

**Cameron + Ross**

**Contributing Areas to  
Combined Sewer Network**

Proposed Commercial Development  
Merchant Place, Mitchelston Industrial  
Estate, Kirkcaldy



prepared for  
**Dingwall Properties Ltd.**  
211106 – April 2023

## Document Issue Record

Revision	Description	Issued by	Checked by	Date
-	Initial Issue	JMA	RAG	13/04/23

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## Table of Contents

<b>1. Introduction.....</b>	4
<b>2. Existing Site Description &amp; Development Proposals.....</b>	4
<b>3. Foul Drainage Proposals.....</b>	4
<b>4. Surface Water Drainage Strategy.....</b>	5

## Appendices

Appendix A – Site Location Plan

Appendix B – Extract of Scottish Water GIS

Appendix C – Drainage Layout Plan

Appendix D – Drainage Calculations (Cellular Storage & Pervious Paving)



## 1. Introduction

Cameron + Ross were appointed by Dingwall properties Ltd. to prepare a report to details the surface water drainage strategy for their proposed commercial development at Merchant Place, Mitchelston Industrial Estate, Kirkcaldy.

## 2. Existing Site Description & Development Proposals

The site is located at grid reference 329375E, 694588N, and is located to the west of the A921, within the existing Mitchelston Industrial Estate.

The development currently contains two commercial buildings along with tarmac & concrete yard and parking areas.

The proposals for this site include demolishing the existing commercial building to the east of the site, adjacent to Myregormie Place, and constructing a new commercial building to the south of the site, which is currently a grassed area.

Please refer to the Site Location contained within *Appendix A* of this report, and extract of Scottish Water GIS, contained within *Appendix B* of this report.

## 3. Foul Drainage Proposals

It is proposed that the existing foul sewers from the existing building to be retained, at the north west of the site, will remain connected to the existing combined sewer network on Merchant Place.

New foul gravity sewers will be laid from the proposed new building, at the southern side of the development, connecting into new legs of combined sewer which, in turn, will connect into the existing combined sewers in Myregormie Place (Ex. Mh 4501).

Refer to Drainage Layout Plan contained within *Appendix C* of this report, and extract of Scottish Water GIS, contained within *Appendix B* of this report.



## 4. Surface Water Drainage Strategy

According to Scottish Waters GIS records, there are several legs of public surface water sewers within the development, connecting into the combined sewer at the north of the site and discharging into the combined sewer network in Merchant Place.

Refer to extract of Scottish Water GIS, contained in *Appendix B* of this report.

It would therefore be reasonable to assert that all surface water run-off from the existing commercial properties, parking areas and yard discharge to the existing combined sewer network via the existing surface water sewers. The developer has confirmed that the existing surface water drainage network does not provide any attenuation or controlled discharge prior to connecting into the combined sewers network.

Prior to determining the following surface water drainage strategy, several trial holes were excavated across the development site to establish if SuDS infiltration devices could be utilised to dispose of all or some of the surface water run-off from both the existing and new areas of the development. However, in all cases the infiltration tests failed due to the existing sub-soils being made up of dense clay material. This information has previously been relayed to Scottish Water during the pre-development enquiry stage of this project. Scottish Water were also notified at this time of our intention to connect the surface water to the combined sewers network due to the failed infiltration tests.

The following is a breakdown of the estimate existing surface water run-off volumes and flow rates vs the estimated post-development run-off volumes and flow rates, demonstrating that the proposed development does not increase the surface water flow to the combined sewers, in fact offering significant betterment.

All contributing areas have been taken from CAD layout and topographical survey models.



#### Existing Development – Estimated Surface Water Run-off Figures.

Building to be retained (north west of site) – 1026m<sup>2</sup>

Building to be demolished (east side of site) – 438m<sup>2</sup>

Access road & parking to north of retained building – 264m<sup>2</sup>

Existing access, parking and yard area – 2375m<sup>2</sup>

Total contributing surface water area = 4103m<sup>2</sup>

Estimated contributing volume =  $4103 \times 50\text{mm/hr}$  rainfall (M30 + 35%) = 205.15m<sup>3</sup>/hr.

Estimated volume as a flow rate =  $205.15 / 3600 \times 1000 = 56.98 \text{ l/s}$

The figure of 56.98 l/s (205.15m<sup>3</sup>/hr) represents the total estimated surface water flow rate from the existing development to the existing combined sewer network.

#### Proposed Development – Estimated Surface Water Run-off Figures.

Building to be retained (north west of site) – 1026m<sup>2</sup>

Parking to north of retained building – 264m<sup>2</sup>

Existing access, parking and yard area – 2375m<sup>2</sup>

New building (south side of site) – 1391m<sup>2</sup>

New access & yard (off Myregormie Place) – 549m<sup>2</sup>

New parking area 1 (north of new access) – 253m<sup>2</sup>

New parking area 2 (south of new access) – 306m<sup>2</sup>

Total contributing surface water area = 6164m<sup>2</sup>

Estimated contributing volume =  $6164 \times 50\text{mm/hr}$  rainfall (M30 + 35%) = 308.2 m<sup>3</sup>/hr.

Estimated volume as a flow rate =  $308.2 / 3600 \times 1000 = 85.61 \text{ l/s}$

The figure of 85.61 l/s (308.2m<sup>3</sup>/hr) represents the total estimated unrestricted surface water flow rate from the proposed finished development to the existing combined sewer network.



As the total contributing area from the proposed new development is considerably larger than the existing development by 2106m<sup>2</sup> (6164m<sup>2</sup> - 4103m<sup>2</sup>), the overall unrestricted flow rate from the development to the combined sewer network would increase from 56.98 l/s to 85.61 l/s, an increase of 28.63 l/s, or as an increase in volume, 103.05m<sup>3</sup>/hr.

While the surface water run-off from the existing development is entering the combined sewer network as an unrestricted flow, we recognise the requirement to restrict the flow from the new areas of the development, with a view to reducing the flows to the combined sewer network, thus providing betterment to Scottish Water.

While we could try and restrict the flow from only the new parts of the development, it was assessed that this alone would not provide a sufficient reduction in the total outflow rate to the combined sewer network. Instead, it was deemed necessary to restrict the flows from not only the new parts of the development but, also some of the existing parts of the development, to bring the overall outflow rates down sufficiently, thus providing Scottish Water with significant betterment over the current surface water regime.

The following is a breakdown of the contributing areas to be restricted and those to remain unrestricted, including the design flow rates for each area, and the overall restricted flow rate from the finished development.

#### **Unrestricted Post Development Flows to Combined Sewers.**

- Flow from northern half of building to be retained = 513m<sup>2</sup> x 50mm/hr = 27m<sup>3</sup>/hr = 7.5 l/s.
- Flow from existing car parking to north of building to be retained = 264m<sup>2</sup> x 50mm/hr = 13.2m<sup>3</sup>/hr = 3.7 l/s
- Flow from main access (to north) and parking area = 443m<sup>2</sup> x 50mm/hr = 22.2m<sup>3</sup>/hr = 6.2 l/s.
- Flow from eastern end of new access road off Myregormie Place = 207m<sup>2</sup> x 50mm/hr = 10.35m<sup>3</sup> = 2.88 l/s

Therefore, the total estimated unrestricted post development flow rate to the combined sewer network would be 20.28 l/s.



This would break down as 17.4 l/s to the existing combined sewers on Merchant Place, and 2.88 l/s to the existing combined sewers on Myregormie Place.

#### Attenuated Post Development Flows to Combined Sewer on Merchant Place (Cellular Storage Area 1)

- Flow from southern half of building to be retained =  $513\text{m}^2 \times 50\text{mm/hr} = 25.7\text{m}^3/\text{hr} = 7.13 \text{ l/s}$ .
- Flow from existing yard, parking area and portion of main access =  $1932\text{m}^2 \times 50\text{mm/hr} = 96.6\text{m}^3/\text{hr} = 26.83 \text{ l/s}$ .
- Flow from northern half of new building =  $696\text{m}^2 \times 50\text{mm/hr} = 34.8\text{m}^3/\text{hr} = 9.6 \text{ l/s}$
- Western part of new access road =  $284\text{m}^2 \times 50\text{mm/hr} = 14.2\text{m}^3/\text{hr} = 3.94 \text{ l/s}$

As an unrestricted volume and flow rate, this would equate to  $171.3\text{m}^3/\text{hr}$  or  $47.58 \text{ l/s}$  (M30 +35%) entering the combined sewer network on Merchant Place. However, by introducing cellular storage and a control manhole, the outflow rate to the combined sewer will be restricted to 5.8 l/s in the M30 + 35% storm event and 7.4 l/s in the M200 + 35% storm event, a reduction of 41.78 l/s (M30 + 35%) on the unrestricted flow rate.

#### Attenuated Post Development Flows to Combined Sewer on Myregormie Place (Cellular Storage Area 2)

- Flow from southern half of new building =  $696\text{m}^2 \times 50\text{mm/hr} = 34.8\text{m}^3/\text{hr} = 9.6 \text{ l/s}$ .
- Southernmost car parking area, adjacent to Myregormie Place =  $306\text{m}^2 \times 50\text{mm/hr} = 15.3\text{m}^3/\text{hr} = 4.25 \text{ l/s}$ .
- Flow from northernmost car parking area, adjacent to Myregormie place =  $253\text{m}^2 \times 50\text{mm/hr} = 12.65\text{m}^3/\text{hr} = 3.51 \text{ l/s}$ .

As an unrestricted volume and flow rate, this would equate to  $62.75\text{m}^3/\text{hr}$  or  $17.43 \text{ l/s}$  (M30 + 35%) entering the combined sewer network on Myregormie Place. However, by introducing cellular storage and a control manhole, the outflow rate to the combined sewer will be restricted to 2.8 l/s in the M30 + 35% storm event and 3.6 l/s in the M200 + 35% storm event, a reduction of 14.63 l/s (M30 + 35%) on the unrestricted flow rate.



In addition to cellular storage area 2, the flow rate from the northernmost pervious paving car parking area will be restricted to 0.6 l/s in the M30 + 35% storm event, and 0.7 l/s in the M200 + 35% storm event, before entering cellular storage area 2, thus reducing the overall volume of storage required. The flow rate from cellular storage area 2 accounts for this in the restricted flow rate of 2.8 l/s in the M30 + 35% storm event and 3.6 l/s in the M200 + 35% storm event.

#### Total Post Development Unrestricted and Restricted Flow Rates to the Combined Sewer Networks.

Based on the above calculations, the total post development unrestricted and restricted flow rates to the combined sewer network would be;

Total unrestricted flow rate = 20.28 l/s (M30 + 35%)

Total restricted flow rate = 8.6 l/s (M30 + 35%)

Total post development flow rate from development to combined sewers = 28.88 l/s

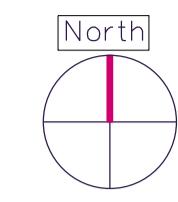
Referring back to the origin pre-development estimated unrestricted flow rate of 56.98 l/s, the post development flow rate reduces this outflow rate to the combined sewers by 27.8 l/s (100.8m<sup>3</sup>/hr) in the M30 +30% storm event, a reduction of 49%.

As an equivalent to domestic foul connections, the 27.8 l/s reduction in surface water flows to the combined sewer would free up approximately 5,900 domestic foul connections.

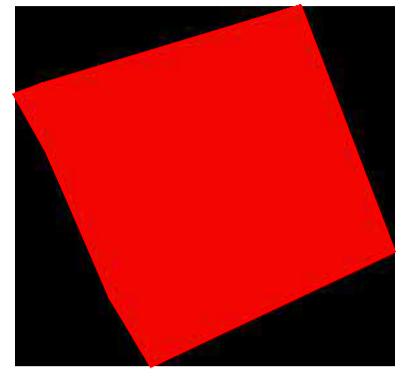
Refer to drainage layout plan in *Appendix C* of this report, and drainage calculations in *Appendix D* of this report.

## **APPENDIX A**

**Site Location Plan**

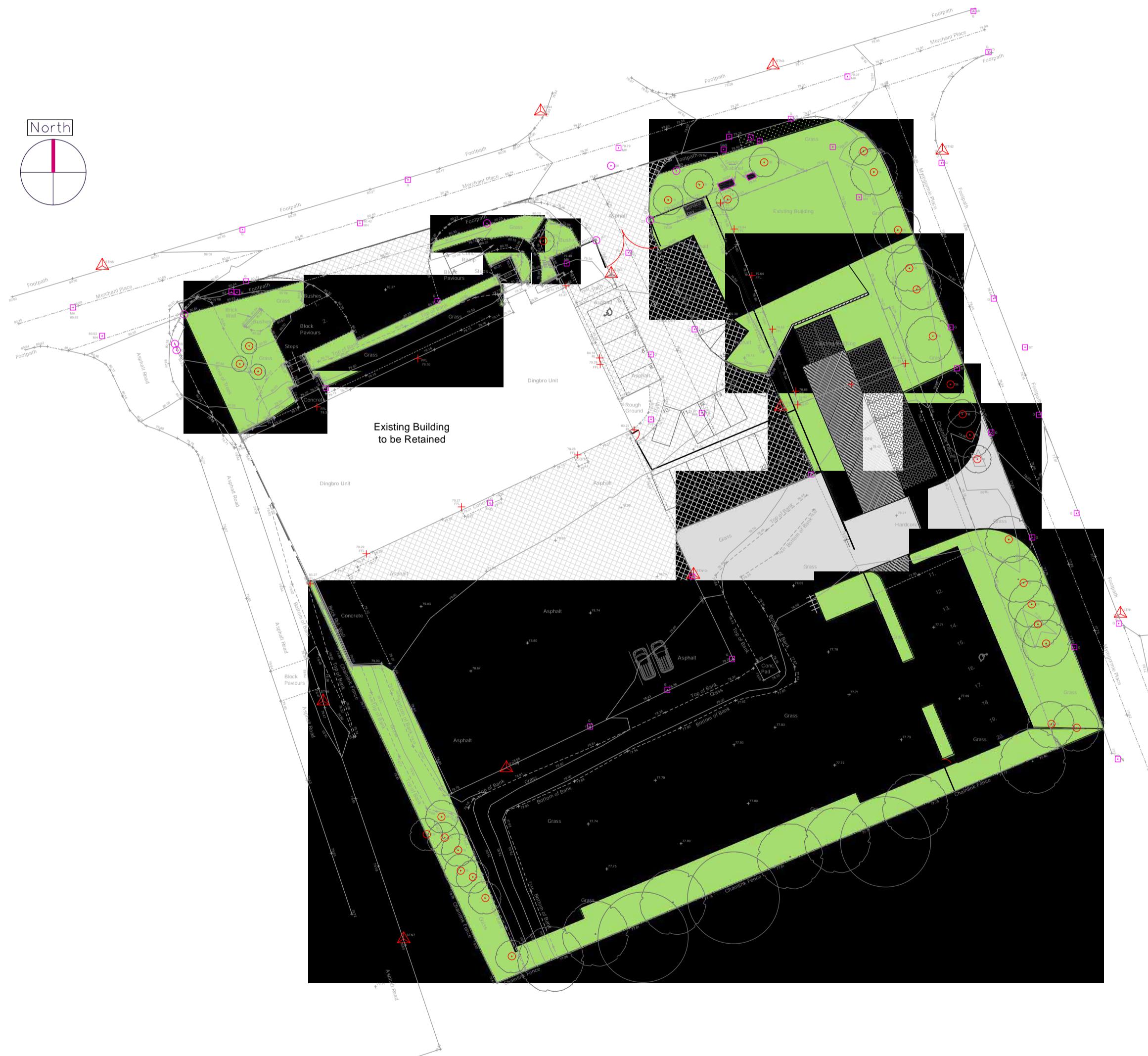


Site Centre Co-ordinates  
329373E, 694586N.



