

# Appendix C – GEG Infiltration Report

# **GEG | Geo Environmental Group** Geotechnical, Environmental & Ecological Consultants

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## INFILTRATION TESTING REPORT



LAND AT NORTH WEST BICESTER **BUCKNELL ROAD OXFORDSHIRE OX277HN** 

**APRIL 2021** 

Prepared for:





# REPORT TITLE: INFILTRATION TESTING REPORT

**Site Address:** Land at North West Bicester

Oxfordshire OX27 7HN

**Performed By:** 

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TA	BLE	OF CONTENTS PAGE
1.	INT	RODUCTION1
	1.1 1.2 1.3 1.4	General
2.	•	E SETTING1
	2.1 2.2	Site Location
3.	GEO	LOGY & HYDROGEOLOGY2
	3.1 3.2 3.3 3.4	Published Geology2Hydrogeology23.2.1 Groundwater Designation2Potential Water Infiltration Properties of the Strata.2Groundwater Source Protection Zone.2
4.	INT	RUSIVE INVESTIGATION 3
5. 6. 7.	REF	Scope of Works       3         4.1.1 Limitations of the Intrusive Investigation       3         Strata Encountered       3         4.2.1 Made Ground       3         4.2.2 Topsoil       3         4.2.3 Alluvium       3         4.2.4 Cornbrash Formation       3         4.2.5 Forest Marble Formation       4         4.2.6 Groundwater       4         4.2.7 Reinstatement       4         Infiltration Tests       4         Calculated Infiltration Rates       5         ICLUSIONS       6         EERENCES       6         ITATIONS       6
Tit		Appendix
$\mathbf{F}$	GUF	RES AND PLANSA
		cation PlanFigure 1 atory Hole Location PlanFigure 2
P	нот	OGRAPHIC RECORDB
E	XPLO	ORATORY HOLE LOGS C
I	<b>IFIL</b> '	TRATION TEST DATA



#### 1. INTRODUCTION

#### 1.1 General

Geo Environmental Group (GEG) were commissioned by Brookbanks, on behalf of their client, Hallam Land Management (HLM), to undertake infiltration testing at the site known as 'Land at North West Bicester,' for the purpose of determining infiltration rates of the strata and the suitability for soakaway drainage.

#### 1.2 Available Information

The following information was supplied by Brookbanks:

- 'Soakaway Test Locations,' Brookbanks, Drawing No. 10663-SK-01, dated 30<sup>th</sup> March 2021.
- Various utility company service drawings.

# 1.3 Proposed Site Development

The site is being considered for a residential development.

### 1.4 Scope

The works performed by GEG included:

- Trial pitting with infiltration testing in accordance with a specification supplied by Brookbanks.
- Calculation of infiltration rates, subject to ground conditions encountered.

Limitations to the scope of the report are outlined in Section 7.

#### 2. SITE SETTING

#### 2.1 Site Location

The site is located approximately 1.6 km to the north west of Bicester town centre, at the approximate National Grid Reference 457457E, 224174N. It lies on land to the east and west of Bucknell Road and to the north west of Lord's Lane and covers an area of approximately 185 hectares.

A section of the 1:25,000 Ordnance Survey (OS) map identifying the site location is shown in Figure 1 of Appendix A. The site layout plan is presented in Figure 2 (Appendix A) and a photographic record is provided in Appendix B.

# 2.2 Site Description

The site comprised 20 No. main agricultural fields divided by internal and external boundary hedgerows with occasional deciduous trees. Bucknell Road bisected the



south western section of the site and 3 No. small watercourses traversed the north eastern, eastern and southern sections of the site.

Site levels fell gently to the south east from an elevation of approximately 98m AOD in the north west to 80m AOD in the south east.

Hawkwell Farm lay adjacent to the south western boundary of the site, with Lord's Farm adjacent to the south with the suburbs of north west Bicester lying beyond.

## 3. GEOLOGY & HYDROGEOLOGY

### 3.1 Published Geology

Reference to the 1:50,000 scale British Geological Survey digital mapping of the area (solid and drift) indicates that the solid geology beneath the site comprises the Cornbrash Formation of the Jurassic period. The formation is described as bluish grey medium to fine grained limestone which weathers to an olive or yellowish brown. Thin argillaceous partings or interbeds of calcareous mudstone may also occur.

The Cornbrash Formation is underlain by the Forest Marble Formation (also of the Jurassic) which outcrops locally including in the vicinity of watercourses (due to the erosion of the Cornbrash Formation). The Forest Marble Formation is described as greenish grey, variably calcareous, silicate-mudstone.

Superficial deposits of Alluvium (clay, silt, sand and gravel) overlie the solid geology associated with the watercourses in the southern and eastern sections of the site.

No faults are conjectured to intersect the site at the surface.

# 3.2 Hydrogeology

#### 3.2.1 Groundwater Designation

Environment Agency data indicates that the solid geology and superficial deposits beneath the site are designated as Secondary A Aquifers.

Secondary A Aquifers are defined as permeable layers capable of supporting water supplies at a local rather than a strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

## 3.3 Potential Water Infiltration Properties of the Strata

In terms of water infiltration, the strata of the solid geology are considered likely to be sufficiently permeable for soakaway drainage.

#### 3.4 Groundwater Source Protection Zone

The site does not lie within a currently defined Groundwater Source Protection Zone (GWSPZ).



#### 4. INTRUSIVE INVESTIGATION

The following section outlines the scope of the intrusive investigation undertaken by GEG and details the ground conditions encountered and the infiltration testing undertaken.

## 4.1 Scope of Works

The intrusive investigation was undertaken from 6<sup>th</sup> to 9<sup>th</sup> April 2021 and comprised the excavation of 12 No. infiltration test trial pits (IT01-IT12) at the locations determined by Brookbanks (as shown on Figure 2).

The infiltration trial pit depths ranged from 0.75m to 2.15m bgl targeting the most permeable strata present in each case.

All works were carried out in accordance with current British Standard guidance (BS: 5930 and BS: 10175) and infiltration testing in general accordance with BRE Digest 365 (Soakaway Design).

The ground conditions were logged by an experienced geo-environmental engineer from GEG. The strata encountered, groundwater levels/seepages, stability of excavations and depths of sampling are recorded on the trial pit logs presented in Appendix C.

# 4.1.1 Limitations of the Intrusive Investigation

No significant limitations were encountered during the intrusive investigation.

#### 4.2 Strata Encountered

The ground conditions encountered are described below and broadly confirmed the published geology.

#### 4.2.1 Made Ground

No Made Ground was encountered in the exploratory holes.

#### 4.2.2 Topsoil

Typically soft CLAY topsoil was encountered across site to depths of 0.20m to 0.40m.

#### 4.2.3 Alluvium

Alluvium was encountered underlying the topsoil in 1 No. exploratory hole (ITo9) adjacent to a watercourse to a depth of 1.20m. It comprised medium dense silty gravelly (limestone and quartzite) SAND.

#### 4.2.4 Cornbrash Formation

Strata of the weathered Cornbrash Formation was encountered underlying the topsoil across the majority of the site from depths of 0.20m to 0.40m to the base of the exploratory holes. It typically comprised horizons of soft to firm variably gravelly (limestone) CLAY, medium dense to dense GRAVEL of limestone, and locally (IT11)



medium dense slightly gravelly SAND with a low cobble content. Very weak LIMESTONE was encountered in the majority of the pits from depths of 0.75m to 1.70m, and locally directly underlying the topsoil from a depth of 0.20m (IT06).

## 4.2.5 Forest Marble Formation

Naturally reworked Forest Marble Formation was encountered underlying the Alluvium from a depth of 1.20m to 2.00m in ITo9. It comprised stiff slightly gravelly (limestone and quartzite) CLAY, with a cobble-sized fragment of rotten wood with a dark organic staining at 1.00m.

Strata of the weathered Forest Marble Formation was encountered locally underlying the topsoil or naturally reworked Forest Marble Formation (ITO4, ITO5, ITO8 & IT12) in the vicinity of the watercourses from depths of 0.25m to 0.30m to the base of the exploratory holes. It typically comprised horizons of soft to firm slightly gravelly (limestone) CLAY and medium dense variably gravelly (limestone) SAND locally with a low cobble content. Extremely weak to weak LIMESTONE was encountered locally from a depths of 1.10m to 2.00m, and locally directly underlying the topsoil from a depth of 0.25m (ITO8).

However, it should be noted that as the Cornbrash and Forest Marble Formations are similar in composition and structure, differentiation between the strata are problematic.

# 4.2.6 Groundwater

Groundwater was not encountered in the majority of the exploratory holes during the intrusive investigation with the exception of a slow inflow at 0.70m in ITo3.

#### 4.2.7 Reinstatement

The trial pits were backfilled with arisings and left slightly mounded to allow for settlement.

## 4.3 Infiltration Tests

A total of 21 No. infiltration tests were undertaken in the 12 No. trial pits (IT01 to IT12) which were excavated to depths ranging from 0.75m to 2.15m bgl. The tests were undertaken in general accordance with BRE Digest 365.

Clean water was dispensed from a bowser at a rapid rate to fill each excavation as quickly as possible to the proposed depth of the invert levels and/or the most permeable strata. The excavations took less than 5 minutes to fill to their maximum capacity. Each test pit was filled to give a head of water of approximately 1.00m.

Measurements were then taken of the fall of water at suitable time increments to allow the infiltration rate to be calculated from the time taken for the water level to drop from 75% to 25% effective depth (where possible). If there was sufficient time, the tests were repeated a maximum of three times in accordance with BRE Digest 365.

On completion of the measurements, the infiltration pits were backfilled with arisings.



# 4.4 Calculated Infiltration Rates

The water level measurements from the infiltration tests are tabulated and graphically depicted on Figures D-1 to D-21 in Appendix D.

The effective depths reached during the tests and associated times are summarised in Table 1 below.

