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ALLAWUNA FARM LANDFILL

Hydrogeological Site Characterisation Studies

Submitted to:
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REPORT

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Golder Associates

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1.0 INTRODUCTION

SITA Australia Pty Limited (SITA) is submitting a Works Approval Application (WAA) for a new Class II landfill site known as the Allawuna Farm Landfill (Allawuna Landfill). The proposed landfill is located south of the Great Southern Highway, approximately 20 km west of the town of York (Figure 1). The landfill is proposed to be developed in a series of cells, which are expected to occupy a total area of approximately 36 ha.

A WAA was originally submitted to the Department of Environment and Regulation (DER) in January 2014. However, following discussions with the DER, the previous WAA was withdrawn.

SITA engaged Golder Associated Pty Ltd (Golder) to carry out additional field studies in order to better understand the hydrogeological setting for the landfill site.

The additional field studies comprised:

- A number of geotechnical test pitting programs primarily for engineering design purposes and reported under a separate cover (Golder Report 147645033-008-R-RevA)
- Drilling, installation, hydraulic testing and groundwater sampling of additional groundwater monitoring wells
- Development of a numerical groundwater model for the site
- Ground geophysical surveying (ground magnetics and Electrical Resistivity Imaging (ERI))
- A geotechnical program of cone penetrometer testing to validate (or otherwise) the findings of the ground geophysical surveys
- A review of public domain remote sensing data to examine the findings of the ground geophysical surveys

This report presents the findings of the additional works undertaken to characterise the hydrogeology of the site and presents the conceptual hydrogeological model.

2.0 BACKGROUND

The WAA submitted to the Department of Environment and Regulation (DER), was assessed by the DER to have limitations in terms of demonstrating an understanding of the geology and hydrogeology of the landfill site. Two drilling programs to install groundwater monitoring wells and provide geological information for the site had been undertaken.

Golder reviewed the drilling logs prepared by ENV and found the logs to be limited with respect to geological descriptions, such that there remained uncertainty in the interpretation of the provenance of those materials, and the hydrogeological conceptualisation based upon this information required reinterpretation. Additionally, the available groundwater monitoring data for the site was insufficient to provide a historical data-based maximum groundwater design level for use in engineering design for the landfill.

Golder was subsequently appointed to carry out more rigorous characterisation of the hydrogeology of the landfill site, and develop a robust conceptual hydrogeological model.

3.0 SUMMARY OF PREVIOUS WORK

In August 2012, BA engaged ENV Australian Pty Ltd (ENV) to carry out a monitoring well drilling and installation program (ENV 2012). The objective of this work, was to identify the hydrogeology and hydrochemistry of the Allawuna Landfill site to support the approvals process for the landfill facility. Eight boreholes were drilled to depths ranging between 10 and 18 m below ground level (bgl). Seven of these boreholes were converted into PVC cased groundwater wells (MB01 and MB03 to MB08) which were used to measure groundwater levels, collect groundwater quality samples for laboratory testing and carry out hydraulic testing to estimate hydraulic conductivities at monitor bore locations. ENV's Baseline Groundwater Monitoring Report and a summary of time-series groundwater elevations is provided in Appendix A.

A number of stakeholders and the regulator identified gaps in the ENV data, relating to the absence of understanding of the geological and hydrogeological setting. Specifically, lithological descriptions of the materials intersected in the original six monitor wells were ambiguous and the interpretation of the difference in groundwater levels between the time of drilling and subsequent measurements, resulted in a misinterpretation of the hydrogeological setting and the assumption that groundwater across the site was confined and could not rise to within 3 m of the base of waste. Based on the ambiguous data, one party interpreted the information to represent a palaeochannel in the vicinity of MB02 (amongst other hypothesised locations) that could provide direct hydraulic connection between the landfill site and the Helena River catchment, which is one of Perth's drinking water sources. Golder has subsequently reinterpreted the hydrogeology based on the findings of the studies outlined herein.

In May 2013, BA installed an additional six groundwater monitor wells at the site (MB09 to MB14) to improve the understanding of geology and groundwater depth below the proposed landfill cells (Bowman 2014a). Groundwater level measurements and groundwater quality sampling and analysis, was carried out on a bi-annual basis (February/August) since August 2012. Laboratory analysis of groundwater samples collected to date included some major cations and anions, nutrients, total organic carbon, metals, hydrocarbons, pesticides, polychlorinated biphenyls and volatile organic compounds.

The locations of all groundwater monitor wells installed during site investigations, are included on Figure 2. Groundwater monitor well construction logs for MB01 – MB 14 are provided in Appendix B. Groundwater level measurements and the results of groundwater quality sampling and laboratory analysis and hydraulic conductivity testing are discussed in Section 5.4.

4.0 SCOPE OF WORK

The various scopes of work carried out by Golder Associates and covered in this report are as follows:

- Drilling of 10 additional groundwater monitor wells using air-coring techniques and completion, hydraulic testing and groundwater sampling of groundwater monitoring wells
- Develop a simple numerical groundwater model to assess the impacts to rainfall infiltration and groundwater levels, of various landfill configurations.
- Ground geophysical surveying using ground magnetics for general mapping purposes and to specifically identify and map the locations of dolerite dykes across the site. Electrical Resistivity Imaging was also carried out to examine a sandy feature.
- Cone penetrometer testing to examine the nature of near-surface materials within the extent of a low total magnetic anomaly identified during the ground magnetics survey, and to determine whether its lateral extent could be accounted for by the nature of the materials.
- Desktop study of remote sensing data to determine the regional extent of the magnetic anomaly.

5.0 REGIONAL SETTING

5.1 General Site Setting

The proposed landfill site is located in a small catchment containing an unnamed headwater tributary located on the eastern side of the valley that contains the northerly flowing, ephemeral, Thirteen Mile Brook, into which the tributary drains. Thirteen Mile Brook is located approximately 400 m south-west of the landfill footprint. The landfill footprint is located on the northern side of the tributary catchment. Figure 3 presents the topographic setting and identifies the local surface drainage sub-catchment boundaries in the immediate vicinity of the landfill.

5.2 Regional Geological Setting

Based on the Perth 1:250 000 Geological Series map, Allawuna Farm is located on the Darling Plateau, to the east of the Darling Fault, and over Archaean granitic and gneissic rocks that form part of the Yilgarn Block (Figure 3 and Figure 4). Developed over these Archaean rocks are extensive areas of laterite (Czl on Figure 3 and Figure 4) of uncertain age, but assumed to have developed during the Tertiary period. The laterite has formed *in situ* from the weathering of the underlying granitic rock and forms part of a classic saprolitic regolith profile, developed during previous wet and/or humid tropical climatic conditions (Figure 5).

The laterite is generally massive and cemented and may be pisolitic or vesicular. It averages 4 m in thickness and the upper portions may consist locally of uncemented pisolites. The laterite passes down through a pallid zone of variable thickness into weathered bedrock. Only local redistribution has occurred. A number of deposits have formed on colluvial slopes above alluvium and are chiefly laterised sands (Wilde and Low, 1978).

Overlying the laterite are deposits of yellow, grey or white sand of variable thickness (Czs on Figure 3 and Figure 4). There has been some redistribution of this material into eolian dunes. Where it overlies the massive laterite of the Darling Range the sand unit is much less extensive, is grey or white but not yellow, and is invariably associated with drainage courses (Wilde and Low, 1978).

Within the vicinity of the proposed landfill site, the Quaternary colluvium (Qrc on Figures 3 and 4) consists of shallow dipping sheets of sand on the valley sides, upslope from alluvial and below rock or laterite outcrops. In areas of active erosion, colluvium occurs between valley alluvium and the rock out crop (separated from both by a marked change of slope) and also occurs as scree deposits in valleys that are actively incising the regolith surface.

Throughout Western Australia, and associated with periods of elevated wet climatic conditions, extensive drainage systems were active which developed palaeovalley drainage networks which are now typically obscured by present day surficial deposits and may not necessarily align with present day drainage patterns. Figure 3 shows an identified primary palaeovalley approximately 10 km west south-west of the proposed landfill footprint, within the Helena River Catchment (Bell *et. al*. 2012 and English *et. al*, 2012).

Tholeiitic quartz dolerite dykes intrude all Archean rocks throughout the sheet area. They are particularly prominent in the granitic terrain but often obscured by surficial deposits. The dykes are generally around 2 to 10 m thick, but range up to 200 m maximum thickness. The closest dyke to the site indicated on the 1:250 000 geology sheet is located approximately 3.4 km to the north-east of the landfill.

Few definite faults were recognized in the Precambrian rock of the sheet area, but it is likely that many more exist but none are indicated in the vicinity of the landfill. Most of the faults have a north-east to north-west trend, but directions of displacement were hard to determine.

5.3 Local Geology

The local geology at the proposed landfill site is presented in Figure 6, along with groundwater level (potentiometric in places) contours presenting a winter high level configuration. The geological description of the area is based on information obtained from the Perth 1:250:000 Geological Series map and shows interpreted granite as bedrock but in reality it is substantially obscured by the regolith profile.

Figure 6 shows predominantly porphyritic granite beneath the footprint of the landfill, with patches of laterite and colluvium on the north-eastern side of Thirteen Mile Brook, while the laterite is indicated on the south-western side of the brook. The residual regolith profile is laterally variable due to the details of weathering of parent rock types, however the overall weathered residual profile is consistent with a classical lateritic profile. For example, coarse grain quartz rich zones within the granite may weather to produce a quartz sand dominated profile in the upper portions of profile, while finer grained zones in the parent granite would result in silt dominated profile. Feldspars within the parent rock weather to kaolinite clay such that the original amount of feldspar in the rock may govern the amount of clay within the profile. The clay colloids (particles) can be quite mobile in the groundwater environment such that with prolonged flushing with seasonal rainfall and groundwater movement, the residual profile can become quartz sand rich, within a matrix of clay of varying percentages.

5.4 Hydrogeology

The conceptual hydrogeological setting for the proposed landfill site is summarised on Figure 7. Groundwater at the site is present as a predominantly phreatic (water table) aquifer that can be locally perched or semi confined, with some lateral variation, depending upon the point of observation within the residual profile.

Rain falling on sandier more permeable materials will infiltrate readily down to the water table whereas rain falling on clayeyer materials will infiltrate more slowly or perch on the less permeable material, possibly moving laterally depending on the local groundwater gradient conditions. In this way after rainfall, some locations on the site may appear damp or boggy until the transient shallow groundwater level attenuates through a combination of infiltration and lateral migration.

Below the regolith profile, fresh bedrock provides a fractured rock setting where groundwater storage and movement is within fractures and defects within the rock.

5.4.1 Groundwater levels

Groundwater levels across the site will generally be elevated at the end of winter in response to the infiltration of winter rains, while the groundwater levels will generally be at seasonal low at the end of summer as levels recede in the absence of recharge from rain. This cycle of groundwater level fluctuation has been exacerbated with the clearing of original vegetation for agricultural purposes, resulting in the development of dryland salinization problems evident in the vicinity of the proposed landfill.

Groundwater levels based on measurements during winter (19 August 2014) show groundwater flow is generally west towards Thirteen Mile Brook, which represents the local groundwater sink. During periods of elevated groundwater level, as illustrated in Figure 7, groundwater will discharge into the creek while during dry periods with lower groundwater levels, discharge into the creek may cease. In dryer months when groundwater levels are seasonally low, recharge to the groundwater environment can also occur from surface water drainage in response to overland flow from rainfall.

Where the water table intersects the ground surface, seeps or springs will develop. One such area identified during a site inspection (9 September 2014) where a substantial area of topographically low ground within the footprint of the proposed landfill, was observed to have seepage water on the ground surface (Figure 6) This water joined the local surface water drainage system, discharging ultimately into Thirteen Mile Brook.

Two of the existing monitor wells located close to the creek that bisects the landfill footprint, were artesian (flowing) when inspected on 9 September 2014. The artesian flow reflects the groundwater potentiometric level being higher than the ground surface and/or locally semi confined conditions where the monitoring wells have intersected higher permeability horizons at depth, that reflect the higher groundwater elevations in the hills adjacent to the creek.

5.4.2 Groundwater chemistry

Available groundwater quality data indicates the groundwater at the site has a low pH range of between 3.2 to 5.6. This is consistent with dryland salinity affected catchments throughout the Wheat Belt.

Groundwater Electrical Conductivity (EC) measurements are highly variable, ranging from 4000 to 30 000 uS/cm. This variability is due to the varying flow paths and mixing histories of the individual waters sampled, with fresher water (lower EC measurements) reflecting more contact with recent infiltrating rainwater, whilst higher ECs may indicate mixing with groundwater exposed to stored salt because of rising water levels in response to clearing, or evaporative concentration processes near the ground surface.

Measured ECs in surface water in creeks on the site ranged from 9000 to 14 000 uS/cm. The EC within the creek water will vary seasonally as a function of the amount of potentially salty groundwater discharging to the creek directly, and the amount of salt picked up by overland flow in response to rainfall events.

5.4.3 Other Groundwater Users

A search of the Department of Waters borehole databases indicated there are no recorded groundwater wells within the Thirteen Mile Brook catchment, in the vicinity of the proposed landfill.

6.0 HYDROGEOLOGICAL FIELDWORK

6.1 Drilling

The drilling investigation by Golder Associates was carried out in two programs, at six locations initially, in the vicinity of the proposed landfill cells between 2 and 4 December 2014, and a follow-up program was undertaken between 12 and 16 March 2015, for the remaining four locations. The rationale for the locations of the new monitor wells is presented in the Table 1. Note that the placement of the first six new monitoring wells was in the context of the then- proposed larger landfill footprint which has since been considerably reduced.

Table 1: Purpose of new monitor wells

Golder Name	Purpose
GMB1	Up-gradient permanent monitor well for geological (lithological) control, hydraulic properties, background water quality and located to constrain groundwater level contours across the footprint of landfill
GMB2	Geological control (validate ambiguous lithological log at MB08), deeper well to assess head distribution vertically (i.e. a nested completion with MB08), hydraulic properties, background water quality and located to constrain groundwater level contours across the footprint of landfill
GMB3	Up-gradient permanent monitor well for geological (lithological) control, hydraulic properties, background water quality and located to constrain groundwater level contours across the footprint of landfill
GMB4	Up or across-gradient (to be determined) permanent monitor well for geological (lithological) control, hydraulic properties, background water quality and located to constrain groundwater level contours across the footprint of landfill
GMB5	Down-gradient monitoring well for geological (lithological) control (validate ambiguous lithological log at MB11), deeper well to assess head distribution vertically (i.e. a nested completion with MB11), hydraulic properties, background and operational water quality and located to constrain groundwater level contours across the footprint of landfill.

Golder Name	Purpose
GMB6	During test pitting carried out concurrently to the monitoring well installation program, one test pit failed to intersect granite to the depth of excavation at a topographically elevated location. The sandy nature of the materials intersected was clearly different to the usual regolith-over-granitic profile intersected in most of the other test pits excavated on the site. Accordingly an exploratory bore was drilled to investigate the provenance of the material, keying into basement granite. This bore was completed as a monitoring well.
GMB7	Drilled to check depth to base of any transported material and sited to constrain groundwater contours from eastern side of Thirteen Mile Brook.
GMB8	Redrill of MB02 for geological (lithological) control (validate ambiguous lithological log at MB02) given the possible interpretation of sedimentary materials being present, possibly representing a palaeochannel setting, that may have adverse implications to the siting of the landfill. The new bore would be completed as monitoring bore to obtain groundwater level given MB02 not completed as a monitoring bore and was reported to be dry.
GMB9	Drilled to check depth to base of any transported material and sited to constrain groundwater contours on western side of the Thirteen Mile Brook valley.
GMB10	Drilled to check depth to base of any transported material and sited to constrain groundwater contours on western side of the Thirteen Mile Brook valley

Notes: *Name may still change to reflect current naming strategy on the site

Both drilling and well completion activities were carried out by Proline Drilling (Proline) using a Comacchio Geo 305 drilling rig and air-core drilling technique (115 mm diameter) under supervision and technical direction of a Golder hydrogeologist. Drill cuttings were collected into 20 L buckets directly from the rigs cyclone at 0.5 m intervals and laid out for logging, sampling and photography.

A summary of the monitor well completion details is provided in Table 2, while the locations of monitor wells are shown on Figure 2. Well completion logs containing details of the lithology encountered during drilling and the monitor well completion details are presented in Appendix B.

6.2 Well Completion

New groundwater monitor wells were initially constructed using nominal 50 mm diameter, Class 18, threaded blank and slotted (0.5 mm aperture) uPVC casing (GMB's 1 to 6), then subsequent monitor wells were constructed with nominal 50 mm diameter Class 12 uPVC casing (GMB's 7 to 10).

The annulus adjacent to the slotted section of each monitor bore casing was back filled using graded "gravel" pack material supplied by the Australian Mud Company (AMC). AMC Medium Bentonite Chips were used in each borehole to create an annular seal of at least 0.5 m thickness above the gravel packed interval of the borehole. The remaining borehole annulus was backfilled using either drill cuttings or additional bentonite chips.

The surface headworks of each bore were completed using blue-painted, steel protective risers set in an approximately 300 mm thick concrete plinth.

Table 2: Summary of Monitor Well Completion Details

Monitor Well	Easting*	Northing*	Ground Elevation*	Top of Casing Elevation*	Casing Stickup (m AGL)	Borehole Depth (m BGL)	Cased Depth (m BGL)	Screened Interval (m BGL)
MB01	461249.6	6469808.3	297.57	298.268	0.70	11.9	11	5.0-11.0
MB03	461968.7	6468385.7	309.26	309.874	0.61	13.42	13	7.0-13.0
MB04	462311.6	6468391.9	302.23	302.726	0.50	10.91	12 ?	6.0-12.0 ?
MB05	462062.6	6468857.2	300.70	301.432	0.74	9.7	10 ?	4.0-10.0 ?
MB06	462700.9	6468874.6	306.81	307.395	0.58	10.64	18 ?	4.5-10.5 ?
MB07	463608.3	6469136.2	330.90	331.502	0.61	10.55	10	4.0-10.0
MB08	463173.1	6469492.8	333.53	333.945	0.41	11.25	10	4.0-10.0
MB09	461856.1	6468566.0	307.10	307.439	0.34	11.7	11.7	8.7-11.7
MB10	461920.0	6468767.4	300.44	301.092	0.65	10	8	5.0-8.0
MB11	462456.7	6468764.6	303.37	303.674	0.30	8.5	7	4.0-7.0
MB12	462367.5	6469000.0	316.42	316.911	0.49	13	13	10.0-13.0
MB13	462516.2	6469123.5	321.21	321.595	0.39	16	15.5	12.5-15.5
MB14	462742.0	6469081.7	314.62	315.105	0.49	8	7.5	4.5-7.5
GMB01	462508	6469516	334.34	334.94	0.60	10.4	10.35	5.6-10.3
GMB02	463175	6469492	333.33	333.87	0.54	9.8	9.5	2.1-9.6
GMB03	463287	6469115	328.27	328.85	0.57	10.0	9.9	3.7-9.9
GMB04	463008	6468751	318.44	319.00	0.56	11.49	11.5	5.4-11.5
GMB05	462449	6468760	303.38	303.90	0.52	16.4	16.0	10.0-16.0
GMB06	462522	6469274	325.91	326.43	0.52	21.8	21.5	8.2-21.8
GMB07	461435	6469819	297.06	297.63	0.56	27	26.25	20.3-26.3
GMB08	461156	6469044	314.46	315.08	0.62	33	31.11	25.1-31.1
GMB09	461195	6469450	303.82	304.30	0.48	18	17.52	11.5-17.5
GMB10	461714	6468886	302.05	302.71	0.66	12	11.33	5.3-11.3

Notes: *Coordinates (Zone 50, MGA94), Elevations in metres Australian Height Datum (AHD). m AGL – metres Above Ground Level, m BGL – metres Below Ground Level, SWL – Static Water Level, m BTOC– metres Below Top of Casing. Monitor wells GMB01-GMB06 surveyed by BCE Survey using a differential GPS system on 5 December 2014.
Monitor wells GMB07-GMB10 surveyed by Crossland & Hardy using a differential GPS system on 20 March 2015. ? indicates conflicting data in original report.

Each monitor well was developed by the airlift method using pressure rated, high density polyethylene tubing placed near the base of the well. Development of GMB1 was not possible since seepage of groundwater into the completed well was negligible. A summary of the duration of development, the volume of water purged and the water quality parameters recorded during development are presented in Table 3.

Table 3: Monitor Bore Airlift Development Details

Monitor Bore	Duration (Hours)	Volume Removed (L)	pH	EC (uS/cm)	Temperature (C)
GMB1	0*	20	NA	NA	NA
GMB2	1	162	4.54	18 100	23
GMB3	1	90	6.00	6 500	20.7
GMB4	1	130	6.78	4 690	19.8
GMB5	1	600	6.46	19 900	22.3
GMB6	1	300	4.55	4 800	24
GMB7			8.20	19 700	
GMB8			5.14	11 300	
GMB9			7.90	2 970	
GMB10			6.57	9 460	

Notes: *GMB1 was not effectively developed due to insufficient yield. All water removed from well casing was remnant from drilling process, not groundwater inflow. uS/cm = micro Siemens per centimetre, NA = not applicable

6.3 Groundwater Levels

Groundwater levels have been recorded monitor wells since August 2012. The available groundwater level database has been provided to Golder by Bowman and Associates and is presented on Figure 8 as hydrographs. Also on Figure 8 is a detailed examination of the hydrographs for MB07 and MB08, showing the peak groundwater level for these wells occurred somewhere between early August and early November, for 2014. This is not unexpected as groundwater levels peak at the end of the wet season.

Reference to Figure 8 shows the groundwater levels generally reflect the height of the monitor wells, with highest groundwater levels occurring in topographically elevated wells (i.e. MB07 and MB08). For wells lower in the topography, groundwater levels may be constrained in winter as the groundwater discharges to the surface drainage system, within topographically low areas such as the seepage area outlined on Figure 6. The seasonal variation in groundwater levels for individual wells ranges from 2.5 m (MB03) to less than 0.3 m, and averages about 1.0 m.

The groundwater levels measured in GMB5 and MB11 were above the local surface elevation and therefore are artesian (potentiometric groundwater level above ground level). Additionally, groundwater was observed to be flowing from around the outside the steel surface casing at MB06, indicating that the annular seal of this well is no longer competent and measurements from this well do not represent local potentiometric levels. Because of the local artesian conditions, groundwater levels shown on Figure 6 are essentially potentiometric levels in the vicinity of these wells and the seepage area.

6.4 Hydraulic Testing

Slug testing was carried out on 12 December 2014 in each newly installed monitor bore. This involved installing an automatic water level logger into the test well and introducing or removing a slug or bailer of known displacement volume, into and out of the well. The resulting displacement in water level was recorded and analysed using proprietary hydraulic test analysis software (Aqtesolve) to provide an estimate of the hydraulic conductivity (K) of the screened and/or gravel packed, saturated interval (test interval).

The results of the hydraulic testing are presented in Table 4 along with the result from ENV's previous work. The Aqtesolve solutions to each Golder data set are provided in Appendix C.

Table 4: Results of Slug Testing

Monitoring Well	Material in Test Interval	Estimated K Range (m/d)	Estimated K Average (m/d)
MB01	Gravelly Clay and Gravelly Sand*	0.03-0.5	NP
MB03	Sandy, Silty, Clay*	0.1	NP
MB06	Gravelly, Sandy, Clay*	0.02-0.6	NP
MB07	Sandy Clay and Gravelly, Sandy Clay*	0.02-0.6	NP
GMB2	Sandy Clay/Sandy Clayey Gravel	0.1-0.2	0.2
GMB3	Sandy Clay/Sandy Gravel	0.3-0.5	0.5
GMB4	Clayey Sand/Gravel	0.4-0.6	0.5
GMB5	Sand/Gravel	1.9-4.5	3.0
GMB6	Clayey Sand/Sandy Clay/Sand	0.3-0.3	0.3

Notes: *ENV sample descriptions based on grab samples and may not be representative of drilled intervals.
NP = Not Provided.

6.5 Sampling and Analysis

Details of the soil and groundwater sampling procedures and quality control and quality assurance measures implemented during drilling, slug testing and groundwater sampling are provided in Appendix D. Chain of custody (COC) forms for all samples collected during the field program are provided in Appendix E.

6.5.1 Particle Size Distribution

Samples were collected from drill cuttings recovered during drilling for Particle Size Distribution (PSD) testing from various depths from GMB5. Samples were tested at Golder's Perth Laboratory (10 Guthrie Street, Osborne Park) under NATA Accreditation 1961 (Perth). Samples for PSD testing were collected to validate sample descriptions of the materials encountered during drilling. A summary of the PSD sample collection and test results is provided in Table 5.

Table 5: Summary of PSD Testing

Lab Reference	Borehole	Depth (m bgl)	Material Description
14441803	GMB5	2.5-3.5	Clayey/Silty Sand (trace of gravel)
14441804	GMB5	5.5-6.0	Clayey/Silty Sand (trace of gravel)
14441805	GMB5	10.0-10.5	Sand (with gravel, clay and silt)
14441806	GMB5	15.0-15.5	Gravel (with sand and trace of clay/silt)

The results of PSD testing were in agreement with the field observation of the materials types recovered during drilling. Reference is made to the depth and sample identification numbers for PSD samples on the borehole logs provided in Appendix B. Copies of the PSD test result certificates are provided in Appendix F.

6.5.2 Groundwater Quality Testing

Groundwater quality samples were collected from each new monitoring well on 11 December 2014. Groundwater sampling was carried out following the methodology presented in Appendix D. Groundwater sampling field records are provided in Appendix G.

A summary of field parameters recorded by Golder immediately prior to sample collection at each well is provided in Table 6. A full set of field and quality laboratory testing results are presented in Table H1 in Appendix H.

Table 6: Field Parameters for Groundwater Quality Samples at Collection

Well	Electrical Conductivity (uS/cm)	Temperature (°C)	pH	Redox Potential (mV)	Dissolved Oxygen (mg/L)
GMB2	17400	21.4	4.0	231	0.5
GMB3	5100	21.6	4.2	120	1.7
GMB4	4100	23.8	4.1	95	1.9
GMB5	17900	22.5	5.9	-4	0.1
GMB6	4900	23.7	4.5	49	0.6
GMB7	19700	ns	8.2	ns	ns
GMB8	11300	ns	5.1	ns	ns
GMB9	2970	ns	7.9	ns	ns
GMB10	9460	ns	6.6	ns	ns

Notes: uS/cm – micro Siemens per centimetre, mV – milli Volts, ppm – parts per million, ns – not sampled

7.0 NUMERICAL MODELLING

During the course of the development and refinement of the landfill design, a fundamental change in the design philosophy was brought about by the amount of groundwater observed to seep to the surface in the vicinity of the valley immediately east of the current landfill footprint, but previously beneath the old landfill footprint. In the new construction approach, cell construction commences in relatively high ground away from the seepage area. Previously cell construction was to commence further down hydraulic gradient, and progress up the hill.

In order to consider the implications of this change in design on groundwater, a simple numerical model was developed in MODFLOW, to simulate the interaction of groundwater and topography (discharge to surface), and the effects of the reduction in rainfall infiltration would have on the amount of groundwater reporting to the seepage area during and after the wet season.

The details of the model are summarised in Appendix I, but the key finding from the modelling exercise was that by constructing the landfill higher topographically, and assuming the design would inhibit rainfall recharge within the footprint of the landfill, the amount of groundwater seeping to the surface would be reduced by approximately 20%. This validates the new design concept in terms of reducing groundwater levels and seepage volumes.

8.0 GROUND GEOPHYSICAL SURVEYS

The geotechnical test pitting program undertaken at the same time as the monitoring well installation program, intersected dolerite dykes at three locations. Dolerite float had previously been recognised within the footprint of the landfill, but until the test pitting program, none had been intersected by drill holes or test pits. The presence of dolerite dykes could affect the amount of borrow material that is freely dig-able as the dolerite is considerably less weathered than the granitic material.

In order to resolve the uncertainty in understanding of the subsurface geology, a program of ground geophysical surveying was carried by geophysical subcontractors ASST, between 12 and 16 January 2015.

The ground geophysical surveying comprised a ground magnetic survey of the entire site, principally to delineate the presence of dolerite dykes in space, plus an ERI (Electrical Resistivity Imaging) traverse was made across the sandy material intersected in TP94 and GMB06, in an effort to delineate the depth of the feature and provide insight as to the geological nature of the occurrence.

The consultant report prepared by ASST for the geophysical survey work is presented in Appendix J, while Figure 9 presents the processed Total Magnetic Intensity data. Referring to Figure 9, the key features of interest are the linear features interpreted as being dolerite dykes, and an arcuate anomalous feature of low magnetic intensity, roughly bisecting the survey area from north-west to east.

Of the interpreted dykes, the two NNW-SSE oriented features in the central-eastern portion of the survey area correlate directly with test pit intersections of dolerite, while the NNE-SSW feature further west is most likely a dyke as it has a strong magnetic contrast with surrounding rock, and there is no indication of displacement of the low magnetic anomaly, as one might expect to see if the feature was a fault.

The low magnetic intensity anomaly could be interpreted in a number of ways, however the principal concern for the project was whether it represented a bedrock response, suppressed by a substantial thickness of low magnetic intensity sandy material which could be interpreted to be a palaeodrainage feature. In order to address this concern, a program of CPTs (Cone Penetrometer Tests) was carried out to evaluate the likelihood of this interpretation (refer to Section 10.0). The CPT program indicated that the low magnetic anomaly was not due to a laterally continuous palaeodrainage feature, and while the factual explanation for anomaly remains unknown and does not warrant further investigation, it possibly reflects mineralogical difference in the basement rock, such as a low magnetic intensity granitic phase of rock (i.e. relatively depleted in magnetic minerals compared to surrounding rocks).

The ERI imaging was inconclusive in delineating the vertical extent of the deep sandy feature intersected by GMB6 and corresponding to the low magnetic anomaly, due principally to the interpreted presence of extensive weathered zones (clayey material) developed over the granites.

It is important to note that any geological interpretation made in the geophysical interpretative report have not been validated by a geologist, and can only be validated through field investigations (i.e. drilling)

9.0 REMOTE SENSING

A remote sensing study was undertaken by ASST, to try and identify the regional extent of surface features which replicate the surface signature of the anomalous magnetic low identified from the ground geophysical surveying. The method was to conduct a search of available remote sensing data that could be of used to search for surface or subsurface feature on a regional scale that replicated the spectral, visual or geophysical signature of the sandy material intersected by TP94 and GMB6.

Information sought included high resolution hyperspectral and ASTER data sets, however, such data were not available in the time frame of the study, or within a reasonable price range, to allow detailed multi spectral analysis of the areas surrounding the landfill.

Data sets reviewed included:

- Regional aeromagnetic and radiometric data sets publicly available from the Department of Mines and Petroleum
- Landsat TM7 data (pixel resolution 30 m)
- SRTM DEM (Shuttle Radar Topographic Mission, Digital Elevation Model).

None of the data sets examined enabled AAST to discern surface geological features at a local scale, with the resolution of the imagery being at regional scale only. The key finding therefore, was that lateral extensions of the sandy unit and low magnetic anomaly indicated at the landfill site, could not be traced outside of the extent of the ground magnetometer survey.

10.0 CPTS

Golder carried out a Cone Penetrometer Testing (CPT) investigation at several locations across the site in order to gain additional geotechnical information in areas of magnetic anomaly, based on the results of Total Magnetic Intensity (TMI) imaging from the geophysical survey (refer to Figure 1 in Appendix K). The investigation took place from 16-17 February 2015 and utilised a truck-mounted CPT rig operated by Probedrill Pty Ltd. The investigation was directed and supervised by a Golder engineer throughout its entirety. Details of the CPT investigation are provided in Appendix K.

The predominant soil types and stratigraphy encountered on site is summarised as follows:

- SAND; moderate density to loose; thickness ranging from 0.1 to 3 m; overlying
- LATERITIC DURICRUST; stiff to very stiff; fine-grained; thickness ranging from 0.2 to 0.5 m; overlying
- CLAY and CLAY MIXTURES; moderate to very stiff; thickness ranging from 0 to 12 m; overlying
- SAPROLITE/SAPROCK.

The above characterisation is broadly consistent with the findings from the 2015 test pit investigation (notwithstanding the maximum depth limitations of the test pits), which suggests that the geological and geotechnical properties do not vary significantly between the test pit locations.

The only test to reach depths greater than 4 m was CPTu6 (refusal depth 14.5 m), located between TP94 and TP2.

Loose sand was encountered in the surficial profile at the following locations:

- CPTu2.5 (Approx. 150 m NNW of proposed Cell 2 footprint, -250T<TMI<-150T)
- CPTu4 (NW of TP94, within footprint of proposed Cell 2, -1150T<TMI<-250T)
- CPTu5.1, 5.2, 5.3 (Between TP21 and TP12, SE of proposed Cell 4, -1150T<TMI<-200T)
- CPTu6, 6.1, 6.3 (Between TP7 and TP2, within footprint of proposed Cells 2 &3, -1150T<TMI<-150T).

The loose sand encountered at CPTu5.1, 5.2, and 5.3 was associated with the ephemeral stream system (dry at time of investigation) passing through the southern portion of the investigation area. Manual potholing with a crowbar and hammer-drill into soft areas revealed the depth of loose sand in these areas to be less than 0.5 m (consistent with the results from the CPT), beyond which further excavation was impracticable.

The results from other locations bulleted above suggest that a relatively small area exists beneath Cell 2 and Cell 3, and also approximately 300 m north-west of this location, within which loose sand is present at depths up to 3.5 m (CPTu6.3). However, this loose sand is underlain by very stiff material which causes refusal on contact.

Overall, loose granular material was encountered as surficial pockets of highly variable thickness not greater than 3.5 m. The results of the CPT testing, supplemented by extensive manual potholing, are not suggestive of a clear relationship between areas of relatively low magnetic intensity and the presence of loose material at significant depths. Furthermore the CPT testing showed the occurrence of a relatively deep sandy material in the vicinity of TP94 and GMB6, did not extend laterally for any great distance

11.0 DISCUSSION

11.1 Geology

The materials encountered during drilling of monitoring wells GMB1 to GMB10, were generally consistent with the regional and local geological descriptions outlined in Section 5.1 and Section 5.3 and also with the hydrogeological conceptual model previously developed for the site (Figure 7), apart from the presence of a deep quartz-sand dominated lithology intersected in GMB6, and the presence of dolerite dykes. The regolith profile is laterally and vertically variable depending on the parent rocktypes, structures (faults and joints), and the history of weathering, erosion and local transportation. With the exception of GMB6, the encountered profile is consistent with a classical regolith profile developed over granitic parent rocks.

GMB6 was drilled to explore the findings from geotechnical test pitted being carried out concurrently with monitoring well installation program, where one test pit (TP94), located on topographically elevated ground within the foot print of the landfill, intersected sand to the maximum depth of investigation possible with an excavator (about 6 m). Field reconnaissance mapping (following crop harvesting) indicated TP94 was located in an area noticeably different soil colour (light grey) extending as a north-west/south-east oriented, approximately 100 m wide, elongated band over at least 350 m.

The angularity of the quartz sands and gravels recovered in GMB6, in combination with the presence of angular felspathic grains, are indicative of material that has not travelled far from its source, and probably not within higher energy fluvial settings that would reduce the angularity of individual quartz or feldspar grains. The presence of intervals with greatly reduced clay matrix material may indicate a reduced proportion of weatherable feldspar minerals in the parent rock, of flushing of the clays during mass wasting/transport processes, or groundwater movement.

Golder interprets the quartz sand and gravel material intersected in GMB6 to possibly represent:

- an extremely weathered quartz-rich phase of granitic parent rock,
- a zone of enhanced weathering due to enhanced groundwater movement because of faulting, or denser fracture or joint spacing,
- palaeovalley fill materials that have not travelled far from their granitic source.

In the latter case, GMB6 was drilled into massive fresh granite at 21.5 m depth (core recovered), without encountering sediments indicative of high energy fluvial process (i.e. palaeochannel sediments), as are often found at the base of palaeovalley systems.

11.1.1 Redrill of MB02

The redrilling of MB02 (as GMB8) confirmed that the lithologies originally logged as silt were in fact typical regolith over granite, and a sedimentary origin is unlikely for the intersected materials. Furthermore, while to original bore was interpreted to be dry to 30 m but was not completed as a monitoring bore so this could not be checked, GMB8 showed groundwater at about 18 m below the ground surface, consistent with what would be expected in the granite regolith hydrogeological setting. However, given the short period of time between drilling the bore and measuring the groundwater level, more time-series groundwater level data is required before conclusions can be made on groundwater levels in the bore.

11.2 Hydrogeology

11.2.1 Groundwater Levels

The expanded groundwater monitoring well array provides better hydrogeological control over the foot print of the site, although during December monitoring round it was noted that MB06, MB11 and GMB5 located next to MB11, but screened at a deeper level, remained artesian. Indeed GMB5 had a groundwater level approximately 10 cm higher than the adjacent MB11, indicating an upward gradient. The artesian conditions mean that interpolated groundwater level contours in the vicinity of these wells, are potentiometric as mentioned previously. The interpreted groundwater elevation contours shown in Figure 6 indicate a westerly to south westerly groundwater flow direction, which is consistent with the results of previous studies, while on the western side of Thirteen Mile Brook, groundwater gradients are likely to be easterly towards the brook during the wet season. However, more time-series monitoring data is required to confirm this.

11.2.2 Groundwater Quality

The groundwater quality data presented in Appendix H shows two distinct water types with GMB2 and GMB5 returning Total Dissolved Solids (TDS) concentrations an order of magnitude higher that the other new monitor wells. When the data is plotted on a Piper Plot (Figure 10), which facilitates assessment of the relative ratios of common ions in the water, all monitor wells are sodium chloride type waters. Minor differences indicate differing histories of the groundwaters, with for example, the more magnesium-rich water possibly reflecting a longer residence time in the ground, or some mixing with groundwater having a history of interaction with mafic rock types (dolerite dykes for example).

The results of laboratory analysis of the samples collected from GMB2 to GMB6 provide additional baseline groundwater quality data for the site.

The range of concentrations for the analytes tested in this investigation have been compared with those obtained from the previous groundwater quality monitoring round (Bowman & Associates, 2014) and are generally consistent. No polycyclic aromatic hydrocarbons, monocyclic aromatic hydrocarbons or total recoverable hydrocarbons were detected in samples collected from the five new monitoring wells.

The groundwater is brackish to saline and has no beneficial use except as drinking water for sheep.

12.0 SUMMARY

The proposed landfill is set in an Archean granitic geological setting, with a classical saprolitic regolith profile developed from weathering processes. There is no evidence of the presence of extensive palaeochannel systems that might hydraulically link the landfill site to other catchments.

Groundwater flow is westerly towards Thirteen Mile Brook, although in winter when the groundwater table is elevated, local groundwater flow directions will be towards the seepage area that feeds groundwater to the ephemeral stream immediately east of the landfill footprint. This water reports to Thirteen Mile Brook. There is no evidence that there is a link between waters that may leak from the landfill facility, and drinking water resources in the region.

The groundwater quality is variable but generally the water has no beneficial use in the context of drinking water quality.

13.0 REFERENCES

Bell, J.G., Kilgour P.L., English P.M., Woodgate, M., Lewis, S., and Wischusen, J., 2012. WASANT Palaeovalley Map – Distribution of Palaeovalleys in Arid and Semi-arid WA-SA-NT (First Edition), scale 1:4 500 000. Geoscience Australia Thematic Map (Geocat. No. 73980 – hard copy and digital publication: hhtp://www.ga.gov.au/cede/maps/96).

Bowman & Associates Pty Ltd, 2014a. Works Approval Submission: Construction and operation of Allawuna Farm Landfill. Prepared for SITA, January 2014

Bowman & Associates Pty Ltd, 2014b. Groundwater Monitoring Report – Allawuna – August 2014. Dated 1 September 2014.

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English P.M., Lewis, S., Bell J.G., Wischusen, J., Woodgate, M., Bastrakov, E.N., Macphail, M., and Kilgour P.L., 2012: Water for Australia's arid zone – identifying and assessing Australia's palaeovalley groundwater resources: summary report, Waterlines Report, National Water Commission, Canberra. ISBN:978-1-922136-01-5.

ENV Australian Pty Ltd (2012), "Baseline Groundwater Monitoring Report, Proposed Allawuna Landfill, Shire of York", dated 19 October 2012, Document Reference J112319 – 12/129,

14.0 LIMITATIONS

Your attention is drawn to the document "Limitations", which is included as Appendix L to this report. This document is intended to assist you in ensuring that your expectations of this report are realistic, and that you understand the inherent limitations of a report of this nature. If you are uncertain as to whether this report is appropriate for any particular purpose please discuss this issue with us.

GOLDER ASSOCIATES PTY LTD

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Hydrogeologist

David Thomson
Associate and Principal Hydrogeologist

MJB/DMT/hsl

A.B.N. 64 006 107 857

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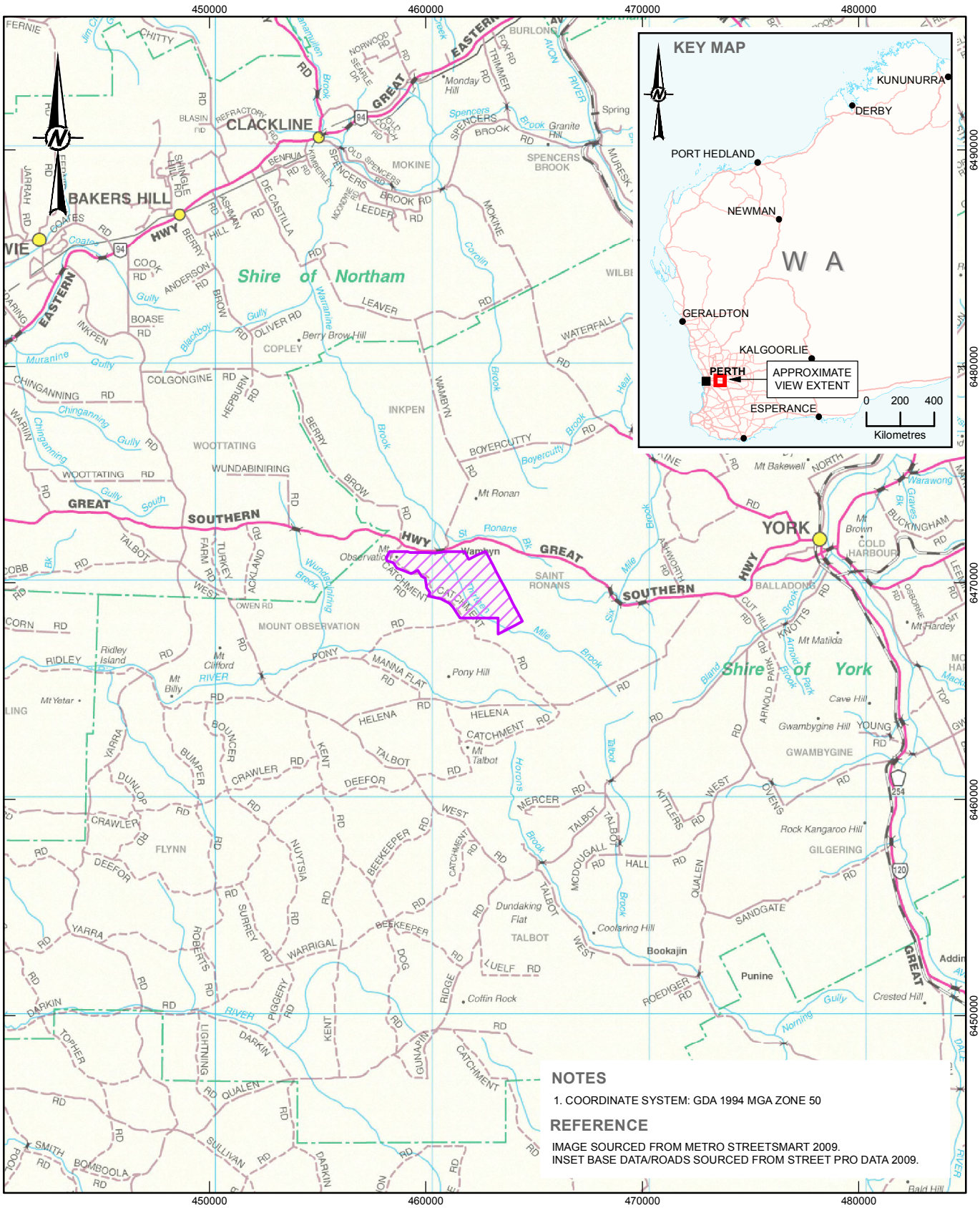

NOTES

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

REFERENCE

IMAGE SOURCED FROM METRO STREETSMART 2009.
INSET BASE DATA/ROADS SOURCED FROM STREET PRO DATA 2009.

LEGEND

ALLUWUNA FARM

0 2 4 6 8 10 km
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CLIENT SITA AUSTRALIA PTY LTD	PROJECT ALLUWUNA FARM, YORK

CONSULTANT

Golder Associates

YYYY-MM-DD	2015.03.24
PREPARED	MS
DESIGN	
REVIEW	DMT
APPROVED	DMT

TITLE
SITE LOCATION

PROJECT	CONTROL	Rev.	FIGURE
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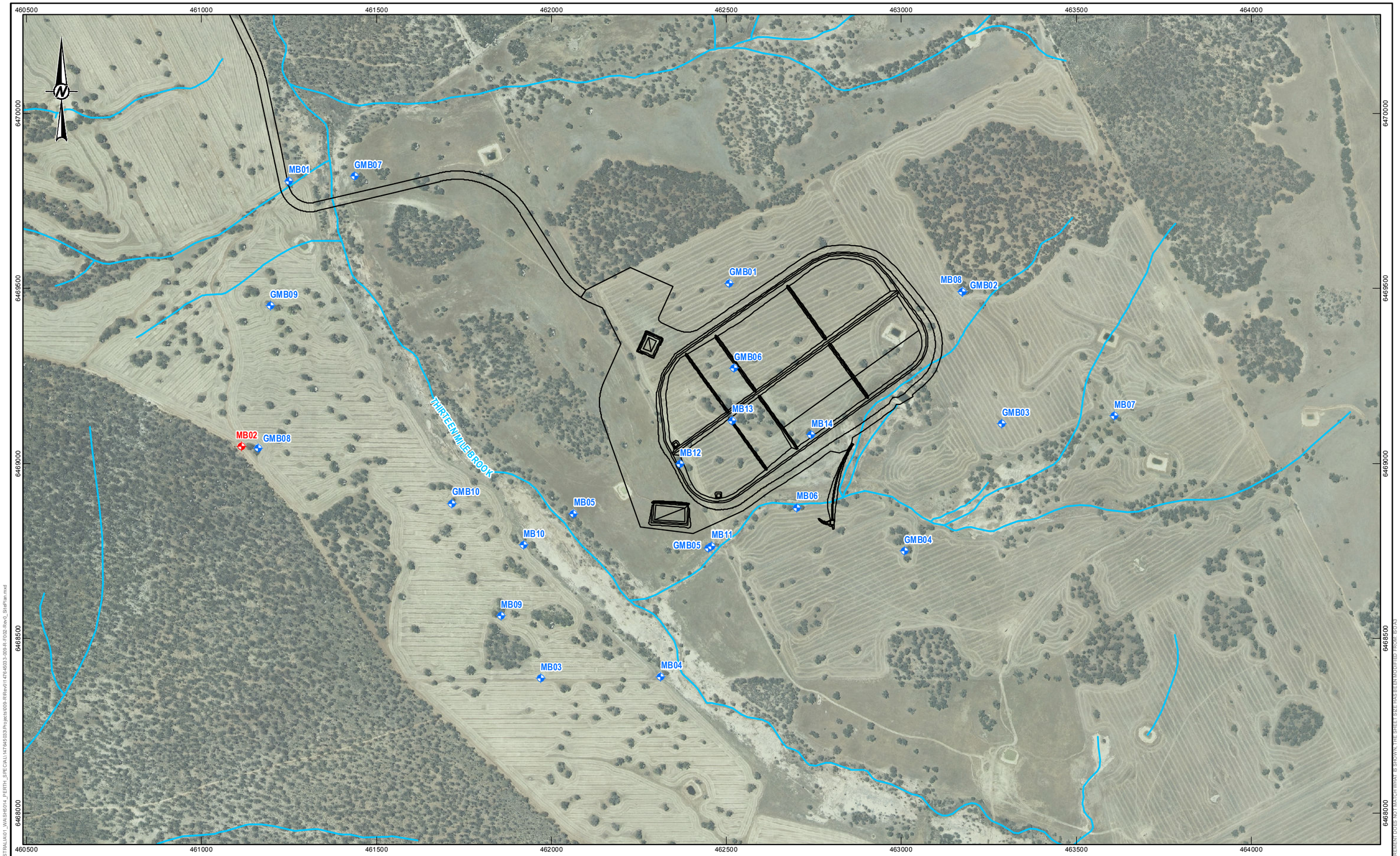

LEGEND

- GROUNDWATER MONITORING BORE
- ABANDONED DRILL HOLE
- LANDFILL DESIGN
- STREAM

NOTES

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

REFERENCE

2012 AERIAL IMAGERY AND STREAMS © WESTERN AUSTRALIAN LAND INFORMATION AUTHORITY TRADING AS LANDGATE (2015)

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DESIGN	
REVIEW	DMT
APPROVED	DMT
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FIGURE	**2**

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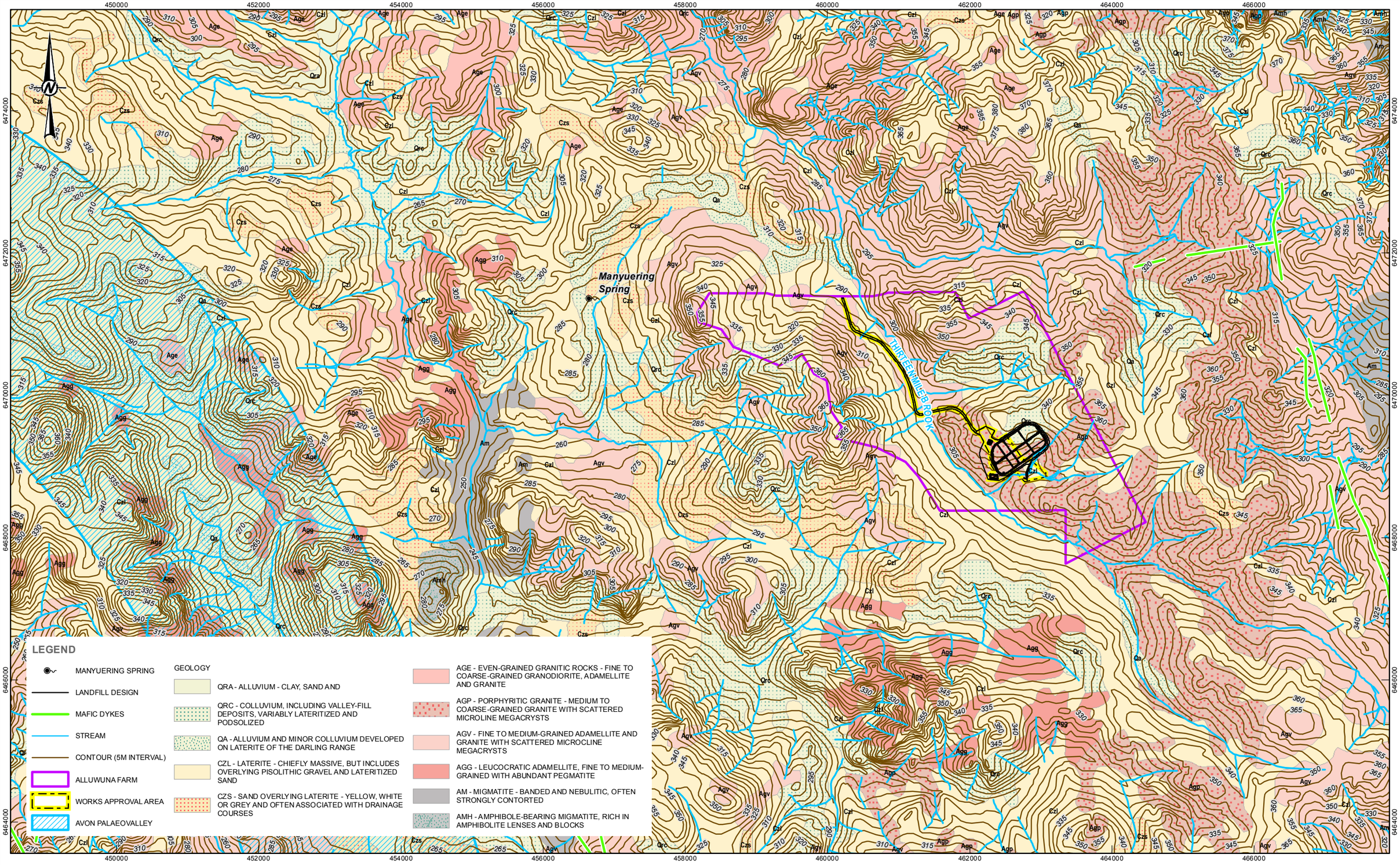

NOTES

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

REFERENCE

GEOLOGY MAP, PERTH SHEET SH 5014 AND PART OF SH 5013 © DEPARTMENT OF MINES AND PETROLEUM.
PALAEOCHANNEL SOURCED FROM GEOSCIENCE AUSTRALIA - WASANTPALAEOVALLEYS2012.
CONTOURS AND STREAMS © WESTERN AUSTRALIAN LAND INFORMATION AUTHORITY TRADING AS LANDGATE (2015)

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REVIEW	DMT
APPROVED	DMT
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PROJECT No.	147645033
CONTROL	009 R
Rev.	0
FIGURE	3

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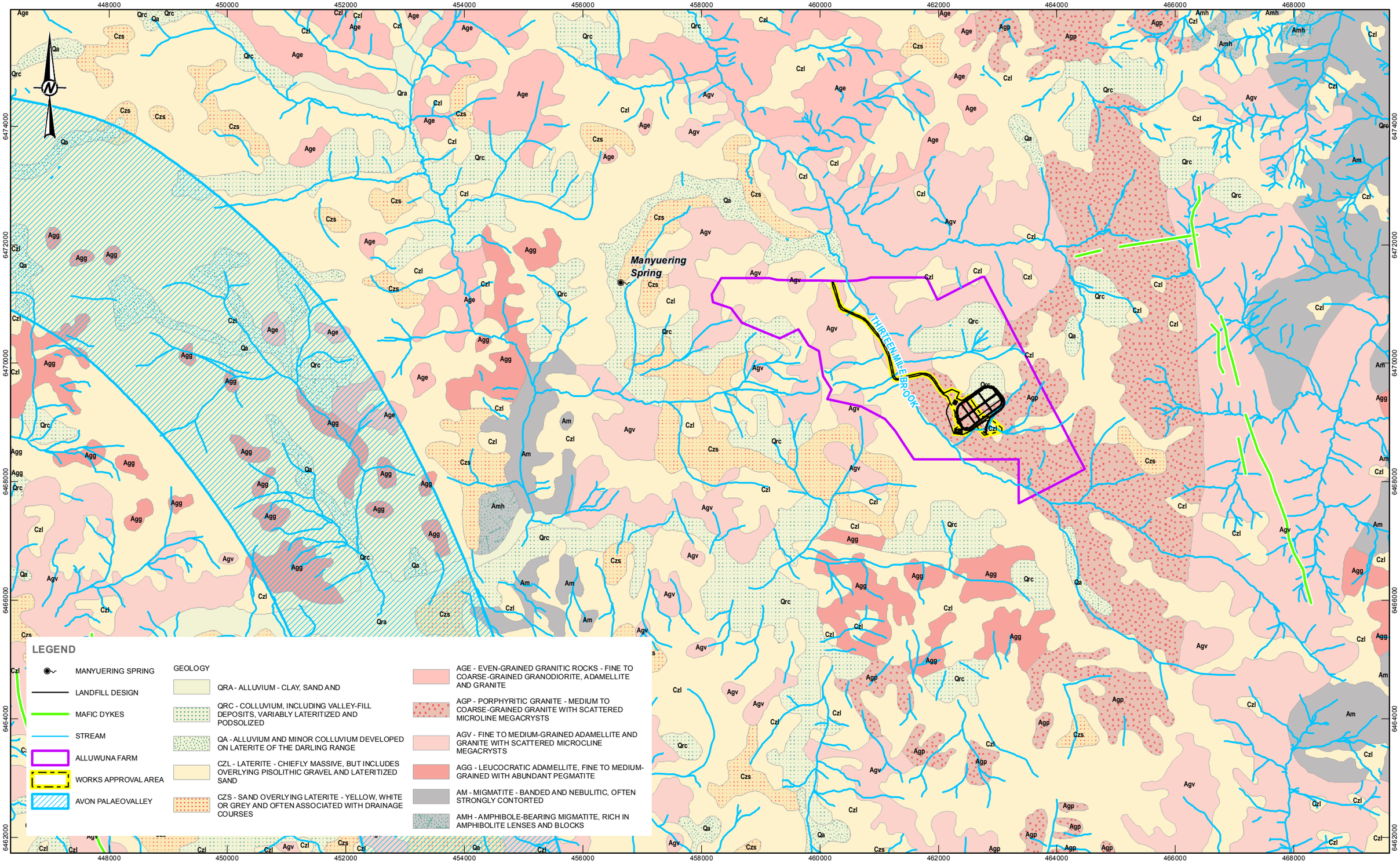

NOTES

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

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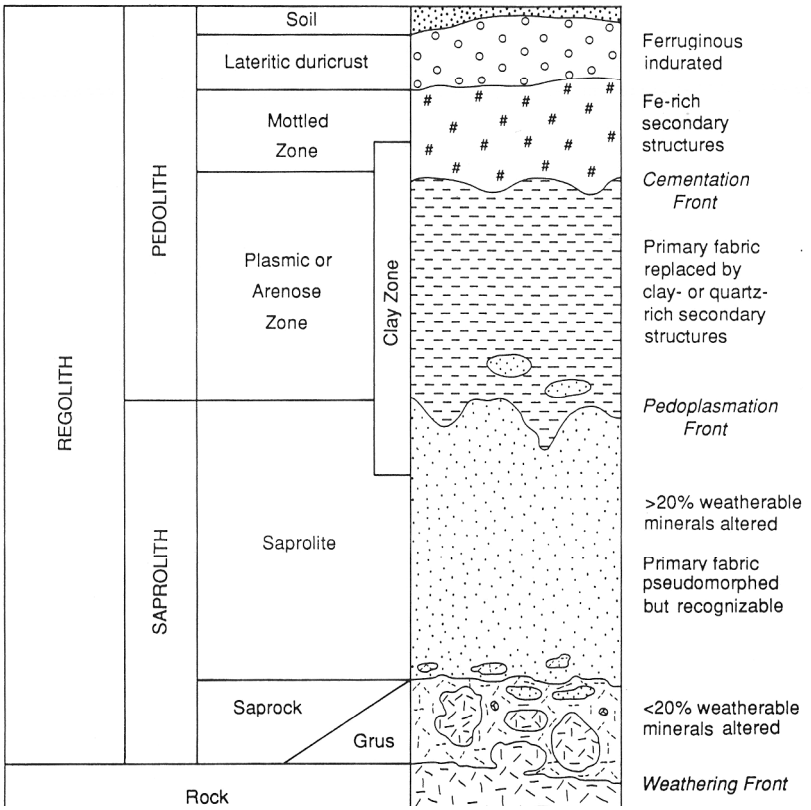

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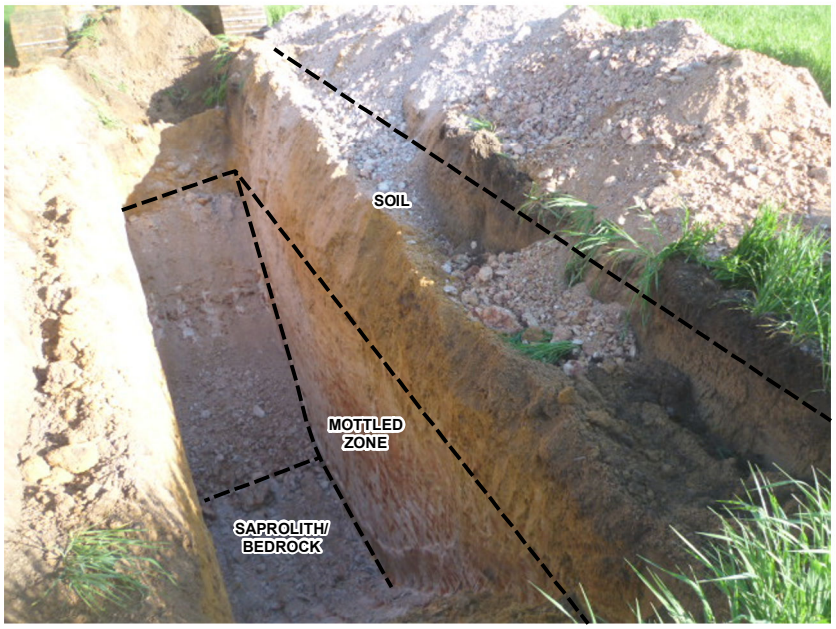

NOTE: PLASMIC ZONE ABSENT.

REFERENCE

PROFILE SOURCE: C.R.M BUTT, D.J. GRAY, M.J. LINTERN, I.D.M. ROBERTSON, G.F. TAYLOR AND K.M. SCOT, GOLD AND ASSOCIATED ELEMENTS IN THE REGOLITH - DISPERSION PROCESSES AND IMPLICATIONS FOR EXPLORATION, FINAL REPORT, CSIRO/AMIRA WEATHERING PROCESSES PROJECT, SEPTEMBER 1991.

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CONSULTANT	Golder Associates
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REVIEW	DMT
APPROVED	DMT
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CONTROL	009 R
Rev.	0
FIGURE	5

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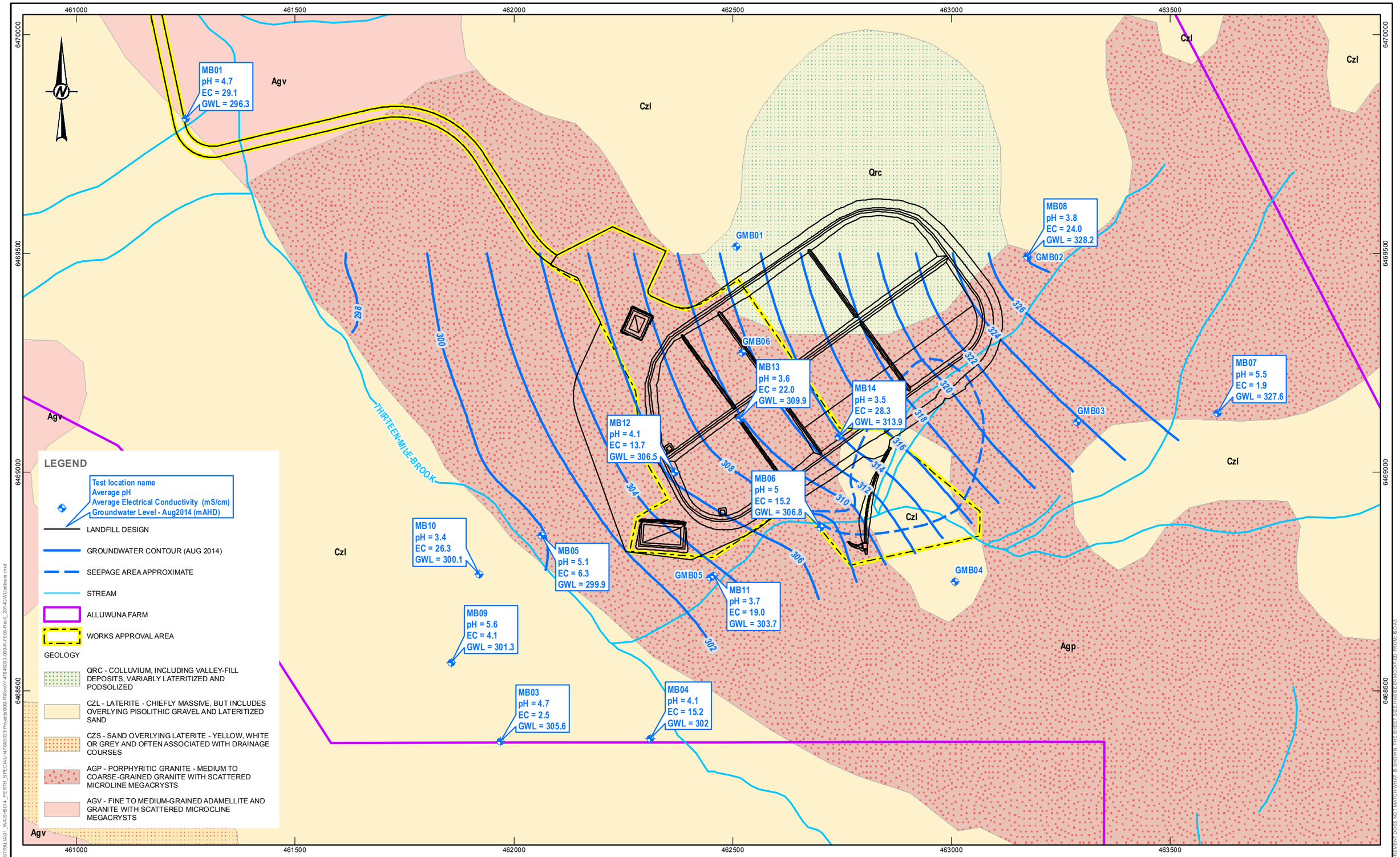

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1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

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REVIEW	DMT
APPROVED	DMT
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Rev.	0
FIGURE	6

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RAIN
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RAIN
MONITORING WELL
TRANSPIRATION
PERCHED GROUNDWATER (MAYBE SEASONAL)
PERCHED GROUNDWATER (MAYBE SEASONAL)
SOIL
SAND
DOLERITE DYKE
CLAY
SOIL
MONITORING WELL
SAND
CLAY
TRANSPIRATION
WINTER SEASON WATER TABLE
SUMMER SEASON WATER TABLE
SAPROLITE
SAPROCK
SAPROCK
GRANITE
SPRINGS AND SEEPAGE FACE
EVAPORATION
ARTESIAN FLOW
SAPROLITE
ALLUVIUM
SCREENED INTERVAL
MONITORING WELL

ELEVATION (m AHD)
335
330
325
320
315
310
305
300

0 5 10 15 20 25 30 35 40 45 50 55 60 65

LEGEND

- ALLUVIUM
- SOIL
- SAND
- CLAY
- SAPROLITE
- SAPROCK
- GRANITE
- DOLERITE
- PERCHED GROUNDWATER
- JOINTS AND FRACTURES
- INFILTRATION
- TRANSPIRATION AND EVAPORATION

CLIENT
SITA AUSTRALIA PTY LTD

PROJECT
ALLUWUNA FARM, YORK

CONSULTANT
Golder Associates

YYYY-MM-DD	2015.04.01
PREPARED	MS
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CONCEPTUAL HYDROGEOLOGICAL SECTION

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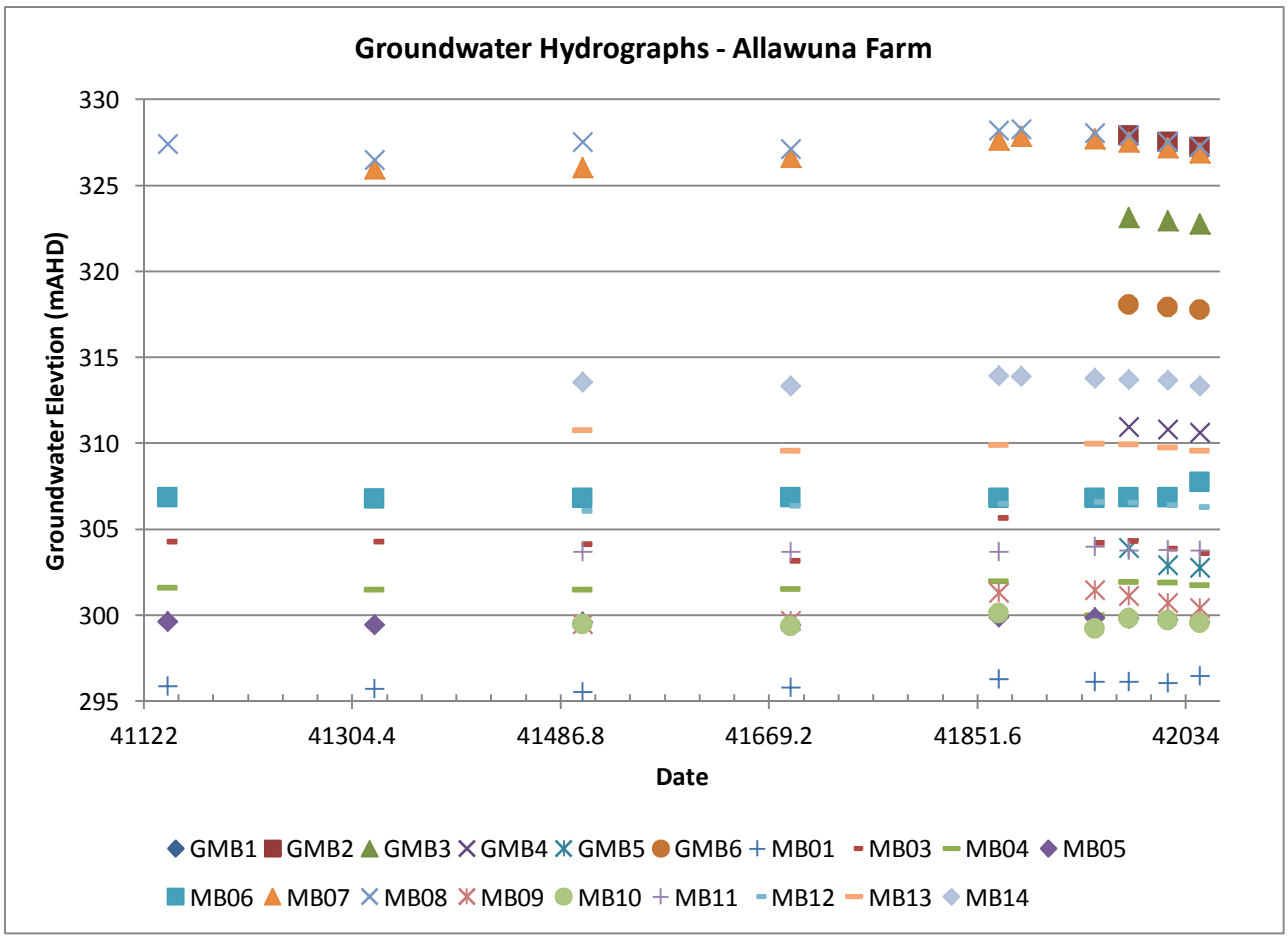

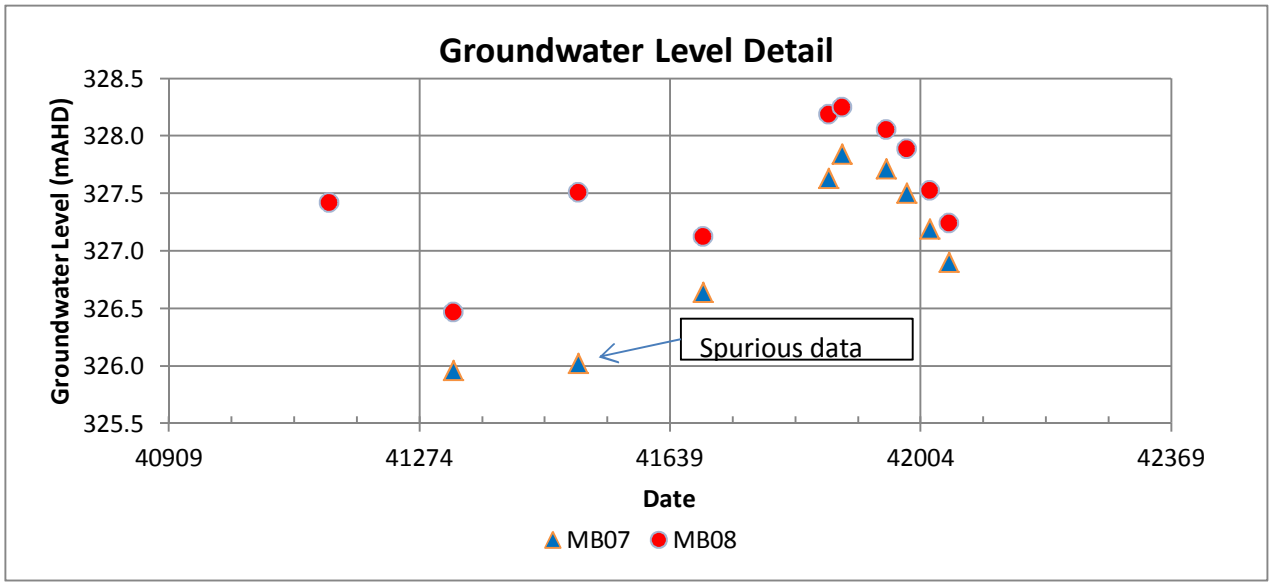

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	CHECK		DATE		
	SCALE	Not To Scale	A4	PROJECT No. 147645033	FIGURE No. 8

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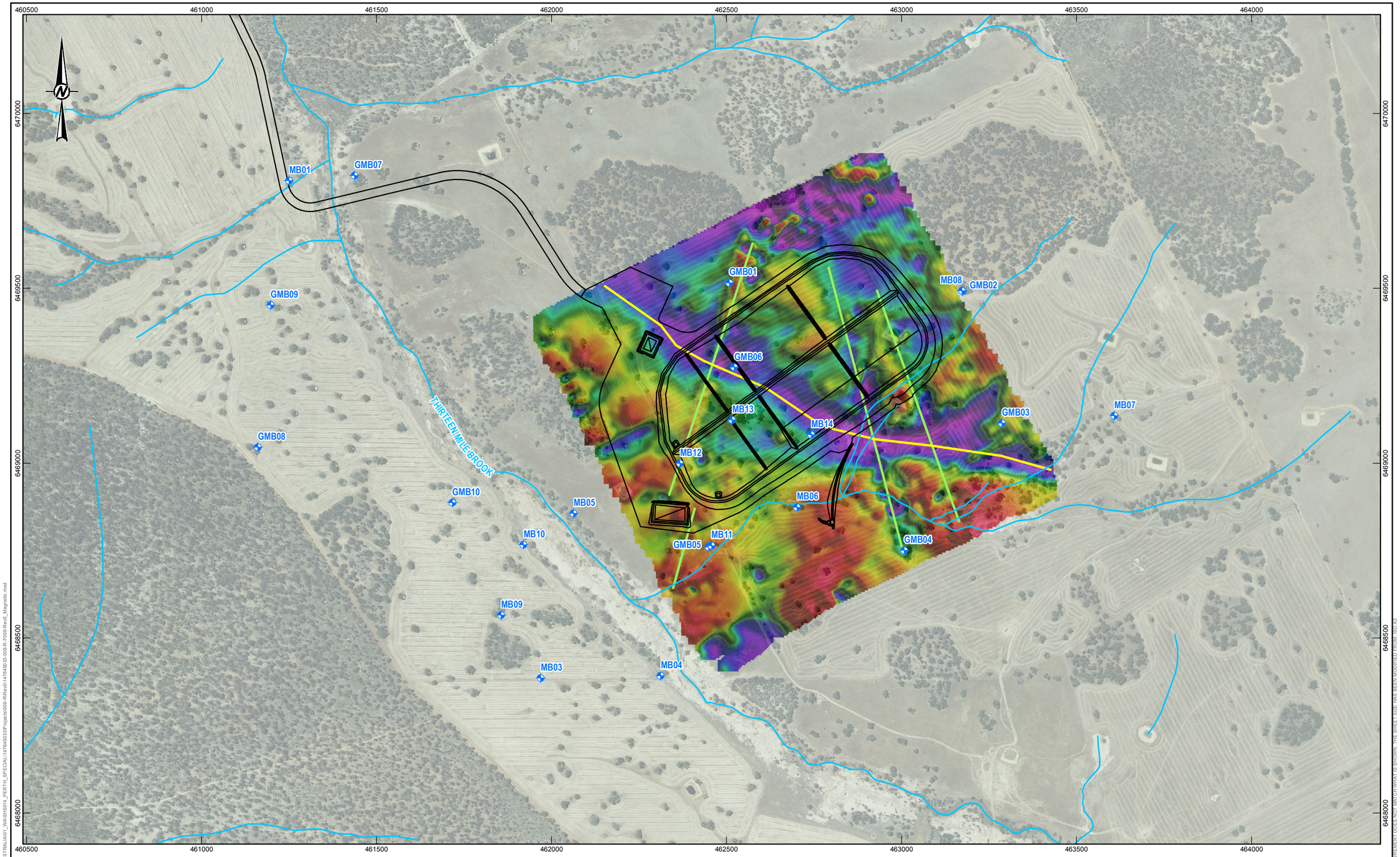

LEGEND

- GROUNDWATER MONITORING BORE
- LANDFILL DESIGN
- DYKE
- MAGNETIC LOW ANOMALY
- STREAM

-1150 -250 -200 -150 -100 -50 0 50

Total Magnetic Intensity

NOTES

1. COORDINATE SYSTEM: GDA 1994 MGA ZONE 50

REFERENCE

2012 AERIAL IMAGERY AND STREAMS © WESTERN AUSTRALIAN LAND INFORMATION AUTHORITY TRADING AS LANDGATE (2015)

0 100 200 300 400 500 m

1:10,000

CLIENT
SITA AUSTRALIA PTY LTD

PROJECT
ALLUWUNA FARM, YORK

CONSULTANT
Golder Associates

YYYY-MM-DD	2015.04.01
PREPARED	MS
DESIGN	
REVIEW	DMT
APPROVED	DMT

TITLE
TOTAL MAGNETIC INTENSITY SURVEY RESULTS

PROJECT No.	CONTROL	Rev.	FIGURE
147645033	009 R	0	9

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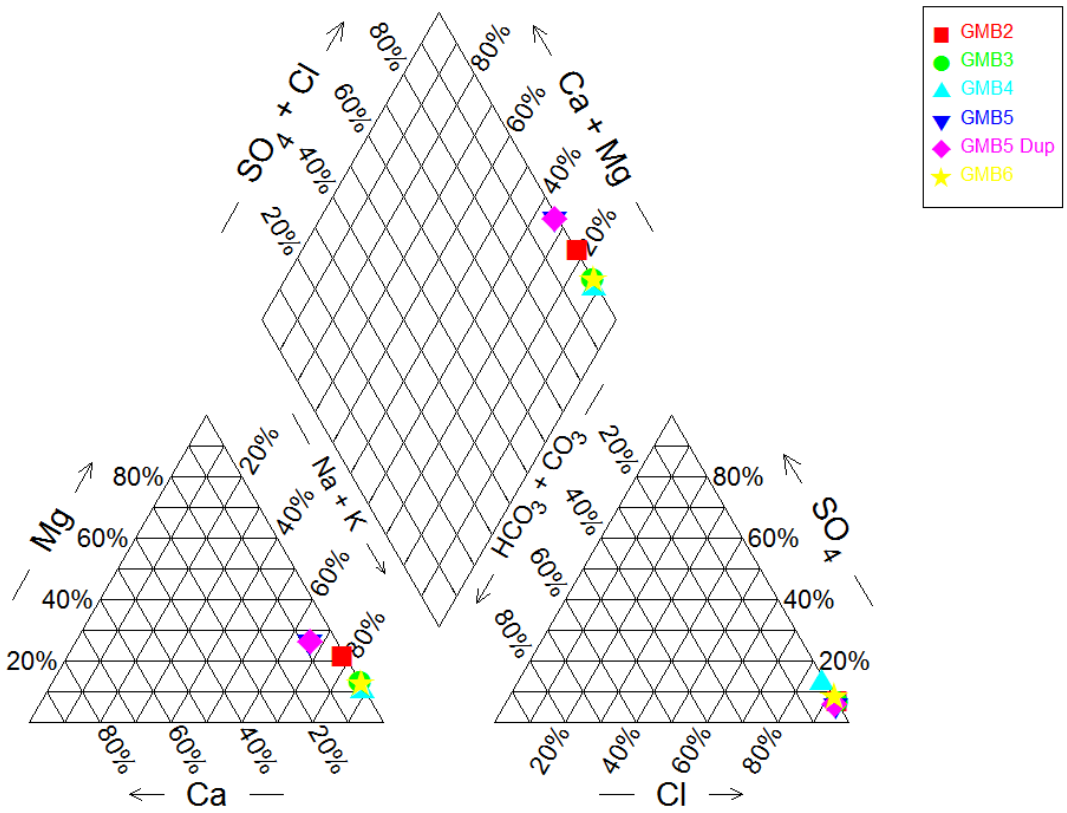

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CLIENT	SITA AUSTRALIA PTY LTD	PROJECT	ALLUWUNA FARM, YORK
DRAWN	SDB	DATE	25/03/2015
TITLE	**PIPER PLOT**		
CHECKED	DT	DATE	25/03/2015
SCALE	NOT TO SCALE	A4	
PROJECT No	147645033-009-R-Rev0	FIGURE No	**Figure 13**

File Location:

APPENDIX A

Baseline Monitoring Report and Time-Series Groundwater Elevations

SUMMARY OF GROUNDWATER ELEVATIONS - ALLAWUNA FARM GROUNDWATER MONITORING BORES

Bore ID	Groundwater Levels (m AHD)									
	22-Aug-12	19-Feb-13	20-Aug-13	18-Feb-14	19-Aug-14	08-Sep-14	11-Nov-14	11-Dec-14	14-Jan-15	11-Feb-15
GMB1	-	-	-	-	-	-	-	-	-	-
GMB2	-	-	-	-	-	-	-	327.889	327.500	327.220
GMB3	-	-	-	-	-	-	-	323.126	322.950	322.750
GMB4	-	-	-	-	-	-	-	310.950	310.780	310.600
GMB5	-	-	-	-	-	-	-	303.918	302.890	302.740
GMB6	-	-	-	-	-	-	-	318.059	317.900	317.770
MB01	295.868	295.729	295.538	295.801	296.269	-	296.108	296.108	296.058	296.440
MB03	304.271	304.271	304.134	303.145	305.649	-	304.214	304.304	303.864	303.590
MB04	301.609	301.468	301.486	301.537	301.975	-	300.006	301.931	301.896	301.760
MB05	299.630	299.444	299.582	299.431	299.875	-	299.842	299.792	299.732	299.570
MB06	306.847	306.777	306.815	306.840	306.821	-	306.825	306.865	306.845	307.760
MB07	-	325.956	326.022	326.637	327.629	327.842	327.712	327.502	327.192	326.900
MB08	327.418	326.467	327.505	327.124	328.188	328.245	328.055	327.885	327.525	327.240
MB09	-	-	299.489	299.652	301.300	-	301.449	301.129	300.709	300.420
MB10	-	-	299.472	299.351	300.119	-	299.232	299.812	299.712	299.560
MB11	-	-	303.674	303.674	303.674	-	303.974	303.774	303.784	303.740
MB12	-	-	306.061	306.348	306.480	-	306.601	306.551	306.401	306.280
MB13	-	-	310.745	309.578	309.892	-	309.985	309.935	309.765	309.550
MB14	-	-	313.565	313.316	313.906	313.905	313.765	313.705	313.655	313.340

BASELINE GROUNDWATER MONITORING REPORT

PROPOSED ALLAWUNA LANDFILL

SHIRE OF YORK

BASELINE GROUNDWATER MONITORING REPORT

PROPOSED ALLAWUNA LANDFILL

SHIRE OF YORK

Prepared for:

Bowman and Associates Pty Ltd

Prepared by:

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Job Number:	*J112319*
Report Number:	*12/129*
Prepared by:	*Dan Jarvis*
Status:	*Draft*
QA Review:	*Phil Bourgault*
Technical Review:	*Phil Bourgault*
Content Review:	*Phil Bourgault*
Date:	*19 October 2012*

A GREENCAP CONSULTING COMPANY

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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.

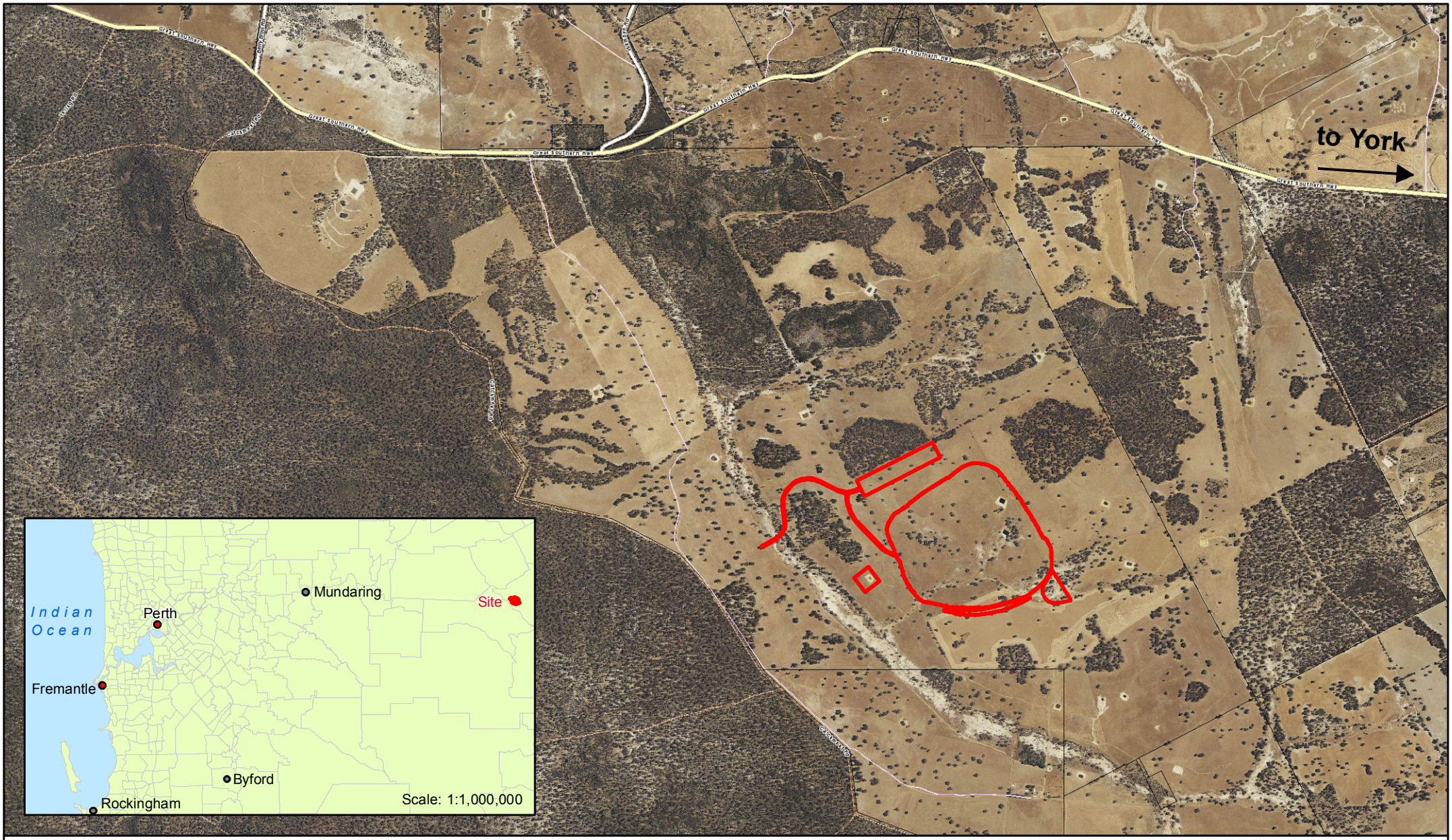
Eight groundwater monitoring bores were installed ranging in depth from 10mbgl and 18mbgl. The location of the bores was be determined by Bowman and Associates. Bore MB02 did not intersect groundwater and so no monitoring data was collected.

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	JOB NO.
Bowman & Associates	J112319

AUTHOR	DRAWN	DATE
D. Jarvis	M. Mikkonen	19-09-12

SCALE	PROJECTION
1:30,000 @ A4	GDA94 MGA50

Legend

Landfill Footprint

N

0 500 1,000

Metres

Site Location

Allawuna Landfill Bore Installation & GW Monitoring

FIGURE 1

env Australia

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Bowman & Associates	J112319

AUTHOR	DRAWN	DATE
D. Jarvis	M. Mikkonen	20-09-12

SCALE	PROJECTION
1:10,000 @ A4	GDA94 MGA50

Legend

- Landfill Footprint
- Groundwater Contour (m AHD)
- Monitoring Bore
- Dry Bore

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

Allawuna Landfill Bore Installation & GW Monitoring

FIGURE **2**

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):

Cooper & Jacob Method $K=(r^2*\ln(Re/Rw) / 2*L)*(1/t)*(\ln(y0/y1))$

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.

Table 1. Groundwater Monitor Bore Locations and Gauging Results.

Monitoring Well ID	Coordinates (MGA 94 Zone 50)		Date	ToC (m AHD)	Well Stickup (m)	Ground Level (m AHD)	Total Well Depth (m bTOC)	Depth to SWL (m bToC)	SWL (m AHD)	SWL (m bgl)	Water Quality					Comments (odours, sheen etc)
	Easting	Northing									pH	Temp (°C)	DO (mg/L)	EC (mS/cm)	TDS (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	-	-	-	-	-	-	-	-	-	-
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
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	Clear, small amount of 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	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

NOTES:

SWL	Static Water Level (the water table)	bToC	below Top of Casing (50 mm PVC)
SPH	Separated Phase Hydrocarbon	bgl	below ground level
EC	Electrical Conductivity	AHD	Australian Height Datum
TDS	Total Dissolved Solids (=EC*680; EPA 1993)	mS	milli Siemens

Environmental Protection Agency, 1993. Western Australian Water Quality Guidelines for Fresh and Marine Waters. Bulletin 711, October 1993.

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).

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

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

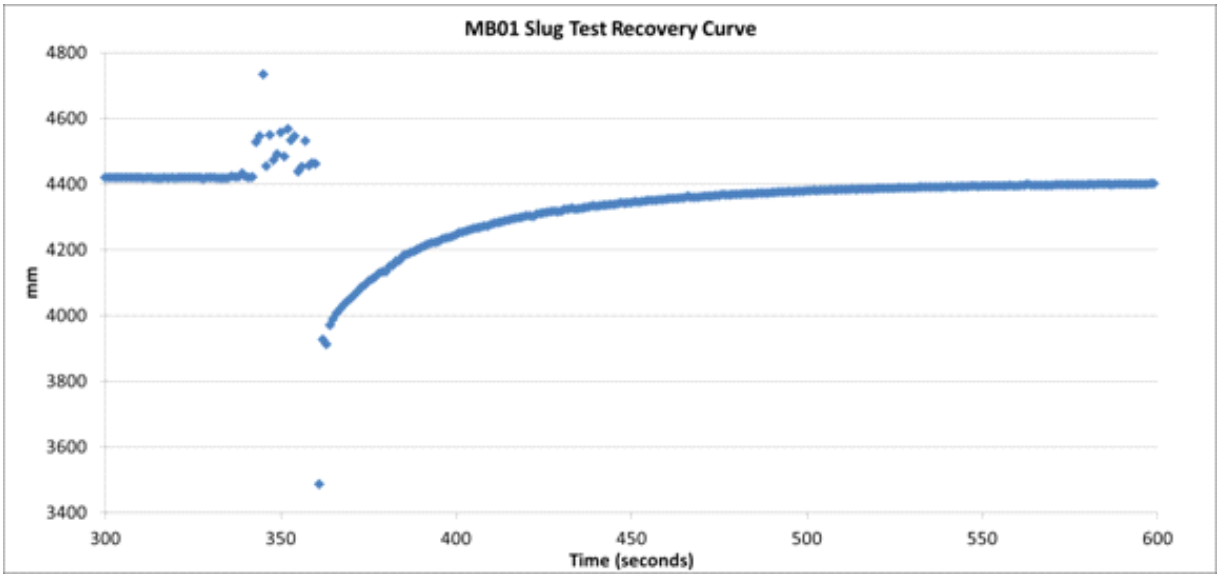
Monitor Bore MB06 underwent pumping for approximately 5.5hrs at a rate sufficient to reduce the water table by about 2cm. The recovery of the well was monitored for one hour after the cessation of pumping. The water table recovered by about 1cm (Figure 4). The pump test at monitor bore MB06 did not provide 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).

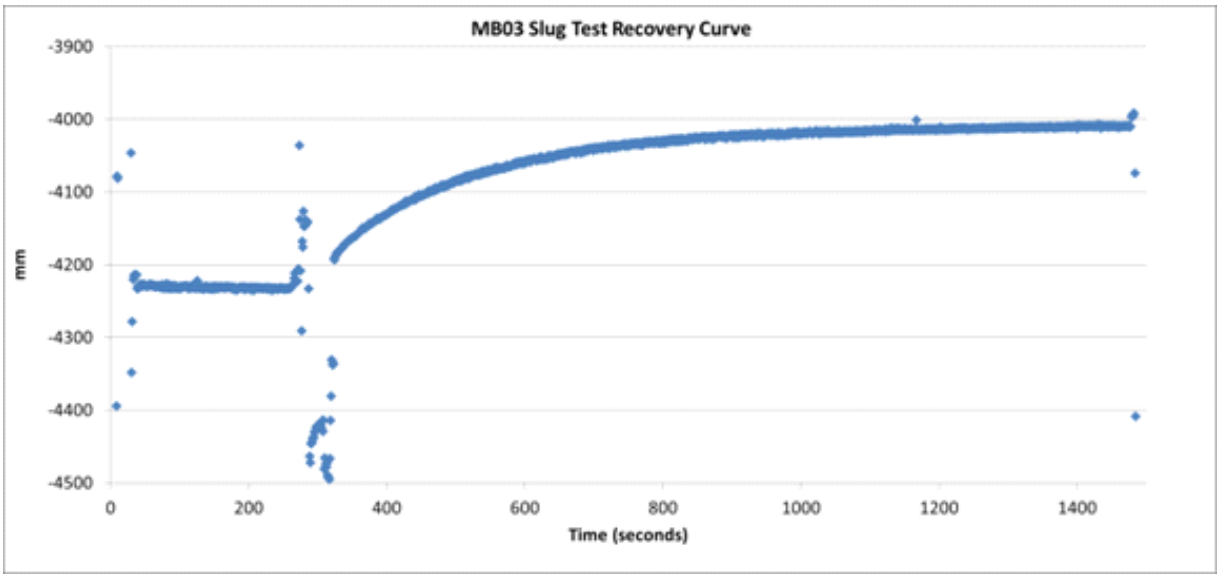
The locations of the monitoring bores were determined primarily for assessing groundwater levels and quality and, as such, were not ideally positioned for the pump test. The regional hydrogeology is, therefore, best assessed by considering the consistent results for K obtained from the slug testing of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

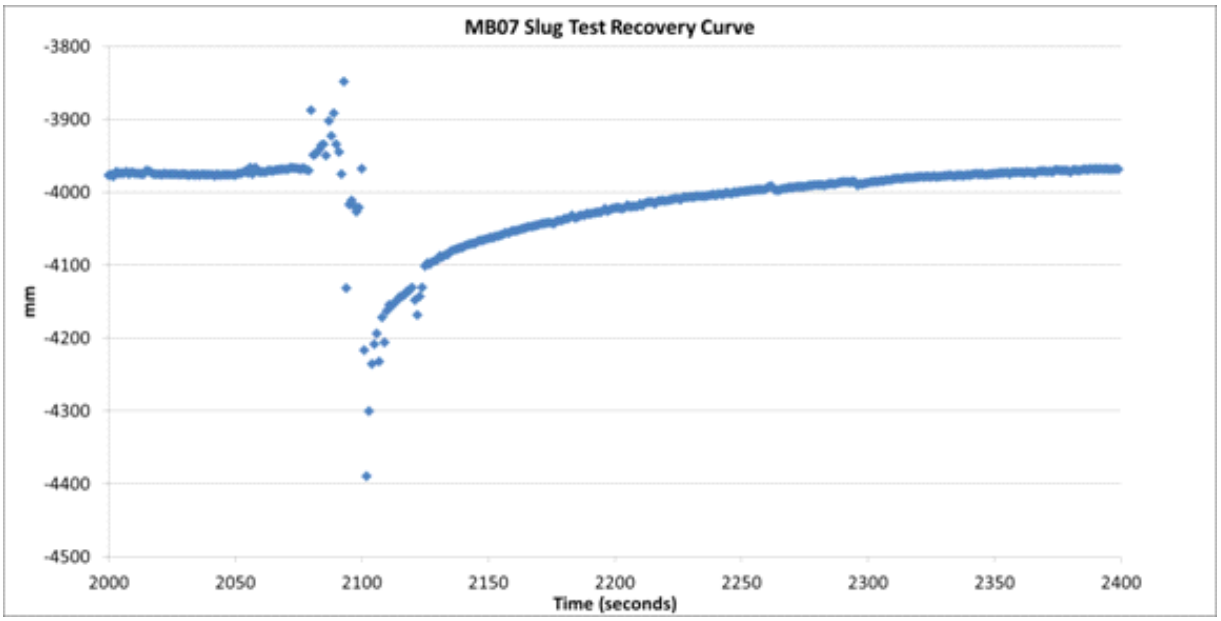
3.4 WATER QUALITY RESULTS

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







Vertical scale in mm is arbitrary

CLIENT	JOB NO.
Bowman & Associates	J112319

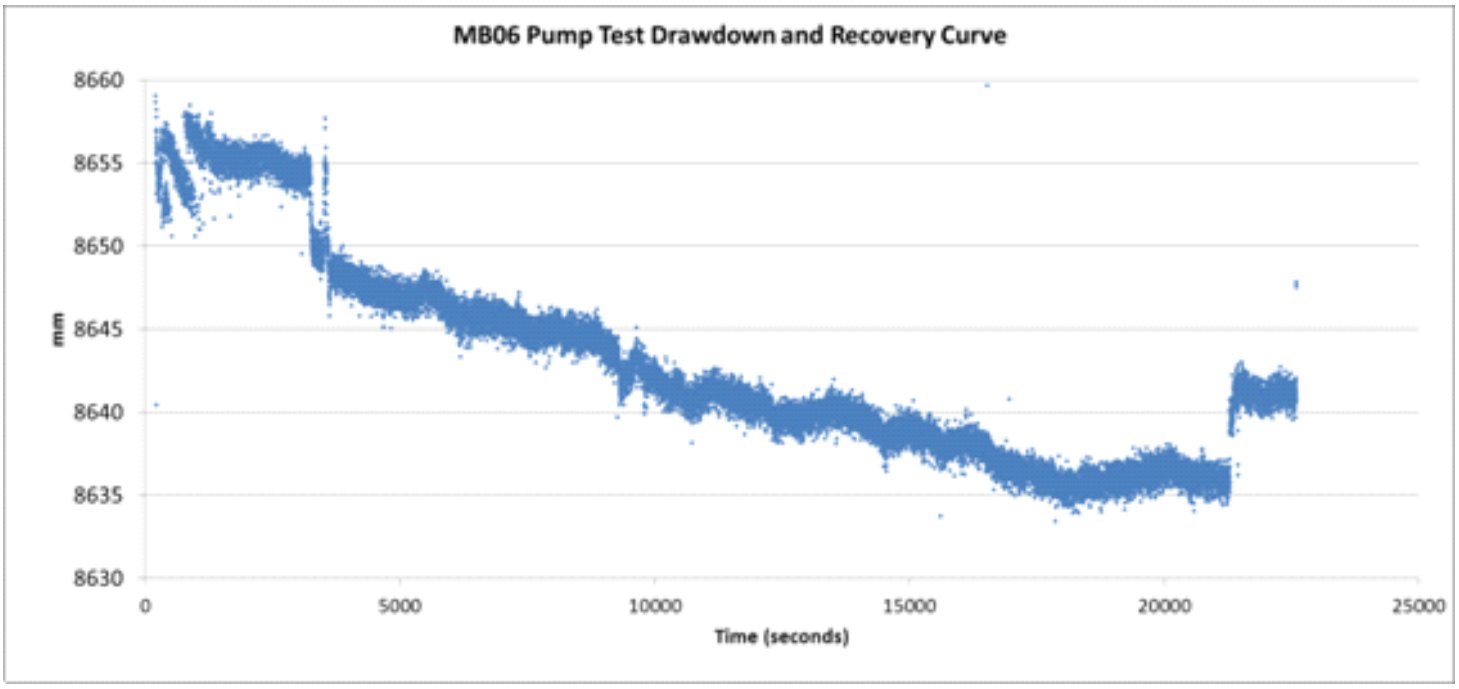
AUTHOR	DRAWN	DATE
D Jarvis	T Ellis	3-10-2012

SCALE	PROJECTION
Not applicable	Not applicable

Slug Test Recovery Curves for MB01, MB03 and MB07

Allawuna Landfill Bore Installation & GW Monitoring

FIGURE **3**



Vertical scale in mm is arbitrary

CLIENT		JOB NO.	
Bowman & Associates		J112319	
AUTHOR	DRAWN	DATE	
D Jarvis	T Ellis	3-10-2012	
SCALE	PROJECTION		
Not applicable	Not applicable		

Pump Test Drawdown and Recovery Curve for MB06

Allawuna Landfill Bore Installation & GW Monitoring

FIGURE **4**

Table 3. Groundwater Laboratory Analysis Results.

Sample ID		MB01	MB03	MB04	MB05	MB06	MB07	MB08	DUP1	TRIP1	RPD (%)	RPD (%)
Date		22/8/12	22/8/12	22/8/12	22/8/12	22/8/12	22/8/12	22/8/12	22/8/12	22/8/12	DUP1	TRIP1
Report Number		349496	349496	349496	349496	349496	349496	349496	349496	349496	MB06	MB06
Metals	Arsenic	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	0.006	*0*	*143*
	Cadmium	0.0051	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< LOR	*0*	*0*
	Chromium	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Copper	0.01	0.002	< 0.001	0.005	< 0.001	< 0.001	0.02	< 0.001	< LOR	*0*	*0*
	Iron	< 0.05	4.1	11	2.9	< 0.05	< 0.05	69	< 0.05	0.08	*0*	*46*
	Lead	< 0.001	< 0.001	0.002	< 0.001	0.002	< 0.001	0.003	0.002	0.01	*0*	*0*
	Manganese	1.4	0.041	0.05	0.11	0.13	0.022	0.13	0.13	0.1	*0*	*26*
	Mercury	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< LOR	*0*	*0*
	Molybdenum	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< LOR	*0*	*0*
	Nickel	0.039	0.006	0.004	0.012	0.002	0.002	0.032	0.002	0.002	*0*	*0*
	Selenium	0.001	< 0.001	0.002	< 0.001	0.005	< 0.001	0.004	0.005	0.005	*0*	*0*
	Zinc	2.9	0.023	0.035	0.34	0.003	0.014	0.14	0.003	0.01	*0*	*108*
TPH 1999 NEPM Fractions	C6-C9	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< LOR	*0*	*0*
	C10-C14	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< LOR	*0*	*0*
	C15-C28	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< LOR	*0*	*0*
	C29-C36	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< LOR	*0*	*0*
	C10-36	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< LOR	*0*	*0*
TRH Draft 2010 NEPM Fractions	C6-C10	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< LOR	*0*	*0*
	>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*
MAHs	Benzene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Ethylbenzene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Toluene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Xylenes(o,m & p)	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< LOR	*0*	*0*
PAHs	Acenaphthene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Acenaphthylene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Anthracene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Benz(a)anthracene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Benzo(a)pyrene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Benzo(b)fluoranthene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Benzo(g.h.i)perylene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Benzo(k)fluoranthene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Chrysene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Dibenz(a.h)anthracene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Fluoranthene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Fluorene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Indeno(1.2.3-cd)pyrene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Naphthalene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Phenanthrene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Pyrene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Total PAH	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
VOCs	Tetrachloroethene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Trichloroethene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
PCBs	Aroclor-1016	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1221	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1232	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1242	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1248	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1254	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1260	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Total PCB	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*

Notes

Results are in mg/L unless otherwise stated

Table 3. Groundwater Laboratory Analysis Results (continued)

OCPs	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*
	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*
	Heptachlor epoxide	< 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*
OPPs	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*
	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	*0*	*0*
	Methyl azinphos	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< LOR	*0*	*0*
	Methyl parathion	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< LOR	*0*	*0*
	Mevinphos	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< LOR	*0*	*0*
	Naled	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< LOR	*0*	*0*
	Phorate	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< LOR	*0*	*0*
	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*
Nutrients	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*
	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*
Other	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*
	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	15	2	*6*	*156*
	pH	6.4	5.9	3.6	5.8	6	6.1	3.8	6	5.4	*0*	*11*

Notes
Results are in mg/L unless otherwise stated
NT: Not Tested

				Potassium	Chloride	Sulphate (	Suspende	Total Diss	Total Orga	pH		

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.

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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 (270mg/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.

5 REFERENCES

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TABLES

Table 1. Groundwater Monitor Bore Locations and Gauging Results.

Monitoring Well ID	Coordinates (MGA 94 Zone 50)		Date	ToC (m AHD)	Well Stickup (m)	Ground Level (m AHD)	Total Well Depth (m bTOC)	Depth to SWL (m bToC)	SWL (m AHD)	SWL (m bgl)	Water Quality					Comments (odours, sheen etc)
	Easting	Northing									pH	Temp (°C)	DO (mg/L)	EC (mS/cm)	TDS (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	-	-	-	-	-	-	-	-	-	-
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
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	Clear, small amount of 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	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

NOTES:

SWL	Static Water Level (the water table)	bToC	below Top of Casing (50 mm PVC)
SPH	Separated Phase Hydrocarbon	bgl	below ground level
EC	Electrical Conductivity	AHD	Australian Height Datum
TDS	Total Dissolved Solids (=EC*680; EPA 1993)	mS	milli Siemens

Environmental Protection Agency, 1993. Western Australian Water Quality Guidelines for Fresh and Marine Waters. Bulletin 711, October 1993.

Table 2. Hydraulic Conductivity (K in m/day) based on slug test 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 3. Groundwater Laboratory Analysis Results.

