Photo 17: Excavation of trial pit IT09.

Photo 18: Arisings from trial pit IT09.

Photo 19: Excavation of trial pit IT10.

Photo 20: Arisings from trial pit IT10.

Geo Environmental Group
Geotechnical, Environmental &
Ecological Consultants

Geo Environmental Group
GEG House
17 Graham Road
Malvern
WR14 2HR

Client: Commercial Estates/ Hallam Land Management/ Brookbanks Consulting

Project: Land off Great Wilsey Farm, Haverhill

Project No.: GEG-14-366

Photo 21: Excavation of trial pit IT11.

Photo 22: Arisings from trial pit IT11.

Photo 23: Excavation of trial pit IT12.

Photo 24: Arisings from trial pit IT12.

Geo Environmental Group
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Ecological Consultants

Geo Environmental Group
GEG House
17 Graham Road
Malvern
WR14 2HR

Client: Commercial Estates/ Hallam Land Management/ Brookbanks Consulting

Project: Land off Great Wilsey Farm, Haverhill

Project No.: GEG-14-366

Photo 25: Excavation of trial pit IT13.

Photo 26: Arisings from trial pit IT13.

Photo 27: Excavation of trial pit IT14.

Photo 28: Arisings from trial pit IT14.

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Ecological Consultants

Geo Environmental Group
GEG House
17 Graham Road
Malvern
WR14 2HR

Client: Commercial Estates/ Hallam Land Management/ Brookbanks Consulting

Project: Land off Great Wilsey Farm, Haverhill

Project No.: GEG-14-366

Photo 29: Excavation of trial pit IT15.

Photo 30: Arisings from trial pit IT15.

Photo 31: Excavation of trial pit IT16.

Photo 32: Arisings from trial pit IT16.

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Ecological Consultants

Geo Environmental Group
GEG House
17 Graham Road
Malvern
WR14 2HR

Client: Commercial Estates/ Hallam Land Management/ Brookbanks Consulting

Project: Land off Great Wilsey Farm, Haverhill

Project No.: GEG-14-366

Photo 33: Excavation of trial pit IT17.

Photo 34: Arisings from trial pit IT17.

Photo 35: Excavation of trial pit IT18.

Photo 36: Arisings from trial pit IT18.

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Ecological Consultants

Geo Environmental Group
GEG House
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Malvern
WR14 2HR

Client: Commercial Estates/ Hallam Land Management/ Brookbanks Consulting

Project: Land off Great Wilsey Farm, Haverhill

Project No.: GEG-14-366

Photo 37: Excavation of trial pit IT19.

Photo 38: Arisings from trial pit IT19.

Photo 39: Excavation of trial pit IT20.

Photo 40: Arisings from trial pit IT20.

Geo Environmental Group
Geotechnical, Environmental &
Ecological Consultants

Geo Environmental Group
GEG House
17 Graham Road
Malvern
WR14 2HR

Client: Commercial Estates/ Hallam Land Management/ Brookbanks Consulting

Project: Land off Great Wilsey Farm, Haverhill

Project No.: GEG-14-366

Photo 41: Excavation of trial pit IT21.

Photo 42: Arisings from trial pit IT21.

Photo 43: Excavation of trial pit IT22.

Photo 44: Arisings from trial pit IT22.

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Geotechnical, Environmental &
Ecological Consultants

Geo Environmental Group
GEG House
17 Graham Road
Malvern
WR14 2HR

Client: Commercial Estates/ Hallam Land Management/ Brookbanks Consulting

Project: Land off Great Wilsey Farm, Haverhill

Project No.: GEG-14-366

Photo 45: Excavation of trial pit IT23.

Photo 46: Arisings from trial pit IT23.

Photo 47: Excavation of trial pit IT24.

Photo 48: Arisings from trial pit IT24.

Geo Environmental Group
Geotechnical, Environmental &
Ecological Consultants

Geo Environmental Group
GEG House
17 Graham Road
Malvern
WR14 2HR

Client: Commercial Estates/ Hallam Land Management/ Brookbanks Consulting

Project: Land off Great Wilsey Farm, Haverhill

Project No.: GEG-14-366

Photo 57: Excavation of trial pit IT25.

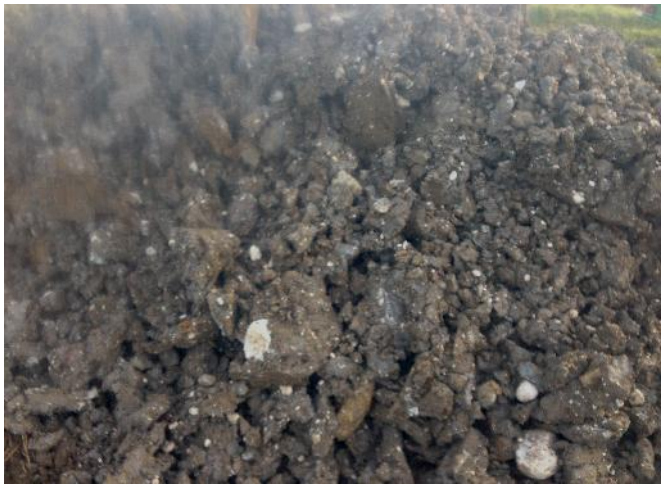


Photo 58: Arisings from trial pit IT25.

Geo Environmental Group
Geotechnical, Environmental &
Ecological Consultants

Geo Environmental Group
GEG House
17 Graham Road
Malvern
WR14 2HR

Client: Commercial Estates/ Hallam Land Management/ Brookbanks Consulting

Project: Land off Great Wilsey Farm, Haverhill

Project No.: GEG-14-366

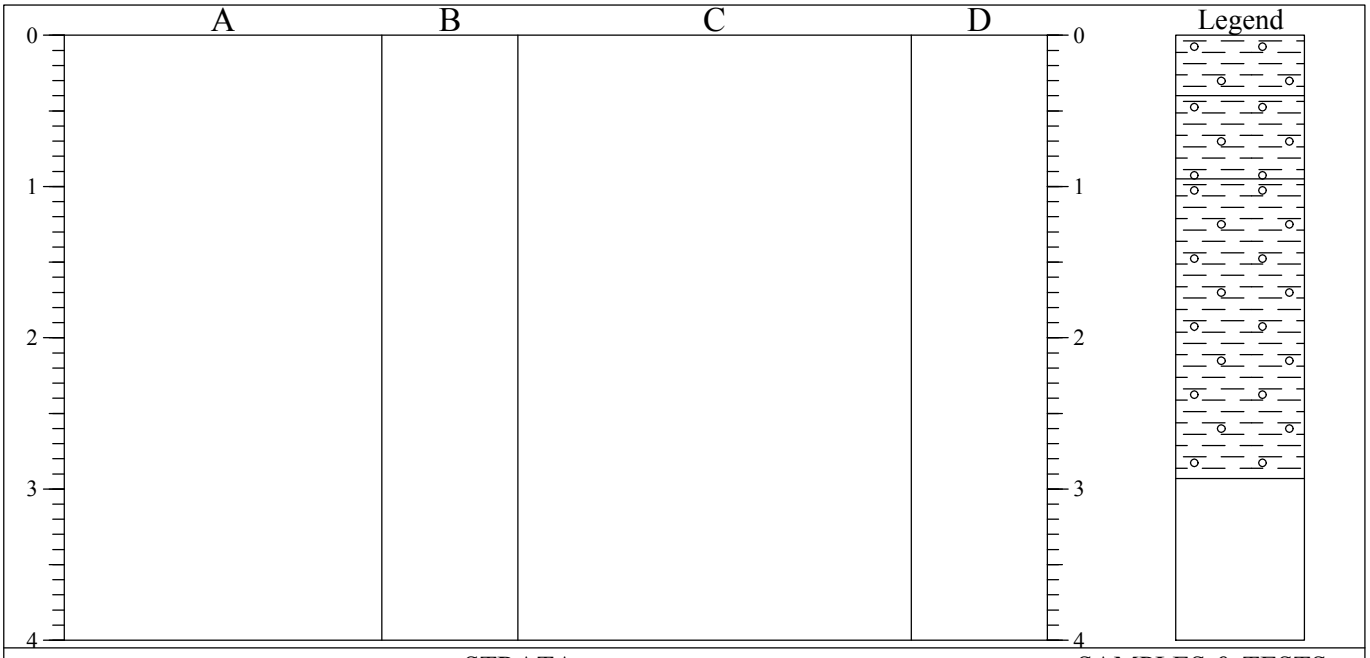
APPENDIX C

EXPLORATORY HOLE LOGS

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

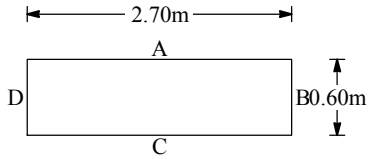
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT01
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	25-11-14		E 568,765.0 N 245,936.0	
Contractor				Sheet
				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		(Soft) slightly friable dark brown slightly gravelly CLAY with occasional rootlets. Gravel is sub-rounded chert and chalk and sub-angular flint. (TOPSOIL)			
0.40-0.95		(Firm) friable brown gravelly CLAY. Gravel is sub-rounded chert, chalk and sub-angular to sub-rounded flint. (LOWESTOFT FORMATION)			
0.95-2.93		0.60 - 0.95 With occasional cobbles and boulders of flint and chalk (Firm to stiff) friable grey gravelly CLAY with occasional cobbles. Gravel and cobbles are of sub-rounded chert, chalk and sub-angular to sub-rounded flint. (LOWESTOFT FORMATION) 2.00 - 2.90 Becoming (stiff) 2.90 - 2.93 Becoming (very stiff)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

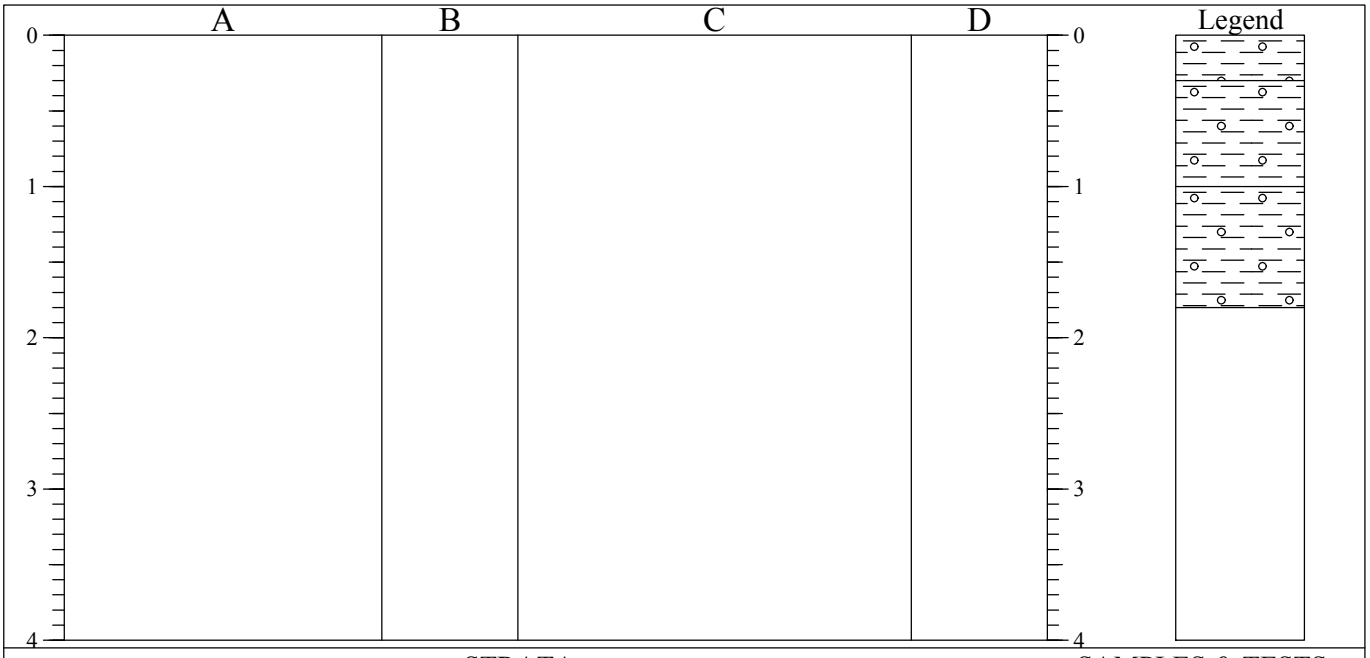
1. No groundwater encountered. 2. Excavation hard from 2.90m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB104	Logged By FT

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

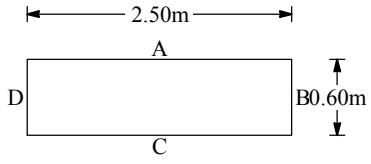
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				**IT02**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	25-11-14		E 568,906.0 N 246,304.0	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft to firm) dark brown slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint and sub-rounded chert.			
0.30-1.00		(TOPSOIL)			
		(Firm) friable brown slightly gravelly CLAY with boulder-sized pockets of very gravelly CLAY. Gravel is sub-angular to sub-rounded flint. (LOWESTOFT FORMATION)			
1.00-1.80		(Firm) friable grey gravelly CLAY. Gravel is sub-rounded chert and chalk. (LOWESTOFT FORMATION)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. Fast groundwater flow encountered at 1.80m. 2. Infiltration test undertaken. 3. Upon completion, backfilled with arisings.

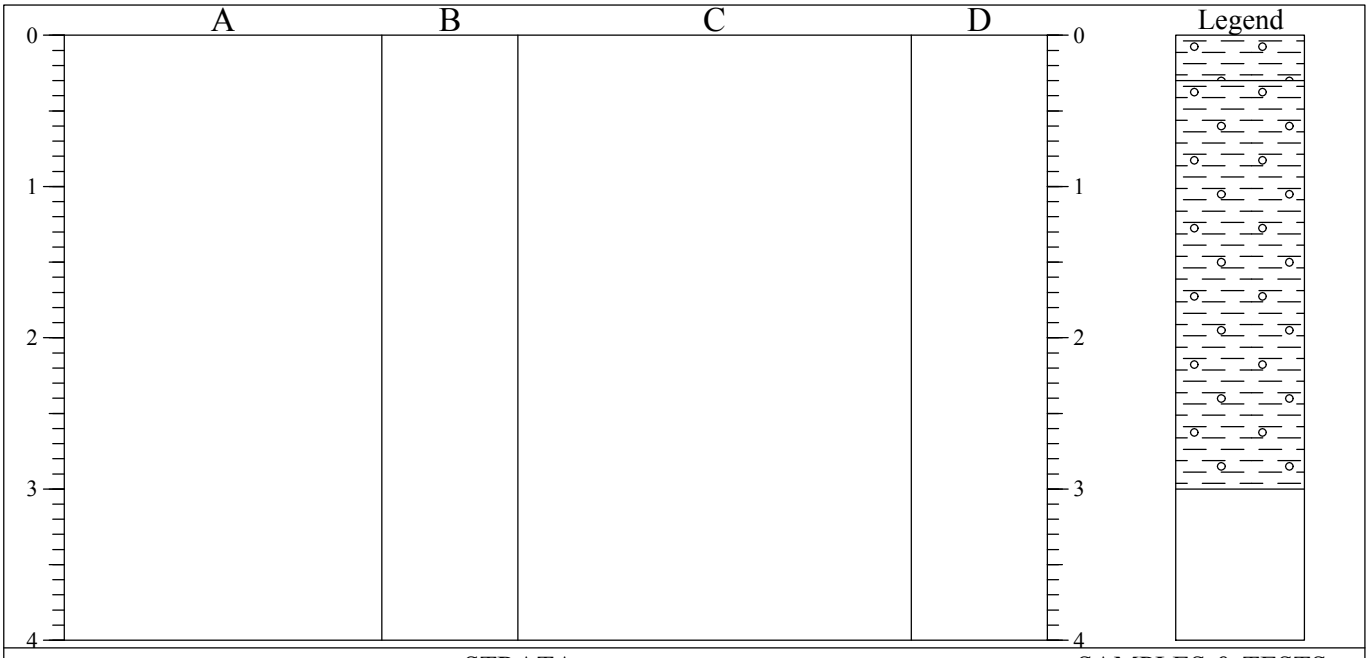
All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB106	Logged By FT

AGS3 UK TP GEG-14-366 HAVERHILL.GPJ GINT STD AGS 3_1.GDT 27/1/15

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

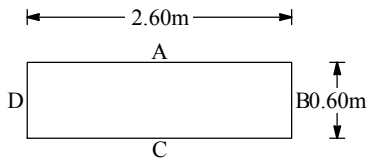
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT03
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	24-11-14		E 568,399.0 N 246,525.0	
Contractor				Sheet
				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) dark brown slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint and sub-rounded chert.			
0.30-3.00		(TOPSOIL)			
		(Soft) brown slightly gravelly CLAY. Gravel is sub-angular to sub-rounded flint. (LOWESTOFT FORMATION)			
		0.55 - 1.00 Becoming (firm) gravelly with occasional cobbles			
		1.00 - 3.00 Becoming (stiff) friable with occasional cobbles and bouder-sized brown sandy pockets			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

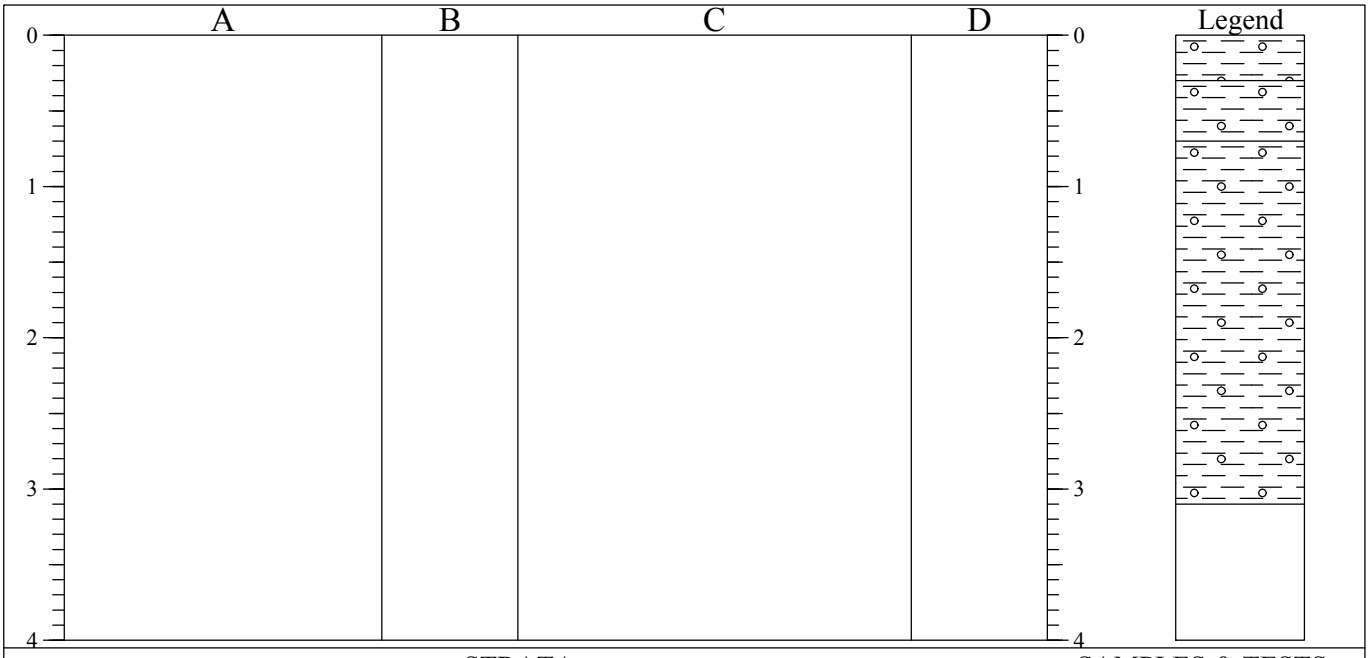
1. No groundwater encountered. 2. Excavation hard at 3.00m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB102	Logged By FT

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

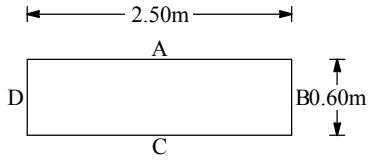
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT04
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	21-11-14		E 568,332.4 N 246,487.0	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) dark brown slightly gravelly CLAY. Gravel is sub-angular flint. (TOPSOIL)			
0.30-0.70		(Soft) friable brown slightly gravelly CLAY with occasional cobbles and cobble-sized slightly sandy pockets. Gravel is sub-angular to sub-rounded flint and chert. (LOWESTOFT FORMATION)			
0.70-3.10		(Firm) friable grey slightly gravelly CLAY. Gravel is sub-angular to sub-rounded flint and chert and sub-rounded chalk. (LOWESTOFT FORMATION) 1.30 - 3.10 Occasional cobble and boulder-sized brown sand pockets 1.40 - 2.00 Becoming (stiff) 1.40 - 3.10 Becoming blue grey 2.00 - 3.10 Becoming (very stiff)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. No groundwater encountered. 2. Excavation hard from 3.00m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

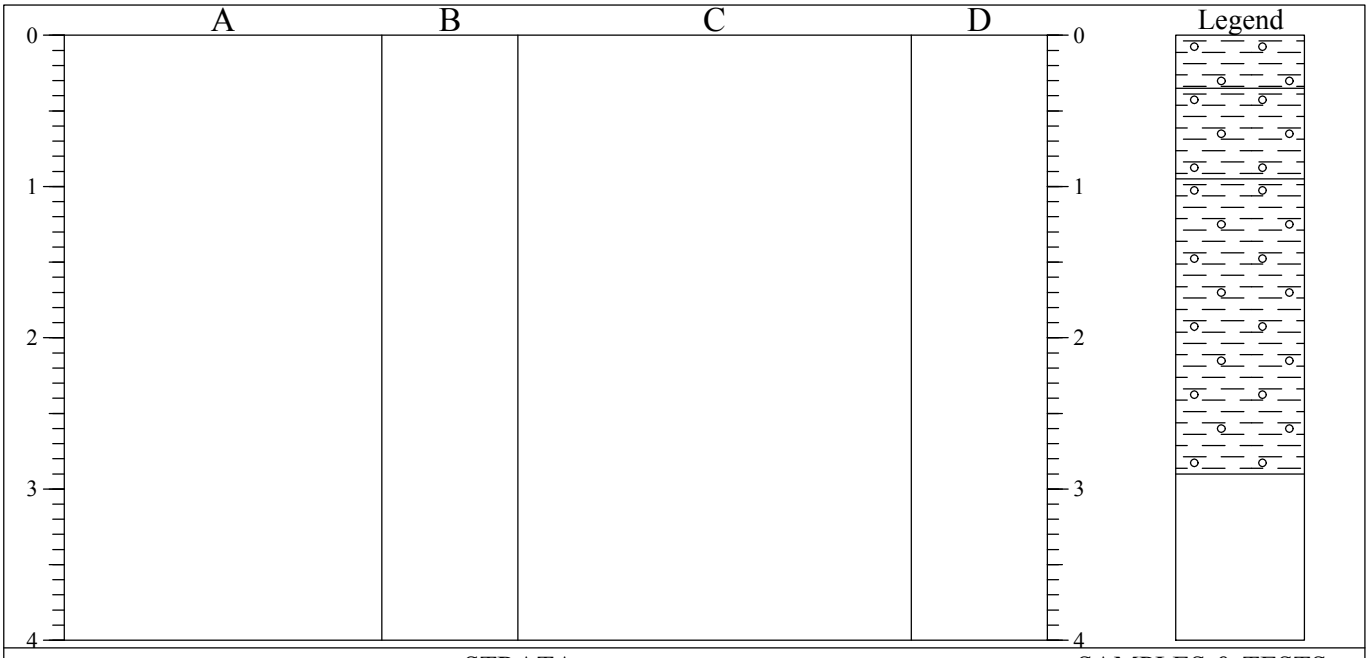
All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

AGS3 UK TP GEG-14-366 HAVERHILL.GPJ GINT STD AGS 3_1.GDT 27/1/15

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

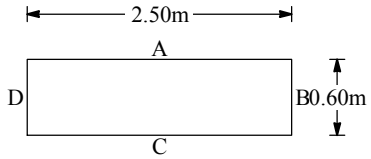
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				**IT05**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	21-11-14		E 568,188.8 N 246,482.7	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.35		(Soft) dark brown slightly gravelly CLAY. Gravel is sub-angular flint. (TOPSOIL)			
0.35-0.95		(Firm) friable brown slightly gravelly CLAY. Gravel is sub-angular flint and sub-rounded chert. (LOWESTOFT FORMATION)			
0.95-2.90		(Firm) friable grey slightly gravelly CLAY. Gravel is sub-angular flint, sub-rounded chert and chalk. (LOWESTOFT FORMATION) 1.00 - 2.90 Becoming (stiff) blue grey with occasional flint cobbles and boulders			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

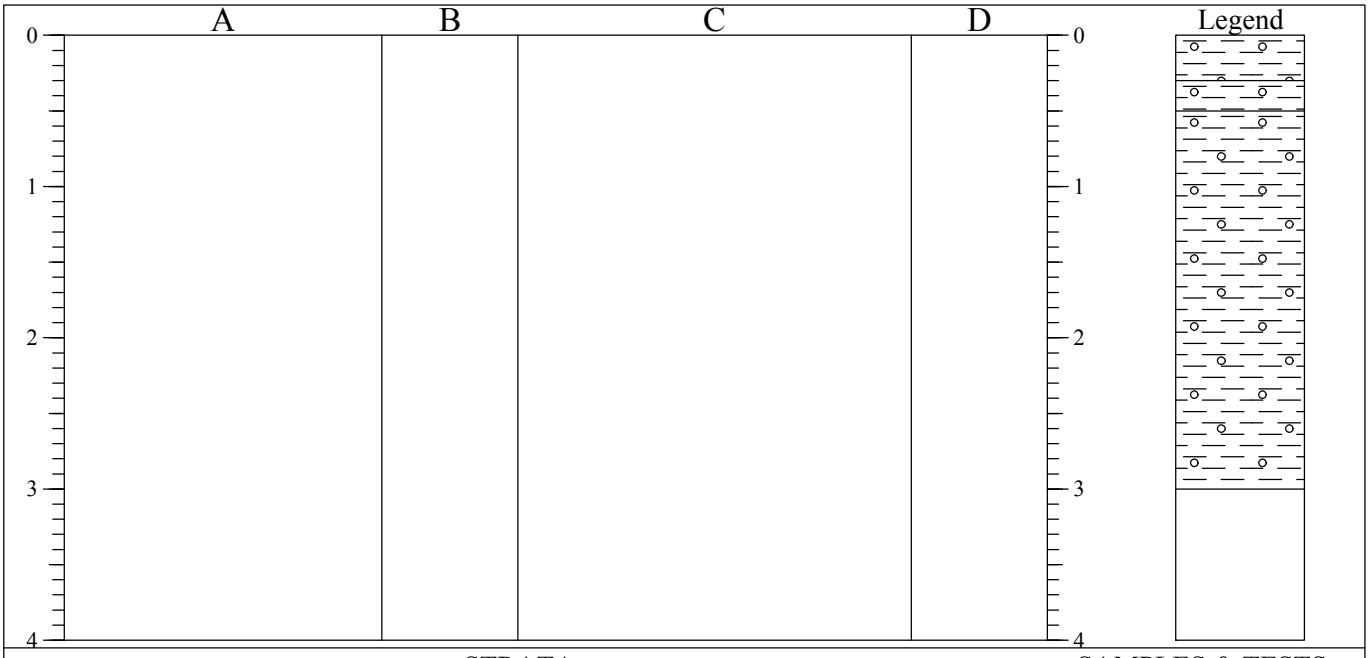
1. No groundwater encountered. 2. Excavation hard at 2.90m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

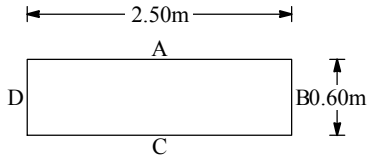
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT06
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	25-11-14		E 568,860.0 N 246,228.0	
Contractor				Sheet
				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft to firm) dark brown slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint and sub-rounded chert.			
0.30-0.50		(TOPSOIL)			
0.50-3.00		(Firm) friable brown slightly gravelly CLAY with occasional cobbeles. Gravel is sub-rounded chert, chalk and sub-angular to sub-rounded flint. (LOWESTOFT FORMATION)			
		(Firm) friable grey slightly gravelly CLAY. Gravel is sub-rounded chert and chalk. (LOWESTOFT FORMATION) 0.80 - 3.00 With occasional cobbles and boulders of sub-rounded chert and chalk 1.00 - 3.00 Becoming (stiff)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

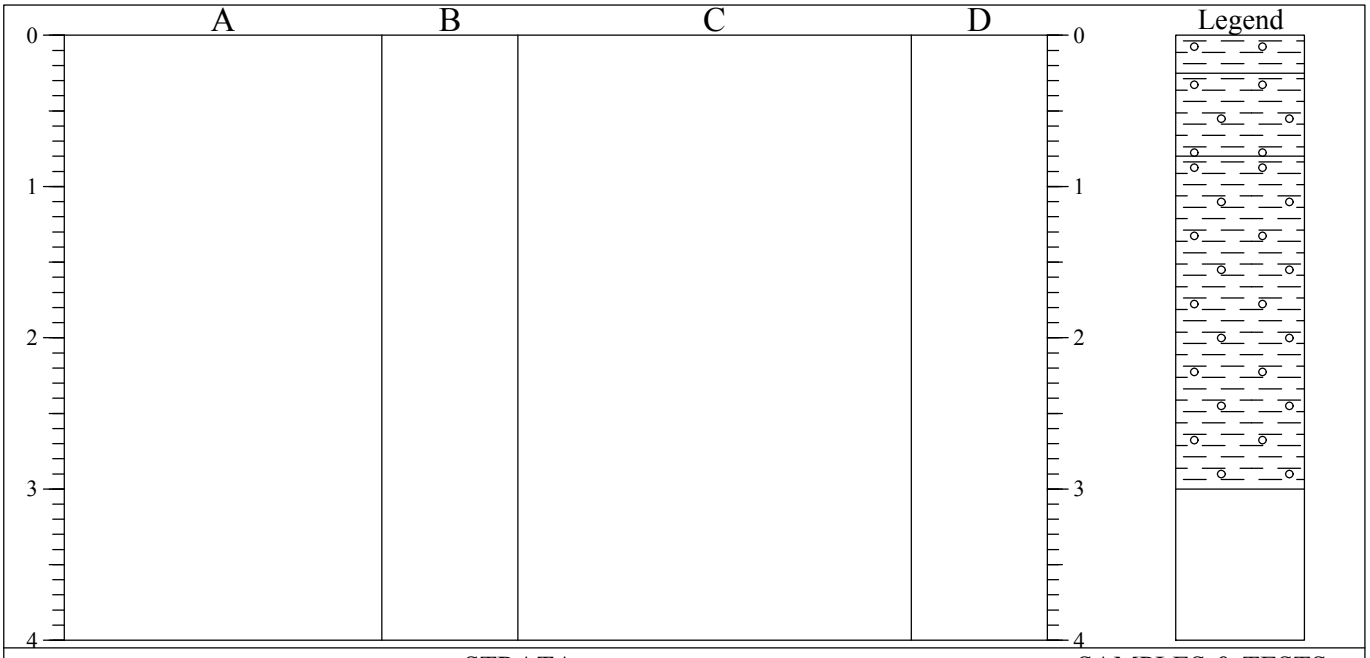
1. No groundwater encountered. 2. Excavation hard at 3.00m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB105	Logged By FT

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

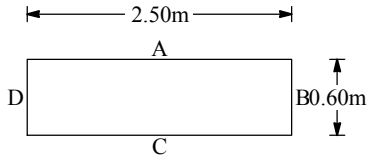
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT07
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	21-11-14		E 568,216.9 N 246,331.3	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.25		(Soft) dark brown slightly gravelly CLAY. Gravel is sub-angular flint. (TOPSOIL)			
0.25-0.80		(Firm) brown slightly gravelly CLAY. Gravel is sub-angular flint and chert. (LOWESTOFT FORMATION)			
0.80-3.00		(Firm) friable grey slightly gravelly CLAY. Gravel is sub-angular to sub-rounded flint, chert and chalk. (LOWESTOFT FORMATION) 1.10 - 3.00 Occasional cobbles and boulders of sub-angular to sub-rounded flint, chert and chalk 1.50 - 2.00 Becoming (stiff) 2.00 - 3.00 Becoming (stiff to very stiff)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. No groundwater encountered. 2. Excavation hard at 3.00m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

