APPENDIX N

Monitoring Program
1.0 INTRODUCTION

This Preliminary Monitoring Program (PMP) has been prepared by Golder Associates Pty Ltd (Golder Associates) on behalf of Landfill Operations Pty Ltd (Landfill Ops) to support the Works Approval Application for the proposed Extension to the Melbourne Regional Landfill (MRL) site (referred to as ‘the Extension’).

This monitoring program is considered to be preliminary only to show the intent of the Monitoring Program envisaged for the Extension using reports prepared for the Works Approval Application (WAA).

The Monitoring Program for the Existing Landfill (MRL) is currently being updated by Landfill Ops in accordance with EPA protocols and the document is to be reviewed and approved by an Environmental Auditor. The new Monitoring Program for the Existing Landfill will be utilised to update this PMP for the Extension.

It is expected that prior to the start of Cell construction for the Extension (in 2025) a detailed Risk Assessment and Monitoring Program would be prepared for the Extension (RAMP) in accordance with the EPA protocols of the day. We expect the future RAMP would be prepared in accordance with EPA Publication 1323.2 Landfill Licensing Guideline – Component A - Environmental Monitoring and Auditing. The RAMP would be reviewed and approved by an EPA accredited Environmental Auditor.

1.1 Objectives

The monitoring program aims to ensure potential environmental impacts are monitored and demonstrate compliance with relevant policies and regulations. The effectiveness and performance of proposed environmental controls are assessed based on performance indicators and assigned action levels.

Preparation of the risk assessment aspects of the monitoring program is in accordance with the risk based approach outlined in EPA Publication 1321.2 Licence Assessment Guidelines - Guidelines for Using a Risk Management Approach to Assess Compliance with Licence Conditions. The program is based on the priority of risk ratings identified by an Environmental Risk Assessment. The Monitoring Program component is based on the intent of EPA Publication 1323.2.

1.2 Structure of the Document

The monitoring program has been provided in three main components for each potential environmental impact. The first component is a summary of the risk assessment undertaken to assess the priority of environmental monitoring and an introduction to the monitoring strategy for the proposed landfill. The second section provides the environmental indicators and action values relevant for the site. The third section outlines the monitoring methodology.
1.3 Legislative Overview

The *Environmental Protection Act 1970* (EP Act) is the key piece of environmental protection legislation in Victoria. Under the EP Act, a series of State Environmental Protection Policies (SEPPs), Waste Management Policies (WMPs) and regulations are enacted. These policies and regulations provide operational and monitoring controls for licenced facilities. The following SEPPs, WMPs and their associated environmental performance objectives are relevant to operations at the Extension to MRL:

- SEPP (Ambient Air Quality)
- SEPP (Air Quality Management)
- SEPP (Prevention and Management of Contaminated Land)
- SEPP (Groundwaters of Victoria)
- SEPP (Control of Noise from Commerce, Industry and Trade)
- SEPP (Waters of Victoria)
- WMP (Siting, Design and Management of Landfills)

EPA Publication 788.3 *Best Practice Environmental Management – Siting, Design, Operation and rehabilitation of Landfill* (BPEM) describes the requirements of the WMP.

Further information is provided in the Works Approval Application (WAA).

2.0 Site Risk Assessment

A site environmental risk assessment has been undertaken to estimate the extent of environmental impacts of the proposed works. The sensitive receptors have been identified in Figure 4. The following documents have been referenced for inclusion in the site risk assessment:

- Air Quality Assessment, Pacific Environment Pty Ltd, February 2016;
- Hydrogeological Assessment, AECOM, February 2016;
- Stormwater Management Plan, Golder Associates, February 2016;
- Leachate Management Plan, Golder Associates, February 2016;
- Landfill Gas Management Plan, Golder Associates, February 2016;
- Noise Assessment, Marshall Day Acoustics Pty Ltd, February 2016;
- Traffic Impact Assessment, GTA Consultants (Vic) Pty Ltd, February 2016;

2.1 Risk Identification

The risks identified in the environmental risk assessments related to the proposed works and environmental management objectives. The following process was used to identify the environmental risks:

- **Source identification:** Consideration of both sources and events, including waste contaminants, landfill gas, leachate, odour, noise, dust, wind and flood events that relate to the proposed landfill design and operation.

