
PROJECT	:	St Columba's Close, Gravesend, Kent
NOTE REF.	:	11270/24002/TN
NOTE TITLE	:	Drainage Statement - Additional Information
AUTHOR	:	Tafari Lewis
APPROVED	:	Ian Durkin
DATE	:	28 th May 2024

1.0 Introduction

This file note has been produced to provide additional information to Kent County Council (KCC) as lead local flood authority (LLFA) on drainage and flood risk for the proposed development of land at St Columbas Close, Gravesend in Kent.

A Drainage Statement (DS) report was produced by Gurney Consulting Engineers (GCE) in April 2024 (report ref; 11270/24002/DS Issue 1) which was submitted supplementary to a discharge of conditions application to Gravesham Borough Council (GBC) under reference 20240319 in respects to conditions 7, 9 and 27 of planning permission 20221179.

Following a review of the DS, KCC maintained a holding objection requesting additional information in support of the application.

This file note has been produced in response to the LLFA's request for further information as detailed within the consultee response annexed within **Appendix A**.

The file note shall provide clarification of the information requested by the LLFA by reviewing each point raised and responding accordingly.

2.0 Additional Information

2.1.1 KCC Comment:

"It is understood from the report that the surface water for the site is to be managed through the use of cellular soakaways and permeable paving. Whilst we have no objection to this principle, we note that within the hydraulic calculations both side and base infiltration has been used. As per the requirements of the Ciria SuDS design manual, section 25, care should be taken when assuming design infiltration rates for designs that are greater than 1×10^{-5} m/s, because above this, the impact of silt

on the performance becomes more significant, especially where infiltration from the bottom of a system is assumed. We request that the simulations be rerun without the use of base infiltration.

2.1.2 GCE Response:

The simulations for the cellular soakaway outfalls CS1 and CS2 have been rerun with the base infiltration set to zero to exclude its use as requested by the LLFA.

This has resulted in an increased storage requirement to avoid flooding on the network.

Tank Cs1 has been increased from 95m² plan area by 2.4m depth to 95m² plan area and 2.8m depth.

The omission of the base for CS1 has also resulted in a requirement for a longer drain down time (i.e in excess of 24 hours). In this regard paragraph 13.4.1 of CIRIA SuDS Manual C753 States; ‘Where components are designed to manage the 1:10 year or 1:30 year event, it is usual to specify that half emptying occurs within 24 hours. If components are designed to infiltrate events greater than the 1:30 year event, designing to half empty in 24 hours can result in very large storage requirements and, with agreement from the approving body, it may be appropriate to allow longer half emptying times’

It would be deemed appropriate to enable the longer drain down time (subject to agreement with the LLFA) noting that the base omission represents a worst case scenario and siltation measures have already been considered on the network by the installation of a catchpit manhole as well as a petrol interceptor.

Tank Cs2 has been increased from 20m² plan area by 0.8m depth to 22.5m² plan area and 1.2m depth to accommodate the additional storage requirement. Half drain of less than 24 hours for Cs2 can still be achieved.

A copy of the updated Micro Drainage hydraulic calculations and updated drainage layout plan have been annexed in **Appendix B**.

2.2.1 KCC Comment:

“We require further clarification regarding the area used within the hydraulic calculations for the permeable paving. The total area for the permeable paving is 0.064ha within the Network Distribution Plan (drawing number: 451, dated March 2024), however the total contributing area within the hydraulic calculations is 0.013ha.”

2.2.2 GCE Response:

The area used within the hydraulic calculations was for part of the heavy duty access in front of Block B (approximately 17.3m length x 7.4m width) from the main impermeable carriageway which equates to 0.013ha. This area was used within the calculations primarily to give a typical indication on the anticipated sub-base thickness required within this zone.

The total areas of permeable paving equate to 0.064ha as identified on drawing 451. To avoid ambiguity within the hydraulic assessment further source control calculations have been included for both light duty and heavy duty areas of permeable paving totalling the calculated 0.064ha area and have been included within **Appendix C**.

2.3.1 KCC Comment:

“Within the hydraulic calculations, the rate utilised for the permeable paving is 2.41920 m/hr we would seek the lowest rate obtained to be used for this given that the permeable paving will not be infiltrating at the same depth of the tests undertaken.”

2.3.2 GCE Response:

The lowest infiltration rate undertaken within the RPS soakaway testing was within TP105 which recorded an infiltration rate of $2.0 \times 10^{-5} \text{ m/s}$ (0.0720 m/hr). As requested by the LLFA, this rate has been applied to the revised source control simulations of the paving areas which have been included within Appendix C.

The sub-base thickness for areas of heavy duty paving has been increased to 475mm. This concurs with the revised modelling and RPS recommendations for the minimum pavement thickness for heavy trafficked areas noting the predicted CBR value for design.

The minimum sub-base thickness for areas of light duty paving based on the revised source control modelling taking into consideration falls and gradients is 350mm.

An updated network distribution plan, referencing the paving areas to be read in conjunction with the additional source control models has been included in **Appendix D**.

2.4.1 KCC Comment:

“With regards to the climate change allowances, in this location the allowance for the 2050s epoch is higher than that for the 2070s epoch for the 100 (1%) year storm scenario. We would expect that for a development that has a lifetime beyond 2061, the higher of the two allowances to be used.”

2.4.2 GCE Response:

The development site falls within the Medway Management Catchment which has a 40% upper end climate change allowance for development with a lifetime beyond 2061, as illustrated with extract figure 1 below.

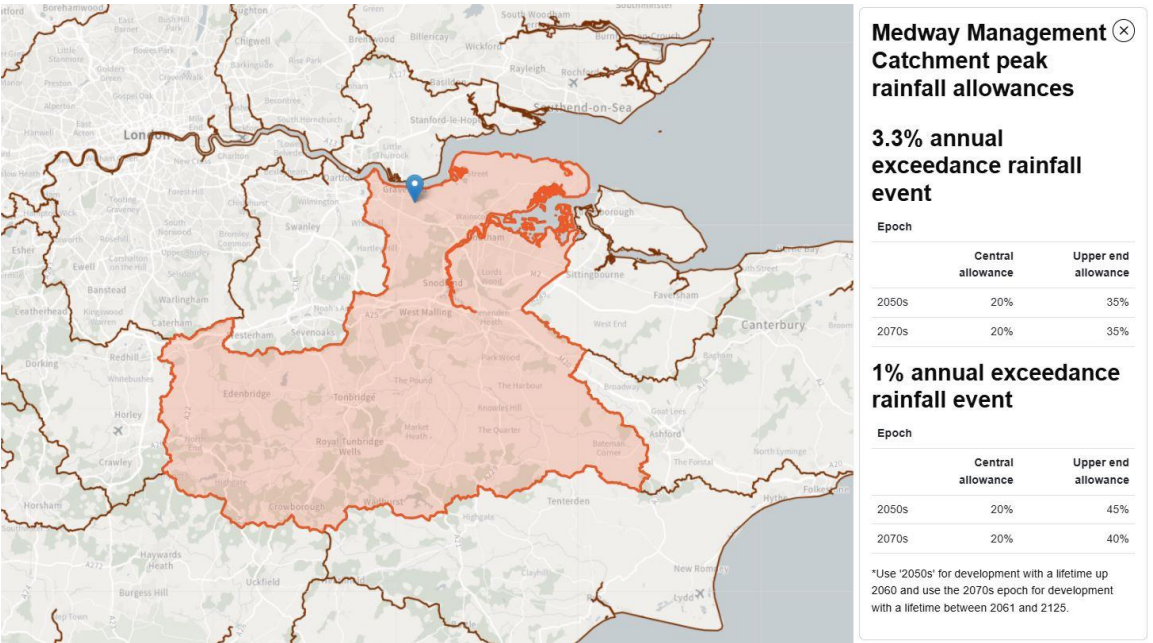


Figure 1: Peak Rainfall Allowances

Noting that the development has a lifetime beyond 2061, the use of the 40% climate change allowance with the designs is in line with the parameters set and defined by the Department for Environment Food & Rural Affairs (DEFRA).

The expectation to use the 2050s upper end climate change epoch has been acknowledged, however the upper end 40% allowance for the 2070s epoch has been retained.

3.0 Conclusion

The findings within this technical conclude sufficient information has now been provided to address the points raised by the LLFA.

List of Appendices

Appendix A	LLFA Consultee Response
Appendix B	Updated Modelling & Drainage Layout
Appendix C	Source Control (Permeable Paving Areas)
Appendix D	Network Distribution Plan

Appendix A

LLFA Consultee Response



Amanda Cue
Gravesham Borough Council
Civic Centre
Windmill Street
Gravesend
Kent
DA12 1AU

Flood and Water Management
Invicta House
Maidstone
Kent
ME14 1XX

Website: www.kent.gov.uk/flooding
Email: suds@kent.gov.uk
Tel: 03000 41 41 41
Our Ref: GBC/2024/099975
Date: 02 May 2024

Application No: 20240319

Location: Land At, St Columbas Close, Gravesend, Kent

Proposal: Application for approval of conditions 7, 9 and 27 attached to planning permission reference number 20221179 relating to details of (7) Scheme of sustainable water drainage, (9) Foul and surface water sewage disposal and (27) Infiltration of surface water drainage.

