



**ROLTON GROUP**  
ENGINEERING THE FUTURE™

# SURFACE WATER DRAINAGE CALCULATIONS

FOR

SYTNER GROUP PORSCHE, MID  
SUSSEX - NEW DEALERSHIP &  
WORKSHOP FACILITY

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|                     |                            |
|---------------------|----------------------------|
| PROJECT NUMBER:     | 23-0466                    |
| DOCUMENT REFERENCE: | 230466-RGL-ZZ-XX-CA-C-0001 |
| REVISION:           | S2-P01                     |

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**1.0 SURFACE WATER DRAINAGE CALCULATIONS**

### Design Settings

|                                      |        |                                    |               |
|--------------------------------------|--------|------------------------------------|---------------|
| Rainfall Methodology                 | FEH-13 | Minimum Velocity (m/s)             | 1.00          |
| Return Period (years)                | 2      | Connection Type                    | Level Soffits |
| Additional Flow (%)                  | 0      | Minimum Backdrop Height (m)        | 0.200         |
| CV                                   | 0.750  | Preferred Cover Depth (m)          | 1.200         |
| Time of Entry (mins)                 | 4.00   | Include Intermediate Ground        | ✓             |
| Maximum Time of Concentration (mins) | 30.00  | Enforce best practice design rules | x             |
| Maximum Rainfall (mm/hr)             | 200.0  |                                    |               |

### Circular Default Sewer Type Link Type

|         |          |                     |    |
|---------|----------|---------------------|----|
| Shape   | Circular | Auto Increment (mm) | 75 |
| Barrels | 1        | Follow Ground       | x  |

### Available Diameters (mm)

100 | 150

### Dan Lee Design Link Type Group

Link Type  
Swale

### Nodes

| Name   | Area<br>(ha) | T of E<br>(mins) | Cover<br>Level<br>(m) | Diameter<br>(mm) | Easting<br>(m) | Northing<br>(m) | Depth<br>(m) |
|--------|--------------|------------------|-----------------------|------------------|----------------|-----------------|--------------|
| S1     | 0.121        | 4.00             | 23.895                | 1200             | 526880.247     | 118782.513      | 1.560        |
| S2     | 0.000        | 4.00             | 23.821                | 1200             | 526850.350     | 118793.650      | 1.616        |
| S3     | 0.037        | 4.00             | 23.792                | 1200             | 526858.167     | 118814.522      | 1.678        |
| SP1    | 0.062        | 4.00             | 23.600                | 1800             | 526865.520     | 118818.432      | 1.489        |
| S4*    | 0.000        |                  | 23.603                | 1500             | 526860.352     | 118820.312      | 1.514        |
| RE1    | 0.012        | 4.00             | 23.506                | 150              | 526857.894     | 118825.236      | 1.195        |
| CP1    | 0.000        |                  | 23.211                | 1200             | 526866.383     | 118848.260      | 1.064        |
| S5     | 0.000        |                  | 23.114                | 1200             | 526870.764     | 118848.160      | 1.146        |
| RE2    | 0.009        | 4.00             | 23.455                | 150              | 526864.833     | 118822.439      | 1.115        |
| CP2    | 0.000        |                  | 23.067                | 1200             | 526877.732     | 118857.424      | 0.976        |
| S6     | 0.037        | 4.00             | 23.112                | 1200             | 526875.052     | 118859.615      | 1.194        |
| CP3    | 0.000        | 4.00             | 23.065                | 1200             | 526870.135     | 118877.050      | 1.000        |
| S7*    | 0.024        | 4.00             | 23.137                | 1200             | 526882.399     | 118879.260      | 1.305        |
| SP2    | 0.101        | 4.00             | 23.162                | 1200             | 526891.383     | 118875.890      | 1.253        |
| S8     | 0.033        | 4.00             | 22.972                | 1200             | 526892.272     | 118883.454      | 1.184        |
| S9     | 0.000        | 4.00             | 22.908                | 1200             | 526909.293     | 118890.686      | 1.195        |
| RE3    | 0.049        | 4.00             | 22.716                | 300              | 526910.049     | 118908.289      | 0.962        |
| S10    | 0.017        | 4.00             | 22.660                | 1200             | 526928.270     | 118901.571      | 0.985        |
| S11    | 0.055        | 4.00             | 23.300                | 1200             | 526913.986     | 118811.005      | 1.380        |
| SP3    | 0.166        | 4.00             | 23.198                | 1500             | 526912.938     | 118824.310      | 1.304        |
| S12    | 0.083        | 4.00             | 23.220                | 1200             | 526918.222     | 118822.309      | 1.349        |
| S13*   | 0.000        |                  | 23.120                | 1200             | 526930.145     | 118854.134      | 1.388        |
| S14    | 0.013        | 4.00             | 23.043                | 1200             | 526904.101     | 118875.687      | 1.246        |
| S15    | 0.014        | 4.00             | 23.038                | 1200             | 526918.532     | 118870.366      | 1.304        |
| S16    | 0.060        | 4.00             | 22.898                | 1200             | 526936.041     | 118869.903      | 1.235        |
| S17*   | 0.000        |                  | 22.635                | 1800             | 526936.447     | 118885.238      | 1.035        |
| HW1    | 0.000        |                  | 22.290                | 1500             | 526946.809     | 118890.420      | 0.737        |
| EX HW1 | 0.000        |                  | 22.250                | 1500             | 526945.190     | 118900.385      | 0.969        |
| EX HW2 | 0.000        |                  | 22.350                | 1200             | 526938.908     | 118908.599      | 1.090        |

Nodes

| Name   | Area<br>(ha) | T of E<br>(mins) | Cover<br>Level<br>(m) | Diameter<br>(mm) | Easting<br>(m) | Northing<br>(m) | Depth<br>(m) |
|--------|--------------|------------------|-----------------------|------------------|----------------|-----------------|--------------|
| EX HW3 | 0.000        | 4.00             | 22.350                | 1200             | 526911.277     | 118914.491      | 1.090        |
| S18*   | 0.000        |                  | 22.747                | 1200             | 526909.384     | 118915.275      | 1.487        |
| EX HW4 | 0.000        |                  | 22.000                | 1200             | 526894.845     | 118921.296      | 0.800        |

Links

| Name   | US<br>Node | DS<br>Node | Length<br>(m) | ks (mm) /<br>n | US IL<br>(m) | DS IL<br>(m) | Fall<br>(m) | Slope<br>(1:X) | Dia<br>(mm) | T of C<br>(mins) | Rain<br>(mm/hr) |
|--------|------------|------------|---------------|----------------|--------------|--------------|-------------|----------------|-------------|------------------|-----------------|
| 1.000  | S1         | S2         | 31.904        | 0.600          | 22.335       | 22.205       | 0.130       | 245.0          | 300         | 4.53             | 55.1            |
| 1.001  | S2         | S3         | 22.288        | 0.600          | 22.205       | 22.114       | 0.091       | 245.0          | 300         | 4.90             | 55.1            |
| 1.002  | S3         | S4*        | 6.189         | 0.600          | 22.114       | 22.089       | 0.025       | 245.0          | 300         | 5.01             | 55.0            |
| 2.000  | SP1        | S4*        | 5.499         | 0.600          | 22.111       | 22.089       | 0.022       | 245.0          | 300         | 4.09             | 55.1            |
| 1.003  | S4*        | S5         | 29.731        | 0.600          | 22.089       | 21.968       | 0.121       | 245.7          | 300         | 5.50             | 53.1            |
| 3.000  | RE1        | CP1        | 24.539        | 0.600          | 22.311       | 22.147       | 0.164       | 150.0          | 150         | 4.50             | 55.1            |
| 3.001  | CP1        | S5         | 4.382         | 0.600          | 22.147       | 22.118       | 0.029       | 151.1          | 150         | 4.59             | 55.1            |
| 1.004  | S5         | S6         | 12.231        | 0.600          | 21.968       | 21.918       | 0.050       | 244.6          | 300         | 5.71             | 52.3            |
| 4.000  | RE2        | CP2        | 37.287        | 0.600          | 22.340       | 22.091       | 0.249       | 150.0          | 150         | 4.76             | 55.1            |
| 4.001  | CP2        | S6         | 3.462         | 0.600          | 22.091       | 22.068       | 0.023       | 150.5          | 150         | 4.83             | 55.1            |
| 1.005  | S6         | S7*        | 20.974        | 0.600          | 21.918       | 21.832       | 0.086       | 243.9          | 300         | 6.06             | 50.9            |
| 5.000  | CP3        | S7*        | 12.462        | 0.600          | 22.065       | 21.982       | 0.083       | 150.0          | 150         | 4.25             | 55.1            |
| 1.006  | S7*        | S8         | 10.727        | 0.600          | 21.832       | 21.788       | 0.044       | 243.8          | 300         | 6.23             | 50.3            |
| 6.000  | SP2        | S8         | 7.616         | 0.600          | 21.909       | 21.863       | 0.046       | 167.0          | 225         | 4.13             | 55.1            |
| 1.007  | S8         | S9         | 18.494        | 0.600          | 21.788       | 21.713       | 0.075       | 246.6          | 300         | 6.54             | 49.2            |
| 1.008  | S9         | S17*       | 27.695        | 0.600          | 21.713       | 21.600       | 0.113       | 245.1          | 300         | 7.00             | 47.6            |
| 7.000  | RE3        | S10        | 19.420        | 0.600          | 21.754       | 21.675       | 0.079       | 245.0          | 300         | 4.32             | 55.1            |
| 7.001  | S10        | S17*       | 18.266        | 0.600          | 21.675       | 21.600       | 0.075       | 243.5          | 300         | 4.63             | 55.1            |
| 8.000  | S11        | S12        | 12.072        | 0.600          | 21.920       | 21.871       | 0.049       | 245.0          | 300         | 4.20             | 55.1            |
| 10.000 | SP3        | S12        | 5.650         | 0.600          | 21.894       | 21.871       | 0.023       | 245.0          | 300         | 4.09             | 55.1            |

