BY EMAIL
Stepnell Limited

Our Ref: C2205/GISA

FAO: Marcus Major

5th January 2015

Dear Marcus,

Re: Soakaway Testing – Otterbourne Hill ,Winchester

Introduction

HSP Consulting Engineers Ltd was commissioned by Stepnell Limited to undertake soakaway testing at the proposed location of the infiltration basin at Otterbourne Hill, Winchester

The site is an open field to the south of the Yellow Dot Nursery. The site is approximately 2.5Ha in area and 7.3km south of Winchester City centre. Access is provided through a gate along the northern boundary.

The purpose of this report is to summarise the findings of soakaway testing.

Intrusive Investigation

Soakaway testing was undertaken in three trial pits SK1, SK2 and SK3 across the proposed location of the infiltration basin in general accordance with BRE Digest 365 Soakaway Design. SK1 and SK2 encountered Topsoil overlying stiff orangish grey slightly sandy slightly gravelly CLAY. Underlying the clay is medium dense to dense slightly clayey SAND which was penetrated to the maximum depth of the trial pit, 2.00m begl. SK3 encountered topsoil overlying sandy slightly clayey gravel. Medium dense to dense slightly clayey slightly gravelly SAND was encountered underlying the gravel. A detailed description of the lithologies encountered in each trial pit is included on the test certificates presented in Appendix II. The results of the soakaway testing are also presented in Appendix II.

Analysis of the results indicates an infiltration rate of between 3.58×10^{-6} and 4.59×10^{-5}m/s. Comparison of this data with table 11.1 Permeability and Drainage Characteristics of Soils Terzaghi and Peck indicates the ground to be of good drainage potential. Therefore infiltration methods of surface water disposal are likely to be feasible across this area of the site.

We trust this information meets your current requirements, should you have any queries please don't hesitate to contact me.

Yours sincerely



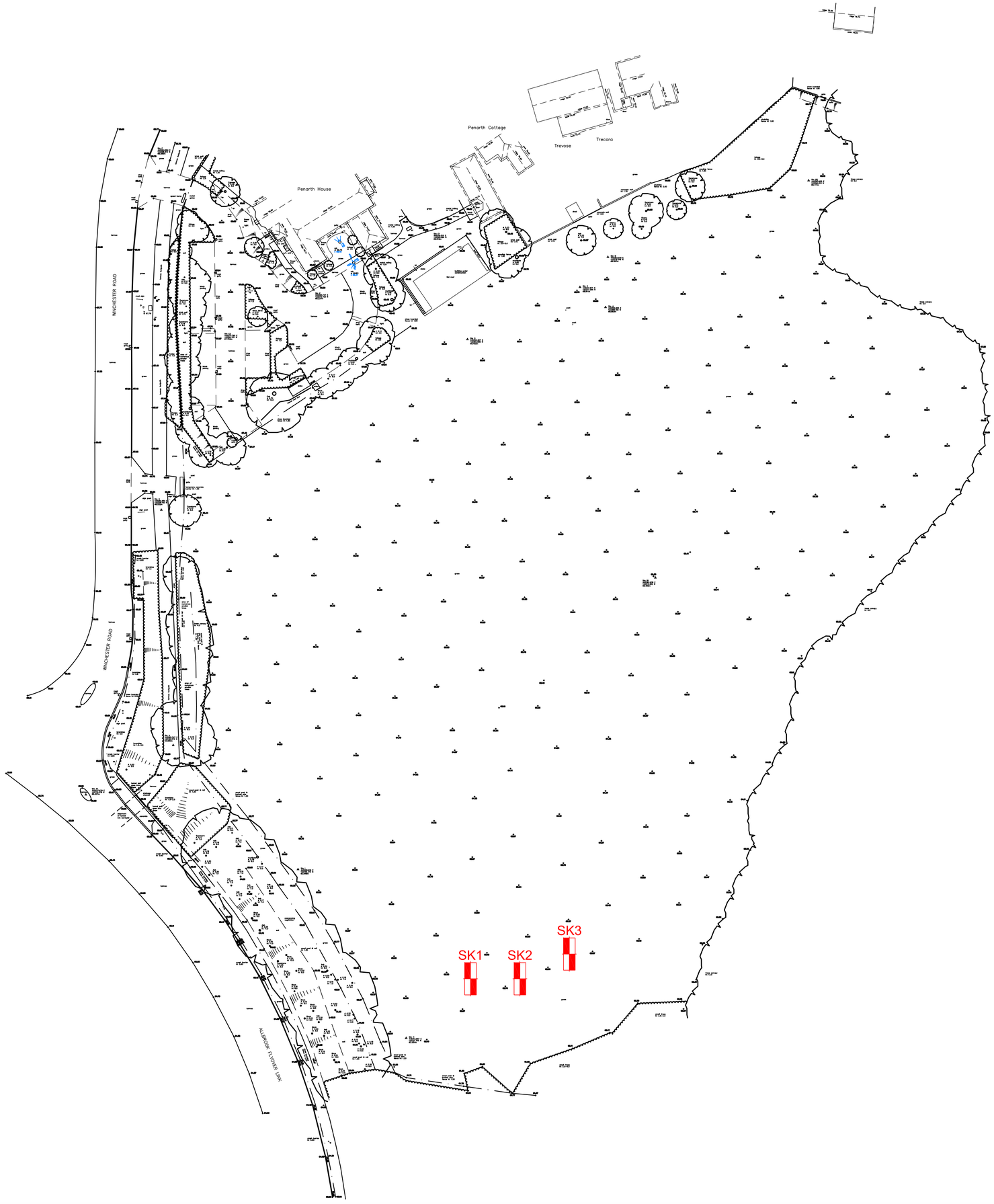
Howard Daley
MGeol (Hons) FGS
Graduate Geo-Environmental Engineer
HSP Consulting Engineers Limited