Sample ID		MB01	MB03	MB04	MB05	MB06	MB07	MB08	DUP1	TRIP1	RPD (%)	RPD (%)
Date		22/8/12	22/8/12	22/8/12	22/8/12	22/8/12	22/8/12	22/8/12	22/8/12	22/8/12	DUP1	TRIP1
Report Number		349496	349496	349496	349496	349496	349496	349496	349496	349496	MB06	MB06
Metals	Arsenic	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	0.006	*0*	*143*
	Cadmium	0.0051	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< LOR	*0*	*0*
	Chromium	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Copper	0.01	0.002	< 0.001	0.005	< 0.001	< 0.001	0.02	< 0.001	< LOR	*0*	*0*
	Iron	< 0.05	4.1	11	2.9	< 0.05	< 0.05	69	< 0.05	0.08	*0*	*46*
	Lead	< 0.001	< 0.001	0.002	< 0.001	0.002	< 0.001	0.003	0.002	0.01	*0*	*0*
	Manganese	1.4	0.041	0.05	0.11	0.13	0.022	0.13	0.13	0.1	*0*	*26*
	Mercury	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< LOR	*0*	*0*
	Molybdenum	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< LOR	*0*	*0*
	Nickel	0.039	0.006	0.004	0.012	0.002	0.002	0.032	0.002	0.002	*0*	*0*
	Selenium	0.001	< 0.001	0.002	< 0.001	0.005	< 0.001	0.004	0.005	0.005	*0*	*0*
	Zinc	2.9	0.023	0.035	0.34	0.003	0.014	0.14	0.003	0.01	*0*	*108*
TPH 1999 NEPM Fractions	C6-C9	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< LOR	*0*	*0*
	C10-C14	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< LOR	*0*	*0*
	C15-C28	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< LOR	*0*	*0*
	C29-C36	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< LOR	*0*	*0*
	C10-36	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< LOR	*0*	*0*
TRH Draft 2010 NEPM Fractions	C6-C10	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< LOR	*0*	*0*
	>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*
MAHs	Benzene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Ethylbenzene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Toluene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Xylenes(o,m & p)	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< LOR	*0*	*0*
PAHs	Acenaphthene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Acenaphthylene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Anthracene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Benz(a)anthracene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Benzo(a)pyrene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Benzo(b)fluoranthene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Benzo(g.h.i)perylene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Benzo(k)fluoranthene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Chrysene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Dibenz(a.h)anthracene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Fluoranthene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Fluorene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Indeno(1.2.3-cd)pyrene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Naphthalene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Phenanthrene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Pyrene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Total PAH	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
VOCs	Tetrachloroethene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Trichloroethene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
PCBs	Aroclor-1016	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1221	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1232	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1242	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1248	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1254	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Aroclor-1260	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*
	Total PCB	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< LOR	*0*	*0*

Notes

Results are in mg/L unless otherwise stated

Table 3. Groundwater Laboratory Analysis Results (continued)

OCPs	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*
	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*
	Heptachlor epoxide	< 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*
OPPs	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*
	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	*0*	*0*
	Methyl azinphos	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< LOR	*0*	*0*
	Methyl parathion	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< LOR	*0*	*0*
	Mevinphos	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< LOR	*0*	*0*
	Naled	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< LOR	*0*	*0*
	Phorate	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< LOR	*0*	*0*
	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*
Nutrients	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*
	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*
Other	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*
	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	15	2	*6*	*156*
	pH	6.4	5.9	3.6	5.8	6	6.1	3.8	6	5.4	*0*	*11*

Notes

Results are in mg/L unless otherwise stated

NT: Not Tested

				Potassium	Chloride	Sulphate (	Suspende	Total Diss	Total Orga	pH		

APPENDIX A

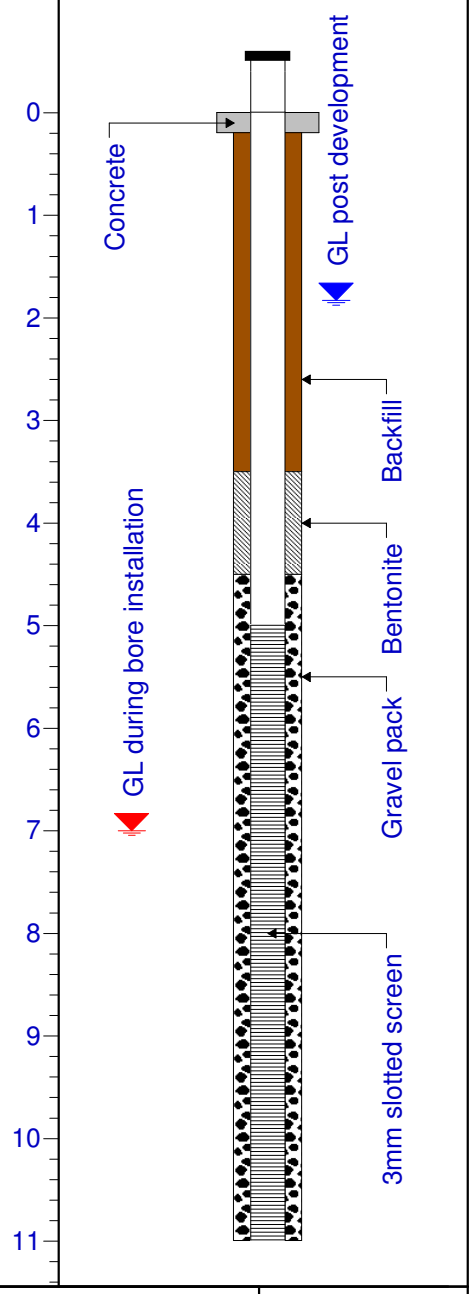
GROUNDWATER MONITORING BORE LITHOLOGY AND INSTALLATION LOGS

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB01

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	267.7		Ground Surface				0	
	266.7		***Clayey SAND*** Orange/brown, medium grain, poorly sorted, damp.					
1			***Clayey SAND*** Orange/yellow, medium grain, poorly sorted, damp.				1	
2	265.7		***Gravelly, clayey SAND*** Yellow, medium grain, poorly sorted, damp.				2	
3	264.7		***Gravelly SAND*** Red/grey, medium grain, poorly sorted, damp.				3	
4							4	
5	262.7		***Gravelly CLAY*** White, damp.				5	
6							6	
7							7	
8							8	
9							9	
10							10	
11	256.7		End of Borehole				11	



Installation Contractor: Strataprobe
Installation Method: Air compressor with blade bit
Bore Diameter: 50mm
Date: 01/08/2012

COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna, Shire of York

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

Well ID: MB02

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	322.0		Ground Surface				0	
1			***Sandy, clayey GRAVEL*** Orange/brown, coarse grain, poorly sorted, dry.				1	
2	320.0						2	
3			***Gravelly, clayey, SAND*** Yellow, coarse grain, poorly sorted, dry.				3	
4	317.5						4	
5	316.5		***Sandy, clayey SILT*** Orange/cream, fine grain, poorly sorted, dry				5	
6							6	
7			***SILT*** Orange/pink, fine grain, moderately sorted, dry.				7	
8							8	
9							9	
10			***Clayey, SILT*** Orange/cream, fine grain, well sorted, dry.				10	
11							11	
12							12	
13	309.0		***SILT*** White, fine grain, well sorted, dry.				13	
14							14	
15	307.0		***SILT*** Pink, fine grain, well sorted, dry.				15	
16			***SILT*** White, fine grain, well sorted, dry.				16	
17							17	
18	304.0						18	
19			***SILT*** White/grey, fine grain, well sorted, damp.				19	
20	302.0						20	
21			***Sandy, silty, CLAY*** White, fine grain, well sorted, damp.				21	
22							22	
23							23	
24							24	
25							25	
26							26	
27							27	
28	294.0						28	
29			***Sandy, clayey, SILT*** Orange, yellow, white, mdeium grain, poorly sorted, damp.				29	
30	292.0						30	
31			End of Borehole				31	

Installation Contractor: Strataprobe
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 2/08/2012

COMMENTS:

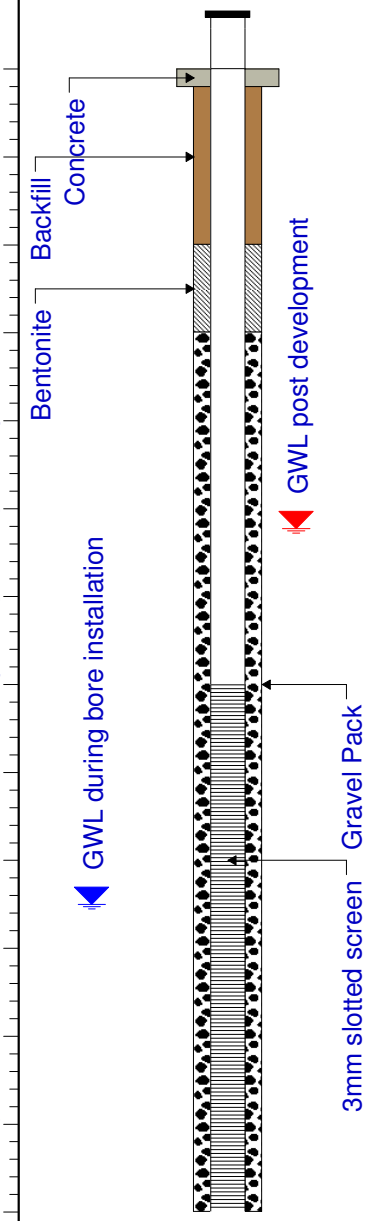
Well was not constructed as groundwater was not intercepted

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna, Shire of York

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

Well ID: MB03

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	275.1		Ground Surface					
	274.6		***Gravelly, sandy, CLAY*** Orange/brown, fine and coarse grain, poorly sorted, damp.					
1			***Gravelly, clayey, SAND*** Orange/yellow, fine and coarse grain, poorly sorted, dry.					
2	273.1							
	272.1		***Gravelly, SAND*** Orange/brown, medium grain, moderately sorted, dry					
3			***Sandy, SILT*** Grey/white, fine grain, well sorted, dry.					
4								
5								
6	269.1		***Sandy, silty, CLAY*** Borwn/grey, fine grain, moderately sorted, dry.					
7								
8	267.1		***Sandy, silty, CLAY*** Brown/grey, fine and coarse grain, moderately sorted, saturated.					
9								
10								
11								
12								
13	262.1		End of Borehole					



Installation Contractor: Edrill
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 14/08/2012

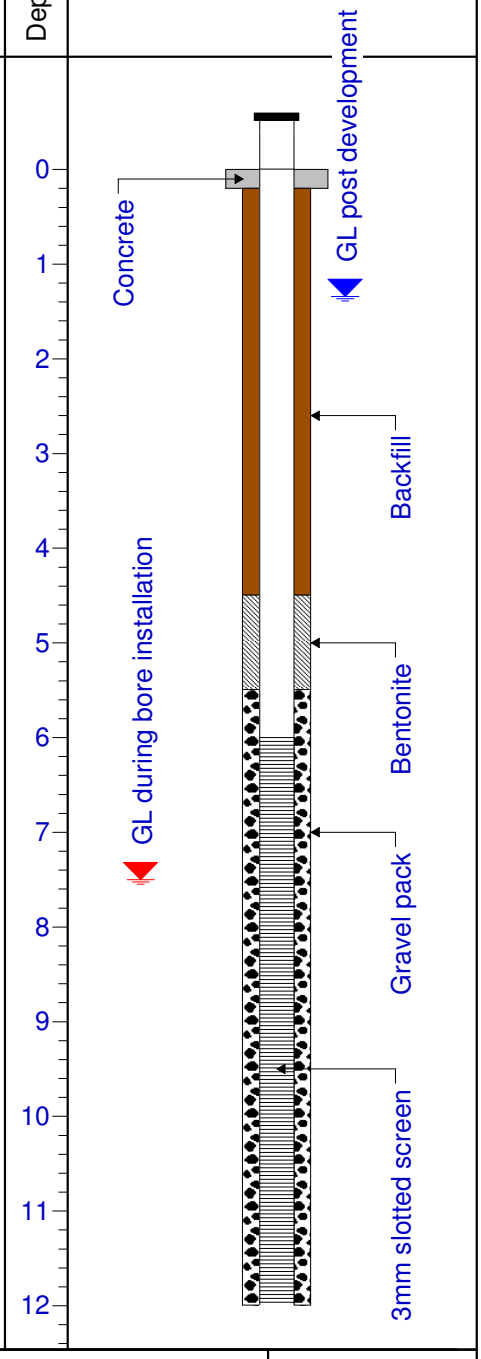
COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB04

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	274.2		Ground Surface					
	273.7		***Gravelly SAND*** Brown, medium grain, moderately sorted, damp.					
1			***Gravelly, clayey SAND*** Orange and brown coloured, medium grain, poorly sorted, and dry					
2	272.2		***Gravelly, sandy CLAY*** Orange/yellow/brown, medium grain, poorly sorted, damp.					
3								
4	270.2		***Sandy, silty, CLAY*** Brown/grey, fine to medium grain, moderately sorted, damp.					
5								
6								
7	267.2		***CLAY*** White, fine grain, well sorted, damp.					
8								
9								
10								
11								
12	262.2		End of Borehole					



Installation Contractor: Strataprobe
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 01/08/2012

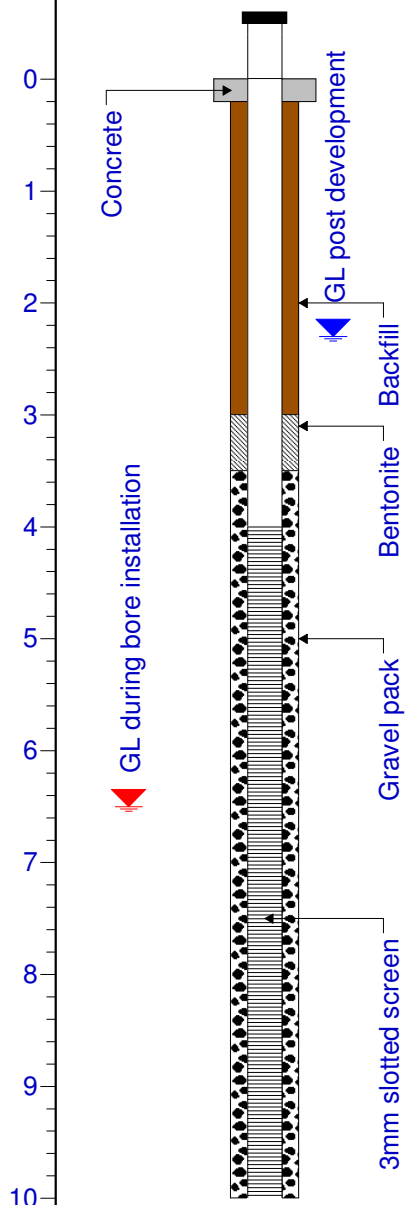
COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB05

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	272.8		Ground Surface					
	272.3		***SAND*** Brown, coarse grain, poorly sorted, damp.					
1			***Sandy CLAY*** Yellow/brown colour, coarse grain, poorly sorted, damp.					
2	270.8		***Sandy SILT*** Orange and brown coloured, coarse grain, poorly sorted and dry.					
3	269.8		***Sandy, silty, CLAY.*** Brown and grey coloured,fine and medium grain, moderately sorted, and damp.					
4	268.3		***Sandy CLAY*** Brown and grey coloured, coarse grain, moderately sorted and damp.					
5								
6	266.8		***Gravelly CLAY*** Orange and grey coloured, coarse grain, poorly sorted and saturated.					
7	265.8		***Gravely CLAY*** Orange coloured, coarse grain, poorly sorted and saturated.					
8	264.8		***Sandy, clayey GRAVEL*** Orange and brown coloured. coarse grain, poorly sorted and saturated.					
9								
10	262.8		End of Borehole					



Installation Contractor: Strataprobe
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 01/08/2012

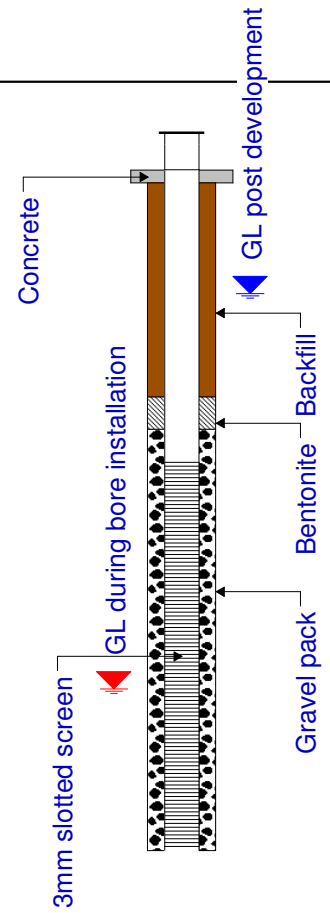
COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB06

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	283.3		Ground Surface				0	
	282.3		***Gravelly, clayey SAND*** Brown, medium grain, poorly sorted, damp.					
1							1	
	281.3		***Gravelly, sandy CLAY*** Orange/brown, medium grain, moderately sorted, dry.					
2							2	
3			***Sandy, silty CLAY*** Grey/brown, fine to medium grain, moderately sorted, damp.				3	
	279.3							
4							4	
5			***Sandy, gravelly CLAY*** Grey, fine grain, moderately sorted and wet.				5	
6							6	
	276.3							
7			***Gravelly CLAY*** White and grey, fine grain, moderately sorted, wet.				7	
8							8	
	274.3							
9			***Gravelly, sandy CLAY*** Cream coloured, fine to coarse grain, poorly sorted, saturated.				9	
10							10	
11							11	
12							12	
13							13	
14							14	
15							15	
16							16	
17							17	
18	265.3		End of Borehole				18	



Installation Contractor: Strataprobe
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 01/08/2012

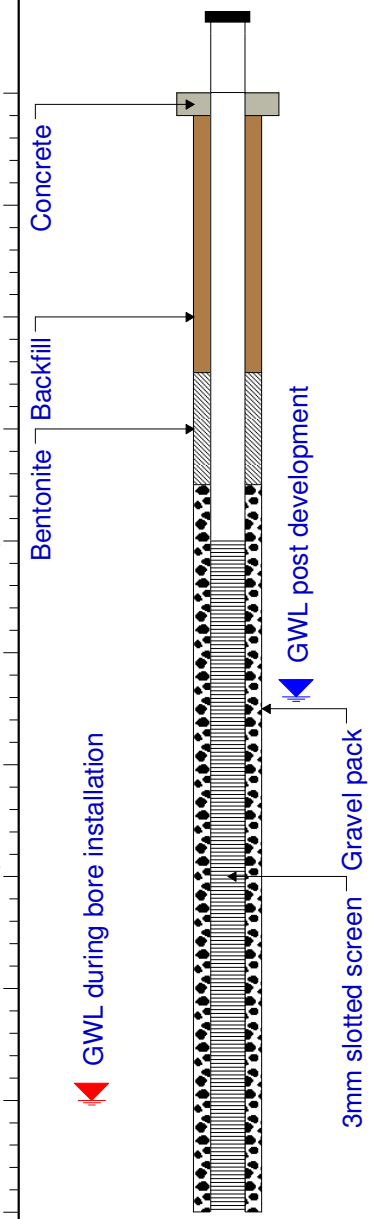
COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB07

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	303.4		Ground Surface					
			Gravelly, clayey, SAND Orange/brown, medium grain, poorly sorted, dry,					
1	302.4		***Gravelly, SAND*** Grey/brown,coarse grain, poorly sorted, dry.					
2								
3								
4	299.4		***Sandy, CLAY*** Yellow/orange, medium grain, moderately sorted, damp.					
5								
6	297.4		***Sandy, CLAY*** Brown/grey, moderately sorted, damp.					
7								
8	295.4		***Gravelly, sandy, CLAY*** Brown/grey, poorly sorted, saturated.					
9								
10	293.4		End of Borehole					



Installation Contractor: Edrill
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 14/08/2012

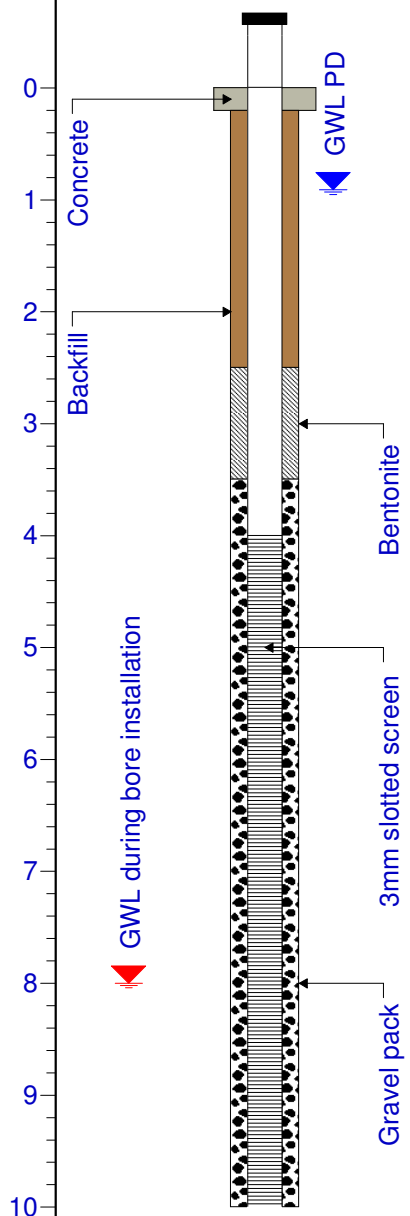
COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB08

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	301.7		Ground Surface					
			Gravelly, SAND Brown, coarse grain, poorly sorted, dry.					
2	299.7		***Gravelly, silty, SAND*** Grey/brown, fine and coarse grain, poorly sorted, dry.					
3	298.7		***Sandy, silty, CLAY*** Grey, fine grain, well sorted, dry.					
7	294.7		***Silty, CLAY*** Brown/grey, fined grain, well sorted, damp.					
10	291.7		End of Borehole					



Installation Contractor: Edrill
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 14/05/2012

COMMENTS: PD = post development

APPENDIX B

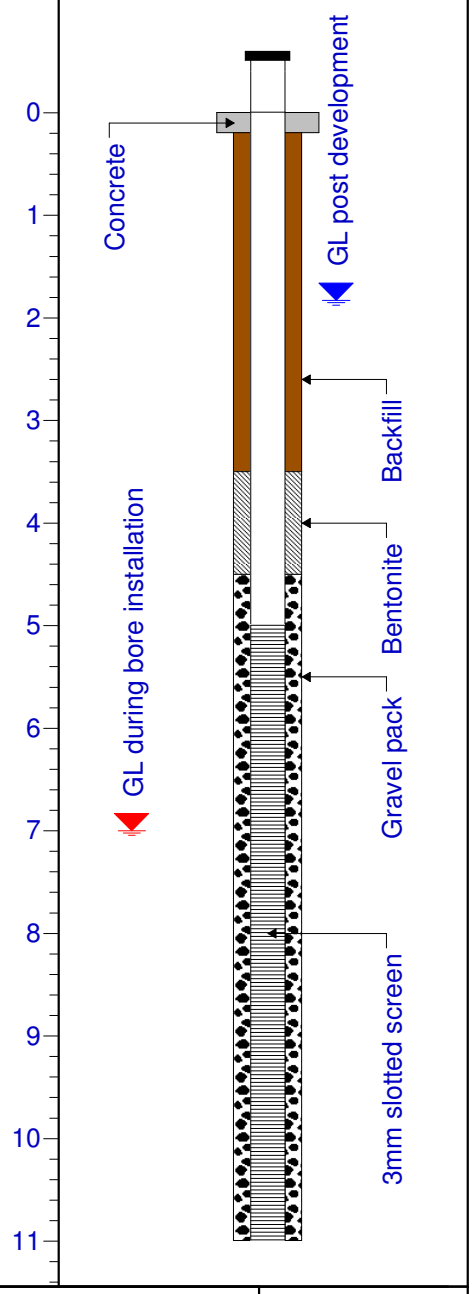
Borehole Logs

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB01

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	267.7		Ground Surface				0	
	266.7		***Clayey SAND*** Orange/brown, medium grain, poorly sorted, damp.					
1			***Clayey SAND*** Orange/yellow, medium grain, poorly sorted, damp.				1	
2	265.7		***Gravelly, clayey SAND*** Yellow, medium grain, poorly sorted, damp.				2	
3	264.7		***Gravelly SAND*** Red/grey, medium grain, poorly sorted, damp.				3	
4							4	
5	262.7		***Gravelly CLAY*** White, damp.				5	
6							6	
7							7	
8							8	
9							9	
10							10	
11	256.7		End of Borehole				11	



Installation Contractor: Strataprobe
Installation Method: Air compressor with blade bit
Bore Diameter: 50mm
Date: 01/08/2012

COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna, Shire of York

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

Well ID: MB02

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	322.0		Ground Surface				0	
1			***Sandy, clayey GRAVEL*** Orange/brown, coarse grain, poorly sorted, dry.				1	
2	320.0						2	
3			***Gravelly, clayey, SAND*** Yellow, coarse grain, poorly sorted, dry.				3	
4	317.5						4	
5	316.5		***Sandy, clayey SILT*** Orange/cream, fine grain, poorly sorted, dry				5	
6							6	
7			***SILT*** Orange/pink, fine grain, moderately sorted, dry.				7	
8							8	
9							9	
10			***Clayey, SILT*** Orange/cream, fine grain, well sorted, dry.				10	
11							11	
12							12	
13	309.0		***SILT*** White, fine grain, well sorted, dry.				13	
14							14	
15	307.0		***SILT*** Pink, fine grain, well sorted, dry.				15	
16			***SILT*** White, fine grain, well sorted, dry.				16	
17							17	
18	304.0						18	
19			***SILT*** White/grey, fine grain, well sorted, damp.				19	
20	302.0						20	
21			***Sandy, silty, CLAY*** White, fine grain, well sorted, damp.				21	
22							22	
23							23	
24							24	
25							25	
26							26	
27							27	
28	294.0						28	
29			***Sandy, clayey, SILT*** Orange, yellow, white, mdeium grain, poorly sorted, damp.				29	
30	292.0						30	
31			End of Borehole				31	

Installation Contractor: Strataprobe
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 2/08/2012

COMMENTS:

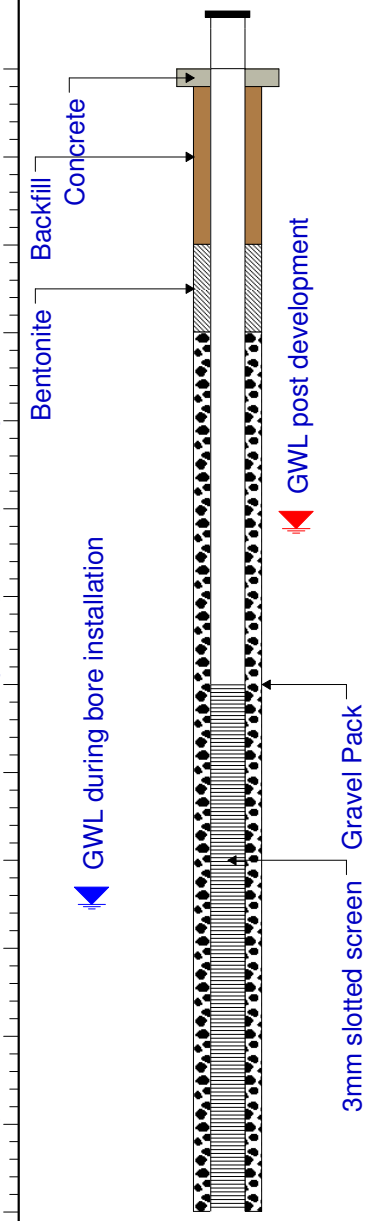
Well was not constructed as groundwater was not intercepted

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna, Shire of York

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

Well ID: MB03

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	275.1		Ground Surface					
	274.6		***Gravelly, sandy, CLAY*** Orange/brown, fine and coarse grain, poorly sorted, damp.					
1			***Gravelly, clayey, SAND*** Orange/yellow, fine and coarse grain, poorly sorted, dry.					
2	273.1							
	272.1		***Gravelly, SAND*** Orange/brown, medium grain, moderately sorted, dry					
3			***Sandy, SILT*** Grey/white, fine grain, well sorted, dry.					
4								
5								
6	269.1		***Sandy, silty, CLAY*** Borwn/grey, fine grain, moderately sorted, dry.					
7								
8	267.1		***Sandy, silty, CLAY*** Brown/grey, fine and coarse grain, moderately sorted, saturated.					
9								
10								
11								
12								
13	262.1		End of Borehole					



Installation Contractor: Edrill
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 14/08/2012

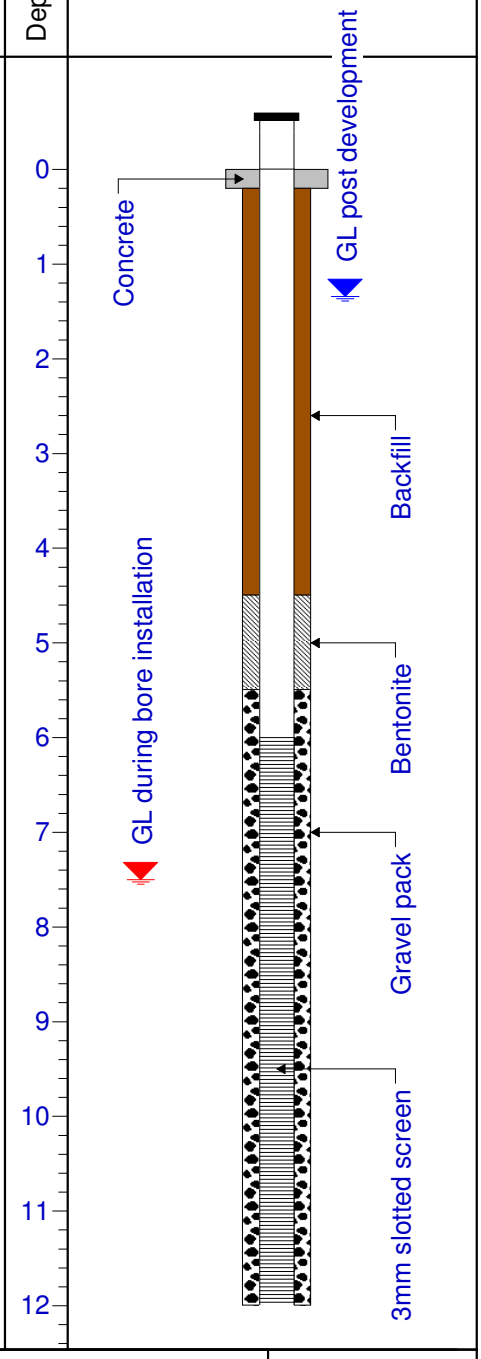
COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB04

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	274.2		Ground Surface					
	273.7		***Gravelly SAND*** Brown, medium grain, moderately sorted, damp.					
1			***Gravelly, clayey SAND*** Orange and brown coloured, medium grain, poorly sorted, and dry					
2	272.2		***Gravelly, sandy CLAY*** Orange/yellow/brown, medium grain, poorly sorted, damp.					
3								
4	270.2		***Sandy, silty, CLAY*** Brown/grey, fine to medium grain, moderately sorted, damp.					
5								
6								
7	267.2		***CLAY*** White, fine grain, well sorted, damp.					
8								
9								
10								
11								
12	262.2		End of Borehole					



Installation Contractor: Strataprobe
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 01/08/2012

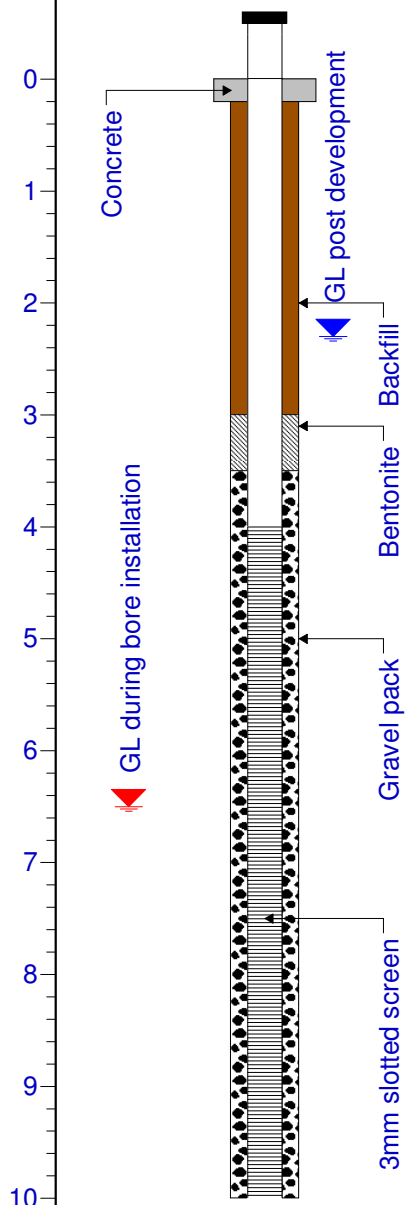
COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB05

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	272.8		Ground Surface					
	272.3		***SAND*** Brown, coarse grain, poorly sorted, damp.					
1			***Sandy CLAY*** Yellow/brown colour, coarse grain, poorly sorted, damp.					
2	270.8		***Sandy SILT*** Orange and brown coloured, coarse grain, poorly sorted and dry.					
3	269.8		***Sandy, silty, CLAY.*** Brown and grey coloured,fine and medium grain, moderately sorted, and damp.					
4	268.3		***Sandy CLAY*** Brown and grey coloured, coarse grain, moderately sorted and damp.					
5								
6	266.8		***Gravelly CLAY*** Orange and grey coloured, coarse grain, poorly sorted and saturated.					
7	265.8		***Gravely CLAY*** Orange coloured, coarse grain, poorly sorted and saturated.					
8	264.8		***Sandy, clayey GRAVEL*** Orange and brown coloured. coarse grain, poorly sorted and saturated.					
9								
10	262.8		End of Borehole					



Installation Contractor: Strataprobe
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 01/08/2012

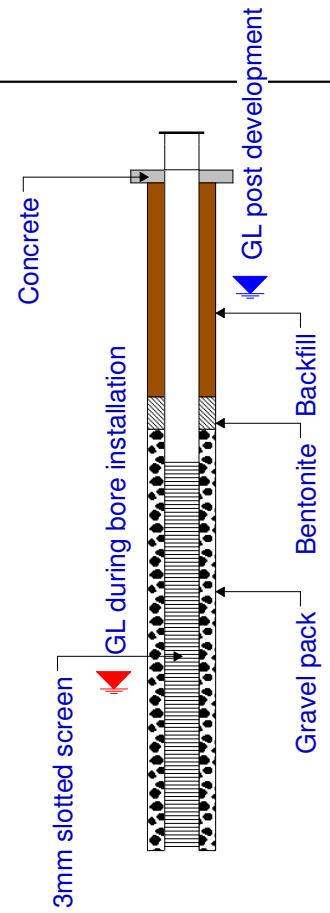
COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB06

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	283.3		Ground Surface				0	
	282.3		***Gravelly, clayey SAND*** Brown, medium grain, poorly sorted, damp.					
1							1	
	281.3		***Gravelly, sandy CLAY*** Orange/brown, medium grain, moderately sorted, dry.					
2							2	
3			***Sandy, silty CLAY*** Grey/brown, fine to medium grain, moderately sorted, damp.				3	
	279.3							
4							4	
5			***Sandy, gravelly CLAY*** Grey, fine grain, moderately sorted and wet.				5	
6							6	
	276.3							
7			***Gravelly CLAY*** White and grey, fine grain, moderately sorted, wet.				7	
8							8	
	274.3							
9			***Gravelly, sandy CLAY*** Cream coloured, fine to coarse grain, poorly sorted, saturated.				9	
10							10	
11							11	
12							12	
13							13	
14							14	
15							15	
16							16	
17							17	
18	265.3		End of Borehole				18	



Installation Contractor: Strataprobe
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 01/08/2012

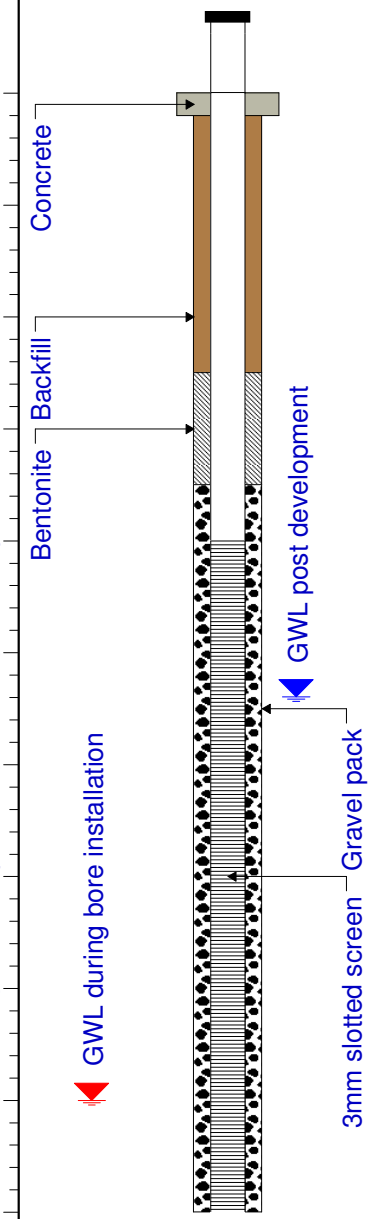
COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB07

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	303.4		Ground Surface					
			Gravelly, clayey, SAND Orange/brown, medium grain, poorly sorted, dry,					
1	302.4		***Gravelly, SAND*** Grey/brown,coarse grain, poorly sorted, dry.					
2								
3								
4	299.4		***Sandy, CLAY*** Yellow/orange, medium grain, moderately sorted, damp.					
5								
6	297.4		***Sandy, CLAY*** Brown/grey, moderately sorted, damp.					
7								
8	295.4		***Gravelly, sandy, CLAY*** Brown/grey, poorly sorted, saturated.					
9								
10	293.4		End of Borehole					



Installation Contractor: Edrill
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 14/08/2012

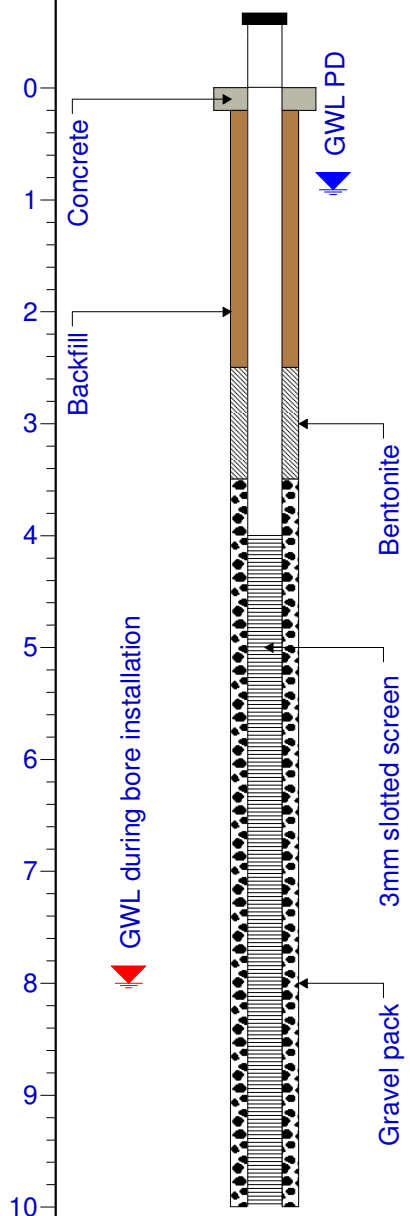
COMMENTS:

Project No: J112319
Project: Groundwater Assessment
Client: Bowman and Associates
Location: Allawuna Farm, Shire of York

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

Well ID: MB08

SUBSURFACE PROFILE				SAMPLE			WELL	
Depth (mbgl)	Elevation (mAHD)	Symbol	Lithology	Number	Type	Lab Analysed	Depth (m)	Well Construction
0	301.7		Ground Surface					
			Gravelly, SAND Brown, coarse grain, poorly sorted, dry.					
2	299.7		***Gravelly, silty, SAND*** Grey/brown, fine and coarse grain, poorly sorted, dry.					
3	298.7		***Sandy, silty, CLAY*** Grey, fine grain, well sorted, dry.					
7	294.7		***Silty, CLAY*** Brown/grey, fined grain, well sorted, damp.					
10	291.7		End of Borehole					



Installation Contractor: Edrill
Installation Method: Air compressor with blade bit
Bore Diameter: 50 mm
Date: 14/05/2012

COMMENTS: PD = post development

Bowman and Associates Pty Ltd

ABN: 22 112 399 514

Mail: PO Box 2059, Rossmoyne WA 6148
Office: 8/640 Beeliar Drive, Success WA 6164
Phone: (08) 9414 9670
Email: adam@bowmanassociates.com.au
Web: www.bowmanassociates.com.au

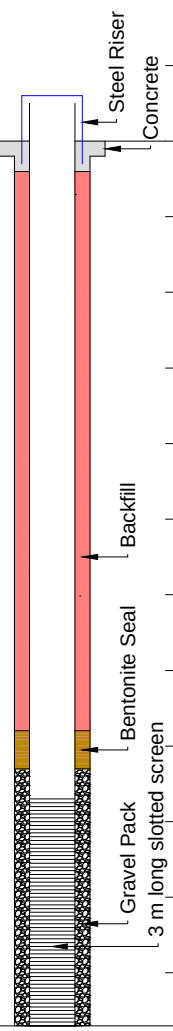
Bore Installation Log Sheet

Bore ID: MB09

Project: Allawuna Farm Landfill	Date: 13-5-13
Client: SITA Australia	Time: 0813 - 1015
Location: Great Southern Highway, St Ronans	Easting: 461856.056
Supervised By: Adam Davies	Northing: 6468565.958
Drilling Contractor: GS Drilling	Elevation (ToC): 307.101
Rig Type: Auger with Blade Bit	Datum: UTM 50S / m AHD

DEPTH (m)	HATCH	MATERIAL DESCRIPTION	SAMPLE #	TYPE
		Ground Surface		
0		Dark Brown and Red Sandy GRAVEL Lateritic gravel, dry and cohesionless	9-0	grab
1			9-1	grab
2		Dark Red Sandy, Silty GRAVEL Sand and fines content increasing with depth. Dry.	9-2	grab
3		Pale Pinkish Brown CLAY Dry.	9-3	grab
4			9-4	grab
			9-4.5	grab
5			9-5	grab
6			9-6	grab
7		Red Brown CLAY Slight moisture. Firm. Trace granitic sand.	9-7	grab
8			9-8	grab
9			9-9	grab
10		WT		
11		White Sandy CLAY Saturated. Weathered Saprolite with granitic sand.	9-11	grab
12		End of Hole @ 11.7 m		
13				
14				
15				
16				
17				
18				

WELL INSTALLATION



NOTES

Canola regrowth at ground level. Fine sunny weather.
Hydrogen Sulphide (Rotten Egg) smell from bore.

Water table @ 10 m below ground level.

Bore developed 2 days post installation. Pumped 70L to dry.

Location, Elevation and Casing Stick-up confirmed by survey.

WELL DETAILS	
Total Depth:	11.7 m
Casing Diameter:	50 mm
Screen Length:	3 m
Casing Material:	C18 PVC
Steel Riser?	Yes
Casing Stick-up:	0.338

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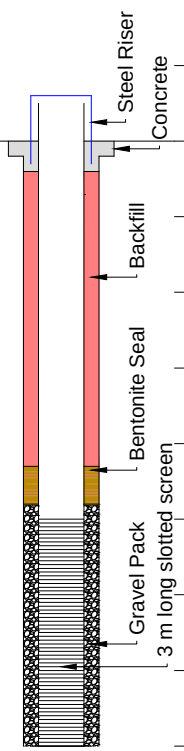
Bore Installation Log Sheet

Bore ID: MB10

Project: Allawuna Farm Landfill	Date: 13-5-13
Client: SITA Australia	Time: 1030 - 1200
Location: Great Southern Highway, St Ronans	Easting: 461919.983
Supervised By: Adam Davies	Northing: 6468767.448
Drilling Contractor: GS Drilling	Elevation (ToC): 300.442
Rig Type: Auger with Blade Bit	Datum: UTM 50S / m AHD

DEPTH (m)	HATCH	MATERIAL DESCRIPTION	SAMPLE #	TYPE
		Ground Surface		
0		Orange Clayey SAND Well graded. Trace laterite, granite and quartz gravel. Dry and of slight cohesion. Well compacted and difficult to drill. Clay content increases with depth.	10-0	grab
1			10-1	grab
2		Grey CLAY Stiff clay, very well consolidated. Trace granitic sand. Slight moisture increasing with depth.	10-2	grab
3			10-3	grab
4				
			10-4.5	grab
5			10-5	grab
6		WT Pale Brown CLAY Trace grey granitic sand. Wet.	10-6	grab
7			10-7	grab
8		White Sandy CLAY Saturated. Runny clay. Weathered Saprolite with granitic sand. Very soft, high plasticity.	10-8	grab
9				
10		End of Hole @ 10 m		
11				
12				
13				
14				
15				
16				
17				
18				

WELL INSTALLATION



NOTES

Bore installed near fence line on opposite side of 13 Mile brook to MB05.

Water table @ 6 m below ground level.

Bore developed 2 days post installation. Pumped 90L.

Location, Elevation and Casing Stick-up confirmed by survey.

WELL DETAILS	
Total Depth:	8.6 m (TOC)
Casing Diameter:	50 mm
Screen Length:	3 m
Casing Material:	C18 PVC
Steel Riser?	Yes
Casing Stick-up:	0.650 m

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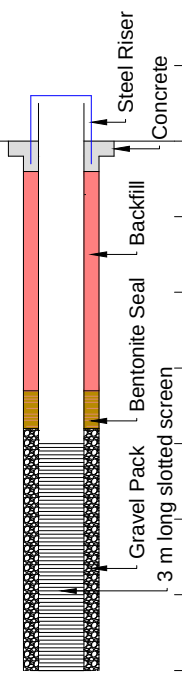
Bore Installation Log Sheet

Bore ID: MB11

Project: Allawuna Farm Landfill	Date: 13-5-13
Client: SITA Australia	Time: 1325-1500
Location: Great Southern Highway, St Ronans	Easting: 462456.69
Supervised By: Adam Davies	Northing: 6468764.614
Drilling Contractor: GS Drilling	Elevation (ToC): 303.371
Rig Type: Auger with Blade Bit	Datum: UTM 50S / m AHD

DEPTH (m)	HATCH	MATERIAL DESCRIPTION	SAMPLE #	TYPE
		Ground Surface		
0		Brown SAND	11-0	grab
		Brown and yellow sandy CLAY.	11-0.5	grab
1		Pale Brown CLAY Trace quartz fragments.	11-1	grab
2		Brown sandy CLAY Weathered grey and white quartzite and granite cobbles.	11-2	grab
3				
		Grey CLAY High plasticity. Trace granitic sand increasing with depth.	11-3.5	grab
4			11-4	grab
5		WT	11-5	grab
6			11-6	grab
7			11-7	grab
8		Tan sandy CLAY Runny clay, low plasticity. Granitic sand.	11-8	grab
9		End of Hole @ 8.5 m		
10				
11				
12				
13				
14				
15				
16				
17				
18				

WELL INSTALLATION



NOTES

Bore installed near creek line south of proposed leachate dams.

Water table @ 5 m below ground level.

Bore developed 2 days post installation. Pumped 95L.

Location, Elevation and Casing Stick-up confirmed by survey.

WELL DETAILS	
Total Depth:	7.3 m (TOC)
Casing Diameter:	50 mm
Screen Length:	3 m
Casing Material:	C18 PVC
Steel Riser?	Yes
Casing Stick-up:	0.303

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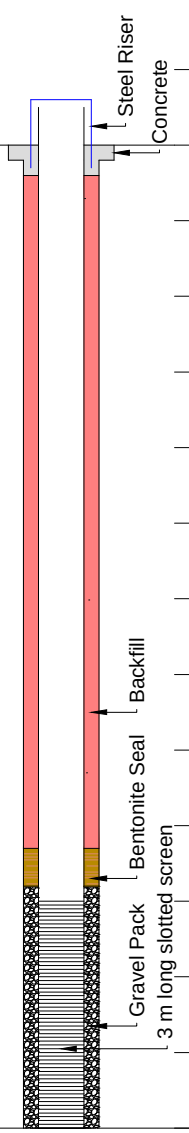
Bore Installation Log Sheet

Bore ID: MB12

Project: Allawuna Farm Landfill	Date: 13/14-5-13
Client: SITA Australia	Time: 1510 - 0915
Location: Great Southern Highway, St Ronans	Easting: 462367.487
Supervised By: Adam Davies	Northing: 6468999.986
Drilling Contractor: GS Drilling	Elevation (ToC): 316.911
Rig Type: Auger with Blade Bit	Datum: UTM 50S / m AHD

DEPTH (m)	HATCH	MATERIAL DESCRIPTION	SAMPLE #	TYPE
		Ground Surface		
0		Pale brown silty CLAY. Very well consolidated and hard to drill. Dry. Trace ironstone gravel cobbles.	12-0	grab grab
1			12-1	grab
2			12-2	grab
3			12-3	grab
4		Pale pink SILT Trace granitic and quartz sands increasing with depth. Softer than layer above. Dry.	12-4	grab
5			12-5	grab
			12-5.5	grab
6		Pale brown CLAY High plasticity. Trace granitic and quartz sands. Slight moisture gradually increasing with depth.	12-6	grab
7			12-7	grab
8			12-8	grab
9		Orange sandy CLAY High plasticity. Granitic sands. Moisture gradually increasing with depth.	12-9	grab
10			12-10	grab
11			12-11	grab
12		WT	12-12	grab
13		End of Hole @ 13 m		
14				
15				
16				
17				
18				

WELL INSTALLATION



NOTES

Drilling halted due to poor light on 13-5-2013, well installation completed on 14-5-2012.

Water table @ 12 m below ground level.

Bore developed 1 day post installation. Pumped 40L to dry.

Location, Elevation and Casing Stick-up confirmed by survey.

WELL DETAILS	
Total Depth:	13.5 m (TOC)
Casing Diameter:	50 mm
Screen Length:	3 m
Casing Material:	C18 PVC
Steel Riser?	Yes
Casing Stick-up:	0.489

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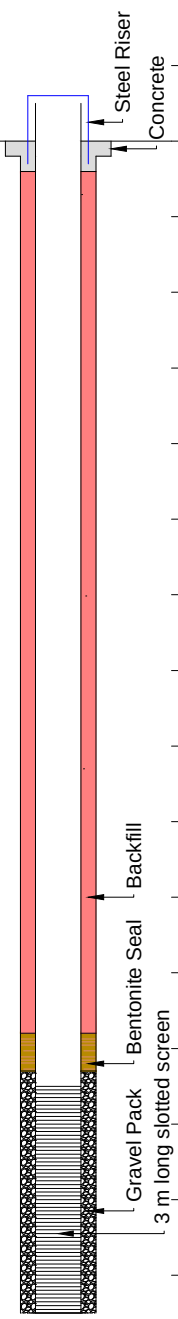
Bore Installation Log Sheet

Bore ID: MB13

Project: Allawuna Farm Landfill	Date: 14-5-13
Client: SITA Australia	Time: 1015 - 1225
Location: Great Southern Highway, St Ronans	Easting: 462516.159
Supervised By: Adam Davies	Northing: 6469123.508
Drilling Contractor: GS Drilling	Elevation (ToC): 321.595
Rig Type: Auger with Blade Bit	Datum: UTM 50S / m AHD

DEPTH (m)	HATCH	MATERIAL DESCRIPTION	SAMPLE #	TYPE
		Ground Surface		
0		Brown silty sandy CLAY Well sorted, trace laterite gravel. Dry.	13-0	grab
1		Pale red silty sandy CLAY Increasing consolidation and drilling difficulty with depth. Dry.	13-1	grab
2			13-2	grab
3		Pale red-brown silty CLAY Very well consolidated and hard to drill. Dry.	13-3	grab
4			13-4	grab
5		Pale pink SILT Trace granitic and quartz sands increasing with depth. Softer than layers above and below. Dry.	13-5	grab
6		Pale brown CLAY High plasticity. Trace granitic and quartz sands. Dry.	13-6	grab
7		Dark red-brown CLAY High plasticity. Dry.	13-7	grab
8		Pale brown CLAY High plasticity. Trace granitic and quartz sands. Dry.	13-8	grab
9		Dark red-brown CLAY High plasticity. Trace granitic sands. Moisture gradually increasing with depth.	13-9	grab
10			13-10	grab
			13-10.5	grab
11			13-11	grab
12			13-12	grab
13			13-13	grab
14		WT	13-14	grab
15			13-15	grab
16		End of Hole @ 16 m		
17				
18				

WELL INSTALLATION



NOTES

Scattered laterite rock on the ground surface.

Water table @ 14 m below ground level.

Bore developed 1 day post installation. Pumped 100L of red water.

Location, Elevation and Casing Stick-up confirmed by survey.

WELL DETAILS	
Total Depth:	16 m (TOC)
Casing Diameter:	50 mm
Screen Length:	3 m
Casing Material:	C18 PVC
Steel Riser?	Yes
Casing Stick-up:	0.387

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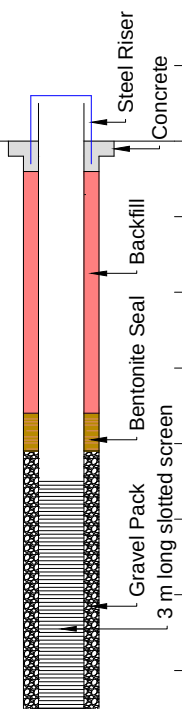
Bore Installation Log Sheet

Bore ID: MB14

Project: Allawuna Farm Landfill	Date: 14-5-13
Client: SITA Australia	Time: 1410-1545
Location: Great Southern Highway, St Ronans	Easting: 462742.032
Supervised By: Adam Davies	Northing: 6469081.65
Drilling Contractor: GS Drilling	Elevation (ToC): 315.105
Rig Type: Auger with Blade Bit	Datum: UTM 50S / m AHD

DEPTH (m)	HATCH	MATERIAL DESCRIPTION	SAMPLE #	TYPE
		Ground Surface		
0		Brown silty sandy CLAY Well sorted, trace laterite gravel. Damp.	14-0	grab
1		White silty CLAY Dry.	14-1	grab
2			14-2	grab
3		Pale brown CLAY High plasticity. Trace granitic and quartz sands. Damp. Hard to Drill	14-3	grab
4		White sandy CLAY Granitic and quartz sands increasing with depth. Moisture increasing with depth.	14-4	grab
5			14-5	grab
6		WT	14-6	grab
7				
8		End of Hole @ 8 m		
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

WELL INSTALLATION



NOTES

Moved northeast from planned location due to rock @ approx 3 m.

Water table @ 6 m below ground level.

Bore developed 1 day post installation. Pumped 65L to dry.

Location, Elevation and Casing Stick-up confirmed by survey.

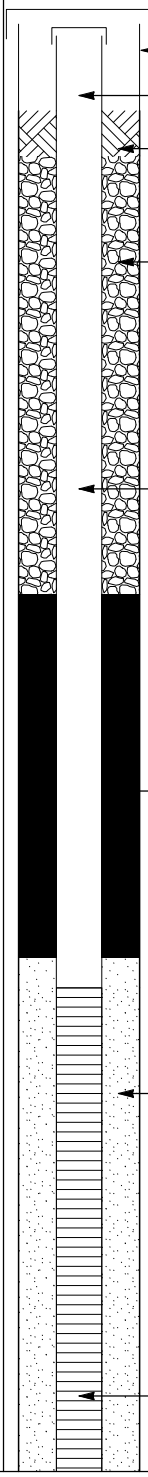
WELL DETAILS	
Total Depth:	8 m (TOC)
Casing Diameter:	50 mm
Screen Length:	3 m
Casing Material:	C18 PVC
Steel Riser?	Yes
Casing Stick-up:	0.488

REPORT OF BOREHOLE: GMB1

SHEET: 1 OF 2

CLIENT:	SITA Australia	COORDS: 462507.6 m E 6469515.7 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 334.34 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: Mike Bartlett DATE: 2/12/14
JOB NO:	147645033	HOLE DIA: 115 mm HOLE DEPTH: 10.40 m	CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		-1							
		0	334.34				**GRAVEL**, fine to coarse grained, orange, red and brown, rounded to sub angular, some cemented fragments (laterised, very well cemented), some fine cobbles (pisolites), orange, rounded, trace sand, fine to medium grained		
		1	1.00 333.34				**Clayey SAND**, fine to medium grained, orange/brown, sub rounded to rounded, well graded, some gravel, fine grained, orange, angular to rounded, trace pisolites		
		2	2.50 331.84				**Sandy CLAY**, orange brown, low plasticity, quartz and feldspar sand , black, clear and white, fine to coarse grained, sub angular to angular, poorly graded, predominance of coarser grains being quartz		
		3	3.00 331.34				orange with red and grey mottling, medium plasticity		
		4							
		5							
		6							
		7							
		8	8.00 326.34				cream		
		9	9.00						



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REPORT OF BOREHOLE: GMB1

SHEET: 2 OF 2

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 462507.6 m E 6469515.7 m N MGA94 50 (dGPS)
SURFACE RL: 334.34 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DIA: 115 mm HOLE DEPTH: 10.40 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: Mike Bartlett DATE: 2/12/14
CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		9	325.34				**Sandy CLAY**, orange brown, low plasticity, quartz and feldspar sand , black, clear and white, fine to coarse grained, sub angular to angular, poorly graded, predominance of coarser grains being quartz orange brown, with red and grey mottling		
		10	*10.35*						Hole collapse/fallback
			323.94				**GRANITE**, coarse grained, white and pink feldspar (65%), clear and pale grey quartz (30%), dark grey mafics (5%), slightly weathered, high strength (5 cm of core recovered) END OF BOREHOLE @ 10.40 m REFUSAL Monitoring Well Installed, Groundwater Not Observed		
		11							
		12							
		13							
		14							
		15							
		16							
		17							
		18							
		19							

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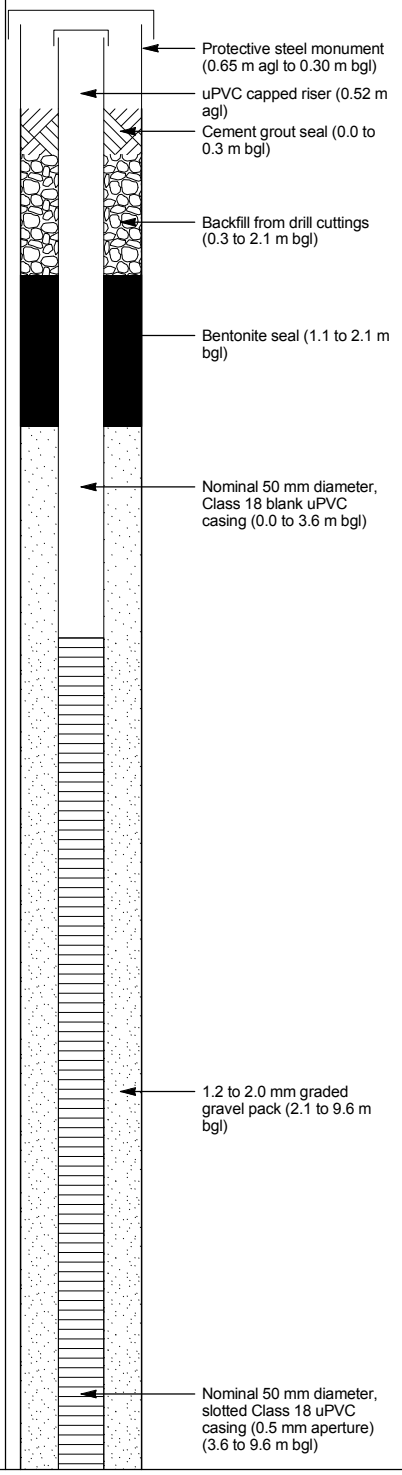
REPORT OF BOREHOLE: GMB2

SHEET: 1 OF 2

CLIENT:	SITA Australia	COORDS: 463174.8 m E 6469491.8 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 333.33 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: Mike Bartlett DATE: 3/12/14
JOB NO:	147645033	HOLE DIA: 115 mm HOLE DEPTH: 9.80 m	CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
	11/12/14	-1							
		0	333.33				**Gravelly SAND**, brown, fine grained, quartz, sub rounded to rounded, fine to medium grained gravel (pisolites), some silt		
		1	1.00 332.33				orange brown with red an grey mottling		
		2	2.00 331.33				**Sandy CLAY**, orange brown, medium plasticity, fine to medium grained, dark grey and clear quartz, angular to sub rounded, trace fine gravel (quartz), clear and dark grey, angular to sub rounded		
		3							
		4	4.00 329.33				cream, some gravel		
		5							
		6	6.00 327.33				well cemented zone, medium strength		
			6.30 327.03				no cementation		
		7	7.00 326.33				pale red (pink)		
		8	8.00 325.33				cream		
		9	9.00						



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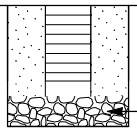
REPORT OF BOREHOLE: GMB2

SHEET: 2 OF 2

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 463174.8 m E 6469491.8 m N MGA94 50 (dGPS)
SURFACE RL: 333.33 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DIA: 115 mm HOLE DEPTH: 9.80 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: Mike Bartlett DATE: 3/12/14
CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		9	324.33				**Sandy Clayey GRAVEL**, pale brown, fine to medium grained, quartz and feldspar (clear, pale grey and white), angular to sub rounded, fine to medium grained sand, dark grey and clear quartz, angular to sub rounded (weathered granite)	<0.1	 Hole collapse/fallback
			9.50 323.83				**GRANITE**, coarse grained, white and pink feldspar (40%), clear and pale grey quartz (40%), dark grey mafics (10%), slightly weathered, high strength, some red brown iron staining at contact with overlying gravel		
			9.80 323.53				END OF BOREHOLE @ 9.80 m REFUSAL Monitoring Well Installed		
		10							
		11							
		12							
		13							
		14							
		15							
		16							
		17							
		18							
		19							

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GAP gINT FN. F05
RL3

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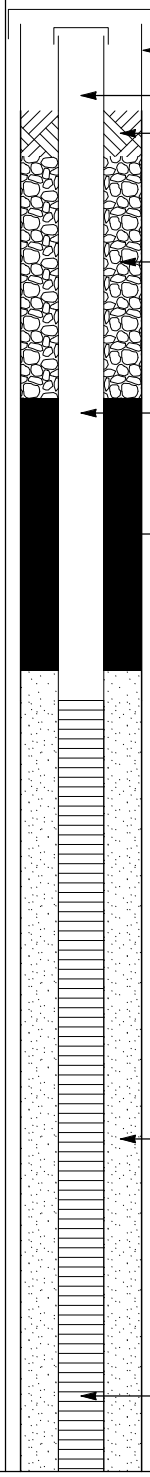
REPORT OF BOREHOLE: GMB3

SHEET: 1 OF 2

CLIENT:	SITA Australia	COORDS: 463287.4 m E 6469114.9 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 328.27 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: Mike Bartlett DATE: 3/12/14
JOB NO:	147645033	HOLE DIA: 115 mm HOLE DEPTH: 10.00 m	CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		-1							
		0	328.27				**Gravelley Sandy CLAY**, medium plasticity, fine to medium grained sand, mainly quartz (grey), sub angular, fine to medium grained gravel (pisolites), trace red, grey and orange mottling		
		1	1.00 327.27				**Sandy CLAY**, pale orange, medium plasticity, fine to medium grained, grey sand (quartz), angular to sub angular, trace silt		
		2	2.00 326.27				pale red brown		
			2.50 325.77				pale orange		
		3							
			3.50 324.77				cream		
		4	4.00 324.27				less weathered zone, low strength, 100 to 200 mm sections of granite core recovered		
			4.80 323.47				no cementation, increasing silt		
	11/12/14	5							
		6	6.00 322.27				**Clayey SAND**, cream, fine to medium grained, quartz, angular to sub rounded, well graded		
			6.50 321.77				**Sandy GRAVEL**, quartz, cream, fine to coarse grained, angular to sub roundeded, fine grained sand (quartz and feldspar), some silt		
		7							
		8							
		9							



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117646036_FMG_SOLOMON GAP 8_07 LIBRARY.GLB Log GAP WELL 147645033 - LOGS.GPJ <<DrawingFile>> 13/01/2015 17:00 8.2.856

REPORT OF BOREHOLE: GMB3

SHEET: 2 OF 2

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 463287.4 m E 6469114.9 m N MGA94 50 (dGPS)
SURFACE RL: 328.27 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DIA: 115 mm HOLE DEPTH: 10.00 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: Mike Bartlett DATE: 3/12/14
CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		9					**Sandy GRAVEL**, quartz, cream, fine to coarse grained, angular to sub roundeded, fine grained sand (quartz and feldspar), some silt		
			9.50 318.77				trace well cemented cobbles (less weathered granite), moderate strength, quartz sand is orange, red, brown and white		
			9.90				**GRANITE**, coarse grained, clear and pale grey quartz (60%), white and pink feldspar (35%), dark grey mafics (5%), slightly weathered, high strength	<0.1	Hole collapse/fallback
		10					END OF BOREHOLE @ 10.00 m REFUSAL Monitoring Well Installed		
		11							
		12							
		13							
		14							
		15							
		16							
		17							
		18							
		19							

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GAP gINT FN. F05
RL3

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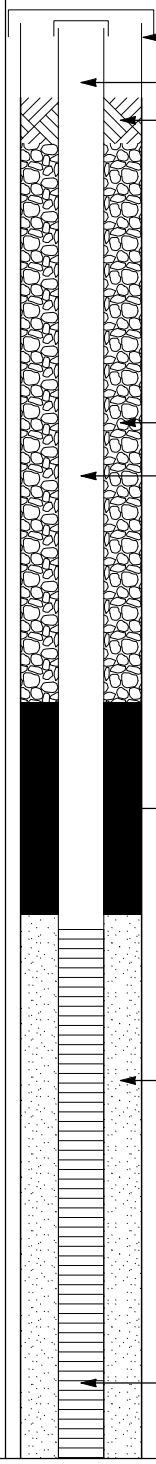
REPORT OF BOREHOLE: GMB4

SHEET: 1 OF 2

CLIENT:	SITA Australia	COORDS: 463007.5 m E 6468751.4 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 318.44 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: Mike Bartlett DATE: 2/12/14
JOB NO:	147645033	HOLE DIA: 115 mm HOLE DEPTH: 11.60 m	CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
			318.44				**Sandy GRAVEL**, brown, fine to coarse grained pisolites, fine to medium grained sand (quartz), sub angular to sub rounded, trace clay, trace silt, trace root materials		
			1.00 / 317.44				**CLAY**, pale red brown with some grey, brown and orange mottling, low plasticity, trace sand (quartz), dark red brown (iron stained), fine to medium grained, well graded, angular to sub rounded, some silt (heavy minerals?)		
			3.50 / 314.94				some sand, fine to coarse grained, angular to sub rounded, very pale red brown		
			4.00 / 314.44				**Clayey SAND**, quartz and feldspar, pale red brown, fine to coarse grained, angular to sub rounded, trace silt, moust from 6.0 m bgl		
			4.50 / 313.94				decreasing clay, some silt		
			4.80 / 313.64				well cemented, moderate strength		
			6.80 / 311.64				**CLAY**, pale red, medium plasticity, some fine to coarse grained sand (quartz), angular to sub rounded, trace fine gravel		
	11/12/14		7.50 / 310.94				**Clayey SAND**, orange brown, medium to coarse grained, angular to sub rounded, trace fine gravel		
			8.50 / 309.94				some fine grained gravel (quartz), sub rounded to angular		



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REPORT OF BOREHOLE: GMB4

SHEET: 2 OF 2

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 463007.5 m E 6468751.4 m N MGA94 50 (dGPS)
SURFACE RL: 318.44 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DIA: 115 mm HOLE DEPTH: 11.60 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: Mike Bartlett DATE: 2/12/14
CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		9					**Clayey SAND**, orange brown, medium to coarse grained, angular to sub rounded, trace fine gravel		
		10	10.00 308.44				**GRAVEL**, quartz and feldspar, orange brown, fine to medium grained, well graded, angular to sub angular, some clay, trace coarse sand and fine to medium gravel (quartz), sub rounded to angular. Coarser grains tend to be quartz, finer grains tend to be feldspar.		
		11	11.49					<0.1	Hole collapse/fallback
							GRANITE, coarse grained, pale and dark grey quartz (70%), white and pink feldspar (25%), dark grey mafics (5%), slightly weathered, high strength END OF BOREHOLE @ 11.60 m REFUSAL Monitoring Well Installed		
		12							
		13							
		14							
		15							
		16							
		17							
		18							
		19							

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GAP gINT FN. F05
RL3

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REPORT OF BOREHOLE: GMB5

SHEET: 1 OF 2

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 462449.3 m E 6468759.8 m N MGA94 50 (dGPS)
SURFACE RL: 303.38 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DIA: 115 mm HOLE DEPTH: 16.40 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: Mike Bartlett DATE: 4/12/14
CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
	11/12/14	-2							
		-1							
		0	303.38				**SAND** (Soil), brown, fine to medium grained, angular to sub rounded, low to high sphericity. Some silt and occasional gravel grain comprised of extremely weathered granite.		Protective steel monument (0.58 m agl to 0.30 m bgl); uPVC capped riser (1.51 m agl); Cement grout seal (0.0 to 0.3 m bgl)
			0.50 302.88				**Silty Clayey SAND** (trace of gravel), orange brown, fine to medium grained, angular to sub rounded quartz in clay matrix, trace orange brown Fe pisolite gravel, occasional white clay blebs containing angular quartz grains (weathered granite?)		
		1	1.50 301.88				**Silty Gravelly SAND**, orange brown, silt and fine to medium grained quartz, angular to sub rounded. Gravel is Fe pisolites and ironstone chips. Feruginised interval		
		2	2.00 301.38				**Silty CLAY**, mostly white but occasionally Fe cemented, silt is quartz		
			2.50 300.88	Lab. Ref. 14441803 2.50-3.50 m Particle Size Distribution			**Clayey Silty SAND** (trace of gravel), pale orange brown, silt to coarse sand is clear to smokey quartz, angular to sub rounded, in white clay matrix with ferruginised intervals. Occasional white feldspar and Fe pisolite sand to gravel. Residual weathered granite.		Nominal 50 mm diameter, Class 18 blank uPVC casing (0.0 to 10.0 m bgl); Bentonite seal (0.3 to 10.0 m bgl)
		3							
		4							
		5		Lab. Ref. 14441804 5.50-6.00 m Particle Size Distribution					
		6	6.00 297.38				**Clayey SAND** (trace of gravel), very fine to coarse, angular to sub rounded, clear to smokey quartz in white clay matrix. Some white feldspar fine sand to gravel. Weathered granite.		
		7	7.00 296.38				**Clayey Silty Sandy GRAVEL**, very fine to coarse, angular to sub rounded, clear to smokey quartz in white clay matrix. Some white feldspar fine sand to gravel. Occasional ferruginised intervals (becomes light orange brown). Weathered granite.		
		8							

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REPORT OF BOREHOLE: GMB5

SHEET: 2 OF 2

CLIENT:	SITA Australia	COORDS: 462449.3 m E 6468759.8 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 303.38 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: Mike Bartlett DATE: 4/12/14
JOB NO:	147645033	HOLE DIA: 115 mm HOLE DEPTH: 16.40 m	CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		8					**Clayey Silty Sandy GRAVEL**, very fine to coarse, angular to sub rounded, clear to smokey quartz in white clay matrix. Some white feldspar fine sand to gravel. Occasional ferruginised intervals (becomes light orange brown). Weathered granite.		
		9	9.00 294.38				**Clayey Gravely SAND**, very fine sand to gravel, angular to subrounded clear to smokey quartz, in white to light orange brown clay matrix. Some white angular feldspar up to gravel. Large granodiorite chip.		
			9.50 293.88				**SAND**, mainly quartz (80 - 90%) with feldspar (10 - 20%), orange, fine to coarse grained, sub angular to sub rounded, gap graded, trace fine gravel		
		10		Lab. Ref. 14441805 10.00-10.50 m Particle Size Distribution					
		11							
			11.50 291.88				some fine to medium grained gravel		
		12							1.2 to 2.0 mm graded gravel pack (10.0 to 16.0 m bgl)
		13							
			13.50 289.88				**Gravelley SAND**, quartz and feldspar, pale orange brown, fine to medium grained, quartz grains are clear, pale orange and pale grey, fine to coarse sand, sub angular to sub rounded, feldspar is fine gravels angular.		
		14							Nominal 50 mm diameter, slotted Class 18 uPVC casing (0.5 mm aperture) (10.0 to 16.0 m bgl)
		15	15.00 288.38	Lab. Ref. 14441806 15.00-15.50 m Particle Size Distribution			**GRAVEL**, quartz (60%), feldspar (35%), pale orange brown, fine to coarse grained, angular		
		16	16.00 287.38				**GRANITE**, coarse grained, pale and dark grey quartz (50%), white and pink feldspar (45%), dark grey mafics (5%), moderately, low to medium strength	0.2	Hole collapse/fallback
			16.40 286.98				END OF BOREHOLE @ 16.40 m REFUSAL Monitoring Well Installed		
		17							
		18							

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GAP gINT FN. F05 RL3

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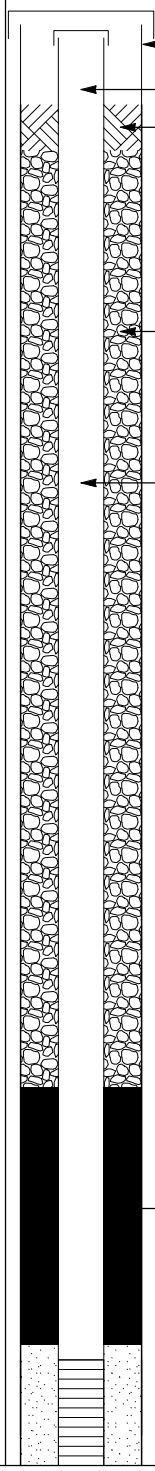
REPORT OF BOREHOLE: GMB6

SHEET: 1 OF 3

CLIENT:	SITA Australia	COORDS: 462521.9 m E 6469273.8 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 325.91 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: Mike Bartlett DATE: 4/12/14
JOB NO:	147645033	HOLE DIA: 115 mm HOLE DEPTH: 21.80 m	CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		-1							
		0	325.91				**SAND**, brown, fine to medium grained, sub rounded, trace gravel (pisolites), fine to medium, rounded		
		1							
			1.50 324.41				**GRAVEL**, orange brown, fine to coarse grained, angular to sub rounded, laterised, some pisolites, trace sand (quartz), pale orange, fine grained		
		2							
		3							
		4	4.00 321.91				**SAND**, quartz, orange brown, fine to medium grained, angular to sub rounded		
		5	5.00 320.91				medium to coarse grained, some gravel (quartz), fine grained, angular to sub rounded		
		6							
		7							
			7.50 318.41				pale orange brown, fine to medium grained		
	11/12/14	8							
			8.50 317.41				**Clayey SAND**, pale brown, fine to medium grained, angular to sub rounded,		
		9	9.00						



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GAP gINT FN. F05 RL3

11764036_FMG_SOLOMON GAP 8_07 LIBRARY.GLB Log GAP WELL 147645033 - LOGS.GPJ <<DrawingFile>> 13/01/2015 17:01 8.2.856

REPORT OF BOREHOLE: GMB6

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 462521.9 m E 6469273.8 m N MGA94 50 (dGPS)
SURFACE RL: 325.91 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DIA: 115 mm HOLE DEPTH: 21.80 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: Mike Bartlett DATE: 4/12/14
CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		9	316.91				**SAND**, pale brown, quartz (pale opaque white, cream and grey), angular to sub rounded		
		10							
		11	11.00 / 314.91				pale grey, red mottling		
		12							
		13							1.2 to 2.0 mm graded gravel pack (8.2 to 21.8 m bgl)
		14	14.00 / 311.91				**Sandy CLAY**, pale orange, low plasticity, medium to coarse grained sand (quartz), sub angular to angular,		
			14.50 / 311.41				off white		
		15							
		16							Nominal 50 mm diameter, slotted Class 18 uPVC casing (0.5 mm aperture) (8.3 to 21.3 m bgl)
		17	17.00 / 308.91				white		
		18							
		19							

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REPORT OF BOREHOLE: GMB6

SHEET: 3 OF 3

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 462521.9 m E 6469273.8 m N MGA94 50 (dGPS)
SURFACE RL: 325.91 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DIA: 115 mm HOLE DEPTH: 21.80 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: Mike Bartlett DATE: 4/12/14
CHECKED: D Thomson DATE: 31/12/14

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		19					**Sandy CLAY**, pale orange, low plasticity, medium to coarse grained sand (quartz), sub angular to angular,		
			19.50 306.41				**SAND**, quartz (orange and pale grey), fine to medium grained, angular to sub rounded, feldspar (white) coarse, angular.		
		20							
		21							
			21.50 304.41				**GRANITE**, coarse grained, pale and dark grey quartz (70%), white and pink feldspar (25%), dark grey mafics (5%), slightly weathered, high strength	<0.1	Hole collapse/fallback
			21.80 304.11				END OF BOREHOLE @ 21.80 m REFUSAL Monitoring Well Installed		
		22							
		23							
		24							
		25							
		26							
		27							
		28							
		29							

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GAP gINT FN. F05
RL3

11764603 6_FMG_SOLOMON GAP 8_07 LIBRARY.GLB Log GAP WELL 147645033 - LOGS.GPJ <<DrawingFile>> 13/01/2015 17:01 8.2.856

REPORT OF BOREHOLE: GMB07

SHEET: 1 OF 3

CLIENT:	SITA Australia	COORDS: 461435.2 m E 6469819.4 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 297.06 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: JFB DATE: 12/3/15
JOB NO:	147645033	HOLE DEPTH: 27.00 m	CHECKED: D Thomson DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
	16/03/15	-1							
		0	297.06				**SANDY CLAY SOIL** (Lateritic), dark brown/ dark red. Fine to medium grained sand (20%), angular, white quartz with variable iron stained colour. Dark brown clay (70%). Highly rounded iron nodules (10%) up to 15mm diameter. Dry.		Protective steel monument (0.65 m agl to 0.30 m bgl) uPVC capped riser (0.57 m agl) Cement grout seal (0.0 to 0.3 m bgl)
		1	1.00 296.06				**SILCRETE**, white with mottled cream (from FeOx). 1 to 4mm angular quartz grains (50%). Competent FeOx/clay matriz (50%). Rock fabric visible but origin unknown. Dry.		Backfill from drill cuttings (0.3 to 19.0 m bgl)
		2	2.00 295.06				**SAPROLITE**, white. 1 to 3mm angular quartz grains (50%). White powdery clay (50%), low plasticity. Original rock fabric not detected in powdery cuttings.		Nominal 50 mm diameter, Class 12 blank uPVC (0.0 to 20.3 m bgl)
		3	3.00 294.06				yellow, slightly moist.		
			3.50 293.56				**SAPROLITE**, white. 1 to 3mm angular quartz grains (45%). White clay (55%), low plasticity. Original rock fabric not detected in fine cuttings. Moist.		
		4							
		5							
		6							
		7							
			7.50 289.56				water inflow (muddy cuttings). Preserved igneous fabric inside some chips.		
		8							
		9							

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GAP gINT FN. F05 RL3

11764603 6_FMG_SOLOMON GAP 8_07 LIBRARY.GLB Log GAP WELL 147645033 - LOGS3.GPJ DWG73714.GDW 31/03/2015 13:15 8.30.004

REPORT OF BOREHOLE: GMB07

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 461435.2 m E 6469819.4 m N MGA94 50 (dGPS)
SURFACE RL: 297.06 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DEPTH: 27.00 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: JFB DATE: 12/3/15
CHECKED: D Thomson DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		9					**SAPROLITE**, white. 1 to 3mm angular quartz grains (45%). White clay (55%), low plasticity. Original rock fabric not detected in fine cuttings. Moist.		
		10	10.00 287.06				yellow colour.		
		11							
		12	12.00 285.06				cream colour.		
		13							
			13.50 283.56				**SAPROLITE**, orange. 1 to 3mm angular quartz grains (45%). Orange clay (55%), low plasticity. Original rock fabric preserved in some chips.		
		14							
		15							
		16							
		17							
		18							
		19							

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117646036_FMG_SOLOMON GAP 8_07 LIBRARY.GLB Log GAP WELL 147645033 - LOGS3.GPJ DWG73714.GDW 31/03/2015 13:15 8.30.004

REPORT OF BOREHOLE: GMB07

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 461435.2 m E 6469819.4 m N MGA94 50 (dGPS)
SURFACE RL: 297.06 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DEPTH: 27.00 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: JFB DATE: 12/3/15
CHECKED: D Thomson DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		19					**SAPROLITE**, orange. 1 to 3mm angular quartz grains (45%). Orange clay (55%), low plasticity. Original rock fabric preserved in some chips.		Bentonite seal (19.0 to 19.5 m bgl)
			19.50 / 277.56				water inflow; very wet, liquid mud cuttings.		
		20							
		21							1.6 to 3.2 mm graded gravel pack (19.5 to 26.3 m bgl)
		22	22.00 / 275.06				**WEATHERED GRANITE**, white with mottled oxidation. Small fragments of weathered granite (core pieces 10 to 30mm long). Dark minerals are completely altered (washed out) at 21 mbgl but start showing up at 23-24mbgl, highly oxidised. Some altered green grains (probably chlorite) also present. Plagioclase is partially weathered to caolin. Highly fractured rock with white clay (caolin) in fractures.		
		23							
		24							Nominal 50 mm diameter, slotted Class 12 uPVC casing (0.5 mm aperture) (20.3 to 26.3 m bgl)
		25	25.00 / 272.06				core pieces 10-50 mm long.		
		26	26.00 / 271.06				**GRANITE**, lightly weathered, coarse grained, pale and dark grey quartz (40%), white and pink feldspar (50%), altered mafics (10%). No clay observed in fractures. Iron stating is present in hairline fractures.		Hole collapse/fallback
		27	27.00 / 270.06				END OF BOREHOLE @ 27.00 m REFUSAL Monitoring Well Installed		
		28							
		29							

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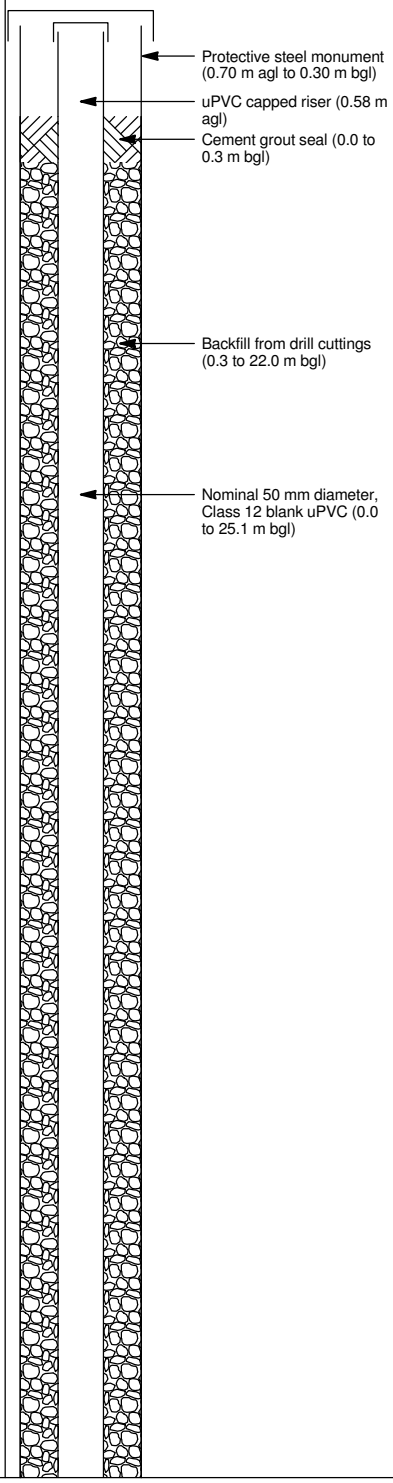
REPORT OF BOREHOLE: GMB08

SHEET: 1 OF 4

CLIENT:	SITA Australia	COORDS: 461155.6 m E 6469043.9 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 314.46 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: JFB DATE: 13/3/15
JOB NO:	147645033	HOLE DEPTH: 33.00 m	CHECKED: D Thomson DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		-1							
		0	314.46				**CLAYEY SAND SOIL**, dark brown. Fine to medium grained sand (60%), angular. Dark brown clay (30%). Highly rounded iron nodules (10%) up to 15mm diameter. Original rock fabric is not present. Dry.		
			0.50 313.96				**CLAYEY SANDY SOIL** (Lateritic), brown. Fine to medium grained sand (65%), angular, white quartz with variable iron stained colour. Brown clay (30%). Highly rounded iron nodules (5%) up to 15mm diameter. Original rock fabric is not preserved. Dry.		
		1	1.50 312.96				**SAPROLITE**, pink/red. Silt to 2mm angular quartz grains (65%). White powdery clay (35%), low plasticity. Original igneous fabric present in some chips. Dry.		
		2							
		3	3.50 310.96				white. 10% chips with igneous fabric present.		
		4	4.50 309.96				**SAPROLITE**, pink. Silt to 2mm angular quartz grains (60%). White powdery clay (40%), low plasticity. Original igneous fabric present in some chips. Dry.		
		5							
		6							
		7							
		8	8.00 306.46				**SAPROLITE**, white. Silt to 2mm angular quartz grains (55%). White powdery clay (45%), low plasticity. Original igneous fabric present in some chips. Dry.		
		9							



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REPORT OF BOREHOLE: GMB08

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 461155.6 m E 6469043.9 m N MGA94 50 (dGPS)
SURFACE RL: 314.46 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DEPTH: 33.00 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: JFB DATE: 13/3/15
CHECKED: D Thomson DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		9					**SAPROLITE**, white. Silt to 2mm angular quartz grains (55%). White powdery clay (45%), low plasticity. Original igneous fabric present in some chips. Dry.		
		10							
		11							
		12							
		13	13.00 / 301.46				pink		
		14							
		15							
		16							
		17							
	16/03/15	18	18.00 / 296.46				red		
		19							

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REPORT OF BOREHOLE: GMB08

CLIENT:	SITA Australia	COORDS: 461155.6 m E 6469043.9 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 314.46 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: JFB DATE: 13/3/15
JOB NO:	147645033	HOLE DEPTH: 33.00 m	CHECKED: D Thomson DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		19					**SAPROLITE**, white. Silt to 2mm angular quartz grains (55%). White powdery clay (45%), low plasticity. Original igneous fabric present in some chips. Dry.		
		20							
		21							
		22	*22.00* 292.46				**SAPROLITE**, white. Silt to 2mm angular quartz grains (50%). White clay (50%), low plasticity. Original igneous fabric present in some chips. Moist.		
		23							Bentonite seal (22.0 to 24.0 m bgl)
		24							
		25							
		26							1.6 to 3.2 mm graded gravel pack (19.5 to 26.3 m bgl)
		27							
		28	*28.50* 285.96						Nominal 50 mm diameter, slotted Class 12 uPVC casing (0.5 mm aperture) (25.1 to 31.1 m bgl)
		29					**SAPROLITE**, light yellow. Silt to 4mm angular quartz grains (45%). Light yellow clay (55%), low plasticity. Original igneous fabric present in some chips. Wet mud (particularly wet at 31.0-31.5mbgl).		

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REPORT OF BOREHOLE: GMB08

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 461155.6 m E 6469043.9 m N MGA94 50 (dGPS)
SURFACE RL: 314.46 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DEPTH: 33.00 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: JFB DATE: 13/3/15
CHECKED: D Thomson DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		29					**SAPROLITE**, light yellow. Silt to 4mm angular quartz grains (45%). Light yellow clay (55%), low plasticity. Original igneous fabric present in some chips. Wet mud (particularly wet at 31.0-31.5mbgl).		
		30							
		31							
		32							Hole collapse/fallback
		33	33.00 281.46				END OF BOREHOLE @ 33.00 m TARGET DEPTH Monitoring Well Installed		
		34							
		35							
		36							
		37							
		38							
		39							

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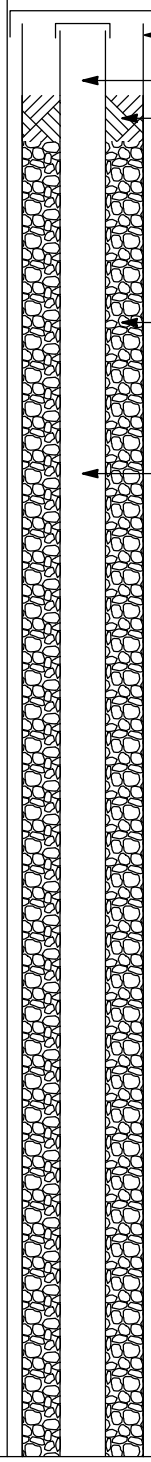
REPORT OF BOREHOLE: GMB09

Golder Associates

SHEET: 1 OF 2

CLIENT: SITA Australia	COORDS: 461194.8 m E 6469449.5 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305	
PROJECT: Proposed Allawuna Landfill	SURFACE RL: 303.82 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling	
LOCATION: Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: JFB	DATE: 16/3/15
JOB NO: 147645033	HOLE DEPTH: 18.00 m	CHECKED: D Thomson	DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		-1							
		0	303.82				**CLAYEY SAND SOIL**, dark brown. Fine to medium grained sand (60%), angular. Dark brown clay (30%). Highly rounded iron nodules (10%) up to 15mm diameter. Original rock fabric is not present. Dry.		
			0.70 303.12				**SAPROLITE** (lightly laterized), yellow/pink. <1mm angular quartz grains (20%). Powdery clay (70%), high iron content, low plasticity. Traces of igneous fabric present in some chips. Dry, competent layer.		
		1							
		2							
		3							
			3.50 300.32				**SAPROLITE** , mottled white/dark red. Clay (60%), white, low pasticity. Silt to sand size particles (40%), dark, angular, with traces of angular quartz. Fine grained igneous fabric present in some chips. Dry.		
		4							
		5							
		6							
	16/03/15								
		7							
		8							
		9							



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REPORT OF BOREHOLE: GMB09

SHEET: 2 OF 2

CLIENT:	SITA Australia	COORDS: 461194.8 m E 6469449.5 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 303.82 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: JFB DATE: 16/3/15
JOB NO:	147645033	HOLE DEPTH: 18.00 m	CHECKED: D Thomson DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		9					**SAPROLITE** , mottled white/dark red. Clay (60%), white, low pasticity. Silt to sand size particles (40%), dark, angular, with traces of angular quartz. Fine grained igneous fabric present in some chips. Dry.		
		10							Bentonite seal (9.5 to 11.0 m bgl)
		11							
		12	12.00 291.82				**SAPROLITE** , yellow. <3mm angular quartz grains (50%). Clay (50%), low plasticity. Some chips preserve igneous fabric. Saturated cuttings (but not muddy).		
		13	13.00 290.82				wet, muddy cuttings.		1.6 to 3.2 mm graded gravel pack (11.0 to 17.5 m bgl)
		14							
		15							Nominal 50 mm diameter, slotted Class 12 uPVC casing (0.5 mm aperture) (11.5 to 17.5 m bgl)
		16							
		17							
		18	18.00 285.82				END OF BOREHOLE @ 18.00 m TARGET DEPTH Monitoring Well Installed		Hole collapse/fallback
		19							

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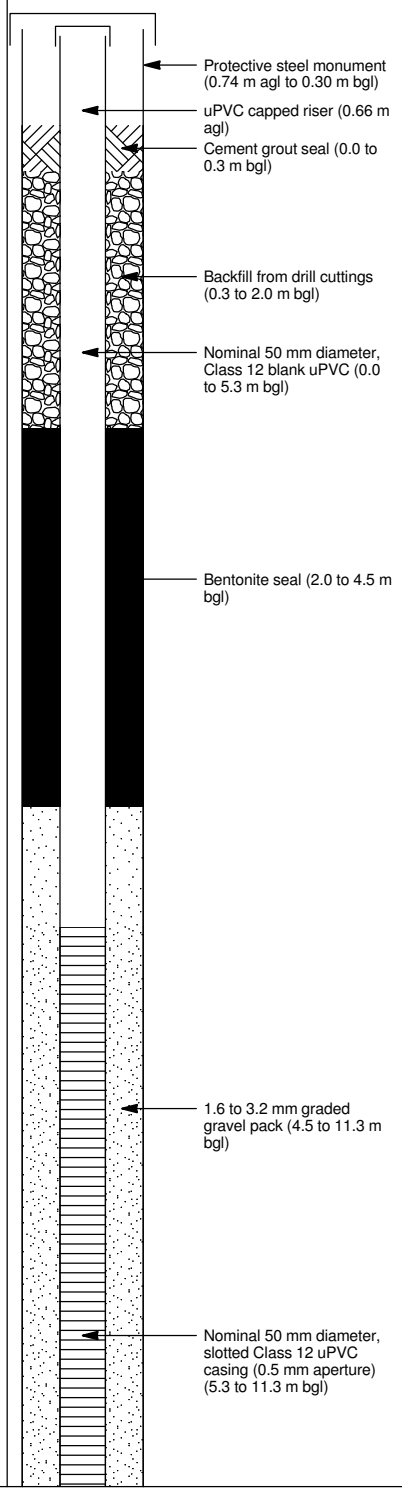
REPORT OF BOREHOLE: GMB10

SHEET: 1 OF 2

CLIENT:	SITA Australia	COORDS: 461714.1 m E 6468885.9 m N MGA94 50 (dGPS)	DRILL RIG: Comacchio Geo 305
PROJECT:	Proposed Allawuna Landfill	SURFACE RL: 302.05 m DATUM: AHD (dGPS)	CONTRACTOR: Proline Drilling
LOCATION:	Allawuna Farm, Shire of York	INCLINATION: -90° DIRECTION: 000°	LOGGED: JFB DATE: 16/3/15
JOB NO:	147645033	HOLE DEPTH: 12.00 m	CHECKED: D Thomson DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
	16/03/15	-1							
		0	302.05				**CLAYEY SAND SOIL**, dark brown. Fine sand (70%) made of angular quartz grains. Dark brown clay (20%), low plasticity. Highly rounded iron nodules (10%) 5 to 15mm diameter. Original rock fabric is not present. Dry.		
		1	1.00 301.05				**SAPROLITE** , yellow/pink. <1mm angular quartz grains (20%). Powdery clay (70%), high iron content, low plasticity. Highly weathered rock chips (10%) with traces of igneous fabric (consistent with fresh granite from the area). Dry.		
		2							
		3	3.00 299.05				**SAPROLITE** , yellow/pink. 1 to 3mm angular quartz/feldspar grains (70%). Powdery clay (25%), yellow, med plasticity. Highly weathered rock chips (5%) with traces of igneous fabric (consistent with fresh granite from the area). Dry.		
		4	4.00 298.05				**SAPROLITE** , white. 1 to 3mm angular quartz/feldspar grains (70%). Powdery clay (30%), white (caolin), low plasticity. Traces of highly weathered rock chips with igneous fabric preserved (consistent with fresh granite from the area). Dry.		
		5							
		6	6.00 296.05				saturated cuttings.		
		7							
			7.50 294.55				wet mud cuttings.		
		8							
		9							



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REPORT OF BOREHOLE: GMB10

SHEET: 2 OF 2

CLIENT: SITA Australia
PROJECT: Proposed Allawuna Landfill
LOCATION: Allawuna Farm, Shire of York
JOB NO: 147645033

COORDS: 461714.1 m E 6468885.9 m N MGA94 50 (dGPS)
SURFACE RL: 302.05 m DATUM: AHD (dGPS)
INCLINATION: -90° DIRECTION: 000°
HOLE DEPTH: 12.00 m

DRILL RIG: Comacchio Geo 305
CONTRACTOR: Proline Drilling
LOGGED: JFB DATE: 16/3/15
CHECKED: D Thomson DATE: 20/3/15

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL/ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		9					**SAPROLITE** , white. 1 to 3mm angular quartz/feldspar grains (70%). Powdery clay (30%), white (caolin), low plasticity. Traces of highly weathered rock chips with igneous fabric preserved (consistent with fresh granite from the area). Dry.		
		10							
		11							Hole collapse/fallback
		12	*12.00* 290.05				END OF BOREHOLE @ 12.00 m TARGET DEPTH Monitoring Well Installed		
		13							
		14							
		15							
		16							
		17							
		18							
		19							

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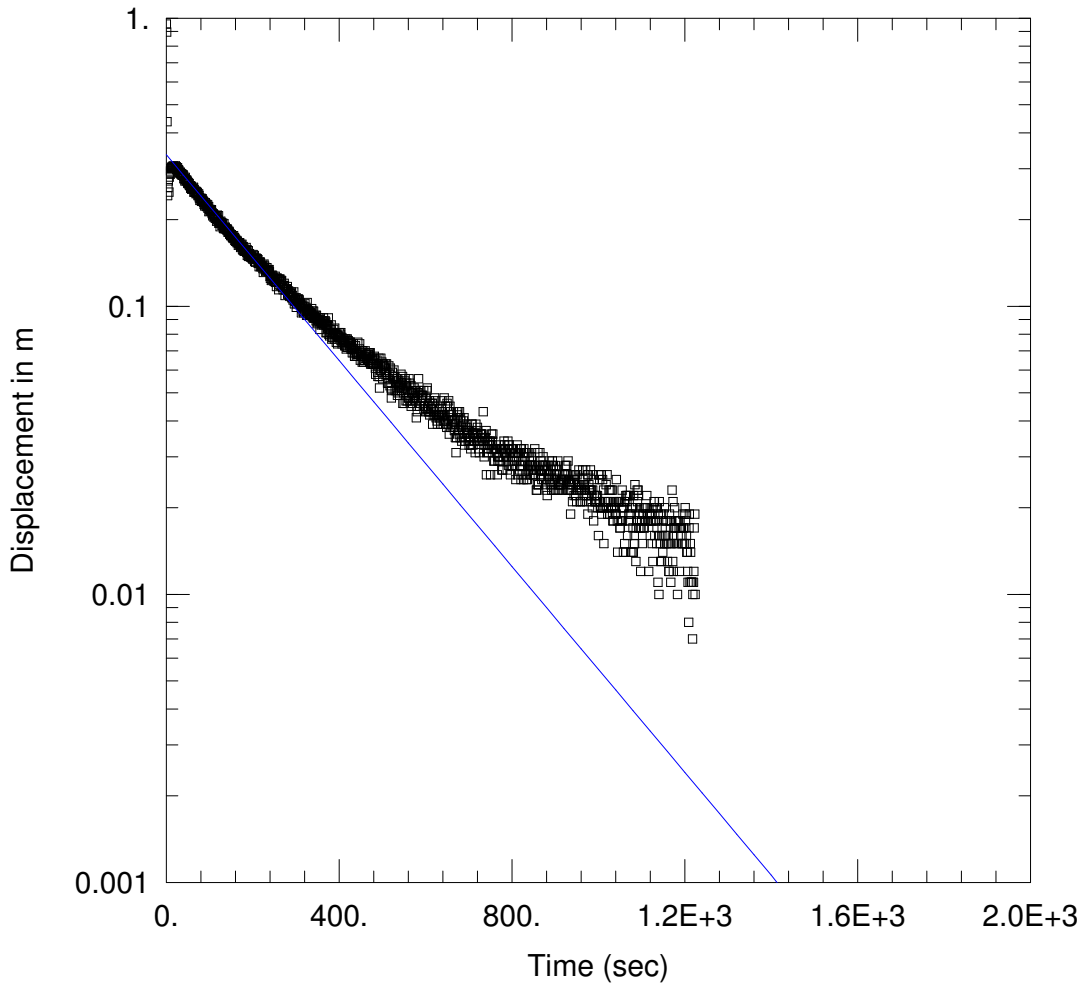
APPENDIX C

Aqtesolve Slug Test Results



WELL TEST ANALYSIS

Data Set: \...\GMB2 Slug In.aqt
Date: 04/01/15 Time: 11:30:38

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB2

AQUIFER DATA

Saturated Thickness: 4.16 m Anisotropy Ratio (Kz/Kr): 1.

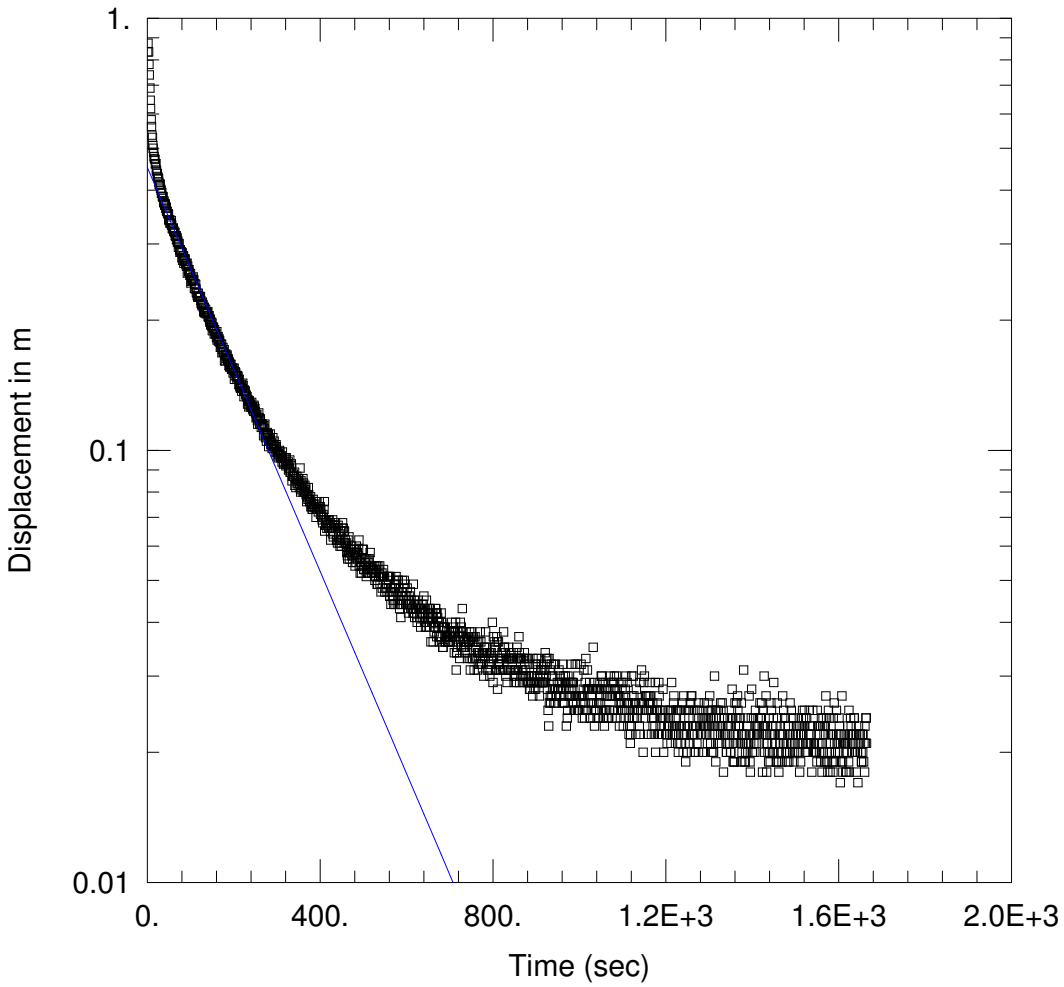
WELL DATA (GMB2)

Initial Displacement: 0.954 m
Total Well Penetration Depth: 4.16 m
Casing Radius: 0.025 m
Static Water Column Height: 4.16 m
Screen Length: 4.16 m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 0.1415 m/day
y0 = 0.3356 m



WELL TEST ANALYSIS

Data Set: \...\GMB2 Slug Out.aqt
Date: 04/01/15 Time: 11:31:36

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB2

AQUIFER DATA

Saturated Thickness: 4.16 m Anisotropy Ratio (Kz/Kr): 1.

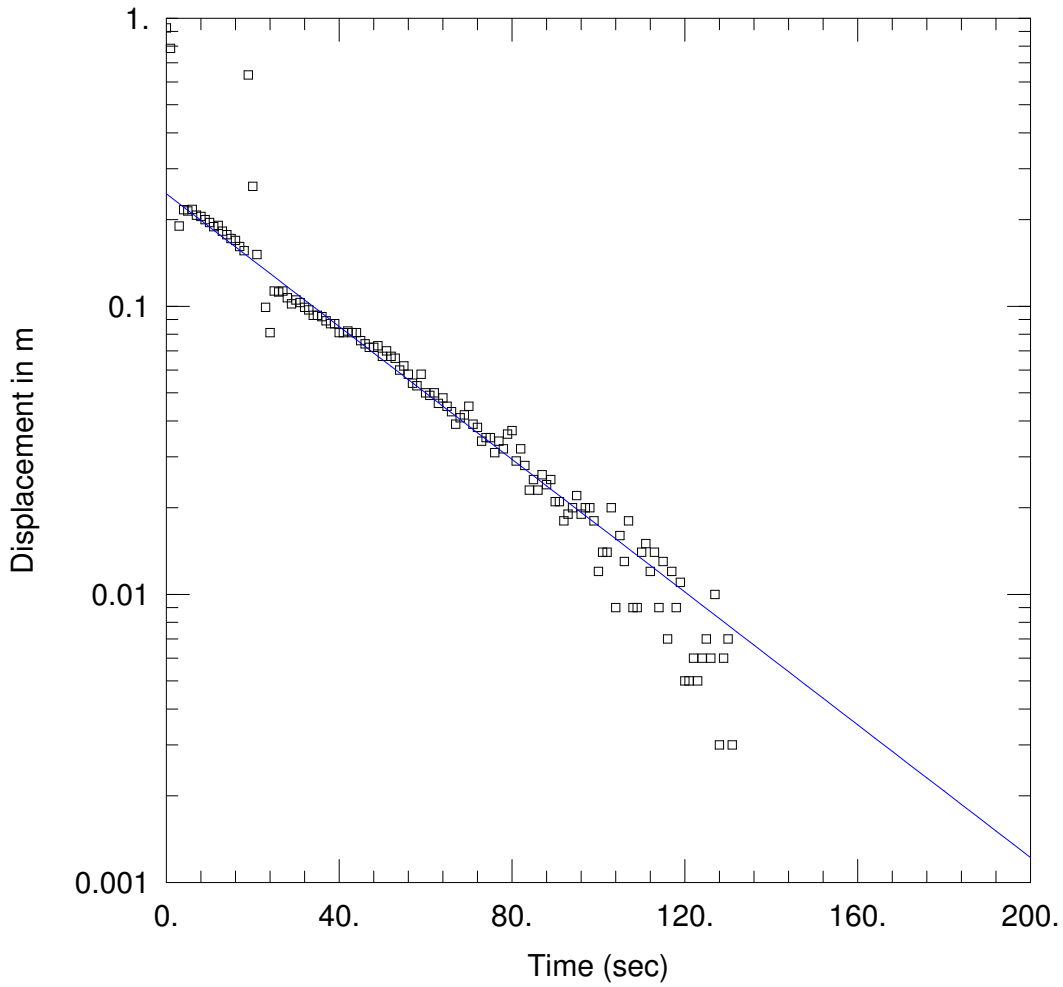
WELL DATA (GMB2)

Initial Displacement: 1.434 m
Total Well Penetration Depth: 4.16 m
Casing Radius: 0.025 m
Static Water Column Height: 4.16 m
Screen Length: 4.16 m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 0.1852 m/day
y0 = 0.4516 m



WELL TEST ANALYSIS

Data Set: \...\GMB3 Slug In 2.aqt
Date: 04/01/15 Time: 11:32:35

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB3

AQUIFER DATA

Saturated Thickness: 4.75 m Anisotropy Ratio (Kz/Kr): 1.

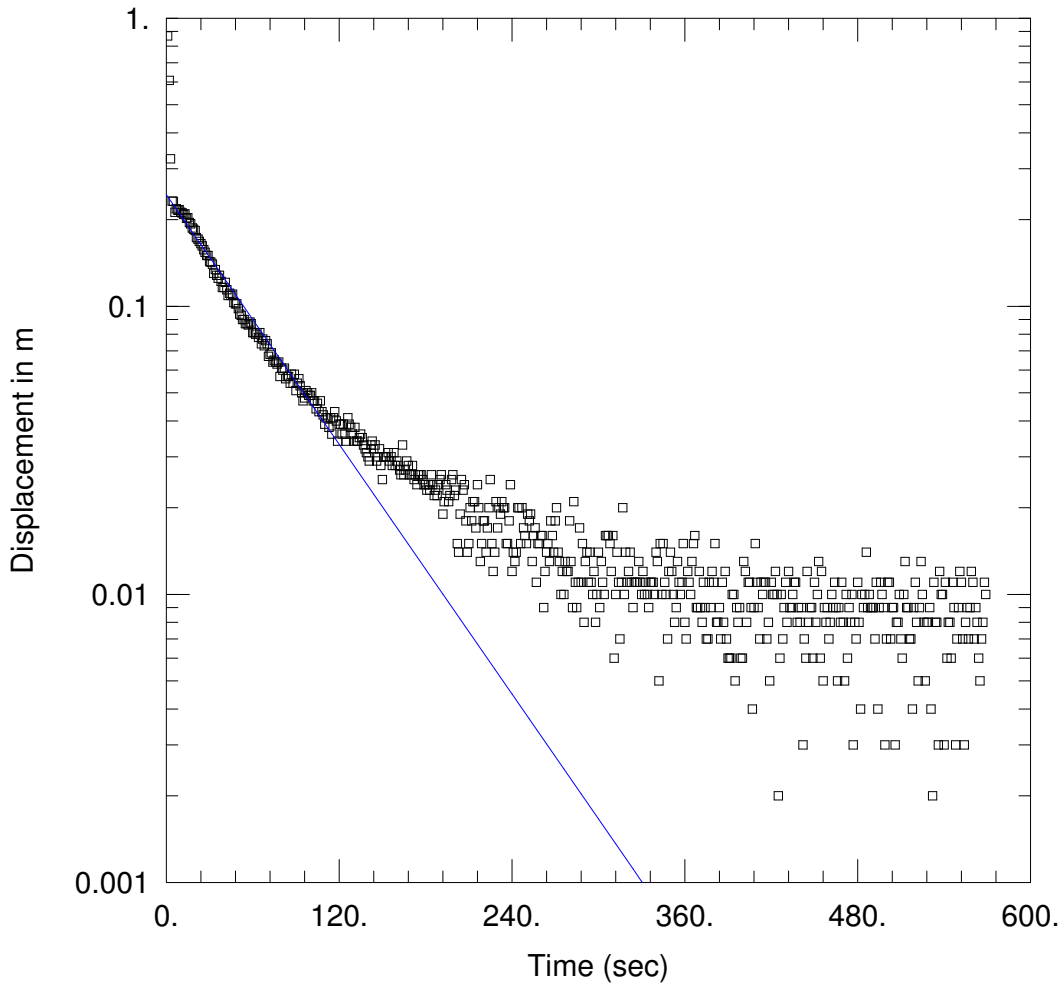
WELL DATA (GMB3)

Initial Displacement: 0.924 m
Total Well Penetration Depth: 4.75 m
Casing Radius: 0.025 m
Static Water Column Height: 4.75 m
Screen Length: 4.75 m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.5115 m/day y0 = 0.2456 m



WELL TEST ANALYSIS

Data Set: \...\GMB3 Slug In1.aqt
Date: 04/01/15 Time: 11:33:05

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB3

AQUIFER DATA

Saturated Thickness: 4.75 m Anisotropy Ratio (Kz/Kr): 1.

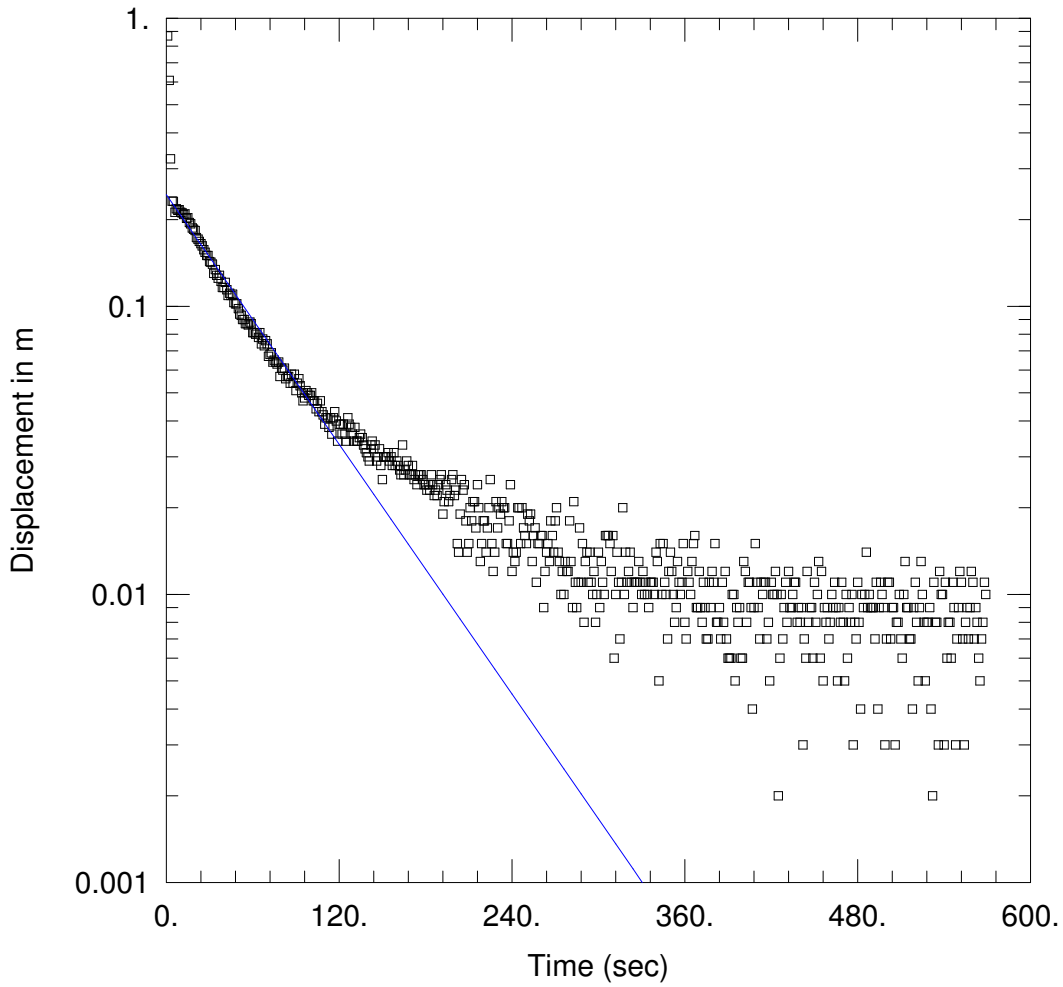
WELL DATA (GMB3)

Initial Displacement: 1.06 m
Total Well Penetration Depth: 4.75 m
Casing Radius: 0.025 m
Static Water Column Height: 4.75 m
Screen Length: 4.75 m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.3207 m/day
y0 = 0.2441 m



WELL TEST ANALYSIS

Data Set: \...\GMB3 Slug Out 1.aqt
Date: 04/01/15 Time: 11:33:22

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB3

AQUIFER DATA

Saturated Thickness: 4.75 m Anisotropy Ratio (Kz/Kr): 1.

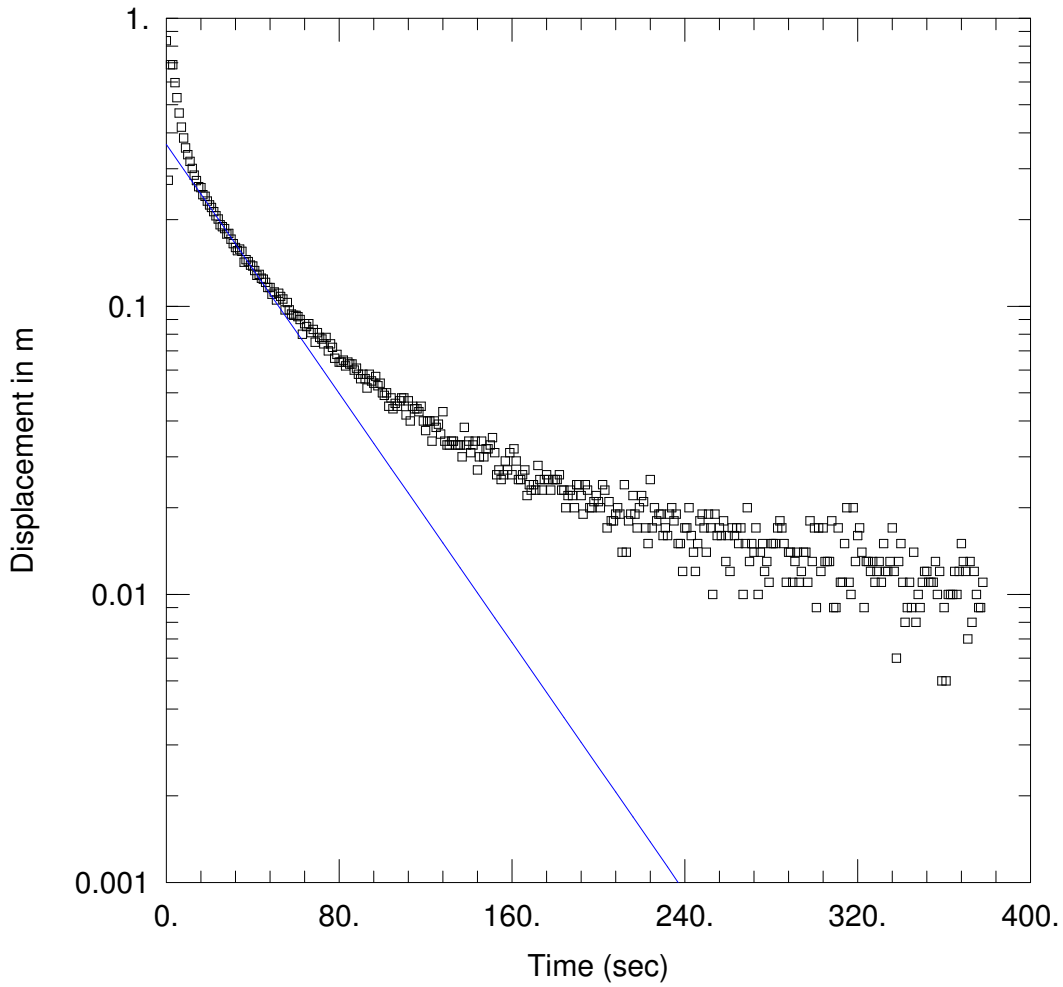
WELL DATA (GMB3)

Initial Displacement: 1.06 m
Total Well Penetration Depth: 4.75 m
Casing Radius: 0.025 m
Static Water Column Height: 4.75 m
Screen Length: 4.75 m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.3207 m/day
y0 = 0.2441 m



WELL TEST ANALYSIS

Data Set: \...\GMB3 Slug Out 2.aqt
Date: 04/01/15 Time: 11:33:34

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB3

AQUIFER DATA

Saturated Thickness: 4.75 m Anisotropy Ratio (Kz/Kr): 1.

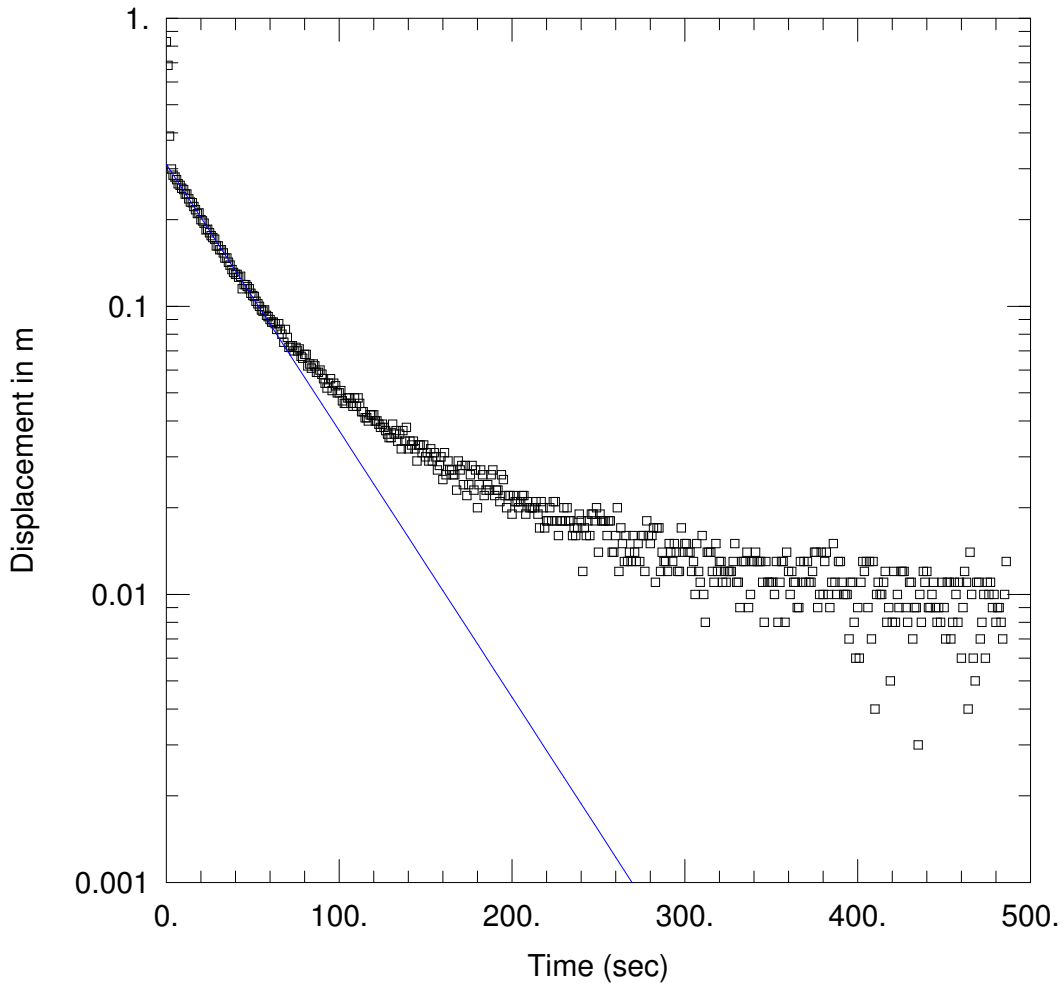
WELL DATA (GMB3)

Initial Displacement: 0.836 m
Total Well Penetration Depth: 4.75 m
Casing Radius: 0.025 m
Static Water Column Height: 4.75 m
Screen Length: 4.75 m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.48 m/day
y0 = 0.3647 m



WELL TEST ANALYSIS

Data Set: \...\GMB4 Slug In 2.aqt
Date: 04/01/15 Time: 11:33:46

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB4

AQUIFER DATA

Saturated Thickness: 4. m Anisotropy Ratio (Kz/Kr): 1.

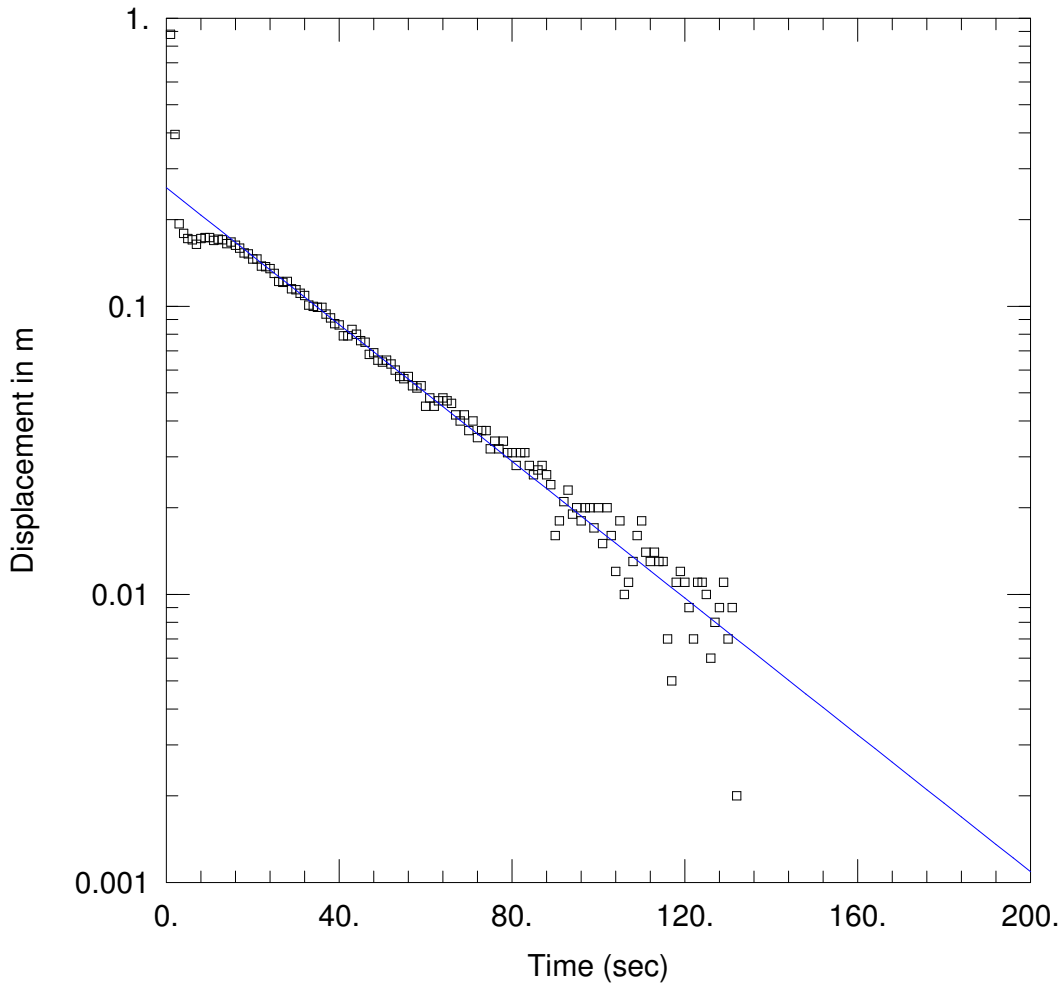
WELL DATA (GMB4)

Initial Displacement: 0.829 m
Total Well Penetration Depth: 4. m
Casing Radius: 0.025 m
Static Water Column Height: 4. m
Screen Length: 4. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.4683 m/day y0 = 0.3112 m



WELL TEST ANALYSIS

Data Set: \...\GMB4 Slug In1.aqt
Date: 04/01/15 Time: 11:34:05

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB4

AQUIFER DATA

Saturated Thickness: 4. m Anisotropy Ratio (Kz/Kr): 1.

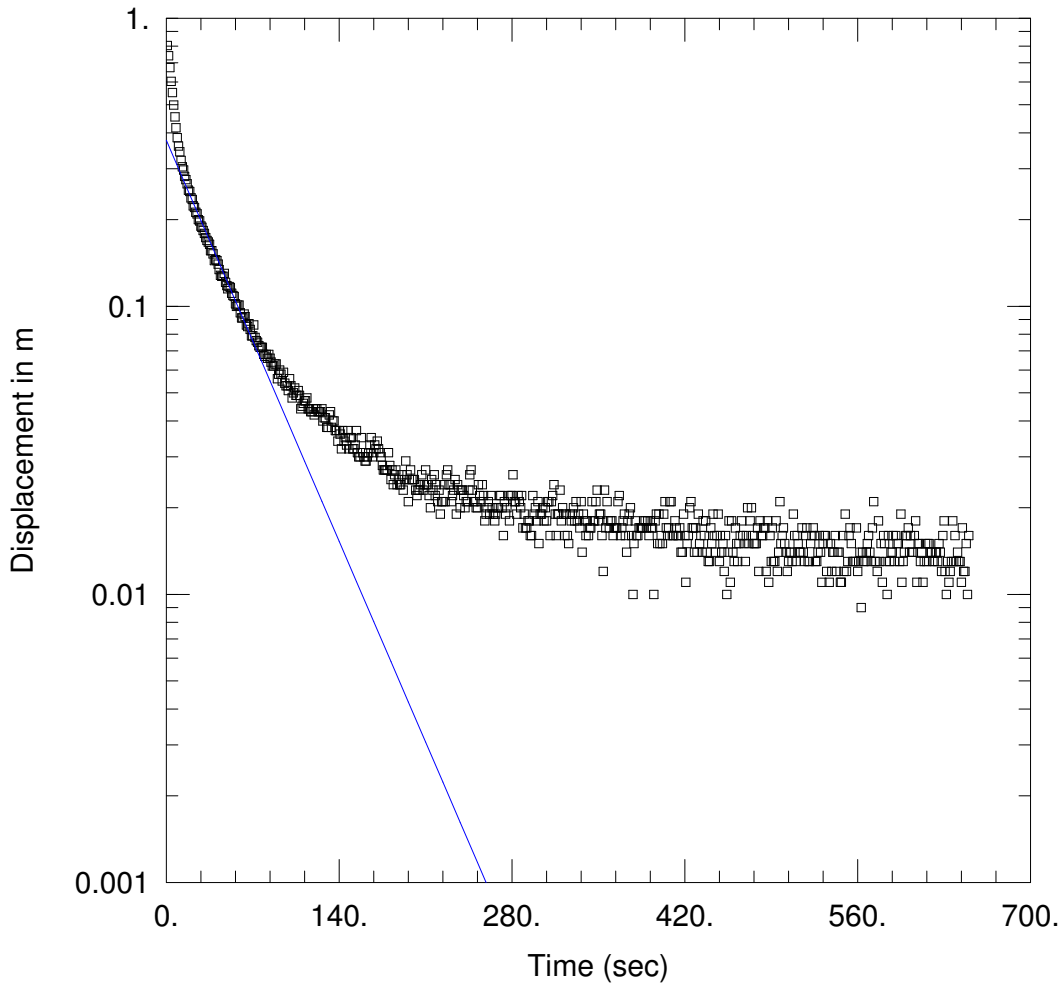
WELL DATA (GMB4)

Initial Displacement: 1.034 m
Total Well Penetration Depth: 4. m
Casing Radius: 0.025 m
Static Water Column Height: 4. m
Screen Length: 4. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.601 m/day
y0 = 0.258 m



WELL TEST ANALYSIS

Data Set: \...\GMB4 Slug Out 2.aqt
Date: 04/01/15 Time: 11:34:18

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB4

AQUIFER DATA

Saturated Thickness: 4. m Anisotropy Ratio (Kz/Kr): 1.

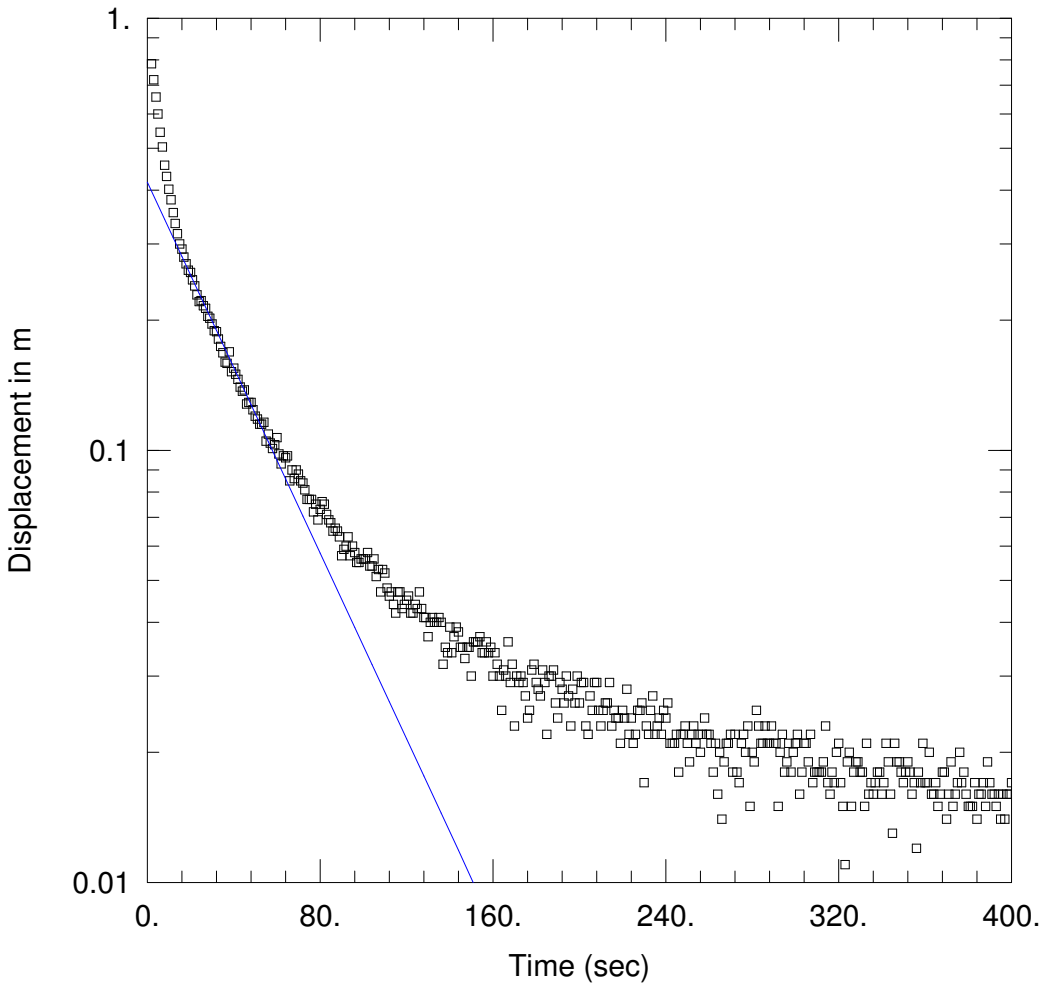
WELL DATA (GMB4)

Initial Displacement: 1.187 m
Total Well Penetration Depth: 4. m
Casing Radius: 0.025 m
Static Water Column Height: 4. m
Screen Length: 4. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.5034 m/day
y0 = 0.3764 m



WELL TEST ANALYSIS

Data Set: \...\GMB4 Slug Out1.aqt
Date: 04/01/15 Time: 11:34:33

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB4

AQUIFER DATA

Saturated Thickness: 4. m Anisotropy Ratio (Kz/Kr): 1.

