

STONE CONSULTING ENGINEERS LTD.

CONSULTING CIVIL, STRUCTURAL AND
FOUNDATION ENGINEERS

117 Barrack Lane
Aldwick
West Sussex
PO21 4ED

Job No. 2099

Date: Aug 2021

QA INFORMATION

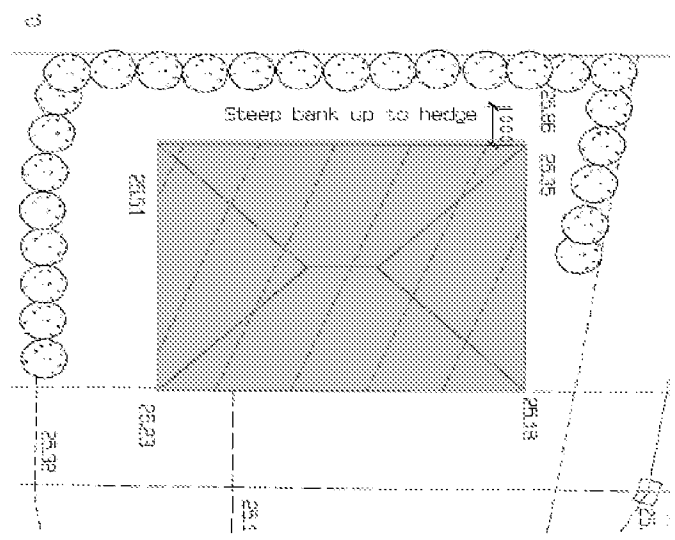
CLIENT:	Kerkham
JOB ID:	Willows, West Walberton Lane
SCOPE OF WORK:	Surface water scheme
DESIGN CODES AND REFERENCES:	BRE 365
SOFTWARE:	MS EXCEL
SUB-SOIL/ FOUNDATION DATA:	N/A

MATERIAL DATA

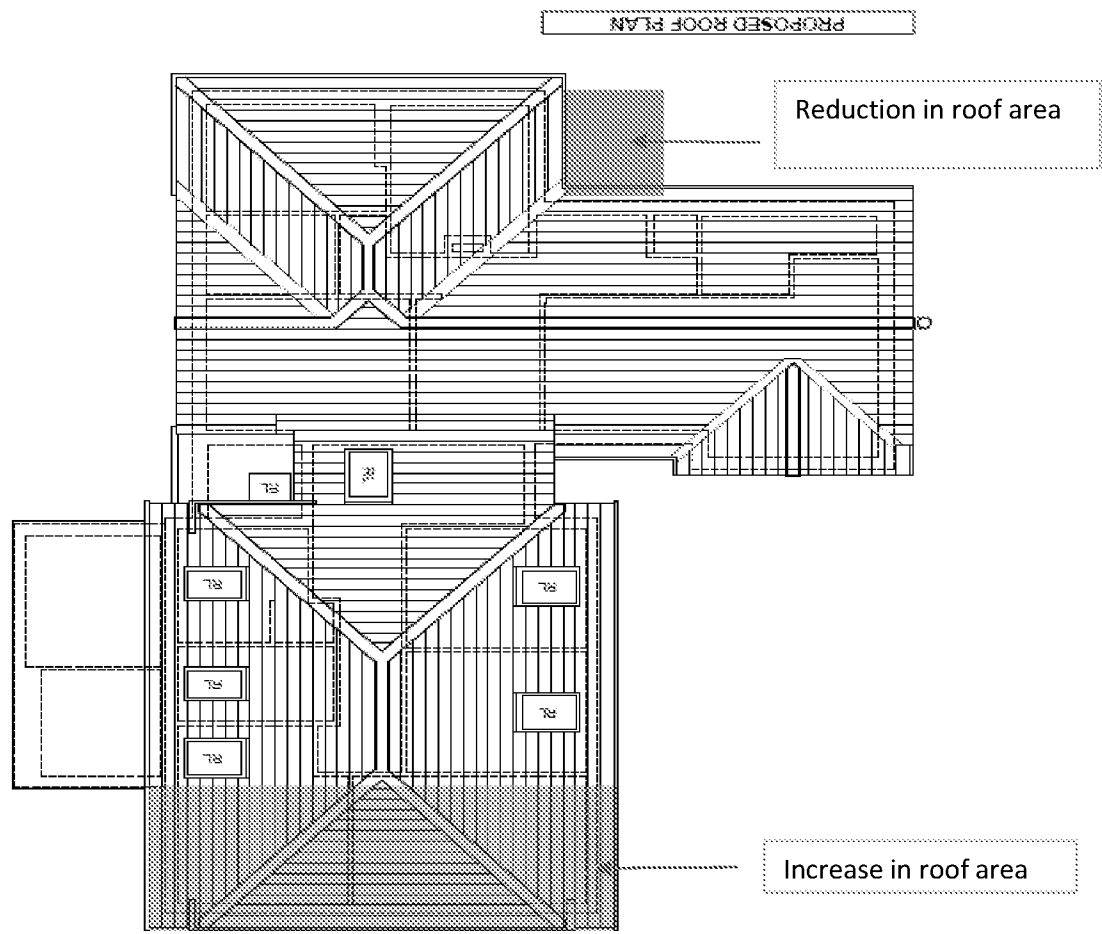
CONCRETE:	
REINFORCEMENT:	
STEELWORK:	
TIMBER:	
OTHER:	

