



**Report on
Geotechnical Investigation
24 Valencia Road Carmel WA**

Project: LG6892016SC_Rev2 3 December 2018

Client: Burswood Care Pty Ltd

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3 December 2018

To
Burswood Care Pty Ltd
43 Old Perth Road, Bassendean WA 6054

Attention: Mr. Dinu Ekanayake

Dear Dinu,

RE: Geotechnical Site Classification for 24 Valencia Road Carmel WA

This letter presents our report on a geotechnical site classification carried out at the above site. If you have any questions related to the report or we can be of further assistance, please do not hesitate to contact local geotechnics or the undersigned.

For and on behalf of Local Geotechnics.

A handwritten signature in blue ink, appearing to read "Harun Meer", is written over a light blue grid background.

Dr. Harun Meer

Ph.D.(Geotech), M. Eng. (Geotech), B. Eng. (Civil), MIE Aust

Director

Local Geotechnics

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EXECUTIVE SUMMARY

This is a geotechnical site classification report for 24 Valencia Road Carmel WA (the project). The project was commissioned by Mr. Dinu Ekanayake on behalf of Burswood Care Pty Ltd (the client).

The proposed construction at the site will be maximum of double storey nursing home.

Objectives of the investigation are to obtain information on the subsurface conditions so as to classify the site in accordance with the definitions provided in Australian Standard AS2870 – 2011 and recommendation on drainage system.

Field investigation and testing were conducted on 2 August July 2016, 1 November 2016, 10 September 2018 and 19 October 2018. The investigation work consists of field observation, taking of photographs, sub-surface probing, soil profile logging, soil sampling, conducting of Dynamic Cone Penetrometer (DCP) testing alongside of the test pits, conducting of field permeability tests and lab testing.

The weather condition was fine and sunny during field works. This report has to read or implement in full. No partial implementation of this report is allowed.

Findings are presented in the following sections:

DCP test revealed that soil is in very loose to dense and firm to hard condition. Based on the DCP results, we recommend that the foundation material is not capable of sustaining an allowable bearing pressure of 100 kPa in its current condition.

Site Classification

Provided earthworks are completed as per the recommendation of in Section 7, based on the site soil profile, laboratory test results and surrounding condition, the site can be classified as “**CLASS S**” in accordance with the definitions provided in Australian Standard AS2870 -2011. The characteristics surface movement Y_s is considered to be $0 \text{ mm} < Y_s \leq 20 \text{ mm}$.

Stormwater Drainage

It is found from the permeability tests that the permeability at the site varies from $3.8\text{E}+00$ m/day to $5.0\text{E}+00$ m/day with an average value of 4.3 m/day. A permeability value of **4.0 m/day** is recommended for this site.

Considering permeability value of 4.0 m/day, onsite disposal can be accommodated for this site. The drainage system has to fulfil the requirements of the Shire of Kalamunda.

It is highly recommended that a competent geotechnical engineer should supervise earthworks and construction to ensure that all organic, roots, demolition debris, very soft to soft clayey material have been adequately removed from the area and that the fill material is adequately compacted.

1.0 INTRODUCTION

This is a geotechnical site classification report for 24 Valencia Road Carmel WA (the project). The project was commissioned by Mr. Dinu Ekanayake on behalf of Burswood Care Pty Ltd (the client). Aerial view of the site location is shown in Figure 1.

The proposed built area is back of the existing nursing home and the area is approximately 3,680 m².



Figure 1. Aerial view of the site location (Source: Google map)

Objectives of the investigation are to obtain information on the sub-surface conditions so as to classify the site in accordance with the definitions provided in Australian Standard AS2870 – 2011 and to provide recommendation on stormwater drainage. Compaction control, bearing capacity, wind force calculations or classifications, slope stability checking and settlement calculation were not in the scope of this investigation. Environmental issues were not considered in this report.

Field investigation and testing were conducted on 2 August July 2016, 1 November 2016, 10 September 2018 and 19 October 2018. Main objectives for field works on different dates are as follows:

- *2 August July 2016* (Reference LG682016SC Rev 1): field investigation was conducted as a part of geotechnical investigation.
- *1 November 2016 and 10 September 2018* (Reference LG7722016FPT and LGK5082018FPT respectively): Field permeability tests were conducted. On 1 November 2016 permeability tests were conducted considering whole area and on 10 September 2018 permeability tests were conducted over proposed leach drain area.
- *19 October 2018* (Reference LGK5472018Lab): soil sampling was conducted in order to determine chemical properties of the soil at the propose leach drain area.

Report and letter were prepared after each field works (References LG682016SC Rev 1, , LG7722016FPT. LGK5082018FPT_Rev0 LGK5472018Lab). This report (LG682016SC Rev 2) will collate all the findings obtained from field testing at different dates. This report has to read or implemented in full. No partial implementation of this report is allowed.

LOCAL GEOTECHNICS

Project: LG6892016SC_Rev1
Geotechnical Site Classification
Site: 24 Valencia Road Carmel WA
Client: Burswood Care Pty Ltd

2.0 PROPOSED DEVELOPMENT

The proposed construction at the site will be a double storey nursing home.

3.0 SCOPE AND OBJECTIVES

The scope and objectives of the investigation are as follows:

- Conducting of up to 6 Test Pits by using a backhoe up to 2.5 m or refusal.
- Logging of site soil profile and groundwater recording as per test pits observation.
- Soil sampling as deemed necessary for laboratory tests, which includes:
 - Particle Size Distribution (PSD)
 - Plasticity Index (PI) test
- Conducting of DCP tests to a depth of 1.0 m or refusal alongside of test pits.
- Conducting of field permeability tests;
- Soil sampling for chemical tests;
- Submit a factual report on findings so as to classify the site in accordance with the Australian Standard AS2870 - 2011.
- Provide recommendation on earthworks.
- Provide recommendation on stormwater drainage.

4.0 SITE CONDITIONS

4.1 Surface condition

The site is located at 24 Valencia Road, Carmel WA. There is an existing nursing home at the site which will remain. There is a house near to the south-east corner of the site. There are few small to large size trees at the site and the site is covered with grasses. There are few leach drains were found at site. The topography of the area is hilly and the site level is found with slope from western towards eastern side. No water ponding was observed at the time of investigation. The site photos taken during the field investigation are shown in Appendix D.

4.2 Subsurface condition

Desktop study was conducted in office about the site condition before going for field investigation to have a better idea about the site geology as well as to implement the proper investigation technique.

A review of Environmental Geological Western Australia survey Map of Armadale 1:50,000 revealed that the site is consisted of Laterite-massive and vuggy to cemented pisolites to 4 m thick, associated loose, sandy pisolite gravel (G2), of residual origin. *Environmental Geological map of Armadale* also revealed that the site soil has variable permeability, Low corrosion potential, medium to high slope stability, high bearing capacity.

Competent, requires to excavate, strong foundations but poorly drained, may be ferruginous or bauxitic, overlies pallid saprolite.

5.0 FIELD INVESTIGATION

The field investigation consists of sub-surface probing by using a backhoe at six locations up to a depth of 2.5 m or refusal, soil profile logging, soil sampling, Dynamic Cone Penetrometer (DCP) testing alongside of the test pits, conducting of field permeability tests, laboratory test and taking photographs.

LOCAL GEOTECHNICS

Project: LG6892016SC_Rev1
Geotechnical Site Classification
Site: 24 Valencia Road Carmel WA
Client: Burswood Care Pty Ltd

5.1 Test Pit Logs

Six Test Pits (TP1 to TP6) were conducted at the site by using a backhoe. Test pit locations are shown in the site sketch in Appendix A.

Test pits (TP1 to TP6) revealed similar soil profile and consists of fine to medium grained, fines of low plasticity silty SAND, black, moist, loose to medium dense, followed by sandy clayey GRAVEL, fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, yellow to orange mottled red, moist, firm to hard, low to medium plasticity, fine to medium grained sand to a depth of 2.5 m.

The depth of silty sand varies from 0.1 m to 0.5 m followed by sandy clayey Gravel. The depth of topsoil for this site can be considered up to 0.1 m. However, it can vary over the site. Ground water table was not observed at any of the test pits.

Test Pits (TP1 to TP6) were terminated at the target depth of 2.5 m. Test pit logs are attached in Appendix B. Our engineering visited the site 10 September 2018 and conducted surface probing and DCP tests. Similar findings were observed during our site inspection on 10 September 2018.

5.2 Dynamic Cone Penetrometer (DCP) Tests

Dynamic Cone Penetrometer (DCP1-6) tests were conducted alongside of the test pits. DCP test indicates that the soil density of the site as per Standard Australia HB 160-2006, Table 6.4.6.1 (A) & (B). DCP data are presented in Table 1 and DCP test certificates are attached in Appendix B. It is observed from the DCP test that soil is in very loose to dense and firm to hard condition.

Table 1. Summary of DCP test data Ref. Table 6.4.6.1 (A) & (B) HB 160-2006

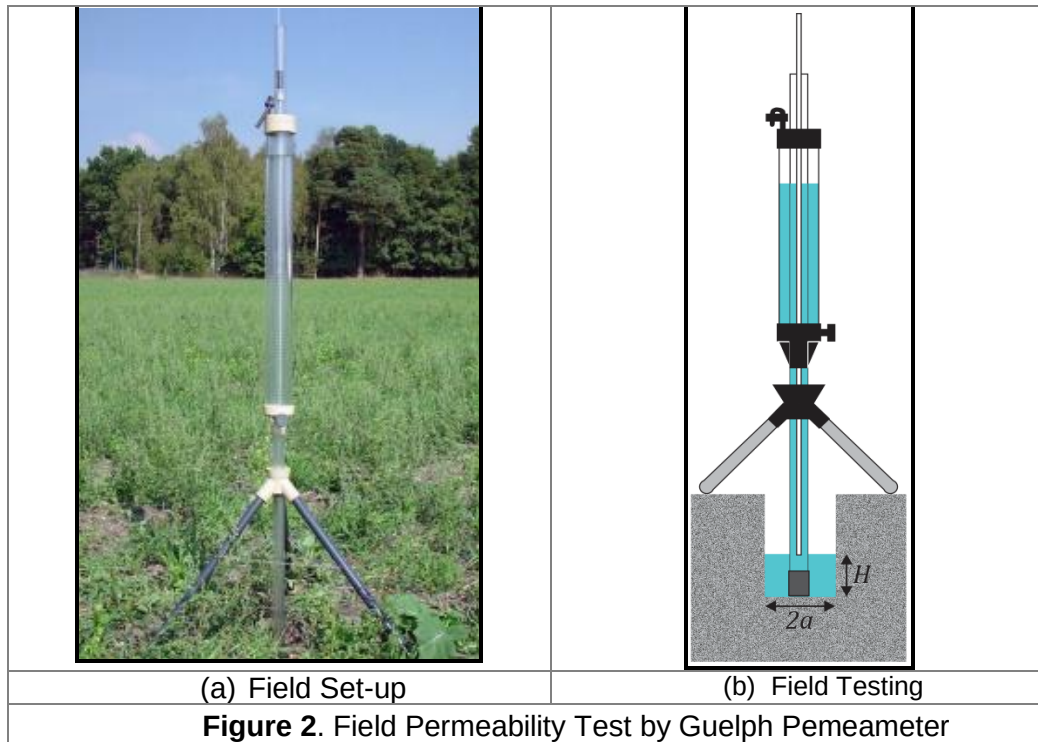
DCP Location	DCP1	DCP2	DCP3	DCP4	DCP5	DCP6
Depth (mm)	No. of Blows/100mm (Density Classification)					
0-100	6 (D)	3 (MD)	1 (L)	1 (L)	<1 (VL)	2 (L)
100 - 200	7 (VSt)	4 (St)	2 (F)	1 (L)	<1 (VL)	2 (L)
200 - 300	6 (VSt)	4 (St)	2 (F)	1 (L)	<1 (VL)	3 (MD)
300 - 400	4 (St)	4 (St)	2 (F)	1 (L)	<1 (VL)	2 (L)
400 - 500	3 (St)	3 (St)	2 (F)	2 (L)	1 (L)	3 (MD)
500 - 600	3 (St)	9 (St)	3 (St)	5 (VSt)	1 (F)	2 (F)
600 - 700	4 (St)	20 (H)	2 (F)	7 (VSt)	1 (F)	3 (St)
700 - 800	5 (VSt)	>25-R (H)	5 (VSt)	8 (VSt)	1 (F)	5 (VSt)
800 - 900	7 (VSt)	-	8 (VSt)	2 (F)	4 (St)	3 (St)
900 - 1000	8 (VSt)	-	9 (VSt)	2 (F)	6 (VSt)	5 (VSt)
Note: Density Classification is obtained based on Number of blows required for 100 mm penetration of DCP (Table A) Very Soft (VS) < 1; Firm (F) 1 – 2; Stiff (St) 3 – 4; Very Stiff (VSt) 5 – 10; Hard (H) > 10; R= Refusal (Table B) Very Loose (VL) < 1; Loose (L) 1 – 2; Medium Dense (MD) 2 – 3; Dense (D) 4 – 8; Very Dense (VD) > 8;						

