A1 1:500 10 20 30

N W E S

Parsons Cottages

Aldbury Cottages

Car Park

FB

Drain

Hall

The Croft

Holly Cottage

Forman Cottage

Cathedral View

York House

Oakside Cottage

Orchard Farm

Harpers House

HARPER'S ROAD

Turning Head

Public open space

F.F.L 79.00
F.F.L 77.20
F.F.L 77.20
F.F.L 77.25
F.F.L 76.50
F.F.L 76.40
F.F.L 76.39
F.F.L 76.35
F.F.L 76.20
F.F.L 76.20
F.F.L 76.20
F.F.L 76.20
F.F.L 76.60
F.F.L 76.60
F.F.L 76.50
F.F.L 76.30
F.F.L 76.50
F.F.L 76.50
F.F.L 76.50
F.F.L 76.50

1 3BH
2 3BH
3 2BH
4 2BH
5 3BH
6 3BH
7 3BH
8 3BH
9 3BH
10 4BH
11 3BH
12 3BH
13 4BH
14 2BH
15 4BH
16 3BH
17 2BH
18 4/5BH
19 4/5BH
20 3BH
21 3BH
22 4BH
1 x 1BF

NOTES

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4. Drawing should be read in conjunction with all other relevant scheme drawings.
5. Drawing Includes:
   - 5.1. Site Layout, ECE Architecture (March 2022).
   - 5.2. Topographic Survey, P Stubbington Land Surveys Ltd (July 2017).
   - 5.3. OS Mapping provided by Bourn Homes, March 2022.

Key

- Site Boundary
- Existing Ditch
- Trial Hole 1 Infiltration Test Results Catchment
- Trial Hole 2 Infiltration Test Results Catchment
- Trial Hole 3 Infiltration Test Results Catchment
- Trial Hole 4 Infiltration Test Results Catchment
- Trial Hole 5 Infiltration Test Results Catchment
- Indicative Location of Proposed Geocellular Soakaway
- Indicative Location of Proposed Bioretention / Rain Garden Feature
- Indicative Proposed Surface Water Flow Route

REV	DATE	REVISION NOTE	BY
P3	17/05/22	PLOT 1-2 SOAKAWAY ADDED	PR
P2	27/04/22	UPDATED MASTERPLAN	PR
P1	25/03/2022	DRAFT FOR COMMENT	PR

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CLIENT

Bourne Homes Ltd

PROJECT

Stream Side
Land at
Harpers Lane

DRAWING TITLE

Indicative
Surface Water Drainage
Strategy

DRAWING ISSUE STATUS

INFORMATION

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06153	A	0101	P3

Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction

BIM DRAWING REFERENCE

SCALE	DRAWN	REVIEWED	DATE
A1@500	PR	AE	MAR 22

A1 1:500 10 20 30

N W E S

Parsons Cottages

Car Park

FB

Hall

Aldbury Cottages

The Croft

Holly Cottage

Forman Cottage

Cathedral View

York House

Oakside Cottage

HARPER'S ROAD

Orchard Farm

Harpers House

22 4BH F.F.L 79.00

19 4/5BH F.F.L 77.25

21 3BH F.F.L 77.20

20 3BH F.F.L 77.20

public open space

18 4/5BH F.F.L 76.50

16 3BH

17 2BH

15 4BH F.F.L 76.40 F.F.L 76.39 F.F.L 76.35

5 3BH F.F.L 76.20

6 3BH F.F.L 76.20

4 2BH F.F.L 76.60

3 2BH F.F.L 76.60

7 3BH F.F.L 76.20

8 3BH F.F.L 76.20

1-2 2 x 1BF F.F.L 76.50

9 3BH F.F.L 76.30

Turning Head

10 3BH F.F.L 76.50

11 3BH F.F.L 76.50

12 3BH F.F.L 76.50

13 2BH F.F.L 76.50

14 2BH F.F.L 76.50

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   - 5.3. OS Mapping provided by Bourn Homes, March 2022.
6. Surface Water Drainage Strategy based on:
   - 6.1. Infiltrating testing included within Flood Risk Assessment and Surface Water Drainage Strategy (Paul Timmins CEng MICE PMP, December 2017) and supporting Technical Note ASP_STR01_RP02 (Paul Timmins CEng MICE PMP, December 2017)
   - 6.2. Assumed 50% impermeable area for residential catchments and 100% impermeable area for highways catchments.
   - 6.3. Residential sensitivity tested to account for a 10% increase in impermeable area for urban creep.

Key

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- Existing Ditch
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- Trial Hole 2 Infiltration Test Results
- Trial Hole 3 Infiltration Test Results
- Trial Hole 4 Infiltration Test Results
- Trial Hole 5 Infiltration Test Results

REV	DATE	REVISION NOTE	BY
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CLIENT

Bourne Homes Ltd

PROJECT

Stream Side
Land at
Harpers Lane

DRAWING TITLE

Surface Water Drainage
Infiltration Catchment
Plan

DRAWING ISSUE STATUS

INFORMATION

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06153	- A -	0102	- P1

Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction

BIM DRAWING REFERENCE

SCALE	DRAWN	REVIEWED	DATE
A1@500	PR	AE	APR 22

Appendix F Exceedance Flow Route Plan

A1 1:500 10 20 30

N W E S

Parsons Cottages

Aldbury Cottages

Car Park

FB

Drain

Hall

The Croft

Holly Cottage

Forman Cottage

Cathedral View

York House

Oakside Cottage

HARPER'S ROAD

Orchard Farm

Harpers House

3

1

NOTES

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- Indicative Proposed Surface Water Exceedance Flow Route

REV	DATE	REVISION NOTE	BY
P1	17/05/2022	DRAFT FOR COMMENT	PR

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CLIENT

Bourne Homes Ltd

PROJECT

Stream Side
Land at
Harpers Lane

DRAWING TITLE

Indicative Overland Exceedance Flow Route Plan

DRAWING ISSUE STATUS

INFORMATION

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
06153	A	0103	P1

Revision Letter : P - Prelim / A - Approval / T - Tender / C - Construction

BIM DRAWING REFERENCE

SCALE	DRAWN	REVIEWED	DATE
A1@500	PR	AE	MAY 22

Appendix G Surface Water Drainage Calculations

Appendix H Surface Water Drainage Calculations (Development Creep)

Appendix I Pre-Application Correspondence

From:	Mike Burch on behalf of suds/EAI/SCC
To:	Phoebe Ryding
Cc:	Amy Evans
Subject:	RE: [PJA: 06153] Flood Risk Advice, Harpers Road GU12 6DB
Date:	18 March 2022 14:08:36
Attachments:	image001.png image002.png image003.png image004.png image005.png image006.png

---

Dear Phoebe Ryding,

Thank you for your email.
On our website, there is some detailed SuDS advice and design guidance
Sustainable Drainage System Design Guidance - Surrey County Council (surreycc.gov.uk)

We also offer a chargeable pre-application service, details of which are in the link below
Planning Advice - Sustainable Drainage Systems (SuDS) - Surrey County Council (surreycc.gov.uk)

Kind Regards

Mike Burch (Mr. pronouns: he/him)
Senior Resilience Officer
Flood Risk, Planning and Consenting Team
Flood and Climate Resilience
Surrey County Council
Merrow Depot, Merrow Lane, Guildford, GU4 7BQ
Email: suds@surreycc.gov.uk | Telephone: 0300 200 1003

From: Phoebe Ryding <Phoebe.ryding@pja.co.uk>
Sent: 14 March 2022 10:28
To: suds/EAI/SCC <suds@surreycc.gov.uk>
Cc: Amy Evans <Amy.evans@pja.co.uk>
Subject: [PJA: 06153] Flood Risk Advice, Harpers Road GU12 6DB

Hello,

We would like to request any flood risk and surface water drainage advice you hold for Harpers Road, GU12 6DB, Site co-ordinates 490422 , 150821 and a site location plan below:

From a review of the surface water flood risk mapping, a high-risk flow route tuns through the south of the Site which we are proposing to undertake hydraulic modelling for to better understand the nature of the flood risk.

We are also proposing to manage surface water through on-plot soakaways in accordance with drainage hierarchy.

We would welcome any advice you could provide or any queries you have with regards to the Site.

Many thanks,
Phoebe

Phoebe Ryding
Senior Flood Risk and Drainage Engineer
T. 0121 387 7961 M. 07872 858452
Seven House, High Street, Longbridge, Birmingham, B31 2UQ
www.pja.co.uk

Phoebe Ryding

From:	Enquiries_THM <enquiries_THM@environment-agency.gov.uk>
Sent:	18 May 2022 13:27
To:	Phoebe Ryding
Subject:	THM263100: [PJA: 06153] Product 4 Request - Harpers Road GU12 6DB
Follow Up Flag:	Follow up
Flag Status:	Flagged
Categories:	Scanned by Gekko

Dear Phoebe,

Thank you for your email requesting Product 4 data.

Please accept my apologies for the delay in responding.

We unfortunately do not have any detailed flood risk modelling in this location. We are sorry that we are therefore unable to provide modelled flood levels and extents for your site.

The Flood Map for Planning in this location is likely to be based on JFLOW data which is not suitable for use in site specific Flood Risk Assessments. Please advise if you would like to request JFLOW data for this location.

You can access our flood map for planning on our website:

https://flood-map-for-planning.service.gov.uk/

You can find more information on the long term risk of flooding for this location on our website:

https://flood-warning-information.service.gov.uk/long-term-flood-risk

You can find recorded flood outlines for this location via the link below:

https://data.gov.uk/dataset/recorded-flood-outlines1

You can find out the risk of flooding from surface water for this location via the link below:

https://data.gov.uk/dataset/d5ca01ec-e535-4d3f-adc0-089b4f03687d/risk-of-flooding-from-surface-water-suitability

You may be interested in the following guidance / information publically available:

- 'Planning Practice Guidance' - provides information about planning considerations in areas at risk of flooding. https://www.gov.uk/government/collections/planning-practice-guidance
- 'Planning applications: assessing flood risk' - information about completing Flood Risk Assessments. https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications
- 'Site specific flood risk assessment: Checklist' – a checklist to help ensure you have considered all the relevant factors in your flood risk assessment. https://www.gov.uk/guidance/flood-risk-and-coastal-change#Site-Specific-Flood-Risk-Assessment-checklist-section

Please be aware that from 20th July 2021 the climate change allowances required in flood risk assessments have been updated. Please see https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#contents for more information.

I hope that we have correctly interpreted your request. Please refer to our Open Government Licence for the permitted use of the supplied data: http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Please be aware that many of our datasets are now available online. Simply visit environment.data.gov.uk

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards,
Hannah

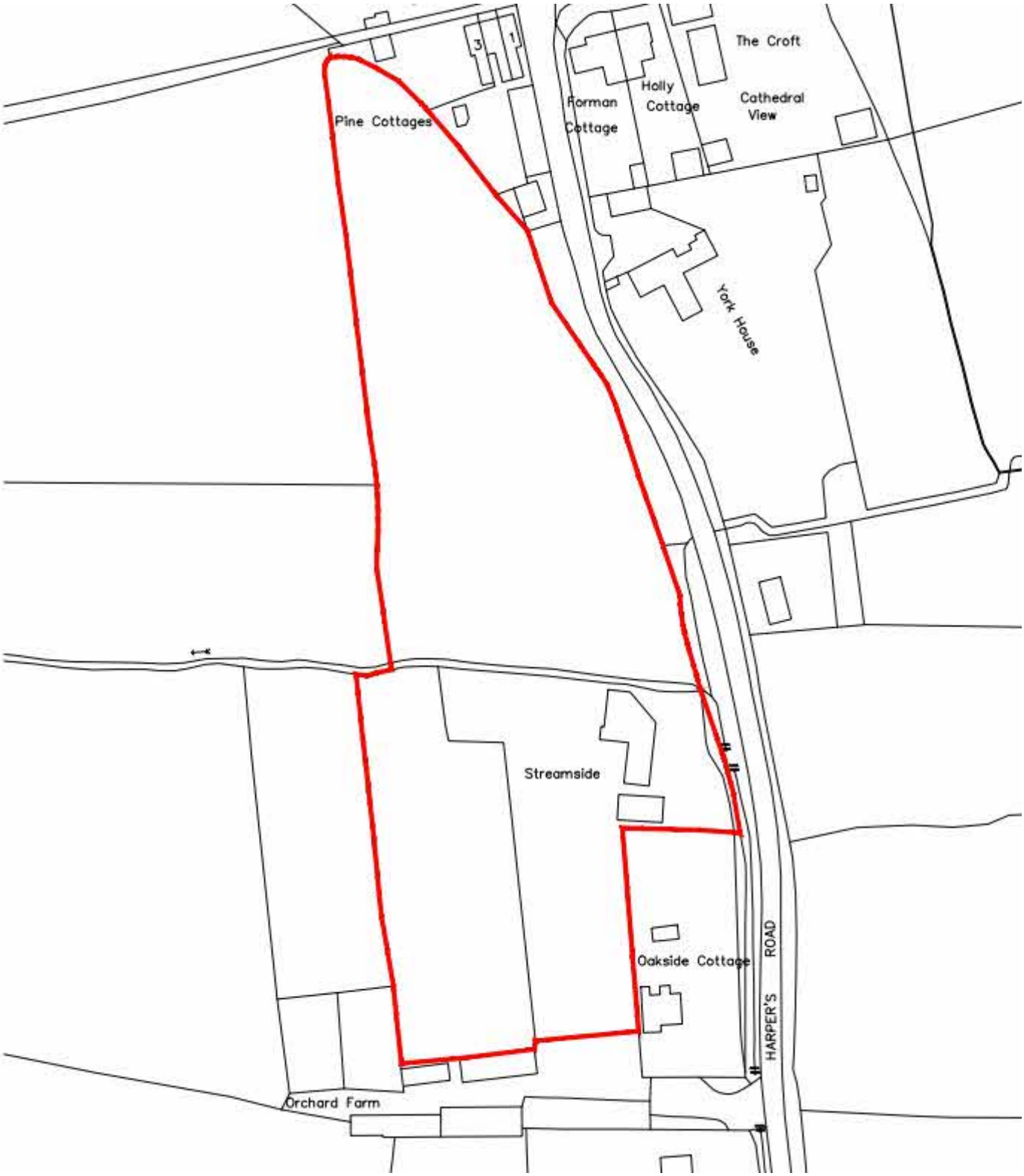
Hannah Berrie
Customers & Engagement Officer
Direct Dial: 02030255337

Environment Planning & Engagement Team
Environment Agency
Thames Area
Red Kite House, Howbery Park, Wallingford OX10 8BD

From: Phoebe Ryding [mailto:Phoebe.ryding@pja.co.uk]
Sent: 14 March 2022 10:25
To: Enquiries, Unit <enquiries@environment-agency.gov.uk>
Subject: [PJA: 06153] Product 4 Request - Harpers Road GU12 6DB

Hello,

We would like to request the Product 4 data you hold for Harpers Road, GU12 6DB, Site co-ordinates 490422 , 150821 and a site location plan below:



We understand that the Site is wholly in Flood Zone 1, but would like any data about reservoirs, flood risk or planning considerations for the Site.

If you have any queries, please don't hesitate to contact me.

Many thanks,
Phoebe

Phoebe Ryding
Senior Flood Risk and Drainage Engineer
T. 0121 387 7961 M. 07872 858452
Seven House, High Street, Longbridge, Birmingham, B31 2UQ
www.pja.co.uk

Appendix J Ground Investigation

GROUND INVESTIGATION REPORT

for the site at

STREAMSIDE, HARPERS ROAD, ASH, ALDERSHOT GU12 6DB

on behalf of

ASPEN CONSTRUCTION LIMITED

Report Reference: GWPR1286/GIR/July 2015		Status: FINAL
Issue:	Prepared By:	Verified By:
V1.01 July 2015	[redacted]	[redacted]
	Megan James BSc. (Hons) Geotechnical Engineer	Francis Williams M.Geol. (Hons) FGS CEnv AGS MSoBRA Director
File Reference: Ground and Water/Project Files/ GWPR1286 Streamside, Harpers Road, Ash GU12 6DB		

CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 General

Ground and Water Limited were instructed by Aspen Construction Ltd on the 14th May 2015 to undertake a Ground Investigation on Streamside, Harpers Road, Ash, Aldershot GU12 6DB. The scope of the investigation was detailed within the Ground and Water Limited fee proposal ref.: GWQ2456, dated 12th May 2015.

1.2 Aims of the Investigation

The aim of the investigation was understood to be to supply the client and their designers with information regarding the ground conditions underlying the site to assist them in preparing an appropriate scheme for development.

The investigation was to be undertaken to provide parameters for the design of foundations by means of in-situ and laboratory geotechnical testing undertaken on soil samples recovered from trial holes.

A Desk Study and full scale contamination assessment were not part of the remit of this report. Included within the fee proposal was an allowance to undertake chemical laboratory testing on soil samples recovered from the site to enable recommendations for the safe redevelopment of the site and the protection of site workers, end-users and the public from any potential contamination identified.

The techniques adopted for the investigation were chosen considering the anticipated ground conditions and development proposals on-site, and bearing in mind the nature of the site, limitations to site access and other logistical limitations.

1.3 Conditions and Limitations

This report has been prepared based on the terms, conditions and limitations outlined within Appendix A.

2.0 SITE SETTING

2.1 Site Location

The site comprised an irregular shaped plot of land, ~2900m^2 in area, located to the west of Harpers Road, north-west of Oakside Cottage. A northerly flowing stream was located adjacent the eastern boundary of the site, turning 90° to the west and flowing along the northern boundary of the site. The site was located to the south-east of Ash, north-east of Ash Green and east of Aldershot.

The national grid reference for the centre of the site was approximately SU 90454 50753. A site location plan is given within Figure 1. A plan showing the site boundary can be seen in Figure 2.

2.2 Site Description

The site comprised a double gated access off Harpers Road leading to a paved parking area. A single storey building was noted adjacent to the parking area. Manicured lawns and ornamental borders were noted in the west and south of the site with outbuildings in the north-west corner. An aerial view of the site is given within Figure 3.

2.3 Proposed Development

At the time of reporting, July 2015, it is understood that the proposed development will comprise the demolition of the existing property and construction of five to seven detached properties with car parking areas and private rear gardens.

2.4 Geology

The BGS Geological Map (Solid and Drift) for the Guildford area (Sheet No. 285) revealed that the site was underlain by the Bagshot Formation.

The Bagshot Formation

The Bagshot Formation comprises fine-grained yellow, pink and brown sands with ferruginous concretions. Beds of grey clay "pipe clay" occur frequently as do beds of black flint gravel.

A BGS borehole ~450m west of the site revealed 0.15m of Topsoil over slightly clayey sands with some gravel to 1.88m bgl. A fine yellow, locally grey, sand was then proved.

No areas of Made Ground or Worked Ground were noted within a 250m radius of the site.

2.5 Hydrogeology and Hydrology

A study of the aquifer maps on the Environment Agency website revealed the site to be located on a Secondary (A) Aquifer relating to the bedrock deposits of the Bagshot Formation. No designation was given for any superficial deposits due to their likely absence.

Superficial (Drift) deposits are permeable unconsolidated (loose) deposits, for example, sands and gravels.The bedrock is described as solid permeable formations e.g. sandstone, chalk and limestone.

Secondary (A) Aquifers consist of deposits with permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as Minor Aquifers.

Examination of the Environment Agency records showed that the site did not fall within a Groundwater Source Protection Zone as classified in the Policy and Practice for the Protection of

Groundwater.

A northerly flowing stream was located adjacent the eastern boundary of the site, turning 90° to the west and flowing along the northern boundary of the site.

From analysis of hydrogeological and topographical maps groundwater was anticipated to be encountered at shallow depth (1 - 3m below existing ground level (bgl)) and it was considered that the groundwater was flowing in a north-westerly direction with the flow of the stream bordering the site.

