



PHILIPS SURVEYORS

BUILDING SURVEYORS, DESIGNERS & CONSULTANTS

SITE:

LAND AT LONGACRE,
MAYPOLE LANE, YAPTON,
WEST SUSSEX. BN18 0DR

PROJECT:

ERECTION OF 2NO
HOLIDAY COTTAGES

1937/14/SUR

PHILIPS SURVEYORS LLP

THE OLD COACH HOUSE
78 LOWER STREET
PULBOROUGH
WEST SUSSEX RH20 2AA

SURFACE WATER CALCULATION

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1.0 SOAKAWAY CALCULATION

1.1 Surface water calculation demonstrating the required size of soakaway to deal with the new surface water run-off / discharge.

1.2 LONGACRE COTTAGES – SOAKAWAY CALCULATION FOR 1 NO COTTAGE

Drainage Results

Test	Time	Vp (Vp is the average time to drop 1mm)
1	4 hours	96 seconds
2	3.8 hours	91.2 seconds

Average – 93.6 seconds

Both tests fall within the range of 12-100 secs for ground suitable for “Drainage Field” secondary dispersal of sewage

The current project requires the storage and dispersal of water from a 200m² (A) dispersible surface for which BRE365 methodology should be used but H3 appears to have been chosen

For this f = infiltration rate

$$f = \frac{10^{-3}}{3V_p} = \frac{(1)}{V_p} = \frac{\text{mm}}{\text{sec}} = \frac{1\text{m}}{1000\text{mm}} = \frac{10^{-3}}{V_p}$$

From the tests above

$$F = \frac{10^{-3}}{3 \times 93.6} = 3.56 \times 10^{-6} \text{ m/s}$$

Outflow from storage volume walls

$$Q = a_{s50} f d = (L + W) h$$

BRE 365 – Consider a storm of duration 10 hours i.e. M10-600

H10 – 600 storm R = 45.6mm = 0.0456m

$$I = A R$$

A = Impermeable surface area to be drained (in this instance 200m²)

$$\text{Hence } I = 200 \times 0.0456 = 9.12\text{m}^3$$

Outflow from storage volume walls

$$O = a_{550} F D$$

$$A_{550} = (L + W) h \text{ half of peripheral area}$$

If $h = 1$ and $w = 0.5$ then

$$A_{550} = L + 0.5$$

$$\text{Hence } O = (L + 0.5) \times 3.561 \times 10^{-6} \times 600 \times 60$$

$$\begin{aligned} \text{Storage Volume} - S &= A \cdot \text{sec. } L P - \text{where } P = \text{proportion of free volume} \\ &\text{taken as } 1 \text{ (or } 100\%) \\ &= (1 \times 0.5) L \\ &= 0.5L \end{aligned}$$

$$\begin{aligned} \text{Therefore, using } S &= I - O \\ 0.5L &= 9.12 - 0.1282L - 0.0641 \end{aligned}$$

$$0.628L = 9.056$$

$$\text{Therefore } L = 14.42\text{m}$$

$$\begin{aligned} T &= \frac{0.5L}{A_{550} f} \\ &= \frac{0.25 \times 14.42}{14.96 \times 3.561} \times 10^6 \\ &= 18.85 \text{ hours} \end{aligned}$$

≤ 24 hours, therefore, acceptable

As required by the methodology this calculation was repeated a number of times to ascertain the maximum;

Area Source		Soakaway Design								
f	200	3.561E-06								
h	1									
w	0.5									
rho	1									
D	D secs	Z1	M5-D	Z2	M10-D	Input	Numerator	Denominator	Length L	Time t hrs
5.00	300.00	0.36	7.20	1.20	8.64	1.728	1.727	0.501	3.448	17.031
10.00	600.00	0.51	10.20	1.22	12.44	2.489	2.488	0.502	4.954	17.714
15.00	900.00	0.62	12.40	1.23	15.25	3.050	3.049	0.503	6.059	18.015
30.00	1800.00	0.79	15.80	1.24	19.59	3.918	3.915	0.506	7.731	18.317
1.00	3600.00	1.00	20.00	1.24	24.80	4.960	4.954	0.513	9.660	18.542
2.00	7200.00	1.22	24.40	1.24	30.26	6.051	6.038	0.526	11.488	18.688
4.00	14400.00	1.48	29.60	1.22	36.11	7.222	7.197	0.551	13.055	18.782
6.00	21600.00	1.67	33.40	1.21	40.41	8.083	8.044	0.577	13.944	18.826
10.00	36000.00	1.90	38.00	1.20	45.60	9.120	9.056	0.628	14.416	18.848
24.00	86400.00	2.42	48.40	1.17	56.63	11.326	11.172	0.808	13.832	18.821

It can then, by reference to the time to discharge, be shown that a storm of duration (D) 10 hours may be considered the peak.

The calculations were repeated, this time substituting a soakaway depth of 1.5m, width 0.5m thus;

Area Source 200		Soakaway Design								
f 3.561E-06										
h 1										
w 0.5										
rho 1										
D	D secs	Z1	M5-D	Z2	M10-D	Input	Numerator	Denominator	Length L	Time t hrs
5.00	300.00	0.36	7.20	1.20	8.64	1.728	1.727	0.752	2.298	16.017
10.00	600.00	0.51	10.20	1.22	12.44	2.489	2.487	0.753	3.302	16.937
15.00	900.00	0.62	12.40	1.23	15.25	3.050	3.048	0.755	4.038	17.353
30.00	1800.00	0.79	15.80	1.24	19.59	3.918	3.914	0.760	5.152	17.776
1.00	3600.00	1.00	20.00	1.24	24.80	4.960	4.950	0.769	6.436	18.095
2.00	7200.00	1.22	24.40	1.24	30.26	6.051	6.032	0.788	7.650	18.305
4.00	14400.00	1.48	29.60	1.22	36.11	7.222	7.184	0.827	8.688	18.440
6.00	21600.00	1.67	33.40	1.21	40.41	8.083	8.025	0.865	9.274	18.504
10.00	36000.00	1.90	38.00	1.20	45.60	9.120	9.024	0.942	9.576	18.534
24.00	86400.00	2.42	48.40	1.17	56.63	11.326	11.095	1.212	9.158	18.492

- 1.3 Taking into account actual Wavin Aquacell crate sizes; 1000 x 500 x 400, it can be seen that by using these a soakaway of either 15m long x 0.5m wide & 1.2m deep OR 10m long x 0.5m wide & 1.6m deep would satisfy the requirement.
- 1.4 The layout and position of the [10m long] soakaway is shown on drawing **PL-01 rev E**.