RSK

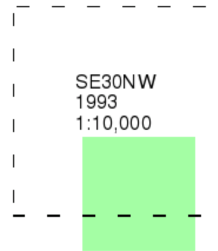
Ordnance Survey Plan

Published 1993

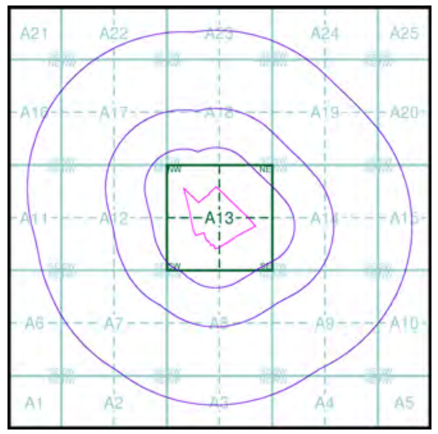
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



N

Order Details

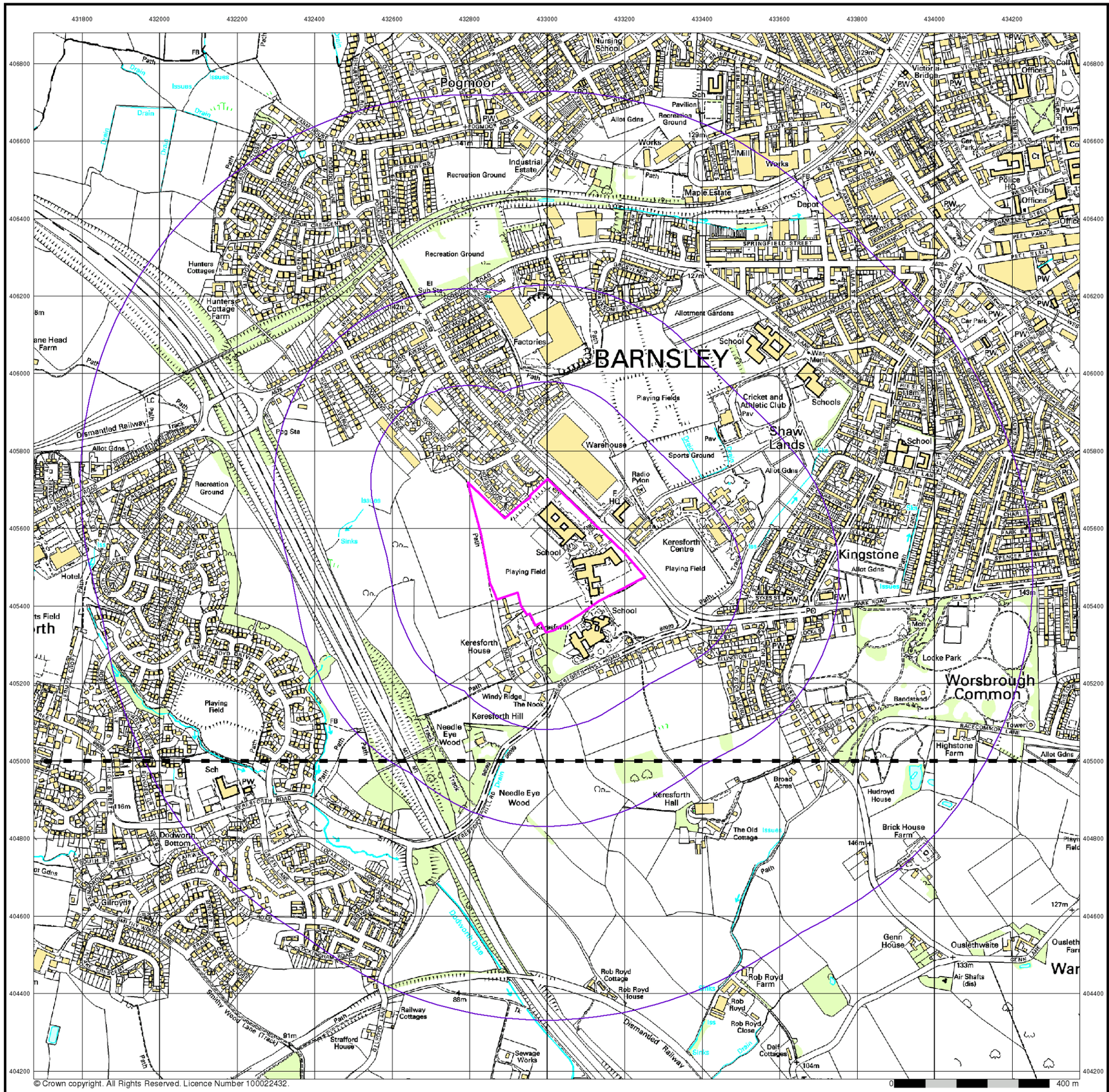
Order Number: 49487972_1_1
Customer Ref: 301285
National Grid Reference: 433000, 405540
Slice: A
Site Area (Ha): 9.62
Search Buffer (m): 1000

Site Details

Kingstone School, Broadway, BARNSLEY, South Yorkshire, S706RB

Landmark Information Group

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



RSK

10k Raster Mapping

Published 2006

Source map scale - 1:10,000

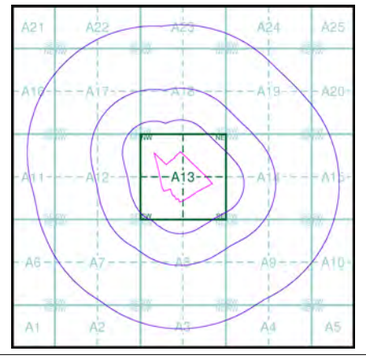
The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

SE30NW
2006
1:10,000

SE30SW
2006
1:10,000

Historical Map - Slice A



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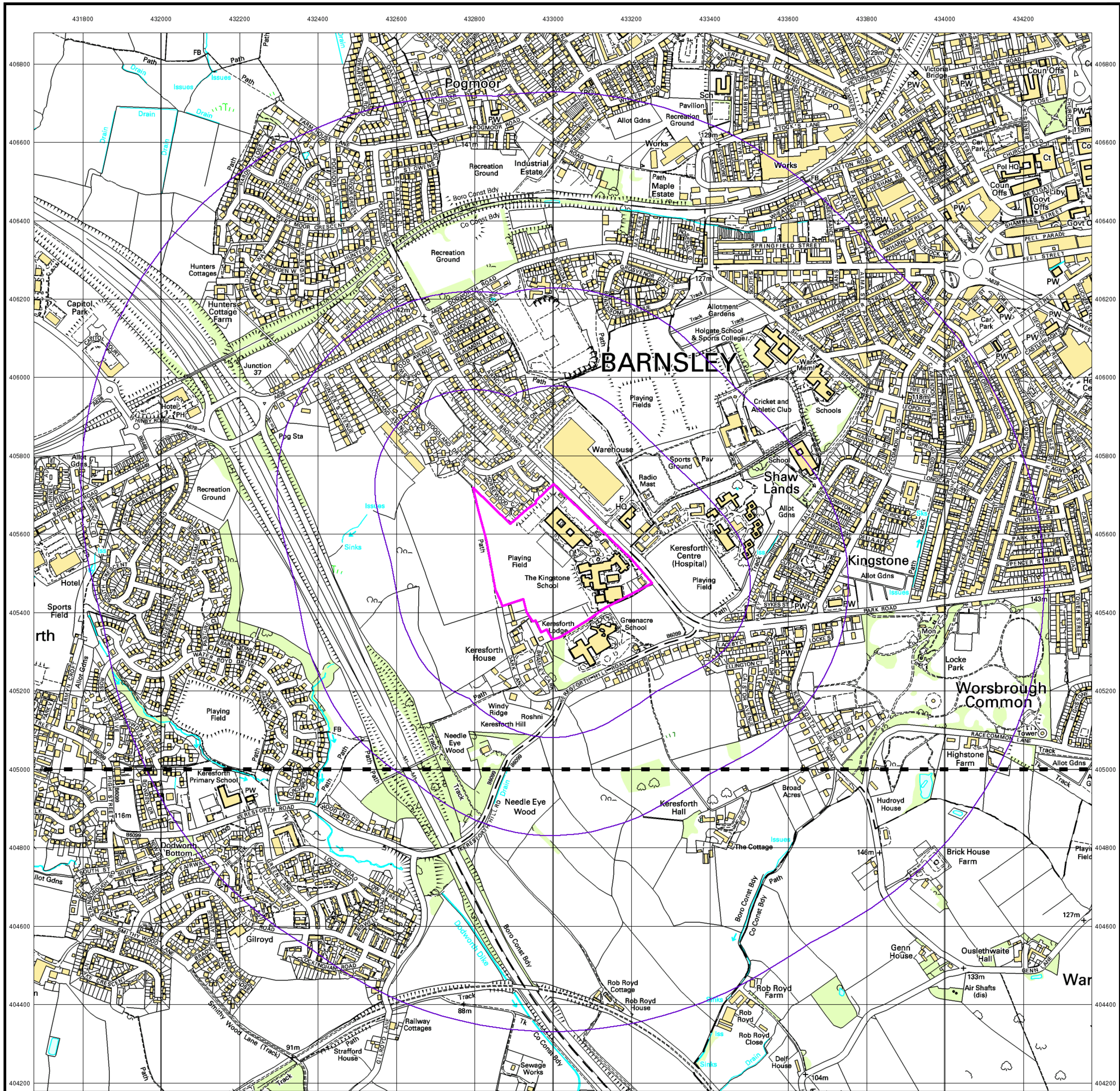

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0 400 m

RSK

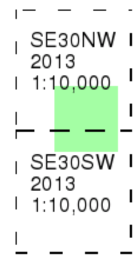
10k Raster Mapping

Published 2013

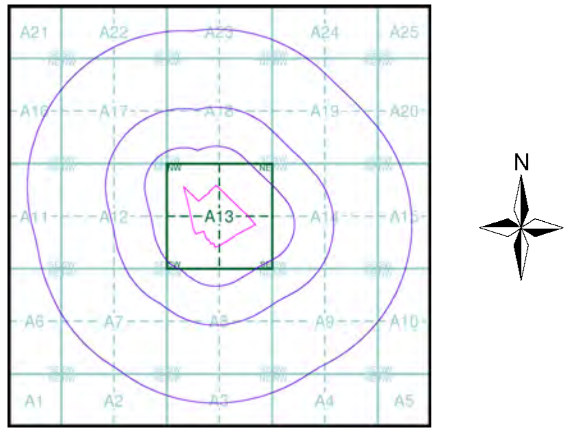
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice A



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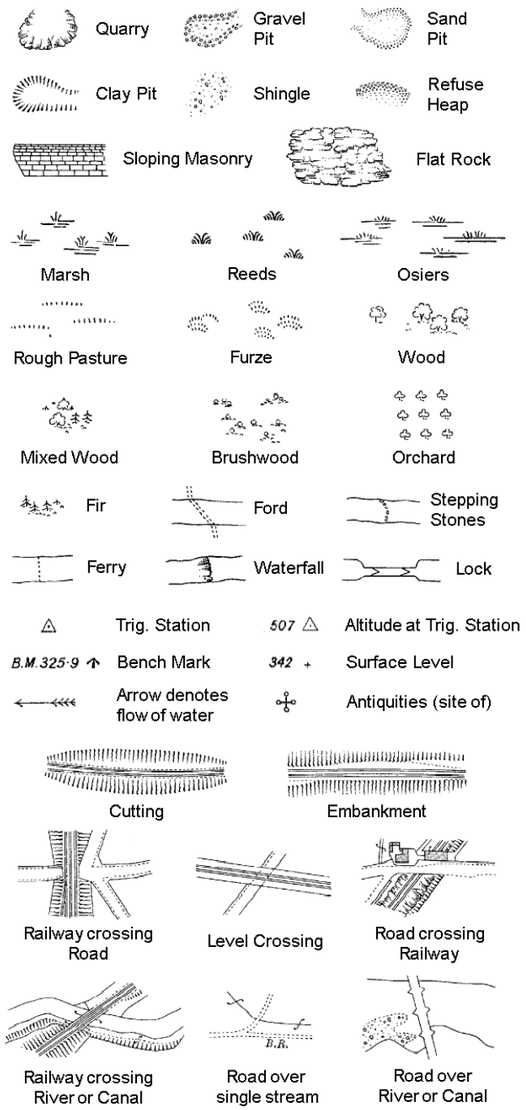
Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



County Boundary (Geographical)

County & Civil Parish Boundary

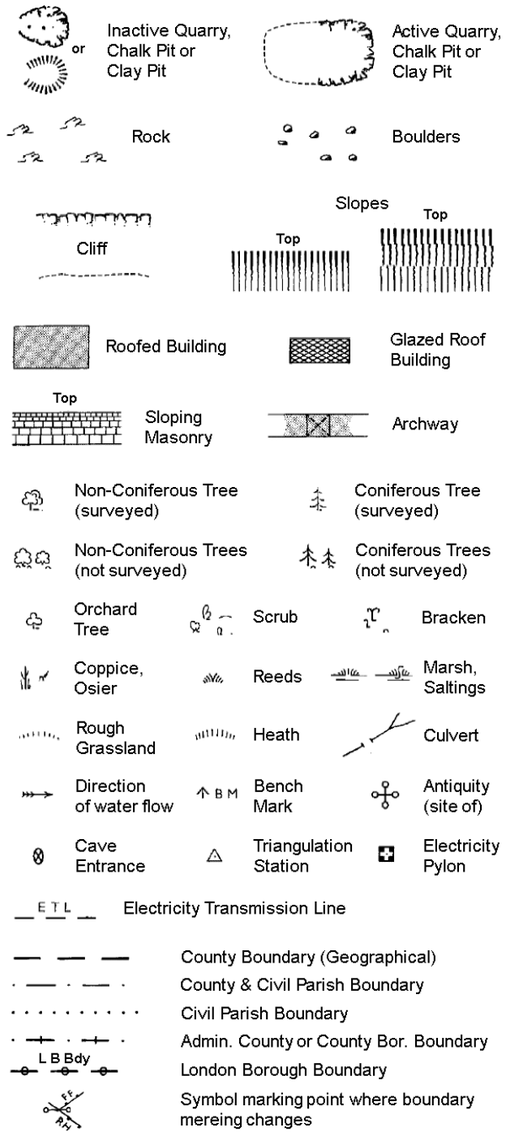
Administrative County & Civil Parish Boundary

Co. Boro. Bdy. County Borough Boundary (England)

Co. Burgh Bdy. County Burgh Boundary (Scotland)

B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	St.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



County Boundary (Geographical)

County & Civil Parish Boundary

Civil Parish Boundary

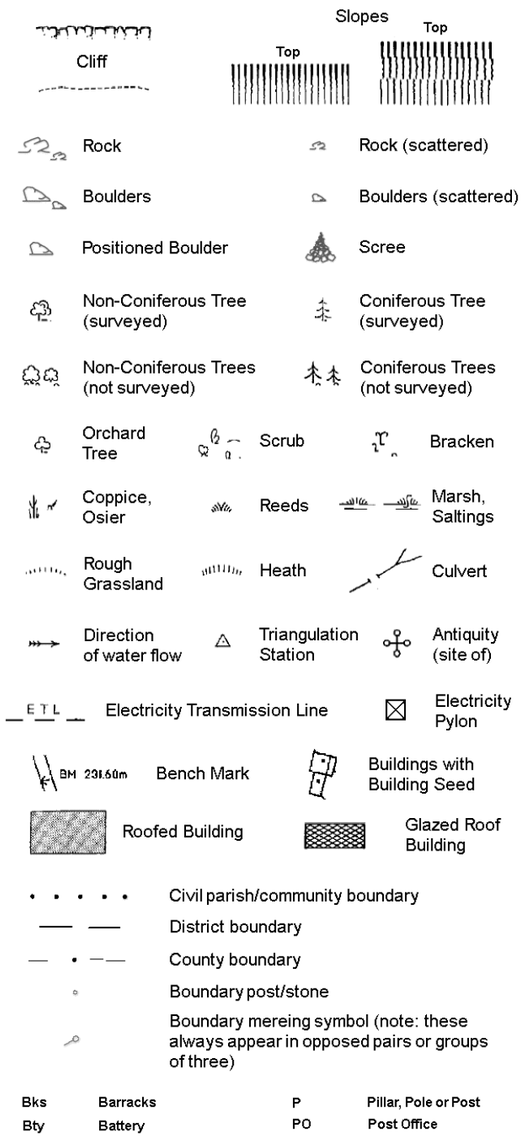
Admin. County or County Bor. Boundary

L B Bdy London Borough Boundary

Symbol marking point where boundary mereing changes

BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



Civil parish/community boundary

District boundary

County boundary

Boundary post/stone

Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)

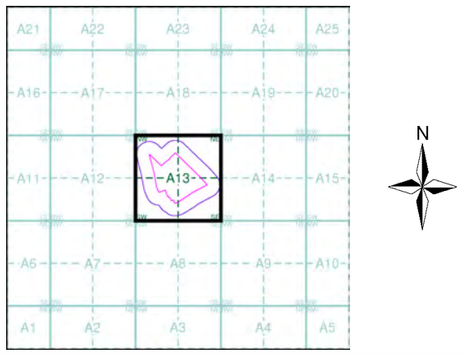
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

RSK

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Yorkshire	1:2,500	1893	2
Yorkshire	1:2,500	1906	3
Yorkshire	1:2,500	1931	4
Ordnance Survey Plan	1:1,250	1960	5
Ordnance Survey Plan	1:2,500	1961	6
Ordnance Survey Plan	1:1,250	1970 - 1974	7
Ordnance Survey Plan	1:2,500	1971	8
Supply of Unpublished Survey Information	1:1,250	1974	9
Additional SIMs	1:1,250	1978 - 1991	10
Additional SIMs	1:1,250	1991	11
Large-Scale National Grid Data	1:1,250	1993	12

Historical Map - Segment A13



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Search Buffer (m):	100

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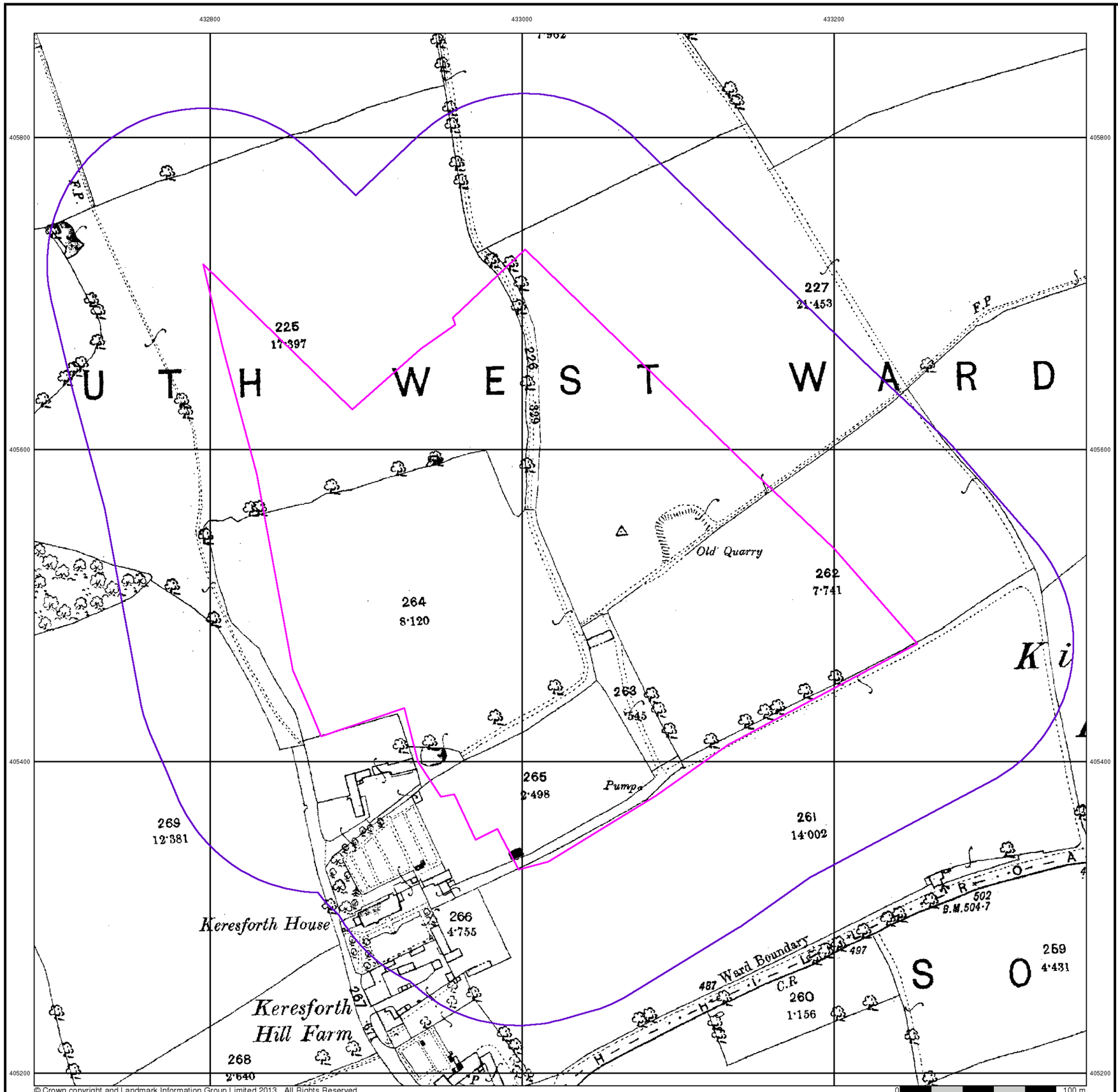

RSK

Yorkshire

Published 1893

Source map scale - 1:2,500

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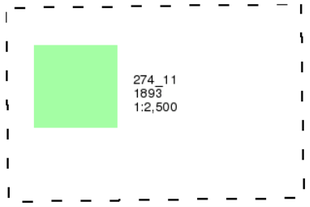
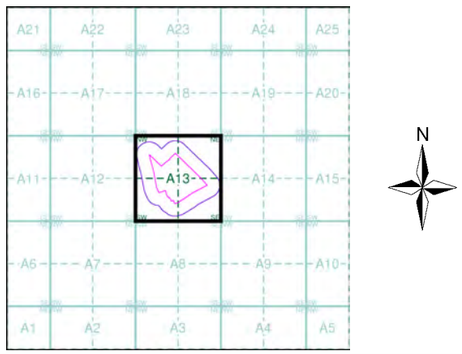
Map Name(s) and Date(s)



