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04 June 2024
Ref: IE23/006/LLFA resp 2

Smith Jenkins Planning & Heritage
The News Building
3rd floor
3 London Bridge Street
SE1 9SG

For the attention of Nick Jenkins - Director

Dear Sir,

LEAD LOCAL FLOOD AUTHORITY QUERIES IN RELATION TO DRAINAGE STRATEGY
TRAVELODGE DRURY LANE, LONDON

Thank you for sending us a copy of the recent correspondence from Camden, in connection with the above application.

We are pleased to note that the 'Review Summary' generally captures the essence of our drainage strategy, although there appears to be some confusion regarding both the rate of discharge and the attenuation.

The email dated 7th May 2024 goes on to request several items of 'additional' information, some of which have been included within the report, but which may have been missed. Please find below a brief outline of the points raised, together with our response (in bold).

Q1. The applicant is proposing to attenuate surface water by capturing water in a blue roof system which will use existing basement attenuation tanks and discharge to the combined sewer at a restricted rate. The applicant has not confirmed the amount of substrate being provided within the blue roof.

This issue was also raised (and responded to) within our response to queries raised following the 2023 application. See correspondence dated 14 June 2023

A1. The ABG calculations show an overall depth of 129mm, which incorporates a 25mm layer of reservoir board. An extract of the information provided within the appendices is copied below.

System Name:	ABG blueroof VF HD 129mm
Description:	The blue roof depth of 129mm, already includes for a 25mm deep, reservoir board. No. of control positions TBC by design team, and also with the structural engineer's deflection analysis. Additional 'tell-tale'/emergency parapet overflow outlets, may also be added by the architect.

Roofdrain 25	25mm	4.3	Standard grade product. Below substrate layers 150mm down including extensive and brown roofs. It is particularly useful on pitched roofs due to the profile of the cone shaped cuspates.

Q2. The applicant proposes to discharge surface water from the site at a rate of 4.67l/s. The applicant has provided the existing and proposed runoff rates however the greenfield runoff rates have not been provided only an estimate due to the small site area. Calculations supporting the greenfield and proposed runoff rates should be supplied. The runoff rate will be restricted at a controlled rate via a restrictor valve in the blue roof, the attenuation tanks discharge via a pumping station into the combined sewer within Short's Gardens at a stepped rate of pump 1 = 2.04 l/s and pump 2 = 4.60 l/s, with a capacity of up 12.0 l/s. Attenuation volumes or details of these tanks have, however, not been provided.

A2. Each of the 3No. areas of blue/green roof will have a restricted discharge of 0.5l/s, resulting in a total maximum discharge rate of 1.5l/s. Across the remainder of the development area, where such roofing cannot be provided, the discharge will not be restricted 'at source'. Combining the areas of new controlled and uncontrolled roof, we have calculated a surface water run-off rate of 4.667l/s. The way in which this is calculated is shown in paragraph 7.02.1 of the issued drainage strategy.

In relation to the Greenfield run-off. The Greenfield rates for 300m^2 are:

- **QBar 0 l/s,**
- **1 year 0 l/s,**
- **30 years 0.1 l/s, and**
- **100 years 0.1 l/s**

These figures have been generated using Micro Drainage. Due to the small area of the site the UK SuDS tool was unable to generate a valid calculation. There is no ability (or requirement) to add climate change allowances to Greenfield rates of run-off. This is something recognised within the Camden drainage proforma. See checked out boxes - section 3a.

We do not have dimensions for the existing storage tanks. Additional surface water storage has been provided within the blue/green roof to provide betterment. See ABG calculations within appendix H. Additional foul storage has been provided, based on the number of additional bedrooms. The existing tanks will not be modified.

Q3. The applicant has provided the greenfield runoff volume with supporting calculations however this is also required for the existing runoff volume and proposed runoff volume.

A3. The existing run-off volume has been provided within Appendix H for a 6 hour storm across three return periods, 1 in 1 year, 1 in 30 and 1 in 100 years.

See extracts below.

The proposed volumes have been accounted for within the ABG calculations for the worst case 1 in 100 years event, including an allowance for climate change. The total storage volume across the 3No. blue/green roofs is 11.5m^3.

Run-off from Hard Standing Areas - Pre Development

Peak Discharge Q = 3.61 Cv i A

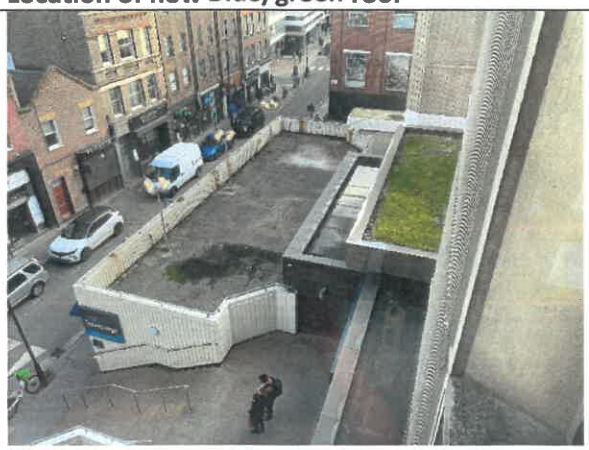
Cv = 0.9
i = Rainfall Intensity From Micro Drainage
A = Area = 0.03 ha

Volume of Run-off from Hard Standing 6 Hour Storm

1 Year Storm	=	0.368	x	60	x	60	x	6 =	7958 litres or 7.958 m^3
30 Year Storm	=	0.770	x	60	x	60	x	6 =	16626 litres or 16.626 m^3
100 Year Storm	=	0.999	x	60	x	60	x	6 =	21582 litres or 21.582 m^3

Q4. It is stated that there will be no flooding on the site during any of the modelled storm events. Calculations have not been provided to support this. The applicant has not considered exceedance flow routes for the site.

