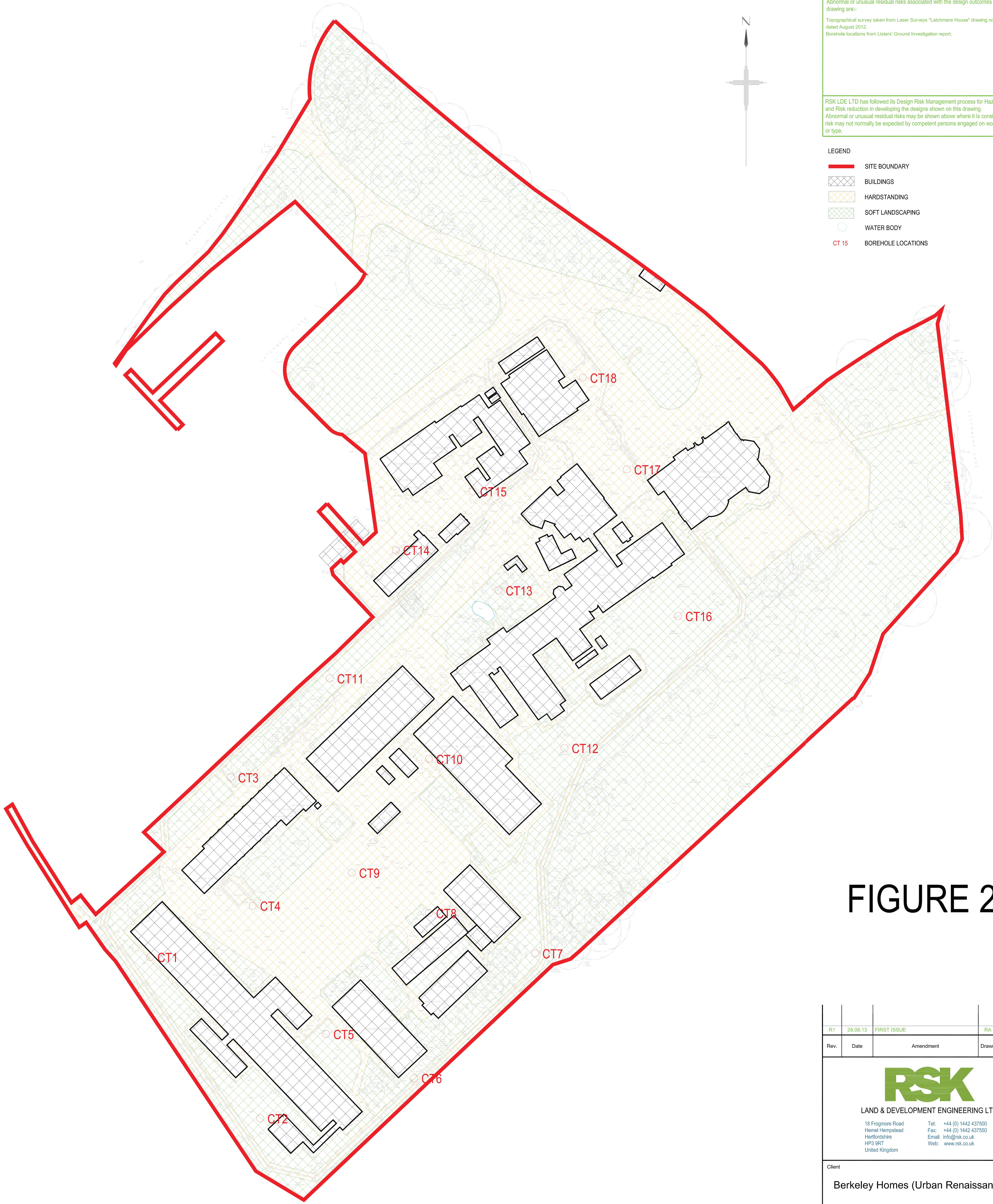


CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

Topographical survey taken from Laser Surveys "Latchmere House" drawing no. L5526/2 dated August 2012.
Borehole locations from Listers' Ground Investigation report.

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

LEGEND

SITE BOUNDARY
BUILDINGS
HARDSTANDING
SOFT LANDSCAPING
WATER BODY
CT 15 BOREHOLE LOCATIONS

FIGURE 2

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
R1	28.08.13	FIRST ISSUE	RA	JC	KR

LAND & DEVELOPMENT ENGINEERING LTD

18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
United Kingdom

Tel: +44 (0) 1442 437500
Fax: +44 (0) 1442 437550
Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client

Berkeley Homes (Urban Renaissance) Ltd

Project Title

LATCHMERE HOUSE

Drawing Title

EXISTING SITE LAYOUT AND TOPOGRAPHIC SURVEY

Drawn	Date	Checked	Date	Approved	Date
RA	28.08.13	JC	28.08.13	KR	28.08.13

Scale	Orig Size	Dimensions
1:500	A1	m

Project No. 132034

Drawing File 10-01 Site layout

Drawing No. 10-01

Rev. R1

File Location: K:\132034 - LATCHMERE PLANNING SUPPORT\GRAPH\FLOOD RISK\10-01 EXISTING LAYOUT INC TOPO (2007).DWG

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

1. Proposed masterplan layout taken from MAA Architects drawing no. BKH04-P_101 Rev. 1, dated September 2013 (Rev. 1 dated 06.12.13).

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

LEGEND

- SITE BOUNDARY
- INDICATIVE PROPOSED CATCHMENT BOUNDARY
- PROPOSED BUILDINGS
- PROPOSED IMPERMEABLE AREA
- PROPOSED PERMEABLE AREA

FIGURE 3

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P4	10.12.13	UPDATED WITH LATEST LAYOUT	JC	KR	KR
P3	26.09.13	UPDATED WITH LATEST LAYOUT	JC	KR	KR
P2	20.09.13	UPDATED WITH LATEST LAYOUT	JC	KR	KR
P1	16.09.13	FIRST ISSUE	JC	KR	KR

LAND & DEVELOPMENT ENGINEERING LTD

18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
United Kingdom

Tel: +44 (0) 1442 437500
Fax: +44 (0) 1442 437550
Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client

