



Network 2 Outfall
 3no. Deep Bore Soakaway
 5m deep 2.1m ϕ chamber
 CL 153.00
 IL 148.00
 300mm ϕ borehole - 20m deep
 from base of chamber
 Assumed Infiltration rate =
 0.3888m/hr

Swale and Filter Drain
 1m deep swale with 1 in 3 side
 slopes and 0.5m base width
 1m deep x 2m filter trench

Attenuation Basin
 CL - 151.00
 IL - 149.80
 Depth (m) - 1.20 m
 Bottom Area (m²) - 431m²
 Top Area (m²) - 939 m²
 1 in 4 Side Slopes
 Tank
 35m x 18m x 1.2m deep
 IL - 148.60

Attenuation Basin
 CL - 155.00
 IL - 154.80
 Depth (m) - 1.20 m
 Bottom Area (m²) - 26m²
 Top Area (m²) - 184 m²
 1 in 3 Side Slopes
 Tank
 18m x 8m x 2m deep
 IL - 152.80

Network 1 Outfall
 Deep Bore Soakaway
 5m deep 1.5m ϕ chamber
 CL 157.25
 IL 152.25
 300mm ϕ borehole - 20m deep
 from base of chamber
 Assumed Infiltration rate =
 0.3888m/hr

- NOTES**
1. Do not scale from this drawing.
 2. All measurements are in metres unless stated otherwise.
 3. Topographical Survey provided by others. C&A accept no liability for any inaccuracies.
 4. Assumed infiltration rate taken from The SuDS Manual (CIRIA SuDS Manual) for chalk (0.388m/hr). Infiltration testing to be undertaken on site with rates being provided to engineer to confirm.
 5. C&A Consulting Engineers Ltd cannot guarantee the authenticity or reliability of any data and/or records provided by third parties.
 6. The suitability of the proposed basin location is subject to receiving detailed topographical survey, arboricultural and ecological constraints by others.
 7. Levels shown for features outside of the area of topographical survey have been taken from Lidar Data.

- Key**
- Proposed Attenuation Basin
 - Proposed Attenuation Tank
 - Proposed Swale and Filter Drain
 - Proposed Deep Bore Soakaway with 10m exclusion zone
 - Proposed Surface Water pipe and chamber

| | | | | |
|---|--|----|---------|--------|
| B | Redline boundary amended | TH | TSH/GAC | Feb 24 |
| A | Amended to suit client comments and updated redline boundary | TH | TSH/GAC | Feb 24 |

| Rev | Amendments | Drn | Chk | App | Date |
|-----|------------|-----|-----|-----|------|
|-----|------------|-----|-----|-----|------|

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Job Title
Capel Le Ferne

Drawing Title
Indicative Surface Water Drainage

Client
Quinn Estates

| | | | | | |
|--------|-----------|------------|------------|----------|-----|
| Scale | 1:500 @A1 | Date | Feb 24 | Designed | MT |
| Drawn | MT | Checked | TSH | Approved | GAC |
| Job No | 18-027 | Drawing No | 18-027-007 | Rev | B |

Appendix G Surface Water Drainage Calculations

Design Settings

| | | | |
|--------------------------------------|--------|------------------------------------|---------------|
| Rainfall Methodology | FEH-22 | Minimum Velocity (m/s) | 1.00 |
| Return Period (years) | 100 | 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) | 5.00 | Include Intermediate Ground | ✓ |
| Maximum Time of Concentration (mins) | 30.00 | Enforce best practice design rules | ✓ |
| Maximum Rainfall (mm/hr) | 50.0 | | |

Nodes

| Name | Area (ha) | T of E (mins) | Add Inflow (l/s) | Cover Level (m) | Diameter (mm) | Depth (m) |
|--------------------|-----------|---------------|------------------|-----------------|---------------|-----------|
| Basin | 0.000 | 5.00 | 0.0 | 156.000 | 1800 | 1.650 |
| Deep Bore Soakaway | 0.000 | 5.00 | 0.0 | 157.250 | | 3.400 |
| 1 | 0.094 | 5.00 | | 162.250 | 1200 | 1.500 |
| 2 | 0.094 | 5.00 | | 159.000 | 1200 | 2.000 |
| 3 | 0.000 | | | 156.500 | 1200 | 1.500 |

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) |
|-------|---------|--------------------|------------|-------------|-----------|-----------|----------|-------------|----------|---------------|--------------|
| 1.003 | Basin | Deep Bore Soakaway | 15.470 | 0.600 | 154.350 | 153.850 | 0.500 | 30.9 | 750 | 5.54 | 50.0 |
| 1.000 | 1 | 2 | 47.680 | 0.600 | 160.750 | 157.000 | 3.750 | 12.7 | 300 | 5.18 | 50.0 |
| 1.001 | 2 | 3 | 35.617 | 0.600 | 157.000 | 155.000 | 2.000 | 17.8 | 300 | 5.34 | 50.0 |
| 1.002 | 3 | Basin | 15.786 | 0.600 | 155.000 | 154.800 | 0.200 | 78.9 | 300 | 5.49 | 50.0 |

| 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) |
|-------|-----------|-----------|------------|--------------|--------------|-------------|--------------------|----------------|--------------------|
| 1.003 | 5.041 | 2227.0 | 25.5 | 0.900 | 2.650 | 0.188 | 0.0 | 55 | 1.755 |
| 1.000 | 4.432 | 313.3 | 12.7 | 1.200 | 1.700 | 0.094 | 0.0 | 41 | 2.201 |
| 1.001 | 3.743 | 264.6 | 25.5 | 1.700 | 1.200 | 0.188 | 0.0 | 62 | 2.396 |
| 1.002 | 1.771 | 125.2 | 25.5 | 1.200 | 0.900 | 0.188 | 0.0 | 91 | 1.397 |

