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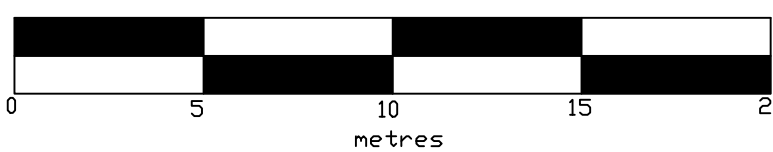
## Topographical Survey

### Land surrounding Cuffley Football Club

Sheet 2 of 10  
August 2014

Scale  
1:200

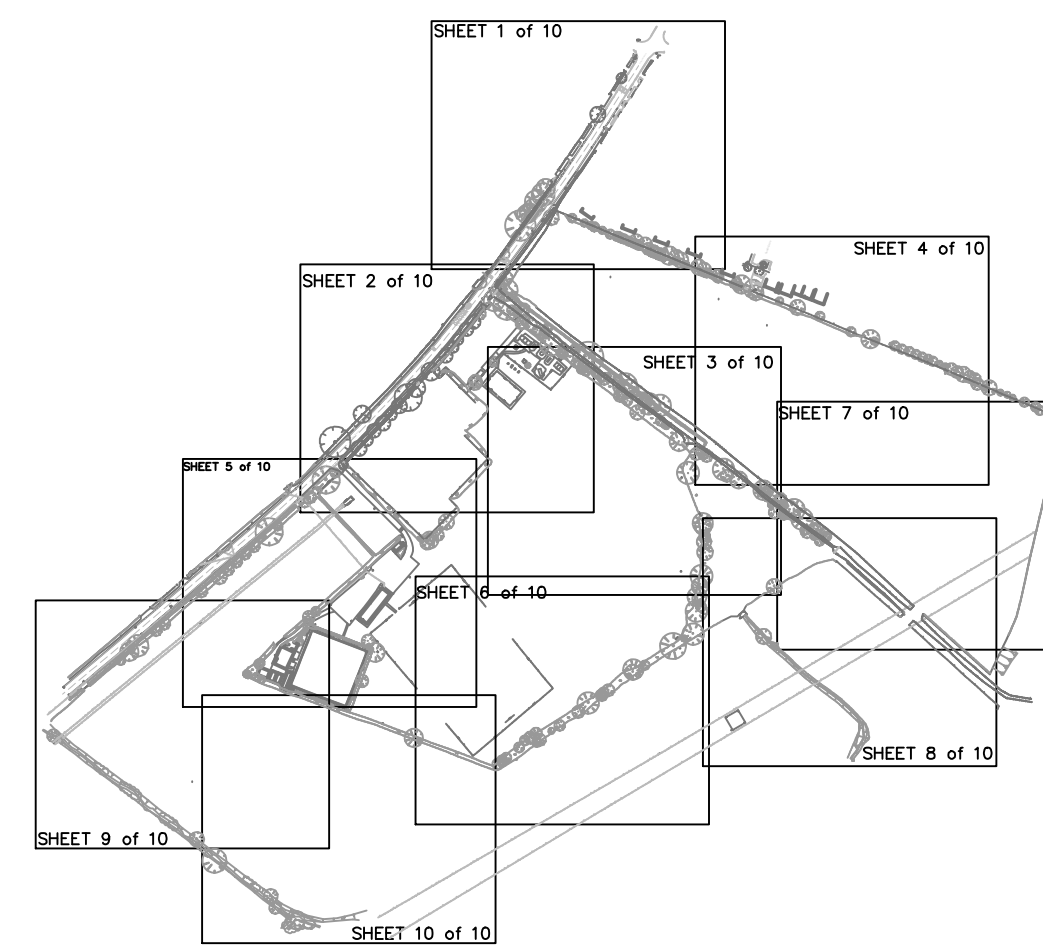
Horizontal Datum: Supplied by client  
Vertical Datum: Supplied by client  
Units: Metres



#### Survey Notes

- 1) This drawing contains elements from drawing S-08-431-01 as supplied by client.
- 2) The survey control is based on the following stations within the above drawing  
S2 ES30158-248 N202117753 Level 62.74  
S3 ES30247-144 N202176-436

#### Sheet Layout



#### Legend

|  |  |  |   |
|--|--|--|---|
|  | Survey Control Station                               |  | Tree with elevation, height in metres and spread to scale |
|  | Spot Level   |  | Gate  |
|  | N.B. Spot levels at road edge relate to channel line |  | Top of bank   |
|  | Major Contour 1m Interval                            |  | Bottom of bank  |
|  | Minor Contour 0.5m Interval                          |  | Tree Canopy   |
|  | Overhead Telecoms                                    |  | Foliage/Hedge edge  |
|  | Overhead Electric                                    |  |   |

#### Abbreviations

|     |                               |     |                 |        |                        |
|-----|-------------------------------|-----|-----------------|--------|------------------------|
| PP  | Post and Panel Fenceline      | ER  | Earth Rod       | TPO    | Telegraph Pole         |
| PR  | Post and Rail Fenceline       | MW  | Monitoring Well | EPO    | Electric Pole          |
| PNV | Post and Wire Fenceline       | CS  | Cable Rider     | RS     | Road Sign              |
| SM  | Post and Steel Mesh Fenceline | EPO | Electric Pole   | BO - C | Boiler - Concrete      |
| mt  | Height in Metres              | GBV | Gas Valve       | BO - S | Boiler - Steel         |
| IC  | Inspection Cover              | GM  | Gas Meter       | BO - W | Boiler - Wooden        |
| CL  | Cover Level                   | GR  | Gas Risar       | LS     | Liter Sign             |
| IL  | Invert Level                  | AV  | Air Valve       | PI     | Pillar                 |
| G   | Gully                         | ST  | Stop Tap        | RS     | Road Sign              |
| DP  | Down Pipe                     | WSV | Wash Valve      | TS     | Tree Slump             |
| RWP | Rain Water Pipe               | WM  | Water Meter     | TGB    | Telephone Call Box     |
| FP  | Foul Water Pipe               | WO  | Wash Out        | FP     | Flag Pole              |
| VC  | Vent Cover                    | SL  | Street Light    | TP     | Traffic Planning       |
| RE  | Rodding Eye                   | PLM | Pipeline Marker | TL     | Traffic Induction Loop |
| VP  | Vent Pipe                     | CAB | Street Cabinet  | LA     | Ladder                 |
| FWS | Foul Water Sewage             |     |                 | FB     | Flower Bed             |
| SWG | Surface Water Sewage          |     |                 | DK     | Dropped Kerb           |

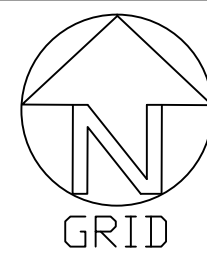
Prepared for: Landis Improvement  
10 Lower Grosvenor Place  
London  
SW1W 0EN

Surveyed by: C. Whiteley, R. Baker  
Date: 14th - 22nd August 2014

| Drawing Reference | Rev | Date     | Description | Filename | Drawn By | Checked By | Approved By |
|-------------------|-----|----------|-------------|----------|----------|------------|-------------|
| 1667-200-2        | 0   | 20/08/14 | First issue | 1667_0   | CW/RSB   | MB         | MB          |

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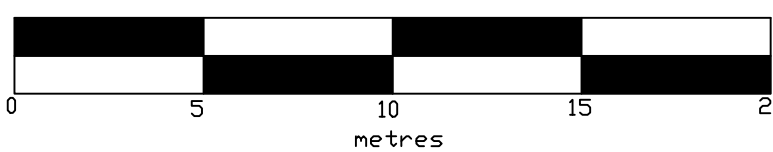
## Topographical Survey

### Land surrounding Cuffley Football Club

Sheet 1 of 10  
August 2014

Scale  
1:200

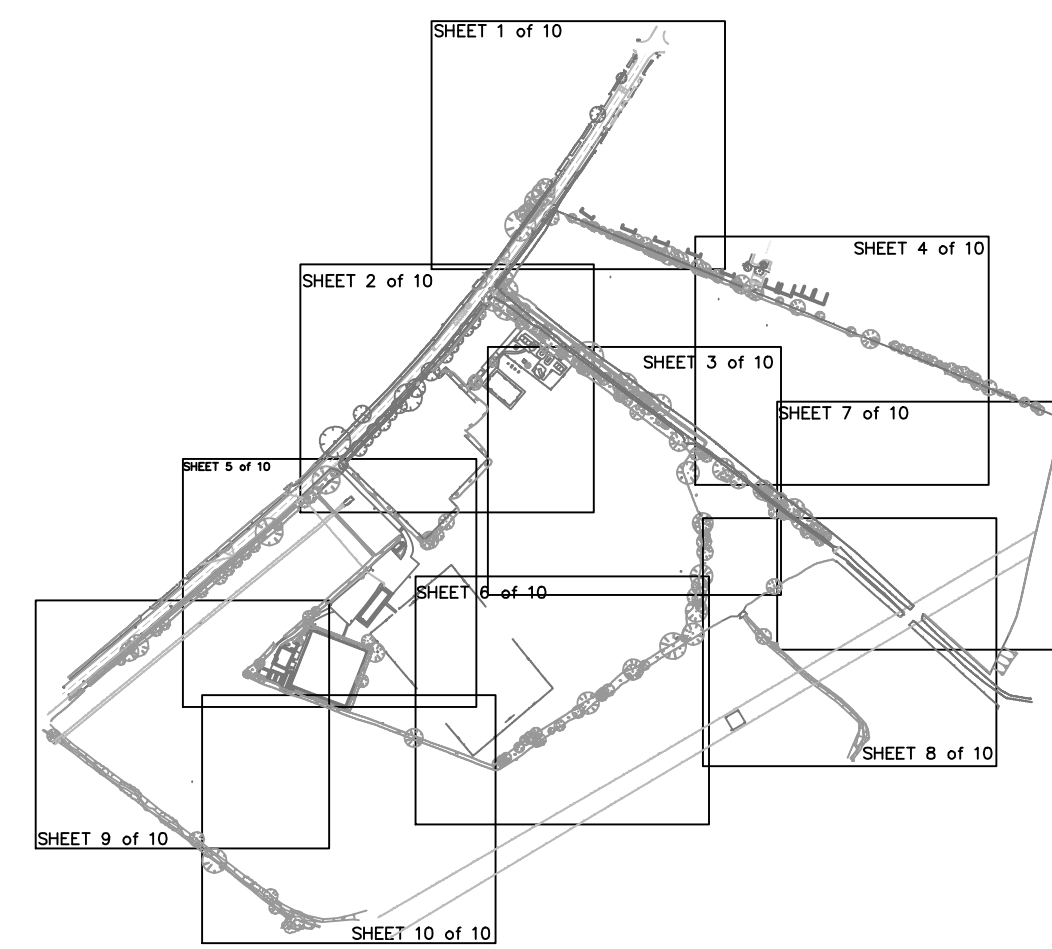
Horizontal Datum: Supplied by client  
Vertical Datum: Supplied by client  
Units: Metres



