



Quotation for the supply of Rainwater Harvesting Equipment

Client :

**Mark Booth
Mbooth Design Limited**

Site Reference :

**Rain Activ for Land at Millstones,
Oxspring, Sheffield S36 8WZ**

Prepared by:

Ian Woodcock

ianw@rainwaterharvesting.co.uk

01733 405104 / 07736 45 46 45

Our reference : IMW230903

Date of proposal : 09/10/2020



Your Proposal

Thank you for your enquiry and as requested please find the following information regarding our proposed system.

SHALLOW DIG F-LINE TANK	Units 1,2 & 3	Unit 4	Unit 5
	1500	2 x 7500	2 x 7500
Weight Kg	80	310	310
Length	2400	3340	3340
Width	1200	2310	2310
Overall Height	1015 - 1415	1415 - 1815	1415 - 1815
Ground to Invert VS60 (Pedestrian 635mm Shaft) Minimum Attenuation Volume Invert to Outlet	320 - 720 1100 litres 547	310 - 710 10,100 litres 794	310 - 710 10,000 litres 787
EXCAVATION		15000 (2 x 7500 side by side)	15000 (2 x 7500 side by side)
Length	2800	3740	3740
Width	1600	5520	5520
Overall height VS60	1115 - 1515	1515 - 1915	1515 - 1915

Overall height allows for 100mm compacted aggregate

The overall height difference above is because up to 400 mm can be cut off of the 635 mm shaft on site so as to achieve your exact invert level.

Please see Drainage Calculation Summary on page 10

If you want to use the excess rainwater for garden irrigation please add £300.00 ex vat to the quoted price below and we will include a pressure sensitive pump, pipe and label pack.

Rainwater Harvesting Limited is a private family owned company, our strong service ethos has been built on many years of experience and this is reflected in our ability to offer both simple to install rainwater harvesting systems and mix and match components to provide bespoke solutions reflecting clients needs. At our 100,000sq ft warehouse in Peterborough we hold over 3000 stock items, we are the largest stockholder of the Shallow Dig Rewatec tanks in the UK and we regularly despatch to site complete rainwater harvesting systems within 5-7 days of order, we also provide full technical support on all our products.

We would welcome the opportunity of supplying your rainwater harvesting system and I can easily be contacted either by phone or email as shown on the previous page

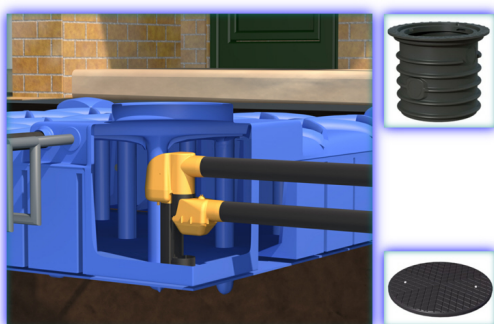


Components and Prices – Supply Only

Units 1, 2 & 3

Product Code : **RWH-1599FL-RA**

1,500 Litre Rain Activ Attenuation System (Per Unit)



Components

Product Code	Description	Qty
RWFT1500	F-LINE 1500L TANK	1
RWDS0062	F-LINE TANK 635mm EXTENSION SHAFT - VS60	1
RWDS0066	F-LINE TANK WALK ON LID	1
RWH-RV01	RAINVANTAGE FILTER KIT INC SIPHON & OVERFLOW	1
RWH-RA02	RAIN ACTIV SUDS COMPONENT SITE SPECIFIC AND PRE FITTED ALLOWING FOR A MINIMUM OF 1100 LITRES WORTH OF ATTENUATION WITH A CONTROLLED DISCHARGE RATE OF 0.2 LITRES PER SECOND	1
RWH-RA01	MICRO DRAINAGE CALCULATIONS	1

Price : £1,650.00 (£1,980.00 Inc. VAT) each

UK delivery is included in the price (Highlands and islands extra)

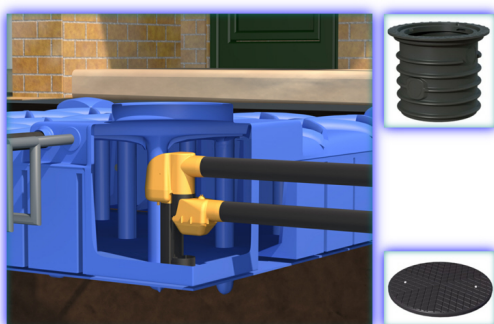


Components and Prices – Supply Only

Unit 4

Product Code : **RWH15000FL-RA**

15,000 Litre Rain Activ Attenuation System



Components

Product Code	Description	Qty
RWFT7500	F-LINE 7500L TANK	2
RWDS0062	F-LINE TANK 635mm EXTENSION SHAFT - VS60	2
RWDS0066	F-LINE TANK WALK ON LID	2
GF-332033	DN100 SEALS FOR TANK CONNECTION	2
RWH-RV01	RAINVANTAGE FILTER KIT INC SIPHON & OVERFLOW	1
RWH-RA02	RAIN ACTIV SUDS COMPONENT SITE SPECIFIC AND PRE FITTED ALLOWING FOR A MINIMUM OF 10100 LITRES WORTH OF ATTENUATION WITH A CONTROLLED DISCHARGE RATE OF 0.8 LITRES PER SECOND	1
RWH-RA01	MICRO DRAINAGE CALCULATIONS	1

Price : £4,300.00 (£5,160.00 Inc. VAT)

UK delivery is included in the price (Highlands and islands extra)

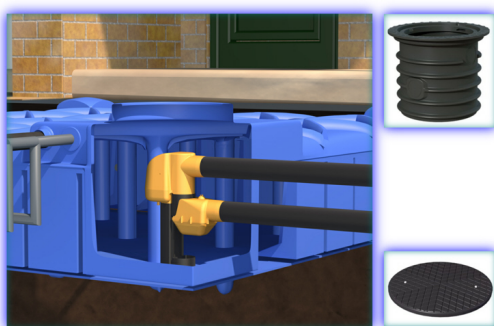


Components and Prices – Supply Only

Unit 5

Product Code : **RWH15000FL-RA**

15,000 Litre Rain Activ Attenuation System



Components

Product Code	Description	Qty
RWFT7500	F-LINE 7500L TANK	2
RWDS0062	F-LINE TANK 635mm EXTENSION SHAFT - VS60	2
RWDS0066	F-LINE TANK WALK ON LID	2
GF-332033	DN100 SEALS FOR TANK CONNECTION	2
RWH-RV01	RAINVANTAGE FILTER KIT INC SIPHON & OVERFLOW	1
RWH-RA02	RAIN ACTIV SUDS COMPONENT SITE SPECIFIC AND PRE FITTED ALLOWING FOR A MINIMUM OF 10000 LITRES WORTH OF ATTENUATION WITH A CONTROLLED DISCHARGE RATE OF 0.7 LITRES PER SECOND	1
RWH-RA01	MICRO DRAINAGE CALCULATIONS	1

Price : £4,300.00 (£5,160.00 Inc. VAT)

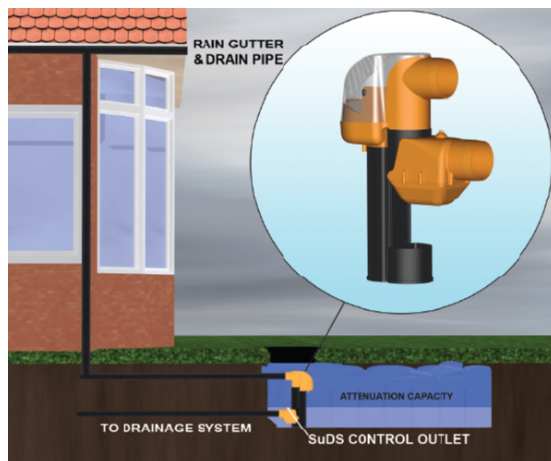
UK delivery is included in the price (Highlands and islands extra)



Rain Activ SuDS Solution

Rain Activ is a totally new concept within the storm attenuation market. Utilising shallow dig underground water tanks as well as a filtration and controlled discharge module.