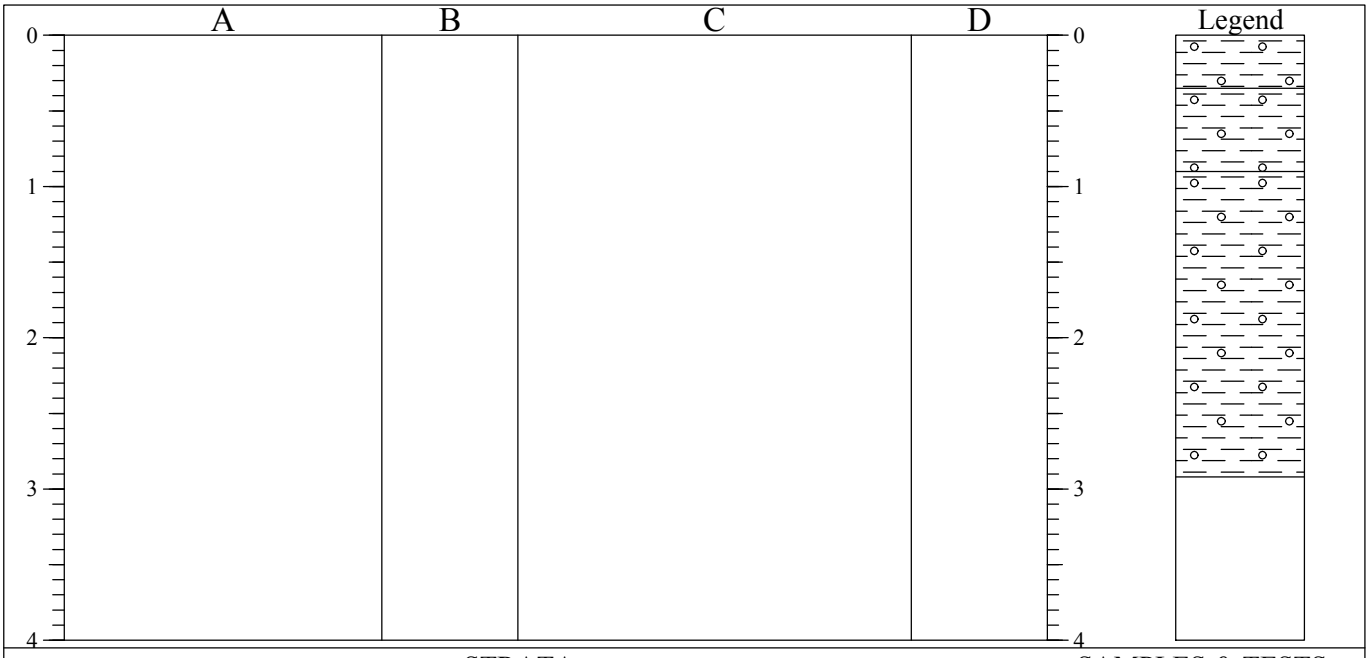
All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

AGS3 UK TP GEG-14-366 HAVERHILL.GPJ GINT STD AGS 3_1.GDT 27/1/15

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

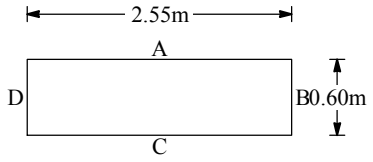
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				**IT08**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	24-11-14		E 568,623.0 N 246,449.0	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.35		(Soft) dark brown slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint and sub-rounded chert. (TOPSOIL)			
0.35-0.90		(Firm) brown slightly gravelly CLAY. Gravel is sub-rounded chalk and flint. (LOWESTOFT FORMATION) 0.60 - 0.90 With large boulder-size pockets of SAND			
0.90-2.92		(Firm) friable grey gravelly CLAY. Gravel is sub-rounded chalk and flint. (LOWESTOFT FORMATION) 1.10 - 2.00 Becoming (stiff) 2.00 - 2.10 Becoming (firm) 2.10 - 2.85 Becoming (stiff) 2.85 - 2.92 Becoming (very stiff)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

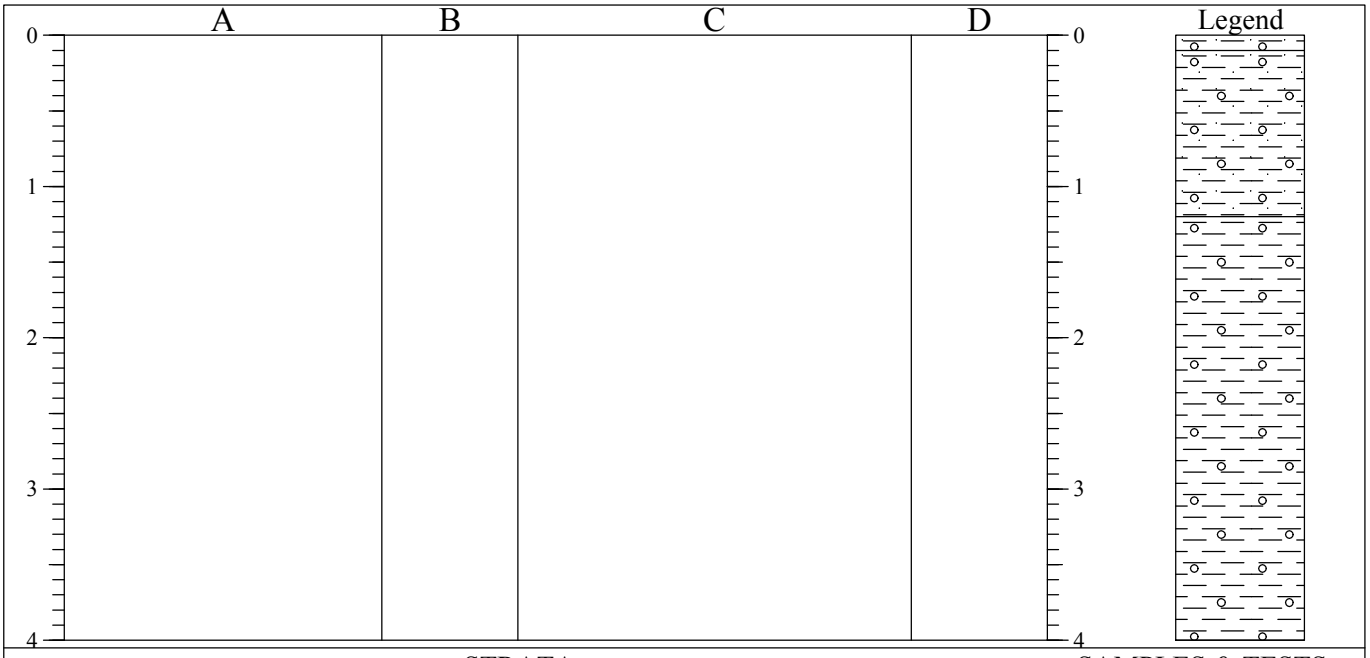
1. No groundwater encountered. 2. Excavation hard from 2.85m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB103	Logged By FT

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

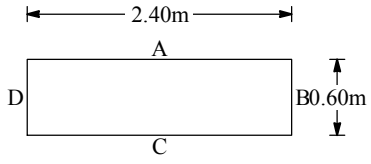
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT09
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	21-11-14		E 568,119.7 N 246,203.9	
Contractor				Sheet
				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10 0.10-1.20		(Soft) brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint. (TOPSOIL)			
		(Soft) light brown slightly sandy slightly gravelly CLAY. Gravel is sub-angular flint. (LOWESTOFT FORMATION) 0.60 - 1.20 Becoming (firm) 1.00 - 1.20 Becoming very sandy			
1.20-4.00		(Stiff) light grey brown slightly gravelly to gravelly CLAY. Gravel is sub-rounded chalk and sub-angular to sub-rounded flint. (LOWESTOFT FORMATION) 1.60 - 1.80 Boulder-sized sand pocket 2.20 - 3.00 Becoming grey brown 3.00 - 3.50 Becoming grey occasionally grey brown 3.50 - 4.00 Becoming (stiff to very stiff) grey. Gravel is sub-rounded chalk			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

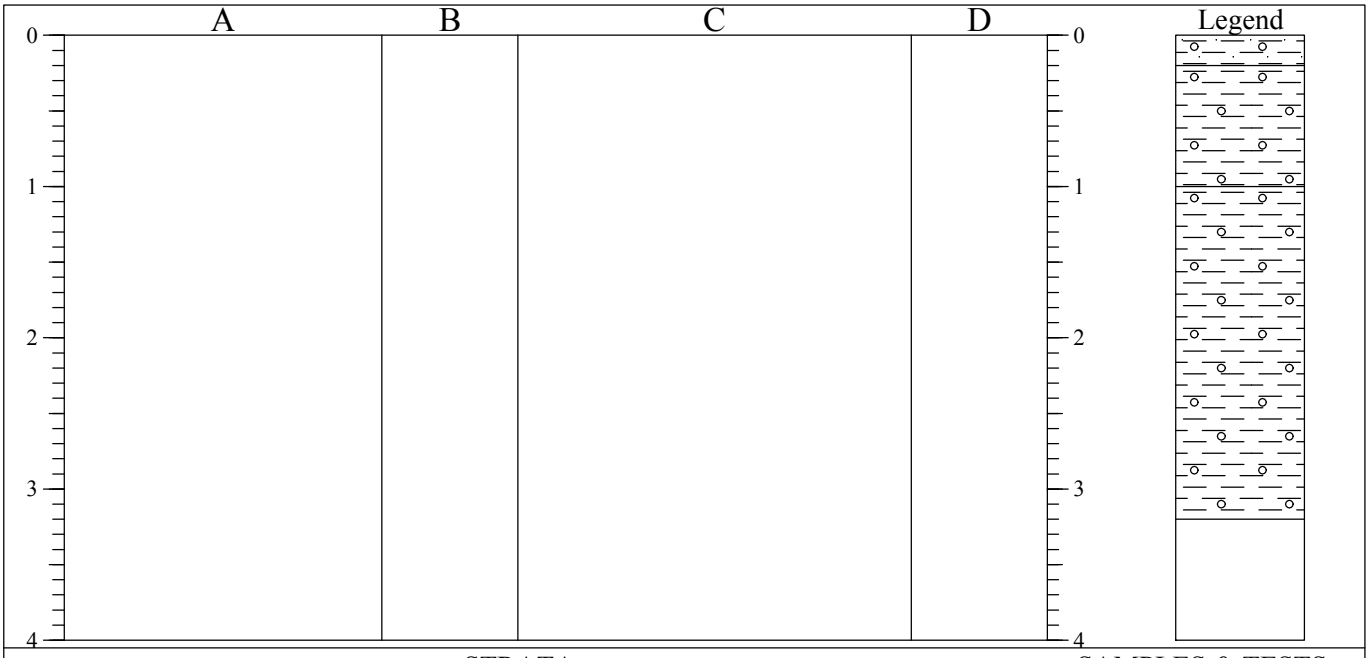
1. Groundwater encountered at 1.80m as an isolated slow seepage after 15 minutes. 2. Infiltration test undertaken. 3. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

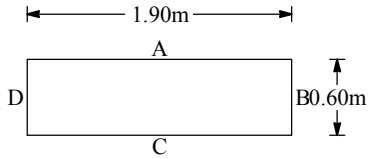
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				**IT10**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	21-11-14		E 568,424.3 N 245,999.2	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		(Soft) dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint (TOPSOIL)			
0.20-1.00		(Soft to firm) friable ligth brown slightly gravelly CLAY. Gravel is sub-rounded chalk. (LOWESTOFT FORMATION)			
1.00-3.20		(Stiff) friable ligth grey slightly gravelly to gravelly CLAY. Gravel is sub-angular to sub-rounded flint and chert and sub-rounded chalk. (LOWESTOFT FORMATION) 1.00 - 1.30 Cobble to boudler-sized sand pocket 2.10 - 3.20 Becoming grey brown			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

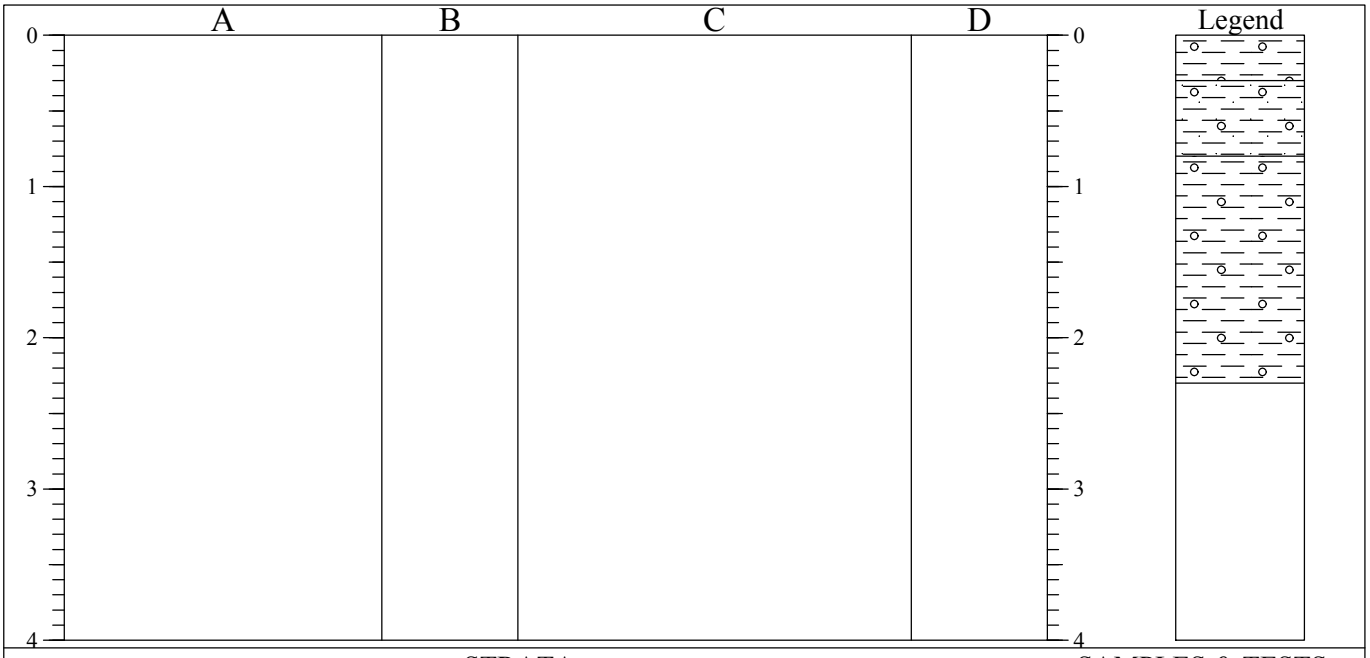
1. No groundwater encountered. 2. Excavation hard at 3.20m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

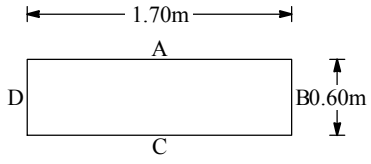
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT11
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	20-11-14		E 568,439.3 N 245,732.6	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) brown slightly gravelly CLAY. Gravel is sub-angular flint and sub-rounded chalk. (TOPSOIL)			
0.30-0.80		(Soft to firm) light grey slightly sandy slightly gravelly CLAY. Gravel is sub-angular fint. (LOWESTOFT FORMATION)			
0.80-2.30		(Firm) friable light grey brown slightly gravelly to gravelly CLAY. Gravel is sub-rounded chalk. (LOWESTOFT FORMATION) 1.50 - 2.30 Becoming (stiff)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. Groundwater encountered at 2.30m as an isolated slow seepage. 2. Infiltration test undertaken. 3. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
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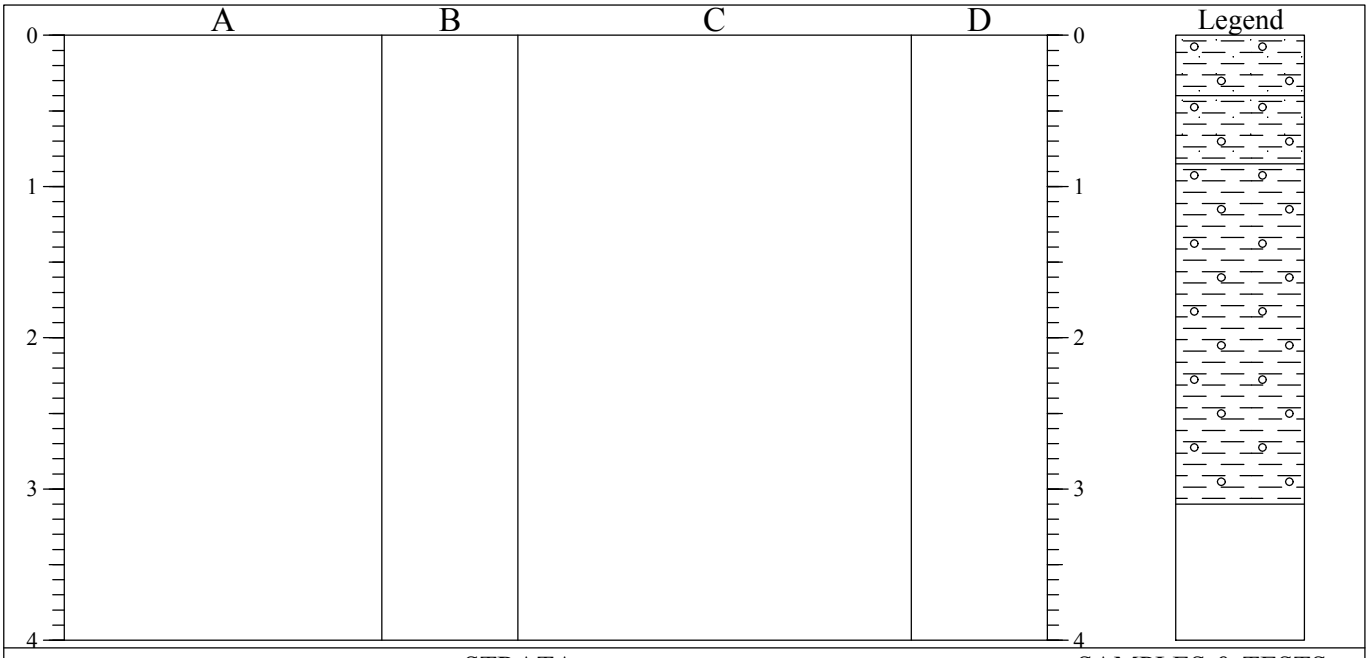
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

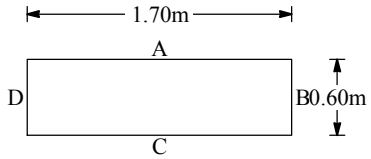
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				**IT12**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	20-11-14		E 568,672.0 N 245,930.8	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		(Soft) dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is sub-rounded chalk and sub-angular flint. (TOPSOIL)			
0.40-0.85		(Firm) friable light brown slightly sandy gravelly CLAY. Gravel is sub-angular flint. (LOWESTOFT FORMATION)			
0.85-3.10		(Stiff) friable light grey slightly gravelly to gravelly CLAY. Gravel is sub-rounded chalk occasionally flint (LOWESTOFT FORMATION)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. No groundwater encountered. 2. Excavation hard at 3.10m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
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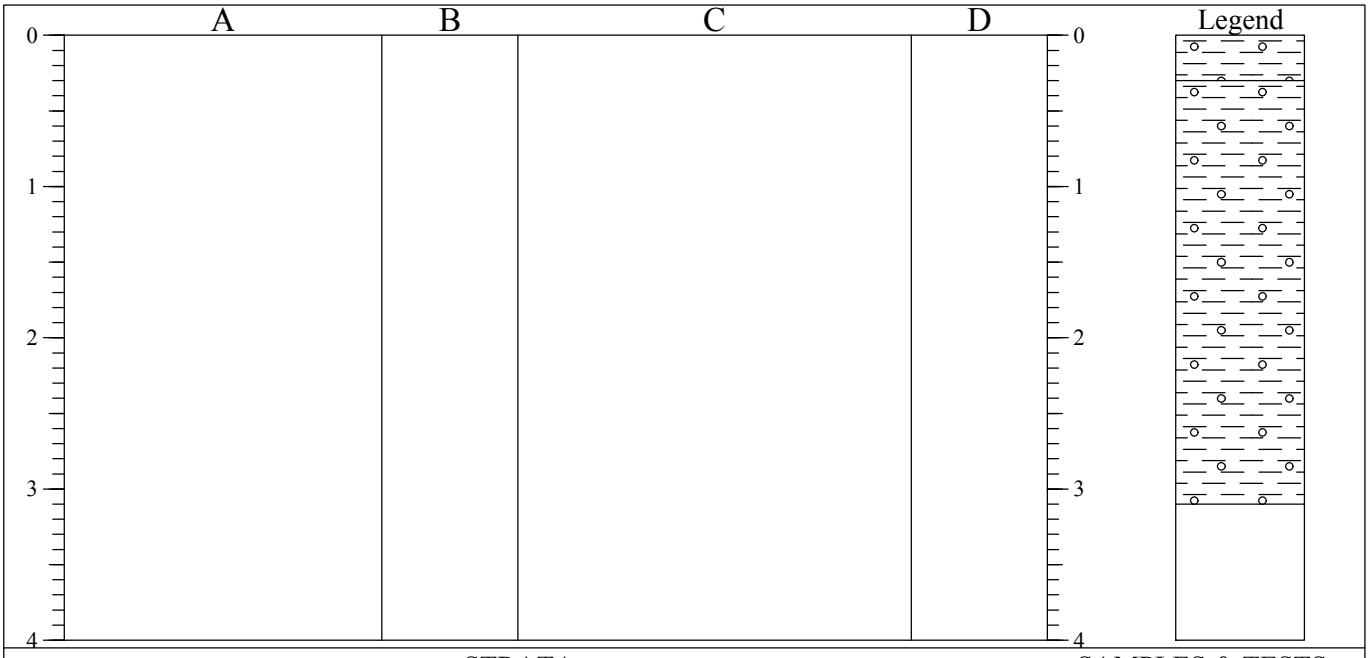
Fax: 01684 576917

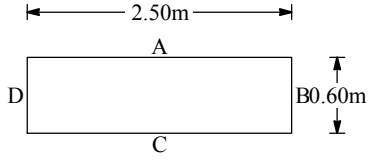
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT13
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	19-11-14		E 569,003.5 N 246,322.8	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) brown slightly gravelly CLAY. Gravel is sub-angular flint and sub-rounded chalk. (TOPSOIL)			
0.30-3.10		(Firm) friable light brown slightly gravelly CLAY. Gravel is sub-angular flint and sub-rounded chalk. (LOWESTOFT FORMATION) 1.10 - 1.40 Becoming light grey. Gravel is sub-rounded chalk 1.10 - 3.10 Becoming (stiff) 1.40 - 3.10 Becoming light grey and brown 2.10 - 2.60 Boulder-sized sand pocket			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. No groundwater encountered. 2. Excavation hard at 3.10m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
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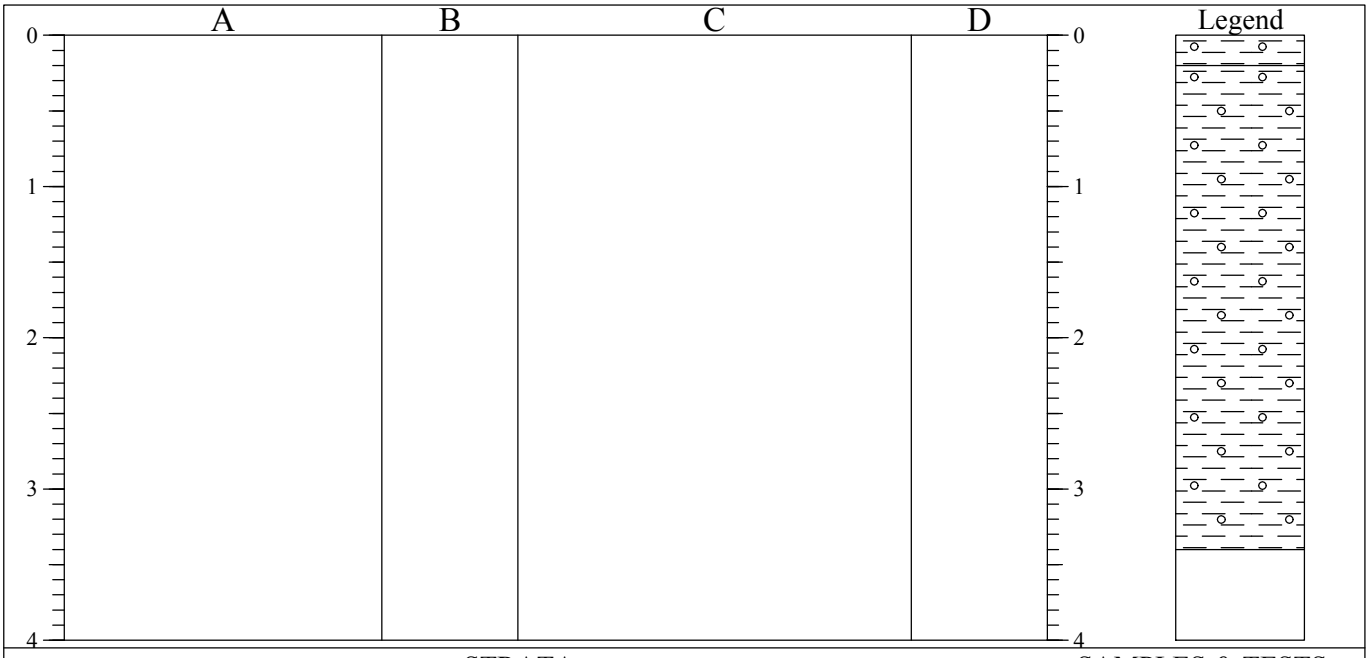
Telephone: 01684 212526
Fax: 01684 576917

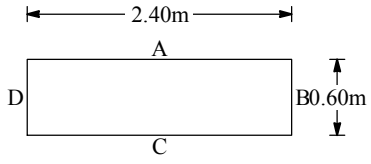
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT14
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	19-11-14		E 569,252.3 N 246,360.5	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		(Soft) brown slightly gravelly CLAY. Gravel is sub-angular flint and sub-rounded chalk. (TOPSOIL)			
0.20-3.40		(Firm) light brown slightly gravelly CLAY. Gravel is sub-angular flint and chalk. (LOWESTOFT FORMATION) 0.70 - 1.20 Becoming light grey occasionally light brown slightly gravelly to gravelly 0.70 - 3.40 Becoming (stiff) friable 1.20 - 3.40 Becoming light grey and brown gravelly with occasional cobbles of sub-angular chalk			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. No groundwater encountered. 2. Excavation hard at 3.40m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
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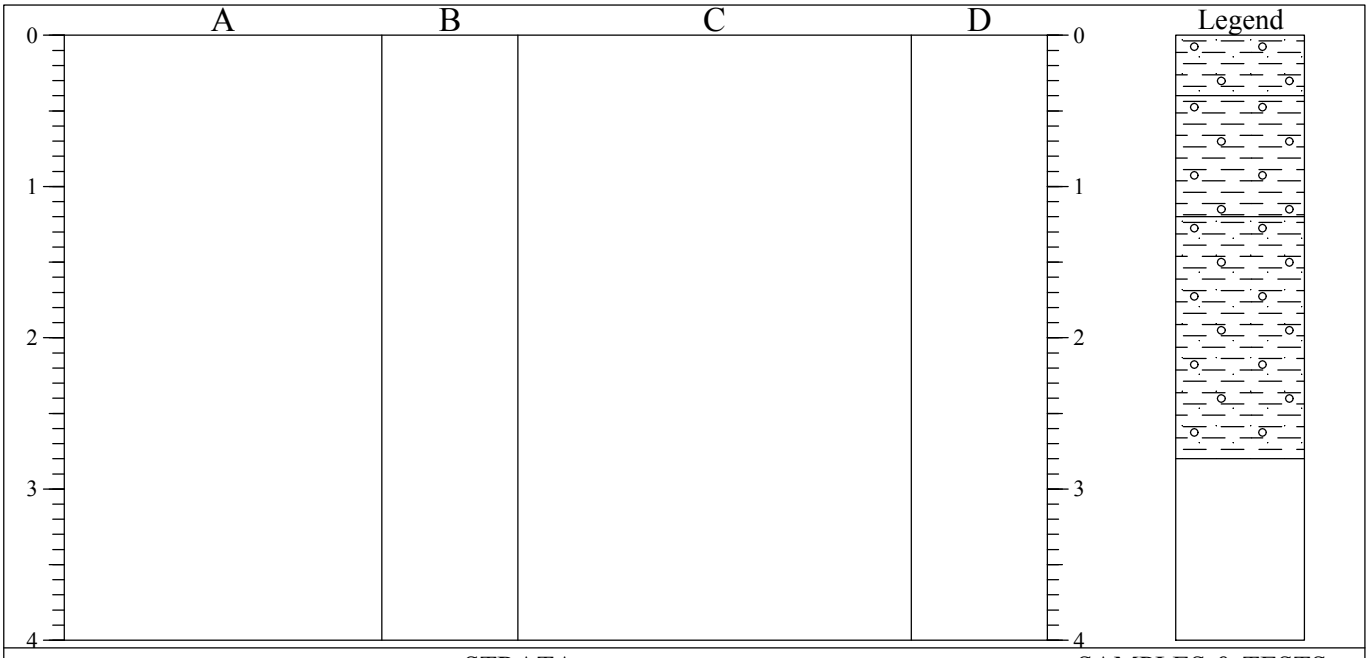
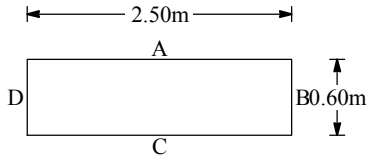
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT15
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	19-11-14		E 568,838.7 N 245,900.4	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		(Soft) dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint (TOPSOIL)			
0.40-1.20		(Firm) friable orange brown slightly gravelly CLAY with occasional cobbles. Gravel and cobbles are sub-rounded flint and quartzite. (POTENITALLY HEAD DEPOSITS)			
1.20-2.80		(Firm) friable grey slightly sandy slightly gravelly CLAY. Gravel is sub-chert and chalk. (LOWESTOFT FORMATION) 1.80 - 2.30 Becoming (firm to stiff) with occasional cobbles of sub-rounded chert, chalk and flint 2.30 - 2.80 Becoming (stiff) dark grey			

Shoring/Support: None
Stability: Slightly unstable from 0.40-1.20m



GENERAL REMARKS

1. Groundwater encountered at 2.80m as a moderate seepage. 2. Infiltration test undertaken. 3. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By FT

Geo Environmental Group
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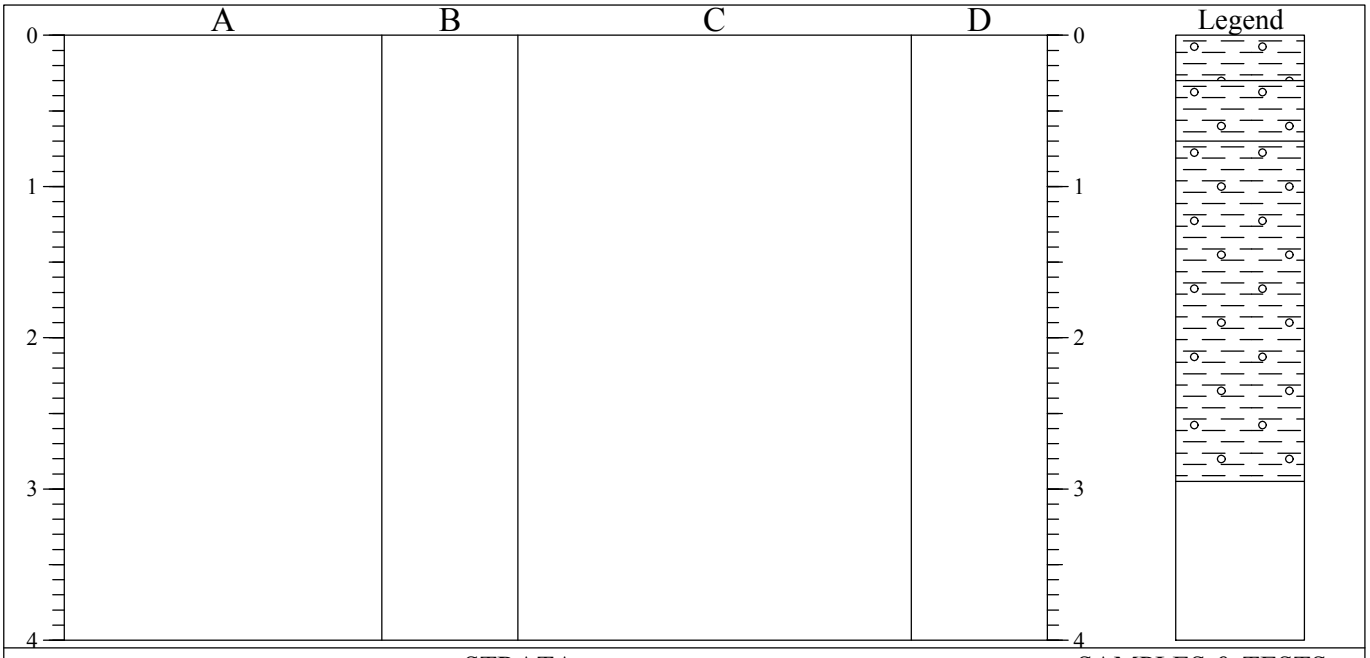
Fax: 01684 576917