#### Survey Notes

- 1) This drawing contains elements from drawing S-08-431-01 as supplied by client.
- 2) The survey control is based on the following stations within the above drawing  
S2 E530159.246 N202117.753 Level 62.74  
S3 E530247.144 N202176.436

#### Sheet Layout



#### Legend

|                           |  |   |
|---------------------------|--|---|
| Survey Station            | Spot Level<br>N.B. Spot levels at road edge relate to channel line | Tree with elevation, height in metres and spread to scale |
| Major Contour 1m Interval | Minor Contour 0.5m Interval  | Gate  |
| Overhead Telecoms         | Overhead Electric  | Top of bank   |
|                           |  | Bottom of bank  |
|                           |  | Tree Canopy   |
|                           |  | Foliage/Hedge edge  |

#### Abbreviations

|   |  |  |  |   |   |
|---|--|--|--|---|---|
| PP<br>PR<br>PW<br>SM<br>mH  | Post and Panel Fenceline<br>Post and Rail Fenceline<br>Post and Wire Fenceline<br>Post and Steel Mesh Fenceline<br>Height in Metres  | ER<br>MW<br>CR<br>EPO  | Earth Rod<br>Monitoring Well<br>Cable Rider<br>Electric Pole   | TPO<br>EPO<br>RS<br>BO - C<br>BO - S                                      | Telegraph Pole<br>Electric Pole<br>Road Sign<br>Bollard - Concrete<br>Bollard - Steel   |
| IC<br>IL<br>G<br>DP<br>RW/P<br>FWRP<br>VC<br>RE<br>VP<br>FWS<br>SWG | Inspection Cover<br>Cover Level<br>Invert Level<br>Gully<br>Down Pipe<br>Rain Water Pipe<br>Foul Water Pipe<br>Vent Cover<br>Roofing Eye<br>Vent Pipe<br>Foul Water Sewage<br>Surface Water Sewage | GSV<br>GM<br>GR<br>AV<br>WEST<br>WSV<br>WM<br>WO<br>SL<br>PLM<br>CAB | Gas Valve<br>Gas Meter<br>Gas Risar<br>Air Valve<br>Stop Tap<br>Sluice Valve<br>Water Meter<br>Wash Out<br>Street Light<br>Pipeline Marker<br>Street Cabinet | BO - W<br>LS<br>PI<br>RS<br>TS<br>TSB<br>FP<br>FP<br>TL<br>LA<br>FB<br>DK | Bollard - Wooden<br>Litter Bin<br>Pillar<br>Road Sign<br>Tree Slump<br>Telephone Call Box<br>Flag Pole<br>Tactile Paving<br>Fuel Pump<br>Traffic Induction Loop<br>Ladder<br>Flower Bed<br>Dropped Kerb |

Prepared for: Landis Improvement  
10 Lower Grosvenor Place  
London  
SW1W 0EN

Surveyed by: C. Whalley, R. Baker  
Date: 14th - 22nd August 2014

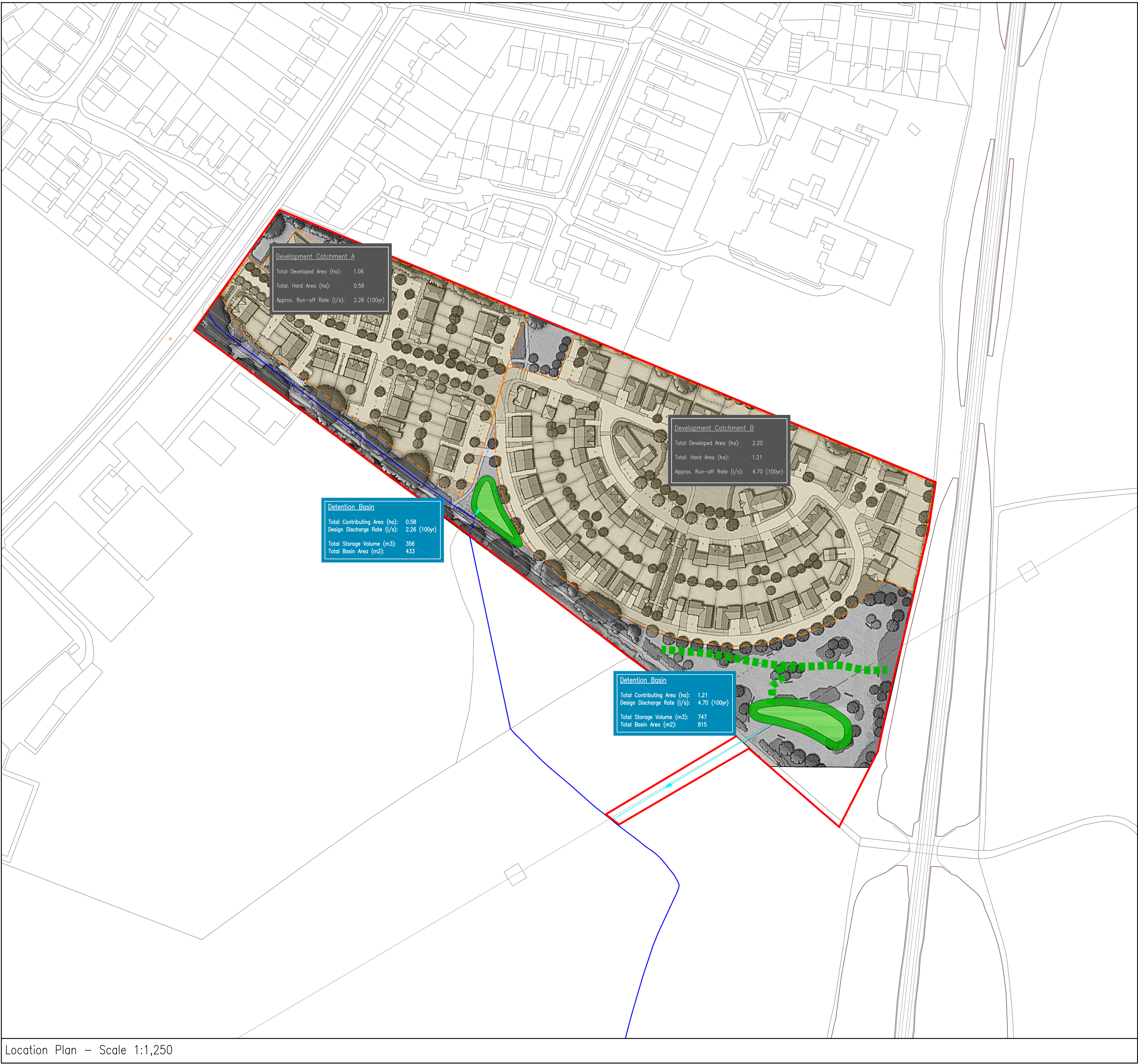
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|-------------------|-----|----------|-------------|-----------|----------|------------|-------------|
| 1667-200-1        | 0   | 20/08/14 | First issue | 1667-0    | CWH/RSB  | MB         | MB          |

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Appendix B

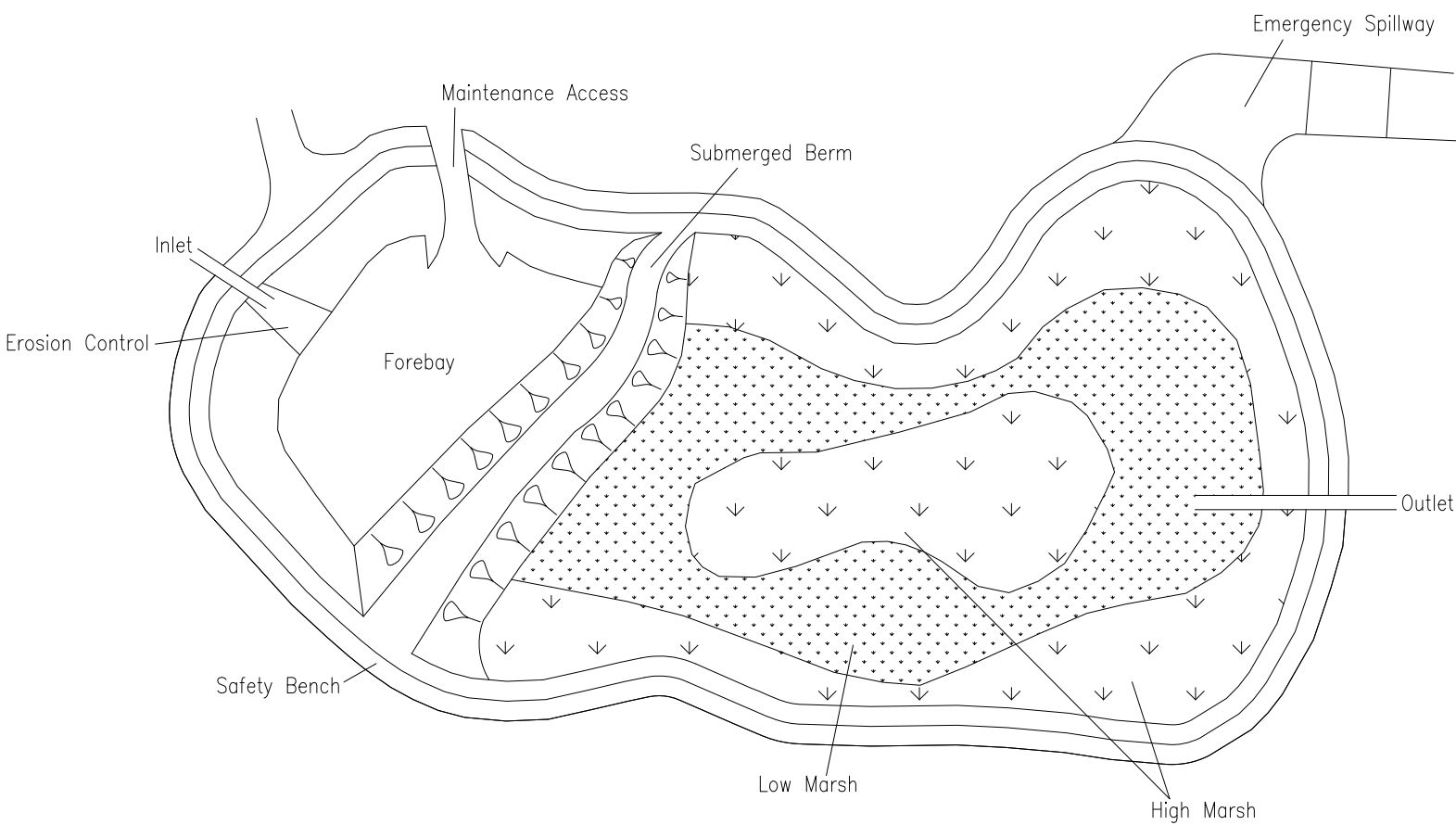
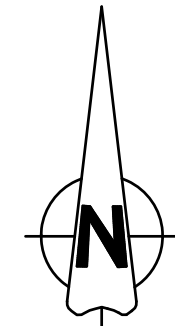
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- NOTES:
- Do not scale from this drawing.
  - All dimensions in metres unless otherwise stated.
  - This drawing has been produced using survey data provided by a Third Party. Brookbanks Consulting Ltd cannot be held responsible for the accuracy of this data. All discrepancies are to be reported to the Engineer immediately, ahead of work commencing.
  - The existing services shown are not necessarily complete nor is their location with regard to position and depth precise. It is the Contractor's responsibility to liaise with all relevant services companies to ensure that all services are accurately located, marked out and adequately protected during all site works.