Rain Activ collects water from the roof and removes debris via a self-cleaning filter. Once inside the tank, the clean water is attenuated and discharged slowly at a calculated rate through an orifice.



- Ultra-low discharge SuDS system.
- Peak discharge rates as low as 0.05 L/sec per property.
- Primary solution reduces secondary SuDS infrastructure and costs.
- Each system individually calibrated to site requirement.
- Can be used in combination with Rainwater Harvesting.

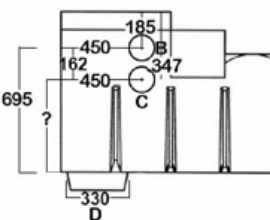
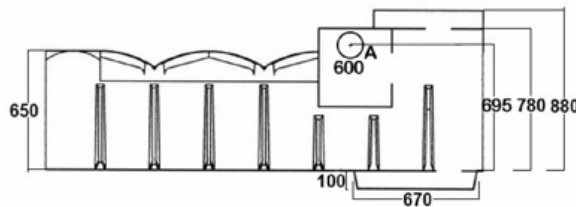
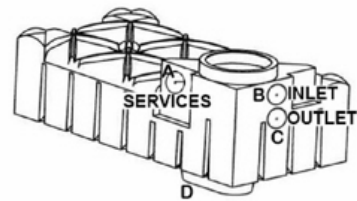
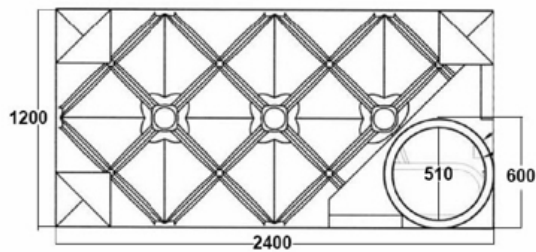
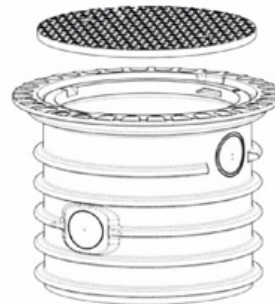
Rain Activ is ideal for sites where low rates of storm water discharge are required. With peak discharge rates as low as 0.05 L/sec, the system provides a solution for applications where flow is typically not sufficient for vortex flow control systems.

By collecting and slowing the water at source, the scale and cost of secondary SuDS infrastructure such as balancing ponds and geocellular storage can be heavily reduced. For many developments this can increase the available land for development.

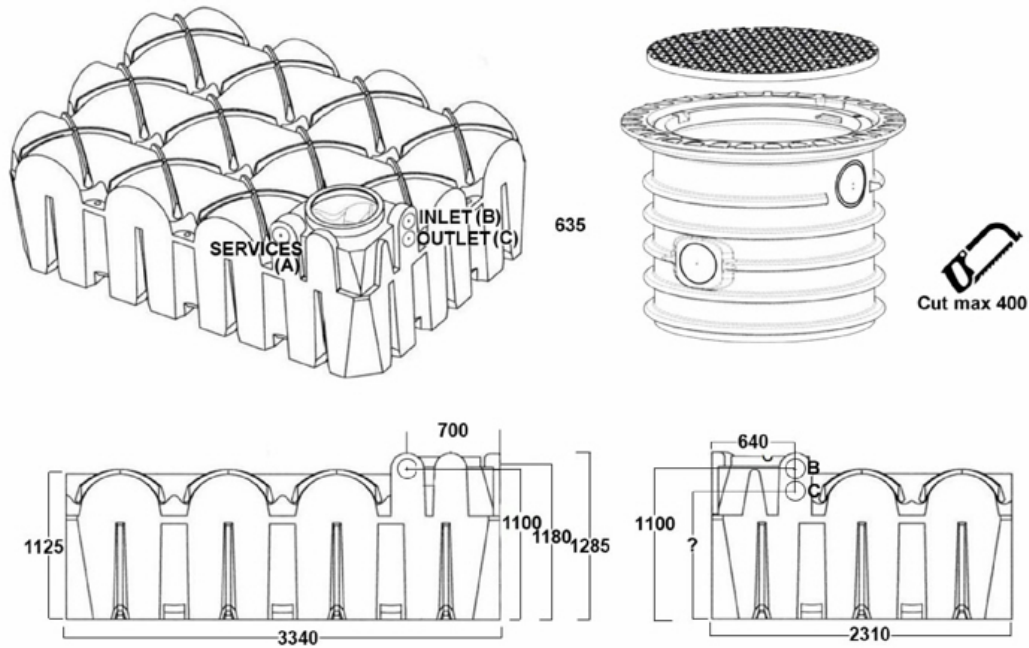
Where applicable, Rain Activ can be used in conjunction with Rainwater Harvesting by simply adding a pump and management system.

1500L F-Line

635



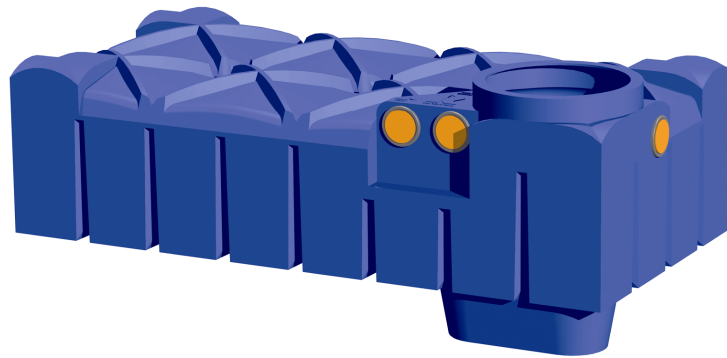
7500L F-Line



15,000 is achieved by linking 2 x 7500L tanks together using the DN100 seals supplied



F-Line Flat Tank shallow dig underground tank



Why buy this tank?

- The F-Line is a high quality, rotationally moulded, one piece rainwater tank that can be installed without the need for concrete, thereby minimising installation costs and supported by our long term 25 year tank guarantee.
- Minimal installation depth
- Easy and quick to install
- Small excavation pit and little earth excavation preserves your garden
- Ideal for installation in new or existing properties
- Can be installed in ground water up to tank shoulder
- Easy to install

The F-line flat tank can be installed into much higher water tables than a standard round tank. If you don't know what your water table will be like in the winter, you're safer to install a flat tank. The F-Line tanks are flat and the installation depth is up to 60% less than other rainwater tanks. The excavation can be up to 70% less, meaning little earth excavation, easy handling and less cost for you! The small excavation pit is easily filled in and your garden will look just like it did before.