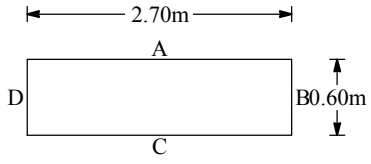
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT16
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	20-11-14		E 568,985.0 N 245,689.1	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) dark brown slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular to sub-rounded flint and chert.			
0.30-0.70		(TOPSOIL)			
		(Firm) friable brown slightly gravelly CLAY. Gravel is sub-angular to sub-rounded flint and chert.			
0.70-2.95		(LOWESTOFT FORMATION)			
		(Firm) friable brown and grey slight gravelly CLAY with occasional cobbles. Gravel and cobbles are sub-rounded chert, flint and chalk. (LOWESTOFT FORMATION) 1.00 - 2.50 Becoming (stiff) 1.00 - 2.95 Becoming grey			
		2.50 - 2.95 Becoming (stiff to very stiff)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. No groundwater encountered. 2. Excavation hard at 2.95m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

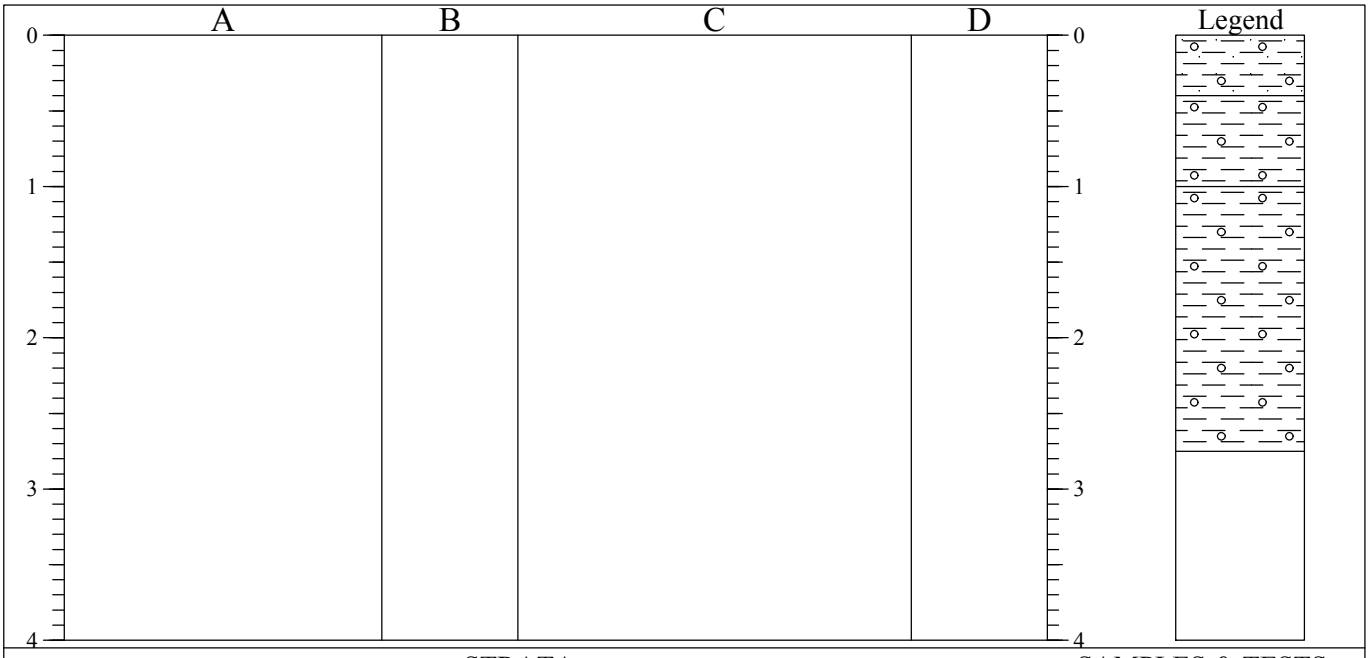
All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By FT

AGS3 UK TP GEG-14-366 HAVERHILL.GPJ GINT STD AGS 3_1.GDT 27/1/15

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

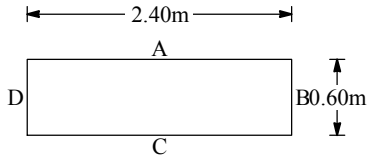
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				**IT17**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	19-11-14		E 569,038.3 N 245,788.9	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		(Soft) dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint (TOPSOIL)			
0.40-1.00		(Firm) friable brown slightly gravelly CLAY. Gravel is sub-angular flint. (LOWESTOFT FORMATION)			
1.00-2.75		(Firm) friable grey gravelly CLAY with occasional cobbles. Gravel and cobbles are sub-rounded chert, flint and chalk. (LOWESTOFT FORMATION) 1.40 - 2.40 Becoming (firm to stiff) 2.40 - 2.75 Becoming (stiff) dark grey			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. Groundwater encountered at 2.75m as a moderate seepage. 2. Infiltration test undertaken. 3. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By FT

AGS3 UK TP GEG-14-366 HAVERHILL.GPJ GINT STD AGS 3_1.GDT 27/1/15

Geo Environmental Group
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Malvern, WR14 2HR
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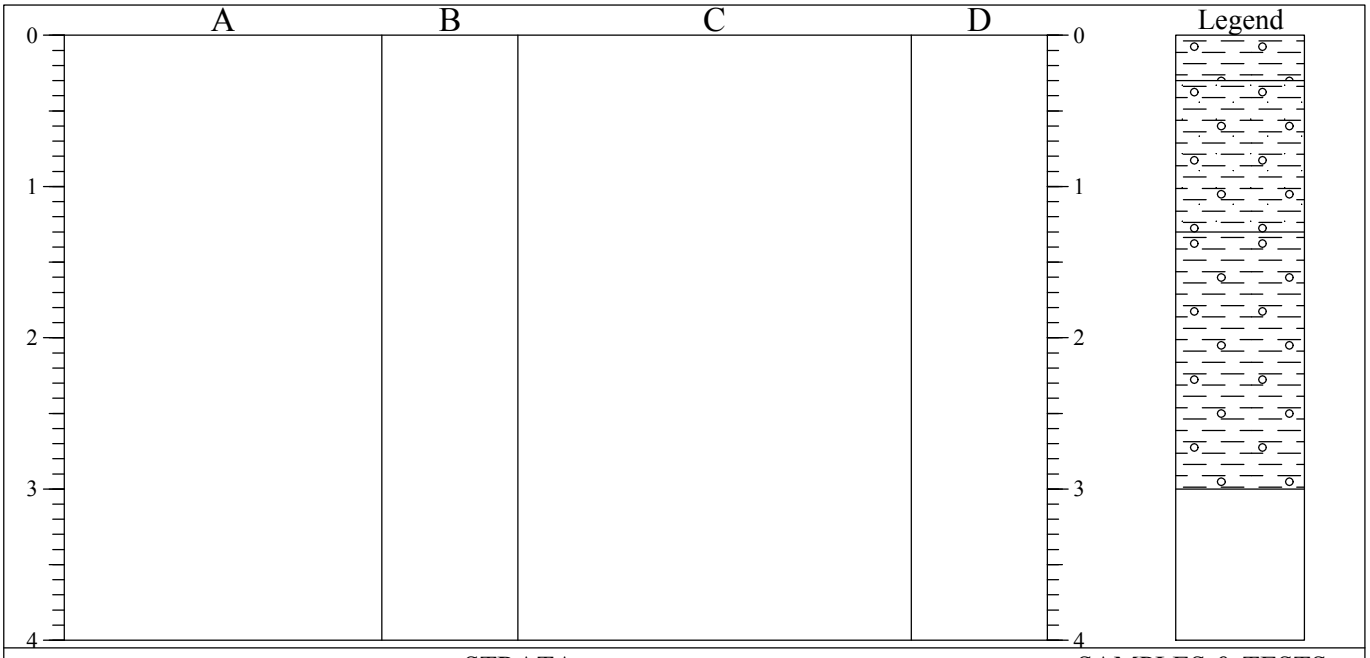
Fax: 01684 576917

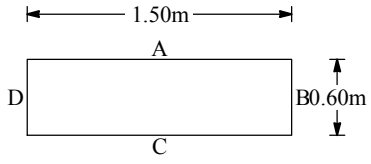
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				**IT18**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	20-11-14		E 568,868.5 N 245,622.2	
Contractor				Sheet
				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) brown slightly gravelly CLAY. Gravel is sub-angular flint and sub-rounded chalk. (TOPSOIL)			
0.30-1.30		(Soft to firm) light brown slightly sandy gravelly CLAY with occasional cobble-sized very sandy pockets. Gravel is fine sub-angular flint and fine sub-rounded chalk. (LOWESTOFT FORMATION) 0.60 - 1.00 Becoming (soft) 1.00 - 1.30 Becoming (firm)			
1.30-3.00		(Firm to stiff) light grey brown slightly gravelly to gravelly CLAY. Gravel is sub-angular to sub-rounded chalk and flint. (LOWESTOFT FORMATION) 2.20 - 3.00 Becoming (stiff) grey brown 2.70 - 3.00 Becoming friable			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. Groundwater encountered at 1.40m as a slow seepage after 30 minutes and at 3.00m as a slow seepage during excavation. 2. Infiltration test undertaken. 3. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
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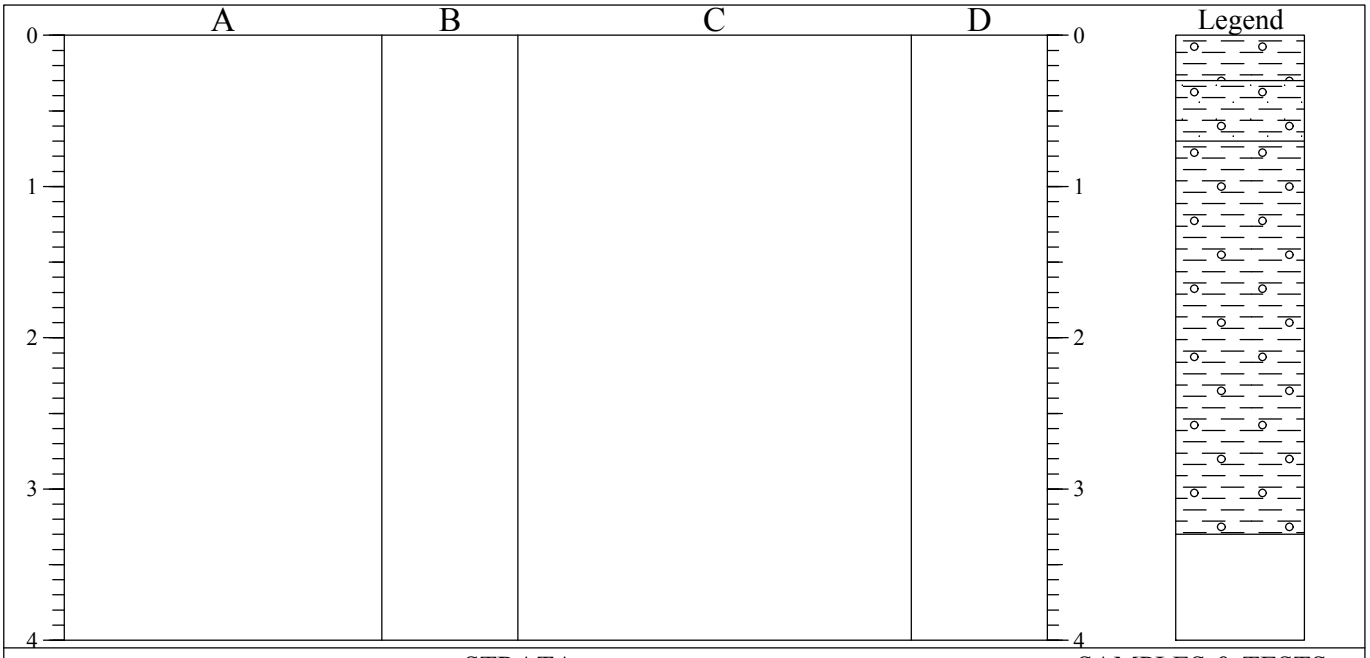
Fax: 01684 576917

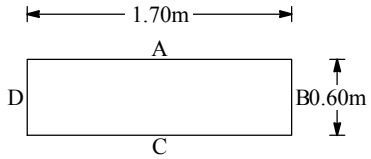
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT19
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	20-11-14		E 568,583.8 N 245,783.0	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) brown slightly gravelly CLAY. Gravel is sub-angular flint and sub-rounded chalk. (TOPSOIL)			
0.30-0.70		(Soft to firm) light brown slightly sandy slightly gravelly CLAY. Gravel is sub-angular fint. (LOWESTOFT FORMATION)			
0.70-3.30		(Firm) friable light grey brown slightly gravelly to gravelly CLAY with occasional cobbles. Gravel and cobbles are sub-rounded chalk occasionally sub-angular flint. (LOWESTOFT FORMATION) 1.30 - 3.30 Becoming grey brown 1.50 - 3.30 Becoming (stiff) 2.60 - 3.30 Occasional relict rootlets			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. No groundwater encountered. 2. Excavation hard at 3.30m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
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Malvern, WR14 2HR
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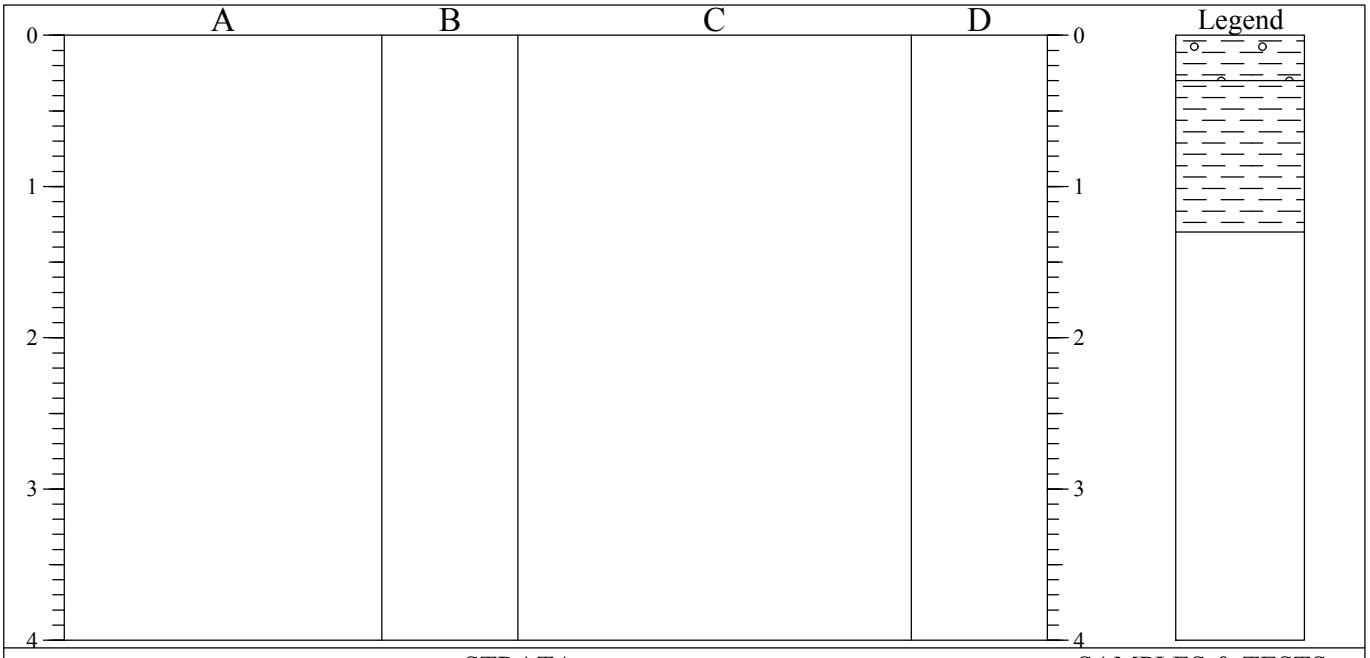
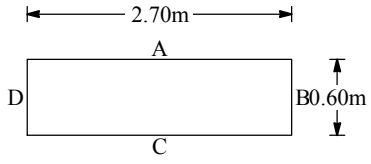
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				**IT20**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	20-11-14		E 569,194.7 N 245,553.1	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) dark brown slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular to sub-rounded flint and chert.			
0.30-1.30		(TOPSOIL)			
		(Soft to firm) friable brown CLAY. (POTENTIALLY HEAD DEPOSITS)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. Groundwater encountered at 1.30m as a fast flow. 2. Infiltration test undertaken. 3. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By FT

AGS3 UK TP GEG-14-366 HAVERHILL.GPJ GINT STD AGS 3_1.GDT 27/1/15

Geo Environmental Group
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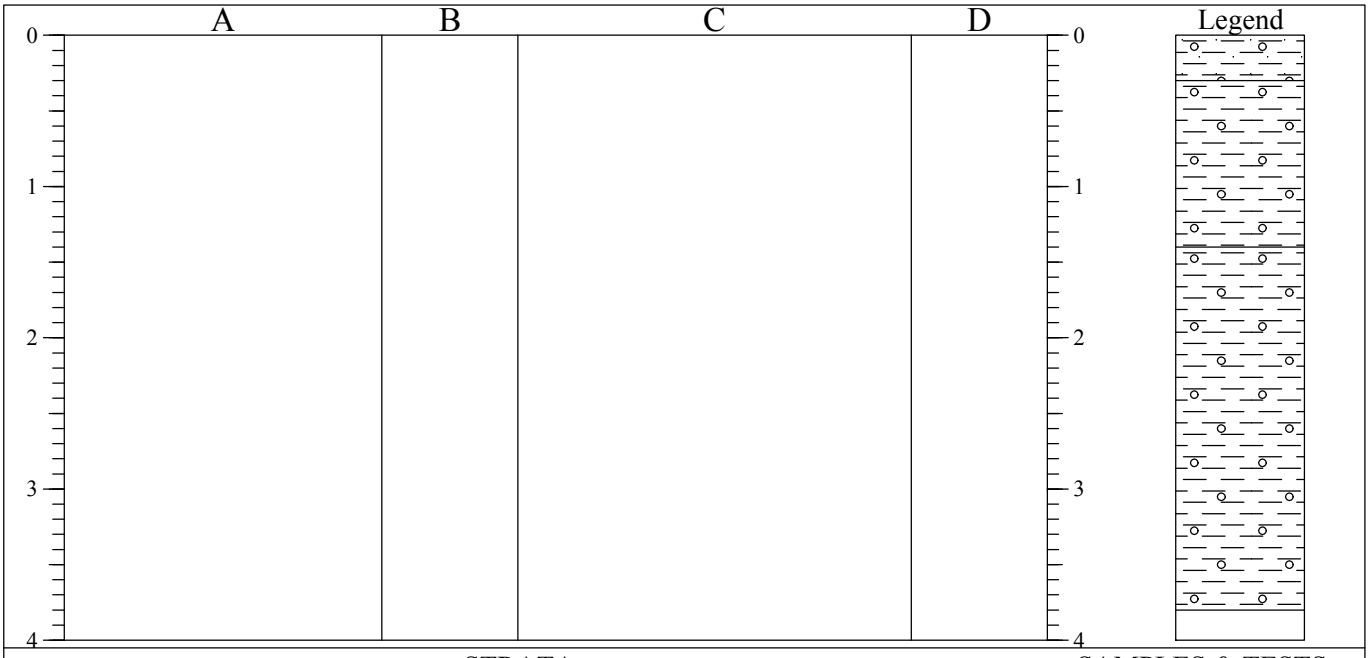
Fax: 01684 576917

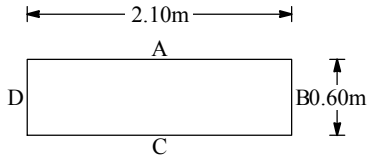
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT21
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	21-11-14		E 568,251.4 N 246,110.6	
Contractor				Sheet
				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint.			
0.30-1.40		(TOPSOIL)			
		(Soft to firm) friable light brown slightly gravelly CLAY. Gravel is sub-angular flint. (LOWESTOFT FORMATION) 0.90 - 1.40 Becoming (firm) 1.10 - 1.40 Becoming slightly sandy slightly gravelly			
1.40-3.80		(Stiff) brown grey slightly gravelly to gravelly CLAY with occasional cobbles. Gravel and cobbles are sub-rounded chalk and sub-angular to sub-rounded flint. (LOWESTOFT FORMATION) 2.00 - 2.20 Occasional cobble to boulder-sized sand pockets 2.00 - 3.80 Becoming grey brown			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

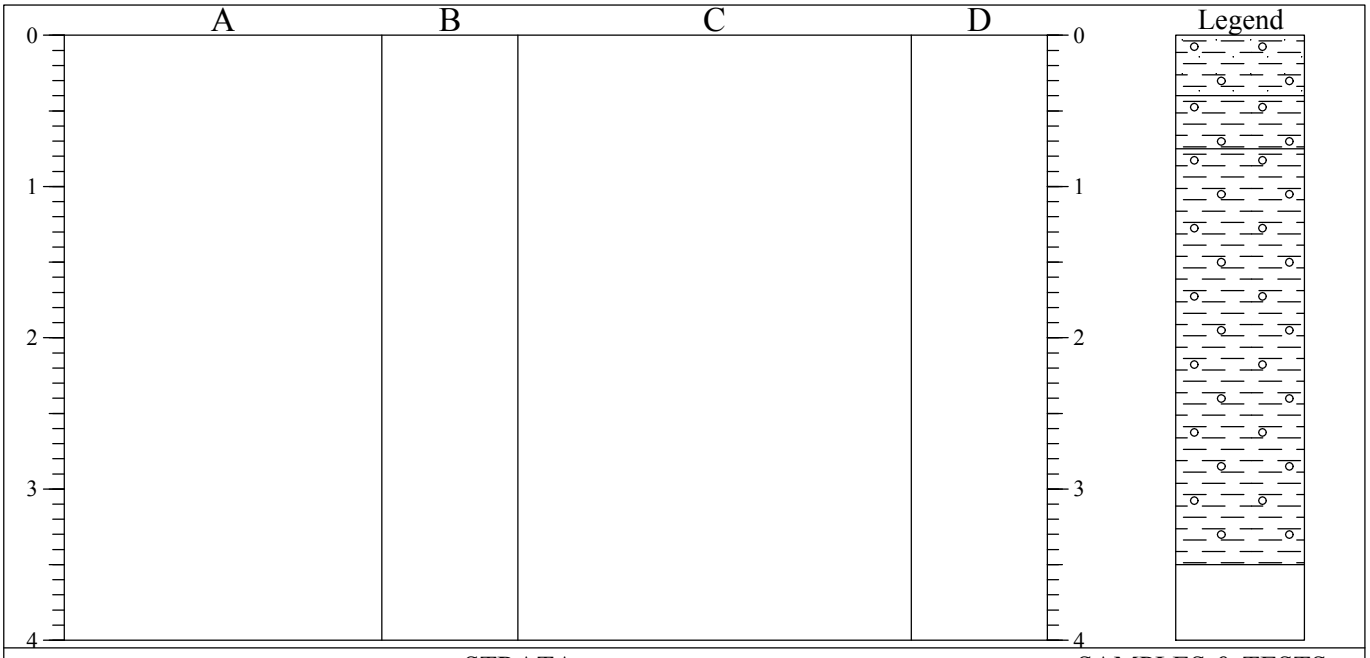
1. No groundwater encountered. 2. Excavation hard at 3.80m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

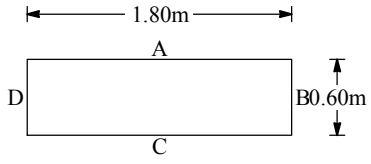
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT22
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	20-11-14		E 568,508.4 N 245,967.4	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		(Soft) dark brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is sub-rounded chalk and sub-angular flint. (TOPSOIL)			
0.40-0.75		(Firm) brown grey slightly gravelly CLAY. Gravel is sub-angular to sub-rounded chalk. (LOWESTOFT FORMATION)			
0.75-3.50		(Firm) friable light grey brown slightly gravelly to gravelly CLAY with occasional cobbles. Gravel and cobbles are sub-rounded chalk and sub-angular to sub-rounded flint occasionally sub-angular to sub-rounded chert (LOWESTOFT FORMATION) 1.40 - 1.90 Becoming grey brown 1.40 - 3.50 Becoming (stiff) 1.90 - 3.50 Becoming grey occasionally grey brown 2.70 - 3.50 Occasional cobbles of sub-rounded ironstone and sub-angular to sub-rounded flint			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

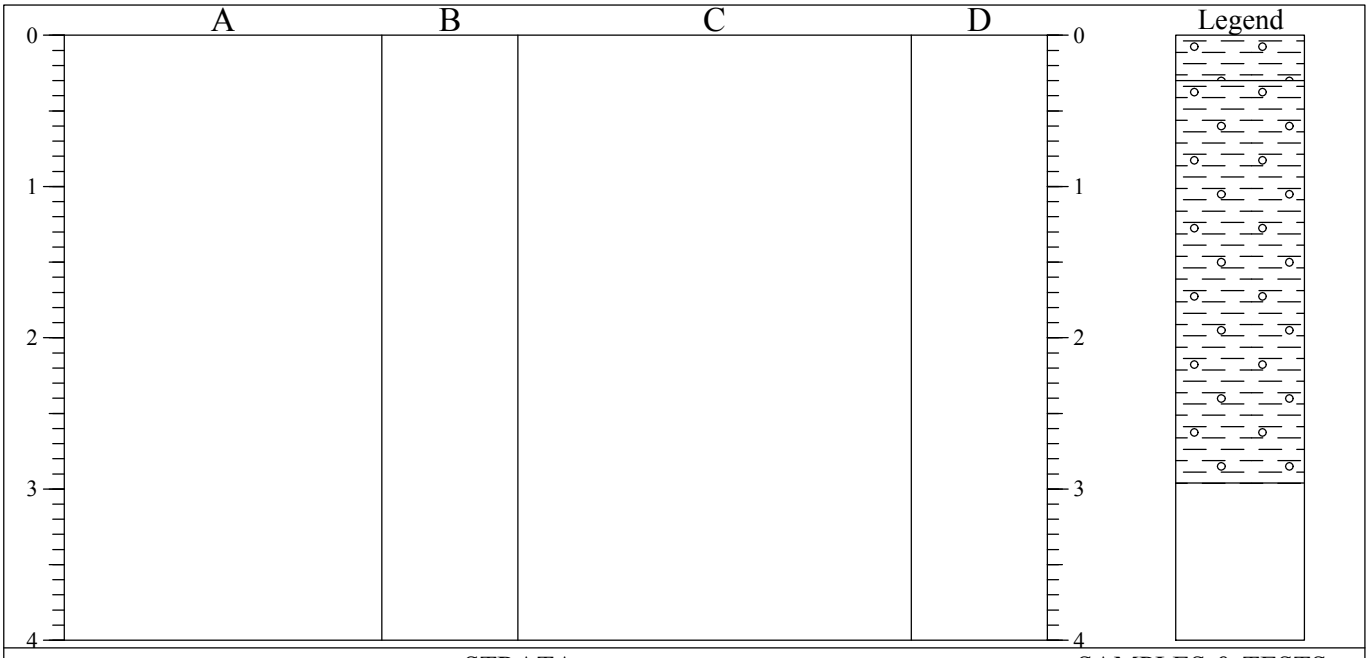
1. No groundwater encountered. 2. Excavation hard at 3.50m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB100	Logged By SA

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

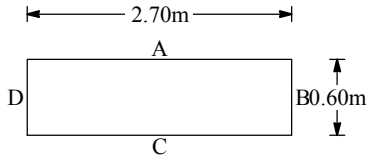
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT23
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	26-11-14		E 569,239.0 N 245,005.0	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft to firm) dark brown slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint and sub-rounded chert.			
0.30-2.96		(TOPSOIL)			
		(Firm) friable yellow-brown gravelly CLAY with occasional cobbles. Gravel and cobbles are sub-rounded chert, chalk and sub-angular to sub-rounded flint. (LOWESTOFT FORMATION/HEAD?)			
		0.70 - 1.30 Becoming light grey, with no flint in the gravel			
		1.20 - 2.80 Becoming (stiff)			
		1.30 - 2.96 Becoming light grey and brown, with no flint in the gravel			
		2.80 - 2.96 Becoming (very stiff)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. No groundwater encountered. 2. Excavation hard from 2.90m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

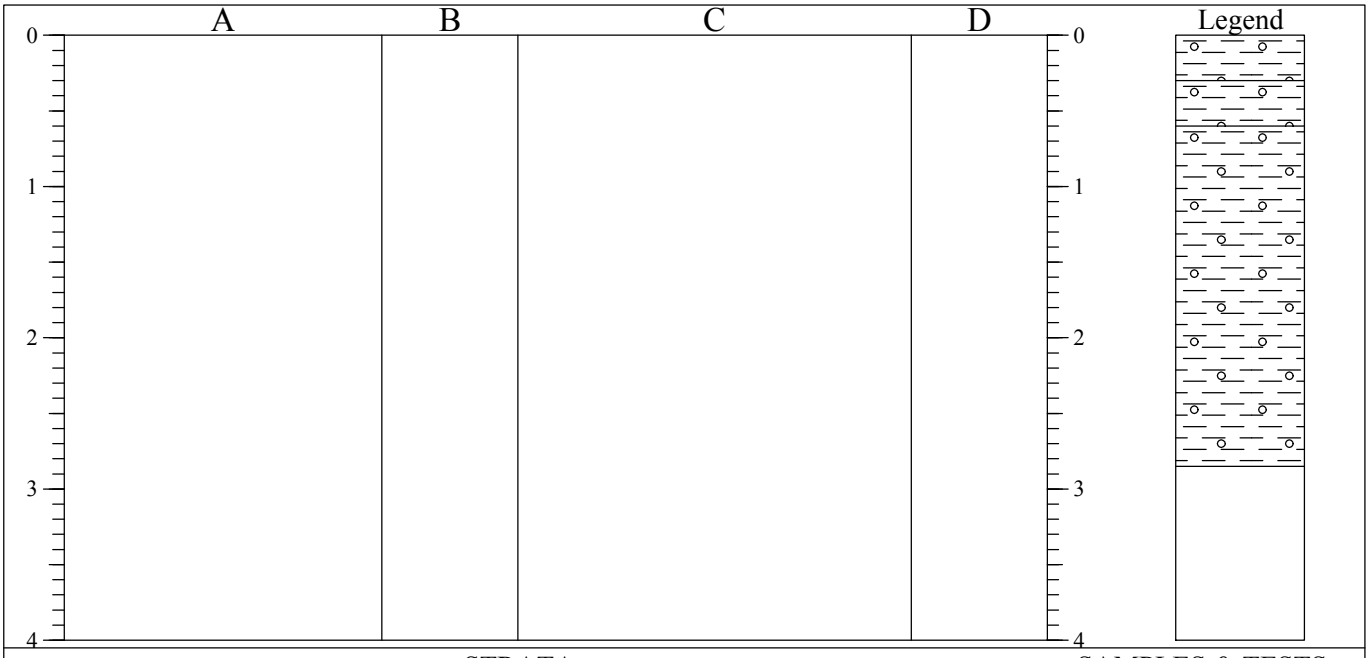
All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB107	Logged By FT

AGS3 UK TP GEG-14-366 HAVERHILL.GPJ GINT STD AGS 3_1.GDT 27/1/15

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

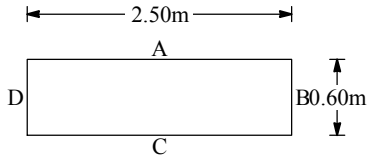
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT24
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	24-11-14		E 568,522.0 N 246,471.0	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) dark brown slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint and sub-rounded chert.			
0.30-0.60		(TOPSOIL)			
0.60-2.85		(Firm) brown slightly gravelly CLAY with occasional cobbles. Gravel and cobbles are of sub-rounded chert and flint. (LOWESTOFT FORMATION)			
		(Firm to stiff) grey and brown gravelly CLAY with occasional cobbbles. Gravel is sub-rounded to sub-angular flint and chalk. (LOWESTOFT FORMATION) 0.65 - 0.68 With occasional flint boulders 0.90 - 2.85 Becoming grey friable 1.40 - 2.80 Becoming (stiff) gravelly with occasional-some cobbles. Gravel and cobbles are of sub-rounded chert and chalk			
		2.80 - 2.85 Becoming (very stiff)			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

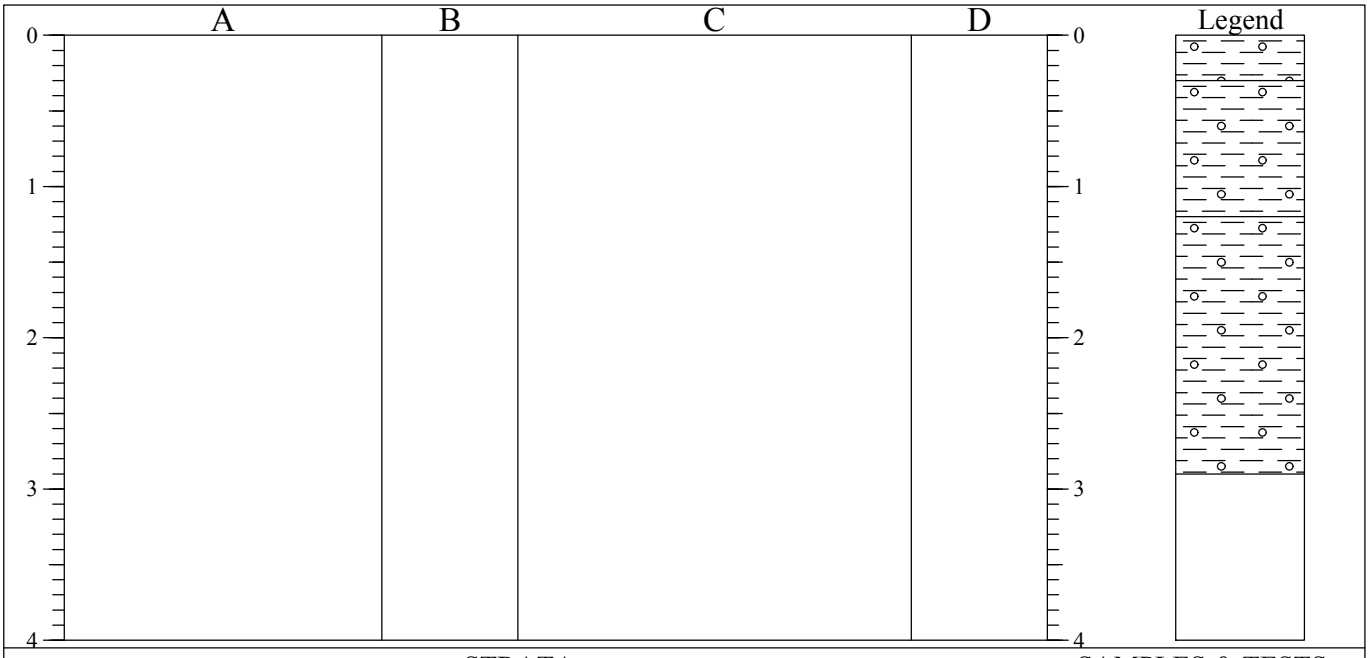
1. No groundwater encountered. 2. Excavation hard at 2.85m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB103	Logged By FT

Geo Environmental Group
GEG House, 17 Graham Road
Malvern, WR14 2HR
Telephone: 01684 212526
Fax: 01684 576917

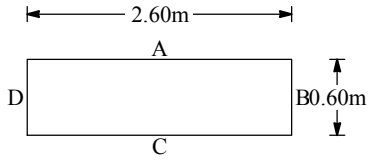
TRIAL PIT LOG

Project				TRIAL PIT No
Haverhill, Suffolk, CB9 0LL				IT25
Job No	Date	Ground Level (m)	Co-Ordinates ()	
GEG-14-366	24-11-14		E 568,394.0 N 246,611.0	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		(Soft) dark brown slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular flint and sub-rounded chert.			
0.30-1.20		(TOPSOIL)			
		(Firm) brown slightly gravelly CLAY. Gravel is sub-angular to sub-rounded flint. (LOWESTOFT FORMATION) 0.70 - 1.20 With occasional cobbles of sub-angular to sub-rounded flint			
1.20-2.90		(Firm) brown and grey gravelly CLAY. Gravel is sub-angular flint. (LOWESTOFT FORMATION) 1.40 - 2.00 Becoming (stiff) friable 2.00 - 2.10 Becoming (firm) 2.10 - 2.90 Becoming (stiff) grey			

Shoring/Support: None
Stability: Sides stable



GENERAL REMARKS

1. No groundwater encountered. 2. Excavation hard at 2.90m. 3. Infiltration test undertaken. 4. Upon completion, backfilled with arisings.

