

REF: 1778/TF/Soakaways/mjs

Mike Forgrave
Gower Homes
8 Temple Row
Wrexham LL13 8LY

31st December 2015

Dear Mike,

RE: TOTAL FITNESS, WREXHAM: SOAKAWAY TEST RESULTS

Introduction

Gower Homes propose to build twenty one properties on the northern half of the Total Fitness car park in Wrexham. The proposed development layout is presented on Sketch 01.

As part of the development it is proposed to drain the site using soakaways and a preliminary drainage scheme has been designed by rba Consulting Engineers, which is also presented on Sketch 01. Three geo cellular soakaway facilities are proposed to take the entire site drainage.

Investigation and Soakaway Testing

Three trial pits were excavated at the approximate location of the cellular soakaways to a maximum depth of 3.90m to ensure suitable material was encountered for the test.

The trial pit logs are presented in Appendix A and the findings of the trial pits are summarised below.

TP No	Made Ground (m)	Clay (m)	Sand/Gravel (m)
1	0.0-0.90	0.90-1.40	1.40-3.50
2	0.0-1.90		1.90-3.70
3	0.0-1.30	2.0-3.15	1.30-2.0 3.15-3.90

The soakaway testing was carried out in accordance with BRE Digest 365 and comprised filling the trial pits quickly using a 2,000 gallon (9,000litre) water bowser, which was frequently refilled during the testing. Three tests were possible in TP 1 and TP 2, however, only one test was possible in TP 3 due to the low permeability of the soils.

The fall in water level was monitored and the permeability of the soil calculated. The results of the testing is summarised below and presented in full in Appendix B.

TP No	Depth (m)	Test No	Permeability m/sec
TP 1	3.5	1	1.60×10^{-4}
		2	1.176×10^{-4}
		3	9.788×10^{-5}
TP 2	3.70	1	2.016×10^{-4}
		2	1.574×10^{-4}
		3	5.108×10^{-5}
TP 3	3.90	1	6.279×10^{-6}

The tests in TP 1 and TP 2 were influenced by slight instability of the trial pits causing silting up of the base of the pit. However, a design permeability of 1×10^{-4} m/sec is considered reasonable for these granular deposits.

However, in TP 03 the soil was much less permeable and the calculated permeability is marginal for the use of soakaways.

While this soakaway could be used for storage, consideration could be given to an overflow facility, which takes excess water to a more permeable soakaway.

Attention is also drawn to the following:

- Soakaway 1 is within the wayleave for the existing drain and may need to be moved.
- Soakaways should not be moved any further northwards without consideration of the potential affect of raising groundwater levels behind the retaining walls leading to the railway bridge.