- **Pathway identification:** Consideration of pathways such as surrounding site geology, groundwater flow and depth, wind speed and direction, diffusion through air, direct physical contact or ingestion.
**Receptor identification**: Consideration of receptors both on and off site, including site staff, local road users and neighbouring properties. Receptors also included receiving environments such as the atmosphere, surface water, groundwater and land.

Using the above process the likelihood of risk outcomes being realised were assessed.

### 2.2 Risk Priority

Environmental risks were considered depending on proximity to sensitive receptors, site conditions and activities. The high priority risks were identified as requiring frequent environmental monitoring. The risks will be re-assessed and prioritised upon review of monitoring results once the landfill begins operation in 2026.

The risks listed for the various operational and environmental aspects of the site include consideration of landfill gas, odour, noise, leachate, groundwater, surface water, dust, storage and handling of chemicals and fuels, fire, noxious weeds, vermin and disease vectors, waste acceptance and the wheel wash.

### 3.0 MONITORING PROGRAM

The Monitoring Program is based on the results of assessment and reports prepared for the Works Approval Application.

#### 3.1 Landfill Gas

A landfill gas risk assessment is included in Section 6 of the Landfill Gas Management Plan included as Appendix H of the Works Approval Application.

##### 3.1.1 Monitoring Strategy

A landfill gas monitoring program is included in Section 7 of the Landfill Gas Management Plan included as Appendix H of the Works Approval Application.

##### 3.1.2 Indicators and Action Levels

Refer Appendix H of the Works Approval Application.

##### 3.1.3 Methodology

Landfill gas monitoring is carried out by suitably qualified personnel using an FID or laser diode monitor. The equipment is calibrated and maintained in accordance with the manufacturer’s specifications and calibration certificates are to be stored on site. A quality assurance / quality control program will be implemented consisting of duplicate monitoring, cross checking, field inspection audits and equipment maintenance and calibration.

The performance of the flares and landfill gas engines will be monitored to assess the efficiency of landfill gas destruction and to detect any issues with the landfill gas extraction system. The data will be automatically logged and saved on an online database.

#### 3.2 Odour

Potential sources of odour at MRL are identified as deposited waste, leachate and landfill gas. Pacific Environment has undertaken a comprehensive analysis of the odour issues related to the Extension in their Air Assessment, refer to Appendix J of the Works Approval Application. A site specific odour monitoring plan will be prepared and reviewed by EPA prior to the commencement of the Extension.

#### 3.3 Noise

Marshall Day Acoustics Pty Ltd has prepared a Noise Assessment, attached as Appendix K of the Works Approval Application.

The primary sources of noise have been identified as vehicle and plant associated with the landfill operations and other commercial noise sources. The risk assessment is summarised in modelling undertaken by Marshall Day in their report.
3.3.1 Noise Monitoring Strategy

Monitoring associated with the preparation of the Noise Assessment is discussed in the Marshall Day report including a strategy of noise mitigation measures (Section 7 Appendix K of the WAA).

It is anticipated that the new Monitoring Plan being developed for the Existing Landfill would take account of the Marshall Day report. It is anticipated the monitoring program for the Extension would take account of the potential impacts of noise beyond the site boundary by assessing the need for the following activities:

- Noise monitoring inspections by Cleanaway personnel at site boundaries and at key sensitive receptors if required;
- Maintenance of a noise complaints register; and
- Maintenance of a register of EPA communications.

3.3.2 Noise Indicators and Action Levels

Noise criteria adopted for the Extension are discussed in Section 5 and Appendix D of the Noise Assessment report.

3.3.3 Noise Methodology

Noise monitoring is to be undertaken at a frequency to be assessed in consultation with EPA to ensure that noise emitted beyond the site boundary is below the adopted Noise criteria. The monitoring locations will depend on the proximity of sensitive receptors and wind direction. Measurements are recorded using a sound level meter, which is to be properly calibrated and checked before and after the monitoring round. If noise levels above the noise limit are detected, further investigation is undertaken into the noise source and effectiveness of noise mitigation measures.