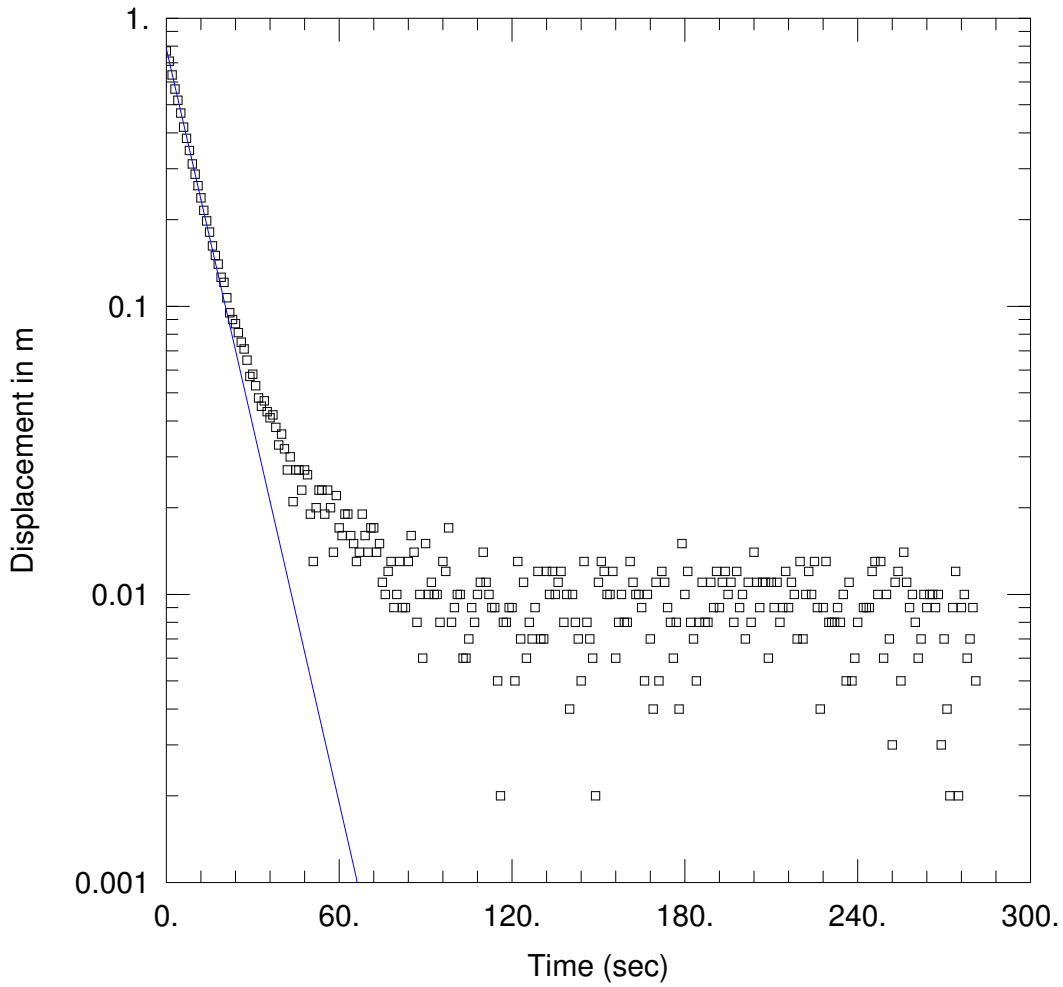
WELL DATA (GMB4)

Initial Displacement: 1.598 m
Total Well Penetration Depth: 4. m
Casing Radius: 0.025 m
Static Water Column Height: 4. m
Screen Length: 4. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.5434 m/day
y0 = 0.4174 m



WELL TEST ANALYSIS

Data Set: \...\GMB5 Falliung Head 1.aqt
Date: 04/01/15 Time: 11:34:47

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB5

AQUIFER DATA

Saturated Thickness: 8.4 m Anisotropy Ratio (Kz/Kr): 1.

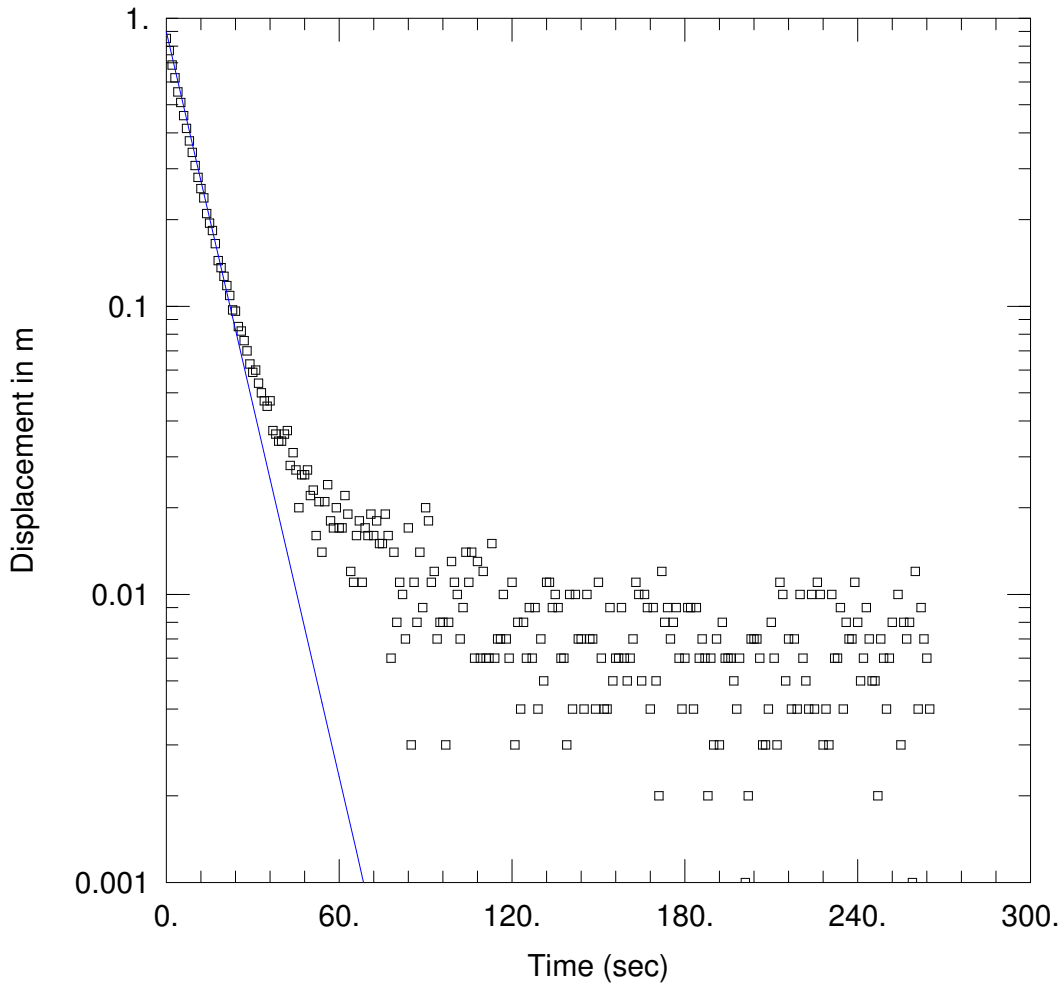
WELL DATA (GMB5)

Initial Displacement: 0.769 m
Total Well Penetration Depth: 16.54 m
Casing Radius: 0.025 m
Static Water Column Height: 16.94 m
Screen Length: 6. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.908 m/day
y0 = 0.7839 m



WELL TEST ANALYSIS

Data Set: \...\GMB5 Falliung Head 2.aqt
Date: 04/01/15 Time: 11:35:00

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB5

AQUIFER DATA

Saturated Thickness: 8.4 m Anisotropy Ratio (Kz/Kr): 1.

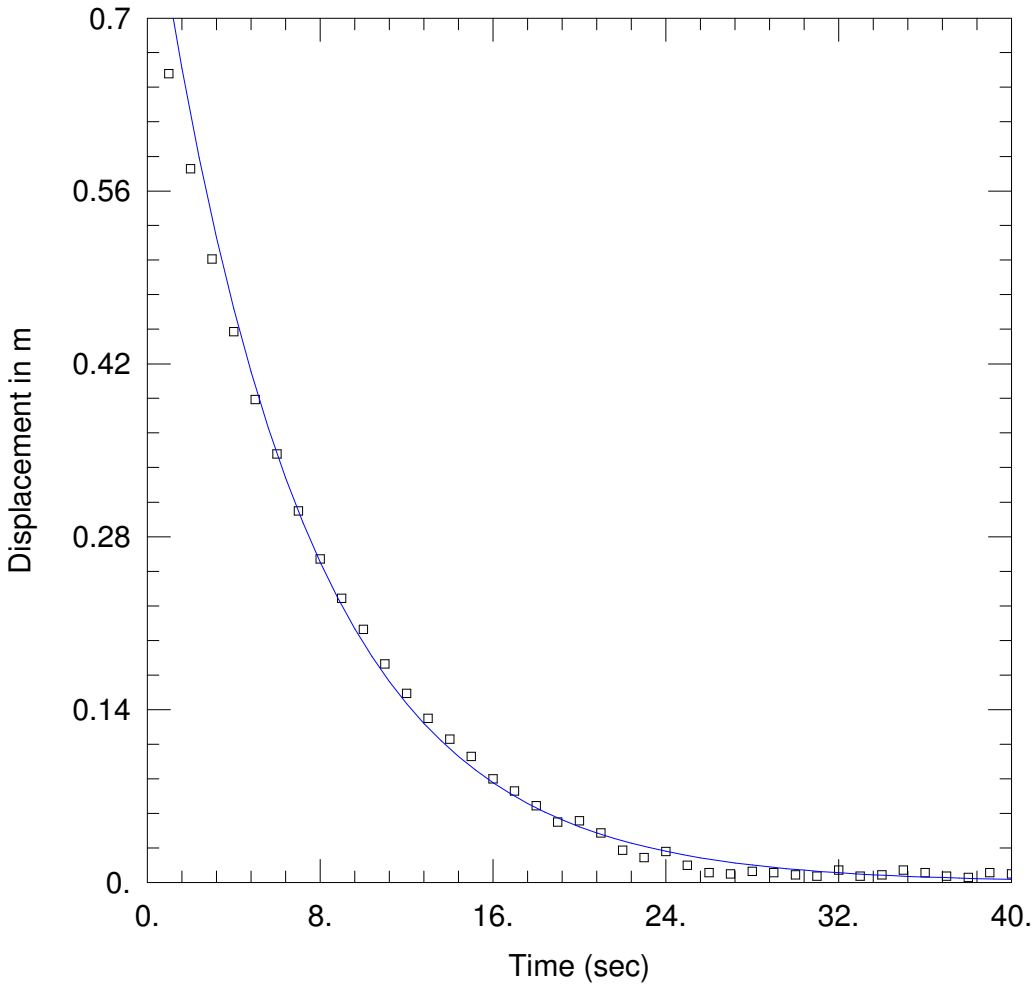
WELL DATA (GMB5)

Initial Displacement: 0.85 m
Total Well Penetration Depth: 16.54 m
Casing Radius: 0.025 m
Static Water Column Height: 16.94 m
Screen Length: 6. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.884 m/day
y0 = 0.8967 m



WELL TEST ANALYSIS

Data Set: \...\GMB5 Slug Out 1 Butler Confined.aqt
Date: 04/01/15 Time: 11:35:12

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB5

AQUIFER DATA

Saturated Thickness: 8.4 m Anisotropy Ratio (Kz/Kr): 1.

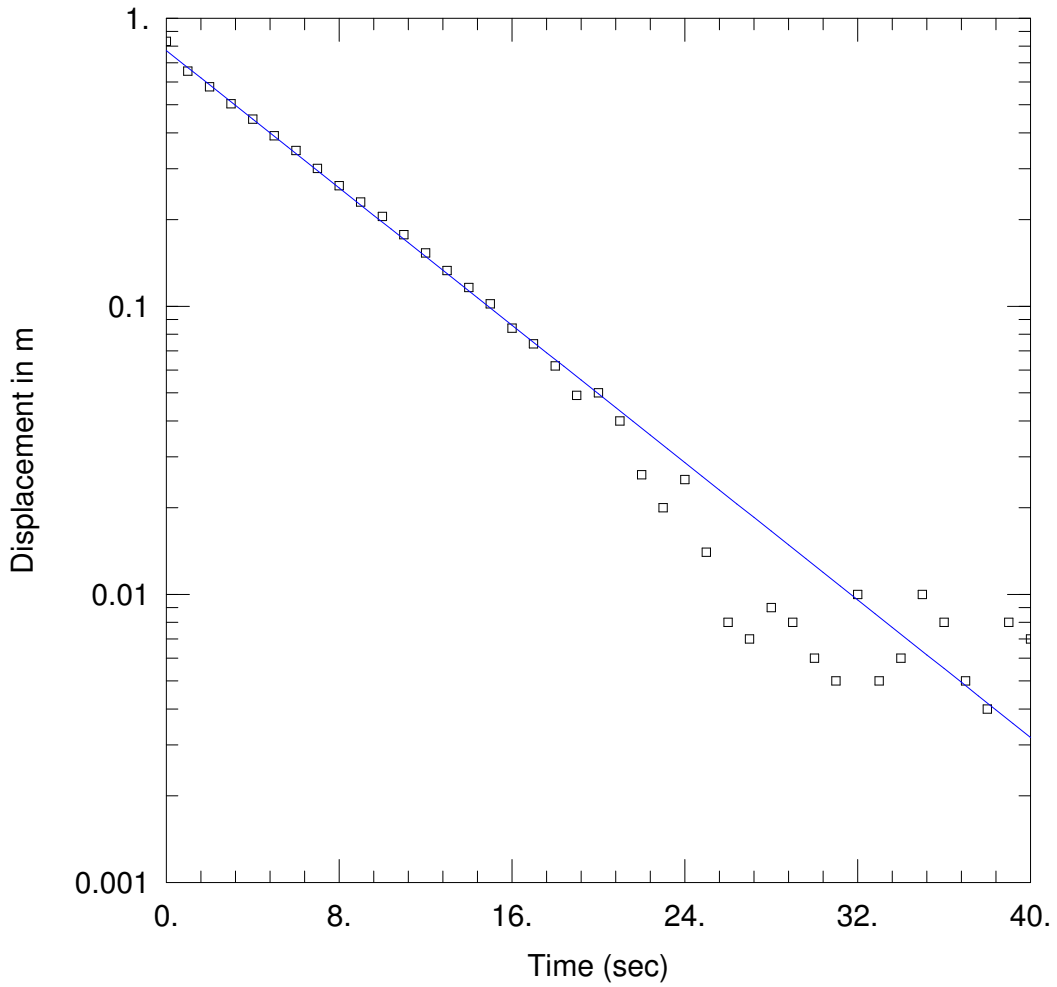
WELL DATA (GMB5)

Initial Displacement: 0.831 m
Total Well Penetration Depth: 16.54 m
Casing Radius: 0.025 m
Static Water Column Height: 16.94 m
Screen Length: 6. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 3.506 m/day Le = 1. m



WELL TEST ANALYSIS

Data Set: \...\GMB5 Slug Out 1.aqt
Date: 04/01/15 Time: 11:35:25

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB5

AQUIFER DATA

Saturated Thickness: 8.4 m Anisotropy Ratio (Kz/Kr): 1.

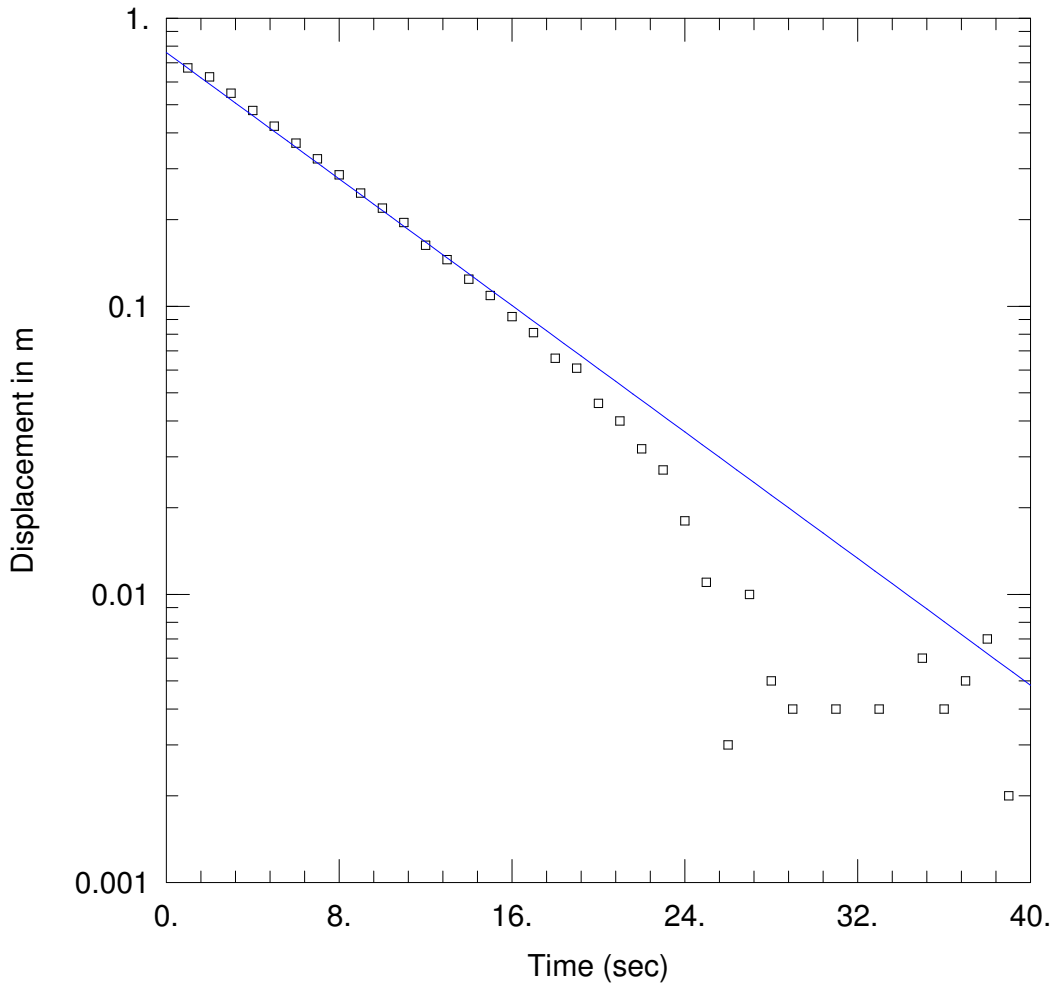
WELL DATA (GMB5)

Initial Displacement: 0.831 m
Total Well Penetration Depth: 16.54 m
Casing Radius: 0.025 m
Static Water Column Height: 16.94 m
Screen Length: 6. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 2.605 m/day y0 = 0.772 m



WELL TEST ANALYSIS

Data Set: \...\GMB5 Slug Out 2.aqt
Date: 04/01/15 Time: 11:35:43

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB5

AQUIFER DATA

Saturated Thickness: 8.4 m Anisotropy Ratio (Kz/Kr): 1.

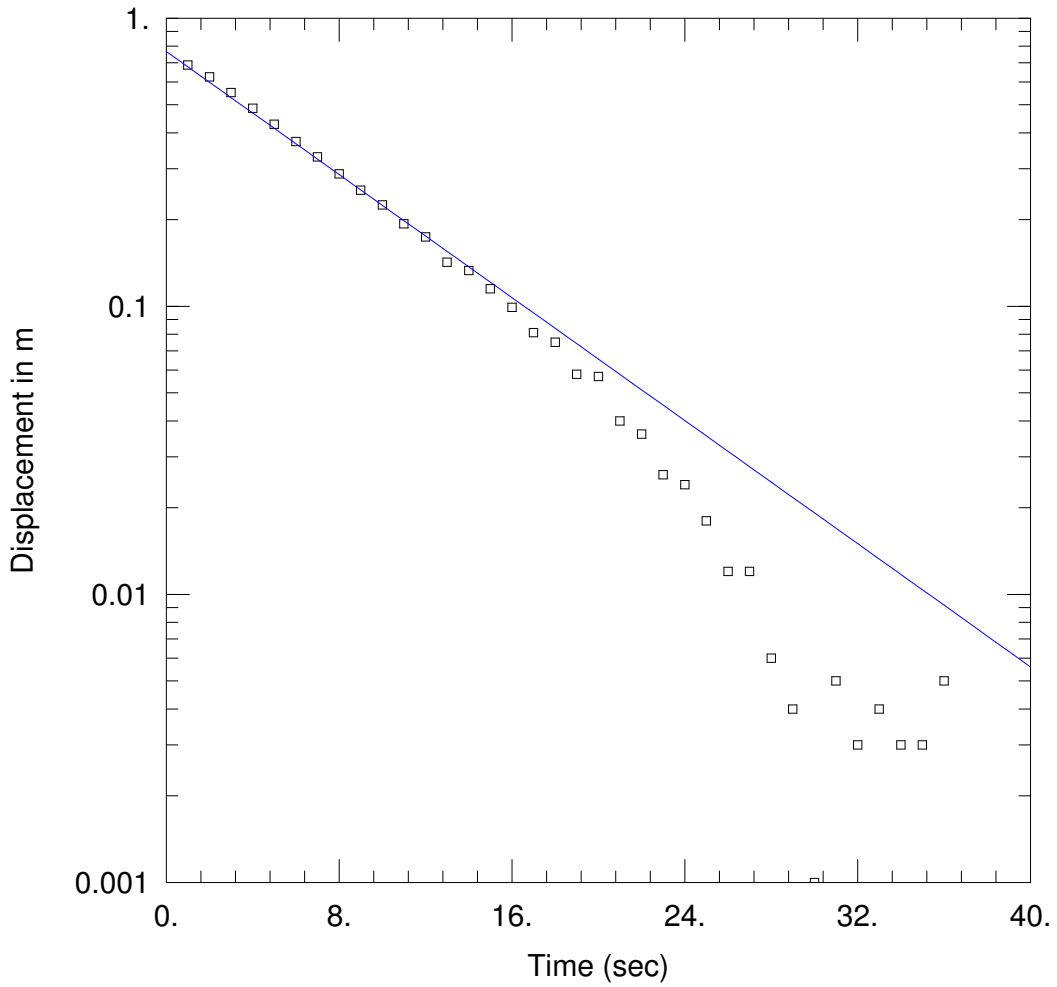
WELL DATA (GMB5)

Initial Displacement: 1.27 m
Total Well Penetration Depth: 16.54 m
Casing Radius: 0.025 m
Static Water Column Height: 16.94 m
Screen Length: 6. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.399 m/day
y0 = 0.7602 m



WELL TEST ANALYSIS

Data Set: \...\GMB5 Slug Out 3.aqt
Date: 04/01/15 Time: 11:36:02

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB5

AQUIFER DATA

Saturated Thickness: 8.4 m Anisotropy Ratio (Kz/Kr): 1.

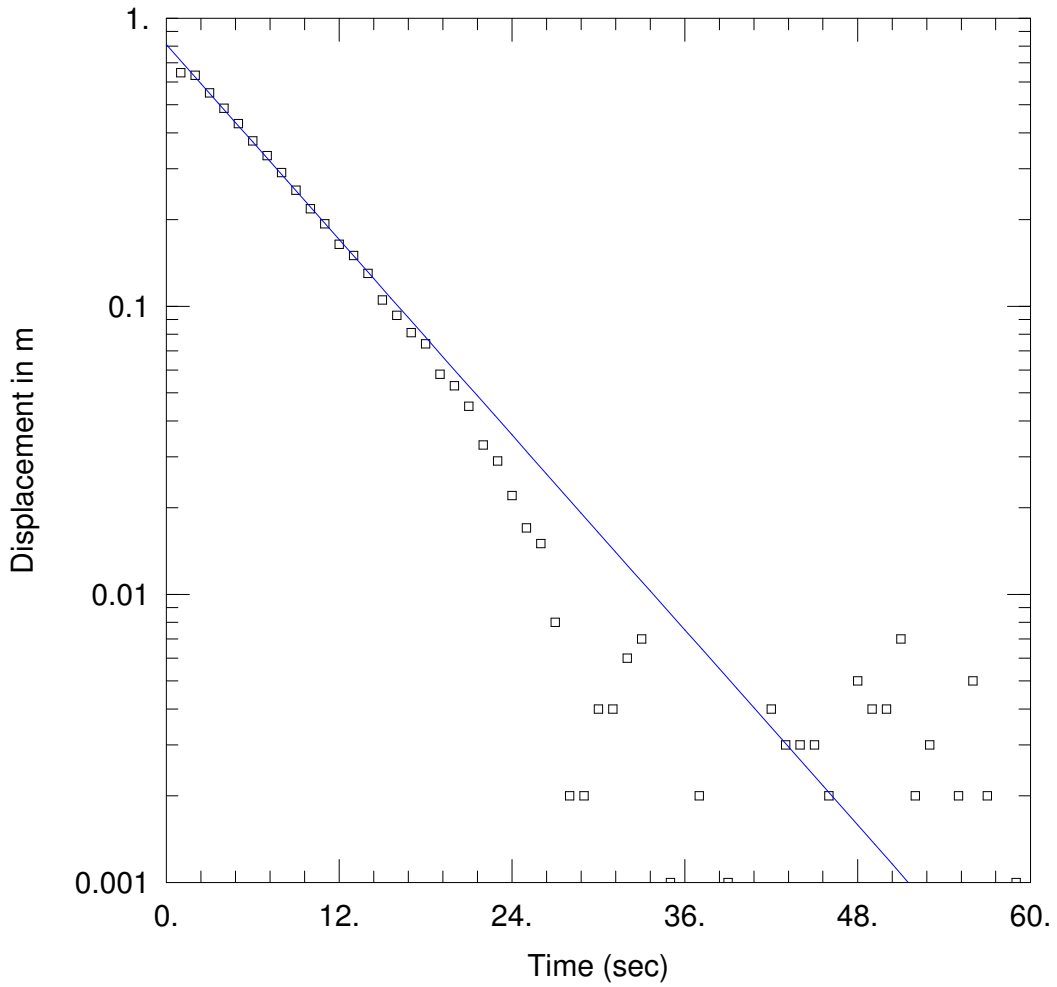
WELL DATA (GMB5)

Initial Displacement: 1.289 m
Total Well Penetration Depth: 16.54 m
Casing Radius: 0.025 m
Static Water Column Height: 16.94 m
Screen Length: 6. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.333 m/day
y0 = 0.7657 m



WELL TEST ANALYSIS

Data Set: \...\GMB5 Slug Out 4.aqt
Date: 04/01/15 Time: 11:36:18

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB5

AQUIFER DATA

Saturated Thickness: 8.4 m Anisotropy Ratio (Kz/Kr): 1.

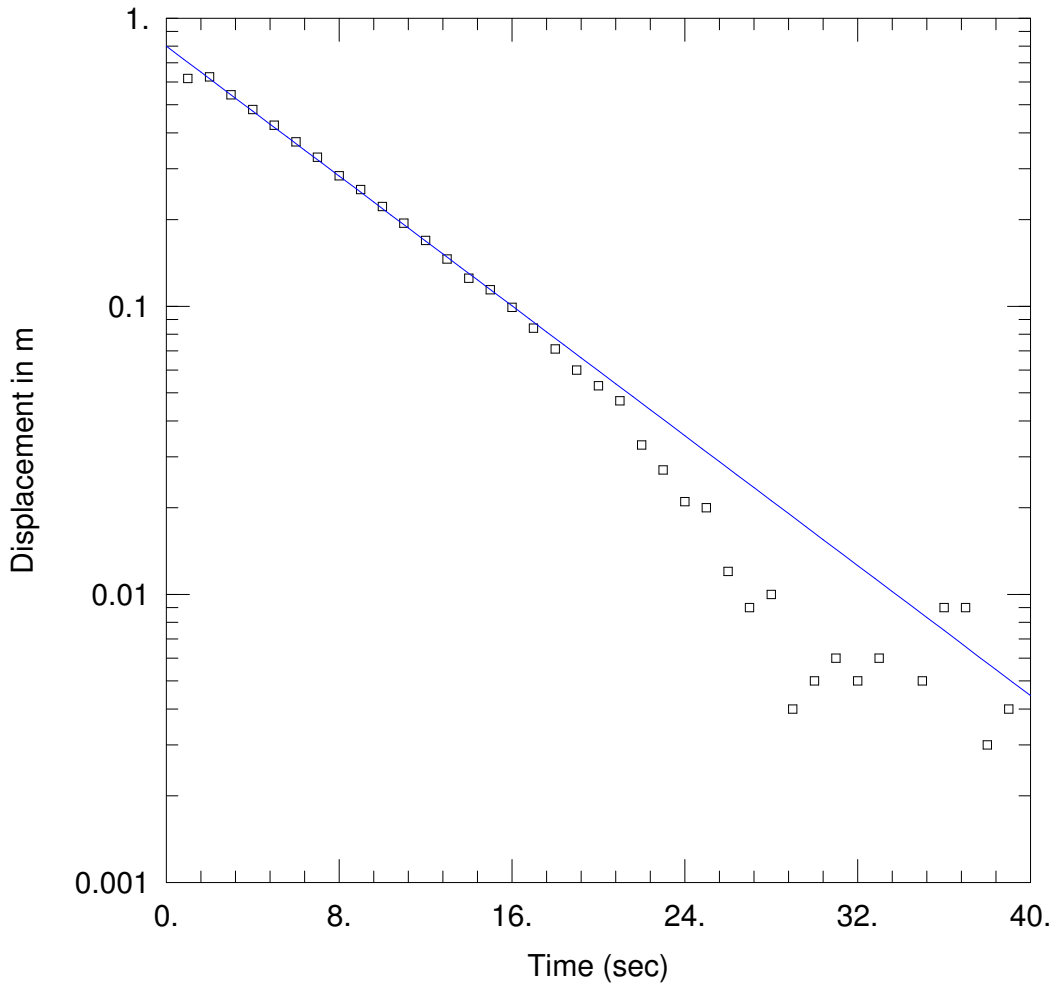
WELL DATA (GMB5)

Initial Displacement: 1.871 m
Total Well Penetration Depth: 16.54 m
Casing Radius: 0.025 m
Static Water Column Height: 16.94 m
Screen Length: 6. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.467 m/day
y0 = 0.8104 m



WELL TEST ANALYSIS

Data Set: \...\GMB5 Slug Out 5.aqt
Date: 04/01/15 Time: 11:36:33

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB5

AQUIFER DATA

Saturated Thickness: 8.4 m Anisotropy Ratio (Kz/Kr): 1.

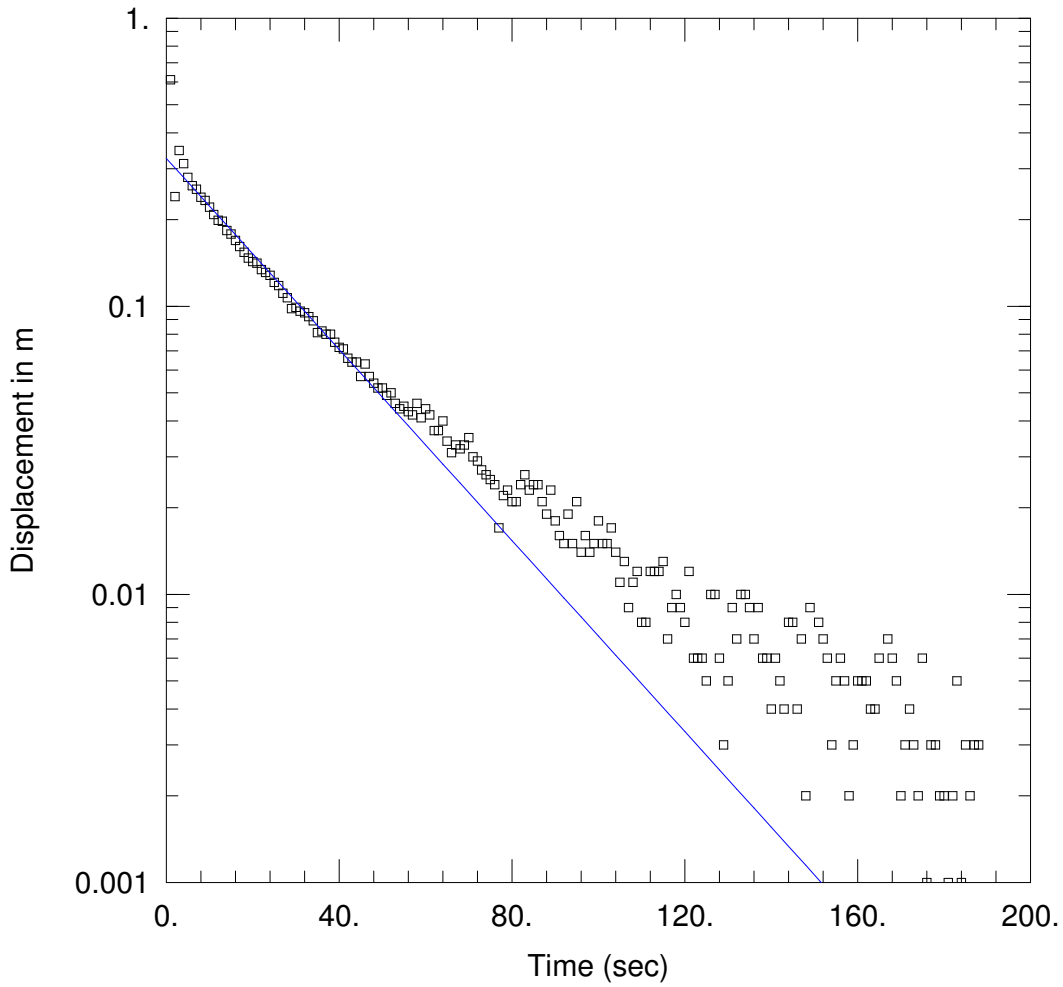
WELL DATA (GMB5)

Initial Displacement: 2.03 m
Total Well Penetration Depth: 16.54 m
Casing Radius: 0.025 m
Static Water Column Height: 16.94 m
Screen Length: 6. m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.462 m/day
y0 = 0.7987 m



WELL TEST ANALYSIS

Data Set: \...\GMB6 Slug In 2.aqt
Date: 04/01/15 Time: 11:37:00

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB6

AQUIFER DATA

Saturated Thickness: 13.65 m Anisotropy Ratio (Kz/Kr): 1.

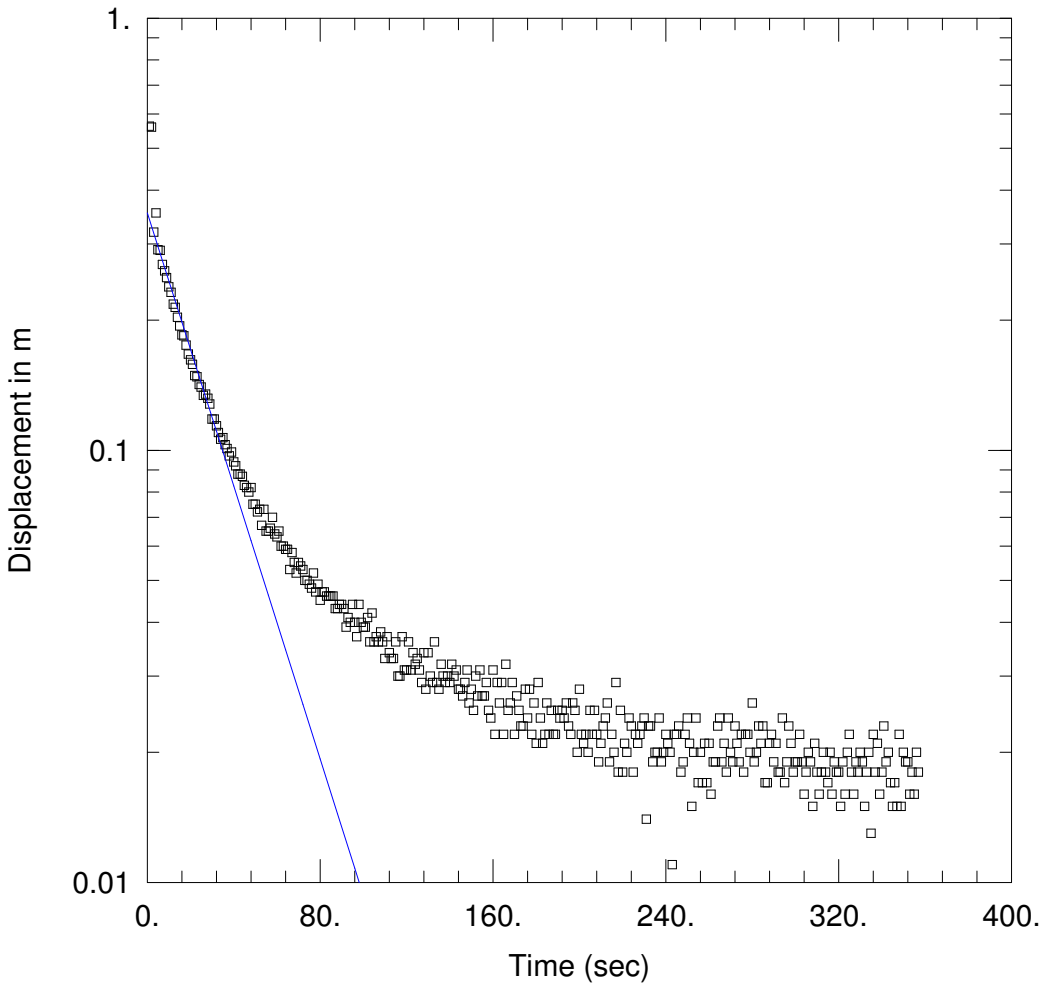
WELL DATA (GMB6)

Initial Displacement: 1.703 m Static Water Column Height: 13.65 m
Total Well Penetration Depth: 13.65 m Screen Length: 13.3 m
Casing Radius: 0.025 m Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.3318 m/day y0 = 0.326 m



WELL TEST ANALYSIS

Data Set: \...\GMB6 Slug In 3.aqt
Date: 04/01/15 Time: 11:37:11

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB6

AQUIFER DATA

Saturated Thickness: 13.65 m Anisotropy Ratio (Kz/Kr): 1.

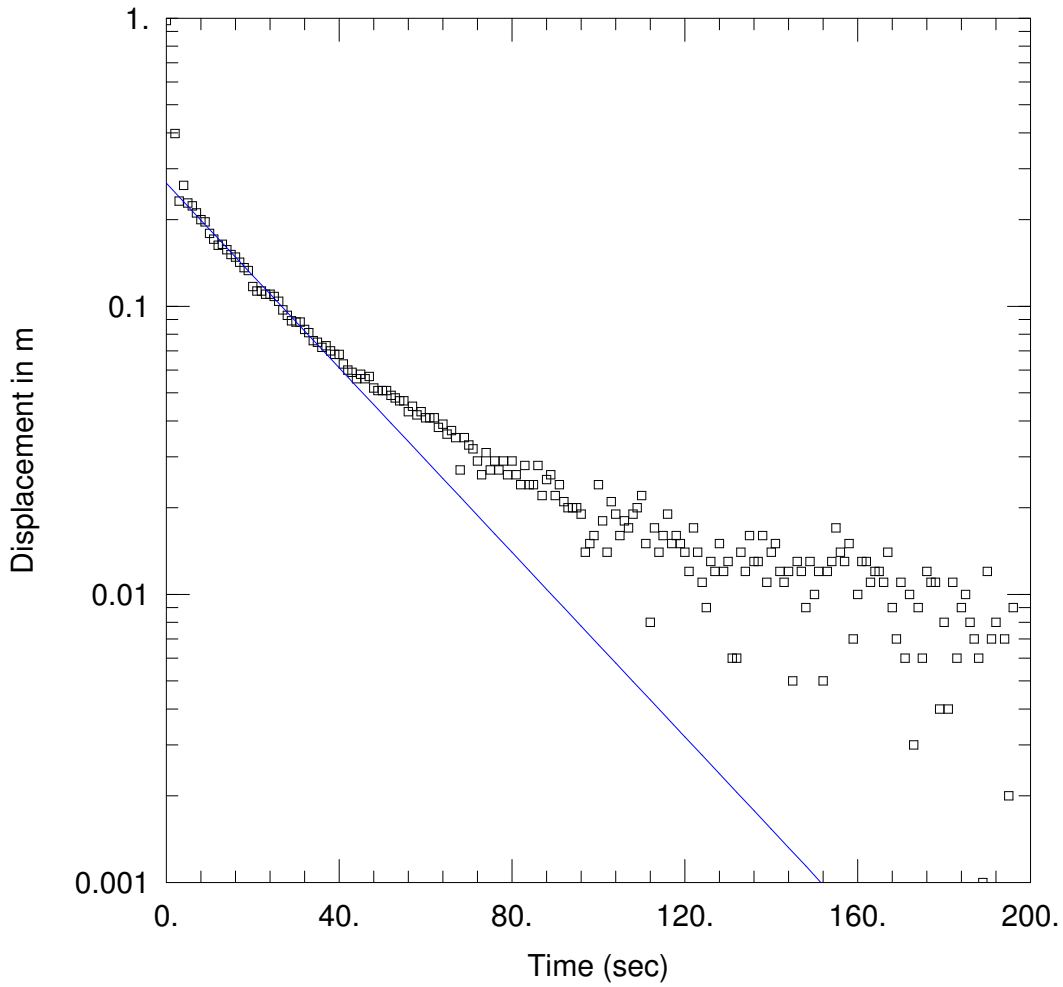
WELL DATA (GMB6)

Initial Displacement: 1.897 m Static Water Column Height: 13.65 m
Total Well Penetration Depth: 13.65 m Screen Length: 13.3 m
Casing Radius: 0.025 m Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.3161 m/day y0 = 0.3542 m



WELL TEST ANALYSIS

Data Set: \...\GMB6 Slug In.aqt
Date: 04/01/15 Time: 11:37:24

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB6

AQUIFER DATA

Saturated Thickness: 13.65 m Anisotropy Ratio (Kz/Kr): 1.

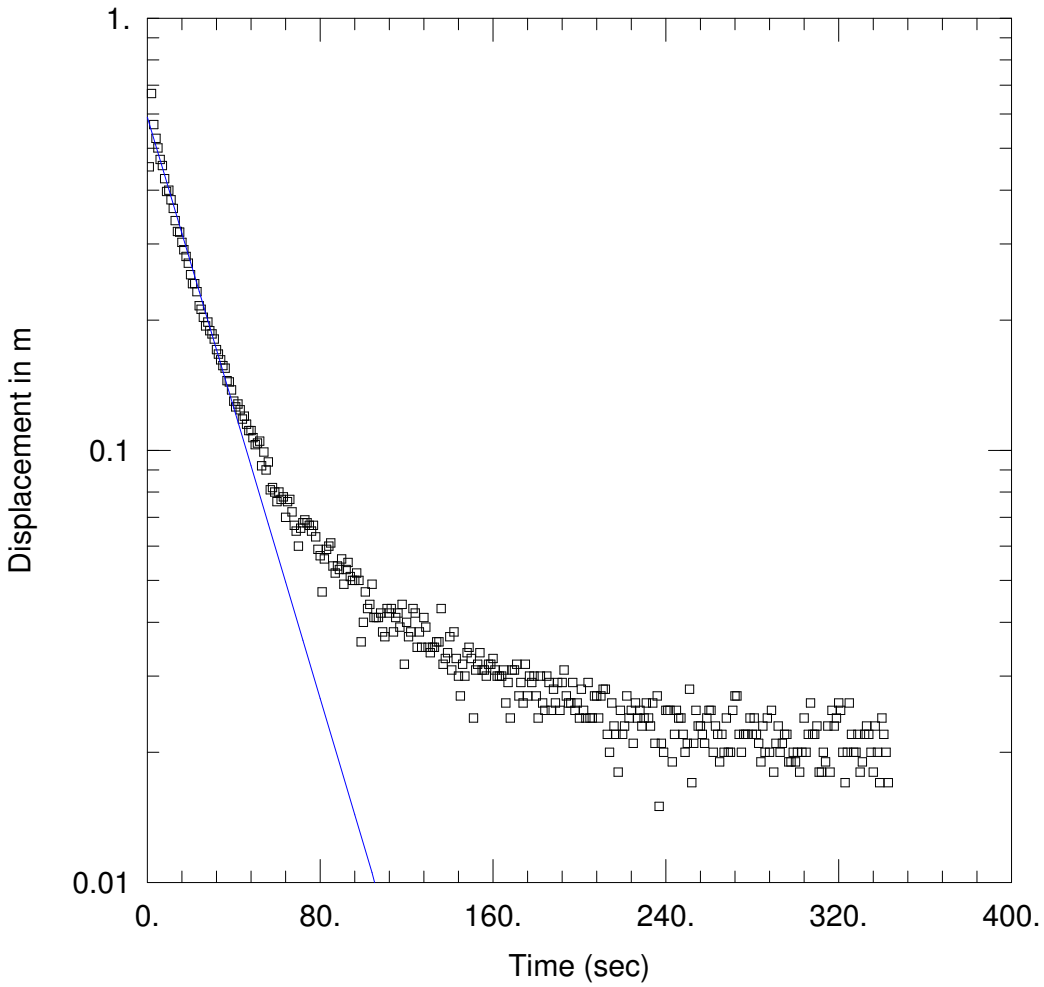
WELL DATA (New Well)

Initial Displacement: 0.982 m Static Water Column Height: 13.65 m
Total Well Penetration Depth: 13.65 m Screen Length: 13.3 m
Casing Radius: 0.025 m Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.3204 m/day y0 = 0.2671 m



WELL TEST ANALYSIS

Data Set: \...\GMB6 Slug Out 1.aqt
Date: 04/01/15 Time: 11:37:39

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB6

AQUIFER DATA

Saturated Thickness: 13.65 m Anisotropy Ratio (Kz/Kr): 1.

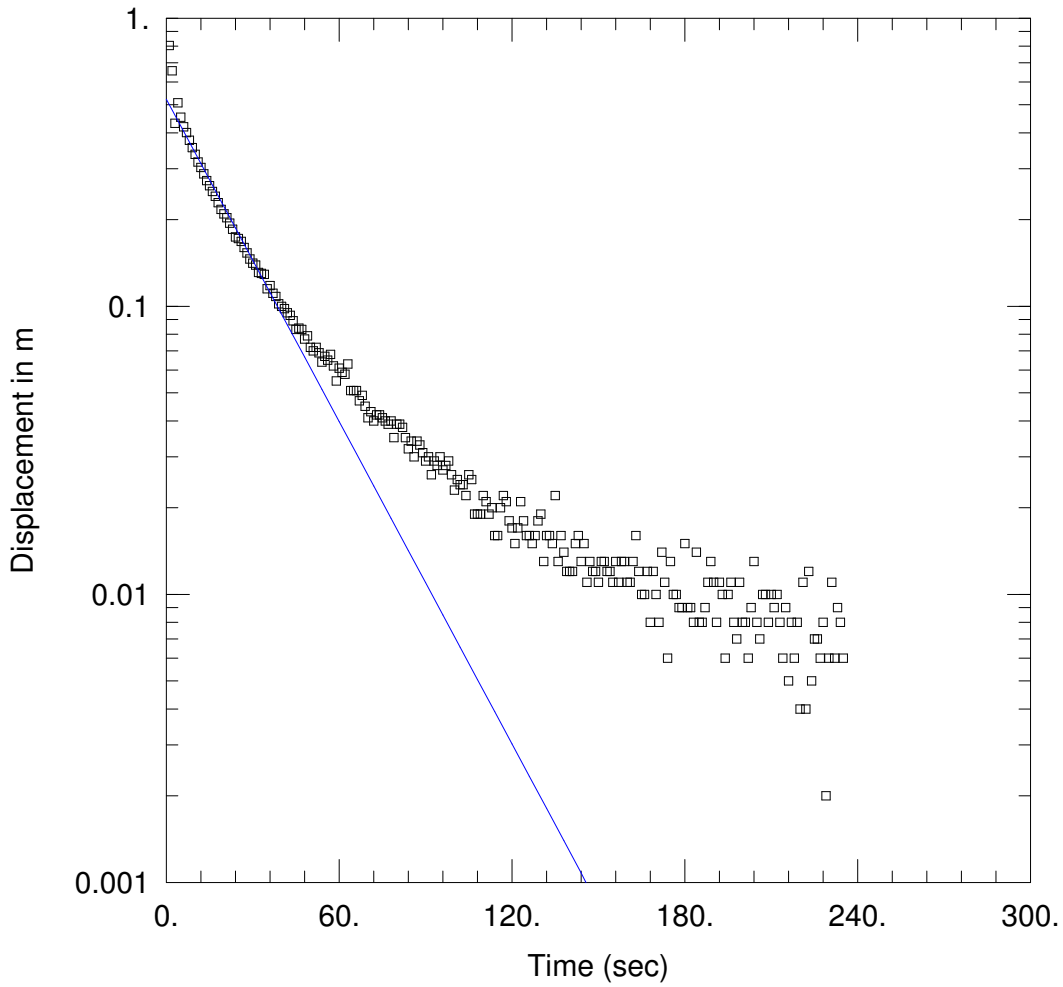
WELL DATA (New Well)

Initial Displacement: 1.642 m Static Water Column Height: 13.65 m
Total Well Penetration Depth: 13.65 m Screen Length: 13.3 m
Casing Radius: 0.025 m Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.3365 m/day y0 = 0.5903 m



WELL TEST ANALYSIS

Data Set: \...\GMB6 Slug Out 2.aqt
Date: 04/01/15 Time: 11:37:56

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB6

AQUIFER DATA

Saturated Thickness: 13.65 m Anisotropy Ratio (Kz/Kr): 1.

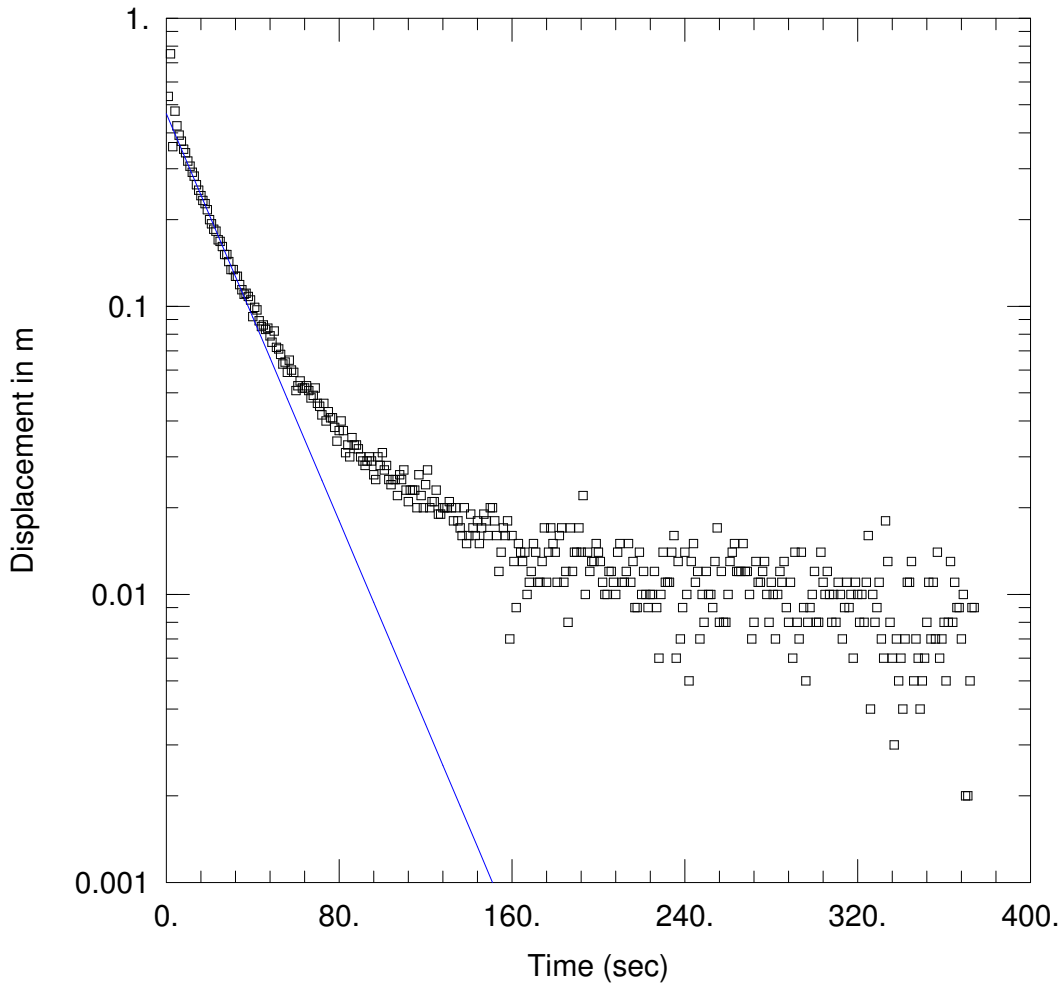
WELL DATA (GMB6)

Initial Displacement: 1.557 m
Total Well Penetration Depth: 13.65 m
Casing Radius: 0.025 m
Static Water Column Height: 13.65 m
Screen Length: 13.3 m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.3733 m/day
y0 = 0.5234 m



WELL TEST ANALYSIS

Data Set: \...\GMB6 Slug Out 3.aqt
Date: 04/01/15 Time: 11:38:10

PROJECT INFORMATION

Company: Golder Associates
Client: SITA Environmental
Project: 147645033
Location: Allawuna Farm
Test Well: GMB6

AQUIFER DATA

Saturated Thickness: 13.65 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GMB6)

Initial Displacement: 1.597 m
Total Well Penetration Depth: 13.65 m
Casing Radius: 0.025 m
Static Water Column Height: 13.65 m
Screen Length: 13.3 m
Well Radius: 0.0575 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.3536 m/day
y0 = 0.466 m

APPENDIX D

Groundwater Sampling Methodology

SAMPLING METHODOLOGY

Prior to sampling, the groundwater level was recorded in each monitoring well using Heron Dipper-T water level probe. Prior to use at each location the water level probe was decontaminated using deionised water and laboratory grade detergent.

Groundwater samples were collected in general accordance with Australian Standard AS/NZS 5667.1:1998, using low-flow sampling methodology adapted from the United States Environmental Protection Agency (US EPA, 1996). Prior to use at each monitoring well, all monitoring equipment introduced into the wells was decontaminated using deionised water and laboratory grade detergent. In addition, clean nitrile gloves were worn by field personnel when handling sampling tubing and containers. Gloves were not transferred between sampling locations.

Samples were collected using a peristaltic pump and dedicated HDPE tubing. A short length (about 0.2 m long) of flexible silicon tubing was used for the pump head and all dedicated tubing was replaced between each sampling location. For sample collection, the intake point of the sample tubing was positioned at approximately 0.5 m above the base of the monitoring well and groundwater was purged at between 100 and 500 mL/min with the intent of preserving chemical equilibrium in the groundwater surrounding the well and minimising drawdown.

During purging, a groundwater drawdown meter was used to monitor drawdown during low flow purging and sampling. During this process, near continuous measurements of temperature, pH, conductivity, dissolved oxygen and redox potential were recorded using a water quality multi-meter and flow-through cell.

Calibration checks of the water quality multi-meter were conducted on-site every day before and after the completion of the days sampling. Where calibration checks indicated that the equipment was more than ±10% outside the acceptable range, the equipment supplier was to be contacted and the issue noted in the field notes. The equipment was re-calibrated or new equipment hired for further sampling.

Once the parameters have stabilised (nominal changes of less than 10%), the flow cell will be removed from the tubing. Samples were then collected directly into pre-cleaned containers supplied by the destination laboratory. Samples were then placed immediately in a cooler with ice and/or ice blocks for storage and transportation to the laboratory.

Sample bottles from the laboratory included the proper preservatives as necessary and field personnel will kept material safety data sheets (MSDS) on hand for all preservatives. Samples were filtered using a new single-use, disposable 0.45 µm filter for each monitoring well sampled.

Copies of equipment calibration certificates, field sampling reports, chain-of-custody documentation and laboratory analytical reports are provided in Appendix D and F.

QUALITY CONTROL AND ASSURANCE MEASURES

The QA/QC program for groundwater sampling and sample management was developed and implemented in accordance with the DEC Contaminated Sites Management Series and National Environment Protection (Assessment of Site Contamination) Measures guidelines and included the following protocols:

- Maintenance and calibration of field instruments (records of calibration are compiled in Appendix F)
- Maintaining samples in eskies (with ice/freezer bricks) and/or refrigeration facilities from sample collection through transport to laboratories
- Sample transport under COC protocol
- Compliance with sample holding times and sample receipt temperatures
- Sample collection methods to prevent cross contamination:
  - Decontamination sampling equipment (where dedicated equipment not used) between each location
  - Nitrile gloves changed between collection of each sample
- Selection of NATA-Accredited laboratories for analytical testing
- One blind duplicate sample and one split duplicate collected and analysed per 20 samples
- Review of laboratory internal analysis of matrix spike/matrix spike duplicates, duplicates, blanks and spike recoveries (as part of laboratory internal QA/QC, the laboratories used in this investigation perform internal duplicate analyses and also report the results from the analysis of method blanks and spiked samples as a recovery percentage).

Relative percentage differences (RPDs) were calculated and assessed for each blind duplicate pair as a measure of the precision (repeatability) of analyte recovery and analysis.

APPENDIX E

Chain of Custody Forms

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Q 11251 page 1 of 1

Golder Associates
1 Havelock Street
West Perth, WA 6005 Australia
Telehone +61 8 9213 7600 Fax +61 8 9213 7611

Project Number: 147645033	Laboratory Name: ALS ENVIRONMENTAL
Short Title: ALLAWUNA FARM – SITA	Address: 10 HOP WAY MALAGA.
Golder Contact: MICHAEL BARTLETT / Golder Email Address: mj.bartlett @golder.com.au	Telephone/Fax: (08) 92097655 / Contact:

Address where reports should be sent to

☐ PO Box 1914
West Perth, WA 6872
Telephone (61 8) 9213 7600
Fax (61 8) 9213 7611

☐ Other

Phone _____ Fax _____

Analyses Required

Sample Control Number (SCN	Sample Location	Sa#	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D/M/Y)	Time Sampled (HH/MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	W-3	Ferrous Iron	NT-14	ED37 Calcium/	Including Bicarbonate	Carbonate Hydroxide	and Total as CaCO3	W7		RUSH	Remarks (over)
Q11251 - 01	GMB06	1		WATER	11/12/14					9	✓	✓	✓	✓				✓			
Q11251 - 02	GMB02.	2		WATER	11/12/14					9	✓	✓	✓	✓				✓			
Q11251 - 03	GMB03	3		WATER	11/12/14					9	✓	✓	✓	✓				✓			
Q11251 - 04	GMB04	4		WATER	11/12/14					9	✓	✓	✓	✓				✓			
Q11251 - 05	GMB05	5		WATER	11/12/14					9	✓	✓	✓	✓				✓			
Q11251 - 06	GMB05	6.		WATER	11/12/14.			FD	Q11251-05	9.	✓	✓	✓	✓				✓			
- 07																					
- 08																					
- 09																					
- 10																					
- 11																					
- 12																					

Sampler's Signature: [signature]	Relinquished by: Signature [signature]	Company GOLDER.	Date 15/12/14.	Time 1140.	Received by: Signature	Company
Sample Storage (°C) 0°C (ICE).	Relinquished by: Signature	Company	Date	Time	Received by: Signature	Company
Comments: FOR QUERIES PLS CONTACT MICE B 0430 451 003.	Method of Shipment:	Waybill No:	Received for Lab by:		Date	Time
	Shipped by:	Shipment Condition: Seal intact:	Temp (°C)	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy PINK: Lab Returns with Final Report

Instructions

Sample Control Number - include Chain-Of-Custody Form Number as prefix.

Sample Matrix - Soil, Water, Air, Refuse, Sludge.

Sample Type - Discrete, Composite, Grab.

QA/QC Code - FD = Field duplicate (homogenized)

FR = Field replicate (unhormogenized)

FB = Field blank

TB = Travel blank

Related SCN - Note associated sample control number for field duplicated or relate composite sample control number for discrete samples.

Remarks - Note any special instructions for analytical lab.

Comments: Note any general comments for this set of samples. If samples are time sensitive, please provide the lab with the earliest time of sampling. I.e.: Earliest sample time: time, date.

APPENDIX F

Particle Size Distribution Test Results

Particle Size Distribution & Plasticity Index Test Report

Perth Laboratory
84 Guthrie Street Osborne Park
Perth WA 6017
P: +61 8 9441 0700 F: +61 8 9441 0701
www.golder.com
perthlab@golder.com.au

Client:	SITA Australia 70 Anzac Road, Chullora NSW 2190		
Project:	Allawuna Proposed Landfill Site	**Date:**	13/12/14
Location:	York	**Project No.:**	147645033
Lab Reference Number:	14441803	**Sample Identification:**	GMB5 2.5-3.5

Laboratory Specimen Description: Clayey/Silty SAND (trace of gravel)

AS 1726 - Soil Classification: -

Particle Size Distribution AS 1289.3.6.1

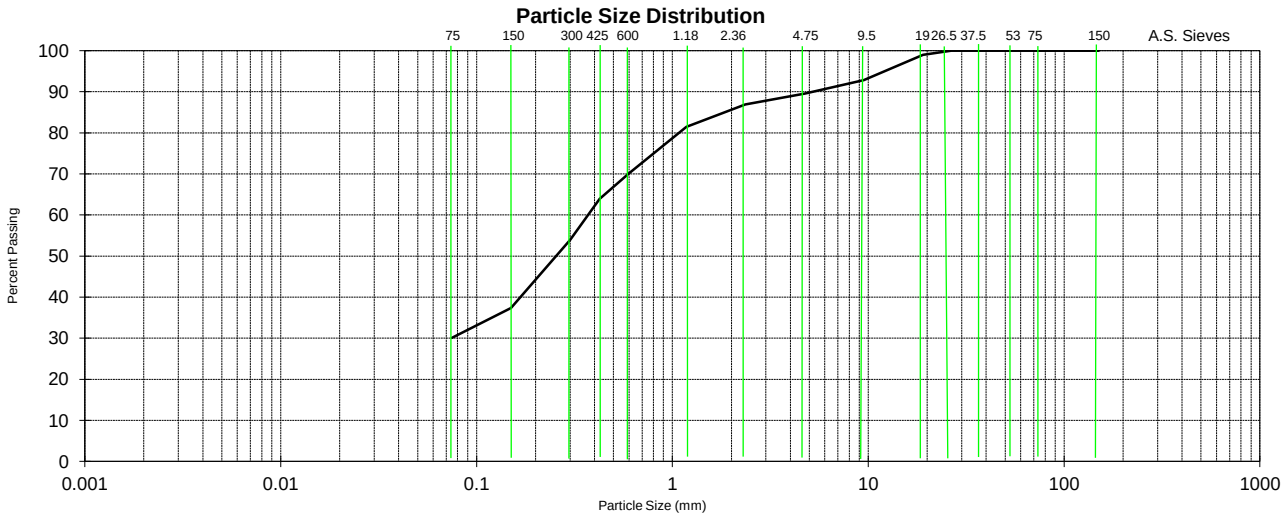
Sieve Size		% Passing	Specification
150.0	mm	100	
75.0	mm	100	
53.0	mm	100	
37.5	mm	100	
26.5	mm	100	
19.0	mm	99	
9.5	mm	93	
4.75	mm	90	
2.36	mm	87	
1.18	mm	81	
0.600	mm	70	
0.425	mm	64	
0.300	mm	54	
0.150	mm	37	
0.075	mm	30	

Plasticity Index and Moisture Content

Test		Method	Result	Specification
Liquid Limit	%	AS 1289.3.1.2	ND	
Plastic Limit	%	AS 1289.3.2.1	ND	
Plasticity Index	%	AS 1289.3.3.1	ND	
Linear Shrinkage	%	AS 1289.3.4.1	ND	
Moisture Content	%	AS 1289.2.1.1	8.7	

Sample History: Air Dried
Preparation Method: Dry Sieved
Cracking/Crumbling/Curling of linear shrinkage:
Linear shrinkage mould length (mm):
ND = not determined NO = not obtainable NP = non plastic

Notes:



Tested as received **PLF1-003 RL0 27/11/12**

Certificate Reference:	**147645033_14441803_TR-140211_Class_Rev0**
	NATA Accreditation No: 1961 Perth
	Accredited for compliance with ISO/IEC 17025
	THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL

Stephen Abbey - Lead Technician

Particle Size Distribution & Plasticity Index Test Report

Perth Laboratory
84 Guthrie Street Osborne Park
Perth WA 6017
P: +61 8 9441 0700 F: +61 8 9441 0701
www.golder.com
perthlab@golder.com.au

Client:	SITA Australia 70 Anzac Road, Chullora NSW 2190		
Project:	Allawuna Proposed Landfill Site	**Date:**	13/12/14
Location:	York	**Project No.:**	147645033
Lab Reference Number:	14441804	**Sample Identification:**	GMB5 5.5-6.0

Laboratory Specimen Description: Clayey/Silty SAND (trace of gravel)

AS 1726 - Soil Classification: -

Particle Size Distribution AS 1289.3.6.1

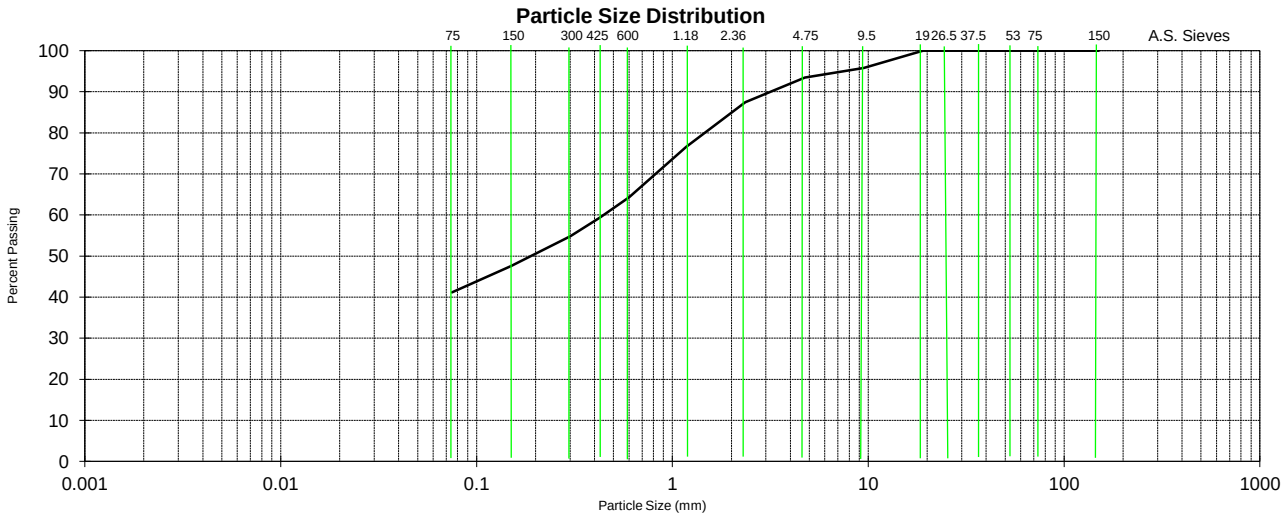
Sieve Size		% Passing	Specification
150.0	mm	100	
75.0	mm	100	
53.0	mm	100	
37.5	mm	100	
26.5	mm	100	
19.0	mm	100	
9.5	mm	96	
4.75	mm	93	
2.36	mm	87	
1.18	mm	77	
0.600	mm	64	
0.425	mm	59	
0.300	mm	55	
0.150	mm	48	
0.075	mm	41	

Plasticity Index and Moisture Content

Test		Method	Result	Specification
Liquid Limit	%	AS 1289.3.1.2	ND	
Plastic Limit	%	AS 1289.3.2.1	ND	
Plasticity Index	%	AS 1289.3.3.1	ND	
Linear Shrinkage	%	AS 1289.3.4.1	ND	
Moisture Content	%	AS 1289.2.1.1	17.1	

Sample History: Air Dried
Preparation Method: Dry Sieved
Cracking/Crumbling/Curling of linear shrinkage:
Linear shrinkage mould length (mm):
ND = not determined NO = not obtainable NP = non plastic

Notes:



Tested as received **PLF1-003 RL0 27/11/12**

Certificate Reference:	**147645033_14441804_TR-140211_Class_Rev0**
	NATA Accreditation No: 1961 Perth
	Accredited for compliance with ISO/IEC 17025
	THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL

Stephen Abbey - Lead Technician

Particle Size Distribution & Plasticity Index Test Report

Perth Laboratory
84 Guthrie Street Osborne Park
Perth WA 6017
P: +61 8 9441 0700 F: +61 8 9441 0701
www.golder.com
perthlab@golder.com.au

Client:	SITA Australia 70 Anzac Road, Chullora NSW 2190		
Project:	Allawuna Proposed Landfill Site	**Date:**	13/12/14
Location:	York	**Project No.:**	147645033
Lab Reference Number:	14441805	**Sample Identification:**	GMB5 10.0-10.5

Laboratory Specimen Description: SAND (with gravel, with clay/silt)

AS 1726 - Soil Classification: -

Particle Size Distribution AS 1289.3.6.1

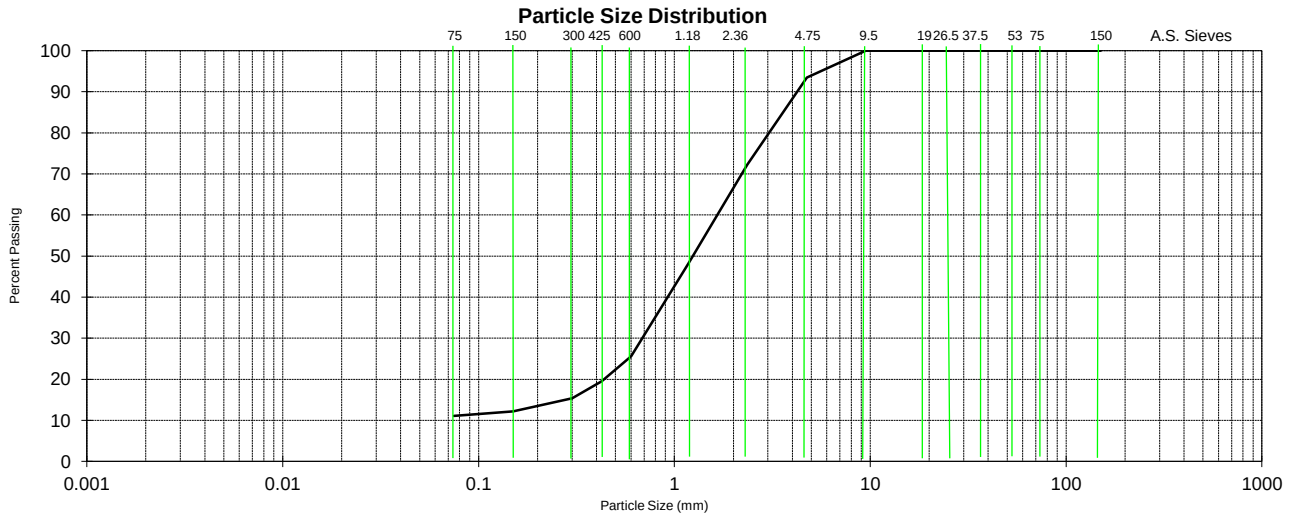
Sieve Size		% Passing	Specification
150.0	mm	100	
75.0	mm	100	
53.0	mm	100	
37.5	mm	100	
26.5	mm	100	
19.0	mm	100	
9.5	mm	100	
4.75	mm	93	
2.36	mm	72	
1.18	mm	48	
0.600	mm	26	
0.425	mm	19	
0.300	mm	15	
0.150	mm	12	
0.075	mm	11	

Plasticity Index and Moisture Content

Test		Method	Result	Specification
Liquid Limit	%	AS 1289.3.1.2	ND	
Plastic Limit	%	AS 1289.3.2.1	ND	
Plasticity Index	%	AS 1289.3.3.1	ND	
Linear Shrinkage	%	AS 1289.3.4.1	ND	
Moisture Content	%	AS 1289.2.1.1	18.5	

Sample History: Air Dried
Preparation Method: Dry Sieved
Cracking/Crumbling/Curling of linear shrinkage:
Linear shrinkage mould length (mm):
ND = not determined NO = not obtainable NP = non plastic

Notes:



Tested as received **PLF1-003 RL0 27/11/12**

Certificate Reference:	**147645033_14441805_TR-140211_Class_Rev0**	
NATA	**NATA Accreditation No: 1961 Perth**	
	Accredited for compliance with ISO/IEC 17025	
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Particle Size Distribution & Plasticity Index Test Report

Perth Laboratory
84 Guthrie Street Osborne Park
Perth WA 6017
P: +61 8 9441 0700 F: +61 8 9441 0701
www.golder.com
perthlab@golder.com.au

Client:	SITA Australia 70 Anzac Road, Chullora NSW 2190		
Project:	Allawuna Proposed Landfill Site	**Date:**	13/12/14
Location:	York	**Project No.:**	147645033
Lab Reference Number:	14441806	**Sample Identification:**	GMB5 15.0-15.5

Laboratory Specimen Description: Gravel (with sand, trace of clay/silt)

AS 1726 - Soil Classification: -

Particle Size Distribution AS 1289.3.6.1

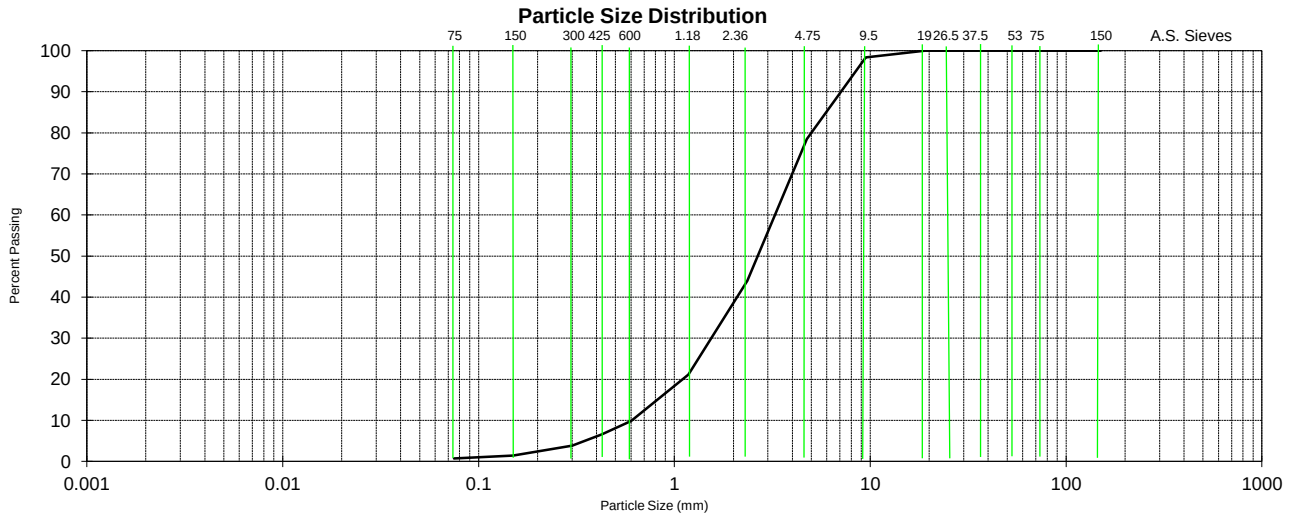
Sieve Size		% Passing	Specification
150.0	mm	100	
75.0	mm	100	
53.0	mm	100	
37.5	mm	100	
26.5	mm	100	
19.0	mm	100	
9.5	mm	98	
4.75	mm	79	
2.36	mm	44	
1.18	mm	21	
0.600	mm	10	
0.425	mm	7	
0.300	mm	4	
0.150	mm	1	
0.075	mm	1	

Plasticity Index and Moisture Content

Test		Method	Result	Specification
Liquid Limit	%	AS 1289.3.1.2	ND	
Plastic Limit	%	AS 1289.3.2.1	ND	
Plasticity Index	%	AS 1289.3.3.1	ND	
Linear Shrinkage	%	AS 1289.3.4.1	ND	
Moisture Content	%	AS 1289.2.1.1	22.8	

Sample History: Air Dried
Preparation Method: Dry Sieved
Cracking/Crumbling/Curling of linear shrinkage:
Linear shrinkage mould length (mm):
ND = not determined NO = not obtainable NP = non plastic

Notes:



Tested as received **PLF1-003 RL0 27/11/12**

Certificate Reference:	**147645033_14441806_TR-140211_Class_Rev0**
	NATA Accreditation No: 1961 Perth
	Accredited for compliance with ISO/IEC 17025
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Stephen Abbey - Lead Technician

APPENDIX G

Field Records

Golder Associates

GROUNDWATER SAMPLING RECORD FORM

LOW FLOW PURGING and SAMPLING (incl. low yielding wells)

WELL ID:	GMB02.

PROJECT INFORMATION

Project Number:	147645033	Date:	11/12/14
Client:	SITA	Sampled By:	MWB
Site Location:	ALLAWUNA	Time:	1305

Weather Conditions (Temperature, Precipitation, Wind): FINE, HOT, DRY ~ 38°C

Well Maintenance Required? YES / NO (circled: NO) Detail

WELL INFORMATION	
Diameter of standpipe (mm)	50
Standpipe stick up (m)	0.57
Surveyed reference point	TOC
Depth to top of filter pack (from log)	—
Depth to bottom of filter pack (from log)	—
Depth of well (from log)	—

mbRP - metres below top of reference point
Hose volume - 0.12 L/m of 1/2 inch diameter hose
Hose volume - 0.07 L/m of 3/8 inch diameter hose
Hose volume - 0.03 L/m of 1/4 inch diameter hose

GAUGING INFORMATION

Pre-Sampling Information		Purging and Sampling Information	
Interface probe used?	YES / NO	Depth of pump intake (mbRP)	-05 - BOW
Initial depth to water (mbRP)	5.98	Length of hose (m)	—
Depth to product (mbRP)	NA	Volume in hose (L)	—
Thickness of product (m)	NA	Depth to water after placement of pump (mbRP)	—
Bailed product thickness (m)	NA	Depth to water at end of purging (mbRP)	—
Total depth of well (mbRP)	—	Depth to water after collection of samples (mbRP)	—
Thickness of sediment on base of well (m)	—	Purging and Sampling Method	DEDESTIC

Controller settings	
CPM	
Refill	
Discharge	NA / /
Throttle	

WQM Model: 90FLMU

WQM Calibration Certificate: NA

GROUNDWATER MONITORING WELL PURGING RECORD

Time	Cumulative Volume Purged (L)	Flow Rate (L/min)	Depth to Water (mbRP)	±0.1 pH	±5% Conductivity (µS)	±10 Redox (mV)	±10% Dissolved Oxygen (ppm)	±0.5°C Temperature (°C)	Appearance (Colour, Turbidity, Odour, etc)
1310		500	6.15	4.31	14.12	192	4.22	23.1	CLEAR, LOW TURBIDITY NO ODOUR
1315		"	6.15	4.43	14.09	110	4.14	21.6	"
1320		"	6.15	3.87	15.12	280	3.19	21.2	"
1325		"	6.15	3.91	16.05	278	1.26	21.3	"
1330		"	6.15	3.87	16.38	282	0.89	21.3	"
1335		"	6.15	3.94	16.82	266	0.71	21.4	"
1340		"	6.15	4.03	17.33	151	0.57	21.6	"
1345		"	"	3.92	17.47	231	0.54	21.3	"
1350		"	"	3.98	17.41	231	0.51	21.4	"

SAMPLING RECORD

Time Sampled: 1350
Colour: CLEAR.
Odour: NIL
Turbidity: Low (circled) Medium High
Hydrocarbon Sheen ? Yes No (circled)
DI Water Lab Certificate No. NA

Sample IDs

Primary Duplicate:	112.51 -02.
Secondary Duplicate:	
Trip Blank:	
Rinsate:	
Field Blank:	

Sample Containers/Preservation (F=Filtered; UF=Unfiltered; P=Preserved; UP=Unpreserved)

	Vials (P/UP)		Metals (F/UF;P/UP)
	1L Amber	REFER	Cyanide
	1L Plastic	GE	Sulphide
	Phenols/COD/NH3 (F/UF; P/UP)		Other
	Ferrous/Ferric Iron (F/UF; P/UP)		Other

Notes:

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Golder Associates

GROUNDWATER SAMPLING RECORD FORM

LOW FLOW PURGING and SAMPLING (incl. low yielding wells)

WELL ID:	GMB03

PROJECT INFORMATION			
Project Number:	1117647033	Date:	11/11/14
Client:	SITA	Sampled By:	MAS
Site Location:	Mt Muirhead	Time:	14:15

Weather Conditions (Temperature, Precipitation, Wind): Fine Hot, Dry. 35°C.

Well Maintenance Required? YES / NO

Detail

WELL INFORMATION	
Diameter of standpipe (mm)	50
Standpipe stick up (m)	0.58
Surveyed reference point	TOC
Depth to top of filter pack (from log)	–
Depth to bottom of filter pack (from log)	–
Depth of well (from log)	–

mbRP - metres below top of reference point
Hose volume - 0.12 L/m of 1/2 inch diameter hose
Hose volume - 0.07 L/m of 3/8 inch diameter hose
Hose volume - 0.03 L/m of 1/4 inch diameter hose

GAUGING INFORMATION			
Pre-Sampling Information		*Purging and Sampling Information*	
Interface probe used?	YES / NO	Depth of pump intake (mbRP)	0.5 below
Initial depth to water (mbRP)	5.72	Length of hose (m)	–
Depth to product (mbRP)	NA	Volume in hose (L)	–
Thickness of product (m)	NA	Depth to water after placement of pump (mbRP)	–
Bailed product thickness (m)	NA	Depth to water at end of purging (mbRP)	–
Total depth of well (mbRP)	–	Depth to water after collection of samples (mbRP)	–
Thickness of sediment on base of well (m)	–	Purging and Sampling Method	Peristaltic

Controller settings	
CPM	
Refill	
Discharge	NA
Throttle	

WQM Model: QD Flow

WQM Calibration Certificate: –

GROUNDWATER MONITORING WELL PURGING RECORD

Time	Cumulative Volume Purged (L)	Flow Rate (L/min)	Depth to Water (mbRP)	±0.1 pH	±5% Conductivity (µS)	±10 Redox (mV)	±10% Dissolved Oxygen (ppm)	±0.5°C Temperature (°C)	Appearance (Colour, Turbidity, Odour, etc)
1420		500 mL/min	5.76	4.22	5.37	131	2.33	23.3	Clear!
1425		"	"	4.19	5.42	123	1.82	21.7	"
1430		"	"	4.18	5.26	103	1.72	21.8	"
1435		"	"	4.20	5.19	114	1.72	21.6	"
1440		"	"	4.21	5.10	115	1.70	21.0	"
1445		"	"	4.23	5.11	118	1.69	21.6	"
1450		"	"	4.22	5.13	120	1.69	21.0	"

SAMPLING RECORD

Time Sampled: 1450
Colour: Clear
Odour: Nil
Turbidity: Low / Medium / High
Hydrocarbon Sheen ? Yes / No
DI Water Lab Certificate No.

Sample IDs

Primary Duplicate:	1251 . -03
Secondary Duplicate:	
Trip Blank:	
Rinsate:	
Field Blank:	

Sample Containers/Preservation (F=Filtered; UF=Unfiltered; P=Preserved; UP=Unpreserved)

	Vials (P/UP)		Metals (F/UF;P/UP)
	1L Amber	85 ml	Cyanide
	1L Plastic	COD	Sulphide
	Phenols/COD/NH3 (F/UF; P/UP)		Other
	Ferrous/Ferric Iron (F/UF; P/UP)		Other

Notes:

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RL0, January 2013

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Golder Associates

GROUNDWATER SAMPLING RECORD FORM

LOW FLOW PURGING and SAMPLING (incl. low yielding wells)

WELL ID:	GWB4

PROJECT INFORMATION

Project Number:	1426 5033	Date:	1/14/14
Client:	SFA	Sampled By:	[illegible]
Site Location:	ALBANY	Time:	1530

Weather Conditions (Temperature, Precipitation, Wind): FINE HOT, 36°C

Well Maintenance Required? YES / NO (NO circled) Detail

WELL INFORMATION

Diameter of standpipe (mm)	50
Standpipe stick up (m)	0.5
Surveyed reference point	—
Depth to top of filter pack (from log)	—
Depth to bottom of filter pack (from log)	—
Depth of well (from log)	—

mbRP - metres below top of reference point
Hose volume - 0.12 L/m of 1/2 inch diameter hose
Hose volume - 0.07 L/m of 3/8 inch diameter hose
Hose volume - 0.03 L/m of 1/4 inch diameter hose

GAUGING INFORMATION

Pre-Sampling Information		Purging and Sampling Information	
Interface probe used?	YES / NO (NO circled)	Depth of pump intake (mbRP)	10.5 Bore
Initial depth to water (mbRP)	8.05	Length of hose (m)	—
Depth to product (mbRP)	NA	Volume in hose (L)	—
Thickness of product (m)	NA	Depth to water after placement of pump (mbRP)	—
Bailed product thickness (m)	NA	Depth to water at end of purging (mbRP)	—
Total depth of well (mbRP)	—	Depth to water after collection of samples (mbRP)	
Thickness of sediment on base of well (m)		Purging and Sampling Method	PERSTALTIC

Controller settings

CPM	NA /
Refill	
Discharge	
Throttle	

WQM Model: QC FLOW.

WQM Calibration Certificate: —

GROUNDWATER MONITORING WELL PURGING RECORD

Time	Cumulative Volume Purged (L)	Flow Rate (L/min)	Depth to Water (mbRP)	±0.1 pH	±5% Conductivity (µS)	±10 Redox (mV)	±10% Dissolved Oxygen (ppm)	±0.5°C Temperature (°C)	Appearance (Colour, Turbidity, Odour, etc)
1505		250 ml/m	8.06	5.56	4.11	107	2.57	27.0	CLEAR
1510		"	"	5.53	4.11	44	1.98	24.9	"
1515		"	"	5.52	4.11	66	1.80	23.8	"
1520		"	"	5.50	4.10	56	1.75	23.7	"
1525		"	"	5.49	4.10	93	1.03	23.4	"
1530		"	"	5.49	4.10	96	1.86	23.5	"
1535		"	"	5.50	4.11	96	1.85	23.6	"
1545		"	"	5.49	4.10	95	1.86	23.8	"

SAMPLING RECORD

Time Sampled: 15
Colour: CLEAR
Odour: NIL
Turbidity: Low Medium High
Hydrocarbon Sheen ? Yes No
DI Water Lab Certificate No.

Sample IDs

Primary Duplicate: 11251 — 04
Secondary Duplicate:
Trip Blank:
Rinsate:
Field Blank:

Sample Containers/Preservation (F=Filtered; UF=Unfiltered; P=Preserved; UP=Unpreserved)

	Vials (P/UP)		Metals (F/UF;P/UP)
	1L Amber	REFER	Cyanide
	1L Plastic	COC.	Sulphide
	Phenols/COD/NH3 (F/UF; P/UP)		Other
	Ferrous/Ferric Iron (F/UF; P/UP)		Other

Notes:

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RL0, January 2013

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Golder Associates

GROUNDWATER SAMPLING RECORD FORM

LOW FLOW PURGING and SAMPLING (incl. low yielding wells)

WELL ID:	GMB05

PROJECT INFORMATION

Project Number: 14764 5033.
Client: SITA.
Site Location: Hollowmoor Farm.
Date: 11/12/14.
Sampled By: MJB.
Time: 1605

Weather Conditions (Temperature, Precipitation, Wind): Fine, Hot. 30°.

Well Maintenance Required? YES / NO — Detail

WELL INFORMATION	
Diameter of standpipe (mm)	50.
Standpipe stick up (m)	0.5.
Surveyed reference point	—
Depth to top of filter pack (from log)	—
Depth to bottom of filter pack (from log)	—
Depth of well (from log)	—

mbRP - metres below top of reference point
Hose volume - 0.12 L/m of 1/2 inch diameter hose
Hose volume - 0.07 L/m of 3/8 inch diameter hose
Hose volume - 0.03 L/m of 1/4 inch diameter hose

GAUGING INFORMATION

Pre-Sampling Information		Purging and Sampling Information	
Interface probe used?	YES / NO	Depth of pump intake (mbRP)	-0.5 BOD.
Initial depth to water (mbRP)	0.06.	Length of hose (m)	—
Depth to product (mbRP)	—	Volume in hose (L)	—
Thickness of product (m)	—	Depth to water after placement of pump (mbRP)	—
Bailed product thickness (m)	—	Depth to water at end of purging (mbRP)	—
Total depth of well (mbRP)	—	Depth to water after collection of samples (mbRP)	—
Thickness of sediment on base of well (m)	—	Purging and Sampling Method	PER-SALTR

Controller settings	
CPM	
Refill	
Discharge	NA / /
Throttle	

WQM Model: 90FLW.

WQM Calibration Certificate: —

GROUNDWATER MONITORING WELL PURGING RECORD

Time	Cumulative Volume Purged (L)	Flow Rate (L/min)	Depth to Water (mbRP)	±0.1 pH	±5% Conductivity (µS)	±10 Redox (mV)	±10% Dissolved Oxygen (ppm)	±0.5°C Temperature (°C)	Appearance (Colour, Turbidity, Odour, etc)
1610		~~[illegible]~~ 750	0.00	5.88	18.15	74	0.80	24.1	Clear / no odour
1615		"	"	5.87	17.89	-5	0.11	22.8	"
1620		"	"	5.86	17.99	-8	0.12	22.5	"
1625		"	"	5.86	17.94	8	0.10	22.5	"
1630		"	"	5.87	17.95	24	0.10	22.5	"
1635		"	"	5.86	17.94	6	0.07	22.5	"
1640		"	"	5.87	17.96	-4	0.09	22.5	"

SAMPLING RECORD

Time Sampled: 1640
Colour: Clear
Odour: Nil
Turbidity: Low Medium High
Hydrocarbon Sheen ? Yes No
DI Water Lab Certificate No.

Sample IDs

Primary Duplicate: 11251 -05
Secondary Duplicate: 11251. -06.
Trip Blank:
Rinsate:
Field Blank:

Sample Containers/Preservation (F=Filtered; UF=Unfiltered; P=Preserved; UP=Unpreserved)

	Vials (P/UP)	Refr.	Metals (F/UF;P/UP)
	1L Amber		Cyanide
	1L Plastic	Coc.	Sulphide
	Phenols/COD/NH3 (F/UF; P/UP)		Other
	Ferrous/Ferric Iron (F/UF; P/UP)		Other

Notes:

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Golder Associates

GROUNDWATER SAMPLING RECORD FORM

LOW FLOW PURGING and SAMPLING (incl. low yielding wells)

WELL ID:	GMB06

PROJECT INFORMATION

Project Number: 147643033
Client: SITA
Site Location: ALLANDINA
Date: 11/12/14
Sampled By: MWB
Time: 12:00

Weather Conditions (Temperature, Precipitation, Wind): FINE HOT. 36°C

Well Maintenance Required? YES / NO (circled: NO)

Detail

WELL INFORMATION	
Diameter of standpipe (mm)	50
Standpipe stick up (m)	0.49
Surveyed reference point	–
Depth to top of filter pack (from log)	–
Depth to bottom of filter pack (from log)	–
Depth of well (from log)	–

mbRP - metres below top of reference point
Hose volume - 0.12 L/m of 1/2 inch diameter hose
Hose volume - 0.07 L/m of 3/8 inch diameter hose
Hose volume - 0.03 L/m of 1/4 inch diameter hose

GAUGING INFORMATION

Pre-Sampling Information		Purging and Sampling Information	
Interface probe used?	YES / NO (circled: NO)	Depth of pump intake (mbRP)	-0.5m BELOW
Initial depth to water (mbRP)	8.40	Length of hose (m)	–
Depth to product (mbRP)	NA	Volume in hose (L)	–
Thickness of product (m)	NA	Depth to water after placement of pump (mbRP)	–
Bailed product thickness (m)	NA	Depth to water at end of purging (mbRP)	–
Total depth of well (mbRP)	–	Depth to water after collection of samples (mbRP)	–
Thickness of sediment on base of well (m)	–	Purging and Sampling Method	PERI PUMP.

Controller settings	
CPM	NA
Refill	
Discharge	
Throttle	

WQM Model: 90FLMV - V 4865

WQM Calibration Certificate: V4665.

GROUNDWATER MONITORING WELL PURGING RECORD

Time	Cumulative Volume Purged (L)	Flow Rate ~~(L/min)~~	Depth to Water (mbRP)	±0.1 pH	±5% Conductivity (µS)	±10 Redox (mV)	±10% Dissolved Oxygen (ppm)	±0.5°C Temperature (°C)	Appearance (Colour, Turbidity, Odour, etc)
1215		500mL/m	8.40	4.72	4.88	119	2.71	26.8	CLEAR. NO ODOUR
1220		"	8.40	4.87	4.81	57	2.10	25.4	
1225		"	8.40	4.78	4.76	30	0.80	24.1	
1230		"	8.40	4.54	4.77	42	0.60	23.5	
1235		"	8.40	4.53	4.88	46	0.53	23.7	
1240		"	8.40	4.50	4.87	49	0.56	23.7	
1245		"	8.40	4.49	4.89	49	0.55	23.7	

SAMPLING RECORD

Time Sampled: 1248
Colour: Clear.
Odour: NIL.
Turbidity: Low (circled) Medium High
Hydrocarbon Sheen ? Yes No (circled: No)
DI Water Lab Certificate No.

Sample IDs

Primary Duplicate: 11751.-01
Secondary Duplicate:
Trip Blank:
Rinsate:
Field Blank:

Sample Containers/Preservation (F=Filtered; UF=Unfiltered; P=Preserved; UP=Unpreserved)

	Vials (P/UP)		Metals (F/UF;P/UP)
	1L Amber	REFRR.	Cyanide
	1L Plastic	COC.	Sulphide
	Phenols/COD/NH3 (F/UF; P/UP)		Other
	Ferrous/Ferric Iron (F/UF; P/UP)		Other

Notes:

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Water Quality Meter Calibration Sheet

Golder Associates

Job:	14764503B - ALLANDNA FARM.	Phase/Task Number:	
Date and time:	2/12/14. 11.51 AM.	WQ meter make/model:	CyBER SCAN.
Name:	MICHAEL BARTLETT	WQ meter serial number:	223 8064.
Signature:	MBA.	Certificate Number*:	N/A.

* use unique identifier (e.g YYYYMMDD_"technician's initials")

Parameter	Standard Solution	Pre-calibration reading	Acceptable range	Calibration Required (Y/N)	Post Calibration Reading
Temperature	_____ °C		± 0.5 °C		
pH	4	3.91.	3.9 - 4.1	Y	3.95.
	7	7.01.	6.9 - 7.1	Y	7.10.
	10	10.10	9.9 – 10.1	Y	9.98.
Conductivity	0	0.0.	0.0 - 0.1 mS/cm	N	0.0.
	2.76, mS/cm @ _____ °C	2.81.	± 5%	N/	2.79.
	12.88. mS/cm @ _____ °C	12.71.	± 5%	N/	12.81.
Dissolved Oxygen	0% Saturation Solution		± 0.1 ppm		
	Ambient Air		± 0.5 ppm of value on Table A overleaf		
Redox	_____ mV @ _____ °C		± 10 mV		

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Water Quality Meter Calibration Sheet

Golder Associates

Job: 147648033 – ALAWINA FARM.

Phase/Task Number: —

Date and time: 8/12/14.

WQ meter make/model: CYBERSCAN.

Name: MICHAEL BARTLEY.

WQ meter serial number: 2238064.

Signature: [signature]

Certificate Number*: N/A.

* use unique identifier (e.g YYYYMMDD_"technician's initials")

Parameter	Standard Solution	Pre-calibration reading	Acceptable range	Calibration Required (Y/N)	Post Calibration Reading
Temperature	_____ °C		± 0.5 °C		
pH	4	4.08	3.9 - 4.1	N	4.11.
	7	7.07.	6.9 - 7.1	N	7.01.
	10	9.95.	9.9 – 10.1	N	9.98.
Conductivity	0	0.0	0.0 - 0.1 mS/cm		
	2.76 mS/cm @ _____ °C	2.77.	± 5%	2.79.	N
	12.88. mS/cm @ _____ °C	12.91	± 5%	12.80	N
Dissolved Oxygen	0% Saturation Solution		± 0.1 ppm		
	Ambient Air		± 0.5 ppm of value on Table A overleaf		
Redox	_____ mV @ _____ °C		± 10 mV		

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RL1
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Water Quality Meter Calibration Sheet

Golder Associates

Job: 147645033 - ALLAWINA FARM.

Date and time: 4/12/14.

Name: MICHAEL BARTLETT.

Signature: [signature]

Phase/Task Number: — -

WQ meter make/model: CYBER SCAN.

WQ meter serial number: 2238064.

Certificate Number*: — -

* use unique identifier (e.g YYYYMMDD_"technician's initials")

Parameter	Standard Solution	Pre-calibration reading	Acceptable range	Calibration Required (Y/N)	Post Calibration Reading
Temperature	_____ °C		± 0.5 °C		
pH	4	4.06.	3.9 - 4.1	N	4.01.
	7	7.08.	6.9 - 7.1	N	7.07.
	10	10.11	9.9 – 10.1	N.	9.96.
Conductivity	0	0.0.	0.0 - 0.1 mS/cm	N	0.0
	2.76. mS/cm @ _____ °C	2.81	± 5%	2.80.	N
	12.88. mS/cm @ _____ °C	12.94.	± 5%	12.92.	N
Dissolved Oxygen	0% Saturation Solution		± 0.1 ppm		
	Ambient Air		± 0.5 ppm of value on Table A overleaf		
Redox	_____ mV @ _____ °C		± 10 mV		

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Water Quality Meter Calibration Sheet

Golder Associates

Job: 147645083 - ALLANDINA FARM.

Date and time: 11/12/14.

Name: MICHAEL BARTLETT.

Signature: [signature]

Phase/Task Number: —

WQ meter make/model: 90 FLMV.

WQ meter serial number: —

Certificate Number*: —

* use unique identifier (e.g YYYYMMDD_"technician's initials")

Parameter	Standard Solution	Pre-calibration reading	Acceptable range	Calibration Required (Y/N)	Post Calibration Reading
Temperature	_____ °C		± 0.5 °C		
pH	4	4.08	3.9 - 4.1	✓	4.05
	7	7.10	6.9 - 7.1	✓	7.05
	10	9.96.	9.9 – 10.1	✓	9.99.
Conductivity	0	0.0	0.0 - 0.1 mS/cm	✓	0.0
	2.76 mS/cm @ _____ °C	2.81	± 5%	✓	2.80
	12.00 mS/cm @ _____ °C	12.79.	± 5%	✓	12.79.
Dissolved Oxygen	0% Saturation Solution		± 0.1 ppm		
	Ambient Air		± 0.5 ppm of value on Table A overleaf		
Redox	_____ mV @ _____ °C		± 10 mV		

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APPENDIX H

Groundwater Quality Laboratory Results and Groundwater Monitoring Report, February 2015

Table H1 - Groundwater Quality Results

Golder Associates

			Lab ID	EP1410543002	EP1410543003	EP1410543004	EP1410543005	EP1410543006	EP1410543001
			Field ID	11251-02	11251-03	11251-04	11251-05	11251-06	11251-01
			Well	**GMB2**	**GMB3**	**GMB4**	**GMB5**	**GMB5 Dup**	**GMB6**
			Sampled Date	11/12/2014	11/12/2014	11/12/2014	11/12/2014	11/12/2014	11/12/2014
Group	**Parameter**	**Unit**	**Limit of Reporting (LOR)**						
Field Parameters	Groundwater Level	mbtoc		5.98	5.72	8.05	0		8.48
	Conductivity	mS/cm		17.41	5.13	4.1	17.96		4.89
	Temperature	deg C		21.4	21.6	23.8	22.5		23.7
	pH			3.98	4.22	4.1	5.87		4.49
	Redox Potential	mV		231	120	95	-4		49
	Dissolved Oxygen	ppm		0.51	1.69	1.86	0.09		0.55
Inorganics	Electrical Conductivity	uS/cm	1	20500	5690	4180	20000	20100	5540
	pH (Lab)	pH Units	0.1	3.61	4.25	6.13	6.47	6.47	4.81
	Total Dissolved Solids @180°C	mg/L	10	13300	3700	2720	13000	13100	3600
	Sodium	mg/L	0.5	3480	920	734	2840	2950	931
	Potassium	mg/L	0.5	79	43	9	24	24	29
	Calcium	mg/L	0.5	41	2	9	290	302	4
	Magnesium	mg/L	0.5	510	75	44	595	618	70
	Chloride	mg/L	1	6370	1570	1190	6130	6160	1670
	Sulphate (as S)	mg/L	5	585	146	237	476	526	194
	Fluoride	mg/L	0.1	0.5	0.2	0.8	0.6	0.6	0.4
	Hydroxide Alkalinity as CaCO3	mg/L	20	<1	<1	<1	<1	<1	<1
	Carbonate Alkalinity as CaCO3	mg/L	20	<1	<1	<1	<1	<1	<1
	Bicarbonate Alkalinity as CaCO3	mg/L	20	<1	<1	34	114	115	<1
	Total Alkalinity as CaCO3	mg/L	20	<1	<1	34	114	115	<1
Nutrients	Ammonia (as N)	mg/L	0.01	0.47	0.05	0.03	0.05	0.04	0.09
	Total Kjeldahl Nitrogen (as N)	mg/L	0.2	0.6	0.4	0.2	0.1	0.1	0.2
	Nitrite & Nitrate (as N)	mg/L	0.05	0.35	0.92	0.93	<0.01	<0.01	0.04
	Nitrogen (Total)	mg/L	0.2	1.0	1.3	1.1	0.1	0.1	0.2
	Reactive Phosphorus (as P)	mg/L	0.05	<0.02	<0.02	0.01	<0.01	<0.01	<0.01
	Total Phosphorus (as P)	mg/L	0.5	<0.02	<0.02	0.01	<0.01	<0.01	<0.01
Dissolved Metals	Arsenic	mg/L	0.001	<0.002	<0.001	<0.001	<0.002	<0.002	<0.001
	Boron	mg/L	0.05	0.32	0.14	0.26	0.06	0.06	<0.05
	Barium	mg/L	0.001	0.045	0.049	0.028	0.045	0.046	0.036
	Beryllium	mg/L	0.001	<0.002	<0.001	<0.001	<0.002	<0.002	<0.001
	Cadmium	mg/L	0.0001	<0.0002	<0.0001	<0.0001	<0.0002	<0.0002	<0.0001
	Cobalt	mg/L	0.001	0.025	0.002	0.004	0.016	0.017	0.003
	Chromium	mg/L	0.001	0.006	<0.001	<0.001	<0.002	<0.002	<0.001
	Copper	mg/L	0.001	0.008	0.004	0.002	0.003	0.003	0.002
	Ferrous Iron	mg/L	0.05	36.4	0.17	<0.05	0.06	0.05	0.25
	Manganese	mg/L	0.001	0.120	0.014	0.028	0.96	0.972	0.021
	Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Nickel	mg/L	0.001	0.014	0.001	0.003	0.009	0.01	0.002
	Lead	mg/L	0.001	0.006	<0.001	<0.001	<0.002	<0.002	0.005
	Selenium	mg/L	0.01	<0.02	<0.01	<0.01	<0.02	<0.02	<0.01
	Vanadium	mg/L	0.01	<0.02	<0.01	<0.01	<0.02	<0.02	0.01
	Zinc	mg/L	0.005	0.048	0.026	0.017	0.013	0.013	0.021
Monocyclic Aromatic Hydrocarbons	Benzene	mg/L	1	<1	<1	<1	<1	<1	<1
	Toluene	mg/L	2	<2	<2	<2	<2	<2	<2
	Ethylbenzene	mg/L	2	<2	<2	<2	<2	<2	<2
	meta- & para-Xylene	mg/L	2	<2	<2	<2	<2	<2	<2
	ortho-Xylene	mg/L	2	<2	<2	<2	<2	<2	<2
	Total Xylenes	mg/L	2	<2	<2	<2	<2	<2	<2
	Sum of BTEX	mg/L	1	<1	<1	<1	<1	<1	<1
	Naphthalene	mg/L	5	<5	<5	<5	<5	<5	<5
Polycyclic Aromatic Hydrocarbons	Naphthalene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Acenaphthylene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Acenaphthene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Fluorene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Phenanthrene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Anthracene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Fluoranthene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Pyrene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Benz(a)anthracene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Chrysene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Benzo(b+j)fluoranthene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Benzo(k)fluoranthene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Benzo(a)pyrene	mg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Indeno(1.2.3.cd)pyrene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Dibenz(a.h)anthracene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Benzo(g.h.i)perylene	mg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Sum of polycyclic aromatic hydrocarbons		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Benzo(a)pyrene TEQ (zero)	mg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Recoverable Hydrocarbons	C6 - C10 Fraction	mg/L	20	<20	<20	<20	<20	<20	<20
	C6 - C10 Fraction minus BTEX (F1)	mg/L	20	<20	<20	<20	<20	<20	<20
	>C10 - C16 Fraction	mg/L	100	<100	<100	<100	<100	<100	<100
	>C16 - C34 Fraction	mg/L	100	<100	<100	<100	<100	<100	<100
	>C34 - C40 Fraction	mg/L	100	<100	<100	<100	<100	<100	<100
	>C10 - C40 Fraction (sum)	mg/L	100	<100	<100	<100	<100	<100	<100
	>C10 - C16 Fraction minus Naphthalene (F2)	mg/L	100	<100	<100	<100	<100	<100	<100

Prepared by MJB
Reviewed by DMT

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THE LEADER IN RESOURCE RECOVERY

GROUNDWATER MONITORING REPORT ALLAWUNA FARM – FEBRUARY 2015

11th March 2015

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DATA SPREADSHEET

The collated data for this round of water quality monitoring and all previous rounds of water quality monitoring is contained in an accompanying excel spreadsheet.

The excel spreadsheet is attached to the PDF version of this document.

150310 SB Allawuna Groundwater Quality Feb 2015.xlsx

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1 EXECUTIVE SUMMARY

Bowman & Associates Pty Ltd was contracted by SITA Australia to undertake a round of bi-annual groundwater and surface water monitoring at the Allawuna Farm in the Shire of York.

This document describes the methodology and results of groundwater monitoring undertaken by Bowman & Associates at Allawuna Farm to continue building a baseline water quality dataset for a proposed landfill development. The sampling event described in this report took place on the 10th and 11th of February, 2015.

The groundwater levels ranged from 295.9 m AHD[1] (MB01) to 327.4 m AHD (MB08). GMB1 and the two surface water monitoring locations were dry during this round of monitoring. Compared to the previous round of monitoring (August 2014), the surface water level (SWL) decreased in all bores.

Groundwater taken from all of the bores was moderately to strongly acidic (ranging from 3.28 to 5.94) and did not meet the ANZECC & ARMCANZ Guidelines for Fresh and Marine Water Quality (the Guidelines). The majority of groundwater samples contained Iron concentrations that exceeded those stipulated in the Guidelines. Trace metals such as Manganese and Nickel were also found to exceed ANZECC & ARMCANZ levels in four separate samples.

The groundwater is generally saline in the region, with all but three bores (MB03, MB07 and MB09) with EC in excess of 4,250 µS/cm. Bores MB03, MB07 and MB09 report as brackish, with EC between 2,480 µS/cm and 4,250 µS/cm. The groundwater salinity profile is consistent with the previous round of monitoring performed in August 2014.

Seven (7) of the groundwater samples also returned Guideline-exceeding levels of Total Nitrogen.

Arsenic, Chromium, Selenium, Mercury and Molybdenum were undetected in all bores. Cadmium was also undetected in all the bores except for MB01 (0.0068 mg/L). Four of the bores (MB01, MB06, MB11 and MB13) exhibit concentrations of Lead significantly higher than the Guidelines. Nickel concentrations exceeded the guidelines in bores MB01, MB13 and MB14. Manganese concentrations exceeded the guidelines in bores MB01, MB11 and GMB5, whilst concentrations of Iron ranged from <0.25 mg/L to 48 mg/L.

No organochlorine pesticides, organophosphorous pesticides, polycyclic aromatic hydrocarbons, polychlorinated biphenyls or volatile organics were detected, which would indicate that there has been no impact on the site from historic land uses that would result in this pollution.

[1] Australian Height Datum.

2 BACKGROUND

SITA Australia (SITA) is currently working to develop a new landfill facility in the Shire of York on a property identified as Allawuna Farm.

Bowman & Associates is providing SITA with technical support for the design of the infrastructure and services. In order to establish a robust baseline water quality dataset, a biannual monitoring program for the bores installed on site is currently in effect. Seven (7) bores were installed in winter 2012 and an additional six (6) bores were installed in autumn 2013. This has been followed more recently by the installation of a further six (6) bores in December 2014 by Golder Associates Pty Ltd.

3 INTRODUCTION

Bowman & Associates was commissioned by SITA to sample the nineteen (19) bores and two (2) surface water locations on site for laboratory analysis.

The groundwater bore sampling was undertaken between the 10th and 11th of February 2015.

Results presented below identify groundwater parameters of significance and any significant changes from the previous round of sampling undertaken in August 2014.

The results have been evaluated using the Australian and New Zealand Guidelines for Freshwater and Marine Water Quality (ANZECC 2000) and the Australian Drinking Water Guidelines (NHMRC, NRMMC 2011), using trigger values for 95% protection level of species for toxicants in water where they have been established, and trigger values for lowland rivers in the south-west Australia for slightly to moderately disturbed ecosystems for physical and chemical stressors (as there are no guidelines specifically for groundwater).

4 PREVIOUS MONITORING EVENTS

The first seven bores were installed and monitored in August 2012 by Greencap (formerly ENV Australia Pty Ltd). The later groundwater monitoring events have been undertaken by Bowman and Associates Pty Ltd. The date of monitoring periods at the site are summarised below:

- August 2014,
- February 2014,
- August 2013, and
- February 2013.

Previous surface water monitoring during the winter months was undertaken by Bowman and Associates Pty Ltd Ltd. The dates of previous sampling at the site are summarised below:

- August 2014, and
- August 2012.

5 BORES

A network of seven (7) monitoring bores (MBs) was installed across the site in August 2012. The bores were initially installed with the objective of establishing the regional groundwater flow direction and water quality under the landfill development area.

An additional six (6) MBs were installed around the previously proposed Landfill Cell 1 and Cell 2 areas to gain a better understanding of the ground water depth and geology below the initially proposed landfill cell locations.

A further six (6) bores were installed by Golder Associates Pty Ltd between the 2nd and 4th December 2014 to provide a better understanding of the groundwater gradient and quality in the northern and eastern areas of the subject site. Hence, this is the first round of monitoring for the Golder Monitoring Bores (GMBs).

Table 1 below identifies the geographic location and elevation of each bore at the site.

Table 1: Bore Locations and Elevations

Bore ID	Easting (GDA94)	Northing (GDA94)	Top of Casing Elevation (m AHD)
MB01	461241	6469802	270.12
MB03	462012	6468382	280.73
MB04	462314	6468385	275.35
MB05	462063	6468857	274.65
MB06	462704	6468877	283.88
MB07	463610	6469135	304.46
MB08	463173	6469493	308.19
MB09	461856	6468566	307.10
MB10	461920	6468767	300.44
MB11	462457	6468765	303.37
MB12	462367	6469000	316.42
MB13	462516	6469124	321.21
MB14	462742	6469082	314.62
GMB1	462508	6469516	334.94
GMB2	463175	6469492	333.87
GMB3	463287	6469115	328.85
GMB4	463008	6468751	319.00
GMB5	462449	6468760	303.90
GMB6	462522	6469274	326.43

Note: Bore MB02 was not installed on site as the hole was dry to the complete exploration depth when drilled.

Drawing ALLA-WA-32 (**Appendix A**) attached shows the locations of the bores at the Allawuna site.

6 SURFACE WATER

13 Mile Brook, the watercourse that runs along the valley floor through the site, was dry during this monitoring period and hence no samples could be taken for analysis. The 13 Mile Brook watercourse is seasonally dry during the summer months. The surface water was previously sampled during the monitoring event in August 2014 after the winter rains.

7 PARAMETERS MEASURED

A broad suite of parameters has been selected for baseline monitoring to enable the elimination of exotic species from operational monitoring at the site.

7.1 *IN SITU* PARAMETERS

The following parameters required determination *in situ* for accurate reporting:

- Standing Water Level (SWL),
- pH,
- Electrical Conductivity (EC), and
- Temperature (for reference only).

7.2 LABORATORY TESTED PARAMETERS

The following groundwater parameters were evaluated by a National Association of Testing Authorities (NATA) accredited laboratory (Eurofins|mgt):

- Chloride,
- Ammonia,
- Nitrogen,
- Phosphate,
- Sulphate,
- Potassium,
- Soluble Solids,
- Total Organic Carbon,
- Heavy Metals (Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium and Zinc) – Laboratory Filtered,
- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX),
- Organochlorine Pesticides,
- Organophosphorous Pesticides,
- Polychlorinated Biphenyls (PCBs),
- Polycyclic Aromatic Hydrocarbons (PAHs),
- Total Recoverable Hydrocarbons,
- Volatile Organics [Tetrachloroethene (TCE) and Trichloroethene (PCE) species].

Laboratory measurement of pH and EC was also performed for comparison and validation.

8 METHODOLOGY

All sampling of groundwater at the site was undertaken in accordance with Australian and New Zealand Standard AS/NZS 5667.1 (1998) and AS/NZ 5667.11 (1998).

8.1 BORE IDENTIFICATION

Bores were located by map and GPS, with confirmation of bore labels and locations against original installation log sheets and labels on the bores.

8.2 STANDING WATER LEVEL MEASUREMENT, PURGING AND SAMPLING

A plopper (60 mm long) and tape measure were used to determine the standing water level (SWL) in each bore, relative to the top of the casing. Each bore casing was purged of three times its volume with a QED Micropurge low flow bladder pump or using a stainless steel hand bailer. The pump intake was positioned in the centre of the screened section of casing, as identified from the bore logs to ensure water would be drawn from the surrounding aquifer and *in situ* parameters would stabilise quickly. Single use sterile plastic pumping bladders, air and water tubing were used, with the pump disassembled and decontaminated using deionised water between bores.

Some of the bores' groundwater contained sediment and silt to such a degree that the pump filter screen became blocked and rendered it unusable. For those bores, the stainless steel hand bailer was used to extract the required volume of water. The bailer was decontaminated with deionised water before and after use.

Samples were taken periodically during pumping and bailing to ensure the EC, pH and temperature measurements were stabilised and that the bore was successfully purged to produce representative groundwater.

During this sampling period, bore GMB1 was dry and as such a water sample was not collected from this bore.

8.3 CONDUCTIVITY AND PH MEASUREMENT

A WP-81 multi-sensor instrument was used to measure the EC, pH and temperature of the water samples in the field. The instrument was calibrated successfully each day before sampling in accordance with the manufacturer's specifications.

8.4 SAMPLE PREPARATION AND PRESERVATION

Samples were transferred into prepared containers supplied by Eurofins|mgt laboratory with appropriate preservatives for the various analyses requested. Samples to be tested for metals were not filtered in the field, but were filtered in the laboratory using a 0.45 µm membrane filter. Containers were chilled on ice and refrigerated overnight before delivery to the laboratory depot.

8.5 LABORATORY DELIVERY AND TESTING

Samples were delivered to the Perth Eurofins|mgt depot and couriered to its Melbourne laboratory for analysis. A chain of custody document was maintained with the samples, as provided in **Appendix D**.

Samples were analysed to the appropriate Australian Standards (Eurofins|mgt, NATA Accreditation Number 1261, Site Number 1254). An analysis certificate for the samples is provided as part of **Appendix E**.

8.6 INTERPRETATION OF RESULTS

The results of the field and laboratory analysis have been interpreted to produce this report.

9 GROUNDWATER RESULTS

9.1 *IN SITU* FIELD PARAMETERS

Log sheets for the sampling at each bore are provided in **Appendix B**.

Table 2 overleaf summarises the results of the *in situ* measurements.

