

In March 2017, the third stage of the ground investigation was undertaken, comprising the excavation of three test pits in order to obtain undisturbed samples for the hydrological characterisation study. The test pits, TP01/17 and TP02/17 were located within the low lying area of the tree avenue. Test pit TP03/17 was located at an elevated location adjacent to a section of healthy trees.

The boreholes were drilled with a truck mounted Gemco HC10 drilling rig using continuous flight augers. The test pits were excavated using a backhoe excavator. The borehole and test pit locations are shown on **Figure 1** attached. The fieldwork was directed by an Engineering Geologist from the group, who was responsible for nominating and directing all testing and sampling and providing field logs of the soils encountered. The hydrological characterisation study was directed by personnel from SMI.

Engineering logs of the borehole, indicating test results, and the accompanying explanation sheets are attached in **Appendix A**.

## 5.0 Field Investigation Findings

Table 1 provides a summary of the stratigraphy encountered and groundwater levels observed in the boreholes and test pits. Results are discussed in **Sections 6 to 8**.

**Table 1: Summary of Ground Investigation Findings**

| Borehole/<br>Test Pit No | Surface<br>Level<br>(m AHD) | Hole Depth<br>(m bgl) | Geology Encountered |                              | Groundwater<br>Level<br>(drilling<br>works)<br>(m AHD) | Groundwater<br>Monitoring<br>Levels<br>(m AHD)<br>(Note 2)                        |
|--------------------------|-----------------------------|-----------------------|---------------------|------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------|
|                          |                             |                       | Geological<br>Unit  | From/To<br>(m AHD)           |                                                        |                                                                                   |
| BH01/16                  | 5.33                        | 4.45                  | Fill<br>Alluvium    | 5.33 to 4.53<br>4.53 to 0.88 | 3.13                                                   | 30/11/16 4.05<br>19/12/16 4.19<br>06/02/17 4.15<br>29/03/17 4.23<br>05/06/17 4.35 |
| BH02/16                  | 5.38                        | 4.45                  | Fill<br>Alluvium    | 5.38 to 4.58<br>4.58 to 0.93 | 2.88                                                   | 30/11/16 3.78<br>19/12/16 3.89<br>06/02/17 3.85<br>29/03/17 3.97<br>05/06/17 4.12 |

| Borehole/<br>Test Pit No | Surface<br>Level<br>(m AHD) | Hole Depth<br>(m bgl) | Geology Encountered                     |                                                 | Groundwater<br>Level<br>(drilling<br>works)<br>(m AHD) | Groundwater<br>Monitoring<br>Levels<br>(m AHD)<br>(Note 2)                        |
|--------------------------|-----------------------------|-----------------------|-----------------------------------------|-------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------|
|                          |                             |                       | Geological<br>Unit                      | From/To<br>(m AHD)                              |                                                        |                                                                                   |
| BH03/16                  | 6.00                        | 5.95                  | Alluvium                                | 6.0 to 0.05                                     | 2.00                                                   | 30/11/16 3.21<br>19/12/16 3.20<br>06/02/17 3.36<br>29/03/17 3.37<br>05/06/17 3.65 |
| BH04/16                  | 6.65<br>(Note 1)            | 7.00                  | Alluvium                                | 6.65 to -0.35                                   | 1.15                                                   | 06/02/17 2.98<br>29/03/17 2.99<br>05/06/17 3.23                                   |
| BH05/16                  | 6.82<br>(Note 1)            | 7.00                  | Fill<br>Alluvium                        | 6.82 to 6.02<br>6.02 to -0.18                   | 1.32                                                   | 06/02/17 2.93<br>29/03/17 2.92<br>05/06/17 3.14                                   |
| BH06/16                  | 5.30<br>(Note 1)            | 2.50                  | Fill<br>Alluvium                        | 5.30 to 4.80<br>4.80 to 2.80                    | 3.80                                                   | -                                                                                 |
| BH07/16                  | 5.40<br>(Note 1)            | 2.50                  | Fill<br>Alluvium                        | 5.40 to 4.60<br>4.60 to 2.90                    | -                                                      | -                                                                                 |
| BH08/16                  | 6.20<br>(Note 1)            | 2.50                  | Alluvium                                | 6.20 to 3.70                                    | Not observed                                           | -                                                                                 |
| BH09/16                  | 11.70<br>(Note 1)           | 4.00                  | Colluvium<br>Residual Soil<br>Sandstone | 11.70 to 10.20<br>10.20 to 8.90<br>8.90 to 7.70 | Not observed                                           | -                                                                                 |
| BH10/16                  | 9.70<br>(Note 1)            | 3.00                  | Colluvium<br>Residual Soil<br>Sandstone | 9.70 to 9.20<br>9.20 to 7.20<br>7.20 to 6.70    | Not observed                                           | -                                                                                 |
| BH11/16                  | 6.00<br>(Note 1)            | 4.00                  | Alluvium                                | 6.00 to 2.00                                    | Not observed                                           | -                                                                                 |
| TP01/17                  | 5.30<br>(Note 1)            | 1.60                  | Fill<br>Alluvium                        | 5.30 to 4.70<br>4.70 to 3.70                    | Not observed                                           | -                                                                                 |
| TP02/17                  | 5.20<br>(Note 1)            | 1.10                  | Alluvium                                | 5.20 to 4.10                                    | Not observed                                           | -                                                                                 |
| TP03/17                  | 5.50<br>(Note 1)            | 1.10                  | Alluvium                                | 5.50 to 4.40                                    | Not observed                                           | -                                                                                 |

**Note 1** - Surface levels are approximate only as no detailed survey has been undertaken. Surface levels determined from BCC site survey data.

**Note 2** - Levels indicated are manually recorded at time of datalogger download. Reference should be made to Appendix B for the detailed levels.

Boreholes, BH01/16 to BH07/16 and BH11/16, drilled along the avenue of trees encountered predominately sandy silty clay deposits considered to be part of recent Holocene aged alluvium. These deposits were characterised by inclusions of some sand pockets / lenses throughout.

At the request of BCC Landscape Architects, borehole BH08/16 was drilled along the western margin of the Arboretum adjacent to the Brisbane River. The clayey sand deposits encountered were considered to be alluvial deposits, although coarser grained relative to alluvium encountered along the subject tree avenue.

Similarly at the request of BCC Landscape Architects, boreholes BH09/16 and BH10/16, were drilled along a ridge in the central part of the Arboretum, in order to investigate the subsurface materials. No core was recovered to allow precise identification of the rock, however it is considered materials encountered were part of the Neranleigh-Fernvale Beds.

Test pits generally confirmed the alluvial materials encountered in boreholes BH01/16 to BH03/16.

## 6.0 Groundwater Monitoring

Solinst Levelloggers were installed in BH01/16 to BH05/16 to monitor groundwater levels and temperature measurements over time. Reading intervals were set record every 5 minutes in order to monitor levels in relation to rainfall / storm events. In addition, a levellogger was placed within the pond in order to provide a comparison of pond levels to groundwater levels. Detailed monitoring results are provided in **Appendix B**.

The groundwater monitoring has indicated a relationship between groundwater level changes and the level changes in the pond. In relation to rainfall events responses were noted to be relatively rapid. However as noted in Table 1, the groundwater level encountered during the drilling works was lower than the monitoring levels of the loggers. This is considered to indicate a piezometric head or confined groundwater system is present. This may be due to the presence of a layer or band of relatively higher hydraulic conductivity at depth, not identified in materials recovered from the borehole augers.

## 7.0 Laboratory Testing

As part of the study soil and water samples were retrieved for subsequent environmental testing. The required testing determinants or testing suites were defined by BCC Landscape Architects and Arborists. All samples were couriered to ALS Pty Ltd for testing.

Particle Size Distribution (PSD) testing was undertaken on samples retrieved from the test pit excavations. The tests confirmed the alluvial deposits to be silty clay.

Interpretation of environmental testing is not part of the scope of this report and is discussed by others as part of the study.

The soil and water laboratory test results are provided in **Appendix C**.

## 8.0 Hydrological Characterisation Study

Following the results of the groundwater monitoring and the indication of a confined aquifer system relative to pond levels and groundwater, a hydrological characterisation study was undertaken in order to provide further information to the near surface (top 1.0m) soil water properties that may be influencing the health of the trees.

The hydrological characterisation study report submitted by SMI is provided in **Appendix D**. Reference should be made to the report for details on the procedures, locations and results of the study. The following factors are considered important to highlight:

- All sample locations (0.1m, 0.40m, 0.70m and 1.0m depths) indicated very low hydraulic conductivity ( $1 \times 10^{-9}$  m/s).
- All samples had a high degree of saturation, between 66% and 76% at the time of sampling.
- Relatively high water suction of the alluvial deposits potentially reducing the water availability to plant roots and the water drainage capacity.

## 9.0 Discussion and Recommendations

It is understood that some options considered for rehabilitation include:

1. Changing the tree species to a species more tolerant to high soil moisture contents.
2. Permanently raising the ground surface levels along the avenue section to elevate trees and root systems above any high moisture content zone.
3. Installing a 'global' drainage system to remove water away from the roots. For example installing 'herringbone' pattern land drainage system.
4. Bulk earthworks option to excavate near surface soils and replace with suitable soil with incorporation of drainage system and possible cut off wall between the pond and the trees.

Options 1 and 2 above would require consideration by others, however from a geotechnical perspective aspects regarding Options 3 and 4 are discussed further.

It is understood that there are a number of other factors potentially affecting tree health including the previously mentioned, phytophthora, as well as salinity of the alluvial deposits and degree of compaction that would be considered in terms of appropriate rehabilitation options.

Although herringbone drains would move water within the system of channels, it is considered that this may not be sufficient to cause a 'dewatering' of the alluvial deposits with very low hydraulic conductivity and high water retention. Notwithstanding any considerations for Options 1 and 2, at this stage from a geotechnical perspective the bulk earthworks option may be considered a preferred option (between considered Options 3 and 4).

It is understood that for the bulk earthworks option the primary purpose would be for the replacement of the in-situ material with fresh, more suitable material for the critical root zone (with soil depth of 800 mm). There are some important aspects that require consideration for the earthworks design, as follows:

- The proposal for replacement of in-situ material with more permeable material does have some hydrology risks, in terms of the potential creation of a groundwater basin that may equilibrate to the existing condition. Detailed consideration would be required for an appropriate drainage system ensuring outlet levels do not allow development of a basin and sufficient drainage from the area is allowed for. In this regard, it is recommended that standpipe monitoring boreholes are installed within the soil replacement zone to monitor for water levels. Allowance should also be made for maintenance of the drainage system.

- The in-situ material has a low hydraulic conductivity and thus can be considered to be somewhat of a barrier (provided replacement soil is drained). Therefore any excavation should be kept as far as possible away from the pond. Depending on the type of excavation and construction procedures considerations should still be given to temporary shoring wall for support of in-situ material and minimisation of seepage from the pond, e.g by construction of a cut-off wall.

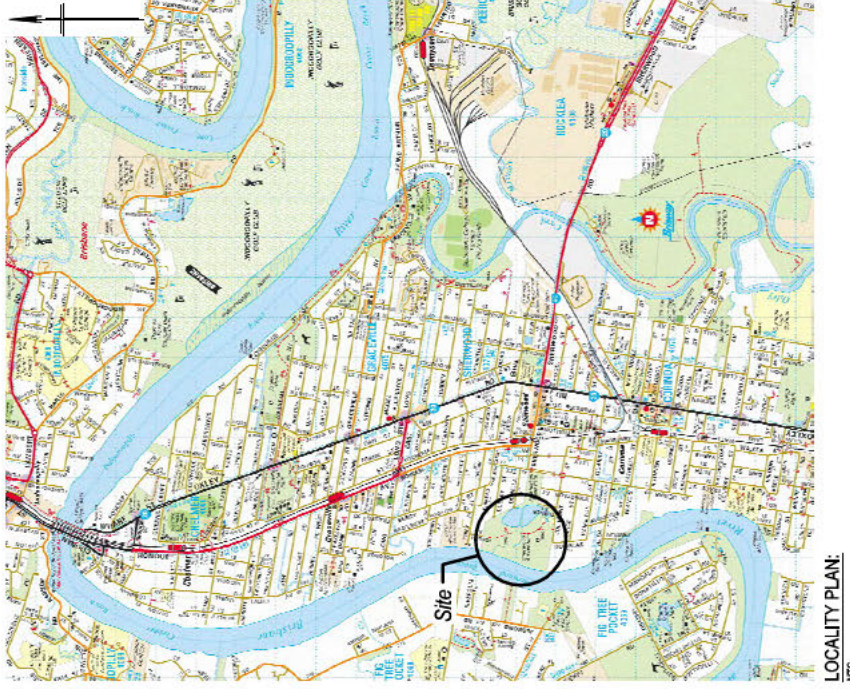
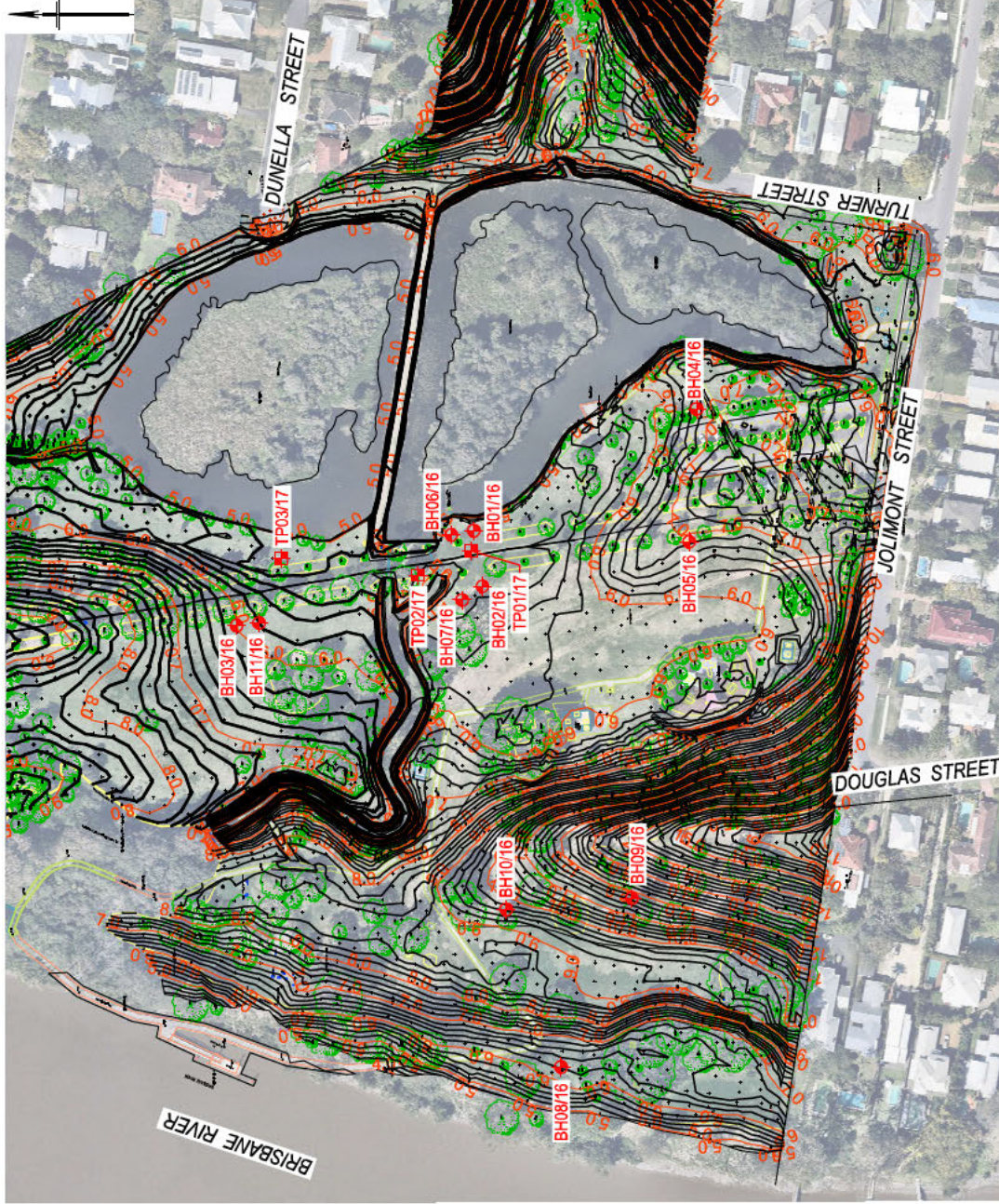
Please take the time to read the attached document '**Important Information About Your Geotechnical Engineering Report**', sections of which relate to the subsurface conditions.