3.4 Leachate

Leachate levels quality and level monitoring are to be undertaken at a frequency to be assessed in consultation with EPA. The risk of leachate from landfilling activities impacting on the site groundwater has been assessed as Very Low, based on the AECOM Hydrogeological Assessment, attached as Appendix D of the Works Approval Application, summarised in Table 1. This is because the site is designed to contain an engineered landfill liner and cap in accordance to BPEM requirements.

<table>
<thead>
<tr>
<th>Table 1: Leachate Risk Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspect/Source</td>
</tr>
<tr>
<td>Waste tipping and placement</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Leachate overflow or spill</td>
</tr>
</tbody>
</table>

3.4.1 Leachate Monitoring Strategy

The proposed leachate monitoring program consists of the following measures:

- Measuring of leachate collection sump levels;
- Collection and testing of leachate samples;
- Recording of leachate extraction and disposal by evaporation or other measures; and
3.4.2 Leachate Indicators and Action Levels
The action level for the head of leachate in each leachate sump is 0.3 m above the liner surface. If the action level is exceeded, leachate extraction should be initiated to reduce the leachate head.

3.4.3 Leachate Methodology
Gauging of all leachate collection sumps is proposed to be undertaken with sampling of leachate at a frequency to be agreed with EPA. In-situ testing will be carried out for the following parameters:

- pH;
- Electrical conductivity;
- Redox potential
- Dissolved oxygen concentration; and
- Temperature

The collected samples will be tested at a NATA accredited laboratory for the following parameters:

- Major ions (calcium, magnesium, sodium, potassium, bicarbonate alkalinity, sulphate and chloride);
- Total dissolved solids;
- Chemical oxygen demand (COD);
- Total organic carbon (TOC); and
- Heavy metals (iron and manganese)

The sampling methodology is to be in accordance with EPA Publication IWRG701.

3.5 Groundwater
The groundwater monitoring program is designed to identify potential impacts on groundwater systems from leachate and other landfill operations. The risks associated with contamination of groundwater have been assessed in the AECOM Hydrogeological Assessment included as Appendix D of the Works Approval Application.

3.5.1 Groundwater Monitoring Strategy
The proposed actions for monitoring groundwater quality consist of:

- Installation of groundwater monitoring bores;
- Measuring of groundwater levels; and
- Sampling and testing of groundwater.

3.5.2 Groundwater Indicators and Action Levels
The action levels are based on protecting the potential beneficial uses of Segment C groundwater. Table 2 summarises the performance indicators and action concentrations for groundwater monitoring. Monitoring of groundwater is to be undertaken at a frequency to be agreed with EPA.
Table 2: Groundwater Monitoring Summary