A4. The blue/green roofs will be surrounded by a parapet. If the storage capacity of the ABG system is exceeded due to any failure of the outlet, rainwater will be retained atop the roof by this parapet. ABG have suggested that: "Additional 'tell-tale'/emergency parapet overflow outlets, may also be added by the architect". This can certainly be considered, although the new roofs (as well as the existing one) are overlooked by multiple windows, both in bedrooms & access routes. Any ponding is therefore likely to be noticed quickly by hotel staff. See photographs below.

Existing green roof	Location of new Blue/green roof
	

Q5. The applicant has included details of the maintenance owner have been stated however the owner of shared features should be confirmed.

A5. Travelodge Hotels are the sole party responsible for drainage maintenance. This includes any drainage that benefits tenants of the retail units fronting onto Drury Lane.

In addition to the overarching points, set out above, the following information has been requested.

1. Details the substrate of the proposed blue roof.
   This has been covered within our response to question 1 above.

2. Details, via supporting calculations, the greenfield runoff rates for the 1 in 1yr, 1 in 30yr, 1 in 100yr and 1 in 100yr+CC return periods.
   This has been covered within our response to question 2 above.

3. Details, via supporting calculations, the proposed run off rates for the 1 in 1yr, 1 in 30yr, 1 in 100yr and 1 in 100yr+CC return periods.
   The proposed run-off rates are a combination of the ABG blue/green roof calculations located in Appendix H, and the 93m^2 of retained impermeable surfacing. The simplified version of the calculations (for the 1 in 100 year event) was set out in paragraph 7.02. This was based on the worst case 1 in 100 year event.
   Following the officer's request, we have extended this calculation to accommodate all the return periods, including the 1 in 100yr+CC. A copy of these calculations is appended to this correspondence.

4. Details, via supporting calculations, the existing runoff volume and proposed runoff volume for the 1 in 100yr 6hr period.
   The predevelopment run-off volume for 1 in 100 year storm was included in Appendix H. We have reduced the impermeable roof area to 93m^2 and added this uncontrolled discharge to the ABG calculations to determine the post development run-off volume. There is a slight reduction, which is likely down to water retained with the blue/green roof or a small amount lost through evapotranspiration. A copy of these calculations is appended to this correspondence.

5. Demonstrates, via supporting calculations, that the site will not flood for a 1 in 30yr and 1 in 100yr event.
   This has been covered within our response to question 4 above.

6. Explains how exceedance flows will be managed for the site should be provided, supported by a drawing of exceedance flow routes.
   This has been covered within our response to question 4 above.

7. Demonstrates the location and attenuation volumes of the pre-existing attenuation tanks.
   We cannot provide this information and have based our design to be self-sufficient. While discharges from the roof areas will continue to flow through the old tanks, additional storage has been provided in the form of blue/green roofs.

8. Confirms full details of the maintenance owner of shared features.
   Travelodge Hotels is and will continue to be the sole party responsible for drainage maintenance.

9. Evidences sufficient sewer capacity from Thames Water.

The post development discharge rates will remain the same as the existing because the surface water & foul pumps will not be changed. As a result, Thames Water will not be adversely impacted by the proposal.

10. Confirm the site area and ensure this is used in the calculations as this differs.
The development footprint is 300m². While the Travelodge as a whole is much larger, it is only 300m² of the 'external' site area that is due to change. The remainder of the proposal comprises an internal reconfiguration.

We trust that the above explanation addresses the points raised. However, if we can be any further assistance, please do not hesitate to contact the undersigned.

Yours faithfully,

RCrowther

R M Crowther AMICE PIEMA AMEI
Director

On behalf of JP Chick & Partners Limited
robin.crowther@chick.co.uk

Enc.
1. **Micro Drainage Greenfield run-off rates**
2. **Updated Greater London Proforma**
3. **Updated and extended Pre & post development run-off calculations**
4. **Micro Drainage Greenfield run-off volume**
5. **Micro Drainage Greenfield storage requirements – 1, 30 100, 100+cc**

Enclosure 1.

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 611 Urban 0.000
Area (ha) 0.030 Soil 0.300 Region Number Region 6

Results l/s

QBAR Rural 0.0
QBAR Urban 0.0

Q100 years 0.1

Q1 year 0.0
Q30 years 0.1
Q100 years 0.1

Enclosure 2.

