

From: Anita Gardner
Sent: 10 July 2018 17:20
To: Planning.Responses
Subject: FW: M/64/18/DOC172 Elmer Road

Please treat as additional info from applicant

Anita Gardner | Principal Planner, Directorate of Place, Arun District Council | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF

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From: [REDACTED]
Sent: 10 July 2018 16:38
To: Anita Gardner
Subject: RE: M/64/18/DOC172 Elmer Road

Hi Anita,

Please see below for our replies, together with revision D attached.

Best regards,

Lee Farndell
Farndell Builders Ltd

From: Anita Gardner [<mailto:Anita.Gardner@arun.gov.uk>]

Sent: 09 July 2018 10:06

Subject: FW: M/64/18/DOC172 Elmer Road

Dear Mr Farndell,

Please see the comments of our Drainage Engineer set out below. I await your response

Regards

Anita Gardner

Anita Gardner | Principal Planner, Directorate of Place, Arun District Council | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF

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From:

Laura Gibbons

Sent: 09 July 2018 09:51

To: Anita Gardner

Subject: RE: M/64/18/DOC172 Elmer Road

Hi Anita,

I have the following comments:

- I am a little confused as to how the infiltration rates have changed between submissions. In the previous submission the lowest rate was $6.07 \times 10^{-6} \text{ms}^{-1}$. Now it has changed to $5.46 \times 10^{-5} \text{ms}^{-1}$. Please can the applicant explain this discrepancy?
The original infiltration rate was incorrectly calculated and based on a different field test. The actual test was a percolation test with the results reported in Vp (mm/sec), the test method and the derivation of infiltration rate is detailed in the calculation together with the test results. And the worst infiltration value has been used which is very conservative as the infiltration rate measured at the location of the soakaway is an order of magnitude greater.
- The finished floor levels are labelled as being lower than the pipe invert levels. It is not clear if some of the levels on the plan are cover or invert levels. If all pipe levels are invert levels they need to reassess design, as water does not flow up hill. If they are cover levels then I am also concerned as the building finished floor level is 1.54 meters lower. Please can the application confirm the levels.
Our error. We went up with the figures (which is what happens when you read the measurements on site), rather than down for the plan.
- Manholes need to be provided at the corners of the property where there is a 90 degree change in pipe direction.
- The winter groundwater monitoring was completed in October, therefore not at the peak of groundwater levels. As a result the base of infiltration structures need to be set no lower than 1mbgl.
- Please ensure all infiltration structures are at least 5m from buildings.
We have now re-designed the drainage to account for all four above points. Please see attached.

Thanks,

Laura Gibbons, MEng, GMICE
Engineer (Drainage & Coastal)

Laura Gibbons | Engineer (Drainage & Coastal), Engineering Services, Arun District Council | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF

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From: Anita Gardner

Sent: 06 July 2018 11:07

To: Laura Gibbons

Subject: FW: M/64/18/DOC172 Elmer Road

Hi Laura,

Please can you advise if this additional information is now sufficient to discharge the condition

Thanks

Anita



From: [REDACTED]
Sent: 06 July 2018 10:45
To: Anita Gardner
Subject: RE: M/64/18/DOC172 Elmer Road

Hi Anita,

Our structural engineer has come back to us fairly rapidly this time. Please find attached revision C for the surface water calcs.

The applicant has not provided winter groundwater monitoring results and therefore the suitability of design cannot be assessed. Please provide this. – Test holes A& B recorded on schedule as 18/10/17

It should also be noted that the lowest recorded infiltration rate should be used, not the average. I.e. please use $6.07 \times 10^{-6} \text{ms}^{-1}$ – Test hole A has the lowest infiltration level. This result has been used for the new calcs.

Please also provide drainage layout plans which label invert and cover levels of infiltration structures; invert level, fall and dimensions of all surface water pipes; as well as the location of catch-pit/ silt traps. Drawing now included in schedule showing the drainage layout, levels, falls and dimensions.

I trust that this revised effort will now be satisfactory for the Drainage Engineer.

Best regards,

Lee Farndell
Farndell Builders Ltd

From: Anita Gardner [<mailto:Anita.Gardner@arun.gov.uk>]
Sent: 06 July 2018 10:27
To: [REDACTED]
Subject: RE: M/64/18/DOC172 Elmer Road

Hi Lee,

I am happy to wait receipt of additional info. At this stage there is no need for an EOT the application does not expire until next month

Regards

Anita Gardner



From: [REDACTED]
Sent: 04 July 2018 10:41
To: Anita Gardner
Subject: RE: M/64/18/DOC172 Elmer Road

Hi Anita,

Thank you for your comments. The surface water calcs are back with our structural engineer and I hope to get it all back to you by next week. Would it be possible to arrange an extension of time if he can't get the information back to me in time?