OTHER INFORMATION / NOTES

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



New roof area (shown shaded) = 23.80 m^2

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Project:	Willows, West Walberton Lane	Date:	Aug 2021	Made by:	KS	Sheet No.	1
CALCULATION SHEET		Job No.	2099	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) new tiled roof area over day room into an attenuation tank. The attenuation tank will overflow to the small stream at the bottom of the garden.

This calculation is based on a 100 year return period with a 40% allowance for Climate Change

Discharge from tank to be at 2 l/sec into stream

Water harvesting.

If grey water recycling required attenuation tank size to be increased to provide flush water based on 150 L/day usage.

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Project: Willows, West Walberton Lane	Date: Aug 2021	Made by: KS	Sheet No. 2
CALCULATION SHEET	JobNo. 2099	Chkd: -	Rev. -

ATTENUATION TANK DESIGN

RUN-OFF VOLUME

Drained area = 82 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 (mins)	Z1	M5-D (mm)	Z2 M10 (cor. Fac)	M10-D* rainfall	Z2 M100 Design	100 yr + 40% rainfall
5	0.36	7.2	1.19	12.00	1.84	18.55
10	0.54	10.8	1.22	18.45	1.92	29.03
15	0.65	13	1.23	22.39	1.96	35.67
30	0.82	16.4	1.24	28.47	2.00	45.92
60	1.00	20	1.24	34.72	2.03	56.84
120	1.19	23.8	1.24	41.32	2.01	66.97
240	1.39	27.8	1.23	47.87	1.97	76.67
360	1.53	30.6	1.22	52.26	1.94	83.11
600	1.70	34	1.21	57.60	1.90	90.44
1440	2.07	41.4	1.19	68.97	1.81	104.91

OUTFLOW

Discharge rate = 2 l/sec
 Outflow = 2.00E-03 m3/sec Discharge rate

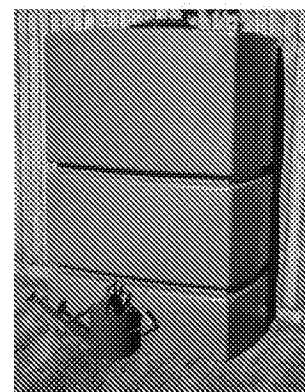
STORAGE CAPACITY

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

Storm duration (mins)	Inflow S(1) m ³	Inflow rate l/sec	Outflow Max m ³	Capacities Outflow rate l/sec	Required capacity m ³
0	0	0	0.000	2.000	0
5	1.51	5.04	0.600	2.000	0.91
10	2.37	3.95	1.200	2.000	1.17
15	2.91	3.23	1.800	2.000	1.11
30	3.75	2.08	3.600	2.000	0.15
60	4.64	1.29	7.200	2.000	n/a
120	5.47	0.76	14.400	2.000	n/a
240	6.26	0.43	28.800	2.000	n/a
360	6.78	0.31	43.200	2.000	n/a
600	7.38	0.20	72.000	2.000	0
1440	8.56	0.10	172.800	2.000	0

