

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 16/04864
Issue Number: 1

Date: 16 August, 2016

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Andrew James/Nigel Austin/Russell Speight
Project Name: Campdown
Project Ref: 28720
Order No: N/A
Date Samples Received: 04/08/16
Date Instructions Received: 08/08/16
Date Analysis Completed: 16/08/16

Prepared by:



Melanie Marshall
Laboratory Coordinator

Approved by:



Georgia King
Client Service Manager

Envirolab Job Number: 16/04864

Client Project Name: Campdown

Client Project Ref: 28720

Lab Sample ID	16/04864/1	16/04864/2	16/04864/3	16/04864/4	16/04864/5	16/04864/6	16/04864/7	16/04864/8	Units	Method ref
Client Sample No										
Client Sample ID	BH1	BH3	BH7	BH8	BH10	BH5	BH12	BH14		
Depth to Top	0.10	0.10	1.10	0.00	0.10	0.50	0.10	0.10		
Depth To Bottom	0.20	0.20	1.20	0.20	0.20		0.20	0.20		
Date Sampled	02-Aug-16	02-Aug-16	02-Aug-16	03-Aug-16	03-Aug-16	02-Aug-16	03-Aug-16	03-Aug-16		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4E	4E	6A	4E	4AE	6A	4E	4E		
% Stones >10mm _A ⁹	<0.1	<0.1	<0.1	<0.1	7.6	1.8	<0.1	<0.1	% w/w	A-T-046
pH ₂₅ ¹⁰	6.01	5.71	6.98	5.31	7.75	6.62	5.42	6.30	pH	A-T-021a
Sulphate (water sol 2:1) ₀ ¹¹	<0.01	0.03	0.03	<0.01	0.02	0.04	<0.01	0.04	g/l	A-T-028a
Sulphate (acid soluble) ₀ ¹²	530	620	420	520	410	260	380	1200	mg/kg	A-T-028a
Arsenic ₀ ¹³	2	3	7	4	5	2	5	2	mg/kg	A-T-021a
Cadmium ₀ ¹⁴	0.9	0.8	1.4	0.9	1.2	0.9	1.1	1.3	mg/kg	A-T-021a
Copper ₀ ¹⁵	3	3	8	6	6	4	1	7	mg/kg	A-T-021a
Chromium ₀ ¹⁶	18	17	36	21	24	24	20	34	mg/kg	A-T-021a
Lead ₀ ¹⁷	15	18	21	25	23	27	21	26	mg/kg	A-T-021a
Mercury ₀	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	mg/kg	A-T-028a
Nickel ₀ ¹⁸	8	8	14	9	12	11	7	19	mg/kg	A-T-021a
Selenium ₀	1	<1	1	<1	<1	<1	<1	1	mg/kg	A-T-021a
Zinc ₀ ¹⁹	31	26	51	35	37	26	27	72	mg/kg	A-T-021a

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Lab Sample ID	16/04864/1	16/04864/2	16/04864/3	16/04864/4	16/04864/5	16/04864/6	16/04864/7	16/04864/8	Units	Method ref
Client Sample No										
Client Sample ID	BH1	BH3	BH7	BH8	BH10	BH5	BH12	BH14		
Depth to Top	0.10	0.10	1.10	0.00	0.10	0.50	0.10	0.10		
Depth To Bottom	0.20	0.20	1.20	0.20	0.20		0.20	0.20		
Date Sampled	02-Aug-16	02-Aug-16	02-Aug-16	03-Aug-16	03-Aug-16	02-Aug-16	03-Aug-16	03-Aug-16		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4E	4E	6A	4E	4AE	6A	4E	4E		
Asbestos in Soil (inc. matrix)										
Asbestos in soil _A *	-	NAD	NAD	NAD	NAD	-	NAD	-		A-1-045
Asbestos ACM - Suitable for Water Absorption Test?D	-	N/A	N/A	N/A	N/A	-	N/A	-		Gravimetry

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Lab Sample ID	16/04864/1	16/04864/2	16/04864/3	16/04864/4	16/04864/5	16/04864/6	16/04864/7	16/04864/8	Units	Method ref
Client Sample No										
Client Sample ID	BH1	BH3	BH7	BH8	BH10	BH5	BH12	BH14		
Depth to Top	0.10	0.10	1.10	0.00	0.10	0.50	0.10	0.10		
Depth To Bottom	0.20	0.20	1.20	0.20	0.20		0.20	0.20		
Date Sampled	02-Aug-16	02-Aug-16	02-Aug-16	03-Aug-16	03-Aug-16	02-Aug-16	03-Aug-16	03-Aug-16		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4E	4E	6A	4E	4AE	6A	4E	4E		
PAH 16										
Acenaphthene _A ^M	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019x
Acenaphthylene _A ^M	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019x
Anthracene _A ^M	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	A-T-019x
Benzo(a)anthracene _A ^M	<0.04	0.07	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	A-T-019x
Benzo(a)pyrene _A ^M	<0.04	0.11	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	A-T-019x
Benzo(b)fluoranthene _A ^M	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-019x
Benzo(ghi)perylene _A ^M	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-019x
Benzo(k)fluoranthene _A ^M	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	A-T-019x
Chrysene _A ^M	<0.06	0.12	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	A-T-012x
Dibenzo(ah)anthracene _A ^M	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	A-T-019x
Fluoranthene _A ^M	<0.08	0.13	<0.08	<0.08	<0.08	<0.06	<0.08	<0.08	mg/kg	A-T-019x
Fluorene _A ^M	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019x
Indeno(123-cd)pyrene _A ^M	<0.03	0.08	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	A-T-019x
Naphthalene _A ^M	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	A-T-019x
Phenanthrene _A ^M	<0.03	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	A-T-019x
Pyrene _A ^M	<0.07	0.13	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	A-T-019x
PAH (total 16) _A ^M	<0.08	0.91	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	mg/kg	A-T-019x

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Client Sample No										
Client Sample ID	BH1	BH3	BH7	BH8	BH10	BH5	BH12	BH14		
Depth to Top	0.10	0.10	1.10	0.00	0.10	0.50	0.10	0.10		
Depth To Bottom	0.20	0.20	1.20	0.20	0.20		0.20	0.20		
Date Sampled	02-Aug-16	02-Aug-16	02-Aug-16	03-Aug-16	03-Aug-16	02-Aug-16	03-Aug-16	03-Aug-16		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4E	4E	6A	4E	4AE	6A	4E	4E		
TPH CWG										
Ali >C5-C8 _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
Ali >C6-C8 _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
Ali >C8-C10 _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
Ali >C10-C12 _A ^g	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022x
Ali >C12-C16 _A ^g	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022x
Ali >C16-C21 _A ^g	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022x
Ali >C21-C35 _A ^g	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022x
Total Aliphatics _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022+22b
Aro >C5-C7 _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
Aro >C7-C8 _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
Aro >C8-C9 _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
Aro >C9-C10 _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
Aro >C10-C12 _A ^g	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022x
Aro >C12-C16 _A ^g	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022x
Aro >C16-C21 _A ^g	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022x
Aro >C21-C35 _A ^g	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022x
Total Aromatics _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022+22b
TPH (Ali & Aro) _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-022+22b
BTEX - Benzene _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
BTEX - Toluene _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
BTEX - Ethyl Benzene _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
BTEX - m & p Xylene _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
BTEX - o Xylene _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x
MTBE _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022x

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Lab Sample ID	16/04864/9	16/04864/10	16/04864/11	16/04864/12					Units	Method ref
Client Sample No										
Client Sample ID	BH15	BH16	BH17	BH7						
Depth to Top	0.10	0.10	0.10	0.50						
Depth To Bottom	0.20	0.20	0.20							
Date Sampled	03-Aug-16	04-Aug-16	04-Aug-16	02-Aug-16						
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES						
Sample Matrix Code	6E	4AE	4AE	5A5A						
% Stones >10mm _A ⁹	<0.1	<0.1	0.8	+					% w/w	A-T-046
pH ₀ ¹⁰	5.86	5.31	6.59	+					pH	A-T-021a
Sulphate (water sol 2:1) ₀ ¹⁰	0.02	<0.01	<0.01	+					g/l	A-T-028a
Sulphate (acid soluble) ₀ ¹⁰	730	660	810	+					mg/kg	A-T-028a
Arsenic ₀ ¹⁰	3	4	5	+					mg/kg	A-T-021a
Cadmium ₀ ¹⁰	0.9	1.1	1.3	+					mg/kg	A-T-021a
Copper ₀ ¹⁰	3	3	9	+					mg/kg	A-T-021a
Chromium ₀ ¹⁰	14	23	31	+					mg/kg	A-T-021a
Lead ₀ ¹⁰	21	22	36	+					mg/kg	A-T-021a
Mercury ₀	<0.17	<0.17	<0.17	-					mg/kg	A-T-028a
Nickel ₀ ¹⁰	9	10	15	+					mg/kg	A-T-021a
Selenium ₀	1	<1	<1	-					mg/kg	A-T-021a
Zinc ₀ ¹⁰	38	34	45	+					mg/kg	A-T-021a

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Lab Sample ID	16/04864/9	16/04864/10	16/04864/11	16/04864/12					Units	Method ref
Client Sample No										
Client Sample ID	BH15	BH16	BH17	BH7						
Depth to Top	0.10	0.10	0.10	0.50						
Depth To Bottom	0.20	0.20	0.20							
Date Sampled	03-Aug-16	04-Aug-16	04-Aug-16	02-Aug-16						
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES						
Sample Matrix Code	6E	4AE	4AE	5A5A						
Asbestos in Soil (inc. matrix)										
Asbestos in soil _A *	NAD	NAD	NAD	NAD						A-1-045
Asbestos ACM - Suitable for Water Absorption Test?D	N/A	N/A	N/A	N/A						Gravimetry

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Lab Sample ID	16/04864/9	16/04864/10	16/04864/11	16/04864/12						
Client Sample No										
Client Sample ID	BH15	BH16	BH17	BH7						
Depth to Top	0.10	0.10	0.10	0.50						
Depth To Bottom	0.20	0.20	0.20							
Date Sampled	03-Aug-16	04-Aug-16	04-Aug-16	02-Aug-16						
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES						
Sample Matrix Code	6E	4AE	4AE	5A5A						
	Units								Method ref	
PAH 16										
Acenaphthene _A ^{MF}	<0.01	<0.01	<0.01	+					mg/kg	A-T-019x
Acenaphthylene _A ^{MF}	<0.01	<0.01	<0.01	+					mg/kg	A-T-019x
Anthracene _A ^{MF}	<0.02	<0.02	<0.02	+					mg/kg	A-T-019x
Benzo(a)anthracene _A ^{MF}	<0.04	<0.04	<0.04	+					mg/kg	A-T-019x
Benzo(a)pyrene _A ^{MF}	<0.04	<0.04	<0.04	+					mg/kg	A-T-019x
Benzo(b)fluoranthene _A ^{MF}	<0.05	<0.05	<0.05	-					mg/kg	A-T-019x
Benzo(ghi)perylene _A ^{MF}	<0.05	<0.05	<0.05	+					mg/kg	A-T-019x
Benzo(k)fluoranthene _A ^{MF}	<0.07	<0.07	<0.07	-					mg/kg	A-T-019x
Chrysene _A ^{MF}	<0.06	<0.06	<0.06	+					mg/kg	A-T-019x
Dibenzo(ah)anthracene _A ^{MF}	<0.04	<0.04	<0.04	+					mg/kg	A-T-019x
Fluoranthene _A ^{MF}	<0.08	<0.08	<0.08	+					mg/kg	A-T-019x
Fluorene _A ^{MF}	<0.01	<0.01	<0.01	+					mg/kg	A-T-019x
Indeno(123-cd)pyrene _A ^{MF}	<0.03	<0.03	<0.03	+					mg/kg	A-T-019x
Naphthalene _A ^{MF}	<0.03	<0.03	<0.03	+					mg/kg	A-T-019x
Phenanthrene _A ^{MF}	<0.03	<0.03	<0.03	+					mg/kg	A-T-019x
Pyrene _A ^{MF}	<0.07	<0.07	<0.07	+					mg/kg	A-T-019x
PAH (total 16) _A ^{MF}	<0.08	<0.08	<0.08	+					mg/kg	A-T-019x

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Lab Sample ID	16/04864/9	16/04864/10	16/04864/11	16/04864/12						
Client Sample No										
Client Sample ID	BH15	BH16	BH17	BH7						
Depth to Top	0.10	0.10	0.10	0.50						
Depth To Bottom	0.20	0.20	0.20							
Date Sampled	03-Aug-16	04-Aug-16	04-Aug-16	02-Aug-16						
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES						
Sample Matrix Code	6E	4AE	4AE	5A5A						
	Units								Method ref	
TPH CWG										
Ali >C5-C8 _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
Ali >C6-C8 _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
Ali >C8-C10 _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
Ali >C10-C12 _A ^g	<0.1	<0.1	<0.1	+					mg/kg	A-T-022x
Ali >C12-C16 _A ^g	<0.1	<0.1	<0.1	+					mg/kg	A-T-022x
Ali >C16-C21 _A ^g	<0.1	<0.1	<0.1	-					mg/kg	A-T-022x
Ali >C21-C35 _A ^g	<0.1	<0.1	<0.1	+					mg/kg	A-T-022x
Total Aliphatics _A	<0.1	<0.1	<0.1	-					mg/kg	A-T-022+22b
Aro >C5-C7 _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
Aro >C7-C8 _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
Aro >C8-C9 _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
Aro >C9-C10 _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
Aro >C10-C12 _A ^g	<0.1	<0.1	<0.1	+					mg/kg	A-T-022x
Aro >C12-C16 _A ^g	<0.1	<0.1	<0.1	+					mg/kg	A-T-022x
Aro >C16-C21 _A ^g	<0.1	<0.1	<0.1	+					mg/kg	A-T-022x
Aro >C21-C35 _A ^g	<0.1	<0.1	<0.1	+					mg/kg	A-T-022x
Total Aromatics _A	<0.1	<0.1	<0.1	+					mg/kg	A-T-022+22b
TPH (Ali & Aro) _A	<0.1	<0.1	<0.1	+					mg/kg	A-T-022+22b
BTEX - Benzene _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
BTEX - Toluene _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
BTEX - Ethyl Benzene _A ^g	<0.01	<0.01	<0.01	-					mg/kg	A-T-022x
BTEX - m & p Xylene _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
BTEX - o Xylene _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x
MTBE _A ^g	<0.01	<0.01	<0.01	+					mg/kg	A-T-022x

REPORT NOTES

Notes - Soil chemical analysis

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

This report shall not be reproduced, except in full, without written approval from Envirolab.

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supersedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supersedes any "D" subscripts.

Superscript "M" indicates method accredited to MCERTS.

If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

APPENDIX H

HUMAN HEALTH GENERIC ASSESSMENT CRITERIA

Generic assessment criteria for human health: residential scenario with home-grown produce

Background

RSK's generic assessment criteria (GAC) were initially prepared following the publication by the Environment Agency (EA) of soil guideline value (SGV) and toxicological (TOX) reports, and associated publications in 2009⁽¹⁾. RSK GAC were updated following the publication of GAC by LQM/CIEH in 2009⁽²⁾. RSK GAC are periodically revised when updated information on toxicological, land use or receptor parameters is published.

Updates to the RSK GAC

In 2014, the publication of Category 4 Screening Levels (C4SL)^(3,4), as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3)⁽⁵⁾ used in the generation of SGVs.

C4SL were published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010⁽³⁾). Where a C4SL has been published, the RSK GAC duplicates the C4SL published values using all input parameters within the SP1010 final project report⁽³⁾ and associated appendices⁽⁶⁾, and adopts them as GAC for these six substances.

For all other substances the C4SL exposure modifications, with the exception of the "top two" produce type approach taken in the C4SL, have been applied to the current RSK GAC. These include alterations to daily inhalation rates for residential and commercial scenarios, reducing soil adherence factors in children (age classes 1 to 12 only) for residential land use, reducing exposure frequency for dermal contact outdoors for residential land use, and updated produce type consumption rates (90th percentile) based on recent data from the National Diet and Nutrition Survey.

The RSK GAC have also been revised with updated toxicology published by LQM/CIEH in 2015⁽⁷⁾ or by the USEPA⁽¹⁴⁾, where a C4SL has not been published.

RSK GAC derivation for metals and organic compounds

Model selection

Soil assessment criteria (SAC) were calculated using the Contaminated Land Exposure Assessment (CLEA) tool v1.071, supporting EA guidance^(5,8,9) and revised exposure scenarios published for the C4SL⁽³⁾. Groundwater assessment criteria (GrAC) protective of human health via the inhalation pathway were derived using the RBCA 2.51 model with the Johnson and Ettinger model for soil and groundwater volatilisation. RSK has updated the inputs within RBCA to reflect EA guidance^(1,5,8,9). The SAC and GrAC collectively are termed GAC.

Conceptual model

In accordance with SR3⁽⁵⁾, the residential with home-grown produce scenario considers risks to a female child between the ages of 0 and 6 years old as the highest risk scenario. In accordance

with Box 3.1 of SR3⁽⁵⁾, the pathways considered for production of the SAC in the residential with home-grown produce scenario are

- direct soil and dust ingestion
- consumption of home-grown produce
- consumption of soil attached to home-grown produce
- dermal contact with soil and indoor dust
- inhalation of indoor and outdoor dust and vapours.

Figure 1 is a conceptual model illustrating these linkages.

In line with guidance in the EA SGV report for cadmium⁽¹⁾, the RSK GAC for cadmium has been derived based on estimates representative of lifetime exposure. Although young children are generally more likely to have higher exposures to soil contaminants, the renal toxicity of cadmium, and the derivation of the TDI_{oral} and TDI_{inh} , are based on considerations of the kidney burden accumulated over 50 years or so. It is therefore reasonable to consider exposure not just in childhood but averaged over a longer period.

The pathway considered in production of the GrAC is the volatilisation of compounds from groundwater and subsequent vapour inhalation by residents while indoors. Figure 2 illustrates this linkage. Although the outdoor air inhalation pathway is also valid, this contributes little to the overall risks owing to the dilution in outdoor air. Within RBCA, the solubility limit of the chemical restricts the extent of volatilisation, which in turn drives the indoor air inhalation pathway. While the same restriction is not built into the CLEA model, the CLEA model output cells are flagged red where the soil saturation limit has been exceeded.

With respect to volatilisation, the CLEA model assumes a simple linear partitioning of a chemical in the soil between the sorbed, dissolved and vapour phase⁽⁹⁾. The upper boundaries of this partitioning are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. The CLEA model estimates saturated soil concentrations where these limits are reached⁽⁹⁾. The CLEA software uses a traffic light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous- or vapour-based soil saturation limits. Model output cells are flagged red where the saturated soil concentration has been exceeded and the contribution of the indoor and outdoor vapour pathway to total exposure is greater than 10%. In this case, further consideration of the following is required⁽⁹⁾:

- Free phase contamination may be present.
- Exposure from the vapour pathways will be over-predicted by the model, as in reality the vapour phase concentration will not increase at concentrations above saturation limits
- Where the vapour pathway contribution is greater than 90%, it is unlikely the relevant health criteria value (HCV) will be exceeded at soil concentrations at least a factor of ten higher than the relevant HCV.

Where the vapour pathway is the predominant pathway (contributes greater than 90% of exposure) or the only exposure route considered and the cell is highlighted red (SAC exceeds saturation limit), the risk based on the assumed conceptual model is likely to be negligible as the vapour risk is assumed to be tolerable at maximum possible soil concentrations. In such circumstances, the vapour pathway exposure should be considered based on the presence of free phase or non-aqueous phase liquid sources and the measured concentrations of volatile organic compounds (VOC) in the vapour phase. Screening could be considered based on setting

the SAC as the modelled soil saturation limits. However, as stated within the CLEA handbook⁽⁹⁾, this is likely to not be practical in many cases because of the very low saturation limits and, in any case, is highly conservative.

It should also be noted that for mixtures of compounds, free phase may be present where soil (or groundwater) concentrations are well below saturation limits for individual compounds.