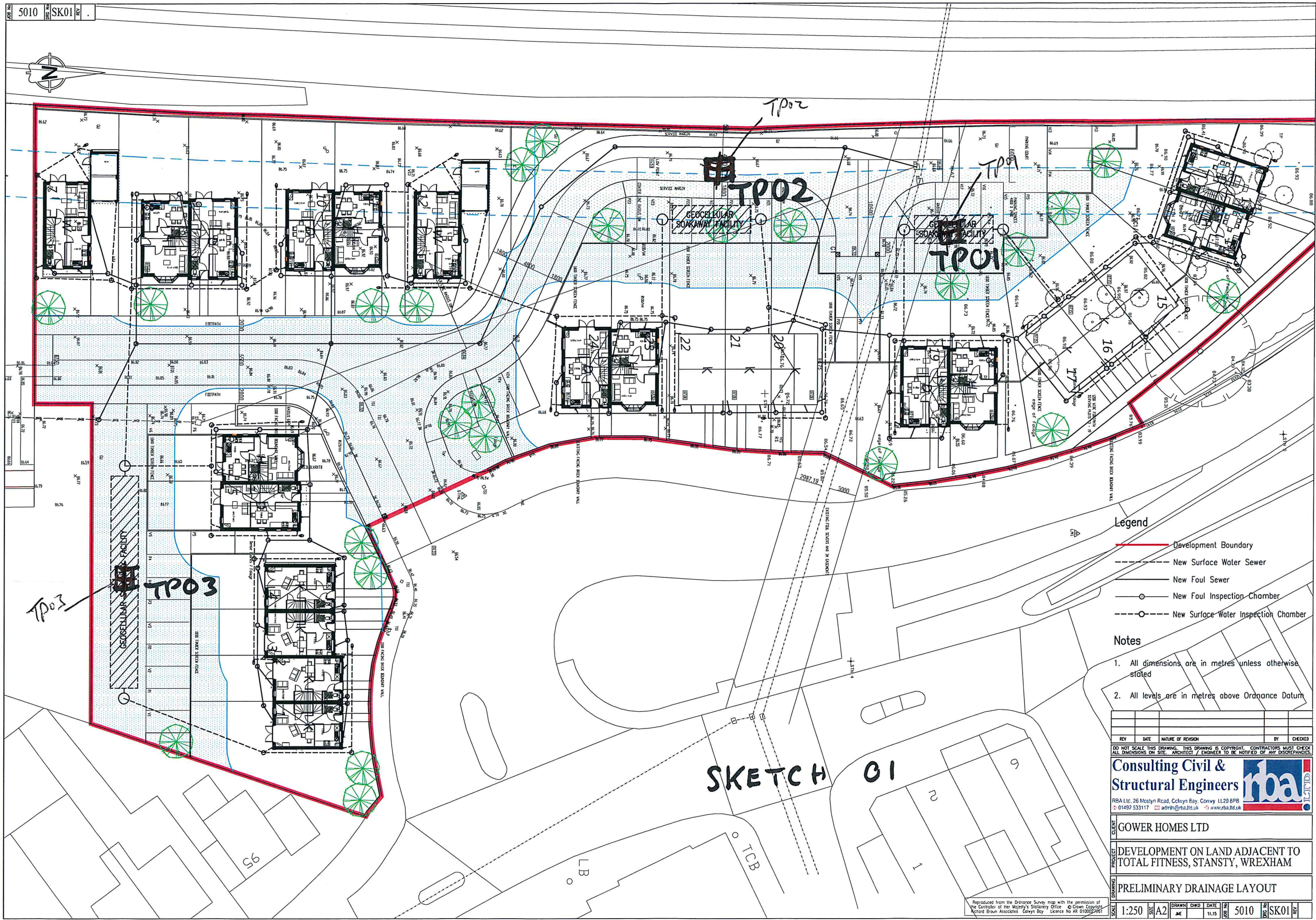
We trust this is satisfactory, any queries please call Mike Scott on 01244 661361.

Yours sincerely



M J Scott

SKETCH



REV	DATE	NATURE OF REVISION	BY	CHECKED

DO NOT SCALE THIS DRAWING. THIS DRAWING IS COPYRIGHT. CONTRACTORS MUST CHECK ALL DIMENSIONS ON SITE. ARCHITECT / ENGINEER TO BE NOTIFIED OF ANY DISCREPANCIES.

Consulting Civil & Structural Engineers **rba LTD**

RBA Ltd, 26 Mostyn Road, Colwyn Bay, Conwy LL29 8PB
 01492 533117 admin@rba.ltd.uk www.rba.ltd.uk

CLIENT GOWER HOMES LTD

PROJECT DEVELOPMENT ON LAND ADJACENT TO TOTAL FITNESS, STANSTY, WREXHAM

DRAWING PRELIMINARY DRAINAGE LAYOUT

SCALE 1:250 A2 DATE 11.15 5010 SK01

Reproduced from the Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright. Richard Brown Associates Colwyn Bay Licence No AR 010002061

APPENDIX A

Trial Pit Logs

TRIAL PIT 01

Depth (m)	Strata
0.00-0.10	Tarmac
0.10-0.20	Loose to medium dense light grey/ off-white slightly sandy silty angular to sub angular medium to coarse limestone GRAVEL (HARDCORE)
0.20-0.30	Medium dense to dense dark grey clayey angular to sub angular fine to coarse GRAVEL (MADE GROUND)
0.30-0.90	Medium dense to dense light grey/ off-white becoming dark grey at depth sub angular limestone and brick COBBLE and angular to sub angular medium to coarse GRAVEL in a sandy silty matrix (MADE GROUND)
0.90-1.40	Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is sub angular to sub rounded fine to coarse (GLACIAL DEPOSITS)
1.40-3.50	Loose to medium dense brown clayey becoming slightly clayey with depth gravelly medium to coarse SAND with a little to some sub rounded cobble. Gravel is sub angular to sub rounded fine to coarse (GLACIAL DEPOSITS)

Notes

1. Pit dimensions 0.80m x 2.40m x 3.50m,
2. Pit sides were slightly unstable from 1.40-3.50m,
3. Groundwater was not encountered,
4. National Grid Reference: SJ 33073 51636,
5. Plastic coated cable encountered at 0.80m.