Grid Reference:  
NT 29373 94586

Development Location Plan  
(Scale 1:2,500)



Development Layout Plan  
(Scale 1:500)

Issue	Revision	Initial	Date

**Cameron + Ross**

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[Client:]

Dingwall Properties Ltd.

[Project:]

Commercial Development  
Merchant Place, Mitchelston Ind. Est.  
Kirkcaldy

[Drawing Title:]

Location Plan

[Status:]

Approval

Scale: 1:500 @ A1 Date: 23/03/23

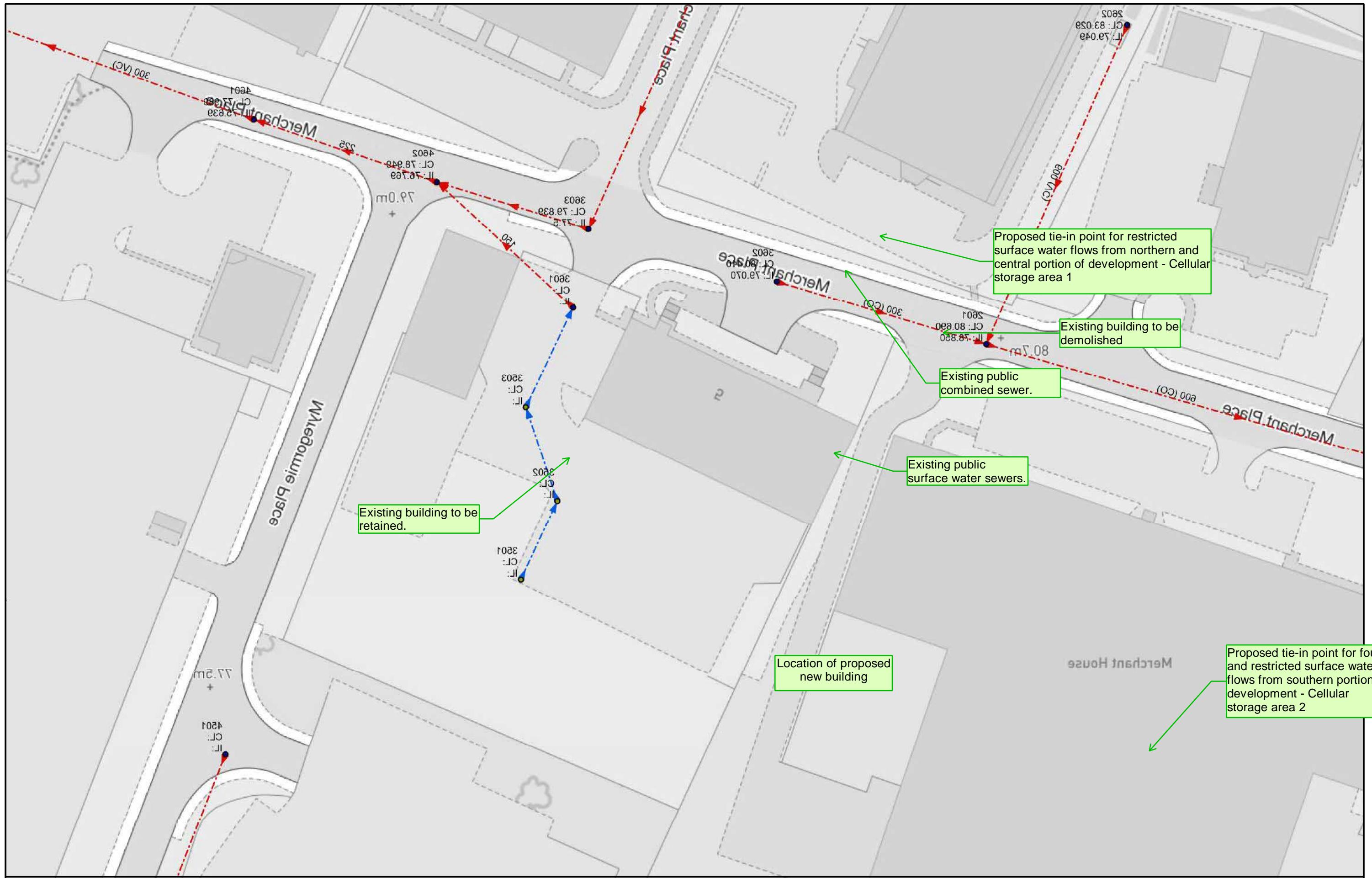
By: JMA Checked: JMA Approved: RAG

Dwg. No. 211106-000-CAM-DR-C-001 Rev. E

## **APPENDIX B**

**Extract of Scottish Water**

**GIS**



Warning! Damaging a large diameter trunk main (12"/300mm and above) can result in loss of life and major water supply and water quality problems. If you're planning any extension work in the vicinity of any large diameter mains shown on our maps, you must contact Scottish Water to arrange a site visit 0800 778 778 WELL IN ADVANCE OF THE WORKS

Plotted By: jmanderson@cameronross.co.uk

The representation of physical assets and the boundaries of areas in which Scottish Water and others have an interest does not necessarily imply their true positions. For further details contact the appropriate District office.

Date: 15/04/2023

## Merchant Place Sewers

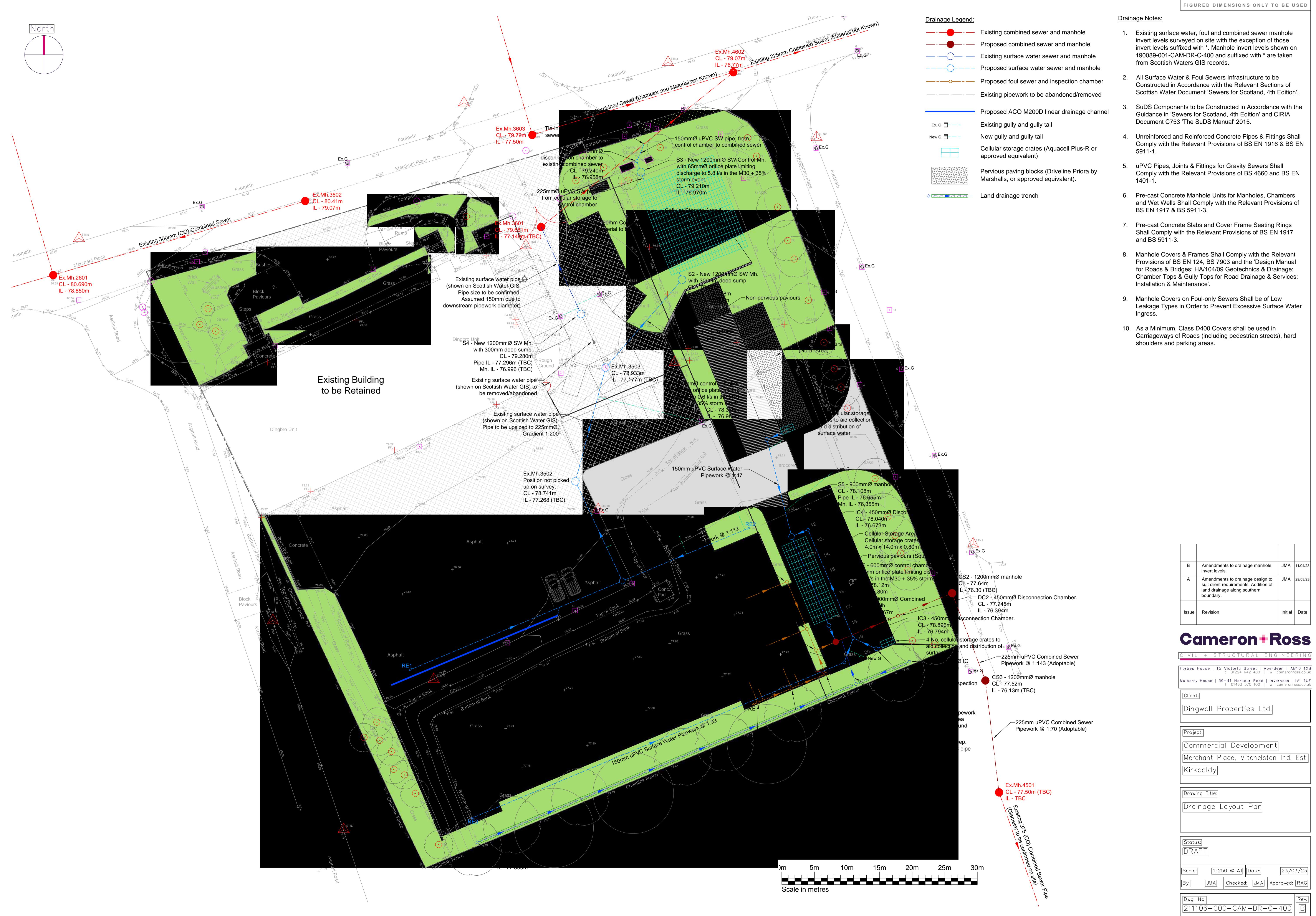
0 3.25 6.5 13 Meters

SCALE: 1:661

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**APPENDIX C**  
**Drainage Layout Plan**



## **APPENDIX D**

**Drainage Calculations**  
**Cellular Storage and Pervious**  
**Paving**

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 1 year Return Period

Half Drain Time : 103 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.014	0.064	0.0	1.2	1.2	11.3	O K
30 min Summer	78.034	0.084	0.0	1.9	1.9	15.0	O K
60 min Summer	78.054	0.104	0.0	2.4	2.4	18.5	O K
120 min Summer	78.072	0.122	0.0	2.6	2.6	21.7	O K
180 min Summer	78.081	0.131	0.0	2.8	2.8	23.4	O K
240 min Summer	78.087	0.137	0.0	2.8	2.8	24.3	O K
360 min Summer	78.091	0.141	0.0	2.9	2.9	25.1	O K
480 min Summer	78.091	0.141	0.0	2.9	2.9	25.0	O K
600 min Summer	78.088	0.138	0.0	2.9	2.9	24.7	O K
720 min Summer	78.085	0.135	0.0	2.8	2.8	24.1	O K
960 min Summer	78.079	0.129	0.0	2.7	2.7	22.9	O K
1440 min Summer	78.066	0.116	0.0	2.5	2.5	20.6	O K
2160 min Summer	78.050	0.100	0.0	2.3	2.3	17.9	O K
2880 min Summer	78.041	0.091	0.0	2.1	2.1	16.1	O K
4320 min Summer	78.029	0.079	0.0	1.7	1.7	14.1	O K
5760 min Summer	78.022	0.072	0.0	1.5	1.5	12.8	O K
7200 min Summer	78.017	0.067	0.0	1.3	1.3	11.8	O K
8640 min Summer	78.012	0.062	0.0	1.2	1.2	11.1	O K
10080 min Summer	78.009	0.059	0.0	1.1	1.1	10.5	O K
15 min Winter	78.021	0.071	0.0	1.5	1.5	12.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	18.851	0.0	11.3	24
30 min Summer	13.113	0.0	16.0	36
60 min Summer	8.847	0.0	22.3	60
120 min Summer	5.872	0.0	29.8	92
180 min Summer	4.604	0.0	35.1	126
240 min Summer	3.871	0.0	39.4	160
360 min Summer	3.030	0.0	46.3	228
480 min Summer	2.547	0.0	51.9	294
600 min Summer	2.227	0.0	56.8	360
720 min Summer	1.996	0.0	61.1	424
960 min Summer	1.680	0.0	68.5	548
1440 min Summer	1.315	0.0	80.4	794
2160 min Summer	1.025	0.0	94.6	1152
2880 min Summer	0.859	0.0	105.7	1504
4320 min Summer	0.670	0.0	123.3	2216
5760 min Summer	0.562	0.0	138.5	2944
7200 min Summer	0.490	0.0	151.0	3680
8640 min Summer	0.437	0.0	161.7	4408
10080 min Summer	0.397	0.0	171.1	5144
15 min Winter	18.851	0.0	12.7	24

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
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### Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	78.044	0.094	0.0	2.2	2.2	16.8	O K
60 min Winter	78.067	0.117	0.0	2.6	2.6	20.8	O K
120 min Winter	78.086	0.136	0.0	2.8	2.8	24.2	O K
180 min Winter	78.094	0.144	0.0	2.9	2.9	25.6	O K
<b>240 min Winter</b>	<b>78.097</b>	<b>0.147</b>	<b>0.0</b>	<b>3.0</b>	<b>3.0</b>	<b>26.2</b>	<b>O K</b>
360 min Winter	78.097	0.147	0.0	3.0	3.0	26.2	O K
480 min Winter	78.093	0.143	0.0	2.9	2.9	25.5	O K
600 min Winter	78.087	0.137	0.0	2.9	2.9	24.5	O K
720 min Winter	78.082	0.132	0.0	2.8	2.8	23.4	O K
960 min Winter	78.070	0.120	0.0	2.6	2.6	21.4	O K
1440 min Winter	78.052	0.102	0.0	2.3	2.3	18.1	O K
2160 min Winter	78.036	0.086	0.0	2.0	2.0	15.4	O K
2880 min Winter	78.028	0.078	0.0	1.7	1.7	13.8	O K
4320 min Winter	78.017	0.067	0.0	1.3	1.3	11.9	O K
5760 min Winter	78.010	0.060	0.0	1.1	1.1	10.7	O K
7200 min Winter	78.006	0.056	0.0	1.0	1.0	9.9	O K
8640 min Winter	78.002	0.052	0.0	0.9	0.9	9.3	O K
10080 min Winter	77.999	0.049	0.0	0.8	0.8	8.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	13.113	0.0	18.0	36
60 min Winter	8.847	0.0	25.0	60
120 min Winter	5.872	0.0	33.4	98
180 min Winter	4.604	0.0	39.3	136
<b>240 min Winter</b>	<b>3.871</b>	<b>0.0</b>	<b>44.1</b>	<b>172</b>
360 min Winter	3.030	0.0	51.9	244
480 min Winter	2.547	0.0	58.2	312
600 min Winter	2.227	0.0	63.6	380
720 min Winter	1.996	0.0	68.5	444
960 min Winter	1.680	0.0	76.8	570
1440 min Winter	1.315	0.0	90.2	812
2160 min Winter	1.025	0.0	106.0	1168
2880 min Winter	0.859	0.0	118.4	1524
4320 min Winter	0.670	0.0	138.2	2248
5760 min Winter	0.562	0.0	155.2	2944
7200 min Winter	0.490	0.0	169.1	3680
8640 min Winter	0.437	0.0	181.1	4408
10080 min Winter	0.397	0.0	191.8	5144