Should you have any queries concerning this investigation, please contact [REDACTED] or [REDACTED].

[REDACTED]  
**Senior Engineering Geologist**  
**Ground Engineering**

*Reviewed by:*

[REDACTED]  
[REDACTED]



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|-----------------------------------------------------------------------------------------------------------|------|
|                                                                                                           |      |
| <b>BRISBANE CITY COUNCIL</b><br><b>CITY PROJECTS OFFICE</b><br>The Engineering Group - Ground Engineering |      |
| Report Reference No.                                                                                      | Rev. |
| GE/160725 PR001A                                                                                          | 1    |
| Fig. 1                                                                                                    |      |

LANDSCAPE ARCHITECTURE  
 GROUND WATER CHARACTERISATION  
 SHERWOOD ARBORETUM  
 BOREHOLE AND TEST PIT LOCATIONS

# IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

As the client of a consulting geotechnical engineer, you should know that site subsurface conditions cause more construction problems than any other factor. ASFE/The Association of Engineering Firms Practicing in the Geosciences offers the following suggestions and observations to help you manage your risks.

## **A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS**

Your geotechnical engineering report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. These factors typically include: the general nature of the structure involved, its size, and configuration; the location of the structure on the site; other improvements, such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask your geotechnical engineer to evaluate how factors that change subsequent to the date of the report may affect the report's recommendations.

Unless your geotechnical engineer indicates otherwise, do not use your geotechnical engineering report:

- when the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size, elevation, or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership; or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems that may occur if they are not consulted after factors considered in their report's development have changed.

## **SUBSURFACE CONDITIONS CAN CHANGE**

A geotechnical engineering report is based on conditions that existed at the time of subsurface exploration. Do not base construction decisions on a geotechnical engineering report whose adequacy may have been affected by time. Speak with your geotechnical consultant to learn if additional tests are advisable before construction starts. Note, too, that additional tests may be required when subsurface conditions are affected by construction operations at or adjacent to the site, or by natural events such as floods, earthquakes, or ground water fluctuations. Keep your geotechnical consultant apprised of any such events.

## **MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL JUDGMENTS**

Site exploration identifies actual subsurface conditions only at those points where samples are taken. The data were extrapolated by your geotechnical engineer who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your geotechnical engineer can work together to help minimize their impact. Retaining your geotechnical engineer to observe construction can be particularly beneficial in this respect.

## **A REPORT'S RECOMMENDATIONS CAN ONLY BE PRELIMINARY**

The construction recommendations included in your geotechnical engineer's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Because actual subsurface conditions can be discerned only during earthwork, you should retain your geotechnical engineer to observe actual conditions and to finalize recommendations. Only the geotechnical engineer who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations are valid and whether or not the contractor is abiding by applicable recommendations. The geotechnical engineer who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

## **GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS**

Consulting geotechnical engineers prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your geotechnical engineer prepared your report expressly for you and expressly for purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the geotechnical engineer. No party should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.

## **GEOENVIRONMENTAL CONCERNS ARE NOT AT ISSUE**

Your geotechnical engineering report is not likely to relate any findings, conclusions, or recommendations

about the potential for hazardous materials existing at the site. The equipment, techniques, and personnel used to perform a geoenvironmental exploration differ substantially from those applied in geotechnical engineering. Contamination can create major risks. If you have no information about the potential for your site being contaminated, you are advised to speak with your geotechnical consultant for information relating to geoenvironmental issues.

#### **A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION**

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid misinterpretations, retain your geotechnical engineer to work with other project design professionals who are affected by the geotechnical report. Have your geotechnical engineer explain report implications to design professionals affected by them, and then review those design professionals' plans and specifications to see how they have incorporated geotechnical factors. Although certain other design professionals may be familiar with geotechnical concerns, none knows as much about them as a competent geotechnical engineer.

#### **BORING LOGS SHOULD NOT BE SEPARATED FROM THE REPORT**

Geotechnical engineers develop final boring logs based upon their interpretation of the field logs (assembled by site personnel) and laboratory evaluation of field samples. Geotechnical engineers customarily include only final boring logs in their reports. Final boring logs should not under any circumstances be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes, and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, give contractors ready access to the complete geotechnical engineering report prepared or authorized for their use. (If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared and that developing construction cost esti-

mates was not one of the specific purposes for which it was prepared. In other words, while a contractor may gain important knowledge from a report prepared for another party, the contractor would be well-advised to discuss the report with your geotechnical engineer and to perform the additional or alternative work that the contractor believes may be needed to obtain the data specifically appropriate for construction cost estimating purposes.) Some clients believe that it is unwise or unnecessary to give contractors access to their geotechnical engineering reports because they hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems. It also helps reduce the adversarial attitudes that can aggravate problems to disproportionate scale.

#### **READ RESPONSIBILITY CLAUSES CLOSELY**

Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical engineers. To help prevent this problem, geotechnical engineers have developed a number of clauses for use in their contracts, reports, and other documents. Responsibility clauses are not exculpatory clauses designed to transfer geotechnical engineers' liabilities to other parties. Instead, they are definitive clauses that identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report. Read them closely. Your geotechnical engineer will be pleased to give full and frank answers to any questions.

#### **RELY ON THE GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE**

Most ASFE-member consulting geotechnical engineering firms are familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a construction project, from design through construction. Speak with your geotechnical engineer not only about geotechnical issues, but others as well, to learn about approaches that may be of genuine benefit. You may also wish to obtain certain ASFE publications. Contact a member of ASFE of ASFE for a complimentary directory of ASFE publications.

## **ASFE** PROFESSIONAL FIRMS PRACTICING IN THE GEOSCIENCES

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# **Appendix A**

## **Explanation Sheets Borehole & Test Pit Logs**

## CITY PROJECTS OFFICE – GROUND ENGINEERING

### EXPLANATION SHEET FOR DESCRIPTION AND CLASSIFICATION OF SOIL



Description and classification of soil are based on definitions and systems given in Australian Standard AS1726-1993, Geotechnical Site Investigations. Refer tables below for classifications in relation to particle size, strength of cohesive soils and relative density of non-cohesive or granular soils.

#### PARTICLE SIZE

| Soils are classified on the basis of predominant particle size, modified by other significant particle size or sizes present (e.g. CLAYEY SAND). Adjectival modifiers vary depending on predominant soil type and percentage of minor components. |        |                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------------|
| Classification                                                                                                                                                                                                                                    |        | Particle Size    |
| CLAY                                                                                                                                                                                                                                              |        | < 0.002 mm       |
| SILT                                                                                                                                                                                                                                              |        | 0.002 - 0.075 mm |
| SAND                                                                                                                                                                                                                                              | fine   | 0.075 - 0.2 mm   |
|                                                                                                                                                                                                                                                   | medium | 0.2 - 0.6 mm     |
|                                                                                                                                                                                                                                                   | coarse | 0.6 - 2.0 mm     |
| GRAVEL                                                                                                                                                                                                                                            | fine   | 2 - 6 mm         |
|                                                                                                                                                                                                                                                   | medium | 6 - 20 mm        |
|                                                                                                                                                                                                                                                   | coarse | 20 - 60 mm       |
| COBBLES                                                                                                                                                                                                                                           |        | 60 - 200 mm      |
| BOULDERS                                                                                                                                                                                                                                          |        | > 200 mm         |

#### COHESIVE SOILS

| Cohesive soils are described in terms of consistency, colour and structure with comments on minor constituents or apparent special features. Consistency is based on the shear strength of the soil, and is generally estimated from experience and pocket penetrometer testing, or determined by vane shear testing or laboratory testing. |        |                          |                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------|---------------------------------|
| Term                                                                                                                                                                                                                                                                                                                                        | Symbol | Undrained Shear Strength | Unconfined Compressive Strength |
| VERY SOFT                                                                                                                                                                                                                                                                                                                                   | VS     | < 12 kPa                 | <25 kPa                         |
| SOFT                                                                                                                                                                                                                                                                                                                                        | S      | 12 - 25 kPa              | 25-50 kPa                       |
| FIRM                                                                                                                                                                                                                                                                                                                                        | F      | 25 - 50 kPa              | 50-100 kPa                      |
| STIFF                                                                                                                                                                                                                                                                                                                                       | St     | 50 - 100 kPa             | 100-200 kPa                     |
| VERY STIFF                                                                                                                                                                                                                                                                                                                                  | VSt    | 100 - 200 kPa            | 200-400 kPa                     |
| HARD                                                                                                                                                                                                                                                                                                                                        | H      | > 200 kPa                | >400 kPa                        |

#### NON-COHESIVE SOILS

| Non-cohesive soils are described in terms of relative density, colour, with comments on minor components or apparent special features. Relative density of borehole strata is generally inferred from SPT "N" values (AS1289 Test 6.3.1), or other forms of penetration testing. |        |               |                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------|------------------|
| Term                                                                                                                                                                                                                                                                             | Symbol | SPT "N" Value | Relative Density |
| VERY LOOSE                                                                                                                                                                                                                                                                       | VL     | 0 - 4         | <15%             |
| LOOSE                                                                                                                                                                                                                                                                            | L      | 4 - 10        | 15 - 35%         |
| MEDIUM DENSE                                                                                                                                                                                                                                                                     | MD     | 10 - 30       | 35 - 65%         |
| DENSE                                                                                                                                                                                                                                                                            | D      | 30 - 50       | 65 - 85%         |
| VERY DENSE                                                                                                                                                                                                                                                                       | VD     | >50           | >85%             |

**Note:** Description and classification of rock are based on definitions and systems given in Australian Standard AS1726-1993, Geotechnical Site Investigations. Refer tables below for classifications and symbols in relation to strength, weathering and defect descriptions.

**CITY PROJECTS OFFICE – GROUND ENGINEERING**  
**EXPLANATION SHEET FOR DESCRIPTION AND CLASSIFICATION OF ROCK**



| STRENGTH OF ROCK MATERIAL                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |                                    |                             |                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------------------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rock Strength                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Symbol | Is <sub>(50)</sub> MPa<br>(Note 1) | Approx. UCS MPa<br>(Note 2) | General Field Guide                                                                                                                                                                                           |
| Extremely Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | EL     | <0.03                              | <0.7                        | Easily remoulded by hand to a material with soil properties.                                                                                                                                                  |
| Very Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | VL     | 0.03 - 0.1                         | 0.7 - 2.4                   | May be crumbled and fragmented by hand                                                                                                                                                                        |
| Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | L      | 0.1 - 0.3                          | 2.4 - 7                     | A piece of core 150 mm x 50 mm diameter may be broken by hand and easily scored with a knife. Sharp edges of the core may be friable and break during handling. Lumps of rock crumble with light hammer blow. |
| Medium                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | M      | 0.3 - 1                            | 7 - 24                      | A piece of core 150 mm x 50 mm diameter may be broken by hand with considerable difficulty but may be scored with a knife. Core may be broken with a light hammer blow.                                       |
| High                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | H      | 1 - 3                              | 24 - 70                     | A piece of core 150 mm x 50 mm diameter cannot be broken by hand, but can be slightly scratched or scored with a knife. Core may be broken with a blow from a hammer.                                         |
| Very High                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | VH     | 3 - 10                             | 70 - 240                    | A piece of core 150 mm x 50 mm diameter may be broken with a heavy hammer blow, but cannot be scratched by a knife.                                                                                           |
| Extremely High                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | EH     | >10                                | >240                        | A piece of core 150 mm x 50 mm diameter is difficult to break with a hammer and rings when struck.                                                                                                            |
| <b>Notes:</b> 1. Is <sub>(50)</sub> is Point Load Strength Index. Refer: AS 4133.4.1-2007, Methods of Testing Rock for Engineering Purposes.<br>Method 4.1: Rock Strength Tests - Determination of Point Load Strength Index.<br>2. UCS is Uniaxial Compressive Strength (or q <sub>u,max</sub> ) and values listed are based on an assumed ratio to the point load strength index of 24:1. This ratio may vary widely from 5 to 30 depending on rock type and is site specific. |        |                                    |                             |                                                                                                                                                                                                               |

**ROCK MATERIAL WEATHERING CLASSIFICATION**

| Term                      | Symbol | Definition                                                                                                                                                                                                               |
|---------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Residual Soil             | RS     | Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.                        |
| Extremely Weathered Rock  | XW     | Rock is weathered to such an extent that it has "soil" properties, i.e. it either disintegrates or can be remoulded, in water.                                                                                           |
| Distinctly Weathered Rock | DW     | Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores. |
| Slightly Weathered Rock   | SW     | Rock is slightly discoloured but shows little or no change of strength from fresh rock.                                                                                                                                  |
| Fresh Rock                | Fr     | Rock shows no sign of decomposition or staining.                                                                                                                                                                         |

**DESCRIPTION OF DEFECTS IN ROCK**

| Defect Type                                                                                      |                                                                          | Surface Shape                                                                 | Surface Features                                                | Coatings                                                                     |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------------|
| PT - Parting along bedding or foliation<br>JT - Joint<br>IS - Infill Seam<br>WS - Weathered Seam | CS - Crushed Seam<br>SZ - Sheared Zone<br>FT - Fault<br>QV - Quartz Vein | PI - Planar<br>Cv - Curved<br>Un - Undulose<br>Ir - Irregular<br>St - Stepped | Sm - Smooth<br>Ro - Rough<br>SI - Slickensided<br>Po - Polished | lc - Limonite<br>cc - Clay<br>mc - Manganese<br>ctc - Calcite<br>qc - Quartz |

**RQD**

RQD (%) = Rock Quality Designation for drill core recovered from borehole, given by:

$$RQD = \frac{\sum (\text{Sound core pieces} \geq 100 \text{ mm long in a drill run})}{\text{Total length of drill run}} \times 100\%$$

**CITY PROJECTS OFFICE – GROUND ENGINEERING**  
**EXPLANATION SHEET FOR ABBREVIATIONS AND SYMBOLS**  
**USED ON BOREHOLE AND TEST PIT LOGS**

**DRILLING / EXCAVATION METHOD**

|              |                                                                                                 |
|--------------|-------------------------------------------------------------------------------------------------|
| Solid Auger  | Continuous solid flight auger, usually 100 mm diameter.                                         |
| Hollow Auger | Hollow flight auger with internal sampling system                                               |
| Washbore     | Rotary Drilling with flushing of cuttings from hole using water and/or polymer mud circulation. |
| Air          | Rotary Drilling with flushing of cuttings from hole using air circulation.                      |
| NMLC Coring  | NMLC 51.2 mm Triple Tube Core Drilling.                                                         |
| HMLC Coring  | HMLC 63.5 mm Triple Tube Core Drilling.                                                         |
| NQ3          | NQ 45.1 mm Triple Tube Core Drilling.                                                           |
| TC           | Tungsten Carbide Bit                                                                            |
| 4C           | 101.6 mm (4 inch) Core Drilling                                                                 |
| Hand Auger   | Hole excavated using a hand auger                                                               |
| Hand Tools   | Shallow excavation using hand tools                                                             |
| Excavation   | Test pit excavated by backhoe or excavator                                                      |

