Tullamarine Closed Landfill Moonee Ponds Creek – Surface Water Salinity Assessment

Leachate Natural Attenuation Assessment

Hydrogeological Assessment (In Progress)





Purpose of the Assessment:

- Primary purpose of each assessment was to meet specific objectives;
- Secondary purposes were to feed the next
 Technical Report for Auditor Review (TRAR).

Works Undertaken by Kleinfelder:

- Surface Water Assessment
 - Supervision of surface water sampling and monitoring within
 Moonee Ponds Creek; and
 - Review of data to determine interaction between the landfill and Moonee Ponds Creek.
- Leachate Attenuation Assessment
 - Review of current and historical groundwater data (field parameters and analytical results); and
 - ⊂ Assess for lines of evidence of natural attenuation occurring.



Moonee Ponds Creek (MPC) – Surface Water Salinity Assessment

 Sampling and Monitoring works conducted by KingTech Services Pty Ltd (KingTech) during January 2014;

Consisted of two methods:

- ⊂ High Spatial Resolution Monitoring;
 - Monitored across 82 transects of MPC;
 - \odot Readings taken from every 1.0 m of pool width and 0.5 m of pool depth.
- C Low Spatial Resolution Monitoring.
 - C Sampling (for laboratory analysis) of 10 locations along MPC with an additional sample taken at the 'Rock Pond'.
- Sampling conducted during Summer to reflect 'Worst case conditions'.



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- Updated Conceptual Site Model:
 - C Localised northerly groundwater flow between the landfill and MPC has been predicted to decrease (Golder 2007 Modeling, Theil Engineering 2011);
 - C Previously reported MPC Morphology confirmed during assessment:
 - ⊂ GHD Macroinvertabrate findings regarding Macroinvertebrate correlations.
 - ⊂ Other potential sources of salinity to MPC:
 - ⊂ Upstream discharge points and overland flow.
 - C Re-vegetation and landscaping works on northern site boundary.





- C High Spatial Resolution Sampling
 - C Assessment of 'Groundwater Interaction within MPC' completed based on two criteria:
 - 1. EC reported at or above 5,000 μ S/cm; and
 - 2. Vertical stratification of EC apparent.
 - C High spatial resolution monitoring showed groundwater interaction with MPC in Zones 1 and 2 (with 18% and 19% of transects respectively showing interaction) with Zone 3 showing less interaction (4% showing interaction).

Base of Creek EC – High Spatial



Moonee Ponds Creek Monitoring Location

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C Low Spatial Resolution Sampling

- Contaminants of Interest (COIs) were screened against assessment criteria provided in Golder SRA (2007) and TRAR (2011):
 - Barium (upstream); Cobalt (all zones); Copper (adjacent and downstream); Nickel (adjacent and downstream); Total Manganese (all zones); Total Iron (all zones).
 - Other analytes Fluoride, Sulphate, Total Hardness and Zinc were above criteria all but zinc were detected in all three zones.
- C Copper, Nickel and Zinc were not detected within Zone1 but were within Zones 2 and 3.
- C Both Copper and Nickel were also above criteria within the 'Rock Pond'.

C Conclusions:

- Groundwater interaction with MPC is evident within each of the three Zones, however was less in downstream Zone 3;
- EC increases adjacent to MPC;
- Comparison of analytical concentrations with assessment criteria shows exceedances in all three Zones with only Copper, Nickel and Zinc unique to Adjacent and Downstream Zones;
- Of these, Copper and Nickel were both above criteria within the Rock Pond, indicating the potential significance of overland flow;
- There is evidence of upstream sources of impact to MPC however further assessment would be required to determine this;
- C Previous macroinvertebrate and frog assessments have concluded that impact from the landfill has had a negligible impact upon frog and macroinvertebrate communities.

Leachate Attenuation Report:

- Sampling and Monitoring works conducted by KingTech Services Pty Ltd (KingTech) during August 2014;
- Consisted of two methods:
 - In-situ monitoring:
 - C Collection of water quality parameter from within all accessible groundwater monitoring wells at the site;
 - Analytical Sampling:
 - Low flow sampling of 16 groundwater monitoring wells for laboratory analysis of natural attenuation indicators.
- Review of current and historical information for evidence of natural attenuation.