Simulation Settings

| | | | | | |
|----------------------|--------|------------------------|--------|---|------|
| Rainfall Methodology | FEH-13 | Analysis Speed | Normal | Additional Storage (m ³ /ha) | 20.0 |
| Summer CV | 0.750 | Skip Steady State | x | Check Discharge Rate(s) | x |
| Winter CV | 0.840 | Drain Down Time (mins) | 240 | Check Discharge Volume | x |

Storm Durations

| | | | | | | | | | |
|----|-----|-----|-----|-----|------|------|------|------|-------|
| 15 | 60 | 180 | 360 | 600 | 960 | 2160 | 4320 | 7200 | 10080 |
| 30 | 120 | 240 | 480 | 720 | 1440 | 2880 | 5760 | 8640 | |

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|-----------------------|-----------------------|-----------------------|-----------------------|
| 2 | 0 | 0 | 0 |
| 30 | 40 | 0 | 0 |
| 100 | 45 | 0 | 0 |

Node Basin Depth/Area Storage Structure

| | | | | | |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 152.800 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m ²) | Inf Area (m ²) | Depth (m) | Area (m ²) | Inf Area (m ²) | Depth (m) | Area (m ²) | Inf Area (m ²) | Depth (m) | Area (m ²) | Inf Area (m ²) |
|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|
| 0.000 | 180.0 | 0.0 | 2.000 | 180.0 | 0.0 | 2.001 | 26.0 | 0.0 | 3.200 | 184.0 | 0.0 |

Node Deep Bore Soakaway Deep Bore Soakaway Storage Structure

| | | | | | |
|-----------------------------|---------|---------------------------|---------|--------------------|--------|
| Base Inf Coefficient (m/hr) | 0.38880 | Invert Level (m) | 152.250 | Borehole Diameter | 0.300 |
| Side Inf Coefficient (m/hr) | 0.38880 | Time to half empty (mins) | 80 | Borehole Depth (m) | 20.000 |
| Safety Factor | 2.0 | Diameter (m) | 1.500 | Inf Depth (m) | 17.000 |
| Porosity | 1.00 | Depth (m) | | Number Required | 1 |

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.11%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m ³) | Flood (m ³) | Status |
|-------------------|--------------------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|--------|
| 480 minute winter | Basin | 376 | 154.460 | 0.110 | 4.6 | 20.0626 | 0.0000 | OK |
| 480 minute winter | Deep Bore Soakaway | 384 | 154.461 | 0.611 | 3.3 | 5.3349 | 0.0000 | OK |
| 15 minute winter | 1 | 10 | 160.790 | 0.040 | 12.2 | 0.0956 | 0.0000 | OK |
| 15 minute winter | 2 | 10 | 157.061 | 0.061 | 24.3 | 0.1256 | 0.0000 | OK |
| 15 minute winter | 3 | 11 | 155.094 | 0.094 | 23.9 | 0.1059 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m ³) |
|-----------------------------|--------------------|--------------|--------------------|---------------|----------------|----------|----------------------------|
| 480 minute winter | Basin | 1.003 | Deep Bore Soakaway | 3.3 | 0.860 | 0.001 | 3.2819 |
| 480 minute winter | Deep Bore Soakaway | Infiltration | | 0.9 | | | |
| 15 minute winter | 1 | 1.000 | 2 | 12.1 | 1.553 | 0.039 | 0.3750 |
| 15 minute winter | 2 | 1.001 | 3 | 23.9 | 1.683 | 0.090 | 0.5117 |
| 15 minute winter | 3 | 1.002 | Basin | 23.9 | 1.328 | 0.191 | 0.2838 |

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.11%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m ³) | Flood (m ³) | Status |
|--------------------|--------------------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 1440 minute winter | Basin | 1350 | 155.176 | 0.826 | 5.4 | 102.1145 | 0.0000 | SURCHARGED |
| 1440 minute winter | Deep Bore Soakaway | 1350 | 155.174 | 1.324 | 1.9 | 6.5953 | 0.0000 | OK |
| 15 minute winter | 1 | 10 | 160.826 | 0.076 | 45.0 | 0.1814 | 0.0000 | OK |
| 15 minute winter | 2 | 10 | 157.119 | 0.119 | 89.7 | 0.2461 | 0.0000 | OK |
| 15 minute winter | 3 | 10 | 155.208 | 0.208 | 88.8 | 0.2356 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m ³) |
|-----------------------------|--------------------|--------------|--------------------|---------------|----------------|----------|----------------------------|
| 1440 minute winter | Basin | 1.003 | Deep Bore Soakaway | 1.9 | 0.720 | 0.001 | 6.8087 |
| 1440 minute winter | Deep Bore Soakaway | Infiltration | | 0.9 | | | |
| 15 minute winter | 1 | 1.000 | 2 | 44.7 | 2.254 | 0.143 | 0.9535 |
| 15 minute winter | 2 | 1.001 | 3 | 88.8 | 2.262 | 0.336 | 1.3920 |
| 15 minute winter | 3 | 1.002 | Basin | 87.6 | 1.808 | 0.700 | 0.7646 |

