Our Ref: 15-154.01L

Michael Naughton
One 17 Design
The Dyehouse
Armitage Bridge
Huddersfield
West Yorkshire
HD4 7PD

Solum House
Unit 1 Elliott Court
St John's Road
Meadowfield
Durham
DH7 8PN

15th July 2015

Dear Michael,

RE: Soakaway Tests for Proposed Residential Development at Station Road, Meltham

As requested by One 17 Design, and in accordance with BRE Digest 365: Soakaway Design, March 2007, three soakaway tests were undertaken for the above mentioned site on the 17th June 2015, by a representative from Arc Environmental Limited and the locations of which can be seen on the attached plan.

The tests were undertaken to determine the soil infiltration rates of the materials across the site, in order to assess their suitability for the use of soakaways, and to subsequently aid in a suitable soakaway design.

For an accurate description of the ground conditions encountered at each investigation position, reference should be made to the soakaway pit record sheets attached. It should be noted that there is always the possibility of variation in the ground conditions around and between the exploratory locations. A summary of the soil profile can be seen in Table 1 below.

Table 1

Type of strata	Depths recorded	Description of strata
TOPSOIL:	From 0.00m to c.0.20m to c.0.30m	Comprising initial site surfacing of grass, overlying dark brown sandy SOIL with occasional roots and sandstone cobbles.
DRIFT DEPOSITS:	Not Encountered	N/A.
SOLID GEOLOGY: (Millstone Grit)	From c.0.20m to c.0.30m to c.1.10m to c.1.20m	Comprising SANDSTONE (recovered as clayey sand with many sandstone cobbles). Occasional clay pockets were present in S2.

The soakaway test pits were excavated by a JCB 3cx excavator, to a depth of c.1.20m (S1), 1.10m (S2) and c.1.10m (S3) below current ground levels. Prior to commencing with the test, the soakaway test pits were filled with water at a relatively rapid rate (to ensure the pit was filled within a short time). However, S1 was unable to be filled as the water was draining away at such a rapid rate.

RE: Soakaway Tests for Proposed Residential Development at Station Road, Meltham (Cont'd)

Both S2 & S3 were filled to c.0.30m and the time (in seconds) was then observed for water to seep away from the pit.

In order to calculate the soil infiltration rate (f) for these materials, the time (in seconds) is required for the water to seep away from 75% to 25% effective depth (tp_{75-25}) was recorded along with the volume of water (Vp_{75}) and surface area if the test pit within this zone, plus the base of the pit (ap_{50}).

A summary of the results is presented in Table 2 below, whilst copies of the soil infiltration rate calculation sheets can be seen attached.

Table 2

Position	Volume of H_2O within 75% to 25% of Effective Depth (V_{P75}) (m^3)	Mean Surface Outflow Area (a_{P50}) (m^2)	Drainage Time over 75% to 25% of Effective Depth (t_{P75-25}) (secs)	Soil Infiltration Rate (f) (ms^{-1})	Average Infiltration Rate (f) (ms^{-1})
S2 (Test 1)	0.644	4.010	58	2.77×10^{-3}	
S2 (Test 2)	0.644	4.010 85		1.89×10^{-3}	1.93×10^{-3}
S2 (Test 3)	0.644	4.010 142		1.13×10^{-3}	
S3 (Test 1)	0.560	3.560	275	5.72×10^{-4}	
S3 (Test 2)	0.560	3.560	130	1.21×10^{-3}	9.97×10^{-4}
S3 (Test 3)	0.560	3.560	130	1.21×10^{-3}	

S1 was unable to be filled with the water rapidly discharging into the sandstone deposits, indicting good drainage characteristics. Similarly, from the results of the soakaway tests completed (S2 & S3), average infiltration values for the soils tested range from 1.93×10^{-3} ms^{-1} to 9.97×10^{-4} ms^{-1}, also indicating good drainage characteristics, with a medium and high permeability classifications.

