# APPENDIX ES11.2

# GREENFIELD RUNOFF CALCULATIONS

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# Catchment 1

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| **Calculated by:** | Chris Greenwood |
| **Site name:** | Cooks Hole |
| **Site location:** | Thornhaugh |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

| | |
|---|---|
| **Latitude:** | 52.58665° N |
| **Longitude:** | 0.44932° W |
| **Reference:** | 3022247618 |
| **Date:** | Dec 19 2023 12:12 |

## Runoff estimation approach

FEH Statistical

## Site characteristics

**Total site area (ha):** 19.9384686000

## Methodology

| | |
|---|---|
| **$Q_{MED}$ estimation method:** | Calculate from BFI and SAAR |
| **BFI and SPR method:** | Specify BFI manually |
| **HOST class:** | N/A |
| **BFI / BFIHOST:** | 0.933 |
| **$Q_{MED}$ (l/s):** | |
| **$Q_{BAR}$ / $Q_{MED}$ factor:** | 1.12 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|

## Notes

### (1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible.

| | | |
|---|---|---|
| SAAR (mm): | 561 | 561 |
| Hydrological region: | 5 | 5 |
| Growth curve factor 1 year: | 0.87 | 0.87 |
| Growth curve factor 30 years: | 2.45 | 2.45 |
| Growth curve factor 100 years: | 3.56 | 3.56 |
| Growth curve factor 200 years: | 4.21 | 4.21 |

Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

## (3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | | 5.02 |
| 1 in 1 year (l/s): | | 4.36 |
| 1 in 30 years (l/s): | | 12.29 |
| 1 in 100 year (l/s): | | 17.86 |
| 1 in 200 years (l/s): | | 21.12 |

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Catchment 2

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| **Calculated by:** | Chris Greenwood |
| **Site name:** | Cooks Hole |
| **Site location:** | Thornhaugh |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

| | |
|---|---|
| **Latitude:** | 52.58665° N |
| **Longitude:** | 0.44932° W |
| **Reference:** | 2049405995 |
| **Date:** | Dec 19 2023 12:12 |

## Runoff estimation approach

FEH Statistical

## Site characteristics

**Total site area (ha):** 9.0232442000

## Methodology

| | |
|---|---|
| **$Q_{MED}$ estimation method:** | Calculate from BFI and SAAR |
| **BFI and SPR method:** | Specify BFI manually |
| **HOST class:** | N/A |
| **BFI / BFIHOST:** | 0.933 |
| **$Q_{MED}$ (l/s):** | |
| **$Q_{BAR}$ / $Q_{MED}$ factor:** | 1.12 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|

## Notes

### (1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible.

| | | |
|---|---|---|
| SAAR (mm): | 561 | 561 |
| Hydrological region: | 5 | 5 |
| Growth curve factor 1 year: | 0.87 | 0.87 |
| Growth curve factor 30 years: | 2.45 | 2.45 |
| Growth curve factor 100 years: | 3.56 | 3.56 |
| Growth curve factor 200 years: | 4.21 | 4.21 |

Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

## (3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | | 2.27 |
| 1 in 1 year (l/s): | | 1.97 |
| 1 in 30 years (l/s): | | 5.56 |
| 1 in 100 year (l/s): | | 8.08 |
| 1 in 200 years (l/s): | | 9.56 |

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Catchment 3

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| **Calculated by:** | Chris Greenwood |
| **Site name:** | Cooks Hole |
| **Site location:** | Thornhaugh |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

| | |
|---|---|
| **Latitude:** | 52.58665° N |
| **Longitude:** | 0.44932° W |
| **Reference:** | 244343672 |
| **Date:** | Dec 19 2023 12:12 |

## Runoff estimation approach

FEH Statistical

## Site characteristics

**Total site area (ha):** 4.3547925000

## Methodology

| | |
|---|---|
| **$Q_{MED}$ estimation method:** | Calculate from BFI and SAAR |
| **BFI and SPR method:** | Specify BFI manually |
| **HOST class:** | N/A |
| **BFI / BFIHOST:** | 0.933 |
| **$Q_{MED}$ (l/s):** | |
| **$Q_{BAR}$ / $Q_{MED}$ factor:** | 1.12 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|