Best regards,

Lee Farndell
Farndell Builders Ltd
[REDACTED]

From: Anita Gardner [<mailto:Anita.Gardner@arun.gov.uk>]
Sent: 27 June 2018 10:06
[REDACTED]
Subject: M/64/18/DOC172 Elmer Road

Dear Mr Farndell,

Please see the comments of the Drainage Engineer set out below:

Engineers Responses Relating to Condition 7- surface water drainage

The applicant has not provided winter groundwater monitoring results and therefore the suitability of design cannot be assessed. Please provide this.

It should also be noted that the lowest recorded infiltration rate should be used, not the average. I.e. please use $6.07 \times 10^{-6} \text{ms}^{-1}$

Please also provide drainage layout plans which label invert and cover levels of infiltration structures; invert level, fall and dimensions of all surface water pipes; as well as the location of catch-pit/ silt traps.

I would appreciate receipt of this additional information within the next 2 weeks

Regards

Anita Gardner

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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. 1735

Date: July 2018

QA INFORMATION

CLIENT:	Farndell Builders Ltd
JOB ID:	172 Elmer Road
SCOPE OF WORK:	Soakaway Design
DESIGN CODES AND REFERENCES:	BRE 365
SOFTWARE:	MS EXCEL
SUB-SOIL/ FOUNDATION DATA:	N/A

MATERIAL DATA

CONCRETE:	
REINFORCEMENT:	
STEELWORK:	
TIMBER:	
OTHER:	Soakage test by others (data included)

OTHER INFORMATION / NOTES

Rev A	First issue
Rev B	Revised for 30% climate increase
Rev C	Revised assessment of percolation test

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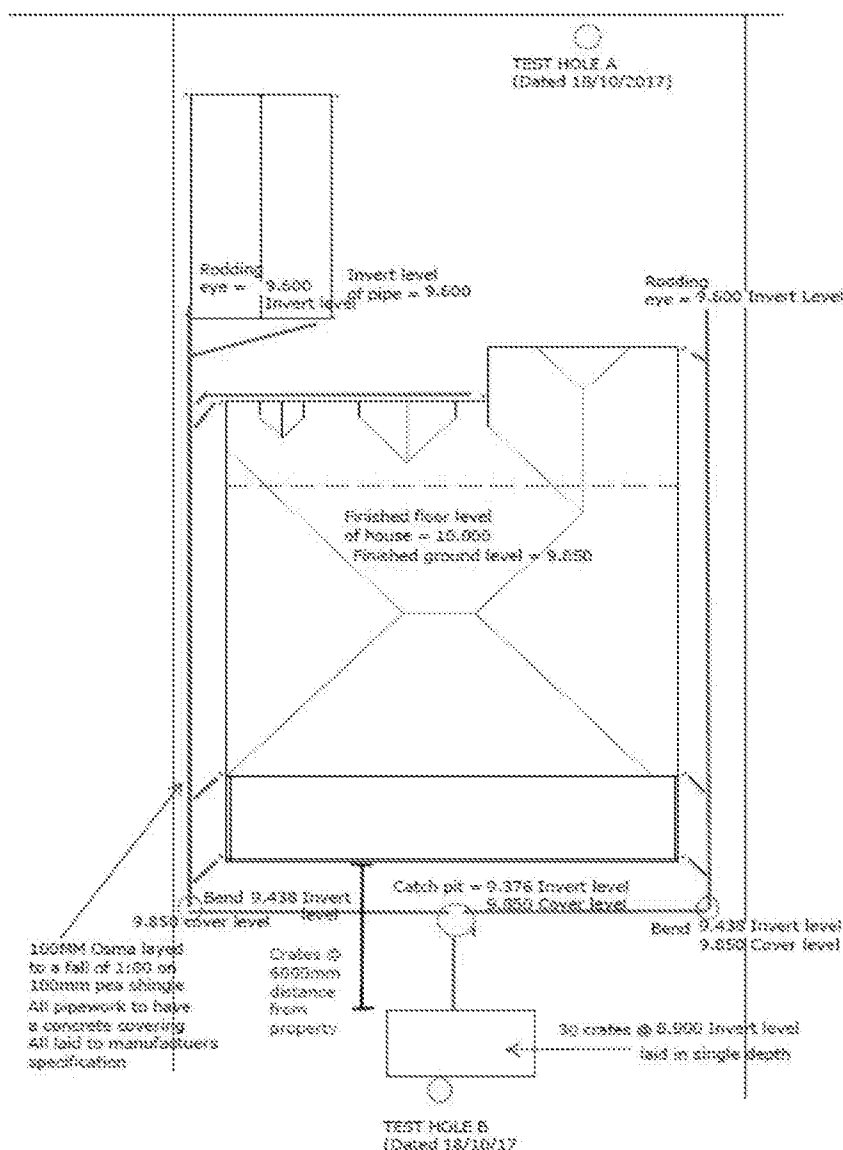
Project:	172 Elmer Road	Date:	July 2018	Made by:	KS	Sheet No.	1
CALCULATION SHEET		Job No.	1735	Chkd:	-	Rev.	D

