



LOCAL GEOTECHNICS

7 November 2016

Report on
Field Permeability Test
24 Valencia Road, Carmel WA

Project:
LG7722016FPT
REV_1

Client: **Burswood Care Pty Ltd**

Geotech

Civil

Pavement

Drainage

07 November 2016

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

Attention: Mr. Paramjeet (PJ) Khaira (from Schearar Consulting)

Dear Mr. Paramjeet,

RE: Field Permeability Test for 24 Valencia Road, Carmel WA

This letter presents our report on a field permeability test 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.



Dr. Harun Meer

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

Local Geotechnics

Project	LG7722016FPT Field Permeability Test				
Site Location	24 Valencia Road, Carmel WA				
Rev	Description	Date	Prepared by	Reviewed by	Approved by
0	Issued to client	02 Nov. 2016	M Hossain	A Rahman	H Meer
1	Issued to client	07 Nov. 2016	M Hossain	A Rahman	H Meer

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EXECUTIVE SUMMARY

This is a field permeability test report for 24 Valencia Road, Carmel WA (the project). The project was commissioned by Mr. Paramjeet (PJ) Khaira from Schearar Consulting on behalf of Burswood Care Pty Ltd (the client).

Objectives of the investigation are to obtain the permeability rate to install septic tank and leach drain as a part of new development at the rear block of the site. Field tests were conducted as per AS 1547 by using Guelph permeameter.

Three field permeability tests were conducted at the site on 1 November 2016 as directed by the client. The weather condition was fine and sunny during field works.

It is found from the permeability tests that the permeability at the site varies from 3.8E+00 m/day to 5.3 m/day with an average value of 5.8 m/day. Based on the field results, Local Geotechnics (LG) recommends using a field permeability value of **5.5 m/day** for drainage design purpose. However, drainage designer can select a value of up to 5.8 m/day depending on design assumptions.

The permeability property at the site can be increased by replacing the site soil with clean sand.

1.0 INTRODUCTION

This is a field permeability test report for 24 Valencia Road, Carmel WA (the project). The project was commissioned by Mr. Paramjeet (PJ) Khaira from Schearar Consulting on behalf of Burswood Care Pty Ltd (the client). The site location is shown in Figure 1.

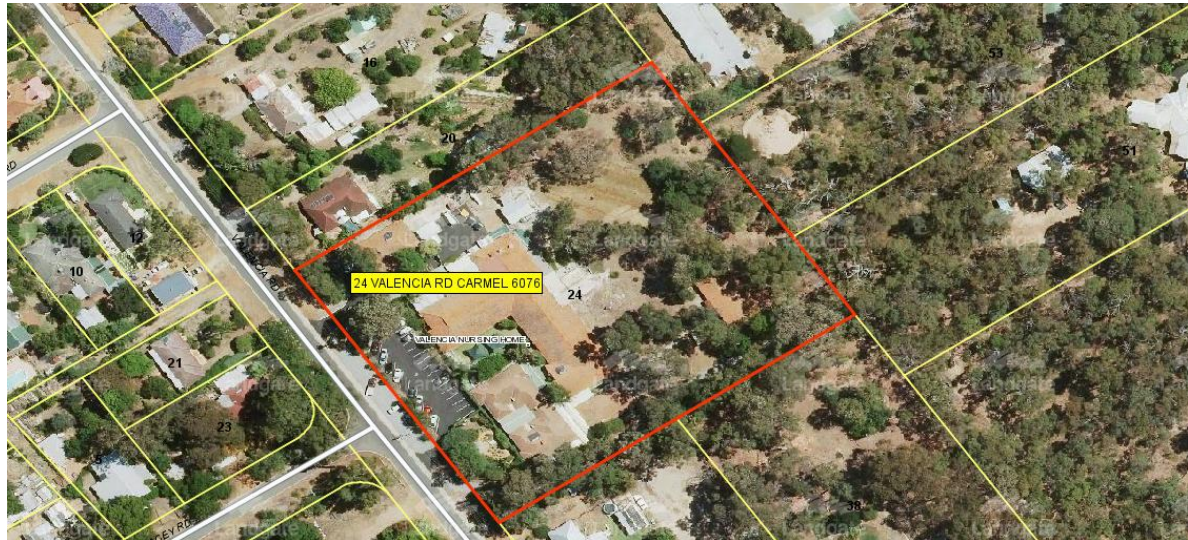


Figure 1. Aerial view of the site location (Source: Landgate map)

We are given to understand that field permeability testing is required to install septic tank and leach drain as a part of new development at the rear block of the site.