**SUPPORT**

|                 |                                                                              |
|-----------------|------------------------------------------------------------------------------|
| No Support      | Borehole sufficiently stable to remain open without support                  |
| NW Casing       | 89 mm diameter flush-threaded steel casing reamed into borehole              |
| HW Casing       | 114 mm diameter flush-threaded steel casing reamed into borehole             |
| Mud Circulation | Bentonite slurry used to support hole during drilling and to remove cuttings |
| Shoring         | Excavation supported by shoring modules                                      |
| Benching        | Excavation progressively benched with depth to maintain stability            |

**GROUNDWATER**

|                 |                                                                                                                                                                                     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Not Observed    | The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage, rain, etc., or caving of borehole or test pit.                     |
| Not Encountered | Borehole or test pit dry soon after drilling; however, groundwater could still be present in impermeable strata or where borehole or test pit was backfilled soon after completion. |

**MOISTURE CONDITION**

|   |                                                    |
|---|----------------------------------------------------|
| D | Dry : looks and feels dry                          |
| M | Moist: no free water on hands when remoulding      |
| W | Wet : free water collects on hands when remoulding |

**FIELD SAMPLING AND TESTING**

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                            |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DS               | Disturbed sample recovered from auger or drill bit cuttings, from excavated spoil recovered from test pit, or from surface exposure.                                                                                                                                                                                                                                                                                                                                                            | <div style="text-align: center;"> <b>Sample Recovery</b><br/>  </div> |
| BDS              | Bulk disturbed sample recovered from surface feature or excavated spoil recovered from test pit.                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                            |
| SPT              | Standard Penetration Test carried out to AS 1289 6.3.1 - 1993.<br>N = penetration resistance (blows for 300 mm penetration following 150 mm seating drive). If SPT penetration = 450 mm, blows for each 150 mm of penetration are detailed, as well as N Value.<br>If SPT penetration <450 mm but >150 mm, blows for seating drive of 150 mm are detailed, plus subsequent blows and penetration in mm.<br>If SPT penetration <150 mm, total blows are detailed plus the resulting penetration. |                                                                                                                                                            |
| RW               | Rod weight only caused full penetration for SPT.                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                            |
| HW               | Hammer and rod weight only caused full penetration for SPT.                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                            |
| HB               | Hammer double bouncing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                            |
| U <sub>50</sub>  | Thin wall tube sample (50 mm dia.) advanced by hydraulic pressure from drill rig.                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                            |
| U <sub>N</sub>   | N indicates nominal tube sample diameter in mm.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                            |
| UP <sub>50</sub> | Piston sample 50 mm dia. tube (or alternative diameter as detailed above).                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                            |
| VS               | Field vane shear test with approximate undrained shear strength (S <sub>u</sub> ) shown in kPa.                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                            |
| PP               | Pocket penetrometer test with PP reading shown in kPa.                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                            |

**WELL CONSTRUCTION DETAILS**

|                                                                                     |             |                                                                                     |             |                                                                                       |             |
|-------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|-------------|
|  | Gatic Cover |  | Bentonite   |  | PVC Blank   |
|  | Concrete    |  | Gravel pack |  | PVC Screen  |
|  | Cuttings    |  | Backfill    |  | PVC End Cap |



# CITY PROJECTS OFFICE

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# BOREHOLE LOG BH01/16

Geotechnical

Page 1 of 1

Dedicated to a better Brisbane

PROJECT No: 160725 PR001A

|                                 |                                         |                        |
|---------------------------------|-----------------------------------------|------------------------|
| CLIENT: Landscape Architecture  | CONTRACTOR: Schneider Drilling          | LOGGED BY: BAC         |
| PROJECT: Groundwater Monitoring | EQUIPMENT: Gemco HC10                   | CHECKED BY:            |
| LOCATION: Sherwood Arboretum    | NOTES: Levels taken at top of standpipe |                        |
| DATE COMMENCED: 4/11/2016       | ELEVATION (m): 5.33 AHD                 | EASTING: 47438.44 BCSG |
| COMPLETED: 4/11/2016            | TOTAL DEPTH (m): 4.45                   | NORTHING: 151900.903   |
|                                 |                                         | HOLE ANGLE: 90°        |
|                                 |                                         | BEARING: ---           |

| DRILLING             |            |             |      |              | INFERRED STRATIGRAPHY AND PROPERTIES |           |             |                                                                              |                  |             |                                                                                                                                                                             | SAMPLING/TESTING |                              |                 | ADDITIONAL COMMENTS/ INTERPRETED GEOLOGY |  |  |          |                 |  |  |
|----------------------|------------|-------------|------|--------------|--------------------------------------|-----------|-------------|------------------------------------------------------------------------------|------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------|-----------------|------------------------------------------|--|--|----------|-----------------|--|--|
| Method               | Support    | Groundwater | Well | Construction | Elevation                            | Depth (m) | Graphic Log | Soil / Rock Description                                                      | Moisture Content | Consistency | Relative Density                                                                                                                                                            | Recovery         | Samples Test Results Remarks | Depth (m)       |                                          |  |  |          |                 |  |  |
| Solid Auger - TC Bit | No Support |             |      |              | 5.0                                  | 0.5       |             | TURF OVER TOPSOIL                                                            | D                |             |                                                                                                                                                                             |                  |                              |                 | FILL                                     |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             | FILL (CI) SANDY CLAY, low to medium plasticity, red brown, fine grained sand |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             | 4.5                                                                          | 1.0              |             | FILL (CI) SANDY CLAY, low to medium plasticity, brown, fine grained sand with pockets of red brown sand                                                                     | M                |                              |                 |                                          |  |  | ALLUVIUM |                 |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                              |                  |             | (CI/CH) SANDY SILTY CLAY, medium plasticity, grey, fine to medium grained sand                                                                                              |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             | 4.0                                                                          | 1.5              |             | (CI/CH) SANDY SILTY CLAY, medium to high plasticity, brown, orange brown fine grained sand with some fine gravel sized pockets (orange brown) of sand, trace organic matter | W                |                              |                 |                                          |  |  |          | SPT 2, 3, 3 N=6 |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             | 3.5                                                                          | 2.0              |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             | 3.0                                                                          | 2.5              |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             | 2.5                                                                          | 3.0              |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
| 2.0                  | 3.5        |             |      |              |                                      |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
| 1.5                  | 4.0        |             |      |              |                                      |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
| 1.0                  | 4.5        |             |      |              |                                      |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              | SPT 2, 3, 3 N=6 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              | 4.5                                  |           |             | Bottom of hole at 4.45 m.                                                    |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              | 0.5                                  |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |
|                      |            |             |      |              | 5.0                                  |           |             |                                                                              |                  |             |                                                                                                                                                                             |                  |                              |                 |                                          |  |  |          |                 |  |  |

NOTE:  
LOG TO BE READ IN  
CONJUNCTION WITH  
REPORT TEXT AND  
EXPLANATION SHEETS

Soil Description and  
Classification Symbols based  
on AS 1726

**Water Symbols**

Water Level (date)

Inflow

Partial Loss

Complete Loss

**Moisture Content**

D - Dry

M - Moist

W - Wet

W<sub>p</sub> - Plastic Limit

W<sub>L</sub> - Liquid Limit

**Consistency  
(cohesive soils)**

VS - Very Soft

S - Soft

F - Firm

St - Stiff

VSt - Very Stiff

H - Hard

**Relative Density  
(cohesionless soils)**

VL - Very Loose

L - Loose

MD - Medium Dense

D - Dense

VD - Very Dense

**Sampling/Testing**

BDS - Bulk Disturbed Sample

DS - Disturbed Sample

SPT - Standard Penetration Test

N - SPT 'N' Value

PP - Pocket Penetrometer (kPa)

VS - Vane Shear (kPa)

U<sub>50</sub> - Undisturbed Sample/Diameter



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# BOREHOLE LOG BH02/16

Geotechnical

Page 1 of 1

Dedicated to a better Brisbane

PROJECT No: 160725 PR001A

|                                        |                                                |                             |
|----------------------------------------|------------------------------------------------|-----------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling          | <b>LOGGED BY:</b> BAC       |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10                   | <b>CHECKED BY:</b>          |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b> Levels taken at top of standpipe |                             |
| <b>DATE COMMENCED:</b> 4/11/2016       | <b>ELEVATION (m):</b> 5.38                     | <b>AHD</b>                  |
| <b>COMPLETED:</b> 4/11/2016            | <b>TOTAL DEPTH (m):</b> 4.45                   | <b>NORTHING:</b> 151897.408 |
|                                        | <b>BCSG</b>                                    | <b>HOLE ANGLE:</b> 90°      |
|                                        |                                                | <b>BEARING:</b> —           |

| DRILLING             |            |             |      |              | INFERRED STRATIGRAPHY AND PROPERTIES |           |             |                                                                                                                           |                  |             |                  | SAMPLING/TESTING |                              |           | ADDITIONAL COMMENTS/ INTERPRETED GEOLOGY |      |          |  |  |
|----------------------|------------|-------------|------|--------------|--------------------------------------|-----------|-------------|---------------------------------------------------------------------------------------------------------------------------|------------------|-------------|------------------|------------------|------------------------------|-----------|------------------------------------------|------|----------|--|--|
| Method               | Support    | Groundwater | Well | Construction | Elevation                            | Depth (m) | Graphic Log | Soil / Rock Description                                                                                                   | Moisture Content | Consistency | Relative Density | Recovery         | Samples Test Results Remarks | Depth (m) |                                          |      |          |  |  |
| Solid Auger - TC Bit | No Support |             |      |              | 5.0                                  | 0.5       |             | TURF OVER TOPSOIL, with 0.1m of fine gravel ash                                                                           | D                |             |                  |                  |                              |           |                                          | FILL |          |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                                                                           |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              | 4.5                                  | 1.0       |             | FILL (Cl) SANDY CLAY, low to medium plasticity, dark brown fine to coarse sand                                            |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                                                                           |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              | 4.0                                  | 1.5       |             | (Cl/CH) SANDY CLAY, medium plasticity, brown mottled grey, fine grained sand                                              | M                |             |                  |                  |                              |           | SPT 2, 2, 3 N=5                          | 1.5  | ALLUVIUM |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                                                                           |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              | 3.5                                  | 2.0       |             |                                                                                                                           |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                                                                           |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              | 3.0                                  | 2.5       |             | (Cl) SANDY SILTY CLAY, medium plasticity, brown and grey mottled, fine grained sand with some brown sand partings/pockets |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              |                                      |           |             |                                                                                                                           |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              | 2.5                                  | 3.0       |             |                                                                                                                           |                  |             |                  |                  | SPT 3, 3, 4 N=7              | 2.5       |                                          |      |          |  |  |
|                      |            |             |      |              | 2.0                                  | 3.5       |             |                                                                                                                           |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              | 1.5                                  | 4.0       |             |                                                                                                                           |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              | 1.0                                  | 4.5       |             |                                                                                                                           |                  |             |                  |                  | SPT 1, 2, 2 N=4              | 4.0       |                                          |      |          |  |  |
|                      |            |             |      |              | 0.5                                  | 5.0       |             |                                                                                                                           |                  |             |                  |                  |                              |           |                                          |      |          |  |  |
|                      |            |             |      |              |                                      |           |             | Bottom of hole at 4.45 m.                                                                                                 |                  |             |                  |                  |                              | 4.5       |                                          |      |          |  |  |

## NOTE:

LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS

Soil Description and Classification Symbols based on AS 1726

### Water Symbols

- Water Level (date)
- Inflow
- Partial Loss
- Complete Loss

### Moisture Content

- D - Dry
- M - Moist
- W - Wet
- W<sub>p</sub> - Plastic Limit
- W<sub>L</sub> - Liquid Limit

### Consistency (cohesive soils)

- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

### Relative Density (cohesionless soils)

- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

### Sampling/Testing

- BDS - Bulk Disturbed Sample
- DS - Disturbed Sample
- SPT - Standard Penetration Test
- N - SPT 'N' Value
- PP - Pocket Penetrometer (kPa)
- VS - Vane Shear (kPa)
- U<sub>50</sub> - Undisturbed Sample/Diameter



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# BOREHOLE LOG BH03/16

Geotechnical

Page 1 of 2

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PROJECT No: 160725 PR001A

|                                 |                                         |                         |
|---------------------------------|-----------------------------------------|-------------------------|
| CLIENT: Landscape Architecture  | CONTRACTOR: Schneider Drilling          | LOGGED BY: BAC          |
| PROJECT: Groundwater Monitoring | EQUIPMENT: Gemco HC10                   | CHECKED BY:             |
| LOCATION: Sherwood Arboretum    | NOTES: Levels taken at top of standpipe |                         |
| DATE COMMENCED: 4/11/2016       | ELEVATION (m): 6.00 AHD                 | EASTING: 47400.293 BCSG |
| COMPLETED: 4/11/2016            | TOTAL DEPTH (m): 5.95                   | NORTHING: 151996.27     |
|                                 |                                         | HOLE ANGLE: 90°         |
|                                 |                                         | BEARING: ---            |

| DRILLING             |            |             |      |              | INFERRED STRATIGRAPHY AND PROPERTIES |           |             |                                                                              |                                                                   |             | SAMPLING/TESTING |          |                              | ADDITIONAL COMMENTS/ INTERPRETED GEOLOGY |          |
|----------------------|------------|-------------|------|--------------|--------------------------------------|-----------|-------------|------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------|------------------|----------|------------------------------|------------------------------------------|----------|
| Method               | Support    | Groundwater | Well | Construction | Elevation                            | Depth (m) | Graphic Log | Soil / Rock Description                                                      | Moisture Content                                                  | Consistency | Relative Density | Recovery | Samples Test Results Remarks | Depth (m)                                |          |
| Solid Auger - TC Bit | No Support |             |      |              |                                      |           |             | TURF OVER TOPSOIL                                                            | D                                                                 |             |                  |          |                              |                                          | FILL     |
|                      |            |             |      |              |                                      |           |             | (Cl) SANDY SILTY CLAY, medium plasticity, brown, fine to medium grained sand |                                                                   |             |                  |          |                              |                                          | ALLUVIUM |
|                      |            |             |      |              |                                      | 5.5       | 0.5         |                                                                              |                                                                   |             |                  |          |                              |                                          | 0.5      |
|                      |            |             |      |              |                                      | 5.0       | 1.0         |                                                                              |                                                                   |             |                  |          |                              |                                          | 1.0      |
|                      |            |             |      |              |                                      | 4.5       | 1.5         |                                                                              |                                                                   |             |                  |          | SPT 4, 4, 6 N=10             | 1.5                                      |          |
|                      |            |             |      |              |                                      | 4.0       | 2.0         |                                                                              | some pockets/partings of orange brown to brown, fine grained sand | M           |                  |          |                              |                                          | 2.0      |
|                      |            |             |      |              |                                      | 3.5       | 2.5         |                                                                              |                                                                   |             |                  |          |                              |                                          | 2.5      |
|                      |            |             |      |              |                                      | 3.0       | 3.0         |                                                                              |                                                                   |             |                  |          | SPT 2, 2, 3 N=5              | 3.0                                      |          |
|                      |            |             |      |              |                                      | 2.5       | 3.5         |                                                                              |                                                                   |             |                  |          |                              |                                          | 3.5      |
|                      |            |             |      |              |                                      | 2.0       | 4.0         |                                                                              | becoming grey and brown mottled                                   | M           |                  |          | SPT 1, 2, 3 N=5              | 4.0                                      |          |
|                      |            |             |      | 1.5          | 4.5                                  |           |             |                                                                              |                                                                   |             |                  |          | 4.5                          |                                          |          |
|                      |            |             |      |              | 5.0                                  |           |             |                                                                              |                                                                   |             |                  |          |                              | 5.0                                      |          |

