APPENDIX O
Aftercare Management Plan
1.0 INTRODUCTION
Landfill Operations Pty Ltd (Landfill Ops) engaged Golder Associates Pty Ltd (Golder Associates) to provide a Preliminary Aftercare Management Plan (AMP) for the proposed extension to the Melbourne Regional Landfill (the ‘Extension’). This AMP is to be read in conjunction with the Works Approval Application (WAA).

2.0 BACKGROUND
This Preliminary AMP has been prepared in general accordance with EPA Victoria Publication 788.3 Best Practice Environmental Management for the Siting, Design, Operation and Rehabilitation of Landfills (2015) (BPEM) Section 8.2 and the intent of the EPA Victoria Publication 1490 Closed Landfill Guidelines (2012). It is expected that a more detailed AMP would be prepared at the time of landfill cap commencement in accordance with EPA licence conditions of the day.

All aftercare management activities will be conducted in accordance with the EPA Licence or Post Closure PAN that is in-place at the time of closure.

The BPEM objective of aftercare management is to manage the site after closure so that environmental protection and monitoring systems are maintained until the landfill has stabilised. The BPEM suggests a typical period of aftercare of approximately 30 years for a putrescible (type 2) landfill. The landfill life expectancy (waste placement period) for the MRL extension is 30 years, with the end of waste filling anticipated in 2055. The final cap is scheduled to be constructed progressively in accordance with the Landfill Sequencing Plan, as described in the WAA.

The total landform cap area is approximately 210 Ha. The final cap comprises the following layers;

- 150 mm topsoil: encourages growth of vegetation.
- 850 mm subsoil: provides a barrier between the lining materials and the surface of the cap, provides drainage and supports plant growth.
- Geocomposite drainage layer: collects subsurface water from the base of the subsoil layer and discharges the collected water to the stormwater management system.
- Linear low density polyethylene (LLDPE) geomembrane liner: acts as a barrier to water infiltration.
- 600 mm compacted clay liner: in combination with the geomembrane provides a very low permeability barrier layer.
Vegetation and rehabilitation of the final landfill cap will be carried out in accordance with the Rehabilitation Plan prepared by ERM, dated 2016, a copy of which is attached to the WAA. Refer to Section 8.1 and 8.2 of Landscape and Visual Impact Assessment, which is attached to this memo.

3.0 LANDSCAPE REHABILITATION

Landscape rehabilitation will be undertaken at the completion of each stage in order to stabilise the final soil profile and to reduce the visibility of future stages. Planting must be based on the characteristics of the final surface, which are:

- Planting will be on a 1.5 m – 2.0 m topsoil mound above the clay capping of the landfill. This capping must not be penetrated by root systems and so trees are to be placed on these low mounds (refer to Figure 8-4).
- For maintenance reasons, it is preferable that the majority of the site is slashable which reduces the probability of Eucalypts self-seeding on landfill areas.
- As landscape rehabilitation will occur in stages concurrent with landfill staging, vehicular and emergency access and drainage must define planting schedule and locations. This should be reassessed after the completion of all stages.
- As the landfill settles, there may be minor changes in elevation, which may require future grading.

It is intended to use a variety of planting techniques including tube and cell planting, hydro-seeding and direct seeding.

3.1 Planting at commencement

It is proposed to thicken up planting to boundary areas where gaps or thinning vegetation exists and to stabilise and vegetatively cover exposed earth surfaces.

Species selected for screening will contain a high proportion of fast growing indigenous native shrubs and small trees, as well as larger but slower growing canopy tree species.

3.1.1 Rehabilitation Techniques

Tube stock and cell planting involves placement of developed seedlings into the soil. These are protected by a plant guard and are usually staked to increase survival rates. Hydro-seeding involves the application of a liquid solution containing seed and usually a soil binding product and/or fertiliser. This process is used to apply seed over large areas or areas at grade. Planting techniques will aim to provide a final establishment rate of:

- Canopy species - 2 plant per 10m² (Proposed planting technique - tube stock or enviro cells)
- Mid storey species - 2 plant per 10m² (Proposed planting technique – tube stock or enviro cells)

It is also proposed that on site soil reserves (stockpiled from selected material delivered to the MRL Extension) will be used to provide the topsoil above the clay capping and will be used on exposed surfaces where grass can be established. Rye grass seed will be introduced to provide initial soil stabilisation, and would be used instead of native seed due to greater germination success, and therefore soil stabilisation. Rye grass is also cost effective, as most of the site will require slashing to manage Eucalyptus or other tree germination on the landfill areas.

The seed would be applied via hydro-seeding containing a mixture of seed and a soil-binding product. A soil-binding product provides a binder within the soil that lasts approximately 18 months, in which time germination would have occurred. This improves hydro-seeding success rates.

3.2 Plant Selection

It is not intended that this planting re-create the species mix of the indigenous EVCs, but rather select species to provide an upper storey canopy and which will also provide a stable and vegetated appearance.
4.0 MAINTENANCE OF LANDFILL CAP

The purpose of the landfill cap is to contain the waste and prevent the migration of contaminants from inside the landfill and to prevent water (rainfall) from entering the waste. The integrity and performance of the landfill cap is required to be maintained throughout the aftercare period.