Field tests were conducted as per AS1547 by using Guelph permeameter.

Three field Permeability tests were proposed by the client. Field works were conducted on 1 November 2016. The weather condition was fine and sunny during field works.

2.0 SCOPE AND OBJECTIVES

The scope and objectives of the investigation are as follows:

- Mobilization and demobilization of an engineering crew to the site;
- Conducting of three field permeability test as per AS1547 by using Guelph permeameter;
- Recording of permeability test locations by a hand held GPS;
- Submit a factual report on findings of soil permeability.

3.0 SITE CONDITIONS

The site is located at 24 Valencia Road, Carmel WA. There is an existing nursing home at front of 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. The site photos taken during the permeability test are shown in Appendix C.

4.0 FIELD WORK

4.1 General

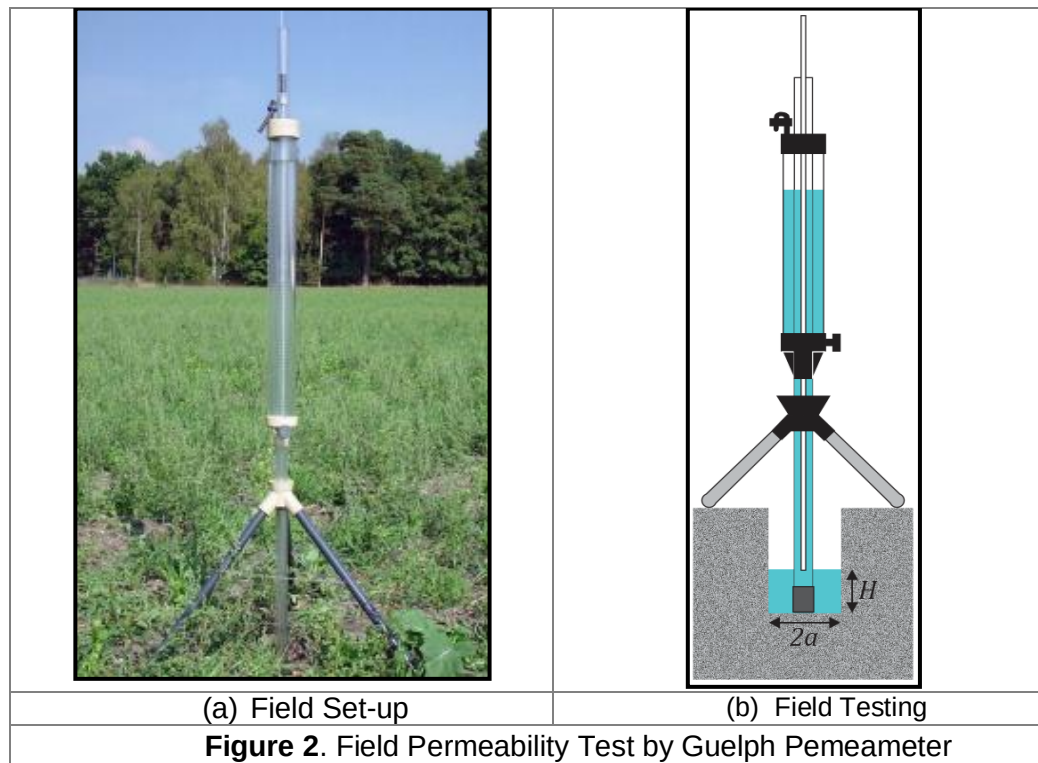
The field works consists of field observation, conduction of three (03) field permeability tests by using Guelph Permeameter and taking photographs. The field permeability test locations are denoted as FPT01, FPT02 and FPT03.

4.2 Field Permeability Test

Three field permeability tests were conducted at the site as per AS1547 by using Guelph Permeameter.

4.2.1 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.



4.2.2 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.

4.2.3 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.

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

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 cm³/min
 H = depth of water in the test hole in cm
 r = radius of the test hole in cm

4.2.4 Permeability Test Results

Permeability test results are summarized in Table 1 and the test certificates are presented in Appendix B.

Table 1. Summary of field permeability tests

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

5.0 RECOMMENDATIONS REFERENCES

It is found from the permeability tests that the permeability at the site varies from 3.8E+00 m/day to 5.3 m/day with an average value of 5.8 m/day. Based on the field results, Local Geotechnics (LG) recommends using a field permeability value of **5.5 m/day** for drainage design purpose. However, drainage designer can select a value of up to 5.8 m/day depending on design assumptions.

