Drainage Addendum

Site: Land to the North of Arundel Road, Fontwell, West Sussex BN18 0SF

Client: Harlequin Developments

Prepared by: DHA Environment
Eclipse House
Eclipse Park
Sittingbourne Road
Maidstone ME14 3EN

Date: June 2026

1.1 Introduction

1.1.1 This Drainage Technical Note (TN) has been produced in response to the latest response from West Sussex County Council (LLFA) dated 5th June 2026 in relation to Planning Application Reference: WA/18/26/PL concerning a proposed residential development of up 64 units on Land to the North of Arundel Road, Fontwell, West Sussex BN18 0SF.

1.1.2 The site has been allocated in the Walberton Neighbourhood Plan for up to approximately 40 units and a childcare facility.

1.1.3 This application follows a previous Outline Planning Application (WA/74/24/OUT) for 56 residential dwellings and a stand-alone community building. That application was recommended for approval by Officers and received a unanimous resolution to grant permission at the January 2025 Planning Committee. However, agreement could not be reached with Walberton Parish Council in relation to the Section 106 provisions concerning the transfer of land for the community building, and the application was therefore withdrawn at the end of 2025. Notwithstanding this, the principle of residential development and the key technical matters including drainage were accepted by the LPA and all statutory consultees.

1.2 Responses to WSCC comments

1.2.1 WSCC full response is contained in **Appendix A** and can be summarised with response to each point as follows: -

Standard 1: runoff destinations

"While water butts are mentioned in 1.3.4 for rainwater harvesting, these are not included in the Drainage Strategy Plan. To ensure these are included during construction, we would recommend a note or the location of the water butts is added."

1.2.2 Water butts are shown on the detailed site layout drawing contained in **Appendix B**. A note has also been added to the drainage strategy drawing, contained in **Appendix C**.

"It has been demonstrated that infiltration is not a viable method of draining the site, as high groundwater levels mean a 1m freeboard cannot be provided between the base of the basin and the highest groundwater level (as stated in National Standards for SuDS). As there are no ordinary watercourses nearby, it is proposed to discharge surface water at a restricted rate into WSCC highways drainage, as previously discussed with highways. in January 2025. In those emails, the applicant proposed replacing a poor condition. 150mm diameter highway drainage pipe with a 225mm diameter pipe. This is not included in the Drainage Strategy Plan".

1.2.3 Sewer improvements have now been included on the drainage strategy drawing contained in **Appendix C**.

"While infiltration is not being used to drain the site, there are several instances where the drainage strategy implies infiltration is still being used. For example, paragraphs 1.3.23 and 1.3.34 and the Contributing Areas Plan and Drainage Strategy Plan all still mention infiltration or infiltration basin. This does not accurately reflect how the site is proposed to drain. There may be other instances where this is an issue. It is also important that this is reflected in any other relevant document submitted under this application, to ensure documents are consistent".

1.2.4 It can be confirmed, that as advised by the LLFA, there is no intention to use infiltration on the site due to the new requirement to provide the 1m clearance to ground water level which was previously accepted on the outline application

1.2.5 Reference to the infiltration basin has been removed from the drawings.

"Standard 2: management of everyday rainfall

While a swale is mentioned in para 1.3.20 to 1.3.21, it is not included in the Drainage Strategy Plan or calculations. We would recommend using the below example when assessing interception:"

1.2.6 The swale has now been removed from the scheme.

1.2.7 The Standard states that all permeable surfaces, whether lined or not, shall be assumed to comply provided there is no additional area drained to the permeable pavement. The area of hardstanding totalling 6,309m^2 comprises entirely of permeable paving therefore be seen to comply.

1.2.8 Given that infiltration is not permitted and the site constraints do not allow for the provision of rainwater harvesting the only option for dealing with the first 5mm of rainfall is via lined permeable paving. It is therefore not possible given the site constraints to accommodate the first 5mm from the roof areas which totals 3,072m^2. It should be noted however that all roofs drain via the permeable paving.

1.2.9 The standards state that there may be specific circumstances or constraints, such as the type or size of a development that mean it is not possible to deliver one or more of the standards.

1.2.10 In these circumstances the opportunity to meet the standard shall be maximised. Given the site constraints, it is considered that the standards have been maximised as far as possible.

Standard 3: management of extreme rainfall and flooding

In the Contributing Areas Plan, the footprint of the attenuation basin is not included, which conflicts with the National Standards for SuDS. We request this is updated, with the Drainage Strategy Plan and corresponding hydraulic calculations amended where necessary.

1.2.11 The footprint of the attenuation basin has now been included on the contributing drawings and corresponding calculations.

"It is unclear whether the design of the attenuation basin has considered the high groundwater levels. We request a cross section of the basin and porous paving, to ensure groundwater is considered in the design of SuDS features.

1.2.12 Cross section of the pond and porous paving have now been provided in **Appendix C**. The bas on the basin is at a level of 30.1m AOD which was the maximum ground water level recorded.

While the report states FEH 2022 rainfall model has been used, the calculations state FEH 1999 rainfall model has been used.

1.2.13 This is point has already been addressed and accepted in the LLFA response dated 8th May 2026. The response from the LLFA is as below.

"The applicant has stated that the latest FEH data has been manually entered, therefore this is adequately addressed."

"It is unclear whether freeboard from the 1 in 100 year plus climate change event has been included in the basin design".

1.2.14 There is a freeboard of 50mm included in the design. It considered that an ample Factor of Safety has been provided in the other drainage parameters to justify additional freeboard is not required as this will lead to an over engineered design. The design has been based on the following parameters.

1.2.15 The drainage has been designed for the 1 in 100 year plus 45% allowance for climate change.

1.2.16 A CV value of 1 has been used which is considered unrealistic. A CV value of 1 assumes that all rainfall will find its way into the drainage system and in turn offsite which is not realistic in a conventional drainage system.

1.2.17 Given the whole site drains via porous paving it is not feasible that all rainfall falling on the site will reach to attenuation basin so a CV less than 1 would be more applicable.

Standard 5: Amenity and Standard 6: Biodiversity

1.2.18 There appears to be some conflicts between the current Drainage Plan and the landscaping plans with regards to proposed tree planting locations and open SuDS features.

1.2.19 Trees has now been removed from the attenuation basin.

Standard 7: Design of drainage for construction, operation, maintenance, decommissioning and structural integrity A minimum 3m easement for the attenuation basin is required, for maintenance access

1.2.20 A 3m easement has been indication for maintenance access.

1.3 Summary and Conclusions

1.3.1 As set out in this technical note it can be demonstrated that all issues raised by the LLFA have been addressed.

APPENDIX
A

WSCC Response

Ground Floor
Northleigh
County Hall
Chichester
West Sussex
PO19 1RH

Lead Local Flood Authority

Mr S Davis
Planning and Building Control
Arun District Council
Arun Civic Centre
Maltravers Road
Littlehampton
West Sussex
BN17 5LF

Date 5th June 2026

Dear Mr Davis,

RE: **WA/18/26/PL - Land off Arundel Road Fontwell**

Thank you for your consultation on the above site, received on 26th May 2026. We have reviewed the application as submitted and wish to make the following comments.

This is a full application for the erection of 64 residential dwellings with access off Arundel Road, together with associated parking, open space, play space, landscaping, drainage and infrastructure.

We **maintain our objection** to this application, and require additional information:

Standard 1: runoff destinations
While water butts are mentioned in 1.3.4 for rainwater harvesting, these are not included in the Drainage Strategy Plan. To ensure these are included during construction, we would recommend a note or the location of the water butts is added.

It has been demonstrated that infiltration is not a viable method of draining the site, as high groundwater levels mean a 1m freeboard cannot be provided between the base of the basin and the highest groundwater level (as stated in National Standards for SuDS). As there are no ordinary watercourses nearby, it is proposed to discharge surface water at a restricted rate into WSCC highways drainage, as previously discussed with highways in January 2025. In those emails, the applicant proposed replacing a poor condition 150mm diameter highway drainage pipe with a 225mm diameter pipe. This is not included in the Drainage Strategy Plan.

While infiltration is not being used to drain the site, there are several instances where the drainage strategy implies infiltration is still being used. For example, paragraphs 1.3.23 and 1.3.34 and the Contributing Areas Plan and Drainage Strategy Plan all still mention infiltration or infiltration basin. This does not accurately reflect how the site is proposed to drain. There may be other instances where this is an issue. It is also important that this is

reflected in any other relevant document submitted under this application, to ensure documents are consistent.

Standard 2: management of everyday rainfall
While a swale is mentioned in para 1.3.20 to 1.3.21, it is not included in the Drainage Strategy Plan or calculations.

We would recommend using the below example when assessing interception:

Positively drained surface area	**Interception method**	**Details of how Standard 2 met**
Parking/private road	Permeable surfaces	No additional drained area XXX area - provides XXX area of interception
Access road	Swale	Longitudinal gradient of swale less than 1:100 500mm base material Xxx swale vegetated base area - provides XXX area of interception
Residential areas		
School / medical building	Green roof	XXX area - XXX area of interception

This shall correspond with the Contributing Area Plan.

Standard 3: management of extreme rainfall and flooding
In the Contributing Areas Plan, the footprint of the attenuation basin is not included, which conflicts with the National Standards for SuDS. We request this is updated, with the Drainage Strategy Plan and corresponding hydraulic calculations amended where necessary.

It is unclear whether the design of the attenuation basin has considered the high groundwater levels. We request a cross section of the basin and porous paving, to ensure groundwater is considered in the design of SuDS features.

We will review this objection when the issues highlighted above are adequately addressed and we are formally reconsulted. When preparing any further documents to address the above comments, we recommend clearly highlighting where amendments have been made.

While the report states FEH 2022 rainfall model has been used, the calculations state FEH 1999 rainfall model has been used.

It is unclear whether freeboard from the 1 in 100 year plus climate change event has been included in the basin design.

Standard 5: Amenity and Standard 6: Biodiversity
There appears to be some conflicts between the current Drainage Plan and the landscaping plans with regards to proposed tree planting locations and open SuDS features.

Standard 7: Design of drainage for construction, operation, maintenance, decommissioning and structural integrity
A minimum 3m easement for the attenuation basin is required, for maintenance access.