## NOTE:

LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS

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# BOREHOLE LOG BH03/16

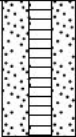
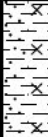
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PROJECT No: 160725 PR001A

|                                        |                                                |                            |
|----------------------------------------|------------------------------------------------|----------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling          | <b>LOGGED BY:</b> BAC      |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10                   | <b>CHECKED BY:</b>         |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b> Levels taken at top of standpipe |                            |
| <b>DATE COMMENCED:</b> 4/11/2016       | <b>ELEVATION (m):</b> 6.00                     | <b>AHD</b>                 |
| <b>COMPLETED:</b> 4/11/2016            | <b>TOTAL DEPTH (m):</b> 5.95                   | <b>NORTHING:</b> 151996,27 |
|                                        |                                                | <b>BCSG</b>                |
|                                        |                                                | <b>HOLE ANGLE:</b> 90°     |
|                                        |                                                | <b>BEARING:</b> —          |

| DRILLING             |            |             |                                                                                   |           | INFERRED STRATIGRAPHY AND PROPERTIES |                                                                                   |                                             |                  |             |                  | SAMPLING/TESTING |                              |           | ADDITIONAL COMMENTS/<br>INTERPRETED GEOLOGY |
|----------------------|------------|-------------|-----------------------------------------------------------------------------------|-----------|--------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------|------------------|-------------|------------------|------------------|------------------------------|-----------|---------------------------------------------|
| Method               | Support    | Groundwater | Well Construction                                                                 | Elevation | Depth (m)                            | Graphic Log                                                                       | Soil / Rock Description                     | Moisture Content | Consistency | Relative Density | Recovery         | Samples Test Results Remarks | Depth (m) |                                             |
| Solid Auger - TC Bit | No Support |             |  | 0.5       | 5.5                                  |  | becoming grey and brown mottled (continued) |                  |             |                  |                  |                              | 5.5       |                                             |
|                      |            |             |                                                                                   | 0.0       | 6.0                                  |                                                                                   | Bottom of hole at 5.95 m.                   |                  |             |                  |                  |                              | 6.0       |                                             |
|                      |            |             |                                                                                   | -0.5      | 6.5                                  |                                                                                   |                                             |                  |             |                  |                  |                              | 6.5       |                                             |
|                      |            |             |                                                                                   | -1.0      | 7.0                                  |                                                                                   |                                             |                  |             |                  |                  |                              | 7.0       |                                             |
|                      |            |             |                                                                                   | -1.5      | 7.5                                  |                                                                                   |                                             |                  |             |                  |                  |                              | 7.5       |                                             |
|                      |            |             |                                                                                   | -2.0      | 8.0                                  |                                                                                   |                                             |                  |             |                  |                  |                              | 8.0       |                                             |
|                      |            |             |                                                                                   | -2.5      | 8.5                                  |                                                                                   |                                             |                  |             |                  |                  |                              | 8.5       |                                             |
|                      |            |             |                                                                                   | -3.0      | 9.0                                  |                                                                                   |                                             |                  |             |                  |                  |                              | 9.0       |                                             |
|                      |            |             |                                                                                   | -3.5      | 9.5                                  |                                                                                   |                                             |                  |             |                  |                  |                              | 9.5       |                                             |
|                      |            |             |                                                                                   | -4.0      | 10.0                                 |                                                                                   |                                             |                  |             |                  |                  |                              | 10.0      |                                             |

## NOTE:

LOG TO BE READ IN  
CONJUNCTION WITH  
REPORT TEXT AND  
EXPLANATION SHEETS

Soil Description and  
Classification Symbols based  
on AS 1726

### Water Symbols

- Water Level (date)
- Inflow
- Partial Loss
- Complete Loss

### Moisture Content

- D - Dry
- M - Moist
- W - Wet
- W<sub>p</sub> - Plastic Limit
- W<sub>L</sub> - Liquid Limit

### Consistency (cohesive soils)

- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

### Relative Density (cohesionless soils)

- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

### Sampling/Testing

- BDS - Bulk Disturbed Sample
- DS - Disturbed Sample
- SPT - Standard Penetration Test
- N - SPT 'N' Value
- PP - Pocket Penetrometer (kPa)
- VS - Vane Shear (kPa)
- U<sub>50</sub> - Undisturbed Sample/Diameter



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# BOREHOLE LOG BH04/16

Geotechnical

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PROJECT No: 160725 PR001A

|                                        |                                       |                        |
|----------------------------------------|---------------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10          | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                         |                        |
| <b>DATE COMMENCED:</b> 5/12/2016       | <b>ELEVATION (m):</b> 6.65            | <b>AHD</b>             |
| <b>COMPLETED:</b> 5/12/2016            | <b>TOTAL DEPTH (m):</b> 7.00          | <b>NORTHING:</b>       |
|                                        | <b>BCSG</b>                           | <b>HOLE ANGLE:</b> 90° |
|                                        |                                       | <b>BEARING:</b> —      |

| DRILLING             |            |             |                   |           | INFERRED STRATIGRAPHY AND PROPERTIES |                                                                                   |                                                                   |                                                                                                  |             |                  |          | SAMPLING/TESTING             |                  |                  | ADDITIONAL COMMENTS/ INTERPRETED GEOLOGY |  |
|----------------------|------------|-------------|-------------------|-----------|--------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------|------------------|----------|------------------------------|------------------|------------------|------------------------------------------|--|
| Method               | Support    | Groundwater | Well Construction | Elevation | Depth (m)                            | Graphic Log                                                                       | Soil / Rock Description                                           | Moisture Content                                                                                 | Consistency | Relative Density | Recovery | Samples Test Results Remarks | Depth (m)        |                  |                                          |  |
| Solid Auger - TC Bit | No Support |             |                   |           | 6.5                                  |  | TOPSOIL                                                           | D                                                                                                |             |                  |          |                              |                  | TOPSOIL          |                                          |  |
|                      |            |             |                   |           |                                      |                                                                                   | (CI) SANDY CLAY, medium plasticity, brown with some sand partings |                                                                                                  |             |                  |          |                              |                  | ALLUVIUM         |                                          |  |
|                      |            |             |                   |           |                                      | 0.5                                                                               |                                                                   |                                                                                                  |             |                  |          |                              | Bag & Jar Sample | 0.5              |                                          |  |
|                      |            |             |                   |           |                                      | 6.0                                                                               |                                                                   |                                                                                                  |             |                  |          |                              |                  |                  |                                          |  |
|                      |            |             |                   |           |                                      | 1.0                                                                               |                                                                   |                                                                                                  |             |                  |          |                              | Bag & Jar Sample | 1.0              |                                          |  |
|                      |            |             |                   |           |                                      | 5.5                                                                               |                                                                   |                                                                                                  |             |                  |          |                              | SPT 3, 3, 3 N=6  | 1.5              |                                          |  |
|                      |            |             |                   |           |                                      | 1.5                                                                               |                                                                   |                                                                                                  |             |                  |          |                              |                  |                  |                                          |  |
|                      |            |             |                   |           |                                      | 5.0                                                                               |                                                                   | (CI/CH) SANDY CLAY, medium to high plasticity, pale brown with orange brown sand partings/lenses | M           |                  |          |                              |                  |                  |                                          |  |
|                      |            |             |                   |           |                                      | 2.0                                                                               |                                                                   |                                                                                                  |             |                  |          |                              | Bag & Jar Sample | 2.0              |                                          |  |
|                      |            |             |                   |           |                                      | 4.5                                                                               |                                                                   |                                                                                                  |             |                  |          |                              |                  |                  |                                          |  |
|                      |            |             |                   |           |                                      | 2.5                                                                               |                                                                   |                                                                                                  |             |                  |          |                              | Bag & Jar Sample | 2.5              |                                          |  |
|                      |            |             |                   |           |                                      | 4.0                                                                               |                                                                   |                                                                                                  |             |                  |          |                              | SPT 4, 4, 8 N=12 | 3.0              |                                          |  |
|                      |            |             |                   |           |                                      | 3.0                                                                               |                                                                   |                                                                                                  |             |                  |          |                              |                  |                  |                                          |  |
|                      |            |             |                   |           |                                      | 3.5                                                                               |                                                                   | (CI/CH) SANDY CLAY, mottled pale brown and pale grey, medium to high plasticity                  |             |                  |          |                              |                  |                  |                                          |  |
|                      |            |             |                   |           |                                      | 3.5                                                                               |                                                                   |                                                                                                  |             |                  |          |                              |                  |                  |                                          |  |
|                      |            |             |                   |           |                                      | 3.0                                                                               |                                                                   |                                                                                                  |             |                  |          |                              |                  |                  |                                          |  |
|                      |            |             |                   |           |                                      | 4.0                                                                               |                                                                   |                                                                                                  |             |                  |          |                              | Bag & Jar Sample | 4.0              |                                          |  |
|                      |            |             |                   |           |                                      | 2.5                                                                               |                                                                   |                                                                                                  |             |                  |          |                              |                  | SPT 4, 5, 7 N=12 | 4.5                                      |  |
|                      |            |             |                   |           |                                      | 4.5                                                                               |                                                                   |                                                                                                  |             |                  |          |                              |                  |                  |                                          |  |
|                      |            |             |                   |           |                                      | 2.0                                                                               |                                                                   |                                                                                                  |             |                  |          |                              |                  |                  |                                          |  |
|                      |            |             |                   |           |                                      | 5.0                                                                               |                                                                   |                                                                                                  |             |                  |          |                              |                  |                  |                                          |  |

|                                                                                       |                                                                     |                                |                         |                                     |                                              |                                               |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------|-------------------------|-------------------------------------|----------------------------------------------|-----------------------------------------------|
| <b>NOTE:</b><br>LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS | <b>Soil Description and Classification Symbols based on AS 1726</b> |                                | <b>Moisture Content</b> | <b>Consistency (cohesive soils)</b> | <b>Relative Density (cohesionless soils)</b> | <b>Sampling/Testing</b>                       |
|                                                                                       | <b>Water Symbols</b>                                                |                                | D - Dry                 | VS - Very Soft                      | VL - Very Loose                              | BDS - Bulk Disturbed Sample                   |
|                                                                                       | Water Level (date)                                                  |                                | M - Moist               | S - Soft                            | L - Loose                                    | DS - Disturbed Sample                         |
|                                                                                       | Inflow                                                              |                                | W - Wet                 | F - Firm                            | MD - Medium Dense                            | SPT - Standard Penetration Test               |
| Partial Loss                                                                          |                                                                     | W <sub>p</sub> - Plastic Limit | St - Stiff              | D - Dense                           | N - SPT 'N' Value                            | PP - Pocket Penetrometer (kPa)                |
| Complete Loss                                                                         |                                                                     | W <sub>L</sub> - Liquid Limit  | VSt - Very Stiff        | VD - Very Dense                     | VS - Vane Shear (kPa)                        | U <sub>50</sub> - Undisturbed Sample/Diameter |



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# BOREHOLE LOG BH04/16

Geotechnical

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PROJECT No: 160725 PR001A

|                                        |                                       |                        |
|----------------------------------------|---------------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10          | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                         |                        |
| <b>DATE COMMENCED:</b> 5/12/2016       | <b>ELEVATION (m):</b> 6.65            | <b>AHD</b>             |
| <b>COMPLETED:</b> 5/12/2016            | <b>TOTAL DEPTH (m):</b> 7.00          | <b>EASTING:</b>        |
|                                        |                                       | <b>NORTHING:</b>       |
|                                        |                                       | <b>BCSG</b>            |
|                                        |                                       | <b>HOLE ANGLE:</b> 90° |
|                                        |                                       | <b>BEARING:</b> —      |

| DRILLING             |            |             |                      |           | INFERRED STRATIGRAPHY AND PROPERTIES |                |                                                                                    |                     |             |                     |          | SAMPLING/TESTING                   |           |  | ADDITIONAL<br>COMMENTS/<br>INTERPRETED<br>GEOLOGY |
|----------------------|------------|-------------|----------------------|-----------|--------------------------------------|----------------|------------------------------------------------------------------------------------|---------------------|-------------|---------------------|----------|------------------------------------|-----------|--|---------------------------------------------------|
| Method               | Support    | Groundwater | Well<br>Construction | Elevation | Depth (m)                            | Graphic<br>Log | Soil / Rock Description                                                            | Moisture<br>Content | Consistency | Relative<br>Density | Recovery | Samples<br>Test Results<br>Remarks | Depth (m) |  |                                                   |
| Solid Auger - TC Bit | No Support |             |                      | 1.5       |                                      |                | (CI/CH) SANDY SILTY CLAY, medium to high plasticity, pale brown, fine grained sand | W                   |             |                     |          | Bag & Jar Sample                   |           |  |                                                   |
|                      |            |             |                      | 5.5       |                                      |                |                                                                                    |                     |             |                     |          | Bag & Jar Sample                   | 5.5       |  |                                                   |
|                      |            |             |                      | 1.0       |                                      |                |                                                                                    |                     |             |                     |          | SPT<br>2, 4, 5<br>N=9              |           |  |                                                   |
|                      |            |             |                      | 6.0       |                                      |                |                                                                                    |                     |             |                     |          |                                    | 6.0       |  |                                                   |
|                      |            |             |                      | 0.5       |                                      |                |                                                                                    |                     |             |                     |          |                                    |           |  |                                                   |
|                      |            |             |                      | 6.5       |                                      |                |                                                                                    |                     |             |                     |          |                                    | 6.5       |  |                                                   |
|                      |            |             |                      | 0.0       |                                      |                |                                                                                    |                     |             |                     |          |                                    |           |  |                                                   |
|                      |            |             |                      | 7.0       |                                      |                |                                                                                    |                     |             |                     |          | Bag & Jar Sample                   | 7.0       |  |                                                   |
|                      |            |             |                      |           |                                      |                |                                                                                    |                     |             |                     |          |                                    |           |  |                                                   |
|                      |            |             |                      |           |                                      |                |                                                                                    |                     |             |                     |          |                                    |           |  |                                                   |
|                      |            |             |                      | -0.5      |                                      |                | Bottom of hole at 7.00 m.                                                          |                     |             |                     |          |                                    |           |  |                                                   |
|                      |            |             |                      | 7.5       |                                      |                |                                                                                    |                     |             |                     |          |                                    | 7.5       |  |                                                   |
|                      |            |             |                      | -1.0      |                                      |                |                                                                                    |                     |             |                     |          |                                    |           |  |                                                   |
|                      |            |             |                      | 8.0       |                                      |                |                                                                                    |                     |             |                     |          |                                    | 8.0       |  |                                                   |
|                      |            |             |                      | -1.5      |                                      |                |                                                                                    |                     |             |                     |          |                                    |           |  |                                                   |
|                      |            |             |                      | 8.5       |                                      |                |                                                                                    |                     |             |                     |          |                                    | 8.5       |  |                                                   |
|                      |            |             |                      | -2.0      |                                      |                |                                                                                    |                     |             |                     |          |                                    |           |  |                                                   |
|                      |            |             |                      | 9.0       |                                      |                |                                                                                    |                     |             |                     |          |                                    | 9.0       |  |                                                   |
|                      |            |             |                      | -2.5      |                                      |                |                                                                                    |                     |             |                     |          |                                    |           |  |                                                   |
|                      |            |             |                      | 9.5       |                                      |                |                                                                                    |                     |             |                     |          |                                    | 9.5       |  |                                                   |
|                      |            |             |                      | -3.0      |                                      |                |                                                                                    |                     |             |                     |          |                                    |           |  |                                                   |
|                      |            |             |                      | 10.0      |                                      |                |                                                                                    |                     |             |                     |          |                                    | 10.0      |  |                                                   |

|                                                                                       |                                                               |                                                                                                    |                                                                                      |                                                                                   |                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NOTE:</b><br>LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS | Soil Description and Classification Symbols based on AS 1726  | <b>Moisture Content</b>                                                                            | <b>Consistency (cohesive soils)</b>                                                  | <b>Relative Density (cohesionless soils)</b>                                      | <b>Sampling/Testing</b>                                                                                                                                                                                                  |
|                                                                                       | <b>Water Symbols</b>                                          | D - Dry<br>M - Moist<br>W - Wet<br>W <sub>p</sub> - Plastic Limit<br>W <sub>L</sub> - Liquid Limit | VS - Very Soft<br>S - Soft<br>F - Firm<br>St - Stiff<br>VSt - Very Stiff<br>H - Hard | VL - Very Loose<br>L - Loose<br>MD - Medium Dense<br>D - Dense<br>VD - Very Dense | BDS - Bulk Disturbed Sample<br>DS - Disturbed Sample<br>SPT - Standard Penetration Test<br>N - SPT 'N' Value<br>PP - Pocket Penetrometer (kPa)<br>VS - Vane Shear (kPa)<br>U <sub>50</sub> - Undisturbed Sample/Diameter |
|                                                                                       | Water Level (date)<br>Inflow<br>Partial Loss<br>Complete Loss |                                                                                                    |                                                                                      |                                                                                   |                                                                                                                                                                                                                          |