Thank you for your consultation on the above referenced planning application.

Kent County Council as Lead Local Flood Authority have reviewed the Drainage Statement prepared by Gurney Consulting Engineers dated 02.04.2024 and have the following comments:

1. It is understood from the report that the surface water for the site is to be managed through the use of cellular soakaways and permeable paving. Whilst we have no objection to this in principle, we note that within the hydraulic calculations both side and base infiltration has been used. As per the requirements of the Ciria SuDS design manual, section 25, care should be taken when assuming infiltration rates for designs that are greater than $1 \times 10^{-5} \text{ m/s}$, because, above this, the impact of silt on performance becomes more significant, especially where infiltration from the bottom of a system is assumed. We request for the simulations to be rerun without the use of base infiltration.
2. Further to this we require further clarification regarding the area used within the hydraulic calculations for the permeable paving. The total area for the permeable paving is 0.064ha within the Network Distribution Plan (Drawing number: 451, dated March 2024) however the total contributing area within the hydraulic calculations is 0.013ha.
3. Within the hydraulic calculations, the rate utilised for the permeable paving is 2.41920 m/hr we would seek for the lowest rate obtained to be used for this given that the permeable paving will not be infiltrating at the same depth of the tests undertaken.
4. With regards to the climate change allowances, in this location the allowance for the 2050s epoch is higher than that for the 2070s epoch for the 100 (1%) year

storm scenario. We would expect that for a development that has a lifetime beyond 2061, the higher of the two allowances is to be used.

We would request for a holding objection until further information is provided to respond to the comments above.

This response has been provided using the best knowledge and information submitted as part of the planning application at the time of responding and is reliant on the accuracy of that information.

Yours faithfully,

Emily Neale

Graduate Flood Risk Officer
Flood and Water Management

Appendix B

Updated Modelling & Drainage Layout

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A SW Network 1 - SA CS1									
Date 28/05/2024 File SW NET1-CS1.MDX	Designed by TL Checked by MD									
Micro Drainage	Network 2020.1									
<u>Time Area Diagram for SW NET1-CS1.sws</u> <table><thead><tr><th>Time (mins)</th><th>Area (ha)</th><th>Time (mins)</th><th>Area (ha)</th></tr></thead><tbody><tr><td>0-4</td><td>0.195</td><td>4-8</td><td>0.066</td></tr></tbody></table> Total Area Contributing (ha) = 0.261 Total Pipe Volume (m³) = 7.521			Time (mins)	Area (ha)	Time (mins)	Area (ha)	0-4	0.195	4-8	0.066
Time (mins)	Area (ha)	Time (mins)	Area (ha)							
0-4	0.195	4-8	0.066							
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A SW Network 1 - SA CS1	
Date 28/05/2024 File SW NET1-CS1.MDX	Designed by TL Checked by MD	
Micro Drainage	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for SW NET1-CS1.sws

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	16.612	0.099	167.8	0.025	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	38.471	2.372	16.2	0.040	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	13.032	0.846	15.4	0.069	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	20.616	0.086	239.7	0.036	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	23.337	0.097	240.6	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	20.549	0.210	97.9	0.060	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	5.543	0.023	241.0	0.011	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	4.537	0.019	238.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	2.500	0.010	250.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.28	27.154	0.025	0.0	0.0	0.0	1.01	40.0	3.4
1.001	50.00	5.47	27.055	0.065	0.0	0.0	0.0	3.27	129.8	8.8
1.002	50.00	5.54	24.683	0.134	0.0	0.0	0.0	3.35	133.2	18.1
2.000	50.00	5.34	22.478	0.036	0.0	0.0	0.0	1.01	71.5	4.9
1.003	50.00	5.92	22.392	0.190	0.0	0.0	0.0	1.01	71.3	25.7
3.000	50.00	5.26	22.580	0.060	0.0	0.0	0.0	1.32	52.6	8.1
1.004	50.00	6.01	22.295	0.261	0.0	0.0	0.0	1.01	71.3	35.3
1.005	50.00	6.09	22.272	0.261	0.0	0.0	0.0	1.01	71.6	35.3
1.006	50.00	6.13	22.253	0.261	0.0	0.0	0.0	0.99	70.0	35.3

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A SW Network 1 - SA CS1																																																																																					
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<u>Storage Structures for SW NET1-CS1.sws</u> <u>Cellular Storage Manhole: SA-CS1, DS/PN: 1.006</u> Invert Level (m) 19.753 Infiltration Coefficient Base (m/hr) 0.00000 Infiltration Coefficient Side (m/hr) 0.07200 Safety Factor 2.0 Porosity 0.95 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>93.5</td><td>93.5</td><td>2.801</td><td>0.0</td><td>219.5</td></tr><tr><td>2.800</td><td>93.5</td><td>219.5</td><td></td><td></td><td></td></tr></table> <u>Volume Summary (Static)</u> Length Calculations based on True Length <table><tr><th>Pipe Number</th><th>USMH Name</th><th>Manhole Volume (m³)</th><th>Pipe Volume (m³)</th><th>Storage Structure Volume (m³)</th><th>Total Volume (m³)</th></tr><tr><td>1.000</td><td>S1</td><td>2.007</td><td>0.610</td><td>0.000</td><td>2.617</td></tr><tr><td>1.001</td><td>S2</td><td>2.316</td><td>1.476</td><td>0.000</td><td>3.792</td></tr><tr><td>1.002</td><td>S3</td><td>2.040</td><td>0.467</td><td>0.000</td><td>2.507</td></tr><tr><td>2.000</td><td>S4</td><td>2.147</td><td>1.367</td><td>0.000</td><td>3.514</td></tr><tr><td>1.003</td><td>S5</td><td>3.246</td><td>1.559</td><td>0.000</td><td>4.805</td></tr><tr><td>3.000</td><td>S6</td><td>3.189</td><td>0.766</td><td>0.000</td><td>3.956</td></tr><tr><td>1.004</td><td>S7</td><td>2.624</td><td>0.284</td><td>0.000</td><td>2.908</td></tr><tr><td>1.005</td><td>Bypass-PI</td><td>8.372</td><td>0.239</td><td>0.000</td><td>8.612</td></tr><tr><td>1.006</td><td>SA-CS1</td><td>1.124</td><td>0.156</td><td>248.740</td><td>250.019</td></tr><tr><td>Total</td><td></td><td>27.065</td><td>6.925</td><td>248.740</td><td>282.730</td></tr></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	93.5	93.5	2.801	0.0	219.5	2.800	93.5	219.5				Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)	1.000	S1	2.007	0.610	0.000	2.617	1.001	S2	2.316	1.476	0.000	3.792	1.002	S3	2.040	0.467	0.000	2.507	2.000	S4	2.147	1.367	0.000	3.514	1.003	S5	3.246	1.559	0.000	4.805	3.000	S6	3.189	0.766	0.000	3.956	1.004	S7	2.624	0.284	0.000	2.908	1.005	Bypass-PI	8.372	0.239	0.000	8.612	1.006	SA-CS1	1.124	0.156	248.740	250.019	Total		27.065	6.925	248.740	282.730
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Unit 34 The Enterprise Centre
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EN6 3DQ

Date 28/05/2024
File SW NET1-CS1.MDX

St Columba's Close
Gravesend - REV A
SW Network 1 - SA CS1

Designed by TL
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Micro Drainage

Network 2020.1

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW NET1-CS1.sws

Simulation Criteria

Areal Reduction Factor 1.000

Hot Start (mins) 0

Hot Start Level (mm) 0

Manhole Headloss Coeff (Global) 0.500

Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000

MADD Factor * 10m³/ha Storage 2.000

Inlet Coefficient 0.800

Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0

Number of Online Controls 1

Number of Offline Controls 0

Number of Storage Structures 1

Number of Time/Area Diagrams 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH

FEH Rainfall Version 2013

Site Location GB 565974 172138 TQ 65974 72138

Data Type Point

Cv (Summer) 0.790

Cv (Winter) 0.830

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status OFF

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 2, 30, 100

Climate Change (%) 0, 35, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	S1	15 minute 2 year Summer I+0%	28.929	27.205	-0.174	0.000	0.11
1.001	S2	15 minute 2 year Summer I+0%	28.673	27.097	-0.183	0.000	0.08
1.002	S3	15 minute 2 year Summer I+0%	26.108	24.745	-0.163	0.000	0.17
2.000	S4	15 minute 2 year Summer I+0%	23.978	22.559	-0.219	0.000	0.09
1.003	S5	15 minute 2 year Summer I+0%	25.262	22.541	-0.151	0.000	0.42
3.000	S6	15 minute 2 year Summer I+0%	25.400	22.649	-0.156	0.000	0.21
1.004	S7	15 minute 2 year Summer I+0%	24.128	22.495	-0.100	0.000	0.76
1.005	Bypass-PI	15 minute 2 year Summer I+0%	25.920	22.475	-0.097	0.000	0.79
1.006	SA-CS1	1440 minute 2 year Winter I+0%	26.228	20.474	-2.079	0.000	0.00

PN	US/MH Name	Overflow (l/s)	Maximum Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	S1		0.052		4.1	OK
1.001	S2		0.094		9.6	OK
1.002	S3		0.088		19.1	OK
2.000	S4		0.110		5.7	OK
1.003	S5		0.586		26.8	OK
3.000	S6		0.073		9.8	OK
1.004	S7		1.142		37.1	OK
1.005	Bypass-PI		0.617		37.5	OK