Therefore the sandstone deposits are considered suitable for the use of traditional soakaways and these results should be passed on to a drainage engineer.

I trust the above and attached are of interest. If you have any queries then please do not hesitate to contact me.

Yours Sincerely,

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For and on behalf of Arc Environmental Ltd
Sophie Donnison BSc (Hons)
Graduate Geo-environmental Engineer

T: 0191 378 6380
F: 0191 378 0494
E: admin@arc-environmental.com
W: www.arc-environmental.com
Registered in England No. 05539784

CHAS Contractors Health & Safety Assessment Scheme Accredited Contractor www.chas.gov.uk
worksafe consultant www.smasltd.com
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ARC ENVIRONMENTAL LTD
Solum House
Unit 1 Elliott Court
St. John's Road
Meadowfield
Durham, DH7 8PN
Tel: (0191) 378 6380
Fax: (0191) 378 0494
e-mail: admin@arc-environmental.com
web: www.arc-environmental.com

The contractor shall check all dimensions on site before commencement of any works. No dimensions to be scaled off this drawing.
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LEGEND	
	APPROXIMATE SITE BOUNDARY
	MECHANICALLY EXCAVATED TRIAL PIT POSITION
	SOAKAWAY TEST POSITION

rev.	date	amendments	drawn	chckd

Client:
ABACUS STONE SALES

Project Title:
Land at Station Road
Meltham
Huddersfield

Drawing Title:
Exploratory Hole Location Plan

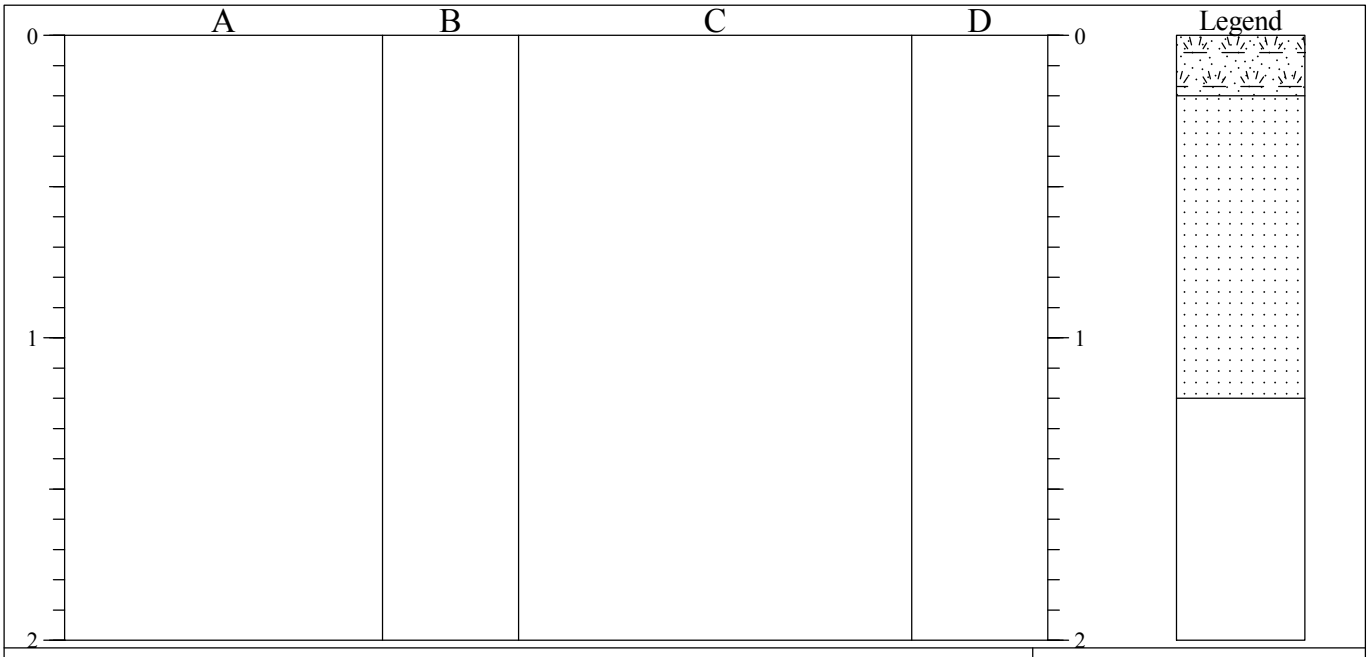
Scale at A3:	Date:	Drawn by:	Approved by:
NTS @ A3	15.07.15	P.D	A.M