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3. Drainage Strategy

3a. Discharge Rates & Required Storage

	Greenfield (GF) runoff rate (l/s)	*Existing discharge rate (l/s)*	*Required storage for GF rate (m^3)*	*Proposed discharge rate (l/s)*
Qbar	0			
1 in 1	0	3.74	5.5	2.66
1 in 30	0.1	7.856	14	3.94
1 in 100	0.1	10.216	19	4.67
1 in 100 + CC			28	5.93
Climate change allowance used		40%		
3b. Principal Method of Flow Control		Restrictor valve within blue/green roof		

3c. Proposed SuDS Measures

	Catchment area (m^2)	*Plan area (m^2)*	*Storage vol. (m^3)*
Rainwater harvesting	0		0
Infiltration systems	0		0
Green roofs	207	178	0
Blue roofs	207	178	11.5
Filter strips	0	0	0
Filter drains	0	0	0
Bioretention / tree pits	0	0	0
Pervious pavements	0	0	0
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	0		0
Total	**414**	**356**	**11.5**

4. Supporting Information

4a. Discharge & Drainage Strategy	*Page/section of drainage report*
Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	N/A - See page 17
Drainage hierarchy (2b)	Page 30
Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Appendix D & Appendix G
Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Appendix H
Proposed SuDS measures & specifications (3b)	Section 6 and Appendix H
4b. Other Supporting Details	*Page/section of drainage report*
Detailed Development Layout	Appendix B
Detailed drainage design drawings, including exceedance flow routes	Appendix H
Detailed landscaping plans	N/A
Maintenance strategy	Appendix I
Demonstration of how the proposed SuDS measures improve:	
a) water quality of the runoff?	Section 6.03
b) biodiversity?	Section 6.04
c) amenity?	Section 6.05

Camden

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LoDEG

1. Project & Site Details

Project / Site Name (including sub-catchment / stage / phase where appropriate)	Travelodge
Address & post code	10 Drury Lane, High Holborn, London, WC2B 5RE
OS Grid ref. (Easting, Northing)	E 530273
	N 181320
LPA reference (if applicable)	2024/0436/P
Brief description of proposed work	The proposal will create an additional 55 bedrooms replacing the existing service yard and undercroft areas together with improvements to the reception area. The works will span 4 floors and form an integral part of the existing hotel.
Total site Area	3900 m^2
Total existing impervious area	3900 m^2
Total proposed impervious area	3900 m^2
Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	The site is not on the historic flooding and local flood risk zones map within Camden Policy CC3 Water and flooding.
Existing drainage connection type and location	Pumping station discharges to the combined TW sewer via a restricted rate.
Designer Name	Robin Crowther
Designer Position	Director
Designer Company	JP Chick & Partners Limited

2. Proposed Discharge Arrangements

2a. Infiltration Feasibility

Superficial geology classification	Lynch Hill Gravel Member - Sand and Gravel	
Bedrock geology classification	London Clay Formation - Clay, Silt & Sand	
Site infiltration rate	0	m/s
Depth to groundwater level	0	m below ground level
Is infiltration feasible?	No	

2b. Drainage Hierarchy

	Feasible (Y/N)	*Proposed (Y/N)*
1 store rainwater for later use	N	N
2 use infiltration techniques, such as porous surfaces in non-clay areas	N	N
3 attenuate rainwater in ponds or open water features for gradual release	N	N
4 attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Y
5 discharge rainwater direct to a watercourse	N	N
6 discharge rainwater to a surface water sewer/drain	N	N
7 discharge rainwater to the combined sewer.	Y	Y

2c. Proposed Discharge Details

Proposed discharge location	Exisitng sewer in Short's Gardens.
Has the owner/regulator of the discharge location been consulted?	No

Enclosure 3.

Pre-development rates of run-off - existing hardstanding 100%

Site area: **300m2**

1 year		Factor	Cv	RI	Area (ha)	Run-off rate	
15	minute	3.61	0.9	38.37	0.03	3.740	l/s
30	minute	3.61	0.9	24.06	0.03	2.345	l/s
120	minute	3.61	0.9	8.68	0.03	0.846	l/s
6	hour	3.61	0.9	3.78	0.03	0.368	l/s
30 year							
15	minute	3.61	0.9	80.6	0.03	7.856	l/s
30	minute	3.61	0.9	51.64	0.03	5.033	l/s
120	minute	3.61	0.9	18.76	0.03	1.829	l/s
6	hour	3.61	0.9	7.9	0.03	0.770	l/s
100 year							
15	minute	3.61	0.9	104.81	0.03	10.216	l/s
30	minute	3.61	0.9	67.67	0.03	6.596	l/s
120	minute	3.61	0.9	24.65	0.03	2.403	l/s
6	hour	3.61	0.9	10.25	0.03	0.999	l/s
100 year+40%cc	with rainfall intensity increasd by 40%						
15	minute	3.61	0.9	146.734	0.03	14.302	l/s
30	minute	3.61	0.9	94.738	0.03	9.234	l/s
120	minute	3.61	0.9	34.51	0.03	3.364	l/s
6	hour	3.61	0.9	14.35	0.03	1.399	l/s