Trial Pit 01 Soakaway results

Test 1			Test 2			Test 3		
Time (Mins)	Depth (m)	Head (m)	Time (Mins)	Depth (m)	Head (m)	Time (Mins)	Depth (m)	Head (m)
0	1.32		0	1.00		0	1.02	
1	1.52		1	1.29		1	1.22	
2	1.72		2	1.41		2	1.31	
3	1.82		3	1.50		3	1.42	
4	1.90		4	1.55		4	1.44	
5	2.01		5	1.61		5	1.50	
6	2.09		6	1.68		6	1.51	
7	2.15		7	1.74		7	1.56	
8	2.22		8	1.83		8	1.62	
9	2.30		9	1.86		9	1.65	
10	2.40		10	1.93		10	1.69	
15	2.60		21	2.36		15	1.85	
23	2.82		26	2.49		20	1.96	
			30	2.60		25	2.12	
			35	2.69		30	2.23	
			40	2.79				
			48	3.00				

TRIAL PIT 02

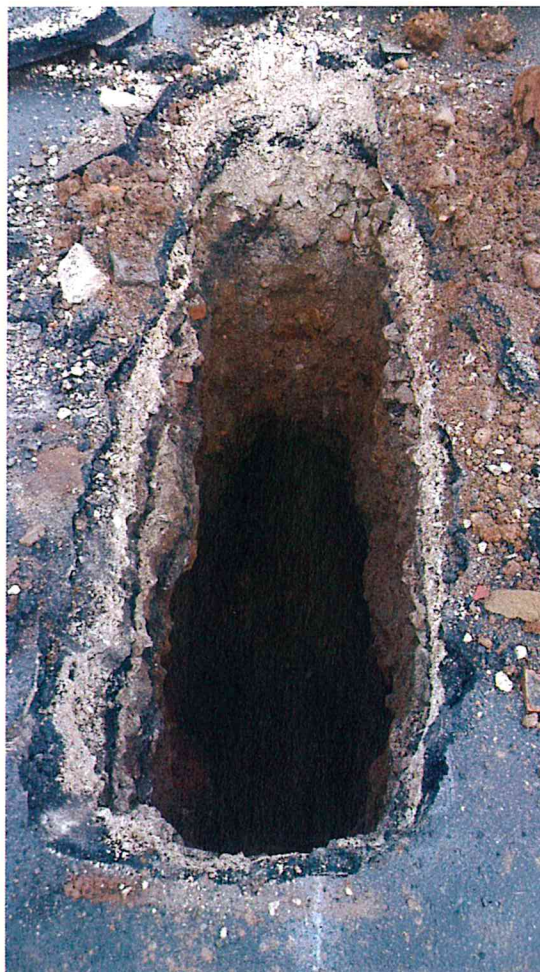
Depth (m)	Strata
0.00-0.10	Tarmac
0.10-0.20	Loose to medium dense light grey/ off-white slightly sandy silty angular to sub angular medium to coarse limestone GRAVEL (HARDCORE)
0.20-0.30	Medium dense to dense dark grey clayey angular to sub angular fine to coarse GRAVEL with a wooden sleeper (MADE GROUND)
0.30-0.35	Loose to medium dense dark grey/ black gravelly ASH/ sub angular fine to coarse GRAVEL in an ash matrix. Gravel includes coal (MADE GROUND)
0.35-0.95	Medium dense to dense light grey/ off-white sub angular limestone and brick COBBLE and sub angular medium to coarse GRAVEL in a sandy silt matrix (MADE GROUND)
0.95-1.90	Loose to medium dense brown gravelly medium to coarse SAND with a little to some sub rounded cobble and boulder. Gravel is sub angular to sub rounded fine to coarse coal and brick (MADE GROUND)
1.90-3.50	Loose to medium dense brown slightly sandy clayey becoming slightly clayey and sandy with depth sub angular to sub rounded fine to coarse GRAVEL with some sub rounded cobble and a little sub rounded boulder (GLACIAL DEPOSITS)
3.50-3.70	Loose to medium dense brown sandy sub angular to sub rounded fine to coarse GRAVEL with some to much sub rounded cobble and a some sub rounded boulder (GLACIAL DEPOSITS)