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# BOREHOLE LOG BH05/16

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PROJECT No: 160725 PR001A

|                                        |                                       |                        |
|----------------------------------------|---------------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10          | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                         |                        |
| <b>DATE COMMENCED:</b> 5/12/2016       | <b>ELEVATION (m):</b> 6.82            | <b>AHD</b>             |
| <b>COMPLETED:</b> 5/12/2016            | <b>TOTAL DEPTH (m):</b> 7.00          | <b>NORTHING:</b>       |
|                                        | <b>BCSG</b>                           | <b>HOLE ANGLE:</b> 90° |
|                                        |                                       | <b>BEARING:</b> —      |

| DRILLING             |            |             |                      |                                                                                    | INFERRED STRATIGRAPHY AND PROPERTIES                                                                                     |                                                                                                                                              |                                                                           |                     |             |                     | SAMPLING/TESTING         |                                    |           | ADDITIONAL<br>COMMENTS/<br>INTERPRETED<br>GEOLOGY |      |
|----------------------|------------|-------------|----------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------|-------------|---------------------|--------------------------|------------------------------------|-----------|---------------------------------------------------|------|
| Method               | Support    | Groundwater | Well<br>Construction | Elevation                                                                          | Depth (m)                                                                                                                | Graphic<br>Log                                                                                                                               | Soil / Rock Description                                                   | Moisture<br>Content | Consistency | Relative<br>Density | Recovery                 | Samples<br>Test Results<br>Remarks | Depth (m) |                                                   |      |
| Solid Auger - TC Bit | No Support |             |                      |                                                                                    | 6.5                                                                                                                      |                                                             | FILL (SC) CLAYEY SAND, fine to medium grained, brown, low plasticity clay | D                   |             |                     |                          |                                    |           |                                                   | FILL |
|                      |            |             | 0.5                  |                                                                                    |                                                                                                                          |                                                                                                                                              |                                                                           |                     |             |                     |                          | Bag & Jar Sample                   | 0.5       |                                                   |      |
|                      |            |             | 6.0                  |  | (CL/CI) SANDY CLAY, low to medium plasticity, brown, fine to coarse grained sand, with orange brown sand partings/lenses |                                                                                                                                              |                                                                           |                     |             |                     |                          | Bag & Jar Sample                   | 1.0       | ALLUVIUM                                          |      |
|                      |            |             | 5.5                  |                                                                                    |                                                                                                                          |                                                                                                                                              |                                                                           |                     |             |                     | SPT<br>7, 14, 15<br>N=29 | 1.5                                |           |                                                   |      |
|                      |            |             | 5.0                  |                                                                                    |                                                                                                                          |                                                                                                                                              |                                                                           |                     |             |                     | Bag & Jar Sample         | 2.0                                |           |                                                   |      |
|                      |            |             | 4.5                  |                                                                                    |                                                                                                                          |                                                                                                                                              |                                                                           |                     |             |                     | Bag & Jar Sample         | 2.5                                |           |                                                   |      |
|                      |            |             | 4.0                  |                                                                                    |                                                                                                                          |                                                                                                                                              | M                                                                         |                     |             |                     | SPT<br>7, 9, 11<br>N=20  | 3.0                                |           |                                                   |      |
|                      |            |             | 3.5                  |                                                                                    |                                                                                                                          |                                                                                                                                              |                                                                           |                     |             |                     | Bag & Jar Sample         | 3.5                                |           |                                                   |      |
|                      |            |             | 3.0                  |                                                                                    |                                                                                                                          | (CI) SANDY CLAY, medium to high plasticity, mottled pale brown and pale grey, fine to medium grained sand, with orange brown partings/lenses |                                                                           |                     |             |                     | Bag & Jar Sample         | 4.0                                |           |                                                   |      |
|                      |            |             | 2.5                  |                                                                                    |                                                                                                                          |                                                                                                                                              |                                                                           |                     |             |                     | SPT<br>5, 7, 8<br>N=15   | 4.5                                |           |                                                   |      |
|                      | 2.0        |             |                      |                                                                                    |                                                                                                                          |                                                                                                                                              |                                                                           |                     |             |                     |                          |                                    |           |                                                   |      |
|                      |            |             |                      |                                                                                    | 5.0                                                                                                                      |                                                                                                                                              |                                                                           |                     |             |                     |                          |                                    |           |                                                   |      |

## NOTE:

LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS

Soil Description and Classification Symbols based on AS 1726

### Water Symbols

- Water Level (date)
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- Partial Loss
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### Moisture Content

- D - Dry
- M - Moist
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- W<sub>p</sub> - Plastic Limit
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### Consistency (cohesive soils)

- VS - Very Soft
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### Relative Density (cohesionless soils)

- VL - Very Loose
- L - Loose
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- VD - Very Dense

### Sampling/Testing

- BDS - Bulk Disturbed Sample
- DS - Disturbed Sample
- SPT - Standard Penetration Test
- N - SPT 'N' Value
- PP - Pocket Penetrometer (kPa)
- VS - Vane Shear (kPa)
- U<sub>50</sub> - Undisturbed Sample/Diameter



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# BOREHOLE LOG BH05/16

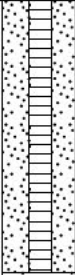
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PROJECT No: 160725 PR001A

|                                        |                                       |                        |
|----------------------------------------|---------------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10          | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                         |                        |
| <b>DATE COMMENCED:</b> 5/12/2016       | <b>ELEVATION (m):</b> 6.82            | <b>AHD</b>             |
| <b>COMPLETED:</b> 5/12/2016            | <b>TOTAL DEPTH (m):</b> 7.00          | <b>EASTING:</b>        |
|                                        |                                       | <b>NORTHING:</b>       |
|                                        |                                       | <b>BCSG</b>            |
|                                        |                                       | <b>HOLE ANGLE:</b> 90° |
|                                        |                                       | <b>BEARING:</b> —      |

| DRILLING             |            |                                                                                   |                                                                                    |           | INFERRED STRATIGRAPHY AND PROPERTIES |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     | SAMPLING/TESTING                                                                     |                                 |           | ADDITIONAL COMMENTS/<br>INTERPRETED GEOLOGY |  |  |  |  |
|----------------------|------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------|--------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------|-----------|---------------------------------------------|--|--|--|--|
| Method               | Support    | Groundwater                                                                       | Well Construction                                                                  | Elevation | Depth (m)                            | Graphic Log                                                                        | Soil / Rock Description                                                                                                                                  | Moisture Content                                                                   | Consistency                                                                        | Relative Density                                                                    | Recovery                                                                             | Samples Test Results<br>Remarks | Depth (m) |                                             |  |  |  |  |
| Solid Auger - TC Bit | No Support |  |  | 6.82      | 0.0                                  |  | (CI) SANDY CLAY, medium to high plasticity, mottled pale brown and pale grey, fine to medium grained sand, with orange brown partings/lenses (continued) |  |  |  |  | Bag & Jar Sample                |           |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 0.5                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      |                                 |           |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 1.0                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      |                                 |           |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 1.5                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      |                                 |           |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 5.5                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      | Bag & Jar Sample                | 5.5       |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 6.0                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      | SPT<br>4, 8, 10<br>N=18         | 6.0       |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 6.5                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      |                                 | 6.5       |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 7.0                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      | Bag & Jar Sample                | 7.0       |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 7.5                                  |                                                                                    | Bottom of hole at 7.00 m.                                                                                                                                |                                                                                    |                                                                                    |                                                                                     |                                                                                      |                                 | 7.5       |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 8.0                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      |                                 | 8.0       |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 8.5                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      |                                 | 8.5       |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 9.0                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      |                                 | 9.0       |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 9.5                                  |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      |                                 | 9.5       |                                             |  |  |  |  |
|                      |            |                                                                                   |                                                                                    |           | 10.0                                 |                                                                                    |                                                                                                                                                          |                                                                                    |                                                                                    |                                                                                     |                                                                                      |                                 | 10.0      |                                             |  |  |  |  |

|                                                                                       |                                                                     |                                |                         |                                     |                                               |                                 |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------|-------------------------|-------------------------------------|-----------------------------------------------|---------------------------------|
| <b>NOTE:</b><br>LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS | <b>Soil Description and Classification Symbols based on AS 1726</b> |                                | <b>Moisture Content</b> | <b>Consistency (cohesive soils)</b> | <b>Relative Density (cohesionless soils)</b>  | <b>Sampling/Testing</b>         |
|                                                                                       | <b>Water Symbols</b>                                                |                                | D - Dry                 | VS - Very Soft                      | VL - Very Loose                               | BDS - Bulk Disturbed Sample     |
|                                                                                       | Water Level (date)                                                  |                                | M - Moist               | S - Soft                            | L - Loose                                     | DS - Disturbed Sample           |
|                                                                                       | Inflow                                                              |                                | W - Wet                 | F - Firm                            | MD - Medium Dense                             | SPT - Standard Penetration Test |
| Partial Loss                                                                          |                                                                     | W <sub>p</sub> - Plastic Limit | St - Stiff              | D - Dense                           | VS - Vane Shear (kPa)                         | N - SPT 'N' Value               |
| Complete Loss                                                                         |                                                                     | W <sub>L</sub> - Liquid Limit  | VSt - Very Stiff        | VD - Very Dense                     | U <sub>50</sub> - Undisturbed Sample/Diameter | PP - Pocket Penetrometer (kPa)  |



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# BOREHOLE LOG BH06/16

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PROJECT No: 160725 PR001A

|                                        |                                       |                        |
|----------------------------------------|---------------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10          | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                         |                        |
| <b>DATE COMMENCED:</b> 5/12/2016       | <b>ELEVATION (m):</b> 5.30            | <b>AHD</b>             |
| <b>COMPLETED:</b> 5/12/2016            | <b>TOTAL DEPTH (m):</b> 2.50          | <b>NORTHING:</b>       |
|                                        | <b>EASTING:</b>                       | <b>BCSG</b>            |
|                                        |                                       | <b>HOLE ANGLE:</b> 90° |
|                                        |                                       | <b>BEARING:</b> ---    |

| DRILLING             |            |             | INFERRED STRATIGRAPHY AND PROPERTIES |           |             |                                                                                              |                  |             |                           | SAMPLING/TESTING |                              |                  | ADDITIONAL COMMENTS/ INTERPRETED GEOLOGY |          |
|----------------------|------------|-------------|--------------------------------------|-----------|-------------|----------------------------------------------------------------------------------------------|------------------|-------------|---------------------------|------------------|------------------------------|------------------|------------------------------------------|----------|
| Method               | Support    | Groundwater | Elevation                            | Depth (m) | Graphic Log | Soil / Rock Description                                                                      | Moisture Content | Consistency | Relative Density          | Recovery         | Samples Test Results Remarks | Depth (m)        |                                          |          |
| Solid Auger - TC Bit | No Support |             | 5.0                                  |           |             | FILL (CI) SANDY CLAY, medium plasticity, red brown                                           | D                |             |                           |                  |                              |                  | FILL                                     |          |
|                      |            |             | 0.5                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 4.5                                  |           |             | (CH) SANDY CLAY, high plasticity, grey, fine to medium grained sand with brown sand partings | M                |             |                           |                  |                              | Bag & Jar Sample | 0.5                                      | ALLUVIUM |
|                      |            |             | 1.0                                  |           |             |                                                                                              |                  |             |                           |                  |                              | Bag & Jar Sample | 1.0                                      |          |
|                      |            |             | 4.0                                  |           |             |                                                                                              |                  |             |                           |                  |                              | Bag & Jar Sample | 1.5                                      |          |
|                      |            |             | 3.5                                  |           |             |                                                                                              |                  |             |                           |                  |                              | Bag & Jar Sample | 2.0                                      |          |
|                      |            |             | 2.0                                  |           |             |                                                                                              |                  |             |                           |                  |                              | Bag & Jar Sample | 2.5                                      |          |
|                      |            |             | 3.0                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 2.5                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             |                                      |           |             |                                                                                              |                  |             | Bottom of hole at 2.50 m. |                  |                              |                  |                                          |          |
|                      |            |             | 2.5                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 3.0                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 2.0                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 3.5                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 1.5                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 4.0                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 1.0                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 4.5                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 0.5                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |
|                      |            |             | 5.0                                  |           |             |                                                                                              |                  |             |                           |                  |                              |                  |                                          |          |

SOIL LOG - GEOTECHNICAL GE 160725 PR001A LOG.GPJ CITY DESIGN DATA TEMPLATE.GDT 9/6/17

|                                                                                       |                                                               |                                                                                                    |                                                                                      |                                                                                   |                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NOTE:</b><br>LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS | Soil Description and Classification Symbols based on AS 1726  | <b>Moisture Content</b>                                                                            | <b>Consistency (cohesive soils)</b>                                                  | <b>Relative Density (cohesionless soils)</b>                                      | <b>Sampling/Testing</b>                                                                                                                                                                                                  |
|                                                                                       | <b>Water Symbols</b>                                          | D - Dry<br>M - Moist<br>W - Wet<br>W <sub>p</sub> - Plastic Limit<br>W <sub>L</sub> - Liquid Limit | VS - Very Soft<br>S - Soft<br>F - Firm<br>St - Stiff<br>VSt - Very Stiff<br>H - Hard | VL - Very Loose<br>L - Loose<br>MD - Medium Dense<br>D - Dense<br>VD - Very Dense | BDS - Bulk Disturbed Sample<br>DS - Disturbed Sample<br>SPT - Standard Penetration Test<br>N - SPT 'N' Value<br>PP - Pocket Penetrometer (kPa)<br>VS - Vane Shear (kPa)<br>U <sub>50</sub> - Undisturbed Sample/Diameter |
|                                                                                       | Water Level (date)<br>Inflow<br>Partial Loss<br>Complete Loss |                                                                                                    |                                                                                      |                                                                                   |                                                                                                                                                                                                                          |