Yours sincerely,

Eleanor Read
Flood Risk Management Team
[redacted]

[redacted]

From: Elaine Walby on behalf of Planning.Responses
Sent: 09 June 2026 14:56
To: Planning Scanning
Subject: FW: Response to application WA/18/26/PL
Attachments: WA 18 26 PL recon May 26.pdf

PL- Consultation- WSCC Drainage response

Elaine Walby
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Littlehampton, West Sussex, BN17 5LF
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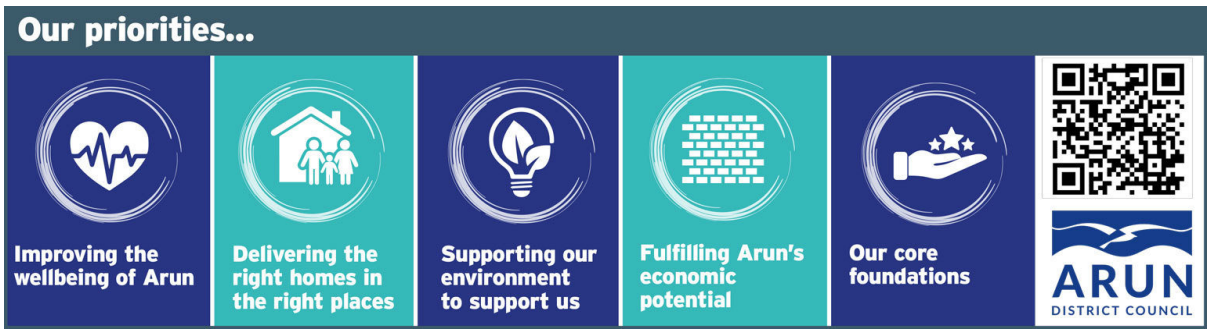

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From: [redacted]
Sent: 05 June 2026 14:30
To: Planning.Responses <Planning.Responses@arun.gov.uk>
Subject: Response to application WA/18/26/PL

CAUTION: This email originated from outside of the organisation. You should take extra care when clicking links or opening attachments - if you are unsure the content is safe contact the IT Helpdesk before clicking or opening.

Please could the attached response be distributed to the relevant case officer.

Regards

Flood Risk Management

Please do not reply directly to this email.

Any formal reconsultation on the application should be directed to [redacted] but the responding officer can be contacted directly via email if there are any questions relating to this response.

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APPENDIX B

Detailed masterplan

CDM 2015 Health & Safety Information

This information relates only to 'Significant Hazards' identified on this drawing and is to be read in conjunction with the Designer's Hazard Register.

N

Residential Accommodation			
8no.	1-bed flats	Block	50sqm
10no.	1-bed maisonettes	Semi / Detached	50sqm
15no.	2-bed houses	Semi-Detached	80sqm
9no.	3-bed houses	Semi-Detached	93sqm
14no.	3-bed townhouses	Semi-Detached	102sqm
2no.	4-bed houses	Detached	110sqm
6no.	4-bed townhouses	Semi-Detached	120sqm

64 Dwellings Total

Car Parking:
1.5 space per 1 bed flat
2 spaces per 2 & 3 bed dwellings
3 spaces per 4 bed dwellings
22no. Visitors car spaces

Application Site Boundary

Rev	Date	Revision Details	Dr	Ch
J	23.06.26	Landscape Updated	MC	KE
I	18.06.26	Attenuation basin and colour amended	MC	KE
H	12.06.26	Site Layout amended	CV	KE
G	13.04.26	Car spaces renumbered	KE	AK
F	18.03.26	Key amended	KP	KE
E	16.03.26	Landscape updated	CV	KE
D	06.03.26	Site Layout amended	KP	KE
C	04.03.26	Site Layout amended	CV	KE
B	06.02.26	Site Layout amended	KP	AK
A	02.02.26	Roofs amended	KP	KE

ECE Architecture

E hello@ecearchitecture.com
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Client's Name
Harlequin Developments

Job Title
Land North of Arundel Road, Fontwell

Drawing Title
Site Layout

Scale
1:500 @ A0 / 1:1000 @ A2

metres 10 20 30 40 50

Drawn	Checked	Date
KE	AK	12.12.25

Job No	Drawing No	Rev
7428A	PL-02	J

Status
APPROVAL

CAD Plot date: 23/06/2026 - 12:47:25 7428-site.dwg

CDM 2015 Health & Safety Information

This information relates only to 'Significant Hazards' identified on this drawing and is to be read in conjunction with the Designer's Hazard Register.

N

Key:

Cs	Timber Shed Cycle Storage Houses
Cs	Cycle Storage maisonettes
	Recycling Storage
	Refuse Storage
*	Refuse Collection Point
	Residents Dragging Distance
g	Garden Gate
RCP	Refuse Collection Point
ev	EV Charging Point
	Water Collection Butt
cbf	Proposed 1.8m high closed boarded fence
bw	Proposed 1.8m high brick screen wall
prf	Proposed 0.9m high post in rail

Rev	Date	Revision Details	Dr	Ch
C	23.06.26	Attenuation Basin and waterbutts amended	MC	KE
B	13.04.26	Car spaces renumbered	KE	AK
A	11.03.26	2.4m fence line added between gardens to plots 47/48	KP	KE

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Client's Name
Harlequin Developments

Job Title
Land North of Arundel Road, Fontwell

Drawing Title
Detailed Layout

Scale
1:250 @ A0 / 1:500 @ A2

metres 0 5 10 15 20 25

Drawn	Checked	Date
KE	AK	06.03.26

Job No	Drawing No	Rev
7428A	PL-25	C

Status
APPROVAL

CAD Plot date: 23/06/2026 - 11:18:22 7428-site.dwg

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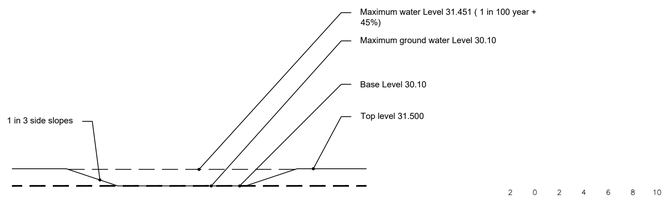
APPENDIX C

Updated Drainage Strategy and Calculations

			Contributing areas							
Ref	Length	Width	Area	Roof	paved		Urban creep		CL	BL
PP 1	105.0	8.8	923	432	49		43	1447	32.75	31.95
PP 2	73.0	7.5	548	394	362		39	1343	32.00	31.20
PP 2A	23.0	14.5	334	0	0		0	334	32.00	31.50
PP 2B	23.0	6.2	143	0	136		0	279	31.50	30.70
PP 3	48.0	12.9	621	409	61		41	1132	32.00	31.20
PP 4A	44.0	5.2	228	97	103		10	438	32.00	31.20
PP 4	83.0	6.1	504	546	566		55	1671	31.50	30.70
PP 5	50.0	9.1	454	179	8		18	659	31.50	30.70
PP 6	120.0	8.0	959	671	310		67	2007	31.50	30.70
B1				344	0	1000	34	1378		
			4714	3072	1595		307	10688		



Flood Exceedance route

Water Butts to be provided on all plots as shown on the architects layout plans.

Porous Paving 1
CL = 32.75
BL = 31.95
d = 0.800
Connection to downstream porous paving 2 via 50mm Orifice control

Porous Paving 2
CL = 32.000
BL = 31.200
d = 0.800
Porous Paving 2B via 100mm Orifice control

Porous Paving 2A
CL = 32.000
BL = 31.500
d = 0.500
Connection to downstream Porous Paving 2 via 30mm Orifice control

Porous Paving 3
CL = 32.00
BL = 31.20
d = 0.800
Connection to downstream Porous Paving 4A via 60mm Orifice control

Porous Paving 4A
CL = 32.000
BL = 31.200
d = 0.800
Connection to downstream Porous Paving 4 via 75mm Orifice control

Porous Paving 5
CL = 31.50
BL = 30.70
d = 0.600
Connection to downstream Porous Paving 6 via 100mm Orifice control

Porous Paving 4
CL = 31.500
BL = 30.700
d = 0.800
Connection to downstream Porous Paving 6 via 200mm Orifice control

Porous Paving 2B
CL = 31.500
BL = 30.700
d = 0.800
Connection to downstream basin via 10mm Orifice control

Porous Paving 6
CL = 31.50
BL = 30.70
d = 0.800
Connection to downstream basin via 150mm Orifice control

Attenuation basin
CL = 31.50
BL = 30.10
d = 1.400
Base area = 643m²
Top area = 1200m²
Volume = 1,200m²

5.4l/s (2.7 x 2l/s/ha)

Proposed Easement for access

Proposed Hydrobrake flow control restricting outfall to 5.4l/s (2.7 x 2l/s/ha)

CL = 31.50
BL = 30.10
d = 1.400

150Ø @ 1 in 150

SW
CL = 30.70
IL = 29.700
d = 1.000

225Ø @ 1 in 73

SW
CL = 30.300
IL = 29.175
d = 1.125

New 225Ømm highway drain to replace existing infrastructure which is in a poor state of repair

SW
CL = 29.00
IL = 27.875
d = 1.125

FW 6901
CL = 29.57
IL = 27.65
d = 1.920

Existing SW
CL = 28.87
IL = 27.42
d = 1.450

Existing 225Ømm highway drain

REV	AMENDMENTS	DATE	CHK
P6	Layout attenuation basin amended	17.06.26	CS
P5	Amened to discharge to highway drain	19.05.26	CS
P4	Exceedance routes added	27.04.26	CS
P3	Amended layout	05.03.26	CS
P2	Amended to suit LLFA comments	27.09.24	CS
P1	First issue	28.05.24	CS

Client
HARLEQUIN DEVELOPMENTS

Project
LAND NORTH OF ARUNDEL ROAD
FONTWELL

Title
DRAINAGE STRATEGY PLAN

Drwg	Rev	Scale	Date
33186-D-02	P6	1:500	28.05.24

Eclipse House, Eclipse Park, Sittingbourne Road
Maidstone, Kent. ME14 3EN
t: 01622 776226 f: 01622 776227
e: info@dhaplanning.co.uk w: www.dhaplanning.co.uk

CAD Reference: A1

N

INDICATIVE ONLY

5 0 5 10 15 20 25

Metres (1:500)

	Proposed site area	-	2.74Ha
	Proposed Porous pavement (Modelled)	-	4,714m^2
	Proposed porous paving (Draining to modelled)	-	1,595m^2
	Proposed roofs	-	3,072m^2
	Proposed pond	-	1,200m^2
	Proposed impermeable area	-	10,581m^2
	10% allowance for urban creep	-	307m^2
	Total contributing area	-	10,888m^2

REV	AMENDMENTS	DATE	CHK
P3	Layout/areas amended	17.06.26	CS
P2	Layout amended	05.03.26	CS
P1	First issue	28.05.24	CS

Client

HARLEQUIN DEVELOPMENTS

Project

LAND NORTH OF ARUNDEL ROAD
FONTWELL

Title

CONTRIBUTING AREAS PLAN

Drwg	Rev	Scale	Date
33186-D-01	P3	1:500	28.05.24

Eclipse House, Eclipse Park. Sittingbourne Road
Maidstone, Kent. ME14 3EN
t: 01622 776226 f: 01622 776227
e: info@dhaplanning.co.uk w: www.dhaplanning.co.uk

