

7. Appendices

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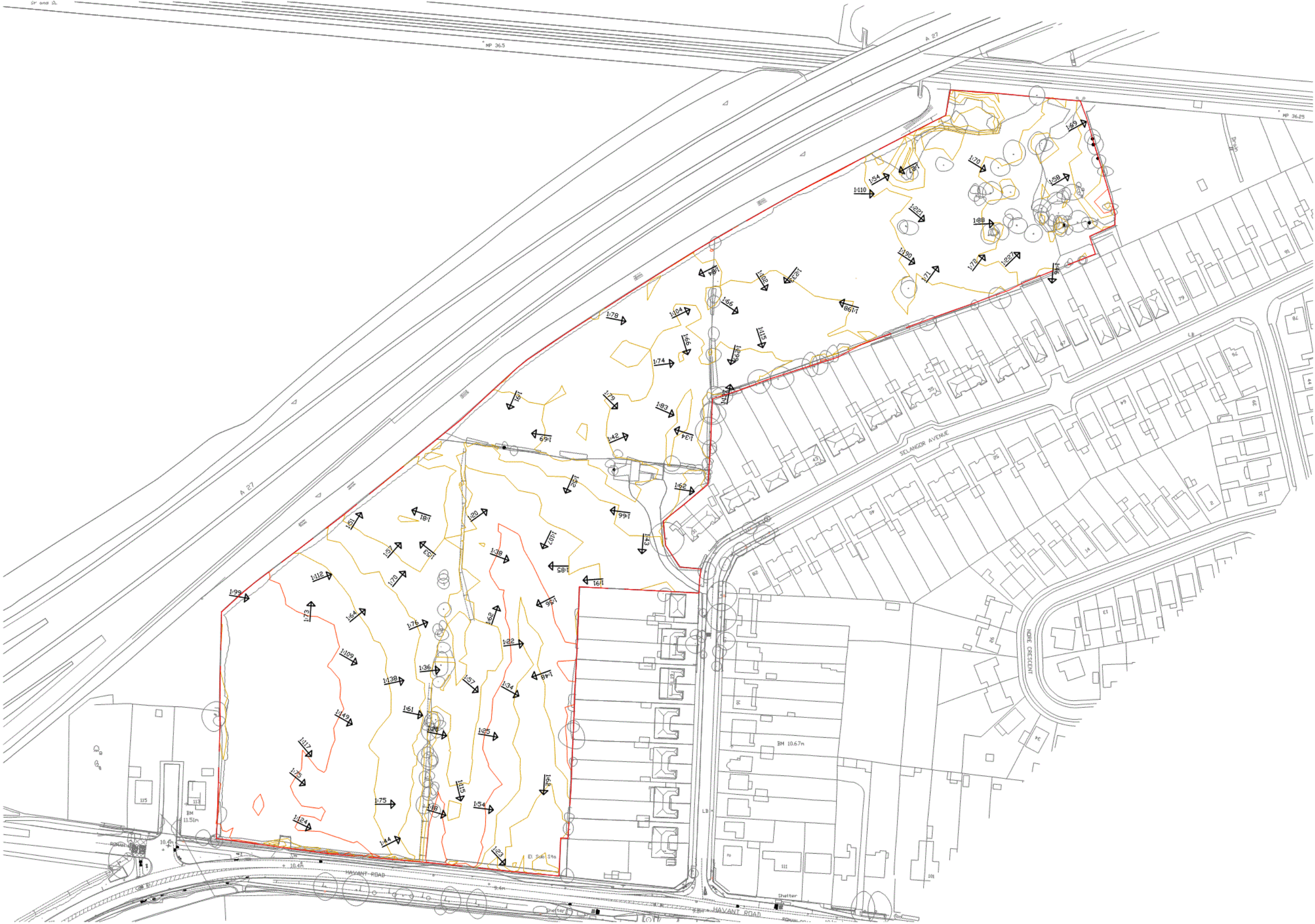
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Appendix 1 - Existing Gradient Variation across Site



Appendix 2 - Current Site Photographs

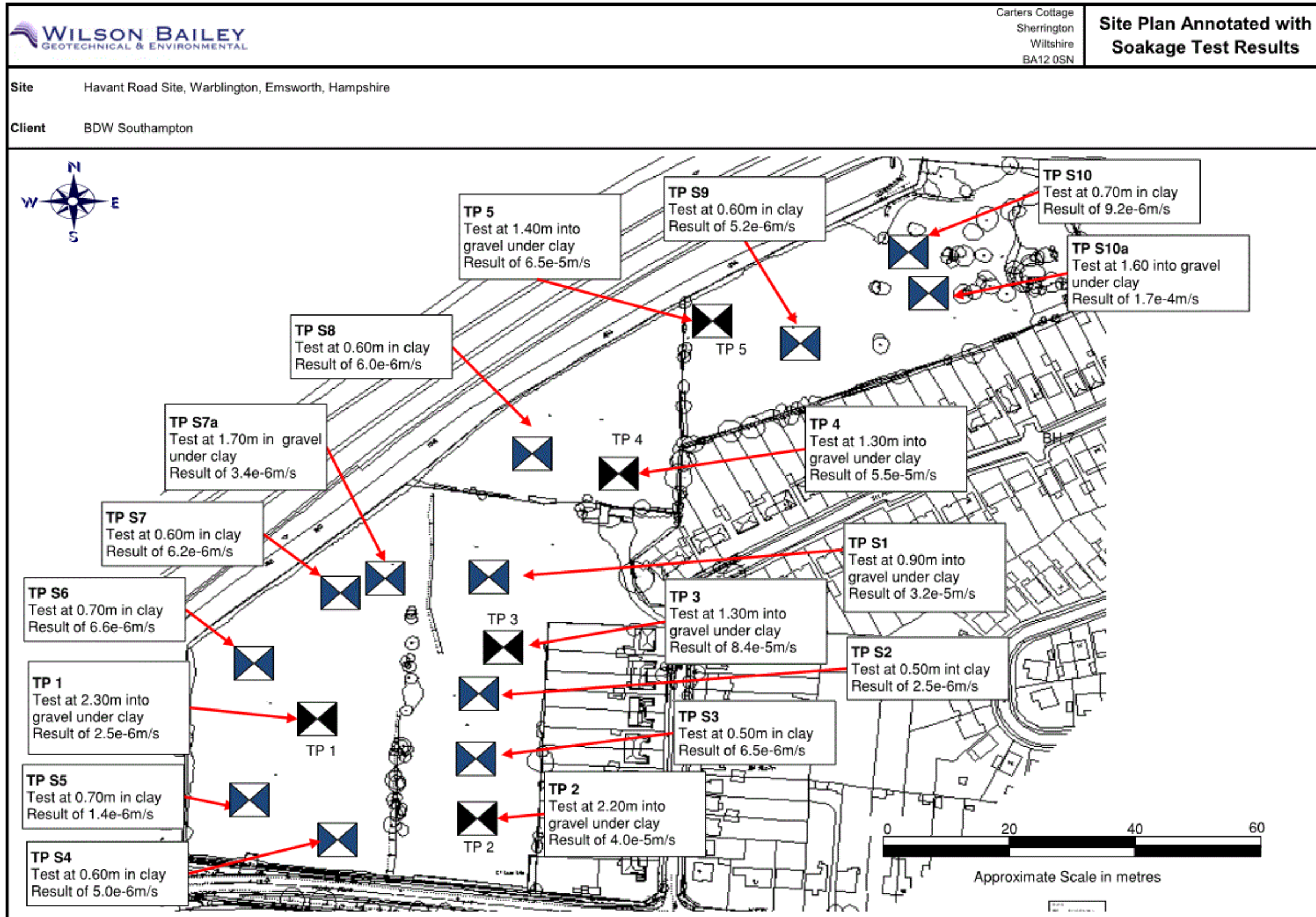
Current entrance to the site (looking towards Selangor Road):



Full site view looking northwest from current site entrance:



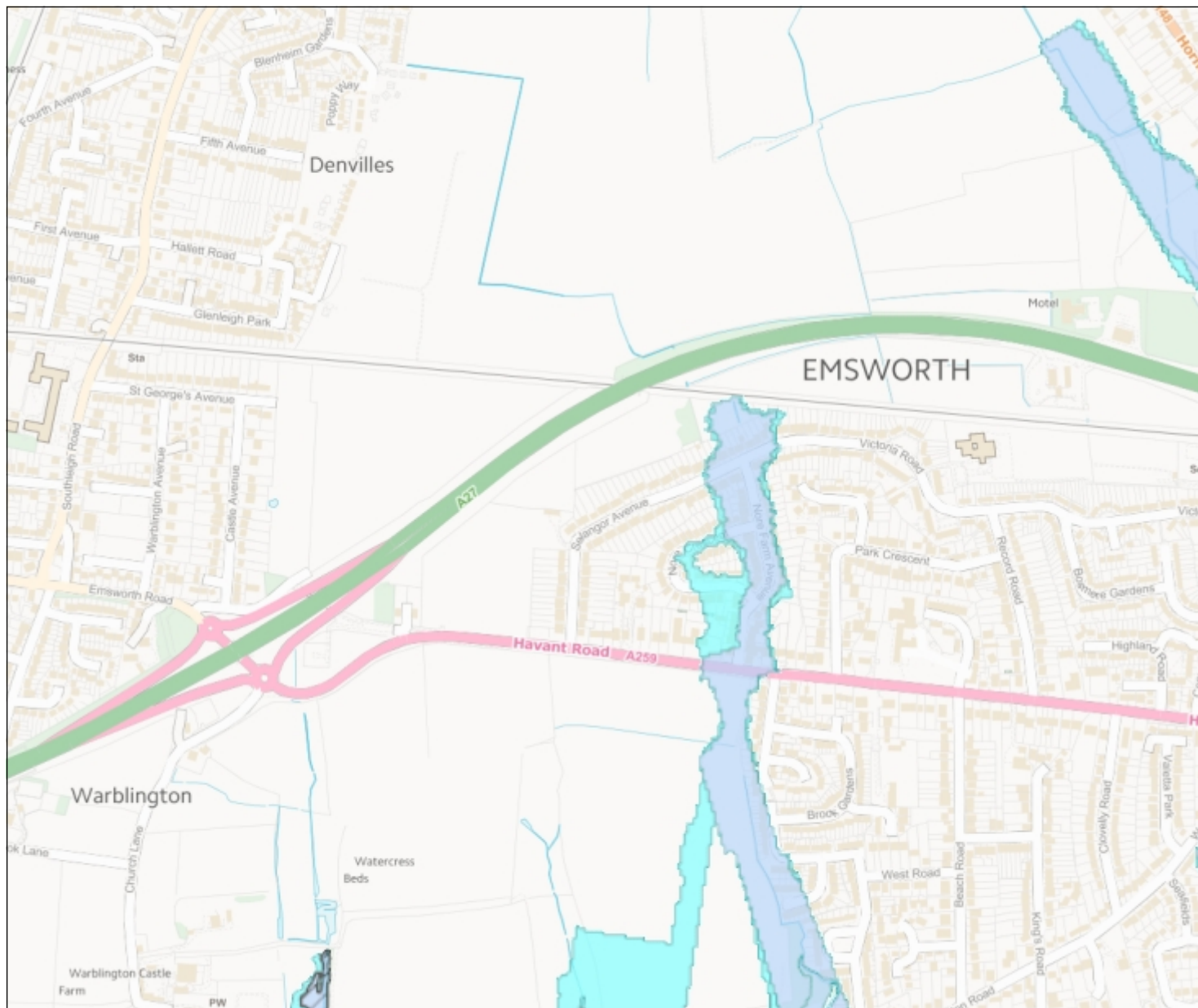
Appendix 3 - Results of Soakage Tests undertaken July 2016



J11145 Site Plan (2)

Appendix 4 – Environment Agency Product 4 Flood Risk Information

Flood Map for Planning (Rivers and Sea) Centered on Havant Road - Created 03 February 2016



Scale 1: 10,001



Flood Map for Planning (Rivers & Sea)

- Flood Map - Defences
- Area Benefitting from Flood Defences
- Flood Map - Flood Storage Area
- Flood Zone 3
- Flood Zone 2

Flood Map Areas (assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

Risk of flooding from Surface Water



Scale 1: 10,001



Likelihood of flooding from Surface Water

- High (1 in 30yr)
- Medium (1 in 100yr)
- Low (1 in 1000yr)
- Very Low

Likelihood of flooding from Surface Water

- High:** Greater than or equal to 1 in 30 (3.3%) chance in any given year
- Medium:** Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year
- Low:** Less than 1 in 100 (1%) but greater than or equal to 1 in 1,000 (0.1%) chance in any given year
- Very Low:** Less than 1 in 1,000 (0.1%) chance in any given year

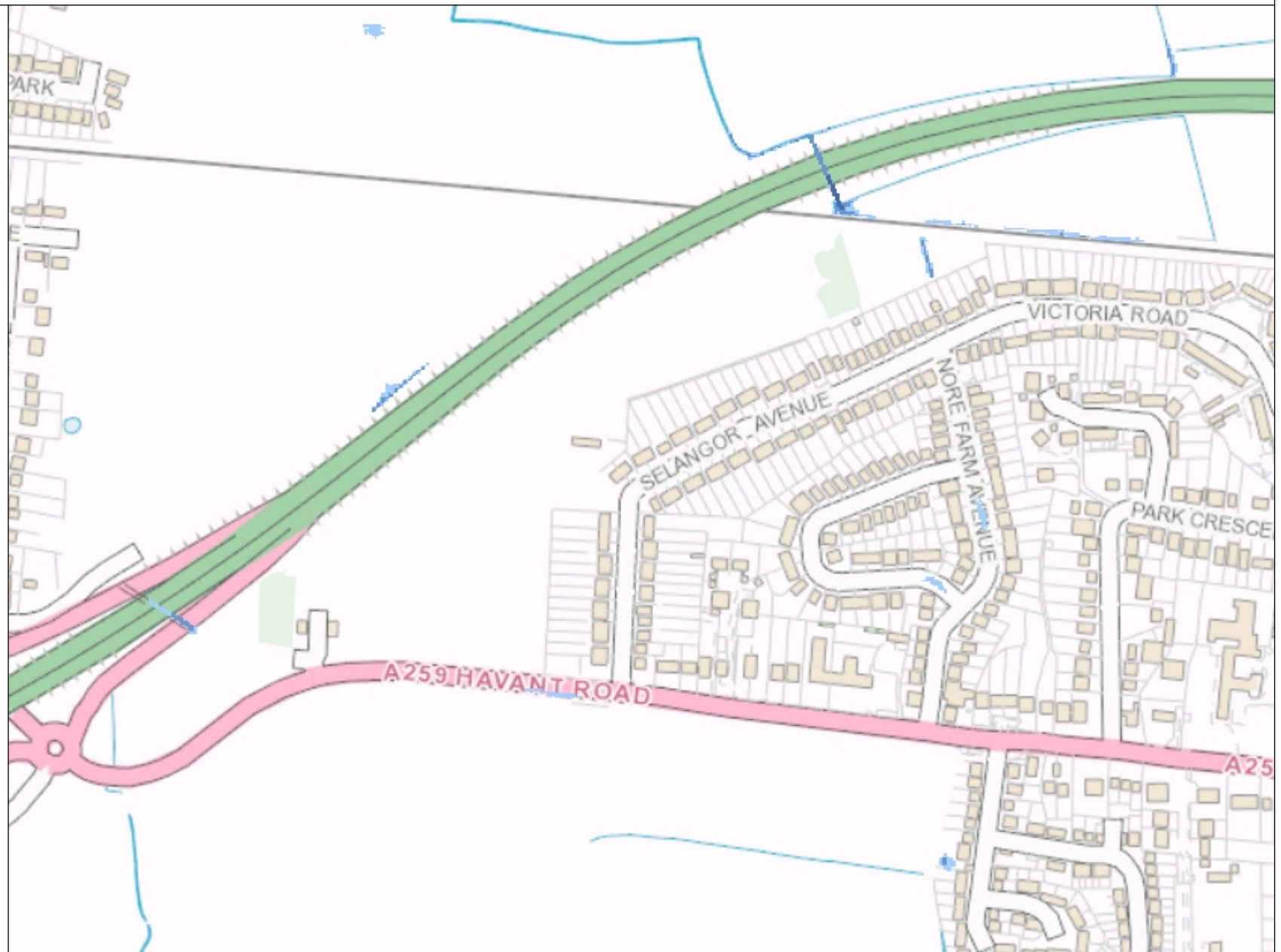
This information is shown on the Risk of Flooding from Surface Water map on our website.

Surface Water Depths Centered on Havant Road - Created 03 February 2016

Legend

Flood Depth 1 in 30

- Below 150mm
- 150-300mm
- 300-600mm
- 600-900mm
- 900-1200mm
- Over 1200mm



0 50 100 150
Metres

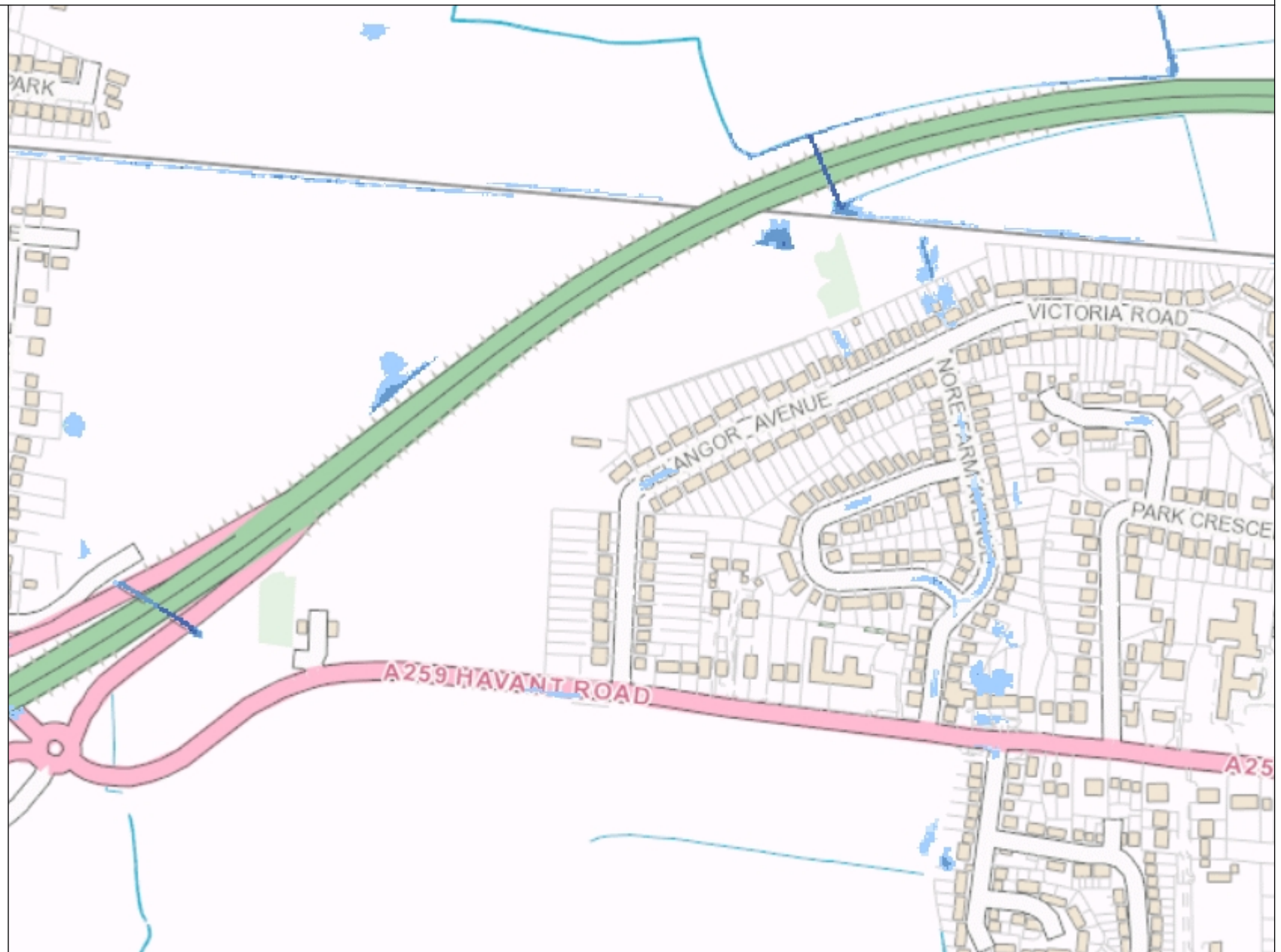


Surface Water Depths Centered on Havant Road - Created 03 February 2016

Legend

Flood Depth 1 in 100

- Below 150mm
- 150-300mm
- 300-600mm
- 600-900mm
- 900-1200mm
- Over 1200mm



0 50 100 150
Metres

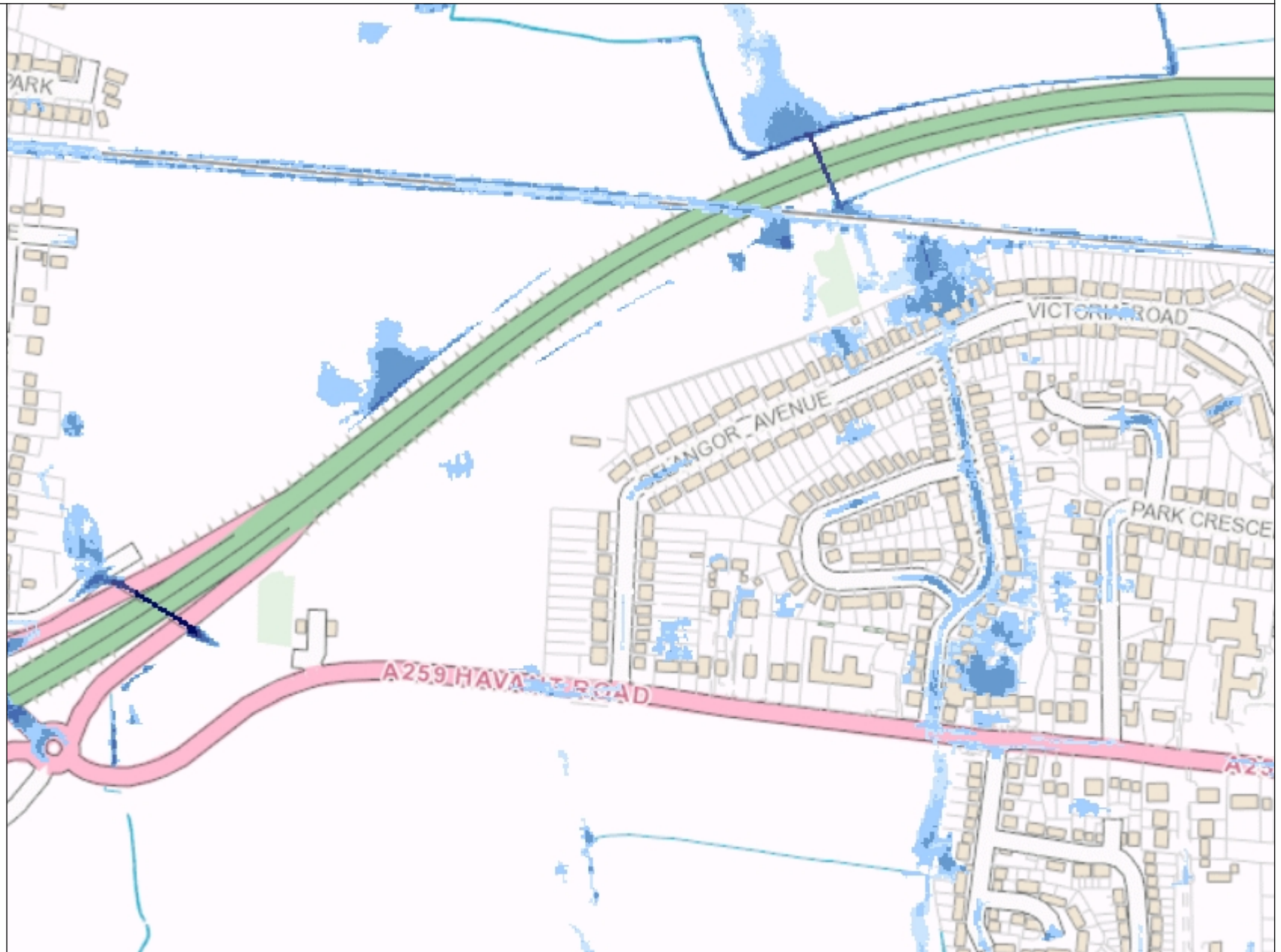


Surface Water Depths Centered on Havant Road - Created 03 February 2016

Legend

Flood Depth 1 in 1000

- Below 150mm
- 150-300mm
- 300-600mm
- 600-900mm
- 900-1200mm
- Over 1200mm



0 50 100 150
Metres



Appendix 5 – Flood Risk and Drainage Policy Review

National Planning Policy Framework

The Government's national policy on Development and Flood Risk is covered by the National Planning Policy Framework March 2012 and its associated Technical Guidance. The principal aim of the NPPF for flood risk is:

"Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere."

The Technical Guidance to the NPPF March 2012 sets out the sequential approach to development and flood risk and the responsibilities of key stakeholders in assessing flood risk. With regard to the sequential approach it states:

"The overall aim should be to steer new development to Flood Zone 1. Where there are no reasonably available sites in Flood Zone 1, local planning authorities allocating land in local plans or determining planning applications for development at any particular location should take into account the flood risk vulnerability of land uses (see table 2) and consider reasonably available sites in Flood Zone 2, applying the Exception Test if required (see table 3). Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required."

The tables relating to flood risk vulnerability classification and flood zone compatibility are included in Appendix 6 below.

Central Government Written Statement to Parliament on Sustainable Drainage Systems, 18 December 2014

In absence of implementation of Section 3 of the Flood and Water Management Act 2010 relating to National Standards, Approving Bodies and Mandatory Adoption for sustainable drainage the Secretary of State for Communities and Local Government has instructed Local Planning Authorities to ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate and that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

The new guidance took effect on 6 April 2015 and include all major development as defined by Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2010).

Havant Borough Core Strategy, March 2011

The Havant Borough Core Strategy is part of the borough's Local Development Framework [HBLDF] and sets an overall policy framework for all other local development documents. The Core Strategy was adopted on 1st March 2011 and as part of the HBLDF will guide the development of the borough until 2026.

Section 1.06 states: *"[The Core Strategy] contains strategic policies and some detailed development management policies against which individual planning applications will be assessed. When considering planning applications the council will consider all the policies contained in the Core Strategy that are relevant to the proposal."*

Policy CS15 Flood and Coastal Erosion Risk states:

“Development in areas at risk of flooding now and in the future as identified on the latest Environment Agency flood risk maps and Strategic Flood Risk Assessment climate change maps will only be permitted where:

- 1. It meets the sequential and exception test (where required) in relation to PPS25.*
- 2. The site is located in a low hazard area as defined in the Strategic Flood Risk Assessment.*
- 3. A site-specific flood risk assessment demonstrates that the development will be safe, including the access, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*
- 4. The scheme incorporates flood protection, flood resilience and resistance measures appropriate to the character and biodiversity of the area and the specific requirements of the site.*
- 5. Appropriate flood warning and evacuation plans are in place.*
- 6. New site drainage systems are designed taking account of events which exceed the normal design standard.*

All development will be required to ensure that there is no net increase in surface water run off. Priority should be given to incorporating Sustainable Drainage Systems (SuDS) to manage surface water drainage, unless it is proven that SuDS are not appropriate. Where SuDS are provided arrangements must be put in place for their whole life management and maintenance.

The council will work with partners to implement the Coastal Policy Zones in the North Solent Shoreline Management Plan to ensure that development avoids areas at risk from coastal erosion and coastal flooding and that areas required to offset coastal squeeze and prevent habitat fragmentation, to allow species to adapt to climate change, are identified and protected from development.”

Havant Borough Local Plan (Allocations), July 2014

The Allocations Plan was adopted on 23rd July 2014 and as part of the HBLDF will guide the development of the borough until 2026.

From Appendix 4 ‘Emsworth Policies Map’ the proposed site is not currently listed as a housing allocation.

PUSH Strategic Flood Risk Assessment, December 2007

The Strategic Flood Risk Assessment was produced for the Partnership for Urban South Hampshire.

Section 4.2.1 states: *“Output Package 1 [of the SFRA] is intended to assist in the application of the Sequential test, by providing information to guide decisions on location of future development in relation to areas of flood risk and, more specifically, the Flood Zones.”*

The above package has been consulted in this Flood Risk Assessment.

Emsworth Flood Risk Strategy Review, October 2015

The area surrounding the site is identified as being affected by flooding.

Section 1.2 states: *“Emsworth is one of the Borough’s few urban areas to suffer from flooding. The settlement is located on the coast and includes the Nore Farm Stream, the West Brook and the River Ems. Over recent years, extreme weather and high tides have resulted in a high frequency of flood events, which have affected local residents and businesses and caused considerable damage to*

properties. These flood events were caused by a combination of fluvial and tidal influences and principally affected Selangor Avenue, Victoria Road, North Street and Bridge Road in Emsworth.

The proposed alleviation schemes for Emsworth are mentioned and the Nore Farm Stream Flood Alleviation Scheme is highlighted – this has been taken into account in this Flood Risk Assessment.

North Solent Coastline Management Plan, December 2010

The North Solent Coastline Management Plan was completed on 16th December 2010 and assesses risks associated with coastal flooding and shoreline evolution at a large scale.

The site has no specific mention in the policy statement maps.

Appendix 6 – NPPF Technical Guidance Tables 2 & 3

Table 2: Flood Risk Vulnerability Classification

Essential Infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly Vulnerable • Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').
More Vulnerable • Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less Vulnerable

- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill* and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.

Water-Compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Table 3: Flood Risk Vulnerability and Flood Risk Zone ‘Compatibility’

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

Key:

✓ Development is appropriate

X Development should not be permitted.

Notes to table 3:

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

Appendix 7 – Greenfield Runoff and SuDS Storage Calculations

- Greenfield Runoff to IH 124
- SuDS Sizing
 - Car Park Permeable Paving Areas
 - Private Road Permeable Paving Areas
 - Typical Driveway Permeable Paving Area
 - Private Trench Soakaways Areas
 - Highway Dry Swale Areas

Cundall, Johnston & Partners		Page 1
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road Emsworth	
Date 05/05/16 File Greenfield runoff.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

IH 124 Mean Annual Flood

Input

Return Period (years)	1	Soil	0.400
Area (ha)	50.000	Urban	0.000
SAAR (mm)	700	Region Number	Region 7

Results l/s

QBAR Rural 170.1
QBAR Urban 170.1

Q1 year 144.6

Q1 year 144.6
Q2 years 149.9
Q5 years 217.7
Q10 years 275.6
Q20 years 340.8
Q25 years 365.4
Q30 years 385.5
Q50 years 445.7
Q100 years 542.7
Q200 years 637.9
Q250 years 668.6
Q1000 years 877.8

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SOAKAWAY REF	SOAKAWAY TYPE	TRIAL PIT REF	INFILTRATION RATE	DRAINED AREA (m ²)	SIZE (PLAN AREA)	STORAGE DEPTH	TOTAL DEPTH
Car Park A	Permeable Paving	TP S10	9.2e-6m/s	1341	592m ²	350mm	450mm
Car Park B	Permeable Paving	TP S9	5.2e-6m/s	743	403m ²	300mm	400mm
Car Park C	Permeable Paving	TP S9	5.2e-6m/s	339	174m ²	350mm	450mm
Car Park D	Permeable Paving	TP S9	5.2e-6m/s	232	126m ²	300mm	400mm
Car Park E	Permeable Paving	TP S9	5.2e-6m/s	855	341m ²	450mm	550mm
Car Park F	Permeable Paving	TP S8	6.0e-6m/s	1028	398m ²	450mm	550mm
Car Park G	Permeable Paving	TP S8	6.0e-6m/s	2574	1363m ²	300mm	400mm
Car Park H	Permeable Paving	TP S7	6.2e-6m/s	883	369m ²	400mm	500mm
Car Park I	Permeable Paving	TP S7	6.2e-6m/s	455	255m ²	300mm	400mm
Car Park J	Permeable Paving	TP S7	6.2e-6m/s	995	474m ²	400mm	500mm
Car Park K	Permeable Paving	TP S4	5.0e-6m/s	644	292m ²	400mm	500mm
Car Park A1	Permeable Paving	TPS10	9.2e-6m/s	248	99m ²	400mm	500mm
Private Road 1	Permeable Paving	TP S9	5.2e-6m/s	2053	1857m ²	300mm	400mm
Private Road 2	Permeable Paving	TP S7	6.2e-6m/s	609	544m ²	300mm	400mm
Private Road 3	Permeable Paving	TP S5	1.4e-6m/s	1132	1132m ²	300mm	400mm
Driveway Typical	Permeable Paving	TP S2	6.6e-6m/s	85	85m ²	300mm	400mm
Trench SA 1	Private Trench Soakaway	TP S5	6.5e-5m/s	165	6m x 1.3m	1900mm	2100mm
Trench SA 2	Private Trench Soakaway	TP5	6.5e-5m/s	95	5.5m x 1.1m	1400mm	1600mm
Trench SA 3	Private Trench Soakaway	TP5	6.5e-5m/s	95	19m x 1m	1300mm	1500mm
Trench SA 4	Private Trench Soakaway	TP5	6.5e-5m/s	127	16m x 1m	1300mm	1500mm
Trench SA 5	Private Trench Soakaway	TP3	8.4e-5m/s	364	14.5m x 1.1m	2000mm	2200mm
Trench SA 6	Private Trench Soakaway	TP7a	3.4e-6m/s	210	17m x 1.2m	2300mm	2500mm
Trench SA 7	Private Trench Soakaway	TP3	8.4e-5m/s	589	38m x 1m	1800mm	2000mm
Trench SA 8	Private Trench Soakaway	TP1	2.5e-6m/s	861	65m x 1.3m	2300mm	2500mm
Trench SA 9	Private Trench Soakaway	TP2	4.0e-5m/s	399	40m x 1m	1300mm	1500mm
Highway Swale 1	Adoptable Dry Swale	TP S1	3.2e-5m/s	508	110.5m x 0.5m	1000mm	1500mm
Highway Swale 2	Adoptable Dry Swale	TPS1	3.2e-5m/s	810	83.5m x 0.5m	1000mm	1500mm
Highway Swale 3	Adoptable Dry Swale	TP1	2.5e-6m/s	266	42.7m x 0.5m	1000mm	1500mm
Highway Swale 4	Adoptable Dry Swale	TP2	4.0e-5m/s	459	50.8m x 0.5m	1000mm	1500mm

Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park A - Permeable Paving			
Date 13/07/16 File Car Park A.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 171 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.447	0.147	2.7	25.8	0 K
30 min Summer	10.494	0.194	2.7	34.1	0 K
60 min Summer	10.535	0.235	2.7	41.5	0 K
120 min Summer	10.562	0.262	2.7	46.1	0 K
180 min Summer	10.564	0.264	2.7	46.6	0 K
240 min Summer	10.561	0.261	2.7	46.1	0 K
360 min Summer	10.550	0.250	2.7	44.1	0 K
480 min Summer	10.537	0.237	2.7	41.7	0 K
600 min Summer	10.522	0.222	2.7	39.1	0 K
720 min Summer	10.508	0.208	2.7	36.6	0 K
960 min Summer	10.480	0.180	2.7	31.6	0 K
1440 min Summer	10.431	0.131	2.7	23.0	0 K
2160 min Summer	10.379	0.079	2.7	13.8	0 K
2880 min Summer	10.352	0.052	2.7	9.0	0 K
4320 min Summer	10.339	0.039	2.1	6.7	0 K
5760 min Summer	10.331	0.031	1.7	5.3	0 K
7200 min Summer	10.326	0.026	1.4	4.5	0 K
8640 min Summer	10.323	0.023	1.3	3.9	0 K
10080 min Summer	10.320	0.020	1.1	3.4	0 K
15 min Winter	10.466	0.166	2.7	29.2	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	60		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	152		
240 min Summer	18.658	0.0	182		
360 min Summer	13.718	0.0	248		
480 min Summer	11.023	0.0	318		
600 min Summer	9.295	0.0	384		
720 min Summer	8.082	0.0	454		
960 min Summer	6.475	0.0	584		
1440 min Summer	4.729	0.0	834		
2160 min Summer	3.446	0.0	1168		
2880 min Summer	2.750	0.0	1496		
4320 min Summer	1.997	0.0	2204		
5760 min Summer	1.589	0.0	2936		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4400		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park A - Permeable Paving			
Date 13/07/16		Designed by LK			
File Car Park A.srcx		Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.520	0.220	2.7	38.7	0 K
60 min Winter	10.569	0.269	2.7	47.4	0 K
120 min Winter	10.603	0.303	2.7	53.4	0 K
180 min Winter	10.607	0.307	2.7	54.3	0 K
240 min Winter	10.601	0.301	2.7	53.2	0 K
360 min Winter	10.585	0.285	2.7	50.4	0 K
480 min Winter	10.565	0.265	2.7	46.7	0 K
600 min Winter	10.543	0.243	2.7	42.8	0 K
720 min Winter	10.520	0.220	2.7	38.8	0 K
960 min Winter	10.477	0.177	2.7	31.1	0 K
1440 min Winter	10.404	0.104	2.7	18.2	0 K
2160 min Winter	10.349	0.049	2.6	8.4	0 K
2880 min Winter	10.339	0.039	2.1	6.7	0 K
4320 min Winter	10.329	0.029	1.6	4.9	0 K
5760 min Winter	10.323	0.023	1.3	3.9	0 K
7200 min Winter	10.319	0.019	1.0	3.2	0 K
8640 min Winter	10.317	0.017	0.9	2.7	0 K
10080 min Winter	10.315	0.015	0.8	2.4	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	116		
180 min Winter	23.167	0.0	170		
240 min Winter	18.658	0.0	196		
360 min Winter	13.718	0.0	270		
480 min Winter	11.023	0.0	346		
600 min Winter	9.295	0.0	420		
720 min Winter	8.082	0.0	490		
960 min Winter	6.475	0.0	624		
1440 min Winter	4.729	0.0	864		
2160 min Winter	3.446	0.0	1128		
2880 min Winter	2.750	0.0	1496		
4320 min Winter	1.997	0.0	2204		
5760 min Winter	1.589	0.0	2936		
7200 min Winter	1.330	0.0	3600		
8640 min Winter	1.151	0.0	4384		
10080 min Winter	1.019	0.0	5072		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park A - Permeable Paving																																		
Date 13/07/16	Designed by LK																																		
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<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>19.100</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.350</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+30</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.134 <table> <thead> <tr> <th colspan="2">Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To:</th> <th>(ha)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> <td>0.134</td> </tr> </tbody> </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)	19.100	Shortest Storm (mins)	15	Ratio R	0.350	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+30	Time (mins)		Area	From:	To:	(ha)	0	1	0.134
Rainfall Model	FSR	Winter Storms	Yes																																
Return Period (years)	100	Cv (Summer)	0.750																																
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park A - Permeable Paving																									
Date 13/07/16	Designed by LK																									
File Car Park A.srcx	Checked by AMF																									
Micro Drainage		Source Control 2015.1																								
<u>Model Details</u> Storage is Online Cover Level (m) 10.750 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.03312</td> <td>Width (m)</td> <td>24.3</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>500</td> <td>Length (m)</td> <td>24.3</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>82.0</td> <td>Slope (1:X)</td> <td>10000.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>3</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>1</td> </tr> <tr> <td>Invert Level (m)</td> <td>10.300</td> <td>Cap Volume Depth (m)</td> <td>0.350</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.03312	Width (m)	24.3	Membrane Percolation (mm/hr)	500	Length (m)	24.3	Max Percolation (l/s)	82.0	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.300	Cap Volume Depth (m)	0.350
Infiltration Coefficient Base (m/hr)	0.03312	Width (m)	24.3																							
Membrane Percolation (mm/hr)	500	Length (m)	24.3																							
Max Percolation (l/s)	82.0	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.300	Cap Volume Depth (m)	0.350																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
Car Park A - Permeable Paving

Date 13/07/16

Designed by LK

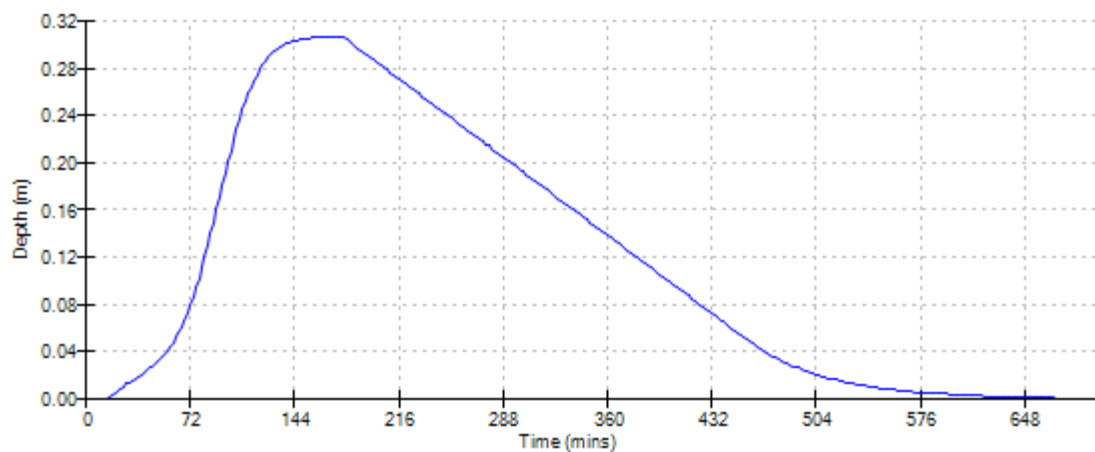
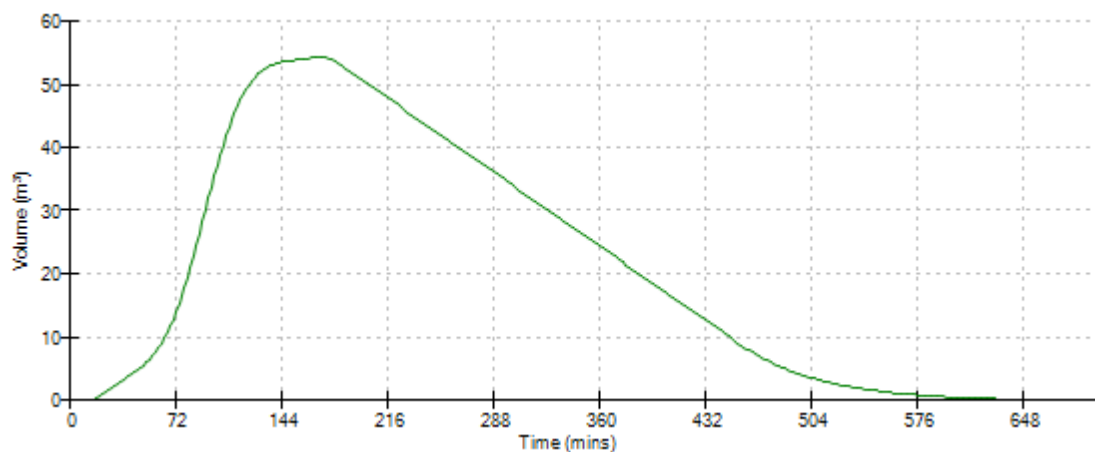
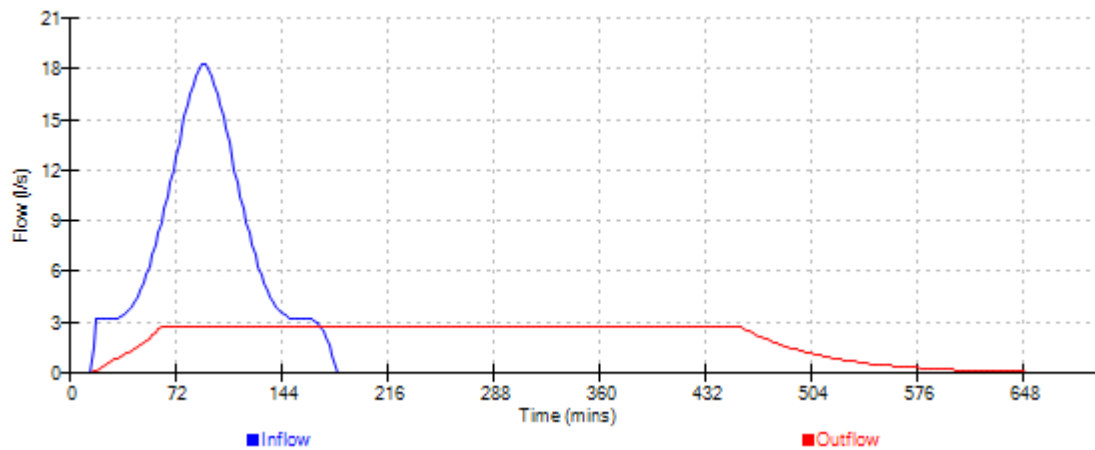
File Car Park A.srcx

Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 180 min Winter

Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park A1 - Permeable Paving			
Date 13/07/16 File Car Park A1.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 203 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.366	0.166	0.5	4.9	0 K
30 min Summer	10.420	0.220	0.5	6.5	0 K
60 min Summer	10.469	0.269	0.5	7.9	0 K
120 min Summer	10.503	0.303	0.5	8.9	0 K
180 min Summer	10.507	0.307	0.5	9.0	0 K
240 min Summer	10.505	0.305	0.5	8.9	0 K
360 min Summer	10.494	0.294	0.5	8.6	0 K
480 min Summer	10.480	0.280	0.5	8.2	0 K
600 min Summer	10.466	0.266	0.5	7.8	0 K
720 min Summer	10.451	0.251	0.5	7.4	0 K
960 min Summer	10.422	0.222	0.5	6.5	0 K
1440 min Summer	10.369	0.169	0.5	4.9	0 K
2160 min Summer	10.307	0.107	0.5	3.1	0 K
2880 min Summer	10.268	0.068	0.5	2.0	0 K
4320 min Summer	10.244	0.044	0.4	1.3	0 K
5760 min Summer	10.235	0.035	0.3	1.0	0 K
7200 min Summer	10.230	0.030	0.3	0.9	0 K
8640 min Summer	10.226	0.026	0.2	0.7	0 K
10080 min Summer	10.223	0.023	0.2	0.7	0 K
15 min Winter	10.388	0.188	0.5	5.5	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	60		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	162		
240 min Summer	18.658	0.0	192		
360 min Summer	13.718	0.0	256		
480 min Summer	11.023	0.0	324		
600 min Summer	9.295	0.0	392		
720 min Summer	8.082	0.0	460		
960 min Summer	6.475	0.0	594		
1440 min Summer	4.729	0.0	850		
2160 min Summer	3.446	0.0	1192		
2880 min Summer	2.750	0.0	1528		
4320 min Summer	1.997	0.0	2204		
5760 min Summer	1.589	0.0	2936		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4400		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park A1 - Permeable Paving			
Date 13/07/16		Designed by LK			
File Car Park A1.srcx		Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.449	0.249	0.5	7.3	0 K
60 min Winter	10.507	0.307	0.5	9.0	0 K
120 min Winter	10.549	0.349	0.5	10.3	0 K
180 min Winter	10.559	0.359	0.5	10.5	0 K
240 min Winter	10.554	0.354	0.5	10.4	0 K
360 min Winter	10.538	0.338	0.5	9.9	0 K
480 min Winter	10.519	0.319	0.5	9.4	0 K
600 min Winter	10.496	0.296	0.5	8.7	0 K
720 min Winter	10.473	0.273	0.5	8.0	0 K
960 min Winter	10.428	0.228	0.5	6.7	0 K
1440 min Winter	10.347	0.147	0.5	4.3	0 K
2160 min Winter	10.264	0.064	0.5	1.9	0 K
2880 min Winter	10.244	0.044	0.4	1.3	0 K
4320 min Winter	10.232	0.032	0.3	0.9	0 K
5760 min Winter	10.226	0.026	0.2	0.7	0 K
7200 min Winter	10.222	0.022	0.2	0.6	0 K
8640 min Winter	10.219	0.019	0.2	0.5	0 K
10080 min Winter	10.217	0.017	0.2	0.5	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	172		
240 min Winter	18.658	0.0	222		
360 min Winter	13.718	0.0	276		
480 min Winter	11.023	0.0	354		
600 min Winter	9.295	0.0	428		
720 min Winter	8.082	0.0	500		
960 min Winter	6.475	0.0	642		
1440 min Winter	4.729	0.0	894		
2160 min Winter	3.446	0.0	1192		
2880 min Winter	2.750	0.0	1476		
4320 min Winter	1.997	0.0	2208		
5760 min Winter	1.589	0.0	2936		
7200 min Winter	1.330	0.0	3616		
8640 min Winter	1.151	0.0	4344		
10080 min Winter	1.019	0.0	5104		
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Cundall, Johnston & Partners		Page 3
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park A1 - Permeable Paving	
Date 13/07/16 File Car Park A1.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.025

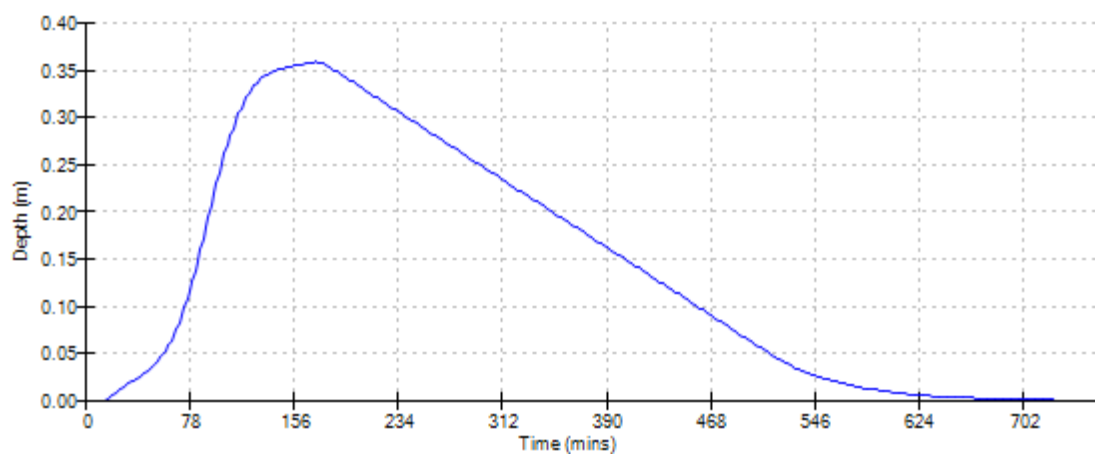
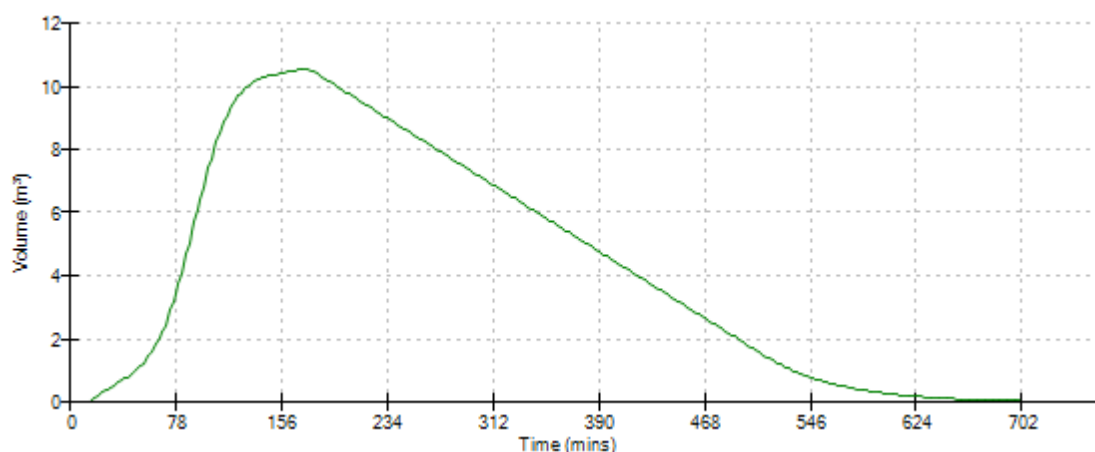
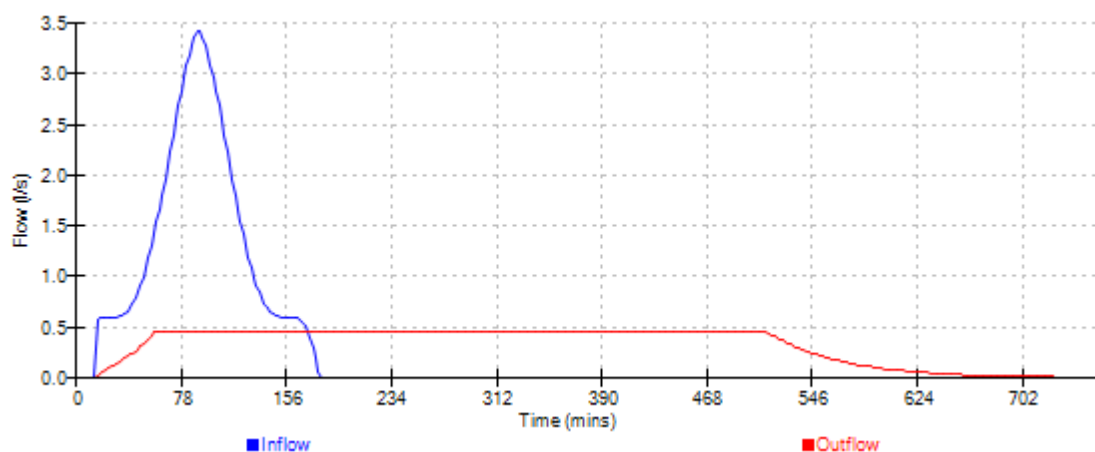
Time (mins)	Area
From:	To: (ha)
0	1 0.025

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park A1 - Permeable Paving																									
Date 13/07/16	Designed by LK																									
File Car Park A1.srcx	Checked by AMF																									
Micro Drainage	Source Control 2015.1																									
Model Details Storage is Online Cover Level (m) 10.700 Porous Car Park Structure <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.03312</td><td>Width (m)</td><td>9.9</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>500</td><td>Length (m)</td><td>9.9</td></tr><tr><td>Max Percolation (l/s)</td><td>13.6</td><td>Slope (1:X)</td><td>10000.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>3</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>1</td></tr><tr><td>Invert Level (m)</td><td>10.200</td><td>Cap Volume Depth (m)</td><td>0.400</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.03312	Width (m)	9.9	Membrane Percolation (mm/hr)	500	Length (m)	9.9	Max Percolation (l/s)	13.6	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.200	Cap Volume Depth (m)	0.400
Infiltration Coefficient Base (m/hr)	0.03312	Width (m)	9.9																							
Membrane Percolation (mm/hr)	500	Length (m)	9.9																							
Max Percolation (l/s)	13.6	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.200	Cap Volume Depth (m)	0.400																							
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park A1 - Permeable Paving	
Date 13/07/16	Designed by LK	
File Car Park A1.srcx	Checked by AMF	
Micro Drainage		Source Control 2015.1

Event: 180 min Winter



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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park B - Permeable Paving			
Date 13/07/16 File Car Park B.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 273 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.419	0.119	1.1	14.3	0 K
30 min Summer	10.460	0.160	1.1	19.2	0 K
60 min Summer	10.499	0.199	1.1	24.0	0 K
120 min Summer	10.531	0.231	1.1	27.8	0 K
180 min Summer	10.540	0.240	1.1	29.0	0 K
240 min Summer	10.541	0.241	1.1	29.1	0 K
360 min Summer	10.538	0.238	1.1	28.8	0 K
480 min Summer	10.533	0.233	1.1	28.1	0 K
600 min Summer	10.526	0.226	1.1	27.3	0 K
720 min Summer	10.518	0.218	1.1	26.3	0 K
960 min Summer	10.502	0.202	1.1	24.3	0 K
1440 min Summer	10.469	0.169	1.1	20.4	0 K
2160 min Summer	10.426	0.126	1.1	15.2	0 K
2880 min Summer	10.393	0.093	1.1	11.1	0 K
4320 min Summer	10.354	0.054	1.1	6.4	0 K
5760 min Summer	10.343	0.043	0.9	5.1	0 K
7200 min Summer	10.337	0.037	0.8	4.3	0 K
8640 min Summer	10.332	0.032	0.7	3.8	0 K
10080 min Summer	10.329	0.029	0.6	3.3	0 K
15 min Winter	10.435	0.135	1.1	16.2	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	180		
240 min Summer	18.658	0.0	218		
360 min Summer	13.718	0.0	278		
480 min Summer	11.023	0.0	342		
600 min Summer	9.295	0.0	410		
720 min Summer	8.082	0.0	478		
960 min Summer	6.475	0.0	614		
1440 min Summer	4.729	0.0	880		
2160 min Summer	3.446	0.0	1256		
2880 min Summer	2.750	0.0	1612		
4320 min Summer	1.997	0.0	2248		
5760 min Summer	1.589	0.0	2944		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4408		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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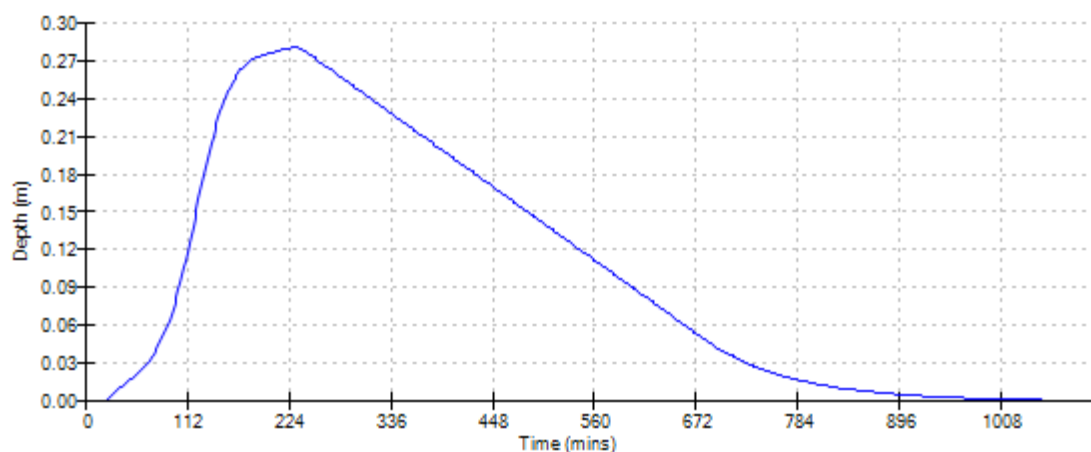
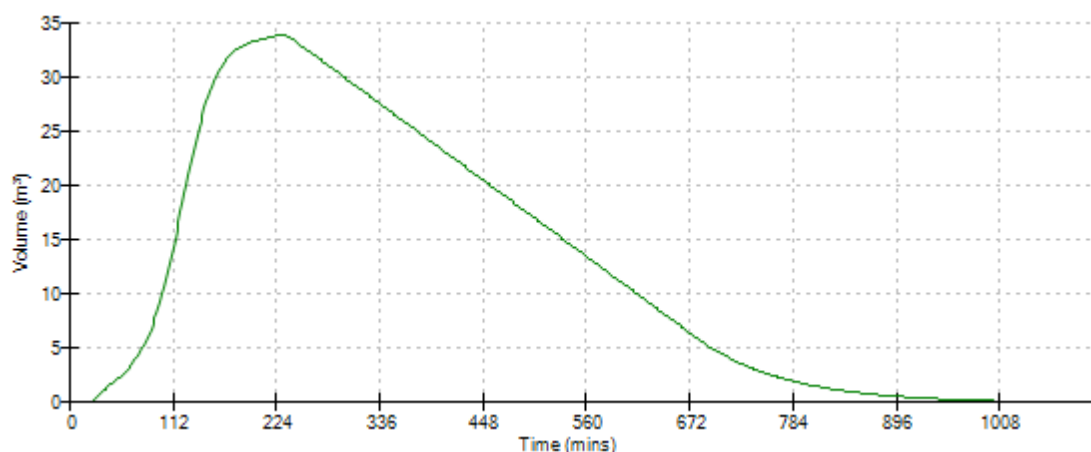
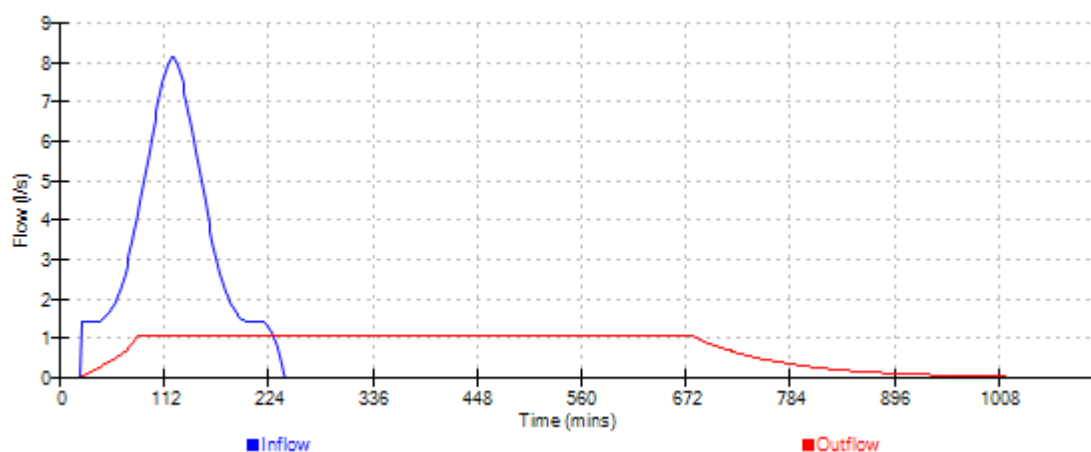
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park B - Permeable Paving			
Date 13/07/16 File Car Park B.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.481	0.181	1.1	21.8	0 K
60 min Winter	10.526	0.226	1.1	27.2	0 K
120 min Winter	10.564	0.264	1.1	31.9	0 K
180 min Winter	10.577	0.277	1.1	33.5	0 K
240 min Winter	10.580	0.280	1.1	33.9	0 K
360 min Winter	10.575	0.275	1.1	33.2	0 K
480 min Winter	10.567	0.267	1.1	32.3	0 K
600 min Winter	10.557	0.257	1.1	31.0	0 K
720 min Winter	10.545	0.245	1.1	29.6	0 K
960 min Winter	10.520	0.220	1.1	26.5	0 K
1440 min Winter	10.469	0.169	1.1	20.4	0 K
2160 min Winter	10.405	0.105	1.1	12.6	0 K
2880 min Winter	10.361	0.061	1.1	7.3	0 K
4320 min Winter	10.340	0.040	0.8	4.8	0 K
5760 min Winter	10.332	0.032	0.7	3.8	0 K
7200 min Winter	10.327	0.027	0.6	3.2	0 K
8640 min Winter	10.324	0.024	0.5	2.7	0 K
10080 min Winter	10.321	0.021	0.4	2.4	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	174		
240 min Winter	18.658	0.0	230		
360 min Winter	13.718	0.0	304		
480 min Winter	11.023	0.0	370		
600 min Winter	9.295	0.0	446		
720 min Winter	8.082	0.0	522		
960 min Winter	6.475	0.0	672		
1440 min Winter	4.729	0.0	938		
2160 min Winter	3.446	0.0	1316		
2880 min Winter	2.750	0.0	1612		
4320 min Winter	1.997	0.0	2248		
5760 min Winter	1.589	0.0	2992		
7200 min Winter	1.330	0.0	3672		
8640 min Winter	1.151	0.0	4344		
10080 min Winter	1.019	0.0	5152		
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Cundall, Johnston & Partners		Page 3																																	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park B - Permeable Paving																																		
Date 13/07/16	Designed by LK																																		
File Car Park B.srcx	Checked by AMF																																		
Micro Drainage		Source Control 2015.1																																	
<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>19.100</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.350</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+30</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.074 <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>1</td> <td>0.074</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)	19.100	Shortest Storm (mins)	15	Ratio R	0.350	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+30	Time (mins)		Area	From:	To:	(ha)	0	1	0.074
Rainfall Model	FSR	Winter Storms	Yes																																
Return Period (years)	100	Cv (Summer)	0.750																																
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From:	To:	(ha)																																	
0	1	0.074																																	
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park B - Permeable Paving																									
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File Car Park B.srcx	Checked by AMF																									
Micro Drainage	Source Control 2015.1																									
Model Details Storage is Online Cover Level (m) 10.700 Porous Car Park Structure <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.01872</td><td>Width (m)</td><td>20.1</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>500</td><td>Length (m)</td><td>20.1</td></tr><tr><td>Max Percolation (l/s)</td><td>56.1</td><td>Slope (1:X)</td><td>10000.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>3</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>1</td></tr><tr><td>Invert Level (m)</td><td>10.300</td><td>Cap Volume Depth (m)</td><td>0.300</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.01872	Width (m)	20.1	Membrane Percolation (mm/hr)	500	Length (m)	20.1	Max Percolation (l/s)	56.1	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.300	Cap Volume Depth (m)	0.300
Infiltration Coefficient Base (m/hr)	0.01872	Width (m)	20.1																							
Membrane Percolation (mm/hr)	500	Length (m)	20.1																							
Max Percolation (l/s)	56.1	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.300	Cap Volume Depth (m)	0.300																							
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park B - Permeable Paving	
Date 13/07/16	Designed by LK	
File Car Park B.srcx	Checked by AMF	
Micro Drainage		Source Control 2015.1

Event: 240 min Winter



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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park C - Permeable Paving			
Date 13/07/16 File Car Park C.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 298 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.527	0.127	0.5	6.6	0 K
30 min Summer	10.571	0.171	0.5	8.9	0 K
60 min Summer	10.613	0.213	0.5	11.1	0 K
120 min Summer	10.648	0.248	0.5	12.9	0 K
180 min Summer	10.660	0.260	0.5	13.6	0 K
240 min Summer	10.662	0.262	0.5	13.6	0 K
360 min Summer	10.659	0.259	0.5	13.5	0 K
480 min Summer	10.654	0.254	0.5	13.2	0 K
600 min Summer	10.647	0.247	0.5	12.9	0 K
720 min Summer	10.639	0.239	0.5	12.5	0 K
960 min Summer	10.622	0.222	0.5	11.6	0 K
1440 min Summer	10.589	0.189	0.5	9.8	0 K
2160 min Summer	10.544	0.144	0.5	7.5	0 K
2880 min Summer	10.508	0.108	0.5	5.6	0 K
4320 min Summer	10.461	0.061	0.5	3.2	0 K
5760 min Summer	10.446	0.046	0.4	2.4	0 K
7200 min Summer	10.439	0.039	0.4	2.0	0 K
8640 min Summer	10.434	0.034	0.3	1.8	0 K
10080 min Summer	10.431	0.031	0.3	1.6	0 K
15 min Winter	10.544	0.144	0.5	7.5	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	180		
240 min Summer	18.658	0.0	230		
360 min Summer	13.718	0.0	286		
480 min Summer	11.023	0.0	348		
600 min Summer	9.295	0.0	416		
720 min Summer	8.082	0.0	484		
960 min Summer	6.475	0.0	618		
1440 min Summer	4.729	0.0	892		
2160 min Summer	3.446	0.0	1272		
2880 min Summer	2.750	0.0	1616		
4320 min Summer	1.997	0.0	2288		
5760 min Summer	1.589	0.0	2944		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4408		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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Cundall, Johnston & Partners				Page 2	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park C - Permeable Paving			
Date 13/07/16 File Car Park C.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.593	0.193	0.5	10.1	0 K
60 min Winter	10.642	0.242	0.5	12.6	0 K
120 min Winter	10.684	0.284	0.5	14.8	0 K
180 min Winter	10.700	0.300	0.5	15.6	0 K
240 min Winter	10.704	0.304	0.5	15.9	0 K
360 min Winter	10.700	0.300	0.5	15.6	0 K
480 min Winter	10.692	0.292	0.5	15.2	0 K
600 min Winter	10.682	0.282	0.5	14.7	0 K
720 min Winter	10.670	0.270	0.5	14.1	0 K
960 min Winter	10.645	0.245	0.5	12.8	0 K
1440 min Winter	10.593	0.193	0.5	10.1	0 K
2160 min Winter	10.525	0.125	0.5	6.5	0 K
2880 min Winter	10.475	0.075	0.5	3.9	0 K
4320 min Winter	10.443	0.043	0.4	2.2	0 K
5760 min Winter	10.435	0.035	0.3	1.8	0 K
7200 min Winter	10.429	0.029	0.3	1.5	0 K
8640 min Winter	10.425	0.025	0.2	1.3	0 K
10080 min Winter	10.422	0.022	0.2	1.1	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	176		
240 min Winter	18.658	0.0	230		
360 min Winter	13.718	0.0	334		
480 min Winter	11.023	0.0	376		
600 min Winter	9.295	0.0	452		
720 min Winter	8.082	0.0	528		
960 min Winter	6.475	0.0	674		
1440 min Winter	4.729	0.0	952		
2160 min Winter	3.446	0.0	1340		
2880 min Winter	2.750	0.0	1648		
4320 min Winter	1.997	0.0	2244		
5760 min Winter	1.589	0.0	2992		
7200 min Winter	1.330	0.0	3664		
8640 min Winter	1.151	0.0	4400		
10080 min Winter	1.019	0.0	5144		
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Cundall, Johnston & Partners		Page 3
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park C - Permeable Paving	
Date 13/07/16	Designed by LK	
File Car Park C.srcx	Checked by AMF	
Micro Drainage		Source Control 2015.1

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.034

Time (mins)		Area
From:	To:	(ha)
0	1	0.034

Cundall, Johnston & Partners		Page 4																								
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park C - Permeable Paving																									
Date 13/07/16	Designed by LK																									
File Car Park C.srcx	Checked by AMF																									
Micro Drainage	Source Control 2015.1																									
Model Details Storage is Online Cover Level (m) 10.850 Porous Car Park Structure <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.01872</td><td>Width (m)</td><td>13.2</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>500</td><td>Length (m)</td><td>13.2</td></tr><tr><td>Max Percolation (l/s)</td><td>24.2</td><td>Slope (1:X)</td><td>10000.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>3</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>1</td></tr><tr><td>Invert Level (m)</td><td>10.400</td><td>Cap Volume Depth (m)</td><td>0.350</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.01872	Width (m)	13.2	Membrane Percolation (mm/hr)	500	Length (m)	13.2	Max Percolation (l/s)	24.2	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.400	Cap Volume Depth (m)	0.350
Infiltration Coefficient Base (m/hr)	0.01872	Width (m)	13.2																							
Membrane Percolation (mm/hr)	500	Length (m)	13.2																							
Max Percolation (l/s)	24.2	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.400	Cap Volume Depth (m)	0.350																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
Car Park C - Permeable Paving

Date 13/07/16

Designed by LK

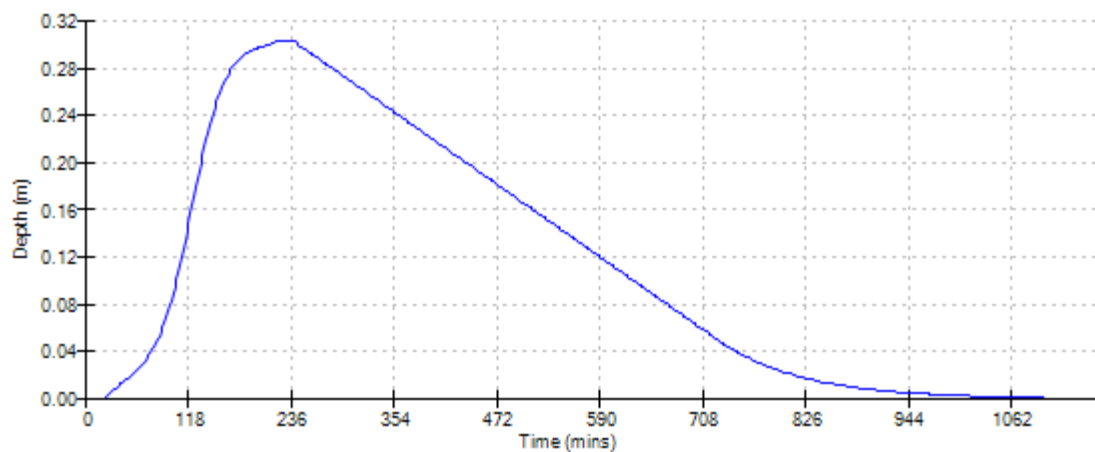
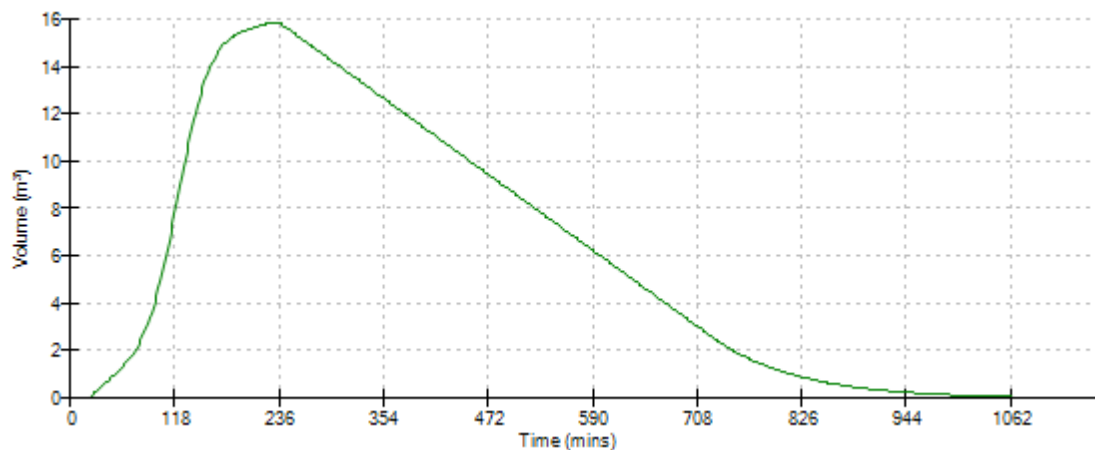
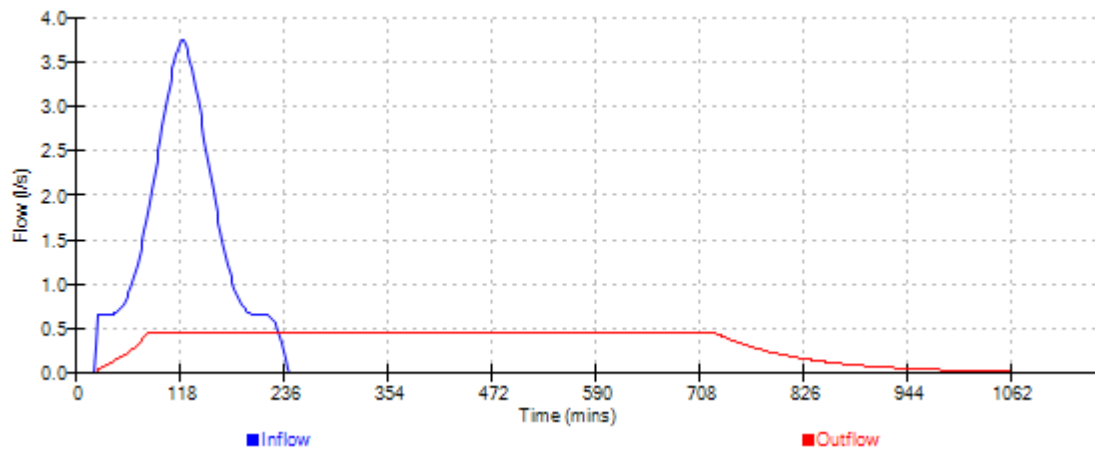
File Car Park C.srcx

Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 240 min Winter

Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park D - Permeable Paving			
Date 13/07/16 File Car Park D.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 273 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.269	0.119	0.3	4.5	0 K
30 min Summer	10.309	0.159	0.3	6.0	0 K
60 min Summer	10.349	0.199	0.3	7.5	0 K
120 min Summer	10.381	0.231	0.3	8.7	0 K
180 min Summer	10.391	0.241	0.3	9.0	0 K
240 min Summer	10.391	0.241	0.3	9.1	0 K
360 min Summer	10.389	0.239	0.3	9.0	0 K
480 min Summer	10.383	0.233	0.3	8.8	0 K
600 min Summer	10.376	0.226	0.3	8.5	0 K
720 min Summer	10.369	0.219	0.3	8.2	0 K
960 min Summer	10.352	0.202	0.3	7.6	0 K
1440 min Summer	10.320	0.170	0.3	6.4	0 K
2160 min Summer	10.277	0.127	0.3	4.7	0 K
2880 min Summer	10.243	0.093	0.3	3.5	0 K
4320 min Summer	10.204	0.054	0.3	2.0	0 K
5760 min Summer	10.193	0.043	0.3	1.6	0 K
7200 min Summer	10.187	0.037	0.2	1.4	0 K
8640 min Summer	10.182	0.032	0.2	1.2	0 K
10080 min Summer	10.179	0.029	0.2	1.1	0 K
15 min Winter	10.285	0.135	0.3	5.0	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	180		
240 min Summer	18.658	0.0	218		
360 min Summer	13.718	0.0	278		
480 min Summer	11.023	0.0	342		
600 min Summer	9.295	0.0	410		
720 min Summer	8.082	0.0	478		
960 min Summer	6.475	0.0	616		
1440 min Summer	4.729	0.0	880		
2160 min Summer	3.446	0.0	1256		
2880 min Summer	2.750	0.0	1612		
4320 min Summer	1.997	0.0	2248		
5760 min Summer	1.589	0.0	2944		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4408		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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Cundall, Johnston & Partners				Page 2	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park D - Permeable Paving			
Date 13/07/16 File Car Park D.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.330	0.180	0.3	6.8	0 K
60 min Winter	10.376	0.226	0.3	8.5	0 K
120 min Winter	10.414	0.264	0.3	9.9	0 K
180 min Winter	10.428	0.278	0.3	10.4	0 K
240 min Winter	10.431	0.281	0.3	10.5	0 K
360 min Winter	10.425	0.275	0.3	10.3	0 K
480 min Winter	10.417	0.267	0.3	10.0	0 K
600 min Winter	10.407	0.257	0.3	9.7	0 K
720 min Winter	10.396	0.246	0.3	9.2	0 K
960 min Winter	10.370	0.220	0.3	8.3	0 K
1440 min Winter	10.320	0.170	0.3	6.4	0 K
2160 min Winter	10.255	0.105	0.3	3.9	0 K
2880 min Winter	10.212	0.062	0.3	2.3	0 K
4320 min Winter	10.191	0.041	0.3	1.5	0 K
5760 min Winter	10.183	0.033	0.2	1.2	0 K
7200 min Winter	10.177	0.027	0.2	1.0	0 K
8640 min Winter	10.174	0.024	0.2	0.9	0 K
10080 min Winter	10.171	0.021	0.1	0.8	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	174		
240 min Winter	18.658	0.0	230		
360 min Winter	13.718	0.0	320		
480 min Winter	11.023	0.0	370		
600 min Winter	9.295	0.0	446		
720 min Winter	8.082	0.0	522		
960 min Winter	6.475	0.0	672		
1440 min Winter	4.729	0.0	950		
2160 min Winter	3.446	0.0	1316		
2880 min Winter	2.750	0.0	1612		
4320 min Winter	1.997	0.0	2244		
5760 min Winter	1.589	0.0	2976		
7200 min Winter	1.330	0.0	3680		
8640 min Winter	1.151	0.0	4472		
10080 min Winter	1.019	0.0	5136		
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Cundall, Johnston & Partners		Page 3																																	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park D - Permeable Paving																																		
Date 13/07/16	Designed by LK																																		
File Car Park D.srcx	Checked by AMF																																		
Micro Drainage		Source Control 2015.1																																	
<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>19.100</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.350</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+30</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.023 <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>1</td> <td>0.023</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)	19.100	Shortest Storm (mins)	15	Ratio R	0.350	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+30	Time (mins)		Area	From:	To:	(ha)	0	1	0.023
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)	19.100	Shortest Storm (mins)	15																																
Ratio R	0.350	Longest Storm (mins)	10080																																
Summer Storms	Yes	Climate Change %	+30																																
Time (mins)		Area																																	
From:	To:	(ha)																																	
0	1	0.023																																	
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Cundall, Johnston & Partners		Page 4																								
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park D - Permeable Paving																									
Date 13/07/16	Designed by LK																									
File Car Park D.srcx	Checked by AMF																									
Micro Drainage	Source Control 2015.1																									
Model Details Storage is Online Cover Level (m) 10.550 Porous Car Park Structure <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.01872</td><td>Width (m)</td><td>11.2</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>500</td><td>Length (m)</td><td>11.2</td></tr><tr><td>Max Percolation (l/s)</td><td>17.4</td><td>Slope (1:X)</td><td>10000.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>3</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>1</td></tr><tr><td>Invert Level (m)</td><td>10.150</td><td>Cap Volume Depth (m)</td><td>0.300</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.01872	Width (m)	11.2	Membrane Percolation (mm/hr)	500	Length (m)	11.2	Max Percolation (l/s)	17.4	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.150	Cap Volume Depth (m)	0.300
Infiltration Coefficient Base (m/hr)	0.01872	Width (m)	11.2																							
Membrane Percolation (mm/hr)	500	Length (m)	11.2																							
Max Percolation (l/s)	17.4	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.150	Cap Volume Depth (m)	0.300																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
Car Park D - Permeable Paving

Date 13/07/16

Designed by LK

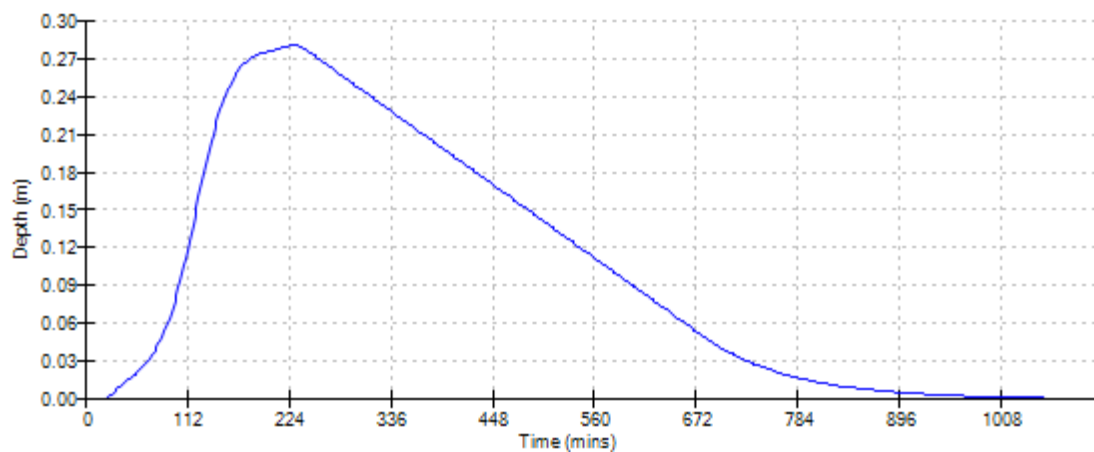
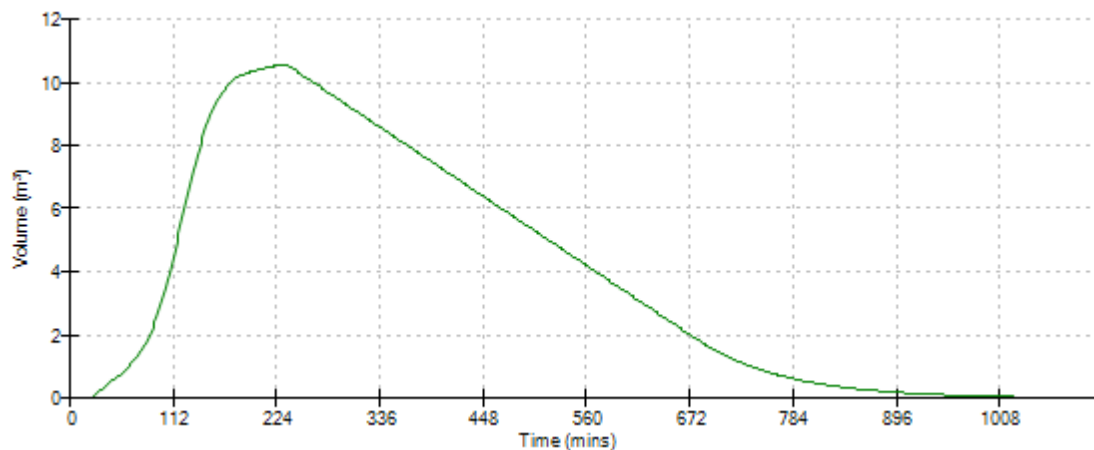
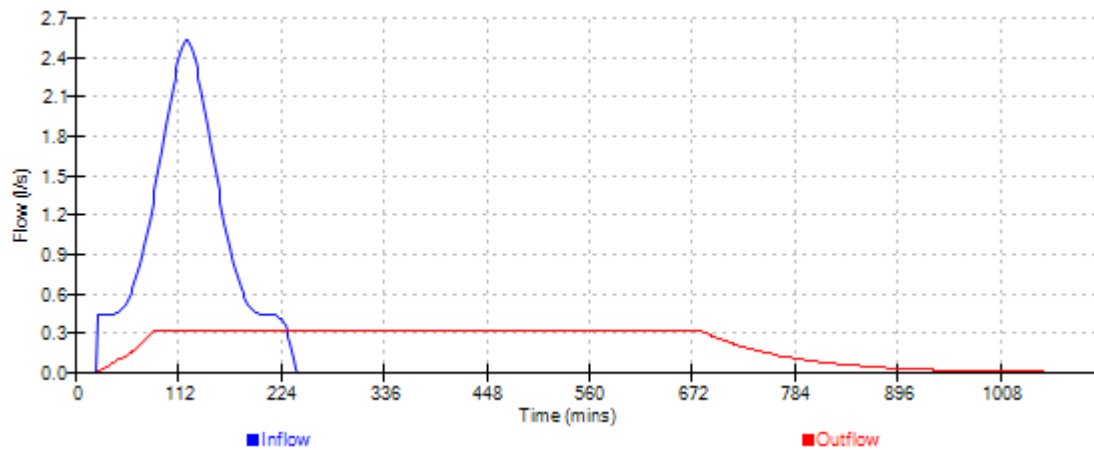
File Car Park D.srcx

Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 240 min Winter

Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park E - Permeable Paving			
Date 13/07/16		Designed by LK			
File Car Park E.srcx		Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 410 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.316	0.166	0.9	17.0	0 K
30 min Summer	10.373	0.223	0.9	22.8	0 K
60 min Summer	10.429	0.279	0.9	28.5	0 K
120 min Summer	10.478	0.328	0.9	33.6	0 K
180 min Summer	10.499	0.349	0.9	35.7	0 K
240 min Summer	10.506	0.356	0.9	36.4	0 K
360 min Summer	10.505	0.355	0.9	36.3	0 K
480 min Summer	10.500	0.350	0.9	35.8	0 K
600 min Summer	10.493	0.343	0.9	35.1	0 K
720 min Summer	10.485	0.335	0.9	34.3	0 K
960 min Summer	10.468	0.318	0.9	32.6	0 K
1440 min Summer	10.433	0.283	0.9	28.9	0 K
2160 min Summer	10.382	0.232	0.9	23.7	0 K
2880 min Summer	10.336	0.186	0.9	19.0	0 K
4320 min Summer	10.265	0.115	0.9	11.7	0 K
5760 min Summer	10.220	0.070	0.9	7.1	0 K
7200 min Summer	10.200	0.050	0.9	5.0	0 K
8640 min Summer	10.194	0.044	0.8	4.4	0 K
10080 min Summer	10.189	0.039	0.7	3.9	0 K
15 min Winter	10.338	0.188	0.9	19.2	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	122		
180 min Summer	23.167	0.0	180		
240 min Summer	18.658	0.0	240		
360 min Summer	13.718	0.0	328		
480 min Summer	11.023	0.0	384		
600 min Summer	9.295	0.0	446		
720 min Summer	8.082	0.0	512		
960 min Summer	6.475	0.0	652		
1440 min Summer	4.729	0.0	922		
2160 min Summer	3.446	0.0	1320		
2880 min Summer	2.750	0.0	1700		
4320 min Summer	1.997	0.0	2380		
5760 min Summer	1.589	0.0	3056		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4408		
10080 min Summer	1.019	0.0	5144		
15 min Winter	116.400	0.0	16		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park E - Permeable Paving			
Date 13/07/16 File Car Park E.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.401	0.251	0.9	25.7	0 K
60 min Winter	10.466	0.316	0.9	32.3	0 K
120 min Winter	10.524	0.374	0.9	38.3	0 K
180 min Winter	10.550	0.400	0.9	41.0	0 K
240 min Winter	10.560	0.410	0.9	42.0	0 K
360 min Winter	10.564	0.414	0.9	42.5	0 K
480 min Winter	10.557	0.407	0.9	41.7	0 K
600 min Winter	10.547	0.397	0.9	40.7	0 K
720 min Winter	10.537	0.387	0.9	39.6	0 K
960 min Winter	10.513	0.363	0.9	37.1	0 K
1440 min Winter	10.458	0.308	0.9	31.6	0 K
2160 min Winter	10.380	0.230	0.9	23.5	0 K
2880 min Winter	10.311	0.161	0.9	16.4	0 K
4320 min Winter	10.216	0.066	0.9	6.7	0 K
5760 min Winter	10.194	0.044	0.8	4.4	0 K
7200 min Winter	10.187	0.037	0.7	3.7	0 K
8640 min Winter	10.182	0.032	0.6	3.2	0 K
10080 min Winter	10.178	0.028	0.5	2.8	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	31		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	176		
240 min Winter	18.658	0.0	234		
360 min Winter	13.718	0.0	344		
480 min Winter	11.023	0.0	446		
600 min Winter	9.295	0.0	480		
720 min Winter	8.082	0.0	554		
960 min Winter	6.475	0.0	710		
1440 min Winter	4.729	0.0	1008		
2160 min Winter	3.446	0.0	1408		
2880 min Winter	2.750	0.0	1788		
4320 min Winter	1.997	0.0	2380		
5760 min Winter	1.589	0.0	2944		
7200 min Winter	1.330	0.0	3744		
8640 min Winter	1.151	0.0	4368		
10080 min Winter	1.019	0.0	5144		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park E - Permeable Paving																																		
Date 13/07/16	Designed by LK																																		
File Car Park E.srcx	Checked by AMF																																		
Micro Drainage		Source Control 2015.1																																	
<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>19.100</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.350</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+30</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.085 <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>1</td> <td>0.085</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)	19.100	Shortest Storm (mins)	15	Ratio R	0.350	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+30	Time (mins)		Area	From:	To:	(ha)	0	1	0.085
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)	19.100	Shortest Storm (mins)	15																																
Ratio R	0.350	Longest Storm (mins)	10080																																
Summer Storms	Yes	Climate Change %	+30																																
Time (mins)		Area																																	
From:	To:	(ha)																																	
0	1	0.085																																	
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Cundall, Johnston & Partners		Page 4																								
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park E - Permeable Paving																									
Date 13/07/16	Designed by LK																									
File Car Park E.srcx	Checked by AMF																									
Micro Drainage	Source Control 2015.1																									
Model Details Storage is Online Cover Level (m) 10.700 Porous Car Park Structure <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.01872</td><td>Width (m)</td><td>18.5</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>500</td><td>Length (m)</td><td>18.5</td></tr><tr><td>Max Percolation (l/s)</td><td>47.5</td><td>Slope (1:X)</td><td>10000.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>3</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>1</td></tr><tr><td>Invert Level (m)</td><td>10.150</td><td>Cap Volume Depth (m)</td><td>0.450</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.01872	Width (m)	18.5	Membrane Percolation (mm/hr)	500	Length (m)	18.5	Max Percolation (l/s)	47.5	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.150	Cap Volume Depth (m)	0.450
Infiltration Coefficient Base (m/hr)	0.01872	Width (m)	18.5																							
Membrane Percolation (mm/hr)	500	Length (m)	18.5																							
Max Percolation (l/s)	47.5	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.150	Cap Volume Depth (m)	0.450																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
Car Park E - Permeable Paving

Date 13/07/16

Designed by LK

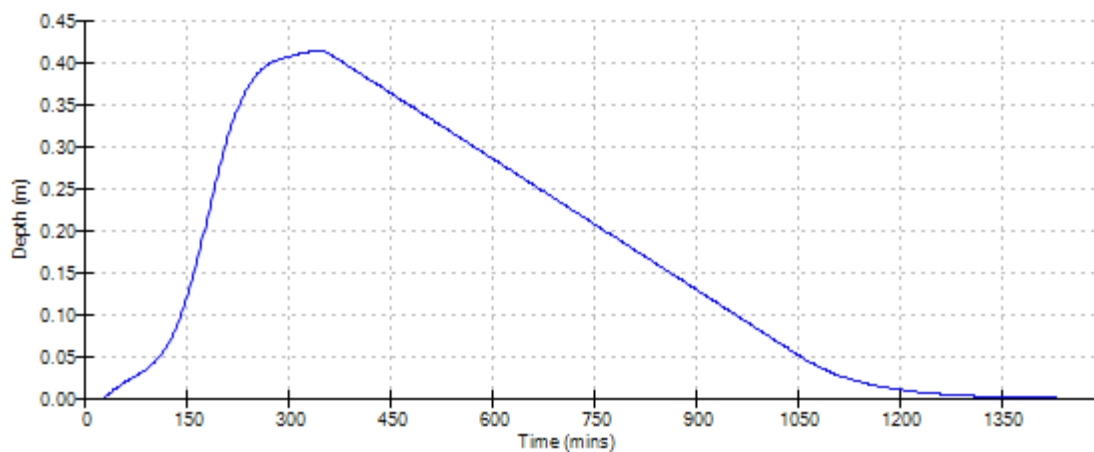
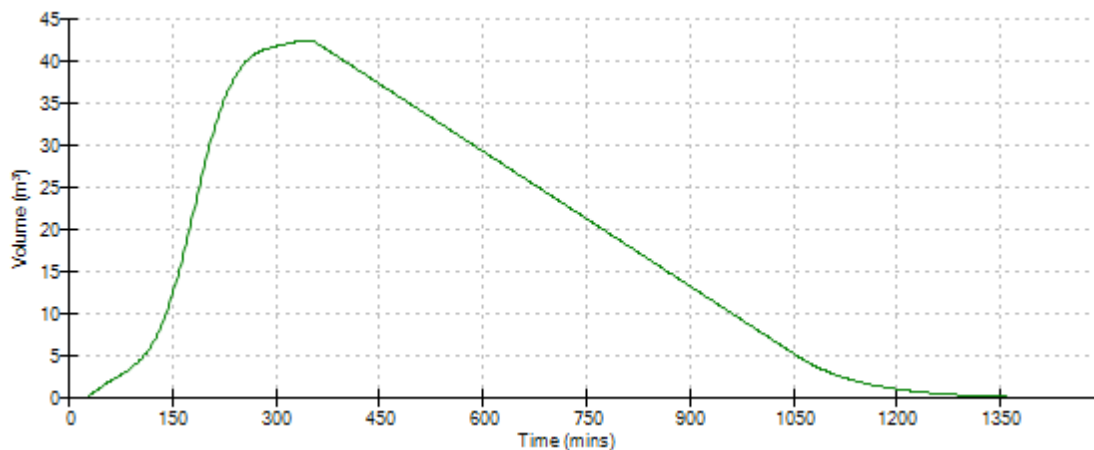
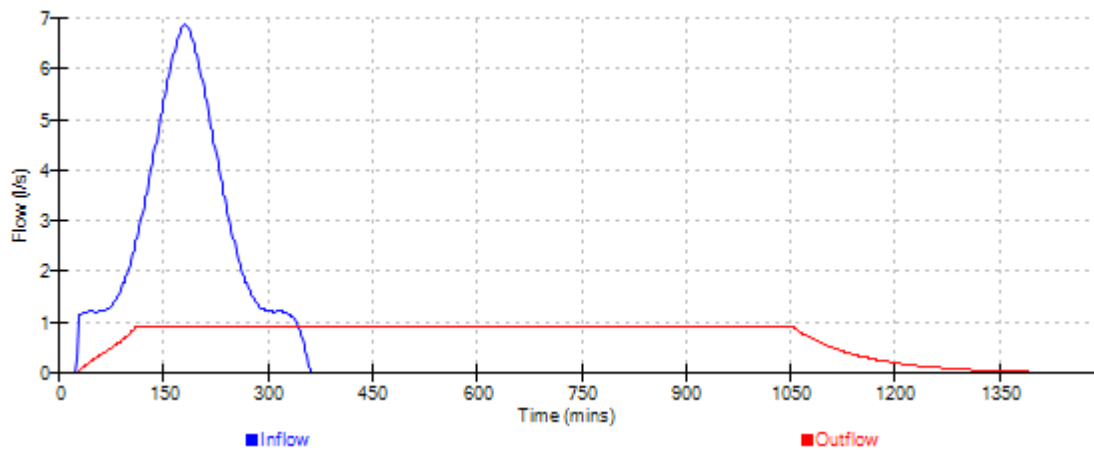
File Car Park E.srcx

Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 360 min Winter

Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park F - Permeable Paving			
Date 13/07/16 File Car Park F.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 357 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.222	0.172	1.2	20.5	0 K
30 min Summer	10.280	0.230	1.2	27.5	0 K
60 min Summer	10.337	0.287	1.2	34.3	0 K
120 min Summer	10.385	0.335	1.2	40.1	0 K
180 min Summer	10.403	0.353	1.2	42.3	0 K
240 min Summer	10.407	0.357	1.2	42.8	0 K
360 min Summer	10.403	0.353	1.2	42.3	0 K
480 min Summer	10.397	0.347	1.2	41.5	0 K
600 min Summer	10.388	0.338	1.2	40.5	0 K
720 min Summer	10.379	0.329	1.2	39.4	0 K
960 min Summer	10.359	0.309	1.2	37.0	0 K
1440 min Summer	10.319	0.269	1.2	32.1	0 K
2160 min Summer	10.262	0.212	1.2	25.4	0 K
2880 min Summer	10.214	0.164	1.2	19.5	0 K
4320 min Summer	10.143	0.093	1.2	11.0	0 K
5760 min Summer	10.105	0.055	1.2	6.5	0 K
7200 min Summer	10.095	0.045	1.1	5.3	0 K
8640 min Summer	10.089	0.039	0.9	4.6	0 K
10080 min Summer	10.085	0.035	0.8	4.1	0 K
15 min Winter	10.244	0.194	1.2	23.2	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	180		
240 min Summer	18.658	0.0	240		
360 min Summer	13.718	0.0	306		
480 min Summer	11.023	0.0	368		
600 min Summer	9.295	0.0	432		
720 min Summer	8.082	0.0	498		
960 min Summer	6.475	0.0	636		
1440 min Summer	4.729	0.0	908		
2160 min Summer	3.446	0.0	1296		
2880 min Summer	2.750	0.0	1668		
4320 min Summer	1.997	0.0	2336		
5760 min Summer	1.589	0.0	2992		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4408		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park F - Permeable Paving			
Date 13/07/16 File Car Park F.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.309	0.259	1.2	31.0	0 K
60 min Winter	10.375	0.325	1.2	38.9	0 K
120 min Winter	10.433	0.383	1.2	45.8	0 K
180 min Winter	10.456	0.406	1.2	48.6	0 K
240 min Winter	10.464	0.414	1.2	49.6	0 K
360 min Winter	10.463	0.413	1.2	49.5	0 K
480 min Winter	10.452	0.402	1.2	48.1	0 K
600 min Winter	10.441	0.391	1.2	46.8	0 K
720 min Winter	10.428	0.378	1.2	45.2	0 K
960 min Winter	10.398	0.348	1.2	41.7	0 K
1440 min Winter	10.336	0.286	1.2	34.2	0 K
2160 min Winter	10.249	0.199	1.2	23.8	0 K
2880 min Winter	10.177	0.127	1.2	15.2	0 K
4320 min Winter	10.100	0.050	1.2	5.8	0 K
5760 min Winter	10.090	0.040	1.0	4.6	0 K
7200 min Winter	10.083	0.033	0.8	3.9	0 K
8640 min Winter	10.079	0.029	0.7	3.3	0 K
10080 min Winter	10.076	0.026	0.6	2.9	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	31		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	176		
240 min Winter	18.658	0.0	232		
360 min Winter	13.718	0.0	342		
480 min Winter	11.023	0.0	396		
600 min Winter	9.295	0.0	464		
720 min Winter	8.082	0.0	542		
960 min Winter	6.475	0.0	692		
1440 min Winter	4.729	0.0	980		
2160 min Winter	3.446	0.0	1384		
2880 min Winter	2.750	0.0	1732		
4320 min Winter	1.997	0.0	2208		
5760 min Winter	1.589	0.0	2944		
7200 min Winter	1.330	0.0	3680		
8640 min Winter	1.151	0.0	4408		
10080 min Winter	1.019	0.0	5080		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park F - Permeable Paving	
Date 13/07/16 File Car Park F.srcx	Designed by LK Checked by AMF	
Micro Drainage		Source Control 2015.1

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.103

Time (mins)		Area
From:	To:	(ha)
0	1	0.103

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park F - Permeable Paving																									
Date 13/07/16	Designed by LK																									
File Car Park F.srcx	Checked by AMF																									
Micro Drainage		Source Control 2015.1																								
<u>Model Details</u> Storage is Online Cover Level (m) 10.600 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.02160</td> <td>Width (m)</td> <td>20.0</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>500</td> <td>Length (m)</td> <td>20.0</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>55.6</td> <td>Slope (1:X)</td> <td>10000.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>3</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>1</td> </tr> <tr> <td>Invert Level (m)</td> <td>10.050</td> <td>Cap Volume Depth (m)</td> <td>0.450</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.02160	Width (m)	20.0	Membrane Percolation (mm/hr)	500	Length (m)	20.0	Max Percolation (l/s)	55.6	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.050	Cap Volume Depth (m)	0.450
Infiltration Coefficient Base (m/hr)	0.02160	Width (m)	20.0																							
Membrane Percolation (mm/hr)	500	Length (m)	20.0																							
Max Percolation (l/s)	55.6	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.050	Cap Volume Depth (m)	0.450																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
Car Park F - Permeable Paving

Date 13/07/16

Designed by LK

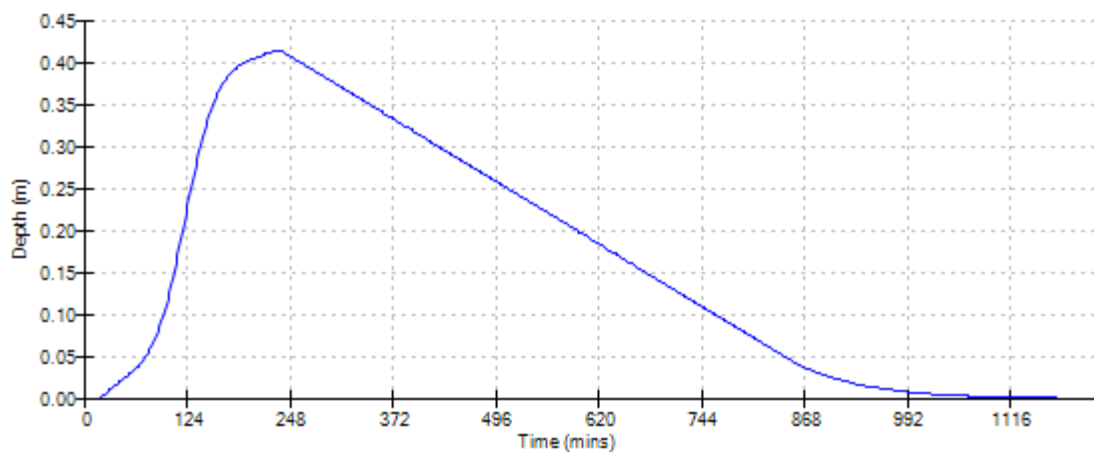
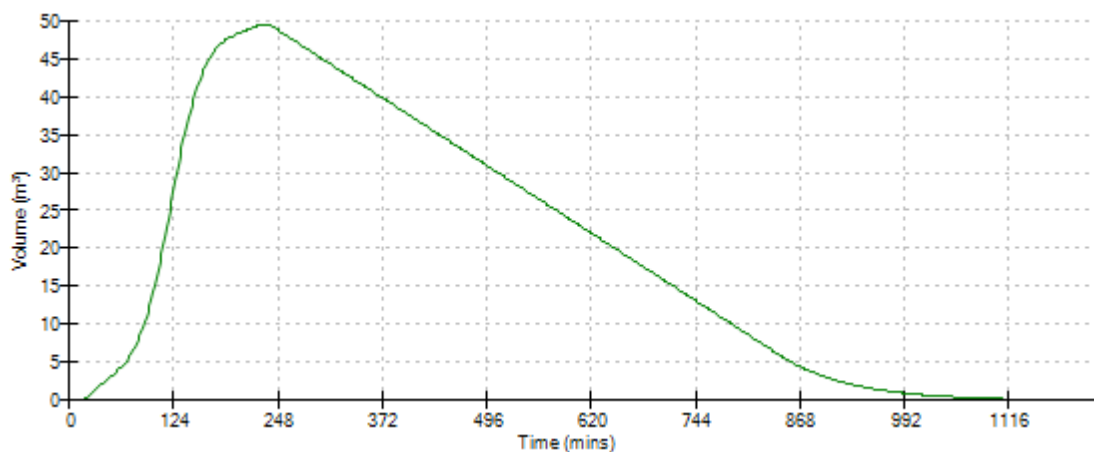
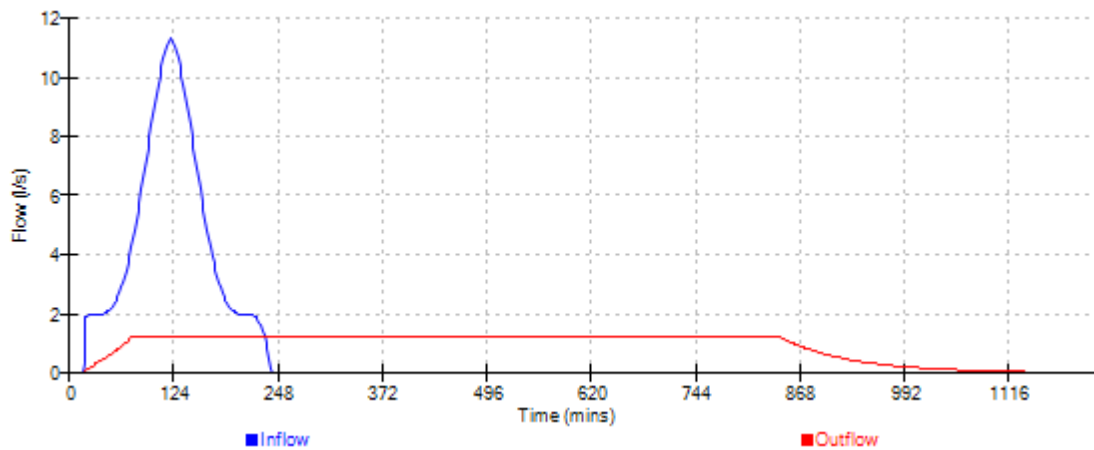
File Car Park F.srcx

Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 240 min Winter

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park G - Permeable Paving			
Date 13/07/16 File Car Park G.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 242 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.473	0.123	4.1	49.6	0 K
30 min Summer	10.514	0.164	4.1	66.3	0 K
60 min Summer	10.553	0.203	4.1	82.1	0 K
120 min Summer	10.583	0.233	4.1	94.3	0 K
180 min Summer	10.590	0.240	4.1	97.3	0 K
240 min Summer	10.590	0.240	4.1	97.2	0 K
360 min Summer	10.585	0.235	4.1	95.3	0 K
480 min Summer	10.578	0.228	4.1	92.4	0 K
600 min Summer	10.569	0.219	4.1	88.8	0 K
720 min Summer	10.560	0.210	4.1	85.0	0 K
960 min Summer	10.541	0.191	4.1	77.3	0 K
1440 min Summer	10.505	0.155	4.1	62.5	0 K
2160 min Summer	10.460	0.110	4.1	44.0	0 K
2880 min Summer	10.427	0.077	4.1	30.7	0 K
4320 min Summer	10.398	0.048	3.9	18.7	0 K
5760 min Summer	10.389	0.039	3.2	15.2	0 K
7200 min Summer	10.383	0.033	2.7	12.8	0 K
8640 min Summer	10.379	0.029	2.3	11.0	0 K
10080 min Summer	10.376	0.026	2.1	9.7	0 K
15 min Winter	10.489	0.139	4.1	56.2	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	178		
240 min Summer	18.658	0.0	204		
360 min Summer	13.718	0.0	266		
480 min Summer	11.023	0.0	332		
600 min Summer	9.295	0.0	402		
720 min Summer	8.082	0.0	470		
960 min Summer	6.475	0.0	606		
1440 min Summer	4.729	0.0	864		
2160 min Summer	3.446	0.0	1232		
2880 min Summer	2.750	0.0	1560		
4320 min Summer	1.997	0.0	2208		
5760 min Summer	1.589	0.0	2944		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4408		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park G - Permeable Paving			
Date 13/07/16		Designed by LK			
File Car Park G.srcx		Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.536	0.186	4.1	75.2	0 K
60 min Winter	10.581	0.231	4.1	93.5	0 K
120 min Winter	10.617	0.267	4.1	108.3	0 K
180 min Winter	10.628	0.278	4.1	112.9	0 K
240 min Winter	10.628	0.278	4.1	113.0	0 K
360 min Winter	10.620	0.270	4.1	109.7	0 K
480 min Winter	10.610	0.260	4.1	105.5	0 K
600 min Winter	10.597	0.247	4.1	100.2	0 K
720 min Winter	10.583	0.233	4.1	94.3	0 K
960 min Winter	10.553	0.203	4.1	82.3	0 K
1440 min Winter	10.497	0.147	4.1	59.4	0 K
2160 min Winter	10.432	0.082	4.1	32.7	0 K
2880 min Winter	10.399	0.049	4.0	19.4	0 K
4320 min Winter	10.386	0.036	3.0	14.1	0 K
5760 min Winter	10.379	0.029	2.4	11.1	0 K
7200 min Winter	10.374	0.024	2.0	9.2	0 K
8640 min Winter	10.371	0.021	1.7	7.8	0 K
10080 min Winter	10.369	0.019	1.5	6.8	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	174		
240 min Winter	18.658	0.0	228		
360 min Winter	13.718	0.0	286		
480 min Winter	11.023	0.0	362		
600 min Winter	9.295	0.0	438		
720 min Winter	8.082	0.0	512		
960 min Winter	6.475	0.0	654		
1440 min Winter	4.729	0.0	922		
2160 min Winter	3.446	0.0	1260		
2880 min Winter	2.750	0.0	1504		
4320 min Winter	1.997	0.0	2244		
5760 min Winter	1.589	0.0	2936		
7200 min Winter	1.330	0.0	3680		
8640 min Winter	1.151	0.0	4328		
10080 min Winter	1.019	0.0	4992		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park G - Permeable Paving																																		
Date 13/07/16	Designed by LK																																		
File Car Park G.srcx	Checked by AMF																																		
Micro Drainage		Source Control 2015.1																																	
<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>19.100</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.350</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+30</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.257 <table> <thead> <tr> <th colspan="2">Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To:</th> <th>(ha)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> <td>0.257</td> </tr> </tbody> </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)	19.100	Shortest Storm (mins)	15	Ratio R	0.350	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+30	Time (mins)		Area	From:	To:	(ha)	0	1	0.257
Rainfall Model	FSR	Winter Storms	Yes																																
Return Period (years)	100	Cv (Summer)	0.750																																
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0	1	0.257																																	
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Cundall, Johnston & Partners		Page 4																								
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park G - Permeable Paving																									
Date 13/07/16	Designed by LK																									
File Car Park G.srcx	Checked by AMF																									
Micro Drainage	Source Control 2015.1																									
Model Details Storage is Online Cover Level (m) 10.750 Porous Car Park Structure <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.02160</td><td>Width (m)</td><td>36.9</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>500</td><td>Length (m)</td><td>36.9</td></tr><tr><td>Max Percolation (l/s)</td><td>189.1</td><td>Slope (1:X)</td><td>10000.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>3</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>1</td></tr><tr><td>Invert Level (m)</td><td>10.350</td><td>Cap Volume Depth (m)</td><td>0.300</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.02160	Width (m)	36.9	Membrane Percolation (mm/hr)	500	Length (m)	36.9	Max Percolation (l/s)	189.1	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.350	Cap Volume Depth (m)	0.300
Infiltration Coefficient Base (m/hr)	0.02160	Width (m)	36.9																							
Membrane Percolation (mm/hr)	500	Length (m)	36.9																							
Max Percolation (l/s)	189.1	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.350	Cap Volume Depth (m)	0.300																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
Car Park G - Permeable Paving

Date 13/07/16

Designed by LK

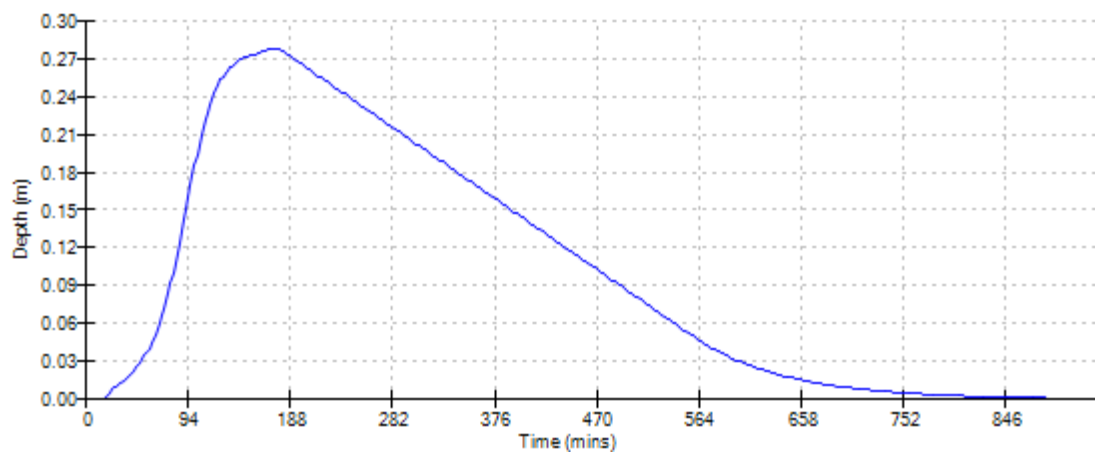
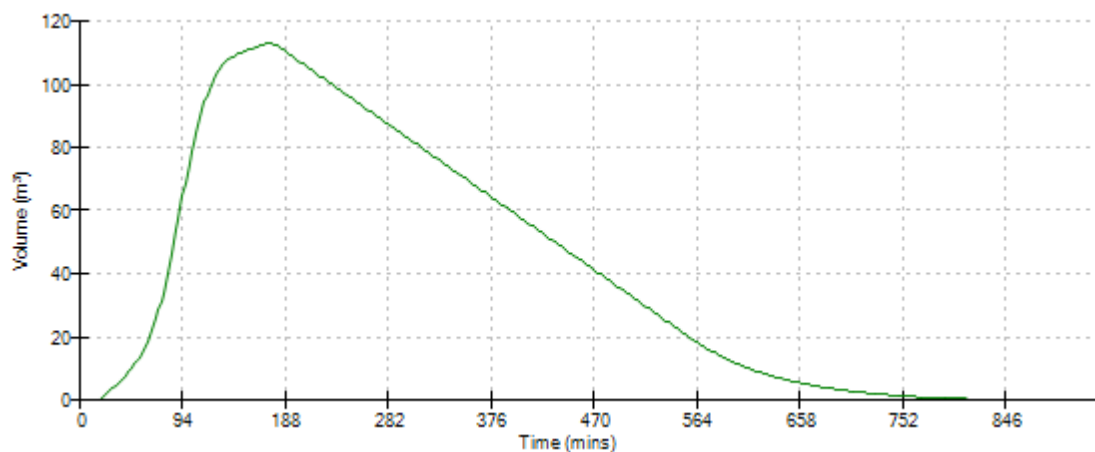
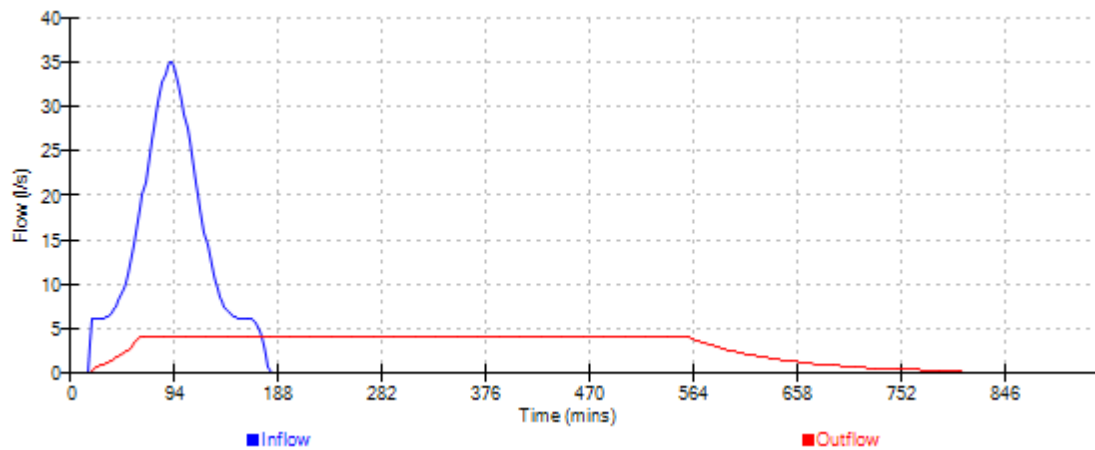
File Car Park G.srcx

Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 180 min Winter

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park H - Permeable Paving			
Date 13/07/16 File Car Park H.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 309 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.758	0.158	1.1	17.4	0 K
30 min Summer	10.811	0.211	1.1	23.2	0 K
60 min Summer	10.863	0.263	1.1	28.9	0 K
120 min Summer	10.905	0.305	1.1	33.6	0 K
180 min Summer	10.919	0.319	1.1	35.2	0 K
240 min Summer	10.921	0.321	1.1	35.4	0 K
360 min Summer	10.916	0.316	1.1	34.9	0 K
480 min Summer	10.909	0.309	1.1	34.1	0 K
600 min Summer	10.900	0.300	1.1	33.1	0 K
720 min Summer	10.890	0.290	1.1	32.0	0 K
960 min Summer	10.870	0.270	1.1	29.7	0 K
1440 min Summer	10.829	0.229	1.1	25.3	0 K
2160 min Summer	10.774	0.174	1.1	19.2	0 K
2880 min Summer	10.729	0.129	1.1	14.2	0 K
4320 min Summer	10.670	0.070	1.1	7.6	0 K
5760 min Summer	10.648	0.048	1.1	5.2	0 K
7200 min Summer	10.641	0.041	0.9	4.4	0 K
8640 min Summer	10.635	0.035	0.8	3.8	0 K
10080 min Summer	10.632	0.032	0.7	3.4	0 K
15 min Winter	10.779	0.179	1.1	19.7	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	180		
240 min Summer	18.658	0.0	234		
360 min Summer	13.718	0.0	288		
480 min Summer	11.023	0.0	352		
600 min Summer	9.295	0.0	420		
720 min Summer	8.082	0.0	488		
960 min Summer	6.475	0.0	624		
1440 min Summer	4.729	0.0	892		
2160 min Summer	3.446	0.0	1276		
2880 min Summer	2.750	0.0	1640		
4320 min Summer	1.997	0.0	2292		
5760 min Summer	1.589	0.0	2944		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4408		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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Cundall, Johnston & Partners				Page 2	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park H - Permeable Paving			
Date 13/07/16 File Car Park H.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.839	0.239	1.1	26.3	0 K
60 min Winter	10.898	0.298	1.1	32.9	0 K
120 min Winter	10.949	0.349	1.1	38.5	0 K
180 min Winter	10.968	0.368	1.1	40.6	0 K
240 min Winter	10.973	0.373	1.1	41.2	0 K
360 min Winter	10.968	0.368	1.1	40.6	0 K
480 min Winter	10.957	0.357	1.1	39.4	0 K
600 min Winter	10.945	0.345	1.1	38.0	0 K
720 min Winter	10.931	0.331	1.1	36.4	0 K
960 min Winter	10.899	0.299	1.1	33.0	0 K
1440 min Winter	10.836	0.236	1.1	26.0	0 K
2160 min Winter	10.753	0.153	1.1	16.8	0 K
2880 min Winter	10.689	0.089	1.1	9.7	0 K
4320 min Winter	10.645	0.045	1.0	4.8	0 K
5760 min Winter	10.636	0.036	0.8	3.8	0 K
7200 min Winter	10.630	0.030	0.7	3.2	0 K
8640 min Winter	10.626	0.026	0.6	2.8	0 K
10080 min Winter	10.623	0.023	0.5	2.4	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	176		
240 min Winter	18.658	0.0	232		
360 min Winter	13.718	0.0	336		
480 min Winter	11.023	0.0	378		
600 min Winter	9.295	0.0	456		
720 min Winter	8.082	0.0	532		
960 min Winter	6.475	0.0	682		
1440 min Winter	4.729	0.0	964		
2160 min Winter	3.446	0.0	1340		
2880 min Winter	2.750	0.0	1672		
4320 min Winter	1.997	0.0	2232		
5760 min Winter	1.589	0.0	2936		
7200 min Winter	1.330	0.0	3680		
8640 min Winter	1.151	0.0	4416		
10080 min Winter	1.019	0.0	5152		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park H - Permeable Paving																																		
Date 13/07/16	Designed by LK																																		
File Car Park H.srcx	Checked by AMF																																		
Micro Drainage		Source Control 2015.1																																	
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Rainfall Model	FSR	Winter Storms	Yes																																
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Date 13/07/16	Designed by LK																									
File Car Park H.srcx	Checked by AMF																									
Micro Drainage		Source Control 2015.1																								
<u>Model Details</u> Storage is Online Cover Level (m) 11.100 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.02232</td> <td>Width (m)</td> <td>19.2</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>500</td> <td>Length (m)</td> <td>19.2</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>51.2</td> <td>Slope (1:X)</td> <td>10000.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>3</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>1</td> </tr> <tr> <td>Invert Level (m)</td> <td>10.600</td> <td>Cap Volume Depth (m)</td> <td>0.400</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.02232	Width (m)	19.2	Membrane Percolation (mm/hr)	500	Length (m)	19.2	Max Percolation (l/s)	51.2	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.600	Cap Volume Depth (m)	0.400
Infiltration Coefficient Base (m/hr)	0.02232	Width (m)	19.2																							
Membrane Percolation (mm/hr)	500	Length (m)	19.2																							
Max Percolation (l/s)	51.2	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.600	Cap Volume Depth (m)	0.400																							
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SUDS Sizing
Car Park H - Permeable Paving

Date 13/07/16

Designed by LK

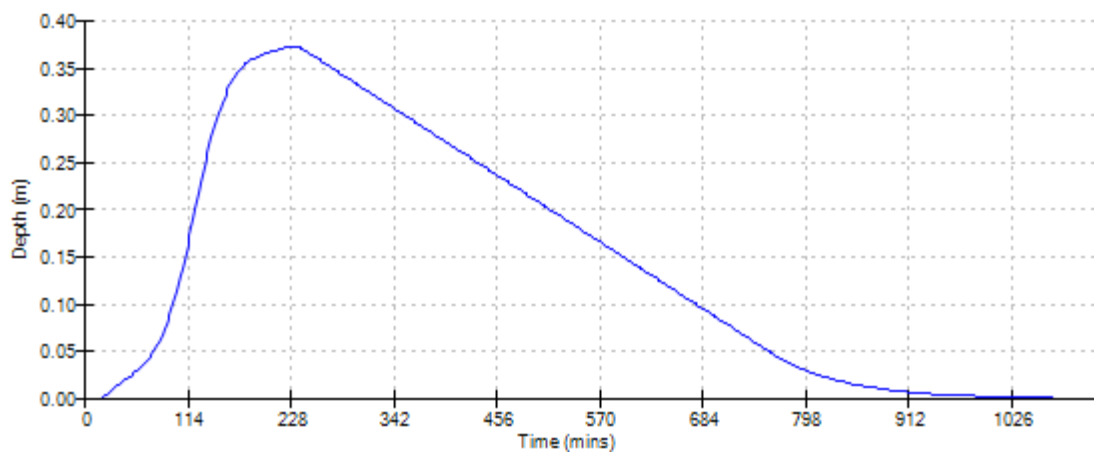
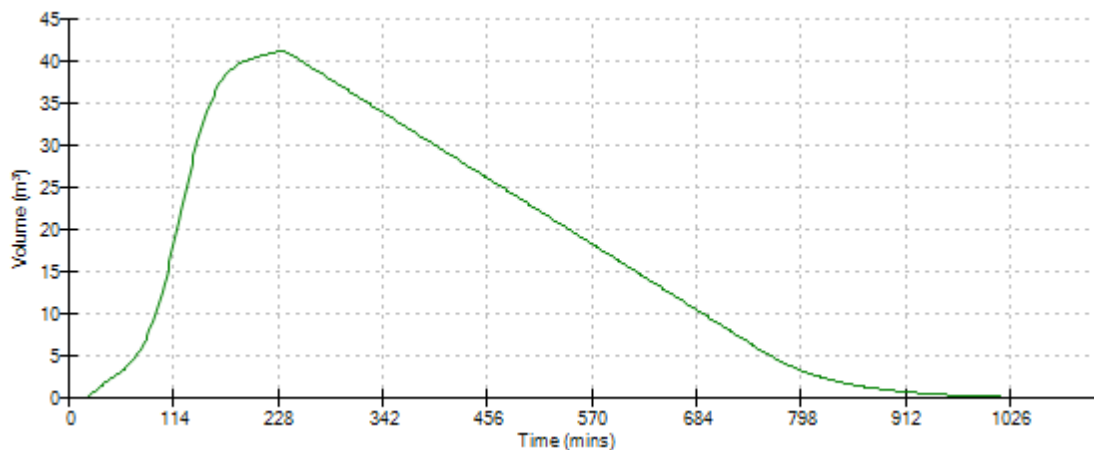
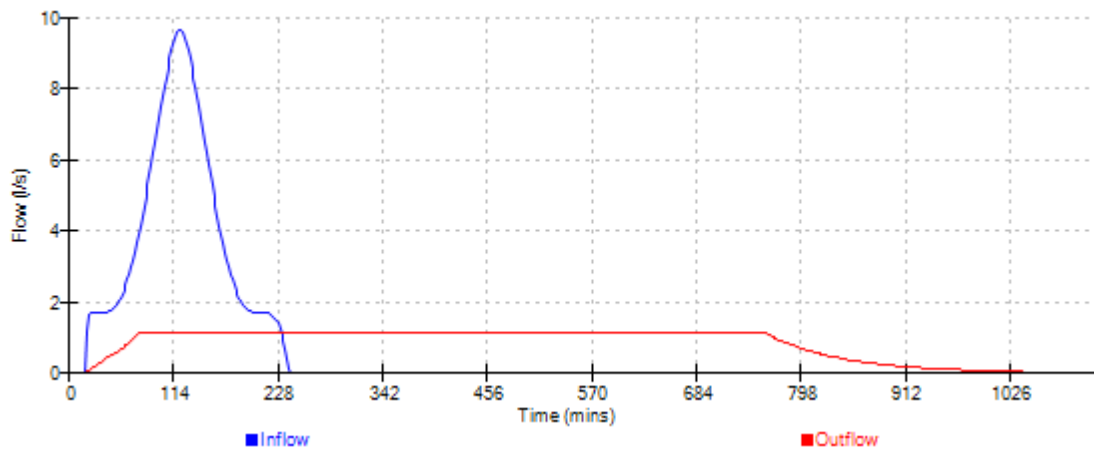
File Car Park H.srcx

Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 240 min Winter

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Date 13/07/16 File Car Park I.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 209 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.913	0.113	0.8	8.6	0 K
30 min Summer	10.950	0.150	0.8	11.5	0 K
60 min Summer	10.985	0.185	0.8	14.2	0 K
120 min Summer	11.011	0.211	0.8	16.2	0 K
180 min Summer	11.016	0.216	0.8	16.6	0 K
240 min Summer	11.016	0.216	0.8	16.5	0 K
360 min Summer	11.011	0.211	0.8	16.1	0 K
480 min Summer	11.003	0.203	0.8	15.6	0 K
600 min Summer	10.994	0.194	0.8	14.9	0 K
720 min Summer	10.985	0.185	0.8	14.1	0 K
960 min Summer	10.966	0.166	0.8	12.7	0 K
1440 min Summer	10.930	0.130	0.8	10.0	0 K
2160 min Summer	10.889	0.089	0.8	6.8	0 K
2880 min Summer	10.862	0.062	0.8	4.7	0 K
4320 min Summer	10.843	0.043	0.7	3.2	0 K
5760 min Summer	10.835	0.035	0.6	2.6	0 K
7200 min Summer	10.830	0.030	0.5	2.2	0 K
8640 min Summer	10.826	0.026	0.4	1.9	0 K
10080 min Summer	10.823	0.023	0.4	1.7	0 K
15 min Winter	10.928	0.128	0.8	9.7	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	60		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	164		
240 min Summer	18.658	0.0	192		
360 min Summer	13.718	0.0	258		
480 min Summer	11.023	0.0	326		
600 min Summer	9.295	0.0	392		
720 min Summer	8.082	0.0	462		
960 min Summer	6.475	0.0	596		
1440 min Summer	4.729	0.0	850		
2160 min Summer	3.446	0.0	1208		
2880 min Summer	2.750	0.0	1528		
4320 min Summer	1.997	0.0	2208		
5760 min Summer	1.589	0.0	2944		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4400		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park I - Permeable Paving			
Date 13/07/16 File Car Park I.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.971	0.171	0.8	13.0	0 K
60 min Winter	11.011	0.211	0.8	16.2	0 K
120 min Winter	11.043	0.243	0.8	18.6	0 K
180 min Winter	11.051	0.251	0.8	19.2	0 K
240 min Winter	11.050	0.250	0.8	19.1	0 K
360 min Winter	11.041	0.241	0.8	18.5	0 K
480 min Winter	11.030	0.230	0.8	17.6	0 K
600 min Winter	11.016	0.216	0.8	16.5	0 K
720 min Winter	11.001	0.201	0.8	15.4	0 K
960 min Winter	10.972	0.172	0.8	13.1	0 K
1440 min Winter	10.917	0.117	0.8	9.0	0 K
2160 min Winter	10.861	0.061	0.8	4.6	0 K
2880 min Winter	10.844	0.044	0.7	3.4	0 K
4320 min Winter	10.833	0.033	0.5	2.4	0 K
5760 min Winter	10.826	0.026	0.4	1.9	0 K
7200 min Winter	10.822	0.022	0.4	1.6	0 K
8640 min Winter	10.819	0.019	0.3	1.4	0 K
10080 min Winter	10.817	0.017	0.3	1.2	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	172		
240 min Winter	18.658	0.0	224		
360 min Winter	13.718	0.0	278		
480 min Winter	11.023	0.0	354		
600 min Winter	9.295	0.0	428		
720 min Winter	8.082	0.0	504		
960 min Winter	6.475	0.0	644		
1440 min Winter	4.729	0.0	894		
2160 min Winter	3.446	0.0	1212		
2880 min Winter	2.750	0.0	1524		
4320 min Winter	1.997	0.0	2244		
5760 min Winter	1.589	0.0	2944		
7200 min Winter	1.330	0.0	3672		
8640 min Winter	1.151	0.0	4368		
10080 min Winter	1.019	0.0	5144		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park I - Permeable Paving																																		
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File Car Park I.srcx	Checked by AMF																																		
Micro Drainage		Source Control 2015.1																																	
<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>19.100</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.350</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+30</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.045 <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>1</td> <td>0.045</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)	19.100	Shortest Storm (mins)	15	Ratio R	0.350	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+30	Time (mins)		Area	From:	To:	(ha)	0	1	0.045
Rainfall Model	FSR	Winter Storms	Yes																																
Return Period (years)	100	Cv (Summer)	0.750																																
Region	England and Wales	Cv (Winter)	0.840																																
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Time (mins)		Area																																	
From:	To:	(ha)																																	
0	1	0.045																																	
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Cundall, Johnston & Partners		Page 4																								
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park I - Permeable Paving																									
Date 13/07/16	Designed by LK																									
File Car Park I.srcx	Checked by AMF																									
Micro Drainage		Source Control 2015.1																								
<u>Model Details</u> Storage is Online Cover Level (m) 11.200 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.02232</td> <td>Width (m)</td> <td>16.0</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>500</td> <td>Length (m)</td> <td>16.0</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>35.6</td> <td>Slope (1:X)</td> <td>10000.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>3</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>1</td> </tr> <tr> <td>Invert Level (m)</td> <td>10.800</td> <td>Cap Volume Depth (m)</td> <td>0.300</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.02232	Width (m)	16.0	Membrane Percolation (mm/hr)	500	Length (m)	16.0	Max Percolation (l/s)	35.6	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.800	Cap Volume Depth (m)	0.300
Infiltration Coefficient Base (m/hr)	0.02232	Width (m)	16.0																							
Membrane Percolation (mm/hr)	500	Length (m)	16.0																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
Car Park I - Permeable Paving

