

No

(1) Is $Q_{PAR} \leq 2.0$ 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. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) $Is \text{ SPR/SPRHOST} \leq 0.3$

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

Greenfield runoff rates	Default	Edited
Q _{own} (l/s):	34.67	34.67
1 in 1 year (l/s):	30.51	30.51
1 in 30 years (l/s):	61.72	61.72
1 in 100 year (l/s):	75.59	75.59
1 in 200 years (l/s):	85.29	85.29

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksubs.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksubs.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydroscolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

SURFACE WATER SYSTEM

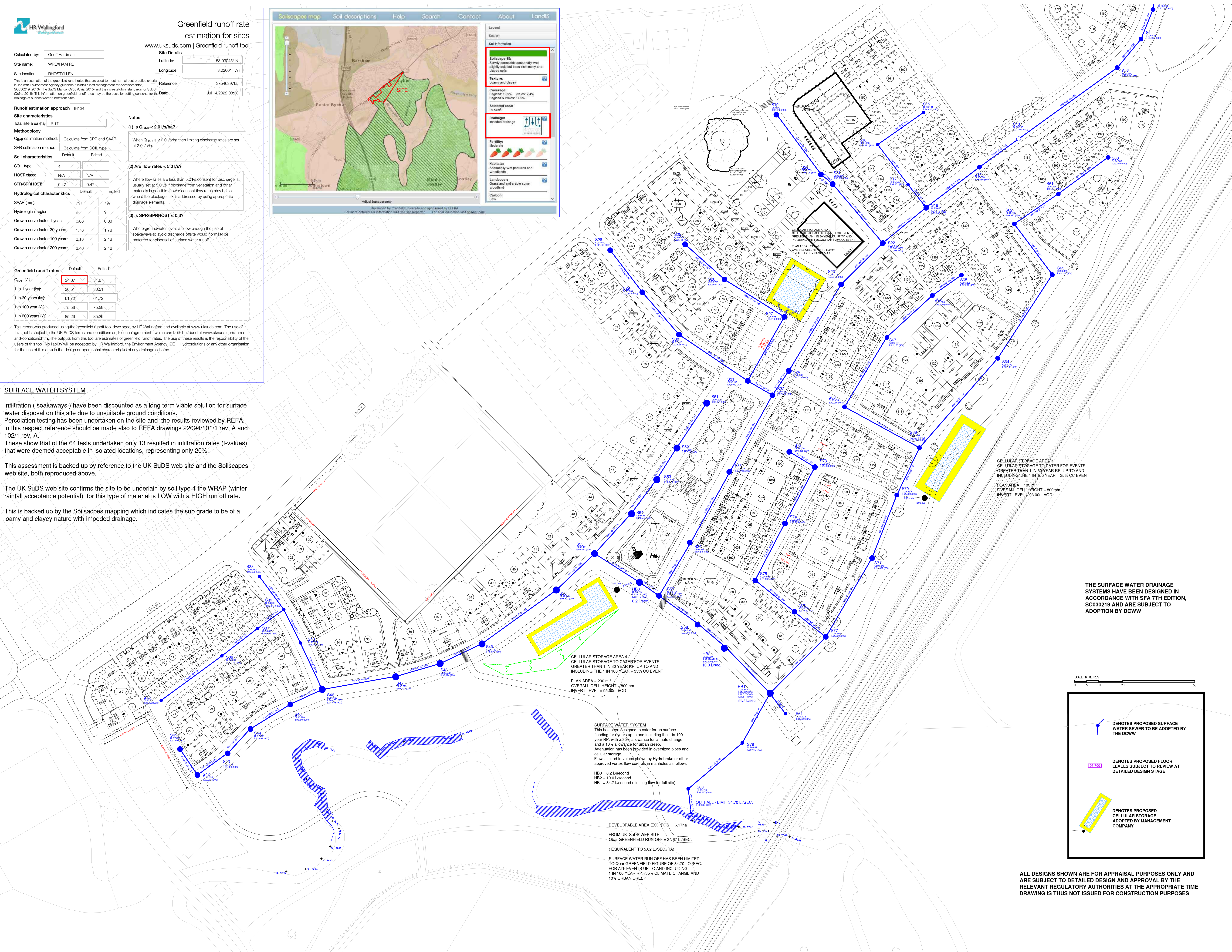
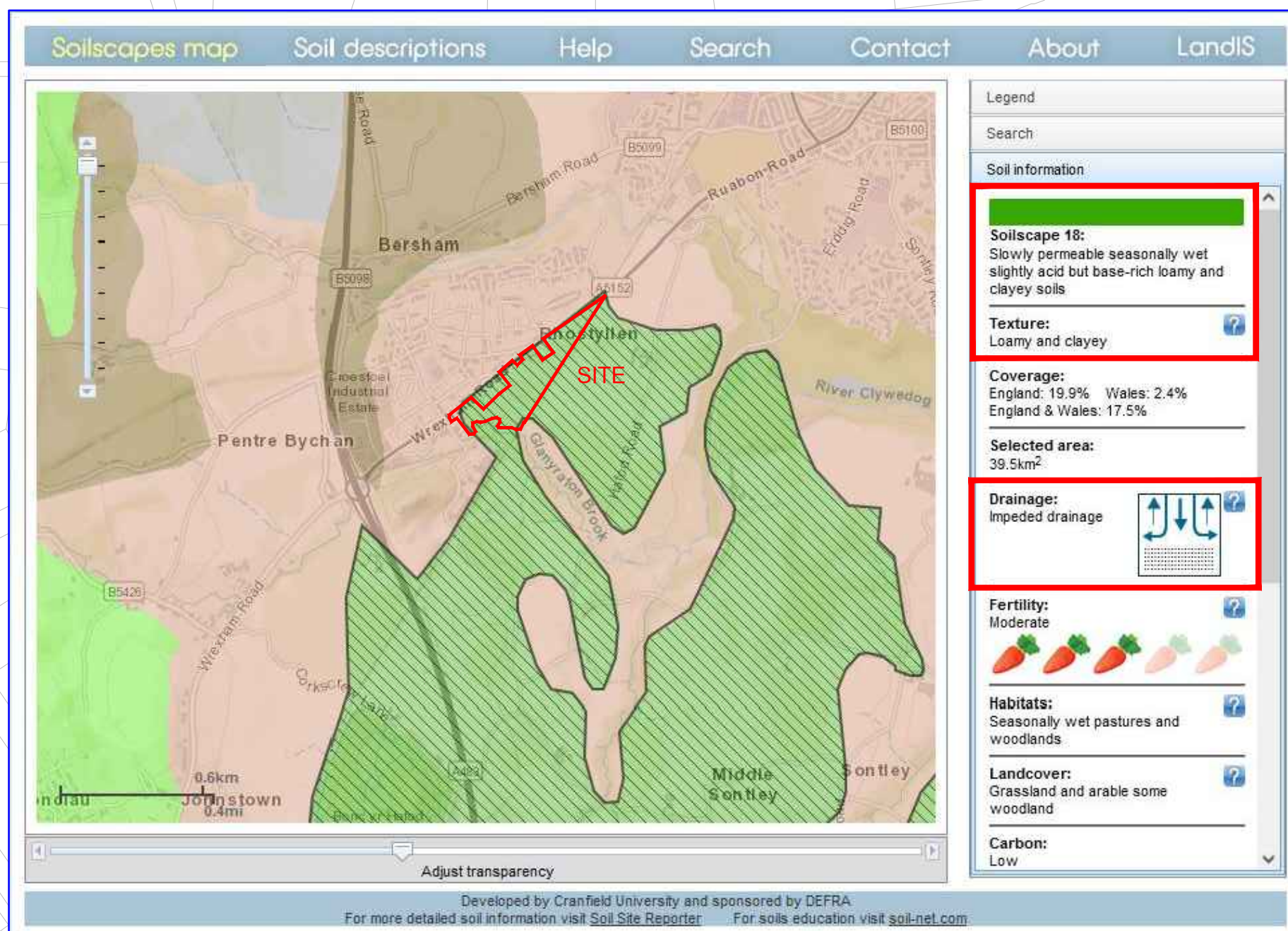
Infiltration (soakaways) have been discounted as a long term viable solution for surface water disposal on this site due to unsuitable ground conditions. Percolation testing has been undertaken on the site and the results reviewed by REFA. In this respect reference should be made also to REFA drawings 22094/101/1 rev. A and 102/1 rev. A.

These show that of the 64 tests undertaken only 13 resulted in infiltration rates (f-values) that were deemed acceptable in isolated locations, representing only 20%.

This assessment is backed up by reference to the UK SuDS web site and the Soilscales web site, both reproduced above.

