

PROPOSED DEVELOPMENT at CHESNUT COURT, SUMMERHILL, WREXHAM, LL11 4SP

KANE DESIGN

JOB NUMBER:

1261

SOAKAWAY RESULTS

CLIENT

SG ESTATES

25 February 2016

AK

PAGE 1 / 6

For locations see drawing Sketch 1261/ SK1: locations set out from Chestnut Court centre line

SOAKAWAY REFERENCE : **TEST PIT E** **CHAINAGE: 30m**

DEPTH

Date

Thur 25 February 2016

TO

Weather:

dry

WATER(m

TIME)

DEPTH OF WATER IN PIT(mm)

START	10.26am	0.75	1150
	10.40am	0.90	1000
	11.00am	1.10	800
	11.30pm	1.20	700
	12.00pm	1.35	550
END	12.30pm	1.49	410

PIT SIZE (m)

Length 2.40

Width 1.10

Average Depth 1.90

PIT AREA (m 2.64

Visual Site Inspection:

0-400mm

Topsoil

Approx depths.

400-bottom

Sandy, silt

TOTAL TIME **124** minutes

CALCULATED:

V25

25%

V75

75%

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

	ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)
31	10.57am	800.00
93	11.59am	550.00
62		250.00

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:

= 9.29 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	2.64	800.00	550.00	0.660	62.00	9.29	1.91E-05	m3/second

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KANE DESIGN

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AK

PAGE 2 /6

For locations see drawing Sketch 1261/ SK1: locations set out from Chestnut Court centre line

SOAKAWAY REFERENCE : **TEST PIT D** **CHAINAGE: 45m****DEPTH**

Date Thur 25 February 2016

TO

Weather: dry

WATER(m**TIME)****DEPTH OF WATER IN PIT(mm)**

START	10.27am	0.67	1330
	10.42am	0.70	1300
	11.02am	0.72	1280
	11.32pm	0.73	1270
	12.00pm	0.77	1230
STOPPED	15.45pm	0.87	1130

PIT SIZE (m)

Length 2.20

Width 0.85

Average Depth 2.00

PIT AREA (m 1.87

Visual Site Inspection: 0-400mm Topsoil

Approx depths. 400-bottom sandy, Clay

TOTAL TIME 318 minutes

CALCULATED:

V25 25%

V75 75%

	ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)
79.5	11.46am	1250.00
238.5	14.25pm	1166.00
159		84.00

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

= 7.97 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

1.87

1250.00

1166.00

0.157

159.00

7.97

2.07E-06

m3/second

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KANE DESIGN

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25 February 2016

AK

PAGE 3 / 6

For locations see drawing Sketch 1261/ SK1: locations set out from Chestnut Court centre line

SOAKAWAY REFERENCE : **TEST PIT C** **CHAINAGE: 60m****DEPTH**

Date Thur 25 February 2016

TO

Weather: dry

WATER(m**TIME) DEPTH OF WATER IN PIT(mm)**

START	10.30am	0.61	1290
	10.53am	0.65	1250
	11.08am	0.67	1230
	11.55am	0.675	1225
	12.25pm	0.69	1210
STOPPED	15.50pm	0.77	1130

PIT SIZE (m)

Length 2.15

Width 0.82

Average Depth 1.90

PIT AREA (m 1.76

Visual Site Inspection: 0-400mm Topsoil

Approx depths. 400-bottom sandy, Clay

TOTAL TIME 320 minutes

CALCULATED:

V25 25%

V75 75%

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

	ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)
80	11.40am	1226.60
240	14.30pm	1148.34
160		78.26

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:

= 7.41 m²

CALCULATED

V (V75-V25)

CALCULATED

SOAKAWAY

	PIT AREA	FROM ABOVE	
		Depth 25%	Depth 75%
	m ²	mm	mm

x PIT AREA

T

AP

f (Infiltration rate)

1

1.76

1226.60

1148.34

0.138

160.00

7.41

1.94E-06m³/second

PROPOSED DEVELOPMENT at CHESNUT COURT, SUMMERHILL, WREXHAM, LL11 4SP

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PAGE 4 / 6

For locations see drawing Sketch 1261/ SK1: locations set out from Chestnut Court centre line

SOAKAWAY REFERENCE : TEST PIT B CHAINAGE: 80m**DEPTH**

Date Thur 25 February 2016

TO

Weather: dry

WATER(m**TIME)****DEPTH OF WATER IN PIT(mm)**

START 10.34am 0.97 580

PIT SIZE (m)