- KEY:
- Site Boundary
  - Proposed Developable Area
  - Existing Watercourse
  - Potential Culverted Section
  - SuDS Location
  - Likely Enabling Earthworks
  - Proposed Outfall Route



|  |                  |          |         |          |          |
|--|------------------|----------|---------|----------|----------|
| C Latest masterplan added.             |                  | SD       | RM      | RM       | 11.6.15  |
| B Contributing areas adjusted.         |                  | DW       | RM      | RM       | 05.6.15  |
| A Basins relocated following comments. |                  | DW       | RM      | RM       | 23.10.14 |
| Rev.                                   | Revision Details | Drawn    | Checked | Approved | Date     |
|  |                  |          |         |          |          |
| PRELIMINARY                            |                  |          |         |          | 04.08.14 |
| Issue Status                           |                  | Approved |         | Date     |          |
| Drawn                                  | DW               | Checked  | RM      | Date     | AUG 14   |

**Brookbanks**  
Consulting

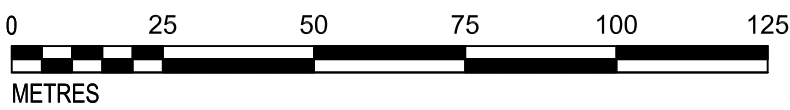
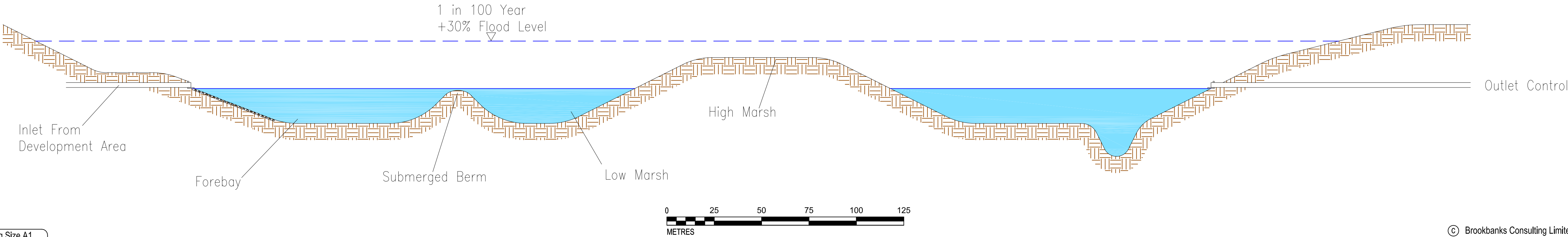
6150 Knights Court Solihull Parkway Birmingham B37 7WY  
Tel (0121) 329 4330 Fax (0121) 329 4331  
www.brookbanks.com



Land at Cuffley  
Hertfordshire

Surface Water  
Drainage Strategy  
Option 1 - Two Outfalls

|             |                 |      |
|-------------|-----------------|------|
| Scale at A1 | Drawing No.     | Rev. |
| 1 : 1,250   | 10316 - DR - 02 | C    |





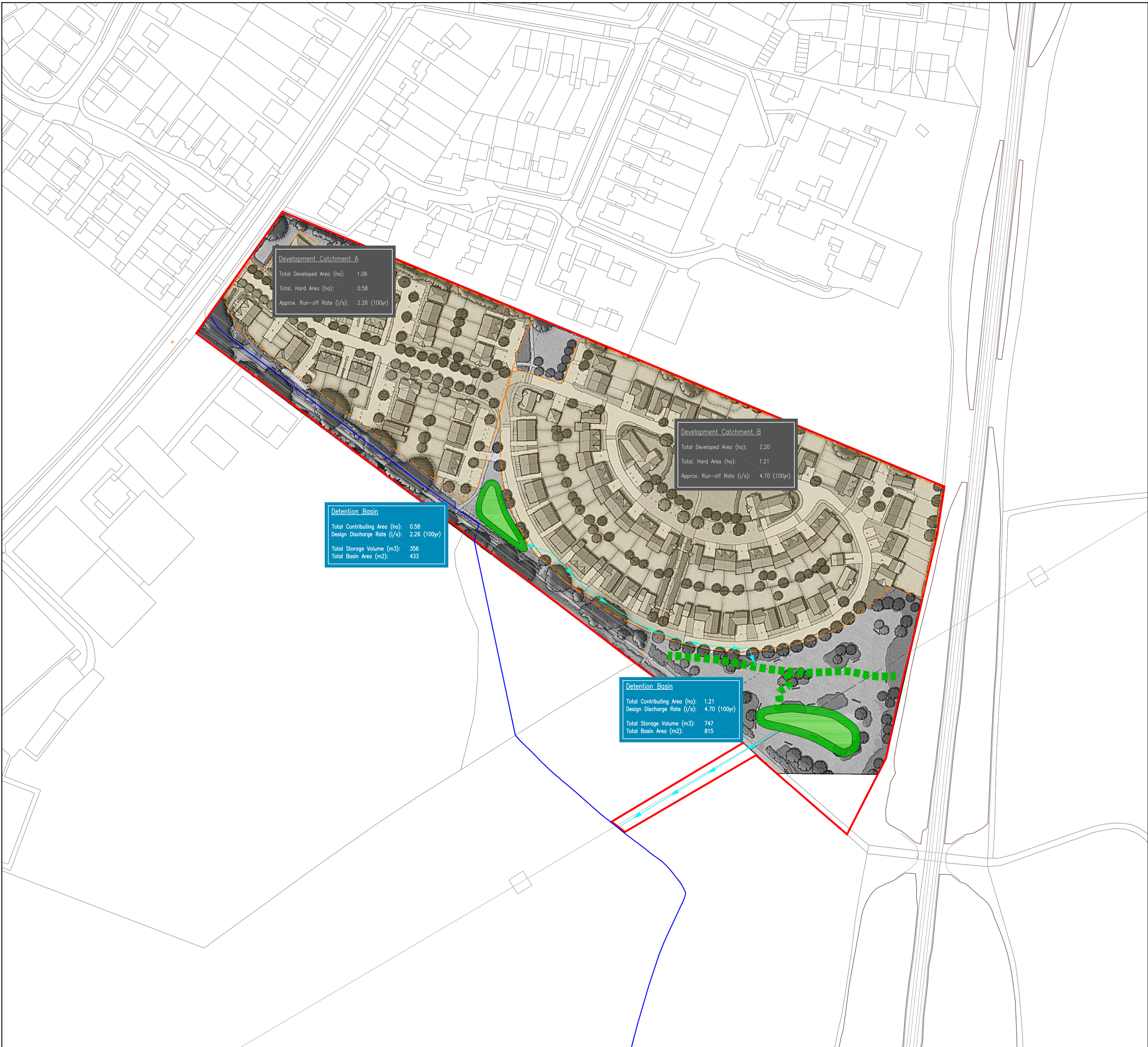
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## Appendix C

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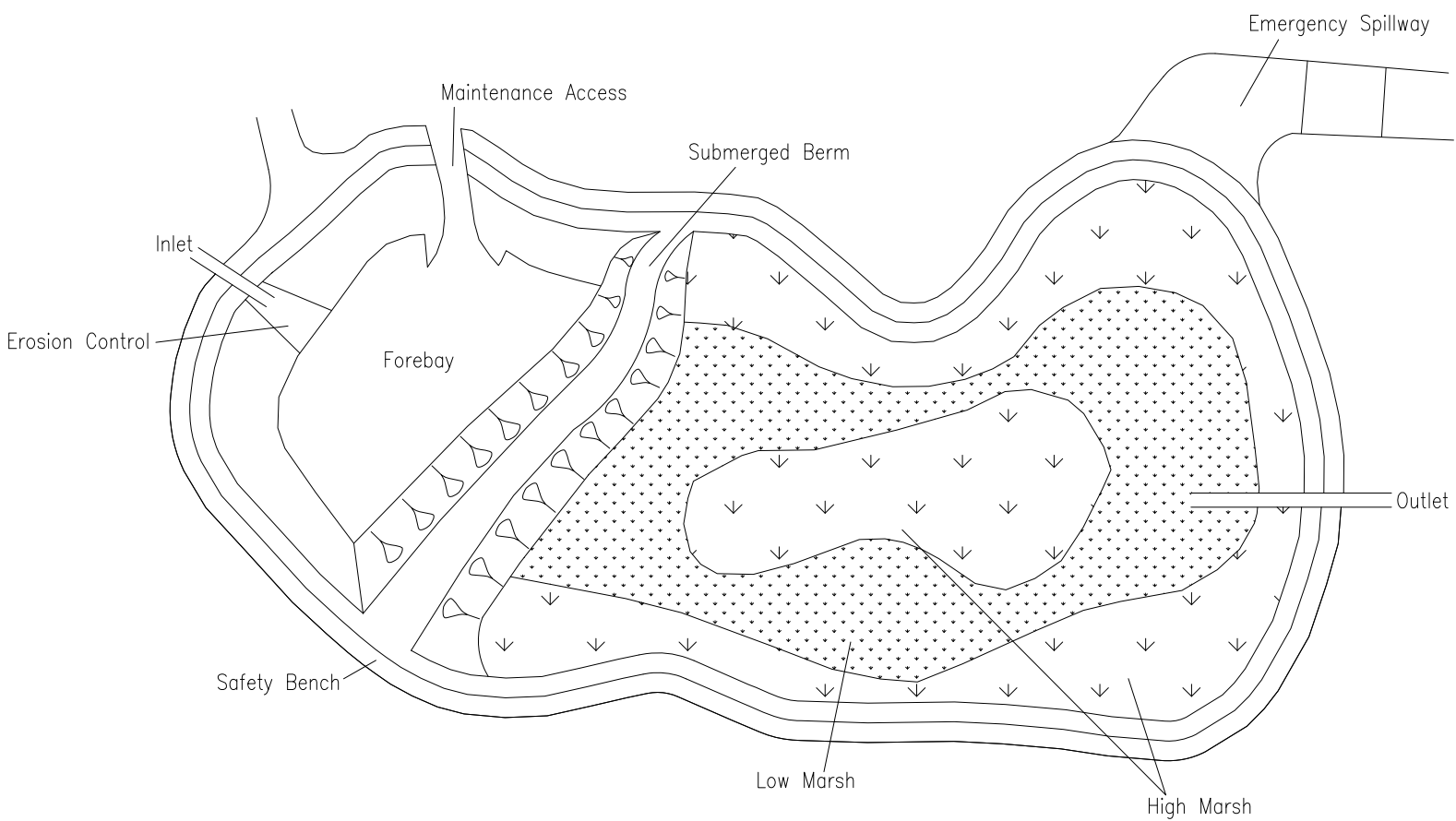
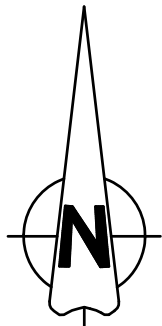


