FORMER READING GOLF CLUB
KIDMORE END ROAD, EMMER, READING

VISTRY THAMES VALLEY

SURFACE WATER TECHNICAL NOTE

Ref: AMc/TN/0391/6452
11th January 2023

This technical note has been updated in response to comments from the LLFA with regard to the proposed surface water design.
Reading Borough Council LLFA Comments:

1. *I would firstly like to clarify that the Highway Authority would not be in a position to adopt the proposed internal road network given that the surface water drainage is to be collected into the private attenuation basins. The internal road network would therefore need to be retained as private.*

2. *The approved FRA indicated that the proposal included a total of 6,484m3 surface water storage which was specified as being required with a total area of 7,085m3 being proposed across the 4 attenuation basins. It would appear that the proposed scheme not only reduces the number of basins but also the amount of surface water storage. As a result a detailed assessment would be required to confirm that this level of storage is sufficient to facilitate the development, this is something that the Technical Note has stipulated has been undertaken.*

As such further detailed clarification is required before I would be able to fully determine the proposal.

Highway Adoption:
Reading Borough Council Development Control have confirmed that should the sewers be adopted by Thames Water Utilities then the Highway Authority would be willing to consider adoption of the road network. This should also be the case if the developer chose to align with an independent water authority.

As the attenuation & infiltration basins will be maintained and managed as part of the development management company the outfalls from the piped storm network to the basins will have licence to discharge in perpetuity under the adoption agreement.

Surface Water Dranage:
The original drainage strategy contained within the flood risk assessment set out by Fairfax Ltd featured a standard piped network within the roads outfalling to a series of lined attenuation basins which in turn discharged to an infiltration basin via a pipework or open swale. The basins were located within the central open space, western boundary, and north-eastern boundary.
See Appendix A for extracts of original drainage strategy

During the engineering design process Vistry Homes undertook additional and extensive ground investigations. This identified two distinct ground conditions on the site, the eastern element of the being predominantly granular soils with reasonable soakage with the north-western element being identified as at a high risk of solution features with known problems on the existing golf course to the north.

Based upon the additional ground investigations the original strategy was reviewed and updated. Permeable type paving was introduced to residential areas within the eastern side of the development, this then allowed the central attenuation area to be amended from two basins to a single basin.
The linking swale takes the controlled flows to the main infiltration basin as originally designed.
The central basin was also adjusted to provide the corrected volume allowing for the reduction through the permeable paved element. This amendment also allowed for the retention of existing trees based upon the proposed root protection zones.

The attenuation basin on the western boundary pond indicated within the drainage strategy was not suitably located to be effective; the proposed location is on the high side of the development and therefore only limited storm drainage could be taken to this area without it being overly deep. The proposed basin area contained numerous trees to be retained which impacted on the available space.

The storm water design for the site entrance and main loop roads is as originally proposed with a gravity piped drainage system. Which then allows for adoption of the main road network by Reading Borough Council. The side roads within the site would currently remain private as Reading BC do not adopt permeable paving.

The open swale linking the central attenuation basin to the northern infiltration basin has been amended from the original designs to allow for an increase in the planting in this area to compensate for tree loss across the site.
We have introduced several culverted crossings to the swale to enable both public and maintenance access to the open space.

See Appendix B for Engineering layouts & construction details and Appendix C for Surface Water calculations.

Conclusion:

In response to the queries raised by the LLFA:

1. Reading Borough Council Development Control have confirmed that subject to the adoption of the storm drainage then the Highway Authority can adopt the road network.

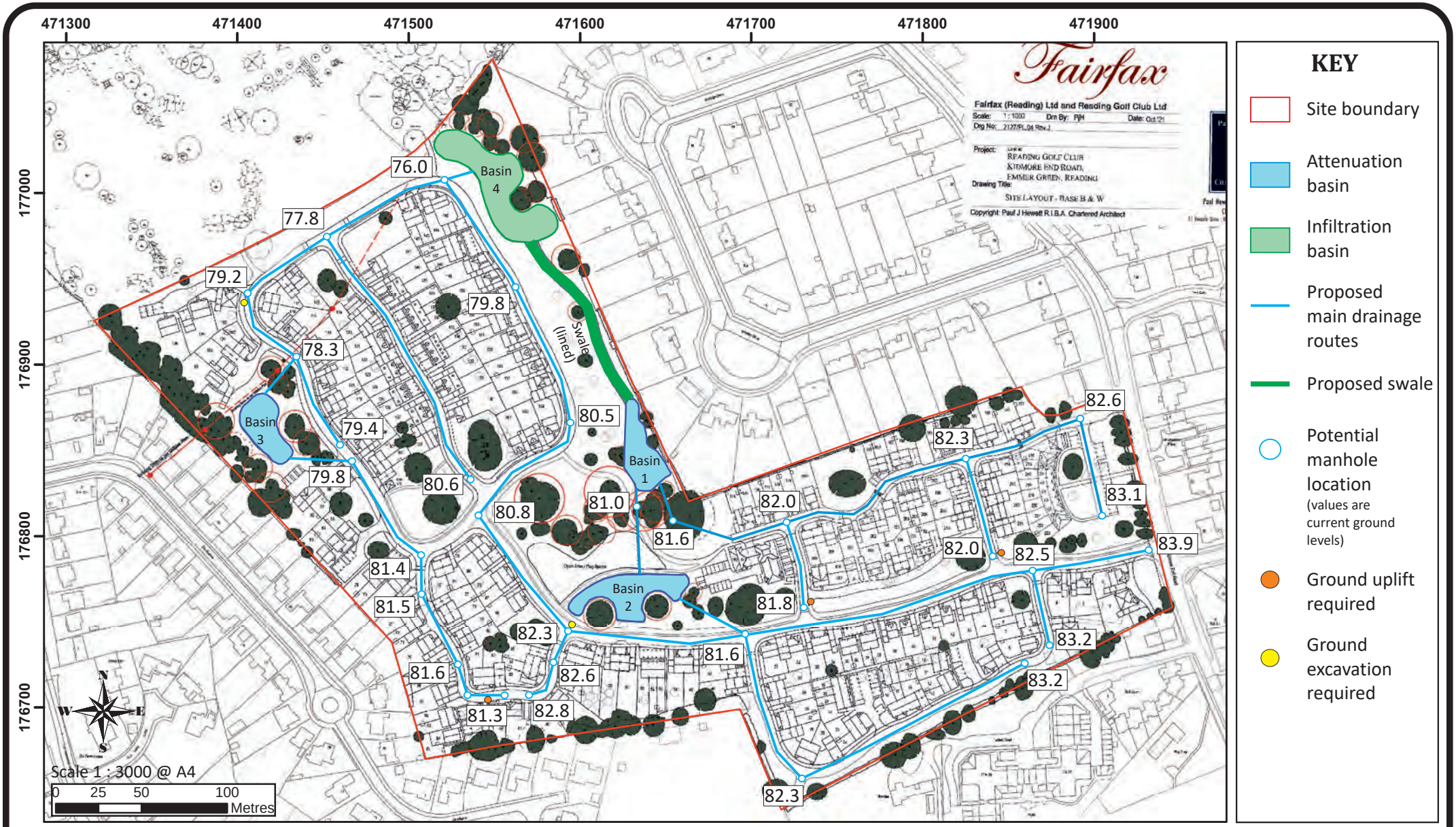
2. The current surface water designs offers a mix of SUDs features which include the permeable paved/sub base network, attenuation basin, swales and final infiltration basin. This equates to circa 7400m^3 of permeable storm and 1800m^3 of open basin & swale. From this I can confirm that that sufficient storage is available within the network for all storms up to and including the 1 in 100 year plus a 40% allowance for climate change

Appendices:

Appendix A: Approved FRA Extracts
Appendix B: Engineering Layouts & Construction Plans
Appendix C: Surface Water Drainage Calculations

Alistair McShane
MJA CONSULTING

Appendix A
Approved FRA Extracts



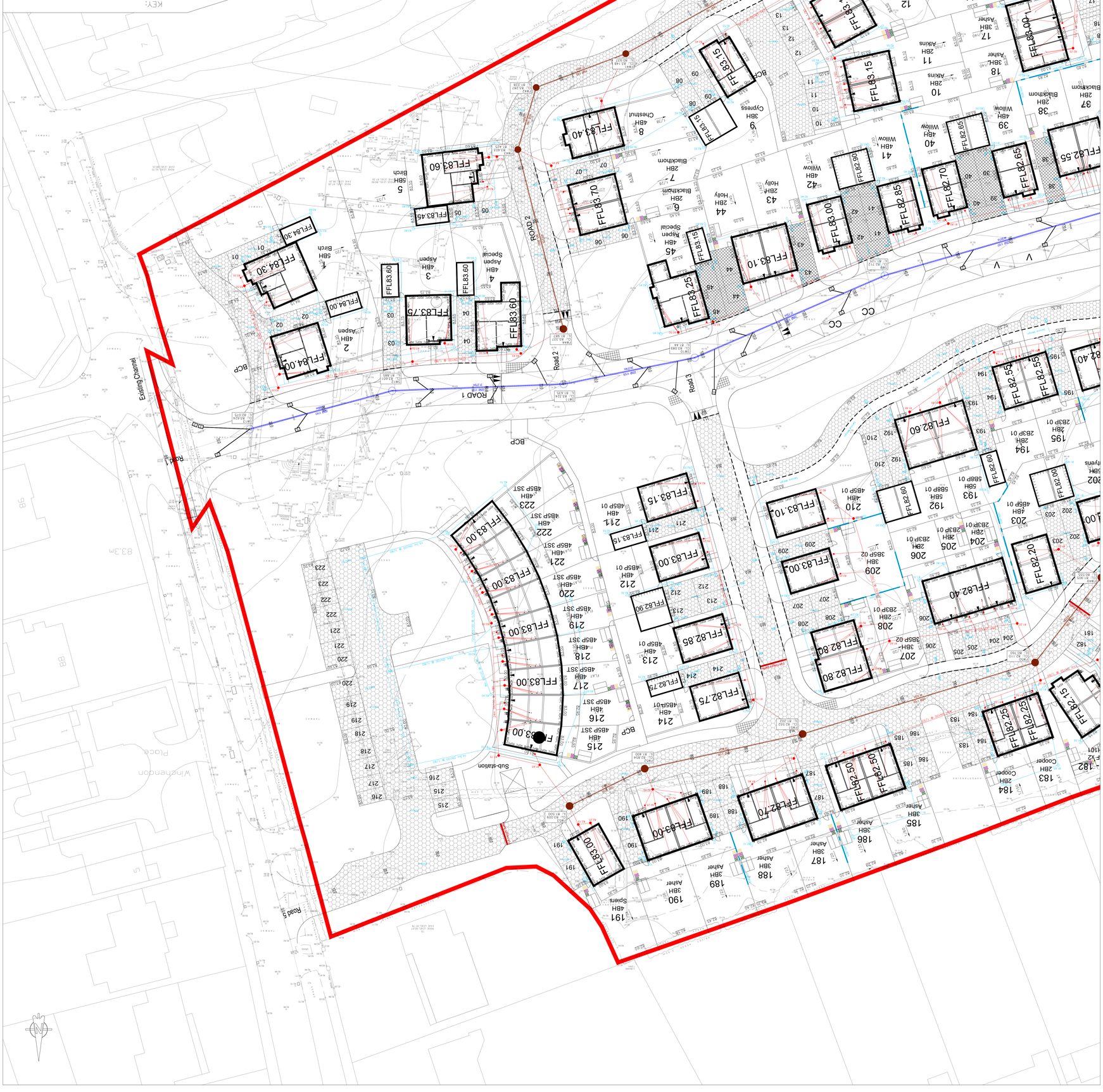
Ref: P21-223 YSG Reading Golf Club
Date: 04/11/2021

Reading Golf Course

Figure 7.2

Preliminary Outline Drainage Routes

Appendix B
Engineering Layouts & Construction Plans



KEY:

Proposed Adoptable Sewers:

- Foul sewer
- Storm sewer
- Highway Gully

Proposed Private Drainage:

- Foul drain
- Storm drain
- Rodding eye
- Yard gully
- Permeable – Surface Water Collector & Distribution Cell. Size and specification, site specific.

Private inspection chambers shall be non-access structural wall plastic. Chamber sizes to accord with manufacturers specifications. Building Regulations Part H, BS EN 752 and to NHBC Standards.

Inert levels shown thus: FL0.00 S10.00

Areas of permeable sub base draining to ground with full height concrete baffle.

Areas of sealed permeable paving discharging to surface water sewer with full height concrete baffle.

Cellular soakaway

– 710X710X150mm (u.n.o) Permavoid surface water collector & distribution cell with geotextile membrane wrap and proprietary pipework connector.

Permeable stone subbase formation levels vary, shown thus: SB105.00

– Baffles to be constructed where permeable subbase abuts public highway / service margins.

Step Cavity Tray/Raised DPC – External ground level is level or 0.15m below finished floor level. Stepped Cavity Tray or Raised DPC to Structural engineer /Architect's specification. SCT/RDPC

Tanking – External level is above finished floor level, specified by structural engineer. T T T

DPC where ground level is 0.15m below finished floor level.

Exposed Brickwork – >0.15m below finished floor level. EXP BWK

Retaining Wall – Refer to structural engineer details. RWX1 CWB

Finished floor levels shown thus: FFL 10.00

Fall Arrows

Proposed Levels XX.XXX

Primary Access

Secondary Access

In accordance with Part–M of the Building Regulations – Every flight of steps with three or more risers (approach to primary access point to have a suitable graspable handrail on one side of the flight (of both sides where the flight is wider than 1000mm). This graspable handrail is 850–1000mm above the pitch line or the flight and extends at least 300mm beyond the top and bottom nosings.

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Externals:

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3. All levels refer to Ordnance Datum; all dimensions in metres unless otherwise specified. Site survey & any discrepancies should be reported to MJA Consulting.
4. The level & location of all existing services shall be verified and marked on site by the Contractor prior to commencing any construction works.
5. All highway levels should be built to an adoptable standard and carried out in accordance with the MOHW Specification for Highway Works and the requirements of the Local Highway Authority.
6. All adoptable foul & surface manholes, gullies and associated structures shall be constructed in accordance with current Sewer for Adoption issued by Construction Guidance (DCG)and any relevant Water Authority specifications or addendum.
7. All highway drainage and associated structures to be constructed in accordance with Sewers Adoption guidance and any relevant specifications issued by the Local Highway Authority.
8. Engineering layouts show bare ground formation only. All soft areas, MC covers and chamber cover levels to ensure compatibility. All slab blocks to be fitted with or conditions have been reached to ensure compatibility. All slab blocks to be fitted with or conditions have been reached to ensure compatibility.
9. Rainwater downpipes to be connected directly to drains via manufacturers adaptor to permit access for rodding. Rainwater and public sewers and in accordance with manufacturer's specifications, building regulations Part H, BS EN 752 and to NHBC Standards.
10. All foul & storm water building drainage are offered for adoption and to be constructed using uPVC or vitrified clay pipes and in accordance with manufacturer's specifications, building regulations Part H, BS EN 752 and to NHBC Standards.
11. Building drainage foul drainage to be DN100 mm at a minimum gradient of 1 in 40 or as specified. Minimum gradient for surface water to be 1 in 80 or as specified.
12. Private inspection chambers shall be non-access structural wall plastic. Chamber sizes to accord with manufacturers specifications, building regulations Part H, BS EN 752 and to NHBC Standards.
13. Levels of different elements to be laid out to scale.
14. All give connections other than on manholes to be "Y" junctions.
15. All kerbed floor levels shown are for guidance only and may need to be adjusted on site where required. However, any amendments or deviation are subject to Engineer's approval, levels shown within gardens are indicative only and subject to landscaping proposals.
16. Requirement for raised DPC / flashing as follows (refer to standard details):
- Raised DPC where external ground level is between –150 & level with FFL
- Standard DPC where ground level is 150mm below FFL
17. Position of driveway or parking area gulley and associated structure shall be adjusted to suit. Inter drains to be installed where junction occurs far towards adjacent to public highway. All covers and gully grates to be suitable for vehicle loading.
18. All drainage chambers to be located and runs to be fished through to remove any building material and debris prior to final tests by building inspector.

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REV. No.	DATE	DESCRIPTION	DRAWN	CHECKED
P7	21.12.22	Minimum subbase depths added and levels updated	SS	AMc
P6	17.11.22	Additional topographical information shown on drawing	JS	AKD
P5	01.11.22	Update to latest detailed design	JS	AKD
P4	21.10.22	Updated to detailed design	JS	AKD
P3	16.09.22	Level updated for sub structures	JS	AKD

Client

Vistry Group

MJA CONSULTING
CIVIL & STRUCTURAL ENGINEERS

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Abingdon Science Park, Abingdon
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Tel: 01235 539173
Email: mail@mjaconsulting.co.uk

Project Kilmore End Road
Elmer Green, Reading

Title
Proposed Levels & Drainage Strategy
Sheet 1 of 5

Scale:	Status:
1:250@A0	PRELIMINARY

Drawn:	Project Engineer:	MJA Project No:	Date:	Rev:
PFB	PPB	6452	19/05/2022	P7

6452–MJA–SW–XX–DR–C–001

Drawing Notes:

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9. Rainwater downpipes to be connected directly to drains via removable adaptor to permit access for rodding.
10. All foul & storm water building drainage not offered for adoption shall be constructed using clay, uPVC or structural wall plastic pipework laid in accordance with manufacturer's specification, Building Regulations Part H, BS EN 752 and to NHBC Standards.
11. Building drainage. Foul drainage to be DN100 laid at a minimum gradient of 1 in 40 where serving less than 1 WC. 1 in 80 otherwise or as specified. Minimum gradient for surface water to be 1 in 80 or as specified.

    Minimum depth of cover to unprotected gravity pipework should be:
    - Domestic gardens without vehicle access – 0.6m
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12. Private inspection chambers shall be non-access structural wall plastic. Chamber sizes to accord with manufacturers specifications, Building Regulations Part H, BS EN 752 and to NHBC Standards.
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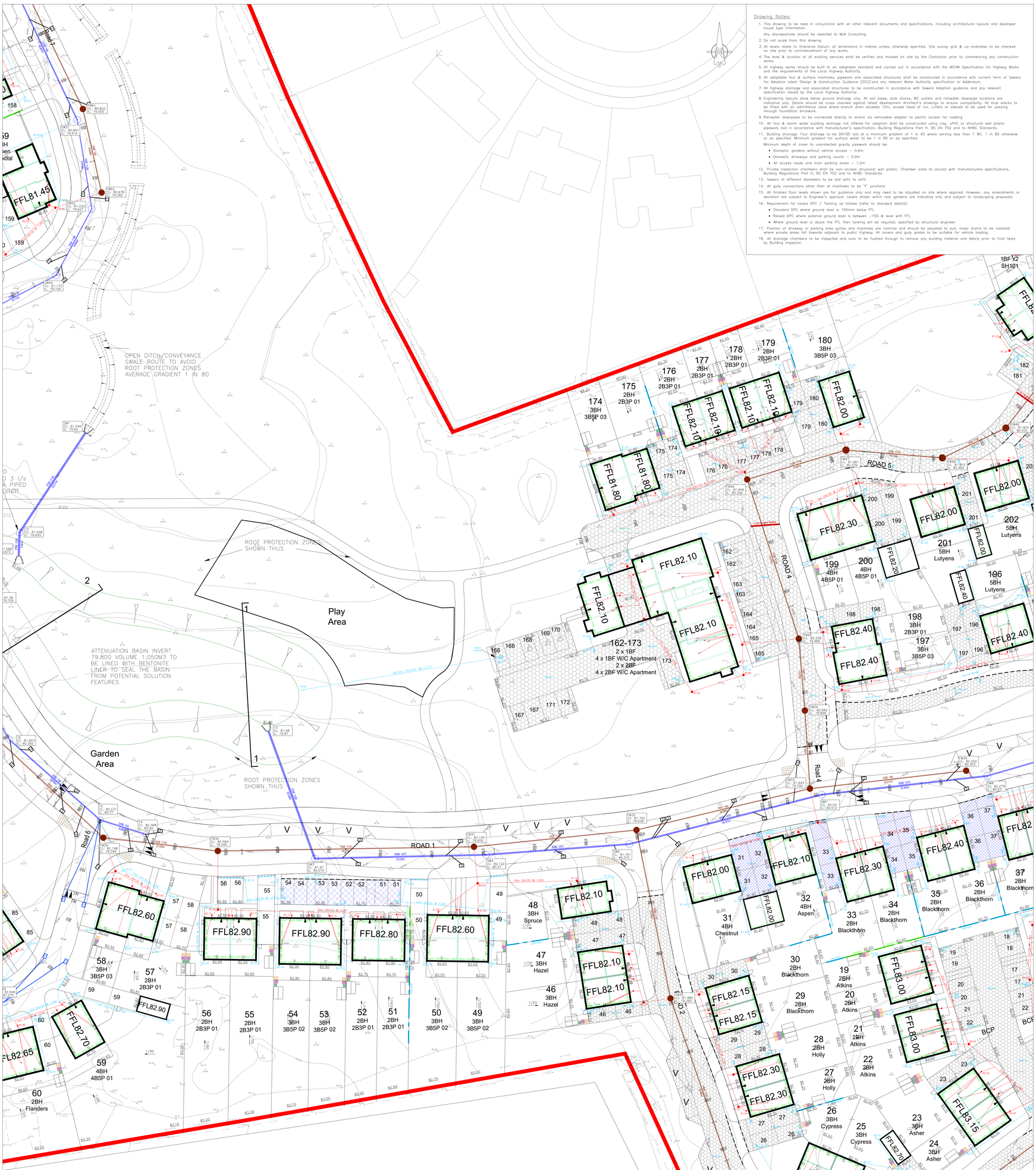

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Retaining Wall – Refer to structural engineer details RWALL CGS

Fall Arrows

Finished floor levels shown thus: FFL 10.00

Proposed Levels xxx.xxx

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Storm sewer

Highway Gully

Proposed Private Drainage:

Foul drain

Storm drain

Rodding eye

Yard gully

Permavoid – Surface Water Collector & Distribution Cell Size and specification, site specific. PV

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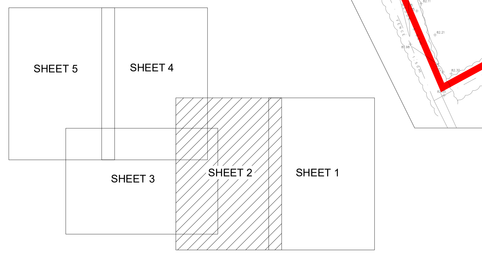

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Client: Vistry Group

Project: Kidmore End Road Emmer Green, Reading

Title: Proposed Levels & Drainage Strategy Sheet 2 of 5

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Tel: 01235 555173
Email: mail@mjaconsulting.co.uk

Scale: 1:250@A0	Status: PRELIMINARY		
Drawn: PPB	Project Engineer: PPB	MJA Project No: 6452	Date: 19/05/2022
Drawing Number: 6452–MJA–SW–XX–DR–C–002			Rev: P7

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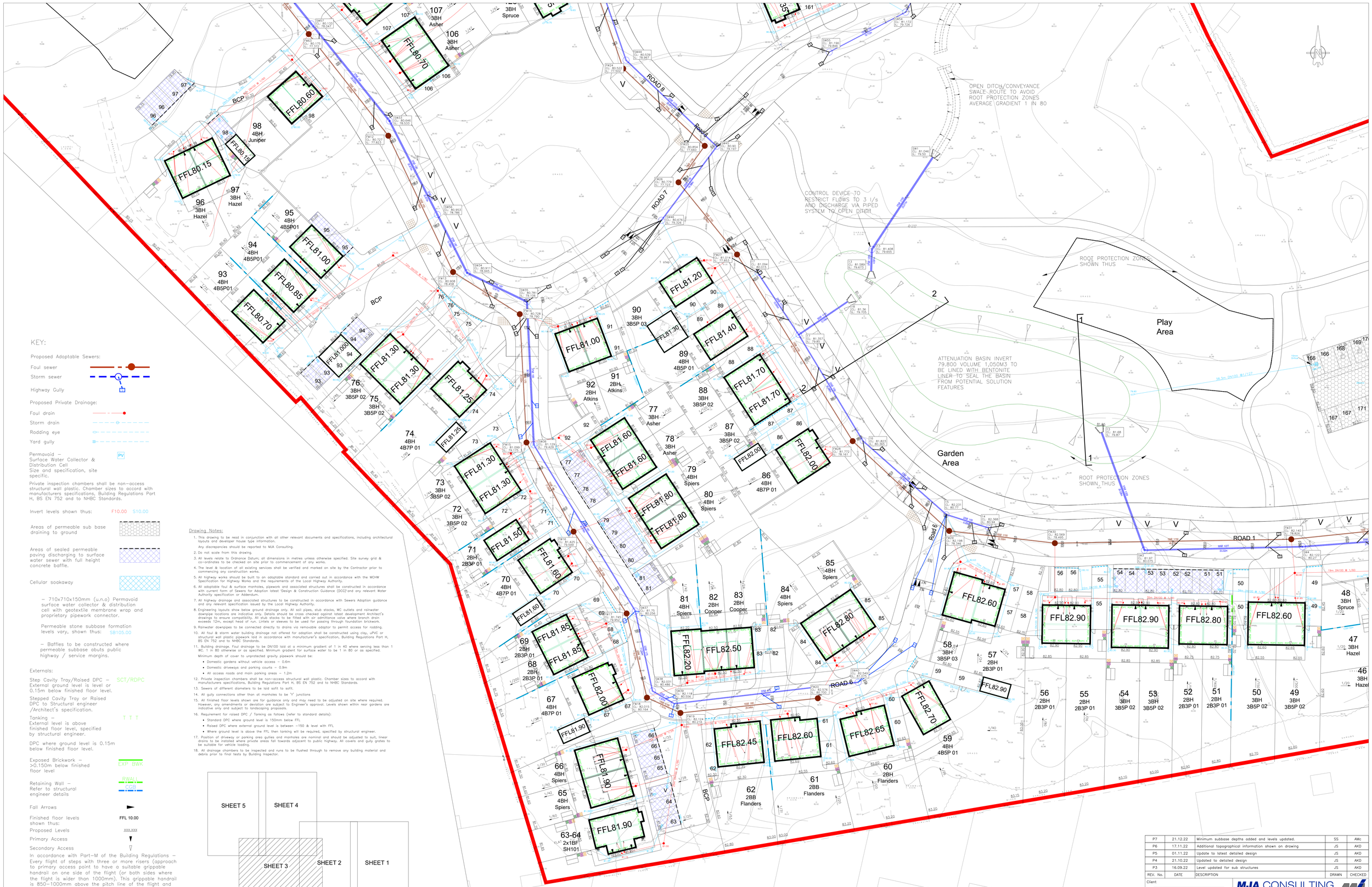

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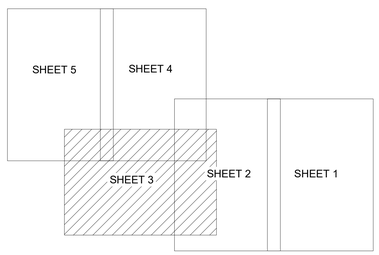

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Client: Vistry Group

Project: P1 Emmer Green, Reading

Title: Proposed Levels & Drainage Strategy Sheet 3 of 5

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Scale: 1:250@A0 Status: PRELIMINARY

Drawn: PPB Project Engineer: PPB MJA Project No: 6452 Date: 19/05/2022

Drawing Number: 6452-MJA-SW-XX-DR-C-003 Rev: P7

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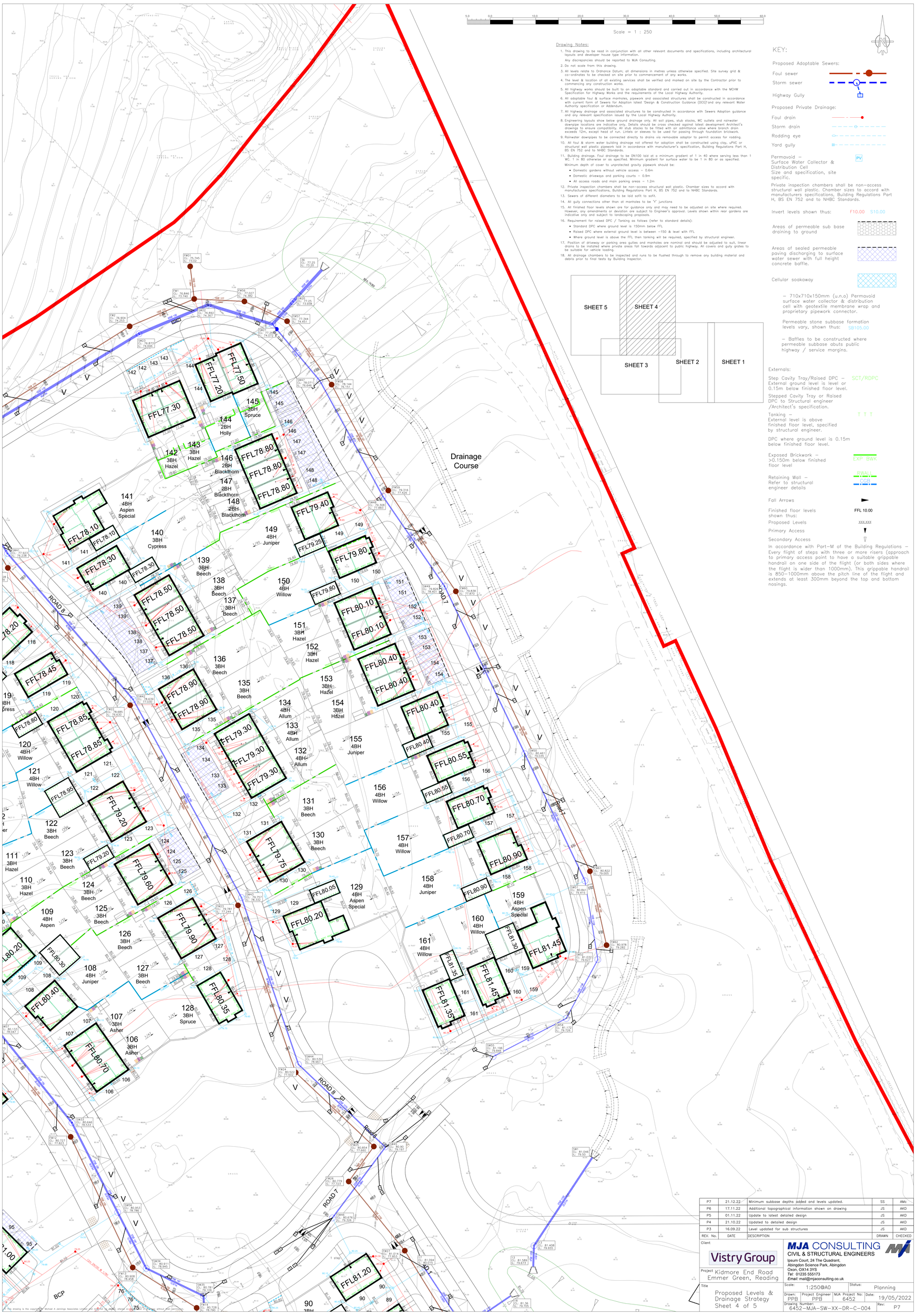

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    - Where ground level is above the FFL then tanking will be required, specified by structural engineer.
17. Position of driveway or parking area gullies and manholes are nominal and should be adjusted to suit, linear drains to be installed where private areas fall towards adjacent to public highway. All covers and gully grates to be suitable for vehicle loading.
18. All drainage chambers to be inspected and runs to be flushed through to remove any building material and debris prior to final tests by Building inspector.

