

This survey is related to OSGB36(15) coordinate system by  
GPS 'rapid static' methods. No scale factor has been  
applied to the survey information. All horizontal distances  
taken from this drawing are ground distances.



**UTILITY KEY**

|                            |                            |
|----------------------------|----------------------------|
| FOUL DRAINAGE              | FOUL DRAINAGE              |
| CONTAMINATED SURFACE       | CONTAMINATED SURFACE       |
| SURFACE DRAINAGE           | SURFACE DRAINAGE           |
| COMBINED DRAINAGE          | COMBINED DRAINAGE          |
| FOUL ASSUMED RUN           | FOUL ASSUMED RUN           |
| SURFACE TAKEN FROM RECORDS | SURFACE TAKEN FROM RECORDS |
| ABANDONED RUN              | ABANDONED RUN              |
| TRADE EFFLUENT             | TRADE EFFLUENT             |
| SURVEY BOUNDARY            | SURVEY BOUNDARY            |

○ CABLE / PIPE ROSE  
● BACKDROP / TRAPPED EXT  
≡ DRAINAGE VALVE

○ END OF TRACE  
X END OF RECORDS  
≡ HEAD OF RUN / CAPED  
≡ PIPE INLET / OUTFALL

**ABBREVIATIONS**

|                                      |                         |
|--------------------------------------|-------------------------|
| AB ASSUMED ROUTE                     | MB MANHOLE              |
| BD BACKDROP                          | MM MONITORING WELL      |
| BN BOPHOLE                           | MC MONITORING CATCHMENT |
| CL COVER LEVEL                       | RWP RAIN WATER PIPE     |
| CP CATCHMENT                         | S/A SOAKAWAY            |
| D DEPTH                              | SV SLURGE VALVE         |
| DP DOWN PIPE                         | SVP SOIL VENT PIPE      |
| EOT END OF TRACE                     | TE TRAPPED EXT          |
| EP EXISTING PIPE                     | TR TAKEN FROM RECORD    |
| GV GULLY                             | UTECTV UNABLE TO CITY   |
| HR HEAD OF RUN                       | UTV UNABLE TO PHOTO     |
| IC INSPECTION CHAMBER                | UTL UNABLE TO LIFT      |
| IL INVERT LEVEL                      | UTS UNABLE TO SURVEY    |
| OWS SURFACE WATER SEWER              | VP VENT PIPE            |
| OWS CONTAMINATED SURFACE WATER SEWER | VR VENT PIPE            |
| FW Foul Water Sewer                  | VS VENT PIPE            |
| CWS COMBINED WATER SEWER             | WL WATER LEVEL          |

Client  
**BWB CONSULTING (BIRMINGHAM)**

Project  
**STAKEHILL INDUSTRIAL ESTATE  
MIDDLETON**

Title  
**DRAINAGE INVESTIGATION**

Drawing Number  
**TS24-386-1-Rev A**

| Revision | Description                                          | Rev By | Date     |
|----------|------------------------------------------------------|--------|----------|
| A        | Additional Manhole references & invert levels added. | JIS    | 29/07/24 |

Scale 1:500@A0

Sheet 1 of 3

| Drawn by | Checked by | Date of Survey |
|----------|------------|----------------|
| JS       | MH         | JULY 2024      |

**TERRAIN SURVEYS**  
Tel: 01438 841300  
www.terrain-surveys.co.uk  
enquiries@terrain-surveys.co.uk

Accreditation:

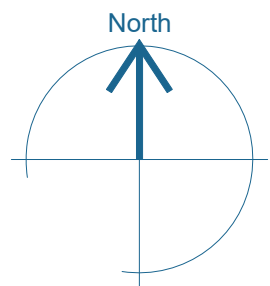
**CHARTERED**  
**ICES**

**THE SURVEY ASSOCIATION**

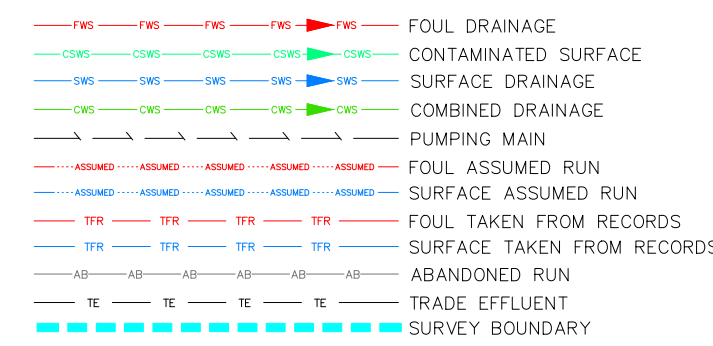
**ISO 9001**  
**ISO 9001**

**CONSTRUCTIONLINE**  
Gold Member

**ACCLAIM**  
Accreditation



This survey is related to OSGB36(15) coordinate system by GPS 'rapid static' methods. No scale factor has been applied to the survey information. All horizontal distances taken from this drawing are ground distances.



|     |                                  |       |                  |
|-----|----------------------------------|-------|------------------|
| AB  | ASSUMED ROUTE                    | MH    | MANHOLE          |
| BD  | BACKDROP                         | MH    | MONITORING WELL  |
| BH  | BORHOLE                          | RE    | ROODING EYE      |
| CL  | CLEAN LEVEL                      | RP    | RAIN WATER PIPE  |
| CP  | CATCHPIT                         | S/A   | SANITARY         |
| D   | DEPTH                            | SV    | SILENCE VALVE    |
| ED  | DOWN PIPE                        | SV    | SURF VENT PIPE   |
| EOT | END OF TRACE                     | TR    | TRAFFIC          |
| ER  | EARTHING ROD                     | TR    | TAKEN FROM COTY  |
| GL  | GULLY                            | UTCTV | UNABLE TO CCTV   |
| HC  | HEAD OF RUN                      | UT    | UNABLE TO FIND   |
| IC  | INSPECTION CHAMBER               | UTL   | UNABLE TO LIFT   |
| IS  | INVERT LEVEL                     | UTS   | UNABLE TO SURVEY |
| SW  | SURFACE WATER SEWER              | V     | VENT PIPE        |
| CWS | CONTAMINATED SURFACE WATER SEWER | VPR   | VAPOUR RECOVERY  |
| WS  | WATER SEWER                      | WL    | WATER LEVEL      |
| CWS | COMBINED WATER SEWER             |       |                  |