5.3 Field Permeability Test

Field permeability tests were conducted at the site as per AS1547 by using Guelph Permeameter on 1 November 2016 and 10 September 2018 (Reference LG7722016FPT and LG5082018FPT): Field permeability tests were conducted. On 1 November 2016 permeability tests were conducted considering whole area and on 10 September 2018 permeability tests were conducted over proposed leach drain area.

5.3.1 Testing Equipment: Guelph Permeameter

Guelph Permeameter is a constant head device that operates on the Mariotte siphon principle. The method involves measuring the steady-state rate of water recharge into unsaturated soil from a cylindrical well hole, in which a constant head of water is maintained. The Guelph Permeameter is capable of measuring hydraulic conductivity in sands and clays. The Guelph Permeameter consists of a Tripod to hold the apparatus vertical, the reservoir tube and the inner air tube. A typical test set-up is shown in Figure 2.



5.3.2 Testing Procedure

The field permeability test was conducted as per **AS1547**. The following steps were followed during testing by using the Guelph Permeameter:

- The testing well (radius = a) was prepared using an auger. Rough auger followed by sizing auger were used to make the hole for permeability test as shown in Figure 2 (b).
- The depth of auger was selected based on head depth to be used in the test.
- Soil around the testing well was saturated by pouring extra water into the test hole. Water pouring was performed few times so as to make sure that surrounded area of the hole becomes fully saturated.
- The Guelph Permeameter was then assembled as shown in Figure 2 (a) and both inner and outer reservoirs were filled with water.
- A head (H) was used in the testing by slowly lifting the air tube.
- The outflow from the reservoirs was recorded for a certain time interval. The timing of the reading was determined based on soil type.
- Reading was taken till at least three steady readings were observed during testing.

5.3.3 Calculations

The field permeability test data were calculated as per **AS 1547**. The following steps were followed during calculation by using the Guelph Permeameter:

The soil permeability/hydraulic conductivity is calculated from the test results using the equation shown below.

$$K_{\text{sat}} = \frac{4.4Q \left[0.5 \sinh^{-1} \left(\frac{H}{2r} \right) - \sqrt{\left(\frac{r}{H} \right)^2 + 0.25} + \frac{r}{H} \right]}{2\pi H^2} \dots\dots\dots \text{Eq. G1}$$

where:

- K_{sat} = saturated hydraulic conductivity of the soil in cm/min
- 4.4 = correction factor for a systematic under-estimate of soil permeability in the mathematical derivation of the equation
- Q = rate of loss of water from the reservoir in cm^3/min
- H = depth of water in the test hole in cm
- r = radius of the test hole in cm

5.3.4 Permeability Test Results

Permeability test results are summarized in Table 2 and Table 3 and the test certificates are presented in Appendix B.

Table 2. Summary of field permeability tests (1 November 2016, REFERENCE LG7722016FPT)

Test ID	Co-ordinates		Permeability		Test Depth (m)	Observed Soil type
	Northing	Easting	cm/sec	m/day		
FPT01	6 456 794	50 414 890	6.7E-03	5.8E+00	0.45	Sandy Clayey/silty Gravel
FPT02	6 456 828	50 414 866	6.1E-03	5.3E+00	0.45	Sandy Clayey/silty Gravel
FPT03	6 456 855	50 414 849	6.3E-03	5.4E+00	0.45	Sandy Clayey/silty Gravel

Table 3. Summary of field permeability tests (10 September 2018, Reference LG5082018FPT_Rev0)

Test ID	Co-ordinates		Permeability		Test Depth (m)	Observed Soil type
	Northing	Easting	cm/sec	m/day		
FPT1	6 456 843	50 414 886	4.7E-03	4.1E+00	0.75	Sand, Clayey Gravelly Sand
FPT2	6 456 846	50 414 895	4.7E-03	4.1E+00	1.0	Sand, Clayey Gravelly Sand
FPT3	6 456 861	50 414 886	5.1E-03	4.4E+00	1.0	Sand, Clayey Gravelly Sand
FPT4	6 456 853	50 414 874	5.8E-03	5.0E+00	1.0	Sand, Clayey Gravelly Sand
FPT5	6 456 871	50 414 876	5.1E-03	4.4E+00	1.0	Sand, Clayey Gravelly Sand
FPT6	6 456 859	50 414 866	4.4E-03	3.8E+00	1.0	Sand, Clayey Gravelly Sand

Test lactation and test certificates are presented in Appendix E. It is found from the permeability tests that the permeability at the site varies from 3.8E+00 m/day to 5.0E+00 m/day with an average value of 4.3 m/day.

6.0 LABORATORY TEST

6.1 General

Laboratory tests were conducted at Kanga & Associates, Naval Base WA, a NATA accredited laboratory. The following laboratory tests were scheduled and undertaken:

- Atterberg Limit Test, AS 1289 2.1.1
- Particle Size Distribution Test, AS 1289 3.6.3, 3.5.1

6.2 Laboratory Test Data

The laboratory test results are summarised in Table 4. Laboratory test data show that the site soil is slightly to moderately reactive. Laboratory test certificates are included in Appendix C.

Table 4. Summary of Laboratory Test Data (soil)

Sample Location	TP1 0.1 to 0.5 m	TP1 1.2 to 1.8 m
Particle Size Distribution (PSD)		
Gravel (%)	46	48
Sand (%)	53	37
Fines < 75µm (%)	1	15
Atterberg Limit Tests (PI)		
Liquid Limit, LL (%)	20	32
Plastic Limit, PL (%)	18	22
Plasticity Index, PI (%)	2	10
Linear Shrinkage, LS (%)	1.0	5.0

6.3 Chemical Testing

Local Geotechnics (LG) was engaged by Burswood Care Pty Ltd for sampling from two locations and to organize laboratory testing. An engineer from LG visited the site on 19 October 2018 and collected soil samples from two location as determined by the client. A summary of soil sampling, testing plan and test results are summarized in Table 5. Sampling locations, soil profile and laboratory test certificates are attached in Appendix F.

Table 5. Summary of Laboratory Test Data (chemical)

Analyte	LOR	Unit	Sample TH1 Depth: 0.6-0.8m	Sample TH2 Depth: 1.1-1.3m
Misc Inorganics in Soil				
pH	.01	pH units	7.0	6.9
Conductivity	0.01	mS/cm	0.01	0.01
Cation Exchange Capacity				
Exchangeable Calcium	0.2	cmol _c /kg	1.7	0.8
Exchangeable Acidity	0.1	cmol _c /kg	<0.1	<0.1
Exchangeable Potassium	0.05	cmol _c /kg	<0.05	0.10
Exchangeable Magnesium	0.2	cmol _c /kg	1.1	0.5
Exchangeable Sodium	0.2	cmol _c /kg	0.3	0.2
Cation Exchange Capacity	1	cmol _c /kg	3	2

Phosphorus Retention Index				
PRI	-	-	40.7	44.4
Emerson Class Number				
ECN	-	-	5	5

7.0 EARTHWORKS RECOMMENDATION

Any earthworks at the site should be carried out in general accordance with the Australian Standard AS 3798-2007 "Guidelines on Earthworks for Commercial and Residential Developments". Asbestos and septic tank investigation was not in the scope of this investigation. Client has to confirm that the site is free from asbestos and there is no septic tank at the site.

The following are general guidelines to be followed during preparation of the site:

- Remove all the trees including tree roots from the site.
- Clear the unsuitable material from site. Unsuitable materials includes: organics, grass roots, uncontrolled fill of building rubbles, bricks, concrete, wood, different types of waste etc. Site soil can be used after screening from unsuitable materials.
- Cut and level the site foundation area as required. Remove the spoil if encountered pockets of very soft to soft clay/silty soils during excavation, if any. Remove to spoil all unsuitable materials exposed by proof rolling and replace with structural fill.
- If imported fill is required due to pockets of very soft to soft clay/silty soils during excavation under the base of the footing, the thickness of each fill material must not be exceeded 300 mm in loose condition. All fill materials layer has to be compacted to dense condition.
- Compact the existing material over excavated area at least to dense condition.
- Prepare a sand pad of 500 mm over the built area and compact to dense condition.
- All backfilling layer or sand pad must be compacted to dense condition, at least 8 Perth Sand Penetrometer (PSP) blows per 300 mm of penetration.
- Site should be prepared in a way so that surrounding stormwater does not pass through the building envelop.
- Care will need to be taken when compacting in the vicinity of existing structures to avoid damage from excessive vibrations.
- Retaining wall is required if there is an elevation difference of 0.5 m.
- *It is highly recommended that a competent geotechnical engineer should supervise earthworks and construction.*
- *For site maintenance it is recommended to follow the CSIRO publication "Guide to Home Owners on Foundation Maintenance and Footing Performance" in Building Technology File Number 18. This document provides important information on the implications of plumbing, property maintenance, site classification on foundation design, drainage and performance expectations.*

8.0 ENGINEERING CONSIDERATIONS AND RECOMMENDATIONS

8.1 Site Classification

Provided earthworks are completed as per the recommendation of in Section 7, based on the site soil profile, laboratory test results and surrounding condition, the site can be classified as "**CLASS S**" in accordance with the definitions provided in Australian Standard AS2870 -2011.

The characteristics surface movement Y_s is considered to be $0 \text{ mm} < Y_s \leq 20 \text{ mm}$. An assumption of soil suction change of 2.5 m is made in this case.

Any earthwork or modification made in the soil profile could change the site classification. General definition of 'Site Class' is shown in Table 6 (Source: AS 2870-2011).

