

HERTS & ESSEX SITE INVESTIGATIONS

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GEOTECHNICAL ASSESSMENTS - ENVIRONMENTAL ASSESSMENT - DESKTOP STUDY - CONTAMINATED LAND

Report For :

London Borough of Hillingdon

Phase II ENVIRONMENTAL REPORT

Site location :

***Site
Hermitage Primary School,
Belmont Road,
Uxbridge,
Middlesex,
UB81RB***

***October 2012
Report No. 11051***

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DOCUMENT INFORMATION AND CONTROL SHEET

Client :

London Borough of Hillingdon,
Civic Centre,
High Street,
Uxbridge,
Middlesex
UB8 1UW

Client Contact :

Owner :

Unknown

Purchaser :

Unknown

Regulatory Body :

London Borough of Hillingdon,
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Document Status and Approval Schedule

Issue No	Status	Date	<i>Prepared by :</i>	<i>Technical review by :</i>	<i>Checked By :</i>
			Chris Gray Signature / Date	Rebecca Chamberlain Martyn Smith Signature / Date	Rebecca Chamberlain Chris Gray Signature / Date
1	Final				

REPORT ISSUE RECORD

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All final copy reports are issued to the client on paper headed with Herts & Essex Site Investigations to assist in the identification of copied reports. Additionally, final copies are printed 'Velum' coloured paper for easy identification of final copy reports.

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Please note, this reports has not been sent to the Local Authority, NHBC or Environment Agency with only the below issues made. Should copies be required for sending the relevant authorities, this can be undertaken upon request.

Controlled copies of this report have been issued according to the following schedule :-

	Issue No	Recipient	Type	No. of copies	Date
1	1	HESI, (File Copy)	Paper	1	October 2012
2	1	London Borough of Hillingdon	Paper	1	October 2012
3	1	MACE	PDF	1	October 2012
4					
5					
6					
7					
8					

EXECUTIVE SUMMARY

Client	London Borough of Hillingdon		
Site Location	Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB		
Proposed Development	The site use will remain a school although it is proposed to completely redevelop the site. A new school building is proposed to the northwest of the site area with a parking area to the north east. To the centre of the site area, a hard play area is proposed and the majority of the recreational/sports field to the south will remain as existing.		
Site Settings and Previous Uses	The site area is recorded as open land from pre 1868 until 1962 when allotments are recorded across the site area. From 1973 the map reference records a school in place, forming that in place to date. The main building is located to the north of the site area. Parking areas are in place to the north east and north west of the site area. Tarmac play areas are in place to the south of the main building with a grassed recreational/sports field across the south of the site. Surrounding the site there was open land in place with some residential land to the north east, over the years more residential land was developed to the north and south east of the site which remains in place to date. To the south of the site area from 1914 there was a cutting in place which remains in place to date lead to railway lines . To the west of the site area there was a depot in place 200m from the site area until 1988 then a larger retail unit was constructed nearer to the site area which is present to date. A drop in ground level is in place between this area and the site.		
Nearest Surface Water Feature	The nearest surface water feature is recorded at 199 meters to the east of the site which is recorded as a pond within Uxbridge College. This is unlikely to form a controlled water feature		
Ground Conditions	Geology	Aquifer	
	Made Ground	Shallow depths of made ground are recorded to max depths of 0.60m	Not Classified
	Glacial Sand & Gravel (Black Park Gravel Member)	None recorded within the investigation	Secondary Aquifer – Not Encountered
	London Clay	Clay was recorded below made ground and present to the close of excavation	Unproductive Aquifer
Groundwater Abstractions	The nearest groundwater abstraction well is recorded as 751 meters to the north west of the site which is recorded for Other Industrial/Commercial/Public Services: General Washing/Process Washing. No potable water supply abstractions are recorded surrounding the site area.		
Source Protection Zone	The information gained confirms that the site does not lie within a Source Protection Zone.		
Contamination Assessment	From DTS	From actual assessment undertaken	
	Sources of contamination identified	Sources of contamination identified	
	- Metals; - Metalloids; - Asbestos; - Speciated PAH's; - Inorganic; - Organic;	- Acids / Alkalis. - Speciated TPH, (Aliphatic / Aromatic Split).	PAH's.
Outline Conclusions	- From the testing undertaken, it is apparent that some areas of contamination have been identified as in place. This relates to contamination to human health which is detailed in this report; - Statistical Analysis has confirmed that the contamination is likely to be widespread across the site; - Outline remediation measures have been suggested within this report, although a Remediation Strategy Report is recommended.		