All dimensions in metres Scale 1:50	Client Brookbanks Consulting	Method/ Plant Used FIAT-HITACHI FB101	Logged By FT

APPENDIX D

INFILTRATION TEST DATA

Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT01 Test 1**

Depth of Pit (cm): 292
Depth of Water at Start of Depth (cm): 190
Date of Test: 25 November 2014

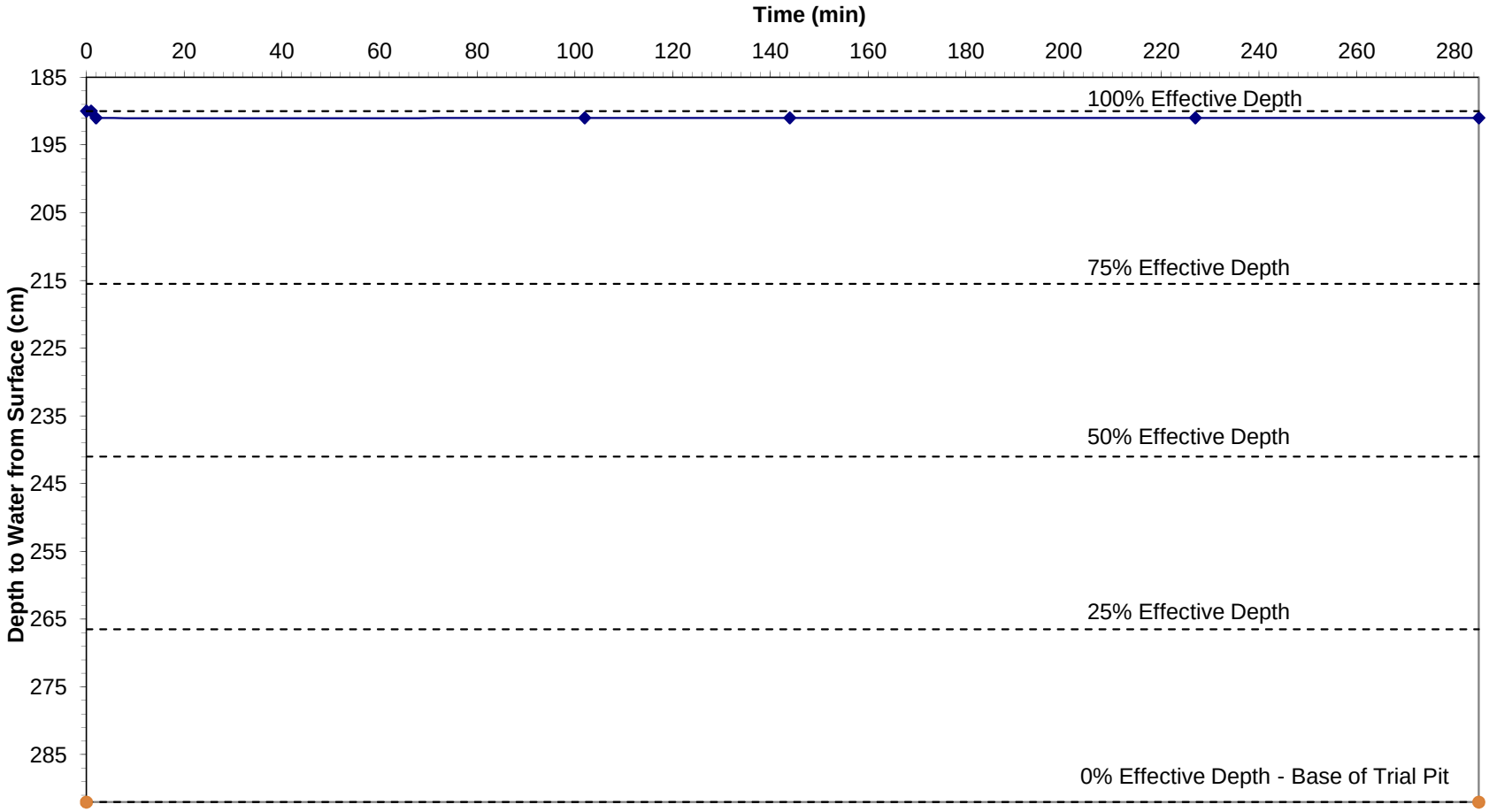
Time (min)	Depth from Surface (cm)	% Effective Depth
0	190	100%
1	190	100%
2	191	99%
102	191	99%
144	191	99%
227	191	99%
285	191	99%
End of Test		

Parameter	Symbol	Calculation	Units	IT01 Test 1
Effective Depth of Trial Pit	d_p		m	1.02
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.70
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.65
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.8262
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.99
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-1**

Figure D-1 **GEG-14-366** **Haverhill** **IT01 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT02 Test 1**

Depth of Pit (cm): 180
Depth of Water at Start of Depth (cm): 80
Date of Test: 25 November 2014

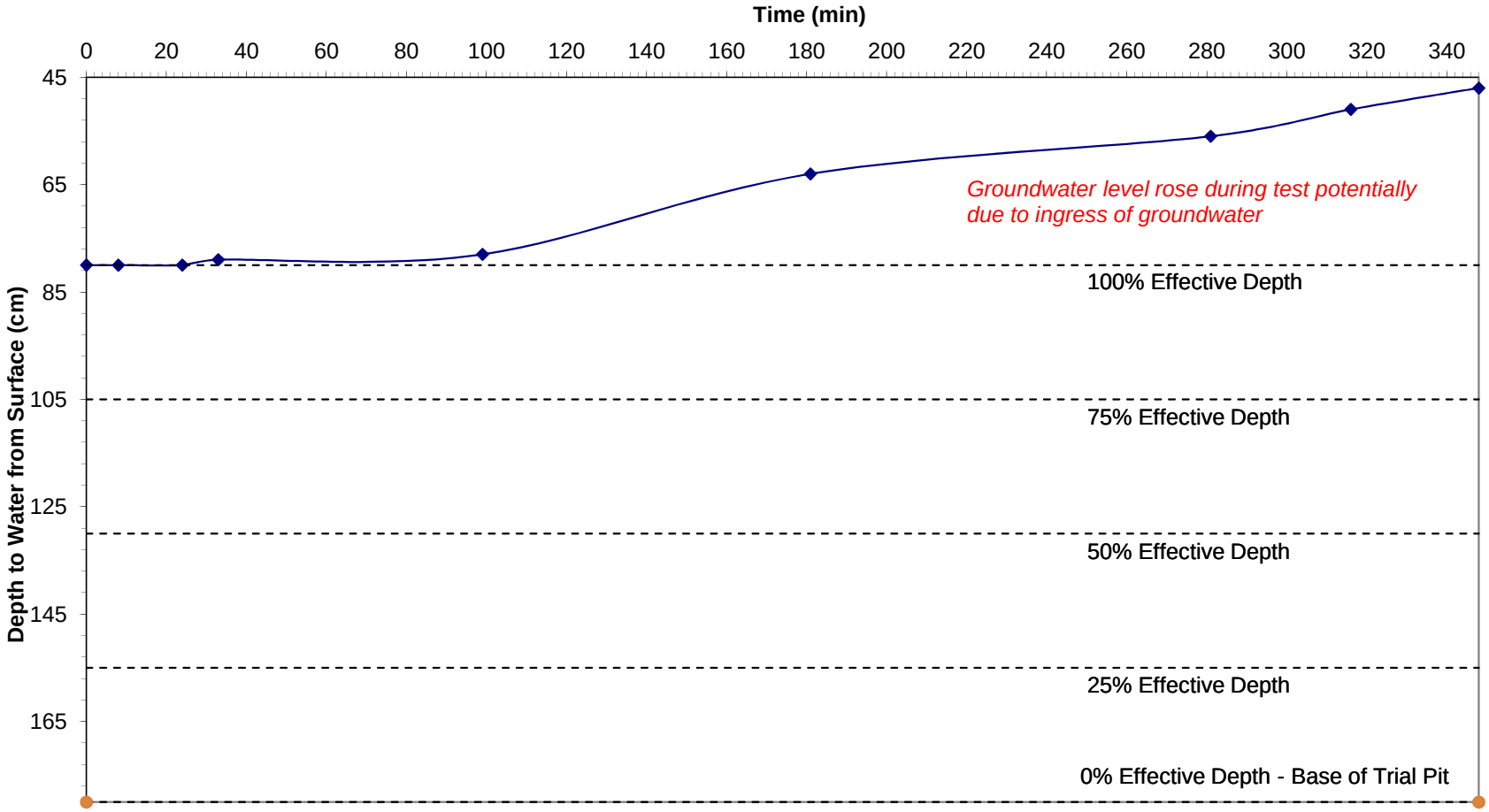
Time (min)	Depth from Surface (cm)	% Effective Depth
0	80	100%
8	80	100%
24	80	100%
33	79	101%
99	78	102%
181	63	117%
281	56	124%
316	51	129%
348	47	133%
End of Test		

Parameter	Symbol	Calculation	Units	IT02 Test 1
Effective Depth of Trial Pit	d_p		m	1.00
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.50
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.50
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.75
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.60
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-2**

Figure D-2 **GEG-14-366** **Haverhill** **IT02 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT03 Test 1**

Depth of Pit (cm): 300
Depth of Water at Start of Depth (cm): 200
Date of Test: 24 November 2014

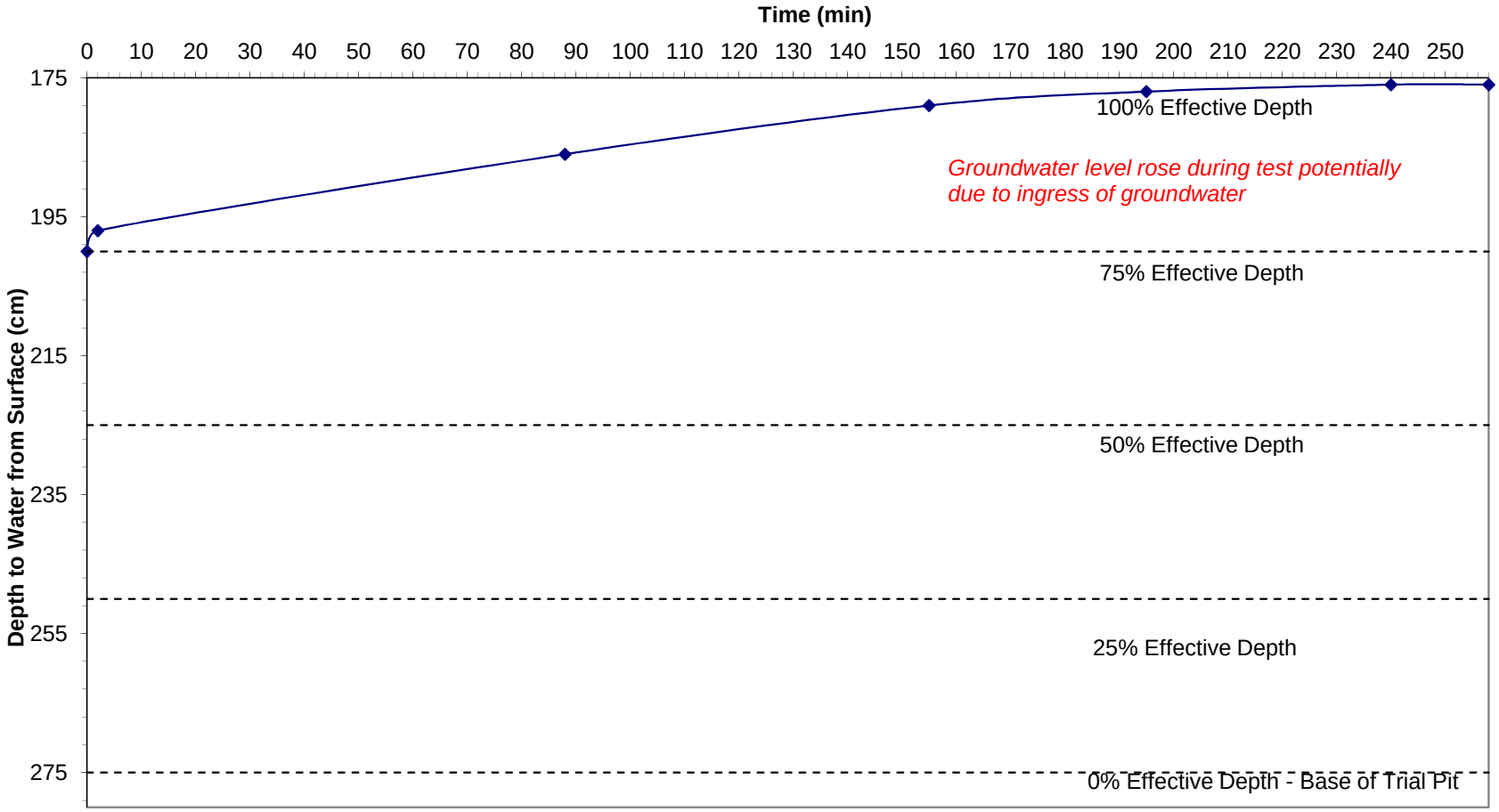
Time (min)	Depth from Surface (cm)	% Effective Depth
0	200	100%
2	197	103%
88	186	114%
155	179	121%
195	177	123%
240	176	124%
258	176	124%
End of Test		

Parameter	Symbol	Calculation	Units	IT03 Test 1
Effective Depth of Trial Pit	d_p		m	1.00
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.60
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.56
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.78
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.76
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-3**

Figure D-3 **GEG-14-366** **Haverhill** **IT03 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT04 Test 1**

Depth of Pit (cm): 310
Depth of Water at Start of Depth (cm): 210
Date of Test: 21 November 2014

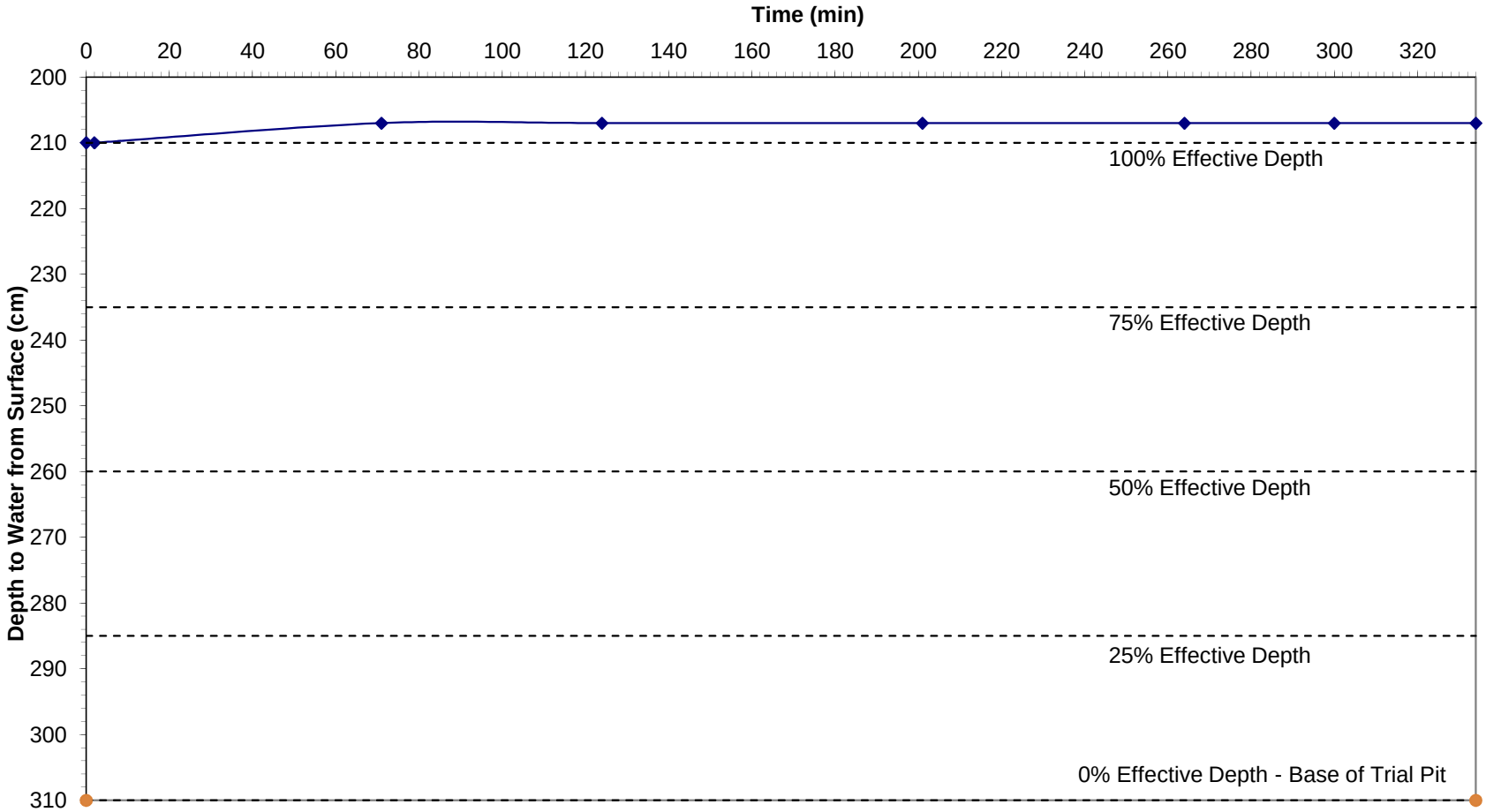
Time (min)	Depth from Surface (cm)	% Effective Depth
0	210	100%
2	210	100%
71	207	103%
124	207	103%
201	207	103%
264	207	103%
300	207	103%
334	207	103%
End of Test		

Parameter	Symbol	Calculation	Units	IT04 Test 1
Effective Depth of Trial Pit	d_p		m	1.00
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.50
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.50
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.75
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.60
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-4**

Figure D-4 **GEG-14-366** **Haverhill** **IT04 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT05 Test 1**

Depth of Pit (cm): 290
Depth of Water at Start of Depth (cm): 190
Date of Test: 21 November 2014

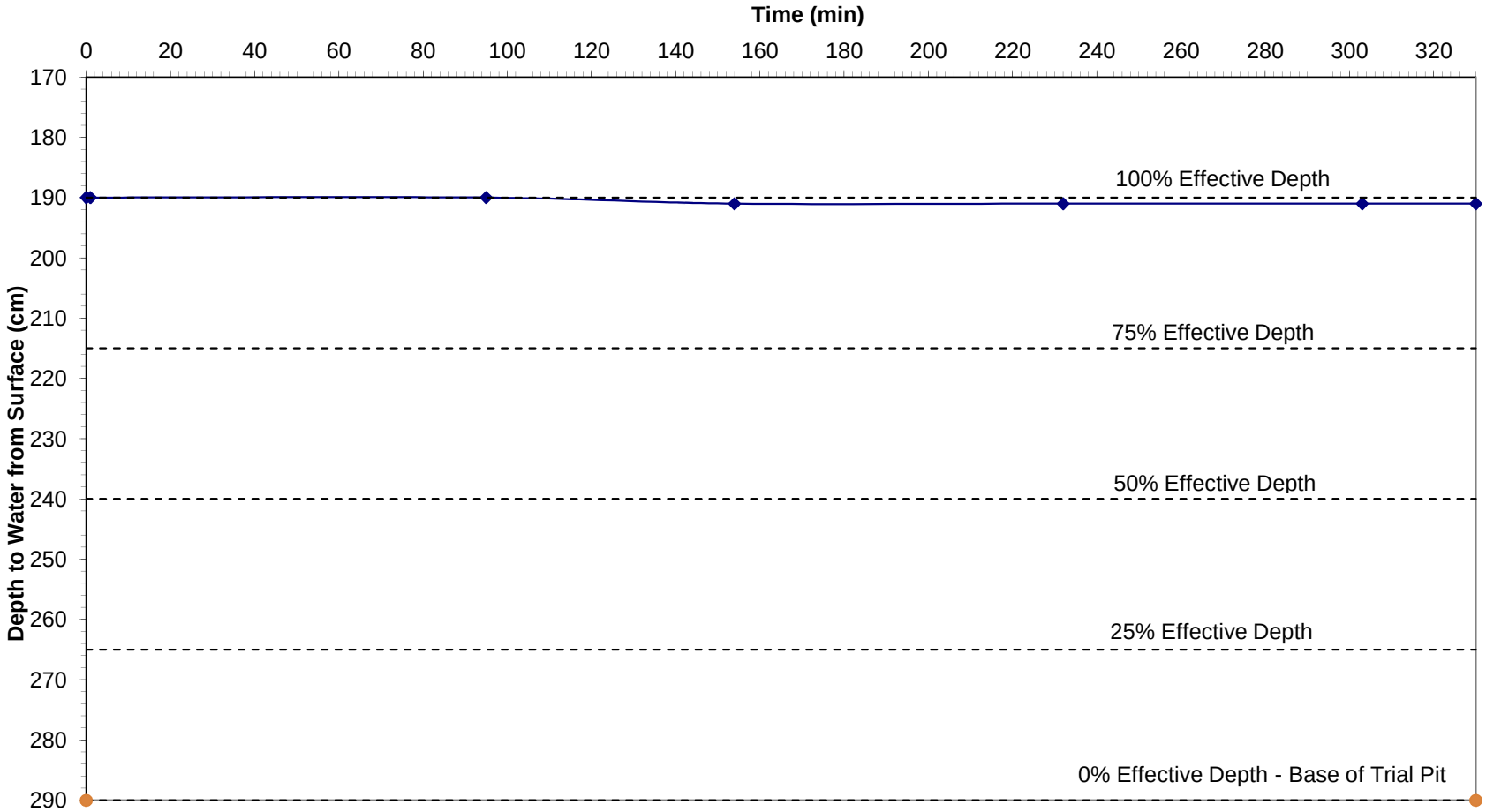
Time (min)	Depth from Surface (cm)	% Effective Depth
0	190	100%
1	190	100%
95	190	100%
154	191	99%
232	191	99%
303	191	99%
330	191	99%
End of Test		

Parameter	Symbol	Calculation	Units	IT05 Test 1
Effective Depth of Trial Pit	d_p		m	1.00
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.50
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.50
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.75
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.60
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-5**

Figure D-5 **GEG-14-366** **Haverhill** **IT05 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT06 Test 1**

Depth of Pit (cm): 300
Depth of Water at Start of Depth (cm): 200
Date of Test: 25 November 2014

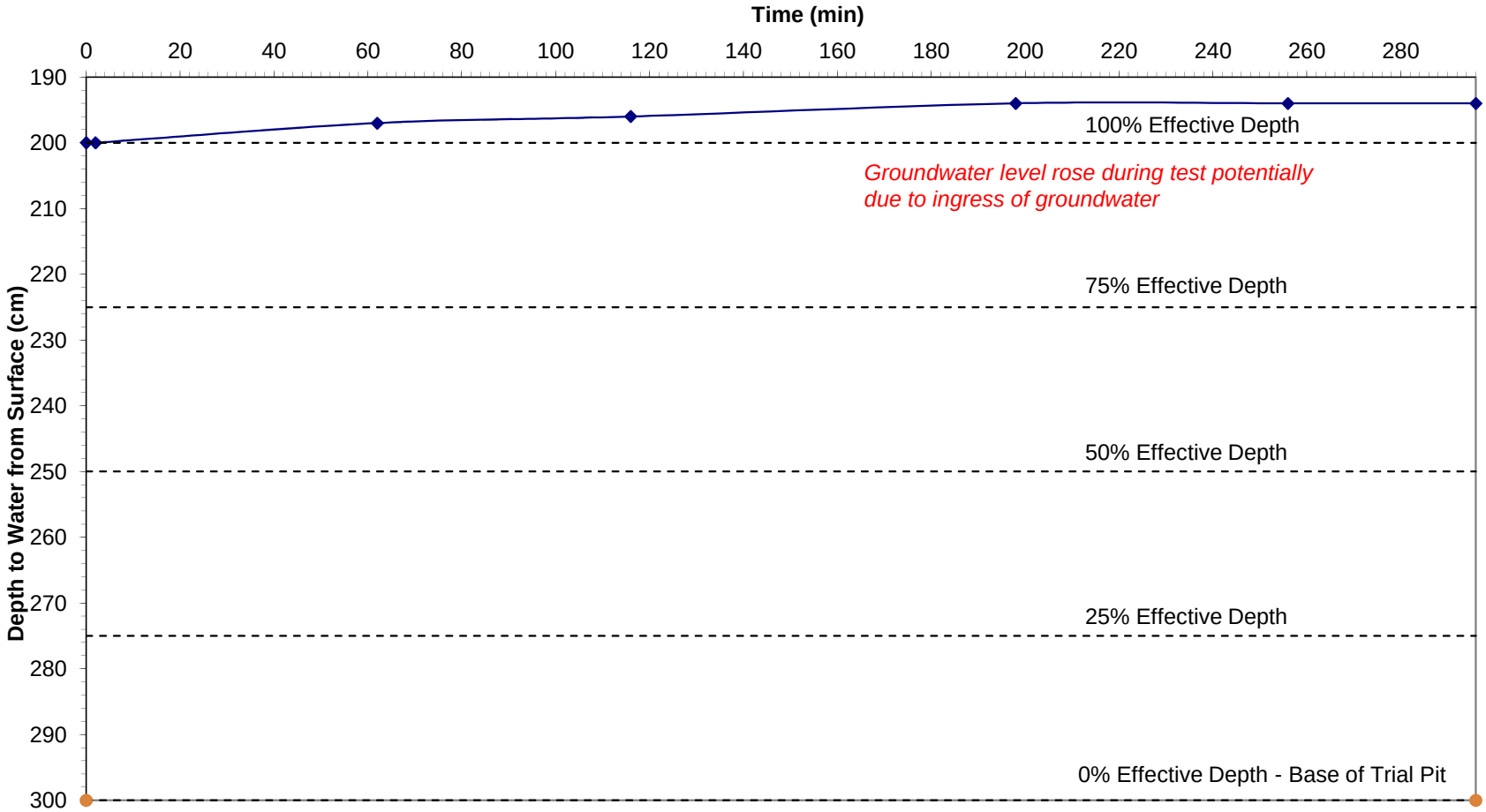
Time (min)	Depth from Surface (cm)	% Effective Depth
0	200	100%
2	200	100%
62	197	103%
116	196	104%
198	194	106%
256	194	106%
296	194	106%
End of Test		

Parameter	Symbol	Calculation	Units	IT06 Test 1
Effective Depth of Trial Pit	d_p		m	1.00
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.50
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.50
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.75
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.60
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-6**

Figure D-6 **GEG-14-366** **Haverhill** **IT06 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT07 Test 1**

Depth of Pit (cm): 300
Depth of Water at Start of Depth (cm): 197
Date of Test: 21 November 2014