Examination of the Environment Agency records showed that the site was not situated within a floodplain or flood warning area.

2.6 Radon

BRE 211 (2007) Map 4 of the Hampshire, Berkshire and south Oxfordshire area revealed the site was located within an area where mandatory protection measures against the ingress of Radon were not required. The site was not located within an area where a risk assessment was required.

3.0 FIELDWORK

3.1 Scope of Works

Fieldwork was undertaken on the 27th May 2015 and comprised the drilling of four Terrier Windowless Sampler Boreholes, WS1 to WS4, to depths of 4.00m bgl in WS2 and 4.45m bgl in WS1, WS3 and WS4. Standard Penetration Testing was undertaken within the boreholes at 1.00m intervals and falling head tests were undertaken within WS1 and WS3 at 4.00m and 3.30m bgl respectively.

The approximate locations of the trial holes can be seen within Figure 4.

Prior to commencing the ground investigation, a walkover survey was carried out to identify the presence of underground services and drainage. Where underground services/drainage were suspected and/or positively identified, exploratory positions were relocated away from these areas.

Upon completion of the site works, the trial holes were backfilled and made good/reinstated in relation to the surrounding area.

3.2 Sampling Procedures

Small disturbed samples were recovered from the trial holes at the depths shown on the trial hole records. Soil samples were generally retrieved from each change of strata and/or at specific areas of concern. Samples were also taken at approximately 0.5m intervals during broad homogenous soil horizons.

A selection of samples were despatched for geotechnical testing purposes. A programme of chemical laboratory testing, scheduled by Ground and Water Limited and carried out by QTS Environmental Limited, was undertaken on samples recovered from the trial holes.

4.0 ENCOUNTERED GROUND CONDITIONS

4.1 Soil Conditions

All exploratory holes were logged by James Dalziel of Ground and Water Limited generally in accordance with BS EN 14688 'Geotechnical Investigation and Testing – Identification and Classification of Soil'.

The ground conditions encountered within the trial holes constructed on the site generally conformed to that anticipated from examination of the geology map. Topsoil and/or Made Ground was noted to overlie Head Deposits and then the soils of the Bagshot Formation.

The ground conditions encountered during the investigation are described in this section. For more complete information about the Topsoil and/or Made Ground, Head Deposits and the Bagshot Formation at particular points, reference must be made to the individual trial hole logs within Appendix B.

The trial hole location plan can be viewed in Figure 4.

For the purposes of discussion the succession of conditions encountered in the trial holes in descending order can be summarised as follows:

Topsoil (WS1, WS2 and WS4 only)
Made Ground (WS1 and WS3 only)
Head Deposits
Bagshot Formation

Topsoil

Topsoil was encountered from ground level to 0.20m, 0.75m and 0.45m bgl within WS1, WS2 and WS4 respectively. The Topsoil comprised a light brown, light grey brown to dark brown gravelly, locally silty, locally clayey, sand. The sand was fine to medium grained and the gravel was rare, fine to medium, sub-angular to sub-rounded flint.

Made Ground

Made Ground was encountered from ground level in WS3 to 0.45m bgl and was noted underlying the Topsoil from 0.20m to 0.55m bgl in WS1. Within WS1 the Made Ground was noted to comprise a mid-brown to dull yellow/grey gravelly silty sand. Within WS3 the Made Ground was described as a dark brown gravelly silty sand. Within both boreholes the sand was noted to be fine to medium grained and the gravel was rare, fine to medium, sub-rounded to sub-angular flint and brick.

Head Deposits

Soils described as representative of Head Deposits were encountered from 0.45m and 0.75m bgl within WS1 and WS2 respectively and from 0.45m bgl in both WS3 and WS4. The deposits were proved to 0.80m, 1.00m, 1.10 and 1.20m bgl within WS1, WS2, WS3 and WS4 respectively. Within all trial holes the soils encountered were described as brown and orange brown, locally light yellow brown, gravelly silty sand. The sand was fine to medium grained and the gravel was rare to abundant, fine to coarse, sub-angular to sub-rounded flint.

From 0.65m to 0.85m bgl within WS4 the Head Deposits were noted to be a light orange brown sandy gravelly clay. The sand was fine to medium grained and the gravel was abundant, fine to coarse, angular to sub-rounded flint. From 0.85 to 1.20m bgl within WS4 the deposits encountered

were described as an orange brown and grey mottled slightly gravelly sandy silty clay. The sand was fine grained and the gravel was rare, fine, sub-angular to sub-rounded flint.

Bagshot Formation

Soils described as representative of the Bagshot Formation were encountered underlying the Head Deposits from 0.80m, 1.00m, 1.10m and 1.20m bgl within WS1, WS2, WS3 and WS4 respectively and were proved for the remaining depth of each of the trial holes, a maximum of 4.00m bgl within WS2 and 4.45m bgl within WS1, WS3 and WS4.

The Bagshot Formation encountered within the trial holes was noted to comprise clayey silty fine to medium grained sands with sandy/silty clay lenses. The deposits were described as mid-brown to yellow orange and grey, locally silty, clayey sand from 1.00m to 1.30m bgl within WS2, 1.10m to 2.15m bgl within WS3 and 1.20m to 1.35m bgl within WS4. The sand was noted to be fine to medium grained.

The deposits were described as an orange, grey and locally pale yellow mottled sandy silty clay from 0.80m to 1.60m bgl within WS1, 2.15m to 2.80m bgl within WS3 and 1.35m to 1.75m bgl within WS4. The sand was fine to medium grained. From 1.60m bgl, for the remaining depth of WS1, and from 1.30m bgl to 3.60m bgl within WS2, the soils of the Bagshot Formation were noted to be a pale yellow slightly silty fine grained sand. The sand was fine to medium grained.

The deposits encountered within WS2, WS3 and WS4 from 3.60m, 2.80m and 1.75m bgl respectively, and proved for the remaining depth of each trial hole, were described as a yellow to brown orange and grey clayey sand. The sand was fine to medium grained.

For details of the composition of the soils encountered at particular points, reference must be made to the individual trial hole logs within Appendix B.

4.2 Roots Encountered

Roots were noted by the supervising engineer to 1.00m, 0.20m, 0.90m and 1.00m bgl within WS1, WS2, WS3 and WS4 respectively.

It must be noted that the chance of determining actual depth of root penetration through a narrow diameter borehole is low. Roots may be found to greater depths at other locations on the site, particularly close to trees and/or trees that have been removed both within the site and its close environs.

4.3 Groundwater Conditions

Groundwater seepages were noted within the 3.00 to 4.00m run in WS2 and WS4 and at 2.00m and 3.00m bgl within WS3. No groundwater was encountered within WS1.

Exact groundwater levels may only be determined through long term measurements from monitoring wells installed on-site. It should be noted that changes in groundwater level do occur for a number of reasons including seasonal effects and variations in drainage.

The site investigation was conducted in May 2015, when groundwater levels should be falling towards their annual minimum (i.e. lowest). The long-term groundwater elevation might increase at some time in the future due to seasonal fluctuation in weather conditions. Isolated pockets of groundwater may be perched within any Made Ground found at other locations around the site.

4.4 Obstructions

No artificial or natural sub-surface obstructions were noted during construction of the trial holes.

5.0 INSITU AND LABORATORY GEOTECHNICAL TESTING

5.1 In-Situ Geotechnical Testing

Standard Penetration Testing (SPT) was undertaken within the trial holes at 1.00m intervals within the boreholes. The results of the SPT's have not been amended to take into account hammer efficiency, rod lengths and overburden pressure in accordance with Eurocode 7.

Windowless Sampler Boreholes provide samples of the ground for assessment but they do not give any engineering data.

The Standard Penetration test (SPT) is an in-situ dynamic penetration test designed to provide information on the geotechnical engineering properties of soil. The test uses a thick-walled sample tube, with an outside diameter of 50 mm and an inside diameter of 35 mm, and a length of around 650mm. This is driven into the ground at the bottom of a borehole by blows from a slide hammer with a weight of 63.5 kg falling through a distance of 760 mm. The sample tube is driven 150 mm into the ground and then the number of blows needed for the tube to penetrate each 150 mm up to a depth of 450 mm is recorded. The sum of the number of blows is termed the "standard penetration resistance" or the "N-value".

The cohesive soils of the Bagshot Formation were classified based on the table below.

Undrained Shear Strength from Field Inspection/ SPT blow counts (N_1) Cohesive Soils (EN ISO 14688-2:2004 & Stroud (1974))		
Classification	Undrained Shear Strength (kPa)	Field Indications
Extremely High	>300	-
Very High	150 – 300	Brittle or very tough
High	75 – 150	Cannot be moulded in the fingers
Medium	40 – 75	Can be moulded in the fingers by strong pressure
Low	20 – 40	Easily moulded in the fingers
Very Low	10 – 20	Exudes between fingers when squeezed in the fist
Extremely Low	<10	-

The granular soils of the Bagshot Formation were classified based on the table below.

Correlation between normalised SPT blow counts (N_1) and granular classification.	
Classification	SPT Blow Counts (N1)
Extremely Dense	>58
Very Dense	42 – 58
Dense	25 – 42
Medium Dense	8 – 25
Loose	3 – 8
Very Loose	0 – 3

An interpretation of the in-situ geotechnical testing results is given in the table overleaf.

Interpretation of In-situ Geotechnical Testing Results (SPT's)					
Strata	SPT "N" Blow Counts	Equivalent Undrained Shear Strength (kPa) Cohesive Soils	Soil Type		Trial Hole/s
			Cohesive	Granular	
Cohesive Bagshot Formation	10 – 16	50 - 80	Medium – High	-	WS1 (0.80m to 1.60m bgl) WS3 (2.15m to 2.80m bgl) WS4 (1.35m to 1.75m bgl)
Granular Bagshot Formation	13 – 35	-	-	Medium Dense to Dense	WS1(1.60m to 4.45m bgl) WS2(1.00m to 4.00m bgl) WS3(1.10m to 2.15m bgl) WS3 (2.80m to 4.45m bgl) WS4(1.75m to 4.45m bgl)

It must be noted that field measurements of undrained shear strength are dependent on a number of variables including disturbance of sample, method of investigation and also the size of specimen or test zone etc.

The test results are presented on the trial hole log within Appendix B.

5.2 Laboratory Geotechnical Testing

A programme of geotechnical laboratory testing scheduled by Ground and Water Limited and carried out by K4 Soils Laboratory and QTS Environmental Limited was undertaken on samples recovered from the Head Deposits and the Bagshot Formation. The results of the tests are presented in Appendix C.

The test procedures used were generally in accordance with the methods described in BS1377:1990.

Details of the specific tests used in each case are given below:

Standard Methodology for Laboratory Geotechnical Testing		
Test	Standard	Number of Tests
Atterberg Limit Tests	BS1377:1990:Part 2:Clauses 3.2, 4.3 & 5	2
Particle Size Distribution	BS1377:1990:Part 2:Clause 9	4
Water Soluble Sulphate & pH	BS1377:1990:Part 3:Clause 5	1
BRE Special Digest 1 (incl. Ph, Electrical Conductivity, Total Sulphate, W/S Sulphate, Total Chlorine, W/S Chlorine, Total Sulphur, Ammonium as NH4, W/S Nitrate, W/S Magnesium)	BRE Special Digest 1 "Concrete in Aggressive Ground (BRE, 2005).	2

5.2.1 Atterberg Limit Tests

A précis of Atterberg Limit Tests undertaken on two cohesive samples of the Bagshot Formation can be seen tabulated overpage.

Atterberg Limit Tests Results Summary							
Stratum/Trial Hole/Depth (m bgl)	Moisture Content (%)	Passing 425 µm sieve (%)	Modified PI (%)	Soil Class	Consistency Index (Ic)	Volume Change Potential	
						BRE	NHBC
Bagshot Formation WS3/2.50	30	100	41	CH	0.32	High	High
Bagshot Formation WS4/1.50	24	100	41	CH	0.88	High	High

NB: NP – Non-plastic
BRE Volume Change Potential refers to BRE Digest 240 (based on Atterberg results)
Soil Classification based on British Soil Classification System.
Consistency Index (Ic) based on BS EN IS0 14688-2:2004.

5.2.2 Comparison of Soil's Moisture Content with Index Properties

5.2.2.1 Liquidity Index Analyses

The results of the Atterberg Limit tests undertaken on two cohesive samples of the Bagshot Formation were analysed to determine the Liquidity Index of the samples. This gives an indication as to whether the samples recovered showed a moisture deficit and their degree of consolidation. The results are tabulated below.

The test results are presented within Appendix C.

Liquidity Index Calculations Summary					
Stratum/Trial Hole/Depth	Moisture Content (%)	Plastic Limit (%)	Modified Plasticity Index (%)	Liquidity Index	Result
Bagshot Formation WS3/2.50m bgl (Light blue grey and pale yellow sandy CLAY)	30	17	41	0.33	Overconsolidated
Bagshot Formation WS4/1.50m bgl (Light grey and orange mottled sandy CLAY)	24	19	41	0.12	Heavily Overconsolidated

The results in the table above indicate that no potential moisture deficit is present within the overconsolidated and heavily overconsolidated samples of the Bagshot Formation tested.

5.2.2.2 Liquid Limit

A comparison of the soil moisture content and the liquid limit can be seen tabulated overpage.

Moisture Content vs. Liquid Limit				
Strata/Trial Hole/Depth/Soil Description	Moisture Content (MC) (%)	Liquid Limit (LL) (%)	40% Liquid Limit (LL)	Result
Bagshot Formation WS3/2.50m bgl (Light blue grey and pale yellow sandy CLAY)	30	58	23.2	MC > 0.4 x LL (Not significantly desiccated)
Bagshot Formation WS4/1.50m bgl (Light grey and orange mottled sandy CLAY)	24	60	24	MC = 0.4 x LL (Not significantly desiccated)

No significant moisture deficits were noted within the samples of the Bagshot Formation analysed.

5.2.3 Particle Size Distribution (PSD) Tests

The results of PSD testing undertaken on four granular samples of the Bagshot Formation encountered are tabulated below.

PSD Test Results Summary			
Trial Hole/Depth/Soil Description	Volume Change Potential Range		Passing 63μm sieve Range (%)
	BRE	NHBC	
Bagshot Formation WS1/2.00m bgl – (Pale yellowish brown silty SAND)	No	No	6
Bagshot Formation WS2/4.00m bgl – (Brown, orange brown and grey silty sandy CLAY)	Yes	Yes	38
Bagshot Formation WS3/1.50m bgl – (Greyish brown and brown silty clayey SAND)	Yes	No	33
Bagshot Formation WS4/3.50m bgl – (Greyish brown and brown silty clayey SAND with rare fine gravel)	Yes	No	24

NB Volume Change Potential refers to BRE Digest 240 (based on Grading test results).
Shrinkability refers to NHBC Standards Chapter 4.2 (based on Grading test results).

Volume Change Potential – BRE 240 states that a soil has a volume change potential when the clay fraction exceeds 15%. Only the silt and clay combined fraction are determined by sieving therefore the volume change potential is estimated from the percentage passing the 63μm sieve.

NHBC Standards Chapter 4.2 states that a soil is shrinkable if the percentage of silt and clay passing the 63μm sieve is greater than 35% and the Plasticity Index is greater than 10%.

5.2.4 Sulphate and pH Tests

A Sulphate and pH test was undertaken on one sample from the Head Deposits (WS4/1.00m bgl). A sulphate concentration of 0.23g/l with a pH of 7.54 was determined.

5.2.5 BRE Special Digest 1

In accordance with BRE Special Digest 1 'Concrete in Aggressive Ground' (BRE, 2005) one

sample of Head Deposits (WS1/0.60m bgl) and one sample of the Bagshot Formation (WS3/4.00m bgl) were scheduled for laboratory analysis to determine parameters for concrete specification.

The results are given within Appendix C and a summary is tabulated below.

Summary of Results of BRE Special Digest Testing			
Determinand	Unit	Minimum	Maximum
pH	-	5.6	5.6
Ammonium as NH_4	mg/kg	16.1	26.8
Sulphur	%	<0.02	0.08
Chloride (water soluble)	mg/kg	<1	<1
Magnesium (water soluble)	g/l	0.8	1.5
Nitrate (water soluble)	mg/kg	<3	12
Sulphate (water soluble)	g/l	<0.01	<0.01
Sulphate (total)	mg/kg	<200	2199

5.3 Chemical Laboratory Testing – Human Health Risk Assessment

A programme of chemical laboratory testing, scheduled by Ground and Water Limited, and carried out by QTS Environmental Limited, was undertaken on two samples of Made Ground (WS1/0.30m and WS3/0.30m bgl) and two samples of Topsoil (WS2/0.5m and WS4/0.20m bgl).

A Desk Study and full scale contamination assessment were not part of the remit of this report. However, four soil samples were sent off for analysis for a broad range of contaminants in accordance with DEFRA/CLEA methodologies. The samples tested and the reasons for testing can be seen tabulated below.

Methodology for Sampling Locations and Chemical Laboratory Testing		
Trial Hole	Depth (m bgl)	Sampling Strategy
WS1	0.30m	Representative sample of Made Ground
WS2	0.50m	Representative sample of Topsoil
WS3	0.30m	Representative sample of Made Ground
WS4	0.20m	Representative sample of Topsoil

The site comprised an irregular shaped plot of land, ~2900m^2 (0.29 ha) in area with four sampling locations, given an unknown hotspot shape, the sampling density means that a hotspot with an area of approximately 1087.5m^2 and a radius of approximately 18.61m would be encountered (CLR 4).

Soil sampling depths were chosen to reflect the receptors of concern, human health, and typically comprised a surface or near surface sample and then at approximately 0.50m depth increments thereafter, extending into the underlying natural soils. The receptors relevant to the sampling depths can be seen below:

Near surface samples	Direct ingestion, dermal contact and dust inhalation. Protection of end-users and maintenance workers e.g. Landscape Gardeners. Protection of shallow rooted plants.
>0.5m below ground level	Protection of deep rooted plants.

The depth of soil sampling can be seen within the trial hole logs presented in Appendix B.

The analysis suite is presented below and comprised:

Semi Metals and Heavy Metals incl. Arsenic, Cadmium, Chromium (incl. Hexavalent Chromium), Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc (WS1/0.30m, WS2/0.50m bgl, WS3/0.30m bgl and WS4/0.20m bgl);
Asbestos Screen (WS1/0.30m, WS2/0.50m bgl, WS3/0.30m bgl and WS4/0.20m bgl);
Polycyclic Aromatic Hydrocarbons (PAHs) incl. Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, Benzo(ghi)perylene (WS1/0.30m, WS2/0.50m bgl, WS3/0.30m bgl and WS4/0.20m bgl);
Fuel Oils – Speciated TPH including full aliphatic/aromatic split (WS2/0.50m bgl and WS3/0.30m bgl);
BTEX compounds (Benzene, Toluene, Ethylbenzene, Xylene) and MTBE – used as marker compounds for Volatile Organic Compounds (VOCs) split (WS2/0.50m bgl and WS3/0.30m bgl).

The chemical laboratory results are presented in Appendix D.

5.3.1 Soil Assessment Criteria

The derivation of Soil Assessment Criteria used within this report can be seen within Appendix E.

5.3.2 Determination of Representative Contamination Concentration

At the time of reporting, July 2015, it is understood that the proposed development will comprise the demolition of the existing property and construction of five to seven detached properties with car parking areas and private rear gardens.

Therefore, the results of the chemical laboratory testing were compared to the LQM/CIEH Suitable 4 Use Levels (S4UL), and C4SL LLTC for Lead, for a 'Residential with homegrown produce' land-use scenario, as this was considered the most appropriate land-use scenario. The C4SL LLTC for Lead was compared to a 'Residential with plant uptake' land-use scenario.