Notes

1. Pit dimensions 0.70m x 2.90m x 3.70m,
2. Pit sides were slightly unstable from 1.20-2.70m,
3. Groundwater was not encountered,
4. National Grid Reference: SJ 33062 51323



Trial Pit 02



Trial Pit 02 Soakaway results

Test 1			Test 2			Test 3		
Time (Mins)	Depth (m)	Head (m)	Time (Mins)	Depth (m)	Head (m)	Time (Mins)	Depth (m)	Head (m)
0	2.00		0	1.79		0	1.79	
1	2.21		1	1.94		1	1.89	
2	2.35		2	2.01		2	1.94	
3	2.48		3	2.12		3	1.98	
4	2.53		4	2.20		4	2.02	
5	2.61		5	2.25		5	2.08	
6	2.67		6	2.30		6	2.09	
7	2.73		7	2.36		7	2.11	
8	2.77		8	2.40		8	2.14	
9	2.80		9	2.45		9	2.18	
10	2.83		10	2.48		10	2.21	
15	3.10		16	2.71		18	2.40	
20	3.26					25	2.49	
						30	2.56	
						37	2.65	
						42	2.73	
						66	2.86	

TRIAL PIT 03

Depth (m)	Strata
0.00-0.10	Grass over loose to medium dense dark brown gravelly clayey SILT. Gravel is sub angular to sub rounded fine to medium (TOPSOIL)
0.10-1.30	Loose to medium dense brown clayey gravelly SILT/ fine SAND with some cobble and boulder sized pockets of firm gravelly clay and a little to some sub angular brick and concrete cobble and a little roots. Gravel is angular to sub angular fine to coarse (MADE GROUND)
1.30-2.00	Medium dense light brown clayey gravelly medium to coarse SAND with a little to some cobble sized pockets of slightly sandy silty clay. Gravel is sub angular to sub rounded fine to coarse (GLACIAL DEPOSITS)
2.00-3.15	Firm brown locally mottled black slightly sandy slightly gravelly silty CLAY with a little to some cobble sized pockets of light brown silty fine sand. Gravel is sub rounded fine (GLACIAL DEPOSITS)
3.15-3.90	Medium dense to dense orangish brown slightly gravelly medium to coarse SAND with a little to some coarse gravel sized pockets of clay. Gravel is sub rounded to rounded medium to coarse (GLACIAL DEPOSITS)

Notes

1. Pit dimensions 0.70m x 2.60m x 3.90m,
2. Pit sides were stable,
3. A very slight seepage of groundwater was encountered in the northern pit wall at 1.00m,
4. National Grid Reference: SJ 33110 51268,
5. Concrete slab found in west of pit at 1.00m, pit extended 0.50m to the east.