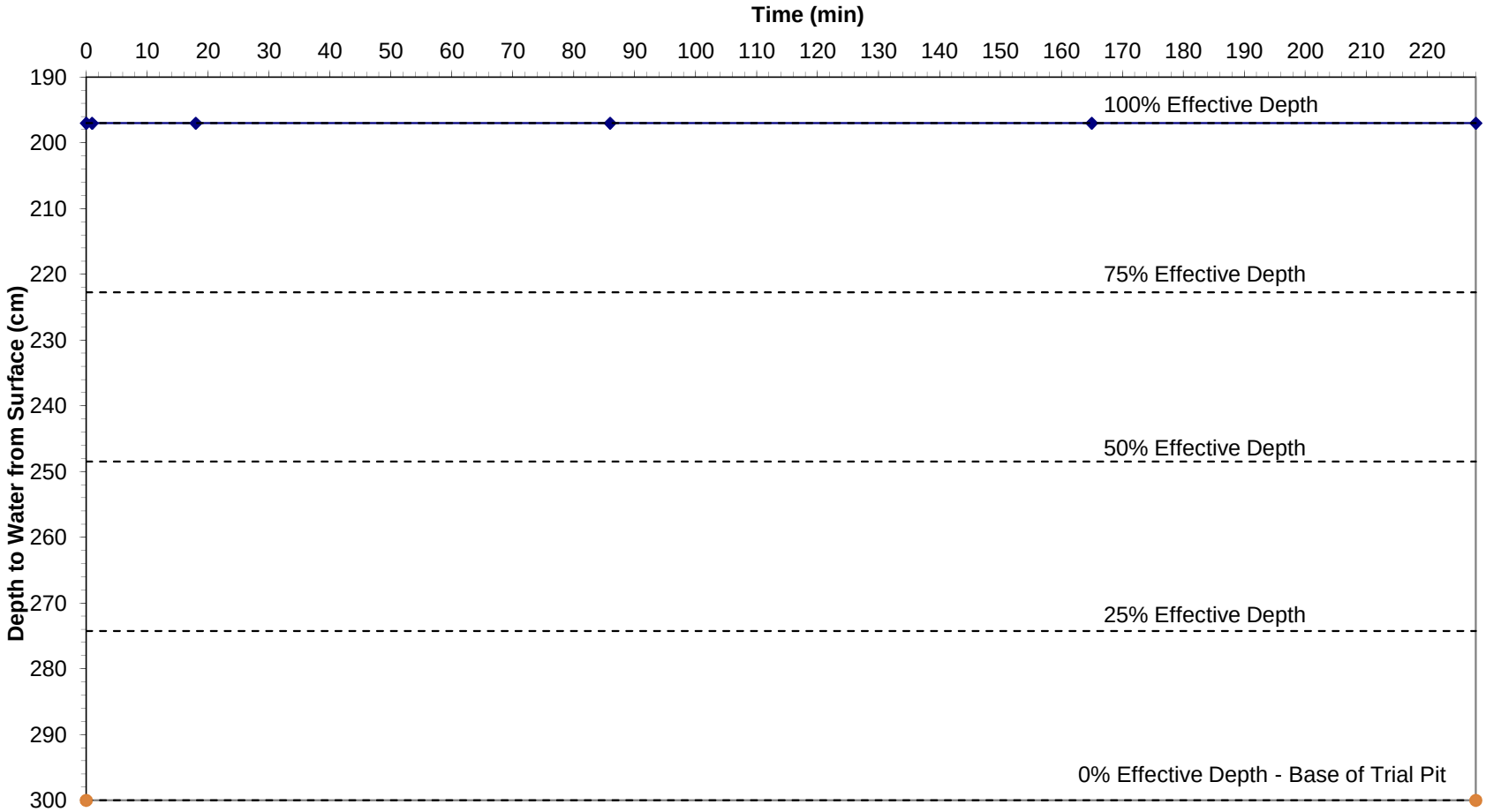
Time (min)	Depth from Surface (cm)	% Effective Depth
0	197	100%
1	197	100%
18	197	100%
86	197	100%
165	197	100%
228	197	100%
End of Test		

Parameter	Symbol	Calculation	Units	IT07 Test 1
Effective Depth of Trial Pit	d_p		m	1.03
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.50
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.55
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.7725
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.69
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-7**

Figure D-7 **GEG-14-366** **Haverhill** **IT07 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT08 Test 1**

Depth of Pit (cm): 298
Depth of Water at Start of Depth (cm): 192
Date of Test: 24 November 2014

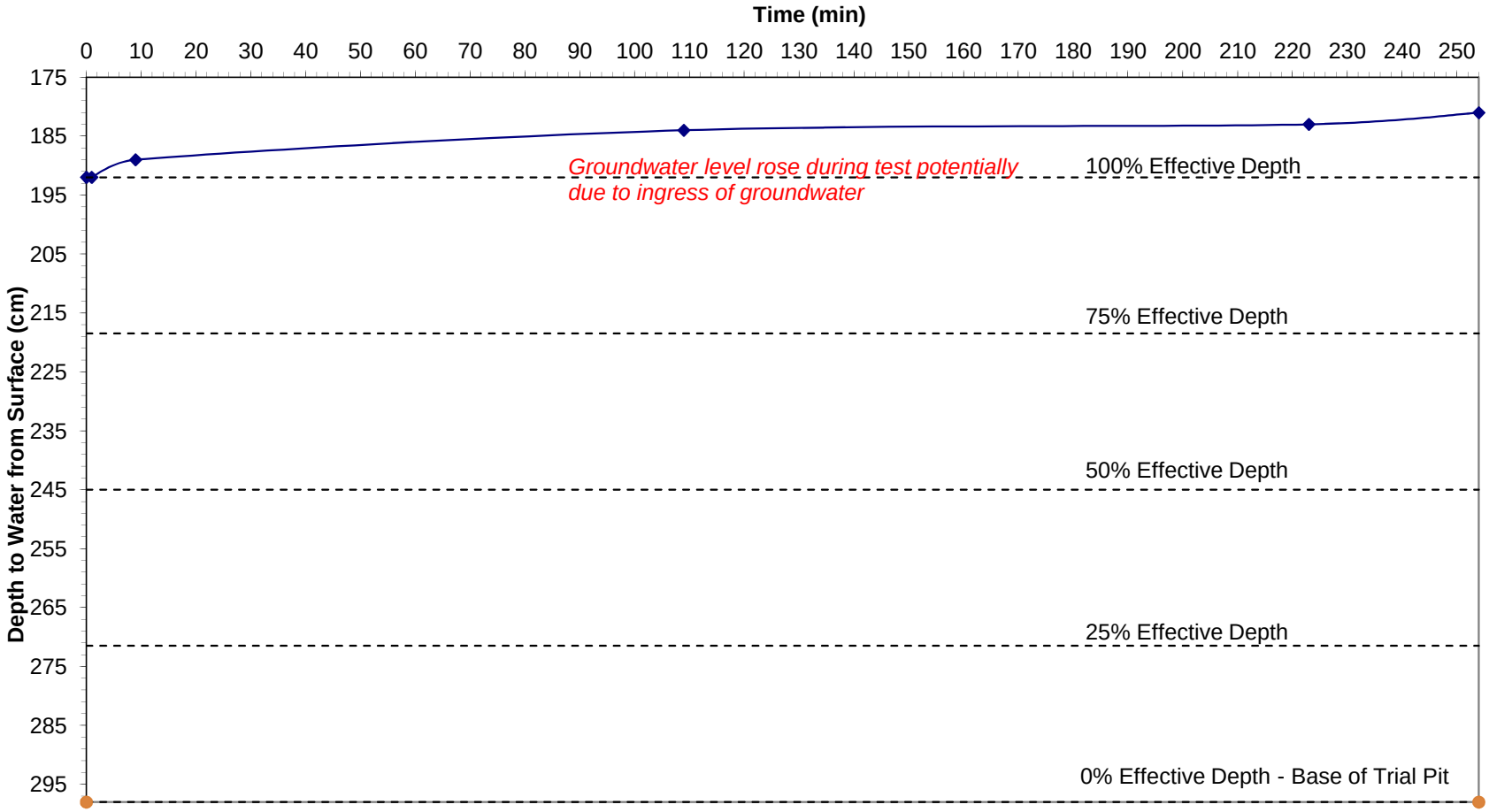
Time (min)	Depth from Surface (cm)	% Effective Depth
0	192	100%
1	192	100%
9	189	103%
109	184	108%
223	183	108%
254	181	110%
End of Test		

Parameter	Symbol	Calculation	Units	IT08 Test 1
Effective Depth of Trial Pit	d_p		m	1.06
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.55
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.62
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.8109
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.87
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-8**

Figure D-8 **GEG-14-366** **Haverhill** **IT08 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT09 Test 1**

Depth of Pit (cm): 400
Depth of Water at Start of Depth (cm): 294
Date of Test: 21 November 2014

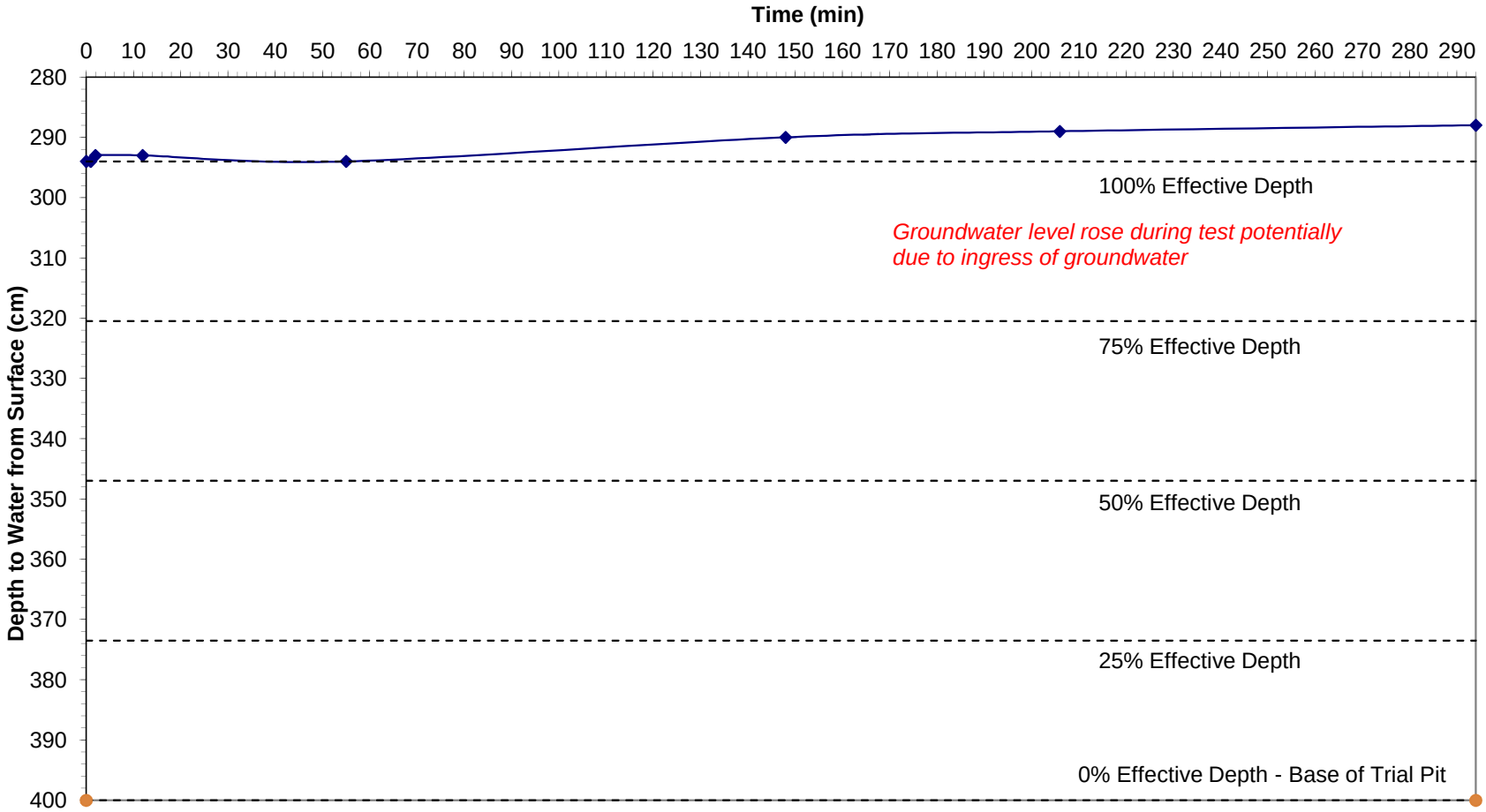
Time (min)	Depth from Surface (cm)	% Effective Depth
0	294	100%
1	294	100%
2	293	101%
12	293	101%
55	294	100%
148	290	104%
206	289	105%
294	288	106%
End of Test		

Parameter	Symbol	Calculation	Units	IT09 Test 1
Effective Depth of Trial Pit	d_p		m	1.06
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.40
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.53
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.7632
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.62
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-9**

Figure D-9 **GEG-14-366** **Haverhill** **IT09 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT10 Test 1**

Depth of Pit (cm): 320
Depth of Water at Start of Depth (cm): 223
Date of Test: 21 November 2014

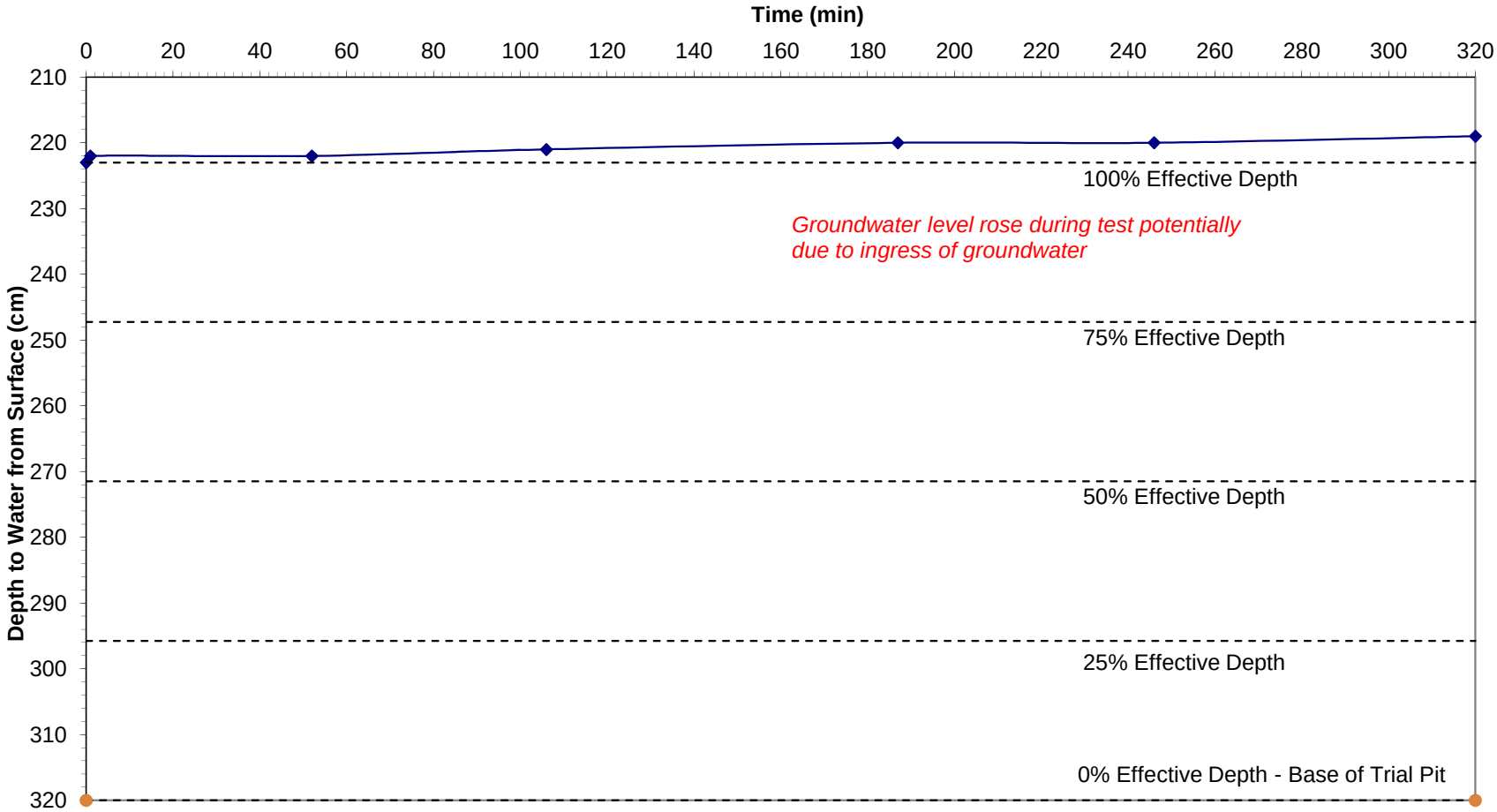
Time (min)	Depth from Surface (cm)	% Effective Depth
0	223	100%
1	222	101%
52	222	101%
106	221	102%
187	220	103%
246	220	103%
320	219	104%
End of Test		

Parameter	Symbol	Calculation	Units	IT10 Test 1
Effective Depth of Trial Pit	d_p		m	0.97
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	1.90
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.11
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.5529
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	3.57
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-10**

Figure D-10 **GEG-14-366** **Haverhill** **IT10 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT11 Test 1**

Depth of Pit (cm): 230
Depth of Water at Start of Depth (cm): 128
Date of Test: 20 November 2014

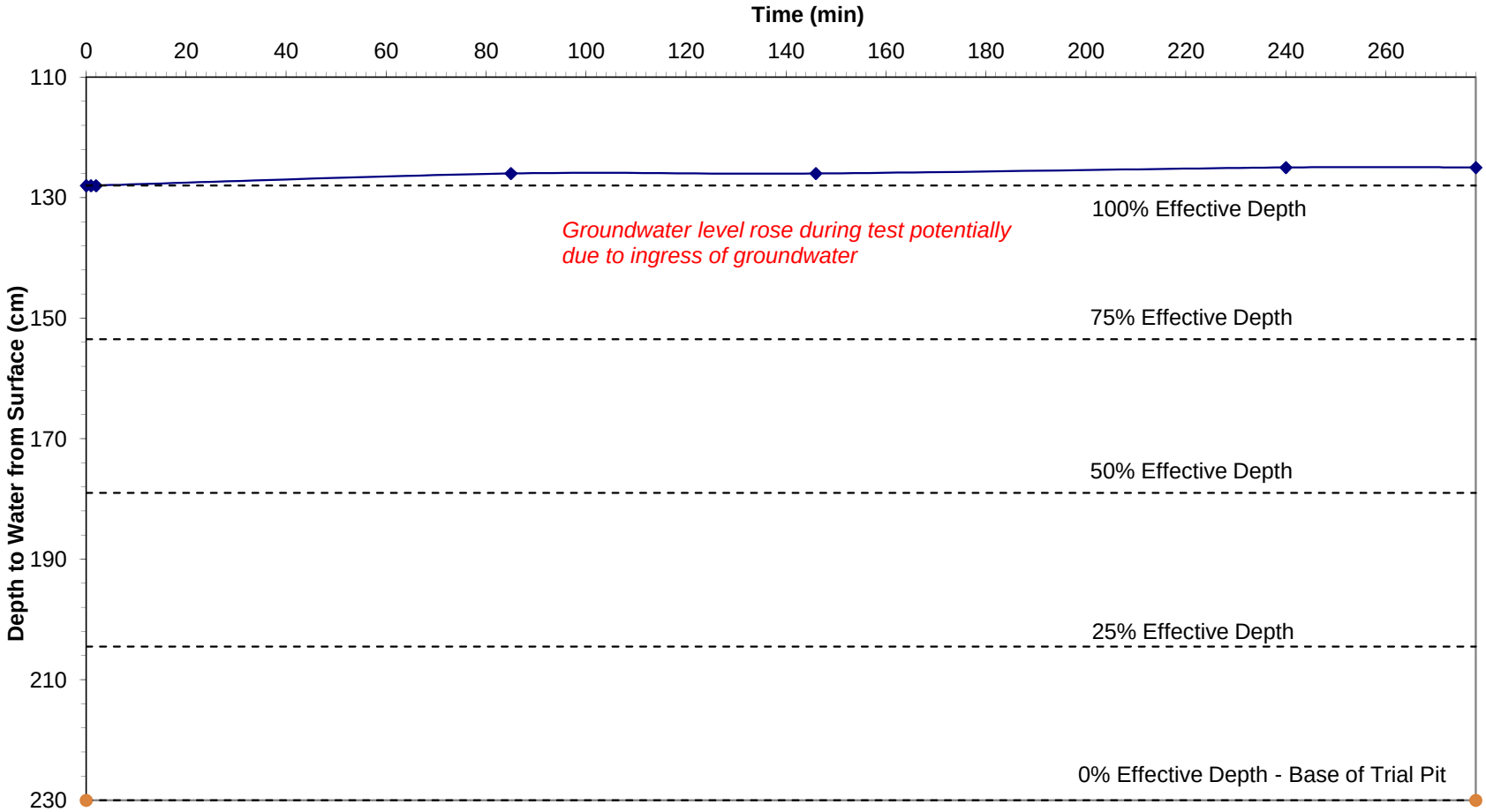
Time (min)	Depth from Surface (cm)	% Effective Depth
0	128	100%
1	128	100%
2	128	100%
85	126	102%
146	126	102%
240	125	103%
278	125	103%
End of Test		

Parameter	Symbol	Calculation	Units	IT11 Test 1
Effective Depth of Trial Pit	d_p		m	1.02
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	1.70
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.04
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.5202
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	3.37
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-11**

Figure D-11 **GEG-14-366** **Haverhill** **IT11 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT12 Test 1**

Depth of Pit (cm): 310
Depth of Water at Start of Depth (cm): 206
Date of Test: 20 November 2014

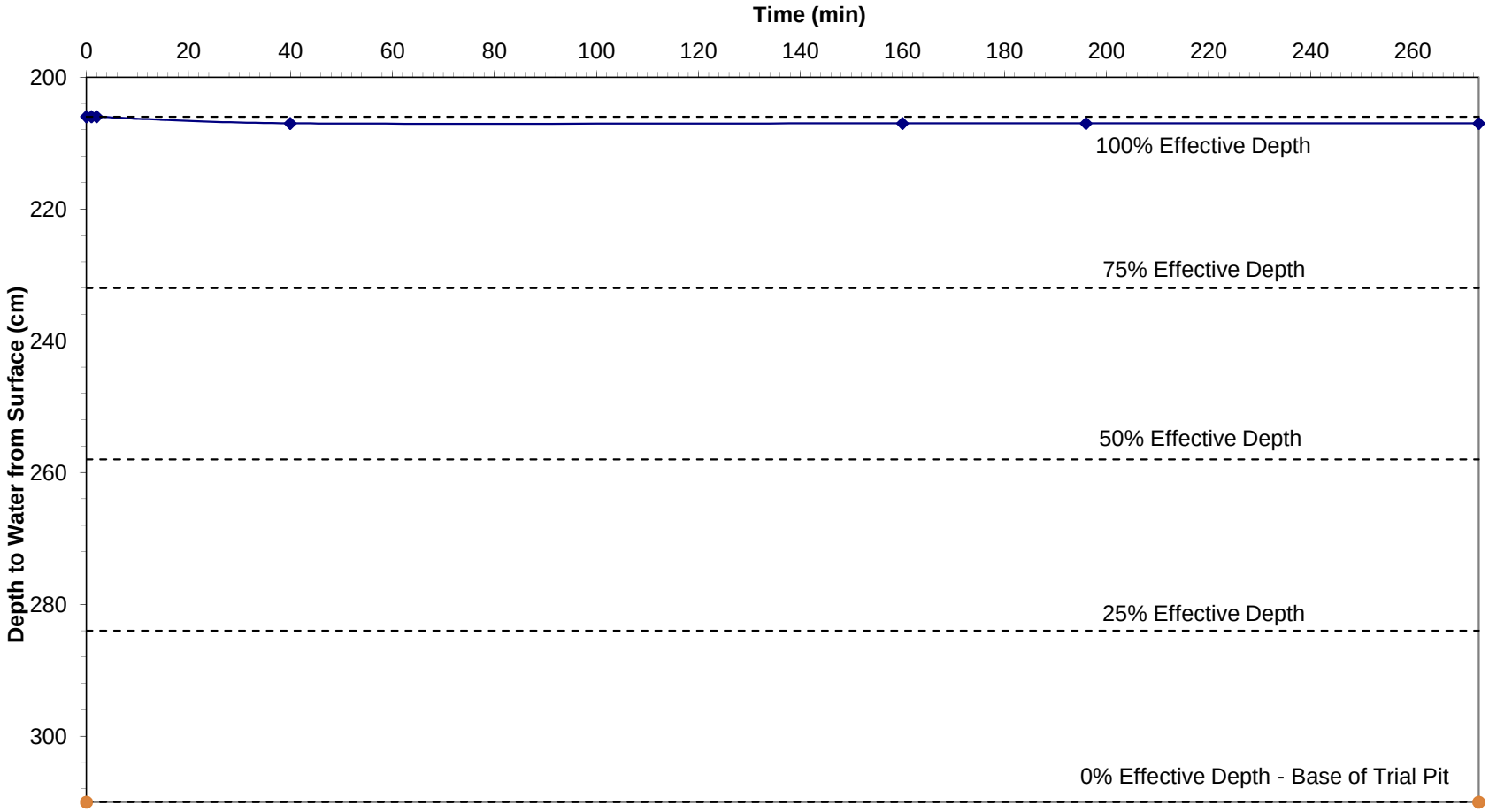
Time (min)	Depth from Surface (cm)	% Effective Depth
0	206	100%
1	206	100%
2	206	100%
40	207	99%
160	207	99%
196	207	99%
273	207	99%
End of Test		

Parameter	Symbol	Calculation	Units	IT12 Test 1
Effective Depth of Trial Pit	d_p		m	1.04
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	1.70
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.06
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.5304
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	3.41
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-12**

Figure D-12 **GEG-14-366** **Haverhill** **IT12 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT13 Test 1**

Depth of Pit (cm): 310
Depth of Water at Start of Depth (cm): 185
Date of Test: 19 November 2014

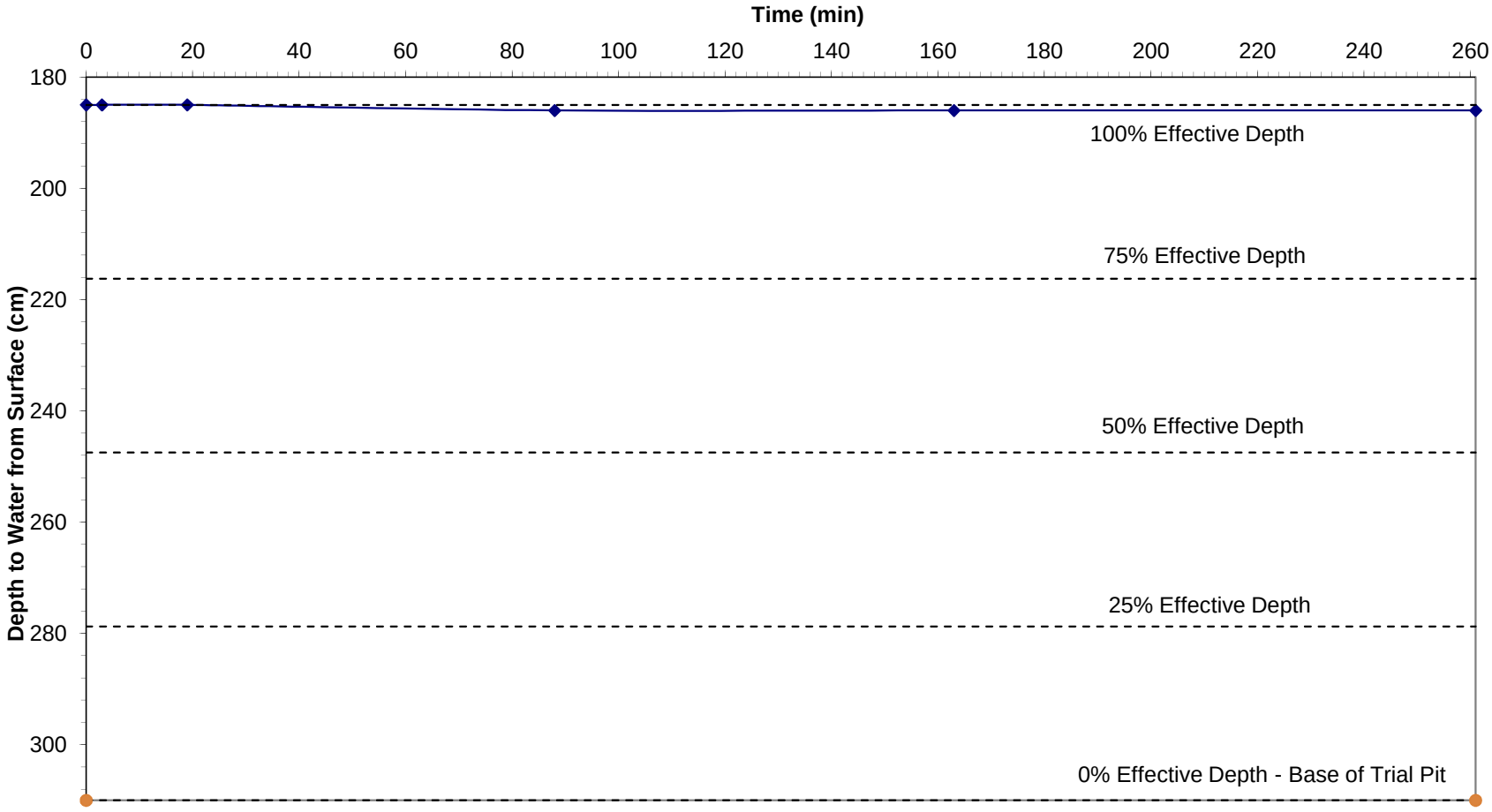
Time (min)	Depth from Surface (cm)	% Effective Depth
0	185	100%
3	185	100%
19	185	100%
88	186	99%
163	186	99%
261	186	99%
End of Test		

Parameter	Symbol	Calculation	Units	IT13 Test 1
Effective Depth of Trial Pit	d_p		m	1.25
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.50
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.88
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.9375
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	5.38
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-13**

Figure D-13 **GEG-14-366** **Haverhill** **IT13 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT14 Test 1**

Depth of Pit (cm): 340
Depth of Water at Start of Depth (cm): 238
Date of Test: 19 November 2014

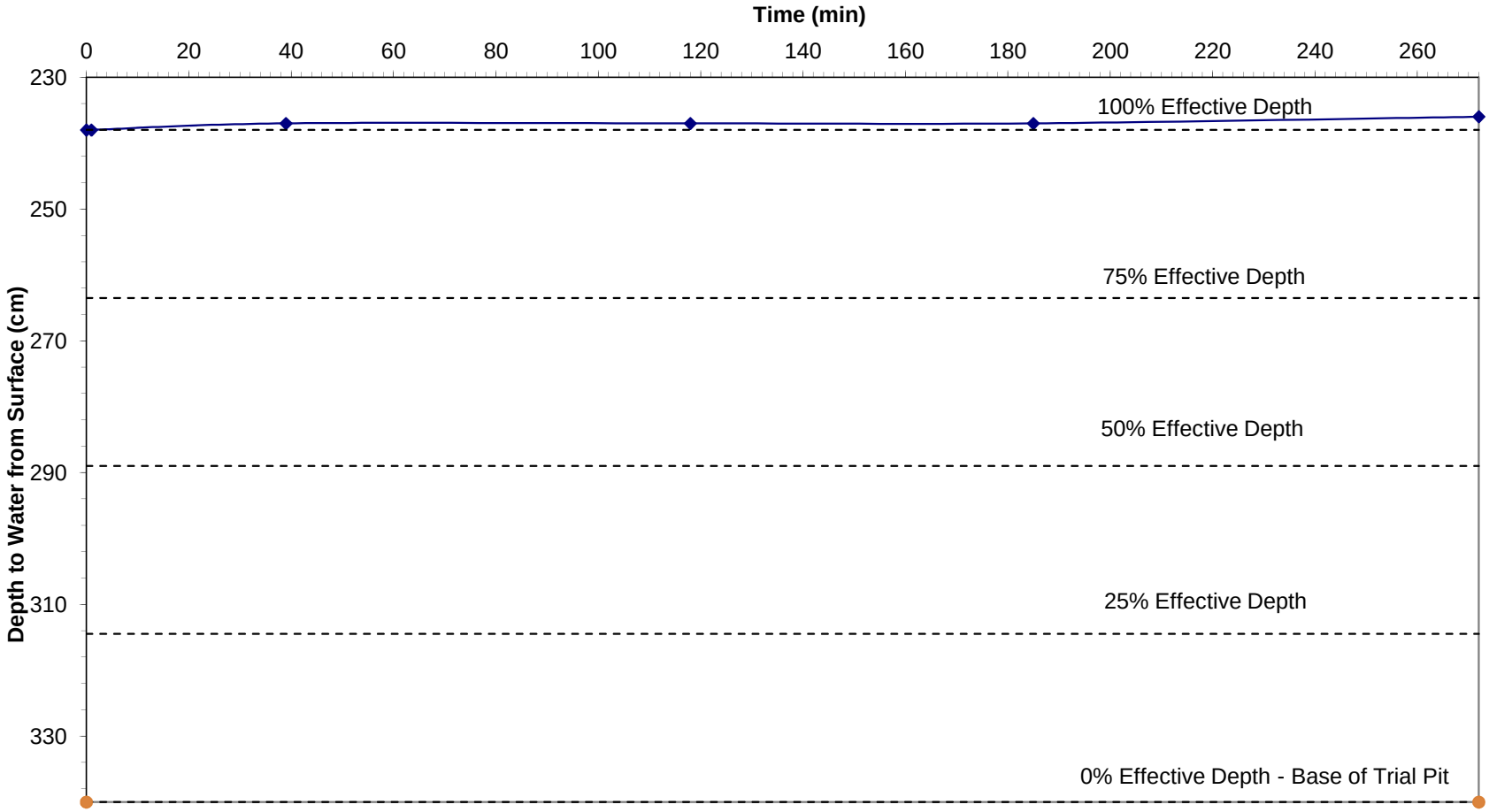
Time (min)	Depth from Surface (cm)	% Effective Depth
0	238	100%
1	238	100%
39	237	101%
118	237	101%
185	237	101%
272	236	102%
End of Test		

