

TECHNICAL NOTE

Job Name: Agar Grove Regeneration
Job No: 28732
Note No: 28732-C-TN03
Date: 22.01.14
Prepared By: Lewis Hubbard
Subject: **Proposed Drainage – Surface Water Attenuation Calculations**

1. Introduction

- 1.1. This technical note responds to comments by The Environment Agency regarding the PBA Flood Risk Assessment for the Agar Grove Regeneration project. The comments received state that:

"Having now reviewed the Flood Risk Assessment (FRA) our Flood Risk Engineer (FRE) has asked me to object in the absence of an acceptable FRA. Please see the comments from the FRE which I have summarised below. Please note we require further information to be submitted in order to address our outstanding concerns. Once we receive this additional information, the FRE will review this information and provide further comments."

Summary

"The applicant has not demonstrated that the storage volume required to attenuate surface water run-off from the critical 1 in 100 chance in any year storm event, with an appropriate allowance for climate change, can be provided on site. There are volumes stated but the calculations need to be provided."

Overcoming our objection

"The current FRA states the volumes provided but does not provide calculations to demonstrate this. These calculations should be provided. The applicant must demonstrate through their surface water strategy that the proposed development will not create an increased risk of flooding from surface water. The surface water strategy should be carried out in accordance with the National Planning Policy Framework and PPS25 Practice Guide, giving preference to infiltration over discharge to a watercourse, which in turn is preferable to discharge to surface water sewer.

The surface water strategy should clearly show that surface water for up to the 1 in 100 chance in any year storm event, including an allowance for climate change, can be safely contained on site. It is acceptable to partially flood the site during this event, ensuring that buildings are not affected by flooding and the site can be safely navigated by users. Where this flooding will be within roads or pathways, the applicants must ensure that safe access and egress is still available."

- 1.2. This technical note should be read in conjunction with the PBA Flood Risk Assessment for the Agar Grove Regeneration project.

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2. Response to the Objection

- 2.1. The objection requests that calculations be provided for the sizing of the surface water attenuation tanks. The attenuation tanks are sized so that surface water for up to the 1 in 100 chance in any year storm event, including an allowance for climate change, can be safely contained on site.
- 2.2. In the proposed drainage strategy, none of the external areas are designed to flood. All of the storage volume needed to contain surface water on site is provided in below ground attenuation tanks.
- 2.3. Referring to the PBA Flood Risk Assessment, the site is divided into five sub-catchments. The required attenuation tank volumes are calculated for each sub-catchment using Microdrainage WinDES Quick Storage Estimate. Screenshots are presented of the calculations for each sub-catchment.

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3. Sub-Catchment 1

- 3.1. Roof and Hard Landscaping Catchment Area = 1599m².
 Allowable discharge rate = 5.0 l/s
 Climate change allowance = 30%

Quick Storage Estimate

Micro Drainage

Variables

FEH Rainfall

Return Period (years) 100

Site Location GB 529250 183900 TQ 29250 8390

Cv (Summer) 0.750

Cv (Winter) 0.840

Impermeable Area (ha) 0.160

Maximum Allowable Discharge (l/s) 5.0

C (1km) -0.026 D3 (1km) 0.239

D1 (1km) 0.329 E (1km) 0.332

D2 (1km) 0.303 F (1km) 2.486

Infiltration Coefficient (m/hr) 0.00000

Safety Factor 2.0

Climate Change (%) 30

Analyse OK Cancel Help

Select required Rainfall Model from the list

Quick Storage Estimate

Micro Drainage

Results

Global Variables require approximate storage of between 78 m³ and 109 m³.