Date 13/07/16

Designed by LK

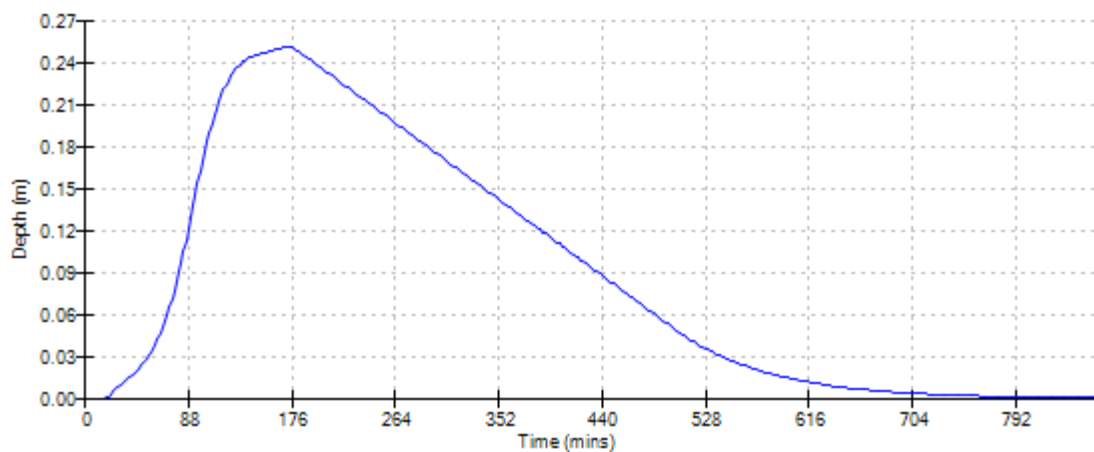
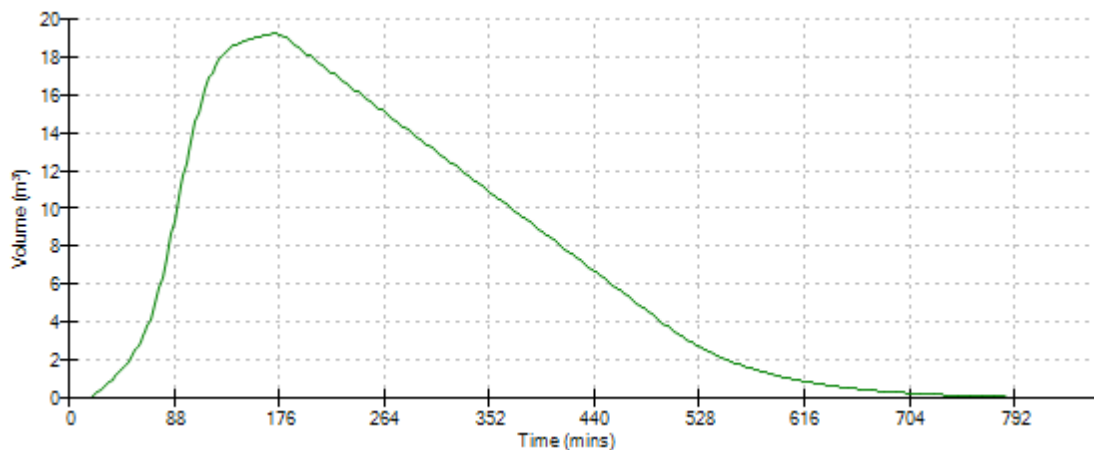
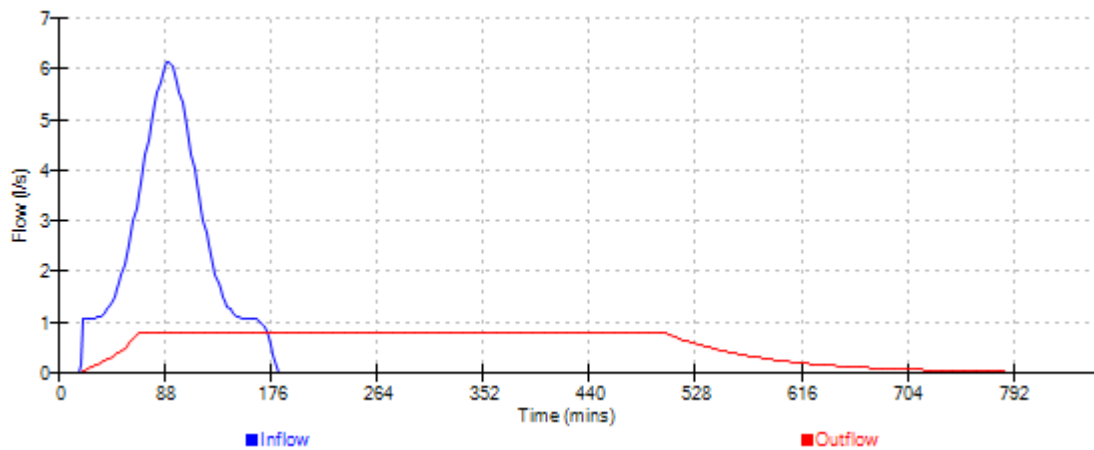
File Car Park I.srcx

Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 180 min Winter

Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park J - Permeable Paving			
Date 13/07/16 File Car Park J.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 259 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.938	0.138	1.5	19.5	0 K
30 min Summer	10.984	0.184	1.5	26.1	0 K
60 min Summer	11.028	0.228	1.5	32.3	0 K
120 min Summer	11.063	0.263	1.5	37.3	0 K
180 min Summer	11.073	0.273	1.5	38.7	0 K
240 min Summer	11.072	0.272	1.5	38.7	0 K
360 min Summer	11.068	0.268	1.5	38.0	0 K
480 min Summer	11.060	0.260	1.5	37.0	0 K
600 min Summer	11.051	0.251	1.5	35.7	0 K
720 min Summer	11.042	0.242	1.5	34.3	0 K
960 min Summer	11.022	0.222	1.5	31.4	0 K
1440 min Summer	10.983	0.183	1.5	25.9	0 K
2160 min Summer	10.933	0.133	1.5	18.8	0 K
2880 min Summer	10.894	0.094	1.5	13.3	0 K
4320 min Summer	10.852	0.052	1.5	7.3	0 K
5760 min Summer	10.842	0.042	1.2	5.8	0 K
7200 min Summer	10.836	0.036	1.1	4.9	0 K
8640 min Summer	10.831	0.031	0.9	4.3	0 K
10080 min Summer	10.828	0.028	0.8	3.8	0 K
15 min Winter	10.956	0.156	1.5	22.1	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	180		
240 min Summer	18.658	0.0	212		
360 min Summer	13.718	0.0	274		
480 min Summer	11.023	0.0	338		
600 min Summer	9.295	0.0	408		
720 min Summer	8.082	0.0	476		
960 min Summer	6.475	0.0	614		
1440 min Summer	4.729	0.0	878		
2160 min Summer	3.446	0.0	1252		
2880 min Summer	2.750	0.0	1588		
4320 min Summer	1.997	0.0	2244		
5760 min Summer	1.589	0.0	2944		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4408		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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Cundall, Johnston & Partners				Page 2	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park J - Permeable Paving			
Date 13/07/16 File Car Park J.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	11.008	0.208	1.5	29.5	0 K
60 min Winter	11.059	0.259	1.5	36.8	0 K
120 min Winter	11.101	0.301	1.5	42.8	0 K
180 min Winter	11.115	0.315	1.5	44.8	0 K
240 min Winter	11.117	0.317	1.5	45.1	0 K
360 min Winter	11.109	0.309	1.5	43.9	0 K
480 min Winter	11.099	0.299	1.5	42.4	0 K
600 min Winter	11.086	0.286	1.5	40.6	0 K
720 min Winter	11.071	0.271	1.5	38.5	0 K
960 min Winter	11.040	0.240	1.5	34.1	0 K
1440 min Winter	10.980	0.180	1.5	25.5	0 K
2160 min Winter	10.905	0.105	1.5	14.8	0 K
2880 min Winter	10.858	0.058	1.5	8.1	0 K
4320 min Winter	10.839	0.039	1.2	5.4	0 K
5760 min Winter	10.831	0.031	0.9	4.3	0 K
7200 min Winter	10.826	0.026	0.8	3.6	0 K
8640 min Winter	10.823	0.023	0.7	3.1	0 K
10080 min Winter	10.820	0.020	0.6	2.7	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	174		
240 min Winter	18.658	0.0	230		
360 min Winter	13.718	0.0	294		
480 min Winter	11.023	0.0	366		
600 min Winter	9.295	0.0	444		
720 min Winter	8.082	0.0	520		
960 min Winter	6.475	0.0	664		
1440 min Winter	4.729	0.0	936		
2160 min Winter	3.446	0.0	1296		
2880 min Winter	2.750	0.0	1584		
4320 min Winter	1.997	0.0	2244		
5760 min Winter	1.589	0.0	2944		
7200 min Winter	1.330	0.0	3680		
8640 min Winter	1.151	0.0	4408		
10080 min Winter	1.019	0.0	5136		
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Cundall, Johnston & Partners		Page 3
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park J - Permeable Paving	
Date 13/07/16 File Car Park J.srcx	Designed by LK Checked by AMF	
Micro Drainage		Source Control 2015.1

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.100

Time (mins)		Area
From:	To:	(ha)
0	1	0.100

Cundall, Johnston & Partners		Page 4																								
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park J - Permeable Paving																									
Date 13/07/16	Designed by LK																									
File Car Park J.srcx	Checked by AMF																									
Micro Drainage		Source Control 2015.1																								
<u>Model Details</u> Storage is Online Cover Level (m) 11.300 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.02232</td> <td>Width (m)</td> <td>21.8</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>500</td> <td>Length (m)</td> <td>21.8</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>66.0</td> <td>Slope (1:X)</td> <td>10000.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>3</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>1</td> </tr> <tr> <td>Invert Level (m)</td> <td>10.800</td> <td>Cap Volume Depth (m)</td> <td>0.400</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.02232	Width (m)	21.8	Membrane Percolation (mm/hr)	500	Length (m)	21.8	Max Percolation (l/s)	66.0	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.800	Cap Volume Depth (m)	0.400
Infiltration Coefficient Base (m/hr)	0.02232	Width (m)	21.8																							
Membrane Percolation (mm/hr)	500	Length (m)	21.8																							
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Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.800	Cap Volume Depth (m)	0.400																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
Car Park J - Permeable Paving

Date 13/07/16

Designed by LK

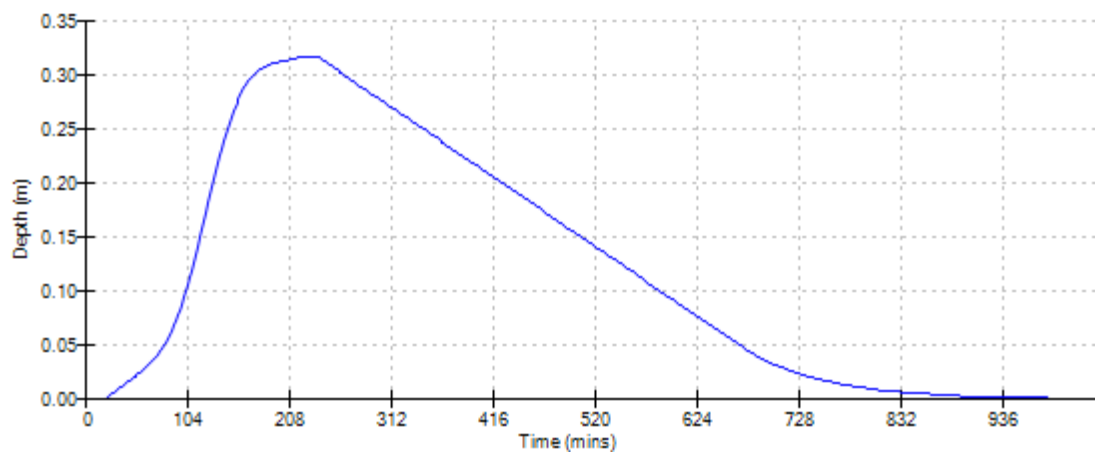
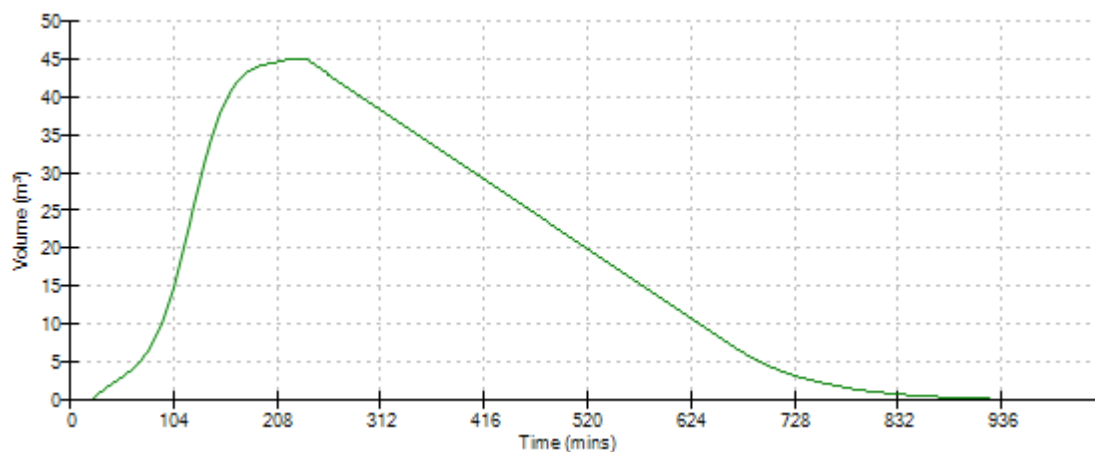
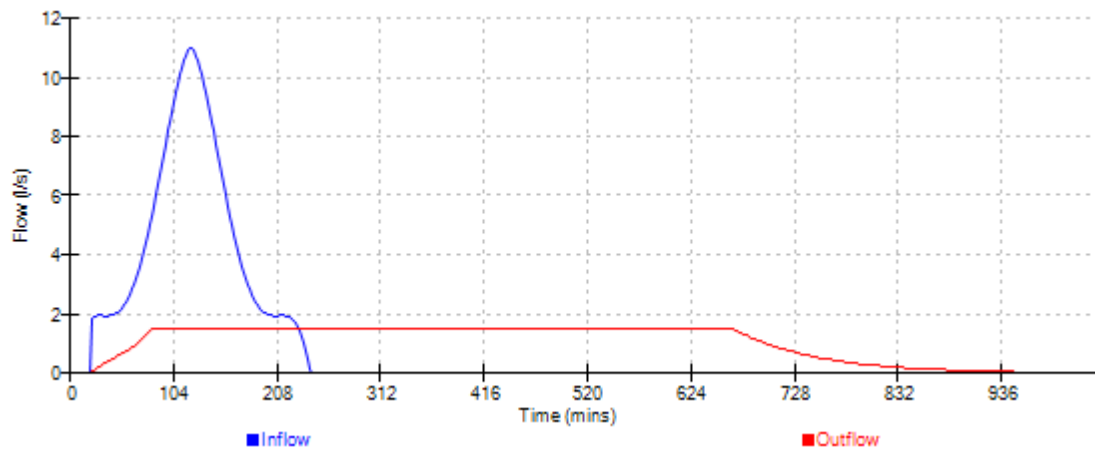
File Car Park J.srcx

Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 240 min Winter

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park K - Permeable Paving			
Date 13/07/16 File Car Park K.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 362 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	9.195	0.145	0.7	12.6	0 K
30 min Summer	9.244	0.194	0.7	17.0	0 K
60 min Summer	9.293	0.243	0.7	21.3	0 K
120 min Summer	9.336	0.286	0.7	25.0	0 K
180 min Summer	9.352	0.302	0.7	26.4	0 K
240 min Summer	9.357	0.307	0.7	26.8	0 K
360 min Summer	9.355	0.305	0.7	26.7	0 K
480 min Summer	9.350	0.300	0.7	26.3	0 K
600 min Summer	9.344	0.294	0.7	25.7	0 K
720 min Summer	9.336	0.286	0.7	25.1	0 K
960 min Summer	9.320	0.270	0.7	23.6	0 K
1440 min Summer	9.287	0.237	0.7	20.7	0 K
2160 min Summer	9.240	0.190	0.7	16.6	0 K
2880 min Summer	9.199	0.149	0.7	13.0	0 K
4320 min Summer	9.138	0.088	0.7	7.7	0 K
5760 min Summer	9.106	0.056	0.7	4.8	0 K
7200 min Summer	9.095	0.045	0.7	3.9	0 K
8640 min Summer	9.090	0.040	0.6	3.4	0 K
10080 min Summer	9.086	0.036	0.5	3.0	0 K
15 min Winter	9.214	0.164	0.7	14.3	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	120		
180 min Summer	23.167	0.0	180		
240 min Summer	18.658	0.0	240		
360 min Summer	13.718	0.0	308		
480 min Summer	11.023	0.0	370		
600 min Summer	9.295	0.0	434		
720 min Summer	8.082	0.0	500		
960 min Summer	6.475	0.0	636		
1440 min Summer	4.729	0.0	908		
2160 min Summer	3.446	0.0	1300		
2880 min Summer	2.750	0.0	1672		
4320 min Summer	1.997	0.0	2340		
5760 min Summer	1.589	0.0	3000		
7200 min Summer	1.330	0.0	3680		
8640 min Summer	1.151	0.0	4408		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Car Park K - Permeable Paving			
Date 13/07/16		Designed by LK			
File Car Park K.srcx		Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	9.270	0.220	0.7	19.2	0 K
60 min Winter	9.326	0.276	0.7	24.1	0 K
120 min Winter	9.376	0.326	0.7	28.5	0 K
180 min Winter	9.397	0.347	0.7	30.4	0 K
240 min Winter	9.405	0.355	0.7	31.0	0 K
360 min Winter	9.406	0.356	0.7	31.1	0 K
480 min Winter	9.397	0.347	0.7	30.4	0 K
600 min Winter	9.389	0.339	0.7	29.7	0 K
720 min Winter	9.379	0.329	0.7	28.8	0 K
960 min Winter	9.355	0.305	0.7	26.7	0 K
1440 min Winter	9.303	0.253	0.7	22.1	0 K
2160 min Winter	9.231	0.181	0.7	15.8	0 K
2880 min Winter	9.170	0.120	0.7	10.5	0 K
4320 min Winter	9.100	0.050	0.7	4.3	0 K
5760 min Winter	9.090	0.040	0.6	3.5	0 K
7200 min Winter	9.084	0.034	0.5	2.9	0 K
8640 min Winter	9.079	0.029	0.4	2.5	0 K
10080 min Winter	9.076	0.026	0.4	2.2	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	31		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	118		
180 min Winter	23.167	0.0	176		
240 min Winter	18.658	0.0	232		
360 min Winter	13.718	0.0	342		
480 min Winter	11.023	0.0	404		
600 min Winter	9.295	0.0	468		
720 min Winter	8.082	0.0	542		
960 min Winter	6.475	0.0	694		
1440 min Winter	4.729	0.0	982		
2160 min Winter	3.446	0.0	1384		
2880 min Winter	2.750	0.0	1732		
4320 min Winter	1.997	0.0	2248		
5760 min Winter	1.589	0.0	2992		
7200 min Winter	1.330	0.0	3680		
8640 min Winter	1.151	0.0	4416		
10080 min Winter	1.019	0.0	5112		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park K - Permeable Paving																																		
Date 13/07/16	Designed by LK																																		
File Car Park K.srcx	Checked by AMF																																		
Micro Drainage		Source Control 2015.1																																	
<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>19.100</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.350</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+30</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.064 <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>1</td> <td>0.064</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)	19.100	Shortest Storm (mins)	15	Ratio R	0.350	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+30	Time (mins)		Area	From:	To:	(ha)	0	1	0.064
Rainfall Model	FSR	Winter Storms	Yes																																
Return Period (years)	100	Cv (Summer)	0.750																																
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Car Park K - Permeable Paving																									
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<u>Model Details</u> Storage is Online Cover Level (m) 9.550 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.01800</td> <td>Width (m)</td> <td>17.1</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>500</td> <td>Length (m)</td> <td>17.1</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>40.6</td> <td>Slope (1:X)</td> <td>10000.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>3</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>1</td> </tr> <tr> <td>Invert Level (m)</td> <td>9.050</td> <td>Cap Volume Depth (m)</td> <td>0.400</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.01800	Width (m)	17.1	Membrane Percolation (mm/hr)	500	Length (m)	17.1	Max Percolation (l/s)	40.6	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	9.050	Cap Volume Depth (m)	0.400
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SUDS Sizing
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Date 13/07/16

Designed by LK

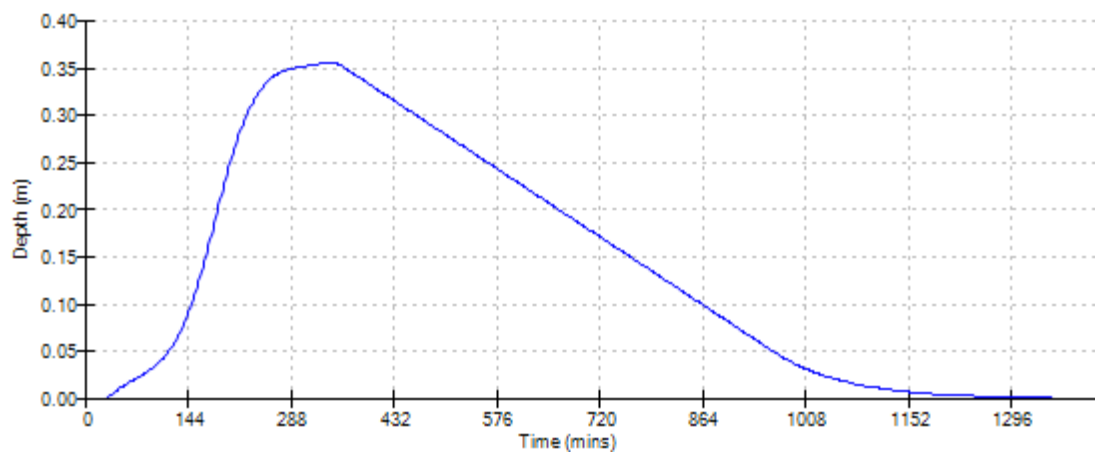
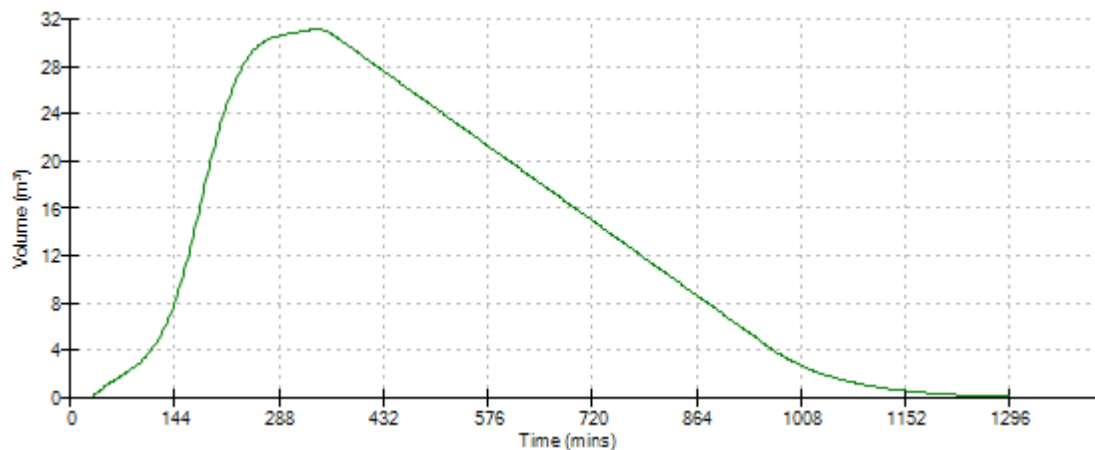
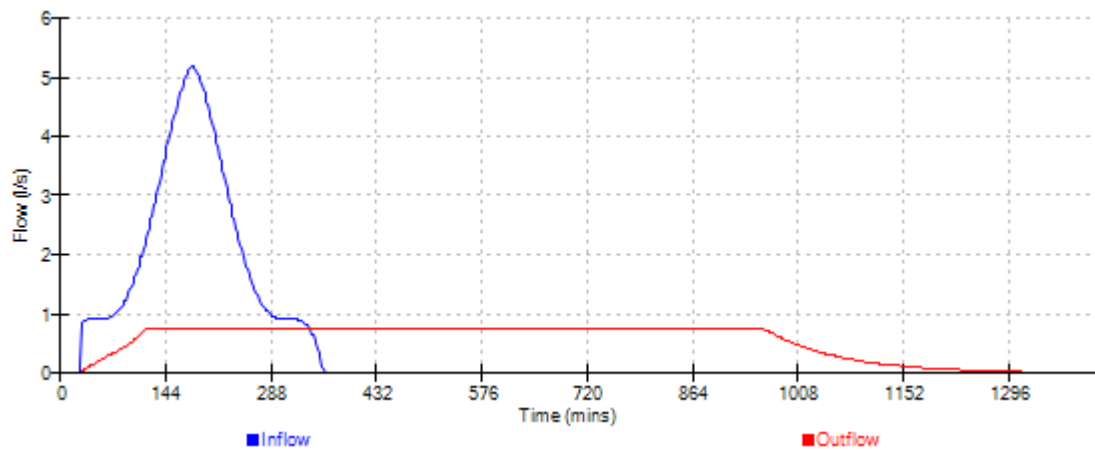
File Car Park K.srcx

Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 360 min Winter

Cundall, Johnston & Partners				Page 1																																																																																																																																																																																																																			
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Summary of Results for 100 year Return Period (+30%) Half Drain Time : 94 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>10.954</td><td>0.054</td><td>0.3</td><td>1.4</td><td>0 K</td></tr><tr><td>30 min Summer</td><td>10.972</td><td>0.072</td><td>0.3</td><td>1.8</td><td>0 K</td></tr><tr><td>60 min Summer</td><td>10.987</td><td>0.087</td><td>0.3</td><td>2.2</td><td>0 K</td></tr><tr><td>120 min Summer</td><td>10.996</td><td>0.096</td><td>0.3</td><td>2.4</td><td>0 K</td></tr><tr><td>180 min Summer</td><td>10.997</td><td>0.097</td><td>0.3</td><td>2.5</td><td>0 K</td></tr><tr><td>240 min Summer</td><td>10.996</td><td>0.096</td><td>0.3</td><td>2.4</td><td>0 K</td></tr><tr><td>360 min Summer</td><td>10.990</td><td>0.090</td><td>0.3</td><td>2.3</td><td>0 K</td></tr><tr><td>480 min Summer</td><td>10.983</td><td>0.083</td><td>0.3</td><td>2.1</td><td>0 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Summer</td><td>8.082</td><td>0.0</td><td>420</td></tr><tr><td>960 min Summer</td><td>6.475</td><td>0.0</td><td>538</td></tr><tr><td>1440 min Summer</td><td>4.729</td><td>0.0</td><td>766</td></tr><tr><td>2160 min Summer</td><td>3.446</td><td>0.0</td><td>1128</td></tr><tr><td>2880 min Summer</td><td>2.750</td><td>0.0</td><td>1500</td></tr><tr><td>4320 min Summer</td><td>1.997</td><td>0.0</td><td>2208</td></tr><tr><td>5760 min Summer</td><td>1.589</td><td>0.0</td><td>2944</td></tr><tr><td>7200 min Summer</td><td>1.330</td><td>0.0</td><td>3672</td></tr><tr><td>8640 min Summer</td><td>1.151</td><td>0.0</td><td>4408</td></tr><tr><td>10080 min Summer</td><td>1.019</td><td>0.0</td><td>5144</td></tr><tr><td>15 min Winter</td><td>116.400</td><td>0.0</td><td>15</td></tr></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	10.954	0.054	0.3	1.4	0 K	30 min Summer	10.972	0.072	0.3	1.8	0 K	60 min Summer	10.987	0.087	0.3	2.2	0 K	120 min Summer	10.996	0.096	0.3	2.4	0 K	180 min Summer	10.997	0.097	0.3	2.5	0 K	240 min Summer	10.996	0.096	0.3	2.4	0 K	360 min Summer	10.990	0.090	0.3	2.3	0 K	480 min Summer	10.983	0.083	0.3	2.1	0 K	600 min Summer	10.976	0.076	0.3	1.9	0 K	720 min Summer	10.970	0.070	0.3	1.8	0 K	960 min Summer	10.958	0.058	0.3	1.5	0 K	1440 min Summer	10.946	0.046	0.2	1.1	0 K	2160 min Summer	10.936	0.036	0.2	0.9	0 K	2880 min Summer	10.930	0.030	0.2	0.8	0 K	4320 min Summer	10.923	0.023	0.1	0.6	0 K	5760 min Summer	10.919	0.019	0.1	0.5	0 K	7200 min Summer	10.916	0.016	0.1	0.4	0 K	8640 min Summer	10.914	0.014	0.1	0.3	0 K	10080 min Summer	10.912	0.012	0.1	0.3	0 K	15 min Winter	10.962	0.062	0.3	1.6	0 K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	116.400	0.0	16	30 min Summer	78.248	0.0	30	60 min Summer	50.211	0.0	60	120 min Summer	31.113	0.0	92	180 min Summer	23.167	0.0	126	240 min Summer	18.658	0.0	160	360 min Summer	13.718	0.0	228	480 min Summer	11.023	0.0	294	600 min Summer	9.295	0.0	356	720 min Summer	8.082	0.0	420	960 min Summer	6.475	0.0	538	1440 min Summer	4.729	0.0	766	2160 min Summer	3.446	0.0	1128	2880 min Summer	2.750	0.0	1500	4320 min Summer	1.997	0.0	2208	5760 min Summer	1.589	0.0	2944	7200 min Summer	1.330	0.0	3672	8640 min Summer	1.151	0.0	4408	10080 min Summer	1.019	0.0	5144	15 min Winter	116.400	0.0	15
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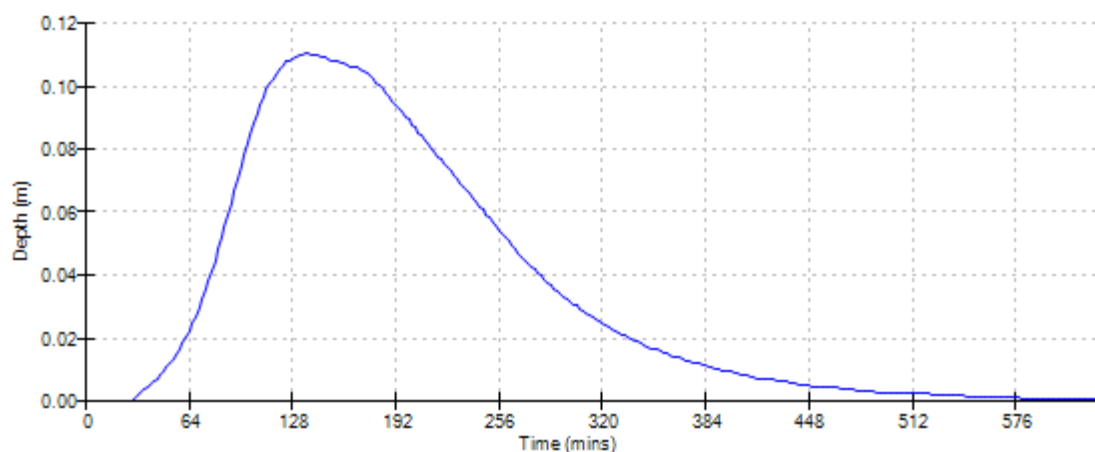
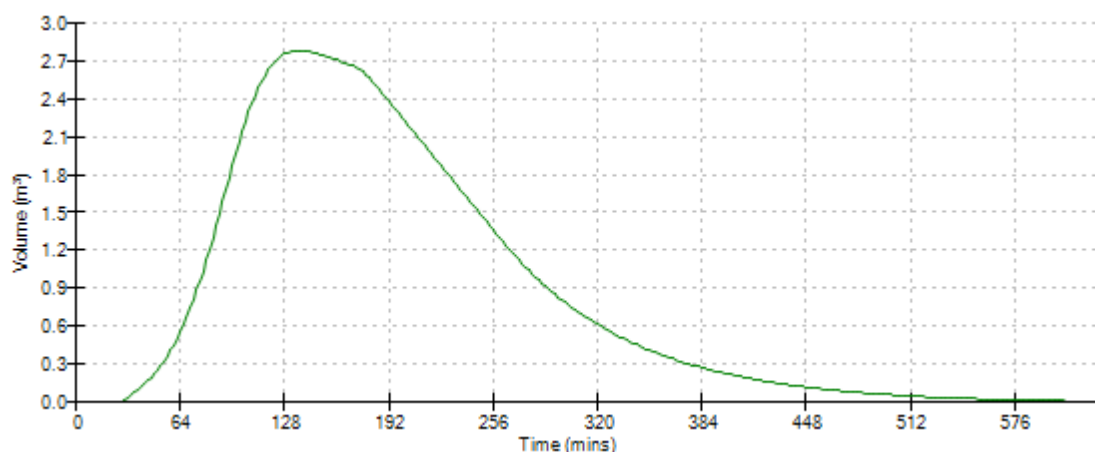
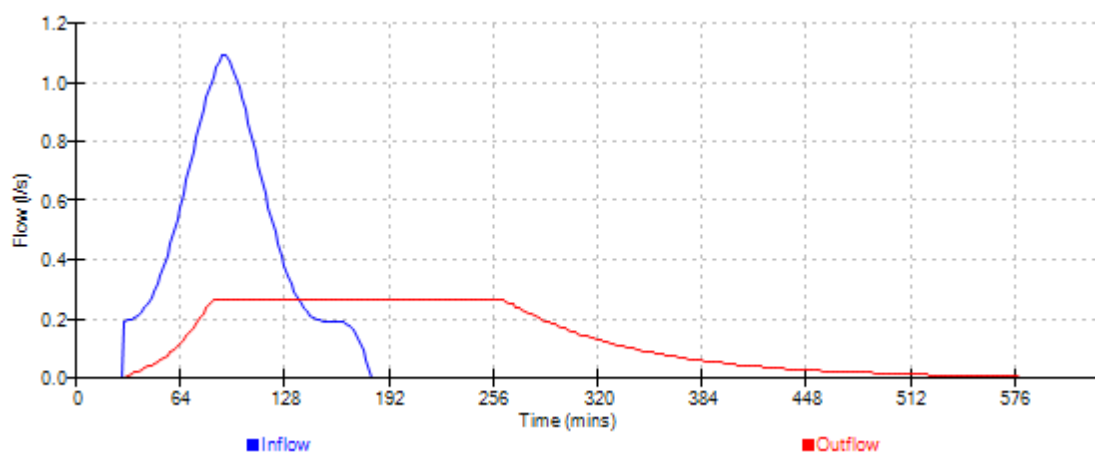
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Typ. Driveway - Perm. Paving			
Date 13/07/16		Designed by LK			
File Typ Driveway.srcx		Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.983	0.083	0.3	2.1	0 K
60 min Winter	11.001	0.101	0.3	2.5	0 K
120 min Winter	11.010	0.110	0.3	2.8	0 K
180 min Winter	11.010	0.110	0.3	2.8	0 K
240 min Winter	11.007	0.107	0.3	2.7	0 K
360 min Winter	10.997	0.097	0.3	2.4	0 K
480 min Winter	10.985	0.085	0.3	2.2	0 K
600 min Winter	10.974	0.074	0.3	1.9	0 K
720 min Winter	10.964	0.064	0.3	1.6	0 K
960 min Winter	10.950	0.050	0.3	1.3	0 K
1440 min Winter	10.939	0.039	0.2	1.0	0 K
2160 min Winter	10.929	0.029	0.2	0.7	0 K
2880 min Winter	10.924	0.024	0.1	0.6	0 K
4320 min Winter	10.918	0.018	0.1	0.4	0 K
5760 min Winter	10.914	0.014	0.1	0.3	0 K
7200 min Winter	10.912	0.012	0.1	0.3	0 K
8640 min Winter	10.910	0.010	0.1	0.2	0 K
10080 min Winter	10.909	0.009	0.0	0.2	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	58		
120 min Winter	31.113	0.0	100		
180 min Winter	23.167	0.0	136		
240 min Winter	18.658	0.0	174		
360 min Winter	13.718	0.0	248		
480 min Winter	11.023	0.0	316		
600 min Winter	9.295	0.0	380		
720 min Winter	8.082	0.0	440		
960 min Winter	6.475	0.0	540		
1440 min Winter	4.729	0.0	792		
2160 min Winter	3.446	0.0	1148		
2880 min Winter	2.750	0.0	1504		
4320 min Winter	1.997	0.0	2204		
5760 min Winter	1.589	0.0	2936		
7200 min Winter	1.330	0.0	3672		
8640 min Winter	1.151	0.0	4296		
10080 min Winter	1.019	0.0	5072		
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File Typ Driveway.srcx	Checked by AMF																									
Micro Drainage		Source Control 2015.1																								
<u>Model Details</u> Storage is Online Cover Level (m) 11.300 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.02232</td> <td>Width (m)</td> <td>9.2</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>500</td> <td>Length (m)</td> <td>9.2</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>11.8</td> <td>Slope (1:X)</td> <td>10000.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>3</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>1</td> </tr> <tr> <td>Invert Level (m)</td> <td>10.900</td> <td>Cap Volume Depth (m)</td> <td>0.300</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.02232	Width (m)	9.2	Membrane Percolation (mm/hr)	500	Length (m)	9.2	Max Percolation (l/s)	11.8	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.900	Cap Volume Depth (m)	0.300
Infiltration Coefficient Base (m/hr)	0.02232	Width (m)	9.2																							
Membrane Percolation (mm/hr)	500	Length (m)	9.2																							
Max Percolation (l/s)	11.8	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.900	Cap Volume Depth (m)	0.300																							
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Cundall, Johnston & Partners		Page 5
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Typ. Driveway - Perm. Paving	
Date 13/07/16	Designed by LK	
File Typ Driveway.srcx	Checked by AMF	
Micro Drainage		Source Control 2015.1

Event: 180 min Winter



Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Private Road 1 - Perm. Paving			
Date 13/07/16 File Private Road 1.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 145 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.218	0.068	4.8	36.7	0 K
30 min Summer	10.241	0.091	4.8	49.3	0 K
60 min Summer	10.261	0.111	4.8	60.7	0 K
120 min Summer	10.274	0.124	4.8	67.8	0 K
180 min Summer	10.277	0.127	4.8	69.4	0 K
240 min Summer	10.276	0.126	4.8	69.3	0 K
360 min Summer	10.272	0.122	4.8	67.0	0 K
480 min Summer	10.266	0.116	4.8	63.7	0 K
600 min Summer	10.260	0.110	4.8	59.9	0 K
720 min Summer	10.253	0.103	4.8	56.1	0 K
960 min Summer	10.239	0.089	4.8	48.6	0 K
1440 min Summer	10.218	0.068	4.8	36.4	0 K
2160 min Summer	10.199	0.049	4.7	26.0	0 K
2880 min Summer	10.191	0.041	4.0	21.7	0 K
4320 min Summer	10.182	0.032	3.1	16.4	0 K
5760 min Summer	10.176	0.026	2.5	13.2	0 K
7200 min Summer	10.172	0.022	2.1	11.1	0 K
8640 min Summer	10.169	0.019	1.9	9.5	0 K
10080 min Summer	10.167	0.017	1.7	8.3	0 K
15 min Winter	10.227	0.077	4.8	41.9	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	60		
120 min Summer	31.113	0.0	110		
180 min Summer	23.167	0.0	140		
240 min Summer	18.658	0.0	172		
360 min Summer	13.718	0.0	240		
480 min Summer	11.023	0.0	308		
600 min Summer	9.295	0.0	378		
720 min Summer	8.082	0.0	442		
960 min Summer	6.475	0.0	568		
1440 min Summer	4.729	0.0	808		
2160 min Summer	3.446	0.0	1144		
2880 min Summer	2.750	0.0	1500		
4320 min Summer	1.997	0.0	2232		
5760 min Summer	1.589	0.0	2944		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4408		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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Cundall, Johnston & Partners				Page 2	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Private Road 1 - Perm. Paving			
Date 13/07/16 File Private Road 1.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.253	0.103	4.8	56.4	0 K
60 min Winter	10.277	0.127	4.8	69.6	0 K
120 min Winter	10.293	0.143	4.8	78.6	0 K
180 min Winter	10.295	0.145	4.8	79.6	0 K
240 min Winter	10.294	0.144	4.8	78.8	0 K
360 min Winter	10.286	0.136	4.8	74.8	0 K
480 min Winter	10.277	0.127	4.8	69.4	0 K
600 min Winter	10.266	0.116	4.8	63.4	0 K
720 min Winter	10.255	0.105	4.8	57.3	0 K
960 min Winter	10.235	0.085	4.8	45.9	0 K
1440 min Winter	10.204	0.054	4.8	29.1	0 K
2160 min Winter	10.190	0.040	3.9	21.3	0 K
2880 min Winter	10.183	0.033	3.2	17.1	0 K
4320 min Winter	10.174	0.024	2.3	12.3	0 K
5760 min Winter	10.170	0.020	1.9	9.7	0 K
7200 min Winter	10.166	0.016	1.6	7.9	0 K
8640 min Winter	10.164	0.014	1.4	6.6	0 K
10080 min Winter	10.163	0.013	1.2	5.8	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	116		
180 min Winter	23.167	0.0	164		
240 min Winter	18.658	0.0	186		
360 min Winter	13.718	0.0	262		
480 min Winter	11.023	0.0	336		
600 min Winter	9.295	0.0	408		
720 min Winter	8.082	0.0	476		
960 min Winter	6.475	0.0	604		
1440 min Winter	4.729	0.0	820		
2160 min Winter	3.446	0.0	1168		
2880 min Winter	2.750	0.0	1528		
4320 min Winter	1.997	0.0	2248		
5760 min Winter	1.589	0.0	2984		
7200 min Winter	1.330	0.0	3680		
8640 min Winter	1.151	0.0	4312		
10080 min Winter	1.019	0.0	5096		
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Cundall, Johnston & Partners		Page 3
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Private Road 1 - Perm. Paving	
Date 13/07/16 File Private Road 1.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.205