NOTES:

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4. The existing services shown are not necessarily complete nor is their location with regard to position and depth precise. It is the Contractor's responsibility to liaise with all relevant services companies to ensure that all services are accurately located, marked out and adequately protected during all site works.

KEY:

- Site Boundary.
- Proposed Developable Area
- Existing Watercourse
- Potential Culverted Section
- SuDS Location
- Likely Enabling Earthworks
- Proposed Outfall Route



| A            | Latest masterplan added. | SD      | RM      | RM       | 11.15    |
|--------------|--------------------------|---------|---------|----------|----------|
| Rev.         | Revision Details         | Drawn   | Checked | Approved | Date     |
| PRELIMINARY  |                          |         |         |          | 04.08.14 |
| Issue Status |                          |         |         | Approved | Date     |
| Drawn        | DW                       | Checked | RM      | Date     | AUG 14   |



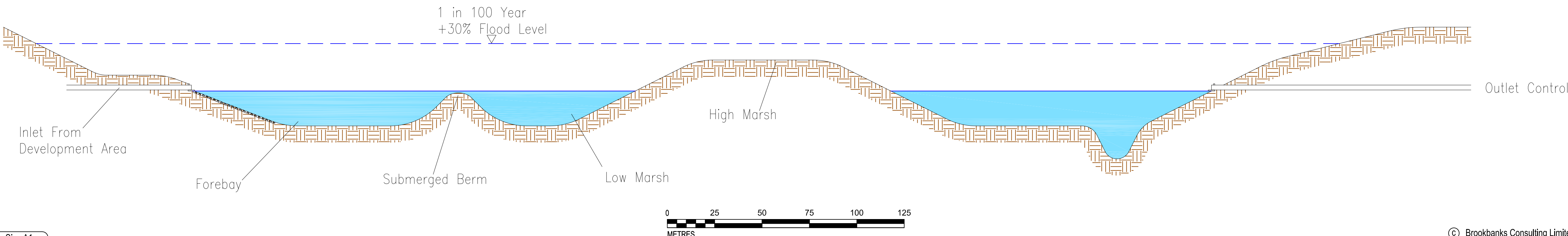
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Land at Cuffley  
Hertfordshire

Surface Water  
Drainage Strategy  
Option 2 - One Outfall

|             |                 |      |
|-------------|-----------------|------|
| Scale at A1 | Drawing No.     | Rev. |
| 1 : 1,250   | 10316 - DR - 10 | A    |






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Appendix D



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|  |                                     |   |
|--|-------------------------------------|---|
| Brookbanks Consulting  |                                     | Page 1  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY   |                                     |  |
| Date 04/08/2014 15:07<br>File  | Designed by dean.ward<br>Checked by |   |
| Micro Drainage   |                                     | Source Control W.12.6   |
| <p style="text-align: center;"><u>IH 124 Mean Annual Flood</u></p> <p style="text-align: center;">Input</p> <p>Return Period (years)    100    SAAR (mm)    630    Urban    0.000<br/> Area (ha) 50.000    Soil 0.450    Region Number    Region 6</p> <p style="text-align: center;"><b>Results      l/s</b></p> <p>QBAR Rural    194.2<br/> QBAR Urban    194.2</p> <p>Q100 years    619.4</p> <p>Q1 year    165.1<br/> Q2 years    171.1<br/> Q5 years    248.6<br/> Q10 years    314.6<br/> Q20 years    389.0<br/> Q25 years    417.1<br/> Q30 years    440.1<br/> Q50 years    508.8<br/> Q100 years    619.4<br/> Q200 years    728.2<br/> Q250 years    763.1<br/> Q1000 years    1002.0</p> |                                     |   |
| ©1982-2011 Micro Drainage Ltd  |                                     |   |




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Appendix E




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|  |   |   |
|--|---|---|
| Brookbanks Consulting  |   | Page 1  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin A<br>1 in 100 Year Event |  |
| Date 30.09.14<br>File DETENTION BASIN A R...                 | Designed by Brookbanks<br>Checked by                        |   |
| Micro Drainage   | Source Control W.12.6                                       |   |

Summary of Results for 100 year Return Period

| Storm<br>Event   | Max<br>Level<br>(m) | Max<br>Depth<br>(m) | Max<br>Control<br>(l/s) | Max<br>Volume<br>(m³) | Status |
|------------------|---------------------|---------------------|-------------------------|-----------------------|--------|
| 15 min Summer    | 0.518               | 0.518               | 1.6                     | 110.7                 | O K    |
| 30 min Summer    | 0.632               | 0.632               | 1.8                     | 141.7                 | O K    |
| 60 min Summer    | 0.735               | 0.735               | 1.9                     | 171.5                 | O K    |
| 120 min Summer   | 0.823               | 0.823               | 2.0                     | 198.9                 | O K    |
| 180 min Summer   | 0.866               | 0.866               | 2.1                     | 212.7                 | O K    |
| 240 min Summer   | 0.890               | 0.890               | 2.1                     | 220.8                 | O K    |
| 360 min Summer   | 0.915               | 0.915               | 2.2                     | 228.8                 | O K    |
| 480 min Summer   | 0.925               | 0.925               | 2.2                     | 232.4                 | O K    |
| 600 min Summer   | 0.928               | 0.928               | 2.2                     | 233.2                 | O K    |
| 720 min Summer   | 0.925               | 0.925               | 2.2                     | 232.2                 | O K    |
| 960 min Summer   | 0.914               | 0.914               | 2.2                     | 228.7                 | O K    |
| 1440 min Summer  | 0.893               | 0.893               | 2.1                     | 221.6                 | O K    |
| 2160 min Summer  | 0.858               | 0.858               | 2.1                     | 210.0                 | O K    |
| 2880 min Summer  | 0.820               | 0.820               | 2.0                     | 198.0                 | O K    |
| 4320 min Summer  | 0.748               | 0.748               | 1.9                     | 175.7                 | O K    |
| 5760 min Summer  | 0.684               | 0.684               | 1.9                     | 156.5                 | O K    |
| 7200 min Summer  | 0.627               | 0.627               | 1.8                     | 140.3                 | O K    |
| 8640 min Summer  | 0.577               | 0.577               | 1.7                     | 126.4                 | O K    |
| 10080 min Summer | 0.532               | 0.532               | 1.6                     | 114.4                 | O K    |
| 15 min Winter    | 0.568               | 0.568               | 1.7                     | 124.1                 | O K    |
| 30 min Winter    | 0.692               | 0.692               | 1.9                     | 158.8                 | O K    |
| 60 min Winter    | 0.803               | 0.803               | 2.0                     | 192.5                 | O K    |
| 120 min Winter   | 0.899               | 0.899               | 2.1                     | 223.7                 | O K    |
| 180 min Winter   | 0.946               | 0.946               | 2.2                     | 239.5                 | O K    |
| 240 min Winter   | 0.974               | 0.974               | 2.2                     | 249.0                 | O K    |
| 360 min Winter   | 1.002               | 1.002               | 2.3                     | 258.9                 | O K    |


| Storm<br>Event   | Rain<br>(mm/hr) | Time-Peak<br>(mins) |
|------------------|-----------------|---------------------|
| 15 min Summer    | 102.824         | 19                  |
| 30 min Summer    | 66.164          | 34                  |
| 60 min Summer    | 40.510          | 64                  |
| 120 min Summer   | 23.988          | 124                 |
| 180 min Summer   | 17.446          | 182                 |
| 240 min Summer   | 13.849          | 242                 |
| 360 min Summer   | 9.946           | 362                 |
| 480 min Summer   | 7.870           | 482                 |
| 600 min Summer   | 6.558           | 600                 |
| 720 min Summer   | 5.649           | 720                 |
| 960 min Summer   | 4.460           | 824                 |
| 1440 min Summer  | 3.194           | 1068                |
| 2160 min Summer  | 2.283           | 1472                |
| 2880 min Summer  | 1.798           | 1876                |
| 4320 min Summer  | 1.283           | 2684                |
| 5760 min Summer  | 1.009           | 3464                |
| 7200 min Summer  | 0.837           | 4256                |
| 8640 min Summer  | 0.718           | 5016                |
| 10080 min Summer | 0.631           | 5752                |
| 15 min Winter    | 102.824         | 19                  |
| 30 min Winter    | 66.164          | 33                  |
| 60 min Winter    | 40.510          | 62                  |
| 120 min Winter   | 23.988          | 122                 |
| 180 min Winter   | 17.446          | 180                 |
| 240 min Winter   | 13.849          | 238                 |
| 360 min Winter   | 9.946           | 354                 |

|  |   |   |
|--|---|---|
| Brookbanks Consulting  |   | Page 2  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin A<br>1 in 100 Year Event |  |
| Date 30.09.14<br>File DETENTION BASIN A R...                 | Designed by Brookbanks<br>Checked by                        |   |
| Micro Drainage   | Source Control W.12.6                                       |   |