Table 6. General Definition of Site Class (Source: AS 2870-2011)

Site Class	Soil Description	Characteristic Surface Movement (mm)
A	Most SAND and ROCK sites with little or no ground movement due to moisture content variation	little or no ground movement
S	Slightly reactive clayey or silty SAND, which will cause slight ground movement due to moisture content variation	$0 < Y_s \leq 20$
M	Moderately reactive clayey or silty soil which will cause moderate ground movement due to moisture content variation	$20 < Y_s \leq 40$
H1	Highly reactive clayey or silty soil which will cause high ground moved due to moisture content variation	$40 < Y_s \leq 60$
H2	Highly reactive clayey or silty soil which will cause high ground moved due to moisture content variation	$60 < Y_s \leq 75$
E	Extremely reactive clayey or silty soil which will cause extreme ground movement due to moisture content variation	$Y_s > 75$
P	Problematic sites, sites consisted of soft soils, soft clay or silt or loose sand; landfills, mine subsidence, collapsing soils, very reactive soils, subjected to erosion and sites which cannot be classified as A to E.	-

8.2 Earthquake Design Factor

Australian Standard AS1170.4-2007 Structural design actions Part 4 "Earthquake actions in Australia" is recommended for earthquake consideration. AS1170.4-2007 outlines the design criteria required for a structure in consideration of the risk of being subjected to earthquake loads. Earthquake design factors are summarized in Table 7.

Table 7. Earthquake Design Factors

Factor/Class	Value/Name	Ref. AS1170.4- 2007
Hazard Factor (z), Perth Zone	0.09 to 0.10	Section 3 Table 3.2
Site subsoil class	Class C _e – Shallow Soil	Section 4 Clause 4.1.1

8.3 Drainage Recommendation

It is found from the permeability tests that the permeability at the site varies from 3.8E+00 m/day to 5.0E+00 m/day with an average value of 4.3 m/day. A permeability value of 4.0 m/day is recommended for this site.

Considering permeability value of 4.0 m/day, onsite disposal can be accommodated. The drainage system has to fulfil the requirements of the Shire of Kalamunda.

9.0 LIMITATION OF USE

The ground is a product of continuing natural and man-made processes and therefore exhibits characteristics and properties which vary from place to place and can change with time. Geotechnical site investigation involves gathering and assimilating limited facts about these characteristics and properties in order to better understand or predict the behaviour of the ground at a particular site under certain conditions.

This site investigation has been carried out by inspection, using a limited amount of pit excavation, sampling, testing or other means of investigation. Achieving a full coverage of the site to ensure all variations is not practical and is seldom done due to cost constraints as well as the impracticality.

It should be noted that the subsurface conditions encountered by the limited number of pit excavation as part of this geotechnical site investigation represents the ground conditions at the locations where the samples were taken and where tests have been undertaken and as such are an extremely small proportion of the site to be developed. The facts reported in this document are directly relevant only to the ground at the place where, and time when, the investigation was carried out and are believed to be reported accurately.

Given the limited number of test pit and limited field and laboratory testing carried out with respect to the overall site area, variations between investigation locations is likely and ground conditions different to those presented in this report may be present within the subject site area. The risk associated with this variability and the impact it will have on the proposed development should be carefully considered.

The level of geotechnical investigation that has been completed to date is considered appropriate for the project objectives. If the above mentioned client, its subcontractors, agents or employees use this factual information for any other purpose for which it was not intended, then the client, its subcontractors, agents or employees does so at its own risk and Local Geotechnics will not and cannot accept liability in respect of the advice, whether under law of contract, tort or otherwise.

Any interpretation or recommendation given in this report is based on judgement and experience and not on greater knowledge of the facts reported. Local Geotechnics does not represent that the information or interpretation contained in this report addresses completely the existing features, subsurface conditions or ground behaviour at the subject site.

10.0 REFERENCES

- Geological Survey Map of Western Australia of *Armadale 1:50,000*
- Australian Standard AS1170.4-2007, "*Earthquake Actions in Australia*".
- Australian Standard AS 1726-1993 "*Geotechnical Site Investigations*".
- Australian Standard AS 2870-2011, "*Residential Slabs and Footings*".
- Australian Standard AS 3798-2007, "*Guidelines on Earthworks for Commercial and Residential Developments*".
- Standards Australia, Hand Book HB 160-2006 "*Soil Testing*".
- CSIRO publication "*Guide to Home Owners on Foundation Maintenance and Footing Performance*" in Building Technology File Number 18.
- Australian Standard AS 1547 "*On-site Domestic Wastewater Management*".



APPENDIX A

SITE SKETCH





Site Sketch : Test Pit & DCP Test Locations



Reference	LG6892016SC
Client	Burswood Care Pty Ltd
Project	Geotechnical Site Classification Location: 24 Valencia Road Carmel WA

LOCAL GEOTECHNICS
 PO Box 5050, Canning Vale South WA 6155
 Phone: 0425 545 508(M), 08 9457 3517
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APPENDIX B

TEST PIT LOGS &
DCP TEST CERTIFICATES





REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC		Test Pit/BH No.	01
Client	Burswood Care Pty Ltd		Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification		Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA		Equipment Type	Backhoe
Chainage	Northing: 6 456 790	Easting: 50 414 893	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Dynamic Cone Penetrometer Test (Blows/100mm)
0.1						SM	Gravelly Silty SAND - fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)		0
				B		GC	Sandy Clayey GRAVEL - fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, stiff to very stiff, low to medium plasticity, fine to medium grained sand, trace of cobble/boulder up to 100 mm		5
0.5									10
									15
0.9							changes colour to yellow-orange mottled red with quartz at a depth of 0.9 m		20
1.0									25
									30
1.2				B					
1.5									
1.8									
2.0									
2.5							Terminated at the target depth of 2.5 m		2.5

Notes:					
Sampling Type:		Method:		Moisture:	
B - Bulk/Disturbed Sample,		HA - Hand Auger		D - Dry	
UD - Undisturbed Sample		E - Excavator		M - Moist	
		BH - Backhoe Bucket		W - Wet	
				Symbols:	
				W _L - Plastic Limit	
				W _P - Plastic Limit	
				Logged: MH	
				Checked: HM	



REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC	Test Pit/BH No.	02
Client	Burswood Care Pty Ltd	Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification	Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA	Equipment Type	Backhoe
Chainage	Northing: 6 456 796 Easting: 50 414 869	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Dynamic Cone Penetrometer Test (Blows/100mm)
0.1						SM	Gravelly Silty SAND - fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)		
						GC	Sandy Clayey GRAVEL - fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, stiff to hard, low to medium plasticity, fine to medium grained sand, trace of cobble/boulder up to 100 mm		
0.5							it changes colour to yellow-orange mottled red with quartz at a depth of 0.6 m		
0.6									
1.0									
1.5									
1.7							changes colour to yellow-grey mottled red at a depth of 1.7 m		
2.0									
2.5							Terminated at the target depth of 2.5 m		

Notes:		Method:	Moisture:	Symbols:	Logged : MH
Sampling Type :		HA - Hand Auger	D - Dry	W_L - Plastic Limit	Checked: HM
B - Bulk/Disturbed Sample,		E - Excavator	M - Moist	W_P - Plastic Limit	
UD - Undisturbed Sample		BH - Backhoe Bucket	W - Wet		



REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC		Test Pit/BH No.	03
Client	Burswood Care Pty Ltd		Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification		Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA		Equipment Type	Backhoe
Chainage	Northing: 6 456 831	Easting: 50 414 890	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Dynamic Cone Penetrometer Test (Blows/100mm)
0.1						SM	Gravelly Silty SAND - fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)		
0.5						GC	Sandy Clayey GRAVEL - fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, firm to very stiff, low to medium plasticity, fine to medium grained sand		
0.6							changes colour to yellow-orange mottled red with quartz at a depth of 0.6 m		
1.0									
1.5									
2.0									
2.5							Terminated at the target depth of 2.5 m		

Notes:		Method:	Moisture:	Symbols:	Logged : MH
B - Bulk/Disturbed Sample,	HA - Hand Auger	D - Dry	W_L - Plastic Limit	W_P - Plastic Limit	Checked: HM
UD - Undisturbed Sample	E - Excavator	M - Moist			
	BH - Backhoe Bucket	W - Wet			



REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC		Test Pit/BH No.	04
Client	Burswood Care Pty Ltd		Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification		Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA		Equipment Type	Backhoe
Chainage	Northing: 6 456 857	Easting: 50 414 875	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Dynamic Cone Penetrometer Test (Blows/100mm)
0.5						SM	Gravelly Silty SAND - fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)		0
0.9						GC	Sandy Clayey GRAVEL - fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, firm to very stiff, low to medium plasticity, fine to medium grained sand		0.5
1.0							changes colour to yellow-orange mottled red with quartz at a depth of 0.9 m		1
1.5									1.5
2.0							changes colour to yellow-grey mottled red at a depth of 2.0 m		2
2.5							Terminated at the target depth of 2.5 m		2.5

Notes:		Method:	Moisture:	Symbols:	Logged : MH
B - Bulk/Disturbed Sample,		HA - Hand Auger	D - Dry	W_L - Plastic Limit	Checked: HM
UD - Undisturbed Sample		E - Excavator	M - Moist	W_P - Plastic Limit	
		BH - Backhoe Bucket	W - Wet		



REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC		Test Pit/BH No.	05
Client	Burswood Care Pty Ltd		Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification		Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA		Equipment Type	Backhoe
Chainage	Northing: 6 456 849	Easting: 50 414 848	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Dynamic Cone Penetrometer Test (Blows/100mm)
0.5						SM	Gravelly Silty SAND - fine to medium grained, fines of low plasticity, black, moist, very loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)		0
0.8						GC	Sandy Clayey GRAVEL - fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, firm to very stiff, low to medium plasticity, fine to medium grained sand changes colour to yellow-orange mottled red with quartz at a depth of 0.8 m		0.5
1.0									1
1.5									1.5
1.7							changes colour to yellow-grey mottled red at a depth of 1.7 m		2
2.0									2
2.5							Terminated at the target depth of 2.5 m		2.5

Notes:			
Sampling Type:	Method:	Moisture:	Symbols:
B - Bulk/Disturbed Sample,	HA - Hand Auger	D - Dry	W_L - Plastic Limit
UD - Undisturbed Sample	E - Excavator	M - Moist	W_P - Plastic Limit
	BH - Backhoe Bucket	W - Wet	
			Logged: MH
			Checked: HM



REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155

Reference	LG6892016SC		Test Pit/BH No.	06
Client	Burswood Care Pty Ltd		Date Excavated	2-Aug-2016
Project	Geotechnical Site Classification		Date completed	2-Aug-2016
Location	24 Valencia Road Carmel WA		Equipment Type	Backhoe
Chainage	Northing: 6 456 830	Easting: 50 414 858	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Dynamic Cone Penetrometer Test (Blows/100mm)
0.5						SM	Gravelly Silty SAND - fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)		
0.9						GC	Sandy Clayey GRAVEL - fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, firm to very stiff, low to medium plasticity, fine to medium grained sand		
1.0							changes colour to yellow-orange mottled red with quartz at a depth of 0.9 m		
1.5									
2.0							changes colour to yellow-grey mottled red at a depth of 2.0 m		
2.5							Terminated at the target depth of 2.5 m		

