

Our Ref J4046/17/E
3rd October 2017

**Environmental
Geotechnical
Specialists**



Mason Clark Associates
Church house
44 Newland Park
Hull
HU5 2DW

For the attention of Mrs Hayley Smith

Dear Hayley

Ref: Soakaway Testing at Mulberry Lodge, Wombwell, S73 0HJ.

We thank you for your request to undertake percolation testing at the above mentioned site and take pleasure in enclosing the results of this work. The investigation was undertaken on the 26th September 2017 in accordance with your instruction to proceed. This letter describes the work undertaken, presents the data obtained and discusses the results of the tests.

Fieldworks

Two trialpits were excavated using a JCB 3CX in order to carry out soakaway testing. The tests were undertaken at the base of the pit at depths rational to the construction of soakaways. The soils exposed in the trial pits were logged on site in general accordance with BS5930: 2015 and full descriptions are given on the trialpit records which are also attached to this letter, along with the soakaway test results.

Geology

The available published geological data for the site has been examined and the following table presents the anticipated geology.

Table 1: Geological Data for the Site

Strata Type	Strata Name ¹	Previous Name	Description ²
Superficial Geology	N/A	N/A	Not indicated to underlie the site.
Solid Geology	Oaks Rock	-	The Oaks Rock is a named sandstone unit of the Pennine Middle Coal Measures Formation.

Strata Conditions

During the investigation the geological succession has been shown to include the following:

¹ Sources: British Geological Survey (NERC) Map Sheets 87; Barnsley; Solid and Drift Edition, and the Geology of Britain Viewer [online resource from www.bgs.ac.uk]

² Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]

Table 2: Generalised strata profile

Depth to base (m)	Strata type	Positions strata was revealed	Groundwater strikes (m)
0.15	TOPSOIL	TP1	None
0.4	MADE GROUND (Gravelly CLAY)	TP2	None
1.98 - +2.0	Weathered Oaks Rock (Sandy GRAVEL)	All	None
+2.0	Weathered Oaks Rock (SANDSTONE)	TP2	None

'+' denotes that the strata extended below the termination depth of the investigated positions, thus the extent of the deposit is only proven to the depths indicated.

Underlying the topsoil and made ground, brownish grey silty sandy gravel with cobbles was revealed to the base of TP1 and to 1.98m in TP2, whereupon sandstone was encountered. It is considered that this material is representative of the weathered fraction of the Oaks Rock.

Soakaway Tests

On reaching the elected soakaway test depth, the pit was trimmed and squared as much as practicable. Water was then introduced into the pit at a controlled rate to prevent collapse of the sides and the level monitored at time intervals relative to a reference bar at ground level. The results obtained from the soakaway tests are appended to this letter and are summarised below:

Table 3: Soakaway Test Results

Location	Soakage Area Dimensions (average) (m)	Test Depth (m)	Soil Description (base of pit)	Infiltration Rate (m/sec)	Drainage Characteristics
TP1	1.8 x 0.4	2.0	Sandy GRAVEL	1.2×10^{-3}	Good
				$9.2 \times 10^{-4*}$	
				1.0×10^{-3}	
TP2	1.9 x 0.4	2.0	SANDSTONE	$1.2 \times 10^{-5*}$	Good
				$1.1 \times 10^{-5*}$	

*Infiltration rate has been obtained via linear extrapolation.

It should be appreciated that in three of the soakaway tests the water level did not achieve a fall from 75% to 25% of the effective depth of the storage volume. Therefore, the data for this test could not be fully completed within the scope of the method provided in BRE Digest 365. Notwithstanding this, an infiltration rate has been obtained by linearly extrapolating the data such that the time to achieve 25% effective depth is approximated.

Discussion

The soakage rates obtained during the investigation were found to be good, thus soakaways could be utilised. However it should be appreciated that the site is underlain by sandstone bedrock, this rock type tends to weather to variably silty and clayey sand so some siltation is possible within the soakaway, thereby reducing the permeability over time. It is therefore recommended that this is taken into account in the soakaway design, however, it may be appreciated that the calculations given in BRE 365 take into account of such fouling.