Table 1. Infiltration Test Results

Location	Test No.	Strata*	Effective Depth Reached	Time (mins)	Infiltration Rate (m/s)
IT01	1	CF	91%	264	N/A
	1			74	3.66 x 10 <sup>-5</sup>
IT02	2	CF	25%	73	3.64 x 10 <sup>-5</sup>
	3			82	3.13 x 10 <sup>-5</sup>
ITo3	1	CF	42%	383	N/A**
IT04	1	FMF	100%	333	N/A
ITo <sub>5</sub>	1	FMF	25%	402	7.20 x 10 <sup>-6</sup> [1]
ITo6	1	CF	25%	141	1.45 x 10 <sup>-5</sup>
1100	2	Cr	25/0	92	2.06 x 10 <sup>-5</sup>
ITo7	1	CF	25%	193	1.34 x 10 <sup>-5</sup>
110/	CF 2		25/0	227	1.08 x 10 <sup>-5[2]</sup>
ITo8	1	FMF	25%	343	8.87 x 10 <sup>-6</sup>
	1			20	1.45 X 10 <sup>-4</sup>
IT09	2	ALL/FMF	25%	18	1.81 x 10 <sup>-4</sup>
	3			19	2.03 X 10 <sup>-4</sup>
IT10	1	CF	25%	500	6.16 x 10 <sup>-6</sup> [1]
IT11	1	CF	25%	158	1.93 x 10 <sup>-5</sup>
1111	2	Cr	2070	142	2.21 X 10 <sup>-5</sup>
	1			27	1.09 x 10 <sup>-4</sup>
IT12	2	FMF	25%	27	1.08 x 10 <sup>-4</sup>
	3			29	1.06 x 10 <sup>-4</sup>

<sup>\*</sup> ALL = Alluvium; CF = Cornbrash Formation; FMF = Forest Marble Formation.

<sup>\*\*</sup> Not strictly in compliance with BRE365 due to the presence of groundwater.



- [1] Based on extrapolated data (due to relatively slow infiltration rate).
- [2] Based on extrapolated data (due to time constraints of running a second test).

# 5. CONCLUSIONS

Infiltration rates could not be calculated in 3 No. of the 12 No. infiltration test pit locations (ITo1, ITo3 & ITo4) indicating that the ground conditions are unsuitable for traditional soakaway drainage in these locations.

The infiltration tests of the remaining 9 No. trial pits yielded infiltration rates of 8.87  $\times$  10<sup>-6</sup> m/s to 1.06  $\times$  10<sup>-4</sup> m/s.

It should be noted that the results from ITo5, IT10 and the second test of ITo7 were based on extrapolated data.

#### 6. REFERENCES

- 1. British Standard Institute (1990) BS: 1377 Parts 1-9. Methods of Tests for Soils for Civil Engineering Purposes.
- 2. British Standard Institute (1999) BS: 5930 Code of Practice for Site Investigations. BSI, London.
- 3. BRE Digest 365 (September 1991) Soakaway Design.

## 7. LIMITATIONS

As with all intrusive site investigations, there is a possibility that there are local variations in ground conditions not identified by the current investigation.

The conclusions and recommendations stated herein are based on information available at the time of production. These may not necessarily apply if the site is to be utilised for a more or less sensitive purpose in the future, or if operational procedures or management alter over time.

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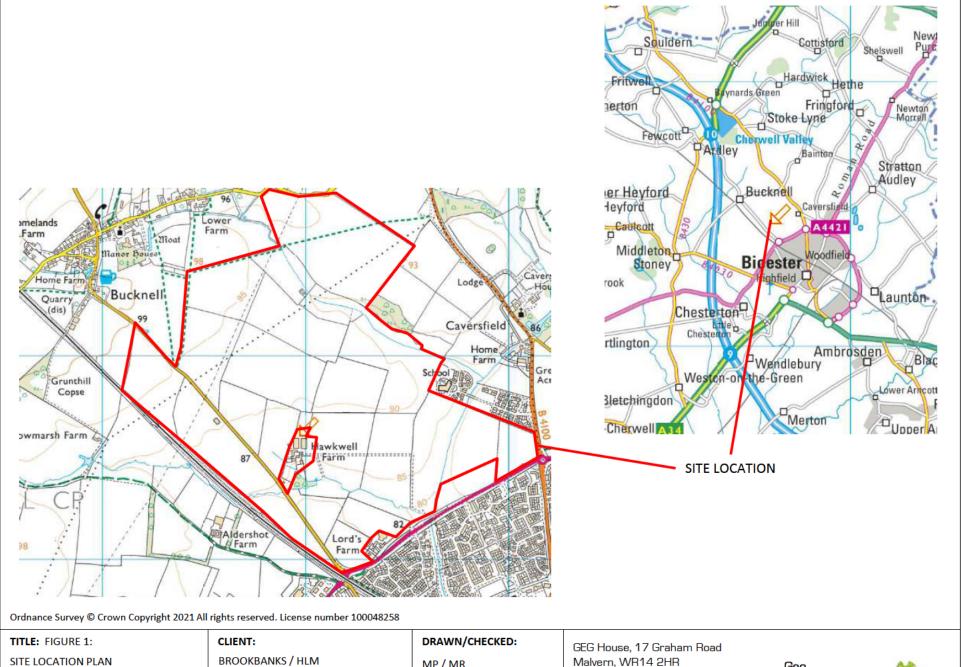
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# **APPENDIX A**

# **FIGURES AND PLANS**



TITLE: FIGURE 1: SITE LOCATION PLAN	BROOKBANKS / H	LM	MP / MR		
SITE:	PROJECT No.:	SCALE:	DATE: REVISION:		
LAND AT NORTH WEST BICESTER	GEG-21-678	NTS	13/04/21	Α	

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TITLE: FIGURE 2:	CLIENT:		DRAWN/CHECKED:		
EXPLORATORY HOLE LOCATION PLAN	BROOKBANKS / HI	LM	MP / MR		
SITE:	PROJECT No.:	SCALE:	DATE:	REVISION:	
LAND AT NORTH WEST BICESTER	GEG-21-678	AS SHOWN	13/04/21	Α	

GEG House, 17 Graham Road Malvern, WR14 2HR Tel. 01684 212526 Fax 01684 576917 admin@g-eg.co.uk, www g-eg.co.uk

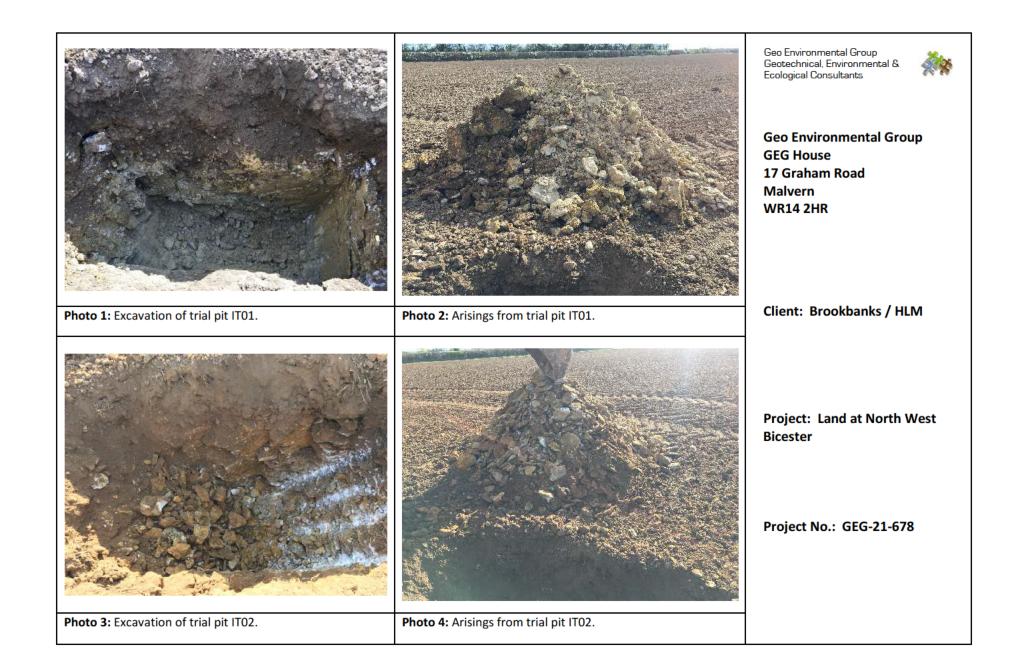
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# **APPENDIX B**

# **PHOTOGRAPHIC RECORD**







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Photo 5: Excavation of trial pit IT03.

Photo 6: Arisings from trial pit IT03.

Client: Brookbanks / HLM



Photo 7: Excavation of trial pit IT04.



Photo 8: Arisings from trial pit IT04.

Project: Land at North West Bicester





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Photo 9: Excavation of trial pit IT05.

Photo 10: Arisings from trial pit IT05.

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Photo 12: Arisings from trial pit IT06.

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Photo 13: Excavation of trial pit IT07.

Photo 14: Arisings from trial pit IT07.

Client: Brookbanks / HLM



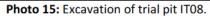




Photo 16: Arisings from trial pit IT08.

Project: Land at North West Bicester



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Photo 17: Excavation of trial pit IT09.

Photo 18: Arisings from trial pit IT09.

Client: Brookbanks / HLM



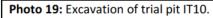




Photo 20: Arisings from trial pit IT10.

Project: Land at North West Bicester



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Photo 21: Excavation of trial pit IT11.

Photo 22: Arisings from trial pit IT11.

Client: Brookbanks / HLM



Photo 23: Excavation of trial pit IT12.



Photo 24: Arisings from trial pit IT12.

Project: Land at North West Bicester



# **APPENDIX C**

# **EXPLORATORY HOLE LOGS**

						Tr	rial Pit Log	TrialPit	1
Project Name	ct Land at No	orth West	t Bicester		ect No. -21-678		Co-ords: - Level:	Sheet 1 Date 06/04/2	;
Locati	on: North Wes	t Biceste	r, OX27 7HL				Dimensions 1.30 (m):	Scale 1:25	
Client	Brookbank	s / HLM					(m): 09	Logge	
Water Strike	Samp	les & In Sit	tu Testing	Depth	Level	Legend	Stratum Description	JIVI	
W. St	Depth	Туре	Results	(m) 0.00	(m)		Soft brown slightly gravelly CLAY. Gravel is fine coarse angular to sub-angular limestone.  (TOPSOIL)	to	-
				0.35			Medium dense yellowish grey fine to coarse sul GRAVEL of limestone. (WEATHERED CORNBRASH FORMATION) Firm grey and yellow slightly gravelly CLAY. Grafine to coarse sub-angular limestone. (WEATHERED CORNBRASH FORMATION)	,	0.5 —
				1.30 1.70 1.75			Dense light yellowish grey clayey GRAVEL with cobble content. Gravel and cobbles are coarse angular limestone. (WEATHERED CORNBRASH FORMATION)  Very weak light grey LIMESTONE. (CORNBRASH FORMATION)	low sub-	1.5 -
							End of Pit at 1.750m		2.0
									2.5 -
									3.0
									3.5 -
									4.0 —
									4.5 -