These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Select required Rainfall Model from the list

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4. Sub-Catchment 2

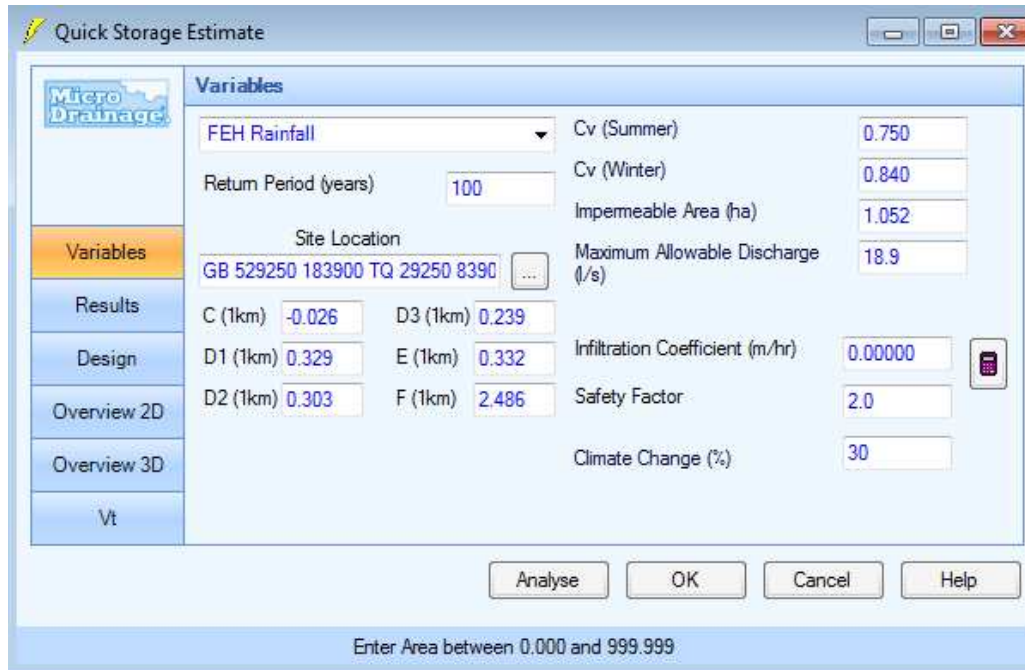
4.1. Sub-catchments 3 and 4 both discharge into sub-catchment 2. The required attenuation volume for sub-catchment 2 is therefore calculated as:

Sub-Catchment 2 Attenuation Volume	=	Required attenuation volume for the combined sub-catchments 2, 3 and 4.	-	Sub-Catchment 3 Attenuation Volume	-	Sub-Catchment 4 Attenuation Volume
Sub-Catchment 2 Attenuation Volume	=	828m ³	-	190m ³	-	113m ³
Sub-Catchment 2 Attenuation Volume	=	525m ³				

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5. Combined Sub-Catchments 2,3 and 4

- 5.1. Roof and Hard Landscaping Catchment Area = 10518m².
 Allowable discharge rate = 18.9 l/s
 Climate change allowance = 30%