Historical Map - Segment A13



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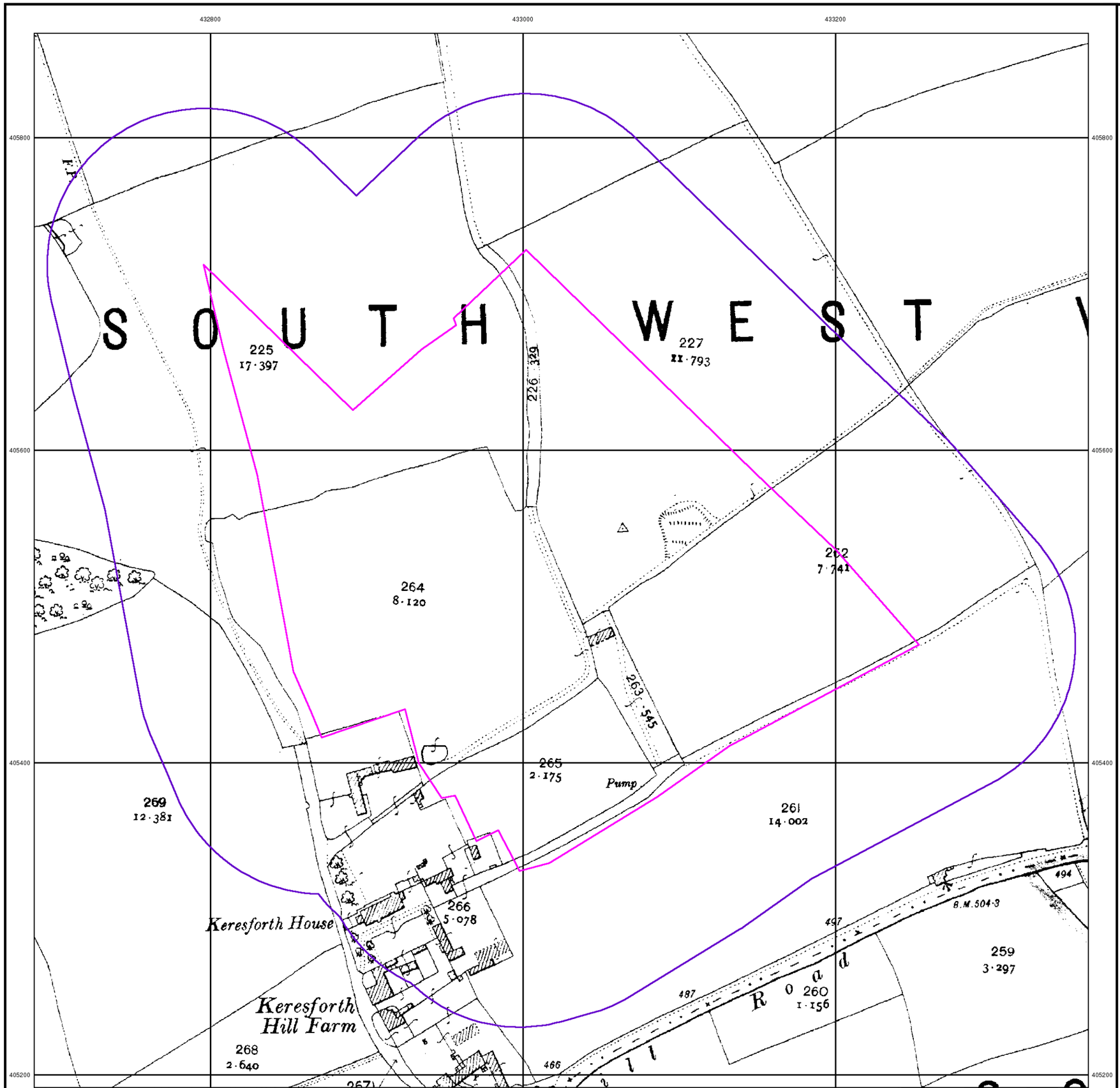

RSK

Yorkshire

Published 1906

Source map scale - 1:2,500

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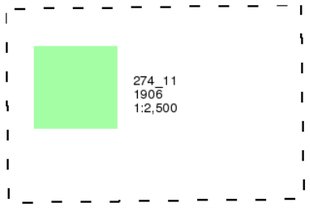
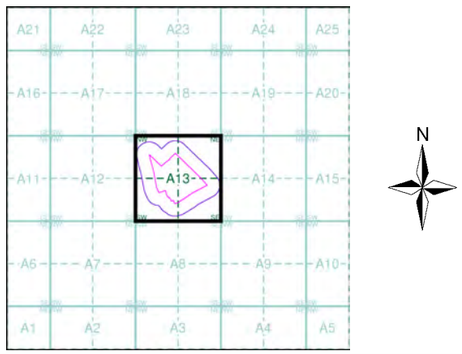
Map Name(s) and Date(s)



Historical Map - Segment A13



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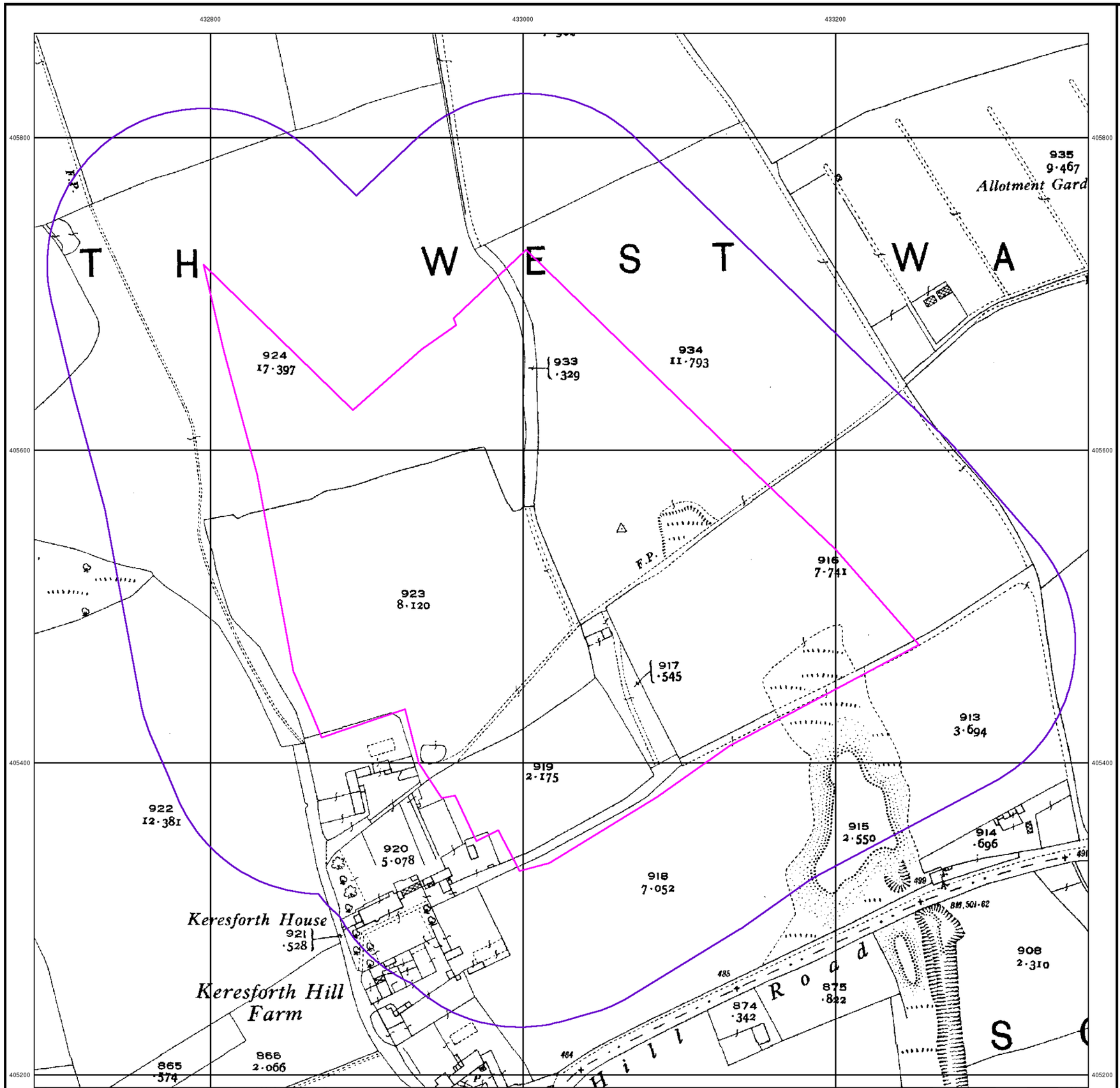


RSK

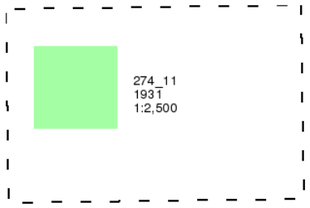
Yorkshire

Published 1931

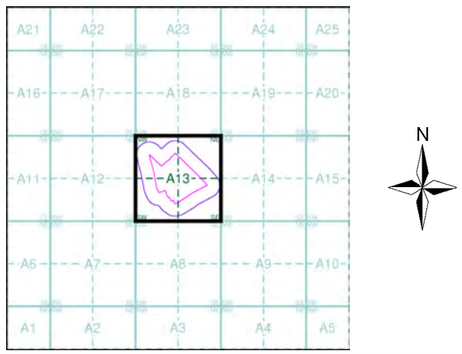
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



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RSK

Ordnance Survey Plan

Published 1960

Source map scale - 1:1,250

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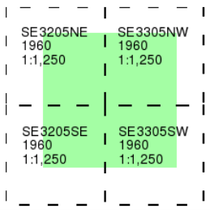
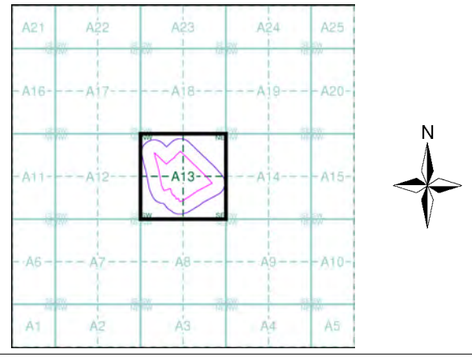
Map Name(s) and Date(s)



Historical Map - Segment A13



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Ordnance Survey Plan

Published 1961

Source map scale - 1:2,500

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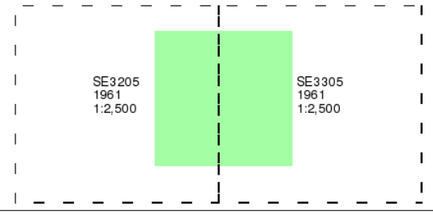
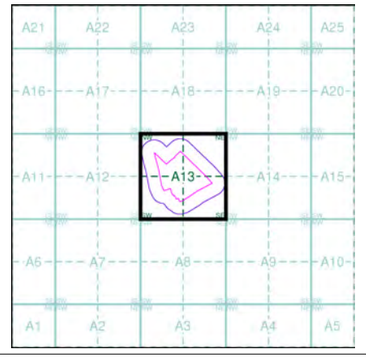


Historical Map - Segment A13



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RSK

Ordnance Survey Plan

Published 1970 - 1974

Source map scale - 1:1,250

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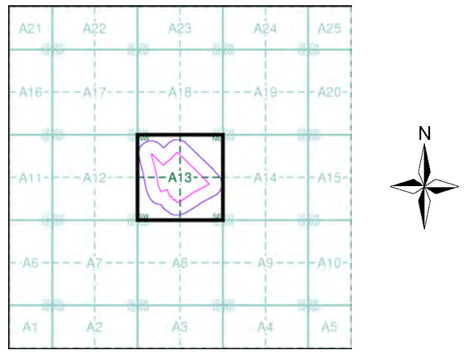
Map Name(s) and Date(s)

SE3205NE 1970 1:1,250	SE3305NW 1974 1:1,250
SE3205SE 1970 1:1,250	SE3305SW 1970 1:1,250

Historical Map - Segment A13



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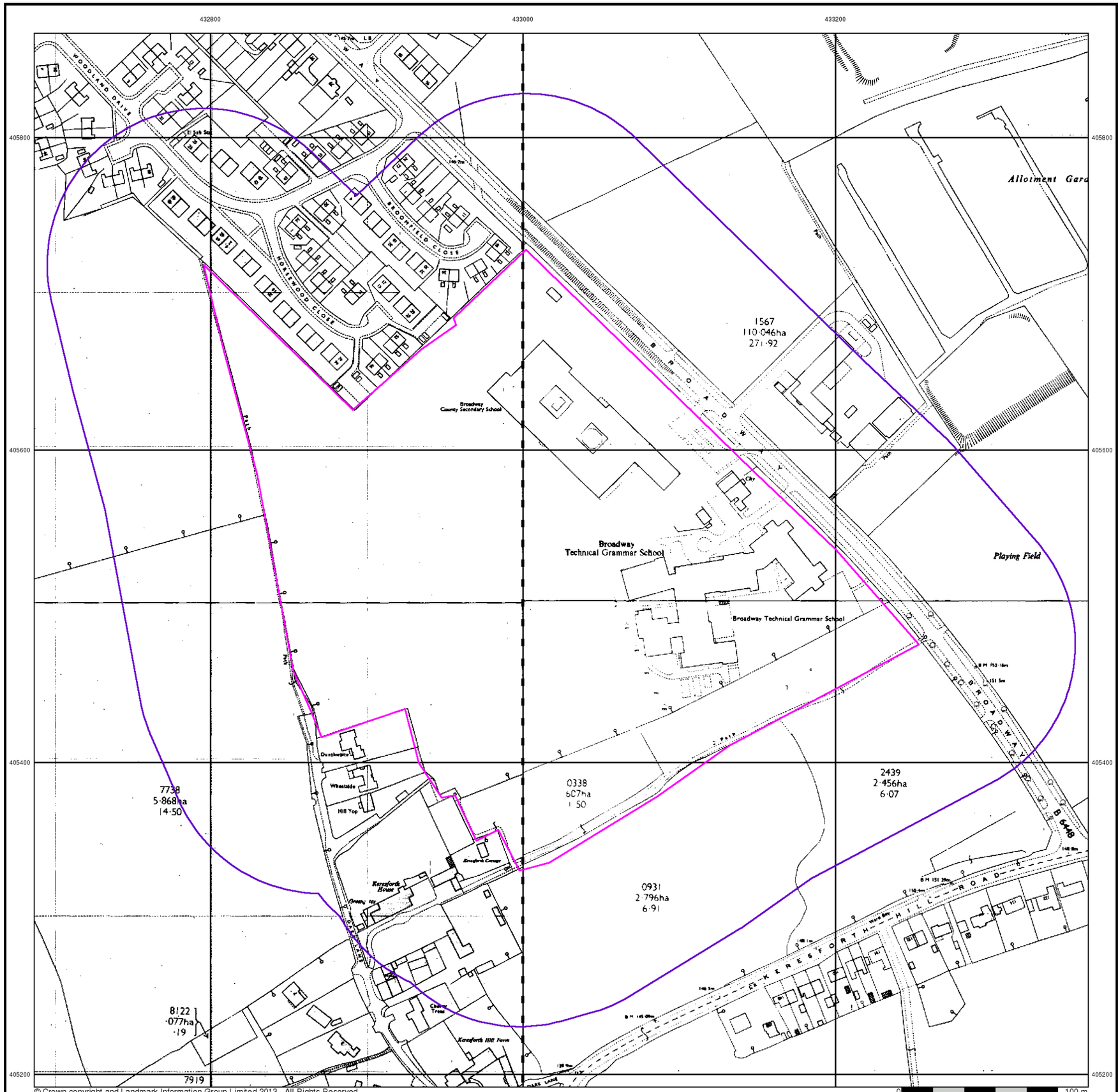

RSK

Ordnance Survey Plan

Published 1971

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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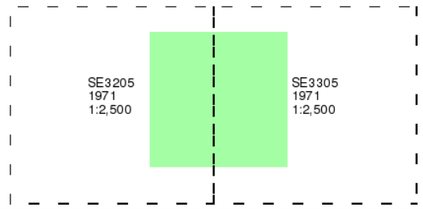
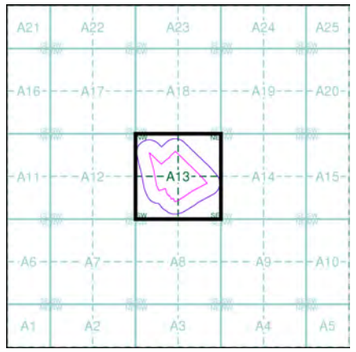


Historical Map - Segment A13



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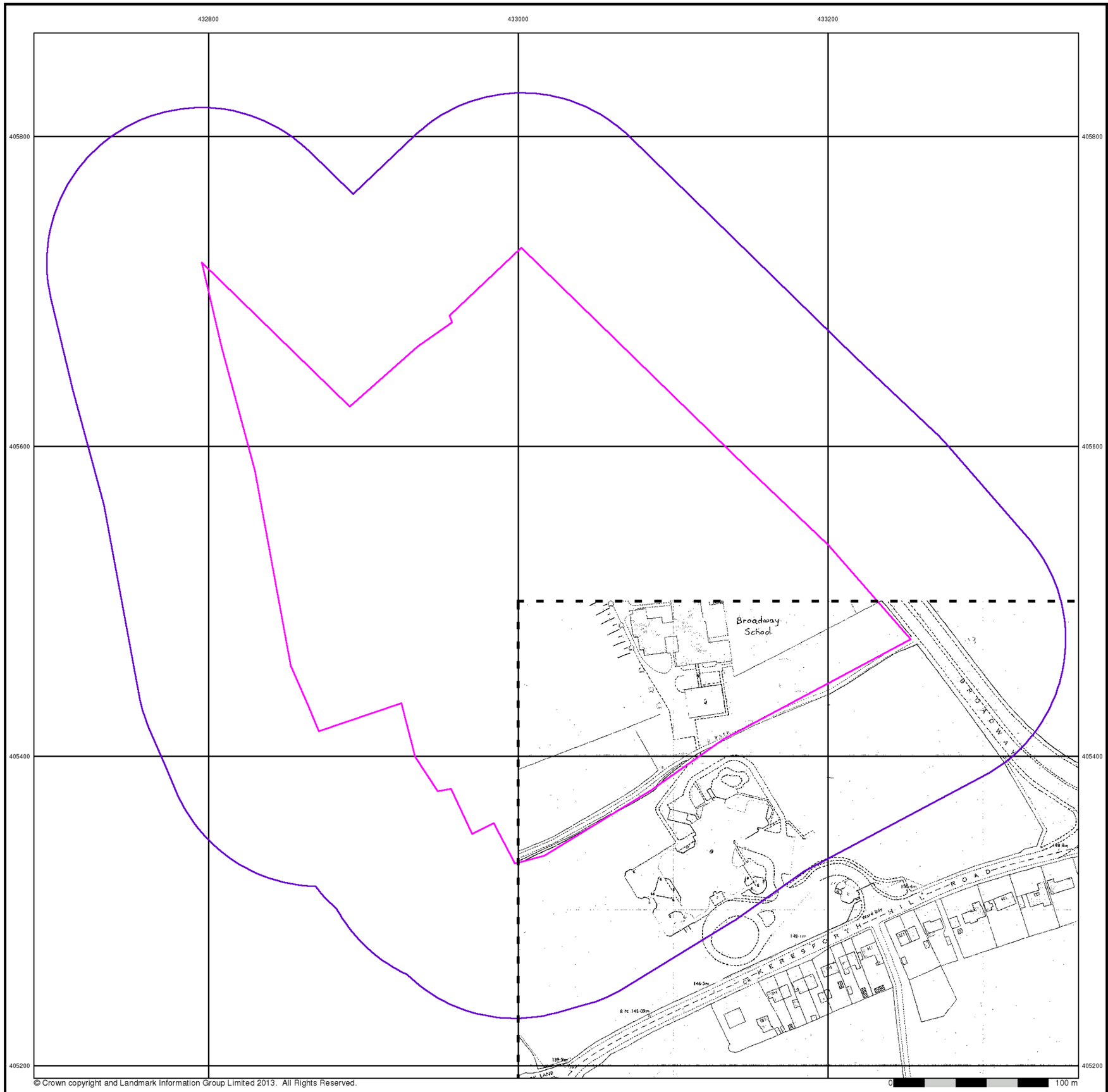


RSK

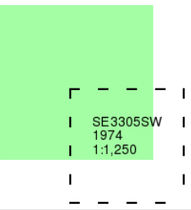
Supply of Unpublished Survey Information

Published 1974

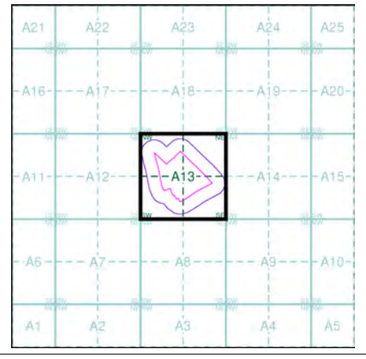
Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a `work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



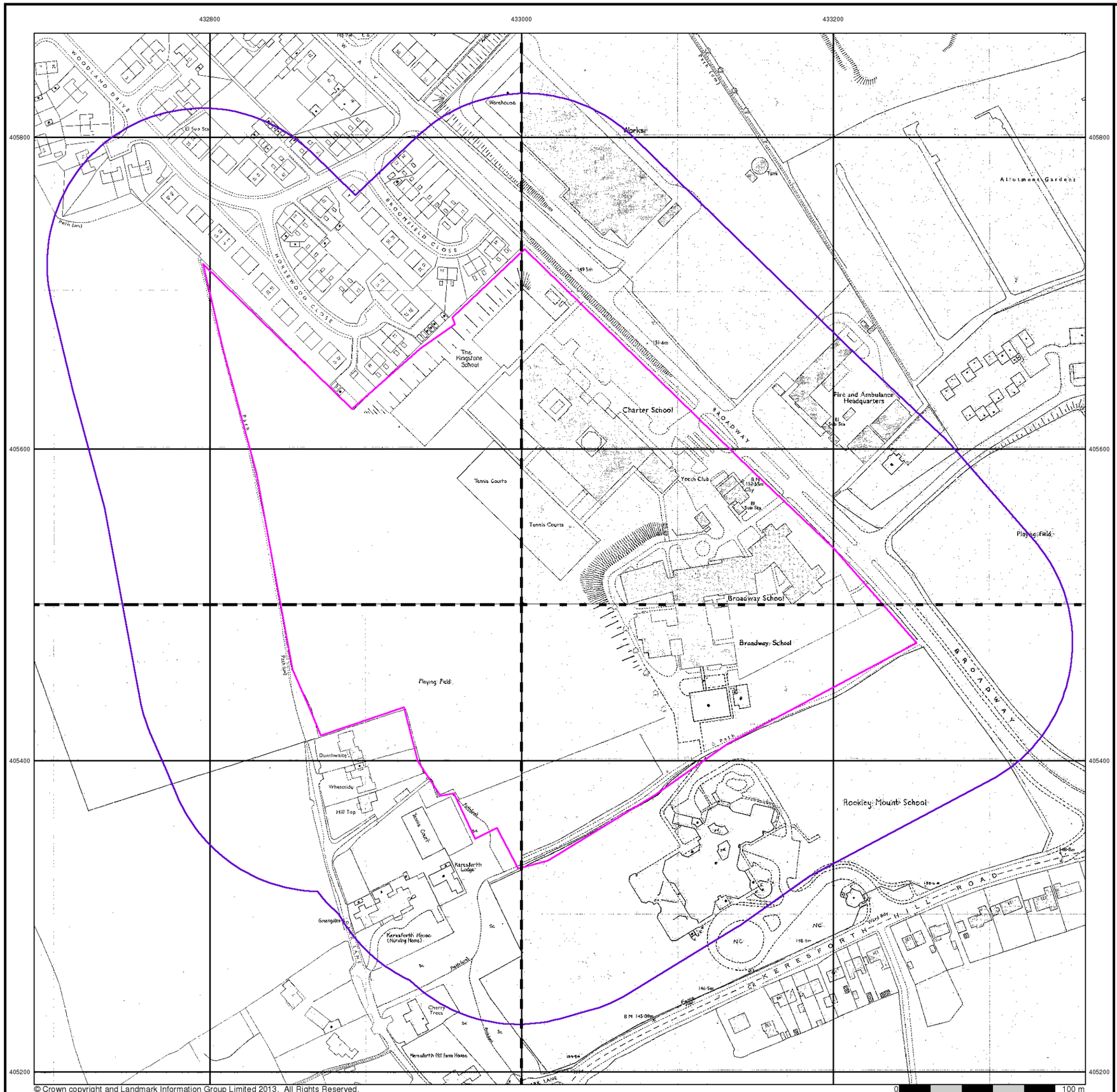
Order Details

Order Number:	49487972_1_1
Customer Ref:	301285
National Grid Reference:	433000, 405540
Slice:	A
Site Area (Ha):	9.62
Search Buffer (m):	100

