

**SOAKAWAY RESULTS AND CALCULATIONS
for
PROPOSED DEVELOPMENT at
HOME FARM, LLAY, WREXHAM, LL12 0NW**

13 August 2015

Client:

**SOAKAWAY RESULTS AND CALCULATIONS FOR
PROPOSED DEVELOPMENT at HOME FARM, LLAY, WREXHAM LL12 0NW**

1.0 Introduction

- 1.1 Soakaway tests were requested by Mike Cunningham Architects at the location of the proposed residential development and undertaken by Kane Design / Alan Kane on 13 August 2015.
This site is Greenfield farming land, approximately 450m in length, and 535m at the northern boundary on Straight Mile Road, tapering to 230m on the southern boundary.
Site levels range from 88m - 79.5m, falling from the north-west to south / south-east.
The overall grade is about 1 in 84, but large tracts are relatively flat.
- 1.2 Weather on the test day was warm and dry
- 1.3 Test pits were partially filled with water and the time taken to empty recorded. In accordance with BRE 365, the time to empty from 75% to 25% was computed, and from this a soil infiltration rate was calculated.
- 1.4 This was compared with the BRE 365 criteria for the acceptance of soakaways, namely:
- The effective pit depth (depth beneath incoming pipework) must be able to contain a worst-in-30 year storm, all storm durations up to 6 hours.
 - The pit must half-empty within 24 hours.

2.0 Limitations:

Seven tests were undertaken, with each test pit filled once, and readings recorded. These tests give an overview of the ability of the site to soak. All measurements are approximate.

These test results do not remove the need for a site investigation. Comments on the trial pit composition are visual from site, and there is no detailed analysis.

For detailed design, the Highway Authority are likely to ask for tests in proposed roads at intervals of about 50m. They may want to be present for these tests. The full BRE 365 testing criteria is for each test to be repeated three times.

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3.0 Results.

None of the tests produced results capable of meeting BRE 365 standards. It will not half-empty within 24 hours

Tests 1,2, and 7 showed zero movement during the duration of measurement.

Tests 3, 4, and 5 showed very slight movement but nowhere near the standard.

Even this slight movement tended to peter out, and could possibly be put down to initial impact of the water from the bowser.

Test Pit 6 encountered a land drain, as indicated in the photo. Water drained to the invert level of this drain, which appeared to be fully functioning, but then no further infiltration took place. The routes, extent and effectiveness of this or any other land drains are not known.

The possibility had been considered that there might be some infiltration in areas known to contain some sand, but this did not transpire. Clay / silt / loam was present at depth and none of the seven infiltration tests even came close to being successful.

Note the presence of a manhole adjacent to test pit 5, and included in the photographs. This was dry and possibly damaged, and is assumed to be some sort of land drain collector. However, it was not taking any of the flow into test pit 6.

4.0 Comments from the land owner.

There is an unlocated 150mm drain from the existing farm, crossing through the centre of the site in a west-east direction.

There is also a foul sewer from the farm draining north along Gresford Road, but not impinging on the actual site.

There has been flooding into the low south-east of the site in the past, from Gresford Road. Apparently a localised land drainage system was installed to cater for this.

The above information is unconfirmed.

5.0 Summary

None of the seven test pits worked to BRE 365 standards.

On the basis of this, the soakaways tested will not work for this site.

There remains the possibility that deeper soakaways will encounter more receptive conditions, and acceptable infiltration rates.

The alternative is to take an agreed discharge to the Welsh Water public sewer network. In this case the standard design would match the permissible discharge to current green-field run-off, and attenuate / store the remainder on site by oversize pipes and / or a storage pond.