Quick Storage Estimate

Variables

FEH Rainfall

Return Period (years) 100

Site Location GB 529250 183900 TQ 29250 8390

Cv (Summer) 0.750

Cv (Winter) 0.840

Impermeable Area (ha) 1.052

Maximum Allowable Discharge (l/s) 18.9

C (1km) -0.026 D3 (1km) 0.239

D1 (1km) 0.329 E (1km) 0.332

D2 (1km) 0.303 F (1km) 2.486

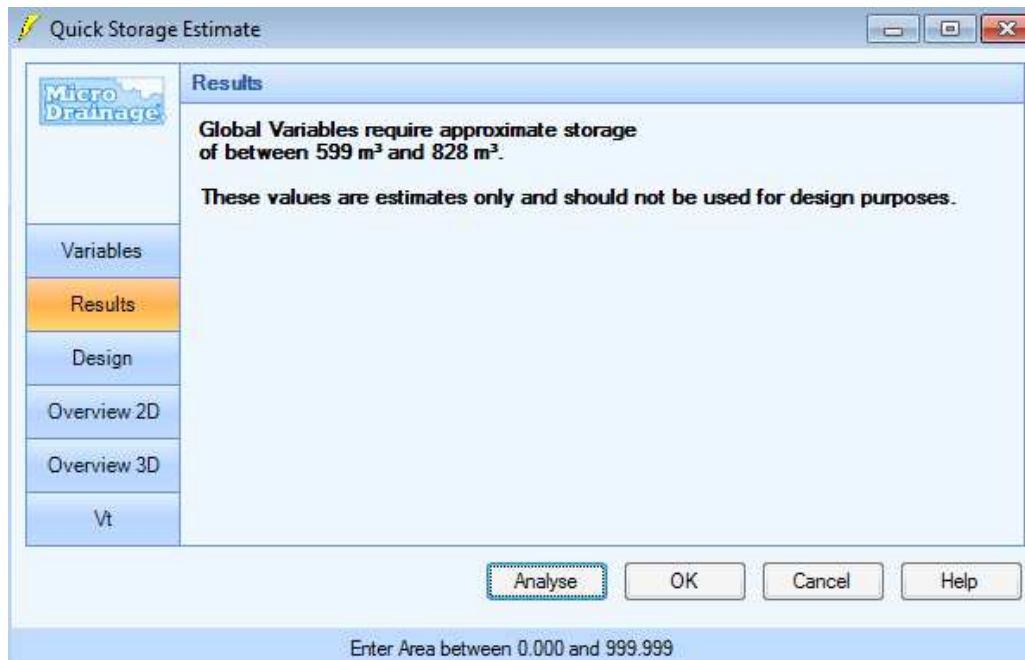
Infiltration Coefficient (m/hr) 0.00000

Safety Factor 2.0

Climate Change (%) 30

Analyse OK Cancel Help

Enter Area between 0.000 and 999.999



Quick Storage Estimate

Results

Global Variables require approximate storage of between 599 m³ and 828 m³.

These values are estimates only and should not be used for design purposes.

