

WOODLAWN BIOREACTOR

**Independent Audit
Leachate and Water Management System**

Prepared for:
Veolia Pty Ltd

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Maxwell Infrastructure (Management) Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
Final	13 June 2019	Duncan Barnes	Tracey Ball	Tracey Ball
Draft B	5 June 2019	Duncan Barnes	Tracey Ball	Tracey Ball
Draft A	3 June 2019	Duncan Barnes	Tracey Ball	Tracey Ball

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1 Introduction

1.1 Background to Site

Veolia Australia and New Zealand (Veolia) owns and operates the Woodlawn Bioreactor (the Development), which forms part of the 6000 hectare Woodlawn Eco-precinct. The Development is situated 250 kilometres south west of Sydney in the NSW Southern Highlands (refer to **Figure 1**). The Development consists of a former open cut mine void, where waste landfilling and landfill gas extraction occurs. The Development has been operating since September 2004. The Development has a capacity of 33 million cubic meters (m³).

Waste is transferred to the Bioreactor via road and rail. Waste from local businesses and councils are sent to the Development via road. Waste in containers is also sent from Sydney via train and then transferred to trucks at the Clyde Transfer Terminal (CTT).

The Woodlawn site is a previous copper-zinc mine operating as a below ground and open cut mining operation. Associated facilities include evaporation dams and tailings storage facilities. Heron Resources (Heron) now operate the mine.

Veolia's current operation includes evaporation and leachate dams, some of which are co-managed by Veolia and Heron (including ED1). Veolia also operates a leachate treatment system and is in the process of commissioning a Leachate Treatment Plant (LTP). No leachate has been treated to date by the LTP.

The Department of Planning (DPE) approved Project Approval (10_0012) on 16 March 2012 to increase the landfill capacity and input limit from 500,000 tonnes per annum (TPA) to 1,130,000 TPA. DPE granted a modification to this consent (PA 10_0012 MOD2) to alter surface water and leachate management in December 2017. This modification includes requirements for a Leachate Treatment Plant (LTP), Coffey Dam and future volumes of existing dams (ED1 and ED3N).

1.2 Audit Scope

This Independent Environmental Audit (Audit) covers the period from the start of commissioning of the Leachate Treatment Plant (LTP) 5 November 2018 to 20 March 2019 (last day of SLR Consulting Australia's [SLR's] onsite Auditing).

Condition 18R, Schedule 2 of Project Approval MP 10_0012, as modified, outlines the requirement to complete the Independent Audit of the Leachate and Water Management System (LWMS).

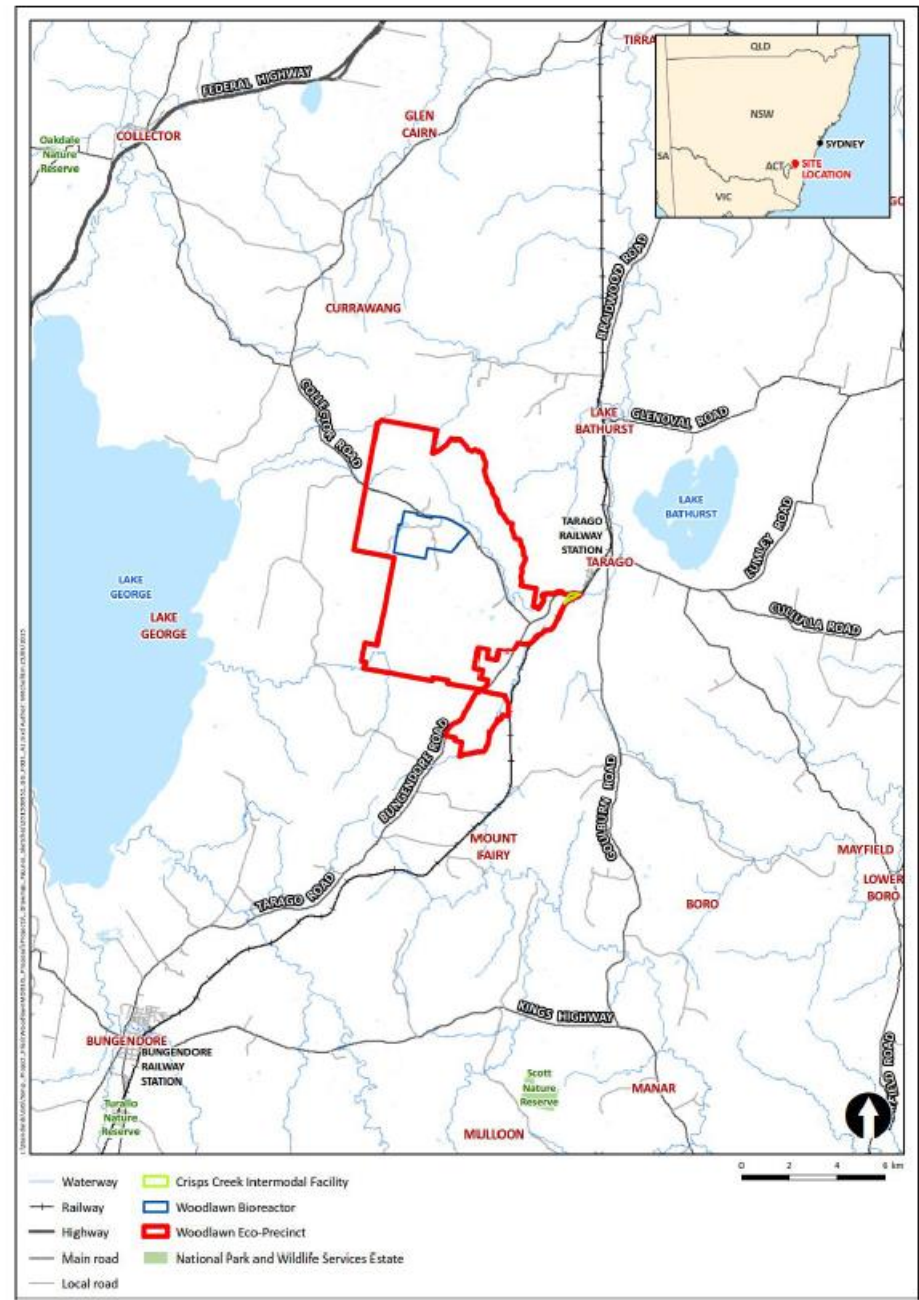


Figure 1 Woodlawn Bioreactor and Eco-Precinct Location

AUDITING

Independent Audit

The Audit will be undertaken in accordance with the following PA condition:

Condition 18R of Schedule 4 of the MP 10 0012, as modified:

18R. Within six months of commissioning the LTP and annually thereafter, unless otherwise agreed to by the Secretary, the Proponent shall commission and pay the full cost of an independent assessment of the leachate and water management system. This audit must be conducted by a suitably qualified, experienced and independent expert whose appointment has been endorsed by the Secretary. During the audit, this expert must:

- (a) consult with the EPA, Water NSW and the Secretary;*
- (b) assess actual performance against the assumptions and predictions made in the project water balance prepared by WSP dated September 2017. This must include:*
 - i. actual versus predicted inputs and outputs into and out of each dam;*
 - ii. actual versus predicted mechanical evaporation from each dam;*
 - iii. actual versus predicted rainfall and evaporation; and*
 - iv. the actual versus predicted volume of water or treated leachate stored in each dam.*
- (c) Assess actual versus predicted performance of the LTP. This must include:*
 - i. Actual versus target effluent quality; and*
 - ii. Actual versus target throughput.*
- (d) determine whether the leachate and water management system is achieving its intended objectives; and*
- (e) Outline all reasonable and feasible measures that may be required to improve water and leachate management of the site.*

It is noted that Condition 18R b) pertains to the accuracy of the WSP site water balance undertaken in 2017. This water balance (like all water balances) is based on a number of assumptions which are prone to change over time. In addition, many inputs and outputs are never going to be exactly the same as what was assumed within the water balance. As such, SLR believes that Condition 18R b) cannot be assessed completely in accordance with the DPE *Independent Audit Guideline (June 2018)* and the respective compliance status of the items within this condition should be read and interpreted in this context.

The layout of the Development is shown on **Figure 2**.



1.3 Key Site Contacts

Contact details for key personnel at the Development are provided in **Table 1** below:

Table 1 Contact Details for Key Mine Personnel

Name	Role	Telephone	Email
Harneet Puarr	Veolia - Woodlawn Environmental Officer	02 8588 1372	harneet.puarr@veolia.com
Ark Du	Landfill/Operations Engineer	02 8588 1372	ark.du@veolia.com

1.4 Audit Methodology

The Audit was undertaken onsite by Tracey Ball (Lead Auditor) and Duncan Barnes (Water Specialist) of SLR, with the site component completed on 19 and 20 March 2019. The SLR Audit team are independent of Veolia as defined under Section 3.3 of the NSW Government's (2018) *Independent Audit Guideline*.

Information was provided by Veolia prior to, during and following the Audit. SLR also sourced some information from the Veolia website.

The methodology for the Audit consisted of the following key steps:

- Introductory and close out meetings;
- Reviewing key documents/data provided by Veolia prior to the Audit;
- Consultation with relevant government agencies as per the Audit requirements prior to the site component;
- Site component of the Audit – including inspections and discussions with key Veolia operational personnel;
- Review of additional relevant documentation/data/information obtained while onsite during the inspection or provided by Veolia after the site inspection; and
- Client review and comment on the draft Audit report.

Photographs taken during the site inspections are included in **Appendix A**. Evidence was viewed and collected as part of the Audit, including monitoring records, reports and correspondence. While this key evidence has been referenced in **Section 2**, it has not been attached to this Audit report.

The Audit has been completed as per the *Independent Audit Guideline* (DPE, June 2018).

The Audit team assessed the documentation outlined in **Section 2**.

1.4.1 Introductory and Closeout Meetings

Introductory and close out meetings were held for the Audit. At the opening meeting introductions were made by each of the meeting attendees and personnel from Veolia provided background details regarding the Development to SLR. During the close-out meeting a general discussion about initial findings and recommendations was undertaken. **Table 2** lists those present at these meetings.

Table 2 Meeting Attendees

Name	Role	Comment
Harneet Puarr	Veolia - Woodlawn Environmental Officer	Present at opening and closing meeting
Ark Du	Landfill/Operations Engineer	Present at opening and closing meeting
Tracey Ball	SLR Lead Auditor	Present at opening and closing meeting
Duncan Barnes	SLR Mine Site Water Specialist	Present at opening and closing meeting

1.5 Consultation Requirements

Table 3 outlines stakeholder consultation completed for Veolia, undertaken in accordance with the Audit Guidelines and Condition 18R of Schedule 4 of the MP 10_0012, as modified.

Table 3 Stakeholder Consultation for the Audit

Regulatory Authority	Contact Details	Comment
Department of Planning and Environment (DPE) – Planning Services	Katrina O'Reilly Team Leader Compliance Phone: 02 4224 9470 Katrina.OReilly@planning.nsw.gov.au	Email sent from SLR on 14 March 2019. Response provided from DPE on 14 March 2019. See Table 4 below for comments and responses.
Environment Protection Authority (EPA)	Nick Feneley Senior Operations Officer, Waste Compliance Phone: 02 4224 4144 nick.feneley@epa.nsw.gov.au	Email sent from SLR on 14 March 2019. Response provided from EPA on 18 March 2019. See Table 5 below for comments and responses.
Department of Industry (Dol) – Lands and Water	regional.wro@dpi.nsw.gov.au	Email sent from SLR on 14 March 2019. Response provided from Dol – Lands and Water on 12 April 2019. See Table 6 below for comments and responses.