Summary of Results for 100 year Return Period

| Storm<br>Event   | Max<br>Level<br>(m) | Max<br>Depth<br>(m) | Max<br>Control<br>(l/s) | Max<br>Volume<br>(m³) | Status |
|------------------|---------------------|---------------------|-------------------------|-----------------------|--------|
| 480 min Winter   | 1.016               | 1.016               | 2.3                     | 264.0                 | O K    |
| 600 min Winter   | 1.022               | 1.022               | 2.3                     | 265.9                 | O K    |
| 720 min Winter   | 1.022               | 1.022               | 2.3                     | 266.0                 | O K    |
| 960 min Winter   | 1.012               | 1.012               | 2.3                     | 262.6                 | O K    |
| 1440 min Winter  | 0.983               | 0.983               | 2.2                     | 252.4                 | O K    |
| 2160 min Winter  | 0.938               | 0.938               | 2.2                     | 236.8                 | O K    |
| 2880 min Winter  | 0.888               | 0.888               | 2.1                     | 220.1                 | O K    |
| 4320 min Winter  | 0.790               | 0.790               | 2.0                     | 188.6                 | O K    |
| 5760 min Winter  | 0.702               | 0.702               | 1.9                     | 161.7                 | O K    |
| 7200 min Winter  | 0.624               | 0.624               | 1.8                     | 139.3                 | O K    |
| 8640 min Winter  | 0.556               | 0.556               | 1.7                     | 120.8                 | O K    |
| 10080 min Winter | 0.497               | 0.497               | 1.6                     | 105.4                 | O K    |
| Storm<br>Event   | Rain<br>(mm/hr)     |                     | Time-Peak<br>(mins)     |                       |        |
| 480 min Winter   | 7.870               |                     | 470                     |                       |        |
| 600 min Winter   | 6.558               |                     | 582                     |                       |        |
| 720 min Winter   | 5.649               |                     | 694                     |                       |        |
| 960 min Winter   | 4.460               |                     | 904                     |                       |        |
| 1440 min Winter  | 3.194               |                     | 1126                    |                       |        |
| 2160 min Winter  | 2.283               |                     | 1580                    |                       |        |
| 2880 min Winter  | 1.798               |                     | 2044                    |                       |        |
| 4320 min Winter  | 1.283               |                     | 2896                    |                       |        |
| 5760 min Winter  | 1.009               |                     | 3744                    |                       |        |
| 7200 min Winter  | 0.837               |                     | 4536                    |                       |        |
| 8640 min Winter  | 0.718               |                     | 5280                    |                       |        |
| 10080 min Winter | 0.631               |                     | 6048                    |                       |        |



|  |   |   |
|--|---|---|
| Brookbanks Consulting  |   | Page 3  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin A<br>1 in 100 Year Event |  |
| Date 30.09.14<br>File DETENTION BASIN A R...                 | Designed by Brookbanks<br>Checked by                        |   |
| Micro Drainage   | Source Control W.12.6                                       |   |

#### Rainfall Details


|                       |                   |                       |       |
|-----------------------|-------------------|-----------------------|-------|
| Rainfall Model        | FSR               | Winter Storms         | Yes   |
| Return Period (years) | 100               | Cv (Summer)           | 0.750 |
| Region                | England and Wales | Cv (Winter)           | 0.840 |
| M5-60 (mm)            | 20.000            | Shortest Storm (mins) | 15    |
| Ratio R               | 0.450             | Longest Storm (mins)  | 10080 |
| Summer Storms         | Yes               | Climate Change %      | +0    |

#### Time / Area Diagram

Total Area (ha) 0.580

| Time<br>(mins) | Area<br>(ha) |
|----------------|--------------|
|----------------|--------------|

|     |       |
|-----|-------|
| 0-4 | 0.580 |
|-----|-------|

|  |   |   |
|--|---|---|
| Brookbanks Consulting  |   | Page 4  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin A<br>1 in 100 Year Event |  |
| Date 30.09.14<br>File DETENTION BASIN A R...                 | Designed by Brookbanks<br>Checked by                        |   |
| Micro Drainage   |   | Source Control W.12.6   |

#### Model Details

Storage is Online Cover Level (m) 1.500


#### Tank or Pond Structure

Invert Level (m) 0.000

| Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|
| 0.000     | 169.6                  | 1.200     | 392.8                  | 2.400     | 0.0                    | 3.600     | 0.0                    | 4.800     | 0.0                    |
| 0.200     | 202.6                  | 1.400     | 434.1                  | 2.600     | 0.0                    | 3.800     | 0.0                    | 5.000     | 0.0                    |
| 0.400     | 238.8                  | 1.600     | 0.0                    | 2.800     | 0.0                    | 4.000     | 0.0                    |           |                        |
| 0.600     | 275.1                  | 1.800     | 0.0                    | 3.000     | 0.0                    | 4.200     | 0.0                    |           |                        |
| 0.800     | 313.7                  | 2.000     | 0.0                    | 3.200     | 0.0                    | 4.400     | 0.0                    |           |                        |
| 1.000     | 352.5                  | 2.200     | 0.0                    | 3.400     | 0.0                    | 4.600     | 0.0                    |           |                        |

#### Orifice Outflow Control

Diameter (m) 0.033 Discharge Coefficient 0.600 Invert Level (m) 0.000


|                             |                          |   |
|-----------------------------|--------------------------|---|
| Brookbanks Consulting       |                          | Page 1  |
| 6150 Knights Court          | Land at Cuffley          |  |
| Solihull Parkway            | Detention Basin A        |   |
| Birmingham B37 7WY          | 1 in 100 Year +30% Event |   |
| Date 30.09.14               | Designed by Brookbanks   |   |
| File DETENTION BASIN A R... | Checked by               |   |
| Micro Drainage              | Source Control W.12.6    |   |

Summary of Results for 100 year Return Period (+30%)

| Storm<br>Event   | Max<br>Level<br>(m) | Max<br>Depth<br>(m) | Max<br>Control<br>(l/s) | Max<br>Volume<br>(m <sup>3</sup> ) | Status     |
|------------------|---------------------|---------------------|-------------------------|------------------------------------|------------|
| 15 min Summer    | 0.641               | 0.641               | 1.8                     | 144.1                              | O K        |
| 30 min Summer    | 0.777               | 0.777               | 2.0                     | 184.5                              | O K        |
| 60 min Summer    | 0.900               | 0.900               | 2.1                     | 223.8                              | O K        |
| 120 min Summer   | 1.006               | 1.006               | 2.3                     | 260.4                              | O K        |
| 180 min Summer   | 1.058               | 1.058               | 2.3                     | 279.2                              | O K        |
| 240 min Summer   | 1.090               | 1.090               | 2.4                     | 290.6                              | O K        |
| 360 min Summer   | 1.123               | 1.123               | 2.4                     | 303.0                              | O K        |
| 480 min Summer   | 1.140               | 1.140               | 2.4                     | 309.5                              | O K        |
| 600 min Summer   | 1.147               | 1.147               | 2.4                     | 312.3                              | O K        |
| 720 min Summer   | 1.149               | 1.149               | 2.4                     | 312.8                              | O K        |
| 960 min Summer   | 1.140               | 1.140               | 2.4                     | 309.5                              | O K        |
| 1440 min Summer  | 1.118               | 1.118               | 2.4                     | 301.2                              | O K        |
| 2160 min Summer  | 1.083               | 1.083               | 2.3                     | 288.1                              | O K        |
| 2880 min Summer  | 1.045               | 1.045               | 2.3                     | 274.3                              | O K        |
| 4320 min Summer  | 0.970               | 0.970               | 2.2                     | 247.6                              | O K        |
| 5760 min Summer  | 0.899               | 0.899               | 2.1                     | 223.7                              | O K        |
| 7200 min Summer  | 0.836               | 0.836               | 2.1                     | 203.0                              | O K        |
| 8640 min Summer  | 0.778               | 0.778               | 2.0                     | 184.9                              | O K        |
| 10080 min Summer | 0.726               | 0.726               | 1.9                     | 169.0                              | O K        |
| 15 min Winter    | 0.701               | 0.701               | 1.9                     | 161.5                              | O K        |
| 30 min Winter    | 0.848               | 0.848               | 2.1                     | 206.9                              | O K        |
| 60 min Winter    | 0.979               | 0.979               | 2.2                     | 251.1                              | O K        |
| 120 min Winter   | 1.095               | 1.095               | 2.4                     | 292.6                              | O K        |
| 180 min Winter   | 1.152               | 1.152               | 2.4                     | 314.2                              | O K        |
| 240 min Winter   | 1.186               | 1.186               | 2.5                     | 327.5                              | O K        |
| 360 min Winter   | 1.224               | 1.224               | 2.5                     | 342.3                              | Flood Risk |

| Storm<br>Event   | Rain<br>(mm/hr) | Time-Peak<br>(mins) |
|------------------|-----------------|---------------------|
| 15 min Summer    | 133.672         | 19                  |
| 30 min Summer    | 86.013          | 34                  |
| 60 min Summer    | 52.662          | 64                  |
| 120 min Summer   | 31.184          | 124                 |
| 180 min Summer   | 22.679          | 182                 |
| 240 min Summer   | 18.004          | 242                 |
| 360 min Summer   | 12.930          | 362                 |
| 480 min Summer   | 10.231          | 482                 |
| 600 min Summer   | 8.526           | 602                 |
| 720 min Summer   | 7.344           | 720                 |
| 960 min Summer   | 5.799           | 914                 |
| 1440 min Summer  | 4.152           | 1138                |
| 2160 min Summer  | 2.968           | 1516                |
| 2880 min Summer  | 2.338           | 1932                |
| 4320 min Summer  | 1.668           | 2728                |
| 5760 min Summer  | 1.312           | 3568                |
| 7200 min Summer  | 1.088           | 4328                |
| 8640 min Summer  | 0.934           | 5104                |
| 10080 min Summer | 0.821           | 5856                |
| 15 min Winter    | 133.672         | 19                  |
| 30 min Winter    | 86.013          | 33                  |
| 60 min Winter    | 52.662          | 64                  |
| 120 min Winter   | 31.184          | 122                 |
| 180 min Winter   | 22.679          | 180                 |
| 240 min Winter   | 18.004          | 240                 |
| 360 min Winter   | 12.930          | 356                 |




|  |  |   |
|--|--|---|
| Brookbanks Consulting  |  | Page 2  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin A<br>1 in 100 Year +30% Event |  |
| Date 30.09.14<br>File DETENTION BASIN A R...                 | Designed by Brookbanks<br>Checked by                             |   |
| Micro Drainage   | Source Control W.12.6  |   |

