CONTENTS

1.0 Brief

ACRA Consulting has been requested by Howard Bruce of AEB Architecture Design Ltd to interpolate and comment on soakaway test data recorded by AEB Architecture Design Ltd.

2.0 Test Methodology

Testing was to be conducted in accordance with BRE365 as industry standard, the testing was conducted 2 times.

3.0 Trial Pit Information

Trial pits were excavated using a JCB.
The final test pit dimension where – 0.6m Wide x 1.0m Long x 1.0m Deep.

4.0 Test Results

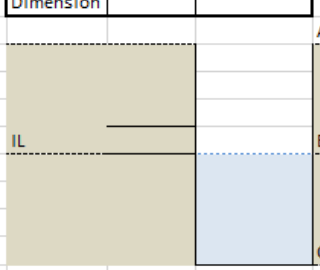
Infiltration tests were undertaken on the proposed site with the following results,

AEB ARCHITECTURE & DESIGN LTD
ACRA Consulting
Civil & Structural Engineer's

Project	2 Main Street Newsholme, Howden	Job Ref	HOWD-100
Section	Soakaway Test	Sheet No/Rev	1 OF 1

Calc by	Date	Chk'd by	Date	App'd by	Date
JHC	16.07.19				

	Width	Breath
Excavation Dimension	0.600	1.0



75% Depth	0.559	
50% Depth	0.373	
25% Depth	0.186	
Volume 75%-25%	0.224	
Wetted 50%	1.792	
Time 75%-25% (mins)	518.261	
f per min (m)	0.001	
Time 75% (mins)	777.391	
Time 25% (mins)	259.130	
Soil Infiltration f	0.014439	m/hr

Test 1

Time	Mins	Water Depth	Depth Dropped
09:00:00	0	0.000	
09:20:00	20	0.700	0.045
10:00:00	60	0.680	0.065
10:30:00	90	0.650	0.095
12:00:00	240	0.500	0.245
14:00:00	480	0.400	0.345

Extract of soakaway log (Pit 1 – Test 1)

ACRA Consulting Civil & Structural Engineer's AEB ARCHITECTURE & DESIGN LTD	Project 2 Main Street Newsholme, Howden			Job Ref. SA-HOWD100	
	Section Soakaway Report			Sheet no./rev. REV A	
	Calc. by JHC	Date 16/07/2019	Chk'd by HB	Date 17/07/2019	App'd by JHC	Date 17/07/2019

AEB ARCHITECTURE & DESIGN LTD

ACRA Consulting
Civil & Structural Engineer's

Project	2 Main Street Newsholme, Howden	Job Ref	HOWD-100
Section	Soakaway Test	Sheet No/Rev	1 OF 1

Calc by	Date	Chk'd by	Date	App'd by	Date

	Width	Breath
Excavation Dimension	0.600	1.0

A	1.000	
IL		
B	0.715	
C	0.000	

75% Depth	0.536	
50% Depth	0.358	
25% Depth	0.179	
Volume 75%-25%	0.215	
Wetted 50%	1.744	
Time 75%-25% (mins)	295.862	
f per min	0.001	
Time 75% (mins)	443.793	
Time 25% (mins)	147.931	
Soil Infiltration f	0.024943	m/hr

Test 2

Time	Mins	Water depth	Depth Dropped
17:00:00	0	0.000	0.715
17:20:00	20	0.670	0.045
18:00:00	60	0.610	0.105
18:30:00	90	0.585	0.130
21:00:00	240	0.425	0.290

Average		
Soil Infiltration f	0.019691	m/hr

Extract of soakaway log (Pit 1 – Test 2)

Trial Pit				
	Test 1 (m/hr)	Test 2 (m/hr)	Test 3 (m/hr)	Average
1	0.014439	0.019691	NOT TESTED	**0.017065**
Average				**0.017065**

Below are the ground definitions in accordance with table 25.1 of the CIRIA SuDs Manual (2016).