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Maintenance of Ecosystems</th>
<th>Industrial Water Use</th>
<th>Buildings and Structures</th>
<th>Stock Watering</th>
<th>Primary Contact Recreation</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.5 - 9</td>
<td>6.0 - 8.3</td>
<td>6.5 - 8.5</td>
<td>6.5 - 8.5</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>420</td>
<td></td>
<td>1 000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td></td>
<td></td>
<td></td>
<td>1 800</td>
<td></td>
</tr>
<tr>
<td>Bicarbonate</td>
<td></td>
<td></td>
<td></td>
<td>2 000</td>
<td></td>
</tr>
<tr>
<td>Sulphate (as SO₄)</td>
<td></td>
<td></td>
<td>1 000</td>
<td>1 000</td>
<td>2 500</td>
</tr>
<tr>
<td>Chloride</td>
<td>19 000</td>
<td>6 000</td>
<td></td>
<td></td>
<td>2 500</td>
</tr>
<tr>
<td>TDS</td>
<td>1 000</td>
<td>35 000</td>
<td>2 000 – 5 000</td>
<td>12 000</td>
<td></td>
</tr>
<tr>
<td>Nitrate as N</td>
<td>7.2</td>
<td></td>
<td></td>
<td>90.3</td>
<td>113 – 226</td>
</tr>
<tr>
<td>Nitrite as N</td>
<td></td>
<td></td>
<td></td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td>Ammonia as N</td>
<td>0.74</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>0.3</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Manganese</td>
<td>1.9</td>
<td></td>
<td>0.2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td>0.024</td>
<td></td>
<td>0.5</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.0002</td>
<td></td>
<td>0.01</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Chromium</td>
<td>0.001 (CrVI)</td>
<td></td>
<td>1</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>0.0014</td>
<td></td>
<td>0.4</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Mercury (inorganic)</td>
<td></td>
<td></td>
<td>0.0006</td>
<td>0.002</td>
<td>0.01</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.011</td>
<td></td>
<td>1.0</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>0.0034</td>
<td></td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>0.008</td>
<td></td>
<td>20</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. ANZECC, 2000 Water Quality Guidelines for Protection of Aquatic Ecosystems (95% freshwater).
2. ANZECC, 1992 Industrial Water Use.
5. NHMRC, 2011 Australian Drinking Water Guidelines increased by a factor of 10 based on NHMRC 2008 Guidelines for Managing Risks in Recreational Waters.
6. All concentrations are expressed as mg/L.

3.5.3 Methodology
Water sampling will be undertaken by qualified personnel. A quality assurance / quality control plan will be implemented for the sampling of groundwater monitoring bores. All field equipment is to be properly calibrated. Chain of custody forms will be submitted with lab samples. The nominated laboratory will be NATA accredited. Sampling and testing procedures will be verified through the collection and analysis of blind field duplicates, field splits and rinsate blanks for each monitoring round. Additional monitoring rounds or installation of additional groundwater monitoring bores may be required if action levels are exceeded.

3.6 Stormwater
Stormwater quality is monitored to ensure that surface water contaminated by leachate or waste litter is not discharged beyond the site boundary. Table 3 summarises the risk of stormwater contamination for the proposed works.
Table 3: Stormwater Risk Matrix

<table>
<thead>
<tr>
<th>Aspect/Source</th>
<th>Hazard</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Consequence</th>
<th>Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste tipping and placement</td>
<td>Leachate generation</td>
<td>Runoff from the active tipping face or leachate storage pond overflow</td>
<td>Stormwater</td>
<td>Contaminant migration impacting on surface waters connected to the stormwater management system.</td>
<td>Very Low</td>
</tr>
<tr>
<td>Fuel or chemical handling</td>
<td>Fuel or chemical spill</td>
<td>Runoff from spill</td>
<td>Stormwater</td>
<td></td>
<td>Very Low</td>
</tr>
</tbody>
</table>

3.6.1 Monitoring Strategy
The stormwater monitoring strategy consists of:

- Sampling of stormwater quality at retention points;
- Inspection of sediment and erosion control measures; and
- Visual monitoring of runoff for wastes and sediment.

3.6.2 Indicators and Action Values
The current action values for stormwater discharge off site are presented in Table 4:

Table 4: Stormwater Monitoring Summary

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Action Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total phosphorus</td>
<td>$\leq 45$ (75&lt;sup&gt;th&lt;/sup&gt; percentile)</td>
</tr>
<tr>
<td>Total nitrogen</td>
<td>$\leq 600$ µg/L (75&lt;sup&gt;th&lt;/sup&gt; percentile)</td>
</tr>
<tr>
<td>Dissolved oxygen</td>
<td>$&gt; 90%$ saturation (25&lt;sup&gt;th&lt;/sup&gt; percentile)</td>
</tr>
<tr>
<td>Dissolved oxygen maximum</td>
<td>110%</td>
</tr>
<tr>
<td>Turbidity</td>
<td>$\leq 10$ NTU (75&lt;sup&gt;th&lt;/sup&gt; percentile)</td>
</tr>
<tr>
<td>Turbidity dry weather</td>
<td>50 Maximum NTU</td>
</tr>
<tr>
<td>Turbidity stormwater flows</td>
<td>100 Median NTU</td>
</tr>
<tr>
<td>Electrical conductivity</td>
<td>$&lt; 1500$ µS/cm</td>
</tr>
<tr>
<td>pH</td>
<td>$&gt; 6.5$ pH units (25&lt;sup&gt;th&lt;/sup&gt; percentile) and $&lt; 8.3$ pH units (75&lt;sup&gt;th&lt;/sup&gt; percentile)</td>
</tr>
</tbody>
</table>

Stormwater monitoring will be carried out at a frequency to be agreed with EPA.