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.11%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m ³) | Flood (m ³) | Status |
|--------------------|--------------------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 1440 minute winter | Basin | 1410 | 155.825 | 1.475 | 7.8 | 180.5049 | 0.0000 | FLOOD RISK |
| 1440 minute winter | Deep Bore Soakaway | 1410 | 155.825 | 1.974 | 1.5 | 7.7439 | 0.0000 | OK |
| 15 minute winter | 1 | 10 | 160.838 | 0.088 | 59.5 | 0.2091 | 0.0000 | OK |
| 15 minute winter | 2 | 10 | 157.139 | 0.139 | 118.6 | 0.2876 | 0.0000 | OK |
| 1440 minute winter | 3 | 1410 | 155.825 | 0.825 | 7.8 | 0.9332 | 0.0000 | SURCHARGED |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m ³) |
|-----------------------------|--------------------|--------------|--------------------|---------------|----------------|----------|----------------------------|
| 1440 minute winter | Basin | 1.003 | Deep Bore Soakaway | 1.5 | 0.732 | 0.001 | 6.8087 |
| 1440 minute winter | Deep Bore Soakaway | Infiltration | | 0.9 | | | |
| 15 minute winter | 1 | 1.000 | 2 | 59.1 | 2.428 | 0.189 | 1.1686 |
| 15 minute winter | 2 | 1.001 | 3 | 117.5 | 2.364 | 0.444 | 1.7414 |
| 1440 minute winter | 3 | 1.002 | Basin | 7.8 | 0.977 | 0.062 | 1.1116 |

Design Settings

| | | | |
|--------------------------------------|--------|------------------------------------|---------------|
| Rainfall Methodology | FEH-22 | Minimum Velocity (m/s) | 1.00 |
| Return Period (years) | 100 | 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) | 5.00 | Include Intermediate Ground | ✓ |
| Maximum Time of Concentration (mins) | 30.00 | Enforce best practice design rules | ✓ |
| Maximum Rainfall (mm/hr) | 50.0 | | |

Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Diameter (mm) | Depth (m) |
|-----------|-----------|---------------|-----------------|---------------|-----------|
| 1 | 0.131 | 5.00 | 157.800 | 1200 | 1.500 |
| 9 | 0.085 | 5.00 | 155.500 | 1350 | 2.100 |
| 10 | 0.007 | 5.00 | 153.750 | 1500 | 3.225 |
| 2 | 0.041 | 5.00 | 160.250 | 1350 | 4.400 |
| 3 | 0.072 | 5.00 | 158.500 | 1350 | 3.000 |
| 4 | 0.017 | 5.00 | 156.500 | 1350 | 1.575 |
| 5 | 0.138 | 5.00 | 162.500 | 1200 | 1.500 |
| 6 | 0.062 | 5.00 | 162.750 | 1200 | 1.950 |
| 7 | 0.143 | 5.00 | 162.250 | 1200 | 2.050 |
| 8 | 0.019 | 5.00 | 161.250 | 1200 | 2.250 |
| basin | 0.000 | | 151.000 | | 2.400 |
| 12 | 0.188 | 5.00 | 155.250 | 1200 | 1.500 |
| Deep bore | | | 153.000 | | 4.466 |
| 11 | 0.184 | 5.00 | 162.000 | 1200 | 1.500 |
| 13 | 0.018 | 5.00 | 162.000 | 1200 | 2.000 |
| 14 | 0.103 | 5.00 | 161.750 | 1200 | 1.950 |
| 15 | 0.188 | 5.00 | 160.750 | 1200 | 1.050 |
| 16 | 0.070 | 5.00 | 156.000 | 1500 | 2.875 |
| Swale 1 | 0.000 | | 154.000 | | 2.000 |
| Swale 2 | 0.000 | | 153.900 | | 2.000 |
| 19 | 0.000 | | 153.750 | | 1.950 |
| 20 | 0.087 | 5.00 | 158.500 | 1200 | 1.500 |
| 21 | 0.179 | 5.00 | 155.000 | 1200 | 1.500 |

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) |
|-------|---------|---------|------------|-------------|-----------|-----------|----------|-------------|----------|---------------|--------------|
| 4.000 | 1 | 2 | 67.569 | 0.600 | 156.300 | 156.000 | 0.300 | 225.2 | 300 | 6.08 | 50.0 |
| 3.006 | 4 | 9 | 19.213 | 0.600 | 154.925 | 153.400 | 1.525 | 12.6 | 450 | 6.67 | 50.0 |
| 3.004 | 2 | 3 | 41.969 | 0.600 | 155.850 | 155.500 | 0.350 | 119.9 | 450 | 6.46 | 50.0 |
| 3.005 | 3 | 4 | 26.961 | 0.600 | 155.500 | 155.000 | 0.500 | 53.9 | 450 | 6.62 | 50.0 |
| 3.007 | 9 | 10 | 36.082 | 0.600 | 153.400 | 151.750 | 1.650 | 21.9 | 450 | 6.81 | 50.0 |

| 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) |
|-------|-----------|-----------|------------|--------------|--------------|-------------|--------------------|----------------|--------------------|
| 4.000 | 1.043 | 73.7 | 17.8 | 1.200 | 3.950 | 0.131 | 0.0 | 100 | 0.862 |
| 3.006 | 5.751 | 914.6 | 84.4 | 1.125 | 1.650 | 0.623 | 0.0 | 91 | 3.644 |
| 3.004 | 1.855 | 295.1 | 72.4 | 3.950 | 2.550 | 0.534 | 0.0 | 151 | 1.543 |
| 3.005 | 2.773 | 441.0 | 82.1 | 2.550 | 1.050 | 0.606 | 0.0 | 131 | 2.142 |
| 3.007 | 4.362 | 693.7 | 121.4 | 1.650 | 1.550 | 0.896 | 0.0 | 126 | 3.310 |