Table 2: Results of *in situ* field measurements

Parameter	MB01	MB03	MB04	MB05	MB06	MB07	MB08	MB09	MB10	MB11	MB12	MB13	MB14
Elevation (SWL, m AHD)	296.44	303.59	301.76	299.57	307.76	326.90	327.24	300.42	299.56	303.74	306.28	309.55	313.34
pH	4.60	4.82	4.36	5.45	5.08	5.66	4.00	5.74	3.69	3.57	4.10	3.28	3.47
Conductivity (µS/cm)	27800	2480	15080	7100	17940	2600	22150	4250	24530	19290	14150	21000	23790
Temperature (°C)	22.4	23.3	24.8	22.9	20.7	21.4	20.5	22.1	23.1	22.8	23.7	21.9	20.7

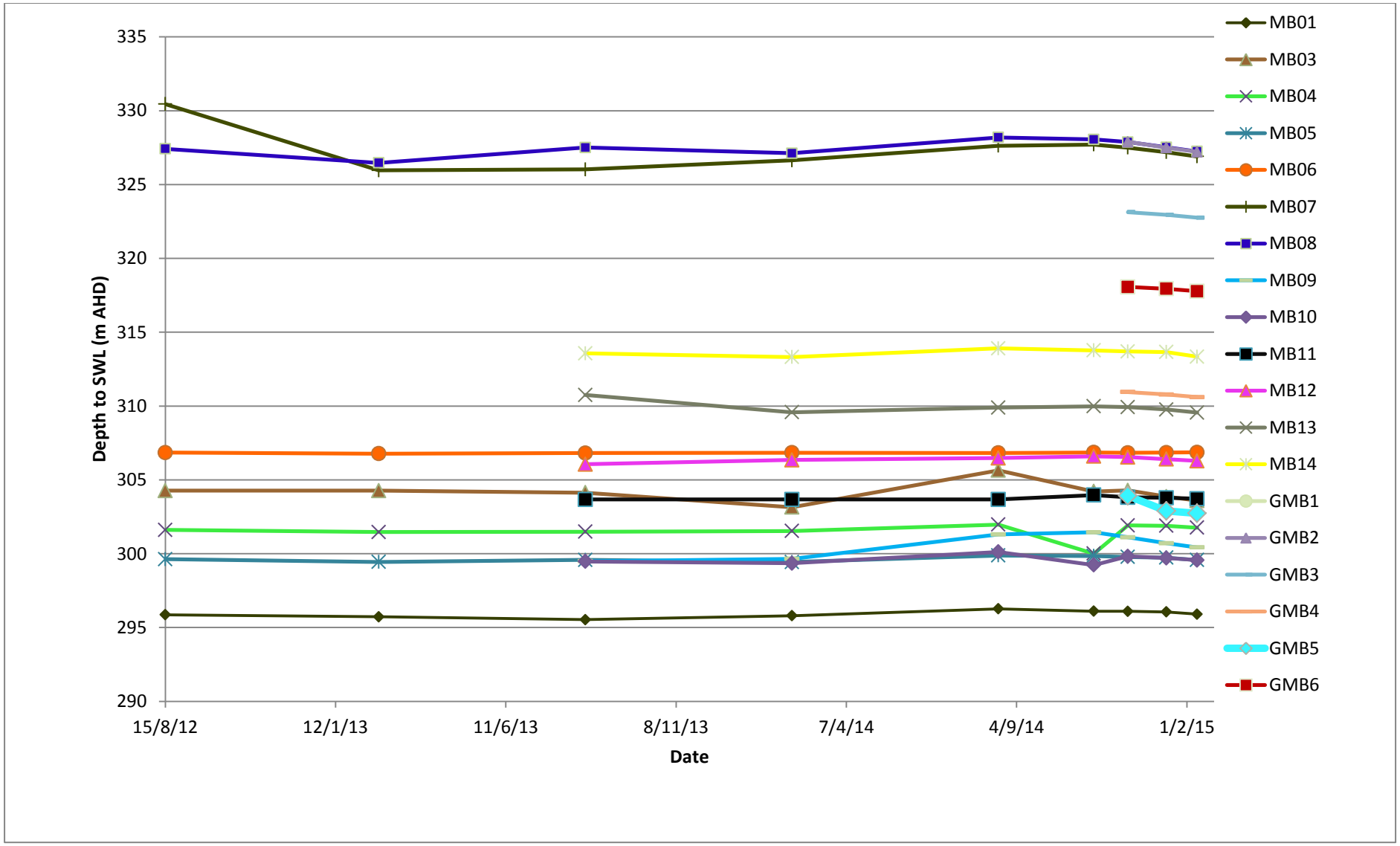
Parameter	GMB01 (dry)	GMB02	GMB03	GMB04	GMB05	GMB06
Elevation (SWL, m AHD)	N/A	327.22	322.75	310.6	302.74	317.77
pH	N/A	3.68	3.91	5.46	5.94	4.56
Conductivity (µS/cm)	N/A	21700	6340	5060	18760	5420
Temperature (°C)	N/A	20.4	21.3	21	22.1	20.9

9.1.1 STANDING WATER LEVEL

The measured elevations of the groundwater table show a decrease in water level in most bores when compared with the previous monitoring exercise. This is consistent with the lack of groundwater recharge from rainfall over the summer months. **Figure 1** below shows the change in water levels in the bores since being installed. The standing water level (SWL) for all bores showed a decline over the summer months.

The variations in water level between the previous winter monitoring and the February summer monitoring were not significant enough to vary the resultant groundwater flow direction. Groundwater flow under 13 Mile Brook remains to the North West, away from the Mundaring Weir catchment.

Figure 1: Groundwater Elevations (m AHD) in Allawuna Bores



9.1.2 PH - FIELD

The groundwater under the site is moderately to strongly acidic, with pH ranging from 3.28 to 5.94. The groundwater samples taken in February 2015 are slightly more acidic than those taken in August 2014. This can also be attributed to the lack of groundwater recharge over the summer months, which serves to increase the acidity of the groundwater.

9.1.3 ELECTRICAL CONDUCTIVITY - FIELD

The groundwater is generally saline in the region, with all but three bores (MB03, MB07 and MB09) with EC in excess of 4,250 µS/cm. Bores MB03, MB07 and MB09 report as brackish, with EC between 2,480 µS/cm and 4,250 µS/cm. The groundwater salinity profile is consistent with the previous round of monitoring performed in August 2014.

The less saline bores are towards the outer limits of the catchment, close to the catchment divide.

9.2 LABORATORY ANALYSIS

The results from this monitoring event and from these previous monitoring events have been tabulated in **Appendix C**.

The sections below summarise the test results for this monitoring event.

9.2.1 CHLORIDE

Chloride concentrations in each of the bores have been summarised below. Consistent with the previous round of water quality monitoring (where applicable), all bores exceed aesthetic limits for chloride.

Table 3: Chloride Concentrations in Bores

Parameter	Assessment Level (AL)	MB01	MB03	MB04	MB05	MB06	MB07	MB08	MB09	MB10
Chloride (mg/L)	250 mg/L (aesthetic)	12,000	680	5,700	2,200	7,000	730	8,700	1,200	9,800

Parameter	AL	MB11	MB12	MB13	MB14	GMB2	GMB3	GMB4	GMB5	GMB6
Chloride (mg/L)	250 mg/L (aesthetic)	7,300	7,300	5,500	8,200	8,400	2,000	1,400	7,400	1,700

9.2.2 NUTRIENTS

Samples were tested for a variety of nutrients including Ammonia, Phosphate, Sulphate, Total Nitrogen, Nitrate & Nitrite, Potassium and Total Kjeldahl Nitrogen. The results of the laboratory testing are summarised in **Table 4** below.

Table 4: Nutrient Concentrations in Bores

Parameter (mg/L)	AL (mg/L)	MB01	MB03	MB04	MB05	MB06	MB07	MB08	MB09	MB10	MB11	MB12	MB13	MB14
Ammonia (as N)	0.5	0.05	0.14	0.18	0.08	0.04	< 0.01	0.27	0.24	0.18	0.21	0.04	0.17	0.17
Phosphate total (as P)	5	< 5	< 0.5	< 5	< 5	< 5	< 0.5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Sulphate (as S)	500	280	35	120	96	160	35	200	64	260	160	110	120	270
Nitrate & Nitrite (as N)	0.01	0.46	0.46	< 0.05	< 0.05	0.31	0.31	< 0.05	0.08	< 0.05	< 0.05	0.31	0.06	< 0.05
Total Kjeldahl Nitrogen (as N)	N/A	< 0.2	< 0.2	0.3	< 0.2	< 0.2	< 0.2	0.5	0.3	0.3	3.1	< 0.2	< 0.2	0.3
Total Nitrogen (as N)	0.35	0.5	0.5	0.3	< 0.2	0.3	0.3	0.5	0.4	0.3	3.1	0.3	< 0.2	0.3

Parameter (mg/L)	AL (mg/L)	GMB2	GMB3	GMB4	GMB5	GMB6
Ammonia (as N)	0.5	0.6	0.09	0.01	0.02	0.09
Phosphate total (as P)	5	3.7	4.1	5.9	6.5	5.1
Sulphate (as S)	500	200	67	110	150	69
Nitrate & Nitrite (as N)	0.01	< 0.05	0.81	0.14	< 0.05	0.2
Total Kjeldahl Nitrogen (as N)	n/a	0.7	< 0.2	< 0.2	< 0.2	< 0.2
Total Nitrogen (as N)	0.35	0.7	0.8	< 0.2	< 0.2	0.2

Note 1: Grey shading indicates the parameter was below the limit of detection for the laboratory test.
Note 2: Red values indicate assessment level exceedence.

Assessment levels (black) have been determined from the Australian Drinking Water Guidelines (NHMRC, NRMMC 2011), or, if no Australian Drinking Water Guideline value exists, from the National Water Quality Management Strategy Guideline (blue) (ANZECC 2000).

9.2.3 POTASSIUM

Potassium concentrations in each of the bores have been summarised in **Table 5** below.

Table 5: Potassium Concentrations in Bores

Parameter	AL	MB01	MB03	MB04	MB05	MB06	MB07	MB08	MB09	MB10
Potassium (mg/L)	N/A	42	7	16	18	44	11	74	19	23

Parameter	AL	MB11	MB12	MB13	MB14	GMB2	GMB3	GMB4	GMB5	GMB6
Potassium (mg/L)	N/A	30	26	11	8.9	83	40	8.5	21	25

The February 2015 concentrations of potassium were slightly higher in all of the bores when compared with results from August 2014.

9.2.4 SOLUBLE SOLIDS

Total Soluble Solids (Sometimes referred to as TDS or Total Dissolved Solids) is an aggregate indicator for the total amount of molecular, ionized or micro-granular material in the water samples. **Table 6** summarises the Soluble Solids in each bore.

Table 6: Soluble Solids in Water Samples

Parameter	AL	MB01	MB03	MB04	MB05	MB06	MB07	MB08	MB09	MB10
Soluble Solids (mg/L)	600 mg/L (aesthetic)	22,000	1,400	9,500	4,000	12,000	1,500	15,000	2,300	17,000

Parameter	AL	MB11	MB12	MB13	MB14	GMB2	GMB3	GMB4	GMB5
Soluble Solids (mg/L)	600 mg/L (aesthetic)	14,000	9,000	13,000	16,000	15,000	3,600	2,900	14,000

The assessment level for Soluble Solids was determined from the Australian Drinking Water Guidelines. All bores show soluble solids well in excess of aesthetic limits.

9.2.5 TOTAL ORGANIC CARBON

Total Organic Carbon (TOC) is included as a broad measure of total organic compounds in the groundwater.

Table 7 summarises the Total Organic Carbon in each bore.

Table 7: Total Organic Carbon of Water Samples

Parameter	AL	MB01	MB03	MB04	MB05	MB06	MB07	MB08	MB09	MB10
TOC (mg/L)	N/A	< 5	7.2	15	15	24	9.8	24	15	24

Parameter	AL	MB11	MB12	MB13	MB14	GMB2	GMB3	GMB4	GMB5	GMB6
TOC (mg/L)	N/A	12	18	19	35	21	10	15	17	17

Note 1: Grey shading indicates the parameter was below the limit of detection for the laboratory test.

Organic compounds were notably absent from the February 2014 monitoring samples, with the exception of bore MB14. This is not the case for the August 2014 and February 2015 samples, which show detectable levels of organics in all bores except MB03 (Aug 2014) and MB01 (Feb 2015).

TOC in the bores ranged from <5 mg/L in MB01 to 35 mg/L in MB14.

9.2.6 HEAVY METALS

Samples to be tested for metals were filtered in the laboratory using a 0.45 µm membrane filter.

- Arsenic, Chromium, Selenium, Mercury and Molybdenum were undetected in all bores.
- Cadmium was also undetected in all the bores except for MB01 (0.0068 mg/L).
- Concentrations of Iron ranged from <0.25 mg/L to 48 mg/L.
- Four of the bores (MB01, MB06, MB11 and MB13) exhibit concentrations of Lead significantly higher than the Australian Drinking Water Guidelines (ADWG).
- Nickel concentrations exceeded the guidelines in bores MB01, MB13 and MB14.
- Manganese concentrations exceeded the guidelines in bores MB01, MB11 and GMB5.

Table 8 & 9 overleaf show a summary of concentrations of metals in the bores.

Table 8: Metal Concentrations in Bores

Metals (mg/L)	AL (mg/L)	MB01	MB03	MB04	MB05	MB06	MB07	MB08	MB09	MB10	MB11	MB12	MB13	MB14
Arsenic	0.01	< 0.005	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.005	< 0.001	< 0.005	0.006	< 0.001	< 0.005	< 0.005
Cadmium	0.002	0.0068	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.001	< 0.0002	< 0.001	< 0.001	< 0.0002	< 0.001	< 0.001
Chromium	0.05	< 0.005	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.005	< 0.001	< 0.005	< 0.005	< 0.001	< 0.005	< 0.005
Copper	2	0.029	< 0.001	< 0.001	0.002	< 0.005	0.002	< 0.005	< 0.001	< 0.005	< 0.005	0.007	0.021	0.01
Iron	0.3 aesthetic	< 0.25	3.6	16	0.46	< 0.25	1	45	22	18	15	< 0.05	1.6	20
Lead	0.01	0.017	< 0.001	0.001	< 0.001	0.026	< 0.001	< 0.005	< 0.001	< 0.005	0.037	0.002	0.14	0.008
Manganese	0.5	1.5	0.035	0.042	0.12	0.21	0.006	0.13	0.016	< 0.025	0.62	0.094	< 0.025	0.31
Mercury	0.001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0005	< 0.0005
Molybdenum	0.05	< 0.025	< 0.005	< 0.005	< 0.005	< 0.025	< 0.005	< 0.025	< 0.005	< 0.025	< 0.025	< 0.005	< 0.025	< 0.025
Nickel	0.02	0.05	0.005	0.004	0.01	0.009	< 0.001	0.011	0.003	0.008	0.015	0.005	0.028	0.025
Selenium	0.01	< 0.005	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.005	< 0.001	< 0.005	< 0.005	< 0.001	< 0.005	< 0.005
Zinc	3 aesthetic	2.6	0.004	0.003	0.007	0.007	0.004	0.015	0.004	0.008	0.009	0.006	0.027	0.13

Note 1: Grey shading indicates the parameter was below the limit of detection for the laboratory test.
Note 2: Red values indicate assessment level exceedence.

Table 9: Concentration of Metals in GMBs.

Metals (mg/L)	AL (mg/L)	GMB2	GMB3	GMB4	GMB5	GMB6
Arsenic	0.01	< 0.005	< 0.001	< 0.001	< 0.005	< 0.001
Cadmium	0.002	< 0.001	< 0.0002	< 0.0002	< 0.001	< 0.0002
Chromium	0.05	< 0.005	< 0.001	< 0.001	< 0.005	< 0.001
Copper	2	0.005	0.013	< 0.001	< 0.005	< 0.001
Iron	0.3 aesthetic	48	1.2	< 0.05	< 0.25	< 0.05
Lead	0.01	0.007	< 0.001	< 0.001	< 0.005	0.001
Manganese	0.5	0.1	0.018	0.013	1	0.043
Mercury	0.001	< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0001
Molybdenum	0.05	< 0.025	< 0.005	< 0.005	< 0.025	< 0.005
Nickel	0.02	0.012	0.002	0.003	0.009	0.004
Selenium	0.01	< 0.005	< 0.001	< 0.001	< 0.005	< 0.001
Zinc	3 aesthetic	0.019	0.016	0.016	0.005	0.018

Assessment levels have been determined from the Australian Drinking Water Guidelines (NHMRC, NRMMC 2011).

9.2.7 BTEX

No Benzene, Toluene, Ethylbenzene or Xylenes were detected in the groundwater samples at the site.

9.2.8 ORGANOCHLORINE PESTICIDES

No Organochlorine Pesticides (OCPs) were detected in the groundwater at the site.

9.2.9 ORGANOPHOSPHOROUS PESTICIDES

No Organophosphorous Pesticides (OPPs) were detected in the groundwater at the site.

9.2.10 POLYCHLORINATED BIPHENYLS

No Polychlorinated Biphenyls (PCBs) were detected in the groundwater at the site.

9.2.11 HYDROCARBONS

No Polycyclic Aromatic Hydrocarbons (PAHs) or any other hydrocarbons were detected in the groundwater at the site.

9.2.12 VOLATILE ORGANICS

No Tetrachloroethene (TCE) or Trichloroethene (PCE) species were detected in the groundwater at the site.

10 SURFACE WATER RESULTS

Given that the two surface water sampling locations are located in 13 Mile Brook, which is dry over the summer months, no surface water samples could be included as part of this round of monitoring.

11 QUALITY CONTROL SAMPLES

11.1 LABORATORY SURROGATES

Surrogate species were added to samples prior to laboratory preparation for BTEX, OCP, OPP, PCB and PAH testing. Surrogates verify the extraction efficiency of the sample preparation technique, ensure the analysis equipment is detecting target species correctly and maintain batch quality control.

11.2 DUPLICATE AND TRIPLICATE SAMPLES

A total of 3 samples were extracted from bore MB09 (primary, duplicate and triplicate) with each sample being separately analysed to verify both the homogeneity of the groundwater collected and the reproducibility of laboratory analysis results.

Duplicate and triplicate results for all tested parameters were almost all within acceptable error bounds of the primary sample. Typical variance between primary and quality control samples was less than 5%. The only parameter that did not fall into this category was TOC, which showed results of 15, 6.1 and 19 mg/L for the three samples. However, the statistical significance of these differences is negligible as the limit of reporting (LOR) for TOC is <5 mg/L.

12 SUMMARY OF COMPARISON TO PREVIOUS MONITORING DATA

The February 2015 monitoring data was compared to that of August 2014 and longer term monitoring data with the following results:

- pH consistently acidic across the seasons.
- Conductivity, Salinity and Chloride levels consistently high across the seasons.
- Nutrient levels largely consistent across winter and summer, with a slightly declining trend.
- Heavy metal concentrations are significantly lower during summer monitoring, with the exception of MB01 which maintains its historically high concentrations of Cadmium, Selenium, Manganese and Nickel.
- Iron concentrations are consistently high across all seasons.
- High Lead concentrations detected year-round in bore MB13 and during winter in bores MB01 and MB11.
- Exotic Species (BTEX, OCPs, OPPs, PCBs, PAHs, Hydrocarbons, TCE and PCE) have not been detected in any sampling performed to date in either groundwater or surface water.

13 REFERENCES

ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Volume 1, The guidelines* / Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).

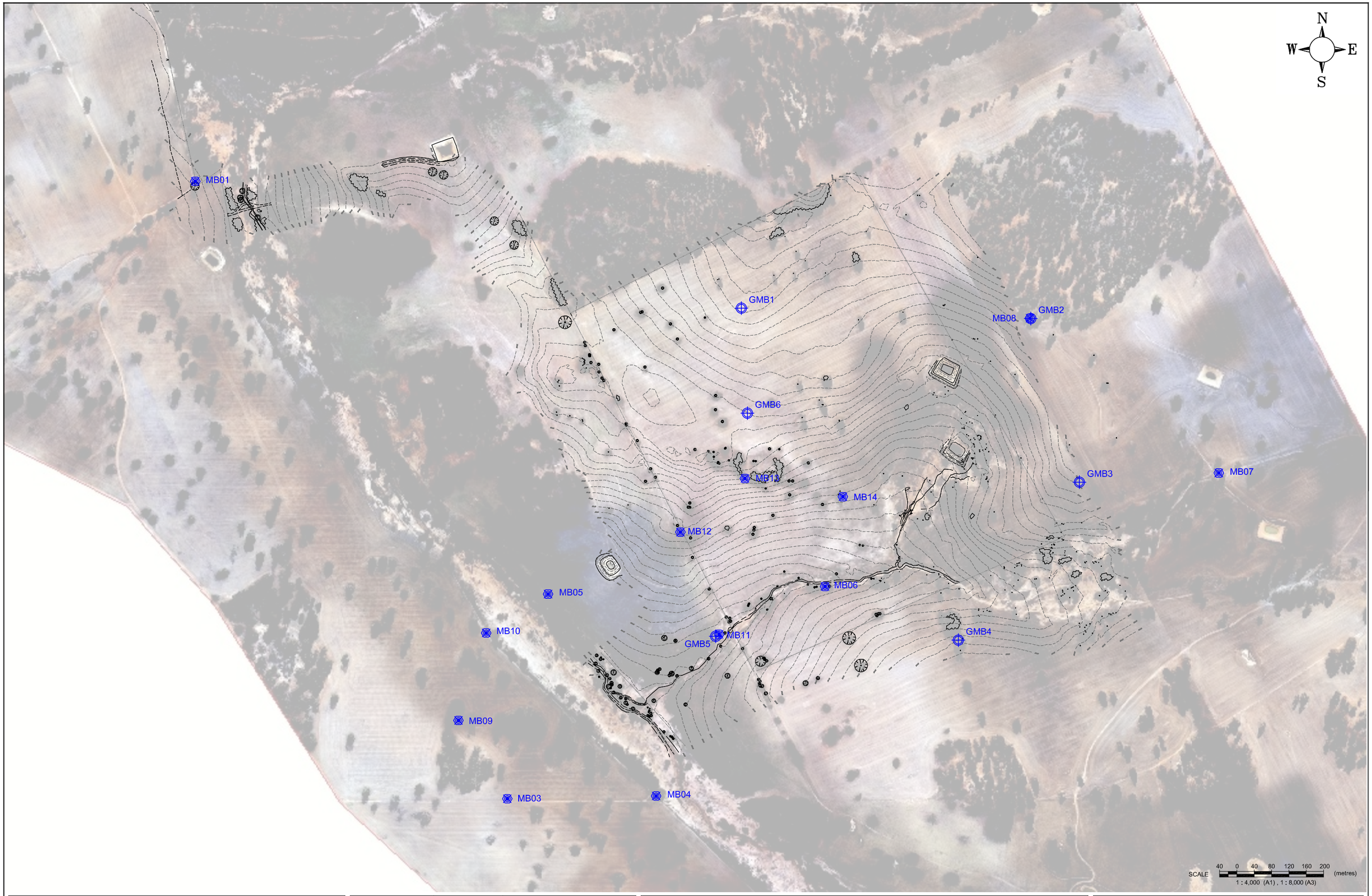
AS/NZS 5667.1 (1998) *Australia / New Zealand Standard*, Water Quality Sampling - Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.

AS/NZS 5667.11 (1998) *Australia / New Zealand Standard*, Water Quality Sampling - Part 11: Guidance on Sampling of Groundwaters.

NHMRC, NRMMC (2011) *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy.* National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra. Version 3.0 updated December 2014.

14 APPENDICES

APPENDIX A: LOCATION OF GROUNDWATER BORES (ALLA-WA-32)



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Client	Location	Drawing Title
SITA Australia	Lots 4869, 5931, 9926 & 26934 Great Southern Hwy, Saint Ronans	Groundwater Well Location Layout Plan

Date	Scale	Design By	Drawn By	Project	Drawing Number	Revision	Drawing Size
06/03/15	1 : 2,500	B.W.B.	S.B.Y.	Allawuna Farm Landfill	ALLA - WA - 32	D	A1

APPENDIX B: FIELD SAMPLING SHEETS

Client	SITA
Site	Allawuna

Date	10/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB01
Time	08:50

Easting	461249.579
Northing	6469808.25
Elevation	298.268m (~~GL~~/TOC)
Casing Height	

Depth to SWL	1.82 (~~BGL~~/BTOC)
Bore Diameter	50 mm
Bailer Volume	

Total Bore Depth	10.3 (~~BGL~~/BTOC)
Casing Volume	16.64 L
Bails / Volume	50 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	4.15	4.20	4.54	4.54		4.60
EC (mS/cm)	26.61	26.76	27.73	27.81		27.8
Temperature	24.3	23.0	23.5	22.5		22.4

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB01	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB01	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB01	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB01 D1 MB01 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB01	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB01	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB01	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water was clear

Client	SITA
Site	Allawuna

Date	10/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB03
Time	10:40

Easting	461968.727
Northing	6468385.71
Elevation	309.874m (~~GL~~/TOC)
Casing Height	

Depth to SWL	6.28 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	13.86 (~~BGL~~/BTOC)
Casing Volume	15.0 L
Bails / Volume	45 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	5.85	5.12	4.86	5.00		4.82
EC (mS/cm)	17.00	23.38	24.38	24.93		24.81
Temperature	24.3	22.3	23.1	22.6		23.3

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB03	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB03	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB03	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB03 D1 MB03 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB03	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB03	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB03	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: cloudy/turbid. 0 – 15L: Very turbid 15 – 45L: Slightly turbid

Client	SITA
Site	Allawuna

Date	10/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB04
Time	12:10

Easting	462311.56
Northing	6468391.87
Elevation	302.726m (~~GL~~/TOC)
Casing Height	

Depth to SWL	1.82 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	10.54 (~~BGL~~/BTOC)
Casing Volume	18.8 L
Bails / Volume	57 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	3.51	4.35	4.16	4.27		4.36
EC (mS/cm)	15.32	15.19	15.19	15.10		15.08
Temperature	29.6	24.9	24.0	24.3		24.8

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB04	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB04	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB04	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB04 D1 MB04 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB04	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB04	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB04	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: clear

Client	SITA
Site	Allawuna

Date	10/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB05
Time	16:00

Easting	462062.565
Northing	6468857.16
Elevation	301.432m (~~GL~~/TOC)
Casing Height	

Depth to SWL	1.86 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	9.7 (~~BGL~~/BTOC)
Casing Volume	15.4 L
Bails / Volume	46 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	5.36	5.44	5.50	5.44		5.45
EC (mS/cm)	6.28	7.11	7.09	7.11		7.10
Temperature	26.1	23.3	23.6	22.7		22.9

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB05	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB05	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB05	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB05 D1 MB05 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB05	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB05	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB05	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: clear

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB06
Time	15:40

Easting	462700.926
Northing	6468874.62
Elevation	308.415m (~~GL~~/TOC)
Casing Height	

Depth to SWL	0.65 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	850mL

Total Bore Depth	10.05 (~~BGL~~/BTOC)
Casing Volume	18.5 L
Bails / Volume	55 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	5.38	5.10	5.11	5.08		5.08
EC (mS/cm)	17.79	17.70	17.87	17.94		17.94
Temperature	22.1	20.8	20.5	20.7		20.7

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB06	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB06	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB06	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB06 D1 MB06 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB06	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB06	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB06	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB07
Time	15:00

Easting	463608.272
Northing	6469136.2
Elevation	331.502m (~~GL~~/TOC)
Casing Height	

Depth to SWL	4.6 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	850 mL

Total Bore Depth	10.55 (~~BGL~~/BTOC)
Casing Volume	12 L
Bails / Volume	50 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	5.76	5.95	5.91	5.77		5.66
EC (mS/cm)	3.10	3.19	2.84	2.67		2.60
Temperature	23.6	22.5	22.1	21.5		21.4

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB07	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB07	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB07	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB07 D1 MB07 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB07	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB07	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB07	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: traces of organic matter, turbid This bore had to be bailed due to the blocking of the pump filter.

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB08
Time	13:10

Easting	463173.13
Northing	6469492.84
Elevation	333.945m (~~GL~~/TOC)
Casing Height	

Depth to SWL	6.7 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	850 mL

Total Bore Depth	11.21 (~~BGL~~/BTOC)
Casing Volume	8.9 L
Bails / Volume	27 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	3.94	4.03	4.01	4.02		4.00
EC (mS/cm)	22.40	22.41	21.69	22.10		22.15
Temperature	21.2	20.4	19.7	20.6		20.5

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB08	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB08	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB08	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB08 D1 MB08 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB08	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB08	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB08	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: turbid, traces of tree roots This bore was bailed due to the constant blocking of the pump filter.

Client	SITA
Site	Allawuna

Date	10/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB09
Time	14:50

Easting	461856.056
Northing	6468565.96
Elevation	307.439m (~~GL~~/TOC)
Casing Height	

Depth to SWL	7.01 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	12.54 (BGL/~~BTOC~~)
Casing Volume	10.85 L
Bails / Volume	33 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	5.68	5.74	5.77			5.74
EC (mS/cm)	4.35	4.30	4.23			4.25
Temperature	25.6	22.5	22.6			22.1

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB09	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB09	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB09	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB09 D1 MB09 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB09	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB09	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB09	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: slightly turbid to clear MB09 – duplicate and triplicate

Client	SITA
Site	Allawuna

Date	10/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB10
Time	13:40

Easting	461919.983
Northing	6468767.45
Elevation	301.092 (~~GL~~/TOC)
Casing Height	

Depth to SWL	1.53 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	8.5 (BGL/~~BTOC~~)
Casing Volume	13.7 L
Bails / Volume	41 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	3.49	3.66	3.65	3.69		3.69
EC (mS/cm)	24.52	24.31	24.67	24.53		24.53
Temperature	29.1	24.6	25.7	23.5		23.1

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB10	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB10	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB10	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB10 D1 MB10 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB10	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB10	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB10	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: turbid and clearing slowly

Client	SITA
Site	Allawuna

Date	10/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB11
Time	18:10

Easting	462456.69
Northing	6468764.61
Elevation	304.674m (GL/TOC)
Casing Height	

Depth to SWL	0.95 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	7.55m (BGL/~~BTOC~~)
Casing Volume	13.0 L
Bails / Volume	39 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	3.12	3.56	3.40	3.58		3.57
EC (mS/cm)	19.33	19.45	19.31	19.39		19.29
Temperature	28.1	23.6	24.1	22.2		22.8

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB11	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB11	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB11	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB11 D1 MB11 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB11	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB11	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB11	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: clear

Client	SITA
Site	Allawuna

Date	10/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB12
Time	17:15

Easting	462367.487
Northing	6468999.99
Elevation	316.991 (~~GL~~/TOC)
Casing Height	

Depth to SWL	10.63 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	13.54 (~~BGL~~/BTOC)
Casing Volume	5.7 L
Bails / Volume	18 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	4.24	4.28	4.25	4.15		4.10
EC (mS/cm)	13.44	13.91	14.05	14.20		14.15
Temperature	27.2	23.4	24.4	24.6		23.7

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB12	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB12	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB12	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB12 MB12	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB12	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB12	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB12	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: turbid.

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB13
Time	11:30

Easting	462516.159
Northing	6469123.51
Elevation	321.595m (~~GL~~/TOC)
Casing Height	

Depth to SWL	12.04m (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	13.54 (BGL/~~BTOC~~)
Casing Volume	3 L
Bails / Volume	9 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	3.30	3.27	3.29	3.28		3.28
EC (mS/cm)	20.85	20.83	21.08	21.00		21.00
Temperature	22.9	22.7	23.1	21.9		21.9

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB13	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB13	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB13	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB13 D1 MB13 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB13	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB13	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB13	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: turbid.

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	MB14
Time	17:00

Easting	462742.032
Northing	6469081.65
Elevation	315.105 (~~GL~~/TOC)
Casing Height	

Depth to SWL	1.76 (BGL/~~BTOC~~)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	8.5 (BGL/~~BTOC~~)
Casing Volume	13 L
Bails / Volume	40 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	2.88	3.47	3.47	3.47		3.47
EC (mS/cm)	24.65	23.83	23.55	23.95		23.79
Temperature	25.4	21.7	20.7	20.6		20.7

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
MB14	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
MB14	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
MB14	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
MB14 D1 MB14 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
MB14	E – Volatile Organics	Vial	30	HCl, Chilled	✓
MB14	F – Semi-Volatile Organics	Glass	200	Chilled	✓
MB14	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: Initially clear, then turbid for volumes 1, 2 & 3.

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	GMB1
Time	09:50

Easting	462508
Northing	6469516
Elevation	334.94 (~~GL~~/TOC)
Casing Height	

Depth to SWL	Dry (BGL/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	10.8m (~~BGL~~/BTOC)
Casing Volume	
Bails / Volume	

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH						
EC (mS/cm)						
Temperature						

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	
	B – Metals	Plastic	250	Filtered, HNO3, Chilled	
	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	
	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	
	E – Volatile Organics	Vial	30	HCl, Chilled	
	F – Semi-Volatile Organics	Glass	200	Chilled	
	G - Unpreserved	Plastic	1000	Chilled	

Notes and Comments
10.8m deep & dry

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	GMB2
Time	13:20

Easting	463175
Northing	6469492
Elevation	333.87 (~~GL~~/TOC)
Casing Height	

Depth to SWL	1.82 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	10.04 (~~BGL~~/BTOC)
Casing Volume	6.7 L
Bails / Volume	20 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	3.71	3.72	3.68	3.65		3.68
EC (mS/cm)	22.06	21.38	21.75	22.09		21.70
Temperature	23.5	20.1	20.7	21.1		20.4

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
GMB2	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
GMB2	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
GMB2	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
GMB2 D1 GMB2 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
GMB2	E – Volatile Organics	Vial	30	HCl, Chilled	✓
GMB2	F – Semi-Volatile Organics	Glass	200	Chilled	✓
GMB2	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: turbid.

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	GMB3
Time	18:10

Easting	463287
Northing	6469115
Elevation	328.85 (~~GL~~/TOC)
Casing Height	

Depth to SWL	6.10 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	10.57 (BGL/~~BTOC~~)
Casing Volume	8.8 L
Bails / Volume	26 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	3.90	3.87	3.87	3.91		3.91
EC (mS/cm)	6.12	6.03	6.21	6.34		6.34
Temperature	20.9	21.1	21.5	21.3		21.3

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
GMB3	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
GMB3	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
GMB3	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
GMB3 GMB3	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
GMB3	E – Volatile Organics	Vial	30	HCl, Chilled	✓
GMB3	F – Semi-Volatile Organics	Glass	200	Chilled	✓
GMB3	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: clear.

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	GMB4
Time	16:15

Easting	463008
Northing	6468751
Elevation	319.000 (~~GL~~/TOC)
Casing Height	

Depth to SWL	8.40 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	12.05 (~~BGL~~/BTOC)
Casing Volume	7.2 L
Bails / Volume	22 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	5.60	5.57	5.47	5.46		5.46
EC (mS/cm)	5.12	5.07	5.03	5.06		5.06
Temperature	22.8	21.1	21.0	21.0		21.0

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
GMB4	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
GMB4	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
GMB4	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
GMB4 D1 GMB4 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
GMB4	E – Volatile Organics	Vial	30	HCl, Chilled	✓
GMB4	F – Semi-Volatile Organics	Glass	200	Chilled	✓
GMB4	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: turbid. Used bailer to sample

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	GMB5
Time	08:45

Easting	462449
Northing	6468760
Elevation	303.900 (~~GL~~/TOC)
Casing Height	

Depth to SWL	1.16 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	16.52 (BGL/~~BTOC~~)
Casing Volume	31 L
Bails / Volume	93 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	5.91	5.85	5.92	5.95		5.94
EC (mS/cm)	18.12	18.56	18.76	19.01		18.76
Temperature	23.9	21.8	21.8	21.8		22.1

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
GMB5	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
GMB5	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
GMB5	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
GMB5 D1 GMB5 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
GMB5	E – Volatile Organics	Vial	30	HCl, Chilled	✓
GMB5	F – Semi-Volatile Organics	Glass	200	Chilled	✓
GMB5	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: clear

Client	SITA
Site	Allawuna

Date	11/2/15
Sampled By	P. Antony, A. O'Malley

Bore / SW ID	GMB6
Time	10:10

Easting	462522
Northing	6469274
Elevation	326.43 (~~GL~~/TOC)
Casing Height	

Depth to SWL	8.66 (~~BGL~~/BTOC)
Bore Diameter	50mm
Bailer Volume	

Total Bore Depth	22.0 (BGL/~~BTOC~~)
Casing Volume	26 L
Bails / Volume	78 L

In Situ Parameters						
Parameter	Initial	Volume 1	Volume 2	Volume 3	Volume 4	Stable Sample
pH	4.75	5.00	4.43	4.77		4.56
EC (mS/cm)	5.80	5.67	5.51	5.49		5.42
Temperature	21.6	21.1	21.4	20.9		20.9

Samples					
Sample ID	Type	Container	Volume (mL)	Preservation	Initial OK
GMB6	A – Preserved Inorganics	Plastic	250	H2SO4, Chilled	✓
GMB6	B – Metals	Plastic	250	Filtered, HNO3, Chilled	✓
GMB6	C – Preserved Inorganics	Glass	100	H2SO4, Chilled	✓
GMB6 D1 GMB6 D2	D – Volatile Organics	Vial	30 x 2	HCl, Chilled	✓
GMB6	E – Volatile Organics	Vial	30	HCl, Chilled	✓
GMB6	F – Semi-Volatile Organics	Glass	200	Chilled	✓
GMB6	G - Unpreserved	Plastic	1000	Chilled	✓

Notes and Comments
Water: very turbid, sand fragments, silty Pump kept blocking due to sediment, had to use bailer instead.

APPENDIX C: CONSOLIDATED SUMMARY OF GROUNDWATER AND SURFACE WATER MONITORING TEST RESULTS

	Units	Assessment Level																						
Client		black = ADWG6	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA
Site		blue = ANZECC	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna
Bore ID		Above aesthetic	MB01	MB03	MB04	MB05	MB06	MB07	MB08	MB09	MB10	MB11	MB12	MB13	MB14	GMB1	GMB2	GMB3	GMB4	GMB5	GMB6	SW01	SW02	MB09#2	MB09#3
Date		Above guideline	10/02/2015	10/02/2015	10/02/2015	10/02/2015	10/02/2015	10/02/2015	10/02/2015	10/02/2015	10/02/2015	10/02/2015	10/02/2015	11/02/2015	11/02/2015	11/02/2015	11/02/2015	11/02/2015	11/02/2015	11/02/2015	11/02/2015	11/02/2015	11/02/2015	42045	42045
Time			8:50:00 AM	10:40:00 AM	12:10:00 PM	4:00:00 PM	3:40:00 PM	3:00:00 PM	1:10:00 PM	2:50:00 PM	1:40:00 PM	6:10:00 PM	5:15:00 PM	11:30:00 AM	5:00:00 PM	9:50:00 AM	1:20:00 PM	2:15:00 PM	4:15:00 PM	8:45:00 AM	10:10:00 AM	12:00:00 AM	12:00:00 AM	1:10:00 PM	########
Sampled By			PA & AO	AO/PA	PA/AO	AO/PA	AO/PA	AO/PA	AO/PA	AO/PA	AO/PA	AO/PA	0	AO/PA	AO/PA	PA/AO	AO/PA	AO/PA	AO/PA	AO/PA	AO/PA	0	0	AO/PA	AO/PA
Easting	m UTM50		461249.579	461968.727	462311.56	462062.565	462700.926	463608.272	463173.13	461856.056	461919.983	462456.69	462367.487	462516.159	462742.032	462508	463175	463287	463008	462449	462522	463269.49	4613659	463173.13	463173.1
Northing	m UTM50		6469808.25	6468385.71	6468391.87	6468857.16	6468874.62	6469136.2	6469492.84	6468565.96	6468767.45	6468764.61	6468999.99	6469123.51	6469081.65	6469516	6469492	6469115	6468751	6468760	6469274	6467984.5	6469855	6469492.8	6469493
Elevation (TOC)	m		298.268	309.874	302.726	301.432	308.415	331.502	333.945	307.439	301.092	304.674	316.911	321.595	315.105	334.94	333.87	328.85	319	303.9	326.43	dry	dry	333.945	333.945
TOC Datum			AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	dry	0	AHD	AHD
Depth to SWL (BTOC)	m		2.36	6.28	0.96	1.86	1.55	4.6	6.7	7.01	1.53	0.95	10.63	12.04	1.76	dry	6.65	6.1	8.4	1.16	8.66	0	0	6.7	6.7
Total Bore Depth (BTOC)	m		10.84	13.86	10.54	9.7	10.05	10.55	11.21	12.54	8.5	7.55	13.54	13.54	8.52	11	10.34	10.57	12.05	16.92	22.32	0	0	11.21	11.21
Elevation (SWL)	m		295.908	303.594	301.766	299.572	306.865	326.902	327.245	300.429	299.562	303.724	306.281	309.555	313.345	NA	327.22	322.75	310.6	302.74	317.77	0	0	327.245	327.245
SWL Datum			AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	0	0	AHD	AHD
In Situ Parameters																									
pH	units	6.5-8.5 aesthetic	4.6	4.82	4.36	5.45	5.08	5.66	4	5.74	3.69	3.57	4.1	3.28	3.47		3.68	3.91	5.46	5.94	4.56	0	0	4	4
Conductivity	uS/cm		27800	2481	15080	7100	17940	2600	22150	4250	24530	19290	14150	21000	23790		21700	6340	5060	18760	5420	0	0	22150	22150
Temperature	degC		22.4	23.3	24.8	22.9	20.7	21.4	20.5	22.1	23.1	22.8	23.7	21.9	20.7		20.4	21.3	21	22.11	20.9	0	0	20.5	20.5
Laboratory Parameters																									
Ammonia (as N)	mg/L	0.5	0.05	0.14	0.18	0.08	0.04	< 0.01	0.27	0.24	0.18	0.21	0.04	0.17	0.17		0.6	0.09	0.01	0.02	0.09	0	0	0.24	0.24
Chloride	mg/L	250 aesthetic	12000	680	5700	2200	7000	730	8700	1200	9800	7300	5500	8200	12000		8400	2000	1400	7400	1700	0	0	1200	1100
Conductivity (at 25Â°C)	uS/cm		31000	2500	15000	7100	18000	2600	24000	4100	26000	20000	14000	22000	26000		23000	6400	5000	19000	5500	0	0	4100	4100
pH	mg/L	6.5-8.5 aesthetic	5	5.1	4.5	5.8	5.5	5.8	4	6	3.6	3.8	4.2	3.5	3.8		3.7	4.1	5.9	6.5	5.1	0	0	6.1	6
Phosphate total (as P)	mg/L	5	< 5	< 0.5	< 5	< 5	< 5	< 0.5	< 5	< 5	< 5	< 5	< 5	< 5	< 5		< 5	< 5	< 5	< 5	< 5	0	0	< 5	< 5
Soluble Solids	mg/L	600 aesthetic	22000	1400	9500	4000	12000	1500	15000	2300	17000	14000	9000	13000	16000		15000	3600	2900	14000	3100	0	0	2400	2300
Sulphate (as S)	mg/L	500	280	35	120	96	160	35	200	64	260	160	110	120	270		200	67	110	150	69	0	0	64	64
Total Organic Carbon	mg/L		< 5	7.2	15	15	24	9.8	24	15	24	12	18	19	35		21	10	15	17	17	0	0	6.1	19
Alkali Metals																									
Potassium			42	7	16	18	44	11	74	19	23	30	26	11	8.9		83	40	8.5	21	25	0	0	21	25
BTEX																									
Benzene	mg/L	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Ethylbenzene	mg/L	0.3 (0.003 aesthetic)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
m&p-Xylenes			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
o-Xylene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Toluene	mg/L	0.8 (0.025 aesthetic)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Xylenes - Total	mg/L	0.6 (0.02 aesthetic)	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003		< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	0	0	< 0.003	< 0.003
Fluorobenzene (surr.)			131	145	130	129	114	149	141	131	121	120	136	114	121		128	125	122	121	134	0	0	112	115
Heavy Metals																									
Arsenic (filtered)	mg/L	0.01	< 0.005	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.005	< 0.001	< 0.005	0.006	< 0.001	< 0.005	< 0.005		< 0.005	< 0.001	< 0.001	< 0.005	< 0.001	0	0	< 0.001	< 0.001
Cadmium (filtered)	mg/L	0.002	0.0068	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.001	< 0.0002	< 0.001	< 0.001	< 0.0002	< 0.001	< 0.001		< 0.001	< 0.0002	< 0.0002	< 0.001	< 0.0002	0	0	< 0.0002	< 0.0002
Chromium (filtered)	mg/L	0.05	< 0.005	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.005	< 0.001	< 0.005	< 0.005	< 0.001	< 0.005	< 0.005		< 0.005	< 0.001	< 0.001	< 0.005	< 0.001	0	0	< 0.001	< 0.001
Copper (filtered)	mg/L	2	0.029	< 0.001	< 0.001	0.002	< 0.005	0.002	< 0.005	< 0.001	< 0.005	< 0.005	0.007	0.021	0.01		0.005	0.013	< 0.001	< 0.005	< 0.001	0	0	< 0.001	< 0.001
Iron (filtered)	mg/L	0.3 aesthetic	< 0.25	3.6	16	0.46	< 0.25	1	45	22	18	15	< 0.05	1.6	20		48	1.2	< 0.05	< 0.25	< 0.05	0	0	22	20
Lead (filtered)	mg/L	0.01	0.017	< 0.001	0.001	< 0.001	0.026	< 0.001	< 0.005	< 0.001	< 0.005	0.037	0.002	0.14	0.008		0.007	< 0.001	< 0.001	< 0.005	0.001	0	0	< 0.001	< 0.001
Manganese (filtered)	mg/L	0.5	1.5	0.035	0.042	0.12	0.21	0.006	0.13	0.016	< 0.025	0.62	0.094	< 0.025	0.31		0.1	0.018	0.013	1	0.043	0	0	0.015	0.015
Mercury (filtered)	mg/L	0.001	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0001	< 0.0005	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0005	< 0.0005		< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0001	0	0	< 0.0001	< 0.0001
Molybdenum (filtered)	mg/L	0.05	< 0.025	< 0.005	< 0.005	< 0.005	< 0.025	< 0.005	< 0.025	< 0.005	< 0.025	< 0.025	< 0.005	< 0.025	< 0.025		< 0.025	< 0.005	< 0.005	< 0.025	< 0.005	0	0	< 0.005	< 0.005
Nickel (filtered)	mg/L	0.02	0.05	0.005	0.004	0.01	0.009	< 0.001	0.011	0.003	0.008	0.015	0.005	0.028	0.025		0.012	0.002	0.003	0.009	0.004	0	0	0.002	0.002
Selenium (filtered)	mg/L	0.01	< 0.005	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.005	< 0.001	< 0.005	< 0.005	< 0.001	< 0.005	< 0.005		< 0.005	< 0.001	< 0.001	< 0.005	< 0.001	0	0	< 0.001	< 0.001
Zinc (filtered)	mg/L	3 aesthetic	2.6	0.004	0.003	0.007	0.007	0.004	0.015	0.004	0.008	0.009	0.006	0.027	0.13		0.019	0.016	0.016	0.005	0.018	0	0	0.006	0.004
Organochlorine Pesticides																									
4.4'-DDD			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
4.4'-DDE			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
4.4'-DDT	mg/L	0.009	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
a-BHC			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Aldrin	mg/L	0.003 (Aldrin + Dieldr	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
b-BHC			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Chlordane	mg/L	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
d-BHC			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Dieldrin	mg/L	0.003 (Aldrin + Dieldr	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Endosulfan I	mg/L	0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Endosulfan II	mg/L	0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Endosulfan sulphate	mg/L	0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Endrin			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Endrin aldehyde			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Endrin ketone			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
g-BHC (Lindane)			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Heptachlor	mg/L	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Heptachlor epoxide			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Hexachlorobenzene			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Methoxychlor	mg/L	0.3	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0	0	< 0.0001	< 0.0001
Toxaphene			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0	0	< 0.01	< 0.01
Dibutylchlorendate (surr.)			89	58	83	62	67	60	58	52	64	61	50	79	84		73	75	66	85	62	0	0	72	82
Tetrachloro-m-xylene (surr.)			85	52	74	62	58	55	61	60	66	68	74	56	62		68	60	56	71	61	0	0	62	66
Organophosphorous Pesticides																									
Bolstar			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Chlorpyrifos	mg/L	0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Demeton-O			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Diazinon	mg/L	0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Dichlorvos	mg/L	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Disulfoton	mg/L	0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Ethion	mg/L	0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Ethoprop	mg/L	0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Fenitrothion	mg/L	0.007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Fensulfothion	mg/L	0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Fenthion	mg/L	0.007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Merphos			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Methyl azinphos			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Methyl parathion			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Mevinphos	mg/L	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Naled			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Phorate			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Ronnel			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Tokuthion			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Trichloronate			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0	0	< 0.002	< 0.002
Triphenylphosphate (surr.)			94	73	97	91	61	68	82	67	57	55	53	70	56		65	64	78	76	62	0	0	76	59
Polychlorinated Biphenyls																									
Aroclor-1016			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Aroclor-1221			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Aroclor-1232			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Aroclor-1242			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Aroclor-1248			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Aroclor-1254			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Aroclor-1260			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Total PCB			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Dibutylchlorendate (surr.)			89	58	83	62	67	60	58	52	64	61	50	79	84		73	66	75	85	62	0	0	72	82
Tetrachloro-m-xylene (surr.)			85	52	74	62	58	55	61	60	66	68	74	56	62		68	56	60	71	61	0	0	62	66
Polycyclic Aromatic Hydrocarbons																									
Acenaphthene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Acenaphthylene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Anthracene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Benz(a)anthracene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Benzo(a)pyrene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Benzo(b)fluoranthene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Benzo(g.h.i)perylene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Benzo(k)fluoranthene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Chrysene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Dibenz(a.h)anthracene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Fluoranthene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Fluorene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Naphthalene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Phenanthrene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Pyrene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Total PAH	mg/L	0.00001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
p-Terphenyl-d14 (surr.)			95	71	93	99	65	66	83	66	64	60	86	71	85		66	72	72	72	57	0	0	74	59
2-Fluorobiphenyl (surr.)			77	57	71	77	52	53	71	55	52	58	73	61	73		55	65	60	63	52	0	0	61	52
Total Nitrogen (as N)																									
Nitrate & Nitrite (as N)	mg/L	0.01	0.46	0.46	< 0.05	< 0.05	0.31	0.31	< 0.05	0.08	< 0.05	< 0.05	0.31	0.06	< 0.05		< 0.05	0.81	0.14	< 0.05	0.2	0	0	< 0.05	< 0.05
Total Kjeldahl Nitrogen (as N)			< 0.2	< 0.2	0.3	< 0.2	< 0.2	< 0.2	0.5	0.3	0.3	3.1	< 0.2	< 0.2	0.3		0.7	< 0.2	< 0.2	< 0.2	< 0.2	0	0	0.3	0.3
Total Nitrogen (as N)	mg/L	0.35	0.5	0.5	0.3	< 0.2	0.3	0.3	0.5	0.4	0.3	3.1	0.3	< 0.2	0.3		0.7	0.8	< 0.2	< 0.2	0.2	0	0	0.3	0.3
Total Recoverable Hydrocarbons - 1999 NEPM Fractions																									
TRH C10-36 (Total)			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0	0	< 0.1	< 0.1
TRH C10-C14			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0	0	< 0.05	< 0.05
TRH C15-C28			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0	0	< 0.1	< 0.1
TRH C29-C36			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0	0	< 0.1	< 0.1
TRH C6-C9			< 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	< 0.02	< 0.02
Total Recoverable Hydrocarbons - Draft 2010 NEPM Fractions *																									
Naphthalene			< 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	< 0.02	< 0.02
TRH >C10-C16			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0	0	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0	0	< 0.05	< 0.05
TRH >C16-C34			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0	0	< 0.1	< 0.1
TRH >C34-C40			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0	0	< 0.1	< 0.1
TRH C6-C10			< 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	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)			< 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	< 0.02	< 0.02
Volatile Organics																									
Tetrachloroethene	mg/L	0.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Trichloroethene																									
Halogenated Volatile Organics																									
1.1.1.2-Tetrachloroethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.1.1-Trichloroethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.1.2.2-Tetrachloroethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.1.2-Trichloroethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.1-Dichloroethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.1-Dichloroethene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.2.3-Trichloropropane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.2-Dibromoethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.2-Dichlorobenzene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.2-Dichloroethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.2-Dichloropropane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.3-Dichlorobenzene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.3-Dichloropropane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
1.4-Dichlorobenzene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Bromodichloromethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Bromoform			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Bromomethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Carbon Tetrachloride			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Chlorobenzene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Chloroform			< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0	0	< 0.005	< 0.005
Chloromethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
cis-1.2-Dichloroethene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
cis-1.3-Dichloropropene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Dibromochloromethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Dibromomethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Methylene Chloride			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Tetrachloroethene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
trans-1.2-Dichloroethene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
trans-1.3-Dichloropropene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Trichloroethene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Trichlorofluoromethane			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Vinyl chloride			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0	0	< 0.001	< 0.001
Fluorobenzene (surr.)			71	80	60	73	61	81	75	71	60	60	71	62	60		56	87	62	59	73	0	0	80	78

	Units	Assessment Level																
Client		black = ADWG6		SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA
Site		blue = ANZECC		Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna
Bore ID		Above aesthetic		MB01	MB03	MB04	MB05	MB06#1	MB07	MB08	MB09	MB10	MB11	MB12	MB13	MB14	SW01	SW02
Date		Above guideline		41870	41870	41870	41870	41870	41871	41871	41870	41872	41870	41870	41871	41871	41871	41871
Time				800	930	1100	1650	1425	1220	1100	1300	1200	1600	1815	815	935	1350	1415
Sampled By				AD,PA	AD,PA	AD, PA	AD, PA	AD, pA	AD	AD	AD, PA	AD, PA	AD, PA	AD,TP	AD	AD	AD	AD
Easting	m UTM50			461249.579	461968.727	462311.56	462062.565	462700.926	463608.272	463173.13	461856.056	461919.983	462456.69	462367.487	462516.159	462742.032	463269.49	4613659
Northing	m UTM50			6469808.254	6468385.707	6468391.868	6468857.162	6468874.622	6469136.201	6469492.839	6468565.958	6468767.448	6468764.614	6468999.986	6469123.508	6469081.65	6467984.5	6469855
Elevation (TOC)	m			298.268	309.874	302.726	301.432	307.395	331.502	333.945	307.439	301.092	303.674	316.911	321.595	315.105		
TOC Datum				AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD		
Depth to SWL (BTOC)	m			1.999	4.225	0.751	1.557	0.574	3.873	5.757	6.139	0.973	0	10.431	11.703	1.199		
Total Bore Depth (BTOC)	m			10.84	13.86	10.54	9.7	10.05	10.55	11.21	12.54	8.5	7.55	13.54	13.54	8.52		
Elevation (SWL)	m			296.269	305.649	301.975	299.875	306.821	327.629	328.188	301.3	300.119	303.674	306.48	309.892	313.906		
SWL Datum				AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD		
									Grass in bore casing									
In Situ Parameters																		
pH	units	6.5-8.5 aesthetic		4.42	4.75	4.05	4.93	5.04	5.47	3.85	5.62	3.41	3.68	4.15	3.29	3.49	5.62	5.33
Conductivity	uS/cm			>20000	2469	15530	5580	18010	2246	22160	4260	25690	19070	13740	21560	>20000	9680	12610
Temperature	degC			19	18.5	18.8	17.3	18.4	19.7	19	18.8	19	18.5	17.2	17.9	17.9	16.2	19.4
Laboratory Parameters																		
Ammonia (as N)	mg/L		0.5	0.05	0.14	0.26	0.21	0.05	< 0.01	0.51	0.23	0.28	0.21	0.04	0.42	0.33	< 0.01	0.07
Chloride	mg/L	250 aesthetic		11000	640	5400	1500	6500	560	8200	1100	9900	6800	4800	8000	11000	3000	4100
Conductivity (at 25Â°C)	uS/cm			28000	2400	15000	5200	18000	2300	23000	4000	26000	19000	13000	23000	27000	9700	12000
pH	mg/L	6.5-8.5 aesthetic		4.7	5	4	5.1	5.3	5.6	4	5.8	3.6	3.9	4.3	3.4	3.7	6.1	5.4
Phosphate total (as P)	mg/L		5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Soluble Solids	mg/L	600 aesthetic		21000	1300	9300	3000	12000	1200	14000	2300	17000	12000	8100	13000	18000	4900	7000
Sulphate (as S)	mg/L		500	280	35	120	88	150	34	220	68	310	180	100	120	240	74	100
Total Organic Carbon	mg/L			12	< 5	6.4	13	17	8.6	17	7.6	18	11	13	18	32	17	15
Alkali Metals																		
Potassium				32	6	12	14	42	7.8	72	17	22	26	23	8	8.8	8.5	11
BTEX																		
Benzene	mg/L		0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/L	0.3 (0.003 aesthetic)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/L	0.8 (0.025 aesthetic)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	mg/L	0.6 (0.02 aesthetic)		< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Fluorobenzene (surr.)				97	98	98	97	97	98	97	98	98	98	98	97	97	97	97
Heavy Metals																		
Arsenic (filtered)	mg/L		0.01	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Cadmium (filtered)	mg/L		0.002	0.0045	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	mg/L		0.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	mg/L		2	0.007	< 0.001	0.002	0.002	< 0.001	< 0.001	0.003	< 0.001	0.004	< 0.001	0.006	0.002	0.002	0.001	0.001
Iron (filtered)	mg/L	0.3 aesthetic		< 0.05	5.7	19	2.2	0.43	0.59	47	22	25	2.5	< 0.05	0.39	50	0.65	0.69
Lead (filtered)	mg/L		0.01	0.01	< 0.001	< 0.001	< 0.001	0.003	< 0.001	0.002	< 0.001	0.004	0.026	0.001	0.11	0.007	< 0.001	0.004
Manganese (filtered)	mg/L		0.5	0.37	0.033	0.04	0.08	0.082	0.006	0.056	0.016	0.009	0.095	0.077	< 0.005	0.12	0.2	0.12
Mercury (filtered)	mg/L		0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Molybdenum (filtered)	mg/L		0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Nickel (filtered)	mg/L		0.02	0.011	0.003	0.004	0.004	0.003	< 0.001	0.004	0.003	0.004	0.002	0.004	0.002	0.005	0.005	0.006
Selenium (filtered)	mg/L		0.01	0.027	0.002	0.017	0.005	0.021	0.002	0.023	0.005	0.027	0.01	0.015	0.018	0.02	0.011	0.015
Zinc (filtered)	mg/L	3 aesthetic		0.28	0.004	0.003	0.005	0.013	0.003	0.004	0.003	0.003	< 0.001	0.003	0.002	0.013	0.006	0.007
Organochlorine Pesticides																		
4.4'-DDD				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDE				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDT	mg/L		0.009	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
a-BHC				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldrin	mg/L	0.003 (Aldrin + Dieldrin combined)		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
b-BHC				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chlordane	mg/L		0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
d-BHC				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dieldrin	mg/L	0.003 (Aldrin + Dieldrin combined)		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan I	mg/L		0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan II	mg/L		0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan sulphate	mg/L		0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin aldehyde				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin ketone				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
g-BHC (Lindane)				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	mg/L		0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor epoxide				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorobenzene				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methoxychlor	mg/L		0.3	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toxaphene				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibutylchlorendate (surr.)				115	72	93	120	86	95	103	88	84	145	85	84	123	79	89
Tetrachloro-m-xylene (surr.)				60	50	50	90	50	50	57	50	50	66	50	50	59	58	54
Organophosphorous Pesticides																		
Bolstar				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Chlorpyrifos	mg/L		0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Demeton-O				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Diazinon	mg/L		0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dichlorvos	mg/L		0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Disulfoton	mg/L		0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethion	mg/L		0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethoprop	mg/L		0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Fenitrothion	mg/L		0.007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Fensulfothion	mg/L		0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Fenthion	mg/L		0.007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Merphos				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methyl azinphos				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methyl parathion				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Mevinphos	mg/L		0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Naled				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Phorate				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ronnel				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Tokuthion				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Trichloronate				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Triphenylphosphate (surr.)				96	120	84	94	94	124	95	110	111	111	107	118	108	92	99
Polychlorinated Biphenyls																		
Aroclor-1016				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1221				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1232				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1242				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1248				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1254				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1260				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total PCB				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dibutylchlorendate (surr.)				115	72	93	120	86	95	103	88	84	145	85	84	123	79	89
Tetrachloro-m-xylene (surr.)				60	50	50	90	50	50	57	50	50	66	50	50	59	58	54
Polycyclic Aromatic Hydrocarbons																		
Acenaphthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b)fluoranthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(g.h.i)perylene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a.h)anthracene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH	mg/L		0.00001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
p-Terphenyl-d14 (surr.)				101	114	78	89	86	115	95	115	112	103	102	115	111	88	93
2-Fluorobiphenyl (surr.)				78	80	65	69	60	78	67	72	86	75	76	84	85	78	75
Total Nitrogen (as N)																		
Nitrate & Nitrite (as N)	mg/L		0.01	0.1	0.9	< 0.05	< 0.05	< 0.05	0.8	< 0.05	< 0.05	< 0.05	< 0.05	0.34	< 0.05	< 0.05	< 0.05	0.17
Total Kjeldahl Nitrogen (as N)				0.5	0.5	0.5	0.2	0.5	< 0.2	0.7	0.4	0.5	0.3	< 0.2	0.4	0.8	0.9	1
Total Nitrogen (as N)	mg/L		0.35	0.6	1.4	0.5	0.2	0.5	0.8	0.7	0.4	0.5	0.3	0.3	0.4	0.8	0.9	1.2
Total Recoverable Hydrocarbons - 1999 NEPM Fractions																		
TRH C10-36 (Total)				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1	< 0.1
TRH C10-C14				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1
TRH C29-C36				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
TRH C6-C9				< 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
Total Recoverable Hydrocarbons - Draft 2010 NEPM Fractions *																		
Naphthalene				< 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
TRH >C10-C16				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	< 0.1	< 0.1
TRH >C34-C40				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TRH C6-C10				< 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
TRH C6-C10 less BTEX (F1)				< 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
Volatile Organics																		
Tetrachloroethene	mg/L		0.05															
Trichloroethene																		
Halogenated Volatile Organics																		
1.1.1.2-Tetrachloroethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1-Trichloroethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2.2-Tetrachloroethane				< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1.1.2-Trichloroethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.1-Dichloroethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.1-Dichloroethene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.2.3-Trichloropropane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dibromoethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichlorobenzene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloroethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloropropane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichlorobenzene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichloropropane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
1.4-Dichlorobenzene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Bromodichloromethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Bromoform				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Carbon Tetrachloride				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chlorobenzene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform				< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chloromethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.2-Dichloroethene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.3-Dichloropropene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dibromochloromethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dibromomethane				< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Methylene Chloride				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Tetrachloroethene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.2-Dichloroethene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.3-Dichloropropene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Trichloroethene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Trichlorofluoromethane				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Vinyl chloride				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Fluorobenzene (surr.)				97	95	92	90	96	90	92	93	95	90	93	92	93	90	88

	Units	Assessment Level																
Client		black = ADWG6	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA
Site		blue = ANZECC	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna
Bore ID		Above aesthetic	MB01	MB03	MB04	MB05	MB06#1	MB07	MB08	MB09	MB10	MB11	MB12	MB13	MB14	SW01	SW02	MB06#2	MB06#3
Date		Above guideline	18/02/2014	18/02/2014	18/02/2014	19/02/2014	18/02/2014	19/02/2014	19/02/2014	18/02/2014	18/02/2014	18/02/2014	19/02/2014	19/02/2014	19/02/2014	18/02/2014	18/02/2014	21/08/2013	21/08/2013
Time			950	1120	1220	850	1500	1230	1335	1350	1310	1600	940	1035	1130	1030	1430		
Sampled By			AD,TP	AD,TP	AD,TP	AD,TP	AD,TP	AD,TP	AD,TP	AD,TP	AD,TP	AD,TP	AD,TP	AD,TP	AD,TP	AD,TP	AD,TP		
Easting	m UTM50		461249.579	461968.727	462311.56	462062.565	462700.926	463608.272	463173.13	461856.056	461919.983	462456.69	462367.487	462516.159	462742.032	463269.49	4613659		
Northing	m UTM50		6469808.254	6468385.707	6468391.868	6468857.162	6468874.622	6469136.201	6469492.839	6468565.958	6468767.448	6468764.614	6468999.986	6469123.508	6469081.65	6467984.5	6469855		
Elevation (TOC)	m		298.268	309.874	302.726	301.432	307.395	331.502	333.945	307.439	301.092	303.674	316.911	321.595	315.105	DRY NO SAMPLING	DRY NO SAMPLING		
TOC Datum			AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD				
Depth to SWL (BTOC)	m		2.467	6.729	1.189	2.001	0.555	4.865	6.821	7.787	1.741	0	10.563	12.017	1.789				
Total Bore Depth (BTOC)	m		10.84	13.86	10.54	9.7	10.05	10.55	11.21	12.54	8.5	7.55	13.54	13.54	8.52				
Elevation (SWL)	m		295.801	303.145	301.537	299.431	306.84	326.637	327.124	299.652	299.351	303.674	306.348	309.578	313.316				
SWL Datum			AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD				
In Situ Parameters																			
pH	units	6.5-8.5 aesthetic	4.46	4.6	4.13	5.24	4.9	5.48	3.79	5.49	3.36	3.64	4.02	3.21	3.42				
Conductivity	uS/cm		>20000	2516	14580	6410	17440	2102	21840	3900	25120	18320	13450	20040	>20000				
Temperature	degC		20.4	20.6	21.6	19.9	20.1	20.6	20	20.4	20.9	21.6	20.4	20.4	21.5				
Laboratory Parameters																			
Ammonia (as N)	mg/L	0.5	0.04	0.15	0.24	0.08	0.04	0.02	0.63	0.23	0.3	0.24	< 0.01	0.41	0.32			0.04	< 0.01
Chloride	mg/L	250 aesthetic	11000	740	5200	2100	6500	560	8300	1100	9700	6900	4900	7700	11000			6600	6600
Conductivity (at 25Â°C)	uS/cm		29000	2600	15000	6800	19000	2100	21000	4100	27000	19000	14000	22000	28000			18000	18000
pH	mg/L	6.5-8.5 aesthetic	6	4.5	4.8	6.1	5.9	6.6	3.6	6.4	3.3	3.5	4.6	3.6	3.1			5.6	5.5
Phosphate total (as P)	mg/L	5	< 5	2	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5			< 0.05	< 0.05
Soluble Solids	mg/L	600 aesthetic	22000	1500	9400	3700	12000	1300	14000	2400	18000	13000	8900	13000	18000			12000	12000
Sulphate (as S)	mg/L	500	270	35	120	98	160	29	210	66	300	160	110	130	240			160	160
Total Organic Carbon	mg/L		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	11			8.7	14
Alkali Metals																			
Potassium			28	6.8	7.8	13	38	6.3	65	15	16	23	18	5.1	< 5			46	49
BTEX																			
Benzene	mg/L	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Ethylbenzene	mg/L	0.3 (0.003 aesthetic)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
m&p-Xylenes			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
o-Xylene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Toluene	mg/L	0.8 (0.025 aesthetic)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Xylenes - Total	mg/L	0.6 (0.02 aesthetic)	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003			< 0.003	< 0.003
Fluorobenzene (surr.)			120	123	120	112	130	116	109	121	120	115	111	110	111			92	74
Heavy Metals																			
Arsenic (filtered)	mg/L	0.01	< 0.001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	0.001	< 0.005	< 0.001	< 0.005	< 0.005			< 0.001	0.003
Cadmium (filtered)	mg/L	0.002	0.0063	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.001	< 0.001			< 0.0002	< 0.0002
Chromium (filtered)	mg/L	0.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.005	< 0.005			0.002	0.002
Copper (filtered)	mg/L	2	0.013	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	0.003	< 0.005	0.01	0.009	< 0.005			0.003	0.003
Iron (filtered)	mg/L	0.3 aesthetic	0.06	7.2	21	1.1	0.56	0.49	61	32	27	12	0.3	0.79	41			0.05	0.05
Lead (filtered)	mg/L	0.01	0.007	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	0.002	< 0.001	0.003	0.03	< 0.001	0.11	0.006			0.003	0.003
Manganese (filtered)	mg/L	0.5	0.8	0.035	0.038	0.11	0.15	< 0.005	0.084	0.022	0.061	0.42	0.083	< 0.025	0.31			0.15	0.15
Mercury (filtered)	mg/L	0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Molybdenum (filtered)	mg/L	0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.025	< 0.005	< 0.005	< 0.005	< 0.005	< 0.025	< 0.005	< 0.025	< 0.025			< 0.005	< 0.005
Nickel (filtered)	mg/L	0.02	0.023	0.003	0.003	0.006	0.006	< 0.001	0.007	0.003	0.007	0.009	0.007	0.01	0.024			0.009	0.008
Selenium (filtered)	mg/L	0.01	< 0.001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	0.001	< 0.001	0.001	< 0.005	< 0.001	< 0.005	< 0.005			0.035	0.034
Zinc (filtered)	mg/L	3 aesthetic	1.1	0.01	< 0.001	0.002	< 0.005	0.004	0.009	0.007	0.007	< 0.005	0.018	0.013	0.15			0.003	0.003
Organochlorine Pesticides																			
4.4'-DDD			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
4.4'-DDE			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
4.4'-DDT	mg/L	0.009	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
a-BHC			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Aldrin	mg/L	0.003 (Aldrin + Dieldrin combined)	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
b-BHC			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Chlordane	mg/L	0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
d-BHC			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Dieldrin	mg/L	0.003 (Aldrin + Dieldrin combined)	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Endosulfan I	mg/L	0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Endosulfan II	mg/L	0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Endosulfan sulphate	mg/L	0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Endrin			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Endrin aldehyde			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Endrin ketone			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
g-BHC (Lindane)			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Heptachlor	mg/L	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Heptachlor epoxide			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Hexachlorobenzene			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Methoxychlor	mg/L	0.3	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			< 0.0001	< 0.0001
Toxaphene			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01			< 0.001	< 0.001
Dibutylchlorendate (surr.)			99	111	94	87	139	84	135	107	130	92	98	70	118			147	124
Tetrachloro-m-xylene (surr.)			58	56	76	94	68	72	92	65	97	98	104	82	80			74	80
Organophosphorous Pesticides																			
Bolstar			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Chlorpyrifos	mg/L	0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Demeton-O			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Diazinon	mg/L	0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Dichlorvos	mg/L	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Disulfoton	mg/L	0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Ethion	mg/L	0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Ethoprop	mg/L	0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Fenitrothion	mg/L	0.007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Fensulfothion	mg/L	0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Fenthion	mg/L	0.007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Merphos			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Methyl azinphos			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Methyl parathion			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Mevinphos	mg/L	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Naled			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Phorate			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Ronnel			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Tokuthion			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Trichloronate			< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002			< 0.002	< 0.002
Triphenylphosphate (surr.)			109	101	104	108	110	113	112	94	101	90	97	127	115			95	88
Polychlorinated Biphenyls																			
Aroclor-1016			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Aroclor-1221			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Aroclor-1232			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Aroclor-1242			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Aroclor-1248			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Aroclor-1254			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Aroclor-1260			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Total PCB			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Dibutylchlorendate (surr.)			99	111	94	87	139	84	135	107	130	92	98	70	118			147	124
Tetrachloro-m-xylene (surr.)			58	56	76	94	68	72	92	65	97	98	104	82	80			74	80
Polycyclic Aromatic Hydrocarbons																			
Acenaphthene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Acenaphthylene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Anthracene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Benz(a)anthracene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Benzo(a)pyrene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Benzo(b)fluoranthene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Benzo(g.h.i)perylene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Benzo(k)fluoranthene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Chrysene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Dibenz(a.h)anthracene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Fluoranthene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Fluorene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Naphthalene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Phenanthrene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Pyrene			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Total PAH	mg/L	0.00001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
p-Terphenyl-d14 (surr.)			116	113	111	117	117	125	121	102	109	98	106	136	126			96	94
2-Fluorobiphenyl (surr.)			97	84	92	94	92	100	99	86	86	81	90	111	99			89	89
Total Nitrogen (as N)																			
Nitrate & Nitrite (as N)	mg/L	0.01	< 0.05	0.18	< 0.05	< 0.05	< 0.05	0.7	< 0.05	< 0.05	< 0.05	< 0.05	0.23	< 0.05	< 0.05			< 0.05	< 0.05
Total Kjeldahl Nitrogen (as N)			0.4	< 0.2	0.4	< 0.2	0.2	3.9	0.7	0.2	0.3	0.6	< 0.2	0.4	0.9			< 0.2	< 0.2
Total Nitrogen (as N)	mg/L	0.35	0.4	< 0.2	0.4	< 0.2	0.2	4.6	0.7	0.2	0.3	0.6	0.2	0.4	0.9			< 0.2	< 0.2
Total Recoverable Hydrocarbons - 1999 NEPM Fractions																			
TRH C10-36 (Total)			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1			< 0.1	< 0.1
TRH C10-C14			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			< 0.05	< 0.05
TRH C15-C28			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1			< 0.1	< 0.1
TRH C29-C36			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1			< 0.1	< 0.1
TRH C6-C9			< 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
Total Recoverable Hydrocarbons - Draft 2010 NEPM Fractions *																			
Naphthalene			< 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
TRH >C10-C16			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)			< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			< 0.05	< 0.05
TRH >C16-C34			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1			< 0.1	< 0.1
TRH >C34-C40			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1			< 0.1	< 0.1
TRH C6-C10			< 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
TRH C6-C10 less BTEX (F1)			< 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
Volatile Organics																			
Tetrachloroethene	mg/L	0.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			< 0.001	< 0.001
Trichloroethene																			

	Units	Assessment Level																		
Client		black = ADWG6		SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA
Site		blue = ANZECC		Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna
Bore ID		Above aesthetic		MB01	MB03	MB04	MB05	MB06#1	MB07	MB08	MB09	MB10	MB11	MB12	MB13	MB14	SW01	SW02	MB06#2	MB06#3
Date		Above guideline		20/08/2013	20/08/2013	20/08/2013	20/08/2013	21/08/2013	21/08/2013	21/08/2013	20/08/2013	20/08/2013	20/08/2013	21/08/2013	21/08/2013	21/08/2013	21/08/2013	21/08/2013	21/08/2013	21/08/2013
Time				900	1020	1245	1815	930	1550	1720	1445	1345	1600	1145	1310	1430	830	800		
Sampled By				AD, PA	AD,PA	AD, PA	AD, PA	AD, PA	AD, PA	AD, PA	AD, PA	AD, PA	AD, PA	AD, PA	AD, PA	AD, PA	AD, PA	AD, PA		
Easting	m UTM50			461249.579	461968.727	462311.56	462062.565	462700.926	463608.272	463173.13	461856.056	461919.983	462456.69	462367.487	462516.159	462742.032	463269	4613659		
Northing	m UTM50			6469808.254	6468385.707	6468391.868	6468857.162	6468874.622	6469136.201	6469492.839	6468565.958	6468767.448	6468764.614	6468999.986	6469123.508	6469081.65	6467985	6469855		
Elevation (TOC)	m			298.268	309.874	302.726	301.432	307.395	331.502	333.945	307.439	301.092	303.674	316.911	321.595	315.105				
TOC Datum				AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD				
Depth to SWL (BTOC)	m			2.73	5.74	1.24	1.85	0.58	5.48	6.44	7.95	1.62	0	10.85	10.85	1.54				
Total Bore Depth (BTOC)	m			10.84	13.86	10.54	9.7	10.05	10.55	11.21	12.54	8.5	7.55	13.54	13.54	8.52				
Elevation (SWL)	m			295.538	304.134	301.486	299.582	306.815	326.022	327.505	299.489	299.472	303.674	306.061	310.745	313.565				
SWL Datum				AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD	AHD				
In Situ Parameters																				
pH	units	6.5-8.5 aesthetic		4.56	4.64	4.09	5.11	5.03	5.38	3.69	5.64	3.45	3.65	4.27	4.27	3.59	5.68	5.32		
Conductivity	uS/cm			>20000	2526	15000	5510	17500	2046	23320	4000	24660	18120	13440	20490	>20000	11210	13900		
Temperature	degC			19	20.2	19	17.2	18.2	18.6	17.6	18.7	19.4	18.2	18.7	18.6	17.6	10.2	10.2		
Laboratory Parameters																				
Ammonia (as N)	mg/L		0.5	0.08	0.22	0.28	0.21	0.09	0.03	0.38	0.27	0.2	0.17	0.05	0.05	0.41	0.05	0.13	0.04	< 0.01
Chloride	mg/L	250 aesthetic		12000	720	5500	1700	6600	540	9100	1100	9500	6800	4800	7900	12000	4000	4900	6600	6600
Conductivity (at 25Â°C)	uS/cm			29000	2700	15000	6000	18000	2100	25000	4100	26000	19000	14000	21000	30000	11000	14000	18000	18000
pH	mg/L	6.5-8.5 aesthetic		5	5.1	4.4	5.5	5.5	5.9	4	5.9	3.7	3.9	4.6	3.6	3.9	6.1	5.5	5.6	5.5
Phosphate total (as P)	mg/L		5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Soluble Solids	mg/L	600 aesthetic		20,000	1,500	10,000	3,200	12,000	1,200	16,000	2,300	17,000	12,000	9,000	14,000	21,000	7,100	9,100	12,000	12000
Sulphate (as S)	mg/L		500	270	34	130	82	160	29	240	66	300	160	110	120	270	96	120	160	160
Total Organic Carbon	mg/L			6.1	< 5	7.3	12	15	7.3	6.5	9.4	12	7.1	13	12	33	16	12	8.7	14
Alkali Metals																				
Potassium				34	8.9	11	15	48	11	83	19	27	29	26	15	17	12	14	46	49
BTEX																				
Benzene	mg/L		0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/L	0.3 (0.003 aesthetic)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/L	0.8 (0.025 aesthetic)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	mg/L	0.6 (0.02 aesthetic)		< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Fluorobenzene (surr.)				58	63	99	65	66	76	63	64	88	51	66	62	65	75	58	92	74
Heavy Metals																				
Arsenic (filtered)	mg/L		0.01	0.002	< 0.001	0.001	0.001	0.003	< 0.001	< 0.001	0.001	< 0.001	0.002	0.002	0.002	< 0.001	0.002	0.003	< 0.001	0.003
Cadmium (filtered)	mg/L		0.002	0.0063	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	mg/L		0.05	0.001	0.002	< 0.001	0.002	0.003	0.002	0.003	0.003	0.003	0.002	0.002	0.003	0.005	0.001	0.001	0.002	0.002
Copper (filtered)	mg/L		2	0.021	< 0.001	< 0.001	0.003	0.002	< 0.001	0.007	< 0.001	0.004	0.014	0.013	0.025	0.007	0.002	0.002	0.003	0.003
Iron (filtered)	mg/L	0.3 aesthetic		< 0.05	6.5	20	1.8	0.05	0.22	82	23	21	19	1.3	0.64	62	1.6	0.94	0.05	0.05
Lead (filtered)	mg/L		0.01	0.004	< 0.001	< 0.001	< 0.001	0.003	< 0.001	0.003	< 0.001	0.003	0.022	0.001	0.063	0.006	< 0.001	0.004	0.003	0.003
Manganese (filtered)	mg/L		0.5	1.3	0.033	0.043	0.18	0.15	0.006	0.087	0.048	0.13	0.55	0.12	0.028	0.44	0.32	0.21	0.15	0.15
Mercury (filtered)	mg/L		0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Molybdenum (filtered)	mg/L		0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Nickel (filtered)	mg/L		0.02	0.042	0.009	0.004	0.019	0.009	0.007	0.022	0.015	0.025	0.048	0.02	0.039	0.032	0.005	0.008	0.009	0.008
Selenium (filtered)	mg/L		0.01	0.063	0.004	< 0.001	0.01	0.038	0.003	0.054	0.006	0.046	0.018	0.021	0.039	0.07	0.018	0.024	0.035	0.034
Zinc (filtered)	mg/L	3 aesthetic		1.6	0.008	0.011	0.014	0.003	0.005	0.013	0.026	0.033	0.026	0.049	0.064	0.088	0.006	0.009	0.003	0.003
Organochlorine Pesticides																				
4.4'-DDD				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDE				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDT	mg/L		0.009	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
a-BHC				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldrin	mg/L	0.003 (Aldrin + Dieldrin combined)		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
b-BHC				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chlordane	mg/L		0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
d-BHC				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dieldrin	mg/L	0.003 (Aldrin + Dieldrin combined)		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan I	mg/L		0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan II	mg/L		0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan sulphate	mg/L		0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin aldehyde				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin ketone				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
g-BHC (Lindane)				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	mg/L		0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor epoxide				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorobenzene				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methoxychlor	mg/L		0.3	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toxaphene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dibutylchlorendate (surr.)				68	84	89	127	138	121	134	72	87	101	139	130	150	140	105	147	124
Tetrachloro-m-xylene (surr.)				52	66	88	86	91	64	72	56	56	63	70	77	68	81	58	74	80
Organophosphorous Pesticides																				
Bolstar				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Chlorpyrifos	mg/L		0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Demeton-O				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Diazinon	mg/L		0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dichlorvos	mg/L		0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Disulfoton	mg/L		0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethion	mg/L		0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethoprop	mg/L		0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Fenitrothion	mg/L		0.007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Fensulfothion	mg/L		0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Fenthion	mg/L		0.007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Merphos				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methyl azinphos				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methyl parathion				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Mevinphos	mg/L		0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Naled				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Phorate				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ronnel				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Tokuthion				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Trichloronate				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Triphenylphosphate (surr.)				99	86	90	88	84	78	82	101	86	106	94	126	67	83	109	95	88
Polychlorinated Biphenyls																				
Aroclor-1016				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1221				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1232				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1242				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1248				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1254				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1260				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total PCB				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dibutylchlorendate (surr.)				68	84	89	127	138	121	134	72	87	101	139	130	150	140	105	147	124
Tetrachloro-m-xylene (surr.)				52	66	88	86	91	64	72	56	56	63	70	77	68	81	58	74	80
Polycyclic Aromatic Hydrocarbons																				
Acenaphthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b)fluoranthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(g.h.i)perylene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a.h)anthracene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH	mg/L		0.00001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
p-Terphenyl-d14 (surr.)				83	82	100	88	90	80	88	126	94	107	100	144	68	92	117	96	94
2-Fluorobiphenyl (surr.)				92	84	118	89	85	67	85	127	94	101	91	129	66	92	144	89	89
Total Nitrogen (as N)																				
Nitrate & Nitrite (as N)	mg/L		0.01	< 0.05	0.8	< 0.05	4.5	< 0.05	1.2	< 0.05	< 0.05	< 0.05	< 0.05	0.19	< 0.05	< 0.05	0.17	0.59	< 0.05	< 0.05
Total Kjeldahl Nitrogen (as N)				< 0.2	0.6	0.5	0.3	< 0.2	< 0.2	0.5	0.5	0.3	0.2	< 0.2	< 0.2	0.6	< 0.2	0.2	< 0.2	< 0.2
Total Nitrogen (as N)	mg/L		0.35	< 0.2	1.4	0.5	4.8	< 0.2	1.2	0.5	0.5	0.3	0.2	< 0.2	< 0.2	0.6	< 0.2	0.8	< 0.2	< 0.2
Total Recoverable Hydrocarbons - 1999 NEPM Fractions																				
TRH C10-36 (Total)				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C14				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TRH C6-C9				< 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
Total Recoverable Hydrocarbons - Draft 2010 NEPM Fractions *																				
Naphthalene				< 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
TRH >C10-C16				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TRH C6-C10				< 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
TRH C6-C10 less BTEX (F1)				< 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
Volatile Organics																				
Tetrachloroethene	mg/L		0.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Trichloroethene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

	Units	Assessment Level											
Client		black = ADWG6		SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA	SITA
Site		blue = ANZECC		Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna	Allawuna
Bore ID		Above aesthetic		MB01	MB03	MB04	MB05	MB06#1	MB07	MB08	MB06#2	MB06#3	FBLANK
Date		Above guideline		19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013	19/02/2013
Time				1109	1220	1317	1417	1530	1715	1755	1530	1530	1755
Sampled By				AD, CK	AD, CK	AD, CK	AD, CK	AD, CK	AD, CK	AD, CK	AD, CK	AD, CK	AD, CK
Easting	m UTM50			461241	462012	462314	462063	462704	463610	463173			
Northing	m UTM50			6469802	6468382	6468385	6468857	6468877	6469135	6469493			
Elevation (TOC)	m			270.12	280.73	275.35	274.65	307.395	304.46	308.19			
TOC Datum				AHD	AHD	AHD	AHD	AHD	AHD	AHD			
Depth to SWL (BTOC)	m			2.539	7.512	1.258	1.988	0.618	5.546	7.478			
Total Bore Depth (BTOC)	m			11.84	13.68	10.668	9.67	10.098	10.568	11.198			
Elevation (SWL)	m			295.729	302.362	301.468	299.444	306.777	325.956	326.467			
SWL Datum				AHD	AHD	AHD	AHD	AHD	AHD	AHD			
In Situ Parameters													
pH	units	6.5-8.5 aesthetic		4.65	4.83	4.17	5.3	5.14	5.58	3.81			
Conductivity	uS/cm			>20000	2855	16330	7600	19700	1989	26280			
Temperature	degC			20.1	20.4	20.6	20.4	20.3	20	19.2			
Laboratory Parameters													
Ammonia (as N)	mg/L		0.5	0.06	0.17	0.28	0.13	0.06	0.02	0.83	0.06	0.04	< 0.01
Chloride	mg/L	250 aesthetic		12000	750	5500	2300	6800	460	9200	6700	6700	< 1
Conductivity (at 25Â°C)	uS/cm			29000	2700	15000	7100	19000	1800	25000	19000	19000	< 10
pH	mg/L	6.5-8.5 aesthetic		7.2	4.2	4.4	7.3	7.5	7.7	3	7.5	7.5	5.2
Phosphate total (as P)	mg/L		5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.13	< 0.05	< 0.05	< 0.05	< 0.05
Soluble Solids	mg/L	600 aesthetic		24000	1600	10000	4200	13000	1200	18000	13000	15000	< 10
Sulphate (as S)	mg/L		500	290	38	130	100	170	29	260	170	160	< 5
Total Organic Carbon	mg/L			11	< 5	7.3	8.1	11	5.4	23	12	12	< 5
Alkali Metals													
Potassium				34	7.8	11	19	49	7.3	86	49	50	< 0.5
BTEX													
Benzene	mg/L		0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/L	0.3 (0.003 aesthetic)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/L	0.8 (0.025 aesthetic)		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	mg/L	0.6 (0.02 aesthetic)		< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Heavy Metals													
Arsenic (filtered)	mg/L		0.01	< 0.001	< 0.001	0.001	< 0.001	0.001	0.001	0.001	0.001	0.001	< 0.001
Cadmium (filtered)	mg/L		0.002	0.0032	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	mg/L		0.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	mg/L		2	0.01	< 0.001	< 0.001	< 0.001	< 0.001	0.003	< 0.001	< 0.001	< 0.001	< 0.001
Iron (filtered)	mg/L	0.3 aesthetic		0.08	6.8	20	1.5	0.21	96	0.21	0.22	< 0.05	
Lead (filtered)	mg/L		0.01	0.004	< 0.001	< 0.001	< 0.001	0.002	0.003	0.002	0.002	< 0.001	
Manganese (filtered)	mg/L		0.5	1.5	0.042	0.043	0.11	0.14	0.075	0.14	0.14	< 0.005	
Mercury (filtered)	mg/L		0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	
Molybdenum (filtered)	mg/L		0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	
Nickel (filtered)	mg/L		0.02	0.026	0.004	0.004	0.007	0.002	0.009	0.003	0.002	< 0.001	
Selenium (filtered)	mg/L		0.01	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Zinc (filtered)	mg/L	3 aesthetic		2.4	0.021	0.011	0.022	0.012	0.036	0.006	0.01	< 0.001	
Organochlorine Pesticides													
4.4'-DDD				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDE				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDT	mg/L		0.009	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
a-BHC				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldrin	mg/L	0.003 (Aldrin + Dieldrin combined)		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
b-BHC				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chlordane	mg/L		0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
d-BHC				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dieldrin	mg/L	0.003 (Aldrin + Dieldrin combined)		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan I	mg/L		0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan II	mg/L		0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan sulphate	mg/L		0.02	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin aldehyde				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin ketone				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
g-BHC (Lindane)				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	mg/L		0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor epoxide				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorobenzene				< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methoxychlor	mg/L		0.3	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toxaphene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Organophosphorous Pesticides													
Bolstar				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Chlorpyrifos	mg/L		0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Demeton-O				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Diazinon	mg/L		0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Dichlorvos	mg/L		0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Disulfoton	mg/L		0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethion	mg/L		0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ethoprop	mg/L		0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Fenitrothion	mg/L		0.007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Fensulfothion	mg/L		0.01	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Fenthion	mg/L		0.007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Merphos				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methyl azinphos				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methyl parathion				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Mevinphos	mg/L		0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Naled				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Phorate				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Ronnel				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Tokuthion				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Trichloronate				< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Polychlorinated Biphenyls													
Aroclor-1016				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1221				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1232				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1242				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1248				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1254				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1260				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total PCB				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Polycyclic Aromatic Hydrocarbons													
Acenaphthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b)fluoranthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(g.h.i)perylene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a.h)anthracene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH	mg/L		0.00001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Total Nitrogen (as N)													
Nitrate & Nitrite (as N)	mg/L		0.01	< 0.05	0.06	< 0.05	< 0.05	< 0.05	0.87	< 0.05	< 0.05	< 0.05	< 0.05
Total Kjeldahl Nitrogen (as N)				1	2.5	0.5	1	0.5	3	2.1	0.5	0.5	< 0.2
Total Nitrogen (as N)	mg/L		0.35	1	2.6	0.5	1	0.5	3.9	2.1	0.5	0.5	< 0.2
Total Recoverable Hydrocarbons - 1999 NEPM Fractions													
TRH C10-36 (Total)				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
TRH C10-C14				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
TRH C15-C28				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
TRH C29-C36				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
TRH C6-C9				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0
Total Recoverable Hydrocarbons - Draft 2010 NEPM Fractions *													
Naphthalene				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0
TRH >C10-C16				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0
TRH >C10-C16 less Naphthalene (F2)				< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0
TRH >C16-C34				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
TRH >C34-C40				< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0
TRH C6-C10				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0
TRH C6-C10 less BTEX (F1)				< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0
Volatile Organics													
Tetrachloroethene	mg/L		0.05	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0
Trichloroethene				< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0

APPENDIX D: CHAIN OF CUSTODY & SAMPLE RECEIPT

Bowman & Associates Pty Ltd

Environmental Engineering Consultants
ABN 22 112 399 514
Telephone: (08) 9414 9670
www.bowmanassociates.com.au
Office: Suite 8/640 Beeliar Drive, SUCCESS WA 6148
Mail: PO Box 2059, ROSSMOYNE WA 6148

Chain of Custody Record

Client	SITA Australia
Project Name	Allawuna Water Quality Feb 2015
B&A Contact Person	Paul Antony
Email	paul@bowmanassociates.com.au

Laboratory	Eurofins (formerly mgt Labmark)
Laboratory Contact	Natalie Krasselt / Kelly Jones
Phone	+61 8 9251 9692
Email	Kellyjones@eurofins.com.au

Job Reference	Sample IDs	Sample Location (Bore/Surface Water)	Sample Type (Soil, Water, Sediment)	Sample Preservation	Sampling Date	Sampling Time	Number of Containers	Analysis Requested	Comments
150210	1A-1F	MB01	water	As per type	10/2/15	9:45	8	pH Electrical Conductivity Metals (As, Cd, Cr, Cu, Fe, Pb, Mn, Mo, Ni, Se, Zn) Mercury (Hg) Ammoniacal Nitrogen Nitrate/Nitrite (NOx) Total Nitrogen Total Phosphorous Total Potassium Chloride Sulphate Total Soluble Solids Total Organic Carbon Total Recoverable Hydrocarbons BTEX PAH's Organochlorine Pesticides Organophosphate Pesticides TCE and PCE (Volatile Chlorinated Hydrocarbons) PCB's	A = Preserved Inorganics (P) B= Metals (field filtered at 0.45 µm) (P) C = Preserved Inorganics (G) D = Volatile Organics (Vial 1 of 2) E = Volatile Organics (Vial 2 of 2) F = Semi-Volatile Organics (G)
150210	2A-2F	~~AA~~ —	—	As per type	—	—	—		
150210	3A-3F	MB03	water	As per type	10/2/15	10:40	8		
150210	4A-4F	MB04	water	As per type	"	12:30	8		
150210	5A-5F	MB05	water	As per type	"	16:30	8		
150211	6A-6F	MB06	"	As per type	11/2/15	"	8		
150211	7A-7F	MB07	"	As per type	11/2/15	15:30	8		
150211	8A-8F	MB08	water	As per type	11/2/15	14:00	8		
150210	9A-9F	MB09	water	As per type	10/2/15	15:45	8x3 (dupl + trip)		
150210	10A-10F	MB 10	water	As per type	10/2/15	14:30	8		
150210	11A-11F	MB11	water	As per type	10/2/15	18:45	8		

PS: Metals not filtered on site. Metals to be filtered in the lab.

LIAM EF/MGT
13/2 8.57am

447392

Job Reference	Sample IDs	Sample Location (Bore/Surface Water)	Sample Type (Soil, Water, Sediment)	Sample Preservation	Date	Time	Number of Containers	Analysis Requested	Comments
150210 ~~150210 MB12~~	12A-12F	MB12.	water	As per type	10/2/15	17:30	8		
150211	13A-13F	MB13	water	As per type	11/2/15	12:15	8		
150211	14A-14F	MB14	water	As per type	11/2/2015	17:40	8		
—	15A-15F	GMB01	dry	As per type	—	—	—		
150211	16A-16F	GMB02	water	As per type	11/2/15	13:40			
150211	17A-17F	GMB03	water	As per type	11/2/15	15:00	8		
150211	18A-18F	GMB04	water	As per type	11/2/15	17:00	8		
150211	19A-19F	GMB05	water	As per type	11/2/15	9:15	8		
150211	20A-20F	GMB06	water	As per type	11/2/15	10:45	8		
—	21A-21F	Surface water 1	dry	As per type	—	—	—		
—	22A-22F	Surface water 2	dry	As per type	—	—	—		
150211	23A-23F	Field Blank	Distilled water	As per type	11/2/2015	14:00	8		
	24A-24F			As per type					
						Total	160		

447392

Samples Relinquished By					Samples Received By				
Initial & Organisation	Signature	Date	Time	Sample Condition	Initial & Organisation	Signature	Date	Time	Sample Condition
Bowman & Associates		12.2.2015	9:00	Chilled	Eurofins/Parklab		12/2/15	10am	Good

This record must be returned to Bowman & Associates by mailing the original or scanning and emailing upon laboratory receipt.

Page 2 of 2

eurofins | mgt

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Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Sample Receipt Advice

Company name:	**Bowman & Associates Pty Ltd**
Contact name:	Paul Antony
Project name:	ALLAWUNA WATER QUALITY FEB 2015
Project ID:	150210/150211
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Feb 13, 2015 8:57 AM
Eurofins | mgt reference:	**447392**

Sample information

- ☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☑ All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- ☑ Attempt to chill was evident.
- ☑ Appropriately preserved sample containers have been used.
- ☑ All samples were received in good condition.
- ☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☑ Appropriate sample containers have been used.
- ☑ Sample containers for volatile analysis received with zero headspace.
- ☒ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Natalie Krasselt on Phone : (+61) (3) 8564 5000 or by e.mail: NatalieKrasselt@eurofins.com.au

Results will be delivered electronically via e.mail to Paul Antony - paul@bowmanassociates.com.au.

APPENDIX E: LABORATORY TEST CERTIFICATES

eurofins | mgt

Certificate of Analysis

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Bowman & Associates Pty Ltd
PO Box 2059
Rossmoyne
WA 6148

Attention: **Paul Antony**

Report **447392-W**
Project name ALLAWUNA WATER QUALITY FEB 2015
Project ID 150210/150211
Received Date Feb 13, 2015

Client Sample ID			**MB01**	**MB03**	**MB04**	**MB05**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M15-Fe09903**	**M15-Fe09904**	**M15-Fe09905**	**M15-Fe09906**
Date Sampled			**Feb 10, 2015**	**Feb 10, 2015**	**Feb 10, 2015**	**Feb 10, 2015**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	131	145	130	129
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Halogenated Volatile Organics						
1.1-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dibromoethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2.3-Trichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			MB01	MB03	MB04	MB05
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09903	M15-Fe09904	M15-Fe09905	M15-Fe09906
Date Sampled			Feb 10, 2015	Feb 10, 2015	Feb 10, 2015	Feb 10, 2015
Test/Reference	LOR	Unit				
Halogenated Volatile Organics						
1.4-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromodichloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromoform	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Carbon Tetrachloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromochloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iodomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Methylene Chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Tetrachloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichlorofluoromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Vinyl chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorobenzene (surr.)	1	%	71	80	60	73
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	77	57	71	77
p-Terphenyl-d14 (surr.)	1	%	95	71	93	99
Organochlorine Pesticides						
Chlordanes - Total	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Client Sample ID			MB01	MB03	MB04	MB05
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09903	M15-Fe09904	M15-Fe09905	M15-Fe09906
Date Sampled			Feb 10, 2015	Feb 10, 2015	Feb 10, 2015	Feb 10, 2015
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
d-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toxaphene	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Dibutylchlorendate (surr.)	1	%	89	58	83	62
Tetrachloro-m-xylene (surr.)	1	%	85	52	74	62
Organophosphorous Pesticides						
Bolstar	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Chlorpyrifos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Demeton-O	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Diazinon	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dichlorvos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Disulfoton	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethoprop	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenitrothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fensulfothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Merphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl azinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl parathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Mevinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Naled	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Phorate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ronnel	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Tokuthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Trichloronate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Triphenylphosphate (surr.)	1	%	94	73	97	91
Polychlorinated Biphenyls						
Aroclor-1016	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1221	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1232	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1242	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1248	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1254	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1260	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PCB*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibutylchlorendate (surr.)	1	%	89	58	83	62
Tetrachloro-m-xylene (surr.)	1	%	85	52	74	62

Client Sample ID			MB01	MB03	MB04	MB05
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M15-Fe09903**	**M15-Fe09904**	**M15-Fe09905**	**M15-Fe09906**
Date Sampled			**Feb 10, 2015**	**Feb 10, 2015**	**Feb 10, 2015**	**Feb 10, 2015**
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.05	0.14	0.18	0.08
Chloride	1	mg/L	12000	680	5700	2200
Conductivity (at 25°C)	1	uS/cm	31000	2500	15000	7100
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	0.46	< 0.05	< 0.05
pH	0.1	pH Units	5.0	5.1	4.5	5.8
Sulphate (as S)	5	mg/L	280	35	120	96
Total Dissolved Solids	10	mg/L	22000	1400	9500	4000
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.3	< 0.2	0.3	< 0.2
Total Nitrogen (as N)	0.2	mg/L	0.3	0.5	0.3	< 0.2
Total Organic Carbon	5	mg/L	< 5	7.2	15	15
Phosphorus	0.5	mg/L	[G01]< 5	< 0.5	[G01]< 5	[G01]< 5
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	[G01]< 0.005	< 0.001	< 0.001	< 0.001
Cadmium (filtered)	0.0002	mg/L	0.0068	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	[G01]< 0.005	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	0.029	< 0.001	< 0.001	0.002
Iron (filtered)	0.05	mg/L	[G01]< 0.25	3.6	16	0.46
Lead (filtered)	0.001	mg/L	0.017	< 0.001	0.001	< 0.001
Manganese (filtered)	0.005	mg/L	1.5	0.035	0.042	0.12
Mercury (filtered)	0.0001	mg/L	[G01]< 0.0005	< 0.0001	< 0.0001	< 0.0001
Molybdenum (filtered)	0.005	mg/L	[G01]< 0.025	< 0.005	< 0.005	< 0.005
Nickel (filtered)	0.001	mg/L	0.050	0.005	0.004	0.010
Selenium (filtered)	0.001	mg/L	[G01]< 0.005	< 0.001	< 0.001	< 0.001
Zinc (filtered)	0.001	mg/L	2.6	0.004	0.003	0.007
Alkali Metals						
Potassium	0.5	mg/L	42	7.0	16	18

Client Sample ID			MB06	MB07	MB08	MB09
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M15-Fe09907**	**M15-Fe09908**	**M15-Fe09909**	**M15-Fe09910**
Date Sampled			**Feb 11, 2015**	**Feb 11, 2015**	**Feb 11, 2015**	**Feb 10, 2015**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	114	149	141	131

Client Sample ID			MB06	MB07	MB08	MB09
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09907	M15-Fe09908	M15-Fe09909	M15-Fe09910
Date Sampled			Feb 11, 2015	Feb 11, 2015	Feb 11, 2015	Feb 10, 2015
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Halogenated Volatile Organics						
1.1-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dibromoethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2.3-Trichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.4-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromodichloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromoform	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Carbon Tetrachloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromochloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iodomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Methylene Chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Tetrachloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichlorofluoromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Vinyl chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorobenzene (surr.)	1	%	61	81	75	71
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			MB06	MB07	MB08	MB09
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09907	M15-Fe09908	M15-Fe09909	M15-Fe09910
Date Sampled			Feb 11, 2015	Feb 11, 2015	Feb 11, 2015	Feb 10, 2015
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	52	53	71	55
p-Terphenyl-d14 (surr.)	1	%	65	66	83	66
Organochlorine Pesticides						
Chlordanes - Total	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toxaphene	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Dibutylchlorendate (surr.)	1	%	67	60	58	52
Tetrachloro-m-xylene (surr.)	1	%	58	55	61	60
Organophosphorous Pesticides						
Bolstar	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Chlorpyrifos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Demeton-O	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Diazinon	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dichlorvos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Disulfoton	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethoprop	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenitrothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fensulfothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002

Client Sample ID			MB06	MB07	MB08	MB09
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09907	M15-Fe09908	M15-Fe09909	M15-Fe09910
Date Sampled			Feb 11, 2015	Feb 11, 2015	Feb 11, 2015	Feb 10, 2015
Test/Reference	LOR	Unit				
Organophosphorous Pesticides						
Merphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl azinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl parathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Mevinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Naled	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Phorate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ronnel	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Tokuthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Trichloronate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Triphenylphosphate (surr.)	1	%	61	68	82	67
Polychlorinated Biphenyls						
Aroclor-1016	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1221	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1232	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1242	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1248	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1254	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1260	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PCB*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibutylchlorendate (surr.)	1	%	67	60	58	52
Tetrachloro-m-xylene (surr.)	1	%	58	55	61	60
Ammonia (as N)	0.01	mg/L	0.04	< 0.01	0.27	0.24
Chloride	1	mg/L	7000	730	8700	1200
Conductivity (at 25°C)	1	uS/cm	18000	2600	24000	4100
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	0.31	< 0.05	0.08
pH	0.1	pH Units	5.5	5.8	4.0	6.0
Sulphate (as S)	5	mg/L	160	35	200	64
Total Dissolved Solids	10	mg/L	12000	1500	15000	2300
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	0.5	0.3
Total Nitrogen (as N)	0.2	mg/L	< 0.2	0.3	0.5	0.4
Total Organic Carbon	5	mg/L	24	9.8	24	15
Phosphorus	0.5	mg/L	[G01] < 5	< 0.5	[G01] < 5	[G01] < 5
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	[G01] < 0.005	< 0.001	[G01] < 0.005	< 0.001
Cadmium (filtered)	0.0002	mg/L	[G01] < 0.001	< 0.0002	[G01] < 0.001	< 0.0002
Chromium (filtered)	0.001	mg/L	[G01] < 0.005	< 0.001	[G01] < 0.005	< 0.001
Copper (filtered)	0.001	mg/L	[G01] < 0.005	0.002	[G01] < 0.005	< 0.001
Iron (filtered)	0.05	mg/L	[G01] < 0.25	1.0	45	22
Lead (filtered)	0.001	mg/L	0.026	< 0.001	[G01] < 0.005	< 0.001
Manganese (filtered)	0.005	mg/L	0.21	0.006	0.13	0.016
Mercury (filtered)	0.0001	mg/L	[G01] < 0.0005	< 0.0001	[G01] < 0.0005	< 0.0001
Molybdenum (filtered)	0.005	mg/L	[G01] < 0.025	< 0.005	[G01] < 0.025	< 0.005
Nickel (filtered)	0.001	mg/L	0.009	< 0.001	0.011	0.003
Selenium (filtered)	0.001	mg/L	[G01] < 0.005	< 0.001	[G01] < 0.005	< 0.001
Zinc (filtered)	0.001	mg/L	0.007	0.004	0.015	0.004
Alkali Metals						
Potassium	0.5	mg/L	44	11	74	19

Client Sample ID			MB10	MB11	MB12	MB13
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09911	M15-Fe09912	M15-Fe09913	M15-Fe09914
Date Sampled			Feb 10, 2015	Feb 10, 2015	Feb 10, 2015	Feb 11, 2015
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	121	120	136	114
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Halogenated Volatile Organics						
1.1-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dibromoethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2.3-Trichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.4-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromodichloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromoform	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Carbon Tetrachloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromochloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iodomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Methylene Chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			MB10	MB11	MB12	MB13
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09911	M15-Fe09912	M15-Fe09913	M15-Fe09914
Date Sampled			Feb 10, 2015	Feb 10, 2015	Feb 10, 2015	Feb 11, 2015
Test/Reference	LOR	Unit				
Halogenated Volatile Organics						
Tetrachloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichlorofluoromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Vinyl chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorobenzene (surr.)	1	%	60	60	71	62
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	52	58	73	61
p-Terphenyl-d14 (surr.)	1	%	64	60	86	71
Organochlorine Pesticides						
Chlordanes - Total	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toxaphene	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			MB10	MB11	MB12	MB13
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09911	M15-Fe09912	M15-Fe09913	M15-Fe09914
Date Sampled			Feb 10, 2015	Feb 10, 2015	Feb 10, 2015	Feb 11, 2015
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Dibutylchlorendate (surr.)	1	%	64	61	50	79
Tetrachloro-m-xylene (surr.)	1	%	66	68	74	56
Organophosphorous Pesticides						
Bolstar	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Chlorpyrifos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Demeton-O	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Diazinon	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dichlorvos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Disulfoton	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethoprop	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenitrothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fensulfothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Merphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl azinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl parathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Mevinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Naled	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Phorate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ronnel	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Tokuthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Trichloronate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Triphenylphosphate (surr.)	1	%	57	55	53	70
Polychlorinated Biphenyls						
Aroclor-1016	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1221	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1232	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1242	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1248	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1254	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1260	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PCB*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibutylchlorendate (surr.)	1	%	64	61	50	79
Tetrachloro-m-xylene (surr.)	1	%	66	68	74	56
Ammonia (as N)	0.01	mg/L	0.18	0.21	0.04	0.17
Chloride	1	mg/L	9800	7300	5500	8200
Conductivity (at 25°C)	1	uS/cm	26000	20000	14000	22000
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	0.31	0.06
pH	0.1	pH Units	3.6	3.8	4.2	3.5
Sulphate (as S)	5	mg/L	260	160	110	120
Total Dissolved Solids	10	mg/L	17000	14000	9000	13000
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.3	3.1	< 0.2	< 0.2
Total Nitrogen (as N)	0.2	mg/L	0.3	3.1	0.3	< 0.2
Total Organic Carbon	5	mg/L	24	12	18	19
Phosphorus	0.5	mg/L	[G01] < 5	[G01] < 5	[G01] < 5	[G01] < 5

Client Sample ID			MB10	MB11	MB12	MB13
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09911	M15-Fe09912	M15-Fe09913	M15-Fe09914
Date Sampled			Feb 10, 2015	Feb 10, 2015	Feb 10, 2015	Feb 11, 2015
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	[G01]< 0.005	0.006	< 0.001	[G01]< 0.005
Cadmium (filtered)	0.0002	mg/L	[G01]< 0.001	[G01]< 0.001	< 0.0002	[G01]< 0.001
Chromium (filtered)	0.001	mg/L	[G01]< 0.005	[G01]< 0.005	< 0.001	[G01]< 0.005
Copper (filtered)	0.001	mg/L	[G01]< 0.005	[G01]< 0.005	0.007	0.021
Iron (filtered)	0.05	mg/L	18	15	< 0.05	1.6
Lead (filtered)	0.001	mg/L	[G01]< 0.005	0.037	0.002	0.14
Manganese (filtered)	0.005	mg/L	[G01]< 0.025	0.62	0.094	[G01]< 0.025
Mercury (filtered)	0.0001	mg/L	[G01]< 0.0005	[G01]< 0.0005	< 0.0001	[G01]< 0.0005
Molybdenum (filtered)	0.005	mg/L	[G01]< 0.025	[G01]< 0.025	< 0.005	[G01]< 0.025
Nickel (filtered)	0.001	mg/L	0.008	0.015	0.005	0.028
Selenium (filtered)	0.001	mg/L	[G01]< 0.005	[G01]< 0.005	< 0.001	[G01]< 0.005
Zinc (filtered)	0.001	mg/L	0.008	0.009	0.006	0.027
Alkali Metals						
Potassium	0.5	mg/L	23	30	26	11

Client Sample ID			MB14	GMB02	GMB03	GMB04
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09915	M15-Fe09916	M15-Fe09917	M15-Fe09918
Date Sampled			Feb 11, 2015	Feb 11, 2015	Feb 11, 2015	Feb 11, 2015
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	121	128	125	122
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Halogenated Volatile Organics						
1.1-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			MB14	GMB02	GMB03	GMB04
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09915	M15-Fe09916	M15-Fe09917	M15-Fe09918
Date Sampled			Feb 11, 2015	Feb 11, 2015	Feb 11, 2015	Feb 11, 2015
Test/Reference	LOR	Unit				
Halogenated Volatile Organics						
1.1.2.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dibromoethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2.3-Trichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.4-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromodichloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromoform	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Carbon Tetrachloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromochloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iodomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Methylene Chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Tetrachloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichlorofluoromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Vinyl chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorobenzene (surr.)	1	%	60	56	87	62
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	73	55	60	65
p-Terphenyl-d14 (surr.)	1	%	85	66	72	72

Client Sample ID			MB14	GMB02	GMB03	GMB04
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09915	M15-Fe09916	M15-Fe09917	M15-Fe09918
Date Sampled			Feb 11, 2015	Feb 11, 2015	Feb 11, 2015	Feb 11, 2015
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toxaphene	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
Dibutylchlorendate (surr.)	1	%	84	73	75	66
Tetrachloro-m-xylene (surr.)	1	%	62	68	60	56
Organophosphorous Pesticides						
Bolstar	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Chlorpyrifos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Demeton-O	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Diazinon	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dichlorvos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Disulfoton	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethoprop	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenitrothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fensulfothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Merphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl azinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl parathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Mevinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Naled	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Phorate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ronnel	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Tokuthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Trichloronate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Triphenylphosphate (surr.)	1	%	56	65	64	78

Client Sample ID			MB14	GMB02	GMB03	GMB04
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09915	M15-Fe09916	M15-Fe09917	M15-Fe09918
Date Sampled			Feb 11, 2015	Feb 11, 2015	Feb 11, 2015	Feb 11, 2015
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Aroclor-1016	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1221	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1232	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1242	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1248	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1254	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1260	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PCB*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibutylchlorendate (surr.)	1	%	84	73	75	66
Tetrachloro-m-xylene (surr.)	1	%	62	68	60	56
Ammonia (as N)	0.01	mg/L	0.17	0.60	0.09	0.01
Chloride	1	mg/L	12000	8400	2000	1400
Conductivity (at 25°C)	1	uS/cm	26000	23000	6400	5000
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	< 0.05	0.81	0.14
pH	0.1	pH Units	3.8	3.7	4.1	5.9
Sulphate (as S)	5	mg/L	270	200	67	110
Total Dissolved Solids	10	mg/L	16000	15000	3600	2900
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.3	0.7	< 0.2	< 0.2
Total Nitrogen (as N)	0.2	mg/L	0.3	0.7	0.8	< 0.2
Total Organic Carbon	5	mg/L	35	21	10	15
Phosphorus	0.5	mg/L	[G01]< 5	[G01]< 5	[G01]< 5	[G01]< 5
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	[G01]< 0.005	[G01]< 0.005	< 0.001	< 0.001
Cadmium (filtered)	0.0002	mg/L	[G01]< 0.001	[G01]< 0.001	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	[G01]< 0.005	[G01]< 0.005	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	0.010	0.005	0.013	< 0.001
Iron (filtered)	0.05	mg/L	20	48	1.2	< 0.05
Lead (filtered)	0.001	mg/L	0.008	0.007	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	0.31	0.10	0.018	0.013
Mercury (filtered)	0.0001	mg/L	[G01]< 0.0005	[G01]< 0.0005	< 0.0001	< 0.0001
Molybdenum (filtered)	0.005	mg/L	[G01]< 0.025	[G01]< 0.025	< 0.005	< 0.005
Nickel (filtered)	0.001	mg/L	0.025	0.012	0.002	0.003
Selenium (filtered)	0.001	mg/L	[G01]< 0.005	[G01]< 0.005	< 0.001	< 0.001
Zinc (filtered)	0.001	mg/L	0.13	0.019	0.016	0.016
Alkali Metals						
Potassium	0.5	mg/L	8.9	83	40	8.5

Client Sample ID			GMB05	GMB06	FIELD BLANK	MB09 DUPLICATE
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09919	M15-Fe09920	M15-Fe09921	M15-Fe09922
Date Sampled			Feb 11, 2015	Feb 11, 2015	Feb 11, 2015	Feb 09, 2015
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
4-Bromofluorobenzene (surr.)	1	%	121	134	128	112
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Halogenated Volatile Organics						
1.1-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.1.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.1.2.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dibromoethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.2.3-Trichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.3-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
1.4-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromodichloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromoform	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Bromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Carbon Tetrachloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chloroform	0.005	mg/L	< 0.005	< 0.005	< 0.005	< 0.005
Chloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
cis-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromochloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Iodomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Methylene Chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

Client Sample ID			GMB05	GMB06	FIELD BLANK	MB09 DUPLICATE
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09919	M15-Fe09920	M15-Fe09921	M15-Fe09922
Date Sampled			Feb 11, 2015	Feb 11, 2015	Feb 11, 2015	Feb 09, 2015
Test/Reference	LOR	Unit				
Halogenated Volatile Organics						
Tetrachloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
trans-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Trichlorofluoromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Vinyl chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorobenzene (surr.)	1	%	59	73	92	80
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	63	52	65	61
p-Terphenyl-d14 (surr.)	1	%	72	57	79	74
Organochlorine Pesticides						
Chlordanes - Total	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Toxaphene	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			GMB05	GMB06	FIELD BLANK	MB09 DUPLICATE
Sample Matrix			Water	Water	Water	Water
Eurofins | mgt Sample No.			M15-Fe09919	M15-Fe09920	M15-Fe09921	M15-Fe09922
Date Sampled			Feb 11, 2015	Feb 11, 2015	Feb 11, 2015	Feb 09, 2015
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Dibutylchlorendate (surr.)	1	%	85	62	68	72
Tetrachloro-m-xylene (surr.)	1	%	71	61	61	62
Organophosphorous Pesticides						
Bolstar	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Chlorpyrifos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Demeton-O	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Diazinon	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Dichlorvos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Disulfoton	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ethoprop	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenitrothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fensulfothion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Fenthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Merphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl azinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Methyl parathion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Mevinphos	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Naled	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Phorate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Ronnel	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Tokuthion	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Trichloronate	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
Triphenylphosphate (surr.)	1	%	76	62	79	76
Polychlorinated Biphenyls						
Aroclor-1016	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1221	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1232	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1242	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1248	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1254	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Aroclor-1260	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PCB*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibutylchlorendate (surr.)	1	%	85	62	68	72
Tetrachloro-m-xylene (surr.)	1	%	71	61	61	62
Ammonia (as N)	0.01	mg/L	0.02	0.09	< 0.01	0.24
Chloride	1	mg/L	7400	1700	< 1	1200
Conductivity (at 25°C)	1	uS/cm	19000	5500	6.3	4100
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05	0.20	< 0.05	< 0.05
pH	0.1	pH Units	6.5	5.1	5.6	6.1
Sulphate (as S)	5	mg/L	150	69	< 5	64
Total Dissolved Solids	10	mg/L	14000	3100	< 10	2400
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	< 0.2	< 0.2	< 0.2	0.3
Total Nitrogen (as N)	0.2	mg/L	< 0.2	0.2	< 0.2	0.3
Total Organic Carbon	5	mg/L	17	17	< 5	6.1
Phosphorus	0.5	mg/L	[G01]< 5	[G01]< 5	< 0.5	[G01]< 5

Client Sample ID			GMB05	GMB06	FIELD BLANK	MB09 DUPLICATE
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins | mgt Sample No.			**M15-Fe09919**	**M15-Fe09920**	**M15-Fe09921**	**M15-Fe09922**
Date Sampled			**Feb 11, 2015**	**Feb 11, 2015**	**Feb 11, 2015**	**Feb 09, 2015**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	[G01] < 0.005	< 0.001	< 0.001	< 0.001
Cadmium (filtered)	0.0002	mg/L	[G01] < 0.001	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	[G01] < 0.005	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	[G01] < 0.005	< 0.001	< 0.001	< 0.001
Iron (filtered)	0.05	mg/L	[G01] < 0.25	< 0.05	< 0.05	22
Lead (filtered)	0.001	mg/L	[G01] < 0.005	0.001	< 0.001	< 0.001
Manganese (filtered)	0.005	mg/L	1.0	0.043	< 0.005	0.015
Mercury (filtered)	0.0001	mg/L	[G01] < 0.0005	< 0.0001	< 0.0001	< 0.0001
Molybdenum (filtered)	0.005	mg/L	[G01] < 0.025	< 0.005	< 0.005	< 0.005
Nickel (filtered)	0.001	mg/L	0.009	0.004	< 0.001	0.002
Selenium (filtered)	0.001	mg/L	[G01] < 0.005	< 0.001	< 0.001	< 0.001
Zinc (filtered)	0.001	mg/L	0.005	0.018	< 0.001	0.006
Alkali Metals						
Potassium	0.5	mg/L	21	25	< 0.5	21

Client Sample ID			MB09 TRIPLICATE
Sample Matrix			**Water**
Eurofins | mgt Sample No.			**M15-Fe10197**
Date Sampled			**Feb 09, 2015**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	0.02	mg/L	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003
4-Bromofluorobenzene (surr.)	1	%	115
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.02	mg/L	< 0.02
TRH C6-C10	0.02	mg/L	< 0.02
TRH C6-C10 less BTEX (F1)[N04]	0.02	mg/L	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05
TRH >C10-C16 less Naphthalene (F2)[N01]	0.05	mg/L	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1
Halogenated Volatile Organics			
1.1-Dichloroethane	0.001	mg/L	< 0.001
1.1-Dichloroethene	0.001	mg/L	< 0.001
1.1.1-Trichloroethane	0.001	mg/L	< 0.001
1.1.1.2-Tetrachloroethane	0.001	mg/L	< 0.001

Client Sample ID			MB09 TRIPLICATE
Sample Matrix			Water
Eurofins | mgt Sample No.			M15-Fe10197
Date Sampled			Feb 09, 2015
Test/Reference	LOR	Unit	
Halogenated Volatile Organics			
1.1.2-Trichloroethane	0.001	mg/L	< 0.001
1.1.2.2-Tetrachloroethane	0.001	mg/L	< 0.001
1.2-Dibromoethane	0.001	mg/L	< 0.001
1.2-Dichlorobenzene	0.001	mg/L	< 0.001
1.2-Dichloroethane	0.001	mg/L	< 0.001
1.2-Dichloropropane	0.001	mg/L	< 0.001
1.2.3-Trichloropropane	0.001	mg/L	< 0.001
1.3-Dichlorobenzene	0.001	mg/L	< 0.001
1.3-Dichloropropane	0.001	mg/L	< 0.001
1.4-Dichlorobenzene	0.001	mg/L	< 0.001
Bromodichloromethane	0.001	mg/L	< 0.001
Bromoform	0.001	mg/L	< 0.001
Bromomethane	0.001	mg/L	< 0.001
Carbon Tetrachloride	0.001	mg/L	< 0.001
Chlorobenzene	0.001	mg/L	< 0.001
Chloroform	0.005	mg/L	< 0.005
Chloromethane	0.001	mg/L	< 0.001
cis-1.2-Dichloroethene	0.001	mg/L	< 0.001
cis-1.3-Dichloropropene	0.001	mg/L	< 0.001
Dibromochloromethane	0.001	mg/L	< 0.001
Dibromomethane	0.001	mg/L	< 0.001
Iodomethane	0.001	mg/L	< 0.001
Methylene Chloride	0.001	mg/L	< 0.001
Tetrachloroethene	0.001	mg/L	< 0.001
trans-1.2-Dichloroethene	0.001	mg/L	< 0.001
trans-1.3-Dichloropropene	0.001	mg/L	< 0.001
Trichloroethene	0.001	mg/L	< 0.001
Trichlorofluoromethane	0.001	mg/L	< 0.001
Vinyl chloride	0.001	mg/L	< 0.001
Fluorobenzene (surr.)	1	%	78
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	0.001	mg/L	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001
Anthracene	0.001	mg/L	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001
Benzo(b&j)fluoranthene[N07]	0.001	mg/L	< 0.001
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001
Chrysene	0.001	mg/L	< 0.001
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001
Fluoranthene	0.001	mg/L	< 0.001
Fluorene	0.001	mg/L	< 0.001
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001
Naphthalene	0.001	mg/L	< 0.001
Phenanthrene	0.001	mg/L	< 0.001
Pyrene	0.001	mg/L	< 0.001
Total PAH*	0.001	mg/L	< 0.001
2-Fluorobiphenyl (surr.)	1	%	52
p-Terphenyl-d14 (surr.)	1	%	59