Where the vapour pathway is only one of the exposure pathways considered, an additional approach can then be utilised as detailed within Section 4.12 of the CLEA model handbook⁽⁹⁾, which explains how to calculate an effective assessment criterion manually.

SR3⁽⁵⁾ states that, as a general rule of thumb, it is recognised that estimating vapour phase concentrations from dissolved and sorbed phase contamination by petroleum hydrocarbons are at least a factor of ten higher than those likely to be measured on-site. RSK has therefore applied an empirical subsurface to indoor air correction factor of 10 into the CLEA model chemical database and to outputs from the RBCA model for all petroleum hydrocarbon fractions (including BTEX, trimethylbenzenes and the polycyclic aromatic hydrocarbons (PAH) naphthalene, acenaphthene and acenaphthylene) to reduce this conservatism.

Input selection

The most up-to-date published chemical and toxicological data was obtained from EA Report SC050021/SR7⁽¹⁰⁾, the EA TOX⁽¹¹⁾ reports, the C4SL SP1010 project report and associated appendices^(3,6), the 2015 LQM/CIEH report⁽⁷⁾ or the USEPA IRIS database⁽¹⁴⁾. Where a C4SL has been published, the RSK GAC have duplicated the C4SL published values using all input parameters within the SP1010 final project report⁽³⁾ and associated appendices⁽⁶⁾, and has adopted them as GAC for these six substances. Toxicological and specific chemical parameters for aromatic hydrocarbon C₈–C₉ (styrene), 1,2,4-trimethylbenzene and methyl tertiary-butyl ether (MTBE) were obtained from the CL:AIRE Soil Generic Assessment Criteria report⁽¹¹⁾.

For TPH, aromatic hydrocarbons C₅–C₈ were not modelled, as this range comprises benzene and toluene, which are modelled separately. The aromatic C₈–C₉ hydrocarbon fraction comprises ethylbenzene, xylene and styrene. As ethylbenzene and xylene are being modelled separately, the physical, chemical and toxicological data for aromatic C₈–C₉ have been taken from styrene.

For the GrAC, the HCV used in the modelling were derived using the toxicological data for the SAC amended as follows:

- A child weighing 13.3kg (average of 0-6 year old female in accordance with Table 4.6 of SR3⁽⁵⁾) and breathing 8.77m³ (average daily inhalation rate for a 0-6yr old female in accordance with SP1010 final project report for the C4SL (Table 3.2⁽³⁾) and USEPA data⁽¹⁴⁾)
- Background inhalation (mean daily intake (MDI)) for a child (Age Classes 1-6)
- Residential amendments to the MDI for younger age groups following Table 3.4 and Section 3.4.1 of SR2⁽⁶⁾; amended to reflect average daily inhalation rates in accordance with SP1010 final project report for the C4SL (Table 3.2⁽³⁾) and USEPA data⁽¹²⁾.

Physical parameters

For the residential with home-grown produce scenario, the CLEA default building is a small, two-storey terrace house with a concrete ground-bearing slab. The house is assumed to have a 100m² private garden consisting of lawn and flowerbeds, incorporating a 20m² plot for growing fruit and vegetables consumed by the residents. SR3⁽⁵⁾ notes this residential building type to be

the most conservative in terms of potential for vapour intrusion. The building parameters used in the production of the RSK GACs are the default CLEA v1.06 inputs presented in Table 3.3 of SR3⁽³⁾, with a dust loading factor detailed in Section 9.3 of SR3⁽⁵⁾. The parameters for a sandy loam soil type were used in line with Table 4.4 of SR3⁽⁵⁾. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for SOM, RSK has produced an additional set of GAC for SOM of 1% and 2.5% for all substances using the CLEA tool.

For the GrAC, the depth to groundwater was taken as 2.5m based on RSK's experience of assessing the volatilisation pathway from groundwater. The GrAC were produced using the input parameters in Table 4.

Summary of modifications to the default CLEA SR3⁽⁵⁾ input parameters for residential with home-grown produce land-use scenario

In summary, the RSK GAC were produced using the default input parameters for soil properties, the air dispersion model, building properties and the vapour model detailed in SR3⁽⁵⁾. Modifications to the default SR3⁽⁵⁾ exposure scenarios based on the C4SL exposure scenarios⁽³⁾ are presented in Tables 2 and 3 below.

The final selected GAC are presented by pathway in Table 5 and the combined GAC in Table 6.

Figure 1: Conceptual model for residential scenario with home-grown produce

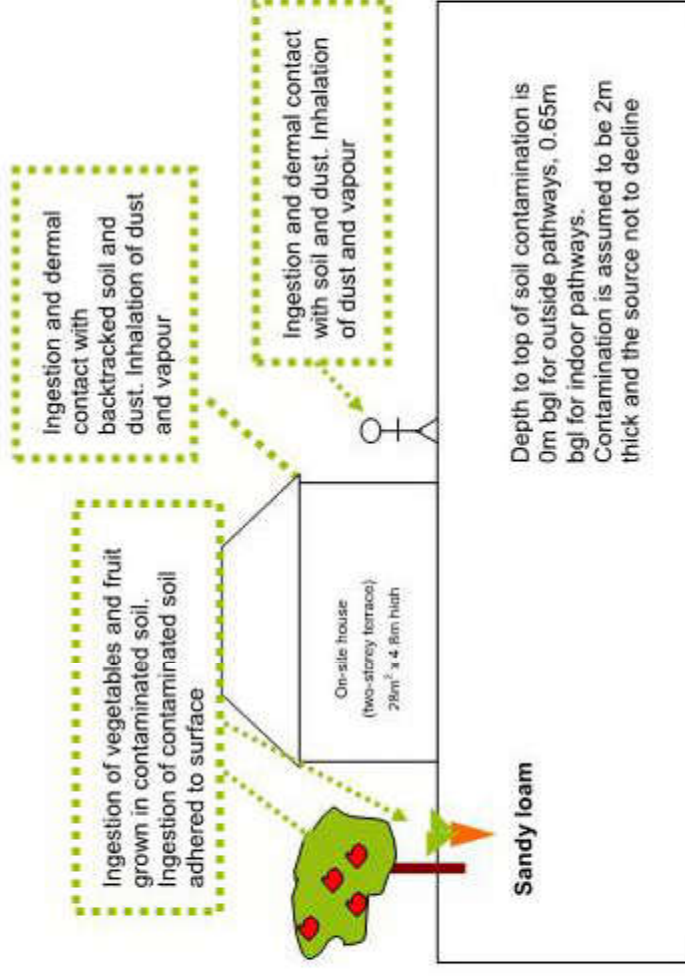


Table 1: Exposure assessment parameters for residential scenario with home-grown produce – inputs for CLEA model

Parameter	Value	Justification
Land use	Residential with homegrown produce	Chosen land use
Receptor	Female child age 1 to 6	Key generic assumption given in Box 3.1, SR3 ⁽⁵⁾
Building	Small terraced house	Key generic assumption given in Box 3.1, SR3. Small, two-storey terraced house chosen, as it is the most conservative residential building type in terms of protection from vapor intrusion (Section 3.4.6, SR3) ⁽⁵⁾
Soil type	Sandy Loam	Most common UK soil type (Section 4.3.1, from Table 3.1, SR3) ⁽⁵⁾
Start AC (age class)	1	Range of age classes corresponding to key generic assumption that the critical receptor is a young female child aged 0–6, From Box 3.1, SR3 ⁽⁵⁾
End AC (age class)	6	
SOM (%)	6	Representative of sandy loamy soil according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents' ⁽¹³⁾
pH	1	To provide SAC for sites where SOM <6% as often observed by RSK
	2.5	
	7	Model default

Table 2: Residential with home-grown produce – modified home-grown produce data

Name	Consumption rate 90 th percentile (g FW kg ⁻¹ BW day ⁻¹) by age class						Dry weight conversion factor (g DW g ⁻¹ FW)	Home-grown fraction (average)	Home-grown fraction (high end)	Soil loading factor (g g ⁻¹ DW)	Preparation correction factor
	1	2	3	4	5	6					
Green vegetables	7.12	5.87	5.87	5.87	4.53	4.53	0.096	0.05	0.33	1.00E-03	2.00E-01
Root vegetables	10.7	2.83	2.83	2.83	2.14	2.14	0.103	0.06	0.4	1.00E-03	1.00E+00
Tuber vegetables	16	6.6	6.6	6.6	4.95	4.95	0.21	0.02	0.13	1.00E-03	1.00E+00
Herbaceous fruit	1.83	3.39	3.39	3.39	2.24	2.24	0.058	0.06	0.4	1.00E-03	6.00E-01
Shrub fruit	2.23	0.46	0.46	0.46	0.19	0.19	0.166	0.09	0.6	1.00E-03	6.00E-01
Tree fruit	3.82	10.3	10.3	10.3	5.16	5.16	0.157	0.04	0.27	1.00E-03	6.00E-01
Justification	Table 3.4, SP1010 ⁽³⁾						Table 6.3, SR3 ⁽⁵⁾	Table 4.19, SR3 ⁽⁵⁾		Table 6.3, SR3 ⁽⁵⁾	

Table 3: Residential with home-grown produce – modified and use and receptor data

Parameter	Unit	Age class					
		1	2	3	4	5	6
EF (soil and dust ingestion)	day yr ⁻¹	180	365	365	365	365	365
EF (consumption of home-grown produce)	day yr ⁻¹	180	365	365	365	365	365
EF (skin contact, indoor)	day yr ⁻¹	180	365	365	365	365	365
EF (skin contact, outdoor)	day yr ⁻¹	170	170	170	170	170	170
EF (inhalation of dust and vapour, indoor)	day yr ⁻¹	365	365	365	365	365	365
EF (inhalation of dust and vapour, outdoor)	day yr ⁻¹	365	365	365	365	365	365
Justification		Table 3.5, SP1010 ⁽³⁾ ; Table 3.1, SR3 ⁽⁵⁾					
Soil to skin adherence factor (outdoor)	mg cm ⁻² day ⁻¹	0.1	0.1	0.1	0.1	0.1	0.1
Justification		Table 3.5, SP1010 ⁽³⁾					
Inhalation rate	m ³ day ⁻¹	5.4	8.0	8.9/f	10.1	10.1	10.1
Justification		Mean value USEPA, 2011 ⁽¹²⁾ ; Table 3.2, SP1010 ⁽³⁾					
Notes: For cadmium , the exposure assessment for a residential land use is based on estimates representative of lifetime exposure AC1-18. This is because the TDI _{oral} and TDI _{inh} are based on considerations of the kidney burden accumulated over 50 years. It is therefore reasonable to consider exposure not just in childhood but averaged over a longer period. See the Environment Agency Science Report SC05002/ TOX 3 ⁽¹¹⁾ , Science Report SC050021/Cadmium SGV ⁽¹¹⁾ and the project report SP1010 ⁽³⁾ for more information.							

Figure 2: GrAC conceptual model for RBCA residential with home-grown produce scenario

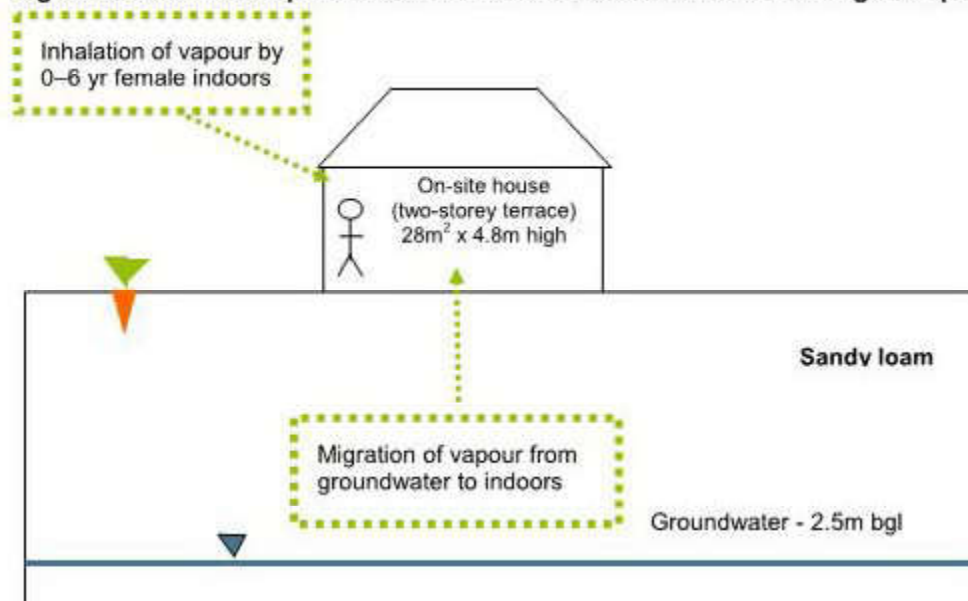


Table 4: Residential with home-grown produce – RBCA inputs

Parameter	Unit	Value	Justification
Receptor			
Averaging time	Years	6	From Box 3.1, SR3 ⁽⁵⁾
Receptor weight	kg	13.3	Average of CLEA 0–6 year old female data, Table 4.6, SR3 ⁽⁵⁾
Exposure duration	Years	6	From Box 3.1, report, SR3 ⁽⁵⁾
Exposure frequency	Days/yr	350	Weighted using occupancy period of 23 hours per day for 365 days of the year
Soil type – sandy loam			
Total porosity	-	0.53	CLEA value for sandy loam. Parameters for sandy loam from Table 4.4, SR3 ⁽⁵⁾
Volumetric water content	-	0.33	
Volumetric air content	-	0.20	
Dry bulk density	g cm ⁻³ or kg/L	1.21	
Vertical hydraulic conductivity	cm s ⁻¹	3.56E-3	CLEA value for saturated conductivity of sandy loam, Table 4.4, SR3 ⁽⁵⁾ equivalent to 307 cm/day
Vapour permeability	m ²	3.05E-12	Calculated for sandy loam using equations in Appendix 1, SR3 ⁽⁵⁾
Capillary zone thickness	m	0.1	Professional judgement
Fraction organic carbon	%	0.0348	Representative of sandy loam according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents' ⁽¹³⁾
Building			
Building volume/area ratio	m	4.8	Table 3.3, SR3 ⁽⁵⁾
Foundation area	m ²	28	
Foundation perimeter	m	22	Calculated assuming building measures 7m x 4m to give 28m ² foundation area
Building air exchange rate	d ⁻¹	12	Table 3.3, SR3 ⁽⁵⁾ Building air exchange rate equivalent to 1.4E-04 s ⁻¹
Depth to bottom of foundation slab	m	0.15	
Foundation thickness	m	0.15	
Foundation crack fraction	-	0.0151	Calculated from floor crack area of 423 cm ² and building footprint of 28m ² in Table 4.21, SR3 ⁽⁵⁾
Volumetric water content of cracks	-	0.33	Assumed equal to underlying soil type in assumption that cracks become filled with soil over time. Parameters for sandy loam from Table 4.4, SR3 ⁽⁵⁾
Volumetric air content of cracks	-	0.2	
Indoor/outdoor differential pressure	Pa	3.1	From Table 3.3, SR3 ⁽⁵⁾ Equivalent to 31 g/cm/s ²

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GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - RESIDENTIAL WITH HOME-GROWN PRODUCE

Table 3
Human Health Genetic Assessment Criteria by Pathway for Residential With Home-Grown Produce Scenarios

Compound	Notes	CrAC (µg/l)	SAC Appropriate to Pathway SOM 1% (mg/kg)			SAC Appropriate to Pathway SOM 2.5% (mg/kg)			SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
			Oral	Inhalation	Combined	Oral	Inhalation	Combined	Oral	Inhalation	Combined	
Metals												
As		3.71E-01	5.94E-02	NR	NR	3.71E-01	5.94E-02	NR	3.71E-01	5.94E-02	NR	NR
Co		2.30E-01	4.88E-02	NR	NR	2.30E-01	4.88E-02	NR	2.30E-01	4.88E-02	NR	NR
Cr		1.81E-01	3.07E-02	NR	NR	1.81E-01	3.07E-02	NR	1.81E-01	3.07E-02	NR	NR
Fe		5.84E-01	2.00E-01	NR	NR	5.84E-01	2.00E-01	NR	5.84E-01	2.00E-01	NR	NR
Mn		2.72E-05	1.41E-04	2.47E-05	NR	2.72E-05	1.41E-04	2.47E-05	NR	2.72E-05	1.41E-04	2.47E-05
Ni		2.01E-02	NR	NR	NR	2.01E-02	NR	NR	2.01E-02	NR	NR	NR
Pb		1.29E-01	2.55E-01	NR	4.31E-01	NR	2.55E-01	NR	1.07E-01	5.25E-01	NR	2.55E-01
Se		3.92E-01	3.03E-02	3.91E-01	NR	3.92E-01	3.03E-02	3.91E-01	NR	3.92E-01	3.03E-02	NR
Si		3.22E-04	1.87E-01	7.33E-01	7.33E-01	3.22E-04	1.87E-01	7.33E-01	1.40E-02	7.08E-01	1.00E-01	3.04E-02
Te		1.87E-02	1.81E-02	NR	NR	1.87E-02	1.81E-02	NR	NR	1.87E-02	1.81E-02	NR
Th		2.58E-02	NR	NR	NR	2.58E-02	NR	NR	NR	2.58E-02	NR	NR
U		3.89E-02	3.83E-02	NR	NR	3.89E-02	3.83E-02	NR	NR	3.89E-02	3.83E-02	NR
V		1.19E-02	1.27E-04	5.57E-02	NR	1.19E-02	1.27E-04	5.57E-02	NR	1.19E-02	1.27E-04	5.57E-02
Organic Compounds												
Ac		2.20E-04	2.60E-01	3.80E-01	1.20E-03	2.60E-01	3.80E-01	1.20E-03	2.60E-01	3.80E-01	1.20E-03	4.71E-03
Be		5.00E-04	1.50E-02	3.51E-02	6.80E-02	1.50E-02	3.51E-02	6.80E-02	1.50E-02	3.51E-02	6.80E-02	4.30E-03
B		1.50E-05	8.34E-01	5.10E-02	1.50E-02	8.34E-01	5.10E-02	1.50E-02	8.34E-01	5.10E-02	1.50E-02	3.00E-03
C		1.00E-05	8.20E-01	6.20E-03	2.10E-03	8.20E-01	6.20E-03	2.10E-03	8.20E-01	6.20E-03	2.10E-03	3.00E-03
D		1.41E-05	6.07E-01	4.70E-02	1.30E-02	6.07E-01	4.70E-02	1.30E-02	6.07E-01	4.70E-02	1.30E-02	3.00E-03
E		1.21E-05	7.03E-01	5.70E-02	1.30E-02	7.03E-01	5.70E-02	1.30E-02	1.30E-02	5.70E-02	1.30E-02	3.17E-03
F		1.62E-05	7.03E-01	6.20E-02	1.30E-02	7.03E-01	6.20E-02	1.30E-02	1.30E-02	6.20E-02	1.30E-02	3.00E-03
G		0.32E-06	1.54E-02	2.04E-04	2.57E-02	1.54E-02	2.04E-04	2.57E-02	3.31E-04	2.21E-03	5.20E-02	6.07E-04
H		0.44E-01	1.70E-01	1.94E-03	1.94E-03	1.70E-01	1.94E-03	1.94E-03	1.61E-01	7.70E-03	7.60E-02	7.14E-03
I		4.00E-02	1.70E-01	4.24E-02	4.24E-02	1.70E-01	4.24E-02	4.24E-02	2.40E-01	8.04E-01	8.04E-01	2.10E-03
J		2.00E-04	8.01E-01	1.40E-03	1.40E-03	8.01E-01	1.40E-03	1.40E-03	1.62E-03	2.92E-02	3.34E-01	6.30E-03
K		2.84E-03	1.04E-01	2.60E-03	2.60E-03	1.04E-01	2.60E-03	2.60E-03	2.00E-01	6.20E-03	6.40E-03	1.40E-04
L		1.80E-04	2.67E-02	3.47E-03	3.47E-03	2.67E-02	3.47E-03	3.47E-03	1.30E-01	7.70E-03	7.70E-03	1.20E-04
M		6.10E-01	2.57E-02	1.52E-03	1.52E-03	2.57E-02	1.52E-03	1.52E-03	1.52E-03	1.29E-01	1.27E-01	7.54E-03
N		3.17E-02	7.03E-02	3.41E-03	3.41E-03	7.03E-02	3.41E-03	3.41E-03	1.00E-01	2.20E-02	1.90E-02	8.00E-03
O		6.20E-01	1.00E-02	1.70E-03	1.70E-03	1.00E-02	1.70E-03	1.70E-03	1.20E-02	1.30E-02	1.30E-02	2.20E-03
P		5.00E-03	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Q		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
R		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
S		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
T		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
U		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
V		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
W		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
X		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Y		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Z		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Semi-Volatile Organic Compounds												
Ac		2.20E-04	2.60E-01	3.80E-01	1.20E-03	2.60E-01	3.80E-01	1.20E-03	2.60E-01	3.80E-01	1.20E-03	4.71E-03
Be		5.00E-04	1.50E-02	3.51E-02	6.80E-02	1.50E-02	3.51E-02	6.80E-02	1.50E-02	3.51E-02	6.80E-02	4.30E-03
B		1.50E-05	8.34E-01	5.10E-02	1.50E-02	8.34E-01	5.10E-02	1.50E-02	8.34E-01	5.10E-02	1.50E-02	3.00E-03
C		1.00E-05	8.20E-01	6.20E-03	2.10E-03	8.20E-01	6.20E-03	2.10E-03	8.20E-01	6.20E-03	2.10E-03	3.00E-03
D		1.41E-05	6.07E-01	4.70E-02	1.30E-02	6.07E-01	4.70E-02	1.30E-02	6.07E-01	4.70E-02	1.30E-02	3.00E-03
E		1.21E-05	7.03E-01	5.70E-02	1.30E-02	7.03E-01	5.70E-02	1.30E-02	1.30E-02	5.70E-02	1.30E-02	3.17E-03
F		1.62E-05	7.03E-01	6.20E-02	1.30E-02	7.03E-01	6.20E-02	1.30E-02	1.30E-02	6.20E-02	1.30E-02	3.00E-03
G		0.32E-06	1.54E-02	2.04E-04	2.57E-02	1.54E-02	2.04E-04	2.57E-02	3.31E-04	2.21E-03	5.20E-02	6.07E-04
H		0.44E-01	1.70E-01	1.94E-03	1.94E-03	1.70E-01	1.94E-03	1.94E-03	1.61E-01	7.70E-03	7.60E-02	7.14E-03
I		4.00E-02	1.70E-01	4.24E-02	4.24E-02	1.70E-01	4.24E-02	4.24E-02	2.40E-01	8.04E-01	8.04E-01	2.10E-03
J		2.00E-04	8.01E-01	1.40E-03	1.40E-03	8.01E-01	1.40E-03	1.40E-03	1.62E-03	2.92E-02	3.34E-01	6.30E-03
K		2.84E-03	1.04E-01	2.60E-03	2.60E-03	1.04E-01	2.60E-03	2.60E-03	2.00E-01	6.20E-03	6.40E-03	1.40E-04
L		1.80E-04	2.67E-02	3.47E-03	3.47E-03	2.67E-02	3.47E-03	3.47E-03	1.30E-01	7.70E-03	7.70E-03	1.20E-04
M		6.10E-01	2.57E-02	1.52E-03	1.52E-03	2.57E-02	1.52E-03	1.52E-03	1.52E-03	1.29E-01	1.27E-01	7.54E-03
N		3.17E-02	7.03E-02	3.41E-03	3.41E-03	7.03E-02	3.41E-03	3.41E-03	1.00E-01	2.20E-02	1.90E-02	8.00E-03
O		6.20E-01	1.00E-02	1.70E-03	1.70E-03	1.00E-02	1.70E-03	1.70E-03	1.20E-02	1.30E-02	1.30E-02	2.20E-03
P		5.00E-03	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Q		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
R		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
S		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
T		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
U		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
V		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
W		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
X		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Y		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Z		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table 6
Human Health Generic Assessment Criteria for Residential with home-grown produce