Time (mins)	Area
From:	To: (ha)
0	1 0.205

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Cundall, Johnston & Partners		Page 4																								
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Private Road 1 - Perm. Paving																									
Date 13/07/16 File Private Road 1.srcx	Designed by LK Checked by AMF																									
Micro Drainage Source Control 2015.1																										
<u>Model Details</u> Storage is Online Cover Level (m) 10.550 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.01872</td> <td>Width (m)</td> <td>43.1</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>500</td> <td>Length (m)</td> <td>43.1</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>258.0</td> <td>Slope (1:X)</td> <td>10000.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>3</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>1</td> </tr> <tr> <td>Invert Level (m)</td> <td>10.150</td> <td>Cap Volume Depth (m)</td> <td>0.300</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.01872	Width (m)	43.1	Membrane Percolation (mm/hr)	500	Length (m)	43.1	Max Percolation (l/s)	258.0	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.150	Cap Volume Depth (m)	0.300
Infiltration Coefficient Base (m/hr)	0.01872	Width (m)	43.1																							
Membrane Percolation (mm/hr)	500	Length (m)	43.1																							
Max Percolation (l/s)	258.0	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.150	Cap Volume Depth (m)	0.300																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
Private Road 1 - Perm. Paving

Date 13/07/16

Designed by LK

File Private Road 1.srcx

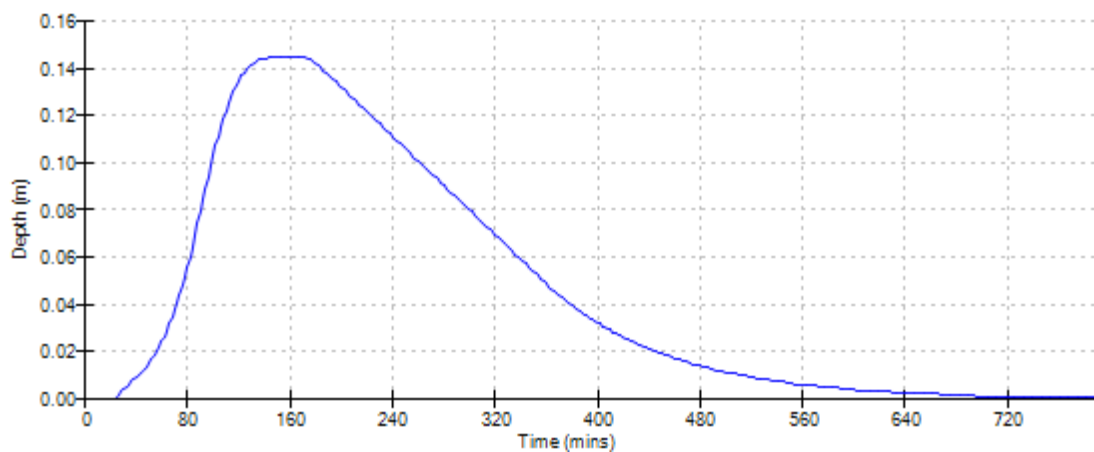
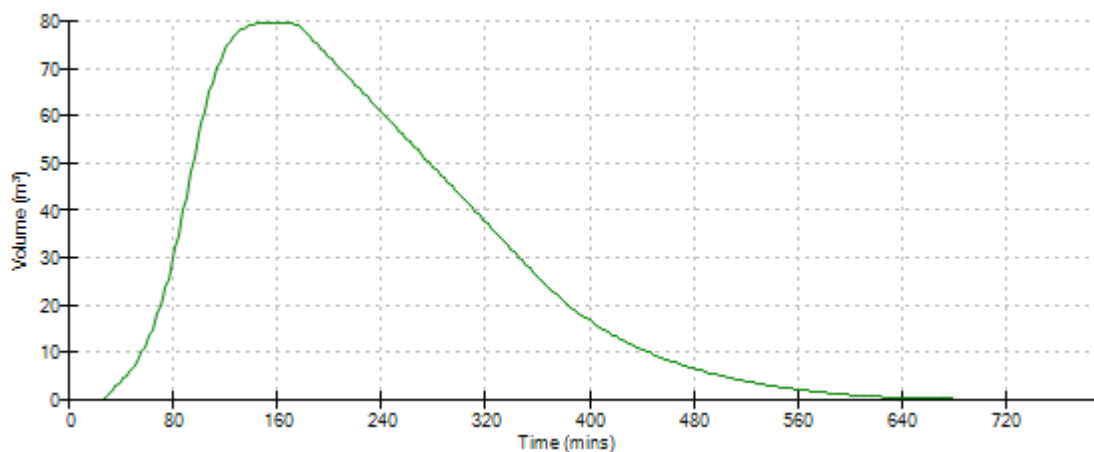
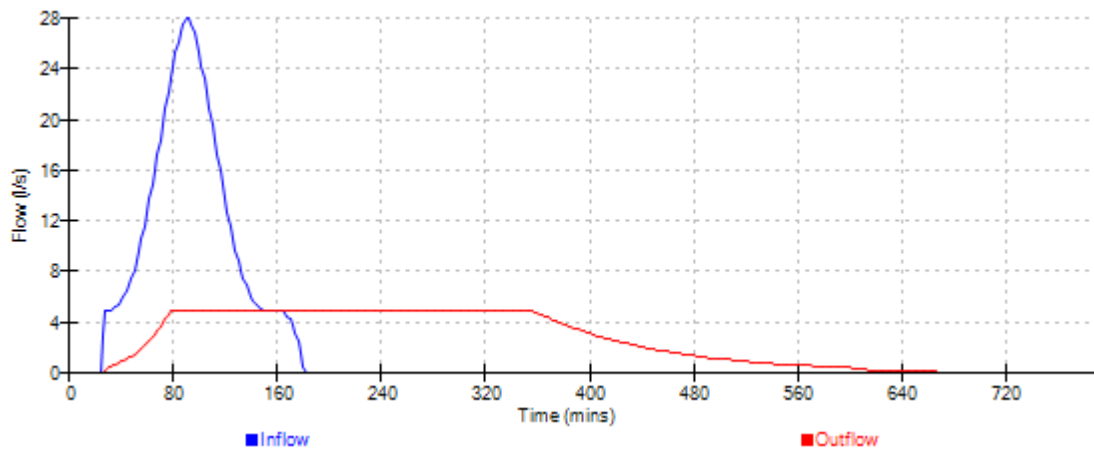
Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 180 min Winter



Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Private Road 2 - Perm. Paving			
Date 13/07/16 File Private Road 2.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 115 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.418	0.068	1.7	10.8	0 K
30 min Summer	10.440	0.090	1.7	14.5	0 K
60 min Summer	10.459	0.109	1.7	17.6	0 K
120 min Summer	10.470	0.120	1.7	19.4	0 K
180 min Summer	10.472	0.122	1.7	19.7	0 K
240 min Summer	10.471	0.121	1.7	19.5	0 K
360 min Summer	10.465	0.115	1.7	18.5	0 K
480 min Summer	10.457	0.107	1.7	17.3	0 K
600 min Summer	10.449	0.099	1.7	16.0	0 K
720 min Summer	10.442	0.092	1.7	14.7	0 K
960 min Summer	10.427	0.077	1.7	12.4	0 K
1440 min Summer	10.406	0.056	1.7	9.0	0 K
2160 min Summer	10.393	0.043	1.5	6.8	0 K
2880 min Summer	10.386	0.036	1.2	5.7	0 K
4320 min Summer	10.377	0.027	0.9	4.3	0 K
5760 min Summer	10.372	0.022	0.7	3.5	0 K
7200 min Summer	10.369	0.019	0.6	2.9	0 K
8640 min Summer	10.367	0.017	0.6	2.5	0 K
10080 min Summer	10.365	0.015	0.5	2.2	0 K
15 min Winter	10.427	0.077	1.7	12.4	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	30		
60 min Summer	50.211	0.0	60		
120 min Summer	31.113	0.0	100		
180 min Summer	23.167	0.0	132		
240 min Summer	18.658	0.0	166		
360 min Summer	13.718	0.0	234		
480 min Summer	11.023	0.0	302		
600 min Summer	9.295	0.0	368		
720 min Summer	8.082	0.0	432		
960 min Summer	6.475	0.0	556		
1440 min Summer	4.729	0.0	780		
2160 min Summer	3.446	0.0	1128		
2880 min Summer	2.750	0.0	1496		
4320 min Summer	1.997	0.0	2208		
5760 min Summer	1.589	0.0	2944		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4400		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	16		
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Cundall, Johnston & Partners				Page 2	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Private Road 2 - Perm. Paving			
Date 13/07/16 File Private Road 2.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.453	0.103	1.7	16.6	0 K
60 min Winter	10.475	0.125	1.7	20.2	0 K
120 min Winter	10.488	0.138	1.7	22.3	0 K
180 min Winter	10.489	0.139	1.7	22.5	0 K
240 min Winter	10.486	0.136	1.7	22.0	0 K
360 min Winter	10.476	0.126	1.7	20.4	0 K
480 min Winter	10.464	0.114	1.7	18.3	0 K
600 min Winter	10.451	0.101	1.7	16.3	0 K
720 min Winter	10.439	0.089	1.7	14.3	0 K
960 min Winter	10.418	0.068	1.7	10.9	0 K
1440 min Winter	10.396	0.046	1.6	7.3	0 K
2160 min Winter	10.385	0.035	1.2	5.5	0 K
2880 min Winter	10.378	0.028	1.0	4.4	0 K
4320 min Winter	10.371	0.021	0.7	3.2	0 K
5760 min Winter	10.367	0.017	0.6	2.5	0 K
7200 min Winter	10.364	0.014	0.5	2.1	0 K
8640 min Winter	10.362	0.012	0.4	1.8	0 K
10080 min Winter	10.361	0.011	0.4	1.5	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	60		
120 min Winter	31.113	0.0	114		
180 min Winter	23.167	0.0	142		
240 min Winter	18.658	0.0	180		
360 min Winter	13.718	0.0	256		
480 min Winter	11.023	0.0	328		
600 min Winter	9.295	0.0	396		
720 min Winter	8.082	0.0	460		
960 min Winter	6.475	0.0	576		
1440 min Winter	4.729	0.0	780		
2160 min Winter	3.446	0.0	1148		
2880 min Winter	2.750	0.0	1524		
4320 min Winter	1.997	0.0	2248		
5760 min Winter	1.589	0.0	2936		
7200 min Winter	1.330	0.0	3664		
8640 min Winter	1.151	0.0	4376		
10080 min Winter	1.019	0.0	5008		
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Cundall, Johnston & Partners		Page 3
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Private Road 2 - Perm. Paving	
Date 13/07/16 File Private Road 2.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.061

Time (mins)	Area
From:	To: (ha)
0	1 0.061

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Cundall, Johnston & Partners		Page 4																								
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Private Road 2 - Perm. Paving																									
Date 13/07/16 File Private Road 2.srcx	Designed by LK Checked by AMF																									
Micro Drainage Source Control 2015.1																										
<u>Model Details</u> Storage is Online Cover Level (m) 10.750 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.02232</td> <td>Width (m)</td> <td>23.3</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>500</td> <td>Length (m)</td> <td>23.3</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>75.4</td> <td>Slope (1:X)</td> <td>10000.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>3</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>1</td> </tr> <tr> <td>Invert Level (m)</td> <td>10.350</td> <td>Cap Volume Depth (m)</td> <td>0.300</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.02232	Width (m)	23.3	Membrane Percolation (mm/hr)	500	Length (m)	23.3	Max Percolation (l/s)	75.4	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.350	Cap Volume Depth (m)	0.300
Infiltration Coefficient Base (m/hr)	0.02232	Width (m)	23.3																							
Membrane Percolation (mm/hr)	500	Length (m)	23.3																							
Max Percolation (l/s)	75.4	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.350	Cap Volume Depth (m)	0.300																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
Private Road 2 - Perm. Paving

Date 13/07/16

Designed by LK

File Private Road 2.srcx

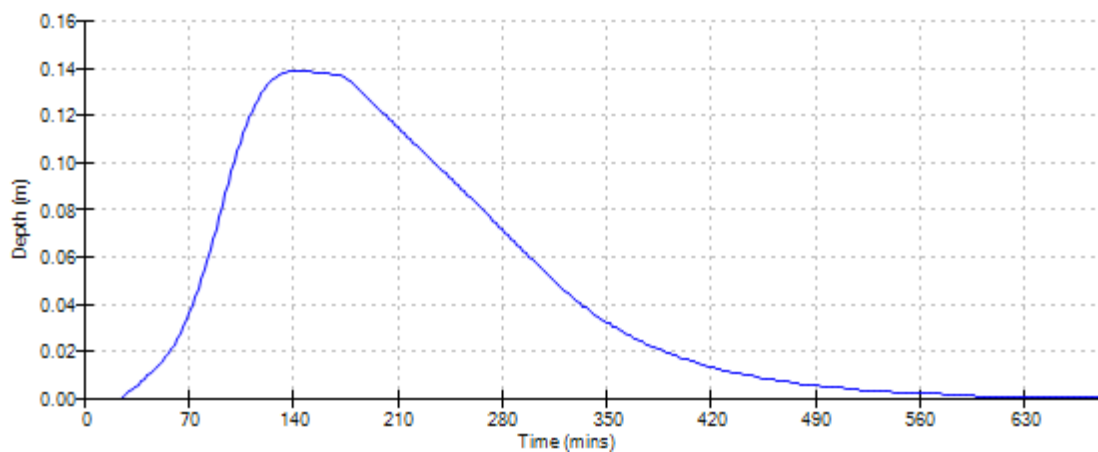
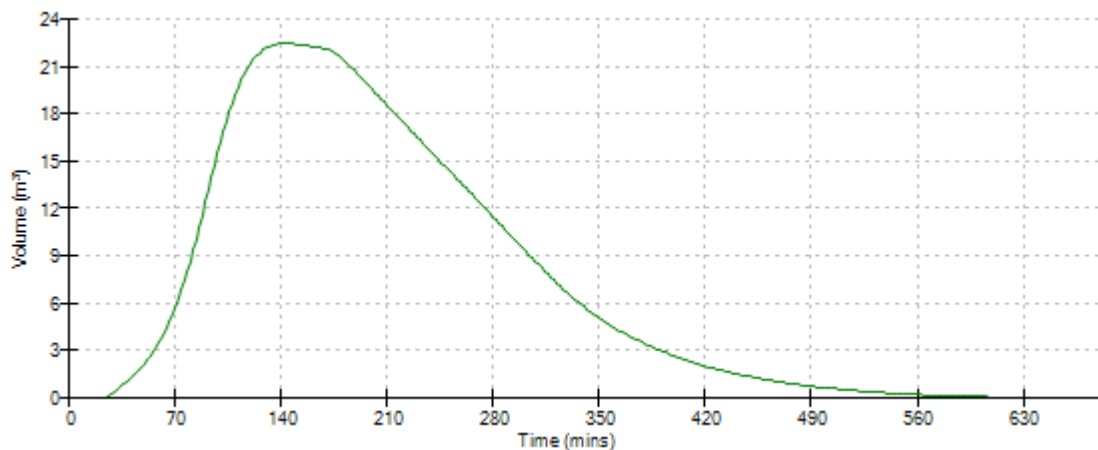
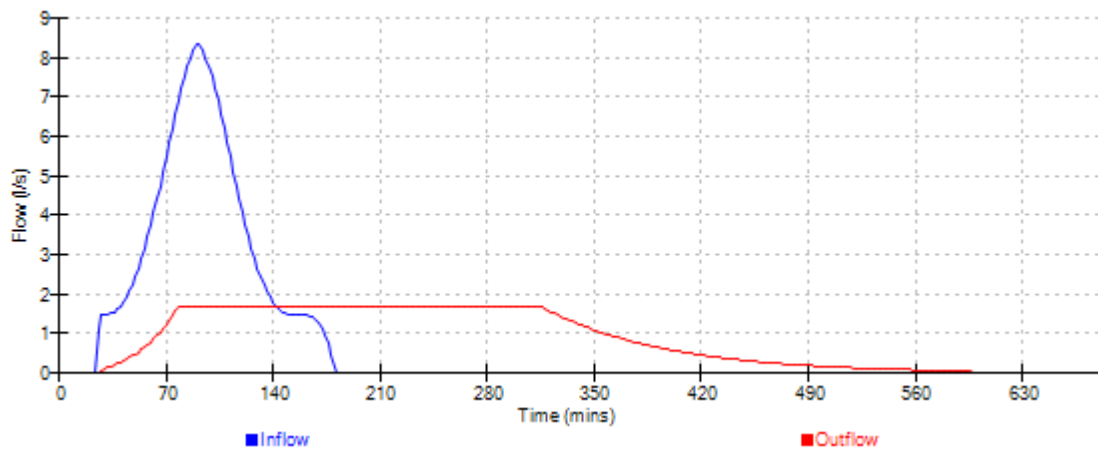
Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 180 min Winter



Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Private Road 3 - Perm. Paving			
Date 13/07/16 File Private Road 3.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 686 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.963	0.063	0.8	20.9	0 K
30 min Summer	10.987	0.087	0.8	28.9	0 K
60 min Summer	11.012	0.112	0.8	37.4	0 K
120 min Summer	11.036	0.136	0.8	45.6	0 K
180 min Summer	11.049	0.149	0.8	49.8	0 K
240 min Summer	11.056	0.156	0.8	52.2	0 K
360 min Summer	11.063	0.163	0.8	54.6	0 K
480 min Summer	11.066	0.166	0.8	55.6	0 K
600 min Summer	11.066	0.166	0.8	55.7	0 K
720 min Summer	11.066	0.166	0.8	55.7	0 K
960 min Summer	11.064	0.164	0.8	55.1	0 K
1440 min Summer	11.058	0.158	0.8	53.1	0 K
2160 min Summer	11.046	0.146	0.8	48.9	0 K
2880 min Summer	11.033	0.133	0.8	44.4	0 K
4320 min Summer	11.008	0.108	0.8	36.0	0 K
5760 min Summer	10.987	0.087	0.8	28.8	0 K
7200 min Summer	10.970	0.070	0.8	23.2	0 K
8640 min Summer	10.958	0.058	0.8	19.1	0 K
10080 min Summer	10.950	0.050	0.8	16.5	0 K
15 min Winter	10.972	0.072	0.8	23.8	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	122		
180 min Summer	23.167	0.0	182		
240 min Summer	18.658	0.0	240		
360 min Summer	13.718	0.0	360		
480 min Summer	11.023	0.0	480		
600 min Summer	9.295	0.0	546		
720 min Summer	8.082	0.0	600		
960 min Summer	6.475	0.0	722		
1440 min Summer	4.729	0.0	982		
2160 min Summer	3.446	0.0	1388		
2880 min Summer	2.750	0.0	1792		
4320 min Summer	1.997	0.0	2556		
5760 min Summer	1.589	0.0	3288		
7200 min Summer	1.330	0.0	3968		
8640 min Summer	1.151	0.0	4664		
10080 min Summer	1.019	0.0	5248		
15 min Winter	116.400	0.0	16		
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Cundall, Johnston & Partners				Page 2	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing Private Road 3 - Perm. Paving			
Date 13/07/16 File Private Road 3.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.999	0.099	0.8	32.9	0 K
60 min Winter	11.027	0.127	0.8	42.4	0 K
120 min Winter	11.055	0.155	0.8	51.8	0 K
180 min Winter	11.069	0.169	0.8	56.7	0 K
240 min Winter	11.077	0.177	0.8	59.5	0 K
360 min Winter	11.087	0.187	0.8	62.7	0 K
480 min Winter	11.091	0.191	0.8	64.1	0 K
600 min Winter	11.092	0.192	0.8	64.6	0 K
720 min Winter	11.092	0.192	0.8	64.4	0 K
960 min Winter	11.088	0.188	0.8	63.2	0 K
1440 min Winter	11.079	0.179	0.8	60.1	0 K
2160 min Winter	11.060	0.160	0.8	53.7	0 K
2880 min Winter	11.040	0.140	0.8	46.8	0 K
4320 min Winter	11.002	0.102	0.8	33.9	0 K
5760 min Winter	10.972	0.072	0.8	23.7	0 K
7200 min Winter	10.952	0.052	0.8	17.1	0 K
8640 min Winter	10.945	0.045	0.7	14.7	0 K
10080 min Winter	10.940	0.040	0.6	13.1	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	31		
60 min Winter	50.211	0.0	62		
120 min Winter	31.113	0.0	120		
180 min Winter	23.167	0.0	178		
240 min Winter	18.658	0.0	236		
360 min Winter	13.718	0.0	352		
480 min Winter	11.023	0.0	464		
600 min Winter	9.295	0.0	572		
720 min Winter	8.082	0.0	678		
960 min Winter	6.475	0.0	778		
1440 min Winter	4.729	0.0	1080		
2160 min Winter	3.446	0.0	1516		
2880 min Winter	2.750	0.0	1956		
4320 min Winter	1.997	0.0	2724		
5760 min Winter	1.589	0.0	3400		
7200 min Winter	1.330	0.0	3960		
8640 min Winter	1.151	0.0	4592		
10080 min Winter	1.019	0.0	5344		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Private Road 3 - Perm. Paving	
Date 13/07/16 File Private Road 3.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.113

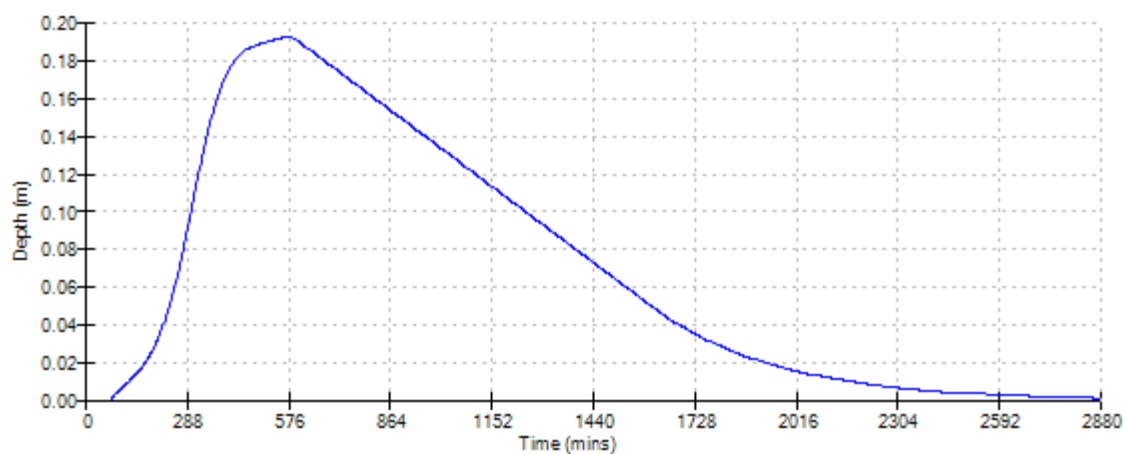
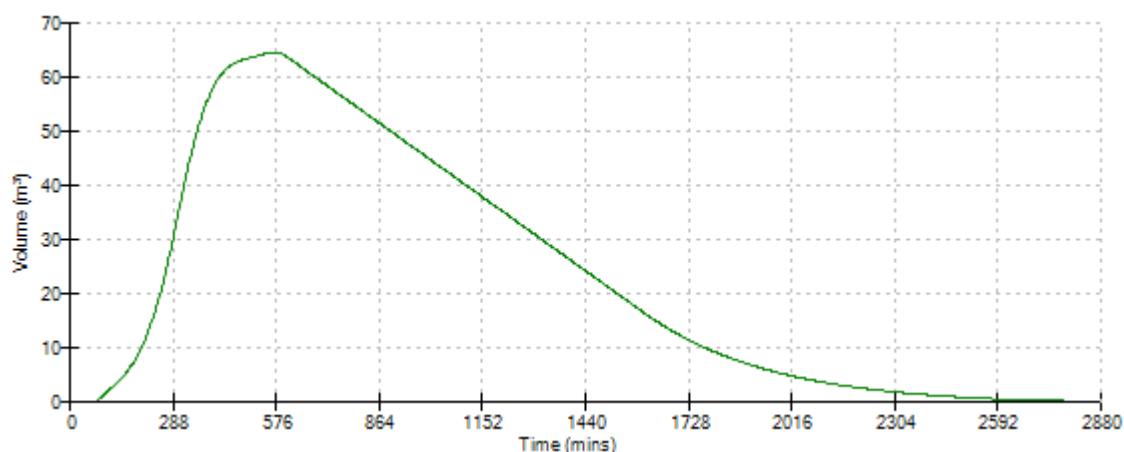
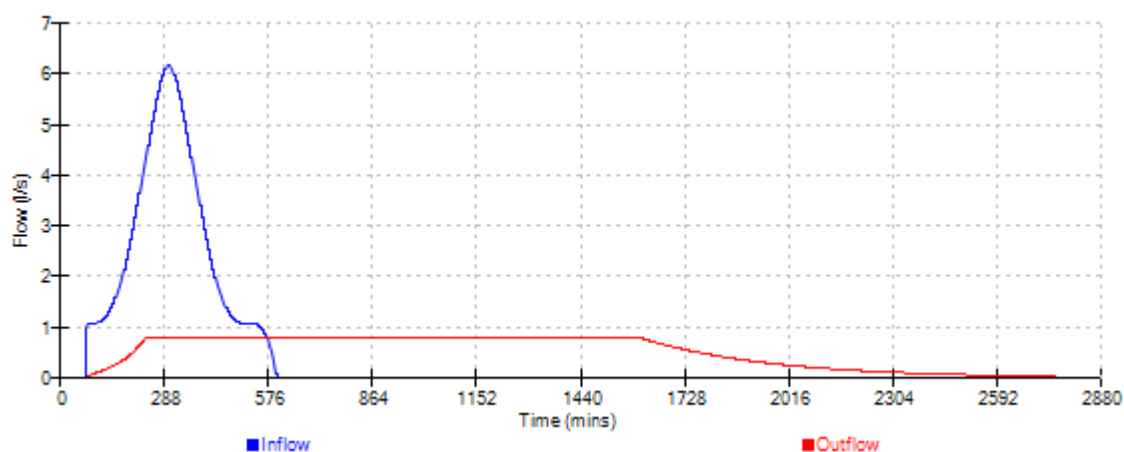
Time (mins)		Area
From:	To:	(ha)
0	1	0.113

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Cundall, Johnston & Partners		Page 4																								
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Private Road 3 - Perm. Paving																									
Date 13/07/16 File Private Road 3.srcx	Designed by LK Checked by AMF																									
Micro Drainage Source Control 2015.1																										
<u>Model Details</u> Storage is Online Cover Level (m) 11.300 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00504</td> <td>Width (m)</td> <td>33.6</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>500</td> <td>Length (m)</td> <td>33.6</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>156.8</td> <td>Slope (1:X)</td> <td>10000.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Depression Storage (mm)</td> <td>3</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>1</td> </tr> <tr> <td>Invert Level (m)</td> <td>10.900</td> <td>Cap Volume Depth (m)</td> <td>0.300</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.00504	Width (m)	33.6	Membrane Percolation (mm/hr)	500	Length (m)	33.6	Max Percolation (l/s)	156.8	Slope (1:X)	10000.0	Safety Factor	2.0	Depression Storage (mm)	3	Porosity	0.30	Evaporation (mm/day)	1	Invert Level (m)	10.900	Cap Volume Depth (m)	0.300
Infiltration Coefficient Base (m/hr)	0.00504	Width (m)	33.6																							
Membrane Percolation (mm/hr)	500	Length (m)	33.6																							
Max Percolation (l/s)	156.8	Slope (1:X)	10000.0																							
Safety Factor	2.0	Depression Storage (mm)	3																							
Porosity	0.30	Evaporation (mm/day)	1																							
Invert Level (m)	10.900	Cap Volume Depth (m)	0.300																							
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing Private Road 3 - Perm. Paving	
Date 13/07/16	Designed by LK	
File Private Road 3.srcx	Checked by AMF	
Micro Drainage		Source Control 2015.1

Event: 600 min Winter



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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 1 - Trench Soakaway			
Date 13/07/16 File Trench SA 1.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 48 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	9.975	1.275	0.9	3.0	0 K
30 min Summer	10.226	1.526	1.0	3.6	0 K
60 min Summer	10.376	1.676	1.0	3.9	0 K
120 min Summer	10.378	1.678	1.0	3.9	0 K
180 min Summer	10.282	1.582	1.0	3.7	0 K
240 min Summer	10.174	1.474	1.0	3.4	0 K
360 min Summer	9.987	1.287	0.9	3.0	0 K
480 min Summer	9.837	1.137	0.8	2.7	0 K
600 min Summer	9.712	1.012	0.7	2.4	0 K
720 min Summer	9.607	0.907	0.7	2.1	0 K
960 min Summer	9.437	0.737	0.6	1.7	0 K
1440 min Summer	9.204	0.504	0.5	1.2	0 K
2160 min Summer	8.991	0.291	0.4	0.7	0 K
2880 min Summer	8.860	0.160	0.3	0.4	0 K
4320 min Summer	8.747	0.047	0.3	0.1	0 K
5760 min Summer	8.738	0.038	0.2	0.1	0 K
7200 min Summer	8.732	0.032	0.2	0.1	0 K
8640 min Summer	8.728	0.028	0.2	0.1	0 K
10080 min Summer	8.724	0.024	0.1	0.1	0 K
15 min Winter	10.143	1.443	0.9	3.4	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	15		
30 min Summer	78.248	0.0	27		
60 min Summer	50.211	0.0	44		
120 min Summer	31.113	0.0	78		
180 min Summer	23.167	0.0	112		
240 min Summer	18.658	0.0	146		
360 min Summer	13.718	0.0	212		
480 min Summer	11.023	0.0	276		
600 min Summer	9.295	0.0	338		
720 min Summer	8.082	0.0	398		
960 min Summer	6.475	0.0	520		
1440 min Summer	4.729	0.0	764		
2160 min Summer	3.446	0.0	1128		
2880 min Summer	2.750	0.0	1496		
4320 min Summer	1.997	0.0	2200		
5760 min Summer	1.589	0.0	2896		
7200 min Summer	1.330	0.0	3600		
8640 min Summer	1.151	0.0	4304		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	15		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 1 - Trench Soakaway				
Date 13/07/16 File Trench SA 1.srcx		Designed by LK Checked by AMF				
Micro Drainage		Source Control 2015.1				
Summary of Results for 100 year Return Period (+30%)						
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	
30 min Winter	10.443	1.743	1.1	4.1	0 K	
60 min Winter	10.612	1.912	1.1	4.5	Flood Risk	
120 min Winter	10.566	1.866	1.1	4.4	Flood Risk	
180 min Winter	10.401	1.701	1.1	4.0	0 K	
240 min Winter	10.240	1.540	1.0	3.6	0 K	
360 min Winter	9.977	1.277	0.9	3.0	0 K	
480 min Winter	9.777	1.077	0.8	2.5	0 K	
600 min Winter	9.618	0.918	0.7	2.1	0 K	
720 min Winter	9.488	0.788	0.6	1.8	0 K	
960 min Winter	9.291	0.591	0.5	1.4	0 K	
1440 min Winter	9.039	0.339	0.4	0.8	0 K	
2160 min Winter	8.830	0.130	0.3	0.3	0 K	
2880 min Winter	8.747	0.047	0.3	0.1	0 K	
4320 min Winter	8.734	0.034	0.2	0.1	0 K	
5760 min Winter	8.728	0.028	0.2	0.1	0 K	
7200 min Winter	8.723	0.023	0.1	0.0	0 K	
8640 min Winter	8.720	0.020	0.1	0.0	0 K	
10080 min Winter	8.718	0.018	0.1	0.0	0 K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)			
30 min Winter	78.248	0.0	29			
60 min Winter	50.211	0.0	48			
120 min Winter	31.113	0.0	86			
180 min Winter	23.167	0.0	120			
240 min Winter	18.658	0.0	156			
360 min Winter	13.718	0.0	222			
480 min Winter	11.023	0.0	288			
600 min Winter	9.295	0.0	350			
720 min Winter	8.082	0.0	414			
960 min Winter	6.475	0.0	538			
1440 min Winter	4.729	0.0	780			
2160 min Winter	3.446	0.0	1144			
2880 min Winter	2.750	0.0	1460			
4320 min Winter	1.997	0.0	2200			
5760 min Winter	1.589	0.0	2856			
7200 min Winter	1.330	0.0	3648			
8640 min Winter	1.151	0.0	4336			
10080 min Winter	1.019	0.0	4976			
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 1 - Trench Soakaway	
Date 13/07/16 File Trench SA 1.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.016

Time (mins)	Area
From:	To: (ha)
0	1 0.016

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 1 - Trench Soakaway	
Date 13/07/16 File Trench SA 1.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

Model Details

Storage is Online Cover Level (m) 10.800

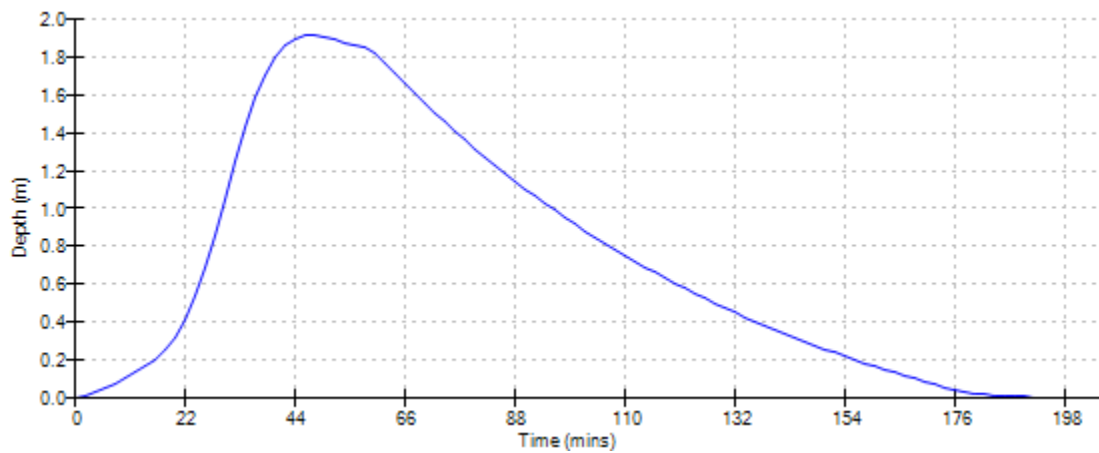
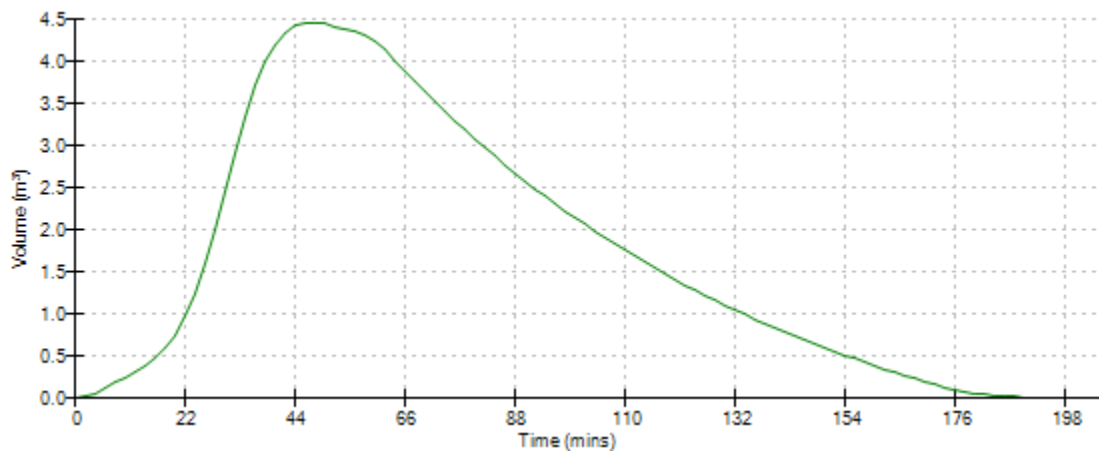
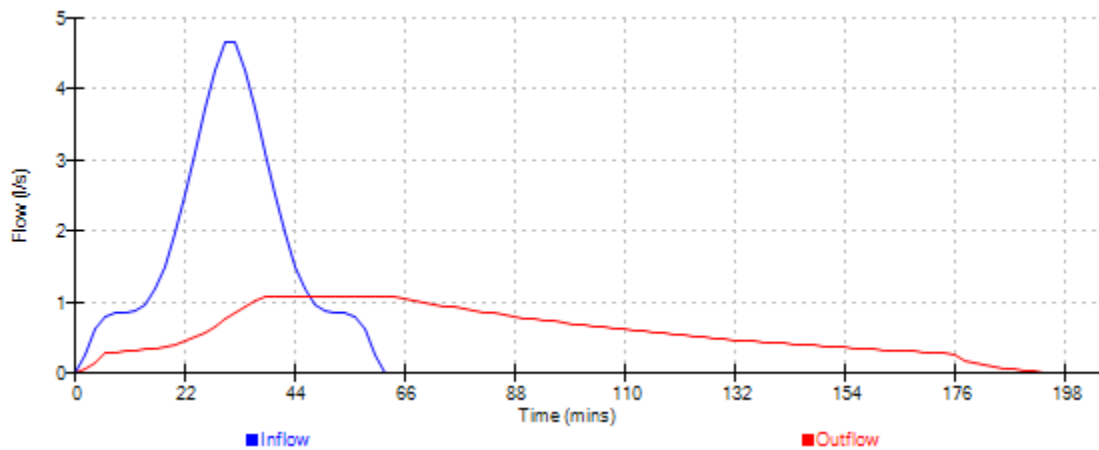
Trench Soakaway Structure

Infiltration Coefficient Base (m/hr)	0.23400	Trench Width (m)	1.3
Infiltration Coefficient Side (m/hr)	0.23400	Trench Length (m)	6.0
Safety Factor	2.0	Slope (1:X)	1000.0
Porosity	0.30	Cap Volume Depth (m)	1.900
Invert Level (m)	8.700	Cap Infiltration Depth (m)	1.700

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 1 - Trench Soakaway	
Date 13/07/16	Designed by LK	
File Trench SA 1.srcx	Checked by AMF	
Micro Drainage		Source Control 2015.1

Event: 60 min Winter



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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG			Havant Road, Emsworth SUDS Sizing TSA 2 - Trench Soakaway																																																																																																																																																																																																																					
Date 13/07/16 File Trench SA 2.srcx			Designed by LK Checked by AMF																																																																																																																																																																																																																					
Micro Drainage			Source Control 2015.1																																																																																																																																																																																																																					
Summary of Results for 100 year Return Period (+30%) Half Drain Time : 41 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>10.399</td><td>0.999</td><td>0.6</td><td>1.8</td><td>0 K</td></tr><tr><td>30 min Summer</td><td>10.579</td><td>1.179</td><td>0.7</td><td>2.1</td><td>0 K</td></tr><tr><td>60 min Summer</td><td>10.682</td><td>1.282</td><td>0.7</td><td>2.3</td><td>0 K</td></tr><tr><td>120 min Summer</td><td>10.651</td><td>1.251</td><td>0.7</td><td>2.3</td><td>0 K</td></tr><tr><td>180 min Summer</td><td>10.558</td><td>1.158</td><td>0.7</td><td>2.1</td><td>0 K</td></tr><tr><td>240 min Summer</td><td>10.466</td><td>1.066</td><td>0.7</td><td>1.9</td><td>0 K</td></tr><tr><td>360 min Summer</td><td>10.310</td><td>0.910</td><td>0.6</td><td>1.6</td><td>0 K</td></tr><tr><td>480 min Summer</td><td>10.186</td><td>0.786</td><td>0.5</td><td>1.4</td><td>0 K</td></tr><tr><td>600 min Summer</td><td>10.086</td><td>0.686</td><td>0.5</td><td>1.2</td><td>0 K</td></tr><tr><td>720 min Summer</td><td>10.002</td><td>0.602</td><td>0.5</td><td>1.1</td><td>0 K</td></tr><tr><td>960 min Summer</td><td>9.869</td><td>0.469</td><td>0.4</td><td>0.8</td><td>0 K</td></tr><tr><td>1440 min Summer</td><td>9.692</td><td>0.292</td><td>0.3</td><td>0.5</td><td>0 K</td></tr><tr><td>2160 min Summer</td><td>9.538</td><td>0.138</td><td>0.3</td><td>0.2</td><td>0 K</td></tr><tr><td>2880 min Summer</td><td>9.459</td><td>0.059</td><td>0.2</td><td>0.1</td><td>0 K</td></tr><tr><td>4320 min Summer</td><td>9.438</td><td>0.038</td><td>0.2</td><td>0.1</td><td>0 K</td></tr><tr><td>5760 min Summer</td><td>9.430</td><td>0.030</td><td>0.1</td><td>0.0</td><td>0 K</td></tr><tr><td>7200 min Summer</td><td>9.425</td><td>0.025</td><td>0.1</td><td>0.0</td><td>0 K</td></tr><tr><td>8640 min Summer</td><td>9.422</td><td>0.022</td><td>0.1</td><td>0.0</td><td>0 K</td></tr><tr><td>10080 min Summer</td><td>9.420</td><td>0.020</td><td>0.1</td><td>0.0</td><td>0 K</td></tr><tr><td>15 min Winter</td><td>10.533</td><td>1.133</td><td>0.7</td><td>2.1</td><td>0 K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>116.400</td><td>0.0</td><td>15</td></tr><tr><td>30 min Summer</td><td>78.248</td><td>0.0</td><td>25</td></tr><tr><td>60 min Summer</td><td>50.211</td><td>0.0</td><td>42</td></tr><tr><td>120 min Summer</td><td>31.113</td><td>0.0</td><td>78</td></tr><tr><td>180 min Summer</td><td>23.167</td><td>0.0</td><td>110</td></tr><tr><td>240 min Summer</td><td>18.658</td><td>0.0</td><td>144</td></tr><tr><td>360 min Summer</td><td>13.718</td><td>0.0</td><td>208</td></tr><tr><td>480 min Summer</td><td>11.023</td><td>0.0</td><td>272</td></tr><tr><td>600 min Summer</td><td>9.295</td><td>0.0</td><td>332</td></tr><tr><td>720 min Summer</td><td>8.082</td><td>0.0</td><td>396</td></tr><tr><td>960 min Summer</td><td>6.475</td><td>0.0</td><td>518</td></tr><tr><td>1440 min Summer</td><td>4.729</td><td>0.0</td><td>762</td></tr><tr><td>2160 min Summer</td><td>3.446</td><td>0.0</td><td>1124</td></tr><tr><td>2880 min Summer</td><td>2.750</td><td>0.0</td><td>1468</td></tr><tr><td>4320 min Summer</td><td>1.997</td><td>0.0</td><td>2160</td></tr><tr><td>5760 min Summer</td><td>1.589</td><td>0.0</td><td>2936</td></tr><tr><td>7200 min Summer</td><td>1.330</td><td>0.0</td><td>3600</td></tr><tr><td>8640 min Summer</td><td>1.151</td><td>0.0</td><td>4304</td></tr><tr><td>10080 min Summer</td><td>1.019</td><td>0.0</td><td>4984</td></tr><tr><td>15 min Winter</td><td>116.400</td><td>0.0</td><td>15</td></tr></tbody></table>							Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	10.399	0.999	0.6	1.8	0 K	30 min Summer	10.579	1.179	0.7	2.1	0 K	60 min Summer	10.682	1.282	0.7	2.3	0 K	120 min Summer	10.651	1.251	0.7	2.3	0 K	180 min Summer	10.558	1.158	0.7	2.1	0 K	240 min Summer	10.466	1.066	0.7	1.9	0 K	360 min Summer	10.310	0.910	0.6	1.6	0 K	480 min Summer	10.186	0.786	0.5	1.4	0 K	600 min Summer	10.086	0.686	0.5	1.2	0 K	720 min Summer	10.002	0.602	0.5	1.1	0 K	960 min Summer	9.869	0.469	0.4	0.8	0 K	1440 min Summer	9.692	0.292	0.3	0.5	0 K	2160 min Summer	9.538	0.138	0.3	0.2	0 K	2880 min Summer	9.459	0.059	0.2	0.1	0 K	4320 min Summer	9.438	0.038	0.2	0.1	0 K	5760 min Summer	9.430	0.030	0.1	0.0	0 K	7200 min Summer	9.425	0.025	0.1	0.0	0 K	8640 min Summer	9.422	0.022	0.1	0.0	0 K	10080 min Summer	9.420	0.020	0.1	0.0	0 K	15 min Winter	10.533	1.133	0.7	2.1	0 K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	116.400	0.0	15	30 min Summer	78.248	0.0	25	60 min Summer	50.211	0.0	42	120 min Summer	31.113	0.0	78	180 min Summer	23.167	0.0	110	240 min Summer	18.658	0.0	144	360 min Summer	13.718	0.0	208	480 min Summer	11.023	0.0	272	600 min Summer	9.295	0.0	332	720 min Summer	8.082	0.0	396	960 min Summer	6.475	0.0	518	1440 min Summer	4.729	0.0	762	2160 min Summer	3.446	0.0	1124	2880 min Summer	2.750	0.0	1468	4320 min Summer	1.997	0.0	2160	5760 min Summer	1.589	0.0	2936	7200 min Summer	1.330	0.0	3600	8640 min Summer	1.151	0.0	4304	10080 min Summer	1.019	0.0	4984	15 min Winter	116.400	0.0	15
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																			
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 2 - Trench Soakaway			
Date 13/07/16 File Trench SA 2.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.755	1.355	0.7	2.5	Flood Risk
60 min Winter	10.915	1.515	0.7	2.7	Flood Risk
120 min Winter	10.788	1.388	0.7	2.5	Flood Risk
180 min Winter	10.625	1.225	0.7	2.2	0 K
240 min Winter	10.489	1.089	0.7	2.0	0 K
360 min Winter	10.276	0.876	0.6	1.6	0 K
480 min Winter	10.116	0.716	0.5	1.3	0 K
600 min Winter	9.991	0.591	0.4	1.1	0 K
720 min Winter	9.892	0.492	0.4	0.9	0 K
960 min Winter	9.744	0.344	0.3	0.6	0 K
1440 min Winter	9.560	0.160	0.3	0.3	0 K
2160 min Winter	9.447	0.047	0.2	0.1	0 K
2880 min Winter	9.438	0.038	0.2	0.1	0 K
4320 min Winter	9.428	0.028	0.1	0.0	0 K
5760 min Winter	9.422	0.022	0.1	0.0	0 K
7200 min Winter	9.418	0.018	0.1	0.0	0 K
8640 min Winter	9.416	0.016	0.1	0.0	0 K
10080 min Winter	9.414	0.014	0.1	0.0	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	28		
60 min Winter	50.211	0.0	46		
120 min Winter	31.113	0.0	84		
180 min Winter	23.167	0.0	118		
240 min Winter	18.658	0.0	152		
360 min Winter	13.718	0.0	218		
480 min Winter	11.023	0.0	284		
600 min Winter	9.295	0.0	344		
720 min Winter	8.082	0.0	410		
960 min Winter	6.475	0.0	530		
1440 min Winter	4.729	0.0	766		
2160 min Winter	3.446	0.0	1084		
2880 min Winter	2.750	0.0	1448		
4320 min Winter	1.997	0.0	2192		
5760 min Winter	1.589	0.0	2936		
7200 min Winter	1.330	0.0	3672		
8640 min Winter	1.151	0.0	4272		
10080 min Winter	1.019	0.0	4968		
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Date 13/07/16 File Trench SA 2.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.010