1.5.1 DPE Comments

Table 4 outlines the DPE comments provided to SLR on 14 March 2019 relating to the Audit.

Table 4 DPE Comments Relating to the Independent Audit

Aspect	Comment
The Audit needs to ensure that it addresses all the requirements outlined in Schedule 4 Condition 18R.	This Independent Audit considers the requirements outlined in Schedule 4 Condition 18R.
The audit should consider the number of complaints that were received in relation to odour and compare it to previous years. For 2016/2017 a total of 36 complaints were received 2015/2016 a total of 88 complaints were received 2014/2015 a total of 63 complaints were received	According to the Complaints Register there was 41 complaints received in regards to odour during the 2017/2018 Annual Environment Management Report (AEMR) Period. This was 5 more complaints than 2016/2017 AEMR period but 47 less complaints than the 2015/2016 AEMR period.
The environmental parameters associated for these complaints should also be assessed, for example: <ul style="list-style-type: none"> What were the prevailing winds when the complaint was made; Was the complaint due to a system breakdown at Woodlawn or the Intermodal; Was there a leachate incident that lead to an increase in complaints; and Did the Bioreactor process a certain type or waste/high processing capacity at the time the complaint was made. 	This aspect is outside of the scope of the report and will not be considered in this Independent Audit.
An analysis of whether the leachate treatment plant has led to a reduction in complaints should also be considered.	The leachate treatment plant is not yet operational. Therefore, this analysis can't be completed.
Consideration should also be given as to which residents are making the complaints and what operational changes Veolia Environmental Services can make, to reduce the odour impacts to those residents.	This aspect is outside of the scope of the report and will not be considered in this Independent Audit.

1.5.2 EPA Comments

Table 5 outlines the EPA comments provided to SLR on 18 March 2019 relating to the Audit.

Table 5 EPA Comments Relating to the Independent Audit

Aspect	Comment
EPA's key concerns are captured well in Condition 18R, so if the audit adequately addresses each of these items we should be satisfied.	The Independent Audit has considered in full the requirements of Condition 18R of Schedule 4 of the MP 10_0012, as modified.
Keen to know whether or not the leachate and water management system is achieving its intended objectives (18Rc). Like to see some commentary around the consequences or any variations between the actual measured performance of the system and the predictions made in the project water balance. Likewise, for actual vs target throughput and effluent quality for the LTP.	Refer to Section 5 .

1.5.3 DoI Lands and Water Comments

Table 6 outlines the DoI - Lands and Water comments provided to SLR on 12 April 2019 relating to the Audit.

Table 6 DoI - Lands and Water Comments Relating to the Independent Audit

Aspect	Comment
NRAR requests that the audit considers compliance with the relevant water licensing requirements for the mining operation, specifically: <ul style="list-style-type: none"> Assessment as to whether the project holds the required water entitlements and licences under the <i>Water Management Act 2000</i> or <i>Water Act 1912</i> (as applicable); Compliance with the conditions of any water licences/approvals held; Identification of all water storages for the mine and identification of their licensing status being either exempt, subject to harvestable rights or regulated via a Water Access Licence; and Quantification of both active and incidental take by the project from each relevant water source and a comparison against previous predictions. 	These aspects are outside of the scope of the report and will not be considered in this Independent Audit.

Aspect	Comment
<p>The following questions may aid in assessing the water licensing requirements of the mine operation:</p> <ul style="list-style-type: none">• Does the proponent have enough licensed water entitlement to account for active and incidental take of water?• Are adequate records kept to enable determination of the volume and source of surface and groundwater taken?• Do any exemptions under the <i>Water Management (General) Regulation 2011</i> or <i>Harvestable Rights Order</i> (gazetted 31 March 2006) apply to the capture of water?	<p>These aspects are outside of the scope of the report and will not be considered in this Independent Audit.</p>

2 Documents Reviewed and Referenced

Key documentation reviewed as part of the Audit includes:

- Project Approval MP 10_0012, as modified;
- Environment Protection Licence (EPL) 1323;
- Annual Environmental Management Reports (AEMRs) – 2015/2016 and 2016/2017;
- Monitoring results;
- WSP Leachate Management Report;
- Monthly Reports for the Leachate Treatment Plant (LTP);
- Environmental Management Plans; and
- Complaints Register.

3 Assessment of Compliance

The terms used in the Audit to describe the level of compliance of the site with the relevant approval documentation are outlined in **Table 7**. These are requirements of the DPE *Independent Audit Guideline* (June 2018).

Table 7 Compliance Assessment Criteria

Assessment	Criteria
Compliant	The auditor has collected sufficient verifiable evidence to demonstrate that all elements of the requirement have been complied with within the scope of the audit.
Non-compliant	The auditor has determined that one or more specific elements of the conditions or requirements have not been complied with within the scope of the audit.
Not triggered	A requirement has an activation or timing trigger that has not been met at the time when the audit is undertaken, therefore an assessment of compliance is not relevant.

4 Approvals and Documentation Assessed

Audit findings and recommendations relating to Condition 18R of Schedule 4 of the MP 10_0012, as modified, are outlined in **Section 5** of this report.

4.1 Previous Audit Recommendations

This is the first audit of Condition 18R. No prior audits of the condition have been undertaken.

4.2 Project Approval PA 10_0012

Only condition 18R of Schedule 4 of Project Approval MP 10_0012, as modified, was assessed as part of this Audit. This is the primary approval for the Development. The Project Approval was first granted on 16 March 2012, with Modification 1 granted September 2016 and Modification 2 granted December 2017.