**BWB CONSULTING (BIRMINGHAM)**

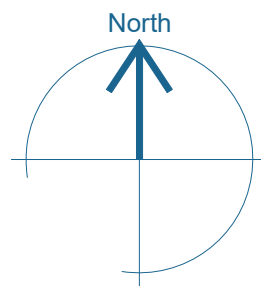
**STAKEHILL INDUSTRIAL ESTATE  
MIDDLETON**

## DRAINAGE INVESTIGATION

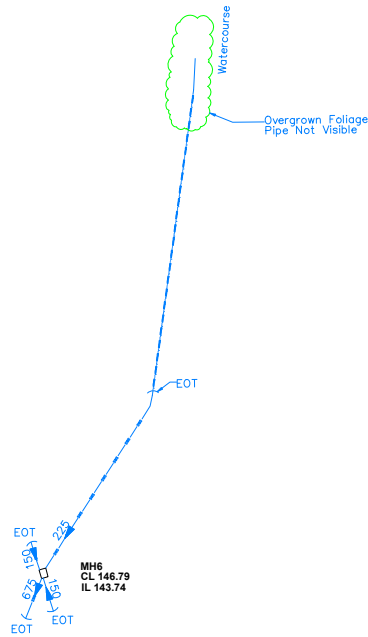




C COPYRIGHT RESERVED  
Do Not Scale From Paper Copies



This survey is related to OSGB36(15) coordinate system by  
GPS 'rapid static' methods. No scale factor has been  
applied to the survey information. All horizontal distances  
taken from this drawing are ground distances.



UTILITY KEY

- FOUL DRAINAGE
  - CONTAMINATED SURFACE DRAINAGE
  - SURFACE DRAINAGE
  - COMBINED DRAINAGE
  - PUMPING MAIN
  - FOUL ASSUMED RUN
  - SURFACE ASSUMED RUN
  - FOUL TAKEN FROM RECORDS
  - SURFACE TAKEN FROM RECORDS
  - ABANDONED RUN
  - TRADE EFFLUENT
  - SURVEY BOUNDARY
- CABLE / PIPE ROSE  
● BACKDROP / TRAPPED EXIT  
⊢ DRAINAGE VALVE
- ⊢ END OF TRACE  
X END OF RECORDS  
⊢ HEAD OF RUN / CAPED  
⊢ PIPE INLET / OUTFALL

ABBREVIATIONS

- |     |                                  |        |                    |
|-----|----------------------------------|--------|--------------------|
| AR  | ASSUMED ROUTE                    | MM     | MANHOLE            |
| BD  | BACKDROP                         | MR     | MONITORING WELL    |
| BN  | BORING                           | RE     | ROCKING EYE        |
| CL  | COVER LEVEL                      | RWP    | RAIN WATER PIPE    |
| CP  | CATCHPIPE                        | S/A    | SOAKAWAY           |
| D   | DEPTH                            | SV     | SUCK VALVE         |
| DP  | DOWN PIPE                        | SVP    | SOIL VENT PIPE     |
| EOT | END OF TRACE                     | TE     | TRAPPED EXT        |
| ET  | EXTENDING ROD                    | TR     | TAKEN FROM RECORD  |
| GY  | GULLY                            | UTECTV | UNABLE TO CITY     |
| HR  | HEAD OF RUN                      | UTL    | UNABLE TO FIND     |
| IC  | INSPECTION CHAMBER               | UTL    | UNABLE TO LIFT     |
| I   | INVERT LEVEL                     | UTS    | UNABLE TO SURVEY   |
| OWS | CONTAMINATED SURFACE WATER SEWER | VP     | VENT PIPE          |
| FW  | FOUL WATER SEWER                 | VR     | VENT PIPE RECOVERY |
| CWS | COMBINED WATER SEWER             | WL     | WATER LEVEL        |

Client  
**BWB CONSULTING (BIRMINGHAM)**

Project  
**STAKEHILL INDUSTRIAL ESTATE  
MIDDLETON**

Title  
**DRAINAGE INVESTIGATION**

Drawing Number  
**TS24-386-1-Rev A**

| Revision | Description                                          | Rev. By | Date     |
|----------|------------------------------------------------------|---------|----------|
| A        | Additional Manhole references & invert levels added. | JJS     | 29/07/24 |

Scale 1:500@A0

Sheet 3 of 3

Drawn by JS  
Checked by MH  
Date of Survey JULY 2024



**TERRAIN  
SURVEYS**  
Tel: 01438 841300  
www.terrainsurveys.co.uk  
enquiries@terrainsurveys.co.uk



**Chartered  
ICES**



**THE SURVEY  
ASSOCIATION**



**ISO 9001**  
Certificate Number 1776  
0003001



**UKAS**  
0003



**Constructionline**  
Gold Member



**SSIP**  
Safety Standard  
Accreditation



**Acclaim**  
Accreditation

## **Appendix 6: Greenfield Runoff Rate**



Simulation Settings

|                      |        |                            |      |                        |     |
|----------------------|--------|----------------------------|------|------------------------|-----|
| Rainfall Methodology | FEH-22 | Skip Steady State          | x    | 2 year (l/s)           | 2.2 |
| Summer CV            | 0.750  | Drain Down Time (mins)     | 240  | 30 year (l/s)          | 4.0 |
| Winter CV            | 0.840  | Additional Storage (m³/ha) | 20.0 | 100 year (l/s)         | 4.9 |
| Analysis Speed       | Normal | Check Discharge Rate(s)    | ✓    | Check Discharge Volume | x   |