Time (mins)	Area
From:	To: (ha)
0	1 0.010

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Date 13/07/16 File Trench SA 2.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

Model Details

Storage is Online Cover Level (m) 11.000

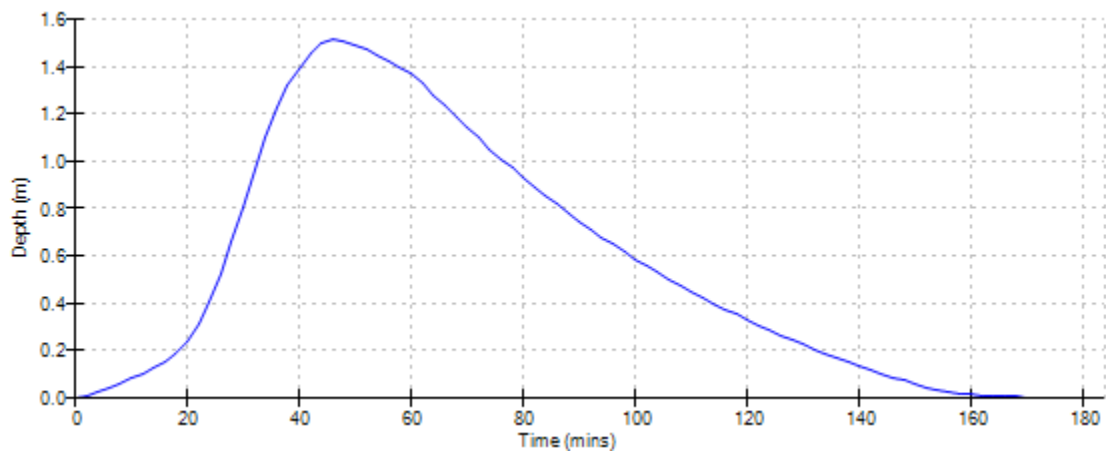
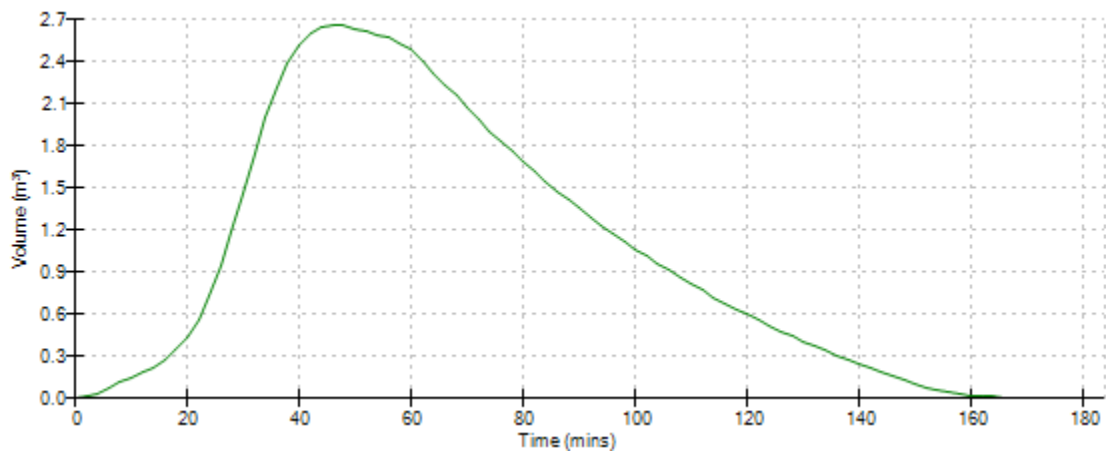
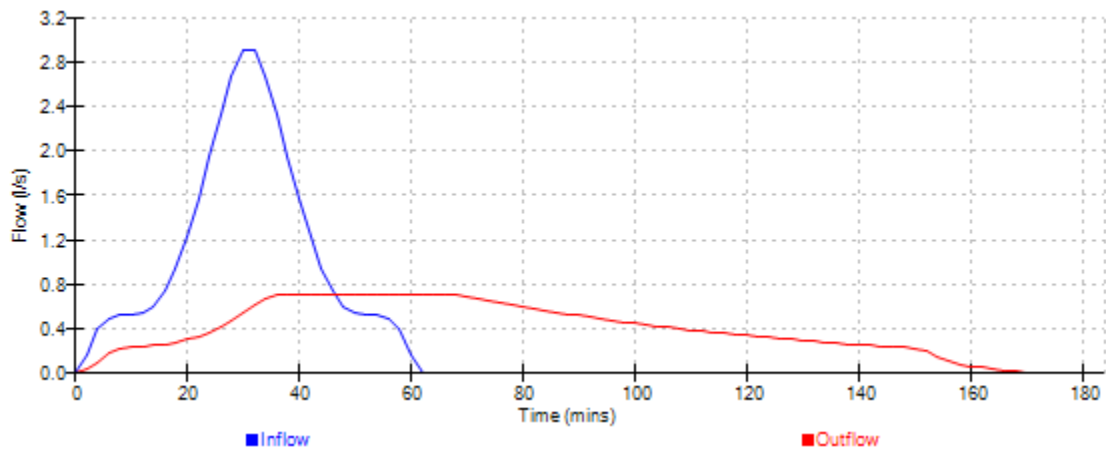
Trench Soakaway Structure

Infiltration Coefficient Base (m/hr)	0.23400	Trench Width (m)	1.1
Infiltration Coefficient Side (m/hr)	0.23400	Trench Length (m)	5.5
Safety Factor	2.0	Slope (1:X)	1000.0
Porosity	0.30	Cap Volume Depth (m)	1.400
Invert Level (m)	9.400	Cap Infiltration Depth (m)	1.200

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Micro Drainage	Source Control 2015.1	

Event: 60 min Winter



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Date 13/07/16 File Trench SA 3.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 19 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	9.825	0.250	0.9	1.4	0 K
30 min Summer	9.856	0.281	1.0	1.5	0 K
60 min Summer	9.855	0.280	1.0	1.5	0 K
120 min Summer	9.815	0.240	0.9	1.3	0 K
180 min Summer	9.772	0.197	0.9	1.1	0 K
240 min Summer	9.733	0.158	0.8	0.8	0 K
360 min Summer	9.677	0.102	0.7	0.5	0 K
480 min Summer	9.641	0.066	0.7	0.3	0 K
600 min Summer	9.625	0.050	0.7	0.2	0 K
720 min Summer	9.619	0.044	0.6	0.2	0 K
960 min Summer	9.610	0.035	0.5	0.1	0 K
1440 min Summer	9.601	0.026	0.3	0.1	0 K
2160 min Summer	9.595	0.020	0.3	0.1	0 K
2880 min Summer	9.592	0.017	0.2	0.0	0 K
4320 min Summer	9.590	0.015	0.1	0.0	0 K
5760 min Summer	9.588	0.013	0.1	0.0	0 K
7200 min Summer	9.587	0.012	0.1	0.0	0 K
8640 min Summer	9.586	0.011	0.1	0.0	0 K
10080 min Summer	9.586	0.011	0.1	0.0	0 K
15 min Winter	9.861	0.286	1.0	1.6	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	13		
30 min Summer	78.248	0.0	22		
60 min Summer	50.211	0.0	40		
120 min Summer	31.113	0.0	74		
180 min Summer	23.167	0.0	106		
240 min Summer	18.658	0.0	136		
360 min Summer	13.718	0.0	196		
480 min Summer	11.023	0.0	252		
600 min Summer	9.295	0.0	306		
720 min Summer	8.082	0.0	368		
960 min Summer	6.475	0.0	490		
1440 min Summer	4.729	0.0	734		
2160 min Summer	3.446	0.0	1092		
2880 min Summer	2.750	0.0	1444		
4320 min Summer	1.997	0.0	2128		
5760 min Summer	1.589	0.0	2936		
7200 min Summer	1.330	0.0	3544		
8640 min Summer	1.151	0.0	4384		
10080 min Summer	1.019	0.0	5096		
15 min Winter	116.400	0.0	14		
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Date 13/07/16 File Trench SA 3.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	9.894	0.319	1.0	1.8	0 K
60 min Winter	9.883	0.308	1.0	1.7	0 K
120 min Winter	9.818	0.243	0.9	1.3	0 K
180 min Winter	9.754	0.179	0.8	1.0	0 K
240 min Winter	9.702	0.127	0.8	0.7	0 K
360 min Winter	9.634	0.059	0.7	0.3	0 K
480 min Winter	9.618	0.043	0.6	0.2	0 K
600 min Winter	9.612	0.037	0.5	0.2	0 K
720 min Winter	9.607	0.032	0.4	0.1	0 K
960 min Winter	9.601	0.026	0.3	0.1	0 K
1440 min Winter	9.594	0.019	0.3	0.1	0 K
2160 min Winter	9.592	0.017	0.2	0.0	0 K
2880 min Winter	9.590	0.015	0.1	0.0	0 K
4320 min Winter	9.588	0.013	0.1	0.0	0 K
5760 min Winter	9.586	0.011	0.1	0.0	0 K
7200 min Winter	9.585	0.010	0.1	0.0	0 K
8640 min Winter	9.585	0.010	0.1	0.0	0 K
10080 min Winter	9.584	0.009	0.1	0.0	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	23		
60 min Winter	50.211	0.0	42		
120 min Winter	31.113	0.0	78		
180 min Winter	23.167	0.0	110		
240 min Winter	18.658	0.0	142		
360 min Winter	13.718	0.0	194		
480 min Winter	11.023	0.0	248		
600 min Winter	9.295	0.0	308		
720 min Winter	8.082	0.0	368		
960 min Winter	6.475	0.0	488		
1440 min Winter	4.729	0.0	734		
2160 min Winter	3.446	0.0	1096		
2880 min Winter	2.750	0.0	1432		
4320 min Winter	1.997	0.0	2180		
5760 min Winter	1.589	0.0	2928		
7200 min Winter	1.330	0.0	3648		
8640 min Winter	1.151	0.0	4568		
10080 min Winter	1.019	0.0	5008		
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Date 13/07/16 File Trench SA 3.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.009

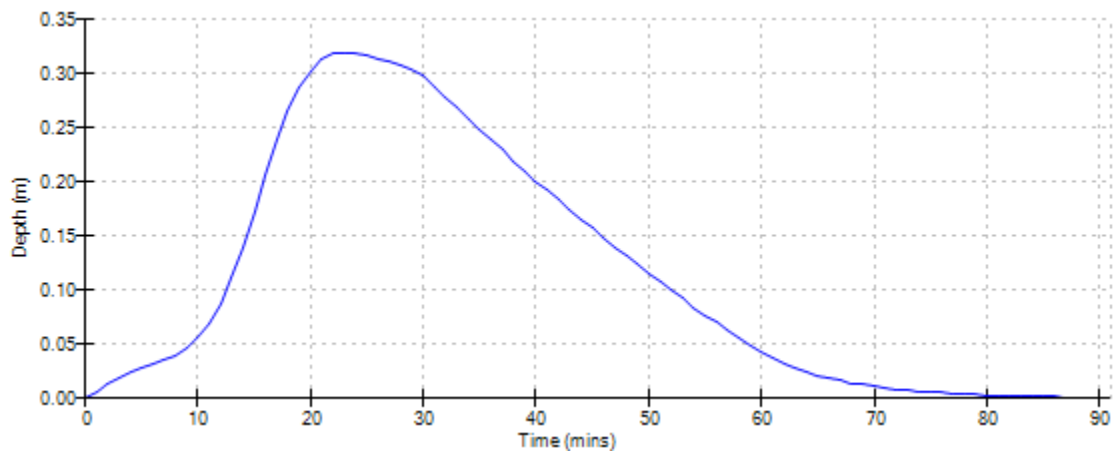
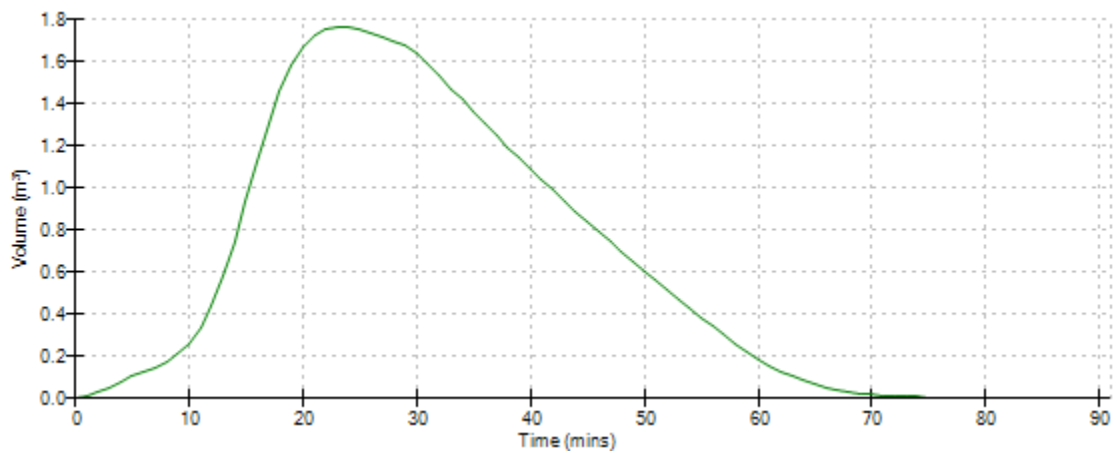
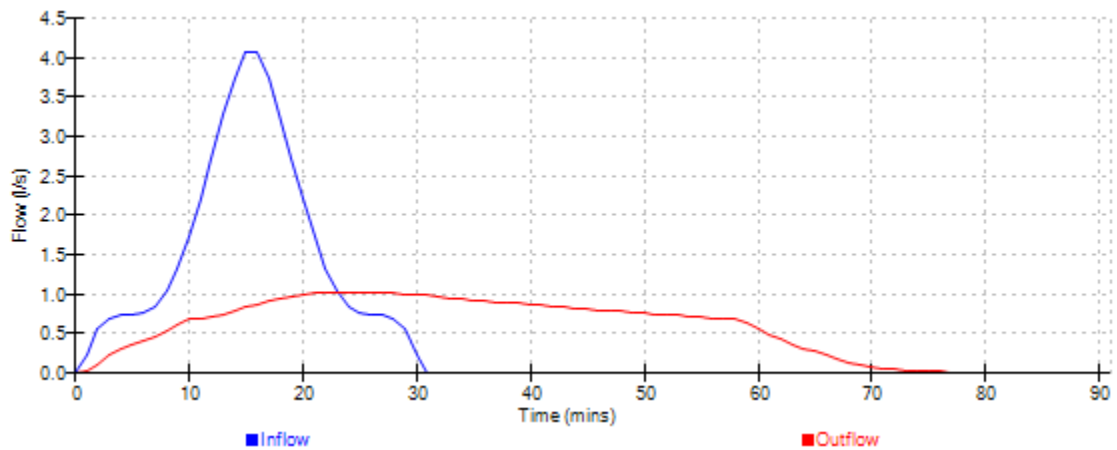
Time (mins)	Area
From:	To: (ha)
0	1 0.009

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 3 - Trench Soakaway																					
Date 13/07/16 File Trench SA 3.srcx	Designed by LK Checked by AMF																					
Micro Drainage Source Control 2015.1																						
<u>Model Details</u> Storage is Online Cover Level (m) 11.075 <u>Trench Soakaway Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.23400</td> <td>Trench Width (m)</td> <td>1.0</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.23400</td> <td>Trench Length (m)</td> <td>19.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Slope (1:X)</td> <td>1000.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>1.300</td> </tr> <tr> <td>Invert Level (m)</td> <td>9.575</td> <td>Cap Infiltration Depth (m)</td> <td>1.100</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.23400	Trench Width (m)	1.0	Infiltration Coefficient Side (m/hr)	0.23400	Trench Length (m)	19.0	Safety Factor	2.0	Slope (1:X)	1000.0	Porosity	0.30	Cap Volume Depth (m)	1.300	Invert Level (m)	9.575	Cap Infiltration Depth (m)	1.100
Infiltration Coefficient Base (m/hr)	0.23400	Trench Width (m)	1.0																			
Infiltration Coefficient Side (m/hr)	0.23400	Trench Length (m)	19.0																			
Safety Factor	2.0	Slope (1:X)	1000.0																			
Porosity	0.30	Cap Volume Depth (m)	1.300																			
Invert Level (m)	9.575	Cap Infiltration Depth (m)	1.100																			
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Cundall, Johnston & Partners		Page 5
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 3 - Trench Soakaway	
Date 13/07/16 File Trench SA 3.srcx	Designed by LK Checked by AMF	
Micro Drainage	Source Control 2015.1	

Event: 30 min Winter



Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 4 - Trench Soakaway			
Date 13/07/16 File Trench SA 4.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 28 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	9.886	0.461	1.0	2.2	0 K
30 min Summer	9.956	0.531	1.1	2.5	0 K
60 min Summer	9.979	0.554	1.1	2.6	0 K
120 min Summer	9.939	0.514	1.1	2.4	0 K
180 min Summer	9.882	0.457	1.0	2.2	0 K
240 min Summer	9.827	0.402	1.0	1.9	0 K
360 min Summer	9.736	0.311	0.9	1.5	0 K
480 min Summer	9.667	0.242	0.8	1.1	0 K
600 min Summer	9.612	0.187	0.7	0.9	0 K
720 min Summer	9.568	0.143	0.7	0.7	0 K
960 min Summer	9.508	0.083	0.6	0.4	0 K
1440 min Summer	9.469	0.044	0.5	0.2	0 K
2160 min Summer	9.458	0.033	0.4	0.1	0 K
2880 min Summer	9.451	0.026	0.3	0.1	0 K
4320 min Summer	9.444	0.019	0.2	0.1	0 K
5760 min Summer	9.441	0.016	0.2	0.0	0 K
7200 min Summer	9.440	0.015	0.1	0.0	0 K
8640 min Summer	9.439	0.014	0.1	0.0	0 K
10080 min Summer	9.438	0.013	0.1	0.0	0 K
15 min Winter	9.952	0.527	1.1	2.5	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	15		
30 min Summer	78.248	0.0	23		
60 min Summer	50.211	0.0	42		
120 min Summer	31.113	0.0	76		
180 min Summer	23.167	0.0	108		
240 min Summer	18.658	0.0	142		
360 min Summer	13.718	0.0	204		
480 min Summer	11.023	0.0	266		
600 min Summer	9.295	0.0	326		
720 min Summer	8.082	0.0	384		
960 min Summer	6.475	0.0	500		
1440 min Summer	4.729	0.0	734		
2160 min Summer	3.446	0.0	1092		
2880 min Summer	2.750	0.0	1468		
4320 min Summer	1.997	0.0	2172		
5760 min Summer	1.589	0.0	2896		
7200 min Summer	1.330	0.0	3560		
8640 min Summer	1.151	0.0	4368		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	15		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 4 - Trench Soakaway			
Date 13/07/16 File Trench SA 4.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.032	0.607	1.2	2.9	0 K
60 min Winter	10.050	0.625	1.2	3.0	0 K
120 min Winter	9.977	0.552	1.1	2.6	0 K
180 min Winter	9.891	0.466	1.0	2.2	0 K
240 min Winter	9.812	0.387	0.9	1.8	0 K
360 min Winter	9.691	0.266	0.8	1.2	0 K
480 min Winter	9.604	0.179	0.7	0.8	0 K
600 min Winter	9.539	0.114	0.6	0.5	0 K
720 min Winter	9.493	0.068	0.6	0.3	0 K
960 min Winter	9.469	0.044	0.5	0.2	0 K
1440 min Winter	9.457	0.032	0.4	0.1	0 K
2160 min Winter	9.449	0.024	0.3	0.1	0 K
2880 min Winter	9.444	0.019	0.2	0.1	0 K
4320 min Winter	9.440	0.015	0.2	0.0	0 K
5760 min Winter	9.439	0.014	0.1	0.0	0 K
7200 min Winter	9.437	0.012	0.1	0.0	0 K
8640 min Winter	9.437	0.012	0.1	0.0	0 K
10080 min Winter	9.436	0.011	0.1	0.0	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	24		
60 min Winter	50.211	0.0	44		
120 min Winter	31.113	0.0	80		
180 min Winter	23.167	0.0	116		
240 min Winter	18.658	0.0	150		
360 min Winter	13.718	0.0	214		
480 min Winter	11.023	0.0	274		
600 min Winter	9.295	0.0	332		
720 min Winter	8.082	0.0	384		
960 min Winter	6.475	0.0	490		
1440 min Winter	4.729	0.0	734		
2160 min Winter	3.446	0.0	1104		
2880 min Winter	2.750	0.0	1460		
4320 min Winter	1.997	0.0	2136		
5760 min Winter	1.589	0.0	2856		
7200 min Winter	1.330	0.0	3608		
8640 min Winter	1.151	0.0	4496		
10080 min Winter	1.019	0.0	5104		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 4 - Trench Soakaway	
Date 13/07/16 File Trench SA 4.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.013

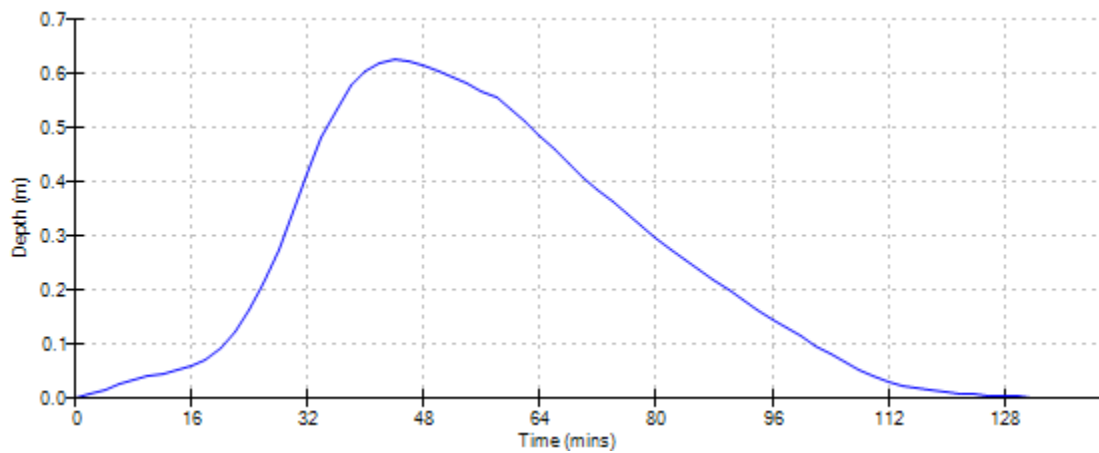
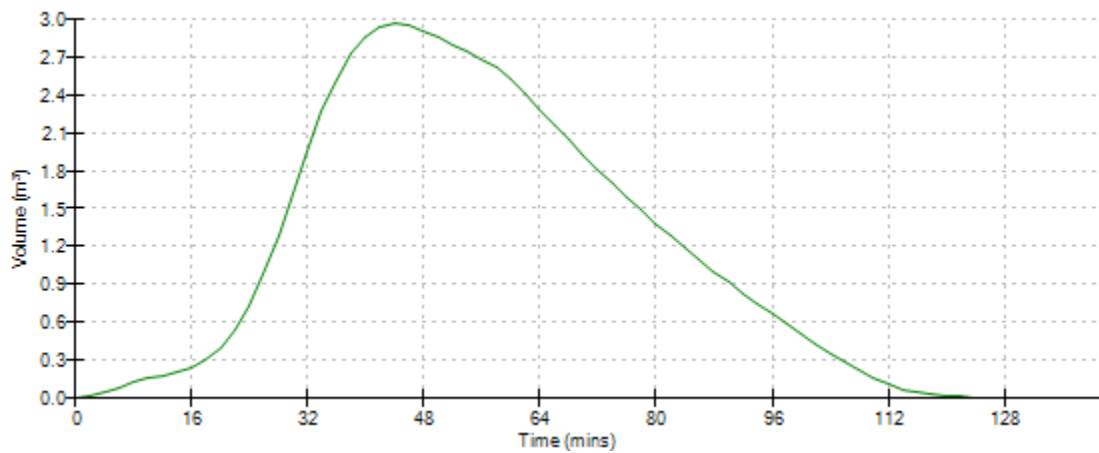
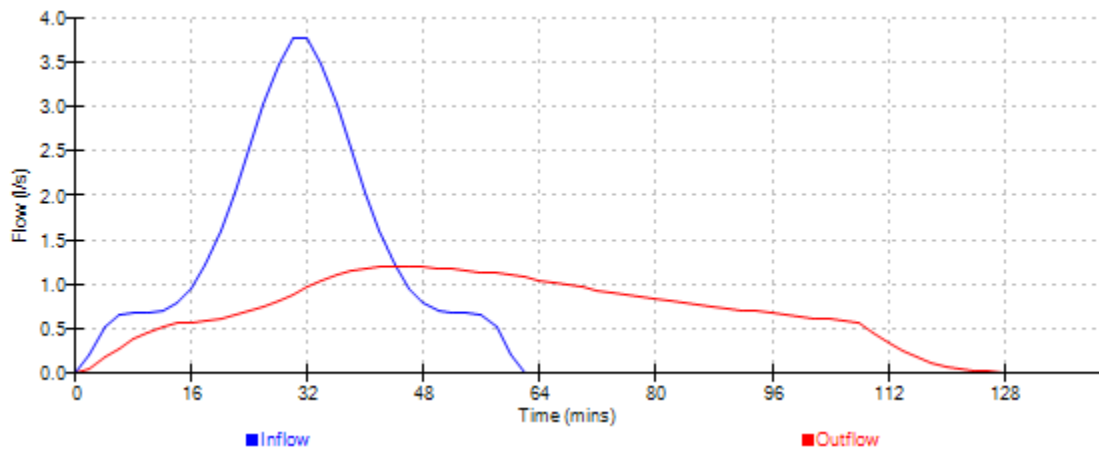
Time (mins)		Area
From:	To:	(ha)
0	1	0.013

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 4 - Trench Soakaway																					
Date 13/07/16 File Trench SA 4.srcx	Designed by LK Checked by AMF																					
Micro Drainage Source Control 2015.1																						
<u>Model Details</u> Storage is Online Cover Level (m) 10.925 <u>Trench Soakaway Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.23400</td> <td>Trench Width (m)</td> <td>1.0</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.23400</td> <td>Trench Length (m)</td> <td>16.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Slope (1:X)</td> <td>1000.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>1.300</td> </tr> <tr> <td>Invert Level (m)</td> <td>9.425</td> <td>Cap Infiltration Depth (m)</td> <td>1.100</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.23400	Trench Width (m)	1.0	Infiltration Coefficient Side (m/hr)	0.23400	Trench Length (m)	16.0	Safety Factor	2.0	Slope (1:X)	1000.0	Porosity	0.30	Cap Volume Depth (m)	1.300	Invert Level (m)	9.425	Cap Infiltration Depth (m)	1.100
Infiltration Coefficient Base (m/hr)	0.23400	Trench Width (m)	1.0																			
Infiltration Coefficient Side (m/hr)	0.23400	Trench Length (m)	16.0																			
Safety Factor	2.0	Slope (1:X)	1000.0																			
Porosity	0.30	Cap Volume Depth (m)	1.300																			
Invert Level (m)	9.425	Cap Infiltration Depth (m)	1.100																			
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 4 - Trench Soakaway	
Date 13/07/16 File Trench SA 4.srcx	Designed by LK Checked by AMF	
Micro Drainage	Source Control 2015.1	

Event: 60 min Winter

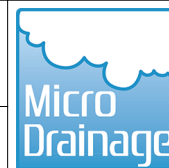


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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 5 - Trench Soakaway			
Date 13/07/16 File Trench SA 5.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 34 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.124	1.349	2.4	6.4	0 K
30 min Summer	10.359	1.584	2.7	7.5	0 K
60 min Summer	10.485	1.710	2.9	8.1	0 K
120 min Summer	10.431	1.656	2.8	7.9	0 K
180 min Summer	10.302	1.527	2.7	7.3	0 K
240 min Summer	10.173	1.398	2.5	6.7	0 K
360 min Summer	9.963	1.188	2.2	5.6	0 K
480 min Summer	9.800	1.025	2.0	4.9	0 K
600 min Summer	9.669	0.894	1.8	4.2	0 K
720 min Summer	9.560	0.785	1.7	3.7	0 K
960 min Summer	9.390	0.615	1.5	2.9	0 K
1440 min Summer	9.167	0.392	1.2	1.8	0 K
2160 min Summer	8.972	0.197	0.9	0.9	0 K
2880 min Summer	8.864	0.089	0.8	0.4	0 K
4320 min Summer	8.816	0.041	0.6	0.2	0 K
5760 min Summer	8.808	0.033	0.5	0.1	0 K
7200 min Summer	8.802	0.027	0.4	0.1	0 K
8640 min Summer	8.799	0.024	0.3	0.1	0 K
10080 min Summer	8.796	0.021	0.3	0.1	0 K
15 min Winter	10.304	1.529	2.7	7.3	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	15		
30 min Summer	78.248	0.0	24		
60 min Summer	50.211	0.0	42		
120 min Summer	31.113	0.0	76		
180 min Summer	23.167	0.0	110		
240 min Summer	18.658	0.0	142		
360 min Summer	13.718	0.0	206		
480 min Summer	11.023	0.0	270		
600 min Summer	9.295	0.0	330		
720 min Summer	8.082	0.0	392		
960 min Summer	6.475	0.0	512		
1440 min Summer	4.729	0.0	752		
2160 min Summer	3.446	0.0	1120		
2880 min Summer	2.750	0.0	1472		
4320 min Summer	1.997	0.0	2188		
5760 min Summer	1.589	0.0	2856		
7200 min Summer	1.330	0.0	3552		
8640 min Summer	1.151	0.0	4256		
10080 min Summer	1.019	0.0	5032		
15 min Winter	116.400	0.0	15		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 5 - Trench Soakaway				
Date 13/07/16 File Trench SA 5.srcx		Designed by LK Checked by AMF				
Micro Drainage		Source Control 2015.1				
Summary of Results for 100 year Return Period (+30%)						
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	
30 min Winter	10.572	1.797	3.0	8.6	0 K	
60 min Winter	10.699	1.924	3.0	9.2	Flood Risk	
120 min Winter	10.569	1.794	3.0	8.6	0 K	
180 min Winter	10.371	1.596	2.8	7.6	0 K	
240 min Winter	10.186	1.411	2.5	6.7	0 K	
360 min Winter	9.903	1.128	2.1	5.4	0 K	
480 min Winter	9.696	0.921	1.9	4.4	0 K	
600 min Winter	9.537	0.762	1.7	3.6	0 K	
720 min Winter	9.412	0.637	1.5	3.0	0 K	
960 min Winter	9.227	0.452	1.3	2.1	0 K	
1440 min Winter	9.000	0.225	1.0	1.0	0 K	
2160 min Winter	8.827	0.052	0.7	0.2	0 K	
2880 min Winter	8.816	0.041	0.6	0.2	0 K	
4320 min Winter	8.805	0.030	0.4	0.1	0 K	
5760 min Winter	8.799	0.024	0.3	0.1	0 K	
7200 min Winter	8.795	0.020	0.3	0.1	0 K	
8640 min Winter	8.793	0.018	0.3	0.0	0 K	
10080 min Winter	8.791	0.016	0.2	0.0	0 K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)			
30 min Winter	78.248	0.0	25			
60 min Winter	50.211	0.0	44			
120 min Winter	31.113	0.0	82			
180 min Winter	23.167	0.0	116			
240 min Winter	18.658	0.0	150			
360 min Winter	13.718	0.0	216			
480 min Winter	11.023	0.0	280			
600 min Winter	9.295	0.0	342			
720 min Winter	8.082	0.0	404			
960 min Winter	6.475	0.0	528			
1440 min Winter	4.729	0.0	766			
2160 min Winter	3.446	0.0	1104			
2880 min Winter	2.750	0.0	1440			
4320 min Winter	1.997	0.0	2188			
5760 min Winter	1.589	0.0	2904			
7200 min Winter	1.330	0.0	3616			
8640 min Winter	1.151	0.0	4344			
10080 min Winter	1.019	0.0	5120			
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Havant Road, Emsworth
SUDS Sizing
TSA 5 - Trench Soakaway

Designed by LK Checked by AMF



Source Control 2015.1

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

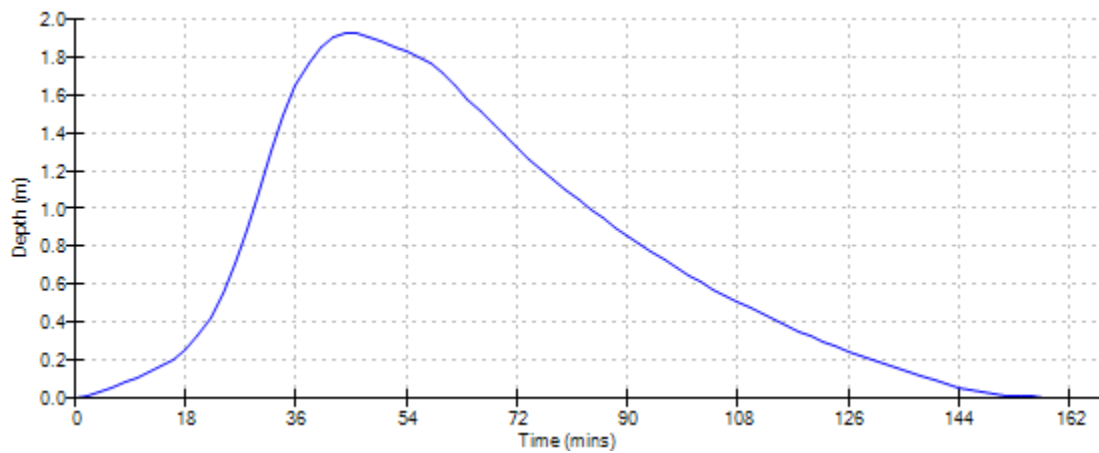
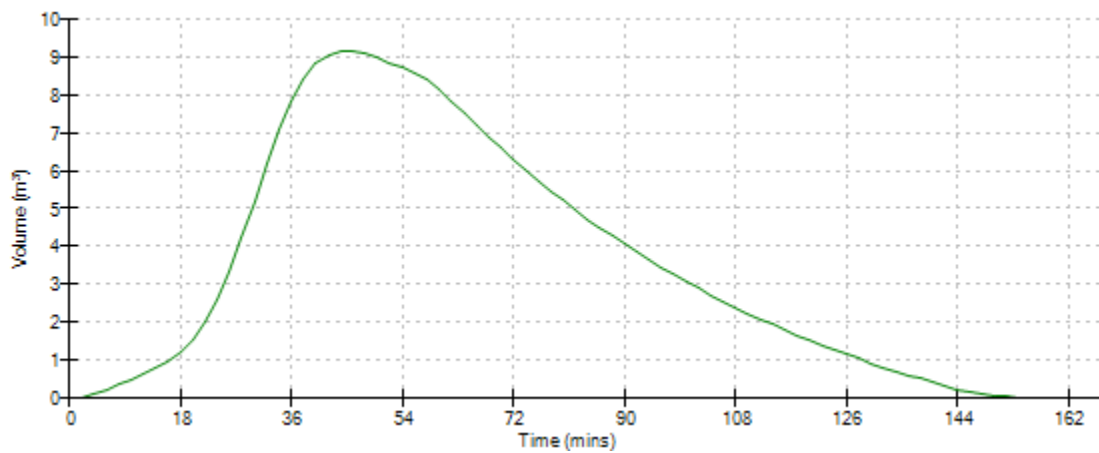
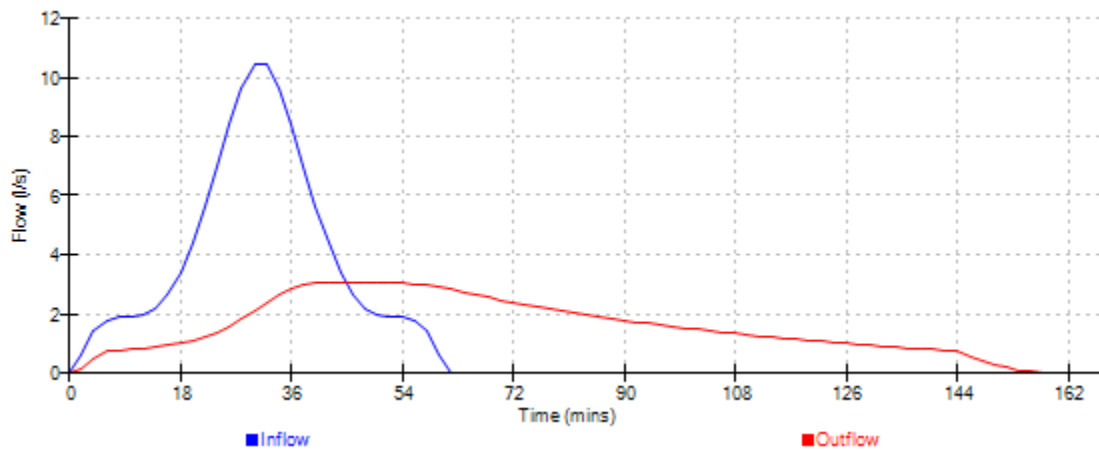
Total Area (ha) 0.036

0 1 0.036

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 5 - Trench Soakaway																					
Date 13/07/16 File Trench SA 5.srcx	Designed by LK Checked by AMF																					
Micro Drainage Source Control 2015.1																						
<u>Model Details</u> Storage is Online Cover Level (m) 10.975 <u>Trench Soakaway Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.30240</td> <td>Trench Width (m)</td> <td>1.1</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.30240</td> <td>Trench Length (m)</td> <td>14.5</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Slope (1:X)</td> <td>1000.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>2.000</td> </tr> <tr> <td>Invert Level (m)</td> <td>8.775</td> <td>Cap Infiltration Depth (m)</td> <td>1.800</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.30240	Trench Width (m)	1.1	Infiltration Coefficient Side (m/hr)	0.30240	Trench Length (m)	14.5	Safety Factor	2.0	Slope (1:X)	1000.0	Porosity	0.30	Cap Volume Depth (m)	2.000	Invert Level (m)	8.775	Cap Infiltration Depth (m)	1.800
Infiltration Coefficient Base (m/hr)	0.30240	Trench Width (m)	1.1																			
Infiltration Coefficient Side (m/hr)	0.30240	Trench Length (m)	14.5																			
Safety Factor	2.0	Slope (1:X)	1000.0																			
Porosity	0.30	Cap Volume Depth (m)	2.000																			
Invert Level (m)	8.775	Cap Infiltration Depth (m)	1.800																			
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 5 - Trench Soakaway	
Date 13/07/16 File Trench SA 5.srcx	Designed by LK Checked by AMF	
Micro Drainage	Source Control 2015.1	