Drainage Calculation Summary

The calculations below have been based on the following criteria:

1:100 Year Storm Event

40% Climate Change

Geographical Location; Land at Millstones, Oxspring, Sheffield. S36 8WZ

We have run the Micro Drainage Calculations (see pages below) and designed a site specific system as follows;

Units 1,2 & 3 - Total impermeable area = 50 sqm per unit

- 1500L tank with a 10mm orifice, providing 1100 litres of attenuation with a peak discharge of 0.2 l/s
- The highest stress put on the system was during the 1:100 year (+40%), 30 minute winter storm.
- Various other events were trailed; (38 in total) all at or below a peak discharge of 0.2 l/s

Unit 4 - Total impermeable area = 242 sqm

- 15000L tank with a 17mm orifice, providing 10100 litres of attenuation with a peak discharge of 0.8 l/s
- The highest stress put on the system was during the 1:100 year (+40%), 180 minute winter storm.
- Various other events were trailed; (38 in total) all at or below a peak discharge of 0.8 l/s



Unit 5 - Total impermeable area = 228 sqm

- 15000L tank with a 16mm orifice, providing 10000 litres of attenuation with a peak discharge of 0.7 l/s
- The highest stress put on the system was during the 1:100 year (+40%), 180 minute winter storm.
- Various other events were trailed; (38 in total) all at or below a peak discharge of 0.7 l/s
-

Total discharge rate for all 5 units = 2.1 litres per second

The reason we can use a very small orifice (between 5-50mm) without risk of blockage is because;

- High quality pre filtration, removing any particles larger than 1000 micron. (*So nothing larger than 1mm can enter the tank.*)
- The filter is self cleaning but does require an annual check for any major debris. As detailed in the maintenance guide.
- The orifice and filter have been developed for simple auditing. (Remove the manhole and look directly below to check for blockage.)

THE SITE SPECIFIC CALCULATIONS BELOW ARE BASED SPECIFICALLY ON OUR TANKS AND SuDS MODULE, THEY ARE NOT VALID FOR ANY OTHER SOLUTION



UNITS 1,2 & 3

Rainwater Harvesting Ltd							Page 1
Unit A Harrier Park Orton Southgate Peterborough PE2 6YQ							
Date 09/10/2020 08:48 File IMW S36 8WZ Millstones ...				Designed by RainWater Harves... Checked by			
XP Solutions				Source Control 2016.1			
Summary of Results for 100 year Return Period (+40%)							
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	0.429	0.429	0.2	0.1	0.3	1.0	O K
30 min Summer	0.468	0.468	0.2	1.1	1.3	1.1	O K
60 min Summer	0.478	0.478	0.2	1.7	1.9	1.1	O K
120 min Summer	0.468	0.468	0.2	1.1	1.3	1.1	O K
180 min Summer	0.462	0.462	0.2	0.8	1.1	1.0	O K
240 min Summer	0.453	0.453	0.2	0.5	0.8	1.0	O K
360 min Summer	0.444	0.444	0.2	0.3	0.5	1.0	O K
480 min Summer	0.436	0.436	0.2	0.1	0.4	1.0	O K
600 min Summer	0.427	0.427	0.2	0.0	0.3	1.0	O K
720 min Summer	0.391	0.391	0.2	0.0	0.2	0.9	O K
960 min Summer	0.328	0.328	0.2	0.0	0.2	0.8	O K
1440 min Summer	0.240	0.240	0.2	0.0	0.2	0.6	O K
2160 min Summer	0.163	0.163	0.1	0.0	0.1	0.4	O K
2880 min Summer	0.119	0.119	0.1	0.0	0.1	0.3	O K
4320 min Summer	0.073	0.073	0.1	0.0	0.1	0.2	O K
5760 min Summer	0.050	0.050	0.1	0.0	0.1	0.1	O K
7200 min Summer	0.037	0.037	0.1	0.0	0.1	0.1	O K
8640 min Summer	0.030	0.030	0.1	0.0	0.1	0.1	O K
10080 min Summer	0.024	0.024	0.0	0.0	0.0	0.1	O K
15 min Winter	0.461	0.461	0.2	0.8	1.0	1.0	O K
30 min Winter	0.481	0.481	0.2	1.8	2.0	1.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)		
15 min Summer	123.501	0.0	1.2	0.0	17		
30 min Summer	83.397	0.0	1.6	0.3	21		
60 min Summer	53.779	0.0	2.0	0.5	36		
120 min Summer	33.482	0.0	2.5	0.5	66		
180 min Summer	24.992	0.0	2.8	0.5	96		
240 min Summer	20.158	0.0	3.0	0.4	128		
360 min Summer	14.857	0.0	3.3	0.3	192		
480 min Summer	11.957	0.0	3.6	0.1	260		
600 min Summer	10.095	0.0	3.8	0.0	338		
720 min Summer	8.786	0.0	4.0	0.0	410		
960 min Summer	7.050	0.0	4.2	0.0	532		
1440 min Summer	5.159	0.0	4.6	0.0	778		
2160 min Summer	3.767	0.0	5.1	0.0	1128		
2880 min Summer	3.009	0.0	5.4	0.0	1496		
4320 min Summer	2.189	0.0	5.9	0.0	2204		
5760 min Summer	1.744	0.0	6.3	0.0	2936		
7200 min Summer	1.462	0.0	6.6	0.0	3672		
8640 min Summer	1.267	0.0	6.8	0.0	4400		
10080 min Summer	1.123	0.0	7.1	0.0	5032		
15 min Winter	123.501	0.0	1.3	0.1	14		
30 min Winter	83.397	0.0	1.8	0.5	20		
©1982-2016 XP Solutions							

