



BASELINE GROUNDWATER MONITORING REPORT PROPOSED ALLAWUNA LANDFILL SHIRE OF YORK



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Prepared for:

Bowman and Associates Pty Ltd

Prepared by:

ENV Australia Pty Ltd

Level 1, 503 Murray Street PERTH WA 6000 Phone: (08) 9214 6100 Fax: (08) 9226 4109 Email: <u>env@env.net.au</u>

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STATEMENT OF LIMITATIONS

Scope of Services

This environmental site assessment report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and ENV.Australia Pty Ltd (ENV). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on Data

In preparing the report, ENV has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, ENV has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. ENV will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to ENV.

Environmental Conclusions

In accordance with the scope of services, ENV has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions. Also it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.



Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. ENV assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of ENV or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.



1 INTRODUCTION

In August 2012, ENV Australia Pty Ltd (ENV) undertook the bore installation and an initial analysis of groundwater quality at the proposed Allawuna Landfill to be run by Sita Australia in the Shire of York. The site location is presented in Figure 1. The key factor to obtaining approval for a landfill facility is the adequate characterisation of the hydrology, hydrogeology and hydrochemistry.

Eight groundwater monitoring bores were installed ranging in depth from 10mbgl and 18mbgl. The location of the bores was be determined by Bowman and Associates. Bore MB02 did not intersect groundwater and so no monitoring data was collected.

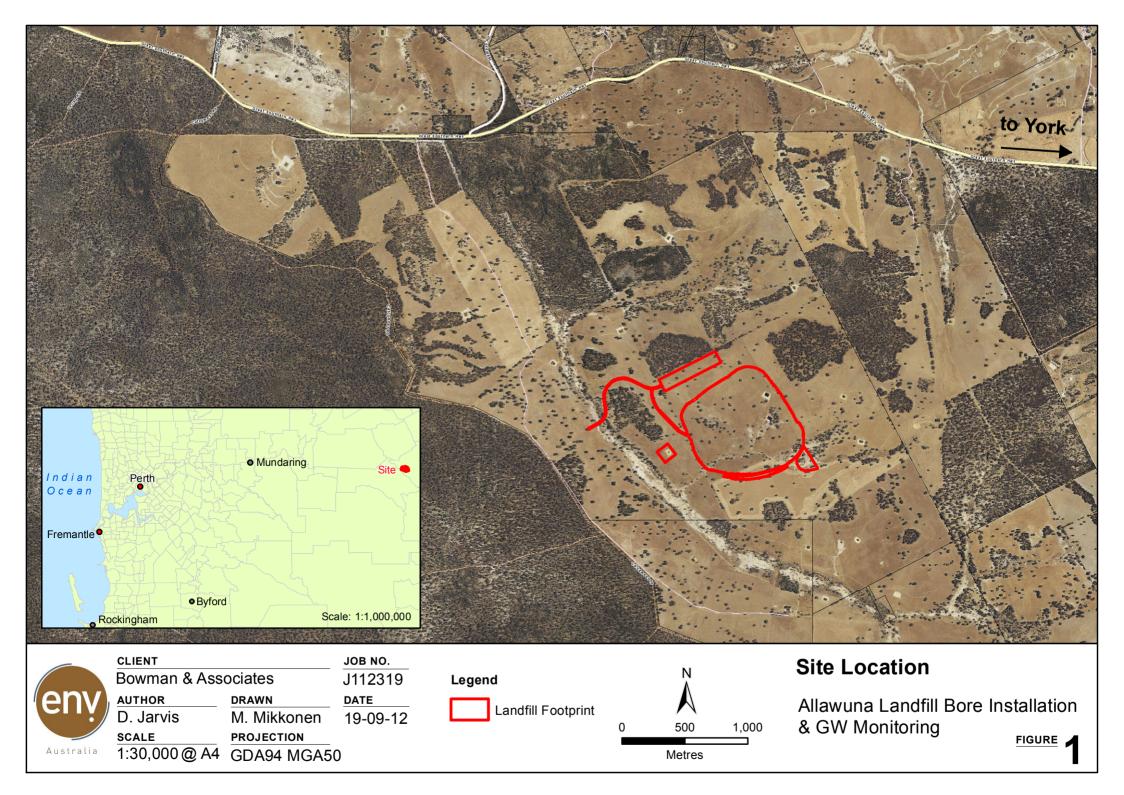
For each of the remaining seven bores the following field data was recorded:

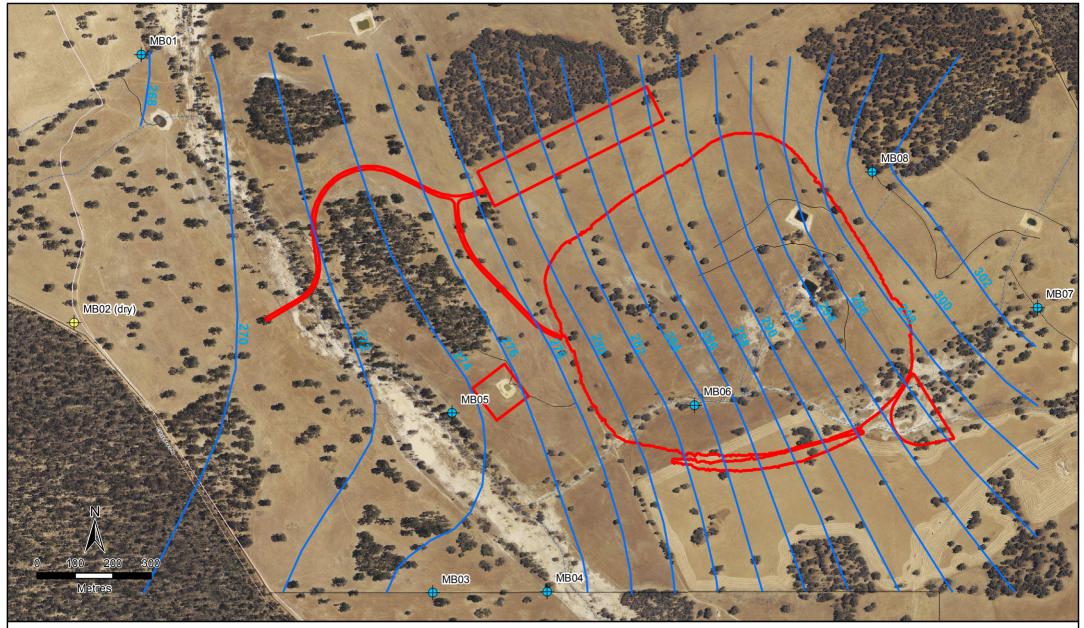
- Log of borehole lithology.
- Log of bore installation, including the location, top of casing elevation, screen depth and the ground level elevation in metres AHD.
- In-situ pH, temperature, electrical conductivity, and dissolved oxygen measured with a multi parameter probe.
- Standing water levels (SWLs) in mAHD.
- Level Troll 500 probe data to record the watertable recovery from slug tests from one bore central to the site (MB06) and three bores located nearest the boundaries (MB01, MB03 and MB07).
- Level Troll 500 probe data to record the watertable recovery from a single constant rate pump undertaken at MB06 with GWL observations at two observation bores (MB05 and MB08).

1.1 GROUNDWATER MONITORING BORE LOCATIONS

The locations of the eight monitoring bores are presented in Figure 2 along with groundwater level contours. The preliminary survey data was based on GPS readings for easting and northing (GDA94) and existing mapping for elevation (mAHD). The bore locations are presented in Table 1 (Section 3 - Results).







| | CLIENT Bowman & Asse | ociates | <u>јов no.</u> J112319 | Legend | | | | | |
|-----------|---|---|---------------------------|---------------|--|--|--|--|--|
| Australia | AUTHOR D. Jarvis SCALE 1:10,000 @ A4 | DRAWN M. Mikkonen PROJECTION GDA94 MGA50 | <u>date</u> 20-09-12 | ♦ ♦ | Groundwater Contour (m AHD) Monitoring Bore Dry Bore | | | | |

Groundwater Monitoring Bore Locations and Groundwater Contours (22/08/2012)

Allawuna Landfill Bore Installation & GW Monitoring

2 METHODS

2.1 MONITOR BORE INSTALLATION

The eight groundwater monitoring bores (50mm diameter) described in the groundwater monitoring bore installation logs (Appendix A) were installed using an air compressor with blade bit. Seven of the eight bores (MB01, MB03-MB08) were installed to a total depth of (at least) 1m below the depth at which the water table was intersected. For the remaining borehole (MB02), drilling continued to a total depth of 30m without intersecting the water table. As such, this borehole was not converted to a monitoring bore.

All seven completed bores were fitted with 6m of slotted screen from the base of the bore. The static water levels following the construction and development of each bore was, on average, about 5m higher than the GWLs intersected during the drilling, indicating that the water table is likely to be confined and under pressure at all bore locations.

2.2 SLUG TEST METHODOLOGY

A Level-Troll 500 probe was activated and placed in the bore. A slug of groundwater (approximately 1L) was "instantaneously" removed from the bore by hand and the response of the recovery was measured by the probe. The output from the Level-Troll is in mm of water in the column above the probe taken at one second intervals.

2.2.1 SLUG TEST DATA ANALYSIS

The time series data provides a graph that represents the groundwater recovery. Estimations of hydraulic conductivity (and other hydrogeological parameters) can be calculated from this graph by a number of methods that vary with regard to assumptions, complexity and accuracy. It is unlikely that all assumptions of the hydrogeology can ever be fully met for any investigation (Bouwer, 1978). As a result of this inherent uncertainty and the scope of the investigation, the simplest of these methods, "Hvorslev's Method" (Hvorslev, 1951) was used for the first stage of the analysis of the data.

A second method, attributed to Cooper et al (1967, in Bouwer 1978), was also used to estimate K. This method requires a more extensive understanding of the aquifer dimensions, however the use of empirically derived constants and limiting values can be employed to allow the calculation for K to be carried out with acceptable confidence in its accuracy.



The governing equation for calculating K using Hvorslev's Method:

Hvorslev's Method

 $K = r^{2} \ln(L/R) / 2^{L}To$

where:

r radius of the well casing (cm)

- R R radius of the well screen (cm)
- L length of the well screen (cm)
- To time required for water level to reach 37% of the initial change (second)
- K hydraulic conductivity (m/d)

The governing equation for calculating K using the Cooper et al Method (1967 in Bouwer, 1978):

 $K = (r^{2} \ln(\text{Re/Rw}) / 2^{L})^{(1/t)} (\ln(y0/y1))$

Cooper & Jacob Method

where:

- r radius of the well casing (m)
- Rw radius of the well (casing and screen) (m)
- Re effective radius over which head difference is dissipated (m)
- Le length of the well screen (m)
- y0 head difference at initial time To
- y1 head difference at T1
 - t T1-T0
- K hydraulic conductivity (m/s)

2.3 PUMP TEST METHODOLOGY

A pump was place in MB06 and was run continuously for approximately 5.5 hours. A Level Troll 500 probe was placed in the well to record the in-situ drawdown. Two other probes were placed in two surrounding observation bores (MB05 and MB08) to record any drawdown/recovery of the water table resulting from the pumping of MB06.