KEY:

Proposed Adoptable Sewers:

Foul sewer

Storm sewer

Highway Gully

Proposed Private Drainage:

Foul drain

Storm drain

Rodding eye

Yard gully

Permavoid – Surface Water Collector & Distribution Cell
Size and specification, site specific. PV

Private inspection chambers shall be non-access structural wall plastic. Chamber sizes to accord with manufacturers specifications, Building Regulations Part H, BS EN 752 and to NHBC Standards.

Invert levels shown thus: F10.00 S10.00

Areas of permeable sub base draining to ground

Areas of sealed permeable paving discharging to surface water sewer with full height concrete baffle.

Cellular soakaway

– 710x710x150mm (u.n.o) Permavoid surface water collector & distribution cell with geotextile membrane wrap and proprietary pipework connector.

Permeable stone subbase formation levels vary, shown thus: SB105.00

– Baffles to be constructed where permeable subbase abuts public highway / service margins.

Externals:

Step Cavity Tray/Raised DPC – External ground level is level or 0.15m below finished floor level. SCT/RDPC

Stepped Cavity Tray or Raised DPC to Structural engineer /Architect's specification.

Tanking – External level is above finished floor level, specified by structural engineer. T T T

DPC where ground level is 0.15m below finished floor level.

Exposed Brickwork – >0.150m below finished floor level EXP BWK

Retaining Wall – Refer to structural engineer details RWALL

Fall Arrows

Finished floor levels shown thus: FFL 10.00

Proposed Levels xxx.xxx

Primary Access

Secondary Access

In accordance with Part–M of the Building Regulations – Every flight of steps with three or more risers (approach to primary access point to have a suitable grippable handrail on one side of the flight (or both sides where the flight is wider than 1000mm). This grippable handrail is 850–1000mm above the pitch line of the flight and extends at least 300mm beyond the top and bottom nosings.

REV. No.	DATE	DESCRIPTION	DRAWN	CHECKED
P7	21.12.22	Minimum subbase depths added and levels updated.	SS	AMc
P6	17.11.22	Additional topographical information shown on drawing	JS	AKD
P5	01.11.22	Update to latest detailed design	JS	AKD
P4	21.10.22	Updated to detailed design	JS	AKD
P3	16.09.22	Level updated for sub structures	JS	AKD

Client: Vistry Group

Project: Kidmore End Road Emmer Green, Reading

MJA CONSULTING
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Title: Proposed Levels & Drainage Strategy Sheet 4 of 5

Scale: 1:250@A0 | Status: Planning

Drawn: PPB | Project Engineer: PPB | MJA Project No: 6452 | Date: 19/05/2022

Drawing Number: 6452–MJA–SW–XX–DR–C–004 | Rev: P7

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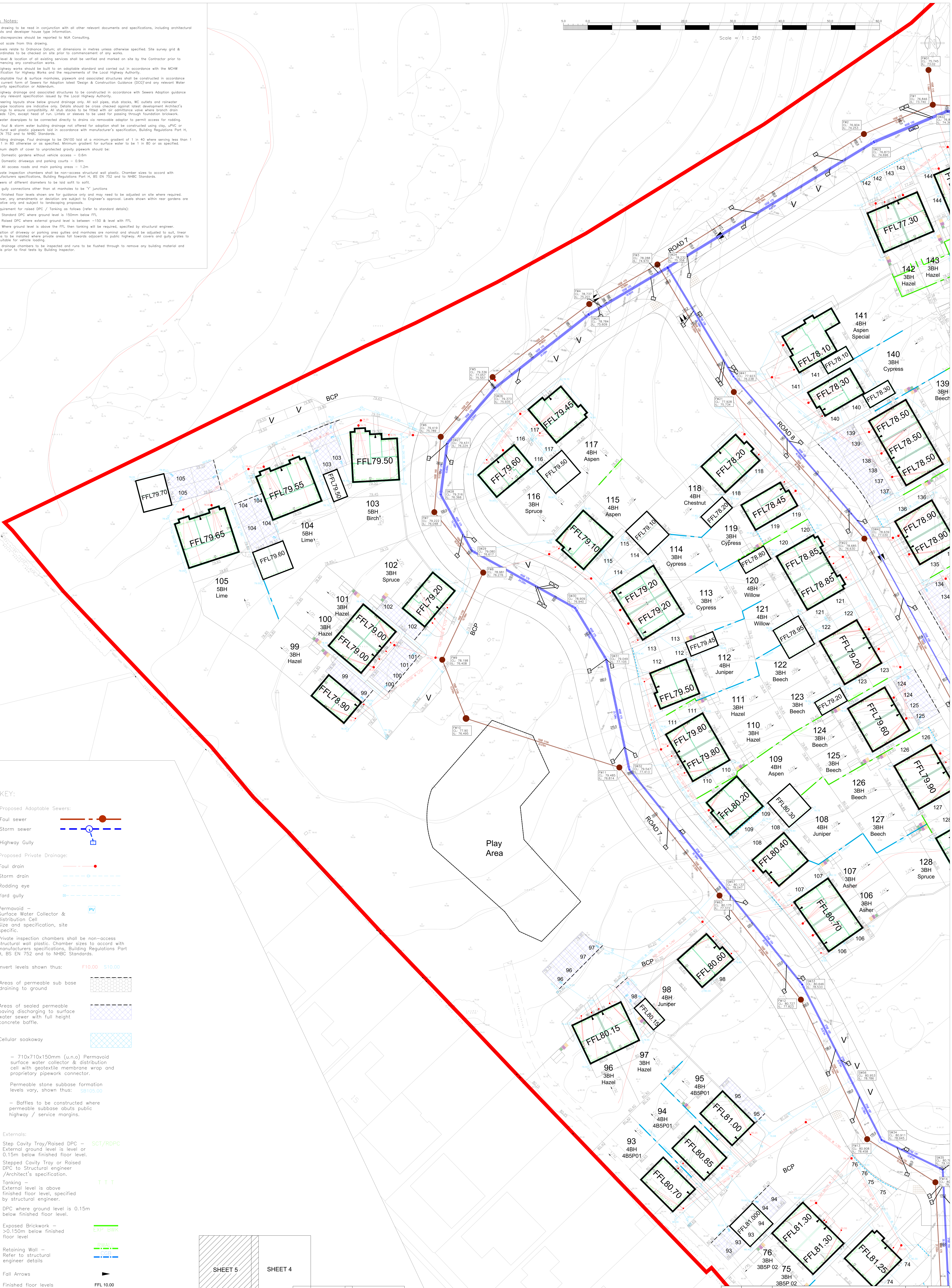
Drawing Notes:

1. This drawing to be read in conjunction with all other relevant documents and specifications, including architectural layouts and developer house type information.

   Any discrepancies should be reported to MJA Consulting.
2. Do not scale from this drawing.
3. All levels relate to Ordnance Datum; all dimensions in metres unless otherwise specified. Site survey grid & co-ordinates to be checked on site prior to commencement of any works.
4. The level & location of all existing services shall be verified and marked on site by the Contractor prior to commencing any construction works.
5. All highway works should be built to an adoptable standard and carried out in accordance with the MCHW Specification for Highway Works and the requirements of the Local Highway Authority.
6. All adoptable foul & surface manholes, pipework and associated structures shall be constructed in accordance with current form of Sewers for Adoption latest 'Design & Construction Guidance (DCG)' and any relevant Water Authority specification or Addendum.
7. All highway drainage and associated structures to be constructed in accordance with Sewers Adoption guidance and any relevant specification issued by the Local Highway Authority.
8. Engineering layouts show below ground drainage only. All soil pipes, stub stacks, WC outlets and rainwater downpipe locations are indicative only. Details should be cross checked against latest development Architect's drawings to ensure compatibility. All stub stacks to be fitted with air admittance valve where branch drain exceeds 12m, except head of run. Lintels or sleeves to be used for passing through foundation brickwork.
9. Rainwater downpipes to be connected directly to drains via removable adaptor to permit access for rodding.
10. All foul & storm water building drainage not offered for adoption shall be constructed using clay, uPVC or structural wall plastic pipework laid in accordance with manufacturer's specification, Building Regulations Part H, BS EN 752 and to NHBC Standards.
11. Building drainage. Foul drainage to be DN100 laid at a minimum gradient of 1 in 40 where serving less than 1 WC. 1 in 80 otherwise or as specified. Minimum gradient for surface water to be 1 in 80 or as specified.

    Minimum depth of cover to unprotected gravity pipework should be:
    - Domestic gardens without vehicle access – 0.6m
    - Domestic driveways and parking courts – 0.9m
    - All access roads and main parking areas – 1.2m
12. Private inspection chambers shall be non-access structural wall plastic. Chamber sizes to accord with manufacturers specifications, Building Regulations Part H, BS EN 752 and to NHBC Standards.
13. Sewers of different diameters to be laid sofit to sofit.
14. All gully connections other than at manholes to be 'Y' junctions
15. All finished floor levels shown are for guidance only and may need to be adjusted on site where required. However, any amendments or deviation are subject to Engineer's approval. Levels shown within rear gardens are indicative only and subject to landscaping proposals.
16. Requirement for raised DPC / Tanking as follows (refer to standard details):
    - Standard DPC where ground level is 150mm below FFL
    - Raised DPC where external ground level is between –150 & level with FFL
    - Where ground level is above the FFL then tanking will be required, specified by structural engineer.
17. Position of driveway or parking area gullies and manholes are nominal and should be adjusted to suit, linear drains to be installed where private areas fall towards adjacent to public highway. All covers and gully grates to be suitable for vehicle loading.
18. All drainage chambers to be inspected and runs to be flushed through to remove any building material and debris prior to final tests by Building Inspector.



KEY:

Proposed Adoptable Sewers:
- Foul sewer
- Storm sewer
- Highway Gully

Proposed Private Drainage:
- Foul drain
- Storm drain
- Rodding eye
- Yard gully

Permavoid – Surface Water Collector & Distribution Cell. Size and specification, site specific. PV

Private inspection chambers shall be non–access structural wall plastic. Chamber sizes to accord with manufacturers specifications, Building Regulations Part H, BS EN 752 and to NHBC Standards.

Invert levels shown thus: F10.00 S10.00

Areas of permeable sub base draining to ground

Areas of sealed permeable paving discharging to surface water sewer with full height concrete baffle.

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Externals:

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Stepped Cavity Tray or Raised DPC to Structural engineer /Architect's specification.

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DPC where ground level is 0.15m below finished floor level.

Exposed Brickwork – >0.150m below finished floor level. EXP BWK

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Fall Arrows

Finished floor levels shown thus: FFL 10.00

Proposed Levels xxx.xxx

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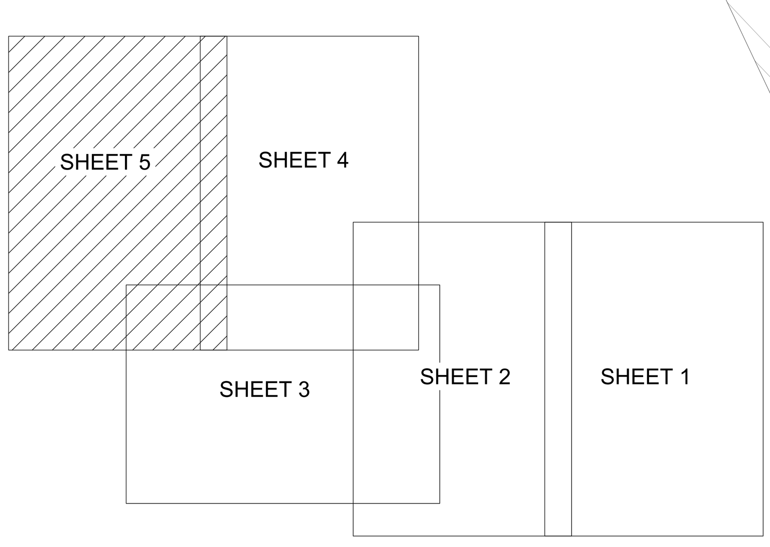

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P4	21.10.22	Updated to detailed design	JS	AKD

Client: Vistry Group

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Project: Kidmore End Road Emmer Green, Reading

Title: Proposed Levels & Drainage Strategy Sheet 5 of 5

Scale: 1:250@A0
Status: PRELIMINARY
Drawn: PPB
Project Engineer: PPB
MJA Project No: 6452
Date: 19/05/2022
Drawing Number: 6452–MJA–SW–XX–DR–C–005
Rev: P7

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Appendix B
Engineering Layouts & Construction Plans

Appendix C
Surface Water Drainage Calculations

Time Area Diagram for SWS East

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.263	4-8	0.544	8-12	0.070

Total Area Contributing (ha) = 0.877

Total Pipe Volume (m^3) = 35.566

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for SWS East

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	26.860	0.190	141.4	0.015	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	31.275	0.250	125.1	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	24.374	0.195	125.0	0.077	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	37.732	0.315	119.8	0.056	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	44.837	0.420	106.8	0.099	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	32.343	0.118	274.1	0.091	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	38.531	0.140	275.2	0.121	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	27.896	0.102	273.5	0.029	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.008	33.232	0.120	276.9	0.061	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.009	26.328	0.080	329.1	0.050	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.010	59.172	0.197	300.4	0.000	0.00	0.3	0.600	o	375	Pipe/Conduit	
2.000	9.269	0.170	54.5	0.062	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	23.395	0.405	57.8	0.064	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.002	26.089	0.440	59.3	0.063	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	15.593	0.090	173.3	0.073	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.003	12.436	0.065	191.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.004	8.088	0.032	252.8	0.000	0.00	0.0	0.600	o	375	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	5.41	82.075	0.015	0.0	0.0	0.0	1.10	43.6	2.0
1.001	50.00	5.85	81.885	0.031	0.0	0.0	0.0	1.17	46.4	4.2
1.002	50.00	6.20	81.635	0.108	0.0	0.0	0.0	1.17	46.4	14.6
1.003	50.00	6.73	81.440	0.163	0.0	0.0	0.0	1.19	47.5	22.1
1.004	50.00	7.32	81.125	0.262	0.0	0.0	0.0	1.26	50.3	35.5
1.005	50.00	7.89	80.630	0.353	0.0	0.0	0.0	0.94	66.8	47.8
1.006	50.00	8.57	80.512	0.474	0.0	0.0	0.0	0.94	66.6	64.2
1.007	49.93	9.00	80.297	0.504	0.0	0.0	0.0	1.09	120.5	68.1
1.008	48.49	9.51	80.195	0.565	0.0	0.0	0.0	1.08	119.7	74.2
1.009	47.32	9.95	80.075	0.615	0.0	0.0	0.0	0.99	109.7	78.8
1.010	45.05	10.90	79.870	0.615	0.3	0.0	0.0	1.04	114.9	78.8
2.000	50.00	5.09	80.940	0.062	0.0	0.0	0.0	1.78	70.6	8.4
2.001	50.00	5.31	80.770	0.126	0.0	0.0	0.0	1.72	68.6	17.1
2.002	50.00	5.57	80.365	0.189	0.0	0.0	0.0	1.70	67.7	25.6
3.000	50.00	5.26	80.015	0.073	0.0	0.0	0.0	0.99	39.4	9.9
2.003	50.00	5.75	79.850	0.262	0.0	0.0	0.0	1.13	80.1	35.5
2.004	50.00	5.87	79.705	0.262	0.0	0.0	0.0	1.14	125.4	35.5

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for SWS East

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
1.011	4.581	0.018	254.5	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.012	23.211	0.155	149.7	0.000	0.00	0.0	0.600	o	375	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)
1.011	50.00	5.07	79.673	0.000	3.0	0.0	0.0	1.13	124.9	3.0
1.012	50.00	5.33	79.655	0.000	3.0	0.0	0.0	1.48	163.3	3.0

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PIPELINE SCHEDULES for SWS East

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	SW13	83.624	82.075	1.324	Open Manhole	1350
1.001	o	225	SW12	83.601	81.885	1.491	Open Manhole	1350
1.002	o	225	SW11	83.324	81.635	1.464	Open Manhole	1350
1.003	o	225	SW10	83.089	81.440	1.424	Open Manhole	1350
1.004	o	225	SW9	82.712	81.125	1.362	Open Manhole	1350
1.005	o	300	SW8	82.279	80.630	1.349	Open Manhole	1350
1.006	o	300	SW7	82.000	80.512	1.188	Open Manhole	1350
1.007	o	375	SW6	81.761	80.297	1.089	Open Manhole	1350
1.008	o	375	SW4	82.122	80.195	1.552	Open Manhole	1350
1.009	o	375	SW3	81.970	80.075	1.520	Open Manhole	1350
1.010	o	375	13	81.680	79.870	1.435	Open Manhole	1350
2.000	o	225	14	82.368	80.940	1.203	Open Manhole	1200
2.001	o	225	15	82.231	80.770	1.236	Open Manhole	1200
2.002	o	225	16	81.823	80.365	1.233	Open Manhole	1200
3.000	o	225	17	81.094	80.015	0.854	Open Manhole	1200
2.003	o	300	17	81.357	79.850	1.207	Open Manhole	1200
2.004	o	375	18	81.360	79.705	1.280	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	26.860	141.4	SW12	83.601	81.885	1.491	Open Manhole	1350
1.001	31.275	125.1	SW11	83.324	81.635	1.464	Open Manhole	1350
1.002	24.374	125.0	SW10	83.089	81.440	1.424	Open Manhole	1350
1.003	37.732	119.8	SW9	82.712	81.125	1.362	Open Manhole	1350
1.004	44.837	106.8	SW8	82.279	80.705	1.349	Open Manhole	1350
1.005	32.343	274.1	SW7	82.000	80.512	1.188	Open Manhole	1350
1.006	38.531	275.2	SW6	81.761	80.372	1.089	Open Manhole	1350
1.007	27.896	273.5	SW4	82.122	80.195	1.552	Open Manhole	1350
1.008	33.232	276.9	SW3	81.970	80.075	1.520	Open Manhole	1350
1.009	26.328	329.1	13	81.680	79.995	1.310	Open Manhole	1350
1.010	59.172	300.4	13	81.589	79.673	1.541	Open Manhole	1350
2.000	9.269	54.5	15	82.231	80.770	1.236	Open Manhole	1200
2.001	23.395	57.8	16	81.823	80.365	1.233	Open Manhole	1200
2.002	26.089	59.3	17	81.357	79.925	1.207	Open Manhole	1200
3.000	15.593	173.3	17	81.357	79.925	1.207	Open Manhole	1200
2.003	12.436	191.3	18	81.360	79.785	1.275	Open Manhole	1350
2.004	8.088	252.8	13	81.589	79.673	1.541	Open Manhole	1350

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PIPELINE SCHEDULES for SWS East

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.011	o	375	13	81.589	79.673	1.541	Open Manhole	1350
1.012	o	375	13	81.408	79.655	1.378	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.011	4.581	254.5	13	81.408	79.655	1.378	Open Manhole	1350
1.012	23.211	149.7	SW1	81.046	79.500	1.171	Open Manhole	0

Free Flowing Outfall Details for SWS East

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.012	SW1	81.046	79.500	0.000	0	0

Simulation Criteria for SWS East

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for SWS East

Hydro-Brake® Optimum Manhole: 13, DS/PN: 1.012, Volume (m³): 2.9

Unit Reference	MD-SHE-0082-3000-1050-3000
Design Head (m)	1.050
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	82
Invert Level (m)	79.655
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.050	3.0	Kick-Flo®	0.658	2.4
Flush-Flo™	0.320	3.0	Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	3.2	3.000	4.9	7.000	7.3
0.200	2.9	1.400	3.4	3.500	5.2	7.500	7.5
0.300	3.0	1.600	3.6	4.000	5.6	8.000	7.7
0.400	3.0	1.800	3.8	4.500	5.9	8.500	8.0
0.500	2.9	2.000	4.0	5.000	6.2	9.000	8.2
0.600	2.7	2.200	4.2	5.500	6.5	9.500	8.4
0.800	2.6	2.400	4.4	6.000	6.8		
1.000	2.9	2.600	4.6	6.500	7.0		

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Storage Structures for SWS East

Tank or Pond Manhole: 13, DS/PN: 1.012

Invert Level (m) 79.655

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	551.3	0.700	787.5	1.400	1031.3	2.100	0.0
0.100	585.0	0.800	821.3	1.500	1065.0	2.200	0.0
0.200	618.8	0.900	855.0	1.600	1098.8	2.300	0.0
0.300	652.5	1.000	896.3	1.700	1275.0	2.400	0.0
0.400	686.3	1.100	930.0	1.800	0.0	2.500	0.0
0.500	720.0	1.200	963.8	1.900	0.0		
0.600	753.8	1.300	997.5	2.000	0.0		

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS East

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 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

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 FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW13	15 Winter	1	+0%	100/15 Summer				82.107
1.001	SW12	15 Winter	1	+0%	100/15 Summer				81.929
1.002	SW11	15 Winter	1	+0%	30/15 Summer				81.716
1.003	SW10	15 Winter	1	+0%	30/15 Summer	100/15 Summer			81.539
1.004	SW9	15 Winter	1	+0%	30/15 Summer	100/15 Summer			81.250
1.005	SW8	15 Winter	1	+0%	30/15 Summer	100/15 Summer			80.800
1.006	SW7	15 Winter	1	+0%	30/15 Summer	100/15 Summer			80.712
1.007	SW6	15 Winter	1	+0%	30/15 Winter				80.478
1.008	SW4	15 Winter	1	+0%	30/15 Summer				80.384
1.009	SW3	15 Winter	1	+0%	30/15 Summer				80.284
1.010	13	15 Winter	1	+0%	30/15 Summer				80.064
2.000	14	15 Winter	1	+0%	100/15 Summer				80.996
2.001	15	15 Winter	1	+0%	100/15 Summer				80.845
2.002	16	15 Winter	1	+0%	30/15 Summer				80.458
3.000	17	15 Winter	1	+0%	30/15 Summer				80.095
2.003	17	15 Winter	1	+0%	30/15 Summer				80.000
2.004	18	15 Winter	1	+0%	30/15 Summer				79.952
1.011	13	15 Winter	1	+0%	30/15 Summer				79.948

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS East

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW13	-0.193	0.000	0.05			1.9	OK	
1.001	SW12	-0.181	0.000	0.08			3.7	OK	
1.002	SW11	-0.144	0.000	0.28			12.0	OK	
1.003	SW10	-0.126	0.000	0.39			17.7	OK	4
1.004	SW9	-0.100	0.000	0.58			27.9	OK	4
1.005	SW8	-0.130	0.000	0.60			36.6	OK	3
1.006	SW7	-0.100	0.000	0.77			47.3	OK	4
1.007	SW6	-0.194	0.000	0.47			49.4	OK	
1.008	SW4	-0.186	0.000	0.50			53.6	OK	
1.009	SW3	-0.166	0.000	0.59			56.8	OK	
1.010	13	-0.181	0.000	0.52			55.7	OK	
2.000	14	-0.169	0.000	0.14			8.1	OK	
2.001	15	-0.150	0.000	0.24			15.0	OK	
2.002	16	-0.132	0.000	0.35			22.1	OK	
3.000	17	-0.145	0.000	0.27			9.4	OK	
2.003	17	-0.150	0.000	0.50			31.7	OK	
2.004	18	-0.128	0.000	0.35			30.5	OK	
1.011	13	-0.100	0.000	0.89			69.3	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS East

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.012	13 720	Winter	1	+0%	30/120 Winter				79.859

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.012	13	-0.171	0.000	0.02			2.9	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS East

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 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

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 FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW13	15 Winter	30	+0%	100/15 Summer				82.128
1.001	SW12	15 Winter	30	+0%	100/15 Summer				82.102
1.002	SW11	15 Winter	30	+0%	30/15 Summer				82.095
1.003	SW10	15 Winter	30	+0%	30/15 Summer	100/15 Summer			82.051
1.004	SW9	15 Winter	30	+0%	30/15 Summer	100/15 Summer			81.888
1.005	SW8	15 Winter	30	+0%	30/15 Summer	100/15 Summer			81.304
1.006	SW7	15 Winter	30	+0%	30/15 Summer	100/15 Summer			81.109
1.007	SW6	15 Winter	30	+0%	30/15 Winter				80.749
1.008	SW4	15 Winter	30	+0%	30/15 Summer				80.656
1.009	SW3	15 Winter	30	+0%	30/15 Summer				80.528
1.010	13	15 Winter	30	+0%	30/15 Summer				80.407
2.000	14	15 Winter	30	+0%	100/15 Summer				81.031
2.001	15	15 Winter	30	+0%	100/15 Summer				80.905
2.002	16	15 Winter	30	+0%	30/15 Summer				80.621
3.000	17	15 Winter	30	+0%	30/15 Summer				80.311
2.003	17	15 Winter	30	+0%	30/15 Summer				80.277
2.004	18	15 Winter	30	+0%	30/15 Summer				80.205
1.011	13	15 Winter	30	+0%	30/15 Summer				80.182

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS East

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW13	-0.172	0.000	0.11			4.6	OK	
1.001	SW12	-0.008	0.000	0.26			11.4	OK	
1.002	SW11	0.235	0.000	0.69			29.6	SURCHARGED	
1.003	SW10	0.386	0.000	0.82			37.1	SURCHARGED	4
1.004	SW9	0.538	0.000	1.17			56.1	SURCHARGED	4
1.005	SW8	0.374	0.000	1.27			77.6	SURCHARGED	3
1.006	SW7	0.297	0.000	1.71			105.3	SURCHARGED	4
1.007	SW6	0.077	0.000	0.98			104.0	SURCHARGED	
1.008	SW4	0.086	0.000	1.04			110.8	SURCHARGED	
1.009	SW3	0.078	0.000	1.21			115.8	SURCHARGED	
1.010	13	0.162	0.000	1.07			114.6	SURCHARGED	
2.000	14	-0.134	0.000	0.34			19.8	OK	
2.001	15	-0.090	0.000	0.66			41.5	OK	
2.002	16	0.031	0.000	0.95			59.3	SURCHARGED	
3.000	17	0.071	0.000	0.60			20.9	SURCHARGED	
2.003	17	0.127	0.000	1.19			76.0	SURCHARGED	
2.004	18	0.125	0.000	0.84			73.6	SURCHARGED	
1.011	13	0.134	0.000	2.08			162.1	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS East

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.012	13 720	Winter	30	+0%	30/120 Winter				80.131

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.012	13	0.101	0.000	0.02			3.0	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS East

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 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

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 FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	SW13	15 Winter	100	+40%	100/15 Summer			
1.001	SW12	15 Winter	100	+40%	100/15 Summer			
1.002	SW11	15 Winter	100	+40%	30/15 Summer			
1.003	SW10	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
1.004	SW9	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
1.005	SW8	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
1.006	SW7	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
1.007	SW6	15 Winter	100	+40%	30/15 Winter			
1.008	SW4	15 Winter	100	+40%	30/15 Summer			
1.009	SW3	15 Winter	100	+40%	30/15 Summer			
1.010	13	15 Winter	100	+40%	30/15 Summer			
2.000	14	15 Winter	100	+40%	100/15 Summer			
2.001	15	15 Winter	100	+40%	100/15 Summer			
2.002	16	15 Winter	100	+40%	30/15 Summer			
3.000	17	15 Winter	100	+40%	30/15 Summer			
2.003	17	15 Winter	100	+40%	30/15 Summer			
2.004	18	15 Winter	100	+40%	30/15 Summer			
1.011	13	1440 Winter	100	+40%	30/15 Summer			

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS East

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	Level Exceeded
1.000	SW13	83.324	1.024	0.000	0.21			8.6	FLOOD RISK	
1.001	SW12	83.312	1.202	0.000	0.52			22.6	FLOOD RISK	
1.002	SW11	83.287	1.427	0.000	0.94			40.2	FLOOD RISK	
1.003	SW10	83.091	1.426	1.745	1.08			48.7	FLOOD	4
1.004	SW9	82.722	1.372	9.619	1.70			81.6	FLOOD	4
1.005	SW8	82.280	1.350	0.630	1.54			94.0	FLOOD	3
1.006	SW7	82.006	1.194	5.876	2.18			134.6	FLOOD	4
1.007	SW6	81.618	0.946	0.000	1.31			138.1	FLOOD RISK	
1.008	SW4	81.487	0.917	0.000	1.46			156.1	SURCHARGED	
1.009	SW3	81.261	0.811	0.000	1.82			173.5	SURCHARGED	
1.010	13	81.005	0.760	0.000	1.53			164.3	SURCHARGED	
2.000	14	81.898	0.733	0.000	0.51			29.8	SURCHARGED	
2.001	15	81.857	0.862	0.000	0.90			56.4	FLOOD RISK	
2.002	16	81.530	0.940	0.000	1.34			83.7	FLOOD RISK	
3.000	17	80.855	0.615	0.000	0.98			34.2	FLOOD RISK	
2.003	17	80.779	0.629	0.000	1.79			114.4	SURCHARGED	
2.004	18	80.579	0.499	0.000	1.29			113.0	SURCHARGED	
1.011	13	80.532	0.484	0.000	0.30			23.0	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS East