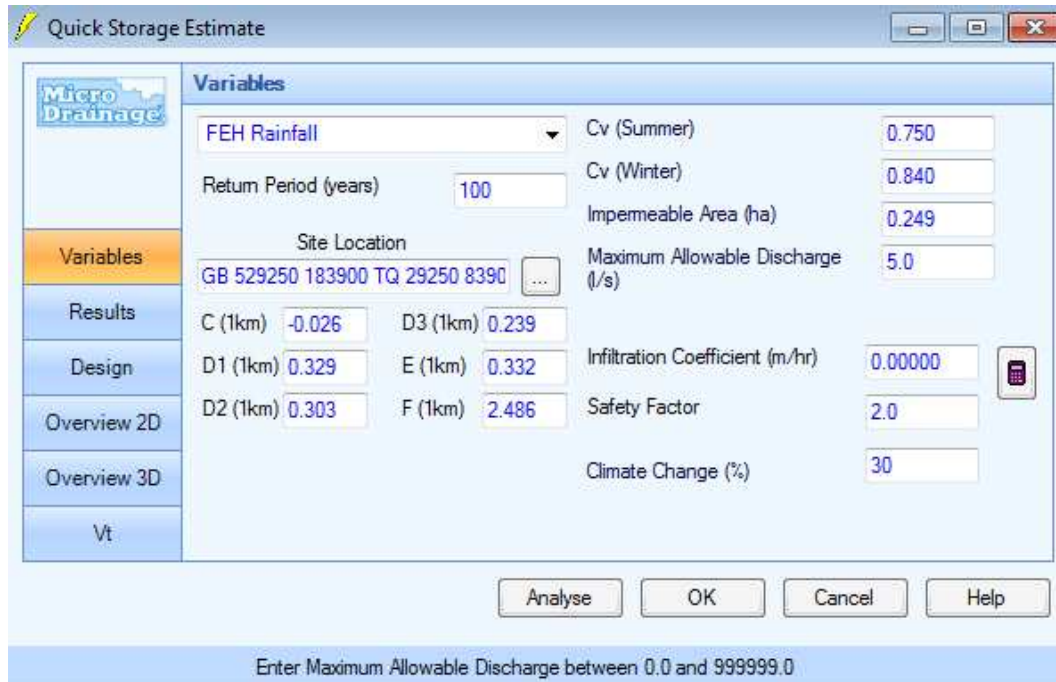
Analyse OK Cancel Help

Enter Area between 0.000 and 999.999

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6. Sub-Catchment 3

- 6.1. Roof and Hard Landscaping Catchment Area = 2492m².
 Allowable discharge rate = 5 l/s
 Climate change allowance = 30%



Quick Storage Estimate

Micro Drainage

Variables

FEH Rainfall

Return Period (years) 100

Site Location GB 529250 183900 TQ 29250 8390

Cv (Summer) 0.750

Cv (Winter) 0.840

Impervious Area (ha) 0.249

Maximum Allowable Discharge (l/s) 5.0

C (1km) -0.026 D3 (1km) 0.239

D1 (1km) 0.329 E (1km) 0.332

D2 (1km) 0.303 F (1km) 2.486

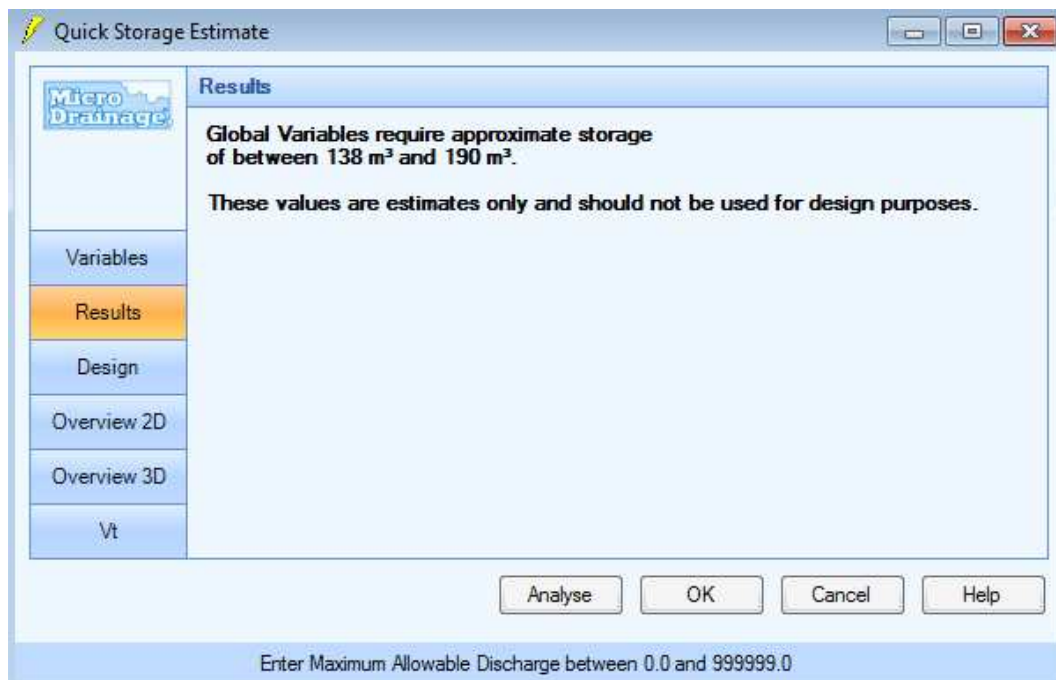
Infiltration Coefficient (m/hr) 0.00000

Safety Factor 2.0

Climate Change (%) 30

Analyse OK Cancel Help

Enter Maximum Allowable Discharge between 0.0 and 999999.0



Quick Storage Estimate

Micro Drainage

Results

Global Variables require approximate storage of between 138 m³ and 190 m³.

These values are estimates only and should not be used for design purposes.