After about 5.5 hours of pumping, the pump was switched off. The in-situ Level Troll 500 probe remained in the bore for an additional 1 hour to measure the recovery response of the water table.

2.4 GROUNDWATER SAMPLING METHOD

Groundwater was sampled to provide an understanding of its background physical and chemical properties.

- A water bailer suitable for environmental investigations was used to purge the groundwater bores until stability in measured field physico-chemical parameters was achieved.
- Water samples were collected once field parameters have stabilised (including pH and electrical conductivity) and sent to a laboratory with NATA accreditation for the parameters



to be measured, and will be analysed in accordance with Standard Methods for Examination of Water and Wastewater 22nd Edition (APHA et. al. 2012).

- Analysis included the following parameters; pH, total dissolved solids, total organic carbon, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, zinc, potassium, chloride, sulphate, ammonia-N, nitrate-N, nitrite-N, total nitrogen, total phosphorous, total petroleum hydrocarbons, total recoverable hydrocarbons, BTEX, polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls, trichloroethylene (TCE), tetrachloroethylene (PCE), organochloride pesticides and organophosphorous pesticides.
- Collection of quality control field duplicate and triplicate samples was undertaken at a rate of one sample per 20 primary samples.



3 RESULTS

3.1 FIELD MEASURED PARAMETERS

Groundwater monitoring bore locations, depth to water and field measured water quality parameters: pH, Temperature, Dissolved Oxygen (DO), Electrical Conductivity (EC) and Total Dissolved Solids (TDS, derived from the value for EC i.e. TDS = EC x 680) are presented in Table 1.

| Moni toring | | linates | | ToC | Well | Ground | Total Well | | SWI | SWI | | | Water Q | | | Comments |
|-------------|-----------|------------|-----------------|-----------|------------|----------|------------|----------|---------|---------|-------|--------|-----------|----------|--------|-----------------------------|
| WellID | (MGA 94 | Zone 50) | Date | (m AHD) | Stickup | Level | Depth | SWL | (m AHD) | (m bgl) | pН | Temp | DO | EC | TDS | (odours, sheen etc) |
| | Easting | Northing | | . , | (m) | (m AHD) | (m bTOC) | (m bToC) | · , | 1 . 37 | | (°C) | (mg/L) | (mS/cm) | (mg/L) | |
| MB01 | 461241.00 | 6469802.00 | 22/08/2012 | 270.12 | 0.64 | 269.48 | 11.90 | 2.405 | 267.72 | 1.765 | 5.34 | 18.9 | 2.81 | 30.6 | 20808 | White, cloudy |
| | | | | | | | | | | | | | | | | ······ |
| MB02 | 461064.00 | 6469095.00 | 22/08/2012 | 287.62 | | 287.62 | | | | | | | | | | |
| IVIB02 | 461064.00 | 6469095.00 | 22/08/2012 | 287.62 | | 287.62 | - | - | - | - | | - | | - | - | - |
| | | | | | | | | | | | | | | | | |
| MB03 | 462012.00 | 6468382.00 | 22/08/2012 | 280.73 | 0.53 | 280.20 | 13.42 | 5.600 | 275.127 | 5.075 | 4.92 | 19.64 | 4.60 | 2.13 | 1448 | Slightly cloudy, no odour |
| | | | | | | | | | | | | | | | | |
| MB04 | 462314.00 | 6468385.00 | 22/08/2012 | 275.35 | 0.43 | 274.92 | 10.91 | 1.115 | 274.233 | 0.685 | 3.84 | 19.19 | 1.71 | 16.20 | 11016 | Clear, no odour |
| | | | | | | | | | | | | | | | | |
| MB05 | 462063.00 | 6468857.00 | 22/08/2012 | 274.65 | 0.77 | 273.88 | 9.70 | 1.804 | 272.848 | 1.036 | 5.14 | 19.23 | 1.25 | 6.38 | 4338 | Cloudy, brown/red, no odour |
| | | | | | | | | | | | | | | | | Clear, small amount of |
| MB06 | 462704.00 | 6468877.00 | 22/08/2012 | 283.88 | 0.53 | 283.35 | 10.64 | 0.543 | 283.332 | 0.013 | 5.06 | 19.31 | 1.53 | 19.70 | 13396 | sediment |
| MB07 | 463610.00 | 6469135.00 | 22/08/2012 | 304.46 | 0.53 | 303.93 | 10.55 | 1.055 | 303.404 | 0.525 | 5.70 | 19.9 | 4.34 | 1.3 | 884 | 01 |
| IVIBU / | 463610.00 | 6469135.00 | 22/08/2012 | 304.46 | 0.53 | 303.93 | 10.55 | 1.055 | 303.404 | 0.525 | 5.70 | 19.9 | 4.34 | 1.3 | 884 | Cloudy, orange, no odour |
| | | | | | | | | | | | | | | | | |
| MB08 | 463173.00 | 6469493.00 | 22/08/2012 | 308.19 | 0.53 | 307.67 | 11.25 | 6.530 | 301.663 | 6.005 | 3.93 | 18.2 | 4.88 | 26.1 | 17748 | Cloudy, light brown |
| IOTES: | | | | | | | | | | | | | | | | |
| SWL | | | Static Water Le | vol (thow | ator table | 2 | | | bToC | | bolow | Top of | Casing (| 50 mm PV | (C) | |
| SPH | | | Separated Pha | | | =) | | | bql | | | ground | | JUINNEV | 6) | |
| FC | | | Electrical Cond | | | | | | AHD | | | | eight Dat | um | | |
| TDS | | | Total Dissolve | | EC*680: E | PA 1993) | | | mS | | | iemens | | | | |

Table 1. Groundwater Monitor Bore Locations and Gauging Results.

3.2 SLUG TEST RESULTS

Table 2 presents the results for the successful slug tests performed at 4 bores (MB01, MB03, MB06 and MB07). The estimations of Hydraulic Conductivity (K in m/day) were calculated based on the methods described in Hvorslev (1951) and Cooper et al (1967).

| Monitor Bore | Hvorslev (1951) | Cooper et al. (1967) |
|-----------------|--------------------|-------------------------|
| MB01 | 0.03 | 0.5 |
| MB03 | - | 0.1 |
| MB06 | 0.02 | 0.6 |
| MB07 | 0.02 | 0.6 |

Table 2. Hydraulic Conductivity (K in m/day) based on slug test results.

The results for K range from 0.02 to 0.6 m/day. These values are in accordance with K values for clay soils (Bouwer, 1978), which estimate a range of 0.01-0.2 m/day for clay soils (surface)

The recovery curves are presented in Figure 3. The vertical scale on the graphs (mm) is arbitrary.



3.3 PUMP TEST RESULTS

Monitor Bore MB06 underwent pumping for approximately 5.5hrs at a rate sufficient to reduce the water table by about 2cm. The recovery of the well was monitored for one hour after the cessation of pumping. The water table recovered by about 1cm (Figure 4). The pump test at monitor bore MB06 did not provide any significant data to assist in the assessment of the regional hydrogeology. This was due to small magnitude of the measured drawdown in MB06, and the observations bores MB05 and MB08 (both several hundred metres away from MB06). The small magnitude of the measurements results in unacceptable margins of error in the estimation of a value for K (the hydraulic conductivity of aquifer material surrounding the bore being tested). An accurate estimation of K was also limited by the lack of reliable data of the dimensions of the aquifer, in particular the depth to the confining layer at the base of the aquifer, as well as the highly variable lithology of the soils at MB06 (and at the site in general).

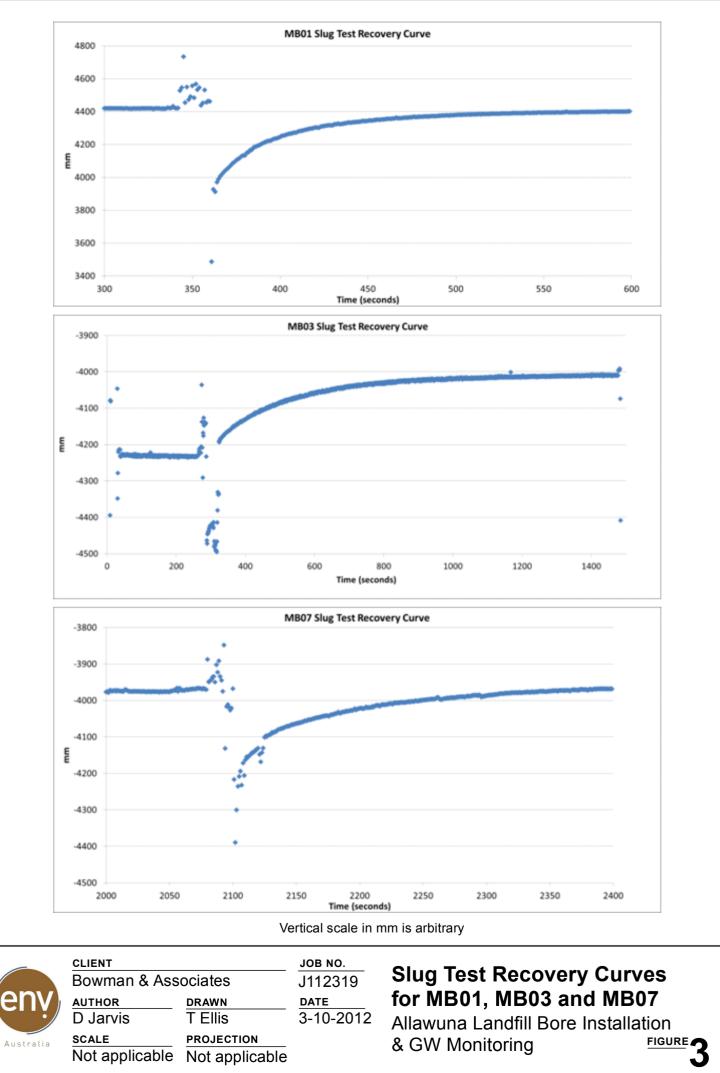
The locations of the monitoring bores were determined primarily for assessing groundwater levels and quality and, as such, were not ideally positioned for the pump test. The regional hydrogeology is, therefore, best assessed by considering the consistent results for K obtained from the slug testing of the four bores that are evenly distributed across the site.

