TECHNICAL MEMORANDUM

DATE 09 April 2020 **Project No.** 19135652-013-M-Rev1

TO Paul Anthony,

CC

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ERSKINE PARK LANDFILL MSE WALL MODIFICATION – GROUNDWATER AND LEACHATE SUMMARY REVIEW OF IMPACTS

1.0 GROUNDWATER

1.1 Existing

Topography, Geology, Hydrology, and Regional Hydrogeology are described elsewhere in the application.

According to the 2005 EIS, the landfill was designed as a 'saturating entombment landfill', where the groundwater flows into the landfill from the surrounding rocks until the level of the water in the fill reaches the level of the surrounding groundwater. The level of the leachate in the landfill is to be maintained below the water levels in the surrounding rock so that there is a positive flow direction into the landfill.

The original leachate collection system design was based on a grading of the base of the landfill so that the leachate runs to a low point, at which location a leachate riser was installed (LP001). Leachate was historically extracted from the landfill to maintain the leachate level within the landfill to below RL 30 mAHD. Leachate extraction switched to LP003 the 'Auxiliary riser' in late 2016 after burial of LP001.The base of LP003 is understood to be at approximately RL 35 mAHD (Senversa, 2019). LP003 has been extracting approximately 60 m^3/day.

A groundwater monitoring network is in place and monitored quarterly to review the impact of leachate on the surrounding groundwater. NSW EPA has approved the design of the groundwater monitoring network and the aquifer contamination program (Consulting Earth Scientists 16 October 2006 and DECC approval 31 October 2006).

A hydrogeological assessment was undertaken by Senversa, 2019 reference *Hydrogeological Assessment, Erskine Park Landfill, Quarry Road, Erskine Park, NSW, Senversa, 2019.*

The Site conceptual site model is described by Senversa 2019 as follows:

- *Stratified waste and leachate quality, with high strength leachate present at depth, and low strength leachate at shallower depths, due to dilution from infiltrating rainfall.*
- *Sub-water table setting, but with leachate mounding within landfill boundaries.*
- *Low permeability (10^{-8} m/s to 10^{-9} m/s) and low effective porosity aquifer characteristics.*
- *An overall westerly groundwater flow , with localised variations to the north and south.*
- *Generally low to very low groundwater seepage rates (<1 m/year)*

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- *Reducing groundwater conditions, due to the naturally high organic content of Wiannamatta shales*
- *Naturally occurring ammonia in groundwater, which persist due to the highly reducing conditions in connate, saline (>5000 mg/L TDS) groundwater. Any leachate would be superimposed over this background ammonia.*
- *Possible localised influence on groundwater quality due to preferential infiltration around poorly compacted edges of landfill waste and adjacent unquarried brecciated rock*
- The Senversa 2019 report presents site characterisation, analytical fate and transport modelling, assessment of the provenance of ammonia, and risk assessment and concludes in summary:
  - The current monitoring network is generally suitable.
  - Over the course of leachate monitoring since 2016 there has only been one exceedance of the EPL ammonia reporting compliance concentration of 15 mg/L at BH17D. It is noted that BH17D may either be showing signs of damage or may be influenced by landfill surface water runoff.
  - The groundwater beneficial uses surrounding the landfill are very limited, due to low to very low aquifer yield and high salinity and there are no sensitive receptors within 1 km of the landfill.
  - Various lines of evidence indicate that ammonia in surrounding groundwater is predominantly naturally occurring.
  - There are increasing ammonia trends in some groundwater wells, albeit at concentrations less than 15 mg/L, however this may reflect a gradual equilibration of well water with surrounding formation groundwater.
  - Time of travel and solute transport screening modelling, results indicate travel times for ammonia are very long in the order of 1,000 years for ammonia to migrate 250 m downgradient.
  - It is concluded that the Erskine Park Landfill, even without active leachate extractions and continued leachate mounding, presents a low risk to surrounding and onsite groundwater quality and beneficial use.

As part of this application Enviroguard are seeking the removal of the Consent Condition and EPL requirements to maintain the leachate level below 30 mAHD.

Enviroguard propose to continue to extract leachate from LP003 at the current extraction rates.

1.2 Potential Impacts

A landfill liner would be constructed inside the MSE wall to mitigate against lateral migration of leachate. The potential for leachate migration would be controlled by the permeability of the liner system. Appropriate design and installation of the liner system would mitigate against impact to groundwater.

Leachate generated within new waste placed as a part of the Project is generally expected to migrate vertically downward driven by gravity, with leachate reporting to the current leachate management and collection system. This will be enhanced near the MSE wall with the inclusion in the design of soaking trenches within the waste at the toe of the liner.