Site Details

Kingstone School, Broadway, BARNSLEY, South Yorkshire, S706RB

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



RSK

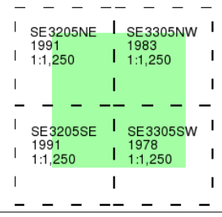
Additional SIMs

Published 1978 - 1991

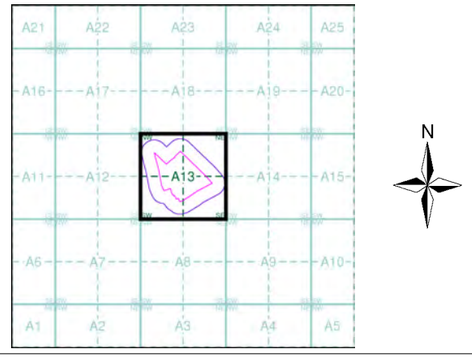
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	49487972_1_1
Customer Ref:	301285
National Grid Reference:	433000, 405540
Slice:	A
Site Area (Ha):	9.62
Search Buffer (m):	100

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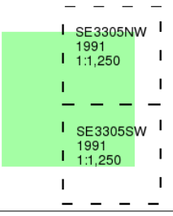
Published 1991

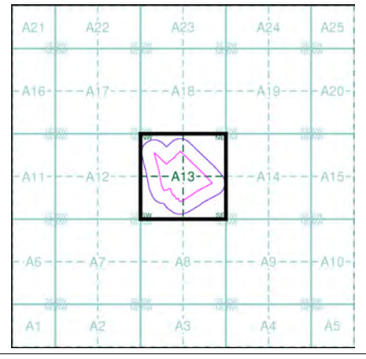
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	49487972_1_1
Customer Ref:	301285
National Grid Reference:	433000, 405540
Slice:	A
Site Area (Ha):	9.62
Search Buffer (m):	100

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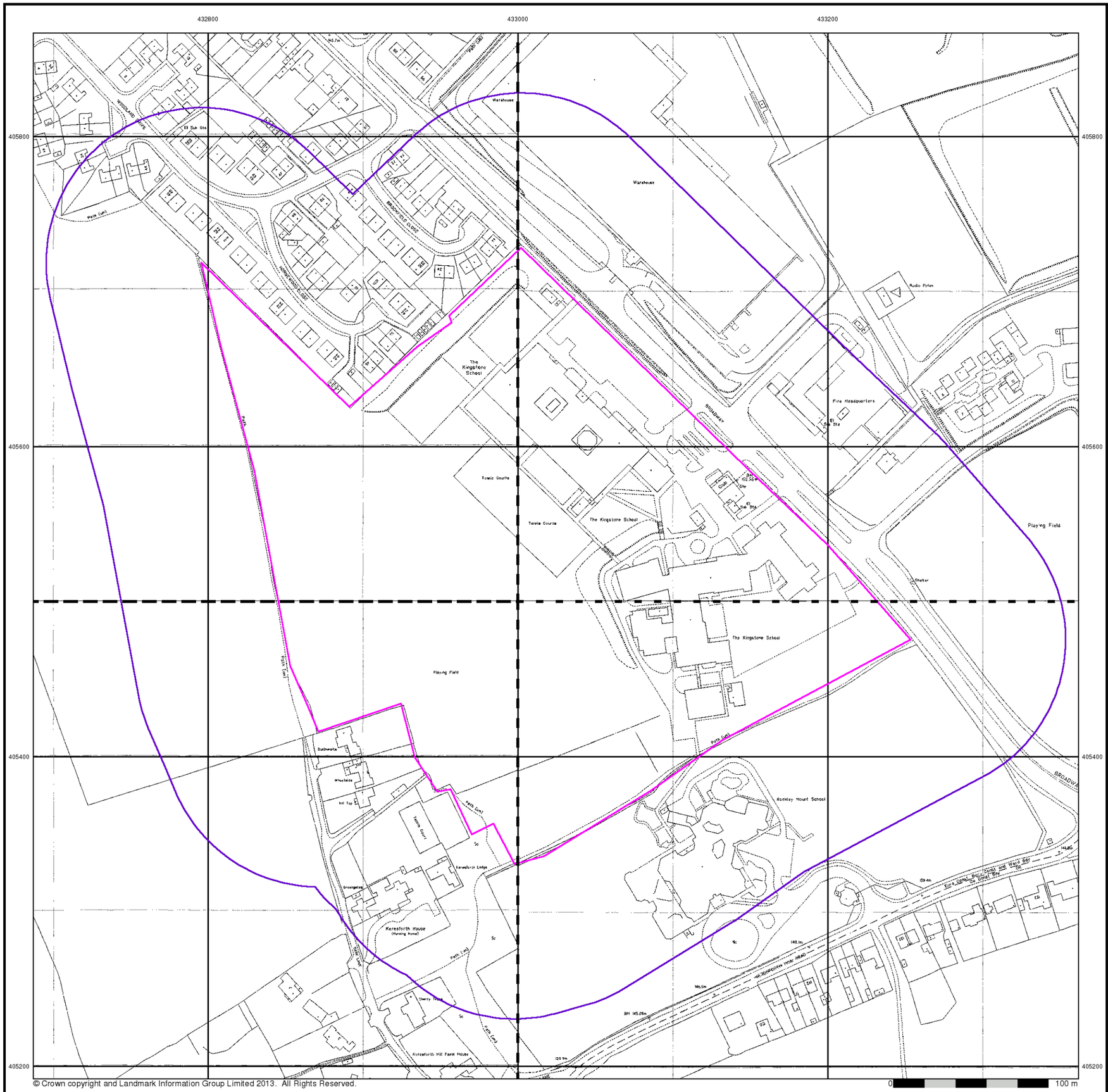


RSK

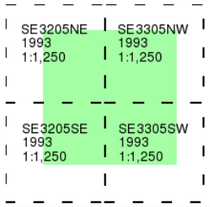
Large-Scale National Grid Data

Published 1993

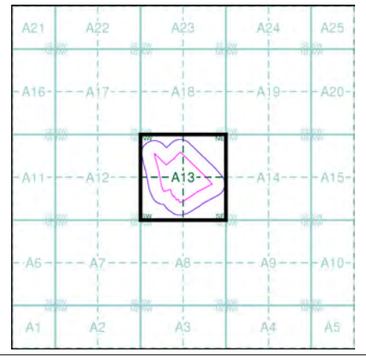
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	49487972_1_1
Customer Ref:	301285
National Grid Reference:	433000, 405540
Slice:	A
Site Area (Ha):	9.62
Search Buffer (m):	100

Site Details

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APPENDIX G
RISK ASSESSMENT METHODOLOGY

CLR11 outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. Under CLR11, three stages of risk assessment exist: preliminary, generic quantitative and detailed quantitative. An outline conceptual model should be formed at the preliminary risk assessment stage that collates all the existing information pertaining to a site in text, tabular or diagrammatic form. The outline conceptual model identifies potentially complete (termed possible) pollutant linkages (contaminant–pathway–receptor) and is used as the basis for the design of the site investigation. The outline conceptual model is updated as further information becomes available, for example as a result of the site investigation.

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk. RSK has adopted guidance provided in CIRIA C552 for use in the production of conceptual models.

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- highly likely: the event appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution
- likely: it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term
- low likelihood: circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term
- unlikely: circumstances are such that it is improbable the event would occur even in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- severe: short term (acute) risk to human health likely to result in ‘significant harm’ as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in ‘Draft Circular on Contaminated Land’, DETR 2000)
- medium: chronic damage to human health (‘significant harm’ as defined in ‘Draft Circular on Contaminated Land’, DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem

- mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment
- minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the probability of an event occurring and its consequences have been classified, a risk category can be assigned according to the table below.

		Consequences			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly likely**	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low

Definitions of these risk categories are as follows together with an assessment of the further work that may be required:

- Very high: there is a high probability that severe harm could occur or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability; urgent investigation and remediation are likely to be required.
- High: harm is likely to occur. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required. Remedial works may be necessary in the short term and are likely over the long term.
- Moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term.
- Low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild.
- Very low: there is a low possibility that harm could occur and if realised the harm is unlikely to be severe

APPENDIX H
EXPLORATORY HOLE RECORDS

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**PH1**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**152.30**	**E:433137.0 N:405576.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.70	1	ES				MADE GROUND: Stiff dark brown slightly sandy gravelly clay. Gravel is subangular to rounded coarse sandstone, brick and limestone.	(1.40)	
	1.00-1.45	2	SPT	N=4				1.40	
							MADE GROUND: Soft brown gravelly clay. Gravel is angular to subrounded fine to coarse concrete, tarmac and brick.	(0.30)	
								1.70	
							Window sample hole terminated at 1.7m depth due to presence of concrete obstruction.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Groundwater not encountered.
2. Window sample hole terminated at 1.7m on concrete obstruction.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**RP Drilling**	**J Duckering**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**PH2**

Contract Ref:	Start: **23.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	End: **23.09.13**	**153.71**	**E:433097.0 N:405562.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Soft to firm brown grey sandy gravelly clay TOPSOIL. Gravel is angular to subangular fine to coarse sandstone and brick.	0.25	
	0.80	1	ES				MADE GROUND: Soft to stiff brown black sandy gravelly clay. Gravel is angular to subrounded fine to coarse sandstone, brick, ceramics, glass, metal, coal, ash and clinker.	(1.55)	
	1.00-1.45	2	SPT	N=6				1.80	
							Stiff grey mottled orange brown sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse mudstone.	2.00	
	2.00-2.45	3	SPT	N=13			(PENNINE MIDDLE COAL MEASURES FORMATION)		
	2.20	4	D				Thinly laminated weak orange brown SANDSTONE recovered as angular to subangular fine to coarse gravel. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.79)	
	2.70-2.87	5	SPT	N=143*				2.79	
							Window sample hole terminated at 2.79m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Groundwater not encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**RP Drilling**	**J Duckering**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**PH3**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**155.21**	**E:433107.0 N:405532.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.30	1	ES				MADE GROUND: Firm brown sandy gravelly clay. Gravel is angular to subangular coarse concrete, brick, sandstone, ash, clinker, plastic and ceramics.	(0.60) 0.60	
	1.00-1.45	2	SPT	N=8			Firm grey mottled orange brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded sandstone and coal. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.40) 2.00	
	1.80	3	ES						
	2.00-2.45	4	SPT	N=8			Weak orange brown SANDSTONE recovered as clayey sandy subangular medium to coarse gravel. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.91) 2.91	
	2.80-2.91	5	SPT	N=214*					
							Window sample hole terminated at 2.91m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Groundwater not encountered.
2. Window sample hole refused on sandstone.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**RP Drilling**	**J Duckering**	AGS

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**PH4**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**153.30**	**E:433062.0 N:405586.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.30	1	ES				MADE GROUND: Firm brown grey sandy gravelly clay. Gravel is angular to subrounded fine to coarse sandstone, limestone, ash, clinker, ceramics, brick, concrete and polystyrene.	(0.45) 0.45	
	0.70	2	D				Firm grey silty slightly gravelly CLAY. Gravel is subangular medium mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	0.55	
	1.00-1.23	3	SPT	N=120*			Very weak thinly laminated friable grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.68) 1.23	
							Window sample hole terminated at 1.23m depth.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Groundwater not encountered.
2. Window sample hole refused on mudstone.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**RP Drilling**	**J Duckering**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**PH5**

Contract Ref:	Start: **23.09.13** End: **23.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285		**153.04**	**E:432953.0 N:405396.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.10	1	ES				Soft to firm light brown slightly sandy slightly gravelly clay TOPSOIL with occasional roots and rootlets. Gravel is subangular medium sandstone.	0.15	
	0.60	2	D				Firm to stiff grey mottled orange brown slightly gravelly CLAY. Gravel is subangular fine to coarse mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.65)	
	1.20	3	D				Very weak thinly laminated brown MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	0.80	
								(1.20)	
							Window sample hole terminated at 2.00m depth.	2.00	

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Groundwater not encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**RP Drilling**	**J Duckering**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**PH5A**

Contract Ref:	Start: **23.09.13** End: **23.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285		**153.25**	**E:432964.0 N:405400.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Soft to firm light brown slightly sandy slightly gravelly clay TOPSOIL with occasional roots and rootlets. Gravel is subangular medium sandstone.	0.15	
							Firm to stiff grey mottled orange brown slightly gravelly CLAY. Gravel is subangular fine to coarse mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.65)	
								0.80	
							Very weak thinly laminated brown MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	1.00	
							Window sample hole terminated at 1.00m depth.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Groundwater not encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**RP Drilling**	**J Duckering**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**PH6**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**153.03**	**E:432990.0 N:405589.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.20	1	ES				MADE GROUND: Firm brown sandy gravelly clay. Gravel is subangular to rounded fine to coarse sandstone, brick, ceramics, plastic and ash.	(0.30)	
								0.30	
	0.40	2	ES				0.20m - 0.30m, roadstone gravel and builders sand. MADE GROUND: Loose? black subangular medium gravel of clinker, ash and tarmac.	0.50	
							Firm grey mottled orange brown slightly gravelly CLAY with occasional sandstone lenses/ flags. Gravel is subangular coarse sandstone and mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.90)	
	1.00-1.45	3	SPT	N=7					
	1.00	4	ES					1.40	
							Soft to firm grey mottled orange brown slightly gravelly CLAY. Gravel is subangular fine to coarse sandstone, mudstone and coal. (PENNINE MIDDLE COAL MEASURES FORMATION)		
	1.80	5	D						
	2.00-2.45	6	SPT	N=9				(2.05)	
	3.00-3.45	7	SPT	N=39			3.00m, Firm.		
								3.45	
							Window sample hole terminated at 3.45m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Groundwater not encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**RP Drilling**	**J Duckering**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**PH7**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**153.11**	**E:432971.0 N:405652.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.30	1	ES				MADE GROUND: Firm orange brown gravelly clay. Gravel is subangular coarse sandstone and brick.	(0.45)	
							0.35m to 0.45m, brick and limestone gravel.	0.45	
	0.80	2	D				Firm orange brown gravelly CLAY with occasional sandstone boulders. Gravel is subangular fine to medium mudstone and coal. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.55)	
	1.00-1.45	3	SPT	N=10				1.00	
	1.40	4	D				Moderately compact light orange brown clayey gravelly fine to medium SAND. Gravel is subangular medium to coarse sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.50)	
								1.50	
	2.00-2.45	5	SPT	N=7			Firm grey slightly gravelly CLAY. Gravel is subangular fine to medium sandstone, mudstone and coal. (PENNINE MIDDLE COAL MEASURES FORMATION)		
	2.30	6	D					(1.95)	
	3.00-3.45	7	SPT	N=29			2.90m, 50mm band of clayey coal/ mudstone.		
								3.45	
							Window sample hole terminated at 3.45m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Groundwater not encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**RP Drilling**	**J Duckering**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**PH8**

Contract Ref:	Start: **23.09.13** End: **23.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285		**152.95**	**E:433153.0 N:405482.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.50	1	ES				MADE GROUND: Soft to firm brown sandy gravelly clay. Gravel is angular to subrounded fine to coarse sandstone, limestone, brick, coal and ash.	(1.36)	
	1.00-1.36	2	SPT	N=71*				1.36	
							Window sample hole terminated at 1.36m depth due to presence of hard ground.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Groundwater not encountered.
2. Window sample hole terminated on hard ground.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**RP Drilling**	**J Duckering**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**PH9**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**154.80**	**E:433103.0 N:405464.0**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Soft brown slightly sandy gravelly clay TOPSOIL with occasional roots and rootlets. Gravel is subrounded fine to medium sandstone and brick.	0.20	
							MADE GROUND: Firm brown sandy gravelly clay. Gravel is angular to rounded fine to coarse sandstone, brick, clinker, ash and mudstone.	(1.25)	
	1.00-1.45 1.00	1 2	SPT ES	N=3			1.20m to 1.45m, concrete gravel (possible footing) and clay is soft to firm grey mottled orange brown.	1.45	
	1.60-1.71 1.60	3 4	SPT D	N=214*			Very weak thinly laminated light grey MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	1.71	
							Window sample hole terminated at 1.71m depth.		

Drilling Progress and Water Observations					
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Groundwater not encountered.
2. Window sample hole refused on mudstone.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Dando Terrier**	**RP Drilling**	**J Duckering**	AGS

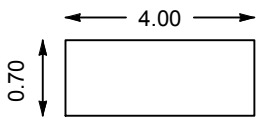
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP1**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**152.20**	**E:433161.0 N:405528.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.30	1	ES	J,J,T			MADE GROUND: Grass over dark brown grey silty slightly gravelly CLAY with rare cobbles of concrete. Gravel is angular to subrounded fine to coarse brick and concrete. 0.60m, up to 500mm concrete boulder encountered.	(1.10) 1.10	
1.20	2	ES	J,J,T			Siff orange brown mottled yellow/buff silty sandy CLAY. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.80) 1.90	
						Recovered as compact to very compact orange brown/yellow sandy angular to subangular fine to coarse gravel of SILTSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.30) 2.20	
						Trial pit terminated at 2.20m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**AJordan**	

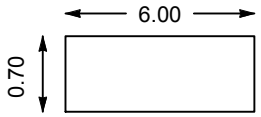
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP2**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**153.41**	**E:433131.0 N:405572.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Compact dark grey/ brown silty sandy angular fine to coarse gravel of brick and clinker.	(2.20)	
						Reinforced concrete slab encountered from 1.20m depth in centre of pit to 2.20m depth in southern end of pit.		
							2.20	
						Trial pit terminated at 2.20m due to presence of concrete obstruction.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**AJordan**	

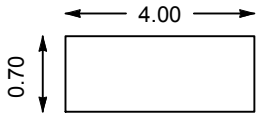
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP3**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**153.20**	**E:433041.0 N:405623.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Re-seeded grass over moderately compact brown silty slightly gravelly SAND. Gravel is angular to subangular fine to coarse concrete.	(0.30)	
0.30	1	ES	J,J,T			0.30m, with occasional concrete boulders.	0.30	
						Recovered as compact friable grey silty angular to subangular fine to coarse gravel of MUDSTONE with rare ironstone nodules. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.90)	
						Trial pit terminated at 2.20m.	2.20	

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**AJordan**	

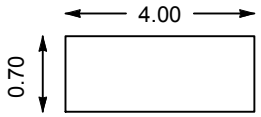
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP4**

Contract Ref:	Start: **23.09.13** End: **23.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285		**152.09**	**E:433016.0 N:405686.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES	J,J,T			MADE GROUND: Re-seeded grass over moderately compact dark brown silty clayey slightly gravelly SAND. Gravel is angular fine to coarse mudstone and sandstone.	0.20	
						Stiff orange brown mottled grey silty CLAY. (PENNINE MIDDLE COAL MEASURES FORMATION)	0.40	
0.60	2	ES	J,J,T			Recovered as compact orange brown silty sandy angular fine to coarse gravel of SANDSTONE with occasional pockets of firm to stiff orange/grey silty clay. (PENNINE MIDDLE COAL MEASURES FORMATION) 0.40m to 0.60m, 6" pipe set in concrete and slight diesel odour encountered.	(2.40)	
						Trial pit terminated at 2.80m due to difficulty of excavation.	2.80	

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**AJordan**	

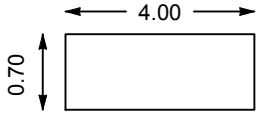
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP5**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**152.98**	**E:432963.0 N:405625.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Re-seeded grass over grey brown silty clayey medium grained sand with rootlets.	0.20	
						MADE GROUND: Compact buff brown angular fine to coarse red/brown sand with pockets of angular ash and clinker.	(0.40)	
							0.60	
1.00	1.3	D				Firm to stiff grey mottled brown silty CLAY with occasional nodules of orange brown ironstone with occasional angular boulders of ironstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.70)	
							1.30	
						Stiff grey silty slightly gravelly CLAY. Gravel is angular to subrounded fine siltstone and coal. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.90)	
						2.80m to 3.00m, thin bands of coal.		
							3.20	
						Trial pit terminated at 3.20m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. Groundwater encountered as slow seepages at 1.2m and 3.0m.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**AJordan**	

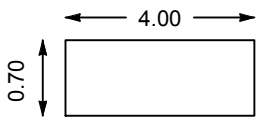
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP6**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**23.09.13** End: **23.09.13**	**153.26**	**E:433006.0 N:405629.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Re-seeded grass over moderately compact brown silty gravelly sand. Gravel is angular fine to coarse brick, polystyrene and plastic sheeting.	(0.60) 0.60	
						Firm to stiff grey mottled brown silty CLAY with occasional nodules of orange brown ironstone with occasional angular boulders of ironstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(2.20) 2.80	
						Trial pit terminated at 2.80m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**AJordan**	

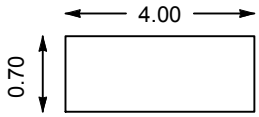
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP7**

Contract Ref:	Start: **23.09.13** End: **23.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285		**153.18**	**E:433021.0 N:405574.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Grass over compact brown silty gravelly sand with occasional bricks. Gravel is angular fine to coarse sandstone, mudstone and brick.	(0.40) 0.40	
						MADE GROUND: Compact orange/buff gravelly fine to coarse sand. Gravel is angular fine to coarse sandstone and mudstone.	0.60	
0.60	1	ES	T,T,J			Black massive COAL. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.30) 0.90	
						Firm to stiff grey mottled brown CLAY. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.30) 1.20	
						0.90m to 1.20m, concrete footing encountered.		
						Strong grey/brown fissile silty MUDSTONE. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.00) 2.20	
						Trial pit terminated at 2.20m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**AJordan**	

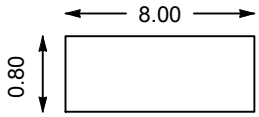
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP8**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13** End: **24.09.13**	**153.11**	**E:433104.0 N:405583.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Re-seeded grass over mid to dark brown silty gravelly sand. Gravel is angular fine to coarse brick and concrete.	(0.30)	
							0.30	
0.35	1	ES	J,J,T			0.20m to 0.30m, discontinuous lens of black ashy sand with tarmac fragments.		
						MADE GROUND: Compact buff angular fine to coarse gravel of sandstone and mudstone.	(0.40)	
							0.70	
						MADE GROUND: Compact red brown angular fine to coarse gravel of sandstone and mudstone.	0.80	
						MADE GROUND: Compact orange brown angular fine to coarse silty sandy GRAVEL of siltstone and sandstone. Brick wall encountered in centre of pit, set on a concrete base - basement infilled with moderately compact brown angular fine to coarse sand with clinker fragments. 8x reinforced concrete slabs encountered (approximately 0.9mx0.4mx0.2m in size). 1.00m, fibreglass pipe lagging encountered.	(1.10)	
							1.90	
						Trial pit terminated at 1.90m due to presence of concrete slab obstruction.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.
3. Trial pit terminated at 1.9m depth due to presence of concrete obstruction.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**AJordan**	

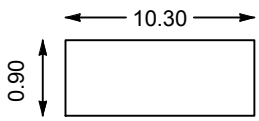
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP9**

Contract Ref:	Start: **24.09.13** End: **24.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285		**153.21**	**E:433078.0 N:405601.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.30	1	ES	T,J,V			MADE GROUND: Soft to firm brown slightly sandy gravelly CLAY. Gravel is angular to rounded fine to coarse sandstone, brick, glass, tarmac, ceramics and concrete.	(0.70)	
0.70	2	D				Service trench encountered in pit, including hardcore in north end of pit, polystyrene blocks and clay piping cross-cutting the centre of the pit and a yellow plastic gas pipe cross-cutting the south end of the pit.	0.70 0.90	
						Firm orange brown sandy gravelly CLAY with occasional sandstone boulders. Gravel is angular to subangular fine to coarse sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION)		
						Trial pit terminated at 0.90m due to risk of possible service strike.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

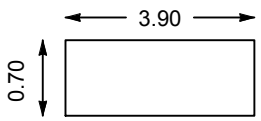
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP10**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13** End: **24.09.13**	**155.90**	**E:433063.0 N:405534.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Brown slightly sandy gravelly clay TOPSOIL. Gravel is angular to subrounded fine to coarse sandstone and mudstone.	0.25	
						Friable grey brown orange stained MUDSTONE with occasional rounded cobbles (approximately 150mm) of ironstone nodules with conchoidal weathering. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.85)	
1.00		V	c_u=86/88/88				1.10	
1.10	1	D				Trial pit terminated at 1.10m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

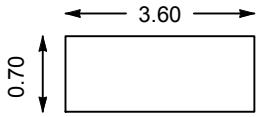
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP11**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13**	**155.20**	**E:433050.0 N:405502.0**	**1** of **1**
	End: **24.09.13**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Brown slightly sandy gravelly clay TOPSOIL. Gravel is angular to subrounded fine to coarse sandstone and mudstone.	0.15	
						Friable grey brown orange stained MUDSTONE with occasional rounded cobbles (approximately 150mm) of ironstone nodules with conchoidal weathering and with occasional 30mm to 40mm bands of iron-rich mudstone/siltstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.95)	
1.00		V	c_u=110/94/>130				1.10	
						Trial pit terminated at 1.10m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

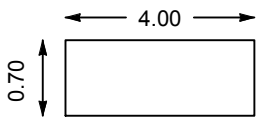
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP12**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13** End: **24.09.13**	**155.05**	**E:433072.0 N:405464.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Brown slightly sandy gravelly clay TOPSOIL. Gravel is angular to subrounded fine to coarse sandstone and mudstone.	0.20	
0.50	1	D				Stiff grey mottled orange brown gravelly CLAY. Gravel is angular to subangular fine to coarse mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.80)	
1.00		V	c_u=>130				1.00	
						Trial pit terminated at 1.00m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.
3. Hand vane attempted at 1.0m; no penetration (>130kpa).

