STEPHENSON STREET

BUS STOP

BUS STOP

BLOCK A

ENERGY CENTER

MORRISONS DEMISE LINE

MORRISON'S TRANSFORMER ROOM

MORRISON'S SUBSTATION

+28.550

TRACKING TO BE UPDATED AND CONFIRMED BY TRANSPORT CONSULTANT

BLOCK F OVER

STORE ENTRANCE

+28.150

BLOCK B OVER

MORRISON'S SUPERSTORE

+28.150

AFFORDABLE OFFICE

CAMDEN YARD

AFFORDABLE WORKSPACE

OFFICE

+28.150

MORRISON'S STAFF ROOM

MORRISONS DEMISE LINE

TRACKING TO BE UPDATED AND CONFIRMED BY TRANSPORT CONSULTANT

+26.950

+28.150

STORE ENTRANCE

+28.550

HOME DELIVERIES

HOME DELIVERIES PARKING

BLOCK E2 OVER

+28.150

BLOCK C OVER

MORRISONS DEMISE LINE

TRACKING TO BE UPDATED AND CONFIRMED BY TRANSPORT CONSULTANT

BLOCK E1 OVER

BLOCK D OVER

1:200 0 2m 4 6 8 10 12 14 16 18 20 22 24m

## PARKING SPACES

| | |
|---|---|
| PARKING SPACES 5.0 X 2.5 | 179 |
| PARKING SPACES 5.0 X 2.5 (charging) | 50 |
| DISABLED BAYS | 11 |
| PARENT AND TODDLER BAYS | 13 |
| TOTAL | 253 |
| TROLLEY BAYS | 7 |
| HOME DELIVERY BAYS | 10 |

| rev | description | drawn | checked | date |
|---|---|---|---|---|
| P2 | Levels and Grids added | MJ | MJ | 27.01.21 |
| P1 | Initial issue | CJ | MJ | 22.01.21 |

revisions

status: PRELIMINARY

reason for issue:



P T A L
| Architects | Masterplanners | Designers |

**Peter Taylor Associates Limited**
Khiara House, 25-26 Poland Street
Soho, London W1F 8QN
**T:** +44 (0)20 7495 3837
**W:** www.ptal.co.uk

St George
Designed for life

project: CAMDEN GOODS YARD
PHASE 2A

title: SITE PLAN
LEVEL B1

scale: 1 : 200 @ A0

date: 01/21/21

drawn: CJ

checked: MJ

file name:

project no: originator: zone: level: type: role: dwg number: revision:
CGYSW - PTA - ZZZ - B1 - DR - AR - 03651 P2

PTAL Project Number: 200035

PTAL Model Reference: CGYSW-PTA-ZZZ-ZZ-M3-AR-00001

BLOCK A
OVER

MORRISONS DEMISE LINE

BLOCK F
OVER

STORE
ENTRANCE

TRACKING TO BE UPDATED
AND CONFIRMED BY
TRANSPORT CONSULTANT

STAIR

BLOCK E2
OVER

MORRISONS DEMISE LINE

TRACKING TO BE UPDATED
AND CONFIRMED BY
TRANSPORT CONSULTANT

BLOCK B
OVER

BLOCK E1
OVER

BLOCK C
OVER

PARKING SPACES

| | |
|---|---|
| PARKING SPACES 5.0 X 2.5 | 179 |
| PARKING SPACES 5.0 X 2.5 (charging) | 50 |
| DISABLED BAYS | 11 |
| PARENT AND TODDLER BAYS | 13 |
| TOTAL | 253 |
| TROLLEY BAYS | 7 |
| HOME DELIVERY BAYS | 10 |

1:200 0 2m 4 6 8 10 12 14 16 18 20 22 24m

| rev | description | drawn | checked | date |
|---|---|---|---|---|
| P2 | Levels and Grids added | MJ | MJ | 27.01.21 |
| P1 | Initial issue | CJ | MJ | 22.01.21 |

revisions

status: PRELIMINARY

reason for issue:



P T A L
| Architects | Masterplanners | Designers |

**Peter Taylor Associates Limited**
Khiara House, 25-26 Poland Street
Soho, London W1F 8QN
**T:** +44 (0)20 7495 3837
**W:** www.ptal.co.uk

St George
Designed for life

project: CAMDEN GOODS YARD
PHASE 2A

title: SITE PLAN
LEVEL B2

scale: 1 : 200 @ A0

date: 01/21/21

drawn: CJ

checked: MJ

file name:

project no: CGYSW originator: PTA zone: ZZZ level: B2 type: DR role: AR dwg number: 03650 revision: P2

PTAL Project Number: 200035

PTAL Model Reference: CGYSW-PTA-ZZZ-ZZ-M3-AR-00001

# Appendix H **Foul Water Calculations**

**Project:** Camden Goods Yard
**Job No:** 5359

**Date:** 26-Mar-21

**Design of Total Foul Flow from Development - Population Method**

| | BLOCK | PERSONS/UNIT | Block F | Block A | Block B | Block D | Block E1 | Block E2 | Block C | lower basement | Basement | affordable workspaces | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | Studio / Student Bed | 1 | 13 | 18 | 20 | | 10 | | | | | | 61 | |
| | 1 Bed Units | 2 | 43 | 44 | 68 | 25 | 24 | 6 | 38 | | | | 248 | |
| | 2 Bed Units | 3 | 58 | | | 8 | | | | | | | 66 | |
| | 3 bed Units | 4 | 38 | 26 | 66 | | 16 | 6 | 58 | | | | 210 | |
| | 4 Bed Units | 5 | 3 | 22 | | 9 | | 6 | | | | | 40 | |
| | 4 Bed Units | 6 | | | 14 | | | 5 | | | | | 19 | Total units |
| | Future development | 3 | | | | 21 | 25 | 10 | | | | | 56 | 700 |
| | Population | No | 539 | 320 | 504 | 182 | 197 | 126 | 308 | | | | 2176 | 3.1 |
| | Peak Design Flow | l/s | 7.5 | 4.5 | 7.1 | 2.5 | 2.8 | 1.8 | 4.3 | | | | 30.5 | pers per unit |
| Office/Commercial | Gross Area | m2 | 1784 | 701 | 2745 | | | | 419 | 2343 | | | 5649 | |
| | Estimated Staff | No | 113 | 44 | 174 | 0 | 0 | 0 | 27 | 148 | | | 358 | |
| | Peak Design Flow | l/s | 0.8 | 0.3 | 1.2 | 0.0 | 0.0 | 0.0 | 0.2 | 1.0 | | | 2.5 | |
| Gym | Gross Area | m2 | | 377.0 | | | | | | | | | | |
| | Estimated persons | No | | 75.4 | | | | | | | | | | |
| | Peak Design Flow | l/s | | 0.5 | | | | | | | | | | |
| Cinema | Gross Area | m2 | | 92.3 | | | | | | | | | | |
| | Estimated persons | No | | 92.3 | | | | | | | | | | |
| | Peak design flow | l/s | | 0.2 | | | | | | | | | | |
| swimming pool | Gross Area | m2 | | 370.0 | | | | | | | | | | |
| | Estimated persons | No | | 74.0 | | | | | | | | | | |
| | Peak design flow | l/s | | 0.1 | | | | | | | | | | |
| Retail | Gross Area | m2 | 245 | 295 | 858 | 118 | 152 | | 501 | | | 538 | 2707 | |
| | Estimated Staff | No | 12 | 15 | 43 | 6 | 8 | 0 | 25 | | | 8 | 116 | |
| | Peak Design Flow | l/s | 0.1 | 0.1 | 0.3 | 0.0 | 0.1 | 0.0 | 0.2 | | | 0.1 | 0.9 | |
| supermarket | Gross Area | m2 | | | | | | | | 3781.0 | 250.0 | | | |
| | Estimated customers + Staff | No | | | | | | | | 58.2 | | | | |
| | Peak Design Flow | l/s | | | | | | | | 0.3 | | | | |
| | Gross Area | m2 | | | 345m2 | | | | | | | | | |

| Restaurant | Customers | No | | | 120.0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Peak Design Flow | l/s | | | 0.7 | | | | | | | | |
| All | Peak Design Flow | l/s | 8.4 | 4.9 | 9.2 | 2.6 | 2.8 | 1.8 | 4.7 | | | 0.1 | 34.5 |