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Date 28/05/2024 File SW NET1-CS1.MDX	Designed by TL Checked by MD	
Micro Drainage Network 2020.1		

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW NET1-CS1.sws

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Synthetic Rainfall Details

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

PN	US/MH Name	Event						US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	S1	15	minute	30	year	Summer	I+35%	28.929	27.249	-0.130	0.000
1.001	S2	15	minute	30	year	Summer	I+35%	28.673	27.139	-0.141	0.000
1.002	S3	15	minute	30	year	Summer	I+35%	26.108	24.819	-0.089	0.000
2.000	S4	15	minute	30	year	Summer	I+35%	23.978	23.341	0.563	0.000
1.003	S5	15	minute	30	year	Summer	I+35%	25.262	23.325	0.633	0.000
3.000	S6	15	minute	30	year	Summer	I+35%	25.400	23.207	0.402	0.000
1.004	S7	15	minute	30	year	Summer	I+35%	24.128	23.095	0.500	0.000
1.005	Bypass-PI	15	minute	30	year	Summer	I+35%	25.920	22.819	0.247	0.000
1.006	SA-CS1	1440	minute	30	year	Winter	I+35%	26.228	21.675	-0.878	0.000

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Date 28/05/2024 File SW NET1-CS1.MDX	Designed by TL Checked by MD	
Micro Drainage Network 2020.1		

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW NET1-CS1.sws

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Synthetic Rainfall Details

PN	US/MH Name	Event						US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)
1.000	S1	15	minute	100	year	Summer	I+40%	28.929	27.268	-0.111	0.000
1.001	S2	15	minute	100	year	Summer	I+40%	28.673	27.155	-0.125	0.000
1.002	S3	15	minute	100	year	Summer	I+40%	26.108	24.852	-0.056	0.000
2.000	S4	15	minute	100	year	Summer	I+40%	23.978	23.972	1.194	0.000
1.003	S5	15	minute	100	year	Summer	I+40%	25.262	23.900	1.208	0.000
3.000	S6	15	minute	100	year	Summer	I+40%	25.400	23.673	0.868	0.000
1.004	S7	15	minute	100	year	Summer	I+40%	24.128	23.513	0.918	0.000
1.005	Bypass-PI	15	minute	100	year	Summer	I+40%	25.920	23.029	0.457	0.000
1.006	SA-CS1	960	minute	100	year	Winter	I+40%	26.228	22.516	-0.037	0.000

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A SW Net 2 - Soakaway CS2									
Date 28/05/2024 File SW NET2-CS2.MDX	Designed by TL Checked by MD									
Micro Drainage	Network 2020.1									
<u>Time Area Diagram for SW NET2-CS2.sws</u> <table><thead><tr><th>Time (mins)</th><th>Area (ha)</th><th>Time (mins)</th><th>Area (ha)</th></tr></thead><tbody><tr><td>0-4</td><td>0.057</td><td>4-8</td><td>0.013</td></tr></tbody></table> Total Area Contributing (ha) = 0.070 Total Pipe Volume (m³) = 1.058			Time (mins)	Area (ha)	Time (mins)	Area (ha)	0-4	0.057	4-8	0.013
Time (mins)	Area (ha)	Time (mins)	Area (ha)							
0-4	0.057	4-8	0.013							
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A SW Net 2 - Soakaway CS2	
Date 28/05/2024 File SW NET2-CS2.MDX	Designed by TL Checked by MD	
Micro Drainage	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for SW NET2-CS2.sws

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	26.001	3.216	8.1	0.020	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	11.330	0.113	100.3	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	2.279	0.010	227.9	0.018	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	1.857	0.008	232.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	1.500	0.006	250.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

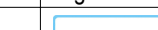
Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.12	31.200	0.020	0.0	0.0	0.0	3.57	63.0	2.7
2.000	50.00	5.19	28.097	0.032	0.0	0.0	0.0	1.00	17.7	4.3
1.001	50.00	5.22	27.834	0.070	0.0	0.0	0.0	1.04	73.3	9.5
1.002	50.00	5.25	27.824	0.070	0.0	0.0	0.0	1.03	72.6	9.5
1.003	50.00	5.28	27.816	0.070	0.0	0.0	0.0	0.99	70.0	9.5

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A SW Net 2 - Soakaway CS2																																																													
Date 28/05/2024 File SW NET2-CS2.MDX	Designed by TL Checked by MD																																																													
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Network 2020.1																																																														
<u>Storage Structures for SW NET2-CS2.sws</u> <u>Cellular Storage Manhole: SA-CS2, DS/PN: 1.003</u> Invert Level (m) 26.916 Infiltration Coefficient Base (m/hr) 0.00000 Infiltration Coefficient Side (m/hr) 2.41920 Safety Factor 2.0 Porosity 0.95 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>22.5</td><td>22.5</td><td>1.201</td><td>0.0</td><td>45.3</td></tr><tr><td>1.200</td><td>22.5</td><td>45.3</td><td></td><td></td><td></td></tr></table> <u>Volume Summary (Static)</u> Length Calculations based on True Length <table><tr><th>Pipe Number</th><th>USMH Name</th><th>Manhole Volume (m³)</th><th>Pipe Volume (m³)</th><th>Storage Structure Volume (m³)</th><th>Total Volume (m³)</th></tr><tr><td>1.000</td><td>S8</td><td>2.147</td><td>0.436</td><td>0.000</td><td>2.583</td></tr><tr><td>2.000</td><td>S9</td><td>1.646</td><td>0.176</td><td>0.000</td><td>1.822</td></tr><tr><td>1.001</td><td>S10</td><td>3.103</td><td>0.053</td><td>0.000</td><td>3.157</td></tr><tr><td>1.002</td><td>Bypass PI</td><td>5.129</td><td>0.055</td><td>0.000</td><td>5.185</td></tr><tr><td>1.003</td><td>SA-CS2</td><td>0.364</td><td>0.090</td><td>25.657</td><td>26.111</td></tr><tr><td>Total</td><td></td><td>12.390</td><td>0.811</td><td>25.657</td><td>38.858</td></tr></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	22.5	22.5	1.201	0.0	45.3	1.200	22.5	45.3				Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)	1.000	S8	2.147	0.436	0.000	2.583	2.000	S9	1.646	0.176	0.000	1.822	1.001	S10	3.103	0.053	0.000	3.157	1.002	Bypass PI	5.129	0.055	0.000	5.185	1.003	SA-CS2	0.364	0.090	25.657	26.111	Total		12.390	0.811	25.657	38.858
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Adama Consulting Ltd			Page 4						
Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ		St Columba's Close Gravesend - REV A SW Net 2 - Soakaway CS2							
Date 28/05/2024 File SW NET2-CS2.MDX		Designed by TL Checked by MD							
Micro Drainage		Network 2020.1							
2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW NET2-CS2.sws									
Simulation Criteria									
Areal Reduction Factor		1.000		Additional Flow - % of Total Flow 0.000					
Hot Start (mins)		0		MADD Factor * 10m³/ha Storage 2.000					
Hot Start Level (mm)		0		Inlet Coefficient 0.800					
Manhole Headloss Coeff (Global)		0.500		Flow per Person per Day (l/per/day) 0.000					
Foul Sewage per hectare (l/s)		0.000							
Number of Input Hydrographs		0		Number of Storage Structures 1					
Number of Online Controls		1		Number of Time/Area Diagrams 0					
Number of Offline Controls		0		Number of Real Time Controls 0					
Synthetic Rainfall Details									
Rainfall Model				FEH					
FEH Rainfall Version				2013					
Site Location		GB 565974 172138 TQ 65974 72138							
Data Type				Point					
Cv (Summer)				0.790					
Cv (Winter)				0.830					
Margin for Flood Risk Warning (mm)				300.0					
Analysis Timestep		2.5 Second Increment (Extended)							
DTS Status				OFF					
DVD Status				ON					
Inertia Status				ON					
Profile(s)				Summer and Winter					
Duration(s) (mins)		15, 30, 60, 120, 240, 360, 480, 960, 1440							
Return Period(s) (years)				2, 30, 100					
Climate Change (%)				0, 35, 40					
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	
1.000	S8	15 Summer	2	+0%	30/15 Summer				
2.000	S9	15 Summer	2	+0%					
1.001	S10	15 Summer	2	+0%					
1.002	Bypass PI	15 Summer	2	+0%					
1.003	SA-CS2	120 Winter	2	+0%					
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	S8	31.223	-0.127	0.000	0.05			3.3	OK
2.000	S9	28.156	-0.091	0.000	0.33			5.2	OK
1.001	S10	27.927	-0.207	0.000	0.21			10.9	OK
1.002	Bypass PI	27.916	-0.208	0.000	0.20			11.0	OK
1.003	SA-CS2	27.194	-0.922	0.000	0.00		61	0.0	OK
		PN	US/MH Name	Level Exceeded					
		1.000	S8						
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A SW Net 2 - Soakaway CS2																
Date 28/05/2024 File SW NET2-CS2.MDX	Designed by TL Checked by MD																
Micro Drainage	Network 2020.1																
<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW NET2-CS2.sws</u> <table> <tr> <th>PN</th><th>US/MH Name</th><th>Level Exceeded</th></tr> <tr> <td>2.000</td><td>S9</td><td></td></tr> <tr> <td>1.001</td><td>S10</td><td></td></tr> <tr> <td>1.002</td><td>Bypass PI</td><td></td></tr> <tr> <td>1.003</td><td>SA-CS2</td><td></td></tr> </table>			PN	US/MH Name	Level Exceeded	2.000	S9		1.001	S10		1.002	Bypass PI		1.003	SA-CS2	
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©1982-2020 Innovyze																	