3.4 WATER QUALITY RESULTS

Table 3 presents the laboratory analysis results for the seven bores that were sampled (MB01, MB03, MB04, MB05, MB06, MB07 & MB08) as well as for the duplicate (DUP1, MB06 as the primary) and triplicate (TRIP 1, MB06 as the primary). All samples (including DUP1 and TRIP1) were analysed for a total of 105 parameters from eight parameter groups, including:

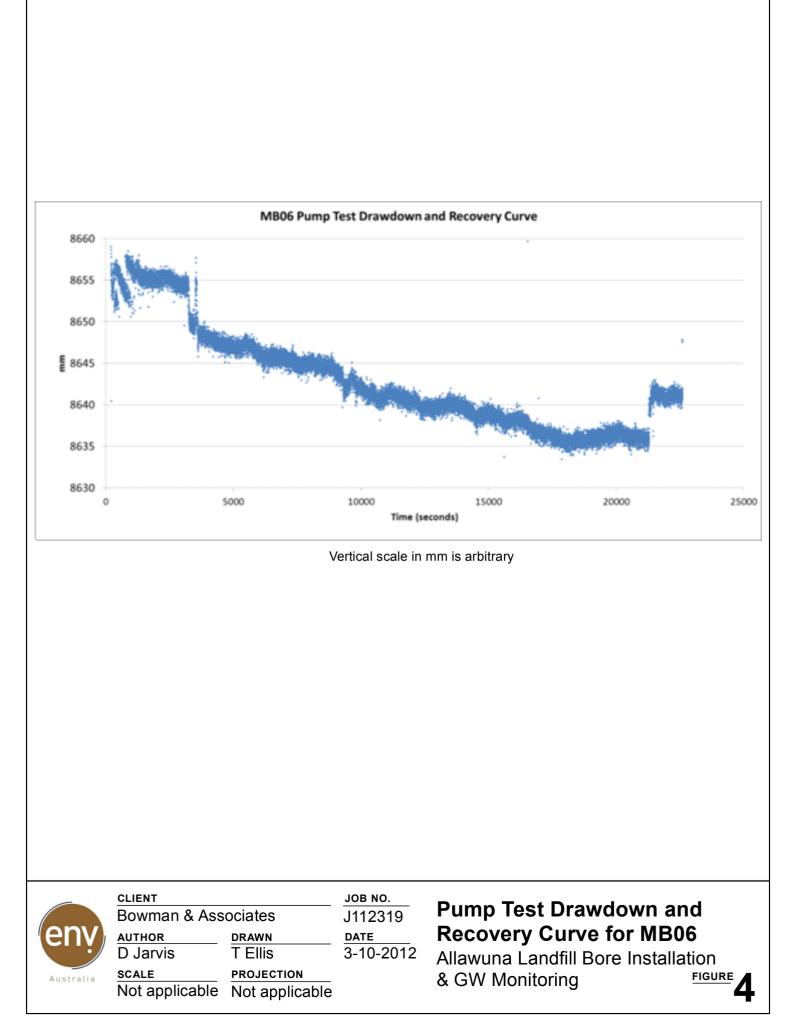
| Metals: | 12 |
|--------------------------------|----|
| TPH 1999 NEPM Fractions: | 5 |
| TRH Draft 2010 NEPM Fractions: | 4 |
| MAHs: | 4 |
| PAHs: | 17 |
| VOCs: | 2 |
| PCBs: | 8 |
| OCPs: | 21 |
| OPPs: | 20 |
| Nutrients: | 5 |
| Other: | 7 |