Stability: 0.00-0.50m unstable



Geo Enviro	onmental Group					Tr	ial Pit Log	TrialPit No  IT02 heet 1 of 1
Projec Name:	t Land at No	orth Wes	st Bicester	1 -	ect No. -21-678		Co-ords: - Level:	Date 06/04/2021
	on: North Wes	t Bicest	er, OX27 7HL	GEG	-21-070		Dimensions 1.20	Scale
Client:	Brookbank	s / HLM	1				(m): Depth 6 1.00	1:25 Logged JM
Water Strike	Samp	les & In S	Situ Testing	Depth	Level	Legend	Stratum Description	JIVI
Str	Depth	Туре	Results	(m) 0.00	(m)		Soft brown slightly gravelly CLAY. Gravel is fine to	
							coarse angular to sub-angular limestone. (TOPSOIL)	-
				0.40			Dense grey GRAVEL of coarse sub-angular limeston (WEATHERED CORNBRASH FORMATION)	0.5 —
				0.90 1.00			Weak grey LIMESTONE. (CORNBRASH FORMATION) End of Pit at 1.000m	1.0 —
								- - 1.5 -
								-
								2.0 —
								2.5 —
								- - -
								3.0 —
								3.5 —
								4.0 —
								4.5 —

Stability: 0.00-0.40m slight collapse



Geo Enviror	nmental Group					Tr	rial Pit Log	TrialPit I	,
Project Name:		rth Wes	st Bicester		ect No. -21-678		Co-ords: - Level:	Sheet 1 o Date 06/04/20	
_ocatio	n: North West	t Bicest	er, OX27 7HL				Dimensions 1.20 (m):	Scale 1:25	
Client:	Brookbank	s / HLM	I				(m): 9 O O O O O O O O O O O O O O O O O O	Logge	d
Water Strike	Samp	les & In S	Situ Testing	Depth	Level	Legend	Stratum Description	0.01	
S tr	Depth	Туре	Results	(m)	(m)	_ · · · ·			
				0.00 0.30 0.70 0.75			Soft brown slightly gravelly CLAY. Gravel is fine to coarse angular to sub-angular limestone. (TOPSOIL)  Soft yellowish brown slightly gravelly CLAY. Gravel fine to coarse sub-angular limestone. (WEATHERED CORNBRASH FORMATION)  Weak grey LIMESTONE. (CORNBRASH FORMATION)  End of Pit at 0.750m		1.0 —  1.5 —  2.0 —  3.5 —  4.0 —  4.0 —
									  4.5  

Stability: 0.00-0.60m slight collapse



						Tr	rial Pit Log	17	Pit No
Project Name	t Land at N	orth Wes	st Bicester		ect No. i-21-678		Co-ords: - Level:	С	et 1 of 1 Pate 4/2021
Locati	on: North We	st Bicest	er, OX27 7HL				Dimensions 1.30 (m):	<b>│</b>	cale :25
Client	Brookban	ks / HLIV	<u> </u>				(m): Depth 0: 2.15		gged JM
Water Strike	Sam Depth	ples & In S	Situ Testing Results	Depth (m)	Level (m)	Legend	Stratum Description		
	-			0.00		* * * * * * * * * * * * * * * * * * * *	Soft brown slightly gravelly CLAY. Gravel is coarse angular to sub-angular limestone. (TOPSOIL)	fine to	-
				0.30			Medium dense orange and grey gravelly S cobble content. Gravel and cobbles are fin angular to sub-angular limestone. (WEATHERED FOREST MARBLE FORM.	e to coarse	0.5 -
				1.00			Firm grey and yellowish brown slightly san gravelly CLAY. Gravel is fine to coarse sub limestone.  (WEATHERED FOREST MARBLE FORM.	-angular	1.0 — - - - - 1.5 —
				1.70			Firm grey and yellow very sandy slightly gi Gravel is fine to coarse sub-angular limest (WEATHERED FOREST MARBLE FORM.	one.	2.0 —
				2.15			End of Pit at 2.150m		2.5 -
									3.0
									3.5 -
									4.0 — - - -
									4.5 —

Remarks: 1. No groundwater encountered. 2. Infiltration test undertaken in trial pit. 3. Equipment used: JCB 3CX. 4. Upon completion trial pit backfilled with arisings.



Geo Enviro	onmental Group					Tr	rial Pit Log	TrialPit	5
Projec	t	orth Wes	st Bicester	-	ct No.		Co-ords: -	Sheet 1 Date	!
Name:				GEG	-21-678		Level: Dimensions 1.10	09/04/20 Scale	
			er, OX27 7HL				(m): 09 Depth 0	1:25 Logge	
Client:						1	1.50	JM	·u
Water Strike			itu Testing	Depth (m)	Level (m)	Legend	Stratum Description		
> 0	Depth	Туре	Results	0.00	()		Soft brown slightly gravelly CLAY. Gravel is fine	to	
							coarse angular to sub-angular limestone. (TOPSOIL)		-
				0.25		× × × × × × × × ×	Medium dense orangish brown silty gravelly SAI Gravel is fine to coarse sub-angular limestone. (WEATHERED FOREST MARBLE FORMATION		- -
				0.50			Medium dense light grey and yellowish grey clay slightly gravelly SAND. Gravel is fine to coarse sangular limestone.	/ev	0.5 — -
							(WEATHERED FOREST MARBLE FORMATION	۷)	-
									1.0 —
									-
				1.40 1.50			Weak grey and yellow LIMESTONE.  (WEATHERED FOREST MARBLE FORMATION End of Pit at 1.500m	N) /	1.5 –
							End of Field 1.500m		-
									2.0 —
									-
									-
									2.5 -
									-
									3.0 —
									-
									_
									3.5 —
									-
									_
									4.0 —
									-
									4.5 -
									-



Con Facility	onmental Group				Tr	rial Pit Log	TrialPit	6	
Project Name		orth Wes	st Bicester		ect No. -21-678		Co-ords: - Level:	Sheet 1  Date 09/04/20	
Locati	on: North We	st Bicest	er, OX27 7HL	•			Dimensions 1.10 (m):	Scale 1:25	
Client	Brookban	ks / HLM	1				(m): Depth 6 0.75	Logge	
Water Strike	Sam	ples & In S	Situ Testing	Depth	Level	Legend	Stratum Description		
Str	Depth	Туре	Results	(m) 0.00	(m)	Logona	Soft brown very gravelly CLAY. Gravel is fine		
				0.20			angular to sub-angular limestone. (TOPSOIL)  Very weak grey and yellow LIMESTONE. (CORNBRASH FORMATION)	io oddisc	-
				0.75					0.5 -
				0.73			End of Pit at 0.750m		1.0 —
									-
									1.5 -
									2.0 —
									- -
									2.5 —
									- - -
									3.0 —
									3.5 —
									- - 4.0
									-
									4.5 —



Goo Fourier	amental Group					Tr	ial Pit Log		TrialPit No			
				Proid	ect No.		Co-ords: -		Sheet 1 of 1  Date			
Project Name:	Land at N	lorth We	st Bicester		5-21-678		Level:		07/04/2021			
		st Bicest	er, OX27 7HL	020	21 010		Dimensions	1.20	Scale 1:25	_		
Client:	Brookban	ks / HLM	1				(m): 09 Depth 0: 1.10		Logged JM			
e e	Sam	ples & In S	Situ Testing	Depth	Level							
Water Strike	Depth	Туре	Results	(m)	(m)	Legend	Stratum D	escription				
				0.00			Soft brown slightly gravelly C coarse angular to sub-angula	CLAY. Gravel is fine	to	_		
				0.20			(TOPSOIL)  Dense grey and yellow sand		ocorco	-		
							sub-angular limestone. (WEATHERED CORNBRAS		Coarse	-		
							(WEATHERED CORNBRAS	n FORMATION)	0.5	- 5 -		
							;			-		
										-		
										_		
				1.00			Very weak grey slightly sand	y LIMESTONE.	1.0	) —		
				1.10			(WEATHERED CORNBRAS End of Pit	H FORMATION)		_		
										-		
										-		
									1.8	5 — -		
										-		
										-		
									2.0	) —		
										-		
										-		
									2.5	; – -		
										-		
										-		
									3.0	- (		
										-		
										-		
										_		
									3.5	5 –		
										-		
										-		
									4.0	- ) —		
									4.0	-		
										-		
										-		
									4.5	; -		
										-		
		1	1	1	I	1	1		ı			



Goo Fraig	onmental Group					Tr	ial Pit Log		TrialPit IT08	3
Projec Name:		orth Wes	t Bicester		ect No. -21-678		Co-ords: - Level:		Sheet 1 Date 07/04/20	!
	on: North Wes						Dimensions (m): 09 Depth 0	1.20	Scale 1:25 Logge	
Client:	Brookbank	s / HLM			ı		1.40		JM	· <b>u</b>
Water Strike	Samp	oles & In S	itu Testing	Depth	Level	Legend	Stratum	Description		
Str	Depth	Туре	Results		(m)	Logona				
Wa Stri	Depth	Type	Results	(m) 0.00 0.25	(m)	Legend	Soft brown slightly gravelly coarse angular to sub-angu (TOPSOIL)  Extremely weak brownish of sandy LIMESTONE.  (WEATHERED FOREST M)	CLAY. Gravel is fine ular limestone.  Gravel and yellow slight	tly silty	1.5 —  2.0 —  3.5 —  4.0 —  4.0 —
										4.5 -



						Tr	ial Pit Log		TrialPit IT09	)
Project Name	t Land at No	orth Wes	et Bicester		ct No. -21-678		Co-ords: - Level:	Sheet 1 Date 07/04/20		
	on: North Wes	t Biceste	er, OX27 7HL				Dimensions (m): 09 Depth 0	1.40	Scale 1:25	
Client:	Brookbank	s / HLM					Depth 3		Logge JM	u ——
Water Strike	Samp Depth	les & In S Type	itu Testing Results	Depth (m)	Level (m)	Legend	Stratum De	escription		
Wa Stri	Depth	Туре	Results	(m) 0.00 0.20  1.20  2.00 2.10	(m)	Legella	Soft brown slightly gravelly CL coarse angular to sub-angular (TOPSOIL)  Medium dense light grey silty fine to coarse sub-angular lim (POTENTIAL ALLUVIUM)  Stiff grey and yellowish brown Gravel is fine to coarse sub-al limestone and quartzite. (POTENTIALLY NATURALLY MARBLE FORMATION)  1.60m Cobble sized piece of rotten staining  Weak grey LIMESTONE. (FOREST MARBLE FORMAT End of Pit a	LAY. Gravel is fine or limestone.  gravelly SAND. Grestone and quartzing a slightly gravelly Congular to rounded REWORKED FOR wood with dark organic	avel is te.	1.5 —  2.0 —  2.5 —  3.5 —  3.5 —