MBE 1879 LEGEND APPROXIMATE LOCATIO OF HISTORIC LEACHATE EVAPORATION PONDS MONITORING WELL LEACHATE EXTRACTION WELL M853 MONITORING WELLS UTILISED FOR EASTERLY FLOW DIRECTION ASSESSMENT NOCHE MONITORING WELLS UTILISED FOR SOUTHERLY FLOW DIRECTION ASSESSMENT WELL13 MBSL MBASU MB46L MBESL MBGS MB4 AND DO MB340 M843 PROXIMATE LOCATION FORMER LIQUID WASTE TREATMENT PLANT MOUND 3 MB49L M880 MB48L MOUND 2 APPROXIMATE LOCATION OF FORMER OIL RECOVERY PLANT 1848L CLOSED LANDFIL MEBL MB 14 MB 13 Flow Line 1 1114 MOUND 1 +L1 MB73 MB71 MB4UR MB4UB -MBB MB52 MB52U LAYOUT: 2 MB83 MBSSL MBSSU Flow Line 2 DO1A TCL Tulla MB54 MB54U 7005 NOTE: ALL LOCATIONS ARE APPROXIMATE DIMENSIONS IN METRES (m). 120 100 300 100 METRES DELTEK 1:6000 (A3) FIGURE PROJECT: 20143927.001A SITE PLAN DATE DRAWN: 20.03.15 DRAWN BY: FLE: 0:09 BOURNE KLEINFELDER LZ 2 The information included on this graphic representation has been complete from a value of scores and is adapted to information. Generative mains an encommendation on activity of the score of activity of the score of the transfer of the score of the score of the information activity of the score of the score of the score of the score of the information contained on the score of the score TCL TULLAMARINE LEACHATE ASSESSMENT CHECKED BY: MW Bright People. Right Solutions. FILE NAME: WESTERN AVENUE WESTMEADOWS, VICTORIA www.kleinfelder.com KLEIN 20143927.001A-3.dwg

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Leachate Attenuation Report:

- Assessment was conducted by evaluating lines of evidence:
- Primary evidence: A comparison of historical data, to show stable or decreasing concentrations over time; and
- 2. Secondary evidence: A comparison of observations of bio-degradation products and reactants within groundwater.



- The following mechanisms were assessed for:
 - Petroleum Hydrocarbons Evidence of active Terminal Electron Acceptor Processes (TEAP); and
 - C Chlorinated Hydrocarbons Evidence of Reductive De-chlorination.
- ⊂ The assessment was qualitative not quantitative.



- Primary Evidence:
 - Dissolved phase plumes are generally stable or decreasing;
 - In some instances the extent may not have decreased however the concentrations have;
 - C Primary evidence was indicative of natural attenuation occurring.



- Secondary Evidence:
 - Geochemical properties (dissolved oxygen, the oxidation or reduction potential, pH) all indicated areas of the site supportive of natural attenuation; and
 - C Review of reactants and products associated with attenuation of hydrocarbons identified oxygen, nitrate and manganese reduction as active TEAPs (petroleum hydrocarbons), and provided evidence of reductive dechlorination (chlorinated hydrocarbons) occurring.



- ⊂ Conclusions:
 - There is evidence of natural attenuation occurring at the site;
 - Monitored natural attenuation may be a viable management option for the site;
 - C Second stage attenuation assessment to provide a quantitative assessment.

Hydrogeological Assessment Report:

- Status Update:
 - C Approaching point of completion;
 - Has been informed by recent assessment works at the site (Practicability Assessment, Leachate Attenuation Report, updated conceptual understanding provided in additional reports);
- Two main objectives:
 - C Provide maximum leachate elevations to be maintained within the landfill;
 - C Provide leachate elevations to be maintained to ensure continued effective management of landfill gas.

Hydrogeological Assessment Report:

○ Maximum Leachate Levels:

- Proposed to determine levels based on the modelled changes in surrounding groundwater elevation;
- Modelling suggests stabilised groundwater elevation not likely to be observed until 30 years post landfill capping (2041);
- C Proposed interim levels to be met between now and 2041.

Hydrogeological Assessment Report:

- Leachate Levels for LFG extraction:
 - Primary consideration is to ensure gas collection systems do not become 'flooded' by leachate;
 - Current LFG extraction system is considered independent of leachate level;
 - C Proposed that current management of leachate level be continued.



Questions?

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