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

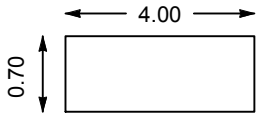
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP13**

Contract Ref:	Start: **24.09.13** End: **24.09.13**	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285		**155.85**	**E:433089.0 N:405493.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Re-seeded sparse grass over moderately compact brown silty clayey slightly gravelly sand. Gravel is angular fine to coarse sandstone, mudstone and occasional brick.	(0.60) 0.60	
						MADE GROUND: Compact orange brown silty sandy angular fine to coarse gravel of sandstone and siltstone. 0.60m, 6" drainage pipe set in concrete and single concrete boulder (up to 500mm) encountered.	0.70	
						Weak thinly laminated fissile grey sandy silty clayey MUDSTONE with occasional lenses of stiff grey brown clay. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.00) 1.70	
						Trial pit terminated at 1.70m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**AJordan**	

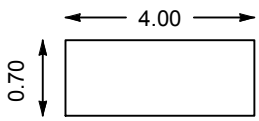
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP14**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13** End: **24.09.13**	**153.53**	**E:433144.0 N:405445.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Firm brown sandy gravelly clay. Gravel is angular to rounded fine to medium sandstone, brick, clinker, ash and mudstone.	(1.60)	
						1.00m to 1.60m, black ash, clinker and tarmac gravel.	1.60	
2.00	1	D				Firm to stiff grey and orange brown gravelly CLAY. Gravel is subangular fine to medium siltstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.60)	
						Grey brown thinly to thickly interlaminated MUDSTONE and siltstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	2.20	
						Trial pit terminated at 2.40m.	2.40	

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

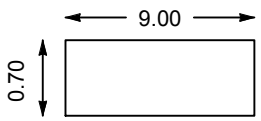
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP15**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13** End: **24.09.13**	**153.10**	**E:432960.0 N:405401.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES	T,J,V			Soft to firm light brown slightly sandy slightly gravelly clay TOPSOIL with occasional roots and rootlets. Gravel is subangular medium sandstone.	0.20	
						Firm to stiff grey mottled orange brown slightly gravelly CLAY. Gravel is subangular fine to coarse mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	0.30	
						Trial pit terminated at 0.30m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

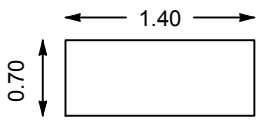
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP16**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13** End: **24.09.13**	**153.83**	**E:432984.0 N:405450.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.15	1	ES	T,J,V			Soft to firm light brown slightly sandy slightly gravelly clay TOPSOIL with occasional roots and rootlets. Gravel is subangular medium sandstone.	0.20	
						Firm to stiff grey mottled orange brown slightly gravelly CLAY. Gravel is subangular fine to coarse mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	0.30	
						Trial pit terminated at 0.30m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

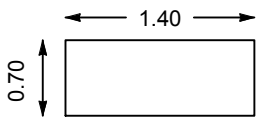
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP17**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13** End: **24.09.13**	**152.53**	**E:432937.0 N:405499.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.15	1	ES	T,J,V			Soft to firm light brown slightly sandy slightly gravelly clay TOPSOIL with occasional roots and rootlets. Gravel is subangular medium sandstone.	0.25	
						Firm to stiff grey mottled orange brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to medium sandstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	0.30	
						Trial pit terminated at 0.30m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

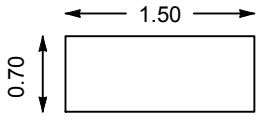
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP18**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13** End: **24.09.13**	**151.95**	**E:432885.0 N:405543.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES	T,J,V			Soft to firm light brown slightly sandy slightly gravelly clay TOPSOIL with occasional roots and rootlets. Gravel is subangular medium sandstone.	(0.70)	
							0.70	
						Stiff orange brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse sandstone and mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	0.90	
						0.70m, land drain encountered (dry).		
						Trial pit terminated at 0.90m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

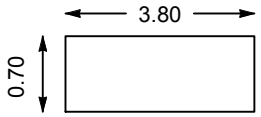
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP19**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13**	**152.83**	**E:432955.0 N:405578.0**	**1** of **1**
	End: **24.09.13**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Soft to firm brown slightly sandy slightly gravelly clay TOPSOIL. Gravel is subangular to subrounded fine to medium sandstone.	0.25	
						Recovered as firm to stiff orange brown sandy subrounded fine to medium gravel of SANDSTONE and occasional coal. (PENNINE MIDDLE COAL MEASURES FORMATION)	(0.85)	
1.10		V	c_u=36/46/40				1.10	
1.20	1	D				Firm grey gravelly CLAY. Gravel is subangular fine to coarse mudstone. (PENNINE MIDDLE COAL MEASURES FORMATION)	(1.40)	
							2.50	
						Trial pit terminated at 2.50m.		

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. Groundwater encountered as slow seepages at 1.0m and 2.0m depth.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

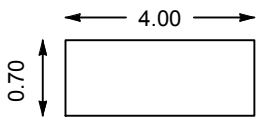
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Kingstone School, Barnsley	**Taylor Wimpey Yorkshire**	**TP20**

Contract Ref:	Start:	Ground Level (m AOD):	National Grid Co-ordinate:	Sheet:
301285	**24.09.13** End: **24.09.13**	**153.07**	**E:432981.0 N:405548.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Soft to firm brown slightly sandy slightly gravelly clay TOPSOIL. Gravel is subangular to subrounded fine to medium sandstone.	0.25	
						Very stiff grey mottled orange brown CLAY with some sandstone bands (up to 100mm) and occasional thin bands and pockets of coal. (PENNINE MIDDLE COAL MEASURES FORMATION)	(2.35)	
1.20		V	c_u=94/102/90					
2.40		V	c_u=105/70/80					
						Trial pit terminated at 2.60m.	2.60	

Plan (Not to Scale)



General Remarks

1. Sides stable throughout excavation.
2. No groundwater encountered.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**J Duckering**	

APPENDIX I
GROUND GAS MONITORING DATA

IN-SITU GAS MONITORING RESULTS

[Pressures]	Previous	During	Start	End	Equipment Used & Remarks
Round 1	Falling	Falling	991	988	Dipmeter 30m + GFM435 + Weather: Wet, foggy + Wind: Medium
Round 2	Falling	Falling	971	968	Dipmeter 30m + GFM435 + Weather: Wet, sunny + Wind: Strong

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
PH1	1	50	1	1.70	1.97	0.70 to 1.70	03/10/2013 08:45:00	0	991	<0.1	DRY	0.1	<0.1	20.1	<0.1	0.0	0.0
PH1	1	50	1		---	0.70 to 1.70	15 secs	0	991	<0.1	-	<0.1	<0.1	16.8	<0.1	0.0	0.0
PH1	1	50	1		---	0.70 to 1.70	30 secs	0	991	<0.1	-	<0.1	<0.1	15.6	<0.1	0.0	0.0
PH1	1	50	1		---	0.70 to 1.70	60 secs	0	991	<0.1	-	<0.1	<0.1	15.3	<0.1	0.0	0.0
PH1	1	50	1		---	0.70 to 1.70	90 secs	-	-	-	-	<0.1	<0.1	14.9	<0.1	0.0	0.0
PH1	1	50	1		---	0.70 to 1.70	120 secs	-	-	-	-	<0.1	<0.1	15.2	<0.1	0.0	0.0
PH1	1	50	1		---	0.70 to 1.70	180 secs	-	-	-	-	<0.1	<0.1	14.5	<0.1	0.0	0.0
PH1	1	50	2	1.70	1.96	0.70 to 1.70	28/10/2013 13:30:00	0	971	<0.1	DRY	<0.1	<0.1	20.7	<0.1	0.0	0.0
PH1	1	50	2		---	0.70 to 1.70	15 secs	0	971	<0.1	-	0.1	<0.1	17.3	<0.1	0.0	0.0
PH1	1	50	2		---	0.70 to 1.70	30 secs	0	971	<0.1	-	0.2	<0.1	14.6	<0.1	0.0	0.0
PH1	1	50	2		---	0.70 to 1.70	60 secs	0	971	<0.1	-	0.2	<0.1	14.4	<0.1	0.0	0.0
PH1	1	50	2		---	0.70 to 1.70	90 secs	-	-	-	-	0.2	<0.1	14.1	<0.1	0.0	0.0
PH1	1	50	2		---	0.70 to 1.70	120 secs	-	-	-	-	0.2	<0.1	14.0	<0.1	0.0	0.0
PH1	1	50	2		---	0.70 to 1.70	180 secs	-	-	-	-	0.2	<0.1	14.0	<0.1	0.0	0.0
PH2	1	50	1	2.00	2.01	0.50 to 2.00	03/10/2013 09:00:00	0	990	<0.1	DRY	0.4	<0.1	20.3	<0.1	0.0	0.0
PH2	1	50	1		---	0.50 to 2.00	15 secs	0	990	<0.1	-	4.3	<0.1	15.5	<0.1	0.0	0.0
PH2	1	50	1		---	0.50 to 2.00	30 secs	0	990	<0.1	-	4.3	<0.1	15.0	<0.1	0.0	0.0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
12 Royal Scot Road
Pride Park
Derby
DE24 8AJ

Compiled By	Date	Checked By	Date	Contract Ref:
	08/11/13			301285

Contract: **Kingstone School, Barnsley**

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
PH2	1	50	1		---	0.50 to 2.00	60 secs	0	990	<0.1	-	4.4	<0.1	14.8	<0.1	0.0	0.0
PH2	1	50	1		---	0.50 to 2.00	90 secs	-	-	-	-	4.5	<0.1	14.8	<0.1	0.0	0.0
PH2	1	50	1		---	0.50 to 2.00	120 secs	-	-	-	-	4.4	<0.1	14.9	<0.1	0.0	0.0
PH2	1	50	1		---	0.50 to 2.00	180 secs	-	-	-	-	4.4	<0.1	14.9	<0.1	0.0	0.0
PH2	1	50	1		---	0.50 to 2.00	240 secs	-	-	-	-	4.4	<0.1	15.0	<0.1	0.0	0.0
PH2	1	50	2	2.00	1.98	0.50 to 2.00	28/10/2013 13:40:00	0	968	<0.1	DRY	<0.1	<0.1	19.4	<0.1	0.0	0.0
PH2	1	50	2		---	0.50 to 2.00	15 secs	0	968	<0.1	-	1.5	<0.1	19.4	<0.1	0.0	0.0
PH2	1	50	2		---	0.50 to 2.00	30 secs	0	968	<0.1	-	2.0	<0.1	19.1	<0.1	0.0	0.0
PH2	1	50	2		---	0.50 to 2.00	60 secs	0	968	<0.1	-	2.1	<0.1	19.1	<0.1	0.0	0.0
PH2	1	50	2		---	0.50 to 2.00	90 secs	-	-	-	-	2.1	<0.1	19.1	<0.1	0.0	0.0
PH2	1	50	2		---	0.50 to 2.00	120 secs	-	-	-	-	2.0	<0.1	19.2	<0.1	0.0	0.0
PH2	1	50	2		---	0.50 to 2.00	180 secs	-	-	-	-	2.0	<0.1	19.2	<0.1	0.0	0.0
PH3	1	50	1	2.80	2.70	0.80 to 2.80	03/10/2013 09:15:00	0	989	<0.1	DRY	0.1	<0.1	19.7	<0.1	0.0	0.0
PH3	1	50	1		---	0.80 to 2.80	15 secs	0	989	<0.1	-	0.5	<0.1	20.0	<0.1	0.0	0.0
PH3	1	50	1		---	0.80 to 2.80	30 secs	0	989	<0.1	-	0.6	<0.1	19.6	<0.1	0.0	0.0
PH3	1	50	1		---	0.80 to 2.80	60 secs	0	989	<0.1	-	0.6	<0.1	19.3	<0.1	0.0	0.0
PH3	1	50	1		---	0.80 to 2.80	90 secs	-	-	-	-	0.6	<0.1	19.2	<0.1	0.0	0.0
PH3	1	50	1		---	0.80 to 2.80	120 secs	-	-	-	-	0.6	<0.1	19.2	<0.1	0.0	0.0
PH3	1	50	1		---	0.80 to 2.80	180 secs	-	-	-	-	0.7	<0.1	19.2	<0.1	0.0	0.0
PH3	1	50	1		---	0.80 to 2.80	240 secs	-	-	-	-	0.7	<0.1	19.1	<0.1	0.0	0.0
PH3	1	50	2	2.80	2.68	0.80 to 2.80	28/10/2013 13:55:00	0	968	<0.1	DRY	0.1	<0.1	20.1	<0.1	0.0	0.0
PH3	1	50	2		---	0.80 to 2.80	15 secs	0	968	<0.1	-	1.5	<0.1	19.5	<0.1	0.0	0.0
PH3	1	50	2		---	0.80 to 2.80	30 secs	0	968	<0.1	-	1.9	<0.1	18.9	<0.1	0.0	0.0
PH3	1	50	2		---	0.80 to 2.80	60 secs	0	968	<0.1	-	2.2	<0.1	18.4	<0.1	0.0	0.0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
PH3	1	50	2		---	0.80 to 2.80	90 secs	-	-	-	-	2.2	<0.1	18.3	<0.1	0.0	0.0
PH3	1	50	2		---	0.80 to 2.80	120 secs	-	-	-	-	2.3	<0.1	18.3	<0.1	0.0	0.0
PH3	1	50	2		---	0.80 to 2.80	180 secs	-	-	-	-	2.3	<0.1	18.3	<0.1	0.0	0.0
PH6	1	50	1	3.00	2.94	1.00 to 3.00	03/10/2013 09:30:00	0	989	<0.1	DRY	1.3	<0.1	19.4	<0.1	0.0	0.0
PH6	1	50	1		---	1.00 to 3.00	15 secs	0	989	<0.1	-	1.9	<0.1	17.6	<0.1	0.0	0.0
PH6	1	50	1		---	1.00 to 3.00	30 secs	0	989	<0.1	-	2.1	<0.1	16.7	<0.1	0.0	0.0
PH6	1	50	1		---	1.00 to 3.00	60 secs	0	989	<0.1	-	2.5	<0.1	16.5	<0.1	0.0	0.0
PH6	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	2.9	<0.1	16.4	<0.1	0.0	0.0
PH6	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	4.5	<0.1	15.8	<0.1	0.0	0.0
PH6	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	5.7	<0.1	15.3	<0.1	0.0	0.0
PH6	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	6.5	<0.1	15.0	<0.1	0.0	0.0
PH6	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	6.3	<0.1	15.2	<0.1	0.0	0.0
PH6	1	50	2	3.00	2.91	1.00 to 3.00	28/10/2013 14:13:00	0	968	<0.1	2.35	0.1	<0.1	16.3	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	15 secs	0	968	<0.1	-	12.5	<0.1	8.0	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	30 secs	0	968	<0.1	-	13.6	<0.1	4.5	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	60 secs	0	968	<0.1	-	13.3	<0.1	5.1	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	12.5	<0.1	6.1	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	10.9	<0.1	7.2	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	9.3	<0.1	9.1	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	7.6	<0.1	10.7	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	6.6	<0.1	12.2	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	360 secs	-	-	-	-	5.6	<0.1	13.4	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	420 secs	-	-	-	-	4.8	<0.1	14.4	<0.1	0.0	0.0
PH6	1	50	2		---	1.00 to 3.00	480 secs	-	-	-	-	4.2	<0.1	15.2	<0.1	0.0	0.0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

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Compiled By	Date	Checked By	Date	Contract Ref:
	08/11/13			301285

Contract: **Kingstone School, Barnsley**

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
PH7	1	50	1	3.00	2.96	1.00 to 3.00	03/10/2013 09:45:00	0	-	<0.1	2.61	0.9	<0.1	19.8	<0.1	0.0	0.0
PH7	1	50	1		---	1.00 to 3.00	15 secs	0	-	<0.1	-	1.5	<0.1	17.0	<0.1	0.0	0.0
PH7	1	50	1		---	1.00 to 3.00	30 secs	0	-	<0.1	-	2.2	<0.1	16.0	<0.1	0.0	0.0
PH7	1	50	1		---	1.00 to 3.00	60 secs	0	-	<0.1	-	2.8	<0.1	14.2	<0.1	0.0	0.0
PH7	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	3.5	<0.1	13.9	<0.1	0.0	0.0
PH7	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	4.0	<0.1	12.2	<0.1	0.0	0.0
PH7	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	4.2	<0.1	12.2	<0.1	0.0	0.0
PH7	1	50	2	3.00	2.95	1.00 to 3.00	28/10/2013 14:33:00	0	-	<0.1	1.80	0.2	<0.1	19.7	<0.1	0.0	0.0
PH7	1	50	2		---	1.00 to 3.00	15 secs	0	-	<0.1	-	2.8	<0.1	12.0	<0.1	0.0	0.0
PH7	1	50	2		---	1.00 to 3.00	30 secs	0	-	<0.1	-	3.1	<0.1	7.4	<0.1	0.0	0.0
PH7	1	50	2		---	1.00 to 3.00	60 secs	0	-	<0.1	-	3.4	<0.1	6.0	<0.1	0.0	0.0
PH7	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	3.5	<0.1	5.7	<0.1	0.0	0.0
PH7	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	3.6	<0.1	5.6	<0.1	0.0	0.0
PH7	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	3.6	<0.1	5.4	<0.1	0.0	0.0
PH9	1	50	1	1.20	1.14	0.20 to 1.20	03/10/2013 10:10:00	0	-	<0.1	DRY	<0.1	<0.1	20.4	<0.1	0.0	0.0
PH9	1	50	1		---	0.20 to 1.20	15 secs	0	-	<0.1	-	0.7	<0.1	3.0	<0.1	0.0	0.0
PH9	1	50	1		---	0.20 to 1.20	30 secs	0	-	<0.1	-	0.7	<0.1	3.0	<0.1	0.0	0.0
PH9	1	50	1		---	0.20 to 1.20	60 secs	0	-	<0.1	-	0.6	<0.1	1.3	<0.1	0.0	0.0
PH9	1	50	1		---	0.20 to 1.20	90 secs	-	-	-	-	0.8	<0.1	0.4	<0.1	0.0	0.0
PH9	1	50	1		---	0.20 to 1.20	120 secs	-	-	-	-	0.7	<0.1	0.3	<0.1	0.0	0.0
PH9	1	50	1		---	0.20 to 1.20	180 secs	-	-	-	-	0.6	<0.1	0.1	<0.1	0.0	0.0
PH9	1	50	1		---	0.20 to 1.20	240 secs	-	-	-	-	0.5	<0.1	0.1	<0.1	0.0	0.0
PH9	1	50	2	1.20	1.14	0.20 to 1.20	28/10/2013 14:03:00	0	-	<0.1	DRY	0.2	<0.1	20.3	<0.1	0.0	0.0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
12 Royal Scot Road
Pride Park
Derby
DE24 8AJ

Compiled By	Date	Checked By	Date	Contract Ref:
	08/11/13			301285

Contract: **Kingstone School, Barnsley**

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
PH9	1	50	2		---	0.20 to 1.20	15 secs	0	-	<0.1	-	0.8	<0.1	7.2	<0.1	0.0	0.0
PH9	1	50	2		---	0.20 to 1.20	30 secs	0	-	<0.1	-	0.8	<0.1	1.0	<0.1	0.0	0.0
PH9	1	50	2		---	0.20 to 1.20	60 secs	0	-	<0.1	-	0.8	<0.1	0.3	<0.1	0.0	0.0
PH9	1	50	2		---	0.20 to 1.20	90 secs	-	-	-	-	0.8	<0.1	0.1	<0.1	0.0	0.0
PH9	1	50	2		---	0.20 to 1.20	120 secs	-	-	-	-	0.8	<0.1	<0.1	<0.1	0.0	0.0
PH9	1	50	2		---	0.20 to 1.20	180 secs	-	-	-	-	0.8	<0.1	<0.1	<0.1	0.0	0.0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

RSK Environment Ltd
12 Royal Scot Road
Pride Park
Derby
DE24 8AJ

Compiled By	Date	Checked By	Date
	08/11/13		

Contract Ref: **301285**

Contract: **Kingstone School, Barnsley**

APPENDIX J
LABORATORY CERTIFICATES FOR SOIL ANALYSIS

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 13/04758
Issue Number: 1 **Date:** 22 October, 2013

Client:
RSK Environment Ltd Derby
12 Royal Scot Road
Pride Park
Derby
Derbyshire
UK
DE24 8AJ

Project Manager: Anthony Jordan
Project Name: Kingstone School, Barnsley
Project Ref: 301285
Order No: Not specified
Date Samples Received: 09/10/13
Date Instructions Received: 09/10/13
Date Analysis Completed: 22/10/13

