

PRELIMINARY SURFACE WATER DRAINAGE STRATEGY

Erection of 117 Dwellings including Provision of
Roundabout to provide access, Internal Access
Roads, Public Open Space Areas
and Retention of Existing Footpath Route

Land off Llay New Road,
Rhosrobin, LL11 4RB

Prepared for Castlemead Group Ltd by
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Document 1 Percolation Tests provided by Kane Design

1. Introduction

- 1.1 This report considers the surface water drainage issues associated with the planning application for 117 dwellings on Land off Llay New Road, Rhosrobin, Wrexham LL11 4RB
- 1.2 The preliminary surface water drainage strategy has been developed to assess the viability of effectively draining the proposed residential development.
- 1.3 The outline strategy is designed to inform a sustainable approach and will be supplemented with a detailed drainage strategy as part of the future Building Regulation submission.

2. The Site

- 2.1 The site is a roughly rectangular shaped field covering approximately 4.74 hectares
- 2.2 The land is separated into 4 parcels of land and is situated on the urban fringe.
- 2.3 The land is generally flat and sits between Llay New Road to the west and Plas Acton Road to the east.

3. Flood Risk

- 3.1 A floodplain is the area that would naturally be affected by flooding if a river rises above its banks, or high tides and stormy seas cause flooding in coastal areas.
- 3.2 The site is shown to be outside the Environment Agency's Indicative Floodplain which shows the 0.1% annual probability flooding and an extract of the Environment Agency mapping is shown below.



- 3.3 There will be no detrimental impact upon any future occupiers of the development through flood risk and the development of the site will not result in the loss of flood storage capacity
- 3.4 The development fulfils the criteria within Technical Advice Note 15 Development and Flood Risk.

4. Technical Guidance Requirements

- 4.1 TAN 15 Development and Flood Risk states that the aim should be for new development not to create additional run-off when compared with the undeveloped situation, and for redevelopment to reduce run-off where possible.
- 4.2 In accordance with TAN15, Sustainable Drainage Systems (SuDS) should be specified wherever possible to manage surface water.
- 4.3 In addition a hierarchical approach should be taken to the design of the surface water drainage system with priority given to:
- Prevention – the use of good site design to prevent run off (e.g. rainwater re-use or harvesting).
 - Source Control – control of run off at or near the source (e.g. soakaways, infiltration beds, green roofs, pervious paving, etc.).
 - Site Controls – management of water run off in a local area or the site (i.e. routing of surface water to large soakaways or attenuation basins/structures).
- 4.4 Approved Document H of the current Building Regulations sets out a hierarchy for disposal of surface water from new development, as listed below in order of preference:
- Infiltration via soakaway or other infiltration device;
 - Watercourse; and,
 - Sewer.

5. Percolation Tests

- 5.1 Percolation Tests in accordance with BRE 365 guidelines have been provided by Kane Design of 15 Winchester Way, Gresford, Wrexham, LL12 8HH and these are attached as Document 1.
- 5.2 The two trial pits tested passed all soakaway design criteria with 'average' infiltration values

6. Conclusions

- 6.1 It is recommended that surface water is discharged via infiltration techniques.
- 6.2 A detailed drainage design strategy to include SuDs measures will be prepared at Building Control stage in consultation with the sewerage undertaker and the Environment Agency.
- 6.3 On the basis of the Preliminary Surface Water Drainage Strategy, and the Percolation Tests undertaken it is clear that the site is suitable for development.

**SOAKAWAY RESULTS AND CALCULATIONS
for
LLAY NEW ROAD
RHOSROBIN, WREXHAM, LL11 2UB**

11 July 2014

Client:

**SOAKAWAY RESULTS AND CALCULATIONS FOR
LLAY NEW ROAD, RHOSROBIN, WREXHAM, LL11 2UB**

1.0 Introduction

- 1.1 Soakaway tests were requested by Castlemead Homes at the location of a proposed residential development and undertaken by Kane Design / Alan Kane on 10 June 2014.
This site is Greenfield, overgrown, and site levels range from 90-85m
- 1.2 Weather on the test day was hot, with intermittent short heavy showers.
- 1.3 Trial pits were partially filled with water and the time taken to empty recorded. In accordance with B.S. 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 B.S. 363 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.

Typical soakaway designs are included using the obtained infiltration rates

2.0 Results.

- 2.1 Four trial pits were excavated, although only two were used for infiltration tests.

Test 1: 3.8 x 1.0m x 2.15m average depth. [2.35m at deepest]

Approximate log:	0-300/600 mm	topsoil
	600-2000mm	clay
	2000mm-	sandy

Infiltration rate: 1.43 X 10⁻⁵m³/s

Test 2: 1.8 x 1.0m x 1.97m average depth.

Approximate log:	0-300/600 mm	topsoil
	600-1300mm	clay
	1300mm-	sandy

Infiltration rate: 1.69 X 10⁻⁵m³/s

**SOAKAWAY RESULTS AND CALCULATIONS FOR
LLAY NEW ROAD, RHOSROBIN, WREXHAM, LL11 2UB**

Test 3: 1.9 x 1.0m x 1.9m average depth.

Approximate log:	0-300mm	topsoil	
	600-1100mm	clay	
	1100mm-	sandy	Not tested

Test 4: 1.8 x 1.0m x 3.6m average depth.