10.49am 1.35 200

Length 2.2

END 10.55am 1.50 50

Width 1.2

Average Depth 1.55

PIT AREA (m 2.47

Visual Site Inspection: 0-400mm Topsoil

Approx depths. 400-bottom Sandy

TOTAL TIME 19 minutes

CALCULATED:

V25 25%

V75 75%

	ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)
4.75	10.39am	460.00
14.25	10.48pm	81.00
9.5		379.00

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

= 7.59 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

2.47

460.00

81.00

0.937

9.50

7.59

2.17E-04

m3/second

PROPOSED DEVELOPMENT at CHESNUT COURT, SUMMERHILL, WREXHAM, LL11 4SP

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SOAKAWAY RESULTS

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SG ESTATES

25 February 2016

AK

PAGE 5 / 6

For locations see drawing Sketch 1261/ SK1: locations set out from Chestnut Court centre line

SOAKAWAY REFERENCE : TEST PIT A CHAINAGE: PROPOSED TURNING HEAD**DEPTH**

Date Thur 25 February 2016

TO

Weather: dry

WATER(m**TIME)****DEPTH OF WATER IN PIT(mm)**

START	11.40am	0.80	1140
	11.55am	1.20	740
	12.10am	1.44	500
	12.25pm	1.65	290
	12.00pm	1.35	590
END	12.30pm	1.49	450

PIT SIZE (m)

Length 1.2

Width 2.0

Average Depth 1.94

PIT AREA (m 2.40

Visual Site Inspection: 0-400mm Topsoil

Approx depths. 400-bottom Sandy, silt

TOTAL TIME 50 minutes

CALCULATED:

V25 25%

V75 75%

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

	ACTUAL	INTERPOLATED
TIME (mins)	TIME	DEPTH (mm)
12.5	11.53am	793.00
37.5	12.18pm	430.00
25		363.00

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:

= 8.61 m2

CALCULATED

V (V75-V25)

CALCULATED

SOAKAWAY**PIT AREA**

FROM ABOVE

Depth 25%**Depth 75%****x PIT AREA****T****AP****f (Infiltration rate)**

1

m2

mm

mm

m3

minutes

m2

0.871

25.00

8.61

6.75E-05

m3/second

PROPOSED DEVELOPMENT at CHESNUT COURT, SUMMERHILL, WREXHAM, LL11 4SP**KANE DESIGN****JOB NUMBER:****1261****SOAKAWAY RESULTS****CLIENT****SG ESTATES****25 February 2016****AK****PAGE 6 / 6****SUMMARY OF RESULTS:**

Chainage (m)		Infiltration rate: m ³ /s	
30	TEST PIT E	1.91E-05	Used for Highway Soakaway SA2
45	TEST PIT D	2.07E-06	
60	TEST PIT C	1.94E-06	
80	TEST PIT B	2.17E-04	Used for Highway Soakaway SA3
T/H	TEST PIT A	6.75E-05	Used for Highway Soakaway SA4 and Private Soakaway P-SA21 (end of access lane)

Previous results	10-Jun-14		
TRIAL PIT 1	1.22E10-4	Approx chainage 12m	Used for Soakaway SA1
TRIAL PIT 2	4.58E10-6	Approx chainage 44m	

CONCLUSION:

The site is generally well draining, sandy-loam, apart from a band approximately 45-60m which has a high clay content.

DESIGN:	AREA (m ²)	DIAMETER (mm)	DEPTH BENEATH INVERT (mm)
HIGHWAY SOAKAWAY 1	294	1500	1700
HIGHWAY SOAKAWAY 2	252	1500	2100
HIGHWAY SOAKAWAY 3	294	1200	1050
HIGHWAY SOAKAWAY 4	294	1500	1700
PRIVATE SOAKAWAY P-SA21	294	1500	1700

ALL PRE-CAST CONCRETE RINGS



KANE DESIGN		HIGHWAY DRAINAGE DESIGN			
Civil Engineering Design Services Red Hill House, Hope Street Chester CH4 8BU Tel: 01244 675926		Project	CHESTNUT COURT, SUMMERHILL, WREXHAM LL11		Scheme number 1261 DATE 14 September 2015 Sheet 1 Of 1
Road 1 = 4.8m: footpath / verge = 1.8m total width =		8.4 m2			
Per road channel=		4.2 m2			
SOAKAWAY 1:	Chainage 5 - 40m	35 m x	8.4	=	294 m2
SOAKAWAY 2:	Chainage 40 - 70m	30 m x	8.4	=	252 m2
SOAKAWAY 3:	Chainage70 - 109.3m left channel	39.3 m x	4.2	=	165.06 m2
SOAKAWAY 4:	Chainage70 - 109.3m Right channel	39.3 m x	4.2	=	165.06 m2
	Plus Turning Head (5m width road)	9.716 m x	8.6	=	83.56 m2
			TOTAL		248.62
TOTAL ROAD/FOOTPATH/VERGE AREA:					959.6776 m2