*Assumptions*

*1. For residential blocks assume 200l/day/person - discharged over a 24 hour period. (Ref. Ciria Report 121 Cl 1.1.2) with DWF 6 i.e. 200/24/3600*6 = 0.014l/s/person*
*2. For offices assume occupancy rate of 15.8m^2 per employee. (Ref.Axcell et al, Real Estate Finance and Investment, City University Research Paper No. 2001.01, Feb 2001 p.10)*
*3. For offices assume foul discharge of 50l/head/day - discharged over a 8 hour period. (Ref. Ciria Report 121 Table 2. ) and DWF of 4 i.e. 50/8/3600*4 = 0.0069 l/sec/employee*
*4. Flow from retail units based on 20m^3/year/employee - discharged over a 8 hour period. (Ref. Ciria Report 177 Table4.4), 70m2 of retail space per employee and DWF of 4 i.e. 20*1000/365/8/3600*4 = 0.0076*
*5. For restaurants assume 40l/head/day - discharged over a 12 hour period. (Ref. Ciria Report 121 Cl 1.1.2 Table 2.)DWF 6 i.e. 40/12/3600*6 = 0.0055 l/s/person*
*6. For restaurants assume 1.0m^2/person/day (Ref. Approved Document B, Vol 2 - Table D1)*
*6. For supermarket assume - 40l/head/day discharged over a 12 hour period. (Ref. Ciria Report 121 Cl 1.1.2 Table 2.) DWF 6 i.e. 40/12/3600*6 = 0.0055 l/s/person*
*8. For supermarket staff assume occupancy rate of 65m^2 per employee (Ref. Metric Handbook Planning and Design Data - chapter 35 4.3 Table 1)*
*7. For gymnasiums assume occupancy rate of 5m^2 per user. (based on full capacity usage from Sport England - Design Guidance Note - Fitness and Exercise spaces March 2008)*
*8. For gymnasiums assume - 50l/person/day - discharged over a 12 hour period. (Ref. British water code of practice - Flows and Loads 4) DWF 6 i.e. 50/12/3600*6 = 0.0069l/s/person*
*9. For cinemas assume - 12L/person/day - (Based on British Water; Flows and Loads 4) treated as fast food amenity DWF i.e. 12/12/3600*6=0.00166*
*10. For cinemas assume - 1m^2/person of floor space (Ref. Approved Document B, Vol 2 - Table D1)*
*11. For swimming pools assume - 10L/person/day - (Based on British Water; Flows and Loads 4)DWF i.e. 10/12/3600*6= 0.00138*
*12. For swimming pools assume occupancy rate of 5m^2 per user. (based on full capacity usage from Sport England - Design Guidance Note - Fitness and Exercise spaces March 2008)*
*12. Affordable workspaces and commercial areas have the same occupancy and discharge rates as offices assumption based on Ciria Report 121 1.1.2 Table 2.*
*13. An allowance for 700 units has been made for future development. This is an addition of 56 units on the accomodation schedule (CGY00-AAM-XXX-XX-SH-IM-00001 dated: 24.02.21) the units have been apportioned to*

| | | |
|---|---|---|
| Foul flow pp | 200 | 0.014 |

**Project:** Camden Goods Yard
**Job No:** 5359

**Date:** 26-Mar-21

**Design of Total Foul Flow from Development - Population Method**

| | BLOCK | PERSONS/UNIT | Block F | Block A | Block B | Block D | Block E1 | Block E2 | Block C | lower basement | Basement | affordable workspaces | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | Studio / Student Bed | 1 | 13 | 18 | 20 | | 10 | | | | | | 61 | |
| | 1 Bed Units | 2 | 43 | 44 | 68 | 25 | 24 | 6 | 38 | | | | 248 | |
| | 2 Bed Units | 3 | 58 | | | 8 | | | | | | | 66 | |
| | 3 bed Units | 4 | 38 | 26 | 66 | | 16 | 6 | 58 | | | | 210 | |
| | 4 Bed Units | 5 | 3 | 22 | | 9 | | 6 | | | | | 40 | |
| | 4 Bed Units | 6 | | | 14 | | | 5 | | | | | 19 | Total units |
| | Future development | 3 | | | | 21 | 25 | 10 | | | | | 56 | 700 |
| | Population | No | 539 | 320 | 504 | 182 | 197 | 126 | 308 | | | | 2176 | 3.1 |
| | Peak Design Flow | l/s | 7.5 | 4.5 | 7.1 | 2.5 | 2.8 | 1.8 | 4.3 | | | | 30.5 | pers per unit |
| Office/Commercial | Gross Area | m2 | 1784 | 701 | 2745 | | | | 419 | 2343 | | | 5649 | |
| | Estimated Staff | No | 113 | 44 | 174 | 0 | 0 | 0 | 27 | 148 | | | 358 | |
| | Peak Design Flow | l/s | 0.8 | 0.3 | 1.2 | 0.0 | 0.0 | 0.0 | 0.2 | 1.0 | | | 2.5 | |
| Gym | Gross Area | m2 | | 377.0 | | | | | | | | | | |
| | Estimated persons | No | | 75.4 | | | | | | | | | | |
| | Peak Design Flow | l/s | | 0.5 | | | | | | | | | | |
| Cinema | Gross Area | m2 | | 92.3 | | | | | | | | | | |
| | Estimated persons | No | | 92.3 | | | | | | | | | | |
| | Peak design flow | l/s | | 0.2 | | | | | | | | | | |
| swimming pool | Gross Area | m2 | | 370.0 | | | | | | | | | | |
| | Estimated persons | No | | 74.0 | | | | | | | | | | |
| | Peak design flow | l/s | | 0.1 | | | | | | | | | | |
| Retail | Gross Area | m2 | 245 | 295 | 858 | 118 | 152 | | 501 | | | 538 | 2707 | |
| | Estimated Staff | No | 12 | 15 | 43 | 6 | 8 | 0 | 25 | | | 8 | 116 | |
| | Peak Design Flow | l/s | 0.1 | 0.1 | 0.3 | 0.0 | 0.1 | 0.0 | 0.2 | | | 0.1 | 0.9 | |
| supermarket | Gross Area | m2 | | | | | | | | 3781.0 | 250.0 | | | |
| | Estimated customers + Staff | No | | | | | | | | 58.2 | | | | |
| | Peak Design Flow | l/s | | | | | | | | 0.3 | | | | |
| Restaurant | Gross Area | m2 | | | 345m2 | | | | | | | | | |
| | Customers | No | | | 120.0 | | | | | | | | | |
| | Peak Design Flow | l/s | | | 0.7 | | | | | | | | | |
| All | Peak Design Flow | l/s | 8.4 | 4.9 | 9.2 | 2.6 | 2.8 | 1.8 | 4.7 | | | 0.1 | 34.5 | |