Event: 60 min Winter



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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 6 - Trench Soakaway			
Date 13/07/16 File Trench SA 6.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 869 minutes.					
Storm Event		Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³) Status
15 min Summer		8.524	0.749	0.1	4.5 0 K
30 min Summer		8.771	0.996	0.1	6.0 0 K
60 min Summer		9.032	1.257	0.1	7.6 0 K
120 min Summer		9.289	1.514	0.1	9.2 0 K
180 min Summer		9.420	1.645	0.1	10.0 0 K
240 min Summer		9.495	1.720	0.1	10.5 0 K
360 min Summer		9.577	1.802	0.1	11.0 0 K
480 min Summer		9.610	1.835	0.1	11.2 0 K
600 min Summer		9.620	1.845	0.1	11.2 0 K
720 min Summer		9.625	1.850	0.1	11.3 0 K
960 min Summer		9.625	1.850	0.1	11.3 0 K
1440 min Summer		9.597	1.822	0.1	11.1 0 K
2160 min Summer		9.520	1.745	0.1	10.6 0 K
2880 min Summer		9.432	1.657	0.1	10.1 0 K
4320 min Summer		9.265	1.490	0.1	9.1 0 K
5760 min Summer		9.124	1.349	0.1	8.2 0 K
7200 min Summer		9.006	1.231	0.1	7.5 0 K
8640 min Summer		8.905	1.130	0.1	6.9 0 K
10080 min Summer		8.817	1.042	0.1	6.3 0 K
15 min Winter		8.613	0.838	0.1	5.1 0 K
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	
15 min Summer		116.400	0.0	16	
30 min Summer		78.248	0.0	31	
60 min Summer		50.211	0.0	62	
120 min Summer		31.113	0.0	122	
180 min Summer		23.167	0.0	182	
240 min Summer		18.658	0.0	240	
360 min Summer		13.718	0.0	360	
480 min Summer		11.023	0.0	480	
600 min Summer		9.295	0.0	548	
720 min Summer		8.082	0.0	600	
960 min Summer		6.475	0.0	722	
1440 min Summer		4.729	0.0	994	
2160 min Summer		3.446	0.0	1408	
2880 min Summer		2.750	0.0	1820	
4320 min Summer		1.997	0.0	2636	
5760 min Summer		1.589	0.0	3456	
7200 min Summer		1.330	0.0	4184	
8640 min Summer		1.151	0.0	5008	
10080 min Summer		1.019	0.0	5744	
15 min Winter		116.400	0.0	16	
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 6 - Trench Soakaway				
Date 13/07/16 File Trench SA 6.srcx		Designed by LK Checked by AMF				
Micro Drainage		Source Control 2015.1				
Summary of Results for 100 year Return Period (+30%)						
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	
30 min Winter	8.891	1.116	0.1	6.8	0 K	
60 min Winter	9.185	1.410	0.1	8.6	0 K	
120 min Winter	9.476	1.701	0.1	10.4	0 K	
180 min Winter	9.627	1.852	0.1	11.3	0 K	
240 min Winter	9.715	1.940	0.2	11.8	0 K	
360 min Winter	9.819	2.044	0.2	12.5	Flood Risk	
480 min Winter	9.872	2.097	0.2	12.8	Flood Risk	
600 min Winter	9.947	2.172	0.2	12.9	Flood Risk	
720 min Winter	9.971	2.196	0.2	12.9	Flood Risk	
960 min Winter	9.887	2.112	0.2	12.9	Flood Risk	
1440 min Winter	9.837	2.062	0.2	12.6	Flood Risk	
2160 min Winter	9.713	1.938	0.2	11.8	0 K	
2880 min Winter	9.585	1.810	0.1	11.0	0 K	
4320 min Winter	9.349	1.574	0.1	9.6	0 K	
5760 min Winter	9.153	1.378	0.1	8.4	0 K	
7200 min Winter	8.993	1.218	0.1	7.4	0 K	
8640 min Winter	8.861	1.086	0.1	6.6	0 K	
10080 min Winter	8.748	0.973	0.1	5.9	0 K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)			
30 min Winter	78.248	0.0	31			
60 min Winter	50.211	0.0	62			
120 min Winter	31.113	0.0	120			
180 min Winter	23.167	0.0	178			
240 min Winter	18.658	0.0	236			
360 min Winter	13.718	0.0	352			
480 min Winter	11.023	0.0	462			
600 min Winter	9.295	0.0	572			
720 min Winter	8.082	0.0	676			
960 min Winter	6.475	0.0	770			
1440 min Winter	4.729	0.0	1068			
2160 min Winter	3.446	0.0	1516			
2880 min Winter	2.750	0.0	1960			
4320 min Winter	1.997	0.0	2808			
5760 min Winter	1.589	0.0	3632			
7200 min Winter	1.330	0.0	4400			
8640 min Winter	1.151	0.0	5192			
10080 min Winter	1.019	0.0	5960			
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 6 - Trench Soakaway	
Date 13/07/16 File Trench SA 6.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

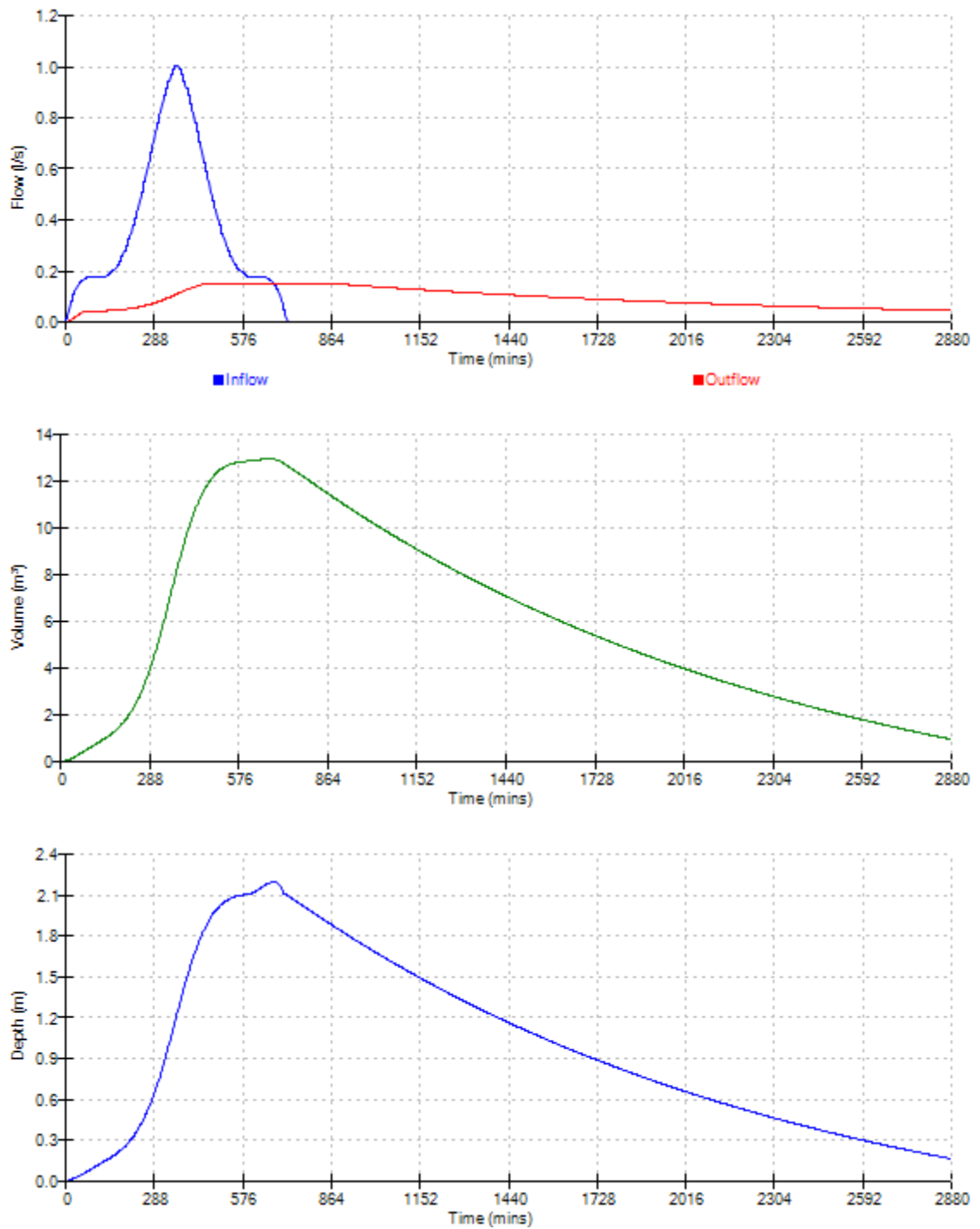
Total Area (ha) 0.021

Time (mins)		Area
From:	To:	(ha)
0	1	0.021

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 6 - Trench Soakaway																					
Date 13/07/16 File Trench SA 6.srcx	Designed by LK Checked by AMF																					
Micro Drainage Source Control 2015.1																						
<u>Model Details</u> Storage is Online Cover Level (m) 10.075 <u>Trench Soakaway Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.01224</td> <td>Trench Width (m)</td> <td>1.2</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.01224</td> <td>Trench Length (m)</td> <td>17.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Slope (1:X)</td> <td>1000.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>2.100</td> </tr> <tr> <td>Invert Level (m)</td> <td>7.775</td> <td>Cap Infiltration Depth (m)</td> <td>1.900</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.01224	Trench Width (m)	1.2	Infiltration Coefficient Side (m/hr)	0.01224	Trench Length (m)	17.0	Safety Factor	2.0	Slope (1:X)	1000.0	Porosity	0.30	Cap Volume Depth (m)	2.100	Invert Level (m)	7.775	Cap Infiltration Depth (m)	1.900
Infiltration Coefficient Base (m/hr)	0.01224	Trench Width (m)	1.2																			
Infiltration Coefficient Side (m/hr)	0.01224	Trench Length (m)	17.0																			
Safety Factor	2.0	Slope (1:X)	1000.0																			
Porosity	0.30	Cap Volume Depth (m)	2.100																			
Invert Level (m)	7.775	Cap Infiltration Depth (m)	1.900																			
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Event: 720 min Winter

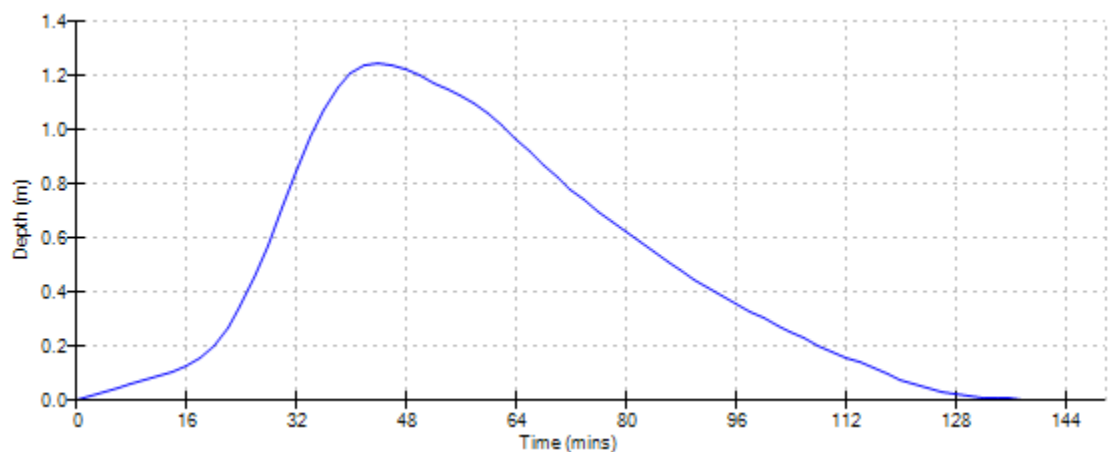
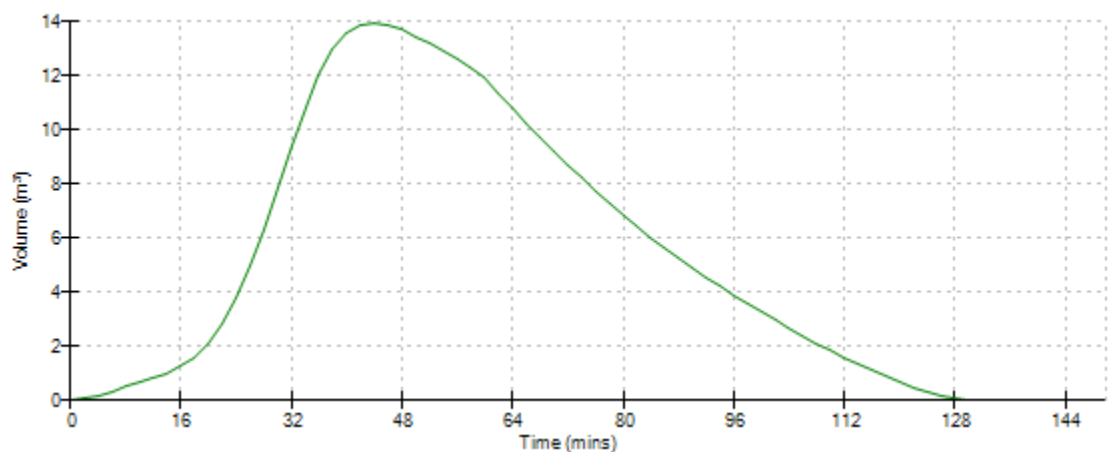
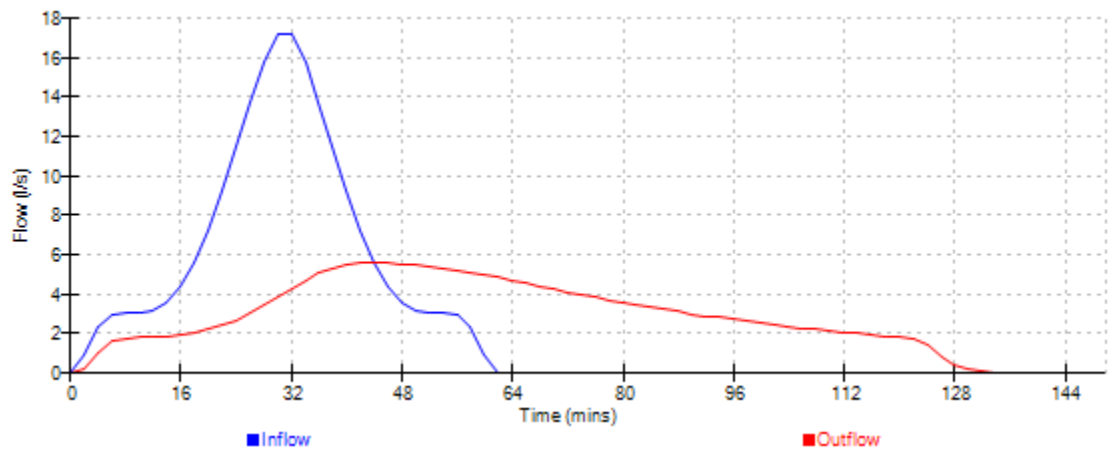


Cundall, Johnston & Partners					Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 7 - Trench Soakaway				
Date 13/07/16 File Trench SA 7.srcx		Designed by LK Checked by AMF				
Micro Drainage		Source Control 2015.1				
Summary of Results for 100 year Return Period (+30%)						
Half Drain Time : 28 minutes.						
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	
15 min Summer	9.705	0.905	4.5	10.1	0 K	
30 min Summer	9.848	1.048	5.0	11.7	0 K	
60 min Summer	9.905	1.105	5.2	12.4	0 K	
120 min Summer	9.840	1.040	4.9	11.6	0 K	
180 min Summer	9.743	0.943	4.6	10.5	0 K	
240 min Summer	9.650	0.850	4.3	9.5	0 K	
360 min Summer	9.498	0.698	3.8	7.7	0 K	
480 min Summer	9.381	0.581	3.4	6.4	0 K	
600 min Summer	9.287	0.487	3.1	5.3	0 K	
720 min Summer	9.211	0.411	2.9	4.5	0 K	
960 min Summer	9.095	0.295	2.5	3.1	0 K	
1440 min Summer	8.947	0.147	2.0	1.5	0 K	
2160 min Summer	8.849	0.049	1.7	0.3	0 K	
2880 min Summer	8.840	0.040	1.3	0.2	0 K	
4320 min Summer	8.833	0.033	1.0	0.2	0 K	
5760 min Summer	8.830	0.030	0.8	0.1	0 K	
7200 min Summer	8.827	0.027	0.7	0.1	0 K	
8640 min Summer	8.825	0.025	0.6	0.1	0 K	
10080 min Summer	8.824	0.024	0.5	0.1	0 K	
15 min Winter	9.828	1.028	4.9	11.5	0 K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)			
15 min Summer	116.400	0.0	15			
30 min Summer	78.248	0.0	23			
60 min Summer	50.211	0.0	42			
120 min Summer	31.113	0.0	76			
180 min Summer	23.167	0.0	108			
240 min Summer	18.658	0.0	142			
360 min Summer	13.718	0.0	204			
480 min Summer	11.023	0.0	266			
600 min Summer	9.295	0.0	330			
720 min Summer	8.082	0.0	390			
960 min Summer	6.475	0.0	510			
1440 min Summer	4.729	0.0	750			
2160 min Summer	3.446	0.0	1080			
2880 min Summer	2.750	0.0	1444			
4320 min Summer	1.997	0.0	2200			
5760 min Summer	1.589	0.0	2896			
7200 min Summer	1.330	0.0	3544			
8640 min Summer	1.151	0.0	4320			
10080 min Summer	1.019	0.0	5080			
15 min Winter	116.400	0.0	15			
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 7 - Trench Soakaway			
Date 13/07/16 File Trench SA 7.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	9.992	1.192	5.4	13.4	0 K
60 min Winter	10.043	1.243	5.6	14.0	0 K
120 min Winter	9.919	1.119	5.2	12.5	0 K
180 min Winter	9.771	0.971	4.7	10.9	0 K
240 min Winter	9.640	0.840	4.3	9.4	0 K
360 min Winter	9.438	0.638	3.6	7.1	0 K
480 min Winter	9.292	0.492	3.1	5.4	0 K
600 min Winter	9.182	0.382	2.8	4.1	0 K
720 min Winter	9.097	0.297	2.5	3.2	0 K
960 min Winter	8.972	0.172	2.1	1.7	0 K
1440 min Winter	8.849	0.049	1.7	0.3	0 K
2160 min Winter	8.837	0.037	1.2	0.2	0 K
2880 min Winter	8.833	0.033	1.0	0.2	0 K
4320 min Winter	8.828	0.028	0.7	0.1	0 K
5760 min Winter	8.825	0.025	0.6	0.1	0 K
7200 min Winter	8.823	0.023	0.5	0.1	0 K
8640 min Winter	8.822	0.022	0.4	0.1	0 K
10080 min Winter	8.820	0.020	0.4	0.1	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	24		
60 min Winter	50.211	0.0	44		
120 min Winter	31.113	0.0	80		
180 min Winter	23.167	0.0	116		
240 min Winter	18.658	0.0	148		
360 min Winter	13.718	0.0	214		
480 min Winter	11.023	0.0	276		
600 min Winter	9.295	0.0	338		
720 min Winter	8.082	0.0	398		
960 min Winter	6.475	0.0	520		
1440 min Winter	4.729	0.0	718		
2160 min Winter	3.446	0.0	1088		
2880 min Winter	2.750	0.0	1424		
4320 min Winter	1.997	0.0	2088		
5760 min Winter	1.589	0.0	2920		
7200 min Winter	1.330	0.0	3584		
8640 min Winter	1.151	0.0	4272		
10080 min Winter	1.019	0.0	4984		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 7 - Trench Soakaway																					
Date 13/07/16 File Trench SA 7.srcx	Designed by LK Checked by AMF																					
Micro Drainage Source Control 2015.1																						
<u>Model Details</u> Storage is Online Cover Level (m) 10.800 <u>Trench Soakaway Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.30240</td> <td>Trench Width (m)</td> <td>1.0</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.30240</td> <td>Trench Length (m)</td> <td>38.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Slope (1:X)</td> <td>1000.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>1.800</td> </tr> <tr> <td>Invert Level (m)</td> <td>8.800</td> <td>Cap Infiltration Depth (m)</td> <td>1.600</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.30240	Trench Width (m)	1.0	Infiltration Coefficient Side (m/hr)	0.30240	Trench Length (m)	38.0	Safety Factor	2.0	Slope (1:X)	1000.0	Porosity	0.30	Cap Volume Depth (m)	1.800	Invert Level (m)	8.800	Cap Infiltration Depth (m)	1.600
Infiltration Coefficient Base (m/hr)	0.30240	Trench Width (m)	1.0																			
Infiltration Coefficient Side (m/hr)	0.30240	Trench Length (m)	38.0																			
Safety Factor	2.0	Slope (1:X)	1000.0																			
Porosity	0.30	Cap Volume Depth (m)	1.800																			
Invert Level (m)	8.800	Cap Infiltration Depth (m)	1.600																			
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Event: 60 min Winter



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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 8 - Trench Soakaway			
Date 13/07/16 File Trench SA 8.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 1298 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	9.717	0.767	0.2	18.6	0 K
30 min Summer	9.965	1.015	0.3	24.9	0 K
60 min Summer	10.230	1.280	0.3	31.6	0 K
120 min Summer	10.500	1.550	0.4	38.5	0 K
180 min Summer	10.646	1.696	0.4	42.2	0 K
240 min Summer	10.737	1.787	0.4	44.5	0 K
360 min Summer	10.851	1.901	0.4	47.4	0 K
480 min Summer	10.918	1.968	0.4	49.1	0 K
600 min Summer	10.955	2.005	0.4	50.0	0 K
720 min Summer	10.974	2.024	0.4	50.5	0 K
960 min Summer	10.983	2.033	0.4	50.7	0 K
1440 min Summer	10.981	2.031	0.4	50.7	0 K
2160 min Summer	10.945	1.995	0.4	49.8	0 K
2880 min Summer	10.889	1.939	0.4	48.3	0 K
4320 min Summer	10.758	1.808	0.4	45.0	0 K
5760 min Summer	10.631	1.681	0.4	41.8	0 K
7200 min Summer	10.520	1.570	0.4	39.0	0 K
8640 min Summer	10.424	1.474	0.3	36.5	0 K
10080 min Summer	10.339	1.389	0.3	34.4	0 K
15 min Winter	9.806	0.856	0.2	20.9	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	122		
180 min Summer	23.167	0.0	182		
240 min Summer	18.658	0.0	242		
360 min Summer	13.718	0.0	360		
480 min Summer	11.023	0.0	480		
600 min Summer	9.295	0.0	600		
720 min Summer	8.082	0.0	720		
960 min Summer	6.475	0.0	854		
1440 min Summer	4.729	0.0	1096		
2160 min Summer	3.446	0.0	1492		
2880 min Summer	2.750	0.0	1904		
4320 min Summer	1.997	0.0	2728		
5760 min Summer	1.589	0.0	3568		
7200 min Summer	1.330	0.0	4392		
8640 min Summer	1.151	0.0	5184		
10080 min Summer	1.019	0.0	5952		
15 min Winter	116.400	0.0	16		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG			Havant Road, Emsworth SUDS Sizing TSA 8 - Trench Soakaway			
Date 13/07/16 File Trench SA 8.srcx			Designed by LK Checked by AMF			
Micro Drainage			Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)						
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	
30 min Winter	10.083	1.133	0.3	27.9	0 K	
60 min Winter	10.382	1.432	0.3	35.5	0 K	
120 min Winter	10.686	1.736	0.4	43.2	0 K	
180 min Winter	10.853	1.903	0.4	47.4	0 K	
240 min Winter	10.958	2.008	0.4	50.1	0 K	
360 min Winter	11.092	2.142	0.5	53.5	0 K	
480 min Winter	11.174	2.224	0.5	55.5	Flood Risk	
600 min Winter	11.225	2.275	0.5	56.9	Flood Risk	
720 min Winter	11.257	2.307	0.5	57.7	Flood Risk	
960 min Winter	11.296	2.346	0.5	58.3	Flood Risk	
1440 min Winter	11.262	2.312	0.5	57.8	Flood Risk	
2160 min Winter	11.205	2.255	0.5	56.3	Flood Risk	
2880 min Winter	11.117	2.167	0.5	54.1	0 K	
4320 min Winter	10.930	1.980	0.4	49.4	0 K	
5760 min Winter	10.752	1.802	0.4	44.9	0 K	
7200 min Winter	10.593	1.643	0.4	40.8	0 K	
8640 min Winter	10.459	1.509	0.4	37.4	0 K	
10080 min Winter	10.343	1.393	0.3	34.5	0 K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)			
30 min Winter	78.248	0.0	31			
60 min Winter	50.211	0.0	62			
120 min Winter	31.113	0.0	120			
180 min Winter	23.167	0.0	180			
240 min Winter	18.658	0.0	238			
360 min Winter	13.718	0.0	354			
480 min Winter	11.023	0.0	470			
600 min Winter	9.295	0.0	582			
720 min Winter	8.082	0.0	694			
960 min Winter	6.475	0.0	912			
1440 min Winter	4.729	0.0	1154			
2160 min Winter	3.446	0.0	1604			
2880 min Winter	2.750	0.0	2048			
4320 min Winter	1.997	0.0	2940			
5760 min Winter	1.589	0.0	3808			
7200 min Winter	1.330	0.0	4616			
8640 min Winter	1.151	0.0	5448			
10080 min Winter	1.019	0.0	6256			
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 8 - Trench Soakaway	
Date 13/07/16 File Trench SA 8.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

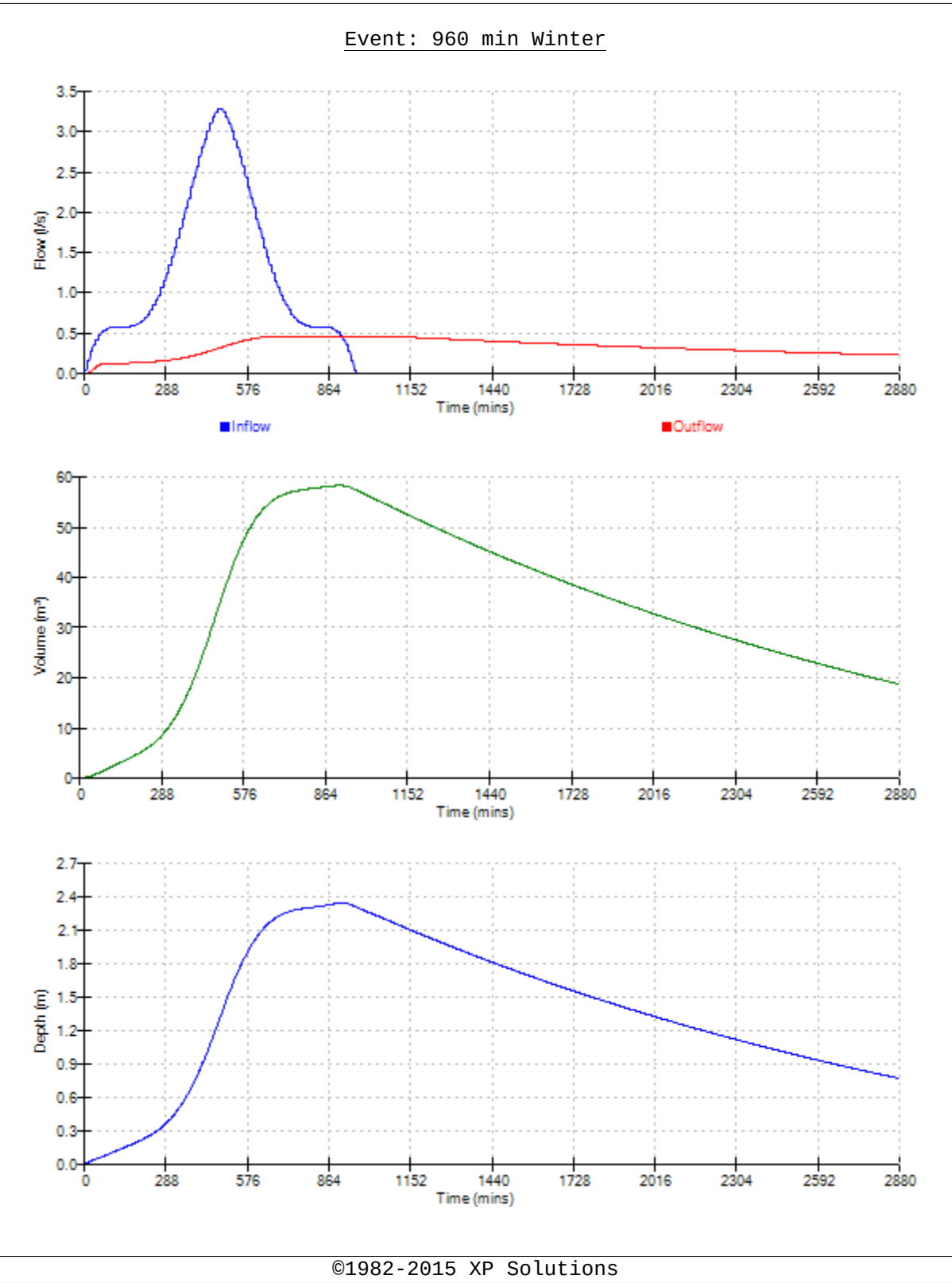
Time Area Diagram

Total Area (ha) 0.086

Time (mins)	Area
From:	To: (ha)
0	1 0.086

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 8 - Trench Soakaway																					
Date 13/07/16 File Trench SA 8.srcx	Designed by LK Checked by AMF																					
Micro Drainage Source Control 2015.1																						
<u>Model Details</u> Storage is Online Cover Level (m) 11.450 <u>Trench Soakaway Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00900</td> <td>Trench Width (m)</td> <td>1.3</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.00900</td> <td>Trench Length (m)</td> <td>65.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Slope (1:X)</td> <td>1000.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>2.300</td> </tr> <tr> <td>Invert Level (m)</td> <td>8.950</td> <td>Cap Infiltration Depth (m)</td> <td>2.100</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.00900	Trench Width (m)	1.3	Infiltration Coefficient Side (m/hr)	0.00900	Trench Length (m)	65.0	Safety Factor	2.0	Slope (1:X)	1000.0	Porosity	0.30	Cap Volume Depth (m)	2.300	Invert Level (m)	8.950	Cap Infiltration Depth (m)	2.100
Infiltration Coefficient Base (m/hr)	0.00900	Trench Width (m)	1.3																			
Infiltration Coefficient Side (m/hr)	0.00900	Trench Length (m)	65.0																			
Safety Factor	2.0	Slope (1:X)	1000.0																			
Porosity	0.30	Cap Volume Depth (m)	2.300																			
Invert Level (m)	8.950	Cap Infiltration Depth (m)	2.100																			
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 9 - Trench Soakaway			
Date 13/07/16 File Trench SA 9.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 57 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	9.947	0.647	1.8	7.5	0 K
30 min Summer	10.084	0.784	2.1	9.2	0 K
60 min Summer	10.158	0.858	2.2	10.1	0 K
120 min Summer	10.164	0.864	2.2	10.1	0 K
180 min Summer	10.122	0.822	2.1	9.6	0 K
240 min Summer	10.072	0.772	2.0	9.0	0 K
360 min Summer	9.982	0.682	1.9	7.9	0 K
480 min Summer	9.905	0.605	1.8	7.0	0 K
600 min Summer	9.838	0.538	1.6	6.2	0 K
720 min Summer	9.780	0.480	1.6	5.5	0 K
960 min Summer	9.684	0.384	1.4	4.4	0 K
1440 min Summer	9.548	0.248	1.2	2.7	0 K
2160 min Summer	9.424	0.124	1.0	1.3	0 K
2880 min Summer	9.360	0.060	0.9	0.5	0 K
4320 min Summer	9.340	0.040	0.7	0.2	0 K
5760 min Summer	9.335	0.035	0.5	0.2	0 K
7200 min Summer	9.332	0.032	0.4	0.2	0 K
8640 min Summer	9.330	0.030	0.4	0.1	0 K
10080 min Summer	9.328	0.028	0.3	0.1	0 K
15 min Winter	10.032	0.732	2.0	8.5	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	15		
30 min Summer	78.248	0.0	30		
60 min Summer	50.211	0.0	46		
120 min Summer	31.113	0.0	80		
180 min Summer	23.167	0.0	116		
240 min Summer	18.658	0.0	150		
360 min Summer	13.718	0.0	216		
480 min Summer	11.023	0.0	280		
600 min Summer	9.295	0.0	344		
720 min Summer	8.082	0.0	406		
960 min Summer	6.475	0.0	530		
1440 min Summer	4.729	0.0	776		
2160 min Summer	3.446	0.0	1128		
2880 min Summer	2.750	0.0	1472		
4320 min Summer	1.997	0.0	2184		
5760 min Summer	1.589	0.0	2920		
7200 min Summer	1.330	0.0	3632		
8640 min Summer	1.151	0.0	4392		
10080 min Summer	1.019	0.0	4984		
15 min Winter	116.400	0.0	15		
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Cundall, Johnston & Partners				Page 2	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing TSA 9 - Trench Soakaway			
Date 13/07/16 File Trench SA 9.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.194	0.894	2.2	10.5	0 K
60 min Winter	10.278	0.978	2.4	11.5	0 K
120 min Winter	10.273	0.973	2.4	11.4	0 K
180 min Winter	10.205	0.905	2.3	10.6	0 K
240 min Winter	10.128	0.828	2.1	9.7	0 K
360 min Winter	9.996	0.696	1.9	8.1	0 K
480 min Winter	9.889	0.589	1.7	6.8	0 K
600 min Winter	9.799	0.499	1.6	5.7	0 K
720 min Winter	9.724	0.424	1.5	4.8	0 K
960 min Winter	9.606	0.306	1.3	3.4	0 K
1440 min Winter	9.451	0.151	1.0	1.6	0 K
2160 min Winter	9.348	0.048	0.8	0.3	0 K
2880 min Winter	9.339	0.039	0.6	0.2	0 K
4320 min Winter	9.334	0.034	0.5	0.2	0 K
5760 min Winter	9.330	0.030	0.4	0.1	0 K
7200 min Winter	9.328	0.028	0.3	0.1	0 K
8640 min Winter	9.326	0.026	0.3	0.1	0 K
10080 min Winter	9.324	0.024	0.2	0.1	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	29		
60 min Winter	50.211	0.0	48		
120 min Winter	31.113	0.0	86		
180 min Winter	23.167	0.0	124		
240 min Winter	18.658	0.0	160		
360 min Winter	13.718	0.0	230		
480 min Winter	11.023	0.0	296		
600 min Winter	9.295	0.0	362		
720 min Winter	8.082	0.0	426		
960 min Winter	6.475	0.0	548		
1440 min Winter	4.729	0.0	792		
2160 min Winter	3.446	0.0	1088		
2880 min Winter	2.750	0.0	1468		
4320 min Winter	1.997	0.0	2164		
5760 min Winter	1.589	0.0	2840		
7200 min Winter	1.330	0.0	3560		
8640 min Winter	1.151	0.0	4256		
10080 min Winter	1.019	0.0	5136		
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Cundall, Johnston & Partners		Page 3
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 9 - Trench Soakaway	
Date 13/07/16 File Trench SA 9.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

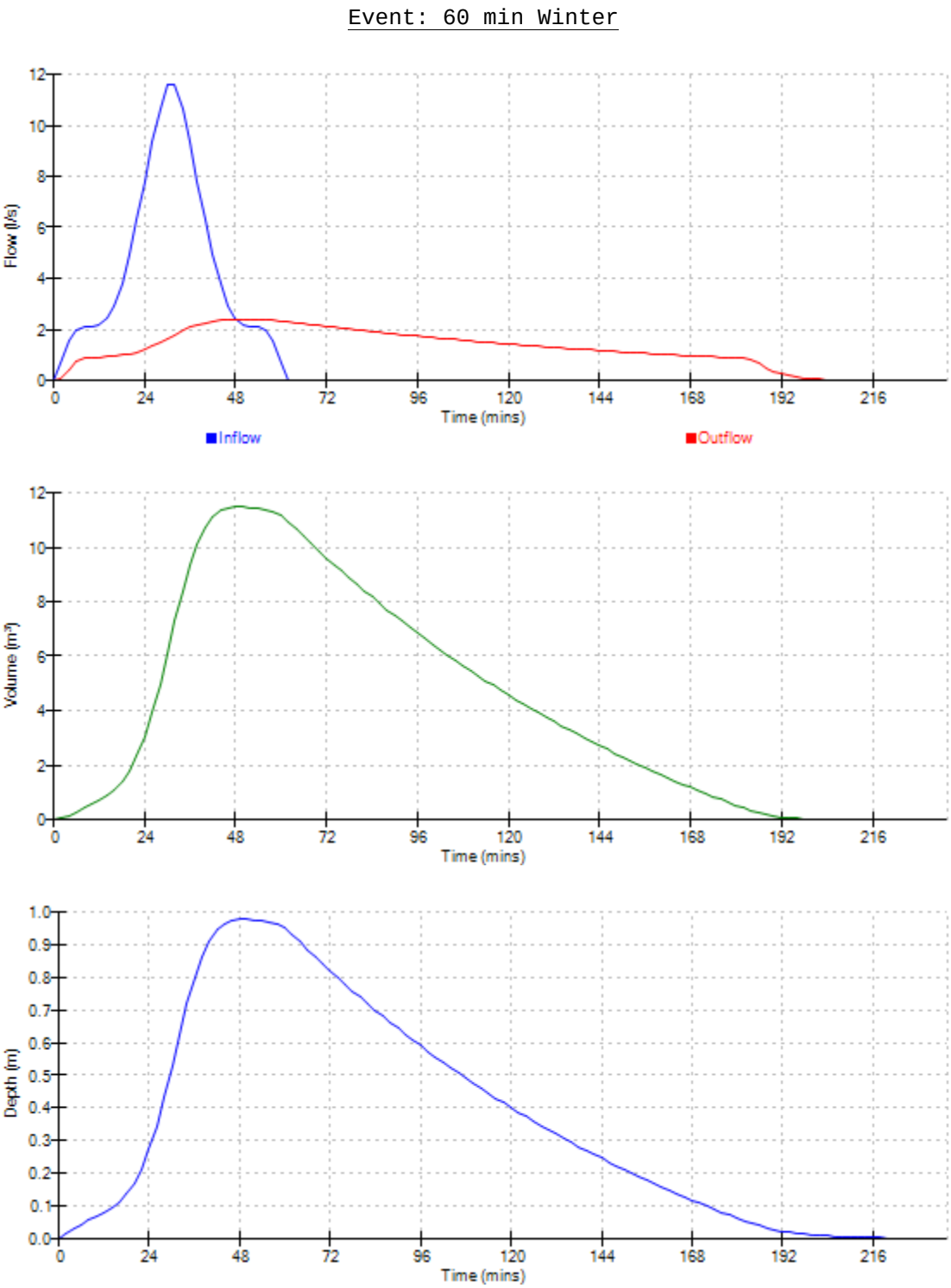
Time Area Diagram

Total Area (ha) 0.040

Time (mins)	Area
From:	To: (ha)
0	1 0.040

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing TSA 9 - Trench Soakaway																					
Date 13/07/16 File Trench SA 9.srcx	Designed by LK Checked by AMF																					
Micro Drainage Source Control 2015.1																						
<u>Model Details</u> Storage is Online Cover Level (m) 10.800 <u>Trench Soakaway Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.14400</td> <td>Trench Width (m)</td> <td>1.0</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.14400</td> <td>Trench Length (m)</td> <td>40.0</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Slope (1:X)</td> <td>1000.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Cap Volume Depth (m)</td> <td>1.300</td> </tr> <tr> <td>Invert Level (m)</td> <td>9.300</td> <td>Cap Infiltration Depth (m)</td> <td>1.100</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.14400	Trench Width (m)	1.0	Infiltration Coefficient Side (m/hr)	0.14400	Trench Length (m)	40.0	Safety Factor	2.0	Slope (1:X)	1000.0	Porosity	0.30	Cap Volume Depth (m)	1.300	Invert Level (m)	9.300	Cap Infiltration Depth (m)	1.100
Infiltration Coefficient Base (m/hr)	0.14400	Trench Width (m)	1.0																			
Infiltration Coefficient Side (m/hr)	0.14400	Trench Length (m)	40.0																			
Safety Factor	2.0	Slope (1:X)	1000.0																			
Porosity	0.30	Cap Volume Depth (m)	1.300																			
Invert Level (m)	9.300	Cap Infiltration Depth (m)	1.100																			
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing HWS1 - Dry Swale			
Date 13/07/16 File Highway Swale 1.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 41 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.051	0.851	2.9	9.5	0 K
30 min Summer	10.164	0.964	3.3	11.4	0 K
60 min Summer	10.232	1.032	3.6	12.6	0 K
120 min Summer	10.236	1.036	3.6	12.7	0 K
180 min Summer	10.198	0.998	3.4	12.0	0 K
240 min Summer	10.148	0.948	3.3	11.1	0 K
360 min Summer	10.060	0.860	3.0	9.7	0 K
480 min Summer	9.989	0.789	2.7	8.5	0 K
600 min Summer	9.931	0.731	2.5	7.5	0 K
720 min Summer	9.884	0.684	2.3	6.8	0 K
960 min Summer	9.809	0.609	2.1	5.5	0 K
1440 min Summer	9.719	0.519	1.7	4.0	0 K
2160 min Summer	9.638	0.438	1.3	2.9	0 K
2880 min Summer	9.584	0.384	1.1	2.2	0 K
4320 min Summer	9.513	0.313	0.8	1.5	0 K
5760 min Summer	9.467	0.267	0.7	1.1	0 K
7200 min Summer	9.434	0.234	0.6	0.8	0 K
8640 min Summer	9.410	0.210	0.5	0.7	0 K
10080 min Summer	9.391	0.191	0.4	0.5	0 K
15 min Winter	10.125	0.925	3.2	10.8	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	15		
30 min Summer	78.248	0.0	26		
60 min Summer	50.211	0.0	44		
120 min Summer	31.113	0.0	78		
180 min Summer	23.167	0.0	112		
240 min Summer	18.658	0.0	144		
360 min Summer	13.718	0.0	208		
480 min Summer	11.023	0.0	272		
600 min Summer	9.295	0.0	332		
720 min Summer	8.082	0.0	396		
960 min Summer	6.475	0.0	512		
1440 min Summer	4.729	0.0	750		
2160 min Summer	3.446	0.0	1108		
2880 min Summer	2.750	0.0	1472		
4320 min Summer	1.997	0.0	2204		
5760 min Summer	1.589	0.0	2936		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4400		
10080 min Summer	1.019	0.0	5080		
15 min Winter	116.400	0.0	15		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing HWS1 - Dry Swale			
Date 13/07/16		Designed by LK			
File Highway Swale 1.srcx		Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.250	1.050	3.6	12.9	0 K
60 min Winter	10.296	1.096	3.8	14.1	0 K
120 min Winter	10.284	1.084	3.7	13.8	0 K
180 min Winter	10.233	1.033	3.6	12.6	0 K
240 min Winter	10.162	0.962	3.3	11.4	0 K
360 min Winter	10.040	0.840	2.9	9.3	0 K
480 min Winter	9.948	0.748	2.6	7.8	0 K
600 min Winter	9.875	0.675	2.3	6.6	0 K
720 min Winter	9.818	0.618	2.1	5.7	0 K
960 min Winter	9.740	0.540	1.8	4.4	0 K
1440 min Winter	9.649	0.449	1.4	3.0	0 K
2160 min Winter	9.566	0.366	1.0	2.0	0 K
2880 min Winter	9.514	0.314	0.8	1.5	0 K
4320 min Winter	9.449	0.249	0.6	0.9	0 K
5760 min Winter	9.410	0.210	0.5	0.7	0 K
7200 min Winter	9.383	0.183	0.4	0.5	0 K
8640 min Winter	9.363	0.163	0.3	0.4	0 K
10080 min Winter	9.348	0.148	0.3	0.3	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	28		
60 min Winter	50.211	0.0	46		
120 min Winter	31.113	0.0	84		
180 min Winter	23.167	0.0	118		
240 min Winter	18.658	0.0	154		
360 min Winter	13.718	0.0	220		
480 min Winter	11.023	0.0	284		
600 min Winter	9.295	0.0	344		
720 min Winter	8.082	0.0	406		
960 min Winter	6.475	0.0	520		
1440 min Winter	4.729	0.0	764		
2160 min Winter	3.446	0.0	1124		
2880 min Winter	2.750	0.0	1472		
4320 min Winter	1.997	0.0	2204		
5760 min Winter	1.589	0.0	2936		
7200 min Winter	1.330	0.0	3656		
8640 min Winter	1.151	0.0	4400		
10080 min Winter	1.019	0.0	5136		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing HWS1 - Dry Swale																																		
Date 13/07/16	Designed by LK																																		
File Highway Swale 1.srcx	Checked by AMF																																		
Micro Drainage		Source Control 2015.1																																	
<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>19.100</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.350</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+30</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.051 <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>1</td> <td>0.051</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)	19.100	Shortest Storm (mins)	15	Ratio R	0.350	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+30	Time (mins)		Area	From:	To:	(ha)	0	1	0.051
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)	19.100	Shortest Storm (mins)	15																																
Ratio R	0.350	Longest Storm (mins)	10080																																
Summer Storms	Yes	Climate Change %	+30																																
Time (mins)		Area																																	
From:	To:	(ha)																																	
0	1	0.051																																	
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing HWS1 - Dry Swale																									
Date 13/07/16	Designed by LK																									
File Highway Swale 1.srcx	Checked by AMF																									
Micro Drainage		Source Control 2015.1																								
<u>Model Details</u> Storage is Online Cover Level (m) 10.700 <u>Dry Swale Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.11520</td> <td>Trench Width (m)</td> <td>0.5</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.11520</td> <td>Trench Length (m)</td> <td>110.5</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Side Slope (1:X)</td> <td>4.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Slope (1:X)</td> <td>200.0</td> </tr> <tr> <td>Invert Level (m)</td> <td>9.200</td> <td>Cap Volume Depth (m)</td> <td>1.300</td> </tr> <tr> <td>Trench Height (m)</td> <td>1.000</td> <td>Cap Infiltration Depth (m)</td> <td>1.000</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.11520	Trench Width (m)	0.5	Infiltration Coefficient Side (m/hr)	0.11520	Trench Length (m)	110.5	Safety Factor	2.0	Side Slope (1:X)	4.0	Porosity	0.30	Slope (1:X)	200.0	Invert Level (m)	9.200	Cap Volume Depth (m)	1.300	Trench Height (m)	1.000	Cap Infiltration Depth (m)	1.000
Infiltration Coefficient Base (m/hr)	0.11520	Trench Width (m)	0.5																							
Infiltration Coefficient Side (m/hr)	0.11520	Trench Length (m)	110.5																							
Safety Factor	2.0	Side Slope (1:X)	4.0																							
Porosity	0.30	Slope (1:X)	200.0																							
Invert Level (m)	9.200	Cap Volume Depth (m)	1.300																							
Trench Height (m)	1.000	Cap Infiltration Depth (m)	1.000																							
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
HWS1 - Dry Swale