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.012	13	1440 Winter	100	+40%	30/120 Winter				80.531

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.012	13	0.501	0.000	0.02			3.0	SURCHARGED	

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Time Area Diagram for SWS West

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.137	4-8	1.019	8-12	0.019

Total Area Contributing (ha) = 2.175

Total Pipe Volume (m^3) = 94.282

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for SWS West

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	38.900	0.519	75.0	0.104	5.00	3.0	0.600	o	225	Pipe/Conduit	
1.001	5.307	0.070	75.5	0.093	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	17.202	0.230	74.8	0.014	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	40.978	0.677	60.5	0.089	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	30.116	0.323	93.2	0.110	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	13.971	0.161	86.8	0.034	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.006	35.873	0.412	87.1	0.114	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.007	56.700	1.045	54.3	0.167	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.008	23.126	0.308	75.1	0.087	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	12.355	0.165	74.9	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.010	24.230	0.323	75.0	0.060	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.011	13.158	0.175	75.0	0.087	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.012	10.669	0.142	75.0	0.023	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.013	15.054	0.201	75.0	0.136	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.014	24.436	0.326	75.0	0.022	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.015	18.897	0.252	75.0	0.019	0.00	0.0	0.600	o	525	Pipe/Conduit	
2.000	19.396	0.129	150.4	0.063	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	26.341	0.155	169.9	0.045	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.002	38.685	0.635	60.9	0.080	0.00	0.0	0.600	o	225	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	5.43	81.075	0.104	3.0	0.0	0.0	1.51	60.1	17.1
1.001	50.00	5.49	80.556	0.197	3.0	0.0	0.0	1.51	59.9	29.7
1.002	50.00	5.68	80.486	0.211	3.0	0.0	0.0	1.51	60.2	31.6
1.003	50.00	6.08	80.256	0.300	3.0	0.0	0.0	1.68	67.0	43.6
1.004	50.00	6.35	79.429	0.410	3.0	0.0	0.0	1.88	207.3	58.6
1.005	50.00	6.47	79.106	0.444	3.0	0.0	0.0	1.95	214.9	63.1
1.006	50.00	6.78	78.945	0.558	3.0	0.0	0.0	1.94	214.6	78.6
1.007	50.00	7.16	78.533	0.725	3.0	0.0	0.0	2.46	272.2	101.2
1.008	50.00	7.32	77.413	0.813	3.0	0.0	0.0	2.35	373.5	113.0
1.009	50.00	7.41	77.105	0.813	3.0	0.0	0.0	2.35	374.0	113.0
1.010	50.00	7.58	76.940	0.872	3.0	0.0	0.0	2.35	373.7	121.1
1.011	50.00	7.68	76.617	0.959	3.0	0.0	0.0	2.35	373.7	132.9
1.012	50.00	7.75	76.366	0.983	3.0	0.0	0.0	2.59	560.4	136.1
1.013	50.00	7.84	76.224	1.118	3.0	0.0	0.0	2.59	560.4	154.4
1.014	50.00	8.00	75.935	1.140	3.0	0.0	0.0	2.59	560.4	157.4
1.015	50.00	8.12	75.609	1.159	3.0	0.0	0.0	2.59	560.4	160.0
2.000	50.00	5.30	79.326	0.063	0.0	0.0	0.0	1.06	42.3	8.6
2.001	50.00	5.74	79.197	0.109	0.0	0.0	0.0	1.00	39.8	14.7
2.002	50.00	6.13	78.967	0.188	0.0	0.0	0.0	1.68	66.7	25.5

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for SWS West

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
2.003	49.540	1.227	40.4	0.140	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.004	42.299	0.716	59.0	0.139	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.005	26.149	0.731	35.8	0.053	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.016	49.613	0.662	75.0	0.038	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.017	16.448	0.329	50.0	0.070	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.018	14.768	0.295	50.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
3.000	18.112	0.121	150.0	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	14.655	0.099	148.7	0.031	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	17.519	0.137	127.7	0.012	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.003	30.857	0.379	81.3	0.059	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.004	40.774	0.635	64.2	0.113	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.005	23.916	0.518	46.2	0.033	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.006	28.899	1.237	23.4	0.072	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.007	16.156	1.306	12.4	0.035	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.019	6.729	0.135	50.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.020	9.377	0.188	49.9	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.021	12.557	0.050	251.1	0.000	0.00	0.0	0.600	o	600	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)
2.003	50.00	6.53	78.332	0.329	0.0	0.0	0.0	2.07	82.1	44.5
2.004	50.00	6.87	77.030	0.467	0.0	0.0	0.0	2.05	144.9	63.3
2.005	50.00	7.01	76.238	0.520	0.0	0.0	0.0	3.04	335.5	70.4
1.016	50.00	8.44	75.358	1.718	3.0	0.0	0.0	2.59	560.4	235.6
1.017	50.00	8.52	74.696	1.788	3.0	0.0	0.0	3.45	975.3	245.1
1.018	50.00	8.59	74.367	1.788	3.0	0.0	0.0	3.45	975.3	245.1
3.000	50.00	5.37	79.846	0.032	0.0	0.0	0.0	0.82	14.5	4.3
3.001	50.00	5.67	79.726	0.063	0.0	0.0	0.0	0.82	14.5	8.5
3.002	50.00	6.00	79.627	0.075	0.0	0.0	0.0	0.89	15.7	10.1
3.003	50.00	6.35	79.415	0.134	0.0	0.0	0.0	1.45	57.7	18.1
3.004	50.00	6.77	79.035	0.247	0.0	0.0	0.0	1.63	65.0	33.4
3.005	50.00	6.97	78.401	0.279	0.0	0.0	0.0	1.93	76.7	37.8
3.006	50.00	7.15	77.883	0.352	0.0	0.0	0.0	2.72	108.1	47.6
3.007	50.00	7.22	76.646	0.387	0.0	0.0	0.0	3.74	148.7	52.4
1.019	50.00	8.62	74.072	2.175	3.0	0.0	0.0	3.45	975.3	297.5
1.020	50.00	8.67	73.938	2.175	3.0	0.0	0.0	3.45	976.5	297.5
1.021	50.00	8.81	73.200	2.175	3.0	0.0	0.0	1.53	433.2	297.5

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for SWS West

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
4.000	10.000	0.050	200.0	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.022	10.000	0.050	200.0	0.000	0.00	0.0	0.600	o	600	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)
4.000	50.00	5.18	75.000	0.000	0.0	0.0	0.0	0.92	36.6	0.0
1.022	50.00	8.90	73.150	2.175	3.0	0.0	0.0	1.72	485.8	297.5

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PIPELINE SCHEDULES for SWS West

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	SW40	82.549	81.075	1.249	Open Manhole	1350
1.001	o	225	SW39	82.118	80.556	1.337	Open Manhole	1350
1.002	o	225	SW38	82.031	80.486	1.320	Open Manhole	1350
1.003	o	225	SW37	81.750	80.256	1.269	Open Manhole	1350
1.004	o	375	SW36	81.129	79.429	1.325	Open Manhole	1350
1.005	o	375	SW35	80.781	79.106	1.300	Open Manhole	1350
1.006	o	375	SW34	80.911	78.945	1.591	Open Manhole	1350
1.007	o	375	SW33	80.646	78.533	1.738	Open Manhole	1350
1.008	o	450	SW32	79.547	77.413	1.684	Open Manhole	1350
1.009	o	450	SW31	79.049	77.105	1.494	Open Manhole	1350
1.010	o	450	SW30	78.909	76.940	1.519	Open Manhole	1350
1.011	o	450	SW29	79.080	76.617	2.014	Open Manhole	1350
1.012	o	525	SW28	79.316	76.366	2.424	Open Manhole	1500
1.013	o	525	SW27	79.431	76.224	2.682	Open Manhole	1500
1.014	o	525	SW26	79.373	75.935	2.913	Open Manhole	1500
1.015	o	525	SW25	78.784	75.609	2.650	Open Manhole	1350
2.000	o	225	SW46	80.676	79.326	1.125	Open Manhole	1350
2.001	o	225	SW45	80.900	79.197	1.478	Open Manhole	1200
2.002	o	225	SW44	80.539	78.967	1.347	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	38.900	75.0	SW39	82.118	80.556	1.337	Open Manhole	1350
1.001	5.307	75.5	SW38	82.031	80.486	1.320	Open Manhole	1350
1.002	17.202	74.8	SW37	81.750	80.256	1.269	Open Manhole	1350
1.003	40.978	60.5	SW36	81.129	79.579	1.325	Open Manhole	1350
1.004	30.116	93.2	SW35	80.781	79.106	1.300	Open Manhole	1350
1.005	13.971	86.8	SW34	80.911	78.945	1.591	Open Manhole	1350
1.006	35.873	87.1	SW33	80.646	78.533	1.738	Open Manhole	1350
1.007	56.700	54.3	SW32	79.547	77.488	1.684	Open Manhole	1350
1.008	23.126	75.1	SW31	79.049	77.105	1.494	Open Manhole	1350
1.009	12.355	74.9	SW30	78.909	76.940	1.519	Open Manhole	1350
1.010	24.230	75.0	SW29	79.080	76.617	2.014	Open Manhole	1350
1.011	13.158	75.0	SW28	79.316	76.441	2.424	Open Manhole	1500
1.012	10.669	75.0	SW27	79.431	76.224	2.682	Open Manhole	1500
1.013	15.054	75.0	SW26	79.373	76.023	2.825	Open Manhole	1500
1.014	24.436	75.0	SW25	78.784	75.609	2.650	Open Manhole	1350
1.015	18.897	75.0	SW24	78.232	75.358	2.350	Open Manhole	1500
2.000	19.396	150.4	SW45	80.900	79.197	1.478	Open Manhole	1200
2.001	26.341	169.9	SW44	80.539	79.042	1.272	Open Manhole	1350
2.002	38.685	60.9	SW43	79.757	78.332	1.200	Open Manhole	1350

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PIPELINE SCHEDULES for SWS West

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
2.003	o	225	SW43	79.757	78.332	1.200	Open Manhole	1350
2.004	o	300	SW42	78.639	77.030	1.309	Open Manhole	1350
2.005	o	375	SW41	77.923	76.238	1.309	Open Manhole	1350
1.016	o	525	SW24	78.232	75.358	2.350	Open Manhole	1500
1.017	o	600	SW23	76.873	74.696	1.576	Open Manhole	1350
1.018	o	600	SW22	76.892	74.367	1.924	Open Manhole	1350
3.000	o	150	SW55	81.196	79.846	1.200	Open Manhole	1350
3.001	o	150	SW54	81.172	79.726	1.296	Open Manhole	1350
3.002	o	150	SW52	81.032	79.627	1.255	Open Manhole	1350
3.003	o	225	SW51	80.841	79.415	1.201	Open Manhole	1350
3.004	o	225	SW50	80.461	79.035	1.200	Open Manhole	1350
3.005	o	225	SW49	79.826	78.401	1.200	Open Manhole	1350
3.006	o	225	SW48	79.308	77.883	1.200	Open Manhole	1350
3.007	o	225	SW47	78.071	76.646	1.200	Open Manhole	1350
1.019	o	600	SW21	77.268	74.072	2.596	Open Manhole	1500
1.020	o	600	SW20	77.250	73.938	2.712	Open Manhole	1350
1.021	o	600	36	77.250	73.200	3.450	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
2.003	49.540	40.4	SW42	78.639	77.105	1.309	Open Manhole	1350
2.004	42.299	59.0	SW41	77.923	76.313	1.309	Open Manhole	1350
2.005	26.149	35.8	SW24	78.232	75.508	2.350	Open Manhole	1500
1.016	49.613	75.0	SW23	76.873	74.696	1.652	Open Manhole	1350
1.017	16.448	50.0	SW22	76.892	74.367	1.924	Open Manhole	1350
1.018	14.768	50.0	SW21	77.268	74.072	2.596	Open Manhole	1500
3.000	18.112	150.0	SW54	81.172	79.726	1.296	Open Manhole	1350
3.001	14.655	148.7	SW52	81.032	79.627	1.255	Open Manhole	1350
3.002	17.519	127.7	SW51	80.841	79.490	1.201	Open Manhole	1350
3.003	30.857	81.3	SW50	80.461	79.035	1.200	Open Manhole	1350
3.004	40.774	64.2	SW49	79.826	78.401	1.200	Open Manhole	1350
3.005	23.916	46.2	SW48	79.308	77.883	1.200	Open Manhole	1350
3.006	28.899	23.4	SW47	78.071	76.646	1.200	Open Manhole	1350
3.007	16.156	12.4	SW21	77.268	75.340	1.703	Open Manhole	1500
1.019	6.729	50.0	SW20	77.250	73.938	2.712	Open Manhole	1350
1.020	9.377	49.9	36	77.250	73.750	2.900	Open Manhole	1500
1.021	12.557	251.1	37	77.250	73.150	3.500	Open Manhole	1500

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PIPELINE SCHEDULES for SWS West

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
4.000	o	225	37	77.250	75.000	2.025	Open Manhole	1200
1.022	o	600	37	77.250	73.150	3.500	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
4.000	10.000	200.0	37	77.250	74.950	2.075	Open Manhole	1500
1.022	10.000	200.0	SW19	75.630	73.100	1.930	Open Manhole	0

Free Flowing Outfall Details for SWS West

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.022	SW19	75.630	73.100	0.000	0	0

Simulation Criteria for SWS West

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Storm Duration (mins)	30
Ratio R	0.400		

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Online Controls for SWS West

Orifice Manhole: 37, DS/PN: 1.022, Volume (m³): 10.7

Diameter (m) 0.001 Discharge Coefficient 0.600 Invert Level (m) 73.150

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Storage Structures for SWS West

Infiltration Basin Manhole: 37, DS/PN: 1.022

Invert Level (m) 73.150 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00720 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.00720

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	50.0	0.700	165.0	1.400	315.0	2.100	575.0
0.100	65.0	0.800	185.0	1.500	340.0	2.200	625.0
0.200	80.0	0.900	205.0	1.600	365.0	2.300	675.0
0.300	95.0	1.000	225.0	1.700	390.0	2.400	2500.0
0.400	110.0	1.100	250.0	1.800	425.0	2.500	2500.0
0.500	125.0	1.200	270.0	1.900	475.0		
0.600	145.0	1.300	295.0	2.000	525.0		

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

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 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

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 FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW40	15 Winter	1	+0%	30/15 Summer	100/15 Summer			81.158
1.001	SW39	15 Winter	1	+0%	30/15 Summer	100/15 Summer			80.698
1.002	SW38	15 Winter	1	+0%	30/15 Summer				80.602
1.003	SW37	15 Winter	1	+0%	30/15 Summer	100/15 Summer			80.381
1.004	SW36	15 Winter	1	+0%	100/15 Summer				79.562
1.005	SW35	15 Winter	1	+0%	100/15 Summer				79.256
1.006	SW34	15 Winter	1	+0%	100/15 Summer				79.095
1.007	SW33	15 Winter	1	+0%	100/15 Summer				78.679
1.008	SW32	15 Winter	1	+0%	100/15 Summer				77.578
1.009	SW31	15 Winter	1	+0%	100/15 Summer				77.300
1.010	SW30	15 Winter	1	+0%	100/15 Summer				77.110
1.011	SW29	15 Winter	1	+0%	30/15 Summer				76.826
1.012	SW28	15 Winter	1	+0%	100/15 Summer				76.586
1.013	SW27	15 Winter	1	+0%	100/15 Summer				76.437
1.014	SW26	15 Winter	1	+0%	100/15 Summer				76.122

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW40	-0.142	0.000	0.29			16.3	OK	2
1.001	SW39	-0.083	0.000	0.72			26.7	OK	4
1.002	SW38	-0.109	0.000	0.53			28.2	OK	
1.003	SW37	-0.100	0.000	0.59			37.6	OK	2
1.004	SW36	-0.242	0.000	0.27			48.9	OK	
1.005	SW35	-0.225	0.000	0.34			52.7	OK	
1.006	SW34	-0.225	0.000	0.33			64.4	OK	
1.007	SW33	-0.229	0.000	0.32			80.9	OK	
1.008	SW32	-0.285	0.000	0.29			89.5	OK	
1.009	SW31	-0.255	0.000	0.39			89.2	OK	
1.010	SW30	-0.280	0.000	0.30			94.5	OK	
1.011	SW29	-0.241	0.000	0.44			102.8	OK	
1.012	SW28	-0.306	0.000	0.36			105.3	OK	
1.013	SW27	-0.313	0.000	0.34			117.5	OK	
1.014	SW26	-0.339	0.000	0.27			119.6	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.015	SW25	15 Winter	1	+0%	100/15 Summer			
2.000	SW46	15 Winter	1	+0%	100/15 Summer	100/15 Summer		
2.001	SW45	15 Winter	1	+0%	100/15 Summer			
2.002	SW44	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
2.003	SW43	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
2.004	SW42	15 Winter	1	+0%	100/15 Summer			
2.005	SW41	15 Winter	1	+0%	100/15 Summer			
1.016	SW24	10080 Summer	1	+0%	100/15 Summer			
1.017	SW23	10080 Summer	1	+0%	1/720 Winter			
1.018	SW22	10080 Summer	1	+0%	1/360 Summer	100/10080 Summer		
3.000	SW55	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
3.001	SW54	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
3.002	SW52	15 Winter	1	+0%	30/15 Summer			
3.003	SW51	15 Winter	1	+0%	100/15 Summer			
3.004	SW50	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
3.005	SW49	15 Winter	1	+0%	30/15 Summer			
3.006	SW48	15 Winter	1	+0%	100/15 Summer			
3.007	SW47	15 Winter	1	+0%	100/15 Summer			
1.019	SW21	10080 Summer	1	+0%	1/120 Winter			
1.020	SW20	10080 Summer	1	+0%	1/120 Summer			
1.021	36	10080 Summer	1	+0%	1/15 Summer			
4.000	37	10080 Summer	1	+0%	1/600 Winter			
1.022	37	10080 Summer	1	+0%	1/15 Summer			

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	Level Exceeded
1.015	SW25	75.811	-0.324	0.000	0.31			121.1	OK	
2.000	SW46	79.397	-0.154	0.000	0.21			8.1	OK	2
2.001	SW45	79.291	-0.131	0.000	0.36			13.3	OK	
2.002	SW44	79.058	-0.134	0.000	0.34			21.7	OK	1
2.003	SW43	78.440	-0.117	0.000	0.46			36.4	OK	4
2.004	SW42	77.158	-0.171	0.000	0.38			50.7	OK	
2.005	SW41	76.351	-0.263	0.000	0.19			56.3	OK	
1.016	SW24	75.610	-0.273	0.000	0.01			7.2	OK	
1.017	SW23	75.608	0.311	0.000	0.01			7.4	SURCHARGED	
1.018	SW22	75.607	0.640	0.000	0.01			7.4	SURCHARGED	
3.000	SW55	79.904	-0.093	0.000	0.30			4.1	OK	1
3.001	SW54	79.806	-0.069	0.000	0.56			7.5	OK	1
3.002	SW52	79.711	-0.066	0.000	0.59			8.7	OK	
3.003	SW51	79.496	-0.144	0.000	0.27			14.8	OK	
3.004	SW50	79.140	-0.121	0.000	0.43			26.5	OK	2
3.005	SW49	78.504	-0.122	0.000	0.43			30.0	OK	
3.006	SW48	77.979	-0.129	0.000	0.37			37.4	OK	
3.007	SW47	76.733	-0.138	0.000	0.31			41.1	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

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	Level Exceeded
1.019	SW21	75.606	0.934	0.000	0.02			8.3	SURCHARGED	
1.020	SW20	75.606	1.068	0.000	0.02			8.3	SURCHARGED	
1.021	36	75.606	1.806	0.000	0.03			8.3	SURCHARGED	
4.000	37	75.605	0.380	0.000	0.00			0.0	SURCHARGED	
1.022	37	75.605	1.855	0.000	0.00			0.0	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

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 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

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 FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW40	15 Winter	30	+0%	30/15 Summer	100/15 Summer			81.361
1.001	SW39	15 Winter	30	+0%	30/15 Summer	100/15 Summer			81.211
1.002	SW38	15 Winter	30	+0%	30/15 Summer				81.069
1.003	SW37	15 Winter	30	+0%	30/15 Summer	100/15 Summer			80.824
1.004	SW36	15 Winter	30	+0%	100/15 Summer				79.641
1.005	SW35	15 Winter	30	+0%	100/15 Summer				79.355
1.006	SW34	15 Winter	30	+0%	100/15 Summer				79.204
1.007	SW33	15 Winter	30	+0%	100/15 Summer				78.796
1.008	SW32	15 Winter	30	+0%	100/15 Summer				77.711
1.009	SW31	15 Winter	30	+0%	100/15 Summer				77.506
1.010	SW30	15 Winter	30	+0%	100/15 Summer				77.299
1.011	SW29	15 Winter	30	+0%	30/15 Summer				77.098
1.012	SW28	15 Winter	30	+0%	100/15 Summer				76.771
1.013	SW27	15 Winter	30	+0%	100/15 Summer				76.616
1.014	SW26	15 Winter	30	+0%	100/15 Summer				76.265
1.015	SW25	15 Winter	30	+0%	100/15 Summer				75.981
2.000	SW46	15 Winter	30	+0%	100/15 Summer	100/15 Summer			79.443
2.001	SW45	15 Winter	30	+0%	100/15 Summer				79.388

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW40	0.061	0.000	0.59			33.6	SURCHARGED	2
1.001	SW39	0.430	0.000	1.42			52.9	SURCHARGED	4
1.002	SW38	0.358	0.000	1.07			57.3	SURCHARGED	
1.003	SW37	0.343	0.000	1.22			77.7	SURCHARGED	2
1.004	SW36	-0.163	0.000	0.60			109.4	OK	
1.005	SW35	-0.126	0.000	0.76			120.1	OK	
1.006	SW34	-0.116	0.000	0.80			155.4	OK	
1.007	SW33	-0.112	0.000	0.82			207.1	OK	
1.008	SW32	-0.152	0.000	0.76			234.0	OK	
1.009	SW31	-0.049	0.000	1.00			228.9	OK	
1.010	SW30	-0.091	0.000	0.78			244.2	OK	
1.011	SW29	0.031	0.000	1.13			266.1	SURCHARGED	
1.012	SW28	-0.120	0.000	0.94			272.5	OK	
1.013	SW27	-0.133	0.000	0.89			304.4	OK	
1.014	SW26	-0.195	0.000	0.71			310.1	OK	
1.015	SW25	-0.154	0.000	0.81			310.8	OK	
2.000	SW46	-0.108	0.000	0.52			19.9	OK	2
2.001	SW45	-0.034	0.000	0.91			33.5	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
2.002	SW44	15 Winter	30	+0%	30/15 Summer	100/15 Winter		
2.003	SW43	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
2.004	SW42	15 Winter	30	+0%	100/15 Summer			
2.005	SW41	15 Winter	30	+0%	100/15 Summer			
1.016	SW24	15 Winter	30	+0%	100/15 Summer			
1.017	SW23	8640 Winter	30	+0%	1/720 Winter			
1.018	SW22	8640 Winter	30	+0%	1/360 Summer	100/10080 Summer		
3.000	SW55	15 Winter	30	+0%	30/15 Summer	100/15 Winter		
3.001	SW54	15 Winter	30	+0%	30/15 Summer	100/15 Winter		
3.002	SW52	15 Winter	30	+0%	30/15 Summer			
3.003	SW51	15 Winter	30	+0%	100/15 Summer			
3.004	SW50	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
3.005	SW49	15 Winter	30	+0%	30/15 Summer			
3.006	SW48	15 Winter	30	+0%	100/15 Summer			
3.007	SW47	15 Winter	30	+0%	100/15 Summer			
1.019	SW21	8640 Winter	30	+0%	1/120 Winter			
1.020	SW20	8640 Winter	30	+0%	1/120 Summer			
1.021	36	8640 Winter	30	+0%	1/15 Summer			
4.000	37	8640 Winter	30	+0%	1/600 Winter			
1.022	37	8640 Winter	30	+0%	1/15 Summer			

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	Level Exceeded
2.002	SW44	79.286	0.094	0.000	0.83			52.7	SURCHARGED	1
2.003	SW43	78.872	0.315	0.000	1.12			87.9	SURCHARGED	4
2.004	SW42	77.267	-0.063	0.000	0.96			129.5	OK	
2.005	SW41	76.429	-0.185	0.000	0.50			145.9	OK	
1.016	SW24	75.832	-0.051	0.000	0.89			444.3	OK	
1.017	SW23	75.813	0.516	0.000	0.02			9.5	SURCHARGED	
1.018	SW22	75.812	0.844	0.000	0.02			9.5	SURCHARGED	
3.000	SW55	80.085	0.088	0.000	0.66			8.9	SURCHARGED	1
3.001	SW54	80.034	0.158	0.000	1.23			16.5	SURCHARGED	1
3.002	SW52	79.879	0.102	0.000	1.33			19.4	SURCHARGED	
3.003	SW51	79.577	-0.063	0.000	0.67			36.3	OK	
3.004	SW50	79.414	0.154	0.000	1.07			66.0	SURCHARGED	2
3.005	SW49	78.681	0.055	0.000	1.06			74.5	SURCHARGED	
3.006	SW48	78.059	-0.049	0.000	0.95			95.6	OK	
3.007	SW47	76.802	-0.069	0.000	0.81			107.3	OK	
1.019	SW21	75.811	1.139	0.000	0.03			11.0	SURCHARGED	
1.020	SW20	75.811	1.273	0.000	0.03			11.0	SURCHARGED	
1.021	36	75.810	2.010	0.000	0.04			11.0	SURCHARGED	
4.000	37	75.809	0.584	0.000	0.00			0.0	SURCHARGED	
1.022	37	75.809	2.059	0.000	0.00		8448	0.0	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

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 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

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 FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 18.800 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 450.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW40	15 Winter	100	+40%	30/15 Summer	100/15 Summer			82.549
1.001	SW39	15 Winter	100	+40%	30/15 Summer	100/15 Summer			82.126
1.002	SW38	15 Winter	100	+40%	30/15 Summer				82.017
1.003	SW37	15 Winter	100	+40%	30/15 Summer	100/15 Summer			81.751
1.004	SW36	15 Winter	100	+40%	100/15 Summer				80.431
1.005	SW35	15 Winter	100	+40%	100/15 Summer				80.273
1.006	SW34	15 Winter	100	+40%	100/15 Summer				80.146
1.007	SW33	15 Winter	100	+40%	100/15 Summer				79.779
1.008	SW32	15 Winter	100	+40%	100/15 Summer				78.827
1.009	SW31	15 Winter	100	+40%	100/15 Summer				78.596
1.010	SW30	15 Winter	100	+40%	100/15 Summer				78.379
1.011	SW29	15 Winter	100	+40%	30/15 Summer				78.116
1.012	SW28	15 Winter	100	+40%	100/15 Summer				77.827
1.013	SW27	30 Winter	100	+40%	100/15 Summer				77.666
1.014	SW26	30 Winter	100	+40%	100/15 Summer				77.493

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW40	1.249	0.504	0.90			51.4	FLOOD	2
1.001	SW39	1.345	8.256	2.19			81.9	FLOOD	4
1.002	SW38	1.306	0.000	1.57			84.5	FLOOD RISK	
1.003	SW37	1.270	0.727	1.53			97.2	FLOOD	2
1.004	SW36	0.627	0.000	0.79			144.2	SURCHARGED	
1.005	SW35	0.792	0.000	0.95			148.9	SURCHARGED	
1.006	SW34	0.826	0.000	0.98			189.8	SURCHARGED	
1.007	SW33	0.871	0.000	1.03			262.2	SURCHARGED	
1.008	SW32	0.964	0.000	0.89			276.4	SURCHARGED	
1.009	SW31	1.041	0.000	1.16			265.8	SURCHARGED	
1.010	SW30	0.989	0.000	0.93			289.2	SURCHARGED	
1.011	SW29	1.049	0.000	1.39			328.3	SURCHARGED	
1.012	SW28	0.935	0.000	1.14			328.8	SURCHARGED	
1.013	SW27	0.917	0.000	1.03			353.4	SURCHARGED	
1.014	SW26	1.033	0.000	0.77			335.7	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.015	SW25	30 Winter	100	+40%	100/15 Summer			
2.000	SW46	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
2.001	SW45	15 Summer	100	+40%	100/15 Summer			
2.002	SW44	15 Winter	100	+40%	30/15 Summer	100/15 Winter		
2.003	SW43	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
2.004	SW42	30 Winter	100	+40%	100/15 Summer			
2.005	SW41	30 Winter	100	+40%	100/15 Summer			
1.016	SW24	30 Winter	100	+40%	100/15 Summer			
1.017	SW23	30 Winter	100	+40%	1/720 Winter			
1.018	SW22	30 Winter	100	+40%	1/360 Summer	100/10080 Summer		
3.000	SW55	15 Winter	100	+40%	30/15 Summer	100/15 Winter		
3.001	SW54	15 Winter	100	+40%	30/15 Summer	100/15 Winter		
3.002	SW52	15 Winter	100	+40%	30/15 Summer			
3.003	SW51	15 Winter	100	+40%	100/15 Summer			
3.004	SW50	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
3.005	SW49	15 Winter	100	+40%	30/15 Summer			
3.006	SW48	15 Winter	100	+40%	100/15 Summer			
3.007	SW47	30 Winter	100	+40%	100/15 Summer			
1.019	SW21	7200 Winter	100	+40%	1/120 Winter			
1.020	SW20	7200 Winter	100	+40%	1/120 Summer			
1.021	36	7200 Winter	100	+40%	1/15 Summer			
4.000	37	7200 Winter	100	+40%	1/600 Winter			
1.022	37	7200 Winter	100	+40%	1/15 Summer			