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 %) |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 100                      | 45                       | 0                        | 0                        |

Pre-development Discharge Rate

|                              |            |                        |      |
|------------------------------|------------|------------------------|------|
| Site Makeup                  | Greenfield | Growth Factor 30 year  | 1.70 |
| Greenfield Method            | FEH        | Growth Factor 100 year | 2.08 |
| Positively Drained Area (ha) | 1.000      | Betterment (%)         | 0    |
| SAAR (mm)                    | 1087       | QMed                   | 2.2  |
| Host                         | 1          | QBar                   | 2.4  |
| BFIHost                      | 0.809      | Q 2 year (l/s)         | 2.2  |
| Region                       | 10         | Q 30 year (l/s)        | 4.0  |
| QBar/QMed conversion factor  | 1.075      | Q 100 year (l/s)       | 4.9  |
| Growth Factor 2 year         | 0.93       |                        |      |

## **Appendix 7: Extract of Phase I Geo-Environmental Desk Study Report**

- 5.3.3 *The Geo-Insight report has indicated that the site is located within an area where the hazard rating for landslides is very low and that slope instability problems are unlikely to be present. No special action is required to avoid problems due to landslides. No special investigation required and increased construction costs will increase financial risks are unlikely due to potential problems with landslides.*
- 5.3.4 *The Geo-Insight report has also indicated that hazard rating for “running sands” is very low. Very low potential for “running sand” problems at water table rises or if in sandy strata exposed to water. No special action is required to avoid problems due to “running sand”. No special ground investigation required in increased construction costs or increased financial risks are unlikely due to potential problems with “running sands”.*
- 5.3.5 *The site has got a highly variable topography but generally the site slopes towards Stakehill Lane at varying gradients between 1:30 to 1:15 therefore the shallow gradients are not considered to increase the risk of slope movement or instability within the site. We do however note that the undulating topography of the site may mean that there may be a requirement for potential retaining structures within areas of the development site.*
- 5.3.6 *During the site visit no visual evidence of slope movement has been identified e.g., in the form of soil “creep” terracettes etc.*
- 5.3.7 *Based upon the above information we consider that the site is considered to be at very low risk of slope stability issues and it is not considered any specific investigation is into slope stability is required.*

#### **5.4 Drainage**

- 5.4.1 *The geological information relating to this site suggests that the majority of the superficial strata is likely to consist of impermeable glacial till deposits, glacial fluvial deposits may be present within the site but comprise of permeable sands and gravels however these are considered to be localised and discontinuous and therefore it is unlikely that the adoption of a sustainable urban drainage system will be feasible on this site.*

### **6.0 PROPOSED GROUND INVESTIGATIONS**

#### **6.1 Ground Investigation**

- 6.1.1 *By undertaking an intrusive ground investigation an assessment of the ground and groundwater profiles may be carried out and the geo-technical and geo-environmental risks associated with this site identified. The investigation will allow a quantitative assessment as to whether any of the potential risks identified in this study are present and are of material concern to the proposed development. The works should be undertaken in accordance with the recommendations laid down in BS 10175 : 2011 “Investigation of Potentially Contaminated Sites”.*

## **Appendix 8: Storage 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<br>(ha) | T of E<br>(mins) | Cover<br>Level<br>(m) | Easting<br>(m) | Northing<br>(m) | Depth<br>(m) |
|--------------|--------------|------------------|-----------------------|----------------|-----------------|--------------|
| Catchment 1  | 2.300        | 5.00             | 130.100               | -17.412        | 76.471          | 1.400        |
| Catchment 8a | 0.200        | 5.00             | 144.000               | 86.781         | 25.875          | 2.000        |
| Catchment 2a | 0.700        | 5.00             | 142.500               | 35.851         | 84.154          | 1.400        |
| Catchment 2b | 0.400        | 5.00             | 138.000               | 19.207         | 78.367          | 1.400        |
| Catchment 3b | 1.800        | 5.00             | 137.000               | 41.465         | 53.689          | 1.400        |
| Catchment 3a | 1.700        | 5.00             | 139.000               | 37.658         | 57.842          | 1.400        |
| Catchment 4a | 1.200        | 5.00             | 139.500               | 53.986         | 55.553          | 1.400        |
| Catchment 4b | 0.500        | 5.00             | 138.500               | 52.415         | 46.233          | 1.400        |
| Catchment 5a | 0.900        | 5.00             | 142.500               | 76.900         | 52.686          | 2.200        |
| Catchment 5b | 0.900        | 5.00             | 139.000               | 65.002         | 40.403          | 1.400        |
| Catchment 6  | 0.500        | 5.00             | 138.000               | 53.007         | 41.027          | 1.400        |
| Catchment 7a | 0.300        | 5.00             | 143.000               | 85.584         | 39.636          | 2.200        |
| Catchment 7b | 0.200        | 5.00             | 142.000               | 79.923         | 32.966          | 2.200        |
| Catchment 9  | 0.500        |                  | 140.500               | 87.771         | 8.471           | 1.400        |
| Catchment 8b | 0.300        | 5.00             | 144.500               | 91.751         | 16.685          | 2.000        |

### Simulation Settings

|                      |        |                            |      |                        |     |
|----------------------|--------|----------------------------|------|------------------------|-----|
| Rainfall Methodology | FEH-22 | Skip Steady State          | x    | 2 year (l/s)           | 2.2 |
| Summer CV            | 0.750  | Drain Down Time (mins)     | 240  | 30 year (l/s)          | 4.0 |
| Winter CV            | 0.840  | Additional Storage (m³/ha) | 20.0 | 100 year (l/s)         | 4.9 |
| Analysis Speed       | Normal | Check Discharge Rate(s)    | ✓    | 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<br>(years) | Climate Change<br>(CC %) | Additional Area<br>(A %) | Additional Flow<br>(Q %) |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 100                      | 45                       | 0                        | 0                        |