3.6.3 Methodology
Stormwater sampling methodology is based on EPA Publication IWRG701. Similar to groundwater monitoring, a quality assurance/quality control plan will be implemented to ensure accuracy of sampling procedures and laboratory testing.
3.7 Dust

Nuisance airborne particles generated by the proposed works must not be discharged beyond the boundaries of the premises. The risks associated with dust deposition have been assessed and summarised in the Air Quality Assessment prepared by Pacific Environment, attached as Appendix J of the Works Approval Application.

3.7.1 Monitoring Strategy

The following measures are proposed to monitor the migration of dust from the Extension.

- Monitoring of dust deposition;
- Maintenance of a dust complaints register; and
- Maintenance of a register of EPA communications.

3.7.2 Indicators and Action Values

Dust action values are derived from the SEPP (Air Quality Management) design values for performance indicators. The indicators and limits for dust monitoring are summarised in the Air Quality Assessment.

3.7.3 Methodology

Dust monitoring requirements are discussed in the Air Quality Assessment. If required, dust monitoring stations measure the concentration of the dust in the ambient air at specific time intervals. Dust particles are captured on a filter and total suspended particles and particles as PM$_{10}$ are measured. Portable instruments may be considered if high dust levels are detected to find the major contributing sources. Equipment will be properly calibrated and records of calibration kept on site.

3.8 Chemicals and Fuels

The level of risk associated with chemical and fuel spills or leaks is assessed by the location and quantity of the spill. The first priority in managing spills and leaks is containment. The extent of the contamination will be measured and remedial actions undertaken. All chemical and fuel storage areas at the Extension are to be bunded accorded to EPA Publication 347.1.

<table>
<thead>
<tr>
<th>Aspect/Source</th>
<th>Hazard</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Consequence</th>
<th>Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical or fuel spill/leak</td>
<td>Toxic materials</td>
<td>Direct dermal contact</td>
<td>Contractor and Landfill Ops employees</td>
<td>Illness</td>
<td>Low</td>
</tr>
<tr>
<td>Chemical or fuel spill/leak</td>
<td>Contamination of groundwater</td>
<td>Migration through surrounding geology</td>
<td>Groundwater</td>
<td>Contaminant migration impacting beneficial uses of Segment C groundwater.</td>
<td>Very Low</td>
</tr>
<tr>
<td>Chemical or fuel spill/leak</td>
<td>Contamination of stormwater</td>
<td>Surface runoff</td>
<td>Stormwater system</td>
<td>Contamination of stormwater system</td>
<td>Low</td>
</tr>
</tbody>
</table>

3.8.1 Monitoring Strategy

The following monitoring strategy is proposed for chemicals and fuel storage and handling:

- Inspections on storage capacity and bunding;
- Regular vehicle and plant maintenance;
- Maintenance of a complaints register; and
- Maintenance of a register of EPA communications.

3.9 Litter

Landfill Ops are required to contain all litter within the site boundaries. Litter screens will be installed around the perimeter of the proposed operations to capture wind blown litter and stormwater litter traps will be installed over drains. Monitoring is required to verify the performance of litter control measures. The risks associated with litter are summarised in Table 6 below.