Notes:		Method:	Moisture:	Symbols:	Logged : MH
B - Bulk/Disturbed Sample,	HA - Hand Auger	D - Dry	W_L - Plastic Limit	W_p - Plastic Limit	Checked: HM
UD - Undisturbed Sample	E - Excavator	M - Moist			
	BH - Backhoe Bucket	W - Wet			



DYNAMIC CONE PENETROMETER (DCP) TEST CERTIFICATES (AS 1289.6.3.2)

LOCAL GEOTECHNICS
ABN: 61 737 984 867
PO Box 5050
Canning Vale South
WA 6155

Density Correlation - Table 6.4.6.1 (A) & (B) HB 160-2006

Reference	LG6892016SC	Test ID	01 to 06
Client	Burswood Care Pty Ltd	Date Tested	02/08/2016
Project	Geotechnical Site Classification	Tested by	MH
Site	24 Valencia Road Carmel WA	Checked by	HM

DCP No.	DCP 1	DCP 2	DCP 3	DCP 4	DCP 5	DCP 6
Depth below ground level (mm)	Penetration Resistance - Blows/100mm					
0-100	6	3	1	1	<1	2
100 - 200	7	4	2	1	<1	2
200 - 300	6	4	2	1	<1	3
300 - 400	4	4	2	1	<1	2
400 - 500	3	3	2	2	1	3
500 - 600	3	9	3	5	1	2
600 - 700	4	20	2	7	1	3
700 - 800	5	>25- R	5	8	1	5
800 - 900	7	-	8	2	4	3
900-1000	8	-	9	2	6	5
Depth below ground level (mm)	Density Classification					
0-100	D	MD	L	L	VL	L
100 - 200	VSt	St	F	L	VL	L
200 - 300	VSt	St	F	L	VL	MD
300 - 400	St	St	F	L	VL	L
400 - 500	St	St	F	L	L	MD
500 - 600	St	VSt	St	VSt	F	F
600 - 700	St	H	F	VSt	F	St
700 - 800	VSt	H	VSt	VSt	F	VSt
800 - 900	VSt	-	VSt	F	St	St
900-1000	VSt	-	VSt	F	VSt	VSt

VS=Very Soft to Soft < 1	F=Firm 1 - 2	St=Stiff 3 - 4	VS_i=Very Stiff 5 - 10	H=Hard > 10
VL=Very Loose < 1	L=Loose 1 - 2	MD=Medium Dense 2 - 3	D=Dense 4 - 8	VD=Very Dense > 8



APPENDIX C

LABORATORY TEST CERTIFICATES



TEST CERTIFICATE

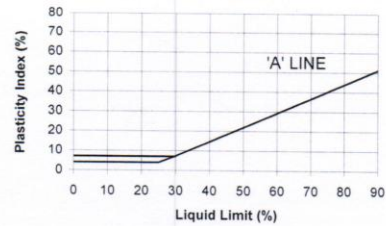
CLIENT : Local Geotechnics
 PROJECT : No : 24 Valencia Road - Carmel
 LOCATION : Carmel
 LG Ref : : N/A
 SAMPLE ID : T P : 1
 DEPTH(m) : (0.1 - 0.5)

K&A JOB NO : 05/185/16
 SAMPLE No : NB37458
 TEST DATE : 04/08/16

TEST DATA

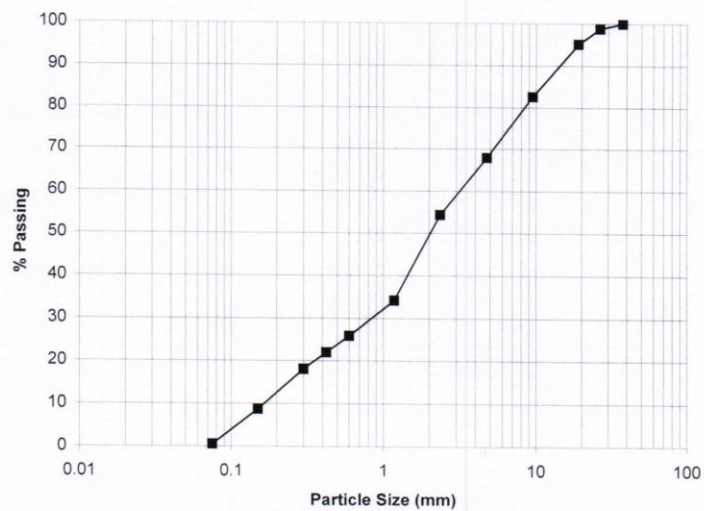
PLASTICITY CHART

ATTERBERG LIMITS		TEST METHODS
LIQUID LIMIT(%)	20	AS 1289 3.1.2
PLASTIC LIMIT(%)	18	AS 1289 3.2.1
PLASTICITY INDEX	2	AS 1289 3.3.1
LINEAR SHRINKAGE(%)	1.0	AS 1289 3.4.1
TESTING INFORMATION		
ATTERBERG LIMITS:		
SAMPLE HISTORY:		Oven Dried
METHOD OF PREPARATION		Dry Sieve
LINEAR SHRINKAGE :		
SIZE OF MOULD (mm)		250
CRUMBLING OR CURLING		Flat

AS 1289 3.6.1
PARTICLE SIZE DISTRIBN.

SIEVE SIZE	%PASSING
100.0mm	
75.0mm	
53.0mm	
37.5mm	100
26.5mm	99
19.0mm	95
9.50mm	83
4.75mm	68
2.36mm	54
1.18mm	34
0.600mm	26
0.425mm	22
0.300mm	18
0.150mm	9
0.075mm	1

AS 1289 3.6.1 - PARTICLE SIZE DISTRIBUTION



Note: Sample supplied by Client



DATE: 08/08/16

APPROVED SIGNATORY: .

M. Murugesan
 M. Murugesan

'Accredited for compliance with ISO/IEC 17025'

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PARTICLE SIZE DISTRIBUTION - TEST CERTIFICATE

Kanga & Associates

42Lionel Street, Naval Base 6165-WA



CERTIFICATE No: N33188

ACCREDITATION No. 2337

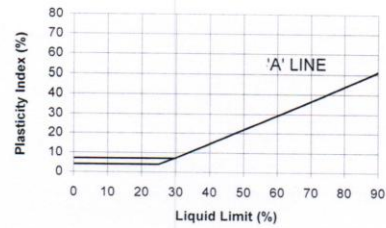
TEST CERTIFICATE

CLIENT : Local Geotechnics
PROJECT : No : 24 Valencia Road - Carmel
LOCATION : Carmel
LG Ref : : N/A
SAMPLE ID : T P : 1
DEPTH(m) : (1.2 - 1.8)

K&A JOB NO : 05/185/16
SAMPLE No : NB37459
TEST DATE : 04/08/16

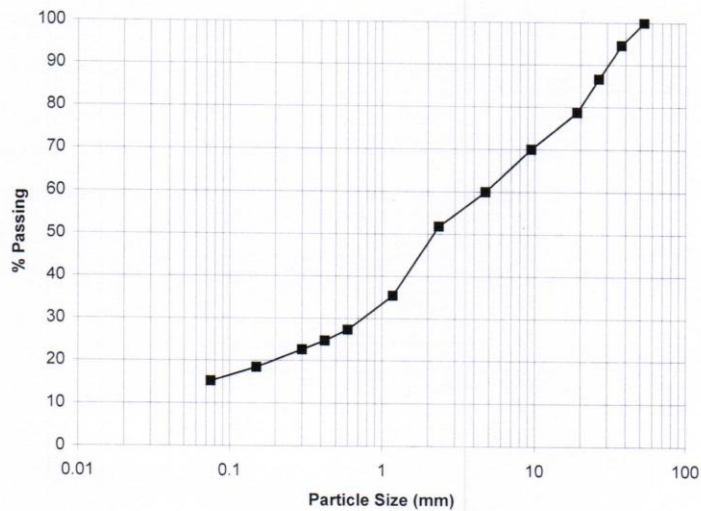
TEST DATA**PLASTICITY CHART**

ATTERBERG LIMITS		TEST METHODS
LIQUID LIMIT(%)	32	AS 1289 3.1.2
PLASTIC LIMIT(%)	22	AS 1289 3.2.1
PLASTICITY INDEX	10	AS 1289 3.3.1
LINEAR SHRINKAGE(%)	5.0	AS 1289 3.4.1
TESTING INFORMATION		
ATTERBERG LIMITS:		Oven Dried
SAMPLE HISTORY:		Dry Sieve
METHOD OF PREPARATION		
LINEAR SHRINKAGE :		
SIZE OF MOULD (mm)		250
CRUMBLING OR CURLING		Flat



AS 1289 3.6.1
PARTICLE SIZE DISTRIBN.

SIEVE SIZE	%PASSING
100.0mm	
75.0mm	
53.0mm	100
37.5mm	95
26.5mm	87
19.0mm	79
9.50mm	70
4.75mm	60
2.36mm	52
1.18mm	35
0.600mm	27
0.425mm	25
0.300mm	23
0.150mm	18
0.075mm	15

AS 1289 3.6.1 - PARTICLE SIZE DISTRIBUTION

Note: Sample supplied by Client



DATE: 08/08/16

APPROVED SIGNATORY: .

M. Murugesan
M. Murugesan

'Accredited for compliance with ISO/IEC 17025'

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PARTICLE SIZE DISTRIBUTION - TEST CERTIFICATE**Kanga & Associates**

42Lionel Street, Naval Base 6165-WA

**CERTIFICATE No: N33189**

ACCREDITATION No. 2337



APPENDIX D

SITE PHOTOS





Photo 1. Site, view from the Access Road



Photo 2. Site, view from the rear boundary of the site

LOCAL GEOTECHNICS

Project: LG6892016SC_Rev0
Geotechnical Site Classification
Site: 24 Valencia Road Carmel WA
Client: Burswood Care Pty Ltd



Photo 3. Site, view from north towards south, showing existing leach drains



Photo 4. Test Pit location 01 (TP1), sub-surface probing by using backhoe

LOCAL GEOTECHNICS

Project: LG6892016SC_Rev0
Geotechnical Site Classification
Site: 24 Valencia Road Carmel WA
Client: Burswood Care Pty Ltd



Photo 5. Soil Profile of Test Pit location 01 (TP1)



Photo 6. Soil from Test Pit location 01 (TP1)

LOCAL GEOTECHNICS

Project: LG6892016SC_Rev0
Geotechnical Site Classification
Site: 24 Valencia Road Carmel WA
Client: Burswood Care Pty Ltd



Photo 7. Test Pit location 03 (TP3), sub-surface probing by using backhoe



Photo 8. Test Pit location 06 (TP6), sub-surface probing by using backhoe

LOCAL GEOTECHNICS

Project: LG6892016SC_Rev0
Geotechnical Site Classification
Site: 24 Valencia Road Carmel WA
Client: Burswood Care Pty Ltd