SUMMARY:

The site is underlain by head gravel with a water table recorded at between 2 and 3m bgl (refer to attached borehole log).

Infiltration rate based on test at location of soakaway (Test B)

The calculation is based on a 100 year return period with a 30% allowance for Climate Change.



(see page 6 for larger plot)

To new soakaways

	Area	
Garage	17.00	m ²
100% house	100.00	m ²
Base design on	117.00	m ²

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Project: 172 Elmer Road	Date: July 2018	Made by: KS	Sheet No. 2
CALCULATION SHEET	JobNo. 1735	Chkd: -	Rev. D

SOAKAWAY DESIGN TO BRE(1991)

SOAKAWAY DETAILS

Ring		Pit/crates	
Soakaway size, Ds =	2.50 m	Length =	3 m
Depth of below invert, Hs =	1.00 m	Width =	2 m
		Depth below invert =	1.2 m
Free volume, S =	4.91 m ³		= 7.20 m ³
Rubble filled volume, S' =	1.47 m ³		= 2.38 m ³

INITIAL SOAKAWAY SIZING

Drained area to soakaway = 117.00 m²
 Climate change allowance = 30 %

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

duration (mins)	Z1	M5-D (mm)	Z2 M10 (cor. Fac)	M10-D* rainfall	Z2 M100 Design	100 yr rainfall
5	0.36	7.2	1.19	11.14	1.84	17.22
10	0.51	10.2	1.22	16.18	1.91	25.33
15	0.62	12.4	1.23	19.83	1.95	31.43
30	0.79	15.8	1.22	25.06	2.00	41.08
60	1	20	1.24	32.24	2.03	52.78
120	1.23	24.6	1.24	39.66	2.01	64.28
240	1.5	30	1.22	47.58	1.97	76.83
360	1.69	33.8	1.21	53.17	1.94	85.24
600	1.94	38.8	1.2	60.53	1.90	95.84
1440	2.48	49.6	1.18	76.09	1.81	116.71

* including 30% for climate change

OUTFLOW

Soil infiltration rate*, f = 9.11E-05 m/sec
 effective storage depth, a(50) = H x .5 = 0.5 m (ring)
 Outflow /sec = 3.142 x Dia x a(50) = 3.58E-04 m3/sec (ring)
 effective storage depth, a(50) = H x .5 = 0.6 m (pit)
 Outflow /sec = 2(L + W) x a(50) x f = 5.46E-04 m3/sec (pit)

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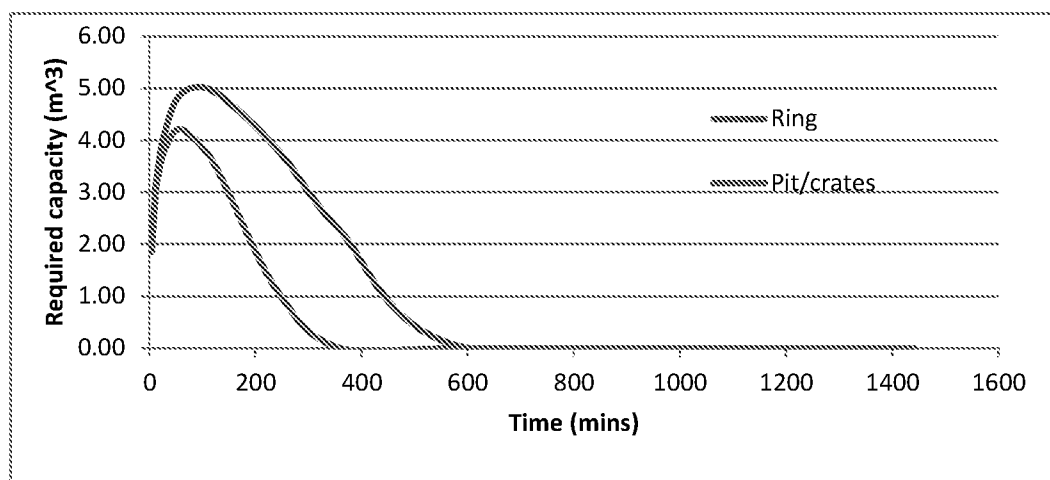
Project: 172 Elmer Road	Date: July 2018	Made by: KS	Sheet No. 3
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STORAGE CAPACITY