Table 6: Litter Risk Matrix

<table>
<thead>
<tr>
<th>Aspect/Source</th>
<th>Hazard</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Consequence</th>
<th>Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migration of litter beyond the site</td>
<td>Wind borne pollution</td>
<td>Wind</td>
<td>Adjacent properties</td>
<td>Loss of amenity</td>
<td>Low</td>
</tr>
<tr>
<td>boundary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flora and Fauna</td>
<td>Injury, illness, damage to habitat</td>
<td>Very Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Surface Water</td>
<td>Contamination of Skeleton Creek</td>
<td>Very Low</td>
</tr>
</tbody>
</table>

3.9.1 Monitoring Strategy

Monitoring of litter controls will be undertaken at a frequency to be agreed with EPA, with an increased frequency likely during periods of extreme wind conditions. The monitoring strategy for litter includes:

- Regular inspection of litter screens and stormwater litter traps; and
- Recording of any defects or litter observed outside the site perimeter and weather conditions at the time.

3.10 Noxious Weeds

A noxious weed is designated under the Catchment and Land Protection Act 1994 as any plant that harms public health, agriculture, recreation, wildlife or property. There are four categories of noxious weeds:

- State prohibited weeds;
- Regionally prohibited weeds;
- Regionally controlled weeds; and
- Restricted weeds.

An overview of the risks associated with the spread of noxious weeds is provided below. Any noxious weed infestations identified on the site are to be eradicated by physical removal or spraying.
<table>
<thead>
<tr>
<th>Aspect/ Source</th>
<th>Hazard</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Consequence</th>
<th>Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spread of noxious weeds off site</td>
<td>Presence of noxious weeds</td>
<td>Wind or transported by animals e.g. birds</td>
<td>Flora and fauna</td>
<td>Damage to habitat</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Harm to adjacent land zoned for farming or agricultural use</td>
<td></td>
</tr>
<tr>
<td>Spraying for weeds using Contractor vehicle</td>
<td>Toxic materials</td>
<td>Direct dermal contact</td>
<td>Contractor and Landfill Ops employees</td>
<td>Illness</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diffusion through air</td>
<td>Contractor and Landfill Ops employees</td>
<td>Illness</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct contact/ingestion</td>
<td>Flora and fauna</td>
<td>Illness, death, damage to habitat</td>
<td>Low</td>
</tr>
<tr>
<td>Physical removal of weeds</td>
<td>Erosion</td>
<td>Surface runoff</td>
<td>Stormwater system</td>
<td>Contamination of stormwater system</td>
<td>Low</td>
</tr>
</tbody>
</table>

### 3.10.1 Monitoring Strategy

The following monitoring strategy is proposed for the Extension.

- Training of Landfill Ops personnel in the identification of noxious weeds;
- Inspections of incoming waste loads containing fill and vegetation; and
- Regular landscape inspections to identify possible noxious weed infestations.

As additional areas of the landfill are rehabilitated they will be incorporated into the monitoring schedule.

### 3.11 Landfill Fire

The occurrence of landfill fire at the proposed site has been assessed to be Low – Medium given that:

- The site is projected to accept municipal waste.
- The proposed site is currently surrounded by agricultural grassland areas.
- The North Portion of the Extension is currently designated by the Department of Environment, Land, Water and Planning as a bushfire prone area, however is not subject to a bushfire management overlay.

Firebreaks will be established around the perimeter where possible. The landfill fire risk matrix is summarised below.
Table 8: Landfill Fire Risk Matrix

<table>
<thead>
<tr>
<th>Aspect/Source</th>
<th>Hazard</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Consequence</th>
<th>Risk Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occurrence of site fire (overland or landfill)</td>
<td>Odour, Smoke</td>
<td>Diffusion through air</td>
<td>Contractor or Landfill Ops employees and adjacent properties.</td>
<td>Loss of amenity</td>
<td>Low - Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Road users of adjacent roads (Hopkins Road, Riding Boundary Road, Middle Road).</td>
<td>Loss of amenity</td>
<td>Low - Medium</td>
</tr>
<tr>
<td>Occurrence of site fire</td>
<td>Underground through waste</td>
<td></td>
<td>Contractor or Landfill Ops employees and site infrastructure.</td>
<td>Loss of amenity</td>
<td>Low</td>
</tr>
</tbody>
</table>

3.11.1 Monitoring Strategy

The following monitoring procedure is proposed:

Surface fire monitoring

- Monitoring of high fire danger conditions for the local area using Bureau of Meteorology (BoM) data and Country Fire Authority (CFA) warnings.
- Recording of local fire outbreaks on daily inspection sheets.
- Recording of any outbreaks of fire on site and documented investigation of the cause and response.