Rainwater Harvesting Ltd						Page 2																																																																																																																																																																																																																																																													
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Summary of Results for 100 year Return Period (+40%) <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Control (l/s)</th><th>Max Overflow (l/s)</th><th>Max Σ Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>60 min Winter</td><td>0.472</td><td>0.472</td><td>0.2</td><td>1.3</td><td>1.5</td><td>1.1</td><td>O K</td></tr><tr><td>120 min Winter</td><td>0.463</td><td>0.463</td><td>0.2</td><td>0.9</td><td>1.1</td><td>1.1</td><td>O K</td></tr><tr><td>180 min Winter</td><td>0.454</td><td>0.454</td><td>0.2</td><td>0.6</td><td>0.8</td><td>1.0</td><td>O K</td></tr><tr><td>240 min Winter</td><td>0.447</td><td>0.447</td><td>0.2</td><td>0.4</td><td>0.6</td><td>1.0</td><td>O K</td></tr><tr><td>360 min Winter</td><td>0.440</td><td>0.440</td><td>0.2</td><td>0.2</td><td>0.4</td><td>1.0</td><td>O K</td></tr><tr><td>480 min Winter</td><td>0.433</td><td>0.433</td><td>0.2</td><td>0.1</td><td>0.3</td><td>1.0</td><td>O K</td></tr><tr><td>600 min Winter</td><td>0.409</td><td>0.409</td><td>0.2</td><td>0.0</td><td>0.2</td><td>1.0</td><td>O K</td></tr><tr><td>720 min Winter</td><td>0.357</td><td>0.357</td><td>0.2</td><td>0.0</td><td>0.2</td><td>0.9</td><td>O K</td></tr><tr><td>960 min Winter</td><td>0.278</td><td>0.278</td><td>0.2</td><td>0.0</td><td>0.2</td><td>0.7</td><td>O K</td></tr><tr><td>1440 min Winter</td><td>0.181</td><td>0.181</td><td>0.1</td><td>0.0</td><td>0.1</td><td>0.4</td><td>O K</td></tr><tr><td>2160 min Winter</td><td>0.110</td><td>0.110</td><td>0.1</td><td>0.0</td><td>0.1</td><td>0.3</td><td>O K</td></tr><tr><td>2880 min Winter</td><td>0.075</td><td>0.075</td><td>0.1</td><td>0.0</td><td>0.1</td><td>0.2</td><td>O K</td></tr><tr><td>4320 min Winter</td><td>0.043</td><td>0.043</td><td>0.1</td><td>0.0</td><td>0.1</td><td>0.1</td><td>O K</td></tr><tr><td>5760 min Winter</td><td>0.029</td><td>0.029</td><td>0.1</td><td>0.0</td><td>0.1</td><td>0.1</td><td>O K</td></tr><tr><td>7200 min Winter</td><td>0.022</td><td>0.022</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.1</td><td>O K</td></tr><tr><td>8640 min Winter</td><td>0.018</td><td>0.018</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>O K</td></tr><tr><td>10080 min Winter</td><td>0.015</td><td>0.015</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Overflow Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>60 min Winter</td><td>53.779</td><td>0.0</td><td>2.3</td><td>0.7</td><td>36</td></tr><tr><td>120 min Winter</td><td>33.482</td><td>0.0</td><td>2.8</td><td>0.8</td><td>64</td></tr><tr><td>180 min Winter</td><td>24.992</td><td>0.0</td><td>3.1</td><td>0.7</td><td>94</td></tr><tr><td>240 min Winter</td><td>20.158</td><td>0.0</td><td>3.4</td><td>0.6</td><td>126</td></tr><tr><td>360 min Winter</td><td>14.857</td><td>0.0</td><td>3.7</td><td>0.4</td><td>192</td></tr><tr><td>480 min Winter</td><td>11.957</td><td>0.0</td><td>4.0</td><td>0.1</td><td>270</td></tr><tr><td>600 min Winter</td><td>10.095</td><td>0.0</td><td>4.2</td><td>0.0</td><td>364</td></tr><tr><td>720 min Winter</td><td>8.786</td><td>0.0</td><td>4.4</td><td>0.0</td><td>428</td></tr><tr><td>960 min Winter</td><td>7.050</td><td>0.0</td><td>4.7</td><td>0.0</td><td>550</td></tr><tr><td>1440 min Winter</td><td>5.159</td><td>0.0</td><td>5.2</td><td>0.0</td><td>792</td></tr><tr><td>2160 min Winter</td><td>3.767</td><td>0.0</td><td>5.7</td><td>0.0</td><td>1144</td></tr><tr><td>2880 min Winter</td><td>3.009</td><td>0.0</td><td>6.1</td><td>0.0</td><td>1496</td></tr><tr><td>4320 min Winter</td><td>2.189</td><td>0.0</td><td>6.6</td><td>0.0</td><td>2204</td></tr><tr><td>5760 min Winter</td><td>1.744</td><td>0.0</td><td>7.0</td><td>0.0</td><td>2872</td></tr><tr><td>7200 min Winter</td><td>1.462</td><td>0.0</td><td>7.4</td><td>0.0</td><td>3624</td></tr><tr><td>8640 min Winter</td><td>1.267</td><td>0.0</td><td>7.7</td><td>0.0</td><td>4408</td></tr><tr><td>10080 min Winter</td><td>1.123</td><td>0.0</td><td>7.9</td><td>0.0</td><td>5008</td></tr></table>								Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status	60 min Winter	0.472	0.472	0.2	1.3	1.5	1.1	O K	120 min Winter	0.463	0.463	0.2	0.9	1.1	1.1	O K	180 min Winter	0.454	0.454	0.2	0.6	0.8	1.0	O K	240 min Winter	0.447	0.447	0.2	0.4	0.6	1.0	O K	360 min Winter	0.440	0.440	0.2	0.2	0.4	1.0	O K	480 min Winter	0.433	0.433	0.2	0.1	0.3	1.0	O K	600 min Winter	0.409	0.409	0.2	0.0	0.2	1.0	O K	720 min Winter	0.357	0.357	0.2	0.0	0.2	0.9	O K	960 min Winter	0.278	0.278	0.2	0.0	0.2	0.7	O K	1440 min Winter	0.181	0.181	0.1	0.0	0.1	0.4	O K	2160 min Winter	0.110	0.110	0.1	0.0	0.1	0.3	O K	2880 min Winter	0.075	0.075	0.1	0.0	0.1	0.2	O K	4320 min Winter	0.043	0.043	0.1	0.0	0.1	0.1	O K	5760 min Winter	0.029	0.029	0.1	0.0	0.1	0.1	O K	7200 min Winter	0.022	0.022	0.0	0.0	0.0	0.1	O K	8640 min Winter	0.018	0.018	0.0	0.0	0.0	0.0	O K	10080 min Winter	0.015	0.015	0.0	0.0	0.0	0.0	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)	60 min Winter	53.779	0.0	2.3	0.7	36	120 min Winter	33.482	0.0	2.8	0.8	64	180 min Winter	24.992	0.0	3.1	0.7	94	240 min Winter	20.158	0.0	3.4	0.6	126	360 min Winter	14.857	0.0	3.7	0.4	192	480 min Winter	11.957	0.0	4.0	0.1	270	600 min Winter	10.095	0.0	4.2	0.0	364	720 min Winter	8.786	0.0	4.4	0.0	428	960 min Winter	7.050	0.0	4.7	0.0	550	1440 min Winter	5.159	0.0	5.2	0.0	792	2160 min Winter	3.767	0.0	5.7	0.0	1144	2880 min Winter	3.009	0.0	6.1	0.0	1496	4320 min Winter	2.189	0.0	6.6	0.0	2204	5760 min Winter	1.744	0.0	7.0	0.0	2872	7200 min Winter	1.462	0.0	7.4	0.0	3624	8640 min Winter	1.267	0.0	7.7	0.0	4408	10080 min Winter	1.123	0.0	7.9	0.0	5008
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Rainwater Harvesting Ltd		Page 3
Unit A Harrier Park Orton Southgate Peterborough PE2 6YQ		
Date 09/10/2020 08:48	Designed by RainWater Harves...	
File IMW S36 8WZ Millstones ...	Checked by	
XP Solutions		Source Control 2016.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.341	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.005

Time (mins)	Area
From:	To: (ha)
0	4 0.005

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Unit A Harrier Park Orton Southgate Peterborough PE2 6YQ		
Date 09/10/2020 08:48	Designed by RainWater Harves...	
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XP Solutions		Source Control 2016.1

Model Details

Storage is Online Cover Level (m) 1.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	2.4	0.420	2.4	0.421	0.0