$$\text{Storage capacity, } S = \text{Inflow} - \text{Outflow}$$

$$= I - O = [A \times (M10-D)] - O$$

Ring soakaway				Pit/crates soakaway	
Duration (mins)	Inflow S(1) m ³	Outflow Max m ³	Required capacity m ³	Outflow Max m ³	Required capacity m ³
5	2.02	0.11	1.91	0.16	1.85
10	2.96	0.21	2.75	0.33	2.64
15	3.68	0.32	3.36	0.49	3.19
30	4.81	0.64	4.16	0.98	3.82
60	6.18	1.29	4.89	1.97	4.21
120	7.52	2.57	4.95	3.93	3.59
240	8.99	5.15	3.84	7.87	1.12
360	9.97	7.72	2.25	11.80	n/a
600	11.21	12.87	n/a	19.67	n/a
1440	13.65	30.90	n/a	47.20	n/a
Max required capacity =			4.95	= 4.21	
Max ring capacity =			4.91	Free volume =	7.20
Rubble filled volume =			1.47	Rubble filled volume =	2.38
			FAIL		OK
			FAIL		FAIL



Options

Ring soakaway				Status
Diameter	2.50	m	Unfilled	FAIL
Depth below invert =	1.00	m	Filled	FAIL
Pit or trench				Status
Length =	3.00	m	Unfilled	OK
Width =	2.00	m	Filled	FAIL
Depth below invert =	1.2	m		

Note: for ring option calculation is conservative as ring is normally placed in square hole with rubble surround providing additional storage capacity.

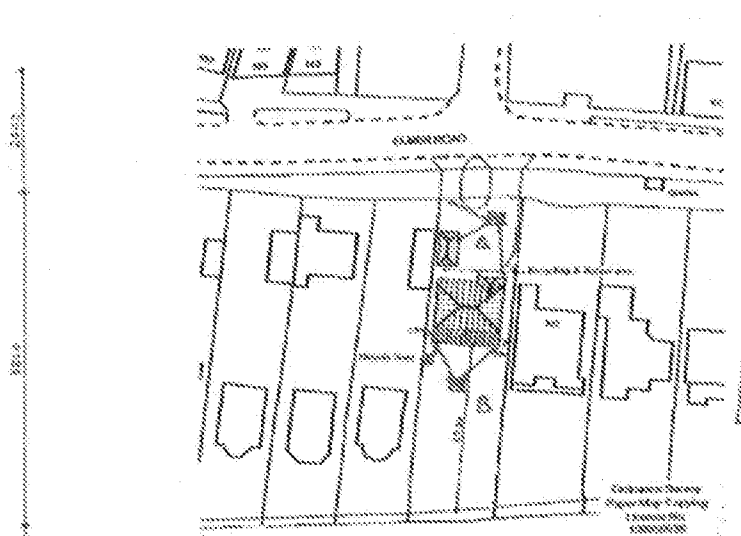
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Project: 172 Elmer Road	Date: July 2018	Made by: KS	Sheet No. 4
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Percolation test data supplied

TEST HOLE A $V_p = 54.91$

TEST HOLE B $V_p = 11.20$



Percolation test method for rainwater disposal

1. A hole 300mm square should be excavated to a depth 300mm below the proposed invert level of the incoming pipe. Where deep drains are necessary, the hole should conform to this shape at the bottom, but may be enlarged above the 300mm level to enable safe excavation to be carried out. Where very deep excavations are necessary, you should seek specialist advice.
2. Fill the 300mm square section of the hole to a depth of at least 300mm with water and allow it to seep away overnight.
3. Next day, refill the 300mm square section of the hole with water to a depth of at least 300mm and observe the time, in seconds, for the water to seep away from 75% full to 25% full level (that is a depth of 150mm). Divide this time by 150mm. The answer gives the average time in seconds (V_p) required for the water to drop 1mm. For example 60mins divided by 150mm = 24 seconds ($V_p = 24$ seconds)
4. The test should preferably be carried out at least three times with at least two trial holes. The average figure from the tests should be taken. The test should not be carried out during abnormal weather conditions such as heavy rain, severe frost or drought.