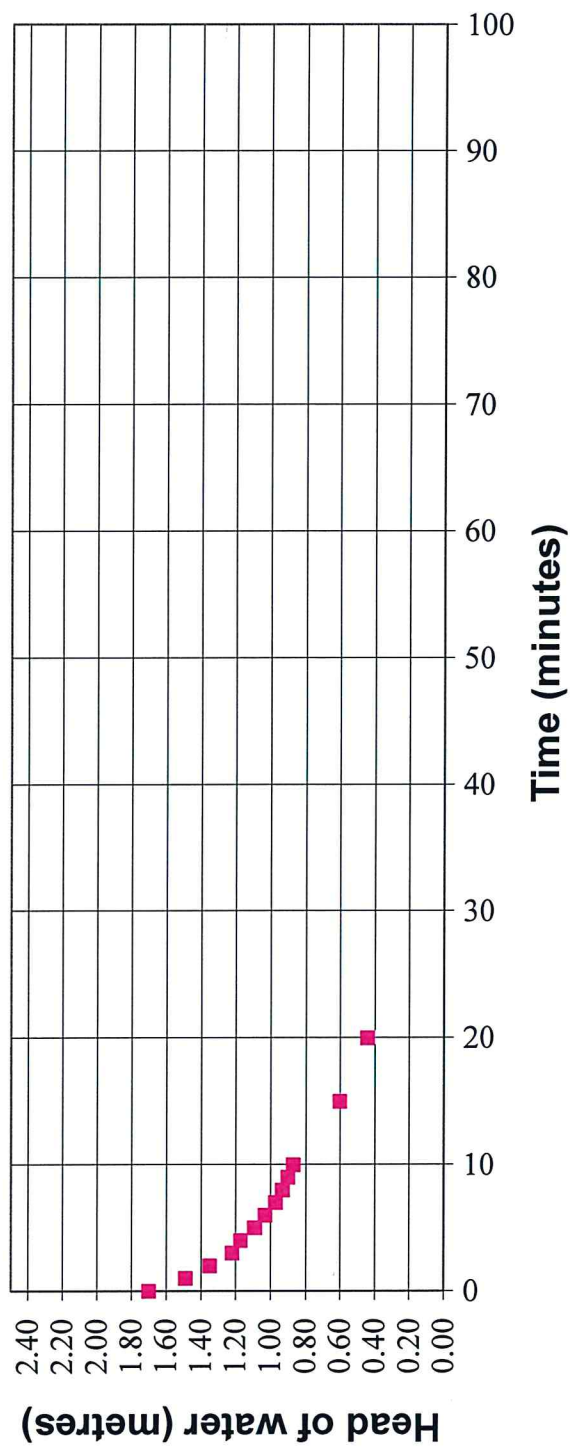
Trial Pit 03

Trial Pit 03 Soakaway results

Test 1		
Time (Mins)	Depth (m)	Head (m)
0	1.00	
1	1.10	
2	1.21	
3	1.31	
4	1.38	
5	1.42	
6	1.46	
7	1.47	
8	1.50	
9	1.51	
10	1.52	
15	1.59	
20	1.62	
40	1.73	
60	1.79	
75	1.85	
95	1.88	
200	2.14	

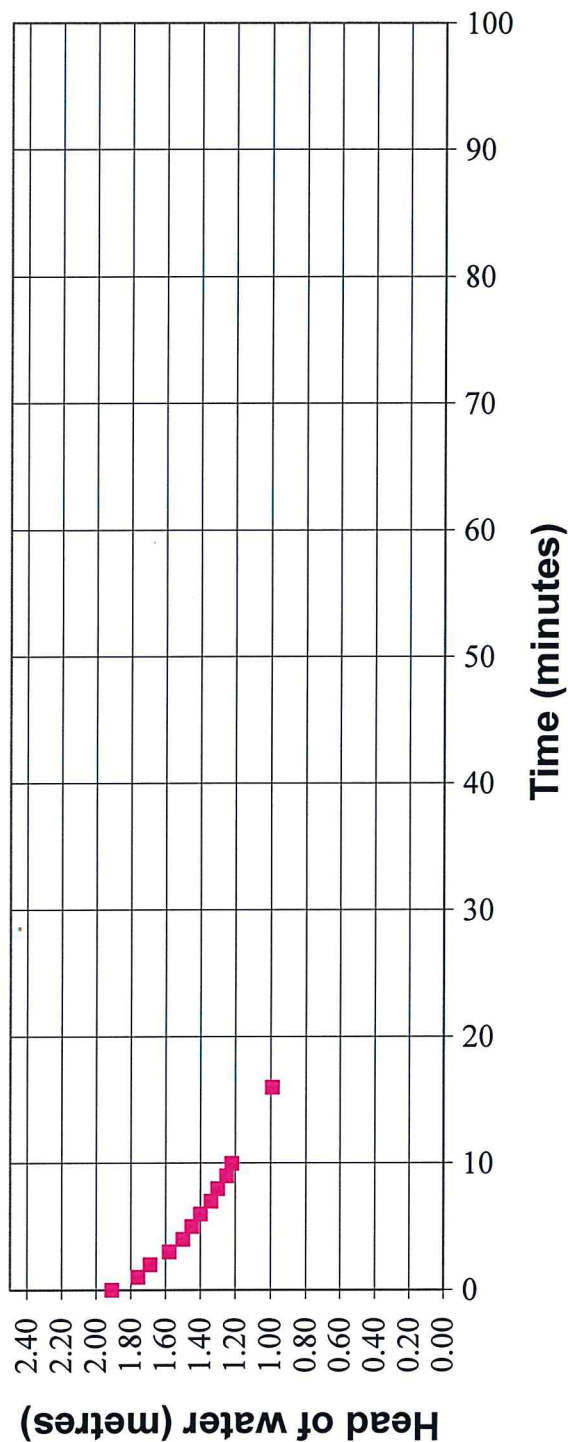
APPENDIX B

Soakaway Test Results

[illegible]