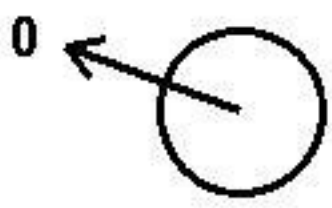
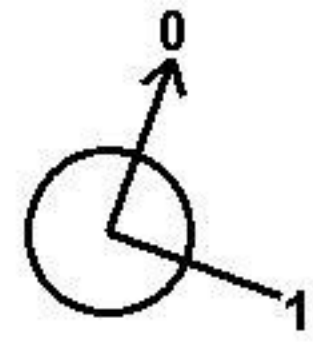
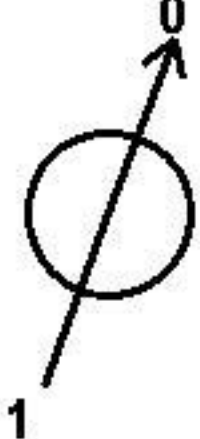
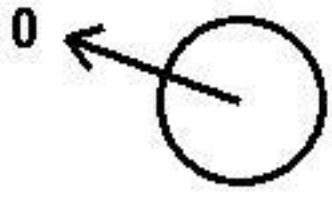
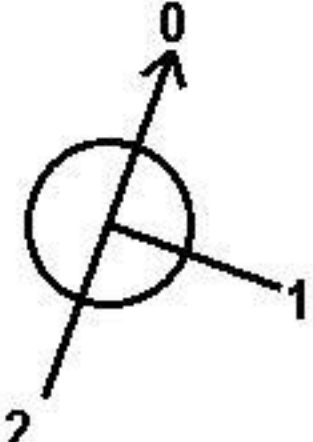
| Name   | Vel<br>(m/s) | Cap<br>(l/s) | Flow<br>(l/s) | US<br>Depth<br>(m) | DS<br>Depth<br>(m) | Σ Area<br>(ha) | Σ Add<br>Inflow<br>(l/s) | Pro<br>Depth<br>(mm) | Pro<br>Velocity<br>(m/s) |
|--------|--------------|--------------|---------------|--------------------|--------------------|----------------|--------------------------|----------------------|--------------------------|
| 1.000  | 1.000        | 70.7         | 18.1          | 1.260              | 1.316              | 0.121          | 0.0                      | 103                  | 0.839                    |
| 1.001  | 1.000        | 70.7         | 18.1          | 1.316              | 1.378              | 0.121          | 0.0                      | 103                  | 0.839                    |
| 1.002  | 1.000        | 70.7         | 23.6          | 1.378              | 1.214              | 0.158          | 0.0                      | 119                  | 0.903                    |
| 2.000  | 1.000        | 70.7         | 9.3           | 1.189              | 1.214              | 0.062          | 0.0                      | 73                   | 0.697                    |
| 1.003  | 0.998        | 70.6         | 31.6          | 1.214              | 0.846              | 0.220          | 0.0                      | 141                  | 0.973                    |
| 3.000  | 0.818        | 14.5         | 1.8           | 1.045              | 0.914              | 0.012          | 0.0                      | 35                   | 0.555                    |
| 3.001  | 0.815        | 14.4         | 1.8           | 0.914              | 0.846              | 0.012          | 0.0                      | 35                   | 0.553                    |
| 1.004  | 1.001        | 70.7         | 32.9          | 0.846              | 0.894              | 0.232          | 0.0                      | 144                  | 0.983                    |
| 4.000  | 0.818        | 14.5         | 1.3           | 0.965              | 0.826              | 0.009          | 0.0                      | 31                   | 0.511                    |
| 4.001  | 0.817        | 14.4         | 1.3           | 0.826              | 0.894              | 0.009          | 0.0                      | 31                   | 0.510                    |
| 1.005  | 1.002        | 70.8         | 38.4          | 0.894              | 1.005              | 0.278          | 0.0                      | 157                  | 1.021                    |
| 5.000  | 0.818        | 14.5         | 0.0           | 0.850              | 1.005              | 0.000          | 0.0                      | 0                    | 0.000                    |
| 1.006  | 1.002        | 70.8         | 41.2          | 1.005              | 0.884              | 0.302          | 0.0                      | 164                  | 1.039                    |
| 6.000  | 1.009        | 40.1         | 15.1          | 1.028              | 0.884              | 0.101          | 0.0                      | 95                   | 0.938                    |
| 1.007  | 0.997        | 70.4         | 58.1          | 0.884              | 0.895              | 0.436          | 0.0                      | 208                  | 1.109                    |
| 1.008  | 1.000        | 70.7         | 56.2          | 0.895              | 0.735              | 0.436          | 0.0                      | 203                  | 1.106                    |
| 7.000  | 1.000        | 70.7         | 7.3           | 0.662              | 0.685              | 0.049          | 0.0                      | 65                   | 0.651                    |
| 7.001  | 1.003        | 70.9         | 9.9           | 0.685              | 0.735              | 0.066          | 0.0                      | 75                   | 0.712                    |
| 8.000  | 1.000        | 70.7         | 8.2           | 1.080              | 1.049              | 0.055          | 0.0                      | 69                   | 0.674                    |
| 10.000 | 1.000        | 70.7         | 24.8          | 1.004              | 1.049              | 0.166          | 0.0                      | 122                  | 0.913                    |

Links

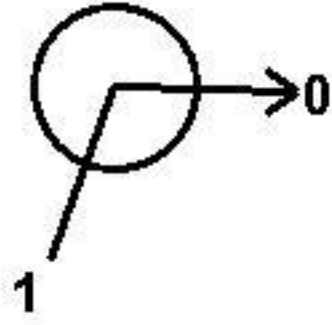
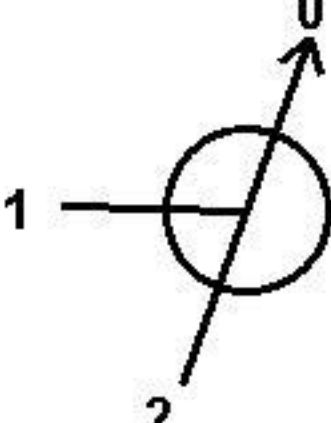
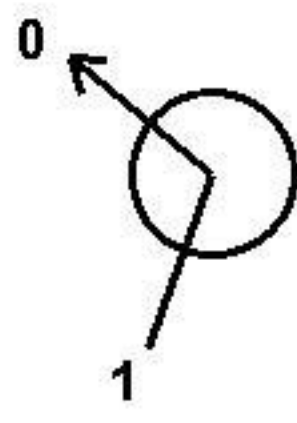
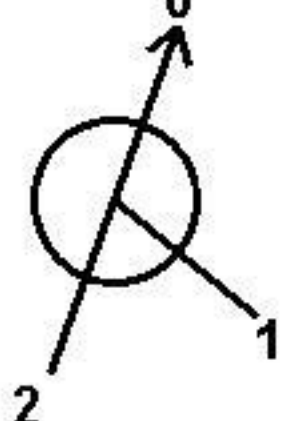
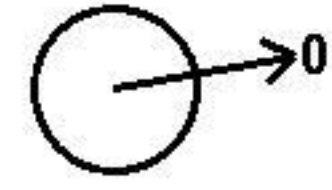
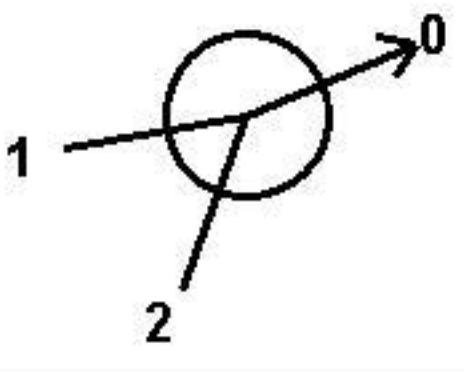
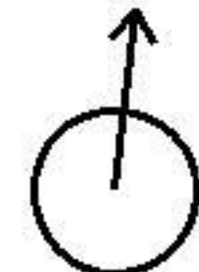
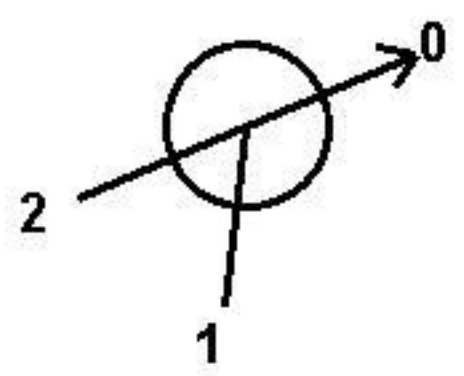
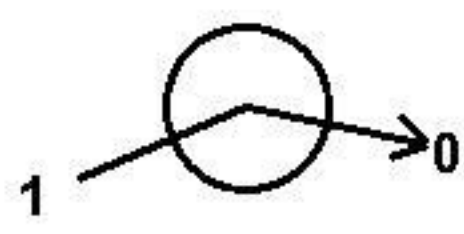
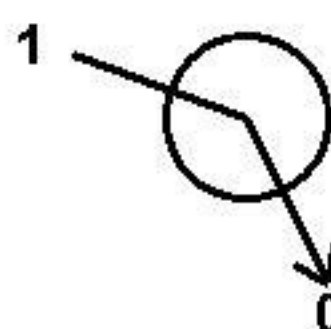
| Name   | US Node | DS Node | Length (m) | ks (mm) / n | US IL (m) | DS IL (m) | Fall (m) | Slope (1:X) | Dia (mm) | T of C (mins) | Rain (mm/hr) |
|--------|---------|---------|------------|-------------|-----------|-----------|----------|-------------|----------|---------------|--------------|
| 9.001  | S12     | S13*    | 33.985     | 0.600       | 21.871    | 21.732    | 0.139    | 244.5       | 300      | 4.77          | 55.1         |
| 9.002  | S13*    | S16     | 16.835     | 0.600       | 21.732    | 21.663    | 0.069    | 244.0       | 300      | 5.05          | 54.9         |
| 11.000 | S14     | S15     | 15.381     | 0.600       | 21.797    | 21.734    | 0.063    | 245.0       | 300      | 4.26          | 55.1         |
| 11.001 | S15     | S16     | 17.515     | 0.600       | 21.734    | 21.663    | 0.071    | 246.7       | 300      | 4.55          | 55.1         |
| 7.003  | S16     | S17*    | 15.340     | 0.600       | 21.663    | 21.600    | 0.063    | 243.5       | 300      | 5.30          | 53.9         |
| 1.009  | S17*    | HW1     | 11.586     | 0.600       | 21.600    | 21.553    | 0.047    | 246.5       | 300      | 7.20          | 47.0         |
| 1.010  | HW1     | EX HW1  | 10.096     | 0.600       | 21.553    | 21.281    | 0.272    | 37.1        | 525      | 7.24          | 46.8         |
| 1.011  | EX HW1  | EX HW2  | 10.341     | 0.600       | 21.281    | 21.260    | 0.021    | 500.0       | 300      | 7.49          | 46.1         |
| 1.013  | EX HW3  | S18*    | 2.049      | 0.600       | 21.260    | 21.260    | 0.000    | 0.0         | 300      | 4.03          | 55.1         |
| 1.014  | S18*    | EX HW4  | 15.736     | 0.600       | 21.260    | 21.200    | 0.060    | 262.3       | 300      | 4.31          | 55.1         |