Berkeley Homes (Central London) Ltd

Project Title

LATCHMERE HOUSE

Drawing Title

PROPOSED SITE LAYOUT - SCHEME 1

Drawn	Date	Checked	Date	Approved	Date
JC	13.08.13	KR	03.09.13	KR	03.09.13

Scale	Orig Size	Dimensions
1:500	A1	m

Project No. 132034

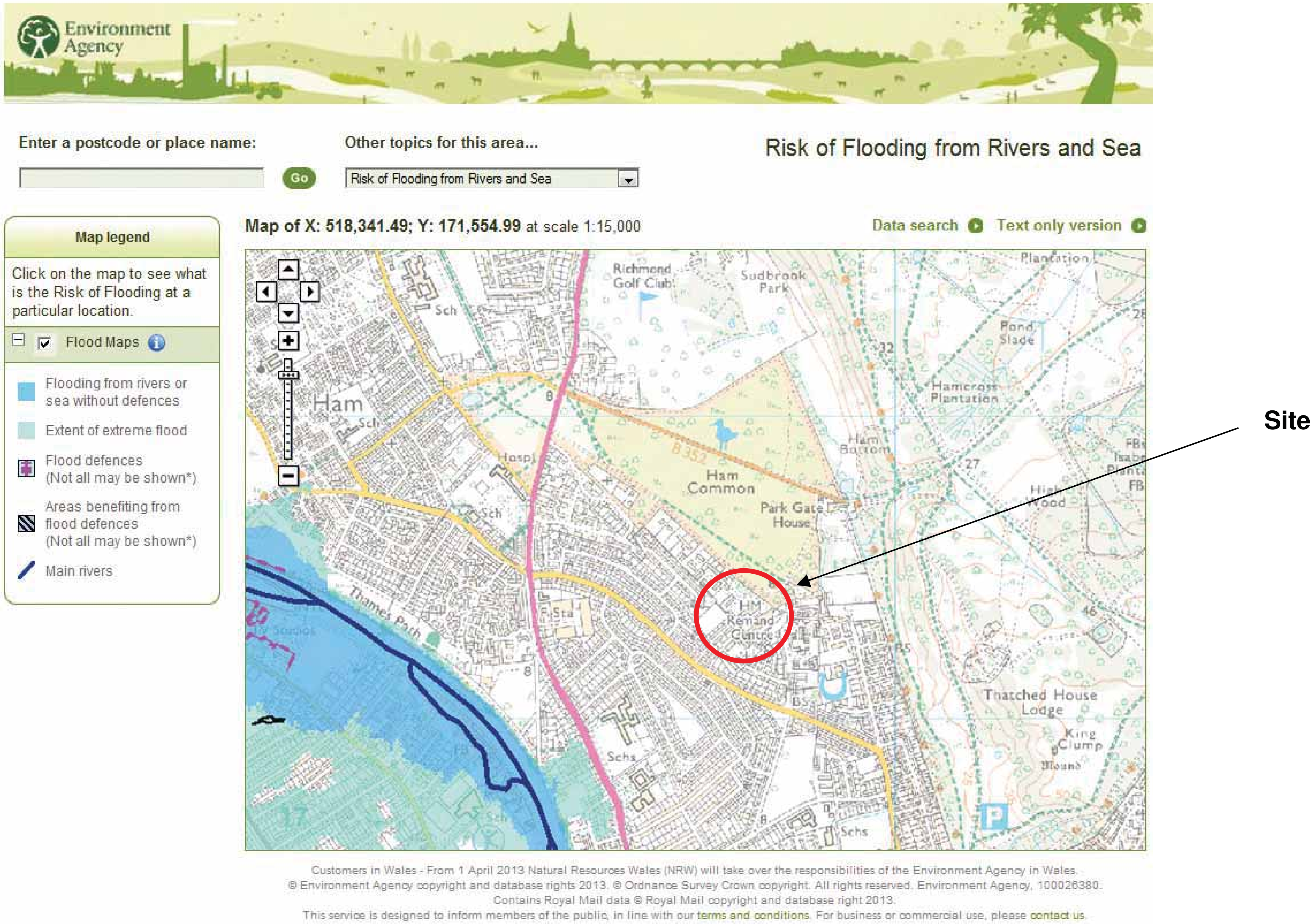
Drawing File 40-01(S1) Proposed layout

Drawing No. 40-01(S1)

Rev. P4

Scale 0 5 10 15 20 25m

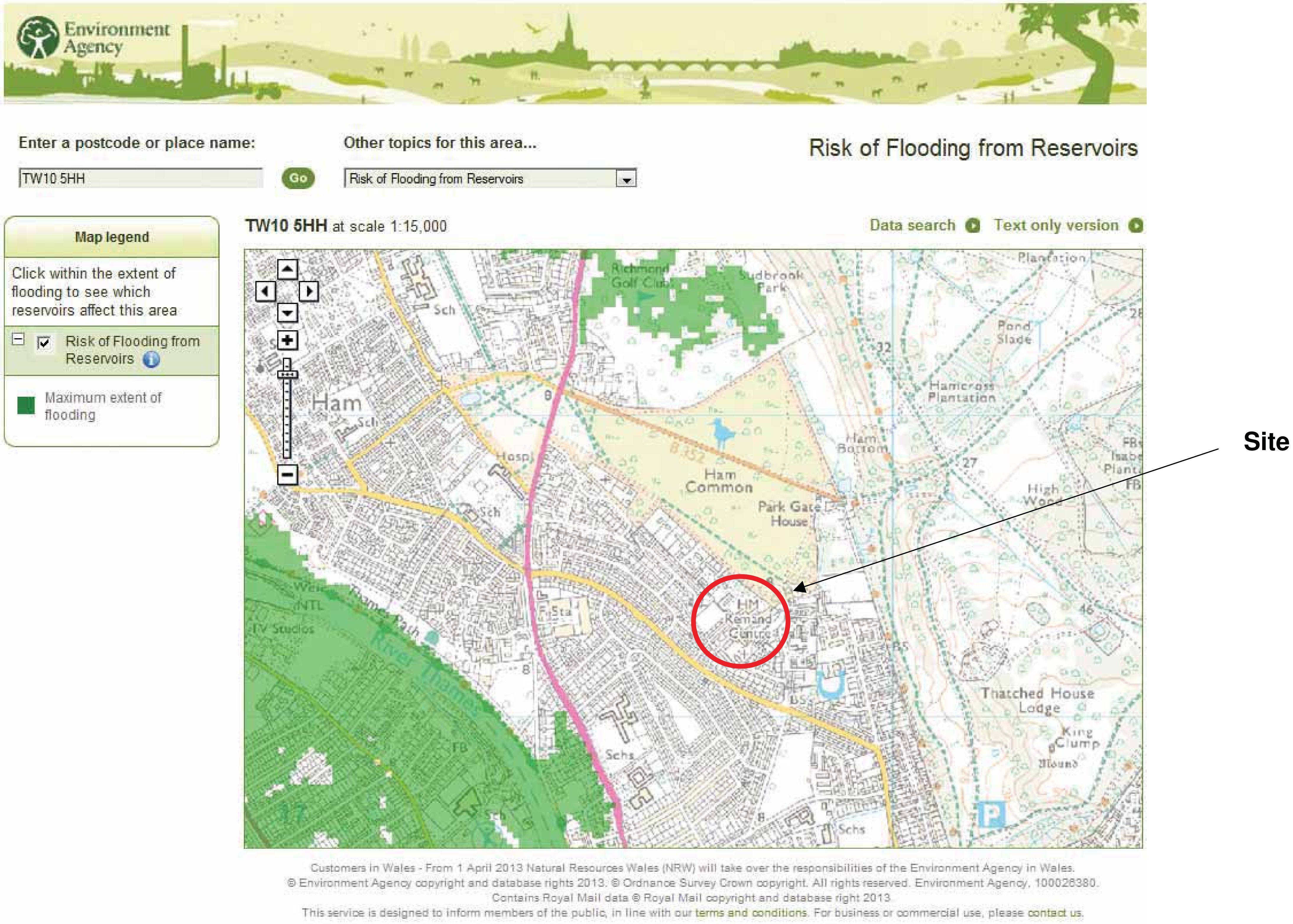
File Location: K:\132034 - LATCHMERE PLANNING SUPPORT\GRAPH\FLOOD RISK\40-01(S1) PROPOSED LAYOUT AND SUDS (P5).DWG



RSK

ENVIRONMENT AGENCY RIVER AND SEA FLOOD ZONE MAP

Client:	Berkeley Homes (Central London) Ltd	**Figure No:**	4
Site:	Latchmere House	**Job No:**	132034
Scale:	NTS	**Source:**	Environment Agency



RSK	ENVIRONMENT AGENCY RESERVOIR FLOOD MAP	**Client:**	Berkeley Homes (Central London) Ltd	**Figure No:**	5
		Site:	Latchmere House	**Job No:**	132034
		Scale:	NTS	**Source:**	Environment Agency

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

1. Proposed masterplan layout taken from MAA Architects drawing no. BKH04-P_101 Rev. 1, dated September 2013 (Rev. 1 dated 06.12.13).