Appendix I – Ground Investigation Layout Plan
Appendix II – Soakaway test certificates

Appendix I

KEY:

- Soakaway pit location



Rev.	By	Date	Details	Chkd
Drawing Status				

hsp consulting

Lawrence House, 4 Meadowbank Way, Eastwood, Nottingham, NG16 3SB
Tel: 01773 535555 www.hspconsulting.com

Client

Stepnell Ltd

Project

Land off Otterbourne Hill,
Otterbourne, Hampshire

Title

Site Investigation Layout Plan

Scale (A1)	Drawn by.	Drg. No.	Rev.
NTS	DRS	C2205-501	
Date. Dec 2015	Checked by. HD		

Appendix II

INSITU SOAKAWAY TEST RESULTS

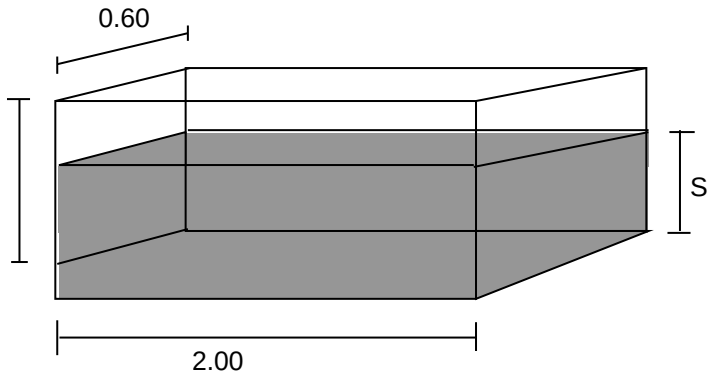
Trialpit No.: SK1

Soil Profile:

Depth (m) From:	To:	Description
0.00	0.20	TOPSOIL - Dark brown clayey slightly gravelly topsoil.
0.20	0.60	CLAY - Stiff orangish grey slightly sandy gravelly clay.
0.60	1.00	SAND - Medium dense orangish brown slightly clayey slightly gravelly sand.
1.00	2.00	SAND - Dense orangish brown slightly gravelly sand.

Sketch plan of test zone

Not to scale
All dimensions in metres.

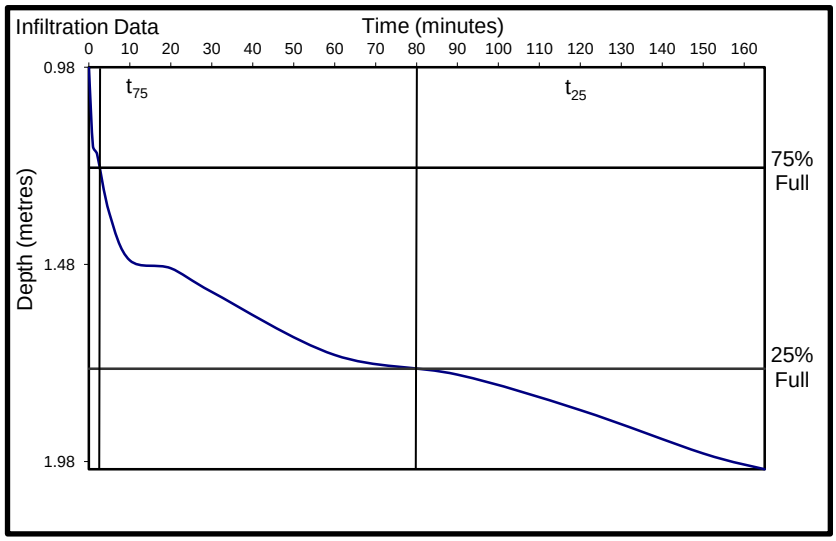


porosity (N) = 1
(measured in laboratory)
S= Storage depth (m) 2.00
Water level from 0.98 to 2.00m.
No Groundwater was encountered