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1	
Date 23/03/2023	Designed by JMA	
File 211106 - Cellular Stora...	Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

### Time Area Diagram

Total Area (ha) 0.343

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.114	4	8 0.114	8	12 0.115

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Model Details

Storage is Online Cover Level (m) 78.750

### Cellular Storage Structure

Invert Level (m)	77.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	187.5	187.5	0.900	0.0	231.5
0.800	187.5	231.5			

### Orifice Outflow Control

Diameter (m) 0.065 Discharge Coefficient 0.600 Invert Level (m) 77.950

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
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### Summary of Results for 10 year Return Period

Half Drain Time : 116 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.060	0.110	0.0	2.5	2.5	19.6	O K
30 min Summer	78.097	0.147	0.0	3.0	3.0	26.2	O K
60 min Summer	78.134	0.184	0.0	3.4	3.4	32.7	O K
120 min Summer	78.163	0.213	0.0	3.7	3.7	37.9	O K
180 min Summer	78.177	0.227	0.0	3.9	3.9	40.5	O K
240 min Summer	78.185	0.235	0.0	4.0	4.0	41.9	O K
360 min Summer	78.190	0.240	0.0	4.0	4.0	42.7	O K
480 min Summer	78.188	0.238	0.0	4.0	4.0	42.5	O K
600 min Summer	78.184	0.234	0.0	4.0	4.0	41.6	O K
720 min Summer	78.178	0.228	0.0	3.9	3.9	40.6	O K
960 min Summer	78.164	0.214	0.0	3.8	3.8	38.2	O K
1440 min Summer	78.139	0.189	0.0	3.5	3.5	33.7	O K
2160 min Summer	78.110	0.160	0.0	3.2	3.2	28.5	O K
2880 min Summer	78.089	0.139	0.0	2.9	2.9	24.7	O K
4320 min Summer	78.061	0.111	0.0	2.5	2.5	19.7	O K
5760 min Summer	78.044	0.094	0.0	2.2	2.2	16.8	O K
7200 min Summer	78.036	0.086	0.0	2.0	2.0	15.3	O K
8640 min Summer	78.030	0.080	0.0	1.7	1.7	14.2	O K
10080 min Summer	78.025	0.075	0.0	1.6	1.6	13.4	O K
15 min Winter	78.073	0.123	0.0	2.7	2.7	22.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	33.055	0.0	20.4	24
30 min Summer	22.973	0.0	28.6	36
60 min Summer	15.410	0.0	39.2	62
120 min Summer	10.073	0.0	51.4	98
180 min Summer	7.808	0.0	59.8	130
240 min Summer	6.505	0.0	66.5	166
360 min Summer	5.020	0.0	77.0	234
480 min Summer	4.173	0.0	85.3	302
600 min Summer	3.613	0.0	92.4	368
720 min Summer	3.212	0.0	98.6	434
960 min Summer	2.666	0.0	109.1	564
1440 min Summer	2.050	0.0	125.8	812
2160 min Summer	1.576	0.0	145.6	1176
2880 min Summer	1.307	0.0	161.0	1536
4320 min Summer	1.004	0.0	185.2	2252
5760 min Summer	0.832	0.0	205.4	2944
7200 min Summer	0.719	0.0	221.9	3680
8640 min Summer	0.639	0.0	236.2	4408
10080 min Summer	0.578	0.0	248.9	5144
15 min Winter	33.055	0.0	22.9	24

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS	Source Control 2017.1.2						



### Summary of Results for 10 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	78.115	0.165	0.0	3.2	3.2	29.5	O K
60 min Winter	78.157	0.207	0.0	3.7	3.7	36.9	O K
120 min Winter	78.189	0.239	0.0	4.0	4.0	42.6	O K
180 min Winter	78.203	0.253	0.0	4.1	4.1	45.0	O K
<b>240 min Winter</b>	<b>78.208</b>	<b>0.258</b>	<b>0.0</b>	<b>4.2</b>	<b>4.2</b>	<b>46.0</b>	<b>O K</b>
360 min Winter	78.207	0.257	0.0	4.2	4.2	45.9	O K
480 min Winter	78.200	0.250	0.0	4.1	4.1	44.5	O K
600 min Winter	78.190	0.240	0.0	4.0	4.0	42.7	O K
720 min Winter	78.179	0.229	0.0	3.9	3.9	40.7	O K
960 min Winter	78.157	0.207	0.0	3.7	3.7	36.9	O K
1440 min Winter	78.121	0.171	0.0	3.3	3.3	30.5	O K
2160 min Winter	78.084	0.134	0.0	2.8	2.8	23.9	O K
2880 min Winter	78.061	0.111	0.0	2.5	2.5	19.7	O K
4320 min Winter	78.037	0.087	0.0	2.0	2.0	15.6	O K
5760 min Winter	78.027	0.077	0.0	1.7	1.7	13.8	O K
7200 min Winter	78.020	0.070	0.0	1.4	1.4	12.5	O K
8640 min Winter	78.015	0.065	0.0	1.3	1.3	11.6	O K
10080 min Winter	78.011	0.061	0.0	1.2	1.2	10.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	22.973	0.0	32.2	36
60 min Winter	15.410	0.0	43.9	62
120 min Winter	10.073	0.0	57.6	102
180 min Winter	7.808	0.0	67.0	140
<b>240 min Winter</b>	<b>6.505</b>	<b>0.0</b>	<b>74.5</b>	<b>178</b>
360 min Winter	5.020	0.0	86.3	252
480 min Winter	4.173	0.0	95.6	324
600 min Winter	3.613	0.0	103.6	392
720 min Winter	3.212	0.0	110.5	460
960 min Winter	2.666	0.0	122.3	592
1440 min Winter	2.050	0.0	141.0	844
2160 min Winter	1.576	0.0	163.1	1212
2880 min Winter	1.307	0.0	180.4	1560
4320 min Winter	1.004	0.0	207.6	2252
5760 min Winter	0.832	0.0	230.0	2952
7200 min Winter	0.719	0.0	248.5	3680
8640 min Winter	0.639	0.0	264.6	4416
10080 min Winter	0.578	0.0	278.9	5152

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1	
Date 23/03/2023	Designed by JMA	
File 211106 - Cellular Stora...	Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

### Time Area Diagram

Total Area (ha) 0.343

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.114	4	8 0.114	8	12 0.115

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	

### Model Details

Storage is Online Cover Level (m) 78.750

### Cellular Storage Structure

Invert Level (m)	77.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	187.5	187.5	0.900	0.0	231.5
0.800	187.5	231.5			

### Orifice Outflow Control

Diameter (m) 0.065 Discharge Coefficient 0.600 Invert Level (m) 77.950

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 30 year Return Period (+35%)

Half Drain Time : 145 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	78.137	0.187	0.0	3.5	3.5	33.4	O K
30 min Summer	78.206	0.256	0.0	4.2	4.2	45.5	O K
60 min Summer	78.275	0.325	0.0	4.8	4.8	57.9	O K
120 min Summer	78.328	0.378	0.0	5.2	5.2	67.3	O K
180 min Summer	78.353	0.403	0.0	5.4	5.4	71.7	O K
240 min Summer	78.367	0.417	0.0	5.5	5.5	74.2	O K
360 min Summer	78.378	0.428	0.0	5.5	5.5	76.2	O K
480 min Summer	78.377	0.427	0.0	5.5	5.5	76.1	O K
600 min Summer	78.372	0.422	0.0	5.5	5.5	75.1	O K
720 min Summer	78.363	0.413	0.0	5.4	5.4	73.6	O K
960 min Summer	78.343	0.393	0.0	5.3	5.3	70.0	O K
1440 min Summer	78.302	0.352	0.0	5.0	5.0	62.7	O K
2160 min Summer	78.250	0.300	0.0	4.6	4.6	53.5	O K
2880 min Summer	78.210	0.260	0.0	4.2	4.2	46.3	O K
4320 min Summer	78.154	0.204	0.0	3.6	3.6	36.3	O K
5760 min Summer	78.117	0.167	0.0	3.2	3.2	29.7	O K
7200 min Summer	78.091	0.141	0.0	2.9	2.9	25.1	O K
8640 min Summer	78.073	0.123	0.0	2.6	2.6	21.9	O K
10080 min Summer	78.060	0.110	0.0	2.5	2.5	19.5	O K
15 min Winter	78.161	0.211	0.0	3.7	3.7	37.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	56.090	0.0	35.1	24
30 min Summer	39.354	0.0	49.6	37
60 min Summer	26.537	0.0	67.8	64
120 min Summer	17.257	0.0	88.3	106
180 min Summer	13.320	0.0	102.3	138
240 min Summer	11.056	0.0	113.3	172
360 min Summer	8.481	0.0	130.4	242
480 min Summer	7.017	0.0	143.9	310
600 min Summer	6.055	0.0	155.2	380
720 min Summer	5.365	0.0	165.0	446
960 min Summer	4.431	0.0	181.7	578
1440 min Summer	3.382	0.0	208.0	836
2160 min Summer	2.580	0.0	238.6	1212
2880 min Summer	2.129	0.0	262.5	1568
4320 min Summer	1.623	0.0	299.8	2296
5760 min Summer	1.337	0.0	330.0	3008
7200 min Summer	1.150	0.0	354.8	3744
8640 min Summer	1.017	0.0	376.4	4416
10080 min Summer	0.917	0.0	395.4	5144
15 min Winter	56.090	0.0	39.5	24

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS	Source Control 2017.1.2						



Summary of Results for 30 year Return Period (+35%)

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	78.238	0.288	0.0	4.5	4.5	51.2	O K
60 min Winter	78.317	0.367	0.0	5.1	5.1	65.4	O K
120 min Winter	78.378	0.428	0.0	5.5	5.5	76.3	O K
180 min Winter	78.403	0.453	0.0	5.7	5.7	80.7	O K
240 min Winter	78.416	0.466	0.0	5.8	5.8	83.0	O K
<b>360 min Winter</b>	<b>78.421</b>	<b>0.471</b>	<b>0.0</b>	<b>5.8</b>	<b>5.8</b>	<b>83.8</b>	<b>O K</b>
480 min Winter	78.412	0.462	0.0	5.8	5.8	82.3	O K
600 min Winter	78.398	0.448	0.0	5.7	5.7	79.8	O K
720 min Winter	78.381	0.431	0.0	5.6	5.6	76.8	O K
960 min Winter	78.347	0.397	0.0	5.3	5.3	70.7	O K
1440 min Winter	78.284	0.334	0.0	4.8	4.8	59.5	O K
2160 min Winter	78.214	0.264	0.0	4.2	4.2	47.0	O K
2880 min Winter	78.165	0.215	0.0	3.8	3.8	38.3	O K
4320 min Winter	78.104	0.154	0.0	3.1	3.1	27.5	O K
5760 min Winter	78.070	0.120	0.0	2.6	2.6	21.4	O K
7200 min Winter	78.050	0.100	0.0	2.3	2.3	17.8	O K
8640 min Winter	78.039	0.089	0.0	2.1	2.1	15.9	O K
10080 min Winter	78.033	0.083	0.0	1.9	1.9	14.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	39.354	0.0	55.7	37
60 min Winter	26.537	0.0	76.0	64
120 min Winter	17.257	0.0	99.0	116
180 min Winter	13.320	0.0	114.6	146
240 min Winter	11.056	0.0	126.9	184
<b>360 min Winter</b>	<b>8.481</b>	<b>0.0</b>	<b>146.1</b>	<b>262</b>
480 min Winter	7.017	0.0	161.2	336
600 min Winter	6.055	0.0	173.9	406
720 min Winter	5.365	0.0	184.9	478
960 min Winter	4.431	0.0	203.6	614
1440 min Winter	3.382	0.0	233.0	874
2160 min Winter	2.580	0.0	267.3	1256
2880 min Winter	2.129	0.0	294.1	1616
4320 min Winter	1.623	0.0	335.9	2336
5760 min Winter	1.337	0.0	369.7	3048
7200 min Winter	1.150	0.0	397.5	3744
8640 min Winter	1.017	0.0	421.6	4408
10080 min Winter	0.917	0.0	443.0	5136

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1	
Date 23/03/2023	Designed by JMA	
File 211106 - Cellular Stora...	Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+35

### Time Area Diagram

Total Area (ha) 0.343

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.114	4	8 0.114	8	12 0.115

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Model Details

Storage is Online Cover Level (m) 78.750

### Cellular Storage Structure

Invert Level (m)	77.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	187.5	187.5	0.900	0.0	231.5
0.800	187.5	231.5			

### Orifice Outflow Control

Diameter (m) 0.065 Discharge Coefficient 0.600 Invert Level (m) 77.950

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 100 year Return Period (+35%)