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	Level Exceeded
1.015	SW25	77.318	1.184	0.000	0.88			337.3	SURCHARGED	
2.000	SW46	80.678	1.127	2.189	0.92			35.3	FLOOD	2
2.001	SW45	80.675	1.253	0.000	1.12			41.3	FLOOD RISK	
2.002	SW44	80.540	1.348	0.191	1.10			69.4	FLOOD	1
2.003	SW43	79.764	1.207	6.847	1.33			104.5	FLOOD	4
2.004	SW42	78.005	0.676	0.000	1.14			154.5	SURCHARGED	
2.005	SW41	77.313	0.700	0.000	0.59			171.4	SURCHARGED	
1.016	SW24	77.138	1.256	0.000	0.98			491.4	SURCHARGED	
1.017	SW23	76.537	1.241	0.000	0.89			510.1	FLOOD RISK	
1.018	SW22	76.306	1.339	0.000	0.93			508.2	SURCHARGED	
3.000	SW55	81.197	1.200	0.347	0.89			12.0	FLOOD	1
3.001	SW54	81.172	1.296	0.002	1.57			21.0	FLOOD	1
3.002	SW52	80.984	1.207	0.000	1.96			28.7	FLOOD RISK	
3.003	SW51	80.721	1.081	0.000	0.82			44.5	FLOOD RISK	
3.004	SW50	80.463	1.202	2.014	1.32			81.4	FLOOD	2
3.005	SW49	79.568	0.942	0.000	1.30			91.5	FLOOD RISK	
3.006	SW48	78.736	0.628	0.000	1.20			120.5	SURCHARGED	
3.007	SW47	77.020	0.149	0.000	0.94			124.2	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SWS West

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	Level Exceeded
1.019	SW21	76.197	1.525	0.000	0.05			18.9	SURCHARGED	
1.020	SW20	76.196	1.658	0.000	0.04			18.9	SURCHARGED	
1.021	36	76.196	2.396	0.000	0.06			18.9	SURCHARGED	
4.000	37	76.195	0.970	0.000	0.00			0.0	SURCHARGED	
1.022	37	76.195	2.445	0.000	0.00			0.0	SURCHARGED	

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Summary of Results for 30 year Return Period

Half Drain Time : 1010 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.153	0.153	0.1	6.1	O K
30 min Summer	80.187	0.187	0.1	8.2	O K
60 min Summer	80.222	0.222	0.1	10.3	O K
120 min Summer	80.256	0.256	0.1	12.3	O K
180 min Summer	80.277	0.277	0.1	13.6	O K
240 min Summer	80.290	0.290	0.1	14.4	O K
360 min Summer	80.305	0.305	0.1	15.3	O K
480 min Summer	80.310	0.310	0.1	15.6	O K
600 min Summer	80.310	0.310	0.1	15.6	O K
720 min Summer	80.309	0.309	0.1	15.5	O K
960 min Summer	80.301	0.301	0.1	15.1	O K
1440 min Summer	80.287	0.287	0.1	14.2	O K
2160 min Summer	80.267	0.267	0.1	13.0	O K
2880 min Summer	80.250	0.250	0.1	12.0	O K
4320 min Summer	80.223	0.223	0.1	10.4	O K
5760 min Summer	80.201	0.201	0.1	9.1	O K
7200 min Summer	80.184	0.184	0.1	8.0	O K
8640 min Summer	80.169	0.169	0.1	7.1	O K
10080 min Summer	80.157	0.157	0.1	6.4	O K
15 min Winter	80.153	0.153	0.1	6.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	78.227	0.0	19
30 min Summer	50.778	0.0	34
60 min Summer	31.575	0.0	64
120 min Summer	19.033	0.0	124
180 min Summer	14.171	0.0	182
240 min Summer	11.445	0.0	242
360 min Summer	8.360	0.0	362
480 min Summer	6.632	0.0	482
600 min Summer	5.523	0.0	600
720 min Summer	4.748	0.0	720
960 min Summer	3.732	0.0	878
1440 min Summer	2.654	0.0	1108
2160 min Summer	1.890	0.0	1488
2880 min Summer	1.492	0.0	1900
4320 min Summer	1.087	0.0	2684
5760 min Summer	0.878	0.0	3464
7200 min Summer	0.751	0.0	4248
8640 min Summer	0.665	0.0	5008
10080 min Summer	0.603	0.0	5744
15 min Winter	78.227	0.0	19

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	80.187	0.187	0.1	8.2	O K
60 min Winter	80.222	0.222	0.1	10.3	O K
120 min Winter	80.256	0.256	0.1	12.3	O K
180 min Winter	80.277	0.277	0.1	13.6	O K
240 min Winter	80.290	0.290	0.1	14.4	O K
360 min Winter	80.305	0.305	0.1	15.3	O K
480 min Winter	80.310	0.310	0.1	15.6	O K
600 min Winter	80.311	0.311	0.1	15.7	O K
720 min Winter	80.309	0.309	0.1	15.6	O K
960 min Winter	80.302	0.302	0.1	15.1	O K
1440 min Winter	80.284	0.284	0.1	14.0	O K
2160 min Winter	80.259	0.259	0.1	12.5	O K
2880 min Winter	80.236	0.236	0.1	11.1	O K
4320 min Winter	80.196	0.196	0.1	8.7	O K
5760 min Winter	80.164	0.164	0.1	6.8	O K
7200 min Winter	80.138	0.138	0.1	5.2	O K
8640 min Winter	80.119	0.119	0.1	4.1	O K
10080 min Winter	80.106	0.106	0.1	3.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	50.778	0.0	33
60 min Winter	31.575	0.0	62
120 min Winter	19.033	0.0	122
180 min Winter	14.171	0.0	180
240 min Winter	11.445	0.0	238
360 min Winter	8.360	0.0	356
480 min Winter	6.632	0.0	470
600 min Winter	5.523	0.0	584
720 min Winter	4.748	0.0	694
960 min Winter	3.732	0.0	912
1440 min Winter	2.654	0.0	1138
2160 min Winter	1.890	0.0	1580
2880 min Winter	1.492	0.0	2020
4320 min Winter	1.087	0.0	2852
5760 min Winter	0.878	0.0	3632
7200 min Winter	0.751	0.0	4328
8640 min Winter	0.665	0.0	5016
10080 min Winter	0.603	0.0	5640

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.041

Time (mins) From:	To:	Area (ha)
0	4	0.041

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	6.5
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	56.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 1954 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.246	0.246	0.1	11.7	O K
30 min Summer	80.311	0.311	0.1	15.7	O K
60 min Summer	80.378	0.378	0.1	19.7	O K
120 min Summer	80.434	0.434	0.1	23.1	O K
180 min Summer	80.472	0.472	0.1	25.4	O K
240 min Summer	80.498	0.498	0.1	27.0	O K
360 min Summer	80.528	0.528	0.1	28.8	O K
480 min Summer	80.544	0.544	0.1	29.7	O K
600 min Summer	80.552	0.552	0.1	30.2	O K
720 min Summer	80.556	0.556	0.1	30.5	O K
960 min Summer	80.555	0.555	0.1	30.4	O K
1440 min Summer	80.537	0.537	0.1	29.4	O K
2160 min Summer	80.503	0.503	0.1	27.3	O K
2880 min Summer	80.476	0.476	0.1	25.7	O K
4320 min Summer	80.438	0.438	0.1	23.3	O K
5760 min Summer	80.408	0.408	0.1	21.6	O K
7200 min Summer	80.385	0.385	0.1	20.1	O K
8640 min Summer	80.365	0.365	0.1	18.9	O K
10080 min Summer	80.348	0.348	0.1	17.9	O K
15 min Winter	80.246	0.246	0.1	11.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	34
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	124
180 min Summer	24.955	0.0	184
240 min Summer	20.058	0.0	244
360 min Summer	14.577	0.0	362
480 min Summer	11.540	0.0	482
600 min Summer	9.595	0.0	602
720 min Summer	8.236	0.0	722
960 min Summer	6.452	0.0	962
1440 min Summer	4.554	0.0	1440
2160 min Summer	3.212	0.0	1812
2880 min Summer	2.516	0.0	2160
4320 min Summer	1.807	0.0	2940
5760 min Summer	1.444	0.0	3752
7200 min Summer	1.223	0.0	4544
8640 min Summer	1.075	0.0	5368
10080 min Summer	0.968	0.0	6160
15 min Winter	139.299	0.0	19

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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
30 min Winter	80.311	0.311	0.1	15.7	O K
60 min Winter	80.378	0.378	0.1	19.7	O K
120 min Winter	80.435	0.435	0.1	23.1	O K
180 min Winter	80.472	0.472	0.1	25.4	O K
240 min Winter	80.498	0.498	0.1	27.0	O K
360 min Winter	80.528	0.528	0.1	28.8	O K
480 min Winter	80.544	0.544	0.1	29.8	O K
600 min Winter	80.553	0.553	0.1	30.3	O K
720 min Winter	80.557	0.557	0.1	30.5	O K
960 min Winter	80.557	0.557	0.1	30.5	O K
1440 min Winter	80.541	0.541	0.1	29.6	O K
2160 min Winter	80.504	0.504	0.1	27.3	O K
2880 min Winter	80.472	0.472	0.1	25.4	O K
4320 min Winter	80.421	0.421	0.1	22.4	O K
5760 min Winter	80.378	0.378	0.1	19.7	O K
7200 min Winter	80.341	0.341	0.1	17.5	O K
8640 min Winter	80.308	0.308	0.1	15.5	O K
10080 min Winter	80.279	0.279	0.1	13.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	34
60 min Winter	57.252	0.0	64
120 min Winter	33.814	0.0	122
180 min Winter	24.955	0.0	182
240 min Winter	20.058	0.0	240
360 min Winter	14.577	0.0	358
480 min Winter	11.540	0.0	476
600 min Winter	9.595	0.0	592
720 min Winter	8.236	0.0	708
960 min Winter	6.452	0.0	936
1440 min Winter	4.554	0.0	1384
2160 min Winter	3.212	0.0	1992
2880 min Winter	2.516	0.0	2244
4320 min Winter	1.807	0.0	3152
5760 min Winter	1.444	0.0	4032
7200 min Winter	1.223	0.0	4896
8640 min Winter	1.075	0.0	5704
10080 min Winter	0.968	0.0	6464

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.041

Time (mins) From:	To:	Area (ha)
0	4	0.041

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	6.5
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	56.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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Summary of Results for 10 year Return Period

Half Drain Time : 1294 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.135	0.135	0.0	1.6	O K
30 min Summer	80.172	0.172	0.0	2.1	O K
60 min Summer	80.212	0.212	0.0	2.7	O K
120 min Summer	80.259	0.259	0.0	3.3	O K
180 min Summer	80.289	0.289	0.0	3.7	O K
240 min Summer	80.309	0.309	0.0	4.0	O K
360 min Summer	80.331	0.331	0.0	4.3	O K
480 min Summer	80.342	0.342	0.0	4.4	O K
600 min Summer	80.346	0.346	0.0	4.5	O K
720 min Summer	80.348	0.348	0.0	4.5	O K
960 min Summer	80.344	0.344	0.0	4.5	O K
1440 min Summer	80.329	0.329	0.0	4.3	O K
2160 min Summer	80.309	0.309	0.0	4.0	O K
2880 min Summer	80.293	0.293	0.0	3.8	O K
4320 min Summer	80.268	0.268	0.0	3.4	O K
5760 min Summer	80.249	0.249	0.0	3.2	O K
7200 min Summer	80.232	0.232	0.0	2.9	O K
8640 min Summer	80.218	0.218	0.0	2.7	O K
10080 min Summer	80.205	0.205	0.0	2.6	O K
15 min Winter	80.135	0.135	0.0	1.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	59.200	0.0	19
30 min Summer	38.000	0.0	34
60 min Summer	23.600	0.0	64
120 min Summer	14.703	0.0	124
180 min Summer	11.137	0.0	184
240 min Summer	9.082	0.0	242
360 min Summer	6.691	0.0	362
480 min Summer	5.344	0.0	482
600 min Summer	4.472	0.0	602
720 min Summer	3.858	0.0	722
960 min Summer	3.045	0.0	960
1440 min Summer	2.184	0.0	1224
2160 min Summer	1.571	0.0	1580
2880 min Summer	1.250	0.0	1988
4320 min Summer	0.921	0.0	2808
5760 min Summer	0.751	0.0	3632
7200 min Summer	0.646	0.0	4400
8640 min Summer	0.576	0.0	5192
10080 min Summer	0.525	0.0	6048
15 min Winter	59.200	0.0	19

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Summary of Results for 10 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	80.172	0.172	0.0	2.1	O K
60 min Winter	80.211	0.211	0.0	2.7	O K
120 min Winter	80.259	0.259	0.0	3.3	O K
180 min Winter	80.289	0.289	0.0	3.7	O K
240 min Winter	80.309	0.309	0.0	4.0	O K
360 min Winter	80.331	0.331	0.0	4.3	O K
480 min Winter	80.342	0.342	0.0	4.4	O K
600 min Winter	80.347	0.347	0.0	4.5	O K
720 min Winter	80.349	0.349	0.0	4.5	O K
960 min Winter	80.345	0.345	0.0	4.5	O K
1440 min Winter	80.330	0.330	0.0	4.3	O K
2160 min Winter	80.305	0.305	0.0	3.9	O K
2880 min Winter	80.283	0.283	0.0	3.6	O K
4320 min Winter	80.244	0.244	0.0	3.1	O K
5760 min Winter	80.211	0.211	0.0	2.7	O K
7200 min Winter	80.182	0.182	0.0	2.3	O K
8640 min Winter	80.158	0.158	0.0	1.9	O K
10080 min Winter	80.136	0.136	0.0	1.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	38.000	0.0	33
60 min Winter	23.600	0.0	62
120 min Winter	14.703	0.0	122
180 min Winter	11.137	0.0	180
240 min Winter	9.082	0.0	240
360 min Winter	6.691	0.0	356
480 min Winter	5.344	0.0	472
600 min Winter	4.472	0.0	588
720 min Winter	3.858	0.0	700
960 min Winter	3.045	0.0	924
1440 min Winter	2.184	0.0	1340
2160 min Winter	1.571	0.0	1648
2880 min Winter	1.250	0.0	2108
4320 min Winter	0.921	0.0	2984
5760 min Winter	0.751	0.0	3856
7200 min Winter	0.646	0.0	4680
8640 min Winter	0.576	0.0	5448
10080 min Winter	0.525	0.0	6160

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	10
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.014

Time (mins) From:	To:	Area (ha)
0	4	0.014

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	3.4
Membrane Percolation (mm/hr)	1000	Length (m)	13.4
Max Percolation (l/s)	12.7	Slope (1:X)	400.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 3342 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.339	0.339	0.0	4.1	O K
30 min Summer	80.443	0.443	0.0	5.5	O K
60 min Summer	80.550	0.550	0.0	6.9	O K
120 min Summer	80.643	0.643	0.0	8.1	O K
180 min Summer	80.705	0.705	0.0	8.9	O K
240 min Summer	80.749	0.749	0.0	9.5	O K
360 min Summer	80.804	0.804	0.0	10.2	O K
480 min Summer	80.836	0.836	0.0	10.6	O K
600 min Summer	80.856	0.856	0.0	10.9	O K
720 min Summer	80.869	0.869	0.0	11.1	O K
960 min Summer	80.881	0.881	0.0	11.2	O K
1440 min Summer	80.879	0.879	0.0	11.2	O K
2160 min Summer	80.851	0.851	0.0	10.8	O K
2880 min Summer	80.813	0.813	0.0	10.3	O K
4320 min Summer	80.758	0.758	0.0	9.6	O K
5760 min Summer	80.725	0.725	0.0	9.2	O K
7200 min Summer	80.703	0.703	0.0	8.9	O K
8640 min Summer	80.686	0.686	0.0	8.7	O K
10080 min Summer	80.674	0.674	0.0	8.5	O K
15 min Winter	80.339	0.339	0.0	4.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	34
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	124
180 min Summer	24.955	0.0	184
240 min Summer	20.058	0.0	244
360 min Summer	14.577	0.0	364
480 min Summer	11.540	0.0	484
600 min Summer	9.595	0.0	602
720 min Summer	8.236	0.0	722
960 min Summer	6.452	0.0	962
1440 min Summer	4.554	0.0	1442
2160 min Summer	3.212	0.0	2160
2880 min Summer	2.516	0.0	2792
4320 min Summer	1.807	0.0	3416
5760 min Summer	1.444	0.0	4152
7200 min Summer	1.223	0.0	4976
8640 min Summer	1.075	0.0	5800
10080 min Summer	0.968	0.0	6656
15 min Winter	139.299	0.0	19

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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
30 min Winter	80.443	0.443	0.0	5.5	O K
60 min Winter	80.550	0.550	0.0	6.9	O K
120 min Winter	80.643	0.643	0.0	8.1	O K
180 min Winter	80.705	0.705	0.0	8.9	O K
240 min Winter	80.750	0.750	0.0	9.5	O K
360 min Winter	80.805	0.805	0.0	10.2	O K
480 min Winter	80.837	0.837	0.0	10.6	O K
600 min Winter	80.857	0.857	0.0	10.9	O K
720 min Winter	80.870	0.870	0.0	11.1	O K
960 min Winter	80.883	0.883	0.0	11.3	O K
1440 min Winter	80.884	0.884	0.0	11.3	O K
2160 min Winter	80.858	0.858	0.0	10.9	O K
2880 min Winter	80.824	0.824	0.0	10.5	O K
4320 min Winter	80.759	0.759	0.0	9.6	O K
5760 min Winter	80.716	0.716	0.0	9.1	O K
7200 min Winter	80.681	0.681	0.0	8.6	O K
8640 min Winter	80.651	0.651	0.0	8.2	O K
10080 min Winter	80.624	0.624	0.0	7.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	34
60 min Winter	57.252	0.0	64
120 min Winter	33.814	0.0	122
180 min Winter	24.955	0.0	182
240 min Winter	20.058	0.0	242
360 min Winter	14.577	0.0	360
480 min Winter	11.540	0.0	478
600 min Winter	9.595	0.0	596
720 min Winter	8.236	0.0	714
960 min Winter	6.452	0.0	946
1440 min Winter	4.554	0.0	1412
2160 min Winter	3.212	0.0	2096
2880 min Winter	2.516	0.0	2740
4320 min Winter	1.807	0.0	3496
5760 min Winter	1.444	0.0	4384
7200 min Winter	1.223	0.0	5328
8640 min Winter	1.075	0.0	6224
10080 min Winter	0.968	0.0	7152

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.014

Time (mins) From:	To:	Area (ha)
0	4	0.014

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	3.4
Membrane Percolation (mm/hr)	1000	Length (m)	12.8
Max Percolation (l/s)	12.1	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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Summary of Results for 10 year Return Period

Half Drain Time : 1371 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.146	0.146	0.0	1.6	O K
30 min Summer	80.185	0.185	0.0	2.1	O K
60 min Summer	80.226	0.226	0.0	2.7	O K
120 min Summer	80.276	0.276	0.0	3.3	O K
180 min Summer	80.308	0.308	0.0	3.7	O K
240 min Summer	80.329	0.329	0.0	4.0	O K
360 min Summer	80.352	0.352	0.0	4.3	O K
480 min Summer	80.364	0.364	0.0	4.5	O K
600 min Summer	80.369	0.369	0.0	4.5	O K
720 min Summer	80.371	0.371	0.0	4.6	O K
960 min Summer	80.367	0.367	0.0	4.5	O K
1440 min Summer	80.352	0.352	0.0	4.3	O K
2160 min Summer	80.332	0.332	0.0	4.1	O K
2880 min Summer	80.315	0.315	0.0	3.8	O K
4320 min Summer	80.290	0.290	0.0	3.5	O K
5760 min Summer	80.271	0.271	0.0	3.3	O K
7200 min Summer	80.254	0.254	0.0	3.0	O K
8640 min Summer	80.240	0.240	0.0	2.9	O K
10080 min Summer	80.228	0.228	0.0	2.7	O K
15 min Winter	80.146	0.146	0.0	1.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	59.200	0.0	19
30 min Summer	38.000	0.0	34
60 min Summer	23.600	0.0	64
120 min Summer	14.703	0.0	124
180 min Summer	11.137	0.0	184
240 min Summer	9.082	0.0	242
360 min Summer	6.691	0.0	362
480 min Summer	5.344	0.0	482
600 min Summer	4.472	0.0	602
720 min Summer	3.858	0.0	722
960 min Summer	3.045	0.0	960
1440 min Summer	2.184	0.0	1252
2160 min Summer	1.571	0.0	1604
2880 min Summer	1.250	0.0	1992
4320 min Summer	0.921	0.0	2812
5760 min Summer	0.751	0.0	3640
7200 min Summer	0.646	0.0	4464
8640 min Summer	0.576	0.0	5272
10080 min Summer	0.525	0.0	6048
15 min Winter	59.200	0.0	19

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Summary of Results for 10 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	80.185	0.185	0.0	2.1	O K
60 min Winter	80.226	0.226	0.0	2.7	O K
120 min Winter	80.276	0.276	0.0	3.3	O K
180 min Winter	80.308	0.308	0.0	3.7	O K
240 min Winter	80.329	0.329	0.0	4.0	O K
360 min Winter	80.353	0.353	0.0	4.3	O K
480 min Winter	80.365	0.365	0.0	4.5	O K
600 min Winter	80.370	0.370	0.0	4.6	O K
720 min Winter	80.372	0.372	0.0	4.6	O K
960 min Winter	80.370	0.370	0.0	4.5	O K
1440 min Winter	80.354	0.354	0.0	4.3	O K
2160 min Winter	80.329	0.329	0.0	4.0	O K
2880 min Winter	80.306	0.306	0.0	3.7	O K
4320 min Winter	80.267	0.267	0.0	3.2	O K
5760 min Winter	80.234	0.234	0.0	2.8	O K
7200 min Winter	80.204	0.204	0.0	2.4	O K
8640 min Winter	80.179	0.179	0.0	2.1	O K
10080 min Winter	80.157	0.157	0.0	1.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	38.000	0.0	33
60 min Winter	23.600	0.0	62
120 min Winter	14.703	0.0	122
180 min Winter	11.137	0.0	180
240 min Winter	9.082	0.0	240
360 min Winter	6.691	0.0	356
480 min Winter	5.344	0.0	472
600 min Winter	4.472	0.0	588
720 min Winter	3.858	0.0	702
960 min Winter	3.045	0.0	926
1440 min Winter	2.184	0.0	1354
2160 min Winter	1.571	0.0	1668
2880 min Winter	1.250	0.0	2132
4320 min Winter	0.921	0.0	3024
5760 min Winter	0.751	0.0	3864
7200 min Winter	0.646	0.0	4688
8640 min Winter	0.576	0.0	5528
10080 min Winter	0.525	0.0	6256

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	10
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.014

Time (mins) From:	To:	Area (ha)
0	4	0.014

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	3.4
Membrane Percolation (mm/hr)	1000	Length (m)	12.8
Max Percolation (l/s)	12.1	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 3342 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.339	0.339	0.0	4.1	O K
30 min Summer	80.443	0.443	0.0	5.5	O K
60 min Summer	80.550	0.550	0.0	6.9	O K
120 min Summer	80.643	0.643	0.0	8.1	O K
180 min Summer	80.705	0.705	0.0	8.9	O K
240 min Summer	80.749	0.749	0.0	9.5	O K
360 min Summer	80.804	0.804	0.0	10.2	O K
480 min Summer	80.836	0.836	0.0	10.6	O K
600 min Summer	80.856	0.856	0.0	10.9	O K
720 min Summer	80.869	0.869	0.0	11.1	O K
960 min Summer	80.881	0.881	0.0	11.2	O K
1440 min Summer	80.879	0.879	0.0	11.2	O K
2160 min Summer	80.851	0.851	0.0	10.8	O K
2880 min Summer	80.813	0.813	0.0	10.3	O K
4320 min Summer	80.758	0.758	0.0	9.6	O K
5760 min Summer	80.725	0.725	0.0	9.2	O K
7200 min Summer	80.703	0.703	0.0	8.9	O K
8640 min Summer	80.686	0.686	0.0	8.7	O K
10080 min Summer	80.674	0.674	0.0	8.5	O K
15 min Winter	80.339	0.339	0.0	4.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	34
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	124
180 min Summer	24.955	0.0	184
240 min Summer	20.058	0.0	244
360 min Summer	14.577	0.0	364
480 min Summer	11.540	0.0	484
600 min Summer	9.595	0.0	602
720 min Summer	8.236	0.0	722
960 min Summer	6.452	0.0	962
1440 min Summer	4.554	0.0	1442
2160 min Summer	3.212	0.0	2160
2880 min Summer	2.516	0.0	2792
4320 min Summer	1.807	0.0	3416
5760 min Summer	1.444	0.0	4152
7200 min Summer	1.223	0.0	4976
8640 min Summer	1.075	0.0	5800
10080 min Summer	0.968	0.0	6656
15 min Winter	139.299	0.0	19

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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
30 min Winter	80.443	0.443	0.0	5.5	O K
60 min Winter	80.550	0.550	0.0	6.9	O K
120 min Winter	80.643	0.643	0.0	8.1	O K
180 min Winter	80.705	0.705	0.0	8.9	O K
240 min Winter	80.750	0.750	0.0	9.5	O K
360 min Winter	80.805	0.805	0.0	10.2	O K
480 min Winter	80.837	0.837	0.0	10.6	O K
600 min Winter	80.857	0.857	0.0	10.9	O K
720 min Winter	80.870	0.870	0.0	11.1	O K
960 min Winter	80.883	0.883	0.0	11.3	O K
1440 min Winter	80.884	0.884	0.0	11.3	O K
2160 min Winter	80.858	0.858	0.0	10.9	O K
2880 min Winter	80.824	0.824	0.0	10.5	O K
4320 min Winter	80.759	0.759	0.0	9.6	O K
5760 min Winter	80.716	0.716	0.0	9.1	O K
7200 min Winter	80.681	0.681	0.0	8.6	O K
8640 min Winter	80.651	0.651	0.0	8.2	O K
10080 min Winter	80.624	0.624	0.0	7.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	34
60 min Winter	57.252	0.0	64
120 min Winter	33.814	0.0	122
180 min Winter	24.955	0.0	182
240 min Winter	20.058	0.0	242
360 min Winter	14.577	0.0	360
480 min Winter	11.540	0.0	478
600 min Winter	9.595	0.0	596
720 min Winter	8.236	0.0	714
960 min Winter	6.452	0.0	946
1440 min Winter	4.554	0.0	1412
2160 min Winter	3.212	0.0	2096
2880 min Winter	2.516	0.0	2740
4320 min Winter	1.807	0.0	3496
5760 min Winter	1.444	0.0	4384
7200 min Winter	1.223	0.0	5328
8640 min Winter	1.075	0.0	6224
10080 min Winter	0.968	0.0	7152

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.014

Time (mins) From:	To:	Area (ha)
0	4	0.014

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	3.4
Membrane Percolation (mm/hr)	1000	Length (m)	12.8
Max Percolation (l/s)	12.1	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 1782 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	80.427	0.427	0.0	2.4	2.4	4.2	O K
30 min Summer	80.463	0.463	0.0	4.5	4.5	4.5	O K
60 min Summer	80.473	0.473	0.0	5.2	5.2	4.6	O K
120 min Summer	80.458	0.458	0.0	4.2	4.2	4.5	O K
180 min Summer	80.446	0.446	0.0	3.5	3.5	4.4	O K
240 min Summer	80.436	0.436	0.0	2.9	3.0	4.3	O K
360 min Summer	80.421	0.421	0.0	2.2	2.2	4.1	O K
480 min Summer	80.411	0.411	0.0	1.8	1.8	4.0	O K
600 min Summer	80.406	0.406	0.0	1.5	1.5	3.9	O K
720 min Summer	80.402	0.402	0.0	1.3	1.3	3.9	O K
960 min Summer	80.397	0.397	0.0	1.0	1.0	3.9	O K
1440 min Summer	80.388	0.388	0.0	0.7	0.7	3.8	O K
2160 min Summer	80.382	0.382	0.0	0.5	0.5	3.7	O K
2880 min Summer	80.378	0.378	0.0	0.4	0.4	3.7	O K
4320 min Summer	80.373	0.373	0.0	0.3	0.3	3.6	O K
5760 min Summer	80.371	0.371	0.0	0.2	0.2	3.6	O K
7200 min Summer	80.369	0.369	0.0	0.2	0.2	3.6	O K
8640 min Summer	80.367	0.367	0.0	0.1	0.2	3.6	O K
10080 min Summer	80.366	0.366	0.0	0.1	0.2	3.5	O K
15 min Winter	80.430	0.430	0.0	2.6	2.6	4.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	1.3	15
30 min Summer	91.544	0.0	2.9	21
60 min Summer	57.252	0.0	4.5	36
120 min Summer	33.814	0.0	5.9	66
180 min Summer	24.955	0.0	6.9	96
240 min Summer	20.058	0.0	7.6	124
360 min Summer	14.577	0.0	8.5	186
480 min Summer	11.540	0.0	9.0	246
600 min Summer	9.595	0.0	9.4	306
720 min Summer	8.236	0.0	9.7	366
960 min Summer	6.452	0.0	10.0	490
1440 min Summer	4.554	0.0	10.2	734
2160 min Summer	3.212	0.0	10.2	1100
2880 min Summer	2.516	0.0	10.0	1460
4320 min Summer	1.807	0.0	9.5	2176
5760 min Summer	1.444	0.0	9.1	2936
7200 min Summer	1.223	0.0	8.9	3608
8640 min Summer	1.075	0.0	8.7	4352
10080 min Summer	0.968	0.0	8.7	5128
15 min Winter	139.299	0.0	1.3	15