	Geo Environmental Group					Trial Pit Log					
Project Name	t Land at Na	orth Wes	t Bicester		ect No. -21-678		Sheet 1   Co-ords: -   Date   Date	е			
Locati	on: North Wes	t Biceste	er, OX27 7HL	<b> </b>			Dimensions 1.20 Scal (m): 0 1.25				
Client	Brookbank	s / HLM					(m):	ed			
ter ke	Samples & In Situ Testing De				Level						
Water Strike	Depth	Туре	Results	(m)	(m)						
				0.00			Soft brown slightly gravelly CLAY. Gravel is fine to coarse angular to sub-angular limestone.  (TOPSOIL)  Dense light grey and yellow slightly sandy cobbles of	-			
				0.50		0 4 2 0 0 0 0 0 0 4 2 0 0 0 0 0 0 0 0 0	limestone, (WEATHERED CORNBRASH FORMATION)	- 0.5 -			
				0.50			Firm yellow and grey sandy gravelly CLAY. Gravel is fine to coarse sub-angular limestone., (WEATHERED CORNBRASH FORMATION)	- 0.5			
				1.00 1.10			Weak grey LIMESTONE. (CORNBRASH FORMATION) End of Pit at 1.100m	1.0 -			
								1.5 —			
								-			
								2.0 —			
								-			
								2.5 —			
								-			
								3.0 —			
								-			
								3.5 -			
								-			
								4.0 —			
								4.5 —			



						Tr	rial Pit Log	TrialPit	
Geo Envin	onmental Group							Sheet 1	of 1
Projec	t Land at No	orth Wes	t Bicester		ect No.		Co-ords: -	Date	
Name	:			GEG	-21-678		Level:	08/04/2	
Locati	on: North Wes	t Biceste	er, OX27 7HL				Dimensions 1.20 (m):	Scal 1:25	
Client:	Brookbank	s / HLM					Depth 0	Logg	
e e	Samp	oles & In S	itu Testing	Donth	Laval		1.50	JM	
Water Strike	Depth	Туре	Results	Depth (m)	Level (m)	Legend	Stratum Description		
				0.00			Soft brown slightly gravelly CLAY. Gravel is fit	e to	
				0.20			coarse angular to sub-angular limestone. (TOPSOIL)		] -
							Soft yellowish brown very sandy slightly grave Gravel is fine to medium sub-angular limestor		-
				0.40			(WEATHERED CORNBRASH FORMATION) Medium dense grey slightly gravelly SAND w	th low	0.5 -
							cobble content. Gravel and cobbles are fine to sub-angular limestone.	coarse	-
							(WEATHERED CORNBRASH FORMATION) 0.60-1.10m Becoming very gravelly		-
									_
							58 - 1		1.0 —
				1.10			Firm grey and yellowish grey slightly sandy sl gravelly CLAY. Gravel is fine to coarse sub-ar	ghtly	-
							limestone.	gulai	-
				1.40			(WEATHERED CORNBRASH FORMATION) Weak grey LIMESTONE.		-
				1.50			(CORNBRASH FORMATION) End of Pit at 1.500m		1.5 -
									-
									-
									2.0 —
									-
									-
									-
									2.5 -
									_
									-
									-
									3.0 —
									-
									-
									3.5 -
									-
									-
									-
									4.0 —
									-
									-
									4.5 -
	I	1 1			1	1			1 7.0

Stability: Slightly unstable 0.00-0.30m



Goo Fouin	onmental Group					Tr	rial Pit Log	TrialPit	2	
Projec Name	t Land at N	orth Wes	st Bicester		Project No. GEG-21-678		Co-ords: - Level:	Date	Sheet 1 of 1  Date  08/04/2021	
Locati	on: North We	st Bicest	er, OX27 7HL				Dimensions 1.30 (m):			
Client:	Brookban	ks / HLIV	1				Depth 0 1.20			
Water Strike	Sam	ples & In S	Situ Testing	Depth	Level	Legend	Stratum Description			
St	Depth	Туре	Results	(m) 0.00	(m)		·	Depth 1.20  Stratum Description  Off brown slightly gravelly CLAY. Gravel is fine to coarse angular to sub-angular limestone.  FOPSOIL)  Off brown sandy gravelly silty CLAY. Gravel is fine to coarse sub-angular limestone.  MEATHERED FOREST MARBLE FORMATION)  Iedium dense greyish brown and yellow very gravelly AND. Gravel is fine to coarse angular to sub-angular mestone.  MEATHERED FOREST MARBLE FORMATION)  Irim grey very gravelly CLAY. Gravel is fine to coarse ub-angular limestone.  MEATHERED FOREST MARBLE FORMATION)  In mestone.  WEATHERED FOREST MARBLE FORMATION)  In mestone.  WEATHERED FOREST MARBLE FORMATION)  In mestone.  WEATHERED FOREST MARBLE FORMATION)		
				0.25			coarse angular to sub-angular limestone. (TOPSOIL)  Soft brown sandy gravelly silty CLAY. Gravel i		- - -	
				0.40			(WEATHERED FOREST MARBLE FORMATI Medium dense greyish brown and yellow very SAND. Gravel is fine to coarse angular to sub limestone. (WEATHERED FOREST MARBLE FORMATI Firm grey very gravelly CLAY. Gravel is fine to sub-angular limestone.	gravelly -angular ON) coarse	0.5 -	
							(WEATHERED FOREST MARBLE FORMATI	ON)	1.0 —	
				1.10 1.20			Weak light grey and yellow LIMESTONE.  (FOREST MARBLE FORMATION)  End of Pit at 1.200m		-	
									-	
									1.5 -	
									2.0 —	
									-	
									-	
									2.5 -	
									-	
									3.0 —	
									_	
									-	
									3.5 -	
									-	
									-	
									4.0 —	
									-	
									_	
									4.5 -	





# **APPENDIX D**

# **INFILTRATION TEST DATA**

### Appendix D Infiltration Tests

**Project Name: Land at North West Bicester** Depth of Pit (cm): 175.00 Project Ref.: Trial Pit: Depth of Water at Start of Depth (cm): 60.00 GEG-21-678 6th April 2021

IT01 Date of Test: Test 1 of 1 Test No.:

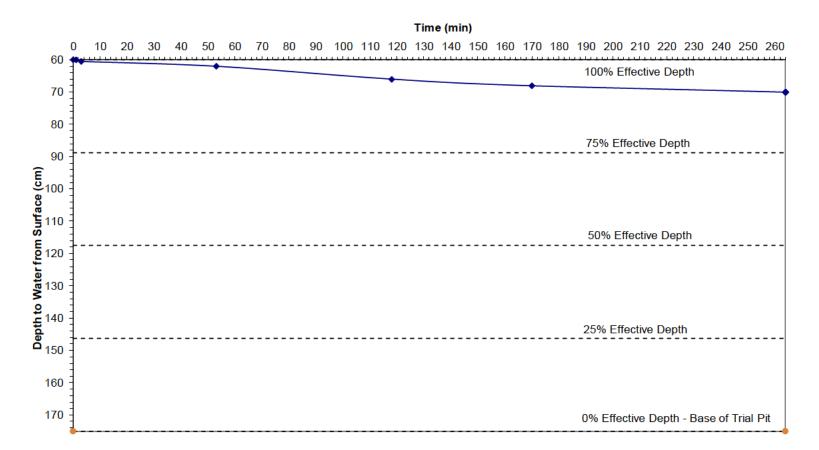
Time (min)	Depth from Surface (cm)	% Effective Depth
0	60	100.0%
1	60	100.0%
3	60.5	99.6%
53	62	98.3%
118	66	94.8%
170	68	93.0%
264	70	91.3%
	End of Test	•

Parameter	Symbol	Calculation	Units	IT01
Effective Depth of Trial Pit	d <sub>p</sub>		m	1.15
Width of Trial Pit	w		m	0.60
Length of Trial Pit	I		m	1.30
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.90
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.4485
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	2.97
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	N/A
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	N/A
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} x (T_{p75\%-25\%})$	m/s	N/A

<sup>\*</sup>To 50% Effective Depth (including base)

With Reference to: Figure D-1

Engineer: JM Checked by: MP



Project Name:Land at North West BicesterDepth of Pit (cm):100.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):28.00Trial Pit:IT02Date of Test:6th April 2021

Test No.: Test 1 of 3

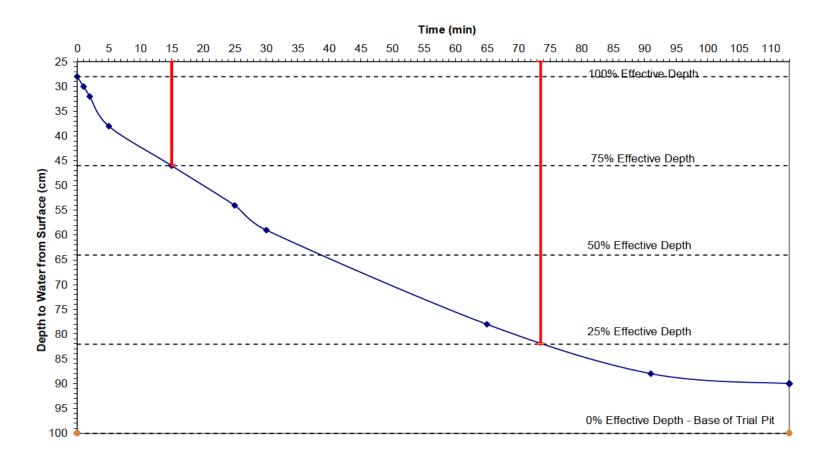
Time (min)	Depth from Surface (cm)	% Effective Depth			
0	28	100.0%			
1	30	97.2%			
2	32	94.4%			
5	38	86.1%			
15	46	75.0%			
25	54	63.9%			
30	59	56.9%			
65	78	30.6%			
91	88	16.7%			
113	90	13.9%			
End of Test					

Parameter	Symbol	Calculation	Units	IT02
Effective Depth of Trial Pit	$d_p$		m	0.72
Width of Trial Pit	w		m	0.60
Length of Trial Pit	1		m	1.20
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.52
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.2592
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	2.02
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	15.00
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	73.50
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	58.5
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	3.66E-05

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Infiltra ion test pit refused at 1.00m on weak grey LIMESTONE.