Post-development rates of run-off

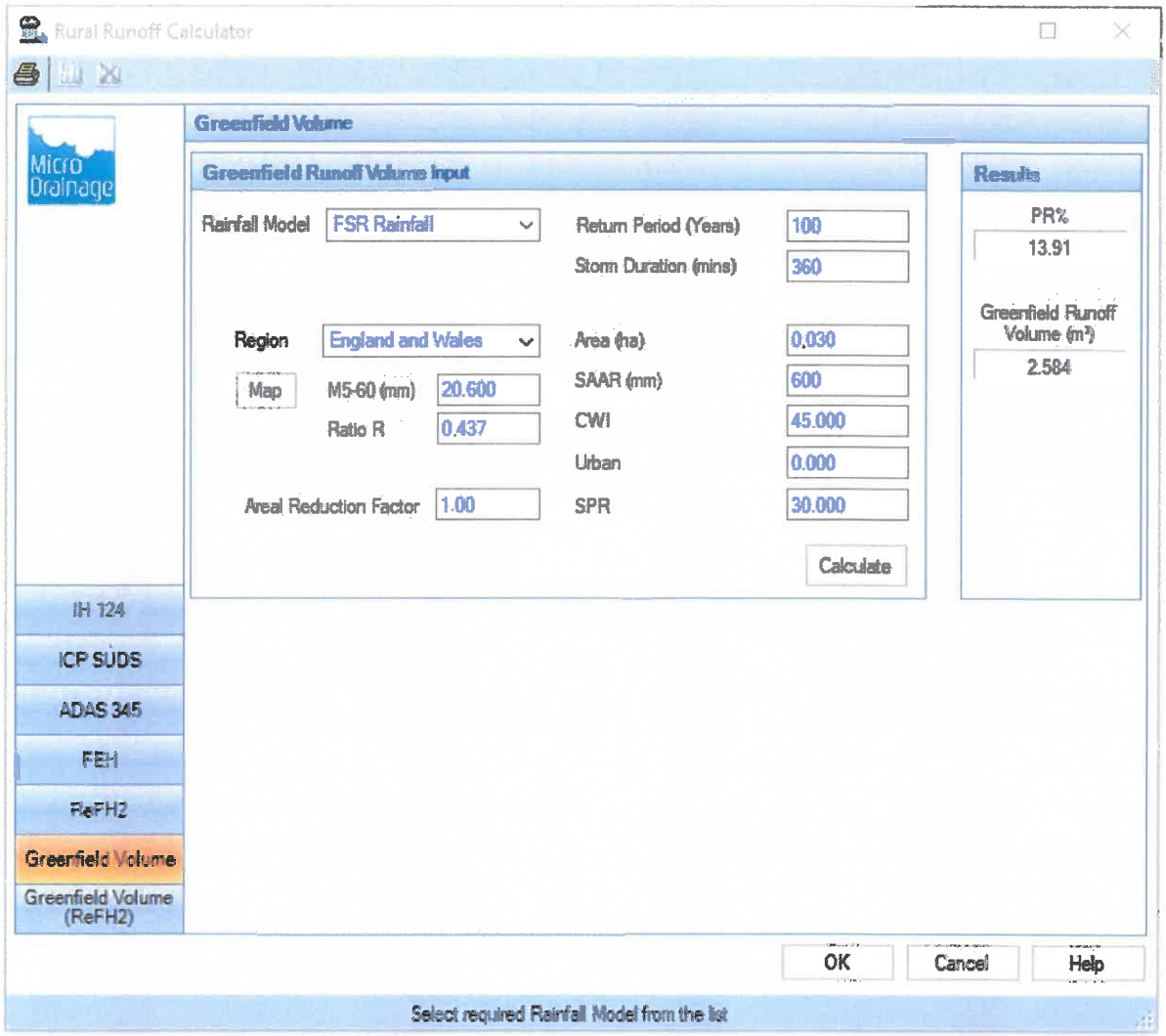
Site area: **300m2**
Blue/green roof area **207m2**
Remaining imperm area **93m2**

1 year		Factor	Cv	RI	Area (ha)	Run-off rate		**Includes 3x0.5l/s**		Total with Blue / green roofs	
15	minute	3.61	0.9	38.37	0.0093	1.159	l/s	+ 1.5	=	2.659	l/s
30	minute	3.61	0.9	24.06	0.0093	0.727	l/s	+ 1.5	=	2.227	l/s
120	minute	3.61	0.9	8.68	0.0093	0.262	l/s	+ 1.5	=	1.762	l/s
6	hour	3.61	0.9	3.78	0.0093	0.114	l/s	+ 1.5	=	1.614	l/s
30 year											
15	minute	3.61	0.9	80.6	0.0093	2.435	l/s	+ 1.5	=	3.935	l/s
30	minute	3.61	0.9	51.64	0.0093	1.560	l/s	+ 1.5	=	3.060	l/s
120	minute	3.61	0.9	18.76	0.0093	0.567	l/s	+ 1.5	=	2.067	l/s
6	hour	3.61	0.9	7.9	0.0093	0.239	l/s	+ 1.5	=	1.739	l/s
100 year											
15	minute	3.61	0.9	104.81	0.0093	3.167	l/s	+ 1.5	=	4.667	l/s
30	minute	3.61	0.9	67.67	0.0093	2.045	l/s	+ 1.5	=	3.545	l/s
120	minute	3.61	0.9	24.65	0.0093	0.745	l/s	+ 1.5	=	2.245	l/s
6	hour	3.61	0.9	10.25	0.0093	0.310	l/s	+ 1.5	=	1.810	l/s
100 year+40%cc	with rainfall intensity increasd by 40%										
15	minute	3.61	0.9	146.734	0.0093	4.434	l/s	+ 1.5	=	5.934	l/s
30	minute	3.61	0.9	94.738	0.0093	2.863	l/s	+ 1.5	=	4.363	l/s
120	minute	3.61	0.9	34.51	0.0093	1.043	l/s	+ 1.5	=	2.543	l/s
6	hour	3.61	0.9	14.35	0.0093	0.434	l/s	+ 1.5	=	1.934	l/s

Volume of run-off from hardstanding

	l/s		**seconds**		**minutes**		**hours**		**Litres**	**m3**	**ABG calcs**	**Total volume**
1 year	0.114	x	60	x	60	x	6	=	2467.1	2.4670515		
30 years	0.239	x	60	x	60	x	6	=	5156.0	5.156007		
100 years	0.310	x	60	x	60	x	6	=	6689.8	6.689756		
100 year+40%cc	0.434	x	60	x	60	x	6	=	9365.7	9.3656584	11.5 m3	20.87 m3