Job Ref:	Drg no:	Rev:
15–154	–	–

Solum House, Unit 1 Elliott Court
St Johns Road, Meadowfield
Durham, DH7 8PN
Telephone: 01913786380

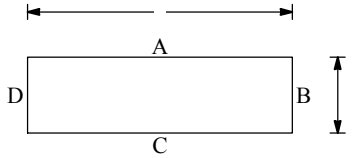
TRIAL PIT LOG

Project				TRIAL PIT No
Land at Station Road, Meltham				**S1**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
15-154	17-06-15			
Contractor				Sheet
				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		Grass overlying dark brown sandy SOIL.			
0.20-1.20		Light brown SANDSTONE. Recovered as clayey sand with many sandstone cobbles.	0.20	J/D	
			0.80	B	
1.20		Trial pit terminated at c.1.20m.			

Shoring/Support:
Stability:





GENERAL REMARKS

WATER: Trial pit remained DRY during the exploratory period.

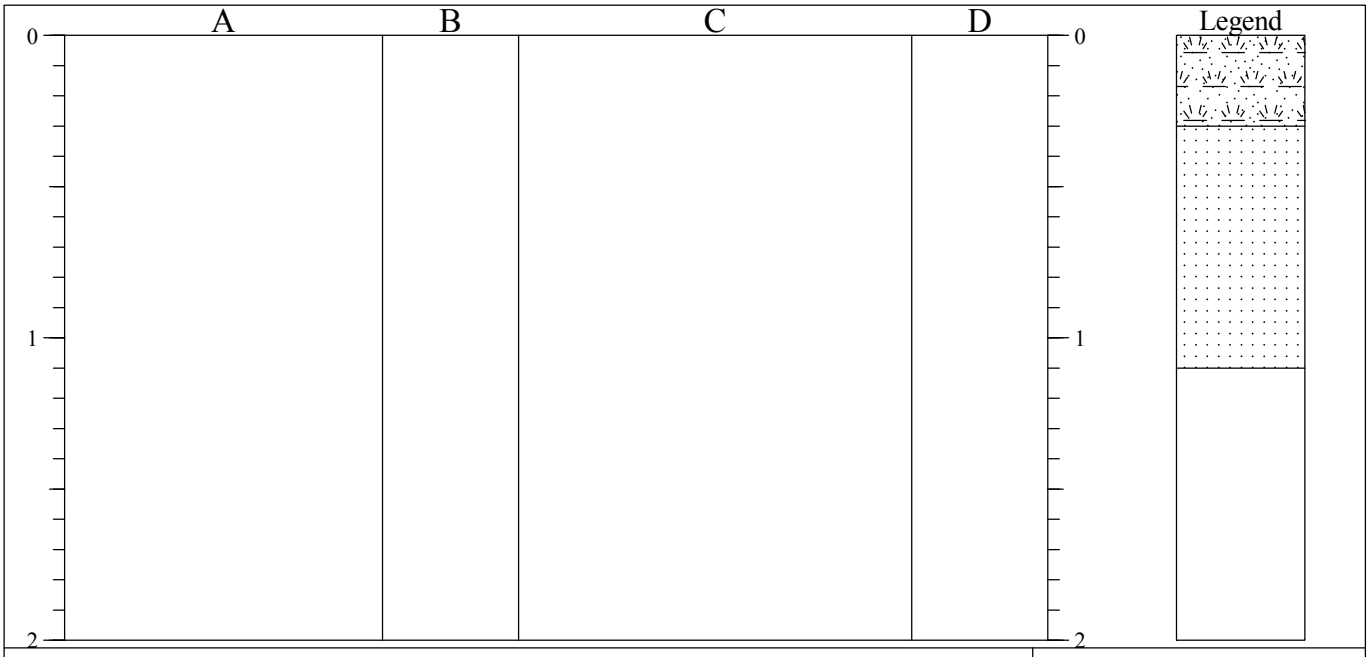
All dimensions in metres Scale 1:25	Client One 17	Method/ Plant Used JCB 3CX	Logged By SD