Underground fire monitoring

- Recording of surface temperature measurements and site weather conditions.
- Plotting of hot spots, areas of subsidence or outbreaks of smoke or odour using handheld GPS device.
- Monitoring of landfill gas and leachate sumps for elevated carbon monoxide levels.

3.11.2 Indicators and Action Levels

Table 9 provides indicators and action levels for landfill fires. UK Environment Agency Publication *Review and Investigation of Deep-Seated Fires within Landfill Sites* was reference for carbon monoxide action levels.

Table 9: Landfill Fire Monitoring Summary

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Indicator</th>
<th>Action Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>High fire risk weather conditions</td>
<td>BoM and CFA warnings</td>
<td>Period of high fire danger or total fire ban</td>
</tr>
<tr>
<td>Local fire outbreaks</td>
<td>As observed or reported in local media</td>
<td>Occurrence of fire in local area or on neighbouring properties</td>
</tr>
<tr>
<td>Surface temperature measurements</td>
<td>Surface temperature above background surface temperature</td>
<td>Increase in surface temperature over time</td>
</tr>
<tr>
<td>Areas of subsidence, odour and smoke</td>
<td>Sink holes, strong odour, 'steam' or smoke observed</td>
<td>Reoccurrence or increase in observations</td>
</tr>
<tr>
<td>Carbon monoxide levels</td>
<td>Carbon monoxide above background levels</td>
<td>1000 ppm</td>
</tr>
</tbody>
</table>

Note

1. Monitoring frequency to be agreed with EPA.
3.11.3 Methodology
The following equipment will be required for landfill fire monitoring;

- Surface temperature: hand-held surface temperature measurement meter suitable for soil temperature measurement.
- CO levels: hand-held gas meter.
- Monitoring locations: hand-held GPS.

All equipment will be calibrated in accordance with manufacturer's instructions and calibration certificates retained on site. The data collected will be reviewed for anomalous reading and trends. The monitoring results will be recorded and submitted as part of the landfill annual performance statement.

3.12 Vermin and other Disease Vectors
Vermin, flies, mosquitos and birds are identified as potential disease carrying vectors. Various control measures are to be implemented to minimise the risk and control the spread of disease vectors from the site and prevent exposure to Landfill Ops staff and Contractors.

Table 10: Vermin and other Disease Vectors Risk Matrix

<table>
<thead>
<tr>
<th>Aspect/Source</th>
<th>Hazard</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Consequence</th>
<th>Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vermin and pests</td>
<td>Spread of diseases</td>
<td>Direct dermal contact</td>
<td>Contractor and Landfill Ops employees</td>
<td>Illness</td>
<td>Low</td>
</tr>
</tbody>
</table>

3.12.1 Monitoring Strategy
The following monitoring strategy is proposed to minimise the spread of disease vectors at the Extension.

- Inspections and maintenance of the landfill cap and quarry floor to minimise ponding water;
- Regular inspections of buildings and structures for vermin; and
- Monitoring of stormwater ponds for the breeding of mosquitos.

3.13 Waste Acceptance and Placement
Landfill Ops are required to monitor waste acceptance and placement to ensure that prohibited waste is not deposited and that waste is compacted in stable lifts and the specified cover layer thickness installed. The incoming waste loads are inspected prior to disposal. Table 11 summarises the risks associated with waste acceptance and placement.
Table 11: Waste Acceptance and Placement Risk Matrix.