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

LEGEND

- SITE BOUNDARY
- PROPOSED BUILDINGS
- INDICATIVE SURFACE WATER DRAINAGE NETWORK
- FIN DRAIN

TYPICAL SECTION A-A

1.2 1.0 1.2
0.6 0.4 1.0 0.6

(Scale 1:200)

TYPICAL SECTION B-B

1.5 12.0 1.5
0.3 0.4 1.0

(Scale 1:200)

FIGURE 6

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P5	10.12.13	UPDATED WITH LATEST LAYOUT	JC	KR	KR
P4	26.09.13	UPDATED WITH LATEST LAYOUT	JC	KR	KR
P3	20.09.13	UPDATED WITH LATEST LAYOUT	JC	KR	KR
P2	03.09.13	REVISED SUDS LAYOUT	JC	KR	KR
P1	19.08.13	FIRST ISSUE	JC	KR	KR

RSK
LAND & DEVELOPMENT ENGINEERING LTD
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
United Kingdom
Tel: +44 (0) 1442 437500
Fax: +44 (0) 1442 437550
Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client
Berkeley Homes (Central London) Ltd

Project Title
LATCHMERE HOUSE

Drawing Title
INDICATIVE SUDS LAYOUT - SCHEME 1

Drawn	Date	Checked	Date	Approved	Date
JC	19.08.13	KR	19.08.13	KR	19.08.13

Scale	Orig Size	Dimensions
1:500	A1	m

Project No.	Drawing File
132034	40-01(S1) Proposed layout

Drawing No.	Rev.
40-04-1(S1)	P5

Scale 0 5 10 15 20 25m

SUDS Components

Source Control		
	Infiltration Devices (soakaways)	Infiltration devices temporarily store runoff from a development and allow it to percolate into the ground. Excavation or trench that can be filled with filter material. Can be made of pre-cast concrete or polyethylene rings/perforated storage structures that are then backfilled with granular material.
	Pervious surfaces	Pervious surfaces allow rainwater to infiltrate through the surface into an underlying storage layer, where water is stored before infiltration to the ground, reuse, or discharge to surface water. Porous surface replaces traditional impermeable surfaces.
Area Control		
	Modular Storage	Modular plastic geocellular systems with a high void ratio that can be used to create a below ground infiltration (soakaway) or storage structure.
Regional Control		
	Infiltration basin	Infiltration basins are depressions in the surface that are designed to store runoff and infiltrate the water to the ground. They may also be landscaped to provide aesthetic and amenity value.

File Location: K:\132034 - LATCHMERE PLANNING SUPPORT\GRAPH\FLOOD RISK\40-01(S1) PROPOSED LAYOUT AND SUDS (P5).DWG

CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

1. Proposed masterplan layout taken from MAA Architects drawing no. BKH04-P_101 Rev. 1, dated September 2013 (Rev. 1 dated 06.12.13).

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

LEGEND

- SITE BOUNDARY
- PROPOSED BUILDINGS
- THAMES WATER PUBLIC FOUL WATER SEWER NETWORK
- INDICATIVE FOUL WATER DRAINAGE NETWORK

FIGURE 7

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P3	10.12.13	UPDATED WITH LATEST LAYOUT	JC	KR	KR
P2	26.09.13	UPDATED WITH LATEST LAYOUT	JC	KR	KR
P1	16.09.13	FIRST ISSUE	JC	KR	KR

LAND & DEVELOPMENT ENGINEERING LTD
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
United Kingdom
Tel: +44 (0) 1442 437500
Fax: +44 (0) 1442 437550
Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client
Berkeley Homes (Central London) Ltd

Project Title
LATCHMERE HOUSE

Drawing Title
INDICATIVE FOUL WATER DRAINAGE STRATEGY - SCHEME 1

Drawn	Date	Checked	Date	Approved	Date
JC	16.09.13	KR	16.09.13	KR	16.09.13

Scale	Orig Size	Dimensions
1:500	A1	m

Project No.	Drawing File
132034	40-01(S1) Proposed layout

Drawing No.	Rev.
40-04-2(S1)	P3

Scale
0 5 10 15 20 25m

File Location: K:\132034 - LATCHMERE PLANNING SUPPORT\GRAPH\FLOOD RISK\40-01(S1) PROPOSED LAYOUT AND SUDS (P5).DWG

APPENDIX A

RSK Service constraints

RSK GROUP
SERVICE CONSTRAINTS

1. This drainage design carried out in connection with the report (together the "Services") were compiled and carried out by RSK LDE Ltd (RSK) for Berkeley Homes (Central London) Ltd (the "client") in accordance with the terms of a contract between RSK and the client dated January 2012. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable Civil Engineer at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the Site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in Site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services, which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the Site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the Site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the Site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The phase II or intrusive environmental Site investigation aspects of the Services is a limited sampling of the Site at pre-determined borehole and soil vapour locations based on the operational configuration of the Site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any Site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the Site.

APPENDIX B

Technical Guidance Notes

National Planning Policy Framework Technical Guidance Note (March 2012)

Site-specific Flood Risk Assessments

As set out in the NPPF, local planning authorities should only consider development in flood risk areas appropriate where informed by a Site-specific FRA. This should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking into account climate change. Those proposing developments should take advice from the emergency services when producing an evacuation plan for the development as part of the flood risk assessment.

BS 8533-2011 Assessing and Managing Flood Risk in Development Code of Practice (Nov 2011)

Assessing the risk of flooding

4.1 General

A detailed, development-based flooding investigation should be undertaken to determine:

a) the likelihood and consequence of flooding in and around the development, from all sources;
b) how the development might alter the existing flooding regime, potentially increasing the risk of flooding elsewhere; and
c) the design measures needed to manage the risk of flooding in and around the development.

NOTE a detailed, development-based flooding investigation to be prepared and submitted to the planning authority as part of the planning application. By producing the flood investigation at such an early stage, it can be used to influence the conceptual layout and design of the development and reduce (or avoid) the risk of flooding.

4.2 Site information

Before undertaking a detailed assessment of the risk of flooding, information about the Site and surroundings should be obtained, including:

a) details of existing infrastructure (e.g. reservoirs, canals, culverts, flood risk management infrastructure and/or drainage infrastructure);
b) details of existing raised flood risk management infrastructure (e.g. the level of protection afforded by them and their condition);
c) evidence of historical flooding;
d) topographic mapping including local features (e.g. boundary walls and hedges); and
e) information on site ground conditions.

Assessing the risk of flooding to the development Site and beyond

The risk of flooding associated with a proposed development should be assessed as the combination of the likelihood of flooding and its consequence. The following factors should be assessed:

a) how likely, and to what extent, the Site might flood and the nature of that flood hazard;
b) the consequence of flooding (e.g. damage to property, injury to people or loss of life); and
c) the impact that the development could have on flooding elsewhere.

The assessment of flood risk should quantify the risk of flooding, both to and from the Site, from the following:

1) tidal and fluvial flooding;
2) surface water flooding;
3) flooding due to surcharging of sewers and drains;
4) groundwater flooding; and
5) flooding caused by the failure of infrastructure.