AGS3 UK TP 15-154 LOGS.GPJ AGS3_ALL.GDT 15/7/15

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Durham, DH7 8PN
Telephone: 01913786380

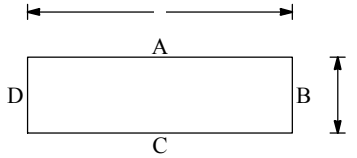
TRIAL PIT LOG

Project				TRIAL PIT No
Land at Station Road, Meltham				S2
Job No	Date	Ground Level (m)	Co-Ordinates ()	
15-154	17-06-15			
Contractor				Sheet
				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Grass overlying dark brown sandy SOIL with sandstone cobbles.			
0.30-1.10		Light orangish brown SANDSTONE. Recovered as slightly clayey sand with many sandstone cobbles.	0.30	J/D	
			0.90	B	
1.10		Trial pit terminated at c.1.10m.			

Shoring/Support:
Stability:





GENERAL REMARKS

WATER: Trial pit remained DRY during the exploratory period.

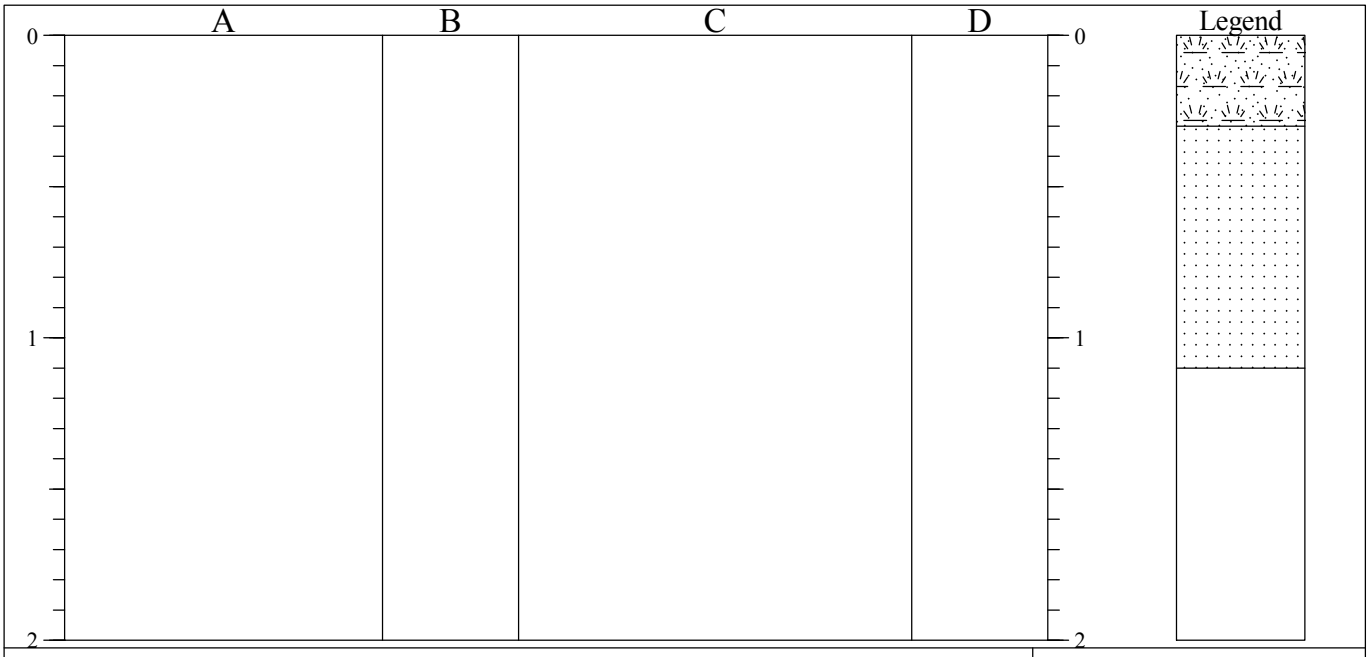
All dimensions in metres Scale 1:25	Client One 17	Method/ Plant Used JCB 3CX	Logged By SD