The UK SuDS web site confirms the site to be underlain by soil type 4 the WRAP (winter rainfall acceptance potential) for this type of material is LOW with a HIGH run off rate.

This is backed up by the Soilsacpes mapping which indicates the sub grade to be of a loamy and clayey nature with impeded drainage.



GENERAL

1. All adaptable sewers and associated works are to comply with "SFA 7TH EDITION" & Local Authority specification.
2. All highway works to be to adopt standards and to comply with the Local Authority specification.
3. All private drainage works are to comply with part 3 of the Building Regulations.
4. All existing invert levels to be checked by the Contractor at the start of works and any discrepancies notified to the Engineer.
5. All levels are based on topographical survey information provided by the Engineer.
6. All materials to bear the relevant B.S.Kitemark and comply fully with the specifications.
7. All concrete & concrete products must use Sulphate Resisting Cement.
8. A geotechnical investigation report proves that sulphate attack from soils and groundwater will not occur)
9. All opening notices etc, as required under highway etc. are to be in place prior to commencement of works.
10. All works to be inspected by LA, HNC or Relevant Water Authority as applicable.

C.D.M. REGULATIONS 2015

In line with the above regulations we are obliged to inform the Client of their responsibilities under section CDM 15/17, and residual risks that may be encountered in the construction of these works. All design work has been carried out with Health and Safety as the primary consideration. Wherever possible risks have been eliminated from the design, however due to the very nature of the work it is not possible to remove all the risks from the design.

We would respectfully remind the Client of his obligations to take all reasonable steps in ensuring that only competent Contractors who have a valid safety policy are employed.

We should also provide satisfactory responses at tender stage to the manner in which they will deal with the elements of risk involved in this type of work and in particular those highlighted by REFA below:-

1. Support / treatment for ALL excavation work.
 2. Guarding / edges of excavations to prevent people/materials and vehicles falling into excavation.
 3. Guarding of excavations outside working hours to prevent unauthorized access.
 4. Undermining to adjacent roads or structures.
 5. Confined space operations.
 6. Dealing with existing services.
 7. Traffic management on existing highways.
 8. Procedure to be followed in event of accident or emergency.
 9. Method of working where contaminated ground is present on site.
 10. Confirmation will be required that all operatives are adequately trained, copies of relevant training certificates to be supplied.
- The above list is by no means exhaustive but it does highlight operations that present a risk to contractors and the public and should be identified for clarification on any item please contact REFA.

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For clarification on any item please contact REFA.

[illegible]

Client
**S G ESTATES
LIMITED**

Job title
WREXHAM ROAD
RHOSTYLLEN

Drawing title

SURFACE WATER DRAINAGE

STRATEGY 1 OF 2

REFA 45 Bridgeman Terrace
Wigan, Lancs
WN1 1TT
Tel: (01942) 826020
Fax: (01942) 230816

CONSULTING ENGINEERS
CIVIL • STRUCTURAL
GEOTECHNICAL • ENVIRONMENTAL

Date 3.11.22	Scale 1/500	Drawn GWH
DRAWING No	22094/105/1	Rev A

(C) This drawing is the property of REFA and should not be copied, used or its contents divulged without prior written consent.

Runoff estimation approach: IH124	
Site characteristics	
Total site area (ha):	6.17
Methodology	
Q ₉₅ estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SPR type
Soil characteristics	Default Edited
SOIL type:	4 4
HOST class:	N/A N/A
SPR/SPRHOST:	0.47 0.47
Hydrological characteristics	Default Edited
SAAR (mm):	797 797
Hydrological region:	9 9
Growth curve factor 1 year:	0.88 0.88
Growth curve factor 30 years:	1.78 1.78
Growth curve factor 100 years:	2.18 2.18
Growth curve factor 200 years:	2.46 2.46

Notes

(1) Is $Q_{95R} < 2.0$ l/s/ha?