*Assumptions*

*1. For residential blocks assume 200l/day/person - discharged over a 24 hour period. (Ref. Ciria Report 121 Cl 1.1.2) with DWF 6 i.e. 200/24/3600*6 = 0.014l/s/person*
*2. For offices assume occupancy rate of 15.8m^2 per employee. (Ref.Axcell et al, Real Estate Finance and Investment, City University Research Paper No. 2001.01, Feb 2001 p.10)*
*3. For offices assume foul discharge of 50l/head/day - discharged over a 8 hour period. (Ref. Ciria Report 121 Table 2. ) and DWF of 4 i.e. 50/8/3600*4 = 0.0069 l/sec/employee*
*4. Flow from retail units based on 20m^3/year/employee - discharged over a 8 hour period. (Ref. Ciria Report 177 Table4.4), 70m2 of retail space per employee and DWF of 4 i.e. 20*1000/365/8/3600*4 = 0.0076*
*5. For restaurants assume 40l/head/day - discharged over a 12 hour period. (Ref. Ciria Report 121 Cl 1.1.2 Table 2.)DWF 6 i.e. 40/12/3600*6 = 0.0055 l/s/person*
*6. For restaurants assume 1.0m^2/person/day (Ref. Approved Document B, Vol 2 - Table D1)*
*6. For supermarket assume - 40l/head/day discharged over a 12 hour period. (Ref. Ciria Report 121 Cl 1.1.2 Table 2.) DWF 6 i.e. 40/12/3600*6 = 0.0055 l/s/person*
*8. For supermarket staff assume occupancy rate of 65m^2 per employee (Ref. Metric Handbook Planning and Design Data - chapter 35 4.3 Table 1)*
*7. For gymnasiums assume occupancy rate of 5m^2 per user. (based on full capacity usage from Sport England - Design Guidance Note - Fitness and Exercise spaces March 2008)*
*8. For gymnasiums assume - 50l/person/day - discharged over a 12 hour period. (Ref. British water code of practice - Flows and Loads 4) DWF 6 i.e. 50/12/3600*6 = 0.0069l/s/person*
*9. For cinemas assume - 12L/person/day - (Based on British Water; Flows and Loads 4) treated as fast food amenity DWF i.e. 12/12/3600*6=0.00166*
*10. For cinemas assume - 1m^2/person of floor space (Ref. Approved Document B, Vol 2 - Table D1)*
*11. For swimming pools assume - 10L/person/day - (Based on British Water; Flows and Loads 4)DWF i.e. 10/12/3600*6= 0.00138*
*12. For swimming pools assume occupancy rate of 5m^2 per user. (based on full capacity usage from Sport England - Design Guidance Note - Fitness and Exercise spaces March 2008)*
*12. Affordable workspaces and commercial areas have the same occupancy and discharge rates as offices assumption based on Ciria Report 121 1.1.2 Table 2.*
*13. An allowance for 700 units has been made for future development. This is an addition of 56 units on the accomodation schedule (CGY00-AAM-XXX-XX-SH-IM-00001 dated: 24.02.21) the units have been apportioned*

| | | |
|---|---|---|
| Foul flow pp | 200 | 0.014 |

# Appendix I **Surface Water Calculations**

## STORM SEWER DESIGN by the Modified Rational Method

### Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

| | | | | | |
|---|---|---|---|---|---|
| Return Period (years) | 100 | Foul Sewage (l/s/ha) | 0.000 | Maximum Backdrop Height (m) | 0.000 |
| M5-60 (mm) | 21.000 | Volumetric Runoff Coeff. | 0.750 | Min Design Depth for Optimisation (m) | 1.200 |
| Ratio R | 0.435 | PIMP (%) | 100 | Min Vel for Auto Design only (m/s) | 1.00 |
| Maximum Rainfall (mm/hr) | 50 | Add Flow / Climate Change (%) | 0 | Min Slope for Optimisation (1:X) | 500 |
| Maximum Time of Concentration (mins) | 30 | Minimum Backdrop Height (m) | 0.000 | | |

Designed with Level Soffits

### Time Area Diagram for Storm at outfall S (pipe S1.017)

| Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) |
|---|---|---|---|---|---|---|---|
| 0-4 | 0.298 | 4-8 | 0.831 | 8-12 | 0.244 | 12-16 | 0.019 |

Total Area Contributing (ha) = 1.392

Total Pipe Volume ($m^3$) = 30.270

## Time Area Diagram at outfall S (pipe S3.006)

| Time (mins) | Area (ha) | Time (mins) | Area (ha) |
|---|---|---|---|
| 0-4 | 0.874 | 4-8 | 0.227 |

Total Area Contributing (ha) = 1.100

Total Pipe Volume (m³) = 26.184

## Time Area Diagram at outfall S23 (pipe S7.004)

| Time (mins) | Area (ha) | Time (mins) | Area (ha) |
|---|---|---|---|
| 0-4 | 0.128 | 4-8 | 0.013 |