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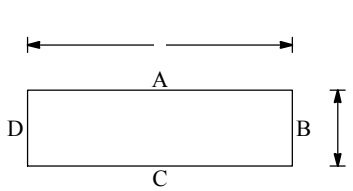
TRIAL PIT LOG

Project				TRIAL PIT No
Land at Station Road, Meltham				**S3**
Job No	Date	Ground Level (m)	Co-Ordinates ()	
15-154	17-06-15			
Contractor				Sheet
				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Grass overlying dark brownish black sandy SOIL with occasional roots.	0.20	J/D	
0.30-1.10		Reddish orange SANDSTONE. Recovered as clayey sand with many sandstone cobbles with occasional clay pockets.	0.80	B	
1.10		Trial pit terminated at c.1.10m.			

Shoring/Support:
Stability:





GENERAL REMARKS

WATER: Trial pit remained DRY during the exploratory period.

All dimensions in metres Scale 1:25	Client One 17	Method/ Plant Used JCB 3CX	Logged By SD

AGS3 UK TP 15-154 LOGS.GPJ AGS3_ALL.GDT 15/7/15

15-154 Meltham - Test Pit No. SA3

Worksheet for Soakaways: Soil Infiltration Rate Calculated as BRE Digest 365: Soakaway Design

DATE: 17/06/15

Test pit dimesions	L	W	D
	2.00	0.70	1.10

Effective depth (D) from 0.30m to 1.10m = 0.80 m

75% effective depth =	0.5	m bg
50% effective depth =	0.7	m bg
25% effective depth =	0.9	m bg

V_{p75-25} = outflow volume between 75% & 25% effective depth — V_{p75-25} = 0.560 m^3

a_{p50} = 50% internal surface area of effective depth including base — a_{p50} = 3.560 m^2