Date 13/07/16

Designed by LK

File Highway Swale 1.srcx

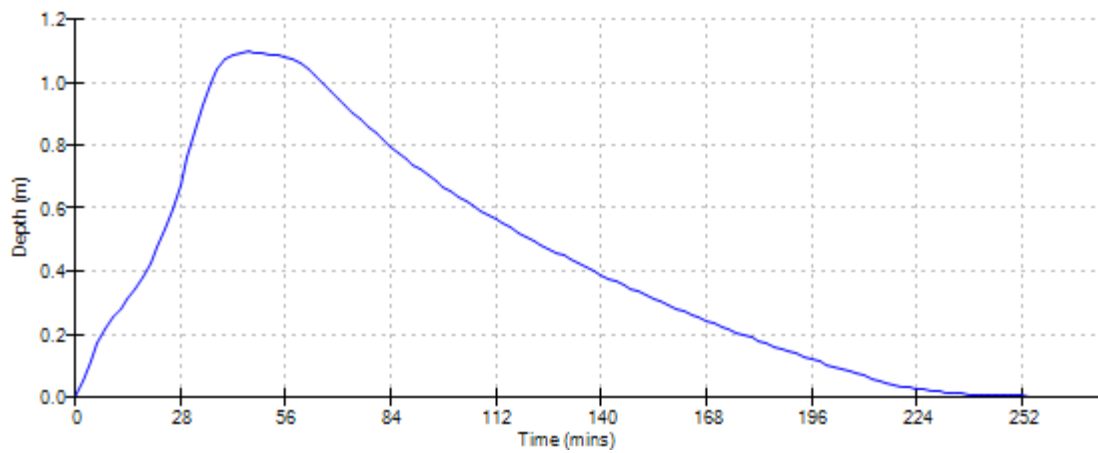
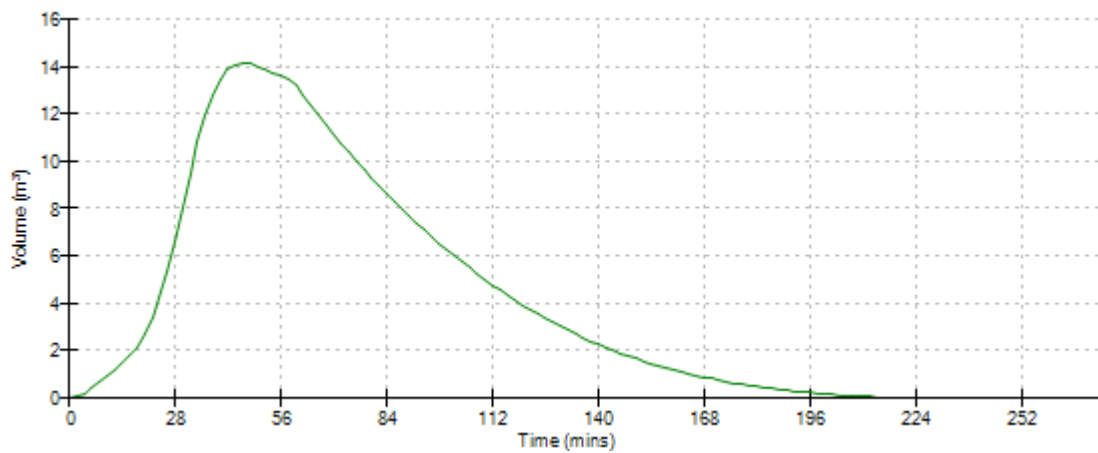
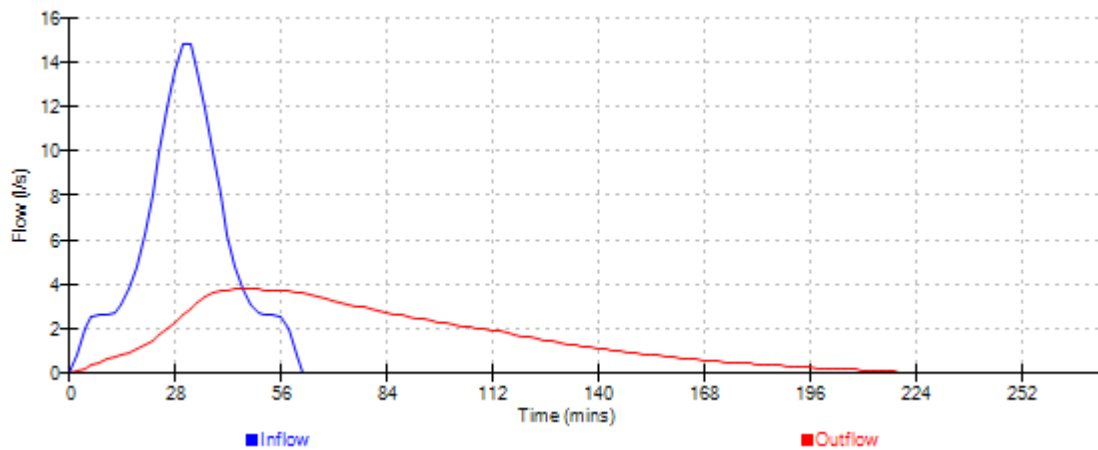
Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 60 min Winter



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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing HWS2 - Dry Swale			
Date 13/07/16 File Highway Swale 2.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 75 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.196	1.196	3.2	15.7	0 K
30 min Summer	10.255	1.255	3.3	19.8	Flood Risk
60 min Summer	10.284	1.284	3.3	22.4	Flood Risk
120 min Summer	10.295	1.295	3.3	23.5	Flood Risk
180 min Summer	10.289	1.289	3.3	22.9	Flood Risk
240 min Summer	10.278	1.278	3.3	21.8	Flood Risk
360 min Summer	10.250	1.250	3.3	19.4	Flood Risk
480 min Summer	10.220	1.220	3.2	17.2	Flood Risk
600 min Summer	10.188	1.188	3.2	15.3	0 K
720 min Summer	10.154	1.154	3.1	13.6	0 K
960 min Summer	10.077	1.077	3.0	11.2	0 K
1440 min Summer	9.886	0.886	2.5	8.5	0 K
2160 min Summer	9.692	0.692	2.0	6.1	0 K
2880 min Summer	9.572	0.572	1.6	4.5	0 K
4320 min Summer	9.434	0.434	1.3	2.8	0 K
5760 min Summer	9.372	0.372	1.0	2.1	0 K
7200 min Summer	9.329	0.329	0.9	1.6	0 K
8640 min Summer	9.297	0.297	0.8	1.3	0 K
10080 min Summer	9.272	0.272	0.7	1.1	0 K
15 min Winter	10.229	1.229	3.2	17.8	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	30		
60 min Summer	50.211	0.0	54		
120 min Summer	31.113	0.0	86		
180 min Summer	23.167	0.0	120		
240 min Summer	18.658	0.0	154		
360 min Summer	13.718	0.0	222		
480 min Summer	11.023	0.0	286		
600 min Summer	9.295	0.0	348		
720 min Summer	8.082	0.0	406		
960 min Summer	6.475	0.0	528		
1440 min Summer	4.729	0.0	764		
2160 min Summer	3.446	0.0	1128		
2880 min Summer	2.750	0.0	1496		
4320 min Summer	1.997	0.0	2204		
5760 min Summer	1.589	0.0	2936		
7200 min Summer	1.330	0.0	3672		
8640 min Summer	1.151	0.0	4400		
10080 min Summer	1.019	0.0	5136		
15 min Winter	116.400	0.0	15		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing HWS2 - Dry Swale			
Date 13/07/16 File Highway Swale 2.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.286	1.286	3.3	22.6	Flood Risk
60 min Winter	10.318	1.318	3.3	25.9	Flood Risk
120 min Winter	10.325	1.325	3.3	26.7	Flood Risk
180 min Winter	10.316	1.316	3.3	25.7	Flood Risk
240 min Winter	10.299	1.299	3.3	23.9	Flood Risk
360 min Winter	10.260	1.260	3.3	20.2	Flood Risk
480 min Winter	10.215	1.215	3.2	16.8	Flood Risk
600 min Winter	10.165	1.165	3.1	14.1	0 K
720 min Winter	10.108	1.108	3.0	12.0	0 K
960 min Winter	9.966	0.966	2.7	9.5	0 K
1440 min Winter	9.738	0.738	2.1	6.6	0 K
2160 min Winter	9.548	0.548	1.6	4.3	0 K
2880 min Winter	9.439	0.439	1.3	2.9	0 K
4320 min Winter	9.349	0.349	0.9	1.8	0 K
5760 min Winter	9.297	0.297	0.8	1.3	0 K
7200 min Winter	9.260	0.260	0.6	1.0	0 K
8640 min Winter	9.234	0.234	0.6	0.8	0 K
10080 min Winter	9.213	0.213	0.5	0.7	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	30		
60 min Winter	50.211	0.0	58		
120 min Winter	31.113	0.0	92		
180 min Winter	23.167	0.0	132		
240 min Winter	18.658	0.0	168		
360 min Winter	13.718	0.0	238		
480 min Winter	11.023	0.0	302		
600 min Winter	9.295	0.0	362		
720 min Winter	8.082	0.0	420		
960 min Winter	6.475	0.0	538		
1440 min Winter	4.729	0.0	780		
2160 min Winter	3.446	0.0	1144		
2880 min Winter	2.750	0.0	1500		
4320 min Winter	1.997	0.0	2204		
5760 min Winter	1.589	0.0	2936		
7200 min Winter	1.330	0.0	3672		
8640 min Winter	1.151	0.0	4376		
10080 min Winter	1.019	0.0	5136		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing HWS2 - Dry Swale	
Date 13/07/16 File Highway Swale 2.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.081

Time (mins)		Area
From:	To:	(ha)
0	1	0.081

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing HWS2 - Dry Swale	
Date 13/07/16 File Highway Swale 2.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

Model Details

Storage is Online Cover Level (m) 10.500

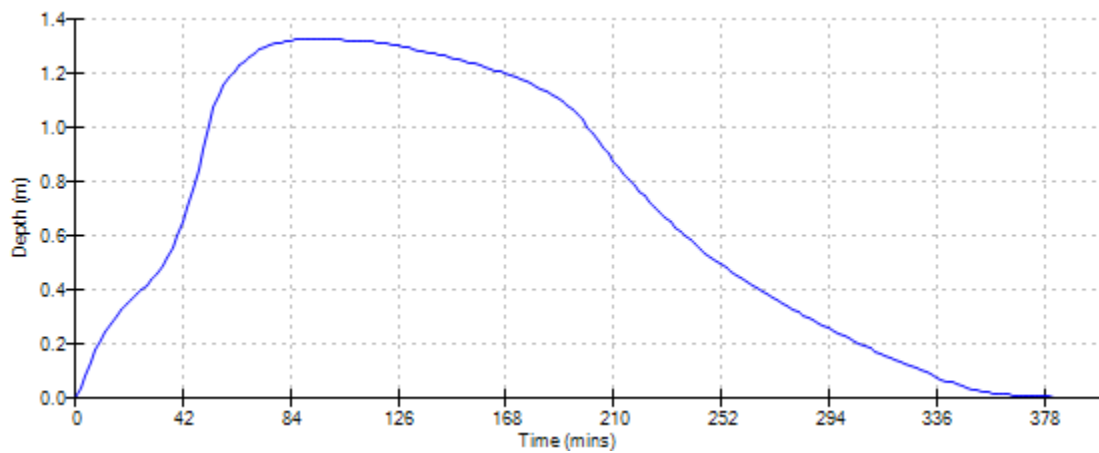
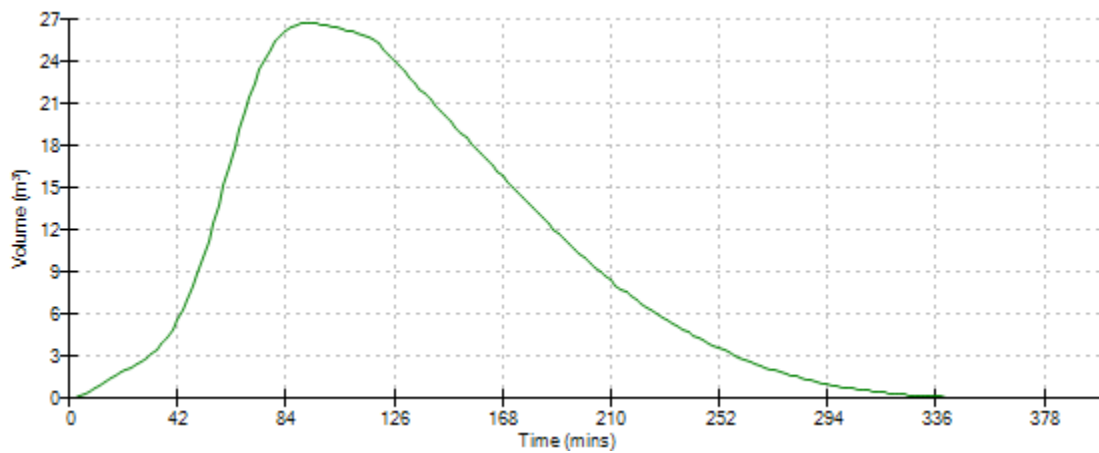
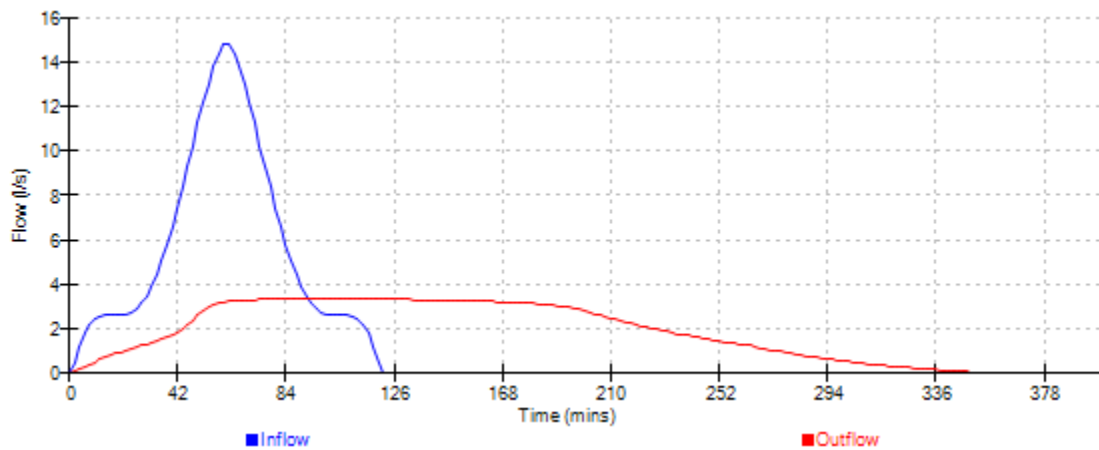
Dry Swale Structure

Infiltration Coefficient Base (m/hr) 0.11520	Trench Width (m) 0.5
Infiltration Coefficient Side (m/hr) 0.11520	Trench Length (m) 83.5
Safety Factor 2.0	Side Slope (1:X) 4.0
Porosity 0.30	Slope (1:X) 200.0
Invert Level (m) 9.000	Cap Volume Depth (m) 1.300
Trench Height (m) 1.000	Cap Infiltration Depth (m) 1.000

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing HWS2 - Dry Swale	
Date 13/07/16	Designed by LK	
File Highway Swale 2.srcx	Checked by AMF	
Micro Drainage		Source Control 2015.1

Event: 120 min Winter



Cundall, Johnston & Partners				Page 1	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing HWS3 - Dry Swale			
Date 13/07/16 File Highway Swale 3.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 1109 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.315	1.015	0.1	5.8	0 K
30 min Summer	10.431	1.131	0.1	7.8	0 K
60 min Summer	10.486	1.186	0.1	9.8	0 K
120 min Summer	10.524	1.224	0.1	11.9	Flood Risk
180 min Summer	10.542	1.242	0.1	13.0	Flood Risk
240 min Summer	10.552	1.252	0.1	13.7	Flood Risk
360 min Summer	10.563	1.263	0.1	14.6	Flood Risk
480 min Summer	10.569	1.269	0.1	15.1	Flood Risk
600 min Summer	10.573	1.273	0.1	15.3	Flood Risk
720 min Summer	10.574	1.274	0.1	15.4	Flood Risk
960 min Summer	10.574	1.274	0.1	15.4	Flood Risk
1440 min Summer	10.571	1.271	0.1	15.1	Flood Risk
2160 min Summer	10.563	1.263	0.1	14.6	Flood Risk
2880 min Summer	10.553	1.253	0.1	13.8	Flood Risk
4320 min Summer	10.531	1.231	0.1	12.3	Flood Risk
5760 min Summer	10.507	1.207	0.1	10.9	Flood Risk
7200 min Summer	10.482	1.182	0.1	9.7	0 K
8640 min Summer	10.456	1.156	0.1	8.6	0 K
10080 min Summer	10.429	1.129	0.1	7.7	0 K
15 min Winter	10.376	1.076	0.1	6.5	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	116.400	0.0	16		
30 min Summer	78.248	0.0	31		
60 min Summer	50.211	0.0	62		
120 min Summer	31.113	0.0	122		
180 min Summer	23.167	0.0	182		
240 min Summer	18.658	0.0	242		
360 min Summer	13.718	0.0	360		
480 min Summer	11.023	0.0	480		
600 min Summer	9.295	0.0	600		
720 min Summer	8.082	0.0	720		
960 min Summer	6.475	0.0	872		
1440 min Summer	4.729	0.0	1108		
2160 min Summer	3.446	0.0	1492		
2880 min Summer	2.750	0.0	1904		
4320 min Summer	1.997	0.0	2720		
5760 min Summer	1.589	0.0	3512		
7200 min Summer	1.330	0.0	4248		
8640 min Summer	1.151	0.0	5008		
10080 min Summer	1.019	0.0	5656		
15 min Winter	116.400	0.0	16		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG		Havant Road, Emsworth SUDS Sizing HWS3 - Dry Swale			
Date 13/07/16 File Highway Swale 3.srcx		Designed by LK Checked by AMF			
Micro Drainage		Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	10.459	1.159	0.1	8.7	0 K
60 min Winter	10.509	1.209	0.1	11.0	Flood Risk
120 min Winter	10.547	1.247	0.1	13.4	Flood Risk
180 min Winter	10.565	1.265	0.1	14.7	Flood Risk
240 min Winter	10.575	1.275	0.1	15.5	Flood Risk
360 min Winter	10.588	1.288	0.1	16.5	Flood Risk
480 min Winter	10.595	1.295	0.1	17.2	Flood Risk
600 min Winter	10.600	1.300	0.1	17.5	Flood Risk
720 min Winter	10.602	1.302	0.1	17.7	Flood Risk
960 min Winter	10.603	1.303	0.1	17.8	Flood Risk
1440 min Winter	10.598	1.298	0.1	17.4	Flood Risk
2160 min Winter	10.588	1.288	0.1	16.6	Flood Risk
2880 min Winter	10.575	1.275	0.1	15.5	Flood Risk
4320 min Winter	10.545	1.245	0.1	13.2	Flood Risk
5760 min Winter	10.510	1.210	0.1	11.1	Flood Risk
7200 min Winter	10.473	1.173	0.1	9.2	0 K
8640 min Winter	10.431	1.131	0.1	7.8	0 K
10080 min Winter	10.383	1.083	0.1	6.7	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.248	0.0	31		
60 min Winter	50.211	0.0	62		
120 min Winter	31.113	0.0	120		
180 min Winter	23.167	0.0	180		
240 min Winter	18.658	0.0	238		
360 min Winter	13.718	0.0	354		
480 min Winter	11.023	0.0	470		
600 min Winter	9.295	0.0	584		
720 min Winter	8.082	0.0	698		
960 min Winter	6.475	0.0	914		
1440 min Winter	4.729	0.0	1184		
2160 min Winter	3.446	0.0	1624		
2880 min Winter	2.750	0.0	2076		
4320 min Winter	1.997	0.0	2940		
5760 min Winter	1.589	0.0	3744		
7200 min Winter	1.330	0.0	4472		
8640 min Winter	1.151	0.0	5184		
10080 min Winter	1.019	0.0	5848		
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing HWS3 - Dry Swale																																		
Date 13/07/16	Designed by LK																																		
File Highway Swale 3.srcx	Checked by AMF																																		
Micro Drainage		Source Control 2015.1																																	
<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>19.100</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.350</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+30</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.027 <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>1</td> <td>0.027</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)	19.100	Shortest Storm (mins)	15	Ratio R	0.350	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+30	Time (mins)		Area	From:	To:	(ha)	0	1	0.027
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File Highway Swale 3.srcx	Checked by AMF																									
Micro Drainage		Source Control 2015.1																								
<u>Model Details</u> Storage is Online Cover Level (m) 10.800 <u>Dry Swale Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.00900</td> <td>Trench Width (m)</td> <td>0.5</td> </tr> <tr> <td>Infiltration Coefficient Side (m/hr)</td> <td>0.00900</td> <td>Trench Length (m)</td> <td>42.7</td> </tr> <tr> <td>Safety Factor</td> <td>2.0</td> <td>Side Slope (1:X)</td> <td>4.0</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Slope (1:X)</td> <td>200.0</td> </tr> <tr> <td>Invert Level (m)</td> <td>9.300</td> <td>Cap Volume Depth (m)</td> <td>1.300</td> </tr> <tr> <td>Trench Height (m)</td> <td>1.000</td> <td>Cap Infiltration Depth (m)</td> <td>1.000</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.00900	Trench Width (m)	0.5	Infiltration Coefficient Side (m/hr)	0.00900	Trench Length (m)	42.7	Safety Factor	2.0	Side Slope (1:X)	4.0	Porosity	0.30	Slope (1:X)	200.0	Invert Level (m)	9.300	Cap Volume Depth (m)	1.300	Trench Height (m)	1.000	Cap Infiltration Depth (m)	1.000
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19 - 21 Silvermills Court
Henderson Place Lane
Edinburgh EH3 5DG

Havant Road, Emsworth
SUDS Sizing
HWS3 - Dry Swale

Date 13/07/16

Designed by LK

File Highway Swale 3.srcx

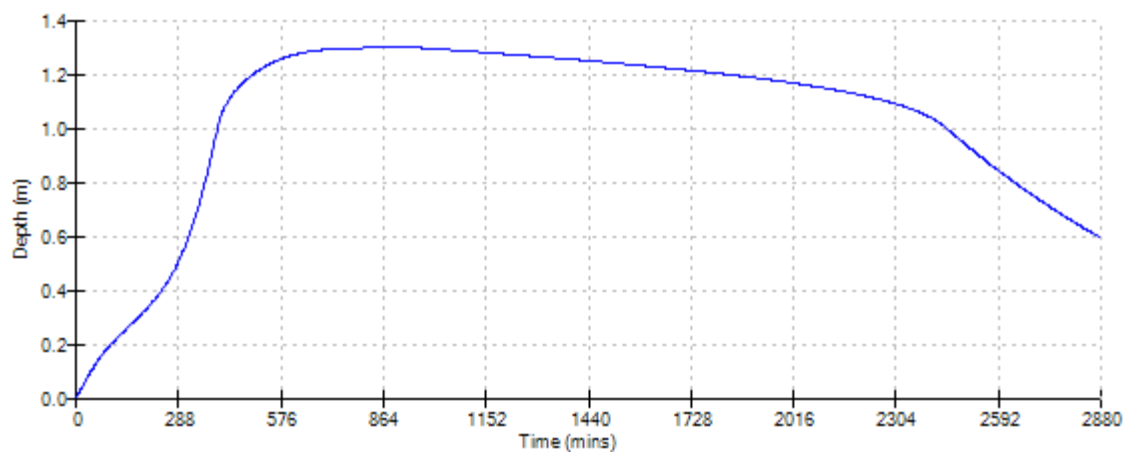
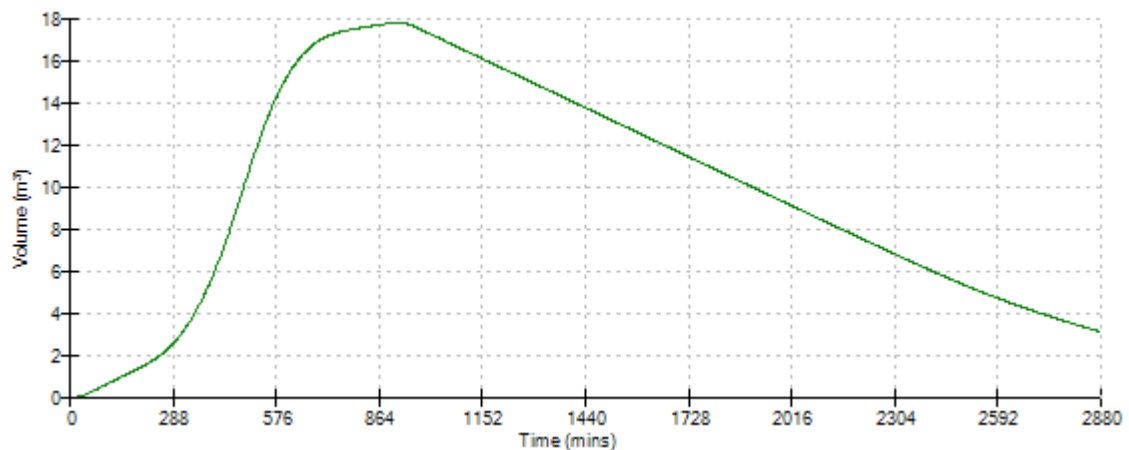
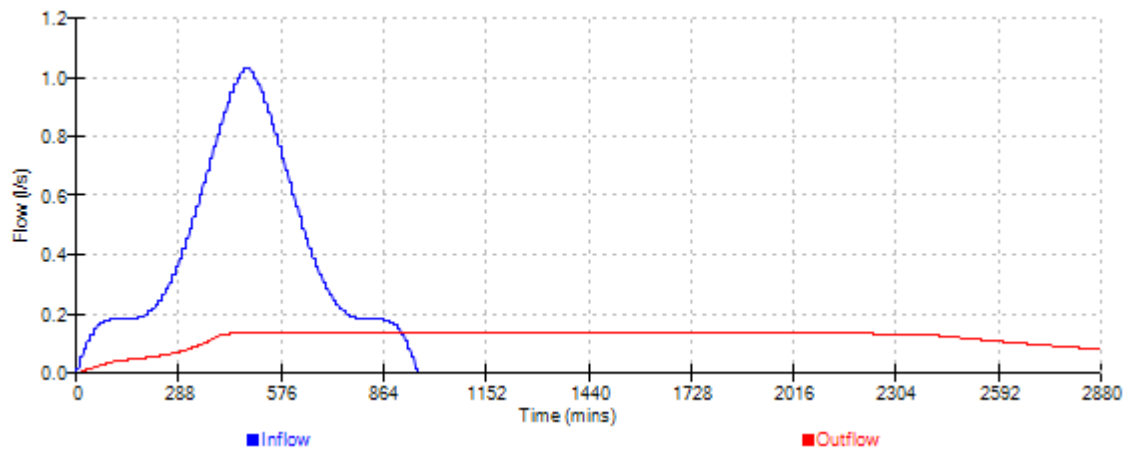
Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 960 min Winter



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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG			Havant Road, Emsworth SUDS Sizing HWS4 - Dry Swale																																																																																																																																																																																																																					
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Summary of Results for 100 year Return Period (+30%) Half Drain Time : 53 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>9.622</td><td>1.122</td><td>2.5</td><td>8.6</td><td>0 K</td></tr><tr><td>30 min Summer</td><td>9.675</td><td>1.175</td><td>2.5</td><td>10.5</td><td>0 K</td></tr><tr><td>60 min Summer</td><td>9.699</td><td>1.199</td><td>2.5</td><td>11.6</td><td>0 K</td></tr><tr><td>120 min Summer</td><td>9.701</td><td>1.201</td><td>2.5</td><td>11.8</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>9.689</td><td>1.189</td><td>2.5</td><td>11.1</td><td>0 K</td></tr><tr><td>240 min Summer</td><td>9.670</td><td>1.170</td><td>2.5</td><td>10.3</td><td>0 K</td></tr><tr><td>360 min Summer</td><td>9.626</td><td>1.126</td><td>2.5</td><td>8.7</td><td>0 K</td></tr><tr><td>480 min Summer</td><td>9.573</td><td>1.073</td><td>2.4</td><td>7.5</td><td>0 K</td></tr><tr><td>600 min Summer</td><td>9.500</td><td>1.000</td><td>2.3</td><td>6.6</td><td>0 K</td></tr><tr><td>720 min Summer</td><td>9.413</td><td>0.913</td><td>2.1</td><td>6.0</td><td>0 K</td></tr><tr><td>960 min Summer</td><td>9.280</td><td>0.780</td><td>1.8</td><td>5.0</td><td>0 K</td></tr><tr><td>1440 min Summer</td><td>9.101</td><td>0.601</td><td>1.5</td><td>3.6</td><td>0 K</td></tr><tr><td>2160 min Summer</td><td>8.944</td><td>0.444</td><td>1.2</td><td>2.4</td><td>0 K</td></tr><tr><td>2880 min Summer</td><td>8.848</td><td>0.348</td><td>1.0</td><td>1.7</td><td>0 K</td></tr><tr><td>4320 min Summer</td><td>8.748</td><td>0.248</td><td>0.7</td><td>0.9</td><td>0 K</td></tr><tr><td>5760 min Summer</td><td>8.709</td><td>0.209</td><td>0.6</td><td>0.7</td><td>0 K</td></tr><tr><td>7200 min Summer</td><td>8.682</td><td>0.182</td><td>0.5</td><td>0.5</td><td>0 K</td></tr><tr><td>8640 min Summer</td><td>8.663</td><td>0.163</td><td>0.4</td><td>0.4</td><td>0 K</td></tr><tr><td>10080 min Summer</td><td>8.647</td><td>0.147</td><td>0.4</td><td>0.3</td><td>0 K</td></tr><tr><td>15 min Winter</td><td>9.657</td><td>1.157</td><td>2.5</td><td>9.7</td><td>0 K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>116.400</td><td>0.0</td><td>15</td></tr><tr><td>30 min Summer</td><td>78.248</td><td>0.0</td><td>29</td></tr><tr><td>60 min Summer</td><td>50.211</td><td>0.0</td><td>46</td></tr><tr><td>120 min Summer</td><td>31.113</td><td>0.0</td><td>80</td></tr><tr><td>180 min Summer</td><td>23.167</td><td>0.0</td><td>114</td></tr><tr><td>240 min Summer</td><td>18.658</td><td>0.0</td><td>148</td></tr><tr><td>360 min Summer</td><td>13.718</td><td>0.0</td><td>212</td></tr><tr><td>480 min Summer</td><td>11.023</td><td>0.0</td><td>272</td></tr><tr><td>600 min Summer</td><td>9.295</td><td>0.0</td><td>332</td></tr><tr><td>720 min Summer</td><td>8.082</td><td>0.0</td><td>396</td></tr><tr><td>960 min Summer</td><td>6.475</td><td>0.0</td><td>518</td></tr><tr><td>1440 min Summer</td><td>4.729</td><td>0.0</td><td>762</td></tr><tr><td>2160 min Summer</td><td>3.446</td><td>0.0</td><td>1124</td></tr><tr><td>2880 min Summer</td><td>2.750</td><td>0.0</td><td>1472</td></tr><tr><td>4320 min Summer</td><td>1.997</td><td>0.0</td><td>2204</td></tr><tr><td>5760 min Summer</td><td>1.589</td><td>0.0</td><td>2936</td></tr><tr><td>7200 min Summer</td><td>1.330</td><td>0.0</td><td>3672</td></tr><tr><td>8640 min Summer</td><td>1.151</td><td>0.0</td><td>4360</td></tr><tr><td>10080 min Summer</td><td>1.019</td><td>0.0</td><td>5136</td></tr><tr><td>15 min Winter</td><td>116.400</td><td>0.0</td><td>15</td></tr></table>							Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	9.622	1.122	2.5	8.6	0 K	30 min Summer	9.675	1.175	2.5	10.5	0 K	60 min Summer	9.699	1.199	2.5	11.6	0 K	120 min Summer	9.701	1.201	2.5	11.8	Flood Risk	180 min Summer	9.689	1.189	2.5	11.1	0 K	240 min Summer	9.670	1.170	2.5	10.3	0 K	360 min Summer	9.626	1.126	2.5	8.7	0 K	480 min Summer	9.573	1.073	2.4	7.5	0 K	600 min Summer	9.500	1.000	2.3	6.6	0 K	720 min Summer	9.413	0.913	2.1	6.0	0 K	960 min Summer	9.280	0.780	1.8	5.0	0 K	1440 min Summer	9.101	0.601	1.5	3.6	0 K	2160 min Summer	8.944	0.444	1.2	2.4	0 K	2880 min Summer	8.848	0.348	1.0	1.7	0 K	4320 min Summer	8.748	0.248	0.7	0.9	0 K	5760 min Summer	8.709	0.209	0.6	0.7	0 K	7200 min Summer	8.682	0.182	0.5	0.5	0 K	8640 min Summer	8.663	0.163	0.4	0.4	0 K	10080 min Summer	8.647	0.147	0.4	0.3	0 K	15 min Winter	9.657	1.157	2.5	9.7	0 K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	116.400	0.0	15	30 min Summer	78.248	0.0	29	60 min Summer	50.211	0.0	46	120 min Summer	31.113	0.0	80	180 min Summer	23.167	0.0	114	240 min Summer	18.658	0.0	148	360 min Summer	13.718	0.0	212	480 min Summer	11.023	0.0	272	600 min Summer	9.295	0.0	332	720 min Summer	8.082	0.0	396	960 min Summer	6.475	0.0	518	1440 min Summer	4.729	0.0	762	2160 min Summer	3.446	0.0	1124	2880 min Summer	2.750	0.0	1472	4320 min Summer	1.997	0.0	2204	5760 min Summer	1.589	0.0	2936	7200 min Summer	1.330	0.0	3672	8640 min Summer	1.151	0.0	4360	10080 min Summer	1.019	0.0	5136	15 min Winter	116.400	0.0	15
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600 min Summer	9.500	1.000	2.3	6.6	0 K																																																																																																																																																																																																																			
720 min Summer	9.413	0.913	2.1	6.0	0 K																																																																																																																																																																																																																			
960 min Summer	9.280	0.780	1.8	5.0	0 K																																																																																																																																																																																																																			
1440 min Summer	9.101	0.601	1.5	3.6	0 K																																																																																																																																																																																																																			
2160 min Summer	8.944	0.444	1.2	2.4	0 K																																																																																																																																																																																																																			
2880 min Summer	8.848	0.348	1.0	1.7	0 K																																																																																																																																																																																																																			
4320 min Summer	8.748	0.248	0.7	0.9	0 K																																																																																																																																																																																																																			
5760 min Summer	8.709	0.209	0.6	0.7	0 K																																																																																																																																																																																																																			
7200 min Summer	8.682	0.182	0.5	0.5	0 K																																																																																																																																																																																																																			
8640 min Summer	8.663	0.163	0.4	0.4	0 K																																																																																																																																																																																																																			
10080 min Summer	8.647	0.147	0.4	0.3	0 K																																																																																																																																																																																																																			
15 min Winter	9.657	1.157	2.5	9.7	0 K																																																																																																																																																																																																																			
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																					
15 min Summer	116.400	0.0	15																																																																																																																																																																																																																					
30 min Summer	78.248	0.0	29																																																																																																																																																																																																																					
60 min Summer	50.211	0.0	46																																																																																																																																																																																																																					
120 min Summer	31.113	0.0	80																																																																																																																																																																																																																					
180 min Summer	23.167	0.0	114																																																																																																																																																																																																																					
240 min Summer	18.658	0.0	148																																																																																																																																																																																																																					
360 min Summer	13.718	0.0	212																																																																																																																																																																																																																					
480 min Summer	11.023	0.0	272																																																																																																																																																																																																																					
600 min Summer	9.295	0.0	332																																																																																																																																																																																																																					
720 min Summer	8.082	0.0	396																																																																																																																																																																																																																					
960 min Summer	6.475	0.0	518																																																																																																																																																																																																																					
1440 min Summer	4.729	0.0	762																																																																																																																																																																																																																					
2160 min Summer	3.446	0.0	1124																																																																																																																																																																																																																					
2880 min Summer	2.750	0.0	1472																																																																																																																																																																																																																					
4320 min Summer	1.997	0.0	2204																																																																																																																																																																																																																					
5760 min Summer	1.589	0.0	2936																																																																																																																																																																																																																					
7200 min Summer	1.330	0.0	3672																																																																																																																																																																																																																					
8640 min Summer	1.151	0.0	4360																																																																																																																																																																																																																					
10080 min Summer	1.019	0.0	5136																																																																																																																																																																																																																					
15 min Winter	116.400	0.0	15																																																																																																																																																																																																																					
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Cundall, Johnston & Partners					Page 2	
19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG			Havant Road, Emsworth SUDS Sizing HWS4 - Dry Swale			
Date 13/07/16			Designed by LK			
File Highway Swale 4.srcx			Checked by AMF			
Micro Drainage			Source Control 2015.1			
Summary of Results for 100 year Return Period (+30%)						
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	
30 min Winter	9.706	1.206	2.6	12.0	Flood Risk	
60 min Winter	9.727	1.227	2.6	13.3	Flood Risk	
120 min Winter	9.726	1.226	2.6	13.2	Flood Risk	
180 min Winter	9.707	1.207	2.6	12.1	Flood Risk	
240 min Winter	9.681	1.181	2.5	10.7	0 K	
360 min Winter	9.616	1.116	2.5	8.4	0 K	
480 min Winter	9.526	1.026	2.3	6.9	0 K	
600 min Winter	9.403	0.903	2.1	5.9	0 K	
720 min Winter	9.302	0.802	1.9	5.1	0 K	
960 min Winter	9.154	0.654	1.6	4.0	0 K	
1440 min Winter	8.971	0.471	1.2	2.6	0 K	
2160 min Winter	8.823	0.323	0.9	1.5	0 K	
2880 min Winter	8.748	0.248	0.7	0.9	0 K	
4320 min Winter	8.694	0.194	0.5	0.6	0 K	
5760 min Winter	8.662	0.162	0.4	0.4	0 K	
7200 min Winter	8.641	0.141	0.4	0.3	0 K	
8640 min Winter	8.625	0.125	0.3	0.2	0 K	
10080 min Winter	8.613	0.113	0.3	0.2	0 K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)			
30 min Winter	78.248	0.0	29			
60 min Winter	50.211	0.0	50			
120 min Winter	31.113	0.0	88			
180 min Winter	23.167	0.0	124			
240 min Winter	18.658	0.0	158			
360 min Winter	13.718	0.0	222			
480 min Winter	11.023	0.0	280			
600 min Winter	9.295	0.0	344			
720 min Winter	8.082	0.0	406			
960 min Winter	6.475	0.0	528			
1440 min Winter	4.729	0.0	766			
2160 min Winter	3.446	0.0	1128			
2880 min Winter	2.750	0.0	1468			
4320 min Winter	1.997	0.0	2200			
5760 min Winter	1.589	0.0	2936			
7200 min Winter	1.330	0.0	3648			
8640 min Winter	1.151	0.0	4304			
10080 min Winter	1.019	0.0	5120			
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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing HWS4 - Dry Swale	
Date 13/07/16 File Highway Swale 4.srcx	Designed by LK Checked by AMF	
Micro Drainage Source Control 2015.1		

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)	19.100	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.046

Time (mins)	Area
From:	To: (ha)
0	1 0.046

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19 - 21 Silvermills Court Henderson Place Lane Edinburgh EH3 5DG	Havant Road, Emsworth SUDS Sizing HWS4 - Dry Swale																									
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Micro Drainage	Source Control 2015.1																									
Model Details Storage is Online Cover Level (m) 10.000 Dry Swale Structure <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.14400</td><td>Trench Width (m)</td><td>0.5</td></tr><tr><td>Infiltration Coefficient Side (m/hr)</td><td>0.14400</td><td>Trench Length (m)</td><td>50.8</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Side Slope (1:X)</td><td>4.0</td></tr><tr><td>Porosity</td><td>0.30</td><td>Slope (1:X)</td><td>200.0</td></tr><tr><td>Invert Level (m)</td><td>8.500</td><td>Cap Volume Depth (m)</td><td>1.300</td></tr><tr><td>Trench Height (m)</td><td>1.000</td><td>Cap Infiltration Depth (m)</td><td>1.000</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.14400	Trench Width (m)	0.5	Infiltration Coefficient Side (m/hr)	0.14400	Trench Length (m)	50.8	Safety Factor	2.0	Side Slope (1:X)	4.0	Porosity	0.30	Slope (1:X)	200.0	Invert Level (m)	8.500	Cap Volume Depth (m)	1.300	Trench Height (m)	1.000	Cap Infiltration Depth (m)	1.000
Infiltration Coefficient Base (m/hr)	0.14400	Trench Width (m)	0.5																							
Infiltration Coefficient Side (m/hr)	0.14400	Trench Length (m)	50.8																							
Safety Factor	2.0	Side Slope (1:X)	4.0																							
Porosity	0.30	Slope (1:X)	200.0																							
Invert Level (m)	8.500	Cap Volume Depth (m)	1.300																							
Trench Height (m)	1.000	Cap Infiltration Depth (m)	1.000																							
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SUDS Sizing
HWS4 - Dry Swale

Date 13/07/16

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Checked by AMF



Micro Drainage

Source Control 2015.1

Event: 60 min Winter