CAD Reference: A1

Cascade Summary of Results for pp1.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	pp2.SRCX	(None)

Half Drain Time : 205 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	32.487	0.537	0.0	3.7	3.7	53.3	Flood Risk
30 min Summer	32.542	0.592	0.0	3.9	3.9	64.8	Flood Risk
60 min Summer	32.594	0.644	0.0	4.1	4.1	76.7	Flood Risk
120 min Summer	32.635	0.685	0.0	4.2	4.2	86.8	Flood Risk
180 min Summer	32.649	0.699	0.0	4.3	4.3	90.3	Flood Risk
240 min Summer	32.656	0.706	0.0	4.3	4.3	92.1	Flood Risk
360 min Summer	32.661	0.711	0.0	4.3	4.3	93.3	Flood Risk
480 min Summer	32.659	0.709	0.0	4.3	4.3	92.9	Flood Risk
600 min Summer	32.654	0.704	0.0	4.3	4.3	91.6	Flood Risk
720 min Summer	32.647	0.697	0.0	4.3	4.3	89.8	Flood Risk
960 min Summer	32.609	0.659	0.0	4.2	4.2	80.2	Flood Risk
1440 min Summer	32.542	0.592	0.0	3.9	3.9	64.7	Flood Risk
2160 min Summer	32.457	0.507	0.0	3.6	3.6	47.5	Flood Risk
2880 min Summer	32.388	0.438	0.0	3.4	3.4	35.4	O K
4320 min Summer	32.302	0.352	0.0	3.0	3.0	22.9	O K
5760 min Summer	32.238	0.288	0.0	2.7	2.7	15.3	O K
7200 min Summer	32.189	0.239	0.0	2.4	2.4	10.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	167.069	0.0	55.9	18
30 min Summer	102.772	0.0	69.8	33
60 min Summer	63.219	0.0	86.9	62
120 min Summer	38.889	0.0	107.9	120
180 min Summer	29.268	0.0	122.3	166
240 min Summer	23.922	0.0	133.7	196
360 min Summer	18.004	0.0	151.3	260
480 min Summer	14.716	0.0	165.2	330
600 min Summer	12.585	0.0	176.7	400
720 min Summer	11.075	0.0	186.7	470
960 min Summer	8.655	0.0	194.3	606
1440 min Summer	6.114	0.0	205.4	866
2160 min Summer	4.320	0.0	216.7	1236
2880 min Summer	3.376	0.0	224.8	1612
4320 min Summer	2.505	0.0	248.6	2332
5760 min Summer	2.027	0.0	266.4	3008
7200 min Summer	1.720	0.0	280.8	3744

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Cascade Summary of Results for pp1.SRCX

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
8640 min Summer	32.153	0.203	0.0	2.2	2.2	7.6	O K
10080 min Summer	32.125	0.175	0.0	2.0	2.0	5.6	O K
15 min Winter	32.487	0.537	0.0	3.7	3.7	53.3	Flood Risk
30 min Winter	32.543	0.593	0.0	3.9	3.9	64.9	Flood Risk
60 min Winter	32.595	0.645	0.0	4.1	4.1	76.8	Flood Risk
120 min Winter	32.637	0.687	0.0	4.2	4.2	87.2	Flood Risk
180 min Winter	32.652	0.702	0.0	4.3	4.3	90.9	Flood Risk
240 min Winter	32.655	0.705	0.0	4.3	4.3	92.0	Flood Risk
360 min Winter	32.657	0.707	0.0	4.3	4.3	92.5	Flood Risk
480 min Winter	32.651	0.701	0.0	4.3	4.3	90.9	Flood Risk
600 min Winter	32.641	0.691	0.0	4.3	4.3	88.1	Flood Risk
720 min Winter	32.628	0.678	0.0	4.2	4.2	84.9	Flood Risk
960 min Winter	32.576	0.626	0.0	4.0	4.0	72.5	Flood Risk
1440 min Winter	32.485	0.535	0.0	3.7	3.7	52.8	Flood Risk
2160 min Winter	32.372	0.422	0.0	3.3	3.3	32.9	O K
2880 min Winter	32.284	0.334	0.0	2.9	2.9	20.6	O K
4320 min Winter	32.182	0.232	0.0	2.4	2.4	10.0	O K
5760 min Winter	32.120	0.170	0.0	2.0	2.0	5.4	O K
7200 min Winter	32.082	0.132	0.0	1.7	1.7	3.2	O K
8640 min Winter	32.057	0.107	0.0	1.5	1.5	2.1	O K
10080 min Winter	32.041	0.091	0.0	1.3	1.3	1.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.504	0.0	292.8	4416
10080 min Summer	1.343	0.0	303.0	5144
15 min Winter	167.069	0.0	55.9	18
30 min Winter	102.772	0.0	69.8	32
60 min Winter	63.219	0.0	86.9	60
120 min Winter	38.889	0.0	107.9	118
180 min Winter	29.268	0.0	122.3	172
240 min Winter	23.922	0.0	133.7	202
360 min Winter	18.004	0.0	151.3	274
480 min Winter	14.716	0.0	165.2	352
600 min Winter	12.585	0.0	176.7	428
720 min Winter	11.075	0.0	186.7	504
960 min Winter	8.655	0.0	194.3	644
1440 min Winter	6.114	0.0	205.4	910
2160 min Winter	4.320	0.0	216.7	1276
2880 min Winter	3.376	0.0	224.8	1640
4320 min Winter	2.505	0.0	248.6	2332
5760 min Winter	2.027	0.0	266.5	3000
7200 min Winter	1.720	0.0	280.9	3680
8640 min Winter	1.504	0.0	292.9	4408
10080 min Winter	1.343	0.0	303.2	5136

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Cascade Rainfall Details for pp1.SRCX

Rainfall Model	FEH	D2 (1km)	0.258	Cv (Summer)	1.000
Return Period (years)	100	D3 (1km)	0.379	Cv (Winter)	1.000
FEH Rainfall Version	1999	E (1km)	0.310	Shortest Storm (mins)	15
Site Location		F (1km)	2.349	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+45
D1 (1km)	0.414	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.145

Time (mins) From:	To:	Area (ha)
0	4	0.145

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Cascade Model Details for pp1.SRCX

Storage is Online Cover Level (m) 32.750

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.8
Membrane Percolation (mm/hr)	1000	Length (m)	105.0
Max Percolation (l/s)	256.7	Slope (1:X)	140.0
Safety Factor	1.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	31.950	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 31.950

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Cascade Summary of Results for pp2.SRCX

Upstream Structures | **Outflow To** | **Overflow To**

pp2a.SRCX, pp1.SRCX | pp2b.SRCX | (None)

Half Drain Time : 32 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	31.927	0.727	0.0	17.2	17.2	44.5	Flood Risk
30 min Summer	31.967	0.767	0.0	17.7	17.7	49.6	Flood Risk
60 min Summer	31.984	0.784	0.0	17.9	17.9	51.9	Flood Risk
120 min Summer	31.980	0.780	0.0	17.8	17.8	51.3	Flood Risk
180 min Summer	31.962	0.762	0.0	17.6	17.6	49.0	Flood Risk
240 min Summer	31.940	0.740	0.0	17.3	17.3	46.3	Flood Risk
360 min Summer	31.896	0.696	0.0	16.8	16.8	40.8	Flood Risk
480 min Summer	31.852	0.652	0.0	16.2	16.2	35.9	Flood Risk
600 min Summer	31.813	0.613	0.0	15.7	15.7	31.7	Flood Risk
720 min Summer	31.777	0.577	0.0	15.1	15.1	28.1	Flood Risk
960 min Summer	31.692	0.492	0.0	13.9	13.9	20.4	O K
1440 min Summer	31.575	0.375	0.0	11.9	11.9	11.9	O K
2160 min Summer	31.474	0.274	0.0	9.9	9.9	6.3	O K
2880 min Summer	31.417	0.217	0.0	8.5	8.5	4.0	O K
4320 min Summer	31.364	0.164	0.0	7.0	7.0	2.3	O K
5760 min Summer	31.338	0.138	0.0	6.1	6.1	1.6	O K
7200 min Summer	31.327	0.127	0.0	5.4	5.4	1.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	167.069	0.0	121.1	17
30 min Summer	102.772	0.0	151.1	30
60 min Summer	63.219	0.0	188.4	46
120 min Summer	38.889	0.0	233.7	82
180 min Summer	29.268	0.0	264.9	116
240 min Summer	23.922	0.0	289.3	150
360 min Summer	18.004	0.0	327.4	216
480 min Summer	14.716	0.0	357.3	280
600 min Summer	12.585	0.0	382.3	342
720 min Summer	11.075	0.0	403.9	404
960 min Summer	8.655	0.0	420.4	522
1440 min Summer	6.114	0.0	444.4	762
2160 min Summer	4.320	0.0	469.4	1108
2880 min Summer	3.376	0.0	487.1	1472
4320 min Summer	2.505	0.0	538.9	2204
5760 min Summer	2.027	0.0	578.3	2936
7200 min Summer	1.720	0.0	609.8	3672

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Cascade Summary of Results for pp2.SRCX