With Reference to: Figure D-2



Project Name:Land at North West BicesterDepth of Pit (cm):90.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):29.00Trial Pit:IT02Date of Test:6th April 2021

Test No.: Test 2 of 3

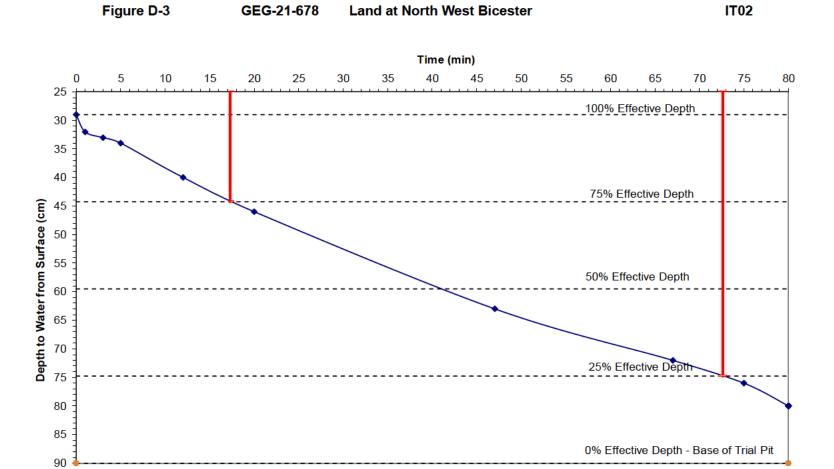
Time (min)	Depth from Surface (cm)	% Effective Depth				
0	29	100.0%				
1	32	95.1%				
3	33	93.4%				
5	34	91.8%				
12	40	82.0%				
20	46	72.1%				
47	63	44.3%				
67	72	29.5%				
75	76	23.0%				
80	80	16.4%				
	End of Test					

Parameter	Symbol	Calculation	Units	IT02
Effective Depth of Trial Pit	d <sub>p</sub>		m	0.61
Width of Trial Pit	w		m	0.60
Length of Trial Pit	1		m	1.20
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.44
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.2196
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	1.82
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	17.30
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	72.60
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	55.3
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	3.64E-05

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Base of pit at 0.90m following slight collapse during Test 1.

With Reference to: Figure D-3



Project Name:Land at North West BicesterDepth of Pit (cm):90.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):31.00Trial Pit:IT02Date of Test:6th April 2021

Test No.: Test 3 of 3

Time (min)	Depth from Surface (cm)	% Effective Depth
0	31	100.0%
2	33	96.6%
11	41	83.1%
50	63	45.8%
105	83	11.9%
122	87	5.1%
	End of Test	

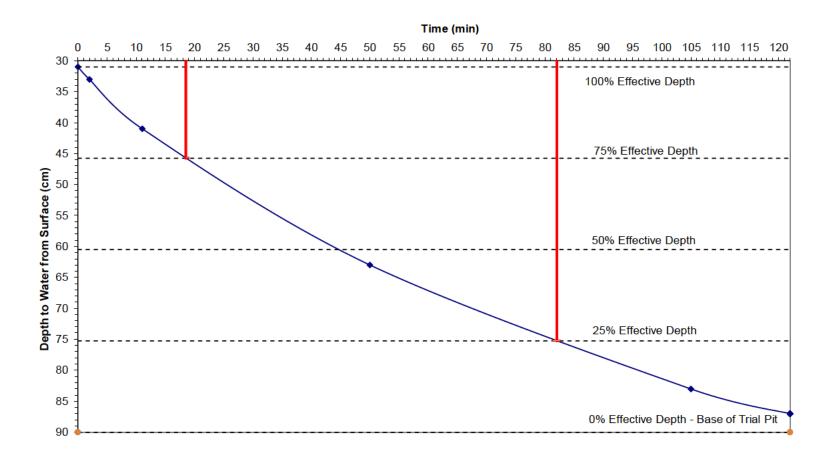
Parameter	Symbol	Calculation	Units	IT02
Effective Depth of Trial Pit	d <sub>p</sub>		m	0.59
Width of Trial Pit	w		m	0.60
Length of Trial Pit	1		m	1.20
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.42
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.2124
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	1.78
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	18.50
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	82.00
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	63.5
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	3.13E-05

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Base of pit at 0.90m following slight collapse during Test 1.

With Reference to: Figure D-4





Project Name:Land at North West BicesterDepth of Pit (cm):75.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):30.00Trial Pit:IT03Date of Test:6th April 2021

Test No.: Test 1 of 1

Time (min)	Depth from Surface (cm)	% Effective Depth		
0	30	100.0%		
2	31	97.8%		
5	33	93.3%		
10	33.5	92.2%		
65	46	64.4%		
119	52	51.1%		
185	54	46.7%		
255	56	42.2%		
383	56	42.2%		
	End of Test			

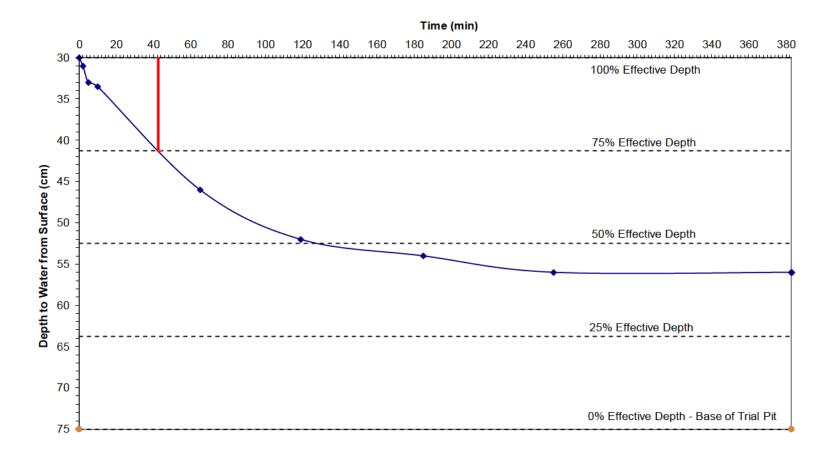
Parameter	Symbol	Calculation	Units	IT03
Effective Depth of Trial Pit	d <sub>p</sub>		m	0.45
Width of Trial Pit	w		m	0.60
Length of Trial Pit	I		m	1.20
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.32
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.162
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	1.53
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	42.50
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	N/A
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Infiltra ion test pit refused at 0.75m on weak grey LIMESTONE.

Slow ingress of perched groundwater encountered at 0.70m prior to commencement of the test.

With Reference to: Figure D-5



**Project Name: Land at North West Bicester** Depth of Pit (cm): 215.00 Project Ref.: Trial Pit: Depth of Water at Start of Depth (cm): 110.00 GEG-21-678 Date of Test: 09 April 2021

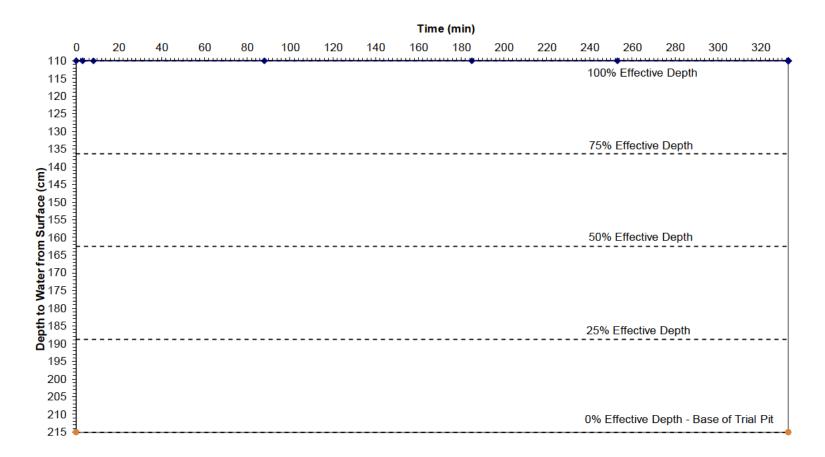
IT04 Test 1 of 1 Test No.:

Time (min)	Depth from Surface (cm)	% Effective Depth	
0	110	100.0%	
3	110	100.0%	
8	110	100.0%	
88	110	100.0%	
185	110	100.0%	
253	110	100.0%	
333	110	100.0%	
End of Test			

Parameter	Symbol	Calculation	Units	IT04
Effective Depth of Trial Pit	d <sub>p</sub>		m	1.05
Width of Trial Pit	w		m	0.60
Length of Trial Pit	I		m	1.30
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.82
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	$= V \times 0.5$	m <sup>3</sup>	0.4095
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	2.78
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	42.50
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	N/A
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

<sup>\*</sup>To 50% Effective Depth (including base)

With Reference to: Figure D-6



**Project Name: Land at North West Bicester** Depth of Pit (cm): 150.00 46.00 Project Ref.: GEG-21-678 Depth of Water at Start of Depth (cm): Trial Pit: IT05 Date of Test: 09 April 2021

Test No.: Test 1 of 1

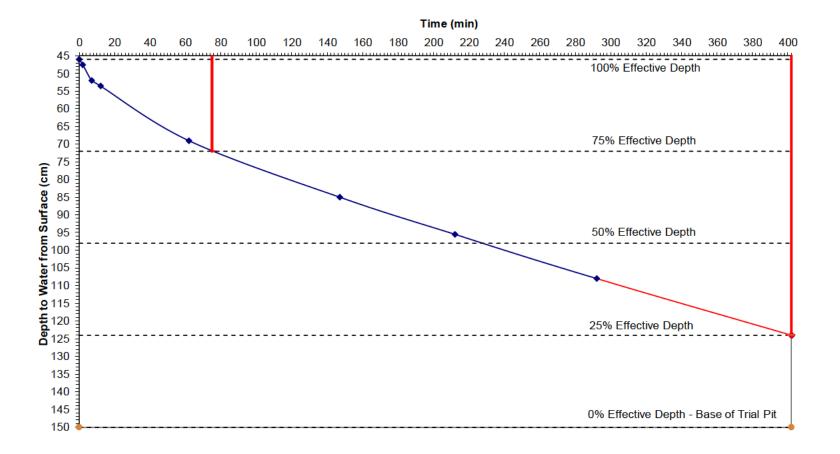
Time (min)	Depth from Surface (cm)	% Effective Depth
0	46	100.0%
2	47.5	98.6%
7	52	94.2%
12	53.5	92.8%
62	69	77.9%
147	85	62.5%
212	95.5	52.4%
292	108	40.4%
402	124	25.0%
_	End of Test	

Parameter	Symbol	Calculation	Units	IT05
Effective Depth of Trial Pit	d <sub>p</sub>		m	1.04
Width of Trial Pit	w		m	0.60
Length of Trial Pit	I		m	1.10
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.69
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.3432
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	2.43
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	75.00
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	402.00
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	327
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} x (T_{p75\%-25\%})$	m/s	7.20E-06
*To 50% Effective Depth (including base)				

Note: Infiltra ion test pit refused at 1.50m on weak grey LIMESTONE.

Last data point is based on extrapolated data.