Orifice Outflow Control

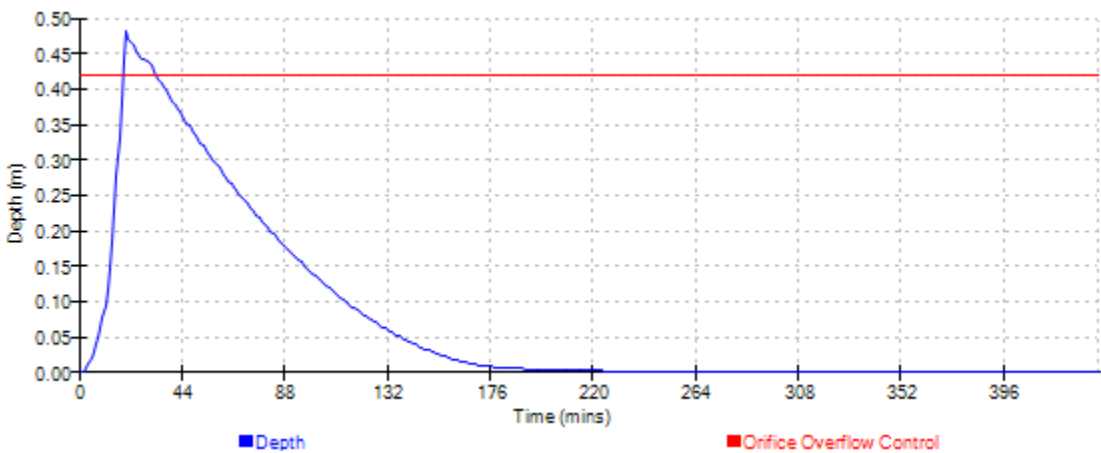
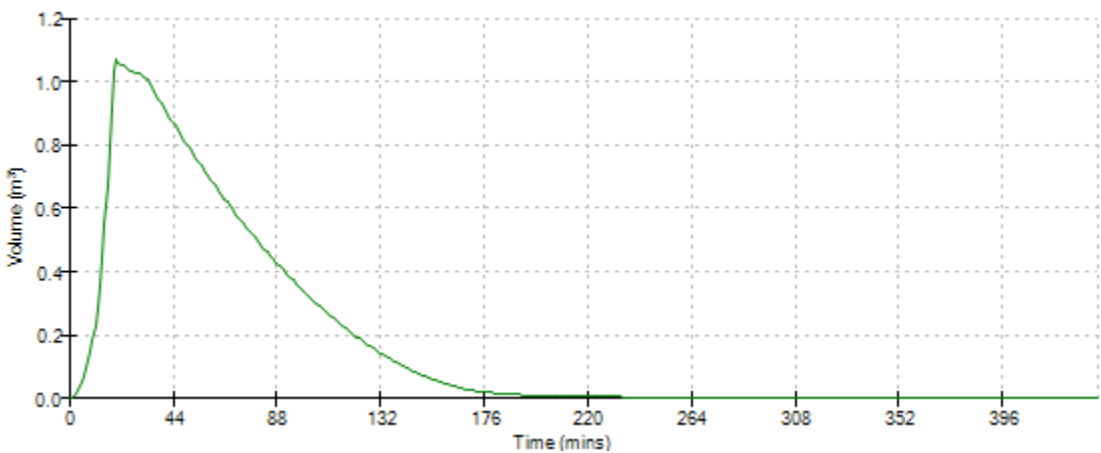
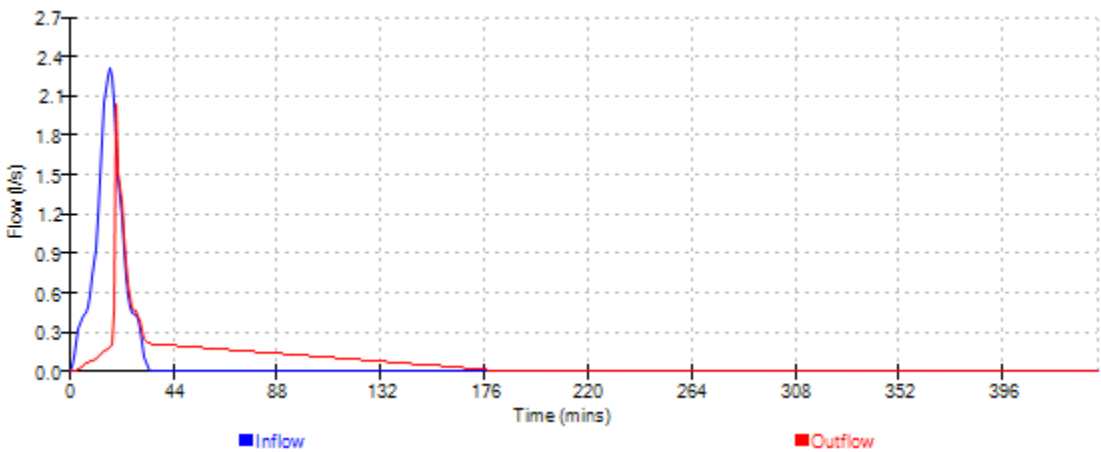
Diameter (m) 0.010 Discharge Coefficient 0.950 Invert Level (m) 0.000