CHESTNUT COURT, SUMMERHILL, WREXHAM
KANE DESIGN

Calculation of Soakaway Requirements

SCHEME 1261

ADOPTABLE ROAD: Pre-cast RINGS: HIGHWAY DRAINAGE SOAKAWAYS

ALAN KANE

HIGHWAY DRAINAGE SOAKAWAY 1

06-Oct-15

OVERALL DEPT

2800 mm

0.350

Rainfall Ratio(r) =

18.000 mm

Assume M5-60 rain =

Assumed Impermeable Area = 294 m2. (from drawings)

TOTAL AREA=

Soil Infiltration Rate = 1.22E-04 m/sec

Assume PCC ring in square hole oversized by -
Assume effective depth = 1700 mm
(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 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 MINUTES / HOURS	Z1 M5-D rain mm	Z2 off sheet	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.
15	0.625	11.25	13.95	17.21	22.39	4.10	3.62	3.45	8.56	8.07
30	0.795	14.31	17.46	21.61	28.19	5.13	4.17	3.82	10.77	9.81
1	1.000	18.00	20.88	24.84	30.96	6.14	4.20	3.51	11.83	9.90
2	1.215	21.87	24.60	27.77	32.81	7.23	3.37	1.98	12.54	8.67
4	1.470	26.46	29.11	32.55	36.51	8.56	0.82	-1.94	13.96	6.22
6	1.645	29.61	31.83	35.24	37.01	9.36	-2.24	-6.39	14.15	2.54
8	1.820	32.76	33.58	36.69	36.36	9.87	-5.60	-11.12	13.90	-1.57

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

9.90 cu.m.
9.05 OKAY

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

Peak Design storm

1 hours /minutes

1500 mm diameter rings used

Time of emptying half storage volume =

1.72 hours

OKAY: WITHIN BRITISH STANDARD | 50% EMPTY IN 24 HOURS |

CHESTNUT COURT, SUMMERHILL, WREXHAM
KANE DESIGN

Calculation of Soakaway Requirements

SCHEME 1261

ADOPTABLE ROAD: Pre-cast RINGS: HIGHWAY DRAINAGE SOAKAWAYS

ALAN KANE

HIGHWAY DRAINAGE SOAKAWAY 2

06-Oct-15

REVISION A 28 FEB 16

OVERALL DEPT

3200 mm

0.350

Rainfall Ratio(r) =

18.000 mm

Assume M5-60 rain =

252 m2. (from drawings)

Assumed Impermeable Area =

TOTAL AREA=

1.91E-05 m/sec (test taken 23 Feb 16)

Soil Infiltration Rate =

Assume voids ratio of stone surround =

0.35

Assume effective depth =

2100 mm

(Depth beneath invert)

Assume PCC ring in square hole oversized by -

STORAGE VOLUME SUPPLIED

Concrete Ring Diameter - mm

Wall thickness - mm

Side Length of square pit - mm

DESIGNED TO BS 1377
with rainfalls from Modified Rational Method
DESIGN to 1 in 100 YEAR EVENT

CLIMATE CHANGE =

30 %

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 MINUTES / HOURS	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.
15	0.625	11.25	off	13.95	17.21	22.39	3.52	3.42	3.39	7.33	7.24
30	0.795	14.31	sheet	17.46	21.61	28.19	4.40	4.21	4.15	9.24	9.05
1	1.000	18.00		20.88	24.84	30.96	5.26	4.89	4.75	10.14	9.77
2	1.215	21.87		24.60	27.77	32.81	6.20	5.45	5.19	10.75	10.00
4	1.470	26.46		29.11	32.55	36.51	7.33	5.84	5.30	11.96	10.47
6	1.645	29.61		31.83	35.24	37.01	8.02	5.78	4.98	12.13	9.88
8	1.820	32.76		33.58	36.69	36.36	8.46	5.47	4.40	11.91	8.92