| Name   | Vel (m/s) | Cap (l/s) | Flow (l/s) | US Depth (m) | DS Depth (m) | Σ Area (ha) | Σ Add Inflow (l/s) | Pro Depth (mm) | Pro Velocity (m/s) |
|--------|-----------|-----------|------------|--------------|--------------|-------------|--------------------|----------------|--------------------|
| 9.001  | 1.001     | 70.7      | 45.4       | 1.049        | 1.088        | 0.304       | 0.0                | 175            | 1.060              |
| 9.002  | 1.002     | 70.8      | 45.2       | 1.088        | 0.935        | 0.304       | 0.0                | 174            | 1.060              |
| 11.000 | 1.000     | 70.7      | 1.9        | 0.946        | 1.004        | 0.013       | 0.0                | 34             | 0.441              |
| 11.001 | 0.996     | 70.4      | 4.0        | 1.004        | 0.935        | 0.027       | 0.0                | 48             | 0.545              |
| 7.003  | 1.003     | 70.9      | 57.1       | 0.935        | 0.735        | 0.391       | 0.0                | 205            | 1.112              |
| 1.009  | 0.997     | 70.5      | 113.7      | 0.735        | 0.437        | 0.893       | 0.0                | 300            | 1.010              |
| 1.010  | 3.684     | 797.6     | 113.4      | 0.212        | 0.444        | 0.893       | 0.0                | 133            | 2.646              |
| 1.011  | 0.696     | 49.2      | 111.6      | 0.669        | 0.790        | 0.893       | 0.0                | 300            | 0.705              |
| 1.013  | 1.000     | 70.7      | 0.0        | 0.790        | 1.187        | 0.000       | 0.0                | 0              | 0.000              |
| 1.014  | 0.966     | 68.3      | 0.0        | 1.187        | 0.500        | 0.000       | 0.0                | 0              | 0.000              |

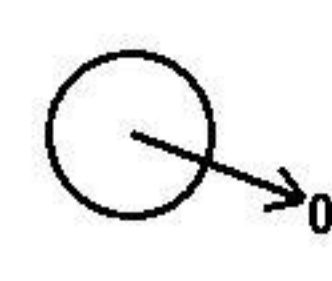
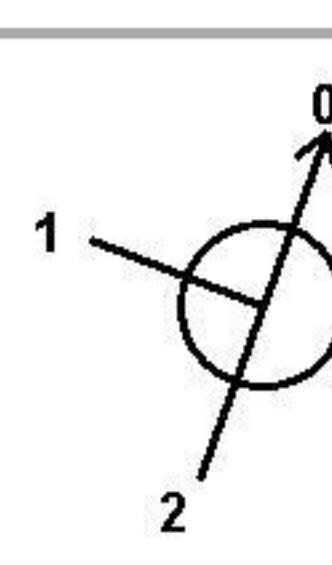
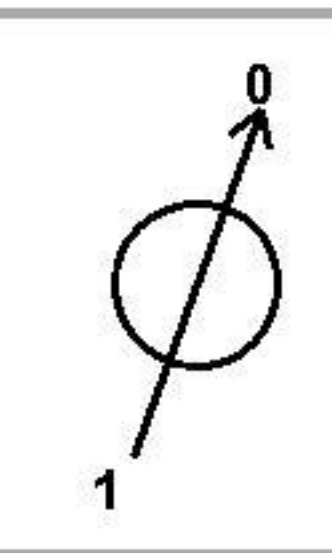
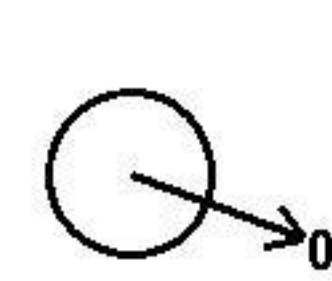
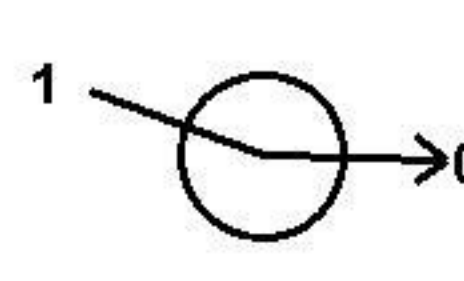
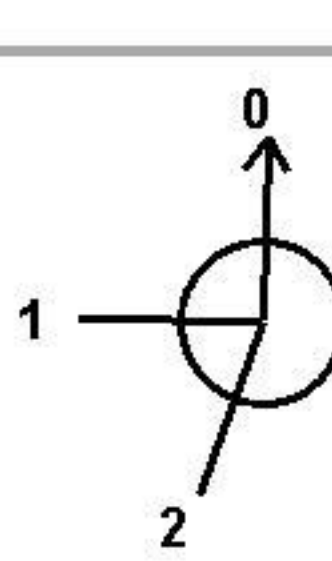
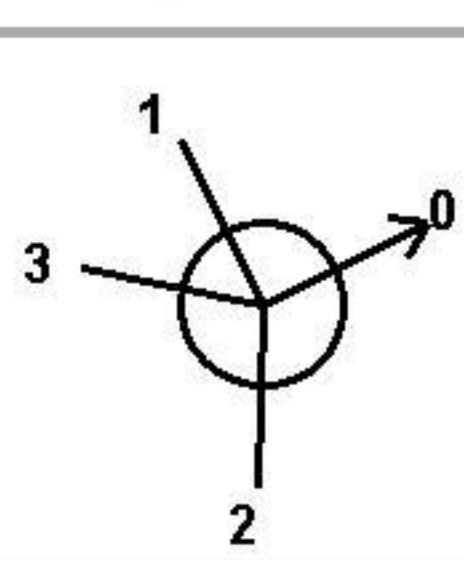
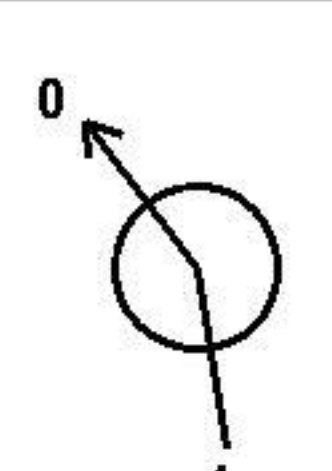
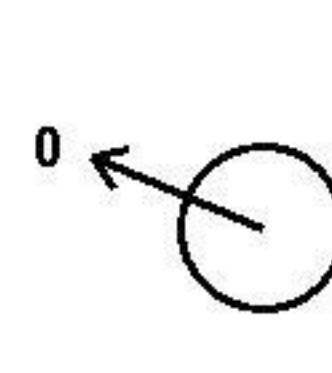
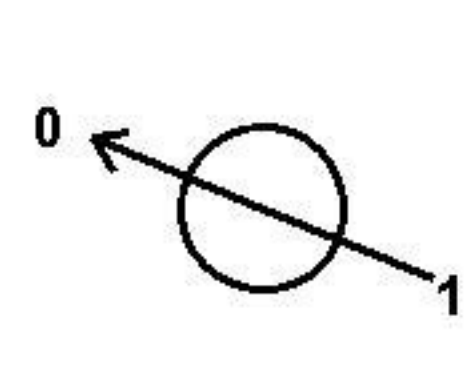
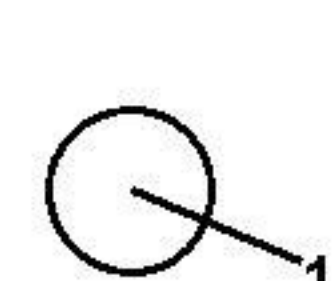
Manhole Schedule