INVESTIGATION WORKS AND RISK ASSESSMENT REPORTING

1 Introduction

We have been asked by London Borough of Hillingdon to undertake an investigation of the above site in order to assess the potential environmental impact of the historical use of the site on the proposed development.

2 Report Objectives

The objectives of this report are to assess and define the extent of contamination within the site as a result of the investigation works undertaken to date.

Limitations

The opinions expressed within this document and the comments and recommendations given, are based on the information gained, to date within a desktop study previously undertaken on the site. The interpretation of the data has been made by Herts & Essex Site Investigations.

Within any site investigation, materials sampled represent only a small proportion of the materials present on site. It is therefore possible that other conditions prevailing at the site which have not been revealed within the scope of this report, have not been taken into account. Where suspect materials are encountered during any further or future works within the site, additional specialist advice should be sought to assess whether any new information will materially affect the recommendations given within any physical ground investigation.

Planning Condition

A review of the planning website at London Borough of Hillingdon has confirmed that within the online planning files there is a current application in place for the site, 3345/APP/2012/2036 it is noted as under consideration at the time of writing this report.

3 Site Location and National Grid Reference

The site is located within a residential and commercial area of Uxbridge, the details of which are summarised in Table 1 with the location plan of the site shown in Appendix 2, Sheet 1.

Table 1 Site Detail

Site Address :	Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB
Site assessed under	Site Owners Instruction
Current use of land :	School
Previous use of site, (if known)	Unknown
Grid Reference	NGR 505930, 184470
Site Area	Approximate area – 1.10 Hectares
Local Authority	London Borough of Hillingdon
Gradient of the site	The general site area forms level area of land with no obvious variations in ground level. To the north west of the site, (just outside the site), there is a drop in ground level by about 6 meters.
Proximity of Controlled Waters, (if known)	The nearest surface water feature is recorded at 199 meters to the east of the site which is recorded as a pond within Uxbridge College

4 Review of Previous Reports or Documents Relating to the Site

Site Details

- A Desk Top Study report compiled by Herts & Essex Site Investigations, (October 2012);
- The ground conditions have been studied using BGS Mapping records. By examination of this map reference, the site is recorded within an area of Glacial Sand & Gravel (Black Park Gravel Member) this is overlying London Clay. Within the online BGS Mapping to the south and west the London clay is recorded as exposed where the railway cutting and the retail store is currently in place, the London Clay is then extends away from the site area;
- The site area is recorded as open land from pre 1868 until 1962 when allotments are recorded across the site area. From 1973 the map reference records a school in place, forming that in place to date. The main building is located to the north of the site area. Parking areas are in place to the north east and north west of the site area. Tarmac play areas are in place to the south of the main building with a grassed recreational/sports field across the south of the site;
- Surrounding the site there was open land in place with some residential land to the north east, over the years more residential land was developed to the north and south east of the site which remains in place to date. To the south of the site area from 1914 there was a cutting in place which remains in place to date lead to railway lines. To the west of the site area there was a depot in place 200m from the site area until 1988 then a larger retail unit was constructed nearer to the site area which is present to date. A drop in ground level is in place between this area and the site.
- The nearest surface water feature is recorded at 199 meters to the east of the site which is recorded as a pond within Uxbridge College. This is unlikely to form a controlled water feature. The nearest groundwater abstraction well is recorded as 751 meters to the north west of the site which is recorded for Other Industrial/Commercial/Public Services: General Washing/Process Washing. No potable water supply abstractions are recorded surrounding the site area. The information gained confirms that the site does not lie within a Source Protection Zone.

Risks derived from DTS

As a result of the works undertaken, the following have been confirmed as the following :

On Site

- Former Allotments;
- School Parking Areas.

Off Site

- None

5 Details of Preparatory Work

Preparatory works had originally been agreed with the client to gain access and undertake excavations within the site. This incorporates free access across the site area, although, where buildings were occupied, some limitation were in place. Obviously, below any buildings, no works have been completed at this stage, although, are proposed as a secondary investigation.