## Notes

### (1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible.

| | | |
|---|---|---|
| SAAR (mm): | 561 | 561 |
| Hydrological region: | 5 | 5 |
| Growth curve factor 1 year: | 0.87 | 0.87 |
| Growth curve factor 30 years: | 2.45 | 2.45 |
| Growth curve factor 100 years: | 3.56 | 3.56 |
| Growth curve factor 200 years: | 4.21 | 4.21 |

Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

## (3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | | 1.1 |
| 1 in 1 year (l/s): | | 0.95 |
| 1 in 30 years (l/s): | | 2.68 |
| 1 in 100 year (l/s): | | 3.9 |
| 1 in 200 years (l/s): | | 4.61 |

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Catchment 4

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| **Calculated by:** | Chris Greenwood |
| **Site name:** | Cooks Hole |
| **Site location:** | Thornhaugh |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

| | |
|---|---|
| **Latitude:** | 52.58665° N |
| **Longitude:** | 0.44932° W |
| **Reference:** | 3250345747 |
| **Date:** | Dec 19 2023 12:13 |

## Runoff estimation approach

FEH Statistical

## Site characteristics

**Total site area (ha):** 0.9454174000

## Methodology

| | |
|---|---|
| **$Q_{MED}$ estimation method:** | Calculate from BFI and SAAR |
| **BFI and SPR method:** | Specify BFI manually |
| **HOST class:** | N/A |
| **BFI / BFIHOST:** | 0.933 |
| **$Q_{MED}$ (l/s):** | |
| **$Q_{BAR}$ / $Q_{MED}$ factor:** | 1.12 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|

## Notes

### (1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible.

| | | |
|---|---|---|
| SAAR (mm): | 561 | 561 |
| Hydrological region: | 5 | 5 |
| Growth curve factor 1 year: | 0.87 | 0.87 |
| Growth curve factor 30 years: | 2.45 | 2.45 |
| Growth curve factor 100 years: | 3.56 | 3.56 |
| Growth curve factor 200 years: | 4.21 | 4.21 |

Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

## (3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | | 0.24 |
| 1 in 1 year (l/s): | | 0.21 |
| 1 in 30 years (l/s): | | 0.58 |
| 1 in 100 year (l/s): | | 0.85 |
| 1 in 200 years (l/s): | | 1 |

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Catchment 5

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| **Calculated by:** | Chris Greenwood |
| **Site name:** | Cooks Hole |
| **Site location:** | Thornhaugh |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

| | |
|---|---|
| **Latitude:** | 52.58665° N |
| **Longitude:** | 0.44932° W |
| **Reference:** | 299296419 |
| **Date:** | Dec 19 2023 12:13 |

## Runoff estimation approach

FEH Statistical

## Site characteristics

**Total site area (ha):** 5.5577717000

## Methodology

| | |
|---|---|
| **$Q_{MED}$ estimation method:** | Calculate from BFI and SAAR |
| **BFI and SPR method:** | Specify BFI manually |
| **HOST class:** | N/A |
| **BFI / BFIHOST:** | 0.933 |
| **$Q_{MED}$ (l/s):** | |
| **$Q_{BAR}$ / $Q_{MED}$ factor:** | 1.12 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|

## Notes

### (1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible.

| | | |
|---|---|---|
| SAAR (mm): | 561 | 561 |
| Hydrological region: | 5 | 5 |
| Growth curve factor 1 year: | 0.87 | 0.87 |
| Growth curve factor 30 years: | 2.45 | 2.45 |
| Growth curve factor 100 years: | 3.56 | 3.56 |
| Growth curve factor 200 years: | 4.21 | 4.21 |

Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

## (3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | | 1.4 |
| 1 in 1 year (l/s): | | 1.22 |
| 1 in 30 years (l/s): | | 3.43 |
| 1 in 100 year (l/s): | | 4.98 |
| 1 in 200 years (l/s): | | 5.89 |

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Catchment 6

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| **Calculated by:** | Chris Greenwood |
| **Site name:** | Cooks Hole |
| **Site location:** | Thornhaugh |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

| | |
|---|---|
| **Latitude:** | 52.58665° N |
| **Longitude:** | 0.44932° W |
| **Reference:** | 1411314383 |
| **Date:** | Dec 19 2023 12:14 |