| Node | Easting (m) | Northing (m) | CL (m) | Depth (m) | Dia (mm) | Connections                                                                           | Link | IL (m) | Dia (mm)   |
|------|-------------|--------------|--------|-----------|----------|---------------------------------------------------------------------------------------|------|--------|------------|
| S1   | 526880.247  | 118782.513   | 23.895 | 1.560     | 1200     |  |      |        |            |
|      |             |              |        |           |          |                                                                                       | 0    | 1.000  | 22.335 300 |
| S2   | 526850.350  | 118793.650   | 23.821 | 1.616     | 1200     |  |      |        |            |
|      |             |              |        |           |          |                                                                                       | 1    | 1.000  | 22.205 300 |
| S3   | 526858.167  | 118814.522   | 23.792 | 1.678     | 1200     |  |      |        |            |
|      |             |              |        |           |          |                                                                                       | 1    | 1.001  | 22.114 300 |
| SP1  | 526865.520  | 118818.432   | 23.600 | 1.489     | 1800     |  |      |        |            |
|      |             |              |        |           |          |                                                                                       | 0    | 2.000  | 22.111 300 |
| S4*  | 526860.352  | 118820.312   | 23.603 | 1.514     | 1500     |  |      |        |            |
|      |             |              |        |           |          |                                                                                       | 1    | 2.000  | 22.089 300 |
|      |             |              |        |           |          |                                                                                       | 2    | 1.002  | 22.089 300 |
|      |             |              |        |           |          |                                                                                       | 0    | 1.003  | 22.089 300 |
| RE1  | 526857.894  | 118825.236   | 23.506 | 1.195     | 150      |  |      |        |            |
|      |             |              |        |           |          |                                                                                       | 0    | 3.000  | 22.311 150 |

**Manhole Schedule**

| Node | Easting<br>(m) | Northing<br>(m) | CL<br>(m) | Depth<br>(m) | Dia<br>(mm) | Connections                                                                                      | Link | IL<br>(m) | Dia<br>(mm) |     |
|------|----------------|-----------------|-----------|--------------|-------------|--------------------------------------------------------------------------------------------------|------|-----------|-------------|-----|
| CP1  | 526866.383     | 118848.260      | 23.211    | 1.064        | 1200        | <div></div>   | 1    | 3.000     | 22.147      | 150 |
|      |                |                 |           |              |             |                                                                                                  | 0    | 3.001     | 22.147      | 150 |
| S5   | 526870.764     | 118848.160      | 23.114    | 1.146        | 1200        | <div></div>   | 1    | 3.001     | 22.118      | 150 |
|      |                |                 |           |              |             |                                                                                                  | 2    | 1.003     | 21.968      | 300 |
|      |                |                 |           |              |             |                                                                                                  | 0    | 1.004     | 21.968      | 300 |
| RE2  | 526864.833     | 118822.439      | 23.455    | 1.115        | 150         | <div></div>   |      |           |             |     |
|      |                |                 |           |              |             |                                                                                                  | 0    | 4.000     | 22.340      | 150 |
| CP2  | 526877.732     | 118857.424      | 23.067    | 0.976        | 1200        | <div></div> | 1    | 4.000     | 22.091      | 150 |
|      |                |                 |           |              |             |                                                                                                  | 0    | 4.001     | 22.091      | 150 |
| S6   | 526875.052     | 118859.615      | 23.112    | 1.194        | 1200        | <div></div> | 1    | 4.001     | 22.068      | 150 |
|      |                |                 |           |              |             |                                                                                                  | 2    | 1.004     | 21.918      | 300 |
|      |                |                 |           |              |             |                                                                                                  | 0    | 1.005     | 21.918      | 300 |
| CP3  | 526870.135     | 118877.050      | 23.065    | 1.000        | 1200        | <div></div> |      |           |             |     |
|      |                |                 |           |              |             |                                                                                                  | 0    | 5.000     | 22.065      | 150 |
| S7*  | 526882.399     | 118879.260      | 23.137    | 1.305        | 1200        | <div></div> | 1    | 5.000     | 21.982      | 150 |
|      |                |                 |           |              |             |                                                                                                  | 2    | 1.005     | 21.832      | 300 |
|      |                |                 |           |              |             |                                                                                                  | 0    | 1.006     | 21.832      | 300 |
| SP2  | 526891.383     | 118875.890      | 23.162    | 1.253        | 1200        | <div></div> |      |           |             |     |
|      |                |                 |           |              |             |                                                                                                  | 0    | 6.000     | 21.909      | 225 |
| S8   | 526892.272     | 118883.454      | 22.972    | 1.184        | 1200        | <div></div> | 1    | 6.000     | 21.863      | 225 |
|      |                |                 |           |              |             |                                                                                                  | 2    | 1.006     | 21.788      | 300 |
|      |                |                 |           |              |             |                                                                                                  | 0    | 1.007     | 21.788      | 300 |
| S9   | 526909.293     | 118890.686      | 22.908    | 1.195        | 1200        | <div></div> | 1    | 1.007     | 21.713      | 300 |
|      |                |                 |           |              |             |                                                                                                  | 0    | 1.008     | 21.713      | 300 |
| RE3  | 526910.049     | 118908.289      | 22.716    | 0.962        | 300         | <div></div> |      |           |             |     |
|      |                |                 |           |              |             |                                                                                                  | 0    | 7.000     | 21.754      | 300 |
| S10  | 526928.270     | 118901.571      | 22.660    | 0.985        | 1200        | <div></div> | 1    | 7.000     | 21.675      | 300 |
|      |                |                 |           |              |             |                                                                                                  | 0    | 7.001     | 21.675      | 300 |
| S11  | 526913.986     | 118811.005      | 23.300    | 1.380        | 1200        | <div></div> |      |           |             |     |
|      |                |                 |           |              |             |                                                                                                  | 0    | 8.000     | 21.920      | 300 |

**Manhole Schedule**

| Node   | Easting<br>(m) | Northing<br>(m) | CL<br>(m) | Depth<br>(m) | Dia<br>(mm) | Connections                                                                           | Link   | IL<br>(m) | Dia<br>(mm) |     |
|--------|----------------|-----------------|-----------|--------------|-------------|---------------------------------------------------------------------------------------|--------|-----------|-------------|-----|
| SP3    | 526912.938     | 118824.310      | 23.198    | 1.304        | 1500        |    | 0      | 10.000    | 21.894      | 300 |
| S12    | 526918.222     | 118822.309      | 23.220    | 1.349        | 1200        |    | 1      | 10.000    | 21.871      | 300 |
|        |                |                 |           |              |             | 2                                                                                     | 8.000  | 21.871    | 300         |     |
|        |                |                 |           |              |             | 0                                                                                     | 9.001  | 21.871    | 300         |     |
| S13*   | 526930.145     | 118854.134      | 23.120    | 1.388        | 1200        |   | 1      | 9.001     | 21.732      | 300 |
|        |                |                 |           |              |             | 0                                                                                     | 9.002  | 21.732    | 300         |     |
| S14    | 526904.101     | 118875.687      | 23.043    | 1.246        | 1200        |  | 0      | 11.000    | 21.797      | 300 |
| S15    | 526918.532     | 118870.366      | 23.038    | 1.304        | 1200        |  | 1      | 11.000    | 21.734      | 300 |
|        |                |                 |           |              |             | 0                                                                                     | 11.001 | 21.734    | 300         |     |
| S16    | 526936.041     | 118869.903      | 22.898    | 1.235        | 1200        |  | 1      | 11.001    | 21.663      | 300 |
|        |                |                 |           |              |             | 2                                                                                     | 9.002  | 21.663    | 300         |     |
|        |                |                 |           |              |             | 0                                                                                     | 7.003  | 21.663    | 300         |     |
| S17*   | 526936.447     | 118885.238      | 22.635    | 1.035        | 1800        |  | 1      | 7.001     | 21.600      | 300 |
|        |                |                 |           |              |             | 2                                                                                     | 7.003  | 21.600    | 300         |     |
|        |                |                 |           |              |             | 3                                                                                     | 1.008  | 21.600    | 300         |     |
|        |                |                 |           |              |             | 0                                                                                     | 1.009  | 21.600    | 300         |     |
| HW1    | 526946.809     | 118890.420      | 22.290    | 0.737        | 1500        |  | 1      | 1.009     | 21.553      | 300 |
|        |                |                 |           |              |             | 0                                                                                     | 1.010  | 21.553    | 525         |     |
| EX HW1 | 526945.190     | 118900.385      | 22.250    | 0.969        | 1500        |  | 1      | 1.010     | 21.281      | 525 |
|        |                |                 |           |              |             | 0                                                                                     | 1.011  | 21.281    | 300         |     |
| EX HW2 | 526938.908     | 118908.599      | 22.350    | 1.090        | 1200        |  | 1      | 1.011     | 21.260      | 300 |
| EX HW3 | 526911.277     | 118914.491      | 22.350    | 1.090        | 1200        |  | 0      | 1.013     | 21.260      | 300 |
| S18*   | 526909.384     | 118915.275      | 22.747    | 1.487        | 1200        |  | 1      | 1.013     | 21.260      | 300 |
|        |                |                 |           |              |             | 0                                                                                     | 1.014  | 21.260    | 300         |     |
| EX HW4 | 526894.845     | 118921.296      | 22.000    | 0.800        | 1200        |  | 1      | 1.014     | 21.200      | 300 |