Orifice Overflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 0.419

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Event: 30 min Winter





UNIT 4

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Unit A Harrier Park Orton Southgate Peterborough PE2 6YQ							
Date 09/10/2020 08:54 File IMW S36 8WZ Millstones ...			Designed by RainWater Harves... Checked by				
XP Solutions			Source Control 2016.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	0.356	0.356	0.6	0.0	0.6	5.2	O K
30 min Summer	0.462	0.462	0.6	0.0	0.6	6.7	O K
60 min Summer	0.551	0.551	0.7	0.0	0.7	8.0	O K
120 min Summer	0.601	0.601	0.7	0.0	0.7	8.8	O K
180 min Summer	0.611	0.611	0.7	0.0	0.7	8.9	O K
240 min Summer	0.607	0.607	0.7	0.0	0.7	8.9	O K
360 min Summer	0.585	0.585	0.7	0.0	0.7	8.5	O K
480 min Summer	0.558	0.558	0.7	0.0	0.7	8.1	O K
600 min Summer	0.530	0.530	0.7	0.0	0.7	7.7	O K
720 min Summer	0.502	0.502	0.7	0.0	0.7	7.3	O K
960 min Summer	0.452	0.452	0.6	0.0	0.6	6.6	O K
1440 min Summer	0.371	0.371	0.6	0.0	0.6	5.4	O K
2160 min Summer	0.286	0.286	0.5	0.0	0.5	4.2	O K
2880 min Summer	0.227	0.227	0.4	0.0	0.4	3.3	O K
4320 min Summer	0.155	0.155	0.4	0.0	0.4	2.3	O K
5760 min Summer	0.113	0.113	0.3	0.0	0.3	1.7	O K
7200 min Summer	0.088	0.088	0.3	0.0	0.3	1.3	O K
8640 min Summer	0.071	0.071	0.2	0.0	0.2	1.0	O K
10080 min Summer	0.059	0.059	0.2	0.0	0.2	0.9	O K
15 min Winter	0.400	0.400	0.6	0.0	0.6	5.8	O K
30 min Winter	0.521	0.521	0.7	0.0	0.7	7.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)		
15 min Summer	123.501	0.0	5.5	0.0	18		
30 min Summer	83.397	0.0	7.5	0.0	32		
60 min Summer	53.779	0.0	9.7	0.0	60		
120 min Summer	33.482	0.0	12.0	0.0	100		
180 min Summer	24.992	0.0	13.5	0.0	132		
240 min Summer	20.158	0.0	14.5	0.0	166		
360 min Summer	14.857	0.0	16.0	0.0	234		
480 min Summer	11.957	0.0	17.2	0.0	304		
600 min Summer	10.095	0.0	18.2	0.0	370		
720 min Summer	8.786	0.0	19.0	0.0	436		
960 min Summer	7.050	0.0	20.3	0.0	568		
1440 min Summer	5.159	0.0	22.3	0.0	822		
2160 min Summer	3.767	0.0	24.4	0.0	1188		
2880 min Summer	3.009	0.0	26.0	0.0	1556		
4320 min Summer	2.189	0.0	28.4	0.0	2252		
5760 min Summer	1.744	0.0	30.1	0.0	2992		
7200 min Summer	1.462	0.0	31.6	0.0	3680		
8640 min Summer	1.267	0.0	32.8	0.0	4408		
10080 min Summer	1.123	0.0	33.9	0.0	5144		
15 min Winter	123.501	0.0	6.2	0.0	18		
30 min Winter	83.397	0.0	8.4	0.0	32		
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Rainwater Harvesting Ltd							Page 2
Unit A Harrier Park Orton Southgate Peterborough PE2 6YQ							
Date 09/10/2020 08:54 File IMW S36 8WZ Millstones ...			Designed by RainWater Harves... Checked by				
XP Solutions			Source Control 2016.1				
Summary of Results for 100 year Return Period (+40%)							
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
60 min Winter	0.626	0.626	0.8	0.0	0.8	9.1	O K
120 min Winter	0.684	0.684	0.8	0.0	0.8	10.0	O K
180 min Winter	0.692	0.692	0.8	0.0	0.8	10.1	O K
240 min Winter	0.683	0.683	0.8	0.0	0.8	10.0	O K
360 min Winter	0.646	0.646	0.8	0.0	0.8	9.4	O K
480 min Winter	0.603	0.603	0.7	0.0	0.7	8.8	O K
600 min Winter	0.560	0.560	0.7	0.0	0.7	8.2	O K
720 min Winter	0.520	0.520	0.7	0.0	0.7	7.6	O K
960 min Winter	0.448	0.448	0.6	0.0	0.6	6.5	O K
1440 min Winter	0.340	0.340	0.6	0.0	0.6	5.0	O K
2160 min Winter	0.236	0.236	0.5	0.0	0.5	3.5	O K
2880 min Winter	0.174	0.174	0.4	0.0	0.4	2.5	O K
4320 min Winter	0.106	0.106	0.3	0.0	0.3	1.5	O K
5760 min Winter	0.073	0.073	0.2	0.0	0.2	1.1	O K
7200 min Winter	0.055	0.055	0.2	0.0	0.2	0.8	O K
8640 min Winter	0.044	0.044	0.2	0.0	0.2	0.6	O K
10080 min Winter	0.036	0.036	0.2	0.0	0.2	0.5	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)		
60 min Winter	53.779	0.0	10.8	0.0	60		
120 min Winter	33.482	0.0	13.5	0.0	112		
180 min Winter	24.992	0.0	15.1	0.0	140		
240 min Winter	20.158	0.0	16.2	0.0	178		
360 min Winter	14.857	0.0	18.0	0.0	254		
480 min Winter	11.957	0.0	19.3	0.0	326		
600 min Winter	10.095	0.0	20.3	0.0	398		
720 min Winter	8.786	0.0	21.2	0.0	466		
960 min Winter	7.050	0.0	22.7	0.0	598		
1440 min Winter	5.159	0.0	25.0	0.0	852		
2160 min Winter	3.767	0.0	27.3	0.0	1216		
2880 min Winter	3.009	0.0	29.1	0.0	1584		
4320 min Winter	2.189	0.0	31.8	0.0	2288		
5760 min Winter	1.744	0.0	33.7	0.0	3000		
7200 min Winter	1.462	0.0	35.4	0.0	3680		
8640 min Winter	1.267	0.0	36.8	0.0	4408		
10080 min Winter	1.123	0.0	38.0	0.0	5080		
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Rainwater Harvesting Ltd		Page 3																																	
Unit A Harrier Park Orton Southgate Peterborough PE2 6YQ																																			
Date 09/10/2020 08:54 File IMW S36 8WZ Millstones ...	Designed by RainWater Harves... Checked by																																		
XP Solutions		Source Control 2016.1																																	
<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.000</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.341</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.024 <table> <tr> <th colspan="2">Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To:</th> <th>(ha)</th> </tr> <tr> <td>0</td> <td>4</td> <td>0.024</td> </tr> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	19.000	Shortest Storm (mins)	15	Ratio R	0.341	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)		Area	From:	To:	(ha)	0	4	0.024
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Date 09/10/2020 08:54	Designed by RainWater Harves...	
File IMW S36 8WZ Millstones ...	Checked by	
XP Solutions		Source Control 2016.1

Model Details

Storage is Online Cover Level (m) 1.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	14.6	0.825	14.6	0.826	0.0

Orifice Outflow Control

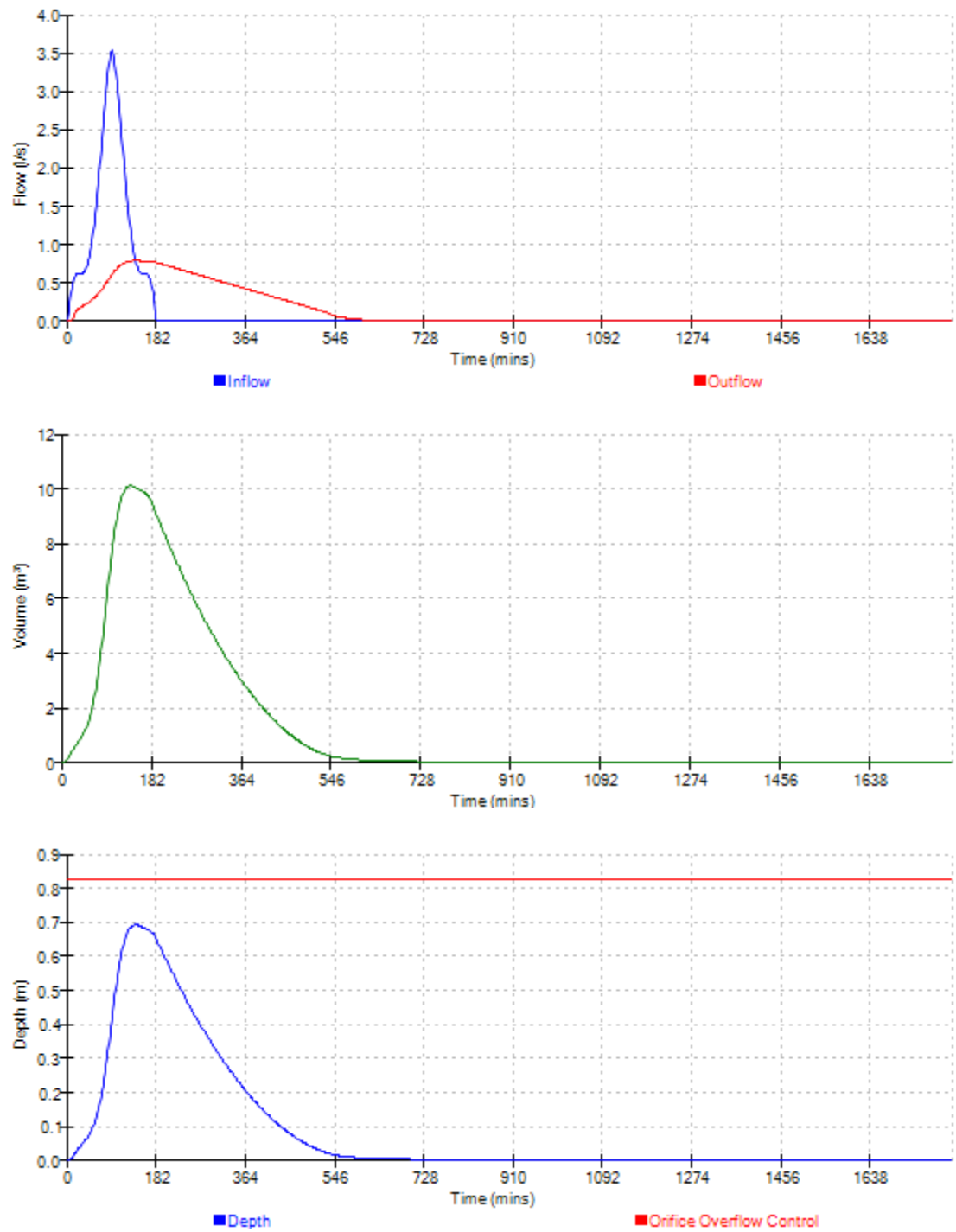
Diameter (m) 0.017 Discharge Coefficient 0.950 Invert Level (m) 0.000