Where no LQM/CIEH S4UL/C4SL LLTC was available for a particular determinant then preliminary reference was made to the laboratory detection limit of the determinant. If a positive concentration was noted then further risk assessment was undertaken.

For Cyanide, where no SGC/GAC or C4SL LLTC was available a Site Specific Assessment Criteria of 10mg/kg was adopted. This is based on ICRCL 59/83, TCL, ATRISK (SOIL) Screening

Value and Dutch Intervention Value (ranging from 20 – 34mg/kg). Therefore, a SSAC of ~10mg/kg is considered conservative.

Where a contaminant of concern's LQM/CIEH S4UL/C4SL LLTC varies according to the Soil's Organic Matter (SOM), the SOM recorded for each soil sample was used to derive the appropriate SGV/GAC. The average SOM of the samples analysed was 1.2% (SOM ranged between 0.8 - 1.7%).

The results of the comparison of the representative contaminant concentrations are presented in the table overpage.

Chemical laboratory testing of the Topsoil and Made Ground revealed no elevated levels above the guidelines for a "Residential with homegrown produce" and 'Residential with plant uptake' land-use scenarios.

In addition, the intrusive investigation did not reveal any visual or olfactory evidence to suggest any hydrocarbon-type contamination in the trial holes excavated on the site. The chemical laboratory results have verified that no elevated concentrations of aliphatic/aromatic hydrocarbons (C_5-C_{35}) or BTEX compounds are present in the soils underlying the site.

Based on the results of the contamination testing to-date no remediation is necessary and the soils encountered are suitable for use on-site.

Soil Guideline Values and General Acceptance Criteria Results	
Substance	Sample Location Where available LQM/CIEH S4UL/, CSL4 LLTC or GAC were exceeded for relevant land-use scenario
	"Residential with home-grown produce" and "Residential with plant uptake" Land-Use Scenarios
Arsenic	None
Boron	None
Cadmium	None
Chromium (III)	None
Hexavalent Chromium (VI)	None
Copper	None
Lead	None
Mercury (Elemental)	None
Nickel	None
Selenium	None
Vanadium	None
Zinc	None
Cyanide (Total)	None
Total Phenol	None
Naphthalene	None
Acenapthylene	None
Acenapthene	None
Fluorene	None
Phenanthrene	None
Anthracene	None
Fluoranthene	None
Pyrene	None
Benzo(a)anthracene	None
Chrysene	None
Benzo(b)fluoranthene	None
Benzo(k)fluoranthene	None
Benzo(a)pyrene	None
Indeno(1,2,3-cd)pyrene	None
Dibenz(a,h)anthracene	None
Benzo(ghi)perylene	None
TPH C5 – C6 (aliphatic)	None
TPH C6 – C8 (aliphatic)	None
TPH C8 - C10 (aliphatic)	None
TPH C10 - C12 (aliphatic)	None
TPH C12 - C16 (aliphatic)	None
TPH C16 - C21 (aliphatic)	None
TPH C21 - C34 (aliphatic)	None
TPH C5 – C7 (aromatic)	None
TPH C7 – C8 (aromatic)	None
TPH C8 – C10 (aromatic)	None
TPH C10 – C12 (aromatic)	None
TPH C12 – C16 (aromatic)	None
TPH C16 - C21 (aromatic)	None
TPH C21 - C35 (aromatic)	None
Benzene	None
Toluene	None
Ethylbenzene	None
Xylene (o, m & p)	None
MTBE	None
Asbestos Screen	None

6.0 ENGINEERING CONSIDERATIONS

6.1 Soil Characteristics and Geotechnical Parameters

Based on the results of the intrusive investigation and geotechnical laboratory testing the following interpretations have been made with respect to engineering considerations.

Topsoil/Made Ground was encountered from ground level to a depth of 0.20m - 0.75m bgl within the trial holes constructed.

As a result of the inherent variability of Topsoil and Made Ground, it is usually unpredictable in terms of bearing capacity and settlement characteristics. Foundations should, therefore, be taken through any Topsoil/Made Ground and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.

Topsoil/Made Ground may be found to deeper depth at other locations on the site, especially close to former structures/foundations and service runs.

Soils described as Head Deposits were encountered underlying the Topsoil/Made Ground to a depth of 0.80m - 1.20m bgl.

The deposits encountered in all trial holes were described as a brown and orange brown, locally light yellow brown, gravelly silty sand. The sand was fine to medium grained. The gravel was rare to abundant, fine to coarse, sub-angular to sub-rounded flint. From 0.65m to 1.20m bgl within WS4 the Head Deposits were noted to comprise a light orange brown becoming orange brown and grey sandy gravelly clay. The sand was fine to medium grained and the gravel was abundant, becoming rare, fine to coarse, angular to sub-rounded flint.

The Head Deposits were considered likely to have low volume change potential in accordance with both BRE240 and no volume change potential in accordance with NHBC Standards Chapter 4.2.

Due to the shallow nature of the Head Deposits (<0.65 – 1.20m in depth) these deposits have not been considered as a founding stratum for this site.

The Bagshot Formation was encountered in all trial holes from 0.80 – 1.20m bgl, for the remaining depths of the trial holes (a depth of 4.00 – 4.45m bgl).

The Bagshot Formation encountered within the trial holes was noted to comprise medium dense to dense clayey silty fine to medium grained sands with sandy/silty clay lenses of medium to high undrained shear strength (50 – 80kpa).

Geotechnical testing revealed the cohesive soils of the Bagshot Formation to have a high volume change potential in accordance with both BRE240 and NHBC Standards Chapter 4.2. Consistency Index calculations indicated these soils to be soft to stiff. The cohesive deposits of the Bagshot Formation were shown to be overconsolidated to heavily overconsolidated with no potential moisture deficit. The granular soils of the Bagshot Formation were considered likely to have low volume change potential in accordance with both BRE240 and NHBC Standards Chapter 4.2.

The soils of the Bagshot Formation were considered a suitable bearing stratum for moderately loaded footings/foundations. Settlements on loading are likely to be moderate.

The final design of foundations will need to take into account the volume change potential of the soil, the depth of root penetration and/or desiccation and the likely serviceability and settlement requirements of the proposed structure. These parameters for design are discussed in the next section of this report.

Groundwater seepages were noted within the 3.00 to 4.00m run in WS2 and WS4 and at 2.00m and 3.00m within WS3. No groundwater was encountered within WS1.

Roots were noted by the supervising engineer to 1.00m, 0.20m, 0.90m and 1.00m bgl within WS1, WS2, WS3 and WS4 respectively.

6.2 Spread Foundations

At the time of reporting, July 2015, it is understood that the proposed development will comprise the demolition of the existing property and construction of five to seven detached properties with car parking areas and private rear gardens. A plan of the proposed development is provided within Figure 4.

The proposed development fell within Geotechnical Design Category 2 in accordance with Eurocode 7. The anticipated foundation loads were unknown to Ground and Water Limited at the time of the preparation of this report, but are thought to range between 75 – 150kN/m^2 based on experience.

Foundations within the Bagshot Formation will need to take into account the high volume change potential clay bands (NHBC Standards Chapter 4.2 and BRE240) within more clayey sands showing low volume change potential (NHBC Standards Chapter 4.2 and BRE240).

It is considered that strip foundations could be adopted for the proposed development with foundations taken through any Topsoil/Made Ground, disturbed and/or desiccated ground and into the soils of the Bagshot Formation.

Foundations must not be placed within cohesive root penetrated and/or desiccated soils and the influence of the trees surrounding the site must be taken into account. The base of foundation excavations must extend at least 300mm into non-root penetrated cohesive soils or soils showing no volume change potential (BRE240 and NHBC Standards Chapter 4.2). Foundations must also be designed in accordance with NHBC Standards Chapter 4.2 and the proximity of nearby trees or recently removed trees. Should semi-mature to mature trees have been removed from the footprint of the proposed structure then consideration should be given to a piled foundation solution.

Roots were observed in each of the trial holes to a depth of 0.20 – 1.00m bgl. Topsoil and/or Made Ground was generally encountered from ground level to depths ranging from 0.45 – 0.75m bgl. Given the above, foundation depths will range from the minimum foundation depth for the volume change potential encountered (High) and ~1.30m bgl.

The following bearing capacities could be adopted for 5.00m long by 0.75m and 1.00m wide footings, or 1.50m by 1.50m pads at depths of 1.00m, 1.50m and 2.00m bgl. The bearing capacities are tabulated below.

Limit State: Bearing Capacities Calculated (Based on WS4)		
Depth (m BGL)	Foundation System	Limit Bearing Capacity (kN/m^2) (EC2)
1.00m	5.00m by 0.75m Strip	96.86
	5.00m by 1.00m Strip	74.95
	1.50m by 1.50m Pad	100.27
1.50m	5.00m by 0.75m Strip	302.46
	5.00m by 1.00m Strip	319.22
	1.50m by 1.50m Pad	353.29
2.00m	5.00m by 0.75m Strip	369.73
	5.00m by 1.00m Strip	387.02
	1.50m by 1.50m Pad	419.31

Serviceability State: Settlement Parameters Calculated (Based on WS4)			
Depth (m BGL)	Foundation System	Limit Bearing Capacity (kN/m^2)	Settlement (mm)
1.00m	5.00m by 0.75m Strip	90	<19
	5.00m by 1.00m Strip	70	<19
	1.50m by 1.50m Pad	100	~23
1.50m	5.00m by 0.75m Strip	120	<21
	5.00m by 1.00m Strip	100	<20
	1.50m by 1.50m Pad	120	<23
2.00m	5.00m by 0.75m Strip	150	<24
	5.00m by 1.00m Strip	120	<21
	1.50m by 1.50m Pad	120	<19

Groundwater seepages were noted within the 3.00 to 4.00m run in WS2 and WS4 and at 2.00m and 3.00m within WS3. No groundwater was encountered within WS1. Therefore it was considered unlikely that foundation excavations would encounter groundwater, unless constructed to 2.00m plus where groundwater seepages were noted.

Perched water may be encountered, especially after a period of prolonged rainfall, and this should be taken into account in final design.

General Recommendations for Spread Foundations:

Foundation excavations must be carefully bottomed out and any loose soil or soft spots removed prior to the foundation concrete or blinding being placed. Failure to ensure that foundation excavations are suitably bottomed out could result in additional settlements.

Inspection of foundation excavations, prior to concreting, must be made by a competent and suitably qualified person to check for any soft spots and to check for the presence of roots.

The excavation must be kept dry as accumulation of water could result in increased settlements.

Foundations must not be cast over foundations of former structures and/or other hard spots.

Any groundwater or surface water ingress must be prevented from entering foundation

trenches.

Isolated Pad Foundations must be at least 1.5 times the width of the widest pad apart to keep to the anticipated settlements.

Final designs for the foundations should be carried out by a suitably qualified Engineer based on the findings of this investigation and with reference to the anticipated loadings, serviceability requirements for the structure and the developments proximity to former, present and proposed trees.

6.3 Piled Foundations

Based on the results of the investigation it was considered unlikely that a piled foundations scheme would be required at this site.

6.4 Excavations

Shallow excavations in the Topsoil, Made Ground, Head Deposits and the Bagshot Formation are likely to be marginally stable at best. Long, deep excavations, through these strata are likely to become unstable, especially if groundwater is encountered.

Unsupported earth faces formed during excavation may be liable to collapse without warning and suitable safety precautions should therefore be taken to ensure that such earth faces are adequately supported before excavations are entered by personnel.

6.5 Sub-Surface Concrete

Sulphate concentrations were measured in 2:1 water/soil extracts taken from the Head Deposits and the Bagshot Formation fell into class DS-1 of the BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground'.

Table C1 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) classification of AC-2z. For the classification given, the "mobile" and "natural" case was adopted given the granular nature of the soils, the presence of groundwater seepages and the residential use of the site. The water soluble sulphate concentrations in the samples ranged from <10 – 230mg/l with a pH range of 4.80 – 7.54. The total potential sulphate concentrations ranged from <0.02 – 0.22%.

Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1, 2005, 'Concrete in Aggressive Ground' taking into account the pH of the soils.

6.6 Surface Water Disposal

Falling head tests was undertaken in WS1 and WS3 at 4.00m and 3.30m bgl respectively. The results of the test can be seen tabulated below.

Falling Head Test Results					
Trial Hole/Depth (m)	Test	Initial Water Level (m bgl)	Final Water Level (m bgl)	Time taken (mins)	Infiltration Rate (m/s)
WS1/4.00m bgl	1	GL	0.50	60	3.33×10^{-6}
WS3/3.30m bgl	1	GL	0.80	64	5.73×10^{-6}

Full scale soakaway tests in accordance with BRE365 are recommended to confirm design criteria.

The Bagshot Formation is a Secondary (A) Aquifer. Consultation with the Environment Agency must be sought regarding any use that may have an impact on groundwater resources.

6.7 Discovery Strategy

There may be areas of contamination that have not been identified during the course of the intrusive investigation. For example, there may have been underground storage tanks (UST's) not identified during the Ground Investigation for which there is no historical or contemporary evidence.

Such occurrences may be discovered during the demolition and construction phases for the redevelopment of the site.

Groundworkers should be instructed to report to the Site Manager any evidence for such contamination; this may comprise visual indicators, such as fibrous materials within the soil, discolouration, or odours and emission. Upon discovery advice must be taken from a suitably qualified person before proceeding, such that appropriate remedial measures and health and safety protection may be applied.

Should a new source of contamination be suspected or identified then the Local Authority will need to be informed.

6.8 Waste Disposal

Foundation excavations on-site are likely to produce waste which will require classification and then recycling or removal from site.

Under the Landfill (England and Wales) Regulations 2002 (as amended), prior to disposal all waste must be classified as;

Inert;
Non-hazardous, or;
Hazardous.

The Environment Agency's Hazardous Waste Technical Guidance (WM2) document outlines the methodology for classifying wastes.

Once classified the waste can be removed to the appropriately licensed facilities, with some waste requiring pre-treatments prior to disposal.

Based on a risk phrase analysis of the chemical laboratory test results, in accordance with EC Hazardous Waste Directive and undertaken by Ground and Water Limited, the Topsoil and Made Ground encountered on-site was NON-HAZARDOUS. The results of the assessment are given within Appendix F.

INERT waste classification should be undertaken to determine if the proposed waste confirms to INERT or NON-HAZARDOUS Waste Acceptable Criteria (WAC).

It is important to note that whilst we consider our in-house assessment tool to be an accurate interpretation of the requirements of WM2, therefore producing an initial classification in

accordance with the guidance, landfill operators have their own assessment tools and can often come to different conclusions. As a result, some landfill operators could refuse to take apparently suitable waste. It is recommended that the receiving landfill views the results of this assessment and the chemical laboratory results to determine their own classification.

6.9 Imported Material

Any soil which is to be imported onto the site must undergo chemical analysis to prove that it is suitable for the purpose for which it is intended.

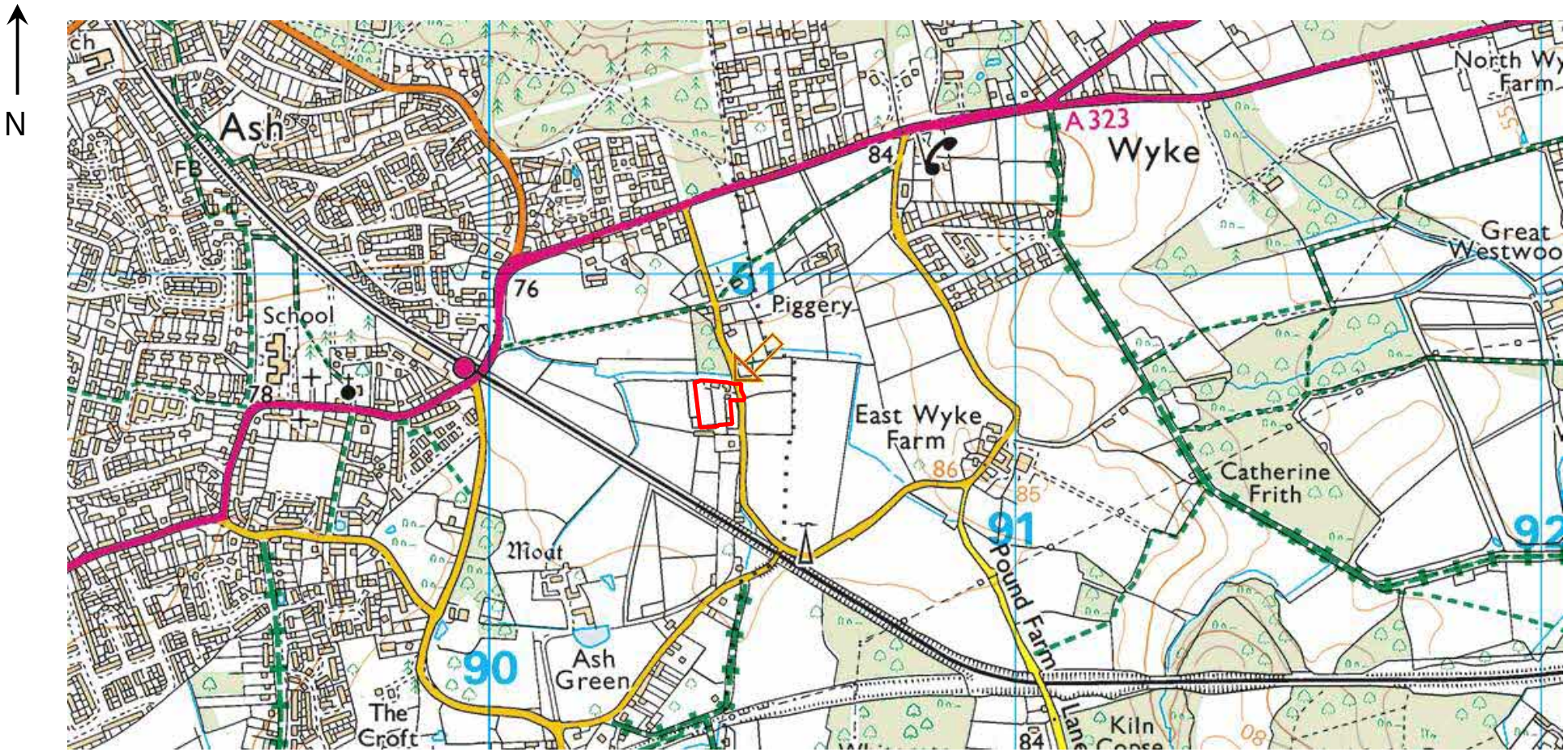
The Topsoil must be fit for purpose and must either be supplied with traceable chemical laboratory test certificates or be tested, either prior to placing (ideally) or after placing, to ensure that the human receptor cannot come into contact with compounds that could be detrimental to human health.

6.10 Duty of Care

Groundworkers must maintain a good standard of personal hygiene including the wearing of overalls, boots, gloves and eye protectors and the use of dust masks during periods of dry weather.

To prevent exposure to airborne dust by both the general public and construction personnel the site should be kept damp during dry weather and at other times when dust were generated as a result of construction activities.

The site should be securely fenced at all times to prevent unauthorised access. Washing facilities should be provided and eating restricted to mess huts.