### Simulation Settings

|                      |        |                            |      |                          |   |
|----------------------|--------|----------------------------|------|--------------------------|---|
| Rainfall Methodology | FEH-13 | Skip Steady State          | ✓    | Check Discharge Volume   | ✓ |
| Summer CV            | 0.750  | Drain Down Time (mins)     | 240  | 100 year 360 minute (m³) |   |
| Winter CV            | 0.840  | Additional Storage (m³/ha) | 20.0 |                          |   |
| Analysis Speed       | Normal | Check Discharge Rate(s)    | ✓    |                          |   |

### Storm Durations

|    |    |    |     |     |     |     |     |     |     |     |      |
|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 |
|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|------|

| Return Period<br>(years) | Climate Change<br>(CC %) | Additional Area<br>(A %) | Additional Flow<br>(Q %) |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 2                        | 0                        | 0                        | 0                        |
| 30                       | 0                        | 0                        | 0                        |
| 100                      | 40                       | 0                        | 0                        |

### Pre-development Discharge Rate

|                              |            |                        |      |
|------------------------------|------------|------------------------|------|
| Site Makeup                  | Greenfield | Growth Factor 30 year  | 1.95 |
| Greenfield Method            | IH124      | Growth Factor 100 year | 2.48 |
| Positively Drained Area (ha) |            | Betterment (%)         | 0    |
| SAAR (mm)                    |            | QBar                   |      |
| Soil Index                   | 1          | Q 1 year (l/s)         |      |
| SPR                          | 0.10       | Q 30 year (l/s)        |      |
| Region                       | 1          | Q 100 year (l/s)       |      |
| Growth Factor 1 year         | 0.85       |                        |      |

### Pre-development Discharge Volume

|                              |            |                       |     |
|------------------------------|------------|-----------------------|-----|
| Site Makeup                  | Greenfield | Return Period (years) | 100 |
| Greenfield Method            | FSR/FEH    | Climate Change (%)    | 0   |
| Positively Drained Area (ha) |            | Storm Duration (mins) | 360 |
| Soil Index                   | 1          | Betterment (%)        | 0   |
| SPR                          | 0.10       | PR                    |     |
| CWI                          |            | Runoff Volume (m³)    |     |

### Node S18\* Online Hydro-Brake® Control

|                          |        |                         |                                |
|--------------------------|--------|-------------------------|--------------------------------|
| Flap Valve               | x      | Objective               | (HE) Minimise upstream storage |
| Downstream Link          | 1.014  | Sump Available          | ✓                              |
| Replaces Downstream Link | ✓      | Product Number          | CTL-SHE-0101-4600-1027-4600    |
| Invert Level (m)         | 21.260 | Min Outlet Diameter (m) | 0.150                          |
| Design Depth (m)         | 1.027  | Min Node Diameter (mm)  | 1200                           |
| Design Flow (l/s)        | 4.6    |                         |                                |

### Node S17\* Online Hydro-Brake® Control

|                          |        |                         |                                |
|--------------------------|--------|-------------------------|--------------------------------|
| Flap Valve               | x      | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓      | Sump Available          | ✓                              |
| Invert Level (m)         | 21.600 | Product Number          | CTL-SHE-0148-1000-0820-1000    |
| Design Depth (m)         | 0.820  | Min Outlet Diameter (m) | 0.225                          |
| Design Flow (l/s)        | 10.0   | Min Node Diameter (mm)  | 1200                           |

|                                                            |  |                  |                           |                                                                                            |        |                           |  |        |
|------------------------------------------------------------|--|------------------|---------------------------|--------------------------------------------------------------------------------------------|--------|---------------------------|--|--------|
| <div>CAUSEWAY</div>                                        |  | Rolton Group Ltd |                           | File: 23-0466 - Flow Design.PFI<br>Network: Storm Network 1<br>Bryan Hoadley<br>18/03/2025 |        | Page 7                    |  |        |
| <div>Node S13* Online Orifice Control</div>                |  |                  |                           |                                                                                            |        |                           |  |        |
| Flap Valve                                                 |  | x                | Design Depth (m)          |                                                                                            | 0.568  | Discharge Coefficient     |  | 0.600  |
| Replaces Downstream Link                                   |  | ✓                | Design Flow (l/s)         |                                                                                            | 8.6    |                           |  |        |
| Invert Level (m)                                           |  | 21.732           | Diameter (m)              |                                                                                            | 0.075  |                           |  |        |
| <div>Node S7* Online Orifice Control</div>                 |  |                  |                           |                                                                                            |        |                           |  |        |
| Flap Valve                                                 |  | x                | Design Depth (m)          |                                                                                            | 0.800  | Discharge Coefficient     |  | 0.600  |
| Replaces Downstream Link                                   |  | ✓                | Design Flow (l/s)         |                                                                                            | 10.5   |                           |  |        |
| Invert Level (m)                                           |  | 21.832           | Diameter (m)              |                                                                                            | 0.075  |                           |  |        |
| <div>Node S4* Online Orifice Control</div>                 |  |                  |                           |                                                                                            |        |                           |  |        |
| Flap Valve                                                 |  | x                | Design Depth (m)          |                                                                                            | 0.916  | Discharge Coefficient     |  | 0.600  |
| Replaces Downstream Link                                   |  | ✓                | Design Flow (l/s)         |                                                                                            | 11.0   |                           |  |        |
| Invert Level (m)                                           |  | 22.089           | Diameter (m)              |                                                                                            | 0.075  |                           |  |        |
| <div>Node EX HW3 Flow through Pond Storage Structure</div> |  |                  |                           |                                                                                            |        |                           |  |        |
| Base Inf Coefficient (m/hr)                                |  | 0.00000          | Porosity                  |                                                                                            | 1.00   | Main Channel Length (m)   |  | 28.252 |
| Side Inf Coefficient (m/hr)                                |  | 0.00000          | Invert Level (m)          |                                                                                            | 21.260 | Main Channel Slope (1:X)  |  | 500.0  |
| Safety Factor                                              |  | 2.0              | Time to half empty (mins) |                                                                                            |        | Main Channel n            |  | 1.000  |
| <div>Inlets</div> <div>EX HW2</div>                        |  |                  |                           |                                                                                            |        |                           |  |        |
| Depth (m)                                                  |  | 0.000            | Area (m²)                 |                                                                                            | 248.6  | Depth (m)                 |  | 1.090  |
|                                                            |  |                  | Inf Area (m²)             |                                                                                            | 0.0    |                           |  | 368.2  |
|                                                            |  |                  |                           |                                                                                            |        |                           |  | 0.0    |
| <div>Node S13* Depth/Area Storage Structure</div>          |  |                  |                           |                                                                                            |        |                           |  |        |
| Base Inf Coefficient (m/hr)                                |  | 0.00000          | Safety Factor             |                                                                                            | 2.0    | Invert Level (m)          |  | 21.732 |
| Side Inf Coefficient (m/hr)                                |  | 0.00000          | Porosity                  |                                                                                            | 0.95   | Time to half empty (mins) |  |        |
| Depth (m)                                                  |  | 0.000            | Area (m²)                 |                                                                                            | 191.7  | Depth (m)                 |  | 0.800  |
|                                                            |  |                  | Inf Area (m²)             |                                                                                            | 0.0    |                           |  | 191.7  |
|                                                            |  |                  |                           |                                                                                            |        |                           |  | 0.0    |
| <div>Node S17* Depth/Area Storage Structure</div>          |  |                  |                           |                                                                                            |        |                           |  |        |
| Base Inf Coefficient (m/hr)                                |  | 0.00000          | Safety Factor             |                                                                                            | 2.0    | Invert Level (m)          |  | 21.600 |
| Side Inf Coefficient (m/hr)                                |  | 0.00000          | Porosity                  |                                                                                            | 0.95   | Time to half empty (mins) |  |        |
| Depth (m)                                                  |  | 0.000            | Area (m²)                 |                                                                                            | 371.3  | Depth (m)                 |  | 0.400  |
|                                                            |  |                  | Inf Area (m²)             |                                                                                            | 0.0    |                           |  | 371.3  |
|                                                            |  |                  |                           |                                                                                            |        |                           |  | 0.0    |
| <div>Node S7* Depth/Area Storage Structure</div>           |  |                  |                           |                                                                                            |        |                           |  |        |
| Base Inf Coefficient (m/hr)                                |  | 0.00000          | Safety Factor             |                                                                                            | 2.0    | Invert Level (m)          |  | 21.832 |
| Side Inf Coefficient (m/hr)                                |  | 0.00000          | Porosity                  |                                                                                            | 0.95   | Time to half empty (mins) |  |        |

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| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 84.0                      | 0.0                           | 0.800        | 84.0                      | 0.0                           | 0.801        | 0.0                       | 0.0                           |

Node S4\* Depth/Area Storage Structure

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 22.089 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 0.95 | Time to half empty (mins) | 252    |

| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 107.5                     | 0.0                           | 0.800        | 107.5                     | 0.0                           | 0.801        | 0.0                       | 0.0                           |

Node S10 Carpark Storage Structure

|                             |         |                           |        |               |       |
|-----------------------------|---------|---------------------------|--------|---------------|-------|
| Base Inf Coefficient (m/hr) | 0.00000 | Invert Level (m)          | 22.470 | Slope (1:X)   | 60.0  |
| Side Inf Coefficient (m/hr) | 0.00000 | Time to half empty (mins) |        | Depth (m)     | 0.500 |
| Safety Factor               | 2.0     | Width (m)                 | 16.000 | Inf Depth (m) |       |
| Porosity                    | 0.30    | Length (m)                | 20.000 |               |       |