Summary of Results for 100 year Return Period (+30%)

| Storm<br>Event   | Max<br>Level<br>(m) | Max<br>Depth<br>(m) | Max<br>Control<br>(l/s) | Max<br>Volume<br>(m <sup>3</sup> ) | Status     |
|------------------|---------------------|---------------------|-------------------------|------------------------------------|------------|
| 480 min Winter   | 1.245               | 1.245               | 2.5                     | 350.8                              | Flood Risk |
| 600 min Winter   | 1.256               | 1.256               | 2.5                     | 355.2                              | Flood Risk |
| 720 min Winter   | 1.261               | 1.261               | 2.5                     | 356.9                              | Flood Risk |
| 960 min Winter   | 1.257               | 1.257               | 2.5                     | 355.7                              | Flood Risk |
| 1440 min Winter  | 1.228               | 1.228               | 2.5                     | 343.9                              | Flood Risk |
| 2160 min Winter  | 1.186               | 1.186               | 2.5                     | 327.2                              | O K        |
| 2880 min Winter  | 1.137               | 1.137               | 2.4                     | 308.4                              | O K        |
| 4320 min Winter  | 1.036               | 1.036               | 2.3                     | 271.0                              | O K        |
| 5760 min Winter  | 0.940               | 0.940               | 2.2                     | 237.3                              | O K        |
| 7200 min Winter  | 0.852               | 0.852               | 2.1                     | 208.2                              | O K        |
| 8640 min Winter  | 0.774               | 0.774               | 2.0                     | 183.4                              | O K        |
| 10080 min Winter | 0.703               | 0.703               | 1.9                     | 162.2                              | O K        |

| Storm<br>Event   | Rain<br>(mm/hr) | Time-Peak<br>(mins) |
|------------------|-----------------|---------------------|
| 480 min Winter   | 10.231          | 472                 |
| 600 min Winter   | 8.526           | 586                 |
| 720 min Winter   | 7.344           | 700                 |
| 960 min Winter   | 5.799           | 920                 |
| 1440 min Winter  | 4.152           | 1212                |
| 2160 min Winter  | 2.968           | 1624                |
| 2880 min Winter  | 2.338           | 2080                |
| 4320 min Winter  | 1.668           | 2980                |
| 5760 min Winter  | 1.312           | 3808                |
| 7200 min Winter  | 1.088           | 4616                |
| 8640 min Winter  | 0.934           | 5440                |
| 10080 min Winter | 0.821           | 6160                |

|  |  |   |
|--|--|---|
| Brookbanks Consulting  |  | Page 3  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin A<br>1 in 100 Year +30% Event |  |
| Date 30.09.14<br>File DETENTION BASIN A R...                 | Designed by Brookbanks<br>Checked by                             |   |
| Micro Drainage   | Source Control W.12.6  |   |

#### Rainfall Details


|                       |                   |                       |       |
|-----------------------|-------------------|-----------------------|-------|
| Rainfall Model        | FSR               | Winter Storms         | Yes   |
| Return Period (years) | 100               | Cv (Summer)           | 0.750 |
| Region                | England and Wales | Cv (Winter)           | 0.840 |
| M5-60 (mm)            | 20.000            | Shortest Storm (mins) | 15    |
| Ratio R               | 0.450             | Longest Storm (mins)  | 10080 |
| Summer Storms         | Yes               | Climate Change %      | +30   |

#### Time / Area Diagram

Total Area (ha) 0.580

| Time<br>(mins) | Area<br>(ha) |
|----------------|--------------|
|----------------|--------------|

|     |       |
|-----|-------|
| 0-4 | 0.580 |
|-----|-------|

|  |  |   |
|--|--|---|
| Brookbanks Consulting  |  | Page 4  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin A<br>1 in 100 Year +30% Event |  |
| Date 30.09.14<br>File DETENTION BASIN A R...                 | Designed by Brookbanks<br>Checked by                             |   |
| Micro Drainage   |  | Source Control W.12.6   |

#### Model Details

Storage is Online Cover Level (m) 1.500

#### Tank or Pond Structure


Invert Level (m) 0.000

| Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|
| 0.000     | 169.6                  | 1.200     | 392.8                  | 2.400     | 0.0                    | 3.600     | 0.0                    | 4.800     | 0.0                    |
| 0.200     | 202.6                  | 1.400     | 434.1                  | 2.600     | 0.0                    | 3.800     | 0.0                    | 5.000     | 0.0                    |
| 0.400     | 238.8                  | 1.600     | 0.0                    | 2.800     | 0.0                    | 4.000     | 0.0                    |           |                        |
| 0.600     | 275.1                  | 1.800     | 0.0                    | 3.000     | 0.0                    | 4.200     | 0.0                    |           |                        |
| 0.800     | 313.7                  | 2.000     | 0.0                    | 3.200     | 0.0                    | 4.400     | 0.0                    |           |                        |
| 1.000     | 352.5                  | 2.200     | 0.0                    | 3.400     | 0.0                    | 4.600     | 0.0                    |           |                        |

#### Orifice Outflow Control

Diameter (m) 0.033 Discharge Coefficient 0.600 Invert Level (m) 0.000




|                             |                        |   |
|-----------------------------|------------------------|---|
| Brookbanks Consulting       |                        | Page 1  |
| 6150 Knights Court          | Land at Cuffley        |  |
| Solihull Parkway            | Detention Basin B      |   |
| Birmingham B37 7WY          | 1 in 100 Year Event    |   |
| Date 30.09.14               | Designed by Brookbanks |   |
| File DETENTION BASIN B R... | Checked by             |   |
| Micro Drainage              | Source Control W.12.6  |   |

Summary of Results for 100 year Return Period


| Storm<br>Event   | Max<br>Level<br>(m) | Max<br>Depth<br>(m) | Max<br>Control<br>(l/s) | Max<br>Volume<br>(m³) | Status |
|------------------|---------------------|---------------------|-------------------------|-----------------------|--------|
| 15 min Summer    | 0.421               | 0.421               | 3.2                     | 231.2                 | O K    |
| 30 min Summer    | 0.529               | 0.529               | 3.6                     | 296.0                 | O K    |
| 60 min Summer    | 0.629               | 0.629               | 3.9                     | 358.7                 | O K    |
| 120 min Summer   | 0.718               | 0.718               | 4.2                     | 416.4                 | O K    |
| 180 min Summer   | 0.763               | 0.763               | 4.3                     | 445.8                 | O K    |
| 240 min Summer   | 0.789               | 0.789               | 4.4                     | 463.2                 | O K    |
| 360 min Summer   | 0.815               | 0.815               | 4.5                     | 480.9                 | O K    |
| 480 min Summer   | 0.827               | 0.827               | 4.5                     | 489.3                 | O K    |
| 600 min Summer   | 0.831               | 0.831               | 4.5                     | 491.8                 | O K    |
| 720 min Summer   | 0.829               | 0.829               | 4.5                     | 490.5                 | O K    |
| 960 min Summer   | 0.820               | 0.820               | 4.5                     | 484.6                 | O K    |
| 1440 min Summer  | 0.802               | 0.802               | 4.4                     | 472.1                 | O K    |
| 2160 min Summer  | 0.770               | 0.770               | 4.3                     | 450.9                 | O K    |
| 2880 min Summer  | 0.736               | 0.736               | 4.2                     | 428.1                 | O K    |
| 4320 min Summer  | 0.669               | 0.669               | 4.0                     | 384.2                 | O K    |
| 5760 min Summer  | 0.608               | 0.608               | 3.8                     | 345.7                 | O K    |
| 7200 min Summer  | 0.556               | 0.556               | 3.7                     | 312.7                 | O K    |
| 8640 min Summer  | 0.510               | 0.510               | 3.5                     | 284.3                 | O K    |
| 10080 min Summer | 0.469               | 0.469               | 3.3                     | 259.7                 | O K    |
| 15 min Winter    | 0.468               | 0.468               | 3.3                     | 259.1                 | O K    |
| 30 min Winter    | 0.586               | 0.586               | 3.8                     | 331.7                 | O K    |
| 60 min Winter    | 0.696               | 0.696               | 4.1                     | 402.2                 | O K    |
| 120 min Winter   | 0.796               | 0.796               | 4.4                     | 467.8                 | O K    |
| 180 min Winter   | 0.845               | 0.845               | 4.5                     | 501.5                 | O K    |
| 240 min Winter   | 0.875               | 0.875               | 4.6                     | 521.7                 | O K    |
| 360 min Winter   | 0.906               | 0.906               | 4.7                     | 543.2                 | O K    |

| Storm<br>Event   | Rain<br>(mm/hr) | Time-Peak<br>(mins) |
|------------------|-----------------|---------------------|
| 15 min Summer    | 102.824         | 19                  |
| 30 min Summer    | 66.164          | 34                  |
| 60 min Summer    | 40.510          | 64                  |
| 120 min Summer   | 23.988          | 124                 |
| 180 min Summer   | 17.446          | 182                 |
| 240 min Summer   | 13.849          | 242                 |
| 360 min Summer   | 9.946           | 362                 |
| 480 min Summer   | 7.870           | 482                 |
| 600 min Summer   | 6.558           | 600                 |
| 720 min Summer   | 5.649           | 720                 |
| 960 min Summer   | 4.460           | 826                 |
| 1440 min Summer  | 3.194           | 1068                |
| 2160 min Summer  | 2.283           | 1472                |
| 2880 min Summer  | 1.798           | 1876                |
| 4320 min Summer  | 1.283           | 2684                |
| 5760 min Summer  | 1.009           | 3512                |
| 7200 min Summer  | 0.837           | 4256                |
| 8640 min Summer  | 0.718           | 5016                |
| 10080 min Summer | 0.631           | 5752                |
| 15 min Winter    | 102.824         | 19                  |
| 30 min Winter    | 66.164          | 33                  |
| 60 min Winter    | 40.510          | 62                  |
| 120 min Winter   | 23.988          | 122                 |
| 180 min Winter   | 17.446          | 180                 |
| 240 min Winter   | 13.849          | 238                 |
| 360 min Winter   | 9.946           | 354                 |

|  |   |   |
|--|---|---|
| Brookbanks Consulting  |   | Page 2  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin B<br>1 in 100 Year Event |  |
| Date 30.09.14<br>File DETENTION BASIN B R...                 | Designed by Brookbanks<br>Checked by                        |   |
| Micro Drainage   | Source Control W.12.6                                       |   |