Client Sample ID			MB09 TRIPLICATE
Sample Matrix			Water
Eurofins | mgt Sample No.			M15-Fe10197
Date Sampled			Feb 09, 2015
Test/Reference	LOR	Unit	
Organochlorine Pesticides			
Chlordanes - Total	0.001	mg/L	< 0.001
4.4'-DDD	0.0001	mg/L	< 0.0001
4.4'-DDE	0.0001	mg/L	< 0.0001
4.4'-DDT	0.0001	mg/L	< 0.0001
a-BHC	0.0001	mg/L	< 0.0001
Aldrin	0.0001	mg/L	< 0.0001
b-BHC	0.0001	mg/L	< 0.0001
d-BHC	0.0001	mg/L	< 0.0001
Dieldrin	0.0001	mg/L	< 0.0001
Endosulfan I	0.0001	mg/L	< 0.0001
Endosulfan II	0.0001	mg/L	< 0.0001
Endosulfan sulphate	0.0001	mg/L	< 0.0001
Endrin	0.0001	mg/L	< 0.0001
Endrin aldehyde	0.0001	mg/L	< 0.0001
Endrin ketone	0.0001	mg/L	< 0.0001
g-BHC (Lindane)	0.0001	mg/L	< 0.0001
Heptachlor	0.0001	mg/L	< 0.0001
Heptachlor epoxide	0.0001	mg/L	< 0.0001
Hexachlorobenzene	0.0001	mg/L	< 0.0001
Methoxychlor	0.0001	mg/L	< 0.0001
Toxaphene	0.01	mg/L	< 0.01
Dibutylchlorendate (surr.)	1	%	82
Tetrachloro-m-xylene (surr.)	1	%	66
Organophosphorous Pesticides			
Bolstar	0.002	mg/L	< 0.002
Chlorpyrifos	0.002	mg/L	< 0.002
Demeton-O	0.002	mg/L	< 0.002
Diazinon	0.002	mg/L	< 0.002
Dichlorvos	0.002	mg/L	< 0.002
Disulfoton	0.002	mg/L	< 0.002
Ethion	0.002	mg/L	< 0.002
Ethoprop	0.002	mg/L	< 0.002
Fenitrothion	0.002	mg/L	< 0.002
Fensulfothion	0.002	mg/L	< 0.002
Fenthion	0.002	mg/L	< 0.002
Merphos	0.002	mg/L	< 0.002
Methyl azinphos	0.002	mg/L	< 0.002
Methyl parathion	0.002	mg/L	< 0.002
Mevinphos	0.002	mg/L	< 0.002
Naled	0.002	mg/L	< 0.002
Phorate	0.002	mg/L	< 0.002
Ronnel	0.002	mg/L	< 0.002
Tokuthion	0.002	mg/L	< 0.002
Trichloronate	0.002	mg/L	< 0.002
Triphenylphosphate (surr.)	1	%	59

Client Sample ID			MB09 TRIPLICATE
Sample Matrix			Water
Eurofins | mgt Sample No.			M15-Fe10197
Date Sampled			Feb 09, 2015
Test/Reference	LOR	Unit	
Polychlorinated Biphenyls			
Aroclor-1016	0.001	mg/L	< 0.001
Aroclor-1221	0.001	mg/L	< 0.001
Aroclor-1232	0.001	mg/L	< 0.001
Aroclor-1242	0.001	mg/L	< 0.001
Aroclor-1248	0.001	mg/L	< 0.001
Aroclor-1254	0.001	mg/L	< 0.001
Aroclor-1260	0.001	mg/L	< 0.001
Total PCB*	0.001	mg/L	< 0.001
Dibutylchlorendate (surr.)	1	%	82
Tetrachloro-m-xylene (surr.)	1	%	66
Ammonia (as N)	0.01	mg/L	0.24
Chloride	1	mg/L	1100
Conductivity (at 25°C)	1	uS/cm	4100
Nitrate & Nitrite (as N)	0.05	mg/L	< 0.05
pH	0.1	pH Units	6.0
Sulphate (as S)	5	mg/L	64
Total Dissolved Solids	10	mg/L	2300
Total Kjeldahl Nitrogen (as N)	0.2	mg/L	0.3
Total Nitrogen (as N)	0.2	mg/L	0.3
Total Organic Carbon	5	mg/L	19
Phosphorus	0.5	mg/L	[G01]< 5
Heavy Metals			
Arsenic (filtered)	0.001	mg/L	< 0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001
Iron (filtered)	0.05	mg/L	20
Lead (filtered)	0.001	mg/L	< 0.001
Manganese (filtered)	0.005	mg/L	0.015
Mercury (filtered)	0.0001	mg/L	< 0.0001
Molybdenum (filtered)	0.005	mg/L	< 0.005
Nickel (filtered)	0.001	mg/L	0.002
Selenium (filtered)	0.001	mg/L	< 0.001
Zinc (filtered)	0.001	mg/L	0.004
Alkali Metals			
Potassium	0.5	mg/L	25

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Feb 19, 2015	7 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Feb 19, 2015	7 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
BTEX	Melbourne	Feb 13, 2015	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Halogenated Volatile Organics	Melbourne	Feb 13, 2015	7 Day
- Method: USEPA 8260 MGT 350A Halogenated Volatile Organics			
Polycyclic Aromatic Hydrocarbons	Melbourne	Feb 19, 2015	7 Day
- Method: USEPA 8270 Polycyclic Aromatic Hydrocarbons			
Organochlorine Pesticides	Melbourne	Feb 19, 2015	7 Day
- Method: USEPA 8081 Organochlorine Pesticides			
Organophosphorous Pesticides	Melbourne	Feb 19, 2015	7 Day
- Method: USEPA 8270 Organophosphorus Pesticides			
Polychlorinated Biphenyls	Melbourne	Feb 19, 2015	7 Day
- Method: USEPA 8082 Polychlorinated Biphenyls			
Ammonia (as N)	Melbourne	Feb 16, 2015	28 Day
- Method: APHA 4500-NH3 Ammonia Nitrogen by FIA			
Chloride	Melbourne	Feb 13, 2015	28 Day
- Method: MGT 1100A			
Conductivity (at 25°C)	Melbourne	Feb 16, 2015	28 Day
- Method: APHA 2510 Conductivity by Direct Measurement			
pH	Melbourne	Feb 16, 2015	0 Hours
- Method: APHA 4500 pH by Direct Measurement - ** Samples analysed outside holding time. Analysis should be performed in situ. Results for reference only.			
Sulphate (as S)	Melbourne	Feb 13, 2015	28 Day
- Method: In house MGT1110A (SO4 by Discrete Analyser)			
Total Dissolved Solids	Melbourne	Feb 13, 2015	7 Day
- Method: APHA 2540C Total Dissolved Solids			
Total Organic Carbon	Melbourne	Feb 20, 2015	28 Day
- Method: APHA 5310B Total Organic Carbon			
Phosphorus	Melbourne	Feb 13, 2015	180 Day
- Method: USEPA 6010			
Heavy Metals (filtered)	Melbourne	Feb 13, 2015	180 Day
- Method: USEPA 6020 Heavy Metals			
Mobil Metals : Metals M15	Melbourne	Feb 13, 2015	28 Day
- Method: USEPA 6010/6020 Heavy Metals & USEPA 7470/71 Mercury			
Alkali Metals	Melbourne	Feb 13, 2015	180 Day
- Method: USEPA 6010 Alkali Metals			
Total Nitrogen Set (as N)			
Nitrate & Nitrite (as N)	Melbourne	Feb 16, 2015	28 Day
- Method: APHA 4500-NO3/NO2 Nitrate-Nitrite Nitrogen by FIA			
Total Kjeldahl Nitrogen (as N)	Melbourne	Feb 13, 2015	7 Day
- Method: APHA 4500 TKN			

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Company Name: Bowman & Associates Pty Ltd
Address: PO Box 2059
Rossmoyne
WA 6148

Order No.:
Report #: 447392
Phone: 08 9457 5899
Fax:

Received: Feb 13, 2015 8:57 AM
Due: Feb 20, 2015
Priority: 5 Day
Contact Name: Paul Antony

Project Name: ALLAWUNA WATER QUALITY FEB 2015
Project ID: 150210/150211

Eurofins | mgt Client Manager: Natalie Krasselt

Sample Detail					Ammonia (as N)	Arsenic (filtered)	Cadmium (filtered)	Chloride	Chromium (filtered)	Conductivity (at 25°C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH	Phosphorus	Potassium	Selenium (filtered)	Sulphate (as S)	Total Dissolved Solids	Total Organic Carbon	Zinc (filtered)	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorous Pesticides	Polychlorinated Biphenyls	BTEX	Total Nitrogen Set (as N)	Total Recoverable Hydrocarbons	Halogenated Volatile Organics
Laboratory where analysis is conducted																																	
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																																	
Brisbane Laboratory - NATA Site # 20794																																	
External Laboratory																																	
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**																													
MB01	Feb 10, 2015		Water	M15-Fe09903	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB03	Feb 10, 2015		Water	M15-Fe09904	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB04	Feb 10, 2015		Water	M15-Fe09905	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB05	Feb 10, 2015		Water	M15-Fe09906	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB06	Feb 11, 2015		Water	M15-Fe09907	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB07	Feb 11, 2015		Water	M15-Fe09908	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB08	Feb 11, 2015		Water	M15-Fe09909	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB09	Feb 10, 2015		Water	M15-Fe09910	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB10	Feb 10, 2015		Water	M15-Fe09911	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Project ID: 150210/150211

Eurofins | mgt Client Manager: Natalie Krasselt

Sample Detail					Ammonia (as N)	Arsenic (filtered)	Cadmium (filtered)	Chloride	Chromium (filtered)	Conductivity (at 25°C)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Manganese (filtered)	Mercury (filtered)	Molybdenum (filtered)	Nickel (filtered)	pH	Phosphorus	Potassium	Selenium (filtered)	Sulphate (as S)	Total Dissolved Solids	Total Organic Carbon	Zinc (filtered)	Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorous Pesticides	Polychlorinated Biphenyls	BTEX	Total Nitrogen Set (as N)	Total Recoverable Hydrocarbons	Halogenated Volatile Organics
Laboratory where analysis is conducted																																
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																																
Brisbane Laboratory - NATA Site # 20794																																
External Laboratory																																
MB11	Feb 10, 2015		Water	M15-Fe09912	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB12	Feb 10, 2015		Water	M15-Fe09913	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB13	Feb 11, 2015		Water	M15-Fe09914	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB14	Feb 11, 2015		Water	M15-Fe09915	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GMB02	Feb 11, 2015		Water	M15-Fe09916	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GMB03	Feb 11, 2015		Water	M15-Fe09917	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GMB04	Feb 11, 2015		Water	M15-Fe09918	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GMB05	Feb 11, 2015		Water	M15-Fe09919	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GMB06	Feb 11, 2015		Water	M15-Fe09920	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FIELD BLANK	Feb 11, 2015		Water	M15-Fe09921	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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Laboratory where analysis is conducted																																	
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217																																	
Brisbane Laboratory - NATA Site # 20794																																	
External Laboratory																																	
MB09 DUPLICATE	Feb 09, 2015		Water	M15-Fe09922	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB09 TRIPLICATE	Feb 09, 2015		Water	M15-Fe10197	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.02			0.02	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH C6-C10 less BTEX (F1)	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Halogenated Volatile Organics							
1.1-Dichloroethane	mg/L	< 0.001			0.001	Pass	
1.1-Dichloroethene	mg/L	< 0.001			0.001	Pass	
1.1.1-Trichloroethane	mg/L	< 0.001			0.001	Pass	
1.1.1.2-Tetrachloroethane	mg/L	< 0.001			0.001	Pass	
1.1.2-Trichloroethane	mg/L	< 0.001			0.001	Pass	
1.1.2.2-Tetrachloroethane	mg/L	< 0.001			0.001	Pass	
1.2-Dibromoethane	mg/L	< 0.001			0.001	Pass	
1.2-Dichlorobenzene	mg/L	< 0.001			0.001	Pass	
1.2-Dichloroethane	mg/L	< 0.001			0.001	Pass	
1.2-Dichloropropane	mg/L	< 0.001			0.001	Pass	
1.2.3-Trichloropropane	mg/L	< 0.001			0.001	Pass	
1.3-Dichlorobenzene	mg/L	< 0.001			0.001	Pass	
1.3-Dichloropropane	mg/L	< 0.001			0.001	Pass	
1.4-Dichlorobenzene	mg/L	< 0.001			0.001	Pass	
Bromodichloromethane	mg/L	< 0.001			0.001	Pass	
Bromoform	mg/L	< 0.001			0.001	Pass	
Bromomethane	mg/L	< 0.001			0.001	Pass	
Carbon Tetrachloride	mg/L	< 0.001			0.001	Pass	
Chlorobenzene	mg/L	< 0.001			0.001	Pass	
Chloroform	mg/L	< 0.005			0.005	Pass	
Chloromethane	mg/L	< 0.001			0.001	Pass	
cis-1.2-Dichloroethene	mg/L	< 0.001			0.001	Pass	
cis-1.3-Dichloropropene	mg/L	< 0.001			0.001	Pass	
Dibromochloromethane	mg/L	< 0.001			0.001	Pass	
Dibromomethane	mg/L	< 0.001			0.001	Pass	
Iodomethane	mg/L	< 0.001			0.001	Pass	
Methylene Chloride	mg/L	< 0.001			0.001	Pass	
Tetrachloroethene	mg/L	< 0.001			0.001	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
trans-1.2-Dichloroethene	mg/L	< 0.001			0.001	Pass	
trans-1.3-Dichloropropene	mg/L	< 0.001			0.001	Pass	
Trichloroethene	mg/L	< 0.001			0.001	Pass	
Trichlorofluoromethane	mg/L	< 0.001			0.001	Pass	
Vinyl chloride	mg/L	< 0.001			0.001	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g.h.i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a.h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1.2.3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/L	< 0.001			0.001	Pass	
4.4'-DDD	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDE	mg/L	< 0.0001			0.0001	Pass	
4.4'-DDT	mg/L	< 0.0001			0.0001	Pass	
a-BHC	mg/L	< 0.0001			0.0001	Pass	
Aldrin	mg/L	< 0.0001			0.0001	Pass	
b-BHC	mg/L	< 0.0001			0.0001	Pass	
d-BHC	mg/L	< 0.0001			0.0001	Pass	
Dieldrin	mg/L	< 0.0001			0.0001	Pass	
Endosulfan I	mg/L	< 0.0001			0.0001	Pass	
Endosulfan II	mg/L	< 0.0001			0.0001	Pass	
Endosulfan sulphate	mg/L	< 0.0001			0.0001	Pass	
Endrin	mg/L	< 0.0001			0.0001	Pass	
Endrin aldehyde	mg/L	< 0.0001			0.0001	Pass	
Endrin ketone	mg/L	< 0.0001			0.0001	Pass	
g-BHC (Lindane)	mg/L	< 0.0001			0.0001	Pass	
Heptachlor	mg/L	< 0.0001			0.0001	Pass	
Heptachlor epoxide	mg/L	< 0.0001			0.0001	Pass	
Hexachlorobenzene	mg/L	< 0.0001			0.0001	Pass	
Methoxychlor	mg/L	< 0.0001			0.0001	Pass	
Toxaphene	mg/L	< 0.01			0.01	Pass	
Method Blank							
Organophosphorous Pesticides							
Bolstar	mg/L	< 0.002			0.002	Pass	
Chlorpyrifos	mg/L	< 0.002			0.002	Pass	
Demeton-O	mg/L	< 0.002			0.002	Pass	
Diazinon	mg/L	< 0.002			0.002	Pass	
Dichlorvos	mg/L	< 0.002			0.002	Pass	
Disulfoton	mg/L	< 0.002			0.002	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Ethion	mg/L	< 0.002			0.002	Pass	
Ethoprop	mg/L	< 0.002			0.002	Pass	
Fenitrothion	mg/L	< 0.002			0.002	Pass	
Fensulfothion	mg/L	< 0.002			0.002	Pass	
Fenthion	mg/L	< 0.002			0.002	Pass	
Merphos	mg/L	< 0.002			0.002	Pass	
Methyl azinphos	mg/L	< 0.002			0.002	Pass	
Methyl parathion	mg/L	< 0.002			0.002	Pass	
Mevinphos	mg/L	< 0.002			0.002	Pass	
Naled	mg/L	< 0.002			0.002	Pass	
Phorate	mg/L	< 0.002			0.002	Pass	
Ronnel	mg/L	< 0.002			0.002	Pass	
Tokuthion	mg/L	< 0.002			0.002	Pass	
Trichloronate	mg/L	< 0.002			0.002	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/L	< 0.001			0.001	Pass	
Aroclor-1221	mg/L	< 0.001			0.001	Pass	
Aroclor-1232	mg/L	< 0.001			0.001	Pass	
Aroclor-1242	mg/L	< 0.001			0.001	Pass	
Aroclor-1248	mg/L	< 0.001			0.001	Pass	
Aroclor-1254	mg/L	< 0.001			0.001	Pass	
Aroclor-1260	mg/L	< 0.001			0.001	Pass	
Total PCB*	mg/L	< 0.001			0.001	Pass	
Method Blank							
Ammonia (as N)	mg/L	< 0.01			0.01	Pass	
Chloride	mg/L	< 1			1	Pass	
Nitrate & Nitrite (as N)	mg/L	< 0.05			0.05	Pass	
Sulphate (as S)	mg/L	< 5			5	Pass	
Total Dissolved Solids	mg/L	< 10			10	Pass	
Total Kjeldahl Nitrogen (as N)	mg/L	< 0.2			0.2	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Phosphorus	mg/L	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Iron (filtered)	mg/L	< 0.05			0.05	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Manganese (filtered)	mg/L	< 0.005			0.005	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Molybdenum (filtered)	mg/L	< 0.005			0.005	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Selenium (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.001			0.001	Pass	
Method Blank							
Alkali Metals							
Potassium	mg/L	< 0.5			0.5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	88			70-130	Pass	
TRH C10-C14	%	76			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
BTEX							
Benzene	%	77			70-130	Pass	
Toluene	%	84			70-130	Pass	
Ethylbenzene	%	83			70-130	Pass	
m&p-Xylenes	%	84			70-130	Pass	
Xylenes - Total	%	84			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	93			75-125	Pass	
TRH C6-C10	%	90			70-130	Pass	
TRH >C10-C16	%	76			70-130	Pass	
LCS - % Recovery							
Halogenated Volatile Organics							
1.1.1-Trichloroethane	%	85			70-130	Pass	
1.2-Dichloroethane	%	110			70-130	Pass	
Trichloroethene	%	75			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	74			70-130	Pass	
Acenaphthylene	%	77			70-130	Pass	
Anthracene	%	75			70-130	Pass	
Benz(a)anthracene	%	85			70-130	Pass	
Benzo(a)pyrene	%	111			70-130	Pass	
Benzo(b&j)fluoranthene	%	115			70-130	Pass	
Benzo(g.h.i)perylene	%	99			70-130	Pass	
Benzo(k)fluoranthene	%	87			70-130	Pass	
Chrysene	%	84			70-130	Pass	
Dibenz(a.h)anthracene	%	110			70-130	Pass	
Fluoranthene	%	87			70-130	Pass	
Fluorene	%	70			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	104			70-130	Pass	
Naphthalene	%	74			70-130	Pass	
Phenanthrene	%	75			70-130	Pass	
Pyrene	%	83			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	86			70-130	Pass	
4.4'-DDE	%	93			70-130	Pass	
4.4'-DDT	%	77			70-130	Pass	
a-BHC	%	101			70-130	Pass	
Aldrin	%	106			70-130	Pass	
b-BHC	%	115			70-130	Pass	
d-BHC	%	96			70-130	Pass	
Dieldrin	%	122			70-130	Pass	
Endosulfan I	%	106			70-130	Pass	
Endosulfan II	%	92			70-130	Pass	
Endosulfan sulphate	%	79			70-130	Pass	
Endrin	%	90			70-130	Pass	
Endrin aldehyde	%	81			70-130	Pass	
Endrin ketone	%	86			70-130	Pass	
g-BHC (Lindane)	%	123			70-130	Pass	
Heptachlor	%	86			70-130	Pass	
Heptachlor epoxide	%	95			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Hexachlorobenzene			%	123			70-130	Pass	
Methoxychlor			%	86			70-130	Pass	
LCS - % Recovery									
Organophosphorous Pesticides									
Diazinon			%	88			70-130	Pass	
Ethion			%	102			70-130	Pass	
Fenitrothion			%	72			70-130	Pass	
Methyl parathion			%	82			70-130	Pass	
Mevinphos			%	116			70-130	Pass	
LCS - % Recovery									
Ammonia (as N)			%	93			70-130	Pass	
Chloride			%	109			70-130	Pass	
Nitrate & Nitrite (as N)			%	96			70-130	Pass	
Sulphate (as S)			%	107			70-130	Pass	
Total Kjeldahl Nitrogen (as N)			%	81			70-130	Pass	
Total Organic Carbon			%	108			70-130	Pass	
Phosphorus			%	94			70-130	Pass	
LCS - % Recovery									
Heavy Metals									
Arsenic (filtered)			%	98			80-120	Pass	
Cadmium (filtered)			%	105			80-120	Pass	
Chromium (filtered)			%	99			80-120	Pass	
Copper (filtered)			%	97			80-120	Pass	
Iron (filtered)			%	97			80-120	Pass	
Lead (filtered)			%	98			80-120	Pass	
Manganese (filtered)			%	98			80-120	Pass	
Mercury (filtered)			%	94			70-130	Pass	
Molybdenum (filtered)			%	98			80-120	Pass	
Nickel (filtered)			%	97			80-120	Pass	
Selenium (filtered)			%	99			80-120	Pass	
Zinc (filtered)			%	99			80-120	Pass	
LCS - % Recovery									
Alkali Metals									
Potassium			%	95			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	M15-Fe08486	NCP	%	117			70-130	Pass	
4.4'-DDE	M15-Fe08486	NCP	%	89			70-130	Pass	
4.4'-DDT	M15-Fe08486	NCP	%	89			70-130	Pass	
a-BHC	M15-Fe08486	NCP	%	84			70-130	Pass	
Aldrin	M15-Fe08486	NCP	%	81			70-130	Pass	
b-BHC	M15-Fe08486	NCP	%	121			70-130	Pass	
d-BHC	M15-Fe08486	NCP	%	104			70-130	Pass	
Dieldrin	M15-Fe08486	NCP	%	82			70-130	Pass	
Endosulfan I	M15-Fe08486	NCP	%	116			70-130	Pass	
Endosulfan II	M15-Fe08486	NCP	%	105			70-130	Pass	
Endosulfan sulphate	M15-Fe08486	NCP	%	71			70-130	Pass	
Endrin	M15-Fe08486	NCP	%	78			70-130	Pass	
Endrin aldehyde	M15-Fe08486	NCP	%	71			70-130	Pass	
Endrin ketone	M15-Fe08486	NCP	%	71			70-130	Pass	
g-BHC (Lindane)	M15-Fe08486	NCP	%	77			70-130	Pass	
Heptachlor	M15-Fe08486	NCP	%	100			70-130	Pass	
Heptachlor epoxide	M15-Fe08486	NCP	%	107			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Hexachlorobenzene	M15-Fe08486	NCP	%	90			70-130	Pass	
Methoxychlor	M15-Fe08486	NCP	%	108			70-130	Pass	
Spike - % Recovery									
				Result 1					
Ammonia (as N)	M15-Fe10580	NCP	%	93			70-130	Pass	
Nitrate & Nitrite (as N)	M15-Fe10580	NCP	%	97			70-130	Pass	
Total Kjeldahl Nitrogen (as N)	M15-Fe09627	NCP	%	87			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	M15-Fe09903	CP	%	95			70-130	Pass	
Cadmium (filtered)	M15-Fe09903	CP	%	91			70-130	Pass	
Chromium (filtered)	M15-Fe09903	CP	%	96			70-130	Pass	
Copper (filtered)	M15-Fe09903	CP	%	84			70-130	Pass	
Lead (filtered)	M15-Fe09903	CP	%	92			70-130	Pass	
Mercury (filtered)	M15-Fe09903	CP	%	92			70-130	Pass	
Molybdenum (filtered)	M15-Fe09903	CP	%	94			75-125	Pass	
Nickel (filtered)	M15-Fe09903	CP	%	85			70-130	Pass	
Selenium (filtered)	M15-Fe09903	CP	%	91			70-130	Pass	
Spike - % Recovery									
				Result 1					
Phosphorus	M15-Fe09906	CP	%	96			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Potassium	M15-Fe09906	CP	%	96			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chloride	M15-Fe09908	CP	%	104			70-130	Pass	
Spike - % Recovery									
				Result 1					
Sulphate (as S)	M15-Fe09909	CP	%	100			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M15-Fe09910	CP	%	88			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH C6-C10	M15-Fe09910	CP	%	90			70-130	Pass	
Spike - % Recovery									
				Result 1					
Chloride	M15-Fe09910	CP	%	96			70-130	Pass	
Spike - % Recovery									
				Result 1					
Sulphate (as S)	M15-Fe09911	CP	%	123			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	M15-Fe09913	CP	%	93			70-130	Pass	
Cadmium (filtered)	M15-Fe09913	CP	%	87			70-130	Pass	
Chromium (filtered)	M15-Fe09913	CP	%	91			70-130	Pass	
Copper (filtered)	M15-Fe09913	CP	%	84			70-130	Pass	
Iron (filtered)	M15-Fe09913	CP	%	87			70-130	Pass	
Lead (filtered)	M15-Fe09913	CP	%	86			70-130	Pass	
Manganese (filtered)	M15-Fe09913	CP	%	83			70-130	Pass	
Mercury (filtered)	M15-Fe09913	CP	%	90			70-130	Pass	
Molybdenum (filtered)	M15-Fe09913	CP	%	91			75-125	Pass	
Nickel (filtered)	M15-Fe09913	CP	%	85			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Selenium (filtered)	M15-Fe09913	CP	%	91			70-130	Pass	
Zinc (filtered)	M15-Fe09913	CP	%	83			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M15-Fe09914	CP	%	72			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M15-Fe09914	CP	%	72			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M15-Fe09915	CP	%	92			70-130	Pass	
Acenaphthylene	M15-Fe09915	CP	%	101			70-130	Pass	
Anthracene	M15-Fe09915	CP	%	98			70-130	Pass	
Benz(a)anthracene	M15-Fe09915	CP	%	100			70-130	Pass	
Benzo(a)pyrene	M15-Fe09915	CP	%	103			70-130	Pass	
Benzo(b&j)fluoranthene	M15-Fe09915	CP	%	107			70-130	Pass	
Benzo(g.h.i)perylene	M15-Fe09915	CP	%	85			70-130	Pass	
Benzo(k)fluoranthene	M15-Fe09915	CP	%	86			70-130	Pass	
Chrysene	M15-Fe09915	CP	%	99			70-130	Pass	
Dibenz(a.h)anthracene	M15-Fe09915	CP	%	95			70-130	Pass	
Fluoranthene	M15-Fe09915	CP	%	111			70-130	Pass	
Fluorene	M15-Fe09915	CP	%	103			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M15-Fe09915	CP	%	90			70-130	Pass	
Naphthalene	M15-Fe09915	CP	%	85			70-130	Pass	
Phenanthrene	M15-Fe09915	CP	%	102			70-130	Pass	
Pyrene	M15-Fe09915	CP	%	106			70-130	Pass	
Spike - % Recovery									
				Result 1					
Phosphorus	M15-Fe09916	CP	%	107			70-130	Pass	
Spike - % Recovery									
Alkali Metals				Result 1					
Potassium	M15-Fe09916	CP	%	106			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	M15-Fe09921	CP	%	81			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	M15-Fe09921	CP	%	90			70-130	Pass	
Toluene	M15-Fe09921	CP	%	116			70-130	Pass	
Ethylbenzene	M15-Fe09921	CP	%	100			70-130	Pass	
m&p-Xylenes	M15-Fe09921	CP	%	104			70-130	Pass	
o-Xylene	M15-Fe09921	CP	%	101			70-130	Pass	
Xylenes - Total	M15-Fe09921	CP	%	103			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	M15-Fe09921	CP	%	113			70-130	Pass	
TRH C6-C10	M15-Fe09921	CP	%	83			70-130	Pass	
Spike - % Recovery									
Halogenated Volatile Organics				Result 1					
1.1.1-Trichloroethane	M15-Fe09921	CP	%	98			70-130	Pass	
1.2-Dichlorobenzene	M15-Fe09921	CP	%	105			70-130	Pass	
1.2-Dichloroethane	M15-Fe09921	CP	%	102			70-130	Pass	
Trichloroethene	M15-Fe09921	CP	%	89			70-130	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heavy Metals				Result 1					
Arsenic (filtered)	M15-Fe10197	CP	%	99			70-130	Pass	
Cadmium (filtered)	M15-Fe10197	CP	%	102			70-130	Pass	
Chromium (filtered)	M15-Fe10197	CP	%	98			70-130	Pass	
Copper (filtered)	M15-Fe10197	CP	%	94			70-130	Pass	
Lead (filtered)	M15-Fe10197	CP	%	96			70-130	Pass	
Manganese (filtered)	M15-Fe10197	CP	%	97			70-130	Pass	
Mercury (filtered)	M15-Fe10197	CP	%	75			70-130	Pass	
Molybdenum (filtered)	M15-Fe10197	CP	%	101			75-125	Pass	
Nickel (filtered)	M15-Fe10197	CP	%	94			70-130	Pass	
Selenium (filtered)	M15-Fe10197	CP	%	97			70-130	Pass	
Zinc (filtered)	M15-Fe10197	CP	%	95			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M15-Fe09903	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	M15-Fe09611	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	M15-Fe09611	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	M15-Fe09611	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M15-Fe09903	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	M15-Fe09903	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M15-Fe09903	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10	M15-Fe09903	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	M15-Fe09903	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	M15-Fe09611	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	M15-Fe09611	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	M15-Fe09611	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Halogenated Volatile Organics				Result 1	Result 2	RPD			
1.1-Dichloroethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.1-Dichloroethene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.1.1-Trichloroethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.1.1.2-Tetrachloroethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.1.2-Trichloroethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.1.2.2-Tetrachloroethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.2-Dibromoethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.2-Dichlorobenzene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.2-Dichloroethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.2-Dichloropropane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.2.3-Trichloropropane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.3-Dichlorobenzene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.3-Dichloropropane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.4-Dichlorobenzene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Bromodichloromethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Bromoform	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Bromomethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	

Duplicate									
Halogenated Volatile Organics				Result 1	Result 2	RPD			
Carbon Tetrachloride	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chlorobenzene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chloroform	M15-Fe09903	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Chloromethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
cis-1.2-Dichloroethene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
cis-1.3-Dichloropropene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibromochloromethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibromomethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iodomethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Methylene Chloride	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Tetrachloroethene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
trans-1.2-Dichloroethene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
trans-1.3-Dichloropropene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Trichloroethene	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Trichlorofluoromethane	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Vinyl chloride	M15-Fe09903	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Toxaphene	M15-Fe08485	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	M15-Fe08485	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Aroclor-1221	M15-Fe08485	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Aroclor-1232	M15-Fe08485	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Aroclor-1242	M15-Fe08485	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Aroclor-1248	M15-Fe08485	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Aroclor-1254	M15-Fe08485	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Aroclor-1260	M15-Fe08485	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Total PCB*	M15-Fe08485	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Ammonia (as N)	M15-Fe10580	NCP	mg/L	0.41	0.41	<1	30%	Pass	
Conductivity (at 25°C)	M15-Fe09903	CP	uS/cm	31000	31000	<1	30%	Pass	
Nitrate & Nitrite (as N)	M15-Fe10580	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
pH	M15-Fe09903	CP	pH Units	5.0	5.0	pass	30%	Pass	
Total Kjeldahl Nitrogen (as N)	M15-Fe09627	NCP	mg/L	0.70	0.80	2.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	M15-Fe09903	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Cadmium (filtered)	M15-Fe09903	CP	mg/L	0.0068	0.0066	3.0	30%	Pass	
Chromium (filtered)	M15-Fe09903	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Copper (filtered)	M15-Fe09903	CP	mg/L	0.029	0.028	3.0	30%	Pass	
Iron (filtered)	M15-Fe09903	CP	mg/L	< 0.25	< 0.25	<1	30%	Pass	
Lead (filtered)	M15-Fe09903	CP	mg/L	0.017	0.016	7.0	30%	Pass	
Manganese (filtered)	M15-Fe09903	CP	mg/L	1.5	1.5	<1	30%	Pass	
Mercury (filtered)	M15-Fe09903	CP	mg/L	< 0.0005	< 0.0005	<1	30%	Pass	
Nickel (filtered)	M15-Fe09903	CP	mg/L	0.050	0.049	1.0	30%	Pass	
Selenium (filtered)	M15-Fe09903	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Zinc (filtered)	M15-Fe09903	CP	mg/L	2.6	2.5	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Organic Carbon	M15-Fe09904	CP	mg/L	7.2	< 5	94	30%	Fail	Q15
Duplicate									
				Result 1	Result 2	RPD			
Phosphorus	M15-Fe09906	CP	mg/L	< 5	< 5	<1	30%	Pass	

Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Potassium	M15-Fe09906	CP	mg/L	18	18	3.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M15-Fe09908	CP	mg/L	730	710	2.5	30%	Pass	
Sulphate (as S)	M15-Fe09908	CP	mg/L	35	33	7.3	30%	Pass	
Total Dissolved Solids	M15-Fe09908	CP	mg/L	1500	1500	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M15-Fe09909	CP	mg/L	8700	9000	3.3	30%	Pass	
Sulphate (as S)	M15-Fe09909	CP	mg/L	200	210	2.3	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M15-Fe09910	CP	mg/L	1200	1100	3.3	30%	Pass	
Sulphate (as S)	M15-Fe09910	CP	mg/L	64	63	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M15-Fe09911	CP	mg/L	9800	9900	1.0	30%	Pass	
Sulphate (as S)	M15-Fe09911	CP	mg/L	260	270	3.8	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Acenaphthylene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Anthracene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benz(a)anthracene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(a)pyrene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(b&j)fluoranthene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(g.h.i)perylene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(k)fluoranthene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chrysene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibenz(a.h)anthracene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluoranthene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluorene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Naphthalene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Phenanthrene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Pyrene	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
4.4'-DDD	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDE	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
4.4'-DDT	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
a-BHC	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Aldrin	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
b-BHC	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
d-BHC	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Dieldrin	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan I	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan II	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endosulfan sulphate	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin aldehyde	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Endrin ketone	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
g-BHC (Lindane)	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	

Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Heptachlor	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Heptachlor epoxide	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Hexachlorobenzene	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Methoxychlor	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Duplicate									
Organophosphorous Pesticides				Result 1	Result 2	RPD			
Bolstar	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Chlorpyrifos	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Demeton-O	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Diazinon	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Dichlorvos	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Disulfoton	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethion	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ethoprop	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fenitrothion	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fensulfothion	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Fenthion	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Merphos	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Methyl azinphos	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Methyl parathion	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Mevinphos	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Naled	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Phorate	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Ronnel	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Tokuthion	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Trichloronate	M15-Fe09913	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (at 25°C)	M15-Fe09913	CP	uS/cm	14000	14000	<1	30%	Pass	
pH	M15-Fe09913	CP	pH Units	4.2	4.2	pass	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	M15-Fe09913	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M15-Fe09913	CP	mg/L	0.007	0.007	2.0	30%	Pass	
Iron (filtered)	M15-Fe09913	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Lead (filtered)	M15-Fe09913	CP	mg/L	0.002	0.002	4.0	30%	Pass	
Manganese (filtered)	M15-Fe09913	CP	mg/L	0.094	0.093	1.0	30%	Pass	
Mercury (filtered)	M15-Fe09913	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M15-Fe09913	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M15-Fe09913	CP	mg/L	0.005	0.005	2.0	30%	Pass	
Selenium (filtered)	M15-Fe09913	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc (filtered)	M15-Fe09913	CP	mg/L	0.006	0.006	5.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Phosphorus	M15-Fe09916	CP	mg/L	< 5	< 5	<1	30%	Pass	
Duplicate									
Alkali Metals				Result 1	Result 2	RPD			
Potassium	M15-Fe09916	CP	mg/L	83	76	10	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	M15-Fe09917	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	M15-Fe09917	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total	M15-Fe09917	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	M15-Fe09917	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10	M15-Fe09917	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C6-C10 less BTEX (F1)	M15-Fe09917	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Halogenated Volatile Organics				Result 1	Result 2	RPD			
1.1-Dichloroethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.1-Dichloroethene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.1.1-Trichloroethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.1.1.2-Tetrachloroethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.1.2-Trichloroethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.1.2.2-Tetrachloroethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.2-Dibromoethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.2-Dichlorobenzene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.2-Dichloroethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.2-Dichloropropane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.2.3-Trichloropropane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.3-Dichlorobenzene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.3-Dichloropropane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
1.4-Dichlorobenzene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Bromodichloromethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Bromoform	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Bromomethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Carbon Tetrachloride	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chlorobenzene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chloroform	M15-Fe09917	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Chloromethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
cis-1.2-Dichloroethene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
cis-1.3-Dichloropropene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibromochloromethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibromomethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iodomethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Methylene Chloride	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Tetrachloroethene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
trans-1.2-Dichloroethene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
trans-1.3-Dichloropropene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Trichloroethene	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Trichlorofluoromethane	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Vinyl chloride	M15-Fe09917	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Dissolved Solids	M15-Fe09918	CP	mg/L	2900	3000	3.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Total Organic Carbon	M15-Fe09922	CP	mg/L	6.1	< 5	28	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	M15-Fe10197	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	M15-Fe10197	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	M15-Fe10197	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	M15-Fe10197	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Iron (filtered)	M15-Fe10197	CP	mg/L	20	19	3.0	30%	Pass	
Lead (filtered)	M15-Fe10197	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Manganese (filtered)	M15-Fe10197	CP	mg/L	0.015	0.015	2.0	30%	Pass	
Mercury (filtered)	M15-Fe10197	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Molybdenum (filtered)	M15-Fe10197	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Nickel (filtered)	M15-Fe10197	CP	mg/L	0.002	0.002	5.0	30%	Pass	
Selenium (filtered)	M15-Fe10197	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc (filtered)	M15-Fe10197	CP	mg/L	0.004	0.004	2.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins | mgt's Acceptance Criteria as stipulated in SOP 05. Refer to Glossary Page of this report for further details

Authorised By

Natalie Krasselt	Analytical Services Manager
Carroll Lee	Senior Analyst-Organic (VIC)
Carroll Lee	Senior Analyst-Volatile (VIC)
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)

Glenn Jackson

National Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

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APPENDIX I

Numerical Groundwater Modelling

MODEL OBJECTIVES

A simple numerical groundwater model was constructed to examine how local topography and drainage features are likely to constrain groundwater levels in the vicinity of the landfill footprint, and to assess how various landfill design concepts may influence the amount of groundwater discharging from the seepage area identified adjacent to the south-eastern boundary of the landfill footprint. Groundwater seepage at surface was observed during the wet seasons in this area.

The landfill construction will incorporate a base liner and cap liner system, effectively inhibiting direct rainfall recharge within the footprint of the landfill cells once operation commence. The model was used to assess the potential reduction of seepage due to reduction of recharge once construction commences.

The model was constructed with limited information, and is not expected to represent groundwater flow and estimated fluxes with a high level of accuracy. Rather, it was expected to provide a basic indication of the magnitude of seepage reduction. Although the modelled area is far larger than the area of interest, the model was calibrated only for the area of interest. Performance of the model outside the area of interest was not verified, and is not expected to be accurate.

The model confidence level can be classified as Class 1-2 (low to medium confidence) according to the Australian Groundwater Modelling Guidelines (2012)[1].

MODEL DESCRIPTION

MODFLOW 2000 was the numerical code selected to build the model. The GUI (Graphical User Interface) used to create the MODFLOW files in an efficient way was Groundwater Vistas version 6.74 build 33.

The model domain covers a portion of the Thirteen Mile Brook catchment, within which the proposed landfill I is located (Figure 1). The model domain comprises uniform elements of the dimension of 40 m by 40 m, arranged in109 rows and 132 columns.

In a conscious effort to keep the model simple, the model comprised a single layer with homogeneous properties, representing a regional unconfined aquifer within a portion of the catchment defined by no flow boundaries at the western and eastern extents (Figure 2).

The surface of the model comprised a digital elevation model (DEM) obtained from the public domain *(Moora_P1240_merged_demg.ers* (ER Mapper Grid file – raster format).

The maximum ground surface elevation within the model area is 372 m AHD; the minimum elevation is 271 m AHD.

File metadata: Map projection *Geographic/GDA94* (converted to *MGA50/GDA94*); pixel resolution 0.000417 degrees (43.2 m); easting extent 457783.1 to 467117.1; northing extent 6464658 to 6473085.3.

The elevation of the base of the model was estimated via model calibration. A flat bottom elevation of 230 m AHD was selected after a range of values between 0 m and 270 m AHD were tested manually.

Creek segments in the model area were represented using the DRAINS package of MODFLOW. Corresponding cells were activated using the DRAIN boundary condition, setting the drain height at the corresponding height of the surface drainage feature, enabling water to exit the model. Refer to Figure 1 above for a visual representation of the DRAIN cells.

[1] Barnett et al, 2012, Australian Groundwater Modelling Guidelines, Waterlines Report, National Water Commission, Canberra

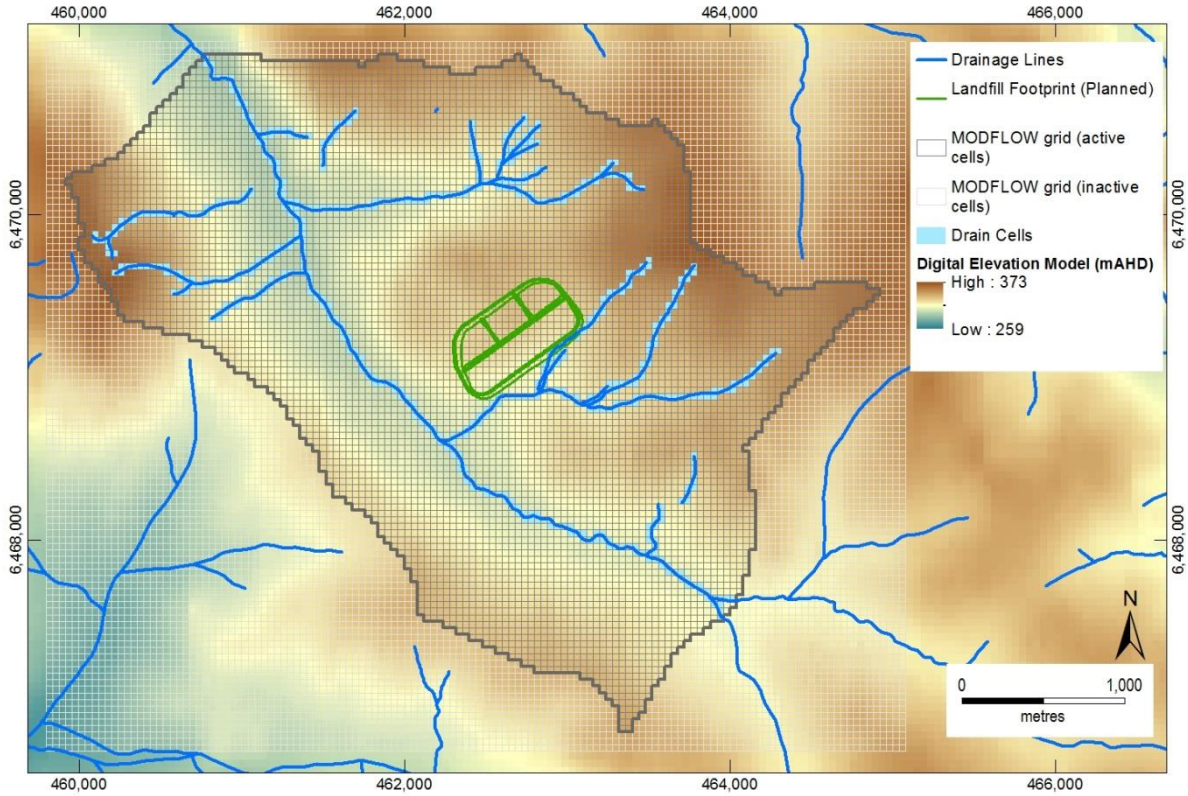

Figure 1: Model grid, DEM and planned location of the landfill.

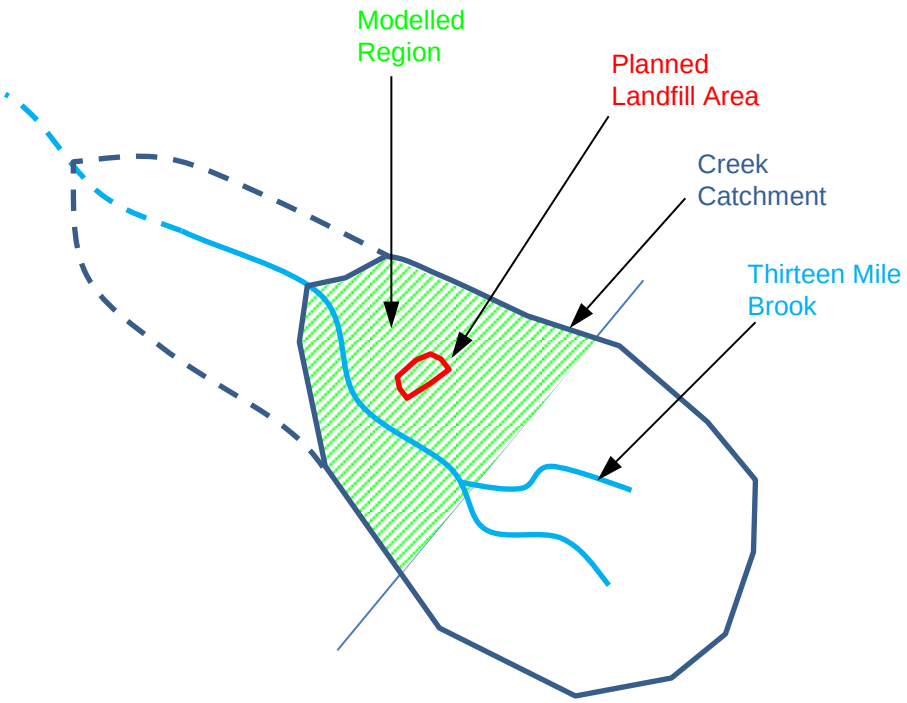

Figure 2: Sketch showing the modelled area compared to the Thirteen Mile Brook catchment.

Hydraulic Properties

Hydraulic conductivity (K) values were based upon the results of hydraulic tests (slug tests) undertaken in the monitoring wells in the area in the vicinity of the proposed landfill footprint. A summary of the hydraulic testing carried out by Golder is provided in Table 1.

Table 1: Summary of hydraulic test results (slug tests) carried out by Golder in the project area

Monitoring Well	Material in Test Interval	Estimated K Range (m/d)	Estimated K Average (m/d)	Comment
GMB2	Sandy Clay/Sandy Clayey Gravel	0.1-0.2	0.2	
GMB3	Sandy Clay/Sandy Gravel	0.3-0.5	0.5	
GMB4	Clayey Sand/Gravel	0.4-0.6	0.5	
GMB5	Sand/Gravel	1.9-4.5	3.0	Well located nearby a creek
GMB6	Clayey Sand/Sandy Clay/Sand	0.3-0.3	0.3	

As a result of the model calibration process, a value for horizontal hydraulic conductivity of 0.1 m/d, and a vertical hydraulic of 0.01 m/d (10% of K_h) was derived.

Groundwater Recharge

Rainfall data was obtained from the York weather station (BoM station number 10144 and 10311), located approximately 15 km away from the site. The data was accessed from the BoM website on 19 January 2015 (Australian Bureau of Meteorology (BoM): www.bom.gov.au)

A monthly average of the last 40 years (1975-2014) was used to estimate the amount of recharge to be used as an input in the model. The monthly averages are represented in Figure 3 below.

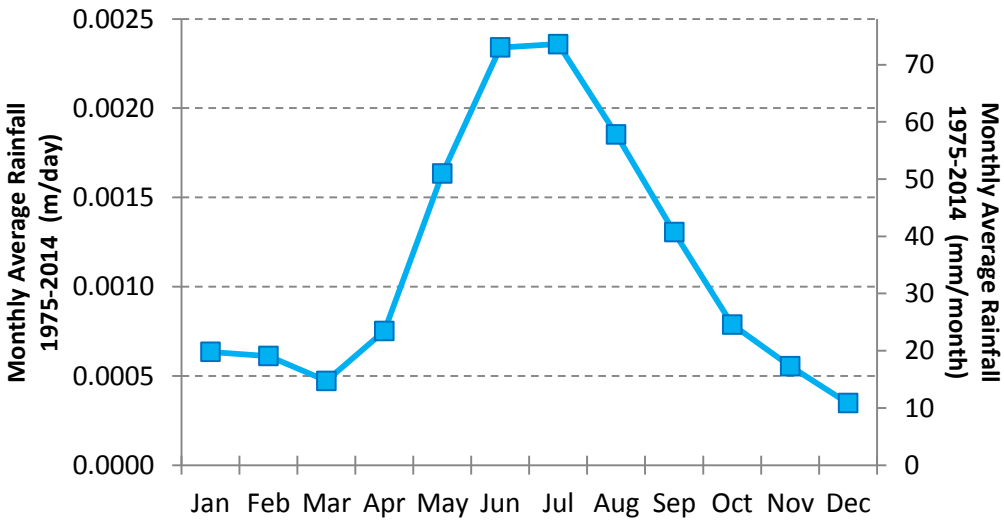

Figure 3: Monthly average rainfall in the vicinity of the site (BoM rainfall stations: 10144 York Post Office (January 1877 – April 1996) and 10311 York (June 1996 – December 2014).

The value of 0.002 m/day of rainfall was used to represent the site conditions (in relatively wet seasons when groundwater seepage at the potential landfill area has been observed). Groundwater recharge was estimated to be 10% of rainfall (equivalent to 0.0002 m/day of recharge) for simplification purposes.

MODEL SCENARIOS

Two model scenarios were simulated:

Scenario 1

Steady state model with normal recharge (0.0002 m/day spread evenly across the model area). This scenario represents "base" conditions, with groundwater seepage observed around the centre of the landfill area in wet seasons. The Scenario 1 model is presented in Figure 4.

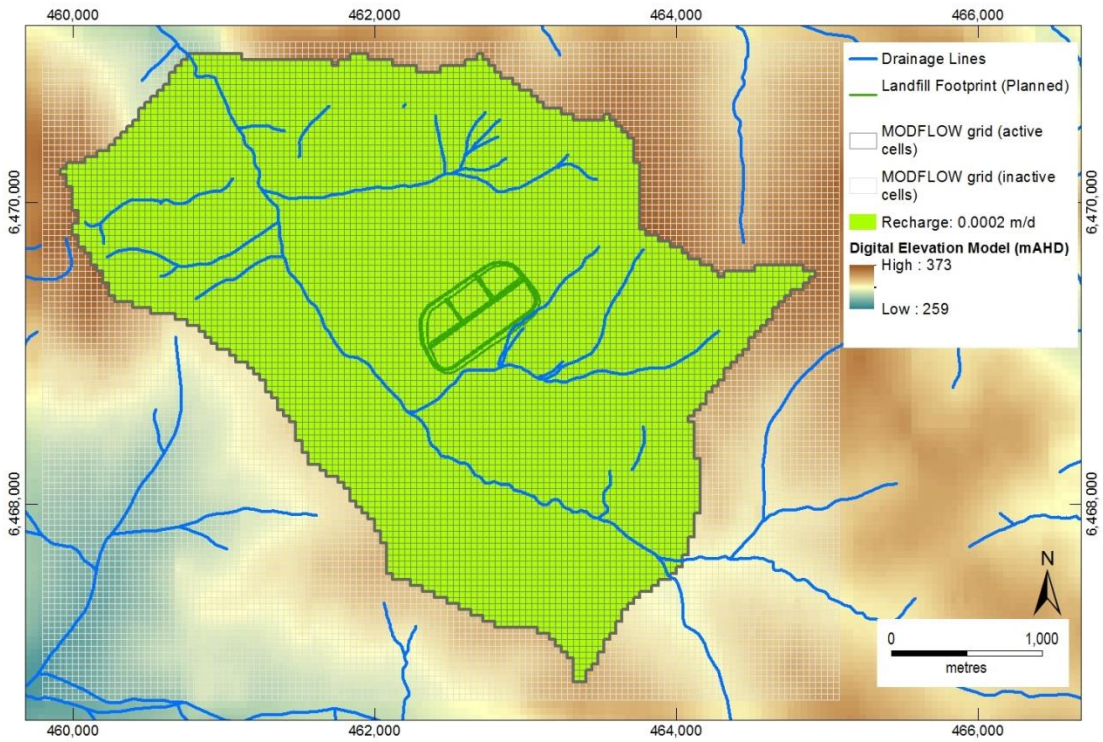

Figure 4: Scenario 1, base case with recharge from rainfall across the entire model domain.

Scenario 2

Steady state model with no recharge over the landfill footprint. The remainder of the model domain receives 'base conditions' recharge (0.0002 m/d). This scenario examines the implications on groundwater flow, when recharge across the landfill is stopped, particularly the amount of seepage reporting to the surface drainage system.

Of the 6957 active cells in the model, 155 were assigned zero recharge for this simulation. The Scenario 2 model is presented in Figure 5.

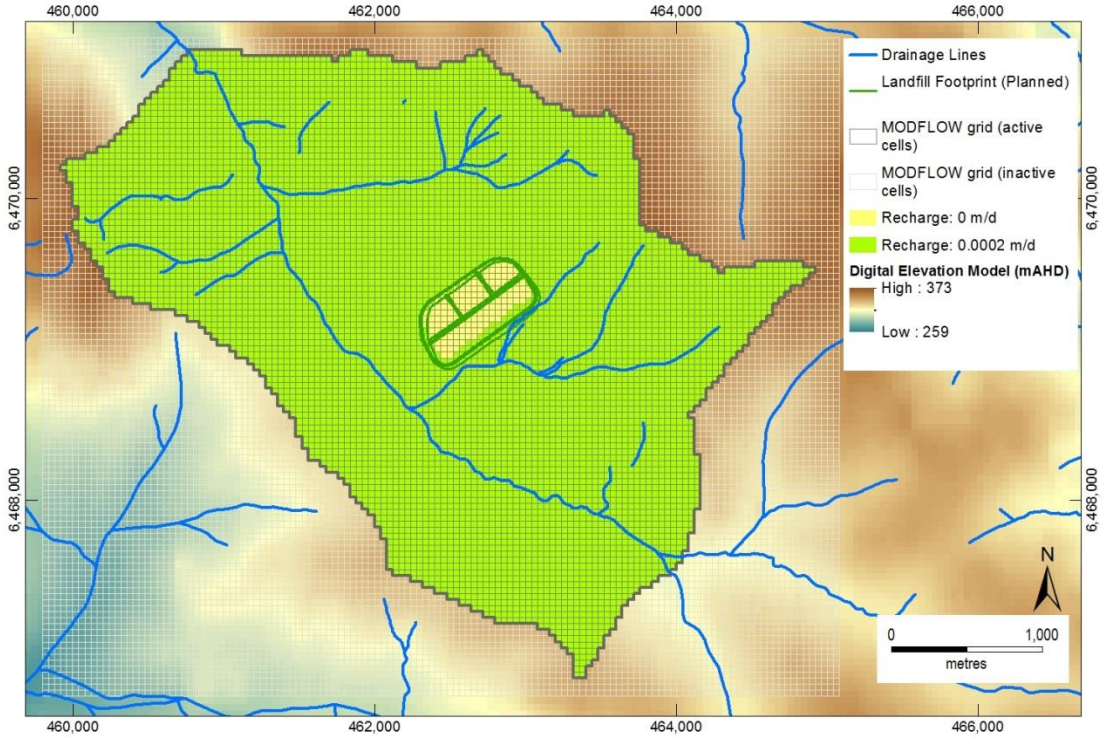

Figure 5: Scenario 2, no rainfall recharge over landfill footprint.

RESULTS

The results for the two modelled scenarios are presented in Table 2, and in Figure 6 and Figure 7 below.

Table 2: Comparison of model results for simulations with and without partially impermeable ground blocking recharge

	Scenario 1: Recharge across full area	Scenario 2: Recharge partially covered
Number of total active cells:	6957	6957
Number of cells with 0.0002 m/d recharge	6957	6802
Number of cells with 0 m/d recharge	-	155
Recharge rate (total model) (m3/d)	2 226.2	2 176.6
Groundwater seepage rate within landfill area (m^3/d)	115.5	92.3

Reference to Table 2 shows that by excluding recharge over the landfill footprint, there is a 20% reduction in groundwater seepage at the topographic low immediately adjacent to the south-east boundary of the landfill footprint.

MODEL LIMITATIONS

The numerical model is a Class 1 to 2 (low to medium confidence) model with limited data available within a fraction of the model domain. It was developed for a particular purpose in mind and its use for sophisticated modelling of complex scenarios may exceed the capabilities of the model.

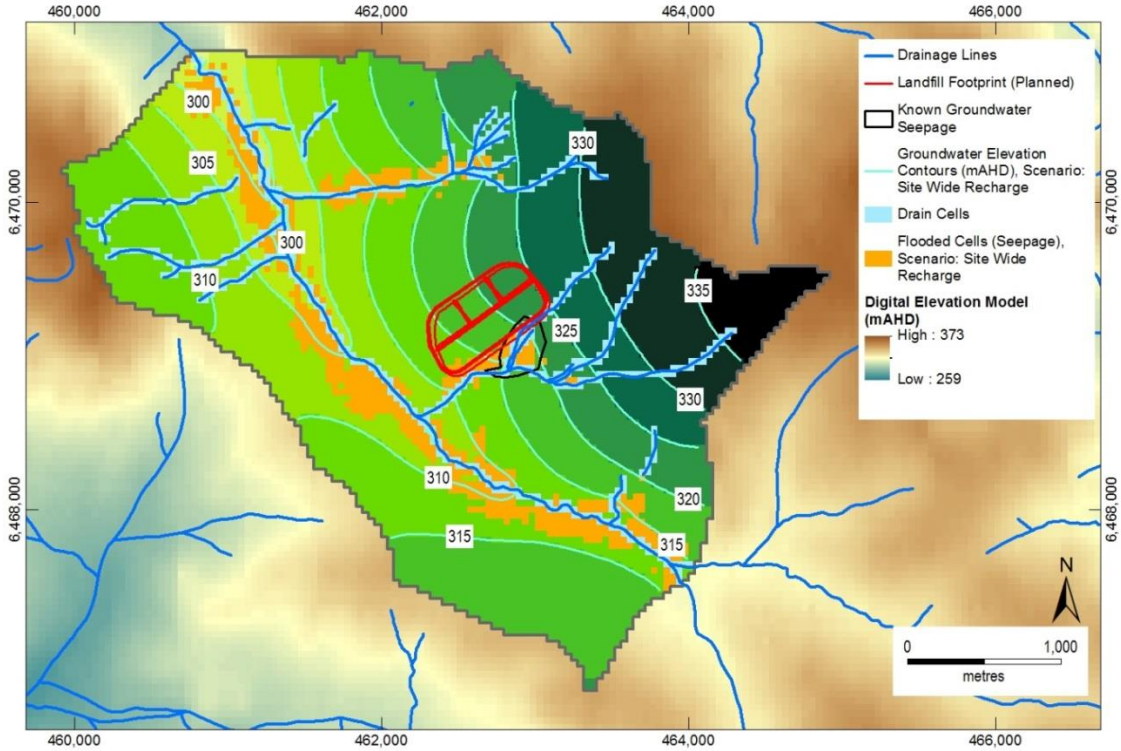

Figure 6: Model result of groundwater elevation for site-wide recharge scenario

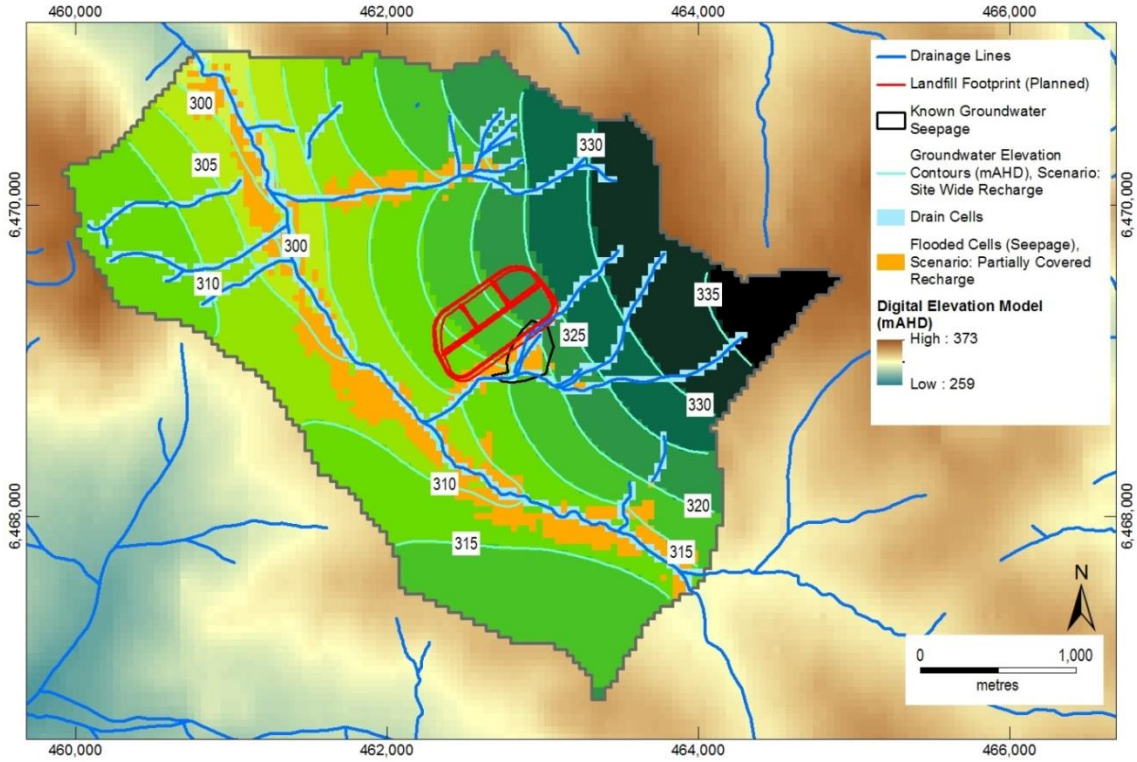

Figure 7: Model result of groundwater elevation for partially covered recharge scenario

https://aupws.golder.com/sites/147645033alluwunafarmpeerreview/correspondence out/147645033-009 hydrogeological investigation/appendices/appendix i - modelling report/appendix i.docx

APPENDIX J

Ground Geophysics Survey Report

Applied Scientific Services & Technology (Pty) Ltd

EXPERIENCE. **QUALITY.** RELIABILITY.

A REPORT ON GROUND MAGNETICS AND ERI SURVEYS AT ALLAWUNA FARM, YORK, WA

A report for

Golder Associates (Pty) Ltd

Compiled by

Ian James & Riaan Mouton

Consulting Geophysicists

6/10 O'Connor Way, Wangara, Perth, WA, 6065

23 March 2015

ASST (Pty) Ltd
EXPERIENCE. QUALITY. RELIABILITY.

Golders Associates Pty Ltd

Level 3, 1 Havelock Street,

West Perth, 6005

Australia

For attention: David Thomson

Principal Hydrogeologist, Associate

Dear David,

RE: A REPORT ON GROUND MAGNETICS AND ERI SURVEYS AT ALLAWUNA FARM, YORK, WA.

I am pleased to present this report on the interpretation of the geophysical surveys completed by ASST at Allawuna Farm in York, Western Australia.

Should you have any questions in relation to the content of this report, or if I can be of further assistance, please do not hesitate to contact me.

Best regards,

RIAAN MOUTON

CONSULTING GEOPHYSICISTS

Executive Summary

In January 2015, ASST Pty Ltd completed works on behalf of Golders Associates Pty Ltd that included the acquisition of ERI and magnetics data over the proposed Allawuna Landfill site. The Allawuna Landfill site is located at Lots 9926, 26934, 4869 and 5831 Great Southern Highway, Saint Ronans in the Shire of York.

The geophysical surveys were conducted over a period of 4 field days from 13th to 16th January 2015.

The Magnetics and ERI data collected at Allawuna extended over a predefined area of interest for targeting the mapping of dolerite dykes, and an area of sandy material known to be unconsolidated to about 20 m depth.

Dolerite occurrences were mapped and the presence of a relatively deep feature west of borehole GMB6 has been confirmed.

It is recommended that additional holes be drilled to examine the nature of the deep feature mapped in the resistivity method.

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1 ABBREVIATIONS

ASST	Applied Scientific Services and Technologies (Pty) Ltd
DGPS	Differential Global Positioning System
ERI	Electrical Resistivity Imaging

2 PURPOSE AND SCOPE OF WORK

In January 2015, ASST Pty Ltd completed works on behalf of Golders Associates Pty Ltd that included the acquisition of ERI and magnetics data over the proposed Allawuna Landfill site. The Allawuna Landfill site is located at Lots 9926, 26934, 4869 and 5831 Great Southern Highway, Saint Ronans in the Shire of York.

The site is located to the south of the Great Southern Highway between Perth and York and is currently a farm.

A map of the survey area is shown in Figure 2.1. The surveyed ERI line is marked in black and the magnetics in white on the map. The proposed landfill and works approved are shown as black polygons.

The aim of the geophysical surveys was to:

- Conduct ground magnetics surveys over both the landfill and works approval area for mapping purposes, as well as to specifically identify the occurrence of shallow magnetic dolerite dykes and sills.
- Conduct an ERI traverse over a NW / SE trending sandy lens to delineate its depth extents.

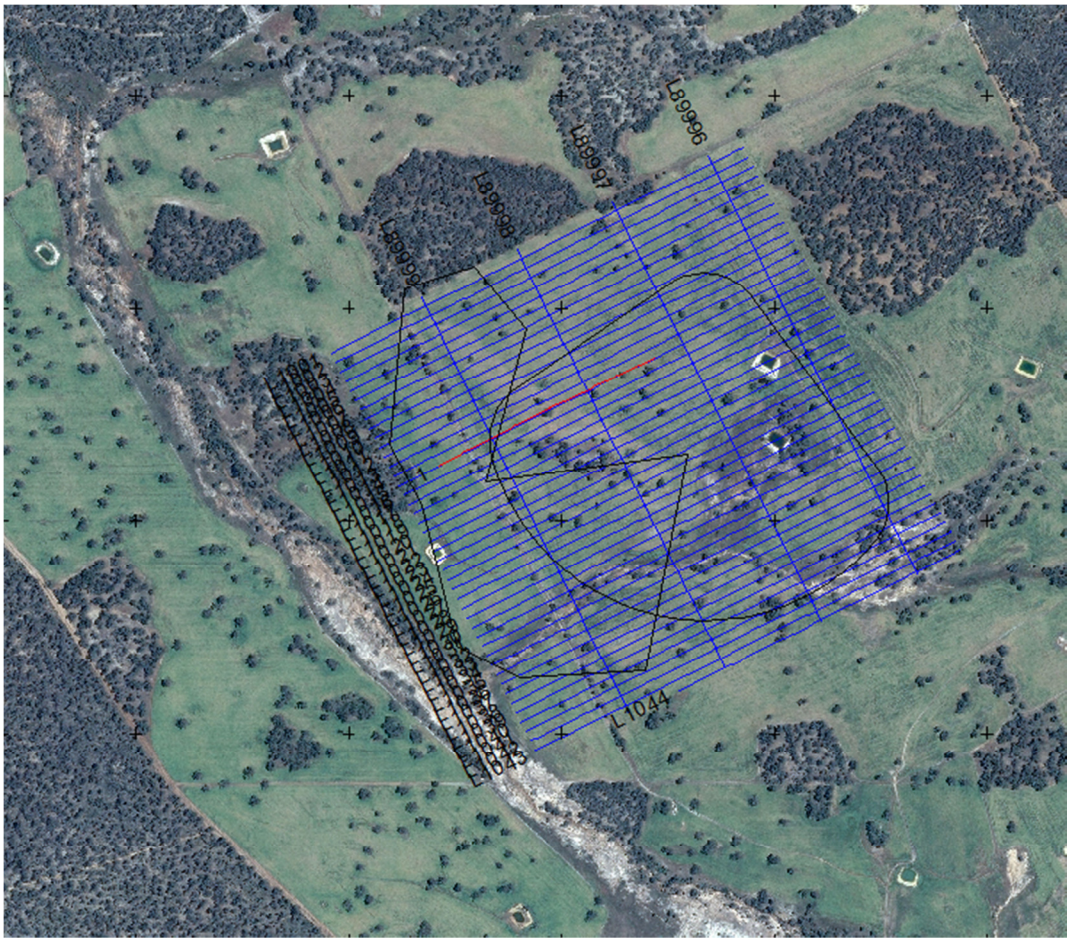


Figure 2.1: Survey Location Map (ERI line in red and planned magnetics lines in blue, landfill and works access area in black)

3 SURVEY METHODOLOGY

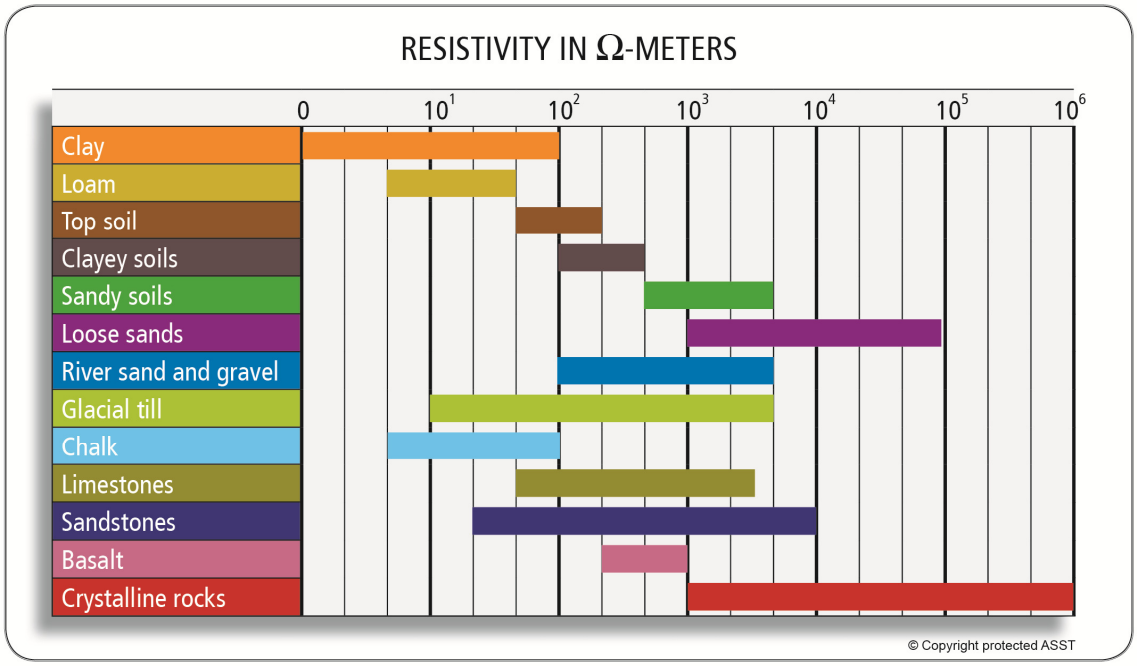
The following sections provide a brief explanation of the techniques used for sub-surface imaging at the survey site.

All subsequent presentation of geophysical datasets were completed using the GDA94, MGA zone 50, coordinate system.

3.1 ERI

An electrical resistivity imaging survey is conducted by injecting electric current into the ground through two electrodes and measuring the resultant potential between two or more electrodes, see Figure 3.1. By injecting and measuring in different electrodes along the cable an image of the ground electrical resistivity can be created. The electrical resistivity method is especially apt at detecting changes in the ground electrical properties. Table 3.1 below represents typical resistivity values for different lithologies.

Table 3.1: Table of typical resistivity for different geology.



ASST conducted the ERI using an ABEM 12 channel Terrameter LS system with four cables with a maximum of 81 electrodes. Table 3.2 lists the ERI acquisition parameters used during the survey and an example of the ERI survey is shown in Figure 3.2.

Table 3.2: ERI acquisition parameters.

Instrumentation:	ABEM Terrameter LS 12 channel system
Survey Spread:	~ 81 × electrodes @ 5 m spacing 4 × 21 channel ERI cables with 5 m take – out
Source:	ABEM Terrameter LS with 12V external battery
Array:	ASST custom protocols
Data Positioning:	Navcom DGPS

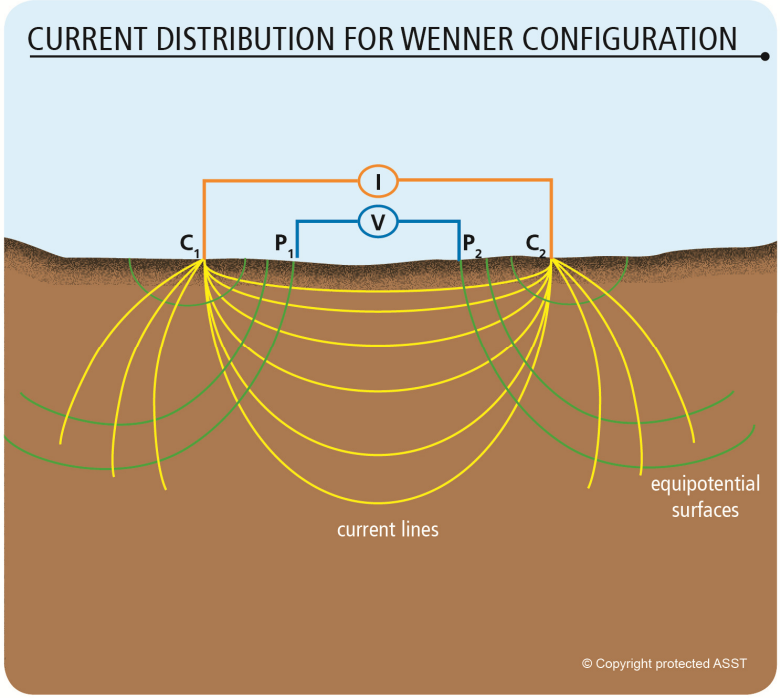


Figure 3.1: Simple current distribution schematic.

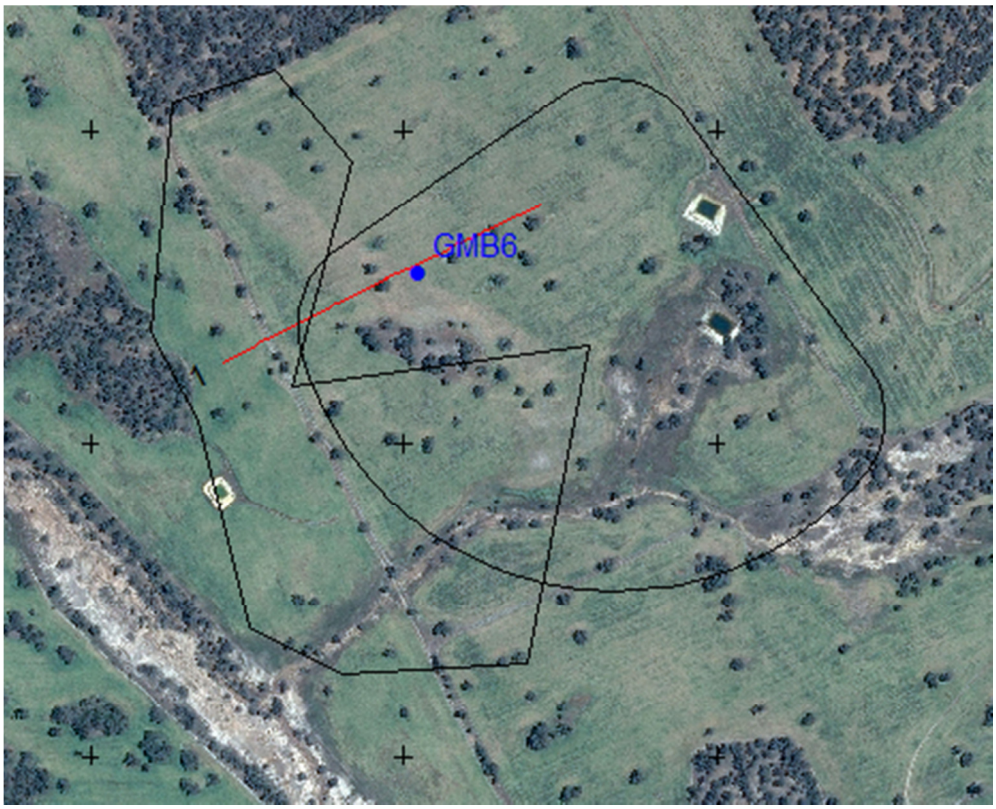


Figure 3.2: ERI survey at Allawuna (ERI line in red and proposed landfill site / works access area in black).

3.2 GROUND MAGNETICS

Magnetic profiling is a passive method that involves measurement of localised variations in the amplitude of the geomagnetic field. These variations may result from buried ferrous objects, such as underground storage tanks and pipes, and changes in the magnetic susceptibility of near surface minerals. The amplitude and shape of the anomaly will depend on the shape, orientation and susceptibility of the target. In certain instances, magnetic data can be interpreted quantitatively and transformed into constrained geological models. More typically, however, magnetic data are interpreted qualitatively and simply used to verify the presence or absence of magnetically susceptible materials or features.

Figure 3.3 shows the earth's magnetic field lines over a metal object and the corresponding response curve measured using a magnetometer.

Table 3.3 lists the magnetics acquisition parameters used during the survey.

Table 3.3: Magnetics acquisition parameters.

Instrumentation:	Geometrics Proton G857 magnetometer (G856 base station)
Station Interval:	4 second recording interval
Line Spacing:	25 m
Data Positioning:	Data located using built in GPS (5m accuracy)

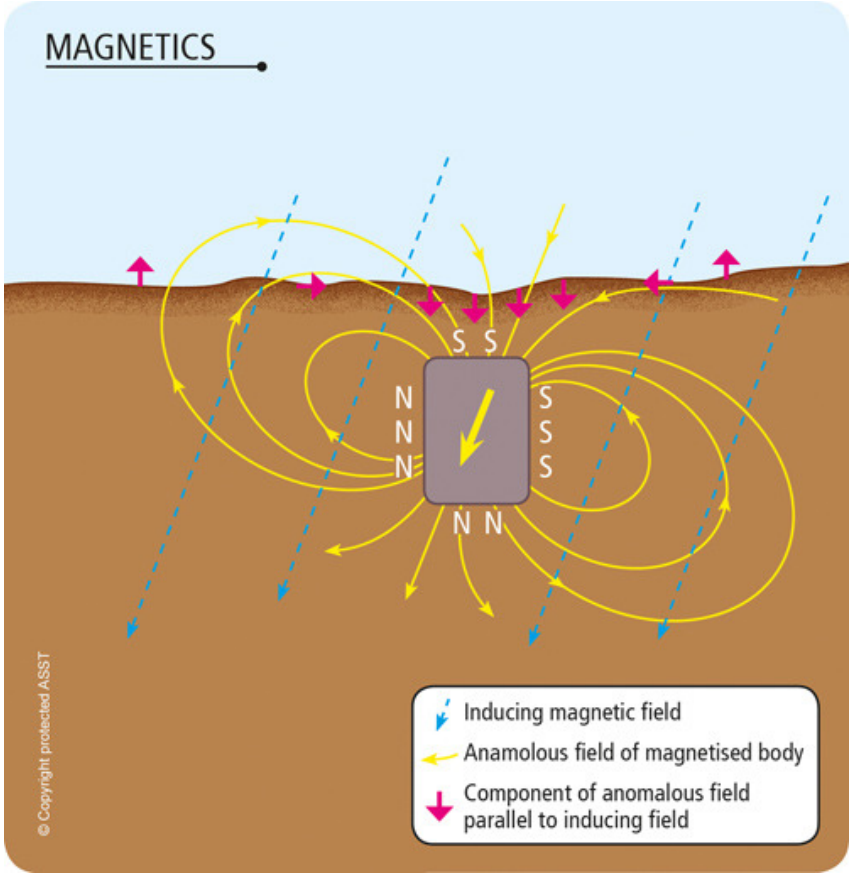


Figure 3.3: A simple image of the magnetics technique.

4 RESULTS AND INTERPRETATION

Imagery from the geophysical investigation can be found in Appendix A. Survey lines were acquired in a WSW - ENE orientation to provide optimal results and best image the anticipated NW - SE trending targets.

4.1 GEOLOGICAL BACKGROUND

The geology of the site is typical of the western bounds of the Yilgarn Craton as it approaches the Darling Range. The site is classified as a dissected lateritic plateau, with elements of the Boyagin and Clackline subsystems. Granitic rock outcrops and fresh soils, with sandy and loamy gravel soils are prevalent across the site (Bowman & Associates 2012).

Mafic dolerite dykes form some of the ridgelines in the area. The Kokeby soil landscape unit is dominant in the valley features, with alluvial deposition of sandy silts over clays (Sawkins 2010). Fresh granite outcrops in places throughout the farm.

The regional geology (Myers & Hocking 1998) shows two features of interest in the Allawuna region. A dolerite dyke crosses the Great Southern Highway and terminates in

the neighbouring property on the eastern side of Allawuna. From the regional geology, the dyke appears to terminate approximately 1 km from the landfill footprint.

The other feature of interest is the Dumbleyung fault. The Dumbleyung fault is a Quaternary fault running in a south easterly direction approximately 11 km to the south west of the site boundary.

4.2 ELECTRICAL RESISTIVITY IMAGING

A single line of ERI was acquired over the site with the aim of delineating a NW - SE trending sandy surface body identified by mapping, test pitting and drilling. The ERI data shows a 3 layer model with resistive material overlaying a conductive zone followed by a more resistive base layer (granite). The boundary between granite and the overlaying conductive zone is not sharp, indicating extensive weathering of the granites. The resistive near surface layer thickens towards the centre of the line portraying a channel shaped feature with a maximum thickness of 13 m.

Borehole log for GMB6 (~12 m to the south of the ERI line) indicates that the geology comprises alternating beds of sand and clay before entering a layer of sandy clay at 14 m depth. This sandy clay layer is in close agreement with the base of the resistive feature in the ERI data and may represent the base of the sandy feature. The borehole log terminates in granite at a depth of 21.5 m.

However, if a saline water table is present the conductive zone indicated on Appendix A may form part of porous system. The sands / clayish sands will become conductive due to the saline water. In this situation the deeper layer boundary should be considered the most likely depth extent of the sandy feature to the west of GMB6.

4.3 MAGNETICS

Magnetic data was processed in custom in-house software and Oasis Montaj. The data was edited to remove noise from cultural features such as the fence lines. Processing of the data includes diurnal corrections, de-spiking, leveling and frequency domain filtering.

A suite of grids were produced with filters applied to best present the data. Those grids included in this report are the total magnetic intensity (TMI), first vertical derivative (1VD) and the analytic signal (AS). Maps showing these final products can be viewed in appendices A2, A3 and A4 respectively. An interpreted magnetics map can be found in appendix A5.

A number of features are present in the data. In the TMI image a broad, NW - SE trending anomaly aligns both with the sandy feature evident in the ERI data as well as the surface impression visible in the satellite imagery.

The first vertical derivative data highlights linear features and indicates that there may be a number of dykes and faults present.

The analytic signal image provides the best means of identifying the causative bodies for magnetic anomalies in the data, with several features of interest being highlighted. In total, seven potential dolerite occurrences are identified, with 3 of them aligning with the test pit results of TP103 and TP115 (which intersected dolerite within 2 m of surface).

5 CONCLUSIONS AND RECOMMENDATIONS

The geophysical surveys were conducted over a period of 4 field days with no incidents reported.

The Magnetics and ERI data collected at Allawuna extended over a predefined area of interest for mapping of dolerite dykes and assessing the deep sandy feature identified in previous field work.

Dolerite occurrences were mapped and the presence of a feature that extends to depth to the west of borehole GMB6 has been confirmed.

It is recommended that at least two to three additional holes be drilled to examine the nature of the feature indicated by the ERI survey.

Recommended positions for the holes are listed in Table 5.1 below:

Table 5.1: Location of follow up targets

ID	Easting	Northing	Depth (m)	Target
1	462467	6469263	8	Sandy feature
2	462399	6468658	2 to 5	Dolerite
3	462805	6468628	2 to 5	Dolerite

6 REFERENCES

Bowman & Associates 2012, EPA Referral Document: Allawuna Landfill, Environmental Protection Authority Western Australia.

Myers, J.S. & Hocking, R.M. 1998, Geological Map of Western Australia, 1:2 500 000 (13 th Edition), Western Australia Geological Survey.

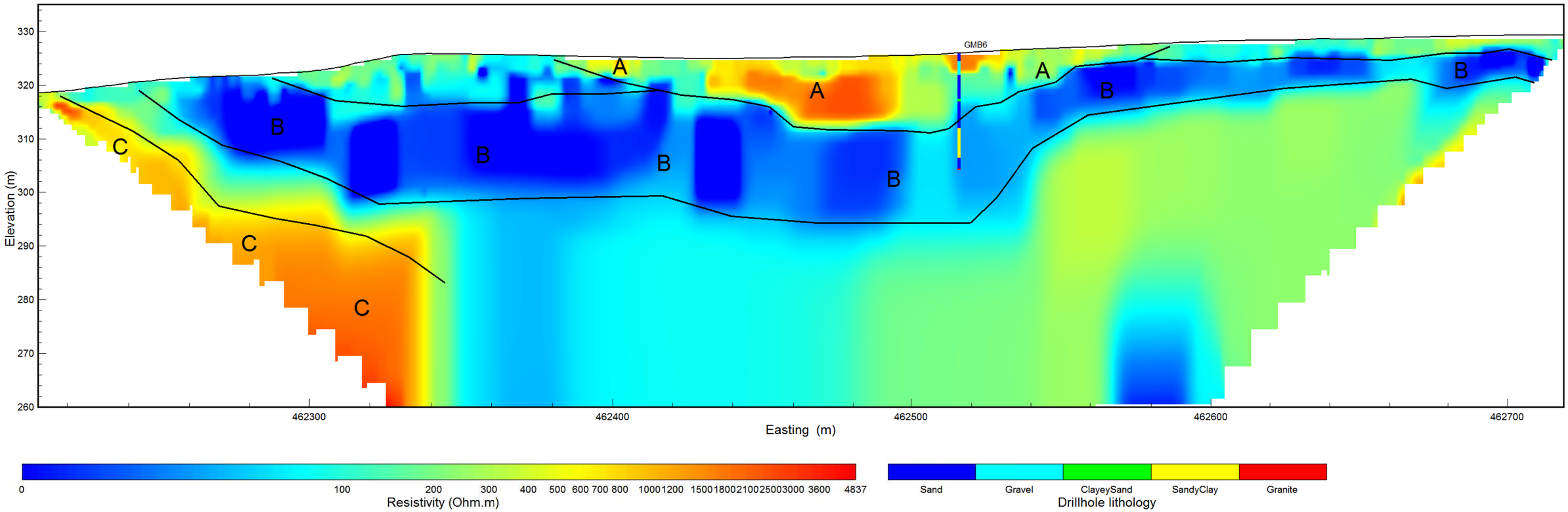
Sawkins, D. 2010, Landscapes and Soils of the Northam District, Department of Agriculture and Food, Western Australia, Western Australian Agriculture Authority.

7 DISCLAIMER

The interpretations contained in this report are based on the training and experience of the author and information acquired during the course of the investigation. As with all geophysical data, multiple interpretations are possible. The client is advised to consider information from all available sources prior to making a decision on how to proceed.

APPENDIX A – Geophysical Imagery

ERI - Allawuna L1



Plan View Map

Horizontal Scale 1 : 1500

Feature	Description
A	Resistive environment possibly caused by sandy sediments
B	Conductive zone (possibly due to saline saturated sands / clay)
C	Granite at depth - outcropping to west of ERI line in the trees

Notes:
- Coordinates are in GDA94, MGA Zone 50
- Current line highlighted in red on plan view map
- Extents of planned landfill outlined in black on plan view map
- Extents of works approval area outlined in black on plan view map
- Plan view map shows total magnetic intensity grid
- Horizontal scale is 1:1500 (for A3 plot)
- Vertical exaggeration is 2:1 (for A3 plot)

Project:	gldr_42012_hy_gmag_eri_allawunafarm_landfill_wa
Figure:	A1
Caption:	ERI - Allawuna L1

Golder Associates

ASST (pty) Ltd
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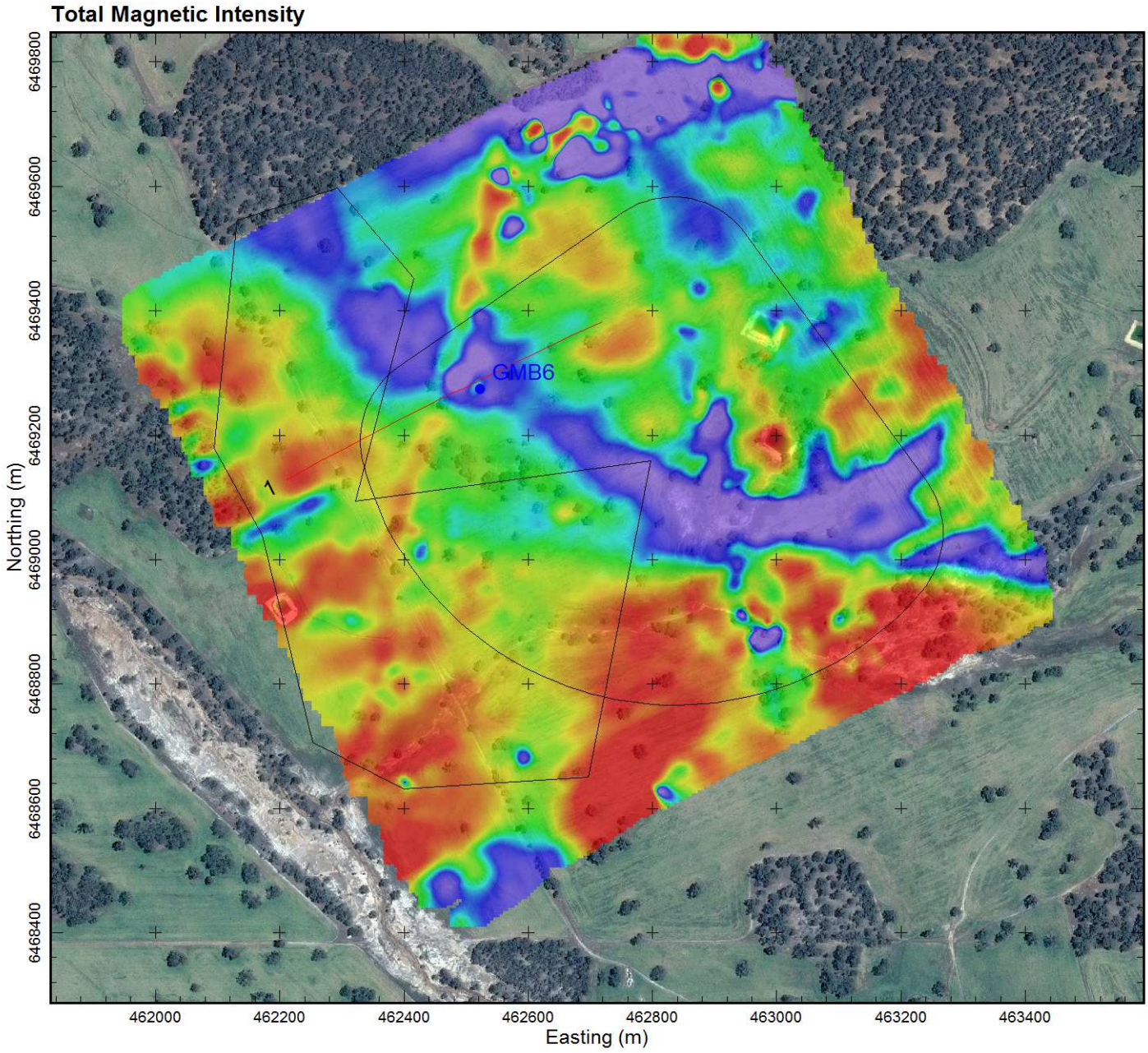

Horizontal Scale 1 : 10000

0m 200m 400m 600m

-1150 -250 -200 -150 -100 -50 0 50

Total Magnetic Intensity

Notes:
- Coordinates are in GDA94, MGA Zone 50
- Current line highlighted in red on plan view map
- Extents of planned landfill outlined in black on plan view map
- Extents of works approval area outlined in black on plan view map
- Horizontal scale is 1:10000 (for A4 plot)

Project:	gldr_42012_hy_gmag_eri_allawunafarm_landfill_wa
Figure:	A2
Caption:	Allawuna - Total magnetic intensity

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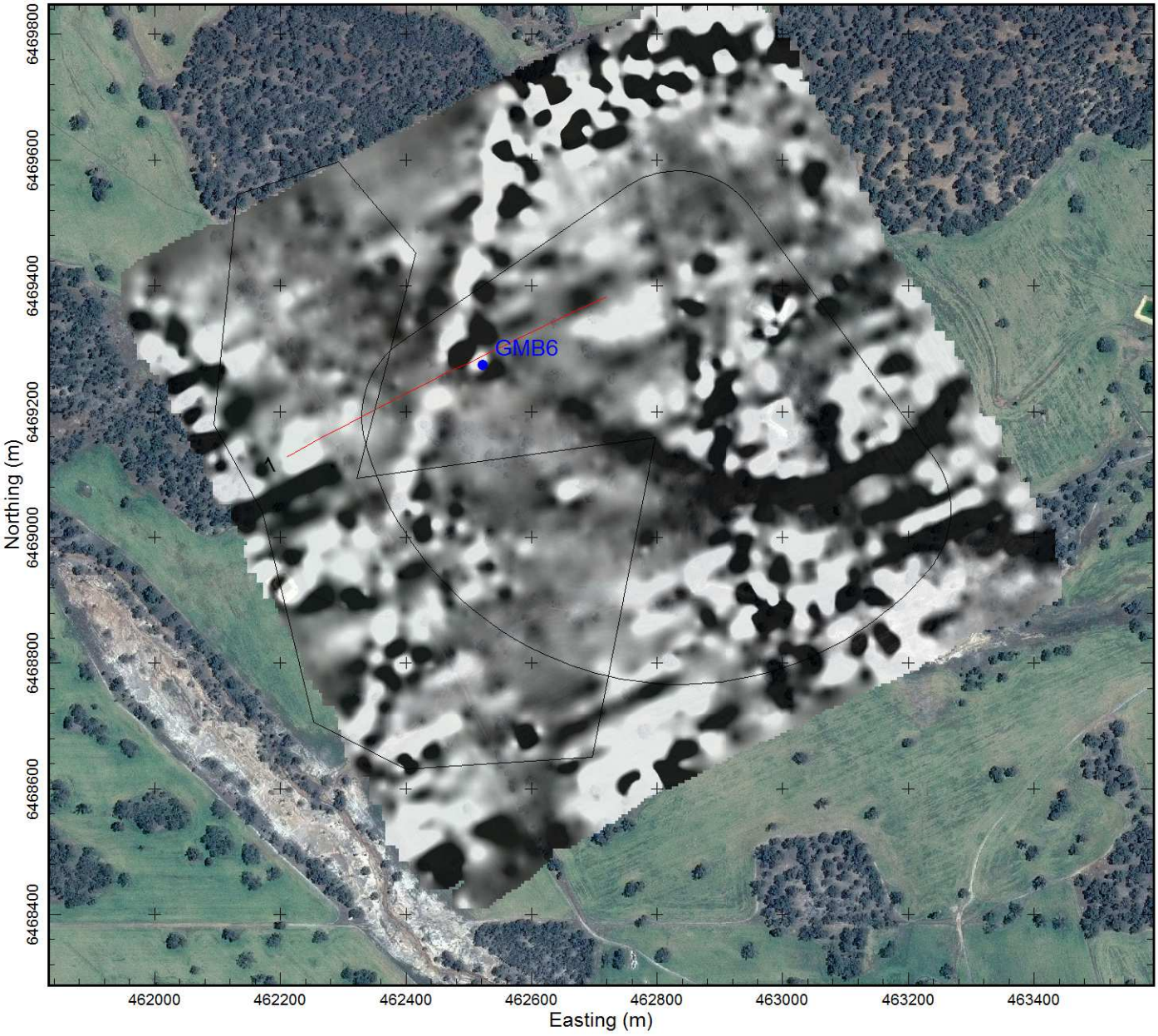
First Vertical Derivative



Horizontal Scale 1 : 10000

0m 200m 400m 600m

Notes:
- Coordinates are in GDA94, MGA Zone 50
- Current line highlighted in red on plan view map
- Extents of planned landfill outlined in black on plan view map
- Extents of works approval area outlined in black on plan view map
- Horizontal scale is 1:10000 (for A4 plot)

Project:	gldr_42012_hy_gmag_eri_allawunafarm_landfill_wa
Figure:	A3
Caption:	Allawuna - First Vertical Derivative

Golder Associates

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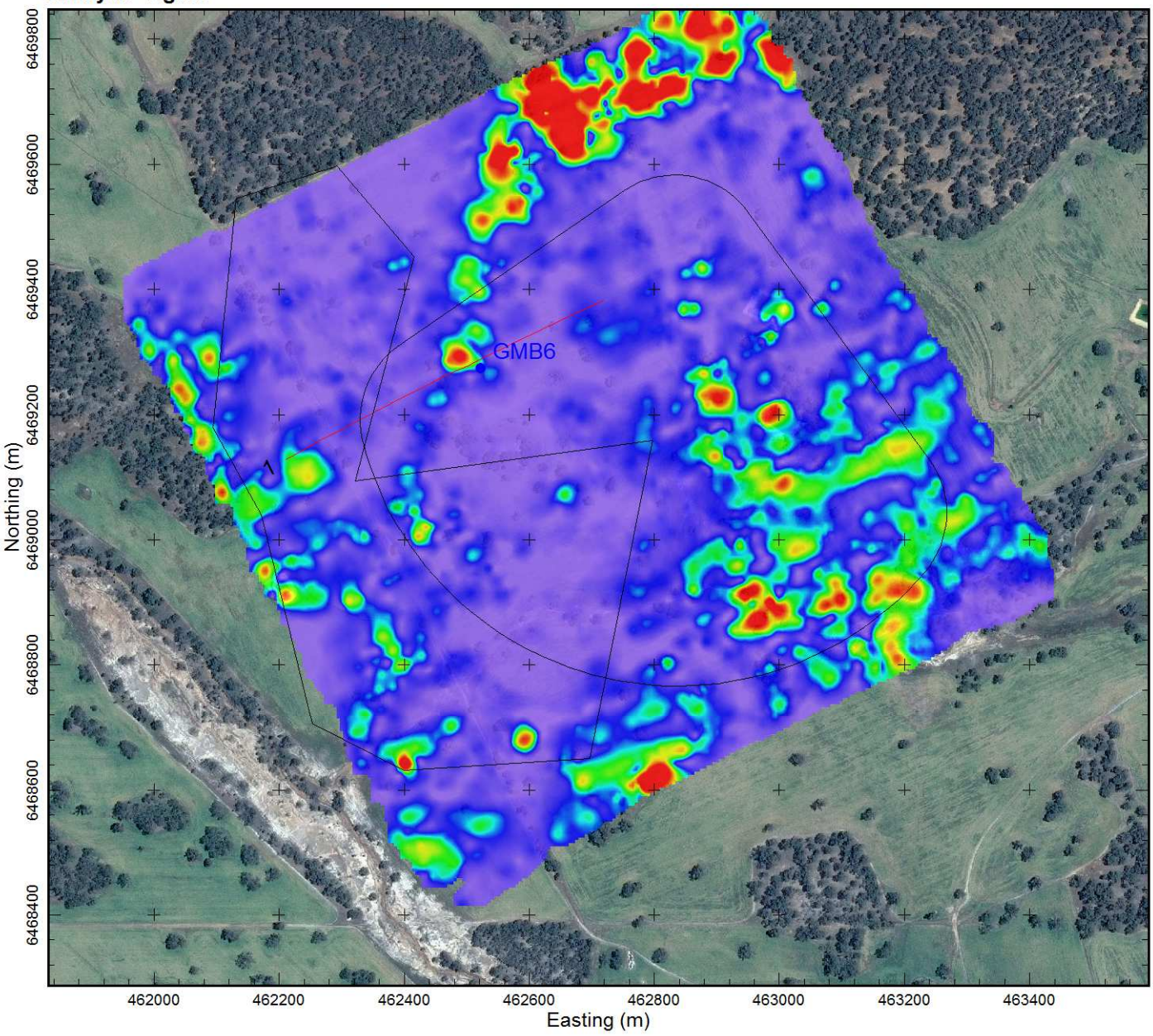
Analytic Signal



Horizontal Scale 1 : 10000

0m 200m 400m 600m

Notes:
- Coordinates are in GDA94, MGA Zone 50
- Current line highlighted in red on plan view map
- Extents of planned landfill outlined in black on plan view map
- Extents of works approval area outlined in black on plan view map
- Horizontal scale is 1:10000 (for A4 plot)

Project:	gldr_42012_hy_gmag_eri_allawunafarm_landfill_wa
Figure:	A4
Caption:	Allawuna - Analytic Signal

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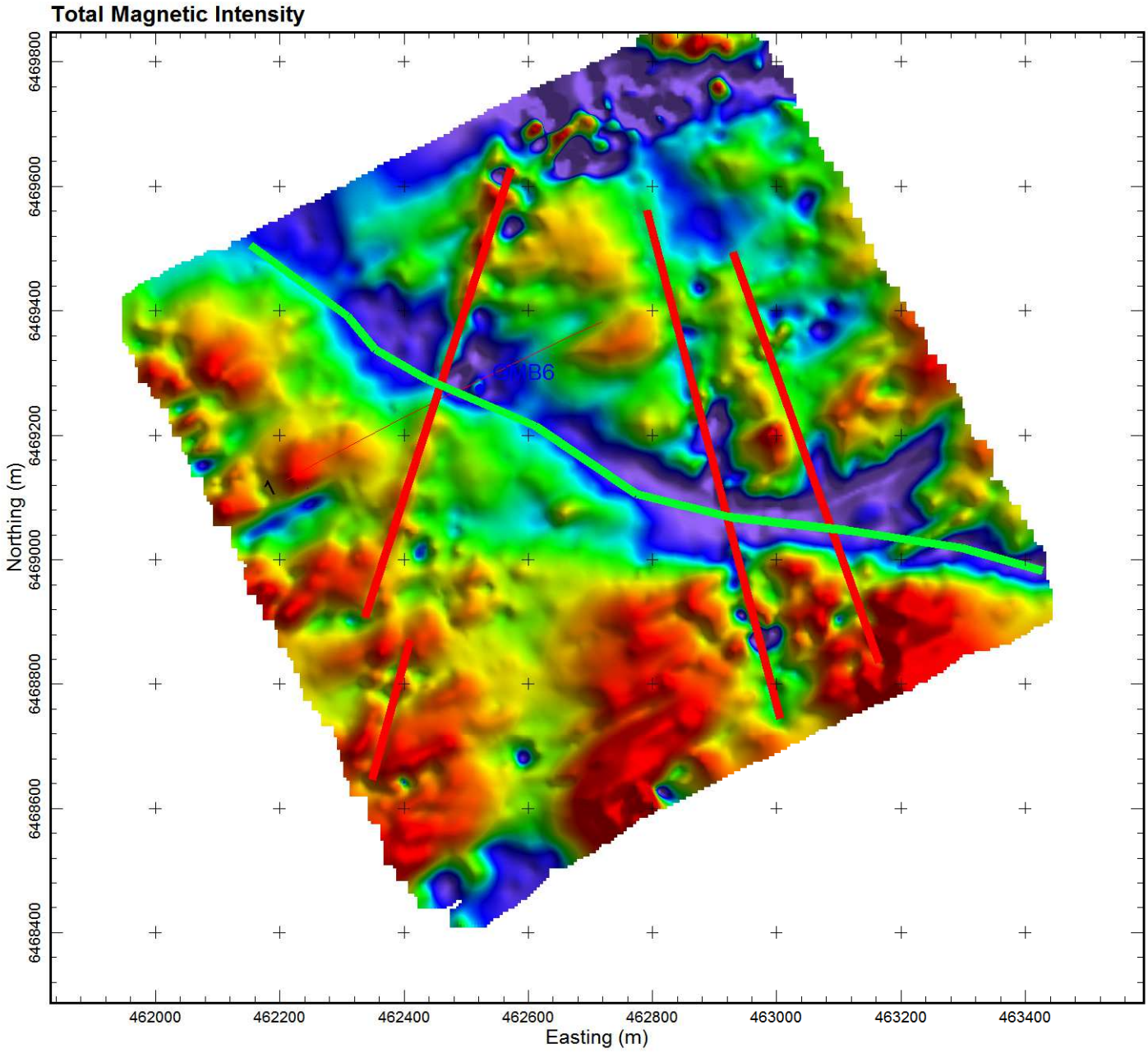

Notes:
- Coordinates are in GDA94, MGA Zone 50
- Current line highlighted in red on plan view map
- Extents of planned landfill outlined in black on plan view map
- Extents of works approval area outlined in black on plan view map
- Horizontal scale is 1:10000 (for A3 plot)

Feature	Description
	Potential lineaments (dykes?)
	Extent of magnetic low

Project:	gldr_42012_hy_gmag_eri_allawunafarm_landfill_wa
Figure:	A5
Caption:	Allawuna - Magnetic Interpretation

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APPENDIX K

CPT Report

CONE PENETROMETER TESTING INVESTIGATION

Introduction

Golder carried out a Cone Penetrometer Testing (CPT) investigation at several locations across the site in order to gain additional geotechnical information in areas of magnetic anomaly, based on the results of Total Magnetic Intensity (TMI) imaging from the geophysical survey (Figure 1). The investigation took place from 16-17 February 2015 and utilised a truck-mounted CPT rig operated by Probedrill Pty Ltd. The investigation was directed and supervised by a Golder engineer throughout its entirety.

Investigation approach

The approach to the CPT investigation was developed following a desktop review of the Golder test pit investigation (January 2015) and the TMI imaging. Based on this information Golder identified several lines which subtend the region of magnetic anomaly, as shown in Figure 1.

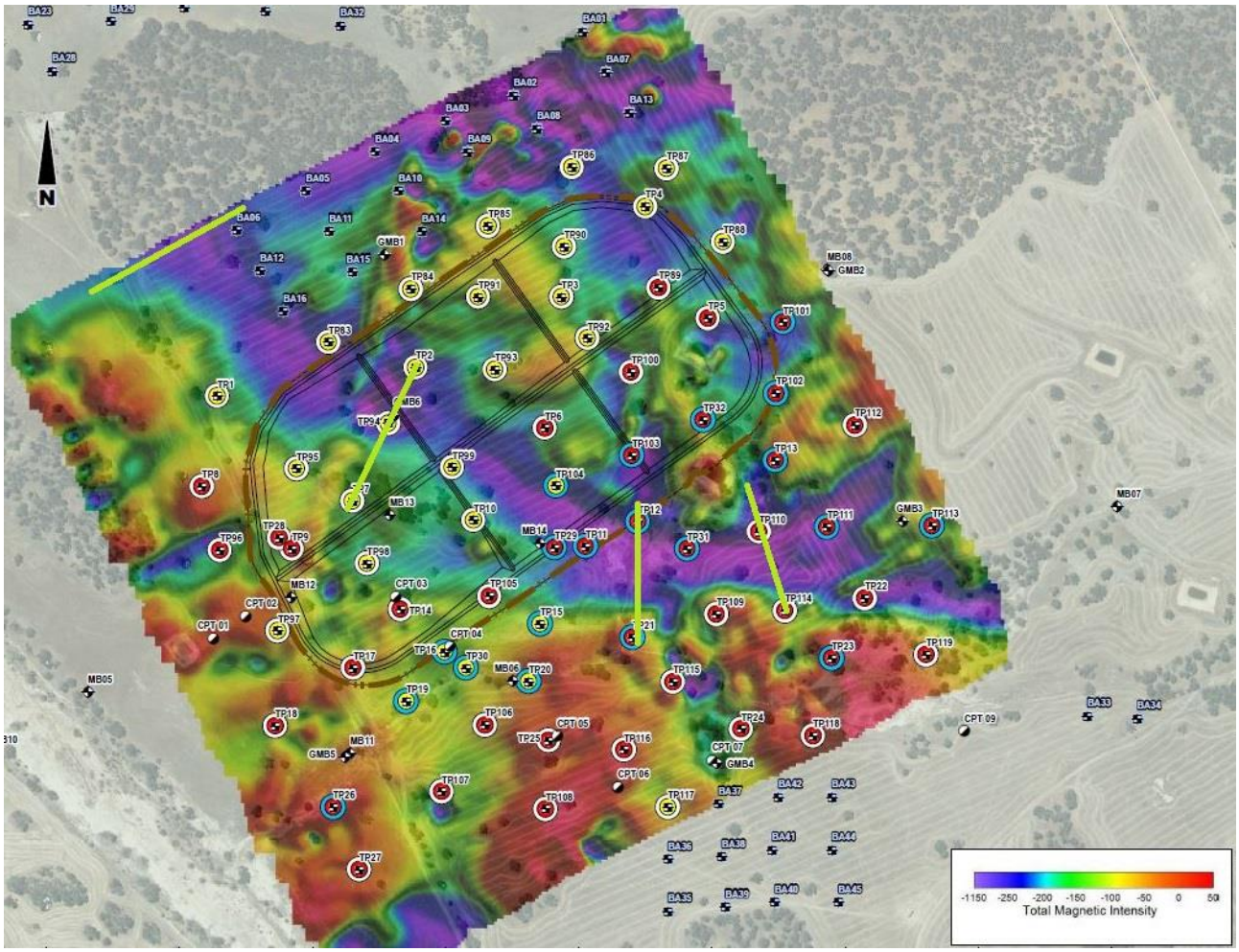


Figure 1: Scheduled alignments for CPT investigation overlay onto TMI and test pit plan

The general approach was to conduct probing at relatively close intervals (10-20 m where possible) along each of the lines shown above, using the test pit information to guide the process (red test pit symbols indicate refusal was reached, yellow indicates no refusal). It must be noted that probing was not conducted directly over any backfilled test pit, but offset into virgin soil so as to accurately characterise the *in situ* conditions. In addition to testing along the scheduled alignments shown above, several incidental locations were investigated based on observations made whilst travelling across the site (CPTu2.5, CPTu3.1 – see Table 1).

About the cone penetrometer test

The specific type of testing performed was CPT with dynamic pore water pressure measurement, or CPTu. The test involves pushing a cone fixed to the end of a series of rods into the ground at a constant rate while taking continuous measurements (recorded at 2 cm depth intervals) using sensors in the probe. The data from the piezocone test is in the form of cone resistance (q_c), sleeve friction (f_s), friction ratio (FR = (f_s/q_c) × 100%) and pore water pressure versus depth.

The above data was used to infer relative changes in soil type and phreatic (ground-water) conditions. Typically, sands exhibit moderate q_c and low f_s; whilst clays exhibit variable q_c (depending on *in situ* state) and high f_s.

Results of the investigation

Figure 2 shows the locations where testing with the CPTu took place in relation to the previous test pits and survey of magnetic intensity. The outcomes of the investigation at each location are summarised in Table 1.

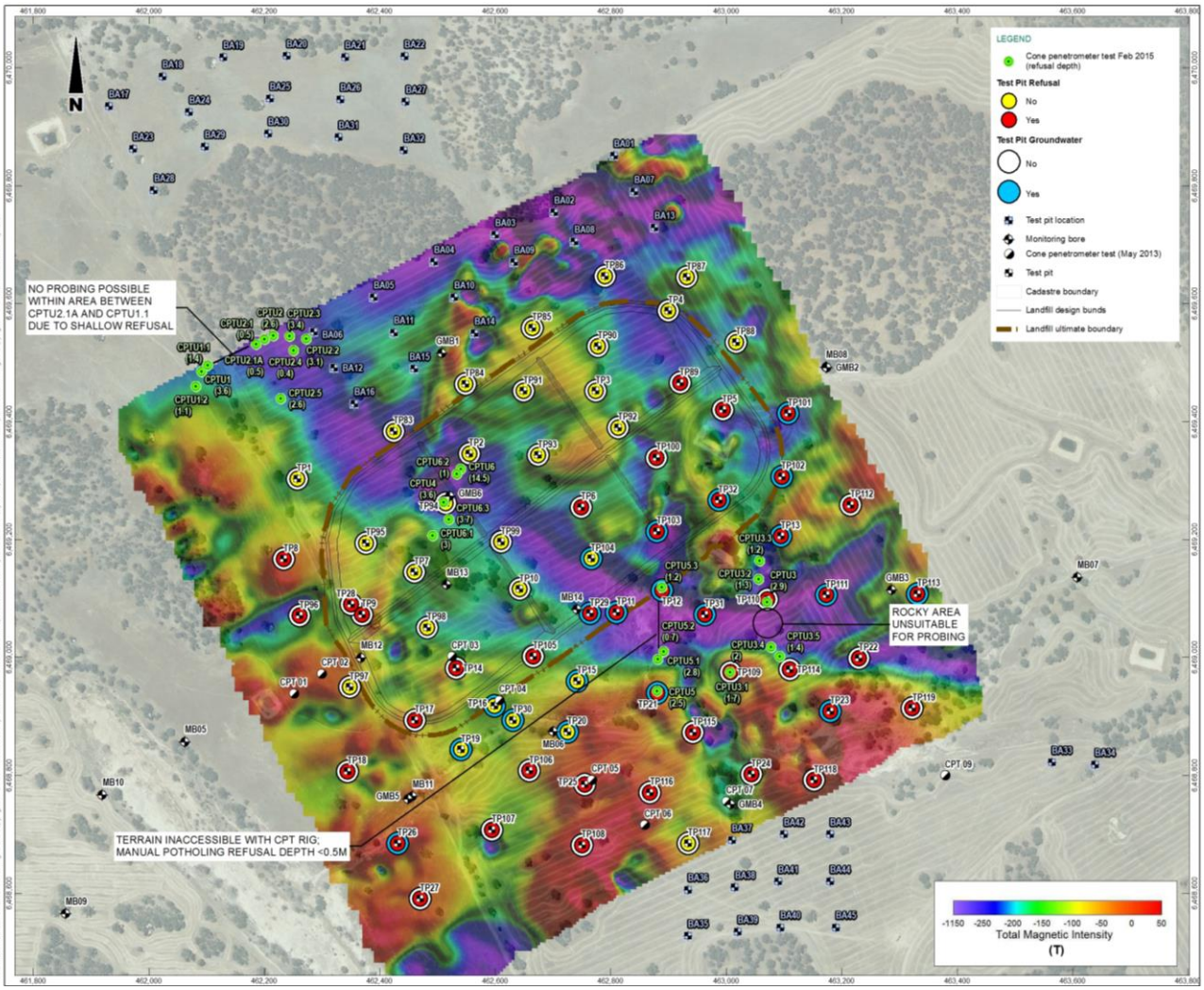


Figure 2: Locations of CPTu tests during February 2015 investigation

Table 1: Summary of findings from February 2015 CPT investigation

Probe ID	Coordinates (MGA Zone 50)*		Test Notes (See below for nomenclature)		Inferred Soil Description (shallowest – deepest)
	Easting	Northing	Refusal Depth (m bgl)[1]	Refusal Condition	
CPTU1	462092	6469485	3.6	PP; inclination	Sand; very stiff clay
CPTU1.1	462102	6469495	1.4	q_c; inclination	Sand; very stiff clay
CPTU1.2	462082	6469460	1.1	q_c	Sand; very stiff clay
CPTU2	462216	6469546	2.6	q_c; PP	Sand; laterite duricrust; clay; very stiff clay
CPTU2.1	462201	6469540	0.5	q_c	Laterite duricrust
CPTU2.1A	462186	6469531	0.5	q_c	Laterite duricrust
CPTU2.2	462273	6469541	3.1	inclination	Sand; very stiff clay
CPTU2.3	462244	6469545	3.4	inclination	Sand; very stiff clay
CPTU2.4	462251	6469521	0.4	inclination	Sand; very stiff clay
CPTU2.5	462229	6469439	2.6	q_c; inclination	Loose sand; very stiff clay
CPTU3	463071	6469099	2.9	inclination	Sand; very stiff clay
CPTU3.1	463007	6468975	1.7	q_c; inclination	Sand; very stiff clay
CPTU3.2	463057	6469133	1.3	q_c	Sand; very stiff clay
CPTU3.3	463058	6469164	1.2	q_c	Sand; very stiff clay
CPTU3.4	463078	6469018	2.0	q_c	Laterite duricrust; very stiff clay
CPTU3.5	463093	6469002	1.4	q_c	Sand; very stiff clay
CPTU4	462514	6469263	3.6	q_c; inclination	Loose sand; clay; very stiff clay
CPTU5	462881	6468941	2.5	q_c; inclination	Sand; very stiff clay
CPTU5.1	462882	6468997	2.8	q_c	Loose sand; very stiff clay
CPTU5.2	462894	6469007	0.7	inclination	Loose sand; laterite duricrust
CPTU5.3	462889	6469115	1.2	q_c; inclination	Loose sand; very stiff clay
CPTU6	462541	6469320	14.5	inclination	Loose sand; stiff clay; clay; clay mixtures; stiff clay
CPTU6.1	462492	6469207	3	inclination	Loose sand; very stiff clay
CPTU6.2	462534	6469311	1	q_c	Sand; laterite duricrust
CPTU6.3	462520	6469234	3.7	inclination	Loose sand; very hard material
Total No. Tests: 25					
Cumulative Test Depth: 62 m					

Notes: *Device tolerance: ± 6 m
[1]metres below ground level

Note that the term “refusal” in the context this CPTu investigation does not necessarily indicate that ‘bedrock’ has been reached. Refusal refers to one or more of the following occurrences:

- Tip resistance q_c exceeds the pushing force capability of the cone or rig
- Friction resistance f_s exceeds the measurement capability of the probe sleeve
- Pore-water pressure exceeds the measurement capability of the transducer
- The inclination of the rod string exceeds the flexural limit of the hardened-steel rods.

As outlined in Table 1 the principal refusal conditions experienced during the investigation were tip resistance and inclination. This is discussed further in the interpretation of results provided in the section below.

Interpretation of CPTu results

Probedrill logs of each CPTu test carried out during the February 2015 investigation are provided at the end of this Appendix.

Predominant Soil Types

The predominant soil types and stratigraphy encountered on site is summarised as follows:

- SAND; moderate density to loose; thickness ranging from 0.1 to 3 m; overlying
- LATERITIC DURICRUST; stiff to very stiff; fine-grained; thickness ranging from 0.2 to 0.5 m; overlying
- CLAY and CLAY MIXTURES; moderate to very stiff; thickness ranging from 0 to 12 m; overlying
- SAPROLITE/SAPROCK.

The above characterisation is broadly consistent with the findings from the 2015 test pit investigation (notwithstanding the maximum depth limitations of the test pits), which suggests that the geological and geotechnical properties do not vary significantly between the test pit locations.

Comments on CPTu6

The only test to reach depths greater than 4 m was CPTu6 (refusal depth 14.5 m), located between TP94 and TP2, and for this reason is the subject of more detailed inquiry. The test results from this location have been plotted in terms of tip resistance (Qt) and friction ratio (Fr) to estimate the Soil Behaviour Type (SBT) after Robertson et al. (2010). Figure 3 shows the SBT graph for the soils at CPTu6.