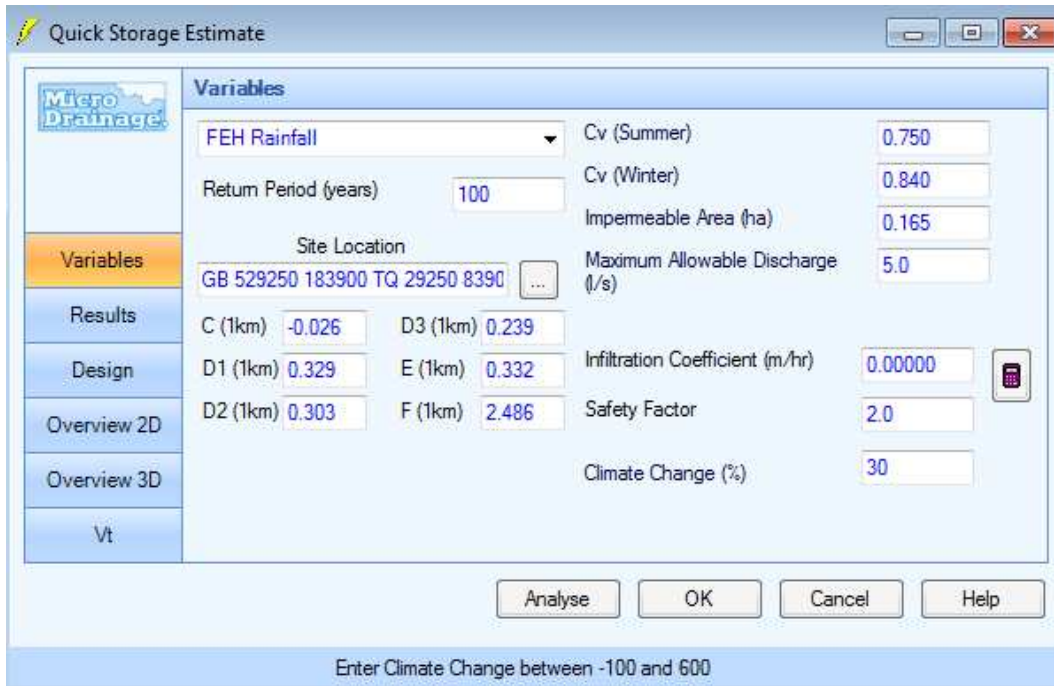
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Enter Maximum Allowable Discharge between 0.0 and 999999.0

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7. Sub-Catchment 4

- 7.1. Roof and Hard Landscaping Catchment Area = 1652m².
Allowable discharge rate = 5 l/s
Climate change allowance = 30%