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A SW Net 2 - Soakaway CS2	
Date 28/05/2024 File SW NET2-CS2.MDX	Designed by TL Checked by MD	
Micro Drainage	Network 2020.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW NET2-CS2.sws

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Synthetic Rainfall Details

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S8	15	Summer	30	+35%			
2.000	S9	15	Summer	30	+35%	30/15	Summer	
1.001	S10	15	Summer	30	+35%			
1.002	Bypass PI	15	Summer	30	+35%			
1.003	SA-CS2	60	Winter	30	+35%			

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A SW Net 2 - Soakaway CS2																
Date 28/05/2024 File SW NET2-CS2.MDX	Designed by TL Checked by MD																
Micro Drainage	Network 2020.1																
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PN	US/MH Name	Level Exceeded															
2.000		S9															
1.001		S10															
1.002	Bypass	PI															
1.003	SA-CS2																
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW NET2-CS2.sws

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Synthetic Rainfall Details

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S8	15 Summer	100	+40%				
2.000	S9	15 Summer	100	+40%	30/15 Summer			
1.001	S10	15 Summer	100	+40%				
1.002	Bypass PI	15 Summer	100	+40%				
1.003	SA-CS2	60 Winter	100	+40%				

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A SW Net 2 - Soakaway CS2																
Date 28/05/2024 File SW NET2-CS2.MDX	Designed by TL Checked by MD																
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PN	US/MH Name	Level Exceeded															
2.000		S9															
1.001		S10															
1.002	Bypass	PI															
1.003	SA-CS2																
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Appendix C

Source Control (Permeable Paving Areas)

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-A	
Date 28/05/2024 File HD-Paving.SRCX	Designed by TL Checked by MD	
Micro Drainage Source Control 2020.1		

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 105 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	28.833	0.308	0.2	1.7	Flood Risk
30 min Summer	28.879	0.354	0.3	2.2	Flood Risk
60 min Summer	28.908	0.383	0.3	2.6	Flood Risk
120 min Summer	28.926	0.401	0.3	2.9	Flood Risk
180 min Summer	28.932	0.407	0.3	2.9	Flood Risk
240 min Summer	28.934	0.409	0.3	3.0	Flood Risk
360 min Summer	28.928	0.403	0.3	2.9	Flood Risk
480 min Summer	28.916	0.391	0.3	2.7	Flood Risk
600 min Summer	28.903	0.378	0.3	2.5	Flood Risk
720 min Summer	28.889	0.364	0.3	2.4	Flood Risk
960 min Summer	28.864	0.339	0.3	2.0	Flood Risk
1440 min Summer	28.820	0.295	0.2	1.5	Flood Risk
2160 min Summer	28.772	0.247	0.2	1.1	Flood Risk
2880 min Summer	28.738	0.213	0.2	0.8	Flood Risk
4320 min Summer	28.691	0.166	0.1	0.5	0 K
5760 min Summer	28.662	0.137	0.1	0.3	0 K
7200 min Summer	28.643	0.118	0.1	0.2	0 K
8640 min Summer	28.628	0.103	0.1	0.2	0 K
10080 min Summer	28.617	0.092	0.1	0.2	0 K
15 min Winter	28.843	0.318	0.2	1.8	Flood Risk
30 min Winter	28.890	0.365	0.3	2.4	Flood Risk
60 min Winter	28.921	0.396	0.3	2.8	Flood Risk
120 min Winter	28.937	0.412	0.3	3.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	158.471	0.0	18
30 min Summer	103.727	0.0	32
60 min Summer	64.567	0.0	60
120 min Summer	39.741	0.0	96
180 min Summer	29.863	0.0	128
240 min Summer	24.305	0.0	162
360 min Summer	18.036	0.0	232
480 min Summer	14.460	0.0	298
600 min Summer	12.122	0.0	366
720 min Summer	10.464	0.0	432
960 min Summer	8.253	0.0	558
1440 min Summer	5.866	0.0	808
2160 min Summer	4.162	0.0	1168
2880 min Summer	3.264	0.0	1528
4320 min Summer	2.322	0.0	2244
5760 min Summer	1.832	0.0	2944
7200 min Summer	1.533	0.0	3672
8640 min Summer	1.332	0.0	4408
10080 min Summer	1.187	0.0	5136
15 min Winter	158.471	0.0	18
30 min Winter	103.727	0.0	32
60 min Winter	64.567	0.0	60
120 min Winter	39.741	0.0	98

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-A	
Date 28/05/2024 File HD-Paving.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
180 min Winter	28.942	0.417	0.3	3.1	Flood Risk
240 min Winter	28.941	0.416	0.3	3.1	Flood Risk
360 min Winter	28.929	0.404	0.3	2.9	Flood Risk
480 min Winter	28.911	0.386	0.3	2.7	Flood Risk
600 min Winter	28.893	0.368	0.3	2.4	Flood Risk
720 min Winter	28.874	0.349	0.3	2.2	Flood Risk
960 min Winter	28.840	0.315	0.2	1.8	Flood Risk
1440 min Winter	28.786	0.261	0.2	1.2	Flood Risk
2160 min Winter	28.729	0.204	0.2	0.7	Flood Risk
2880 min Winter	28.692	0.167	0.1	0.5	0 K
4320 min Winter	28.647	0.122	0.1	0.3	0 K
5760 min Winter	28.622	0.097	0.1	0.2	0 K
7200 min Winter	28.606	0.081	0.1	0.1	0 K
8640 min Winter	28.595	0.070	0.1	0.1	0 K
10080 min Winter	28.587	0.062	0.0	0.1	0 K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
180 min Winter	29.863	0.0	136
240 min Winter	24.305	0.0	174
360 min Winter	18.036	0.0	248
480 min Winter	14.460	0.0	320
600 min Winter	12.122	0.0	388
720 min Winter	10.464	0.0	456
960 min Winter	8.253	0.0	586
1440 min Winter	5.866	0.0	834
2160 min Winter	4.162	0.0	1188
2880 min Winter	3.264	0.0	1532
4320 min Winter	2.322	0.0	2248
5760 min Winter	1.832	0.0	2944
7200 min Winter	1.533	0.0	3672
8640 min Winter	1.332	0.0	4408
10080 min Winter	1.187	0.0	5080