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) |
|-------|---------|-----------|------------|-------------|-----------|-----------|----------|-------------|----------|---------------|--------------|
| 3.000 | 5 | 6 | 41.442 | 0.600 | 161.000 | 160.800 | 0.200 | 207.2 | 300 | 5.63 | 50.0 |
| 3.001 | 6 | 7 | 20.712 | 0.600 | 160.800 | 160.200 | 0.600 | 34.5 | 300 | 5.76 | 50.0 |
| 3.002 | 7 | 8 | 17.690 | 0.600 | 160.200 | 159.000 | 1.200 | 14.7 | 300 | 5.83 | 50.0 |
| 3.003 | 8 | 2 | 12.051 | 0.600 | 159.000 | 156.000 | 3.000 | 4.0 | 300 | 5.86 | 50.0 |
| 1.008 | 10 | basin | 23.890 | 0.035 | 150.525 | 149.800 | 0.725 | 33.0 | 600 | 10.08 | 50.0 |
| 5.000 | 12 | 9 | 67.836 | 0.600 | 153.750 | 153.400 | 0.350 | 193.8 | 300 | 6.00 | 50.0 |
| 1.009 | basin | Deep bore | 38.000 | 0.035 | 148.600 | 148.534 | 0.066 | 580.0 | 900 | 11.52 | 50.0 |
| 1.000 | 11 | 13 | 37.080 | 0.600 | 160.500 | 160.000 | 0.500 | 74.2 | 300 | 5.34 | 50.0 |
| 1.001 | 13 | 14 | 15.946 | 0.600 | 160.000 | 159.800 | 0.200 | 79.7 | 300 | 5.49 | 50.0 |
| 1.002 | 14 | 15 | 15.677 | 0.600 | 159.800 | 159.700 | 0.100 | 156.8 | 300 | 5.70 | 50.0 |
| 1.003 | 15 | 16 | 55.237 | 0.600 | 159.700 | 153.425 | 6.275 | 8.8 | 300 | 5.87 | 50.0 |
| 1.004 | 16 | Swale 1 | 22.801 | 0.600 | 153.125 | 153.000 | 0.125 | 182.4 | 600 | 6.80 | 50.0 |
| 1.005 | Swale 1 | Swale 2 | 60.962 | 0.035 | 152.000 | 151.900 | 0.100 | 609.6 | 500 | 8.17 | 50.0 |
| 1.006 | Swale 2 | 19 | 60.571 | 0.035 | 151.900 | 151.800 | 0.100 | 605.7 | 500 | 9.53 | 50.0 |
| 1.007 | 19 | 10 | 21.164 | 0.035 | 151.800 | 150.750 | 1.050 | 20.2 | 375 | 9.79 | 50.0 |
| 2.000 | 20 | 21 | 29.652 | 0.600 | 157.000 | 153.500 | 3.500 | 8.5 | 300 | 5.09 | 50.0 |
| 2.001 | 21 | 16 | 52.603 | 0.600 | 153.500 | 153.425 | 0.075 | 701.4 | 300 | 6.59 | 50.0 |

| 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) |
|-------|-----------|-----------|------------|--------------|--------------|-------------|--------------------|----------------|--------------------|
| 3.000 | 1.088 | 76.9 | 18.7 | 1.200 | 1.650 | 0.138 | 0.0 | 100 | 0.902 |
| 3.001 | 2.684 | 189.8 | 27.1 | 1.650 | 1.750 | 0.200 | 0.0 | 76 | 1.919 |
| 3.002 | 4.115 | 290.9 | 46.5 | 1.750 | 1.950 | 0.343 | 0.0 | 81 | 3.041 |
| 3.003 | 7.895 | 558.1 | 49.1 | 1.950 | 3.950 | 0.362 | 0.0 | 59 | 4.922 |
| 1.008 | 1.405 | 397.3 | 234.7 | 2.625 | 0.600 | 1.732 | 0.0 | 332 | 1.464 |
| 5.000 | 1.126 | 79.6 | 25.5 | 1.200 | 1.800 | 0.188 | 0.0 | 116 | 1.004 |
| 1.009 | 0.439 | 279.2 | 234.7 | 1.500 | 3.566 | 1.732 | 0.0 | 632 | 0.492 |
| 1.000 | 1.827 | 129.2 | 24.9 | 1.200 | 1.700 | 0.184 | 0.0 | 89 | 1.422 |
| 1.001 | 1.762 | 124.5 | 27.4 | 1.700 | 1.650 | 0.202 | 0.0 | 95 | 1.422 |
| 1.002 | 1.253 | 88.6 | 41.3 | 1.650 | 0.750 | 0.305 | 0.0 | 144 | 1.231 |
| 1.003 | 5.329 | 376.7 | 66.8 | 0.750 | 2.275 | 0.493 | 0.0 | 85 | 4.062 |
| 1.004 | 1.800 | 508.8 | 112.4 | 2.275 | 0.400 | 0.829 | 0.0 | 190 | 1.457 |
| 1.005 | 0.741 | 2595.0 | 112.4 | 1.000 | 1.000 | 0.829 | 0.0 | 261 | 0.335 |
| 1.006 | 0.744 | 2603.3 | 112.4 | 1.000 | 0.950 | 0.829 | 0.0 | 261 | 0.336 |
| 1.007 | 1.313 | 145.1 | 112.4 | 1.575 | 2.625 | 0.829 | 0.0 | 248 | 1.450 |
| 2.000 | 5.432 | 384.0 | 11.8 | 1.200 | 1.200 | 0.087 | 0.0 | 35 | 2.478 |
| 2.001 | 0.586 | 41.4 | 36.0 | 1.200 | 2.275 | 0.266 | 0.0 | 217 | 0.658 |