Photo 9. Test Location DCP2, Conducting Dynamic Cone Penetrometer Test



Photo 10. Test Location DCP4, Conducting Dynamic Cone Penetrometer Test

LOCAL GEOTECHNICS

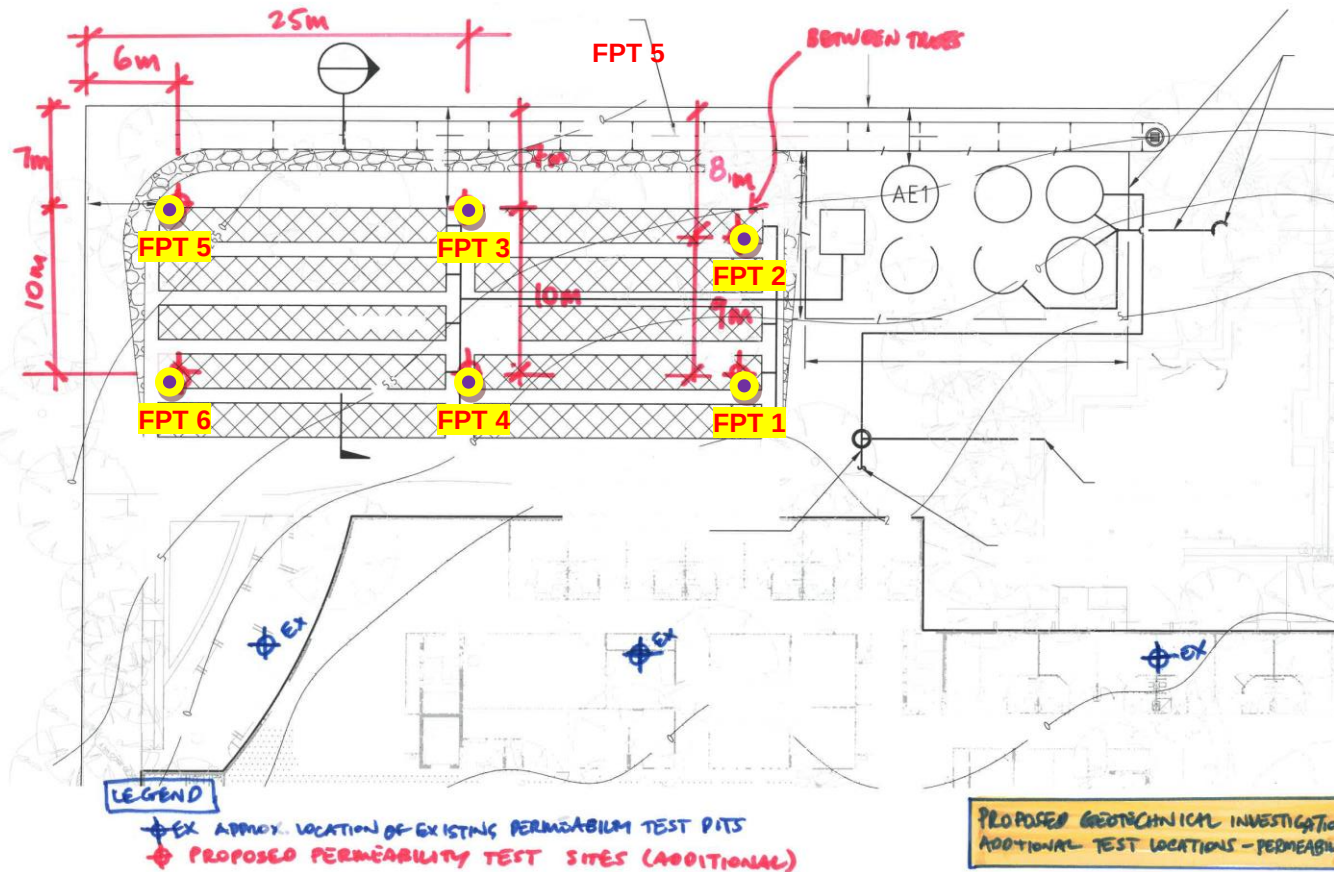
Project: LG6892016SC_Rev0
Geotechnical Site Classification
Site: 24 Valencia Road Carmel WA
Client: Burswood Care Pty Ltd



APPENDIX E

PERMEABILITY TEST





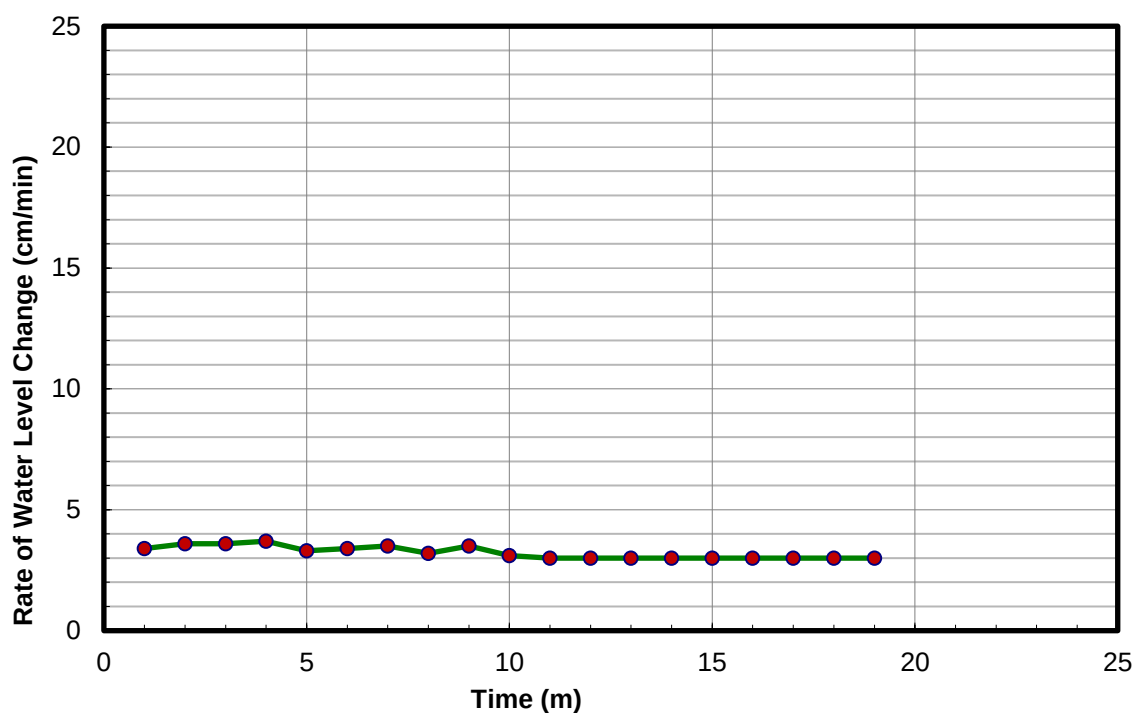
Site Sketch : Field permeability test locations

Reference	LGK5032018FPT	 LOCAL GEOTECHNICS Unit 12, 8 Production Road Canning Vale WA 6155 PO Box 5050, Canning Vale South WA 6155 Phone: 08 9457 3517 E-mail: admin@localgeotechnics.com.au Web: www.localgeotechnics.com.au
Client	Burswood Care Pty Ltd	
Project	Field Permeability Test Location: 24 Valencia Road, Carmel WA	

PERMEABILITY TEST CERTIFICATES (AS 1547)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

Reference	LGK5032018FPT		Test ID	FPT01
Client	Burswood Care Pty Ltd		Date Tested	10-Sep-18
Project	Field Permeability Test		Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA		Instrument Type	Guelph Permeameter
Position	Northing: 6 456 843	Easting: 50 414 886	Tested by	AB



Notes: Test was conducted at a depth of 0.75 m from the existing surface level

Water Hydraulic conductivity K_{fs} : **4.7E-03** **cm/sec**
 4.1E+00 **m/day**

Signatory: _____



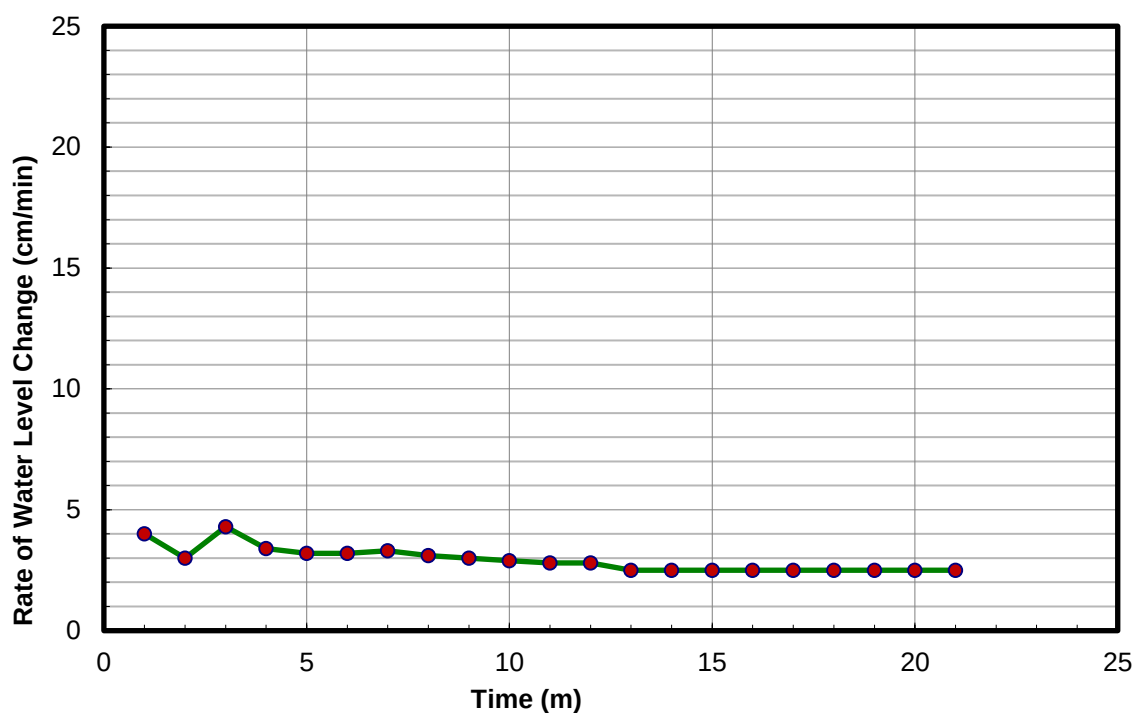
Dr. Harun Meer

Date: 13/09/2018

PERMEABILITY TEST CERTIFICATES (AS 1547)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

Reference	LGK5032018FPT		Test ID	FPT02
Client	Burswood Care Pty Ltd		Date Tested	10-Sep-18
Project	Field Permeability Test		Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA		Instrument Type	Guelph Permeameter
Position	Northing: 6 456 846	Easting: 50 414 895	Tested by	AB