5 Audit Findings

Table 8 outlines the findings of the Independent Audit and proposed recommendations.

Table 8 Independent Audit Findings

Condition Number	Condition	Compliance Status	Evidence		Recommendation
			Predicted	Actual	
Project Approval MP 10_0012 MOD 2 Schedule 2 Condition 18R					
18R	Within six months of commissioning the LTP and annually thereafter, unless otherwise agreed to by the Secretary, the Proponent shall commission and pay the full cost of an independent assessment of the leachate and water management system. This audit must be conducted by a suitably qualified, experienced and independent expert whose appointment has been endorsed by the Secretary. During the audit, this expert must:	Compliant	<p>This Independent Audit is the first audit to be conducted against this condition.</p> <p>November 2018 Monthly Report indicates the Bioreactor was commissioned on 5 November 2018. This audit was commissioned by Veolia and endorsed by DPE. DPE endorsement letter dated 4 February 2019.</p>		-

Condition Number	Condition	Compliance Status	Evidence	Recommendation
a)	Consult with the EPA, Water NSW and the Secretary;	Compliant	<p>This Independent Audit is the first audit to be conducted against this condition.</p> <p>The EPA, Water NSW and DPE were consulted during the Independent Audit (refer to Section 1.5).</p>	-
b) i)	<p>Assess actual performance against the assumptions and predictions made in the project water balance prepared by WSP dated September 2017. This must include:</p> <p>actual versus predicted inputs and outputs into and out of each dam</p>	Non-Compliant ¹	<p>Non-Compliant: Actual inputs and outputs into and out of each dam are not the same as actual inputs and outputs.</p> <p>Refer to Appendix B for details of predicted WSP inputs and outputs from each dam and what has actually occurred.</p>	<p>Rec 1:</p> <p>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 WSP water balance (dated September 2017) have changed. It is recommended that this water balance update be undertaken once the LTP is fully operational and once the uncertainties associated with Heron's ED1 water inflows/outflows, including the final ED1 evaporator system, have been determined. This updated water balance will be more accurate if Veolia continue to monitor all leachate / water flows around the site.</p>

Condition Number	Condition	Compliance Status	Evidence	Recommendation
ii)	Actual versus predicted mechanical evaporation from each dam	Non-Compliant ¹	<p>The actual mechanical evaporation from each dam is not easily measurable. Veolia currently undertakes monthly monitoring of dams, which can be used to provide an approximate indication of dam evaporation. As such, this assessment has been based on the available information including the number/type of evaporators used in each dam (refer to Appendix B).</p> <p><u>Non-compliant:</u> Generally, dam mechanical evaporation is similar to what was assumed in the WSP water balance, except for ED1 North and the ED1 Coffey Dam, where Heron are still determining the evaporation unit requirements.</p> <p>For the dams where mechanical evaporators have been installed it was observed (during the site inspection) that dam water inflows are sprayed into the dams to further increase evaporation rates.</p> <p>The operation of the floating evaporators and dam inflow spray locations are selected based on real time weather data including the wind direction, wind speed, temperature, humidity and the time of the day.</p>	<p>Rec 2: If the mechanical evaporators are expected to continue to operate less than 70% of the time (as predicted within the WSP water balance) then install additional evaporators to make up the shortfall. This would be based on the outcomes of the revised water balance (refer to Rec 1).</p>

Condition Number	Condition	Compliance Status	Evidence		Recommendation
iii)	Actual versus predicted rainfall and evaporation	Compliant ¹	<p>“Leachate management by mechanical evaporators and the proposed ED1 coffer dam Report” (WSP 2017) included three climate sub-sets (wettest, driest and average):</p> <p>1. Wettest (1950-1959), a sequence with 4 years of annual rainfalls > 1000 mm</p> <p>2. Driest (1979-1988), a sequence with 5 years of annual pan evaporation > 1500 mm</p> <p>3. Average (1963-1972), a sequence with annual rainfalls < 900 mm and annual pan evaporation between 1000 mm to 1200 mm.</p> <p>The WSP report also indicated the long-term averages for annual rainfall and pan evaporation from 1932 to 2016 are 683 mm and 1,231mm respectively.</p>	<p>Rainfall and evaporation data were assessed from the approximate date that the WSP report was prepared (18 September 2017) to the date of the most recent data available at the time of the audit (18 February 2019). This period equates to approximately 518 days or 1.4182 years.</p> <p>The rainfall total for the assessment period was 731.5 mm based on the hourly rainfall data monitored on-site. This equates to an annual depth of 513 mm which is significantly lower than the average annual rainfall depth of 683 mm.</p> <p>The nearest natural evaporation data was obtained from the 'Braidwood (Wallace Street)' weather station (Station Number 069010). This data indicates that the total (pan adjusted) annual evaporation for the assessment period was prepared was 746mm (or 1023mm for pan evaporation). Although this annual evaporation rate is lower than the average evaporation rate predicted within the WSP water balance report, it is higher than the historical annual average evaporation of 614mm at the Braidwood (Wallace Street)' weather station.</p> <p>The site has generally been relatively dry since the WSP water balance report was prepared. This would equate to a sub-set category between 'driest' and 'average' within this report. These recent relatively dry conditions would assist in prolonging the time for the leachate dams to fill.</p>	-

