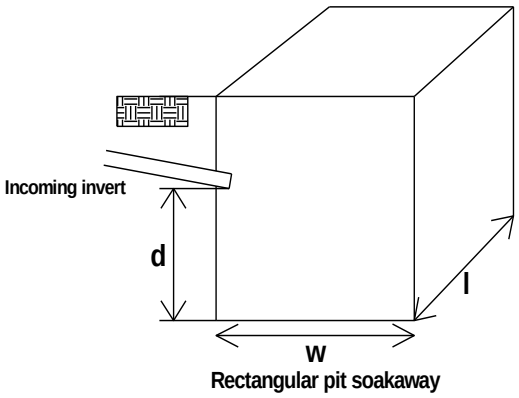
	Site: Hill Farm, Replacement Dwelling, All Stretton.	Date: 29/11/2021
	Client: W. Beamond	Planning Ref:

Proposed Soakaway Design



Rectangular pit soakaway

Soil infiltration rate (BRE digest 365)

Length of trial pit;	l_{trial} =	600 mm	Width of Pit; b_{trial} =	600 mm	
Depth of trial pit (below invert);	d_{trial} =	1000 mm	Free volume (if fill used); V_{trial} =	100%	
75% depth of pit;	d_{75} =	750 mm			
50% depth of pit;	d_{50} =	500 mm			
25% depth of pit;	d_{25} =	250 mm			
Test 1 - time to fall from 75% depth to 25% depth;			T1 =	36 min	
Test 2 - time to fall from 75% depth to 25% depth;			T2 =	36 min	
Test 3 - time to fall from 75% depth to 25% depth;			T3 =	37 min	
Longest time to fall from 75% depth to 25% depth;			t_{p75-25} =	37 min	
Storage volume from 75% to 25% depth;		$V_{p75\_25} = (l_{trial} \times b_{trial} \times (d_{75} - d_{25})) \times V_{trial}$ =		0.18 m^3	
Internal surface area to 50% depth;		$a_{p50} = ((l_{trial} \times b_{trial}) + (l_{trial} + b_{trial}) \times 2 \times d_{50})$ =		1.56 m^2	
Surface area of soakaway to 50% storage depth;		$A_{s50} = 2 \times (l_{trial} + b_{trial}) \times d_{trial} / 2$ =		1.200 m^2	
Soil infiltration rate;		$f = V_{p75\_25} / (a_{p50} \times t_{p75-25})$ =		5.19751E-05 m/s	

Rectangular Pit Design

Pit length;	l =	3200 mm	Pit width;	w =	3200 mm
Pit depth below inv	d =	1000 mm	Free volume;	V_{free} =	30%
Location of soakaway;		England & Wales	Return period;	10	Years
Ratio of 60 minute to 2 day rainfalls of 5 year return period (BRE digest 365 - fig 1);				r =	0.39
Impermeable area;	A =	165 m^2	Soil infiltration rate;	f =	5.19751E-05 m/s

Surface area of soakaway to 50% storage depth

$A_{s50} = 2 \times (l + w) \times d / 2$ = 6.400 m^2

Outflow factor; $AF = A_{s50} \times f$ = 0.00033264 m^3/s

M5 rainfalls are calculated from table 1 BRE digest 365 using Factor Z1

Duration D	M5 - D rainfalls (mm)	Growth factor Z2	M10 - D rainfall R (mm)
5 mins	*7.40*	*1.20*	*8.91*
10 mins	*10.40*	*1.22*	*12.70*
15 mins	*12.60*	*1.23*	*15.50*
30 mins	*16.00*	*1.24*	*19.84*
1 hour	*20.00*	*1.24*	*24.80*
2 hours	*24.20*	*1.24*	*30.01*
4 hours	*29.20*	*1.22*	*35.72*
6 hours	*32.40*	*1.21*	*39.29*
10 hours	*36.40*	*1.20*	*43.71*
24 hours	*45.60*	*1.18*	*53.75*

Inflow I = A x R (m^3)	Outflow O = as_{50} x f x D	Storage required I - O = S
1.47	*0.10*	*1.37*
2.10	0.20	1.90
2.56	0.30	2.26
3.27	0.60	2.67
4.09	1.20	2.89
4.95	2.40	2.56
5.89	4.79	1.10
6.48	7.19	-0.70
7.21	11.98	-4.76
8.87	*28.74*	*-19.87*

Required storage volume; S_{reqd} = 2.89 m^3

Soakaway storage volume; $S_{act} = l \times d \times w \times V_{free}$ = 3.072 m^3

Soakaway Storage Volume- OK

Time for emptying soakaway to half volume;

$T_{s50} = S_{reqd} \times 0.5 / (A_{s50} \times f)$ = 4350.788 s = 1 hrs 12 min 31 sec

Soakaway Discharge Time - OK

Aquacell/Polystorm modular storage cells - 95% void ratio

Soakaway Design (BRE Digest 365)