Summary of Results for 100 year Return Period

| Storm<br>Event   | Max<br>Level<br>(m) | Max<br>Depth<br>(m) | Max<br>Control<br>(l/s) | Max<br>Volume<br>(m³) | Status |
|------------------|---------------------|---------------------|-------------------------|-----------------------|--------|
| 480 min Winter   | 0.922               | 0.922               | 4.7                     | 554.5                 | O K    |
| 600 min Winter   | 0.929               | 0.929               | 4.8                     | 559.3                 | O K    |
| 720 min Winter   | 0.930               | 0.930               | 4.8                     | 560.1                 | O K    |
| 960 min Winter   | 0.921               | 0.921               | 4.7                     | 554.3                 | O K    |
| 1440 min Winter  | 0.895               | 0.895               | 4.7                     | 535.6                 | O K    |
| 2160 min Winter  | 0.852               | 0.852               | 4.6                     | 506.3                 | O K    |
| 2880 min Winter  | 0.805               | 0.805               | 4.4                     | 474.0                 | O K    |
| 4320 min Winter  | 0.711               | 0.711               | 4.2                     | 412.0                 | O K    |
| 5760 min Winter  | 0.628               | 0.628               | 3.9                     | 358.2                 | O K    |
| 7200 min Winter  | 0.556               | 0.556               | 3.7                     | 313.0                 | O K    |
| 8640 min Winter  | 0.495               | 0.495               | 3.4                     | 275.3                 | O K    |
| 10080 min Winter | 0.442               | 0.442               | 3.2                     | 243.6                 | O K    |
| Storm<br>Event   | Rain<br>(mm/hr)     |                     | Time-Peak<br>(mins)     |                       |        |
| 480 min Winter   | 7.870               |                     | 470                     |                       |        |
| 600 min Winter   | 6.558               |                     | 582                     |                       |        |
| 720 min Winter   | 5.649               |                     | 694                     |                       |        |
| 960 min Winter   | 4.460               |                     | 904                     |                       |        |
| 1440 min Winter  | 3.194               |                     | 1126                    |                       |        |
| 2160 min Winter  | 2.283               |                     | 1580                    |                       |        |
| 2880 min Winter  | 1.798               |                     | 2044                    |                       |        |
| 4320 min Winter  | 1.283               |                     | 2896                    |                       |        |
| 5760 min Winter  | 1.009               |                     | 3744                    |                       |        |
| 7200 min Winter  | 0.837               |                     | 4536                    |                       |        |
| 8640 min Winter  | 0.718               |                     | 5280                    |                       |        |
| 10080 min Winter | 0.631               |                     | 6056                    |                       |        |

|  |   |   |
|--|---|---|
| Brookbanks Consulting  |   | Page 3  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin B<br>1 in 100 Year Event |  |
| Date 30.09.14<br>File DETENTION BASIN B R...                 | Designed by Brookbanks<br>Checked by                        |   |
| Micro Drainage   | Source Control W.12.6                                       |   |

#### Rainfall Details


|                       |                   |                       |       |
|-----------------------|-------------------|-----------------------|-------|
| Rainfall Model        | FSR               | Winter Storms         | Yes   |
| Return Period (years) | 100               | Cv (Summer)           | 0.750 |
| Region                | England and Wales | Cv (Winter)           | 0.840 |
| M5-60 (mm)            | 20.000            | Shortest Storm (mins) | 15    |
| Ratio R               | 0.450             | Longest Storm (mins)  | 10080 |
| Summer Storms         | Yes               | Climate Change %      | +0    |

#### Time / Area Diagram

Total Area (ha) 1.210

| Time<br>(mins) | Area<br>(ha) |
|----------------|--------------|
|----------------|--------------|

|     |       |
|-----|-------|
| 0-4 | 1.210 |
|-----|-------|

|  |   |   |
|--|---|---|
| Brookbanks Consulting  |   | Page 4  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin B<br>1 in 100 Year Event |  |
| Date 30.09.14<br>File DETENTION BASIN B R...                 | Designed by Brookbanks<br>Checked by                        |   |
| Micro Drainage   |   | Source Control W.12.6   |

#### Model Details

Storage is Online Cover Level (m) 1.500

#### Tank or Pond Structure


Invert Level (m) 0.000

| Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|
| 0.000     | 506.7                  | 1.200     | 766.4                  | 2.400     | 0.0                    | 3.600     | 0.0                    | 4.800     | 0.0                    |
| 0.200     | 546.3                  | 1.400     | 815.6                  | 2.600     | 0.0                    | 3.800     | 0.0                    | 5.000     | 0.0                    |
| 0.400     | 587.5                  | 1.600     | 0.0                    | 2.800     | 0.0                    | 4.000     | 0.0                    |           |                        |
| 0.600     | 629.9                  | 1.800     | 0.0                    | 3.000     | 0.0                    | 4.200     | 0.0                    |           |                        |
| 0.800     | 674.0                  | 2.000     | 0.0                    | 3.200     | 0.0                    | 4.400     | 0.0                    |           |                        |
| 1.000     | 719.8                  | 2.200     | 0.0                    | 3.400     | 0.0                    | 4.600     | 0.0                    |           |                        |

#### Orifice Outflow Control

Diameter (m) 0.049 Discharge Coefficient 0.600 Invert Level (m) 0.000




|                             |                          |   |
|-----------------------------|--------------------------|---|
| Brookbanks Consulting       |                          | Page 1  |
| 6150 Knights Court          | Land at Cuffley          |  |
| Solihull Parkway            | Detention Basin B        |   |
| Birmingham B37 7WY          | 1 in 100 Year +30% Event |   |
| Date 30.09.14               | Designed by Brookbanks   |   |
| File DETENTION BASIN B R... | Checked by               |   |
| Micro Drainage              | Source Control W.12.6    |   |

Summary of Results for 100 year Return Period (+30%)


| Storm<br>Event   | Max<br>Level<br>(m) | Max<br>Depth<br>(m) | Max<br>Control<br>(l/s) | Max<br>Volume<br>(m³) | Status |
|------------------|---------------------|---------------------|-------------------------|-----------------------|--------|
| 15 min Summer    | 0.537               | 0.537               | 3.6                     | 300.9                 | O K    |
| 30 min Summer    | 0.671               | 0.671               | 4.0                     | 385.4                 | O K    |
| 60 min Summer    | 0.795               | 0.795               | 4.4                     | 467.6                 | O K    |
| 120 min Summer   | 0.907               | 0.907               | 4.7                     | 544.3                 | O K    |
| 180 min Summer   | 0.963               | 0.963               | 4.9                     | 584.0                 | O K    |
| 240 min Summer   | 0.997               | 0.997               | 4.9                     | 608.2                 | O K    |
| 360 min Summer   | 1.034               | 1.034               | 5.0                     | 634.6                 | O K    |
| 480 min Summer   | 1.053               | 1.053               | 5.1                     | 648.9                 | O K    |
| 600 min Summer   | 1.062               | 1.062               | 5.1                     | 655.3                 | O K    |
| 720 min Summer   | 1.064               | 1.064               | 5.1                     | 656.8                 | O K    |
| 960 min Summer   | 1.056               | 1.056               | 5.1                     | 651.1                 | O K    |
| 1440 min Summer  | 1.036               | 1.036               | 5.0                     | 636.3                 | O K    |
| 2160 min Summer  | 1.003               | 1.003               | 5.0                     | 612.0                 | O K    |
| 2880 min Summer  | 0.966               | 0.966               | 4.9                     | 585.6                 | O K    |
| 4320 min Summer  | 0.891               | 0.891               | 4.7                     | 533.0                 | O K    |
| 5760 min Summer  | 0.821               | 0.821               | 4.5                     | 485.0                 | O K    |
| 7200 min Summer  | 0.759               | 0.759               | 4.3                     | 443.1                 | O K    |
| 8640 min Summer  | 0.703               | 0.703               | 4.1                     | 406.3                 | O K    |
| 10080 min Summer | 0.653               | 0.653               | 4.0                     | 373.9                 | O K    |
| 15 min Winter    | 0.595               | 0.595               | 3.8                     | 337.1                 | O K    |
| 30 min Winter    | 0.742               | 0.742               | 4.2                     | 431.9                 | O K    |
| 60 min Winter    | 0.878               | 0.878               | 4.6                     | 524.3                 | O K    |
| 120 min Winter   | 1.002               | 1.002               | 5.0                     | 611.3                 | O K    |
| 180 min Winter   | 1.064               | 1.064               | 5.1                     | 656.7                 | O K    |
| 240 min Winter   | 1.102               | 1.102               | 5.2                     | 684.7                 | O K    |
| 360 min Winter   | 1.144               | 1.144               | 5.3                     | 716.2                 | O K    |

| Storm<br>Event   | Rain<br>(mm/hr) | Time-Peak<br>(mins) |
|------------------|-----------------|---------------------|
| 15 min Summer    | 133.672         | 19                  |
| 30 min Summer    | 86.013          | 34                  |
| 60 min Summer    | 52.662          | 64                  |
| 120 min Summer   | 31.184          | 124                 |
| 180 min Summer   | 22.679          | 182                 |
| 240 min Summer   | 18.004          | 242                 |
| 360 min Summer   | 12.930          | 362                 |
| 480 min Summer   | 10.231          | 482                 |
| 600 min Summer   | 8.526           | 602                 |
| 720 min Summer   | 7.344           | 720                 |
| 960 min Summer   | 5.799           | 912                 |
| 1440 min Summer  | 4.152           | 1126                |
| 2160 min Summer  | 2.968           | 1512                |
| 2880 min Summer  | 2.338           | 1928                |
| 4320 min Summer  | 1.668           | 2728                |
| 5760 min Summer  | 1.312           | 3568                |
| 7200 min Summer  | 1.088           | 4328                |
| 8640 min Summer  | 0.934           | 5104                |
| 10080 min Summer | 0.821           | 5856                |
| 15 min Winter    | 133.672         | 19                  |
| 30 min Winter    | 86.013          | 33                  |
| 60 min Winter    | 52.662          | 64                  |
| 120 min Winter   | 31.184          | 122                 |
| 180 min Winter   | 22.679          | 180                 |
| 240 min Winter   | 18.004          | 240                 |
| 360 min Winter   | 12.930          | 356                 |

|  |  |   |
|--|--|---|
| Brookbanks Consulting  |  | Page 2  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin B<br>1 in 100 Year +30% Event |  |
| Date 30.09.14<br>File DETENTION BASIN B R...                 | Designed by Brookbanks<br>Checked by                             |   |
| Micro Drainage   | Source Control W.12.6  |   |