Condition Number	Condition	Compliance Status	Evidence	Recommendation
iv)	The actual versus predicted volume of water or treated leachate stored in each dam	Not Verified	<p>30 April 2019 predicted volume of water or treated leachate stored in each dam (Average Climate Sub-Set)</p> <ul style="list-style-type: none"> • ED1 North = 250ML • ED1 Coffey Dam = 50ML • ED3N1 = 10ML • ED3N2 = 8ML • ED3N3 = 5ML • ED3N4 = 60ML • ED3SS = 90ML <p>30 April 2019 actual volume of water or treated leachate stored in each dam (refer to Appendix B)</p> <ul style="list-style-type: none"> • ED1 North = Unknown • ED1 Coffey Dam = 0.1ML (Less than predicted) • ED3N1 = 13.9ML (More than predicted) • ED3N2 = 16.9ML (More than predicted) • ED3N3 = 8.7ML (More than predicted) • ED3N4 = 95.9ML (More than predicted) • ED3SS = 81.9ML (Less than predicted) <p>The results indicate that the ED3N dams generally have more water in them than what was predicted within the WSP water balance whereas the ED1 Coffey Dam has less. The water volume in ED3SS is similar to what was predicted.</p> <p>The results indicate that the ED3N dams generally have more water in them than what was predicted within the WSP water balance whereas the ED1 Coffey Dam has less. The water volume in ED3SS is similar to what was predicted. The actual stored volume of water of 217.4ML is less than the predicted volume of 223ML.</p> <p>These results are likely due to a number of factors including the fact that the LTP is yet to be operational and discharge into the ED1 Coffey Dam, the reduced operational frequency of the installed mechanical evaporators, and the relatively dry weather since the water balance was prepared.</p> <p>No water volume information was available for the ED1 North dam.</p>	<p>Rec 1</p> <p>Rec 3: Seek integration of Veolia's leachate / water management system with Heron's, where possible, and where the systems overlap, to avoid potential conflicting interests and to benefit from mutual management opportunities.</p> <p>Rec 4: Install formalised depth markers in all dams and compare levels to available dam stage-storage relationships so that progress against the long-term objectives can be easily assessed.</p> <p>Rec 5: Engage a suitably qualified surveyor to survey the ED1 North dam to determine the current water level and overall storage capacity to assist with assessment against the leachate management objectives.</p>

Condition Number	Condition	Compliance Status	Evidence		Recommendation
c) i)	Assess actual versus predicted performance of the LTP. This must include: Actual versus target effluent quality	Not Verified	<p>The LTP is still in construction/commissioning phase and has not started discharging as yet. SLR was advised that this is expected to occur within a couple of weeks from the time of the audit.</p> <p>At the time of the site inspection the following progress had been made at the LTP:</p> <ul style="list-style-type: none"> • ED1 coffer construction complete; • Transformer and HV connection complete; • Surface sealing complete; • Process installation contractors works ongoing; • Process tank contractors works ongoing; • Sludge seeding ongoing; • SCADA implementation ongoing; • Discharge pipeline installation/connection ongoing; • Backup generator commissioning complete; and • Inlet Management System (IMS) pumps clean water commissioning complete. <p>Wehrle Umwelt was also undertaking the following at the time of the audit:</p> <ul style="list-style-type: none"> • Testing the functionality of SCACA; • Full operation of UF system; and • Formal training for project/operation teams. 		Rec 6: Audit sub-condition (Schedule 2 Condition 18Rc) of MP 10_0012 MOD 2 during the next Annual Independent Audit.
ii)	Actual versus target throughput	Not Verified	Refer to Appendix B for details of predicted leachate throughputs	The LTP is still in construction/commissioning phase and has not started discharging as yet. Refer to Condition c) i) above for further details.	Rec 6
d)	Determine whether the leachate and water management system is achieving its intended objectives	Compliant	1. Construction of a suitably sized and lined coffer dam (referred to as ED1 Cofferd Dam) to store and evaporate treated leachate from its leachate treatment plant from September 2018 for 4- year period without filling.	The LTP has not started discharging effluent (treated leachate) to ED1 coffer dam yet. The volume/footprint of the ED1 coffer dam has been increased from the proposed one in the WSP report.	-

Condition Number	Condition	Compliance Status	Evidence	Recommendation
		Not Verified	<p>2. ED1 North to be evaporated until dry within next 10 years so that it can be engineered for future leachate management.</p> <p>The volume of water within ED1 North was not available during the audit. As such, this condition could not be assessed.</p> <p>ED1 not only receives runoff from its external catchment, but also receives water from PCD and Western Ridge, dewatering activities by Heron. Approximately 100ML of water has been transferred into ED1 from Heron's Activities (from Tailings Dam).</p>	<p>Rec 1, 3 & 5</p> <p>Rec 7 Continue to seek measures that will reduce the volume of leachate produced including the containment of runoff from the existing void batters/benches.</p>
		Not Verified	<p>3. In accordance with Condition 18S of the Project Approval (MP 10_0012), as modified, the volume of mine water stored in ED1 must be no more than 10 ML by 31 December 2023.</p> <p>The volume of water within ED1 North was not available during the audit. As such, this condition could not be assessed.</p> <p>ED1 not only receives runoff from its external catchment, but also receives water from PCD and Western Ridge, dewatering activities by Heron. Approximately 100ML of water has been transferred into ED1 from Heron's Activities (from Tailings Dam)</p>	Rec 1, 3, 5 & 7
		Compliant	<p>4. In accordance with Condition 18T of the Project Approval (MP 10_0012), as modified, ED3N must be emptied of effluent from the existing leachate system by 31 December 2023.</p> <p>The combined water volume in the ED3SS and ED3N lagoons has dropped from 226.9ML on 30 August 2017 to 215.4ML on 25 February 2019. This equates to a drop of 11.5ML. As of 25 February 2019, an additional 55.8 ML is available within the ED3SS and ED3N lagoons. Although this has been a relatively dry period this suggests that that this objective may be achieved provided that treated leachate can be pumped into the ED1 Coffe Dam in the near future, which is anticipated.</p>	Rec 1