Quick Storage Estimate

Variables

FEH Rainfall

Return Period (years) 100

Site Location GB 529250 183900 TQ 29250 8390

Cv (Summer) 0.750

Cv (Winter) 0.840

Impervious Area (ha) 0.165

Maximum Allowable Discharge (l/s) 5.0

C (1km) -0.026 D3 (1km) 0.239

D1 (1km) 0.329 E (1km) 0.332

D2 (1km) 0.303 F (1km) 2.486

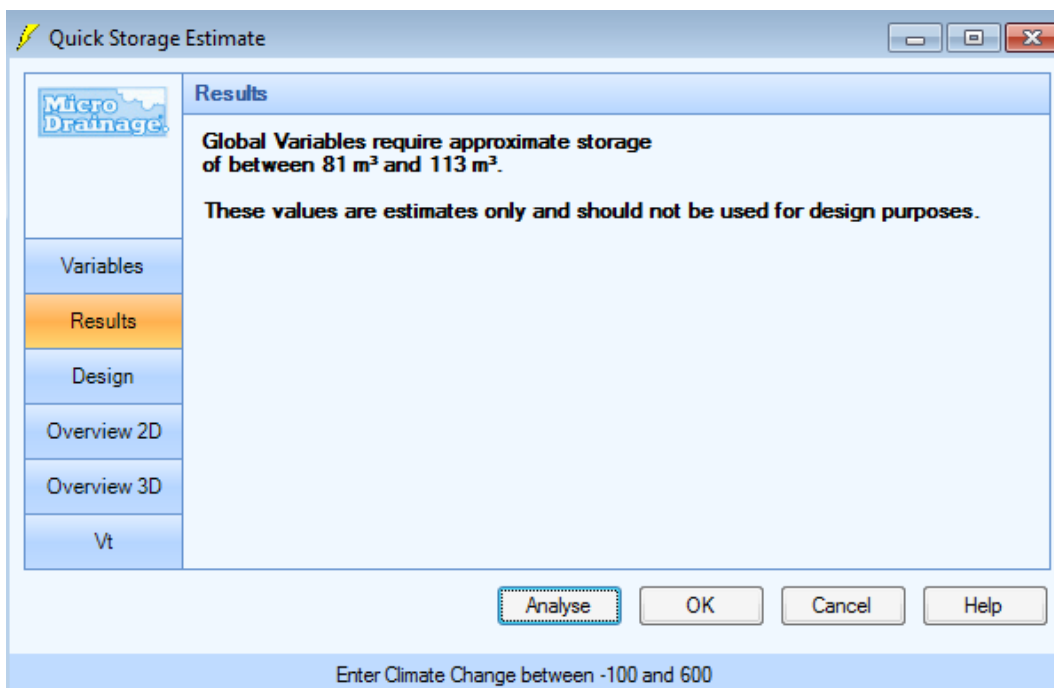
Infiltration Coefficient (m/hr) 0.00000

Safety Factor 2.0

Climate Change (%) 30

Analyse OK Cancel Help

Enter Climate Change between -100 and 600



Quick Storage Estimate

Results

Global Variables require approximate storage of between 81 m³ and 113 m³.

These values are estimates only and should not be used for design purposes.