References

Building Research Establishment (BRE) Digest 365, *Soakaway Design*, September 1991.

British Standards Institution (1999) BS5930: *Code of practice for site investigations*, B.S.I., London.

British Standards Institution (2007), Amendment No 1, BS5930: *Code of practice for site investigations*, B.S.I., London.

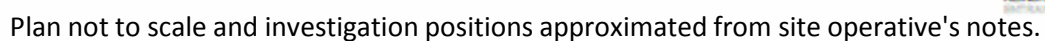
We trust that this information is of interest and should you have any other requirements do not hesitate to contact us.

For and on behalf of
Rogers Geotechnical Services,

Yours Faithfully

I. Sakoor BEng
Geotechnical Engineer

C. E. Mason BSc FGS
Graduate Geotechnical Engineer



Investigation Location Plan



**Land between 73 and 77 Park St,
Wombwell**

J4046/17/E



Trial Pit Log

Trialpit No

TP2

Sheet 1 of 1

Project Name: Mulberry Lodge

Project No.
J4046/17/ECo-ords: -
Level:Date
26/09/2017

Location: Land between 73 & 77, Park Street, Wombwell, S73 0HL

Dimensions
(m):

1.9

0.4

Depth
2.00

Scale

1:50

Logged
JDMI

Client: Mason Clark Associates

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.00 - 0.40	B		0.40			MADE GROUND (Grey and black, silty gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse of brick, concrete and ash).	
	1.00 - 1.50	B					Brownish grey, silty sandy angular, tabular, fine to coarse GRAVEL of sandstone with cobbles sized inclusions of clay and medium cobble content. Cobbles are of sandstone.	1
	1.50 - 2.00	B		1.98 2.00			Brown SANDSTONE recovered as sandy gravel. End of pit at 2.00 m	2
								3
								4
								5
								6
								7
								8
								9
								10

Remarks:

Stability:

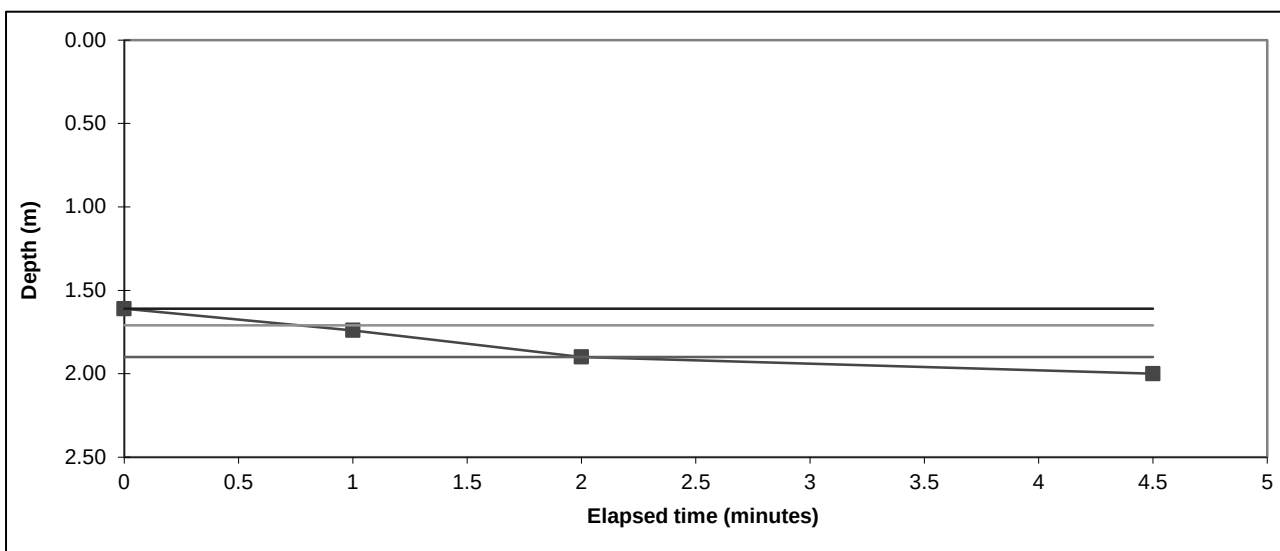


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Soakaway Test

Trial Pit No:	TP1	Test No:	1	26/09/2017
Length (m):	1.800	Datum Height:	0.00 m agl	
Width (m):	0.40	Granular infill:	None	
Depth (m):	2.00	Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.610		
1	1.740		
2	1.900		
4.5	2.000		



Start water depth for analysis (mbgl):	1.61		
75% effective depth (mbgl):	1.71	Elapsed time (mins):	0.8
50% effective depth (mbgl):	1.81		
25% effective depth (mbgl):	1.90	Elapsed time (mins):	2.0
Base of soakage zone (mbgl):	2.00		

Volume outflow between 75% and 25% effective depth (m³):	0.137
Mean surface area of outflow (m²):	1.56
(side area at 50% effective depth + base area)	
Time for outflow between 75% and 25% effective depth (mins):	1.2

Soil infiltration rate (m/s):	1.2E-3
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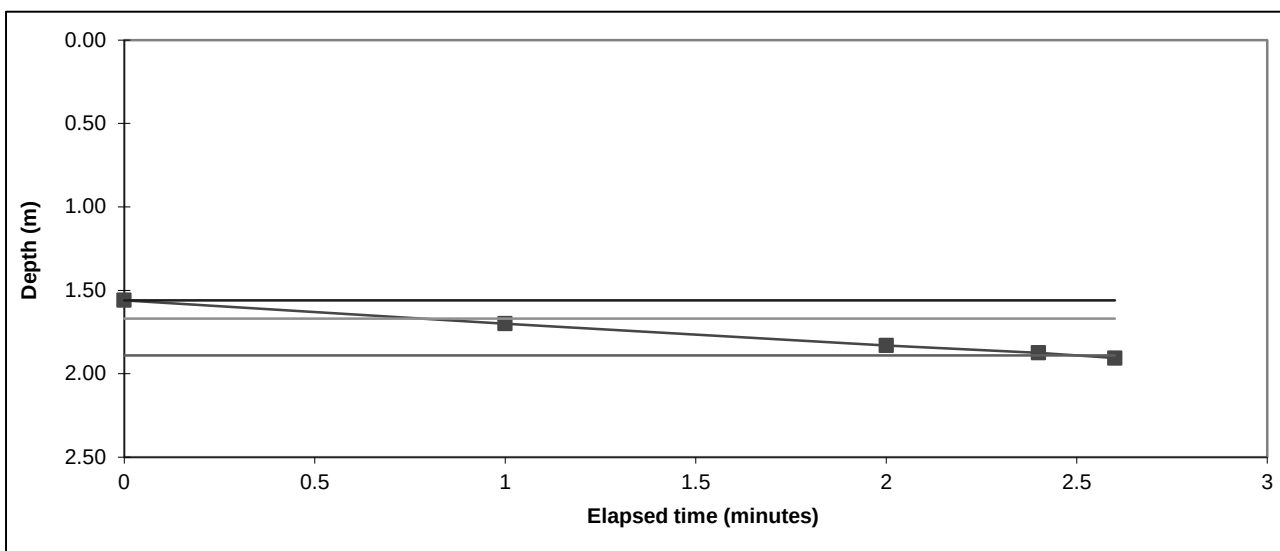
Remarks	Results processed following BRE 365 (2007).
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Client:	Mason Clarke Associates	Job No:
Site:	Land between 71 and 77 Park St, Wombwell	J4046/17/E