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	80.460	0.460	0.0	4.3	4.4	4.5	O K
60 min Winter	80.460	0.460	0.0	4.3	4.4	4.5	O K
120 min Winter	80.439	0.439	0.0	3.1	3.1	4.3	O K
180 min Winter	80.426	0.426	0.0	2.4	2.4	4.2	O K
240 min Winter	80.416	0.416	0.0	2.0	2.0	4.1	O K
360 min Winter	80.405	0.405	0.0	1.5	1.5	3.9	O K
480 min Winter	80.400	0.400	0.0	1.2	1.2	3.9	O K
600 min Winter	80.396	0.396	0.0	1.0	1.0	3.9	O K
720 min Winter	80.392	0.392	0.0	0.8	0.8	3.8	O K
960 min Winter	80.387	0.387	0.0	0.6	0.7	3.8	O K
1440 min Winter	80.381	0.381	0.0	0.4	0.5	3.7	O K
2160 min Winter	80.375	0.375	0.0	0.3	0.3	3.6	O K
2880 min Winter	80.372	0.372	0.0	0.2	0.3	3.6	O K
4320 min Winter	80.368	0.368	0.0	0.2	0.2	3.6	O K
5760 min Winter	80.366	0.366	0.0	0.1	0.2	3.5	O K
7200 min Winter	80.364	0.364	0.0	0.1	0.1	3.5	O K
8640 min Winter	80.363	0.363	0.0	0.1	0.1	3.5	O K
10080 min Winter	80.362	0.362	0.0	0.1	0.1	3.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	2.9	22
60 min Winter	57.252	0.0	4.5	38
120 min Winter	33.814	0.0	5.9	68
180 min Winter	24.955	0.0	6.9	96
240 min Winter	20.058	0.0	7.6	126
360 min Winter	14.577	0.0	8.5	184
480 min Winter	11.540	0.0	9.1	242
600 min Winter	9.595	0.0	9.4	304
720 min Winter	8.236	0.0	9.7	370
960 min Winter	6.452	0.0	10.0	482
1440 min Winter	4.554	0.0	10.3	732
2160 min Winter	3.212	0.0	10.3	1104
2880 min Winter	2.516	0.0	10.2	1492
4320 min Winter	1.807	0.0	9.7	2164
5760 min Winter	1.444	0.0	9.2	2872
7200 min Winter	1.223	0.0	8.9	3608
8640 min Winter	1.075	0.0	8.7	4256
10080 min Winter	0.968	0.0	8.5	5032

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.016

Time (mins) From:	To:	Area (ha)
0	4	0.016

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	3.2
Membrane Percolation (mm/hr)	1000	Length (m)	10.6
Max Percolation (l/s)	9.4	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

Orifice Overflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 80.350

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Summary of Results for 30 year Return Period

Half Drain Time : 1329 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	80.167	0.167	0.0	0.0	0.0	1.4	O K
30 min Summer	80.214	0.214	0.0	0.0	0.0	1.9	O K
60 min Summer	80.263	0.263	0.0	0.0	0.0	2.3	O K
120 min Summer	80.311	0.311	0.0	0.0	0.0	2.8	O K
180 min Summer	80.341	0.341	0.0	0.0	0.0	3.1	O K
240 min Summer	80.358	0.358	0.0	0.0	0.1	3.3	O K
360 min Summer	80.360	0.360	0.0	0.1	0.1	3.3	O K
480 min Summer	80.360	0.360	0.0	0.1	0.1	3.3	O K
600 min Summer	80.360	0.360	0.0	0.1	0.1	3.3	O K
720 min Summer	80.359	0.359	0.0	0.1	0.1	3.3	O K
960 min Summer	80.359	0.359	0.0	0.0	0.1	3.3	O K
1440 min Summer	80.357	0.357	0.0	0.0	0.0	3.2	O K
2160 min Summer	80.351	0.351	0.0	0.0	0.0	3.2	O K
2880 min Summer	80.331	0.331	0.0	0.0	0.0	3.0	O K
4320 min Summer	80.301	0.301	0.0	0.0	0.0	2.7	O K
5760 min Summer	80.277	0.277	0.0	0.0	0.0	2.5	O K
7200 min Summer	80.258	0.258	0.0	0.0	0.0	2.3	O K
8640 min Summer	80.241	0.241	0.0	0.0	0.0	2.1	O K
10080 min Summer	80.226	0.226	0.0	0.0	0.0	2.0	O K
15 min Winter	80.167	0.167	0.0	0.0	0.0	1.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	78.227	0.0	0.0	19
30 min Summer	50.778	0.0	0.0	34
60 min Summer	31.575	0.0	0.0	64
120 min Summer	19.033	0.0	0.0	124
180 min Summer	14.171	0.0	0.0	184
240 min Summer	11.445	0.0	0.1	240
360 min Summer	8.360	0.0	0.3	306
480 min Summer	6.632	0.0	0.4	364
600 min Summer	5.523	0.0	0.4	428
720 min Summer	4.748	0.0	0.4	504
960 min Summer	3.732	0.0	0.4	648
1440 min Summer	2.654	0.0	0.3	968
2160 min Summer	1.890	0.0	0.0	1600
2880 min Summer	1.492	0.0	0.0	2020
4320 min Summer	1.087	0.0	0.0	2852
5760 min Summer	0.878	0.0	0.0	3640
7200 min Summer	0.751	0.0	0.0	4464
8640 min Summer	0.665	0.0	0.0	5272
10080 min Summer	0.603	0.0	0.0	6048
15 min Winter	78.227	0.0	0.0	19

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	80.214	0.214	0.0	0.0	0.0	1.9	O K
60 min Winter	80.263	0.263	0.0	0.0	0.0	2.3	O K
120 min Winter	80.311	0.311	0.0	0.0	0.0	2.8	O K
180 min Winter	80.341	0.341	0.0	0.0	0.0	3.1	O K
240 min Winter	80.358	0.358	0.0	0.0	0.1	3.3	O K
360 min Winter	80.360	0.360	0.0	0.1	0.1	3.3	O K
480 min Winter	80.361	0.361	0.0	0.1	0.1	3.3	O K
600 min Winter	80.361	0.361	0.0	0.1	0.1	3.3	O K
720 min Winter	80.360	0.360	0.0	0.1	0.1	3.3	O K
960 min Winter	80.359	0.359	0.0	0.1	0.1	3.3	O K
1440 min Winter	80.357	0.357	0.0	0.0	0.1	3.2	O K
2160 min Winter	80.349	0.349	0.0	0.0	0.0	3.2	O K
2880 min Winter	80.323	0.323	0.0	0.0	0.0	2.9	O K
4320 min Winter	80.279	0.279	0.0	0.0	0.0	2.5	O K
5760 min Winter	80.241	0.241	0.0	0.0	0.0	2.1	O K
7200 min Winter	80.208	0.208	0.0	0.0	0.0	1.8	O K
8640 min Winter	80.180	0.180	0.0	0.0	0.0	1.5	O K
10080 min Winter	80.155	0.155	0.0	0.0	0.0	1.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
30 min Winter	50.778	0.0	0.0	33
60 min Winter	31.575	0.0	0.0	64
120 min Winter	19.033	0.0	0.0	122
180 min Winter	14.171	0.0	0.0	180
240 min Winter	11.445	0.0	0.1	234
360 min Winter	8.360	0.0	0.3	326
480 min Winter	6.632	0.0	0.4	366
600 min Winter	5.523	0.0	0.4	442
720 min Winter	4.748	0.0	0.5	522
960 min Winter	3.732	0.0	0.4	682
1440 min Winter	2.654	0.0	0.3	1022
2160 min Winter	1.890	0.0	0.0	1688
2880 min Winter	1.492	0.0	0.0	2136
4320 min Winter	1.087	0.0	0.0	3028
5760 min Winter	0.878	0.0	0.0	3872
7200 min Winter	0.751	0.0	0.0	4688
8640 min Winter	0.665	0.0	0.0	5528
10080 min Winter	0.603	0.0	0.0	6256

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.009

Time (mins) From:	To:	Area (ha)
0	4	0.009

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	2.5
Membrane Percolation (mm/hr)	1000	Length (m)	12.9
Max Percolation (l/s)	9.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

Orifice Overflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 80.350

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

Half Drain Time : 1614 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	80.295	0.295	0.0	0.0	0.0	2.6	O K
30 min Summer	80.376	0.376	0.0	0.3	0.3	3.4	O K
60 min Summer	80.393	0.393	0.0	0.9	0.9	3.6	O K
120 min Summer	80.400	0.400	0.0	1.2	1.2	3.7	O K
180 min Summer	80.400	0.400	0.0	1.2	1.2	3.7	O K
240 min Summer	80.399	0.399	0.0	1.1	1.1	3.7	O K
360 min Summer	80.396	0.396	0.0	0.9	1.0	3.6	O K
480 min Summer	80.392	0.392	0.0	0.8	0.8	3.6	O K
600 min Summer	80.389	0.389	0.0	0.7	0.7	3.6	O K
720 min Summer	80.386	0.386	0.0	0.6	0.6	3.5	O K
960 min Summer	80.383	0.383	0.0	0.5	0.5	3.5	O K
1440 min Summer	80.378	0.378	0.0	0.4	0.4	3.4	O K
2160 min Summer	80.373	0.373	0.0	0.2	0.3	3.4	O K
2880 min Summer	80.370	0.370	0.0	0.2	0.2	3.4	O K
4320 min Summer	80.366	0.366	0.0	0.1	0.1	3.3	O K
5760 min Summer	80.363	0.363	0.0	0.1	0.1	3.3	O K
7200 min Summer	80.361	0.361	0.0	0.1	0.1	3.3	O K
8640 min Summer	80.360	0.360	0.0	0.1	0.1	3.3	O K
10080 min Summer	80.359	0.359	0.0	0.1	0.1	3.3	O K
15 min Winter	80.294	0.294	0.0	0.0	0.0	2.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	0.0	19
30 min Summer	91.544	0.0	0.3	32
60 min Summer	57.252	0.0	1.1	44
120 min Summer	33.814	0.0	1.9	74
180 min Summer	24.955	0.0	2.4	106
240 min Summer	20.058	0.0	2.8	136
360 min Summer	14.577	0.0	3.3	196
480 min Summer	11.540	0.0	3.5	256
600 min Summer	9.595	0.0	3.7	314
720 min Summer	8.236	0.0	3.8	376
960 min Summer	6.452	0.0	3.8	494
1440 min Summer	4.554	0.0	3.8	736
2160 min Summer	3.212	0.0	3.4	1104
2880 min Summer	2.516	0.0	3.1	1472
4320 min Summer	1.807	0.0	2.6	2244
5760 min Summer	1.444	0.0	2.3	3000
7200 min Summer	1.223	0.0	2.1	3752
8640 min Summer	1.075	0.0	1.9	4496
10080 min Summer	0.968	0.0	1.8	5256
15 min Winter	139.299	0.0	0.0	19

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	80.376	0.376	0.0	0.3	0.3	3.4	O K
60 min Winter	80.396	0.396	0.0	1.0	1.0	3.6	O K
120 min Winter	80.399	0.399	0.0	1.1	1.1	3.7	O K
180 min Winter	80.397	0.397	0.0	1.0	1.0	3.6	O K
240 min Winter	80.394	0.394	0.0	0.9	0.9	3.6	O K
360 min Winter	80.389	0.389	0.0	0.7	0.7	3.6	O K
480 min Winter	80.385	0.385	0.0	0.6	0.6	3.5	O K
600 min Winter	80.382	0.382	0.0	0.5	0.5	3.5	O K
720 min Winter	80.380	0.380	0.0	0.4	0.4	3.5	O K
960 min Winter	80.376	0.376	0.0	0.3	0.4	3.4	O K
1440 min Winter	80.372	0.372	0.0	0.2	0.3	3.4	O K
2160 min Winter	80.368	0.368	0.0	0.2	0.2	3.4	O K
2880 min Winter	80.366	0.366	0.0	0.1	0.1	3.3	O K
4320 min Winter	80.362	0.362	0.0	0.1	0.1	3.3	O K
5760 min Winter	80.360	0.360	0.0	0.1	0.1	3.3	O K
7200 min Winter	80.359	0.359	0.0	0.0	0.1	3.3	O K
8640 min Winter	80.358	0.358	0.0	0.0	0.1	3.3	O K
10080 min Winter	80.357	0.357	0.0	0.0	0.1	3.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	0.3	32
60 min Winter	57.252	0.0	1.1	46
120 min Winter	33.814	0.0	1.9	78
180 min Winter	24.955	0.0	2.4	110
240 min Winter	20.058	0.0	2.8	142
360 min Winter	14.577	0.0	3.3	200
480 min Winter	11.540	0.0	3.5	262
600 min Winter	9.595	0.0	3.7	324
720 min Winter	8.236	0.0	3.8	384
960 min Winter	6.452	0.0	3.9	508
1440 min Winter	4.554	0.0	3.8	744
2160 min Winter	3.212	0.0	3.5	1116
2880 min Winter	2.516	0.0	3.2	1496
4320 min Winter	1.807	0.0	2.6	2292
5760 min Winter	1.444	0.0	2.2	3064
7200 min Winter	1.223	0.0	1.8	3888
8640 min Winter	1.075	0.0	1.5	4736
10080 min Winter	0.968	0.0	1.2	5632

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.009

Time (mins) From:	To:	Area (ha)
0	4	0.009

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	2.5
Membrane Percolation (mm/hr)	1000	Length (m)	12.9
Max Percolation (l/s)	9.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

Orifice Overflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 80.350

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Summary of Results for 30 year Return Period

Half Drain Time : 1362 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	80.162	0.162	0.0	0.0	0.0	1.4	O K
30 min Summer	80.209	0.209	0.0	0.0	0.0	1.9	O K
60 min Summer	80.257	0.257	0.0	0.0	0.0	2.3	O K
120 min Summer	80.305	0.305	0.0	0.0	0.0	2.8	O K
180 min Summer	80.336	0.336	0.0	0.0	0.0	3.1	O K
240 min Summer	80.356	0.356	0.0	0.0	0.0	3.3	O K
360 min Summer	80.359	0.359	0.0	0.1	0.1	3.3	O K
480 min Summer	80.359	0.359	0.0	0.1	0.1	3.3	O K
600 min Summer	80.359	0.359	0.0	0.1	0.1	3.3	O K
720 min Summer	80.359	0.359	0.0	0.0	0.1	3.3	O K
960 min Summer	80.358	0.358	0.0	0.0	0.1	3.3	O K
1440 min Summer	80.356	0.356	0.0	0.0	0.0	3.3	O K
2160 min Summer	80.348	0.348	0.0	0.0	0.0	3.2	O K
2880 min Summer	80.328	0.328	0.0	0.0	0.0	3.0	O K
4320 min Summer	80.298	0.298	0.0	0.0	0.0	2.7	O K
5760 min Summer	80.274	0.274	0.0	0.0	0.0	2.5	O K
7200 min Summer	80.255	0.255	0.0	0.0	0.0	2.3	O K
8640 min Summer	80.238	0.238	0.0	0.0	0.0	2.2	O K
10080 min Summer	80.224	0.224	0.0	0.0	0.0	2.0	O K
15 min Winter	80.161	0.161	0.0	0.0	0.0	1.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	78.227	0.0	0.0	19
30 min Summer	50.778	0.0	0.0	34
60 min Summer	31.575	0.0	0.0	64
120 min Summer	19.033	0.0	0.0	124
180 min Summer	14.171	0.0	0.0	184
240 min Summer	11.445	0.0	0.0	242
360 min Summer	8.360	0.0	0.2	314
480 min Summer	6.632	0.0	0.3	376
600 min Summer	5.523	0.0	0.4	444
720 min Summer	4.748	0.0	0.4	512
960 min Summer	3.732	0.0	0.4	668
1440 min Summer	2.654	0.0	0.2	996
2160 min Summer	1.890	0.0	0.0	1640
2880 min Summer	1.492	0.0	0.0	2020
4320 min Summer	1.087	0.0	0.0	2852
5760 min Summer	0.878	0.0	0.0	3640
7200 min Summer	0.751	0.0	0.0	4464
8640 min Summer	0.665	0.0	0.0	5272
10080 min Summer	0.603	0.0	0.0	6048
15 min Winter	78.227	0.0	0.0	19

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	80.209	0.209	0.0	0.0	0.0	1.9	O K
60 min Winter	80.257	0.257	0.0	0.0	0.0	2.3	O K
120 min Winter	80.305	0.305	0.0	0.0	0.0	2.8	O K
180 min Winter	80.336	0.336	0.0	0.0	0.0	3.1	O K
240 min Winter	80.356	0.356	0.0	0.0	0.0	3.3	O K
360 min Winter	80.360	0.360	0.0	0.1	0.1	3.3	O K
480 min Winter	80.360	0.360	0.0	0.1	0.1	3.3	O K
600 min Winter	80.360	0.360	0.0	0.1	0.1	3.3	O K
720 min Winter	80.360	0.360	0.0	0.1	0.1	3.3	O K
960 min Winter	80.359	0.359	0.0	0.0	0.1	3.3	O K
1440 min Winter	80.357	0.357	0.0	0.0	0.0	3.3	O K
2160 min Winter	80.345	0.345	0.0	0.0	0.0	3.2	O K
2880 min Winter	80.319	0.319	0.0	0.0	0.0	2.9	O K
4320 min Winter	80.276	0.276	0.0	0.0	0.0	2.5	O K
5760 min Winter	80.238	0.238	0.0	0.0	0.0	2.1	O K
7200 min Winter	80.206	0.206	0.0	0.0	0.0	1.8	O K
8640 min Winter	80.178	0.178	0.0	0.0	0.0	1.6	O K
10080 min Winter	80.154	0.154	0.0	0.0	0.0	1.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
30 min Winter	50.778	0.0	0.0	33
60 min Winter	31.575	0.0	0.0	64
120 min Winter	19.033	0.0	0.0	122
180 min Winter	14.171	0.0	0.0	180
240 min Winter	11.445	0.0	0.0	238
360 min Winter	8.360	0.0	0.2	326
480 min Winter	6.632	0.0	0.3	376
600 min Winter	5.523	0.0	0.4	452
720 min Winter	4.748	0.0	0.4	528
960 min Winter	3.732	0.0	0.4	692
1440 min Winter	2.654	0.0	0.2	1048
2160 min Winter	1.890	0.0	0.0	1688
2880 min Winter	1.492	0.0	0.0	2136
4320 min Winter	1.087	0.0	0.0	3028
5760 min Winter	0.878	0.0	0.0	3872
7200 min Winter	0.751	0.0	0.0	4688
8640 min Winter	0.665	0.0	0.0	5528
10080 min Winter	0.603	0.0	0.0	6256

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.009

Time (mins) From:	To:	Area (ha)
0	4	0.009

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	2.5
Membrane Percolation (mm/hr)	1000	Length (m)	12.9
Max Percolation (l/s)	9.0	Slope (1:X)	400.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

Orifice Overflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 80.350

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

Half Drain Time : 1590 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	80.289	0.289	0.0	0.0	0.0	2.6	O K
30 min Summer	80.373	0.373	0.0	0.2	0.3	3.4	O K
60 min Summer	80.392	0.392	0.0	0.8	0.8	3.6	O K
120 min Summer	80.399	0.399	0.0	1.1	1.1	3.7	O K
180 min Summer	80.400	0.400	0.0	1.2	1.2	3.7	O K
240 min Summer	80.399	0.399	0.0	1.1	1.1	3.7	O K
360 min Summer	80.395	0.395	0.0	0.9	0.9	3.7	O K
480 min Summer	80.392	0.392	0.0	0.8	0.8	3.6	O K
600 min Summer	80.389	0.389	0.0	0.7	0.7	3.6	O K
720 min Summer	80.386	0.386	0.0	0.6	0.6	3.6	O K
960 min Summer	80.383	0.383	0.0	0.5	0.5	3.5	O K
1440 min Summer	80.377	0.377	0.0	0.4	0.4	3.5	O K
2160 min Summer	80.373	0.373	0.0	0.2	0.3	3.4	O K
2880 min Summer	80.370	0.370	0.0	0.2	0.2	3.4	O K
4320 min Summer	80.366	0.366	0.0	0.1	0.1	3.4	O K
5760 min Summer	80.363	0.363	0.0	0.1	0.1	3.4	O K
7200 min Summer	80.361	0.361	0.0	0.1	0.1	3.3	O K
8640 min Summer	80.360	0.360	0.0	0.1	0.1	3.3	O K
10080 min Summer	80.359	0.359	0.0	0.1	0.1	3.3	O K
15 min Winter	80.289	0.289	0.0	0.0	0.0	2.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	0.0	19
30 min Summer	91.544	0.0	0.2	32
60 min Summer	57.252	0.0	1.1	44
120 min Summer	33.814	0.0	1.9	74
180 min Summer	24.955	0.0	2.4	106
240 min Summer	20.058	0.0	2.8	136
360 min Summer	14.577	0.0	3.2	196
480 min Summer	11.540	0.0	3.5	256
600 min Summer	9.595	0.0	3.6	316
720 min Summer	8.236	0.0	3.7	376
960 min Summer	6.452	0.0	3.8	500
1440 min Summer	4.554	0.0	3.7	738
2160 min Summer	3.212	0.0	3.4	1104
2880 min Summer	2.516	0.0	3.1	1484
4320 min Summer	1.807	0.0	2.6	2244
5760 min Summer	1.444	0.0	2.3	3000
7200 min Summer	1.223	0.0	2.1	3752
8640 min Summer	1.075	0.0	1.9	4504
10080 min Summer	0.968	0.0	1.8	5296
15 min Winter	139.299	0.0	0.0	19

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	80.373	0.373	0.0	0.3	0.3	3.5	O K
60 min Winter	80.395	0.395	0.0	0.9	0.9	3.7	O K
120 min Winter	80.398	0.398	0.0	1.1	1.1	3.7	O K
180 min Winter	80.397	0.397	0.0	1.0	1.0	3.7	O K
240 min Winter	80.394	0.394	0.0	0.9	0.9	3.7	O K
360 min Winter	80.389	0.389	0.0	0.7	0.7	3.6	O K
480 min Winter	80.385	0.385	0.0	0.6	0.6	3.6	O K
600 min Winter	80.382	0.382	0.0	0.5	0.5	3.5	O K
720 min Winter	80.380	0.380	0.0	0.4	0.4	3.5	O K
960 min Winter	80.376	0.376	0.0	0.3	0.4	3.5	O K
1440 min Winter	80.372	0.372	0.0	0.2	0.3	3.4	O K
2160 min Winter	80.368	0.368	0.0	0.2	0.2	3.4	O K
2880 min Winter	80.366	0.366	0.0	0.1	0.1	3.4	O K
4320 min Winter	80.362	0.362	0.0	0.1	0.1	3.3	O K
5760 min Winter	80.360	0.360	0.0	0.1	0.1	3.3	O K
7200 min Winter	80.359	0.359	0.0	0.0	0.1	3.3	O K
8640 min Winter	80.358	0.358	0.0	0.0	0.1	3.3	O K
10080 min Winter	80.357	0.357	0.0	0.0	0.1	3.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	0.2	32
60 min Winter	57.252	0.0	1.1	46
120 min Winter	33.814	0.0	1.9	78
180 min Winter	24.955	0.0	2.4	110
240 min Winter	20.058	0.0	2.8	142
360 min Winter	14.577	0.0	3.2	202
480 min Winter	11.540	0.0	3.5	262
600 min Winter	9.595	0.0	3.6	324
720 min Winter	8.236	0.0	3.7	384
960 min Winter	6.452	0.0	3.8	508
1440 min Winter	4.554	0.0	3.8	760
2160 min Winter	3.212	0.0	3.5	1120
2880 min Winter	2.516	0.0	3.1	1500
4320 min Winter	1.807	0.0	2.6	2292
5760 min Winter	1.444	0.0	2.1	3064
7200 min Winter	1.223	0.0	1.8	3920
8640 min Winter	1.075	0.0	1.5	4736
10080 min Winter	0.968	0.0	1.2	5656

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.009

Time (mins) From:	To:	Area (ha)
0	4	0.009

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	2.5
Membrane Percolation (mm/hr)	1000	Length (m)	12.9
Max Percolation (l/s)	9.0	Slope (1:X)	400.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

Orifice Overflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 80.350

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

Half Drain Time : 2624 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	80.351	0.351	0.0	0.0	0.0	7.7	O K
30 min Summer	80.461	0.461	0.0	0.0	0.0	10.2	O K
60 min Summer	80.575	0.575	0.0	0.0	0.0	12.8	O K
120 min Summer	80.670	0.670	0.0	0.2	0.2	15.0	O K
180 min Summer	80.684	0.684	0.0	0.6	0.6	15.3	O K
240 min Summer	80.686	0.686	0.0	0.6	0.7	15.4	O K
360 min Summer	80.691	0.691	0.0	0.8	0.8	15.5	O K
480 min Summer	80.692	0.692	0.0	0.8	0.9	15.5	O K
600 min Summer	80.692	0.692	0.0	0.8	0.9	15.5	O K
720 min Summer	80.691	0.691	0.0	0.8	0.8	15.5	O K
960 min Summer	80.688	0.688	0.0	0.7	0.7	15.4	O K
1440 min Summer	80.684	0.684	0.0	0.5	0.6	15.3	O K
2160 min Summer	80.678	0.678	0.0	0.4	0.4	15.2	O K
2880 min Summer	80.674	0.674	0.0	0.3	0.3	15.1	O K
4320 min Summer	80.669	0.669	0.0	0.2	0.2	15.0	O K
5760 min Summer	80.666	0.666	0.0	0.1	0.2	14.9	O K
7200 min Summer	80.664	0.664	0.0	0.1	0.1	14.9	O K
8640 min Summer	80.662	0.662	0.0	0.1	0.1	14.8	O K
10080 min Summer	80.661	0.661	0.0	0.1	0.1	14.8	O K
15 min Winter	80.351	0.351	0.0	0.0	0.0	7.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	0.0	19
30 min Summer	91.544	0.0	0.0	34
60 min Summer	57.252	0.0	0.0	64
120 min Summer	33.814	0.0	0.3	122
180 min Summer	24.955	0.0	1.8	162
240 min Summer	20.058	0.0	2.9	184
360 min Summer	14.577	0.0	4.2	240
480 min Summer	11.540	0.0	5.0	304
600 min Summer	9.595	0.0	5.6	370
720 min Summer	8.236	0.0	5.9	436
960 min Summer	6.452	0.0	6.3	568
1440 min Summer	4.554	0.0	6.3	836
2160 min Summer	3.212	0.0	5.8	1252
2880 min Summer	2.516	0.0	5.1	1668
4320 min Summer	1.807	0.0	3.8	2508
5760 min Summer	1.444	0.0	3.0	3352
7200 min Summer	1.223	0.0	2.5	4248
8640 min Summer	1.075	0.0	2.2	5096
10080 min Summer	0.968	0.0	1.9	5944
15 min Winter	139.299	0.0	0.0	19

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	80.461	0.461	0.0	0.0	0.0	10.2	O K
60 min Winter	80.575	0.575	0.0	0.0	0.0	12.8	O K
120 min Winter	80.670	0.670	0.0	0.2	0.2	15.0	O K
180 min Winter	80.686	0.686	0.0	0.6	0.7	15.4	O K
240 min Winter	80.689	0.689	0.0	0.7	0.8	15.5	O K
360 min Winter	80.694	0.694	0.0	0.9	0.9	15.6	O K
480 min Winter	80.693	0.693	0.0	0.9	0.9	15.6	O K
600 min Winter	80.692	0.692	0.0	0.8	0.9	15.5	O K
720 min Winter	80.690	0.690	0.0	0.8	0.8	15.5	O K
960 min Winter	80.687	0.687	0.0	0.6	0.7	15.4	O K
1440 min Winter	80.682	0.682	0.0	0.5	0.5	15.3	O K
2160 min Winter	80.676	0.676	0.0	0.3	0.4	15.2	O K
2880 min Winter	80.672	0.672	0.0	0.2	0.3	15.1	O K
4320 min Winter	80.668	0.668	0.0	0.2	0.2	15.0	O K
5760 min Winter	80.664	0.664	0.0	0.1	0.2	14.9	O K
7200 min Winter	80.661	0.661	0.0	0.1	0.1	14.8	O K
8640 min Winter	80.659	0.659	0.0	0.1	0.1	14.8	O K
10080 min Winter	80.658	0.658	0.0	0.0	0.1	14.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	0.0	34
60 min Winter	57.252	0.0	0.0	64
120 min Winter	33.814	0.0	0.3	120
180 min Winter	24.955	0.0	1.8	168
240 min Winter	20.058	0.0	2.9	184
360 min Winter	14.577	0.0	4.3	252
480 min Winter	11.540	0.0	5.1	320
600 min Winter	9.595	0.0	5.6	390
720 min Winter	8.236	0.0	6.0	458
960 min Winter	6.452	0.0	6.3	596
1440 min Winter	4.554	0.0	6.5	878
2160 min Winter	3.212	0.0	6.0	1300
2880 min Winter	2.516	0.0	5.3	1756
4320 min Winter	1.807	0.0	3.9	2636
5760 min Winter	1.444	0.0	2.9	3576
7200 min Winter	1.223	0.0	2.1	4536
8640 min Winter	1.075	0.0	1.4	5528
10080 min Winter	0.968	0.0	0.9	6552

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.026

Time (mins) From:	To:	Area (ha)
0	4	0.026

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	6.7
Membrane Percolation (mm/hr)	1000	Length (m)	11.4
Max Percolation (l/s)	21.2	Slope (1:X)	400.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

Orifice Overflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 80.650

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Summary of Results for 30 year Return Period