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
8640 min Summer	31.318	0.118	0.0	4.8	4.8	1.2	O K
10080 min Summer	31.310	0.110	0.0	4.4	4.4	1.0	O K
15 min Winter	31.927	0.727	0.0	17.2	17.2	44.6	Flood Risk
30 min Winter	31.968	0.768	0.0	17.7	17.7	49.8	Flood Risk
60 min Winter	31.981	0.781	0.0	17.8	17.8	51.5	Flood Risk
120 min Winter	31.963	0.763	0.0	17.6	17.6	49.1	Flood Risk
180 min Winter	31.929	0.729	0.0	17.2	17.2	44.8	Flood Risk
240 min Winter	31.893	0.693	0.0	16.7	16.7	40.5	Flood Risk
360 min Winter	31.823	0.623	0.0	15.8	15.8	32.8	Flood Risk
480 min Winter	31.762	0.562	0.0	14.9	14.9	26.7	Flood Risk
600 min Winter	31.709	0.509	0.0	14.1	14.1	21.9	Flood Risk
720 min Winter	31.664	0.464	0.0	13.4	13.4	18.2	O K
960 min Winter	31.573	0.373	0.0	11.9	11.9	11.7	O K
1440 min Winter	31.464	0.264	0.0	9.7	9.7	5.9	O K
2160 min Winter	31.386	0.186	0.0	7.7	7.7	2.9	O K
2880 min Winter	31.346	0.146	0.0	6.5	6.5	1.8	O K
4320 min Winter	31.323	0.123	0.0	5.2	5.2	1.3	O K
5760 min Winter	31.309	0.109	0.0	4.3	4.3	1.0	O K
7200 min Winter	31.299	0.099	0.0	3.7	3.7	0.8	O K
8640 min Winter	31.291	0.091	0.0	3.2	3.2	0.7	O K
10080 min Winter	31.286	0.086	0.0	2.9	2.9	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.504	0.0	636.2	4400
10080 min Summer	1.343	0.0	658.8	5112
15 min Winter	167.069	0.0	121.1	17
30 min Winter	102.772	0.0	151.1	30
60 min Winter	63.219	0.0	188.4	48
120 min Winter	38.889	0.0	233.7	86
180 min Winter	29.268	0.0	264.9	124
240 min Winter	23.922	0.0	289.3	158
360 min Winter	18.004	0.0	327.4	226
480 min Winter	14.716	0.0	357.3	290
600 min Winter	12.585	0.0	382.3	354
720 min Winter	11.075	0.0	403.9	414
960 min Winter	8.655	0.0	420.4	532
1440 min Winter	6.114	0.0	444.4	766
2160 min Winter	4.320	0.0	469.4	1128
2880 min Winter	3.376	0.0	487.2	1500
4320 min Winter	2.505	0.0	538.9	2240
5760 min Winter	2.027	0.0	578.3	2928
7200 min Winter	1.720	0.0	609.9	3664
8640 min Winter	1.504	0.0	636.4	4376
10080 min Winter	1.343	0.0	659.1	5128

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Cascade Rainfall Details for pp2.SRCX

Rainfall Model	FEH	D2 (1km)	0.258	Cv (Summer)	1.000
Return Period (years)	100	D3 (1km)	0.379	Cv (Winter)	1.000
FEH Rainfall Version	1999	E (1km)	0.310	Shortest Storm (mins)	15
Site Location		F (1km)	2.349	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+45
D1 (1km)	0.414	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.134

Time (mins) From:	To:	Area (ha)
0	4	0.134

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Cascade Model Details for pp2.SRCX

Storage is Online Cover Level (m) 32.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.5
Membrane Percolation (mm/hr)	1000	Length (m)	73.0
Max Percolation (l/s)	152.1	Slope (1:X)	75.0
Safety Factor	1.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	31.200	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 31.200

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Cascade Summary of Results for pp2a.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	pp2.SRCX	(None)

Half Drain Time : 282 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	31.622	0.122	0.0	0.6	0.6	12.2	O K
30 min Summer	31.651	0.151	0.0	0.7	0.7	15.1	O K
60 min Summer	31.683	0.183	0.0	0.8	0.8	18.3	O K
120 min Summer	31.713	0.213	0.0	0.8	0.8	21.4	Flood Risk
180 min Summer	31.728	0.228	0.0	0.9	0.9	22.8	Flood Risk
240 min Summer	31.736	0.236	0.0	0.9	0.9	23.6	Flood Risk
360 min Summer	31.746	0.246	0.0	0.9	0.9	24.6	Flood Risk
480 min Summer	31.752	0.252	0.0	0.9	0.9	25.2	Flood Risk
600 min Summer	31.755	0.255	0.0	0.9	0.9	25.5	Flood Risk
720 min Summer	31.755	0.255	0.0	0.9	0.9	25.5	Flood Risk
960 min Summer	31.740	0.240	0.0	0.9	0.9	24.0	Flood Risk
1440 min Summer	31.711	0.211	0.0	0.8	0.8	21.1	Flood Risk
2160 min Summer	31.676	0.176	0.0	0.8	0.8	17.6	O K
2880 min Summer	31.650	0.150	0.0	0.7	0.7	15.0	O K
4320 min Summer	31.621	0.121	0.0	0.6	0.6	12.1	O K
5760 min Summer	31.601	0.101	0.0	0.6	0.6	10.1	O K
7200 min Summer	31.586	0.086	0.0	0.5	0.5	8.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	167.069	0.0	12.0	19
30 min Summer	102.772	0.0	15.2	33
60 min Summer	63.219	0.0	19.5	62
120 min Summer	38.889	0.0	24.4	122
180 min Summer	29.268	0.0	27.8	180
240 min Summer	23.922	0.0	30.4	208
360 min Summer	18.004	0.0	34.5	270
480 min Summer	14.716	0.0	37.7	338
600 min Summer	12.585	0.0	40.4	406
720 min Summer	11.075	0.0	42.7	476
960 min Summer	8.655	0.0	44.4	610
1440 min Summer	6.114	0.0	46.8	880
2160 min Summer	4.320	0.0	49.5	1272
2880 min Summer	3.376	0.0	51.2	1644
4320 min Summer	2.505	0.0	56.3	2376
5760 min Summer	2.027	0.0	60.4	3112
7200 min Summer	1.720	0.0	63.4	3816

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Cascade Summary of Results for pp2a.SRCX

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
8640 min Summer	31.574	0.074	0.0	0.5	0.5	7.4	O K
10080 min Summer	31.566	0.066	0.0	0.4	0.4	6.6	O K
15 min Winter	31.622	0.122	0.0	0.6	0.6	12.2	O K
30 min Winter	31.651	0.151	0.0	0.7	0.7	15.1	O K
60 min Winter	31.683	0.183	0.0	0.8	0.8	18.3	O K
120 min Winter	31.714	0.214	0.0	0.8	0.8	21.4	Flood Risk
180 min Winter	31.729	0.229	0.0	0.9	0.9	22.9	Flood Risk
240 min Winter	31.737	0.237	0.0	0.9	0.9	23.7	Flood Risk
360 min Winter	31.745	0.245	0.0	0.9	0.9	24.5	Flood Risk
480 min Winter	31.748	0.248	0.0	0.9	0.9	24.9	Flood Risk
600 min Winter	31.748	0.248	0.0	0.9	0.9	24.8	Flood Risk
720 min Winter	31.746	0.246	0.0	0.9	0.9	24.6	Flood Risk
960 min Winter	31.726	0.226	0.0	0.9	0.9	22.6	Flood Risk
1440 min Winter	31.689	0.189	0.0	0.8	0.8	18.9	O K
2160 min Winter	31.648	0.148	0.0	0.7	0.7	14.8	O K
2880 min Winter	31.618	0.118	0.0	0.6	0.6	11.8	O K
4320 min Winter	31.587	0.087	0.0	0.5	0.5	8.7	O K
5760 min Winter	31.568	0.068	0.0	0.4	0.4	6.8	O K
7200 min Winter	31.555	0.055	0.0	0.4	0.4	5.5	O K
8640 min Winter	31.547	0.047	0.0	0.3	0.3	4.7	O K
10080 min Winter	31.542	0.042	0.0	0.3	0.3	4.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.504	0.0	65.8	4504
10080 min Summer	1.343	0.0	67.7	5248
15 min Winter	167.069	0.0	12.0	18
30 min Winter	102.772	0.0	15.2	33
60 min Winter	63.219	0.0	19.5	62
120 min Winter	38.889	0.0	24.4	118
180 min Winter	29.268	0.0	27.8	174
240 min Winter	23.922	0.0	30.4	226
360 min Winter	18.004	0.0	34.5	280
480 min Winter	14.716	0.0	37.7	358
600 min Winter	12.585	0.0	40.4	434
720 min Winter	11.075	0.0	42.7	510
960 min Winter	8.655	0.0	44.4	654
1440 min Winter	6.114	0.0	46.8	936
2160 min Winter	4.320	0.0	49.6	1320
2880 min Winter	3.376	0.0	51.2	1700
4320 min Winter	2.505	0.0	56.3	2424
5760 min Winter	2.027	0.0	60.4	3168
7200 min Winter	1.720	0.0	63.4	3824
8640 min Winter	1.504	0.0	65.9	4504
10080 min Winter	1.343	0.0	67.8	5224

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Cascade Rainfall Details for pp2a.SRCX

Rainfall Model	FEH	D2 (1km)	0.258	Cv (Summer)	1.000
Return Period (years)	100	D3 (1km)	0.379	Cv (Winter)	1.000
FEH Rainfall Version	1999	E (1km)	0.310	Shortest Storm (mins)	15
Site Location		F (1km)	2.349	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+45
D1 (1km)	0.414	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.034

Time (mins) From:	To:	Area (ha)
0	4	0.034

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Cascade Model Details for pp2a.SRCX

Storage is Online Cover Level (m) 32.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	14.5
Membrane Percolation (mm/hr)	1000	Length (m)	23.0
Max Percolation (l/s)	92.6	Slope (1:X)	0.0
Safety Factor	1.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	31.500	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.030 Discharge Coefficient 0.600 Invert Level (m) 31.500

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Cascade Summary of Results for pp2b.SRCX

Upstream Structures	Outflow To	Overflow To
pp2.SRCX pp2a.SRCX pp1.SRCX	basin.SRCX	(None)

Half Drain Time : 15 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	31.244	0.544	0.0	14.7	14.7	16.7	Flood Risk
30 min Summer	31.319	0.619	0.0	15.7	15.7	19.9	Flood Risk
60 min Summer	31.399	0.699	0.0	16.8	16.8	23.4	Flood Risk
120 min Summer	31.456	0.756	0.0	17.5	17.5	25.8	Flood Risk
180 min Summer	31.458	0.758	0.0	17.6	17.6	25.9	Flood Risk
240 min Summer	31.455	0.755	0.0	17.5	17.5	25.7	Flood Risk
360 min Summer	31.438	0.738	0.0	17.3	17.3	25.0	Flood Risk
480 min Summer	31.413	0.713	0.0	17.0	17.0	23.9	Flood Risk
600 min Summer	31.383	0.683	0.0	16.6	16.6	22.7	Flood Risk
720 min Summer	31.352	0.652	0.0	16.2	16.2	21.3	Flood Risk
960 min Summer	31.264	0.564	0.0	15.0	15.0	17.6	Flood Risk
1440 min Summer	31.136	0.436	0.0	13.0	13.0	12.1	O K
2160 min Summer	31.019	0.319	0.0	10.8	10.8	7.1	O K
2880 min Summer	30.951	0.251	0.0	9.4	9.4	4.4	O K
4320 min Summer	30.888	0.188	0.0	7.7	7.7	2.5	O K
5760 min Summer	30.852	0.152	0.0	6.7	6.7	1.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	167.069	0.0	132.1	46
30 min Summer	102.772	0.0	164.8	56
60 min Summer	63.219	0.0	205.4	72
120 min Summer	38.889	0.0	254.7	120
180 min Summer	29.268	0.0	288.7	148
240 min Summer	23.922	0.0	315.3	178
360 min Summer	18.004	0.0	356.9	242
480 min Summer	14.716	0.0	389.4	306
600 min Summer	12.585	0.0	416.6	368
720 min Summer	11.075	0.0	440.2	432
960 min Summer	8.655	0.0	458.2	550
1440 min Summer	6.114	0.0	484.4	786
2160 min Summer	4.320	0.0	511.6	1136
2880 min Summer	3.376	0.0	531.0	1484
4320 min Summer	2.505	0.0	587.4	2208
5760 min Summer	2.027	0.0	630.3	2936