& GW Monitoring

Not applicable Not applicable



| Metals Cells | rsenic admium hromium opper on ead fanganese lercury folybdenum ickel elenium inc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C10-C16 C16-C34 | 22/8/12 349496 <0.001 0.0051 <0.001 <0.005 <0.001 1.4 <0.0001 <0.005 0.039 0.001 2.9 <0.02 <0.02 <0.05 <0.02 <0.01 <0.01 <0.01 2.9 <0.02 <0.02 <0.01 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.02 <0.0 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 0.002 4.1 0.041 < 0.0001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.02 < 0.05 < 0.1 < 0.1 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 11 0.002 < 0.005 < 0.0001 < 0.005 0.004 0.002 < 0.035 < 0.02 < 0.02 < 0.05 < 0.1 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 0.005 2.9 < 0.001 0.11 < 0.005 0.012 < 0.001 0.34 < 0.02 < 0.02 < 0.02 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 < 0.005 0.002 0.13 < 0.005 0.002 0.005 0.002 0.005 0.003 < 0.02 < 0.05 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 < 0.05 < 0.001 < 0.020 < 0.0001 < 0.005 0.002 < 0.001 0.014 < 0.02 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 0.02 69 0.003 < 0.003 < 0.0001 < 0.005 0.032 0.004 0.14 < 0.02 | 22/8/12 349496 0.001 < 0.0002 < 0.001 < 0.005 0.002 0.13 < 0.005 0.002 0.005 0.002 0.005 0.003 < 0.02 | 22/8/12 349496 0.006 <lor <lor <lor 0.08 0.01 0.1 <lor <lor <lor 0.002 0.005 0.01</lor </lor </lor </lor </lor </lor | DUP1 MB06 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | TRIP1 MB06 143 0 0 0 46 0 26 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
|--|--|--|--|--|---|---|---|--|---|--|--|--|
| Metals Cells Ce | rsenic admium hromium opper on ead fanganese lercury folybdenum ickel elenium inc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C10-C16 C16-C34 | <0.001 0.0051 <0.001 <0.01 <0.05 <0.001 1.4 <0.0001 <0.005 0.039 0.001 2.9 <0.02 <0.05 <0.1 <0.1 <0.01 <0.05 <0.05 <0.01 <0.05 <0.05 <0.01 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 < | <0.001 <0.0002 <0.001 0.002 4.1 <0.001 0.041 <0.005 0.006 <0.001 0.023 <0.02 <0.05 <0.1 <0.1 | <0.001 <0.0002 <0.001 11 0.002 0.05 <0.0001 <0.005 0.004 0.005 0.004 0.002 0.035 <0.02 <0.02 <0.05 <0.02 | <0.001 <0.0002 <0.001 0.005 2.9 <0.001 0.11 <0.0001 <0.0001 <0.0001 <0.0012 <0.001 0.34 <0.02 <0.05 | <0.001 <0.0002 <0.001 <0.05 0.002 0.13 <0.0001 <0.005 0.002 0.005 0.003 <0.02 | < 0.001 < 0.0002 < 0.001 < 0.05 < 0.001 0.022 < 0.0001 < 0.005 0.002 < 0.001 0.014 | < 0.001 < 0.0002 < 0.001 0.02 69 0.003 0.13 < 0.0001 < 0.005 0.032 0.004 0.14 | 0.001 < 0.0002 < 0.001 < 0.05 0.002 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 | 0.006 < LOR < LOR 0.08 0.01 0.1 < LOR < LOR < LOR 0.002 0.005 | 0 0 0 0 0 0 0 0 0 0 0 0 0 | 143 0 0 0 46 0 26 0 0 0 0 0 0 0 |
| Metals Cells Ce | rsenic admium hromium opper on ead fanganese lercury folybdenum ickel elenium inc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C10-C16 C16-C34 | $\begin{array}{c} 0.0051 \\ < 0.001 \\ 0.01 \\ < 0.05 \\ < 0.001 \\ 1.4 \\ < 0.0001 \\ < 0.005 \\ 0.039 \\ 0.001 \\ 2.9 \\ < 0.02 \\ < 0.05 \\ < 0.1 \\ < 0.1 \\ < 0.02 \end{array}$ | <0.0002 <0.001 0.002 4.1 <0.001 0.041 <0.0001 <0.005 0.006 <0.000 0.006 <0.001 0.023 <0.02 <0.02 <0.05 <0.1 | <0.0002 <0.001 <0.001 11 0.002 0.05 <0.0001 <0.005 0.004 0.005 0.004 0.002 0.035 <0.02 <0.02 <0.05 <0.02 | <0.0002 < 0.001 0.005 2.9 < 0.001 0.11 < 0.0001 < 0.005 0.012 < 0.001 0.34 < 0.02 < 0.05 | < 0.0002 < 0.001 < 0.001 < 0.05 0.002 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 < 0.02 | < 0.0002 < 0.001 < 0.001 < 0.05 < 0.001 0.022 < 0.0001 < 0.005 0.002 < 0.001 0.014 | < 0.0002 < 0.001 0.02 69 0.003 0.13 < 0.0001 < 0.005 0.032 0.004 0.14 | < 0.0002 < 0.001 < 0.001 < 0.05 0.002 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 | <lor <lor <lor 0.08 0.01 0.1 <lor <lor 0.002 0.005</lor </lor </lor </lor </lor | 0 0 0 0 0 0 0 0 0 0 0 | 0 0 46 0 26 0 0 0 0 |
| Metals Cells | admium hromium opper on ead fanganese fercury folybdenum ickel elenium inc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C16-C34 | <0.001 0.01 <0.05 <0.001 1.4 <0.0001 <0.005 0.039 0.001 2.9 <0.02 <0.02 <0.01 <0.1 <0.1 <0.02 | <0.001 0.002 4.1 <0.001 0.041 <0.0001 <0.005 0.006 <0.000 0.023 <0.02 <0.02 <0.05 <0.1 <0.1 | <0.001 <0.001 11 0.002 0.05 <0.0001 <0.005 0.004 0.002 0.035 <0.02 <0.05 <0.02 <0.05 <0.01 | < 0.001 0.005 2.9 < 0.001 0.11 < 0.0001 < 0.005 0.012 < 0.001 0.34 < 0.02 < 0.05 | <0.001 <0.001 <0.05 0.002 0.13 <0.0001 <0.005 0.002 0.005 0.003 <0.02 | < 0.001 < 0.001 < 0.05 < 0.001 0.022 < 0.0001 < 0.005 0.002 < 0.001 0.014 | <0.001 0.02 69 0.003 0.13 <0.0001 <0.005 0.032 0.004 0.14 | <0.001 <0.001 <0.05 0.002 0.13 <0.0001 <0.005 0.002 0.005 0.003 | <lor <lor 0.08 0.01 0.1 <lor <lor 0.002 0.005</lor </lor </lor </lor | 0 0 0 0 0 0 0 0 0 | 0 0 46 0 26 0 0 0 0 0 |
| Metals Metals Metals M M M M N See Zi C C C C C C C C C C C C C C C C C C | opper on aad fanganese fercury folybdenum ickel elenium inc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C10-C16 C16-C34 | $\begin{array}{c} 0.01 \\ < 0.05 \\ < 0.001 \\ 1.4 \\ < 0.0001 \\ < 0.005 \\ 0.039 \\ 0.001 \\ 2.9 \\ < 0.02 \\ < 0.02 \\ < 0.01 \\ < 0.1 \\ < 0.1 \\ < 0.01 \\ < 0.02 \end{array}$ | 0.002 4.1 < 0.001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.05 < 0.1 < 0.1 | < 0.001 11 0.002 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 < 0.02 < 0.05 < 0.1 | 0.005 2.9 < 0.001 0.11 < 0.0001 < 0.005 0.012 < 0.001 0.34 < 0.02 < 0.05 | < 0.001 < 0.05 0.002 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 < 0.02 | < 0.001 < 0.05 < 0.001 0.022 < 0.0001 < 0.005 0.002 < 0.001 0.014 | 0.02 69 0.003 0.13 < 0.0001 < 0.005 0.032 0.004 0.14 | <0.001 < 0.05 0.002 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 | <lor 0.08 0.01 0.1 <lor <lor 0.002 0.005</lor </lor </lor | 0 0 0 0 0 0 0 0 | 0 46 0 26 0 0 0 0 |
| Metals Metals Metals M M M M N See Zi C C C C C C C C C C C C C C C C C C | opper on aad fanganese fercury folybdenum ickel elenium inc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C10-C16 C16-C34 | $\begin{array}{c} 0.01 \\ < 0.05 \\ < 0.001 \\ 1.4 \\ < 0.0001 \\ < 0.005 \\ 0.039 \\ 0.001 \\ 2.9 \\ < 0.02 \\ < 0.02 \\ < 0.01 \\ < 0.1 \\ < 0.1 \\ < 0.01 \\ < 0.02 \end{array}$ | 0.002 4.1 < 0.001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.05 < 0.1 < 0.1 | < 0.001 11 0.002 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 < 0.02 < 0.05 < 0.1 | 0.005 2.9 < 0.001 0.11 < 0.0001 < 0.005 0.012 < 0.001 0.34 < 0.02 < 0.05 | < 0.001 < 0.05 0.002 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 < 0.02 | < 0.001 < 0.05 < 0.001 0.022 < 0.0001 < 0.005 0.002 < 0.001 0.014 | 0.02 69 0.003 0.13 < 0.0001 < 0.005 0.032 0.004 0.14 | <0.001 < 0.05 0.002 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 | <lor 0.08 0.01 0.1 <lor <lor 0.002 0.005</lor </lor </lor | 0 0 0 0 0 0 0 0 | 0 46 0 26 0 0 0 0 |
| Metals Internet of the second | on anganese lercury lolybdenum ickel elenium inc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C10-C16 C16-C34 | <0.05 <0.001 1.4 <0.0001 <0.005 0.039 0.001 2.9 <0.02 <0.02 <0.05 <0.1 <0.1 <0.1 <0.02 | 4.1 < 0.001 0.041 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.02 < 0.05 < 0.1 < 0.1 | 11 0.002 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 < 0.02 < 0.05 < 0.1 | 2.9 <0.001 0.11 <0.0001 <0.005 0.012 <0.001 0.34 <0.02 <0.05 | < 0.05 0.002 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 < 0.02 | < 0.05 < 0.001 0.022 < 0.0001 < 0.005 0.002 < 0.001 0.014 | 69 0.003 0.13 < 0.0001 < 0.005 0.032 0.004 0.14 | < 0.05 0.002 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 | 0.08 0.01 < LOR < LOR 0.002 0.005 | 0 0 0 0 0 0 | 0 26 0 0 0 0 |
| Metals M M M Ni Se Zi TPH 1999 C1 NEPM C1 Fractions C2 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 | Ianganese lercury Iolybdenum ickel elenium for 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C16-C34 | 1.4 < 0.0001 | 0.041 < 0.0001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.02 < 0.05 < 0.1 < 0.1 | 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 < 0.02 < 0.05 < 0.1 | 0.11 < 0.0001 < 0.005 0.012 < 0.001 0.34 < 0.02 < 0.05 | 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 < 0.02 | 0.022 < 0.0001 < 0.005 0.002 < 0.001 0.014 | 0.13 < 0.0001 < 0.005 0.032 0.004 0.14 | 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 | 0.1 <lor <lor 0.002 0.005</lor </lor | 0 0 0 0 0 | 26 0 0 0 |
| Metals M M M Ni Se Zi TPH 1999 C1 NEPM C1 Fractions C2 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 | Ianganese lercury Iolybdenum ickel elenium for 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C16-C34 | 1.4 < 0.0001 | 0.041 < 0.0001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.02 < 0.05 < 0.1 < 0.1 | 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 < 0.02 < 0.05 < 0.1 | 0.11 < 0.0001 < 0.005 0.012 < 0.001 0.34 < 0.02 < 0.05 | 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 < 0.02 | 0.022 < 0.0001 < 0.005 0.002 < 0.001 0.014 | 0.13 < 0.0001 < 0.005 0.032 0.004 0.14 | 0.13 < 0.0001 < 0.005 0.002 0.005 0.003 | 0.1 <lor <lor 0.002 0.005</lor </lor | 0 0 0 0 0 | 26 0 0 0 |
| M M Nii Se Zii CfPH 1999 C1 NEPM C1 Fractions C2 C1 FrAL Draft C6 2010 > | lercury lolybdenum ickel elenium frc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C10-C16 C16-C34 | <0.0001 <0.005 0.039 0.001 2.9 <0.02 <0.05 <0.1 <0.1 <0.1 <0.02 | < 0.0001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.05 < 0.1 < 0.1 | < 0.0001 < 0.005 0.004 0.002 0.035 < 0.02 < 0.05 < 0.1 | <0.0001 <0.005 0.012 <0.001 0.34 <0.02 <0.05 | < 0.0001 < 0.005 0.002 0.005 0.003 < 0.02 | < 0.0001 < 0.005 0.002 < 0.001 0.014 | < 0.0001 < 0.005 0.032 0.004 0.14 | < 0.0001 < 0.005 0.002 0.005 0.003 | < LOR < LOR 0.002 0.005 | 0 0 0 0 | 0 0 0 0 |
| M Nii Se Zii DEPM C1 Tractions C1 C1 C1 C2 C1 C2 C2 C1 C2 C1 C1 C1 C2 C1 C2 C1 C2 C1 C2 C1 C2 C10 | tolybdenum ickel elenium inc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C16-C34 | <0.005 0.039 0.001 2.9 <0.02 <0.05 <0.1 <0.1 <0.1 <0.02 | <0.005 0.006 <0.001 0.023 <0.02 <0.05 <0.1 <0.1 | < 0.005 0.004 0.002 0.035 < 0.02 < 0.05 < 0.1 | < 0.005 0.012 < 0.001 0.34 < 0.02 < 0.05 | < 0.005 0.002 0.005 0.003 < 0.02 | < 0.005 0.002 < 0.001 0.014 | < 0.005 0.032 0.004 0.14 | < 0.005 0.002 0.005 0.003 | < LOR 0.002 0.005 | 0 0 0 | 0 0 0 |
| IPH 1999 C1 NEPM C1 Fractions C2 C1 RH Draft C6 2010 > | ickel elenium inc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C16-C34 | 0.039 0.001 2.9 <0.02 <0.05 <0.1 <0.1 <0.1 <0.02 | 0.006 < 0.001 0.023 < 0.02 < 0.05 < 0.1 < 0.1 | 0.004 0.002 0.035 < 0.02 < 0.05 < 0.1 | 0.012 < 0.001 0.34 < 0.02 < 0.05 | 0.002 0.005 0.003 < 0.02 | 0.002 < 0.001 0.014 | 0.032 0.004 0.14 | 0.002 0.005 0.003 | 0.002 | 0 0 | 0 0 |
| FPH 1999 C1 NEPM C1 NEPM C1 Fractions C2 C1 RH Draft C6 2010 > | elenium inc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C16-C34 | 0.001 2.9 <0.02 <0.05 <0.1 <0.1 <0.1 <0.02 | < 0.001 0.023 < 0.02 < 0.05 < 0.1 < 0.1 | 0.002 0.035 < 0.02 < 0.05 < 0.1 | < 0.001 0.34 < 0.02 < 0.05 | 0.005 0.003 < 0.02 | < 0.001 0.014 | 0.004 0.14 | 0.005 | 0.005 | 0 | 0 |
| Zi CC TPH 1999 C1 NEPM C1 Fractions C2 C1 TRH Draft CC 2010 > | nc 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C10-C16 C16-C34 | 2.9 < 0.02 < 0.05 < 0.1 < 0.1 < 0.1 < 0.02 | 0.023 < 0.02 < 0.05 < 0.1 < 0.1 | 0.035 < 0.02 < 0.05 < 0.1 | 0.34 < 0.02 < 0.05 | 0.003 < 0.02 | 0.014 | 0.14 | 0.003 | | - | |
| TPH 1999 C1 NEPM C1 Fractions C2 C1 TRH Draft C6 2010 > | 6-C9 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C16-C34 | <0.02 <0.05 <0.1 <0.1 <0.1 <0.02 | < 0.02 < 0.05 < 0.1 < 0.1 | < 0.02 < 0.05 < 0.1 | < 0.02 < 0.05 | < 0.02 | | | | 0.01 | | |
| TPH 1999 C1 NEPM C1 Fractions C2 TRH Draft C6 2010 | 10-C14 15-C28 29-C36 10-36 6-C10 C10-C16 C16-C34 | <0.05 <0.1 <0.1 <0.1 <0.1 <0.02 | < 0.05 < 0.1 < 0.1 | < 0.05 < 0.1 | < 0.05 | | < 0.0Z | | | < LOR | 0 | 0 |
| NEPM C1 Fractions C2 C1 TRH Draft C6 2010 > | 15-C28 29-C36 10-36 6-C10 C10-C16 C16-C34 | < 0.1 < 0.1 < 0.1 < 0.02 | < 0.1 < 0.1 | < 0.1 | | | < 0.05 | < 0.05 | < 0.02 | < LOR | 0 | 0 |
| Fractions C2 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 | 29-C36 10-36 6-C10 C10-C16 C16-C34 | < 0.1 < 0.1 < 0.02 | < 0.1 | | | < 0.03 | < 0.05 | < 0.05 | < 0.05 | < LOR < LOR | 0 | 0 |
| C1 [RH Draft C6 2010 >0 | 10-36 6-C10 C10-C16 C16-C34 | < 0.1 < 0.02 | | 201 | < 0.1 < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < LOR < LOR | 0 | 0 |
| TRH Draft C6 2010 > | 6-C10 C10-C16 C16-C34 | < 0.02 | 50.1 | < 0.1 < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | <lor <lor< td=""><td>0</td><td>0</td></lor<></lor | 0 | 0 |
| 2010 > | C10-C16 C16-C34 | | < 0.02 | < 0.1 | < 0.02 | < 0.1 | < 0.1 | < 0.02 | < 0.02 | < LOR < LOR | 0 | 0 |
| | C16-C34 | | < 0.02 | | | < 0.02 | < 0.02 | | | - | 0 | 0 |
| | | < 0.05 | < 0.05 | < 0.05 < 0.1 | < 0.05 < 0.1 | < 0.05 | < 0.05 | < 0.05 < 0.1 | < 0.05 < 0.1 | < LOR < LOR | 0 | 0 |
| | | | | | | | | | | | | - |
| | C34-C40 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | enzene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | thylbenzene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| IC | oluene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | ylenes(o,m & p) | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | cenaphthene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | cenaphthylene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | nthracene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | enz(a)anthracene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | enzo(a)pyrene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | enzo(b)fluoranthene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | enzo(g.h.i)perylene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| Be | enzo(k)fluoranthene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| PAHs Ch | hrysene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| Di | ibenz(a.h)anthracene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | uoranthene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| FI | uorene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | ndeno(1.2.3-cd)pyrene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| Na | aphthalene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| Pł | henanthrene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | yrene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| To | otal PAH | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| Te | etrachloroethene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| VOCs Tr | richloroethene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | roclor-1016 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | roclor-1221 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | roclor-1232 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| ٨ | roclor-1242 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| P('Bc - | roclor-1248 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | roclor-1254 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | roclor-1260 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | otal PCB | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | | \$ 0.001 | \$ 0.001 | 10.001 | 10.001 | \$ 0.001 | 10.001 | \$ 0.001 | . 0.001 | < LOIN | 5 | |