Total Area Contributing (ha) = 0.141

Total Pipe Volume (m³) = 2.634

## Network Design Table for Storm

« - Indicates pipe capacity < flow

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|

## Network Design Table for Storm

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.000 | 3.765 | 0.000 | 0.0 | 0.083 | 5.00 | 0.0 | 0.600 | o | 250 | Pipe/Conduit | |
| S1.001 | 33.340 | 0.033 | 1010.3 | 0.053 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S1.002 | 30.837 | 0.031 | 994.7 | 0.098 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S1.003 | 56.711 | 0.227 | 250.0 | 0.111 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S1.004 | 5.334 | 0.053 | 100.6 | 0.000 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S1.005 | 27.710 | 0.111 | 250.0 | 0.185 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S1.006 | 33.513 | 0.134 | 250.0 | 0.370 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S2.000 | 39.086 | 0.004 | 9771.5 | 0.070 | 5.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S2.001 | 11.459 | 0.374 | 30.6 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S1.000 | 50.00 | 5.48 | 34.150 | 0.083 | 0.0 | 0.0 | 0.0 | 0.13 | 6.5« | 11.3 |
| S1.001 | 50.00 | 6.62 | 34.150 | 0.136 | 0.0 | 0.0 | 0.0 | 0.49 | 34.4 | 18.4 |
| S1.002 | 50.00 | 7.67 | 34.150 | 0.234 | 0.0 | 0.0 | 0.0 | 0.49 | 34.7 | 31.7 |
| S1.003 | 50.00 | 8.62 | 33.710 | 0.346 | 0.0 | 0.0 | 0.0 | 0.99 | 70.0 | 46.8 |
| S1.004 | 50.00 | 8.67 | 33.483 | 0.346 | 0.0 | 0.0 | 0.0 | 1.81 | 199.5 | 46.8 |
| S1.005 | 50.00 | 9.08 | 30.096 | 0.530 | 0.0 | 0.0 | 0.0 | 1.14 | 126.1 | 71.8 |
| S1.006 | 50.00 | 9.56 | 29.986 | 0.900 | 0.0 | 0.0 | 0.0 | 1.14 | 126.1 | 121.9 |
| S2.000 | 50.00 | 9.34 | 33.150 | 0.070 | 0.0 | 0.0 | 0.0 | 0.15 | 10.6 | 9.4 |
| S2.001 | 50.00 | 9.42 | 33.146 | 0.070 | 0.0 | 0.0 | 0.0 | 2.37 | 94.3 | 9.4 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.007 | 16.870 | 0.067 | 250.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S1.008 | 21.129 | 0.085 | 250.0 | 0.083 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S1.009 | 43.133 | 0.173 | 249.3 | 0.020 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S1.010 | 17.541 | 0.117 | 150.0 | 0.139 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S1.011 | 5.545 | 0.014 | 400.0 | 0.006 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S1.012 | 8.932 | 0.036 | 248.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S1.013 | 19.254 | 0.036 | 534.8 | 0.095 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S1.014 | 11.708 | 0.148 | 79.1 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S1.015 | 9.646 | 0.039 | 250.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S1.007 | 50.00 | 9.85 | 29.851 | 0.970 | 0.0 | 0.0 | 0.0 | 0.99 | 70.0« | 131.3 |
| S1.008 | 50.00 | 10.20 | 29.784 | 1.053 | 0.0 | 0.0 | 0.0 | 0.99 | 70.0« | 142.6 |
| S1.009 | 50.00 | 11.08 | 29.234 | 1.073 | 0.0 | 0.0 | 0.0 | 0.82 | 32.7« | 145.2 |
| S1.010 | 50.00 | 11.35 | 28.825 | 1.211 | 0.0 | 0.0 | 0.0 | 1.07 | 42.4« | 164.0 |
| S1.011 | 50.00 | 11.47 | 26.000 | 1.218 | 0.0 | 0.0 | 0.0 | 0.78 | 55.1« | 164.9 |
| S1.012 | 50.00 | 11.62 | 25.978 | 1.218 | 0.0 | 0.0 | 0.0 | 0.99 | 70.2« | 164.9 |
| S1.013 | 50.00 | 12.03 | 25.942 | 1.312 | 0.0 | 0.0 | 0.0 | 0.78 | 85.8« | 177.7 |
| S1.014 | 50.00 | 12.17 | 25.870 | 1.312 | 0.0 | 0.0 | 0.0 | 1.47 | 58.5« | 177.7 |
| S1.015 | 50.00 | 12.36 | 25.838 | 1.312 | 0.0 | 0.0 | 0.0 | 0.82 | 32.7« | 177.7 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.016 | 9.646 | 0.030 | 321.5 | 0.080 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S1.017 | 9.367 | 0.053 | 176.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| S3.000 | 14.544 | 0.160 | 90.9 | 0.000 | 5.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S4.000 | 17.477 | 0.076 | 230.0 | 0.026 | 5.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S4.001 | 24.516 | 0.200 | 122.6 | 0.186 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S4.002 | 19.367 | 0.200 | 96.8 | 0.096 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S3.001 | 36.980 | 0.840 | 44.0 | 0.187 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S1.016 | 50.00 | 12.58 | 25.799 | 1.392 | 0.0 | 0.0 | 0.0 | 0.72 | 28.8« | 188.5 |
| S1.017 | 50.00 | 12.69 | 25.765 | 1.392 | 0.0 | 0.0 | 0.0 | 1.53 | 242.7 | 188.5 |
| S3.000 | 50.00 | 5.13 | 31.000 | 0.000 | 0.0 | 0.0 | 0.0 | 1.90 | 210.0 | 0.0 |
| S4.000 | 50.00 | 5.24 | 33.850 | 0.026 | 0.0 | 0.0 | 0.0 | 1.19 | 131.5 | 3.6 |
| S4.001 | 50.00 | 5.49 | 33.850 | 0.212 | 0.0 | 0.0 | 0.0 | 1.64 | 180.6 | 28.7 |
| S4.002 | 50.00 | 5.67 | 33.500 | 0.308 | 0.0 | 0.0 | 0.0 | 1.84 | 203.4 | 41.7 |
| S3.001 | 50.00 | 5.89 | 30.840 | 0.495 | 0.0 | 0.0 | 0.0 | 2.74 | 302.3 | 67.1 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S3.002 | 36.710 | 0.300 | 122.4 | 0.000 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S3.003 | 11.680 | 0.078 | 150.0 | 0.234 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S3.004 | 8.740 | 0.058 | 150.7 | 0.102 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S3.005 | 16.298 | 0.065 | 250.7 | 0.054 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S5.000 | 37.655 | 0.038 | 990.9 | 0.028 | 5.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S5.001 | 19.675 | 0.131 | 150.0 | 0.036 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| S5.002 | 11.104 | 4.000 | 2.8 | 0.087 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S6.000 | 12.423 | 0.116 | 107.1 | 0.000 | 5.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S3.002 | 50.00 | 6.27 | 30.000 | 0.495 | 0.0 | 0.0 | 0.0 | 1.64 | 180.8 | 67.1 |
| S3.003 | 50.00 | 6.40 | 28.720 | 0.730 | 0.0 | 0.0 | 0.0 | 1.48 | 163.1 | 98.8 |
| S3.004 | 50.00 | 6.50 | 28.642 | 0.832 | 0.0 | 0.0 | 0.0 | 1.47 | 162.8 | 112.6 |
| S3.005 | 50.00 | 6.74 | 28.584 | 0.886 | 0.0 | 0.0 | 0.0 | 1.14 | 125.9 | 120.0 |
| S5.000 | 50.00 | 6.28 | 33.850 | 0.028 | 0.0 | 0.0 | 0.0 | 0.49 | 34.7 | 3.9 |
| S5.001 | 50.00 | 6.53 | 33.812 | 0.065 | 0.0 | 0.0 | 0.0 | 1.28 | 90.6 | 8.8 |
| S5.002 | 50.00 | 6.55 | 33.800 | 0.152 | 0.0 | 0.0 | 0.0 | 10.94 | 1208.3 | 20.6 |
| S6.000 | 50.00 | 5.28 | 30.000 | 0.000 | 0.0 | 0.0 | 0.0 | 0.74 | 5.8 | 0.0 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S3.006 | 2.082 | 0.014 | 150.0 | 0.063 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit | |
| S7.000 | 39.613 | 0.566 | 70.0 | 0.018 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S7.001 | 18.702 | 0.187 | 100.0 | 0.017 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S7.002 | 5.255 | 0.027 | 194.6 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| S8.000 | 10.371 | 0.067 | 154.8 | 0.000 | 5.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit | |
| S8.001 | 16.523 | 0.364 | 45.3 | 0.057 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S3.006 | 50.00 | 6.76 | 28.519 | 1.100 | 0.0 | 0.0 | 0.0 | 1.48 | 163.1 | 149.0 |
| S7.000 | 50.00 | 5.55 | 27.750 | 0.018 | 0.0 | 0.0 | 0.0 | 1.20 | 21.3 | 2.4 |
| S7.001 | 50.00 | 5.79 | 26.740 | 0.034 | 0.0 | 0.0 | 0.0 | 1.31 | 52.0 | 4.6 |
| S7.002 | 50.00 | 5.88 | 26.550 | 0.034 | 0.0 | 0.0 | 0.0 | 0.93 | 37.1 | 4.6 |
| S8.000 | 50.00 | 5.28 | 26.800 | 0.000 | 0.0 | 0.0 | 0.0 | 0.62 | 4.8 | 0.0 |
| S8.001 | 50.00 | 5.42 | 27.300 | 0.057 | 0.0 | 0.0 | 0.0 | 1.95 | 77.4 | 7.7 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S7.003 | 1.968 | 0.041 | 48.0 | 0.050 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| S7.004 | 5.239 | 0.041 | 127.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| S7.003 | 50.00 | 5.90 | 26.537 | 0.141 | 0.0 | 0.0 | 0.0 | 1.46 | 25.7 | 19.1 |
| S7.004 | 50.00 | 5.98 | 26.421 | 0.141 | 0.0 | 0.0 | 0.0 | 1.16 | 45.9 | 19.1 |

## Area Summary for Storm

| Pipe Number | PIMP Type | PIMP Name | PIMP (%) | Gross Area (ha) | Imp. Area (ha) | Pipe Total (ha) |
|---|---|---|---|---|---|---|
| 1.000 | User | - | 100 | 0.083 | 0.083 | 0.083 |
| 1.001 | User | - | 100 | 0.053 | 0.053 | 0.053 |
| 1.002 | User | - | 100 | 0.043 | 0.043 | 0.043 |
| | User | - | 100 | 0.055 | 0.055 | 0.098 |
| 1.003 | User | - | 100 | 0.078 | 0.078 | 0.078 |
| | User | - | 100 | 0.033 | 0.033 | 0.111 |
| 1.004 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.005 | User | - | 100 | 0.185 | 0.185 | 0.185 |
| 1.006 | User | - | 100 | 0.308 | 0.308 | 0.308 |
| | User | - | 100 | 0.062 | 0.062 | 0.370 |
| 2.000 | User | - | 100 | 0.070 | 0.070 | 0.070 |
| 2.001 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.007 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.008 | User | - | 100 | 0.041 | 0.041 | 0.041 |
| | User | - | 100 | 0.042 | 0.042 | 0.083 |
| 1.009 | User | - | 100 | 0.020 | 0.020 | 0.020 |
| 1.010 | User | - | 100 | 0.139 | 0.139 | 0.139 |
| 1.011 | User | - | 100 | 0.006 | 0.006 | 0.006 |
| 1.012 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.013 | User | - | 100 | 0.095 | 0.095 | 0.095 |
| 1.014 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.015 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 1.016 | User | - | 100 | 0.080 | 0.080 | 0.080 |
| 1.017 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 3.000 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 4.000 | User | - | 100 | 0.026 | 0.026 | 0.026 |
| 4.001 | User | - | 100 | 0.186 | 0.186 | 0.186 |