Prepared by:

Melanie Marshall
Laboratory Coordinator

Approved by:

Liz Oliver
Client Service Manager

Envirolab Job Number: 13/04758

Client Project Name: Kingstone School, Barnsley

Client Project Ref: 301285

Lab Sample ID	13/04758/1	13/04758/2	13/04758/3	13/04758/4	13/04758/5	13/04758/6	13/04758/7	13/04758/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	2	1		
Client Sample ID	PH1	PH2	PH3	PH8	PH6	TP8	TP8	TP9		
Depth to Top	0.70	0.80	0.30	0.50	0.40	0.35	1.00	0.30		
Depth To Bottom										
Date Sampled	23-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13	24-Sep-13	24-Sep-13	24-Sep-13		
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Solid	Soil - D	Solid - Fibres	Soil - D		
Sample Matrix Code	6A	6A	6AE	6AE	7	4AE		4A		
% Stones >10mm$_A$ #	4.3	6.7	9.5	0.5	<0.1	16.9	-	11.3	% w/w	A-T-044
Asbestos Matrix (visual)$_A$	-	-	-	-	-	-	N/A	-		Visual
Bulk Fibre Identification$_D$ #	-	-	-	-	-	-	NAD	-		A-T-045
Total Organic Carbon$_D$ M#	-	-	-	1.92	-	-	-	4.08	% w/w	A-T-032s
Arsenic$_D$ #	7	17	10	8	6	23	-	7	mg/kg	A-T-024
Cadmium$_D$ M#	1.3	0.7	1.2	1.5	1.2	1.7	-	1.2	mg/kg	A-T-024
Copper$_D$ M#	50	57	31	28	24	229	-	43	mg/kg	A-T-024
Chromium$_D$ #	48	57	93	41	21	55	-	60	mg/kg	A-T-024
Lead$_D$ M#	69	92	41	46	34	112	-	65	mg/kg	A-T-024
Mercury$_D$	0.35	0.46	0.46	0.23	1.06	<0.17	-	0.68	mg/kg	A-T-024
Nickel$_D$ #	34	23	30	26	21	71	-	28	mg/kg	A-T-024
Selenium$_D$ #	2	<1	2	2	<1	2	-	2	mg/kg	A-T-024
Zinc$_D$ M#	124	104	81	88	56	144	-	102	mg/kg	A-T-024
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_D$ #	NAD	NAD	NAD	NAD	NAD	NAD	-	-		A-T-045

Envirolab Job Number: 13/04758

Client Project Name: Kingstone School, Barnsley

Client Project Ref: 301285

Lab Sample ID	13/04758/1	13/04758/2	13/04758/3	13/04758/4	13/04758/5	13/04758/6	13/04758/7	13/04758/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	2	1		
Client Sample ID	PH1	PH2	PH3	PH8	PH6	TP8	TP8	TP9		
Depth to Top	0.70	0.80	0.30	0.50	0.40	0.35	1.00	0.30		
Depth To Bottom										
Date Sampled	23-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13	24-Sep-13	24-Sep-13	24-Sep-13		
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Solid	Soil - D	Solid - Fibres	Soil - D		
Sample Matrix Code	6A	6A	6AE	6AE	7	4AE		4A		
PAH 16										
Acenaphthene$_A^{M\#}$	0.11	0.18	0.15	0.13	4.34	0.11	-	0.97	mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	0.02	0.15	0.07	0.02	0.50	0.07	-	0.17	mg/kg	A-T-019s
Anthracene$_A^{M\#}$	0.20	0.67	0.88	0.24	12.9	0.28	-	2.70	mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.45	2.44	3.47	0.57	45.4	1.21	-	10.9	mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.40	2.26	3.36	0.51	53.8	1.11	-	9.12	mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.49	2.84	3.96	0.59	50.9	1.51	-	10.2	mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.25	1.26	2.19	0.29	25.2	0.69	-	5.01	mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.18	1.11	1.73	0.24	23.3	0.70	-	4.84	mg/kg	A-T-019s
Chrysene$_A^{M\#}$	0.53	2.49	3.41	0.57	43.9	1.25	-	9.93	mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.07	0.36	0.56	0.08	6.64	0.19	-	1.38	mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	1.11	4.63	8.45	1.26	114	2.23	-	22.7	mg/kg	A-T-019s
Fluorene$_A^{M\#}$	0.11	0.21	0.14	0.09	5.24	0.07	-	0.79	mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.23	1.20	1.93	0.27	26.2	0.66	-	4.86	mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	0.07	0.17	0.04	0.09	0.13	0.24	-	0.13	mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	0.80	2.33	2.74	0.82	61.4	1.06	-	11.1	mg/kg	A-T-019s
Pyrene$_A^{M\#}$	0.97	3.80	8.02	1.08	106	1.96	-	19.5	mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	5.99	26.1	41.1	6.86	580	13.3	-	114	mg/kg	A-T-019s

Envirolab Job Number: 13/04758

Client Project Name: Kingstone School, Barnsley

Client Project Ref: 301285

Lab Sample ID	13/04758/1	13/04758/2	13/04758/3	13/04758/4	13/04758/5	13/04758/6	13/04758/7	13/04758/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	2	1		
Client Sample ID	PH1	PH2	PH3	PH8	PH6	TP8	TP8	TP9		
Depth to Top	0.70	0.80	0.30	0.50	0.40	0.35	1.00	0.30		
Depth To Bottom										
Date Sampled	23-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13	24-Sep-13	24-Sep-13	24-Sep-13		
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Solid	Soil - D	Solid - Fibres	Soil - D		
Sample Matrix Code	6A	6A	6AE	6AE	7	4AE		4A		
Speciated PCB-EC7										
PCB BZ $28_A^{M\#}$	<0.002	-	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ $52_A^{M\#}$	<0.002	-	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ $101_A^{M\#}$	<0.004	-	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ $118_A^{M\#}$	<0.007	-	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ $138_A^{M\#}$	<0.006	-	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ $153_A^{M\#}$	<0.004	-	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ $180_A^{M\#}$	<0.004	-	-	-	-	-	-	-	mg/kg	A-T-004s

Envirolab Job Number: 13/04758

Client Project Name: Kingstone School, Barnsley

Client Project Ref: 301285

Lab Sample ID	13/04758/1	13/04758/2	13/04758/3	13/04758/4	13/04758/5	13/04758/6	13/04758/7	13/04758/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	2	1		
Client Sample ID	PH1	PH2	PH3	PH8	PH6	TP8	TP8	TP9		
Depth to Top	0.70	0.80	0.30	0.50	0.40	0.35	1.00	0.30		
Depth To Bottom										
Date Sampled	23-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13	24-Sep-13	24-Sep-13	24-Sep-13		
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Solid	Soil - D	Solid - Fibres	Soil - D		
Sample Matrix Code	6A	6A	6AE	6AE	7	4AE		4A		
TPH CWG										
Ali >C5-C6$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Ali >C6-C8$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Ali >C8-C10$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Ali >C10-C12$_A$#	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	-	<0.1	mg/kg	A-T-023s
Ali >C12-C16$_A$#	<0.1	<0.1	<0.1	<0.1	3.5	<0.1	-	0.7	mg/kg	A-T-023s
Ali >C16-C21$_A$#	<0.1	<0.1	<0.1	<0.1	79.6	<0.1	-	3.7	mg/kg	A-T-023s
Ali >C21-C35$_A$#	<0.1	<0.1	<0.1	<0.1	526	<0.1	-	40.6	mg/kg	A-T-023s
Total Aliphatics$_A$	<0.1	<0.1	<0.1	<0.1	610	<0.1	-	44.8	mg/kg	A-T-022+23s
Aro >C5-C7$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Aro >C7-C8$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Aro >C8-C9$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Aro >C9-C10$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Aro >C10-C12$_A$#	<0.1	<0.1	0.4	<0.1	1.2	0.3	-	<0.1	mg/kg	A-T-023s
Aro >C12-C16$_A$#	<0.1	0.5	0.9	<0.1	12.8	0.9	-	3.8	mg/kg	A-T-023s
Aro >C16-C21$_A$#	0.8	7.3	9.2	<0.1	270	2.8	-	32.3	mg/kg	A-T-023s
Aro >C21-C35$_A$#	0.7	21.2	46.5	<0.1	1370	4.4	-	102	mg/kg	A-T-023s
Total Aromatics$_A$	1.5	29.2	56.9	<0.1	1650	8.4	-	138	mg/kg	A-T-022+23s
TPH (Ali & Aro)$_A$	1.5	29.2	56.9	<0.1	2260	8.4	-	183	mg/kg	A-T-022+23s
BTEX - Benzene$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
BTEX - Toluene$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
BTEX - Ethyl Benzene$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
BTEX - m & p Xylene$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
BTEX - o Xylene$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
MTBE$_A$#	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Mineral Oil (>C10-C35)$_A$	<0.1	<0.1	<0.1	<0.1	610	<0.1	-	44.8	mg/kg	A-T-023s

Envirolab Job Number: 13/04758

Client Project Name: Kingstone School, Barnsley

Client Project Ref: 301285

Lab Sample ID	13/04758/9	13/04758/10	13/04758/11	13/04758/12	13/04758/13	13/04758/14	13/04758/15	13/04758/16	Units	Method ref
Client Sample No	2	2	1	1	1	1	2			
Client Sample ID	TP1	TP5	TP16	TP18	TP7	TP4	PH3	PH4		
Depth to Top	1.20	1.20	0.15	0.20	0.70	0.60	1.80	0.70		
Depth To Bottom										
Date Sampled	23-Sep-13	23-Sep-13	24-Sep-13	24-Sep-13	24-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13		
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D		
Sample Matrix Code	5	6A	4E	4EA		5EA	5	5		
% Stones >10mm$_A$ #	<0.1	7.2	<0.1	13.3	-	9.2	<0.1	<0.1	% w/w	A-T-044
pH BRE$_D$ M#	-	-	-	-	-	-	7.03	7.44	pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D$ M#	-	-	-	-	-	-	107	35	mg/l	A-T-026s
Sulphate BRE (acid sol)$_D$ M#	-	-	-	-	-	-	0.05	<0.02	% w/w	A-T-028
Sulphur BRE (total)$_D$	-	-	-	-	-	-	0.29	0.03	% w/w	A-T-024
Total Organic Carbon$_D$ M#	0.24	2.69	5.48	3.60	-	-	-	-	% w/w	A-T-032s
Calorific Value (Gross/Total)	-	-	-	-	19800	-	-	-	kJ/kg	Subcon
Arsenic$_D$ #	3	2	15	10	-	-	-	-	mg/kg	A-T-024
Cadmium$_D$ M#	1.2	0.9	1.2	1.1	-	-	-	-	mg/kg	A-T-024
Copper$_D$ M#	27	38	40	25	-	-	-	-	mg/kg	A-T-024
Chromium$_D$ #	32	38	41	33	-	-	-	-	mg/kg	A-T-024
Lead$_D$ M#	50	25	73	49	-	-	-	-	mg/kg	A-T-024
Mercury$_D$	<0.17	<0.17	0.23	<0.17	-	-	-	-	mg/kg	A-T-024
Nickel$_D$ #	19	40	25	19	-	-	-	-	mg/kg	A-T-024
Selenium$_D$ #	<1	<1	3	2	-	-	-	-	mg/kg	A-T-024
Zinc$_D$ M#	132	87	110	85	-	-	-	-	mg/kg	A-T-024
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_D$ #	-	-	NAD	NAD	-	-	-	-		A-T-045

Lab Sample ID	13/04758/9	13/04758/10	13/04758/11	13/04758/12	13/04758/13	13/04758/14	13/04758/15	13/04758/16	Units	Method ref
Client Sample No	2	2	1	1	1	1	2			
Client Sample ID	TP1	TP5	TP16	TP18	TP7	TP4	PH3	PH4		
Depth to Top	1.20	1.20	0.15	0.20	0.70	0.60	1.80	0.70		
Depth To Bottom										
Date Sampled	23-Sep-13	23-Sep-13	24-Sep-13	24-Sep-13	24-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13		
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D		
Sample Matrix Code	5	6A	4E	4EA		5EA	5	5		
PAH 16										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	0.01	<0.01	-	-	-	-	mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	0.02	<0.01	-	-	-	-	mg/kg	A-T-019s
Anthracene$_A^{M\#}$	<0.02	<0.02	0.05	0.03	-	-	-	-	mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04	<0.04	0.30	0.21	-	-	-	-	mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04	<0.04	0.29	0.21	-	-	-	-	mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05	<0.05	0.40	0.26	-	-	-	-	mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	<0.05	0.19	0.14	-	-	-	-	mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	0.16	0.10	-	-	-	-	mg/kg	A-T-019s
Chrysene$_A^{M\#}$	<0.06	<0.06	0.35	0.24	-	-	-	-	mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	<0.04	<0.04	-	-	-	-	mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	<0.08	0.58	0.35	-	-	-	-	mg/kg	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03	<0.03	0.18	0.13	-	-	-	-	mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.03	<0.03	<0.03	<0.03	-	-	-	-	mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03	0.04	0.22	0.12	-	-	-	-	mg/kg	A-T-019s
Pyrene$_A^{M\#}$	<0.07	<0.07	0.47	0.30	-	-	-	-	mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	<0.08	<0.08	3.23	2.10	-	-	-	-	mg/kg	A-T-019s

Envirolab Job Number: 13/04758

Client Project Name: Kingstone School, Barnsley

Client Project Ref: 301285

Lab Sample ID	13/04758/9	13/04758/10	13/04758/11	13/04758/12	13/04758/13	13/04758/14	13/04758/15	13/04758/16	Units	Method ref
Client Sample No	2	2	1	1	1	1	2			
Client Sample ID	TP1	TP5	TP16	TP18	TP7	TP4	PH3	PH4		
Depth to Top	1.20	1.20	0.15	0.20	0.70	0.60	1.80	0.70		
Depth To Bottom										
Date Sampled	23-Sep-13	23-Sep-13	24-Sep-13	24-Sep-13	24-Sep-13	23-Sep-13	23-Sep-13	23-Sep-13		
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D		
Sample Matrix Code	5	6A	4E	4EA		5EA	5	5		
TPH CWG										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
Ali >C8-C10$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
Ali >C10-C12$_A^{\#}$	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	mg/kg	A-T-023s
Ali >C12-C16$_A^{\#}$	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	mg/kg	A-T-023s
Ali >C16-C21$_A^{\#}$	<0.1	<0.1	<0.1	<0.1	-	1.7	-	-	mg/kg	A-T-023s
Ali >C21-C35$_A^{\#}$	<0.1	<0.1	<0.1	<0.1	-	28.6	-	-	mg/kg	A-T-023s
Total Aliphatics$_A$	<0.1	<0.1	<0.1	<0.1	-	30.2	-	-	mg/kg	A-T-022+23s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
Aro >C8-C9$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
Aro >C9-C10$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
Aro >C10-C12$_A^{\#}$	<0.1	<0.1	<0.1	<0.1	-	0.1	-	-	mg/kg	A-T-023s
Aro >C12-C16$_A^{\#}$	<0.1	<0.1	<0.1	<0.1	-	1.0	-	-	mg/kg	A-T-023s
Aro >C16-C21$_A^{\#}$	<0.1	<0.1	<0.1	<0.1	-	7.8	-	-	mg/kg	A-T-023s
Aro >C21-C35$_A^{\#}$	<0.1	<0.1	<0.1	<0.1	-	41.2	-	-	mg/kg	A-T-023s
Total Aromatics$_A$	<0.1	<0.1	<0.1	<0.1	-	50.1	-	-	mg/kg	A-T-022+23s
TPH (Ali & Aro)$_A$	<0.1	<0.1	<0.1	<0.1	-	80.4	-	-	mg/kg	A-T-022+23s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	-	<0.01	-	-	mg/kg	A-T-022s
Mineral Oil (>C10-C35)$_A$	<0.1	<0.1	<0.1	<0.1	-	30.2	-	-	mg/kg	A-T-023s

Envirolab Job Number: 13/04758

Client Project Name: Kingstone School, Barnsley

Client Project Ref: 301285

Lab Sample ID	13/04758/17	13/04758/18	13/04758/19	13/04758/20					Units	Method ref
Client Sample No				1						
Client Sample ID	PH6	PH7	TP4	TP14						
Depth to Top	1.80	0.80	0.60	2.00						
Depth To Bottom										
Date Sampled	23-Sep-13	23-Sep-13	23-Sep-13	24-Sep-13						
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D						
Sample Matrix Code	6	5A	5A	5						
% Stones >10mm$_A^{\#}$	<0.1	14.5	24.9	<0.1					% w/w	A-T-044
pH BRE$_D^{M\#}$	5.58	8.15	7.80	6.87					pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	90	<10	53	68					mg/l	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	0.03	<0.02	0.02	<0.02					% w/w	A-T-028
Sulphur BRE (total)$_D$	0.02	0.02	0.02	<0.01					% w/w	A-T-024

REPORT NOTES

Notes - Soil analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.
Superscript "M" indicates method accredited to MCERTS.
For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations. If results are in italic font they are associated with such quality control failures and may be unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

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

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER.
Samples with Matrix Code 7 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our MCERTS accreditation.

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

IS indicates Insufficient sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

APPENDIX K
HUMAN HEALTH GENERIC ASSESSMENT CRITERIA

Generic assessment criteria for human health: residential scenario – private gardens

The human health generic assessment criteria (GAC) have been developed during a period of regulatory review and updating of the Contaminated Land Exposure Assessment (CLEA) project. Therefore, the Environment Agency (EA) is in the process of publishing updated reports relating to the CLEA project and the GAC presented in this document may change to reflect these updates. This issue was prepared following the publication of soil guideline value (SGV) reports and associated publications[(1)] for mercury, selenium, benzene, toluene, ethylbenzene and xylene in March 2009, arsenic and nickel in May 2009, cadmium and phenol in June 2009, dioxins, furans and dioxin-like polychlorinated biphenyls (PCBs) in September 2009. It was also produced following publication of GAC by LQM[(6)]. Where available, the published soil guideline values (SGV)[(1)] were used as the GAC. The GAC for lead is discussed separately below owing to it not being derived using the same approach as other compounds.

Lead GAC derivation

The Environment Agency SGV and Tox reports for lead were withdrawn in 2009. In addition, the provisional tolerable weekly intake data published in the Netherlands were withdrawn in 2010 owing to concerns that they were not suitably protective of human health. The withdrawn SGVs were based on a target blood lead concentration of 10µg/dl. In the absence of current guidelines many consultants continue to use the withdrawn SGV. However, as this is not considered sufficiently protective of human health, after attendance at the SOBRA summer workshop June 2011, RSK has revised its GAC and is currently undertaking a review of recent toxicological developments that will be used to refine this GAC further in the coming months. In the meantime, RSK has undertaken sensitivity analysis using the Society of Environmental Geochemistry and Health (SEGH) equation and the CLEA model to produce an interim GAC value. The results are summarised below:

- Using CLEA with the former provisional tolerable weekly intake (PTWI) (25 µg/kg bw), assuming 100% lead is bioavailable, produces a GAC of 212 mg/kg
- Using CLEA with the former PTWI, assuming 50% lead is bioavailable, produces a GAC of 478 mg/kg
- Using the SEGH equation amended for a blood target concentration of 5.6 µg/dl (equal to the LOAEL for IQ defects) gives a negative GAC number unless other factors such as child background blood concentration or delta are amended. Without undertaking further research into these numbers, RSK can present sensitivity analysis to demonstrate the sensitivity of these input parameters but cannot justify one parameter over another. The results are:
    - GAC between 39mg/kg and 99mg/kg if the value of delta (the slope or response of blood Pb versus soil and dust Pb relationship) only is amended from 5 to 2µg/dl/1000µg/g. The value of 2 was chosen as it is within the reasonable range quoted in the former SGV report
    - GAC between 244mg/kg and 610mg/kg if the geometric mean of blood lead concentration in young children is reduced from 3.4µg/dl to 2µg/dl. This decrease has been simulated on the basis that blood concentrations are likely to decrease over time across the UK owing to a ban on lead in petrol, lead within paint used internally and water pipe replacement. This decrease is considered reasonable as the site is a new development

so lead-based paints will not be used internally and lead water supply pipelines will be absent.

Therefore, given the results above RSK proposes to use a GAC of **300mg/kg** for a residential end use. This value is broadly in the middle of the range of sensitivity modelling results quoted above when background mean blood lead concentrations in children are reduced to reflect a new development. The value is also broadly in the middle of the range of sensitivity modelling results for a range of bioavailability of lead between 50% and 100%. This number is considered reasonably protective of human health while being practical for use.

GAC derivation for other metals and organic compounds

Model selection

Soil assessment criteria (SAC) were calculated using CLEA v1.06 and the supporting UK guidance[1–6]. Groundwater assessment criteria (GrAC) protective of human health via the inhalation pathway were derived using the RBCA 1.3b model. RSK has updated the inputs within RBCA to reflect the UK guidance[1–5]. The SAC and GrAC collectively are termed GAC.

Conceptual model

In accordance with EA Science Report SC050221/SR3[3], the residential with private garden scenario considers risks to a female child between the ages of 0 and 6 years old. In accordance with Box 3.1, SR3[3], the pathways considered for production of the SAC in the residential with gardens scenario are:

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

Figure 1 is a conceptual model illustrating these linkages.

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

An assumption used in the CLEA model is that of simple linear partitioning of a chemical in the soil between the sorbed, dissolved and vapour phase[4]. The upper boundaries of this partitioning are represented by the aqueous solubility and pure saturated vapour concentration of the chemical. The CLEA software uses a traffic light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous-based or the vapour based

saturation limits. Where model output cells are flagged red the soil or vapour saturation limit has been exceeded and further consideration of the SAC to be used within the assessment is required. One approach that could be adopted is to use the 'modelled' solubility saturation limit or vapour saturation limit of the compound as the SAC. However, as stated within the CLEA handbook[4] this is likely to not be practical in many cases because of the very low limits and, in any case, is highly conservative. Unless free-phase product is present, concentrations of the chemical are unlikely to be present at sufficient concentration to result in an exceedance of the health criteria value (HCV).

RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CIEH[6] whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limit given in brackets. Therefore, when using the SAC to screen laboratory analysis the assessor should take note if a given SAC has a corresponding solubility or vapour saturation limit (in brackets), and subsequently incorporate this piece of information within the screening analytical discussion. If further assessment is required following this process then an additional approach can be utilised as detailed within Section 4.12 of the CLEA model handbook[4], which explains how to calculate an effective assessment criterion manually.

Input selection

Chemical data was obtained from EA Report SC050021/SR7[5] and the health criteria values (HCV) from the UK TOX[1] reports where available. For SAC for total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH), toxicological and chemical specific parameters were obtained from the LQM/CIEH report[6]. Similarly, toxicological and specific chemical parameters for the volatile organic compound 1,2,4-trimethylbenzene were obtained from EIC/AGS/CL:AIRE[7].

For total petroleum hydrocarbons (TPH), aromatic hydrocarbons C_5-C_8 were not modelled since benzene and toluene are being modelled separately. The aromatic C_8-C_9 hydrocarbon fraction comprises ethylbenzene, xylene and styrene. Since ethylbenzene and xylene are being modelled separately, the physical, chemical and toxicological data for this band has been taken from styrene.