APPROXIMATE SITE BOUNDARY

NOTE: NOT TO SCALE

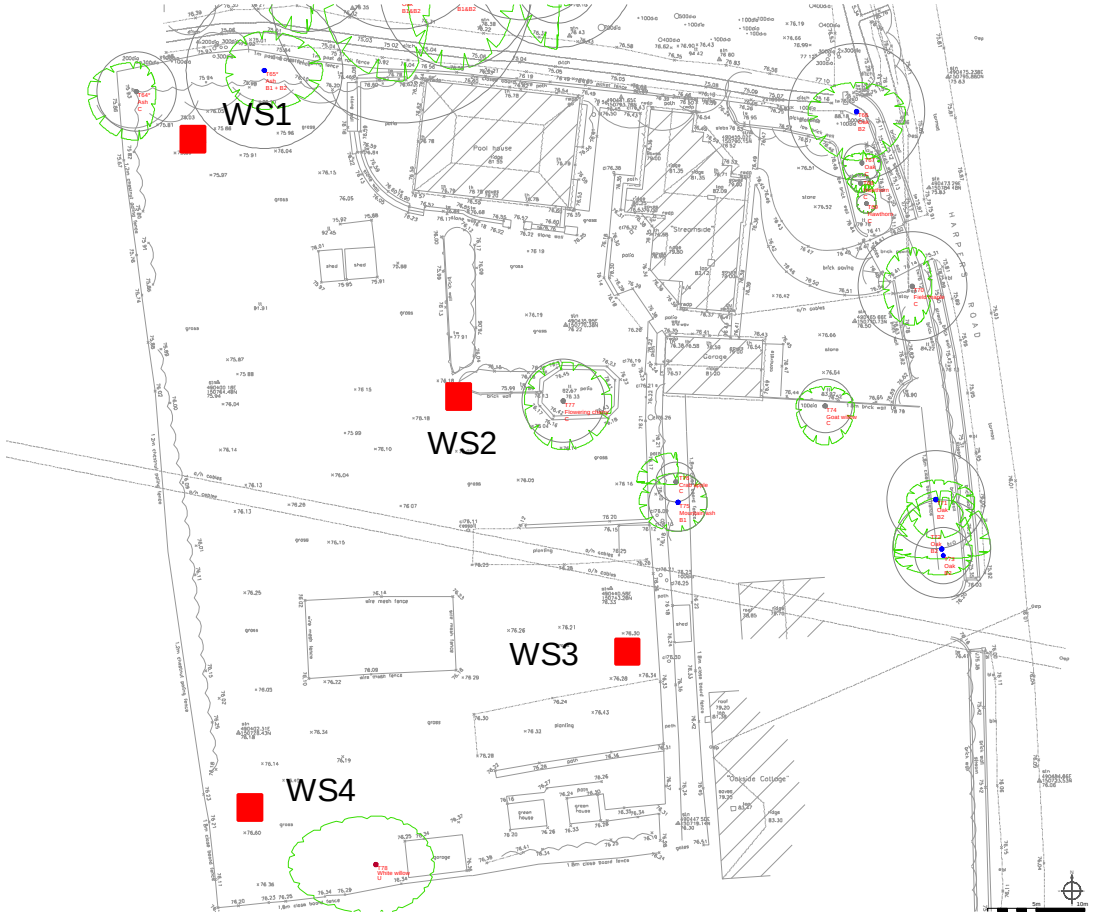
Project: Streamside, Harpers Road, Ash, Aldershot GU12 6DB		Figure 1
Client: Aspen Construction Ltd	Date: July 2015	
Site Location Plan	Ref: GWPR1286	

APPROXIMATE SITE BOUNDARY

NOTE: NOT TO SCALE

Project: Streamside, Harpers Road, Ash, Aldershot GU12 6DB		Figure 2
Client: Aspen Construction Ltd	Date: July 2015	
Site Development Area	Ref: GWPR1286	

N



BOREHOLE LOCATION

APPROXIMATE
SITE BOUNDARY

NOT TO SCALE

Project: Streamside, Harpers Road, Ash, Aldershot GU12 6DB		Figure 5
Client: Aspen Construction Ltd	Date: July 2015	
Trial Hole Location Plan	Ref: GWPR1286	

APPENDIX A
Conditions and Limitations

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief; as such these do not necessarily address all aspects of ground behaviour at the site. No liability is accepted for any reliance placed on it by others unless specifically agreed in writing.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

This report is based on readily available geological records, the recorded physical investigation, the strata observed in the works, together with the results of completed site and laboratory tests. Whilst skill and care has been taken to interpret these conditions likely between or below investigation points, the possibility of other characteristics not revealed cannot be discounted, for which no liability can be accepted. The impact of our assessment on other aspects of the development required evaluation by other involved parties.

The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous in ground activities. The ground conditions have been samples or monitored in recorded locations and tests for some of the more common chemicals generally expected. Other concentrations of types of chemicals may exist. It was not part of the scope of this report to comment on environment/contaminated land considerations.

The conclusions and recommendations relate to Streamside, Harpers Road, Ash, Aldershot GU12 6DB.

Trial hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sampler borehole implies the specific technique used to produce a trial hole.

The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot-by-plot basis prior to the construction of foundations. Where trees are mentioned in the text this means existing trees, recently removed trees (approximately 15 years to full recovery on cohesive soils) and those planned as part of the site landscaping.

APPENDIX B
Fieldwork Logs

Ground and Water Ltd
Tel: 0333 600 1221
email: enquiries@groundandwater.co.uk
www.groundandwater.co.uk

Borehole No
WS1
Sheet 1 of 1

Project Name: Streamside	Project No.: GWPR1286	Co-ords: -	Hole Type: WLS
Location: Harpers Road, Ash, Aldershot Hampshire GU12 6DB		Level: -	Scale: 1:50
Client: Aspen Construction Limited		Dates: 27/05/2015	Logged By: JD

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.10	D		0.20			TOPSOIL: Light grey brown slightly gravelly silty sand. Sand is fine grained. Gravel is rare, fine to medium, sub-angular to sub-rounded flint.
		0.30	D					
		0.60	D		0.55			MADE GROUND: Mid brown to dull yellow/grey gravelly silty clayey sand. Sand is fine to medium grained. Gravel is rare, fine to medium, sub-angular to sub-rounded flint and brick.
					0.80			
		1.00	SPT	N=16				HEAD DEPOSITS: Light yellow brown very gravelly silty SAND. Sand is fine to medium grained. Gravel is occasional to abundant, medium, sub-angular to sub-rounded flint.
		1.00	D	(2,3/				
		1.00-1.45	SPTLS	3,3,4,6)				
		1.50	D					
					1.60			BAGSHOT FORMATION: Orange and grey brown mottled very sandy silty CLAY. Sand is fine to medium grained.
		2.00	SPT	N=29				BAGSHOT FORMATION: Pale yellow brown slightly silty SAND. Sand is fine grained. Thin grey clay bands noted at 1.65m, 1.75m and between 3.00-3.60m bgl.
		2.00	D	(3,4/				
		2.00-2.45	SPTLS	6,7,8,8)				
		2.50	D					
		3.00	SPT	N=34				
		3.00	D	(3,4/				
		3.00-3.45	SPTLS	6,8,10,10)				
		3.50	D					
		4.00	SPT	N=18				
		4.00	D	(5,5/				
				4,4,5,5)				
					4.45			End of Borehole at 4.45 m
			Type	Results				

Remarks: Roots noted to 1.00m bgl.
No groundwater encountered

Ground and Water Ltd
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email: enquiries@groundandwater.co.uk
www.groundandwater.co.uk

Borehole No **WS2**

Project Name	Project No.	Co-ords: -	Hole Type
Streamside	GWPR1286		WLS
Location: Harpers Road, Ash, Aldershot Hampshire GU12 6DB		Level: -	Scale
Client: Aspen Construction Limited		Dates: 27/05/2015	Logged By JD

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	D		0.25			
		0.50	D					
					0.75			
		0.90	D					
		1.00	SPT	N=21	1.00			
		1.00-1.45	SPTLS	(2,3/ 3,5,6,7)	1.30			
		1.50	D					
		2.00	SPT	N=35				
		2.00	D	(3,5/				
		2.00-2.45	SPTLS	6,8,10,11)				
		2.50	D					
	—	3.00	SPT	N=31				
		3.00	D	(3,6/				
		3.00-3.45	SPTLS	7,8,8,8)				
		3.50	D		3.60			
		4.00	D		4.00			
			Type	Results				

Remarks: Roots noted to 0.20m bgl.
Groundwater seepage within 3.00 - 4.00m run.

Ground and Water Ltd
Tel: 0333 600 1221
email: enquiries@groundandwater.co.uk
www.groundandwater.co.uk

Borehole No **WS3**

Project Name	Project No.	Co-ords: -	Hole Type
Streamside	GWPR1286		WLS
Location: Harpers Road, Ash, Aldershot Hampshire GU12 6DB		Level: -	Scale
Client: Aspen Construction Limited		Dates: 27/05/2015	Logged By JD

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.10	D					
		0.30	D		0.45			
		0.60	D		0.70			
		0.90	D					
		1.00	SPT	N=13	1.10			
		1.00-1.45	SPTLS	(2,2/ 2,2,4,5)				
		1.50	D					
	—	2.00	SPT	N=10				
		2.00	D	(2,2/	2.15			
		2.00-2.45	SPTLS	2,3,2,3)				
		2.50	D					
		3.00	SPT	N=20	2.80			
		3.00	D	(2,3/				
		3.00-3.45	SPTLS	4,4,5,7)				
		3.50	D					
		4.00	SPT	N=30				
		4.00	D	(3,3/ 3,6,9,12)	4.45			
			Type	Results				

Remarks: Roots noted to 0.90m bgl.
Groundwater seepages at 2.00m and 3.00m bgl.

AGS

Ground and Water Ltd
Tel: 0333 600 1221
email: enquiries@groundandwater.co.uk
www.groundandwater.co.uk

Borehole No **WS4**

Project Name: Streamside	Project No.: GWPR1286	Co-ords: -	Hole Type: WLS
Location: Harpers Road, Ash, Aldershot Hampshire GU12 6DB		Level: -	Scale
Client: Aspen Construction Limited		Dates: 27/05/2015	Logged By: JD

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.20	D		0.45			
		0.50	D		0.65			
		0.70	D		0.85			
		1.00	SPT	N=10				
		1.00	D	(1,3/	1.20			
		1.00-1.45	SPTLS	2,3,2,3)	1.35			
		1.30	D					
		1.50	D		1.75			
		2.00	SPT	N=13				
		2.00	D	(2,2/				
		2.00-2.45	SPTLS	3,3,3,4)				
	—	3.00	SPT	N=18				
		3.00	D	(2,5/				
		3.00-3.45	SPTLS	4,4,4,6)				
		3.50	D					
		4.00	SPT	N=19				
		4.00	D	(3,3/				
				3,3,5,8)	4.45			
			Type	Results				

Remarks: Roots noted to 1.00m bgl.
Groundwater seepage in 3.00 - 4.00m run.

AGS

APPENDIX C
Geotechnical Laboratory Test Results

Summary of Classification Test Results

Job No.	Project Name	Programme	
19001	Streamside, Harpers Road, GU12 6DB	Samples received	11/06/2015
		Schedule received	09/06/2015
Project No.	Client	Project started	11/06/2015
GWPR1286	Ground and Water Ltd	Testing Started	17/06/2015

Hole No.	Sample				Soil Description	NMC	Passing 425µm	LL	PL	PI	Remarks
	Ref	Top	Base	Type		%	%	%	%	%	
WS3		2.50		D	Pale grey and patchy brown CLAY with patchy sand staining	30	100	58	17	41	
WS4		1.50		D	Pale grey and occasional orange CLAY with patchy sand staining	24	100	60	19	41	

UKAS TESTING
2519

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3 and 5.0

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved

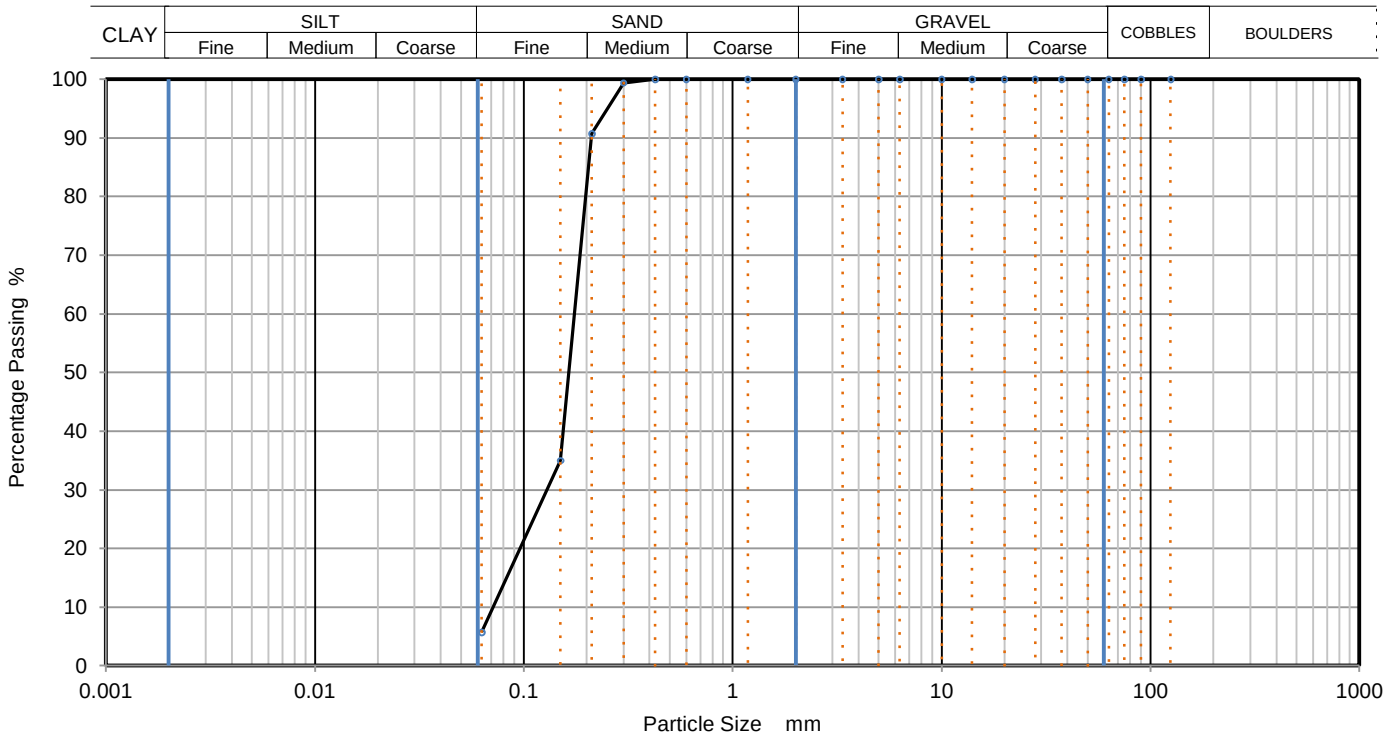
Initials **J.P**

Date: 23/06/2015

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

PARTICLE SIZE DISTRIBUTION

Job Ref	19001				
Borehole/Pit No.	WS1				
Site Name	Streamside, Harpers Road, GU12 6DB			Sample No.	
Project No.	GWPR1286	Client	Ground and Water Ltd	Depth	2.00 m
Soil Description	Pale yellowish brown silty SAND			Sample Type	D
				Samples received	11/06/2015
				Schedules received	09/06/2015
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	11/06/2015
				Date tested	18/06/2015



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	91		
0.15	35		
0.063	6		

Dry Mass of sample, g	348

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	94
Fines <0.063mm	6

Grading Analysis		
D100	mm	
D60	mm	0.175
D30	mm	0.129
D10	mm	0.0715
Uniformity Coefficient		2.4
Curvature Coefficient		1.3

Remarks

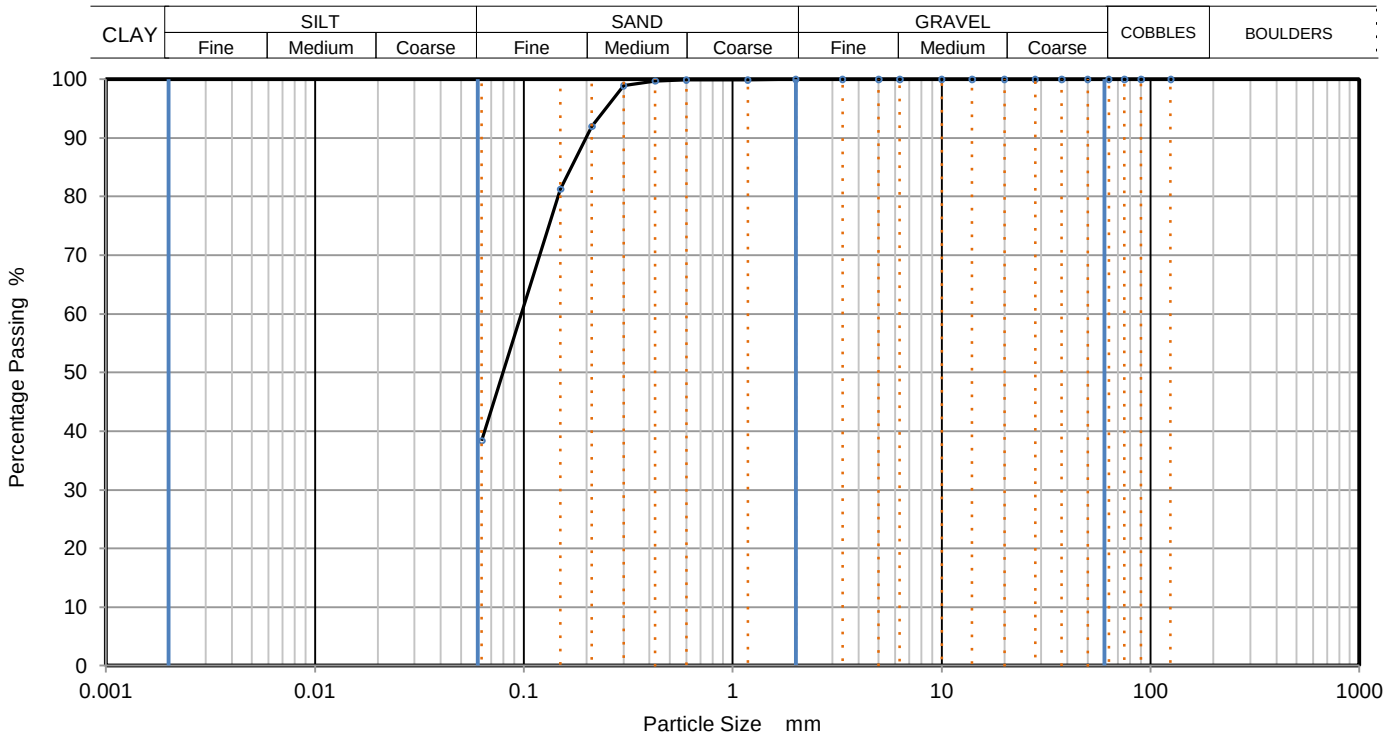
Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory
Unit 8, Olds Close, Watford, Herts, WD18 9RU
Email: james@k4soils.com
Tel: 01923 711288

Checked and Approved
Initials: J.P
Date: 23/06/2015

PARTICLE SIZE DISTRIBUTION

				Job Ref	19001
				Borehole/Pit No.	WS2
Site Name	Streamside, Harpers Road, GU12 6DB			Sample No.	
Project No.	GWPR1286	Client	Ground and Water Ltd	Depth	4.00 m
Soil Description	Brown, orangish brown and grey silty sandy CLAY			Sample Type	D
				Samples received	11/06/2015
				Schedules received	09/06/2015
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	11/06/2015
				Date tested	18/06/2015