Once the landfill cap, vegetation and rehabilitation works are complete the site will begin the aftercare management period. Site walkovers are to be undertaken at a frequency to be determined in consultation with the EPA. The site walkovers shall inspect the cap for:

- Ponding water;
- Cracking;
- Depressions;
- Exposed waste; and
- Erosion.

In the event that these aspects occur then a methodology will be developed to rectify the cap (contingency plan). Table 1 summarises the contingency planning anticipated for maintenance of the final landfill cap.

<table>
<thead>
<tr>
<th>Trigger condition</th>
<th>Contingency Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface cracking</td>
<td>Cover soils where significant cracking is observed shall be removed to the depth of cracking and additional cover soils placed. A surface landfill gas survey shall then be undertaken to confirm the effectiveness of remedial works.</td>
</tr>
<tr>
<td>Surface depression capable of ponding water</td>
<td>Any depressions capable of ponding water shall be filled with a layer of clayey subsoil material with top soil placed on top such that the area is free draining.</td>
</tr>
<tr>
<td>Exposed area of waste</td>
<td>Investigate the reasons for the exposed areas and prepare a report with recommendations for rectifications works. The cap shall be reinstated to cover any exposed waste. A surface landfill gas survey shall then be undertaken to confirm the effectiveness of remedial works.</td>
</tr>
<tr>
<td>Areas of erosion</td>
<td>Investigate the reasons for the erosion areas and prepare a report with recommendations for rectification works. Areas of erosion shall be rehabilitated to prevent further damage. A surface landfill gas survey shall then be undertaken to confirm effectiveness of remedial works.</td>
</tr>
</tbody>
</table>

5.0 MAINTENANCE AND OPERATION OF LEACHATE MANAGEMENT SYSTEM

The leachate management system collects leachate generated by the waste and pumps the leachate to evaporative leachate storage ponds. The volume of leachate generated is expected to progressively decline in the post closure period. Leachate levels are monitored to prevent the build-up of leachate above the base liner.

Any blockages in the system are detected through monitoring of leachate inspection lines and cleared. Inspections of the leachate management system are also undertaken to detect any defects or damage to infrastructure.

Regular maintenance of the leachate management system is anticipated post closure at a frequency to be determined in consultation with the EPA to include the following as a minimum:

- Visual inspections of the leachate storage ponds to check for any defects in the lining and pumping systems.
- Regular maintenance of the leachate pumps as and when needed to ensure the effectiveness of the pumping system. As a minimum it would be expected that the pumps would be cleaned and serviced on a regular basis.
■ Regular inspections of the integrity of the leachate sumps in each landfill cell including visual inspections. It is anticipated that camera inspections of the sumps would occur at a frequency to be determined based on the performance of the leachate system in conjunction with the EPA requirements of the day.

■ In the event that Landfill Ops elect to construct an onsite leachate treatment plant then maintenance requirements would depend on the type of plant constructed. It is assumed that the plant would be maintained in accordance with a site specific maintenance plan agreed with EPA and the Operations Environmental Auditor.

6.0 MAINTENANCE AND OPERATION OF LANDFILL GAS MANAGEMENT SYSTEM

The landfill gas management system is required to undergo periodic inspections to ensure the integrity and performance of the system is maintained.

Generator and flare power outages or shutdowns trigger an automatic notification to the system operator. The system is then analysed to investigate the source of the defect and remedial work carried out.

Landfill Ops will maintain maintenance and monitoring of the gas management infrastructure on an ongoing basis post closure in accordance with the current EPA approved protocols developed for the Existing Landfill.

Regular maintenance of the landfill gas management system is anticipated post closure, at a frequency to be determined in consultation with the EPA, to include the following as a minimum:

■ Visual inspections of the LFG infrastructure to check for any defects in the lines, seals around penetrations and gas extraction systems.

■ Regular maintenance of the LFG infrastructure as and when needed to ensure the effectiveness of the system. As a minimum it would be expected that the landfill gas extraction infrastructure would be cleaned and serviced on a regular basis.

During the post closure period it is anticipated that gas engines (power generators) and flares will be very active for the first 10 to 15 year period post closure of the landfill (post 2055) converting landfill gas collected in the system to green power electricity. With time, say around 10 to 15 years post closure, the rate of gas generation will start to decline, as discussed further in the Landfill Gas Management Plan attached to the WAA.

It is anticipated that post closure with time the number of landfill gas engines and flares needed will reduce from peak production (around 27 engines) in 2055. The gas engines and flares will be decommissioned in a phased process as landfill gas generation rates decline. The capacity of the gas compounds, located as shown on Figure 15 – Landfill Gas Management Plan (refer Appendix B of the WAA) will be gradually reduced to correspond with gas production results.
7.0 ENVIRONMENTAL MONITORING IN THE AFTERCARE PERIOD

The frequency of monitoring in the aftercare period (post closure of the landfill) may be decreased based on the consistency of environmental monitoring results and emerging trends that may indicate a reduced need for monitoring. The following areas require ongoing environmental monitoring in the post closure period.