Approximate log:	0-600 mm	topsoil	
	600-3600mm	clay	Not tested

Based on an infiltration rate of $1.69 \times 10^{-5} \text{m}^3/\text{s}$, and draining an area of 200m^2 :

A soakaway size of 1200mm diameter rings, with an effective depth of 2.0m (beneath incoming pipe) would empty in 8.22 hours.

Required storm storage is 2.78m^3 , and 2.85m^3 is available.

2.0 Summary

The two trial pits tested passed all soakaway design criteria, with 'average' infiltration values.

Visual inspection of the removed earth from trial pit 3 indicated it was identical to pit 2. There appears to be a layer of soakable sandy material, beginning at a level of 85.5m approximately. This is overlain by clay.

Trial pit 4 was not tested, but the excavation revealed clay only. It is possible that deeper excavation might have encountered the sandy layer.

**SOAKAWAY RESULTS AND CALCULATIONS FOR
LLAY NEW ROAD, RHOSROBIN, WREXHAM, LL11 2UB**

3.0 Limitation and comment

The above tests were limited by time constraints, but do 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 at least some of these tests. The full B.S. 363 testing criteria is for each test to be repeated three times.

This report has only considered 4 locations on what is deemed a large site. Detailed design would require about 25 tests, to give a good mapping of the entire site. There may be other clay areas.

The purpose of this document is to prove that there are areas where soakaways do work, therefore removed 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 “worst-storm-in 100 years, plus 30% climate change” must also be considered. At design stage this can be accommodated in several ways, such as:

- Deeper soakaways.
- Designated emergency flood zones such as public open spaces, car parks.

PROPOSED DEVELOPMENT at LLAY NEW ROAD, RHOSROBIN, WREXHAM, LL11 2UB

KANE DESIGN

JOB NUMBER:

1241

SOAKAWAY RESULTS

CLIENT

Castelemead Homes

11 June 2014 AK

PAGE

SOAKAWAY REFERENCE : TRIAL PIT 1**Test details**

Date Tue 10 June 2014

Weather: Hot sunny, some heavy showers

DEPTH OF WATER IN PIT(mm)TIME (MINS)

TIME

START	11.30am	0	500
	11.40am	10	500
	12.10pm	40	350
	12.20pm	50	280
	12.46pm	76	190
	13.05pm	95	150
	13.25pm	115	120
	13.45pm	135	110
END	14.00pm	150	65

PIT SIZE (m)

Length 3.8

Width 1.0

Average Depth 2.15 (depth average of 2.35+1.95)

PIT AREA (m 3.80)

TOTAL TIME 150 minutes

CALCULATED:

V25 25%

V75 75%

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

	ACTUAL	INTERPLOATED
TIME (mins)	TIME	DEPTH (mm)
37.5		362.50
112.5		123.75
75		238.75

CALCULATION:

INFILTRATION RATE = f =

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:

= 14.12 m2

CALCULATED

V (V75-V25)

CALCULATED

SOAKAWAY	PIT AREA	FROM ABOVE Depth 25%	Depth 75%	x PIT AREA	T	AP	f (Infiltration rate)
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	m2	mm	mm	m3	minutes	m2	
1	3.80	362.50	123.75	0.907	75.00	14.12	1.43E-05 m3/second

PROPOSED DEVELOPMENT at LLAY NEW ROAD, RHOSROBIN, WREXHAM, LL11 2UB

KANE DESIGN

JOB NUMBER:

1241

SOAKAWAY RESULTS

CLIENT

Castelemead Homes

11 June 2014 AK

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SOAKAWAY REFERENCE : TRIAL PIT 2**Test details**

Date Tue 10 June 2014

Weather: Hot sunny, some heavy showers

DEPTH OF WATER IN PIT(mm)TIME (MINS)

TIME

START	12.10pm	0	290
	12.30pm	20	200
	12.40pm	30	120
	12.55pm	45	50
END	13.15pm	65	20

PIT SIZE (m)

Length 1.8

Width 1.0

Average Depth 1.97

PIT AREA (m 1.80

TOTAL TIME 65 minutes

CALCULATED:

V25 25%

V75 75%

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

	ACTUAL	INTERPLOATED
TIME (mins)	TIME	DEPTH (mm)
16.25		176.00
48.75		41.92
32.5		134.08

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:

= 7.32 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	1.80	176.00	41.92	0.241	32.50	7.32	1.69E-05 m3/second

NOTES

- 1. SURVEY TAKEN FROM
- 2. TRIAL PITTS DIMENSIONS ARE APPROXIMATE
- 3. EXISTING FOUL SEWER LOCATION TO BE CONFIRMED



SIZE: A3

Rev.		Description	Date	Dwn.	Chd.
KANE DESIGN		Project	PROPOSED DEVELOPMENT at LLAY NEW ROAD, RHOSROBIN WREXHAM LL11 2UB		
Civil Engineering Design		Title	SOAKAWAY TEST LOCATIONS		
15 WINCHESTER WAY GRESFORD GRESFORD LL12 8HH		Dwg. No.	1241-100	Dwn. AK	Date 11.06.14
Tel: 01 978 855888 Email: alan_kane_net@btinternet.com		Scale	1:2000	Rev.	



PIT 1



PIT 1



PIT 2



PIT 2

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