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Soakaway Test

Trial Pit No:	TP1	Test No:	2	26/09/2017
Length (m):	1.800	Datum Height:	0.00 m agl	
Width (m):	0.40	Granular infill:	None	
Depth (m):	2.00	Porosity of infill:	1	(assumed)
	Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
	0	1.560		
	1	1.700		
	2	1.830		
	2.4	1.875		
	2.6	1.906		



Start water depth for analysis (mbgl):	1.56		
75% effective depth (mbgl):	1.67	Elapsed time (mins):	0.8
50% effective depth (mbgl):	1.78		
25% effective depth (mbgl):	1.89	Elapsed time (mins):	2.5
Base of soakage zone (mbgl):	2.00		
Volume outflow between 75% and 25% effective depth (m³):			0.158
Mean surface area of outflow (m²):			1.69
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):			1.7

Soil infiltration rate (m/s):	9.2E-4
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Remarks	Results processed following BRE 365 (2007). Infiltration rate obtained via linear extrapolation of results from 2.4 minutes.
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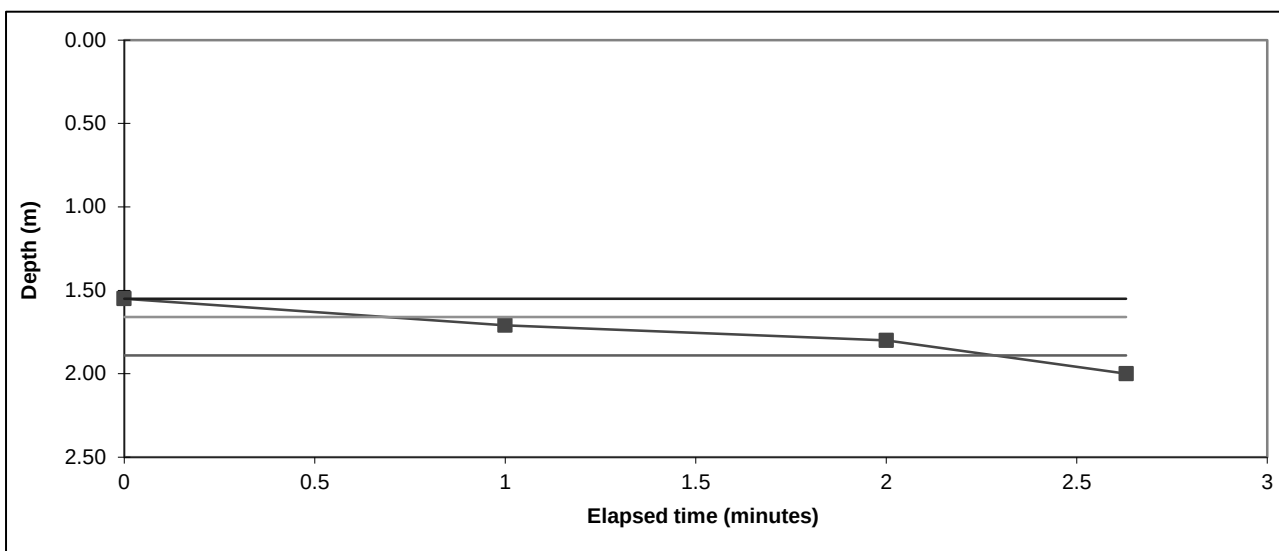
Client:	Mason Clarke Associates	Job No:
Site:	Land between 71 and 77 Park St, Wombwell	J4046/17/E

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Soakaway Test

Trial Pit No:	TP1	Test No:	3	26/09/2017
Length (m):	1.800	Datum Height:	0.00 m agl	
Width (m):	0.40	Granular infill:	None	
Depth (m):	2.00	Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.550		
1	1.710		
2	1.800		
2.63	2.000		



Start water depth for analysis (mbgl):	1.55		
75% effective depth (mbgl):	1.66	Elapsed time (mins):	0.7
50% effective depth (mbgl):	1.78		
25% effective depth (mbgl):	1.89	Elapsed time (mins):	2.3
Base of soakage zone (mbgl):	2.00		