Simulation Settings

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

Storm Durations

| | | | | | | | | | |
|----|-----|-----|-----|-----|------|------|------|------|-------|
| 15 | 60 | 180 | 360 | 600 | 960 | 2160 | 4320 | 7200 | 10080 |
| 30 | 120 | 240 | 480 | 720 | 1440 | 2880 | 5760 | 8640 | |

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|-----------------------|-----------------------|-----------------------|-----------------------|
| 2 | 0 | 0 | 0 |
| 30 | 40 | 0 | 0 |
| 100 | 45 | 0 | 0 |

Node 19 Online Hydro-Brake® Control

| | | | |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve | x | Objective | (HE) Minimise upstream storage |
| Downstream Link | 1.007 | Sump Available | ✓ |
| Replaces Downstream Link | ✓ | Product Number | CTL-SHE-0057-2000-2000-2000 |
| Invert Level (m) | 151.800 | Min Outlet Diameter (m) | 0.075 |
| Design Depth (m) | 2.000 | Min Node Diameter (mm) | 1200 |
| Design Flow (l/s) | 2.0 | | |

Node basin Depth/Area Storage Structure

| | | | | | |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 148.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | |

| Depth (m) | Area (m ²) | Inf Area (m ²) | Depth (m) | Area (m ²) | Inf Area (m ²) | Depth (m) | Area (m ²) | Inf Area (m ²) | Depth (m) | Area (m ²) | Inf Area (m ²) |
|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|
| 0.000 | 630.0 | 0.0 | 1.200 | 630.0 | 0.0 | 1.201 | 431.0 | 0.0 | 2.400 | 939.0 | 0.0 |

Node Deep bore Deep Bore Soakaway Storage Structure

| | | | | | |
|-----------------------------|---------|---------------------------|---------|--------------------|--------|
| Base Inf Coefficient (m/hr) | 0.38880 | Invert Level (m) | 148.000 | Borehole Diameter | 0.300 |
| Side Inf Coefficient (m/hr) | 0.38880 | Time to half empty (mins) | 156 | Borehole Depth (m) | 20.000 |
| Safety Factor | 2.0 | Diameter (m) | 2.100 | Inf Depth (m) | 17.000 |
| Porosity | 1.00 | Depth (m) | | Number Required | 3 |