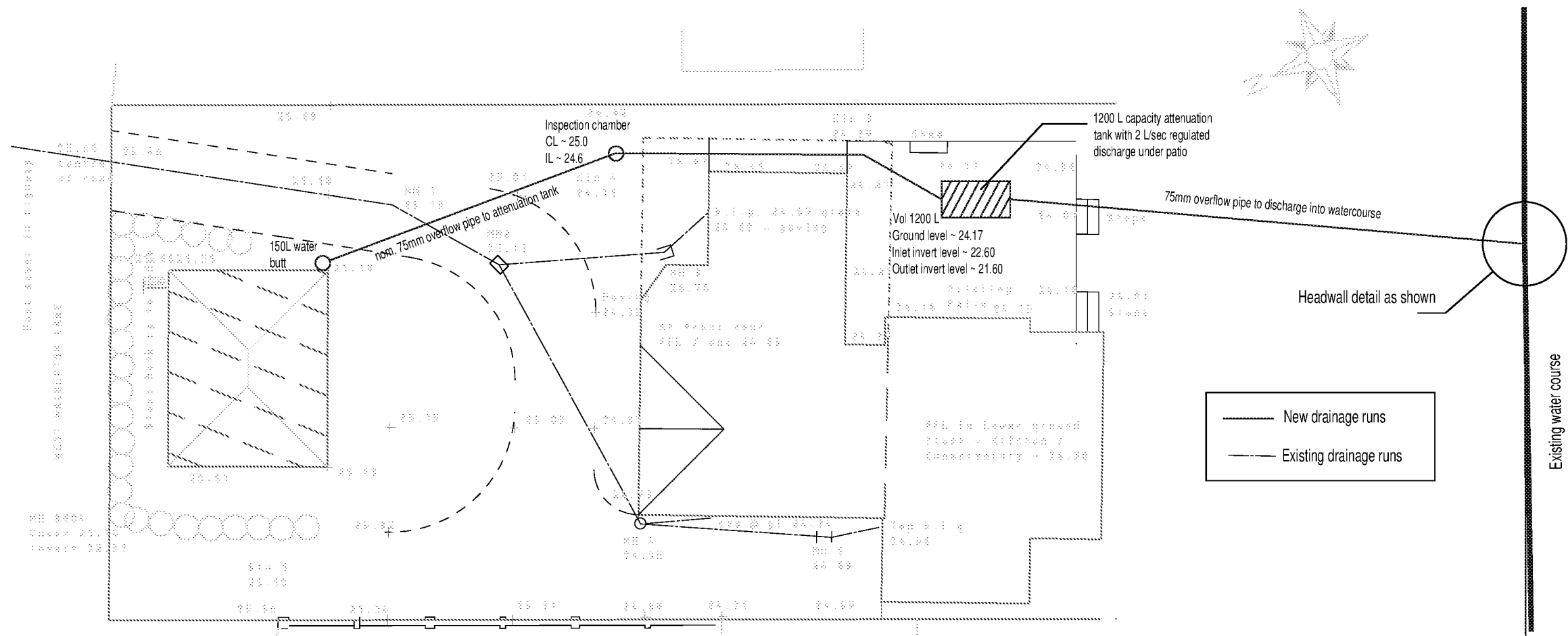
Volume required = 1.17 m3 (1200 L)

