

**STONE CONSULTING
ENGINEERS LTD.**

**CONSULTING CIVIL, STRUCTURAL AND
FOUNDATION ENGINEERS**

Hundred Acres House
Wickham
Hampshire
PO17 4ED

117 Barrack Lane
Aldwick
West Sussex
PO21 4ED

Job No. 2007

Date: Aug 2020

QA INFORMATION

CLIENT:	Kerkham
JOB ID:	Willows, West Walberton Lane
SCOPE OF WORK:	Surface water run-off
DESIGN CODES AND REFERENCES:	BRE 365 The Building Regulations
SOFTWARE:	MS EXCEL
SUB-SOIL/ FOUNDATION DATA:	N/A

MATERIAL DATA

CONCRETE:	
REINFORCEMENT:	
STEELWORK:	
TIMBER:	
OTHER:	

OTHER INFORMATION / NOTES

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CALCULATION SHEET		Job No.	2007	Chkd:	-	Rev.	-

Summary:

The site has recorded a winter groundwater level of ~0.5m bgl and is not considered suitable for infiltration.

Proposed surface water scheme is as follows:

Surface water shall be collected from

- (1) new garage structure and
- (2) small additional roof area of main house extension.

Collected water to be attenuated and discharged into via overflow pipe to a drainage ditch at the end of the garden.

A rainwater harvesting system will also be installed in the attenuation system.

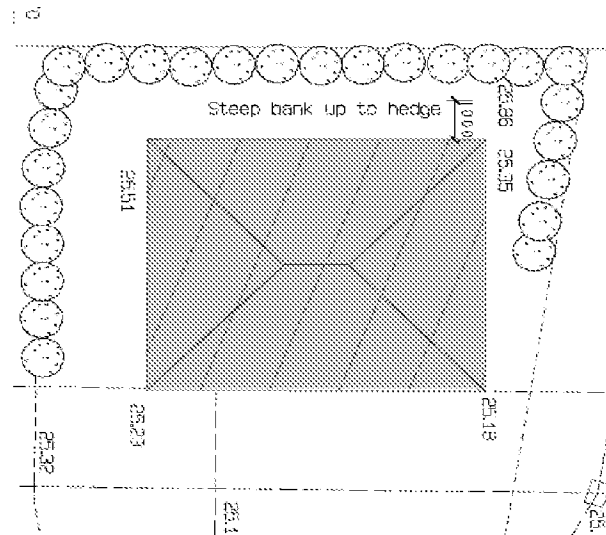
Household usage is base on EA guidelines of ~ 150 litres/day per person and 30% is used of toilet flushing.

Houshold of 3 persons so usage estimated at 150 l/day as outflow from tank

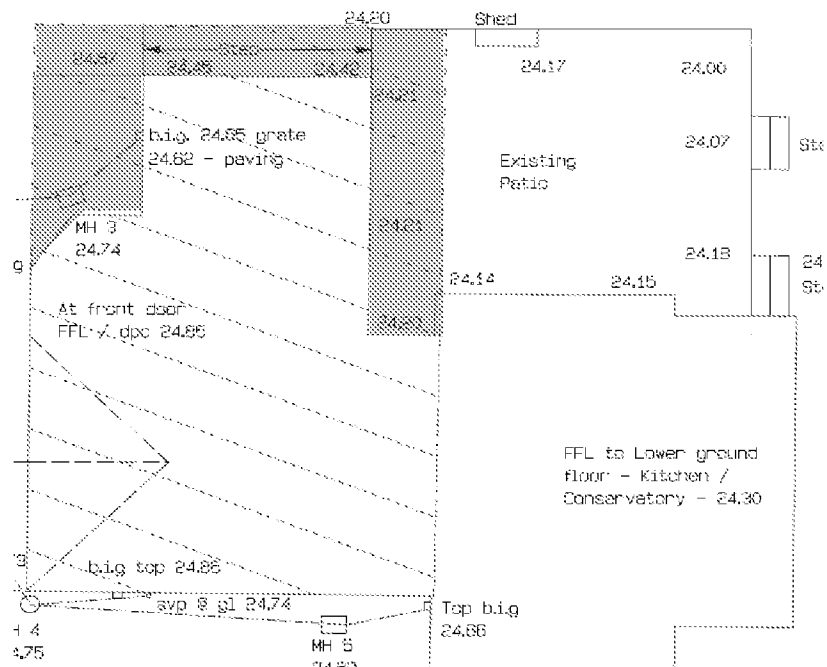
The calculation of attenuation volumes is based on a 100 year return period with a 40% allowance for Climate Change.

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Garage roof area = $(8.5 \times 6.8) = 57.80 \text{ m}^2$



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ATTENUATION VOLUME REQUIREMENTS

RUN-OFF VOLUMES

DRAINED AREA

Drained area = 77.92 m²
 Climate change allowance = 40 %

INFLOW

Inflow, I = (run off area) x (design rainfall)
 = A x (M10-D)

DESIGN RAINFALL

Return period = 100 yrs
 Ratio of 60 min to 2-Day rainfalls of 5 year return period, r = 0.35 BRE(1991) Fig 1.

M5 rainfalls are calculated from table 1 (BRE 365) using Z1 factor

Storm duration (hrs)	Storm duration (mins)	Z1	M5-D (mm)	Z2 M10 (cor. Fac)	M10-D* rainfall	Z2 M100 Design	100 yr + 40%	
							rainfall	
0	5	0.36	7.2	1.19	12.00	1.84	18.55	
0	10	0.54	10.8	1.22	18.45	1.92	29.03	
0	15	0.65	13	1.23	22.39	1.96	35.67	
1	30	0.82	16.4	1.24	28.47	2.00	45.92	
1	60	1	20	1.24	34.72	2.03	56.84	
2	120	1.19	23.8	1.24	41.32	2.01	66.97	
4	240	1.39	27.8	1.23	47.87	1.97	76.67	
6	360	1.53	30.6	1.22	52.26	1.94	83.11	
10	600	1.7	34	1.21	57.60	1.90	90.44	
24	1440	2.07	41.4	1.19	68.97	1.81	104.91	

* including 40% for climate change

OUTFLOW

Controlled discharge
 Outflow = 2.00E+00 l/sec

REQUIRED STORAGE CAPACITY

Storage capacity, S = Inflow - Outflow
 = I - O = [A x (M10-D)] - O

Storm duration (hrs)	Storm duration (mins)	Inflow S m ³	Inflow rate l/sec	Outflow Max m ³	Capacities	
					Outflow rate l/sec	Required capacity m ³
0	5	1.45	4.82	0.600	2.000	0.85
0	10	2.26	2.72	1.200	2.000	1.06
0	15	2.78	1.73	1.800	2.000	0.98
1	30	3.58	0.89	3.600	2.000	n/a
1	60	4.43	0.47	7.200	2.000	n/a
2	120	5.22	0.22	14.400	2.000	n/a
4	240	5.97	0.10	28.800	2.000	n/a
6	360	6.48	0.07	43.200	2.000	n/a
10	600	7.05	0.04	72.000	2.000	n/a
24	1440	8.17	0.02	172.800	2.000	n/a

Volume required = 1.06

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Sketch of proposed surface water scheme