### Pre-development Discharge Rate

|                              |            |                        |      |
|------------------------------|------------|------------------------|------|
| Site Makeup                  | Greenfield | Growth Factor 30 year  | 1.70 |
| Greenfield Method            | FEH        | Growth Factor 100 year | 2.08 |
| Positively Drained Area (ha) | 1.000      | Betterment (%)         | 0    |
| SAAR (mm)                    | 1087       | QMed                   | 2.2  |
| Host                         | 1          | QBar                   | 2.4  |
| BFIHost                      | 0.809      | Q 2 year (l/s)         | 2.2  |
| Region                       | 10         | Q 30 year (l/s)        | 4.0  |
| QBar/QMed conversion factor  | 1.075      | Q 100 year (l/s)       | 4.9  |
| Growth Factor 2 year         | 0.93       |                        |      |

### Node Catchment 1 Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 128.700 | Product Number          | CTL-SHE-0127-7400-1000-7400    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s)        | 7.4     | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 4b Offline Hydro-Brake® Control

|                   |             |                         |                                |
|-------------------|-------------|-------------------------|--------------------------------|
| Flap Valve        | x           | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 6 | Sump Available          | ✓                              |
| Invert Level (m)  | 137.100     | Product Number          | CTL-SHE-0108-5300-1000-5300    |
| Design Depth (m)  | 1.000       | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s) | 5.3         | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 2a Offline Hydro-Brake® Control

|                   |              |                         |                                |
|-------------------|--------------|-------------------------|--------------------------------|
| Flap Valve        | x            | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 2b | Sump Available          | ✓                              |
| Invert Level (m)  | 141.100      | Product Number          | CTL-SHE-0075-2500-1000-2500    |
| Design Depth (m)  | 1.000        | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s) | 2.5          | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 2b Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 136.600 | Product Number          | CTL-SHE-0090-3600-1000-3600    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s)        | 3.6     | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 3a Offline Hydro-Brake® Control

|                   |              |                         |                                |
|-------------------|--------------|-------------------------|--------------------------------|
| Flap Valve        | x            | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 3b | Sump Available          | ✓                              |
| Invert Level (m)  | 137.600      | Product Number          | CTL-SHE-0132-8000-1000-8000    |
| Design Depth (m)  | 1.000        | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s) | 8.0          | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 3b Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 135.600 | Product Number          | CTL-SHE-0154-1130-1000-1130    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.225                          |
| Design Flow (l/s)        | 11.3    | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 4a Offline Hydro-Brake® Control

|                   |              |                         |                                |
|-------------------|--------------|-------------------------|--------------------------------|
| Flap Valve        | x            | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 4b | Sump Available          | ✓                              |
| Invert Level (m)  | 138.100      | Product Number          | CTL-SHE-0089-3500-1000-3500    |
| Design Depth (m)  | 1.000        | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s) | 3.5          | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 8a Offline Hydro-Brake® Control

|                   |             |                         |                                |
|-------------------|-------------|-------------------------|--------------------------------|
| Flap Valve        | x           | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 9 | Sump Available          | ✓                              |
| Invert Level (m)  | 142.000     | Product Number          | CTL-SHE-0066-2000-1100-2000    |
| Design Depth (m)  | 1.100       | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s) | 2.0         | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 5a Offline Hydro-Brake® Control

|                   |              |                         |                                |
|-------------------|--------------|-------------------------|--------------------------------|
| Flap Valve        | x            | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 5b | Sump Available          | ✓                              |
| Invert Level (m)  | 140.300      | Product Number          | CTL-SHE-0066-2000-1100-2000    |
| Design Depth (m)  | 1.100        | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s) | 2.0          | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 5b Offline Hydro-Brake® Control

|                   |             |                         |                                |
|-------------------|-------------|-------------------------|--------------------------------|
| Flap Valve        | x           | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 6 | Sump Available          | ✓                              |
| Invert Level (m)  | 137.600     | Product Number          | CTL-SHE-0098-4300-1000-4300    |
| Design Depth (m)  | 1.000       | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s) | 4.3         | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 6 Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 136.600 | Product Number          | CTL-SHE-0151-1080-1000-1080    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.225                          |
| Design Flow (l/s)        | 10.8    | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 7a Offline Hydro-Brake® Control

|                   |              |                         |                                |
|-------------------|--------------|-------------------------|--------------------------------|
| Flap Valve        | x            | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 7b | Sump Available          | ✓                              |
| Invert Level (m)  | 140.800      | Product Number          | CTL-SHE-0066-2000-1100-2000    |
| Design Depth (m)  | 1.100        | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s) | 2.0          | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 7b Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 139.800 | Product Number          | CTL-SHE-0066-2000-1100-2000    |
| Design Depth (m)         | 1.100   | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s)        | 2.0     | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 9 Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 139.100 | Product Number          | CTL-SHE-0074-2400-1000-2400    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s)        | 2.4     | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 8b Offline Hydro-Brake® Control

|                   |             |                         |                                |
|-------------------|-------------|-------------------------|--------------------------------|
| Flap Valve        | x           | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 9 | Sump Available          | ✓                              |
| Invert Level (m)  | 142.500     | Product Number          | CTL-SHE-0066-2000-1100-2000    |
| Design Depth (m)  | 1.100       | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s) | 2.0         | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 1 Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 128.700 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) |         |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|-----------|-----------|---------------|-----------|-----------|---------------|
| 0.000     | 2046.0    | 0.0           | 1.400     | 3262.0    | 0.0           |

### Node Catchment 8a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 142.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) |         |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|-----------|-----------|---------------|-----------|-----------|---------------|-----------|-----------|---------------|-----------|-----------|---------------|
| 0.000     | 198.0     | 0.0           | 1.000     | 198.0     | 0.0           | 1.001     | 0.0       | 0.0           | 2.000     | 0.0       | 0.0           |

### Node Catchment 2a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 141.100 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) |         |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|-----------|-----------|---------------|-----------|-----------|---------------|
| 0.000     | 512.0     | 0.0           | 1.400     | 1098.0    | 0.0           |