Notes: Test was conducted at a depth of 1.0 m from the existing surface level

Water Hydraulic conductivity K_{fs} : **4.7E-03** **cm/sec**
 4.1E+00 **m/day**

Signatory: _____



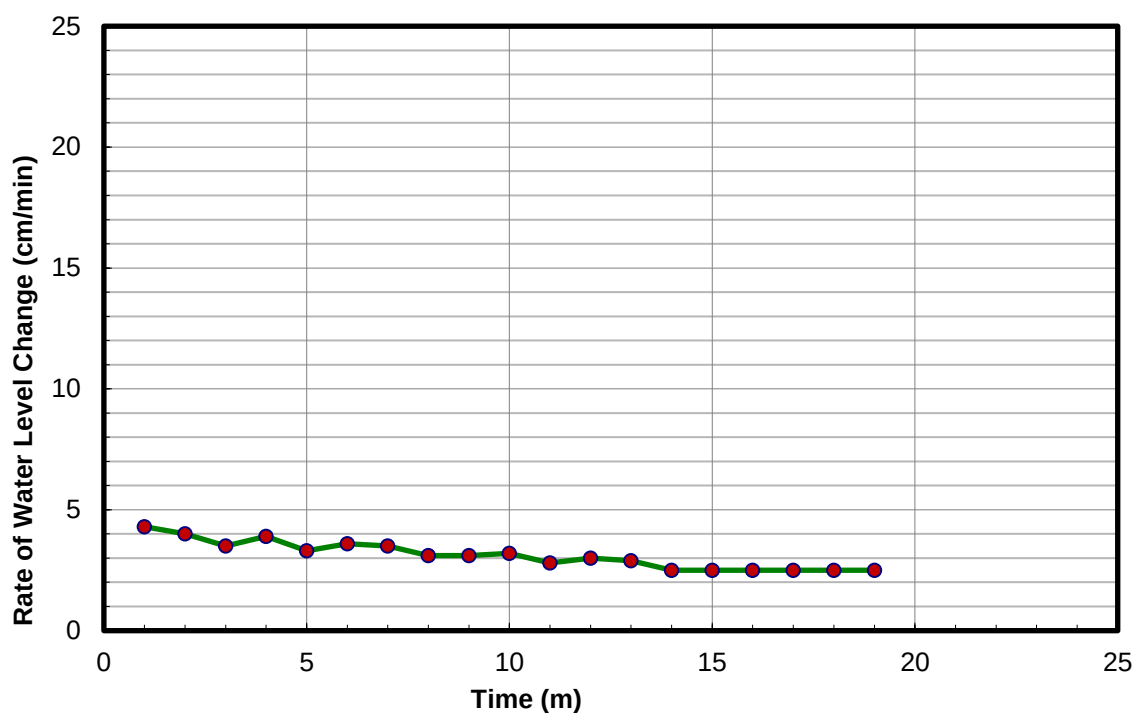
Dr. Harun Meer

Date: 13/09/2018

PERMEABILITY TEST CERTIFICATES (AS 1547)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

Reference	LGK5032018FPT		Test ID	FPT03
Client	Burswood Care Pty Ltd		Date Tested	10-Sep-18
Project	Field Permeability Test		Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA		Instrument Type	Guelph Permeameter
Position	Northing: 6 456 861	Easting: 50 414 886	Tested by	AB



Notes: Test was conducted at a depth of 1.0 m from the existing surface level

Water Hydraulic conductivity K_{fs} : **5.1E-03** **cm/sec**
 4.4E+00 **m/day**

Signatory: _____



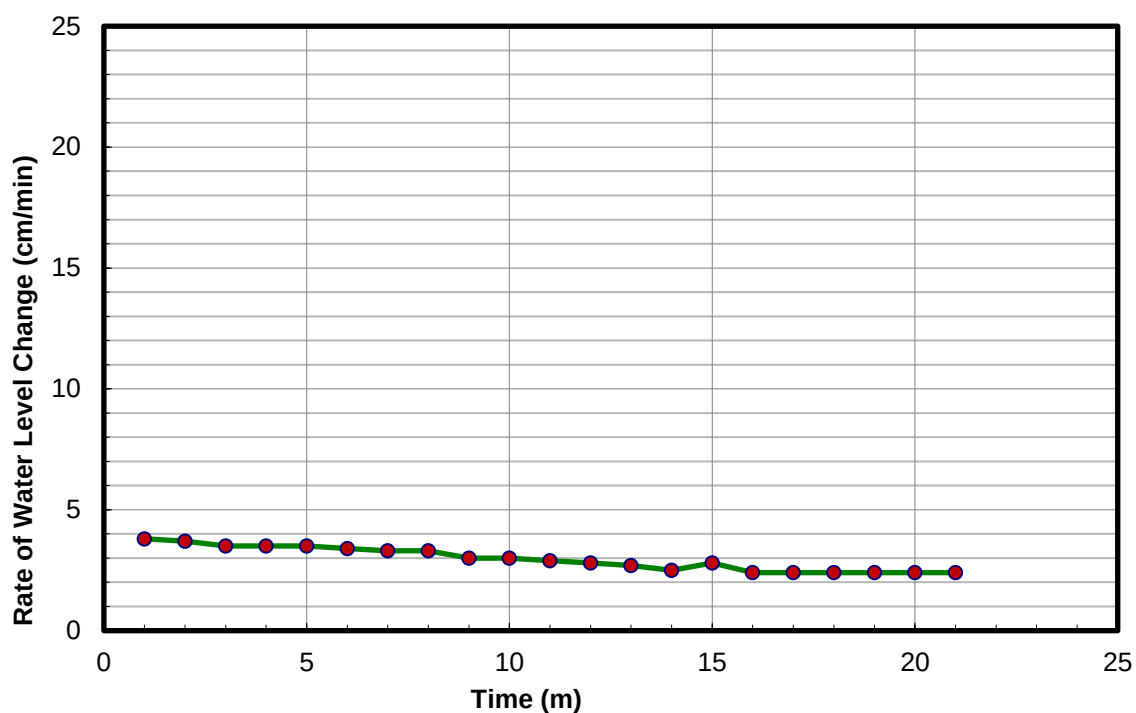
Dr. Harun Meer

Date: 13/09/2018

PERMEABILITY TEST CERTIFICATES (AS 1547)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

Reference	LGK5032018FPT		Test ID	FPT04
Client	Burswood Care Pty Ltd		Date Tested	10-Sep-18
Project	Field Permeability Test		Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA		Instrument Type	Guelph Permeameter
Position	Northing: 6 456 853	Easting: 50 414 874	Tested by	AB



Notes: Test was conducted at a depth of 1.0 m from the existing surface level

Water Hydraulic conductivity K_{fs} : **5.8E-03** **cm/sec**
 5.0E+00 **m/day**

Signatory: _____



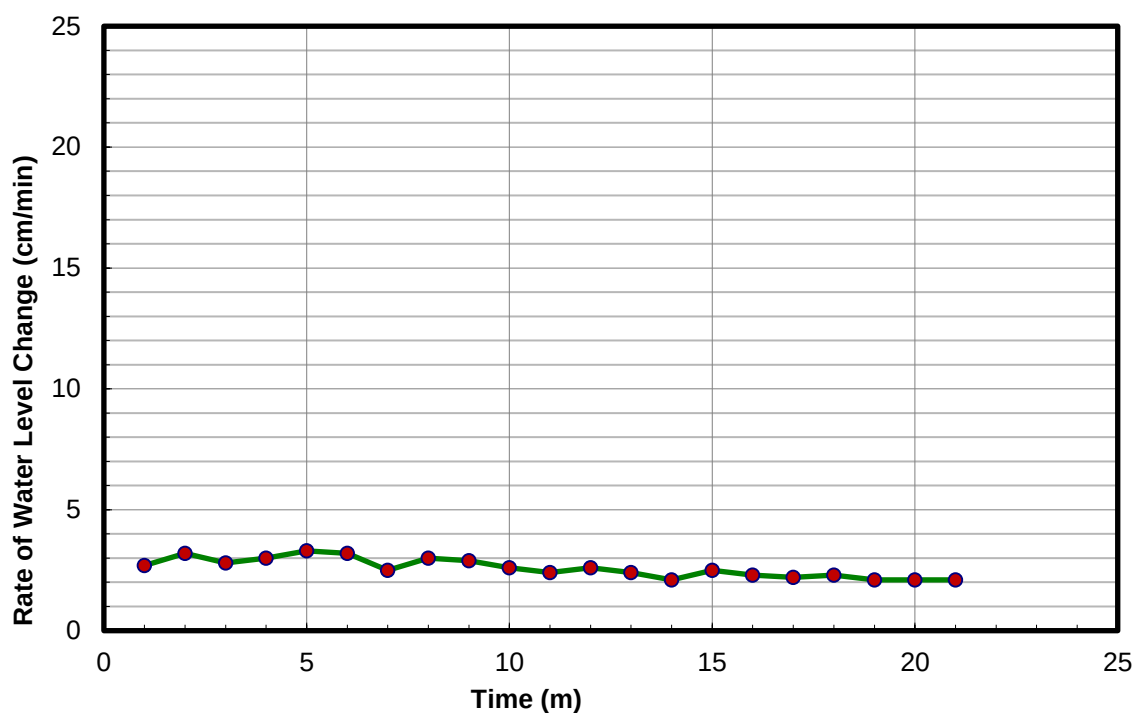
Dr. Harun Meer

Date: 13/09/2018

PERMEABILITY TEST CERTIFICATES (AS 1547)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

Reference	LGK5032018FPT		Test ID	FPT05
Client	Burswood Care Pty Ltd		Date Tested	10-Sep-18
Project	Field Permeability Test		Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA		Instrument Type	Guelph Permeameter
Position	Northing: 6 456 871	Easting: 50 414 876	Tested by	AB



Notes: Test was conducted at a depth of 1.0 m from the existing surface level

Water Hydraulic conductivity K_{fs} : **5.1E-03** **cm/sec**
 4.4E+00 **m/day**

Signatory:



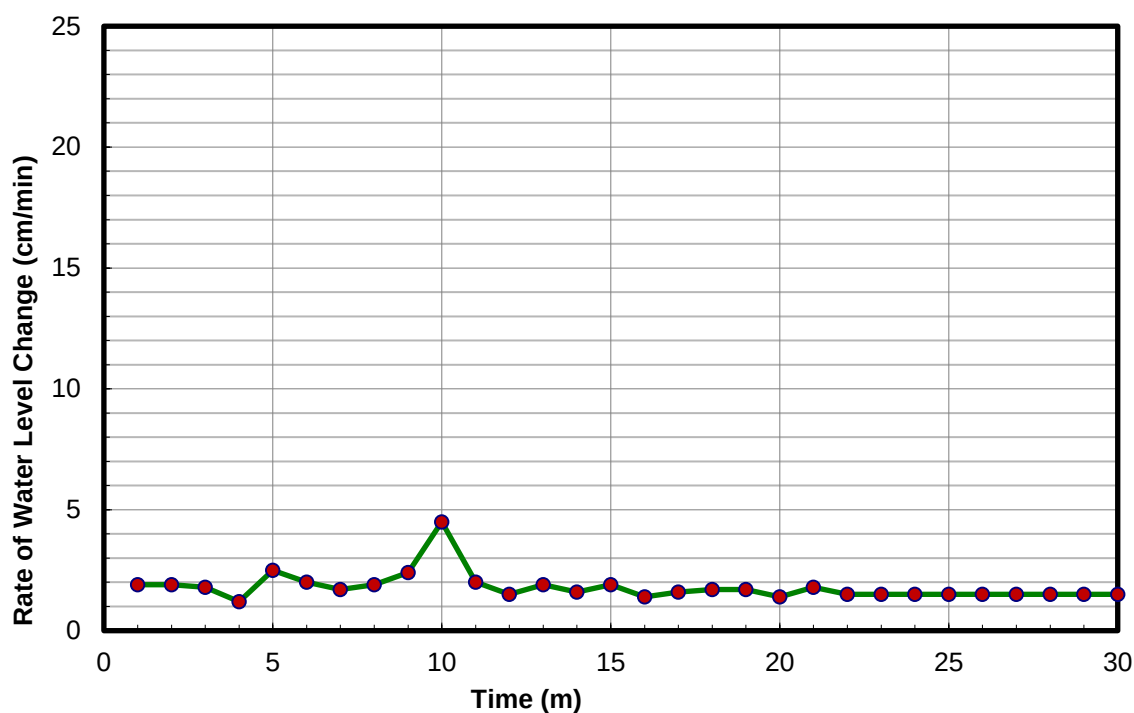
Dr. Harun Meer

Date: 13/09/2018

PERMEABILITY TEST CERTIFICATES (AS 1547)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