Orifice Overflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 0.824

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Event: 180 min Winter





UNIT 5

Rainwater Harvesting Ltd							Page 1
Unit A Harrier Park Orton Southgate Peterborough PE2 6YQ							
Date 09/10/2020 08:58 File IMW S36 8WZ Millstones ...			Designed by RainWater Harves... Checked by				
XP Solutions			Source Control 2016.1				
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	0.343	0.343	0.5	0.0	0.5	5.0	O K
30 min Summer	0.447	0.447	0.6	0.0	0.6	6.5	O K
60 min Summer	0.537	0.537	0.6	0.0	0.6	7.8	O K
120 min Summer	0.590	0.590	0.6	0.0	0.6	8.6	O K
180 min Summer	0.603	0.603	0.7	0.0	0.7	8.8	O K
240 min Summer	0.601	0.601	0.7	0.0	0.7	8.8	O K
360 min Summer	0.585	0.585	0.6	0.0	0.6	8.5	O K
480 min Summer	0.561	0.561	0.6	0.0	0.6	8.2	O K
600 min Summer	0.536	0.536	0.6	0.0	0.6	7.8	O K
720 min Summer	0.511	0.511	0.6	0.0	0.6	7.5	O K
960 min Summer	0.465	0.465	0.6	0.0	0.6	6.8	O K
1440 min Summer	0.387	0.387	0.5	0.0	0.5	5.7	O K
2160 min Summer	0.304	0.304	0.5	0.0	0.5	4.4	O K
2880 min Summer	0.245	0.245	0.4	0.0	0.4	3.6	O K
4320 min Summer	0.170	0.170	0.3	0.0	0.3	2.5	O K
5760 min Summer	0.126	0.126	0.3	0.0	0.3	1.8	O K
7200 min Summer	0.098	0.098	0.3	0.0	0.3	1.4	O K
8640 min Summer	0.079	0.079	0.2	0.0	0.2	1.2	O K
10080 min Summer	0.066	0.066	0.2	0.0	0.2	1.0	O K
15 min Winter	0.386	0.386	0.5	0.0	0.5	5.6	O K
30 min Winter	0.504	0.504	0.6	0.0	0.6	7.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)		
15 min Summer	123.501	0.0	5.3	0.0	18		
30 min Summer	83.397	0.0	7.2	0.0	32		
60 min Summer	53.779	0.0	9.3	0.0	62		
120 min Summer	33.482	0.0	11.5	0.0	104		
180 min Summer	24.992	0.0	12.9	0.0	136		
240 min Summer	20.158	0.0	13.9	0.0	170		
360 min Summer	14.857	0.0	15.4	0.0	238		
480 min Summer	11.957	0.0	16.5	0.0	306		
600 min Summer	10.095	0.0	17.4	0.0	374		
720 min Summer	8.786	0.0	18.2	0.0	442		
960 min Summer	7.050	0.0	19.4	0.0	576		
1440 min Summer	5.159	0.0	21.4	0.0	824		
2160 min Summer	3.767	0.0	23.4	0.0	1192		
2880 min Summer	3.009	0.0	24.9	0.0	1556		
4320 min Summer	2.189	0.0	27.2	0.0	2288		
5760 min Summer	1.744	0.0	28.9	0.0	3000		
7200 min Summer	1.462	0.0	30.3	0.0	3680		
8640 min Summer	1.267	0.0	31.5	0.0	4408		
10080 min Summer	1.123	0.0	32.5	0.0	5144		
15 min Winter	123.501	0.0	6.0	0.0	18		
30 min Winter	83.397	0.0	8.0	0.0	32		
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Unit A Harrier Park Orton Southgate Peterborough PE2 6YQ							
Date 09/10/2020 08:58 File IMW S36 8WZ Millstones ...			Designed by RainWater Harves... Checked by				
XP Solutions			Source Control 2016.1				
Summary of Results for 100 year Return Period (+40%)							
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
60 min Winter	0.610	0.610	0.7	0.0	0.7	8.9	O K
120 min Winter	0.674	0.674	0.7	0.0	0.7	9.8	O K
180 min Winter	0.684	0.684	0.7	0.0	0.7	10.0	O K
240 min Winter	0.678	0.678	0.7	0.0	0.7	9.9	O K
360 min Winter	0.649	0.649	0.7	0.0	0.7	9.5	O K
480 min Winter	0.613	0.613	0.7	0.0	0.7	8.9	O K
600 min Winter	0.574	0.574	0.6	0.0	0.6	8.4	O K
720 min Winter	0.537	0.537	0.6	0.0	0.6	7.8	O K
960 min Winter	0.469	0.469	0.6	0.0	0.6	6.9	O K
1440 min Winter	0.364	0.364	0.5	0.0	0.5	5.3	O K
2160 min Winter	0.259	0.259	0.4	0.0	0.4	3.8	O K
2880 min Winter	0.193	0.193	0.4	0.0	0.4	2.8	O K
4320 min Winter	0.119	0.119	0.3	0.0	0.3	1.7	O K
5760 min Winter	0.082	0.082	0.2	0.0	0.2	1.2	O K
7200 min Winter	0.062	0.062	0.2	0.0	0.2	0.9	O K
8640 min Winter	0.049	0.049	0.2	0.0	0.2	0.7	O K
10080 min Winter	0.040	0.040	0.2	0.0	0.2	0.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)		
60 min Winter	53.779	0.0	10.4	0.0	60		
120 min Winter	33.482	0.0	12.9	0.0	114		
180 min Winter	24.992	0.0	14.5	0.0	142		
240 min Winter	20.158	0.0	15.6	0.0	182		
360 min Winter	14.857	0.0	17.2	0.0	258		
480 min Winter	11.957	0.0	18.5	0.0	332		
600 min Winter	10.095	0.0	19.5	0.0	404		
720 min Winter	8.786	0.0	20.4	0.0	472		
960 min Winter	7.050	0.0	21.8	0.0	608		
1440 min Winter	5.159	0.0	23.9	0.0	866		
2160 min Winter	3.767	0.0	26.2	0.0	1236		
2880 min Winter	3.009	0.0	27.9	0.0	1588		
4320 min Winter	2.189	0.0	30.4	0.0	2292		
5760 min Winter	1.744	0.0	32.3	0.0	3000		
7200 min Winter	1.462	0.0	33.9	0.0	3744		
8640 min Winter	1.267	0.0	35.2	0.0	4408		
10080 min Winter	1.123	0.0	36.4	0.0	5144		
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Unit A Harrier Park Orton Southgate Peterborough PE2 6YQ		
Date 09/10/2020 08:58	Designed by RainWater Harves...	
File IMW S36 8WZ Millstones ...	Checked by	
XP Solutions		Source Control 2016.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.341	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.023