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.45%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m ³) | Flood (m ³) | Status |
|--------------------|-----------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 15 minute winter | 1 | 11 | 156.396 | 0.096 | 17.1 | 0.2757 | 0.0000 | OK |
| 15 minute winter | 9 | 11 | 153.527 | 0.127 | 112.4 | 0.2837 | 0.0000 | OK |
| 15 minute winter | 10 | 11 | 150.746 | 0.221 | 113.5 | 0.4002 | 0.0000 | OK |
| 15 minute winter | 2 | 11 | 156.001 | 0.151 | 66.6 | 0.2445 | 0.0000 | OK |
| 15 minute winter | 3 | 11 | 155.633 | 0.133 | 75.9 | 0.2538 | 0.0000 | OK |
| 15 minute winter | 4 | 11 | 155.013 | 0.088 | 78.1 | 0.1444 | 0.0000 | OK |
| 15 minute winter | 5 | 10 | 161.101 | 0.101 | 18.0 | 0.3011 | 0.0000 | OK |
| 15 minute winter | 6 | 11 | 160.875 | 0.075 | 25.6 | 0.1317 | 0.0000 | OK |
| 15 minute winter | 7 | 10 | 160.286 | 0.086 | 43.7 | 0.2178 | 0.0000 | OK |
| 15 minute winter | 8 | 10 | 159.061 | 0.061 | 45.8 | 0.0795 | 0.0000 | OK |
| 1440 minute winter | basin | 1350 | 148.953 | 0.353 | 10.2 | 222.2815 | 0.0000 | OK |
| 15 minute winter | 12 | 10 | 153.863 | 0.113 | 24.5 | 0.4111 | 0.0000 | OK |
| 1440 minute winter | Deep bore | 1350 | 148.953 | 0.419 | 4.5 | 14.1840 | 0.0000 | OK |
| 15 minute winter | 11 | 10 | 160.587 | 0.087 | 24.0 | 0.3131 | 0.0000 | OK |
| 15 minute winter | 13 | 10 | 160.097 | 0.097 | 25.9 | 0.1273 | 0.0000 | OK |
| 15 minute winter | 14 | 11 | 159.946 | 0.146 | 38.8 | 0.3184 | 0.0000 | OK |
| 15 minute winter | 15 | 11 | 159.784 | 0.084 | 62.6 | 0.3942 | 0.0000 | OK |
| 15 minute winter | 16 | 11 | 153.311 | 0.186 | 102.1 | 0.4201 | 0.0000 | OK |
| 960 minute winter | Swale 1 | 930 | 152.534 | 0.534 | 11.1 | 0.0000 | 0.0000 | OK |
| 960 minute winter | Swale 2 | 930 | 152.534 | 0.634 | 8.9 | 0.0000 | 0.0000 | OK |
| 960 minute winter | 19 | 930 | 152.534 | 0.734 | 4.0 | 0.0000 | 0.0000 | SURCHARGED |
| 15 minute winter | 20 | 10 | 157.035 | 0.035 | 11.3 | 0.0804 | 0.0000 | OK |
| 15 minute winter | 21 | 11 | 153.696 | 0.196 | 34.5 | 0.6888 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m ³) |
|-----------------------------|-----------|--------------|-----------|---------------|----------------|----------|----------------------------|
| 15 minute winter | 1 | 4.000 | 2 | 16.0 | 0.840 | 0.218 | 1.2904 |
| 15 minute winter | 9 | 3.007 | 10 | 111.8 | 3.169 | 0.161 | 1.2728 |
| 15 minute winter | 10 | 1.008 | basin | 111.7 | 1.216 | 0.281 | 2.1984 |
| 15 minute winter | 2 | 3.004 | 3 | 67.1 | 1.567 | 0.227 | 1.7986 |
| 15 minute winter | 3 | 3.005 | 4 | 76.0 | 2.036 | 0.172 | 1.0070 |
| 15 minute winter | 4 | 3.006 | 9 | 78.0 | 2.705 | 0.085 | 0.5590 |
| 15 minute winter | 5 | 3.000 | 6 | 17.5 | 1.023 | 0.228 | 0.7155 |
| 15 minute winter | 6 | 3.001 | 7 | 25.3 | 1.677 | 0.133 | 0.3141 |
| 15 minute winter | 7 | 3.002 | 8 | 43.3 | 3.232 | 0.149 | 0.2389 |
| 15 minute winter | 8 | 3.003 | 2 | 45.6 | 4.648 | 0.082 | 0.1182 |
| 1440 minute winter | basin | 1.009 | Deep bore | 4.5 | 0.203 | 0.016 | 9.8671 |
| 15 minute winter | 12 | 5.000 | 9 | 24.0 | 0.929 | 0.301 | 1.7692 |
| 1440 minute winter | Deep bore | Infiltration | | 2.6 | | | |
| 15 minute winter | 11 | 1.000 | 13 | 23.6 | 1.288 | 0.183 | 0.6815 |
| 15 minute winter | 13 | 1.001 | 14 | 25.7 | 0.965 | 0.207 | 0.4272 |
| 15 minute winter | 14 | 1.002 | 15 | 38.8 | 1.567 | 0.438 | 0.3913 |
| 15 minute winter | 15 | 1.003 | 16 | 62.4 | 3.948 | 0.166 | 0.8727 |
| 15 minute winter | 16 | 1.004 | Swale 1 | 102.3 | 1.415 | 0.201 | 1.6481 |
| 960 minute winter | Swale 1 | 1.005 | Swale 2 | 8.9 | 0.102 | 0.003 | 80.5712 |
| 960 minute winter | Swale 2 | 1.006 | 19 | 4.0 | 0.087 | 0.002 | 106.1168 |
| 960 minute winter | 19 | Hydro-Brake® | 10 | 1.3 | | | |
| 15 minute winter | 20 | 2.000 | 21 | 11.2 | 0.698 | 0.029 | 0.7882 |
| 15 minute winter | 21 | 2.001 | 16 | 31.2 | 0.787 | 0.752 | 2.0921 |