1.3 Mitigations Measures

Design features have been incorporated into the Project design to mitigate the potential for leachate to impact upon ground water. The design incorporates a liner system to mitigate against the potential for lateral migration of leachate.

A Construction Quality Assurance (CQA) System would be in place for construction of the MSE Wall and Liner system.

Design and CQA requirements are presented in the report Mechanically Stabilised Earth Retaining Wall Preliminary Design Report, Golder 2020.

In addition, in line with the recommendations of the Senversa 2019 report, it is proposed to:

- Conduct an inspection of the groundwater monitoring network infrastructure and repair or replace as required.
- Continue to monitor the leachate and groundwater.
- Maintain current leachate extraction rates from LP003, in order to prevent leachate springs though the surface and ground level.
- Confirm the inverts of the South Creek tributaries to the west and south.
- Undertake a review of stormwater management pathways and repair as required.

2.0 LEACHATE

2.1 Existing

As per the 2005 EIS, the landfill has been designed as a 'saturating entombment landfill', where the groundwater flows into the landfill from the surrounding rocks until the level of the water in the landfill reaches the level of the surrounding groundwater.

The operational philosophy for management of leachate at the site, was to maintain the level of the leachate in the landfill below the water levels in the surrounding rock so that there is a positive flow direction into the landfill.

The leachate collection system design was based on a grading of the base of the landfill so that the leachate runs to a low point, at which location a leachate riser has been installed (LP001). Leachate has historically been extracted from the landfill to maintain the leachate level within the landfill to below RL 30 mAHD. Leachate extraction switched to LP003 the ‘Auxillary riser’ in late 2016 after burial of LP001.The base of LP003 is understood to be at approximately RL 35 mAHD. LP003 has been extracting approximately 60 m^3/day.

A Leachate Treatment Plant (LTP) was constructed onsite in June 2011 to treat leachate as per DA 11/0063.

The LTP has an average treatment capacity of 750 m^3 per day. The LTP has a maximum allowable discharge of 1036 m^3 per day as per the Site Sydney Water Trade Waste Agreement (maximum discharge rate of 12 L/s).

The LTP consists of the following;

- Equalisation Tank

- Sequencing Batch Reactors (SBRs)
- Final Equalisation Tank
- Aerobic Digester (Sludge Thickening Tank)
- Chemical Dosing System

Levels and quality of the leachate are monitored in the leachate riser.

As per *JPG Engineering Leachate Treatment Plant – Treatment Capacity (Rev 0) dated 9 March 2020,* leachate pumping rates reported between October 2018 to February 2020 are as follows;

- Average of 52.7 m^3/day
- Minimum of 35.6 m^3/day in September 2019
- Maximum of 131.2 m^3/day in November 2018

2.2 Potential Impacts

Enviroguard would continue to reduce leachate generation at the Site through the following operational measures adopted at the Site:

- Segregation of clean surface water run on to the landfill
- Application of daily and intermediate cover during landfill operations
- Reduce the area of the active tipping face
- Progressive vegetation of inactive batters where possible

Leachate generation at the Site is not expected to increase over the long-term as a result of the newly placed waste as part of the Project, this is due to:

- The new waste of approximately 420,000 cum represents only approximately a 5% increase in the total volume of waste at the landfill.
- The total footprint of the landfill, therefore the surface area over which rainfall can infiltrate has increased by less than 5% as a result of the Project.

Leachate generation during project construction may slightly increase due to local disturbance of interim capping in the active MSE wall construction area.

Any such slight increase in leachate generation at the landfill is within the capacity of the existing leachate collection, extraction and treatment system. The landfill is nearing its approved landfill life and therefore approaching worst case leachate generation scenario where the landfill is at capacity but not yet capped. Based on *JPG Engineering Leachate Treatment Plant – Treatment Capacity (Rev 0) dated 9 March 2020*, current average leachate pumping rates are 52.7 m^3/day compared to an average leachate treatment plant available capacity of 750 m^3/day.

2.3 Mitigation Measures

Mitigation Measures proposed to reduce the impact of leachate include:

- Continue to operate and maintain the leachate management collection, extraction and treatment system
- Continue to separate stormwater from leachate to reduce leachate generation

- Continue application of daily and intermediate cover during landfill operations
- Continue to reduce the area of the active tipping face
- Progressive vegetation of inactive batters where possible
- The Project design incorporates a liner system at the MSE wall to mitigate against the potential for lateral migration of leachate

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https://golderassociates.sharepoint.com/sites/120150/project files/6 deliverables/19135652-013-m-groundwater and leachate/19135652-013-m-rev1 groundwater and leachate text.docx

APPENDIX A

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