Condition Number	Condition	Compliance Status	Evidence		Recommendation
		Compliant	5. Install floating evaporators in ED3N1, ED3N2, ED3N3, ED3N4 and ED3SS to manage leachate from September 2017 through to December 2019.	As verified by the site inspection, floating evaporators have already been installed in ED3N1, ED3N2, ED3N3, ED3N4 and ED3SS. In addition, dam water inflows are sprayed into the dams to further increase evaporation rates. The operation of the floating evaporators and dam inflow spray locations are selected based on real time weather data including the wind direction, wind speed, temperature, humidity and the time of the day.	-
		Non-Compliant	6. Operate effectively without adversely impacting on the surrounding community.	<u>Non-compliant</u> : Complaints Register dated March 2019 indicates there was 41 complaints received in regards to odour during the 2017/2018 Annual Environment Management Report (AEMR) Period. This was 5 more complaints than 2016/2017 AEMR period but 47 less complaints than the 2015/2016 AEMR period.	Rec 8: 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.
e)	Outline all reasonable and feasible measures that may be required to improve water and leachate management at the site	-	Rec 1 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 WSP water balance (dated September 2017) have changed. It is recommended that this water balance update be undertaken once the LTP is fully operational and once the uncertainties associated with Heron's ED1 water inflows/outflows, including the final ED1 evaporator system, have been determined. This updated water balance will be more accurate if Veolia continue to monitor all leachate / water flows around the site. Rec 2 If the mechanical evaporators are expected to continue to operate less than 70% of the time (as predicted within the WSP water balance) then consider installing additional evaporators to make up the shortfall. This will be based on the outcomes of the revised water balance (refer to Rec 1). Rec 3 Seek integration of Veolia's leachate / water management system with Heron's, where possible and where the systems overlap, to avoid potential conflicting interests and to benefit from mutual management opportunities. Rec 4 Install formalised depth markers in all dams and compare levels to available dam stage-storage relationships so that progress against the long term objectives can be easily assessed.		

Condition Number	Condition	Compliance Status	Evidence	Recommendation
			<p>Rec 5 Engage a suitably qualified surveyor to survey the ED1 North dam to determine the current water level and overall storage capacity to assist with assessment against the leachate management objectives.</p> <p>Rec 6 Audit sub-condition (Schedule 2 Condition 18Rc) of MP 10_0012 MOD 2 during the next Annual Independent Audit.</p> <p>Rec 7 Continue to seek measures that will reduce the volume of leachate produced, including the containment of runoff from the existing void batters/benches.</p> <p>Rec 8: 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.</p>	

1 – It is noted that Condition 18R b) pertains to the accuracy of the WSP site water balance undertaken in 2017. This water balance (like all water balances) is based on a number of assumptions which are prone to change over time. In addition, many inputs and outputs are never going to be exactly the same as what was assumed within the water balance. As such, SLR believes that Condition 18R b) cannot be assessed completely in accordance with the DPE *Independent Audit Guidelines (June 2018)* and the respective compliance status of the items within this condition should be read and interpreted in this context.

6 Conclusion

Condition 18R of Schedule 4 of the MP 10_0012, as modified, was assessed by this Independent Audit.

This Independent Audit was undertaken at a time of change with regards to the water / leachate management system. The ED1 Cofferdam had recently been constructed and the LTP was expected to become operational in the near future. Veolia was also in discussions with Heron regarding integrating the water management system to identify mutual opportunities. As such, the majority of the audit recommendations pertain to obtaining additional information to identify the current changes to aid future water management and to assist with the assessment of the water management objectives.

In terms of actual performance against the assumptions and predictions made in the project water balance included in the report by WSP, dated September 2017, the Development was found to be non-compliant (refer to **Section 5**), as actual inputs and outputs of the leachate management system vary from what was assumed in this water balance. It is acknowledged that many inputs and outputs are never going to be exactly the same as what was assumed within the water balance. As such, SLR believes that Condition 18R b) cannot be assessed completely in accordance with the DPE *Independent Audit Guideline (June 2018)* and the respective compliance status of the items within this condition should be read and interpreted in this context.

The actual versus predicted performance of the LTP could not be assessed as the LTP was in the process of being commissioned. This assessment should be undertaken during the next Audit of Condition 18R of Schedule 4 of the MP 10_0012, as modified.

The leachate and water management system is achieving its intended objectives (those that could be assessed), except for operating effectively without adversely impacting on the surrounding community. This is due to the number of odour complaints received from the local community (refer to **Section 5**).

Evidence was observed that Veolia does proactively manage water with additional measures implemented to decrease and improve leachate management at the site. Although, not part of the scope of this audit SLR were advised that Veolia are compliant with all of their licence requirements and have achieved good LFG gas capture results.

Reasonable and feasible measures that are recommended to improve water and leachate management of the site are provided in **Section 5**.

APPENDIX A

Photographs



Photo 1 – ED1 Cofferd Dam (1)



Photo 2 – ED1 Cofferd Dam (2)



Photo 3 – ED1 Cofferd Dam (3)



Photo 4 – ED1 Cofferd Dam (4)



Photo 5 – ED1 North (1)



Photo 6 – ED1 North (2)



Photo 7 – ED1 North (3)



Photo 8 – ED3N1



Photo 9 – ED3N3



Photo 10 – ED3N4 (1)



Photo 11 – ED3N4 (2)



Photo 12 – ED3SS (1)



Photo 13 – ED3SS (2)



Photo 14 – ED3SS (3)



Photo 15 – ED3SS (4)



Photo 16 – Informal Depth Marker



Photo 17 – Leachate Treatment Dam (1)



Photo 18 – Leachate Treatment Dam (2)



Photo 19 – Leachate Treatment Plant (1)



Photo 20 – Leachate Treatment Plant (2)