Half Drain Time : 163 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.192	0.242	0.0	4.0	4.0	43.1	O K
30 min Summer	78.285	0.335	0.0	4.8	4.8	59.6	O K
60 min Summer	78.380	0.430	0.0	5.6	5.6	76.7	O K
120 min Summer	78.451	0.501	0.0	6.0	6.0	89.2	O K
180 min Summer	78.482	0.532	0.0	6.2	6.2	94.8	O K
240 min Summer	78.499	0.549	0.0	6.3	6.3	97.9	O K
360 min Summer	78.513	0.563	0.0	6.4	6.4	100.3	O K
480 min Summer	78.513	0.563	0.0	6.4	6.4	100.2	O K
600 min Summer	78.505	0.555	0.0	6.4	6.4	98.9	O K
720 min Summer	78.495	0.545	0.0	6.3	6.3	97.0	O K
960 min Summer	78.469	0.519	0.0	6.1	6.1	92.4	O K
1440 min Summer	78.416	0.466	0.0	5.8	5.8	82.9	O K
2160 min Summer	78.348	0.398	0.0	5.3	5.3	70.9	O K
2880 min Summer	78.295	0.345	0.0	4.9	4.9	61.5	O K
4320 min Summer	78.219	0.269	0.0	4.3	4.3	47.9	O K
5760 min Summer	78.168	0.218	0.0	3.8	3.8	38.8	O K
7200 min Summer	78.133	0.183	0.0	3.4	3.4	32.6	O K
8640 min Summer	78.107	0.157	0.0	3.1	3.1	27.9	O K
10080 min Summer	78.088	0.138	0.0	2.9	2.9	24.6	O K
15 min Winter	78.222	0.272	0.0	4.3	4.3	48.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.064	0.0	45.4	24
30 min Summer	51.093	0.0	64.7	38
60 min Summer	34.650	0.0	88.7	64
120 min Summer	22.408	0.0	114.8	112
180 min Summer	17.212	0.0	132.3	144
240 min Summer	14.230	0.0	145.9	176
360 min Summer	10.845	0.0	166.8	246
480 min Summer	8.929	0.0	183.2	316
600 min Summer	7.672	0.0	196.8	384
720 min Summer	6.775	0.0	208.5	452
960 min Summer	5.565	0.0	228.4	586
1440 min Summer	4.213	0.0	259.3	844
2160 min Summer	3.188	0.0	294.9	1220
2880 min Summer	2.616	0.0	322.6	1588
4320 min Summer	1.976	0.0	365.3	2300
5760 min Summer	1.618	0.0	399.4	3016
7200 min Summer	1.385	0.0	427.2	3752
8640 min Summer	1.219	0.0	451.1	4488
10080 min Summer	1.094	0.0	472.2	5152
15 min Winter	72.064	0.0	50.9	25

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



Summary of Results for 100 year Return Period (+35%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	78.327	0.377	0.0	5.2	5.2	67.1	O K
60 min Winter	78.436	0.486	0.0	5.9	5.9	86.6	O K
120 min Winter	78.520	0.570	0.0	6.5	6.5	101.5	O K
180 min Winter	78.551	0.601	0.0	6.6	6.6	107.0	O K
240 min Winter	78.568	0.618	0.0	6.7	6.7	110.1	O K
<b>360 min Winter</b>	<b>78.575</b>	<b>0.625</b>	<b>0.0</b>	<b>6.8</b>	<b>6.8</b>	<b>111.4</b>	<b>O K</b>
480 min Winter	78.566	0.616	0.0	6.7	6.7	109.7	O K
600 min Winter	78.548	0.598	0.0	6.6	6.6	106.6	O K
720 min Winter	78.528	0.578	0.0	6.5	6.5	102.9	O K
960 min Winter	78.484	0.534	0.0	6.2	6.2	95.1	O K
1440 min Winter	78.402	0.452	0.0	5.7	5.7	80.6	O K
2160 min Winter	78.308	0.358	0.0	5.0	5.0	63.8	O K
2880 min Winter	78.242	0.292	0.0	4.5	4.5	51.9	O K
4320 min Winter	78.157	0.207	0.0	3.7	3.7	36.8	O K
5760 min Winter	78.108	0.158	0.0	3.1	3.1	28.2	O K
7200 min Winter	78.078	0.128	0.0	2.7	2.7	22.8	O K
8640 min Winter	78.058	0.108	0.0	2.4	2.4	19.3	O K
10080 min Winter	78.045	0.095	0.0	2.2	2.2	16.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	51.093	0.0	72.5	38
60 min Winter	34.650	0.0	99.3	64
120 min Winter	22.408	0.0	128.6	118
180 min Winter	17.212	0.0	148.3	150
240 min Winter	14.230	0.0	163.5	188
<b>360 min Winter</b>	<b>10.845</b>	<b>0.0</b>	<b>186.9</b>	<b>266</b>
480 min Winter	8.929	0.0	205.2	340
600 min Winter	7.672	0.0	220.4	414
720 min Winter	6.775	0.0	233.6	484
960 min Winter	5.565	0.0	255.9	624
1440 min Winter	4.213	0.0	290.5	888
2160 min Winter	3.188	0.0	330.4	1272
2880 min Winter	2.616	0.0	361.3	1644
4320 min Winter	1.976	0.0	409.2	2344
5760 min Winter	1.618	0.0	447.3	3064
7200 min Winter	1.385	0.0	478.5	3752
8640 min Winter	1.219	0.0	505.3	4496
10080 min Winter	1.094	0.0	529.0	5144

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1	
Date 23/03/2023	Designed by JMA	
File 211106 - Cellular Stora...	Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+35

### Time Area Diagram

Total Area (ha) 0.343

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.114	4	8 0.114	8	12 0.115

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Model Details

Storage is Online Cover Level (m) 78.750

### Cellular Storage Structure

Invert Level (m)	77.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	187.5	187.5	0.900	0.0	231.5
0.800	187.5	231.5			

### Orifice Outflow Control

Diameter (m) 0.065 Discharge Coefficient 0.600 Invert Level (m) 77.950

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS	Source Control 2017.1.2						



### Summary of Results for 200 year Return Period (+35%)

Half Drain Time : 179 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.230	0.280	0.0	4.4	4.4	49.9	O K
30 min Summer	78.341	0.391	0.0	5.3	5.3	69.6	O K
60 min Summer	78.456	0.506	0.0	6.1	6.1	90.1	O K
120 min Summer	78.540	0.590	0.0	6.6	6.6	105.1	O K
180 min Summer	78.575	0.625	0.0	6.8	6.8	111.3	O K
240 min Summer	78.595	0.645	0.0	6.9	6.9	114.9	O K
360 min Summer	78.611	0.661	0.0	7.0	7.0	117.7	O K
480 min Summer	78.610	0.660	0.0	7.0	7.0	117.6	O K
600 min Summer	78.602	0.652	0.0	6.9	6.9	116.1	O K
720 min Summer	78.589	0.639	0.0	6.9	6.9	113.8	O K
960 min Summer	78.559	0.609	0.0	6.7	6.7	108.5	O K
1440 min Summer	78.498	0.548	0.0	6.3	6.3	97.5	O K
2160 min Summer	78.419	0.469	0.0	5.8	5.8	83.5	O K
2880 min Summer	78.357	0.407	0.0	5.4	5.4	72.5	O K
4320 min Summer	78.266	0.316	0.0	4.7	4.7	56.4	O K
5760 min Summer	78.206	0.256	0.0	4.2	4.2	45.6	O K
7200 min Summer	78.164	0.214	0.0	3.8	3.8	38.1	O K
8640 min Summer	78.132	0.182	0.0	3.4	3.4	32.5	O K
10080 min Summer	78.109	0.159	0.0	3.1	3.1	28.3	O K
15 min Winter	78.265	0.315	0.0	4.7	4.7	56.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	83.249	0.0	52.6	25
30 min Summer	59.378	0.0	75.3	38
60 min Summer	40.401	0.0	103.4	64
120 min Summer	26.043	0.0	133.5	118
180 min Summer	19.950	0.0	153.4	148
240 min Summer	16.455	0.0	168.8	180
360 min Summer	12.494	0.0	192.3	248
480 min Summer	10.256	0.0	210.5	318
600 min Summer	8.793	0.0	225.6	388
720 min Summer	7.750	0.0	238.6	456
960 min Summer	6.345	0.0	260.5	588
1440 min Summer	4.781	0.0	294.3	852
2160 min Summer	3.601	0.0	333.2	1232
2880 min Summer	2.945	0.0	363.2	1592
4320 min Summer	2.214	0.0	409.3	2332
5760 min Summer	1.806	0.0	445.7	3056
7200 min Summer	1.541	0.0	475.3	3752
8640 min Summer	1.353	0.0	500.7	4496
10080 min Summer	1.212	0.0	523.0	5152
15 min Winter	83.249	0.0	59.0	25

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



Summary of Results for 200 year Return Period (+35%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	78.390	0.440	0.0	5.6	5.6	78.3	O K
60 min Winter	78.521	0.571	0.0	6.5	6.5	101.7	O K
120 min Winter	78.621	0.671	0.0	7.0	7.0	119.6	O K
180 min Winter	78.657	0.707	0.0	7.2	7.2	126.0	O K
240 min Winter	78.677	0.727	0.0	7.4	7.4	129.5	O K
<b>360 min Winter</b>	<b>78.687</b>	<b>0.737</b>	<b>0.0</b>	<b>7.4</b>	<b>7.4</b>	<b>131.2</b>	<b>O K</b>
480 min Winter	78.676	0.726	0.0	7.3	7.3	129.4	O K
600 min Winter	78.657	0.707	0.0	7.2	7.2	125.9	O K
720 min Winter	78.634	0.684	0.0	7.1	7.1	121.8	O K
960 min Winter	78.583	0.633	0.0	6.8	6.8	112.8	O K
1440 min Winter	78.489	0.539	0.0	6.3	6.3	96.0	O K
2160 min Winter	78.378	0.428	0.0	5.5	5.5	76.3	O K
2880 min Winter	78.299	0.349	0.0	5.0	5.0	62.1	O K
4320 min Winter	78.196	0.246	0.0	4.1	4.1	43.9	O K
5760 min Winter	78.137	0.187	0.0	3.5	3.5	33.3	O K
7200 min Winter	78.100	0.150	0.0	3.0	3.0	26.7	O K
8640 min Winter	78.075	0.125	0.0	2.7	2.7	22.3	O K
10080 min Winter	78.058	0.108	0.0	2.4	2.4	19.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	59.378	0.0	84.4	38
60 min Winter	40.401	0.0	115.9	64
120 min Winter	26.043	0.0	149.6	118
180 min Winter	19.950	0.0	171.9	156
240 min Winter	16.455	0.0	189.1	190
<b>360 min Winter</b>	<b>12.494</b>	<b>0.0</b>	<b>215.4</b>	<b>268</b>
480 min Winter	10.256	0.0	235.8	344
600 min Winter	8.793	0.0	252.7	418
720 min Winter	7.750	0.0	267.3	490
960 min Winter	6.345	0.0	291.8	630
1440 min Winter	4.781	0.0	329.7	898
2160 min Winter	3.601	0.0	373.2	1280
2880 min Winter	2.945	0.0	406.9	1648
4320 min Winter	2.214	0.0	458.5	2380
5760 min Winter	1.806	0.0	499.2	3064
7200 min Winter	1.541	0.0	532.4	3760
8640 min Winter	1.353	0.0	560.9	4496
10080 min Winter	1.212	0.0	585.9	5240

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1	
Date 23/03/2023	Designed by JMA	
File 211106 - Cellular Stora...	Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	200	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+35

### Time Area Diagram

Total Area (ha) 0.343

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.114	4	8 0.114	8	12 0.115

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place Cellular Storage Area 1	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	

### Model Details

Storage is Online Cover Level (m) 78.750

### Cellular Storage Structure

Invert Level (m)	77.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	187.5	187.5	0.900	0.0	231.5
0.800	187.5	231.5			

### Orifice Outflow Control

Diameter (m) 0.065 Discharge Coefficient 0.600 Invert Level (m) 77.950

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 1 year Return Period

Half Drain Time : 55 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.019	0.069	0.0	0.9	0.9	3.7	O K
30 min Summer	78.040	0.090	0.0	1.1	1.1	4.8	O K
60 min Summer	78.058	0.108	0.0	1.2	1.2	5.8	O K
120 min Summer	78.073	0.123	0.0	1.3	1.3	6.5	O K
180 min Summer	78.078	0.128	0.0	1.4	1.4	6.8	O K
240 min Summer	78.078	0.128	0.0	1.4	1.4	6.8	O K
360 min Summer	78.075	0.125	0.0	1.4	1.4	6.6	O K
480 min Summer	78.069	0.119	0.0	1.3	1.3	6.3	O K
600 min Summer	78.063	0.113	0.0	1.3	1.3	6.0	O K
720 min Summer	78.058	0.108	0.0	1.2	1.2	5.7	O K
960 min Summer	78.048	0.098	0.0	1.2	1.2	5.2	O K
1440 min Summer	78.032	0.082	0.0	1.0	1.0	4.4	O K
2160 min Summer	78.018	0.068	0.0	0.9	0.9	3.6	O K
2880 min Summer	78.011	0.061	0.0	0.8	0.8	3.2	O K
4320 min Summer	78.002	0.052	0.0	0.6	0.6	2.8	O K
5760 min Summer	77.997	0.047	0.0	0.5	0.5	2.5	O K
7200 min Summer	77.993	0.043	0.0	0.5	0.5	2.3	O K
8640 min Summer	77.990	0.040	0.0	0.4	0.4	2.1	O K
10080 min Summer	77.988	0.038	0.0	0.4	0.4	2.0	O K
15 min Winter	78.027	0.077	0.0	1.0	1.0	4.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	18.851	0.0	4.1	22
30 min Summer	13.113	0.0	5.8	33
60 min Summer	8.847	0.0	7.9	52
120 min Summer	5.872	0.0	10.5	86
180 min Summer	4.604	0.0	12.4	120
240 min Summer	3.871	0.0	13.9	154
360 min Summer	3.030	0.0	16.3	218
480 min Summer	2.547	0.0	18.3	282
600 min Summer	2.227	0.0	20.0	344
720 min Summer	1.996	0.0	21.5	406
960 min Summer	1.680	0.0	24.1	528
1440 min Summer	1.315	0.0	28.3	770
2160 min Summer	1.025	0.0	33.2	1128
2880 min Summer	0.859	0.0	37.1	1476
4320 min Summer	0.670	0.0	43.3	2208
5760 min Summer	0.562	0.0	48.5	2936
7200 min Summer	0.490	0.0	52.9	3672
8640 min Summer	0.437	0.0	56.7	4408
10080 min Summer	0.397	0.0	60.0	5136
15 min Winter	18.851	0.0	4.7	22