Table 3. Groundwater Laboratory Analysis Results.



| | 4.4'-DDD | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | <lor< th=""><th>0</th><th>0</th></lor<> | 0 | 0 |
|------------|----------------------------------|-------------|----------|------------|------------|------------|------------|-------------|-------------|--|---------|---------|
| | 4.4'-DDD 4.4'-DDE | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | <lor <lor< td=""><td>0</td><td>0</td></lor<></lor | 0 | 0 |
| | 4.4 -DDE 4.4'-DDT | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | <lor <lor< td=""><td>0</td><td>0</td></lor<></lor | 0 | 0 |
| | a-BHC | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR < LOR | 0 | 0 |
| | Aldrin | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR < LOR | 0 | 0 |
| | b-BHC | < 0.0001 | < 0.0001 | | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR < LOR | 0 | 0 |
| | | | | < 0.0001 | | | | | | | | |
| | Chlordane | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | d-BHC | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 0 | 0 |
| | Dieldrin | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | - | |
| | Endosulfan I | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| OCPs | Endosulfan II | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Endosulfan sulphate | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Endrin | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Endrin aldehyde | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Endrin ketone | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | g-BHC (Lindane) | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Heptachlor | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Heptachlorepoxide | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Hexachlorobenzene | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Methoxychlor | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Toxaphene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | Bolstar | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Chlorpyrifos | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Demeton-O | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Diazinon | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Dichlorvos | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Disulfoton | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Ethion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Ethoprop | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Fenitrothion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Fensulfothion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| OPPs | Fenthion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Merphos | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Methyl azinphos | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Methyl parathion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Mevinphos | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Naled | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Phorate | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Ronnel | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Tokuthion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Trichloronate | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Ammonia (as N) | 0.11 | 0.21 | 0.47 | 0.37 | 0.1 | 0.03 | 1.2 | 0.15 | 1.4 | 40 | 173 |
| | Nitrate (as N) | 0.06 | 0.21 | < 0.02 | 0.37 | < 0.02 | 1.1 | < 0.02 | < 0.02 | < LOR | 40 | 0 |
| Nutrients | Nitrate & Nitrite (as N) | 0.00 | 0.57 | < 0.02 | 0.35 | < 0.02 | 1.1 | < 0.02 | < 0.02 | < LOR | 0 | 0 |
| | Total Kjeldahl Nitrogen (as N) | < 0.2 | 0.38 | 0.47 | 0.35 | < 0.03 | 6.8 | 1.2 | < 0.03 | < LOK 1.4 | 0 | 150 |
| | Total Nitrogen (as N) | < 0.2 | 0.3 | 0.47 | 1.1 | <0.2 | 7.9 | 1.2 | < 0.2 | 1.4 | 0 | 150 |
| | Potassium | <0.2 49 | 6.6 | 14 | 59 | <0.2 49 | 6.7 | 95 | <0.2 54 | 36 | 10 | 31 |
| | Chloride | 49 12000 | 6.6 | 14 5500 | 59 1900 | 49 6800 | 6.7 470 | 95 9300 | 54 6500 | 36 6400 | 10 5 | 31 6 |
| | | 300 | 33 | 130 | 1900 88 | 170 | 470 | 9300 270 | 6500 170 | 460 | 5 | 6 92 |
| Other | Sulphate (as S) | | | | | 95 | | | 110 | 460 NT | 0 15 | |
| Other | Suspended Solids | 680 | 1400 | 53 | 1400 | - | 2800 | 3500 | - | | - | 0 |
| | Total Dissolved Solids | 19000 | 1300 | 8700 | 3200 | 11000 | 970 | 15000 | 12000 | 13000 | 9 | 17 |
| | Total Organic Carbon | 13 | 5.7 | 12 | 15 | 16 | 11 | 15 | 15 | 2 | 6 | 156 |
| | рН | 6.4 | 5.9 | 3.6 | 5.8 | 6 | 6.1 | 3.8 | 6 | 5.4 | 0 | 11 |
| Notes | | | | | | | | | | | | |
| | re in mg/L unless otherwise stat | ted | | | | | | | | | | |
| NT: Not Te | 5 | | | Potassium | Chloride | Sulphate | Suspende | Total Diss | Total Orga | рН | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

| Table 3. Groundwater Laboratory A | Analysis Results | (continued) |
|-----------------------------------|------------------|-------------|
|-----------------------------------|------------------|-------------|

The analysis of primary samples reported a total of 85 parameters with values below the LOR (Limit of Reporting). This included all of the hydrocarbon, VOCs, PCBs, and pesticide parameter groups.



3.4.1 Metals

The following metals were detected in the laboratory analysis:

| Cadmium: | MB01 |
|------------|------------------------|
| Copper: | MB01, MB03, MB05, MB08 |
| Iron: | MB03, MB04, MB05, MB08 |
| Lead: | MB06, MB08 |
| Manganese: | All Bores |
| Nickel: | All Bores |
| Selenium: | MB01, MB04, MB06, MB08 |
| Zinc: | All Bores |

Arsenic, Chromium, Mercury and Molybdenum were not detected in any of the primary samples. Arsenic was detected in the triplicate sample TRIP1 (0.006 mg/L)

For the primary bore samples, monitor bore MB08 had the highest recorded values for Iron (69 mg/L). MB01 had the highest levels of Zinc (2.9 mg/L), Manganese (1.4 mg/L) and the only recorded levels of Cadmium (0.0051 mg/L).

3.4.2 Nutrients

The following nutrients were detected in the laboratory analysis:

| Ammonia (as N): | All Bores |
|---------------------------------|------------------------------|
| Nitrate (as N): | MB01, MB03, MB05, MB07 |
| Nitrate & Nitrite (as N): | MB01, MB03, MB05, MB07 |
| Total Kjeldahl Nitrogen (as N): | MB03, MB04, MB05, MB07, MB08 |
| Total Nitrogen (as N): | MB03, MB04, MB05, MB07, MB08 |

For the primary bore samples, monitor bore MB07 had the highest recorded values for Total N (7.9 mg/L). This was due mainly to Total Kjeldahl Nitrogen (as N) (6.8 mg/L) and corresponds with the lowest recorded levels of Ammonia (as N) (0.03 mg/L). Use of broad-acre fertilisers and manure from grazing animals are the likely source of the nitrogen.

3.4.3 Other Parameters

Other parameters include Potassium, Chloride, Sulphate (as S), Suspended Solids, Total Dissolved Solids, Total Organic Carbon and pH. All bore samples had typical values reported for these parameters (except for TRIP1 that was not tested for Total Suspended Solids).

All samples had pH (field) values of less than 6. The bore with the lowest pH (field and laboratory) was MB04 (pH (field) = 3.84). This reflects the weathering of the acidic granitic rock underlying geology.



For the primary bore samples, monitor bore MB01 had the highest recorded values for Total Dissolved Salts (19000 mg/L), Chloride (12000 mg/L) and Sulfate (300mg/L). High chloride and dissolved salts indicates secondary salinisation of the landscape as a result of the clearing of native vegetation.

For the primary bore samples, monitor bore MB07 had the lowest recorded values for Total Dissolved Solids (970 mg/L), Chloride (470 mg/L) and Sulfate (327mg/L).

Monitor bore MB08 (the bore with elevated levels of Iron) recorded a corresponding pH(field) of 3.93 (the second lowest pH). MB08 had the second highest recorded values for Total Dissolved Solids (15000 mg/L), Chloride (93000 mg/L) and Sulfate (270 mg/L).



4 CONCLUSIONS

4.1 HYDRAULIC CONDUCTIVITY

The hydraulic conductivity of the clay soils at the site are estimated to be in the range 0.02-0.6 m/day. These values are consistent with K values for clay soils from Southwest Australia derived from Granite (Davidson, 1995). These values agree with K values found in Bouwer (1978), which estimates a range of 0.01-0.2 m/day for clay soils (surface).

Clay soils at the base of the aquifer are likely to be of lower hydraulic conductivity and within the range provided in Bouwer (1978) of 10⁻⁸-10⁻² m/day. Clay, sand and gravel mixes (identified in the borehole lithology logs, Appendix A) have a K value in the range 0.001-0.1 m/day (Bouwer, 1978).

4.2 GROUNDWATER LEVELS AND FLOW

Groundwater levels at the site range from about 303 mAHD (MB07, to the east) to 268 mAHD (MB01, to the west) indicating a flow from east to west (Figure 2). The groundwater levels provide suitable baseline assessment for the purposes of ongoing monitoring that will be required as part of the proposed landfill.

4.3 GROUNDWATER QUALITY

The groundwater quality at the site ranges from fresh (MB07, TDS=970mg/L) to saline (MB01, TDS=19000 mg/L). For the seven primary samples, MB03 and MB07 would be classified as "fresh", with the remaining bores classified as "saline" (AWRC, 1988).

The groundwater pH (field) ranged from 3.84 to 5.70, indicating that the groundwater is moderately acidic. The bores with pH<4 (MB08 and MB04) have correspondingly higher concentrations of iron (exceeding the 10mg/L)

The analysis of the groundwater indicated all levels of pesticides and hydrocarbons are below the detection limits of the laboratory analysis. This is expected in a site that should not have been affected by pesticide treatments.

The extensive analysis of the groundwater quality provides a suitable baseline assessment for the purposes of ongoing monitoring that will be required as part of the proposed landfill.



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Vicksburg, Ms.