Compound	GrAC for Groundwater (µg/l)	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals				
Arsenic	-	37	37	37
Cadmium	-	22	22	22
Chromium (III) - trivalent	-	910	910	910
Chromium (VI) - hexavalent	-	21	21	21
Copper	-	2,500	2,500	2,500
Lead	-	200	200	200
Elemental Mercury (Hg ⁰)	12.90	0.2	0.6	1.2
Inorganic Mercury (Hg ²⁺)	-	39	39	39
Methyl Mercury (Hg ^{CH3})	22180	10	10	10
Nickel	-	130	130	130
Selenium	-	258	258	258
Zinc	-	3,900	3,900	3,900
Cyanide (free)	-	1.4	1.4	1.4
Volatile Organic Compounds				
Benzene	23000	0.20	0.41	0.87
Toluene	59000	130	300	680
Ethylbenzene	124600	50	110	260
Xylene - m	115900	59	140	327
Xylene - o	141400	61	143	332
Xylene - p	121100	57	133	310
Total xylene	115900	57	133	310
Methyl tertiary-Butyl ether (MTBE)	9320000	130	250	510
Trichloroethene	64	0.02	0.03	0.08
Tetrachloroethene	408	0.2	0.4	0.9
1,1,1-Trichloroethane	35900	9	18	39
1,1,1,2-Tetrachloroethane	2800	1.2	2.6	6.5
1,1,2,2-Tetrachloroethane	18500	1.6	3.5	7.7
Carbon Tetrachloride	61	0.026	0.056	0.127
1,2-Dichloroethane	97	0.007	0.011	0.019
Vinyl Chloride	6	0.0006	0.0009	0.0014
1,2,4-Trimethylbenzene	5920	1.8	4.3	9.7
1,3,5-Trimethylbenzene	-	NR	NR	NR
Semi-Volatile Organic Compounds				
Acenaphthene	4150	230	540	1,170
Acenaphthylene	7550	180	440	970
Anthracene	-	2,400	5,500	10,900
Benzo(a)anthracene	-	7	11	13
Benzo(b)fluoranthene	-	2.6	3.3	3.7
Benzo(g,h,i)perylene	-	310	340	350
Benzo(k)fluoranthene	-	77	92	100
Chrysene	-	15	22	27
Dibenzo(a,h)anthracene	-	0.24	0.28	0.30
Fluoranthene	-	290	560	900
Fluorene	-	170	410	880
Indeno(1,2,3-cd)pyrene	-	27	36	41
Phenanthrene	-	100	220	440
Pyrene	-	620	1,240	2,040
Benzo(a)pyrene	-	5	5	5
Naphthalene	19000	13	30	71
Phenol	-	120	210	390
Total Petroleum Hydrocarbons				
Aliphatic hydrocarbons >EC ₄ -EC ₆	20000	42	78	160
Aliphatic hydrocarbons >EC ₄ -EC ₈	5370	100	230	530
Aliphatic hydrocarbons >EC ₄ -EC ₁₀	427	27	65	154
Aliphatic hydrocarbons >EC ₁₀ -EC ₁₂	93.9	130 (40)	320 (110)	760 (285)
Aliphatic hydrocarbons >EC ₁₂ -EC ₁₄	0.759	100 (24)	2,400 (56)	5,100 (142)
Aliphatic hydrocarbons >EC ₁₄ -EC ₂₀	-	65,000 (6)	92,000 (21)	110,000
Aliphatic hydrocarbons >EC ₂₀ -EC ₂₄	-	85,000 (8)	92,000 (21)	110,000
Aromatic hydrocarbons >EC ₄ -EC ₆ (styrene)	29000	11	25	57
Aromatic hydrocarbons >EC ₆ -EC ₁₀	20000	30	80	190
Aromatic hydrocarbons >EC ₁₀ -EC ₁₂	24500	80	180	390
Aromatic hydrocarbons >EC ₁₂ -EC ₁₄	5760	140	330	670
Aromatic hydrocarbons >EC ₁₄ -EC ₂₀	-	260	540	930
Aromatic hydrocarbons >EC ₂₀ -EC ₂₄	-	1,100	1,500	1,700
Aromatic hydrocarbons >EC ₂₄ -EC ₂₈	-	1,100	1,500	1,700
Minerals				
Asbestos	-	No asbestos detected with ID or <0.001% dry weight ¹		

Notes:

¹ Generic assessment criteria not calculated owing to low volatility of substance and therefore no pathway, or an absence of toxicological data.

NR - SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data. SAC for 1,2,4-trimethylbenzene may be used.

EC - equivalent carbon. GrAC - groundwater assessment criteria. SAC - soil assessment criteria.

¹ LOD for weight of asbestos per unit weight of soil calculated on a dry weight basis using PLM, handpicking and gravimetry.

The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58.
1% SOM is 0.58% TOC. DL Russell Soil Science: Methods and Applications. Longman, 1994.

SAC and GrAC for TPH fractions, PAHs naphthalene, acenaphthene and acenaphthylene, MTBE, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1; SR3.

VALUE IN BRACKETS The SAC has been set as the model calculated SAC with the saturation limit shown in brackets.
RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CIH whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limits given in brackets.

For consistency where the GrAC exceeds the solubility limit, GrAC has been set at the solubility limit. The GrAC is conservative since concentrations of the chemical are very unlikely to be at sufficient concentration to result in an exceedance of the health criteria value at the point of exposure (i.e. indoor air) provided free phase product is absent.

APPENDIX I

GENERIC ASSESSMENT CRITERIA FOR PHYTOTOXIC EFFECTS

Several compounds can inhibit plant growth; hence it is important to have generic assessment criteria (GAC) to promote healthy plant growth. In the absence of other published GAC, the GAC have been obtained from legislation (UK and European) and guidance related to the use of sewage sludge on agricultural fields.

The Council of European Communities Sewage Sludge Directive (86/278/EEC) dated 1986, has been transposed into UK law by Statutory Instrument No. 1263, The Sludge (use in Agriculture) Regulations 1989 (Public Health England, Wales and Scotland), as amended in 1990 and The Sludge (use in Agriculture) Regulations (Northern Ireland) SR No, 245, 1990. In addition the Department of Environment (DoE) produced a Code of Practice (CoP) (Updated 2nd Edition) in 2006 which provided guidance on the application of sewage sludge on agricultural land (however the status of this document is unclear as it is on the archive section of the Defra website).

The directive seeks to encourage the use of sewage sludge in agriculture and to regulate its use in such a way as to **"prevent harmful effects on soil, vegetation, animals and man"**. To this end, it prohibits the use of untreated sludge on agricultural land unless it is injected or incorporated into the soil. Treated sludge is defined as having undergone "biological, chemical or heat treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use". To provide protection against potential health risks from residual pathogens, sludge must not be applied to soil in which fruit and vegetable crops are growing, or less than ten months before fruit and vegetable crops are to be harvested. Grazing animals must not be allowed access to grassland or forage land less than three weeks after the application of sludge.

The specified limits of concentrations of selected elements in soil are presented in Table 4 of the updated 2nd Edition of the DoE Code of Practice and are designed to protect plant growth. It is noted that these values are more stringent than the values set in current UK regulations. However since they were amended following recommendations from the Independent Scientific Committee in 1993. (MAFF/DOE 1993). The GAC are presented in Table 1.

Table 1: Generic assessment criteria

Determinant	Generic assessment criteria (mg/kg)			
	pH 5.0 < 5.5	pH 5.5 < 6.0	pH 6.0 < 7.0	pH >7.0
Zinc	200	200	200	300
Copper	80	100	135	200
Nickel	50	60	75	110
Lead	300	300	300	300
Cadmium	3	3	3	3
Mercury	1	1	1	1

Note: Only compounds with assessment criteria documented within the Directive 86/278/EEC have been included, although criteria for 5 additional compounds have been presented within the 2006 CoP.

APPENDIX J

GENERIC ASSESSMENT CRITERIA FOR POTABLE WATER SUPPLY PIPES

A range of pipe materials is available and careful selection, design and installation is required to ensure that water supply pipes are satisfactorily installed and meet the requirements of the Water Supply (Water Fittings) Regulations 1999 in England and Wales, the Byelaws 2000 in Scotland and the Northern Ireland Water Regulations. The regulations include a requirement to use only suitable materials when laying water pipes and laying water pipes without protection is not permitted at contaminated sites. The water supply company has a statutory duty to enforce the regulations.

Contaminants in the ground can pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligation, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from specific contaminants, or that the proposed remedial strategy will mitigate any existing risk. If these requirements cannot be demonstrated to the satisfaction of the relevant water company, it becomes necessary to specify an alternative pipe material on the whole development or in specific zones.

In 2010, UK Water Industry Research (UKWIR) published *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (Report Ref. No. 10/WM/03/21). This report reviewed previously published industry guidelines and threshold concentrations adopted by individual water supply companies.

The focus of the UKWIR research project was to develop clear and concise procedures, which provide consistency in the pipe selection decision process. It was intended to provide guidance that can be used to ensure compliance with current regulations and to prevent water supply pipe failing prematurely due to the presence of contamination.

The report concluded that in most circumstances only organic contaminants pose a potential risk to plastic pipe materials and Table 3.1 of the report provides threshold concentrations for polyethylene (PE) and polyvinyl chloride (PVC) pipes for the organic contaminants of concern. The report also makes recommendations for the procedures to be adopted in the design of site investigations and sampling strategies, and the assessment of data, to ensure that the ground through which water supply pipes will be laid is adequately characterised.

Risks to water supply pipes have therefore been assessed against the threshold concentrations for PE and PVC pipe specified in Table 3.1 of Report 10/WM/03/21, which have been adopted as the GAC for this linkage and are reproduced in Table A3 below.

Since water supply pipes are typically laid at a minimum depth of 0.75m below finished ground levels, sample results from depths between 0.5m and 1.5m below finished level are generally considered suitable for assessing risks to water supply. Samples outside these depths can be

used, providing the stratum is the same as that in which water supply pipes are likely to be located. The report specifies that sampling should characterise the ground conditions to a minimum of 0.5m below the proposed depth of the pipe.

It should be noted that the assessment provided in this report is a guide and the method of assessment and recommendations should be checked with the relevant water supply company.

Table A3: Generic assessment criteria for water supply pipes

		Pipe material	
		GAC (mg/kg)	
	Parameter group	PE	PVC
1	Extended VOC suite by purge and trap or head space and GC-MS with TIC (Not including compounds within group 1a)	0.5	0.125
1a	BTEX + MTBE	0.1	0.03
2	SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C ₅ –C ₁₀) (Not including compounds within group 2e and 2f)	2	1.4
2e	Phenols	2	0.4
2f	Cresols and chlorinated phenols	2	0.04
3	Mineral oil C ₁₁ –C ₂₀	10	Suitable
4	Mineral oil C ₂₁ –C ₄₀	500	Suitable
5	Corrosive (conductivity, redox and pH)	Suitable	Suitable
Specific suite identified as relevant following site investigation			
2a	Ethers	0.5	1
2b	Nitrobenzene	0.5	0.4
2c	Ketones	0.5	0.02
2d	Aldehydes	0.5	0.02
6	Amines	Not suitable	Suitable
Notes: where indicated as 'suitable', the material is considered resistant to permeation or degradation and no threshold concentration has been specified by UKWIR.			

APPENDIX K

CERTIFICATES OF GEOTECHNICAL ANALYSIS



STRUCTURAL SOILS LTD

TEST REPORT



Report No. 583477-01 (00)

1774

Date 19-August-2016 Contract Campdown

Client RSK
Address 18 Frogmore Rd
Apsley
Hemel Hempstead
Hertfordshire
HP3 9RT

For the Attention of Andrew James

Samples submitted by client 10-August-2016
Testing Started 11-August-2016
Testing Completed 16-August-2016

Client Reference 28720
Client Order No. n/a
Instruction Type Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests

- 1.01 Moisture Content (oven drying method) BS1377:Part 2:1990:clause 3.2 (superseded)*
- 1.03 Liquid Limit (one point method) & Plastic Limit BS1377:Part 2:1990,clause 4.4/5.3
- 1.10 Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2

Undertaken by a sub-contractor

- 2.04 Sulphate content (water extract) in accordance with BRE Special Digest 1:2005
- 2.05 Total sulphur in accordance with BRE Special Digest 1:2005
- 2.06 Sulphate content (acid extract) in accordance with BRE Special Digest 1:2005
- 2.07 pH value in accordance with BRE Special Digest 1:2005

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of .

Test were undertaken on samples 'as received' unless otherwise stated.

Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd 18 Frogmore Rd Hemel Hempstead HP3 9RT Tel.01442 416661

TESTING VERIFICATION CERTIFICATE



1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **22/08/2016 16:36:51**.

Testing reported after this date is not covered by this Verification Certificate.



Approved Signatory
Dimitris Xirouchakis (Associate Laboratory Director)

(Head Office)
Bristol Laboratory
Unit 1A, Princess Street
Bedminster
Bristol
BS3 4AG

Castleford Laboratory
The Potteries, Pottery Street
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Hemel Hempstead
Hertfordshire
HP3 9RT

Tonbridge Laboratory
Anerley Court, Half Moon Lane
Hildenborough
Tonbridge
TN11 9HU



**STRUCTURAL
SOILS LTD**

Contract:

Campdown

Job No:

583477



SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BH1		D	1.50	32	59	28	31	100	Brown mottled grey slightly sandy CLAY
BH3		D	1.50	22	68	32	36	93	Brown mottled orangish brown sandy slightly gravelly CLAY
BH4		D	1.40	20	35	17	18	100	Bluish grey mottled greyish brown CLAY
BH6		D	1.60	28	65	29	36	100	Brown slightly sandy CLAY
BH11		D	1.60	30	66	29	37	97	Orangish brown mottled brown mottled grey slightly gravelly CLAY with some shell. Gravel is claystone
BH14		D	1.30	16	49	23	26	90	Reddish brown mottled pale grey slightly sandy slightly gravelly CLAY
BH16		D	1.40	30	60	24	36	100	Orangish brown mottled grey very sandy CLAY
BH18		D	2.30	31	65	25	40	100	Brown mottled grey slightly sandy CLAY

Contract:

Contract Ref:



**STRUCTURAL
SOILS LTD**

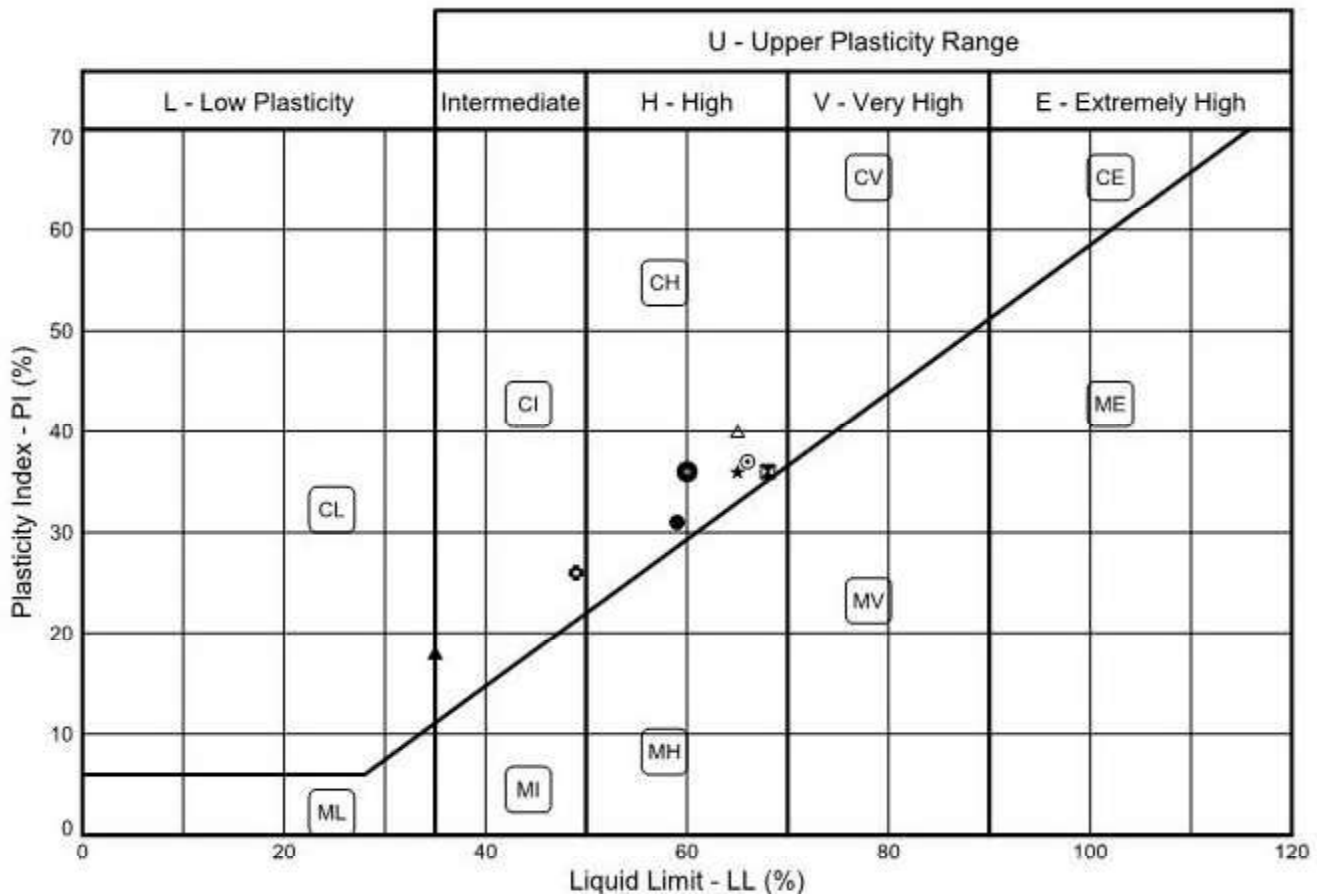
Campdown

583477



PLASTICITY CHART - PI Vs LL

In accordance with clause 42.3 of BS5930:1999
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC %	LL %	PL %	PI %	<425um %	Lab location
Exploratory Position ID	Sample	Depth (m)									
●	BH1	D	1.50	3.2/4.4/5.3/5.4	4.2.3	32	59	28	31	100	H
■	BH3	D	1.50	3.2/4.4/5.3/5.4	4.2.4	22	68	32	36	93	H
▲	BH4	D	1.40	3.2/4.4/5.3/5.4	4.2.3	20	35	17	18	100	H
★	BH6	D	1.60	3.2/4.4/5.3/5.4	4.2.3	28	65	29	36	100	H
⊙	BH11	D	1.60	3.2/4.4/5.3/5.4	4.2.4	30	66	29	37	97	H
⊕	BH14	D	1.30	3.2/4.4/5.3/5.4	4.2.4	16	49	23	26	90	H
⊗	BH16	D	1.40	3.2/4.4/5.3/5.4	4.2.3	30	60	24	36	100	H
△	BH18	D	2.30	3.2/4.4/5.3/5.4	4.2.3	31	65	25	40	100	H

Tested in accordance with the following clauses of BS1377-2:1990.

- 3.2 - Moisture Content
- 4.3 - Cone Penetrometer Method
- 4.4 - One Point Cone Penetrometer Method
- 4.6 - One Point Casagrande Method
- 5.3 - Plastic Limit Method
- 5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

- 4.2.3 - Natural State
- 4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)



STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By

Date

SHARON CAIRNS

19/08/16

Contract

Campdown

Contract Ref:

583477



In accordance with clauses 9.2 of BS1377:Part 2:1990

The graph displays a single data series representing the cumulative distribution of particle sizes. The curve starts at a particle size of approximately 0.075 mm with about 21% of the material passing. It rises steeply, passing through approximately 50% at 0.15 mm, and reaches 100% passing at a particle size of 0.25 mm. The curve remains at 100% passing for all larger particle sizes shown on the graph.

Particle Size (mm)	Percentage Passing (%)
0.075	21
0.10	45
0.15	50
0.20	85
0.25	100
0.30	100
0.40	100
0.50	100
0.60	100
0.75	100
1.0	100
1.5	100
2.0	100
3.0	100
4.0	100
5.0	100
7.5	100
10.0	100
15.0	100
20.0	100
30.0	100
40.0	100
60.0	100
75.0	100

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	100
6.30	100
3.35	100
2.00	100
1.18	100
0.600	100
0.425	100
0.212	100
0.150	100
0.063	21

Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	0
SAND	79
SILT/CLAY	21

Soil Description:
Yellowish brown very clayey SAND



STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By

Date _____

SHARON CAIRNS

19/08/16

Contract

Campdown

Contract Ref:

583477



FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 16/05062
Issue Number: 1

Date: 18 August, 2016

Client: Structural Soils Limited (Hemel Hempstead Lab)
18 Frogmore Road
Hemel Hempstead
UK
HP3 9RT

Project Manager: Hemel Lab
Project Name: Campdown
Project Ref: 28720
Order No: N/A
Date Samples Received: 15/08/16
Date Instructions Received: 15/08/16
Date Analysis Completed: 18/08/16

Prepared by:



Melanie Marshall
Laboratory Coordinator

Approved by:



Lianne Bromiley
Senior Client Manager

Envirolab Job Number: 16/05062

Client Project Name: Campdown

Client Project Ref: 28720

Lab Sample ID	16/05062/1	16/05062/2	16/05062/3	16/05062/4	16/05062/5	16/05062/6	16/05062/7		Units	Method ref
Client Sample No										
Client Sample ID	BH4	BH18	BH8	BH10	BH5	BH2	BH14			
Depth to Top	1.40	1.20	2.50	1.30	1.50	1.50	2.40			
Depth To Bottom										
Date Sampled		04-Aug-16	03-Aug-16	03-Aug-16	02-Aug-16	02-Aug-16	02-Aug-16			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	5A	3	1	3	6	3	5			
% Stones >10mm _A ⁹	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		% w/w	A-T-046
pH BRE _D ¹⁰	7.27	8.19	7.22	7.77	6.66	6.45	6.34		pH	A-T-021a
Sulphate BRE (water sol 2:1) _D ¹¹	35	72	17	287	35	64	31		mg/l	A-T-028a
Sulphate BRE (acid sol) _D ¹²	<0.02	0.02	0.02	0.05	<0.02	<0.02	-		% w/w	A-T-028a
Sulphur BRE (total) _D	0.02	<0.01	<0.01	0.02	0.01	<0.01	-		% w/w	A-T-021a

REPORT NOTES

Notes - Soil chemical analysis

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

This report shall not be reproduced, except in full, without written approval from Envirolab.

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supersedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supersedes any "D" subscripts.

Superscript "M" indicates method accredited to MCERTS.

If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

APPENDIX L

ENVIROCHECK REPORT

Index Map

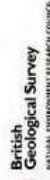
For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:



Envirocheck reports are compiled from 136 different sources of data.

Client Details

Mr R Speight, RSK Environment Ltd, Unit 18, Basepoint
Abbey Enterprise Centre, Premier Way, Romsey,
Hampshire, SO51 9AQ

Order Details

Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469060, 106970
Site Area (Ha): 26.37
Search Buffer (m): 1000

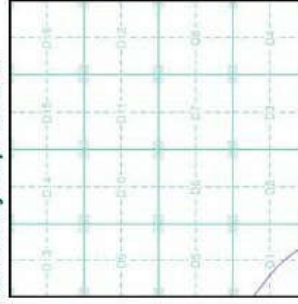
Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA

Full Terms and Conditions can be found on the following link:
<http://www.landmarkinfo.co.uk/Terms/Show/515>



Tel: 0844 844 9992
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Order Details

Order Details
Order Number: 92122794 1 1

Order Number: 92122794_1_1
Customer Ref: 28720

Customer Ref. 26720
National Grid Reference: 469870, 107850

Slice: D

Site Area (Ha): 26.3

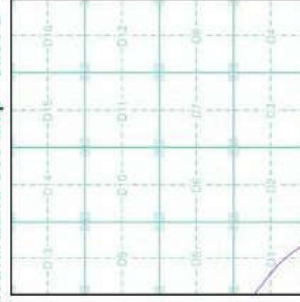
Site Details

Site Details
Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA

Industrial Land Use Map

- | | | | | | | |
|----------------|--|-----------------------------------|--|-------------------|--|-------------------------|
| General | | Specified Site | | Specified Buff(s) | | Bearing Reference Point |
| | | Slide | | Map ID | | |
| | | Contemporary Test Directory Entry | | | | |
| | | Fuel Station Entry | | | | |
| | | Gas Pipeline | | | | |
| | | Underground Electrical Cables | | | | |

Industrial Land Use Map - Slice D



Order Details

Order Details

Order Number:	92122794_1_1
Customer Ref:	28720
National Grid Reference:	469870, 107850
Slice:	D
Site Area (Ha):	26.37
Search Buffer (m):	1000

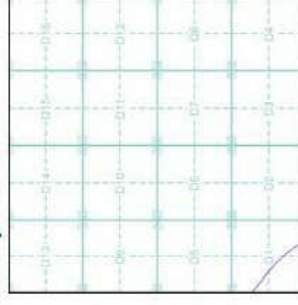
Site Details

Site Details
Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA

Agency and Hydrological (Flood)

-  Extreme Flooding from Rivers or Sea without Defences (Zone 2)
 Flooding from Rivers or Sea without Defences (Zone 3)
 Area Benefiting from Flood Defence
 Flood Water Storage Areas
 Flood Defence

Flood Map - Slice D



Order Details

Order Details

Order Number:	92122794_1_1
Customer Ref:	28720
National Grid Reference:	469870, 107850
Slice:	D
Site Area (Ha):	26.37
Search Buffer (m):	1000

Site Details

Site Details
Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA

- General**
- Specified Site
 - Specified Buffer(s)
 - Bearing Reference Point
 - Map ID
 - General of Type & Location

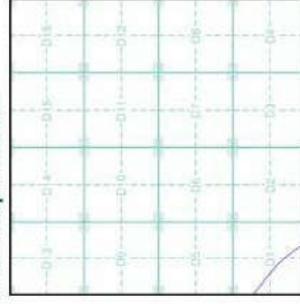
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 20m
- BGS Borehole Depth 20m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice D

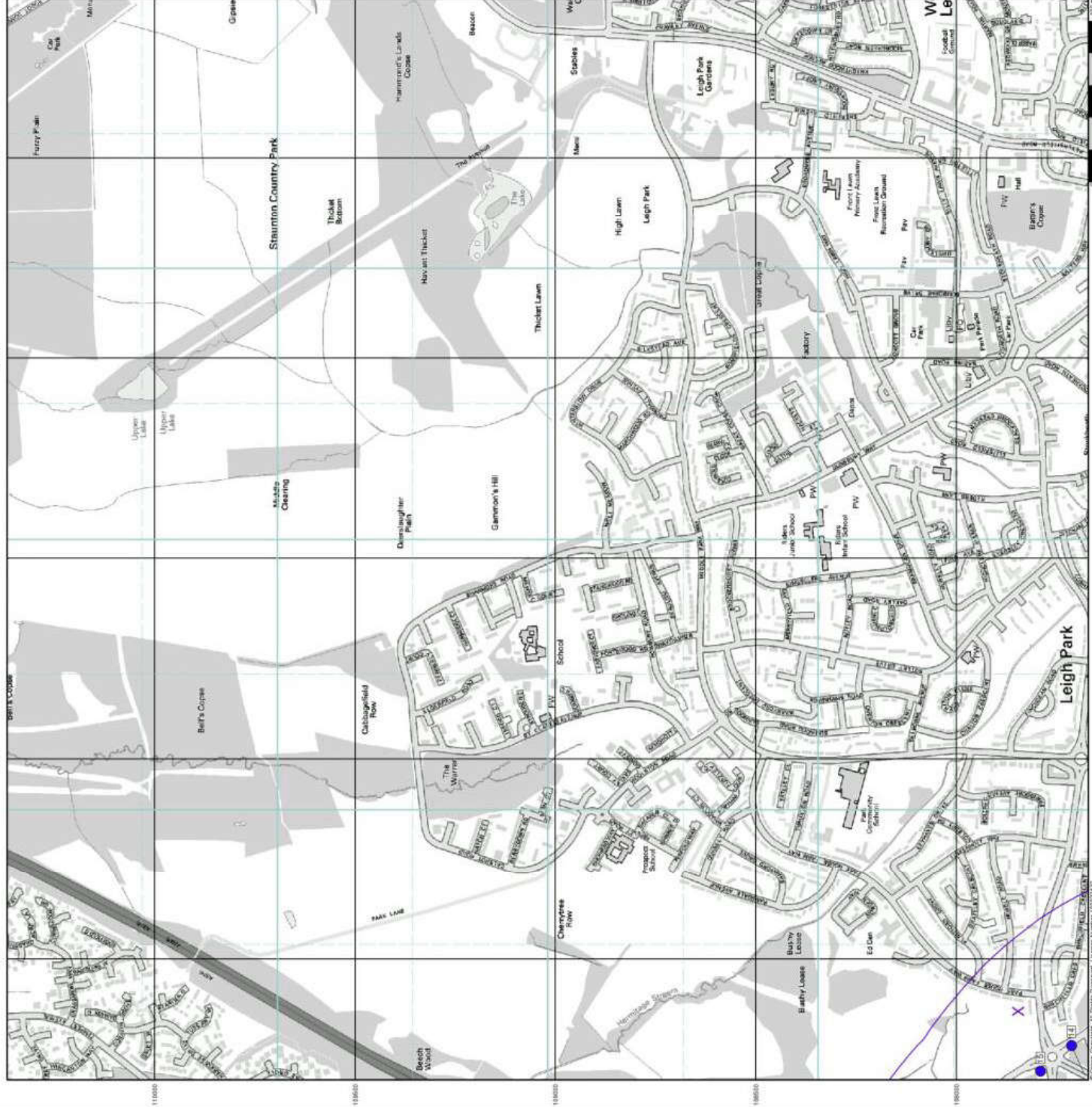


Order Details

Order Number: 92122794_1_1
 Customer Ref: 28720
 National Grid Reference: 469870, 107850
 Slice: D
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
 Hampshire, PO7 8AA



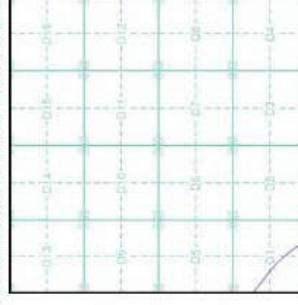
General

-  Specified Site
-  Specified Buffer(s)
-  Bearing Reference Point
-  Map ID

Detailed River Network Data

-  Primary River
-  Secondary River
-  Tertiary River
-  Canal
-  Canal Tunnel
-  Undefined River
-  Lake/Reservoir
-  Offine Drainage Feature
-  Extended Culvert (greater than 50m)
-  Underground River (inferred)
-  Underground River (local knowledge)
-  Downstream of High Water Mark
-  Downstream of Seaward Extension
-  Not assigned River feature

EANRW Detailed River Network Map - Slice D

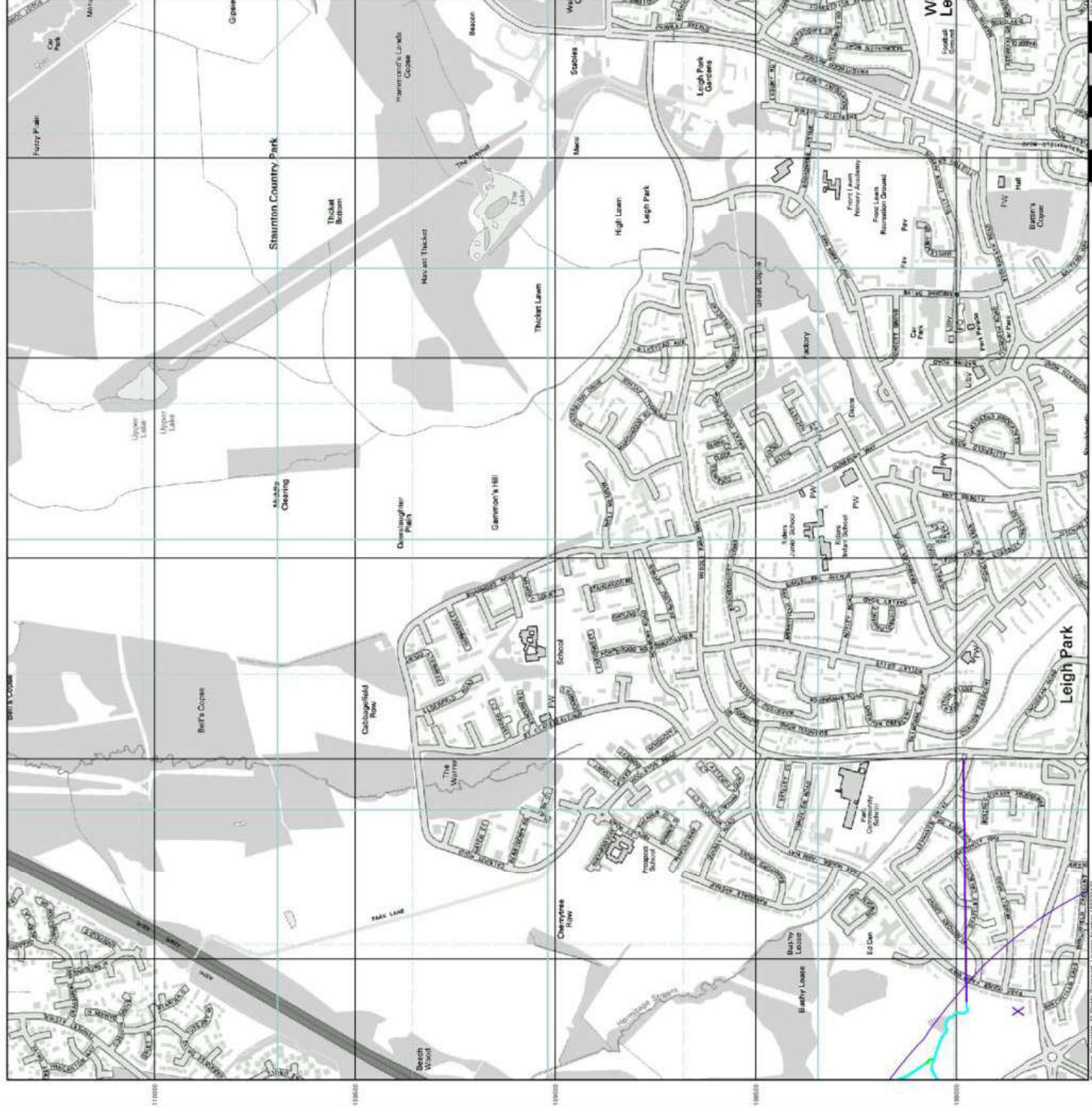


Order Details

Order Number: 92122794_1_1
 Customer Ref: 28720
 National Grid Reference: 469870, 107850
 Slice: D
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

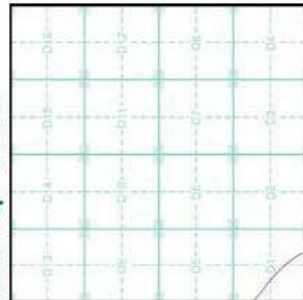
Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
 Hampshire, PO7 8AA



Envirocheck[®]

Mapping Type	Scale	Date	Pg
Hampshire & Isle Of Wight	1:10,560	1870	2
Sussex	1:10,560	1880	3
Hampshire & Isle Of Wight	1:10,560	1897 - 1898	4
Sussex	1:10,560	1899	5
Hampshire & Isle Of Wight	1:10,560	1909 - 1910	6
Sussex	1:10,560	1914	7
Sussex	1:10,560	1914	8
Sussex	1:10,560	1914	9
Hampshire & Isle Of Wight	1:10,560	1931 - 1933	10
Hampshire & Isle Of Wight	1:10,560	1931	11
Hampshire & Isle Of Wight	1:10,560	1933	12
Hampshire & Isle Of Wight	1:10,560	1938 - 1942	13
Ordinance Survey Plan	1:10,000	1962 - 1963	14
Ordinance Survey Plan	1:10,000	1966	15
Ordinance Survey Plan	1:10,000	1975	16
Ordinance Survey Plan	1:10,000	1980 - 1982	17
Ordinance Survey Plan	1:10,000	1991 - 1992	18
1:10K Raster Mapping	1:10,000	2000	19
Street View	1:10,000	2016	20



Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469870, 107850
D
Slice:
Site Area (Ha): 26.37
Search Buffer (m): 1000

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA

Map Legend

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Coppice
	Bracken		Rough Grassland
	Marsh		Sattings
	Building		Shingle
	Glasshouse		Sand
	Sloping Masonry		Direction of Flow of Water
	Pylon		Electricity Transmission Line
	Sloping Masonry		Pole
	Cutting		Standard Gauge Multiple Track
	Road Under		Standard Gauge Single Track
	Road Over		Siding, Tramway or Mineral Line
	Level Crossing		Narrow Gauge
	Foot Bridge		
	Geographical County		
	Administrative County, County Borough or County of City		
	Municipal Borough, Urban or Rural District, Burgh or District Council		
	Borough, Burgh or County Constituency Shown only when not coincident with other boundaries		
	Civil Parish Shown alternately when coincidence of boundaries occurs		

Gravel Pit	Quarry	Oysters	Mixed Wood	Deciduous	Furze	Fir
Sand Pit	Shingle	Reeds	Marsh	Brushwood	Rough Pasture	Trigonometrical Station
Other Pits	Orchard	Bench Mark	Well, Spring, Boundary Post	Surface Level	Instrumental Contour	Minor Roads
Main Roads	Sunken Road	Road over Railway	Railway over Road	Road over River or Canal	Road over Stream	County Boundary (Geographical)
County & Civil Parish Boundary	Administrative County & Civil Parish Boundary	County Borough Boundary (England)	County Borough Boundary (Scotland)	Rural District Boundary	Civil Parish Boundary	

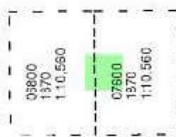
Hampshire & Isle Of Wight

Published 1870

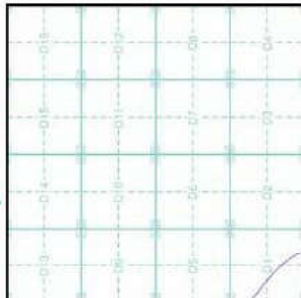
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the state archive for Wales and Scotland in the 1840's. In 1854 all the 1:62,500 scale maps depicting the mapping areas, these maps were updated to include 10,560 maps. The maps were produced by the Ordnance Survey Office between 1905 and 1950. Before 1938, all OS maps used the Cassini Projection, with independent surveys of a wide variety of parts of the country. After 1938, the majority of the country was covered by national grid coordinates, which replaced the county or groups of counties, giving rise to significant inaccuracies in outlining boundaries. In the late 1940's, a Provisional Edition was produced, which updated the 1:62,500 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first edition of 1:62,500 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice D



Order Details

Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469870, 107850
Slice: D
Site Area (Ha): 26.37
Search Buffer (m): 1000

Site Details

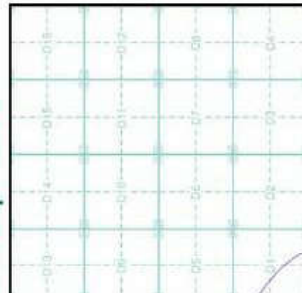
Land off College Road, Putbrook, WATERLOOVILLE,
Hampshire, PO7 8AA

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840s. In 1954 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published data from Ordnance maps often some years after the survey they date. Before 1938, all the maps were based on the Cassini Projection, with independent surveys of a single area being carried out at different times. In the late 1940s, a new 'contouring process', in the form of a Photostatic Edition, was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear, therefore, unfinished – with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice D



Order Details

Order Details

Order Number:	92122794_1_1
Customer Ref:	28720
National Grid Reference:	469870, 107850
Slice:	D
Site Area (Ha):	26.37
Search Buffer (m):	1000

Site Details

Site Details
Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire. PO7 8AA

Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469870, 107850
Slice: D
Site Area (Ha): 26.37
Search Buffer (m): 1000

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA

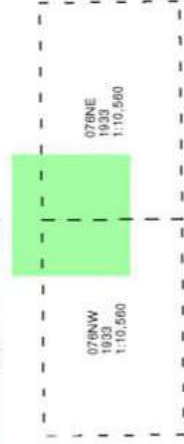
Hampshire & Isle Of Wight

Published 1933

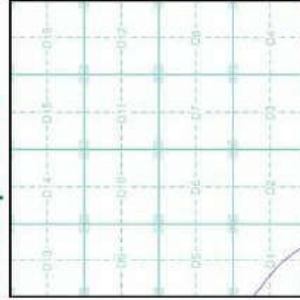
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the Ordnance Survey, which were produced in the 1840's. In 1854 a 1:2,500 scale map of Hampshire was produced, which was then used to produce a 1:10,560 scale map. The map was then updated in 1933, with the map being updated to reflect changes in the landscape. The map was then updated in 1933, with the map being updated to reflect changes in the landscape. The map was then updated in 1933, with the map being updated to reflect changes in the landscape.

Map Name(s) and Date(s)



Historical Map - Slice D



Order Details

Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469870, 107850
Slice: D
Site Area (Ha): 26.37
Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA



Ordinance Survey Plan Published 1962 - 1963

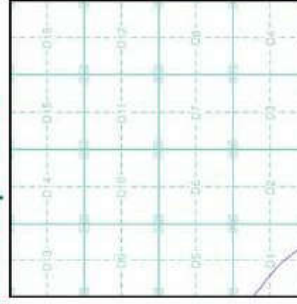
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held in the Ordnance Survey archives for England, Wales and Scotland in the 1840's. In 1854 a 1:2,500 scale map of the area was published. This map was then used to update the 1:10,000 scale map. The published Ordnance Survey map was often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys in existing county or group of counties, giving rise to significant inaccuracies in existing areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,000 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

SU61SE	SU71SW
1962	1962
1:10,560	1:10,560
SU60NE	SU70NW
1963	1963
1:10,560	1:10,560

Historical Map - Slice D



Order Details

Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469870, 107850
Slice: D
Site Area (Ha): 26.37
Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA



Ordinance Survey Plan Published 1975

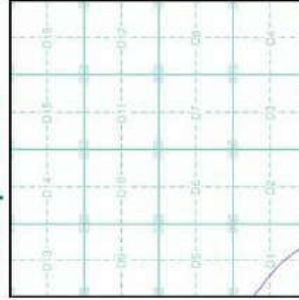
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the Ordnance Survey, which were produced in the 1840's. In 1854, the 1:10,000 scale maps were used to produce the 1:10,000 scale maps. The 1:10,000 scale maps were often some years later than the surveyed data. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in edging areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,000 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice D



Order Details

Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469870, 107850
Slice: D
Site Area (Ha): 26.37
Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA



Ordinance Survey Plan Published 1980 - 1982

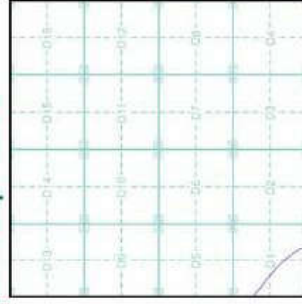
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at a scale adopted for England, Wales and Scotland in the 1840's. In 1854 a 1:2,500 scale map was produced for the Ordnance Survey. These maps were used to update the 1:10,000 scale. The published date on the map is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in collating areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,000 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

SL61SE	SU71SW
1980	1982
1:10,000	1:10,000
SL60NE	1982
1:10,000	

Historical Map - Slice D



Order Details

Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469870, 107850
Slice: D
Site Area (Ha): 26.37
Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA

Ordnance Survey Plan Published 1991 - 1992

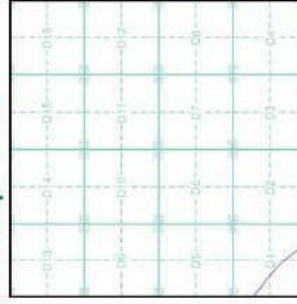
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the Ordnance Survey archives in the 1840's. In 1854 a 1:2,500 scale map of the area was produced. This map was used as the basis for the 1:10,000 scale map. The 1:10,000 scale map was often some years later than the surveyed data. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in adjoining areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overlaid with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

SL61SE	SU71SW
1992	1992
1:10,000	1:10,000
SL60NE	SU70NW
1991	1992
1:10,000	1:10,000

Historical Map - Slice D

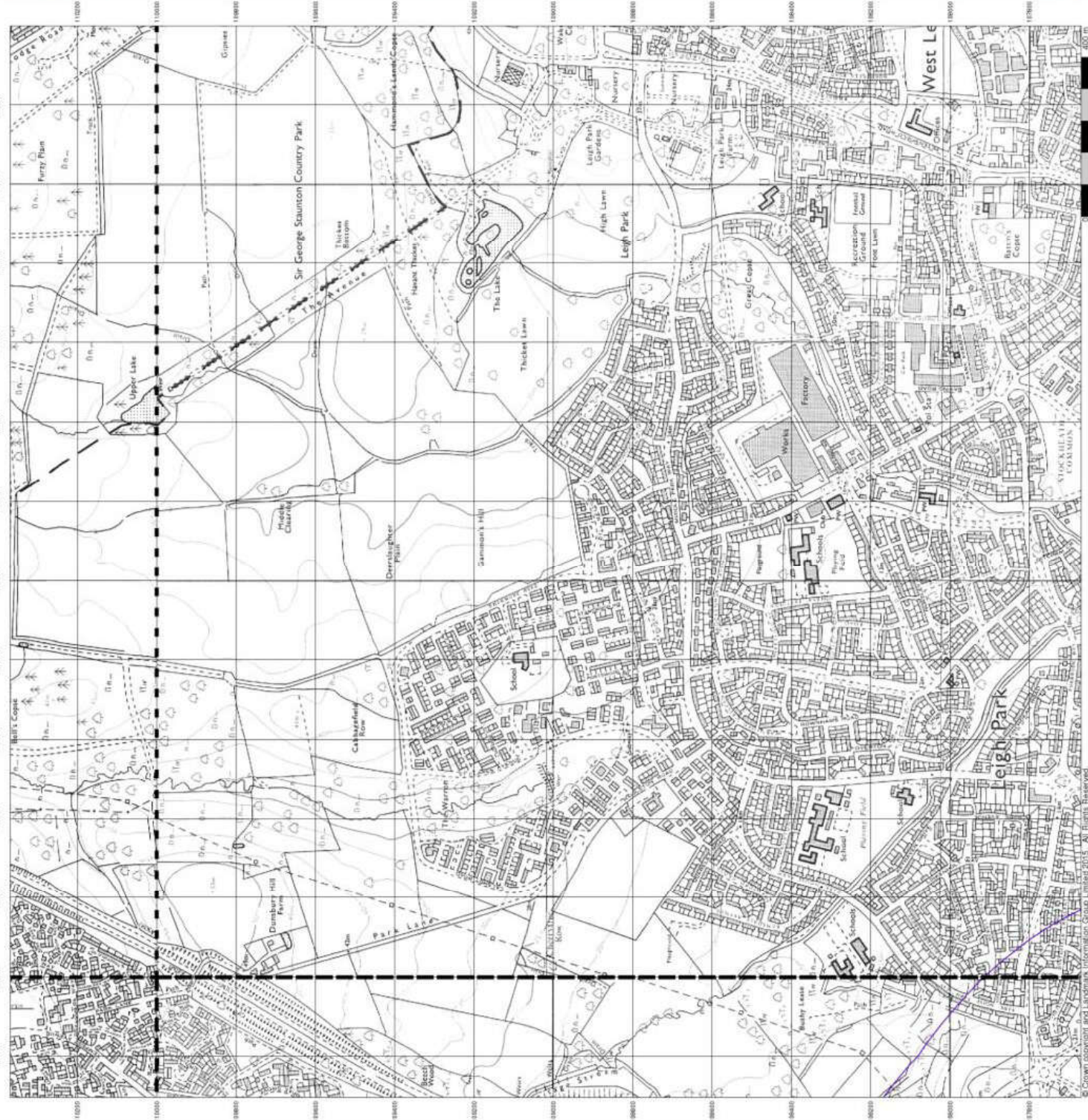


Order Details

Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469870, 107850
Slice: D
Site Area (Ha): 26.37
Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA



Envirocheck[®] Report:

Datasheet

Order Details:

Order Number:

92122794_1_1

Customer Reference:

28720

National Grid Reference:

469870, 107850

Slice:

D

Site Area (Ha):

26.37

Search Buffer (m):

1000

Site Details:

Land off College Road

Purbrook

WATERLOOVILLE

Hampshire

PO7 8AA

Client Details:

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RSK Environment Ltd

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Basepoint Abbey Enterprise Centre

Premier Way

Romsey

Hampshire

SO51 9AQ

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	3
Hazardous Substances	-
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Industrial Land Use	5
Sensitive Land Use	6
Data Currency	7
Data Suppliers	12
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Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v50.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1	Yes	Yes	Yes	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents					
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls					
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 1				Yes
Pollution Incidents to Controlled Waters					
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register					
Water Abstractions					
Water Industry Act Referrals					
Groundwater Vulnerability	pg 2	Yes	n/a	n/a	n/a
Drift Deposits			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 2	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones	pg 2	1			
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
Detailed River Network Lines					n/a
Detailed River Network Offline Drainage					n/a

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Landfill Coverage	pg 3	2	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
Geological					
BGS 1:625,000 Solid Geology	pg 4	Yes	n/a	n/a	n/a
BGS Recorded Mineral Sites					
Brine Compensation Area			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 4	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 4	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 4	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 4	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Industrial Land Use					
Contemporary Trade Directory Entries	pg 5				1
Fuel Station Entries	pg 5				1
Gas Pipelines					
Underground Electrical Cables					
Sensitive Land Use					
Ancient Woodland	pg 6		5	1	3
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 6	1			
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(SW)	0	1	469250 107450
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(SW)	74	1	469550 107350
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(SW)	93	1	469200 107500
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	129	1	469250 107600
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(SW)	176	1	469600 107250
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	193	1	469150 107600
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	197	1	469200 107600
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(SW)	200	1	469350 107600
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(SW)	238	1	469350 107550
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	243	1	469150 107650
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	246	1	469250 107650
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	(S)	261	1	469750 107200
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	280	1	469450 107700
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(SW)	308	1	469400 107600
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(SW)	319	1	469600 107500
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(SW)	341	1	469450 107650
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	343	1	469100 107750
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(SW)	356	1	469600 107600
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(S)	365	1	469700 107200
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	D1SW (NW)	406	1	469871 107846
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(SW)	427	1	469650 107550
	Nearest Surface Water Feature	D1NW (NW)	895	-	469712 108053

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Groundwater Vulnerability Soil Classification: Not classified Map Sheet: Sheet 52 Southern Hampshire Scale: 1:100,000	D1SW (NW)	0	2	469871 107846
	Groundwater Vulnerability Soil Classification: Soils of Low Leaching Potential - Soils in which pollutants are unlikely to penetrate the soil layer because water movement is largely horizontal or they have large ability to attenuate diffuse pollutants. Lateral flow from these soils contribute to groundwater recharge elsewhere in the catchment Map Sheet: Sheet 52 Southern Hampshire Scale: 1:100,000	(SW)	0	2	469559 107562
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - A	(SW)	0	1	469257 107442
	Bedrock Aquifer Designations Aquifer Designation: Unproductive Strata	D1SW (NW)	0	1	469871 107846
	Superficial Aquifer Designations No Data Available				
1	Source Protection Zones Name: Not Supplied Source: Environment Agency, Head Office Reference: Not Supplied Type: Zone 1c (Inner Protection Zone): Travel time of 50 days or less to the groundwater source - subsurface activity only.	D1SW (NW)	0	2	469871 107846
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
	Detailed River Network Lines None				
	Detailed River Network Offline Drainage None				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Landfill Coverage Name: Havant Borough Council - Has supplied landfill data		0	3	469871 107846
	Local Authority Landfill Coverage Name: Hampshire County Council - Had landfill data but passed it to the relevant environment agency		0	4	469871 107846

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Thames Group	D1SW (NW)	0	1	469871 107846
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain No Hazard				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	D1SW (NW)	0	1	469871 107846
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	D1SW (NW)	0	1	469871 107846
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	D1SW (NW)	0	1	469871 107846
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	D1SW (NW)	0	1	469871 107846
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	D1SW (NW)	0	1	469871 107846
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	D1SW (NW)	0	1	469871 107846
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	D1SW (NW)	0	1	469871 107846
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	D1SW (NW)	0	1	469871 107846

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
2	Contemporary Trade Directory Entries Name: Asda Petrol Location: Larchwood Avenue, Havant, Hampshire, PO9 3QW Classification: Petrol Filling Stations Status: Active Positional Accuracy: Manually positioned to the address or location	D1SW (SW)	648	-	469712 107702
3	Fuel Station Entries Name: Asda Havant Location: Willowdene Close, Bedhampton, Havant, Hampshire, PO9 3QP Brand: ASDA Premises Type: Hypermarket Status: Open Positional Accuracy: Manually positioned to the address or location	D1SW (SW)	648	-	469712 107702

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
4	Ancient Woodland Name: Not Supplied Reference: 1487521 Area(m²): 49712.64 Type: Ancient and Semi-Natural Woodland	(W)	6	5	469218 107579
5	Ancient Woodland Name: Not Supplied Reference: 1488333 Area(m²): 15356.02 Type: Ancient and Semi-Natural Woodland	(SW)	72	5	469414 107354
6	Ancient Woodland Name: Not Supplied Reference: 1489282 Area(m²): 32441.88 Type: Plantation on Ancient Woodland	(SW)	110	5	469583 107203
7	Ancient Woodland Name: Not Supplied Reference: 1487374 Area(m²): 20019.65 Type: Plantation on Ancient Woodland	(W)	182	5	469112 107621
8	Ancient Woodland Name: Not Supplied Reference: 1489389 Area(m²): 11336.1 Type: Ancient and Semi-Natural Woodland	(SW)	241	5	469639 107359
9	Ancient Woodland Name: Not Supplied Reference: 1489383 Area(m²): 68501.86 Type: Ancient and Semi-Natural Woodland	(W)	334	5	469182 108072
10	Ancient Woodland Name: Not Supplied Reference: 1488854 Area(m²): 4580.05 Type: Plantation on Ancient Woodland	(W)	581	5	469128 108004
11	Ancient Woodland Name: Not Supplied Reference: 1489661 Area(m²): 4918.42 Type: Plantation on Ancient Woodland	(NW)	911	5	469570 108165
12	Ancient Woodland Name: Not Supplied Reference: 1488487 Area(m²): 6374.51 Type: Ancient and Semi-Natural Woodland	(NW)	988	5	469602 108216
13	Nitrate Vulnerable Zones Name: Not Supplied Description: Eutrophic Water Source: Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	D1SW (NW)	0	6	469871 107846