Gives the Figures

S=	1.02	m
a_{p50}=	3.85	m^2
V_{p75-25}=	0.61	m^3

Soakaway Test Run 1 **Test Date: 14/12/2015**



Time (minutes)	Depth (m)
0	0.98
1	1.18
2	1.20
5	1.35
10	1.47
20	1.49
30	1.55
60	1.71
90	1.76
120	1.85
150	1.96
165	2.00

From the above graph,

t_{p75}= 3 (min) $t_{p25=}$ 80 (min)

Soil Infiltration Rate: $f = \frac{V_{p75-25} \times N}{a_{p50} \times t_{p75-25}}$ = 3.44E-05 f_{run1}= 3.44×10^{-5} m/s

Test and analysis carried out in general accordance with BRE Digest 365 : 1991

Job No.: **Otterbourne Hill, Winchester**
Site: **C2205**
Client: **Stepnell Ltd**

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INSITU SOAKAWAY TEST RESULTS

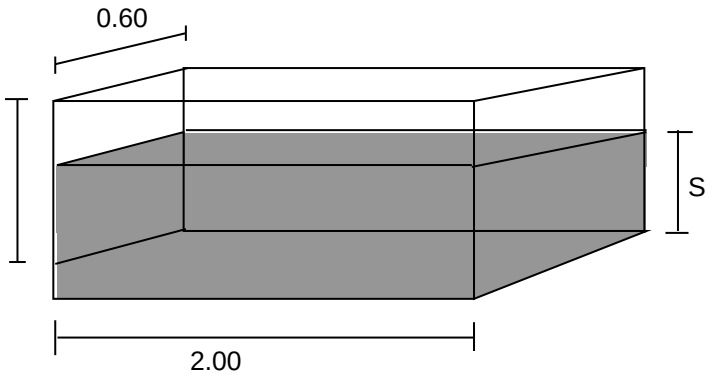
Trialpit No.: SK1

Soil Profile:

Depth (m) From:	To:	Description
0.00	0.20	TOPSOIL - Dark brown clayey slightly gravelly topsoil.
0.20	0.60	CLAY - Stiff orangish grey slightly sandy gravelly clay.
0.60	1.00	SAND - Medium dense orangish brown slightly clayey slightly gravelly sand.
1.00	2.00	SAND - Dense orangish brown slightly gravelly sand.

Sketch plan of test zone

Not to scale
All dimensions in metres.

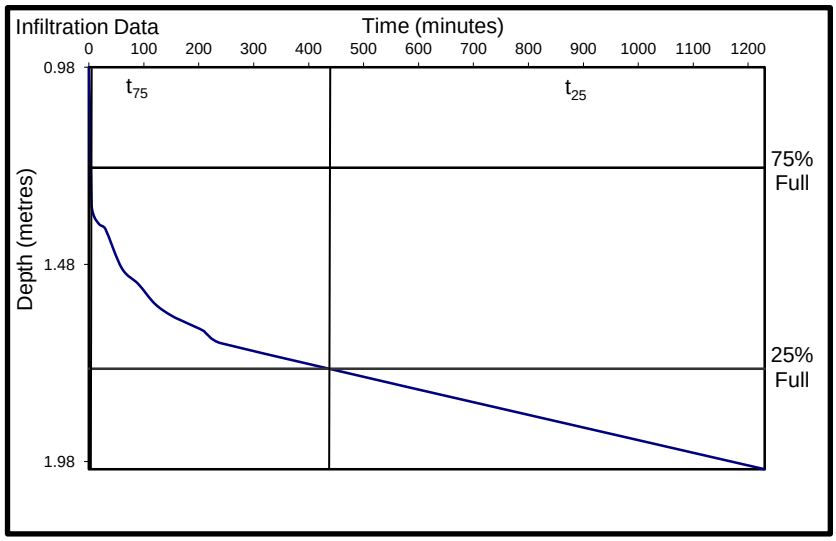


porosity (N) = 1
(measured in laboratory)
S= Storage depth (m) 2.00
Water level from 0.98 to 2.00m.
No Groundwater was encountered

Gives the Figures

S=	1.02	m
a_{p50}=	3.85	m^2
V_{p75-25}=	0.61	m^3

Soakaway Test Run 2 **Test Date: 14/12/2015**



Time (minutes)	Depth (m)
0	0.98
1	1.04
2	1.09
5	1.33
10	1.36
20	1.38
30	1.39
60	1.49
90	1.53
120	1.58
150	1.61
180	1.63
210	1.65
240	1.68
1230	2.00

From the above graph,

t_{p75}= 1 (min) $t_{p25=}$ 435 (min)

Soil Infiltration Rate: $f = \frac{V_{p75-25} \times N}{a_{p50} \times t_{p75-25}}$ = 6.10E-06 f_{run1}= 6.10×10^{-6} m/s