Parameter	Symbol	Calculation	Units	IT14 Test 1
Effective Depth of Trial Pit	d_p		m	1.02
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.40
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.47
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.7344
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.50
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-14**

Figure D-14 **GEG-14-366** **Haverhill** **IT14 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT15 Test 1**

Depth of Pit (cm): 260
Depth of Water at Start of Depth (cm): 178
Date of Test: 19 November 2014

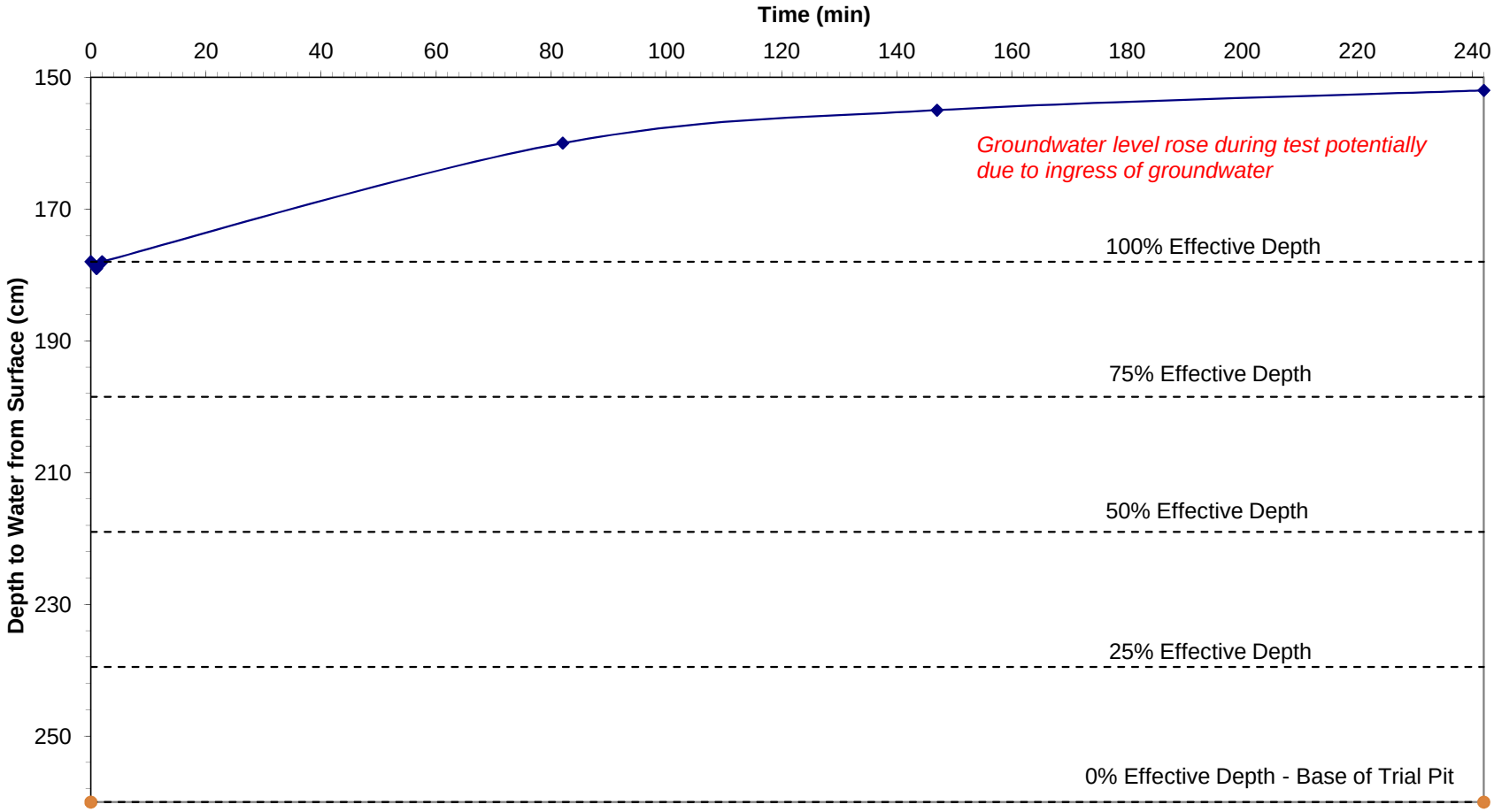
Time (min)	Depth from Surface (cm)	% Effective Depth
0	178	100%
1	179	99%
2	178	100%
82	160	122%
147	155	128%
242	152	132%
End of Test		

Parameter	Symbol	Calculation	Units	IT15 Test 1
Effective Depth of Trial Pit	d_p		m	0.82
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.50
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.23
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.615
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.04
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-15**

Figure D-15 **GEG-14-366** **Haverhill** **IT15 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT16 Test 1**

Depth of Pit (cm): 295
Depth of Water at Start of Depth (cm): 195
Date of Test: 20 November 2014

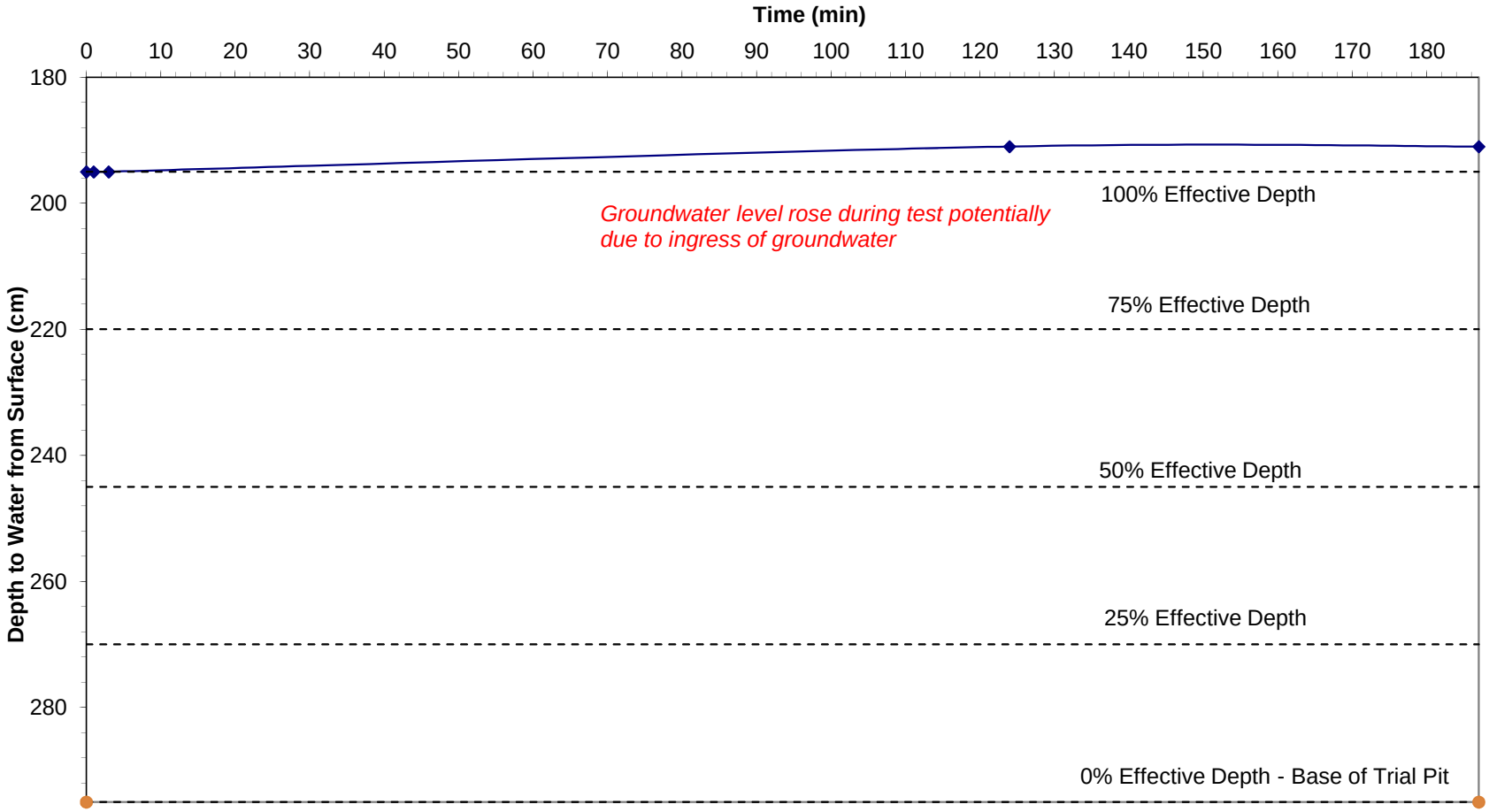
Time (min)	Depth from Surface (cm)	% Effective Depth
0	195	100%
1	195	100%
3	195	100%
124	191	104%
187	191	104%
End of Test		

Parameter	Symbol	Calculation	Units	IT16 Test 1
Effective Depth of Trial Pit	d_p		m	1.00
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.70
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.62
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.81
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.92
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-16**

Figure D-16 **GEG-14-366** **Haverhill** **IT16 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT17 Test 1**

Depth of Pit (cm): 275
Depth of Water at Start of Depth (cm): 174
Date of Test: 19 November 2014

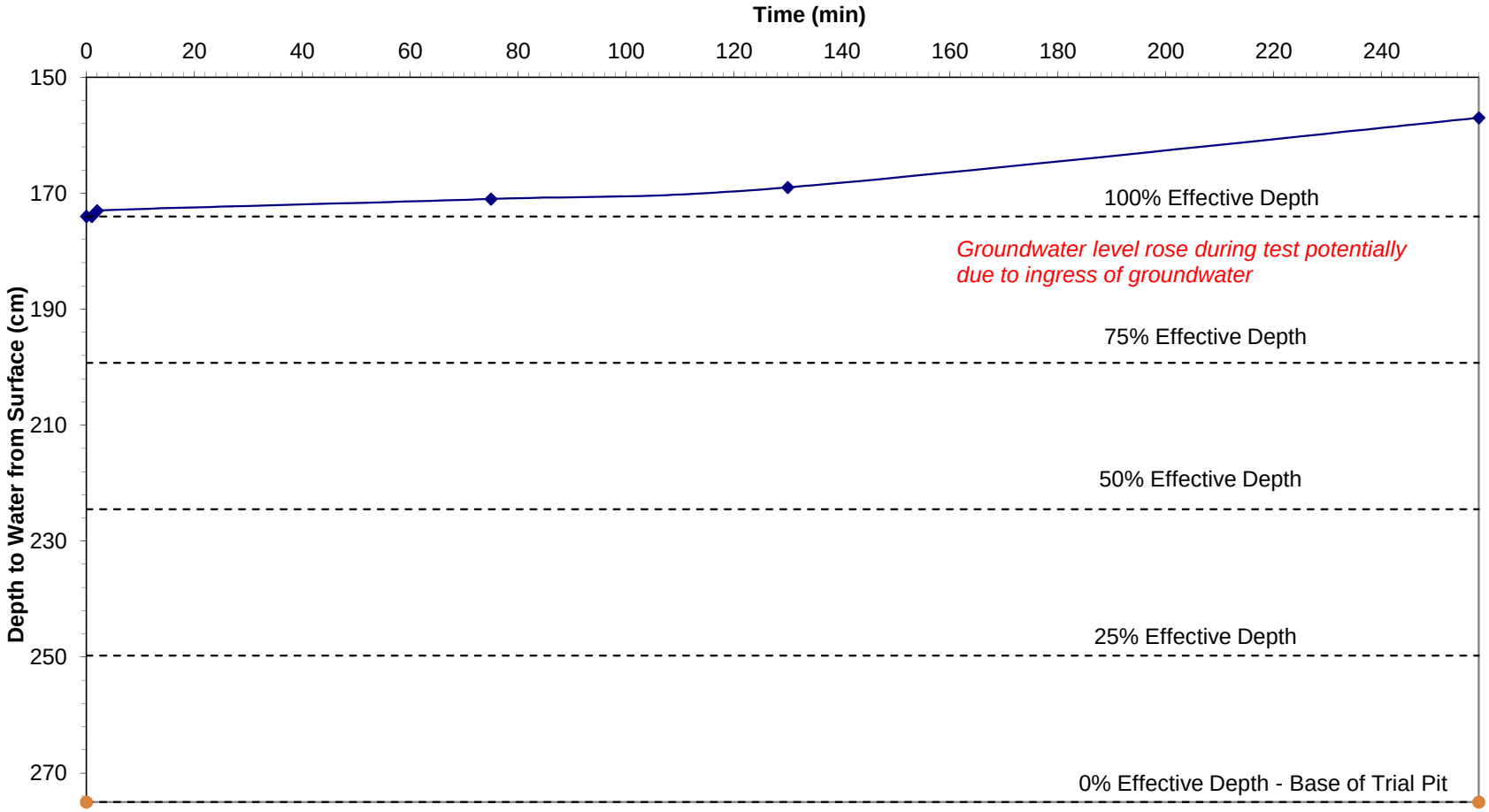
Time (min)	Depth from Surface (cm)	% Effective Depth
0	174	100%
1	174	100%
2	173	101%
75	171	103%
130	169	105%
258	157	117%
End of Test		

Parameter	Symbol	Calculation	Units	IT17 Test 1
Effective Depth of Trial Pit	d_p		m	1.01
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.40
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.45
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.7272
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.47
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-17**

Figure D-17 **GEG-14-366** **Haverhill** **IT17 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT18 Test 1**

Depth of Pit (cm): 300
Depth of Water at Start of Depth (cm): 183
Date of Test: 20 November 2014

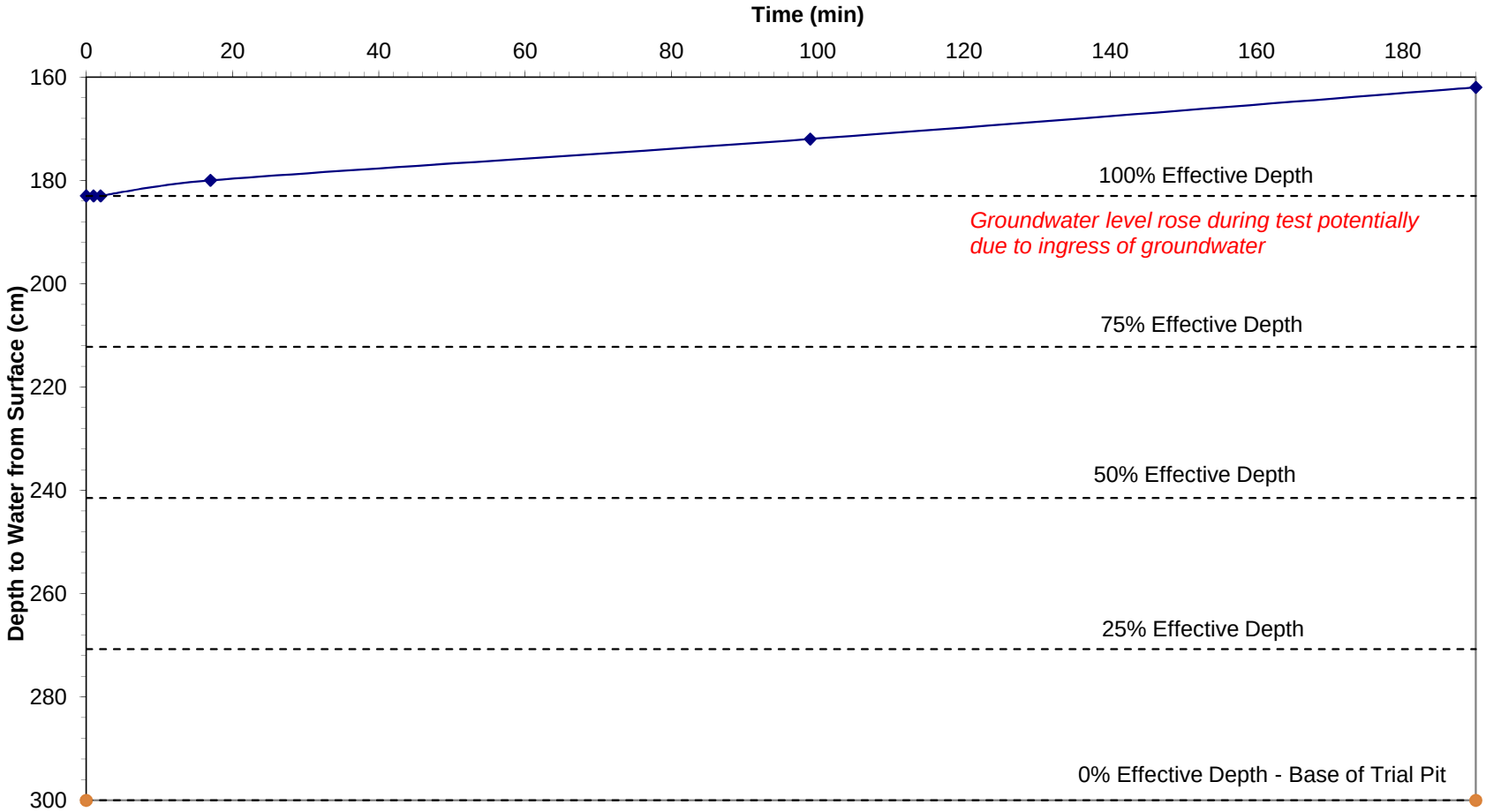
Time (min)	Depth from Surface (cm)	% Effective Depth
0	183	100%
1	183	100%
2	183	100%
17	180	103%
99	172	109%
190	162	118%
End of Test		

Parameter	Symbol	Calculation	Units	IT18 Test 1
Effective Depth of Trial Pit	d_p		m	1.17
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	1.50
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.05
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.5265
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	3.36
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-18**

Figure D-18 **GEG-14-366** **Haverhill** **IT18 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT19 Test 1**

Depth of Pit (cm): 330
Depth of Water at Start of Depth (cm): 225
Date of Test: 20 November 2014

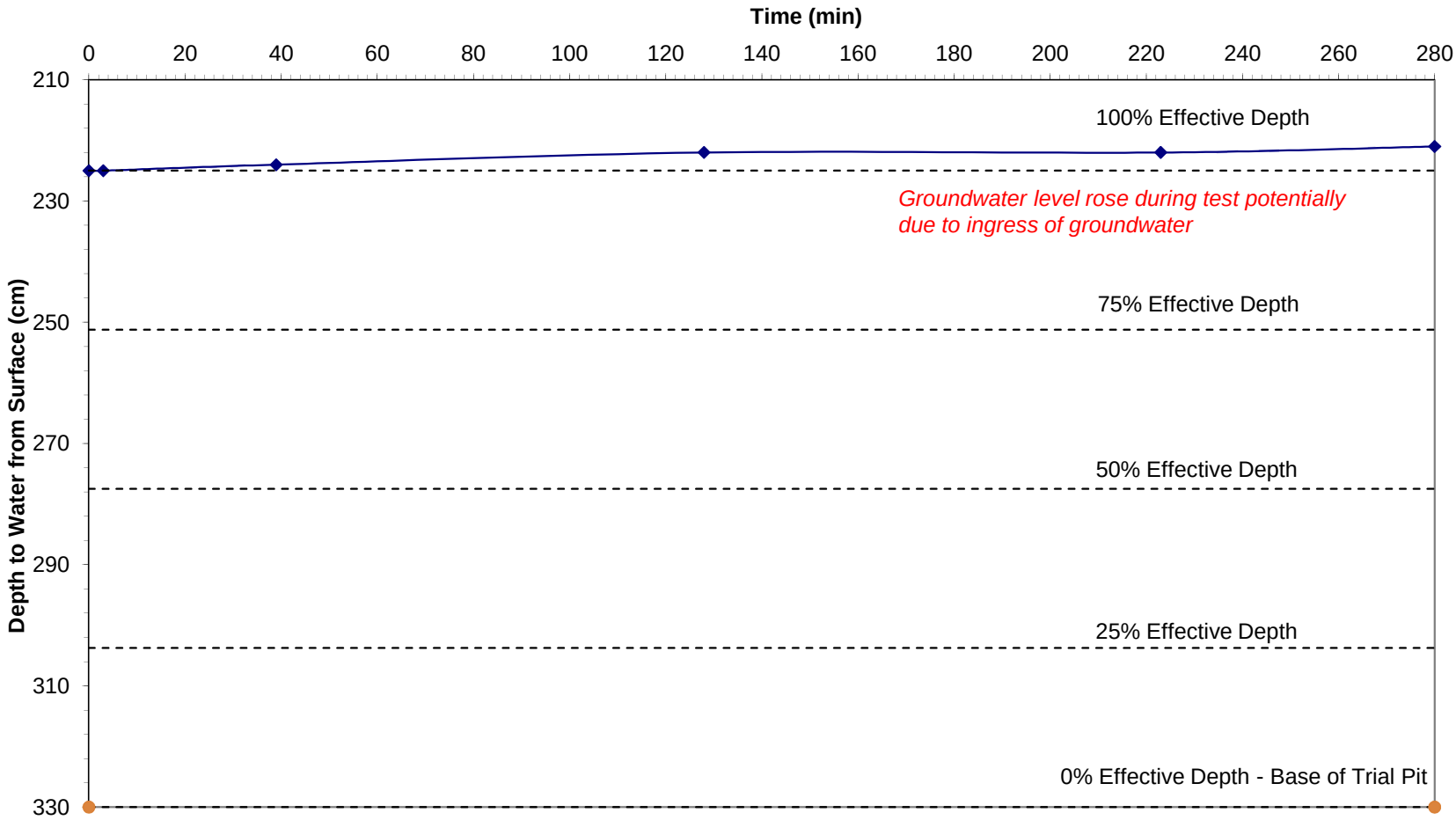
Time (min)	Depth from Surface (cm)	% Effective Depth
0	225	100%
3	225	100%
39	224	101%
128	222	103%
223	222	103%
280	221	104%
End of Test		

Parameter	Symbol	Calculation	Units	IT19 Test 1
Effective Depth of Trial Pit	d_p		m	1.05
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	1.70
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.07
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.5355
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	3.44
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-19**

Figure D-19 **GEG-14-366** **Haverhill** **IT19 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT20 Test 1**

Depth of Pit (cm): 130
Depth of Water at Start of Depth (cm): 30
Date of Test: 20 November 2014

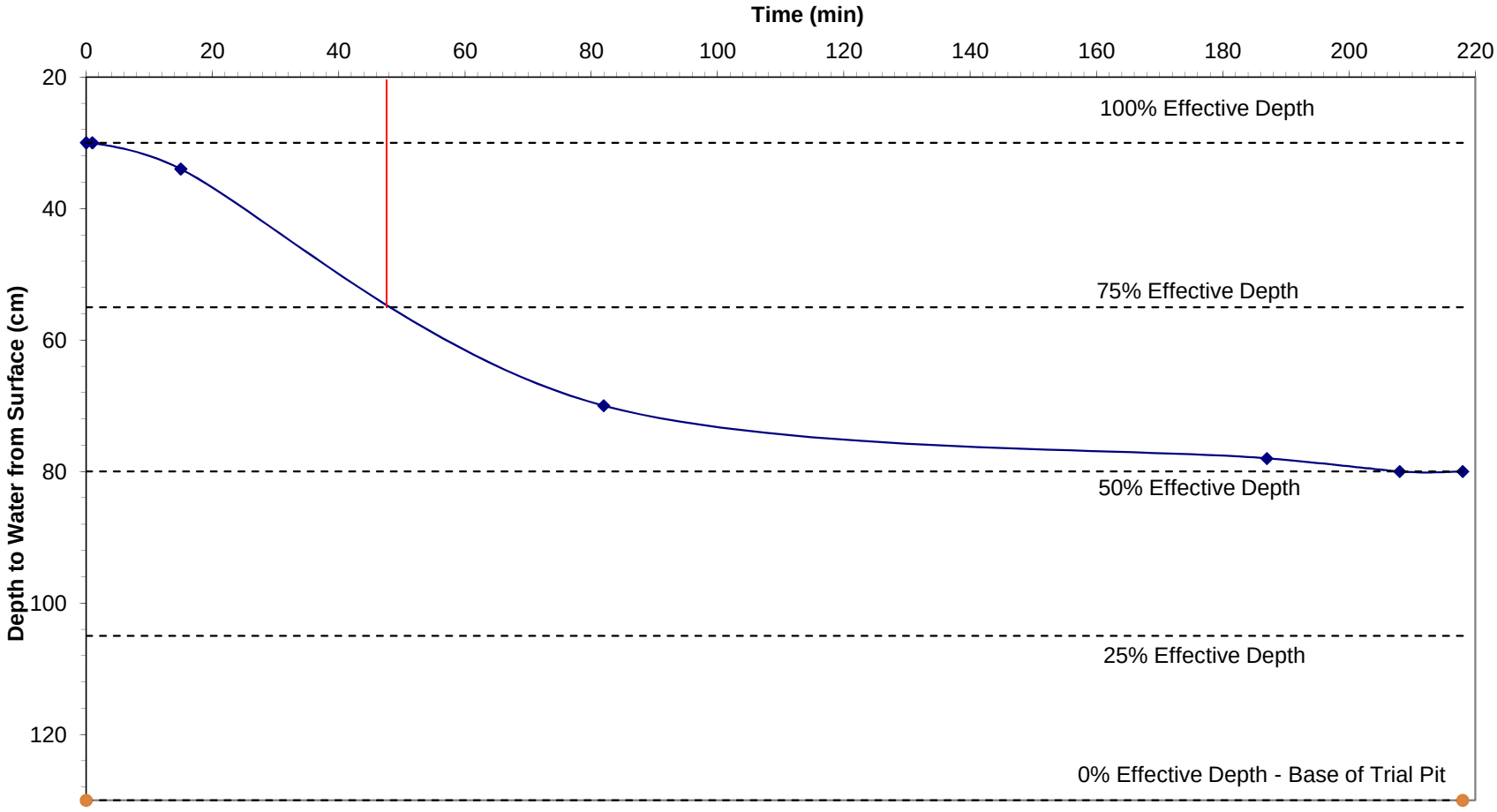
Time (min)	Depth from Surface (cm)	% Effective Depth
0	30	100%
1	30	100%
15	34	96%
82	70	60%
187	78	52%
208	80	50%
218	80	50%
End of Test		

Parameter	Symbol	Calculation	Units	IT20 Test 1
Effective Depth of Trial Pit	d_p		m	1.00
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.70
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.62
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.81
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.92
Time to reach 75% Effective Depth	$T_{p75\%}$		min	47.90
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-20**

Figure D-20 **GEG-14-366** **Haverhill** **IT20 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT21 Test 1**

Depth of Pit (cm): 380
Depth of Water at Start of Depth (cm): 284
Date of Test: 21 November 2014

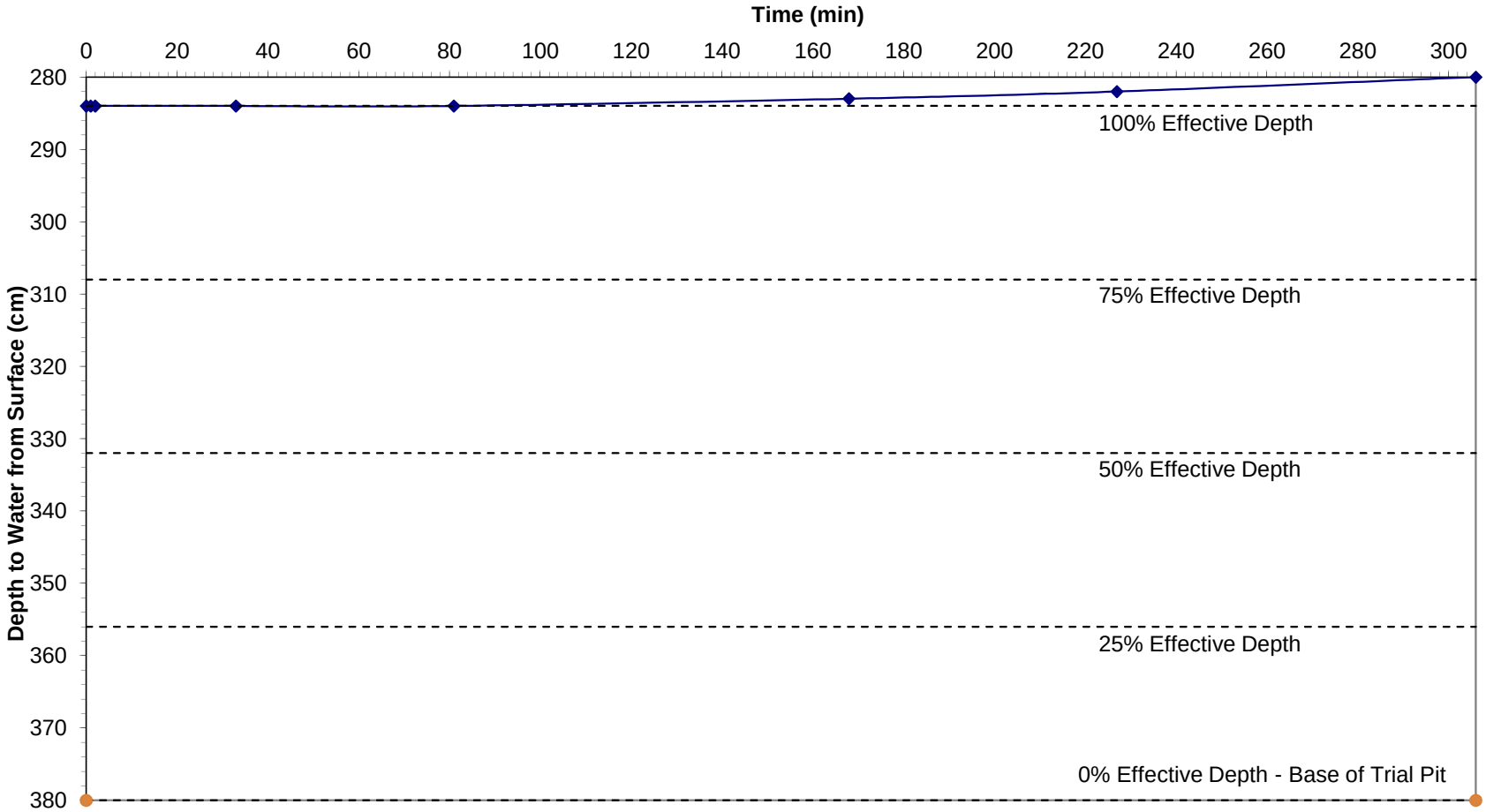
Time (min)	Depth from Surface (cm)	% Effective Depth
0	284	100%
1	284	100%
2	284	100%
33	284	100%
81	284	100%
168	283	101%
227	282	102%
306	280	104%
End of Test		

Parameter	Symbol	Calculation	Units	IT21 Test 1
Effective Depth of Trial Pit	d_p		m	0.96
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.10
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.21
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.6048
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	3.85
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-21**

Figure D-21 **GEG-14-366** **Haverhill** **IT21 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT22 Test 1**

Depth of Pit (cm): 350
Depth of Water at Start of Depth (cm): 250
Date of Test: 20 November 2014