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	92		
0.15	81		
0.063	38		

Dry Mass of sample, g	230

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	62
Fines <0.063mm	38

Grading Analysis		
D100	mm	
D60	mm	0.0975
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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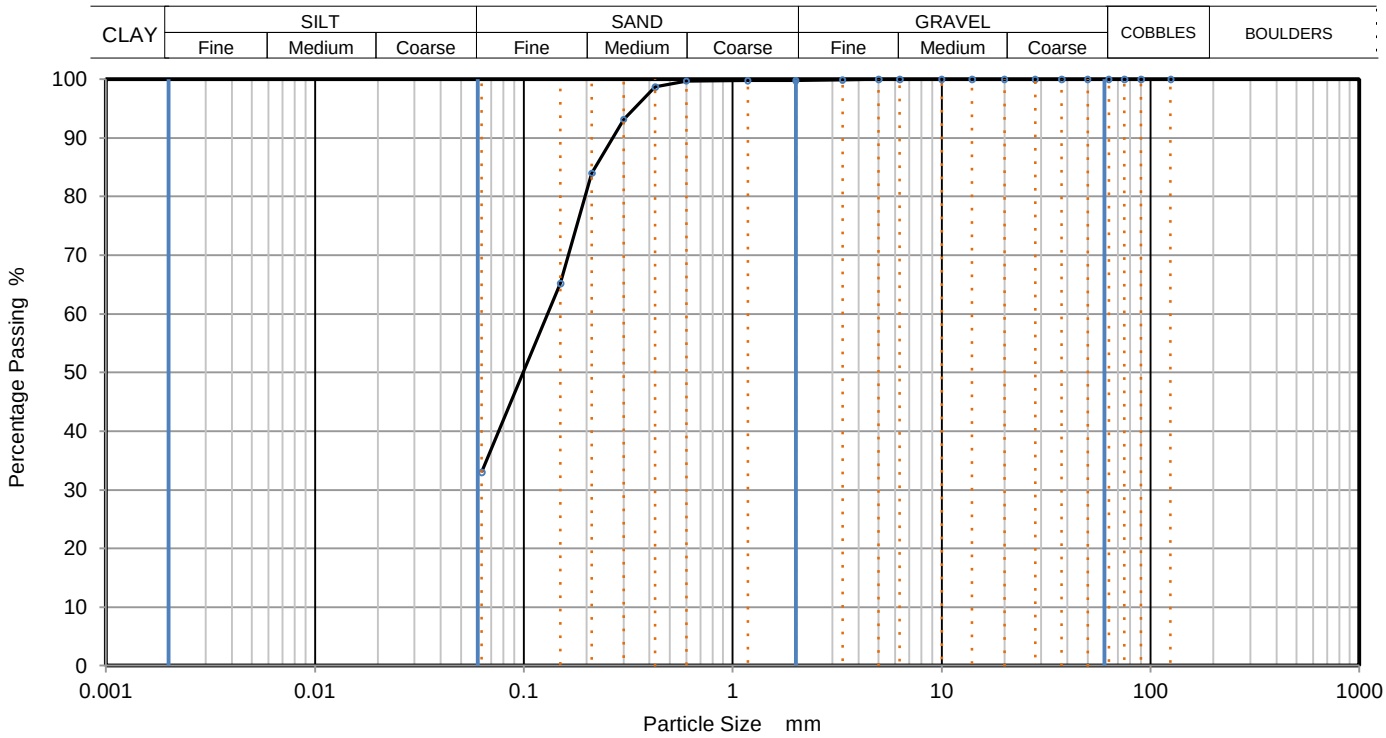
Email: james@k4soils.com
Tel: 01923 711288

Checked and Approved
Initials: J.P
Date: 23/06/2015

PARTICLE SIZE DISTRIBUTION

				Job Ref	19001
				Borehole/Pit No.	WS3
Site Name	Streamside, Harpers Road, GU12 6DB			Sample No.	
Project No.	GWPR1286	Client	Ground and Water Ltd	Depth	1.50 m
Soil Description	Greyish brown and brown silty clayey SAND			Sample Type	D
				Samples received	11/06/2015
				Schedules received	09/06/2015
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	11/06/2015
				Date tested	18/06/2015



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	99		
0.3	93		
0.212	84		
0.15	65		
0.063	33		

Dry Mass of sample, g	239

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	67
Fines <0.063mm	33

Grading Analysis		
D100	mm	
D60	mm	0.13
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

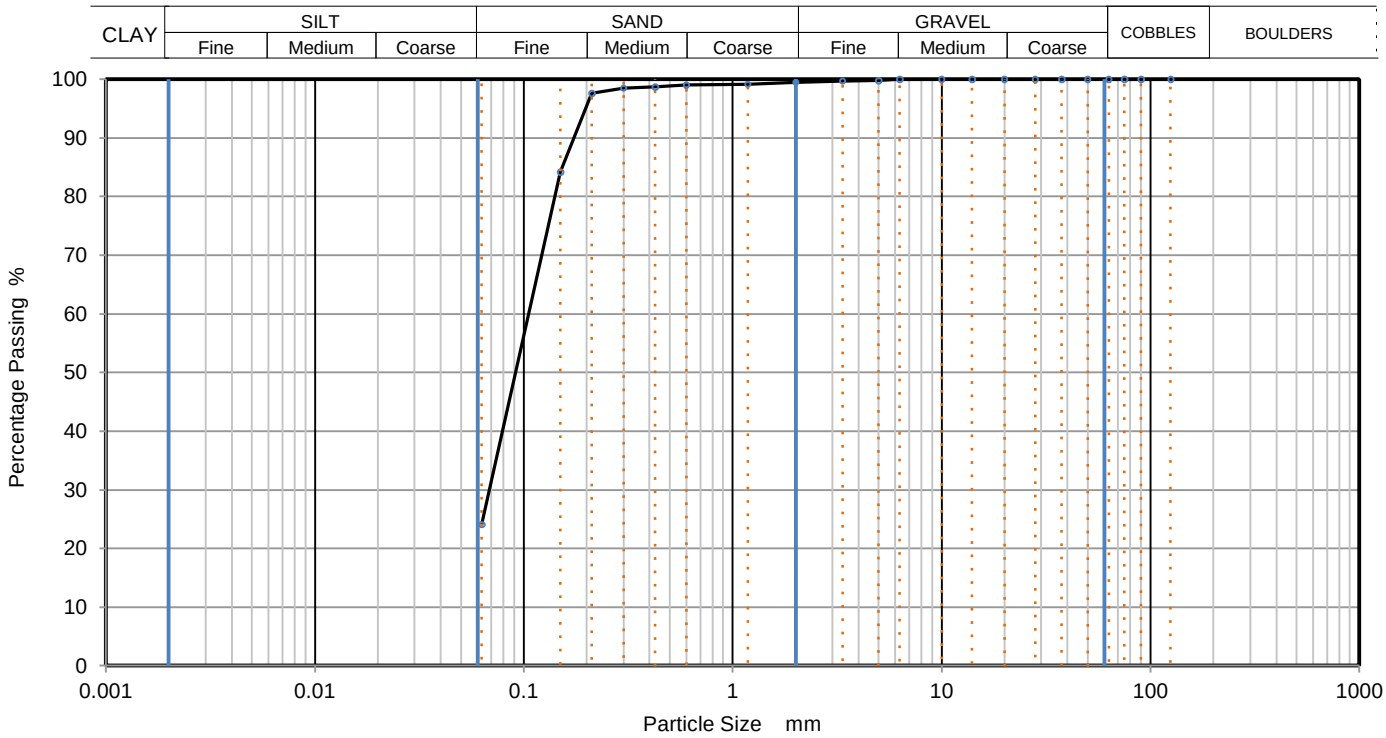
Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory
Unit 8, Olds Close, Watford, Herts, WD18 9RU
Email: james@k4soils.com
Tel: 01923 711288

Checked and Approved
Initials: J.P
Date: 23/06/2015

PARTICLE SIZE DISTRIBUTION

Job Ref	19001				
Borehole/Pit No.	WS4				
Site Name	Streamside, Harpers Road, GU12 6DB			Sample No.	
Project No.	GWPR1286	Client	Ground and Water Ltd	Depth	3.50 m
Soil Description	Greyish brown and brown silty clayey SAND with rare fine gravel			Sample Type	D
				Samples received	11/06/2015
				Schedules received	09/06/2015
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	11/06/2015
				Date tested	18/06/2015



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	99		
0.3	99		
0.212	98		
0.15	84		
0.063	24		

Dry Mass of sample, g	253

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	75
Fines <0.063mm	24

Grading Analysis		
D100	mm	
D60	mm	0.106
D30	mm	0.0686
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory
Unit 8, Olds Close, Watford, Herts, WD18 9RU
Email: james@k4soils.com
Tel: 01923 711288

Checked and Approved
Initials: J.P
Date: 23/06/2015

Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results

Tested in accordance with BS1377 : Part 3 : 1990, clause 5.3 and clause 9

Job No.	Project Name	Programme	
19001	Streamside, Harpers Road, GU12 6DB	Samples received	11/06/2015
		Schedule received	09/06/2015
Project No.	Client	Project started	11/06/2015
GWPR1286	Ground and Water Ltd	Testing Started	17/06/2015

Hole No.	Sample				Soil description	Dry Mass passing 2mm	SO3 Content	SO4 Content	pH	Remarks
	Ref	Top	Base	Type		%	g/l	g/l		
WS4		1.00		D	Brown and orangish brown grey slighly gravelly slightly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)	97	0.19	0.23	7.54	

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved

Initials J.P

Date: 23/06/2015

APPENDIX D
Chemical Laboratory Test Results

Francis Williams
Ground & Water Ltd
2 The Long Barn
Norton Farm
Selborne Road
Alton
Hampshire
GU34 3NB

QTS Environmental Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 15-32290

Site Reference:	Streamside, Harpers Road, Ash, Aldershot GU12 6DB
Project / Job Ref:	GWPR1286
Order No:	None Supplied
Sample Receipt Date:	11/06/2015
Sample Scheduled Date:	11/06/2015
Report Issue Number:	1
Reporting Date:	17/06/2015

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate							
QTS Environmental Report No: 15-32290	Date Sampled	09/06/15	09/06/15	09/06/15	09/06/15	09/06/15
Ground & Water Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Streamside, Harpers Road, Ash, Aldershot GU12 6DB	TP / BH No	WS1	WS1	WS2	WS3	WS3
Project / Job Ref: GWPR1286	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.30	0.60	0.50	0.30	4.00
Reporting Date: 17/06/2015	QTSE Sample No	152372	152373	152374	152375	152376

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected		Not Detected	Not Detected	
pH	pH Units	N/a	MCERTS	5.7	5.6	5.5	5.4	5.6
Total Cyanide	mg/kg	< 2	NONE	< 2		< 2	< 2	
Total Sulphate as SO_4	mg/kg	< 200	NONE		< 200			2199
Total Sulphate as SO_4	%	< 0.02	NONE		< 0.02			0.22
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total Sulphur	%	< 0.02	NONE		< 0.02			0.08
Organic Matter	%	< 0.1	MCERTS	1		0.8	1.2	
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	0.6		0.5	0.7	
Ammonium as NH_4	mg/kg	< 0.5	NONE		26.8			16.1
W/S Chloride (2:1)	mg/kg	< 1	MCERTS		< 1			< 1
Water Soluble Nitrate (2:1) as NO_3	mg/kg	< 3	MCERTS		12			< 3
Arsenic (As)	mg/kg	< 2	MCERTS	4		4	5	
W/S Boron	mg/kg	< 1	NONE	< 1		< 1	< 1	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.2		< 0.2	< 0.2	
Chromium (Cr)	mg/kg	< 2	MCERTS	12		11	13	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2		< 2	< 2	
Copper (Cu)	mg/kg	< 4	MCERTS	8		14	18	
Lead (Pb)	mg/kg	< 3	MCERTS	37		31	34	
W/S Magnesium	mg/l	< 0.1	NONE		1.5			0.8
Mercury (Hg)	mg/kg	< 1	NONE	< 1		< 1	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	6		6	7	
Selenium (Se)	mg/kg	< 3	NONE	< 3		< 3	< 3	
Vanadium (V)	mg/kg	< 2	NONE	23		20	24	
Zinc (Zn)	mg/kg	< 3	MCERTS	27		25	33	
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2		< 2	< 2	

Analytical results are expressed on a dry weight basis where samples are dried at less than 30^{O}C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Wioletta Goral

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis $^{(S)}$

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate							
QTS Environmental Report No: 15-32290	Date Sampled	09/06/15					
Ground & Water Ltd	Time Sampled	None Supplied					
Site Reference: Streamside, Harpers Road, Ash, Aldershot GU12 6DB	TP / BH No	WS4					
Project / Job Ref: GWPR1286	Additional Refs	None Supplied					
Order No: None Supplied	Depth (m)	0.20					
Reporting Date: 17/06/2015	QTSE Sample No	152377					

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected				
pH	pH Units	N/a	MCERTS	4.8				
Total Cyanide	mg/kg	< 2	NONE	< 2				
Total Sulphate as SO_4	mg/kg	< 200	NONE					
Total Sulphate as SO_4	%	< 0.02	NONE					
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	< 10				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	< 0.01				
Total Sulphur	%	< 0.02	NONE					
Organic Matter	%	< 0.1	MCERTS	1.7				
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	1				
Ammonium as NH_4	mg/kg	< 0.5	NONE					
W/S Chloride (2:1)	mg/kg	< 1	MCERTS					
Water Soluble Nitrate (2:1) as NO_3	mg/kg	< 3	MCERTS					
Arsenic (As)	mg/kg	< 2	MCERTS	7				
W/S Boron	mg/kg	< 1	NONE	< 1				
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2				
Chromium (Cr)	mg/kg	< 2	MCERTS	13				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	MCERTS	18				
Lead (Pb)	mg/kg	< 3	MCERTS	109				
W/S Magnesium	mg/l	< 0.1	NONE					
Mercury (Hg)	mg/kg	< 1	NONE	< 1				
Nickel (Ni)	mg/kg	< 3	MCERTS	8				
Selenium (Se)	mg/kg	< 3	NONE	< 3				
Vanadium (V)	mg/kg	< 2	NONE	22				
Zinc (Zn)	mg/kg	< 3	MCERTS	47				
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2				

Analytical results are expressed on a dry weight basis where samples are dried at less than 30^{O}C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Wioletta Goral

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis $^{(S)}$

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Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - Speciated PAHs							
QTS Environmental Report No: 15-32290	Date Sampled	09/06/15	09/06/15	09/06/15	09/06/15		
Ground & Water Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied		
Site Reference: Streamside, Harpers Road, Ash, Aldershot GU12 6DB	TP / BH No	WS1	WS2	WS3	WS4		
Project / Job Ref: GWPR1286	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	0.30	0.50	0.30	0.20		
Reporting Date: 17/06/2015	QTSE Sample No	152372	152374	152375	152377		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.15	
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.12	
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.13	
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	

Analytical results are expressed on a dry weight basis where samples are dried at less than 30^{O}C

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Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - TPH CWG Banded							
QTS Environmental Report No: 15-32290	Date Sampled	09/06/15	09/06/15			
Ground & Water Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Streamside, Harpers Road, Ash, Aldershot GU12 6DB	TP / BH No	WS2	WS3			
Project / Job Ref: GWPR1286	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.50	0.30			
Reporting Date: 17/06/2015	QTSE Sample No	152374	152375			

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2			
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2			
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3			
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3			
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10			
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21			
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01			
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05			
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2			
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3			
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10			
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21			
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30^{O}C

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Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - BTEX / MTBE							
QTS Environmental Report No: 15-32290	Date Sampled	09/06/15	09/06/15			
Ground & Water Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Streamside, Harpers Road, Ash, Aldershot GU12 6DB	TP / BH No	WS2	WS3			
Project / Job Ref: GWPR1286	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.50	0.30			
Reporting Date: 17/06/2015	QTSE Sample No	152374	152375			

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2			
Toluene	ug/kg	< 5	MCERTS	< 5	< 5			
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2			
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2			
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2			
MTBE	ug/kg	< 5	MCERTS	< 5	< 5			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30^{O}C

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 15-32290	
Ground & Water Ltd	
Site Reference: Streamside, Harpers Road, Ash, Aldershot GU12 6DB	
Project / Job Ref: GWPR1286	
Order No: None Supplied	
Reporting Date: 17/06/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
152372	WS1	None Supplied	0.30	8.4	Brown clayey sand with stones
152373	WS1	None Supplied	0.60	9.8	Brown clayey sand with stones
152374	WS2	None Supplied	0.50	11.2	Brown clayey sand with stones
152375	WS3	None Supplied	0.30	9.7	Brown clayey sand with stones and vegetation
152376	WS3	None Supplied	4.00	19.6	Brown clayey sand
152377	WS4	None Supplied	0.20	9.1	Brown clayey sand with stones and vegetation

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/S

Unsuitable Sample U/S

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Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-32290
Ground & Water Ltd
Site Reference: Streamside, Harpers Road, Ash, Aldershot GU12 6DB
Project / Job Ref: GWPR1286
Order No: None Supplied
Reporting Date: 17/06/2015

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

APPENDIX E
Soil Assessment Criteria

Waste Classification Report

ASL3Y-U64ZT-9GCCK

Job name

GWPR1268

Waste Stream

Ground and Water V2 PA

Comments

Project

GWPR1268 Streamside, Harpers Road, Ash, Aldershot GU12 6DB

Site

Streamside, Harpers Road, Ash, Aldershot GU12 6DB

Classified by

Name:
Allvey , Phillip
Date:
04/08/2015 13:45UTC
Telephone:
07740110219

Company:
Ground and Water
15 Bow Street
Alton
GU34 1NY

Report

Created by: Allvey , Phillip
Createddate:04/08/2015 13:45UTC

Job summary

Classification of sample: WS1/0.30m

Non Hazardous Waste
Classified as **17 05 04**
in the European Waste Catalogue

Sample details

Sample Name:
WS1/0.30m
Sample Depth:
0 m
Moisture content: **0%**
(no correction)

EWC Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

pH: (Whole conc. entered as: 5.7 pH, converted to conc.:5.7 pH or 5.7 pH)
cyanides (with the exception of complex cyanides): (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
arsenic trioxide: (Cation conc. entered: 4 mg/kg, converted to compound conc.:5.281 mg/kg or 0.000528%)
boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: <1 mg/kg, converted to compound conc.:<13.43 mg/kg or <0.00134%) IGNORED Because: "<LOD"
cadmium sulfide: (Cation conc. entered: 0.2 mg/kg, converted to compound conc.:0.257 mg/kg or 0.0000257%, Note 1 conc.: 0.00002%)
Chromium (III) Sulphate: (Whole conc. entered as: 12 mg/kg or 0.0012%)
chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%) IGNORED Because: "<LOD"
copper (I) oxide: (Cation conc. entered: 8 mg/kg, converted to compound conc.:9.007 mg/kg or 0.000901%)
lead chromate: (Cation conc. entered: 37 mg/kg, converted to compound conc.:57.713 mg/kg or 0.00577%, Note 1 conc.: 0.0037%)
mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%) IGNORED Because: "<LOD"
nickel dihydroxide: (Cation conc. entered: 6 mg/kg, converted to compound conc.:9.477 mg/kg or 0.000948%)
selenium compounds (with the exception of cadmium sulfoselenide and sodium selenite): (Cation conc. entered: <3 mg/kg, converted to compound conc.:<4.5 mg/kg or <0.00045%) IGNORED Because: "<LOD"
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 23 mg/kg, converted to compound conc.:41.059 mg/kg or 0.00411%)
zinc chromate: (Cation conc. entered: 27 mg/kg, converted to compound conc.:74.902 mg/kg or 0.00749%)
phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[a]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[b]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"

indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
dibenz[a,h]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"

Legend

- This determinand has one or more of its Hazard Statements and Risk Phrases defined and maintained by the Classifier

Notes utilised in assessment

C14: Step 5
"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "cadmium sulfide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "zinc chromate"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "divanadium pentaoxide; vanadium pentoxide"

Note 1 , used on:

Test: "HP 5 on STOT SE 1; H370, STOT RE 1; H372" for determinand: "cadmium sulfide"
Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "cadmium sulfide"
Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cadmium sulfide"
Test: "HP 7 on Carc. 1B; H350, Carc. 1A; H350, Carc. 1B; H350i, Carc. 1A; H350i" for determinand: "cadmium sulfide"
Test: "HP 10 on Repr. 1A; H360, Repr. 1B; H360, Repr. 1B; H360F, Repr. 1A; H360F, Repr. 1A; H360D, Repr. 1B; H360D, Repr. 1B; H360FD, Repr. 1A; H360FD, Repr. 1A; H360Fd, Repr. 1B; H360Fd, Repr. 1B; H360Df, Repr. 1A; H360Df" for determinand: "lead chromate"
Test: "HP 10 on Repr. 2; H361, Repr. 2; H361f, Repr. 2; H361d, Repr. 2; H361fd" for determinand: "cadmium sulfide"
Test: "HP 11 on Muta. 2; H341" for determinand: "cadmium sulfide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "cadmium sulfide"

Determinand notes

Note 1 , used on:

determinand: "cadmium sulfide"
determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS2/0.50m

Non Hazardous Waste
Classified as **17 05 04**
in the European Waste Catalogue

Sample details

Sample Name:
WS2/0.50m
Sample Depth:
0 m
Moisture content: **0%**
(no correction)

EWC Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

pH: (Whole conc. entered as: 5.5 pH, converted to conc.:5.5 pH or 5.5 pH)
cyanides (with the exception of complex cyanides): (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
arsenic trioxide: (Cation conc. entered: 4 mg/kg, converted to compound conc.:5.281 mg/kg or 0.000528%)
boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: <1 mg/kg, converted to compound conc.:<13.43 mg/kg or <0.00134%) IGNORED Because: "<LOD"
cadmium sulfide: (Cation conc. entered: <0.2 mg/kg, converted to compound conc.:<0.257 mg/kg or <0.0000257%, Note 1 conc.: <0.00002%) IGNORED Because: "<LOD"
Chromium (III) Sulphate: (Whole conc. entered as: 11 mg/kg or 0.0011%)
chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%) IGNORED Because: "<LOD"
copper (I) oxide: (Cation conc. entered: 14 mg/kg, converted to compound conc.:15.762 mg/kg or 0.00158%)
lead chromate: (Cation conc. entered: 31 mg/kg, converted to compound conc.:48.354 mg/kg or 0.00484%, Note 1 conc.: 0.0031%)
mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%) IGNORED Because: "<LOD"
nickel dihydroxide: (Cation conc. entered: 6 mg/kg, converted to compound conc.:9.477 mg/kg or 0.000948%)
selenium compounds (with the exception of cadmium sulfoselenide and sodium selenite): (Cation conc. entered: <3 mg/kg, converted to compound conc.:<4.5 mg/kg or <0.00045%) IGNORED Because: "<LOD"
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 20 mg/kg, converted to compound conc.:35.704 mg/kg or 0.00357%)
zinc chromate: (Cation conc. entered: 25 mg/kg, converted to compound conc.:69.354 mg/kg or 0.00694%)
phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[a]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[b]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"

indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
dibenz[a,h]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
toluene: (Whole conc. entered as: <5 mg/kg or <0.0005%) IGNORED Because: "<LOD"
ethylbenzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
xylene: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
diesel petroleum group: (Whole conc. entered as: <21 mg/kg or <0.0021%) IGNORED Because: "<LOD"
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <42 mg/kg or <0.0042%) IGNORED Because: "<LOD"

Legend

- This determinand has one or more of its Hazard Statements and Risk Phrases defined and maintained by the Classifier

Notes utilised in assessment

C14: Step 5
"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "zinc chromate"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "divanadium pentaoxide; vanadium pentoxide"

Determinand notes

Note 1 , used on:

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS3/0.30m

Non Hazardous Waste
Classified as **17 05 04**
in the European Waste Catalogue

Sample details

Sample Name:
WS3/0.30m
Sample Depth:
0 m
Moisture content: **0%**
(no correction)

EWC Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

pH: (Whole conc. entered as: 5.4 pH, converted to conc.:5.4 pH or 5.4 pH)
cyanides (with the exception of complex cyanides): (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
arsenic trioxide: (Cation conc. entered: 5 mg/kg, converted to compound conc.:6.602 mg/kg or 0.00066%)
boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: <1 mg/kg, converted to compound conc.:<13.43 mg/kg or <0.00134%) IGNORED Because: "<LOD"
cadmium sulfide: (Cation conc. entered: <0.2 mg/kg, converted to compound conc.:<0.257 mg/kg or <0.0000257%, Note 1 conc.: <0.00002%) IGNORED Because: "<LOD"
Chromium (III) Sulphate: (Whole conc. entered as: 13 mg/kg or 0.0013%)
chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%) IGNORED Because: "<LOD"
copper (I) oxide: (Cation conc. entered: 18 mg/kg, converted to compound conc.:20.266 mg/kg or 0.00203%)
lead chromate: (Cation conc. entered: 34 mg/kg, converted to compound conc.:53.034 mg/kg or 0.0053%, Note 1 conc.: 0.0034%)
mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%) IGNORED Because: "<LOD"
nickel dihydroxide: (Cation conc. entered: 7 mg/kg, converted to compound conc.:11.056 mg/kg or 0.00111%)
selenium compounds (with the exception of cadmium sulfoselenide and sodium selenite): (Cation conc. entered: <3 mg/kg, converted to compound conc.:<4.5 mg/kg or <0.00045%) IGNORED Because: "<LOD"
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 24 mg/kg, converted to compound conc.:42.844 mg/kg or 0.00428%)
zinc chromate: (Cation conc. entered: 33 mg/kg, converted to compound conc.:91.547 mg/kg or 0.00915%)
phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[a]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[b]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"

indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
dibenz[a,h]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
toluene: (Whole conc. entered as: <5 mg/kg or <0.0005%) IGNORED Because: "<LOD"
ethylbenzene: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
xylene: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
diesel petroleum group: (Whole conc. entered as: <21 mg/kg or <0.0021%) IGNORED Because: "<LOD"
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <42 mg/kg or <0.0042%) IGNORED Because: "<LOD"

Legend

- This determinand has one or more of its Hazard Statements and Risk Phrases defined and maintained by the Classifier

Notes utilised in assessment

C14: Step 5
"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "divanadium pentaoxide; vanadium pentoxide"

Note 1 , used on:

Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead chromate"
Test: "HP 7 on Carc. 1B; H350, Carc. 1A; H350, Carc. 1B; H350i, Carc. 1A; H350i" for determinand: "lead chromate"
Test: "HP 10 on Repr. 1A; H360, Repr. 1B; H360, Repr. 1B; H360F, Repr. 1A; H360F, Repr. 1A; H360D, Repr. 1B; H360D, Repr. 1B; H360FD, Repr. 1A; H360FD, Repr. 1A; H360Fd, Repr. 1B; H360Fd, Repr. 1B; H360Df, Repr. 1A; H360Df" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Determinand notes

Note 1 , used on:

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Classification of sample: WS4/0.20m

Non Hazardous Waste
Classified as **17 05 04**
in the European Waste Catalogue

Sample details

Sample Name:
WS4/0.20m
Sample Depth:
0 m
Moisture content: **0%**
(no correction)

EWC Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands (Moisture content: 0%, no correction)

pH: (Whole conc. entered as: 4.8 pH, converted to conc.:4.8 pH or 4.8 pH)
cyanides (with the exception of complex cyanides): (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
arsenic trioxide: (Cation conc. entered: 7 mg/kg, converted to compound conc.:9.242 mg/kg or 0.000924%)
boron tribromide/trichloride/trifluoride (combined): (Cation conc. entered: <1 mg/kg, converted to compound conc.:<13.43 mg/kg or <0.00134%) IGNORED Because: "<LOD"
cadmium sulfide: (Cation conc. entered: <0.2 mg/kg, converted to compound conc.:<0.257 mg/kg or <0.0000257%, Note 1 conc.: <0.00002%) IGNORED Because: "<LOD"
Chromium (III) Sulphate: (Whole conc. entered as: 13 mg/kg or 0.0013%)
chromium(VI) oxide: (Cation conc. entered: <2 mg/kg, converted to compound conc.:<3.846 mg/kg or <0.000385%) IGNORED Because: "<LOD"
copper (I) oxide: (Cation conc. entered: 18 mg/kg, converted to compound conc.:20.266 mg/kg or 0.00203%)
lead chromate: (Cation conc. entered: 109 mg/kg, converted to compound conc.:170.02 mg/kg or 0.017%, Note 1 conc.: 0.0109%)
mercury dichloride: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.353 mg/kg or <0.000135%) IGNORED Because: "<LOD"
nickel dihydroxide: (Cation conc. entered: 8 mg/kg, converted to compound conc.:12.636 mg/kg or 0.00126%)
selenium compounds (with the exception of cadmium sulfoselenide and sodium selenite): (Cation conc. entered: <3 mg/kg, converted to compound conc.:<4.5 mg/kg or <0.00045%) IGNORED Because: "<LOD"
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 22 mg/kg, converted to compound conc.:39.274 mg/kg or 0.00393%)
zinc chromate: (Cation conc. entered: 47 mg/kg, converted to compound conc.:130.385 mg/kg or 0.013%)
phenol: (Whole conc. entered as: <2 mg/kg or <0.0002%) IGNORED Because: "<LOD"
naphthalene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
acenaphthylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
acenaphthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
fluorene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
phenanthrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
fluoranthene: (Whole conc. entered as: 0.15 mg/kg or 0.000015%)
pyrene: (Whole conc. entered as: 0.12 mg/kg or 0.000012%)
benzo[a]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[b]fluoranthene: (Whole conc. entered as: 0.13 mg/kg or 0.000013%)
benzo[k]fluoranthene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"

indeno[123-cd]pyrene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
dibenz[a,h]anthracene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"
benzo[ghi]perylene: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) IGNORED Because: "<LOD"

Legend

- This determinand has one or more of its Hazard Statements and Risk Phrases defined and maintained by the Classifier

Notes utilised in assessment

C14: Step 5
"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "pyrene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[b]fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "divanadium pentaoxide; vanadium pentoxide"

Determinand notes

Note 1 , used on:

determinand: "lead chromate"

Note A , used on:

determinand: "zinc chromate"

Appendix A: Classifier defined and non CLP determinands

pH

Comments: Appendix C, C4.5
Data source: WM2 - Interpretation of the definition and classification of hazardous waste (Second Edition, version2.2), Environment Agency
Data source date: 30/05/2008
Risk Phrases: None.
Hazard Statements: None.

boron tribromide/trichloride/trifluoride (combined)

Comments: Combines the risk phrases and the average of the conversion factors for Boron tribromide, Boron trichloride and Boron trifluoride
Data source: N/A
Data source date: 10/01/2011
Risk Phrases: R14, T+; R26/28, C; R34, C; R35
Hazard Statements: EUH014, Acute Tox. 2; H330, Acute Tox. 2; H300, Skin Corr. 1A; H314, Skin Corr. 1B; H314

Chromium (III) Sulphate (CAS Number: 10101-53-8)

Comments:
Data source: 10101-53-8
Data source date: 23/06/2015
Risk Phrases: None.
Hazard Statements: None.

acenaphthylene (CAS Number: 208-96-8)

Comments: Risk phrase data taken from European Chemicals Agency's Classification & Labelling Inventory
Data source: http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=59285&HarmOnly=no
Data source date: 16/07/2012
Risk Phrases: R22, R26, R27, R36, R37, R38
Hazard Statements: Acute Tox. 4; H302, Acute Tox. 1; H330, Acute Tox. 1; H310, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315

acenaphthene (CAS Number: 83-32-9)

Comments: Risk phrase data taken from European Chemicals Agency's Classification & Labelling Inventory
Data source: http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=133563&HarmOnly=no
Data source date: 16/07/2012
Risk Phrases: R36, R37, R38, N; R50/53, N; R51/53
Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Aquatic Chronic 2; H411

fluorene (CAS Number: 86-73-7)

Comments: Risk phrase data taken from European Chemicals Agency's Classification & Labelling Inventory
Data source: http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=81845&HarmOnly=no
Data source date: 16/07/2012
Risk Phrases: N; R50/53, R53
Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Aquatic Chronic 4; H413

phenanthrene (CAS Number: 85-01-8)

Comments: Risk phrase data taken from European Chemicals Agency's Classification & Labelling Inventory
Data source: http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=109754&HarmOnly=no
Data source date: 16/07/2012
Risk Phrases: R22, R36, R37, R38, R40, R43, N; R50/53
Hazard Statements: Acute Tox. 4; H302, Eye Irrit. 2; H319, STOT SE 3; H335, Carc. 2; H351, Skin Sens. 1; H317, Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Skin Irrit. 2; H315

anthracene (CAS Number: 120-12-7)

Comments: Risk phrase data taken from European Chemicals Agency's Classification & Labelling Inventory
Data source:
http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=101102&HarmOnly=no
Data source date: 08/03/2013
Risk Phrases: R36, R37, R38, R43, N; R50/53
Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Skin Sens. 1; H317, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

fluoranthene (CAS Number: 206-44-0)

Comments: Risk phrase data taken from European Chemicals Agency's Classification & Labelling Inventory
Data source:
http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=56375&HarmOnly=no
Data source date: 16/07/2012
Risk Phrases: R20, R22, R36, N; R50/53
Hazard Statements: Acute Tox. 4; H302, Acute Tox. 4; H332, Eye Irrit. 2; H319, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

pyrene (CAS Number: 129-00-0)

Comments: Risk phrase data taken from European Chemicals Agency's Classification & Labelling Inventory
Data source:
http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=87484&HarmOnly=no
Data source date: 16/07/2012
Risk Phrases: R23, N; R50/53
Hazard Statements: Acute Tox. 3; H331, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

indeno[123-cd]pyrene (CAS Number: 193-39-5)

Comments: Risk phrase data taken from European Chemicals Agency's Classification & Labelling Inventory
Data source:
http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=128806&HarmOnly=no
Data source date: 08/03/2013
Risk Phrases: R40
Hazard Statements: Carc. 2; H351

benzo[ghi]perylene (CAS Number: 191-24-2)

Comments: Risk phrase data taken from European Chemicals Agency's Classification & Labelling Inventory
Data source:
http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=15793&HarmOnly=no
Data source date: 16/07/2012
Risk Phrases: N; R50/53
Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

diesel petroleum group

Comments: Risk phrase data given in table A3, page A41
Data source: WM2 3rd edition, 2013
Data source date: 01/08/2013
Risk Phrases: R40, R51/53, R65, R66
Hazard Statements: Flam. Liq. 3; H226, Skin Irrit. 2; H315, Acute Tox. 4; H332, Carc. 2; H351, Asp. Tox. 1; H304, STOT RE 2; H373, Aquatic Chronic 2; H411

TPH (C6 to C40) petroleum group

Comments: Risk phrase data given on page A41
Data source: WM2 3rd edition, 2013
Data source date: 01/08/2013
Risk Phrases: R10, R45, R46, R51/53, R63, R65
Hazard Statements: Flam. Liq. 3; H226, Asp. Tox. 1; H304, STOT RE 2; H373, Muta. 1B; H340, Carc. 1B; H350, Repr. 2; H361d, Aquatic Chronic 2; H411

Appendix B: Notes

C14: Step 5

from section: WM3: C14 in the document: "WM3 - Waste Classification"

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..."

Note 1

from section: 1.1.3.2, Annex VI in the document: "CLP Regulations"

"The concentration stated or, in the absence of such concentrations, the generic concentrations of this Regulation (Table 3.1) or the generic concentrations of Directive 1999/45/EC (Table 3.2), are the percentages by weight of the metallic element calculated with reference to the total weight of the mixture."

Note A

from section: 1.1.3.1, Annex VI in the document: "CLP Regulations"

"Without prejudice to Article 17(2), the name of the substance must appear on the label in the form of one of the designations given in Part 3. In Part 3, use is sometimes made of a general description such as '... compounds' or '... salts'. In this case, the supplier is required to state on the label the correct name, due account being taken of section 1.1.1.4."

Appendix C: Version

Classification utilises the following:

- CLPRegulations - Regulation1272/2008/ECof16December2008
  REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006
- 1stATP - Regulation790/2009/ECof10August2009
  COMMISSION REGULATION (EC) No 790/2009 of 10 August 2009 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures
- 2ndATP - Regulation286/2011/ECof10March2011
  COMMISSION REGULATION (EU) No 286/2011 of 10 March 2011 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures
- 3rdATP - Regulation618/2012/EUof10July2012
  COMMISSION REGULATION (EU) No 618/2012 of 10 July 2012 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures
- 4thATP - Regulation487/2013/EUof8May2013
  COMMISSION REGULATION (EU) No 487/2013 of 8 May 2013 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures
- Correctionto1stATP - Regulation758/2013/EUof7August2013
  COMMISSION REGULATION (EU) No 758/2013 of 7 August 2013 correcting Annex VI to Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures
- 5thATP - Regulation944/2013/EUof2October2013
  COMMISSION REGULATION (EU) No 944/2013 of 2 October 2013 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures
- 6thATP - Regulation605/2014/EUof5June2014
  COMMISSION REGULATION (EU) No 605/2014 of 5 June 2014 amending, for the purposes of introducing hazard and precautionary statements in the Croatian language and its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures
- WFDAnnexIIIreplacement - Regulation1357/2014/EUof18December2014
  COMMISSION REGULATION (EU) No 1357/2014 of 18 December 2014 replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives
- RevisedListofWastes2014 - Decision2014/955/EUof18December2014
  COMMISSION DECISION of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council (2014/955/EU)
- WM3-WasteClassification - May2015
  Technical Guidance WM3 - Guidance on the classification and assessment of waste (1st edition 2015)
- POPsRegulation2004 - Regulation850/2004/ECof29April2004
  REGULATION (EC) No 850/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC
- 1stATPtoPOPsRegulation - Regulation756/2010/EUof24August2010
  COMMISSION REGULATION (EU) No 756/2010 of 24 August 2010 amending Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annexes IV and V
- 2ndATPtoPOPsRegulation - Regulation757/2010/EUof24August2010
  COMMISSION REGULATION (EU) No 757/2010 of 24 August 2010 amending Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annexes I and III

HazWasteOnline Engine: WM3 1st Edition, May 2015
HazWasteOnline Engine Version: 2015.169.2852.5804 (18 Jun 2015)
HazWasteOnline Database: 2015.169.2852.5804 (18 Jun 2015)

APPENDIX F
Waste Hazard Assessment

Appendix E
Soil Guideline Values and Genera Assessment Criteria

E1 Assessment Criteria

The Contaminated Land Regime reflects the UK Government's stated objectives of achieving sustainable development through the 'suitable for use approach'.

E1.1 Contaminated Land Exposure Assessment Model (CLEA)

Current United Kingdom risk assessment practice is based on the Contaminated Land Exposure Assessment Model (CLEA).

The CLEA Guidance comprises the following documents:

1) EA Science Report SC050021/SR2: Human health toxicological assessment of contaminants in soil.
2) EA Science Report SC050021/SR3: Updated technical background to the CLEA model.
3) EA CLEA Bulletin (2009).
4) CLEA software version 1.06 (2009)
5) Toxicological reports and SGV technical notes.

The CLEA guidance and tools:

do not cover other types of risk to humans, such as fire, suffocation or explosion, or short-term and acute exposures.

do not cover risks to the environment, such as groundwater, ecosystems or buildings.

do not provide a definitive test for telling when human health risks are significant.

are not a legal requirement in assessing land contamination risks. They are not part of the legal regime for Part 2A of the Environmental Protection Act 1990.

The CLEA guidance derives soil concentrations of contaminants above which (in the opinion of the EA) there may be a concern that warrants further investigation. It does not provide a definitive test for establishing that the risk is significant.

E1.2 Land-use Scenarios

The CLEA model uses a range of standard land-use scenarios to develop conceptual exposure models as follows:

1 Residential (with home grown produce) (RwHP)

Generic scenario assumes a typical two-storey house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

Critical receptor is a young female child (zero to six years old)
Exposure duration is six years.
Exposure pathways include direct soil and indoor dust ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
Building type is a two-storey small terraced house.

