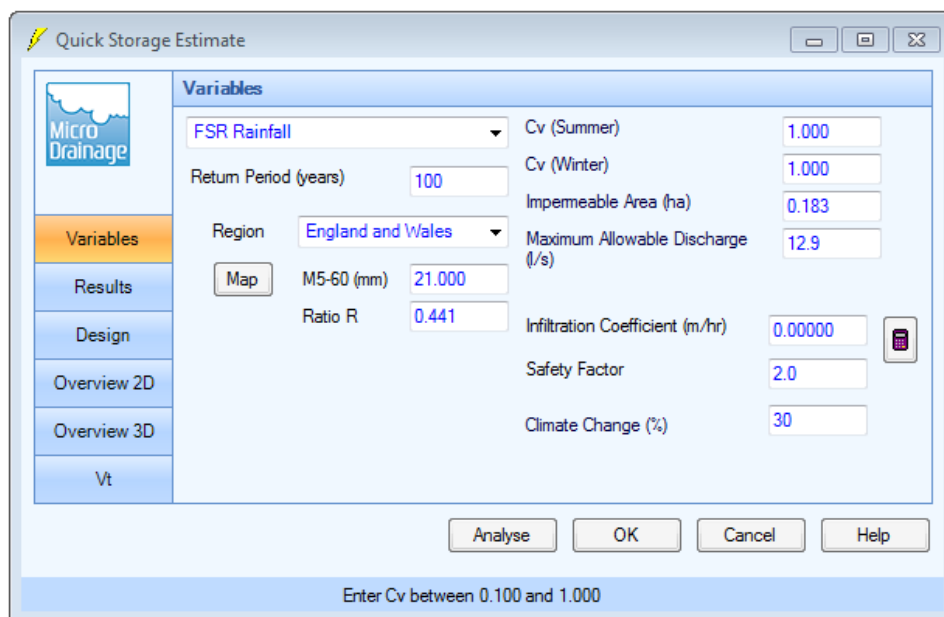
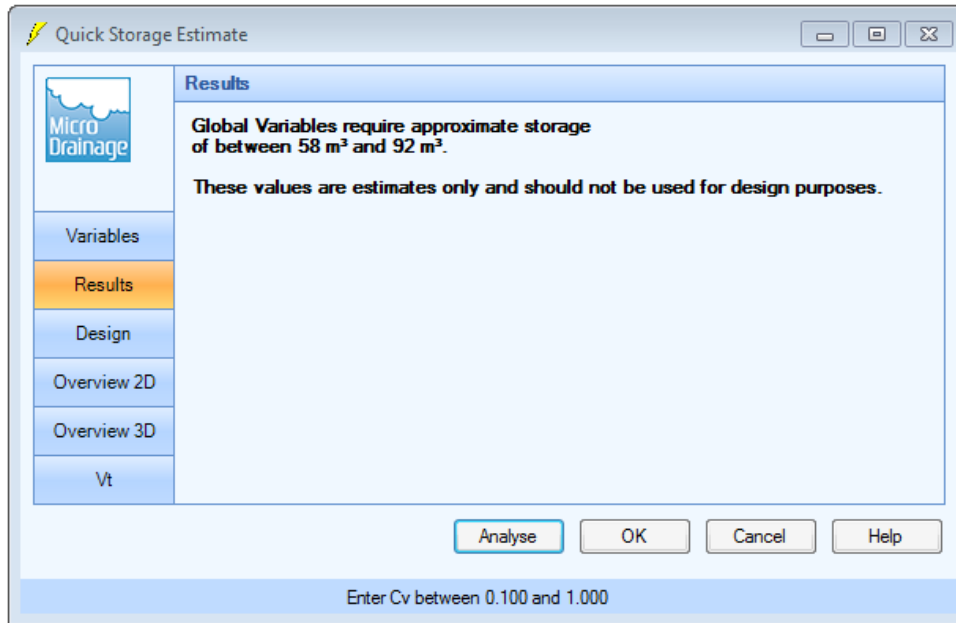



Appendix F

Drainage Calculations



Quick Storage Estimate Calculations (Windes, 2015)

1. Greenfield Runoff rates and volumes

Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 14:40 File ATTENUATION.SRCX	Designed by anna.wilk Checked by	
XP Solutions	Source Control 2015.1	

ICP SUDS Mean Annual Flood

Input


Return Period (years)	100	Soil	0.450
Area (ha)	0.185	Urban	0.750
SAAR (mm)	609	Region Number	Region 6

Results 1/s

QBAR Rural 0.7
QBAR Urban 2.0

Q100 years 4.0

Q1 year 1.7
Q30 years 3.5
Q100 years 4.0

Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 14:05 File	Designed by anna.wilk Checked by	
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Greenfield Runoff Volume

FSR Data

Return Period (years)	10
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	21.000
Ratio R	0.441
Areal Reduction Factor	1.00
Area (ha)	0.185
SAAR (mm)	613
CWI	89.340
Urban	0.000
SPR	47.000