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices East Hampshire District Council - Environmental Health Department Havant Borough Council - Environmental Health Department Chichester District Council - Environmental Health Department	January 2015 January 2015 July 2013	Annual Rolling Update Annual Rolling Update Annual Rolling Update
Discharge Consents Environment Agency - Southern Region	April 2016	Quarterly
Enforcement and Prohibition Notices Environment Agency - Southern Region	March 2013	As notified
Integrated Pollution Controls Environment Agency - Southern Region	October 2008	Not Applicable
Integrated Pollution Prevention And Control Environment Agency - Southern Region	April 2016	Quarterly
Local Authority Integrated Pollution Prevention And Control East Hampshire District Council - Environmental Health Department Havant Borough Council - Environmental Health Department Chichester District Council - Environmental Health Department	December 2014 December 2015 October 2014	Annual Rolling Update Annual Rolling Update Annual Rolling Update
Local Authority Pollution Prevention and Controls East Hampshire District Council - Environmental Health Department Havant Borough Council - Environmental Health Department Chichester District Council - Environmental Health Department	December 2014 December 2015 October 2014	Annual Rolling Update Annual Rolling Update Annual Rolling Update
Local Authority Pollution Prevention and Control Enforcements East Hampshire District Council - Environmental Health Department Havant Borough Council - Environmental Health Department Chichester District Council - Environmental Health Department	December 2014 December 2015 October 2014	Annual Rolling Update Annual Rolling Update Annual Rolling Update
Nearest Surface Water Feature Ordnance Survey	July 2012	Quarterly
Pollution Incidents to Controlled Waters Environment Agency - Southern Region	December 1999	Not Applicable
Prosecutions Relating to Authorised Processes Environment Agency - Southern Region	March 2013	As notified
Prosecutions Relating to Controlled Waters Environment Agency - Southern Region	March 2013	As notified
River Quality Environment Agency - Head Office	November 2001	Not Applicable
River Quality Biology Sampling Points Environment Agency - Head Office	July 2012	Annually
River Quality Chemistry Sampling Points Environment Agency - Head Office	July 2012	Annually
Substantiated Pollution Incident Register Environment Agency - Southern Region - Hampshire and Isle of Wight Area Office Environment Agency - Southern Region - Solent and South Downs Environment Agency - Southern Region - Sussex Area	April 2016 April 2016 April 2016	Quarterly Quarterly Quarterly
Water Abstractions Environment Agency - Southern Region	April 2016	Quarterly
Water Industry Act Referrals Environment Agency - Southern Region	April 2016	Quarterly
Groundwater Vulnerability Environment Agency - Head Office	April 2015	Not Applicable
Drift Deposits Environment Agency - Head Office	January 1999	Not Applicable
Bedrock Aquifer Designations British Geological Survey - National Geoscience Information Service	August 2015	As notified

Agency & Hydrological	Version	Update Cycle
Superficial Aquifer Designations British Geological Survey - National Geoscience Information Service	August 2015	As notified
Source Protection Zones Environment Agency - Head Office	April 2016	Quarterly
Extreme Flooding from Rivers or Sea without Defences Environment Agency - Head Office	February 2016	Quarterly
Flooding from Rivers or Sea without Defences Environment Agency - Head Office	February 2016	Quarterly
Areas Benefiting from Flood Defences Environment Agency - Head Office	February 2016	Quarterly
Flood Water Storage Areas Environment Agency - Head Office	February 2016	Quarterly
Flood Defences Environment Agency - Head Office	February 2016	Quarterly
Detailed River Network Lines Environment Agency - Head Office	March 2012	Annually
Detailed River Network Offline Drainage Environment Agency - Head Office	March 2012	Annually
BGS Groundwater Flooding Susceptibility British Geological Survey - National Geoscience Information Service	May 2013	Annually

Waste	Version	Update Cycle
BGS Recorded Landfill Sites British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Integrated Pollution Control Registered Waste Sites Environment Agency - Southern Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries) Environment Agency - Southern Region - Hampshire and Isle of Wight Area Office Environment Agency - Southern Region - Solent and South Downs Environment Agency - Southern Region - Sussex Area	May 2016 May 2016 May 2016	Quarterly Quarterly Quarterly
Licensed Waste Management Facilities (Locations) Environment Agency - Southern Region - Hampshire and Isle of Wight Area Office Environment Agency - Southern Region - Solent and South Downs Environment Agency - Southern Region - Sussex Area	April 2016 April 2016 April 2016	Quarterly Quarterly Quarterly
Local Authority Landfill Coverage Chichester District Council - Environmental Health Department East Hampshire District Council Hampshire County Council - Minerals and Waste Planning Havant Borough Council - Environmental Health Department West Sussex County Council - Environment & Development	May 2000 May 2000 May 2000 May 2000 May 2000	Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable
Local Authority Recorded Landfill Sites Chichester District Council - Environmental Health Department East Hampshire District Council Hampshire County Council - Minerals and Waste Planning Havant Borough Council - Environmental Health Department West Sussex County Council - Environment & Development	May 2000 May 2000 May 2000 May 2000 May 2000	Not Applicable Not Applicable Not Applicable Not Applicable Not Applicable
Registered Landfill Sites Environment Agency - Southern Region - Hampshire Area Environment Agency - Southern Region - Sussex Area	March 2003 March 2003	Not Applicable Not Applicable
Registered Waste Transfer Sites Environment Agency - Southern Region - Hampshire Area Environment Agency - Southern Region - Sussex Area	March 2003 March 2003	Not Applicable Not Applicable
Registered Waste Treatment or Disposal Sites Environment Agency - Southern Region - Hampshire Area Environment Agency - Southern Region - Sussex Area	March 2003 March 2003	Not Applicable Not Applicable
Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH) Health and Safety Executive	February 2016	Bi-Annually
Explosive Sites Health and Safety Executive	February 2016	Bi-Annually
Notification of Installations Handling Hazardous Substances (NIHHS) Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements Chichester District Council - Planning Department East Hampshire District Council Hampshire County Council - Minerals and Waste Planning Havant Borough Council - Commercial Team West Sussex County Council - Environment & Development	February 2016 February 2016 February 2016 February 2016 October 2006	Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update
Planning Hazardous Substance Consents Chichester District Council - Planning Department East Hampshire District Council Hampshire County Council - Minerals and Waste Planning Havant Borough Council - Commercial Team West Sussex County Council - Environment & Development	February 2016 February 2016 February 2016 February 2016 October 2006	Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update Annual Rolling Update

Geological	Version	Update Cycle
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	May 2016	Bi-Annually
Brine Compensation Area Cheshire Brine Subsidence Compensation Board	August 2011	Not Applicable
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	As notified
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	As notified
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	As notified
Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	June 2016	Quarterly
Fuel Station Entries Catalist Ltd - Experian	July 2016	Quarterly
Gas Pipelines National Grid	July 2014	Quarterly
Underground Electrical Cables National Grid	January 2016	Bi-Annually

Sensitive Land Use	Version	Update Cycle
Ancient Woodland Natural England	June 2015	Bi-Annually
Areas of Outstanding Natural Beauty Natural England	April 2016	Bi-Annually
Environmentally Sensitive Areas Natural England	April 2016	Annually
Forest Parks Forestry Commission	April 1997	Not Applicable
Local Nature Reserves Natural England	April 2016	Bi-Annually
Marine Nature Reserves Natural England	April 2016	Bi-Annually
National Nature Reserves Natural England	April 2016	Bi-Annually
National Parks Natural England	March 2016	Bi-Annually
Nitrate Sensitive Areas Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	April 2016	Not Applicable
Nitrate Vulnerable Zones Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	October 2015	Annually
Ramsar Sites Natural England	April 2016	Bi-Annually
Sites of Special Scientific Interest Natural England	April 2016	Bi-Annually
Special Areas of Conservation Natural England	April 2016	Bi-Annually
Special Protection Areas Natural England	April 2016	Bi-Annually
World Heritage Sites English Heritage - National Monument Record Centre	September 2015	Bi-Annually

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	 British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL
Centre for Ecology and Hydrology	 Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Peter Brett Associates	

Contact	Name and Address	Contact Details
1	British Geological Survey - Enquiry Service British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	Environment Agency - National Customer Contact Centre (NCCC) PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
3	Havant Borough Council - Environmental Health Department Public Service PLaza, Civic Centre Road, Havant, Hampshire, PO9 2AX	Telephone: 023 9244 6677 Email: env.services@havant.gov.uk Website: www.havant.gov.uk
4	Hampshire County Council - Minerals and Waste Planning Room 130, Ashburton Court West, The Castle, Winchester, Hampshire, SO23 8UD	Telephone: 01962 841841 Fax: 01962 847055 Website: www.hants.gov.uk
5	Natural England County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
6	Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA) Government Buildings, Otley Road, Lawnswood, Leeds, West Yorkshire, LS16 5QT	Telephone: 0113 2613333 Fax: 0113 230 0879
-	Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.

Groundwater Vulnerability

General
 Spot First Site
 Shaded Buffers
 Map ID
 Shading Reference Point

Agency and Hydrological

Major Aquifer
 (Highly Permeable)

Minor Aquifer
 (Moderately Permeable)

Non Aquifer
 (Slightly Permeable)

Water or Sea

Drift Deposition

Soil Classes

High (H) 1, 2, 3, 4

Intermediate (I) 1, 2

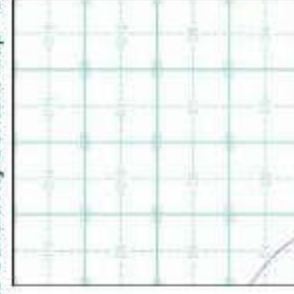
Low

High (H) 1, 2, 3, 4

Intermediate (I) 1, 2

Low

Site Sensitivity Context Map - Slice D



Order Details

Order Number: 92122754_1_1
 Customer Ref: 26/20
 National Grid Reference: 469870, 107850
 Slice: D
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

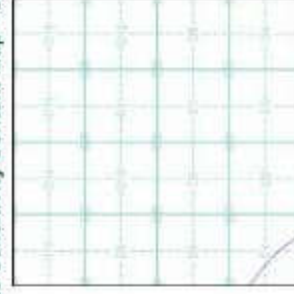
Site Details

Land off College Road, Putbrook, WATERLOOVILLE, Hampshire, PO7
 BMA

Bedrock Aquifer Designation



Site Sensitivity Context Map - Slice D

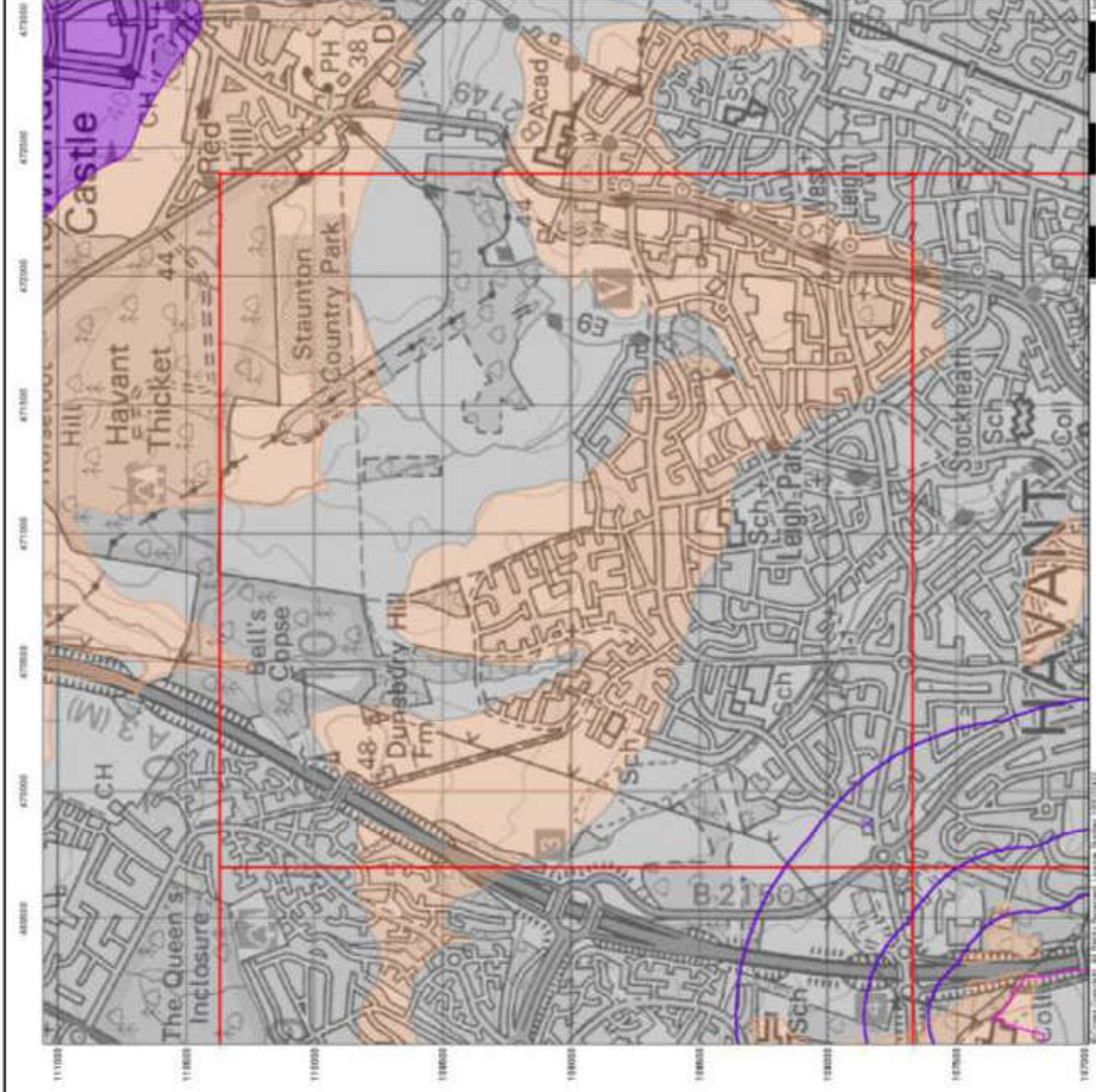


Order Details

Order Number: 92122754_1_1
 Customer Ref: 26/20
 National Grid Reference: 469870, 107850
 Slice: D
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

Site Details

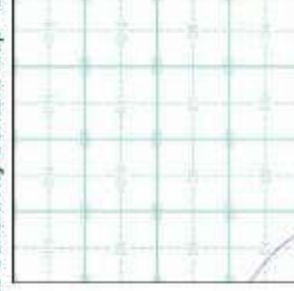
Land off College Road, Putbrook, WATERLOOVILLE, Hampshire, PO7
 BMA



Superficial Aquifer Designation



Site Sensitivity Context Map - Slice D

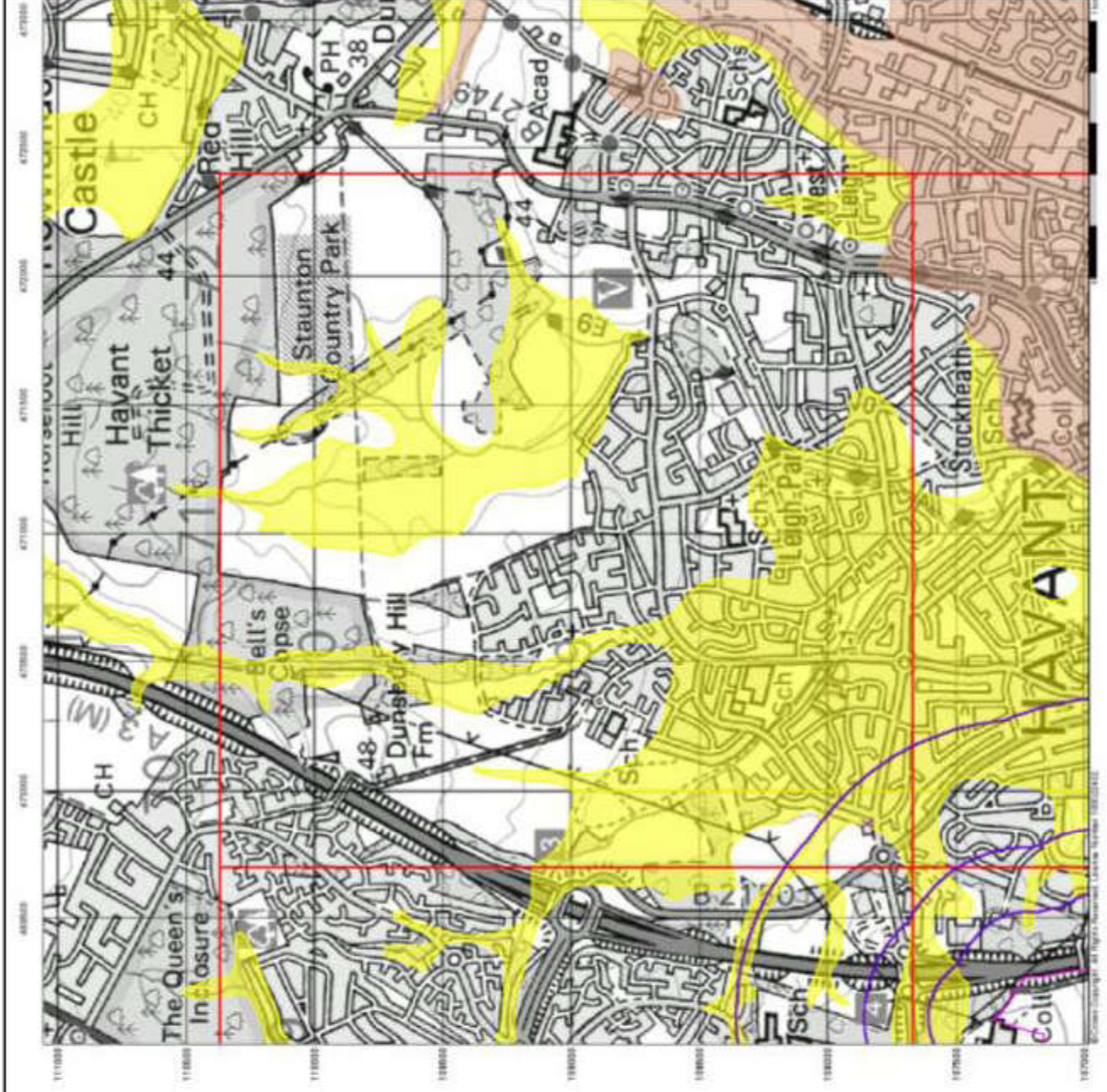


Order Details

Order Number: 92122794_1_1
 Customer Ref: 28/20
 National Grid Reference: 469870, 107850
 Slice: D
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

Site Details

Land off College Road, Putbrook, WATERLOOVILLE, Hampshire, PO7
 BMA



Source Protection Zones

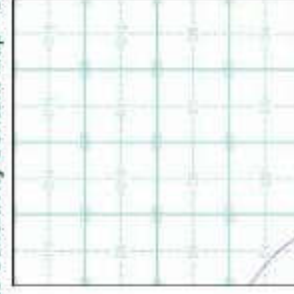
General

- Best First Site
- Specified Buffers
- Drinking Water Source
- Map ID

Agency and Hydrological

- Inner zone (Zone 1)
- Inner zone - subsurface activity only (Zone 1c)
- Outer zone (Zone 2)
- Outer zone - subsurface activity only (Zone 2c)
- Total catchment (Zone 3)
- Total catchment - subsurface activity only (Zone 3c)
- Special interest (Zone 4)
- Source Protection Zone Boundary