## Runoff estimation approach

FEH Statistical

## Site characteristics

**Total site area (ha):** 3.4728602000

## Methodology

| | |
|---|---|
| **$Q_{MED}$ estimation method:** | Calculate from BFI and SAAR |
| **BFI and SPR method:** | Specify BFI manually |
| **HOST class:** | N/A |
| **BFI / BFIHOST:** | 0.933 |
| **$Q_{MED}$ (l/s):** | |
| **$Q_{BAR}$ / $Q_{MED}$ factor:** | 1.12 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|

## Notes

### (1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible.

| | | |
|---|---|---|
| SAAR (mm): | 561 | 561 |
| Hydrological region: | 5 | 5 |
| Growth curve factor 1 year: | 0.87 | 0.87 |
| Growth curve factor 30 years: | 2.45 | 2.45 |
| Growth curve factor 100 years: | 3.56 | 3.56 |
| Growth curve factor 200 years: | 4.21 | 4.21 |

Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

## (3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | | 0.87 |
| 1 in 1 year (l/s): | | 0.76 |
| 1 in 30 years (l/s): | | 2.14 |
| 1 in 100 year (l/s): | | 3.11 |
| 1 in 200 years (l/s): | | 3.68 |

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Catchment 7

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| **Calculated by:** | Chris Greenwood |
| **Site name:** | Cooks Hole |
| **Site location:** | Thornhaugh |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

| | |
|---|---|
| **Latitude:** | 52.58665° N |
| **Longitude:** | 0.44932° W |
| **Reference:** | 3892809414 |
| **Date:** | Dec 19 2023 12:14 |

## Runoff estimation approach

FEH Statistical

## Site characteristics

**Total site area (ha):** 6.9725270000

## Methodology

| | |
|---|---|
| **$Q_{MED}$ estimation method:** | Calculate from BFI and SAAR |
| **BFI and SPR method:** | Specify BFI manually |
| **HOST class:** | N/A |
| **BFI / BFIHOST:** | 0.933 |
| **$Q_{MED}$ (l/s):** | |
| **$Q_{BAR}$ / $Q_{MED}$ factor:** | 1.12 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|

## Notes

### (1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible.

| | | |
|---|---|---|
| SAAR (mm): | 561 | 561 |
| Hydrological region: | 5 | 5 |
| Growth curve factor 1 year: | 0.87 | 0.87 |
| Growth curve factor 30 years: | 2.45 | 2.45 |
| Growth curve factor 100 years: | 3.56 | 3.56 |
| Growth curve factor 200 years: | 4.21 | 4.21 |

Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

## (3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | | 1.75 |
| 1 in 1 year (l/s): | | 1.53 |
| 1 in 30 years (l/s): | | 4.3 |
| 1 in 100 year (l/s): | | 6.24 |
| 1 in 200 years (l/s): | | 7.39 |

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Area draining to Cooks Hole surface water management system

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| **Calculated by:** | Chris Greenwood |
| **Site name:** | Cooks Hole |
| **Site location:** | Thornhaugh |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Site Details

| | |
|---|---|
| **Latitude:** | 52.58648° N |
| **Longitude:** | 0.44929° W |
| **Reference:** | 3484219859 |
| **Date:** | Dec 19 2023 12:10 |

## Runoff estimation approach

FEH Statistical

## Site characteristics

**Total site area (ha):** 57.6

## Methodology

| | |
|---|---|
| **$Q_{MED}$ estimation method:** | Calculate from BFI and SAAR |
| **BFI and SPR method:** | Specify BFI manually |
| **HOST class:** | N/A |
| **BFI / BFIHOST:** | 0.933 |
| **$Q_{MED}$ (l/s):** | |
| **$Q_{BAR}$ / $Q_{MED}$ factor:** | 1.12 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|

## Notes

### (1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible.

| | | |
|---|---|---|
| SAAR (mm): | 561 | 561 |
| Hydrological region: | 5 | 5 |
| Growth curve factor 1 year: | 0.87 | 0.87 |
| Growth curve factor 30 years: | 2.45 | 2.45 |
| Growth curve factor 100 years: | 3.56 | 3.56 |
| Growth curve factor 200 years: | 4.21 | 4.21 |

Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

## (3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | | 14.19 |
| 1 in 1 year (l/s): | | 12.34 |
| 1 in 30 years (l/s): | | 34.76 |
| 1 in 100 year (l/s): | | 50.51 |
| 1 in 200 years (l/s): | | 59.74 |