Test and analysis carried out in general accordance with BRE Digest 365 : 1991

Job No.: **Otterbourne Hill, Winchester**
Site: **C2205**
Client: **Stepnell Ltd**

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INSITU SOAKAWAY TEST RESULTS

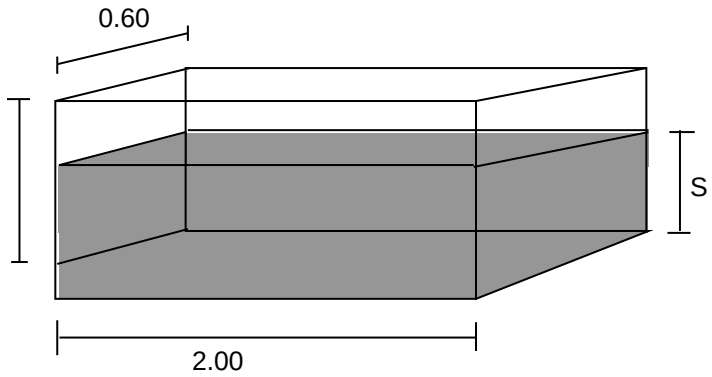
Trialpit No.: SK1

Soil Profile:

Depth (m) From:	To:	Description
0.00	0.20	TOPSOIL - Dark brown clayey slightly gravelly topsoil.
0.20	0.60	CLAY - Stiff orangish grey slightly sandy gravelly clay.
0.60	1.00	SAND - Medium dense orangish brown slightly clayey slightly gravelly sand.
1.00	2.00	SAND - Dense orangish brown slightly gravelly sand.

Sketch plan of test zone

Not to scale
All dimensions in metres.

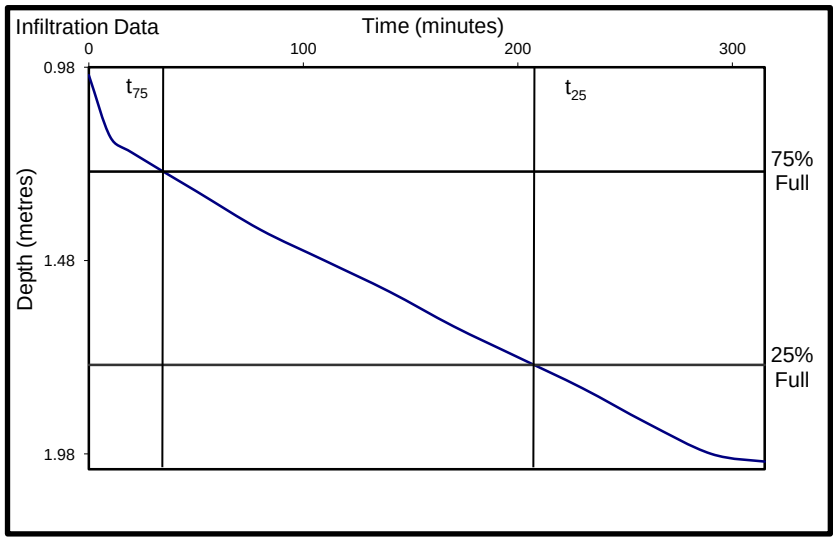


porosity (N) = 1
(measured in laboratory)
S= Storage depth (m) 2.00
Water level from 1.00 to 2.00m.
No Groundwater was encountered

Gives the Figures

S=	1.00	m
a_{p50}=	3.80	m^2
V_{p75-25}=	0.60	m^3

Soakaway Test Run 3 **Test Date: 15/12/2015**



Time (minutes)	Depth (m)
0	1.00
10	1.16
20	1.20
50	1.30
80	1.40
110	1.48
140	1.56
170	1.65
200	1.73
230	1.81
260	1.90
290	1.98
315	2.00

From the above graph,
t_{p75}= 30 (min) $t_{p25=}$ 205 (min)

Soil Infiltration Rate: $f = \frac{V_{p75-25} \times N}{a_{p50} \times t_{p75-25}}$ = 1.50E-05 $f_{run1} = 1.50 \times 10^{-5}$ m/s

Test and analysis carried out in general accordance with BRE Digest 365 : 1991

Job No.: **Otterboure Hill**
Site: **C2205**
Client: **Stepnell Ltd**

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INSITU SOAKAWAY TEST RESULTS

Trialpit No.: SK2

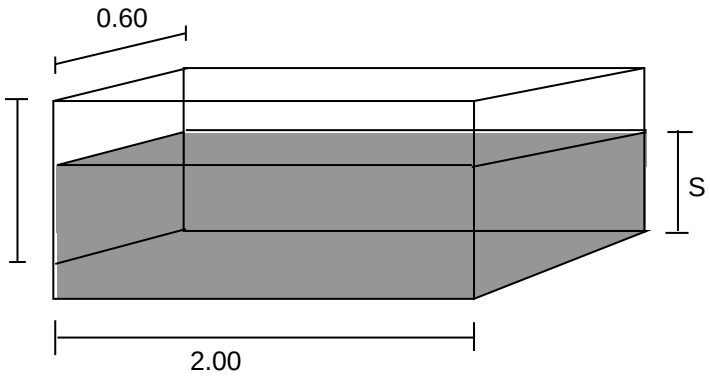
Soil Profile:

Depth (m) From:	To:	Description
0.00	0.20	TOPSOIL - Dark brown clayey slightly gravelly topsoil.
0.20	0.40	CLAY - Stiff orangish grey slightly sandy gravelly clay.
0.40	1.00	SAND - Medium dense orangish brown slightly clayey slightly gravelly sand.
1.00	2.00	SAND - Dense orangish brown slightly gravelly sand.