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ENCLOSURES:

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SITE PHOTO INDEX:

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Page 16: TEST PIT 4

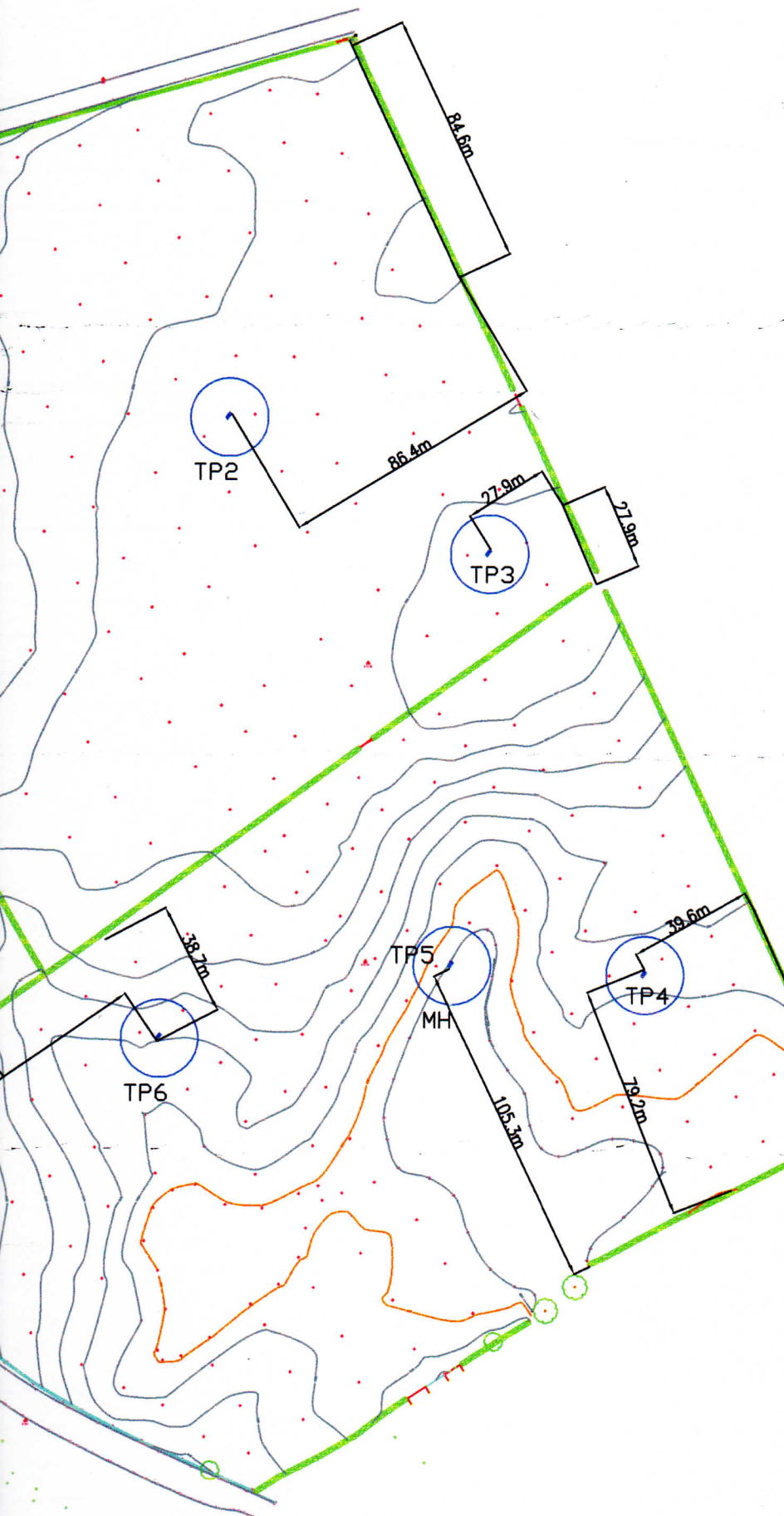
Page 17: TEST PIT 5

Page 18: TEST PIT 6

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Page 20: MANHOLE ADJACENT TO TEST PIT 7