The permeability property at the site can be increased by replacing the site soil with clean sand.

6.0 REFERENCES

- Australian Standard AS 1726-1993 *"Geotechnical Site Investigations"*.
- Australian Standard AS 1547 *"On-site Domestic Wastewater Management"*.

7.0 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.



APPENDIX A

SITE SKETCH





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



APPENDIX B

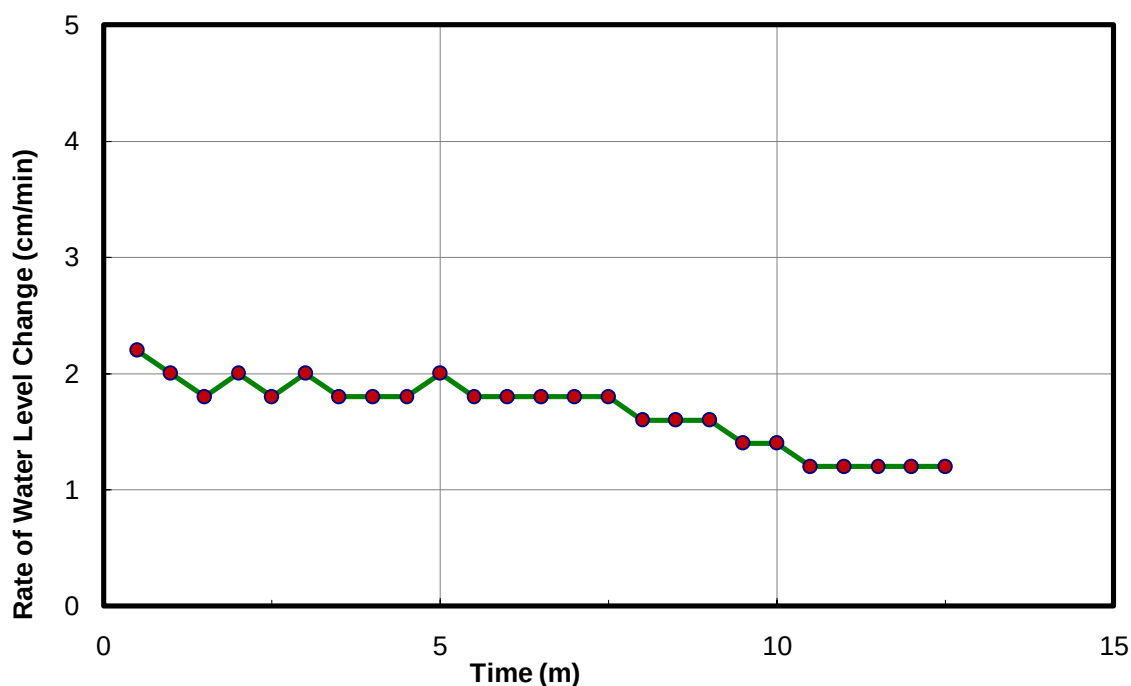
FIELD PERMEABILITY TEST CERTIFICATES



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	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**