Time (mins)	Area
From:	To: (ha)
0	4 0.023

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Unit A Harrier Park Orton Southgate Peterborough PE2 6YQ		
Date 09/10/2020 08:58	Designed by RainWater Harves...	
File IMW S36 8WZ Millstones ...	Checked by	
XP Solutions		Source Control 2016.1

Model Details

Storage is Online Cover Level (m) 1.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	14.6	0.825	14.6	0.826	0.0

Orifice Outflow Control

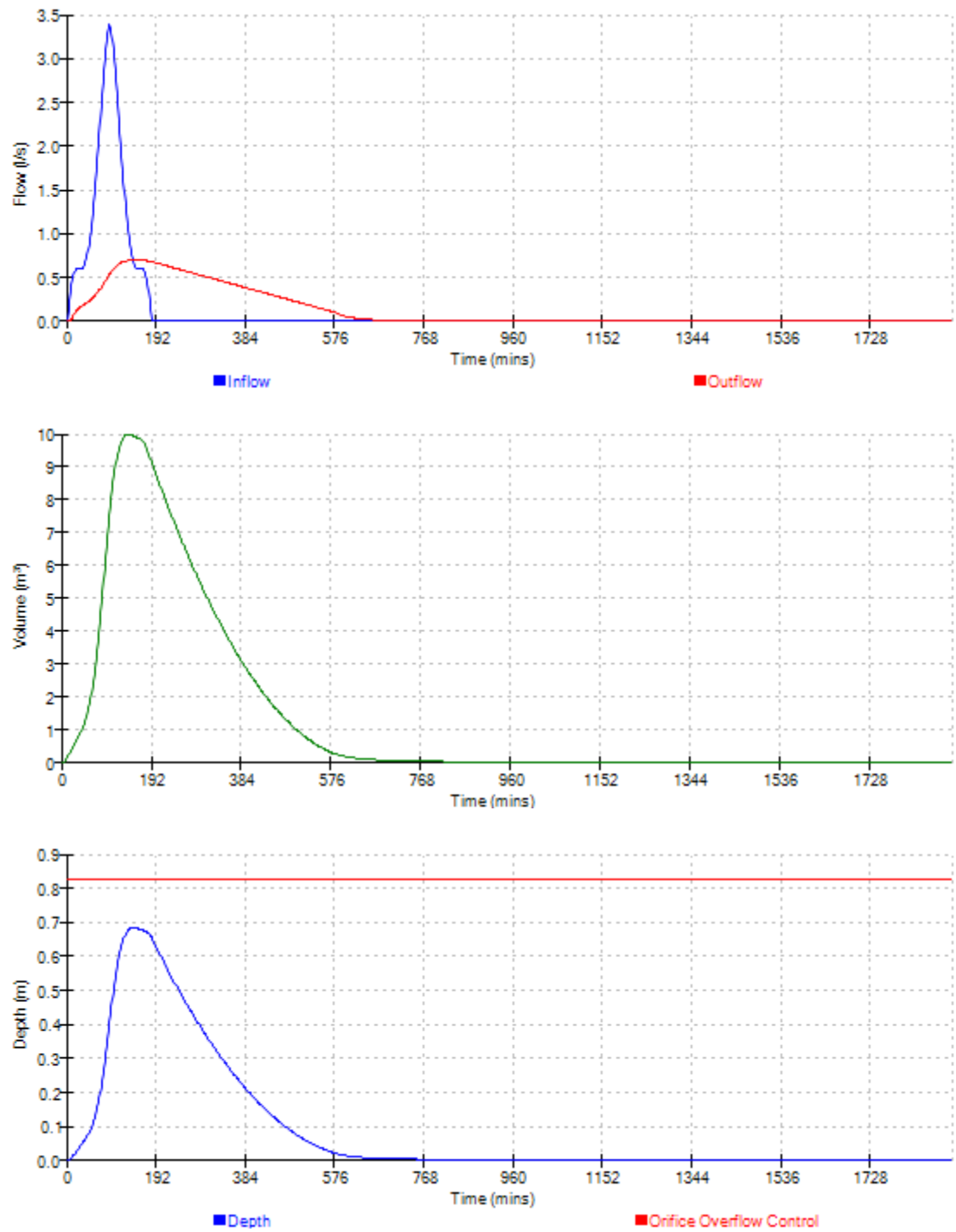
Diameter (m) 0.016 Discharge Coefficient 0.950 Invert Level (m) 0.000

Orifice Overflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 0.824

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Event: 180 min Winter



Rain Activ maintenance schedule.

Filter: *Warranty 2 years. Expected service life 100 years.*

Self cleaning filter with 1000 micron screen.

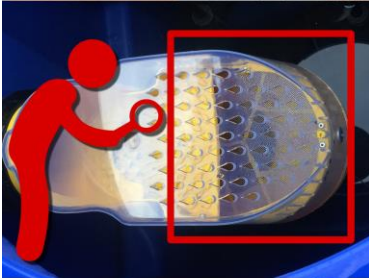
Every 6 months. Visually check the filter for larger blockages.

1. Release child locks on the lid. (13mm bolt).



2. Inspect filter for visible large blockage.

If large or non moving debris is found refer to stage 3. If none is found refer to stage 6.



NB: Small debris will be periodically self cleaned during storms. Leaves, moss and other smaller debris will self clean and do not require removing unless obvious they are causing a blockage.

3. (If a blockage has been found) Remove filter lid.



4. Remove debris, wash filter head under a tap.



5. Replace filter head.



6. Replace lid, ensure 13mm child safe locks are tight.



Risk if neglected: Very low, possible reduction of filter efficiency. Reduction in quality of water for rainwater harvesting.

NB: the filter is fully self cleaning under normal conditions. Only abnormal or large debris from gutters can cause a blockage.

Maintenance frequency can be reduced by adding additional leaf and debris guards to gutters. Dependant on the quality of guarding and location, maintenance intervals can be reduced to 12, 18, or 24 months.

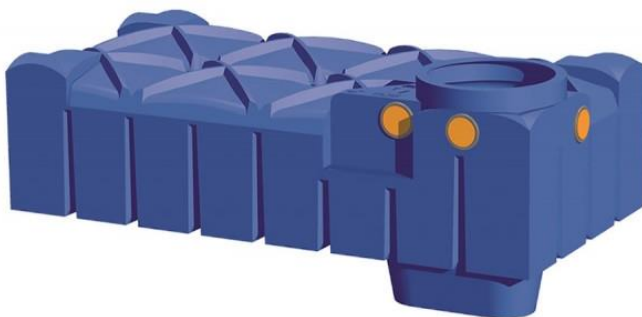
Examples of gutter guarding systems.



F-Line Tank. *Warranty 25 years. Expected service life 100 years.*

Every 10 years. Pump out completely and clean sidewalls with pressure washer, pump out using dirty water pump. (Around 0.5cm of very fine silt builds per year.)

Risk if missed: Low, potential reduction in water quality for rainwater harvesting. If missed multiple times (circa 50 years), potential blockage of outlet orifice.



Gutters: N/A

Clean every 10 years to reduce strain on self cleaning filter. Remove all leaf matter, moss, debris. Wash through.

Risk if missed: Very low, increased fine sediment entering the tank.