Adama Consulting Ltd		Page 3																												
Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-A																													
Date 28/05/2024 File HD-Paving.SRCX	Designed by TL Checked by MD																													
Micro Drainage		Source Control 2020.1																												
<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FEH</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> </tr> <tr> <td>FEH Rainfall Version</td> <td>2013</td> </tr> <tr> <td>Site Location</td> <td>GB 565974 172138 TQ 65974 72138</td> </tr> <tr> <td>Data Type</td> <td>Point</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> </tr> <tr> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Cv (Summer)</td> <td>0.790</td> </tr> <tr> <td>Cv (Winter)</td> <td>0.830</td> </tr> <tr> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.007 <table> <thead> <tr> <th>Time (mins)</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>From: 0</td> <td>To: 4 0.007</td> </tr> </tbody> </table>			Rainfall Model	FEH	Return Period (years)	100	FEH Rainfall Version	2013	Site Location	GB 565974 172138 TQ 65974 72138	Data Type	Point	Summer Storms	Yes	Winter Storms	Yes	Cv (Summer)	0.790	Cv (Winter)	0.830	Shortest Storm (mins)	15	Longest Storm (mins)	10080	Climate Change %	+40	Time (mins)	Area (ha)	From: 0	To: 4 0.007
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-A	
Date 28/05/2024 File HD-Paving.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	
Model Details Storage is Online Cover Level (m) 29.000 Porous Car Park Structure Infiltration Coefficient Base (m/hr) 0.07200 Membrane Percolation (mm/hr) 1000 Max Percolation (l/s) 20.6 Safety Factor 3.0 Porosity 0.32 Invert Level (m) 28.525 Width (m) 7.4 Length (m) 10.0 Slope (1:X) 15.0 Depression Storage (mm) 5 Evaporation (mm/day) 3 Cap Volume Depth (m) 0.475		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ			St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-B			
Date 28/05/2024 File HD-B.SRCX			Designed by TL Checked by MD			
Micro Drainage			Source Control 2020.1			
Summary of Results for 100 year Return Period (+40%)						
Half Drain Time : 114 minutes.						
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	
15 min Summer	29.517	0.342	0.3	2.2	Flood	Risk
30 min Summer	29.569	0.394	0.3	2.9	Flood	Risk
60 min Summer	29.605	0.430	0.3	3.4	Flood	Risk
120 min Summer	29.626	0.451	0.3	3.8	Flood	Risk
180 min Summer	29.635	0.460	0.4	3.9	Flood	Risk
240 min Summer	29.638	0.463	0.4	4.0	Flood	Risk
360 min Summer	29.633	0.458	0.4	3.9	Flood	Risk
480 min Summer	29.622	0.447	0.3	3.7	Flood	Risk
600 min Summer	29.609	0.434	0.3	3.5	Flood	Risk
720 min Summer	29.595	0.420	0.3	3.3	Flood	Risk
960 min Summer	29.567	0.392	0.3	2.8	Flood	Risk
1440 min Summer	29.520	0.345	0.3	2.2	Flood	Risk
2160 min Summer	29.467	0.292	0.2	1.6	Flood	Risk
2880 min Summer	29.429	0.254	0.2	1.2	Flood	Risk
4320 min Summer	29.376	0.201	0.2	0.7	Flood	Risk
5760 min Summer	29.341	0.166	0.1	0.5		O K
7200 min Summer	29.319	0.144	0.1	0.4		O K
8640 min Summer	29.302	0.127	0.1	0.3		O K
10080 min Summer	29.289	0.114	0.1	0.2		O K
15 min Winter	29.528	0.353	0.3	2.3	Flood	Risk
30 min Winter	29.581	0.406	0.3	3.1	Flood	Risk
60 min Winter	29.619	0.444	0.3	3.6	Flood	Risk
120 min Winter	29.640	0.465	0.4	4.0	Flood	Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)			
15 min Summer	158.471	0.0	21			
30 min Summer	103.727	0.0	34			
60 min Summer	64.567	0.0	62			
120 min Summer	39.741	0.0	102			
180 min Summer	29.863	0.0	132			
240 min Summer	24.305	0.0	168			
360 min Summer	18.036	0.0	236			
480 min Summer	14.460	0.0	304			
600 min Summer	12.122	0.0	372			
720 min Summer	10.464	0.0	438			
960 min Summer	8.253	0.0	566			
1440 min Summer	5.866	0.0	812			
2160 min Summer	4.162	0.0	1172			
2880 min Summer	3.264	0.0	1532			
4320 min Summer	2.322	0.0	2248			
5760 min Summer	1.832	0.0	2944			
7200 min Summer	1.533	0.0	3672			
8640 min Summer	1.332	0.0	4408			
10080 min Summer	1.187	0.0	5136			
15 min Winter	158.471	0.0	21			
30 min Winter	103.727	0.0	34			
60 min Winter	64.567	0.0	62			
120 min Winter	39.741	0.0	110			
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-B	
Date 28/05/2024 File HD-B.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
180 min Winter	29.647	0.472	0.4	4.1	Flood Risk
240 min Winter	29.647	0.472	0.4	4.1	Flood Risk
360 min Winter	29.636	0.461	0.4	3.9	Flood Risk
480 min Winter	29.619	0.444	0.3	3.6	Flood Risk
600 min Winter	29.600	0.425	0.3	3.3	Flood Risk
720 min Winter	29.581	0.406	0.3	3.0	Flood Risk
960 min Winter	29.545	0.370	0.3	2.5	Flood Risk
1440 min Winter	29.485	0.310	0.2	1.8	Flood Risk
2160 min Winter	29.421	0.246	0.2	1.1	Flood Risk
2880 min Winter	29.378	0.203	0.2	0.8	Flood Risk
4320 min Winter	29.325	0.150	0.1	0.4	0 K
5760 min Winter	29.294	0.119	0.1	0.3	0 K
7200 min Winter	29.275	0.100	0.1	0.2	0 K
8640 min Winter	29.261	0.086	0.1	0.1	0 K
10080 min Winter	29.252	0.077	0.1	0.1	0 K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
180 min Winter	29.863	0.0	140
240 min Winter	24.305	0.0	180
360 min Winter	18.036	0.0	254
480 min Winter	14.460	0.0	326
600 min Winter	12.122	0.0	396
720 min Winter	10.464	0.0	462
960 min Winter	8.253	0.0	594
1440 min Winter	5.866	0.0	842
2160 min Winter	4.162	0.0	1208
2880 min Winter	3.264	0.0	1560
4320 min Winter	2.322	0.0	2252
5760 min Winter	1.832	0.0	2944
7200 min Winter	1.533	0.0	3672
8640 min Winter	1.332	0.0	4408
10080 min Winter	1.187	0.0	5104

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-B	
Date 28/05/2024 File HD-B.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	
Model Details Storage is Online Cover Level (m) 29.650 Porous Car Park Structure Infiltration Coefficient Base (m/hr) 0.07200 Membrane Percolation (mm/hr) 1000 Max Percolation (l/s) 25.9 Safety Factor 3.0 Porosity 0.32 Invert Level (m) 29.175 Width (m) 7.7 Length (m) 12.1 Slope (1:X) 15.0 Depression Storage (mm) 5 Evaporation (mm/day) 3 Cap Volume Depth (m) 0.475		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ			St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-C		
Date 28/05/2024 File HD-C.SRCX			Designed by TL Checked by MD		
Micro Drainage			Source Control 2020.1		
Summary of Results for 100 year Return Period (+40%)					
Half Drain Time : 116 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	29.812	0.337	0.3	2.4	Flood Risk
30 min Summer	29.863	0.388	0.3	3.2	Flood Risk
60 min Summer	29.897	0.422	0.4	3.8	Flood Risk
120 min Summer	29.918	0.443	0.4	4.2	Flood Risk
180 min Summer	29.925	0.450	0.4	4.3	Flood Risk
240 min Summer	29.928	0.453	0.4	4.4	Flood Risk
360 min Summer	29.923	0.448	0.4	4.3	Flood Risk
480 min Summer	29.911	0.436	0.4	4.1	Flood Risk
600 min Summer	29.898	0.423	0.4	3.8	Flood Risk
720 min Summer	29.884	0.409	0.4	3.6	Flood Risk
960 min Summer	29.857	0.382	0.3	3.1	Flood Risk
1440 min Summer	29.810	0.335	0.3	2.4	Flood Risk
2160 min Summer	29.759	0.284	0.3	1.7	Flood Risk
2880 min Summer	29.721	0.246	0.2	1.3	Flood Risk
4320 min Summer	29.669	0.194	0.2	0.8	Flood Risk
5760 min Summer	29.636	0.161	0.1	0.6	0 K
7200 min Summer	29.614	0.139	0.1	0.4	0 K
8640 min Summer	29.597	0.122	0.1	0.3	0 K
10080 min Summer	29.585	0.110	0.1	0.3	0 K
15 min Winter	29.823	0.348	0.3	2.6	Flood Risk
30 min Winter	29.875	0.400	0.4	3.4	Flood Risk
60 min Winter	29.910	0.435	0.4	4.1	Flood Risk
120 min Winter	29.930	0.455	0.4	4.4	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	158.471	0.0	21		
30 min Summer	103.727	0.0	34		
60 min Summer	64.567	0.0	62		
120 min Summer	39.741	0.0	100		
180 min Summer	29.863	0.0	132		
240 min Summer	24.305	0.0	166		
360 min Summer	18.036	0.0	236		
480 min Summer	14.460	0.0	304		
600 min Summer	12.122	0.0	370		
720 min Summer	10.464	0.0	436		
960 min Summer	8.253	0.0	564		
1440 min Summer	5.866	0.0	812		
2160 min Summer	4.162	0.0	1172		
2880 min Summer	3.264	0.0	1532		
4320 min Summer	2.322	0.0	2248		
5760 min Summer	1.832	0.0	2944		
7200 min Summer	1.533	0.0	3672		
8640 min Summer	1.332	0.0	4408		
10080 min Summer	1.187	0.0	5136		
15 min Winter	158.471	0.0	21		
30 min Winter	103.727	0.0	34		
60 min Winter	64.567	0.0	62		
120 min Winter	39.741	0.0	108		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-C	
Date 28/05/2024 File HD-C.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
180 min Winter	29.937	0.462	0.4	4.6	Flood Risk
240 min Winter	29.936	0.461	0.4	4.5	Flood Risk
360 min Winter	29.926	0.451	0.4	4.3	Flood Risk
480 min Winter	29.908	0.433	0.4	4.0	Flood Risk
600 min Winter	29.889	0.414	0.4	3.7	Flood Risk
720 min Winter	29.870	0.395	0.4	3.3	Flood Risk
960 min Winter	29.834	0.359	0.3	2.8	Flood Risk
1440 min Winter	29.775	0.300	0.3	1.9	Flood Risk
2160 min Winter	29.713	0.238	0.2	1.2	Flood Risk
2880 min Winter	29.671	0.196	0.2	0.8	Flood Risk
4320 min Winter	29.620	0.145	0.1	0.4	0 K
5760 min Winter	29.590	0.115	0.1	0.3	0 K
7200 min Winter	29.571	0.096	0.1	0.2	0 K
8640 min Winter	29.558	0.083	0.1	0.1	0 K
10080 min Winter	29.549	0.074	0.1	0.1	0 K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
180 min Winter	29.863	0.0	140
240 min Winter	24.305	0.0	178
360 min Winter	18.036	0.0	254
480 min Winter	14.460	0.0	326
600 min Winter	12.122	0.0	394
720 min Winter	10.464	0.0	462
960 min Winter	8.253	0.0	592
1440 min Winter	5.866	0.0	840
2160 min Winter	4.162	0.0	1196
2880 min Winter	3.264	0.0	1556
4320 min Winter	2.322	0.0	2252
5760 min Winter	1.832	0.0	2944
7200 min Winter	1.533	0.0	3672
8640 min Winter	1.332	0.0	4408
10080 min Winter	1.187	0.0	5136