When $Q_{95R} < 2.0$ l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

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

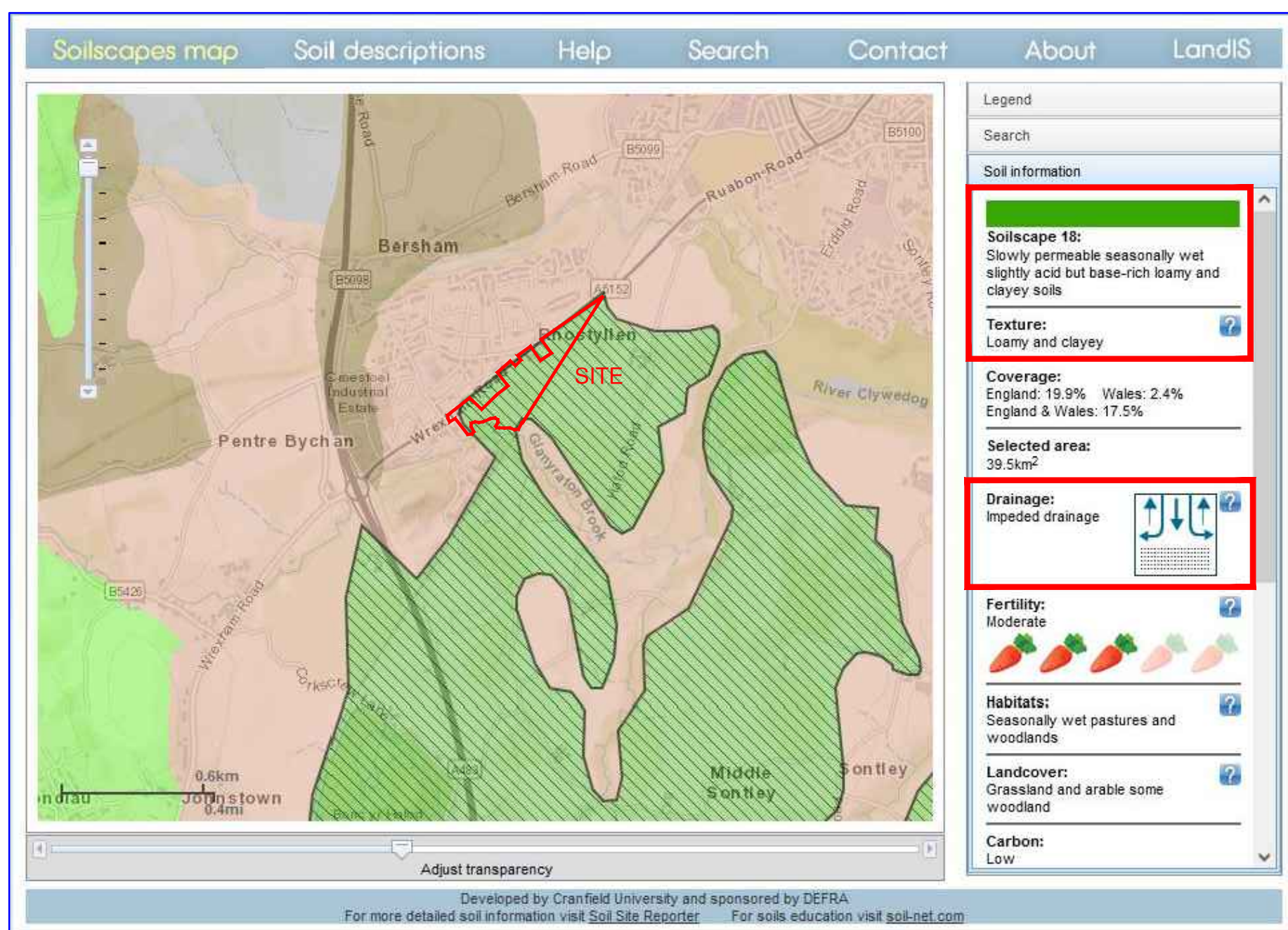
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SURFACE WATER SYSTEM

Infiltration (soakaway) have been discounted as a long term viable solution for surface water disposal on this site due to unsuitable ground conditions.