	Result	Definition	Description
Test Result	0.017065	Very Poor	Clay

Based on the above results and comparing them with the data provided within the SuDs manual the result is considered to be Very Poor.

TABLE 25.1 Typical infiltration coefficients based on soil texture (after Bettess, 1996)

Soil type/texture	ISO 14688-1 description (after Blake, 2010)	Typical infiltration coefficients (m/s)
Good infiltration media		
• gravel	Sandy GRAVEL	$3 \times 10^{-4} - 3 \times 10^{-2}$
• sand	Slightly silty slightly clayey SAND	$1 \times 10^{-5} - 5 \times 10^{-5}$
• loamy sand	Silty slightly clayey SAND	$1 \times 10^{-4} - 3 \times 10^{-5}$
• sandy loam	Silty clayey SAND	$1 \times 10^{-7} - 1 \times 10^{-5}$
Poor infiltration media		
• loam	Very silty clayey SAND	$1 \times 10^{-7} - 5 \times 10^{-6}$
• silt loam	Very sandy clayey SILT	$1 \times 10^{-7} - 1 \times 10^{-5}$
• chalk (structureless)	N/A	$3 \times 10^{-6} - 3 \times 10^{-6}$
• sandy clay loam	Very clayey silty SAND	$3 \times 10^{-10} - 3 \times 10^{-7}$
Very poor infiltration media	–	
• silty clay loam	–	$1 \times 10^{-6} - 1 \times 10^{-6}$
• clay	Can be any texture of soil	$< 3 \times 10^{-6}$
• till	described above	$3 \times 10^{-9} - 3 \times 10^{-6}$
Other		
• rock* (note mass infiltration capacity will depend on the type of rock and the extent and nature of discontinuities and any infill)	N/A	$3 \times 10^{-9} - 3 \times 10^{-5}$