### Node Catchment 2b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 136.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) |         |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|-----------|-----------|---------------|-----------|-----------|---------------|
| 0.000     | 239.0     | 0.0           | 1.400     | 839.0     | 0.0           |

### Node Catchment 3b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 135.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) |         |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|-----------|-----------|---------------|-----------|-----------|---------------|
| 0.000     | 1958.0    | 0.0           | 1.400     | 3204.0    | 0.0           |

### Node Catchment 3a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 137.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 1209.0                    | 0.0                           | 1.400        | 2203.0                    | 0.0                           |

#### Node Catchment 4a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 138.100 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 987.0                     | 0.0                           | 1.400        | 1980.0                    | 0.0                           |

#### Node Catchment 4b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 137.100 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 319.0                     | 0.0                           | 1.400        | 883.0                     | 0.0                           |

#### Node Catchment 5a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 140.300 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 981.0                     | 0.0                           | 1.200        | 981.0                     | 0.0                           | 1.201        | 0.0                       | 0.0                           | 2.200        | 0.0                       | 0.0                           |

#### Node Catchment 5b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 137.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 638.0                     | 0.0                           | 1.400        | 1797.0                    | 0.0                           |

#### Node Catchment 6 Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 136.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 324.0                     | 0.0                           | 1.400        | 1103.0                    | 0.0                           |

#### Node Catchment 7a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 140.800 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 265.0                     | 0.0                           | 1.200        | 265.0                     | 0.0                           | 1.201        | 0.0                       | 0.0                           | 2.200        | 0.0                       | 0.0                           |

#### Node Catchment 7b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 139.800 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 326.0                     | 0.0                           | 1.200        | 326.0                     | 0.0                           | 1.201        | 0.0                       | 0.0                           | 2.200        | 0.0                       | 0.0                           |

#### Node Catchment 9 Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 139.100 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 734.0                     | 0.0                           | 1.400        | 1678.0                    | 0.0                           |

#### Node Catchment 8b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 142.500 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 256.0                     | 0.0                           | 1.000        | 256.0                     | 0.0                           | 1.001        | 0.0                       | 0.0                           | 2.000        | 0.0                       | 0.0                           |

**Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%**

| Node Event         | US<br>Node   | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m <sup>3</sup> ) | Flood<br>(m <sup>3</sup> ) | Status |
|--------------------|--------------|----------------|--------------|--------------|-----------------|-------------------------------|----------------------------|--------|
| 2880 minute winter | Catchment 1  | 2760           | 129.699      | 0.999        | 50.8            | 2511.1490                     | 0.0000                     | OK     |
| 960 minute winter  | Catchment 8a | 885            | 142.702      | 0.702        | 9.5             | 140.4880                      | 0.0000                     | OK     |
| 2160 minute winter | Catchment 2a | 2100           | 142.089      | 0.989        | 18.9            | 721.0896                      | 0.0000                     | OK     |
| 2880 minute winter | Catchment 2b | 2760           | 137.587      | 0.986        | 11.0            | 449.9182                      | 0.0000                     | OK     |
| 4320 minute winter | Catchment 3b | 4140           | 136.582      | 0.982        | 37.1            | 2376.4210                     | 0.0000                     | OK     |
| 2160 minute winter | Catchment 3a | 1980           | 138.598      | 0.998        | 45.9            | 1584.1080                     | 0.0000                     | OK     |
| 2880 minute winter | Catchment 4a | 2760           | 139.090      | 0.990        | 26.5            | 1342.0250                     | 0.0000                     | OK     |
| 2160 minute winter | Catchment 4b | 2100           | 138.081      | 0.981        | 16.7            | 513.6234                      | 0.0000                     | OK     |
| 4320 minute winter | Catchment 5a | 4140           | 141.429      | 1.129        | 14.8            | 1116.3910                     | 0.0000                     | OK     |
| 2880 minute winter | Catchment 5b | 2820           | 138.582      | 0.982        | 21.5            | 1037.6000                     | 0.0000                     | OK     |
| 4320 minute winter | Catchment 6  | 4080           | 137.585      | 0.985        | 17.1            | 596.1398                      | 0.0000                     | OK     |
| 1440 minute winter | Catchment 7a | 1320           | 141.723      | 0.923        | 10.8            | 247.0880                      | 0.0000                     | OK     |
| 8640 minute winter | Catchment 7b | 7140           | 140.805      | 1.005        | 3.9             | 329.4687                      | 0.0000                     | OK     |
| 7200 minute winter | Catchment 9  | 7020           | 140.096      | 0.996        | 9.2             | 1072.7910                     | 0.0000                     | OK     |
| 1440 minute winter | Catchment 8b | 1320           | 143.450      | 0.950        | 10.8            | 245.9816                      | 0.0000                     | OK     |

| Link Event<br>(Upstream Depth) | US<br>Node   | Link         | DS<br>Node   | Outflow<br>(l/s) | Discharge<br>Vol (m <sup>3</sup> ) |
|--------------------------------|--------------|--------------|--------------|------------------|------------------------------------|
| 2880 minute winter             | Catchment 1  | Hydro-Brake® |              | 7.4              | 1110.4                             |
| 960 minute winter              | Catchment 8a | Hydro-Brake® | Catchment 9  | 1.9              | 100.9                              |
| 2160 minute winter             | Catchment 2a | Hydro-Brake® | Catchment 2b | 2.5              | 298.4                              |
| 2880 minute winter             | Catchment 2b | Hydro-Brake® |              | 3.6              | 564.8                              |
| 4320 minute winter             | Catchment 3b | Hydro-Brake® |              | 11.3             | 2430.6                             |
| 2160 minute winter             | Catchment 3a | Hydro-Brake® | Catchment 3b | 8.0              | 929.1                              |
| 2880 minute winter             | Catchment 4a | Hydro-Brake® | Catchment 4b | 3.5              | 539.3                              |
| 2160 minute winter             | Catchment 4b | Hydro-Brake® | Catchment 6  | 5.3              | 623.8                              |
| 4320 minute winter             | Catchment 5a | Hydro-Brake® | Catchment 5b | 2.0              | 440.0                              |
| 2880 minute winter             | Catchment 5b | Hydro-Brake® | Catchment 6  | 4.3              | 666.4                              |
| 4320 minute winter             | Catchment 6  | Hydro-Brake® |              | 10.8             | 2447.9                             |
| 1440 minute winter             | Catchment 7a | Hydro-Brake® | Catchment 7b | 1.9              | 153.3                              |
| 8640 minute winter             | Catchment 7b | Hydro-Brake® |              | 1.9              | 763.9                              |
| 7200 minute winter             | Catchment 9  | Hydro-Brake® |              | 2.4              | 869.5                              |
| 1440 minute winter             | Catchment 8b | Hydro-Brake® | Catchment 9  | 1.9              | 155.0                              |