With Reference to: Figure D-7



Project Name:Land at North West BicesterDepth of Pit (cm):75.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):19.00Trial Pit:IT06Date of Test:09 April 2021

Test No.: Test 1 of 2

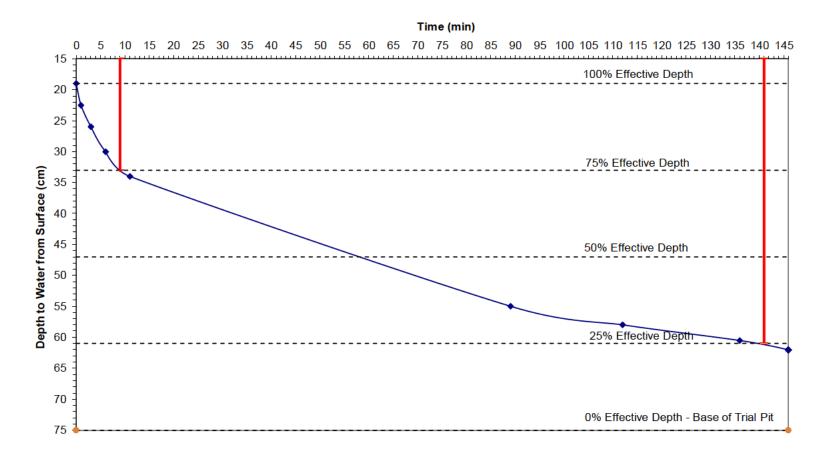
Time (min)	Depth from Surface (cm)	% Effective Depth
0	19	100.0%
1	22.5	93.8%
3	26	87.5%
6	30	80.4%
11	34	73.2%
89	55	35.7%
112	58	30.4%
136	60.5	25.9%
146	62	23.2%
	End of Test	1

Parameter	Symbol	Calculation	Units	IT06
Effective Depth of Trial Pit	d <sub>p</sub>		m	0.56
Width of Trial Pit	w		m	0.60
Length of Trial Pit	- 1		m	1.10
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.37
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.1848
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	1.61
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	9.00
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	141.00
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	132
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} x (T_{p75\%-25\%})$	m/s	1.45E-05

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Infiltra ion test pit refused at 0.75m on weak grey LIMESTONE.

With Reference to: Figure D-8



Project Name:Land at North West BicesterDepth of Pit (cm):62.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):20.00Trial Pit:Date of Test:09 April 2021

Test No.: Test 2 of 2

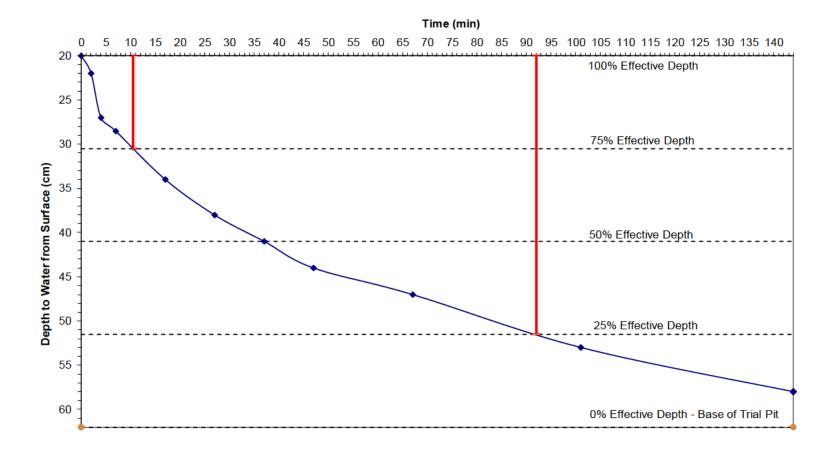
rest No rest 2 of 2			
Time (min)	Depth from Surface (cm)	% Effective Depth	
0	20	100.0%	
2	22	95.2%	
4	27	83.3%	
7	28.5	79.8%	
17	34	66.7%	
27	38	57.1%	
37	41	50.0%	
47	44	42.9%	
67	47	35.7%	
101	53	21.4%	
144	58	9.5%	
	End of Test		

Parameter	Symbol	Calculation	Units	IT06
Effective Depth of Trial Pit	d <sub>p</sub>		m	0.42
Width of Trial Pit	w		m	0.60
Length of Trial Pit	1		m	1.10
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.28
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.1386
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	1.37
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	10.50
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	92.00
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	81.5
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} x (T_{p75\%-25\%})$	m/s	2.06E-05

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Base of pit at 0.62m following slight collapse during Test 1.

With Reference to: Figure D-9



**Project Name: Land at North West Bicester** Depth of Pit (cm): 110.00 Project Ref.: Trial Pit: 34.00 GEG-21-678 Depth of Water at Start of Depth (cm): Date of Test: 07 April 2021

IT07 Test No.: Test 1 of 2

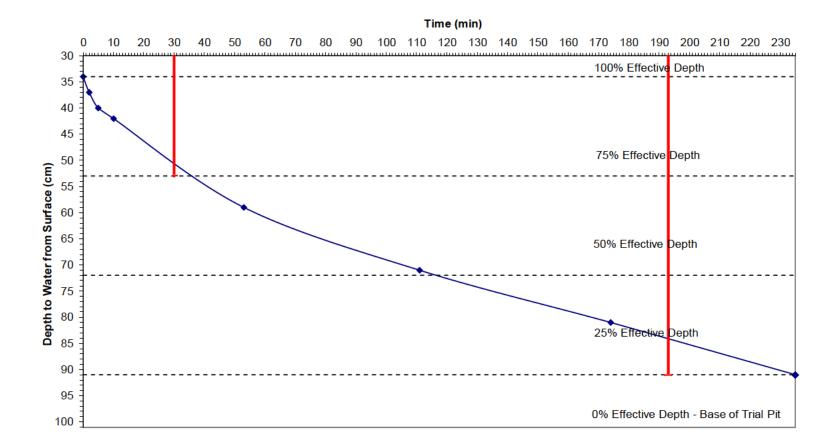
Time (min)	Depth from Surface (cm)	% Effective Depth
0	34	100.0%
2	37	96.1%
5	40	92.1%
10	42	89.5%
53	59	67.1%
111	71	51.3%
174	81	38.2%
235	91	25.0%
	End of Test	

Parameter	Symbol	Calculation	Units	IT07
Effective Depth of Trial Pit	d <sub>p</sub>		m	0.76
Width of Trial Pit	w		m	0.60
Length of Trial Pit	I		m	1.20
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.55
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.2736
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	2.09
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	30.00
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	193.00
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	163
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} x (T_{p75\%-25\%})$	m/s	1.34E-05

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Infiltra ion test pit refused at 1.10m on weak grey LIMESTONE.

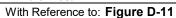
With Reference to: Figure D-10

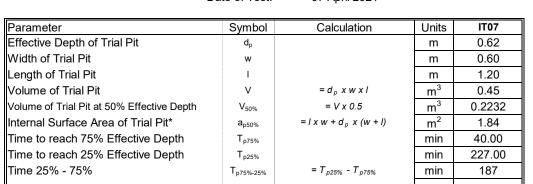


Project Name:Land at North West BicesterDepth of Pit (cm):92.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):30.00Trial Pit:IT07Date of Test:07 April 2021

Test No.: Test 2 of 2

Time (min)	Depth from Surface (cm)	% Effective Depth
0	30	100.0%
2	32	96.8%
7	34	93.5%
12	37	88.7%
62	51	66.1%
127	60	51.6%
157	68	38.7%
227	76.5	25.0%
	End of Test	





 $= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$ 

Infiltration Rate

Notes: Base of pit at 0 92m following slight collapse during Test 1.

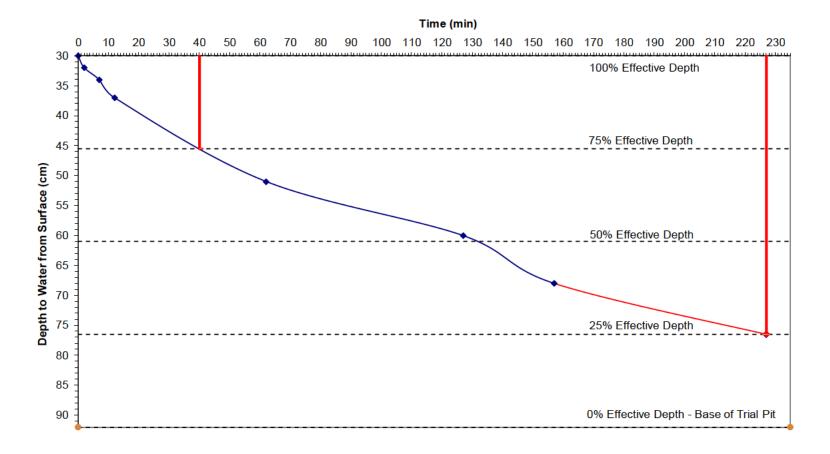
Last data point is based on extrapolated data.

Engineer: JM Checked by: MP

1.08E-05

m/s

<sup>\*</sup>To 50% Effective Depth (including base)



Project Name:Land at North West BicesterDepth of Pit (cm):140.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):40.00Trial Pit:IT08Date of Test:07 April 2021

Test No.: Test 1 of 1

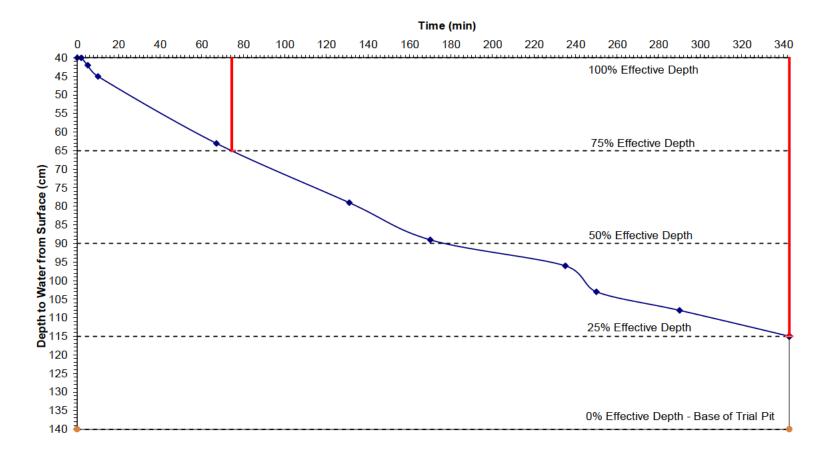
Time (min)	Depth from Surface (cm)	% Effective Depth
0	40	100.0%
2	40	100.0%
5	42	98.0%
10	45	95.0%
67	63	77.0%
131	79	61.0%
170	89	51.0%
235	96	44.0%
250	103	37.0%
290	108	32.0%
343	115	25.0%
	End of Test	_

Parameter	Symbol	Calculation	Units	IT08
Effective Depth of Trial Pit	d <sub>p</sub>		m	1.00
Width of Trial Pit	w		m	0.60
Length of Trial Pit	I		m	1.20
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.72
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.36
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	2.52
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	74.50
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	343.00
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	268.5
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} x (T_{p75\%-25\%})$	m/s	8.87E-06

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Infiltra ion test pit refused at 1.40m on weak grey LIMESTONE.