Sketch plan of test zone

Not to scale
All dimensions in metres.

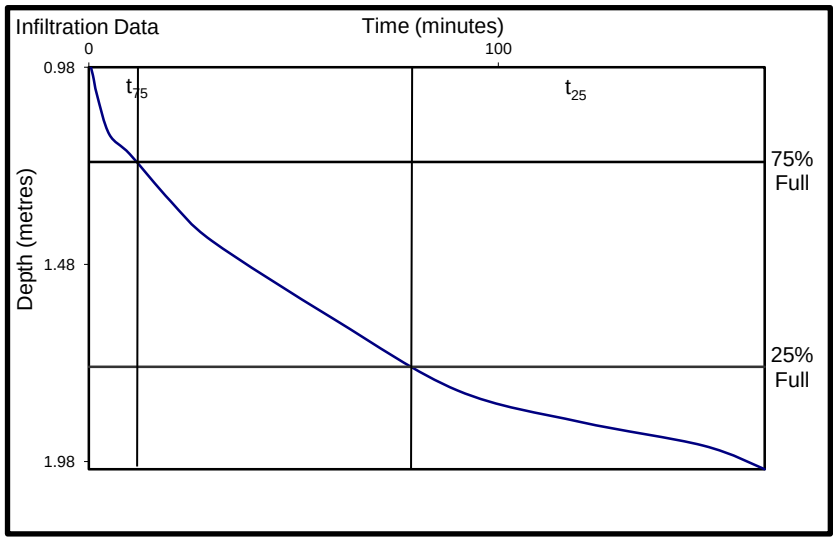
porosity (N) = 1
(measured in laboratory)
S= Storage depth (m) 2.00
Water level from 0.96 to 2.00m.
No Groundwater was encountered



Gives the Figures

S=	1.04	m
a_{p50}=	3.90	m^2
V_{p75-25}=	0.62	m^3

Soakaway Test Run 1 Test Date: 14/12/2015



Time (minutes)	Depth (m)
0	0.96
1	1.00
2	1.05
5	1.15
10	1.20
20	1.32
30	1.42
60	1.62
90	1.80
120	1.88
150	1.94
165	2.00

From the above graph,

t_{p75}= 12 (min) $t_{p25=}$ 70 (min)

Soil Infiltration Rate: $f = \frac{V_{p75-25} \times N}{a_{p50} \times t_{p75-25}}$ = 4.59E-05 f_{run1}= 4.59×10^{-5} m/s

Test and analysis carried out in general accordance with BRE Digest 365 : 1991

Job No.: Otterbourne Hill, Winchester
Site: C2205
Client: Stepnell Ltd

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INSITU SOAKAWAY TEST RESULTS

Trialpit No.: SK2

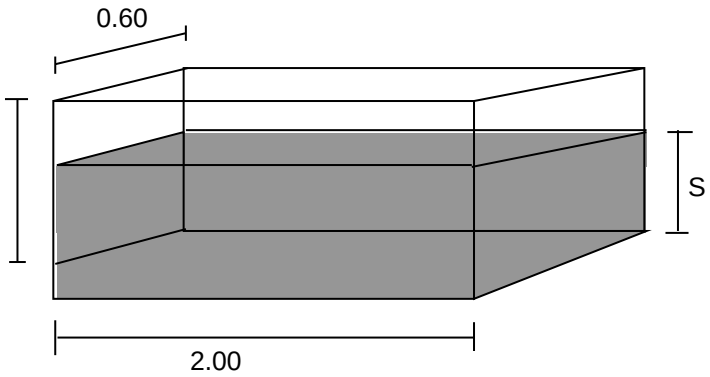
Soil Profile:

Depth (m) From:	To:	Description
0.00	0.20	TOPSOIL - Dark brown clayey slightly gravelly topsoil.
0.20	0.40	CLAY - Stiff orangish grey slightly sandy gravelly clay.
0.40	1.00	SAND - Medium dense orangish brown slightly clayey slightly gravelly sand.
1.00	2.00	SAND - Dense orangish brown slightly gravelly sand.

Sketch plan of test zone

Not to scale
All dimensions in metres.