Owing to the lack of UK-specific data, default information in the RBCA model was used to evaluate methyl tertiary butyl ether (MTBE). No published UK data was available for 1,3,5-trimethylbenzene, so information was obtained from the US EPA as in the RBCA model. RBCA uses toxicity data for the inhalation pathway in different units to the CLEA model and cannot consider separately the mean daily intake (MDI), occupancy periods or breathing rates. Therefore, the HCV in RBCA was amended to take account of:

- amendments to the MDI using Table 3.4 of SR2[2]
- a child weighing 13.3kg (average of 0–6 year old female in accordance with Table 4.6 of SR3[3]) and breathing 11.85m^3 (average daily inhalation rate for a 0–6-year old female in accordance with Table 4.14 of SR3[3]

1. The 50% rule (for petroleum hydrocarbons, trimethylbenzenes and MTBE)[2] where MDI data is not available but background exposure is considered important in the overall exposure.

Physical parameters

For the residential with private gardens scenario, the CLEA default building is a small two-storey terrace house with concrete ground-bearing slab. The house is assumed to have a 100m^2 private garden consisting of lawn, flowerbeds and incorporating a 20m^2 plot for growing fruit and vegetables consumed by the residents. SR3[3] notes this residential building type to be the most conservative in terms of protection from vapour intrusion. The building parameters are outlined in Table 5.

The parameters for a sandy loam soil type were used in line with SR3[3]. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for this parameter, RSK has produced an additional set of SAC for an SOM of 1% and 2.5%. For the GrAC, the depth to groundwater was taken as 2.5m based on RSK's experience of assessing the volatilisation pathway from groundwater.

GAC

The SAC were produced using the input parameters in Tables 1 to 5 and the GrAC using input parameters in Table 6. The final selected GAC are presented by pathway in Table 7 and the combined GAC in Table 8.

Figure 1: Conceptual model for CLEA residential scenario – private gardens

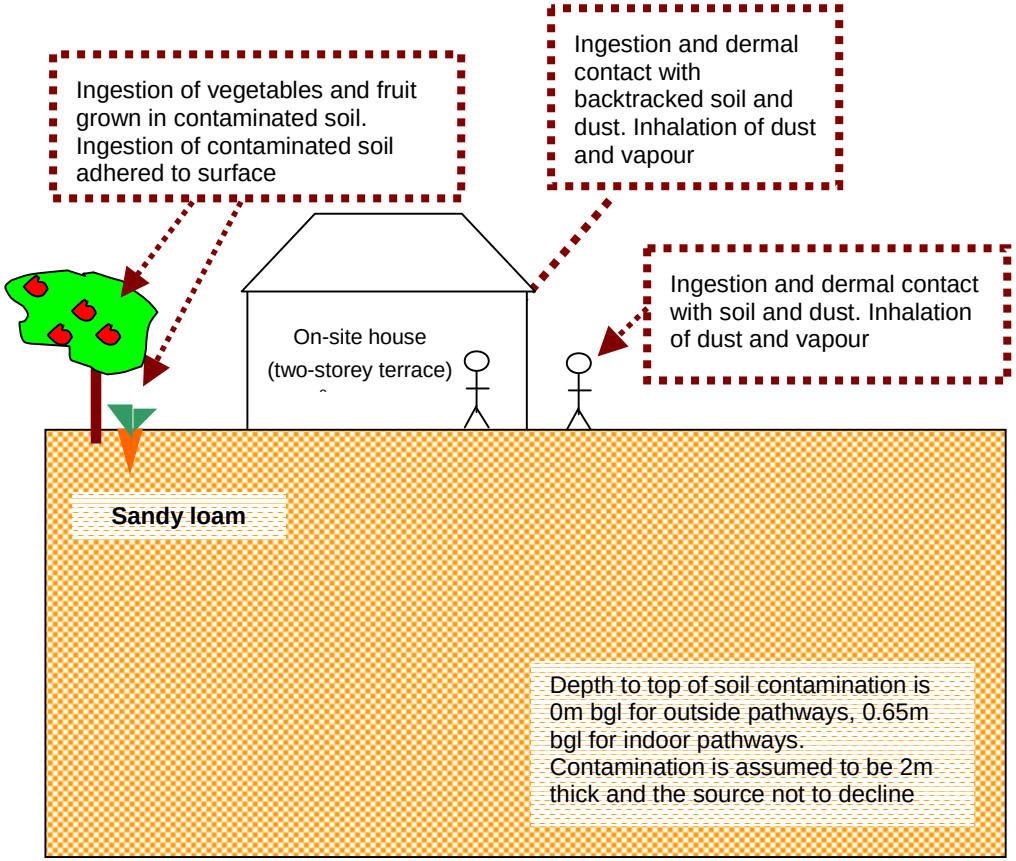


Table 1: Exposure assessment parameters for residential scenario - private gardens – inputs for CLEA model

Parameter	Value	Justification
Land use	Residential with homegrown produce	Chosen land use
Receptor	Female child age 1 to 6	Key generic assumption given in Box 3.1, report SC050021/SR3[3]
Building	Small terraced house	Key generic assumption given in Box 3.1, report SC050021/SR3. Two storey small terraced house chosen as it is the most conservative residential building type in terms of protection from vapor intrusion (Section 3.4.6, report SC050021/SR3)[3]
Soil type	Sandy Loam	Most common UK soil type (Section 4.3.1, From Table 3.1, report SC050021/SR3)[3]
Start AC (age class)	1	Range of age classes corresponding to key generic assumption that the critical receptor is a young female child aged zero to six. From Box 3.1, report SC050021/SR3[3]
End AC (age class)	6	
SOM (%)	6	Representative of sandy loamy soil according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents'[8]
	1	To provide SAC for sites where SOM <6% as often observed by RSK
	2.5	
pH	7	Model default

Table 2: Residential with private gardens –home-grown produce data for CLEA model

	Consumption rate (g FW kg^{-1} BW day^{-1}) by age class						Dry weight conversion factor	Home-grown fraction (average)	Home-grown fraction (high end)	Soil loading factor	Preparation correction factor
Name	1	2	3	4	5	6	g DW g^{-1} FW	-	-	g g^{-1} DW	-
Green vegetables	7.12	6.85	6.85	6.85	3.74	3.74	0.096	0.05	0.33	1.00E-03	2.00E-01
Root vegetables	10.69	3.30	3.30	3.30	1.77	1.77	0.103	0.06	0.4	1.00E-03	1.00E+00
Tuber vegetables	16.03	5.46	5.46	5.46	3.38	3.38	0.21	0.02	0.13	1.00E-03	1.00E+00
Herbaceous fruit	1.83	3.96	3.96	3.96	1.85	1.85	0.058	0.06	0.4	1.00E-03	6.00E-01
Shrub fruit	2.23	0.54	0.54	0.54	0.16	0.16	0.166	0.09	0.6	1.00E-03	6.00E-01
Tree fruit	3.82	11.96	11.96	11.96	4.26	4.26	0.157	0.04	0.27	1.00E-03	6.00E-01
Justification	Table 4.17, SR3[3]						Table 6.3, SR3[3]	Table 4.19, SR3[3]		Table 6.3, SR3[3]	

Table 3: Residential with private gardens – land use data for CLEA model

Parameter	Unit	Age class					
		1	2	3	4	5	6
EF (soil and dust ingestion)	day yr^{-1}	180	365	365	365	365	365
EF (consumption of home-grown produce)	day yr^{-1}	180	365	365	365	365	365
EF (skin contact, indoor)	day yr^{-1}	180	365	365	365	365	365
EF (skin contact, outdoor)	day yr^{-1}	180	365	365	365	365	365
EF (inhalation of dust and vapour, indoor)	day yr^{-1}	365	365	365	365	365	365
EF (inhalation of dust and vapour, outdoor)	day yr^{-1}	365	365	365	365	365	365
Justification		Table 3.1, SR3[3]					
Occupancy period (indoor)	hr day^{-1}	23	23	23	23	19	19
Occupancy period (outdoor)	hr day^{-1}	1	1	1	1	1	1
Justification		Table 3.2, SR3[3]					
Soil to skin adherence factor (indoor)	mg cm^{-2} day^{-1}	6.00E-02	6.00E-02	6.00E-02	6.00E-02	6.00E-02	6.00E-02
Soil to skin adherence factor (outdoor)	mg cm^{-2} day^{-1}	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Justification		Table 8.1, SR3[3]					
Soil and dust ingestion rate	g day^{-1}	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
Justification		Table 6.2, SR3[3]					

Of note, for **cadmium**, the exposure assessment for a residential land use is based on estimates representative of lifetime exposure AC1-18. This is because the TDI_{oral} and TDI_{inh} – are based on considerations of the kidney burden accumulated over 50 years. It is therefore reasonable to consider exposure not only in childhood but averaged over a longer time period. See the Environment Agency Science report: SC05002 / TOX 3 [1] and Science Report SC050021/Cadmium SGV [1] for more information.

Table 4: Residential with private gardens – receptor data for CLEA model

Parameter	Unit	Age Class						Justification
		1	2	3	4	5	6	
Body weight	kg	5.6	9.8	12.7	15.1	16.9	19.7	Table 4.6, SR3[3]
Body height	m	0.7	0.8	0.9	0.9	1	1.1	
Inhalation rate	m^3 day^{-1}	8.5	13.3	12.7	12.2	12.2	12.2	Table 4.14, SR3[3]
Max exposed skin fraction (indoor)	m^2 m^{-2}	0.32	0.33	0.32	0.35	0.35	0.33	Table 4.8, SR3[3]
Max exposed skin fraction (outdoor)	m^2 m^{-2}	0.26	0.26	0.25	0.28	0.28	0.26	

See cadmium note as per Table 3 above.

Table 5: Residential with private gardens – soil and building inputs for CLEA model

Parameter	Unit	Value	Justification
Soil properties for sandy loam			
Porosity, total	cm^3 cm^{-3}	0.53	Default soil type is sandy loam, Section 4.3.1, SR3[3] Parameters for sandy loam from Table 4.4, SR3[3]
Porosity, air filled	cm^3 cm^{-3}	0.20	
Porosity, water filled	cm^3 cm^{-3}	0.33	
Residual soil water content	cm^3 cm^{-3}	0.12	
Saturated hydraulic conductivity	cm s^{-1}	3.56E-03	
van Genuchten shape parameter (*m*)	-	3.20E-01	
Bulk density	g cm^{-3}	1.21	
Threshold value of wind speed at 10m	m s^{-1}	7.20	Default value taken from Section 9.2.2, SR3[3]
Empirical function (F_x) for dust model	-	1.22	Value taken from Section 9.2.2, SR3[3]
Ambient soil temperature	K	283	Annual average soil temperature representative of UK surface soils. Section 4.3.1, SR3[3]
Air dispersion model			
Mean annual wind speed (10m)	m s^{-1}	5.00	Default value taken from Section 9.2.2, SR3[3]
Air dispersion factor at height of 0.8m	g m^{-2} s^{-1} per kg m^{-3}	2400	Values for a 0.01 ha site, appropriate to a residential land use in Newcastle (most representative city for UK). (from Table 9.1, SR3)[3] Assumed child of 6 is not tall enough to reach 1.6m
Air dispersion factor at height of 1.6m	g m^{-2} s^{-1} per kg m^{-3}	0	
Fraction of site with hard or vegetative cover	m^2 m^{-2}	0.75	Section 3.2.6, SR3 [3] based on residential land use

Parameter	Unit	Value	Justification
Building properties for small terrace house with ground-bearing floor slab			
Building footprint	m^2	28	From Table 3.3 and 4.21, SR3[3]
Living space air exchange rate	hr^{-1}	0.50	
Living space height (above ground)	m	4.8	
Living space height (below ground)	m	0.0	Assumed no basement
Pressure difference (soil to enclosed space)	Pa	3.1	From Table 3.3, SR3[3]
Foundation thickness	m	0.15	
Floor crack area	cm^2	423	
Dust loading factor	$\mu g\ m^{-3}$	50	Default value for a residential site taken from Section 9.3, SR3[3]
Vapour model			
Default soil gas ingress rate	$cm^3\ s^{-1}$	25	Generic flow rate, Section 10.3, SR3[3]
Depth to top of source (beneath building)	cm	50	Section 3.2.6, SR3 [3] states source is 50cm below building or 65cm below ground surface
Depth to top of source (no building)	cm	0	Section 10.2, SR3 [3] assumes impact from 0m to 1m for outdoor inhalation pathway
Thickness of contaminant layer	cm	200	Model default for indoor air, Section 4.9, SR4[4]
Time average period for surface emissions	years	6	Time period of a 0 to 6 year old, Box 3.5, SR3[3]
User-defined effective air permeability	cm^2	3.05E-08	Calculated for sandy loam using equations in Appendix 1, SR3[3]

Figure 2: GrAC conceptual model for RBCA residential with private gardens scenario

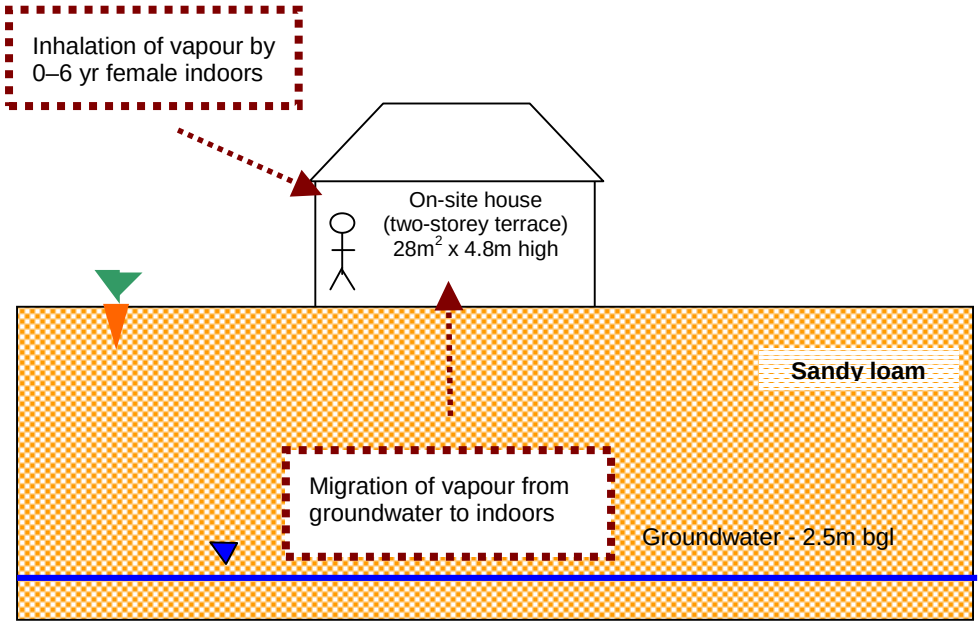


Table 6: Residential with private gardens – RBCA inputs

Parameter	Unit	Value	Justification
Receptor			
Averaging time	Years	6	From Box 3.1, SR3[3]
Receptor weight	kg	13.3	Average of CLEA 0–6 year old female data, Table 4.6, SR3[3]
Exposure duration	Years	6	From Box 3.1, report, SR3[3]
Exposure frequency	Days/yr	350	Weighted using occupancy period of 23 hours per day for 365 days of the year
Soil type – sandy loam			
Total porosity	-	0.53	CLEA value for sandy loam. Parameters for sandy loam from Table 4.4, SR3[3]
Volumetric water content	-	0.33	
Volumetric air content	-	0.20	
Dry bulk density	g cm^{-3}	1.21	
Vertical hydraulic conductivity	cm s^{-1}	3.56E-3	CLEA value for saturated conductivity of sandy loam, Table 4.4, SR3[3]
Vapour permeability	m^2	3.05E-12	Calculated for sandy loam using equations in Appendix 1, SR3[3]
Capillary zone thickness	m	0.1	Professional judgement

Parameter	Unit	Value	Justification
Fraction organic carbon	%	(i) 0.0348	Representative of sandy loam according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents'[8]
		(ii) 0.0058	To provide SAC for sites where SOM < 6% as often observed by RSK
Building			
Building volume/area ratio	m	4.8	Table 3.3, SR3[3]
Foundation area	m^2	28	
Foundation perimeter	m	22	Calculated assuming building measures 7m x 4m to give 28m^2 foundation area
Building air exchange rate	d^{-1}	12	Table 3.3, SR3[3]
Depth to bottom of foundation slab	m	0.15	
Foundation thickness	m	0.15	
Foundation crack fraction	-	0.0151	Calculated from floor crack area of 423 cm^2 and building footprint of 28m^2 in Table 4.21, SR3[3]
Volumetric water content of cracks	-	0.33	Assumed equal to underlying soil type in assumption that cracks become filled with soil over time. Parameters for sandy loam from Table 4.4, SR3[3]
Volumetric air content of cracks	-	0.2	
Indoor/outdoor differential pressure	Pa	3.1	From Table 3.3, SR3[3]

References

1. Environment Agency (2009), 'Science Report SC050021/benzene SGV, toluene SGV, ethylbenzene SGV, xylene SGV, mercury SGV, selenium SGV, nickel SGV, arsenic SGV, cadmium SGV, phenol SGV, dioxins, furans and dioxin like PCBs SGVs', 'Supplementary information for the derivation of SGV for: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin- like PCBs', and 'Contaminants in soil: updated collation of toxicological data and intake values for humans: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin- like PCBs', March 2009, May 2009 and September 2009.

2. Environment Agency (2009), *Human health toxicological assessment of contaminants in soil. Science Report – Final SC050021/SR2*, January (Bristol: Environment Agency).

3. Environment Agency (2009), *Science Report – SC050021/SR3. Updated technical background to the CLEA model* (Bristol: Environment Agency).

4. Environment Agency (2009), Contaminated Land Exposure Assessment (CLEA) software, version 1.06.

5. Environment Agency (2008), *Science Report SC050021/SR7. Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values* (Bristol: Environment Agency).

6. Chartered Institute for Environmental Health and Land Quality Management (2009), 'The LQM/CIEH Generic Assessment Criteria for Human Health', second edition.

7. CL:AIRE (2009), *Soil Generic Assessment Criteria for Human Health Risk Assessment* (London: CL:AIRE).

8. Changes made to the CLEA framework documents after the three-month evaluation period in 2008, released January 2009 by the Environment Agency.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - RESIDENTIAL WITH PRIVATE GARDENS

Table 7

Human Health Generic Assessment Criteria by Pathway for Residential Scenario - Private Gardens