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 1 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	78.051	0.101	0.0	1.2	1.2	5.4	O K
60 min Winter	78.071	0.121	0.0	1.3	1.3	6.4	O K
120 min Winter	78.084	0.134	0.0	1.4	1.4	7.1	O K
<b>180 min Winter</b>	<b>78.086</b>	<b>0.136</b>	<b>0.0</b>	<b>1.4</b>	<b>1.4</b>	<b>7.2</b>	<b>O K</b>
240 min Winter	78.083	0.133	0.0	1.4	1.4	7.1	O K
360 min Winter	78.074	0.124	0.0	1.3	1.3	6.6	O K
480 min Winter	78.064	0.114	0.0	1.3	1.3	6.1	O K
600 min Winter	78.054	0.104	0.0	1.2	1.2	5.6	O K
720 min Winter	78.046	0.096	0.0	1.1	1.1	5.1	O K
960 min Winter	78.033	0.083	0.0	1.0	1.0	4.4	O K
1440 min Winter	78.016	0.066	0.0	0.9	0.9	3.5	O K
2160 min Winter	78.006	0.056	0.0	0.7	0.7	3.0	O K
2880 min Winter	78.000	0.050	0.0	0.6	0.6	2.7	O K
4320 min Winter	77.993	0.043	0.0	0.5	0.5	2.3	O K
5760 min Winter	77.989	0.039	0.0	0.4	0.4	2.0	O K
7200 min Winter	77.986	0.036	0.0	0.3	0.3	1.9	O K
8640 min Winter	77.983	0.033	0.0	0.3	0.3	1.8	O K
10080 min Winter	77.981	0.031	0.0	0.3	0.3	1.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	13.113	0.0	6.5	33
60 min Winter	8.847	0.0	8.9	54
120 min Winter	5.872	0.0	11.8	92
<b>180 min Winter</b>	<b>4.604</b>	<b>0.0</b>	<b>13.9</b>	<b>128</b>
240 min Winter	3.871	0.0	15.6	164
360 min Winter	3.030	0.0	18.3	230
480 min Winter	2.547	0.0	20.5	296
600 min Winter	2.227	0.0	22.4	360
720 min Winter	1.996	0.0	24.1	420
960 min Winter	1.680	0.0	27.0	542
1440 min Winter	1.315	0.0	31.7	772
2160 min Winter	1.025	0.0	37.2	1124
2880 min Winter	0.859	0.0	41.5	1476
4320 min Winter	0.670	0.0	48.5	2216
5760 min Winter	0.562	0.0	54.3	2984
7200 min Winter	0.490	0.0	59.2	3680
8640 min Winter	0.437	0.0	63.5	4384
10080 min Winter	0.397	0.0	67.2	5144

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2	
Date 23/03/2023	Designed by JMA	
File 211106 - Cellular Stora...	Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

### Time Area Diagram

Total Area (ha) 0.120

From:	To:	Area (ha)	From:	To:	Area (ha)	From:	To:	Area (ha)
0	4	0.040	4	8	0.040	8	12	0.040

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	

### Model Details

Storage is Online Cover Level (m) 78.750

### Cellular Storage Structure

Invert Level (m)	77.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	56.0	56.0	0.900	0.0	84.8
0.800	56.0	84.8			

### Orifice Outflow Control

Diameter (m) 0.045 Discharge Coefficient 0.600 Invert Level (m) 77.950

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 10 year Return Period

Half Drain Time : 67 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.072	0.122	0.0	1.3	1.3	6.5	O K
30 min Summer	78.111	0.161	0.0	1.6	1.6	8.6	O K
60 min Summer	78.144	0.194	0.0	1.8	1.8	10.3	O K
120 min Summer	78.169	0.219	0.0	1.9	1.9	11.6	O K
180 min Summer	78.177	0.227	0.0	1.9	1.9	12.1	O K
240 min Summer	78.178	0.228	0.0	1.9	1.9	12.1	O K
360 min Summer	78.171	0.221	0.0	1.9	1.9	11.8	O K
480 min Summer	78.161	0.211	0.0	1.8	1.8	11.2	O K
600 min Summer	78.150	0.200	0.0	1.8	1.8	10.7	O K
720 min Summer	78.140	0.190	0.0	1.7	1.7	10.1	O K
960 min Summer	78.121	0.171	0.0	1.6	1.6	9.1	O K
1440 min Summer	78.092	0.142	0.0	1.5	1.5	7.6	O K
2160 min Summer	78.062	0.112	0.0	1.3	1.3	6.0	O K
2880 min Summer	78.043	0.093	0.0	1.1	1.1	5.0	O K
4320 min Summer	78.021	0.071	0.0	0.9	0.9	3.8	O K
5760 min Summer	78.011	0.061	0.0	0.8	0.8	3.3	O K
7200 min Summer	78.005	0.055	0.0	0.7	0.7	3.0	O K
8640 min Summer	78.001	0.051	0.0	0.6	0.6	2.7	O K
10080 min Summer	77.998	0.048	0.0	0.6	0.6	2.6	O K
15 min Winter	78.087	0.137	0.0	1.4	1.4	7.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	33.055	0.0	7.3	23
30 min Summer	22.973	0.0	10.2	34
60 min Summer	15.410	0.0	13.8	54
120 min Summer	10.073	0.0	18.1	88
180 min Summer	7.808	0.0	21.0	124
240 min Summer	6.505	0.0	23.4	158
360 min Summer	5.020	0.0	27.1	224
480 min Summer	4.173	0.0	30.0	290
600 min Summer	3.613	0.0	32.5	354
720 min Summer	3.212	0.0	34.6	418
960 min Summer	2.666	0.0	38.3	540
1440 min Summer	2.050	0.0	44.2	784
2160 min Summer	1.576	0.0	51.0	1148
2880 min Summer	1.307	0.0	56.4	1504
4320 min Summer	1.004	0.0	65.0	2212
5760 min Summer	0.832	0.0	71.9	2936
7200 min Summer	0.719	0.0	77.7	3672
8640 min Summer	0.639	0.0	82.7	4400
10080 min Summer	0.578	0.0	87.2	5104
15 min Winter	33.055	0.0	8.2	23

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS	Source Control 2017.1.2						



### Summary of Results for 10 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	78.131	0.181	0.0	1.7	1.7	9.6	O K
60 min Winter	78.170	0.220	0.0	1.9	1.9	11.7	O K
120 min Winter	78.193	0.243	0.0	2.0	2.0	12.9	O K
<b>180 min Winter</b>	<b>78.197</b>	<b>0.247</b>	<b>0.0</b>	<b>2.0</b>	<b>2.0</b>	<b>13.2</b>	<b>O K</b>
240 min Winter	78.194	0.244	0.0	2.0	2.0	13.0	O K
360 min Winter	78.178	0.228	0.0	1.9	1.9	12.2	O K
480 min Winter	78.161	0.211	0.0	1.8	1.8	11.2	O K
600 min Winter	78.143	0.193	0.0	1.7	1.7	10.3	O K
720 min Winter	78.128	0.178	0.0	1.7	1.7	9.5	O K
960 min Winter	78.102	0.152	0.0	1.5	1.5	8.1	O K
1440 min Winter	78.066	0.116	0.0	1.3	1.3	6.2	O K
2160 min Winter	78.035	0.085	0.0	1.1	1.1	4.5	O K
2880 min Winter	78.018	0.068	0.0	0.9	0.9	3.6	O K
4320 min Winter	78.006	0.056	0.0	0.7	0.7	3.0	O K
5760 min Winter	77.999	0.049	0.0	0.6	0.6	2.6	O K
7200 min Winter	77.995	0.045	0.0	0.5	0.5	2.4	O K
8640 min Winter	77.992	0.042	0.0	0.5	0.5	2.2	O K
10080 min Winter	77.989	0.039	0.0	0.4	0.4	2.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	22.973	0.0	11.5	34
60 min Winter	15.410	0.0	15.5	58
120 min Winter	10.073	0.0	20.3	94
<b>180 min Winter</b>	<b>7.808</b>	<b>0.0</b>	<b>23.6</b>	<b>132</b>
240 min Winter	6.505	0.0	26.2	168
360 min Winter	5.020	0.0	30.3	240
480 min Winter	4.173	0.0	33.6	306
600 min Winter	3.613	0.0	36.4	372
720 min Winter	3.212	0.0	38.8	436
960 min Winter	2.666	0.0	42.9	562
1440 min Winter	2.050	0.0	49.5	802
2160 min Winter	1.576	0.0	57.2	1156
2880 min Winter	1.307	0.0	63.2	1504
4320 min Winter	1.004	0.0	72.8	2208
5760 min Winter	0.832	0.0	80.5	2944
7200 min Winter	0.719	0.0	87.0	3648
8640 min Winter	0.639	0.0	92.7	4408
10080 min Winter	0.578	0.0	97.7	5144

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2	
Date 23/03/2023	Designed by JMA	
File 211106 - Cellular Stora...	Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

### Time Area Diagram

Total Area (ha) 0.120

From:	To:	Area (ha)	From:	To:	Area (ha)	From:	To:	Area (ha)
0	4	0.040	4	8	0.040	8	12	0.040

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	

### Model Details

Storage is Online Cover Level (m) 78.750

### Cellular Storage Structure

Invert Level (m)	77.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	56.0	56.0	0.900	0.0	84.8
0.800	56.0	84.8			

### Orifice Outflow Control

Diameter (m) 0.045 Discharge Coefficient 0.600 Invert Level (m) 77.950

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 30 year Return Period (+35%)

Half Drain Time : 87 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	78.160	0.210	0.0	1.8	1.8	11.2	O K
30 min Summer	78.233	0.283	0.0	2.2	2.2	15.1	O K
60 min Summer	78.300	0.350	0.0	2.4	2.4	18.6	O K
120 min Summer	78.344	0.394	0.0	2.6	2.6	21.0	O K
180 min Summer	78.361	0.411	0.0	2.6	2.6	21.9	O K
240 min Summer	78.366	0.416	0.0	2.7	2.7	22.1	O K
360 min Summer	78.360	0.410	0.0	2.6	2.6	21.8	O K
480 min Summer	78.347	0.397	0.0	2.6	2.6	21.1	O K
600 min Summer	78.330	0.380	0.0	2.5	2.5	20.2	O K
720 min Summer	78.314	0.364	0.0	2.5	2.5	19.3	O K
960 min Summer	78.282	0.332	0.0	2.4	2.4	17.7	O K
1440 min Summer	78.230	0.280	0.0	2.1	2.1	14.9	O K
2160 min Summer	78.173	0.223	0.0	1.9	1.9	11.9	O K
2880 min Summer	78.134	0.184	0.0	1.7	1.7	9.8	O K
4320 min Summer	78.085	0.135	0.0	1.4	1.4	7.2	O K
5760 min Summer	78.057	0.107	0.0	1.2	1.2	5.7	O K
7200 min Summer	78.039	0.089	0.0	1.1	1.1	4.7	O K
8640 min Summer	78.026	0.076	0.0	1.0	1.0	4.0	O K
10080 min Summer	78.017	0.067	0.0	0.9	0.9	3.6	O K
15 min Winter	78.187	0.237	0.0	2.0	2.0	12.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	56.090	0.0	12.5	23
30 min Summer	39.354	0.0	17.6	35
60 min Summer	26.537	0.0	23.8	60
120 min Summer	17.257	0.0	31.0	94
180 min Summer	13.320	0.0	35.9	128
240 min Summer	11.056	0.0	39.8	162
360 min Summer	8.481	0.0	45.7	230
480 min Summer	7.017	0.0	50.5	298
600 min Summer	6.055	0.0	54.4	364
720 min Summer	5.365	0.0	57.9	428
960 min Summer	4.431	0.0	63.7	556
1440 min Summer	3.382	0.0	73.0	802
2160 min Summer	2.580	0.0	83.6	1168
2880 min Summer	2.129	0.0	91.9	1532
4320 min Summer	1.623	0.0	105.1	2248
5760 min Summer	1.337	0.0	115.5	2952
7200 min Summer	1.150	0.0	124.2	3680
8640 min Summer	1.017	0.0	131.8	4408
10080 min Summer	0.917	0.0	138.5	5136
15 min Winter	56.090	0.0	14.0	23

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



Summary of Results for 30 year Return Period (+35%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	78.269	0.319	0.0	2.3	2.3	17.0	O K
60 min Winter	78.346	0.396	0.0	2.6	2.6	21.1	O K
120 min Winter	78.394	0.444	0.0	2.7	2.7	23.6	O K
180 min Winter	78.408	0.458	0.0	2.8	2.8	24.4	O K
240 min Winter	78.408	0.458	0.0	2.8	2.8	24.3	O K
360 min Winter	78.389	0.439	0.0	2.7	2.7	23.3	O K
480 min Winter	78.362	0.412	0.0	2.6	2.6	21.9	O K
600 min Winter	78.335	0.385	0.0	2.5	2.5	20.5	O K
720 min Winter	78.309	0.359	0.0	2.5	2.5	19.1	O K
960 min Winter	78.262	0.312	0.0	2.3	2.3	16.6	O K
1440 min Winter	78.192	0.242	0.0	2.0	2.0	12.9	O K
2160 min Winter	78.125	0.175	0.0	1.7	1.7	9.3	O K
2880 min Winter	78.086	0.136	0.0	1.4	1.4	7.2	O K
4320 min Winter	78.043	0.093	0.0	1.1	1.1	5.0	O K
5760 min Winter	78.022	0.072	0.0	0.9	0.9	3.8	O K
7200 min Winter	78.012	0.062	0.0	0.8	0.8	3.3	O K
8640 min Winter	78.007	0.057	0.0	0.7	0.7	3.0	O K
10080 min Winter	78.003	0.053	0.0	0.7	0.7	2.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	39.354	0.0	19.7	36
60 min Winter	26.537	0.0	26.7	60
120 min Winter	17.257	0.0	34.7	98
180 min Winter	13.320	0.0	40.2	138
240 min Winter	11.056	0.0	44.5	174
360 min Winter	8.481	0.0	51.2	248
480 min Winter	7.017	0.0	56.5	318
600 min Winter	6.055	0.0	61.0	386
720 min Winter	5.365	0.0	64.8	452
960 min Winter	4.431	0.0	71.4	582
1440 min Winter	3.382	0.0	81.7	830
2160 min Winter	2.580	0.0	93.6	1192
2880 min Winter	2.129	0.0	103.0	1552
4320 min Winter	1.623	0.0	117.7	2252
5760 min Winter	1.337	0.0	129.4	2944
7200 min Winter	1.150	0.0	139.1	3664
8640 min Winter	1.017	0.0	147.6	4400
10080 min Winter	0.917	0.0	155.1	5136

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	

### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+35

### Time Area Diagram

Total Area (ha) 0.120

From:	To:	Area (ha)	From:	To:	Area (ha)	From:	To:	Area (ha)
0	4	0.040	4	8	0.040	8	12	0.040

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	

### Model Details

Storage is Online Cover Level (m) 78.750

### Cellular Storage Structure

Invert Level (m)	77.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	56.0	56.0	0.900	0.0	84.8
0.800	56.0	84.8			