Table 25.1 of the CIRIA SuDs Manual 2016

5.0 Proposed Model

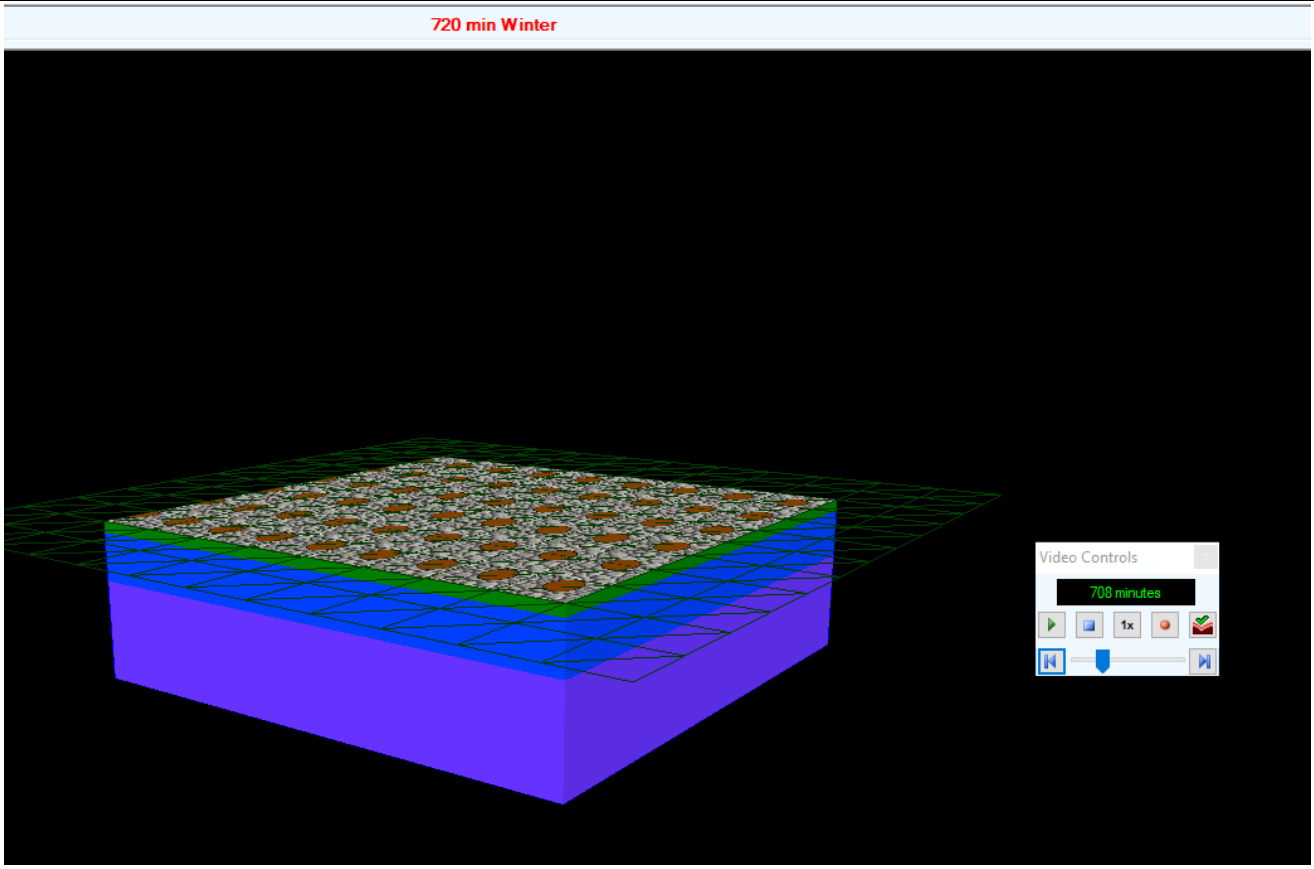
In order to establish whether soakaways are a viable option for this development, a model has been built based on an impermeable area for a single proposed plot discharging to ground via a ring soakaway.

In order to be deemed compliant, the soakaway must be able to contain all flows generated during the 1 in 1, 1 in 10 and 1 in 30 year events with a 30% allowance for climate change to be included.

It will also need to demonstrate compliance with the 24hr half drain down time.

Model Parameters

CL:	+10.000 (Assumed Level)
IL:	+7.600
Infiltration Rate:	0.017 m/hr
Ring Diameter	1.5m DIA
Pit Multiplier	2.0
Infiltration Cap	1.5m
Catchment Area	155m^2



Extract of 3D Model showing water level withn Mircodrainage – 1:30yr + 30%

Results

During the all the above events including an allowance for climate change no above ground flooding will occur, as demonstrated by the below image showing the maximum depth during the 1 in 30 year event + 30%.

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

Half Drain Time : 1100 minutes.