Where the test is carried out as described above, the soil infiltration rate (f) is related to the value (V_p) derived from the test by the equation:

Formula to calculate the soil filtration rate

$$f = \frac{10^{-3}}{2V_p}$$

Infiltration rates

Test hole A

$$V_p = 54.91 \text{ sec}$$

$$\text{Infiltration rate, } f = 9.11\text{E-}05 \text{ mm/sec}$$

Test hole B

$$V_p = 11.20 \text{ sec}$$

$$\text{Infiltration rate, } f = 0.000446 \text{ m/sec}$$

Use lowest value in calculation from Test hole A

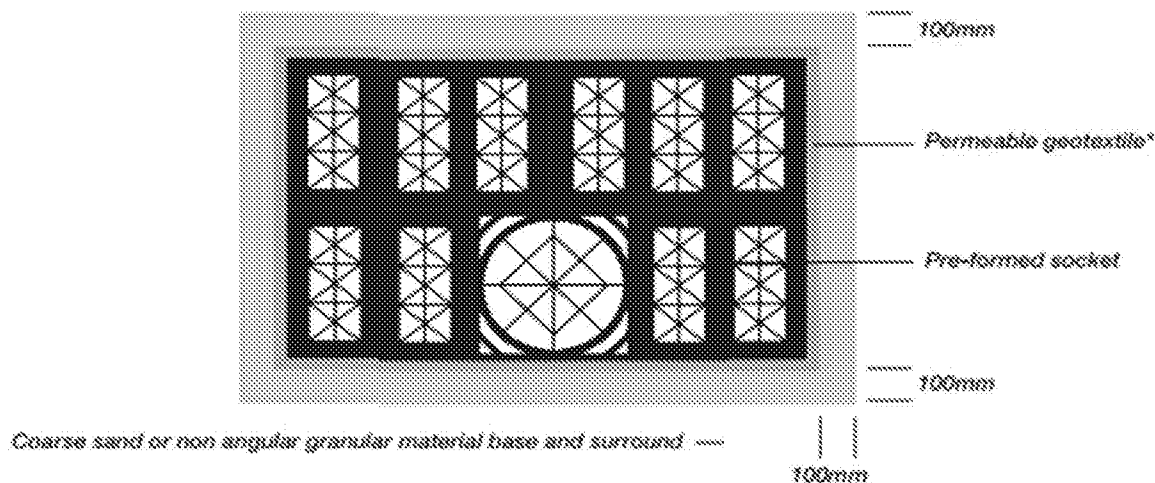
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Typical installation procedure for AquaCell Eco (or similar) crated

1. Excavate the trench to the required depth ensuring that the plan area is slightly greater than that of the AquaCell units.
2. Lay 100mm bed of coarse sand or non angular granular material, level and compact.
3. Lay the geotextile over the base and up the sides of the trench.
4. Lay the AquaCell units parallel with each other. In multiple layer applications, wherever possible, continuous vertical joints should be avoided. AquaCell units can be laid in a 'brick bonded' formation (i.e. to overlap the joints below). For single layer applications use the AquaCell Clips and for multi layers use the AquaCell Clips and the AquaCell Shear Connectors (vertical rods).
5. Fix the Adaptors to the AquaCell units as required and connect pipework.
6. In order to prevent silt from entering the tank, clogging inlet pipework and reducing storage capacity, it is recommended that the Domestic Silt Trap (SLB300) or the standard Silt Trap (SLB600) is installed prior to the inlet pipework.
7. Wrap and overlap the geotextile covering the entire AquaCell structure.
8. Lay 100mm of coarse sand or non angular granular material between the trench walls and the AquaCell structure and compact.
9. Lay 100mm of coarse sand or non angular granular material over the geotextile and compact.
10. Backfill with suitable material.
11. Rainwater from roof areas may discharge directly into the soakaway but rainwater from carparks must discharge through a catchpit manhole and/or a petrol interceptor.

Crates installed in three layers



SUMMARY:

The design indicates a single soakaway located in the rear garden would be sufficient to cater for run-off from the house and garage.

A typical arrangement using 30 AquaCell or similar crates of 1 x 0.5 x 0.4 (high) installed in the rear garden in accordance with manufacturers recommendations.

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Project: 172 Elmer Road

Date: July 2018

Made by: KS

Sheet No. 6

CALCULATION SHEET

JobNo. 1735

Chkd: -

Rev. D