## Area Summary for Storm

| Pipe Number | PIMP Type | PIMP Name | PIMP (%) | Gross Area (ha) | Imp. Area (ha) | Pipe Total (ha) |
|---|---|---|---|---|---|---|
| 4.002 | User | - | 100 | 0.096 | 0.096 | 0.096 |
| 3.001 | User | - | 100 | 0.094 | 0.094 | 0.094 |
| | User | - | 100 | 0.093 | 0.093 | 0.187 |
| 3.002 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 3.003 | User | - | 100 | 0.064 | 0.064 | 0.064 |
| | User | - | 100 | 0.170 | 0.170 | 0.234 |
| 3.004 | User | - | 100 | 0.102 | 0.102 | 0.102 |
| 3.005 | User | - | 100 | 0.054 | 0.054 | 0.054 |
| 5.000 | User | - | 100 | 0.028 | 0.028 | 0.028 |
| 5.001 | User | - | 100 | 0.036 | 0.036 | 0.036 |
| 5.002 | User | - | 100 | 0.087 | 0.087 | 0.087 |
| 6.000 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 3.006 | User | - | 100 | 0.036 | 0.036 | 0.036 |
| | User | - | 100 | 0.027 | 0.027 | 0.063 |
| 7.000 | User | - | 100 | 0.018 | 0.018 | 0.018 |
| 7.001 | User | - | 100 | 0.017 | 0.017 | 0.017 |
| 7.002 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 8.000 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| 8.001 | User | - | 100 | 0.057 | 0.057 | 0.057 |
| 7.003 | User | - | 100 | 0.050 | 0.050 | 0.050 |
| 7.004 | - | - | 100 | 0.000 | 0.000 | 0.000 |
| | | | | Total | Total | Total |
| | | | | 2.634 | 2.634 | 2.634 |

## Simulation Criteria for Storm

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

| | | | | | |
|---|---|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Offline Controls | 5 | Number of Time/Area Diagrams | 0 |
| Number of Online Controls | 9 | Number of Storage Structures | 13 | Number of Real Time Controls | 0 |

## Synthetic Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FEH | Summer Storms | Yes |
| Return Period (years) | 100 | Winter Storms | Yes |
| FEH Rainfall Version | 2013 | Cv (Summer) | 0.750 |
| Site Location | GB 524250 186950 TQ 24250 86950 | Cv (Winter) | 0.840 |
| Data Type | Catchment | Storm Duration (mins) | 30 |

## Online Controls for Storm

### Hydro-Brake® Optimum Manhole: S5, DS/PN: S1.009, Volume (m³): 7.0

| | | | |
|---|---|---|---|
| Unit Reference | MD-SHE-0151-1840-4000-1840 | Sump Available | Yes |
| Design Head (m) | 4.000 | Diameter (mm) | 151 |
| Design Flow (l/s) | 18.4 | Invert Level (m) | 29.234 |
| Flush-Flo™ | Calculated | Minimum Outlet Pipe Diameter (mm) | 225 |
| Objective | Minimise upstream storage | Suggested Manhole Diameter (mm) | 1500 |
| Application | Surface | | |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 4.000 | 18.4 | Kick-Flo® | 1.354 | 11.0 |
| Flush-Flo™ | 0.662 | 14.0 | Mean Flow over Head Range | - | 14.0 |

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

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 5.4 | 0.600 | 13.9 | 1.600 | 11.9 | 2.600 | 15.0 | 5.000 | 20.5 | 7.500 | 24.9 |
| 0.200 | 11.2 | 0.800 | 13.9 | 1.800 | 12.6 | 3.000 | 16.0 | 5.500 | 21.4 | 8.000 | 25.7 |
| 0.300 | 12.6 | 1.000 | 13.4 | 2.000 | 13.2 | 3.500 | 17.3 | 6.000 | 22.3 | 8.500 | 26.4 |
| 0.400 | 13.4 | 1.200 | 12.5 | 2.200 | 13.8 | 4.000 | 18.4 | 6.500 | 23.2 | 9.000 | 27.2 |
| 0.500 | 13.8 | 1.400 | 11.2 | 2.400 | 14.4 | 4.500 | 19.5 | 7.000 | 24.1 | 9.500 | 27.9 |

## Hydro-Brake® Optimum Manhole: S9, DS/PN: S1.014, Volume (m³): 7.0

| | | | |
|---|---|---|---|
| Unit Reference | MD-SHE-0179-2400-3500-2400 | Sump Available | Yes |
| Design Head (m) | 3.500 | Diameter (mm) | 179 |
| Design Flow (l/s) | 24.0 | Invert Level (m) | 25.870 |
| Flush-Flo™ | Calculated | Minimum Outlet Pipe Diameter (mm) | 225 |
| Objective | Minimise upstream storage | Suggested Manhole Diameter (mm) | 1800 |
| Application | Surface | | |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 3.500 | 24.0 | Kick-Flo® | 1.599 | 16.5 |
| Flush-Flo™ | 0.775 | 21.1 | Mean Flow over Head Range | - | 19.5 |

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

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 6.3 | 0.600 | 20.8 | 1.600 | 16.6 | 2.600 | 20.8 | 5.000 | 28.5 | 7.500 | 34.6 |
| 0.200 | 15.9 | 0.800 | 21.1 | 1.800 | 17.5 | 3.000 | 22.3 | 5.500 | 29.8 | 8.000 | 35.7 |
| 0.300 | 18.2 | 1.000 | 20.8 | 2.000 | 18.4 | 3.500 | 24.0 | 6.000 | 31.1 | 8.500 | 36.8 |
| 0.400 | 19.6 | 1.200 | 20.2 | 2.200 | 19.2 | 4.000 | 25.6 | 6.500 | 32.3 | 9.000 | 37.8 |
| 0.500 | 20.4 | 1.400 | 18.9 | 2.400 | 20.0 | 4.500 | 27.1 | 7.000 | 33.5 | 9.500 | 38.8 |

## Complex Manhole: S11, DS/PN: S1.017, Volume (m³): 4.0

## Hydro-Brake® Optimum

| | | | |
|---|---|---|---|
| Unit Reference | MD-SHE-0149-1300-2000-1300 | Sump Available | Yes |
| Design Head (m) | 2.000 | Diameter (mm) | 149 |
| Design Flow (l/s) | 13.0 | Invert Level (m) | 25.765 |
| Flush-Flo™ | Calculated | Minimum Outlet Pipe Diameter (mm) | 225 |
| Objective | Minimise upstream storage | Suggested Manhole Diameter (mm) | 1500 |
| Application | Surface | | |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 2.000 | 13.0 | Kick-Flo® | 1.213 | 10.3 |
| Flush-Flo™ | 0.585 | 13.0 | Mean Flow over Head Range | - | 11.4 |

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

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 5.4 | 0.600 | 13.0 | 1.600 | 11.7 | 2.600 | 14.7 | 5.000 | 20.1 | 7.500 | 24.4 |
| 0.200 | 10.9 | 0.800 | 12.8 | 1.800 | 12.4 | 3.000 | 15.8 | 5.500 | 21.1 | 8.000 | 25.2 |
| 0.300 | 12.1 | 1.000 | 12.1 | 2.000 | 13.0 | 3.500 | 17.0 | 6.000 | 22.0 | 8.500 | 26.0 |
| 0.400 | 12.7 | 1.200 | 10.5 | 2.200 | 13.6 | 4.000 | 18.1 | 6.500 | 22.8 | 9.000 | 26.7 |
| 0.500 | 12.9 | 1.400 | 11.0 | 2.400 | 14.2 | 4.500 | 19.1 | 7.000 | 23.6 | 9.500 | 27.4 |

## Orifice

Diameter (m) 0.061 Discharge Coefficient 0.600 Invert Level (m) 27.600

## Hydro-Brake® Optimum Manhole: S22, DS/PN: S4.001, Volume (m³): 2.7

| | | | |
|---|---|---|---|
| Unit Reference | MD-SHE-0115-5000-0300-5000 | Sump Available | Yes |
| Design Head (m) | 0.300 | Diameter (mm) | 115 |
| Design Flow (l/s) | 5.0 | Invert Level (m) | 33.850 |
| Flush-Flo™ | Calculated | Minimum Outlet Pipe Diameter (mm) | 150 |
| Objective | Minimise upstream storage | Suggested Manhole Diameter (mm) | 1200 |
| Application | Surface | | |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 0.300 | 5.0 | Kick-Flo® | 0.253 | 4.6 |
| Flush-Flo™ | 0.161 | 5.0 | Mean Flow over Head Range | - | 3.8 |