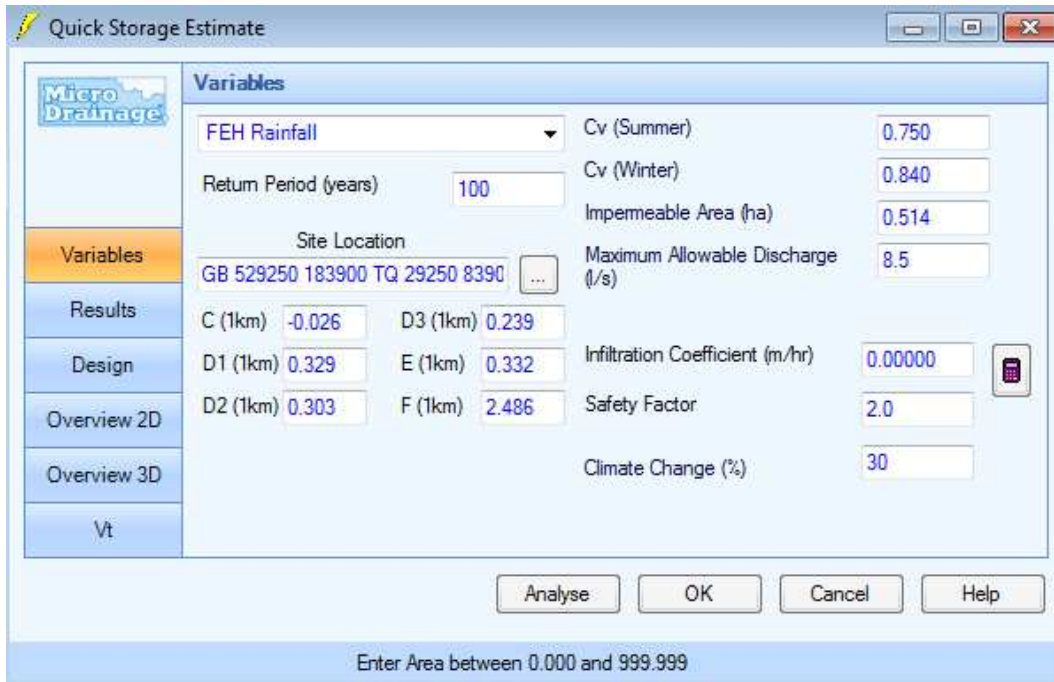
Analyse OK Cancel Help

Enter Climate Change between -100 and 600

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8. Sub-Catchment 5

- 8.1. Roof and Hard Landscaping Catchment Area = 1652m².
 Allowable discharge rate = 5 l/s
 Climate change allowance = 30%



Quick Storage Estimate

Micro Drainage

Variables

FEH Rainfall

Return Period (years) 100

Site Location GB 529250 183900 TQ 29250 8390

Cv (Summer) 0.750

Cv (Winter) 0.840

Impemeable Area (ha) 0.514

Maximum Allowable Discharge (l/s) 8.5

C (1km) -0.026 D3 (1km) 0.239

D1 (1km) 0.329 E (1km) 0.332

D2 (1km) 0.303 F (1km) 2.486

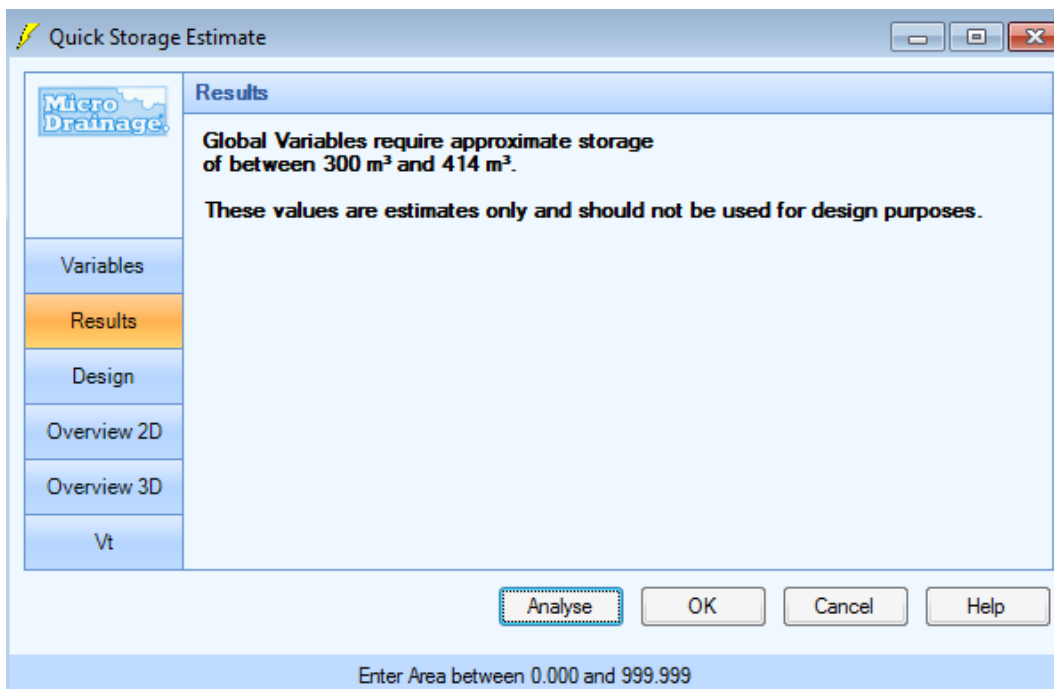
Infiltration Coefficient (m/hr) 0.00000

Safety Factor 2.0

Climate Change (%) 30

Analyse OK Cancel Help

Enter Area between 0.000 and 999.999



Quick Storage Estimate

Micro Drainage

Results

Global Variables require approximate storage of between 300 m³ and 414 m³.

These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Area between 0.000 and 999.999