

**SOAKAWAY RESULTS AND CALCULATIONS
for
LAND AT WRIGHTS GARAGE
HALL LANE, PEN Y CAE WREXHAM, LL14 2RU**

5 JANUARY 2017

Client:

**SOAKAWAY RESULTS AND CALCULATIONS FOR
LAND AT WRIGHTS GARAGE, HALL STREET, PEN Y CAE, WREXHAM LL14 2RU**

1.0 Introduction

- 1.1 A soakaway test was requested by Blueprint Architects at the location of the above proposed residential development, and was undertaken by Kane Design / Alan Kane on 21 December 2016.
This site consists of disused garage workshop, and is almost totally hardstanding / workshop building / hard surfaced access.
No survey or Site Investigation was available at the time of test.
Site levels are in the region of 180m, with a flood plain to the north and east, some 5m lower. The site appears to be fill, with a steep fall to the flood plain / river below.
- 1.2 Weather on the test day was dry
- 1.3 A trial pit was 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. 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.

2.0 Limitations and comments:

The tests was undertaken, the trial pit filled once, and readings recorded.

The test result does not remove the need for a site investigation. Comments on the trial pit composition are visual, and there is no detailed analysis.

The full B.S. 365 testing criteria is for each test to be repeated three times, although this is rarely implemented.

This report has only considered one location. Detailed design would require two-three tests, to give a good mapping of the site. These may need to be located in areas to coincide with final road gully and private house soakaway locations.

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3.0 Results.

Test 1: 2.0m x 1.0m x 2.2m average depth

Approximate log:	0-400	topsoil
	400- bottom	gravelly fill

Infiltration rate: 3.08 X 10⁻⁴m³/s

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 1.9m (beneath incoming pipe) could drain 270m²

4.0 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 may request a further test in the exact location of proposed soakaways.

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, trench systems (for cellular blocks) or concrete rings.

PROPOSED DEVELOPMENT at WRIGHTS GARAGE, HALL STREET, PEN Y CAE, WREXHAM LL14 2RU

KANE DESIGN

SOAKAWAY RESULTS

CLIENT

21 December 2016

JOB NUMBER:

1358

MARTIN THOMPSON

AK

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For locations see drawing Sketch XXXX

SOAKAWAY REFERENCE : TEST PIT TPI

DEPTH

TO

WATER(m

Date

Wednesday 21 December 2016

Weather:

dry

TIME)

DEPTH OF WATER IN PIT(mm)

START 9.00am 1.30 900
9.07am 1.84 360
9.08am 1.92 280
END 9.11am 2.20 0

PIT SIZE (m)

Length 2.00

Width 1.00

Average Depth 2.20

Effective depth of soakaway (mm) = 900

PIT AREA (m 2.00

Visual Site Inspection:

0-400mm

Topsoil

Approx depths.

to bottom

gravely / fill

TOTAL TIME 11 minutes

CALCULATED:

V25

25%

V75

75%

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

EFFECTIVE	ACTUAL	TIME TO
DEPTH(mm)	DEPTH (mm)	FALL(min)
675	1525	2.92
225	1975	8.59
450		5.67

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:

= 8.60 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
2.00 675.00 225.00 0.900 5.67 8.60 **3.08E-04** m3/second

KANE DESIGN

Calculation of Soakaway Requirements

SCHEME

1358

Pre-cast RINGS:PRELIMINARY CALCULATIONS

ALAN KANE

05-Jan-17

OVERALL DEPT

3000

mm

Rainfall Ratio(r) = 0.350
Assume M5-60 rain = 18,000 mm

Assume PCC ring in square hole oversized by -

1000

mm

Assumed Impermeable Area = 270 m2. (from drawings)

Assume effective depth =

1900

mm

TOTAL AREA=

(Depth beneath invert)

Soil Infiltration Rate = 3.08E-04 m/sec

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 10 YEAR STORM, BUT CONSIDER 100 YEAR EVENT

CLIMATE CHANGE = 30 %

Concrete Ring Diameter - mm
Wall thickness - mm
Side Length of square pit - mm
Storage Volume in Chamber - cu.m.
Storage Volume in stone backfill - cu.m.

Total Storage Volume Provided - cu.m.