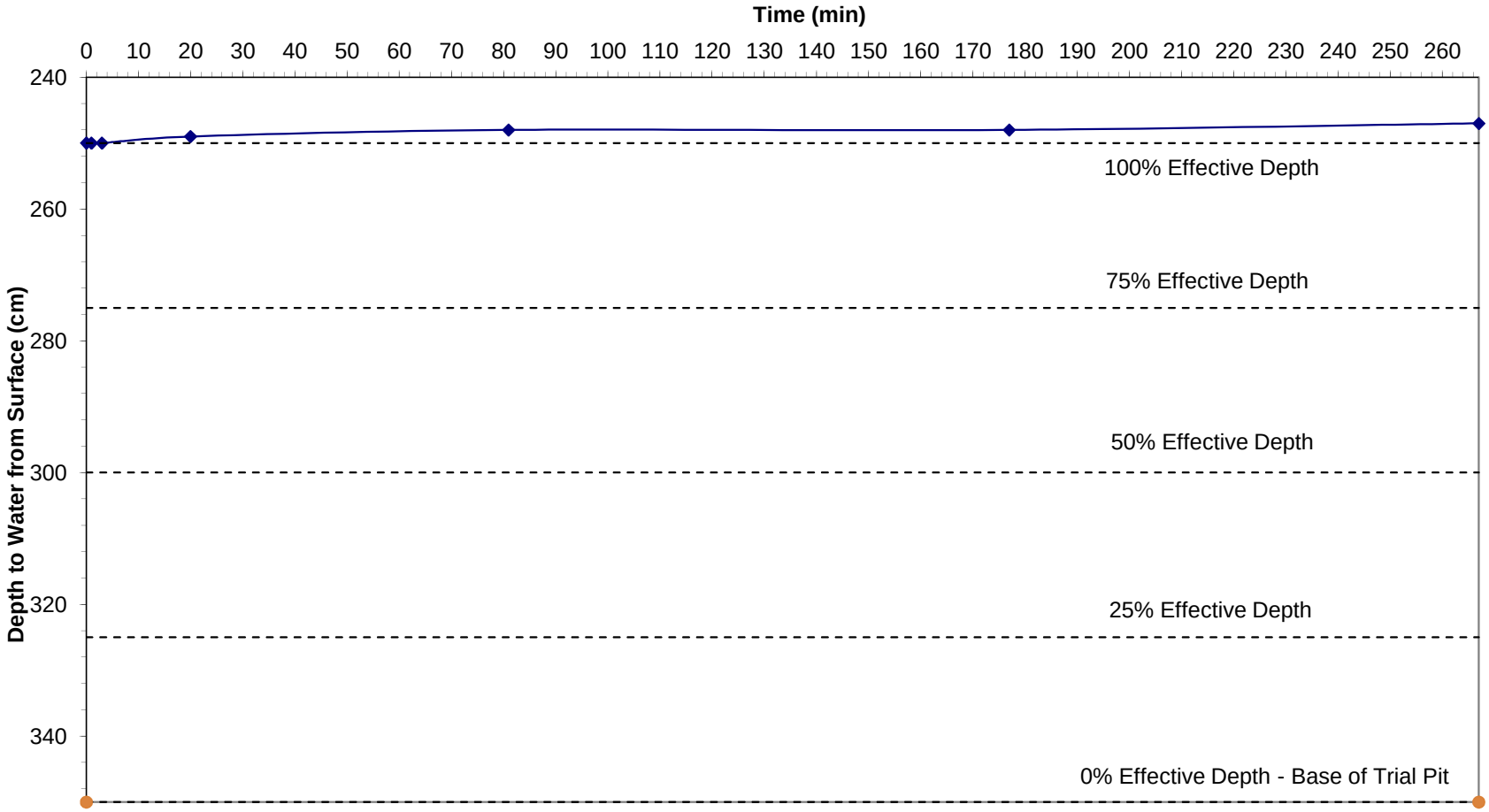
Time (min)	Depth from Surface (cm)	% Effective Depth
0	250	100%
1	250	100%
3	250	100%
20	249	101%
81	248	102%
177	248	102%
267	247	103%
End of Test		

Parameter	Symbol	Calculation	Units	IT22 Test 1
Effective Depth of Trial Pit	d_p		m	1.00
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	1.80
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.08
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.54
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	3.48
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-22**

Figure D-22 **GEG-14-366** **Haverhill** **IT22 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT23 Test 1**

Depth of Pit (cm): 296
Depth of Water at Start of Depth (cm): 193
Date of Test: 26 November 2014

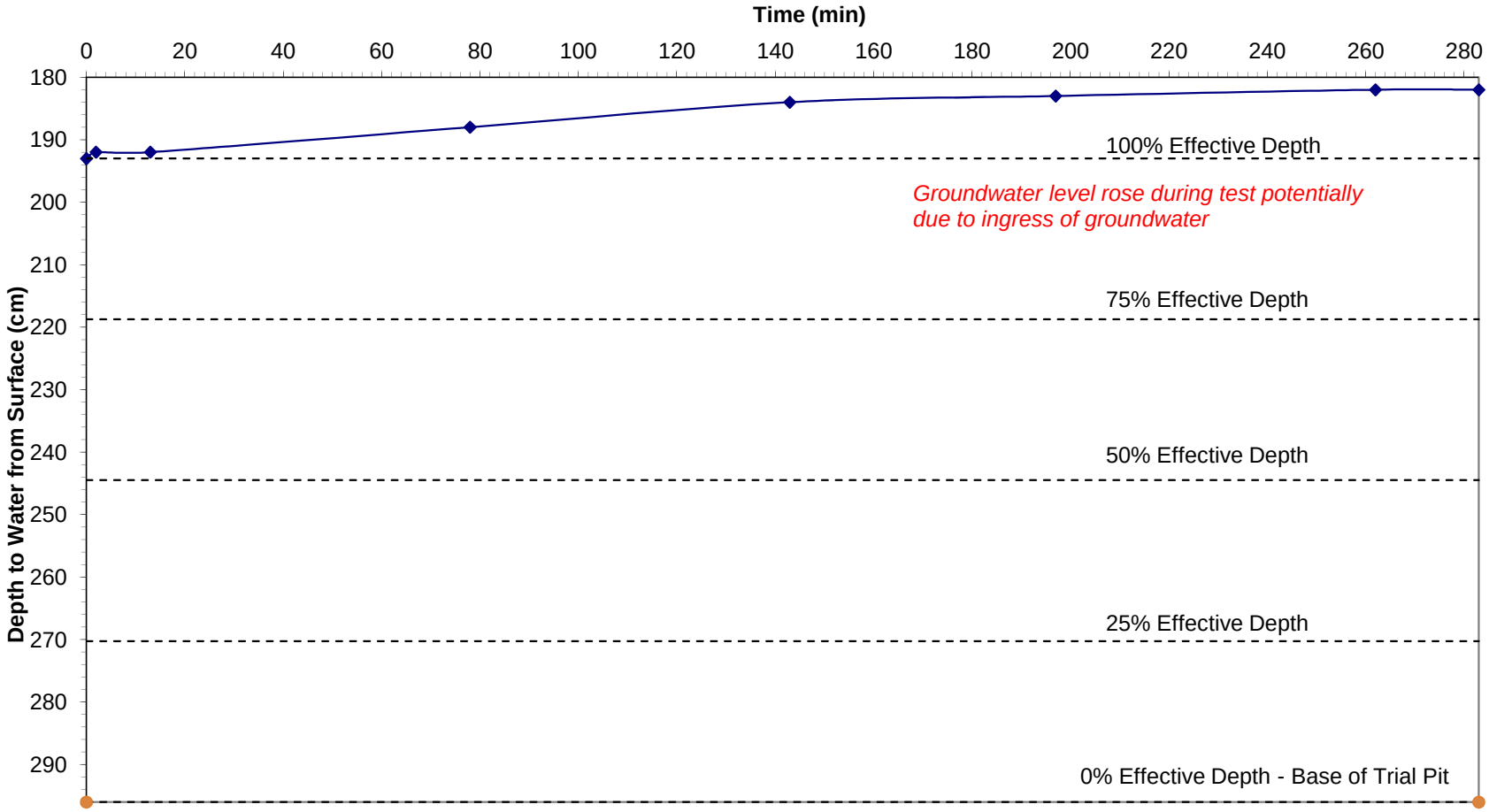
Time (min)	Depth from Surface (cm)	% Effective Depth
0	193	100%
2	192	101%
13	192	101%
78	188	105%
143	184	109%
197	183	110%
262	182	111%
283	182	111%
End of Test		

Parameter	Symbol	Calculation	Units	IT23 Test 1
Effective Depth of Trial Pit	d_p		m	1.03
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.70
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.67
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.8343
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	5.02
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-23**

Figure D-23 **GEG-14-366** **Haverhill** **IT23 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT24 Test 1**

Depth of Pit (cm): 285
Depth of Water at Start of Depth (cm): 185
Date of Test: 24 November 2014

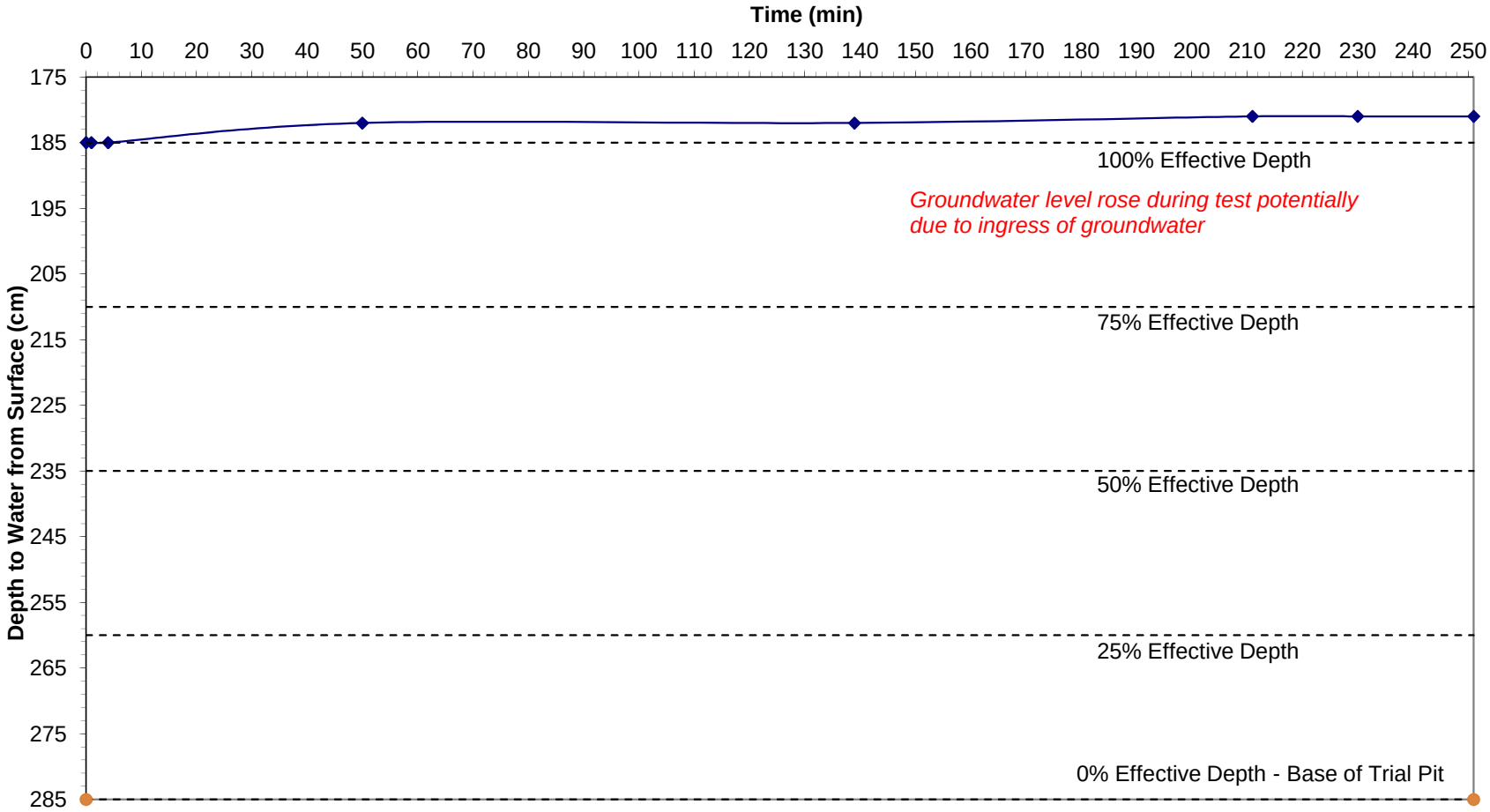
Time (min)	Depth from Surface (cm)	% Effective Depth
0	185	100%
1	185	100%
4	185	100%
50	182	103%
139	182	103%
211	181	104%
230	181	104%
251	181	104%
End of Test		

Parameter	Symbol	Calculation	Units	IT24 Test 1
Effective Depth of Trial Pit	d_p		m	1.00
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.50
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.50
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.75
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.60
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-24**

Figure D-24 **GEG-14-366** **Haverhill** **IT24 Test 1**



Appendix D
Infiltration Tests

Project Name: **Haverhill**
Project Ref.: **GEG-14-366**
Trial Pit: **IT25 Test 1**

Depth of Pit (cm): 290
Depth of Water at Start of Depth (cm): 188
Date of Test: 24 November 2014

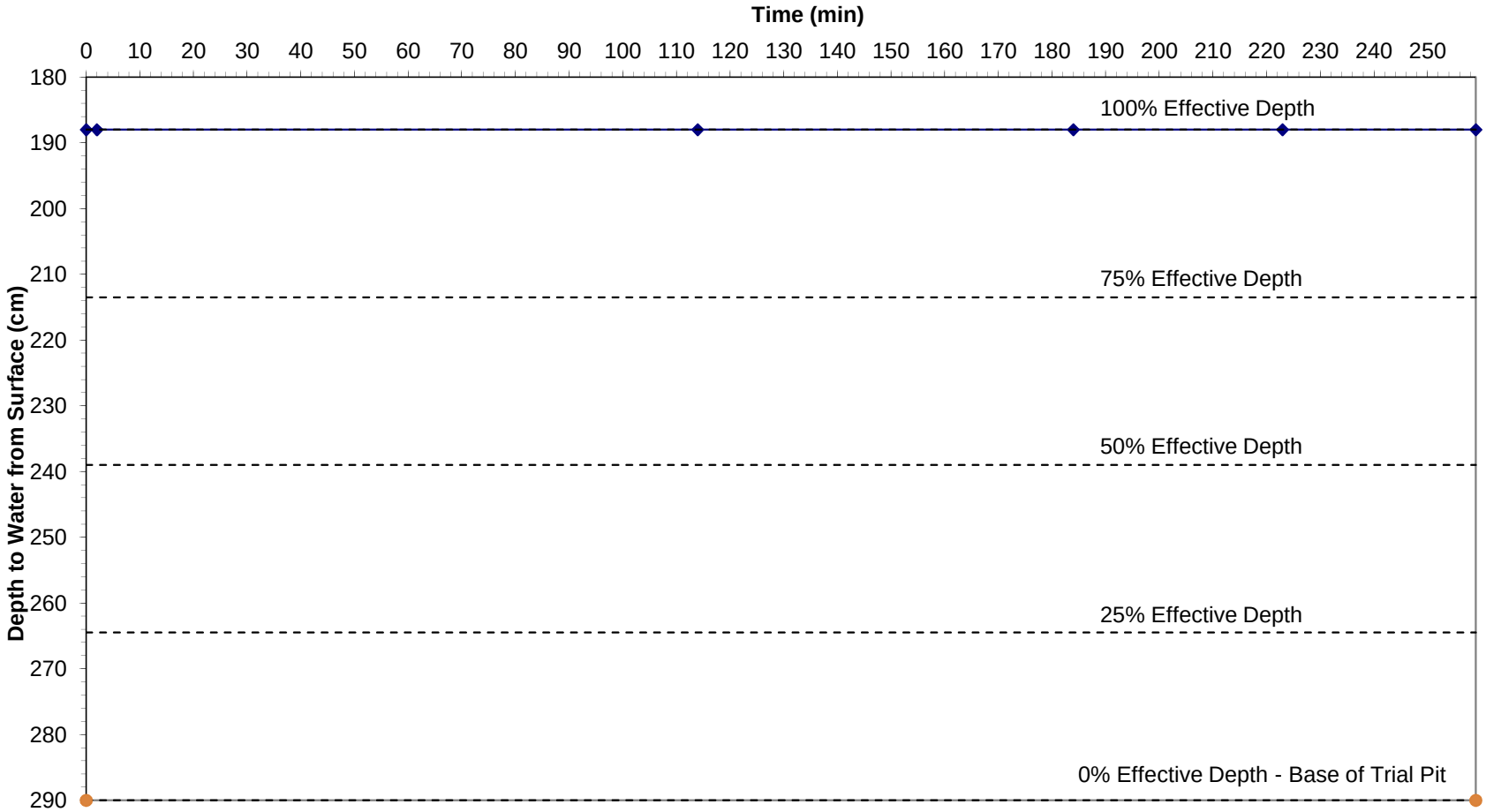
Time (min)	Depth from Surface (cm)	% Effective Depth
0	188	100%
2	188	100%
114	188	100%
184	188	100%
223	188	100%
259	188	100%
End of Test		

Parameter	Symbol	Calculation	Units	IT25 Test 1
Effective Depth of Trial Pit	d_p		m	1.02
Width of Trial Pit	w		m	0.60
Length of Trial Pit	l		m	2.60
Volume of Trial Pit	V	$= d_p \times w \times l$	m^3	1.59
Volume of Trial Pit at 50% Effective Depth	$V_{50\%}$	$= V \times 0.5$	m^3	0.7956
Internal Surface Area of Trial Pit*	$a_{p50\%}$	$= l \times w + d_p \times (w + l)$	m^2	4.82
Time to reach 75% Effective Depth	$T_{p75\%}$		min	N/A
Time to reach 25% Effective Depth	$T_{p25\%}$		min	N/A
Time 75% - 25%	$T_{p75\%-25\%}$	$= T_{p25\%} - T_{p75\%}$	min	N/A
Infiltration Rate	f	$= V_{50\%} / a_{p50\%} \times (T_{p75\%-25\%})$	m/s	N/A

*To 50% Effective Depth (including base)

With Reference to: **Figure D-25**

Figure D-25 **GEG-14-366** **Haverhill** **IT25 Test 1**



IH 124 Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 600 Urban 0.000
Area (ha) 50.000 Soil 0.400 Region Number Region 5

Results	l/s
QBAR Rural	142.0
QBAR Urban	142.0
Q100 years	505.7
Q1 year	123.6
Q2 years	126.9
Q5 years	183.2
Q10 years	235.1
Q20 years	297.0
Q25 years	321.3
Q30 years	341.3
Q50 years	403.7
Q100 years	505.7
Q200 years	595.2
Q250 years	623.6
Q1000 years	818.2

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.379	0.379	11.7	1839.7	O K
30 min Summer	0.485	0.485	13.5	2373.3	O K
60 min Summer	0.589	0.589	15.0	2905.1	O K
120 min Summer	0.688	0.688	16.4	3420.5	O K
180 min Summer	0.742	0.742	17.0	3703.0	O K
240 min Summer	0.777	0.777	17.5	3886.8	O K
360 min Summer	0.823	0.823	18.0	4132.7	O K
480 min Summer	0.854	0.854	18.3	4296.6	O K
600 min Summer	0.875	0.875	18.6	4410.2	O K
720 min Summer	0.890	0.890	18.8	4490.8	O K
960 min Summer	0.908	0.908	19.0	4588.4	O K
1440 min Summer	0.918	0.918	19.1	4639.2	O K
2160 min Summer	0.907	0.907	18.9	4582.3	O K
2880 min Summer	0.895	0.895	18.8	4516.5	O K
4320 min Summer	0.866	0.866	18.5	4363.2	O K
5760 min Summer	0.834	0.834	18.1	4188.4	O K
7200 min Summer	0.800	0.800	17.7	4009.1	O K
8640 min Summer	0.767	0.767	17.3	3832.5	O K
10080 min Summer	0.735	0.735	16.9	3662.5	O K
15 min Winter	0.423	0.423	12.5	2060.9	O K
30 min Winter	0.541	0.541	14.3	2658.9	O K
60 min Winter	0.657	0.657	15.9	3255.3	O K
120 min Winter	0.767	0.767	17.3	3835.5	O K
180 min Winter	0.827	0.827	18.0	4154.3	O K
240 min Winter	0.866	0.866	18.5	4362.5	O K
360 min Winter	0.918	0.918	19.1	4643.3	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	136.550	23
30 min Summer	88.279	38
60 min Summer	54.281	68
120 min Summer	32.242	128
180 min Summer	23.469	186
240 min Summer	18.633	246
360 min Summer	13.430	366
480 min Summer	10.644	484
600 min Summer	8.882	604
720 min Summer	7.658	724
960 min Summer	6.056	962
1440 min Summer	4.345	1440
2160 min Summer	3.113	1840
2880 min Summer	2.455	2216
4320 min Summer	1.755	2984
5760 min Summer	1.382	3808
7200 min Summer	1.148	4616
8640 min Summer	0.986	5448
10080 min Summer	0.866	6256
15 min Winter	136.550	23
30 min Winter	88.279	37
60 min Winter	54.281	66
120 min Winter	32.242	126
180 min Winter	23.469	184
240 min Winter	18.633	242
360 min Winter	13.430	360

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
480 min Winter	0.953	0.953	19.4	4832.5	O K
600 min Winter	0.978	0.978	19.7	4965.4	O K
720 min Winter	0.995	0.995	19.9	5061.7	O K
960 min Winter	1.018	1.018	20.1	5184.2	O K
1440 min Winter	1.034	1.034	20.3	5271.8	O K
2160 min Winter	1.024	1.024	20.2	5220.6	O K
2880 min Winter	1.004	1.004	20.0	5108.5	O K
4320 min Winter	0.964	0.964	19.6	4892.9	O K
5760 min Winter	0.918	0.918	19.1	4638.6	O K
7200 min Winter	0.869	0.869	18.5	4377.9	O K
8640 min Winter	0.822	0.822	18.0	4125.0	O K
10080 min Winter	0.777	0.777	17.4	3884.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
480 min Winter	10.644	478
600 min Winter	8.882	594
720 min Winter	7.658	710
960 min Winter	6.056	942
1440 min Winter	4.345	1390
2160 min Winter	3.113	2032
2880 min Winter	2.455	2308
4320 min Winter	1.755	3204
5760 min Winter	1.382	4104
7200 min Winter	1.148	4976
8640 min Winter	0.986	5880
10080 min Winter	0.866	6752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 7.220

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	4.000	4-8	3.220

Model Details

Storage is Online Cover Level (m) 1.700

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	4712.4	1.200	5629.2	2.400	6627.4	3.600	7707.0	4.800	8868.1
0.200	4859.6	1.400	5789.9	2.600	6801.7	3.800	7894.9	5.000	9069.5
0.400	5009.0	1.600	5952.9	2.800	6978.2	4.000	8085.0		
0.600	5160.6	1.800	6118.1	3.000	7157.0	4.200	8277.4		
0.800	5314.6	2.000	6285.6	3.200	7338.1	4.400	8472.0		
1.000	5470.7	2.200	6455.4	3.400	7521.4	4.600	8668.9		

Orifice Outflow Control

Diameter (m) 0.099 Discharge Coefficient 0.600 Invert Level (m) 0.000

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.424	0.424	7.3	1109.2	O K
30 min Summer	0.541	0.541	8.3	1430.5	O K
60 min Summer	0.654	0.654	9.2	1750.5	O K
120 min Summer	0.761	0.761	10.0	2060.1	O K
180 min Summer	0.818	0.818	10.4	2229.1	O K
240 min Summer	0.855	0.855	10.6	2338.7	O K
360 min Summer	0.904	0.904	10.9	2485.1	O K
480 min Summer	0.937	0.937	11.1	2582.3	O K
600 min Summer	0.959	0.959	11.3	2649.0	O K
720 min Summer	0.974	0.974	11.4	2696.0	O K
960 min Summer	0.992	0.992	11.5	2751.7	O K
1440 min Summer	1.000	1.000	11.5	2776.9	O K
2160 min Summer	0.987	0.987	11.4	2736.3	O K
2880 min Summer	0.972	0.972	11.4	2691.2	O K
4320 min Summer	0.939	0.939	11.1	2589.6	O K
5760 min Summer	0.902	0.902	10.9	2477.1	O K
7200 min Summer	0.864	0.864	10.7	2363.5	O K
8640 min Summer	0.826	0.826	10.4	2253.1	O K
10080 min Summer	0.791	0.791	10.2	2147.6	O K
15 min Winter	0.473	0.473	7.7	1242.5	O K
30 min Winter	0.602	0.602	8.8	1602.6	O K
60 min Winter	0.727	0.727	9.7	1961.5	O K
120 min Winter	0.846	0.846	10.6	2310.0	O K
180 min Winter	0.910	0.910	11.0	2500.9	O K
240 min Winter	0.951	0.951	11.2	2625.5	O K
360 min Winter	1.006	1.006	11.6	2792.9	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	136.550	19
30 min Summer	88.279	34
60 min Summer	54.281	64
120 min Summer	32.242	124
180 min Summer	23.469	184
240 min Summer	18.633	244
360 min Summer	13.430	362
480 min Summer	10.644	482
600 min Summer	8.882	602
720 min Summer	7.658	722
960 min Summer	6.056	962
1440 min Summer	4.345	1440
2160 min Summer	3.113	1836
2880 min Summer	2.455	2196
4320 min Summer	1.755	2984
5760 min Summer	1.382	3808
7200 min Summer	1.148	4616
8640 min Summer	0.986	5448
10080 min Summer	0.866	6256
15 min Winter	136.550	19
30 min Winter	88.279	34
60 min Winter	54.281	64
120 min Winter	32.242	122
180 min Winter	23.469	182
240 min Winter	18.633	240
360 min Winter	13.430	358

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
480 min Winter	1.042	1.042	11.8	2905.3	O K
600 min Winter	1.068	1.068	11.9	2983.9	O K
720 min Winter	1.086	1.086	12.0	3040.6	O K
960 min Winter	1.109	1.109	12.2	3111.8	O K
1440 min Winter	1.124	1.124	12.2	3160.1	O K
2160 min Winter	1.113	1.113	12.2	3123.4	O K
2880 min Winter	1.089	1.089	12.0	3050.7	O K
4320 min Winter	1.044	1.044	11.8	2911.9	O K
5760 min Winter	0.992	0.992	11.5	2751.6	O K
7200 min Winter	0.939	0.939	11.1	2588.9	O K
8640 min Winter	0.887	0.887	10.8	2432.2	O K
10080 min Winter	0.837	0.837	10.5	2283.9	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
480 min Winter	10.644	476
600 min Winter	8.882	592
720 min Winter	7.658	708
960 min Winter	6.056	940
1440 min Winter	4.345	1386
2160 min Winter	3.113	2032
2880 min Winter	2.455	2304
4320 min Winter	1.755	3200
5760 min Winter	1.382	4104
7200 min Winter	1.148	4976
8640 min Winter	0.986	5880
10080 min Winter	0.866	6752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 4.350

Time (mins)	Area (ha)
0-4	4.350

Model Details

Storage is Online Cover Level (m) 1.500

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2500.0	0.600	2829.2	1.200	3178.8	1.800	3548.7	2.400	3939.0
0.100	2553.5	0.700	2886.1	1.300	3239.0	1.900	3612.4	2.500	4006.1
0.200	2607.5	0.800	2943.5	1.400	3299.8	2.000	3676.6		
0.300	2662.1	0.900	3001.5	1.500	3361.2	2.100	3741.3		
0.400	2717.2	1.000	3060.0	1.600	3423.2	2.200	3806.7		
0.500	2772.9	1.100	3119.1	1.700	3485.7	2.300	3872.6		

Orifice Outflow Control

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 0.000

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.481	0.481	10.9	1657.4	O K
30 min Summer	0.612	0.612	12.5	2137.5	O K
60 min Summer	0.741	0.741	13.8	2615.7	O K
120 min Summer	0.862	0.862	15.0	3078.4	O K
180 min Summer	0.927	0.927	15.5	3330.9	O K
240 min Summer	0.969	0.969	15.9	3494.8	O K
360 min Summer	1.025	1.025	16.4	3713.5	O K
480 min Summer	1.062	1.062	16.7	3858.7	O K
600 min Summer	1.087	1.087	16.9	3958.5	O K
720 min Summer	1.104	1.104	17.0	4028.7	O K
960 min Summer	1.125	1.125	17.2	4111.8	O K
1440 min Summer	1.134	1.134	17.3	4149.3	O K
2160 min Summer	1.119	1.119	17.1	4089.1	O K
2880 min Summer	1.103	1.103	17.0	4022.2	O K
4320 min Summer	1.065	1.065	16.7	3871.1	O K
5760 min Summer	1.022	1.022	16.3	3703.4	O K
7200 min Summer	0.979	0.979	16.0	3534.0	O K
8640 min Summer	0.937	0.937	15.6	3369.0	O K
10080 min Summer	0.897	0.897	15.3	3211.6	O K
15 min Winter	0.536	0.536	11.6	1856.6	O K
30 min Winter	0.682	0.682	13.2	2394.7	O K
60 min Winter	0.824	0.824	14.6	2931.0	O K
120 min Winter	0.958	0.958	15.8	3451.8	O K
180 min Winter	1.031	1.031	16.4	3737.1	O K
240 min Winter	1.078	1.078	16.8	3923.3	O K
360 min Winter	1.140	1.140	17.3	4173.3	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	136.550	19
30 min Summer	88.279	34
60 min Summer	54.281	64
120 min Summer	32.242	124
180 min Summer	23.469	184
240 min Summer	18.633	244
360 min Summer	13.430	362
480 min Summer	10.644	482
600 min Summer	8.882	602
720 min Summer	7.658	722
960 min Summer	6.056	962
1440 min Summer	4.345	1440
2160 min Summer	3.113	1836
2880 min Summer	2.455	2192
4320 min Summer	1.755	2984
5760 min Summer	1.382	3808
7200 min Summer	1.148	4616
8640 min Summer	0.986	5448
10080 min Summer	0.866	6256
15 min Winter	136.550	19
30 min Winter	88.279	34
60 min Winter	54.281	64
120 min Winter	32.242	122
180 min Winter	23.469	182
240 min Winter	18.633	240
360 min Winter	13.430	358

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
480 min Winter	1.182	1.182	17.6	4341.2	O K
600 min Winter	1.210	1.210	17.9	4458.6	O K
720 min Winter	1.231	1.231	18.0	4543.4	O K
960 min Winter	1.257	1.257	18.2	4649.7	O K
1440 min Winter	1.275	1.275	18.3	4721.6	O K
2160 min Winter	1.261	1.261	18.2	4666.4	O K
2880 min Winter	1.235	1.235	18.0	4558.4	O K
4320 min Winter	1.184	1.184	17.7	4351.2	O K
5760 min Winter	1.125	1.125	17.2	4111.8	O K
7200 min Winter	1.064	1.064	16.7	3868.9	O K
8640 min Winter	1.005	1.005	16.2	3634.8	O K
10080 min Winter	0.949	0.949	15.7	3413.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
480 min Winter	10.644	476
600 min Winter	8.882	592
720 min Winter	7.658	708
960 min Winter	6.056	940
1440 min Winter	4.345	1386
2160 min Winter	3.113	2032
2880 min Winter	2.455	2304
4320 min Winter	1.755	3200
5760 min Winter	1.382	4104
7200 min Winter	1.148	4976
8640 min Winter	0.986	5880
10080 min Winter	0.866	6752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 6.500

Time (mins)	Area (ha)
0-4	6.500

Model Details

Storage is Online Cover Level (m) 1.600

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3300.0	0.600	3676.7	1.200	4073.8	1.800	4491.3	2.400	4929.1
0.100	3361.4	0.700	3741.5	1.300	4142.0	1.900	4562.8	2.500	5004.0
0.200	3423.3	0.800	3806.8	1.400	4210.7	2.000	4634.9		
0.300	3485.8	0.900	3872.7	1.500	4280.0	2.100	4707.6		
0.400	3548.9	1.000	3939.2	1.600	4349.9	2.200	4780.9		
0.500	3612.5	1.100	4006.2	1.700	4420.3	2.300	4854.7		

Orifice Outflow Control

Diameter (m) 0.089 Discharge Coefficient 0.600 Invert Level (m) 0.000

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.437	0.437	3.8	560.8	O K
30 min Summer	0.554	0.554	4.3	723.3	O K
60 min Summer	0.667	0.667	4.7	884.9	O K
120 min Summer	0.772	0.772	5.1	1041.2	O K
180 min Summer	0.829	0.829	5.3	1126.4	O K
240 min Summer	0.865	0.865	5.4	1181.6	O K
360 min Summer	0.912	0.912	5.5	1255.1	O K
480 min Summer	0.943	0.943	5.6	1303.8	O K
600 min Summer	0.964	0.964	5.7	1337.2	O K
720 min Summer	0.979	0.979	5.7	1360.5	O K
960 min Summer	0.996	0.996	5.8	1388.0	O K
1440 min Summer	1.004	1.004	5.8	1399.6	O K
2160 min Summer	0.990	0.990	5.8	1377.0	O K
2880 min Summer	0.974	0.974	5.7	1352.3	O K
4320 min Summer	0.939	0.939	5.6	1297.8	O K
5760 min Summer	0.902	0.902	5.5	1238.7	O K
7200 min Summer	0.863	0.863	5.4	1179.6	O K
8640 min Summer	0.826	0.826	5.2	1122.5	O K
10080 min Summer	0.790	0.790	5.1	1068.3	O K
15 min Winter	0.486	0.486	4.0	628.3	O K
30 min Winter	0.615	0.615	4.5	810.3	O K
60 min Winter	0.739	0.739	5.0	991.7	O K
120 min Winter	0.856	0.856	5.3	1167.7	O K
180 min Winter	0.918	0.918	5.5	1264.0	O K
240 min Winter	0.958	0.958	5.7	1326.8	O K
360 min Winter	1.011	1.011	5.8	1411.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	136.550	19
30 min Summer	88.279	34
60 min Summer	54.281	64
120 min Summer	32.242	124
180 min Summer	23.469	184
240 min Summer	18.633	244
360 min Summer	13.430	362
480 min Summer	10.644	482
600 min Summer	8.882	602
720 min Summer	7.658	722
960 min Summer	6.056	962
1440 min Summer	4.345	1440
2160 min Summer	3.113	1840
2880 min Summer	2.455	2216
4320 min Summer	1.755	2984
5760 min Summer	1.382	3808
7200 min Summer	1.148	4616
8640 min Summer	0.986	5448
10080 min Summer	0.866	6256
15 min Winter	136.550	19
30 min Winter	88.279	34
60 min Winter	54.281	64
120 min Winter	32.242	122
180 min Winter	23.469	182
240 min Winter	18.633	240
360 min Winter	13.430	358