### Design Settings

|                       |                   |                                      |               |
|-----------------------|-------------------|--------------------------------------|---------------|
| Rainfall Methodology  | FSR               | Maximum Time of Concentration (mins) | 30.00         |
| Return Period (years) | 100               | Maximum Rainfall (mm/hr)             | 50.0          |
| Additional Flow (%)   | 0                 | Minimum Velocity (m/s)               | 1.00          |
| FSR Region            | England and Wales | Connection Type                      | Level Soffits |
| M5-60 (mm)            | 20.000            | Minimum Backdrop Height (m)          | 0.200         |
| Ratio-R               | 0.300             | Preferred Cover Depth (m)            | 1.200         |
| CV                    | 0.750             | Include Intermediate Ground          | ✓             |
| Time of Entry (mins)  | 5.00              | Enforce best practice design rules   | ✓             |

### Nodes

| Name         | Area<br>(ha) | T of E<br>(mins) | Cover<br>Level<br>(m) | Easting<br>(m) | Northing<br>(m) | Depth<br>(m) |
|--------------|--------------|------------------|-----------------------|----------------|-----------------|--------------|
| Catchment 1  | 2.300        | 5.00             | 130.100               | -17.412        | 76.471          | 1.400        |
| Catchment 8a | 0.200        | 5.00             | 144.000               | 86.781         | 25.875          | 2.000        |
| Catchment 2a | 0.700        | 5.00             | 142.500               | 35.851         | 84.154          | 1.400        |
| Catchment 2b | 0.400        | 5.00             | 138.000               | 19.207         | 78.367          | 1.400        |
| Catchment 3b | 1.800        | 5.00             | 137.000               | 41.465         | 53.689          | 1.400        |
| Catchment 3a | 1.700        | 5.00             | 139.000               | 37.658         | 57.842          | 1.400        |
| Catchment 4a | 1.200        | 5.00             | 139.500               | 53.986         | 55.553          | 1.400        |
| Catchment 4b | 0.500        | 5.00             | 138.500               | 52.415         | 46.233          | 1.400        |
| Catchment 5a | 0.900        | 5.00             | 142.500               | 76.900         | 52.686          | 2.200        |
| Catchment 5b | 0.900        | 5.00             | 139.000               | 65.002         | 40.403          | 1.400        |
| Catchment 6  | 0.500        | 5.00             | 138.000               | 53.007         | 41.027          | 1.400        |
| Catchment 7a | 0.300        | 5.00             | 143.000               | 85.584         | 39.636          | 2.200        |
| Catchment 7b | 0.200        | 5.00             | 142.000               | 79.923         | 32.966          | 2.200        |
| Catchment 9  | 0.500        |                  | 140.500               | 87.771         | 8.471           | 1.400        |
| Catchment 8b | 0.300        | 5.00             | 144.500               | 91.751         | 16.685          | 2.000        |

### Simulation Settings

|                      |                   |                            |      |
|----------------------|-------------------|----------------------------|------|
| Rainfall Methodology | FSR               | Drain Down Time (mins)     | 240  |
| FSR Region           | England and Wales | Additional Storage (m³/ha) | 20.0 |
| M5-60 (mm)           | 20.000            | Check Discharge Rate(s)    | ✓    |
| Ratio-R              | 0.300             | 2 year (l/s)               | 2.2  |
| Summer CV            | 0.750             | 30 year (l/s)              | 4.0  |
| Winter CV            | 0.840             | 100 year (l/s)             | 4.9  |
| Analysis Speed       | Normal            | Check Discharge Volume     | x    |
| Skip Steady State    | x                 |                            |      |

### Storm Durations

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

| Return Period<br>(years) | Climate Change<br>(CC %) | Additional Area<br>(A %) | Additional Flow<br>(Q %) |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 100                      | 45                       | 0                        | 0                        |

### Pre-development Discharge Rate

|                              |            |                        |      |
|------------------------------|------------|------------------------|------|
| Site Makeup                  | Greenfield | Growth Factor 30 year  | 1.70 |
| Greenfield Method            | FEH        | Growth Factor 100 year | 2.08 |
| Positively Drained Area (ha) | 1.000      | Betterment (%)         | 0    |
| SAAR (mm)                    | 1087       | QMed                   | 2.2  |
| Host                         | 1          | QBar                   | 2.4  |
| BFIHost                      | 0.809      | Q 2 year (l/s)         | 2.2  |
| Region                       | 10         | Q 30 year (l/s)        | 4.0  |
| QBar/QMed conversion factor  | 1.075      | Q 100 year (l/s)       | 4.9  |
| Growth Factor 2 year         | 0.93       |                        |      |

