintenance situation at the mine site. Heron Resources will be collaborating with Veolia to develop the Tailings remediation trial as the prove up the agreed tailings cap with the NSW regulator. The trial is set to occur in the first quarter of the next reporting period.

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.

Part 7 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.

7.1 Improvement Actions

A number of improvements to the environmental management of the Woodlawn Eco-Precinct have been implemented during this reporting period. 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 7.1.1 outlines the improvements identified in the 2018/2019 AEMR and implemented in the 2019/2020 reporting year for the Woodlawn Bioreactor, Crisp Creek IMF and Woodlawn MBT facility.

***Table 7.1.1* 2019/2020 Improvements Implemented**

Item.	Recommendation	Implemented Action
1.	Veolia should continue the current community liaison program (including the Woodlawn Community Liaison Committee (CLC) and the Tarago and District Progress Association Inc. (TADPAI) to notify affected/nearby residents of works and address concerns.	Veolia continues to liaise with the local community through both the CLC and TADPAI.
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 (WIP) for 2020.	Veolia continues to update the WIP with each waste lift.
3.	Continue to develop and optimise the operation of the Woodlawn Leachate Treatment plant, achieving a consistent treatment target of 4 l/sec.	Multiple concurrent projects were undertaken with the aim of achieving a consistent treatment target of 4 l/sec at the Woodlawn Leachate Treatment plant. Where this cannot be met, the original leachate dam treatment system is used to meet the required extraction rates is necessary.
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.	SLR completed an external audit of the Leachate and Water Management System in 2020. 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.	Review evaporation systems of ED1 mine legacy water and assess capabilities of the existing system and modify as required to meet the development consent requirements.	Several improvements have been made to the evaporation system at ED1 to ensure the legacy mine waters can be dealt with according to the development consent requirements.
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.	Stormwater catchment dams with pumps and drainage bunds have been constructed at multiple locations on the void wall and benches, that prevents the stormwater caught on the void wall from falling onto the waste surface thus minimizing the leachate production. New discharge pipework has been established for the new stormwater management system. With the new pump and pipe system, the upgraded stormwater management system will have more reliability and capacity. SCADA is being modified and improved in accordance with the new stormwater management system to gain better control and awareness of the system performance.
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.	Veolia developed an Odour Complaint Response Procedure and Complaints Handling Procedure. These procedures detail how each complaint is handled and ensures the recording and capture of each complaint is compliance of Condition M5.2.
8.	Veolia will review the scope for Woodlawn Bioreactor odour audits ensuring that the Woodlawn MBT is assessed as a potential source for odour.	Scope for IOA was amended in 2020 to include a detailed assessment of the Woodlawn MBT. The recommendations are included in **Section 6.1.1.**
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.	A RRE & RRO was granted by NSW EPA with trials on tailings to commence in December 2020. Refer to **Section 6.3.1**.

Veolia intends on broadening its community and environmental performance in the next reporting period by implementing a number of improvements. The activities proposed will principally involve a continuation of activities undertaken during the 2019-20 reporting period.

Table 7.1.2 outlines the improvements proposed for the 2020/2021 reporting year for the Woodlawn Bioreactor, Crisp Creek IMF and Woodlawn MBT facility.

Table 7.1.2 **2020/2021 Improvement Recommendations**

Item	Recommendation	Proposed Action
1.	Engage suitably qualified persons to conduct a review of the Groundwater Monitoring Network in the vicinity of the Void	Veolia engaged Earth 2 Water (E2W) in March 2020 to assess the existing well network within the Void. A comprehensive review and report outlining recommendations was received in April 2020.
2.	Act on the recommendations of the Groundwater Monitoring Network review by installing two deep wells to replace previously decommissioned wells within the void	The installation of two new wells was completed in November 2020 in conjunction with E2W and Terratest.
3.	Increase the landfill gas extraction infrastructure including the installation of an additional blower and flares.	Progressively add new extraction wells as the surface area increases with the bioreactor. This is in line with the WIP 2020 and beyond,
4.	Install and optimise additional infrastructure for dam evaporation.	A new evaporative system will be fully implemented with the ED1 and ED1 coffer dam system by the end of November 2020.
5.	Develop and implement trigger values & control measures for monitoring points located within the vicinity of ED1 as identified in the Groundwater Management Strategies for ED-1.	Continue to monitor ground and surface water quality and develop effective methods of identifying trends in heavy metal concentrations and natural attenuation.
6.	Implement a Dams Safety Management System including the development of a Dams Safety Emergency Plan (DSEP) in order to meet new regulatory requirements.	Carry out review of existing dams management strategy and consult with Heron Resources in developing a collaborated DSEP for the Woodlawn Eco-Precinct.
7.	Manage Regional Waste Tonnage inside the approved limits received at the Bioreactor and the MBT.	Manage regional waste volumes against project approval conditions. This process involves managing customers and their requirement to adhere to the limits imposed. Bushfire waste acceptance period extended to 31st March 2021.
8.	Implement stormwater diversion to reduce the leachate generation due to mixing with storm water at Woodlawn MBT site.	Storm water diversion from clean concrete pad in front of the Reception Building to reduce potential leachate generation.
9.	Develop leachate evaporation system at Woodlawn MBT to evaporate leachate mainly generated from the stormwater.	Design and install system to improve evaporate leachate generated from the stormwater at the leachate pond and on the Maturation Pad.
10.	Improvement of the leachate aeration system for the Leachate Aeration Pond.	Increase the leachate aeration capacity to reduce potential odour emission from highly concentrated leachate generated from the process.

Reference and Related Documents

Document Name
URS Australia Pty Ltd, Veolia Environmental Services Environment Assessment: Woodlawn Expansion Project Volume 1 – Main Report, August 2010
URS Australia Pty Ltd, Veolia Environmental Services Environment Assessment: Woodlawn Expansion Project Volume 2 – Appendices, August 2010
EPA, Waste Classification Guidelines Part 1: Classifying Waste, November 2014;
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Appendices

Appendix 1 Site Location Map

Appendix 2 EPL Boundary Map

Appendix 3 Monitoring Locations Map

Appendix 4 Tabulated Monitoring Results

Appendix 5 Monitoring Trend Graphs

Appendix 6 Complaints Register