Surface water management scheme

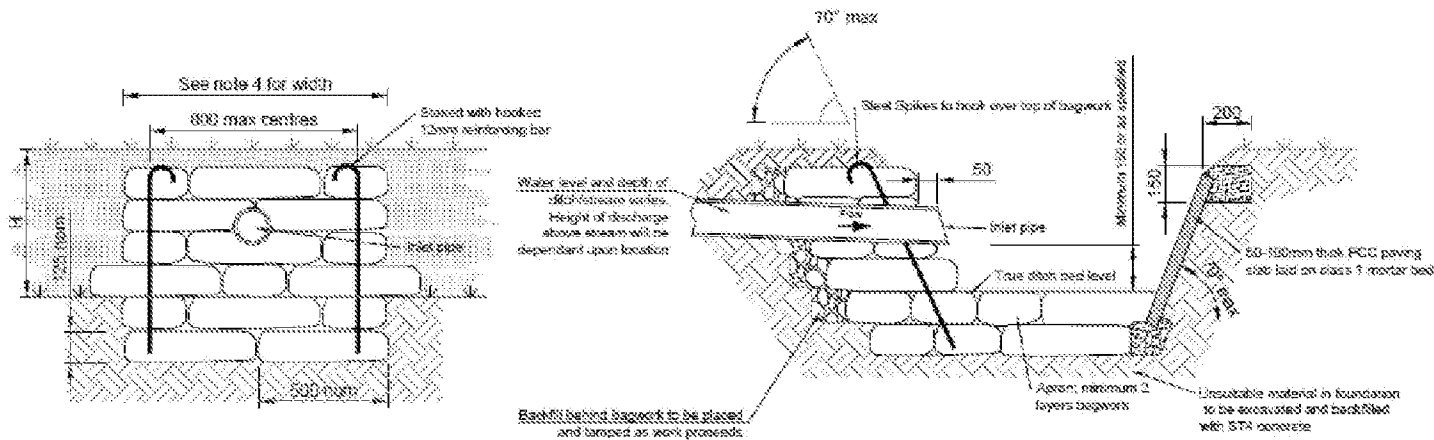


Optional Greywater harvesting tank with overflow to attenuaion tank

Attenuation tank under patio formed from crates with 1200 L capacity with 2 L/second regulated discharge



MANHOLE REF	COVER LEVEL	INVERT LEVEL
ROAD - 8804	25.70	22.37
MH 1	25.18	24.16
MH 2	25.13	24.37
MH 3	24.74	24.49
MH 4	24.75	24.50
MH 5	24.69	24.19



ELEVATION OF HEADWALL
OUTFALL TO SIDE OF DITCH

HEADWALL SECTION
OUTFALL TO SIDE OF DITCH

NOTES:

General

1. Attenuation tank sized for 100 yr return period with 40 % increase for climate change (refer to SCEL calculations August 2021)
2. Ground levels from Grove Design UK drawing 19-07-GD-228-10-DA, July 2019.
3. All below ground pipework laid at 1:100
4. Headwall to be formed at discharge location into drainage ditch as per details and notes.
5. Pipe levels are approximate and may vary but adequate falls and cover depths are to be maintained.
6. Soakaway construction in accordance with manufacturers guidelines.

Headwall

7. Bags shall be of Hessian and shall be of a size to provide a wall thickness of 500mm
8. Concrete bagwork shall be to Clause 519 and be three quarter filled with 25mm slump ST4 concrete immediately prior to placing with the ends sewn.
9. The bags shall be placed in a modified Flemish bond so as to 'break joint' with the mouths away from the surface and be tamped into position to form a rectangular block.
10. Extent of outlet protection to be the greater of 1500mm or pipe diameter + 1200mm spanning the outlet pipe.
11. Headwall design may need to be adjusted to on site conditions following approval from the Engineer.
12. Ditch to be regraded as required.
13. All exposed pipework to be certified UV stable.
14. Pipe levels are approximate and may vary but adequate falls and cover depths are to be maintained.

Rev 0	27/09/2021	First issue
Revision	Date	Notes

STONE CONSULTING ENGINEERS
Civil and Structural Engineers

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Drawn by: KS	Title: The Willows Surface water attenuation scheme
Checked:	
Date: Sept 2021	Drawing No: SCEL-2099-01
Scale: See bar	