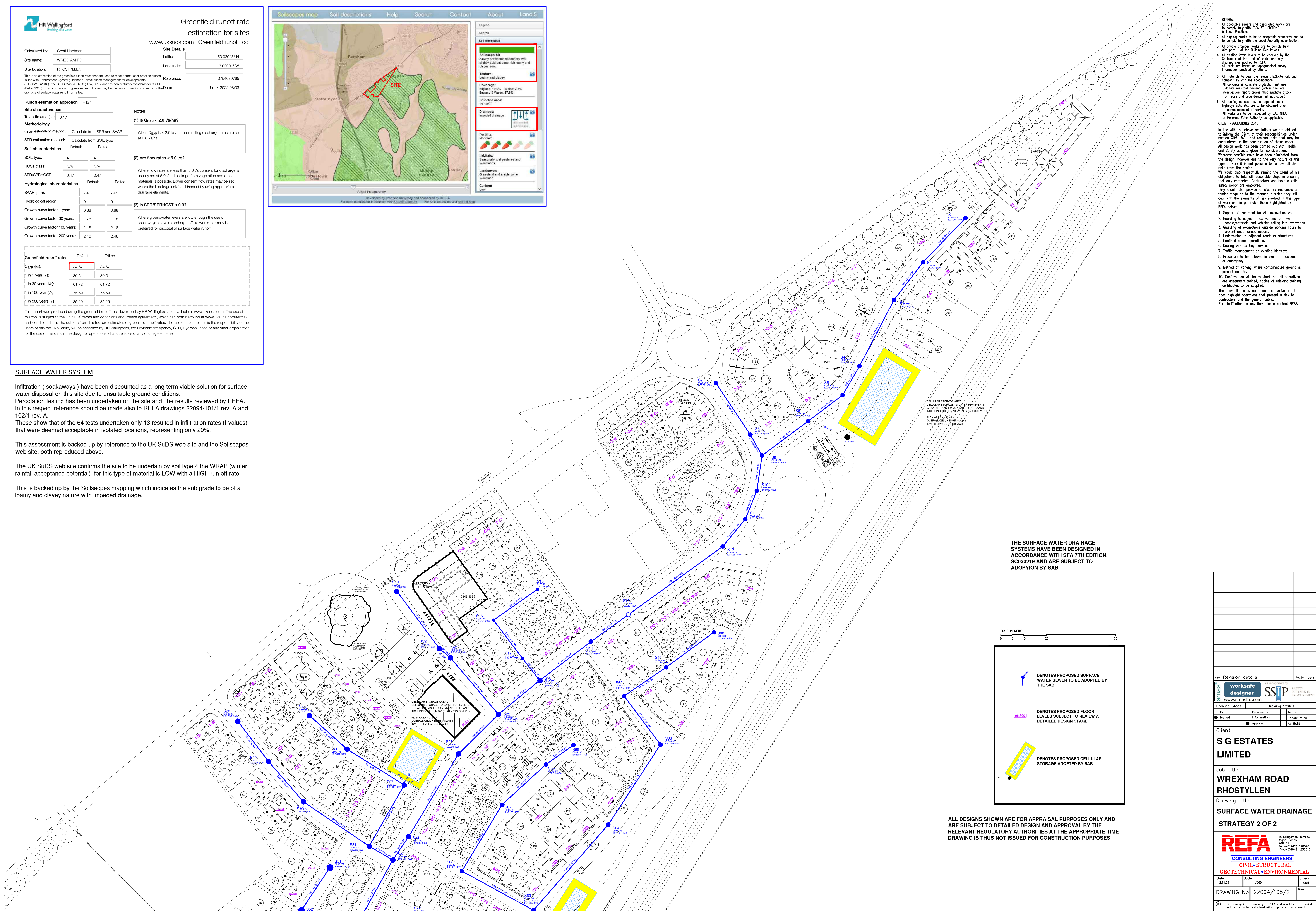
Percolation testing has been undertaken on the site and the results reviewed by REFA. In this respect reference should be made also to REFA drawings 22094/101/1 rev. A and 102/1 rev. A.

These show that of the 64 tests undertaken only 13 resulted in infiltration rates (f-values) that were deemed acceptable in isolated locations, representing only 20%.

This assessment is backed up by reference to the UK SuDS web site and the Soilscape web site, both reproduced above.

The UK SuDS web site confirms the site to be underlain by soil type 4 the WRAP (winter rainfall acceptance potential) for this type of material is LOW with a HIGH run off rate.

This is backed up by the Soilsapes mapping which indicates the sub grade to be of a loamy and clayey nature with impeded drainage.



APPENDIX F

REFA Site Investigation Trial Pit and Borehole Logs

Exploratory Hole Location Plan Plots 1-44 – Drawing Number 22094/05 Rev D

Window Sample Location Plan – Drawing Number 22094/06

Exploratory Hole Location Plan Plots 45-223 Page 1 – Drawing Number 22094/07/01

Exploratory Hole Location Plan Plots 45-223 Page 2 – Drawing Number 22094/07/02