### Orifice Outflow Control

Diameter (m) 0.045 Discharge Coefficient 0.600 Invert Level (m) 77.950

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 100 year Return Period (+35%)

Half Drain Time : 104 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.223	0.273	0.0	2.1	2.1	14.5	O K
30 min Summer	78.323	0.373	0.0	2.5	2.5	19.8	O K
60 min Summer	78.417	0.467	0.0	2.8	2.8	24.8	O K
120 min Summer	78.476	0.526	0.0	3.0	3.0	28.0	O K
180 min Summer	78.499	0.549	0.0	3.1	3.1	29.2	O K
240 min Summer	78.506	0.556	0.0	3.1	3.1	29.6	O K
360 min Summer	78.500	0.550	0.0	3.1	3.1	29.3	O K
480 min Summer	78.483	0.533	0.0	3.0	3.0	28.3	O K
600 min Summer	78.462	0.512	0.0	3.0	3.0	27.2	O K
720 min Summer	78.440	0.490	0.0	2.9	2.9	26.1	O K
960 min Summer	78.399	0.449	0.0	2.8	2.8	23.9	O K
1440 min Summer	78.330	0.380	0.0	2.5	2.5	20.2	O K
2160 min Summer	78.254	0.304	0.0	2.2	2.2	16.2	O K
2880 min Summer	78.201	0.251	0.0	2.0	2.0	13.3	O K
4320 min Summer	78.132	0.182	0.0	1.7	1.7	9.7	O K
5760 min Summer	78.091	0.141	0.0	1.5	1.5	7.5	O K
7200 min Summer	78.066	0.116	0.0	1.3	1.3	6.2	O K
8640 min Summer	78.048	0.098	0.0	1.2	1.2	5.2	O K
10080 min Summer	78.035	0.085	0.0	1.1	1.1	4.5	O K
15 min Winter	78.257	0.307	0.0	2.3	2.3	16.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.064	0.0	16.1	23
30 min Summer	51.093	0.0	22.9	36
60 min Summer	34.650	0.0	31.1	62
120 min Summer	22.408	0.0	40.3	96
180 min Summer	17.212	0.0	46.4	130
240 min Summer	14.230	0.0	51.2	166
360 min Summer	10.845	0.0	58.5	234
480 min Summer	8.929	0.0	64.2	302
600 min Summer	7.672	0.0	69.0	368
720 min Summer	6.775	0.0	73.1	434
960 min Summer	5.565	0.0	80.1	562
1440 min Summer	4.213	0.0	90.9	812
2160 min Summer	3.188	0.0	103.3	1176
2880 min Summer	2.616	0.0	113.0	1536
4320 min Summer	1.976	0.0	128.0	2252
5760 min Summer	1.618	0.0	139.8	2952
7200 min Summer	1.385	0.0	149.5	3680
8640 min Summer	1.219	0.0	157.9	4408
10080 min Summer	1.094	0.0	165.4	5144
15 min Winter	72.064	0.0	18.1	24

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



Summary of Results for 100 year Return Period (+35%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	78.371	0.421	0.0	2.7	2.7	22.4	O K
60 min Winter	78.480	0.530	0.0	3.0	3.0	28.2	O K
120 min Winter	78.545	0.595	0.0	3.2	3.2	31.7	O K
180 min Winter	78.566	0.616	0.0	3.3	3.3	32.8	O K
<b>240 min Winter</b>	<b>78.567</b>	<b>0.617</b>	<b>0.0</b>	<b>3.3</b>	<b>3.3</b>	<b>32.8</b>	<b>O K</b>
360 min Winter	78.546	0.596	0.0	3.2	3.2	31.7	O K
480 min Winter	78.513	0.563	0.0	3.1	3.1	30.0	O K
600 min Winter	78.478	0.528	0.0	3.0	3.0	28.1	O K
720 min Winter	78.444	0.494	0.0	2.9	2.9	26.3	O K
960 min Winter	78.382	0.432	0.0	2.7	2.7	23.0	O K
1440 min Winter	78.287	0.337	0.0	2.4	2.4	17.9	O K
2160 min Winter	78.195	0.245	0.0	2.0	2.0	13.0	O K
2880 min Winter	78.138	0.188	0.0	1.7	1.7	10.0	O K
4320 min Winter	78.075	0.125	0.0	1.4	1.4	6.7	O K
5760 min Winter	78.044	0.094	0.0	1.1	1.1	5.0	O K
7200 min Winter	78.026	0.076	0.0	1.0	1.0	4.0	O K
8640 min Winter	78.014	0.064	0.0	0.9	0.9	3.4	O K
10080 min Winter	78.010	0.060	0.0	0.8	0.8	3.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	51.093	0.0	25.6	36
60 min Winter	34.650	0.0	34.9	62
120 min Winter	22.408	0.0	45.1	102
180 min Winter	17.212	0.0	52.0	140
<b>240 min Winter</b>	<b>14.230</b>	<b>0.0</b>	<b>57.3</b>	<b>178</b>
360 min Winter	10.845	0.0	65.5	252
480 min Winter	8.929	0.0	71.9	322
600 min Winter	7.672	0.0	77.3	392
720 min Winter	6.775	0.0	81.9	460
960 min Winter	5.565	0.0	89.7	590
1440 min Winter	4.213	0.0	101.8	842
2160 min Winter	3.188	0.0	115.7	1212
2880 min Winter	2.616	0.0	126.5	1560
4320 min Winter	1.976	0.0	143.3	2260
5760 min Winter	1.618	0.0	156.5	2992
7200 min Winter	1.385	0.0	167.5	3680
8640 min Winter	1.219	0.0	176.9	4360
10080 min Winter	1.094	0.0	185.2	5128

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+35

### Time Area Diagram

Total Area (ha) 0.120

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.040	4	8 0.040	8	12 0.040

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	

### Model Details

Storage is Online Cover Level (m) 78.750

### Cellular Storage Structure

Invert Level (m)	77.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	56.0	56.0	0.900	0.0	84.8
0.800	56.0	84.8			

### Orifice Outflow Control

Diameter (m) 0.045 Discharge Coefficient 0.600 Invert Level (m) 77.950

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2					
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA					
CADS	Source Control 2017.1.2						



### Summary of Results for 200 year Return Period (+35%)

Half Drain Time : 108 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.267	0.317	0.0	2.3	2.3	16.8	O K
30 min Summer	78.387	0.437	0.0	2.7	2.7	23.2	O K
60 min Summer	78.501	0.551	0.0	3.1	3.1	29.3	O K
120 min Summer	78.572	0.622	0.0	3.3	3.3	33.1	O K
180 min Summer	78.599	0.649	0.0	3.3	3.3	34.5	O K
240 min Summer	78.607	0.657	0.0	3.4	3.4	35.0	O K
360 min Summer	78.601	0.651	0.0	3.4	3.4	34.6	O K
480 min Summer	78.581	0.631	0.0	3.3	3.3	33.6	O K
600 min Summer	78.557	0.607	0.0	3.2	3.2	32.3	O K
720 min Summer	78.533	0.583	0.0	3.2	3.2	31.0	O K
960 min Summer	78.485	0.535	0.0	3.0	3.0	28.5	O K
1440 min Summer	78.403	0.453	0.0	2.8	2.8	24.1	O K
2160 min Summer	78.313	0.363	0.0	2.5	2.5	19.3	O K
2880 min Summer	78.249	0.299	0.0	2.2	2.2	15.9	O K
4320 min Summer	78.167	0.217	0.0	1.9	1.9	11.5	O K
5760 min Summer	78.117	0.167	0.0	1.6	1.6	8.9	O K
7200 min Summer	78.086	0.136	0.0	1.4	1.4	7.2	O K
8640 min Summer	78.064	0.114	0.0	1.3	1.3	6.1	O K
10080 min Summer	78.048	0.098	0.0	1.2	1.2	5.2	O K
15 min Winter	78.306	0.356	0.0	2.4	2.4	19.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	83.249	0.0	18.6	24
30 min Summer	59.378	0.0	26.6	36
60 min Summer	40.401	0.0	36.3	62
120 min Summer	26.043	0.0	46.8	98
180 min Summer	19.950	0.0	53.8	132
240 min Summer	16.455	0.0	59.2	166
360 min Summer	12.494	0.0	67.4	236
480 min Summer	10.256	0.0	73.8	304
600 min Summer	8.793	0.0	79.1	370
720 min Summer	7.750	0.0	83.6	436
960 min Summer	6.345	0.0	91.3	566
1440 min Summer	4.781	0.0	103.2	816
2160 min Summer	3.601	0.0	116.6	1180
2880 min Summer	2.945	0.0	127.2	1540
4320 min Summer	2.214	0.0	143.4	2256
5760 min Summer	1.806	0.0	156.0	2992
7200 min Summer	1.541	0.0	166.4	3680
8640 min Summer	1.353	0.0	175.3	4408
10080 min Summer	1.212	0.0	183.1	5144
15 min Winter	83.249	0.0	20.9	24

Cameron & Ross							Page 2						
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2											
Date 23/03/2023 File 211106 - Cellular Stora...		Designed by JMA Checked by JMA											
CADS	Source Control 2017.1.2												
<u>Summary of Results for 200 year Return Period (+35%)</u>													
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status						
30 min Winter	78.443	0.493	0.0	2.9	2.9	26.2	O K						
60 min Winter	78.575	0.625	0.0	3.3	3.3	33.3	O K						
120 min Winter	78.654	0.704	0.0	3.5	3.5	37.5	O K						
180 min Winter	78.680	0.730	0.0	3.6	3.6	38.8	O K						
<b>240 min Winter</b>	<b>78.683</b>	<b>0.733</b>	<b>0.0</b>	<b>3.6</b>	<b>3.6</b>	<b>39.0</b>	<b>O K</b>						
360 min Winter	78.660	0.710	0.0	3.5	3.5	37.8	O K						
480 min Winter	78.623	0.673	0.0	3.4	3.4	35.8	O K						
600 min Winter	78.583	0.633	0.0	3.3	3.3	33.7	O K						
720 min Winter	78.543	0.593	0.0	3.2	3.2	31.6	O K						
960 min Winter	78.471	0.521	0.0	3.0	3.0	27.7	O K						
1440 min Winter	78.359	0.409	0.0	2.6	2.6	21.7	O K						
2160 min Winter	78.247	0.297	0.0	2.2	2.2	15.8	O K						
2880 min Winter	78.178	0.228	0.0	1.9	1.9	12.1	O K						
4320 min Winter	78.100	0.150	0.0	1.5	1.5	8.0	O K						
5760 min Winter	78.061	0.111	0.0	1.3	1.3	5.9	O K						
7200 min Winter	78.038	0.088	0.0	1.1	1.1	4.7	O K						
8640 min Winter	78.023	0.073	0.0	1.0	1.0	3.9	O K						
10080 min Winter	78.014	0.064	0.0	0.9	0.9	3.4	O K						
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)									
30 min Winter	59.378	0.0	29.8	36									
60 min Winter	40.401	0.0	40.7	62									
120 min Winter	26.043	0.0	52.5	104									
180 min Winter	19.950	0.0	60.3	142									
<b>240 min Winter</b>	<b>16.455</b>	<b>0.0</b>	<b>66.3</b>	<b>180</b>									
360 min Winter	12.494	0.0	75.5	254									
480 min Winter	10.256	0.0	82.6	326									
600 min Winter	8.793	0.0	88.6	396									
720 min Winter	7.750	0.0	93.7	464									
960 min Winter	6.345	0.0	102.3	596									
1440 min Winter	4.781	0.0	115.6	852									
2160 min Winter	3.601	0.0	130.7	1216									
2880 min Winter	2.945	0.0	142.4	1568									
4320 min Winter	2.214	0.0	160.6	2292									
5760 min Winter	1.806	0.0	174.7	3000									
7200 min Winter	1.541	0.0	186.3	3680									
8640 min Winter	1.353	0.0	196.3	4416									
10080 min Winter	1.212	0.0	205.1	5088									



Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	

### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	200	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+35

### Time Area Diagram

Total Area (ha) 0.120

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	(ha)	From:	To:	(ha)
0	4 0.040	4	8 0.040	8	12 0.040

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Cellular Storage Area 2	
Date 23/03/2023 File 211106 - Cellular Stora...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	

### Model Details

Storage is Online Cover Level (m) 78.750

### Cellular Storage Structure

Invert Level (m)	77.950	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf. Area (m <sup>2</sup> )
0.000	56.0	56.0	0.900	0.0	84.8
0.800	56.0	84.8			

### Orifice Outflow Control

Diameter (m) 0.045 Discharge Coefficient 0.600 Invert Level (m) 77.950

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)					
Date 23/03/2023 File A211106 - Pervious Pavi...		Designed by JMA Checked by JMA					
CADS	Source Control 2017.1.2						



### Summary of Results for 1 year Return Period

Half Drain Time : 24 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	77.997	0.052		0.0	0.3	0.3	O K
30 min Summer	78.013	0.068		0.0	0.3	0.3	O K
60 min Summer	78.025	0.080		0.0	0.3	0.3	O K
120 min Summer	78.033	0.088		0.0	0.4	0.4	O K
180 min Summer	78.034	0.089		0.0	0.4	0.4	O K
240 min Summer	78.033	0.088		0.0	0.4	0.4	O K
360 min Summer	78.028	0.083		0.0	0.3	0.3	O K
480 min Summer	78.023	0.078		0.0	0.3	0.3	O K
600 min Summer	78.018	0.073		0.0	0.3	0.3	O K
720 min Summer	78.013	0.068		0.0	0.3	0.3	O K
960 min Summer	78.005	0.060		0.0	0.3	0.3	O K
1440 min Summer	77.994	0.049		0.0	0.2	0.2	O K
2160 min Summer	77.983	0.038		0.0	0.2	0.2	O K
2880 min Summer	77.978	0.033		0.0	0.2	0.2	O K
4320 min Summer	77.973	0.028		0.0	0.1	0.1	O K
5760 min Summer	77.970	0.025		0.0	0.1	0.1	O K
7200 min Summer	77.968	0.023		0.0	0.1	0.1	O K
8640 min Summer	77.966	0.021		0.0	0.1	0.1	O K
10080 min Summer	77.965	0.020		0.0	0.1	0.1	O K
15 min Winter	78.005	0.060		0.0	0.3	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	18.851	0.0	0.4	16
30 min Summer	13.113	0.0	0.8	27
60 min Summer	8.847	0.0	1.2	44
120 min Summer	5.872	0.0	1.8	78
180 min Summer	4.604	0.0	2.2	112
240 min Summer	3.871	0.0	2.5	144
360 min Summer	3.030	0.0	3.0	208
480 min Summer	2.547	0.0	3.4	270
600 min Summer	2.227	0.0	3.7	330
720 min Summer	1.996	0.0	4.0	390
960 min Summer	1.680	0.0	4.5	510
1440 min Summer	1.315	0.0	5.4	748
2160 min Summer	1.025	0.0	6.2	1104
2880 min Summer	0.859	0.0	6.9	1464
4320 min Summer	0.670	0.0	8.0	2200
5760 min Summer	0.562	0.0	8.8	2920
7200 min Summer	0.490	0.0	9.5	3672
8640 min Summer	0.437	0.0	10.0	4336
10080 min Summer	0.397	0.0	10.4	5112
15 min Winter	18.851	0.0	0.5	16