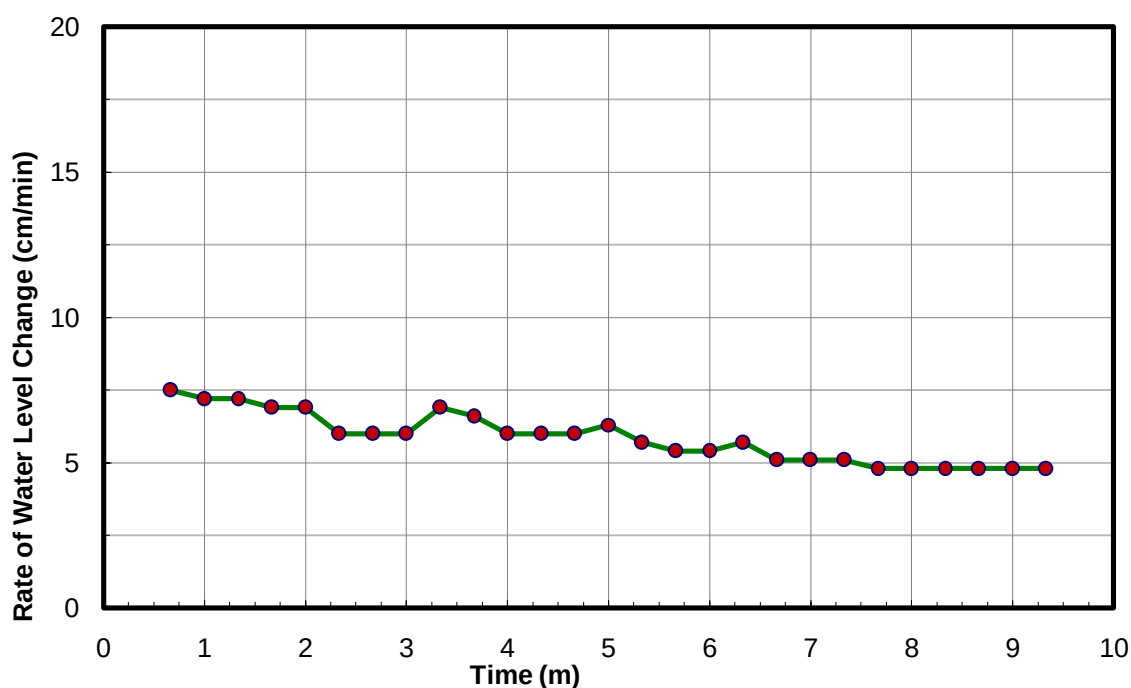
Signatory: 
 Dr. Harun Meer

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**

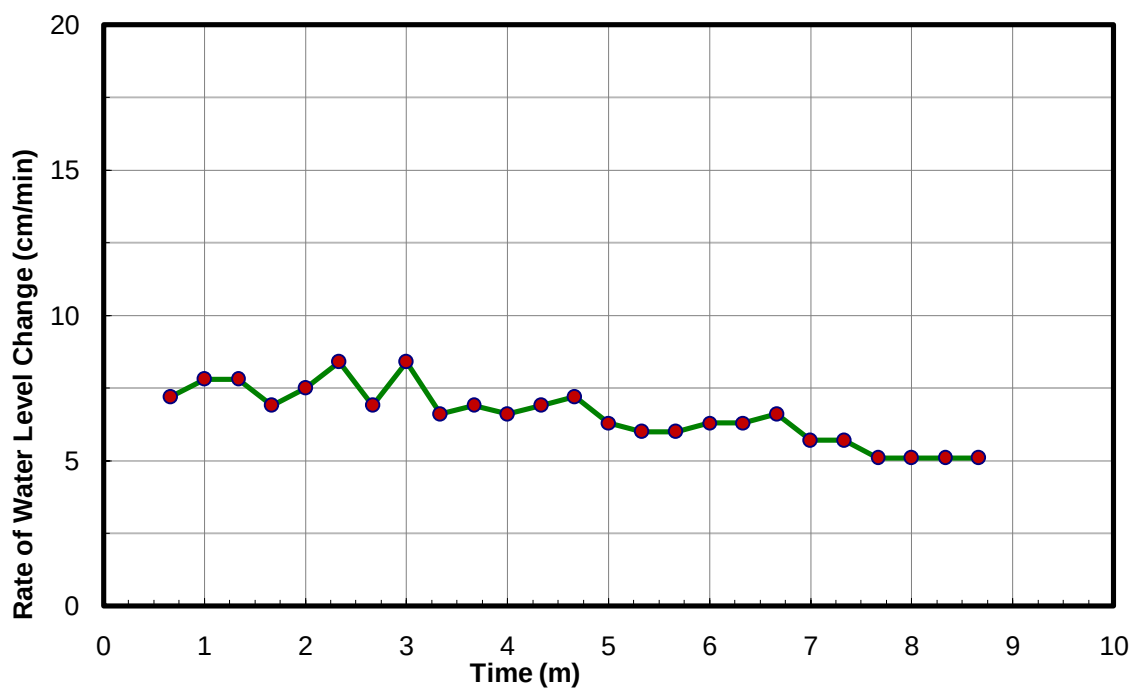
Signatory: 
 Dr. Harun Meer

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 C

SITE PHOTOS





Photo 1. Site, view from southern to northern side



Photo 2. Site, view from eastern to western side

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Project: LG7722016FPT _Rev0

Field Permeability Test

Site: 24 Valencia Road, Carmel WA

Client: Burswood Care Pty Ltd



Photo 3. Existing leach drain area at site



Photo 4. Infiltration Test at Location FPT01

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Project: LG7722016FPT _Rev0

Field Permeability Test

Site: 24 Valencia Road, Carmel WA

Client: Burswood Care Pty Ltd



Photo 5. Infiltration Test at Location FPT02



Photo 6. Infiltration Test at Location FPT03

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Project: LG7722016FPT _Rev0

Field Permeability Test

Site: 24 Valencia Road, Carmel WA

Client: Burswood Care Pty Ltd