TABLES



| Zone 50) Northing 6469802.00 6469095.00 6468382.00 | Doring Council ID (MGA 94) Easting 01 | Date | ToC (m AHD) | Stickup | | Total Well | Depth to | SWL | SWL | | | Nater Q | | | Comments |
|--|---|----------------|---|---|---|--|--|--|---|---|--|--|--|---|---|
| 6469802.00 6469095.00 | Easting | | | | Level | Depth | SWL | (m AHD) | (m bgl) | pН | Temp | DO | EC | TDS | (odours, sheen etc) |
| 6469095.00 | 01 461241.00 | | `, | (m) | (m AHD) | (m bTOC) | (m bToC) | | (m bgi) | pri | (°C) | (mg/L) | (mS/cm) | (mg/L) | |
| | | 22/08/2012 | 270.12 | 0.64 | 269.48 | 11.90 | 2.405 | 267.72 | 1.765 | 5.34 | 18.9 | 2.81 | 30.6 | 20808 | White, cloudy |
| 6468382.00 | 461064.00 | 22/08/2012 | 287.62 | | 287.62 | - | - | - | - | - | - | - | - | - | - |
| | 03 462012.00 | 22/08/2012 | 280.73 | 0.53 | 280.20 | 13.42 | 5.600 | 275.127 | 5.075 | 4.92 | 19.64 | 4.60 | 2.13 | 1448 | Slightly cloudy, no odour |
| 6468385.00 | 462314.00 | 22/08/2012 | 275.35 | 0.43 | 274.92 | 10.91 | 1.115 | 274.233 | 0.685 | 3.84 | 19.19 | 1.71 | 16.20 | 11016 | Clear, no odour |
| 6468857.00 | 462063.00 | 22/08/2012 | 274.65 | 0.77 | 273.88 | 9.70 | 1.804 | 272.848 | 1.036 | 5.14 | 19.23 | 1.25 | 6.38 | 4338 | Cloudy, brown/red, no odour |
| 6468877.00 | 462704.00 | 22/08/2012 | 283.88 | 0.53 | 283.35 | 10.64 | 0.543 | 283.332 | 0.013 | 5.06 19.31 1.53 19.70 1 | | | 19.70 | 13396 | Clear, small amount of sediment |
| 6469135.00 | 463610.00 | 22/08/2012 | 304.46 | 0.53 | 303.93 | 10.55 | 1.055 | 303.404 | 0.525 | 5.70 | 19.9 | 4.34 | 1.3 | 884 | Cloudy, orange, no odour |
| 6469493.00 | 463173.00 | 22/08/2012 | 308.19 | 0.53 | 307.67 | 11.25 | 6.530 | 301.663 | 6.005 | 3.93 | 18.2 | 4.88 | 26.1 | 17748 | Cloudy, light brown |
| | : | | | | | | | | | | | | | | |
| | /L | | | | e) | | | bToC | | below Top of Casing (50 mm PVC) | | | 50 mm PV | 'C) | |
| | н | | | arbon | | | | bgl | | below ground level | | | | | |
| | | | | | | | | | | Australian Height Datum | | | | | |
| | S | Total Dissolve | d Solids (= | EC*680; E | PA 1993) | | | mS | milli Siemens | | | | | | |
| 6469 | : //_ Н С S | | Static Water Le Separated Pha Electrical Cone Total Dissolve | Static Water Level (the w Separated Phase Hydroc Electrical Conductivity Total Dissolved Solids (= | Static Water Level (the water table Separated Phase Hydrocarbon Electrical Conductivity Total Dissolved Solids (=EC*680; E | Static Water Level (the water table) Separated Phase Hydrocarbon Electrical Conductivity Total Dissolved Solids (=EC*680; EPA 1993) | Static Water Level (the water table) Separated Phase Hydrocarbon Electrical Conductivity Total Dissolved Solids (=EC*680; EPA 1993) | Static Water Level (the water table) Separated Phase Hydrocarbon Electrical Conductivity Total Dissolved Solids (=EC*680; EPA 1993) | Static Water Level (the water table) bToC Separated Phase Hydrocarbon bgl Electrical Conductivity AHD Total Dissolved Solids (=EC*680; EPA 1993) mS | Static Water Level (the water table) bToC Separated Phase Hydrocarbon bgl Electrical Conductivity AHD | Static Water Level (the water table) bToC below Static Water Level (the water table) bToC below Electrical Conductivity AHD Austra Total Dissolved Solids (=EC*680; EPA 1993) mS milli S | Image: Static Water Level (the water table) bToC below Top of Separated Phase Hydrocarbon Electrical Conductivity AHD Australian Her Total Dissolved Solids (=EC*680; EPA 1993) mS milli Siemens | Image: Static Water Level (the water table) bToC below Top of Casing (Compared Phase Hydrocarbon Static Orductivity btloc below ground level Electrical Conductivity AHD Australian Height Dat Total Dissolved Solids (=EC*680; EPA 1993) mS milli Siemens | Image: Static Water Level (the water table) bToC below Top of Casing (50 mm PV Static Water Level (the water table) bToC below ground level Electrical Conductivity AHD Australian Height Datum Total Dissolved Solids (=EC*680; EPA 1993) mS milli Siemens | Image: Constraint of the set of the |

 Table 1. Groundwater Monitor Bore Locations and Gauging Results.



| Monitor Bore | Hvorslev (1951) | Cooper et al (1967) |
|--------------|-----------------|---------------------|
| MB01 | 0.03 | 0.5 |
| MB03 | - | 0.1 |
| MB06 | 0.02 | 0.6 |
| MB07 | 0.02 | 0.6 |

Table 2. Hydraulic Conductivity (K in m/day) based on slug test results.



Table 3. Groundwater Laboratory Analysis Results.