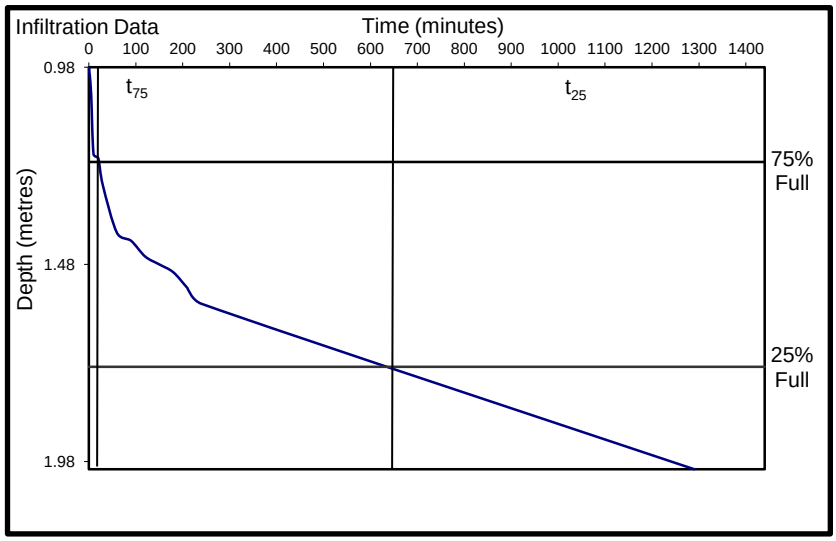
porosity (N) = 1
(measured in laboratory)
S= Storage depth (m) 2.00
Water level from 0.96 to 2.00m.
No Groundwater was encountered



Gives the Figures

S=	1.04	m
a_{p50}=	3.90	m^2
V_{p75-25}=	0.62	m^3

Soakaway Test Run 2 Test Date: 15/12/2015



Time (minutes)	Depth (m)
0	0.96
1	0.99
2	1.00
5	1.05
10	1.20
20	1.21
30	1.28
60	1.40
90	1.42
120	1.46
150	1.48
180	1.50
210	1.54
240	1.58
1290	2.00

From the above graph,

t_{p75}= 12 (min) $t_{p25=}$ 660 (min)

Soil Infiltration Rate: $f = \frac{V_{p75-25} \times N}{a_{p50} \times t_{p75-25}}$ = 4.11E-06 f_{run1}= 4.11×10^{-6} m/s

Test and analysis carried out in general accordance with BRE Digest 365 : 1991

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Site: C2205
Client: Stepnell Ltd

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INSITU SOAKAWAY TEST RESULTS

Trialpit No.: SK2

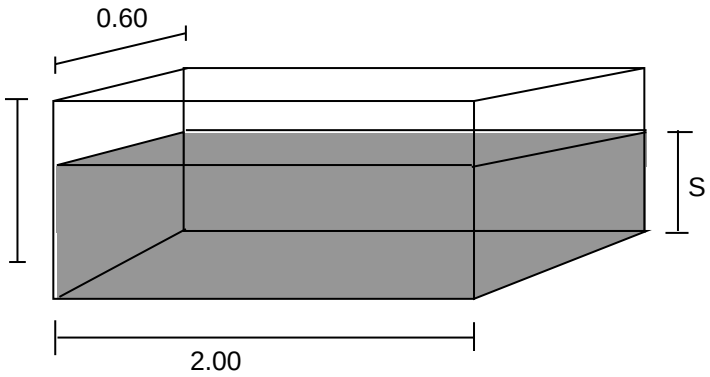
Soil Profile:

Depth (m) From:	To:	Description
0.00	0.20	TOPSOIL - Dark brown clayey slightly gravelly topsoil.
0.20	0.40	CLAY - Stiff orangish grey slightly sandy gravelly clay.
0.40	1.00	SAND - Medium dense orangish brown slightly clayey slightly gravelly sand.
1.00	2.00	SAND - Dense orangish brown slightly gravelly sand.

Sketch plan of test zone

Not to scale
All dimensions in metres.

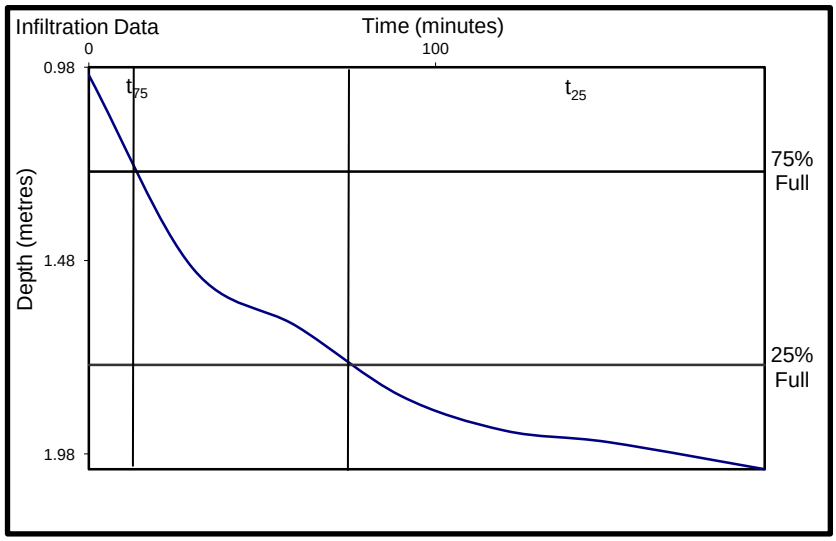
porosity (N) = 1
(measured in laboratory)
S= Storage depth (m) 2.00
Water level from 1.00 to 2.00m.
No Groundwater was encountered