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)					
Date 23/03/2023 File A211106 - Pervious Pavi...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	78.021	0.076	0.0	0.3	0.3	0.6	O K
60 min Winter	78.032	0.087	0.0	0.4	0.4	0.8	O K
<b>120 min Winter</b>	<b>78.037</b>	<b>0.092</b>	<b>0.0</b>	<b>0.4</b>	<b>0.4</b>	<b>1.0</b>	<b>O K</b>
180 min Winter	78.036	0.091	0.0	0.4	0.4	0.9	O K
240 min Winter	78.032	0.087	0.0	0.4	0.4	0.9	O K
360 min Winter	78.024	0.079	0.0	0.3	0.3	0.7	O K
480 min Winter	78.015	0.070	0.0	0.3	0.3	0.6	O K
600 min Winter	78.008	0.063	0.0	0.3	0.3	0.4	O K
720 min Winter	78.001	0.056	0.0	0.3	0.3	0.4	O K
960 min Winter	77.992	0.047	0.0	0.2	0.2	0.2	O K
1440 min Winter	77.981	0.036	0.0	0.2	0.2	0.1	O K
2160 min Winter	77.975	0.030	0.0	0.2	0.2	0.1	O K
2880 min Winter	77.972	0.027	0.0	0.1	0.1	0.1	O K
4320 min Winter	77.968	0.023	0.0	0.1	0.1	0.1	O K
5760 min Winter	77.966	0.021	0.0	0.1	0.1	0.0	O K
7200 min Winter	77.964	0.019	0.0	0.1	0.1	0.0	O K
8640 min Winter	77.962	0.017	0.0	0.1	0.1	0.0	O K
10080 min Winter	77.961	0.016	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	13.113	0.0	0.9	29
60 min Winter	8.847	0.0	1.4	46
<b>120 min Winter</b>	<b>5.872</b>	<b>0.0</b>	<b>2.0</b>	<b>84</b>
180 min Winter	4.604	0.0	2.5	120
240 min Winter	3.871	0.0	2.8	154
360 min Winter	3.030	0.0	3.4	218
480 min Winter	2.547	0.0	3.9	278
600 min Winter	2.227	0.0	4.2	338
720 min Winter	1.996	0.0	4.6	398
960 min Winter	1.680	0.0	5.2	512
1440 min Winter	1.315	0.0	6.1	748
2160 min Winter	1.025	0.0	7.1	1104
2880 min Winter	0.859	0.0	7.9	1464
4320 min Winter	0.670	0.0	9.1	2112
5760 min Winter	0.562	0.0	10.1	2912
7200 min Winter	0.490	0.0	10.9	3568
8640 min Winter	0.437	0.0	11.5	4376
10080 min Winter	0.397	0.0	12.0	5136

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)	
Date 23/03/2023 File A211106 - Pervious Pavi...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

### Time Area Diagram

Total Area (ha) 0.026

Time (mins) Area  
From: To: (ha)

0 4 0.026

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)	
Date 23/03/2023 File A211106 - Pervious Pavi...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Model Details

Storage is Online Cover Level (m) 78.425

### Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	27.8	Slope (1:X)	150.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	77.945	Membrane Depth (m)	0

### Orifice Outflow Control

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 77.945

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)					
Date 23/03/2023 File A211106 - Pervious Pavi...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 10 year Return Period

Half Drain Time : 49 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.035	0.090	0.0	0.4	0.4	0.9	O K
30 min Summer	78.054	0.109	0.0	0.4	0.4	1.3	O K
60 min Summer	78.068	0.123	0.0	0.4	0.4	1.7	O K
120 min Summer	78.076	0.131	0.0	0.4	0.4	1.9	O K
180 min Summer	78.078	0.133	0.0	0.5	0.5	2.0	O K
240 min Summer	78.077	0.132	0.0	0.5	0.5	2.0	O K
360 min Summer	78.072	0.127	0.0	0.4	0.4	1.8	O K
480 min Summer	78.066	0.121	0.0	0.4	0.4	1.6	O K
600 min Summer	78.060	0.115	0.0	0.4	0.4	1.5	O K
720 min Summer	78.054	0.109	0.0	0.4	0.4	1.3	O K
960 min Summer	78.044	0.099	0.0	0.4	0.4	1.1	O K
1440 min Summer	78.027	0.082	0.0	0.3	0.3	0.8	O K
2160 min Summer	78.009	0.064	0.0	0.3	0.3	0.5	O K
2880 min Summer	77.997	0.052	0.0	0.3	0.3	0.3	O K
4320 min Summer	77.983	0.038	0.0	0.2	0.2	0.2	O K
5760 min Summer	77.978	0.033	0.0	0.2	0.2	0.1	O K
7200 min Summer	77.974	0.029	0.0	0.1	0.1	0.1	O K
8640 min Summer	77.972	0.027	0.0	0.1	0.1	0.1	O K
10080 min Summer	77.970	0.025	0.0	0.1	0.1	0.1	O K
15 min Winter	78.044	0.099	0.0	0.4	0.4	1.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	33.055	0.0	1.1	17
30 min Summer	22.973	0.0	1.7	30
60 min Summer	15.410	0.0	2.5	48
120 min Summer	10.073	0.0	3.4	82
180 min Summer	7.808	0.0	4.0	116
240 min Summer	6.505	0.0	4.5	150
360 min Summer	5.020	0.0	5.3	218
480 min Summer	4.173	0.0	5.9	282
600 min Summer	3.613	0.0	6.4	344
720 min Summer	3.212	0.0	6.9	406
960 min Summer	2.666	0.0	7.6	530
1440 min Summer	2.050	0.0	8.8	766
2160 min Summer	1.576	0.0	10.1	1124
2880 min Summer	1.307	0.0	11.1	1472
4320 min Summer	1.004	0.0	12.7	2200
5760 min Summer	0.832	0.0	13.9	2928
7200 min Summer	0.719	0.0	14.8	3672
8640 min Summer	0.639	0.0	15.6	4376
10080 min Summer	0.578	0.0	16.3	5136
15 min Winter	33.055	0.0	1.3	17

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)					
Date 23/03/2023 File A211106 - Pervious Pavi...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 10 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	78.063	0.118	0.0	0.4	0.4	1.6	O K
60 min Winter	78.077	0.132	0.0	0.5	0.5	2.0	O K
<b>120 min Winter</b>	<b>78.085</b>	<b>0.140</b>	<b>0.0</b>	<b>0.5</b>	<b>0.5</b>	<b>2.2</b>	<b>O K</b>
180 min Winter	78.084	0.139	0.0	0.5	0.5	2.2	O K
240 min Winter	78.081	0.136	0.0	0.5	0.5	2.1	O K
360 min Winter	78.072	0.127	0.0	0.4	0.4	1.8	O K
480 min Winter	78.062	0.117	0.0	0.4	0.4	1.5	O K
600 min Winter	78.053	0.108	0.0	0.4	0.4	1.3	O K
720 min Winter	78.044	0.099	0.0	0.4	0.4	1.1	O K
960 min Winter	78.029	0.084	0.0	0.3	0.3	0.8	O K
1440 min Winter	78.008	0.063	0.0	0.3	0.3	0.4	O K
2160 min Winter	77.990	0.045	0.0	0.2	0.2	0.2	O K
2880 min Winter	77.981	0.036	0.0	0.2	0.2	0.1	O K
4320 min Winter	77.975	0.030	0.0	0.2	0.2	0.1	O K
5760 min Winter	77.971	0.026	0.0	0.1	0.1	0.1	O K
7200 min Winter	77.969	0.024	0.0	0.1	0.1	0.1	O K
8640 min Winter	77.967	0.022	0.0	0.1	0.1	0.1	O K
10080 min Winter	77.966	0.021	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	22.973	0.0	2.0	30
60 min Winter	15.410	0.0	2.9	50
<b>120 min Winter</b>	<b>10.073</b>	<b>0.0</b>	<b>3.9</b>	<b>88</b>
180 min Winter	7.808	0.0	4.6	126
240 min Winter	6.505	0.0	5.1	162
360 min Winter	5.020	0.0	6.0	232
480 min Winter	4.173	0.0	6.7	298
600 min Winter	3.613	0.0	7.3	362
720 min Winter	3.212	0.0	7.8	422
960 min Winter	2.666	0.0	8.6	540
1440 min Winter	2.050	0.0	9.9	768
2160 min Winter	1.576	0.0	11.4	1124
2880 min Winter	1.307	0.0	12.6	1448
4320 min Winter	1.004	0.0	14.4	2196
5760 min Winter	0.832	0.0	15.8	2856
7200 min Winter	0.719	0.0	16.9	3608
8640 min Winter	0.639	0.0	17.8	4344
10080 min Winter	0.578	0.0	18.6	5040

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)	
Date 23/03/2023 File A211106 - Pervious Pavi...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	10	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

### Time Area Diagram

Total Area (ha) 0.026

Time (mins) Area  
From: To: (ha)

0 4 0.026

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)	
Date 23/03/2023 File A211106 - Pervious Pavi...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Model Details

Storage is Online Cover Level (m) 78.425

### Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	27.8	Slope (1:X)	150.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	77.945	Membrane Depth (m)	0

### Orifice Outflow Control

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 77.945

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)					
Date 23/03/2023 File A211106 - Pervious Pavi...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 30 year Return Period (+35%)

Half Drain Time : 78 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.077	0.132	0.0	0.5	0.5	2.0	O K
30 min Summer	78.104	0.159	0.0	0.5	0.5	2.8	O K
60 min Summer	78.128	0.183	0.0	0.5	0.5	3.5	O K
120 min Summer	78.144	0.199	0.0	0.6	0.6	4.0	O K
180 min Summer	78.148	0.203	0.0	0.6	0.6	4.1	O K
240 min Summer	78.149	0.204	0.0	0.6	0.6	4.1	O K
360 min Summer	78.144	0.199	0.0	0.6	0.6	4.0	O K
480 min Summer	78.138	0.193	0.0	0.6	0.6	3.8	O K
600 min Summer	78.130	0.185	0.0	0.5	0.5	3.6	O K
720 min Summer	78.123	0.178	0.0	0.5	0.5	3.3	O K
960 min Summer	78.109	0.164	0.0	0.5	0.5	2.9	O K
1440 min Summer	78.087	0.142	0.0	0.5	0.5	2.2	O K
2160 min Summer	78.062	0.117	0.0	0.4	0.4	1.5	O K
2880 min Summer	78.043	0.098	0.0	0.4	0.4	1.1	O K
4320 min Summer	78.018	0.073	0.0	0.3	0.3	0.6	O K
5760 min Summer	78.002	0.057	0.0	0.3	0.3	0.4	O K
7200 min Summer	77.991	0.046	0.0	0.2	0.2	0.2	O K
8640 min Summer	77.984	0.039	0.0	0.2	0.2	0.2	O K
10080 min Summer	77.980	0.035	0.0	0.2	0.2	0.1	O K
15 min Winter	78.088	0.143	0.0	0.5	0.5	2.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	56.090	0.0	2.2	17
30 min Summer	39.354	0.0	3.3	31
60 min Summer	26.537	0.0	4.7	56
120 min Summer	17.257	0.0	6.2	88
180 min Summer	13.320	0.0	7.3	124
240 min Summer	11.056	0.0	8.1	158
360 min Summer	8.481	0.0	9.3	226
480 min Summer	7.017	0.0	10.3	294
600 min Summer	6.055	0.0	11.2	360
720 min Summer	5.365	0.0	11.9	426
960 min Summer	4.431	0.0	13.1	550
1440 min Summer	3.382	0.0	15.0	794
2160 min Summer	2.580	0.0	17.2	1148
2880 min Summer	2.129	0.0	18.8	1504
4320 min Summer	1.623	0.0	21.4	2208
5760 min Summer	1.337	0.0	23.3	2936
7200 min Summer	1.150	0.0	24.9	3672
8640 min Summer	1.017	0.0	26.3	4400
10080 min Summer	0.917	0.0	27.4	5000
15 min Winter	56.090	0.0	2.6	17

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)					
Date 23/03/2023 File A211106 - Pervious Pavi...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



Summary of Results for 30 year Return Period (+35%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	78.119	0.174	0.0	0.5	0.5	3.2	O K
60 min Winter	78.146	0.201	0.0	0.6	0.6	4.0	O K
120 min Winter	78.163	0.218	0.0	0.6	0.6	4.5	O K
<b>180 min Winter</b>	<b>78.166</b>	<b>0.221</b>	<b>0.0</b>	<b>0.6</b>	<b>0.6</b>	<b>4.6</b>	<b>O K</b>
240 min Winter	78.165	0.220	0.0	0.6	0.6	4.6	O K
360 min Winter	78.155	0.210	0.0	0.6	0.6	4.3	O K
480 min Winter	78.143	0.198	0.0	0.6	0.6	3.9	O K
600 min Winter	78.130	0.185	0.0	0.5	0.5	3.6	O K
720 min Winter	78.119	0.174	0.0	0.5	0.5	3.2	O K
960 min Winter	78.099	0.154	0.0	0.5	0.5	2.6	O K
1440 min Winter	78.068	0.123	0.0	0.4	0.4	1.7	O K
2160 min Winter	78.036	0.091	0.0	0.4	0.4	0.9	O K
2880 min Winter	78.015	0.070	0.0	0.3	0.3	0.6	O K
4320 min Winter	77.993	0.048	0.0	0.2	0.2	0.3	O K
5760 min Winter	77.981	0.036	0.0	0.2	0.2	0.1	O K
7200 min Winter	77.978	0.033	0.0	0.2	0.2	0.1	O K
8640 min Winter	77.975	0.030	0.0	0.2	0.2	0.1	O K
10080 min Winter	77.973	0.028	0.0	0.1	0.1	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	39.354	0.0	3.8	31
60 min Winter	26.537	0.0	5.3	58
120 min Winter	17.257	0.0	7.0	94
<b>180 min Winter</b>	<b>13.320</b>	<b>0.0</b>	<b>8.2</b>	<b>132</b>
240 min Winter	11.056	0.0	9.1	170
360 min Winter	8.481	0.0	10.5	244
480 min Winter	7.017	0.0	11.7	314
600 min Winter	6.055	0.0	12.6	382
720 min Winter	5.365	0.0	13.4	448
960 min Winter	4.431	0.0	14.8	578
1440 min Winter	3.382	0.0	16.9	822
2160 min Winter	2.580	0.0	19.3	1168
2880 min Winter	2.129	0.0	21.2	1504
4320 min Winter	1.623	0.0	24.1	2204
5760 min Winter	1.337	0.0	26.3	2936
7200 min Winter	1.150	0.0	28.2	3624
8640 min Winter	1.017	0.0	29.7	4288
10080 min Winter	0.917	0.0	31.0	5112