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# BOREHOLE LOG BH07/16

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PROJECT No: 160725 PR001A

|                                        |                                       |                        |
|----------------------------------------|---------------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10          | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                         |                        |
| <b>DATE COMMENCED:</b> 5/12/2016       | <b>ELEVATION (m):</b> 5.40            | <b>AHD</b>             |
| <b>COMPLETED:</b> 5/12/2016            | <b>TOTAL DEPTH (m):</b> 2.50          | <b>NORTHING:</b>       |
|                                        |                                       | <b>BCSG</b>            |
|                                        |                                       | <b>HOLE ANGLE:</b> 90° |
|                                        |                                       | <b>BEARING:</b> ---    |

| DRILLING             |            |                 | INFERRED STRATIGRAPHY AND PROPERTIES |           |             |                                                                                          |                  |             | SAMPLING/TESTING |          |                                    | ADDITIONAL<br>COMMENTS/<br>INTERPRETED<br>GEOLOGY |           |     |          |  |
|----------------------|------------|-----------------|--------------------------------------|-----------|-------------|------------------------------------------------------------------------------------------|------------------|-------------|------------------|----------|------------------------------------|---------------------------------------------------|-----------|-----|----------|--|
| Method               | Support    | Groundwater     | Elevation                            | Depth (m) | Graphic Log | Soil / Rock Description                                                                  | Moisture Content | Consistency | Relative Density | Recovery | Samples<br>Test Results<br>Remarks |                                                   | Depth (m) |     |          |  |
| Solid Auger - TC Bit | No Support | Not Encountered | 5.0                                  | 0.5       |             | FILL (CI) SANDY CLAY, medium plasticity, brown, fine to medium grained sand              | D                |             |                  |          |                                    |                                                   | FILL      |     |          |  |
|                      |            |                 |                                      |           |             |                                                                                          |                  |             |                  |          |                                    | Bag & Jar Sample                                  |           | 0.5 |          |  |
|                      |            |                 | 4.5                                  | 1.0       |             | (CI/CH) SANDY CLAY, medium to high plasticity, mottled brown and grey, fine grained sand | M                |             |                  |          |                                    |                                                   |           |     | ALLUVIUM |  |
|                      |            |                 |                                      |           |             |                                                                                          |                  |             |                  |          |                                    | Bag & Jar Sample                                  |           | 1.0 |          |  |
|                      |            |                 | 4.0                                  | 1.5       |             |                                                                                          |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 |                                      |           |             |                                                                                          |                  |             |                  |          |                                    | Bag & Jar Sample                                  |           | 1.5 |          |  |
|                      |            |                 | 3.5                                  | 2.0       |             | with orange brown sand partings/pockets                                                  |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 |                                      |           |             |                                                                                          |                  |             |                  |          |                                    | Bag & Jar Sample                                  |           | 2.0 |          |  |
|                      |            |                 | 3.0                                  | 2.5       |             |                                                                                          |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 |                                      |           |             |                                                                                          |                  |             |                  |          |                                    | Bag & Jar Sample                                  |           | 2.5 |          |  |
|                      |            |                 | 2.5                                  | 3.0       |             | Bottom of hole at 2.50 m.                                                                |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 |                                      |           |             |                                                                                          |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 | 2.0                                  | 3.5       |             |                                                                                          |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 |                                      |           |             |                                                                                          |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 | 1.5                                  | 4.0       |             |                                                                                          |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 |                                      |           |             |                                                                                          |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 | 1.0                                  | 4.5       |             |                                                                                          |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 |                                      |           |             |                                                                                          |                  |             |                  |          |                                    |                                                   |           |     |          |  |
|                      |            |                 | 0.5                                  | 5.0       |             |                                                                                          |                  |             |                  |          |                                    |                                                   |           |     |          |  |

## NOTE:

LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS

Soil Description and Classification Symbols based on AS 1726

### Water Symbols

- Water Level (date)
- Inflow
- Partial Loss
- Complete Loss

### Moisture Content

- D - Dry
- M - Moist
- W - Wet
- W<sub>p</sub> - Plastic Limit
- W<sub>L</sub> - Liquid Limit

### Consistency (cohesive soils)

- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

### Relative Density (cohesionless soils)

- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

### Sampling/Testing

- BDS - Bulk Disturbed Sample
- DS - Disturbed Sample
- SPT - Standard Penetration Test
- N - SPT 'N' Value
- PP - Pocket Penetrometer (kPa)
- VS - Vane Shear (kPa)
- U<sub>50</sub> - Undisturbed Sample/Diameter



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# BOREHOLE LOG BH08/16

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PROJECT No: 160725 PR001A

|                                        |                                       |                        |
|----------------------------------------|---------------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10          | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                         |                        |
| <b>DATE COMMENCED:</b> 5/12/2016       | <b>ELEVATION (m):</b> 6.20            | <b>AHD</b>             |
| <b>COMPLETED:</b> 5/12/2016            | <b>TOTAL DEPTH (m):</b> 2.50          | <b>NORTHING:</b>       |
|                                        |                                       | <b>BCSG</b>            |
|                                        |                                       | <b>HOLE ANGLE:</b> 90° |
|                                        |                                       | <b>BEARING:</b> ---    |

| DRILLING             |            |                 | INFERRED STRATIGRAPHY AND PROPERTIES |           |                                                                                   |                           |                  |             | SAMPLING/TESTING |          |                              | ADDITIONAL COMMENTS/ INTERPRETED GEOLOGY |         |                  |          |  |
|----------------------|------------|-----------------|--------------------------------------|-----------|-----------------------------------------------------------------------------------|---------------------------|------------------|-------------|------------------|----------|------------------------------|------------------------------------------|---------|------------------|----------|--|
| Method               | Support    | Groundwater     | Elevation                            | Depth (m) | Graphic Log                                                                       | Soil / Rock Description   | Moisture Content | Consistency | Relative Density | Recovery | Samples Test Results Remarks | Depth (m)                                |         |                  |          |  |
| Solid Auger - TC Bit | No Support | Not Encountered | 6.0                                  |           |  | TOPSOIL                   | D                |             |                  |          |                              |                                          | TOPSOIL |                  |          |  |
|                      |            |                 |                                      |           | (SC) CLAYEY SAND, fine to medium grained, brown, low to medium plasticity clay    |                           |                  |             |                  |          |                              |                                          |         |                  | ALLUVIUM |  |
|                      |            |                 | 0.5                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         | Bag & Jar Sample | 0.5      |  |
|                      |            |                 | 5.5                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 1.0                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         | Bag & Jar Sample | 1.0      |  |
|                      |            |                 | 5.0                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 1.5                                  |           |                                                                                   | sandy clay in places      |                  |             |                  |          |                              |                                          |         | Bag & Jar Sample | 1.5      |  |
|                      |            |                 | 4.5                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 2.0                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         | Bag & Jar Sample | 2.0      |  |
|                      |            |                 | 4.0                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 2.5                                  |           |                                                                                   | Bottom of hole at 2.50 m. |                  |             |                  |          | Bag & Jar Sample             | 2.5                                      |         |                  |          |  |
|                      |            |                 | 3.5                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 3.0                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 3.0                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 3.5                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 2.5                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 4.0                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 2.0                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 4.5                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 1.5                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |
|                      |            |                 | 5.0                                  |           |                                                                                   |                           |                  |             |                  |          |                              |                                          |         |                  |          |  |

## NOTE:

LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS

Soil Description and Classification Symbols based on AS 1726

### Water Symbols

- Water Level (date)
- Inflow
- Partial Loss
- Complete Loss

### Moisture Content

- D - Dry
- M - Moist
- W - Wet
- W<sub>p</sub> - Plastic Limit
- W<sub>L</sub> - Liquid Limit

### Consistency (cohesive soils)

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- H - Hard

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- VD - Very Dense

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- PP - Pocket Penetrometer (kPa)
- VS - Vane Shear (kPa)
- U<sub>50</sub> - Undisturbed Sample/Diameter



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# BOREHOLE LOG BH09/16

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PROJECT No: 160725 PR001A

|                                        |                                       |                        |
|----------------------------------------|---------------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10          | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                         |                        |
| <b>DATE COMMENCED:</b> 5/12/2016       | <b>ELEVATION (m):</b> 11.70 AHD       | <b>EASTING:</b>        |
| <b>COMPLETED:</b> 5/12/2016            | <b>TOTAL DEPTH (m):</b> 4.00          | <b>NORTHING:</b>       |
|                                        |                                       | <b>BCSG</b>            |
|                                        |                                       | <b>HOLE ANGLE:</b> 90° |
|                                        |                                       | <b>BEARING:</b> —      |

| DRILLING             |            |                 | INFERRED STRATIGRAPHY AND PROPERTIES                                              |            |                           |                                                                                                                       |                  |             | SAMPLING/TESTING |          |                              | ADDITIONAL COMMENTS/ INTERPRETED GEOLOGY |     |                               |
|----------------------|------------|-----------------|-----------------------------------------------------------------------------------|------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------|-------------|------------------|----------|------------------------------|------------------------------------------|-----|-------------------------------|
| Method               | Support    | Groundwater     | Elevation                                                                         | Depth (m)  | Graphic Log               | Soil / Rock Description                                                                                               | Moisture Content | Consistency | Relative Density | Recovery | Samples Test Results Remarks | Depth (m)                                |     |                               |
| Solid Auger - TC Bit | No Support | Not Encountered | 11.5                                                                              |            |                           | (SC) CLAYEY SAND, fine to medium grained, brown, low to medium plasticity clay, trace fine to medium gravel           | D                |             |                  |          |                              | Bag & Jar Sample                         | 0.5 | COLLUVIUM                     |
|                      |            |                 | 11.0                                                                              |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 1.0                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 10.5                                                                              |            |                           | (SC) GRAVELLY CLAYEY SAND, fine to coarse grained, orange brown, low to medium plasticity clay, fine to coarse gravel |                  |             |                  |          |                              | Bag Sample                               | 1.5 | RESIDUAL SOIL                 |
|                      |            |                 | 1.5                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 10.0                                                                              |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 2.0                                                                               |            |                           | SANDSTONE, fine to medium grained, pale brown, extremely low to very low strength                                     |                  |             |                  |          |                              | Bag & Jar Sample                         | 2.0 | EXTREMELY WEATHERED SANDSTONE |
|                      |            |                 | 9.5                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 2.5                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 9.0                                                                               |            |                           | SANDSTONE, fine to medium grained, pale brown, extremely low to very low strength                                     |                  |             |                  |          |                              | Bag Sample                               | 2.5 | EXTREMELY WEATHERED SANDSTONE |
|                      |            |                 | 2.5                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 9.0                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 3.0                                                                               |            |                           | SANDSTONE, fine to medium grained, pale brown, extremely low to very low strength                                     |                  |             |                  |          |                              | Bag Sample                               | 3.0 | EXTREMELY WEATHERED SANDSTONE |
|                      |            |                 | 8.5                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 3.5                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 8.0                                                                               |            |                           | SANDSTONE, fine to medium grained, pale brown, extremely low to very low strength                                     |                  |             |                  |          |                              | Bag Sample                               | 3.5 | EXTREMELY WEATHERED SANDSTONE |
| 3.5                  |            |                 |                                                                                   |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
| 8.0                  |            |                 |                                                                                   |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
| 4.0                  |            |                 | SANDSTONE, fine to medium grained, pale brown, extremely low to very low strength | Bag Sample | 4.0                       | EXTREMELY WEATHERED SANDSTONE                                                                                         |                  |             |                  |          |                              |                                          |     |                               |
| 4.0                  |            |                 |                                                                                   |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
| 4.0                  |            |                 |                                                                                   |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 7.5                                                                               |            | Bottom of hole at 4.00 m. |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 4.5                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 7.0                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |
|                      |            |                 | 5.0                                                                               |            |                           |                                                                                                                       |                  |             |                  |          |                              |                                          |     |                               |

|                                                                                       |                                                               |                                                                                                    |                                                                                      |                                                                                   |                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NOTE:</b><br>LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS | Soil Description and Classification Symbols based on AS 1726  | <b>Moisture Content</b>                                                                            | <b>Consistency (cohesive soils)</b>                                                  | <b>Relative Density (cohesionless soils)</b>                                      | <b>Sampling/Testing</b>                                                                                                                                                                                                  |
|                                                                                       | <b>Water Symbols</b>                                          | D - Dry<br>M - Moist<br>W - Wet<br>W <sub>p</sub> - Plastic Limit<br>W <sub>L</sub> - Liquid Limit | VS - Very Soft<br>S - Soft<br>F - Firm<br>St - Stiff<br>VSt - Very Stiff<br>H - Hard | VL - Very Loose<br>L - Loose<br>MD - Medium Dense<br>D - Dense<br>VD - Very Dense | BDS - Bulk Disturbed Sample<br>DS - Disturbed Sample<br>SPT - Standard Penetration Test<br>N - SPT 'N' Value<br>PP - Pocket Penetrometer (kPa)<br>VS - Vane Shear (kPa)<br>U <sub>50</sub> - Undisturbed Sample/Diameter |
|                                                                                       | Water Level (date)<br>Inflow<br>Partial Loss<br>Complete Loss |                                                                                                    |                                                                                      |                                                                                   |                                                                                                                                                                                                                          |



# CITY PROJECTS OFFICE

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# BOREHOLE LOG BH10/16

Geotechnical

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Dedicated to a better Brisbane

PROJECT No: 160725 PR001A

|                                        |                                       |                        |
|----------------------------------------|---------------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10          | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                         |                        |
| <b>DATE COMMENCED:</b> 5/12/2016       | <b>ELEVATION (m):</b> 9.70            | <b>AHD</b>             |
| <b>COMPLETED:</b> 5/12/2016            | <b>TOTAL DEPTH (m):</b> 3.00          | <b>NORTHING:</b>       |
|                                        | <b>BCSG</b>                           | <b>HOLE ANGLE:</b> 90° |
|                                        |                                       | <b>BEARING:</b> ---    |

| DRILLING             |            |                 | INFERRED STRATIGRAPHY AND PROPERTIES |           |                                                                                    |                                                                           |                                                                                                                          |             |                  | SAMPLING/TESTING |                              | ADDITIONAL COMMENTS/ INTERPRETED GEOLOGY |               |     |                               |
|----------------------|------------|-----------------|--------------------------------------|-----------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------|------------------------------|------------------------------------------|---------------|-----|-------------------------------|
| Method               | Support    | Groundwater     | Elevation                            | Depth (m) | Graphic Log                                                                        | Soil / Rock Description                                                   | Moisture Content                                                                                                         | Consistency | Relative Density | Recovery         | Samples Test Results Remarks | Depth (m)                                |               |     |                               |
| Solid Auger - TC Bit | No Support | Not Encountered | 9.5                                  |           |  | (SC) CLAYEY SAND, fine to medium grained, brown, low to medium plasticity | D                                                                                                                        |             |                  |                  |                              |                                          | COLLUVIUM     |     |                               |
|                      |            |                 | 0.5                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  | Bag & Jar Sample             | 0.5                                      | RESIDUAL SOIL |     |                               |
|                      |            |                 | 9.0                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              | Bag & Jar Sample                         | 1.0           |     |                               |
|                      |            |                 | 8.5                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              | Bag & Jar Sample                         | 1.0           |     |                               |
|                      |            |                 | 1.5                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              | Bag Sample                               | 1.5           |     |                               |
|                      |            |                 | 8.0                                  |           |                                                                                    |                                                                           | (SW) CLAYEY GRAVELLY SAND, fine to medium grained, pale brown, fine to medium gravel sandstone, low to medium plasticity |             |                  |                  |                              | Bag & Jar Sample                         | 2.0           |     |                               |
|                      |            |                 | 2.0                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              | Bag & Jar Sample                         | 2.0           |     |                               |
|                      |            |                 | 7.5                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 2.5                                  |           |                                                                                    |                                                                           | SANDSTONE, fine to medium grained, pale brown, very low to low strength                                                  |             |                  |                  |                              |                                          | Bag Sample    | 2.5 | EXTREMELY WEATHERED SANDSTONE |
|                      |            |                 | 7.0                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          | Bag Sample    | 3.0 | AUGER REFUSAL                 |
| 3.0                  |            |                 |                                      |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 6.5                                  |           |  | Bottom of hole at 3.00 m.                                                 |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 3.5                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 6.0                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 4.0                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 5.5                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 4.5                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 5.0                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 5.0                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 5.0                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |
|                      |            |                 | 5.0                                  |           |                                                                                    |                                                                           |                                                                                                                          |             |                  |                  |                              |                                          |               |     |                               |