Interim Code of Practice for Sustainable Drainage Systems (July 2004)

Drainage impact assessments

The drainage impact assessment (DIA) or drainage assessment (DA) will ensure that consideration is given to the impact of the proposed development on the catchment. It should be submitted with the first planning application for developments that require waste or surface water to be drained.

The DIA is Site-specific, and guidance on the completion of the assessment recommends the implementation of a drainage system that provides the best environmental protection and states that sustainable drainage systems (SUDS) are the preferred method of surface water drainage.

The basic requirements for a drainage impact assessment include:

- an examination of drainage patterns including overland flood pathways during extreme events;
- a concept drawing of the development proposal;
- a brief summary of how the drainage design provides SUDS techniques (in accordance with CIRIA guidance);
- a summary of SUDS to be incorporated;
- soil classification for the Site;
- evidence of soil porosity Sites (where possible at Site of infiltration devices);
- consideration of ground and groundwater conditions;
- calculation for runoff flow for the range of critical rainfall events;
- attenuation and treatment designed for a relevant return period rainfall events;
- wastewater drainage proposals;
- confirmation of maintenance responsibility; and
- a copy of letter from sewerage undertaker giving location of nearest public sewer and confirmation of their availability for servicing the Site.

APPENDIX C

Environment Agency Correspondence

creating a better place

Environment Agency

Ross Armstrong
RSK ENSR Land and Development Engineering Ltd
18 Frogmore Road Industrial Estate
Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Our ref: SL/2013/111596/01-L01
Your ref: 132034 HMP Latchmere

Date: 3 September 2013

Dear Ross

It is proposed to redevelop the site to accommodate approximately 70 residential dwellings.

Site at HMP; Latchmere House, Church Road, Richmond, Surrey.

Thank you for consulting us at the pre-application stage. Having reviewed the information submitted we would like to highlight the following issues and opportunities.

- Surface water drainage
- Groundwater and contaminated land.

The proposed site is in Flood Zone 1, where the risk of flooding from rivers is classified as low. However, as the development is greater than 1 Hectare, a Flood Risk Assessment is still required but should be focused on the management of surface water run-off.

Development that increases the amount of impermeable surfaces can result in an increase in surface water run-off, which in turn can result in an increase in flood risk both on site and elsewhere within the catchment. In addition, the site may also still be at risk from other sources of flooding (e.g. groundwater and overland runoff), which are not considered in the mapping of Flood Zones.

As detailed in Policy 5.13 of the London Plan, developments should utilise sustainable urban drainage systems (SuDS), achieve Greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

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

Drainage should further be designed and implemented in ways that deliver other policy objectives of the London Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

We also recommend you contact the Lead Local Flood Authorities [LLFA] – The London Borough of Richmond upon Thames and the Royal Borough of Kingston upon Thames regarding this proposal and refer to their Surface Water Management Plans.

As a result of the Flood and Water Management Act 2010, the LLFA are responsible for local flood risk (i.e. surface runoff, ground water and ordinary watercourse).

You may also wish to consider contacting the appropriate relevant water/sewerage undertaker for the area. They may be able to provide some knowledge on the risk of flooding from other sources.

We note that the proposed method for dealing with surface water is infiltration. Whilst we welcome this approach, percolation tests must be undertaken, and soakaways designed and constructed in accordance with the guidelines stipulated in BRE Digest 365.

The site must be able to contain the 1 in 100 year critical storm including an allowance for climate change for the lifetime of the development and demonstrate that there is no property flooding from this event. Where soakaways do not accommodate the critical storm, overland flow and storage areas must be designed within the layout of the site.

There must also be at least 1m between the maximum anticipated groundwater level and the base of the infiltration system. If the surface of an infiltration system is too close to the water table, a rise in water levels during particularly wet periods could cause groundwater to enter the infiltration system, reducing the amount of storage available. Groundwater entering the infiltration system would also result in direct discharge from that infiltration system into groundwater, which may contravene permitting requirements and environmental legislation.

Potential for Land Contamination
We will need a Preliminary Risk Assessment (PRA) to assess if land contamination may be present at the site. This should be submitted with the planning application. The PRA needs to include information on *past and current uses, if sensitive controlled waters receptors are present and if the site could pose a pollution risk.* The PRA should also consider if any aspects of the proposed development could pose a pollution risk should contamination be present (i.e. deep drilling to facilitate the installation of foundation piles, site drainage). Further work such as an intrusive site investigation may be required depending on the findings of the PRA.

We recommend that developers should:

1. Follow the risk management framework provided in CLR11, 'Model Procedures for the Management of Land Contamination', when dealing with land potentially affected by contamination;

2. Refer to our 'Guiding Principles for Land Contamination' documents for the type of information that should be included in a PRA;

3. Refer to our ‘Groundwater Protection: policy and practice (GP3)’ documents.

Of the drainage options for a site, infiltration techniques (primarily soakaways) pose the highest risk of polluting the groundwater. Some general information is provided below in relation to the use of infiltration techniques. Ultimately, any drainage design must be protective of the groundwater and in line with our ‘Groundwater Protection: policy and practice (GP3)’ for the use of infiltration techniques to be approved.

- If contamination is present in areas proposed for infiltration, we will require the removal of all contaminated material and provision of satisfactory evidence of its removal;
- The point of discharge should be kept as shallow as possible. Deep bored infiltration techniques are not acceptable;
- The distance between the point of discharge and the groundwater table should be a minimum of five metres;
- Only clean, uncontaminated water should be discharged into the ground.

Advice for developers
We have updated our advice for developers and it is now a joint agency document with advice from Environment Agency, Natural England and Forestry Commission, it’s available to view on our website
http://www.environment-agency.gov.uk/business/sectors/136252.aspx

I trust that our comments are of use, if you have any questions please contact me.

Yours sincerely

Joe Martyn
Planning Advisor

Direct dial 0203 263 8087
Direct e-mail joseph.martyn@environment-agency.gov.uk

Please note that the view expressed in this letter by the Environment Agency is a response to a pre application enquiry only and does not represent our final view in relation to any future planning application made in relation to this site. We reserve the right to change our position in relation to any such application. You should seek your own expert advice in relation to technical matters relevant to any planning application before submission

APPENDIX D

Thames Water Sewer Records

CommercialDW Drainage and Water Enquiry Water Map-CDWS/CDWS Standard/2012_2168534

The width of the displayed area is 500m

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

CommercialDW Drainage and Water Enquiry Sewer Map- CDWS/CDWS Standard/2012_2168534

The width of the displayed area is 500m

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

WORKS OFFICE
W I N G
NEW MANHOLE
tarmac
grass
concrete
THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE FOLLOWING DRAWINGS:-
139969
RECORD DRAWIN
'A' WING
UNDERGROUND FOUL WATER
DRAINAGE LAYOUT.
39/M/59774

Developer Services Waste – Provinces

Your ref
Our ref DE/JB/RM/1010766230
Name J.Boerio
Phone 0203 577 9018
Fax
E-Mail jim.boerio@thameswater.co.uk

RSK Group
16 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RW

1 March 2013

attn:- Kevin Ravenhill

Dear Sirs

Proposed Development at:- HM Prison, Latchmere House, Church Road, Richmond, Surrey TW10 5HH

Thank you for your predevelopment enquiry of 6th February 2013.

I understand you have a copy of the local sewer map showing the location size and depth of the sewers in the vicinity of your site.

The drainage system is separate.

There is adequate capacity in the sewer for your foul drainage proposals.