Volume outflow between 75% and 25% effective depth (m³):	0.166
Mean surface area of outflow (m²):	1.69
(side area at 50% effective depth + base area)	
Time for outflow between 75% and 25% effective depth (mins):	1.6

Soil infiltration rate (m/s):	1.0E-3
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Remarks	Results processed following BRE 365 (2007).
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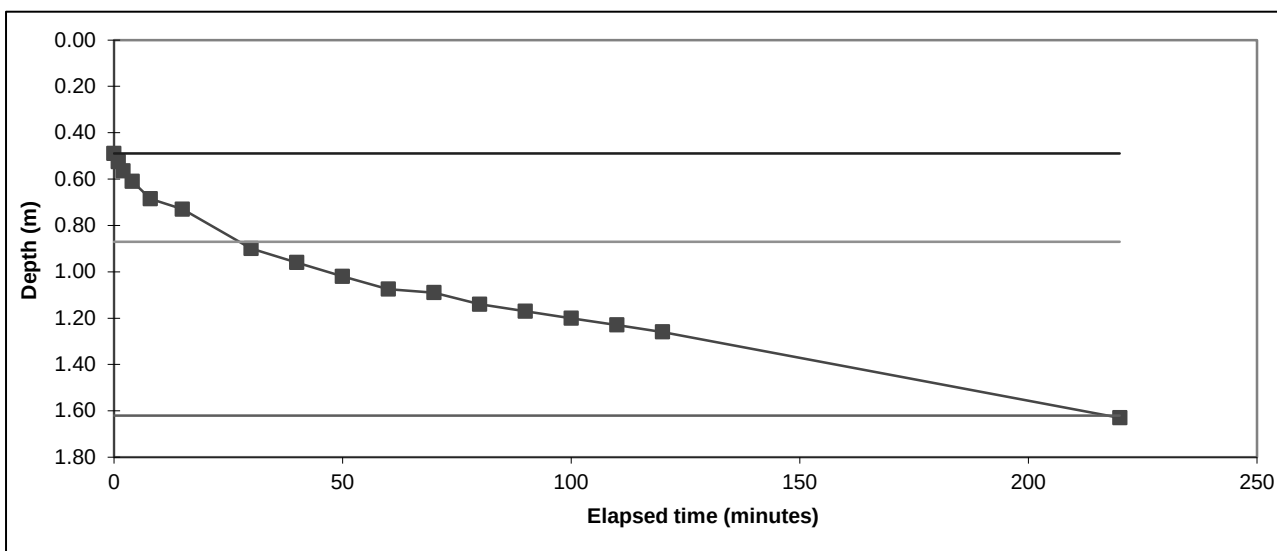
Client:	Mason Clarke Associates	Job No:
Site:	Land between 71 and 77 Park St, Wombwell	J4046/17/E

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Soakaway Test

Trial Pit No:	TP2	Test No:	1	26/09/2017
Length (m):	1.900	Datum Height:		0.00 m agl
Width (m):	0.40	Granular infill:	None	
Depth (m):	2.00	Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.490	90	1.170
1	0.525	100	1.200
2	0.565	110	1.230
4	0.610	120	1.260
8	0.685	220	1.630
15	0.730		
30	0.900		
40	0.960		
50	1.020		
60	1.075		
70	1.090		
80	1.140		



Start water depth for analysis (mbgl):	0.49		
75% effective depth (mbgl):	0.87	Elapsed time (mins):	27.4
50% effective depth (mbgl):	1.25		
25% effective depth (mbgl):	1.62	Elapsed time (mins):	217.3
Base of soakage zone (mbgl):	2.00		
Volume outflow between 75% and 25% effective depth (m³):			0.570
Mean surface area of outflow (m²):			4.21
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):			189.9