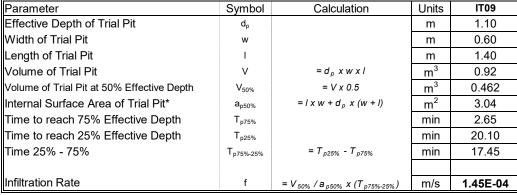
With Reference to: Figure D-12



Project Name:Land at North West BicesterDepth of Pit (cm):210.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):100.00Trial Pit:IT09Date of Test:07 April 2021

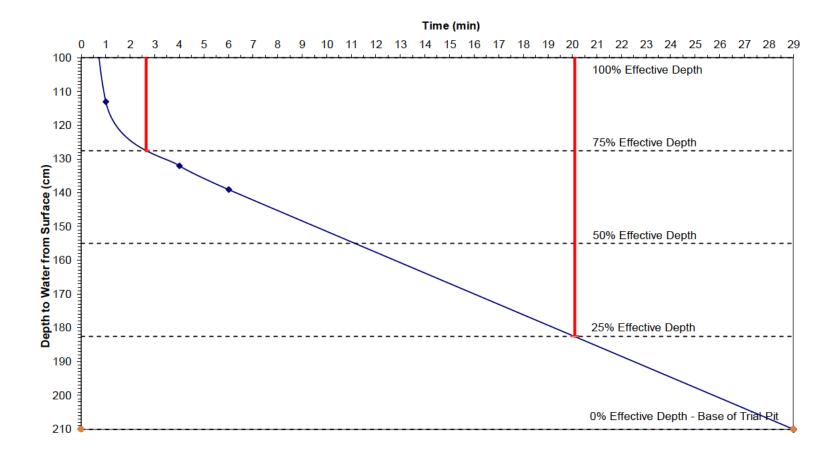
Trial Pit: IT09
Test No.: Test 1 of 3

Time (min)	Depth from Surface (cm)	% Effective Depth
0	1	190.0%
1	113	88.2%
4	132	70.9%
6	139	64.5%
29	210	0.0%
	End of Test	



<sup>\*</sup>To 50% Effective Depth (including base)

With Reference to: Figure D-13



Project Name:Land at North West BicesterDepth of Pit (cm):210.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):104.00Trial Pit:IT09Date of Test:07 April 2021

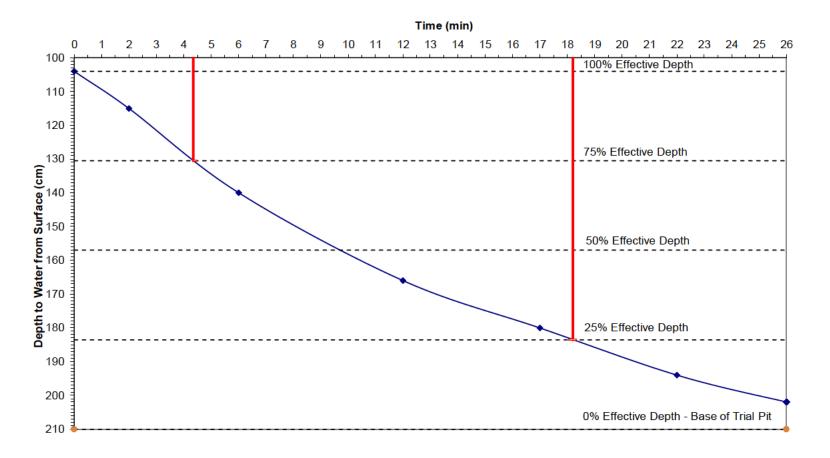
Test No.: Test 2 of 3

Time (min)	Depth from Surface (cm)	% Effective Depth	
0	104	100.0%	
2	115	89.6%	
6	140	66.0%	
12	166	41.5%	
17	180	28.3%	
22	194	15.1%	
26	202	7.5%	
End of Test			

Parameter	Symbol	Calculation	Units	IT09
Effective Depth of Trial Pit	d <sub>p</sub>		m	1.06
Width of Trial Pit	w		m	0.60
Length of Trial Pit	I		m	1.40
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.89
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	$= V \times 0.5$	m <sup>3</sup>	0.4452
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	2.96
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	4.35
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	18.20
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	13.85
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	1.81E-04
*T 50% F% (* D # /* L # L * )	'	- v 50% / a p50% X (1 p75%-25%)	111/5	1.01E-04

<sup>\*</sup>To 50% Effective Depth (including base)

With Reference to: Figure D-14



Project Name:Land at North West BicesterDepth of Pit (cm):210.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):90.00Trial Pit:Date of Test:07 April 2021

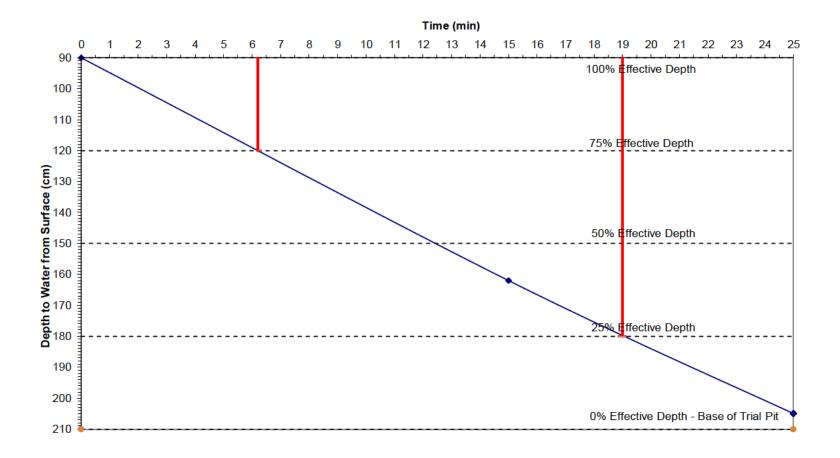
Trial Pit: IT09 Date of Test No.: Test 3 of 3

Time (min)	Depth from Surface (cm)	% Effective Depth			
0	90	100.0%			
15	162	40.0%			
25	205	4.2%			
	Find of Toct				
	End of Test				

Parameter	Symbol	Calculation	Units	IT09
Effective Depth of Trial Pit	d <sub>p</sub>		m	1.20
Width of Trial Pit	w		m	0.60
Length of Trial Pit	1		m	1.40
Volume of Trial Pit	V	$= d_p \times w \times I$	$m^3$	1.01
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	$m^3$	0.504
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	3.24
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	6.20
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	19.00
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	12.8
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	2.03E-04

<sup>\*</sup>To 50% Effective Depth (including base)

With Reference to: Figure D-15

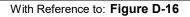


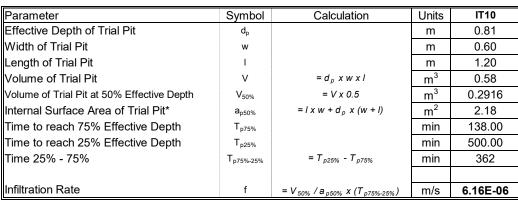
**Project Name:** Depth of Pit (cm): 110.00 Land at North West Bicester Project Ref.: Depth of Water at Start of Depth (cm): 29.00 GEG-21-678 08 April 2021 Date of Test:

	i riai Pit:		1110
	Test No.:		Test 1 of 1
I	Time (min)	Depth from Surface (cm)	% Effective Depth
I	0	29	100.0%
I	2	30	98.8%
ı			

- ' '	, ,	
0	29	100.0%
2	30	98.8%
7	31	97.5%
59	40	86.4%
120	47	77.8%
154	51	72.8%
208	56.5	66.0%
241	61	60.5%
302	68	51.9%
353	74	44.4%
387	79	38.3%
500	89.5	25.3%

End of Test

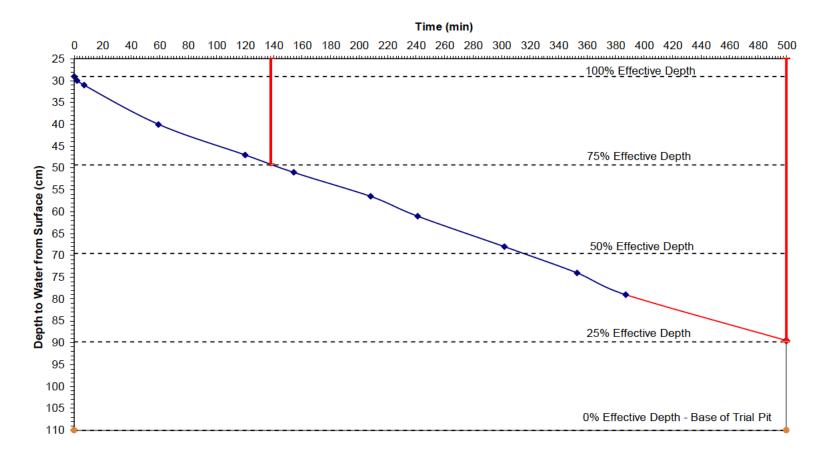




<sup>\*</sup>To 50% Effective Depth (including base)

Note: Infiltra ion test pit refused at 1.10m on weak grey LIMESTONE.

Last data point is based on extrapolated data.