A sub-set of this land-use is residential apartments with communal landscaped gardens where the consumption of home grown vegetables will not occur. (Residential without homegrown produce (RwoHP)).

2) Allotments

Provision of open space (about 250sq.m) commonly made available to tenants by the local authority to grow fruit and vegetable for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make occasional accompanied visits.

Although some allotment holders may choose to keep animals including rabbits, hens, and ducks, potential exposure to contaminated meat and eggs is not considered.

Critical receptor is a young female child (zero to six years old)
Exposure duration is six years.
Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours.
There is no building.

3) Commercial/Industrial

The generic scenario assumes a typical commercial or light industrial property comprising a three-storey building at which employees spend most time indoors and are involved in office-based or relatively light physical work.

Critical receptor is a working female adult (aged 16 to 65 years old).
Exposure duration is a working lifetime of 49 years.
Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours.
Building type is a three-storey office (pre 1970).

E1.4 LQM/CIEH SUITABLE 4 USE LEVELS (S4UL)

For derivation of these S4UL reference must be made to:

Nathanial, P., McCaffrey, C., Gillet, A., Ogden, R., Nathanial, J.,. The LQM/CIEH S4UL's for Human Health Risk Assessment. Land Quality Press. 2015

The LQM/CIEH S4UL for a given land use is the concentration of the contaminant in soil at which the predicted daily exposure, as calculated by the CLEA software, equals the Health Criteria Value.

The final output for each contaminant represents a synthesis of new toxicological (and fate and transport) reviews published since the preparation of the 2nd edition LQM/CIEH GAC's (Nathanial et al., 2009).

In the derivation of LQM/CIEH S4UL's the principles of 'minimal' or 'tolerable' risk enshrined in SR2, which has not been withdrawn, has been maintained.

S4UL's have been derived for the basic CLEA land-uses, as described above, and for two new land uses:

Public Open Spaces near Residential Housing (POSresi)
Public Park (POSpark).

Public Open Spaces near Residential Housing (POSresi)
Includes the predominantly grassed areas adjacent to high density housing, the central green area on many 1930's – 1970's housing estates, and smaller areas commonly incorporated in newer developments as informal grassed areas or more formal landscaped areas with a mixture of open space and covered soils with planting. It is assumed that the close proximity to the place of residence will allow tracking back of soil to occur.

Public Park (POSpark)
An area of open space, usually owned and maintained by the local authority, provided for recreational uses including family visists and picnics, children's play area, informal sporting activities (not a dedicated sports pitch), and dog walking. It is assumed that tracking back of soils into places of residence will be negligible.

E1.5 Category 4 Screening Levels (C4SLs)
In the case of Lead, no SGV or GAC has been published to date. This is likely to be due to the toxicity review that is currently being undertaken by the Environment Agency. In the absence of updated toxicity information the SGV derived using CLEA 1.06 methodology and related toxicity will be used.

The overall objective of the C4SLs research project was to assist the provision of technical guidance in support of Defra's revised Statutory Guidance (SG) for Part 2A of the Environmental Protection Act 1990 (Part 2A) (Defra, 2012a). Specifically, the project aimed to deliver:

• A methodology for deriving C4SLs for four generic land-uses comprising residential, commercial, allotments and public open space; and
• A demonstration of the methodology, via the derivation of C4SLs for six substances – arsenic, benzene, benzo(a)pyrene, cadmium, chromium (VI) and lead.

To help achieve a more targeted approach to identifying and managing contaminated land in relation to the risk (or possibility) of harm to human health, the revised SG presented a new four category system for considering land under Part 2A, ranging from Category 4, where there is no risk that land poses a

significant possibility of significant harm (SPOSH), or the level of risk is low, to Category 1, where the risk that land poses a significant possibility of significant harm (SPOSH) is unacceptably high. More specific guidance on what type of land should be considered as Category 4 (Human Health) is provided in Paragraphs 4.21 and 4.22 of the revised SG, as follows:

*"*4.21 The local authority should consider that the following types of land should be placed into Category 4: Human Health:
(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil, as explained in Section 3 of this Guidance.

(c) Land that has been excluded from the need for further inspection and assessment because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of this Guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of this Guidance.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed in the normal course of their lives).

4.22 The local authority may consider that land other than the types described in paragraph 4.21 should be placed into Category 4: Human Health if following a detailed quantitative risk assessment it is satisfied that the level of risk posed is sufficiently low.*"*

The C4SLs are intended as "relevant technical tools" (in relation to Paragraph 4.21(c)) to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

*"*The new statutory guidance will bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land.*"*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):
*"*SGVs are guidelines on the level of long-term human exposure to individual chemicals in soil that, unless stated otherwise, are tolerable or pose a minimal risk to human health.*"*

The implication of Paragraph 47(h) of the IA is that minimal risk is well within Category 4 and that the C4SLs should describe a higher level of risk which, whilst not minimal, can still be considered low enough to allow a judgement to be made

that land containing substances at, or below, the C4SLs would typically fall within Category 4. This reflects Paragraph 4.20 of the revised SG, which states:

*"*4.20 The local authority should not assume that land poses a significant possibility of significant harm if it considers that there is no risk or that the level of risk posed is low. For the purposes of this Guidance, such land is referred to as a *"*Category 4: Human Health*"* case. The authority may decide that the land is a Category 4: Human Health case as soon as it considers it has evidence to this effect, and this may happen at any stage during risk assessment including the early stages.*"*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

The generic screening values referred to before usually take the form of risk-based Soil Guideline Values (SGVs) or other Generic Assessment Criteria (GACs) that are most typically derived using the Environment Agency's Contaminated Land Exposure Assessment (CLEA) model, as described in the Environment Agency's SR2, SR3 and SR7 reports (EA, 2009b & c; EA, 2008). It is anticipated that C4SLs will be used in a similar manner; as generic screening criteria that can be used within a GQRA, albeit describing a higher level of risk than the SGVs.

The suggested approach to the development of C4SLs consists of the retention and use of the CLEA framework, modified according to considerations of the underlying science within the context of Defra's policy objectives relating to the revised SG. Within this context, it is suggested that the development of C4SLs may be achieved in one of three ways, namely:

- By modifying the toxicological parameters used within CLEA (while maintaining current exposure parameters);
- By modifying the exposure parameters embedded within CLEA (while maintaining current toxicological "minimal risk" interpretations); and
- By modifying both toxicological and exposure parameters.

There is also a suggested check on "other considerations" (e.g., background levels, epidemiological data, sources of uncertainty) within the approach, applicable to all three options.

It is suggested that a new term is defined for the toxicological guidance values associated with the derivation of C4SLs – a Low Level of Toxicological Concern (LLTC). A LLTC should represent an intake of low concern that remains suitably protective of health, and definitely does not approach an intake level that could be defined as SPOSH.

E1.6 CL:AIRE Generic Assessment Criteria (GAC)

For derivation of the CL:AIRE Generic Assessment Criteria (GAC) reference should be made to the following report:

CL:AIRE, The Soil Generic Assessment Criteria for Human Health Risk Assessment. Contaminated Land: Applications in the Real Environment. 2009.

Within this report CL:AIRE provided Generic Assessment Criteria (GAC's) in accordance with the CLEA software and the principles outlined above for a further 35 contaminants sometime encountered on land affected by contamination.

E1.7 Detailed Quantitative Risk Assessments (DQRA)
Where the adoption of an S4UL/GAC/C4SL is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses then a DQRA may be undertaking to develop site specific values for relevant soil contaminants.

Establishing the plausibility that generic exposure pathways exist in practice by measurement and observation.

Developing more accurate parameters using site data.

E1.8 Phytotoxicity
CLEA guidance only addresses human health toxicity; assessment of plant toxicity (phytotoxicity) is based on threshold trigger values obtained from the following source:

ICRCL 70/90: Notes on the restoration and aftercare of metalliferous mining sites for pasture and grazing.

E1.8 Statistical Tests
DEFRA R&D Publication CLR 7 (DOE 1994) addressed the statistical treatment of test results and their comparison to Soil Guideline Values.

Consideration must be given to the appropriate area of land to be considered termed the critical averaging area.

For a communal open space or commercial land-use, the critical averaging area will depend on the proposed layout. For a residential use with private gardens the averaging area is the individual plot.

It may be appropriate to compare the upper 95th percentile concentration with the Soil Guideline Value, subject to applying a statistical test to establish that the range of concentrations are reasonably consistent and belonging to the same underlying distribution of data.

The DEFRA discussion paper Assessing risks from land contamination – a proportionate approach ('the way forward') (CLAN06/2006) aimed to increase understanding of the role that statistics can play in quantifying the uncertainty attached to the estimates of the mean concentration of contaminants in soil. In direct response CLAIRE/CIEH published a joint report, Guidance in comparing soil contamination data with a critical concentration (CLAIRE/CIEH 2008). A software implementation of the statistical techniques given in the report was published by ESI International (2008).

Treatment of Hot-Spots

A statistical test is applied to establish whether the data is a part of a single set, or whether data outliers are present.

Provided that the data is based on random sampling and no distinct contamination source was present at the sampling location, the hot-spot(s) may be excluded and the mean of the remaining data assessed.

E2 Ground and Water Limited Soil Assessment Criteria

The Soil Assessment Criteria used in the preparation of this report are tabulated in the following pages:

C4SL Low Level of Toxicological Concern

C4SL Low Level of Toxicological Concern						
Contaminant	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Lead	<210	<330	<84	<6000	<760	<1400

Phytotoxicity Recommendations

ICRCL 70/90 Restoration of metalliferous mining areas

Phytotoxicity (Harmful to Plants) Threshold Trigger Values	
Copper	250mg/kg
Zinc	1000mg/kg
Notes: Many cultivars and specifically grasses have a high tolerance and there will be no ill-effect at the threshold trigger values given for neutral or near neutral pH. Site observation of plant vitality may give additional guidance.	

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LQM CIEH Suitable 4 Use Levels (S4UL's)

LQM/CIEH Suitable 4 Use Levels – Metals and Semi-metals

Contaminant	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Metals:						
Arsenic	37	40	43	640	79	170
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	11000	45	240000	21000	46000
Cadmium	11	85	1.9	190	120	532
Chromium (III)	910	910	18000	8600	1500	33000
Chromium (VI)	6	6	1.8	33	7.7	20
Copper	2400	7100	520	68000	12000	44000
Elemental Mercury	1.2	1.2	21	58	16	30
Inorganic Mercury	40	56	19	1100	120	240
Methylmercury	11	15	6	320	40	68
Nickel	180	180	230	980	230	3400
Selenium	250	430	88	12000	1100	1800
Vanadium	410	1200	91	9000	2000	5000
Zinc	3700	40000	620	730000	81000	170000

LQM/CIEH Suitable 4 Use Levels – BTEX Compounds

Contaminant	Soil Organic Matter	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Benzene	1.0% SOM	0.087	0.38	0.017	27	72	90
	2.5% SOM	0.170	0.70	0.034	47	72	100
	6.0% SOM	0.370	1.40	0.075	90	73	110
Toluene	1.0% SOM	130	880	22	56000	56000	87000
	2.5% SOM	290	1900	51	110000	56000	95000
	6.0% SOM	660	3900	120	180000	56000	100000
Ethylbenzene	1.0% SOM	47	83	16	5700	24000	17000
	2.5% SOM	110	190	39	13000	24000	22000
	6.0% SOM	260	440	91	27000	25000	27000
o-Xylene	1.0% SOM	60	88	28	6600	41000	17000
	2.5% SOM	140	210	67	15000	42000	24000
	6.0% SOM	330	480	160	33000	43000	33000
m-Xylene	1.0% SOM	59	82	31	6200	41000	17000
	2.5% SOM	140	190	74	14000	42000	24000
	6.0% SOM	320	450	170	31000	43000	33000
p-Xylene	1.0% SOM	56	79	29	5900	41000	17000
	2.5% SOM	130	180	69	14000	42000	23000
	6.0% SOM	310	430	160	30000	43000	31000
The most health protective value in each scenario for Xylene is highlighted in bold.							

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LQM/CIEH Suitable 4 Use Levels For TPH

Aliphatic		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
EC 5-6	1.0% SOM	42	42	730	3,200 (304) sol	570,000 (304) sol	95,000 (304) sol
	2.5% SOM	78	78	1,700	5,900 (558) sol	590,000	130,000 (558) sol
	6.0% SOM	160	160	3,900	12,000 (1150) sol	600,000l	180,000 (1150) sol
EC >6-8	1.0% SOM	100	100	2,300	7,800 (144) sol	600,000	150,000 (144) sol
	2.5% SOM	230	230	5,600	17,000 (322) sol	610,000	220,000 (322) sol
	6.0% SOM	530	530	13,000	40,000 (736) sol	620,000	320,000 (736) sol
EC >8-10	1.0% SOM	27	27	320	2,000 (78) sol	13,000	14,000 (78) sol
	2.5% SOM	65	65	770	4,800 (118) vap	13,000	18,000 (118) vap
	6.0% SOM	150	150	1,700	11,000 (451) vap	13,000	21,000 (451) vap
EC >10-12	1.0% SOM	130 (48) vap	130 (48) vap	2,200	9,700 (48) sol	13,000	21,000 (48) sol
	2.5% SOM	330 (118) vap	330 (118) vap	4,400	23,000 (118) vap	13,000	23,000 (118) vap
	6.0% SOM	760 (283) vap	770 (283) vap	7,300	47,000 (283) vap	13,000	24,000 (283) vap
EC >12-16	1.0% SOM	1,100 (24) sol	1,100 (24) sol	11,000	59,000 (24) sol	13,000	25,000 (24) sol
	2.5% SOM	2,400 (59) sol	2,400 (59) sol	13,000	82,000 (59) sol	13,000	25,000 (59) sol
	6.0% SOM	4,300 (142) sol	4,400 (142) sol	13,000	90,000 (142) sol	13,000	26,000 (142) sol
EC >16-35	1.0% SOM	65,000 (8.48) sol	65,000 (8.48) sol	260,000	1,600,000	250,000	450,000
	2.5% SOM	92,000 (21) sol	92,000 (21) sol	270,000	1,700,000	250,000	480,000
	6.0% SOM	110,000	110,000	270,000	1,800,000	250,000	490,000
EC >35-44	1.0% SOM	65,000 (8.48) sol	65,000 (8.48) sol	260,000	1,600,000	250,000	450,000
	2.5% SOM	92,000 (21) sol	92,000 (21) sol	270,000	1,700,000	250,000	480,000
	6.0% SOM	110,000	110,000	270,000	1,800,000	250,000	490,000

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LQM/CIEH Suitable 4 Use Levels For TPH

Aromatic		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
EC 5-7 (Benzene)	1.0% SOM	70	370	13	26,000 (1220) sol	56,000	76,000 (1220 sol
	2.5% SOM	140	690	27	46,000 (2260) sol	56,000	84,000 (2260) sol
	6.0% SOM	300	1,400	57	86,000 (4710) sol	56,000	92,000 (4710) sol
EC >7-8 (Toluene)	1.0% SOM	130	860	22	56,000 (869) vap	56,000	87,000 (869) sol
	2.5% SOM	290	1,800	51	110,000 (1920) sol	56,000	95,000 (1920) sol
	6.0% SOM	660	3,900	120	180,000 (4360) vap	56,000	100,000 (4360) vap
EC >8-10	1.0% SOM	34	47	8.6	3,500 (613) vap	5,000	7,200 (613) vap
	2.5% SOM	83	110	21	8,100 (1500) vap	5,000	8,500 (1500) vap
	6.0% SOM	190	270	51	17,000 (3850) vap	5,000	9,300 (3580) vap
EC >10-12	1.0% SOM	74	250	13	16,000 (364) sol	5,000	9,200 (364) sol
	2.5% SOM	180	590	31	28,000 (899) sol	5,000	9,700 (889) sol
	6.0% SOM	380	1,200	74	34,000 (2150) sol	5,000	10,000
EC >12-16	1.0% SOM	140	1,800	23	36,000 (169) sol	5,100	10,000
	2.5% SOM	330	2,300 (419) sol	57	37,000	5,100	10,000
	6.0% SOM	660	2,500	130	38,000	5,000	10,000
EC >16-21	1.0% SOM	260	1,900	46	28,000	3,800	7,600
	2.5% SOM	540	1,900	110	28,000	3,800	7,700
	6.0% SOM	930	1,900	260	28,000	3,800	7,800
EC >21-35	1.0% SOM	1,100	1,900	370	28,000	3,800	7,800
	2.5% SOM	1,500	1,900	820	28,000	3,800	7,800
	6.0% SOM	1,700	1,900	1,600	28,000	3,800	7,900
EC >35-44	1.0% SOM	1,100	1,900	370	28,000	3,800	7,800
	2.5% SOM	1,500	1,900	820	28,000	3,800	7,800
	6.0% SOM	1,700	1,900	1,600	28,000	3,800	7,900
EC >44-70	1.0% SOM	1,600	1,900	1,200	28,000	3,800	7,800
	2.5% SOM	1,800	1,900	2,100	28,000	3,800	7,800
	6.0% SOM	1,900	1,900	3,000	28,000	3,800	7,900

SOM = Soil Organic Matter Content (%)

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LQM/CIEH Suitable 4 Use Levels For Polycyclic Aromatic Hydrocarbons (PAH's)

Determinants		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Acenapthene	1.0% SOM	210	3,000 (57.0) sol	34	84,000(57.0) sol	15,000	29,000
	2.5% SOM	510	4,700(141) sol	85	97,000(141) sol	15,000	30,000
	6.0% SOM	1100	6,000(336) sol	200	100,000	15,000	30,000
Acenapthylene	1.0% SOM	170	2,900(86.1) sol	28	83,000(86.1) sol	15,000	29,000
	2.5% SOM	420	4,600(212) sol	69	97,000(212) sol	15,000	30,000
	6.0% SOM	920	6,000(506) sol	160	100,000	15,000	30,000
Anthracene	1.0% SOM	2,400	31,000(1.17) vap	380	520,000	74,000	150,000
	2.5% SOM	5,400	35,000	950	540,000	74,000	150,000
	6.0% SOM	11,000	37,000	2,200	540,000	74,000	150,000
Benzo(a)anthracene	1.0% SOM	7.20	11	2.90	170	29	49
	2.5% SOM	11	14	6.50	170	29	56
	6.0% SOM	13	15	13	180	29	62
Benzo(a)pyrene	1.0% SOM	2.20	3.20	0.97	35	5.70	11
	2.5% SOM	2.70	3.20	2.00	35	5.70	12
	6.0% SOM	3.00	3.20	3.50	36	5.70	13
Benzo(b)flouranthene	1.0% SOM	2.60	3.90	0.99	44	7.10	13
	2.5% SOM	3.30	4.00	2.10	44	7.20	15
	6.0% SOM	3.70	4.00	3.90	45	7.20	16
Benzo(ghi)perylene	1.0% SOM	320	360	290	3,900	640	1,400
	2.5% SOM	340	360	470	4,000	640	1,500
	6.0% SOM	350	360	640	4,000	640	1,600
Benzo(k)flouranthene	1.0% SOM	77	110	37	1,200	190	370
	2.5% SOM	93	110	75	1,200	190	410
	6.0% SOM	100	110	130	1,200	190	440
Chrysene	1.0% SOM	15	30	4.10	350	57	93
	2.5% SOM	22	31	9.40	350	57	110
	6.0% SOM	27	32	19	350	57	120
Dibenzo(ah)anthracene	1.0% SOM	0.24	0.31	0.14	3.50	0.57	1.10
	2.5% SOM	0.28	0.32	0.27	3.60	0.57	1.30
	6.0% SOM	0.30	0.32	0.43	3.60	0.58	1.40

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LQM/CIEH Suitable 4 Use Levels For Polycyclic Aromatic Hydrocarbons (PAH's)

Determinants		RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Flouranthene	1.0% SOM	280	1,500	52	2,3000	3,100	6,300
	2.5% SOM	560	1,600	130	2,3000	3,100	6,300
	6.0% SOM	890	1,600	290	2,3000	3,100	6,300
Flourene	1.0% SOM	170	2,800 (30.9) sol	27	63,000(30.9) sol	9,900	20,000
	2.5% SOM	400	3,800(76.5) sol	67	68,000	9,900	20,000
	6.0% SOM	860	4,500(183) sol	160	71,000	9,900	20,000
Indeno(123-cd)pyrene	1.0% SOM	27	45	9.50	500	82	150
	2.5% SOM	36	46	21	510	82	170
	6.0% SOM	41	46	39	510	82	180
Napthalene	1.0% SOM	2.30	2.6	4.10	190 f (76.4) sol	4,900f	1,200f(76.4) sol
	2.5% SOM	5.60	5.6	10	460 f(183) sol	4,900f	1,900f(183) sol
	6.0% SOM	13	13	24	1,100f(432) sol	4,900f	3,000
Phenanthrene	1.0% SOM	95	1,300(183) sol	18	22,000	3,100	6,200
	2.5% SOM	220	1,500	38	22,000	3,100	6,200
	6.0% SOM	440	1,500	90	23,000	3,100	6,300
Pyrene	1.0% SOM	620	3,700	110	54,000	7,400	15,000
	2.5% SOM	1200	3,800	270	54,000	7,400	15,000
	6.0% SOM	2000	3,800	620	54,000	7,400	15,000
Coal Tar (Benzo(a)pyrene used as marker compound	1.0% SOM	0.79	1.2	0.32	15	2.20	4.40
	2.5% SOM	0.98	1.2	0.67	15	2.20	4.70
	6.0% SOM	1.10	1.2	1.20	15	2.20	4.80

vap – GAC presented exceeds the vapour saturation limit, which is presented in brackets.
sol – GAC presented exceeds the soil saturation limit, which is presented in brackets.