### Node Catchment 1 Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 128.700 | Product Number          | CTL-SHE-0127-7400-1000-7400    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s)        | 7.4     | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 4b Offline Hydro-Brake® Control

|                   |             |                         |                                |
|-------------------|-------------|-------------------------|--------------------------------|
| Flap Valve        | x           | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 6 | Sump Available          | ✓                              |
| Invert Level (m)  | 137.100     | Product Number          | CTL-SHE-0108-5300-1000-5300    |
| Design Depth (m)  | 1.000       | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s) | 5.3         | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 2a Offline Hydro-Brake® Control

|                   |              |                         |                                |
|-------------------|--------------|-------------------------|--------------------------------|
| Flap Valve        | x            | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 2b | Sump Available          | ✓                              |
| Invert Level (m)  | 141.100      | Product Number          | CTL-SHE-0075-2500-1000-2500    |
| Design Depth (m)  | 1.000        | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s) | 2.5          | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 2b Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 136.600 | Product Number          | CTL-SHE-0090-3600-1000-3600    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s)        | 3.6     | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 3a Offline Hydro-Brake® Control

|                   |              |                         |                                |
|-------------------|--------------|-------------------------|--------------------------------|
| Flap Valve        | x            | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 3b | Sump Available          | ✓                              |
| Invert Level (m)  | 137.600      | Product Number          | CTL-SHE-0132-8000-1000-8000    |
| Design Depth (m)  | 1.000        | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s) | 8.0          | Min Node Diameter (mm)  | 1200                           |

### **Node Catchment 3b Online Hydro-Brake® Control**

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 135.600 | Product Number          | CTL-SHE-0154-1130-1000-1130    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.225                          |
| Design Flow (l/s)        | 11.3    | Min Node Diameter (mm)  | 1200                           |

### **Node Catchment 4a Offline Hydro-Brake® Control**

|                   |              |                         |                                |
|-------------------|--------------|-------------------------|--------------------------------|
| Flap Valve        | x            | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 4b | Sump Available          | ✓                              |
| Invert Level (m)  | 138.100      | Product Number          | CTL-SHE-0089-3500-1000-3500    |
| Design Depth (m)  | 1.000        | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s) | 3.5          | Min Node Diameter (mm)  | 1200                           |

### **Node Catchment 8a Offline Hydro-Brake® Control**

|                   |             |                         |                                |
|-------------------|-------------|-------------------------|--------------------------------|
| Flap Valve        | x           | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 9 | Sump Available          | ✓                              |
| Invert Level (m)  | 142.000     | Product Number          | CTL-SHE-0066-2000-1100-2000    |
| Design Depth (m)  | 1.100       | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s) | 2.0         | Min Node Diameter (mm)  | 1200                           |

### **Node Catchment 5a Offline Hydro-Brake® Control**

|                   |              |                         |                                |
|-------------------|--------------|-------------------------|--------------------------------|
| Flap Valve        | x            | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 5b | Sump Available          | ✓                              |
| Invert Level (m)  | 140.300      | Product Number          | CTL-SHE-0066-2000-1100-2000    |
| Design Depth (m)  | 1.100        | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s) | 2.0          | Min Node Diameter (mm)  | 1200                           |

### **Node Catchment 5b Offline Hydro-Brake® Control**

|                   |             |                         |                                |
|-------------------|-------------|-------------------------|--------------------------------|
| Flap Valve        | x           | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 6 | Sump Available          | ✓                              |
| Invert Level (m)  | 137.600     | Product Number          | CTL-SHE-0098-4300-1000-4300    |
| Design Depth (m)  | 1.000       | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s) | 4.3         | Min Node Diameter (mm)  | 1200                           |

### **Node Catchment 6 Online Hydro-Brake® Control**

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 136.600 | Product Number          | CTL-SHE-0151-1080-1000-1080    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.225                          |
| Design Flow (l/s)        | 10.8    | Min Node Diameter (mm)  | 1200                           |

### **Node Catchment 7a Offline Hydro-Brake® Control**

|                   |              |                         |                                |
|-------------------|--------------|-------------------------|--------------------------------|
| Flap Valve        | x            | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 7b | Sump Available          | ✓                              |
| Invert Level (m)  | 140.800      | Product Number          | CTL-SHE-0066-2000-1100-2000    |
| Design Depth (m)  | 1.100        | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s) | 2.0          | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 7b Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 139.800 | Product Number          | CTL-SHE-0066-2000-1100-2000    |
| Design Depth (m)         | 1.100   | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s)        | 2.0     | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 9 Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 139.100 | Product Number          | CTL-SHE-0074-2400-1000-2400    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s)        | 2.4     | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 8b Offline Hydro-Brake® Control

|                   |             |                         |                                |
|-------------------|-------------|-------------------------|--------------------------------|
| Flap Valve        | x           | Objective               | (HE) Minimise upstream storage |
| Loop to Node      | Catchment 9 | Sump Available          | ✓                              |
| Invert Level (m)  | 142.500     | Product Number          | CTL-SHE-0066-2000-1100-2000    |
| Design Depth (m)  | 1.100       | Min Outlet Diameter (m) | 0.100                          |
| Design Flow (l/s) | 2.0         | Min Node Diameter (mm)  | 1200                           |

### Node Catchment 1 Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 128.700 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 2046.0                    | 0.0                           | 1.400        | 3262.0                    | 0.0                           |

### Node Catchment 8a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 142.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 198.0                     | 0.0                           | 1.000        | 198.0                     | 0.0                           | 1.001        | 0.0                       | 0.0                           | 2.000        | 0.0                       | 0.0                           |

### Node Catchment 2a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 141.100 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 512.0                     | 0.0                           | 1.400        | 1098.0                    | 0.0                           |

### Node Catchment 2b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 136.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 239.0                     | 0.0                           | 1.400        | 839.0                     | 0.0                           |

#### Node Catchment 3b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 135.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 1958.0                    | 0.0                           | 1.400        | 3204.0                    | 0.0                           |

#### Node Catchment 3a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 137.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 1209.0                    | 0.0                           | 1.400        | 2203.0                    | 0.0                           |

#### Node Catchment 4a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 138.100 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 987.0                     | 0.0                           | 1.400        | 1980.0                    | 0.0                           |