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

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 4.0 | 0.600 | 6.9 | 1.600 | 11.0 | 2.600 | 13.8 | 5.000 | 19.0 | 7.500 | 23.3 |
| 0.200 | 4.9 | 0.800 | 7.9 | 1.800 | 11.6 | 3.000 | 14.8 | 5.500 | 19.9 | 8.000 | 24.1 |
| 0.300 | 5.0 | 1.000 | 8.8 | 2.000 | 12.2 | 3.500 | 15.8 | 6.000 | 20.8 | 8.500 | 24.8 |
| 0.400 | 5.7 | 1.200 | 9.6 | 2.200 | 12.7 | 4.000 | 17.0 | 6.500 | 21.7 | 9.000 | 25.5 |
| 0.500 | 6.3 | 1.400 | 10.3 | 2.400 | 13.3 | 4.500 | 18.0 | 7.000 | 22.5 | 9.500 | 26.2 |

## Non Return Valve Manhole: S13, DS/PN: S3.001, Volume (m³): 8.3

## Hydro-Brake® Optimum Manhole: S18, DS/PN: S5.002, Volume (m³): 2.3

| | | | |
|---|---|---|---|
| Unit Reference | MD-SHE-0085-3000-0800-3000 | Sump Available | Yes |
| Design Head (m) | 0.800 | Diameter (mm) | 85 |
| Design Flow (l/s) | 3.0 | Invert Level (m) | 33.800 |
| Flush-Flo™ | Calculated | Minimum Outlet Pipe Diameter (mm) | 100 |
| Objective | Minimise upstream storage | Suggested Manhole Diameter (mm) | 1200 |
| Application | Surface | | |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 0.800 | 3.0 | Kick-Flo® | 0.517 | 2.5 |
| Flush-Flo™ | 0.239 | 3.0 | Mean Flow over Head Range | - | 2.6 |

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

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 2.6 | 0.600 | 2.6 | 1.600 | 4.1 | 2.600 | 5.2 | 5.000 | 7.0 | 7.500 | 8.5 |
| 0.200 | 3.0 | 0.800 | 3.0 | 1.800 | 4.4 | 3.000 | 5.5 | 5.500 | 7.4 | 8.000 | 8.8 |
| 0.300 | 3.0 | 1.000 | 3.3 | 2.000 | 4.6 | 3.500 | 6.0 | 6.000 | 7.7 | 8.500 | 9.0 |
| 0.400 | 2.9 | 1.200 | 3.6 | 2.200 | 4.8 | 4.000 | 6.3 | 6.500 | 8.0 | 9.000 | 9.3 |
| 0.500 | 2.6 | 1.400 | 3.9 | 2.400 | 5.0 | 4.500 | 6.7 | 7.000 | 8.3 | 9.500 | 9.6 |

## Complex Manhole: S17, DS/PN: S3.006, Volume (m³): 11.4

## Hydro-Brake® Optimum

| | | | |
|---|---|---|---|
| Unit Reference | MD-SHE-0097-7000-3200-7000 | Sump Available | Yes |
| Design Head (m) | 3.200 | Diameter (mm) | 97 |
| Design Flow (l/s) | 7.0 | Invert Level (m) | 28.519 |
| Flush-Flo™ | Calculated | Minimum Outlet Pipe Diameter (mm) | 150 |
| Objective | Minimise upstream storage | Suggested Manhole Diameter (mm) | 1200 |
| Application | Surface | | |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 3.200 | 7.0 | Kick-Flo® | 0.866 | 3.8 |
| Flush-Flo™ | 0.417 | 4.8 | Mean Flow over Head Range | - | 5.2 |

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

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 3.2 | 0.600 | 4.7 | 1.600 | 5.1 | 2.600 | 6.3 | 5.000 | 8.6 | 7.500 | 10.5 |
| 0.200 | 4.4 | 0.800 | 4.2 | 1.800 | 5.3 | 3.000 | 6.8 | 5.500 | 9.0 | 8.000 | 10.8 |
| 0.300 | 4.7 | 1.000 | 4.1 | 2.000 | 5.6 | 3.500 | 7.3 | 6.000 | 9.4 | 8.500 | 11.1 |
| 0.400 | 4.8 | 1.200 | 4.4 | 2.200 | 5.9 | 4.000 | 7.8 | 6.500 | 9.8 | 9.000 | 11.4 |
| 0.500 | 4.8 | 1.400 | 4.8 | 2.400 | 6.1 | 4.500 | 8.2 | 7.000 | 10.1 | 9.500 | 11.7 |

## Orifice

Diameter (m) 0.040 Discharge Coefficient 0.600 Invert Level (m) 31.739

## Hydro-Brake® Optimum Manhole: S21, DS/PN: S7.003, Volume (m³): 2.6

| | | | |
|---|---|---|---|
| Unit Reference | MD-SHE-0063-1800-1000-1800 | Sump Available | Yes |
| Design Head (m) | 1.000 | Diameter (mm) | 63 |
| Design Flow (l/s) | 1.8 | Invert Level (m) | 26.537 |
| Flush-Flo™ | Calculated | Minimum Outlet Pipe Diameter (mm) | 100 |
| Objective | Minimise upstream storage | Suggested Manhole Diameter (mm) | 1200 |
| Application | Surface | | |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 1.000 | 1.8 | Kick-Flo® | 0.565 | 1.4 |
| Flush-Flo™ | 0.280 | 1.7 | Mean Flow over Head Range | - | 1.5 |

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

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 1.5 | 0.600 | 1.4 | 1.600 | 2.2 | 2.600 | 2.8 | 5.000 | 3.8 | 7.500 | 4.6 |
| 0.200 | 1.7 | 0.800 | 1.6 | 1.800 | 2.3 | 3.000 | 3.0 | 5.500 | 3.9 | 8.000 | 4.7 |
| 0.300 | 1.7 | 1.000 | 1.8 | 2.000 | 2.5 | 3.500 | 3.2 | 6.000 | 4.1 | 8.500 | 4.8 |
| 0.400 | 1.7 | 1.200 | 2.0 | 2.200 | 2.6 | 4.000 | 3.4 | 6.500 | 4.3 | 9.000 | 5.0 |
| 0.500 | 1.6 | 1.400 | 2.1 | 2.400 | 2.7 | 4.500 | 3.6 | 7.000 | 4.4 | 9.500 | 5.1 |

## Non Return Valve Manhole: S39, DS/PN: S7.004, Volume (m³): 0.5

## Offline Controls for Storm

### Pipe Manhole: S1, DS/PN: S1.000, Loop to PN: S2.000

| | | | | | |
|---|---|---|---|---|---|
| Diameter (m) | 0.250 | Length (m) | 10.000 | Coefficient of Contraction | 0.600 |
| Section Type | Pipe/Conduit | Roughness k (mm) | 0.600 | Upstream Invert Level (m) | 34.150 |
| Slope (1:X) | 14.0 | Entry Loss Coefficient | 0.500 | | |

### Pipe Manhole: S21, DS/PN: S4.000, Loop to PN: S5.001

| | | | | | |
|---|---|---|---|---|---|
| Diameter (m) | 0.450 | Length (m) | 5.000 | Coefficient of Contraction | 0.600 |
| Section Type | Pipe/Conduit | Roughness k (mm) | 0.600 | Upstream Invert Level (m) | 33.850 |
| Slope (1:X) | 1000.0 | Entry Loss Coefficient | 0.500 | | |

### Pipe Manhole: S17, DS/PN: S5.001, Loop to PN: S4.000

| | | | | | |
|---|---|---|---|---|---|
| Diameter (m) | 0.450 | Length (m) | 5.000 | Coefficient of Contraction | 0.600 |
| Section Type | Pipe/Conduit | Roughness k (mm) | 0.600 | Upstream Invert Level (m) | 33.850 |
| Slope (1:X) | 1000.0 | Entry Loss Coefficient | 0.500 | | |