Photo 21 – Leachate Treatment Plant (3)



Photo 22 – Leachate Treatment Plant (4)



Photo 23 – Leachate Treatment Plant (5)



Photo 24 – Leachate Treatment Plant (6)



Photo 25 – Leachate Treatment Plant Permeate Inspection Point



Photo 26 – Stormwater Dam



Photo 27 – Void (1)



Photo 28 – Void (2)

APPENDIX B

WSP Comparison and Dam Data

WSP Comparison Table

Legend:

Same as WSP
Different to WSP
Undecided or Not Applicable


WSP Report Section	Report Location	Site Feature	Component	Predicted	Actual (based on Woodlawn information)	Outcome
Section 1.3	Page 4	ED1 Coffor Dam	Dam Input	Treated water from Leachate Treatment Plant at the rate of 4 L/s and direct rainfall and local runoff	The LTP has not started discharging effluent (treated leachate) to ED1 yet.	Different to WSP
Sections 1.3 and 7.1	Pages 4, 11, 12		Dam Output : (Herron Water Use Scenario)	Herron water use scenarios including a usage rate of 2 L/s and no water use.	ED1 coffor dam, as the LTP has not started discharging effluent (treated leachate) to ED1 coffor dam yet, Heron has not made the decision about whether they are going to use the water in ED1 coffor dam. Could not confirm which scenario.	Undecided
			Dam Output : (Evaporation System)	Floating Evaporator Type A x 4	ED1 Coffor Dam water will be managed through evaporation (forced and mechanical) starting in 2019. As the ED1 coffor dam is still empty, no floating evaporator has been installed. The installation of the evaporation system along the dam wall is in progress. The evaporation system along the dam wall will be used for discharge of effluent and expect to evaporate 10-20% of the volume during effluent discharge process. When the dam is fully full, the installation of the floating evaporation system will be assessed.	Will occur but hadn't at the time of audit.
			Storage Capacity	Various storage scenarios from 150ML to 450ML	The actual capacity of ED1 coffor dam is 189.35 ML (survey after construction, including 0.5m freeboard).	Within range of scenarios listed in Table 7.1
Section 7.1	Pages 11 and 12		ED1 Coffor Dam Cells	WSP Report included a number ED1 Coffor Dam cell scenarios	ED1 coffor dam has only 1 cell. Volume capacity is 189.35 ML including 0.5m freeboard.	1st Scenario in Section 7.1
		ED1 North Dam	Dam Input	Stormwater from its catchment and direct rainfall	ED1 north dam will need to be re-assessed. The footprint of the ED1 coffor dam has been increased from the proposed one in the WSP report, which lead to a change of the ED1 north dam surface area. ED1 not only receives runoff from its external catchment, but also receives water from PCD and Western Ridge, dewatering activities by Heron. Approximately 100ML of water has been transferred into ED1 from Heron's Activities (from Tailings Dam)	Different to WSP
Dam Output	75kw Minetek Units - throughput flow 25 L/s each unit.		Heron are in the installation stage of the evaporation system in the ED1 north dam although the specifications of the system are yet to be confirmed. A letter was provided to the NSW EPA on 28 September 2018 from Veolia regarding, amongst other things, the installation of evaporators on ED1. This letter documented the previous plan to install evaporators at the end of 2018 (subject to Essential Energy connection agreement and Heron Resources High Voltage connection schedule). Veolia have been advised that Heron have ordered evaporative equipment and are in the installation stage of the evaporation system in the ED1 north dam.	Not confirmed yet		
Section 1.3 and 7.3	Pages 4, 19, 20 and 21		ED3N1, ED3N2, ED3N3	Dam Input	Treated water from the existing leachate treatment dam and direct rainfall and local runoff	No change from water balance. Treated water is sprayed into the dam cells to promote evaporation.
		Dam Output		Floating Evaporation Unit Type A	Each cell has a floating evaporator Type A and has been running since Feb 2018. Flowrate is 2 L/s for each cell. ED3N1 operates about 40% of the time. ED3N2 and ED3N3 operate about 50% of the time.	Same as WSP
		ED3N4	Dam Input	Treated water from the existing leachate treatment dam and direct rainfall and local runoff	All of the leachate produced in 2018 discharged into ED3N system. Treated water is sprayed into the dam to promote evaporation.	Same as WSP
			Dam Output	Existing Mechanical Evaporator (x 5) at the bank of ED3N4 and Floating Evaporation Unit Type A	ED3N4, has 3 of floating evaporator Type A and has been running since Feb 2018. Flowrate of each evaporator is 2 L/s and they operate about 60% of the time. The number of mechanical evaporators is 4 at the moment. Flowrate is about 6-15 L/s, varying from 1 - 4 units operating. Operates about 40% of the time. In addition to the above evaporation system, spray evaporation nozzles has been installed to the inlet of the ED3N system, which will evaporate about 5-10% of the treated leachate discharged to ED3N system.	Different to WSP
		ED3S5	Dam Input	Treated water from the existing leachate treatment dam and direct rainfall and local runoff	No change from water balance. Treated water is sprayed into the dam to promote evaporation.	Same as WSP
			Dam Output	Floating Evaporation Unit Type B x 3	Has 3 of the floating evaporator Type B. Flow rate is about 86 L/min. Operates about 50% of the time.	Same as WSP
Section 1.2	Page 3	Leachate Production	2018	3 L/s (Sep 2017) - 6 L/s (Sep 2018)	2.25L/s	Different to WSP
			2019	6 L/s	The leachate production rate in the future is expected around 4-6 L/s till end of 2019, dependent on the performance the LTP and the demand of transfer leachate out from the bioreactor.	Same as WSP
		Leachate Supply to ED1 Coffor Dam	2018	0 L/s	0 L/s	Same as WSP
			2019	4 L/s	4 L/s	Same as WSP
		Leachate Supply ED3N, ED3S5	2018	2 L/s	2.1 L/s	Similar to WSP
			2019	2 L/s	2 L/s	Same as WSP
Section 4	Page 7	Dam Seepage	All Dams	Potential seepage loss from the dam floors were not considered in the simulations	Dam inspections are conducted internally each month and have not shown evidence of seepage.	Same as WSP
Section 7.3	Page 19	Leachate Supply Priority	LTP	Veolia will continue to supply leachate to ED3N4 while the evaporators are operating. If required, the leachate will be diverted to other dams in the following order of priority: ED3N1, ED3S5, ED3N3 and ED3N2.	All the extracted leachate from Bioreactor will be treated in LTD and discharge into ED3N or ED3S5 until LTP starts to operates at designed load. After LTP operates at designed load, 0 -2 L/s of leachate will be treated in LTD and discharge to ED3N or ED3S5. There is no priority of discharging. The leachate will be discharged to whichever cell not reaching the 0.5m freeboard.	Similar to WSP