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Cascade Summary of Results for pp2b.SRCX

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
7200 min Summer	30.835	0.135	0.0	5.9	5.9	1.3	O K
8640 min Summer	30.825	0.125	0.0	5.3	5.3	1.1	O K
10080 min Summer	30.817	0.117	0.0	4.8	4.8	1.0	O K
15 min Winter	31.244	0.544	0.0	14.7	14.7	16.7	Flood Risk
30 min Winter	31.320	0.620	0.0	15.8	15.8	19.9	Flood Risk
60 min Winter	31.401	0.701	0.0	16.8	16.8	23.4	Flood Risk
120 min Winter	31.459	0.759	0.0	17.6	17.6	25.9	Flood Risk
180 min Winter	31.454	0.754	0.0	17.5	17.5	25.7	Flood Risk
240 min Winter	31.442	0.742	0.0	17.4	17.4	25.2	Flood Risk
360 min Winter	31.398	0.698	0.0	16.8	16.8	23.3	Flood Risk
480 min Winter	31.346	0.646	0.0	16.1	16.1	21.1	Flood Risk
600 min Winter	31.295	0.595	0.0	15.4	15.4	18.9	Flood Risk
720 min Winter	31.247	0.547	0.0	14.7	14.7	16.8	Flood Risk
960 min Winter	31.142	0.442	0.0	13.1	13.1	12.4	O K
1440 min Winter	31.012	0.312	0.0	10.7	10.7	6.8	O K
2160 min Winter	30.916	0.216	0.0	8.5	8.5	3.3	O K
2880 min Winter	30.866	0.166	0.0	7.1	7.1	1.9	O K
4320 min Winter	30.831	0.131	0.0	5.6	5.6	1.2	O K
5760 min Winter	30.816	0.116	0.0	4.7	4.7	0.9	O K
7200 min Winter	30.805	0.105	0.0	4.0	4.0	0.8	O K
8640 min Winter	30.796	0.096	0.0	3.5	3.5	0.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Summer	1.720	0.0	664.7	3672
8640 min Summer	1.504	0.0	693.5	4400
10080 min Summer	1.343	0.0	718.2	5112
15 min Winter	167.069	0.0	132.1	46
30 min Winter	102.772	0.0	164.8	55
60 min Winter	63.219	0.0	205.4	72
120 min Winter	38.889	0.0	254.7	118
180 min Winter	29.268	0.0	288.7	150
240 min Winter	23.922	0.0	315.3	182
360 min Winter	18.004	0.0	356.9	250
480 min Winter	14.716	0.0	389.4	316
600 min Winter	12.585	0.0	416.6	380
720 min Winter	11.075	0.0	440.2	442
960 min Winter	8.655	0.0	458.2	560
1440 min Winter	6.114	0.0	484.4	794
2160 min Winter	4.320	0.0	511.6	1148
2880 min Winter	3.376	0.0	531.0	1500
4320 min Winter	2.505	0.0	587.4	2248
5760 min Winter	2.027	0.0	630.4	2936
7200 min Winter	1.720	0.0	664.8	3672
8640 min Winter	1.504	0.0	693.7	4336

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Cascade Summary of Results for pp2b.SRCX

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
10080 min Winter	30.790	0.090	0.0	3.2	3.2	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	1.343	0.0	718.6	5048

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Cascade Rainfall Details for pp2b.SRCX

Rainfall Model	FEH	D2 (1km)	0.258	Cv (Summer)	1.000
Return Period (years)	100	D3 (1km)	0.379	Cv (Winter)	1.000
FEH Rainfall Version	1999	E (1km)	0.310	Shortest Storm (mins)	15
Site Location		F (1km)	2.349	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+45
D1 (1km)	0.414	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.028

Time (mins) From:	To:	Area (ha)
0	4	0.028

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Cascade Model Details for pp2b.SRCX

Storage is Online Cover Level (m) 31.500

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.2
Membrane Percolation (mm/hr)	1000	Length (m)	23.0
Max Percolation (l/s)	39.6	Slope (1:X)	75.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	30.700	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 30.700

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Cascade Summary of Results for pp3.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	pp4 a.SRCX	(None)

Half Drain Time : 89 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	31.853	0.653	0.0	5.9	5.9	41.3	Flood Risk
30 min Summer	31.909	0.709	0.0	6.2	6.2	48.6	Flood Risk
60 min Summer	31.949	0.749	0.0	6.4	6.4	54.3	Flood Risk
120 min Summer	31.967	0.767	0.0	6.5	6.5	57.0	Flood Risk
180 min Summer	31.969	0.769	0.0	6.5	6.5	57.2	Flood Risk
240 min Summer	31.964	0.764	0.0	6.4	6.4	56.4	Flood Risk
360 min Summer	31.944	0.744	0.0	6.4	6.4	53.6	Flood Risk
480 min Summer	31.922	0.722	0.0	6.2	6.2	50.4	Flood Risk
600 min Summer	31.898	0.698	0.0	6.1	6.1	47.2	Flood Risk
720 min Summer	31.875	0.675	0.0	6.0	6.0	44.1	Flood Risk
960 min Summer	31.804	0.604	0.0	5.7	5.7	35.3	Flood Risk
1440 min Summer	31.690	0.490	0.0	5.1	5.1	23.2	O K
2160 min Summer	31.566	0.366	0.0	4.4	4.4	12.9	O K
2880 min Summer	31.481	0.281	0.0	3.8	3.8	7.6	O K
4320 min Summer	31.394	0.194	0.0	3.0	3.0	3.6	O K
5760 min Summer	31.343	0.143	0.0	2.5	2.5	2.0	O K
7200 min Summer	31.312	0.112	0.0	2.1	2.1	1.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	167.069	0.0	45.3	18
30 min Summer	102.772	0.0	56.5	32
60 min Summer	63.219	0.0	70.2	60
120 min Summer	38.889	0.0	87.0	94
180 min Summer	29.268	0.0	98.5	126
240 min Summer	23.922	0.0	107.6	162
360 min Summer	18.004	0.0	121.7	230
480 min Summer	14.716	0.0	132.8	298
600 min Summer	12.585	0.0	142.1	364
720 min Summer	11.075	0.0	150.1	432
960 min Summer	8.655	0.0	156.3	558
1440 min Summer	6.114	0.0	165.3	794
2160 min Summer	4.320	0.0	174.5	1148
2880 min Summer	3.376	0.0	181.2	1500
4320 min Summer	2.505	0.0	200.5	2204
5760 min Summer	2.027	0.0	215.2	2936
7200 min Summer	1.720	0.0	227.0	3672

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Cascade Summary of Results for pp3.SRCX

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
8640 min Summer	31.293	0.093	0.0	1.9	1.9	0.8	O K
10080 min Summer	31.282	0.082	0.0	1.7	1.7	0.7	O K
15 min Winter	31.853	0.653	0.0	5.9	5.9	41.3	Flood Risk
30 min Winter	31.910	0.710	0.0	6.2	6.2	48.8	Flood Risk
60 min Winter	31.951	0.751	0.0	6.4	6.4	54.6	Flood Risk
120 min Winter	31.966	0.766	0.0	6.4	6.4	56.8	Flood Risk
180 min Winter	31.962	0.762	0.0	6.4	6.4	56.2	Flood Risk
240 min Winter	31.950	0.750	0.0	6.4	6.4	54.4	Flood Risk
360 min Winter	31.915	0.715	0.0	6.2	6.2	49.5	Flood Risk
480 min Winter	31.877	0.677	0.0	6.0	6.0	44.4	Flood Risk
600 min Winter	31.839	0.639	0.0	5.9	5.9	39.5	Flood Risk
720 min Winter	31.802	0.602	0.0	5.7	5.7	35.1	Flood Risk
960 min Winter	31.708	0.508	0.0	5.2	5.2	25.0	Flood Risk
1440 min Winter	31.564	0.364	0.0	4.3	4.3	12.8	O K
2160 min Winter	31.431	0.231	0.0	3.4	3.4	5.1	O K
2880 min Winter	31.359	0.159	0.0	2.7	2.7	2.4	O K
4320 min Winter	31.302	0.102	0.0	2.0	2.0	1.0	O K
5760 min Winter	31.281	0.081	0.0	1.6	1.6	0.6	O K
7200 min Winter	31.272	0.072	0.0	1.4	1.4	0.5	O K
8640 min Winter	31.266	0.066	0.0	1.2	1.2	0.4	O K
10080 min Winter	31.261	0.061	0.0	1.1	1.1	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.504	0.0	237.0	4352
10080 min Summer	1.343	0.0	245.6	5112
15 min Winter	167.069	0.0	45.3	18
30 min Winter	102.772	0.0	56.5	31
60 min Winter	63.219	0.0	70.2	58
120 min Winter	38.889	0.0	87.0	96
180 min Winter	29.268	0.0	98.5	134
240 min Winter	23.922	0.0	107.6	172
360 min Winter	18.004	0.0	121.7	246
480 min Winter	14.716	0.0	132.8	316
600 min Winter	12.585	0.0	142.1	386
720 min Winter	11.075	0.0	150.1	450
960 min Winter	8.655	0.0	156.3	576
1440 min Winter	6.114	0.0	165.3	808
2160 min Winter	4.320	0.0	174.5	1144
2880 min Winter	3.376	0.0	181.2	1472
4320 min Winter	2.505	0.0	200.5	2176
5760 min Winter	2.027	0.0	215.2	2912
7200 min Winter	1.720	0.0	227.1	3648
8640 min Winter	1.504	0.0	237.0	4264
10080 min Winter	1.343	0.0	245.6	4952

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Cascade Rainfall Details for pp3.SRCX

Rainfall Model	FEH	D2 (1km)	0.258	Cv (Summer)	1.000
Return Period (years)	100	D3 (1km)	0.379	Cv (Winter)	1.000
FEH Rainfall Version	1999	E (1km)	0.310	Shortest Storm (mins)	15
Site Location		F (1km)	2.349	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+45
D1 (1km)	0.414	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.116

Time (mins) From:	To:	Area (ha)
0	4	0.116

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Cascade Model Details for pp3.SRCX