Half Drain Time : 855 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.134	0.134	0.2	6.7	O K
30 min Summer	80.164	0.164	0.2	9.0	O K
60 min Summer	80.194	0.194	0.2	11.4	O K
120 min Summer	80.223	0.223	0.2	13.6	O K
180 min Summer	80.241	0.241	0.2	15.0	O K
240 min Summer	80.253	0.253	0.2	15.9	O K
360 min Summer	80.264	0.264	0.2	16.7	O K
480 min Summer	80.268	0.268	0.2	17.0	O K
600 min Summer	80.267	0.267	0.2	17.0	O K
720 min Summer	80.265	0.265	0.2	16.7	O K
960 min Summer	80.257	0.257	0.2	16.2	O K
1440 min Summer	80.244	0.244	0.2	15.2	O K
2160 min Summer	80.225	0.225	0.2	13.7	O K
2880 min Summer	80.209	0.209	0.2	12.5	O K
4320 min Summer	80.183	0.183	0.2	10.5	O K
5760 min Summer	80.162	0.162	0.2	8.9	O K
7200 min Summer	80.146	0.146	0.2	7.6	O K
8640 min Summer	80.132	0.132	0.2	6.6	O K
10080 min Summer	80.121	0.121	0.2	5.8	O K
15 min Winter	80.134	0.134	0.2	6.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	78.227	0.0	19
30 min Summer	50.778	0.0	34
60 min Summer	31.575	0.0	64
120 min Summer	19.033	0.0	124
180 min Summer	14.171	0.0	182
240 min Summer	11.445	0.0	242
360 min Summer	8.360	0.0	362
480 min Summer	6.632	0.0	482
600 min Summer	5.523	0.0	600
720 min Summer	4.748	0.0	718
960 min Summer	3.732	0.0	816
1440 min Summer	2.654	0.0	1052
2160 min Summer	1.890	0.0	1448
2880 min Summer	1.492	0.0	1848
4320 min Summer	1.087	0.0	2640
5760 min Summer	0.878	0.0	3408
7200 min Summer	0.751	0.0	4176
8640 min Summer	0.665	0.0	4848
10080 min Summer	0.603	0.0	5552
15 min Winter	78.227	0.0	19

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	80.164	0.164	0.2	9.0	O K
60 min Winter	80.194	0.194	0.2	11.4	O K
120 min Winter	80.223	0.223	0.2	13.6	O K
180 min Winter	80.241	0.241	0.2	15.0	O K
240 min Winter	80.253	0.253	0.2	15.9	O K
360 min Winter	80.264	0.264	0.2	16.7	O K
480 min Winter	80.268	0.268	0.2	17.0	O K
600 min Winter	80.268	0.268	0.2	17.0	O K
720 min Winter	80.265	0.265	0.2	16.8	O K
960 min Winter	80.257	0.257	0.2	16.2	O K
1440 min Winter	80.240	0.240	0.2	14.9	O K
2160 min Winter	80.216	0.216	0.2	13.0	O K
2880 min Winter	80.193	0.193	0.2	11.2	O K
4320 min Winter	80.155	0.155	0.2	8.3	O K
5760 min Winter	80.126	0.126	0.2	6.1	O K
7200 min Winter	80.105	0.105	0.2	4.5	O K
8640 min Winter	80.092	0.092	0.2	3.5	O K
10080 min Winter	80.085	0.085	0.2	3.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	50.778	0.0	33
60 min Winter	31.575	0.0	62
120 min Winter	19.033	0.0	122
180 min Winter	14.171	0.0	180
240 min Winter	11.445	0.0	238
360 min Winter	8.360	0.0	354
480 min Winter	6.632	0.0	468
600 min Winter	5.523	0.0	580
720 min Winter	4.748	0.0	690
960 min Winter	3.732	0.0	894
1440 min Winter	2.654	0.0	1098
2160 min Winter	1.890	0.0	1556
2880 min Winter	1.492	0.0	1988
4320 min Winter	1.087	0.0	2768
5760 min Winter	0.878	0.0	3520
7200 min Winter	0.751	0.0	4176
8640 min Winter	0.665	0.0	4760
10080 min Winter	0.603	0.0	5448

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.046

Time (mins) From:	To:	Area (ha)
0	4	0.046

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	9.2
Membrane Percolation (mm/hr)	1000	Length (m)	27.8
Max Percolation (l/s)	71.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 1680 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.216	0.216	0.2	13.0	O K
30 min Summer	80.273	0.273	0.2	17.4	O K
60 min Summer	80.332	0.332	0.2	21.9	O K
120 min Summer	80.381	0.381	0.2	25.7	O K
180 min Summer	80.414	0.414	0.2	28.2	O K
240 min Summer	80.436	0.436	0.2	29.9	O K
360 min Summer	80.461	0.461	0.2	31.8	O K
480 min Summer	80.474	0.474	0.2	32.8	O K
600 min Summer	80.480	0.480	0.2	33.2	O K
720 min Summer	80.481	0.481	0.2	33.4	O K
960 min Summer	80.478	0.478	0.2	33.1	O K
1440 min Summer	80.457	0.457	0.2	31.5	O K
2160 min Summer	80.426	0.426	0.2	29.1	O K
2880 min Summer	80.401	0.401	0.2	27.2	O K
4320 min Summer	80.364	0.364	0.2	24.4	O K
5760 min Summer	80.336	0.336	0.2	22.2	O K
7200 min Summer	80.312	0.312	0.2	20.4	O K
8640 min Summer	80.292	0.292	0.2	18.9	O K
10080 min Summer	80.275	0.275	0.2	17.6	O K
15 min Winter	80.216	0.216	0.2	13.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	34
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	124
180 min Summer	24.955	0.0	184
240 min Summer	20.058	0.0	244
360 min Summer	14.577	0.0	362
480 min Summer	11.540	0.0	482
600 min Summer	9.595	0.0	602
720 min Summer	8.236	0.0	722
960 min Summer	6.452	0.0	962
1440 min Summer	4.554	0.0	1400
2160 min Summer	3.212	0.0	1708
2880 min Summer	2.516	0.0	2072
4320 min Summer	1.807	0.0	2856
5760 min Summer	1.444	0.0	3688
7200 min Summer	1.223	0.0	4472
8640 min Summer	1.075	0.0	5280
10080 min Summer	0.968	0.0	6056
15 min Winter	139.299	0.0	19

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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
30 min Winter	80.273	0.273	0.2	17.4	O K
60 min Winter	80.332	0.332	0.2	21.9	O K
120 min Winter	80.382	0.382	0.2	25.7	O K
180 min Winter	80.414	0.414	0.2	28.2	O K
240 min Winter	80.436	0.436	0.2	29.9	O K
360 min Winter	80.462	0.462	0.2	31.9	O K
480 min Winter	80.474	0.474	0.2	32.8	O K
600 min Winter	80.480	0.480	0.2	33.3	O K
720 min Winter	80.483	0.483	0.2	33.5	O K
960 min Winter	80.480	0.480	0.2	33.3	O K
1440 min Winter	80.461	0.461	0.2	31.8	O K
2160 min Winter	80.424	0.424	0.2	29.0	O K
2880 min Winter	80.394	0.394	0.2	26.7	O K
4320 min Winter	80.344	0.344	0.2	22.9	O K
5760 min Winter	80.301	0.301	0.2	19.6	O K
7200 min Winter	80.265	0.265	0.2	16.8	O K
8640 min Winter	80.233	0.233	0.2	14.3	O K
10080 min Winter	80.206	0.206	0.2	12.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	34
60 min Winter	57.252	0.0	64
120 min Winter	33.814	0.0	122
180 min Winter	24.955	0.0	180
240 min Winter	20.058	0.0	240
360 min Winter	14.577	0.0	358
480 min Winter	11.540	0.0	474
600 min Winter	9.595	0.0	590
720 min Winter	8.236	0.0	706
960 min Winter	6.452	0.0	934
1440 min Winter	4.554	0.0	1370
2160 min Winter	3.212	0.0	1732
2880 min Winter	2.516	0.0	2164
4320 min Winter	1.807	0.0	3068
5760 min Winter	1.444	0.0	3928
7200 min Winter	1.223	0.0	4760
8640 min Winter	1.075	0.0	5536
10080 min Winter	0.968	0.0	6344

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.046

Time (mins) From:	To:	Area (ha)
0	4	0.046

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00468	Width (m)	9.2
Membrane Percolation (mm/hr)	1000	Length (m)	27.8
Max Percolation (l/s)	71.0	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 1099 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.331	0.331	0.1	7.0	O K
30 min Summer	80.431	0.431	0.1	9.3	O K
60 min Summer	80.532	0.532	0.1	11.6	O K
120 min Summer	80.614	0.614	0.1	13.4	O K
180 min Summer	80.665	0.665	0.1	14.6	O K
240 min Summer	80.698	0.698	0.1	15.3	O K
360 min Summer	80.731	0.731	0.1	16.1	O K
480 min Summer	80.741	0.741	0.1	16.3	O K
600 min Summer	80.739	0.739	0.1	16.3	O K
720 min Summer	80.731	0.731	0.1	16.1	O K
960 min Summer	80.702	0.702	0.1	15.4	O K
1440 min Summer	80.642	0.642	0.1	14.1	O K
2160 min Summer	80.574	0.574	0.1	12.5	O K
2880 min Summer	80.521	0.521	0.1	11.3	O K
4320 min Summer	80.440	0.440	0.1	9.5	O K
5760 min Summer	80.374	0.374	0.1	8.0	O K
7200 min Summer	80.319	0.319	0.1	6.8	O K
8640 min Summer	80.273	0.273	0.1	5.7	O K
10080 min Summer	80.234	0.234	0.1	4.9	O K
15 min Winter	80.331	0.331	0.1	7.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	34
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	124
180 min Summer	24.955	0.0	182
240 min Summer	20.058	0.0	242
360 min Summer	14.577	0.0	362
480 min Summer	11.540	0.0	482
600 min Summer	9.595	0.0	602
720 min Summer	8.236	0.0	720
960 min Summer	6.452	0.0	952
1440 min Summer	4.554	0.0	1142
2160 min Summer	3.212	0.0	1516
2880 min Summer	2.516	0.0	1928
4320 min Summer	1.807	0.0	2724
5760 min Summer	1.444	0.0	3512
7200 min Summer	1.223	0.0	4256
8640 min Summer	1.075	0.0	5016
10080 min Summer	0.968	0.0	5752
15 min Winter	139.299	0.0	19

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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
30 min Winter	80.431	0.431	0.1	9.3	O K
60 min Winter	80.532	0.532	0.1	11.6	O K
120 min Winter	80.614	0.614	0.1	13.4	O K
180 min Winter	80.666	0.666	0.1	14.6	O K
240 min Winter	80.699	0.699	0.1	15.4	O K
360 min Winter	80.733	0.733	0.1	16.1	O K
480 min Winter	80.744	0.744	0.1	16.4	O K
600 min Winter	80.744	0.744	0.1	16.4	O K
720 min Winter	80.736	0.736	0.1	16.2	O K
960 min Winter	80.710	0.710	0.1	15.6	O K
1440 min Winter	80.643	0.643	0.1	14.1	O K
2160 min Winter	80.560	0.560	0.1	12.2	O K
2880 min Winter	80.489	0.489	0.1	10.6	O K
4320 min Winter	80.370	0.370	0.1	7.9	O K
5760 min Winter	80.273	0.273	0.1	5.7	O K
7200 min Winter	80.195	0.195	0.1	4.0	O K
8640 min Winter	80.135	0.135	0.1	2.6	O K
10080 min Winter	80.090	0.090	0.1	1.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	33
60 min Winter	57.252	0.0	62
120 min Winter	33.814	0.0	122
180 min Winter	24.955	0.0	180
240 min Winter	20.058	0.0	240
360 min Winter	14.577	0.0	356
480 min Winter	11.540	0.0	472
600 min Winter	9.595	0.0	586
720 min Winter	8.236	0.0	700
960 min Winter	6.452	0.0	916
1440 min Winter	4.554	0.0	1170
2160 min Winter	3.212	0.0	1604
2880 min Winter	2.516	0.0	2048
4320 min Winter	1.807	0.0	2896
5760 min Winter	1.444	0.0	3688
7200 min Winter	1.223	0.0	4400
8640 min Winter	1.075	0.0	5096
10080 min Winter	0.968	0.0	5656

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.024

Time (mins) From:	To:	Area (ha)
0	4	0.024

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.01188	Width (m)	6.6
Membrane Percolation (mm/hr)	1000	Length (m)	11.4
Max Percolation (l/s)	20.9	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 379 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.294	0.294	1.3	27.8	O K
30 min Summer	80.357	0.357	1.3	36.9	O K
60 min Summer	80.417	0.417	1.3	45.6	O K
120 min Summer	80.458	0.458	1.3	51.5	O K
180 min Summer	80.479	0.479	1.3	54.5	O K
240 min Summer	80.488	0.488	1.3	55.8	O K
360 min Summer	80.485	0.485	1.3	55.3	O K
480 min Summer	80.475	0.475	1.3	53.8	O K
600 min Summer	80.462	0.462	1.3	52.1	O K
720 min Summer	80.449	0.449	1.3	50.2	O K
960 min Summer	80.423	0.423	1.3	46.4	O K
1440 min Summer	80.374	0.374	1.3	39.3	O K
2160 min Summer	80.312	0.312	1.3	30.5	O K
2880 min Summer	80.266	0.266	1.3	23.7	O K
4320 min Summer	80.207	0.207	1.3	15.3	O K
5760 min Summer	80.180	0.180	1.1	11.6	O K
7200 min Summer	80.161	0.161	1.0	9.3	O K
8640 min Summer	80.147	0.147	0.9	7.7	O K
10080 min Summer	80.136	0.136	0.9	6.6	O K
15 min Winter	80.294	0.294	1.3	27.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	21
30 min Summer	91.544	0.0	35
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	122
180 min Summer	24.955	0.0	182
240 min Summer	20.058	0.0	242
360 min Summer	14.577	0.0	338
480 min Summer	11.540	0.0	390
600 min Summer	9.595	0.0	450
720 min Summer	8.236	0.0	514
960 min Summer	6.452	0.0	646
1440 min Summer	4.554	0.0	912
2160 min Summer	3.212	0.0	1300
2880 min Summer	2.516	0.0	1668
4320 min Summer	1.807	0.0	2336
5760 min Summer	1.444	0.0	3056
7200 min Summer	1.223	0.0	3752
8640 min Summer	1.075	0.0	4496
10080 min Summer	0.968	0.0	5152
15 min Winter	139.299	0.0	21

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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
30 min Winter	80.357	0.357	1.3	36.9	O K
60 min Winter	80.417	0.417	1.3	45.6	O K
120 min Winter	80.459	0.459	1.3	51.5	O K
180 min Winter	80.480	0.480	1.3	54.6	O K
240 min Winter	80.489	0.489	1.3	55.9	O K
360 min Winter	80.487	0.487	1.3	55.6	O K
480 min Winter	80.472	0.472	1.3	53.5	O K
600 min Winter	80.458	0.458	1.3	51.4	O K
720 min Winter	80.441	0.441	1.3	49.1	O K
960 min Winter	80.407	0.407	1.3	44.1	O K
1440 min Winter	80.341	0.341	1.3	34.5	O K
2160 min Winter	80.260	0.260	1.3	22.9	O K
2880 min Winter	80.207	0.207	1.3	15.3	O K
4320 min Winter	80.163	0.163	1.0	9.4	O K
5760 min Winter	80.135	0.135	0.9	6.5	O K
7200 min Winter	80.117	0.117	0.7	4.8	O K
8640 min Winter	80.103	0.103	0.7	3.8	O K
10080 min Winter	80.093	0.093	0.6	3.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	34
60 min Winter	57.252	0.0	62
120 min Winter	33.814	0.0	120
180 min Winter	24.955	0.0	178
240 min Winter	20.058	0.0	234
360 min Winter	14.577	0.0	344
480 min Winter	11.540	0.0	404
600 min Winter	9.595	0.0	468
720 min Winter	8.236	0.0	542
960 min Winter	6.452	0.0	692
1440 min Winter	4.554	0.0	970
2160 min Winter	3.212	0.0	1344
2880 min Winter	2.516	0.0	1672
4320 min Winter	1.807	0.0	2376
5760 min Winter	1.444	0.0	3064
7200 min Winter	1.223	0.0	3752
8640 min Winter	1.075	0.0	4496
10080 min Winter	0.968	0.0	5240

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.100

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.080	4	8	0.020

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.01908	Width (m)	13.2
Membrane Percolation (mm/hr)	1000	Length (m)	36.4
Max Percolation (l/s)	133.5	Slope (1:X)	180.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 551 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.280	0.280	0.1	3.8	O K
30 min Summer	80.368	0.368	0.1	4.9	O K
60 min Summer	80.453	0.453	0.1	6.1	O K
120 min Summer	80.515	0.515	0.1	7.0	O K
180 min Summer	80.550	0.550	0.1	7.4	O K
240 min Summer	80.569	0.569	0.1	7.7	O K
360 min Summer	80.577	0.577	0.1	7.8	O K
480 min Summer	80.565	0.565	0.1	7.6	O K
600 min Summer	80.547	0.547	0.1	7.4	O K
720 min Summer	80.530	0.530	0.1	7.2	O K
960 min Summer	80.496	0.496	0.1	6.7	O K
1440 min Summer	80.435	0.435	0.1	5.9	O K
2160 min Summer	80.358	0.358	0.1	4.8	O K
2880 min Summer	80.294	0.294	0.1	3.9	O K
4320 min Summer	80.197	0.197	0.1	2.6	O K
5760 min Summer	80.131	0.131	0.1	1.7	O K
7200 min Summer	80.087	0.087	0.1	1.1	O K
8640 min Summer	80.061	0.061	0.1	0.8	O K
10080 min Summer	80.050	0.050	0.1	0.6	O K
15 min Winter	80.280	0.280	0.1	3.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	34
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	122
180 min Summer	24.955	0.0	182
240 min Summer	20.058	0.0	242
360 min Summer	14.577	0.0	360
480 min Summer	11.540	0.0	478
600 min Summer	9.595	0.0	520
720 min Summer	8.236	0.0	578
960 min Summer	6.452	0.0	696
1440 min Summer	4.554	0.0	966
2160 min Summer	3.212	0.0	1364
2880 min Summer	2.516	0.0	1756
4320 min Summer	1.807	0.0	2504
5760 min Summer	1.444	0.0	3176
7200 min Summer	1.223	0.0	3824
8640 min Summer	1.075	0.0	4496
10080 min Summer	0.968	0.0	5144
15 min Winter	139.299	0.0	19

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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
30 min Winter	80.368	0.368	0.1	4.9	O K
60 min Winter	80.453	0.453	0.1	6.1	O K
120 min Winter	80.516	0.516	0.1	7.0	O K
180 min Winter	80.552	0.552	0.1	7.5	O K
240 min Winter	80.571	0.571	0.1	7.7	O K
360 min Winter	80.580	0.580	0.1	7.8	O K
480 min Winter	80.570	0.570	0.1	7.7	O K
600 min Winter	80.551	0.551	0.1	7.4	O K
720 min Winter	80.529	0.529	0.1	7.1	O K
960 min Winter	80.489	0.489	0.1	6.6	O K
1440 min Winter	80.410	0.410	0.1	5.5	O K
2160 min Winter	80.303	0.303	0.1	4.1	O K
2880 min Winter	80.215	0.215	0.1	2.9	O K
4320 min Winter	80.094	0.094	0.1	1.2	O K
5760 min Winter	80.048	0.048	0.1	0.6	O K
7200 min Winter	80.041	0.041	0.1	0.5	O K
8640 min Winter	80.036	0.036	0.1	0.4	O K
10080 min Winter	80.032	0.032	0.1	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	33
60 min Winter	57.252	0.0	62
120 min Winter	33.814	0.0	120
180 min Winter	24.955	0.0	178
240 min Winter	20.058	0.0	236
360 min Winter	14.577	0.0	350
480 min Winter	11.540	0.0	460
600 min Winter	9.595	0.0	564
720 min Winter	8.236	0.0	592
960 min Winter	6.452	0.0	732
1440 min Winter	4.554	0.0	1026
2160 min Winter	3.212	0.0	1448
2880 min Winter	2.516	0.0	1820
4320 min Winter	1.807	0.0	2468
5760 min Winter	1.444	0.0	2944
7200 min Winter	1.223	0.0	3680
8640 min Winter	1.075	0.0	4416
10080 min Winter	0.968	0.0	5144

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.013

Time (mins) From:	To:	Area (ha)
0	4	0.013

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.01908	Width (m)	5.4
Membrane Percolation (mm/hr)	1000	Length (m)	8.4
Max Percolation (l/s)	12.6	Slope (1:X)	1000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 517 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.408	0.408	0.2	5.5	O K
30 min Summer	80.490	0.490	0.2	7.2	O K
60 min Summer	80.570	0.570	0.2	8.9	O K
120 min Summer	80.629	0.629	0.2	10.2	O K
180 min Summer	80.662	0.662	0.2	10.9	O K
240 min Summer	80.681	0.681	0.2	11.3	O K
360 min Summer	80.689	0.689	0.2	11.5	O K
480 min Summer	80.680	0.680	0.2	11.3	O K
600 min Summer	80.667	0.667	0.2	11.0	O K
720 min Summer	80.653	0.653	0.2	10.7	O K
960 min Summer	80.625	0.625	0.2	10.1	O K
1440 min Summer	80.571	0.571	0.2	8.9	O K
2160 min Summer	80.500	0.500	0.2	7.4	O K
2880 min Summer	80.443	0.443	0.2	6.2	O K
4320 min Summer	80.362	0.362	0.2	4.5	O K
5760 min Summer	80.310	0.310	0.2	3.4	O K
7200 min Summer	80.283	0.283	0.2	2.8	O K
8640 min Summer	80.261	0.261	0.2	2.4	O K
10080 min Summer	80.244	0.244	0.2	2.1	O K
15 min Winter	80.408	0.408	0.2	5.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	33
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	122
180 min Summer	24.955	0.0	182
240 min Summer	20.058	0.0	242
360 min Summer	14.577	0.0	360
480 min Summer	11.540	0.0	456
600 min Summer	9.595	0.0	504
720 min Summer	8.236	0.0	562
960 min Summer	6.452	0.0	684
1440 min Summer	4.554	0.0	952
2160 min Summer	3.212	0.0	1344
2880 min Summer	2.516	0.0	1732
4320 min Summer	1.807	0.0	2464
5760 min Summer	1.444	0.0	3120
7200 min Summer	1.223	0.0	3824
8640 min Summer	1.075	0.0	4576
10080 min Summer	0.968	0.0	5248
15 min Winter	139.299	0.0	19

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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
30 min Winter	80.490	0.490	0.2	7.2	O K
60 min Winter	80.570	0.570	0.2	8.9	O K
120 min Winter	80.629	0.629	0.2	10.2	O K
180 min Winter	80.663	0.663	0.2	10.9	O K
240 min Winter	80.681	0.681	0.2	11.3	O K
360 min Winter	80.691	0.691	0.2	11.5	O K
480 min Winter	80.682	0.682	0.2	11.3	O K
600 min Winter	80.666	0.666	0.2	11.0	O K
720 min Winter	80.649	0.649	0.2	10.6	O K
960 min Winter	80.615	0.615	0.2	9.9	O K
1440 min Winter	80.544	0.544	0.2	8.4	O K
2160 min Winter	80.449	0.449	0.2	6.3	O K
2880 min Winter	80.375	0.375	0.2	4.7	O K
4320 min Winter	80.290	0.290	0.2	2.9	O K
5760 min Winter	80.248	0.248	0.2	2.2	O K
7200 min Winter	80.218	0.218	0.1	1.7	O K
8640 min Winter	80.195	0.195	0.1	1.3	O K
10080 min Winter	80.178	0.178	0.1	1.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	33
60 min Winter	57.252	0.0	62
120 min Winter	33.814	0.0	120
180 min Winter	24.955	0.0	178
240 min Winter	20.058	0.0	236
360 min Winter	14.577	0.0	348
480 min Winter	11.540	0.0	458
600 min Winter	9.595	0.0	554
720 min Winter	8.236	0.0	574
960 min Winter	6.452	0.0	722
1440 min Winter	4.554	0.0	1012
2160 min Winter	3.212	0.0	1428
2880 min Winter	2.516	0.0	1792
4320 min Winter	1.807	0.0	2464
5760 min Winter	1.444	0.0	3176
7200 min Winter	1.223	0.0	3888
8640 min Winter	1.075	0.0	4584
10080 min Winter	0.968	0.0	5328

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.019

Time (mins) From:	To:	Area (ha)
0	4	0.019

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.01908	Width (m)	6.3
Membrane Percolation (mm/hr)	1000	Length (m)	11.3
Max Percolation (l/s)	19.8	Slope (1:X)	37.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 437 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.240	0.240	0.2	5.1	O K
30 min Summer	80.313	0.313	0.2	6.7	O K
60 min Summer	80.383	0.383	0.2	8.3	O K
120 min Summer	80.432	0.432	0.2	9.4	O K
180 min Summer	80.457	0.457	0.2	10.0	O K
240 min Summer	80.469	0.469	0.2	10.2	O K
360 min Summer	80.467	0.467	0.2	10.2	O K
480 min Summer	80.453	0.453	0.2	9.9	O K
600 min Summer	80.437	0.437	0.2	9.5	O K
720 min Summer	80.421	0.421	0.2	9.1	O K
960 min Summer	80.390	0.390	0.2	8.5	O K
1440 min Summer	80.334	0.334	0.2	7.2	O K
2160 min Summer	80.264	0.264	0.2	5.6	O K
2880 min Summer	80.207	0.207	0.2	4.4	O K
4320 min Summer	80.126	0.126	0.2	2.6	O K
5760 min Summer	80.077	0.077	0.2	1.5	O K
7200 min Summer	80.053	0.053	0.2	0.9	O K
8640 min Summer	80.046	0.046	0.2	0.8	O K
10080 min Summer	80.042	0.042	0.2	0.7	O K
15 min Winter	80.240	0.240	0.2	5.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	33
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	122
180 min Summer	24.955	0.0	182
240 min Summer	20.058	0.0	242
360 min Summer	14.577	0.0	360
480 min Summer	11.540	0.0	420
600 min Summer	9.595	0.0	478
720 min Summer	8.236	0.0	540
960 min Summer	6.452	0.0	666
1440 min Summer	4.554	0.0	936
2160 min Summer	3.212	0.0	1324
2880 min Summer	2.516	0.0	1704
4320 min Summer	1.807	0.0	2420
5760 min Summer	1.444	0.0	3064
7200 min Summer	1.223	0.0	3680
8640 min Summer	1.075	0.0	4408
10080 min Summer	0.968	0.0	5144
15 min Winter	139.299	0.0	18

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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
30 min Winter	80.313	0.313	0.2	6.7	O K
60 min Winter	80.384	0.384	0.2	8.3	O K
120 min Winter	80.433	0.433	0.2	9.4	O K
180 min Winter	80.459	0.459	0.2	10.0	O K
240 min Winter	80.471	0.471	0.2	10.3	O K
360 min Winter	80.471	0.471	0.2	10.3	O K
480 min Winter	80.456	0.456	0.2	9.9	O K
600 min Winter	80.436	0.436	0.2	9.5	O K
720 min Winter	80.417	0.417	0.2	9.1	O K
960 min Winter	80.378	0.378	0.2	8.2	O K
1440 min Winter	80.303	0.303	0.2	6.5	O K
2160 min Winter	80.205	0.205	0.2	4.3	O K
2880 min Winter	80.130	0.130	0.2	2.7	O K
4320 min Winter	80.051	0.051	0.2	0.9	O K
5760 min Winter	80.041	0.041	0.2	0.6	O K
7200 min Winter	80.034	0.034	0.1	0.5	O K
8640 min Winter	80.030	0.030	0.1	0.4	O K
10080 min Winter	80.027	0.027	0.1	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	33
60 min Winter	57.252	0.0	62
120 min Winter	33.814	0.0	120
180 min Winter	24.955	0.0	178
240 min Winter	20.058	0.0	236
360 min Winter	14.577	0.0	346
480 min Winter	11.540	0.0	452
600 min Winter	9.595	0.0	488
720 min Winter	8.236	0.0	558
960 min Winter	6.452	0.0	710
1440 min Winter	4.554	0.0	996
2160 min Winter	3.212	0.0	1404
2880 min Winter	2.516	0.0	1756
4320 min Winter	1.807	0.0	2252
5760 min Winter	1.444	0.0	2960
7200 min Winter	1.223	0.0	3680
8640 min Winter	1.075	0.0	4408
10080 min Winter	0.968	0.0	5136

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.018

Time (mins) From:	To:	Area (ha)
0	4	0.018

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.01908	Width (m)	6.9
Membrane Percolation (mm/hr)	1000	Length (m)	10.8
Max Percolation (l/s)	20.7	Slope (1:X)	470.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 446 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.308	0.308	0.1	2.6	O K
30 min Summer	80.381	0.381	0.1	3.4	O K
60 min Summer	80.450	0.450	0.1	4.2	O K
120 min Summer	80.500	0.500	0.1	4.7	O K
180 min Summer	80.526	0.526	0.1	5.0	O K
240 min Summer	80.538	0.538	0.1	5.2	O K
360 min Summer	80.539	0.539	0.1	5.2	O K
480 min Summer	80.526	0.526	0.1	5.0	O K
600 min Summer	80.512	0.512	0.1	4.9	O K
720 min Summer	80.498	0.498	0.1	4.7	O K
960 min Summer	80.469	0.469	0.1	4.4	O K
1440 min Summer	80.414	0.414	0.1	3.8	O K
2160 min Summer	80.346	0.346	0.1	3.0	O K
2880 min Summer	80.291	0.291	0.1	2.4	O K
4320 min Summer	80.215	0.215	0.1	1.5	O K
5760 min Summer	80.171	0.171	0.1	1.0	O K
7200 min Summer	80.151	0.151	0.1	0.8	O K
8640 min Summer	80.137	0.137	0.1	0.7	O K
10080 min Summer	80.127	0.127	0.1	0.6	O K
15 min Winter	80.308	0.308	0.1	2.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	33
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	122
180 min Summer	24.955	0.0	182
240 min Summer	20.058	0.0	242
360 min Summer	14.577	0.0	360
480 min Summer	11.540	0.0	418
600 min Summer	9.595	0.0	476
720 min Summer	8.236	0.0	536
960 min Summer	6.452	0.0	664
1440 min Summer	4.554	0.0	936
2160 min Summer	3.212	0.0	1320
2880 min Summer	2.516	0.0	1700
4320 min Summer	1.807	0.0	2416
5760 min Summer	1.444	0.0	3056
7200 min Summer	1.223	0.0	3752
8640 min Summer	1.075	0.0	4488
10080 min Summer	0.968	0.0	5152
15 min Winter	139.299	0.0	18