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.45%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m ³) | Flood (m ³) | Status |
|--------------------|-----------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 15 minute winter | 1 | 11 | 156.514 | 0.214 | 62.7 | 0.6153 | 0.0000 | OK |
| 15 minute winter | 9 | 11 | 153.676 | 0.276 | 413.8 | 0.6183 | 0.0000 | OK |
| 15 minute winter | 10 | 11 | 151.074 | 0.549 | 418.1 | 0.9950 | 0.0000 | OK |
| 15 minute winter | 2 | 11 | 156.191 | 0.341 | 246.7 | 0.5514 | 0.0000 | OK |
| 15 minute winter | 3 | 11 | 155.795 | 0.295 | 282.0 | 0.5640 | 0.0000 | OK |
| 15 minute winter | 4 | 11 | 155.105 | 0.180 | 290.4 | 0.2962 | 0.0000 | OK |
| 15 minute winter | 5 | 10 | 161.217 | 0.217 | 66.1 | 0.6443 | 0.0000 | OK |
| 15 minute winter | 6 | 10 | 160.958 | 0.158 | 94.5 | 0.2787 | 0.0000 | OK |
| 15 minute winter | 7 | 10 | 160.393 | 0.193 | 162.0 | 0.4871 | 0.0000 | OK |
| 15 minute winter | 8 | 10 | 159.114 | 0.114 | 169.9 | 0.1484 | 0.0000 | OK |
| 4320 minute winter | basin | 4260 | 150.079 | 1.479 | 13.0 | 892.7227 | 0.0000 | SURCHARGED |
| 15 minute winter | 12 | 11 | 154.060 | 0.310 | 90.0 | 1.1279 | 0.0000 | SURCHARGED |
| 4320 minute winter | Deep bore | 4260 | 150.079 | 1.545 | 3.2 | 25.8864 | 0.0000 | OK |
| 15 minute winter | 11 | 11 | 160.689 | 0.189 | 88.1 | 0.6782 | 0.0000 | OK |
| 15 minute winter | 13 | 11 | 160.450 | 0.450 | 93.7 | 0.5897 | 0.0000 | SURCHARGED |
| 15 minute winter | 14 | 11 | 160.291 | 0.491 | 138.7 | 1.0738 | 0.0000 | SURCHARGED |
| 15 minute winter | 15 | 11 | 159.874 | 0.173 | 223.8 | 0.8175 | 0.0000 | OK |
| 15 minute winter | 16 | 11 | 153.522 | 0.397 | 373.3 | 0.8948 | 0.0000 | OK |
| 2880 minute winter | Swale 1 | 2760 | 153.241 | 1.241 | 14.3 | 0.0000 | 0.0000 | SURCHARGED |
| 2880 minute winter | Swale 2 | 2760 | 153.241 | 1.341 | 11.3 | 0.0000 | 0.0000 | SURCHARGED |
| 2880 minute winter | 19 | 2760 | 153.241 | 1.441 | 4.9 | 0.0000 | 0.0000 | SURCHARGED |
| 15 minute winter | 20 | 10 | 157.066 | 0.066 | 41.7 | 0.1515 | 0.0000 | OK |
| 15 minute winter | 21 | 11 | 154.301 | 0.801 | 127.2 | 2.8173 | 0.0000 | SURCHARGED |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m ³) |
|-----------------------------|-----------|--------------|-----------|---------------|----------------|----------|----------------------------|
| 15 minute winter | 1 | 4.000 | 2 | 60.9 | 1.200 | 0.825 | 3.4245 |
| 15 minute winter | 9 | 3.007 | 10 | 413.7 | 4.345 | 0.596 | 3.4341 |
| 15 minute winter | 10 | 1.008 | basin | 413.3 | 1.695 | 1.040 | 5.7599 |
| 15 minute winter | 2 | 3.004 | 3 | 249.6 | 2.084 | 0.846 | 5.0152 |
| 15 minute winter | 3 | 3.005 | 4 | 282.7 | 2.775 | 0.641 | 2.7446 |
| 15 minute winter | 4 | 3.006 | 9 | 290.4 | 3.607 | 0.318 | 1.5464 |
| 15 minute winter | 5 | 3.000 | 6 | 64.9 | 1.411 | 0.843 | 1.9075 |
| 15 minute winter | 6 | 3.001 | 7 | 93.5 | 2.205 | 0.493 | 0.8840 |
| 15 minute winter | 7 | 3.002 | 8 | 160.8 | 4.453 | 0.553 | 0.6407 |
| 15 minute winter | 8 | 3.003 | 2 | 169.5 | 5.461 | 0.304 | 0.4295 |
| 4320 minute winter | basin | 1.009 | Deep bore | 3.2 | 0.182 | 0.011 | 24.0834 |
| 15 minute winter | 12 | 5.000 | 9 | 85.1 | 1.237 | 1.069 | 4.6879 |
| 4320 minute winter | Deep bore | Infiltration | | 2.6 | | | |
| 15 minute winter | 11 | 1.000 | 13 | 85.1 | 1.601 | 0.659 | 2.1735 |
| 15 minute winter | 13 | 1.001 | 14 | 92.3 | 1.311 | 0.741 | 1.1229 |
| 15 minute winter | 14 | 1.002 | 15 | 138.9 | 2.201 | 1.569 | 0.8829 |
| 15 minute winter | 15 | 1.003 | 16 | 224.6 | 5.484 | 0.596 | 2.2625 |
| 15 minute winter | 16 | 1.004 | Swale 1 | 374.0 | 1.965 | 0.735 | 4.3378 |
| 2880 minute winter | Swale 1 | 1.005 | Swale 2 | 11.3 | 0.102 | 0.004 | 344.4447 |
| 2880 minute winter | Swale 2 | 1.006 | 19 | 4.9 | 0.053 | 0.002 | 393.9897 |
| 2880 minute winter | 19 | Hydro-Brake® | 10 | 1.7 | | | |
| 15 minute winter | 20 | 2.000 | 21 | 41.5 | 0.970 | 0.108 | 1.2144 |
| 15 minute winter | 21 | 2.001 | 16 | 117.1 | 1.667 | 2.827 | 3.5686 |