The sewers are already overloaded with surface water.
Your surface water should drain therefore to soakaways as you propose. The ground should be suitable but you must make your own tests. Failing this your surface water discharge should be restricted to a rate of 5 Litres per second. There should be no flooding of the surface in a 30 year storm.

Access roads and open car parks should drain via deep trapped gullies to the surface water system.

Underground car parks if involved should drain via petrol interceptor to the foul system.

Basements if involved depending on depth, may need pumping or protection against back surges in the public sewer.

Trade effluent discharges will require a license from Thames Water.

Thames Water Utilities Ltd
Clearwater Court
Vastern Road
Reading RG1 8DB

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

Your connection to the public sewer should be by manhole due to the number of properties involved.

In due course you will need to submit a formal application for sewer connections. I should be grateful if you would contact our help line on 0845 850 2777 or go to our web site www.thameswater.co.uk navigating to developers at the top then developer services and new sewer connections at the side to obtain an application form.

Yours faithfully

J. Boerio
Developer Services Engineer

APPENDIX E

NPPF Technical Guidance: Flood Zones and Land Use Vulnerability

Within the NPPF Technical Guidance, each flood zone has a list of appropriate land uses dependent on vulnerability to flooding. The flood zones are described in Table 1: Flood Zones reproduced below. (Note: These flood zones refer to the probability of river and sea flooding, ignoring the presence of defences).

NPPF Technical Guidance Table 1: Flood Zones

Zone 1 - Low Probability
Definition
This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%)
Appropriate uses
All uses of land are appropriate in this zone
FRA requirements
For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a FRA. This need only be brief unless the factors above or other local considerations require particular attention.
Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage techniques. Sustainable drainage systems cover the whole range of sustainable approaches to surface drainage management. They are designed to control surface water run off close to where it falls and mimic natural drainage as closely as possible.
Zone 2 - Medium Probability
Definition
This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.
Appropriate uses
Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses, as set out in Table 2, are appropriate in this zone. The highly vulnerable uses are *only* appropriate in this zone if the Exception Test is passed.
FRA requirements
All development proposals in this zone should be accompanied by a FRA.
Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage systems.

Zone 3a - High Probability
Definition
This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
Appropriate uses
The water-compatible and less vulnerable uses of land (Table 2) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable and essential infrastructure uses should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.
FRA requirements
All development proposals in this zone should be accompanied by a FRA.
Policy aims
In this zone, developers and local authorities should seek opportunities to: • reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems; • relocate existing development to land in zones with a lower probability of flooding; and • create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.
Zone 3b High Probability
Definition
This zone comprises land where water *has* to flow or be stored in times of flood. Local Planning Authorities should identify in their SFRAs areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.
Appropriate uses
Only the water-compatible uses and the essential infrastructure listed in Table 2 that has to be there should be permitted in this zone. It should be designed and constructed to: • remain operational and safe for users in times of flood; • result in no net loss of floodplain storage; • not impede water flows; and • not increase flood risk elsewhere. Essential infrastructure in this zone should pass the Exception Test.
FRA requirements
All development proposals in this zone should be accompanied by a FRA.
Policy aims
In this zone, developers and local authorities should seek opportunities to: • reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems; and • relocate existing development to land with a lower probability of flooding.

The vulnerability classes are related to the sensitivity of the development to flooding and also consider the risk to people, property and services. The vulnerability classification Table 2 from NPPF Technical Guidance is reproduced below.

NPPF Technical Guidance Table 2: Flood Risk Vulnerability Classification

Vulnerability classes	Description
Essential Infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines
Highly Vulnerable	• Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required being operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent.[1] (where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as "Essential Infrastructure"[2])
More Vulnerable	• Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and Sites used for waste management facilities for hazardous waste.[3] • Sites used for holiday or short-let caravans and camping, ***subject to a specific warning and evacuation plan***.

Less Vulnerable	• Police, ambulance and fire stations which are ***not*** required to be operational during flooding • Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non–residential institutions not included in 'more vulnerable'; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do ***not*** need to remain operational during times of flood • Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
Water-compatible Development	• Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas and wharves. • Navigation facilities. • MOD defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, ***subject to a specific warning and evacuation plan.***

APPENDIX F

IoH-124 Surface Water Runoff Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.300
Area (ha)	3.578	Urban	0.520
SAAR (mm)	607	Region Number	Region 6

Results	**l/s**
QBAR Rural	5.5
QBAR Urban	14.5
Q2 years	14.2
Q1 year	12.4
Q30 years	27.2
Q100 years	32.8