| Metals Met | rsenic admium popper on ead langanese lercury lolybdenum ickel elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | 22/8/12 349496 < 0.001 0.0051 < 0.001 < 0.001 < 0.001 1.4 < 0.0001 < 0.005 0.039 0.001 2.9 < 0.02 < 0.02 < 0.05 < 0.01 < 0.1 | 22/8/12 349496 < 0.001 < 0.002 < 0.001 0.002 4.1 < 0.001 < 0.001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.02 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 11 0.002 0.05 < 0.0001 < 0.005 0.004 0.005 0.004 0.002 0.035 < 0.02 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 0.005 2.9 < 0.001 0.11 < 0.0001 < 0.005 0.012 < 0.001 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 < 0.001 < 0.002 0.13 < 0.0001 < 0.005 0.002 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 < 0.001 < 0.001 0.022 < 0.0001 < 0.005 | 22/8/12 349496 < 0.001 < 0.0002 < 0.001 0.02 69 0.003 0.13 < 0.0001 | 22/8/12 349496 0.001 < 0.0002 < 0.001 < 0.001 < 0.05 0.002 0.13 < 0.0001 | 22/8/12 349496 0.006 < LOR < LOR 0.08 0.01 0.1 < LOR | DUP1 MB06 0 0 0 0 0 0 0 0 0 0 0 | TRIP1 MB06 143 0 0 0 46 0 26 |
|---|--|---|--|--|---|---|---|--|---|--|---|--|
| Metals Arr Ca Ca Ch Co Iro Metals Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma M | rsenic admium popper on ead langanese lercury lolybdenum ickel elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | <0.001 0.0051 <0.001 0.01 <0.05 <0.001 1.4 <0.005 0.001 <0.005 0.039 0.001 2.9 <0.02 <0.02 <0.05 <0.01 | < 0.001 < 0.0002 < 0.001 0.002 4.1 < 0.001 < 0.001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.05 | < 0.001 < 0.0002 < 0.001 11 0.002 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 | <0.001 <0.0002 <0.001 0.005 2.9 <0.001 0.11 <0.0001 <0.005 0.012 | <0.001 <0.0002 <0.001 <0.05 0.002 0.13 <0.0001 <0.005 | <0.001 <0.002 <0.001 <0.05 <0.001 0.022 <0.0001 | <0.001 <0.0002 <0.001 0.02 69 0.003 0.13 <0.0001 | 0.001 < 0.0002 < 0.001 < 0.05 0.002 0.13 < 0.0001 | 0.006 < LOR < LOR < LOR 0.08 0.01 0.1 | 0 0 0 0 0 0 0 | 143 0 0 46 0 26 |
| Metals Met | admium promium ppper on ad langanese lercury lolybdenum ickel elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | $\begin{array}{c} 0.0051\\ < 0.001\\ 0.01\\ < 0.05\\ < 0.001\\ 1.4\\ < 0.0001\\ < 0.005\\ 0.039\\ 0.001\\ 2.9\\ < 0.02\\ < 0.02\\ < 0.05\\ < 0.1\\ \end{array}$ | <0.0002 <0.001 0.002 4.1 <0.001 0.041 <0.0001 <0.005 0.006 <0.001 0.023 <0.02 <0.05 | < 0.0002 < 0.001 < 0.001 11 0.002 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 | <0.0002 <0.001 0.005 2.9 <0.001 0.11 <0.0001 <0.005 0.012 | <0.0002 <0.001 <0.05 0.002 0.13 <0.0001 <0.005 | <0.0002 <0.001 <0.001 <0.005 <0.001 0.022 <0.0001 | <0.0002 <0.001 0.02 69 0.003 0.13 <0.0001 | < 0.0002 < 0.001 < 0.001 < 0.05 0.002 0.13 < 0.0001 | < LOR < LOR < LOR 0.08 0.01 0.1 | 0 0 0 0 0 0 | 0 0 46 0 26 |
| Metals Metals Mathematical Math | nromium opper on ad langanese lercury lolybdenum ickel elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | <0.001 0.01 <0.05 <0.001 1.4 <0.0001 <0.005 0.039 0.039 <0.001 2.9 <0.002 <0.02 <0.05 <0.1 | <0.001 0.002 4.1 <0.001 0.041 <0.005 0.006 <0.001 0.023 <0.02 <0.05 | < 0.001 < 0.001 11 0.002 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 | < 0.001 0.005 2.9 < 0.001 0.11 < 0.0001 < 0.005 0.012 | < 0.001 < 0.001 < 0.05 0.002 0.13 < 0.0001 < 0.005 | < 0.001 < 0.001 < 0.05 < 0.001 0.022 < 0.0001 | < 0.001 0.02 69 0.003 0.13 < 0.0001 | < 0.001 < 0.001 < 0.05 0.002 0.13 < 0.0001 | <lor <lor 0.08 0.01 0.1</lor </lor | 0 0 0 0 0 | 0 0 46 0 26 |
| Metals Met | opper on ead langanese lercury lolybdenum ickel elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | $\begin{array}{c} 0.01 \\ < 0.05 \\ < 0.001 \\ 1.4 \\ < 0.0001 \\ < 0.005 \\ 0.039 \\ 0.001 \\ 2.9 \\ < 0.02 \\ < 0.05 \\ < 0.1 \end{array}$ | 0.002 4.1 < 0.001 < 0.001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.05 | <0.001 11 0.002 0.05 <0.0001 <0.005 0.004 0.002 0.035 | 0.005 2.9 < 0.001 0.11 < 0.0001 < 0.005 0.012 | < 0.001 < 0.05 0.002 0.13 < 0.0001 < 0.005 | < 0.001 < 0.05 < 0.001 0.022 < 0.0001 | 0.02 69 0.003 0.13 < 0.0001 | < 0.001 < 0.05 0.002 0.13 < 0.0001 | < LOR 0.08 0.01 0.1 | 0 0 0 0 | 0 46 0 26 |
| Metals Met | bn ead langanese lercury lolybdenum ickel elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | <0.05 <0.001 1.4 <0.0001 <0.005 0.039 0.001 2.9 <0.02 <0.05 <0.1 | 4.1 <0.001 0.041 <0.000 <0.005 <0.001 0.023 <0.02 <0.02 <0.05 | 11 0.002 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 | 2.9 < 0.001 0.11 < 0.0001 < 0.005 0.012 | < 0.05 0.002 0.13 < 0.0001 < 0.005 | < 0.05 < 0.001 0.022 < 0.0001 | 69 0.003 0.13 < 0.0001 | < 0.05 0.002 0.13 < 0.0001 | 0.08 0.01 0.1 | 0 0 0 | 46 0 26 |
| Metals Le: Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma Ma | ead langanese lercury lolybdenum ickel elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | <0.001 1.4 <0.0001 <0.005 0.039 0.001 2.9 <0.02 <0.05 <0.1 | < 0.001 0.041 < 0.0001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.02 | 0.002 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 | < 0.001 0.11 < 0.0001 < 0.005 0.012 | 0.002 0.13 < 0.0001 < 0.005 | < 0.001 0.022 < 0.0001 | 0.003 0.13 < 0.0001 | 0.002 0.13 < 0.0001 | 0.01 0.1 | 0 0 | 0 26 |
| Miletais Miletais Main Miletais Main Miletais See Zir TPH 1999 C11 Tractions C2 C11 C11 Fractions C2 C11 C11 TRH Draft C6 2010 >C NEPM Se | langanese lercury lolybdenum lickel elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | 1.4 < 0.0001 | 0.041 < 0.0001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.05 | 0.05 < 0.0001 < 0.005 0.004 0.002 0.035 | 0.11 < 0.0001 < 0.005 0.012 | 0.13 < 0.0001 < 0.005 | 0.022 < 0.0001 | 0.13 < 0.0001 | 0.13 < 0.0001 | 0.1 | 0 | 26 |
| Ma Ma Ma Ma Ma See Zir Image: Comparison of the second s | lercury lolybdenum ickel elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | <0.0001 <0.005 0.039 0.001 2.9 <0.02 <0.05 <0.1 | < 0.0001 < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.05 | < 0.0001 < 0.005 0.004 0.002 0.035 | < 0.0001 < 0.005 0.012 | < 0.0001 < 0.005 | < 0.0001 | < 0.0001 | < 0.0001 | | - | |
| Mc Nin Se Zir TPH 1999 TPH 1999 Tractions C2 Tractions C1 TRH Draft 2010 XEPM NEPM | iolybdenum ickel slenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | <0.005 0.039 0.001 2.9 <0.02 <0.05 <0.1 | < 0.005 0.006 < 0.001 0.023 < 0.02 < 0.05 | < 0.005 0.004 0.002 0.035 | < 0.005 0.012 | < 0.005 | | | | < LOR | 0 | |
| Nii Se Zir C6 TPH 1999 C1 Tractions C2 TRH Draft C6 2010 NEPM NED | ickel elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | 0.039 0.001 2.9 < 0.02 < 0.05 < 0.1 | 0.006 < 0.001 0.023 < 0.02 < 0.05 | 0.004 0.002 0.035 | 0.012 | | < 0.005 | 0.005 | | | 0 | 0 |
| Se Zir C6 TPH 1999 NEPM C1 Tractions C2 TRH Draft 2010 XC NEPM X | elenium nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | 0.001 2.9 < 0.02 < 0.05 < 0.1 | < 0.001 0.023 < 0.02 < 0.05 | 0.002 0.035 | | 0.000 | | < 0.005 | < 0.005 | < LOR | 0 | 0 |
| Zir C6 TPH 1999 NEPM Tractions C1 TRH Draft C6 2010 NEPM NEPM | nc 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | 2.9 < 0.02 < 0.05 < 0.1 | 0.023 < 0.02 < 0.05 | 0.035 | < 0.001 | 0.002 | 0.002 | 0.032 | 0.002 | 0.002 | 0 | 0 |
| C6 TPH 1999 C1 NEPM C1 Fractions C2 TRH Draft C6 2010 >C NEPM C1 | 5-C9 10-C14 15-C28 29-C36 10-36 5-C10 | < 0.02 < 0.05 < 0.1 | < 0.02 < 0.05 | | | 0.005 | < 0.001 | 0.004 | 0.005 | 0.005 | 0 | 0 |
| TPH 1999 C11 NEPM C11 Fractions C22 Image: C11 C11 RH Draft C6 2010 >C NEPM >C | 10-C14 15-C28 29-C36 10-36 5-C10 | < 0.05 < 0.1 | < 0.05 | < 0.02 | 0.34 | 0.003 | 0.014 | 0.14 | 0.003 | 0.01 | 0 | 108 |
| NEPM C1 Tractions C2 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 | 15-C28 29-C36 10-36 5-C10 | < 0.1 | | < U.UZ | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < LOR | 0 | 0 |
| NEPM C1 Tractions C2 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 | 15-C28 29-C36 10-36 5-C10 | < 0.1 | | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < LOR | 0 | 0 |
| Fractions C2 C1 TRH Draft C6 2010 >C NEPM >C | 29-C36 10-36 5-C10 | | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < LOR | 0 | 0 |
| C1 TRH Draft C6 2010 >C NEPM >C | 10-36 5-C10 | | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < LOR | 0 | 0 |
| TRH Draft C6 2010 >C NEPM >C | 5-C10 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < LOR | 0 | 0 |
| 2010 >C NEPM >C | | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < 0.02 | < LOR | 0 | 0 |
| NEPM >C | C10-C16 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < LOR | 0 | 0 |
| | C16-C34 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < LOR | 0 | 0 |
| | C34-C40 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < LOR | 0 | 0 |
| | enzene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| Eth | hylbenzene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| N/IAHs — | bluene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | /lenes(o,m & p) | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < 0.003 | < LOR | 0 | 0 |
| | cenaphthene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | cenaphthylene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | nthracene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | enz(a)anthracene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | enzo(a)pyrene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | enzo(b)fluoranthene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | enzo(g.h.i)perylene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | enzo(k)fluoranthene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | nrysene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | ibenz(a.h)anthracene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | uoranthene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | uorene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | deno(1.2.3-cd)pyrene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | aphthalene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | nenanthrene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | /rene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR < LOR | 0 | 0 |
| | otal PAH | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| Te | etrachloroethene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| VOCs — | ichloroethene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR < LOR | 0 | 0 |
| | roclor-1016 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | | < 0.001 | < 0.001 | | < 0.001 | | | | < 0.001 | | - | - |
| | roclor-1221 roclor-1232 | | | < 0.001 | | < 0.001 | < 0.001 | < 0.001 | | < LOR | 0 | 0 0 |
| | roclor-1232 | < 0.001 | < 0.001 < 0.001 | < 0.001 | < 0.001 < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR < LOR | 0 0 | 0 |
| PUBS | | < 0.001 | | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | | 0 | 0 |
| | roclor-1248 | < 0.001 | < 0.001 | < 0.001 | | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | | |
| | roclor-1254 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | roclor-1260 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| 10 | otal PCB | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |

env

Table 3. Groundwater Laboratory Analysis Results (continued)

| | | | | | 0.0001 | 0.0001 | | 0.0004 | 0.0004 | | | |
|-----------|----------------------------------|----------|----------|-----------|----------|----------|----------|------------|-------------|---|----|-----|
| | 4.4'-DDD | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | 4.4'-DDE | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | 4.4'-DDT | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | a-BHC | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Aldrin | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | b-BHC | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Chlordane | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | d-BHC | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Dieldrin | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Endosulfan I | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| OCPs | Endosulfan II | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Endosulfan sulphate | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Endrin | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Endrin aldehyde | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Endrin ketone | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | g-BHC (Lindane) | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Heptachlor | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR < LOR | 0 | 0 |
| | Heptachlor epoxide | | | | | | | | | | - | |
| | Hexachlorobenzene | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Methoxychlor | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | < LOR | 0 | 0 |
| | Toxaphene | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < LOR | 0 | 0 |
| | Bolstar | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Chlorpyrifos | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Demeton-O | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Diazinon | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Dichlorvos | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Disulfoton | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Ethion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Ethoprop | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Fenitrothion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Fensulfothion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| OPPs | Fenthion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Merphos | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Methyl azinphos | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Methyl parathion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Mevinphos | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | <lor< td=""><td>0</td><td>0</td></lor<> | 0 | 0 |
| | Naled | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | | | | | | | | | | | 0 | 0 |
| | Phorate | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | - | - |
| | Ronnel | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Tokuthion | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Trichloronate | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < 0.002 | < LOR | 0 | 0 |
| | Ammonia (as N) | 0.11 | 0.21 | 0.47 | 0.37 | 0.1 | 0.03 | 1.2 | 0.15 | 1.4 | 40 | 173 |
| | Nitrate (as N) | 0.06 | 0.57 | < 0.02 | 0.33 | < 0.02 | 1.1 | < 0.02 | < 0.02 | < LOR | 0 | 0 |
| Nutrients | Nitrate & Nitrite (as N) | 0.07 | 0.58 | < 0.05 | 0.35 | < 0.05 | 1.1 | < 0.05 | < 0.05 | < LOR | 0 | 0 |
| | Total Kjeldahl Nitrogen (as N) | < 0.2 | 0.3 | 0.47 | 0.7 | <0.2 | 6.8 | 1.2 | < 0.2 | 1.4 | 0 | 150 |
| | Total Nitrogen (as N) | <0.2 | 0.88 | 0.47 | 1.1 | <0.2 | 7.9 | 1.2 | <0.2 | 1.4 | 0 | 150 |
| | Potassium | 49 | 6.6 | 14 | 59 | 49 | 6.7 | 95 | 54 | 36 | 10 | 31 |
| | Chloride | 12000 | 650 | 5500 | 1900 | 6800 | 470 | 9300 | 6500 | 6400 | 5 | 6 |
| | Sulphate (as S) | 300 | 33 | 130 | 88 | 170 | 27 | 270 | 170 | 460 | 0 | 92 |
| Other | Suspended Solids | 680 | 1400 | 53 | 1400 | 95 | 2800 | 3500 | 110 | NT | 15 | 0 |
| | Total Dissolved Solids | 19000 | 1300 | 8700 | 3200 | 11000 | 970 | 15000 | 12000 | 13000 | 9 | 17 |
| | Total Organic Carbon | 13 | 5.7 | 12 | 15 | 16 | 11 | 15 | 12000 | 2 | 6 | 156 |
| | pH | 6.4 | 5.9 | 3.6 | 5.8 | 6 | 6.1 | 3.8 | 6 | 5.4 | 0 | 130 |
| I | pri | 0.4 | 5.7 | 3.0 | 3.0 | 0 | 0.1 | 5.0 | U | 3.4 | 0 | |
| Notos | | | | | | | | | | | | |
| Notes | so in ma/Lunloos attacasia | to d | | | | | | | | | | |
| | re in mg/L unless otherwise stat | led | | Data : | Obla 11 | Culmber | C | T-1-L D' | T-1-1-0 | | | |
| NT: Not T | ested | | | Potassium | chioride | Sulphate | Suspende | Total Diss | i otal Orga | рн | | |
| | | | | | | | | | | | | |