Storage is Online Cover Level (m) 32.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	12.9
Membrane Percolation (mm/hr)	1000	Length (m)	48.0
Max Percolation (l/s)	172.0	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	31.200	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.060 Discharge Coefficient 0.600 Invert Level (m) 31.200

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Cascade Summary of Results for pp4.SRCX

Upstream Structures	Outflow To	Overflow To
pp4 a.SRCX pp3.SRCX	pp6.SRCX	(None)

Half Drain Time : 5 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	31.460	0.760	0.0	67.8	67.8	34.9	Flood Risk
30 min Summer	31.434	0.734	0.0	66.5	66.5	32.5	Flood Risk
60 min Summer	31.357	0.657	0.0	62.3	62.3	26.1	Flood Risk
120 min Summer	31.236	0.536	0.0	55.1	55.1	17.3	Flood Risk
180 min Summer	31.147	0.447	0.0	49.2	49.2	12.0	O K
240 min Summer	31.083	0.383	0.0	44.4	44.4	8.8	O K
360 min Summer	31.004	0.304	0.0	37.7	37.7	5.6	O K
480 min Summer	30.968	0.268	0.0	32.9	32.9	4.3	O K
600 min Summer	30.947	0.247	0.0	29.2	29.2	3.7	O K
720 min Summer	30.931	0.231	0.0	26.6	26.6	3.2	O K
960 min Summer	30.905	0.205	0.0	22.0	22.0	2.5	O K
1440 min Summer	30.875	0.175	0.0	17.0	17.0	1.8	O K
2160 min Summer	30.848	0.148	0.0	13.1	13.1	1.3	O K
2880 min Summer	30.830	0.130	0.0	10.9	10.9	1.0	O K
4320 min Summer	30.812	0.112	0.0	8.5	8.5	0.8	O K
5760 min Summer	30.803	0.103	0.0	7.1	7.1	0.6	O K
7200 min Summer	30.797	0.097	0.0	6.1	6.1	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	167.069	0.0	129.6	13
30 min Summer	102.772	0.0	161.0	21
60 min Summer	63.219	0.0	199.7	38
120 min Summer	38.889	0.0	247.2	68
180 min Summer	29.268	0.0	279.8	98
240 min Summer	23.922	0.0	305.4	128
360 min Summer	18.004	0.0	345.4	186
480 min Summer	14.716	0.0	376.8	246
600 min Summer	12.585	0.0	403.0	306
720 min Summer	11.075	0.0	425.7	366
960 min Summer	8.655	0.0	443.3	490
1440 min Summer	6.114	0.0	468.9	734
2160 min Summer	4.320	0.0	495.6	1100
2880 min Summer	3.376	0.0	514.9	1468
4320 min Summer	2.505	0.0	570.7	2196
5760 min Summer	2.027	0.0	613.2	2928
7200 min Summer	1.720	0.0	647.8	3632

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Cascade Summary of Results for pp4.SRCX

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
8640 min Summer	30.792	0.092	0.0	5.3	5.3	0.5	O K
10080 min Summer	30.786	0.086	0.0	4.8	4.8	0.4	O K
15 min Winter	31.448	0.748	0.0	67.2	67.2	33.8	Flood Risk
30 min Winter	31.396	0.696	0.0	64.4	64.4	29.3	Flood Risk
60 min Winter	31.277	0.577	0.0	57.7	57.7	20.1	Flood Risk
120 min Winter	31.112	0.412	0.0	46.7	46.7	10.3	O K
180 min Winter	31.020	0.320	0.0	39.1	39.1	6.2	O K
240 min Winter	30.975	0.275	0.0	34.1	34.1	4.6	O K
360 min Winter	30.937	0.237	0.0	27.5	27.5	3.4	O K
480 min Winter	30.915	0.215	0.0	23.7	23.7	2.8	O K
600 min Winter	30.900	0.200	0.0	21.1	21.1	2.4	O K
720 min Winter	30.889	0.189	0.0	19.4	19.4	2.2	O K
960 min Winter	30.870	0.170	0.0	16.2	16.2	1.7	O K
1440 min Winter	30.843	0.143	0.0	12.5	12.5	1.2	O K
2160 min Winter	30.818	0.118	0.0	9.4	9.4	0.8	O K
2880 min Winter	30.806	0.106	0.0	7.6	7.6	0.7	O K
4320 min Winter	30.795	0.095	0.0	5.8	5.8	0.5	O K
5760 min Winter	30.784	0.084	0.0	4.6	4.6	0.4	O K
7200 min Winter	30.777	0.077	0.0	3.9	3.9	0.4	O K
8640 min Winter	30.772	0.072	0.0	3.4	3.4	0.3	O K
10080 min Winter	30.768	0.068	0.0	3.1	3.1	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.504	0.0	677.0	4376
10080 min Summer	1.343	0.0	702.3	4984
15 min Winter	167.069	0.0	129.6	13
30 min Winter	102.772	0.0	161.0	22
60 min Winter	63.219	0.0	199.7	38
120 min Winter	38.889	0.0	247.2	68
180 min Winter	29.268	0.0	279.8	98
240 min Winter	23.922	0.0	305.4	126
360 min Winter	18.004	0.0	345.4	186
480 min Winter	14.716	0.0	376.8	248
600 min Winter	12.585	0.0	403.0	308
720 min Winter	11.075	0.0	425.7	368
960 min Winter	8.655	0.0	443.3	492
1440 min Winter	6.114	0.0	468.9	748
2160 min Winter	4.320	0.0	495.6	1124
2880 min Winter	3.376	0.0	514.9	1468
4320 min Winter	2.505	0.0	570.7	2192
5760 min Winter	2.027	0.0	613.2	2904
7200 min Winter	1.720	0.0	647.8	3672
8640 min Winter	1.504	0.0	677.0	4304
10080 min Winter	1.343	0.0	702.4	5128

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Cascade Rainfall Details for pp4.SRCX

Rainfall Model	FEH	D2 (1km)	0.258	Cv (Summer)	1.000
Return Period (years)	100	D3 (1km)	0.379	Cv (Winter)	1.000
FEH Rainfall Version	1999	E (1km)	0.310	Shortest Storm (mins)	15
Site Location		F (1km)	2.349	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+45
D1 (1km)	0.414	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.167

Time (mins) From:	To:	Area (ha)
0	4	0.167

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Cascade Model Details for pp4.SRCX

Storage is Online Cover Level (m) 31.500

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.1
Membrane Percolation (mm/hr)	1000	Length (m)	83.0
Max Percolation (l/s)	140.6	Slope (1:X)	66.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	30.700	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.200 Discharge Coefficient 0.600 Invert Level (m) 30.700

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Cascade Summary of Results for pp4 a.SRCX

Upstream Structures	Outflow To	Overflow To
pp3.SRCX	pp4.SRCX	(None)

Half Drain Time : 45 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	31.469	0.269	0.0	5.6	5.6	18.4	O K
30 min Summer	31.533	0.333	0.0	6.4	6.4	22.9	O K
60 min Summer	31.608	0.408	0.0	7.1	7.1	28.0	O K
120 min Summer	31.671	0.471	0.0	7.7	7.7	32.3	O K
180 min Summer	31.691	0.491	0.0	7.9	7.9	33.7	O K
240 min Summer	31.700	0.500	0.0	8.0	8.0	34.3	Flood Risk
360 min Summer	31.703	0.503	0.0	8.0	8.0	34.5	Flood Risk
480 min Summer	31.696	0.496	0.0	8.0	8.0	34.1	O K
600 min Summer	31.686	0.486	0.0	7.9	7.9	33.4	O K
720 min Summer	31.674	0.474	0.0	7.8	7.8	32.6	O K
960 min Summer	31.630	0.430	0.0	7.4	7.4	29.5	O K
1440 min Summer	31.555	0.355	0.0	6.6	6.6	24.4	O K
2160 min Summer	31.473	0.273	0.0	5.7	5.7	18.7	O K
2880 min Summer	31.415	0.215	0.0	5.0	5.0	14.8	O K
4320 min Summer	31.356	0.156	0.0	4.0	4.0	10.7	O K
5760 min Summer	31.322	0.122	0.0	3.4	3.4	8.4	O K
7200 min Summer	31.304	0.104	0.0	3.0	3.0	7.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	167.069	0.0	62.4	39
30 min Summer	102.772	0.0	77.8	34
60 min Summer	63.219	0.0	96.8	62
120 min Summer	38.889	0.0	119.9	120
180 min Summer	29.268	0.0	135.9	152
240 min Summer	23.922	0.0	148.4	180
360 min Summer	18.004	0.0	167.9	246
480 min Summer	14.716	0.0	183.2	314
600 min Summer	12.585	0.0	196.0	380
720 min Summer	11.075	0.0	207.1	448
960 min Summer	8.655	0.0	215.6	578
1440 min Summer	6.114	0.0	227.9	824
2160 min Summer	4.320	0.0	240.7	1188
2880 min Summer	3.376	0.0	249.9	1532
4320 min Summer	2.505	0.0	276.6	2244
5760 min Summer	2.027	0.0	296.9	2944
7200 min Summer	1.720	0.0	313.2	3656

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Cascade Summary of Results for pp4 a.SRCX

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
8640 min Summer	31.294	0.094	0.0	2.6	2.6	6.5	O K
10080 min Summer	31.287	0.087	0.0	2.3	2.3	6.0	O K
15 min Winter	31.469	0.269	0.0	5.6	5.6	18.4	O K
30 min Winter	31.533	0.333	0.0	6.4	6.4	22.8	O K
60 min Winter	31.609	0.409	0.0	7.2	7.2	28.0	O K
120 min Winter	31.673	0.473	0.0	7.8	7.8	32.5	O K
180 min Winter	31.692	0.492	0.0	7.9	7.9	33.8	O K
240 min Winter	31.700	0.500	0.0	8.0	8.0	34.4	Flood Risk
360 min Winter	31.696	0.496	0.0	8.0	8.0	34.1	O K
480 min Winter	31.680	0.480	0.0	7.8	7.8	32.9	O K
600 min Winter	31.660	0.460	0.0	7.6	7.6	31.6	O K
720 min Winter	31.638	0.438	0.0	7.4	7.4	30.1	O K
960 min Winter	31.576	0.376	0.0	6.8	6.8	25.8	O K
1440 min Winter	31.479	0.279	0.0	5.8	5.8	19.2	O K
2160 min Winter	31.387	0.187	0.0	4.5	4.5	12.8	O K
2880 min Winter	31.335	0.135	0.0	3.7	3.7	9.3	O K
4320 min Winter	31.299	0.099	0.0	2.8	2.8	6.8	O K
5760 min Winter	31.286	0.086	0.0	2.2	2.2	5.9	O K
7200 min Winter	31.277	0.077	0.0	1.9	1.9	5.3	O K
8640 min Winter	31.271	0.071	0.0	1.7	1.7	4.8	O K
10080 min Winter	31.266	0.066	0.0	1.5	1.5	4.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.504	0.0	327.0	4400
10080 min Summer	1.343	0.0	338.7	5136
15 min Winter	167.069	0.0	62.4	39
30 min Winter	102.772	0.0	77.8	34
60 min Winter	63.219	0.0	96.8	62
120 min Winter	38.889	0.0	119.9	118
180 min Winter	29.268	0.0	135.9	162
240 min Winter	23.922	0.0	148.4	186
360 min Winter	18.004	0.0	167.9	260
480 min Winter	14.716	0.0	183.2	332
600 min Winter	12.585	0.0	196.0	404
720 min Winter	11.075	0.0	207.1	470
960 min Winter	8.655	0.0	215.6	600
1440 min Winter	6.114	0.0	227.9	840
2160 min Winter	4.320	0.0	240.7	1188
2880 min Winter	3.376	0.0	249.9	1524
4320 min Winter	2.505	0.0	276.6	2200
5760 min Winter	2.027	0.0	296.9	2936
7200 min Winter	1.720	0.0	313.3	3600
8640 min Winter	1.504	0.0	327.0	4384
10080 min Winter	1.343	0.0	338.9	5056