Results

Percentage Runoff (%)	38.09
Greenfield Runoff Volume (m ³)	26.906

1-5 Offord Street
Islington
London N1 1DH



Date 05/05/2016 14:02
File

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XP Solutions Source Control 2015.1


Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	21.000
Ratio R	0.441
Areal Reduction Factor	1.00
Area (ha)	0.185
SAAR (mm)	613
CWI	89.340
Urban	0.000
SPR	47.000

Results

Percentage Runoff (%)	42.09
Greenfield Runoff Volume (m ³)	48.853

Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 14:03 File	Designed by anna.wilk Checked by	
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Greenfield Runoff Volume


FSR Data

Return Period (years)	30
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	21.000
Ratio R	0.441
Areal Reduction Factor	1.00
Area (ha)	0.185
SAAR (mm)	613
CWI	89.340
Urban	0.000
SPR	47.000

Results

Percentage Runoff (%)	40.08
Greenfield Runoff Volume (m ³)	35.883


2. Existing volumes

Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 15:28 File Proposed 1 year.srcx	Designed by anna.wilk Checked by	
XP Solutions	Source Control 2015.1	

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
360 min Summer	7.041	0.041	40.5	O K
360 min Winter	7.041	0.041	40.5	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Summer	3.652	0.0	368
360 min Winter	3.652	0.0	368

Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 15:29 File Proposed 1 year.srcx	Designed by anna.wilk Checked by	
XP Solutions		Source Control 2015.1

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
360 min Summer	7.089	0.089	89.3	O K
360 min Winter	7.089	0.089	89.3	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Summer	8.045	0.0	368
360 min Winter	8.045	0.0	368

Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 15:30 File Proposed 1 year.srcx	Designed by anna.wilk Checked by	
XP Solutions		Source Control 2015.1

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
360 min Summer	7.116	0.116	115.8	O K
360 min Winter	7.116	0.116	115.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Summer	10.430	0.0	368
360 min Winter	10.430	0.0	368


Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 15:33 File Proposed 1 year.srcx	Designed by anna.wilk Checked by	
XP Solutions		Source Control 2015.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
360 min Summer	7.151	0.151	150.5	O K
360 min Winter	7.151	0.151	150.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Summer	13.559	0.0	368
360 min Winter	13.559	0.0	368


3. Proposed volumes

Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 15:34 File Proposed 1 year.srcx	Designed by anna.wilk Checked by	
XP Solutions	Source Control 2015.1	

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
360 min Summer	7.040	0.040	40.1	O K
360 min Winter	7.040	0.040	40.1	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Summer	3.652	0.0	368
360 min Winter	3.652	0.0	368

Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 15:35 File Proposed 1 year.srcx	Designed by anna.wilk Checked by	
XP Solutions		Source Control 2015.1

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
360 min Summer	7.088	0.088	88.3	O K
360 min Winter	7.088	0.088	88.3	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Summer	8.045	0.0	368
360 min Winter	8.045	0.0	368

Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 15:36 File Proposed 1 year.srcx	Designed by anna.wilk Checked by	
XP Solutions	Source Control 2015.1	

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
360 min Summer	7.115	0.115	114.5	O K
360 min Winter	7.115	0.115	114.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Summer	10.430	0.0	368
360 min Winter	10.430	0.0	368


Conisbee		Page 1
1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 15:37 File Proposed 1 year.srcx	Designed by anna.wilk Checked by	
XP Solutions		Source Control 2015.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m³)	Status
360 min Summer	7.149	0.149	148.9	O K
360 min Winter	7.149	0.149	148.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
360 min Summer	13.559	0.0	368
360 min Winter	13.559	0.0	368


4. Attenuation Volume required for 100 year + 30 % Climate change.

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1-5 Offord Street Islington London N1 1DH		
Date 05/05/2016 15:07 File attenuation tank.frrx.srcx	Designed by anna.wilk Checked by	
XP Solutions		Source Control 2015.1