Figure 3 shows that from 0-2 m the soils fall within Zones 5 and 6, indicating the presence of sands and sand mixtures, respectively. From 2-14.5 m the soils fall within Zone 3 Upper, and Zones 8 and 9, indicating the presence of overconsolidated clay mixtures, very stiff clayey sand, and very stiff fine-grained soil, respectively.

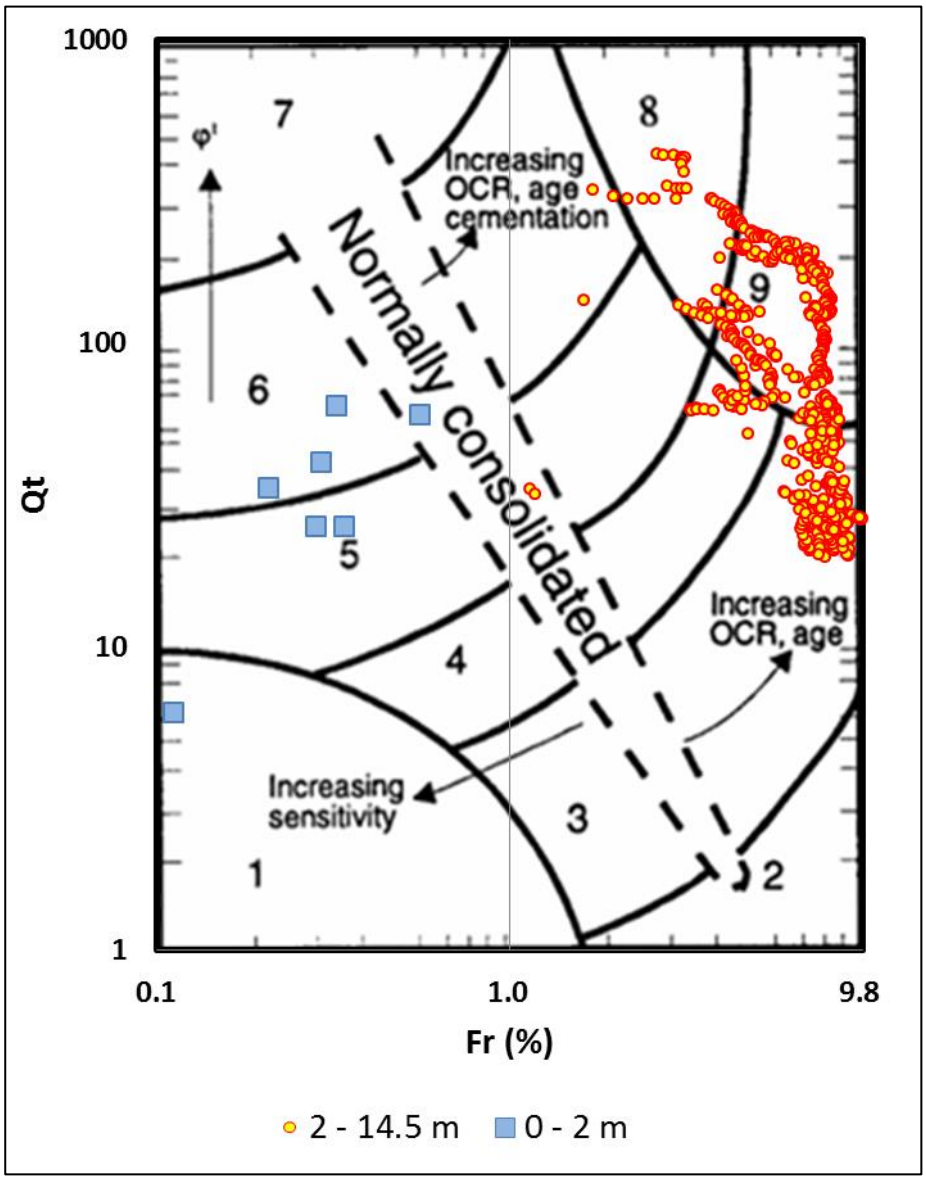


Figure 3: Soil Behaviour Type (SBT) graph for CPTu6 test location

Location and Extents of Loose Sand

Loose sand (defined for these purposes as q_c<10 MPa, f_s<100 kPa) was encountered in the surficial profile at the following locations:

- CPTu2.5 (Approx. 150 m NNW of proposed Cell 2 footprint, -250T<TMI<-150T)
- CPTu4 (NW of TP94, within footprint of proposed Cell 2, -1150T<TMI<-250T)
- CPTu5.1, 5.2, 5.3 (Between TP21 and TP12, SE of proposed Cell 4, -1150T<TMI<-200T)
- CPTu6, 6.1, 6.3 (Between TP7 and TP2, within footprint of proposed Cells 2 &3, -1150T<TMI<-150T)

The loose sand encountered at CPTu5.1, 5.2, and 5.3 was associated with the ephemeral stream system (dry at time of investigation) passing through the southern portion of the investigation area. Manual potholing with a crowbar and hammer-drill into soft areas revealed the depth of loose sand in these areas to be less than 0.5 m (consistent with the results from the CPT), beyond which further excavation was impracticable.

The results from other locations bulleted above suggest that a relatively small area exists beneath Cell 2&3, and also approximately 300 m north-west of this location, within which loose sand is present at depths up to 3.5 m (CPTu6.3). However, this loose sand is underlain by very stiff material which causes refusal on contact.

Overall, loose granular material was encountered as surficial pockets of highly variable thickness not greater than 3.5 m. The results of the CPT testing, supplemented by extensive manual potholing, are not suggestive of a clear relationship between areas of relatively low magnetic intensity and the presence of loose material at significant depths.

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA

PROJECT: Allawuna Farm

LOCATION: York, W.A.

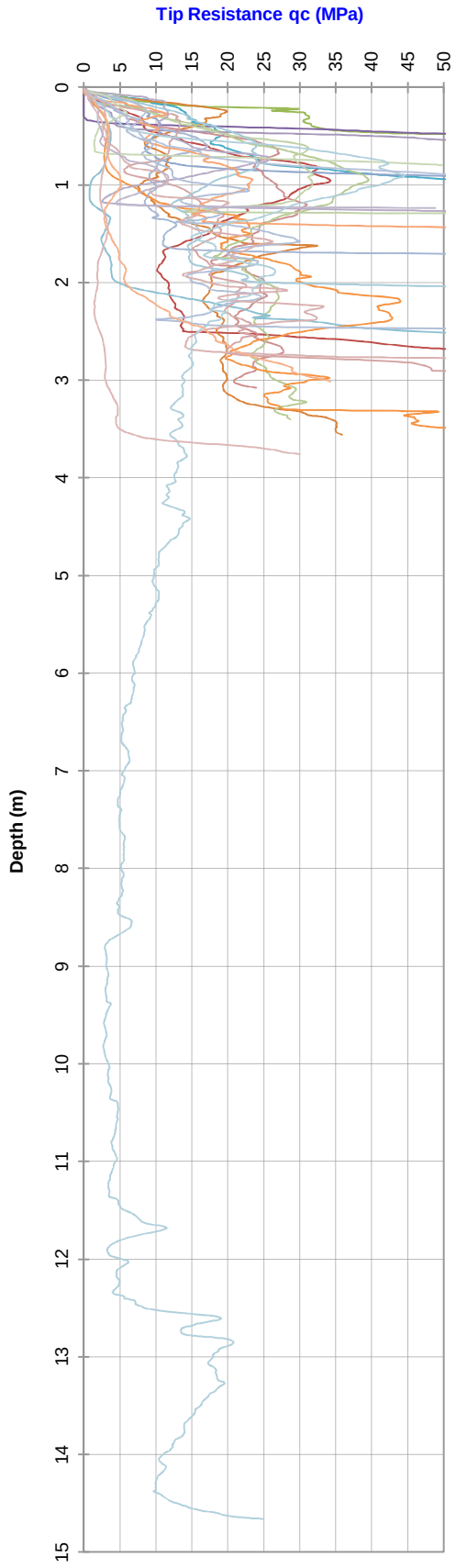
RL (m):

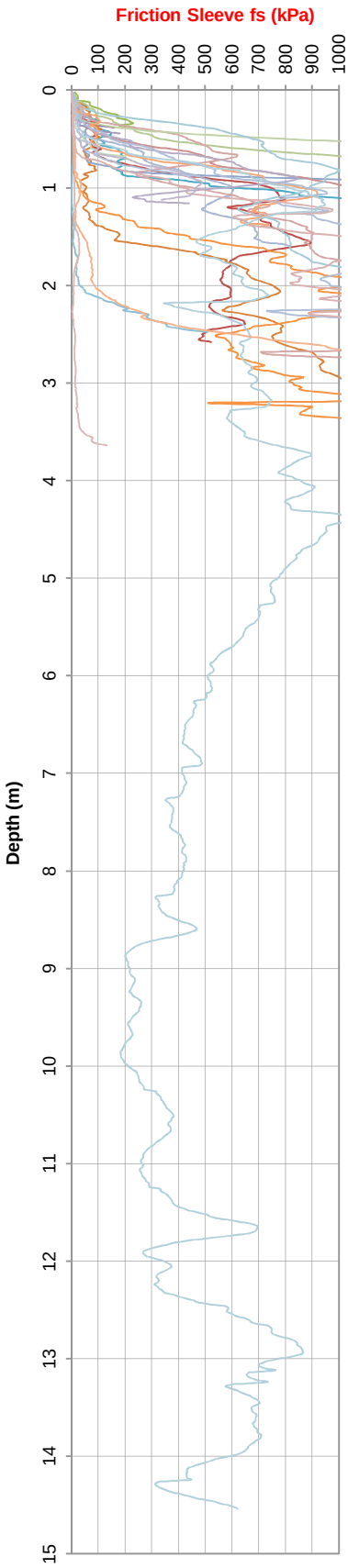
Date: 16 - 17/2/15

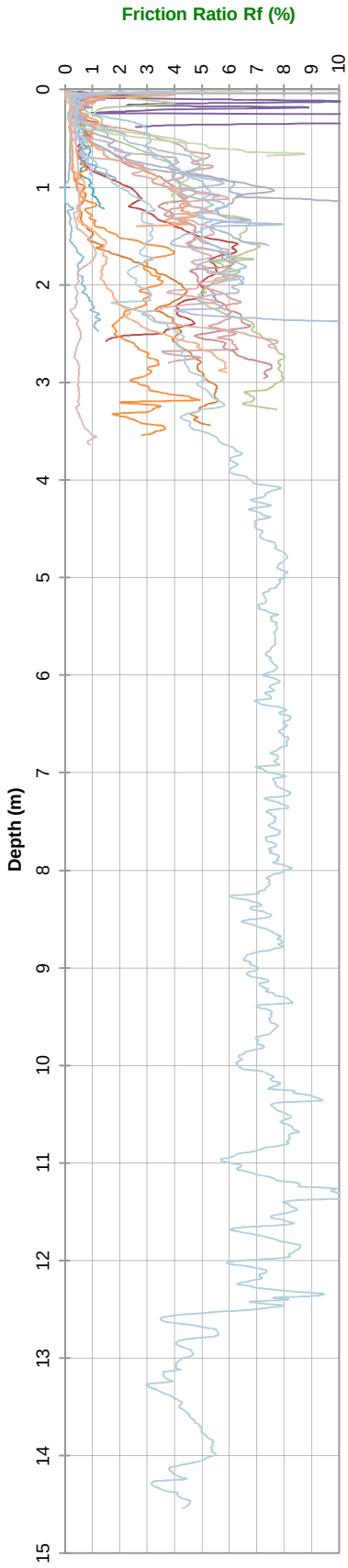
Probe No.: All Data

Job Number: 147645033

Co-ordinates:







PROBEDRILL GEOTECHNICAL SURVEY

Water (m):

Refusal:

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File:

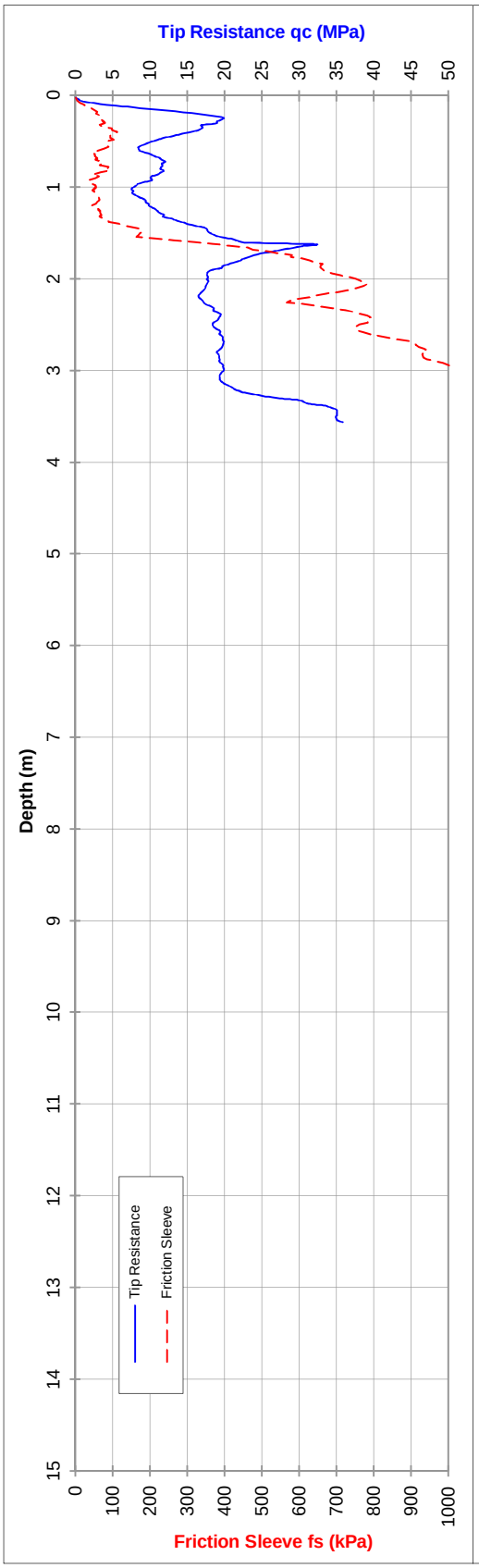
Cone I.D. :

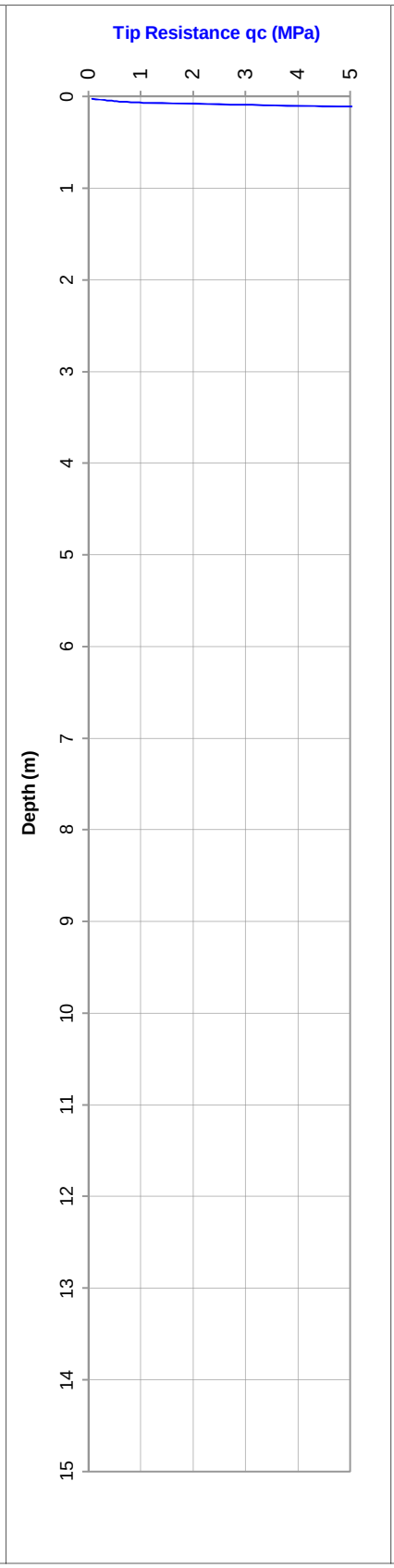
Dummy probe to (m):

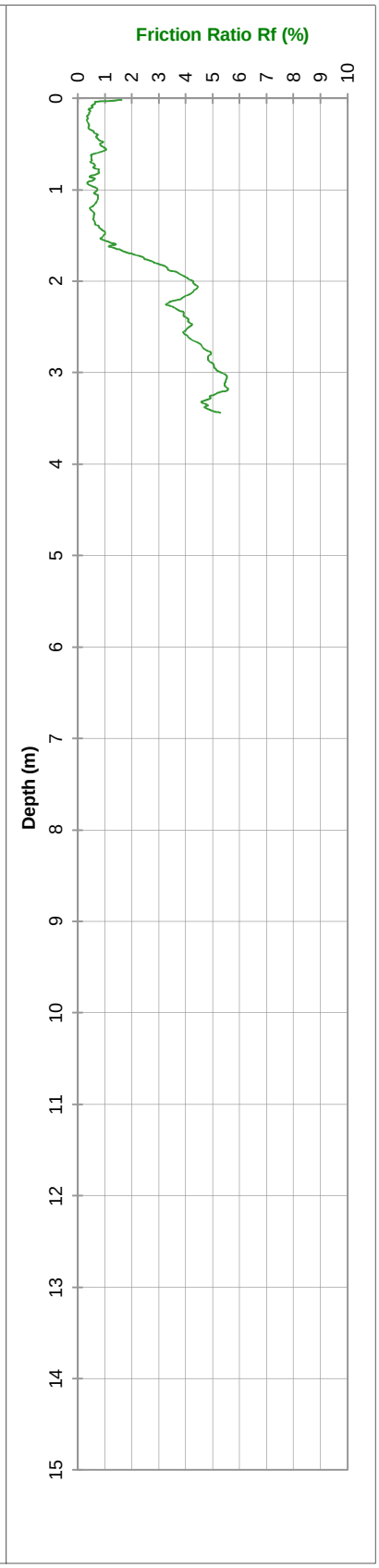
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 1
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462092E, 6469485N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.0

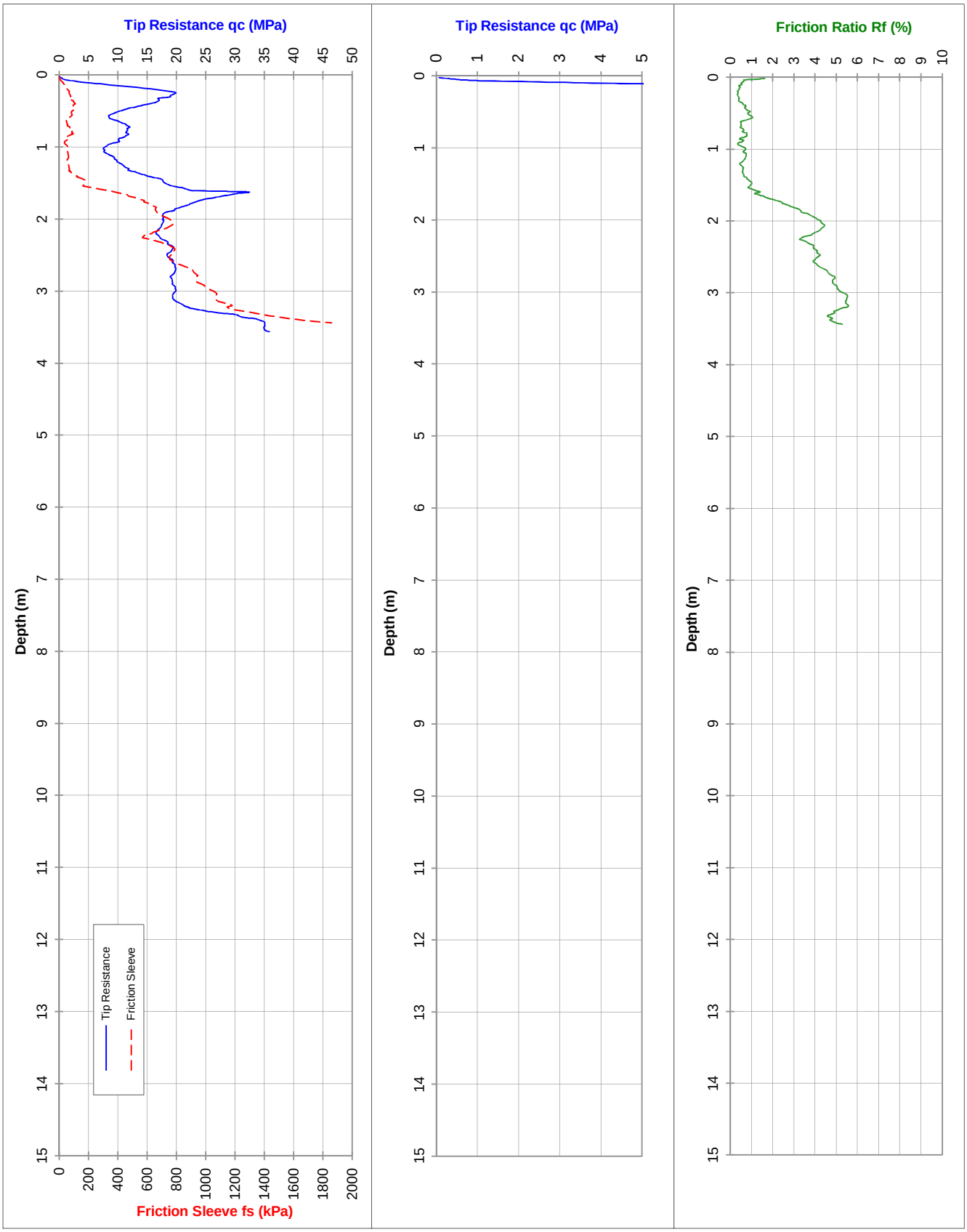
Refusal: Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9248R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 1
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462092E, 6469485N



PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.0

Refusal: Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9248R

Cone I.D. : EC42

Dummy probe to (m):

25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Monday, 16 February 2015

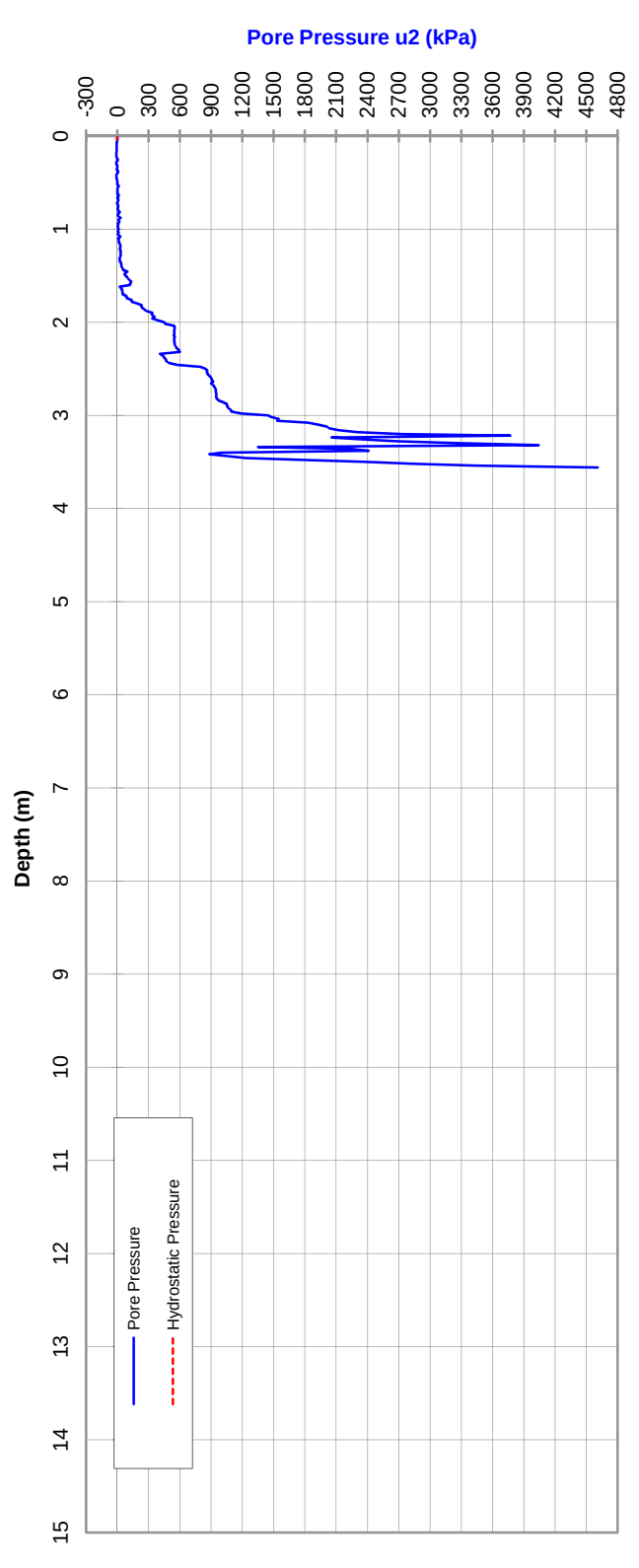
Project: Allawuna Farm

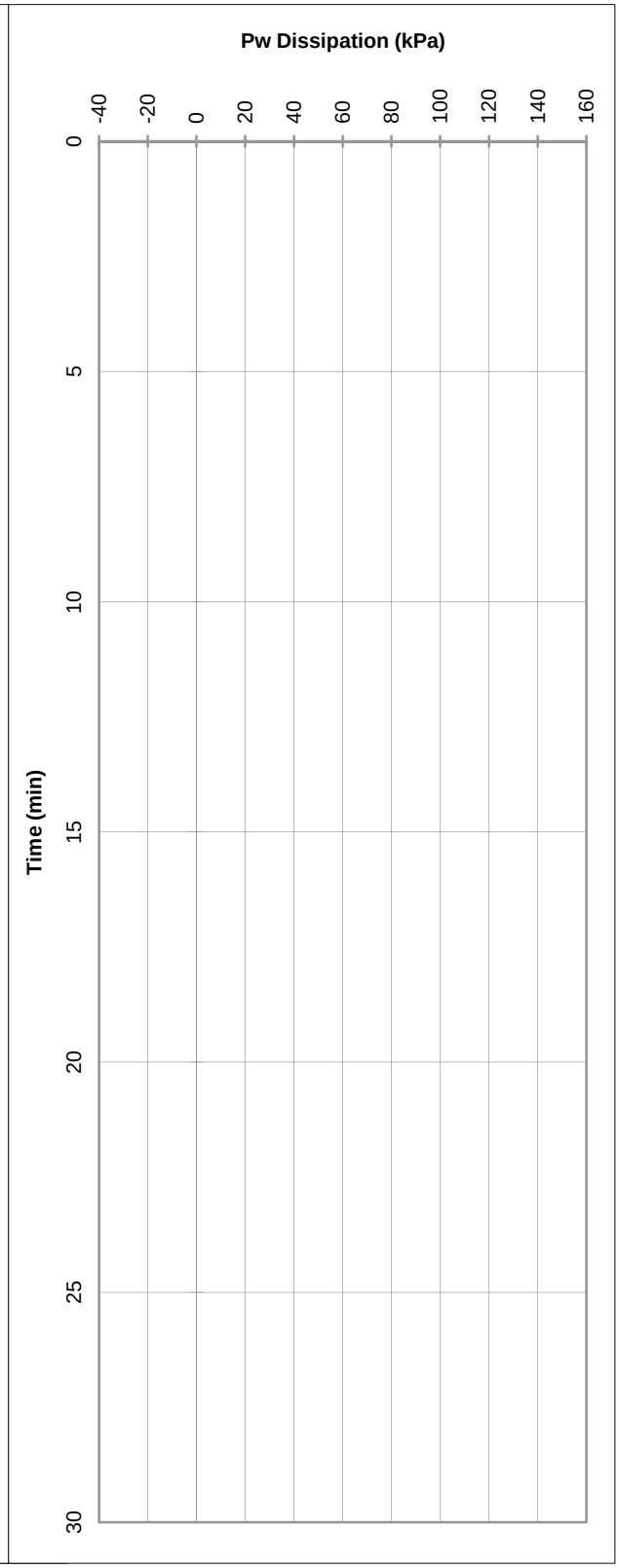
Probe No.: CPTU 1

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462092E, 6469485N





PROBEDRILL GEOTECHNICAL SURVEY

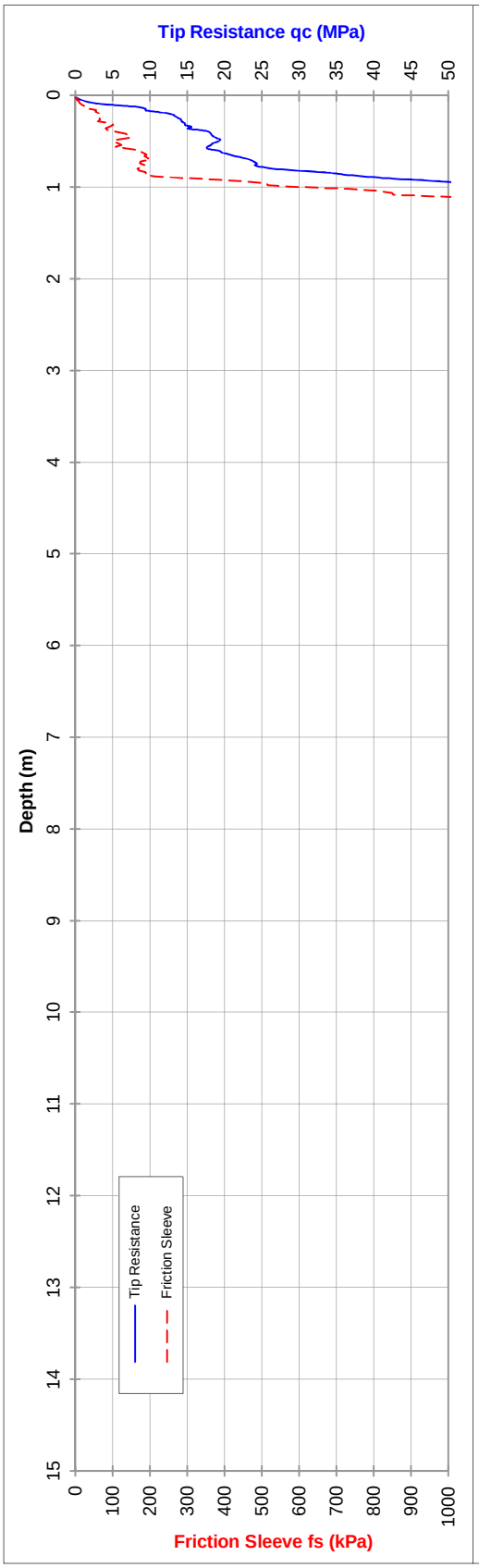
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

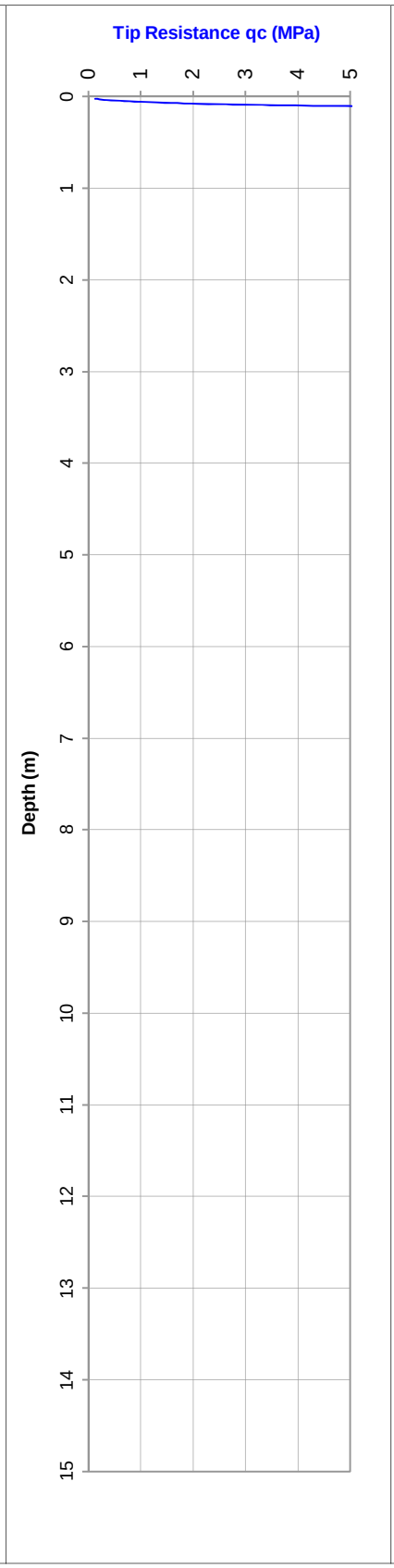
File: GA9248R.txt

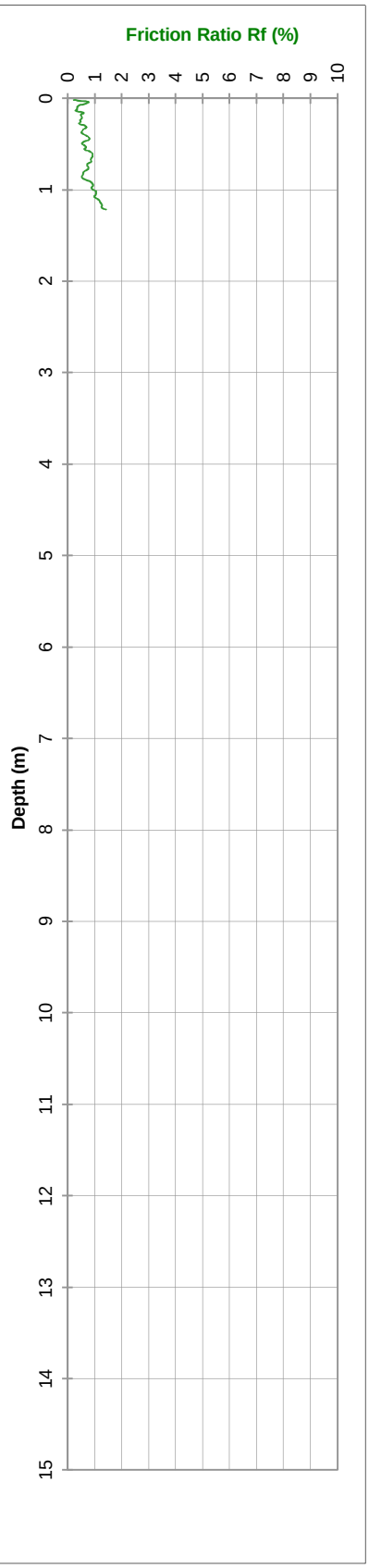
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 1.1
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates:







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 0.85

Refusal: 100MPa + Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9247R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Monday, 16 February 2015

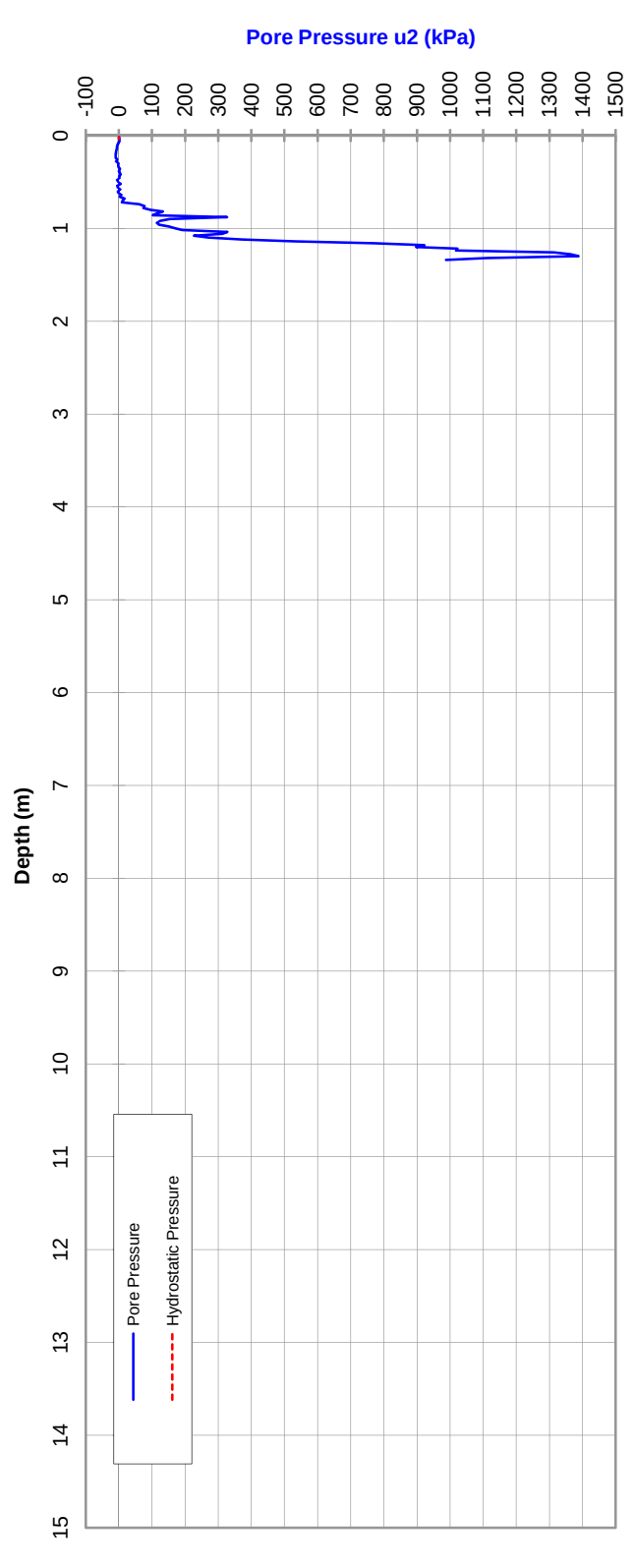
Project: Allawuna Farm

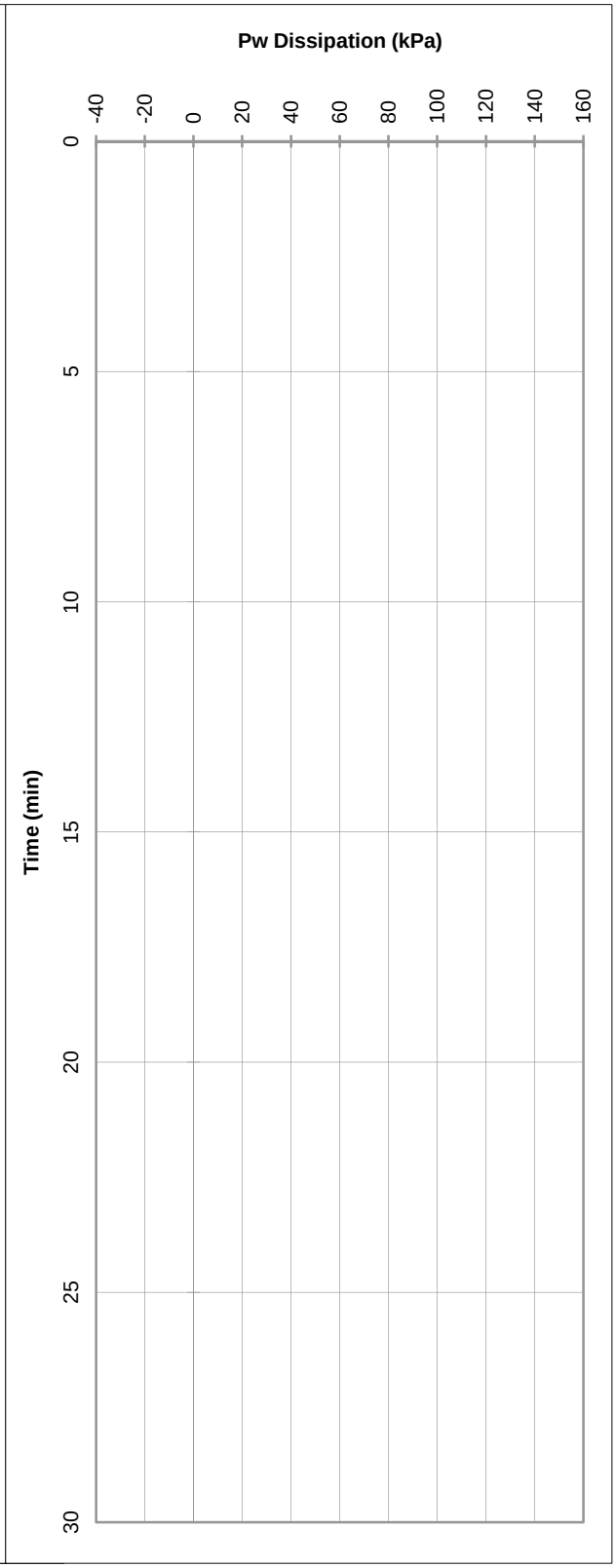
Probe No.: CPTU 1.1

Location: York, W.A.

Job Number: 147645033

Co-ordinates:





PROBEDRILL GEOTECHNICAL SURVEY

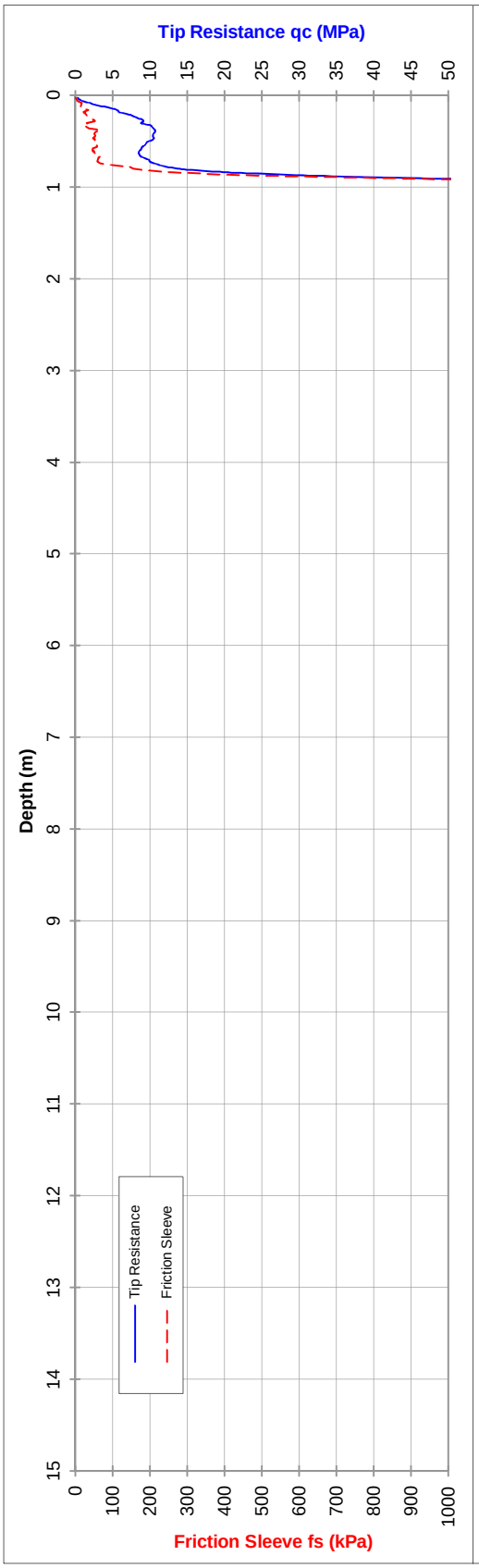
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

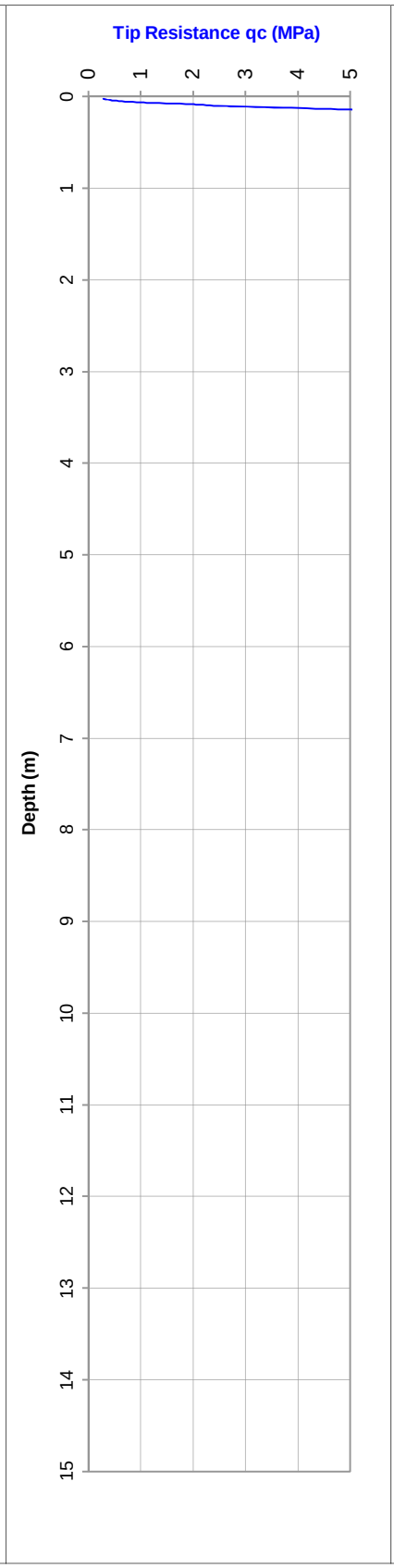
File: GA9247R.txt

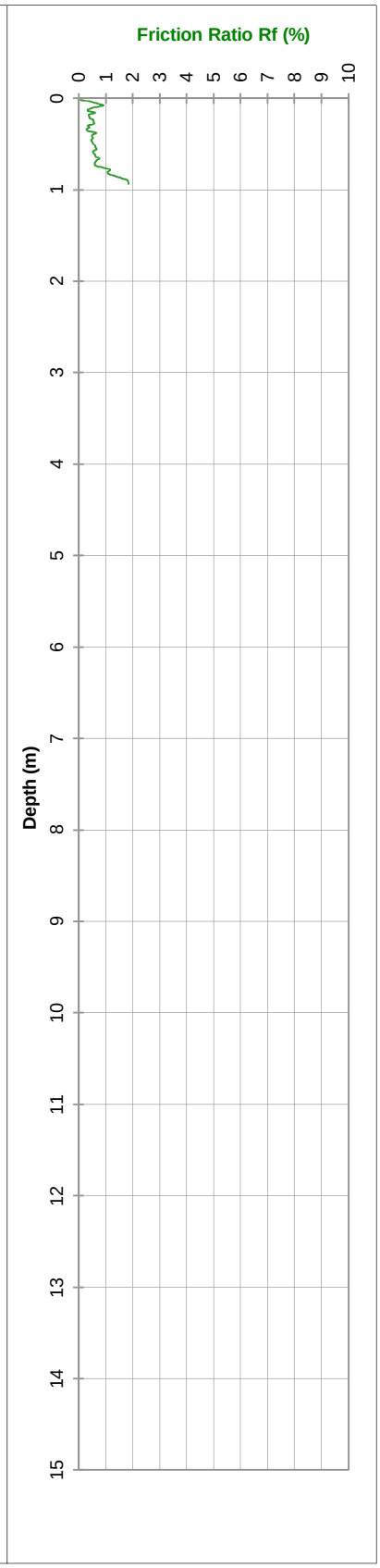
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 1.2
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462082E, 6469460N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 0.60

Refusal: 100MPa

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9249R

Cone I.D. : EC42

Dummy probe to (m):

25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Monday, 16 February 2015

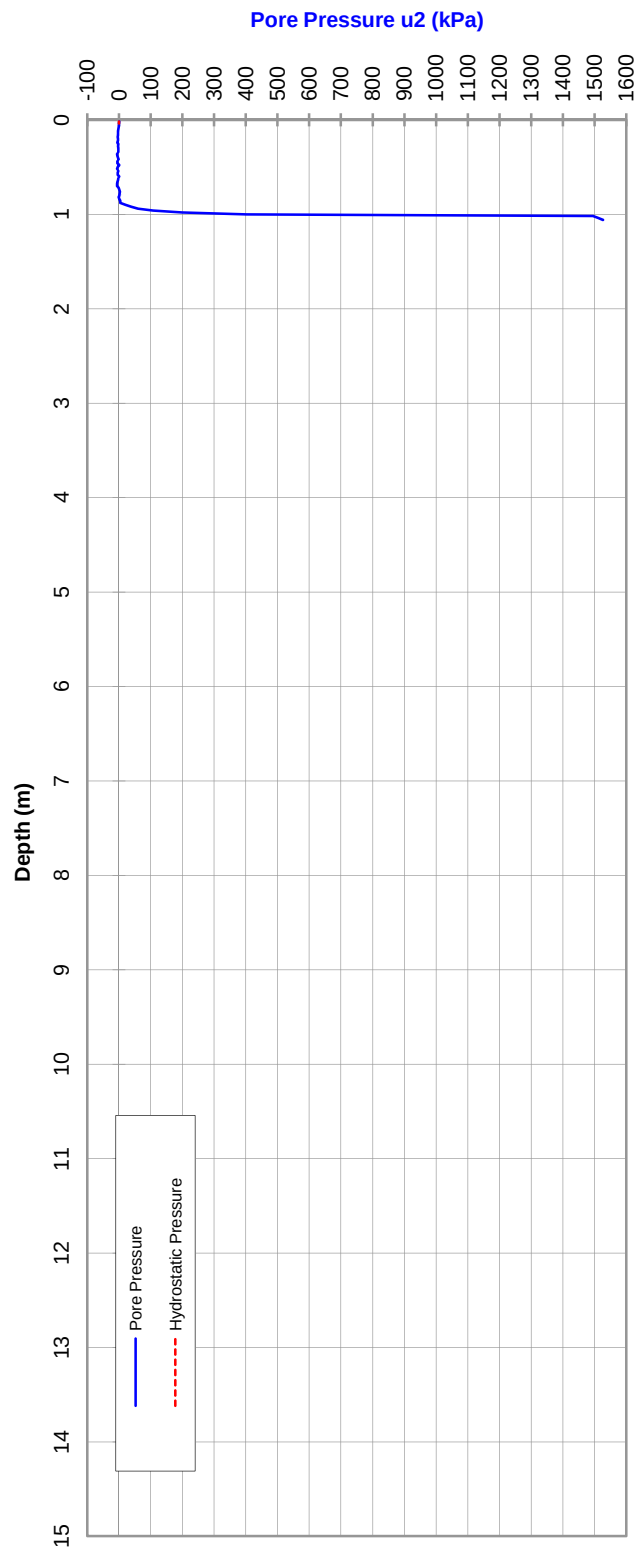
Project: Allawuna Farm

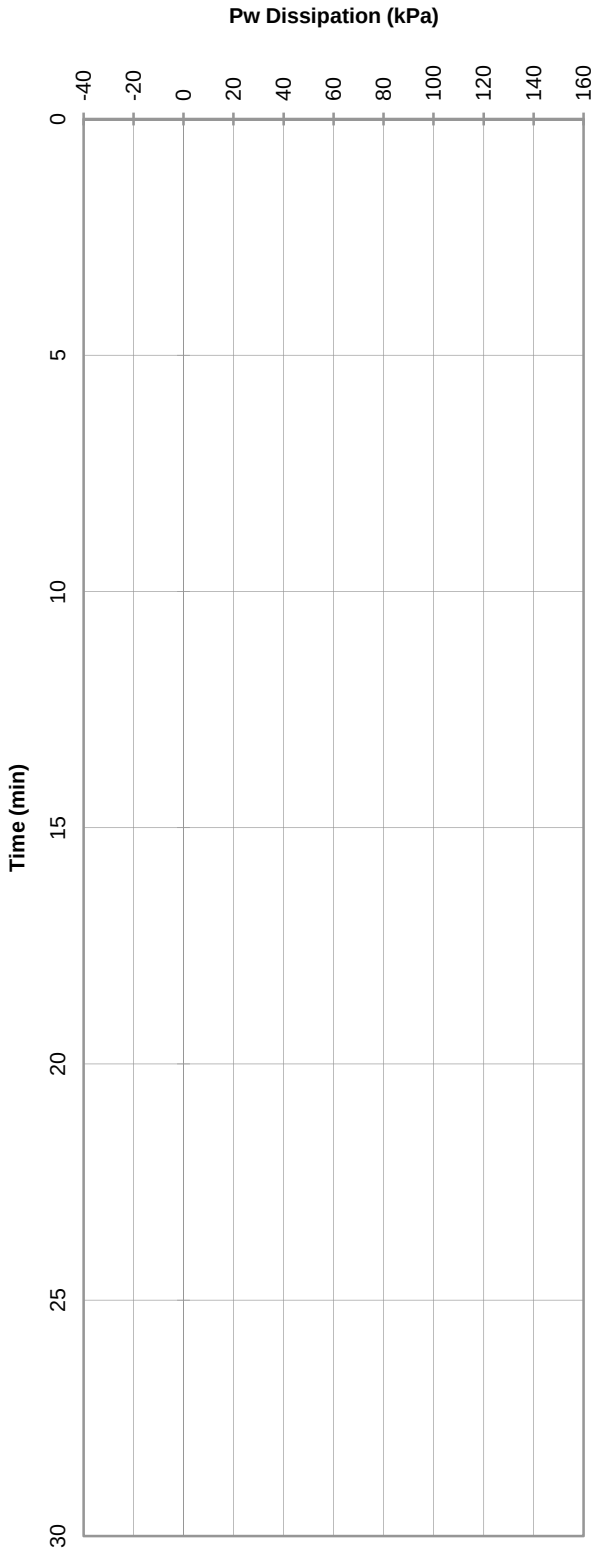
Probe No.: CPTU 1.2

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462082E, 6469460N





PROBEDRILL GEOTECHNICAL SURVEY

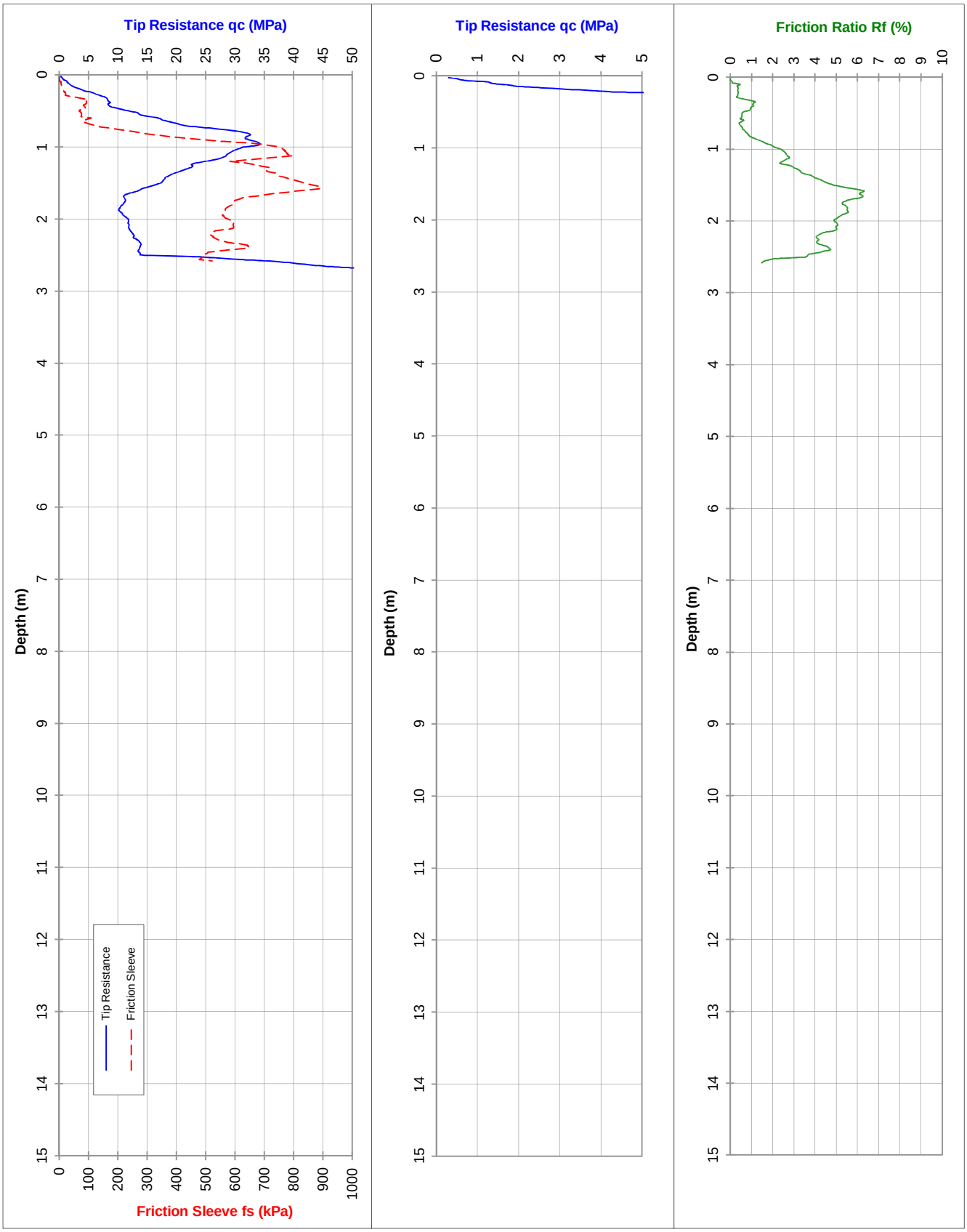
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

File: GA9249R.txt

25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 2
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462216E, 6469546N



PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 1.10

Refusal: Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9244R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Monday, 16 February 2015

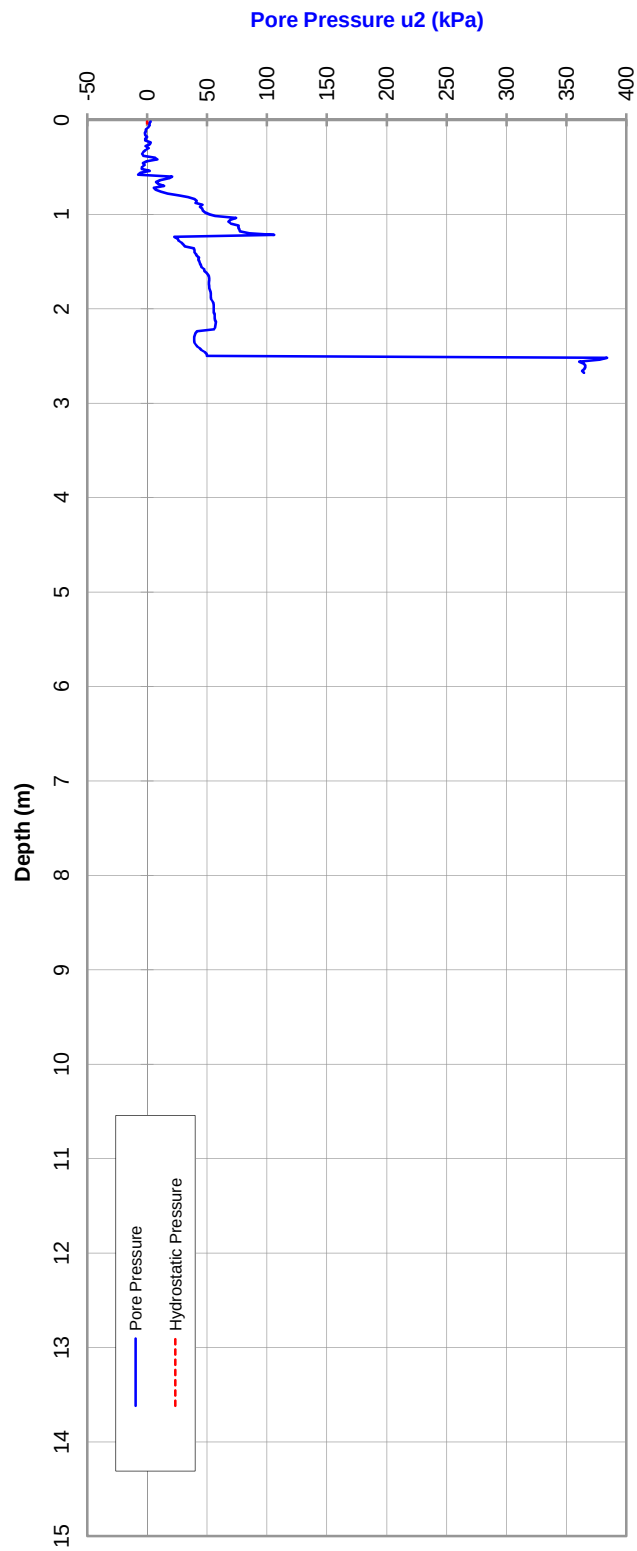
Project: Allawuna Farm

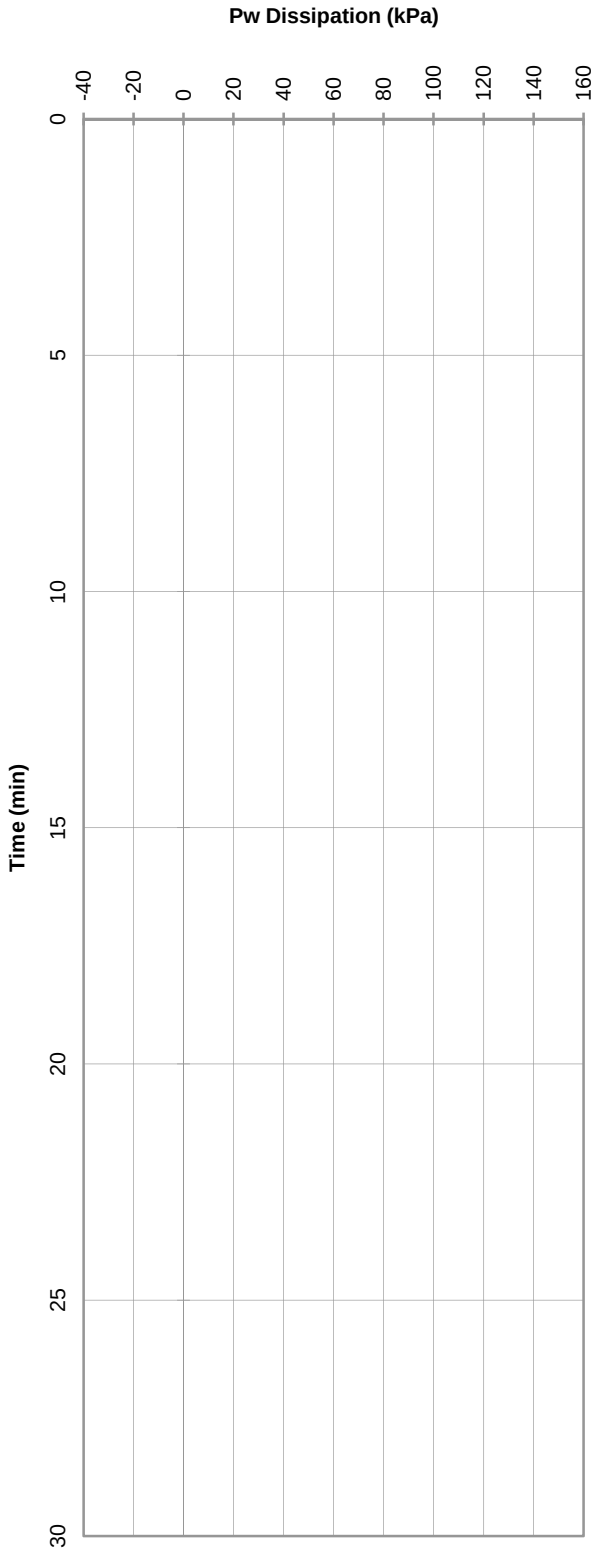
Probe No.: CPTU 2

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462216E, 6469546N





PROBEDRILL GEOTECHNICAL SURVEY

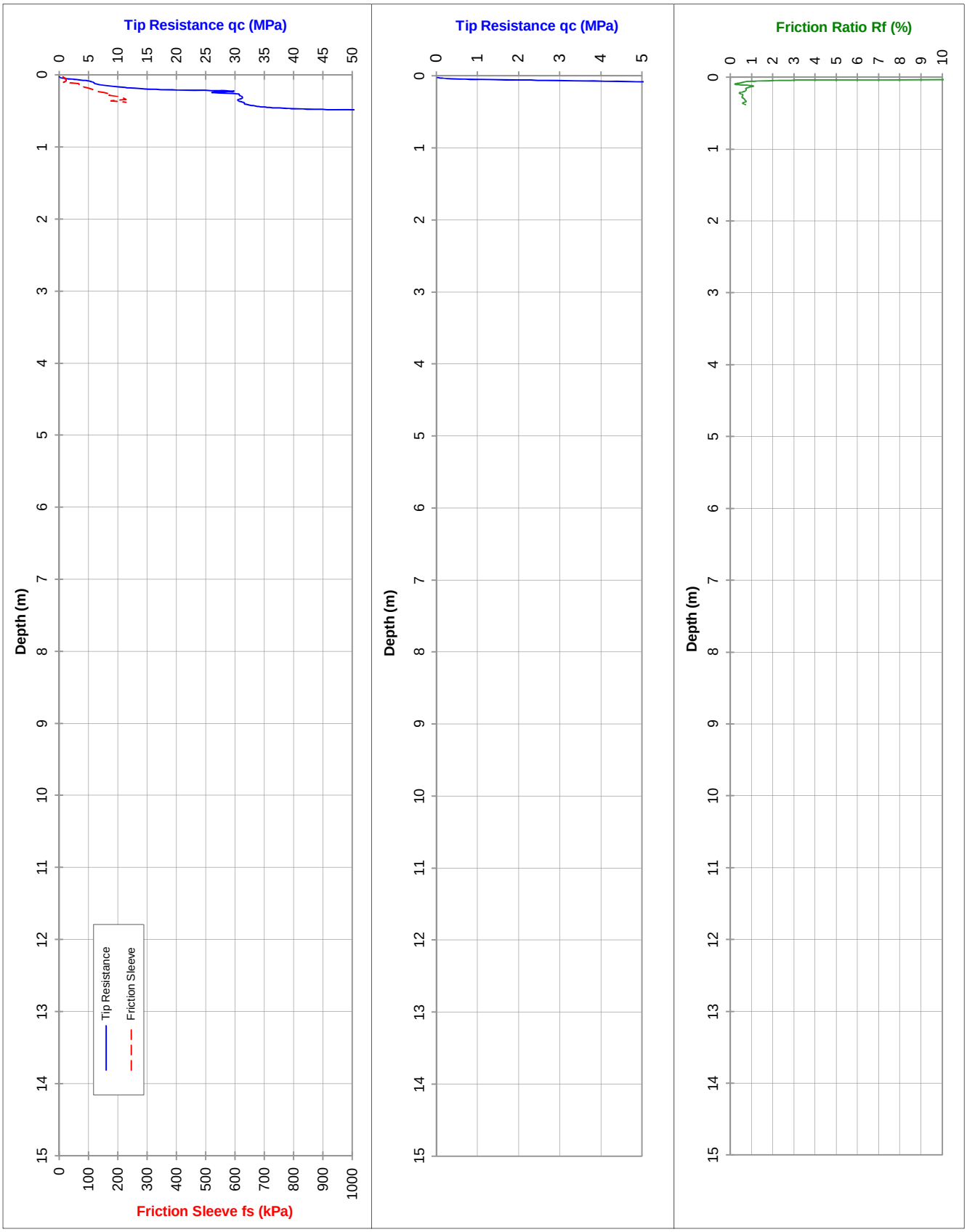
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

File: GA9244R.txt

25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 2.1
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates:



PROBEDRILL GEOTECHNICAL SURVEY

Water (m): -

Refusal: 80MPa + Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9245R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Monday, 16 February 2015

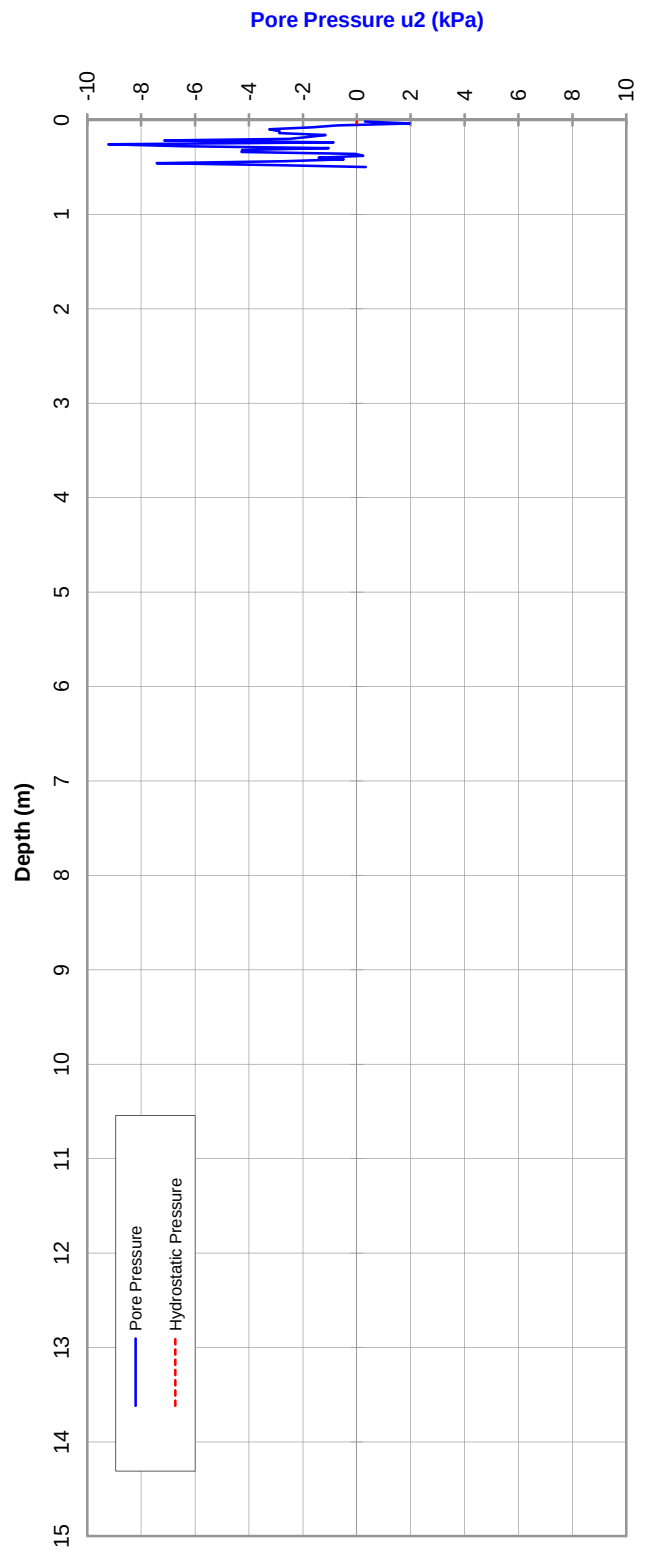
Project: Allawuna Farm

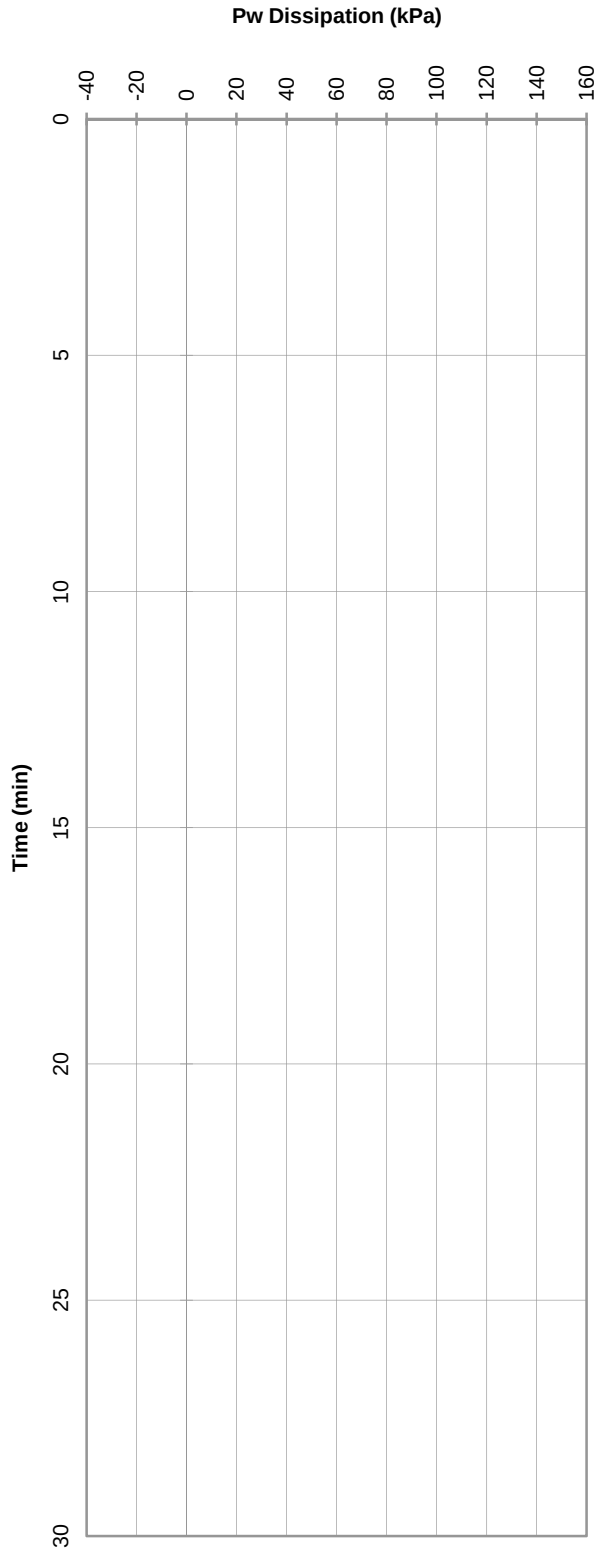
Probe No.: CPTU 2.1

Location: York, W.A.

Job Number: 147645033

Co-ordinates:





PROBEDRILL GEOTECHNICAL SURVEY

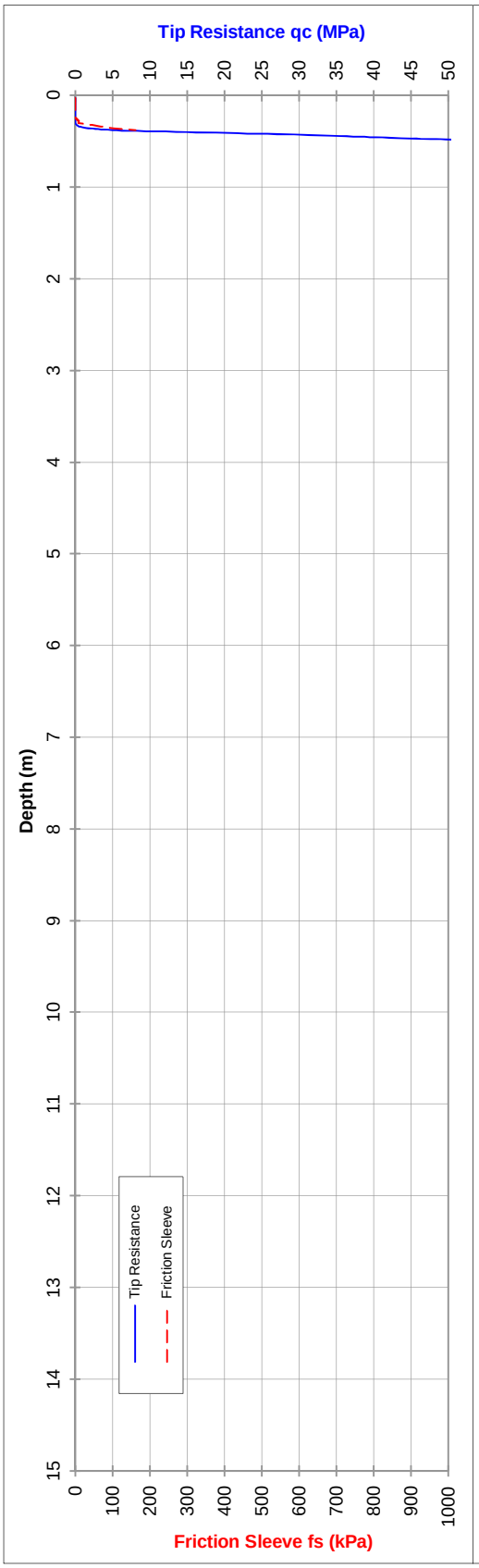
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

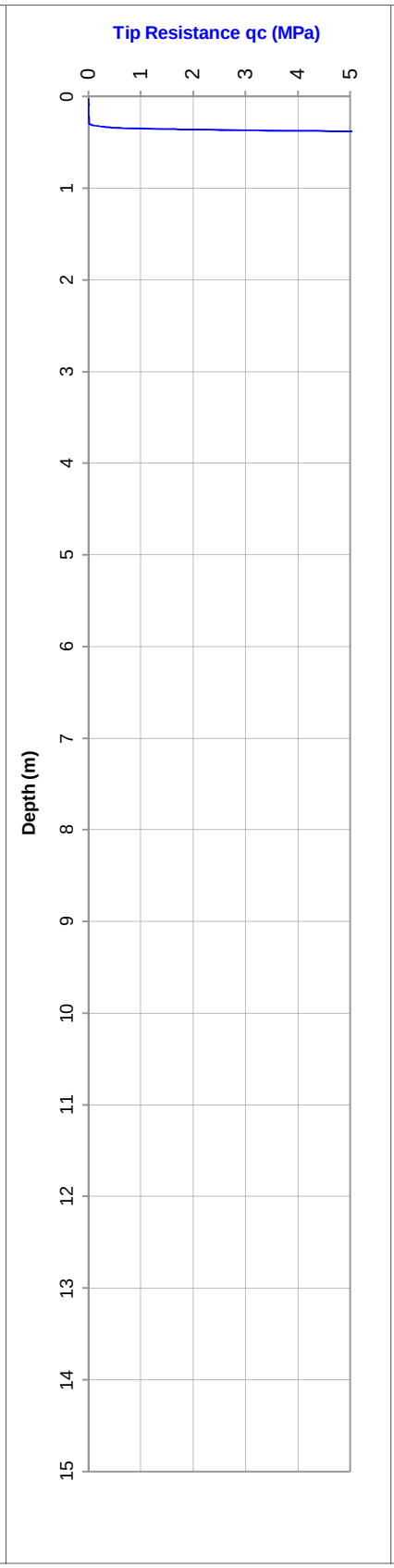
File: GA9245R.txt

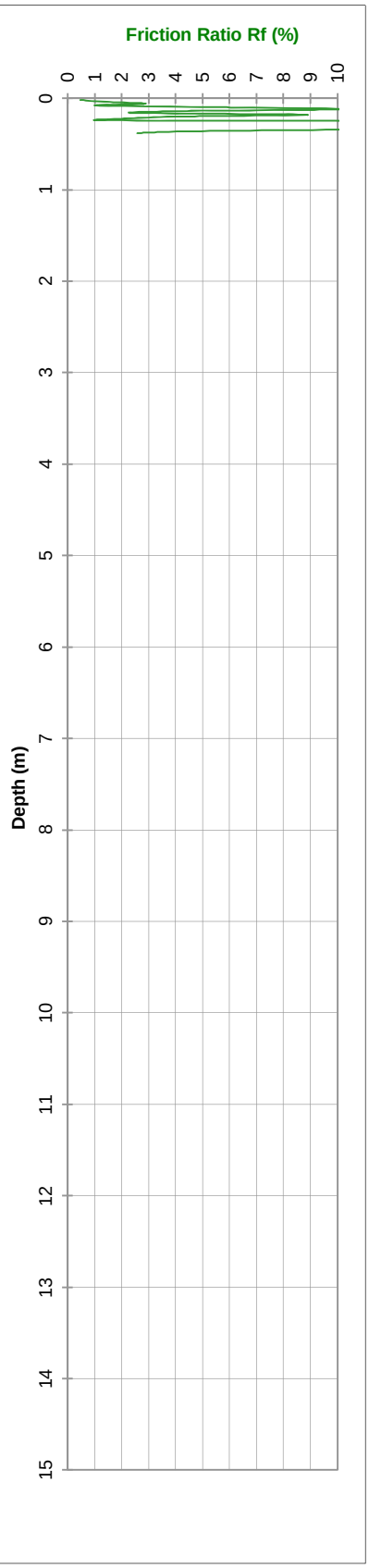
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 2.1A
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates:







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): -

Refusal: 80MPa + Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9246R | Cone I.D. : EC42 | Pre-drilled to (m): 0.5 | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Monday, 16 February 2015

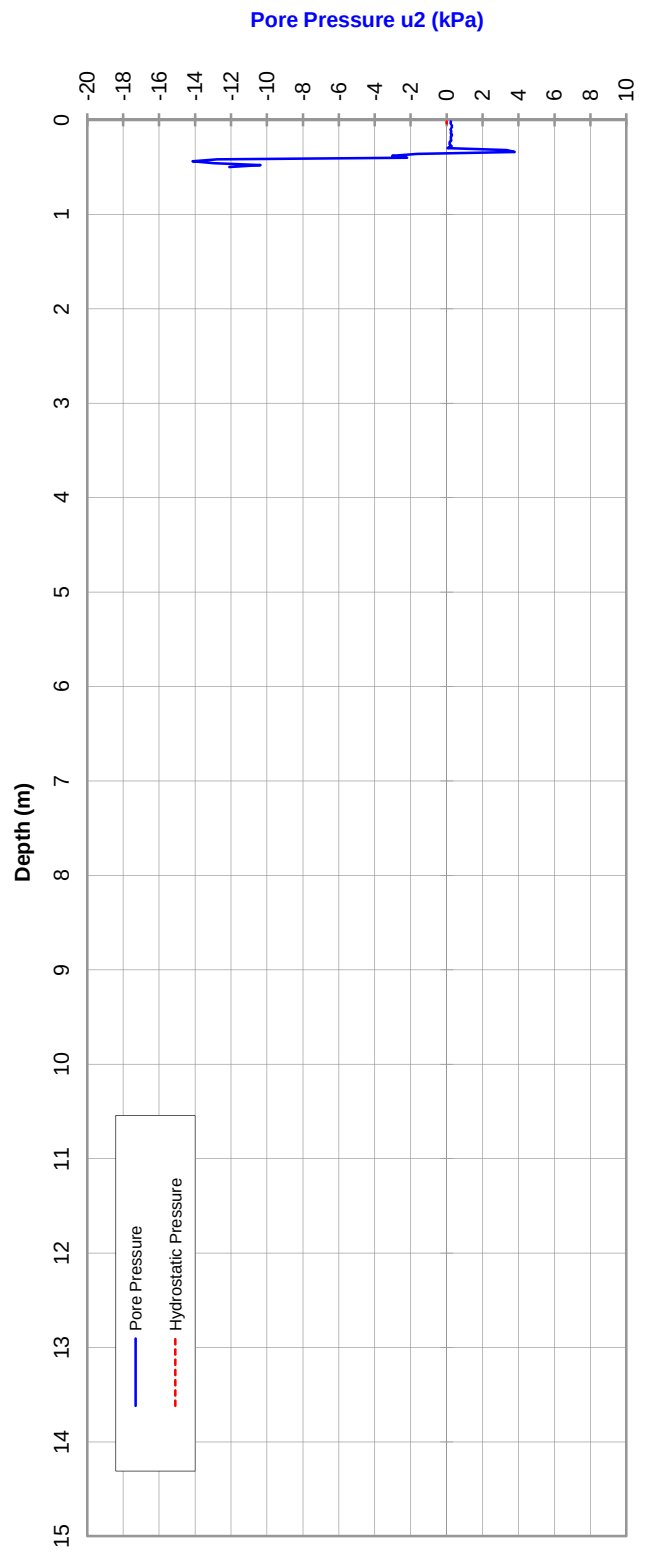
Project: Allawuna Farm

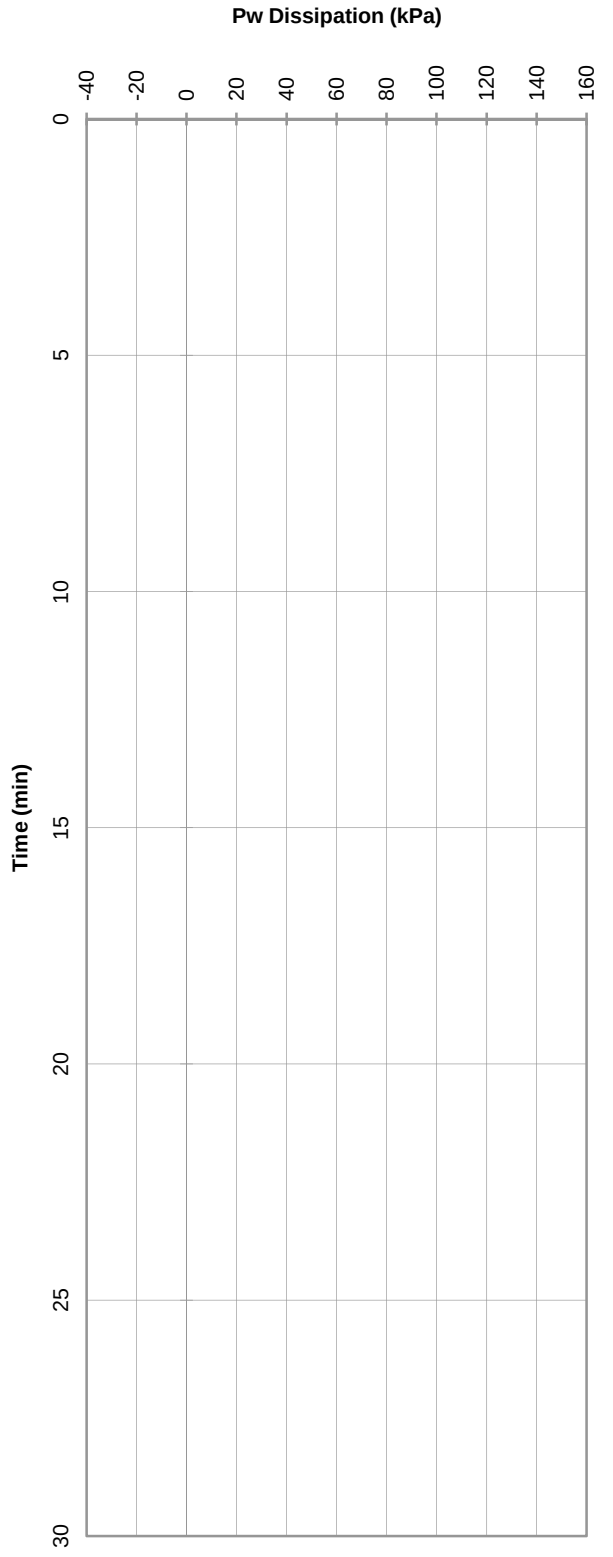
Probe No.: CPTU 2.1A

Location: York, W.A.

Job Number: 147645033

Co-ordinates:





PROBEDRILL GEOTECHNICAL SURVEY

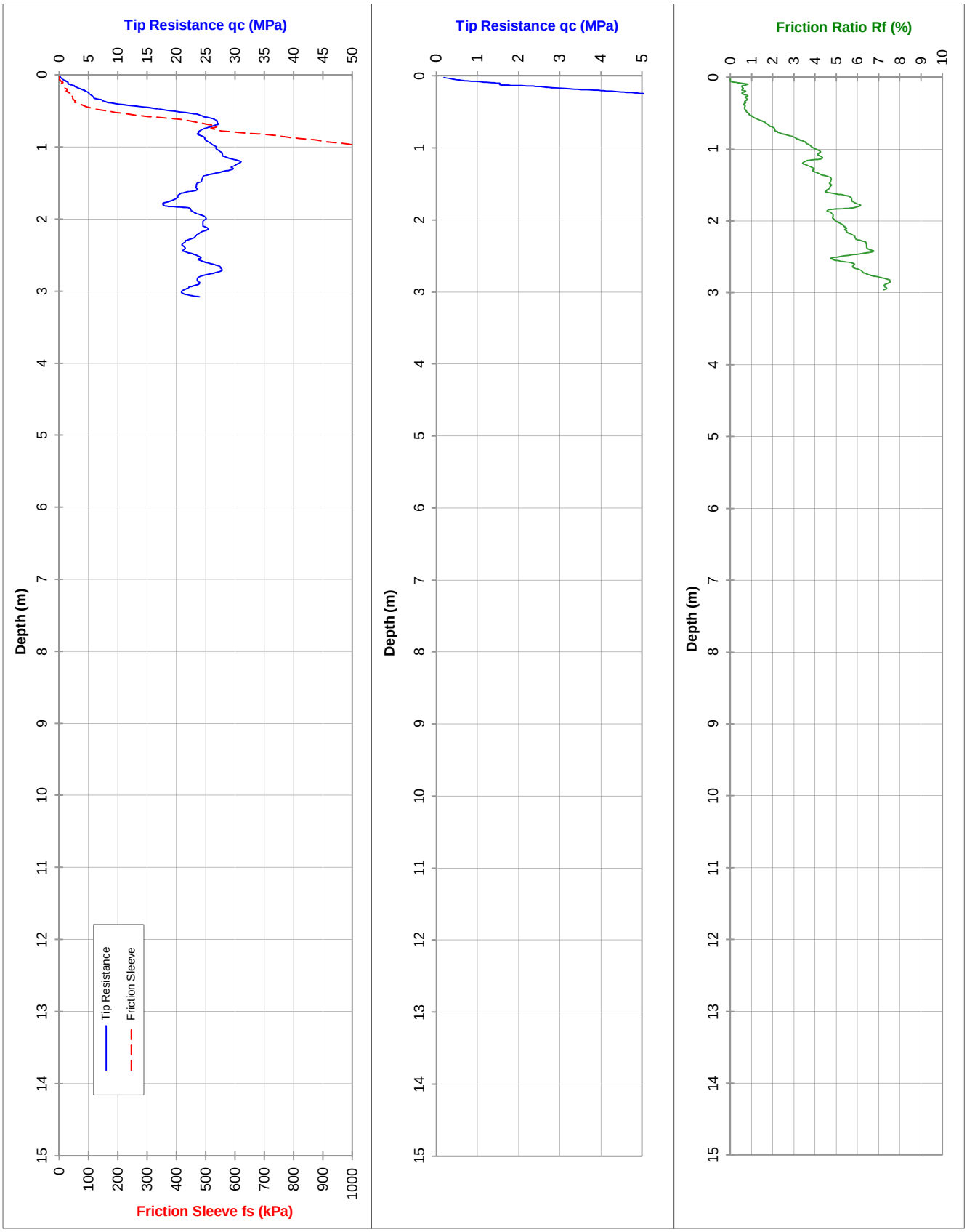
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

File: GA9246R.txt

25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 2.2
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462273E, 6469541N



PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.10

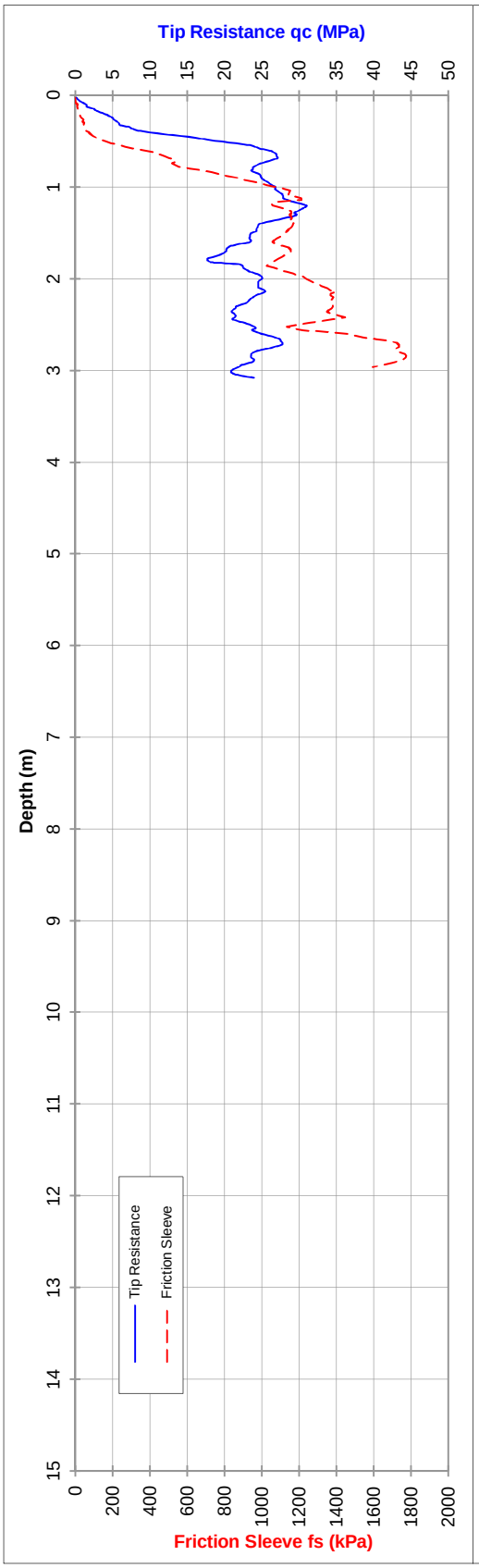
Refusal: Inclination & Rod Friction

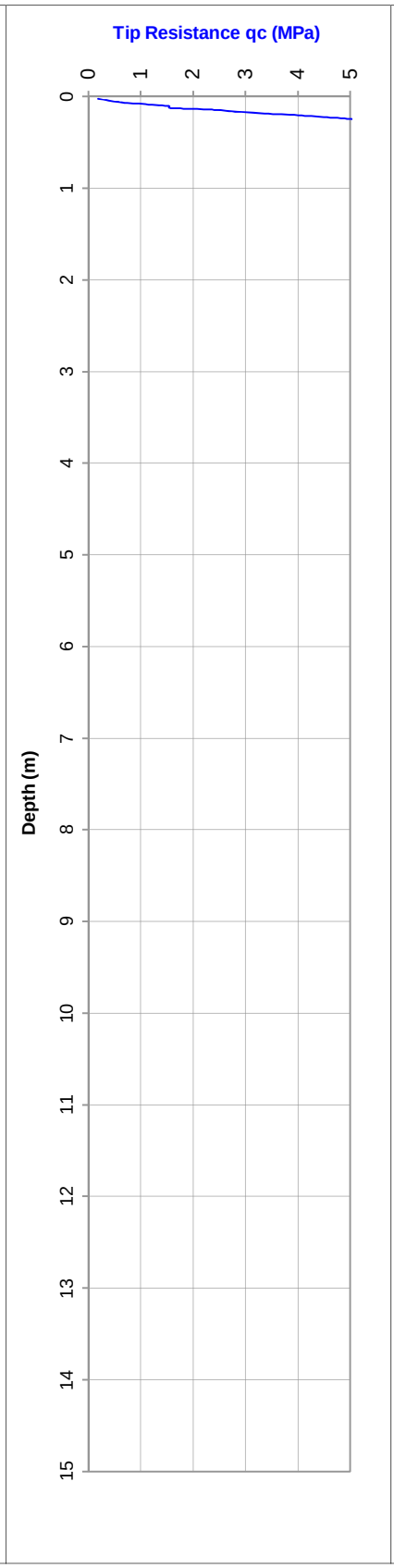
Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

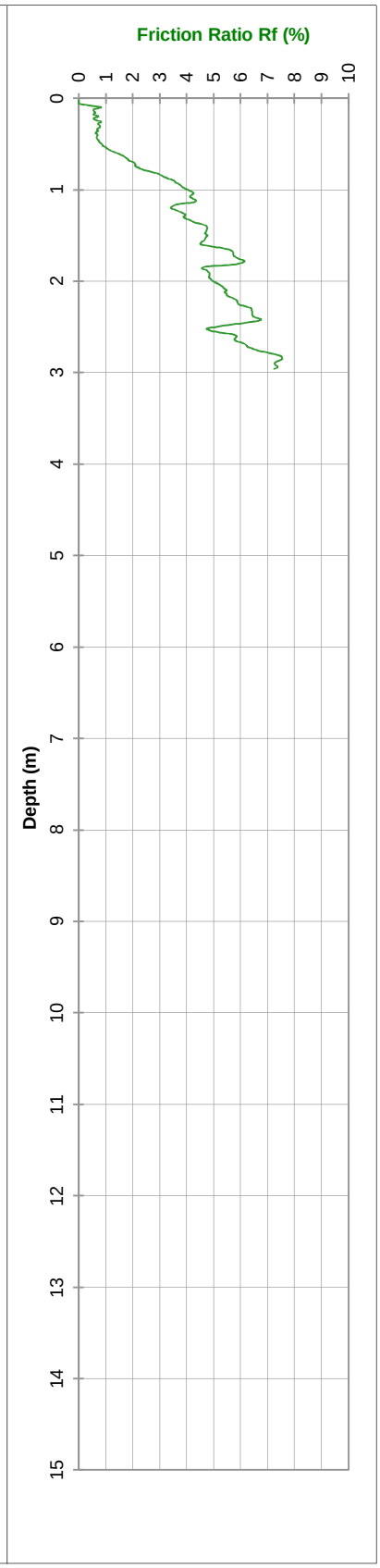
File: GA9250R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 2.2
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462273E, 6469541N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.10

Refusal: Inclination & Rod Friction

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9250R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Monday, 16 February 2015

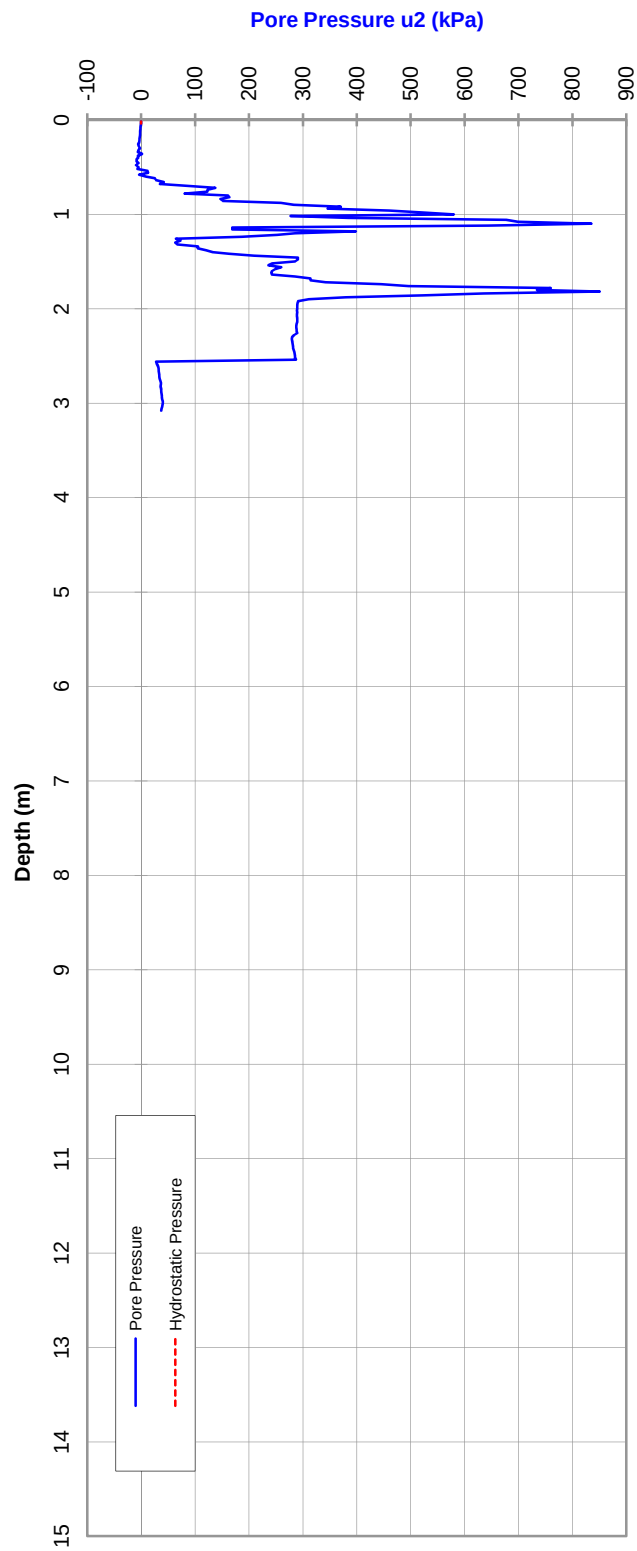
Project: Allawuna Farm

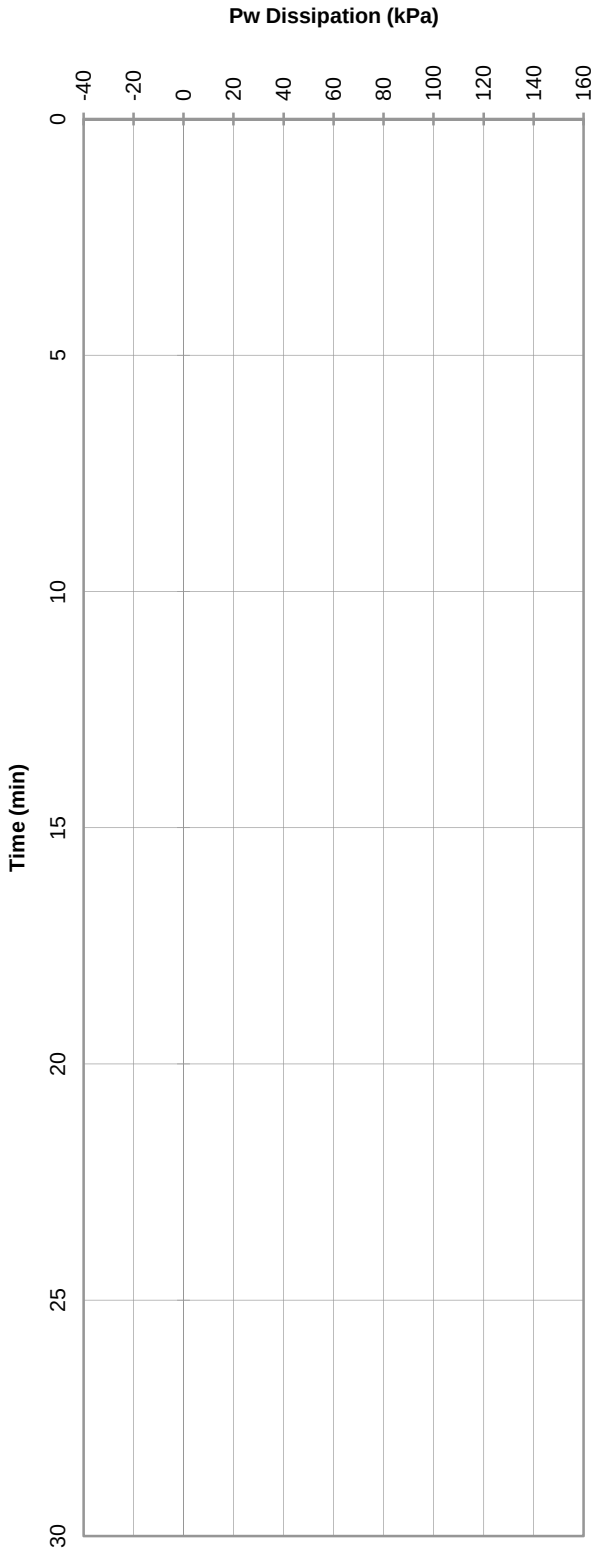
Probe No.: CPTU 2.2

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462273E, 6469541N





PROBEDRILL GEOTECHNICAL SURVEY

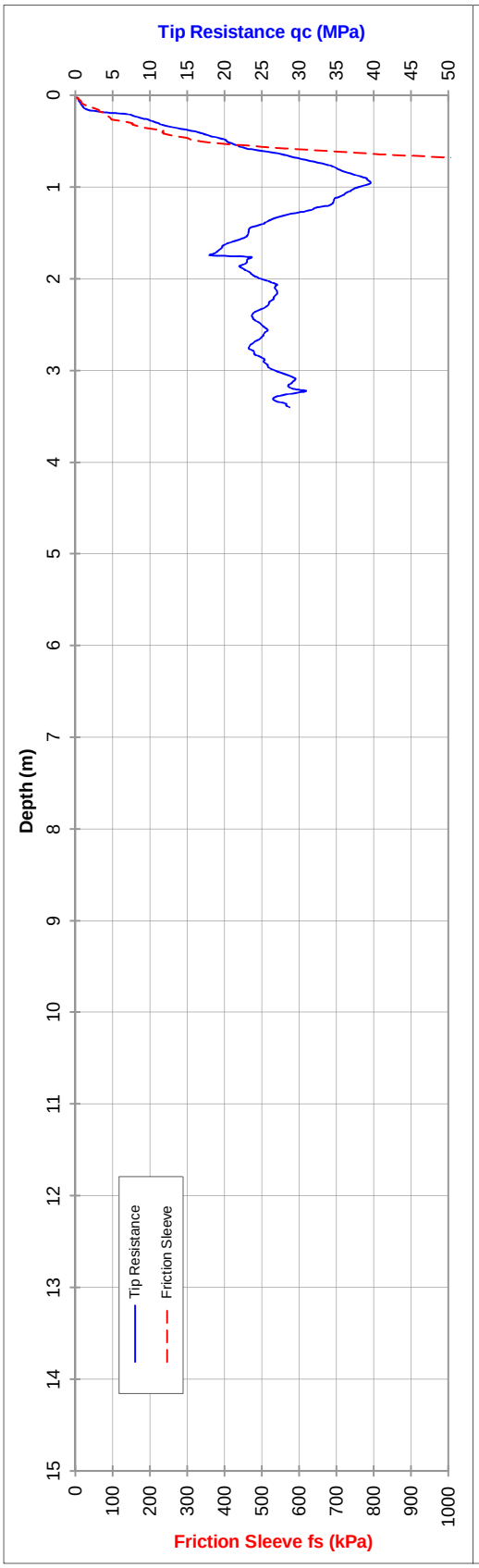
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

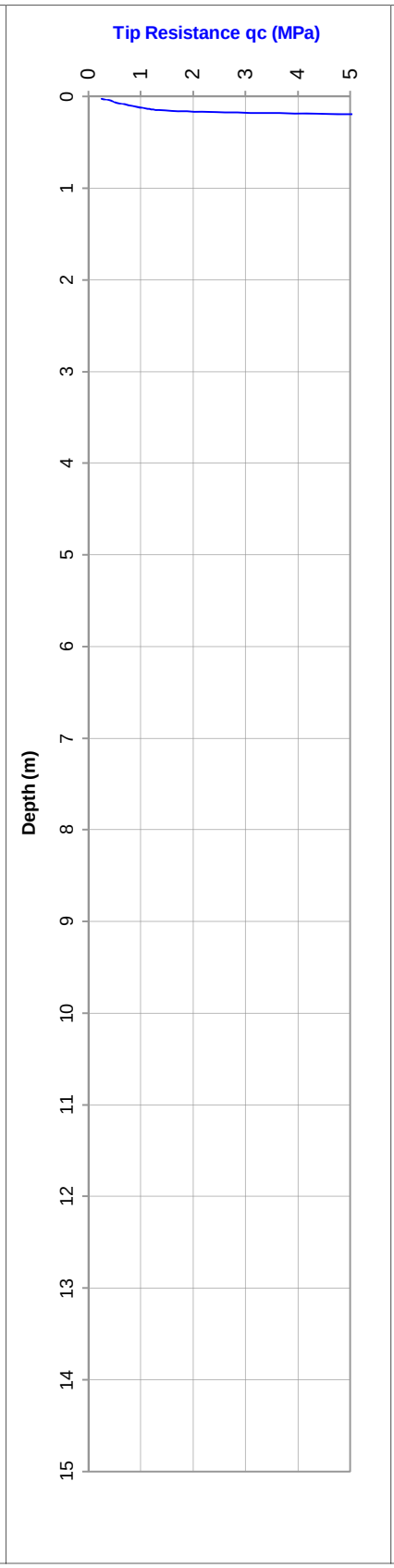
File: GA9250R.txt

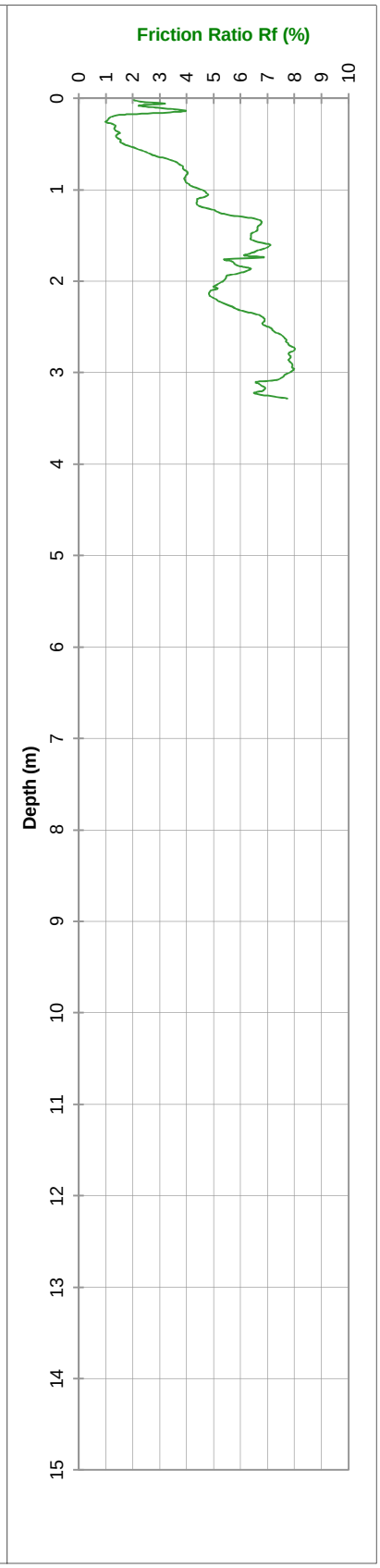
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPT 2.3
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462244E, 6469545N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 3.10

Refusal: Rod Friction + Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9251R

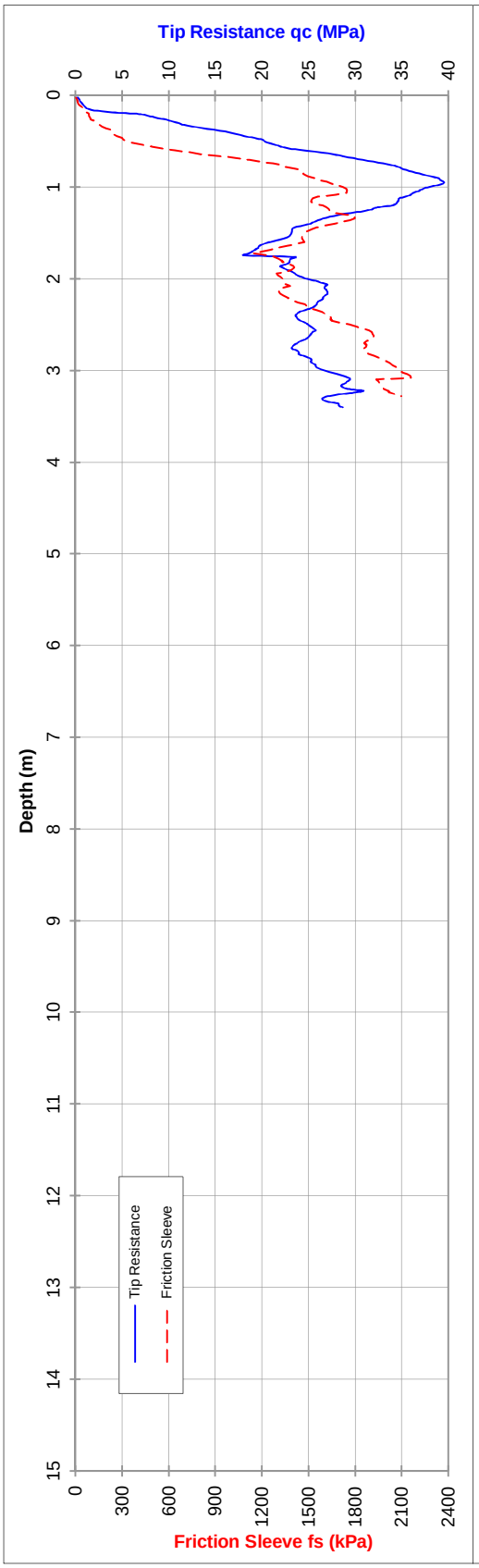
Cone I.D. : EC42

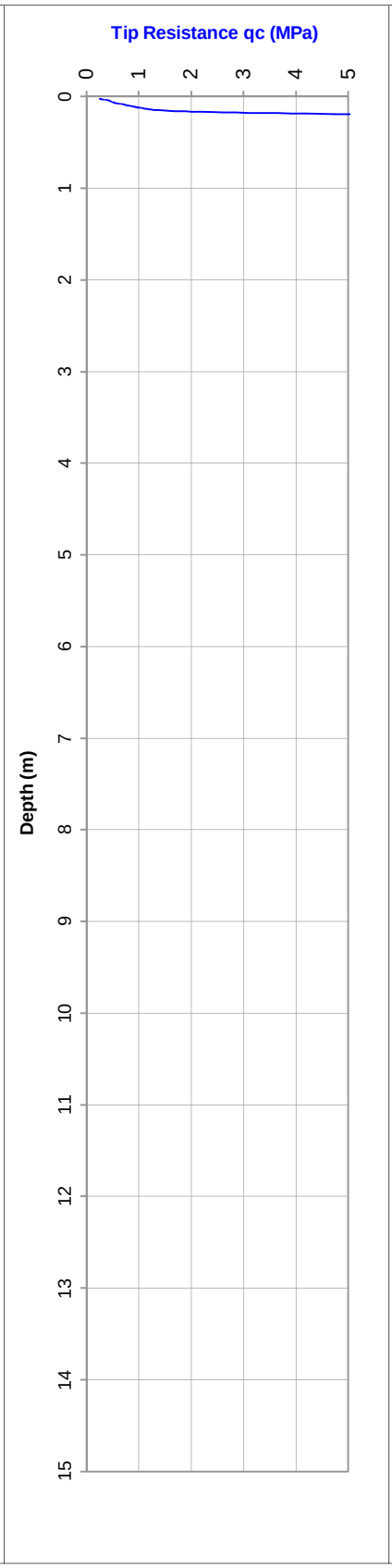
Dummy probe to (m):

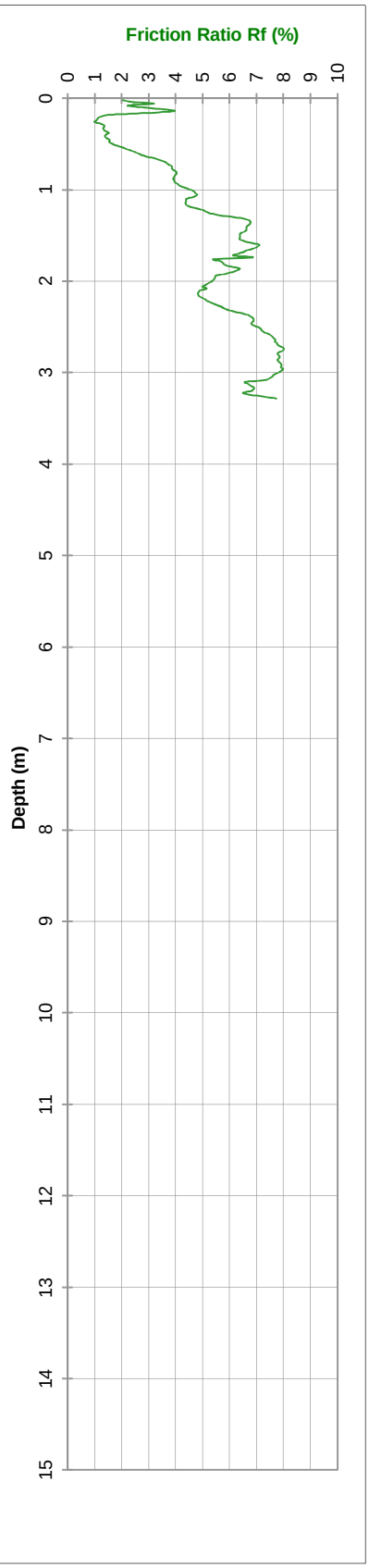
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPT 2.3
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462244E, 6469545N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 3.10

Refusal: Rod Friction + Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9251R

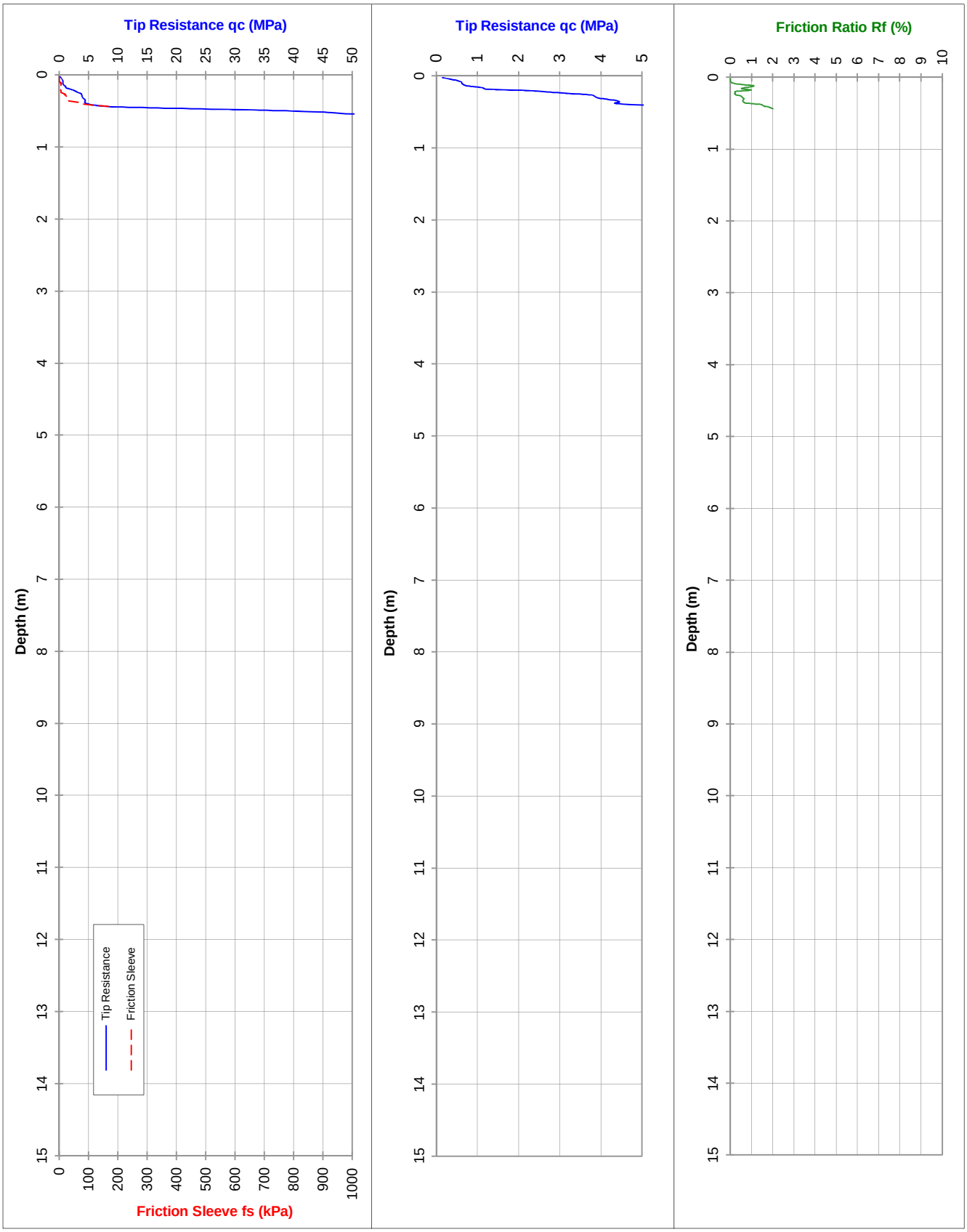
Cone I.D. : EC42

Dummy probe to (m):