Soil infiltration rate (m/s):	1.2E-5
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Remarks	Results processed following BRE 365 (2007). Infiltration rate obtained via linear extrapolation from 120 minutes.
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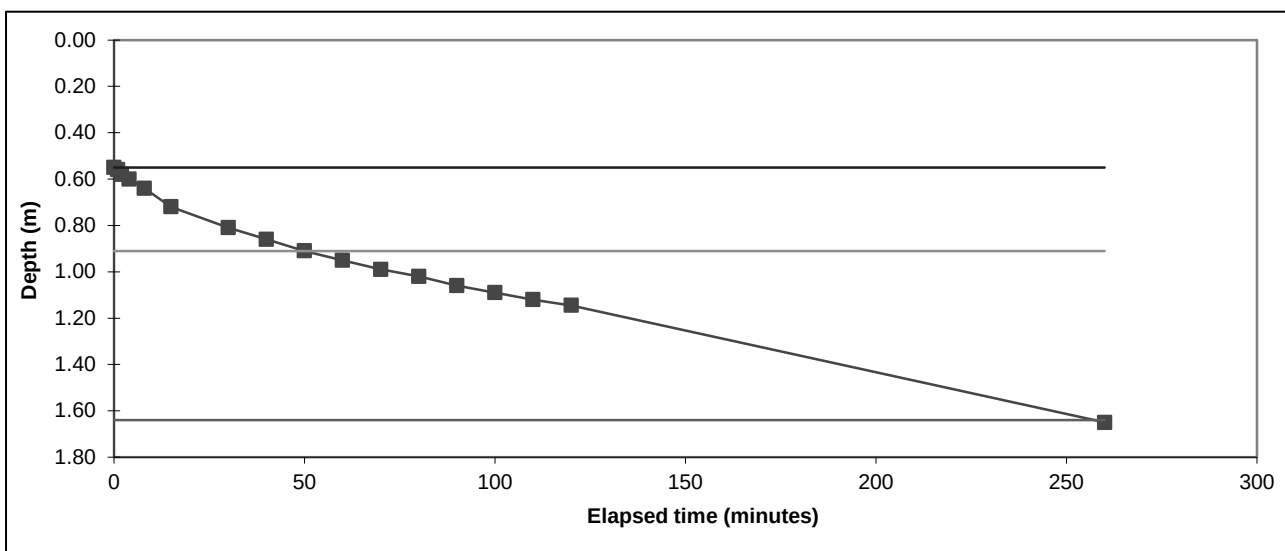
Client:	Mason Clarke Associates	Job No:
Site:	Land between 71 and 77 Park St, Wombwell	J4046/17/E

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Soakaway Test

Trial Pit No:	TP2	Test No:	2	26/09/2017
Length (m):	1.900	Datum Height:	0.00 m agl	
Width (m):	0.40	Granular infill:	None	
Depth (m):	2.00	Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.550	90	1.060
1	0.560	100	1.090
2	0.580	110	1.120
4	0.600	120	1.145
8	0.640	260	1.650
15	0.720		
30	0.810		
40	0.860		
50	0.910		
60	0.950		
70	0.990		
80	1.020		



Start water depth for analysis (mbgl):	0.55		
75% effective depth (mbgl):	0.91	Elapsed time (mins):	50.0
50% effective depth (mbgl):	1.28		
25% effective depth (mbgl):	1.64	Elapsed time (mins):	257.2
Base of soakage zone (mbgl):	2.00		
Volume outflow between 75% and 25% effective depth (m³):	0.555		
Mean surface area of outflow (m²):	4.07		
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):	207.2		

Soil infiltration rate (m/s):	1.1E-5
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Remarks	Results processed following BRE 365 (2007). Slight collapse of material from side wall prior to test resulting in reduced depth. Infiltration rate obtained via linear extrapolation from 260 minutes.
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Client:	Mason Clarke Associates	Job No:
Site:	Land between 71 and 77 Park St, Wombwell	J4046/17/E