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	7.921	0.921	11.7	50.6	O K
30 min Summer	8.118	1.118	12.4	61.5	O K
60 min Summer	8.189	1.189	12.8	65.4	O K
120 min Summer	8.141	1.141	12.6	62.7	O K
180 min Summer	8.048	1.048	12.1	57.6	O K
240 min Summer	7.949	0.949	11.7	52.2	O K
360 min Summer	7.765	0.765	11.7	42.1	O K
480 min Summer	7.594	0.594	11.7	32.6	O K
600 min Summer	7.441	0.441	11.7	24.3	O K
720 min Summer	7.334	0.334	11.7	18.4	O K
960 min Summer	7.230	0.230	11.1	12.6	O K
1440 min Summer	7.164	0.164	8.6	9.0	O K
2160 min Summer	7.125	0.125	6.3	6.9	O K
2880 min Summer	7.105	0.105	5.0	5.8	O K
4320 min Summer	7.084	0.084	3.7	4.6	O K
5760 min Summer	7.071	0.071	2.9	3.9	O K
7200 min Summer	7.063	0.063	2.4	3.5	O K
8640 min Summer	7.058	0.058	2.1	3.2	O K
10080 min Summer	7.053	0.053	1.8	2.9	O K
15 min Winter	7.920	0.920	11.7	50.6	O K
30 min Winter	8.120	1.120	12.5	61.6	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	131.747	0.0	60.2	19
30 min Summer	86.035	0.0	78.7	32
60 min Summer	53.473	0.0	97.8	52
120 min Summer	32.095	0.0	117.5	86
180 min Summer	23.491	0.0	129.0	120
240 min Summer	18.714	0.0	137.0	154
360 min Summer	13.559	0.0	148.9	220
480 min Summer	10.785	0.0	157.9	282
600 min Summer	9.024	0.0	165.1	338
720 min Summer	7.797	0.0	171.2	390
960 min Summer	6.187	0.0	181.1	500
1440 min Summer	4.459	0.0	195.8	736
2160 min Summer	3.209	0.0	211.4	1100
2880 min Summer	2.539	0.0	223.0	1468
4320 min Summer	1.822	0.0	240.0	2196
5760 min Summer	1.439	0.0	252.7	2880
7200 min Summer	1.197	0.0	262.9	3608
8640 min Summer	1.030	0.0	271.4	4368
10080 min Summer	0.907	0.0	278.7	5024
15 min Winter	131.747	0.0	60.2	19
30 min Winter	86.035	0.0	78.7	32

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1-5 Offord Street Islington London N1 1DH		
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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	8.188	1.188	12.8	65.3	O K
120 min Winter	8.107	1.107	12.4	60.9	O K
180 min Winter	7.970	0.970	11.7	53.4	O K
240 min Winter	7.824	0.824	11.7	45.3	O K
360 min Winter	7.534	0.534	11.7	29.4	O K
480 min Winter	7.314	0.314	11.7	17.3	O K
600 min Winter	7.224	0.224	11.0	12.3	O K
720 min Winter	7.187	0.187	9.8	10.3	O K
960 min Winter	7.150	0.150	7.9	8.3	O K
1440 min Winter	7.115	0.115	5.7	6.4	O K
2160 min Winter	7.091	0.091	4.1	5.0	O K
2880 min Winter	7.078	0.078	3.3	4.3	O K
4320 min Winter	7.063	0.063	2.4	3.4	O K
5760 min Winter	7.054	0.054	1.9	3.0	O K
7200 min Winter	7.048	0.048	1.6	2.6	O K
8640 min Winter	7.044	0.044	1.3	2.4	O K
10080 min Winter	7.040	0.040	1.2	2.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	53.473	0.0	97.8	54
120 min Winter	32.095	0.0	117.5	90
180 min Winter	23.491	0.0	128.9	128
240 min Winter	18.714	0.0	137.0	164
360 min Winter	13.559	0.0	148.9	230
480 min Winter	10.785	0.0	157.9	276
600 min Winter	9.024	0.0	165.1	324
720 min Winter	7.797	0.0	171.2	380
960 min Winter	6.187	0.0	181.1	496
1440 min Winter	4.459	0.0	195.8	738
2160 min Winter	3.209	0.0	211.4	1096
2880 min Winter	2.539	0.0	223.0	1460
4320 min Winter	1.822	0.0	240.0	2200
5760 min Winter	1.439	0.0	252.7	2864
7200 min Winter	1.197	0.0	262.9	3664
8640 min Winter	1.030	0.0	271.4	4336
10080 min Winter	0.907	0.0	278.7	5136

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1-5 Offord Street Islington London N1 1DH		
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	20.300	Shortest Storm (mins)	15
Ratio R	0.412	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.183

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.100	4	8	0.083

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1-5 Offord Street Islington London N1 1DH		
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XP Solutions		Source Control 2015.1

Model Details

Storage is Online Cover Level (m) 10.000

Tank or Pond Structure

Invert Level (m) 7.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	55.0	2.800	0.0	5.600	0.0	8.400	0.0
0.400	55.0	3.200	0.0	6.000	0.0	8.800	0.0
0.800	55.0	3.600	0.0	6.400	0.0	9.200	0.0
1.200	55.0	4.000	0.0	6.800	0.0	9.600	0.0
1.600	0.0	4.400	0.0	7.200	0.0	10.000	0.0
2.000	0.0	4.800	0.0	7.600	0.0		
2.400	0.0	5.200	0.0	8.000	0.0		

Hydro-Brake® Outflow Control

Design Head (m) 1.200 Hydro-Brake® Type Md6 SW Only Invert Level (m) 7.000
Design Flow (l/s) 12.9 Diameter (mm) 143

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.7	1.200	12.8	3.000	20.2	7.000	30.9
0.200	10.3	1.400	13.8	3.500	21.8	7.500	32.0
0.300	11.6	1.600	14.8	4.000	23.3	8.000	33.0
0.400	11.4	1.800	15.7	4.500	24.7	8.500	34.0
0.500	11.0	2.000	16.5	5.000	26.1	9.000	35.0
0.600	10.7	2.200	17.3	5.500	27.4	9.500	36.0
0.800	11.0	2.400	18.1	6.000	28.6		
1.000	11.9	2.600	18.8	6.500	29.7		