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.45%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m ³) | Flood (m ³) | Status |
|--------------------|-----------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 15 minute winter | 1 | 11 | 156.775 | 0.475 | 82.9 | 1.3674 | 0.0000 | SURCHARGED |
| 15 minute winter | 9 | 11 | 153.739 | 0.339 | 538.8 | 0.7588 | 0.0000 | OK |
| 15 minute winter | 10 | 11 | 151.574 | 1.049 | 543.2 | 1.9004 | 0.0000 | SURCHARGED |
| 15 minute winter | 2 | 11 | 156.390 | 0.539 | 322.5 | 0.8728 | 0.0000 | SURCHARGED |
| 15 minute winter | 3 | 11 | 155.864 | 0.364 | 366.1 | 0.6953 | 0.0000 | OK |
| 15 minute winter | 4 | 11 | 155.136 | 0.211 | 375.2 | 0.3478 | 0.0000 | OK |
| 15 minute winter | 5 | 11 | 161.283 | 0.283 | 87.3 | 0.8401 | 0.0000 | OK |
| 15 minute winter | 6 | 10 | 160.990 | 0.190 | 123.1 | 0.3358 | 0.0000 | OK |
| 15 minute winter | 7 | 10 | 160.443 | 0.243 | 212.6 | 0.6127 | 0.0000 | OK |
| 15 minute winter | 8 | 10 | 159.130 | 0.130 | 223.0 | 0.1686 | 0.0000 | OK |
| 5760 minute winter | basin | 5700 | 150.846 | 2.246 | 14.8 | 1438.4390 | 0.0000 | FLOOD RISK |
| 15 minute winter | 12 | 11 | 154.537 | 0.787 | 119.0 | 2.8620 | 0.0000 | SURCHARGED |
| 5760 minute winter | Deep bore | 5700 | 150.846 | 2.312 | 3.4 | 33.8584 | 0.0000 | OK |
| 15 minute winter | 11 | 11 | 161.220 | 0.720 | 116.4 | 2.5800 | 0.0000 | SURCHARGED |
| 15 minute winter | 13 | 11 | 160.799 | 0.799 | 117.9 | 1.0474 | 0.0000 | SURCHARGED |
| 15 minute winter | 14 | 11 | 160.542 | 0.742 | 178.6 | 1.6226 | 0.0000 | SURCHARGED |
| 15 minute winter | 15 | 11 | 159.908 | 0.208 | 289.7 | 0.9807 | 0.0000 | OK |
| 15 minute winter | 16 | 11 | 153.613 | 0.488 | 485.4 | 1.0993 | 0.0000 | OK |
| 2880 minute winter | Swale 1 | 2820 | 153.600 | 1.600 | 20.9 | 0.0000 | 0.0000 | SURCHARGED |
| 2880 minute winter | Swale 2 | 2820 | 153.600 | 1.700 | 16.3 | 0.0000 | 0.0000 | SURCHARGED |
| 2880 minute winter | 19 | 2820 | 153.600 | 1.800 | 6.7 | 0.0000 | 0.0000 | FLOOD RISK |
| 15 minute winter | 20 | 10 | 157.076 | 0.076 | 55.1 | 0.1743 | 0.0000 | OK |
| 15 minute winter | 21 | 11 | 154.830 | 1.330 | 168.2 | 4.6795 | 0.0000 | FLOOD RISK |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m ³) |
|-----------------------------|-----------|--------------|-----------|---------------|----------------|----------|----------------------------|
| 15 minute winter | 1 | 4.000 | 2 | 78.1 | 1.252 | 1.059 | 4.7582 |
| 15 minute winter | 9 | 3.007 | 10 | 537.9 | 4.539 | 0.775 | 4.2672 |
| 15 minute winter | 10 | 1.008 | basin | 534.6 | 1.935 | 1.345 | 6.2410 |
| 15 minute winter | 2 | 3.004 | 3 | 323.2 | 2.124 | 1.095 | 6.2063 |
| 15 minute winter | 3 | 3.005 | 4 | 365.1 | 2.896 | 0.828 | 3.3926 |
| 15 minute winter | 4 | 3.006 | 9 | 375.1 | 3.710 | 0.410 | 1.9309 |
| 15 minute winter | 5 | 3.000 | 6 | 84.7 | 1.472 | 1.101 | 2.3977 |
| 15 minute winter | 6 | 3.001 | 7 | 122.2 | 2.294 | 0.644 | 1.1192 |
| 15 minute winter | 7 | 3.002 | 8 | 211.0 | 4.612 | 0.725 | 0.7977 |
| 15 minute winter | 8 | 3.003 | 2 | 222.6 | 5.546 | 0.399 | 0.6000 |
| 5760 minute winter | basin | 1.009 | Deep bore | 3.4 | 0.186 | 0.012 | 24.0834 |
| 15 minute winter | 12 | 5.000 | 9 | 113.1 | 1.606 | 1.421 | 4.7770 |
| 5760 minute winter | Deep bore | Infiltration | | 2.6 | | | |
| 15 minute winter | 11 | 1.000 | 13 | 107.2 | 1.593 | 0.830 | 2.6111 |
| 15 minute winter | 13 | 1.001 | 14 | 117.2 | 1.664 | 0.941 | 1.1229 |
| 15 minute winter | 14 | 1.002 | 15 | 177.6 | 2.667 | 2.006 | 0.9608 |
| 15 minute winter | 15 | 1.003 | 16 | 290.1 | 5.764 | 0.770 | 2.7797 |
| 15 minute winter | 16 | 1.004 | Swale 1 | 484.8 | 2.059 | 0.953 | 5.3749 |
| 2880 minute winter | Swale 1 | 1.005 | Swale 2 | 16.3 | 0.104 | 0.006 | 548.5564 |
| 2880 minute winter | Swale 2 | 1.006 | 19 | 6.7 | 0.051 | 0.003 | 609.8469 |
| 2880 minute winter | 19 | Hydro-Brake® | 10 | 1.9 | | | |
| 15 minute winter | 20 | 2.000 | 21 | 54.9 | 1.081 | 0.143 | 1.2519 |
| 15 minute winter | 21 | 2.001 | 16 | 153.6 | 2.181 | 3.707 | 3.6599 |