7.1 Groundwater

The groundwater within the site has been classified as Segment C (refer to the Hydrogeological Assessment). Monitoring of groundwater is to be undertaken. Groundwater monitoring is undertaken for a period until an Environmental Auditor and EPA are satisfied monitoring is complete. Any groundwater monitoring wells removed or damaged by future development must be replaced or repaired.

7.2 Surface Water

Until vegetation has been established, runoff from the capped areas will be classified as sediment laden and will be subject to sediment controls such as silt fencing. The surface water collection and storage system shall be inspected to ensure the landfill cap is free draining and functioning. The swale drains shall be inspected for erosion, any depressions capable of ponding water and build-up of sediment will be rectified. The capacity of the 22 stormwater ponds located at the site will be monitored. Inspections shall be undertaken after heavy rainfall to ensure the system is not overloaded. Any defects observed during site inspections shall be recorded and rectified.

7.3 Landfill Gas

Landfill gas monitoring and frequency for the proposed MRL extension has been provided in the Landfill Gas Management Plan attached to the Works Approval Application. Trigger levels will be developed during the post closure period according to BPEM action values, monitoring bore location, landfill gas risk assessment and previous monitoring results.

The landfill gas management system needs to be maintained until monitoring indicates that gas generation rates have decreased to allow decommissioning of the system. The monitoring results must be reviewed by the EPA prior to decommissioning of any management infrastructure. At this point the gas management system may be downgraded according to the BPEM requirements for treatment strategies at different landfill gas generation rates. Prior to this, any landfill gas monitoring bores or other management infrastructure removed or damaged by future development must be repaired or replaced.

7.4 Leachate

The landfill is expected to continue to generate leachate into the post closure period. Regular monitoring is required to demonstrate clear trends in leachate generation. At a time to be agreed with the EPA post closure, the leachate generation will decrease to a negligible rate that poses no hazard to the environment and the leachate collection system will no longer require operation. EPA will review monitoring data to assess this and give approval to cease maintenance of the leachate management system. Inspections after heavy rainfall are carried out to ensure the system is not overloaded and that leachate levels above the base liner do not exceed established action levels.

7.5 Settlement

Most settlement is expected in the first 5 to 10 years after closure. Frequent settlement inspections are required during this period. Based on the inspection results, monitoring of settlement may be decreased over time in consultation with the EPA and the Environmental Auditor.

8.0 CLOSURE

Landfill Ops are committed to ensuring that the Landfill Aftercare Management Plan is implemented until an Environmental Audit demonstrates that the site no longer poses a risk to the environment, or for at least 30 years after the site has stopped receiving waste. EPA may serve a pollution abatement notice on the site to ensure ongoing management of the site and place the site on a Priority Sites Register to ensure that all potential future stakeholders are aware of the ongoing management requirements of the site.

Closure of the Aftercare Management Plan or selected maintenance activities may take place subject to EPA approval upon review of monitoring results.
LJY/ATG/ljy

Attachments: Extract from ERM Landscape and Visual Impact Assessment (February 2016)

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8 END USE PLAN AND REHABILITATION

It is proposed that a staged landscape rehabilitation program be commenced, not only to provide short term screening to the areas discussed previously especially along Hopkins Road and Middle Road, but also to implement a landscape program that will lead to an end use land use that is consistent with the surrounding landscape pattern of the area.

8.1 Rehabilitation Plan

The rehabilitation of the landfill will be undertaken progressively following completion of the northern and southern portions of the landfill. The progressive rehabilitation is shown in Figure 8-1.

Existing perimeter planting to the western and southern boundaries will be retained. Planting will be undertaken within gaps in vegetation to the northern section of the western perimeter.

Stormwater ponds will be strategically located along the perimeter of the landfill. These will be ephemeral in nature and will sustain native vegetation.

A swale along the western boundary will integrate with the existing drainage line such as the Skeleton Creek. Ephemeral wetlands are proposed behind existing perimeter planting. Figure 8-3 shows the section across the northern portion of the MRL Extension.

Planting to the landfill will be undertaken following the capping. Planting on the landfill will be undertaken in hedgerows that will mimic existing windrow along property lines in the farmland area as well as in copses that will mimic remnant patches of indigenous vegetation. Such planting will integrate with the existing landscape character of the area upon establishment.
8.1.1 Potential pedestrian network

A shared pedestrian and bicycle access track will allow future users to walk or cycle to the summit of the landfill portions and enjoy the views over the surrounding landscape.

The Structure Plan for Mt Atkinson shows a pedestrian connection to the eastern boundary of the structure plan. This connection should be continued on the eastern side of Hopkins Road. Such a connection is shown as a black dotted line in Figure 8-2.

The pedestrian network would also connect to highpoints located on the northern and southern portions of the landfill, which would afford views to the surrounding landscape.
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