Enclosure 4.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Micro Drainage
Greenfield Volume
Greenfield Runoff Volume Input
Rainfall Model
FSR Rainfall
Return Period (Years)
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Storm Duration (mins)
360
Region
England and Wales
Area (ha)
0.030
Map
M5-60 (mm)
20.600
SAAR (mm)
600
Ratio R
0.437
CWI
45.000
Urban
0.000
Areal Reduction Factor
1.00
SPR
30.000
Calculate
Results
PR%
13.91
Greenfield Runoff Volume (m³)
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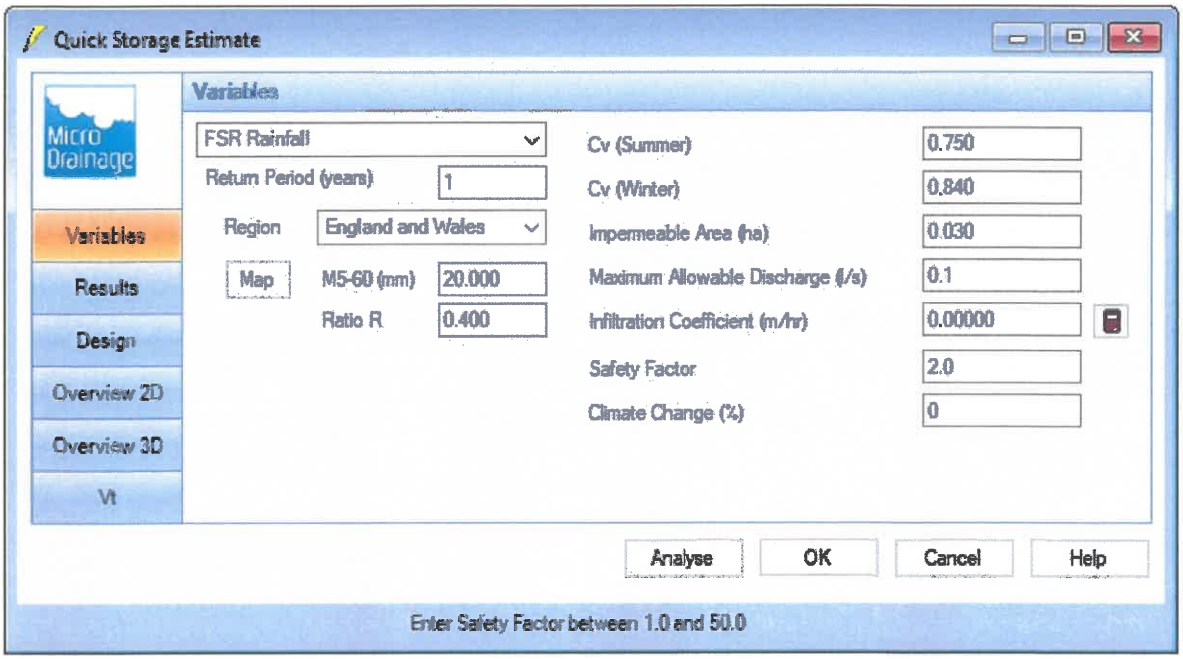
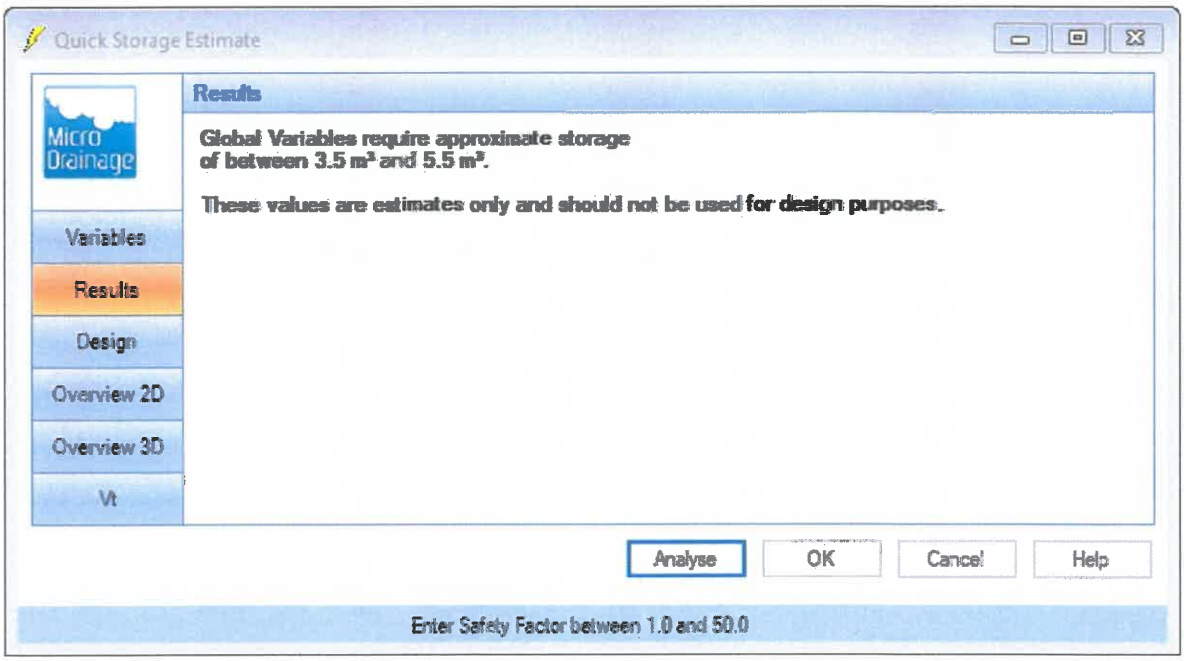
IH 124
ICP SUDS
ADAS 345
FEH
ReFH2
Greenfield Volume
Greenfield Volume (ReFH2)
OK
Cancel
Help
Select required Rainfall Model from the list