## NOTE:

LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS

Soil Description and Classification Symbols based on AS 1726

### Water Symbols

- Water Level (date)
- Inflow
- Partial Loss
- Complete Loss

### Moisture Content

- D - Dry
- M - Moist
- W - Wet
- W<sub>p</sub> - Plastic Limit
- W<sub>L</sub> - Liquid Limit

### Consistency (cohesive soils)

- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

### Relative Density (cohesionless soils)

- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

### Sampling/Testing

- BDS - Bulk Disturbed Sample
- DS - Disturbed Sample
- SPT - Standard Penetration Test
- N - SPT 'N' Value
- PP - Pocket Penetrometer (kPa)
- VS - Vane Shear (kPa)
- U<sub>50</sub> - Undisturbed Sample/Diameter



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# BOREHOLE LOG BH11/16

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PROJECT No: 160725 PR001A

|                                        |                                       |                        |
|----------------------------------------|---------------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Schneider Drilling | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Gemco HC10          | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                         |                        |
| <b>DATE COMMENCED:</b> 5/12/2016       | <b>ELEVATION (m):</b> 6.00            | <b>AHD</b>             |
| <b>COMPLETED:</b> 5/12/2016            | <b>TOTAL DEPTH (m):</b> 4.00          | <b>EASTING:</b> BCSG   |
|                                        |                                       | <b>HOLE ANGLE:</b> 90° |
|                                        |                                       | <b>BEARING:</b> —      |

| DRILLING             |            |                  | INFERRED STRATIGRAPHY AND PROPERTIES |           |             |                                                                                   |                  |             | SAMPLING/TESTING |          |                              | ADDITIONAL COMMENTS/ INTERPRETED GEOLOGY |                                                                                                                                          |                           |     |  |     |  |  |          |
|----------------------|------------|------------------|--------------------------------------|-----------|-------------|-----------------------------------------------------------------------------------|------------------|-------------|------------------|----------|------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----|--|-----|--|--|----------|
| Method               | Support    | Groundwater      | Elevation                            | Depth (m) | Graphic Log | Soil / Rock Description                                                           | Moisture Content | Consistency | Relative Density | Recovery | Samples Test Results Remarks | Depth (m)                                |                                                                                                                                          |                           |     |  |     |  |  |          |
| Solid Auger - TC Bit | No Support |                  | 5.5                                  | 0.5       |             | (CI/CH) SANDY CLAY, medium to high plasticity, brown, fine to medium grained sand | M                |             |                  |          |                              | Bag & Jar Sample                         | 0.5                                                                                                                                      | ALLUVIUM                  |     |  |     |  |  |          |
|                      |            | Bag & Jar Sample | 1.0                                  |           |             |                                                                                   |                  |             |                  |          |                              |                                          |                                                                                                                                          |                           |     |  |     |  |  |          |
|                      |            | Bag & Jar Sample | 1.5                                  |           |             |                                                                                   |                  |             |                  |          |                              |                                          |                                                                                                                                          |                           |     |  |     |  |  |          |
|                      |            | Bag & Jar Sample | 2.0                                  |           |             |                                                                                   |                  |             |                  |          |                              |                                          |                                                                                                                                          |                           |     |  |     |  |  |          |
|                      |            |                  |                                      |           |             | 4.0                                                                               |                  |             |                  |          |                              | 2.0                                      | (CI/CH) SANDY CLAY, medium to high plasticity, mottled brown and grey, fine to medium grained sand with partings/pockets of orange brown |                           |     |  |     |  |  | ALLUVIUM |
|                      |            |                  |                                      |           |             | 3.5                                                                               |                  |             |                  |          |                              | 2.5                                      |                                                                                                                                          | Bag & Jar Sample          | 2.5 |  |     |  |  |          |
|                      |            |                  |                                      |           |             | 3.0                                                                               |                  |             |                  |          |                              | 3.0                                      |                                                                                                                                          |                           |     |  | 3.0 |  |  |          |
|                      |            |                  |                                      |           |             | 2.5                                                                               |                  |             |                  |          |                              | 3.5                                      |                                                                                                                                          |                           |     |  | 3.5 |  |  |          |
|                      |            |                  |                                      |           |             | 2.0                                                                               |                  |             |                  |          |                              | 4.0                                      |                                                                                                                                          | Bag & Jar Sample          | 4.0 |  |     |  |  |          |
|                      |            |                  |                                      |           |             |                                                                                   |                  |             |                  |          |                              |                                          |                                                                                                                                          | Bottom of hole at 4.00 m. |     |  |     |  |  |          |
|                      |            |                  | 1.5                                  | 4.5       |             |                                                                                   |                  |             |                  |          | 4.5                          |                                          |                                                                                                                                          |                           |     |  |     |  |  |          |
|                      |            |                  | 1.0                                  | 5.0       |             |                                                                                   |                  |             |                  |          |                              | 5.0                                      |                                                                                                                                          |                           |     |  |     |  |  |          |

## NOTE:

LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS

Soil Description and Classification Symbols based on AS 1726

### Water Symbols

- Water Level (date)
- Inflow
- Partial Loss
- Complete Loss

### Moisture Content

- D - Dry
- M - Moist
- W - Wet
- W<sub>p</sub> - Plastic Limit
- W<sub>L</sub> - Liquid Limit

### Consistency (cohesive soils)

- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

### Relative Density (cohesionless soils)

- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

### Sampling/Testing

- BDS - Bulk Disturbed Sample
- DS - Disturbed Sample
- SPT - Standard Penetration Test
- N - SPT 'N' Value
- PP - Pocket Penetrometer (kPa)
- VS - Vane Shear (kPa)
- U<sub>50</sub> - Undisturbed Sample/Diameter



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# TEST PIT LOG TP01/17

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PROJECT No: 160725 PR001A

|                                        |                                   |                        |
|----------------------------------------|-----------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Eagle Alliance | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Backhoe         | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                     |                        |
| <b>DATE COMMENCED:</b> 29/03/2017      | <b>ELEVATION (m):</b> 5.30        | <b>AHD</b>             |
| <b>COMPLETED:</b> 29/03/2017           | <b>TOTAL DEPTH (m):</b> 1.60      | <b>EASTING:</b> BCSG   |
|                                        |                                   | <b>HOLE ANGLE:</b> --- |
|                                        |                                   | <b>BEARING:</b> ---    |

| DRILLING |         |              | INFERRED STRATIGRAPHY AND PROPERTIES |           |                                                                                    |                                                                                           |                  |             | SAMPLING/TESTING |          |                                    | ADDITIONAL<br>COMMENTS/<br>INTERPRETED<br>GEOLOGY |           |     |     |
|----------|---------|--------------|--------------------------------------|-----------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------|-------------|------------------|----------|------------------------------------|---------------------------------------------------|-----------|-----|-----|
| Method   | Support | Groundwater  | Elevation                            | Depth (m) | Graphic Log                                                                        | Soil / Rock Description                                                                   | Moisture Content | Consistency | Relative Density | Recovery | Samples<br>Test Results<br>Remarks |                                                   | Depth (m) |     |     |
|          |         | Not Observed |                                      |           |  | TOPSOIL                                                                                   | M                |             |                  |          |                                    |                                                   | ALLUVIUM  |     |     |
|          |         |              | 5.0                                  |           |                                                                                    | (FILL) (CL/CI) SILTY CLAY, low to medium plasticity brown to grey with fine sand partings |                  |             |                  |          |                                    |                                                   |           | 0.5 |     |
|          |         |              | 0.5                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    |                                                   |           |     |     |
|          |         |              | 4.5                                  |           |                                                                                    | (CI) CLAY, medium plasticity, grey with some silty sand partings                          |                  |             |                  |          |                                    |                                                   |           |     | 1.0 |
|          |         |              | 1.0                                  |           |                                                                                    | —1.10 to 1.60m: Moisture content increasing with depth                                    |                  |             |                  |          |                                    |                                                   |           |     |     |
|          |         |              | 4.0                                  |           |                                                                                    |                                                                                           | W                |             |                  |          |                                    |                                                   | 1.5       |     |     |
|          |         |              | 1.5                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    |                                                   |           |     |     |
|          |         |              | 3.5                                  |           |                                                                                    | Bottom of test pit at 1.60 m.                                                             |                  |             |                  |          |                                    |                                                   |           |     |     |
|          |         |              | 2.0                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    | 2.0                                               |           |     |     |
|          |         |              | 3.0                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    |                                                   |           |     |     |
|          |         |              | 2.5                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    | 2.5                                               |           |     |     |
|          |         |              | 2.5                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    |                                                   |           |     |     |
|          |         |              | 3.0                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    | 3.0                                               |           |     |     |
|          |         |              | 2.0                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    |                                                   |           |     |     |
|          |         |              | 3.5                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    | 3.5                                               |           |     |     |
|          |         |              | 1.5                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    |                                                   |           |     |     |
|          |         |              | 4.0                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    | 4.0                                               |           |     |     |
|          |         |              | 1.0                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    |                                                   |           |     |     |
|          |         |              | 4.5                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    | 4.5                                               |           |     |     |
|          |         |              | 0.5                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    |                                                   |           |     |     |
|          |         |              | 5.0                                  |           |                                                                                    |                                                                                           |                  |             |                  |          |                                    | 5.0                                               |           |     |     |

|                                                                                       |                                                                     |  |                                |                                     |                                              |                                               |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------------|--|--------------------------------|-------------------------------------|----------------------------------------------|-----------------------------------------------|
| <b>NOTE:</b><br>LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS | <b>Soil Description and Classification Symbols based on AS 1726</b> |  | <b>Moisture Content</b>        | <b>Consistency (cohesive soils)</b> | <b>Relative Density (cohesionless soils)</b> | <b>Sampling/Testing</b>                       |
|                                                                                       | <b>Water Symbols</b>                                                |  | D - Dry                        | VS - Very Soft                      | VL - Very Loose                              | BDS - Bulk Disturbed Sample                   |
|                                                                                       | Water Level (date)                                                  |  | M - Moist                      | S - Soft                            | L - Loose                                    | DS - Disturbed Sample                         |
|                                                                                       | Inflow                                                              |  | W - Wet                        | F - Firm                            | MD - Medium Dense                            | SPT - Standard Penetration Test               |
|                                                                                       | Partial Loss                                                        |  | W <sub>p</sub> - Plastic Limit | St - Stiff                          | D - Dense                                    | N - SPT 'N' Value                             |
|                                                                                       | Complete Loss                                                       |  | W <sub>L</sub> - Liquid Limit  | VSt - Very Stiff                    | VD - Very Dense                              | PP - Pocket Penetrometer (kPa)                |
|                                                                                       |                                                                     |  |                                | H - Hard                            |                                              | VS - Vane Shear (kPa)                         |
|                                                                                       |                                                                     |  |                                |                                     |                                              | U <sub>50</sub> - Undisturbed Sample/Diameter |



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Ground Engineering  
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Phone: (07) 30274774 Fax: (07) 33340220

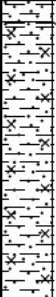
# TEST PIT LOG TP02/17

Page 1 of 1

Dedicated to a better Brisbane

PROJECT No: 160725 PR001A

|                                        |                                   |                        |
|----------------------------------------|-----------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Eagle Alliance | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Backhoe         | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                     |                        |
| <b>DATE COMMENCED:</b> 29/03/2017      | <b>ELEVATION (m):</b> 5.20        | <b>AHD</b>             |
| <b>COMPLETED:</b> 29/03/2017           | <b>TOTAL DEPTH (m):</b> 1.10      | <b>EASTING:</b> BCSG   |
|                                        |                                   | <b>HOLE ANGLE:</b> --- |
|                                        |                                   | <b>BEARING:</b> ---    |

| DRILLING |         |              | INFERRED STRATIGRAPHY AND PROPERTIES |           |                                                                                   |                                                                                |                  |             |                  | SAMPLING/TESTING |                              |           | ADDITIONAL COMMENTS/ INTERPRETED GEOLOGY |  |
|----------|---------|--------------|--------------------------------------|-----------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------|-------------|------------------|------------------|------------------------------|-----------|------------------------------------------|--|
| Method   | Support | Groundwater  | Elevation                            | Depth (m) | Graphic Log                                                                       | Soil / Rock Description                                                        | Moisture Content | Consistency | Relative Density | Recovery         | Samples Test Results Remarks | Depth (m) |                                          |  |
|          |         | Not Observed | 5.0                                  |           |  | TOPSOIL                                                                        | M                |             |                  |                  |                              |           | ALLUVIUM                                 |  |
|          |         |              | 0.5                                  |           |                                                                                   | (CI)SILTY SANDY CLAY medium plasticity, brown, becoming clayey sand in places. |                  |             |                  |                  | DS                           | 0.5       |                                          |  |
|          |         |              | 1.0                                  |           |                                                                                   |                                                                                |                  |             |                  |                  | DS                           | 1.0       |                                          |  |
|          |         |              | 4.0                                  |           |                                                                                   | Bottom of test pit at 1.10 m.                                                  |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 1.5                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 3.5                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 2.0                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 3.0                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 2.5                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 2.5                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 3.0                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 2.0                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 3.5                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 1.5                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 4.0                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 1.0                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 4.5                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 0.5                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |
|          |         |              | 5.0                                  |           |                                                                                   |                                                                                |                  |             |                  |                  |                              |           |                                          |  |

|                                                                                       |                                                                     |  |                                                                                                    |                                                                                      |                                                                                   |                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NOTE:</b><br>LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS | <b>Soil Description and Classification Symbols based on AS 1726</b> |  | <b>Moisture Content</b>                                                                            | <b>Consistency (cohesive soils)</b>                                                  | <b>Relative Density (cohesionless soils)</b>                                      | <b>Sampling/Testing</b>                                                                                                                                                                                                  |
|                                                                                       | <b>Water Symbols</b>                                                |  | D - Dry<br>M - Moist<br>W - Wet<br>W <sub>p</sub> - Plastic Limit<br>W <sub>l</sub> - Liquid Limit | VS - Very Soft<br>S - Soft<br>F - Firm<br>St - Stiff<br>VSt - Very Stiff<br>H - Hard | VL - Very Loose<br>L - Loose<br>MD - Medium Dense<br>D - Dense<br>VD - Very Dense | BDS - Bulk Disturbed Sample<br>DS - Disturbed Sample<br>SPT - Standard Penetration Test<br>N - SPT 'N' Value<br>PP - Pocket Penetrometer (kPa)<br>VS - Vane Shear (kPa)<br>U <sub>50</sub> - Undisturbed Sample/Diameter |
|                                                                                       | Water Level (date)<br>Inflow<br>Partial Loss<br>Complete Loss       |  |                                                                                                    |                                                                                      |                                                                                   |                                                                                                                                                                                                                          |



# CITY PROJECTS OFFICE

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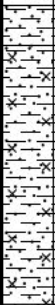
# TEST PIT LOG TP03/17