Gives the Figures

S=	1.00	m
a_{p50}=	3.80	m^2
V_{p75-25}=	0.60	m^3

Soakaway Test Run 3 Test Date: 15/12/2015



Time (minutes)	Depth (m)
0	1.00
30	1.50
60	1.65
90	1.83
120	1.92
150	1.95
195	2.02

From the above graph,

t_{p75}= 15 (min) $t_{p25=}$ 85 (min)

Soil Infiltration Rate: $f = \frac{V_{p75-25} \times N}{a_{p50} \times t_{p75-25}}$ = 3.76E-05 f_{run1}= 3.76×10^{-5} m/s

Test and analysis carried out in general accordance with BRE Digest 365 : 1991

Job No.: Otterboure Hill
Site: C2205
Client: Stepnell Ltd

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INSITU SOAKAWAY TEST RESULTS

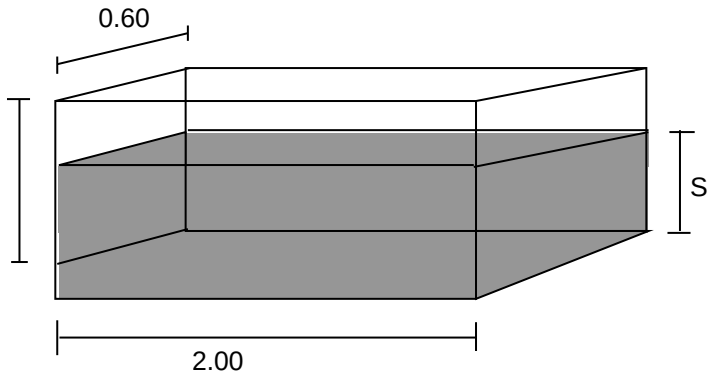
Trialpit No.: SK3

Soil Profile:

Depth (m) From:	To:	Description
0.00	0.10	TOPSOIL - Grass overlying gravelly slightly clayey topsoil.
0.10	0.30	GRAVEL - Medium dense sandy slightly clayey gravel.
0.30	0.80	SAND - Medium dense orangish brown clayey slightly gravelly sand.
0.80	2.00	SAND - Dense orangish brown slightly gravelly sand.

Sketch plan of test zone

Not to scale
All dimensions in metres.

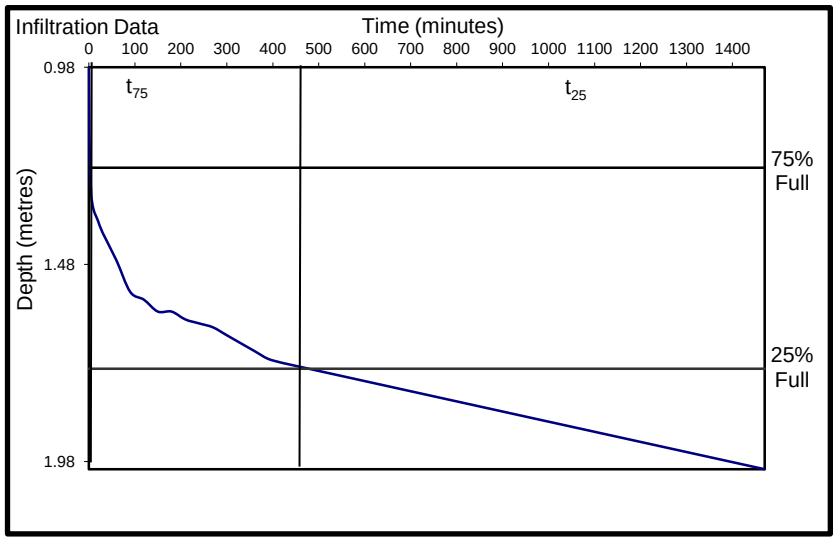


porosity (N) = 1
(measured in laboratory)
S= Storage depth (m) 2.00
Water level from 0.98 to 2.00m.
No Groundwater was encountered