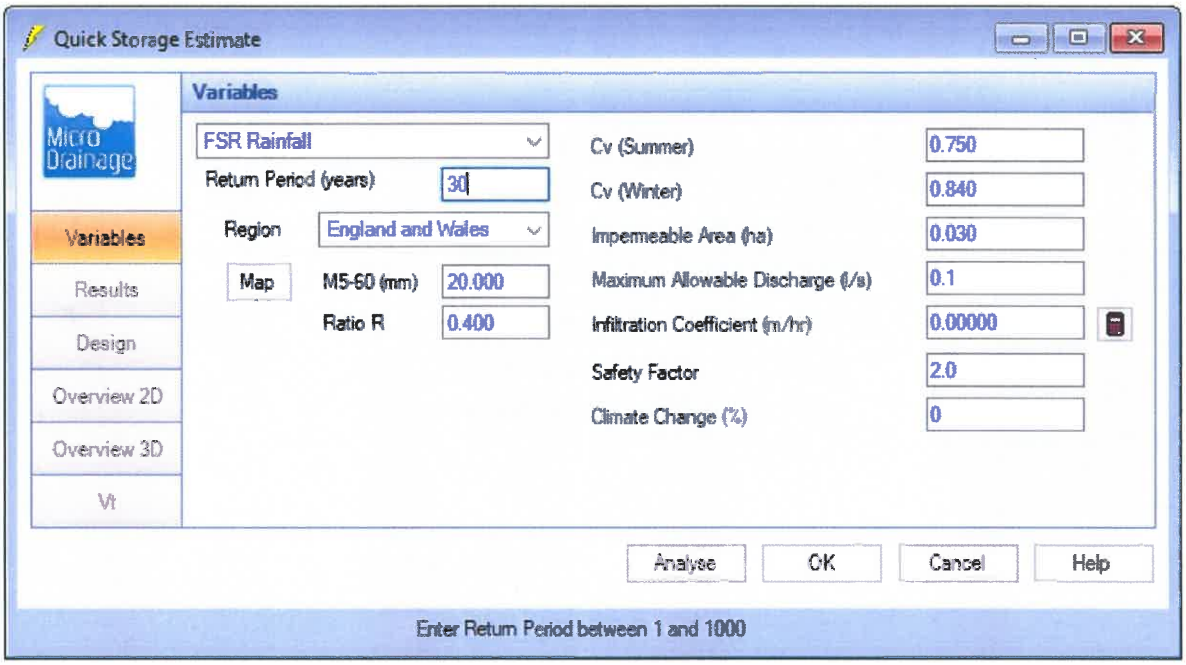
Enclosure 5

1 Year





30 Years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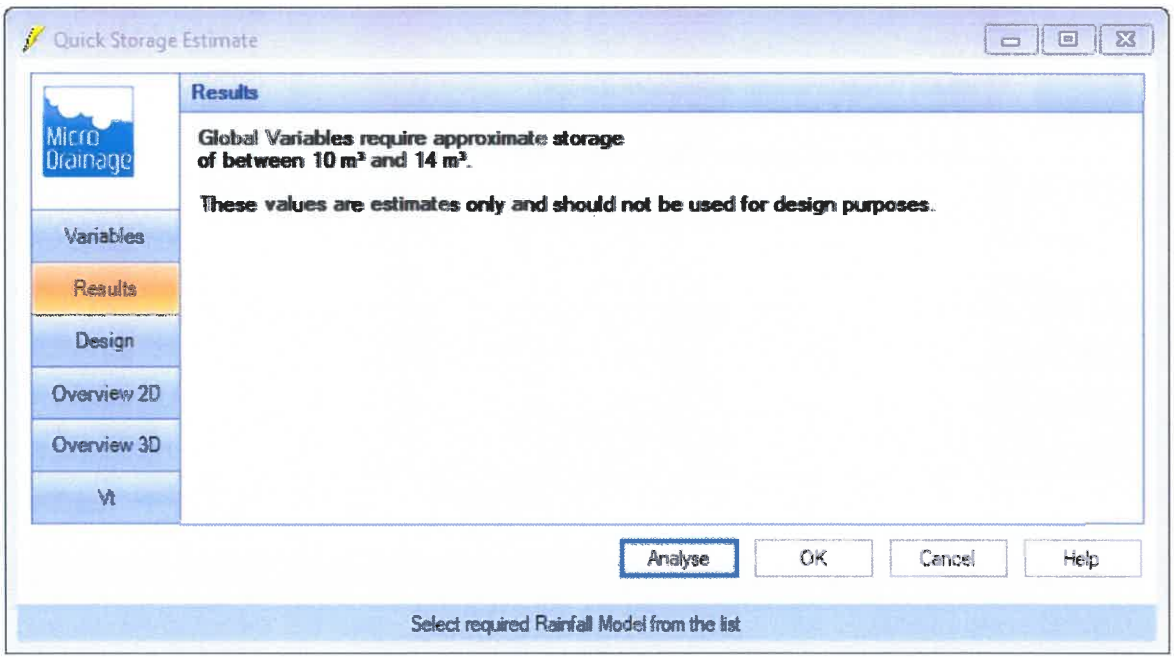
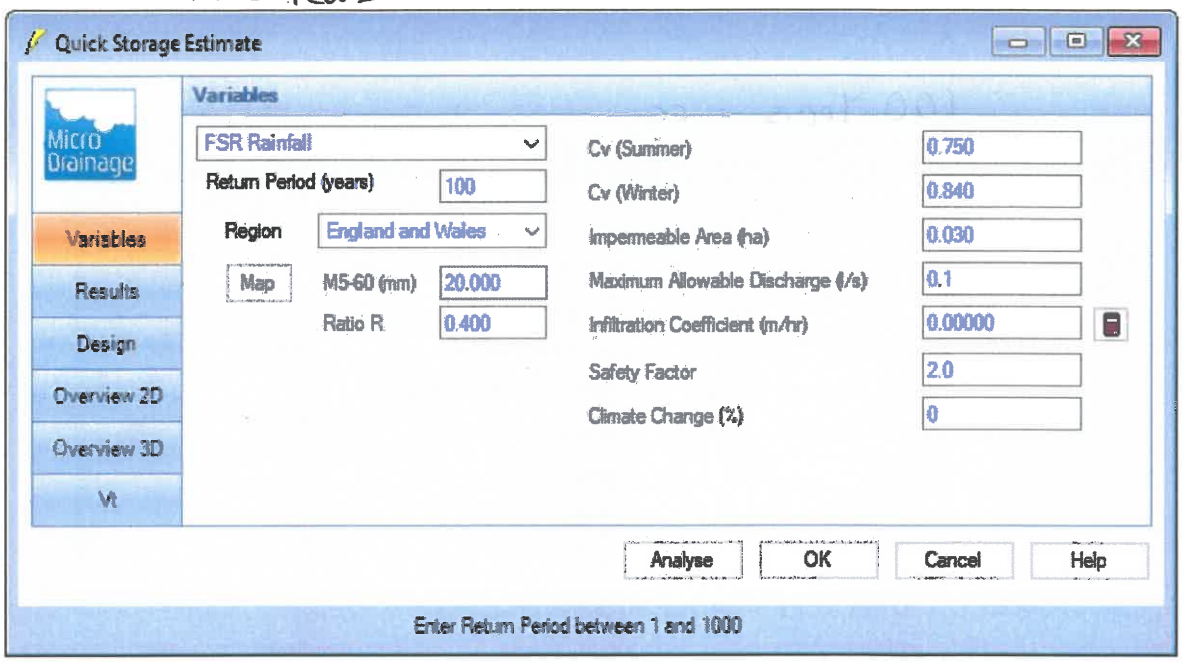
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FSR Rainfall
Return Period (years) 30
Region England and Wales
Map
M5-60 (mm) 20.000
Ratio R 0.400
Cv (Summer) 0.750
Cv (Winter) 0.840
Impermeable Area (ha) 0.030
Maximum Allowable Discharge (l/s) 0.1
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 0
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 10 m³ and 14 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