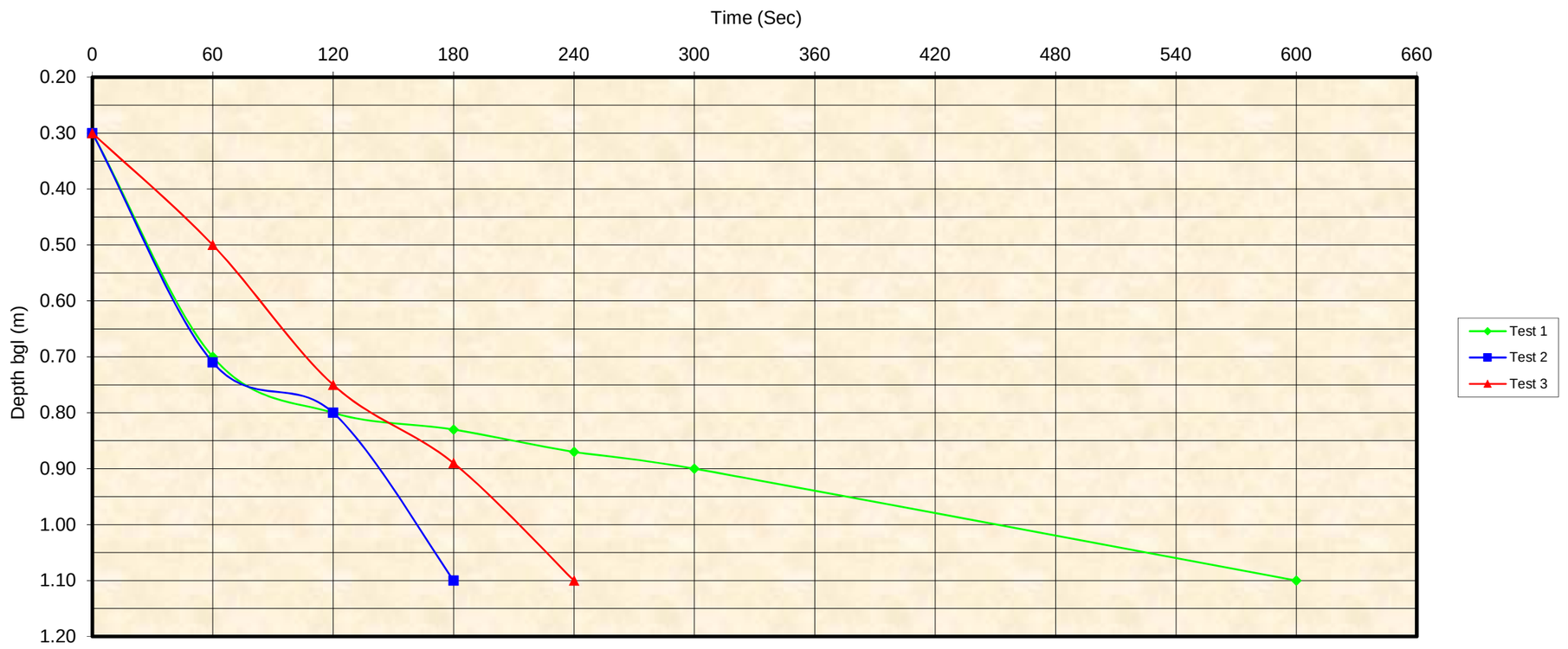
OBSERVATIONS:

Pit filled from water bowser- Fill times c.5mins

The pit remained stable during construction

Time (sec) dt_0	Depth bgl (m) Test No. 1	2	3
0	0.30	0.30	0.30
60	0.70	0.71	0.50
120	0.80	0.80	0.75
180	0.83	1.10	0.89
240	0.87		1.10
300	0.90		
600	1.10		

Fig 1: Depth v's Time - Infiltration Rates



Soil Infiltration Calculations

t_{p75-25} = time for infiltration (from fig 1)

t_{p75-25} = 275 130 130 **secs**

Soil infiltration rate (**f**) = $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

f= 5.72E-04 1.21E-03 1.21E-03 **ms^{-1}**

Average f= 9.97E-04 ms^{-1}

15-154 Meltham - Test Pit No. SA2

Worksheet for Soakaways: Soil Infiltration Rate Calculated as BRE Digest 365: Soakaway Design

DATE: 17/06/15

Test pit dimesions	L	W	D
	2.30	0.70	1.10

Effective depth (D) from 0.30m to 1.10m = 0.80 m

75% effective depth =	0.5	m bg
50% effective depth =	0.7	m bg
25% effective depth =	0.9	m bg

V_{p75-25} = outflow volume between 75% & 25% effective depth — V_{p75-25} = 0.644 m^3

a_{p50} = 50% internal surface area of effective depth including base — a_{p50} = 4.010 m^2