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
480 min Winter	1.046	1.046	5.9	1467.6	O K
600 min Winter	1.070	1.070	6.0	1507.0	O K
720 min Winter	1.088	1.088	6.0	1535.4	O K
960 min Winter	1.109	1.109	6.1	1570.9	O K
1440 min Winter	1.124	1.124	6.1	1594.5	O K
2160 min Winter	1.112	1.112	6.1	1574.7	O K
2880 min Winter	1.088	1.088	6.0	1535.8	O K
4320 min Winter	1.043	1.043	5.9	1463.0	O K
5760 min Winter	0.991	0.991	5.8	1379.9	O K
7200 min Winter	0.938	0.938	5.6	1295.9	O K
8640 min Winter	0.887	0.887	5.4	1215.3	O K
10080 min Winter	0.837	0.837	5.3	1139.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
480 min Winter	10.644	476
600 min Winter	8.882	592
720 min Winter	7.658	708
960 min Winter	6.056	940
1440 min Winter	4.345	1386
2160 min Winter	3.113	2032
2880 min Winter	2.455	2308
4320 min Winter	1.755	3200
5760 min Winter	1.382	4144
7200 min Winter	1.148	5040
8640 min Winter	0.986	5880
10080 min Winter	0.866	6752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 2.200

Time (mins)	Area (ha)
0-4	2.200

Model Details

Storage is Online Cover Level (m) 1.500

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1200.0	0.600	1431.2	1.200	1682.8	1.800	1954.7	2.400	2247.0
0.100	1237.1	0.700	1471.7	1.300	1726.7	1.900	2002.0	2.500	2297.7
0.200	1274.8	0.800	1512.8	1.400	1771.2	2.000	2049.9		
0.300	1313.1	0.900	1554.5	1.500	1816.2	2.100	2098.3		
0.400	1351.9	1.000	1596.7	1.600	1861.8	2.200	2147.3		
0.500	1391.3	1.100	1639.4	1.700	1908.0	2.300	2196.9		

Orifice Outflow Control

Diameter (m) 0.053 Discharge Coefficient 0.600 Invert Level (m) 0.000

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.382	0.382	4.0	604.2	O K
30 min Summer	0.486	0.486	4.6	779.2	O K
60 min Summer	0.587	0.587	5.1	953.4	O K
120 min Summer	0.682	0.682	5.5	1121.9	O K
180 min Summer	0.733	0.733	5.7	1213.7	O K
240 min Summer	0.766	0.766	5.8	1273.2	O K
360 min Summer	0.809	0.809	6.0	1352.6	O K
480 min Summer	0.837	0.837	6.1	1405.1	O K
600 min Summer	0.856	0.856	6.2	1441.1	O K
720 min Summer	0.870	0.870	6.2	1466.3	O K
960 min Summer	0.885	0.885	6.3	1495.9	O K
1440 min Summer	0.892	0.892	6.3	1508.3	O K
2160 min Summer	0.879	0.879	6.3	1484.9	O K
2880 min Summer	0.866	0.866	6.2	1459.2	O K
4320 min Summer	0.835	0.835	6.1	1401.9	O K
5760 min Summer	0.801	0.801	6.0	1339.1	O K
7200 min Summer	0.767	0.767	5.8	1276.1	O K
8640 min Summer	0.734	0.734	5.7	1215.1	O K
10080 min Summer	0.702	0.702	5.6	1157.0	O K
15 min Winter	0.426	0.426	4.3	676.9	O K
30 min Winter	0.541	0.541	4.9	873.0	O K
60 min Winter	0.652	0.652	5.4	1068.4	O K
120 min Winter	0.757	0.757	5.8	1258.1	O K
180 min Winter	0.814	0.814	6.0	1361.9	O K
240 min Winter	0.850	0.850	6.1	1429.6	O K
360 min Winter	0.898	0.898	6.3	1520.4	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	136.550	19
30 min Summer	88.279	34
60 min Summer	54.281	64
120 min Summer	32.242	124
180 min Summer	23.469	184
240 min Summer	18.633	244
360 min Summer	13.430	362
480 min Summer	10.644	482
600 min Summer	8.882	602
720 min Summer	7.658	722
960 min Summer	6.056	962
1440 min Summer	4.345	1440
2160 min Summer	3.113	1836
2880 min Summer	2.455	2192
4320 min Summer	1.755	2984
5760 min Summer	1.382	3808
7200 min Summer	1.148	4616
8640 min Summer	0.986	5448
10080 min Summer	0.866	6256
15 min Winter	136.550	19
30 min Winter	88.279	34
60 min Winter	54.281	64
120 min Winter	32.242	122
180 min Winter	23.469	182
240 min Winter	18.633	240
360 min Winter	13.430	358

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
480 min Winter	0.930	0.930	6.4	1581.2	O K
600 min Winter	0.952	0.952	6.5	1623.7	O K
720 min Winter	0.968	0.968	6.6	1654.3	O K
960 min Winter	0.988	0.988	6.6	1692.5	O K
1440 min Winter	1.001	1.001	6.7	1717.6	O K
2160 min Winter	0.990	0.990	6.6	1696.0	O K
2880 min Winter	0.969	0.969	6.6	1655.4	O K
4320 min Winter	0.928	0.928	6.4	1577.8	O K
5760 min Winter	0.882	0.882	6.3	1488.9	O K
7200 min Winter	0.834	0.834	6.1	1399.0	O K
8640 min Winter	0.787	0.787	5.9	1312.6	O K
10080 min Winter	0.742	0.742	5.7	1231.0	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
480 min Winter	10.644	476
600 min Winter	8.882	592
720 min Winter	7.658	708
960 min Winter	6.056	940
1440 min Winter	4.345	1386
2160 min Winter	3.113	2032
2880 min Winter	2.455	2304
4320 min Winter	1.755	3200
5760 min Winter	1.382	4104
7200 min Winter	1.148	4976
8640 min Winter	0.986	5880
10080 min Winter	0.866	6752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 2.370

Time (mins)	Area (ha)
0-4	2.370

Model Details

Storage is Online Cover Level (m) 1.500

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1500.0	0.600	1757.3	1.200	2035.0	1.800	2333.0	2.400	2651.4
0.100	1541.5	0.700	1802.2	1.300	2083.2	1.900	2384.6	2.500	2706.4
0.200	1583.5	0.800	1847.6	1.400	2132.1	2.000	2436.9		
0.300	1626.1	0.900	1893.6	1.500	2181.4	2.100	2489.6		
0.400	1669.3	1.000	1940.2	1.600	2231.4	2.200	2543.0		
0.500	1713.0	1.100	1987.3	1.700	2281.9	2.300	2596.9		

Orifice Outflow Control

Diameter (m) 0.057 Discharge Coefficient 0.600 Invert Level (m) 0.000

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.437	0.437	3.8	560.8	O K
30 min Summer	0.554	0.554	4.3	723.3	O K
60 min Summer	0.667	0.667	4.7	884.9	O K
120 min Summer	0.772	0.772	5.1	1041.2	O K
180 min Summer	0.829	0.829	5.3	1126.4	O K
240 min Summer	0.865	0.865	5.4	1181.6	O K
360 min Summer	0.912	0.912	5.5	1255.1	O K
480 min Summer	0.943	0.943	5.6	1303.8	O K
600 min Summer	0.964	0.964	5.7	1337.2	O K
720 min Summer	0.979	0.979	5.7	1360.5	O K
960 min Summer	0.996	0.996	5.8	1388.0	O K
1440 min Summer	1.004	1.004	5.8	1399.6	O K
2160 min Summer	0.990	0.990	5.8	1377.0	O K
2880 min Summer	0.974	0.974	5.7	1352.3	O K
4320 min Summer	0.939	0.939	5.6	1297.8	O K
5760 min Summer	0.902	0.902	5.5	1238.7	O K
7200 min Summer	0.863	0.863	5.4	1179.6	O K
8640 min Summer	0.826	0.826	5.2	1122.5	O K
10080 min Summer	0.790	0.790	5.1	1068.3	O K
15 min Winter	0.486	0.486	4.0	628.3	O K
30 min Winter	0.615	0.615	4.5	810.3	O K
60 min Winter	0.739	0.739	5.0	991.7	O K
120 min Winter	0.856	0.856	5.3	1167.7	O K
180 min Winter	0.918	0.918	5.5	1264.0	O K
240 min Winter	0.958	0.958	5.7	1326.8	O K
360 min Winter	1.011	1.011	5.8	1411.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	136.550	19
30 min Summer	88.279	34
60 min Summer	54.281	64
120 min Summer	32.242	124
180 min Summer	23.469	184
240 min Summer	18.633	244
360 min Summer	13.430	362
480 min Summer	10.644	482
600 min Summer	8.882	602
720 min Summer	7.658	722
960 min Summer	6.056	962
1440 min Summer	4.345	1440
2160 min Summer	3.113	1840
2880 min Summer	2.455	2216
4320 min Summer	1.755	2984
5760 min Summer	1.382	3808
7200 min Summer	1.148	4616
8640 min Summer	0.986	5448
10080 min Summer	0.866	6256
15 min Winter	136.550	19
30 min Winter	88.279	34
60 min Winter	54.281	64
120 min Winter	32.242	122
180 min Winter	23.469	182
240 min Winter	18.633	240
360 min Winter	13.430	358

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
480 min Winter	1.046	1.046	5.9	1467.6	O K
600 min Winter	1.070	1.070	6.0	1507.0	O K
720 min Winter	1.088	1.088	6.0	1535.4	O K
960 min Winter	1.109	1.109	6.1	1570.9	O K
1440 min Winter	1.124	1.124	6.1	1594.5	O K
2160 min Winter	1.112	1.112	6.1	1574.7	O K
2880 min Winter	1.088	1.088	6.0	1535.8	O K
4320 min Winter	1.043	1.043	5.9	1463.0	O K
5760 min Winter	0.991	0.991	5.8	1379.9	O K
7200 min Winter	0.938	0.938	5.6	1295.9	O K
8640 min Winter	0.887	0.887	5.4	1215.3	O K
10080 min Winter	0.837	0.837	5.3	1139.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
480 min Winter	10.644	476
600 min Winter	8.882	592
720 min Winter	7.658	708
960 min Winter	6.056	940
1440 min Winter	4.345	1386
2160 min Winter	3.113	2032
2880 min Winter	2.455	2308
4320 min Winter	1.755	3200
5760 min Winter	1.382	4144
7200 min Winter	1.148	5040
8640 min Winter	0.986	5880
10080 min Winter	0.866	6752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 2.200

Time (mins)	Area (ha)
0-4	2.200

Model Details

Storage is Online Cover Level (m) 1.500

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1200.0	0.600	1431.2	1.200	1682.8	1.800	1954.7	2.400	2247.0
0.100	1237.1	0.700	1471.7	1.300	1726.7	1.900	2002.0	2.500	2297.7
0.200	1274.8	0.800	1512.8	1.400	1771.2	2.000	2049.9		
0.300	1313.1	0.900	1554.5	1.500	1816.2	2.100	2098.3		
0.400	1351.9	1.000	1596.7	1.600	1861.8	2.200	2147.3		
0.500	1391.3	1.100	1639.4	1.700	1908.0	2.300	2196.9		

Orifice Outflow Control

Diameter (m) 0.053 Discharge Coefficient 0.600 Invert Level (m) 0.000

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.468	0.468	10.3	1560.5	O K
30 min Summer	0.595	0.595	11.7	2012.5	O K
60 min Summer	0.718	0.718	13.0	2462.8	O K
120 min Summer	0.834	0.834	14.0	2898.4	O K
180 min Summer	0.896	0.896	14.6	3136.2	O K
240 min Summer	0.936	0.936	14.9	3290.5	O K
360 min Summer	0.988	0.988	15.4	3496.5	O K
480 min Summer	1.023	1.023	15.6	3633.4	O K
600 min Summer	1.047	1.047	15.8	3727.5	O K
720 min Summer	1.063	1.063	16.0	3793.7	O K
960 min Summer	1.083	1.083	16.1	3872.4	O K
1440 min Summer	1.092	1.092	16.2	3908.3	O K
2160 min Summer	1.078	1.078	16.1	3851.3	O K
2880 min Summer	1.062	1.062	15.9	3787.8	O K
4320 min Summer	1.026	1.026	15.7	3644.7	O K
5760 min Summer	0.986	0.986	15.3	3486.3	O K
7200 min Summer	0.945	0.945	15.0	3326.2	O K
8640 min Summer	0.905	0.905	14.7	3170.5	O K
10080 min Summer	0.866	0.866	14.3	3021.9	O K
15 min Winter	0.522	0.522	10.9	1748.0	O K
30 min Winter	0.662	0.662	12.4	2254.6	O K
60 min Winter	0.797	0.797	13.7	2759.6	O K
120 min Winter	0.925	0.925	14.8	3250.0	O K
180 min Winter	0.994	0.994	15.4	3518.7	O K
240 min Winter	1.038	1.038	15.8	3694.0	O K
360 min Winter	1.097	1.097	16.2	3929.6	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	136.550	19
30 min Summer	88.279	34
60 min Summer	54.281	64
120 min Summer	32.242	124
180 min Summer	23.469	184
240 min Summer	18.633	244
360 min Summer	13.430	362
480 min Summer	10.644	482
600 min Summer	8.882	602
720 min Summer	7.658	722
960 min Summer	6.056	962
1440 min Summer	4.345	1440
2160 min Summer	3.113	1840
2880 min Summer	2.455	2216
4320 min Summer	1.755	2984
5760 min Summer	1.382	3808
7200 min Summer	1.148	4616
8640 min Summer	0.986	5448
10080 min Summer	0.866	6256
15 min Winter	136.550	19
30 min Winter	88.279	34
60 min Winter	54.281	64
120 min Winter	32.242	122
180 min Winter	23.469	182
240 min Winter	18.633	240
360 min Winter	13.430	358

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
480 min Winter	1.136	1.136	16.5	4087.9	O K
600 min Winter	1.164	1.164	16.7	4198.7	O K
720 min Winter	1.183	1.183	16.9	4278.7	O K
960 min Winter	1.208	1.208	17.0	4379.2	O K
1440 min Winter	1.224	1.224	17.2	4447.7	O K
2160 min Winter	1.212	1.212	17.1	4396.7	O K
2880 min Winter	1.187	1.187	16.9	4293.9	O K
4320 min Winter	1.139	1.139	16.5	4098.5	O K
5760 min Winter	1.083	1.083	16.1	3872.7	O K
7200 min Winter	1.026	1.026	15.7	3643.4	O K
8640 min Winter	0.970	0.970	15.2	3422.5	O K
10080 min Winter	0.916	0.916	14.8	3213.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
480 min Winter	10.644	476
600 min Winter	8.882	592
720 min Winter	7.658	708
960 min Winter	6.056	940
1440 min Winter	4.345	1386
2160 min Winter	3.113	2032
2880 min Winter	2.455	2304
4320 min Winter	1.755	3200
5760 min Winter	1.382	4104
7200 min Winter	1.148	4976
8640 min Winter	0.986	5880
10080 min Winter	0.866	6752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 6.120

Time (mins)	Area (ha)
0-4	6.120

Model Details

Storage is Online Cover Level (m) 1.500

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3148.4	1.200	4110.3	2.400	0.0	3.600	0.0	4.800	0.0
0.200	3303.6	1.400	4278.5	2.600	0.0	3.800	0.0	5.000	0.0
0.400	3460.7	1.600	0.0	2.800	0.0	4.000	0.0		
0.600	3619.7	1.800	0.0	3.000	0.0	4.200	0.0		
0.800	3781.1	2.000	0.0	3.200	0.0	4.400	0.0		
1.000	3944.7	2.200	0.0	3.400	0.0	4.600	0.0		

Orifice Outflow Control

Diameter (m) 0.087 Discharge Coefficient 0.600 Invert Level (m) 0.000

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.443	0.443	13.3	2063.5	O K
30 min Summer	0.566	0.566	15.3	2661.9	O K
60 min Summer	0.686	0.686	17.0	3258.2	O K
120 min Summer	0.801	0.801	18.4	3835.9	O K
180 min Summer	0.862	0.862	19.2	4152.2	O K
240 min Summer	0.902	0.902	19.7	4357.7	O K
360 min Summer	0.955	0.955	20.3	4632.2	O K
480 min Summer	0.990	0.990	20.6	4815.3	O K
600 min Summer	1.014	1.014	20.9	4941.5	O K
720 min Summer	1.031	1.031	21.1	5030.8	O K
960 min Summer	1.052	1.052	21.3	5138.4	O K
1440 min Summer	1.062	1.062	21.4	5191.6	O K
2160 min Summer	1.049	1.049	21.3	5123.3	O K
2880 min Summer	1.034	1.034	21.1	5045.5	O K
4320 min Summer	1.000	1.000	20.8	4866.8	O K
5760 min Summer	0.962	0.962	20.3	4665.4	O K
7200 min Summer	0.922	0.922	19.9	4460.1	O K
8640 min Summer	0.883	0.883	19.4	4259.0	O K
10080 min Summer	0.846	0.846	19.0	4066.1	O K
15 min Winter	0.494	0.494	14.2	2311.6	O K
30 min Winter	0.631	0.631	16.2	2982.5	O K
60 min Winter	0.764	0.764	18.0	3651.4	O K
120 min Winter	0.891	0.891	19.5	4301.4	O K
180 min Winter	0.960	0.960	20.3	4658.7	O K
240 min Winter	1.005	1.005	20.8	4891.8	O K
360 min Winter	1.064	1.064	21.4	5205.7	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	136.550	23
30 min Summer	88.279	38
60 min Summer	54.281	68
120 min Summer	32.242	126
180 min Summer	23.469	186
240 min Summer	18.633	246
360 min Summer	13.430	366
480 min Summer	10.644	484
600 min Summer	8.882	604
720 min Summer	7.658	724
960 min Summer	6.056	962
1440 min Summer	4.345	1440
2160 min Summer	3.113	1840
2880 min Summer	2.455	2216
4320 min Summer	1.755	2984
5760 min Summer	1.382	3808
7200 min Summer	1.148	4616
8640 min Summer	0.986	5448
10080 min Summer	0.866	6256
15 min Winter	136.550	23
30 min Winter	88.279	37
60 min Winter	54.281	66
120 min Winter	32.242	126
180 min Winter	23.469	184
240 min Winter	18.633	242
360 min Winter	13.430	360

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
480 min Winter	1.104	1.104	21.9	5416.8	O K
600 min Winter	1.132	1.132	22.1	5565.1	O K
720 min Winter	1.152	1.152	22.3	5672.2	O K
960 min Winter	1.177	1.177	22.6	5807.8	O K
1440 min Winter	1.195	1.195	22.8	5902.8	O K
2160 min Winter	1.184	1.184	22.7	5841.2	O K
2880 min Winter	1.159	1.159	22.4	5711.6	O K
4320 min Winter	1.113	1.113	21.9	5463.3	O K
5760 min Winter	1.058	1.058	21.4	5172.8	O K
7200 min Winter	1.002	1.002	20.8	4876.3	O K
8640 min Winter	0.947	0.947	20.2	4589.4	O K
10080 min Winter	0.894	0.894	19.6	4316.9	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
480 min Winter	10.644	478
600 min Winter	8.882	594
720 min Winter	7.658	710
960 min Winter	6.056	942
1440 min Winter	4.345	1390
2160 min Winter	3.113	2032
2880 min Winter	2.455	2304
4320 min Winter	1.755	3204
5760 min Winter	1.382	4104
7200 min Winter	1.148	4976
8640 min Winter	0.986	5880
10080 min Winter	0.866	6752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 8.100

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	5.000	4-8	3.100

Model Details

Storage is Online Cover Level (m) 1.500

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	4500.0	0.600	4938.2	1.200	5396.8	1.800	5875.7	2.400	6375.0
0.100	4571.6	0.700	5013.2	1.300	5475.2	1.900	5957.5	2.500	6460.2
0.200	4643.8	0.800	5088.8	1.400	5554.2	2.000	6039.9		
0.300	4716.6	0.900	5165.0	1.500	5633.7	2.100	6122.8		
0.400	4789.9	1.000	5241.7	1.600	5713.8	2.200	6206.3		
0.500	4863.8	1.100	5319.0	1.700	5794.5	2.300	6290.4		

Orifice Outflow Control

Diameter (m) 0.101 Discharge Coefficient 0.600 Invert Level (m) 0.000

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.465	0.465	9.6	1458.5	O K
30 min Summer	0.592	0.592	10.9	1881.1	O K
60 min Summer	0.716	0.716	12.1	2301.9	O K
120 min Summer	0.834	0.834	13.1	2709.1	O K
180 min Summer	0.897	0.897	13.6	2931.4	O K
240 min Summer	0.937	0.937	13.9	3075.7	O K
360 min Summer	0.991	0.991	14.3	3268.3	O K
480 min Summer	1.026	1.026	14.6	3396.3	O K
600 min Summer	1.051	1.051	14.8	3484.3	O K
720 min Summer	1.068	1.068	14.9	3546.3	O K
960 min Summer	1.088	1.088	15.1	3619.9	O K
1440 min Summer	1.097	1.097	15.1	3653.6	O K
2160 min Summer	1.082	1.082	15.0	3600.7	O K
2880 min Summer	1.066	1.066	14.9	3541.8	O K
4320 min Summer	1.030	1.030	14.6	3408.9	O K
5760 min Summer	0.989	0.989	14.3	3261.6	O K
7200 min Summer	0.948	0.948	14.0	3112.6	O K
8640 min Summer	0.907	0.907	13.7	2967.6	O K
10080 min Summer	0.868	0.868	13.4	2829.2	O K
15 min Winter	0.518	0.518	10.2	1633.8	O K
30 min Winter	0.659	0.659	11.6	2107.3	O K
60 min Winter	0.797	0.797	12.8	2579.3	O K
120 min Winter	0.927	0.927	13.9	3037.7	O K
180 min Winter	0.997	0.997	14.4	3288.9	O K
240 min Winter	1.042	1.042	14.7	3452.8	O K
360 min Winter	1.102	1.102	15.2	3673.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	136.550	19
30 min Summer	88.279	34
60 min Summer	54.281	64
120 min Summer	32.242	124
180 min Summer	23.469	184
240 min Summer	18.633	244
360 min Summer	13.430	362
480 min Summer	10.644	482
600 min Summer	8.882	602
720 min Summer	7.658	722
960 min Summer	6.056	962
1440 min Summer	4.345	1440
2160 min Summer	3.113	1840
2880 min Summer	2.455	2216
4320 min Summer	1.755	2984
5760 min Summer	1.382	3808
7200 min Summer	1.148	4616
8640 min Summer	0.986	5448
10080 min Summer	0.866	6256
15 min Winter	136.550	19
30 min Winter	88.279	34
60 min Winter	54.281	64
120 min Winter	32.242	122
180 min Winter	23.469	182
240 min Winter	18.633	240
360 min Winter	13.430	358

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
480 min Winter	1.142	1.142	15.4	3821.0	O K
600 min Winter	1.170	1.170	15.6	3924.6	O K
720 min Winter	1.190	1.190	15.8	3999.4	O K
960 min Winter	1.215	1.215	16.0	4093.4	O K
1440 min Winter	1.232	1.232	16.1	4157.5	O K
2160 min Winter	1.220	1.220	16.0	4110.0	O K
2880 min Winter	1.194	1.194	15.8	4014.6	O K
4320 min Winter	1.146	1.146	15.5	3833.0	O K
5760 min Winter	1.088	1.088	15.1	3622.8	O K
7200 min Winter	1.030	1.030	14.6	3409.4	O K
8640 min Winter	0.973	0.973	14.2	3203.8	O K
10080 min Winter	0.919	0.919	13.8	3008.9	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
480 min Winter	10.644	476
600 min Winter	8.882	592
720 min Winter	7.658	708
960 min Winter	6.056	940
1440 min Winter	4.345	1386
2160 min Winter	3.113	2032
2880 min Winter	2.455	2304
4320 min Winter	1.755	3200
5760 min Winter	1.382	4104
7200 min Winter	1.148	4976
8640 min Winter	0.986	5880
10080 min Winter	0.866	6752

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.600	Shortest Storm (mins)	15
Ratio R	0.436	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 5.720

Time (mins)	Area (ha)
0-4	5.720

Model Details

Storage is Online Cover Level (m) 1.500

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	3000.0	0.600	3359.7	1.200	3739.7	1.800	4140.1	2.400	4560.8
0.100	3058.5	0.700	3421.6	1.300	3805.0	1.900	4208.8	2.500	4632.9
0.200	3117.6	0.800	3484.1	1.400	3870.9	2.000	4278.1		
0.300	3177.3	0.900	3547.1	1.500	3937.3	2.100	4347.9		
0.400	3237.5	1.000	3610.8	1.600	4004.4	2.200	4418.3		
0.500	3298.3	1.100	3674.9	1.700	4071.9	2.300	4489.3		

Orifice Outflow Control

Diameter (m) 0.084 Discharge Coefficient 0.600 Invert Level (m) 0.000

GROWTH PLANNING
AND EQUIVALENCE

Pre Planning Assessment Report

Land at Haverhill, HAVERHILL - Haverhill East

Section 1: Proposed Development

Thank you for submitting a pre planning enquiry. This has been produced for Brookbanks Consulting Ltd. Your reference number is 00003551. If you have any questions upon receipt of this report, please contact Catherine McArdle on 01733 414690 or email planningliaison@anglianwater.co.uk.

The response within this report has been based on the following information which was submitted as part of your application:

List of Planned Developments		
Type of Development	Type of Unit	No. Of Units
C3 Dwellings	Dwellings	2500
D2 Assembly and Leisure	Community Centre	3
D1 Non-residential	School	2

- The grid reference for the site is TL6817045910.
- The site currently does not have planning permission and is located on a Greenfield site.

Figure 1: Location of proposed development

The comments contained within this report relate to the public water mains and sewers indicated on our records. Your attention is drawn to the disclaimer in the useful information section of this report.

Section 2: Assets Affected

Our records indicate that there are no public water mains or public sewers or other assets owned by Anglian Water within the boundary or overlapping your development site. However, it is recommended that you carry out a thorough investigation of your proposed working area to establish whether any unmapped public or private sewers and lateral drains are in existence.

Due to the private sewer transfer in October 2011 many newly adopted public used water assets and their history are not indicated on our records. You also need to be aware that your development site may contain private water mains, drains or other assets not shown on our records. These are private assets and not the responsibility of Anglian Water but that of the landowner.

Section 3: Water Supply

In examining the available capacity for your development site we assess the capacity and costs for two categories of water main. These are:

Strategic – these are the offsite potable water mains which deliver water within an area to a large number of development sites often across a number of towns. The strategic provision of these water mains enables us to provide of the cheapest solution across a large geographical area.

Local reinforcement – these are the offsite potable water mains that connect your site to the closest available public water main. Alternatively, reinforcement may be needed to protect existing houses against the loss of water or water pressure.

Water Supply Network

There is insufficient capacity in the current network to supply this development site and therefore offsite reinforcements are needed. Details of the necessary upgrades and their costs can be found in the water infrastructure and cost section of this report. If you wish to proceed with the development then you will need to complete an application for a new supply. This is recommended to be done at the earliest opportunity as it could take a minimum of 12 months to install any offsite reinforcement works.

Currently, there is no expectation that there will be a need for any strategic main contributions. However, capacity can be reduced at any time due to an increased demand from existing commercial and residential housing as well as from new developments. You are therefore recommended to formally apply for a connection at your earliest convenience.

The connection point for the site will be from the existing 21 inch AC water main in Boyton Hall Water Tower, accessed from Witherfield Road, Great Wratting at National Grid Reference (NGR) TL6744847217.

Water Budget Costs

The costs provided in this report are based on the current information available. These costs are provided as an indicative estimate to help inform you on a budget for supplying water to your site.

- The strategic costs are based on a proportion of the total strategic scheme cost. These costs are calculated based on the flow rate that your development requires as compared to the total flow rate that the strategic main has been designed against.

- The local reinforcement costs have been calculated based on the typical costs of providing a length of water main across a similar distance as required for this development site.

Based on these estimated and predicted costs, the cost to provide water to your site:

Predicted costs for supplying water to your development		
Strategic Water Mains	Based on	Cost
None		£ 0
Estimated Local reinforcement Mains		
Land at Haverhill	Booster & 750m of 280mm HPPE main	£ 554,782.00
Total Cost for providing the water infrastructure		£ 554.782.00

The above table provides an estimated breakdown of the costs to supply the water infrastructure. A more detailed cost provision will be provided following a formal application for a new water mains or water connection.

In examining the used water system we assess the ability for your site to connect to the public sewerage network without causing a detriment to the operation of the system. We also assess the receiving water recycling centre and determine whether the water recycling centre can cope with the increased flow and influent quality arising from your development

Water Recycling Centre

The foul drainage from the proposed development is in the catchment of Haverhill Water Recycling Centre, which currently has capacity to treat the flows from your development site. Anglian Water cannot reserve capacity and the available capacity at the water recycling centre can be reduced at any time due to growth and due to environmental and regulation driven changes.

Used Water Network

Anglian Water has assessed your proposals and a desktop study has indicated that a direct connection to the public foul sewerage system is likely to have a detrimental effect on the existing sewerage network. Therefore further hydraulic modelling work is required to enable Anglian Water to provide you with a solution for draining the foul flows from the proposed development. There is no additional charge for this work.

Rob Morris, our Senior Growth Planning Engineer for this area, will be responsible for undertaking this additional work. Rob will contact you shortly to discuss the timescales and to obtain any further information required. For your reference, Rob can be contacted on 07702 341018 or at rmorris2@anglianwater.co.uk.

If this modelling work confirms your development will have a detrimental effect on the existing sewerage network, the drainage strategy will be detailed within the pre-planning addendum report. This will be issued to you under separate cover within the timescales advised by Rob. This will include a no detriment foul drainage solution which will encompass a connection point, details of any upgrades or work required and indicative budgetary costs.

If an alternative drainage solution is required following the work undertaken for the pre-planning addendum report, any additional hydraulic modelling work will be at the cost of the developer. A cost and timescale is available upon request.

Please note that Anglian Water will request a suitably worded condition at planning application stage to ensure the strategy is implemented to mitigate the risk of flooding.

Surface Water Disposal

Due to the proximity of the watercourse/ditch to the site, it is considered not appropriate to provide a connection to the public sewer. Disposal via infiltration should also be explored first to ensure SUDS hierarchy is followed.

As you may be aware, Anglian Water will consider the adoption of SuDs provided that they meet the criteria outline in our SuDs adoption manual. This can be found on our website at www.anglianwater.co.uk/developers/sewer-connection/suds.aspx. We will adopt

features located in public open space that are designed and constructed, in conjunction with the future SuDs Approving Body, to the criteria within our SuDs adoption manual. Specifically, developers must be able to demonstrate:

1. Effective upstream source control,
2. Effective exceedance design, and
3. Effective maintenance schedule demonstrating than the assets can be maintained both now and in the future with adequate access.

Our preference is that the Local Authority is requested to adopt in the first instance as duty will pass to them in future legislation. Consequently as part of your submission, evidence will need to be provided to show that you have approached the local authority. If you wish to look at the adoption of any SuDs then an expression of interest form can be found on our website at:
http://www.anglianwater.co.uk/_assets/media/SuDS_Adoption_Form_2012.pdf

Trade Effluent

We note that you do not have any trade effluent requirements. Should this be required in the future you will need our written formal consent. This is in accordance with Section 118 of the Water Industry Act (1991).

Used Water Budget Costs

It has been assumed that the onsite used water network will be provided under a section 104 Water Industry Act application. It is recommended that you also budget for both infrastructure charges and connection costs. The 2014/15 charges are:

Infrastructure Charge	£345.00 per connection
S104 Supervision and inspection costs	2.5% of estimated construction costs
S104 Survey costs	10% of estimated construction costs