Storm Event	Rain (mm/hr)	Time to Vol Peak (mins)	Max Water Level (m)	Max Depth (m)	Flooded Volume (m³)	Max Filtration (l/s)	Σ Max Outflow (l/s)	Maximum Volume (m³)	Status
30 min Summer	63.339	37	8.487	0.887	0.0	0.0	0.0	3.5	O K
60 min Summer	39.442	66	8.691	1.091	0.0	0.1	0.1	4.3	O K
120 min Summer	23.846	126	8.889	1.289	0.0	0.1	0.1	5.1	O K
180 min Summer	17.580	186	8.994	1.394	0.0	0.1	0.1	5.5	O K
240 min Summer	14.100	244	9.058	1.458	0.0	0.1	0.1	5.7	O K
360 min Summer	10.301	362	9.167	1.567	0.0	0.1	0.1	6.0	O K
480 min Summer	8.243	482	9.248	1.648	0.0	0.1	0.1	6.2	O K
600 min Summer	6.929	600	9.280	1.680	0.0	0.1	0.1	6.2	O K
720 min Summer	6.011	698	9.281	1.681	0.0	0.1	0.1	6.2	O K
960 min Summer	4.801	800	9.265	1.665	0.0	0.1	0.1	6.2	O K
1440 min Summer	3.493	1044	9.200	1.600	0.0	0.1	0.1	6.1	O K
2160 min Summer	2.539	1452	9.081	1.481	0.0	0.1	0.1	5.8	O K
2880 min Summer	2.023	1876	9.009	1.409	0.0	0.1	0.1	5.5	O K
4320 min Summer	1.467	2684	8.877	1.277	0.0	0.1	0.1	5.0	O K
5760 min Summer	1.168	3512	8.765	1.165	0.0	0.1	0.1	4.6	O K
7200 min Summer	0.978	4320	8.667	1.067	0.0	0.1	0.1	4.2	O K
8640 min Summer	0.846	5096	8.579	0.979	0.0	0.0	0.0	3.9	O K
10080 min Summer	0.748	5848	8.501	0.901	0.0	0.0	0.0	3.5	O K
15 min Winter	97.276	23	8.368	0.768	0.0	0.0	0.0	3.0	O K
30 min Winter	63.339	37	8.595	0.995	0.0	0.0	0.0	3.9	O K
60 min Winter	39.442	66	8.826	1.226	0.0	0.1	0.1	4.8	O K
120 min Winter	23.846	124	9.051	1.451	0.0	0.1	0.1	5.7	O K
180 min Winter	17.580	182	9.259	1.659	0.0	0.1	0.1	6.2	O K
240 min Winter	14.100	240	9.430	1.830	0.0	0.1	0.1	6.5	O K
360 min Winter	10.301	356	9.636	2.036	0.0	0.1	0.1	6.9	O K
480 min Winter	8.243	470	9.751	2.151	0.0	0.1	0.1	7.1	O K
600 min Winter	6.929	584	9.812	2.212	0.0	0.1	0.1	7.2	O K
720 min Winter	6.011	694	9.837	2.237	0.0	0.1	0.1	7.2	O K
960 min Winter	4.801	906	9.824	2.224	0.0	0.1	0.1	7.2	O K
1440 min Winter	3.493	1128	9.719	2.119	0.0	0.1	0.1	7.0	O K
2160 min Winter	2.539	1580	9.516	1.916	0.0	0.1	0.1	6.6	O K
2880 min Winter	2.023	2020	9.275	1.675	0.0	0.1	0.1	6.2	O K
4320 min Winter	1.467	2896	8.981	1.381	0.0	0.1	0.1	5.4	O K
5760 min Winter	1.168	3744	8.821	1.221	0.0	0.1	0.1	4.8	O K
7200 min Winter	0.978	4544	8.684	1.084	0.0	0.1	0.1	4.3	O K
8640 min Winter	0.846	5360	8.565	0.965	0.0	0.0	0.0	3.8	O K
10080 min Winter	0.748	6152	8.461	0.861	0.0	0.0	0.0	3.4	O K

Extract of Summary withn Mircodrainage – 1:30yr + 30%

6.0 Conclusion

The test was undertaken in accordance with Building regulations with the water level dropping between 75% - 25%. The calculated infiltration rate has concluded it fall under parameter of good infiltration, due to the small catchment area draining to this soakaway, the required 24hr half drain down time can be achieved based on the modelled parameters.

Therefore, it is recommended the development should uses soakaway as the primary method of surface water disposal.

7.0 Recommendations

1. Soakaway shall be used.
2. The proposed development shall include 30% climate changes for all storm periods.
3. The 1:100yr return period shall be contained above ground.
4. The system should be designed in a way that flows generated during events above a 1 in 30 year storm should follow dedicated flow paths to be kept away from on-site and adjacent property.

For AEB Architecture Design Ltd

Report Written by:-

J H Collins BSc, (Hons), MCIWEM
Civil Engineer