25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPT 2.4
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462251E, 6469521N



PROBEDRILL GEOTECHNICAL SURVEY

Water (m): -

Refusal: 70MPa + Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9252R

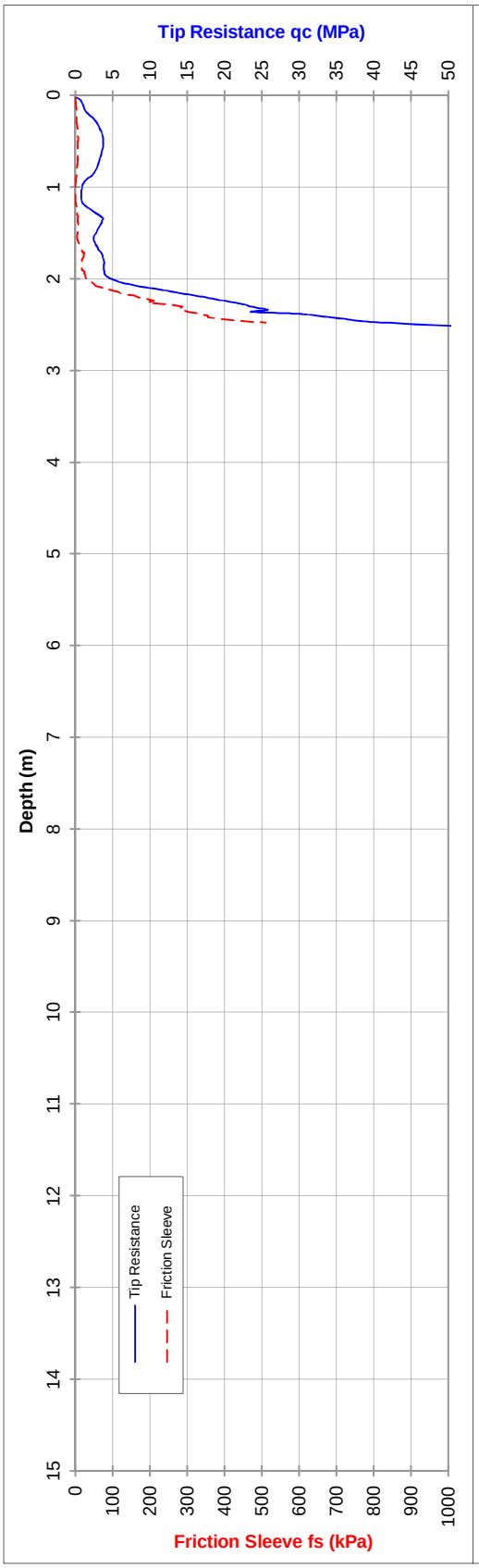
Cone I.D. : EC42

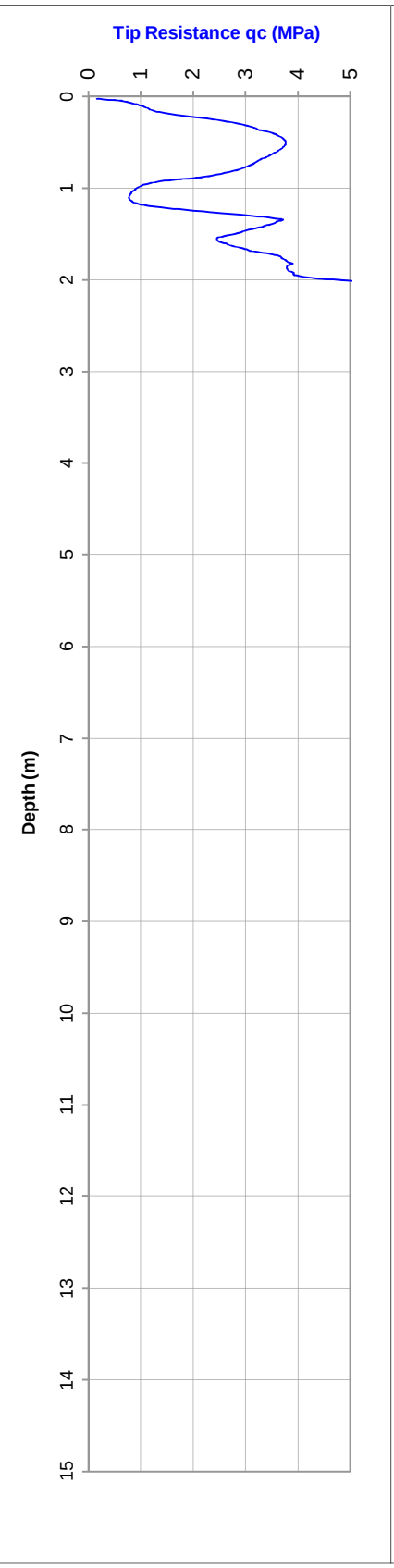
Dummy probe to (m):

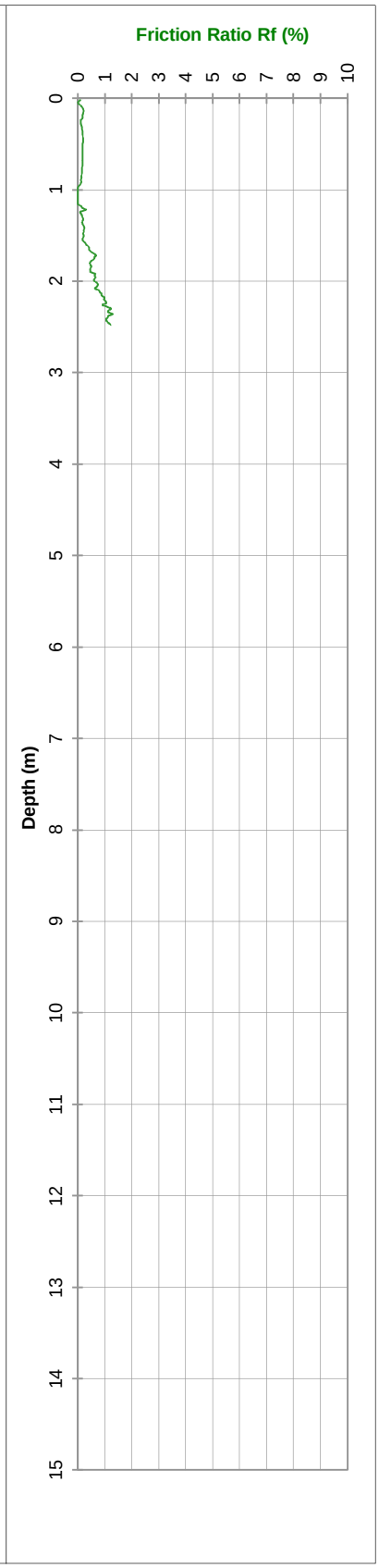
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Monday, 16 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 2.5
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462229E, 6469439N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.40

Refusal: 85MPa / No Lateral Support

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9253R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Monday, 16 February 2015

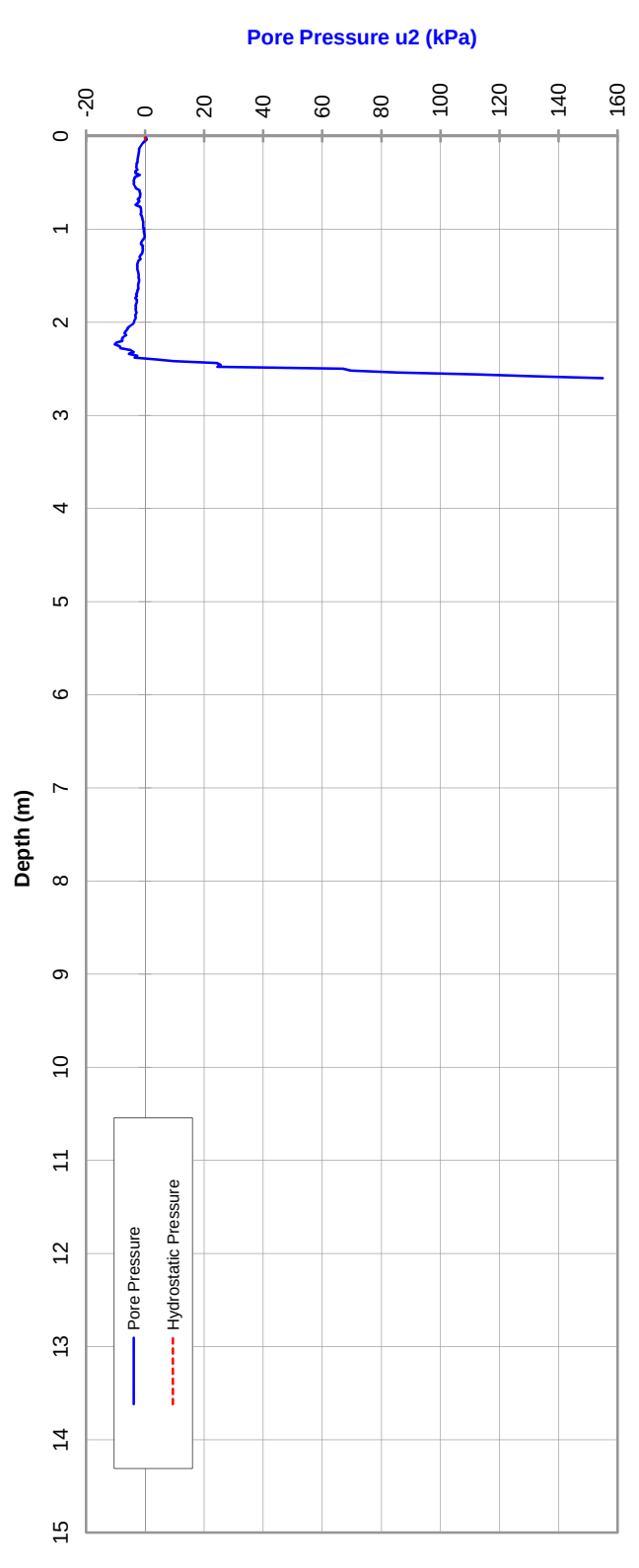
Project: Allawuna Farm

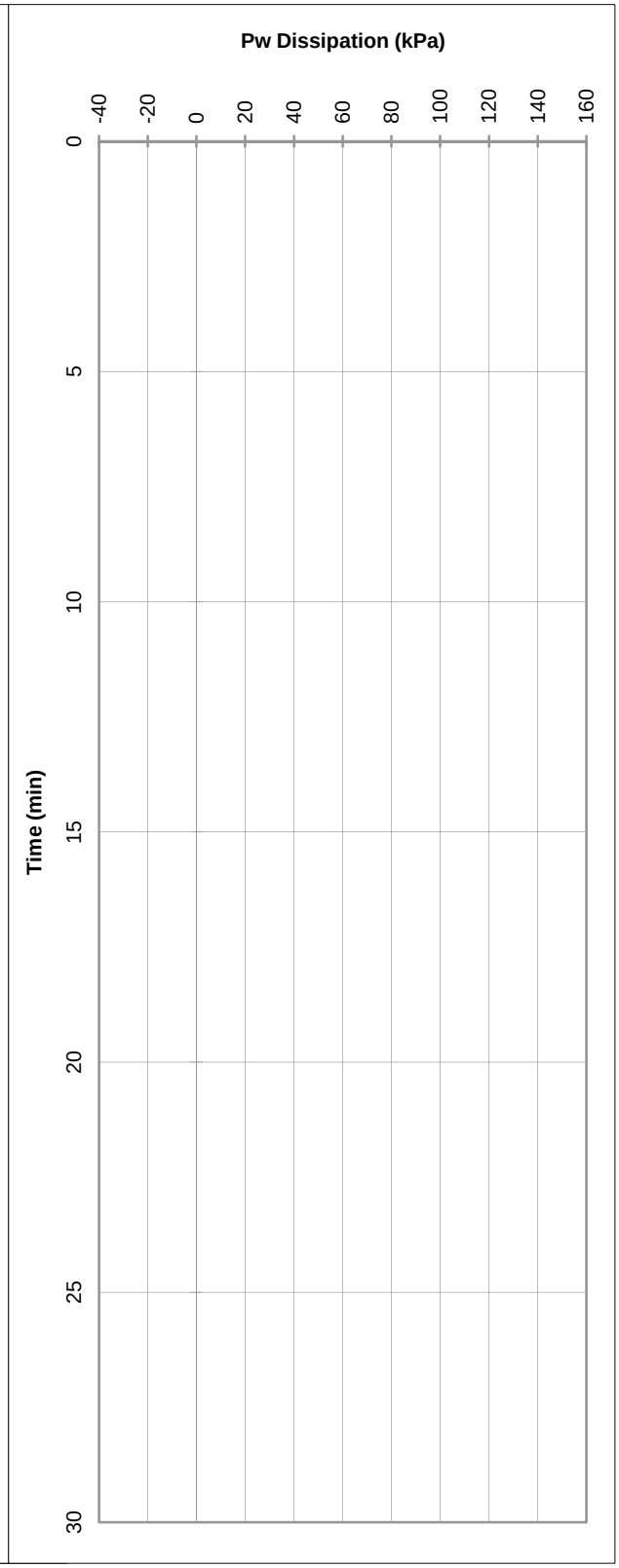
Probe No.: CPTU 2.5

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462229E, 6469439N





PROBEDRILL GEOTECHNICAL SURVEY

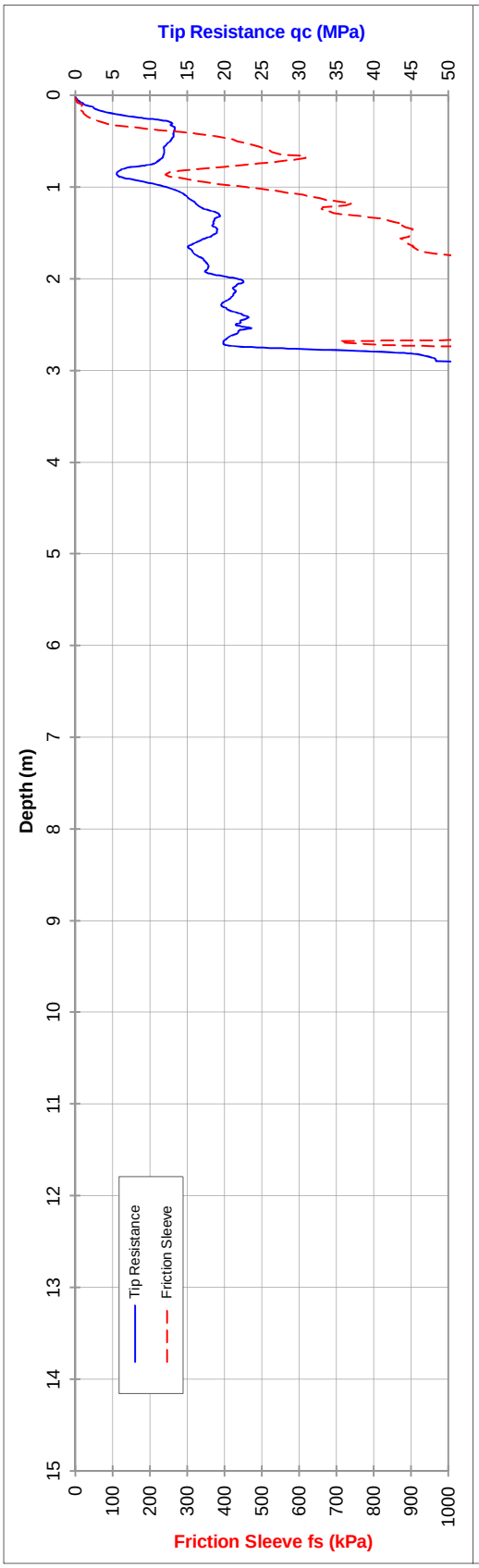
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

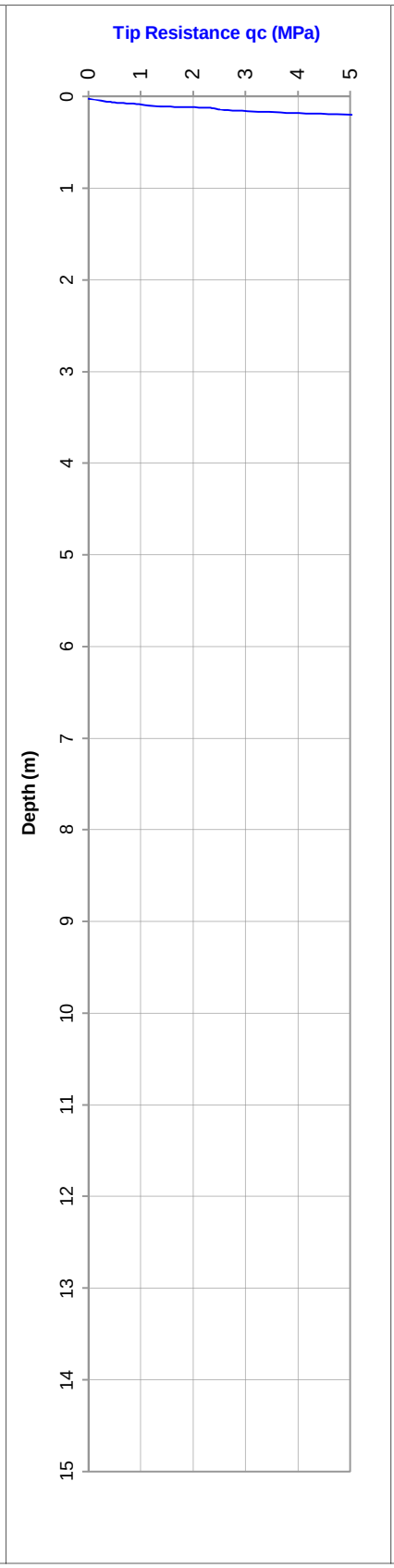
File: GA9253R.txt

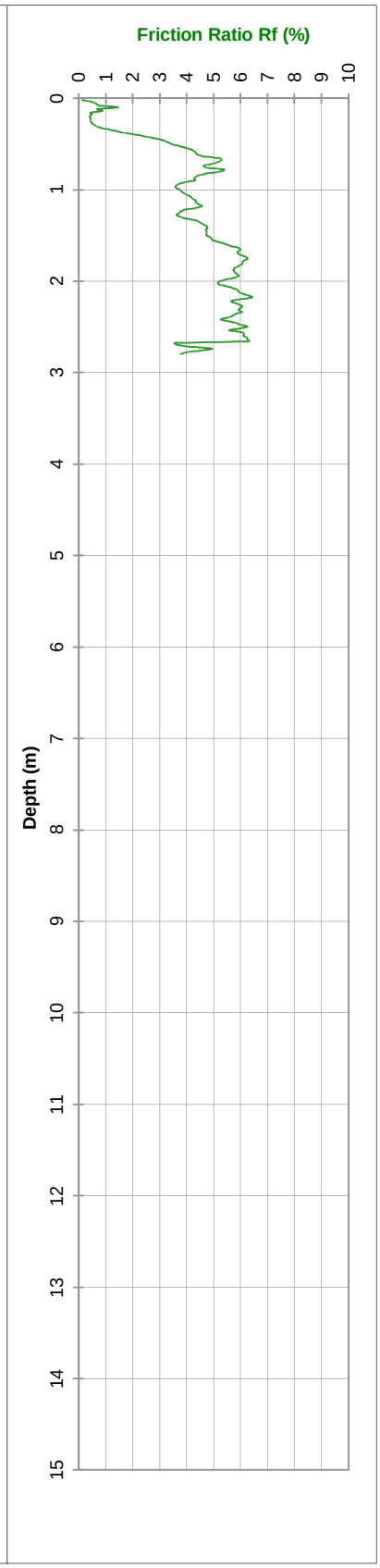
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 3
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 463071E, 6469099N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.30

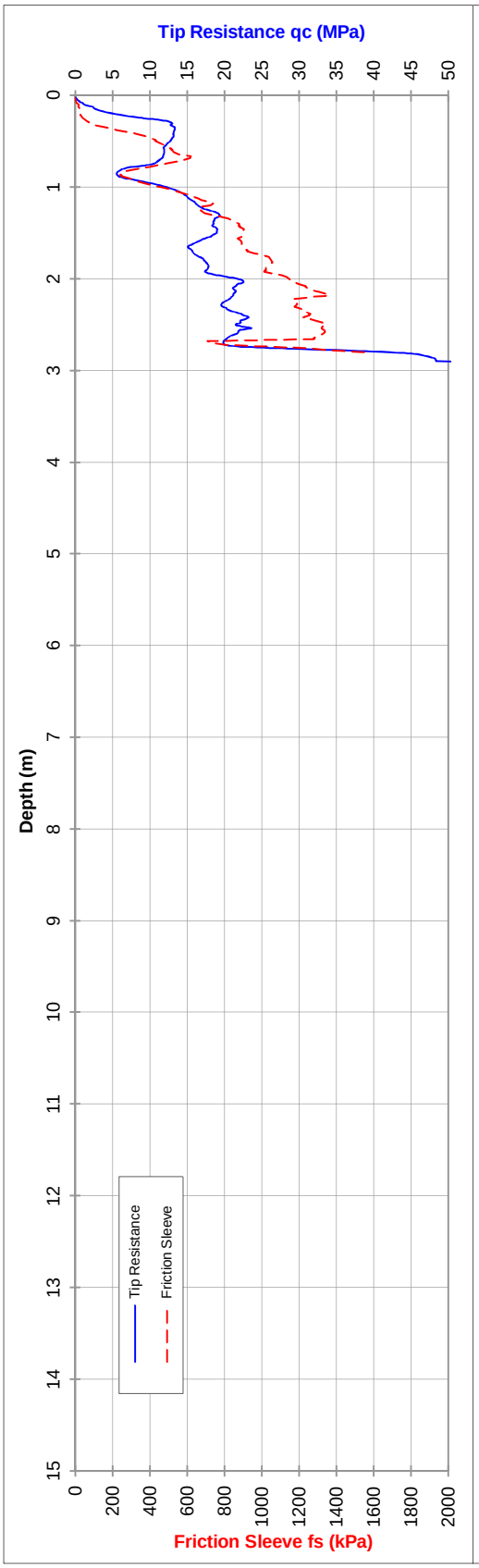
Refusal: 60MPa + Rod Friction

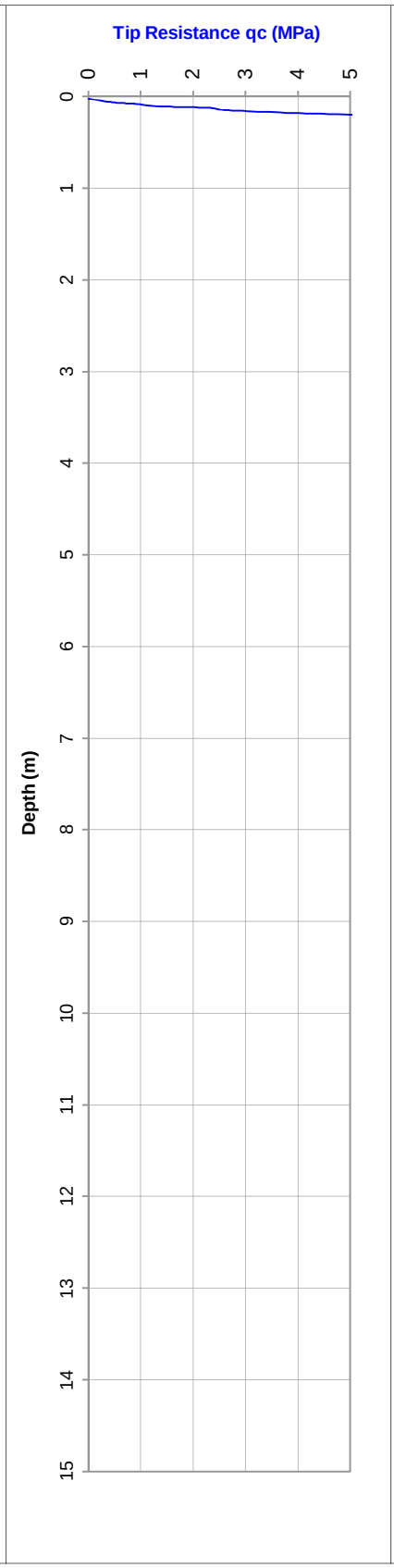
Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

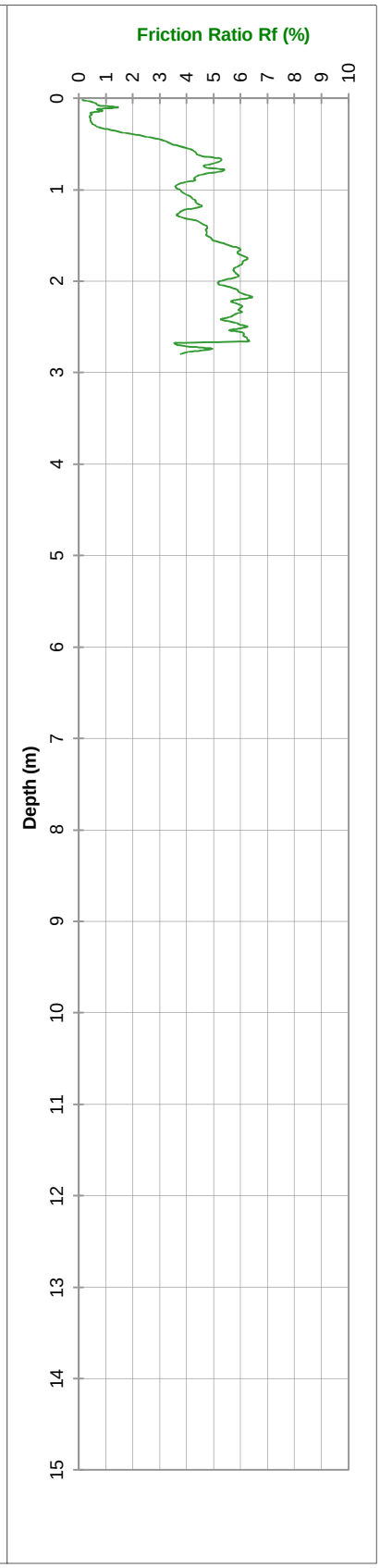
File: GA9256R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 3
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 463071E, 6469099N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.30

Refusal: 60MPa + Rod Friction

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9256R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

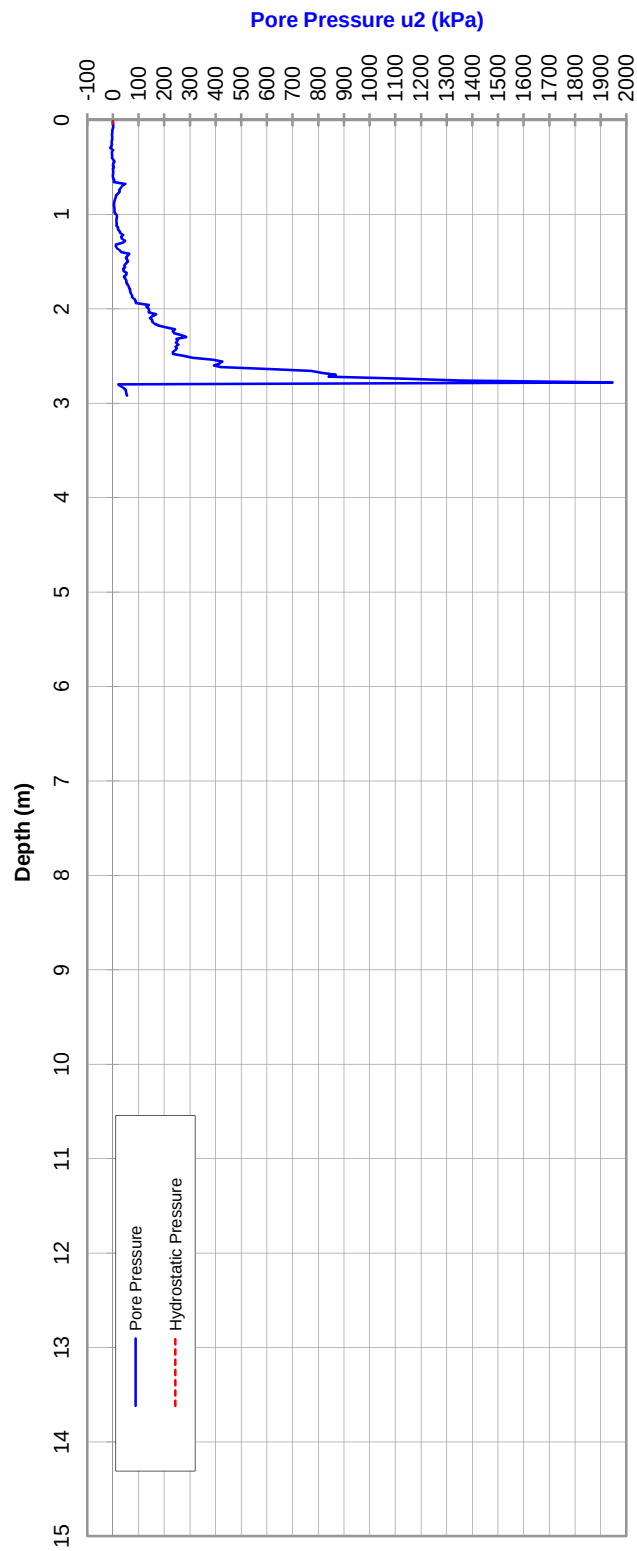
Project: Allawuna Farm

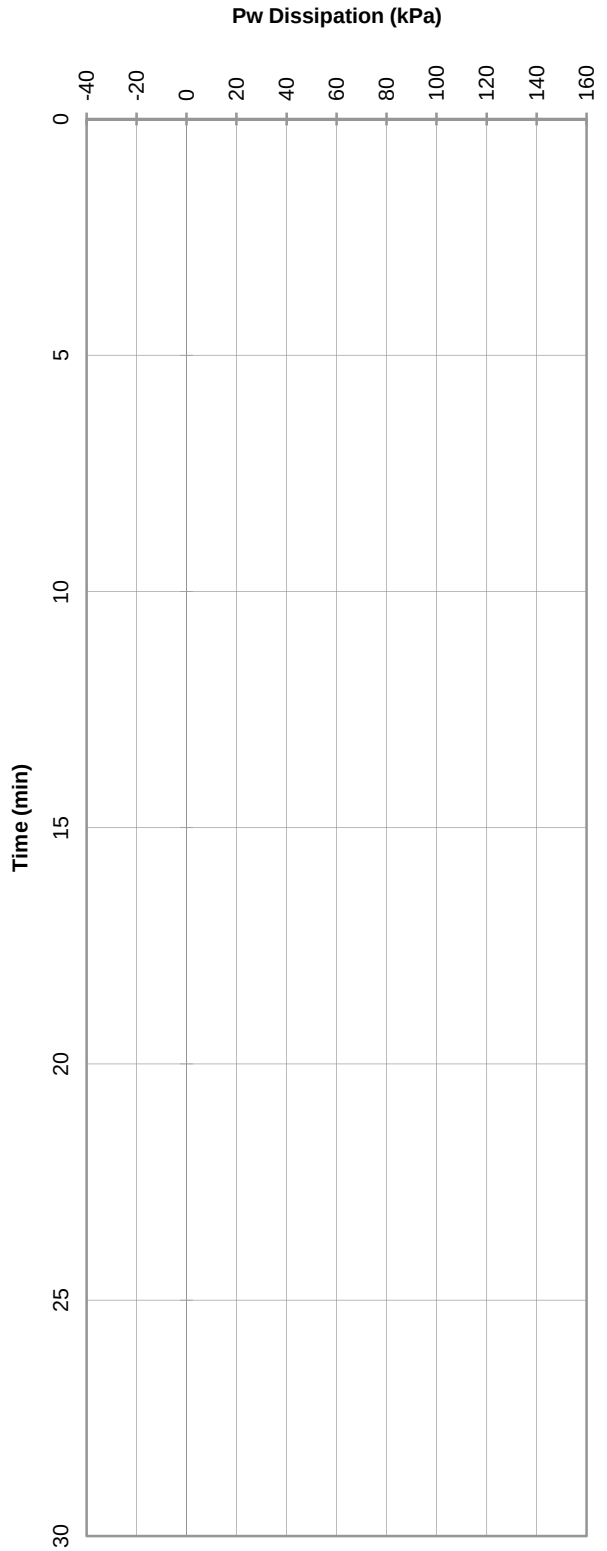
Probe No.: CPTU 3

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 463071E, 6469099N





PROBEDRILL GEOTECHNICAL SURVEY

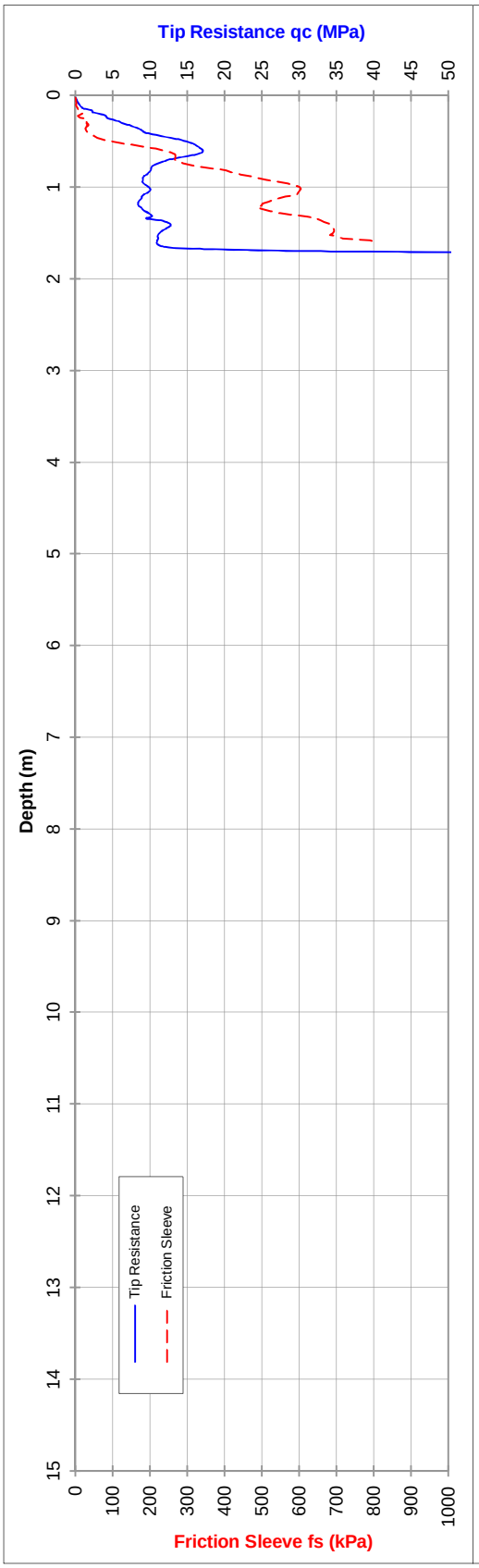
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

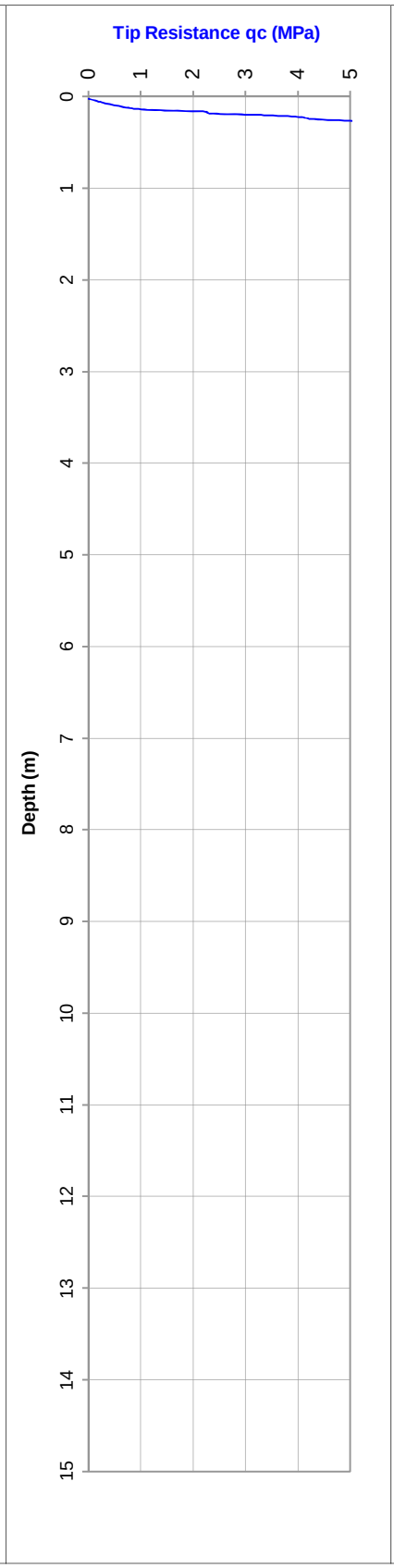
File: GA9256R.txt

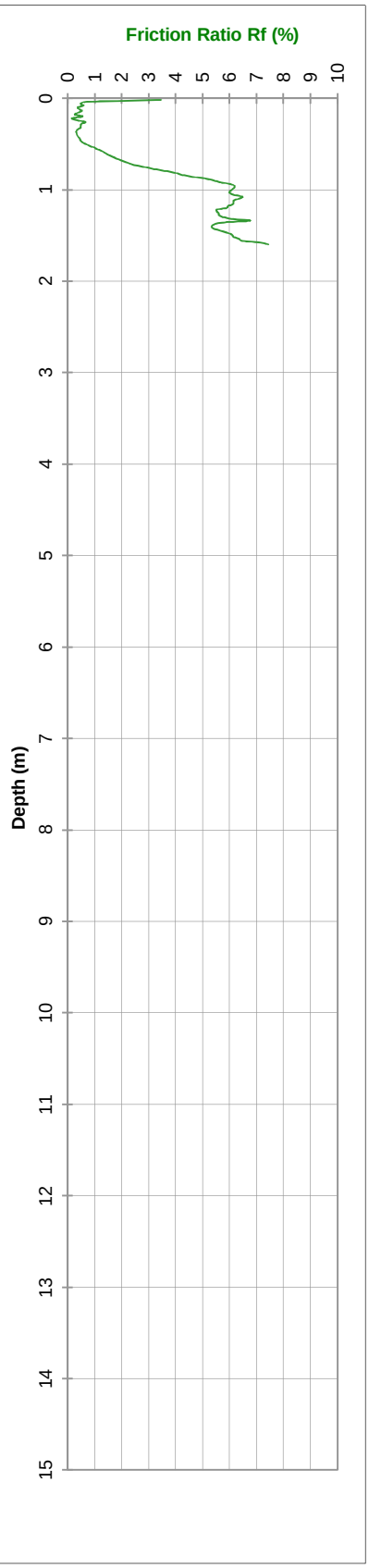
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 3.1
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 463007E, 6468975N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 1.40

Refusal: 85MPa

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9255R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

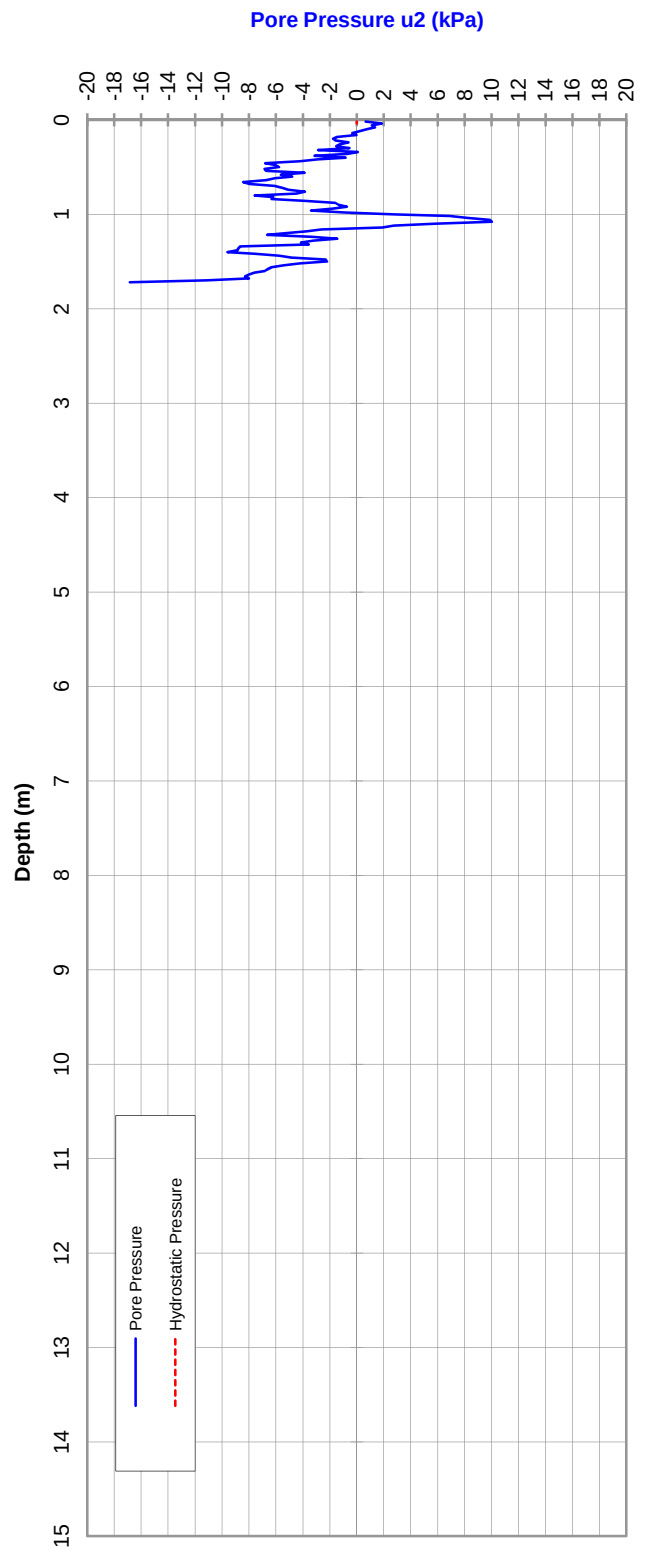
Project: Allawuna Farm

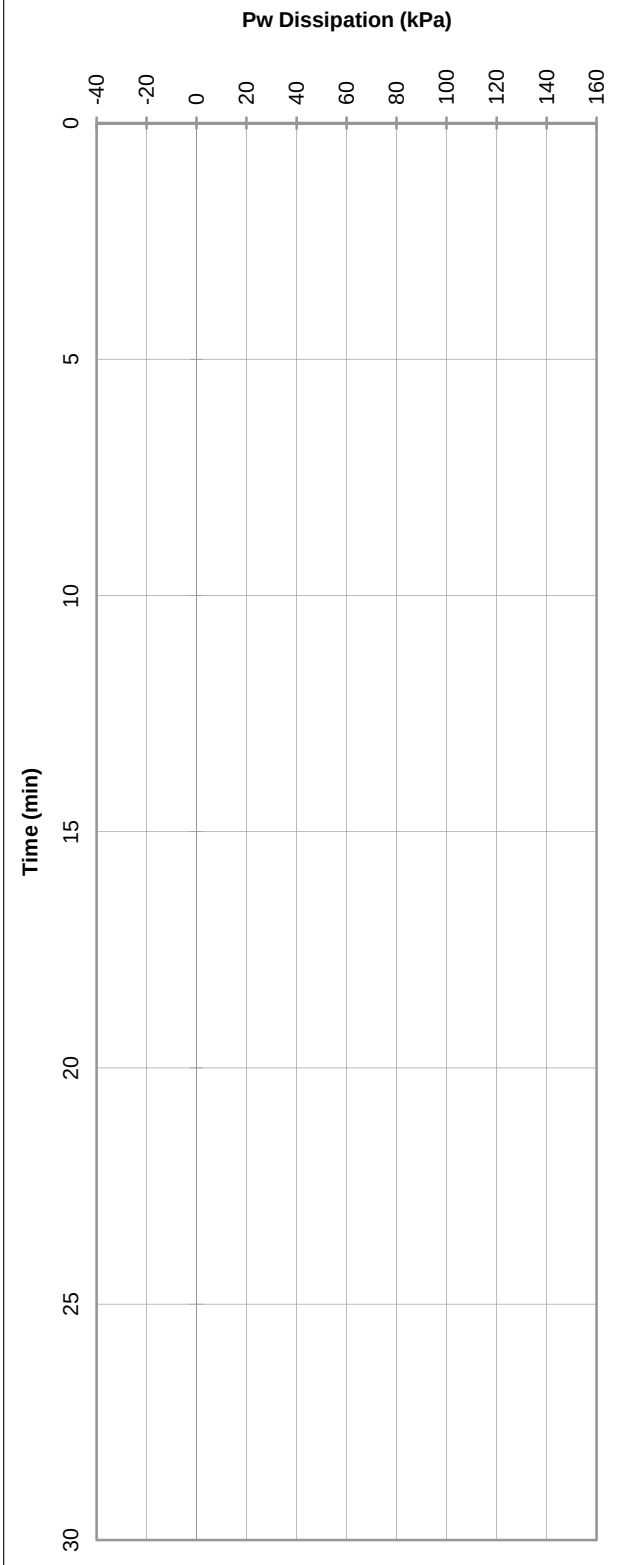
Probe No.: CPTU 3.1

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 463007E, 6468975N





PROBEDRILL GEOTECHNICAL SURVEY

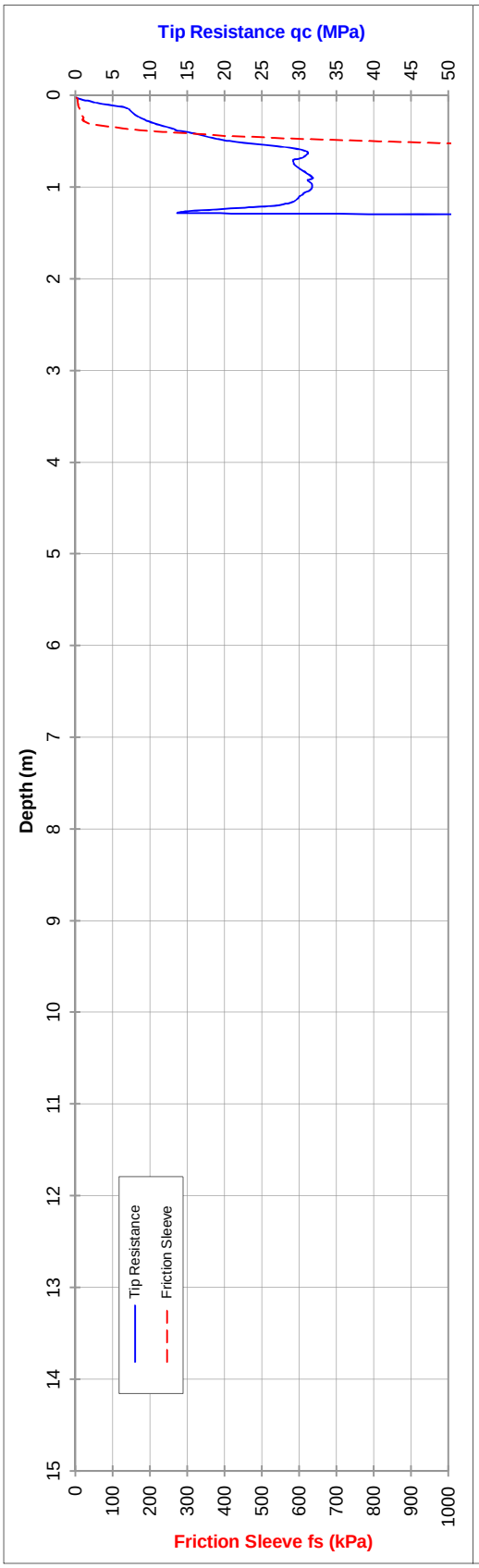
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

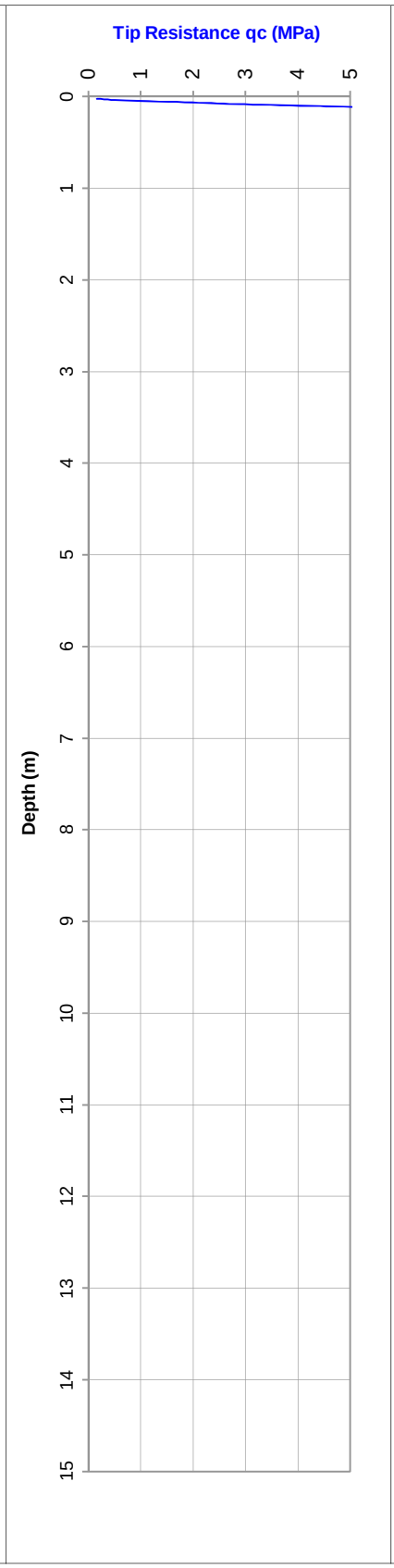
File: GA9255R.txt

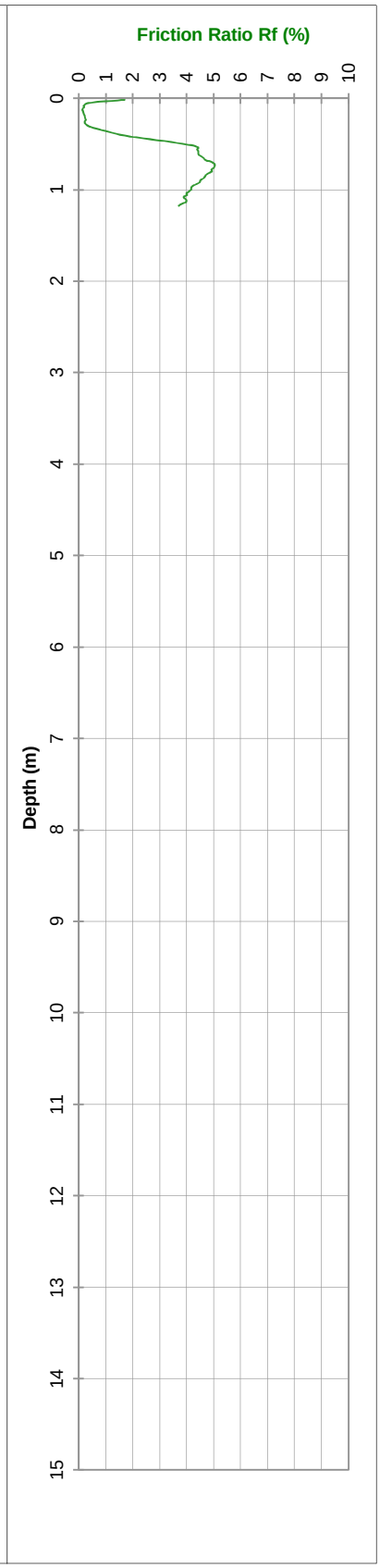
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 3.2
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 463057E, 6469133N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 1.20

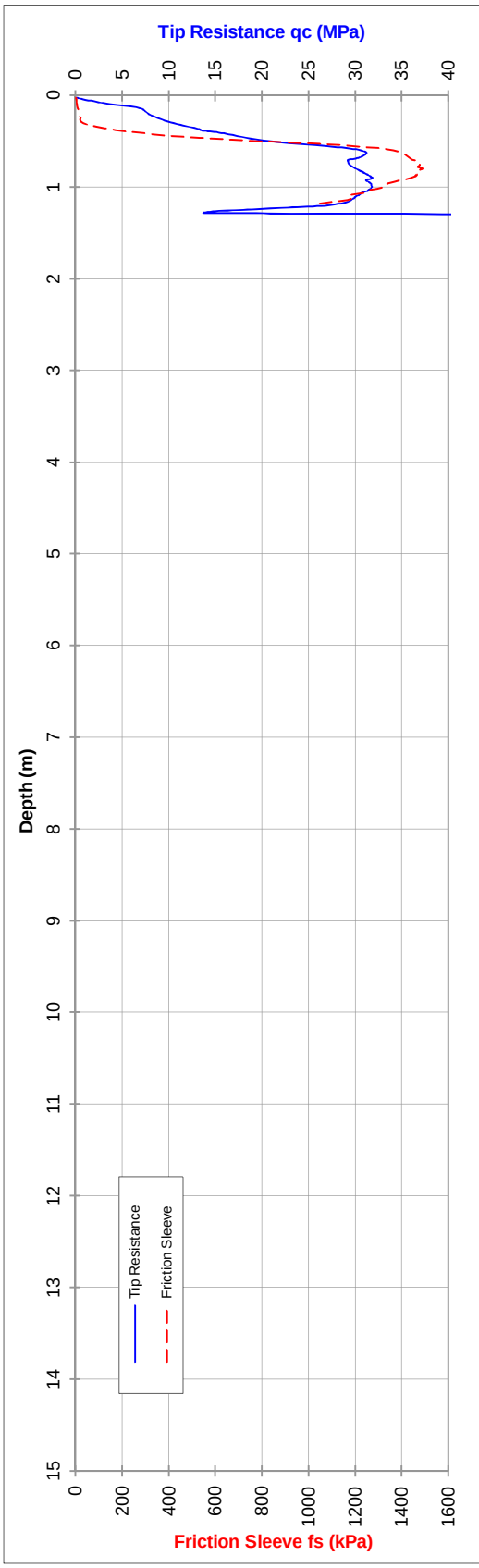
Refusal: 65MPa

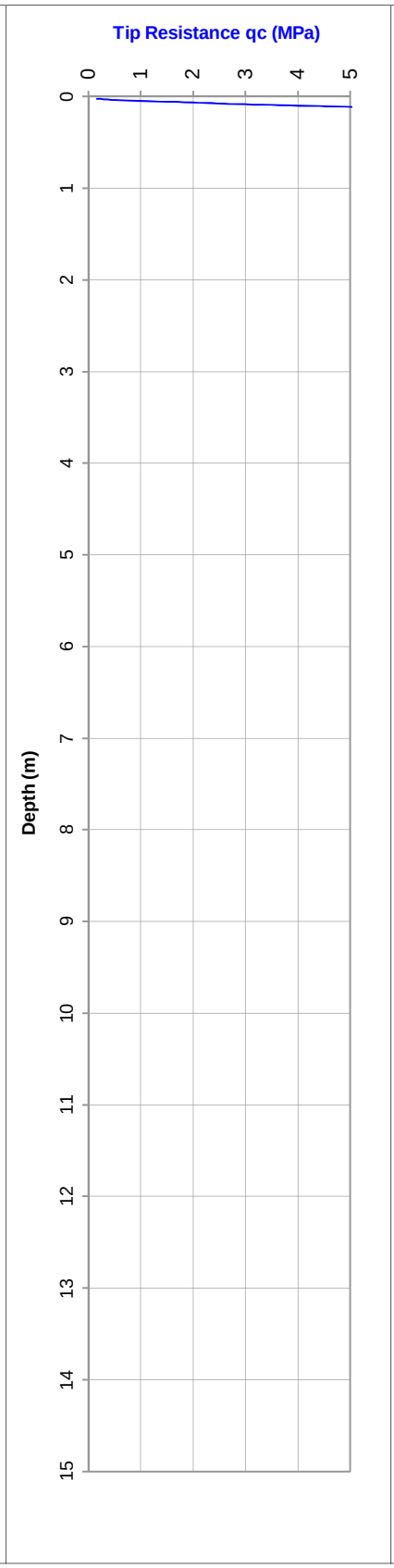
Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

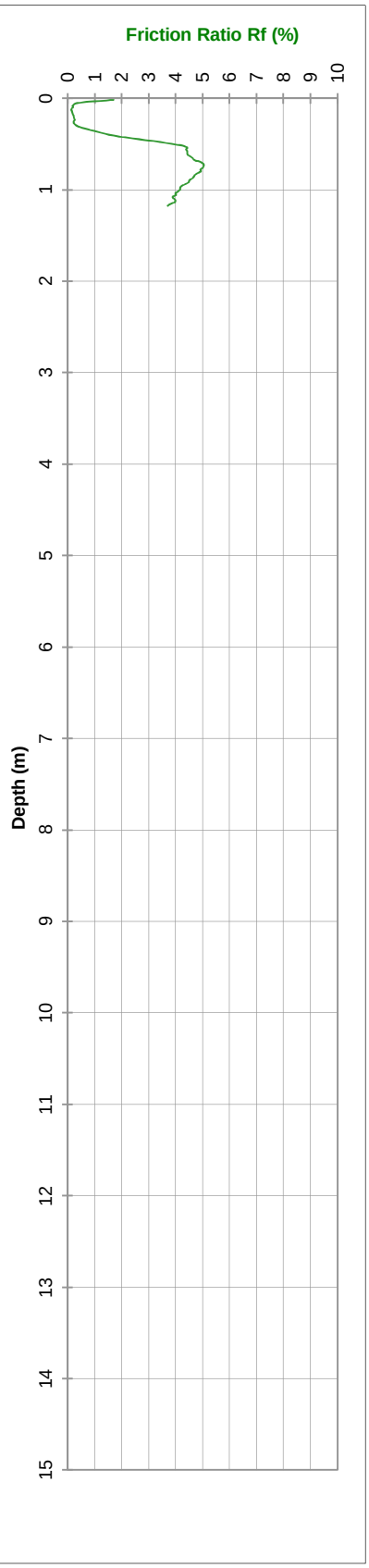
File: GA9257R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 3.2
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 463057E, 6469133N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 1.20

Refusal: 65MPa

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9257R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

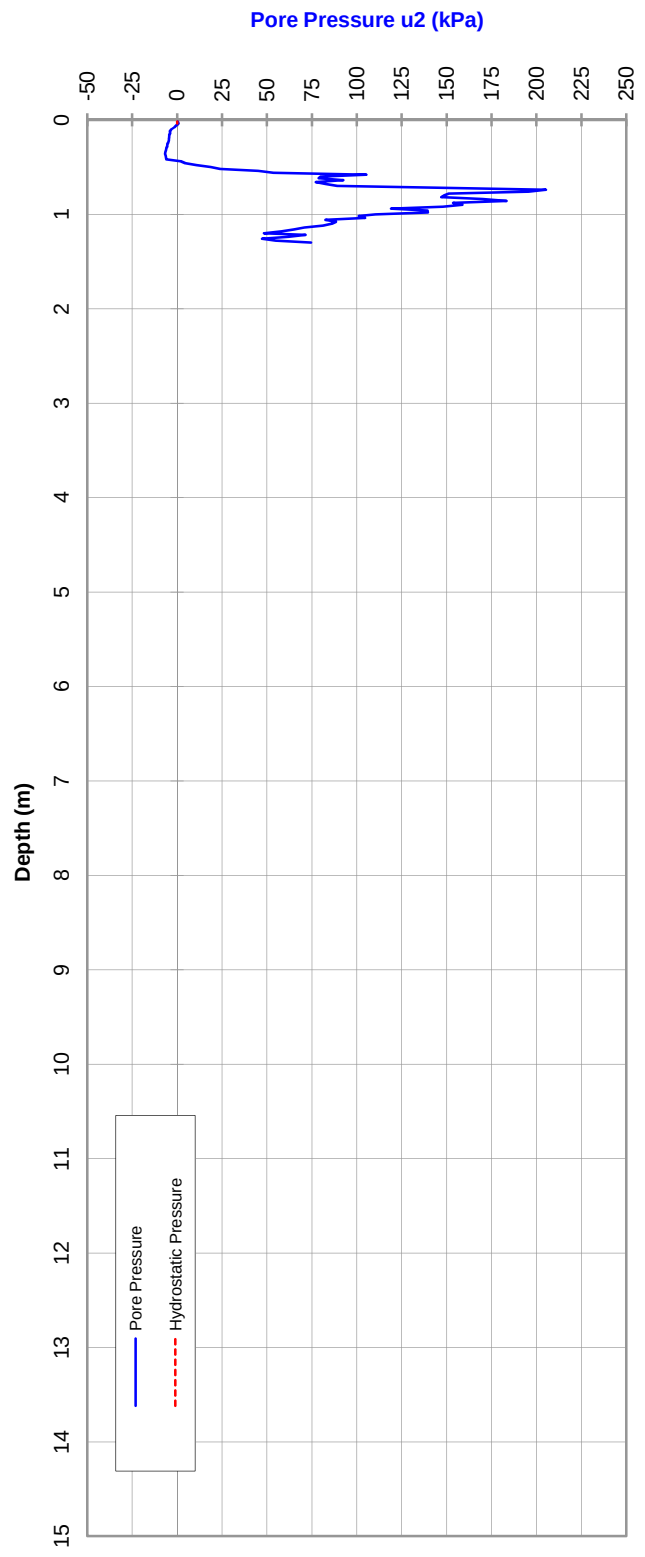
Project: Allawuna Farm

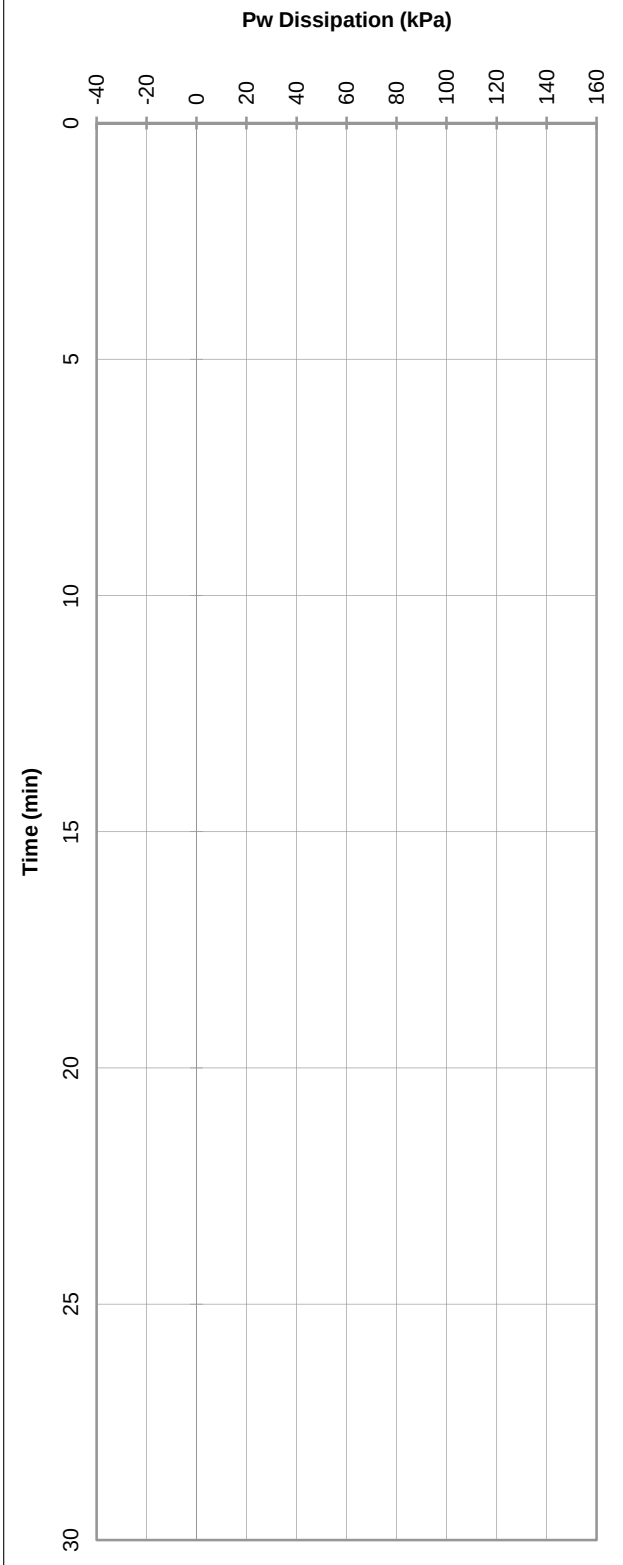
Probe No.: CPTU 3.2

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 463057E, 6469133N





PROBEDRILL GEOTECHNICAL SURVEY

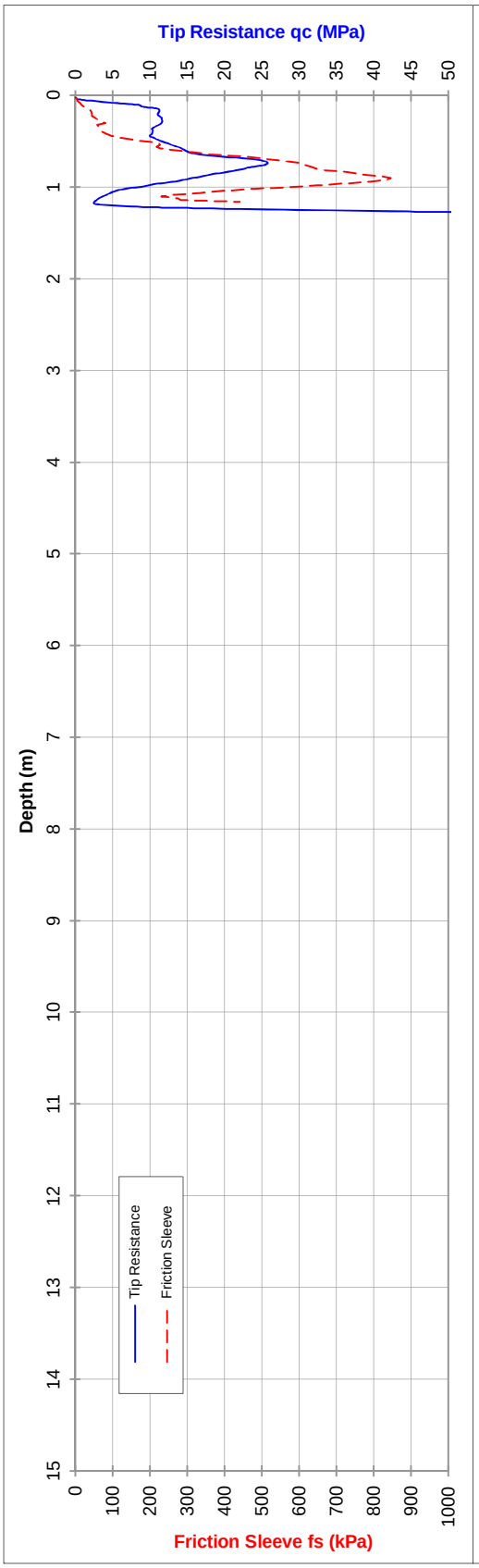
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

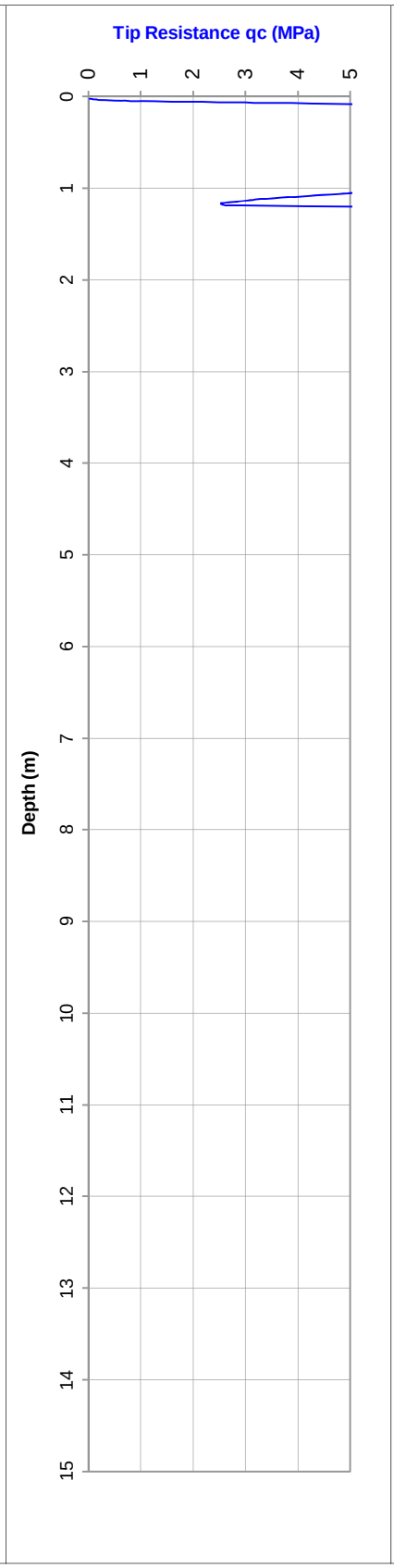
File: GA9257R.txt

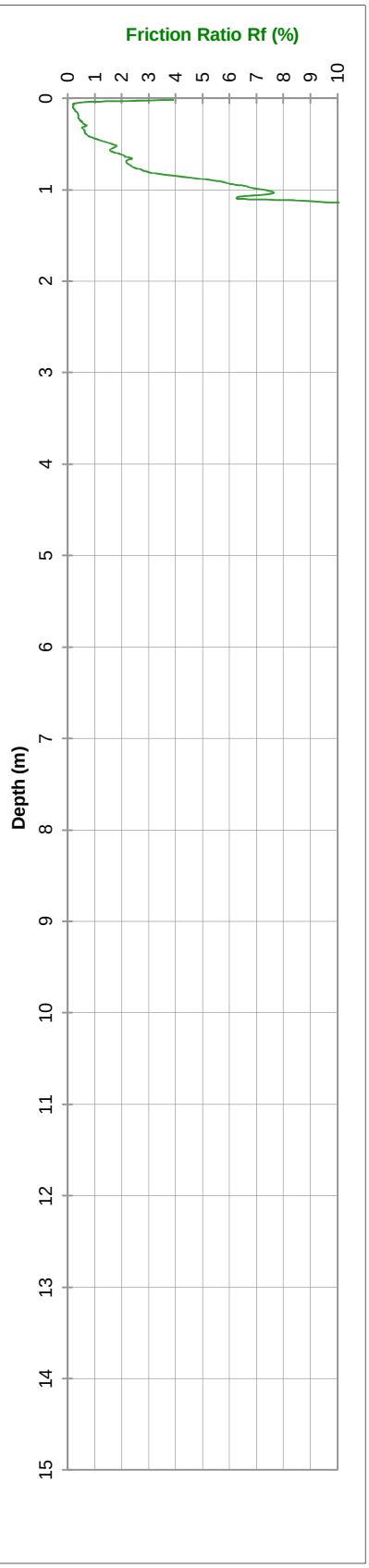
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 3.3
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 463058E, 6469164N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 1.10

Refusal: 65MPa

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9258R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

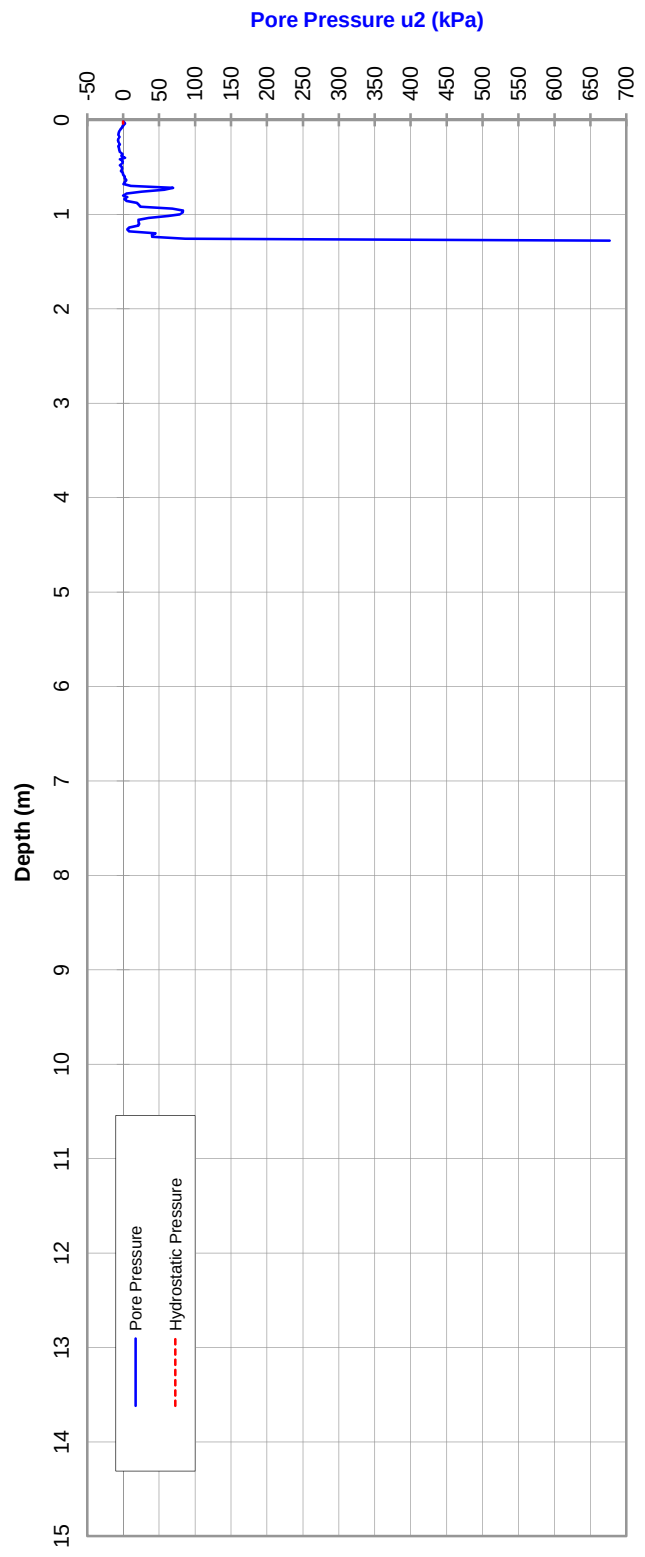
Project: Allawuna Farm

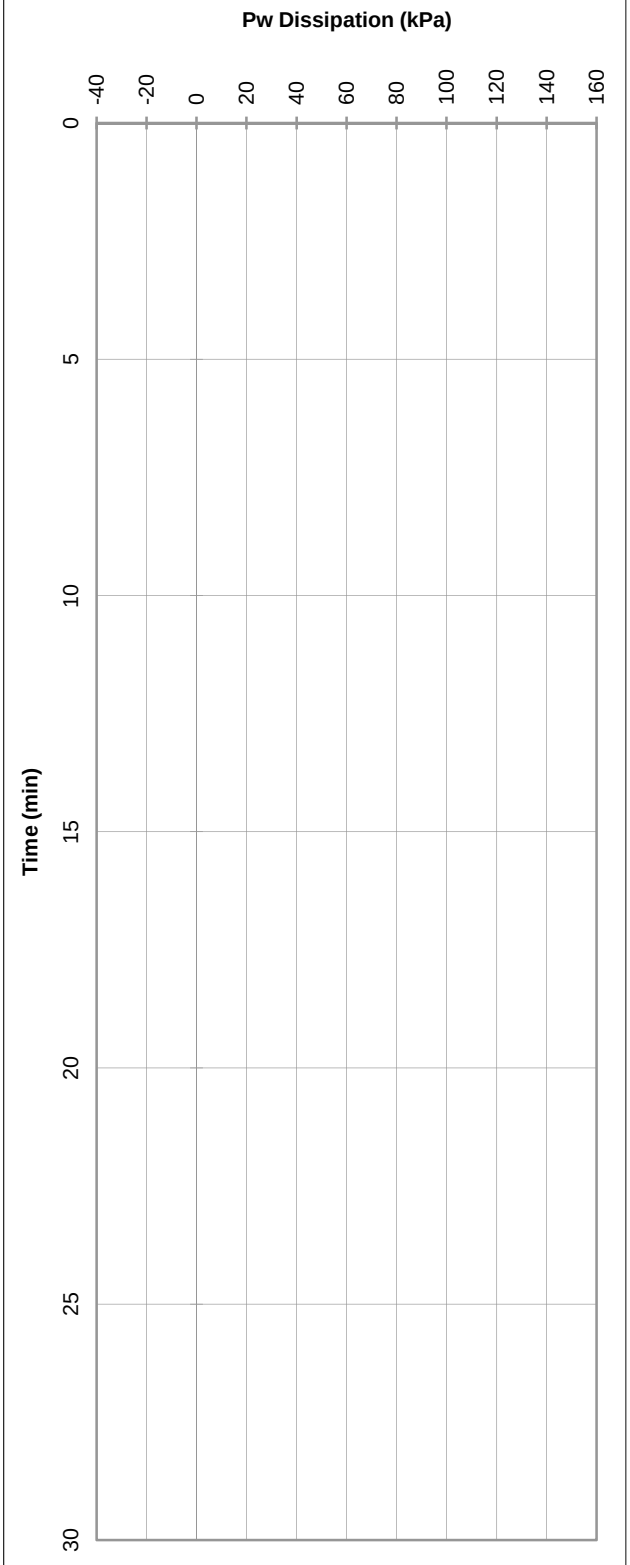
Probe No.: CPTU 3.3

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 463058E, 6469164N





PROBEDRILL GEOTECHNICAL SURVEY

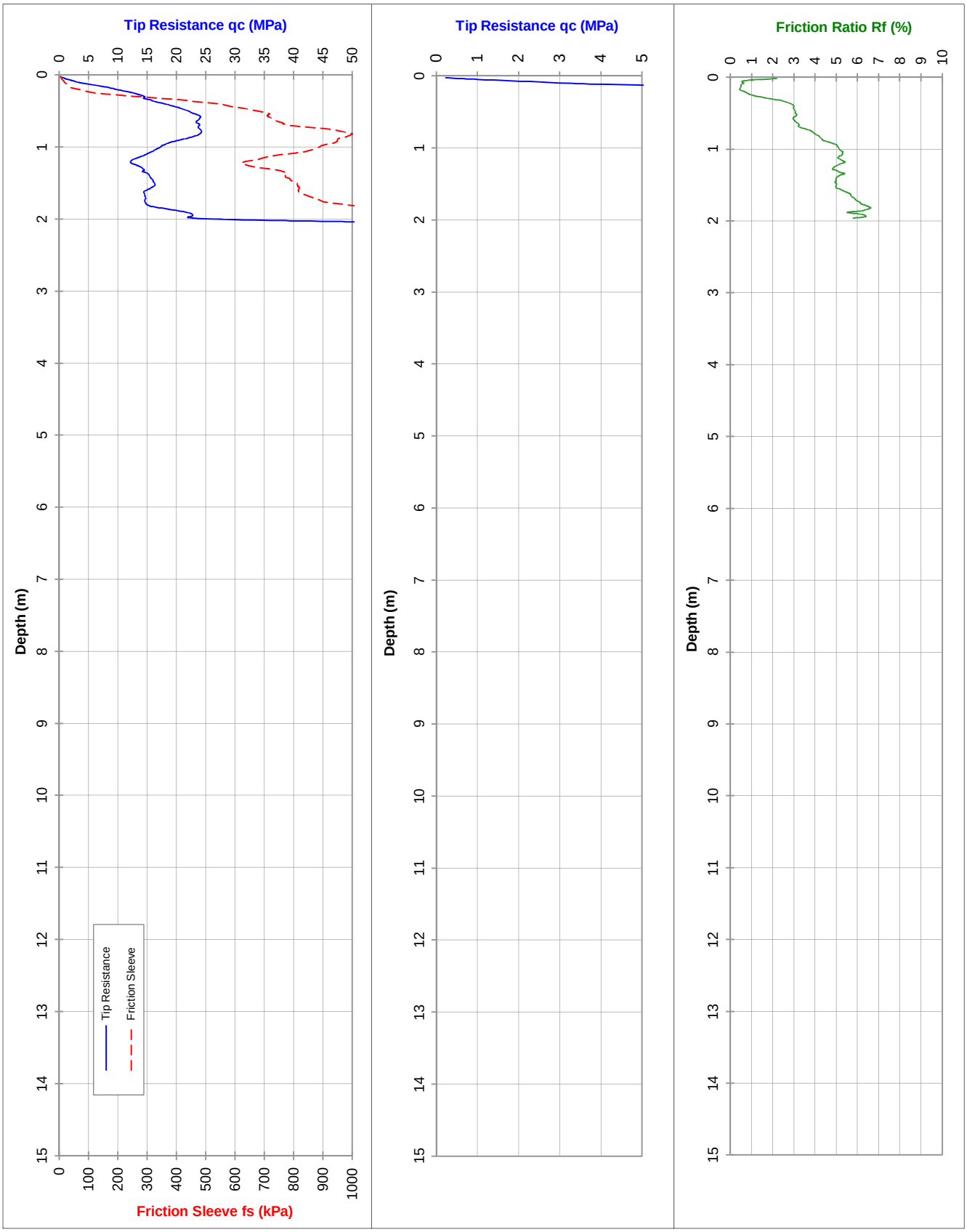
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

File: GA9258R.txt

25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 3.4
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 463078E, 6469018N



PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.0

Refusal: 75MPa + Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9259R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

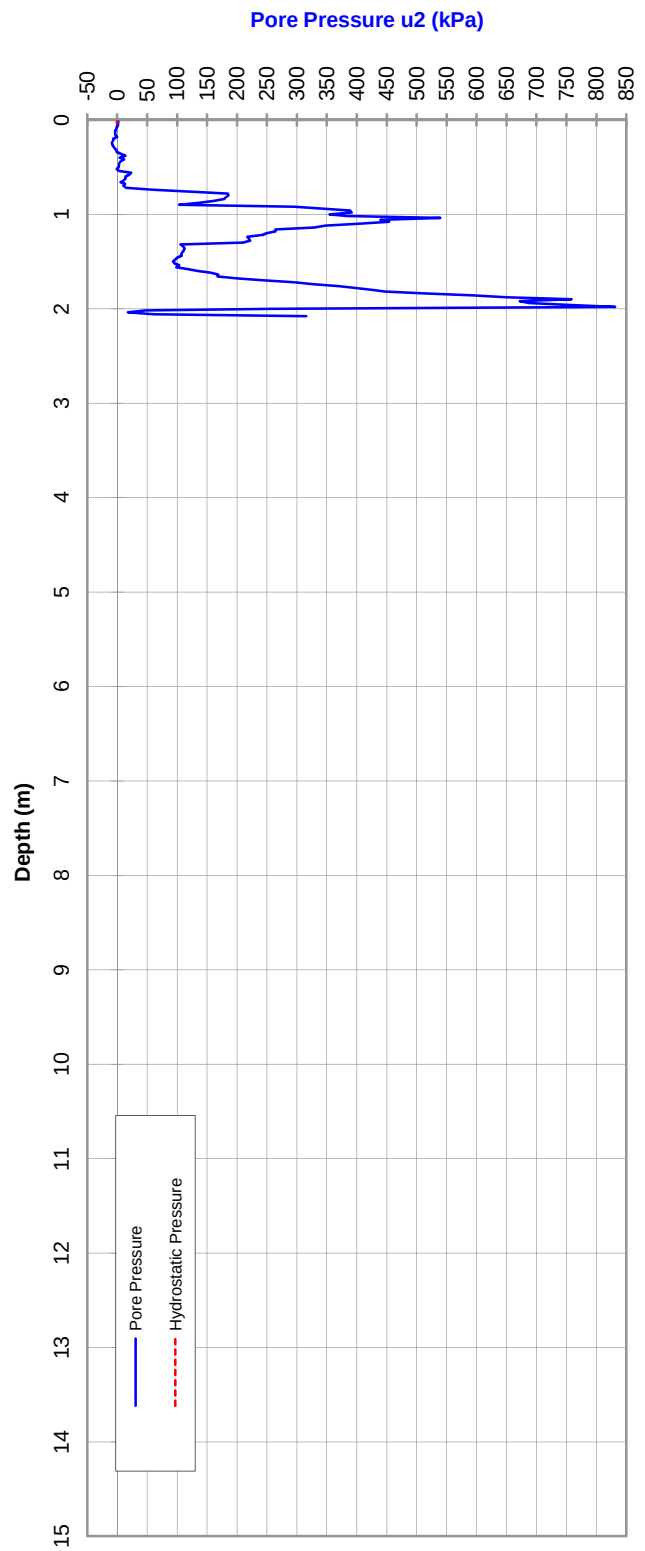
Project: Allawuna Farm

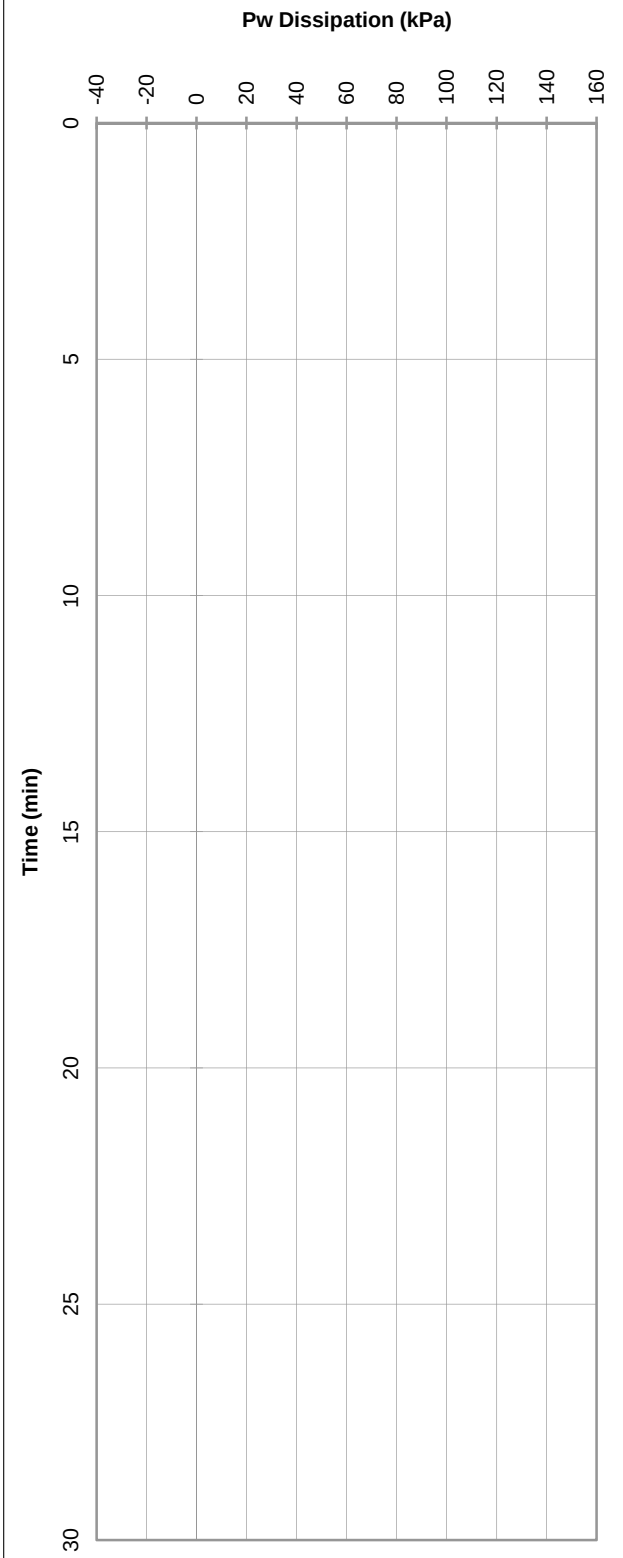
Probe No.: CPTU 3.4

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 463078E, 6469018N





PROBEDRILL GEOTECHNICAL SURVEY

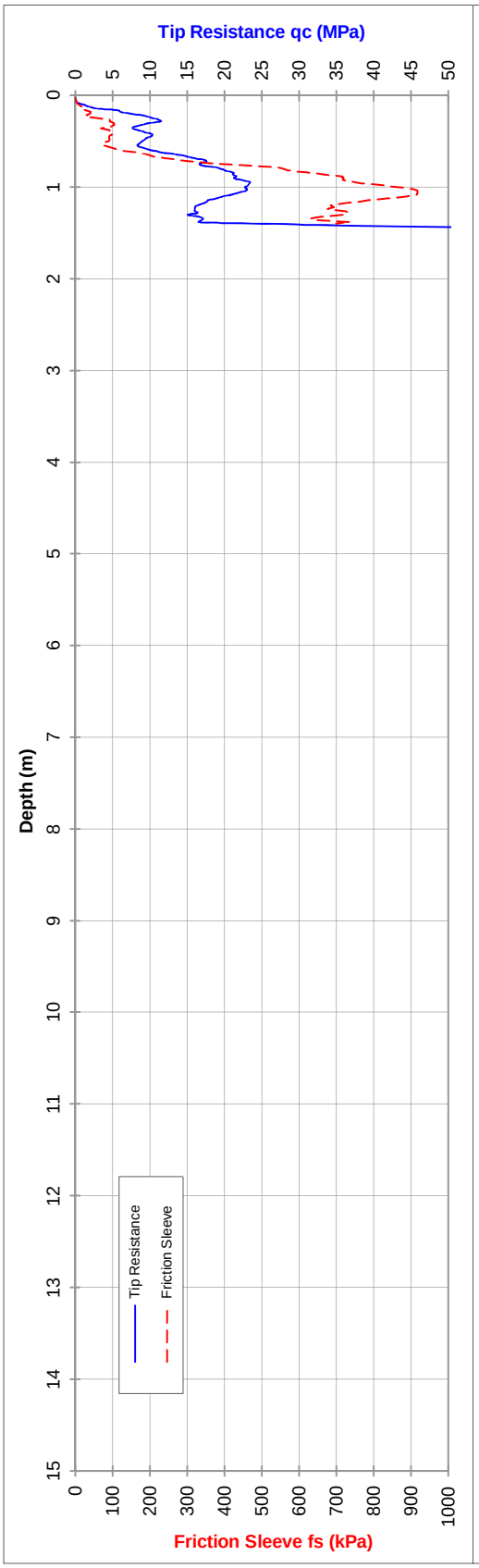
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

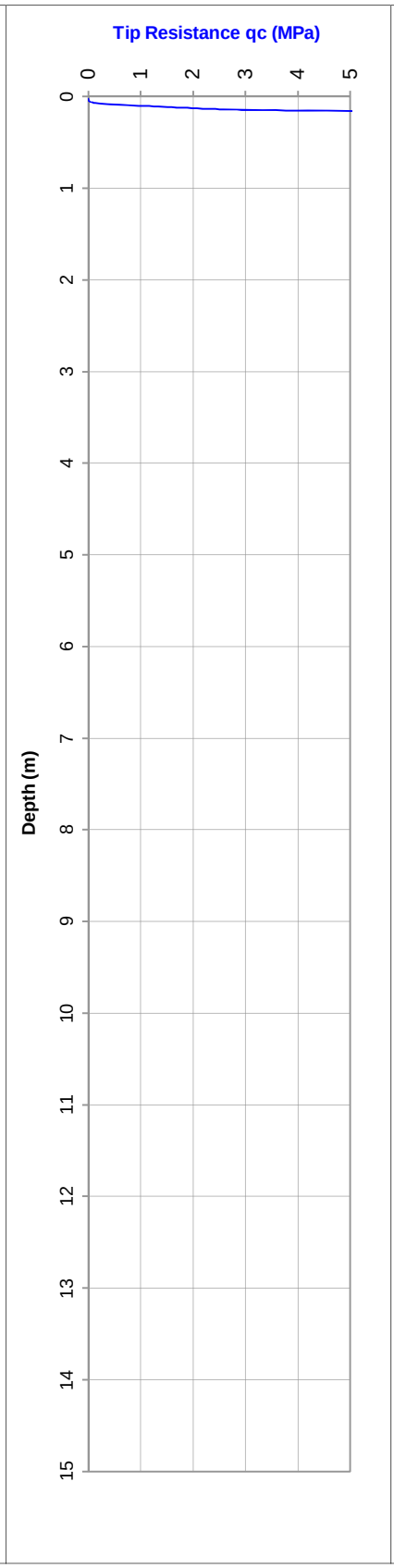
File: GA9259R.txt

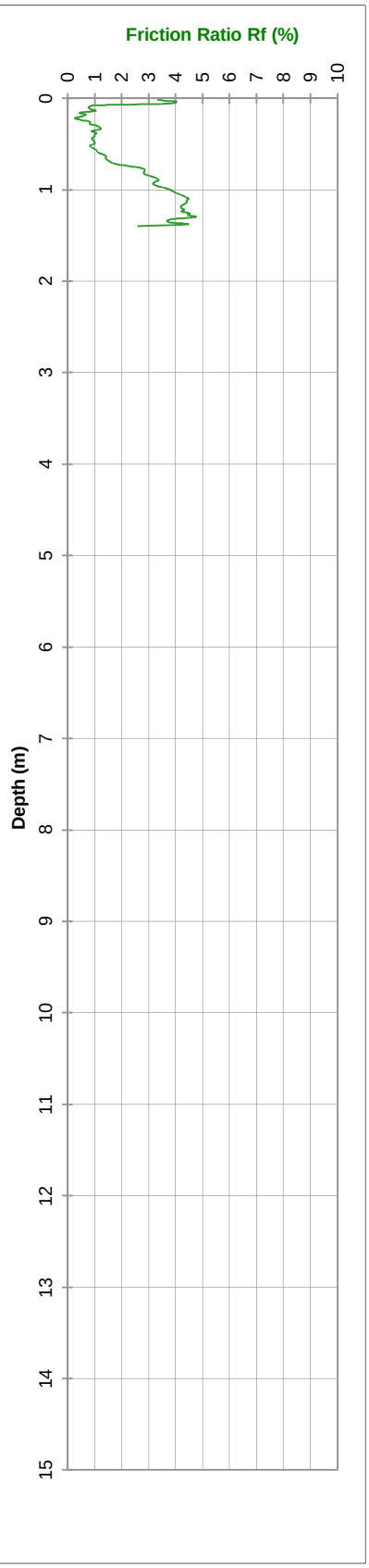
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 3.5
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 463093E, 6469002N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 0.3

Refusal: 75MPa

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9260R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

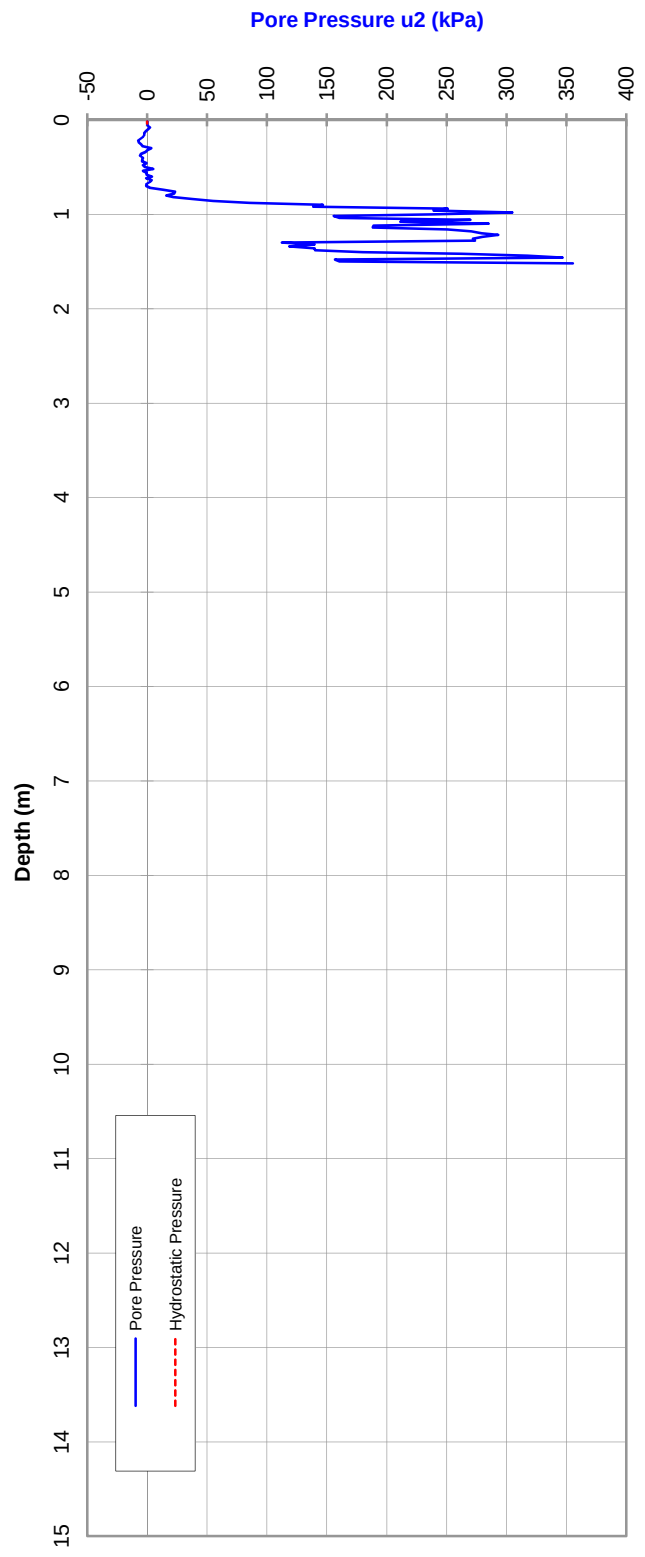
Project: Allawuna Farm

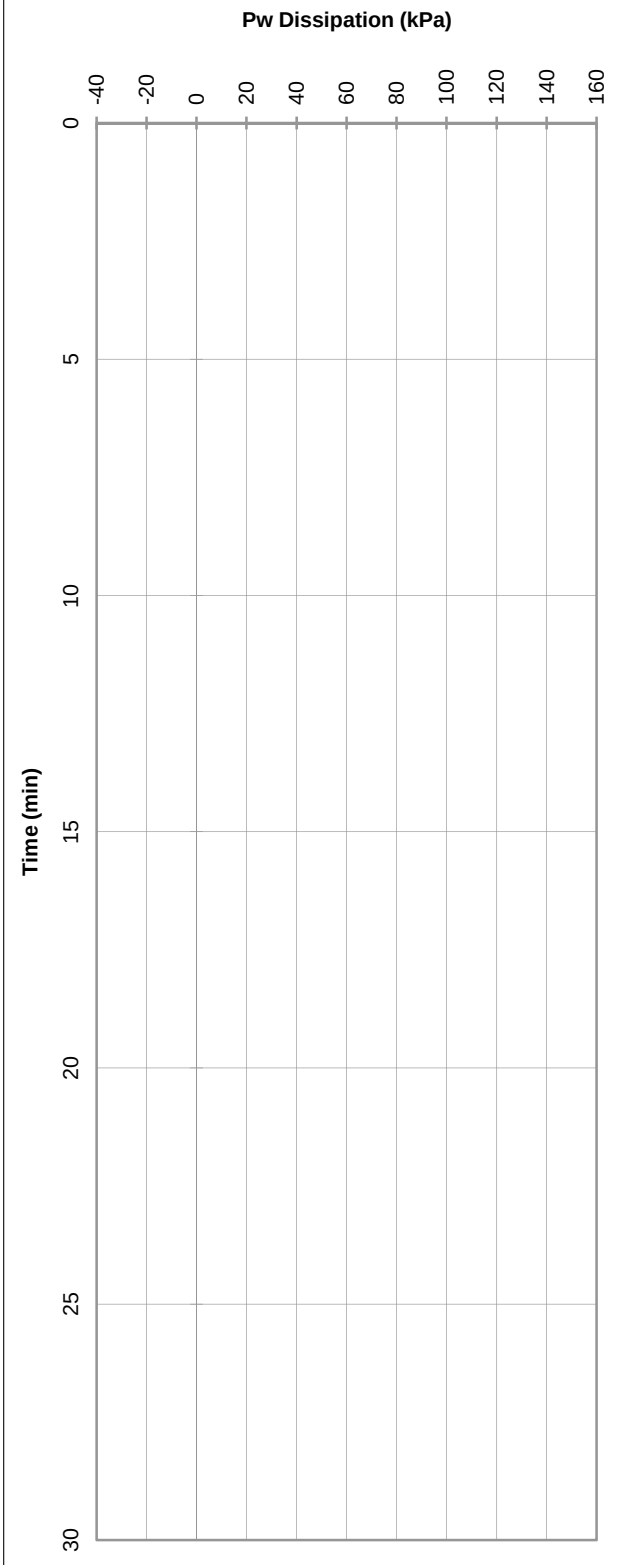
Probe No.: CPTU 3.5

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 463093E, 6469002N





PROBEDRILL GEOTECHNICAL SURVEY

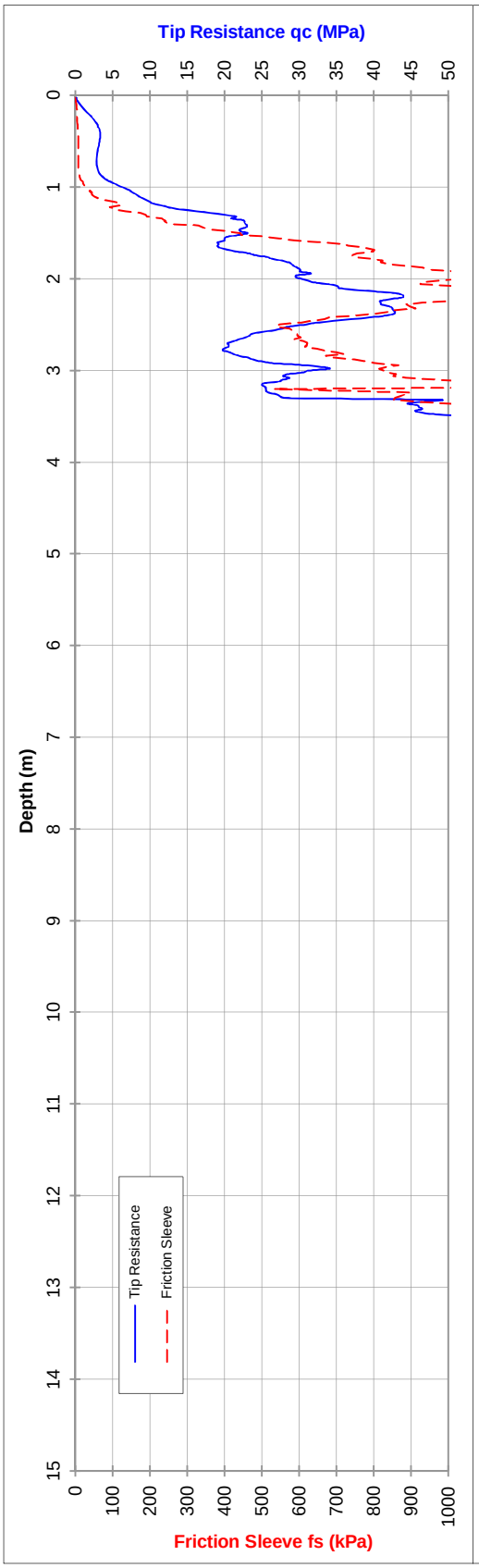
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

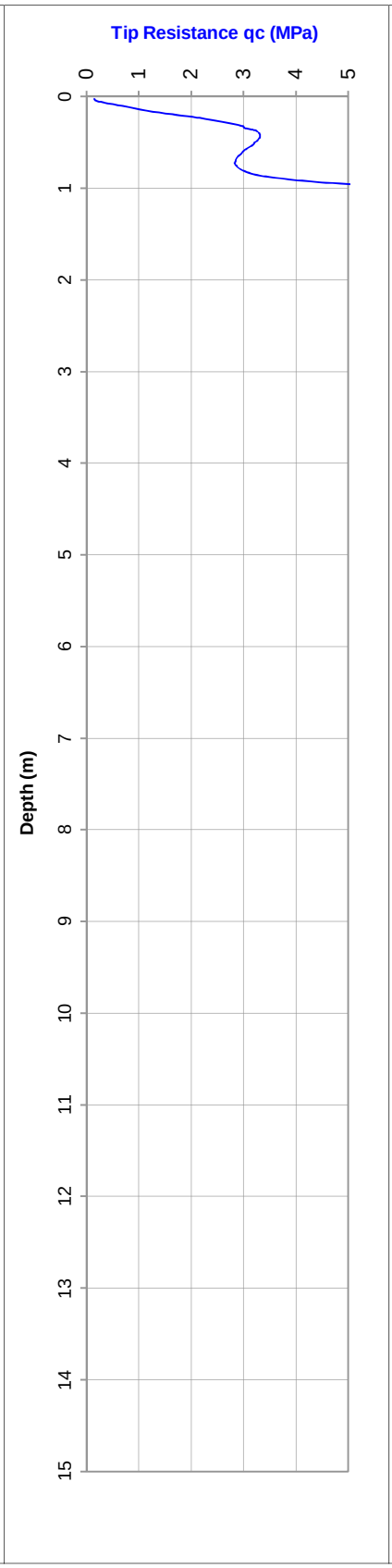
File: GA9260R.txt

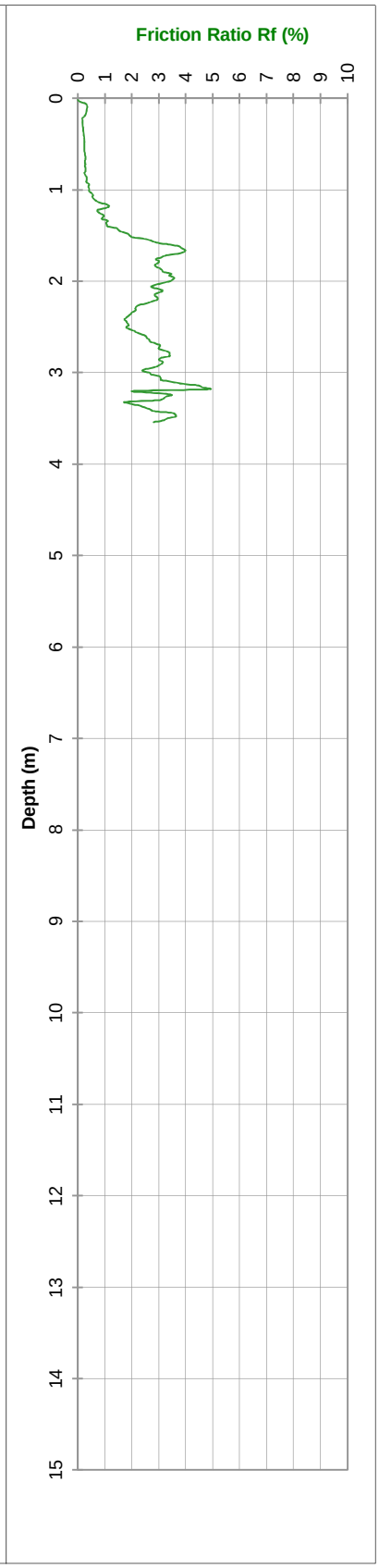
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 4
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462514E, 6469263N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 3.0

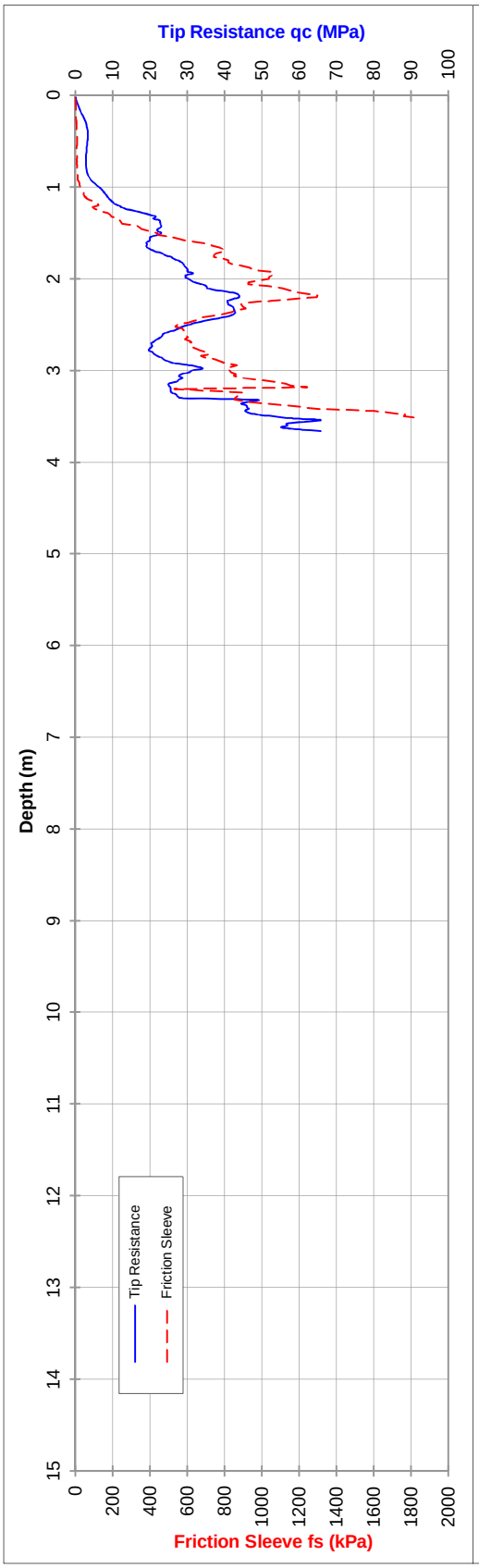
Refusal: Inclination / No Lateral Support

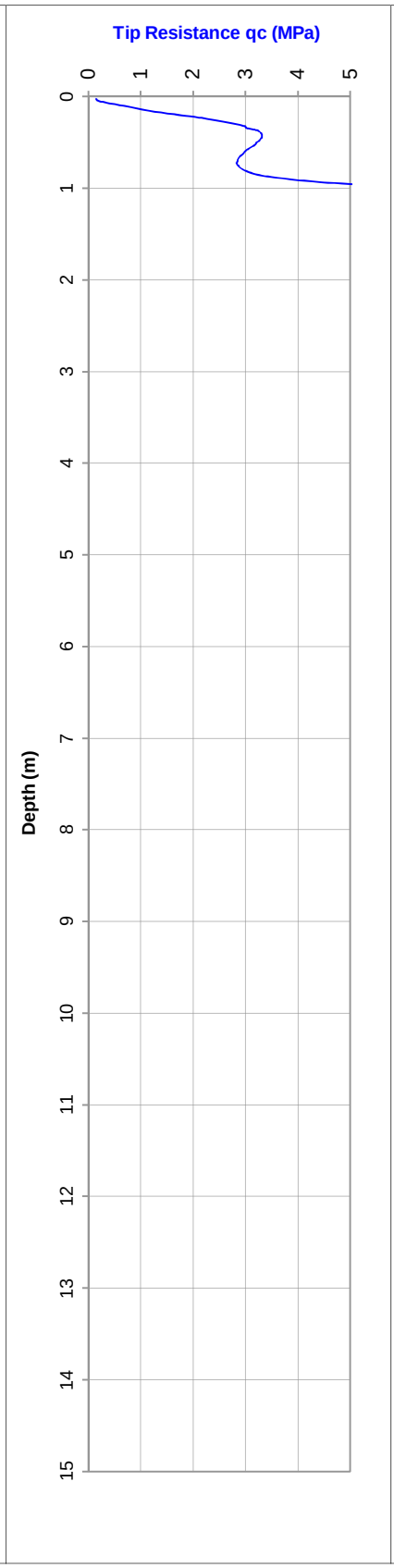
Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

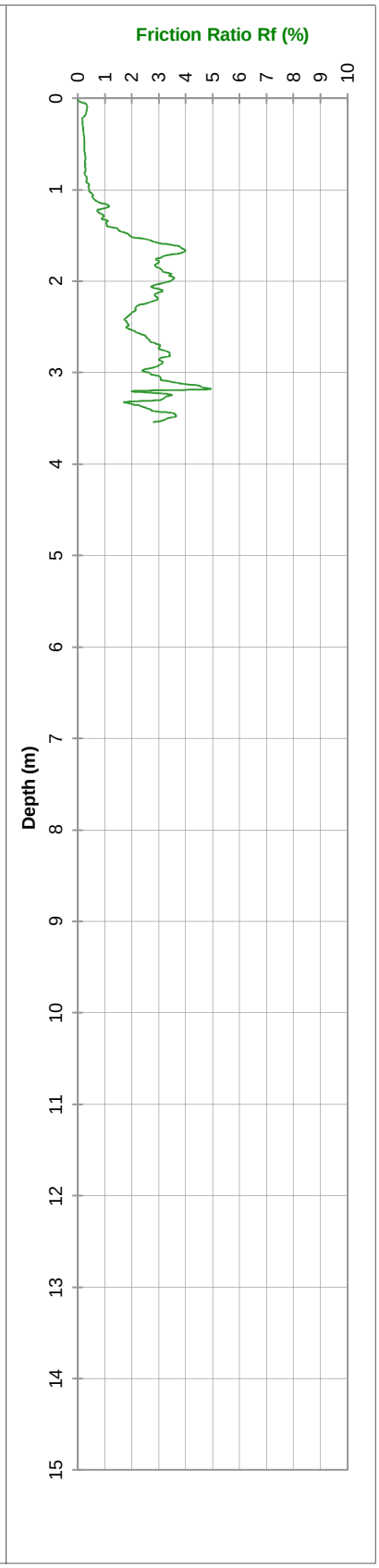
File: GA9254R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 4
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462514E, 6469263N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 3.0

Refusal: Inclination / No Lateral Support

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9254R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

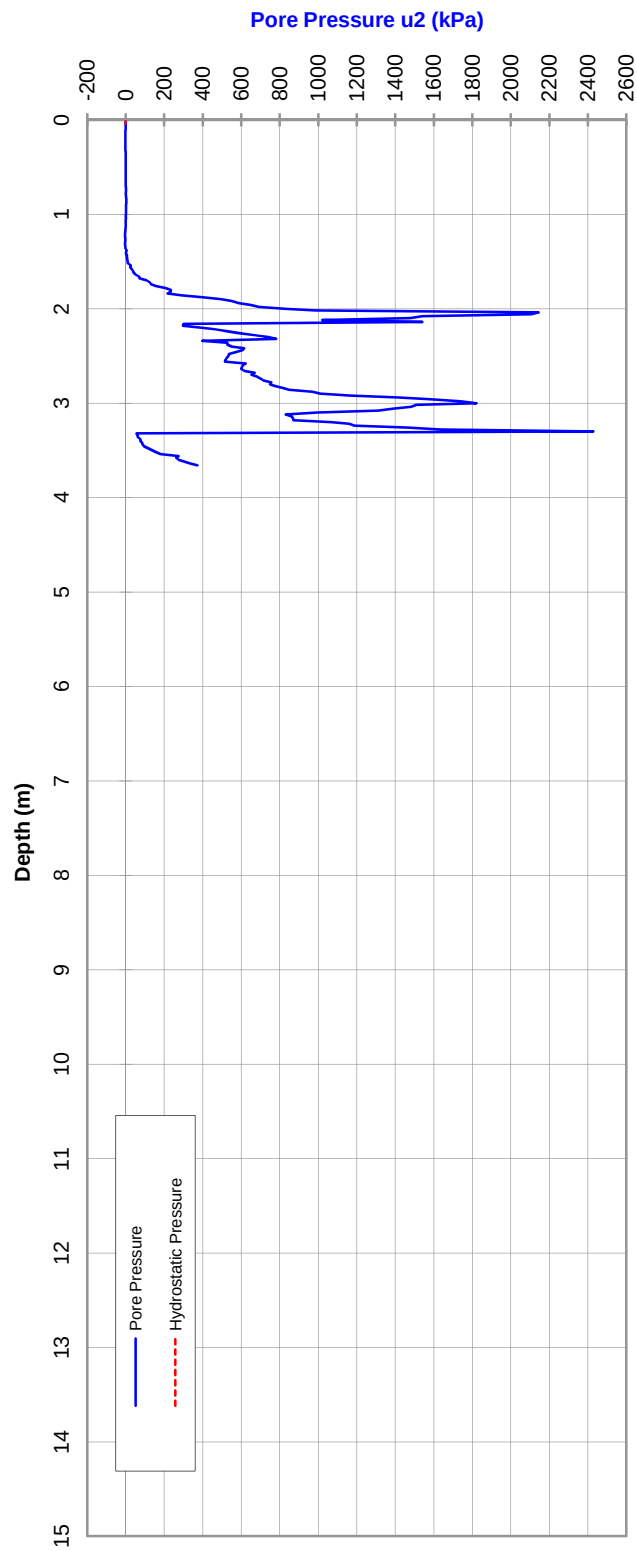
Project: Allawuna Farm

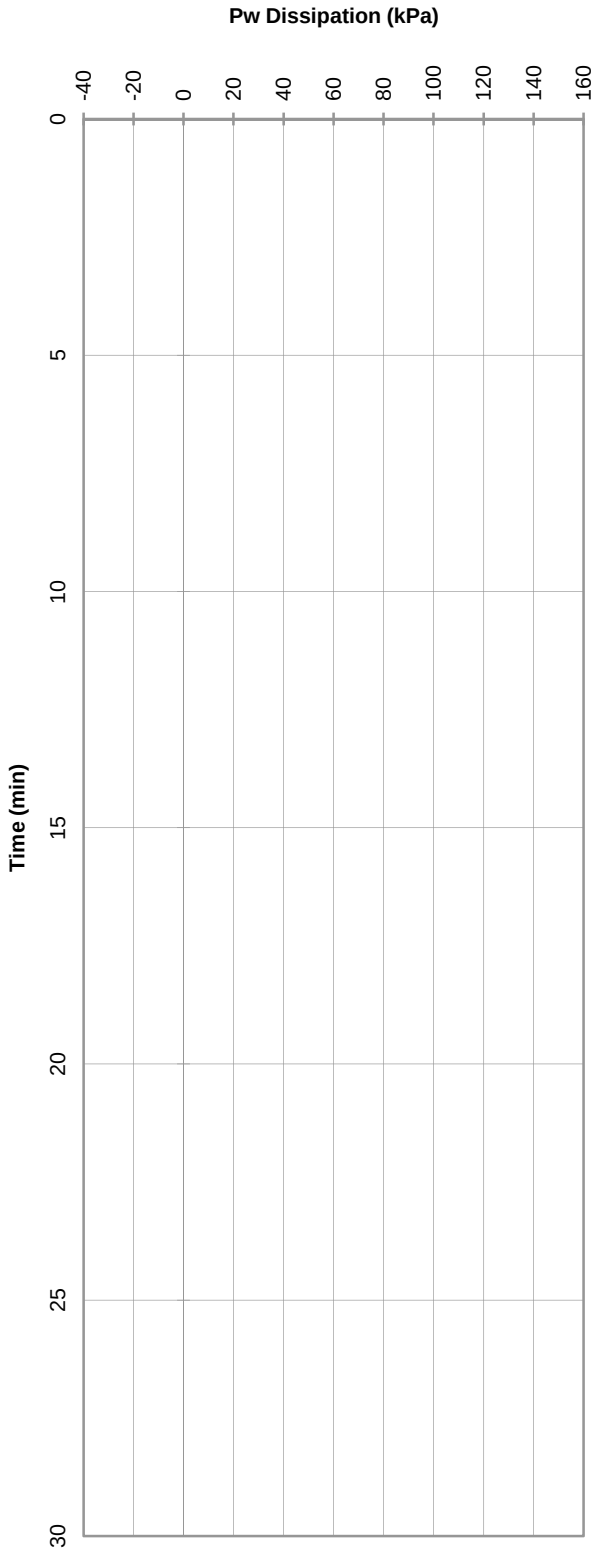
Probe No.: CPTU 4

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462514E, 6469263N





PROBEDRILL GEOTECHNICAL SURVEY

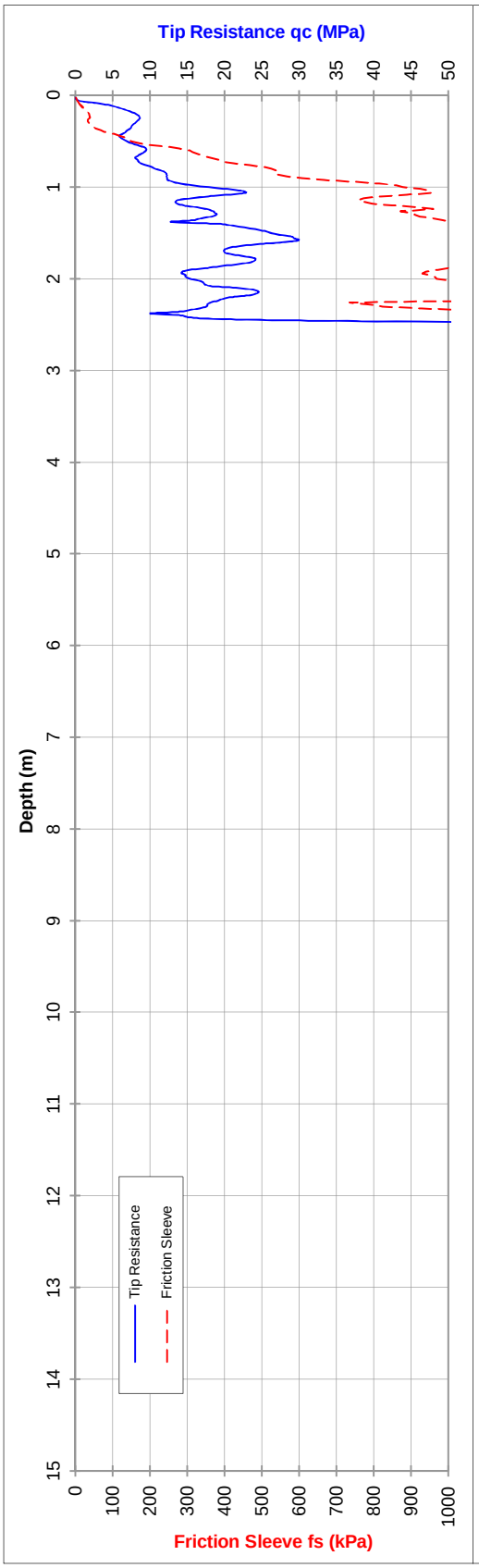
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