Site Sensitivity Context Map - Slice D

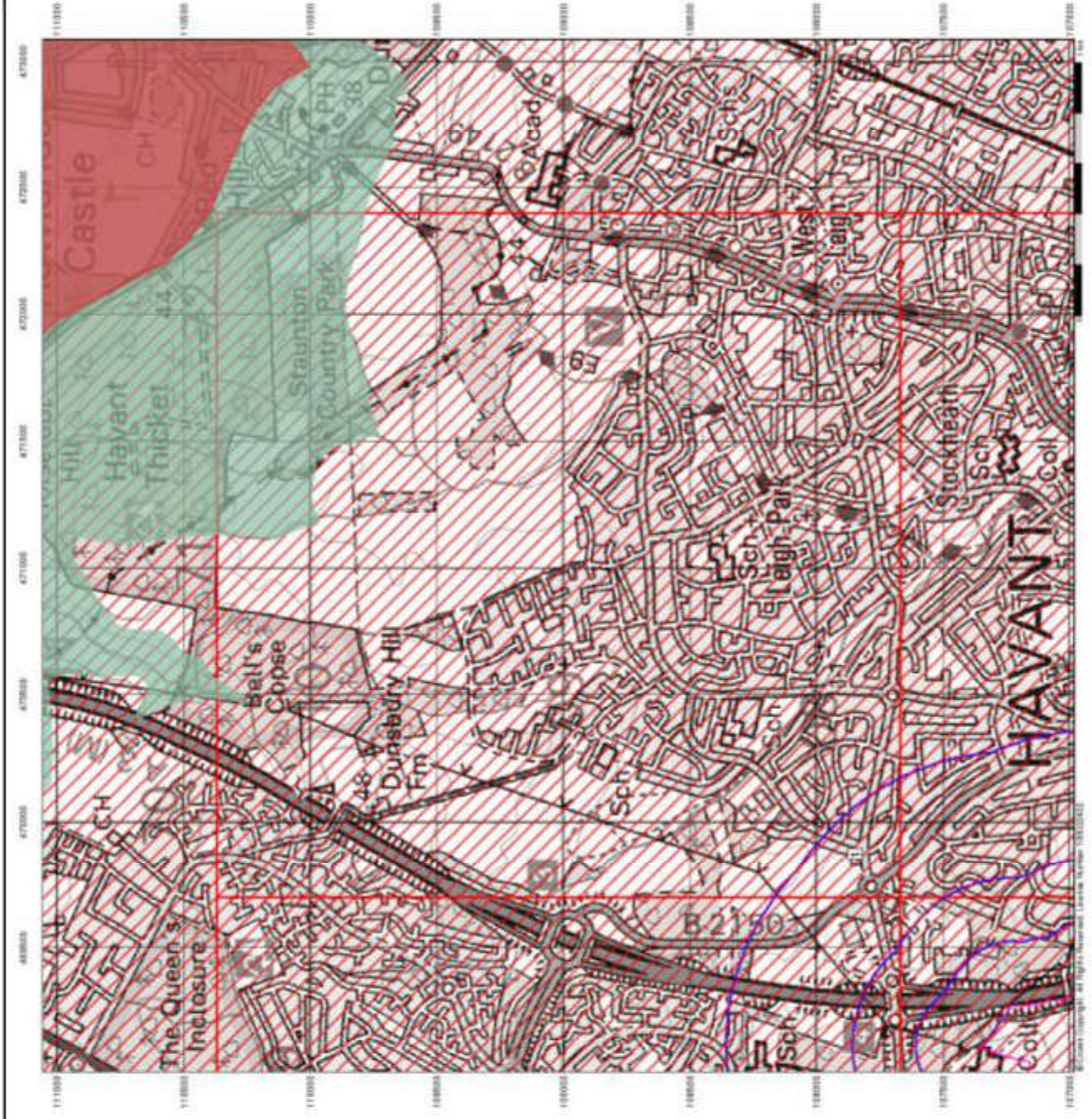


Order Details

Order Number: 92122794_1_1
 Customer Ref: 26/20
 National Grid Reference: 469870, 107850
 Slice: D
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

Site Details

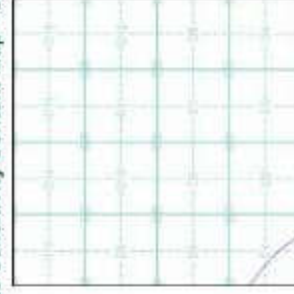
Land off College Road, Putbrook, WATERLOOVILLE, Hampshire, PO7
 BMA



Sensitive Land Uses



Site Sensitivity Context Map - Slice D

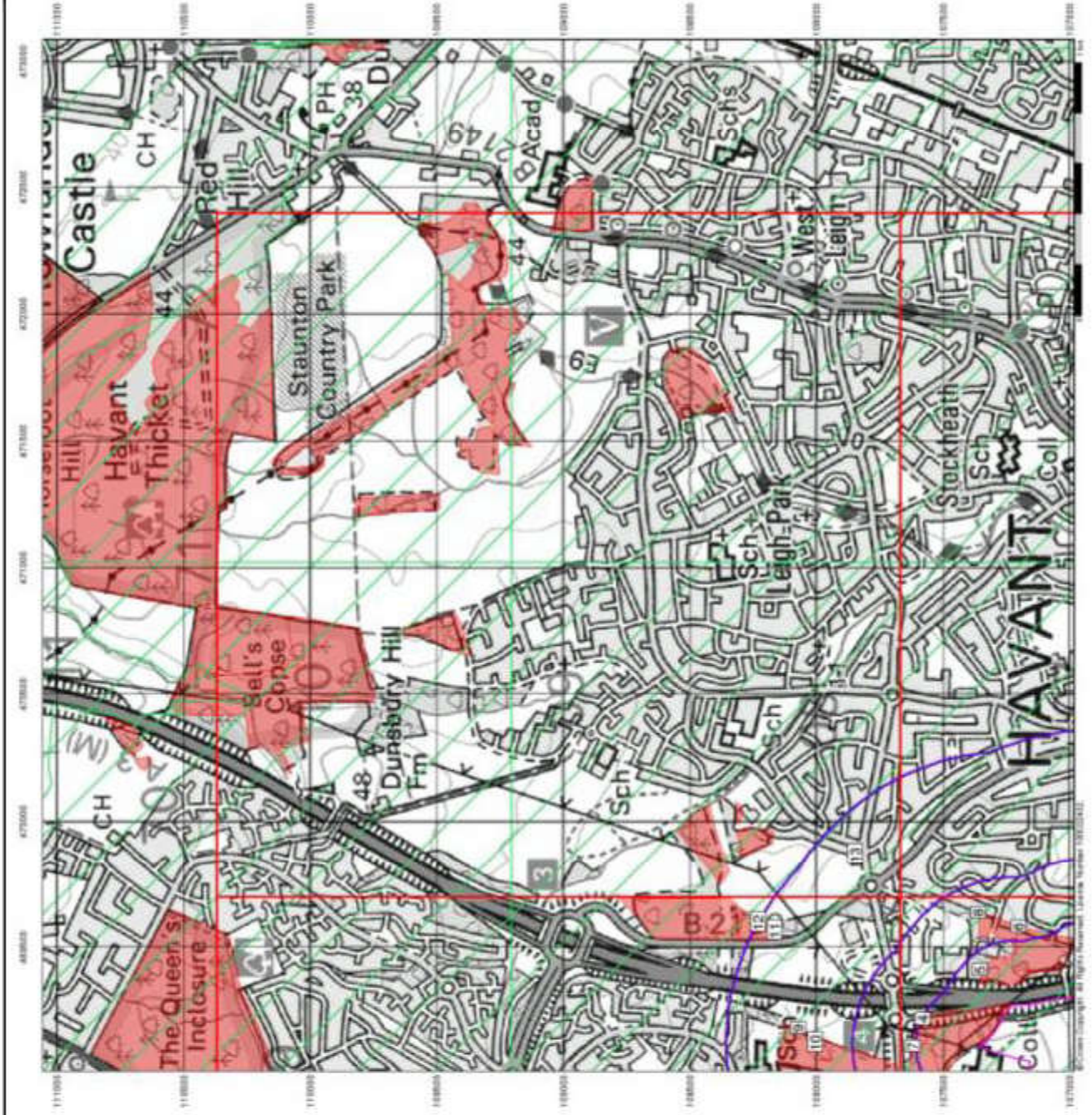


Order Details

Order Number: 92122794_1_1
 Customer Ref: 28/20
 National Grid Reference: 469870, 107850
 Slice: D
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

Site Details

Land off College Road, Putbrook, WATERLOOVILLE, Hampshire, PO7
 BMA



BGS Flood GFS Data

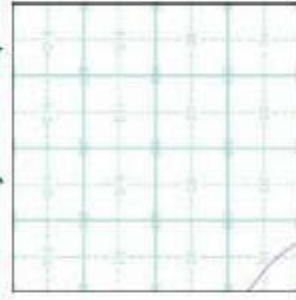
General

- Specified Site
- Specified Buffer(s)
- Seawall Reference Point

Agency and Hydrological (Flood)

- Unlimited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding at Property Shaded Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice D

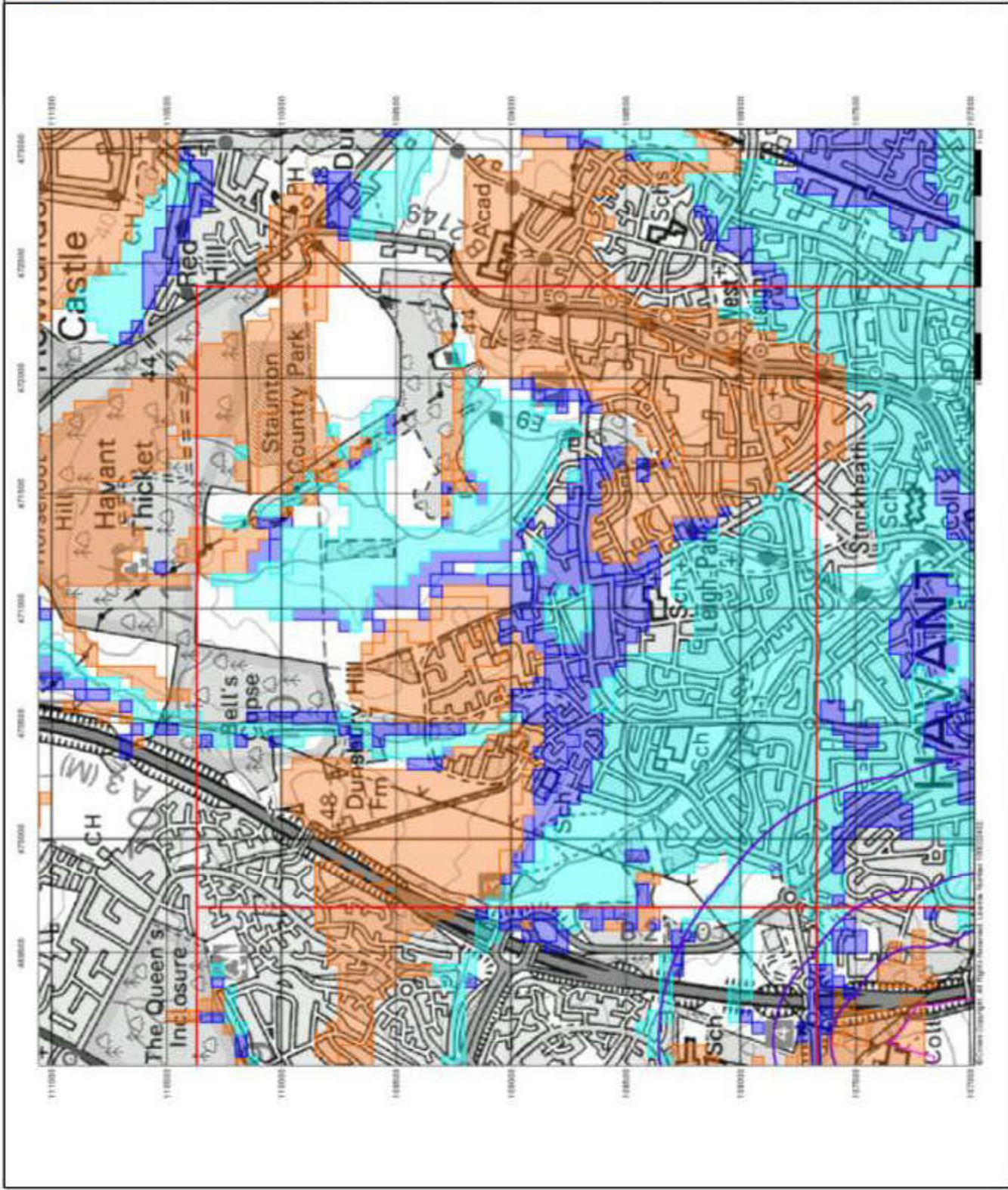


Order Details

Order Number: 92122794_1_1
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Site Details

Land off College Road, Putbrook, WATERLOOVILLE, Hampshire, PO7
 BMA



Geology 1:10,000 Maps Legends

Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	MGR	Made Ground (Undivided)	Artificial Deposit	Holocene - Holocene

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	SUPNM	Superficial Theme Not Mapped (For Digital Map Use Only)	Unknown/Unclassified Entry	Not Supplied - Not Supplied
	HEAD	Head	Clay, Silt, Sand and Gravel	Quaternary - Quaternary
	RTDU	River Terrace Deposits (Undifferentiated)	Sand, Silt and Clay	Quaternary - Quaternary

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	LC	London Clay Formation	Clay, Silt and Sand	Eocene - Eocene
	BOSA	Bognor Sand Member	Sand	Eocene - Eocene
	BOSA	Bognor Sand Member	Clay, Silt and Sand	Eocene - Eocene
	LC	London Clay Formation	Sand	Eocene - Eocene
	LMBE	Lambeth Group	Clay, Silt and Sand	Paleocene - Paleocene
	LMBE	Lambeth Group	Clay	Paleocene - Paleocene



Geology 1:10,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:10,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around a site. This mapping may be more up to date than previously published paper maps.

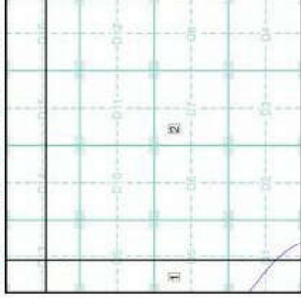
The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page.

Please Note: Not all of the layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:10,000 Maps Coverage

Map ID:	Map Name:	Map ID:	Map Name:
SUK1SE	1996	SUK1SW	1984
Bedrock Geology:	Available	Bedrock Geology:	Available
Superficial Geology:	Available	Superficial Geology:	Available
Artificial Geology:	Available	Artificial Geology:	Available
Faults:	Not Available	Faults:	Not Supplied
Landslip:	Not Available	Landslip:	Available
Rock Segments:	Not Available	Rock Segments:	Not Supplied
Map ID:	Map Name:	Map ID:	Map Name:
SUK1NW	1984	SUK1NE	1984
Bedrock Geology:	Available	Bedrock Geology:	Available
Superficial Geology:	Available	Superficial Geology:	Available
Artificial Geology:	Available	Artificial Geology:	Available
Faults:	Not Supplied	Faults:	Not Supplied
Landslip:	Not Available	Landslip:	Not Available
Rock Segments:	Not Supplied	Rock Segments:	Not Supplied

Geology 1:10,000 Maps - Slice D



Order Details

Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469870, 107850
Slice: D
Site Area (Ha): 26.37
Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA



Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Artificial Ground and Landslip

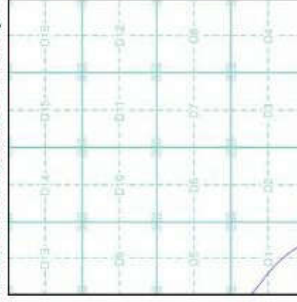
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- In-filled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes faulted strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice D

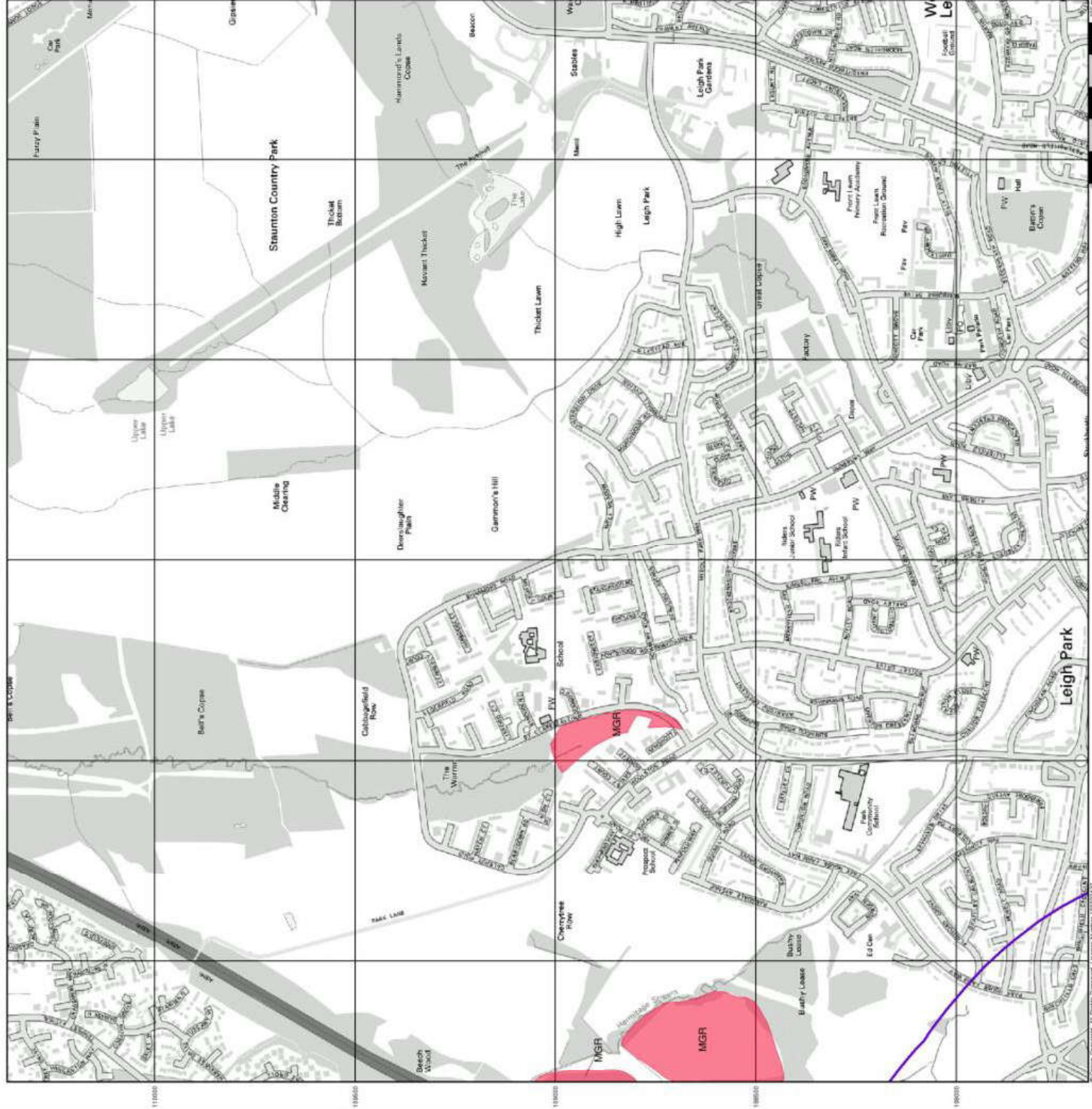


Order Details

Order Number: 92122794_1_1
 Customer Ref: 28720
 National Grid Reference: 469870, 107850
 Slice: D
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

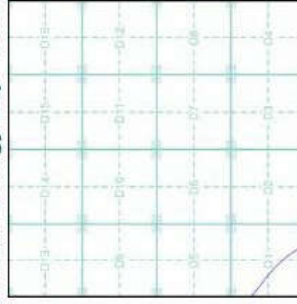
Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
 Hampshire, PO7 8AA



Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice D



Order Details

Order Details

Order Number:	92122794_1_1
Customer Ref:	28720
National Grid Reference:	469870, 107850
Slice:	D
Site Area (Ha):	26.37
Search Buffer (m):	1000

Site Details

Site Details
Land off College Road, Purbrook, Waterlooville,
Hampshire, PO7 8AA

Bedrock and Faults

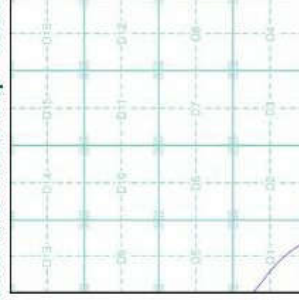
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults and thin beds mapped as lines such as coal seams and mineral veins. These are not restricted by age and could relate to features of any of the 1:10,000 geology datasets.