### Flap Valve Manhole: S37, DS/PN: S8.000, Loop to PN: S6.000

Discharge Coefficient 0.600 Diameter (m) 0.100 Invert Level (m) 26.800

## Pump Manhole: S37, DS/PN: S8.000, Loop to PN: S6.000

Invert Level (m) 26.800

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 0.0000 | 0.600 | 0.0000 | 1.100 | 1.8000 | 1.600 | 1.8000 | 2.100 | 1.8000 | 2.600 | 1.8000 |
| 0.200 | 0.0000 | 0.700 | 0.0000 | 1.200 | 1.8000 | 1.700 | 1.8000 | 2.200 | 1.8000 | 2.700 | 1.8000 |
| 0.300 | 0.0000 | 0.800 | 1.8000 | 1.300 | 1.8000 | 1.800 | 1.8000 | 2.300 | 1.8000 | 2.800 | 1.8000 |
| 0.400 | 0.0000 | 0.900 | 1.8000 | 1.400 | 1.8000 | 1.900 | 1.8000 | 2.400 | 1.8000 | 2.900 | 1.8000 |
| 0.500 | 0.0000 | 1.000 | 1.8000 | 1.500 | 1.8000 | 2.000 | 1.8000 | 2.500 | 1.8000 | 3.000 | 1.8000 |

## Storage Structures for Storm

### Porous Car Park Manhole: S2, DS/PN: S1.001

| | | | | | |
|---|---|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity | 0.95 | Slope (1:X) | 1000.0 |
| Membrane Percolation (mm/hr) | 1000 | Invert Level (m) | 33.650 | Depression Storage (mm) | 5 |
| Max Percolation (l/s) | 34.4 | Width (m) | 31.0 | Evaporation (mm/day) | 5 |
| Safety Factor | 2.0 | Length (m) | 4.0 | Cap Volume Depth (m) | 0.150 |

### Porous Car Park Manhole: S2, DS/PN: S1.002

| | | | | | |
|---|---|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity | 0.95 | Slope (1:X) | 1000.0 |
| Membrane Percolation (mm/hr) | 1000 | Invert Level (m) | 33.650 | Depression Storage (mm) | 5 |
| Max Percolation (l/s) | 34.4 | Width (m) | 31.0 | Evaporation (mm/day) | 5 |
| Safety Factor | 2.0 | Length (m) | 4.0 | Cap Volume Depth (m) | 0.150 |

### Cellular Storage Manhole: S2, DS/PN: S1.005

| | | | | | |
|---|---|---|---|---|---|
| Invert Level (m) | 29.700 | Infiltration Coefficient Side (m/hr) | 0.00000 | Porosity | 0.95 |
| Infiltration Coefficient Base (m/hr) | 0.00000 | | | Safety Factor | 2.0 |

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 80.0 | 0.0 | 3.200 | 80.0 | 0.0 | 3.201 | 0.0 | 0.0 |

## Cellular Storage Manhole: S3, DS/PN: S1.006

Invert Level (m) 29.700 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 80.0 | 0.0 | 3.200 | 80.0 | 0.0 | 3.201 | 0.0 | 0.0 |

## Porous Car Park Manhole: S8, DS/PN: S2.001

| | | | | | |
|---|---|---|---|---|---|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity | 0.95 | Slope (1:X) | 1000.0 |
| Membrane Percolation (mm/hr) | 1000 | Invert Level (m) | 33.300 | Depression Storage (mm) | 5 |
| Max Percolation (l/s) | 22.5 | Width (m) | 54.0 | Evaporation (mm/day) | 5 |
| Safety Factor | 2.0 | Length (m) | 1.5 | Cap Volume Depth (m) | 0.150 |

## Cellular Storage Manhole: S4, DS/PN: S1.008

Invert Level (m) 29.700 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 80.0 | 0.0 | 3.200 | 80.0 | 0.0 | 3.201 | 0.0 | 0.0 |

## Cellular Storage Manhole: S11, DS/PN: S1.013

Invert Level (m) 26.000 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

## Cellular Storage Manhole: S11, DS/PN: S1.013

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 100.0 | 0.0 | 2.400 | 100.0 | 0.0 | 2.401 | 0.0 | 0.0 |

## Cellular Storage Manhole: S13, DS/PN: S1.016

Invert Level (m) 25.838 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 160.0 | 0.0 | 0.800 | 160.0 | 0.0 | 0.801 | 0.0 | 0.0 |

## Cellular Storage Manhole: S21, DS/PN: S4.000

Invert Level (m) 33.850 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 100.0 | 0.0 | 0.450 | 100.0 | 0.0 | 0.451 | 0.0 | 0.0 |

## Cellular Storage Manhole: S16, DS/PN: S3.002

Invert Level (m) 30.000 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

## Cellular Storage Manhole: S16, DS/PN: S3.002

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 260.0 | 0.0 | 3.000 | 260.0 | 0.0 | 3.001 | 0.0 | 0.0 |

## Cellular Storage Manhole: S29, DS/PN: S5.000

Invert Level (m) 33.850 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 139.0 | 0.0 | 0.450 | 139.0 | 0.0 | 0.451 | 0.0 | 0.0 |

## Cellular Storage Manhole: S17, DS/PN: S5.001

Invert Level (m) 33.850 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 431.0 | 0.0 | 0.450 | 431.0 | 0.0 | 0.451 | 0.0 | 0.0 |

## Cellular Storage Manhole: S21, DS/PN: S8.001

Invert Level (m) 26.600 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0

## Cellular Storage Manhole: S21, DS/PN: S8.001

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 140.0 | 300.0 | 0.800 | 140.0 | 364.0 | 0.801 | 0.0 | 364.0 |

## 30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

### Simulation Criteria

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

| | | | | | |
|---|---|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Offline Controls | 5 | Number of Time/Area Diagrams | 0 |
| Number of Online Controls | 9 | Number of Storage Structures | 13 | Number of Real Time Controls | 0 |

### Synthetic Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FEH | Data Type | Catchment |
| FEH Rainfall Version | 2013 | Cv (Summer) | 0.750 |
| Site Location | GB 528850 184100 TQ 28850 84100 | Cv (Winter) | 0.840 |

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

| | |
|---|---|
| Profile(s) | Summer and Winter |
| Duration(s) (mins) | 15, 30, 60, 120, 240, 360, 480, 960, 1440 |
| Return Period(s) (years) | 2, 30, 100 |
| Climate Change (%) | 40, 40, 40 |

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.000 | S1 | 15 Winter | 30 | +40% | | | 2/15 Summer | 54 | 34.241 | -0.159 | 0.000 | 0.28 | 42.0 | 9.2 | FLOOD RISK |