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LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds

Contaminant	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Chloroalkanes & alkenes						
1,2 Dichloroethane						
1.0% SOM	0.0071	0.0092	0.0046	0.67	29	21
2.5% SOM	0.011	0.013	0.0083	0.97	29	24
6.0% SOM	0.019	0.023	0.016	1.70	29	28
1,1,2,2 Tetrachloroethane						
1.0% SOM	1.60	3.90	0.41	270	1,400	1,800
2.5% SOM	3.40	8.00	0.89	550	1,400	2,100
6.0% SOM	7.50	17	2.00	1,100	1,400	2,300
1,1,1,2 Tetrachloroethane						
1.0% SOM	1.20	1.50	0.79	110	1,400	1,500
2.5% SOM	2.80	3.50	1.90	250	1,400	1,800
6.0% SOM	6.40	8.20	4.40	560	1,400	2,100
Tetrachloroethene						
1.0% SOM	0.18	0.18	0.65	19	1,400	810 [sol](424)
2.5% SOM	0.39	0.40	1.50	42	1,400	1,100 [sol](951)
6.0% SOM	0.90	0.92	3.60	95	1,400	1,500
1,1,1 Trichloroethane						
1.0% SOM	8.80	9.00	48	660	140,000	57,000 [vap](1425)
2.5% SOM	18	18	110	1,300	140,000	76,000 [vap](2915)
6.0% SOM	39	40	240	3,000	140,000	100,000 [vap](6392)
Tetrachloromethene						
1.0% SOM	0.026	0.026	0.45	2.90	890	190
2.5% SOM	0.056	0.056	1.00	6.30	920	270
6.0% SOM	0.130	0.130	2.40	14	950	400
Trichloroethene						
1.0% SOM	0.016	0.017	0.041	1.20	120	70
2.5% SOM	0.034	0.036	0.091	2.60	120	91
6.0% SOM	0.075	0.080	0.210	5.70	120	120
Trichloromethane						
1.0% SOM	0.91	1.20	0.42	99	2,500	2,600
2.5% SOM	1.70	2.10	0.83	170	2,500	2,800
6.0% SOM	3.40	4.20	1.70	350	2,500	3,100
Vinyl Chloride						
1.0% SOM	0.00064	0.00077	0.00055	0.059	3.50	4.80
2.5% SOM	0.00087	0.00100	0.00100	0.077	3.50	5.00
6.0% SOM	0.00014	0.00150	0.00180	0.120	3.50	5.40

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LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds						
Contaminant	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Explosives						
2,4,6 Trinitrotoluene						
1.0% SOM	1.60	65	0.24	1,000	130	260
2.5% SOM	3.70	66	0.58	1,000	130	270
6.0% SOM	8.10	66	1.40	1,000	130	270
RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)						
1.0% SOM	120	13,000	17	210,000	26,000	49,000(18.7)^{sol}
2.5% SOM	250	13,000	38	210,000	26,000	51,000
6.0% SOM	540	13,000	85	210,000	27,000	53,000
HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)						
1.0% SOM	5.70	67,00	0.86	110,000	13,000	23,000(0.35)^{vap}
2.5% SOM	13	67,00	1.90	110,000	13,000	23,000(0.39)^{vap}
6.0% SOM	26	67,00	3.90	110,000	13,000	24,000(0.48)^{vap}
Atrazine						
1.0% SOM	3.30	610	0.50	9,300	1,200	2,300
2.5% SOM	7.60	620	1.20	9,400	1,200	2,400
6.0% SOM	17.40	620	2.70	9,400	1,200	2,400
Pesticides						
Aldrin						
1.0% SOM	5.70	7.30	3.20	170	18	30
2.5% SOM	6.60	7.40	6.10	170	18	31
6.0% SOM	7.10	7.50	9.60	170	18	31
Dieldrin						
1.0% SOM	0.97	7.00	0.17	170	18	30
2.5% SOM	2.00	7.30	0.41	170	18	30
6.0% SOM	3.50	7.40	0.96	170	18	31
Dichlorvos						
1.0% SOM	0.032	6.40	0.0049	140	16	26
2.5% SOM	0.066	6.50	0.0100	140	16	26
6.0% SOM	0.140	6.60	0.0220	140	16	27
Alpha - Endosulfan						
1.0% SOM	7.40	160(0.003)^{vap}	1.20	5,600(0.003)^{vap}	1,200	2,400
2.5% SOM	18	280(0.007)^{vap}	2.90	7,400(0.007)^{vap}	1,200	2,400
6.0% SOM	41	410(0.016)^{vap}	6.80	8,400(0.016)^{vap}	1,200	2,400

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LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds

Contaminant	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Pesticides						
Beta - Endosulfan						
1.0% SOM	7.00	190(0.00007)[vap]	1.10	6,300(0.00007)[vap]	1,200	2,400
2.5% SOM	17	320(0.0002)[vap]	2.70	7,800(0.0002)[vap]	1,200	2,400
6.0% SOM	39	440(0.0004)[vap]	6.40	8700	1,200	2,500
Alpha - Hexachlorocyclohexanes						
1.0% SOM	0.23	6.90	0.035	170	24	47
2.5% SOM	0.55	9.20	0.087	180	24	48
6.0% SOM	1.20	11	0.210	180	24	48
Beta - Hexachlorocyclohexanes						
1.0% SOM	0.085	3.70	0.013	65	8.10	15
2.5% SOM	0.200	3.80	0.032	65	8.10	15
6.0% SOM	0.460	3.80	0.077	65	8.10	16
Gamma - Hexachlorocyclohexanes						
1.0% SOM	0.06	2.90	0.0092	67	8.2	14
2.5% SOM	0.14	3.30	0.0230	69	8.2	15
6.0% SOM	0.33	3.50	0.0540	70	8.2	15
Chlorobenzenes						
Chlorobenzene						
1.0% SOM	0.46	0.46	5.90	56	11,000	1,300(675)[sol]
2.5% SOM	1.00	1.00	14	130	13,000	2,000(1520)[sol]
6.0% SOM	2.40	2.40	32	290	14,000	2,900
1,2-Dichlorobenzene						
1.0% SOM	23	24	94	2,000 (571) [sol]	90,000	24,000(571)[sol]
2.5% SOM	55	57	230	4,800 (1370) [sol]	95,000	36,000(1370)[sol]
6.0% SOM	130	130	540	11,000 (3240) [sol]	98,000	51,000(3240)[sol]
1,3-Dichlorobenzene						
1.0% SOM	0.40	0.44	0.25	30	300	390
2.5% SOM	1.00	1.10	0.60	73	300	440
6.0% SOM	2.30	2.50	1.50	170	300	470
1,4-Dichlorobenzene						
1.0% SOM	61	61	15	4,400 (224)[vap]	17,000[g]	36,000 (224)[vap]
2.5% SOM	150	150	37	10,000 (540)[vap]	17,000[g]	36,000 (540)[vap]
6.0% SOM	350	350	88[g]	25,000 (1280)[vap]	17,000[g]	36,000 (1280)[vap]
1,2,3,-Trichlorobenzene						
1.0% SOM	1.50	1.50	4.70	102	1,800	770(134)[vap]
2.5% SOM	3.60	3.70	12	250	1,800	1,100(330)[vap]
6.0% SOM	8.60	8.80	28	590	1,800	1,600(789)[vap]

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LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds						
Contaminant	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Chlorobenzenes						
1,2,3,- Trichlorobenzene						
1.0% SOM	1.50	1.50	4.70	102	1,800	770(134)[vap]
2.5% SOM	3.60	3.70	12	250	1,800	1,100(330)[vap]
6.0% SOM	8.60	8.80	28	590	1,800	1,600(789)[vap]
1,2,4,- Trichlorobenzene						
1.0% SOM	2.60	2.60	55	220	15,000	1,700(318)[vap]
2.5% SOM	6.40	6.40	140	530	17,000	2,600(786)[vap]
6.0% SOM	15	15	320	1,300	19,000	4,000(1880)[vap]
1,3,5,- Trichlorobenzene						
1.0% SOM	0.33	0.33	4.70	23	1,700	380(36.7)[vap]
2.5% SOM	0.81	0.81	12	55	1,700	590(90.8)[vap]
6.0% SOM	1.90	1.90	140	130	1,800	860(217)[vap]
1,2,3,4,- Tetrachlorobenzene						
1.0% SOM	15	24	4.40	1,700(122)[vap]	830	1,500(122)[vap]
2.5% SOM	36	56	11	3,080(304)[vap]	830	1,600
6.0% SOM	78	120	26	4,400(728)[vap]	830	1,600
1,2,3,5,- Tetrachlobenzene						
1.0% SOM	0.66	0.75	0.38	49(39.4)[vap]	78	110(39)[vap]
2.5% SOM	1.60	1.90	0.90	120(98.1)[vap]	79	120
6.0% SOM	3.70	4.30	2.20	240(235)[vap]	79	130
1,2,4, 5,- Tetrachlobenzene						
1.0% SOM	0.33	0.73	0.06	42(19.7)[sol]	13	25
2.5% SOM	0.77	1.70	0.16	72(49.1)[sol]	13	26
6.0% SOM	1.60	3.50	0.37	96	13	26
Pentachlrobenzene						
1.0% SOM	5.80	19	1.20	640(43.0)[sol]	100	190
2.5% SOM	12	30	3.10	770(107)[sol]	100	190
6.0% SOM	22	38	7.00	830	100	190
Hexachlorobenzene						
1.0% SOM	1.80(0.20)[vap]	4.10 (0.20)[vap]	0.47	110(0.20)[vap]	16	30
2.5% SOM	3.30(0.50)[vap]	5.70 (0.50)[vap]	1.10	120	16	30
6.0% SOM	4.90	6.70 (1.2)[vap]	2.50	120	16	30

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LQM CIEH General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds						
Contaminant	RwHP (mg/kg)	RwoHP (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)	POSresi (mg/kg)	POSpark (mg/kg)
Phenols & Chlorophenols						
Phenols						
1.0% SOM	280	750	66	760[dir](31,000)	760[dir](11,000)	760[dir](8,600)
2.5% SOM	550	1,300	140	1,500[dir](35,000)	1,500[dir](11,000)	1,500[dir](9,700)
6.0% SOM	1100	2,300	280	3,200[dir](37,000)	3,200[dir](11,000)	3,200[dir](11,000)
Chlorophenols (4 Congeners)						
1.0% SOM	0.87	94	0.13	3,500	620	1,100
2.5% SOM	2.00	150	0.30	4,000	620	1,100
6.0% SOM	4.50	210	0.70	4,300	620	1,100
Pentachlorophenols						
1.0% SOM	0.22	27(16.4)[vap]	0.03	400	60	110
2.5% SOM	0.52	29	0.08	400	60	120
6.0% SOM	1.20	31	0.19	400	60	120
Others						
Carbon Disulphide						
1.0% SOM	0.14	0.14	4.80	11	11,000	1,300
2.5% SOM	0.29	0.29	10	22	11,000	1,900
6.0% SOM	0.62	0.62	23	47	12,000	2,700
Hexachloro-1,3-Butadiene						
1.0% SOM	0.29	0.32	0.25	31	25	48
2.5% SOM	0.70	0.78	0.61	68	25	50
6.0% SOM	1.60	1.80	1.40	120	25	51

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CL:AIRE Soil Generic Assessment Criteria				
Contaminant	Residential (mg/kg)	Residential without plant uptake (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
Metals:				
Antimony	ND	550	ND	7500
Barium	ND	1300	ND	22000
Molybdenum	ND	670	ND	17000

ND – Not Derived.
NA – Not Applicable

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CL:AIRE General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds				
Contaminant	Residential (mg/kg)	Residential without plant uptake (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
1,1,2 Trichloroethane				
1.0% SOM	0.60	0.88	0.28	94
2.5% SOM	1.20	1.8	0.61	190
6.0% SOM	2.70	3.9	1.40	400
1,1-Dichloroethane				
1.0% SOM	2.40	2.50	9.20	280
2.5% SOM	3.90	4.10	17	450
6.0% SOM	7.40	7.70	35	850
1,1-Dichloroethene				
1.0% SOM	0.23	0.23	2.80	26
2.5% SOM	0.40	0.41	5.60	46
6.0% SOM	0.82	0.82	12	92
1,2,4-Trimethylbenzene				
1.0% SOM	0.35	0.41	0.38	42
2.5% SOM	0.85	0.99	0.93	99
6.0% SOM	2.00	2.30	2.20	220
1,2-Dichloropropane				
1.0% SOM	0.024	0.024	0.62	3.3
2.5% SOM	0.042	0.042	1.20	5.9
6.0% SOM	0.084	0.085	2.60	12
2,4-Dimethylphenol				
1.0% SOM	19	210	3.10	16000*
2.5% SOM	43	410	7.20	24000*
6.0% SOM	97	730	17	30000*
2,4-Dinitrotoluene				
1.0% SOM	1.50	170*	0.22	3700*
2.5% SOM	3.20	170	0.49	3700*
6.0% SOM	7.20	170	1.10	3800*
2,6-Dinitrotoluene				
1.0% SOM	0.78	78	0.12	1900*
2.5% SOM	1.70	84	0.27	1900*
6.0% SOM	3.90	87	0.61	1900*
2-Chloronapthalene				
1.0% SOM	3.70	3.80	40	390*
2.5% SOM	9.20	9.30	98	960*
6.0% SOM	22	22	230	2200*

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CL:AIRE General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds				
Contaminant	Residential (mg/kg)	Residential without plant uptake (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
Biphenyl				
1.0% SOM	66*	220*	14	18000*
2.5% SOM	160	500*	35	33000*
6.0% SOM	360	980*	83	48000*
Bis (2-ethylhexyl) phthalate				
1.0% SOM	280*	2700*	47*	85000*
2.5% SOM	610*	2800*	120*	86000*
6.0% SOM	1100*	2800*	280*	86000*
Bromobenzene				
1.0% SOM	0.87	0.91	3.2	97
2.5% SOM	2.0	2.1	7.6	220
6.0% SOM	4.7	4.9	18	520
Bromodichloromethane				
1.0% SOM	0.016	0.019	0.016	2.1
2.5% SOM	0.030	0.034	0.032	3.7
6.0% SOM	0.061	0.070	0.068	7.6
Bromoform				
1.0% SOM	2.8	5.2	0.95	760
2.5% SOM	5.9	11	2.1	1500
6.0% SOM	13	23	4.6	3100
Butyl benzyl phthalate				
1.0% SOM	1400*	42000*	220*	940000*
2.5% SOM	3300*	44000*	550*	940000*
6.0% SOM	7200*	44000*	1300*	950000*
Chloroethane				
1.0% SOM	8.3	8.4	110	960
2.5% SOM	11	11	200	1300
6.0% SOM	18	18	380	2100
Chloromethane				
1.0% SOM	0.0083	0.0085	0.066	1.0
2.5% SOM	0.0098	0.0099	0.13	1.2
6.0% SOM	0.013	0.013	0.23	1.6
Cis 1,2 Dichloroethene				
1.0% SOM	0.11	0.12	0.26	14
2.5% SOM	0.19	0.20	0.50	24
6.0% SOM	0.37	0.39	1.0	47

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CL:AIRE General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds				
Contaminant	Residential (mg/kg)	Residential without plant uptake (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
Dichloromethane				
1.0% SOM	0.58	2.10	0.10	270
2.5% SOM	0.98	2.80	0.19	360
6.0% SOM	1.70	4.50	0.34	560
Diethyl Phthalate				
1.0% SOM	120*	1800*	19*	150000*
2.5% SOM	260*	3500*	41*	220000*
6.0% SOM	570*	6300*	94*	290000*
Di-n-butyl phthalate				
1.0% SOM	13*	450*	2.00	15000*
2.5% SOM	31*	450*	5.00	15000*
6.0% SOM	67*	450*	12	15000*
Di-n-octyl phthalate				
1.0% SOM	2300*	3400*	940*	89000*
2.5% SOM	2800*	3400*	2100*	89000*
6.0% SOM	3100*	3400*	3900*	89000*
Hexachloroethane				
1.0% SOM	0.20	0.22	0.27	22*
2.5% SOM	0.48	0.54	0.67	53*
6.0% SOM	1.10	1.30	1.60	120*
Isopropylbenzene				
1.0% SOM	11	12	32	1400*
2.5% SOM	27	28	79	3300*
6.0% SOM	64	67	190	7700*
Methyl tert-butyl ether				
1.0% SOM	49	73	23	7900
2.5% SOM	84	120	44	13000
6.0% SOM	160	220	90	24000
Propylbenzene				
1.0% SOM	34	40	34	4100*
2.5% SOM	82	97	83	9700*
6.0% SOM	190	230	200	21000*
Styrene				
1.0% SOM	8.10	35	1.60	3300*
2.5% SOM	19	78	3.70	6500*
6.0% SOM	43	170	8.70	11000*

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CL:AIRE General Assessment Criteria: Volatile and Semi-Volatile Organic Compounds				
Contaminant	Residential (mg/kg)	Residential without plant uptake (mg/kg)	Allotment (mg/kg)	Commercial (mg/kg)
Total Cresols (2-, 3-, and 4-methylphenol)				
1.0% SOM	80	3700	12	160000
2.5% SOM	180	5400	27	180000*
6.0% SOM	400	6900	63	180000*
Trans 1,2 Dichloroethene				
1.0% SOM	0.19	0.19	0.93	22
2.5% SOM	0.34	0.35	1.90	40
6.0% SOM	0.70	0.71	0.24	81
Tributyl tin oxide				
1.0% SOM	0.25	1.40	0.042	130*
2.5% SOM	0.59	3.10	0.100	180*
6.0% SOM	1.30	5.70	0.240	200*

Notes: *Soil concentration above soil saturation limit