Summary of Results for 100 year Return Period (+30%)

| Storm<br>Event   | Max<br>Level<br>(m) | Max<br>Depth<br>(m) | Max<br>Control<br>(l/s) | Max<br>Volume<br>(m³) | Status |
|------------------|---------------------|---------------------|-------------------------|-----------------------|--------|
| 480 min Winter   | 1.168               | 1.168               | 5.4                     | 734.3                 | O K    |
| 600 min Winter   | 1.180               | 1.180               | 5.4                     | 743.8                 | O K    |
| 720 min Winter   | 1.186               | 1.186               | 5.4                     | 747.8                 | O K    |
| 960 min Winter   | 1.183               | 1.183               | 5.4                     | 746.0                 | O K    |
| 1440 min Winter  | 1.154               | 1.154               | 5.3                     | 723.7                 | O K    |
| 2160 min Winter  | 1.112               | 1.112               | 5.2                     | 692.0                 | O K    |
| 2880 min Winter  | 1.062               | 1.062               | 5.1                     | 655.2                 | O K    |
| 4320 min Winter  | 0.959               | 0.959               | 4.8                     | 580.9                 | O K    |
| 5760 min Winter  | 0.863               | 0.863               | 4.6                     | 513.6                 | O K    |
| 7200 min Winter  | 0.777               | 0.777               | 4.3                     | 455.2                 | O K    |
| 8640 min Winter  | 0.701               | 0.701               | 4.1                     | 405.0                 | O K    |
| 10080 min Winter | 0.634               | 0.634               | 3.9                     | 362.1                 | O K    |
| Storm<br>Event   | Rain<br>(mm/hr)     |                     | Time-Peak<br>(mins)     |                       |        |
| 480 min Winter   | 10.231              |                     | 472                     |                       |        |
| 600 min Winter   | 8.526               |                     | 584                     |                       |        |
| 720 min Winter   | 7.344               |                     | 698                     |                       |        |
| 960 min Winter   | 5.799               |                     | 916                     |                       |        |
| 1440 min Winter  | 4.152               |                     | 1184                    |                       |        |
| 2160 min Winter  | 2.968               |                     | 1624                    |                       |        |
| 2880 min Winter  | 2.338               |                     | 2076                    |                       |        |
| 4320 min Winter  | 1.668               |                     | 2980                    |                       |        |
| 5760 min Winter  | 1.312               |                     | 3808                    |                       |        |
| 7200 min Winter  | 1.088               |                     | 4616                    |                       |        |
| 8640 min Winter  | 0.934               |                     | 5440                    |                       |        |
| 10080 min Winter | 0.821               |                     | 6160                    |                       |        |

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|--|--|---|
| Brookbanks Consulting  |  | Page 3  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin B<br>1 in 100 Year +30% Event |  |
| Date 30.09.14<br>File DETENTION BASIN B R...                 | Designed by Brookbanks<br>Checked by                             |   |
| Micro Drainage   | Source Control W.12.6  |   |

Rainfall Details


|                       |                   |                       |       |
|-----------------------|-------------------|-----------------------|-------|
| Rainfall Model        | FSR               | Winter Storms         | Yes   |
| Return Period (years) | 100               | Cv (Summer)           | 0.750 |
| Region                | England and Wales | Cv (Winter)           | 0.840 |
| M5-60 (mm)            | 20.000            | Shortest Storm (mins) | 15    |
| Ratio R               | 0.450             | Longest Storm (mins)  | 10080 |
| Summer Storms         | Yes               | Climate Change %      | +30   |

Time / Area Diagram

Total Area (ha) 1.210

| Time   | Area |
|--------|------|
| (mins) | (ha) |

|     |       |
|-----|-------|
| 0-4 | 1.210 |
|-----|-------|

|  |  |   |
|--|--|---|
| Brookbanks Consulting  |  | Page 4  |
| 6150 Knights Court<br>Solihull Parkway<br>Birmingham B37 7WY | Land at Cuffley<br>Detention Basin B<br>1 in 100 Year +30% Event |  |
| Date 30.09.14<br>File DETENTION BASIN B R...                 | Designed by Brookbanks<br>Checked by                             |   |
| Micro Drainage   | Source Control W.12.6  |   |

#### Model Details

Storage is Online Cover Level (m) 1.500

#### Tank or Pond Structure

Invert Level (m) 0.000

| Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|
| 0.000     | 506.7                  | 1.200     | 766.4                  | 2.400     | 0.0                    | 3.600     | 0.0                    | 4.800     | 0.0                    |
| 0.200     | 546.3                  | 1.400     | 815.6                  | 2.600     | 0.0                    | 3.800     | 0.0                    | 5.000     | 0.0                    |
| 0.400     | 587.5                  | 1.600     | 0.0                    | 2.800     | 0.0                    | 4.000     | 0.0                    |           |                        |
| 0.600     | 629.9                  | 1.800     | 0.0                    | 3.000     | 0.0                    | 4.200     | 0.0                    |           |                        |
| 0.800     | 674.0                  | 2.000     | 0.0                    | 3.200     | 0.0                    | 4.400     | 0.0                    |           |                        |
| 1.000     | 719.8                  | 2.200     | 0.0                    | 3.400     | 0.0                    | 4.600     | 0.0                    |           |                        |

#### Orifice Outflow Control

Diameter (m) 0.049 Discharge Coefficient 0.600 Invert Level (m) 0.000



Appendix F

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**F.A.O: Miss G Ogden**

Brookbanks Consulting Ltd,  
6150 Knights Court,  
Solihull Parkway,  
Birmingham Business Park,  
Birmingham,  
B37 7WY

Developer Services Waste  
Clearwater Court 3<sup>rd</sup> West  
Vastern Road, Reading, RG1 8DB

Your ref  
Our ref 1012049666/50024655

Name Shaun Picart  
Phone 0845 850 2777  
Fax 0118 373 8973  
E-Mail

Date: 02/09/2014

Dear Mrs Ogden,

**Re: Pre-Development Enquiry For Proposed Development At L/a Northaw Road East, Cuffley, EN6 4LY**

I refer to your application for the above site requesting that a pre-development capacity check is undertaken.

Thankyou for providing the correct fee and information regarding the site. I can now respond as follows;

With regard to clean water supplies, this comes within the area covered by the Affinity Water Company. For your information the address to write to is - Veolia Water Company The Hub, Tamblin Way, Hatfield, Herts, AL10 9EZ - Tel - 0845 782 3333.

**Foul Drainage**

From the information you have provided, I can confirm that the existing foul water sewer does have sufficient capacity to accommodate the proposed foul water discharge from the proposal as specified in your application.

Please note: There are public sewers crossing the development site. In order to protect public sewers and to ensure that Thames Water can gain access to those sewers for future repair and maintenance, approval should be sought from Thames Water where the erection of a building would come within 3 metres of, a public sewer.

**Surface Water Drainage**

Please note that discharging surface water to the public sewer network should only be considered after all other methods of disposal have been investigated and proven to be not viable. In accordance with the Building Act 2000 Clause H3.3, positive connection to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. The disposal hierarchy being: 1<sup>st</sup> Soakaways; 2<sup>nd</sup> Watercourses; 3<sup>rd</sup> Sewers.

In respect of surface water it is recommended that you should ensure that storm flows are attenuated or regulated into the receiving drainage system through on

Thames Water Utilities Ltd  
Developer Services  
Clearwater Court 3<sup>rd</sup> West  
Vastern Road  
Reading RG1 8DB

T 0845 850 2777  
F 0207.713.3888  
I www.thames-water.com

Registered in England and Wales  
No. 2366661, Registered office  
Clearwater Court, Vastern Road  
Reading, Berks. RG1 8DB



or off site storage. Connections to public sewers are not permitted for the removal of groundwater.

All connection requests are subject to a full Section 106 (Water Industry Act 1991) application before the Company can confirm approval to the connection itself. Please also note that capacity in the public sewerage system cannot be reserved.

**Please note that the views expressed by Thames Water in this letter are in response to this pre development enquiry at this time and do not represent our final views on any future planning applications made in relation to this site.**

**We reserve the right to change our position in relation to any such planning applications.**

Yours faithfully

A handwritten signature in black ink, appearing to read "Shaun Picart", written in a cursive style.

Shaun Picart  
Development Engineer

Appendix G

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Mr Richard Moorcroft  
Brookbanks Consulting  
Knights Court (6150) Solihull Parkway  
Birmingham Business Park  
Birmingham  
B37 7WY

**Our ref:** NE/2014/121698/01-L01  
**Your ref:** 10316/FRA/01  
**Date:** 1 December 2014

Dear Richard

**Charged enquiry: Flood Risk Assessment review for Land At Northaw Road, Cuffley.**

We have reviewed the draft Flood Risk Assessment (FRA) (Lands End Ref 10316/FRA/01 dated 31/10/14) and we are very pleased to see that you are proposing ponds, swales and permeable paving and a better than Greenfield run off rate.

Should this FRA accompany a full planning application we would have no objection on flood risk grounds, and would apply conditions to ensure the surface water drainage system is carried out as proposed.

To discharge the conditions, we would need to see the below points, some of these have been partly covered within the information submitted in the FRA.

- a) A clearly labelled drainage layout plan showing pipe networks and any attenuation areas or storage locations. This plan should show any pipe 'node numbers' that have been referred to in network calculations and it should also show invert and cover levels of manholes.
- b) Confirmation of the critical storm duration.
- c) Where infiltration forms part of the proposed storm water system such as infiltration trenches and soakaways, soakage test results and test locations are to be submitted in accordance with BRE digest 365.
- d) Where on site attenuation is achieved through ponds, swales, geocellular storage or other similar methods, calculations showing the volume of these are also required.
- e) Where an outfall discharge control device is to be used such as a hydrobrake or twin orifice, this should be shown on the plan with the rate of discharge stated.
- f) Calculations should demonstrate how the system operates during a 1 in 100 chance in any year critical duration storm event, including an allowance for climate change in line with the 'Planning Practice Guidance: Flood Risk and Coastal Change'. If overland flooding occurs in this event, a plan should also be submitted detailing the location of overland flow paths and the extent and depth of ponding.

I hope that you have found this helpful, should you have any queries please feel free to contact me.

Yours sincerely

**Mr Kai Mitchell**  
**Sustainable Places Planning Advisor**

Tel: 01707 632388

E-mail [SPHatfield@environment-agency.gov.uk](mailto:SPHatfield@environment-agency.gov.uk)

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