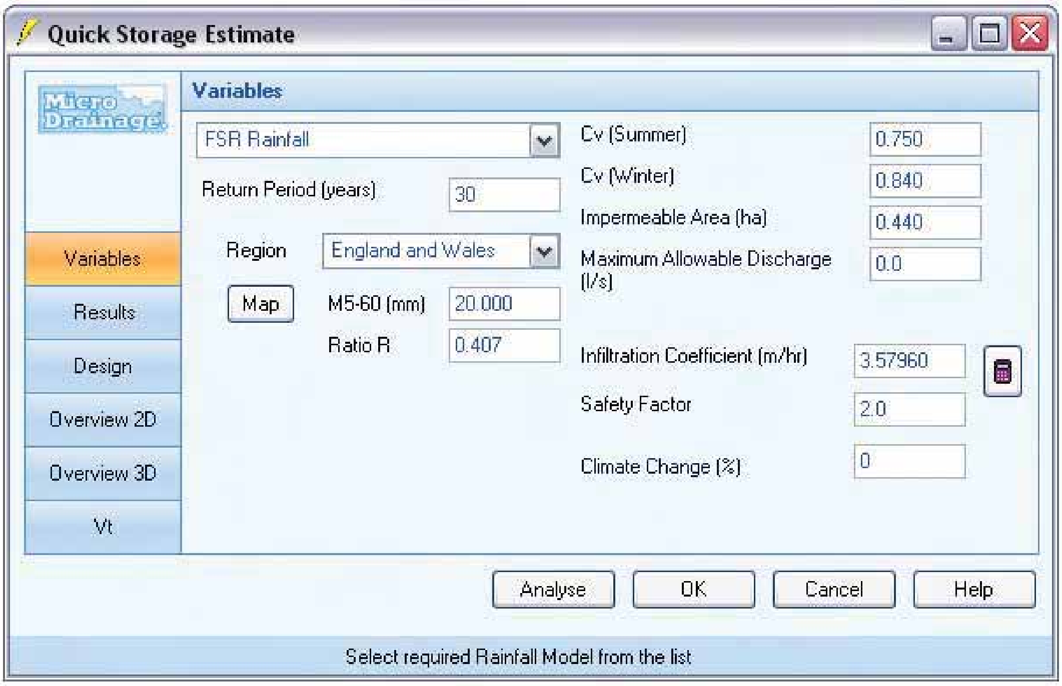
APPENDIX G

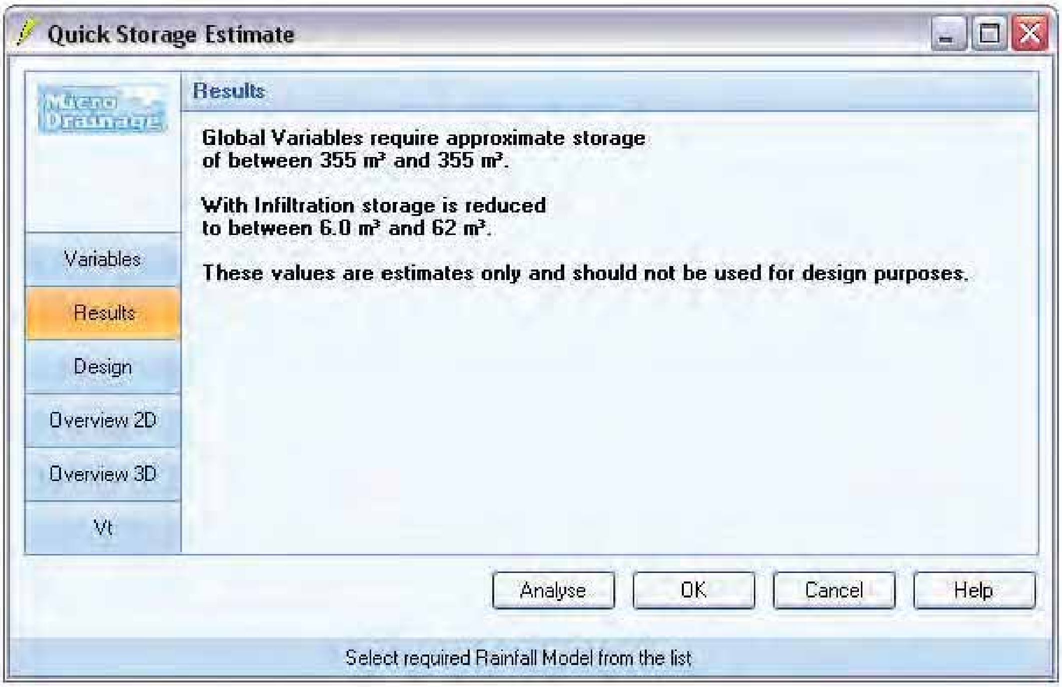
WinDes Quick Storage Calculations

Quick Store Estimates (P3)
- Latchmere

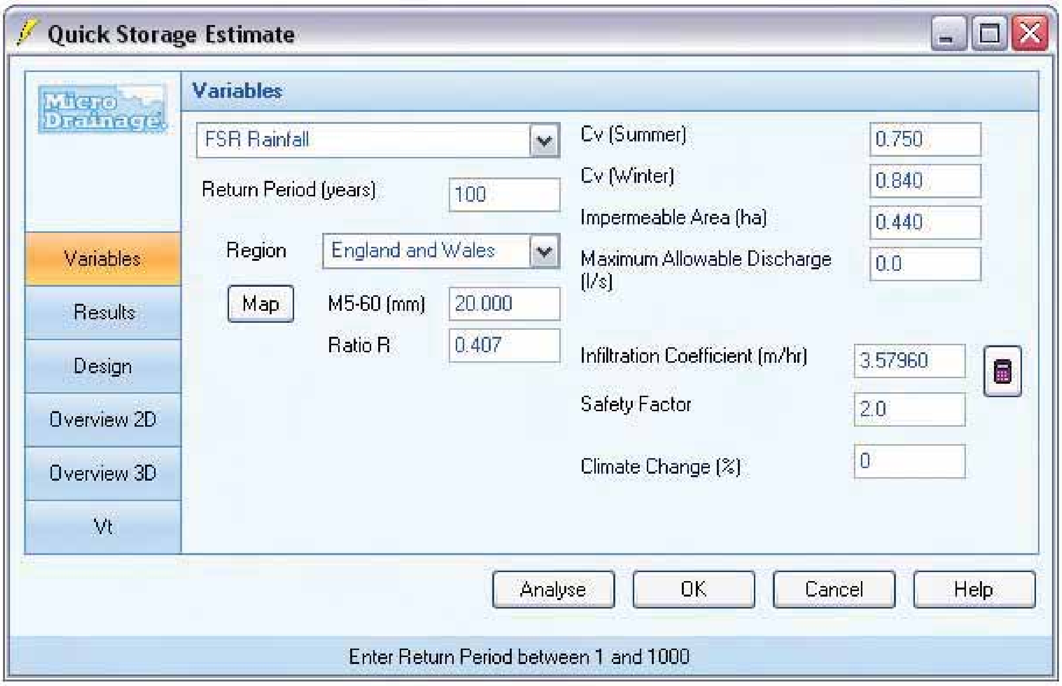
Northern Catchment

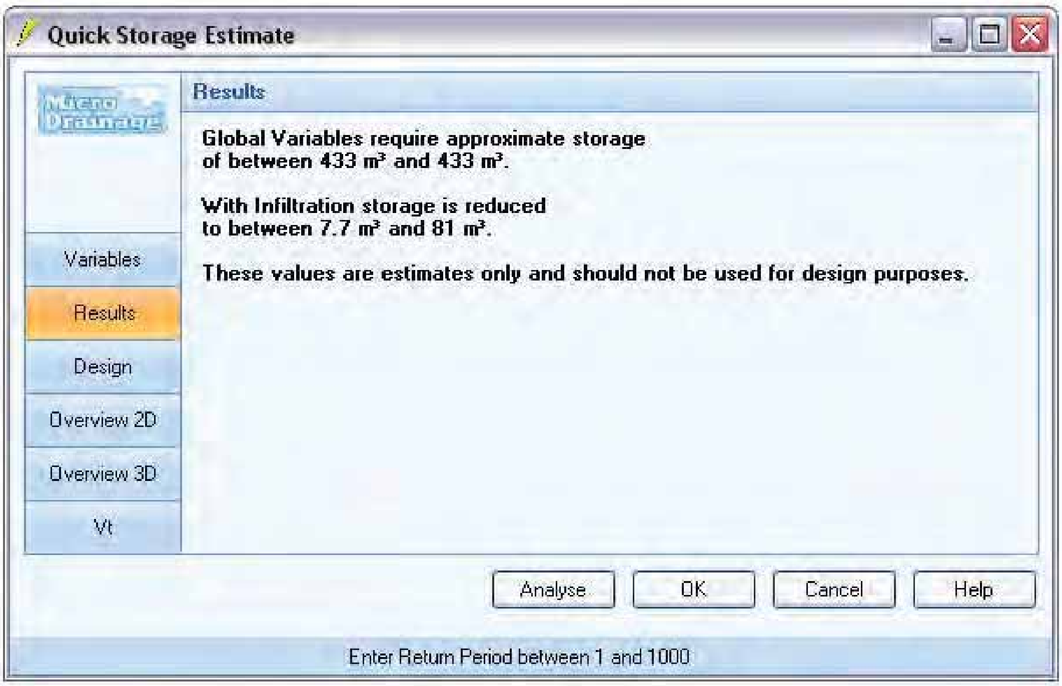
1 in 30 year



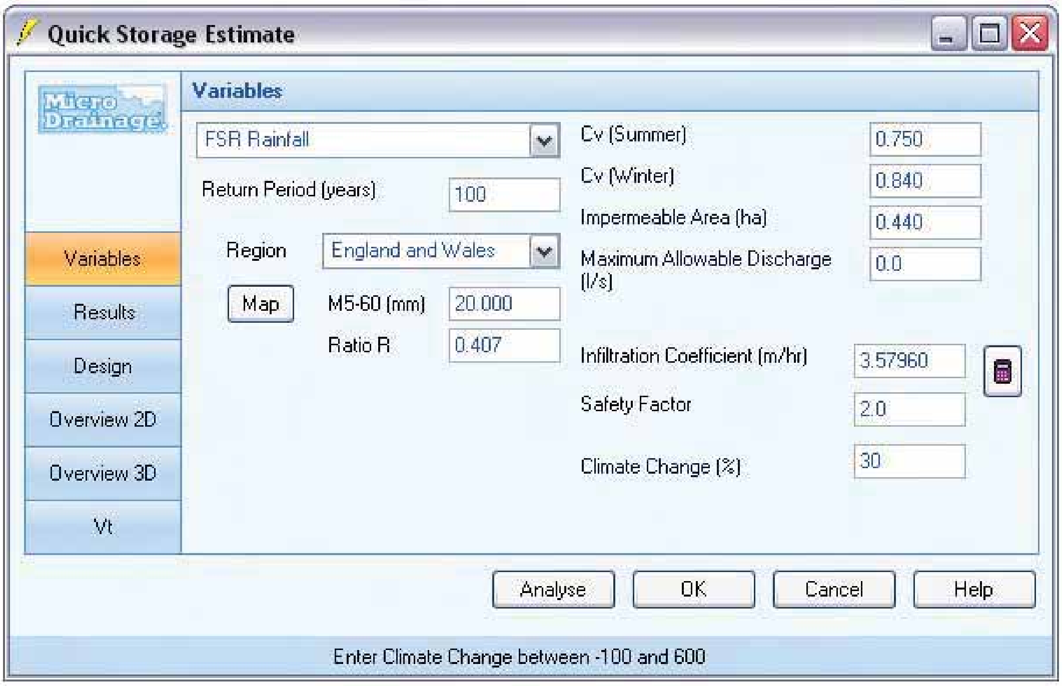


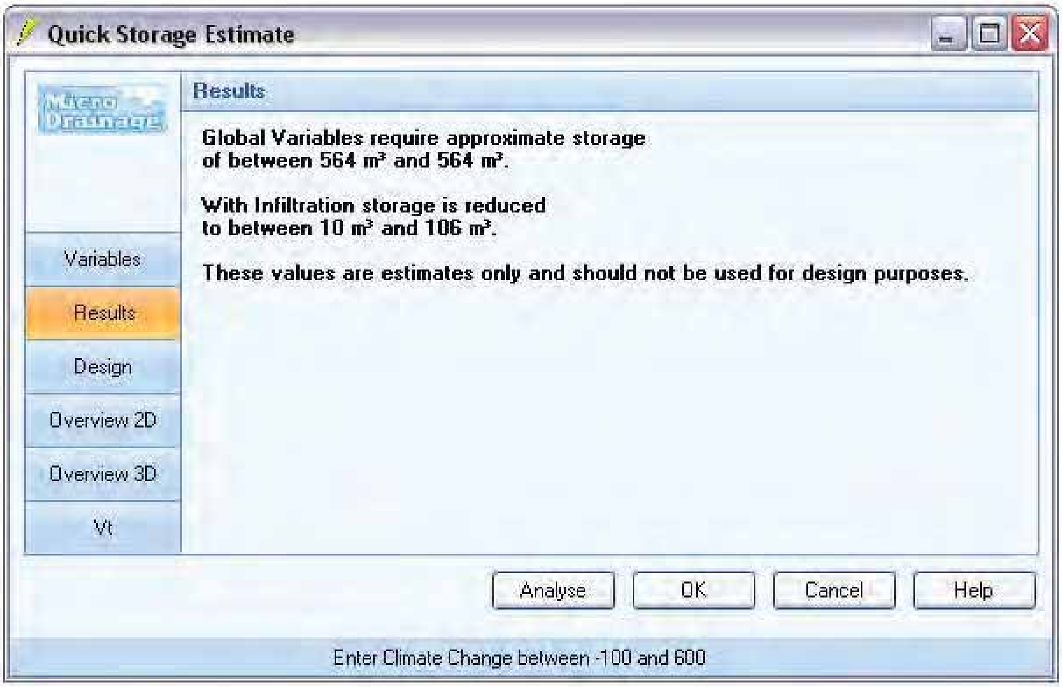
1 in 100 year


Quick Storage Estimate
Micro Drainage
Variables
FSR Rainfall
Return Period (years)
100
Region
England and Wales
Map
M5-60 (mm)
20.000
Ratio R
0.407
Cv (Summer)
0.750
Cv (Winter)
0.840
Impermeable Area (ha)
0.440
Maximum Allowable Discharge (l/s)
0.0
Infiltration Coefficient (m/hr)
3.57960
Safety Factor
2.0
Climate Change (%)
0
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000


Quick Storage Estimate
Micro Drainage
Results
Global Variables require approximate storage
of between 433 m³ and 433 m³.
With Infiltration storage is reduced
to between 7.7 m³ and 81 m³.
These values are estimates only and should not be used for design purposes.
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000