GENERAL NOTES

1. SURVEY DRAWING TAKEN FROM POWERS AND TILTMAN DRAWING NUMBER 6880-1 DATE 17 FEBRUARY 2014
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH REPORT "SOAKAWAYS AND CALCULATIONS FOR PROPOSED DEVELOPMENT AT HOME FARM, LLAY, WREXHAM LL12 0NW: 13 AUGUST 2015



TP2 SOAKAWAY TEST LOCATION

Rev	Description	Date	Drawn	Chkd

KANE DESIGN

Civil Engineering Design

17 Winchester Way
Gresford
Wrexham
LL12 8HH

Tel: 01 978 855888

Client

MERSEY DESIGN GROUP LTD

Project

PROPOSED DEVELOPMENT at
HOME FARM, LLAY, WREXHAM, LL12 0NW

Title

SOAKAWAY TEST LOCATIONS

DRAWING NUMBER	SCALE	T:1000	@ A1
1266/100	DATE	13.08.15	REVISION
	DRAWN	AK	
	CHECKED	AK	

PROPOSED DEVELOPMENT: 365 HOUSES at HOME FARM, LLAY, WREXHAM, LL12 0NW

KANE DESIGN

SOAKAWAY RESULTS

JOB NUMBER:

1266

CLIENT

Mersey Design Group

13 August 2015

AK

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For locations see drawing 1266-100

SOAKAWAY REFERENCE : TEST PIT 1

Test details

Date Thur 13 August 2015

Weather: Hot sunny

**DEPTH
TO
WATER(m)**

TIME) DEPTH OF WATER IN PIT(mm)

START	10.00am	1.10	1550
	10.26am	1.10	1550
	11.21am	1.10	1550
	12.03pm	1.10	1550
	12.53pm	1.10	1550
	14.32pm	1.10	1550
END	15.32pm	1.10	1550

PIT SIZE (m)

Length 2.9

Width 1.2

Average Depth 2.65

PIT AREA (m 3.48

Visual Site Inspection: 0-400mm Topsoil

Approx depths. 400-bottom Clay

Slight foul smell. Cracked land drain visible

TOTAL TIME 332 minutes

CALCULATED:

V25 25%

V75 75%

TIME TO FALL FROM 75% to 25% (mins)

	ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)
0		

CALCULATION:

INFILTRATION RATE = f =

$$\frac{V = \text{Effective Storage Volume between 75\% and 25\% full}}{T = \text{Time taken to drain above X AP}}$$

where AP = 50% internal surface area, including base:

= 14.35 m2

CALCULATED

V (V75-V25)

CALCULATED

SOAKAWAY

FROM ABOVE

PIT AREA

Depth 25%

Depth 75%

x PIT AREA

T

AP

f (Infiltration rate)

m2

mm

mm

m3

minutes

m2

1

3.48

0.00

0.00

0.000

0.00

14.35

m3/second

SOAKAWAY DID NOT DRAIN

SOAKAWAY DID NOT DRAIN

PROPOSED DEVELOPMENT: 365 HOUSES at HOME FARM, LLAY, WREXHAM, LL12 0NWKANE DESIGN
SOAKAWAY RESULTSJOB NUMBER: 1266
CLIENT Mersey Design Group
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For locations see drawing 1266-100

SOAKAWAY REFERENCE : TEST PIT 3**Test details**Date Thur 13 August 2015
Weather: Hot sunny

	TO WATER(m TIME)	DEPTH OF WATER IN PIT(mm)
START	10.50am	0.90 1750
	11.27am	0.96 1690
	12.10am	0.98 1670
	13.01pm	0.98 1670
	14.45am	0.98 1670
END	15.39pm	0.98 1670

PIT SIZE (m)
 Length 2.5
 Width 1.2
 Average Depth 2.65

 PIT AREA (m 3.00
 Visual Site Inspection: 0-300mm Topsoil
 Approx depths. 300-bottom Sand becoming silt
TOTAL TIME 289 minutes**CALCULATED:**V25 25%
V75 75%**TIME TO FALL FROM 75% to 25% (mins)**

	ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)
72.25	12.02pm	0.98
216.75	14.27pm	0.98
144.5		0.00

CALCULATION:

INFILTRATION RATE = f =

 $V = \text{Effective Storage Volume between 75\% and 25\% full}$ $T = \text{Time taken to drain above } X \text{ AP}$

where AP = 50% internal surface area, including base:

= 12.81 m2

CALCULATED**V (V75-V25)****CALCULATED**

SOAKAWAY	PIT AREA	FROM ABOVE Depth 25%	Depth 75%	x PIT AREA	T	AP	f (Infiltration rate)
	m2	mm	mm	m3	minutes	m2	
1	3.00	0.98	0.98	0.000	144.50	12.81	m3/second

SOAKAWAY DID NOT DRAIN

PROPOSED DEVELOPMENT: 365 HOUSES at HOME FARM, LLAY, WREXHAM, LL12 0NWKANE DESIGN
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SOAKAWAY REFERENCE : TEST PIT 4**Test details**Date Thur 13 August 2015
Weather: Hot sunny

	TO WATER(m TIME)	DEPTH OF WATER IN PIT(mm)
START	11.05am	0.90 1850
	11.15am	1.20 1550
	11.32am	1.20 1550
	12.14pm	1.20 1550
	13.05pm	1.20 1550
	14.53pm	1.25 1500
END	15.43pm	1.13 1620

PIT SIZE (m)
 Length 2.7
 Width 1.2
 Average Depth 2.75

 PIT AREA (m 3.18
 Visual Site Inspection: 0-600mm Grey clay
 Approx depths. 600-bottom Dense Clay
Collapse in?
1.16158
0.0394304**CALCULATED:**V25 25%
V75 75%**TOTAL TIME 278** minutes**TIME TO FALL FROM 75% to 25% (mins)**

	ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)
69.5	12.25pm	1.20
208.5	14.34pm	1.23
		End result used
139		0.03

CALCULATION:

INFILTRATION RATE = f =

 $V = \text{Effective Storage Volume between 75\% and 25\% full}$ $T = \text{Time taken to drain above } X \text{ AP}$

where AP = 50% internal surface area, including base:

= 13.77 m2

CALCULATED**V (V75-V25)****CALCULATED****f (Infiltration rate)**

SOAKAWAY	PIT AREA	FROM ABOVE Depth 25%	Depth 75%	x PIT AREA	T	AP	f (Infiltration rate)
	m2	mm	mm	m3	minutes	m2	
1	3.18	1.20	1.23	-0.00010	139.00	13.77	-8.31E-10 m3/second

SOAKAWAY DID NOT DRAIN

PROPOSED DEVELOPMENT: 365 HOUSES at HOME FARM, LLAY, WREXHAM, LL12 0NWKANE DESIGN
SOAKAWAY RESULTSJOB NUMBER: 1266
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For locations see drawing 1266-100

SOAKAWAY REFERENCE : TEST PIT 5**Test details**Date Thur 13 August 2015
Weather: Hot sunny

	TIME)	TO WATER(m)	DEPTH OF WATER IN PIT(mm)
START	11.38am	0.50	2500
	12.16pm	0.60	2050
	13.07pm	0.60	2050
END	15.47pm	0.63	2020

PIT SIZE (m)
 Length 2.9
 Width 1.2
 Average Depth 3.00

 PIT AREA (m 3.48
 Visual Site Inspection: 0-500mm Topsoil
 Approx depths. 500-bottom Black Clay / Mud
 Foul smell

		ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)	
62.25	12.41pm	0.60	
186.75	14.45pm	0.61	
124.5		0.01	

TOTAL TIME 249 minutes

CALCULATED:
 V25 25%
 V75 75%

TIME TO FALL FROM 75% to 25% (mins)