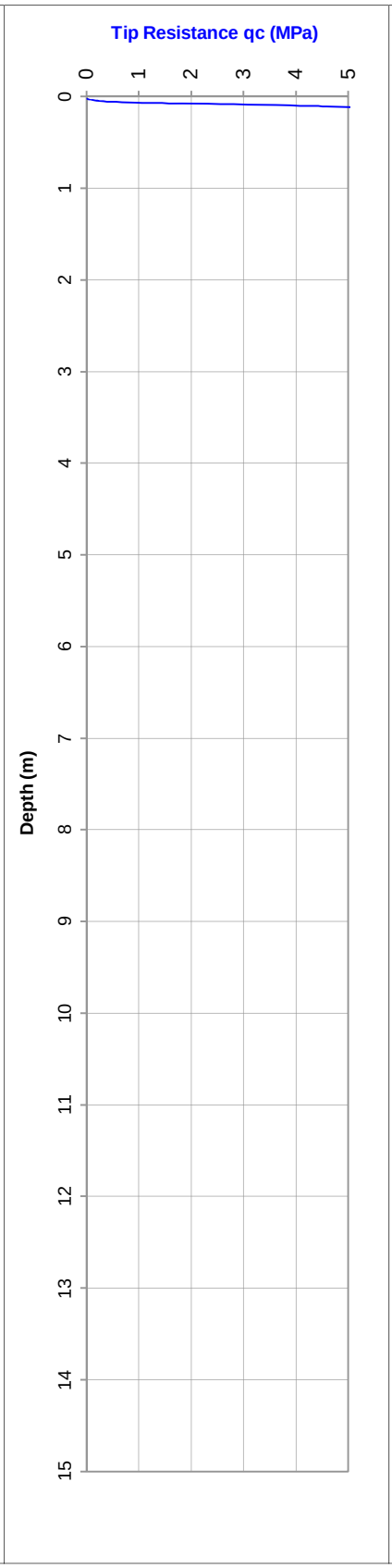
File: GA9254R.txt

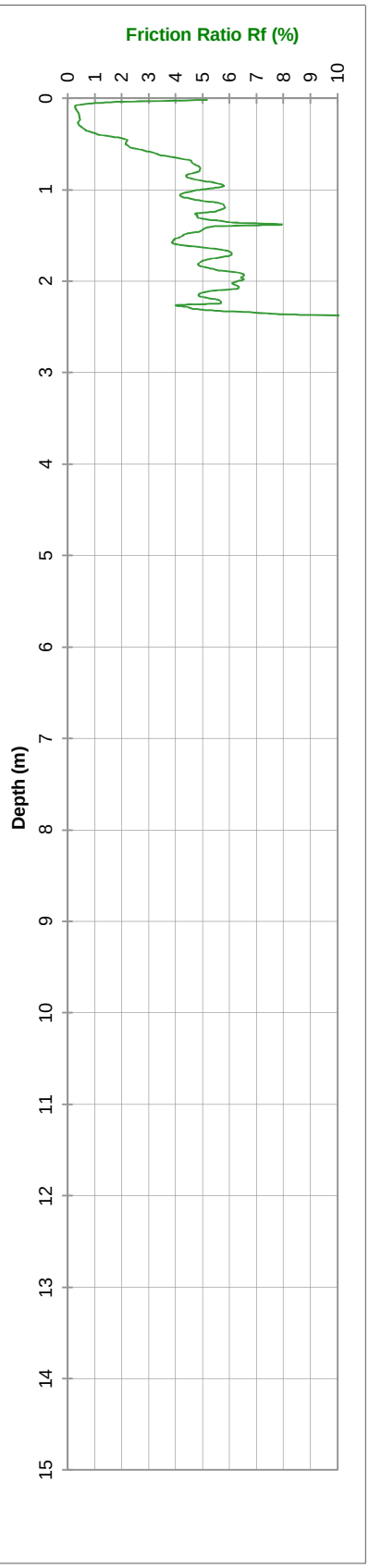
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 5
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462881E, 6468941N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.35

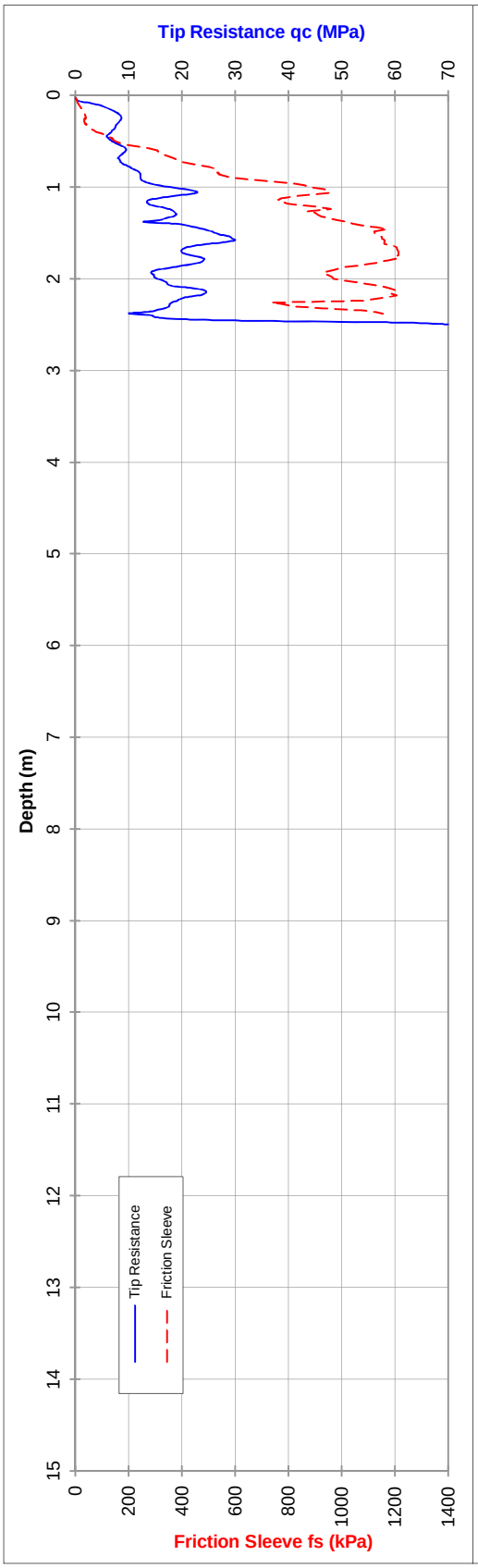
Refusal: 70MPa

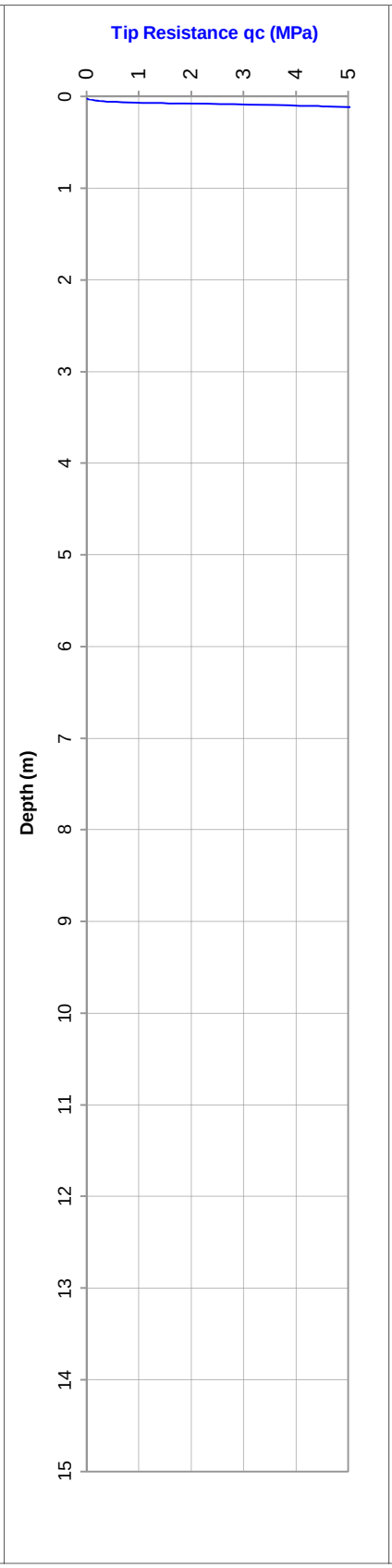
Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

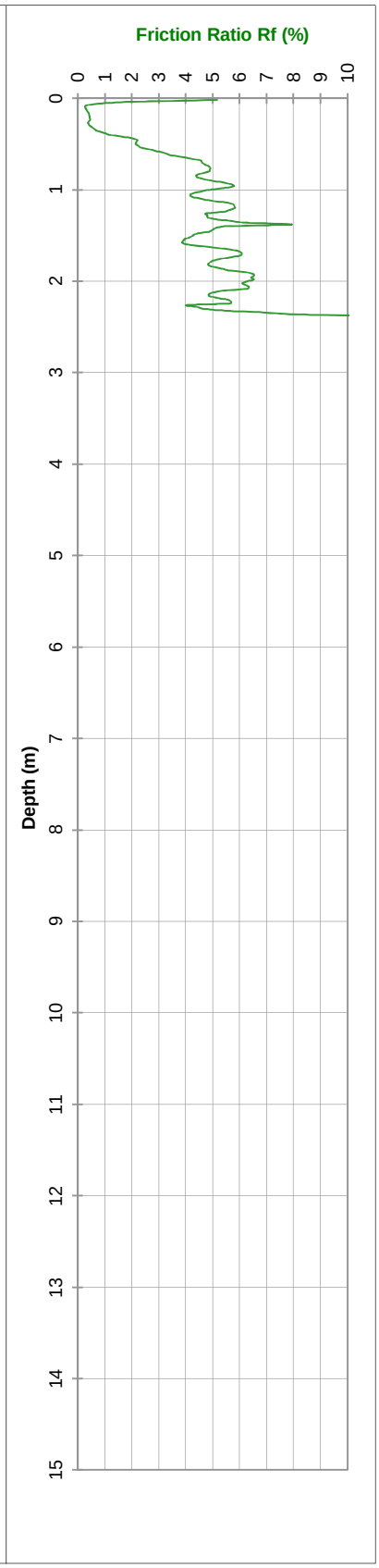
File: GA9261R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 5
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462881E, 6468941N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.35

Refusal: 70MPa

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9261R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

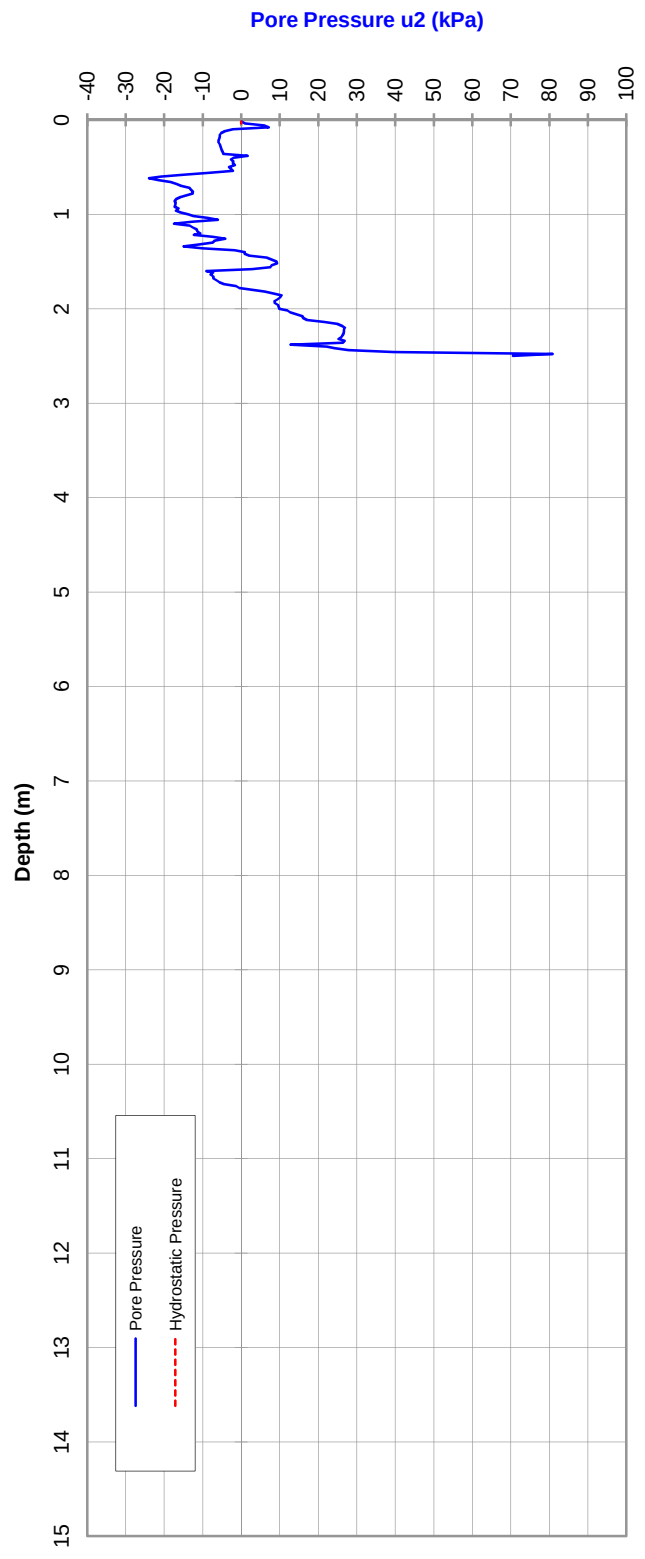
Project: Allawuna Farm

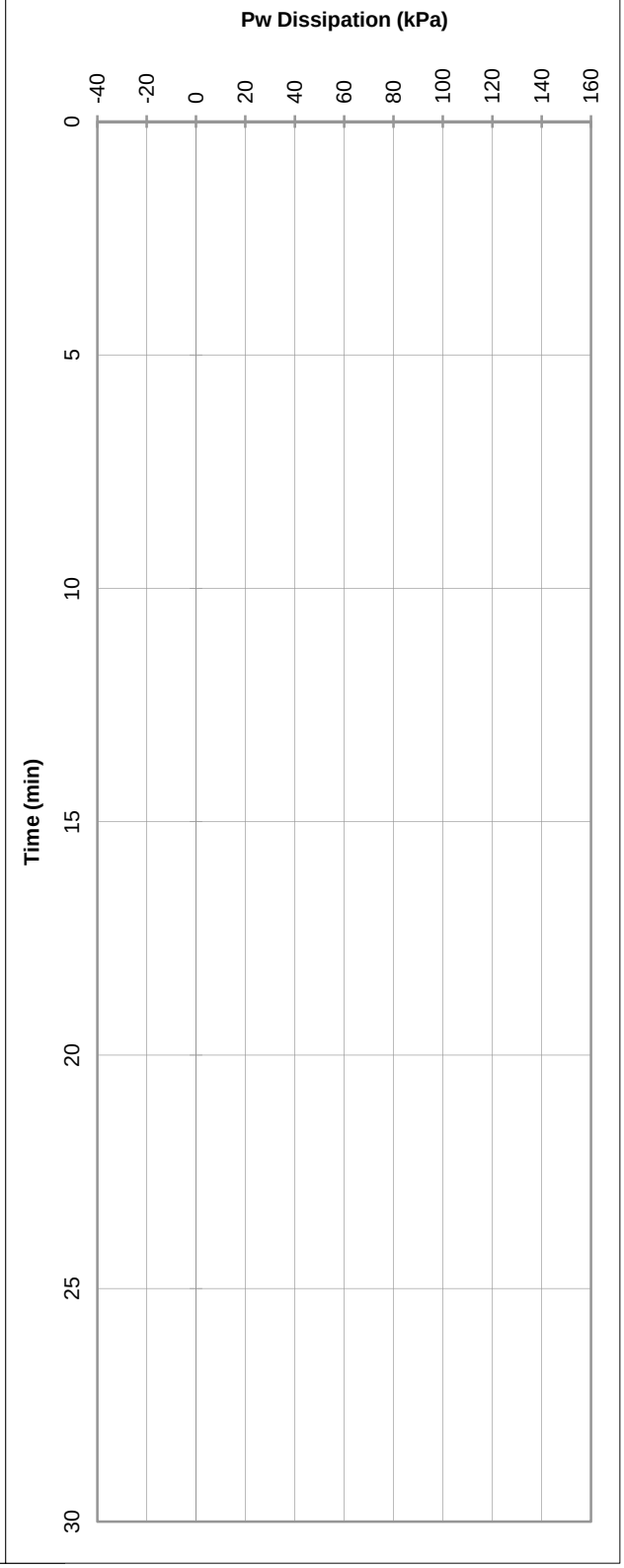
Probe No.: CPTU 5

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462881E, 6468941N





PROBEDRILL GEOTECHNICAL SURVEY

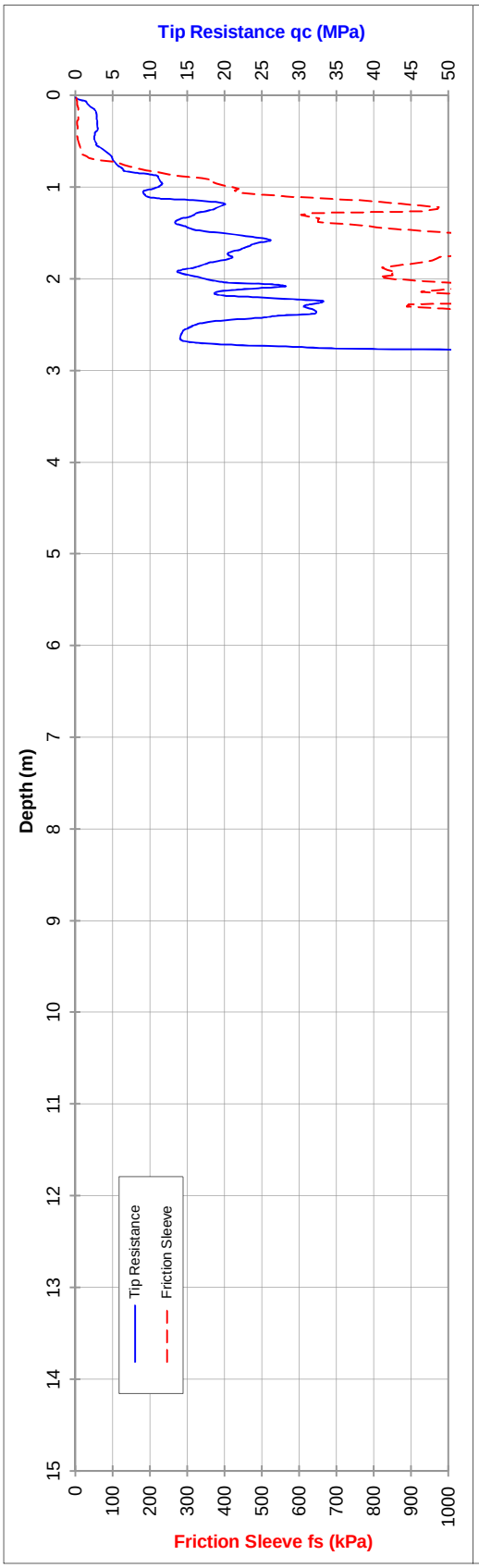
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

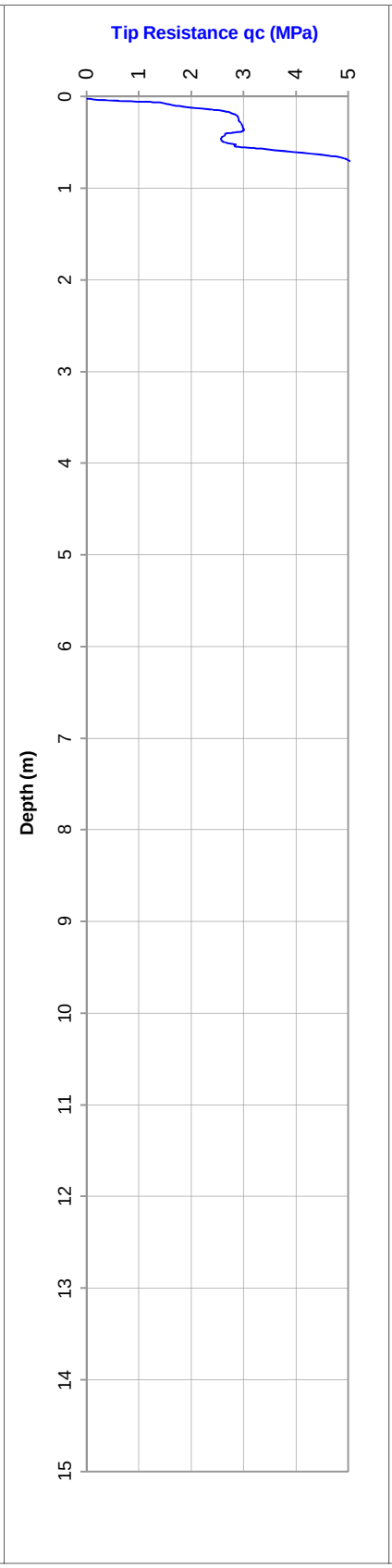
File: GA9261R.txt

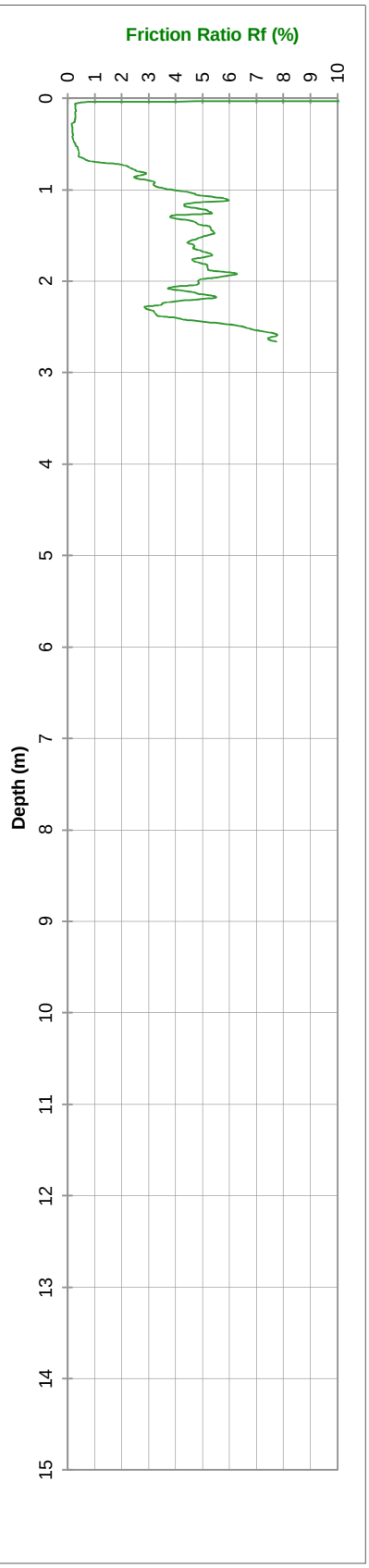
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 5.1
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462882E, 6468997N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.70

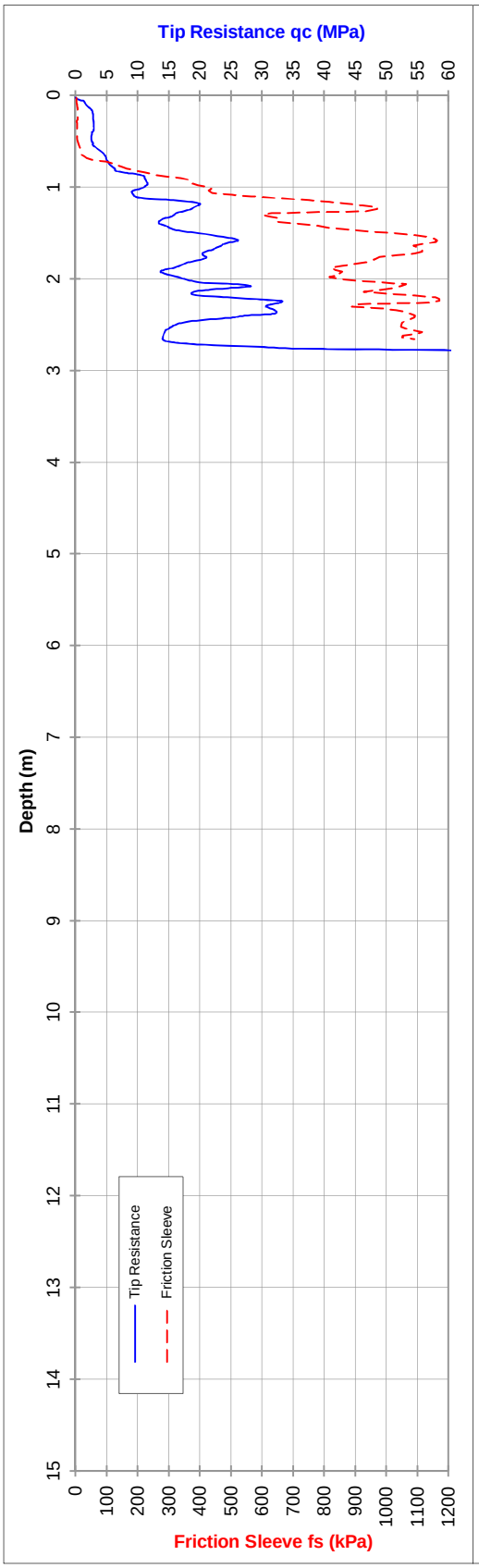
Refusal: 65MPa

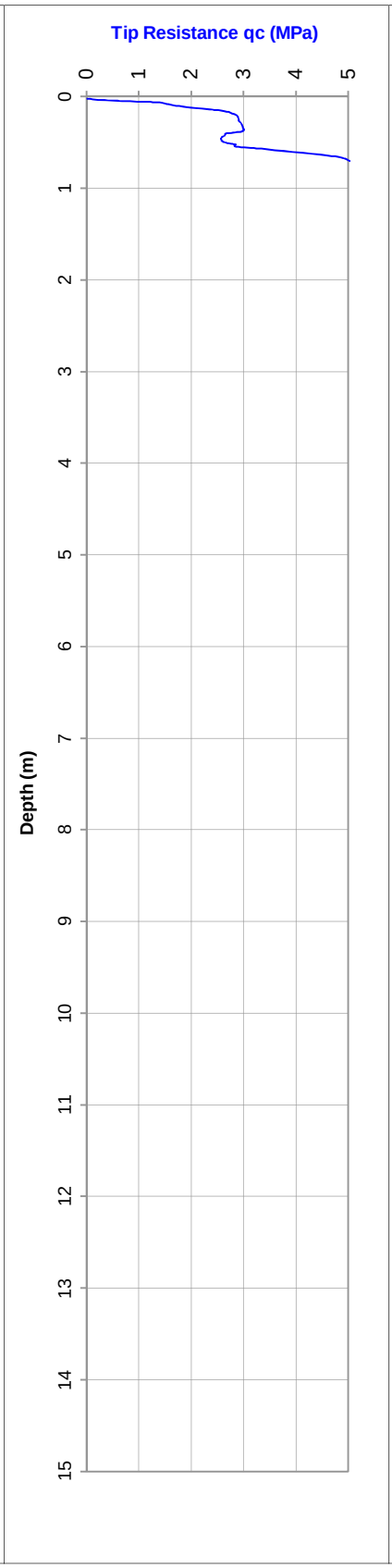
Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

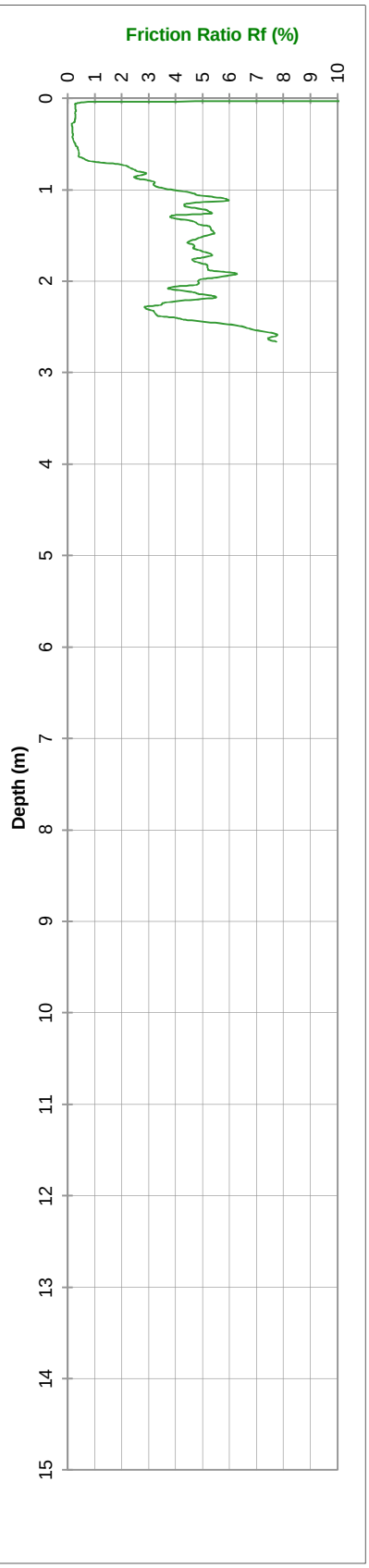
File: GA9262R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 5.1
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462882E, 6468997N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.70

Refusal: 65MPa

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9262R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

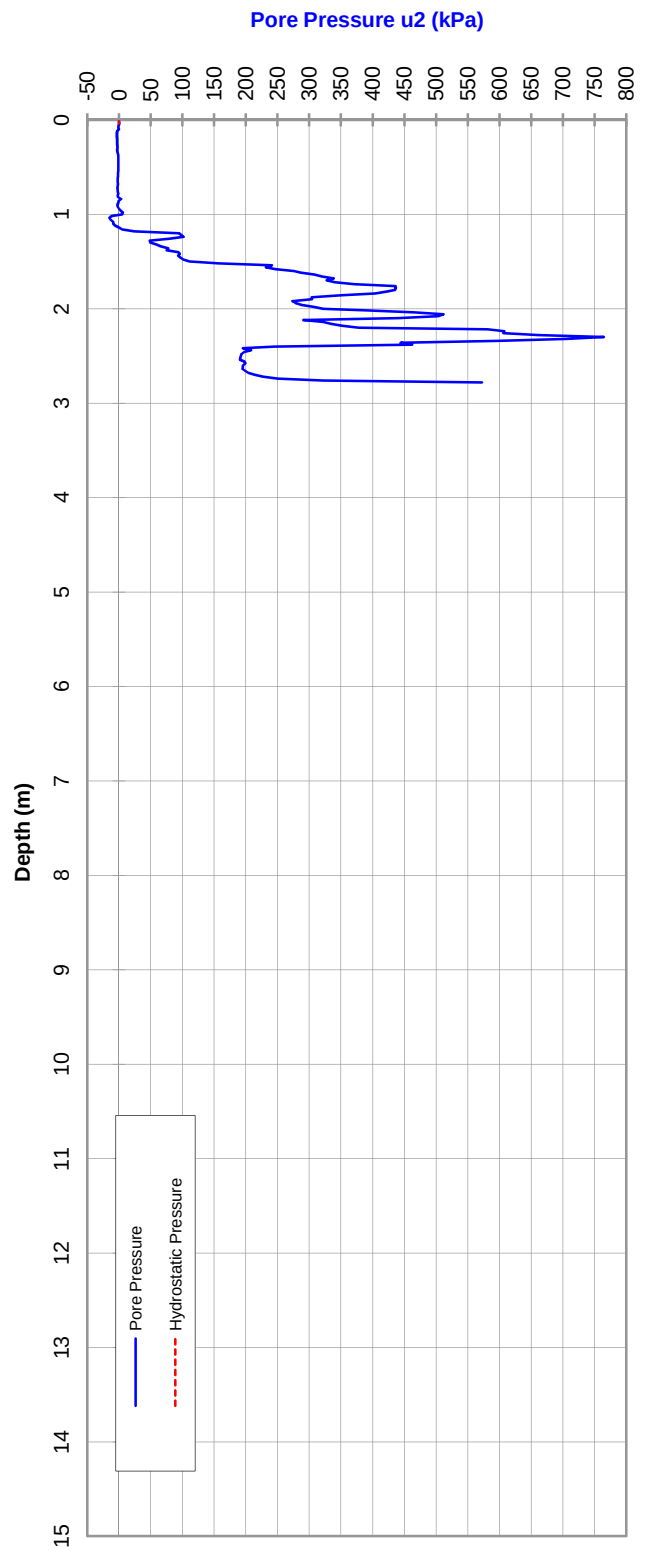
Project: Allawuna Farm

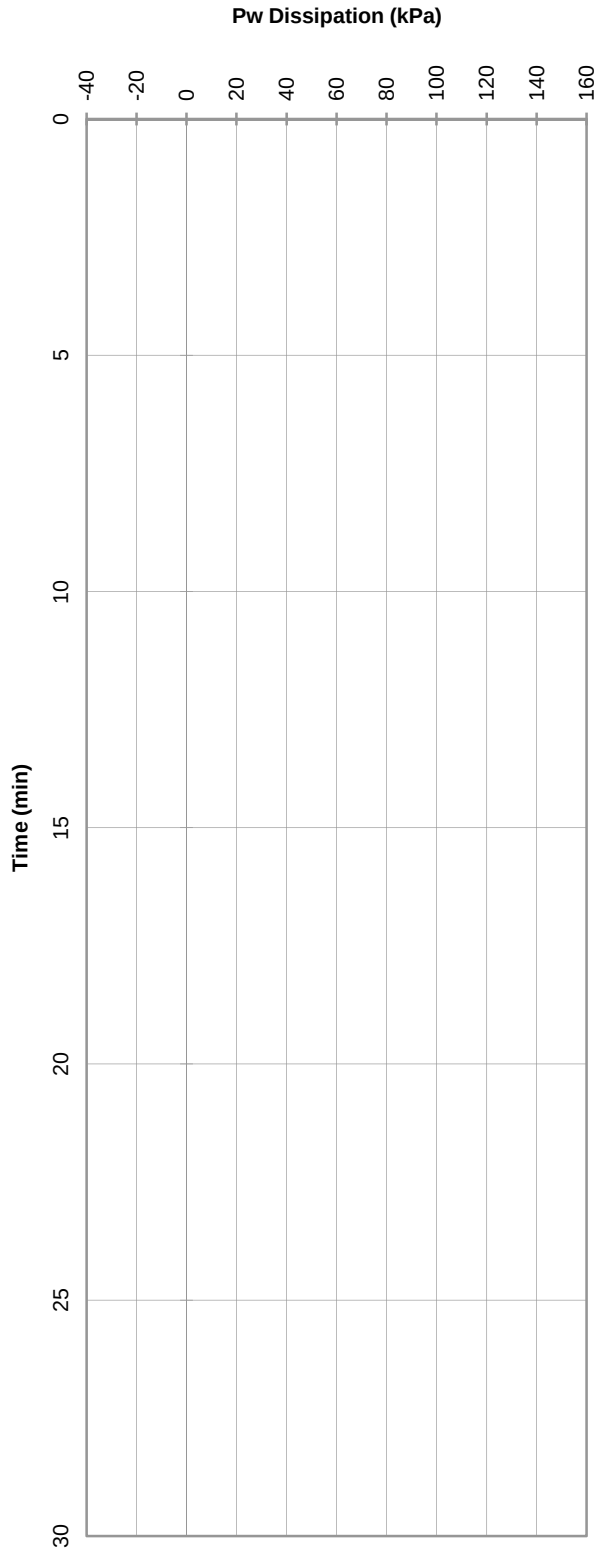
Probe No.: CPTU 5.1

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462882E, 6468997N





PROBEDRILL GEOTECHNICAL SURVEY

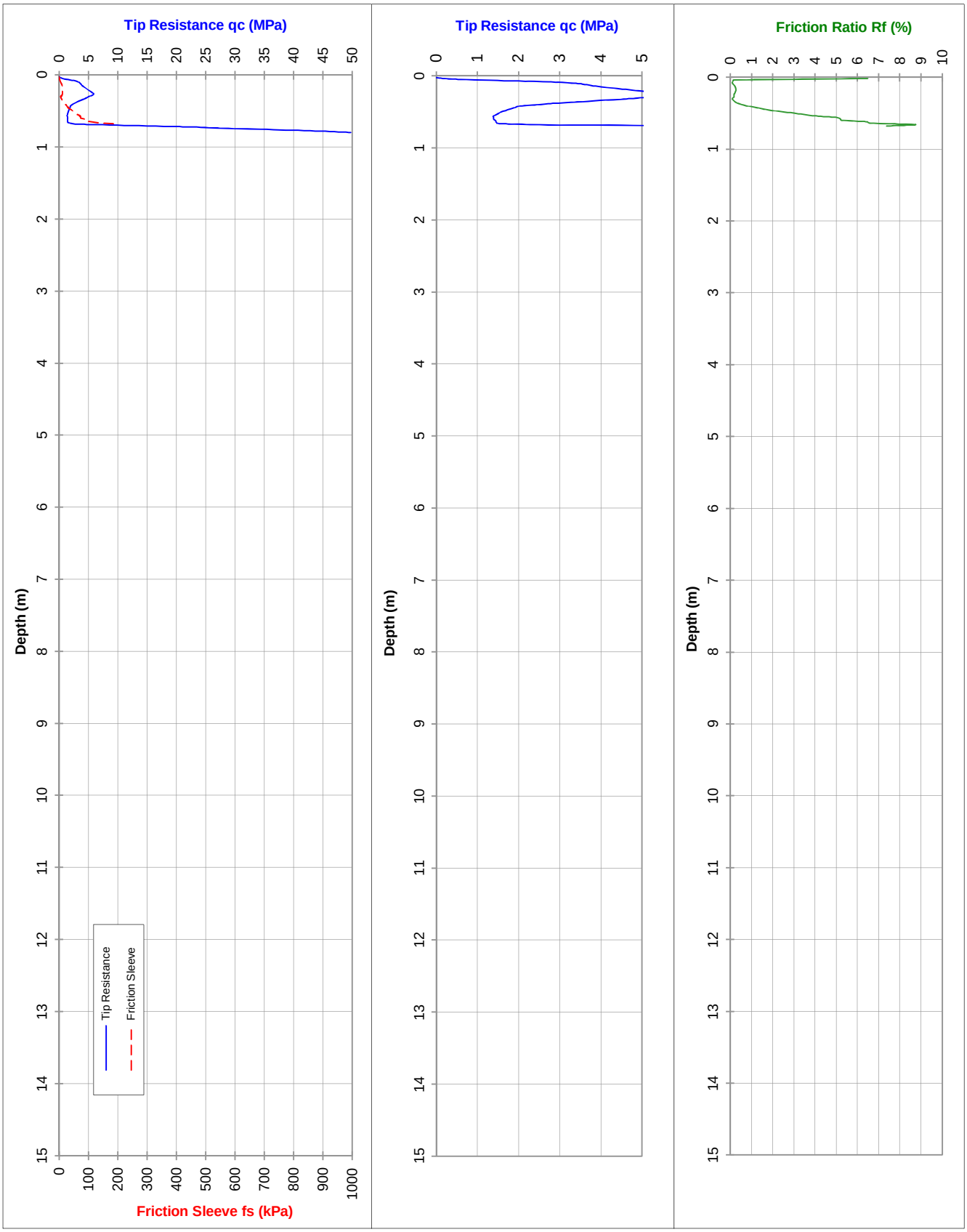
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

File: GA9262R.txt

25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 5.2
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462894E, 6469007N



PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 0.70

Refusal: Inclination

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9263R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

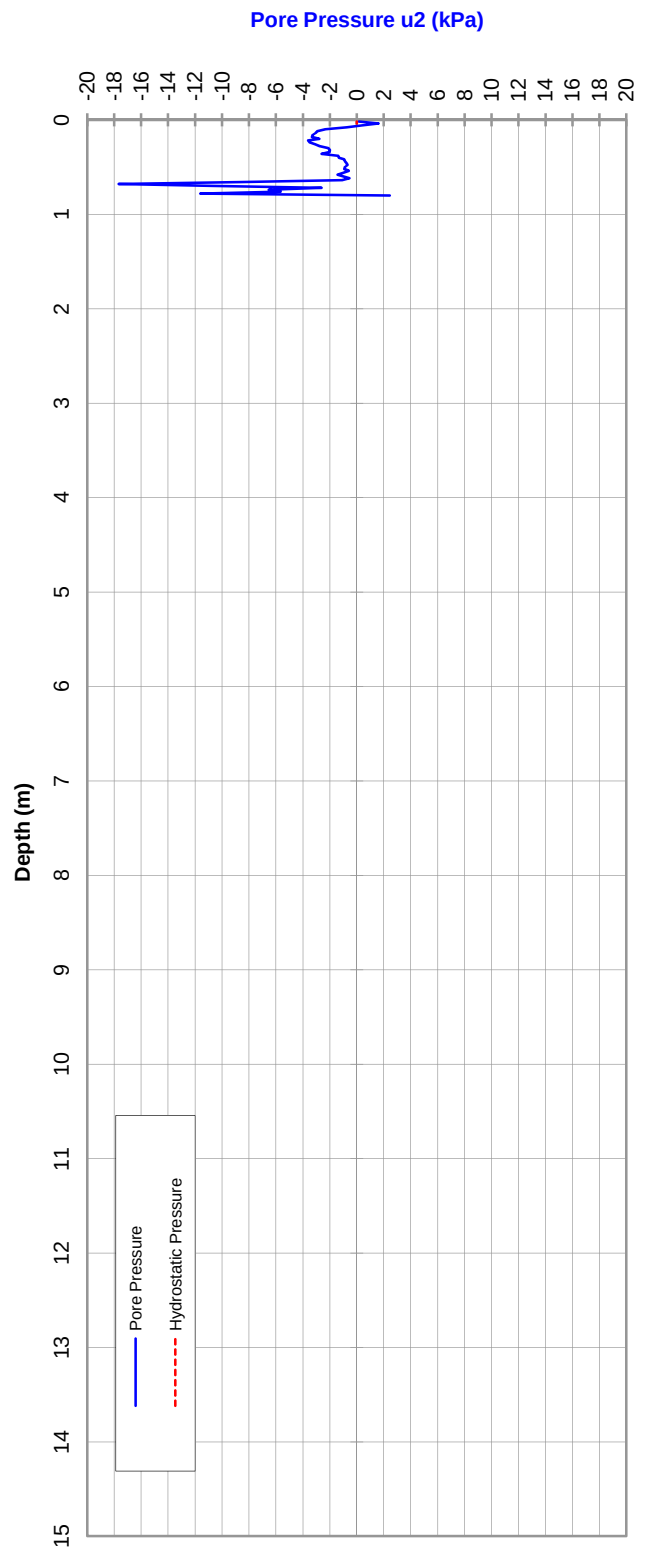
Project: Allawuna Farm

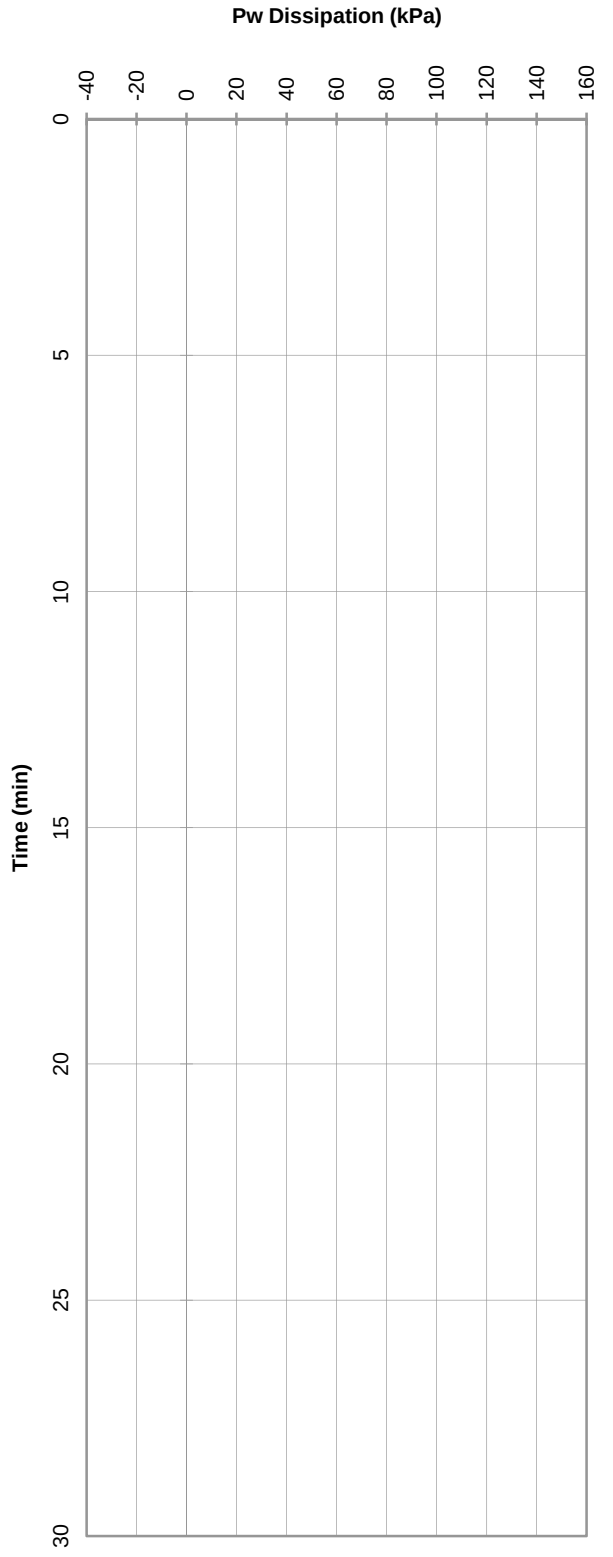
Probe No.: CPTU 5.2

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462894E, 6469007N





PROBEDRILL GEOTECHNICAL SURVEY

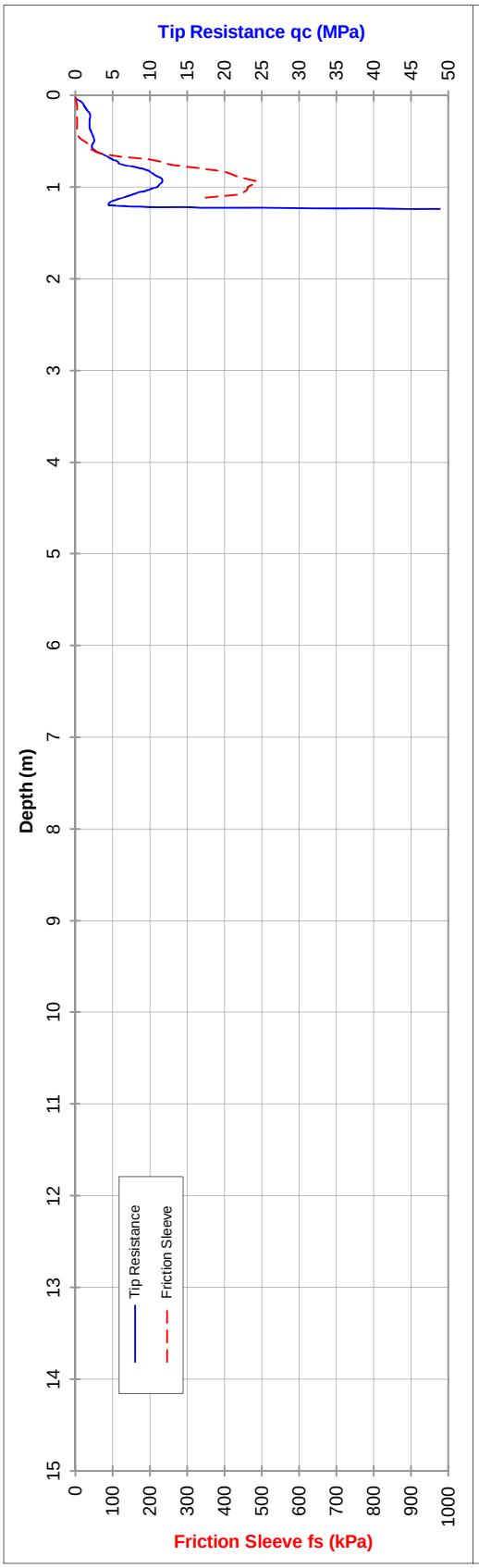
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

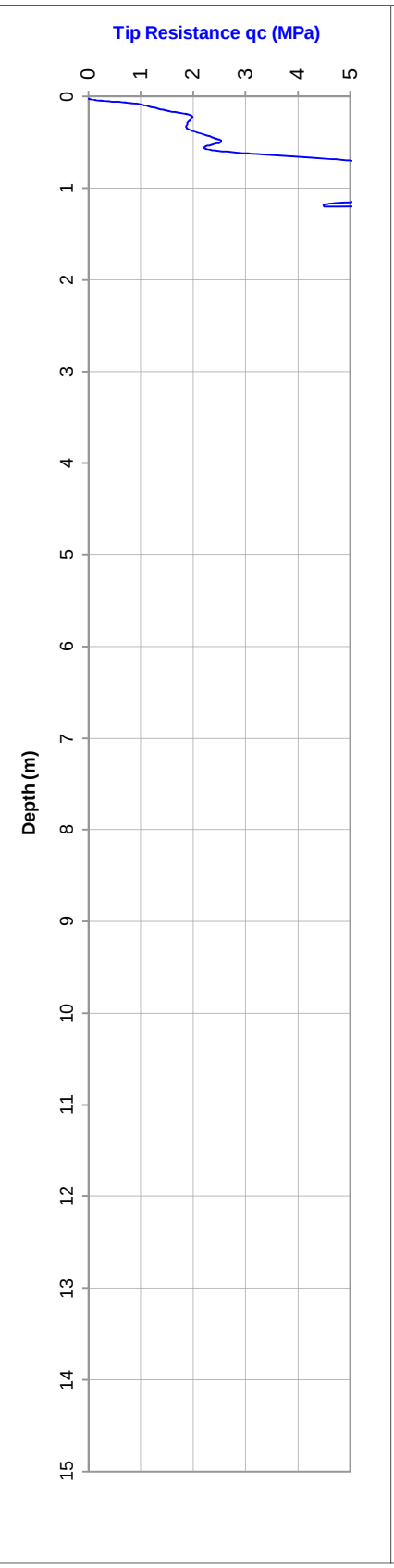
File: GA9263R.txt

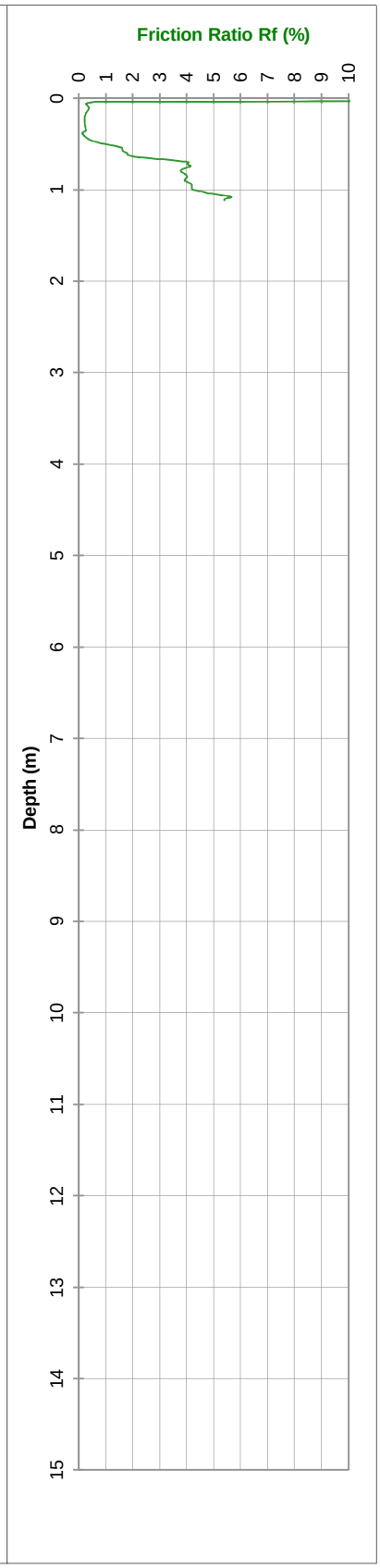
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 5.3
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462889E, 6469115N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 1.15

Refusal: 65MPa

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9264R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

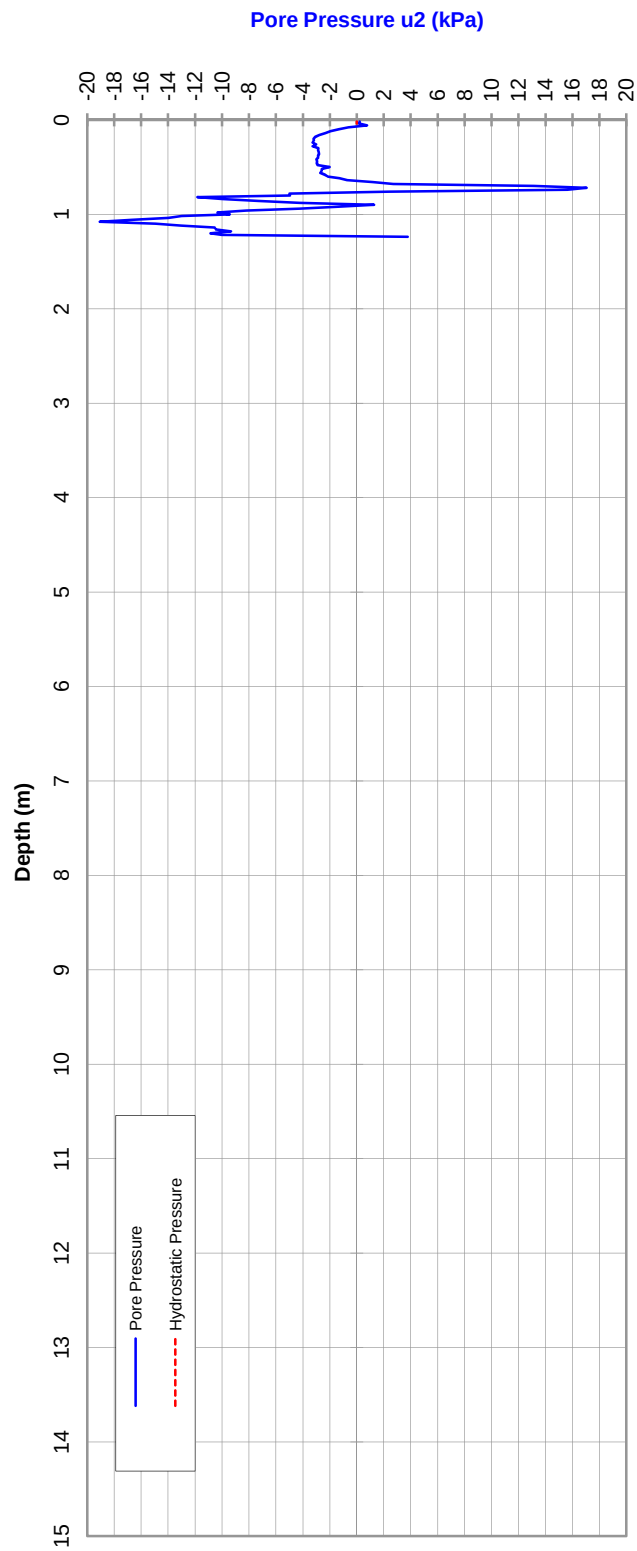
Project: Allawuna Farm

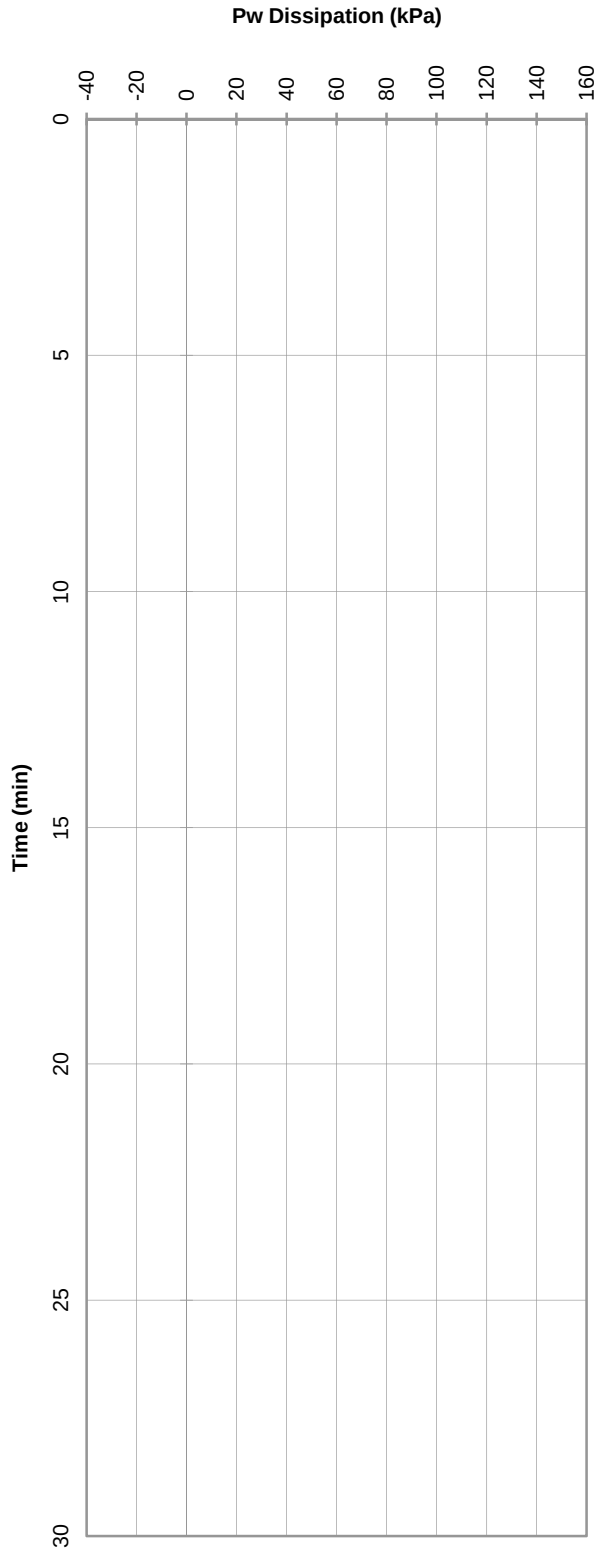
Probe No.: CPTU 5.3

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462889E, 6469115N





PROBEDRILL GEOTECHNICAL SURVEY

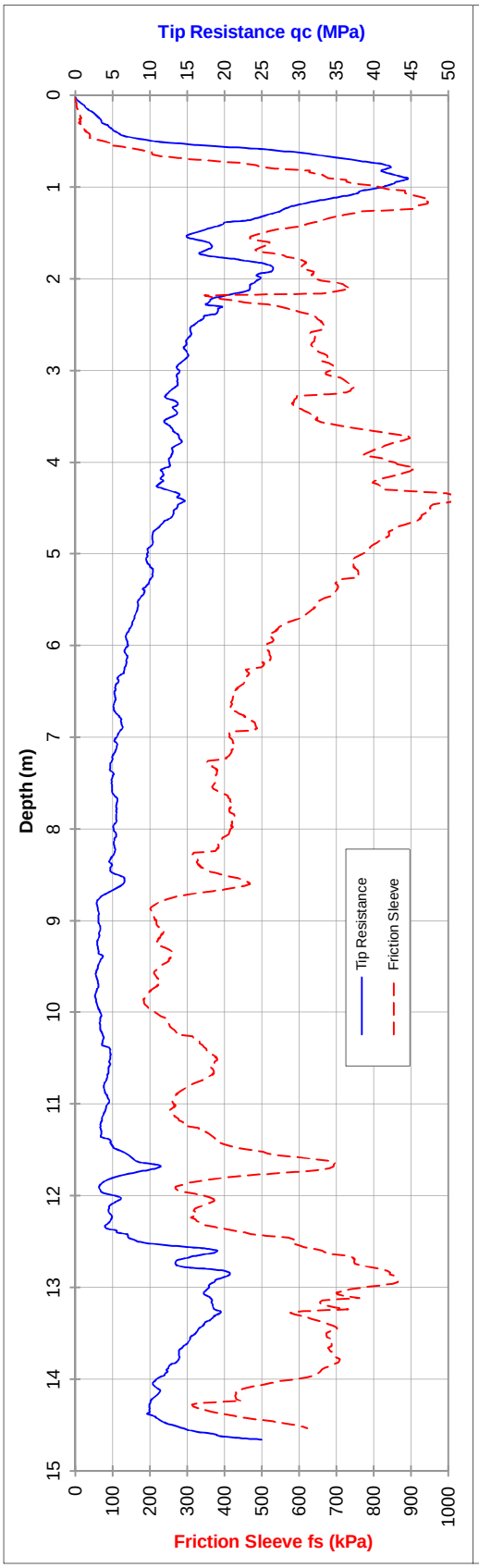
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

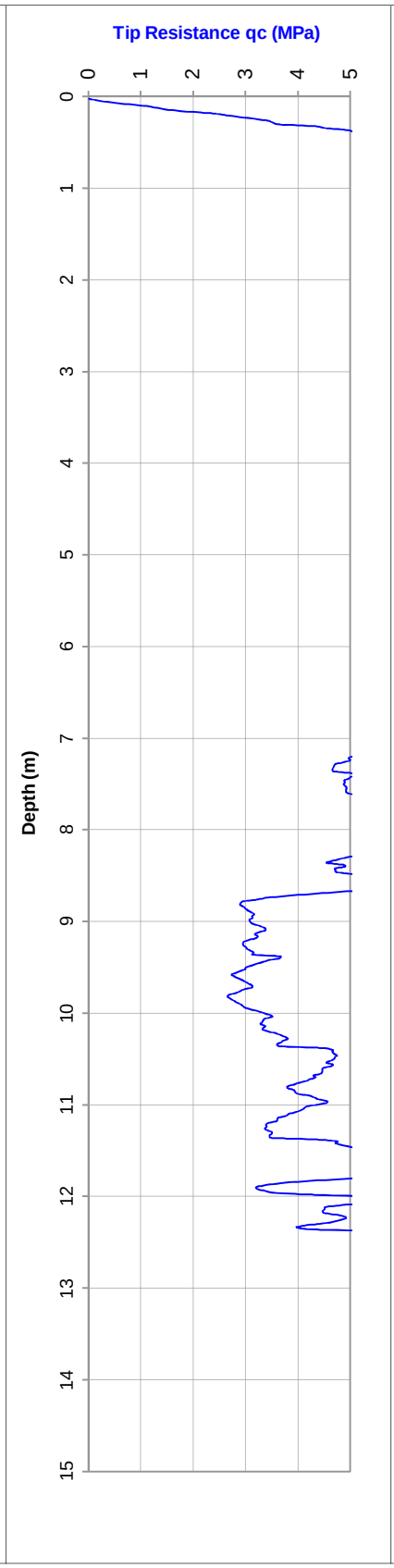
File: GA9264R.txt

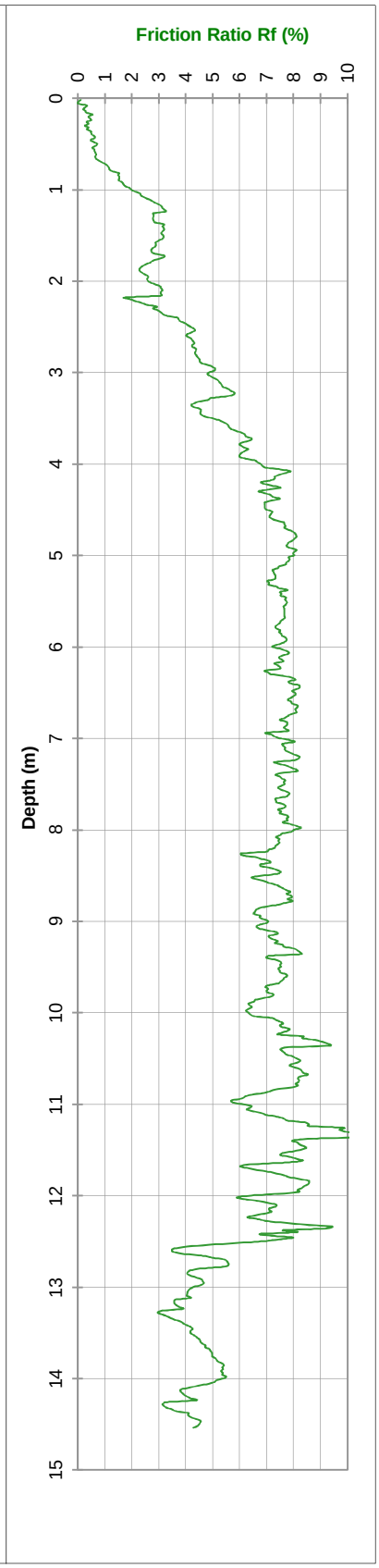
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 6
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462541E, 6469320N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 4.30

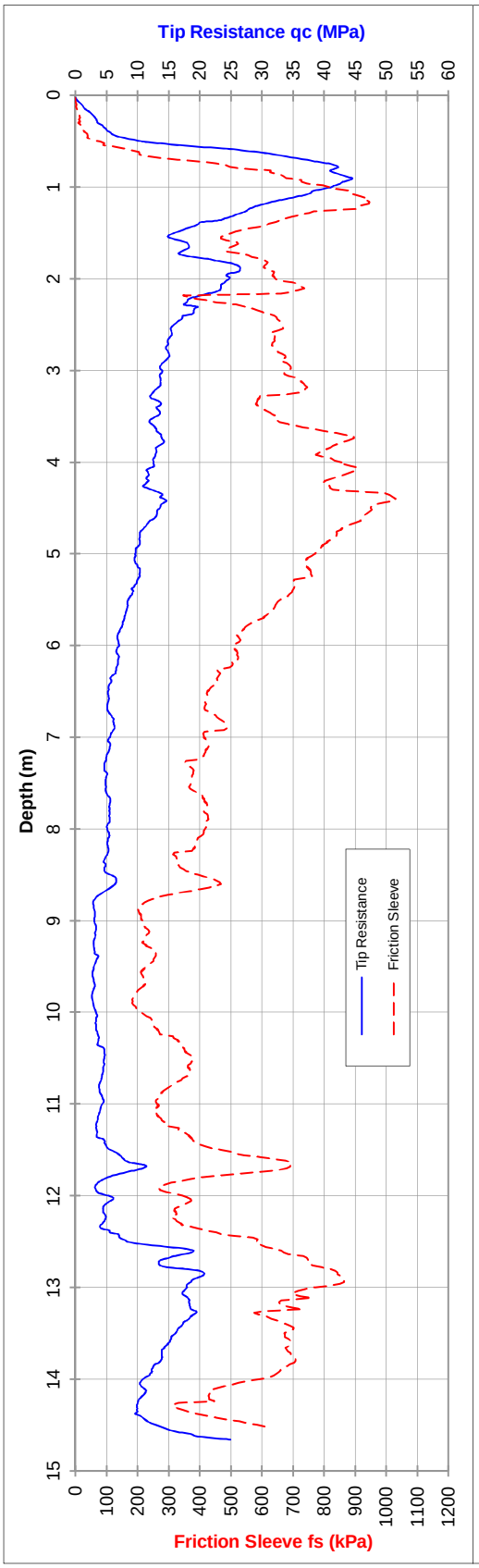
Refusal: 25MPa + No Lateral Support

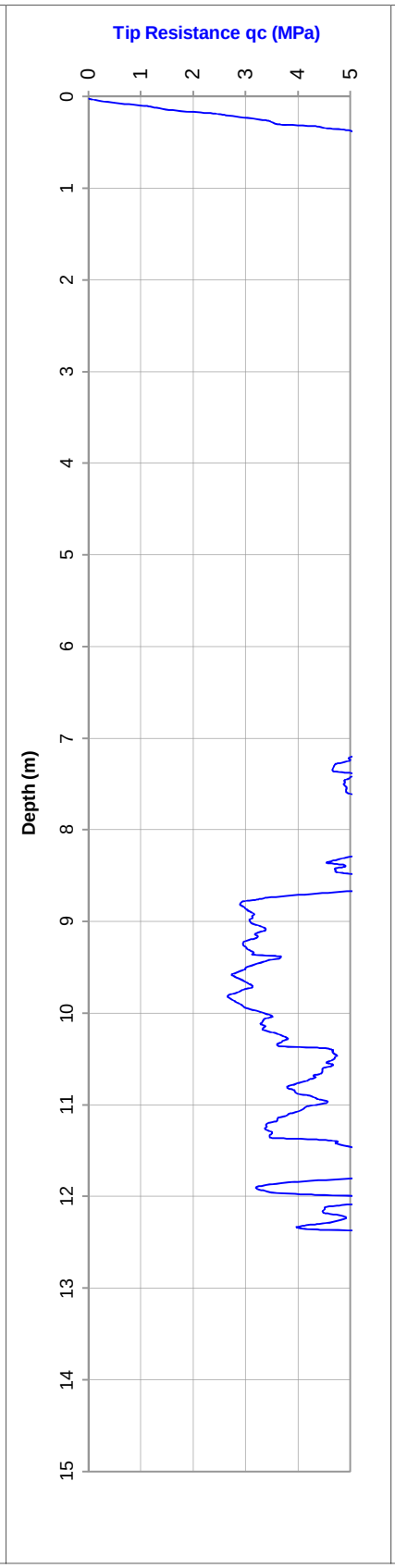
Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

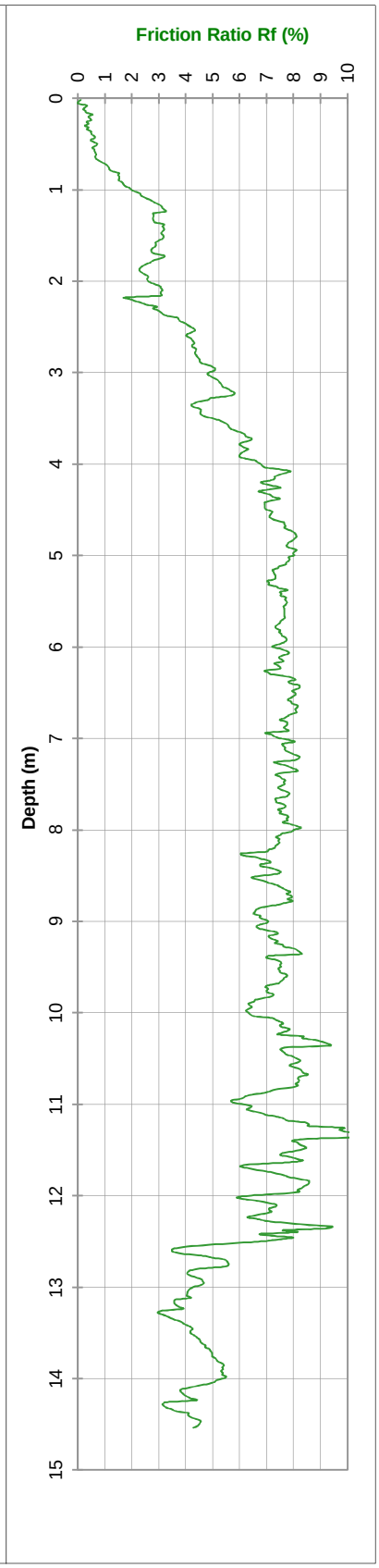
File: GA9265R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 6
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462541E, 6469320N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 4.30

Refusal: 25MPa + No Lateral Support

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9265R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

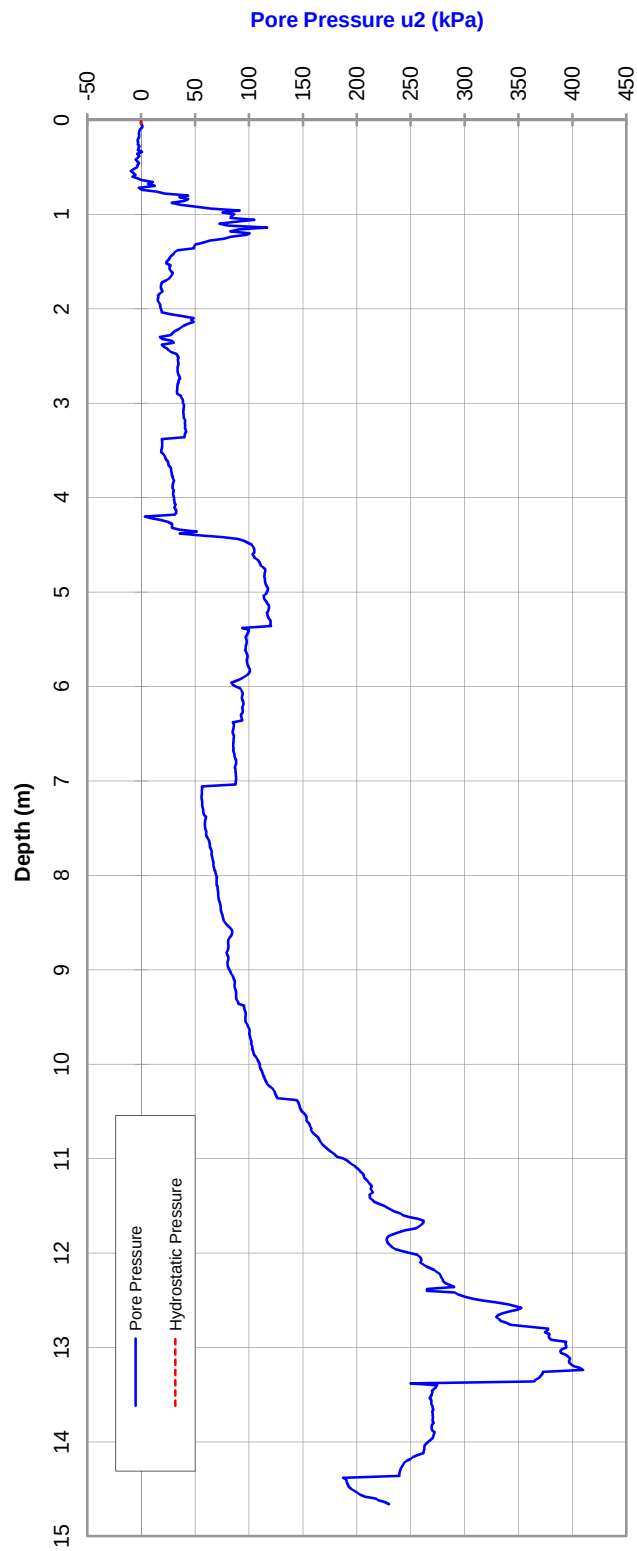
Project: Allawuna Farm

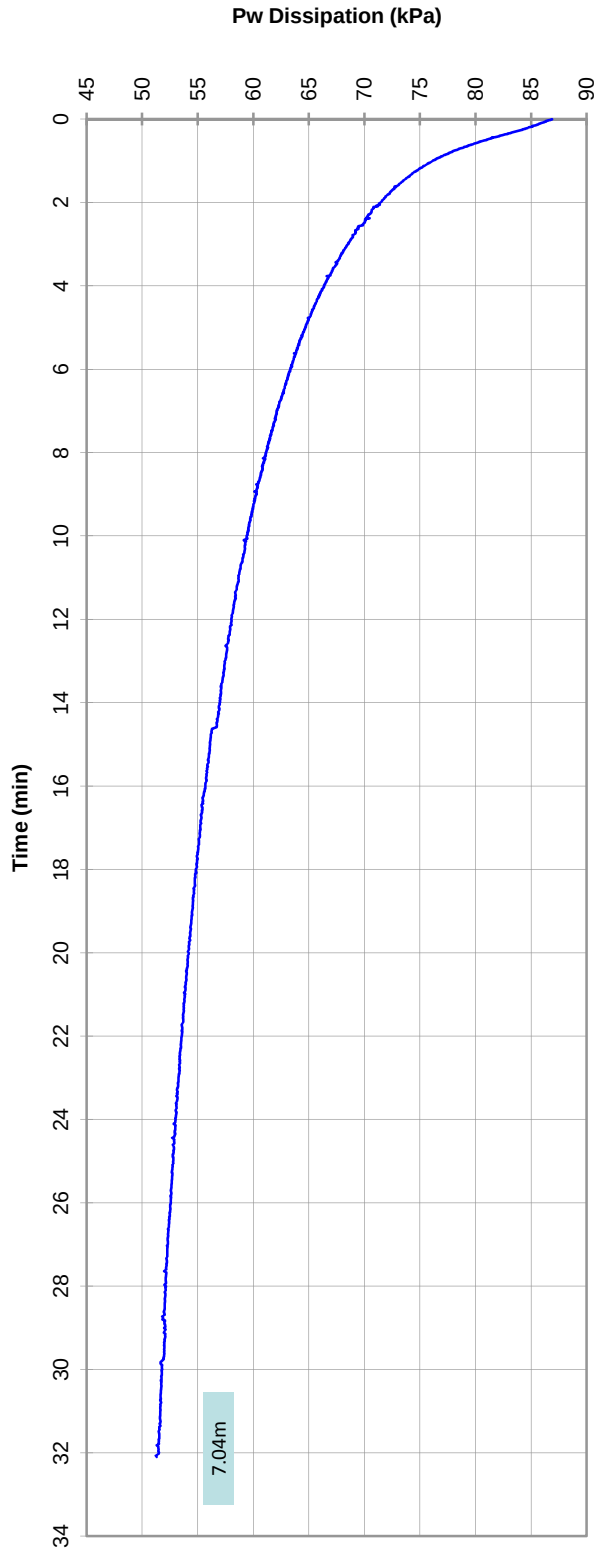
Probe No.: CPTU 6

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462541E, 6469320N





PROBEDRILL GEOTECHNICAL SURVEY

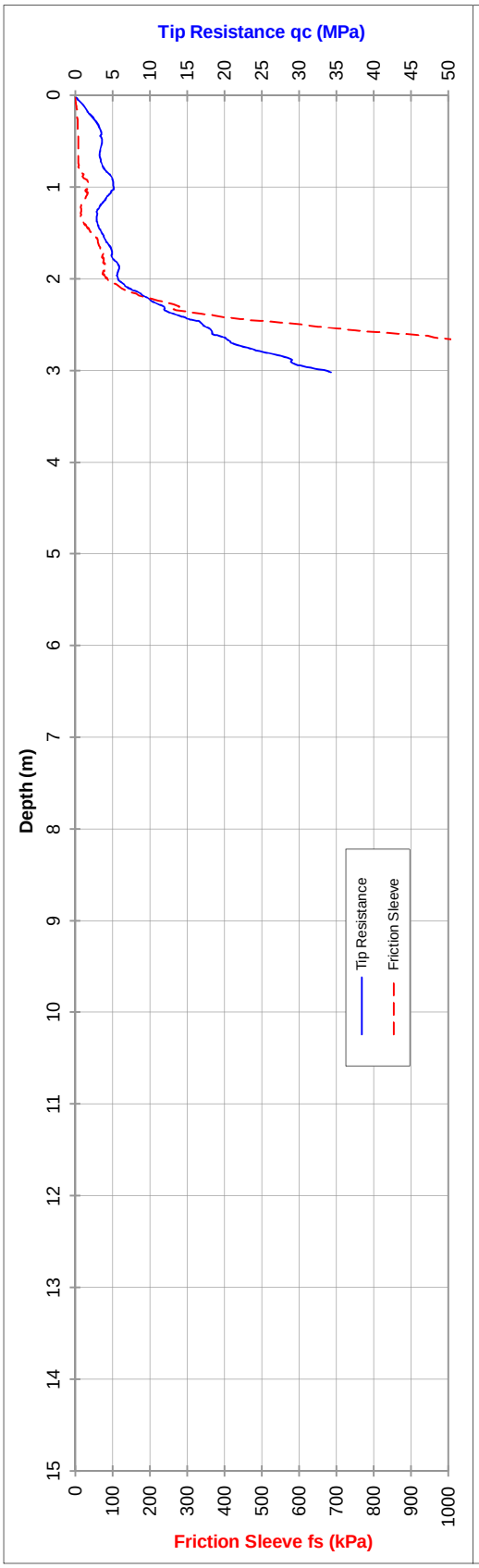
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

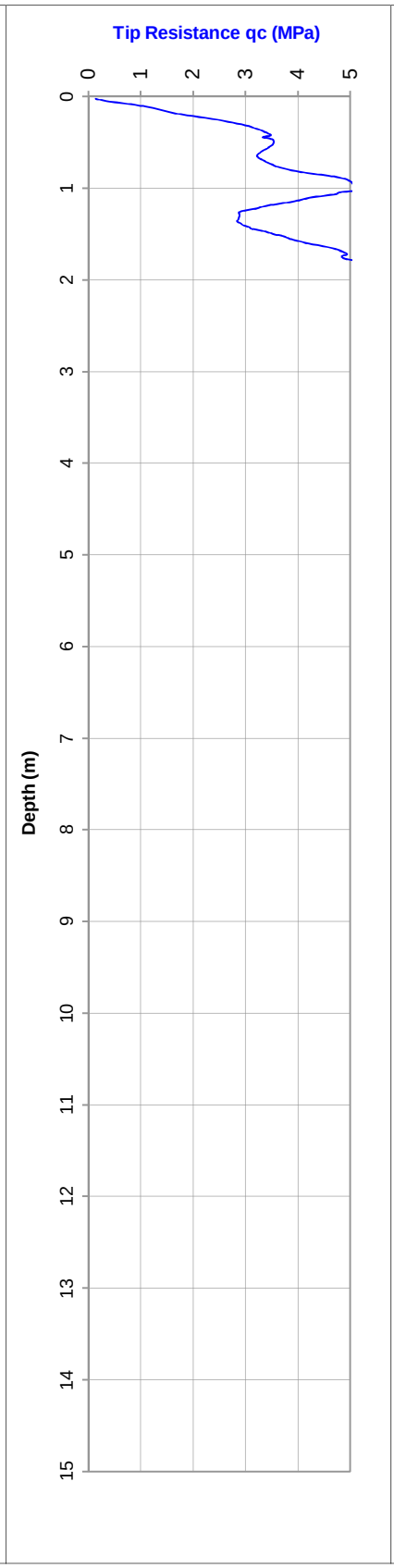
File: GA9265R.txt

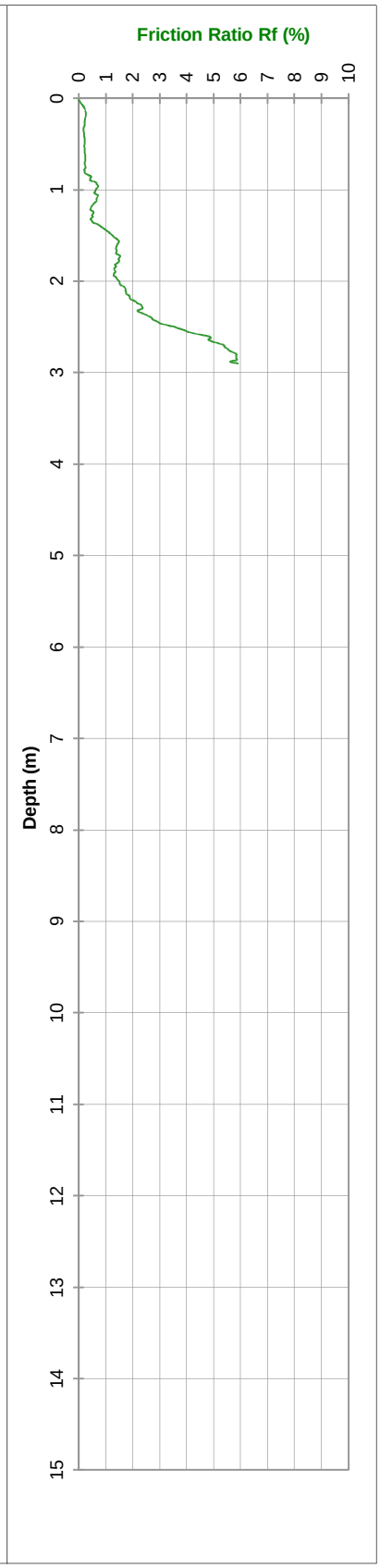
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 6.1
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462492E, 6469207N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.70

Refusal: 35MPa + No Lateral Support

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9266R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

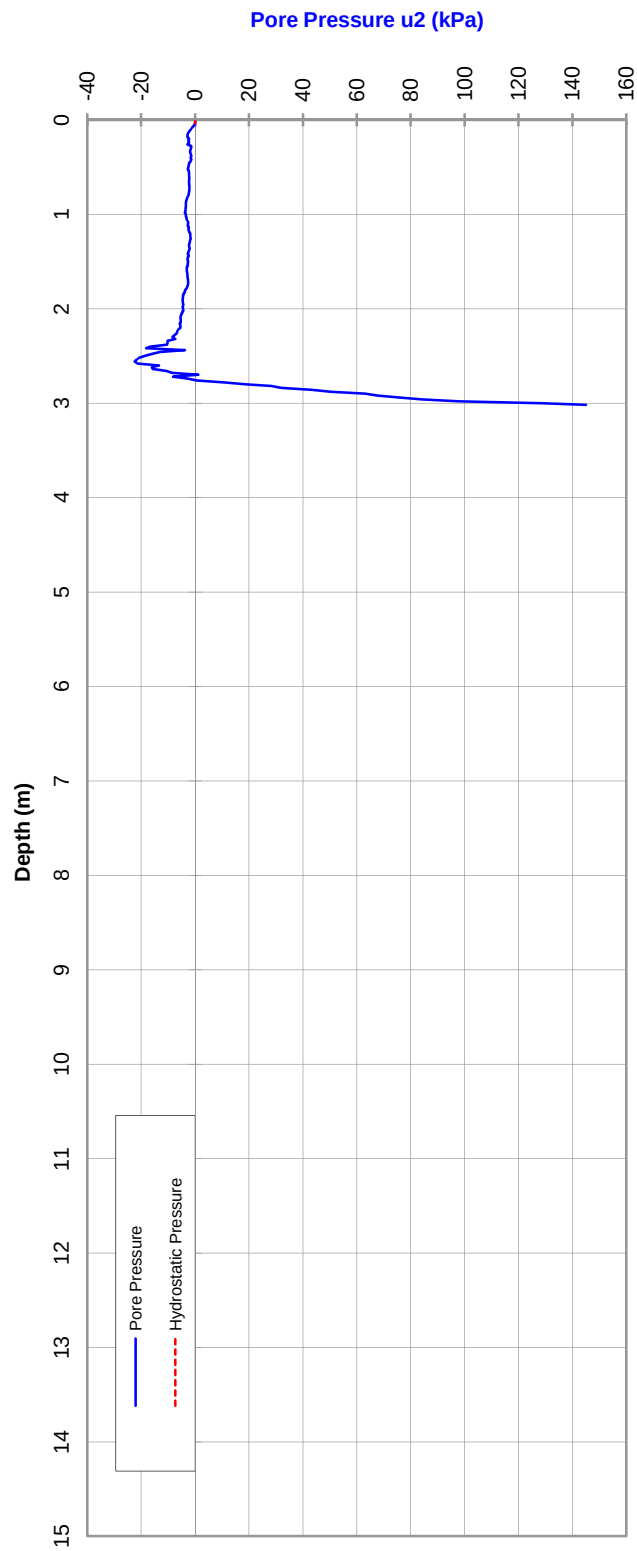
Project: Allawuna Farm

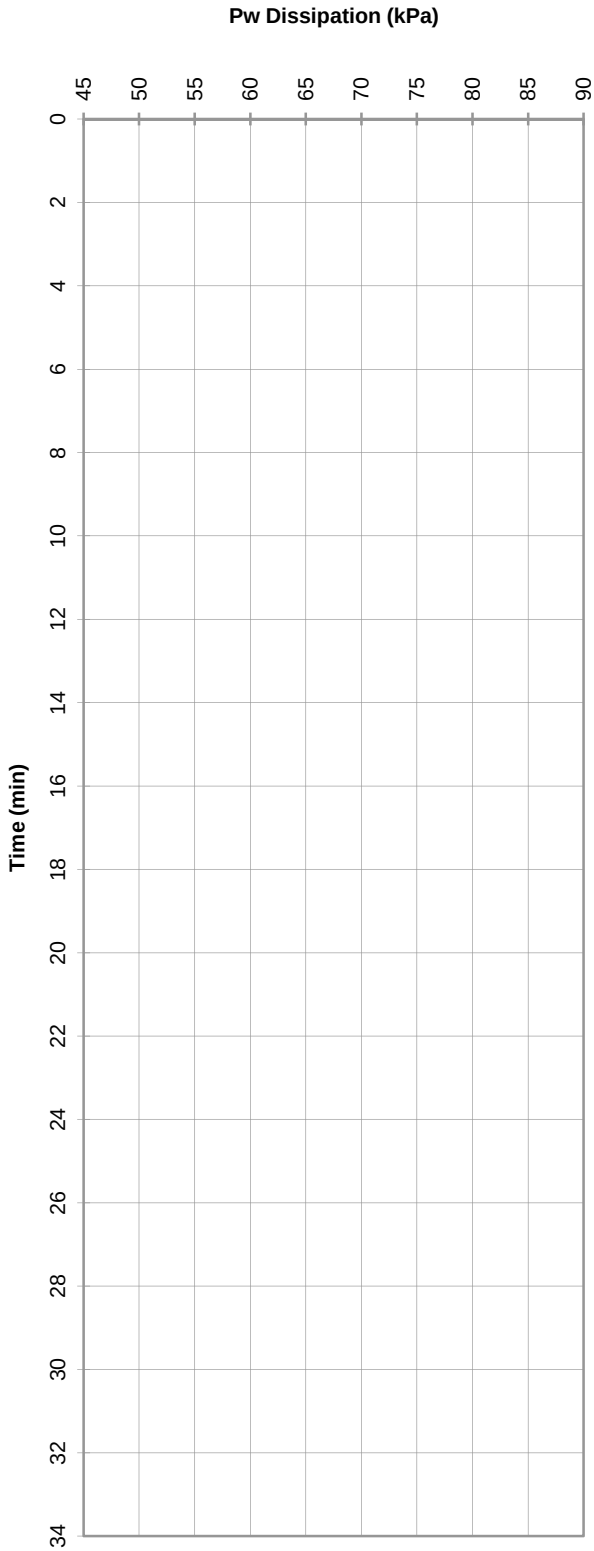
Probe No.: CPTU 6.1

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462492E, 6469207N





PROBEDRILL GEOTECHNICAL SURVEY

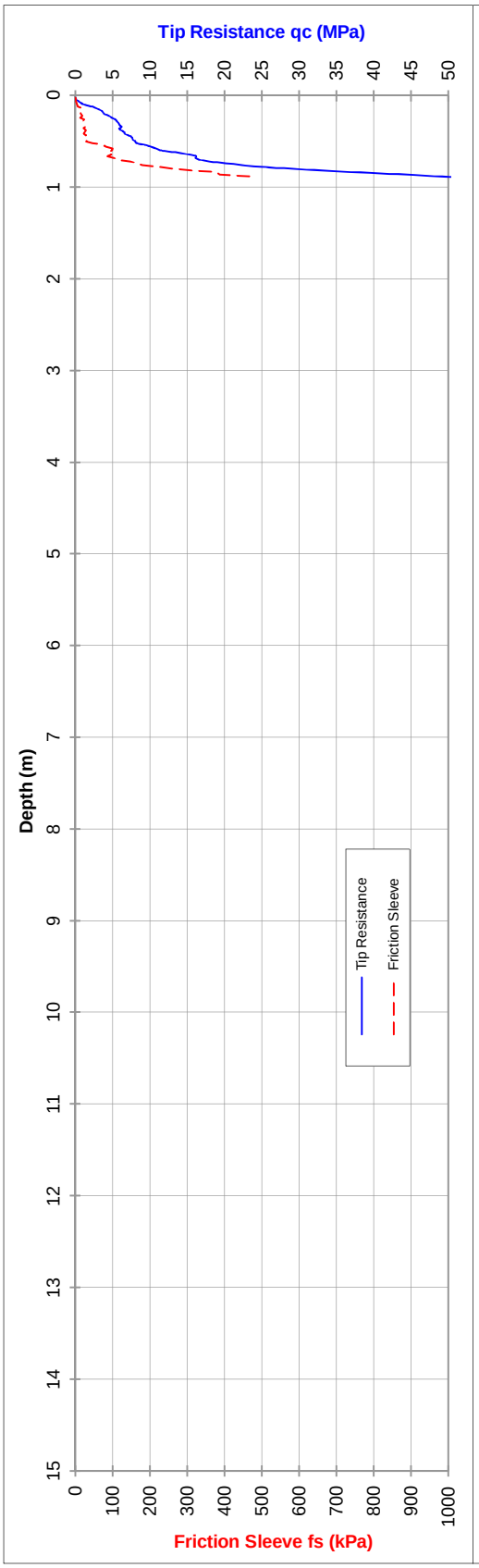
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

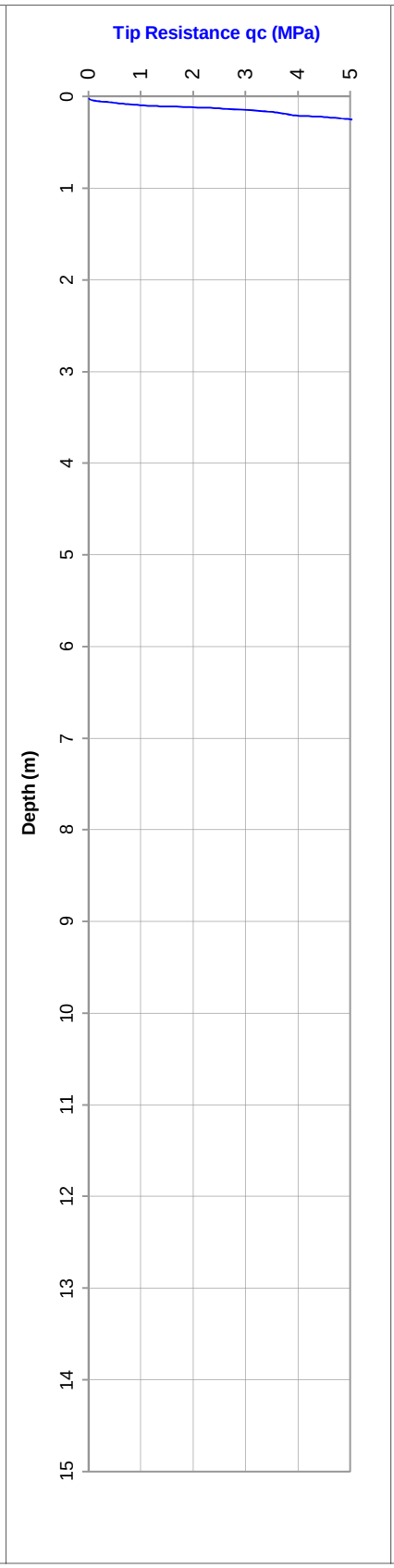
File: GA9266R.txt

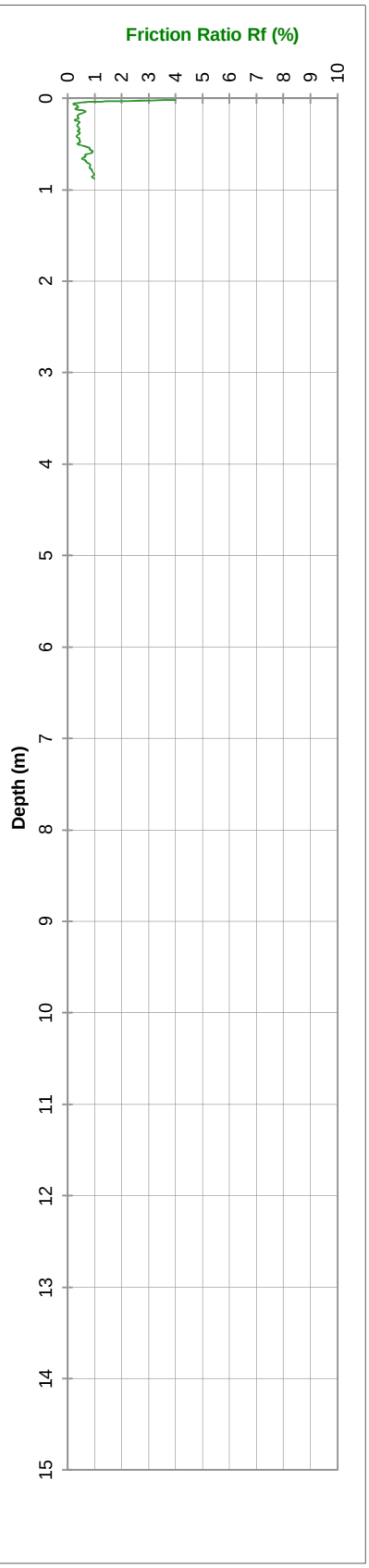
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 6.2
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462534E, 6469311N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 0.9

Refusal: 85MPa

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9267R Cone I.D. : EC42 Dummy probe to (m): 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

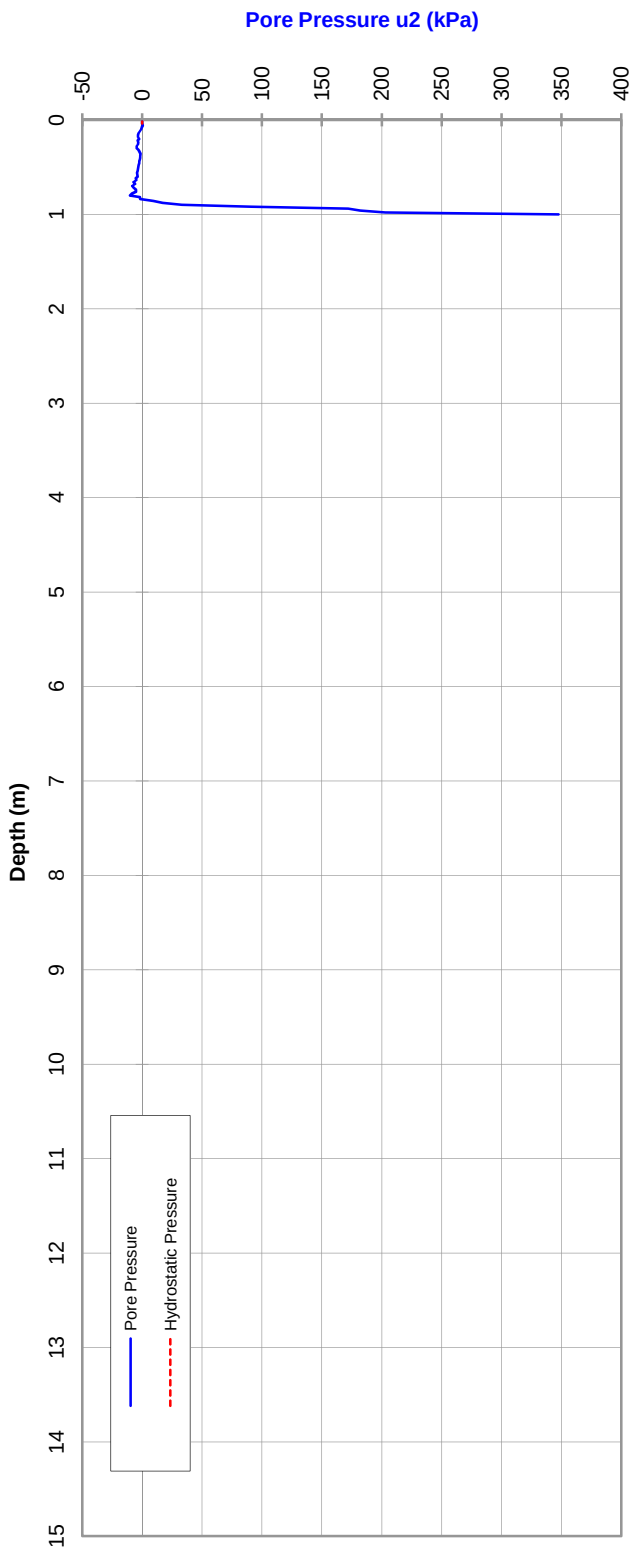
Project: Allawuna Farm

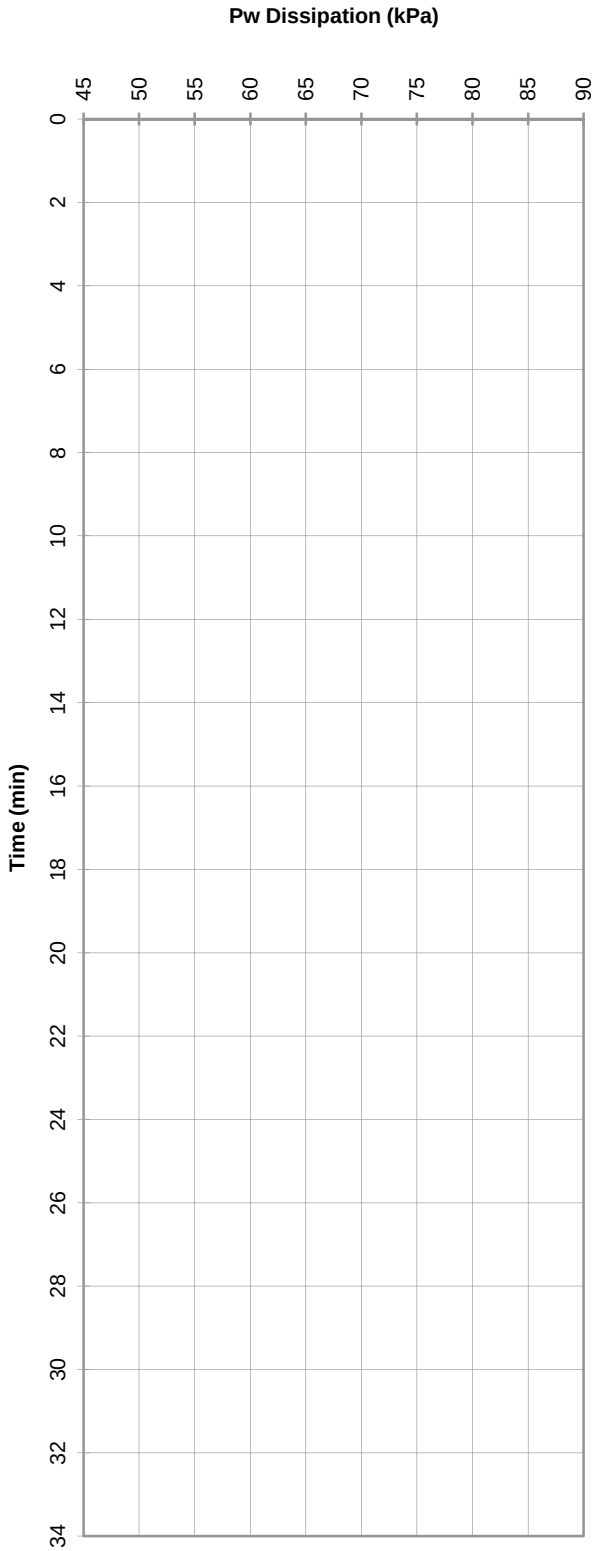
Probe No.: CPTU 6.2

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462534E, 6469311N





PROBEDRILL GEOTECHNICAL SURVEY

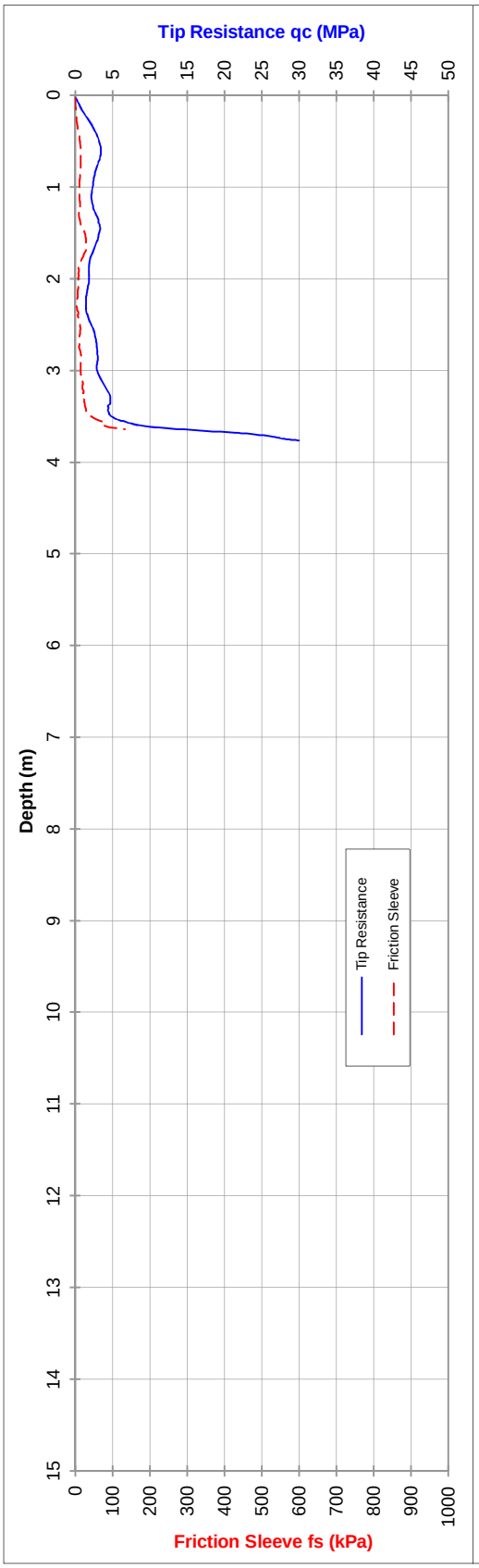
Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

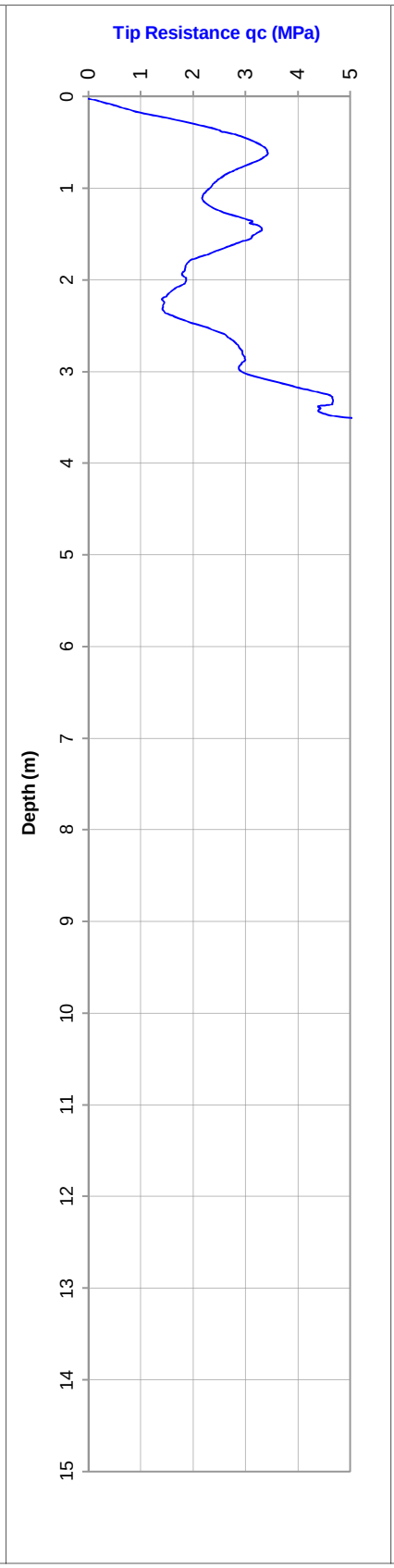
File: GA9267R.txt

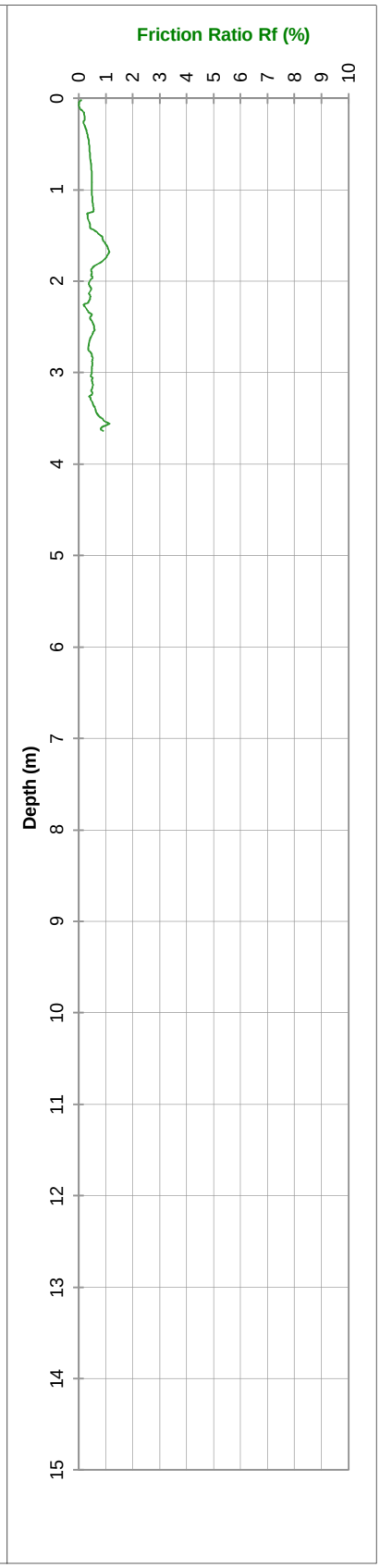
25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: SITA	Date: Tuesday, 17 February 2015
PROJECT: Allawuna Farm	Probe No.: CPTU 6.3
LOCATION: York, W.A.	Job Number: 147645033
RL (m):	Co-ordinates: 462520E, 6469234N







PROBEDRILL GEOTECHNICAL SURVEY

Water (m): Dry to 2.25

Refusal: 30MPa + No Lateral Support

Tested in accordance with AS 1289.6.5.1 - 1999 and IRTP 2001 for friction reducer

File: GA9268R | Cone I.D. : EC42 | Dummy probe to (m): | 25 tonne truck mounted CPT Rig (RFW)

ELECTRIC FRICTION-CONE PENETROMETER

Client: SITA

Date: Tuesday, 17 February 2015

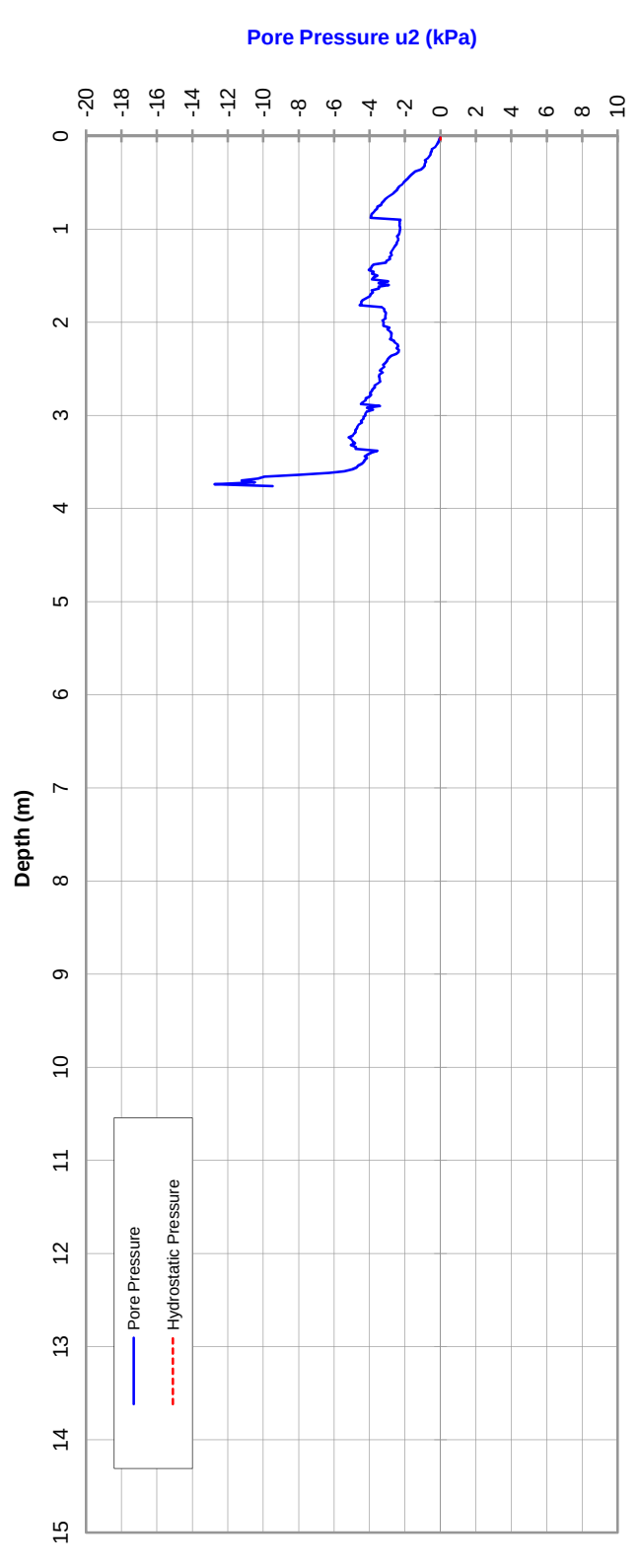
Project: Allawuna Farm

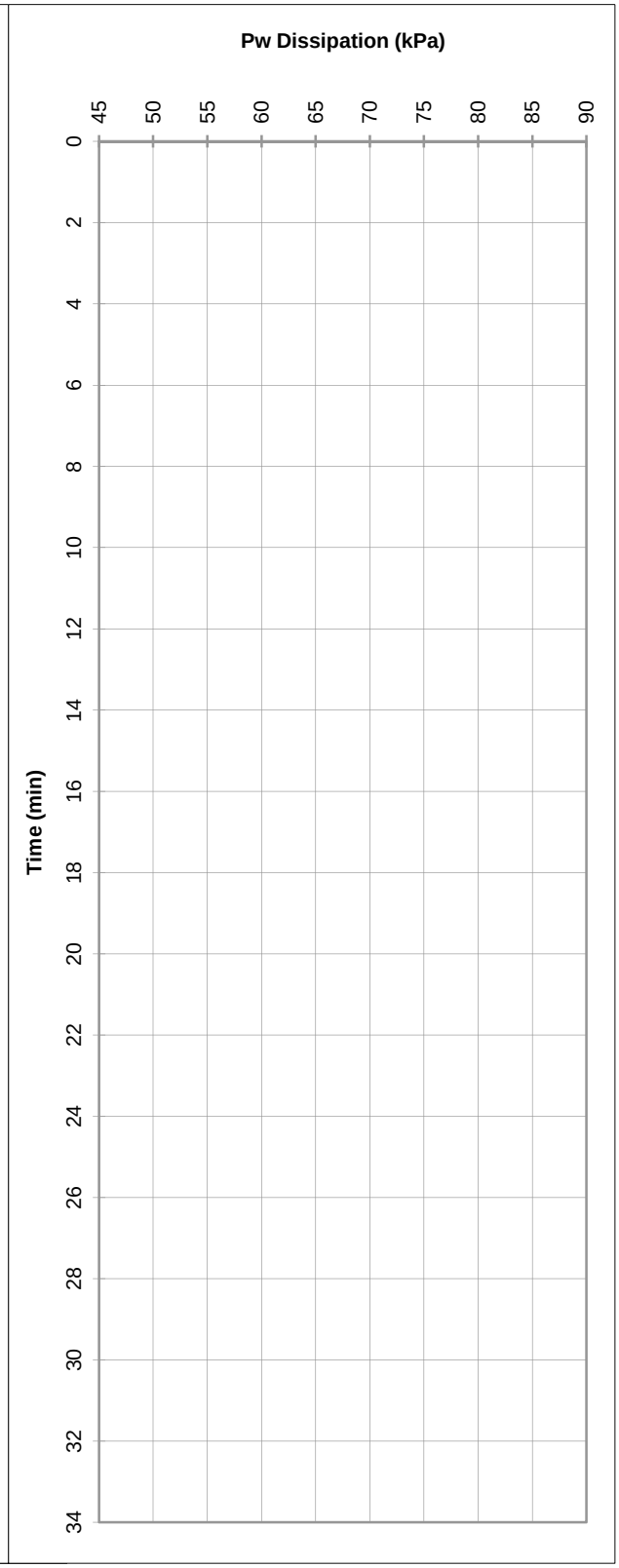
Probe No.: CPTU 6.3

Location: York, W.A.

Job Number: 147645033

Co-ordinates: 462520E, 6469234N





PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1 - 1999
and IRTP 2001 for friction reducer

File: GA9268R.txt

25 tonne truck mounted CPT Rig (RFW)

APPENDIX L

Limitations

LIMITATIONS

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