APPENDIX A

GROUNDWATER MONITORING BORE LITHOLOGY AND INSTALLATION LOGS



Project: Groundwater Assessment

Client: Bowman and Associates

Location: Allawuna Farm, Shire of York

Easting: 461246 Northing: 6469801 Datum: GDA94 (UTM 50) Scientist: Kristy Ferguson

| | SUBSURFACE PROFILE | SA | MPL | E | | WELL |
|--|--------------------|--------|------|--------------|---|--------------------------------|
| Depth (mbgl) Elevation (mAHD) Symbol | Lithology | Number | Type | Lab Analysed | Depth (m) | Well Construction |
| | | ENTS: | | | 0- 1- 2- 3- 4- 5- 6- 7- 8- 9- 10- 11- 11- 11- 11- 11- 11- 11 | Gravel pack Bentonite Backfill |

Project: Groundwater Assessment

Client: Bowman and Associates

Location: Allawuna, Shire of York

Easting: 461064 Northing: 6469095 Datum: GDA94 (UTM50) Scientist: Kristy Ferguson

| | | Allawuna, Shire of York Scient | | | 1 | \A/=1 1 | | |
|---|----------------|---|--------|-------------------------------|----------------|--------------|--|-------------------|
| | ; | SUBSURFACE PROFILE | | SA | MPL | .E | , | WELL |
| Depth (mbgl) Elevation (mAHD) | Symbol | Lithology | | Number | Type | Lab Analysed | Depth (m) | Well Construction |
| 0 1 2 322.0 1 2 320.0 3 4 317.5 5 316.5 6 7 8 9 10 11 12 309.0 11 12 309.0 13 14 309.0 13 14 309.0 13 14 309.0 13 14 309.0 13 14 309.0 15 309.0 16 17 309.0 16 17 309.0 10 11 12 309.0 10 11 12 309.0 13 14 309.0 16 17 309.0 16 17 309.0 16 17 309.0 10 12 309.0 10 12 309.0 10 12 309.0 10 12 309.0 10 12 309.0 10 12 309.0 10 12 309.0 10 12 309.0 10 12 309.0 10 12 309.0 10 12 309.0 10 12 309.0 21 22 23 24 25 26 27 294.0 29 292.0 30 31 31 31 31 30 30 20 21 22 23 24 25 26 27 294.0 30 31 31 31 31 31 31 31 31 31 31 | | Ground Surface Sandy, clayey GRAVEL Orange/brown, coarse grain, poorly sorted, dry. Gravelly, clayey, SAND Yellow, coarse grain, poorly sorted, dry. Sandy, clayey SILT Orange/cream, fine grain, poorly sorted dry SILT Orange/pink, fine grain, moderately sorted, dry. Clayey, SILT Orange/cream, fine grain, well sorted, dry. SILT White, fine grain, well sorted, dam Sandy, silty, CLAY White, fine grain, well sorted, damp. Sandy, clayey, SILT Orange, yellow, white, mdeium grain, poorly sorted, damp. End of Borehole | , / | | | | $\begin{array}{c} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 21 \\ 22 \\ 23 \\ 24 \\ 25 \\ 26 \\ 27 \\ 28 \\ 29 \\ 30 \\ 31 \\ \end{array}$ | |
| Installati | on Me amete | ethod: Air compressor with blade bit r: 50 mm | ll was | NTS: not cons ntercepte | structec ed | l as gr | oundwa | ter |

Project: Groundwater Assessment

Client: Bowman and Associates

Location: Allawuna, Shire of York

Easting: 462012 Northing: 6468392 Datum: GDA94 (UTM50) Scientist: Kristy Ferguson

| Image: Second | | SUBSURFACE PROFILE | SA | MPL | E | | WELL |
|---|---|---|--------|------|--------------|---|--|
| 0 274.6 Gravelly, sandy, CLAY 1 Dorange/brown, fine and coarse grain, poorly sorted, dry. 2 272.1 Gravelly, SAND 3 72.1 Gravelly, SAND 0 Gravelly, SAND Gravelly, SAND 0 Gravelly, SILT Gravelly, SILT 6 Sandy, SILT Grey/white, fine grain, well sorted, dry. 5 Sandy, silty, CLAY Borwn/grey, fine grain, moderately sorted, dry. 8 Borwn/grey, fine and coarse grain, moderately sorted, saturated. 9 10 10 10 11 End of Borehole 10 12 End of Borehole 11 12 End of Borehole 13 | Depth (mbgl) Elevation (mAHD) Symbol | Lithology | Number | Type | Lab Analysed | Depth (m) | Well Construction |
| Bore Diameter: 50 mm | 0 274.6 1 2 273.1 3 272.1 3 272.1 4 5 6 269.1 6 7 7 8 267.1 8 267.1 8 9 10 11 12 13 262.1 13 13 14 15 15 15 15 15 15 15 15 15 15 | Gravelly, sandy, CLAY Orange/brown, fine and coarse grain, poorly sorted, damp. Gravelly, clayey, SAND Orange/yellow, fine and coarse grain, poorly sorted, dry. Gravelly, SAND Orange/brown, medium grain, moderately sorted, dry Sandy, SILT Grey/white, fine grain, well sorted, dry. Sandy, silty, CLAY Borwn/grey, fine grain, moderately sorted, dry. Sandy, silty, CLAY Borwn/grey, fine and coarse grain, moderately sorted, dry. Sandy, silty, CLAY Brown/grey, fine and coarse grain, moderately sorted, dry. End of Borehole Destructor: Edrill COMI Compressor with blade bit | | | | 1- 2- 3- 4- 5- 5- 6- 7- 8- 9- 10- 11- 12- | GWL during bore installation Gravel Pack Gravel Pack |

Project: Groundwater Assessment

Client: Bowman and Associates

Location: Allawuna Farm, Shire of York

Easting: 462316 Northing: 6468390 Datum: GDA94 (UTM 50) Scientist: Kristy Ferguson

| | | SUBSURFACE PROFILE | SA | MPL | E | | WELL |
|----------------------------------|---------------|--------------------|--------|------|--------------|---|----------------------------|
| Depth (mbgl) Elevation (mAHD) | Symbol | Lithology | Number | Type | Lab Analysed | Depth (m) | Well Construction |
| | on Me mete | | NTS: | | | 0- 1- 2- 3- 4- - - - - - - - - - - - - - | A during bore installation |

Project: Groundwater Assessment

Client: Bowman and Associates

Location: Allawuna Farm, Shire of York

Easting: 462065 Northing: 6468851 Datum: GDA94 (UTM 50) Scientist: Kristy Ferguson

| | SUBSURFACE PROFILE | SA | MPL | E | | WELL |
|--|--------------------|--------|------|--------------|--|----------------------------|
| Depth (mbgl) Elevation (mAHD) Symbol | Lithology | Number | Type | Lab Analysed | Depth (m) | Well Construction |
| | | NTS: | | | 0- 1- 2- 3- 4- 5- 6- 7- 8- 9- 10- 10- | A during bore installation |

Project: Groundwater Assessment

Client: Bowman and Associates

Location: Allawuna Farm, Shire of York

Easting: 462699 Northing: 6468873 Datum: GDA94 (UTM 50) Scientist: Kristy Ferguson

| | | : | SUBSURFACE PROFILE | SA | MPL | E | | WELL |
|--|---|--------|---|--------|------|--------------|--|--------------------|
| Depth (mbgl) | Elevation (mAHD) | Symbol | Lithology | Number | Type | Lab Analysed | Depth (m) | Well Construction |
| 0 1 2 3 4 5 6 7 10 11 12 13 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 14 15 16 16 16 16 17 16 17 16 17 16 17 17 16 17 | 283.3 282.3 281.3 279.3 279.3 276.3 274.3 | | Ground Surface Gravelly, clayey SAND Brown, medium grain, poorly sorted, damp. Gravelly, sandy CLAY Orange/brown, medium grain, moderately sorted, dry. Sandy, silty CLAY Grey/brown, fine to medium grain, moderately sorted, damp. Sandy, gravelly CLAY Grey, fine grain, moderately sorted and wet. Gravelly CLAY White and grey, fine grain, moderately sorted, wet. Gravelly, sandy CLAY Cream coloured, fine to coarse grain, poorly sorted, saturated. | | | | 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 | 3mm slotted screen |
| -01 | | | End of Borehole | | | | | |
| Inst Bor | tallati e Dia | on Me | ontractor: Strataprobe COMME ethod: Air compressor with blade bit r: 50 mm 012 | NTS: | | | | |

Project: Groundwater Assessment

Client: Bowman and Associates

Location: Allawuna Farm, Shire of York

Easting: 463607 Northing: 6469137 Datum: GDA94 (UTM50) Scientist: Kristy Ferguson

| SUBSURFACE PROFILE | | | SAMPLE | | | WELL | |
|--|---|--------|--------|--------------|-----------|--|--|
| Depth (mbgl) Elevation (mAHD) Symbol | Lithology | Number | Type | Lab Analysed | Depth (m) | Well Construction | |
| 0 8 8 8 8 8 9 1 1 1 1 1 1 1 1 1 1 1 1 1 | thod: Air compressor with blade bit r: 50 mm | ENTS: | | | 0- | Gurrete Backfill Concrete Back | |

Project: Groundwater Assessment

Client: Bowman and Associates

Location: Allawuna Farm, Shire of York

Easting: 463172 Northing: 6469459 Datum: GDA94 (UTM50) Scientist: Kristy Ferguson

| SUBSURFACE PROFILE | | | SA | SAMPLE | | | WELL | |
|---|--------|---|--------|--------|--------------|---|------------------------------|--|
| Depth (mbgl) Elevation (mAHD) | Symbol | Lithology | Number | Type | Lab Analysed | Depth (m) | Well Construction | |
| 0 <u>301</u> - 1- - | .7 | Ground Surface Gravelly, SAND Brown, coarse grain, poorly sorted, dry. | | | | 0- - 1- - | Concrete GWL PD | |
| 2 299 | | Gravelly, silty, SAND Grey/brown, fine and coarse grain, poorly sorted, dry. Sandy, silty, CLAY Grey, fine grain, well sorted, dry. | - | | | 2- | Bentonite | |
| 5- - - - - - - - - - - - - - - - - - - | | | | | | 5- 5- - - - - - - - - - - - - - - - - - | GWL during bore installation | |
| 7 8 9 - | | <i>Silty, CLAY</i> Brown/grey, fined grain, well sorted, damp. | | | | 7 | Gravel pack 3mm | |
| 10-291 | .7 | End of Borehole | - | | | 10- | | |
| Installation Contractor: Edrill Installation Method: Air compressor with blade bit Bore Diameter: 50 mm Date: 14/05/2012 | | | | | | | | |