

**Drainage Appraisal
for
Proposed Residential Development
at
Darland Lane, Rossett, Wrexham, LL12 0FA**

4 February 2017

Client:

**DRAINAGE APPRAISAL FOR
LAND AT DARLAND LANE, ROSSETT, WREXHAM LL12 0FA**

1.0 Introduction

- 1.1 A drainage appraisal was requested by Land Planning at the location of the above proposed residential development and undertaken by Kane Design / Alan Kane on 3 February 2017
- 1.2 This site consists of an irregular farming field approximately 2.35Ha, with site levels range from about 12m-15m, with the high point at the south-east. The front / north of the site fronts Darland Lane, which will be the proposed site access. There are trees all along the southern-eastern boundary, with hedges or fences on the other boundaries.
- 1.3 This drainage appraisal consists primarily of analysing the potential for soakaway drainage, but also considers drainage to the adjacent culvert / ditch.

2.0 Soakaway Testing

- 2.1 Weather on the test day was dry initially with rain later
- 2.2 A trial pit was partially filled with water and the time taken to empty recorded. In accordance with the B.S. 365 requirement, the time to empty from 75% to 25% was computed, and from this a soil infiltration rate was calculated.
- 2.3 This was compared with the B.S. 365 criteria for the acceptance of soakaways, namely:
- The effective pit depth (depth beneath incoming pipework) must be able to contain a worst-in-100 year storm, all storm durations up to 6 hours.
 - The pit must half-empty within 24 hours.

3.0 Soakaway Test Limitations:

The trial pit was filled once, and readings recorded. The purpose of the test was to 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, and there is no detailed analysis.

For detailed design, Wrexham Council Drainage and 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 B.S. 365 testing criteria is for each test to be repeated three times, and this implemented at detailed design stage.

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4.0 Soakaway Test Results.

Test 1: 1.65m x 0.45m x 1.60m average depth

Approximate log:	0-4300	topsoil
	400-bottom	silt / gravelly

Infiltration rate: $3.7 \times 10^{-6} \text{m}^3/\text{s}$

Based on a single test, this soakaway will drain satisfactorily to B.S. 365 standards, for a 100 year-plus 30% climate change storm event, for all storms up to six hour duration. Based on this infiltration rate a soakaway diameter of 1200mm diameter rings, with an effective depth of 2.5m (beneath incoming pipe) could drain 135m²

The purpose of this document is to prove that there are areas where soakaways do work, therefore removing the major issues connected with draining surface water to public sewers (assuming they will accept it), and the cost of over-size storage pipes and large diameter manholes.

The critical item for the tests is the storage volume that must be supplied, rather than time to empty. Various permutations of soakaways can be used to meet this volume, e.g. larger diameter or deeper soakaways or trench systems, with either option consisting of cellular blocks or concrete rings

4.1 General notes:

An adoptable road will require concrete ring soakaways for the road gullies, which will then be adopted by Wrexham Council Highways. It is anticipated that the road will fall to the low end of the site. Wrexham are likely to request further tests in the exact location of proposed soakaways.

5.0 Drainage Ditch and Culvert in Darland Lane.

There is a highway ditch, draining into a 150mm diameter culvert on the opposite side of Darland Lane to the proposed site entrance. This follows a route along Darland Lane, in the direction of Chester Road, then takes a north-east bend between houses, across the golf course, to Pulford Brook.

The function of the ditch appears to be the collection of rainwater from the road-gullies. The existing site (field) falls towards the road and hence to the gullies / ditch culvert system.

In the event that the lower road-side of the site cannot be drained by soakaways, the proposal is to take the rain-water run-off to the ditch, matching the existing water movement.

In-site storage and a flow control will be required to minimise proposed run-off and match the existing surface water run-off value.

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5.1 Betterment.

The developer is prepared to assist with ditch improvements, if required
Proposed surface water run-off could be designed to offer a reduction from the current value, thereby further improving the situation.

6.0 Summary

The soakaway test suggested soakaways will work within this site. This is the primary method to be used for drainage
The drainage ditch / culvert in Darland Lane offers an alternative method of surface water disposal if required.
Agreement will have to be reached with Wrexham County Council Highways and Drainage departments if the ditch / culvert option is to be implemented.

Kane Design requests further time to conduct more soakaways tests to fully map the site, and confirm results. The enclosed is a pre-design preliminary analysis.