Reference	LGK5032018FPT		Test ID	FPT06
Client	Burswood Care Pty Ltd		Date Tested	10-Sep-18
Project	Field Permeability Test		Date Completed	10-Sep-18
Location	24 Valencia Road, Carmel WA		Instrument Type	Guelph Permeameter
Position	Northing: 6 456 857	Easting: 50 414 866	Tested by	AB



Notes: Test was conducted at a depth of 1.0 m from the existing surface level

Water Hydraulic conductivity K_{fs} : **4.4E-03** **cm/sec**
 3.8E+00 **m/day**

Signatory: _____



Dr. Harun Meer

Date: 13/09/2018



Site Sketch : Field Permeability Test Locations



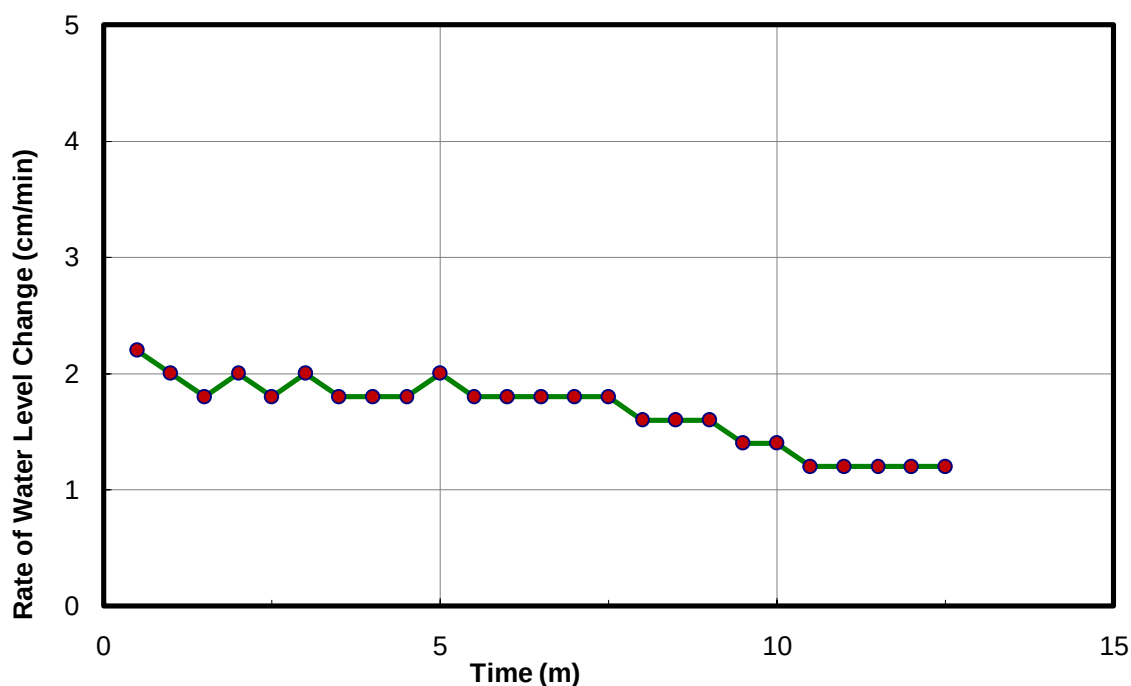
Reference	LG7722016FPT
Client	Burswood Care Pty Ltd
Project	Field Permeability Test Location: 24 Valencia Road, Carmel WA

LOCAL GEOTECHNICS
 3/173 High Road, Willetton WA 6155
 PO Box 5050, Canning Vale South WA 6155
Phone: 08 9457 3517
 E-mail: admin@localgeotechnics.com.au
 Web: www.localgeotechnics.com.au

PERMEABILITY TEST CERTIFICATES (AS 1547)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

GEO-TECHNICS				
Reference	LG7722016FPT		Test ID	FPT01
Client	Burswood Care Pty Ltd		Date Tested	01-Nov-16
Project	Field Permeability Test		Date Completed	01-Nov-16
Location	24 Valencia Road, Carmel WA		Instrument Type	Guelph Permeameter
Position	Northing: 6 456 794	Easting: 50 414 890	Tested by	MH



Notes: Test was conducted at a depth of 0.45 m from the existing surface level

Water Hydraulic conductivity K_{fs} : **6.7E-03** **cm/sec**
 5.8E+00 **m/day**

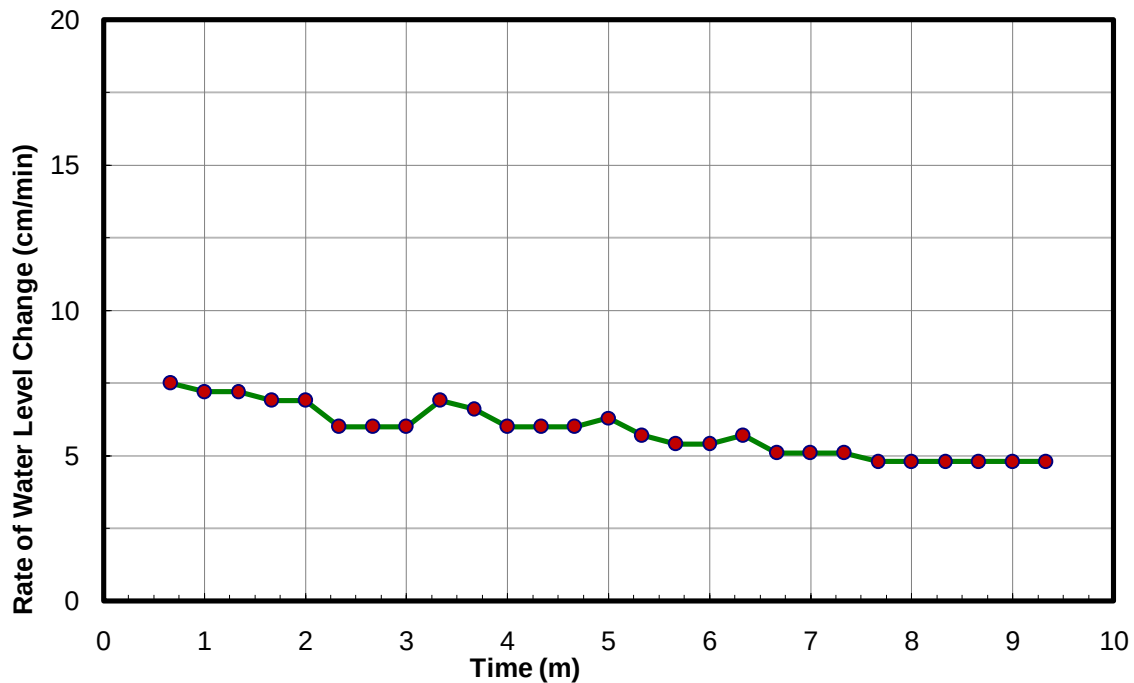
Signatory: 
 Dr. Harun Meer

Date: 7/11/2016

PERMEABILITY TEST CERTIFICATES (AS 1547)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

Reference	LG7722016FPT		Test ID	FPT02
Client	Burswood Care Pty Ltd		Date Tested	01-Nov-16
Project	Field Permeability Test		Date Completed	01-Nov-16
Location	24 Valencia Road, Carmel WA		Instrument Type	Guelph Permeameter
Position	Northing: 6 456 828	Easting: 50 414 866	Tested by	MH



Notes: Test was conducted at a depth of 0.45 m from the existing surface level

Water Hydraulic conductivity K_{fs} : **6.1E-03** **cm/sec**
 5.3E+00 **m/day**

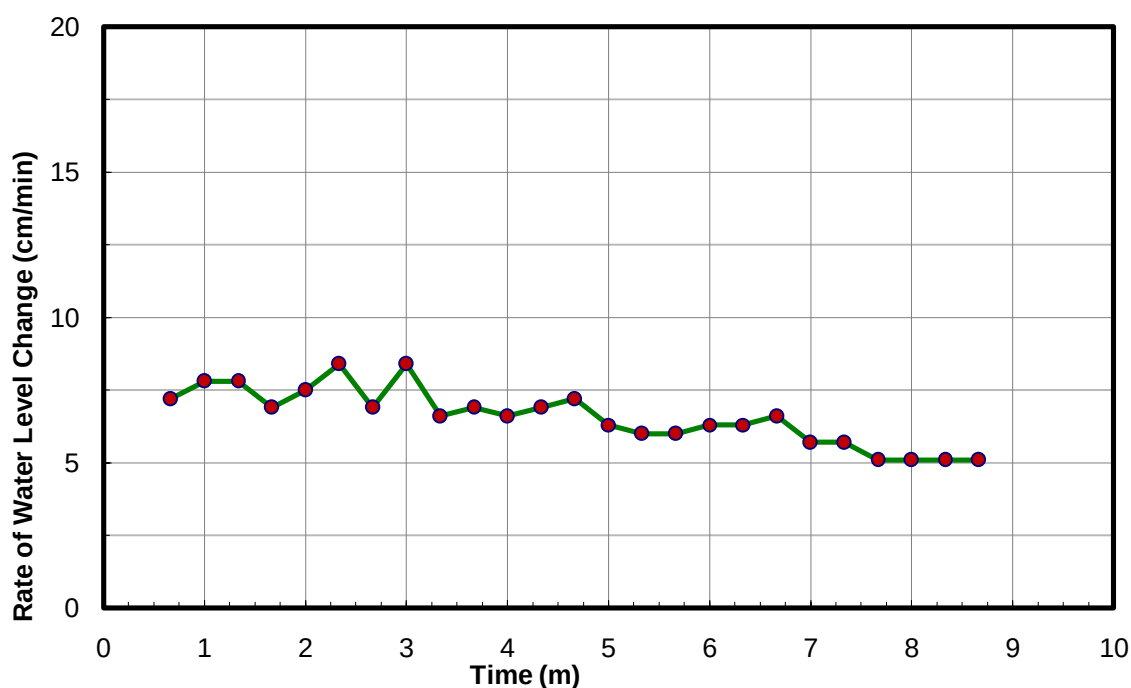
Signatory: 
 Dr. Harun Meer

Date: 7/11/2016

PERMEABILITY TEST CERTIFICATES (AS 1547)

ABN: 61 737 984 867
PO Box 5050 Canning Vale South
WA 6155
admin@localgeotechnics.com.au

Reference	LG7722016FPT	Test ID	FPT03
Client	Burswood Care Pty Ltd	Date Tested	01-Nov-16
Project	Field Permeability Test	Date Completed	01-Nov-16
Location	24 Valencia Road, Carmel WA	Instrument Type	Guelph Permeameter
Position	Northing: 6 456 855 Easting: 50 414 849	Tested by	MH



Notes: Test was conducted at a depth of 0.45 m from the existing surface level

Water Hydraulic conductivity K_{fs} : **6.3E-03** **cm/sec**
5.4E+00 **m/day**

Signatory:



Dr. Harun Meer

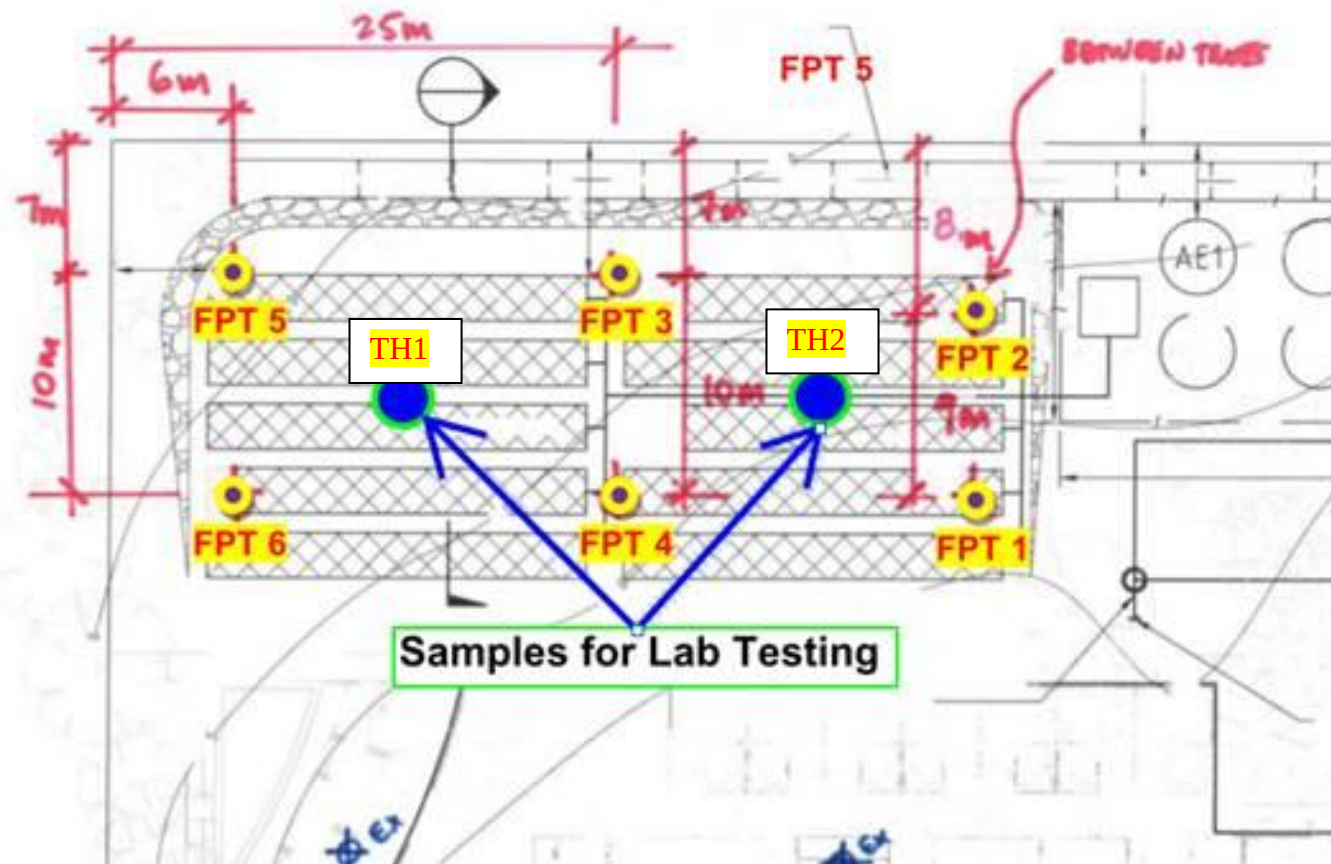
Date: 7/11/2016



APPENDIX F

CHEMICAL TEST





Site Sketch : Test Pit Locations



Reference	LGK5472018Lab
Client	Burswood Care Pty Ltd
Project	Location: 24 Valencia Road, Carmel WA

LOCAL GEOTECHNICS
 PO Box 5050, Canning Vale South WA 6155
 Phone: 0425 545 508(M), 08 9457 3517
 E-mail: admin@localgeotechnics.com.au
 Web: www.localgeotechnics.com.au



EMERSON CLASS TEST REPORT

AS 1289.3.8.1

Client	Local Geotechnics	Ticket No.	S2440
Client Address	8 Production Road, Canning Vale WA 6155	Report No.	LLS18/4801-4802_1_RCN
Project	Geotechnical Site Classification	Sample No.	LLS18/4801-4802
Location	24 Valencia Road, Carmel WA	Sampled By	Client
Sample Identification	Various - See Below		
Sampling Method:	Sampled by Client, Tested as Received		
Source of Material	Not Specified		

EMERSON CLASS NUMBER

Sample Number	Soil Description	Sample Identification	Emerson Class Number
LLS18/4801	Silty Gravel	TH1 0.6-0.8m	5
LLS18/4802	Silty Gravel	TH2 1.1-1.3m	5

Comments:



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Accreditation No. 19872
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Approved Signatory

Name

Brooke Elliott

Function

Quality Manager

Issue Date

24-October-2018

LABORATORY REPORT

Job Number: 18-15746
Revision: 02
Date: 2 November 2018

ADDRESS: **Local Geotechnics**
12/8 Production Rd
Canning Vale WA

ATTENTION: Harun Meer

DATE RECEIVED: 19/10/2018

YOUR REFERENCE: Local Geotechnics

PURCHASE ORDER: Inv: 137689

APPROVALS:


Sean Sangster Sam Becker Douglas Todd
Inorganics Supervisor Inorganics Manager Laboratory Manager

REPORT COMMENTS:

This report is issued by Analytical Reference Laboratory (WA) Pty Ltd
Samples are analysed on an as received basis unless otherwise noted.
PRI analysis subcontracted to CSBP, Report Number 3RS18153-54

METHOD REFERENCES:

Method ID	Method Description
ARL No. 138	pH in Soil and Biosolid
ARL No. 140	Conductivity in Soil and Biosolid
ARL No. 213	Exchangeable Bases
ARL No. 212	Exchangeable Acidity
Subcontracting	See Report Comments section for more information.

Local Geotechnics
Job No: 18-15746

LABORATORY REPORT
Revision: 02

Date: 2/11/18

Misc. Inorganics in Soil			Sample No: 18-15746-1	18-15746-2
			Sample Details:	
			TH1 (0.6-0.8m)	TH2 (1.1-1.3m)
ANALYTE	LOR	Units	19/10/2018	19/10/2018
pH	0.1	pH units	7.0	6.9
Conductivity	0.01	mS/cm	0.01	0.01

Cation Exchange Capacity			Sample No: 18-15746-1	18-15746-2
			Sample Details:	
			TH1 (0.6-0.8m)	TH2 (1.1-1.3m)
ANALYTE	LOR	Units	19/10/2018	19/10/2018
Exchangeable Calcium	0.2	cmol _c /kg	1.7	0.8
Exchangeable Acidity	0.1	cmol _c /kg	<0.1	<0.1
Exchangeable Potassium	0.05	cmol _c /kg	<0.05	0.10
Exchangeable Magnesium	0.2	cmol _c /kg	1.1	0.5
Exchangeable Sodium	0.2	cmol _c /kg	0.3	0.2
Cation Exchange Capacity	1	cmol _c /kg	3	2

Subcontracting			Sample No: 18-15746-1	18-15746-2
			Sample Details:	
			TH1 (0.6-0.8m)	TH2 (1.1-1.3m)
ANALYTE	LOR	Units	19/10/2018	19/10/2018
Phosphorus Retention Index		-	40.7	44.0

Result Definitions

LOR Limit of Reporting [NT] Not Tested [ND] Not Detected at indicated Limit of Reporting
* Denotes test conducted by in-house methodology.

FOR MICROBIOLOGICAL TESTING - The data in this report may not be representative of a lot, batch or other samples and may not necessarily justify the acceptance or rejection of a lot or batch, a product recall or support legal proceedings. Tests are not routinely performed as duplicates unless specifically requested. Changes occur in the bacterial content of biological samples. Samples should be examined as soon as possible after collection, preferably within 6 hrs and must be stored at 4 degrees Celsius or below. Samples tested after 24 hrs cannot be regarded as satisfactory because of temperature abuse and variations.



46-48 Banksia Road WELSHPOOL WA 6106
Ph: +61 8 6253 4444 www.arlwa.com.au

Samples Relinquished By: _____ On: ____/____/____ At: _____ Signed: _____
 Samples Received By: M. Goulas On: 19/10/18 At: 4pm Signed: _____



REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155
admin@localgeotechnics.com.au

Reference	LGK5472018Lab		Test Pit/BH No.	01
Client	Burswood Care Pty Ltd		Date Excavated	19-Oct-2018
Project	Geotechnical Site Classification		Date completed	19-Oct-2018
Location	24 Valencia Road Carmel WA		Equipment Type	Hand Auger
Chainage	Northing:	Easting:	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Dynamic Cone Penetrometer Test (Blows/100mm)
0.1						SM	Gravelly Silty SAND - fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)		0
0.5						GC	Sandy Clayey GRAVEL - fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, stiff to very stiff, low to medium plasticity, fine to medium grained sand, trace of cobble/boulder up to 100 mm		0.5
1.0									1
1.2									
1.5									1.5
2.0									2
2.5							Terminated at a depth of 1.2 m Terminated at the target depth of 2.5 m		2.5

Notes:

Sampling Type :

B - Bulk/Disturbed Sample,
UD - Undisturbed Sample

Method:

HA - Hand Auger
E - Excavator
BH - Backhoe Bucket

Moisture:

D - Dry
M - Moist
W - Wet

Symbols:

W_L - Plastic Limit
W_P - Plastic Limit

Logged : FR
Checked: HM



REPORT OF TEST PIT

ABN: 61 737 984 867
PO Box 5050
Canning Vale South WA 6155
admin@localgeotechnics.com.au

Reference	LGK5472018Lab		Test Pit/BH No.	02
Client	Burswood Care Pty Ltd		Date Excavated	19-Oct-2018
Project	Geotechnical Site Classification		Date completed	19-Oct-2018
Location	24 Valencia Road Carmel WA		Equipment Type	Hand Auger
Chainage	Northing:	Easting:	Water Table	N/A

Depth (m)	RL (m)	Method	Penetration resistance	Sampling Type	Graphic Log	Classification Symbol	Description of Soil Strata	Additional observations	Dynamic Cone Penetrometer Test (Blows/100mm)
0.1						SM	Gravelly Silty SAND - fine to medium grained, fines of low plasticity, black, moist, loose, fine to medium grained gravel up to 15 mm with grass roots, tree roots and organics (TOPSOIL)		0
0.5						GC	Sandy Clayey GRAVEL - fine to coarse grained, sub rounded gravel up to 30 mm, brown to yellow, moist, stiff to very stiff, low to medium plasticity, fine to medium grained sand, trace of cobble/boulder up to 100 mm		0.5
1.0									1
1.2									
1.5									1.5
2.0							Terminated at the target depth of 1.5 m		2
2.5									2.5

Notes:

Sampling Type :

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W_L - Plastic Limit
W_P - Plastic Limit

Logged : FR
Checked: HM