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

10.47 cu.m.
10.45 OKAY

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

Peak Design storm

4 hours/minutes

1500 mm diameter rings used

Time of emptying half storage volume =

7.28 hours

OKAY: WITHIN BRITISH STANDARD | 50% EMPTY IN 24 HOURS |

CHESTNUT COURT, SUMMERHILL, WREXHAM
KANE DESIGN

Calculation of Soakaway Requirements

SCHEME 1261

ADOPTABLE ROAD: Pre-cast RINGS: HIGHWAY DRAINAGE SOAKAWAYS

ALAN KANE

HIGHWAY DRAINAGE SOAKAWAY 3

06-Oct-15

REVISION A 28 FEB 16

OVERALL DEPT

2150 mm

0.350

Rainfall Ratio(r) =

18 000 mm

Assume M5-60 rain =

165 m2. (from drawings)

Assumed Impermeable Area =

TOTAL AREA=

2.17E-04 m/sec (test taken 23 Feb 16)

Soil Infiltration Rate =

Assume voids ratio of stone surround =

0.35

Assume effective depth =

1050 mm

(Depth beneath invert)

STORAGE VOLUME SUPPLIED

Concrete Ring Diameter - mm

Wall thickness - mm

Side Length of square pit - mm

DESIGNED TO BS 1377
with rainfalls from Modified Rational Method
DESIGN to 1 in 100 YEAR EVENT

CLIMATE CHANGE =

30 %

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 MINUTES / HOURS	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.
				10 year storm	30 year storm	100 year storm					overall depth used*

15	0.625	11.25	off	13.95	17.21	22.39	2.30	1.77	1.58	4.80	4.27
30	0.795	14.31	sheet	17.46	21.61	28.19	2.88	1.82	1.44	6.05	4.98
1	1.000	18.00		20.88	24.84	30.96	3.45	1.32	0.56	6.64	4.52
2	1.215	21.87		24.60	27.77	32.81	4.06	-0.19	-1.71	7.04	2.79
4	1.470	26.46		29.11	32.55	36.51	4.80	-3.70	-6.73	7.83	-0.67
6	1.645	29.61		31.83	35.24	37.01	5.25	-7.50	-12.05	7.94	-4.81
8	1.820	32.76		33.58	36.69	36.36	5.54	-11.46	-17.52	7.80	-9.20

Storage Volume required (peak value)=

4.98 cu.m.

Storage Volume designed=

5.08 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 =

0.63 hours

OKAY: WITHIN BRITISH STANDARD | 50% EMPTY IN 24 HOURS |

CHESTNUT COURT, SUMMERHILL, WREXHAM
KANE DESIGN

Calculation of Soakaway Requirements

SCHEME 1261

ADOPTABLE ROAD: Pre-cast RINGS: HIGHWAY DRAINAGE SOAKAWAYS

ALAN KANE

HIGHWAY DRAINAGE SOAKAWAY 4

06-Oct-15

REVISION A 28 February 2016

OVERALL DEPT

2800 mm

0.350

Rainfall Ratio(r) =

18.000 mm

Assume M5-60 rain =

248 m/sec

Assumed Impermeable Area =

TOTAL AREA=

6.75E-05 m/sec (test taken 23 Feb 16)

Soil Infiltration Rate =

Assume voids ratio of stone surround =

0.35

Assume effective depth =

1700 mm

(Depth beneath invert)

STORAGE VOLUME SUPPLIED

Concrete Ring Diameter - mm

Wall thickness - mm

Side Length of square pit - mm

DESIGNED TO BS 1377
with rainfalls from Modified Rational Method
DESIGN to 1 in 100 YEAR EVENT

CLIMATE CHANGE = 30 %

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 MINUTES / HOURS	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.
				10 year storm	30 year storm	100 year storm					overall depth used*
15	0.625	11.25	off	13.95	17.21	22.39	3.46	3.19	3.10	7.22	6.95
30	0.795	14.31	sheet	17.46	21.61	28.19	4.33	3.79	3.60	9.09	8.55
1	1.000	18.00		20.88	24.84	30.96	5.18	4.11	3.73	9.98	8.91
2	1.215	21.87		24.60	27.77	32.81	6.10	3.96	3.20	10.58	8.44
4	1.470	26.46		29.11	32.55	36.51	7.22	2.94	1.41	11.77	7.49
6	1.645	29.61		31.83	35.24	37.01	7.89	1.47	-0.82	11.93	5.51
8	1.820	32.76		33.58	36.69	36.36	8.33	-0.23	-3.29	11.72	3.16

Negative value denotes "no storage time required:

Rainwater dispersing within storm duration"

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

8.91 cu.m.
9.05 OKAY

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

Peak Design storm

1 hours/minutes

1500 mm diameter rings used

Time of emptying half storage volume =

2.03 hours

OKAY: WITHIN BRITISH STANDARD | 50% EMPTY IN 24 HOURS |