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)	
Date 23/03/2023 File A211106 - Pervious Pavi...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+35

### Time Area Diagram

Total Area (ha) 0.026

Time (mins) Area  
From: To: (ha)

0 4 0.026

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)	
Date 23/03/2023 File A211106 - Pervious Pavi...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Model Details

Storage is Online Cover Level (m) 78.425

### Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	27.8	Slope (1:X)	150.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	77.945	Membrane Depth (m)	0

### Orifice Outflow Control

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 77.945

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)					
Date 23/03/2023 File A211106 - Pervious Pavi...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



### Summary of Results for 100 year Return Period (+35%)

Half Drain Time : 97 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.102	0.157	0.0	0.5	0.5	2.7	O K
30 min Summer	78.140	0.195	0.0	0.6	0.6	3.8	O K
60 min Summer	78.174	0.229	0.0	0.6	0.6	4.9	O K
120 min Summer	78.195	0.250	0.0	0.6	0.6	5.5	O K
180 min Summer	78.202	0.257	0.0	0.6	0.6	5.7	O K
240 min Summer	78.203	0.258	0.0	0.6	0.6	5.7	O K
360 min Summer	78.199	0.254	0.0	0.6	0.6	5.6	O K
480 min Summer	78.191	0.246	0.0	0.6	0.6	5.4	O K
600 min Summer	78.182	0.237	0.0	0.6	0.6	5.1	O K
720 min Summer	78.173	0.228	0.0	0.6	0.6	4.8	O K
960 min Summer	78.156	0.211	0.0	0.6	0.6	4.3	O K
1440 min Summer	78.127	0.182	0.0	0.5	0.5	3.4	O K
2160 min Summer	78.094	0.149	0.0	0.5	0.5	2.5	O K
2880 min Summer	78.072	0.127	0.0	0.4	0.4	1.8	O K
4320 min Summer	78.040	0.095	0.0	0.4	0.4	1.0	O K
5760 min Summer	78.020	0.075	0.0	0.3	0.3	0.6	O K
7200 min Summer	78.006	0.061	0.0	0.3	0.3	0.4	O K
8640 min Summer	77.995	0.050	0.0	0.3	0.3	0.3	O K
10080 min Summer	77.988	0.043	0.0	0.2	0.2	0.2	O K
15 min Winter	78.115	0.170	0.0	0.5	0.5	3.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.064	0.0	3.0	18
30 min Summer	51.093	0.0	4.5	32
60 min Summer	34.650	0.0	6.2	60
120 min Summer	22.408	0.0	8.2	92
180 min Summer	17.212	0.0	9.5	126
240 min Summer	14.230	0.0	10.5	162
360 min Summer	10.845	0.0	12.1	230
480 min Summer	8.929	0.0	13.3	300
600 min Summer	7.672	0.0	14.3	366
720 min Summer	6.775	0.0	15.2	432
960 min Summer	5.565	0.0	16.7	560
1440 min Summer	4.213	0.0	18.9	808
2160 min Summer	3.188	0.0	21.4	1172
2880 min Summer	2.616	0.0	23.4	1528
4320 min Summer	1.976	0.0	26.3	2244
5760 min Summer	1.618	0.0	28.6	2944
7200 min Summer	1.385	0.0	30.4	3672
8640 min Summer	1.219	0.0	31.9	4400
10080 min Summer	1.094	0.0	33.2	5136
15 min Winter	72.064	0.0	3.4	17

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)					
Date 23/03/2023 File A211106 - Pervious Pavi...		Designed by JMA Checked by JMA					
CADS	Source Control 2017.1.2						



Summary of Results for 100 year Return Period (+35%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	78.158	0.213	0.0	0.6	0.6	4.4	O K
60 min Winter	78.198	0.253	0.0	0.6	0.6	5.6	O K
120 min Winter	78.221	0.276	0.0	0.7	0.7	6.3	O K
<b>180 min Winter</b>	<b>78.228</b>	<b>0.283</b>	<b>0.0</b>	<b>0.7</b>	<b>0.7</b>	<b>6.5</b>	<b>O K</b>
240 min Winter	78.228	0.283	0.0	0.7	0.7	6.5	O K
360 min Winter	78.217	0.272	0.0	0.7	0.7	6.2	O K
480 min Winter	78.203	0.258	0.0	0.6	0.6	5.7	O K
600 min Winter	78.188	0.243	0.0	0.6	0.6	5.3	O K
720 min Winter	78.174	0.229	0.0	0.6	0.6	4.9	O K
960 min Winter	78.148	0.203	0.0	0.6	0.6	4.1	O K
1440 min Winter	78.107	0.162	0.0	0.5	0.5	2.9	O K
2160 min Winter	78.067	0.122	0.0	0.4	0.4	1.7	O K
2880 min Winter	78.041	0.096	0.0	0.4	0.4	1.0	O K
4320 min Winter	78.009	0.064	0.0	0.3	0.3	0.5	O K
5760 min Winter	77.993	0.048	0.0	0.2	0.2	0.3	O K
7200 min Winter	77.983	0.038	0.0	0.2	0.2	0.2	O K
8640 min Winter	77.979	0.034	0.0	0.2	0.2	0.1	O K
10080 min Winter	77.976	0.031	0.0	0.2	0.2	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	51.093	0.0	5.1	31
60 min Winter	34.650	0.0	7.1	60
120 min Winter	22.408	0.0	9.3	98
<b>180 min Winter</b>	<b>17.212</b>	<b>0.0</b>	<b>10.7</b>	<b>136</b>
240 min Winter	14.230	0.0	11.9	174
360 min Winter	10.845	0.0	13.6	250
480 min Winter	8.929	0.0	15.0	322
600 min Winter	7.672	0.0	16.1	392
720 min Winter	6.775	0.0	17.1	458
960 min Winter	5.565	0.0	18.7	590
1440 min Winter	4.213	0.0	21.3	840
2160 min Winter	3.188	0.0	24.1	1192
2880 min Winter	2.616	0.0	26.3	1532
4320 min Winter	1.976	0.0	29.7	2244
5760 min Winter	1.618	0.0	32.2	2928
7200 min Winter	1.385	0.0	34.3	3648
8640 min Winter	1.219	0.0	36.0	4400
10080 min Winter	1.094	0.0	37.6	5008

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)	
Date 23/03/2023 File A211106 - Pervious Pavi...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+35

### Time Area Diagram

Total Area (ha) 0.026

Time (mins) Area  
From: To: (ha)

0 4 0.026

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)	
Date 23/03/2023 File A211106 - Pervious Pavi...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Model Details

Storage is Online Cover Level (m) 78.425

### Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	27.8	Slope (1:X)	150.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	77.945	Membrane Depth (m)	0

### Orifice Outflow Control

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 77.945

Cameron & Ross							Page 1
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)					
Date 23/03/2023 File A211106 - Pervious Pavi...		Designed by JMA Checked by JMA					
CADS	Source Control 2017.1.2						



### Summary of Results for 200 year Return Period (+35%)

Half Drain Time : 107 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
15 min Summer	78.119	0.174	0.0	0.5	0.5	3.2	O K
30 min Summer	78.165	0.220	0.0	0.6	0.6	4.6	O K
60 min Summer	78.207	0.262	0.0	0.7	0.7	5.9	O K
120 min Summer	78.232	0.287	0.0	0.7	0.7	6.6	O K
180 min Summer	78.241	0.296	0.0	0.7	0.7	6.9	O K
240 min Summer	78.243	0.298	0.0	0.7	0.7	6.9	O K
360 min Summer	78.238	0.293	0.0	0.7	0.7	6.8	O K
480 min Summer	78.230	0.285	0.0	0.7	0.7	6.5	O K
600 min Summer	78.220	0.275	0.0	0.7	0.7	6.2	O K
720 min Summer	78.210	0.265	0.0	0.7	0.7	5.9	O K
960 min Summer	78.190	0.245	0.0	0.6	0.6	5.4	O K
1440 min Summer	78.156	0.211	0.0	0.6	0.6	4.3	O K
2160 min Summer	78.118	0.173	0.0	0.5	0.5	3.2	O K
2880 min Summer	78.091	0.146	0.0	0.5	0.5	2.4	O K
4320 min Summer	78.056	0.111	0.0	0.4	0.4	1.4	O K
5760 min Summer	78.032	0.087	0.0	0.4	0.4	0.9	O K
7200 min Summer	78.016	0.071	0.0	0.3	0.3	0.6	O K
8640 min Summer	78.004	0.059	0.0	0.3	0.3	0.4	O K
10080 min Summer	77.995	0.050	0.0	0.3	0.3	0.3	O K
15 min Winter	78.135	0.190	0.0	0.5	0.5	3.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	83.249	0.0	3.6	18
30 min Summer	59.378	0.0	5.3	32
60 min Summer	40.401	0.0	7.4	60
120 min Summer	26.043	0.0	9.6	96
180 min Summer	19.950	0.0	11.1	128
240 min Summer	16.455	0.0	12.3	164
360 min Summer	12.494	0.0	14.0	234
480 min Summer	10.256	0.0	15.4	302
600 min Summer	8.793	0.0	16.5	368
720 min Summer	7.750	0.0	17.5	434
960 min Summer	6.345	0.0	19.1	568
1440 min Summer	4.781	0.0	21.6	820
2160 min Summer	3.601	0.0	24.3	1188
2880 min Summer	2.945	0.0	26.5	1532
4320 min Summer	2.214	0.0	29.7	2248
5760 min Summer	1.806	0.0	32.1	2944
7200 min Summer	1.541	0.0	34.1	3672
8640 min Summer	1.353	0.0	35.7	4408
10080 min Summer	1.212	0.0	37.1	5136
15 min Winter	83.249	0.0	4.0	18

Cameron & Ross							Page 2
15 Victoria Street Aberdeen AB10 1XB		A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)					
Date 23/03/2023 File A211106 - Pervious Pavi...		Designed by JMA Checked by JMA					
CADS		Source Control 2017.1.2					



Summary of Results for 200 year Return Period (+35%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ (l/s)	Max Outflow Volume (m³)	Status
30 min Winter	78.187	0.242	0.0	0.6	0.6	5.2	O K
60 min Winter	78.236	0.291	0.0	0.7	0.7	6.7	O K
120 min Winter	78.264	0.319	0.0	0.7	0.7	7.6	O K
180 min Winter	78.273	0.328	0.0	0.7	0.7	7.8	O K
<b>240 min Winter</b>	<b>78.273</b>	<b>0.328</b>	<b>0.0</b>	<b>0.7</b>	<b>0.7</b>	<b>7.9</b>	<b>O K</b>
360 min Winter	78.263	0.318	0.0	0.7	0.7	7.5	O K
480 min Winter	78.247	0.302	0.0	0.7	0.7	7.1	O K
600 min Winter	78.231	0.286	0.0	0.7	0.7	6.6	O K
720 min Winter	78.215	0.270	0.0	0.7	0.7	6.1	O K
960 min Winter	78.185	0.240	0.0	0.6	0.6	5.2	O K
1440 min Winter	78.137	0.192	0.0	0.6	0.6	3.8	O K
2160 min Winter	78.089	0.144	0.0	0.5	0.5	2.3	O K
2880 min Winter	78.059	0.114	0.0	0.4	0.4	1.5	O K
4320 min Winter	78.021	0.076	0.0	0.3	0.3	0.7	O K
5760 min Winter	78.001	0.056	0.0	0.3	0.3	0.4	O K
7200 min Winter	77.989	0.044	0.0	0.2	0.2	0.2	O K
8640 min Winter	77.982	0.037	0.0	0.2	0.2	0.2	O K
10080 min Winter	77.979	0.034	0.0	0.2	0.2	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	59.378	0.0	6.0	31
60 min Winter	40.401	0.0	8.3	60
120 min Winter	26.043	0.0	10.9	100
180 min Winter	19.950	0.0	12.5	138
<b>240 min Winter</b>	<b>16.455</b>	<b>0.0</b>	<b>13.8</b>	<b>176</b>
360 min Winter	12.494	0.0	15.8	252
480 min Winter	10.256	0.0	17.3	324
600 min Winter	8.793	0.0	18.6	396
720 min Winter	7.750	0.0	19.7	464
960 min Winter	6.345	0.0	21.5	598
1440 min Winter	4.781	0.0	24.3	852
2160 min Winter	3.601	0.0	27.4	1212
2880 min Winter	2.945	0.0	29.8	1560
4320 min Winter	2.214	0.0	33.4	2248
5760 min Winter	1.806	0.0	36.2	2936
7200 min Winter	1.541	0.0	38.4	3672
8640 min Winter	1.353	0.0	40.3	4336
10080 min Winter	1.212	0.0	41.9	5072

Cameron & Ross		Page 3
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)	
Date 23/03/2023 File A211106 - Pervious Pavi...	Designed by JMA Checked by JMA	
CADS	Source Control 2017.1.2	



### Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	200	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	12.900	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+35

### Time Area Diagram

Total Area (ha) 0.026

Time (mins) Area  
From: To: (ha)

0 4 0.026

Cameron & Ross		Page 4
15 Victoria Street Aberdeen AB10 1XB	A/211106 - Commercial Dev. Merchant Place. Perviopus Paving (North Area)	
Date 23/03/2023 File A211106 - Pervious Pavi...	Designed by JMA Checked by JMA	
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### Model Details

Storage is Online Cover Level (m) 78.425

### Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	20.0
Max Percolation (l/s)	27.8	Slope (1:X)	150.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	77.945	Membrane Depth (m)	0

### Orifice Outflow Control

Diameter (m) 0.025 Discharge Coefficient 0.600 Invert Level (m) 77.945

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