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**Land at Painsbrook Farm,  
 Hadnall, Shropshire**

Revision

Job No: **170**

Page: **1.00**

Section: **Poultry Units 2/3 Southern Elevation and Concrete Yard**

Prepared By: **KG**

Date: **26/01/2024**

**SUMMARY OF CALCULATIONS**

critical design rainfall duration ' $t_{crit}$ ' = 1440 *min*  
 required storage volume ' $V_{req}$ ' = 318.44  $m^3$   
 provided storage volume ' $V_{prov}$ ' = 318.78  $m^3$   
 utilisation factor = **1.00** **.OK**  
 required time to discharge 50% ' $t_{50}$ ' = 21.26 *hours*  
 utilisation factor = **0.89** **.OK**

**GENERAL DATA**

site location: **England and Wales**  
 soakaway type: **infilled pit or trench**

impermeable area drained to soakaway 'A' [ $m^2$ ] = **2919**  
 60 min rainfall depth of 5 year return period 'R' [ $mm$ ] = **20**  
 M5-60 to M5-2d rainfall ratio 'r' = **0.19**  
 allowance for climate change: **30%**

**SOAKAWAY DATA**

soakaway width 'W' [ $m$ ] = **3.50**  
 soakaway length 'L' [ $m$ ] = **138.00**

total depth from ground level ' $D_b$ ' [ $m$ ] = **2.70**  
 depth to drain invert level ' $D_d$ ' [ $m$ ] = **1.20**  
 soakaway effective depth ' $D_{eff}$ ' [ $m$ ] = 1.50  
 free volume in infill aggregate [%] = **44**

**SOIL INFILTRATION DATA**

allowance for infiltration through soakaway base: **30%**  
 available on-site infiltration test results:  Yes  No  
 soil infiltration rate 'f' [ $m/s$ ] = **5.83E-06**

**REQUIRED STORAGE CAPACITY PER RAINFALL DURATION**

rainfall duration [ $min$ ]	rainfall factor Z1	M5-D rainfalls [ $mm$ ]	M10-D			M50-D			M100-D			outflow from soakaway [ $m^3$ ]	required storage [ $m^3$ ]
			Z2	rainfalls [ $mm$ ]	inflow [ $m^3$ ]	Z2	rainfalls [ $mm$ ]	inflow [ $m^3$ ]	Z2	rainfalls [ $mm$ ]	inflow [ $m^3$ ]		
5	0.28	5.53	1.19	8.58	25.05	1.57	11.29	32.96	1.80	12.97	37.85	0.62	37.23
10	0.42	8.33	1.21	13.11	38.26	1.62	17.55	51.23	1.87	20.26	59.13	1.25	57.88
15	0.52	10.40	1.22	16.52	48.21	1.65	22.36	65.27	1.92	25.91	75.63	1.87	73.76
30	0.72	14.33	1.24	23.06	67.30	1.69	31.55	92.10	1.98	36.88	107.66	3.75	103.91
60	1.00	20.00	1.24	32.24	94.11	1.73	44.98	131.30	2.03	52.78	154.06	7.50	146.57
120	1.35	27.00	1.23	43.24	126.23	1.71	60.09	175.41	1.99	69.99	204.30	14.99	189.31
240	1.83	36.60	1.20	57.11	166.69	1.66	79.00	230.61	1.92	91.22	266.27	29.98	236.29
360	2.21	44.13	1.18	67.80	197.91	1.62	92.67	270.50	1.86	106.54	310.99	44.98	266.01
600	2.78	55.60	1.16	84.08	245.44	1.56	112.42	328.16	1.77	128.07	373.85	74.96	298.89
<b>1440</b>	<b>4.07</b>	<b>81.33</b>	<b>1.14</b>	<b>120.27</b>	<b>351.06</b>	<b>1.45</b>	<b>153.55</b>	<b>448.22</b>	<b>1.61</b>	<b>170.72</b>	<b>498.34</b>	<b>179.90</b>	<b>318.44</b>

\* Z2 is growth factor from M5 rainfalls



**SUMMARY OF CALCULATIONS**

critical design rainfall duration ' $t_{crit}$ ' =	600	min
required storage volume ' $V_{req}$ ' =	128.02	$m^3$
provided storage volume ' $V_{prov}$ ' =	128.70	$m^3$
utilisation factor =	<b>0.99</b>	<b>.OK</b>
required time to discharge 50% ' $t_{50}$ ' =	14.76	hours
utilisation factor =	<b>0.61</b>	<b>.OK</b>

**GENERAL DATA**

site location: **England and Wales**  
 soakaway type: **infilled pit or trench**

impermeable area drained to soakaway 'A' [ $m^2$ ] = **1340**  
 60 min rainfall depth of 5 year return period 'R' [mm] = **20**  
 M5-60 to M5-2d rainfall ratio 'r' = **0.19**  
 allowance for climate change: **30%**

**SOAKAWAY DATA**

soakaway width 'W' [m] = **2.00**  
 soakaway length 'L' [m] = **97.50**

total depth from ground level ' $D_b$ ' [m] = **2.70**  
 depth to drain invert level ' $D_d$ ' [m] = **1.20**  
 soakaway effective depth ' $D_{eff}$ ' [m] = **1.50**  
 free volume in infill aggregate [%] = **44**

**SOIL INFILTRATION DATA**

allowance for infiltration through soakaway base: **30%**  
 available on-site infiltration test results:  Yes  No  
 soil infiltration rate 'f' [m/s] = **5.83E-06**

**REQUIRED STORAGE CAPACITY PER RAINFALL DURATION**

rainfall duration [min]	rainfall factor Z1	M5-D rainfalls [mm]	M10-D			M50-D			M100-D			outflow from soakaway [ $m^3$ ]	required storage [ $m^3$ ]
			Z2	rainfalls [mm]	inflow [ $m^3$ ]	Z2	rainfalls [mm]	inflow [ $m^3$ ]	Z2	rainfalls [mm]	inflow [ $m^3$ ]		
5	0.28	5.53	1.19	8.58	11.50	1.57	11.29	15.13	1.80	12.97	17.38	0.36	17.01
10	0.42	8.33	1.21	13.11	17.57	1.62	17.55	23.52	1.87	20.26	27.15	0.73	26.42
15	0.52	10.40	1.22	16.52	22.13	1.65	22.36	29.97	1.92	25.91	34.72	1.09	33.63
30	0.72	14.33	1.24	23.06	30.89	1.69	31.55	42.28	1.98	36.88	49.42	2.18	47.24
60	1.00	20.00	1.24	32.24	43.20	1.73	44.98	60.27	2.03	52.78	70.73	4.36	66.36
120	1.35	27.00	1.23	43.24	57.95	1.71	60.09	80.52	1.99	69.99	93.79	8.72	85.07
240	1.83	36.60	1.20	57.11	76.52	1.66	79.00	105.86	1.92	91.22	122.24	17.44	104.79
360	2.21	44.13	1.18	67.80	90.85	1.62	92.67	124.18	1.86	106.54	142.76	26.16	116.60
<b>600</b>	2.78	55.60	1.16	84.08	112.67	1.56	112.42	150.64	1.77	128.07	171.62	43.60	<b>128.02</b>
1440	4.07	81.33	1.14	120.27	161.16	1.45	153.55	205.76	1.61	170.72	228.77	104.65	124.12

\* Z2 is growth factor from M5 rainfalls