Project Name:Land at North West BicesterDepth of Pit (cm):150.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):59.00Trial Pit:IT11Date of Test:08 April 2021

Test No.: Test 1 of 2

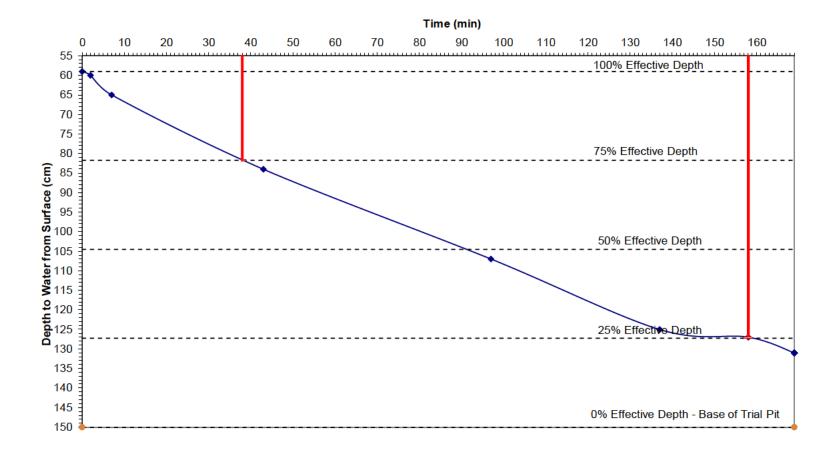
Time (min)	Depth from Surface (cm)	% Effective Depth	
0	59	100.0%	
2	60	98.9%	
7	65	93.4%	
43	84	72.5%	
97	107	47.3%	
137	125	27.5%	
158	127	25.3%	
169	131	20.9%	
End of Test			

Parameter	Symbol	Calculation	Units	IT11
Effective Depth of Trial Pit	d <sub>p</sub>		m	0.91
Width of Trial Pit	w		m	0.60
Length of Trial Pit	I		m	1.20
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.66
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.3276
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	2.36
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	38.00
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	158.00
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	120
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	1.93E-05

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Infiltra ion test pit refused at 1.50m on weak grey LIMESTONE.

With Reference to: Figure D-17



**Project Name: Land at North West Bicester** Depth of Pit (cm): 132.00 Project Ref.: Trial Pit: 35.00 GEG-21-678 Depth of Water at Start of Depth (cm): Date of Test: 08 April 2021

IT11 Test No.: Test 2 of 2

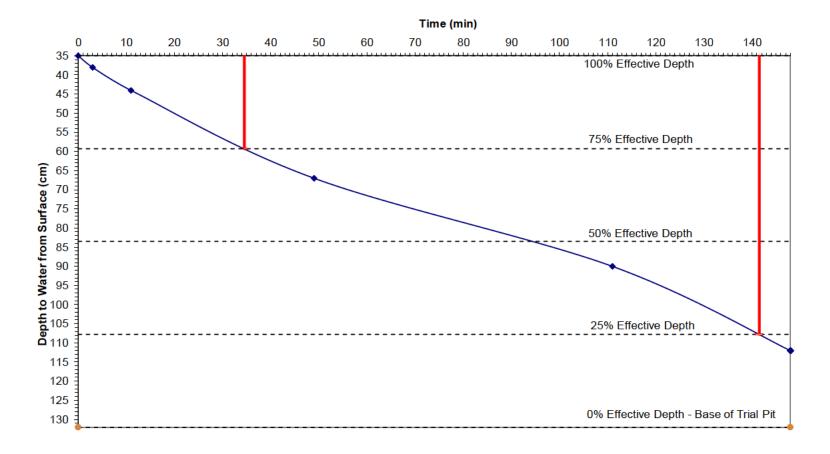
Time (min)	Depth from Surface (cm)	% Effective Depth		
0	35	100.0%		
3	38	96.9%		
11	44	90.7%		
49	67	67.0%		
111	90	43.3%		
148	112	20.6%		
End of Test				

Parameter	Symbol	Calculation	Units	IT11
Effective Depth of Trial Pit	d <sub>p</sub>		m	0.97
Width of Trial Pit	w		m	0.60
Length of Trial Pit	1		m	1.20
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.70
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.3492
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	2.47
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	34.50
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	141.50
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	107
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} x (T_{p75\%-25\%})$	m/s	2.21E-05

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Base of pit at 1.32m following slight collapse during Test 1.

With Reference to: Figure D-18



Project Name:Land at North West BicesterDepth of Pit (cm):120.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):31.00Trial Pit:IT12Date of Test:08 April 2021

Test No.: Test 1 of 3

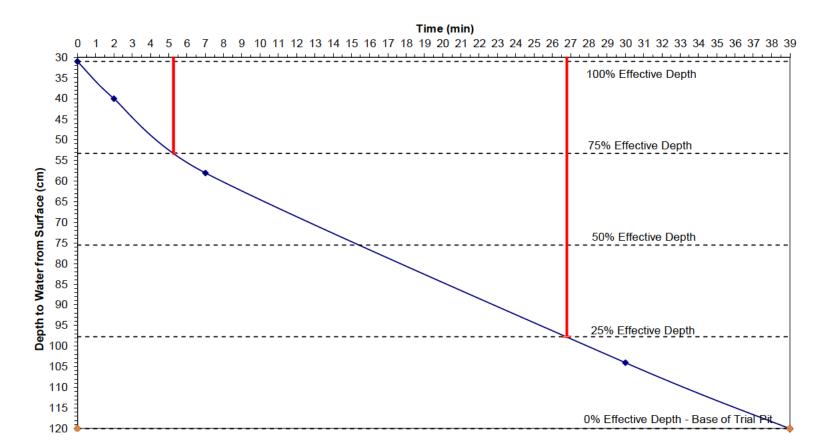
Time (min)	Depth from Surface (cm)	% Effective Depth		
0	31	100.0%		
2	40	89.9%		
7	58	69.7%		
30	104	18.0%		
39	120	0.0%		
	End of Test			

Parameter	Symbol	Calculation	Units	IT12
Effective Depth of Trial Pit	d <sub>p</sub>		m	0.89
Width of Trial Pit	w		m	0.60
Length of Trial Pit	1		m	1.30
Volume of Trial Pit	V	$= d_p \times w \times I$	m <sup>3</sup>	0.69
Volume of Trial Pit at 50% Effective Depth	V <sub>50%</sub>	= V x 0.5	m <sup>3</sup>	0.3471
Internal Surface Area of Trial Pit*	a <sub>p50%</sub>	$= I \times w + d_p \times (w + I)$	m <sup>2</sup>	2.47
Time to reach 75% Effective Depth	T <sub>p75%</sub>		min	5.25
Time to reach 25% Effective Depth	T <sub>p25%</sub>		min	26.80
Time 25% - 75%	T <sub>p75%-25%</sub>	$= T_{p25\%} - T_{p75\%}$	min	21.55
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	1.09E-04

<sup>\*</sup>To 50% Effective Depth (including base)

Note: Infiltra ion test pit refused at 1.20m on weak grey LIMESTONE.

With Reference to: Figure D-19



Project Name:Land at North West BicesterDepth of Pit (cm):120.00Project Ref.:GEG-21-678Depth of Water at Start of Depth (cm):31.00Trial Pit:IT12Date of Test:08 April 2021

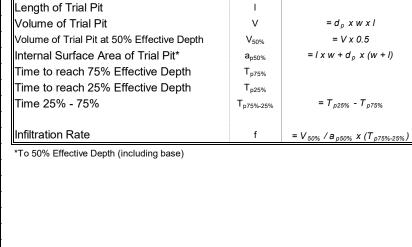
Effective Depth of Trial Pit

Parameter

Width of Trial Pit

Test No.: Test 2 of 3

Time (min)	Depth from Surface (cm)	% Effective Depth			
0	31	100.0%			
3	48	80.9%			
8	60	67.4%			
23	91	32.6%			
36	114	6.7%			
	End of Test				



Symbol

W

Calculation

Units

m

m

m

 $m^3$ 

 $m^3$ 

 $m^2$ 

min

min

min

m/s

IT12

0.89

0.60

1.30

0.69

0.3471

2.47

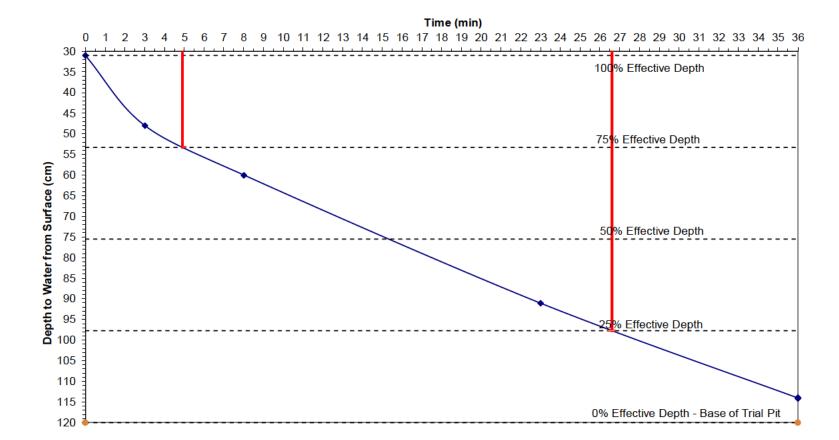
4.90

26.60

21.7

1.08E-04

With Reference to: Figure D-20

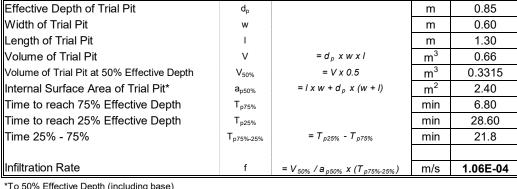


**Project Name:** Depth of Pit (cm): 117.00 **Land at North West Bicester** Project Ref.: Depth of Water at Start of Depth (cm): 32.00 GEG-21-678 Date of Test: 08 April 2021

Parameter

Trial Pit: IT12 Test No.: Test 3 of 3

Time (min)	Depth from Surface (cm)	% Effective Depth
0	32	100.0%
5	48	81.2%
11	63	63.5%
33	104	15.3%
	End of Test	



Symbol

Calculation

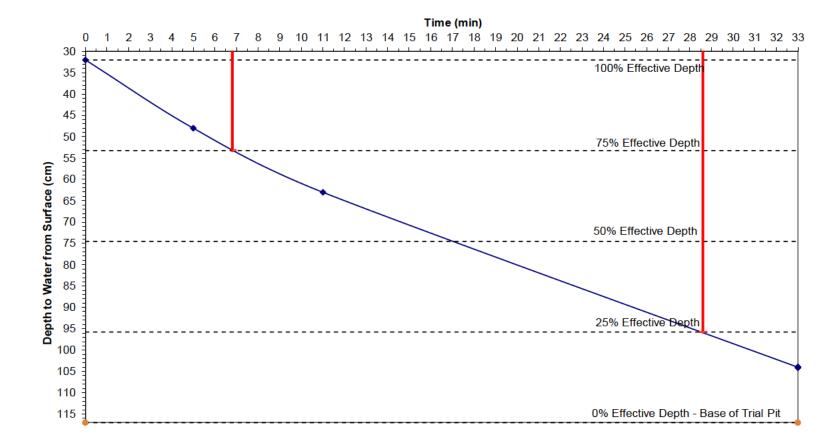
Units

IT12

Note: Base of pit at 1.17m following slight collapse during Test 2.

With Reference to: Figure D-21

<sup>\*</sup>To 50% Effective Depth (including base)



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