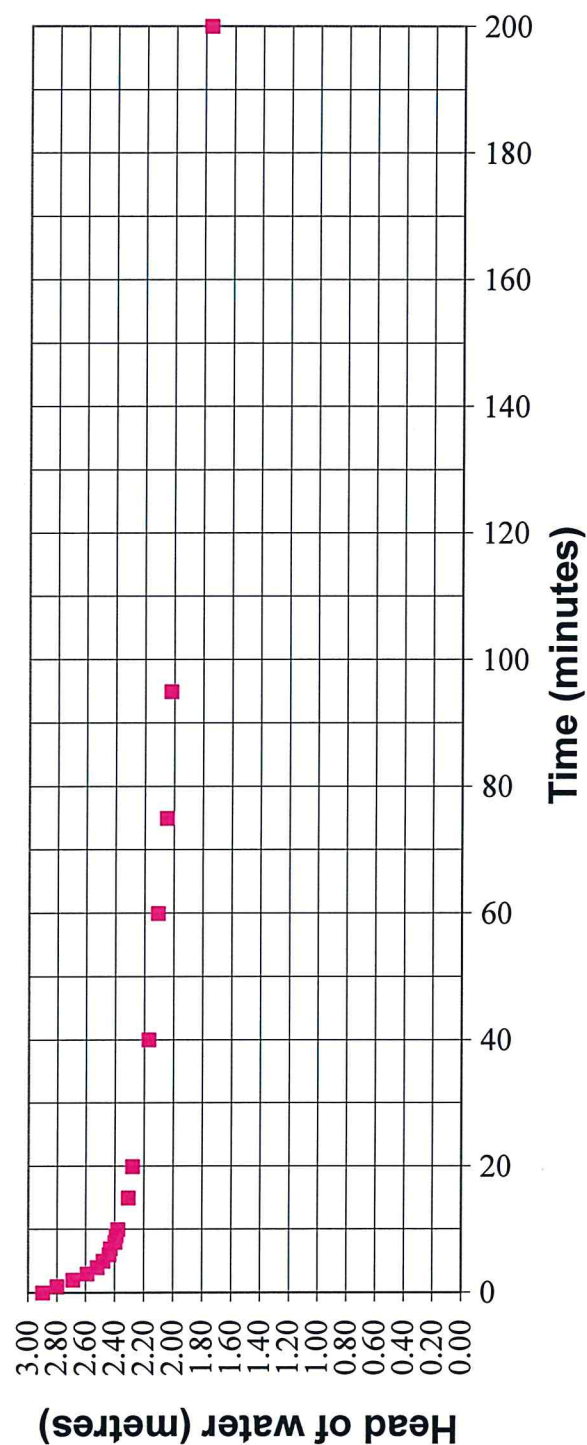
Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjusment Factor *	t75 (mins)	t25 (mins)	Infiltration rate m/s
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m ²	Volume of water m ³				
3.70	2.90	0.70	1.275	0.43	1.70	8.150	1.726	1.00	2.5	20	2.016E-04

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

[illegible]

Depth (m)	Length (m)	Width (m)	Head at 75% Vol (m)	Head at 25% Vol (m)	Water depth(t=0) (m)	Effective Area Ap50 m2	Vp75-Vp25 Volume of water m3	Adjustment Factor *	t75 (mins)	t25 (mins)	Infiltration rate m/s
3.70	2.90	1.50	1.433	0.48	1.91	12.754	4.154	1.00	5.5	40	1.574E-04

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

[illegible]

Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
3.90	2.10	0.70	2.175	0.73	2.90	9.590	2.132	1.00	40	630	6.279E-06

* with gravel filter adjustment factor = 0.30, with no filter = 1.0