#### Node Catchment 4b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 137.100 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 319.0                     | 0.0                           | 1.400        | 883.0                     | 0.0                           |

#### Node Catchment 5a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 140.300 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 981.0                     | 0.0                           | 1.200        | 981.0                     | 0.0                           | 1.201        | 0.0                       | 0.0                           | 2.200        | 0.0                       | 0.0                           |

#### Node Catchment 5b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 137.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 638.0                     | 0.0                           | 1.400        | 1797.0                    | 0.0                           |

#### Node Catchment 6 Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 136.600 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 324.0                     | 0.0                           | 1.400        | 1103.0                    | 0.0                           |

#### Node Catchment 7a Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 140.800 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 265.0                     | 0.0                           | 1.200        | 265.0                     | 0.0                           | 1.201        | 0.0                       | 0.0                           | 2.200        | 0.0                       | 0.0                           |

#### Node Catchment 7b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 139.800 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 326.0                     | 0.0                           | 1.200        | 326.0                     | 0.0                           | 1.201        | 0.0                       | 0.0                           | 2.200        | 0.0                       | 0.0                           |

#### Node Catchment 9 Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 139.100 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 734.0                     | 0.0                           | 1.400        | 1678.0                    | 0.0                           |

#### Node Catchment 8b Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 142.500 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | 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> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 256.0                     | 0.0                           | 1.000        | 256.0                     | 0.0                           | 1.001        | 0.0                       | 0.0                           | 2.000        | 0.0                       | 0.0                           |

**Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%**

| 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 |
|--------------------|--------------|----------------|--------------|--------------|-----------------|------------------|---------------|--------|
| 2160 minute winter | Catchment 1  | 2100           | 129.647      | 0.947        | 59.5            | 2359.3550        | 0.0000        | OK     |
| 720 minute winter  | Catchment 8a | 690            | 142.731      | 0.731        | 11.9            | 146.2201         | 0.0000        | OK     |
| 2160 minute winter | Catchment 2a | 2100           | 142.048      | 0.947        | 18.1            | 682.4557         | 0.0000        | OK     |
| 2160 minute winter | Catchment 2b | 2100           | 137.541      | 0.941        | 12.6            | 419.9157         | 0.0000        | OK     |
| 4320 minute winter | Catchment 3b | 4140           | 136.518      | 0.918        | 35.4            | 2197.0300        | 0.0000        | OK     |
| 1440 minute winter | Catchment 3a | 1380           | 138.574      | 0.974        | 60.1            | 1537.5840        | 0.0000        | OK     |
| 2160 minute winter | Catchment 4a | 2100           | 139.038      | 0.938        | 31.0            | 1254.5560        | 0.0000        | OK     |
| 1440 minute winter | Catchment 4b | 1410           | 138.034      | 0.934        | 21.0            | 480.4440         | 0.0000        | OK     |
| 4320 minute winter | Catchment 5a | 4140           | 141.347      | 1.046        | 13.9            | 1035.1260        | 0.0000        | OK     |
| 2880 minute winter | Catchment 5b | 2820           | 138.533      | 0.933        | 20.5            | 967.1469         | 0.0000        | OK     |
| 2880 minute winter | Catchment 6  | 2820           | 137.545      | 0.945        | 19.5            | 561.3770         | 0.0000        | OK     |
| 960 minute winter  | Catchment 7a | 930            | 141.722      | 0.921        | 14.4            | 246.7102         | 0.0000        | OK     |
| 7200 minute winter | Catchment 7b | 6420           | 140.754      | 0.954        | 4.0             | 312.8340         | 0.0000        | OK     |
| 7200 minute winter | Catchment 9  | 6600           | 140.036      | 0.936        | 8.8             | 989.4878         | 0.0000        | OK     |
| 960 minute winter  | Catchment 8b | 930            | 143.449      | 0.949        | 14.4            | 245.8696         | 0.0000        | OK     |

| Link Event<br>(Upstream Depth) | US<br>Node   | Link         | DS<br>Node   | Outflow<br>(l/s) | Discharge<br>Vol (m³) |
|--------------------------------|--------------|--------------|--------------|------------------|-----------------------|
| 2160 minute winter             | Catchment 1  | Hydro-Brake® |              | 7.4              | 833.9                 |
| 720 minute winter              | Catchment 8a | Hydro-Brake® | Catchment 9  | 1.9              | 82.1                  |
| 2160 minute winter             | Catchment 2a | Hydro-Brake® | Catchment 2b | 2.5              | 293.9                 |
| 2160 minute winter             | Catchment 2b | Hydro-Brake® |              | 3.6              | 427.3                 |
| 4320 minute winter             | Catchment 3b | Hydro-Brake® |              | 11.3             | 2368.5                |
| 1440 minute winter             | Catchment 3a | Hydro-Brake® | Catchment 3b | 8.0              | 650.6                 |
| 2160 minute winter             | Catchment 4a | Hydro-Brake® | Catchment 4b | 3.5              | 406.1                 |
| 1440 minute winter             | Catchment 4b | Hydro-Brake® | Catchment 6  | 5.3              | 438.0                 |
| 4320 minute winter             | Catchment 5a | Hydro-Brake® | Catchment 5b | 2.0              | 428.7                 |
| 2880 minute winter             | Catchment 5b | Hydro-Brake® | Catchment 6  | 4.3              | 653.5                 |
| 2880 minute winter             | Catchment 6  | Hydro-Brake® |              | 10.8             | 1645.3                |
| 960 minute winter              | Catchment 7a | Hydro-Brake® | Catchment 7b | 1.9              | 110.9                 |
| 7200 minute winter             | Catchment 7b | Hydro-Brake® |              | 1.9              | 639.8                 |
| 7200 minute winter             | Catchment 9  | Hydro-Brake® |              | 2.4              | 850.4                 |
| 960 minute winter              | Catchment 8b | Hydro-Brake® | Catchment 9  | 1.9              | 112.1                 |

## **Appendix 9: Illustrative Drainage Strategy**