Node CP2 Carpark Storage Structure

|                             |         |                           |        |               |       |
|-----------------------------|---------|---------------------------|--------|---------------|-------|
| Base Inf Coefficient (m/hr) | 0.00000 | Invert Level (m)          | 22.560 | Slope (1:X)   | 500.0 |
| Side Inf Coefficient (m/hr) | 0.00000 | Time to half empty (mins) | 56     | Depth (m)     | 0.500 |
| Safety Factor               | 2.0     | Width (m)                 | 5.000  | Inf Depth (m) |       |
| Porosity                    | 0.30    | Length (m)                | 25.000 |               |       |

Node S10 Depth/Area Storage Structure

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 21.675 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 0.95 | Time to half empty (mins) |        |

| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 68.7                      | 0.0                           | 0.400        | 68.7                      | 0.0                           | 0.401        | 0.0                       | 0.0                           |

Node S12 Depth/Area Storage Structure

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 21.871 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 0.95 | Time to half empty (mins) |        |

| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 91.0                      | 0.0                           | 0.800        | 91.0                      | 0.0                           | 0.801        | 0.0                       | 0.0                           |

**Results for 2 year Critical Storm Duration. Lowest mass balance: 99.53%**

| Node Event        | US<br>Node | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status |
|-------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|--------|
| 15 minute summer  | S1         | 10             | 22.440       | 0.105        | 17.7            | 0.2815           | 0.0000        | OK     |
| 15 minute winter  | S2         | 10             | 22.310       | 0.105        | 17.8            | 0.1193           | 0.0000        | OK     |
| 180 minute winter | S3         | 124            | 22.262       | 0.148        | 6.7             | 0.2326           | 0.0000        | OK     |
| 180 minute winter | SP1        | 124            | 22.262       | 0.151        | 2.6             | 0.5095           | 0.0000        | OK     |
| 180 minute winter | S4*        | 124            | 22.262       | 0.173        | 8.8             | 17.9575          | 0.0000        | OK     |
| 15 minute summer  | RE1        | 10             | 22.347       | 0.036        | 1.8             | 0.0079           | 0.0000        | OK     |
| 15 minute winter  | CP1        | 10             | 22.184       | 0.037        | 1.8             | 0.0418           | 0.0000        | OK     |
| 240 minute winter | S5         | 188            | 22.022       | 0.054        | 4.5             | 0.0616           | 0.0000        | OK     |
| 15 minute summer  | RE2        | 10             | 22.371       | 0.031        | 1.3             | 0.0055           | 0.0000        | OK     |
| 15 minute winter  | CP2        | 11             | 22.122       | 0.031        | 1.3             | 0.0354           | 0.0000        | OK     |
| 240 minute winter | S6         | 192            | 22.020       | 0.102        | 5.9             | 0.1784           | 0.0000        | OK     |
| 15 minute summer  | CP3        | 1              | 22.065       | 0.000        | 0.0             | 0.0000           | 0.0000        | OK     |
| 240 minute winter | S7*        | 192            | 22.019       | 0.187        | 6.6             | 15.2253          | 0.0000        | OK     |
| 15 minute summer  | SP2        | 10             | 22.011       | 0.102        | 14.8            | 0.2804           | 0.0000        | OK     |
| 15 minute summer  | S8         | 10             | 21.942       | 0.154        | 19.6            | 0.2594           | 0.0000        | OK     |
| 15 minute winter  | S9         | 9              | 21.927       | 0.214        | 20.5            | 0.2419           | 0.0000        | OK     |
| 15 minute summer  | RE3        | 9              | 21.824       | 0.070        | 7.2             | 0.0765           | 0.0000        | OK     |
| 480 minute winter | S10        | 368            | 21.767       | 0.092        | 1.5             | 6.1111           | 0.0000        | OK     |
| 30 minute winter  | S11        | 21             | 22.006       | 0.086        | 6.1             | 0.1654           | 0.0000        | OK     |
| 15 minute winter  | SP3        | 11             | 22.020       | 0.126        | 24.3            | 0.5446           | 0.0000        | OK     |
| 30 minute winter  | S12        | 21             | 22.005       | 0.134        | 32.4            | 11.9280          | 0.0000        | OK     |
| 240 minute winter | S13*       | 176            | 21.906       | 0.174        | 10.6            | 31.8055          | 0.0000        | OK     |
| 15 minute winter  | S14        | 10             | 21.831       | 0.034        | 1.9             | 0.0450           | 0.0000        | OK     |
| 15 minute winter  | S15        | 9              | 21.817       | 0.083        | 3.9             | 0.1121           | 0.0000        | OK     |
| 15 minute summer  | S16        | 9              | 21.812       | 0.149        | 14.9            | 0.3126           | 0.0000        | OK     |

| Link Event<br>(Upstream Depth) | US<br>Node | Link    | DS<br>Node | Outflow<br>(l/s) | Velocity<br>(m/s) | Flow/Cap | Link<br>Vol (m³) | Discharge<br>Vol (m³) |
|--------------------------------|------------|---------|------------|------------------|-------------------|----------|------------------|-----------------------|
| 15 minute summer               | S1         | 1.000   | S2         | 17.8             | 0.820             | 0.251    | 0.7012           |                       |
| 15 minute winter               | S2         | 1.001   | S3         | 17.4             | 0.744             | 0.246    | 0.5218           |                       |
| 180 minute winter              | S3         | 1.002   | S4*        | 6.4              | 0.661             | 0.091    | 0.2371           |                       |
| 180 minute winter              | SP1        | 2.000   | S4*        | 2.4              | 0.500             | 0.034    | 0.2131           |                       |
| 180 minute winter              | S4*        | Orifice | S5         | 4.3              |                   |          |                  |                       |
| 15 minute summer               | RE1        | 3.000   | CP1        | 1.8              | 0.554             | 0.125    | 0.0807           |                       |
| 15 minute winter               | CP1        | 3.001   | S5         | 1.7              | 0.534             | 0.120    | 0.0142           |                       |
| 240 minute winter              | S5         | 1.004   | S6         | 4.5              | 0.495             | 0.064    | 0.1820           |                       |
| 15 minute summer               | RE2        | 4.000   | CP2        | 1.3              | 0.520             | 0.090    | 0.0944           |                       |
| 15 minute winter               | CP2        | 4.001   | S6         | 1.2              | 0.483             | 0.086    | 0.0088           |                       |
| 240 minute winter              | S6         | 1.005   | S7*        | 5.8              | 0.481             | 0.081    | 0.7059           |                       |
| 15 minute summer               | CP3        | 5.000   | S7*        | 0.0              | 0.000             | 0.000    | 0.0000           |                       |
| 240 minute winter              | S7*        | Orifice | S8         | 4.5              |                   |          |                  |                       |
| 15 minute summer               | SP2        | 6.000   | S8         | 14.8             | 0.894             | 0.369    | 0.1261           |                       |
| 15 minute summer               | S8         | 1.007   | S9         | 17.6             | 0.629             | 0.250    | 0.8248           |                       |
| 15 minute winter               | S9         | 1.008   | S17*       | 26.0             | 1.538             | 0.368    | 0.7478           |                       |
| 15 minute summer               | RE3        | 7.000   | S10        | 7.3              | 1.053             | 0.103    | 0.1506           |                       |
| 480 minute winter              | S10        | 7.001   | S17*       | 1.3              | 0.241             | 0.019    | 0.5328           |                       |
| 30 minute winter               | S11        | 8.000   | S12        | 5.8              | 0.620             | 0.081    | 0.2845           |                       |
| 15 minute winter               | SP3        | 10.000  | S12        | 23.6             | 1.307             | 0.334    | 0.1568           |                       |
| 30 minute winter               | S12        | 9.001   | S13*       | 24.4             | 1.506             | 0.345    | 0.6030           |                       |
| 240 minute winter              | S13*       | Orifice | S16        | 4.3              |                   |          |                  |                       |
| 15 minute winter               | S14        | 11.000  | S15        | 1.9              | 0.307             | 0.027    | 0.1539           |                       |
| 15 minute winter               | S15        | 11.001  | S16        | 6.5              | 0.319             | 0.093    | 0.4409           |                       |
| 15 minute summer               | S16        | 7.003   | S17*       | 15.1             | 1.396             | 0.213    | 0.2684           |                       |

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.53%

| Node Event        | US<br>Node | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status     |
|-------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|------------|
| 480 minute winter | S17*       | 376            | 21.767       | 0.167        | 12.3            | 59.1743          | 0.0000        | OK         |
| 720 minute winter | HW1        | 690            | 21.623       | 0.070        | 9.5             | 0.1239           | 0.0000        | OK         |
| 720 minute winter | EX HW1     | 690            | 21.623       | 0.342        | 9.5             | 0.6051           | 0.0000        | SURCHARGED |
| 720 minute winter | EX HW2     | 690            | 21.623       | 0.363        | 9.4             | 0.4107           | 0.0000        | OK         |
| 720 minute winter | EX HW3     | 690            | 21.623       | 0.363        | 7.1             | 0.4104           | 0.0000        | SURCHARGED |
| 720 minute winter | S18*       | 690            | 21.624       | 0.364        | 6.3             | 0.4113           | 0.0000        | SURCHARGED |
| 15 minute summer  | EX HW4     | 1              | 21.200       | 0.000        | 0.0             | 0.0000           | 0.0000        | OK         |

| Link Event<br>(Upstream Depth) | US<br>Node | Link              | DS<br>Node | Outflow<br>(l/s) | Velocity<br>(m/s) | Flow/Cap | Link<br>Vol (m³) | Discharge<br>Vol (m³) |
|--------------------------------|------------|-------------------|------------|------------------|-------------------|----------|------------------|-----------------------|
| 480 minute winter              | S17*       | Hydro-Brake®      | HW1        | 9.7              |                   |          |                  |                       |
| 720 minute winter              | HW1        | 1.010             | EX HW1     | 9.5              | 0.352             | 0.012    | 0.8390           |                       |
| 720 minute winter              | EX HW1     | 1.011             | EX HW2     | 9.4              | 0.239             | 0.192    | 0.7282           |                       |
| 720 minute winter              | EX HW2     | Flow through pond | EX HW3     | 7.1              | 0.007             | 0.023    | 89.3110          |                       |
| 720 minute winter              | EX HW3     | 1.013             | S18*       | 6.3              | 0.171             | 0.089    | 0.1443           |                       |
| 720 minute winter              | S18*       | Hydro-Brake®      | EX HW4     | 4.6              |                   |          |                  | 169.0                 |