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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
30 min Winter	80.381	0.381	0.1	3.4	O K
60 min Winter	80.451	0.451	0.1	4.2	O K
120 min Winter	80.500	0.500	0.1	4.7	O K
180 min Winter	80.527	0.527	0.1	5.0	O K
240 min Winter	80.540	0.540	0.1	5.2	O K
360 min Winter	80.542	0.542	0.1	5.2	O K
480 min Winter	80.528	0.528	0.1	5.0	O K
600 min Winter	80.510	0.510	0.1	4.8	O K
720 min Winter	80.493	0.493	0.1	4.6	O K
960 min Winter	80.456	0.456	0.1	4.2	O K
1440 min Winter	80.383	0.383	0.1	3.4	O K
2160 min Winter	80.290	0.290	0.1	2.4	O K
2880 min Winter	80.220	0.220	0.1	1.6	O K
4320 min Winter	80.152	0.152	0.1	0.8	O K
5760 min Winter	80.126	0.126	0.1	0.6	O K
7200 min Winter	80.109	0.109	0.1	0.4	O K
8640 min Winter	80.096	0.096	0.1	0.3	O K
10080 min Winter	80.087	0.087	0.1	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	33
60 min Winter	57.252	0.0	62
120 min Winter	33.814	0.0	120
180 min Winter	24.955	0.0	178
240 min Winter	20.058	0.0	236
360 min Winter	14.577	0.0	346
480 min Winter	11.540	0.0	452
600 min Winter	9.595	0.0	488
720 min Winter	8.236	0.0	558
960 min Winter	6.452	0.0	710
1440 min Winter	4.554	0.0	996
2160 min Winter	3.212	0.0	1388
2880 min Winter	2.516	0.0	1732
4320 min Winter	1.807	0.0	2340
5760 min Winter	1.444	0.0	3056
7200 min Winter	1.223	0.0	3752
8640 min Winter	1.075	0.0	4488
10080 min Winter	0.968	0.0	5152

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.009

Time (mins) From:	To:	Area (ha)
0	4	0.009

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.01908	Width (m)	3.3
Membrane Percolation (mm/hr)	1000	Length (m)	11.4
Max Percolation (l/s)	10.5	Slope (1:X)	70.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 507 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.345	0.345	0.1	2.6	O K
30 min Summer	80.425	0.425	0.1	3.4	O K
60 min Summer	80.503	0.503	0.1	4.2	O K
120 min Summer	80.560	0.560	0.1	4.8	O K
180 min Summer	80.591	0.591	0.1	5.1	O K
240 min Summer	80.607	0.607	0.1	5.3	O K
360 min Summer	80.613	0.613	0.1	5.3	O K
480 min Summer	80.601	0.601	0.1	5.2	O K
600 min Summer	80.586	0.586	0.1	5.1	O K
720 min Summer	80.571	0.571	0.1	4.9	O K
960 min Summer	80.541	0.541	0.1	4.6	O K
1440 min Summer	80.484	0.484	0.1	4.0	O K
2160 min Summer	80.412	0.412	0.1	3.3	O K
2880 min Summer	80.354	0.354	0.1	2.7	O K
4320 min Summer	80.269	0.269	0.1	1.8	O K
5760 min Summer	80.215	0.215	0.1	1.2	O K
7200 min Summer	80.185	0.185	0.1	0.9	O K
8640 min Summer	80.170	0.170	0.1	0.8	O K
10080 min Summer	80.157	0.157	0.1	0.7	O K
15 min Winter	80.345	0.345	0.1	2.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	33
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	122
180 min Summer	24.955	0.0	182
240 min Summer	20.058	0.0	242
360 min Summer	14.577	0.0	360
480 min Summer	11.540	0.0	448
600 min Summer	9.595	0.0	500
720 min Summer	8.236	0.0	558
960 min Summer	6.452	0.0	682
1440 min Summer	4.554	0.0	950
2160 min Summer	3.212	0.0	1344
2880 min Summer	2.516	0.0	1728
4320 min Summer	1.807	0.0	2460
5760 min Summer	1.444	0.0	3120
7200 min Summer	1.223	0.0	3752
8640 min Summer	1.075	0.0	4496
10080 min Summer	0.968	0.0	5240
15 min Winter	139.299	0.0	19

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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
30 min Winter	80.425	0.425	0.1	3.4	O K
60 min Winter	80.503	0.503	0.1	4.2	O K
120 min Winter	80.560	0.560	0.1	4.8	O K
180 min Winter	80.592	0.592	0.1	5.1	O K
240 min Winter	80.609	0.609	0.1	5.3	O K
360 min Winter	80.615	0.615	0.1	5.4	O K
480 min Winter	80.604	0.604	0.1	5.2	O K
600 min Winter	80.586	0.586	0.1	5.1	O K
720 min Winter	80.568	0.568	0.1	4.9	O K
960 min Winter	80.531	0.531	0.1	4.5	O K
1440 min Winter	80.456	0.456	0.1	3.7	O K
2160 min Winter	80.358	0.358	0.1	2.7	O K
2880 min Winter	80.281	0.281	0.1	1.9	O K
4320 min Winter	80.188	0.188	0.1	1.0	O K
5760 min Winter	80.157	0.157	0.1	0.7	O K
7200 min Winter	80.136	0.136	0.1	0.5	O K
8640 min Winter	80.121	0.121	0.1	0.4	O K
10080 min Winter	80.110	0.110	0.1	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	33
60 min Winter	57.252	0.0	62
120 min Winter	33.814	0.0	120
180 min Winter	24.955	0.0	178
240 min Winter	20.058	0.0	236
360 min Winter	14.577	0.0	348
480 min Winter	11.540	0.0	456
600 min Winter	9.595	0.0	552
720 min Winter	8.236	0.0	572
960 min Winter	6.452	0.0	722
1440 min Winter	4.554	0.0	1012
2160 min Winter	3.212	0.0	1424
2880 min Winter	2.516	0.0	1788
4320 min Winter	1.807	0.0	2380
5760 min Winter	1.444	0.0	3112
7200 min Winter	1.223	0.0	3816
8640 min Winter	1.075	0.0	4496
10080 min Winter	0.968	0.0	5240

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.009

Time (mins) From:	To:	Area (ha)
0	4	0.009

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.01908	Width (m)	2.9
Membrane Percolation (mm/hr)	1000	Length (m)	11.8
Max Percolation (l/s)	9.5	Slope (1:X)	63.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 477 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.264	0.264	0.2	5.7	O K
30 min Summer	80.342	0.342	0.2	7.5	O K
60 min Summer	80.417	0.417	0.2	9.3	O K
120 min Summer	80.469	0.469	0.2	10.5	O K
180 min Summer	80.498	0.498	0.2	11.2	O K
240 min Summer	80.511	0.511	0.2	11.5	O K
360 min Summer	80.512	0.512	0.2	11.5	O K
480 min Summer	80.496	0.496	0.2	11.1	O K
600 min Summer	80.478	0.478	0.2	10.7	O K
720 min Summer	80.461	0.461	0.2	10.3	O K
960 min Summer	80.428	0.428	0.2	9.6	O K
1440 min Summer	80.371	0.371	0.2	8.2	O K
2160 min Summer	80.298	0.298	0.2	6.5	O K
2880 min Summer	80.238	0.238	0.2	5.1	O K
4320 min Summer	80.150	0.150	0.2	3.1	O K
5760 min Summer	80.094	0.094	0.2	1.8	O K
7200 min Summer	80.062	0.062	0.2	1.0	O K
8640 min Summer	80.049	0.049	0.2	0.7	O K
10080 min Summer	80.045	0.045	0.2	0.6	O K
15 min Winter	80.264	0.264	0.2	5.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	33
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	122
180 min Summer	24.955	0.0	182
240 min Summer	20.058	0.0	242
360 min Summer	14.577	0.0	360
480 min Summer	11.540	0.0	440
600 min Summer	9.595	0.0	494
720 min Summer	8.236	0.0	554
960 min Summer	6.452	0.0	676
1440 min Summer	4.554	0.0	940
2160 min Summer	3.212	0.0	1340
2880 min Summer	2.516	0.0	1728
4320 min Summer	1.807	0.0	2424
5760 min Summer	1.444	0.0	3112
7200 min Summer	1.223	0.0	3752
8640 min Summer	1.075	0.0	4408
10080 min Summer	0.968	0.0	5136
15 min Winter	139.299	0.0	19

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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
30 min Winter	80.342	0.342	0.2	7.5	O K
60 min Winter	80.417	0.417	0.2	9.3	O K
120 min Winter	80.470	0.470	0.2	10.5	O K
180 min Winter	80.499	0.499	0.2	11.2	O K
240 min Winter	80.513	0.513	0.2	11.5	O K
360 min Winter	80.516	0.516	0.2	11.6	O K
480 min Winter	80.501	0.501	0.2	11.2	O K
600 min Winter	80.479	0.479	0.2	10.7	O K
720 min Winter	80.459	0.459	0.2	10.3	O K
960 min Winter	80.419	0.419	0.2	9.3	O K
1440 min Winter	80.341	0.341	0.2	7.5	O K
2160 min Winter	80.240	0.240	0.2	5.2	O K
2880 min Winter	80.159	0.159	0.2	3.3	O K
4320 min Winter	80.061	0.061	0.2	1.0	O K
5760 min Winter	80.043	0.043	0.2	0.6	O K
7200 min Winter	80.037	0.037	0.2	0.4	O K
8640 min Winter	80.035	0.035	0.1	0.4	O K
10080 min Winter	80.033	0.033	0.1	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	33
60 min Winter	57.252	0.0	62
120 min Winter	33.814	0.0	120
180 min Winter	24.955	0.0	178
240 min Winter	20.058	0.0	236
360 min Winter	14.577	0.0	348
480 min Winter	11.540	0.0	456
600 min Winter	9.595	0.0	548
720 min Winter	8.236	0.0	568
960 min Winter	6.452	0.0	720
1440 min Winter	4.554	0.0	1010
2160 min Winter	3.212	0.0	1408
2880 min Winter	2.516	0.0	1784
4320 min Winter	1.807	0.0	2376
5760 min Winter	1.444	0.0	2944
7200 min Winter	1.223	0.0	3672
8640 min Winter	1.075	0.0	4304
10080 min Winter	0.968	0.0	5144

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.020

Time (mins) From:	To:	Area (ha)
0	4	0.020

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.01908	Width (m)	7.0
Membrane Percolation (mm/hr)	1000	Length (m)	11.1
Max Percolation (l/s)	21.6	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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Summary of Results for 30 year Return Period

Half Drain Time : 1073 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	80.096	0.096	0.0	0.1	0.1	8.4	O K
30 min Summer	80.119	0.119	0.0	0.2	0.2	11.6	O K
60 min Summer	80.142	0.142	0.0	0.2	0.2	14.8	O K
120 min Summer	80.164	0.164	0.0	0.2	0.2	18.0	O K
180 min Summer	80.178	0.178	0.0	0.2	0.2	19.9	O K
240 min Summer	80.187	0.187	0.0	0.2	0.2	21.2	O K
360 min Summer	80.197	0.197	0.0	0.2	0.2	22.6	O K
480 min Summer	80.201	0.201	0.0	0.2	0.2	23.2	O K
600 min Summer	80.202	0.202	0.0	0.2	0.2	23.3	O K
720 min Summer	80.201	0.201	0.0	0.2	0.2	23.2	O K
960 min Summer	80.198	0.198	0.0	0.2	0.2	22.8	O K
1440 min Summer	80.192	0.192	0.0	0.2	0.2	22.0	O K
2160 min Summer	80.184	0.184	0.0	0.2	0.2	20.7	O K
2880 min Summer	80.176	0.176	0.0	0.2	0.2	19.6	O K
4320 min Summer	80.163	0.163	0.0	0.2	0.2	17.9	O K
5760 min Summer	80.153	0.153	0.0	0.2	0.2	16.5	O K
7200 min Summer	80.145	0.145	0.0	0.2	0.2	15.3	O K
8640 min Summer	80.139	0.139	0.0	0.2	0.2	14.4	O K
10080 min Summer	80.133	0.133	0.0	0.2	0.2	13.7	O K
15 min Winter	80.096	0.096	0.0	0.1	0.1	8.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	78.227	0.0	8.4	23
30 min Summer	50.778	0.0	10.5	38
60 min Summer	31.575	0.0	15.2	68
120 min Summer	19.033	0.0	18.8	126
180 min Summer	14.171	0.0	21.2	186
240 min Summer	11.445	0.0	22.8	246
360 min Summer	8.360	0.0	24.4	364
480 min Summer	6.632	0.0	25.1	482
600 min Summer	5.523	0.0	25.5	602
720 min Summer	4.748	0.0	25.7	720
960 min Summer	3.732	0.0	25.7	842
1440 min Summer	2.654	0.0	25.1	1084
2160 min Summer	1.890	0.0	33.5	1476
2880 min Summer	1.492	0.0	34.8	1900
4320 min Summer	1.087	0.0	37.0	2724
5760 min Summer	0.878	0.0	39.1	3520
7200 min Summer	0.751	0.0	40.9	4320
8640 min Summer	0.665	0.0	42.7	5104
10080 min Summer	0.603	0.0	44.4	5856
15 min Winter	78.227	0.0	8.4	23

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	80.119	0.119	0.0	0.2	0.2	11.6	O K
60 min Winter	80.142	0.142	0.0	0.2	0.2	14.8	O K
120 min Winter	80.164	0.164	0.0	0.2	0.2	18.0	O K
180 min Winter	80.178	0.178	0.0	0.2	0.2	20.0	O K
240 min Winter	80.187	0.187	0.0	0.2	0.2	21.3	O K
360 min Winter	80.197	0.197	0.0	0.2	0.2	22.7	O K
480 min Winter	80.202	0.202	0.0	0.2	0.2	23.2	O K
600 min Winter	80.203	0.203	0.0	0.2	0.2	23.4	O K
720 min Winter	80.203	0.203	0.0	0.2	0.2	23.4	O K
960 min Winter	80.199	0.199	0.0	0.2	0.2	22.9	O K
1440 min Winter	80.192	0.192	0.0	0.2	0.2	21.9	O K
2160 min Winter	80.181	0.181	0.0	0.2	0.2	20.3	O K
2880 min Winter	80.170	0.170	0.0	0.2	0.2	18.8	O K
4320 min Winter	80.152	0.152	0.0	0.2	0.2	16.3	O K
5760 min Winter	80.138	0.138	0.0	0.2	0.2	14.3	O K
7200 min Winter	80.126	0.126	0.0	0.2	0.2	12.7	O K
8640 min Winter	80.117	0.117	0.0	0.2	0.2	11.4	O K
10080 min Winter	80.109	0.109	0.0	0.1	0.1	10.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	50.778	0.0	10.5	37
60 min Winter	31.575	0.0	15.2	66
120 min Winter	19.033	0.0	18.8	124
180 min Winter	14.171	0.0	21.2	182
240 min Winter	11.445	0.0	22.8	240
360 min Winter	8.360	0.0	24.4	356
480 min Winter	6.632	0.0	25.1	472
600 min Winter	5.523	0.0	25.5	584
720 min Winter	4.748	0.0	25.7	694
960 min Winter	3.732	0.0	25.7	904
1440 min Winter	2.654	0.0	25.1	1126
2160 min Winter	1.890	0.0	33.5	1580
2880 min Winter	1.492	0.0	34.9	2024
4320 min Winter	1.087	0.0	37.1	2900
5760 min Winter	0.878	0.0	39.2	3744
7200 min Winter	0.751	0.0	41.0	4544
8640 min Winter	0.665	0.0	42.8	5352
10080 min Winter	0.603	0.0	44.6	6144

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.062

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.030	4	8	0.030	8	12	0.002

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	13.0
Membrane Percolation (mm/hr)	1000	Length (m)	36.0
Max Percolation (l/s)	130.0	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.015 Discharge Coefficient 0.600 Invert Level (m) 80.000

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

Half Drain Time : 1567 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	80.156	0.156	0.0	0.2	0.2	16.9	O K
30 min Summer	80.199	0.199	0.0	0.2	0.2	22.9	O K
60 min Summer	80.242	0.242	0.0	0.2	0.2	29.0	O K
120 min Summer	80.279	0.279	0.0	0.2	0.2	34.1	O K
180 min Summer	80.303	0.303	0.0	0.3	0.3	37.5	O K
240 min Summer	80.319	0.319	0.0	0.3	0.3	39.8	O K
360 min Summer	80.338	0.338	0.0	0.3	0.3	42.4	O K
480 min Summer	80.347	0.347	0.0	0.3	0.3	43.7	O K
600 min Summer	80.352	0.352	0.0	0.3	0.3	44.3	O K
720 min Summer	80.353	0.353	0.0	0.3	0.3	44.5	O K
960 min Summer	80.351	0.351	0.0	0.3	0.3	44.2	O K
1440 min Summer	80.339	0.339	0.0	0.3	0.3	42.5	O K
2160 min Summer	80.323	0.323	0.0	0.3	0.3	40.4	O K
2880 min Summer	80.311	0.311	0.0	0.3	0.3	38.6	O K
4320 min Summer	80.290	0.290	0.0	0.2	0.2	35.7	O K
5760 min Summer	80.274	0.274	0.0	0.2	0.2	33.4	O K
7200 min Summer	80.261	0.261	0.0	0.2	0.2	31.6	O K
8640 min Summer	80.251	0.251	0.0	0.2	0.2	30.1	O K
10080 min Summer	80.242	0.242	0.0	0.2	0.2	28.9	O K
15 min Winter	80.156	0.156	0.0	0.2	0.2	16.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	12.7	24
30 min Summer	91.544	0.0	14.8	38
60 min Summer	57.252	0.0	27.7	68
120 min Summer	33.814	0.0	30.8	128
180 min Summer	24.955	0.0	32.8	186
240 min Summer	20.058	0.0	34.0	246
360 min Summer	14.577	0.0	35.5	366
480 min Summer	11.540	0.0	36.2	484
600 min Summer	9.595	0.0	36.6	604
720 min Summer	8.236	0.0	36.7	722
960 min Summer	6.452	0.0	36.6	960
1440 min Summer	4.554	0.0	35.4	1228
2160 min Summer	3.212	0.0	59.1	1584
2880 min Summer	2.516	0.0	59.0	1992
4320 min Summer	1.807	0.0	56.5	2812
5760 min Summer	1.444	0.0	69.4	3632
7200 min Summer	1.223	0.0	72.6	4464
8640 min Summer	1.075	0.0	75.6	5272
10080 min Summer	0.968	0.0	78.6	6048
15 min Winter	139.299	0.0	12.7	24

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	80.199	0.199	0.0	0.2	0.2	22.9	O K
60 min Winter	80.242	0.242	0.0	0.2	0.2	29.0	O K
120 min Winter	80.279	0.279	0.0	0.2	0.2	34.2	O K
180 min Winter	80.303	0.303	0.0	0.3	0.3	37.5	O K
240 min Winter	80.320	0.320	0.0	0.3	0.3	39.8	O K
360 min Winter	80.339	0.339	0.0	0.3	0.3	42.5	O K
480 min Winter	80.348	0.348	0.0	0.3	0.3	43.8	O K
600 min Winter	80.353	0.353	0.0	0.3	0.3	44.5	O K
720 min Winter	80.354	0.354	0.0	0.3	0.3	44.7	O K
960 min Winter	80.353	0.353	0.0	0.3	0.3	44.5	O K
1440 min Winter	80.340	0.340	0.0	0.3	0.3	42.7	O K
2160 min Winter	80.322	0.322	0.0	0.3	0.3	40.2	O K
2880 min Winter	80.306	0.306	0.0	0.3	0.3	37.9	O K
4320 min Winter	80.279	0.279	0.0	0.2	0.2	34.2	O K
5760 min Winter	80.257	0.257	0.0	0.2	0.2	31.0	O K
7200 min Winter	80.238	0.238	0.0	0.2	0.2	28.4	O K
8640 min Winter	80.223	0.223	0.0	0.2	0.2	26.2	O K
10080 min Winter	80.210	0.210	0.0	0.2	0.2	24.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	14.8	38
60 min Winter	57.252	0.0	27.7	66
120 min Winter	33.814	0.0	30.9	126
180 min Winter	24.955	0.0	32.8	184
240 min Winter	20.058	0.0	34.0	242
360 min Winter	14.577	0.0	35.5	358
480 min Winter	11.540	0.0	36.2	474
600 min Winter	9.595	0.0	36.6	590
720 min Winter	8.236	0.0	36.7	704
960 min Winter	6.452	0.0	36.6	926
1440 min Winter	4.554	0.0	35.5	1342
2160 min Winter	3.212	0.0	59.1	1664
2880 min Winter	2.516	0.0	59.1	2112
4320 min Winter	1.807	0.0	56.6	3028
5760 min Winter	1.444	0.0	69.5	3872
7200 min Winter	1.223	0.0	72.6	4752
8640 min Winter	1.075	0.0	75.7	5536
10080 min Winter	0.968	0.0	78.8	6360

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.062

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.030	4	8	0.030	8	12	0.002

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	13.0
Membrane Percolation (mm/hr)	1000	Length (m)	36.0
Max Percolation (l/s)	130.0	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.015 Discharge Coefficient 0.600 Invert Level (m) 80.000

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

Half Drain Time : 981 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.251	0.251	1.1	51.0	O K
30 min Summer	80.301	0.301	1.1	68.6	O K
60 min Summer	80.351	0.351	1.1	86.4	O K
120 min Summer	80.392	0.392	1.1	100.8	O K
180 min Summer	80.418	0.418	1.1	110.0	O K
240 min Summer	80.435	0.435	1.1	116.0	O K
360 min Summer	80.452	0.452	1.1	122.1	O K
480 min Summer	80.459	0.459	1.1	124.3	O K
600 min Summer	80.459	0.459	1.1	124.5	O K
720 min Summer	80.456	0.456	1.1	123.4	O K
960 min Summer	80.445	0.445	1.1	119.5	O K
1440 min Summer	80.423	0.423	1.1	111.8	O K
2160 min Summer	80.394	0.394	1.1	101.5	O K
2880 min Summer	80.369	0.369	1.1	92.5	O K
4320 min Summer	80.329	0.329	1.1	78.4	O K
5760 min Summer	80.297	0.297	1.1	67.4	O K
7200 min Summer	80.273	0.273	1.1	58.7	O K
8640 min Summer	80.253	0.253	1.1	51.7	O K
10080 min Summer	80.237	0.237	1.1	46.1	O K
15 min Winter	80.251	0.251	1.1	51.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	26
30 min Summer	91.544	0.0	40
60 min Summer	57.252	0.0	68
120 min Summer	33.814	0.0	128
180 min Summer	24.955	0.0	186
240 min Summer	20.058	0.0	246
360 min Summer	14.577	0.0	364
480 min Summer	11.540	0.0	484
600 min Summer	9.595	0.0	602
720 min Summer	8.236	0.0	720
960 min Summer	6.452	0.0	874
1440 min Summer	4.554	0.0	1088
2160 min Summer	3.212	0.0	1476
2880 min Summer	2.516	0.0	1876
4320 min Summer	1.807	0.0	2680
5760 min Summer	1.444	0.0	3456
7200 min Summer	1.223	0.0	4184
8640 min Summer	1.075	0.0	4928
10080 min Summer	0.968	0.0	5648
15 min Winter	139.299	0.0	25

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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
30 min Winter	80.301	0.301	1.1	68.6	O K
60 min Winter	80.351	0.351	1.1	86.4	O K
120 min Winter	80.392	0.392	1.1	100.9	O K
180 min Winter	80.418	0.418	1.1	110.0	O K
240 min Winter	80.435	0.435	1.1	116.1	O K
360 min Winter	80.453	0.453	1.1	122.2	O K
480 min Winter	80.459	0.459	1.1	124.5	O K
600 min Winter	80.460	0.460	1.1	124.7	O K
720 min Winter	80.457	0.457	1.1	123.7	O K
960 min Winter	80.446	0.446	1.1	119.8	O K
1440 min Winter	80.419	0.419	1.1	110.4	O K
2160 min Winter	80.383	0.383	1.1	97.5	O K
2880 min Winter	80.349	0.349	1.1	85.5	O K
4320 min Winter	80.293	0.293	1.1	65.9	O K
5760 min Winter	80.251	0.251	1.1	50.9	O K
7200 min Winter	80.221	0.221	1.1	40.3	O K
8640 min Winter	80.203	0.203	1.0	34.1	O K
10080 min Winter	80.189	0.189	0.9	29.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	39
60 min Winter	57.252	0.0	68
120 min Winter	33.814	0.0	126
180 min Winter	24.955	0.0	184
240 min Winter	20.058	0.0	242
360 min Winter	14.577	0.0	358
480 min Winter	11.540	0.0	472
600 min Winter	9.595	0.0	586
720 min Winter	8.236	0.0	698
960 min Winter	6.452	0.0	910
1440 min Winter	4.554	0.0	1128
2160 min Winter	3.212	0.0	1580
2880 min Winter	2.516	0.0	2016
4320 min Winter	1.807	0.0	2816
5760 min Winter	1.444	0.0	3576
7200 min Winter	1.223	0.0	4248
8640 min Winter	1.075	0.0	4928
10080 min Winter	0.968	0.0	5648

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.185

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.080	4	8	0.080	8	12	0.025

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00648	Width (m)	13.8
Membrane Percolation (mm/hr)	1000	Length (m)	85.3
Max Percolation (l/s)	327.0	Slope (1:X)	400.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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Summary of Results for 30 year Return Period

Half Drain Time : 1080 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.403	0.403	0.4	26.0	O K
30 min Summer	80.468	0.468	0.5	35.2	O K
60 min Summer	80.527	0.527	0.5	44.6	O K
120 min Summer	80.579	0.579	0.6	53.7	O K
180 min Summer	80.609	0.609	0.6	59.5	O K
240 min Summer	80.628	0.628	0.6	63.3	O K
360 min Summer	80.648	0.648	0.6	67.3	O K
480 min Summer	80.655	0.655	0.6	68.9	O K
600 min Summer	80.658	0.658	0.6	69.4	O K
720 min Summer	80.656	0.656	0.6	69.1	O K
960 min Summer	80.651	0.651	0.6	68.1	O K
1440 min Summer	80.641	0.641	0.6	66.0	O K
2160 min Summer	80.626	0.626	0.6	62.9	O K
2880 min Summer	80.612	0.612	0.6	60.1	O K
4320 min Summer	80.588	0.588	0.6	55.4	O K
5760 min Summer	80.568	0.568	0.5	51.7	O K
7200 min Summer	80.551	0.551	0.5	48.7	O K
8640 min Summer	80.537	0.537	0.5	46.2	O K
10080 min Summer	80.525	0.525	0.5	44.2	O K
15 min Winter	80.403	0.403	0.4	26.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	78.227	0.0	23
30 min Summer	50.778	0.0	37
60 min Summer	31.575	0.0	66
120 min Summer	19.033	0.0	126
180 min Summer	14.171	0.0	186
240 min Summer	11.445	0.0	244
360 min Summer	8.360	0.0	364
480 min Summer	6.632	0.0	482
600 min Summer	5.523	0.0	602
720 min Summer	4.748	0.0	720
960 min Summer	3.732	0.0	830
1440 min Summer	2.654	0.0	1070
2160 min Summer	1.890	0.0	1472
2880 min Summer	1.492	0.0	1876
4320 min Summer	1.087	0.0	2688
5760 min Summer	0.878	0.0	3512
7200 min Summer	0.751	0.0	4320
8640 min Summer	0.665	0.0	5096
10080 min Summer	0.603	0.0	5848
15 min Winter	78.227	0.0	23

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	80.468	0.468	0.5	35.2	O K
60 min Winter	80.527	0.527	0.5	44.6	O K
120 min Winter	80.579	0.579	0.6	53.8	O K
180 min Winter	80.609	0.609	0.6	59.6	O K
240 min Winter	80.628	0.628	0.6	63.4	O K
360 min Winter	80.648	0.648	0.6	67.4	O K
480 min Winter	80.656	0.656	0.6	69.1	O K
600 min Winter	80.659	0.659	0.6	69.7	O K
720 min Winter	80.659	0.659	0.6	69.6	O K
960 min Winter	80.653	0.653	0.6	68.4	O K
1440 min Winter	80.640	0.640	0.6	65.6	O K
2160 min Winter	80.619	0.619	0.6	61.5	O K
2880 min Winter	80.599	0.599	0.6	57.6	O K
4320 min Winter	80.564	0.564	0.5	51.0	O K
5760 min Winter	80.534	0.534	0.5	45.8	O K
7200 min Winter	80.509	0.509	0.5	41.5	O K
8640 min Winter	80.487	0.487	0.5	38.0	O K
10080 min Winter	80.468	0.468	0.5	35.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	50.778	0.0	37
60 min Winter	31.575	0.0	66
120 min Winter	19.033	0.0	124
180 min Winter	14.171	0.0	182
240 min Winter	11.445	0.0	240
360 min Winter	8.360	0.0	356
480 min Winter	6.632	0.0	470
600 min Winter	5.523	0.0	582
720 min Winter	4.748	0.0	692
960 min Winter	3.732	0.0	900
1440 min Winter	2.654	0.0	1114
2160 min Winter	1.890	0.0	1576
2880 min Winter	1.492	0.0	2020
4320 min Winter	1.087	0.0	2896
5760 min Winter	0.878	0.0	3696
7200 min Winter	0.751	0.0	4536
8640 min Winter	0.665	0.0	5280
10080 min Winter	0.603	0.0	6056