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-C	
Date 28/05/2024 File HD-C.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-C	
Date 28/05/2024 File HD-C.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	
Model Details Storage is Online Cover Level (m) 29.950 Porous Car Park Structure Infiltration Coefficient Base (m/hr) 0.07200 Membrane Percolation (mm/hr) 1000 Max Percolation (l/s) 27.2 Safety Factor 3.0 Porosity 0.32 Invert Level (m) 29.475 Width (m) 8.9 Length (m) 11.0 Slope (1:X) 15.0 Depression Storage (mm) 5 Evaporation (mm/day) 3 Cap Volume Depth (m) 0.475		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ		St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-D				
Date 28/05/2024 File HD-D.SRCX		Designed by TL Checked by MD				
Micro Drainage		Source Control 2020.1				
Summary of Results for 100 year Return Period (+40%)						
Half Drain Time : 84 minutes.						
Storm Event		Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer		29.378	0.253	0.2	1.2	Flood Risk
30 min Summer		29.413	0.288	0.2	1.6	Flood Risk
60 min Summer		29.433	0.308	0.2	1.8	Flood Risk
120 min Summer		29.445	0.320	0.3	2.0	Flood Risk
180 min Summer		29.448	0.323	0.3	2.0	Flood Risk
240 min Summer		29.446	0.321	0.3	2.0	Flood Risk
360 min Summer		29.437	0.312	0.2	1.9	Flood Risk
480 min Summer		29.425	0.300	0.2	1.7	Flood Risk
600 min Summer		29.412	0.287	0.2	1.6	Flood Risk
720 min Summer		29.400	0.275	0.2	1.5	Flood Risk
960 min Summer		29.377	0.252	0.2	1.2	Flood Risk
1440 min Summer		29.340	0.215	0.2	0.9	Flood Risk
2160 min Summer		29.302	0.177	0.1	0.6	Flood Risk
2880 min Summer		29.275	0.150	0.1	0.4	0 K
4320 min Summer		29.240	0.115	0.1	0.3	0 K
5760 min Summer		29.219	0.094	0.1	0.2	0 K
7200 min Summer		29.205	0.080	0.1	0.1	0 K
8640 min Summer		29.195	0.070	0.1	0.1	0 K
10080 min Summer		29.187	0.062	0.0	0.1	0 K
15 min Winter		29.385	0.260	0.2	1.3	Flood Risk
30 min Winter		29.421	0.296	0.2	1.7	Flood Risk
60 min Winter		29.443	0.318	0.3	1.9	Flood Risk
120 min Winter		29.453	0.328	0.3	2.1	Flood Risk
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer		158.471	0.0	20		
30 min Summer		103.727	0.0	33		
60 min Summer		64.567	0.0	60		
120 min Summer		39.741	0.0	90		
180 min Summer		29.863	0.0	124		
240 min Summer		24.305	0.0	160		
360 min Summer		18.036	0.0	228		
480 min Summer		14.460	0.0	294		
600 min Summer		12.122	0.0	360		
720 min Summer		10.464	0.0	424		
960 min Summer		8.253	0.0	548		
1440 min Summer		5.866	0.0	794		
2160 min Summer		4.162	0.0	1148		
2880 min Summer		3.264	0.0	1504		
4320 min Summer		2.322	0.0	2208		
5760 min Summer		1.832	0.0	2936		
7200 min Summer		1.533	0.0	3672		
8640 min Summer		1.332	0.0	4400		
10080 min Summer		1.187	0.0	5136		
15 min Winter		158.471	0.0	20		
30 min Winter		103.727	0.0	33		
60 min Winter		64.567	0.0	60		
120 min Winter		39.741	0.0	96		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-D				
Date 28/05/2024 File HD-D.SRCX	Designed by TL Checked by MD				
Micro Drainage		Source Control 2020.1			
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
180 min Winter	29.453	0.328	0.3	2.1	Flood Risk
240 min Winter	29.449	0.324	0.3	2.0	Flood Risk
360 min Winter	29.434	0.309	0.2	1.8	Flood Risk
480 min Winter	29.417	0.292	0.2	1.6	Flood Risk
600 min Winter	29.399	0.274	0.2	1.4	Flood Risk
720 min Winter	29.383	0.258	0.2	1.3	Flood Risk
960 min Winter	29.354	0.229	0.2	1.0	Flood Risk
1440 min Winter	29.309	0.184	0.1	0.6	Flood Risk
2160 min Winter	29.266	0.141	0.1	0.4	0 K
2880 min Winter	29.238	0.113	0.1	0.2	0 K
4320 min Winter	29.207	0.082	0.1	0.1	0 K
5760 min Winter	29.190	0.065	0.1	0.1	0 K
7200 min Winter	29.179	0.054	0.0	0.1	0 K
8640 min Winter	29.174	0.049	0.0	0.0	0 K
10080 min Winter	29.171	0.046	0.0	0.0	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
180 min Winter	29.863	0.0	134		
240 min Winter	24.305	0.0	172		
360 min Winter	18.036	0.0	244		
480 min Winter	14.460	0.0	312		
600 min Winter	12.122	0.0	378		
720 min Winter	10.464	0.0	444		
960 min Winter	8.253	0.0	568		
1440 min Winter	5.866	0.0	810		
2160 min Winter	4.162	0.0	1168		
2880 min Winter	3.264	0.0	1524		
4320 min Winter	2.322	0.0	2208		
5760 min Winter	1.832	0.0	2936		
7200 min Winter	1.533	0.0	3648		
8640 min Winter	1.332	0.0	4320		
10080 min Winter	1.187	0.0	5040		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Heavy Duty Paving - HD-D																																		
Date 28/05/2024 File HD-D.SRCX	Designed by TL Checked by MD																																		
Micro Drainage		Source Control 2020.1																																	
<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FEH</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> </tr> <tr> <td>FEH Rainfall Version</td> <td>2013</td> </tr> <tr> <td>Site Location</td> <td>GB 565974 172138 TQ 65974 72138</td> </tr> <tr> <td>Data Type</td> <td>Point</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> </tr> <tr> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Cv (Summer)</td> <td>0.790</td> </tr> <tr> <td>Cv (Winter)</td> <td>0.830</td> </tr> <tr> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.005 <table> <thead> <tr> <th>Time (mins) From:</th> <th>Time (mins) To:</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4</td> <td>0.003</td> </tr> <tr> <td>4</td> <td>8</td> <td>0.002</td> </tr> </tbody> </table>			Rainfall Model	FEH	Return Period (years)	100	FEH Rainfall Version	2013	Site Location	GB 565974 172138 TQ 65974 72138	Data Type	Point	Summer Storms	Yes	Winter Storms	Yes	Cv (Summer)	0.790	Cv (Winter)	0.830	Shortest Storm (mins)	15	Longest Storm (mins)	10080	Climate Change %	+40	Time (mins) From:	Time (mins) To:	Area (ha)	0	4	0.003	4	8	0.002
Rainfall Model	FEH																																		
Return Period (years)	100																																		
FEH Rainfall Version	2013																																		
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Data Type	Point																																		
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Time (mins) From:	Time (mins) To:	Area (ha)																																	
0	4	0.003																																	
4	8	0.002																																	
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Date 28/05/2024 File HD-D.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	
Model Details Storage is Online Cover Level (m) 29.600 Porous Car Park Structure Infiltration Coefficient Base (m/hr) 0.07200 Membrane Percolation (mm/hr) 1000 Max Percolation (l/s) 11.1 Safety Factor 3.0 Porosity 0.32 Invert Level (m) 29.125 Width (m) 8.0 Length (m) 5.0 Slope (1:X) 15.0 Depression Storage (mm) 5 Evaporation (mm/day) 3 Cap Volume Depth (m) 0.475		
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Date 28/05/2024 File LD-A.SRCX		Designed by TL Checked by MD				
Micro Drainage		Source Control 2020.1				
Summary of Results for 100 year Return Period (+40%)						
Half Drain Time : 58 minutes.						
Storm Event		Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer		28.834	0.184	0.3	1.4	Flood Risk
30 min Summer		28.860	0.210	0.3	1.8	Flood Risk
60 min Summer		28.874	0.224	0.4	2.0	Flood Risk
120 min Summer		28.881	0.231	0.4	2.1	Flood Risk
180 min Summer		28.881	0.231	0.4	2.1	Flood Risk
240 min Summer		28.878	0.228	0.4	2.1	Flood Risk
360 min Summer		28.869	0.219	0.4	1.9	Flood Risk
480 min Summer		28.857	0.207	0.3	1.7	Flood Risk
600 min Summer		28.846	0.196	0.3	1.5	Flood Risk
720 min Summer		28.835	0.185	0.3	1.4	Flood Risk
960 min Summer		28.817	0.167	0.3	1.1	Flood Risk
1440 min Summer		28.789	0.139	0.2	0.8	Flood Risk
2160 min Summer		28.760	0.110	0.2	0.5	Flood Risk
2880 min Summer		28.741	0.091	0.2	0.3	Flood Risk
4320 min Summer		28.719	0.069	0.1	0.2	Flood Risk
5760 min Summer		28.705	0.055	0.1	0.1	Flood Risk
7200 min Summer		28.698	0.048	0.1	0.1	0 K
8640 min Summer		28.695	0.045	0.1	0.1	0 K
10080 min Summer		28.692	0.042	0.1	0.1	0 K
15 min Winter		28.840	0.190	0.3	1.5	Flood Risk
30 min Winter		28.866	0.216	0.4	1.9	Flood Risk
60 min Winter		28.880	0.230	0.4	2.1	Flood Risk
120 min Winter		28.886	0.236	0.4	2.2	Flood Risk
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer		158.471	0.0	20		
30 min Summer		103.727	0.0	32		
60 min Summer		64.567	0.0	54		
120 min Summer		39.741	0.0	86		
180 min Summer		29.863	0.0	120		
240 min Summer		24.305	0.0	154		
360 min Summer		18.036	0.0	222		
480 min Summer		14.460	0.0	286		
600 min Summer		12.122	0.0	350		
720 min Summer		10.464	0.0	412		
960 min Summer		8.253	0.0	534		
1440 min Summer		5.866	0.0	770		
2160 min Summer		4.162	0.0	1128		
2880 min Summer		3.264	0.0	1480		
4320 min Summer		2.322	0.0	2204		
5760 min Summer		1.832	0.0	2936		
7200 min Summer		1.533	0.0	3648		
8640 min Summer		1.332	0.0	4336		
10080 min Summer		1.187	0.0	5128		
15 min Winter		158.471	0.0	20		
30 min Winter		103.727	0.0	32		
60 min Winter		64.567	0.0	56		
120 min Winter		39.741	0.0	92		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Light Duty Paving - LD-A	
Date 28/05/2024 File LD-A.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
180 min Winter	28.883	0.233	0.4	2.2	Flood Risk
240 min Winter	28.877	0.227	0.4	2.1	Flood Risk
360 min Winter	28.862	0.212	0.4	1.8	Flood Risk
480 min Winter	28.846	0.196	0.3	1.5	Flood Risk
600 min Winter	28.831	0.181	0.3	1.3	Flood Risk
720 min Winter	28.818	0.168	0.3	1.1	Flood Risk
960 min Winter	28.795	0.145	0.2	0.8	Flood Risk
1440 min Winter	28.762	0.112	0.2	0.5	Flood Risk
2160 min Winter	28.733	0.083	0.1	0.3	Flood Risk
2880 min Winter	28.716	0.066	0.1	0.2	Flood Risk
4320 min Winter	28.699	0.049	0.1	0.1	0 K
5760 min Winter	28.693	0.043	0.1	0.1	0 K
7200 min Winter	28.689	0.039	0.1	0.1	0 K
8640 min Winter	28.687	0.037	0.0	0.1	0 K
10080 min Winter	28.685	0.035	0.0	0.0	0 K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
180 min Winter	29.863	0.0	130
240 min Winter	24.305	0.0	166
360 min Winter	18.036	0.0	234
480 min Winter	14.460	0.0	300
600 min Winter	12.122	0.0	366
720 min Winter	10.464	0.0	428
960 min Winter	8.253	0.0	548
1440 min Winter	5.866	0.0	784
2160 min Winter	4.162	0.0	1132
2880 min Winter	3.264	0.0	1496
4320 min Winter	2.322	0.0	2164
5760 min Winter	1.832	0.0	2872
7200 min Winter	1.533	0.0	3672
8640 min Winter	1.332	0.0	4328
10080 min Winter	1.187	0.0	5056