**Results for 30 year Critical Storm Duration. Lowest mass balance: 99.53%**

| Node Event                  | US Node | Peak (mins) | Level (m) | Depth (m)     | Inflow (l/s)   | Node Vol (m³) | Flood (m³)    | Status             |
|-----------------------------|---------|-------------|-----------|---------------|----------------|---------------|---------------|--------------------|
| 15 minute winter            | S1      | 10          | 22.525    | 0.190         | 47.3           | 0.5103        | 0.0000        | OK                 |
| 120 minute winter           | S2      | 92          | 22.510    | 0.305         | 15.0           | 0.3450        | 0.0000        | SURCHARGED         |
| 120 minute winter           | S3      | 92          | 22.510    | 0.396         | 18.0           | 0.6222        | 0.0000        | SURCHARGED         |
| 120 minute winter           | SP1     | 92          | 22.510    | 0.399         | 7.7            | 1.3461        | 0.0000        | SURCHARGED         |
| 120 minute winter           | S4*     | 92          | 22.510    | 0.421         | 24.1           | 43.6956       | 0.0000        | SURCHARGED         |
| 15 minute summer            | RE1     | 10          | 22.371    | 0.060         | 4.7            | 0.0131        | 0.0000        | OK                 |
| 240 minute winter           | CP1     | 220         | 22.217    | 0.070         | 0.9            | 0.0794        | 0.0000        | OK                 |
| 240 minute winter           | S5      | 220         | 22.217    | 0.249         | 7.2            | 0.2818        | 0.0000        | OK                 |
| 15 minute summer            | RE2     | 10          | 22.391    | 0.051         | 3.5            | 0.0090        | 0.0000        | OK                 |
| 240 minute winter           | CP2     | 220         | 22.217    | 0.126         | 0.7            | 0.1423        | 0.0000        | OK                 |
| 240 minute winter           | S6      | 220         | 22.217    | 0.299         | 10.1           | 0.5232        | 0.0000        | OK                 |
| 240 minute winter           | CP3     | 216         | 22.216    | 0.151         | 0.1            | 0.1707        | 0.0000        | SURCHARGED         |
| 240 minute winter           | S7*     | 224         | 22.216    | 0.384         | 11.4           | 31.2186       | 0.0000        | SURCHARGED         |
| 15 minute summer            | SP2     | 9           | 22.119    | 0.210         | 39.5           | 0.5769        | 0.0000        | OK                 |
| 15 minute winter            | S8      | 8           | 22.059    | 0.271         | 53.0           | 0.4579        | 0.0000        | OK                 |
| 15 minute winter            | S9      | 8           | 22.029    | 0.316         | 51.0           | 0.3578        | 0.0000        | SURCHARGED         |
| 480 minute winter           | RE3     | 464         | 21.952    | 0.198         | 2.2            | 0.2154        | 0.0000        | OK                 |
| 480 minute winter           | S10     | 464         | 21.952    | 0.277         | 3.0            | 18.4747       | 0.0000        | OK                 |
| 15 minute winter            | S11     | 12          | 22.145    | 0.225         | 21.5           | 0.4346        | 0.0000        | OK                 |
| 15 minute winter            | SP3     | 11          | 22.165    | 0.271         | 64.8           | 1.1701        | 0.0000        | OK                 |
| 15 minute winter            | S12     | 12          | 22.144    | 0.273         | 114.3          | 24.2709       | 0.0000        | OK                 |
| 240 minute winter           | S13*    | 184         | 22.081    | 0.349         | 22.1           | 63.9475       | 0.0000        | SURCHARGED         |
| 480 minute winter           | S14     | 464         | 21.952    | 0.155         | 0.6            | 0.2078        | 0.0000        | OK                 |
| 480 minute winter           | S15     | 464         | 21.952    | 0.218         | 1.2            | 0.2935        | 0.0000        | OK                 |
| 480 minute winter           | S16     | 464         | 21.952    | 0.289         | 8.6            | 0.6079        | 0.0000        | OK                 |
| Link Event (Upstream Depth) | US Node | Link        | DS Node   | Outflow (l/s) | Velocity (m/s) | Flow/Cap      | Link Vol (m³) | Discharge Vol (m³) |
| 15 minute winter            | S1      | 1.000       | S2        | 47.3          | 0.991          | 0.670         | 1.5269        |                    |
| 120 minute winter           | S2      | 1.001       | S3        | 13.4          | 0.515          | 0.189         | 1.5695        |                    |
| 120 minute winter           | S3      | 1.002       | S4*       | 17.1          | 0.924          | 0.241         | 0.4358        |                    |
| 120 minute winter           | SP1     | 2.000       | S4*       | 7.0           | 0.706          | 0.099         | 0.3872        |                    |
| 120 minute winter           | S4*     | Orifice     | S5        | 7.0           |                |               |               |                    |
| 15 minute summer            | RE1     | 3.000       | CP1       | 4.7           | 0.701          | 0.326         | 0.1668        |                    |
| 240 minute winter           | CP1     | 3.001       | S5        | 0.9           | 0.444          | 0.062         | 0.0448        |                    |
| 240 minute winter           | S5      | 1.004       | S6        | 7.1           | 0.489          | 0.100         | 0.8127        |                    |
| 15 minute summer            | RE2     | 4.000       | CP2       | 3.5           | 0.662          | 0.243         | 0.2006        |                    |
| 240 minute winter           | CP2     | 4.001       | S6        | 0.7           | 0.413          | 0.049         | 0.0577        |                    |
| 240 minute winter           | S6      | 1.005       | S7*       | 9.7           | 0.559          | 0.136         | 1.4762        |                    |
| 240 minute winter           | CP3     | 5.000       | S7*       | -0.1          | -0.022         | -0.010        | 0.2194        |                    |
| 240 minute winter           | S7*     | Orifice     | S8        | 6.6           |                |               |               |                    |
| 15 minute summer            | SP2     | 6.000       | S8        | 39.6          | 1.136          | 0.988         | 0.2740        |                    |
| 15 minute winter            | S8      | 1.007       | S9        | 51.0          | 0.971          | 0.723         | 1.2708        |                    |
| 15 minute winter            | S9      | 1.008       | S17*      | 57.4          | 1.895          | 0.813         | 0.9880        |                    |
| 480 minute winter           | RE3     | 7.000       | S10       | 2.2           | 0.425          | 0.031         | 1.1382        |                    |
| 480 minute winter           | S10     | 7.001       | S17*      | 1.4           | 0.270          | 0.020         | 1.2637        |                    |
| 15 minute winter            | S11     | 8.000       | S12       | 19.0          | 0.856          | 0.269         | 0.7493        |                    |
| 15 minute winter            | SP3     | 10.000      | S12       | 62.8          | 1.442          | 0.889         | 0.3758        |                    |
| 15 minute winter            | S12     | 9.001       | S13*      | 80.1          | 1.872          | 1.133         | 1.5148        |                    |
| 240 minute winter           | S13*    | Orifice     | S16       | 5.4           |                |               |               |                    |
| 480 minute winter           | S14     | 11.000      | S15       | 0.6           | 0.226          | 0.008         | 0.7044        |                    |
| 480 minute winter           | S15     | 11.001      | S16       | 1.1           | 0.145          | 0.015         | 1.0901        |                    |
| 480 minute winter           | S16     | 7.003       | S17*      | 8.4           | 0.563          | 0.118         | 1.0741        |                    |

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.53%

| Node Event        | US<br>Node | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status     |
|-------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|------------|
| 480 minute winter | S17*       | 464            | 21.952       | 0.352        | 20.5            | 124.9940         | 0.0000        | SURCHARGED |
| 720 minute winter | HW1        | 810            | 21.832       | 0.279        | 31.4            | 0.4924           | 0.0000        | OK         |
| 720 minute winter | EX HW1     | 810            | 21.832       | 0.551        | 45.3            | 0.9730           | 0.0000        | SURCHARGED |
| 720 minute winter | EX HW2     | 810            | 21.831       | 0.571        | 19.8            | 0.6462           | 0.0000        | OK         |
| 720 minute winter | EX HW3     | 810            | 21.831       | 0.571        | 8.7             | 0.6463           | 0.0000        | SURCHARGED |
| 720 minute winter | S18*       | 780            | 21.833       | 0.573        | 7.2             | 0.6485           | 0.0000        | SURCHARGED |
| 15 minute summer  | EX HW4     | 1              | 21.200       | 0.000        | 0.0             | 0.0000           | 0.0000        | OK         |

| Link Event<br>(Upstream Depth) | US<br>Node | Link              | DS<br>Node | Outflow<br>(l/s) | Velocity<br>(m/s) | Flow/Cap | Link<br>Vol (m³) | Discharge<br>Vol (m³) |
|--------------------------------|------------|-------------------|------------|------------------|-------------------|----------|------------------|-----------------------|
| 480 minute winter              | S17*       | Hydro-Brake®      | HW1        | 10.0             |                   |          |                  |                       |
| 720 minute winter              | HW1        | 1.010             | EX HW1     | 43.6             | 0.386             | 0.055    | 1.6780           |                       |
| 720 minute winter              | EX HW1     | 1.011             | EX HW2     | 19.8             | 0.282             | 0.403    | 0.7282           |                       |
| 720 minute winter              | EX HW2     | Flow through pond | EX HW3     | 8.7              | 0.007             | 0.028    | 151.1325         |                       |
| 720 minute winter              | EX HW3     | 1.013             | S18*       | 7.2              | 0.171             | 0.102    | 0.1443           |                       |
| 720 minute winter              | S18*       | Hydro-Brake®      | EX HW4     | 4.6              |                   |          |                  | 181.8                 |