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Cascade Rainfall Details for pp4 a.SRCX

Rainfall Model	FEH	D2 (1km)	0.258	Cv (Summer)	1.000
Return Period (years)	100	D3 (1km)	0.379	Cv (Winter)	1.000
FEH Rainfall Version	1999	E (1km)	0.310	Shortest Storm (mins)	15
Site Location		F (1km)	2.349	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+45
D1 (1km)	0.414	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.044

Time (mins) From:	To:	Area (ha)
0	4	0.044

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Cascade Model Details for pp4 a.SRCX

Storage is Online Cover Level (m) 32.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.2
Membrane Percolation (mm/hr)	1000	Length (m)	44.0
Max Percolation (l/s)	63.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	31.200	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 31.200

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Cascade Summary of Results for pp5.SRCX

Upstream Structures	Outflow To	Overflow To
(None)	pp6.SRCX	(None)

Half Drain Time : 13 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	31.205	0.505	0.0	14.1	14.1	17.4	Flood Risk
30 min Summer	31.215	0.515	0.0	14.2	14.2	18.1	Flood Risk
60 min Summer	31.198	0.498	0.0	14.0	14.0	16.9	O K
120 min Summer	31.147	0.447	0.0	13.1	13.1	13.6	O K
180 min Summer	31.099	0.399	0.0	12.3	12.3	10.8	O K
240 min Summer	31.057	0.357	0.0	11.6	11.6	8.7	O K
360 min Summer	30.991	0.291	0.0	10.2	10.2	5.8	O K
480 min Summer	30.943	0.243	0.0	9.2	9.2	4.0	O K
600 min Summer	30.907	0.207	0.0	8.3	8.3	2.9	O K
720 min Summer	30.881	0.181	0.0	7.5	7.5	2.2	O K
960 min Summer	30.840	0.140	0.0	6.2	6.2	1.3	O K
1440 min Summer	30.811	0.111	0.0	4.4	4.4	0.8	O K
2160 min Summer	30.789	0.089	0.0	3.1	3.1	0.5	O K
2880 min Summer	30.777	0.077	0.0	2.4	2.4	0.4	O K
4320 min Summer	30.762	0.062	0.0	1.8	1.8	0.3	O K
5760 min Summer	30.755	0.055	0.0	1.5	1.5	0.2	O K
7200 min Summer	30.751	0.051	0.0	1.2	1.2	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	167.069	0.0	25.3	14
30 min Summer	102.772	0.0	31.6	23
60 min Summer	63.219	0.0	39.4	40
120 min Summer	38.889	0.0	48.9	72
180 min Summer	29.268	0.0	55.5	104
240 min Summer	23.922	0.0	60.7	134
360 min Summer	18.004	0.0	68.7	194
480 min Summer	14.716	0.0	75.0	252
600 min Summer	12.585	0.0	80.2	310
720 min Summer	11.075	0.0	84.8	370
960 min Summer	8.655	0.0	88.2	490
1440 min Summer	6.114	0.0	93.2	730
2160 min Summer	4.320	0.0	98.3	1088
2880 min Summer	3.376	0.0	101.9	1448
4320 min Summer	2.505	0.0	112.7	2196
5760 min Summer	2.027	0.0	120.7	2896
7200 min Summer	1.720	0.0	127.1	3592

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Cascade Summary of Results for pp5.SRCX

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
8640 min Summer	30.749	0.049	0.0	1.1	1.1	0.2	O K
10080 min Summer	30.746	0.046	0.0	1.0	1.0	0.1	O K
15 min Winter	31.204	0.504	0.0	14.1	14.1	17.4	Flood Risk
30 min Winter	31.207	0.507	0.0	14.1	14.1	17.6	Flood Risk
60 min Winter	31.174	0.474	0.0	13.6	13.6	15.4	O K
120 min Winter	31.093	0.393	0.0	12.2	12.2	10.5	O K
180 min Winter	31.023	0.323	0.0	10.9	10.9	7.1	O K
240 min Winter	30.969	0.269	0.0	9.8	9.8	4.9	O K
360 min Winter	30.896	0.196	0.0	8.0	8.0	2.6	O K
480 min Winter	30.853	0.153	0.0	6.7	6.7	1.6	O K
600 min Winter	30.834	0.134	0.0	5.8	5.8	1.2	O K
720 min Winter	30.823	0.123	0.0	5.1	5.1	1.0	O K
960 min Winter	30.804	0.104	0.0	4.0	4.0	0.7	O K
1440 min Winter	30.784	0.084	0.0	2.8	2.8	0.5	O K
2160 min Winter	30.767	0.067	0.0	2.0	2.0	0.3	O K
2880 min Winter	30.757	0.057	0.0	1.6	1.6	0.2	O K
4320 min Winter	30.750	0.050	0.0	1.2	1.2	0.2	O K
5760 min Winter	30.746	0.046	0.0	0.9	0.9	0.1	O K
7200 min Winter	30.741	0.041	0.0	0.8	0.8	0.1	O K
8640 min Winter	30.738	0.038	0.0	0.7	0.7	0.1	O K
10080 min Winter	30.736	0.036	0.0	0.6	0.6	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.504	0.0	132.5	4360
10080 min Summer	1.343	0.0	137.0	5016
15 min Winter	167.069	0.0	25.3	15
30 min Winter	102.772	0.0	31.6	24
60 min Winter	63.219	0.0	39.4	42
120 min Winter	38.889	0.0	48.9	76
180 min Winter	29.268	0.0	55.5	106
240 min Winter	23.922	0.0	60.7	136
360 min Winter	18.004	0.0	68.7	192
480 min Winter	14.716	0.0	75.0	250
600 min Winter	12.585	0.0	80.2	306
720 min Winter	11.075	0.0	84.8	366
960 min Winter	8.655	0.0	88.2	482
1440 min Winter	6.114	0.0	93.2	714
2160 min Winter	4.320	0.0	98.3	1104
2880 min Winter	3.376	0.0	101.9	1436
4320 min Winter	2.505	0.0	112.7	2172
5760 min Winter	2.027	0.0	120.7	2912
7200 min Winter	1.720	0.0	127.2	3656
8640 min Winter	1.504	0.0	132.5	4400
10080 min Winter	1.343	0.0	137.1	5064

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Cascade Rainfall Details for pp5.SRCX

Rainfall Model	FEH	D2 (1km)	0.258	Cv (Summer)	1.000
Return Period (years)	100	D3 (1km)	0.379	Cv (Winter)	1.000
FEH Rainfall Version	1999	E (1km)	0.310	Shortest Storm (mins)	15
Site Location		F (1km)	2.349	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+45
D1 (1km)	0.414	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.066

Time (mins) From:	To:	Area (ha)
0	4	0.066

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Cascade Model Details for pp5.SRCX

Storage is Online Cover Level (m) 31.500

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	9.1
Membrane Percolation (mm/hr)	1000	Length (m)	50.0
Max Percolation (l/s)	126.4	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	30.700	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.100 Discharge Coefficient 0.600 Invert Level (m) 30.700

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Cascade Summary of Results for pp6.SRCX

Upstream Structures	Outflow To	Overflow To
pp5.SRCX	basin.SRCX	(None)
pp4.SRCX		
pp4 a.SRCX		
pp3.SRCX		

Half Drain Time : 60 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	31.176	0.476	0.0	29.7	29.7	137.0	O K
30 min Summer	31.285	0.585	0.0	33.5	33.5	168.4	Flood Risk
60 min Summer	31.391	0.691	0.0	36.9	36.9	199.0	Flood Risk
120 min Summer	31.448	0.748	0.0	38.5	38.5	215.5	Flood Risk
180 min Summer	31.469	0.769	0.0	39.1	39.1	221.5	Flood Risk
240 min Summer	31.471	0.771	0.0	39.2	39.2	222.1	Flood Risk
360 min Summer	31.447	0.747	0.0	38.5	38.5	215.2	Flood Risk
480 min Summer	31.409	0.709	0.0	37.4	37.4	204.1	Flood Risk
600 min Summer	31.368	0.668	0.0	36.2	36.2	192.5	Flood Risk
720 min Summer	31.330	0.630	0.0	35.0	35.0	181.6	Flood Risk
960 min Summer	31.235	0.535	0.0	31.8	31.8	154.0	Flood Risk
1440 min Summer	31.108	0.408	0.0	27.1	27.1	117.5	O K
2160 min Summer	31.000	0.300	0.0	22.3	22.3	86.3	O K
2880 min Summer	30.939	0.239	0.0	19.0	19.0	68.9	O K
4320 min Summer	30.895	0.195	0.0	15.3	15.3	56.1	O K
5760 min Summer	30.871	0.171	0.0	12.7	12.7	49.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	167.069	0.0	232.2	28
30 min Summer	102.772	0.0	289.2	38
60 min Summer	63.219	0.0	360.5	62
120 min Summer	38.889	0.0	446.6	94
180 min Summer	29.268	0.0	505.7	126
240 min Summer	23.922	0.0	552.2	160
360 min Summer	18.004	0.0	624.7	226
480 min Summer	14.716	0.0	681.6	290
600 min Summer	12.585	0.0	729.2	356
720 min Summer	11.075	0.0	770.3	418
960 min Summer	8.655	0.0	801.9	542
1440 min Summer	6.114	0.0	847.9	782
2160 min Summer	4.320	0.0	896.9	1144
2880 min Summer	3.376	0.0	931.3	1500
4320 min Summer	2.505	0.0	1030.9	2204
5760 min Summer	2.027	0.0	1108.6	2936