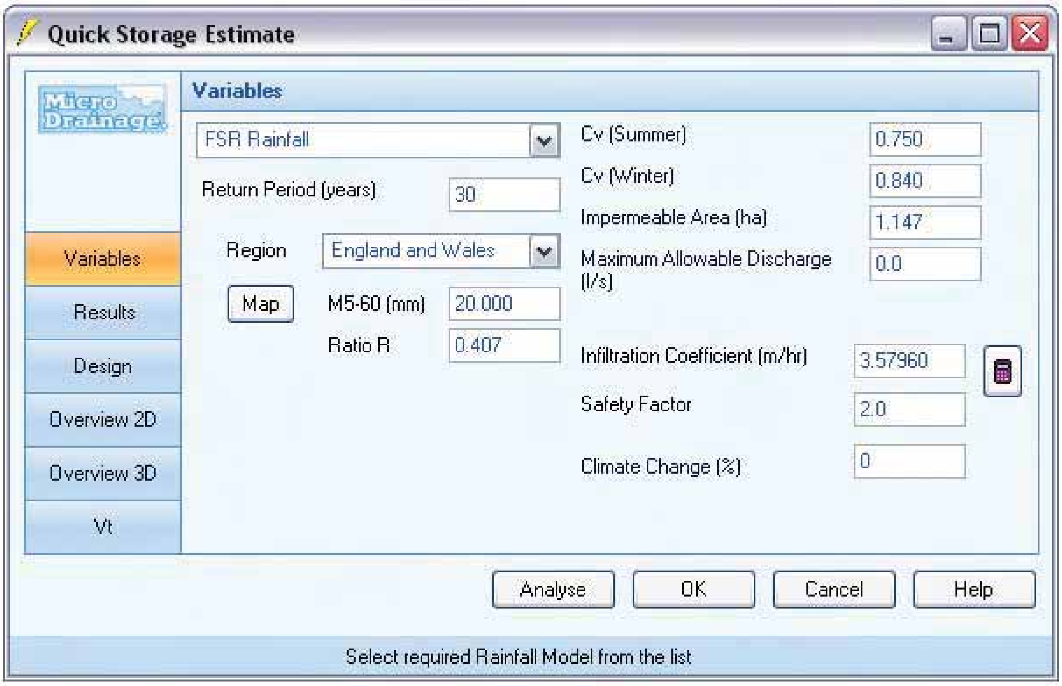
1 in 100 year plus 30% climate change

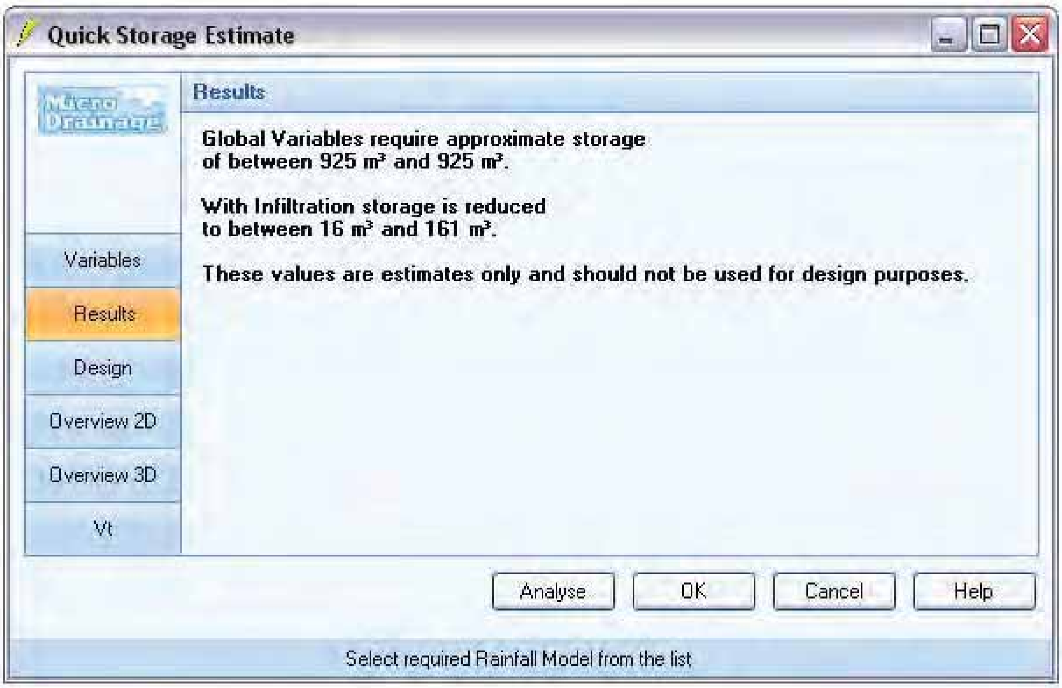




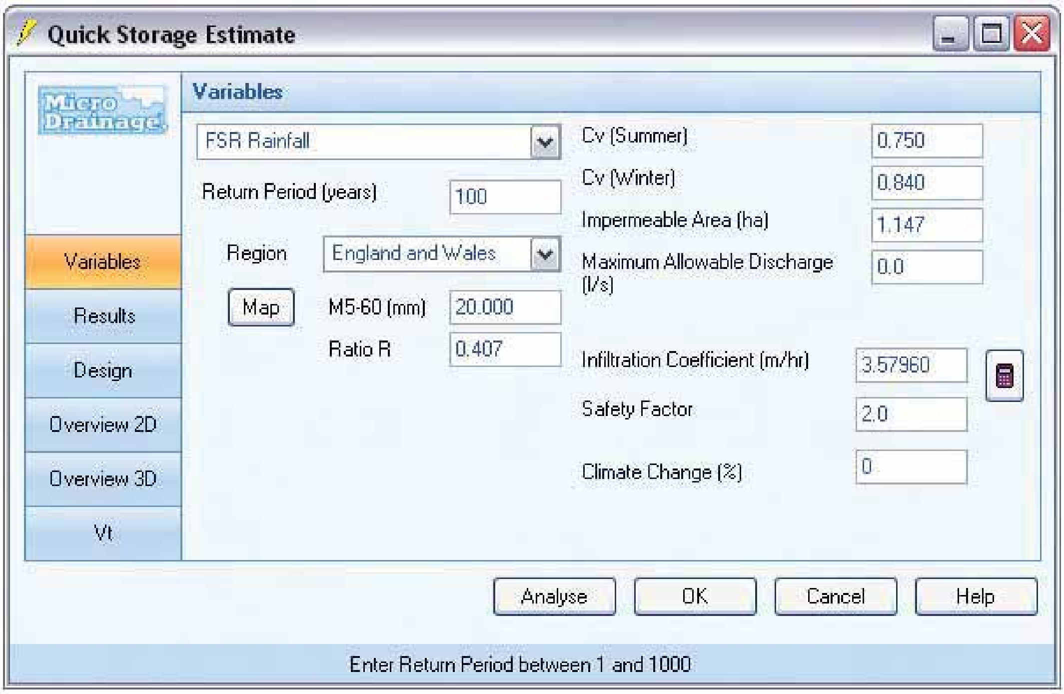
Southern Catchment

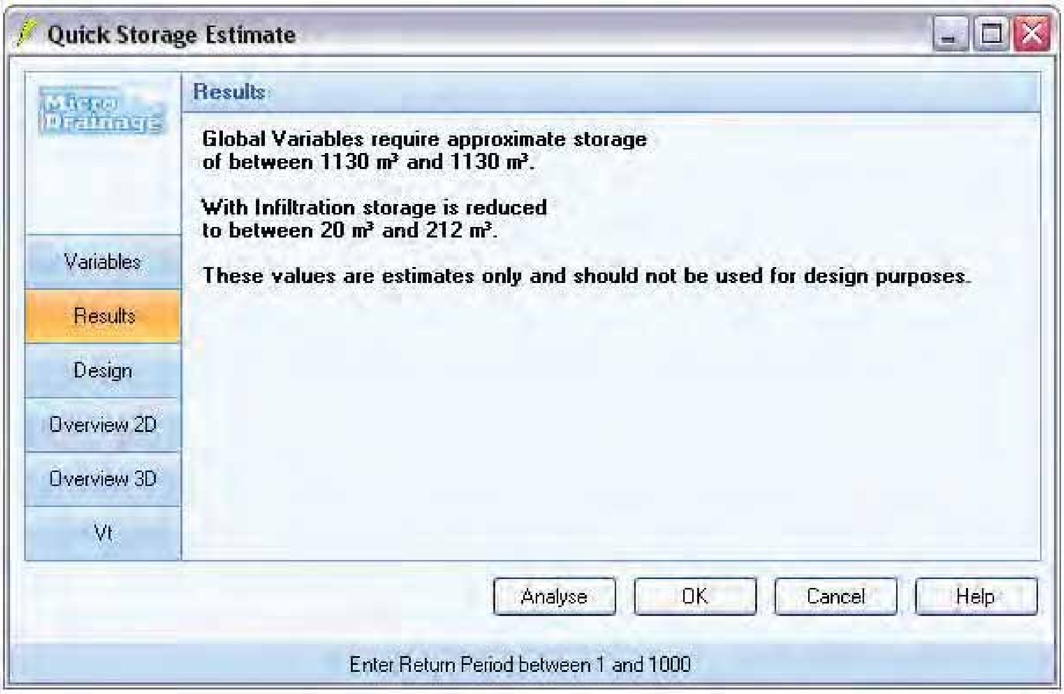
1 in 30 year





1 in 100 year


Quick Storage Estimate
Micro Drainage
Variables
FSR Rainfall
Return Period (years)
100
Region
England and Wales
Map
M5-60 (mm)
20.000
Ratio R
0.407
Cv (Summer)
0.750
Cv (Winter)
0.840
Impermeable Area (ha)
1.147
Maximum Allowable Discharge (l/s)
0.0
Infiltration Coefficient (m/hr)
3.57960
Safety Factor
2.0
Climate Change (%)
0
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000


Quick Storage Estimate
Micro Drainage
Results
Global Variables require approximate storage of between 1130 m³ and 1130 m³.
With Infiltration storage is reduced to between 20 m³ and 212 m³.
These values are estimates only and should not be used for design purposes.
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000

1 in 100 year plus 30% climate change