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Light Duty Paving - LD-A	
Date 28/05/2024 File LD-A.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	
Model Details Storage is Online Cover Level (m) 29.000 Porous Car Park Structure Infiltration Coefficient Base (m/hr) 0.07200 Membrane Percolation (mm/hr) 1000 Max Percolation (l/s) 17.7 Safety Factor 3.0 Porosity 0.32 Invert Level (m) 28.650 Width (m) 12.5 Length (m) 5.1 Slope (1:X) 20.0 Depression Storage (mm) 5 Evaporation (mm/day) 3 Cap Volume Depth (m) 0.350		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ		St Columba's Close Gravesend - REV A Light Duty Paving - LD-B				
Date 28/05/2024 File LD-B.SRCX		Designed by TL Checked by MD				
Micro Drainage		Source Control 2020.1				
Summary of Results for 100 year Return Period (+40%)						
Half Drain Time : 54 minutes.						
Storm Event		Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer		27.023	0.173	1.1	4.8	Flood Risk
30 min Summer		27.047	0.197	1.3	6.1	Flood Risk
60 min Summer		27.059	0.209	1.4	6.9	Flood Risk
120 min Summer		27.065	0.215	1.4	7.3	Flood Risk
180 min Summer		27.065	0.215	1.4	7.3	Flood Risk
240 min Summer		27.061	0.211	1.4	7.1	Flood Risk
360 min Summer		27.052	0.202	1.3	6.4	Flood Risk
480 min Summer		27.040	0.190	1.3	5.7	Flood Risk
600 min Summer		27.029	0.179	1.2	5.1	Flood Risk
720 min Summer		27.019	0.169	1.1	4.6	Flood Risk
960 min Summer		27.002	0.152	1.0	3.7	Flood Risk
1440 min Summer		26.975	0.125	0.8	2.5	Flood Risk
2160 min Summer		26.949	0.099	0.7	1.6	Flood Risk
2880 min Summer		26.932	0.082	0.5	1.1	Flood Risk
4320 min Summer		26.911	0.061	0.4	0.6	Flood Risk
5760 min Summer		26.900	0.050	0.3	0.4	0 K
7200 min Summer		26.895	0.045	0.3	0.3	0 K
8640 min Summer		26.892	0.042	0.2	0.3	0 K
10080 min Summer		26.890	0.040	0.2	0.2	0 K
15 min Winter		27.029	0.179	1.2	5.1	Flood Risk
30 min Winter		27.053	0.203	1.3	6.5	Flood Risk
60 min Winter		27.065	0.215	1.4	7.3	Flood Risk
120 min Winter		27.069	0.219	1.4	7.6	Flood Risk
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer		158.471	0.0	20		
30 min Summer		103.727	0.0	32		
60 min Summer		64.567	0.0	52		
120 min Summer		39.741	0.0	86		
180 min Summer		29.863	0.0	120		
240 min Summer		24.305	0.0	154		
360 min Summer		18.036	0.0	220		
480 min Summer		14.460	0.0	284		
600 min Summer		12.122	0.0	348		
720 min Summer		10.464	0.0	410		
960 min Summer		8.253	0.0	530		
1440 min Summer		5.866	0.0	768		
2160 min Summer		4.162	0.0	1128		
2880 min Summer		3.264	0.0	1476		
4320 min Summer		2.322	0.0	2204		
5760 min Summer		1.832	0.0	2936		
7200 min Summer		1.533	0.0	3640		
8640 min Summer		1.332	0.0	4360		
10080 min Summer		1.187	0.0	5080		
15 min Winter		158.471	0.0	20		
30 min Winter		103.727	0.0	32		
60 min Winter		64.567	0.0	54		
120 min Winter		39.741	0.0	92		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Light Duty Paving - LD-B																																					
Date 28/05/2024 File LD-B.SRCX	Designed by TL Checked by MD																																					
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<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FEH</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> </tr> <tr> <td>FEH Rainfall Version</td> <td>2013</td> </tr> <tr> <td>Site Location</td> <td>GB 565974 172138 TQ 65974 72138</td> </tr> <tr> <td>Data Type</td> <td>Point</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> </tr> <tr> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Cv (Summer)</td> <td>0.790</td> </tr> <tr> <td>Cv (Winter)</td> <td>0.830</td> </tr> <tr> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.021 <table> <thead> <tr> <th>Time (mins)</th> <th>Area (ha)</th> <th>Time (mins)</th> <th>Area (ha)</th> </tr> <tr> <th>From:</th> <th>To:</th> <th>From:</th> <th>To:</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4 0.011</td> <td>4</td> <td>8 0.010</td> </tr> </tbody> </table>			Rainfall Model	FEH	Return Period (years)	100	FEH Rainfall Version	2013	Site Location	GB 565974 172138 TQ 65974 72138	Data Type	Point	Summer Storms	Yes	Winter Storms	Yes	Cv (Summer)	0.790	Cv (Winter)	0.830	Shortest Storm (mins)	15	Longest Storm (mins)	10080	Climate Change %	+40	Time (mins)	Area (ha)	Time (mins)	Area (ha)	From:	To:	From:	To:	0	4 0.011	4	8 0.010
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Light Duty Paving - LD-B	
Date 28/05/2024 File LD-B.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	
Model Details Storage is Online Cover Level (m) 27.200 Porous Car Park Structure Infiltration Coefficient Base (m/hr) 0.07200 Membrane Percolation (mm/hr) 1000 Max Percolation (l/s) 59.6 Safety Factor 3.0 Porosity 0.32 Invert Level (m) 26.850 Width (m) 33.0 Length (m) 6.5 Slope (1:X) 30.0 Depression Storage (mm) 5 Evaporation (mm/day) 3 Cap Volume Depth (m) 0.350		
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Light Duty Paving - LD-C	
Date 28/05/2024 File LD-C.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 48 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	26.987	0.137	0.3	1.1	Flood Risk
30 min Summer	27.006	0.156	0.3	1.4	Flood Risk
60 min Summer	27.016	0.166	0.3	1.6	Flood Risk
120 min Summer	27.021	0.171	0.3	1.7	Flood Risk
180 min Summer	27.018	0.168	0.3	1.6	Flood Risk
240 min Summer	27.013	0.163	0.3	1.5	Flood Risk
360 min Summer	27.000	0.150	0.3	1.3	Flood Risk
480 min Summer	26.987	0.137	0.3	1.1	Flood Risk
600 min Summer	26.978	0.128	0.3	1.0	Flood Risk
720 min Summer	26.970	0.120	0.3	0.9	Flood Risk
960 min Summer	26.955	0.105	0.3	0.7	Flood Risk
1440 min Summer	26.935	0.085	0.2	0.4	Flood Risk
2160 min Summer	26.915	0.065	0.2	0.3	Flood Risk
2880 min Summer	26.904	0.054	0.1	0.2	Flood Risk
4320 min Summer	26.894	0.044	0.1	0.1	0 K
5760 min Summer	26.889	0.039	0.1	0.1	0 K
7200 min Summer	26.886	0.036	0.1	0.1	0 K
8640 min Summer	26.883	0.033	0.1	0.1	0 K
10080 min Summer	26.882	0.032	0.1	0.1	0 K
15 min Winter	26.992	0.142	0.3	1.2	Flood Risk
30 min Winter	27.012	0.162	0.3	1.5	Flood Risk
60 min Winter	27.022	0.172	0.3	1.7	Flood Risk
120 min Winter	27.024	0.174	0.3	1.7	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	158.471	0.0	17
30 min Summer	103.727	0.0	31
60 min Summer	64.567	0.0	50
120 min Summer	39.741	0.0	84
180 min Summer	29.863	0.0	118
240 min Summer	24.305	0.0	152
360 min Summer	18.036	0.0	216
480 min Summer	14.460	0.0	276
600 min Summer	12.122	0.0	338
720 min Summer	10.464	0.0	398
960 min Summer	8.253	0.0	520
1440 min Summer	5.866	0.0	752
2160 min Summer	4.162	0.0	1108
2880 min Summer	3.264	0.0	1468
4320 min Summer	2.322	0.0	2164
5760 min Summer	1.832	0.0	2880
7200 min Summer	1.533	0.0	3672
8640 min Summer	1.332	0.0	4400
10080 min Summer	1.187	0.0	5128
15 min Winter	158.471	0.0	17
30 min Winter	103.727	0.0	30
60 min Winter	64.567	0.0	52
120 min Winter	39.741	0.0	90