Dam Data

Dam	Catchment (ha)	Total Dam Volume (ML)	Dam Spill Level (m AHD)	Dam Surface Area (m2)	30 August 2017		30-Apr-19	
					Volume of Water (ML)	Water Surface Level	Volume of Water (ML)	Water Surface Level
ED3N1	1.148	22.593	791.3	8573	16.9	790.61	13.9	790.22
ED3N2	0.93	18.08	791.1	7104	18.1	791.10	16.9	790.92
ED3N3	0.89	14.796	791	6304	13.1	790.73	8.7	789.95
ED3N4	4.59	104.21	791.3	39720	76.1	790.57	95.9	791.09
ED3SS	2.59	111.446	793.62	21782	102.7	793.21	81.9	792.18
ED1 North	55	Unknown	788.8	417916	380.2	786.7	Unknown	786.38
ED1 Coffe Dam		189.35	Unknown	66090	0.0	0	0.1	786.53

APPENDIX C

Audit Certification Form

Development Name	Woodlawn Bioreactor Site
Development Consent No.	Project Approval MP 10_0012, as modified
Description of Development	Bioreactor where landfilling and gas extraction is undertaken
Development Address	Collector Road, Tarago, NSW
Operator	Veolia Environmental Services (Australia) Pty Ltd
Operator Address	Collector Road, Tarago, NSW
Title of Audit	Woodlawn Bioreactor LWMS 2018 Independent Audit
<p><i>I certify that I have undertaken the independent Audit and prepared the contents of the attached independent Audit report and to the best of my knowledge:</i></p> <p><i>The Audit has been undertaken in accordance with relevant approval condition(s) and in accordance with the Auditing standard AS/NZS ISO 19011:2014 and Post Approval Guidelines – Independent Audits</i></p> <p><i>The findings of the Audit are reported truthfully, accurately and completely;</i></p> <p><i>I have exercised due diligence and professional judgement in conducting the Audit;</i></p> <p><i>I have acted professionally, in an unbiased manner and did not allow undue influence to limit or over-ride objectivity in conducting the Audit;</i></p> <p><i>I am not related to any owner or operator of the development as an employer, business partner, employee, sharing a common employer, having a contractual arrangement outside the Audit, spouse, partner, sibling, parent, or child;</i></p> <p><i>I do not have any pecuniary interest in the Audited development, including where there is a reasonable likelihood or expectation of financial gain or loss to me or to a person to whom I am closely related (i.e. immediate family);</i></p> <p><i>Neither I nor my employer have provided consultancy services for the Audited development that were subject to this Audit except as otherwise declared to the lead regulator prior to the Audit; and</i></p> <p><i>I have not accepted, nor intend to accept any inducement, commission, gift or any other benefit (apart from fair payment) from any owner or operator of the development, their employees or any interested party. I have not knowingly allowed, nor intend to allow my colleagues to do so.</i></p> <p><i>Note.</i></p> <p><i>The Independent Audit is an ‘environmental Audit’ for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an Audit report produced to the Minister in connection with an environmental Audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</i></p> <p><i>The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or \$22,000, or both).</i></p>	
Signature	
Name of Lead / Principal Auditor	Tracey Ball
Address	10 Kings Road, New Lambton NSW 2305, Australia
Email Address	tball@slrconsulting.com
Auditor Certification (if relevant)	Principal Environmental Auditor
Date:	13 June 2019

APPENDIX D

Endorsement of SLR



Contact: Jennifer Rowe
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Amandeep Brar
Environmental Planner NSW
Veolia Environmental Services (Australia) Pty Ltd
Cnr Unwin and Shirley Streets
ROSEHILL NSW 2142

Dear Amandeep

**Woodlawn Bioreactor & Leachate Treatment Plant
(MP10_0012)**

I refer to your letter dated 1 February 2019 seeking the Secretary's endorsement for an audit team to undertake the Leachate and Water Management System Audit (audit) under Project Approval MP10_0012 as modified (the approval) for the Woodlawn Bioreactor and Woodlawn Leachate Treatment Plant.

Having considered the qualifications and experience of the SLR Consulting Pty Ltd audit team, namely;

- Tracey Ball – SLR Lead Auditor
- Duncan Barnes – SLR Water Quality Specialist

the Secretary endorses the appointment of this team to undertake the audit in accordance with Condition 18R of Schedule 4 of the approval. This approval is conditional on the audit team being independent of the development.

Prior to submitting the audit report to the Secretary, it is recommended that Veolia review the report to ensure it complies with the relevant approval condition.

Should you wish to discuss this matter please contact Jennifer Rowe on the details above.

Yours sincerely

Katrina O'Reilly
Team Leader Compliance
as nominee for the Secretary

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