STORAGE VOLUME REQUIRED

Rainfall Duration D	Z1	M5-D rain mm	Z2	M10-D rain mm	M30-D rain mm	M100-D rain mm	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.
MINUTES / HOURS				10 year storm	30 year storm	100 year storm					
15	0.625	11.25	off	13.95	17.21	22.39	3.77	2.40	10 year 1.86	100 year 7.86	6.49
30	0.795	14.31	sheet	17.46	21.61	28.19	4.71	1.99	0.89	9.89	7.17
1	1.000	18.00		20.88	24.84	30.96	5.64	0.18	-2.01	10.87	5.41
2	1.215	21.87		24.60	27.77	32.81	6.64	-4.27	-8.65	11.51	0.60
4	1.470	26.46		29.11	32.55	36.51	7.86	-13.97	-22.72	12.82	-9.01
6	1.645	29.61		31.83	35.24	37.01	8.59	-24.15	-37.28	12.99	-19.75
8	1.820	32.76		33.58	36.69	36.36	9.07	-34.59	-52.10	12.76	-30.89
overall depth used*											

Storage Volume required (peak value)=
Storage Volume designed=

7.17 cu.m.
7.26 OKAY

* Overall depth used for 100 year: allowance for pipe / gully filling to road level

Peak Design storm

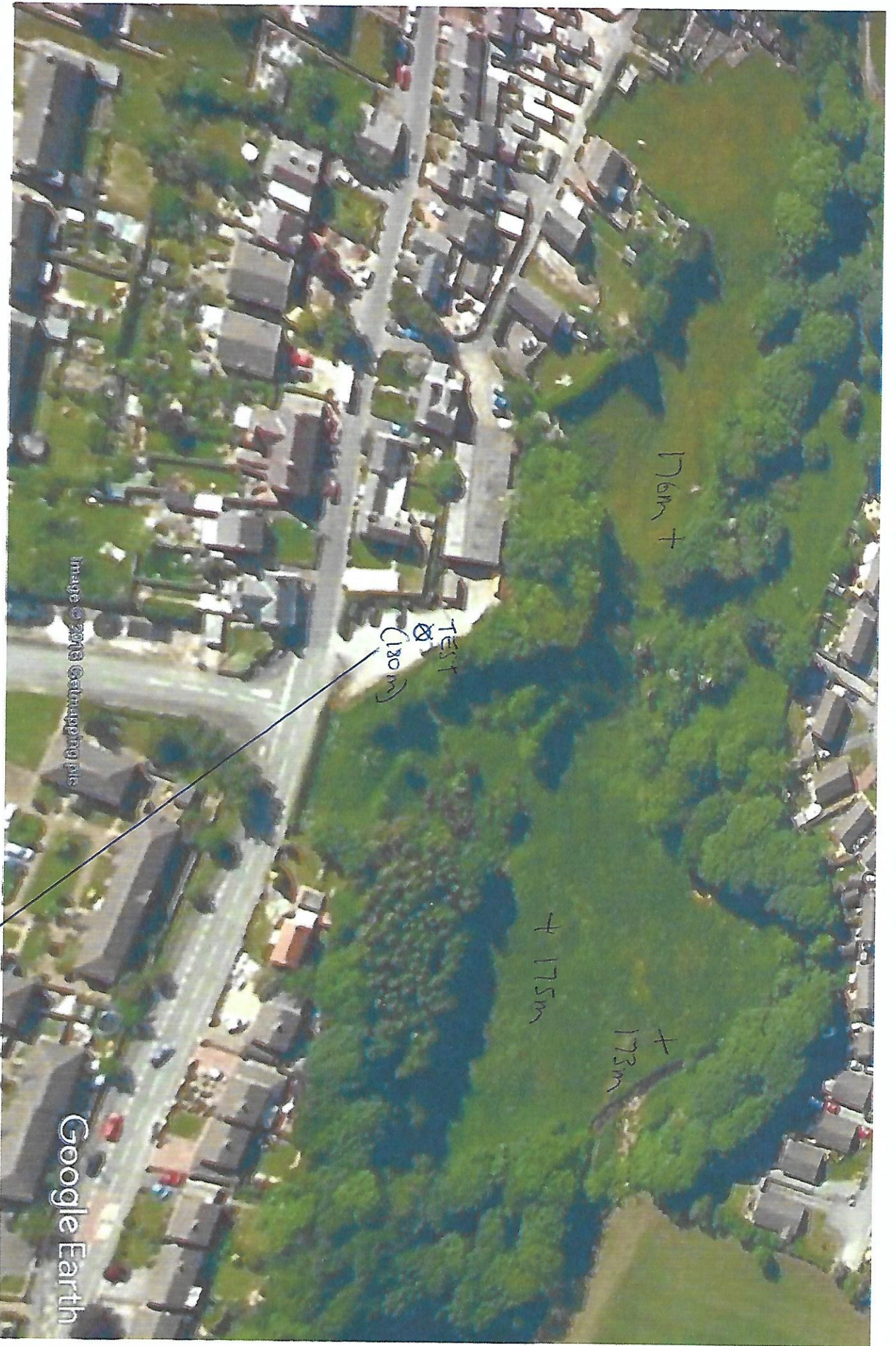
30 hours /minutes

1200 mm diameter rings used

Time of emptying half storage volume =

0.45 hours

OKAY: WITHIN BRITISH STANDARD [50% EMPTY IN 24 HOURS]



Google Earth

feet
meters

100

500

SITE

Google Earth