CALCULATION:

INFILTRATION RATE = f =

$$f = \frac{V}{T \times AP}$$

V = Effective Storage Volume between 75% and 25% full
 T= Time taken to drain above X AP

 where AP = 50% internal surface area, including base:
 = 15.78 m2

SOAKAWAY	PIT AREA m2	FROM ABOVE		CALCULATED V (V75-V25) x PIT AREA m3	T minutes	CALCULATED AP m2	f (Infiltration rate) m3/second
		Depth 25% mm	Depth 75% mm				
1	3.48	0.60	0.61	-0.00003	124.50	15.78	-2.95E-10

SOAKAWAY DID NOT DRAIN

PROPOSED DEVELOPMENT: 365 HOUSES at HOME FARM, LLAY, WREXHAM, LL12 0NWKANE DESIGN
SOAKAWAY RESULTS

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SOAKAWAY REFERENCE : TEST PIT 6**Test details**Date Thur 13 August 2015
Weather: Hot sunny

	TO WATER(m TIME)	DEPTH OF WATER IN PIT(mm)
START	15.00pm	0.48 2220
	15.15pm	0.80 1900
	15.51pm	0.80 1900

PIT SIZE (m)
 Length 2.9
 Width 1.2
 Average Depth 2.70
Water falling to land drain depth (800mm)
Then flowing away
 PIT AREA (m 3.48
 Visual Site Inspection: 0-300mm Topsoil
 Approx depths. 300-bottom Clay
 Several land drains (see photo)

TOTAL TIME	minutes	CALCULATED:		TIME TO FALL FROM 75% to 25% (mins)
		V25	25%	
		V75	75%	

	ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)
0		

CALCULATION:

INFILTRATION RATE = f =

 $V = \text{Effective Storage Volume between 75\% and 25\% full}$ $T = \text{Time taken to drain above } X \text{ AP}$ where AP = 50% internal surface area, including base:
= 14.55 m²

SOAKAWAY	PIT AREA m ²	FROM ABOVE		CALCULATED V (V75-V25) x PIT AREA	T minutes	CALCULATED AP m ²	f (Infiltration rate) m ³ /second
		Depth 25% mm	Depth 75% mm				
1	3.48	0.00	0.00	0.000	0.00	14.55	

SOAKAWAY DID NOT DRAIN

PROPOSED DEVELOPMENT: 365 HOUSES at HOME FARM, LLAY, WREXHAM, LL12 0NWKANE DESIGN
SOAKAWAY RESULTS

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SOAKAWAY REFERENCE : TEST PIT 7**Test details**Date Thur 13 August 2015
Weather: Hot sunny

	TIME)	TO WATER(m)	DEPTH OF WATER IN PIT(mm)
START	12.44pm	0.68	1820
END	16.03pm	0.68	1820

PIT SIZE (m)
 Length 2.5
 Width 1.2
 Average Depth 2.50

 PIT AREA (m 2.94
 Visual Site Inspection: 0-300mm Topsoil
 Approx depths. 300-bottom Dry clay, then wet
TOTAL TIME 199 minutes
 CALCULATED:
 V25 25%
 V75 75%
TIME TO FALL FROM 75% to 25% (mins)

	ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)
0		

CALCULATION:

INFILTRATION RATE = f =

$$f = \frac{V}{T \times AP}$$
 V = Effective Storage Volume between 75% and 25% full
 T = Time taken to drain above

 where AP = 50% internal surface area, including base:
 = 12.07 m2

SOAKAWAY	PIT AREA	FROM ABOVE Depth 25%	Depth 75%	CALCULATED V (V75-V25) x PIT AREA	T	CALCULATED AP	f (Infiltration rate)
	m2	mm	mm	m3	minutes	m2	
1	2.94	0.00	0.00	0.000	0.00	12.07	m3/second

SOAKAWAY DID NOT DRAIN