30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

| PN | US/MH Name | Level Exceeded |
|---|---|---|
| S1.000 | S1 | |

## 30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1.001 | S2 | 30 Winter | 30 | +40% | 100/15 Winter | 100/15 Summer | | | 34.397 | -0.053 | 0.000 | 0.03 | | 0.8 |
| S1.002 | S2 | 30 Winter | 30 | +40% | 100/15 Summer | 100/15 Summer | | | 34.396 | -0.054 | 0.000 | 1.00 | | 24.9 |
| S1.003 | S2 | 15 Winter | 30 | +40% | 30/15 Summer | | | | 34.043 | 0.033 | 0.000 | 1.04 | | 68.8 |
| S1.004 | S1 | 15 Winter | 30 | +40% | 100/360 Winter | 100/360 Winter | | | 33.701 | -0.157 | 0.000 | 0.63 | | 67.5 |
| S1.005 | S2 | 15 Winter | 30 | +40% | 30/15 Summer | 100/360 Winter | | | 30.758 | 0.287 | 0.000 | 0.27 | | 30.1 |
| S1.006 | S3 | 15 Winter | 30 | +40% | 2/240 Summer | | | | 30.752 | 0.391 | 0.000 | 0.53 | | 59.9 |
| S2.000 | S7 | 15 Winter | 30 | +40% | 2/15 Summer | | | | 33.710 | 0.260 | 0.000 | 2.88 | | 81.7 |
| S2.001 | S8 | 15 Winter | 30 | +40% | 100/15 Winter | | | | 33.318 | -0.053 | 0.000 | 0.93 | | 74.7 |
| S1.007 | S3 | 15 Winter | 30 | +40% | 2/60 Winter | | | | 30.747 | 0.596 | 0.000 | 2.08 | | 124.1 |
| S1.008 | S4 | 30 Winter | 30 | +40% | 2/30 Winter | | | | 31.034 | 0.950 | 0.000 | 0.41 | | 25.4 |
| S1.009 | S5 | 240 Winter | 30 | +40% | 2/15 Summer | | | | 31.944 | 2.485 | 0.000 | 0.49 | | 15.2 |
| S1.010 | S6 | 15 Winter | 30 | +40% | 30/15 Summer | | | | 29.757 | 0.707 | 0.000 | 2.58 | | 97.8 |
| S1.011 | S7 | 15 Winter | 30 | +40% | 2/120 Summer | | | | 26.678 | 0.378 | 0.000 | 2.23 | | 101.1 |
| S1.012 | S8 | 15 Winter | 30 | +40% | 2/120 Summer | | | | 26.645 | 0.367 | 0.000 | 1.86 | | 100.0 |
| S1.013 | S11 | 60 Summer | 30 | +40% | 2/120 Summer | | | | 26.708 | 0.391 | 0.000 | 0.49 | | 29.8 |
| S1.014 | S9 | 120 Winter | 30 | +40% | 2/15 Summer | | | | 26.990 | 0.895 | 0.000 | 0.41 | | 20.6 |
| S1.015 | S10 | 120 Winter | 30 | +40% | 2/60 Winter | | | | 26.568 | 0.505 | 0.000 | 0.76 | | 20.6 |
| S1.016 | S13 | 360 Winter | 30 | +40% | 2/60 Summer | | | | 27.485 | 1.461 | 0.000 | 0.63 | | 14.4 |
| S1.017 | S11 | 1440 Winter | 30 | +40% | 2/360 Winter | 100/480 Winter | | | 27.546 | 1.331 | 0.000 | 0.08 | | 13.0 |
| S3.000 | S12 | 15 Summer | 30 | +40% | 30/120 Summer | | | | 31.074 | -0.301 | 0.000 | 0.01 | | 0.9 |
| S4.000 | S21 | 240 Winter | 30 | +40% | 100/15 Summer | | 2/15 Summer | 54 | 34.085 | -0.140 | 0.000 | 0.04 | 12.6 | 4.8 |
| S4.001 | S22 | 15 Winter | 30 | +40% | 2/15 Winter | 100/15 Winter | | | 34.322 | 0.097 | 0.000 | 0.04 | | 6.1 |
| S4.002 | S23 | 15 Winter | 30 | +40% | | | | | 33.667 | -0.208 | 0.000 | 0.41 | | 69.7 |
| S3.001 | S13 | 15 Winter | 30 | +40% | 30/60 Winter | | | | 31.074 | -0.141 | 0.000 | 0.71 | | 192.9 |
| S3.002 | S16 | 960 Winter | 30 | +40% | 2/60 Winter | | | | 32.109 | 1.734 | 0.000 | 0.10 | | 16.9 |

## 30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

| PN | US/MH Name | Status | Level Exceeded |
|---|---|---|---|
| S1.001 | S2 | FLOOD RISK | 4 |
| S1.002 | S2 | FLOOD RISK | 3 |
| S1.003 | S2 | SURCHARGED | |
| S1.004 | S1 | FLOOD RISK | 1 |
| S1.005 | S2 | SURCHARGED | 1 |
| S1.006 | S3 | SURCHARGED | |
| S2.000 | S7 | SURCHARGED | |
| S2.001 | S8 | OK | |
| S1.007 | S3 | SURCHARGED | |
| S1.008 | S4 | SURCHARGED | |
| S1.009 | S5 | SURCHARGED | |
| S1.010 | S6 | SURCHARGED | |
| S1.011 | S7 | SURCHARGED | |
| S1.012 | S8 | SURCHARGED | |
| S1.013 | S11 | SURCHARGED | |
| S1.014 | S9 | SURCHARGED | |
| S1.015 | S10 | SURCHARGED | |
| S1.016 | S13 | SURCHARGED | |
| S1.017 | S11 | SURCHARGED | 1 |
| S3.000 | S12 | OK | |
| S4.000 | S21 | OK | |
| S4.001 | S22 | FLOOD RISK | 2 |
| S4.002 | S23 | OK | |
| S3.001 | S13 | OK | |

30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

| PN | US/MH Name | Status | Level Exceeded |
|---|---|---|---|
| S3.002 | S16 | SURCHARGED | |

## 30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S3.003 | S14 | 15 Winter | 30 | +40% | 2/15 Summer | | | | 31.336 | 2.241 | 0.000 | 0.20 | | 21.6 |
| S3.004 | S15 | 15 Winter | 30 | +40% | 2/15 Summer | | | | 31.461 | 2.444 | 0.000 | 0.20 | | 21.2 |
| S3.005 | S16 | 15 Winter | 30 | +40% | 2/15 Summer | | | | 31.519 | 2.560 | 0.000 | 0.16 | | 16.8 |
| S5.000 | S29 | 240 Winter | 30 | +40% | 100/120 Winter | | | | 34.085 | -0.065 | 0.000 | 0.06 | | 1.6 |
| S5.001 | S17 | 15 Winter | 30 | +40% | 100/30 Winter | | 2/60 Winter | 44 | 33.989 | -0.123 | 0.000 | 0.05 | 2.0 | 3.5 |
| S5.002 | S18 | 360 Summer | 30 | +40% | 30/15 Summer | | | | 34.044 | -0.131 | 0.000 | 0.00 | | 3.0 |
| S6.000 | S33 | 15 Summer | 30 | +40% | 2/15 Summer | | | | 31.519 | 1.419 | 0.000 | 1.28 | | 7.0 |
| S3.006 | S17 | 480 Winter | 30 | +40% | 2/15 Summer | | | | 32.163 | 3.269 | 0.000 | 0.11 | | 9.4 |
| S7.000 | S19 | 15 Winter | 30 | +40% | 30/15 Winter | | | | 27.902 | 0.002 | 0.000 | 0.51 | | 10.4 |
| S7.001 | S20 | 15 Winter | 30 | +40% | 2/15 Summer | | | | 27.762 | 0.797 | 0.000 | 0.43 | | 20.1 |
| S7.002 | S36 | 15 Winter | 30 | +40% | 2/15 Summer | | | | 27.712 | 0.937 | 0.000 | 0.76 | | 20.7 |
| S8.000 | S37 | 1440 Summer | 30 | +40% | 30/30 Winter | | | 0 | 26.992 | 0.092 | 0.000 | 0.00 | 0.0 | 0.0 |
| S8.001 | S21 | 960 Summer | 30 | +40% | | | | | 27.024 | -0.501 | 0.000 | 0.00 | | 0.0 |
| S7.003 | S21 | 15 Winter | 30 | +40% | 2/15 Summer | | | | 27.696 | 1.009 | 0.000 | 0.15 | | 1.9 |
| S7.004 | S39 | 15 Winter | 30 | +40% | | | | | 26.458 | -0.188 | 0.000 | 0.06 | | 1.9 |

| PN | US/MH Name | Status | Level Exceeded |
|---|---|---|---|
| S3.003 | S14 | SURCHARGED | |
| S3.004 | S15 | SURCHARGED | |
| S3.005 | S16 | SURCHARGED | |
| S5.000 | S29 | OK | |

## 30 year Return Period Summary of Critical Results by Maximum Outflow (Rank 1) for Storm

| PN | US/MH Name | Status | Level Exceeded |
|---|---|---|---|
| S5.001 | S17 | OK | |
| S5.002 | S18 | OK | |
| S6.000 | S33 | SURCHARGED | |
| S3.006 | S17 | SURCHARGED | |
| S7.000 | S19 | SURCHARGED | |
| S7.001 | S20 | SURCHARGED | |
| S7.002 | S36 | SURCHARGED | |
| S8.000 | S37 | SURCHARGED | |
| S8.001 | S21 | OK | |
| S7.003 | S21 | SURCHARGED | |
| S7.004 | S39 | OK | |

# Appendix J Camden Critical Drainage Areas & SUDS Proforma