Compound	Notes	GrAC (mg/l)	SAC Appropriate to Pathway SOM 1% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
			Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Metals														
Arsenic	(b)(c)	-	3.24E+01	8.50E+01	-	NR	3.24E+01	8.50E+01	-	NR	3.24E+01	8.50E+01	-	NR
Cadmium	(b)	-	1.12E+01	1.85E+02	1.10E+01	NR	1.12E+01	1.85E+02	1.10E+01	NR	1.12E+01	1.85E+02	1.10E+01	NR
Chromium (III) - oxide		-	1.84E+04	3.55E+03	2.98E+03	NR	1.84E+04	3.55E+03	2.98E+03	NR	1.84E+04	3.55E+03	2.98E+03	NR
Chromium (VI) - hexavalent		-	1.02E+01	4.25E+00	3.21E+00	NR	1.02E+01	4.25E+00	3.21E+00	NR	1.02E+01	4.25E+00	3.21E+00	NR
Copper		-	2.66E+03	1.04E+04	2.33E+03	NR	2.66E+03	1.04E+04	2.33E+03	NR	2.66E+03	1.04E+04	2.33E+03	NR
Lead	(a)	-	3.00E+02	-	-	NR	3.00E+02	-	-	NR	3.00E+02	-	-	NR
Elemental Mercury (Hg^0)	(b)(d)	9.40E-03	-	1.70E-01	-	4.31E+00	-	4.24E-01	-	1.07E+01	-	1.02E+00	-	2.58E+01
Inorganic Mercury (Hg^{2+})	(b)	-	1.81E+02	2.55E+03	1.69E+02	NR	1.81E+02	2.55E+03	1.69E+02	NR	1.81E+02	2.55E+03	1.69E+02	NR
Methyl Mercury (Hg^{4+})	(b)	2.00E+01	1.39E+01	1.59E+01	7.40E+00	7.33E+01	1.39E+01	3.08E+01	9.55E+00	1.42E+02	1.39E+01	6.53E+01	1.14E+01	3.04E+02
Nickel	(b)(d)	-	5.31E+02	1.27E+02	-	NR	5.31E+02	1.27E+02	-	NR	5.31E+02	1.27E+02	-	NR
Selenium	(b)(c)	-	3.50E+02	-	-	NR	3.50E+02	NR	-	NR	3.50E+02	-	-	NR
Zinc	(c)	-	3.75E+03	2.55E+07	-	NR	3.75E+03	2.55E+07	-	NR	3.75E+03	2.55E+07	-	NR
Cyanide		-	2.66E+01	3.97E+00	3.68E+00	NR	2.66E+01	3.97E+00	3.68E+00	NR	2.66E+01	3.97E+00	3.68E+00	NR
Volatile Organic Compounds														
Benzene	(b)	7.20E+00	1.12E-01	2.69E-01	7.92E-02	1.22E+03	2.28E-01	4.99E-01	1.57E-01	2.26E+03	4.89E-01	1.04E+00	3.32E-01	4.71E+03
Toluene	(b)	1.90E+03	1.47E+02	6.26E+02	1.19E+02	8.69E+02	3.35E+02	1.38E+03	2.70E+02	1.92E+03	7.59E+02	3.14E+03	6.11E+02	4.36E+03
Ethylbenzene	(b)	2.60E+02	1.06E+02	1.70E+02	6.52E+01	5.18E+02	2.51E+02	3.98E+02	1.54E+02	1.22E+03	5.70E+02	9.32E+02	3.54E+02	2.84E+03
Xylene - m	(b)	8.40E+01	2.02E+02	5.56E+01	4.36E+01	6.25E+02	4.80E+02	1.31E+02	1.03E+02	1.47E+03	1.09E+03	3.07E+02	2.40E+02	3.46E+03
Xylene - o		1.00E+02	1.85E+02	5.98E+01	4.52E+01	4.78E+02	4.38E+02	1.40E+02	1.06E+02	1.12E+03	9.96E+02	3.27E+02	2.46E+02	2.62E+03
Xylene - p		8.70E+01	1.91E+02	5.34E+01	4.17E+01	5.76E+02	4.51E+02	1.26E+02	9.82E+01	1.35E+03	1.02E+03	2.94E+02	2.28E+02	3.17E+03
Total xylene		8.40E+01	2.02E+02	5.56E+01	4.36E+01	6.25E+02	4.80E+02	1.31E+02	1.03E+02	1.47E+03	1.09E+03	3.07E+02	2.40E+02	3.46E+03
Methyl t-Butyl ether		2.20E+03	1.75E+00	1.84E+02	1.75E+00	1.66E+04	3.68E+00	2.40E+02	3.67E+00	2.16E+04	7.41E+00	3.70E+02	7.37E+00	3.34E+04
Trichloroethene		1.80E+00	2.83E+00	1.10E-01	1.06E-01	1.54E+03	6.25E+00	2.30E-01	2.22E-01	3.22E+03	1.40E+01	5.11E-01	4.93E-01	7.14E+03
Tetrachloroethene		3.60E+00	1.06E+01	1.03E+00	9.36E-01	4.24E+02	2.44E+01	2.30E+00	2.10E+00	9.51E+02	5.55E+01	5.28E+00	4.82E+00	2.18E+03
1,1,1-Trichloroethane		2.60E+01	3.20E+02	6.33E+00	6.21E+00	1.43E+03	6.97E+02	1.29E+01	1.27E+01	2.92E+03	1.55E+03	2.84E+01	2.79E+01	6.39E+03
1,1,1,2 Tetrachloroethane		1.40E+01	5.19E+00	1.08E+00	8.93E-01	2.60E+03	1.22E+01	2.50E+00	2.08E+00	6.02E+03	2.78E+01	5.83E+00	4.82E+00	1.40E+04
1,1,2,2-Tetrachloroethane		1.40E+01	2.70E+00	2.76E+00	1.37E+00	2.67E+03	5.85E+00	5.65E+00	2.87E+00	5.46E+03	1.30E+01	1.24E+01	6.34E+00	1.20E+04
Carbon Tetrachloride		5.50E-02	1.05E+00	1.81E-02	1.79E-02	1.52E+03	2.41E+00	3.97E-02	3.93E-02	3.32E+03	5.44E+00	8.99E-02	8.92E-02	7.54E+03
1,2-Dichloroethane		3.00E-01	3.06E-02	6.46E-03	5.34E-03	3.41E+03	5.53E-02	9.32E-03	7.98E-03	4.91E+03	1.05E-01	1.60E-02	1.39E-02	8.43E+03
Vinyl Chloride		1.90E-02	3.69E-03	5.43E-04	4.73E-04	1.36E+03	6.64E-03	7.02E-04	6.35E-04	1.76E+03	1.21E-02	1.07E-03	9.86E-04	2.69E+03
1,2,4-Trimethylbenzene		7.50E-02	-	3.51E-01	-	5.57E+02	-	8.55E-01	-	1.36E+03	-	2.10E+00	-	3.25E+03
1,3,5-Trimethylbenzene		4.70E-02	1.45E+01	4.60E-01	4.56E-01	9.47E+01	3.47E+01	1.10E+00	1.09E+00	2.26E+02	7.94E+01	2.59E+00	2.56E+00	5.33E+02
Semi-Volatile Organic Compounds														
Acenaphthene		3.20E+00	2.18E+02	3.46E+03	2.05E+02	5.70E+01	5.08E+02	8.54E+03	4.79E+02	1.41E+02	1.06E+03	2.03E+04	1.01E+03	3.36E+02
Acenaphthylene		4.20E+00	1.78E+02	3.27E+03	1.68E+02	8.61E+01	4.17E+02	8.03E+03	3.97E+02	2.12E+02	8.90E+02	1.91E+04	8.51E+02	5.06E+02
Anthracene		2.10E-02	2.31E+03	1.08E+05	2.26E+03	1.17E+00	5.03E+03	2.65E+05	4.93E+03	2.91E+00	9.33E+03	6.15E+05	9.19E+03	6.96E+00
Benzo(a)anthracene		3.80E-03	7.00E+00	5.55E+00	3.10E+00	1.71E+00	8.98E+00	9.83E+00	4.69E+00	4.28E+00	1.01E+01	1.41E+01	5.88E+00	1.03E+01
Benzo(b)fluoranthene		2.00E-03	8.06E+00	1.79E+01	5.56E+00	1.22E+00	9.78E+00	1.97E+01	6.53E+00	3.04E+00	1.07E+01	2.05E+01	7.02E+00	7.29E+00
Benzo(g,h,i)perylene		2.60E-04	6.68E+01	1.27E+02	4.38E+01	1.54E-02	7.04E+01	1.32E+02	4.59E+01	3.85E-02	7.19E+01	1.34E+02	4.68E+01	9.23E-02
Benzo(k)fluoranthene		8.00E-04	1.25E+01	2.66E+01	8.51E+00	6.87E-01	1.44E+01	2.83E+01	9.56E+00	1.72E+00	1.53E+01	2.91E+01	1.00E+01	4.12E+00
Chrysene		2.00E-03	8.76E+00	1.95E+01	6.00E+00	4.40E-01	1.20E+01	2.45E+01	8.04E+00	1.10E+00	1.41E+01	2.72E+01	9.27E+00	2.64E+00
Dibenzo(a,h)anthracene		6.00E-04	1.19E+00	2.13E+00	7.62E-01	3.93E-03	1.33E+00	2.42E+00	8.58E-01	9.82E-03	1.39E+00	2.56E+00	9.03E-01	2.36E-02
Fluoranthene		2.30E-01	2.59E+02	2.69E+04	2.57E+02	1.89E+01	4.67E+02	6.23E+04	4.63E+02	4.73E+01	6.78E+02	1.28E+05	6.74E+02	1.13E+02
Fluorene		1.90E+00	1.70E+02	4.35E+03	1.63E+02	3.09E+01	3.91E+02	1.07E+04	3.77E+02	7.65E+01	8.00E+02	2.54E+04	7.76E+02	1.83E+02
Indeno(1,2,3-cd)pyrene		2.00E-04	4.58E+00	1.04E+01	3.18E+00	6.13E-02	5.74E+00	1.17E+01	3.85E+00	1.53E-01	6.37E+00	1.22E+01	4.19E+00	3.68E-01
Phenanthrene		5.30E-01	9.35E+01	5.04E+03	9.18E+01	3.60E+01	2.04E+02	1.23E+04	2.01E+02	8.96E+01	3.81E+02	2.86E+04	3.76E+02	2.14E+02
Pyrene		1.30E-01	5.69E+02	6.18E+04	5.63E+02	2.20E+00	1.05E+03	1.44E+05	1.04E+03	5.49E+00	1.56E+03	2.97E+05	1.56E+03	1.32E+01
Benzo(a)pyrene		3.80E-03	1.21E+00	2.62E+00	8.26E-01	9.11E-01	1.42E+00	2.81E+00	9.43E-01	2.28E+00	1.52E+00	2.90E+00	9.98E-01	5.46E+00
Naphthalene		1.90E+01	2.68E+01	1.64E+00	1.54E+00	7.64E+01	6.36E+01	3.93E+00	3.70E+00	1.83E+02	1.43E+02	9.27E+00	8.71E+00	4.32E+02
Phenol	(b)	-	4.51E+02	3.11E+02	1.84E+02	4.16E+04	9.38E+02	4.20E+02	2.90E+02	8.15E+04	2.04E+03	5.21E+02	4.15E+02	1.74E+05

Table 7

Human Health Generic Assessment Criteria by Pathway for Residential Scenario - Private Gardens

Compound	Notes	GrAC (mg/l)	SAC Appropriate to Pathway SOM 1% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
			Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Total Petroleum Hydrocarbons														
Aliphatic hydrocarbons EC_5-EC_6		1.00E+01	4.79E+03	2.98E+01	2.97E+01	3.04E+02	1.08E+04	5.47E+01	5.46E+01	5.58E+02	2.35E+04	1.13E+02	1.13E+02	1.15E+03
Aliphatic hydrocarbons >EC_6-EC_8		5.40E+00	1.43E+04	7.27E+01	7.26E+01	1.44E+02	3.21E+04	1.62E+02	1.62E+02	3.22E+02	6.36E+04	3.72E+02	3.71E+02	7.36E+02
Aliphatic hydrocarbons >EC_8-EC_{10}		2.30E-01	1.46E+03	1.89E+01	1.88E+01	7.77E+01	2.44E+03	4.60E+01	4.58E+01	1.90E+02	3.30E+03	1.09E+02	1.08E+02	4.51E+02
Aliphatic hydrocarbons >EC_{10}-EC_{12}		3.40E-02	3.52E+03	9.34E+01	9.28E+01	4.75E+01	4.01E+03	2.32E+02	2.29E+02	1.18E+02	4.24E+03	5.57E+02	5.37E+02	2.83E+02
Aliphatic hydrocarbons >EC_{12}-EC_{16}		7.60E-04	4.37E+03	7.82E+02	7.44E+02	2.37E+01	4.40E+03	1.95E+03	1.69E+03	5.91E+01	4.41E+03	4.68E+03	3.03E+03	1.42E+00
Aliphatic hydrocarbons >EC_{16}-EC_{35}	(c)	-	4.51E+04	-	-	8.48E+00	6.38E+04	-	-	2.12E+01	7.61E+04	-	-	5.09E+01
Aliphatic hydrocarbons >EC_{35}-EC_{44}	(c)	-	4.51E+04	-	-	8.48E+00	6.38E+04	-	-	2.12E+01	7.61E+04	-	-	5.09E+01
Aromatic hydrocarbons >EC_8-EC_9 (styrene)		7.40E+00	1.66E+02	2.65E+02	1.33E+02	6.20E+02	3.92E+02	6.47E+02	3.16E+02	1.52E+03	8.50E+02	1.54E+03	7.02E+02	3.61E+03
Aromatic hydrocarbons >EC_9-EC_{10}		7.40E+00	5.55E+01	3.33E+01	2.69E+01	6.13E+02	1.31E+02	8.16E+01	6.54E+01	1.50E+03	2.84E+02	1.94E+02	1.51E+02	3.58E+02
Aromatic hydrocarbons >EC_{10}-EC_{12}		2.50E-01	7.97E+01	1.82E+02	6.91E+01	3.64E+02	1.86E+02	4.48E+02	1.62E+02	8.99E+02	3.87E+02	1.07E+03	3.46E+02	2.15E+03
Aromatic hydrocarbons >EC_{12}-EC_{16}		5.80E+00	1.40E+02	2.00E+03	1.38E+02	1.69E+02	3.13E+02	4.96E+03	3.08E+02	4.19E+02	6.01E+02	1.18E+04	5.93E+02	1.00E+03
Aromatic hydrocarbons >EC_{16}-EC_{21}	(c)	-	2.47E+02	-	-	5.37E+01	4.82E+02	-	-	1.34E+02	7.66E+02	-	-	3.21E+02
Aromatic hydrocarbons >EC_{21}-EC_{35}	(c)	-	8.88E+02	-	-	4.83E+00	1.11E+03	-	-	1.21E+01	1.22E+03	-	-	2.90E+01
Aromatic hydrocarbons >EC_{35}-EC_{44}	(c)	-	8.88E+02	-	-	4.83E+00	1.11E+03	-	-	1.21E+01	1.22E+03	-	-	2.90E+01

Notes:

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

NR - the compound is not volatile and therefore a soil saturation limit not calculated within CLEA

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

The CLEA model output is colour coded depending upon whether the soil saturation limit has been exceeded.

Calculated SAC exceeds soil saturation limit and may significantly effect the interpretation of any exceedances since the contribution of the indoor and outdoor vapour pathway to total exposure is >10%. This shading has also been used for the RBCA output where the theoretical solubility limit has been exceeded. The SAC has been set as the model calculated SAC with the saturation limits shown in brackets.

Calculated SAC exceeds soil saturation limit but will not effect the SSV significantly since the contribution of the indoor and outdoor vapour pathway to total exposure is <10%.

Calculated SAC does not exceed the soil saturation limit.

For consistency where the theoretical solubility limit within RBCA has been exceeded in production of the GrAC, these cellls have also been hatched red.

The SAC for organic compounds are dependant upon soil organic matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, polycyclic aromatic hydrocarbons, MTBE, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3

(a) Sensitivity analysis undertaken on SEGH equation and CLEA model, considered reasonable in absence of UK specific data

(b) GAC taken from the Environment Agency SGV reports published 2009.

(c) SAC for selenium, aliphatic and aromatic hydrocarbons >EC16 does not include inhalation pathway owing to absence of toxicity data. SAC for arsenic is only based on oral contribution (rather than combined) owing to the relative small contribution from inhalation in accordance with the SGV report. The same approach has been adopted for zinc.

(d) SAC for elemental mercury, chromium VI and nickel is based on the inhalation pathway only owing to an absence of toxicity for elemental mercury, in accordance with the SGV report for nickel and LQM report for chromium VI.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - RESIDENTIAL WITH PRIVATE GARDENS

Table 8
Human Health Generic Assessment Criteria for Residential Scenario - Private Gardens

Compound	GrAC for Groundwater (mg/l)	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals				
Arsenic	-	32	32	32
Cadmium	-	10	10	10
Chormium (III) - oxide	-	3,000	3,000	3,000
Chromium (VI) - hexavalent	-	4.3	4.3	4.3
Copper	-	2,300	2,300	2,300
Lead	-	300	300	300
Elemental Mercury (Hg^0)	0.009	0.17	0.42	1.0
Inorganic Mercury (Hg^{2+})	-	170	170	170
Methyl Mercury (Hg^{4+})	20	7.4	9.6	11
Nickel	-	130	130	130
Selenium	-	350	350	350
Zinc	-	3,800	3,800	3,800
Cyanide	-	3.7	3.7	3.7
Volatile Organic Compounds				
Benzene	7	0.079	0.157	0.33
Toluene	1,900	120	270	610
Ethylbenzene	260	65	154	350
Xylene - m	100	44	103	240
Xylene - o	87	45	106	250
Xylene - p	84	42	98	230
Total xylene	84	44	103	240
Methyl tertiary butyl ether (MTBE)	2,200	1.8	3.7	7.4
Trichloroethene	1.8	0.11	0.2	0.49
Tetrachloroethene	3.6	0.94	2.1	4.8
1,1,1-Trichloroethane	26	6.2	12.7	28
1,1,1,2Tetrachloroethane	14	0.89	2.1	4.8
1,1,2,2-Tetrachloroethane	14	1.4	2.87	6.3
Carbon Tetrachloride	0.055	0.018	0.039	0.089
1,2-Dichloroethane	0.30	0.0053	0.0080	0.014
Vinyl Chloride	0.019	0.00047	0.0006	0.001
1,2,4-Trimethylbenzene	0.075	0.35	0.85	2.1
1,3,5-Trimethylbenzene	0.047	0.46	1.1	2.6
Semi-Volatile Organic Compounds				
Acenaphthene	3.2	210	480	1,000
Acenaphthylene	4.2	170	400	850
Anthracene	0.021	2,300	4,900	9,200
Benzo(a)anthracene	0.0038	3.1	4.7	5.9
Benzo(b)fluoranthene	0.0020	5.6	6.5	7.0
Benzo(g,h,i)perylene	0.00026	44	46	47
Benzo(k)fluoranthene	0.00080	8.5	9.6	10
Chrysene	0.0020	6.0	8.0	9.3
Dibenzo(a,h)anthracene	0.00060	0.76	0.86	0.90
Fluoranthene	0.23	260	460	670
Fluorene	1.9	160	380	780
Indeno(1,2,3-cd)pyrene	0.0002	3.2	3.8	4.2
Phenanthrene	0.53	92	200	380
Pyrene	0.13	560	1,000	1,600
Benzo(a)pyrene	0.0038	0.83	0.94	1.0
Naphthalene	19	1.5	3.7	8.7
Phenol	-	180	290	420
Total Petroleum Hydrocarbons				
Aliphatic hydrocarbons EC_5-EC_6	10	30	55	110
Aliphatic hydrocarbons >EC_6-EC_8	5.4	73	160	370
Aliphatic hydrocarbons >EC_8-EC_{10}	0.23	19	46	110
Aliphatic hydrocarbons >EC_{10}-EC_{12}	0.034	93 (48)	230 (118)	540 (283)
Aliphatic hydrocarbons >EC_{12}-EC_{16}	0.00076	744 (24)	1,700 (59)	3,000 (142)
Aliphatic hydrocarbons >EC_{16}-EC_{35}	-	45,100 (8.48)	64,000 (21)	76,000
Aliphatic hydrocarbons >EC_{35}-EC_{44}	-	45,100 (8.48)	64,000 (21)	76,000
Aromatic hydrocarbons >EC_8-EC_9 (styrene)	7.4	130	316	700
Aromatic hydrocarbons >EC_9-EC_{10}	7.4	27	65	150
Aromatic hydrocarbons >EC_{10}-EC_{12}	25	69	160	346
Aromatic hydrocarbons >EC_{12}-EC_{16}	5.8	140	310	593
Aromatic hydrocarbons >EC_{16}-EC_{21}	-	250	480	770
Aromatic hydrocarbons >EC_{21}-EC_{35}	-	890	1,100	1,230
Aromatic hydrocarbons >EC_{35}-EC_{44}	-	890	1,100	1,230

Notes:

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

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

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

SAC for TPH fractions, polycyclic aromatic hydrocarbons, MTBE, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3.

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

APPENDIX L
GENERIC ASSESSMENT CRITERIA FOR PHYTOTOXIC EFFECTS AND CONTROLLED WATERS

This appendix presents the generic assessment criteria (GAC) that RSK considers are suitable for assessing risks to:

- vegetation via the uptake of phytotoxic determinants through plant roots
- controlled waters.

The GAC for each of these receptors is discussed in turn.

Phytotoxic determinants to facilitate healthy plant growth

Copper and zinc can inhibit plant growth but are not normally hazardous to human health. The GAC for this pollutant linkage have been taken from Department of the Environment (1996) publication, *Code of Practice for Agricultural Use of Sewage Sludge*. The GAC for the phytotoxic determinants are presented in Table A1. The table also includes nickel as this is also phytotoxic. Please note that the human health GAC may not be suitably protective of the phytotoxic effects pathway depending on the soil pH.

Table A1: Generic assessment criteria for phytotoxic determinants

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

Controlled waters

The GAC for controlled waters are presented in Table A3. In line with the Environment Agency's (2006b) remedial targets methodology, the GAC for controlled waters are termed 'target concentrations'.

The target concentration can be derived by several means with consideration to:

- whether the substance is classified as hazardous or non-hazardous by the EU under the Water Framework Directive (2000/60/EC) and Groundwater Daughter Directive (2006/118/EC) implemented though the Environmental Permitting Regulations 2010;
- background concentrations in the aquifer; and
- published guidance such as Environmental Quality Standards that are protective of ecology or The Water Supply (Water Quality) Regulations 2001 that are protective of drinking water.

A list of target concentrations considered suitable to assess risks to principal aquifers and secondary aquifers are presented in Table A2. Those for a principal aquifer are taken from the UK water supply (water quality) standards where possible owing to the possibility of a drinking water supply being within an influencing distance from the site or the possibility of one being installed. The target concentrations for a secondary aquifer are generally taken as the freshwater EQS where available owing to groundwater in secondary aquifers commonly providing base flow to surface watercourses.

Table A2: Target concentrations for controlled waters

Determinant	Target concentrations (mg/l)	
	Principal aquifer/source protection zone	Secondary aquifer/surface watercourse
Metals		
Arsenic	0.01 (1)	0.05 (15a)
Cadmium	0.005 (1)	</=0.00008, 0.00008, 0.00009, 0.00015, 0.00025 (15b)
Chromium (total)	0.05 (1)	Use values for chromium III and VI
Chromium (VI)	Use value for total chromium	0.0034 (15a)
Chromium (III)		0.0047 (15a)
Copper	2.0 (1)	0.001, 0.006, 0.01, 0.028 (15e)
Lead	0.025 (before 25/12/2013), 0.01 (after 25/12/2013) (1)	0.0072 (15a)
Mercury	0.001 (1)	0.00005 (15a))
Nickel	0.02 (1)	0.02 (15a)
Selenium	0.01 (1)	0.01 (1,12)

Zinc	5[2]	0.008, 0.05, 0.075, 0.125 [15e]
Chlorinated solvents		
Trichloroethene	0.01[1]	0.01[15a]
Tetrachloroethene		0.01[15a]
1,1,1-Trichloroethane	0.0001[3]	0.1[15a]
1,1,2-Trichloroethane	0.0001[3]	0.4[15a]
Carbon tetrachloride	0.003[1]	0.012[15a)]
1,2-Dichloroethane	0.003[1]	0.01[15a]
Vinyl chloride	0.0005[1]	0.0005[1,12]
Trihalomethanes	0.1[4]	0.1[4,12]
Chloroform (one of the trihalomethanes included above)	-	0.0025[15a]
Polycyclic aromatic hydrocarbons		
Acenaphthene	0.0058[9,13]	0.0058[9]
Acenaphthylene	0.0058[9,13]	0.0058[9]
Anthracene	0.0001[13, 15a]	0.0001[15a]
Benzo(a)anthracene	0.000018[9,13]	0.000018[9]
Benzo(b)fluoranthene	0.0001[1]	0.00003[15f]
Benzo(k)fluoranthene		
Benzo(g,h,i)perylene		0.000002[15g]
Indeno(1,2,3-cd)pyrene		
Chrysene	0.00001[9,13]	0.00001[9]
Dibenzo(a,h)anthracene	0.00001[9,13]	0.00001[9]
Fluoranthene	0.00001[9,13]	0.00001[15a)]
Fluorene	0.0021[9,13]	0.0021[9]
Phenanthrene	0.003[9,13]	0.003[9]
Pyrene	0.00004[9,13]	0.00004[9]
Benzo(a)pyrene	0.00001[1]	0.00005[15a]
Naphthalene	0.0024[13,15]	0.0024[15a]
Petroleum hydrocarbons		
Total petroleum hydrocarbons	0.01[1]	0.01[2,10]
Benzene	0.001[1]	0.01[15a]
Toluene	0.004[3]	0.05[15a]
Ethylbenzene	0.02[13,14]	0.02[14]
Xylene	0.003[3]	0.03[15a)]
Methyl tertiary butyl ether	0.015[6]	0.015[6,12]

Pesticides and herbicides		
Aldrin	0.003[3]	0.00001[15d]
Dieldrin	0.003[3]	
Endrin	0.0001[3]	
Isodrin	0.0001[3]	
Heptachlor	0.00003[1]	0.00003[1,12]
Heptachlor epoxide	0.00003[1]	0.00003[1,12]
Other pesticides	0.0001[1]	0.0001[1,12]
Total pesticides	0.0005[1]	0.0005[1,12]
Total DDT	0.001[8]	0.000025[15a]
Azinphos – methyl	0.0001[3]	0.00001[14]
Cyfluthrin	0.0001[3]	0.000001[3]
Demeton	0.0001[3]	0.0005[10]
Dichlorvos	0.000001[13,15]	0.000001[15a]
Dimethoate	0.0001[13,15a]	0.00048[15a]
Endosulphan	0.0001[13,15a]	0.000005[15a]
Fenitrothion	0.0001[3]	0.00001[15a]
Flucofuron	0.0001[3]	0.001[3]
Malathion	0.0001[3]	0.00001[15a]
Mevinphos	0.00002[7,13]	0.00002[7]
Omethoate	0.0001[3)]	0.00001[3]
PCSDs (cyfluthrin, sulcofuron, flucofuron and permethrin)	0.00005[7,13]	0.00005[17]
Permethrin	0.0001[3]	0.00001[15a]
Sulcofuron	0.0001[3]	0.025[7]
Triazaphos	0.0001[3]	0.000005[10]
Atrazine	0.0001[3]	0.0006[15a]
Simazine		0.001[15a]
Bentazone	0.1[3]	0.5[15a]
Linuron	0.0001[3]	0.0005[15a]
Mecoprop	0.0001[3]	0.018[15a]
Trifluralin	0.0001[3]	0.00003[15a]
Miscellaneous		
Cyanide	0.05[1]	0.001[15a]
Phenol	0.0005[3]	0.0077[15a]
Sodium	200[1]	170[3]

Chloride	250[1]	250[5]
Ammonium (as NH_4^+)	0.5[1]	0.5[1,12]
Ammonia (NH_3 as N)	0.015[13]	0.015[3]
Sulphate	250[1]	400[5]
Iron	0.20[1]	1[15a]
Manganese	0.05[1]	0.05[1,12]
Aluminium	0.2[1]	0.2[1,12]
Nitrate (as NO_3)	50[1]	50[1,12]
Nitrite (as NO_2)	0.1[1]	0.1[1,12]

Notes:

1. Statutory Instrument 2000 No. 3184. The Water Supply (Water Quality) Regulations 2000.
2. Statutory Instrument 1989 No. 1147. The Water Supply (Water Quality) Regulations 1989.
3. Minimum reporting values listed in Annex (j) of Horizontal Guidance Note H1 (Environment Agency, 2010b). Note target concentration for xylenes is 0.003mg/l each for o-xylene and m/p xylene.
4. Statutory Instrument 2000 No. 3184. The Water Supply (Water Quality) Regulations 2000 – sum of chloroform, bromoform, dibromochloromethane and bromodichloromethane.
5. Proposed list of EQS for implementation of the Dangerous Substances Directive (76/464.EEC).
6. Environment Agency MTBE guidance, dated 2006.
7. Freshwater Environmental Quality Standards: The Water Framework Directive.
8. WHO's (2004) guidelines for drinking-water quality.
9. WRc plc (2002), R&D Technical Report P45. Where predicted no-effect concentration is below the laboratory method detection limit (LMDL) for chrysene, dibenzo(ah)anthracene and fluoranthene, the target concentration has been set at the LMDL of 0.00001mg/l.
10. Owing to hydrocarbons being hazardous substances, 0.01mg/l (DWS) should be used in the first instance against the total of the hydrocarbon bands. However, if the hydrocarbon concentrations measured in groundwater exceed this value, an alternative value of 0.05mg/l could be used providing it is justified based on the type of aquifer and distance to secondary receptors such as a stream. The value is taken as the lowest concentration in Statutory Instrument 1996 No. 3001 titled the Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996.