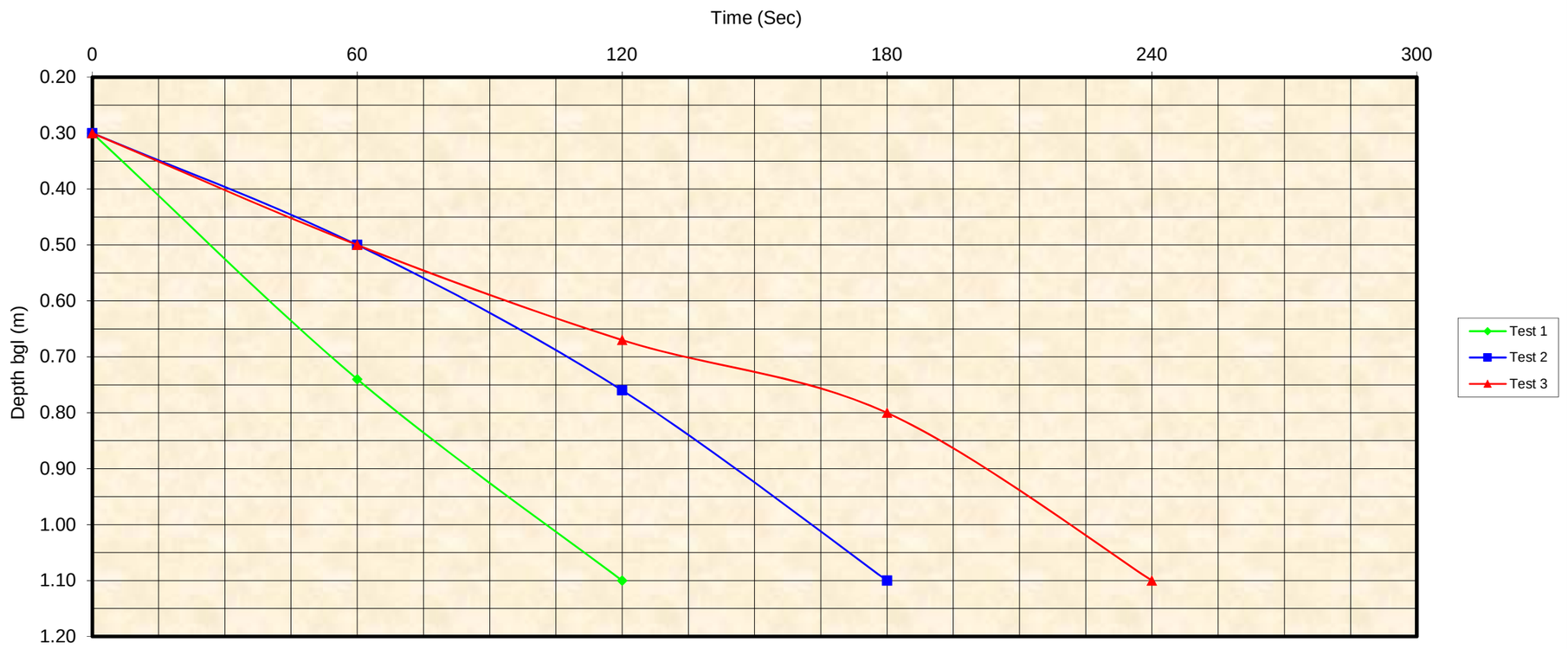
OBSERVATIONS:

Pit filled from water bowser- Fill times c.5mins

The pit remained stable during construction

Time (sec) dt_0	**Depth bgl (m)** Test No. 1	Test No. 2	Test No. 3
0	0.30	0.30	0.30
60	0.74	0.50	0.50
120	1.10	0.76	0.67
180		1.10	0.80
240			1.10
300			
600			

Fig 1: Depth v's Time - Infiltration Rates



Soil Infiltration Calculations

t_{p75-25} = time for infiltration (from fig 1) — t_{p75-25} = 58 85 142 **secs**

Soil infiltration rate (**f**) = $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

f= 2.77E-03 1.89E-03 1.13E-03 **ms^{-1}**

Average f= 1.93E-03 ms^{-1}