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.180

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.100	4	8	0.080

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00648	Width (m)	9.3
Membrane Percolation (mm/hr)	1000	Length (m)	114.0
Max Percolation (l/s)	294.5	Slope (1:X)	115.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 1494 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.562	0.562	0.5	50.7	O K
30 min Summer	80.651	0.651	0.6	68.0	O K
60 min Summer	80.731	0.731	0.7	85.7	O K
120 min Summer	80.792	0.792	0.8	100.6	O K
180 min Summer	80.829	0.829	0.8	110.3	O K
240 min Summer	80.854	0.854	0.8	116.9	O K
360 min Summer	80.881	0.881	0.8	124.5	O K
480 min Summer	80.894	0.894	0.9	128.1	O K
600 min Summer	80.899	0.899	0.9	129.8	O K
720 min Summer	80.901	0.901	0.9	130.2	O K
960 min Summer	80.897	0.897	0.9	129.0	O K
1440 min Summer	80.881	0.881	0.8	124.6	O K
2160 min Summer	80.861	0.861	0.8	118.9	O K
2880 min Summer	80.843	0.843	0.8	114.0	O K
4320 min Summer	80.813	0.813	0.8	106.2	O K
5760 min Summer	80.789	0.789	0.8	99.8	O K
7200 min Summer	80.768	0.768	0.7	94.6	O K
8640 min Summer	80.751	0.751	0.7	90.4	O K
10080 min Summer	80.736	0.736	0.7	86.9	O K
15 min Winter	80.562	0.562	0.5	50.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	23
30 min Summer	91.544	0.0	38
60 min Summer	57.252	0.0	68
120 min Summer	33.814	0.0	126
180 min Summer	24.955	0.0	186
240 min Summer	20.058	0.0	246
360 min Summer	14.577	0.0	364
480 min Summer	11.540	0.0	484
600 min Summer	9.595	0.0	602
720 min Summer	8.236	0.0	722
960 min Summer	6.452	0.0	960
1440 min Summer	4.554	0.0	1188
2160 min Summer	3.212	0.0	1556
2880 min Summer	2.516	0.0	1964
4320 min Summer	1.807	0.0	2772
5760 min Summer	1.444	0.0	3624
7200 min Summer	1.223	0.0	4400
8640 min Summer	1.075	0.0	5192
10080 min Summer	0.968	0.0	5960
15 min Winter	139.299	0.0	23

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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
30 min Winter	80.651	0.651	0.6	68.0	O K
60 min Winter	80.731	0.731	0.7	85.7	O K
120 min Winter	80.792	0.792	0.8	100.7	O K
180 min Winter	80.830	0.830	0.8	110.4	O K
240 min Winter	80.854	0.854	0.8	117.1	O K
360 min Winter	80.882	0.882	0.8	124.7	O K
480 min Winter	80.895	0.895	0.9	128.4	O K
600 min Winter	80.901	0.901	0.9	130.2	O K
720 min Winter	80.903	0.903	0.9	130.7	O K
960 min Winter	80.900	0.900	0.9	129.9	O K
1440 min Winter	80.882	0.882	0.8	124.7	O K
2160 min Winter	80.858	0.858	0.8	118.0	O K
2880 min Winter	80.834	0.834	0.8	111.7	O K
4320 min Winter	80.794	0.794	0.8	101.1	O K
5760 min Winter	80.758	0.758	0.7	92.2	O K
7200 min Winter	80.727	0.727	0.7	84.9	O K
8640 min Winter	80.701	0.701	0.7	78.8	O K
10080 min Winter	80.678	0.678	0.7	73.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	37
60 min Winter	57.252	0.0	66
120 min Winter	33.814	0.0	124
180 min Winter	24.955	0.0	182
240 min Winter	20.058	0.0	242
360 min Winter	14.577	0.0	358
480 min Winter	11.540	0.0	474
600 min Winter	9.595	0.0	588
720 min Winter	8.236	0.0	702
960 min Winter	6.452	0.0	924
1440 min Winter	4.554	0.0	1316
2160 min Winter	3.212	0.0	1644
2880 min Winter	2.516	0.0	2104
4320 min Winter	1.807	0.0	2984
5760 min Winter	1.444	0.0	3856
7200 min Winter	1.223	0.0	4688
8640 min Winter	1.075	0.0	5528
10080 min Winter	0.968	0.0	6264

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.180

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.100	4	8	0.080

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00648	Width (m)	9.3
Membrane Percolation (mm/hr)	1000	Length (m)	114.0
Max Percolation (l/s)	294.5	Slope (1:X)	115.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 1253 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.476	0.476	0.4	32.4	O K
30 min Summer	80.552	0.552	0.5	43.5	O K
60 min Summer	80.620	0.620	0.5	54.8	O K
120 min Summer	80.671	0.671	0.6	64.3	O K
180 min Summer	80.702	0.702	0.6	70.3	O K
240 min Summer	80.722	0.722	0.6	74.4	O K
360 min Summer	80.743	0.743	0.6	78.8	O K
480 min Summer	80.752	0.752	0.6	80.8	O K
600 min Summer	80.755	0.755	0.6	81.5	O K
720 min Summer	80.755	0.755	0.6	81.4	O K
960 min Summer	80.748	0.748	0.6	80.0	O K
1440 min Summer	80.734	0.734	0.6	77.0	O K
2160 min Summer	80.715	0.715	0.6	72.9	O K
2880 min Summer	80.697	0.697	0.6	69.3	O K
4320 min Summer	80.667	0.667	0.6	63.6	O K
5760 min Summer	80.643	0.643	0.6	59.0	O K
7200 min Summer	80.622	0.622	0.5	55.3	O K
8640 min Summer	80.605	0.605	0.5	52.3	O K
10080 min Summer	80.591	0.591	0.5	49.8	O K
15 min Winter	80.476	0.476	0.4	32.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	26
30 min Summer	91.544	0.0	40
60 min Summer	57.252	0.0	70
120 min Summer	33.814	0.0	128
180 min Summer	24.955	0.0	186
240 min Summer	20.058	0.0	246
360 min Summer	14.577	0.0	364
480 min Summer	11.540	0.0	484
600 min Summer	9.595	0.0	602
720 min Summer	8.236	0.0	722
960 min Summer	6.452	0.0	896
1440 min Summer	4.554	0.0	1116
2160 min Summer	3.212	0.0	1500
2880 min Summer	2.516	0.0	1908
4320 min Summer	1.807	0.0	2728
5760 min Summer	1.444	0.0	3528
7200 min Summer	1.223	0.0	4328
8640 min Summer	1.075	0.0	5104
10080 min Summer	0.968	0.0	5864
15 min Winter	139.299	0.0	26

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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
30 min Winter	80.552	0.552	0.5	43.5	O K
60 min Winter	80.620	0.620	0.5	54.8	O K
120 min Winter	80.671	0.671	0.6	64.3	O K
180 min Winter	80.702	0.702	0.6	70.4	O K
240 min Winter	80.722	0.722	0.6	74.5	O K
360 min Winter	80.744	0.744	0.6	79.0	O K
480 min Winter	80.753	0.753	0.6	81.0	O K
600 min Winter	80.757	0.757	0.6	81.8	O K
720 min Winter	80.757	0.757	0.6	81.8	O K
960 min Winter	80.751	0.751	0.6	80.6	O K
1440 min Winter	80.734	0.734	0.6	76.8	O K
2160 min Winter	80.710	0.710	0.6	71.9	O K
2880 min Winter	80.686	0.686	0.6	67.2	O K
4320 min Winter	80.645	0.645	0.6	59.5	O K
5760 min Winter	80.611	0.611	0.5	53.2	O K
7200 min Winter	80.581	0.581	0.5	48.2	O K
8640 min Winter	80.556	0.556	0.5	44.1	O K
10080 min Winter	80.534	0.534	0.5	40.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	40
60 min Winter	57.252	0.0	68
120 min Winter	33.814	0.0	126
180 min Winter	24.955	0.0	184
240 min Winter	20.058	0.0	242
360 min Winter	14.577	0.0	358
480 min Winter	11.540	0.0	474
600 min Winter	9.595	0.0	586
720 min Winter	8.236	0.0	698
960 min Winter	6.452	0.0	914
1440 min Winter	4.554	0.0	1144
2160 min Winter	3.212	0.0	1600
2880 min Winter	2.516	0.0	2052
4320 min Winter	1.807	0.0	2940
5760 min Winter	1.444	0.0	3752
7200 min Winter	1.223	0.0	4608
8640 min Winter	1.075	0.0	5368
10080 min Winter	0.968	0.0	6152

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.116

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.050	4	8	0.050	8	12	0.016

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00648	Width (m)	6.8
Membrane Percolation (mm/hr)	1000	Length (m)	105.0
Max Percolation (l/s)	198.3	Slope (1:X)	140.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 769 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.188	0.188	0.4	16.5	O K
30 min Summer	80.228	0.228	0.4	22.2	O K
60 min Summer	80.269	0.269	0.4	27.9	O K
120 min Summer	80.301	0.301	0.4	32.5	O K
180 min Summer	80.320	0.320	0.4	35.3	O K
240 min Summer	80.333	0.333	0.4	37.1	O K
360 min Summer	80.344	0.344	0.4	38.6	O K
480 min Summer	80.346	0.346	0.4	38.9	O K
600 min Summer	80.343	0.343	0.4	38.6	O K
720 min Summer	80.338	0.338	0.4	37.9	O K
960 min Summer	80.328	0.328	0.4	36.4	O K
1440 min Summer	80.308	0.308	0.4	33.5	O K
2160 min Summer	80.280	0.280	0.4	29.5	O K
2880 min Summer	80.256	0.256	0.4	26.2	O K
4320 min Summer	80.219	0.219	0.4	20.9	O K
5760 min Summer	80.191	0.191	0.4	17.0	O K
7200 min Summer	80.170	0.170	0.4	14.0	O K
8640 min Summer	80.155	0.155	0.4	11.8	O K
10080 min Summer	80.144	0.144	0.4	10.3	O K
15 min Winter	80.188	0.188	0.4	16.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	19
30 min Summer	91.544	0.0	34
60 min Summer	57.252	0.0	64
120 min Summer	33.814	0.0	122
180 min Summer	24.955	0.0	182
240 min Summer	20.058	0.0	242
360 min Summer	14.577	0.0	362
480 min Summer	11.540	0.0	480
600 min Summer	9.595	0.0	600
720 min Summer	8.236	0.0	672
960 min Summer	6.452	0.0	778
1440 min Summer	4.554	0.0	1022
2160 min Summer	3.212	0.0	1424
2880 min Summer	2.516	0.0	1816
4320 min Summer	1.807	0.0	2596
5760 min Summer	1.444	0.0	3344
7200 min Summer	1.223	0.0	4040
8640 min Summer	1.075	0.0	4752
10080 min Summer	0.968	0.0	5440
15 min Winter	139.299	0.0	19

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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
30 min Winter	80.228	0.228	0.4	22.2	O K
60 min Winter	80.269	0.269	0.4	27.9	O K
120 min Winter	80.301	0.301	0.4	32.5	O K
180 min Winter	80.320	0.320	0.4	35.3	O K
240 min Winter	80.333	0.333	0.4	37.1	O K
360 min Winter	80.344	0.344	0.4	38.7	O K
480 min Winter	80.347	0.347	0.4	39.0	O K
600 min Winter	80.344	0.344	0.4	38.7	O K
720 min Winter	80.340	0.340	0.4	38.0	O K
960 min Winter	80.326	0.326	0.4	36.1	O K
1440 min Winter	80.302	0.302	0.4	32.7	O K
2160 min Winter	80.265	0.265	0.4	27.5	O K
2880 min Winter	80.233	0.233	0.4	22.9	O K
4320 min Winter	80.183	0.183	0.4	15.8	O K
5760 min Winter	80.149	0.149	0.4	11.0	O K
7200 min Winter	80.133	0.133	0.4	8.7	O K
8640 min Winter	80.121	0.121	0.4	7.2	O K
10080 min Winter	80.111	0.111	0.3	6.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	33
60 min Winter	57.252	0.0	62
120 min Winter	33.814	0.0	122
180 min Winter	24.955	0.0	180
240 min Winter	20.058	0.0	238
360 min Winter	14.577	0.0	354
480 min Winter	11.540	0.0	466
600 min Winter	9.595	0.0	578
720 min Winter	8.236	0.0	686
960 min Winter	6.452	0.0	798
1440 min Winter	4.554	0.0	1082
2160 min Winter	3.212	0.0	1516
2880 min Winter	2.516	0.0	1932
4320 min Winter	1.807	0.0	2684
5760 min Winter	1.444	0.0	3344
7200 min Winter	1.223	0.0	4032
8640 min Winter	1.075	0.0	4752
10080 min Winter	0.968	0.0	5448

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.061

Time (mins) From:	To:	Area (ha)
0	4	0.061

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00648	Width (m)	11.0
Membrane Percolation (mm/hr)	1000	Length (m)	43.0
Max Percolation (l/s)	131.4	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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Summary of Results for 30 year Return Period

Half Drain Time : 836 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.275	0.275	0.4	17.4	O K
30 min Summer	80.317	0.317	0.4	23.1	O K
60 min Summer	80.356	0.356	0.5	29.0	O K
120 min Summer	80.393	0.393	0.5	34.6	O K
180 min Summer	80.416	0.416	0.5	38.1	O K
240 min Summer	80.431	0.431	0.5	40.3	O K
360 min Summer	80.446	0.446	0.5	42.5	O K
480 min Summer	80.450	0.450	0.5	43.2	O K
600 min Summer	80.450	0.450	0.5	43.1	O K
720 min Summer	80.447	0.447	0.5	42.6	O K
960 min Summer	80.440	0.440	0.5	41.6	O K
1440 min Summer	80.425	0.425	0.5	39.4	O K
2160 min Summer	80.405	0.405	0.5	36.3	O K
2880 min Summer	80.386	0.386	0.5	33.5	O K
4320 min Summer	80.357	0.357	0.5	29.1	O K
5760 min Summer	80.335	0.335	0.5	25.7	O K
7200 min Summer	80.319	0.319	0.4	23.4	O K
8640 min Summer	80.307	0.307	0.4	21.7	O K
10080 min Summer	80.297	0.297	0.4	20.2	O K
15 min Winter	80.275	0.275	0.4	17.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	78.227	0.0	25
30 min Summer	50.778	0.0	39
60 min Summer	31.575	0.0	68
120 min Summer	19.033	0.0	126
180 min Summer	14.171	0.0	186
240 min Summer	11.445	0.0	246
360 min Summer	8.360	0.0	364
480 min Summer	6.632	0.0	482
600 min Summer	5.523	0.0	600
720 min Summer	4.748	0.0	690
960 min Summer	3.732	0.0	790
1440 min Summer	2.654	0.0	1030
2160 min Summer	1.890	0.0	1432
2880 min Summer	1.492	0.0	1844
4320 min Summer	1.087	0.0	2636
5760 min Summer	0.878	0.0	3400
7200 min Summer	0.751	0.0	4112
8640 min Summer	0.665	0.0	4848
10080 min Summer	0.603	0.0	5640
15 min Winter	78.227	0.0	25

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	80.317	0.317	0.4	23.1	O K
60 min Winter	80.356	0.356	0.5	29.0	O K
120 min Winter	80.394	0.394	0.5	34.6	O K
180 min Winter	80.417	0.417	0.5	38.1	O K
240 min Winter	80.431	0.431	0.5	40.3	O K
360 min Winter	80.446	0.446	0.5	42.6	O K
480 min Winter	80.451	0.451	0.5	43.3	O K
600 min Winter	80.451	0.451	0.5	43.3	O K
720 min Winter	80.448	0.448	0.5	42.8	O K
960 min Winter	80.438	0.438	0.5	41.3	O K
1440 min Winter	80.421	0.421	0.5	38.7	O K
2160 min Winter	80.393	0.393	0.5	34.5	O K
2880 min Winter	80.367	0.367	0.5	30.7	O K
4320 min Winter	80.328	0.328	0.5	24.8	O K
5760 min Winter	80.302	0.302	0.4	21.0	O K
7200 min Winter	80.281	0.281	0.4	18.2	O K
8640 min Winter	80.264	0.264	0.4	16.0	O K
10080 min Winter	80.250	0.250	0.3	14.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	50.778	0.0	39
60 min Winter	31.575	0.0	68
120 min Winter	19.033	0.0	124
180 min Winter	14.171	0.0	182
240 min Winter	11.445	0.0	240
360 min Winter	8.360	0.0	356
480 min Winter	6.632	0.0	470
600 min Winter	5.523	0.0	582
720 min Winter	4.748	0.0	688
960 min Winter	3.732	0.0	874
1440 min Winter	2.654	0.0	1086
2160 min Winter	1.890	0.0	1536
2880 min Winter	1.492	0.0	1960
4320 min Winter	1.087	0.0	2728
5760 min Winter	0.878	0.0	3520
7200 min Winter	0.751	0.0	4264
8640 min Winter	0.665	0.0	5024
10080 min Winter	0.603	0.0	5752

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.115

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.050	4	8	0.050	8	12	0.015

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00648	Width (m)	10.8
Membrane Percolation (mm/hr)	1000	Length (m)	46.5
Max Percolation (l/s)	139.5	Slope (1:X)	142.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 1579 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.383	0.383	0.5	33.1	O K
30 min Summer	80.456	0.456	0.5	44.1	O K
60 min Summer	80.531	0.531	0.5	55.4	O K
120 min Summer	80.594	0.594	0.5	64.9	O K
180 min Summer	80.636	0.636	0.5	71.1	O K
240 min Summer	80.664	0.664	0.5	75.4	O K
360 min Summer	80.697	0.697	0.5	80.3	O K
480 min Summer	80.713	0.713	0.5	82.7	O K
600 min Summer	80.720	0.720	0.5	83.9	O K
720 min Summer	80.723	0.723	0.5	84.3	O K
960 min Summer	80.719	0.719	0.5	83.7	O K
1440 min Summer	80.694	0.694	0.5	79.9	O K
2160 min Summer	80.659	0.659	0.5	74.6	O K
2880 min Summer	80.630	0.630	0.5	70.3	O K
4320 min Summer	80.586	0.586	0.5	63.6	O K
5760 min Summer	80.550	0.550	0.5	58.2	O K
7200 min Summer	80.521	0.521	0.5	53.8	O K
8640 min Summer	80.496	0.496	0.5	50.1	O K
10080 min Summer	80.476	0.476	0.5	47.0	O K
15 min Winter	80.383	0.383	0.5	33.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	26
30 min Summer	91.544	0.0	40
60 min Summer	57.252	0.0	70
120 min Summer	33.814	0.0	128
180 min Summer	24.955	0.0	188
240 min Summer	20.058	0.0	246
360 min Summer	14.577	0.0	366
480 min Summer	11.540	0.0	486
600 min Summer	9.595	0.0	604
720 min Summer	8.236	0.0	724
960 min Summer	6.452	0.0	962
1440 min Summer	4.554	0.0	1340
2160 min Summer	3.212	0.0	1664
2880 min Summer	2.516	0.0	2024
4320 min Summer	1.807	0.0	2852
5760 min Summer	1.444	0.0	3640
7200 min Summer	1.223	0.0	4464
8640 min Summer	1.075	0.0	5264
10080 min Summer	0.968	0.0	6048
15 min Winter	139.299	0.0	26

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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
30 min Winter	80.456	0.456	0.5	44.1	O K
60 min Winter	80.531	0.531	0.5	55.4	O K
120 min Winter	80.595	0.595	0.5	64.9	O K
180 min Winter	80.636	0.636	0.5	71.1	O K
240 min Winter	80.664	0.664	0.5	75.4	O K
360 min Winter	80.697	0.697	0.5	80.3	O K
480 min Winter	80.713	0.713	0.5	82.8	O K
600 min Winter	80.721	0.721	0.5	84.0	O K
720 min Winter	80.724	0.724	0.5	84.4	O K
960 min Winter	80.721	0.721	0.5	83.9	O K
1440 min Winter	80.697	0.697	0.5	80.3	O K
2160 min Winter	80.654	0.654	0.5	73.9	O K
2880 min Winter	80.619	0.619	0.5	68.6	O K
4320 min Winter	80.557	0.557	0.5	59.3	O K
5760 min Winter	80.505	0.505	0.5	51.4	O K
7200 min Winter	80.461	0.461	0.5	44.8	O K
8640 min Winter	80.424	0.424	0.5	39.2	O K
10080 min Winter	80.393	0.393	0.5	34.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	40
60 min Winter	57.252	0.0	68
120 min Winter	33.814	0.0	126
180 min Winter	24.955	0.0	184
240 min Winter	20.058	0.0	242
360 min Winter	14.577	0.0	360
480 min Winter	11.540	0.0	476
600 min Winter	9.595	0.0	592
720 min Winter	8.236	0.0	708
960 min Winter	6.452	0.0	934
1440 min Winter	4.554	0.0	1368
2160 min Winter	3.212	0.0	1704
2880 min Winter	2.516	0.0	2144
4320 min Winter	1.807	0.0	3032
5760 min Winter	1.444	0.0	3872
7200 min Winter	1.223	0.0	4688
8640 min Winter	1.075	0.0	5448
10080 min Winter	0.968	0.0	6160

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.115

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.050	4	8	0.050	8	12	0.015

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00648	Width (m)	10.8
Membrane Percolation (mm/hr)	1000	Length (m)	46.5
Max Percolation (l/s)	139.5	Slope (1:X)	142.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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

Half Drain Time : 904 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.252	0.252	0.8	35.5	O K
30 min Summer	80.298	0.298	0.8	47.8	O K
60 min Summer	80.344	0.344	0.8	60.2	O K
120 min Summer	80.381	0.381	0.8	70.3	O K
180 min Summer	80.405	0.405	0.8	76.6	O K
240 min Summer	80.420	0.420	0.8	80.7	O K
360 min Summer	80.435	0.435	0.8	84.8	O K
480 min Summer	80.440	0.440	0.8	86.1	O K
600 min Summer	80.439	0.439	0.8	86.0	O K
720 min Summer	80.436	0.436	0.8	85.0	O K
960 min Summer	80.425	0.425	0.8	82.2	O K
1440 min Summer	80.406	0.406	0.8	76.9	O K
2160 min Summer	80.379	0.379	0.8	69.6	O K
2880 min Summer	80.355	0.355	0.8	63.2	O K
4320 min Summer	80.318	0.318	0.8	53.1	O K
5760 min Summer	80.289	0.289	0.8	45.4	O K
7200 min Summer	80.267	0.267	0.8	39.4	O K
8640 min Summer	80.250	0.250	0.8	34.9	O K
10080 min Summer	80.239	0.239	0.8	31.7	O K
15 min Winter	80.252	0.252	0.8	35.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	26
30 min Summer	91.544	0.0	41
60 min Summer	57.252	0.0	70
120 min Summer	33.814	0.0	128
180 min Summer	24.955	0.0	188
240 min Summer	20.058	0.0	246
360 min Summer	14.577	0.0	364
480 min Summer	11.540	0.0	484
600 min Summer	9.595	0.0	602
720 min Summer	8.236	0.0	720
960 min Summer	6.452	0.0	826
1440 min Summer	4.554	0.0	1058
2160 min Summer	3.212	0.0	1452
2880 min Summer	2.516	0.0	1852
4320 min Summer	1.807	0.0	2640
5760 min Summer	1.444	0.0	3408
7200 min Summer	1.223	0.0	4112
8640 min Summer	1.075	0.0	4840
10080 min Summer	0.968	0.0	5552
15 min Winter	139.299	0.0	26

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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
30 min Winter	80.298	0.298	0.8	47.8	O K
60 min Winter	80.344	0.344	0.8	60.2	O K
120 min Winter	80.381	0.381	0.8	70.3	O K
180 min Winter	80.405	0.405	0.8	76.6	O K
240 min Winter	80.420	0.420	0.8	80.7	O K
360 min Winter	80.435	0.435	0.8	84.8	O K
480 min Winter	80.440	0.440	0.8	86.2	O K
600 min Winter	80.440	0.440	0.8	86.1	O K
720 min Winter	80.437	0.437	0.8	85.3	O K
960 min Winter	80.425	0.425	0.8	82.1	O K
1440 min Winter	80.401	0.401	0.8	75.6	O K
2160 min Winter	80.366	0.366	0.8	66.3	O K
2880 min Winter	80.335	0.335	0.8	57.7	O K
4320 min Winter	80.284	0.284	0.8	44.0	O K
5760 min Winter	80.248	0.248	0.8	34.3	O K
7200 min Winter	80.226	0.226	0.8	28.6	O K
8640 min Winter	80.210	0.210	0.7	24.5	O K
10080 min Winter	80.196	0.196	0.7	21.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	91.544	0.0	40
60 min Winter	57.252	0.0	68
120 min Winter	33.814	0.0	126
180 min Winter	24.955	0.0	184
240 min Winter	20.058	0.0	242
360 min Winter	14.577	0.0	358
480 min Winter	11.540	0.0	472
600 min Winter	9.595	0.0	584
720 min Winter	8.236	0.0	694
960 min Winter	6.452	0.0	900
1440 min Winter	4.554	0.0	1106
2160 min Winter	3.212	0.0	1556
2880 min Winter	2.516	0.0	1984
4320 min Winter	1.807	0.0	2772
5760 min Winter	1.444	0.0	3464
7200 min Winter	1.223	0.0	4192
8640 min Winter	1.075	0.0	4936
10080 min Winter	0.968	0.0	5656

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Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.130

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.050	4	8	0.050	8	12	0.030

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Model Details

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00648	Width (m)	12.4
Membrane Percolation (mm/hr)	1000	Length (m)	72.6
Max Percolation (l/s)	250.1	Slope (1:X)	300.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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Cascade Summary of Results for Road 2.SRCX

Upstream Structures	Outflow To	Overflow To
Plot 5.SRCX	(None)	(None)
Plot 6.SRCX		
Plot 7.SRCX		
Plot 8-9.SRCX		

Half Drain Time : 832 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	80.563	0.563	1.2	60.1	O K
30 min Summer	80.660	0.660	1.4	82.5	O K
60 min Summer	80.749	0.749	1.6	106.5	O K
120 min Summer	80.815	0.815	1.7	126.0	O K
180 min Summer	80.857	0.857	1.8	139.2	O K
240 min Summer	80.883	0.883	1.8	147.9	O K
360 min Summer	80.908	0.908	1.9	156.4	O K
480 min Summer	80.915	0.915	1.9	158.9	O K
600 min Summer	80.914	0.914	1.9	158.5	O K
720 min Summer	80.909	0.909	1.9	156.7	O K
960 min Summer	80.897	0.897	1.9	152.7	O K
1440 min Summer	80.872	0.872	1.8	144.4	O K
2160 min Summer	80.835	0.835	1.7	132.3	O K
2880 min Summer	80.801	0.801	1.7	121.8	O K
4320 min Summer	80.745	0.745	1.6	105.3	O K
5760 min Summer	80.700	0.700	1.5	93.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	139.299	0.0	33
30 min Summer	91.544	0.0	47
60 min Summer	57.252	0.0	76
120 min Summer	33.814	0.0	134
180 min Summer	24.955	0.0	192
240 min Summer	20.058	0.0	250
360 min Summer	14.577	0.0	368
480 min Summer	11.540	0.0	484
600 min Summer	9.595	0.0	602
720 min Summer	8.236	0.0	670
960 min Summer	6.452	0.0	778
1440 min Summer	4.554	0.0	1032
2160 min Summer	3.212	0.0	1440
2880 min Summer	2.516	0.0	1852
4320 min Summer	1.807	0.0	2656
5760 min Summer	1.444	0.0	3464

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Cascade Summary of Results for Road 2.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
7200 min Summer	80.664	0.664	1.4	83.6	O K
8640 min Summer	80.634	0.634	1.3	76.2	O K
10080 min Summer	80.610	0.610	1.3	70.6	O K
15 min Winter	80.563	0.563	1.2	60.1	O K
30 min Winter	80.660	0.660	1.4	82.6	O K
60 min Winter	80.749	0.749	1.6	106.5	O K
120 min Winter	80.815	0.815	1.7	126.1	O K
180 min Winter	80.858	0.858	1.8	139.5	O K
240 min Winter	80.884	0.884	1.8	148.3	O K
360 min Winter	80.910	0.910	1.9	157.0	O K
480 min Winter	80.918	0.918	1.9	159.9	O K
600 min Winter	80.918	0.918	1.9	159.8	O K
720 min Winter	80.913	0.913	1.9	158.1	O K
960 min Winter	80.897	0.897	1.9	152.6	O K
1440 min Winter	80.868	0.868	1.8	142.9	O K
2160 min Winter	80.821	0.821	1.7	127.8	O K
2880 min Winter	80.776	0.776	1.6	114.3	O K
4320 min Winter	80.701	0.701	1.5	93.2	O K
5760 min Winter	80.639	0.639	1.3	77.5	O K
7200 min Winter	80.589	0.589	1.2	65.7	O K
8640 min Winter	80.549	0.549	1.1	57.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
7200 min Summer	1.223	0.0	4256
8640 min Summer	1.075	0.0	5016
10080 min Summer	0.968	0.0	5672
15 min Winter	139.299	0.0	33
30 min Winter	91.544	0.0	46
60 min Winter	57.252	0.0	74
120 min Winter	33.814	0.0	132
180 min Winter	24.955	0.0	188
240 min Winter	20.058	0.0	246
360 min Winter	14.577	0.0	360
480 min Winter	11.540	0.0	474
600 min Winter	9.595	0.0	584
720 min Winter	8.236	0.0	690
960 min Winter	6.452	0.0	798
1440 min Winter	4.554	0.0	1092
2160 min Winter	3.212	0.0	1544
2880 min Winter	2.516	0.0	1988
4320 min Winter	1.807	0.0	2824
5760 min Winter	1.444	0.0	3648
7200 min Winter	1.223	0.0	4392
8640 min Winter	1.075	0.0	5144

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Cascade Summary of Results for Road 2.SRCX

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	80.516	0.516	1.1	50.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
10080 min Winter	0.968	0.0	5944

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Cascade Rainfall Details for Road 2.SRCX

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 471626 176771 SU 71626 76771
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.217

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.050	8	12	0.050	16	20	0.017
4	8	0.050	12	16	0.050			

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Cascade Model Details for Road 2.SRCX

Storage is Online Cover Level (m) 82.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.01188	Width (m)	5.5
Membrane Percolation (mm/hr)	1000	Length (m)	280.0
Max Percolation (l/s)	427.8	Slope (1:X)	230.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	80.000	Membrane Depth (m)	0

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