Bedrock and Faults Map - Slice D

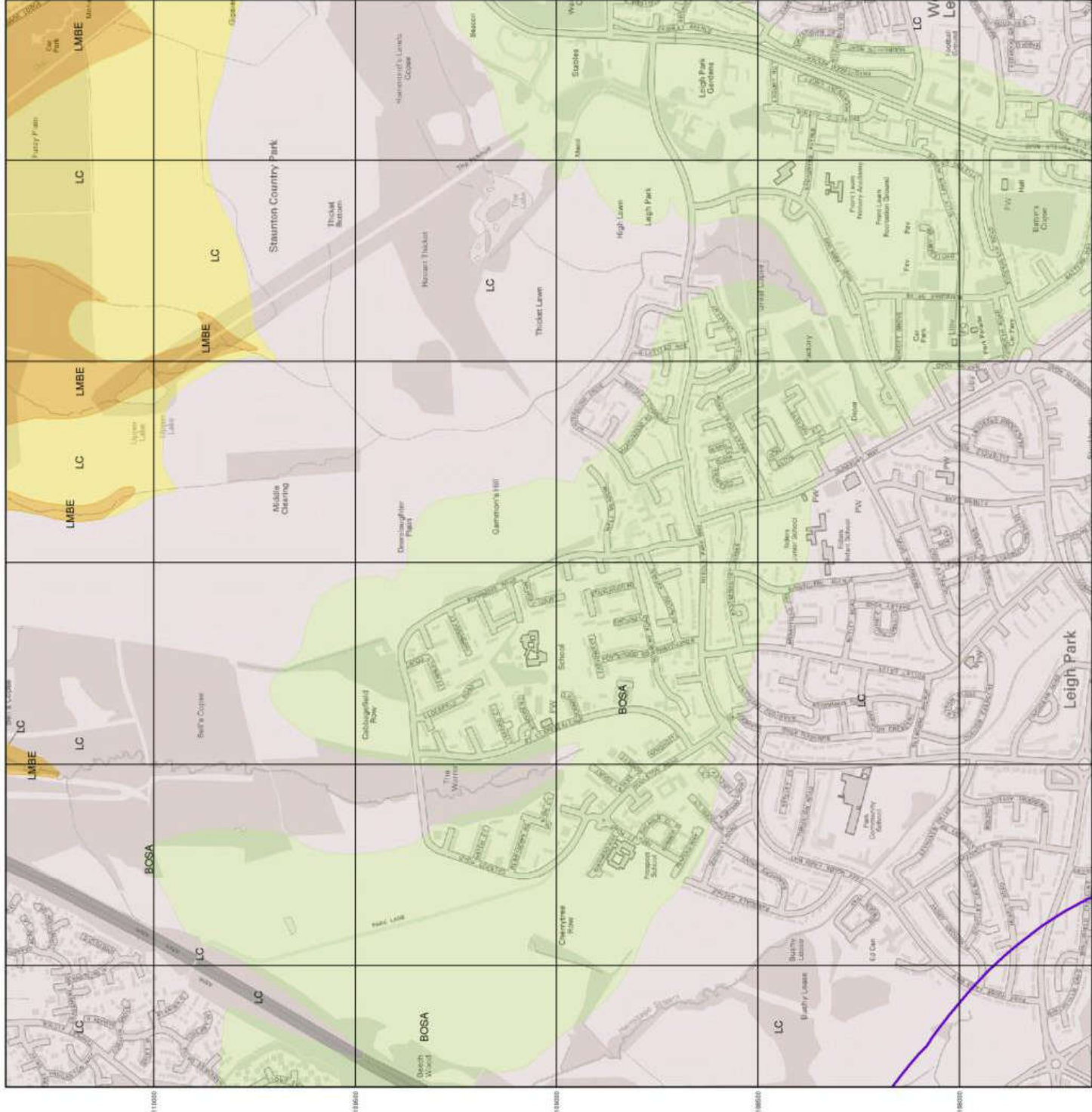


Order Details

Order Number: 92122794_1_1
Customer Ref: 28720
National Grid Reference: 469870, 107850
Site: D
Site Area (Ha): 26.37
Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA



Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

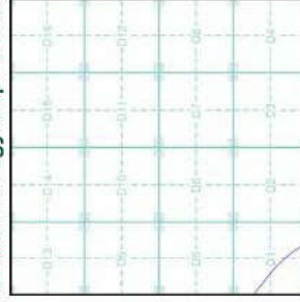
Additional Information

More information on 1:10,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice D

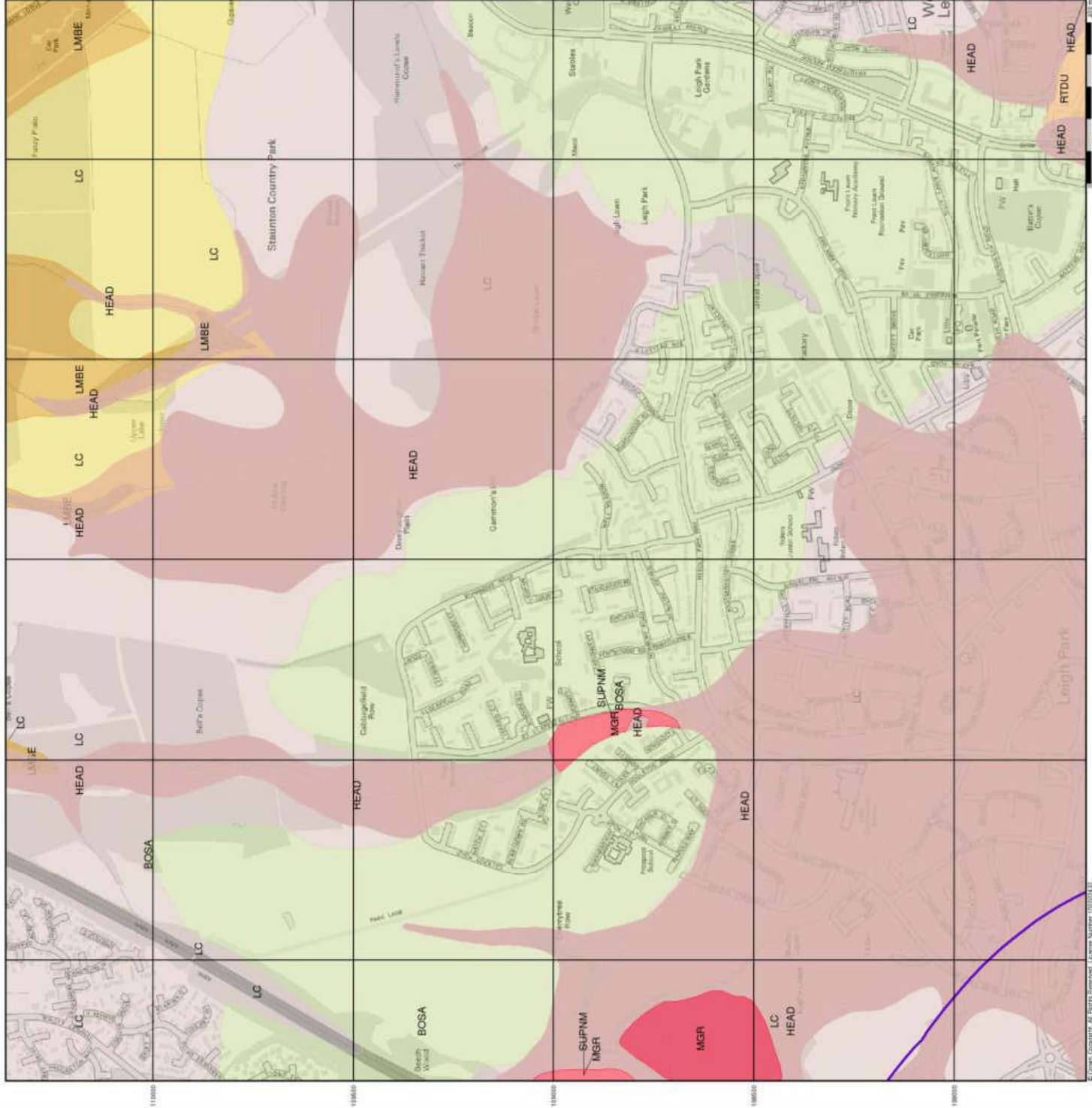


Order Details

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Customer Ref: 28720
National Grid Reference: 469870, 107850
Slice: D
Site Area (Ha): 26.37
Search Buffer (m): 1000

Site Details

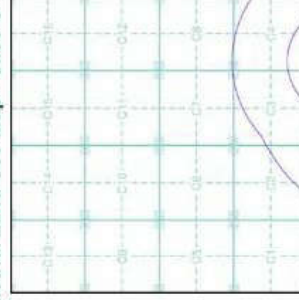
Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA



Industrial Land Use Map

- General**
- Specified Site
 - Specified Buffer(s)
 - Bearing Reference Point
 - Map ID
- Industrial Land Use**
- Contemporary Trade Directory Entry
 - Fuel Station Entry
 - Gas Pipeline
 - Underground Electrical Cables

Industrial Land Use Map - Slice C



Order Details

Order Number: 92122794_1_1
 Customer Ref: 28720
 National Grid Reference: 468960, 107960
 Slice: C
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
 Hampshire, PO7 8AA



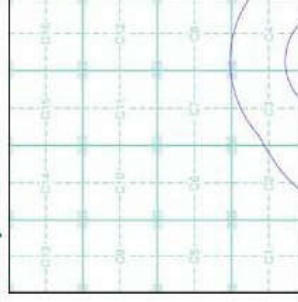
General

- Specified Site
- Specified (Buried)
- Nearest Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice C



Order Details

Order Number: 92122794_1_1
 Customer Ref: 28720
 National Grid Reference: 468960, 107960
 Slice: C
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
 Hampshire, PO7 8AA



- General**
- Specified Site
 - Specified Borehole
 - Borehole Reference Point
 - Map ID
 - General of Type at Location

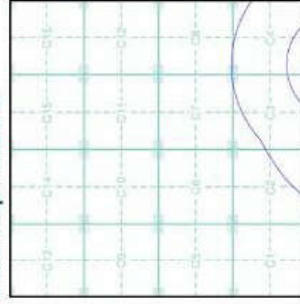
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 20m
- BGS Borehole Depth 20m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice C

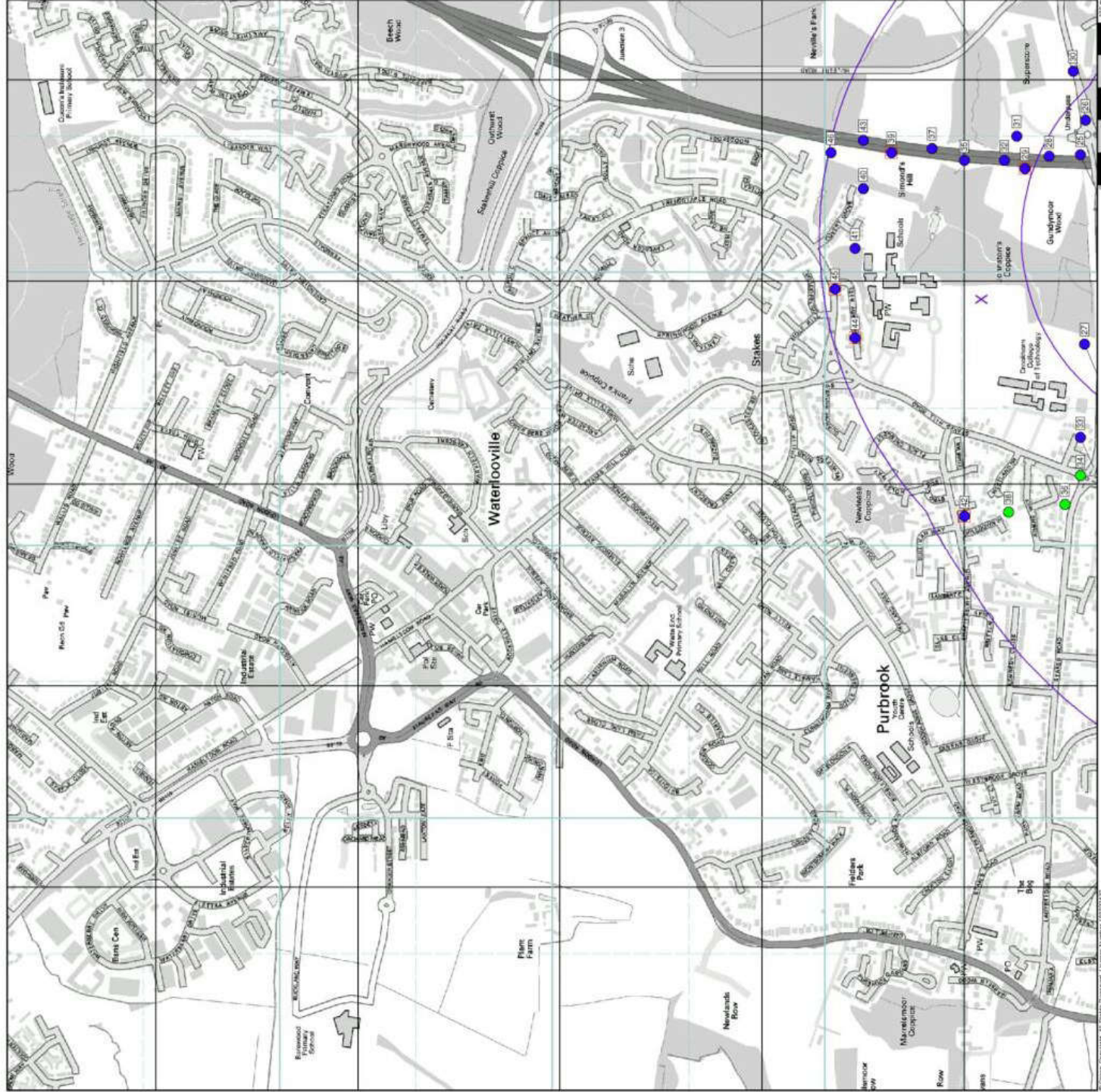


Order Details

Order Number: 92122794_1_1
 Customer Ref: 28720
 National Grid Reference: 468960, 107960
 Site: C
 Site Area (Ha): 26.37
 Search Buffer (m): 1000

Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
 Hampshire, PO7 8AA



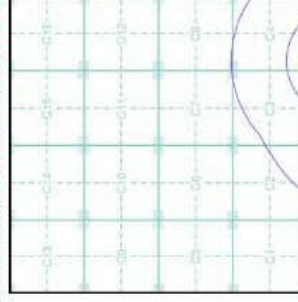
General

-  Specified Site
-  Specified Buffer(s)
-  Being Reference Point
-  Map ID

Detailed River Network Data

-  Primary River
-  Secondary River
-  Tertiary River
-  Canal
-  Canal Tunnel
-  Undefined River
-  Lake/Reservoir
-  Offine Drainage Feature
-  Extended Culvert (greater than 50m)
-  Underground River (inferred)
-  Underground River (local knowledge)
-  Downstream of High Water Mark
-  Downstream of Seaward Extension
-  Not assigned River feature

EANRW Detailed River Network Map - Slice C



Order Details

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 Site: C
 Site Area (Ha): 26.37
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Site Details

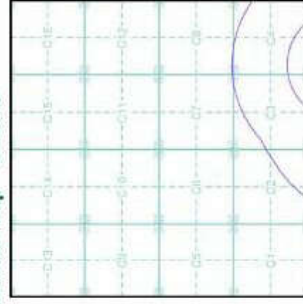
Land off College Road, Purbrook, WATERLOOVILLE,
 Hampshire, PO7 8AA



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Hampshire & Isle Of Wight	1:10,560	1870	2
Hampshire & Isle Of Wight	1:10,560	1897 - 1898	3
Hampshire & Isle Of Wight	1:10,560	1900 - 1910	4
Hampshire & Isle Of Wight	1:10,560	1933	5
Hampshire & Isle Of Wight	1:10,560	1933	6
Hampshire & Isle Of Wight	1:10,560	1938 - 1942	7
Ordnance Survey Plan	1:10,000	1962 - 1963	8
Ordnance Survey Plan	1:10,000	1980 - 1982	9
Ordnance Survey Plan	1:10,000	1991 - 1992	10
10K Raster Mapping	1:10,000	2000	11
Street View	1:10,000	2016	12

Historical Map - Slice C

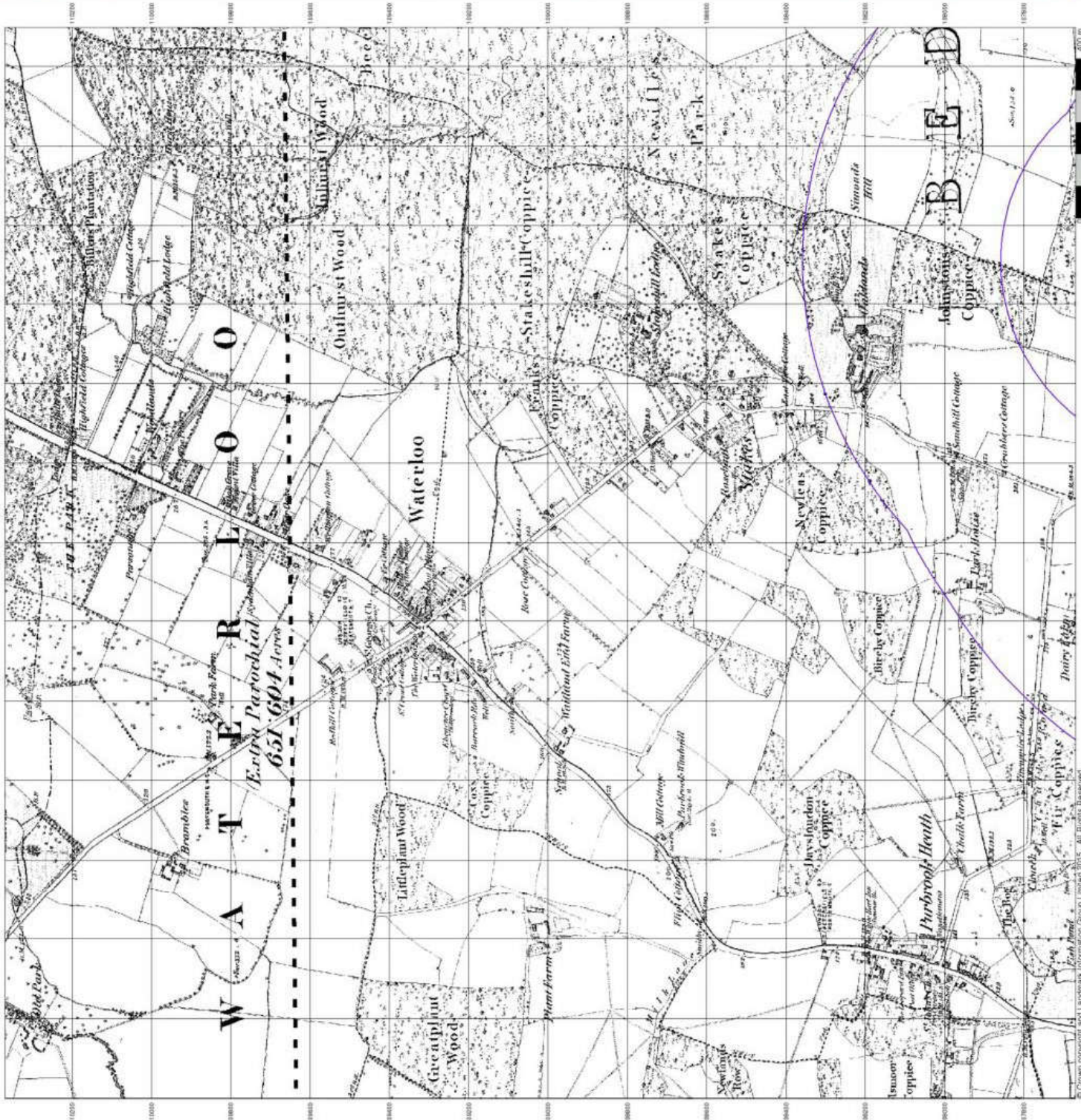


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Site Details

Land off College Road, Purbrook, WATERLOOVILLE,
Hampshire, PO7 8AA



Hampshire & Isle Of Wight

Published 1897 - 1898

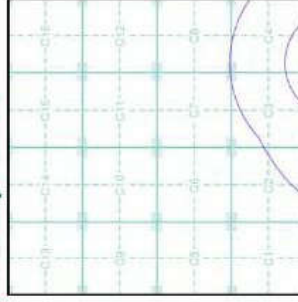
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the Ordnance Survey (OS) archive. The maps were produced in 1897 and 1898, and are based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in relating the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overlaid with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

038SW	1397	1:10,560
075NW	1398	1:10,560

Historical Map - Slice C



Order Details

Order Number: 92122794_1_1
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