11. Surface Waters (Dangerous Substances) (Classification) Regulations 1998.

12. Where a published target concentration considered suitable for use with a secondary aquifer could not be found for certain substances such as selenium, the target concentration used for the principal aquifer has been adopted.

13. Where a published target concentration considered suitable for use with a principal aquifer could not be found for certain substances such as ethylbenzene, the target concentration used for the secondary aquifer has been adopted.

14. Environment Agency Chemical Standards Database (May 2011).

15. The River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2010.

    15a. Value for 'Good' status.

    15b. Applies to hardness ranges of <40mg/l $CaCO_3$, 40–<50mg/l $CaCO_3$, 50–<100mg/l $CaCO_3$, 100–<200mg/l $CaCO_3$ and >/=200mg/l $CaCO_3$. The target concentrations included in Table 3 are listed in order of increasing calcium carbonate concentrations.

    15c 'High' standard: < /= 50mg $CaCO_3$/l or >50–200mg $CaCO_3$/l and an altitude of >80m above mean sea level, >50–200mg $CaCO_3$/l and an altitude of < /= 80m above mean sea level, 'Good' standard: < /= 50mg $CaCO_3$/l or >50–200mg $CaCO_3$/l and an altitude of >80m above mean sea level, >50–200mg $CaCO_3$/l and an altitude of < /= 80m above sea level.

    15d. Sum of aldrin, dieldrin, endrin and isodrin.

    15e. Hardness ranges are 0–50mg/l $CaCO_3$, 50–100mg/l $CaCO_3$, 100–250mg/l $CaCO_3$ and >250mg/l $CaCO_3$. The target concentrations included in Table 3 are listed in order of increasing calcium carbonate concentrations. Applies to annual average. Applies to annual average value for 'Good' status.

    15f. Sum of benzo(a) anthracene and benzo(k)fluoranthene.

    15g. Sum of benzo(g,h,I)perylene and indeno(1,2,3-cd)pyrene.

'-' A target concentration for chloroform for a principal aquifer is absent since it is one of the trihalomethane compounds. See note 4 above.

APPENDIX M
GENERIC ASSESSMENT CRITERIA FOR POTABLE WATER SUPPLY PIPES

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

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

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

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

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

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

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

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

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

Table A3: Generic assessment criteria for water supply pipes

		Pipe material	
		GAC (mg/kg)	
	Parameter group	**PE**	**PVC**
1	Extended VOC suite by purge and trap or head space and GC-MS with TIC (Not including compounds within group 1a)	0.5	0.125
1a	• BTEX + MTBE	0.1	0.03
2	SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C_5–C_{10}) (Not including compounds within group 2e and 2f)	2	1.4
2e	• Phenols	2	0.4
2f	• Cresols and chlorinated phenols	2	0.04
3	Mineral oil C_{11}–C_{20}	10	Suitable
4	Mineral oil C_{21}–C_{40}	500	Suitable
5	Corrosive (conductivity, redox and pH)	Suitable	Suitable
Specific suite identified as relevant following site investigation			
2a	Ethers	0.5	1
2b	Nitrobenzene	0.5	0.4
2c	Ketones	0.5	0.02
2d	Aldehydes	0.5	0.02
6	Amines	Not suitable	Suitable
Notes: where indicated as ‘suitable’, the material is considered resistant to permeation or degradation and no threshold concentration has been specified by UKWIR.			

APPENDIX N
CERTIFICATES OF GEOTECHNICAL ANALYSIS

STRUCTURAL SOILS LTD

TEST REPORT

Report No. 582624-01 (00) 2652

Date 27-October-2013 Contract Kingstone School, Barnsley

Client RSK
Address 12 Royal Scot Rd
Pride Park
Derby
Derbyshire
DE24 8AJ
For the Attention of Anthony Jordan

Samples submitted by client	09-October-2013	Client Reference	301285
Testing Started	09-October-2013	Client Order No.	n/a
Testing Completed	25-October-2013	Instruction Type	Written

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

UKAS Accredited Tests

1.01	Moisture Content (oven drying method) BS1377:Part 2:1990:clause 3.2
1.03	Liquid Limit (one point method) & Plastic Limit BS1377:Part 2:1990,clause 4.4/5.3

Undertaken by a sub-contractor

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

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of .
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

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

TESTING VERIFICATION CERTIFICATE

UKAS TESTING
2652

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

ISSUE STATUS: **FINAL**

In accordance with Structural Soils Ltd Laboratory Quality Assurance Manual, Issue 6, January 2010 all results sheets and summaries of results issued by the laboratory are checked by an approved signatory. This check will also involve checking of at least 10% of calculations for each test type to ensure that data has been correctly entered into the computer and calculated. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Assurance Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **27/10/2013 09:43:28**.

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

Approved Signatory
Justin Barrett (Laboratory Manager)

STRUCTURAL SOILS 18 Frogmore Road Hemel Hempstead Hertfordshire HP3 9RT	Contract: **Kingstone School, Barnsley**	Job No: **582624**

AGS

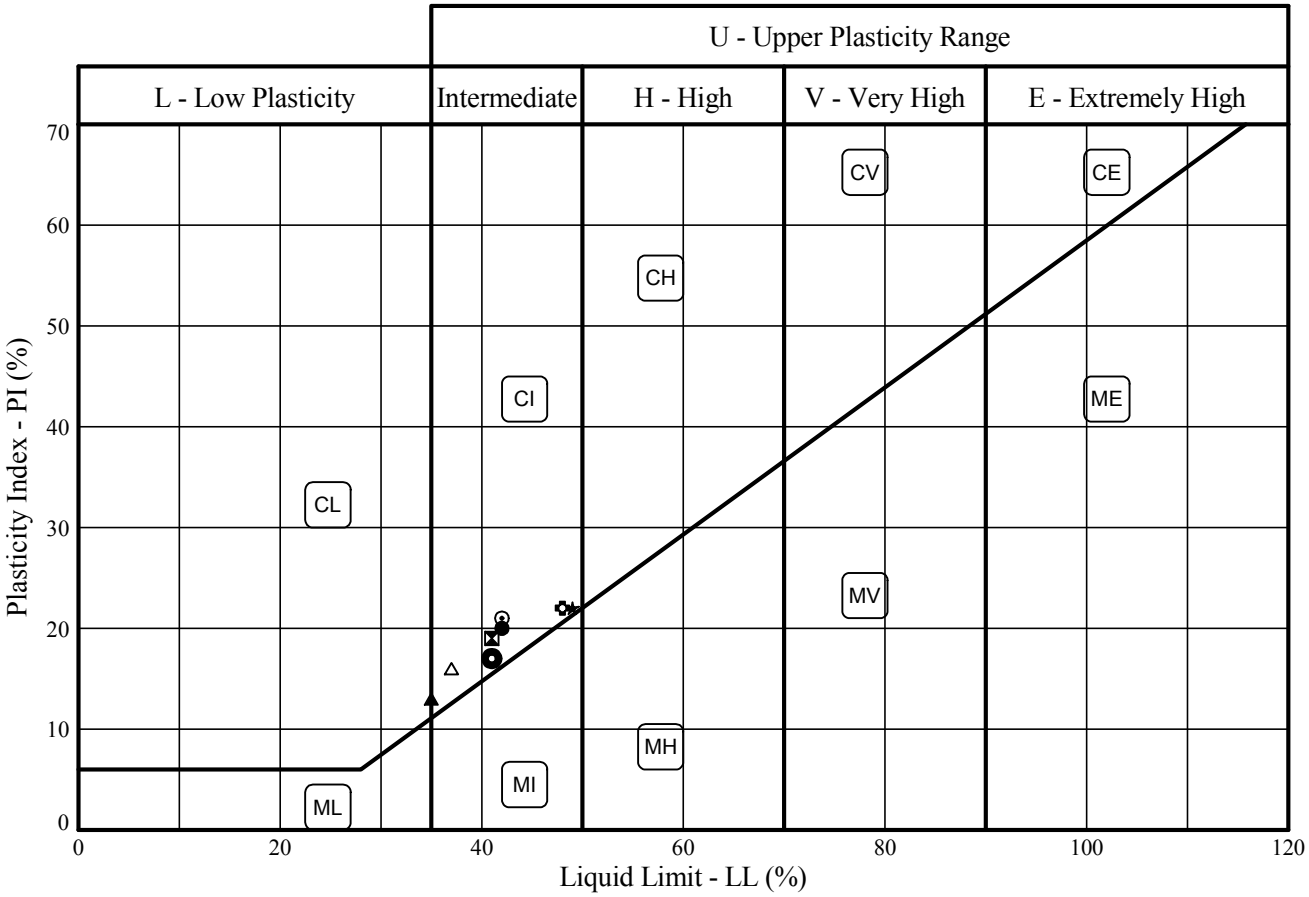
SUMMARY OF SOIL CLASSIFICATION TESTS

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

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %	% <425um	Description of Sample
PH6		D	1.00	23	42	22	20	75	Light grey mottled brown slightly gravelly slightly sandy CLAY
PH7		D	1.40	8.2	41	22	19	50	Brown slightly sandy slightly gravelly CLAY
PH9		D	1.60	11	35	22	13	80	Brownish grey CLAY/WEAK MUDSTONE
TP3	2	D	1.00	9.7	49	27	22	82	Grey CLAY with weak mudstone gravel
TP6	2	D	1.20	16	42	21	21	72	Brownish grey slightly gravelly slightly sandy CLAY
TP10	1	D	1.10	11	48	26	22	94	Grey CLAY with weak mudstone gravel
TP12	1	D	0.50	12	41	24	17	82	Brown slightly gravelly sandy CLAY
TP19	2	D	1.20	15	37	21	16	74	Light grey mottled brown slightly gravelly slightly sandy CLAY

PLASTICITY CHART - PI Vs LL

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



Sample Identification				BS Test Method #	Preparation Method +	MC	LL	PL	PI	<425um	
	Exploratory Position ID	Sample	Depth (m)			%	%	%	%	%	
●	PH6	D	1.00	3.2/4.4/5.3/5.4	4.2.4	23	42	22	20	75	
⊠	PH7	D	1.40	3.2/4.4/5.3/5.4	4.2.4	8.2	41	22	19	50	
▲	PH9	D	1.60	3.2/4.4/5.3/5.4	4.2.4	11	35	22	13	80	
★	TP3	2D	1.00	3.2/4.4/5.3/5.4	4.2.4	9.7	49	27	22	82	
⊙	TP6	2D	1.20	3.2/4.4/5.3/5.4	4.2.4	16	42	21	21	72	
✿	TP10	1D	1.10	3.2/4.4/5.3/5.4	4.2.4	11	48	26	22	94	
◉	TP12	1D	0.50	3.2/4.4/5.3/5.4	4.2.4	12	41	24	17	82	
△	TP19	2D	1.20	3.2/4.4/5.3/5.4	4.2.4	15	37	21	16	74	

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

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

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

4.2.3 - Natural State
4.2.4 - Wet Sieved

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

Approved Signatories: D. TROWBRIDGE J. BARRETT A. FROST S. CAIRNS

STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By		Date
	JUSTIN BARRETT	**27/10/13**

Contract	Contract Ref:
Kingstone School, Barnsley	**582624**

AGS

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 13/04906
Issue Number: 1 **Date:** 23 October, 2013

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

Project Manager: Sharon Cairnes / Anya Agulova / Justin Barrett
Project Name: RSK Env / Kingstone School, Barnsley
Project Ref: 301285
Order No: Not specified
Date Samples Received: 17/10/13
Date Instructions Received: 17/10/13
Date Analysis Completed: 22/10/13

Prepared by:

Melanie Marshall
Laboratory Coordinator

Approved by:

Liz Oliver
Client Service Manager

Envirolab Job Number: 13/04906

Client Project Name:RSK Env / Kingstone School, Barnsley

Client Project Ref: 301285

Lab Sample ID	13/04906/1								Units	Method ref
Client Sample No	1									
Client Sample ID	TP12									
Depth to Top	0.50									
Depth To Bottom										
Date Sampled	24-Sep-13									
Sample Type	Soil - D									
Sample Matrix Code	6									
% Stones >10mm$_A^{\#}$	<0.1								% w/w	A-T-044
pH BRE$_D^{M\#}$	6.32								pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	113								mg/l	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	0.05								% w/w	A-T-028
Sulphur BRE (total)$_D$	0.05								% w/w	A-T-024

REPORT NOTES

Notes - Soil analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.
Superscript "M" indicates method accredited to MCERTS.
For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations. If results are in italic font they are associated with such quality control failures and may be unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

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

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER.
Samples with Matrix Code 7 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our MCERTS accreditation.

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

IS indicates Insufficient sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

APPENDIX O
HAZARDOUS WASTE CALCULATION SHEETS

As cmpds (AsS), Cd (CdO), CrVI cmpds ($FeCrO_4$), Cu (Cu_2O), Inorg Hg cmpds (HgO), Pb cmpds ($PbSO_4$), Ni ($NiCO_3$), Se cmpds (SeS) and Zn as ZnO. Also Ba ($BaCO_3$), Be cmpds ($BeSO_4$), Co (CoO), Mn (MnO_2) and Mo (MoO_3).

HASWASTE v4a. Envirolab's Contaminated Land Soil Hazardous Waste Assessment Tool.

Envirolab, Sandpits Business Park, Mottram Road, Hyde, Cheshire SK14 3AR.

envirolab

Site Code and Name	301285 Kingstone School, Barnsley

TP/WS/BH		PH1	PH2	PH3	PH8	PH6	TP8	TP8	TP9	TP1	TP5	TP16	TP18	TP7	TP4	PH3	PH4		
Depth (m)		0.70	0.80	0.30	0.50	0.40	0.35	1.00	0.30	1.20	1.20	0.15	0.20	0.70	0.60	1.80	0.70		
Envirolab reference		13/04758/1	13/04758/2	13/04758/3	13/04758/4	13/04758/5	13/04758/6	13/04758/7	13/04758/8	13/04758/9	13/04758/9	13/04758/9	13/04758/9	13/04758/9	13/04758/9	13/04758/9	13/04758/9		
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic		7	17	10	8	6	23		7	3	2	15	10						
CrVI or Chromium		48	57	93	41	21	55		60	32	38	41	33						
Copper		50	57	31	28	24	229		43	27	38	40	25						
Lead		69	92	41	46	34	112		65	50	25	73	49						
Nickel		34	23	30	26	21	71		28	19	40	25	19						
Zinc		124	104	81	81	56	144		102	132	87	110	85						
Cadmium		1.3	0.7	1.2	1.5	1.2	1.7		1.2	1.2	0.9	1.2	1.1						
Mercury		0.35	0.46	0.46	0.23	1.06	0.17		0.68	0.17	0.17	0.23	0.17						
Selenium		2	1	2	2	1	2		2	1	1	3	2						
Barium																			
Beryllium																			
Cobalt																			
Manganese																			
Molybdenum																			
Total USEPA 16 PAHs																			
Acenaphthene		0.11	0.18	0.15	0.13	4.34	0.11		0.97	0.01	0.01	0.01	0.01						
Acenaphthylene		0.02	0.15	0.07	0.02	0.50	0.07		0.17	0.01	0.01	0.02	0.01						
Anthracene		0.20	0.67	0.88	0.24	12.90	0.28		2.70	0.02	0.02	0.05	0.03						
Benzo(a)anthracene		0.45	2.44	3.47	0.57	45.40	1.21		10.90	0.04	0.04	0.30	0.21						
Benzo(a)pyrene		0.40	2.26	3.36	0.51	53.80	1.11		9.12	0.04	0.04	0.29	0.21						
Benzo(b)fluoranthene		0.49	2.84	3.96	0.59	50.90	1.51		10.20	0.05	0.05	0.40	0.26						
Benzo(ghi)perylene		0.25	1.26	2.19	0.29	25.20	0.69		5.01	0.05	0.05	0.19	0.14						
Benzo(k)fluoranthene		0.18	1.11	1.73	0.24	23.30	0.70		4.84	0.07	0.07	0.16	0.10						
Chrysene		0.53	2.49	3.41	0.57	43.90	1.25		9.93	0.06	0.06	0.35	0.24						
Dibenzo(ah)anthracene		0.07	0.36	0.56	0.08	6.64	0.19		1.38	0.04	0.04	0.04	0.04						
Fluoranthene		1.11	4.63	8.45	1.26	114.00	2.23		22.70	0.08	0.08	0.58	0.35						
Fluorene		0.11	0.21	0.14	0.09	5.24	0.07		0.79	0.01	0.01	0.01	0.01						
Indeno(123cd)pyrene		0.23	1.20	1.93	0.27	26.20	0.66		4.86	0.03	0.03	0.18	0.13						
Naphthalene		0.07	0.17	0.04	0.09	0.13	0.24		0.13	0.03	0.03	0.03	0.03						
Phenanthrene		0.80	2.33	2.74	0.82	61.40	1.06		11.10	0.03	0.04	0.22	0.12						
Pyrene		0.97	3.80	8.02	1.08	106.00	1.96		19.50	0.07	0.07	0.47	0.30						
Benzo(j)fluoranthene																			
Benzene		0.01	0.01	0.01	0.01	0.01	0.01		0.01	0.01	0.01	0.01	0.01		0.01				
Toluene		0.01	0.01	0.01	0.01	0.01	0.01		0.01	0.01	0.01	0.01	0.01		0.01				
Ethylbenzene		0.01	0.01	0.01	0.01	0.01	0.01		0.01	0.01	0.01	0.01	0.01		0.01				
Xylenes		0.02	0.02	0.02	0.02	0.02	0.02		0.02	0.02	0.02	0.02	0.02		0.02				
Trimethylbenzenes																			
Chlorobenzene																			
1,2-Dichlorobenzene																			
1,3-Dichlorobenzene																			
1,4-Dichlorobenzene																			
1,2,4-Trichlorobenzene																			
2-Chlorotoluene																			
4-Chlorotoluene																			
Trichloroethene (TCE)																			
Oil in Waste Carcinogenic H7																			
Total TPH	≥1,000mg/kg	1.5	29.2	56.9	0.1	2,260.0	8.4		183.0	0.1	0.1	0.1	0.1		80.4				
Petrol or (C6-C10)	≥1,000mg/kg																		
Diesel or (C10-C25) or (conservative C10-C35)	≥10,000mg/kg																		
Lube Oil or (C25+) or (conservative C21+)	≥1,000mg/kg																		
8 IARC H7 Carcinogenic PAHs marker test (applicable to LRO only)	≥1%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
Kerosene																			
Kerosene																			
Creosote																			
Creosote																			
pH Corrosive H8 (Irritant H4)																			
pH (soil)	≤2 H8 ≥11.5																		
pH (leachate)	≤2 H8 ≥11.5																		
Alkali Reserve (gNaOH/100g)																			
H4 Alkali Reserve test	≥13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H8 Alkali Reserve test	≥14.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases H12																			
Total Sulphide	≥1,400mg/kg																		
Free Cyanide	≥1,200mg/kg																		
Thiocyanate	≥2,600mg/kg																		
Elemental/Free Sulphur																			
PCBs Total																			
Phenols Total by HPLC																			
Phenol																			
Cresols																			
Xylenols																			
1-Naphthol																			
Resourcinol																			
2,3,5,6-Tetrachlorophenol																			
2,4,5-Trichlorophenol																			
2,4,6-Trichlorophenol																			
2,4-Dichlorophenol																			
4-Chloro-3-methylphenol																			
Pentachlorophenol																			
Bis(2-ethylhexyl)phthalate																			
Butylbenzylphthalate																			
Di-n-butylphthalate																			
Visual Fibre Screen or Asbestos ID (enter Y or N)	H7≥0.1%; H5≥3%; H6≥25%																		

Hazard Codes	Thresholds	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Irritant H4	≥10%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Irritant H4	≥20%	0.007	0.005	0.006	0.005	0.004	0.014	0.000	0.006	0.004	0.008	0.005	0.004	0.000	0.000	0.000	0.000	0.000	0.000
Harmful H5	≥25%	0.023	0.027	0.021	0.015	0.238	0.057	0.000	0.038	0.014	0.016	0.020	0.014	0.000	0.008	0.000	0.000	0.000	0.000
Toxic H6 (Harmful H5)	≥0.1%H5<7%; H6≥7%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Toxic H6 (Harmful H5)	≥3%H5<25%; H6≥25%	0.008	0.007	0.008	0.007	0.005	0.018	0.000	0.007	0.005	0.009	0.008	0.006	0.000	0.000	0.000	0.000	0.000	0.000
Carcinogenic H7	≥0.1%	0.016	0.019	0.031	0.014	0.007	0.018	0.000	0.020	0.011	0.013	0.014	0.011	0.000	0.000	0.000	0.000	0.000	0.000
Carcinogenic H7	≥1%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Corrosive H8 (Irritant H4)	≥5%H4<10%; H8≥10%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Toxic for Reproduction H10	≥0.5%	0.010	0.013	0.006	0.007	0.005	0.016	0.000	0.009	0.007	0.008	0.011	0.007	0.000	0.000	0.000	0.000	0.000	0.000
Toxic for Reproduction H10	≥5%	0.010	0.013	0.006	0.007	0.005	0.016	0.000	0.009	0.007	0.004	0.011	0.007	0.000	0.000	0.000	0.000	0.000	0.000
Mutagenic H11	≥0.1%	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mutagenic H11	≥1%	0.007	0.005	0.006	0.005	0.004	0.014	0.000	0.006	0.004	0.008	0.005	0.004	0.000	0.000	0.000	0.000	0.000	0.000
New H13 Sensitising	≥1%	0.0159	0.0189	0.0308	0.0136	0.0070	0.0182	0.0000	0.0199	0.0106	0.0126	0.0136	0.0109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ecotoxic H14	≥1.0	0.209	0.221	0.231	0.153	0.261	0.364	0.000	0.225	0.158	0.155	0.186	0.138	0.000	0.003	0.000	0.000	0.000	0.000
New Ecotoxic H14 individual substance specific thresholds	≥0.0025%	0.00005	0.00024	0.00035	0.00006	0.00454	0.00012	0.00000	0.00109	0.00000	0.00000	0.00003	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
New Ecotoxic H14 individual substance specific thresholds	≥0.025%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Consider other individual contaminants on a case by case basis.

Table 3.2 of Annex VI of the CLP Regulation incluing 1st ATP (sometimes called ATSP1).