PROPOSED DEVELOPMENT at DARLAND LANE, ROSSET, WREXHAM LL12 OFA

KANE DESIGN

SOAKAWAY RESULTS

CLIENT

03 February 2017

JOB NUMBER:

1365

LAND PLANNING

AK

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Sites at junction of Darland Lane / Gamford Lane: Green field

For locations see drawing Sketch XXXX

SOAKAWAY REFERENCE : TEST PIT TPI

DEPTH

TO

WATER(m)

Date Friday 2 February 2017

Weather: dry / some rain

	TIME)	DEPTH OF WATER IN PIT(mm)	
START	9.10am	0.97 630	
	9.20am	1.07 530	
	9.30am	1.09 510	
	9.45am	1.13 470	
	10.00am	1.16 440	
	10.15am	1.42 180	
	10.30am	1.19 410	
	15.00pm	1.41 190	
	15.30pm	1.44 160	
END	16.00pm	1.46 140	

PIT SIZE (m)

Length 1.65

Width 0.45

Average Depth 1.60

Effective depth of soakaway (mm) = 0.630

PIT AREA (m 0.74

Visual Site Inspection: 0-400mm Topsoil

Approx depths. to bottom Silt /gravel / sandy

TOTAL TIME 410 minutes

CALCULATED:

V25 25%

V75 75%

EFFECTIVE	ACTUAL	TIME TO
DEPTH(mm)	DEPTH (mm)	FALL(min)
0.473	1.128	0.47
0.158	1.443	0.16
0.315	0.315	0.31

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

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:

= 4.10 m²

CALCULATED

V (V75-V25)

CALCULATED

SOAKAWAY

	FROM ABOVE						
	PIT AREA	Depth 25%	Depth 75%	x PIT AREA	T	AP	f (Infiltration rate)
	m ²	mm	mm	m ³	minutes	m ²	
	0.74	0.47	0.16	0.000	0.31	4.10	3.07E-06 m ³ /second

PROPOSED DEVELOPMENT at DARLAND LANE, ROSSETT, WREXHAM LL12 0FA
KANE DESIGN

Calculation of Soakaway Requirements

SCHEME 1365

Pre-cast RINGS:PRELIMINARY CALCULATIONS

Rainfall Ratio(r) =		0.300	ALAN KANE
Assume M5-60 rain =		17,000 mm	04-Feb-17
Assumed Impermeable Area =		135 m ² . (from drawings)	OVERALL DEPT 3600 mm
TOTAL AREA=			1000 mm
Soil Infiltration Rate =		3.70E-06 m/sec	2500 mm
			Assume PCC ring in square hole oversized by -
			Assume effective depth =
			(Depth beneath invert)
			Assume voids ratio of stone surround =
			0.35

STORAGE VOLUME SUPPLIED											
DESIGNED TO BS 1377 with rainfalls from Modified Rational Method DESIGN to 1 in 100 YEAR STORM					Concrete Ring Diameter - mm						
					Wall thickness - mm						
					Side Length of square pit - mm						
CLIMATE CHANGE = 30 %					Storage Volume in Chamber - cu.m. Storage Volume in stone backfill - cu.m.						
STORAGE VOLUME REQUIRED					Total Storage Volume Provided - cu.m.						
					1200		1500		TOTAL DEPTH -450mm USED FOR 100 YEAR VALUE		1200
Rainfall Duration D MINUTES / HOURS	Z1	M5-D rain mm	Z2	M10-D rain mm 10 year storm	M30-D rain mm 30 year storm	M100-D rain mm 100 year storm	Inflow to Soakaway = 1 cu.m.	Storage Volume Required = S cu.m.	Storage Volume Required = S cu.m.	Inflow to Soakaway = 1 cu.m. plus 30%	Storage Volume Required = S cu.m.
15	0.625	10.63	off	13.18	16.26	21.14	1.78	1.76	1.75	3.71	3.69
30	0.795	13.52	sheet	16.49	20.41	26.62	2.23	2.18	2.17	4.67	4.63
1	1.000	17.00		19.72	23.46	29.24	2.66	2.58	2.54	5.13	5.05
2	1.215	20.66		23.24	26.23	30.98	3.14	2.96	2.90	5.44	5.26
4	1.470	24.99		27.49	30.74	34.49	3.71	3.37	3.23	6.05	5.71
6	1.645	27.97		30.06	33.28	34.96	4.06	3.54	3.33	6.13	5.62
8	1.820	30.94		31.71	34.65	34.34	4.28	3.59	3.31	6.03	5.34
Storage Volume required (peak value)=					5.62		cu.m.				
Storage Volume designed=					8.82		OKAY				
Peak Design storm					6		hours /minutes				
Time of emptying half storage volume =					23.92		hours		OKAY: WITHIN BRITISH STANDARD 50% EMPTY IN 24 HOURS		