Gives the Figures

S=	1.02	m
a_{p50}=	3.85	m^2
V_{p75-25}=	0.61	m^3

Soakaway Test Run 1 **Test Date: 14/12/2015**



Time (minutes)	Depth (m)
0	0.98
1	1.12
2	1.20
5	1.30
10	1.34
20	1.37
30	1.40
60	1.47
90	1.55
120	1.57
150	1.60
180	1.60
210	1.62
240	1.63
270	1.64
300	1.66
330	1.68
360	1.70
390	1.72
420	1.73
1470	2.00

From the above graph,

t_{p75}= 2 (min) $t_{p25=}$ 480 (min)

Soil Infiltration Rate: $f = \frac{V_{p75-25} \times N}{a_{p50} \times t_{p75-25}}$ = 5.54E-06 f_{run1}= 5.54×10^{-6} m/s

Test and analysis carried out in general accordance with BRE Digest 365 : 1991

Job No.: **Otterbourne Hill, Winchester**
Site: **C2205**
Client: **Stepnell Ltd**

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INSITU SOAKAWAY TEST RESULTS

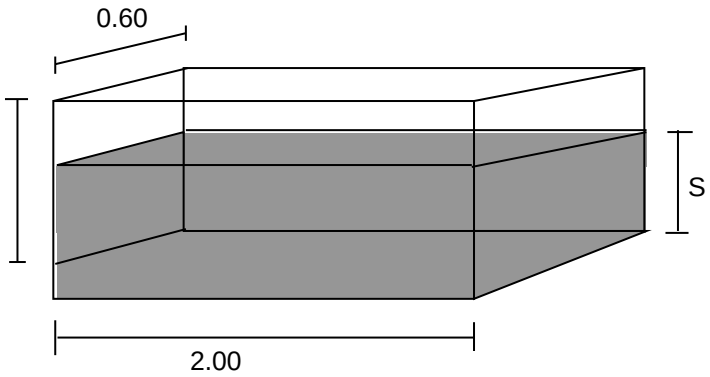
Trialpit No.: SK3

Soil Profile:

Depth (m) From:	To:	Description
0.00	0.10	TOPSOIL - Grass overlying gravelly slightly clayey topsoil.
0.10	0.30	GRAVEL - Medium dense sandy slightly clayey gravel.
0.30	0.80	SAND - Medium dense orangish brown clayey slightly gravelly sand.
0.80	2.00	SAND - Dense orangish brown slightly gravelly sand.

Sketch plan of test zone

Not to scale
All dimensions in metres.

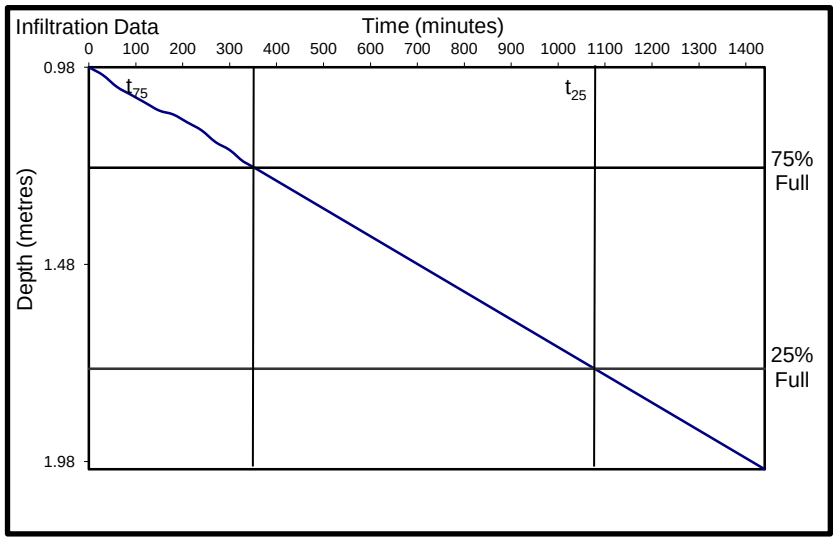


porosity (N) = 1
(measured in laboratory)
S= Storage depth (m) 2.00
Water level from 0.98 to 2.00m.
No Groundwater was encountered

Gives the Figures

S=	1.02	m
a_{p50}=	3.85	m^2
V_{p75-25}=	0.61	m^3

Soakaway Test Run 2 Test Date: 15/12/2015



Time (minutes)	Depth (m)
0	0.98
30	1.00
60	1.03
90	1.05
120	1.07
150	1.09
180	1.10
210	1.12
240	1.14
270	1.17
300	1.19
330	1.22
360	1.24
1440	2.00

From the above graph,

t_{p75}= 350 (min) $t_{p25=}$ 1090 (min)

Soil Infiltration Rate: $f = \frac{V_{p75-25} \times N}{a_{p50} \times t_{p75-25}}$ = 3.58E-06 f_{run1}= 3.58×10^{-6} m/s

Test and analysis carried out in general accordance with BRE Digest 365 : 1991

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