100 years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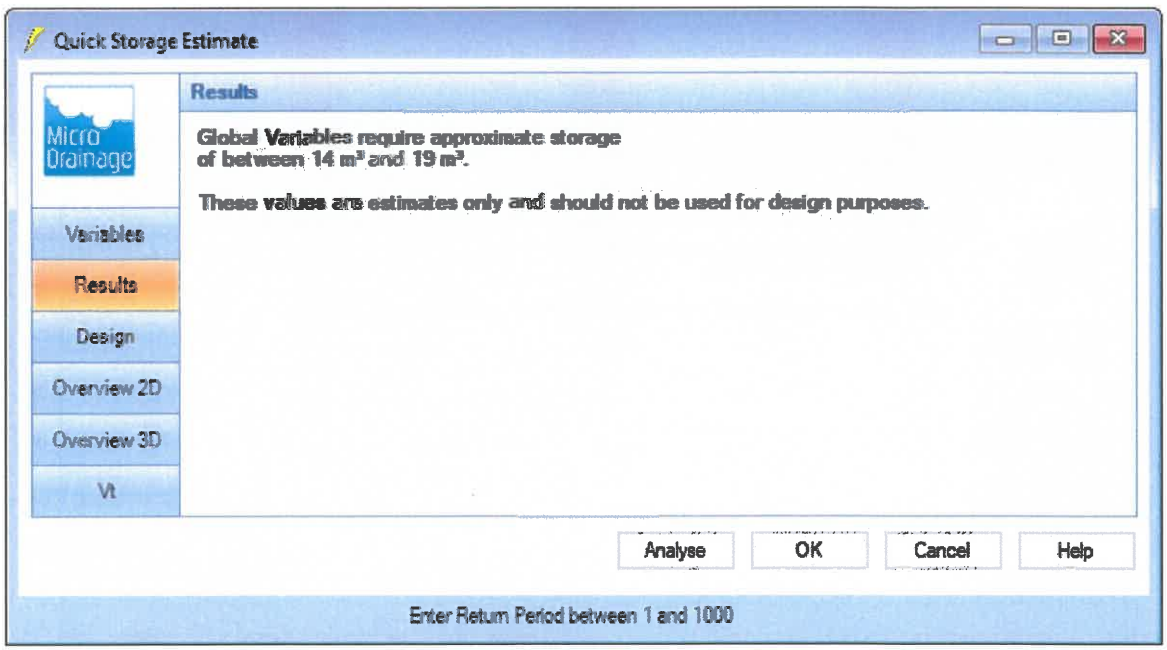
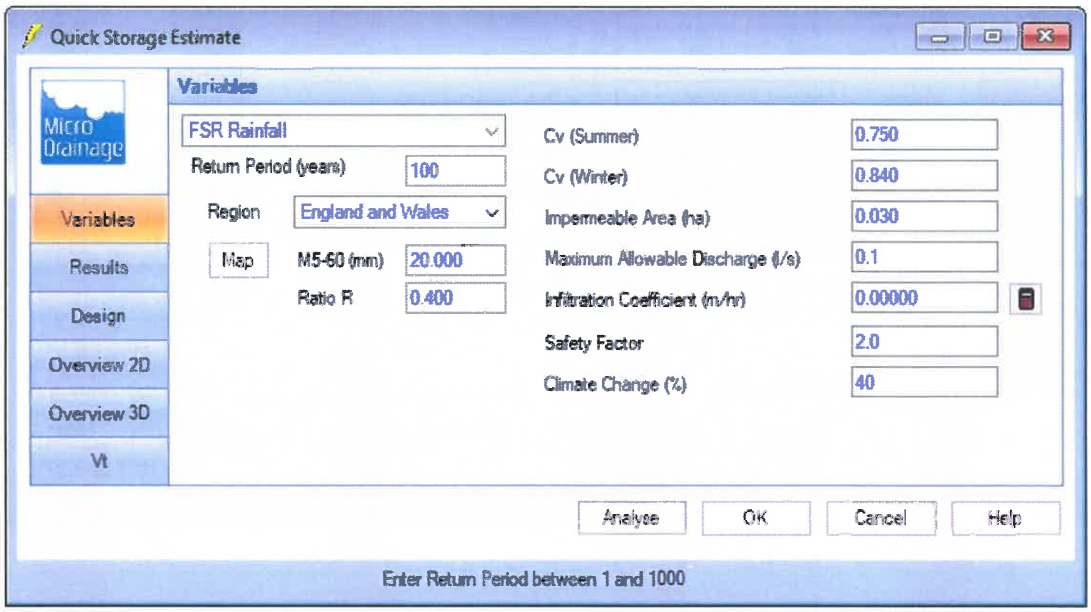
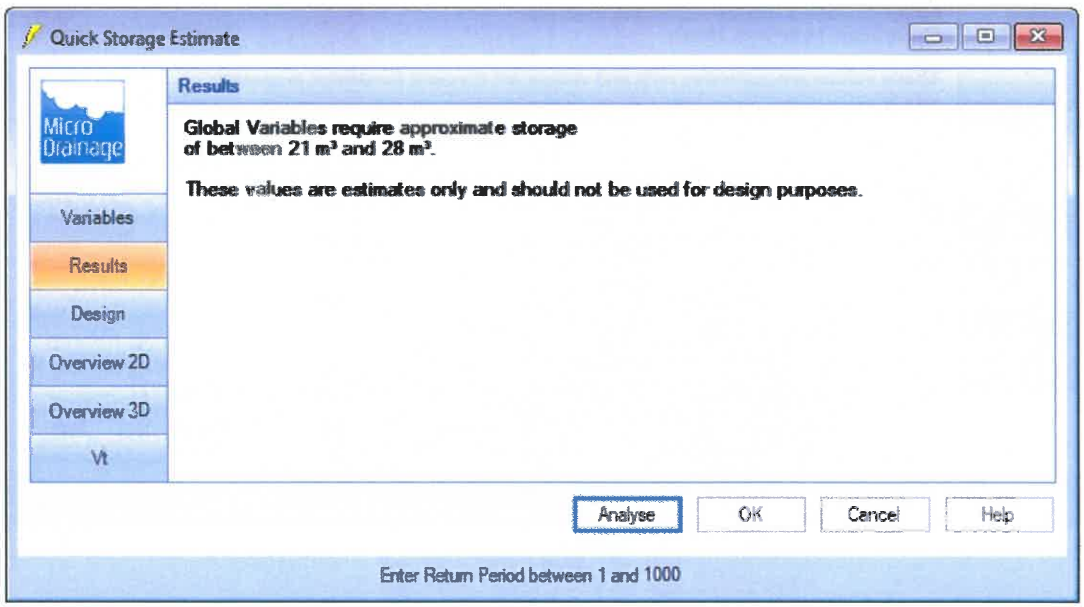
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FSR Rainfall
Return Period (years) 100
Region England and Wales
Map
M5-60 (mm) 20.000
Ratio R 0.400
Cv (Summer) 0.750
Cv (Winter) 0.840
Impermeable Area (ha) 0.030
Maximum Allowable Discharge (l/s) 0.1
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 0
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 14 m³ and 19 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000

100 Years + cc.


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FSR Rainfall
Return Period (years) 100
Region England and Wales
Map
M5-60 (mm) 20.000
Ratio R 0.400
Cv (Summer) 0.750
Cv (Winter) 0.840
Impermeable Area (ha) 0.030
Maximum Allowable Discharge (l/s) 0.1
Infiltration Coefficient (m/hr) 0.00000
Safety Factor 2.0
Climate Change (%) 40
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 21 m³ and 28 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000