<table>
<thead>
<tr>
<th>Aspect/Source</th>
<th>Hazard</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Consequence</th>
<th>Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deposit of prohibited wastes</td>
<td>Breach of licence conditions</td>
<td>Direct deposit to active tipping face</td>
<td>Landfill Ops</td>
<td>EPA penalty</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Potential groundwater contaminant</td>
<td></td>
<td>Groundwater</td>
<td>Contamination of groundwater</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waste instability</td>
<td></td>
<td>Landfill stability</td>
<td>Geotechnical failure causing injury, death, damage to amenity</td>
<td></td>
</tr>
<tr>
<td>Inadequate compaction of waste</td>
<td>Waste instability</td>
<td>Waste placement process</td>
<td>Landfill stability</td>
<td>Geotechnical failure causing injury, death, damage to amenity</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Waste instability</td>
<td>Waste placement process</td>
<td>Landfill stability</td>
<td>Geotechnical failure causing injury, death, damage to amenity</td>
<td></td>
</tr>
<tr>
<td>Interim slope</td>
<td>Waste instability</td>
<td>Waste placement process</td>
<td>Landfill stability</td>
<td>Geotechnical failure causing injury, death, damage to amenity</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Loss of cover soil</td>
<td>Interim slope is too steep to retain cover soil</td>
<td>Contractor and Landfill Ops employees Properties in proximity of the site.</td>
<td>Offensive odour, migration of landfill gas and contribution to greenhouse gas emissions</td>
<td></td>
</tr>
</tbody>
</table>

3.13.1 Monitoring Strategy

The following strategy is proposed to monitor waste acceptance and placement:

- Inspection of incoming waste loads for;
  - Hazardous materials;
  - Liquid or chemical wastes;
  - ‘Hot’ loads;
  - Any other materials prohibited by the landfill licence.
- Random sampling of incoming waste loads;
- Recording of vehicles carrying prohibited materials;
- Recording of location of active tipping face;
- Inspection of deposited wastes; and
- Inspection of waste compaction, interim slope and cover soil thickness.
3.14 **Wheel Wash**

The wheel wash is used by vehicles exiting the site in order to control the migration of contaminants from the active tipping face. Water is recirculated to conserve water and trap sediment present in the wash water.

<table>
<thead>
<tr>
<th>Table 12: Wheel Wash Risk Matrix</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Aspect/source</th>
<th>Hazard</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Consequence</th>
<th>Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation and maintenance of wheel-wash as a result of landfill activities</td>
<td>Contaminated washwaters</td>
<td>Direct dermal contact</td>
<td>Contractor and Landfill Ops employees</td>
<td>Illness</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct ingestion</td>
<td>Fauna</td>
<td>Illness and death</td>
<td>Very Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Migration through fractured basalt geology and overland flow</td>
<td>Groundwater</td>
<td>Contaminant migration impacting beneficial uses</td>
<td>Very Low</td>
</tr>
<tr>
<td>Contaminated sediment</td>
<td>Direct dermal contact</td>
<td>Contractor and Landfill Ops employees</td>
<td>Flora and fauna</td>
<td>Illness and death</td>
<td>Low</td>
</tr>
</tbody>
</table>

3.14.1 **Monitoring Strategy**

The following monitoring strategy is proposed.

- Regular inspection and maintenance of wheel wash;
- Regular removal of sediment build up;
- Regular replacement of recirculated water; and
- All liquid and solid waste disposed of appropriately.

3.14.2 **Indicators and Action Values**

Records to demonstrate wheel wash maintenance and disposal of wheel wash wastes.

4.0 **DATA MANAGEMENT AND AUDIT REVIEW**

To assist the monitoring program, Landfill Ops will be required to maintain the following records:

- Waste inspection register;
- Site incident register;
- Site inspection sheets;
- Landfill complaints register;
- Landfill rectification requests and instructions;
- Landfill employee and contractor induction checklist;
- Training records;
- Groundwater management records;
- Leachate management records;
- Surface water management records;
- Landfill gas management records;
- Dust, noise and odour management records; and
- Plant and equipment management and maintenance records.

MRL will be required to submit an Annual Performance Statement (APS). Audits of operational performance will be conducted by an independent Environmental Auditor subject to periodic risk assessment review. The APS will be accompanied by monitoring results, the monitoring program and an analysis of performance against each licence condition for the previous financial year.

LJY/ATG/ljy