Page 1 of 1

Dedicated to a better Brisbane

PROJECT No: 160725 PR001A

|                                        |                                   |                        |
|----------------------------------------|-----------------------------------|------------------------|
| <b>CLIENT:</b> Landscape Architecture  | <b>CONTRACTOR:</b> Eagle Alliance | <b>LOGGED BY:</b> BAC  |
| <b>PROJECT:</b> Groundwater Monitoring | <b>EQUIPMENT:</b> Backhoe         | <b>CHECKED BY:</b>     |
| <b>LOCATION:</b> Sherwood Arboretum    | <b>NOTES:</b>                     |                        |
| <b>DATE COMMENCED:</b> 29/03/2017      | <b>ELEVATION (m):</b> 5.50        | <b>AHD</b>             |
| <b>COMPLETED:</b> 29/03/2017           | <b>TOTAL DEPTH (m):</b> 1.10      | <b>EASTING:</b>        |
|                                        |                                   | <b>BCSG</b>            |
|                                        |                                   | <b>HOLE ANGLE:</b> --- |
|                                        |                                   | <b>BEARING:</b> ---    |

| DRILLING |         |              | INFERRED STRATIGRAPHY AND PROPERTIES |           |                                                                                   |                                                                                                   |                  |                                                                                   |                                                                                    | SAMPLING/TESTING |                                 |           | ADDITIONAL<br>COMMENTS/<br>INTERPRETED<br>GEOLOGY |    |     |
|----------|---------|--------------|--------------------------------------|-----------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------|---------------------------------|-----------|---------------------------------------------------|----|-----|
| Method   | Support | Groundwater  | Elevation                            | Depth (m) | Graphic Log                                                                       | Soil / Rock Description                                                                           | Moisture Content | Consistency                                                                       | Relative Density                                                                   | Recovery         | Samples Test Results<br>Remarks | Depth (m) |                                                   |    |     |
|          |         | Not Observed |                                      |           |  | TOPSOIL                                                                                           | M                |  |  |                  |                                 |           |                                                   |    |     |
|          |         |              |                                      | 5.0 0.5   |                                                                                   | (CL/CI) SILTY SANDY CLAY, low to medium plasticity, brown with increase in sand content in places |                  |                                                                                   |                                                                                    |                  |                                 |           |                                                   | DS | 0.5 |
|          |         |              |                                      | 4.5 1.0   |                                                                                   |                                                                                                   |                  |                                                                                   |                                                                                    |                  |                                 |           |                                                   | DS | 1.0 |
|          |         |              | 4.0 1.5                              |           |                                                                                   | Bottom of test pit at 1.10 m.                                                                     |                  |                                                                                   |                                                                                    |                  |                                 | 1.5       |                                                   |    |     |
|          |         |              | 3.5 2.0                              |           |                                                                                   |                                                                                                   |                  |                                                                                   |                                                                                    |                  |                                 | 2.0       |                                                   |    |     |
|          |         |              | 3.0 2.5                              |           |                                                                                   |                                                                                                   |                  |                                                                                   |                                                                                    |                  |                                 | 2.5       |                                                   |    |     |
|          |         |              | 2.5 3.0                              |           |                                                                                   |                                                                                                   |                  |                                                                                   |                                                                                    |                  |                                 | 3.0       |                                                   |    |     |
|          |         |              | 2.0 3.5                              |           |                                                                                   |                                                                                                   |                  |                                                                                   |                                                                                    |                  |                                 | 3.5       |                                                   |    |     |
|          |         |              | 1.5 4.0                              |           |                                                                                   |                                                                                                   |                  |                                                                                   |                                                                                    |                  |                                 | 4.0       |                                                   |    |     |
|          |         |              | 1.0 4.5                              |           |                                                                                   |                                                                                                   |                  |                                                                                   |                                                                                    |                  |                                 | 4.5       |                                                   |    |     |
|          |         |              | 0.5 5.0                              |           |                                                                                   |                                                                                                   |                  |                                                                                   |                                                                                    |                  |                                 | 5.0       |                                                   |    |     |

## NOTE:

LOG TO BE READ IN CONJUNCTION WITH REPORT TEXT AND EXPLANATION SHEETS

Soil Description and Classification Symbols based on AS 1726

### Water Symbols

- Water Level (date)
- Inflow
- Partial Loss
- Complete Loss

### Moisture Content

- D - Dry
- M - Moist
- W - Wet
- W<sub>p</sub> - Plastic Limit
- W<sub>L</sub> - Liquid Limit

### Consistency (cohesive soils)

- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

### Relative Density (cohesionless soils)

- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

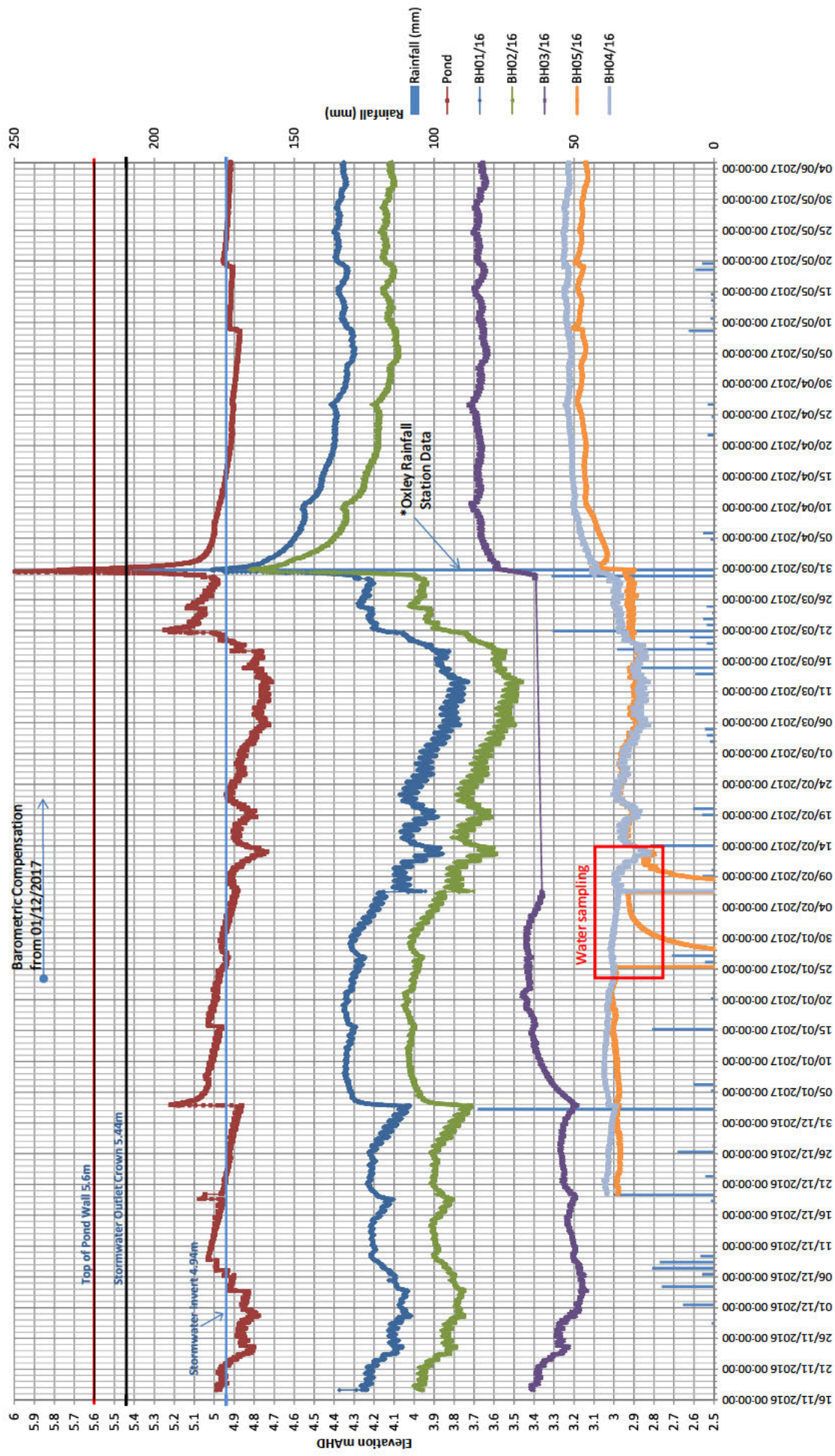
### Sampling/Testing

- BDS - Bulk Disturbed Sample
- DS - Disturbed Sample
- SPT - Standard Penetration Test
- N - SPT 'N' Value
- PP - Pocket Penetrometer (kPa)
- VS - Vane Shear (kPa)
- U<sub>50</sub> - Undisturbed Sample/Diameter

# **Appendix B**

## **Groundwater Monitoring Data**

# Sherwood Arboretum



# **Appendix C**

## **Laboratory Analytical Reports**

# CERTIFICATE OF ANALYSIS

|                         |                                                                                     |                         |                                             |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------|---------------------------------------------|
| Work Order              | : EB1626468                                                                         | Page                    | : 1 of 3                                    |
| Client                  | : BRISBANE CITY COUNCIL                                                             | Laboratory              | : Environmental Division Brisbane           |
| Contact                 | : [REDACTED]                                                                        | Contact                 | : Customer Services EB                      |
| Address                 | : CITY PROJECTS OFFICE 505 ST PAULS TERRACE<br>FORTITUDE VALLEY QLD, AUSTRALIA 4006 | Address                 | : 2 Byth Street Stafford QLD Australia 4053 |
| Telephone               | : +61 [REDACTED]                                                                    | Telephone               | : +61-7-3243 7222                           |
| Project                 | : 160725 Sherwood                                                                   | Date Samples Received   | : 07-Nov-2016 16:45                         |
| Order number            | : M64232WD                                                                          | Date Analysis Commenced | : 10-Nov-2016                               |
| C-O-C number            | : [REDACTED]                                                                        | Issue Date              | : 11-Nov-2016 11:57                         |
| Sampler                 | : [REDACTED]                                                                        |                         |                                             |
| Site                    | : [REDACTED]                                                                        |                         |                                             |
| Quote number            | : [REDACTED]                                                                        |                         |                                             |
| No. of samples received | : 4                                                                                 |                         |                                             |
| No. of samples analysed | : 4                                                                                 |                         |                                             |



Accreditation No. 825  
Accredited for compliance with  
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

## Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| Signatories        | Position | Accreditation Category                      |
|--------------------|----------|---------------------------------------------|
| Ben Felgendrejeris |          | Brisbane Acid Sulphate Soils, Stafford, QLD |



Page : 2 of 3  
Work Order : EB1626468  
Client : BRISBANE CITY COUNCIL  
Project : 160725 Sherwood

### General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

▲ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite); Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite); ANC not required because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(ox) screening); pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- ASS: EA033 (CRS Suite); Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO<sub>3</sub>) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m<sup>3</sup> in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m<sup>3</sup>'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.



## Analytical Results

| Sub-Matrix: SOIL<br>(Matrix: SOIL)           |            | Client sample ID            |             |               |               |               |               |               |       |
|----------------------------------------------|------------|-----------------------------|-------------|---------------|---------------|---------------|---------------|---------------|-------|
|                                              |            | Client sampling date / time |             |               |               |               |               |               |       |
| Compound                                     | CAS Number | LOR                         | Unit        | BH02/16 4.0m  |               | BH02/16 2.5m  | BH03/16 5.5m  | BH01/16 4.0   | ----  |
|                                              |            |                             |             | [03-Nov-2016] | [03-Nov-2016] | [03-Nov-2016] | [03-Nov-2016] | [03-Nov-2016] | ----  |
|                                              |            |                             |             | EB1626468-001 | EB1626468-002 | EB1626468-003 | EB1626468-004 |               | ----- |
|                                              |            |                             |             | Result        | Result        | Result        | Result        |               | ---   |
| EA033-A: Actual Acidity                      |            |                             |             |               |               |               |               |               |       |
| pH KCl (23A)                                 | ---        | 0.1                         | pH Unit     | 5.2           | 5.7           | 6.0           | 5.0           |               | ---   |
| Titratable Actual Acidity (23F)              | ---        | 2                           | mole H+ / t | 18            | 17            | 8             | 30            |               | ---   |
| sulfidic - Titratable Actual Acidity (s-23F) | ---        | 0.02                        | % pyrite S  | 0.03          | 0.03          | <0.02         | 0.05          |               | ---   |
| EA033-B: Potential Acidity                   |            |                             |             |               |               |               |               |               |       |
| Chromium Reducible Sulfur (22B)              | ---        | 0.005                       | % S         | 0.016         | <0.005        | 0.005         | <0.005        |               | ---   |
| acidity - Chromium Reducible Sulfur (a-22B)  | ---        | 10                          | mole H+ / t | <10           | <10           | <10           | <10           |               | ---   |
| EA033-E: Acid Base Accounting                |            |                             |             |               |               |               |               |               |       |
| ANC Fineness Factor                          | ---        | 0.5                         | -           | 1.5           | 1.5           | 1.5           | 1.5           |               | ---   |
| Net Acidity (sulfur units)                   | ---        | 0.02                        | % S         | 0.04          | 0.03          | <0.02         | 0.05          |               | ---   |
| Net Acidity (acidity units)                  | ---        | 10                          | mole H+ / t | 28            | 18            | 11            | 31            |               | ---   |
| Liming Rate                                  | ---        | 1                           | kg CaCO3/t  | 2             | 1             | <1            | 2             |               | ---   |
| Net Acidity excluding ANC (sulfur units)     | ---        | 0.02                        | % S         | 0.04          | 0.03          | <0.02         | 0.05          |               | ---   |
| Net Acidity excluding ANC (acidity units)    | ---        | 10                          | mole H+ / t | 28            | 18            | 11            | 31            |               | ---   |
| Liming Rate excluding ANC                    | ---        | 1                           | kg CaCO3/t  | 2             | 1             | <1            | 2             |               | ---   |
| EA037: Ass Field Screening Analysis          |            |                             |             |               |               |               |               |               |       |
| ø pH (F)                                     | ---        | 0.1                         | pH Unit     | 6.0           | 6.7           | 7.4           | 6.2           |               | ---   |
| ø pH (Fox)                                   | ---        | 0.1                         | pH Unit     | 4.4           | 5.1           | 7.3           | 4.0           |               | ---   |
| ø Reaction Rate                              | ---        | 1                           | -           | 3             | 2             | 4             | 3             |               | ---   |



Environmental

## CERTIFICATE OF ANALYSIS

|                                |                                     |                                |                                                    |
|--------------------------------|-------------------------------------|--------------------------------|----------------------------------------------------|
| <b>Work Order</b>              | <b>: EB1627332</b>                  | <b>Page</b>                    | <b>: 1 of 4</b>                                    |
| <b>Client</b>                  | <b>: BRISBANE CITY COUNCIL</b>      | <b>Laboratory</b>              | <b>: Environmental Division Brisbane</b>           |
| <b>Contact</b>                 | <b>: [REDACTED]</b>                 | <b>Contact</b>                 | <b>: Customer Services EB</b>                      |
| <b>Address</b>                 | <b>: GPO BOX 2567</b>               | <b>Address</b>                 | <b>: 2 Byth Street Stafford QLD Australia 4053</b> |
|                                | <b>BRISBANE QLD, AUSTRALIA 4001</b> |                                |                                                    |
| <b>Telephone</b>               | <b>: +61 3 [REDACTED]</b>           | <b>Telephone</b>               | <b>: +61-7-3243 7222</b>                           |
| <b>Project</b>                 | <b>: BH94 Sherwood Arbitrium</b>    | <b>Date Samples Received</b>   | <b>: 17-Nov-2016 11:56</b>                         |
| <b>Order number</b>            | <b>: 4400187329</b>                 | <b>Date Analysis Commenced</b> | <b>: 17-Nov-2016</b>                               |
| <b>C-O-C number</b>            | <b>: ---</b>                        | <b>Issue Date</b>              | <b>: 22-Nov-2016 11:24</b>                         |
| <b>Sampler</b>                 | <b>: [REDACTED]</b>                 |                                |                                                    |
| <b>Site</b>                    | <b>: ---</b>                        |                                |                                                    |
| <b>Quote number</b>            | <b>: ---</b>                        |                                |                                                    |
| <b>No. of samples received</b> | <b>: 4</b>                          |                                |                                                    |
| <b>No. of samples analysed</b> | <b>: 4</b>                          |                                |                                                    |



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| Signatories | Position                 | Accreditation Category             |
|-------------|--------------------------|------------------------------------|
| Greg Vogel  | Laboratory Manager       | Brisbane Inorganics, Stafford, QLD |
| Kim McCabe  | Senior Inorganic Chemist | Brisbane Inorganics, Stafford, QLD |



Page : 2 of 4  
Work Order : EB1627332  
Client : BRISBANE CITY COUNCIL  
Project : BH94 Sherwood Arbitrum

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LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.