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Light Duty Paving - LD-C	
Date 28/05/2024 File LD-C.SRCX	Designed by TL Checked by MD	
Micro Drainage		

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
180 min Winter	27.017	0.167	0.3	1.6	Flood Risk
240 min Winter	27.008	0.158	0.3	1.5	Flood Risk
360 min Winter	26.989	0.139	0.3	1.2	Flood Risk
480 min Winter	26.975	0.125	0.3	0.9	Flood Risk
600 min Winter	26.963	0.113	0.3	0.8	Flood Risk
720 min Winter	26.953	0.103	0.3	0.6	Flood Risk
960 min Winter	26.937	0.087	0.2	0.5	Flood Risk
1440 min Winter	26.915	0.065	0.2	0.3	Flood Risk
2160 min Winter	26.899	0.049	0.1	0.1	0 K
2880 min Winter	26.893	0.043	0.1	0.1	0 K
4320 min Winter	26.886	0.036	0.1	0.1	0 K
5760 min Winter	26.882	0.032	0.1	0.1	0 K
7200 min Winter	26.879	0.029	0.0	0.1	0 K
8640 min Winter	26.877	0.027	0.0	0.0	0 K
10080 min Winter	26.876	0.026	0.0	0.0	0 K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
180 min Winter	29.863	0.0	126
240 min Winter	24.305	0.0	162
360 min Winter	18.036	0.0	224
480 min Winter	14.460	0.0	286
600 min Winter	12.122	0.0	350
720 min Winter	10.464	0.0	408
960 min Winter	8.253	0.0	528
1440 min Winter	5.866	0.0	762
2160 min Winter	4.162	0.0	1100
2880 min Winter	3.264	0.0	1456
4320 min Winter	2.322	0.0	2200
5760 min Winter	1.832	0.0	2936
7200 min Winter	1.533	0.0	3672
8640 min Winter	1.332	0.0	4344
10080 min Winter	1.187	0.0	5016

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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Light Duty Paving - LD-C																															
Date 28/05/2024 File LD-C.SRCX	Designed by TL Checked by MD																															
Micro Drainage		Source Control 2020.1																														
<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FEH</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> </tr> <tr> <td>FEH Rainfall Version</td> <td>2013</td> </tr> <tr> <td>Site Location</td> <td>GB 565974 172138 TQ 65974 72138</td> </tr> <tr> <td>Data Type</td> <td>Point</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> </tr> <tr> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Cv (Summer)</td> <td>0.790</td> </tr> <tr> <td>Cv (Winter)</td> <td>0.830</td> </tr> <tr> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.005 <table> <tr> <th>Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To: (ha)</th> </tr> <tr> <td>0</td> <td>4 0.005</td> </tr> </table>			Rainfall Model	FEH	Return Period (years)	100	FEH Rainfall Version	2013	Site Location	GB 565974 172138 TQ 65974 72138	Data Type	Point	Summer Storms	Yes	Winter Storms	Yes	Cv (Summer)	0.790	Cv (Winter)	0.830	Shortest Storm (mins)	15	Longest Storm (mins)	10080	Climate Change %	+40	Time (mins)	Area	From:	To: (ha)	0	4 0.005
Rainfall Model	FEH																															
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From:	To: (ha)																															
0	4 0.005																															
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Unit 34 The Enterprise Centre Cranborne Rd Potters Bar EN6 3DQ	St Columba's Close Gravesend - REV A Light Duty Paving - LD-C	
Date 28/05/2024 File LD-C.SRCX	Designed by TL Checked by MD	
Micro Drainage	Source Control 2020.1	
Model Details Storage is Online Cover Level (m) 27.200 Porous Car Park Structure Infiltration Coefficient Base (m/hr) 0.07200 Membrane Percolation (mm/hr) 1000 Max Percolation (l/s) 14.1 Safety Factor 3.0 Porosity 0.32 Invert Level (m) 26.850 Width (m) 18.8 Length (m) 2.7 Slope (1:X) 20.0 Depression Storage (mm) 5 Evaporation (mm/day) 3 Cap Volume Depth (m) 0.350		
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Appendix D

Network Distribution Plan

Network Area Key:

SW NETWORK 1 - OUTFALL SA-CS1 (0.261ha)

Pipe Node	Key	Area	Area + UC	Pn Model Total (ha)
1.000		0.012	0.013	0.025
1.000		0.012	N/A	
1.001		0.040	N/A	
1.002		0.022	0.024	
1.002		0.045	N/A	0.069
2.000		0.036	N/A	
1.003		0.020	N/A	0.020
3.000		0.060	N/A	
1.004		0.011	N/A	

SW NETWORK 2 - OUTFALL SA-CS2 (0.070ha)

Pipe Node	Key	Area
1.000		0.020
2.000		0.032
1.001		0.018

PERMEABLE PAVING (0.064ha)

TYPE	Key	Area
HD		0.031
LD		0.033

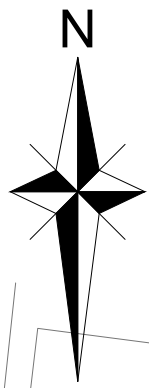
AMENITY / PEDESTRIAN PATHS (DISCHARGING TO LANDSCAPE AREAS)

Key	Area
	0.025

IMPERMEABLE AREA TOTAL: 0.420ha

- DO NOT SCALE FROM THIS DRAWING -
All dimensions in mm U.N.O

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT SPECIFICATION AND ALL OTHER RELATED DRAWINGS ISSUED BY THE ENGINEER
- DO NOT SCALE FROM THIS DRAWING. WORK FROM FIGURED DIMENSIONS ONLY
- ALL DIMENSIONS, LEVELS AND SURVEY GRID CO-ORDINATES ARE TO BE CHECKED ON SITE AND THE ENGINEER NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF THE WORKS
- LOCATION AND LEVELS OF EXISTING PUBLIC SEWERS HAVE BEEN TRANSCRIBED FROM THAMES WATER ASSET PLANS



A	Paving area references added to plan to match source control models. Completed following LLFA consultee comments	TGL	ICD	28.05.24
Rev		By	Chk'd	Date

Status PRELIMINARY

Client OAKWOOD BUILDING CONTRACTORS

Project ST COLUMBA'S CLOSE GRAVESEND, KENT

Title NETWORK DISTRIBUTION PLAN

	Job No.	Drg No.	Rev
	11270	451	A
	Drawn by	Date	
	TL	March 24	
	Checked by	Scale	
	MD	1:250 on A1	

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