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Cascade Summary of Results for pp6.SRCX

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
7200 min Summer	30.856	0.156	0.0	11.0	11.0	44.8	O K
8640 min Summer	30.843	0.143	0.0	9.6	9.6	41.3	O K
10080 min Summer	30.834	0.134	0.0	8.6	8.6	38.5	O K
15 min Winter	31.176	0.476	0.0	29.7	29.7	137.1	O K
30 min Winter	31.284	0.584	0.0	33.5	33.5	168.3	Flood Risk
60 min Winter	31.392	0.692	0.0	36.9	36.9	199.4	Flood Risk
120 min Winter	31.441	0.741	0.0	38.3	38.3	213.5	Flood Risk
180 min Winter	31.449	0.749	0.0	38.5	38.5	215.7	Flood Risk
240 min Winter	31.435	0.735	0.0	38.1	38.1	211.6	Flood Risk
360 min Winter	31.382	0.682	0.0	36.6	36.6	196.4	Flood Risk
480 min Winter	31.324	0.624	0.0	34.8	34.8	179.7	Flood Risk
600 min Winter	31.271	0.571	0.0	33.1	33.1	164.3	Flood Risk
720 min Winter	31.223	0.523	0.0	31.4	31.4	150.7	Flood Risk
960 min Winter	31.121	0.421	0.0	27.6	27.6	121.4	O K
1440 min Winter	30.998	0.298	0.0	22.2	22.2	85.8	O K
2160 min Winter	30.911	0.211	0.0	17.2	17.2	60.8	O K
2880 min Winter	30.880	0.180	0.0	13.7	13.7	51.9	O K
4320 min Winter	30.850	0.150	0.0	10.3	10.3	43.1	O K
5760 min Winter	30.832	0.132	0.0	8.4	8.4	37.9	O K
7200 min Winter	30.820	0.120	0.0	7.1	7.1	34.5	O K
8640 min Winter	30.809	0.109	0.0	6.2	6.2	31.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Summer	1.720	0.0	1170.2	3672
8640 min Summer	1.504	0.0	1222.0	4408
10080 min Summer	1.343	0.0	1266.3	5136
15 min Winter	167.069	0.0	232.2	28
30 min Winter	102.772	0.0	289.2	38
60 min Winter	63.219	0.0	360.5	60
120 min Winter	38.889	0.0	446.6	96
180 min Winter	29.268	0.0	505.7	134
240 min Winter	23.922	0.0	552.2	170
360 min Winter	18.004	0.0	624.7	238
480 min Winter	14.716	0.0	681.6	306
600 min Winter	12.585	0.0	729.2	372
720 min Winter	11.075	0.0	770.3	436
960 min Winter	8.655	0.0	802.0	560
1440 min Winter	6.114	0.0	847.9	804
2160 min Winter	4.320	0.0	896.9	1132
2880 min Winter	3.376	0.0	931.4	1500
4320 min Winter	2.505	0.0	1031.0	2208
5760 min Winter	2.027	0.0	1108.6	2936
7200 min Winter	1.720	0.0	1170.4	3680
8640 min Winter	1.504	0.0	1222.3	4400

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Cascade Summary of Results for pp6.SRCX

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
10080 min Winter	30.800	0.100	0.0	5.5	5.5	28.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	1.343	0.0	1266.8	5136

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Cascade Rainfall Details for pp6.SRCX

Rainfall Model	FEH	D2 (1km)	0.258	Cv (Summer)	1.000
Return Period (years)	100	D3 (1km)	0.379	Cv (Winter)	1.000
FEH Rainfall Version	1999	E (1km)	0.310	Shortest Storm (mins)	15
Site Location		F (1km)	2.349	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+45
D1 (1km)	0.414	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.201

Time (mins) From:	To:	Area (ha)
0	4	0.201

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Cascade Model Details for pp6.SRCX

Storage is Online Cover Level (m) 31.500

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0
Membrane Percolation (mm/hr)	1000	Length (m)	120.0
Max Percolation (l/s)	266.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	30.700	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.150 Discharge Coefficient 0.600 Invert Level (m) 30.700

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Cascade Summary of Results for pp6.SRCX

Upstream Structures	Outflow To	Overflow To
pp5.SRCX	basin.SRCX	(None)
pp4.SRCX		
pp4 a.SRCX		
pp3.SRCX		

Half Drain Time : 60 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	31.176	0.476	0.0	29.7	29.7	137.0	O K
30 min Summer	31.285	0.585	0.0	33.5	33.5	168.4	Flood Risk
60 min Summer	31.391	0.691	0.0	36.9	36.9	199.0	Flood Risk
120 min Summer	31.448	0.748	0.0	38.5	38.5	215.5	Flood Risk
180 min Summer	31.469	0.769	0.0	39.1	39.1	221.5	Flood Risk
240 min Summer	31.471	0.771	0.0	39.2	39.2	222.1	Flood Risk
360 min Summer	31.447	0.747	0.0	38.5	38.5	215.2	Flood Risk
480 min Summer	31.409	0.709	0.0	37.4	37.4	204.1	Flood Risk
600 min Summer	31.368	0.668	0.0	36.2	36.2	192.5	Flood Risk
720 min Summer	31.330	0.630	0.0	35.0	35.0	181.6	Flood Risk
960 min Summer	31.235	0.535	0.0	31.8	31.8	154.0	Flood Risk
1440 min Summer	31.108	0.408	0.0	27.1	27.1	117.5	O K
2160 min Summer	31.000	0.300	0.0	22.3	22.3	86.3	O K
2880 min Summer	30.939	0.239	0.0	19.0	19.0	68.9	O K
4320 min Summer	30.895	0.195	0.0	15.3	15.3	56.1	O K
5760 min Summer	30.871	0.171	0.0	12.7	12.7	49.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	167.069	0.0	232.2	28
30 min Summer	102.772	0.0	289.2	38
60 min Summer	63.219	0.0	360.5	62
120 min Summer	38.889	0.0	446.6	94
180 min Summer	29.268	0.0	505.7	126
240 min Summer	23.922	0.0	552.2	160
360 min Summer	18.004	0.0	624.7	226
480 min Summer	14.716	0.0	681.6	290
600 min Summer	12.585	0.0	729.2	356
720 min Summer	11.075	0.0	770.3	418
960 min Summer	8.655	0.0	801.9	542
1440 min Summer	6.114	0.0	847.9	782
2160 min Summer	4.320	0.0	896.9	1144
2880 min Summer	3.376	0.0	931.3	1500
4320 min Summer	2.505	0.0	1030.9	2204
5760 min Summer	2.027	0.0	1108.6	2936

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Cascade Summary of Results for pp6.SRCX

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
7200 min Summer	30.856	0.156	0.0	11.0	11.0	44.8	O K
8640 min Summer	30.843	0.143	0.0	9.6	9.6	41.3	O K
10080 min Summer	30.834	0.134	0.0	8.6	8.6	38.5	O K
15 min Winter	31.176	0.476	0.0	29.7	29.7	137.1	O K
30 min Winter	31.284	0.584	0.0	33.5	33.5	168.3	Flood Risk
60 min Winter	31.392	0.692	0.0	36.9	36.9	199.4	Flood Risk
120 min Winter	31.441	0.741	0.0	38.3	38.3	213.5	Flood Risk
180 min Winter	31.449	0.749	0.0	38.5	38.5	215.7	Flood Risk
240 min Winter	31.435	0.735	0.0	38.1	38.1	211.6	Flood Risk
360 min Winter	31.382	0.682	0.0	36.6	36.6	196.4	Flood Risk
480 min Winter	31.324	0.624	0.0	34.8	34.8	179.7	Flood Risk
600 min Winter	31.271	0.571	0.0	33.1	33.1	164.3	Flood Risk
720 min Winter	31.223	0.523	0.0	31.4	31.4	150.7	Flood Risk
960 min Winter	31.121	0.421	0.0	27.6	27.6	121.4	O K
1440 min Winter	30.998	0.298	0.0	22.2	22.2	85.8	O K
2160 min Winter	30.911	0.211	0.0	17.2	17.2	60.8	O K
2880 min Winter	30.880	0.180	0.0	13.7	13.7	51.9	O K
4320 min Winter	30.850	0.150	0.0	10.3	10.3	43.1	O K
5760 min Winter	30.832	0.132	0.0	8.4	8.4	37.9	O K
7200 min Winter	30.820	0.120	0.0	7.1	7.1	34.5	O K
8640 min Winter	30.809	0.109	0.0	6.2	6.2	31.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
7200 min Summer	1.720	0.0	1170.2	3672
8640 min Summer	1.504	0.0	1222.0	4408
10080 min Summer	1.343	0.0	1266.3	5136
15 min Winter	167.069	0.0	232.2	28
30 min Winter	102.772	0.0	289.2	38
60 min Winter	63.219	0.0	360.5	60
120 min Winter	38.889	0.0	446.6	96
180 min Winter	29.268	0.0	505.7	134
240 min Winter	23.922	0.0	552.2	170
360 min Winter	18.004	0.0	624.7	238
480 min Winter	14.716	0.0	681.6	306
600 min Winter	12.585	0.0	729.2	372
720 min Winter	11.075	0.0	770.3	436
960 min Winter	8.655	0.0	802.0	560
1440 min Winter	6.114	0.0	847.9	804
2160 min Winter	4.320	0.0	896.9	1132
2880 min Winter	3.376	0.0	931.4	1500
4320 min Winter	2.505	0.0	1031.0	2208
5760 min Winter	2.027	0.0	1108.6	2936
7200 min Winter	1.720	0.0	1170.4	3680
8640 min Winter	1.504	0.0	1222.3	4400

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Cascade Summary of Results for pp6.SRCX

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
10080 min Winter	30.800	0.100	0.0	5.5	5.5	28.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	1.343	0.0	1266.8	5136

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Cascade Rainfall Details for pp6.SRCX

Rainfall Model	FEH	D2 (1km)	0.258	Cv (Summer)	1.000
Return Period (years)	100	D3 (1km)	0.379	Cv (Winter)	1.000
FEH Rainfall Version	1999	E (1km)	0.310	Shortest Storm (mins)	15
Site Location		F (1km)	2.349	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+45
D1 (1km)	0.414	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.201

Time (mins) From:	To:	Area (ha)
0	4	0.201

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Cascade Model Details for pp6.SRCX

Storage is Online Cover Level (m) 31.500

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0
Membrane Percolation (mm/hr)	1000	Length (m)	120.0
Max Percolation (l/s)	266.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	30.700	Membrane Depth (m)	0

Orifice Outflow Control

Diameter (m) 0.150 Discharge Coefficient 0.600 Invert Level (m) 30.700

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