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.53%**

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 180 minute winter | S1      | 136         | 23.204    | 0.869     | 19.7         | 2.3295        | 0.0000     | SURCHARGED |
| 180 minute winter | S2      | 136         | 23.203    | 0.998     | 18.5         | 1.1286        | 0.0000     | SURCHARGED |
| 180 minute winter | S3      | 136         | 23.202    | 1.088     | 24.2         | 1.7110        | 0.0000     | SURCHARGED |
| 180 minute winter | SP1     | 136         | 23.202    | 1.091     | 10.1         | 3.6841        | 0.0000     | SURCHARGED |
| 180 minute winter | S4*     | 136         | 23.202    | 1.113     | 32.9         | 83.7176       | 0.0000     | SURCHARGED |
| 360 minute winter | RE1     | 344         | 22.756    | 0.445     | 1.2          | 0.0975        | 0.0000     | SURCHARGED |
| 360 minute winter | CP1     | 344         | 22.756    | 0.609     | 1.2          | 0.6889        | 0.0000     | SURCHARGED |
| 360 minute winter | S5      | 344         | 22.756    | 0.788     | 8.0          | 0.8914        | 0.0000     | SURCHARGED |
| 360 minute winter | RE2     | 344         | 22.756    | 0.416     | 0.9          | 0.0744        | 0.0000     | SURCHARGED |
| 360 minute winter | CP2     | 344         | 22.756    | 0.665     | 3.7          | 7.1622        | 0.0000     | SURCHARGED |
| 360 minute winter | S6      | 344         | 22.756    | 0.838     | 11.9         | 1.4671        | 0.0000     | SURCHARGED |
| 360 minute winter | CP3     | 344         | 22.755    | 0.690     | 0.2          | 0.7808        | 0.0000     | SURCHARGED |
| 360 minute winter | S7*     | 344         | 22.755    | 0.923     | 14.0         | 65.2640       | 0.0000     | SURCHARGED |
| 480 minute winter | SP2     | 456         | 22.601    | 0.692     | 7.8          | 1.8982        | 0.0000     | SURCHARGED |
| 480 minute winter | S8      | 456         | 22.601    | 0.813     | 16.9         | 1.3723        | 0.0000     | SURCHARGED |
| 480 minute winter | S9      | 456         | 22.600    | 0.887     | 17.5         | 1.0034        | 0.0000     | SURCHARGED |
| 480 minute winter | RE3     | 456         | 22.599    | 0.845     | 3.8          | 0.9205        | 0.0000     | FLOOD RISK |
| 480 minute winter | S10     | 456         | 22.599    | 0.924     | 16.6         | 29.9178       | 0.0000     | FLOOD RISK |
| 480 minute winter | S11     | 464         | 22.653    | 0.733     | 4.3          | 1.4140        | 0.0000     | SURCHARGED |
| 480 minute winter | SP3     | 464         | 22.653    | 0.759     | 12.9         | 3.2755        | 0.0000     | SURCHARGED |
| 480 minute winter | S12     | 464         | 22.653    | 0.782     | 23.0         | 69.4887       | 0.0000     | SURCHARGED |
| 480 minute winter | S13*    | 464         | 22.653    | 0.921     | 16.9         | 146.8249      | 0.0000     | SURCHARGED |
| 480 minute winter | S14     | 456         | 22.599    | 0.802     | 1.0          | 1.0753        | 0.0000     | SURCHARGED |
| 480 minute winter | S15     | 456         | 22.599    | 0.865     | 3.0          | 1.1649        | 0.0000     | SURCHARGED |
| 480 minute winter | S16     | 456         | 22.599    | 0.936     | 11.6         | 1.9694        | 0.0000     | FLOOD RISK |

| Link Event<br>(Upstream Depth) | US Node | Link    | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|--------------------------------|---------|---------|---------|---------------|----------------|----------|---------------|--------------------|
| 180 minute winter              | S1      | 1.000   | S2      | 18.5          | 0.708          | 0.262    | 2.2467        |                    |
| 180 minute winter              | S2      | 1.001   | S3      | 18.3          | 0.467          | 0.259    | 1.5695        |                    |
| 180 minute winter              | S3      | 1.002   | S4*     | 23.8          | 0.953          | 0.337    | 0.4358        |                    |
| 180 minute winter              | SP1     | 2.000   | S4*     | 9.3           | 0.719          | 0.131    | 0.3872        |                    |
| 180 minute winter              | S4*     | Orifice | S5      | 10.0          |                |          |               |                    |
| 360 minute winter              | RE1     | 3.000   | CP1     | 1.2           | 0.470          | 0.083    | 0.4320        |                    |
| 360 minute winter              | CP1     | 3.001   | S5      | 1.1           | 0.455          | 0.077    | 0.0771        |                    |
| 360 minute winter              | S5      | 1.004   | S6      | 7.9           | 0.483          | 0.112    | 0.8613        |                    |
| 360 minute winter              | RE2     | 4.000   | CP2     | 0.9           | 0.418          | 0.062    | 0.6564        |                    |
| 360 minute winter              | CP2     | 4.001   | S6      | -3.6          | 0.409          | -0.246   | 0.0609        |                    |
| 360 minute winter              | S6      | 1.005   | S7*     | 11.7          | 0.573          | 0.165    | 1.4770        |                    |
| 360 minute winter              | CP3     | 5.000   | S7*     | -0.2          | -0.020         | -0.011   | 0.2194        |                    |
| 360 minute winter              | S7*     | Orifice | S8      | 7.0           |                |          |               |                    |
| 480 minute winter              | SP2     | 6.000   | S8      | 7.8           | 0.757          | 0.194    | 0.3029        |                    |
| 480 minute winter              | S8      | 1.007   | S9      | 17.5          | 0.738          | 0.249    | 1.3023        |                    |
| 480 minute winter              | S9      | 1.008   | S17*    | 16.3          | 0.729          | 0.231    | 1.9503        |                    |
| 480 minute winter              | RE3     | 7.000   | S10     | 3.6           | 0.482          | 0.051    | 1.3675        |                    |
| 480 minute winter              | S10     | 7.001   | S17*    | -12.3         | 0.313          | -0.173   | 1.2863        |                    |
| 480 minute winter              | S11     | 8.000   | S12     | 4.1           | 0.434          | 0.058    | 0.8501        |                    |
| 480 minute winter              | SP3     | 10.000  | S12     | 12.6          | 0.669          | 0.178    | 0.3979        |                    |
| 480 minute winter              | S12     | 9.001   | S13*    | 16.9          | 0.838          | 0.238    | 2.3932        |                    |
| 480 minute winter              | S13*    | Orifice | S16     | 5.4           |                |          |               |                    |
| 480 minute winter              | S14     | 11.000  | S15     | 2.1           | 0.238          | 0.030    | 1.0831        |                    |
| 480 minute winter              | S15     | 11.001  | S16     | 3.5           | 0.158          | 0.050    | 1.2334        |                    |
| 480 minute winter              | S16     | 7.003   | S17*    | 12.2          | 0.638          | 0.172    | 1.0802        |                    |

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.53%

| Node Event         | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|--------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 480 minute winter  | S17*    | 456         | 22.599    | 0.999     | 28.8         | 143.8134      | 0.0000     | FLOOD RISK |
| 1440 minute winter | HW1     | 1470        | 22.247    | 0.694     | 33.5         | 1.2267        | 0.0000     | FLOOD RISK |
| 1440 minute winter | EX HW1  | 1440        | 22.247    | 0.966     | 19.7         | 1.7067        | 0.0000     | FLOOD RISK |
| 1440 minute winter | EX HW2  | 1440        | 22.246    | 0.986     | 21.0         | 1.1147        | 0.0000     | OK         |
| 1440 minute winter | EX HW3  | 1440        | 22.245    | 0.985     | 8.6          | 1.1144        | 0.0000     | FLOOD RISK |
| 1440 minute winter | S18*    | 1440        | 22.253    | 0.993     | 7.7          | 1.1225        | 0.0000     | SURCHARGED |
| 15 minute summer   | EX HW4  | 1           | 21.200    | 0.000     | 0.0          | 0.0000        | 0.0000     | OK         |

| Link Event (Upstream Depth) | US Node | Link              | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|---------|-------------------|---------|---------------|----------------|----------|---------------|--------------------|
| 480 minute winter           | S17*    | Hydro-Brake®      | HW1     | 10.6          |                |          |               |                    |
| 1440 minute winter          | HW1     | 1.010             | EX HW1  | -23.5         | 0.296          | -0.029   | 2.1811        |                    |
| 1440 minute winter          | EX HW1  | 1.011             | EX HW2  | 21.0          | 0.299          | 0.427    | 0.7282        |                    |
| 1440 minute winter          | EX HW2  | Flow through pond | EX HW3  | 8.6           | 0.007          | 0.028    | 288.0902      |                    |
| 1440 minute winter          | EX HW3  | 1.013             | S18*    | 7.7           | 0.169          | 0.109    | 0.1443        |                    |
| 1440 minute winter          | S18*    | Hydro-Brake®      | EX HW4  | 4.6           |                |          |               | 354.3              |

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