6 Details of Investigation Objectives.

Within the scope of this report, the objectives will form the following :-

- To anticipate regulatory action and provide sufficient data to overcome and answer any outstanding queries they may raise;
- Provide the relevant authorities sufficient information to satisfy any regulatory requirements set for the site;

- To ensure that the development, on completion, will be fit for the proposed use with all risk assessed and removed.
- It is proposed within this investigation to assess the suitability of the site for a new development which will incorporate residential structure and associated landscaping;
- In order to assess this suitability for development, it is proposed to use a source-pathway-receptor analogy, which, if broken, presents a reduced risk to the development.
- It is proposed to assess, where possible, sources of contamination within the site as a result of historical or ongoing use and whether these uses have pathways to receptors within the proposed development.

7 Summery of Work Undertaken

The scope of the works involved excavation of boreholes to gain a better and more visual understanding of the site conditions. This was undertaken at locations around the site and broadly confirmed the findings of the visual inspection of the site.

Samples were taken in containers dependant upon the proposed sampling regime required and placed in cool boxes where they were transported directly to the analytical chemist for assessment. These works included the following :-

- Three Competitor Rig Windowless Sampler Boreholes, (sunk to depths of 5 meters)
- Shell & Auger Borehole, (Two sunk to a depth of 20 meters);
- Two trial pits sunk to expose foundations.

8 Location Plans for Exploratory Excavations

Recorded in Appendix One, Sheet One/Two are location plans and plans of the works undertaken within the above development.

Additionally, it is recorded that the existing and proposed developments are recorded incorporating zoned areas of concern regarding the existing site layout.

9 Description of Site Works and on/off Site Observations

A review of the borehole logs has been completed and confirm the geology is as anticipated.

This is detailed as follows :-

Table 2 Geological Profile

Stratum	Description	Depth, Range	Thickness, Range
Made Ground	Variable ground conditions including Brick, Sand And Gravel FILL, Topsoil FILL	0.20-0.60 meters	0.20-0.60 meters
London CLAY	Brown CLAY	2.00-20.00 meters	1.10-19.80 meters
Standing Water No standing water was identified within the excavations made based on short term observations. No long term monitoring has been completed. .			

10 Contamination Assessment

10.1 Contamination

Primarily, we have assessed the conditions of the subsoil with human health risk to humans within a residential land use scenario.

Table 3 Test Suites

Suite No	Test Criteria
Suite 1	Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, Asbestos, Boron, Sulfate, Phenols, Selenium, Vanadium, Speciated PAH's, pH.
Suite 2	Total Petroleum Hydrocarbons, (Speciated – 8 Band)

In order to assess the subsoil conditions within the site, samples have been sent for analysis, as detailed below :-

Table 4 Sampling Regime & Testing Scheme Implemented

Location	Depth (m)	Soil / Water	Made Ground / Natural Ground	Test Criteria	Justification For Position of excavation
WS1	0.15m	Soil Samples Only	Made Ground	Suite 1	Provide spatial coverage of the site
WS2	0.30m		Made Ground	Suite 1	
TP1	0.90m		Natural Ground	Suite 1, 2	
WS3	0.40m		Made Ground	Suite 1, 2	

10.2 Human Health Risk

As part of a generic assessment of the subsoil conditions, a comparison has initially been made using Generic Quantitative Assessment Criteria, (GQRA), values for contaminants derived by LQM / CIEH, (2nd Edition), to evaluate whether the levels of contamination measured at the site exceed the human health risk levels which have been derived from residential land use sites.

It is possible that where exceedances of these values are recorded, a more Detailed, Qualitative Risk Assessment, (DQRA), could be completed using site specific scenarios and toxicological properties of the subsoil and site conditions to derive Site Specific Assessment Criteria, (SSAC), for the site. The assessment of testing has been completed as follows and reports the initial risks considered in place compared to GQRA.

Table 5 Table of Source risk contamination based on GQRA

Location	Depth	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[a]pyrene	Dibenzo[a,h]anthracene	Indeno[123-cd]perylene
WS1	0.15m				1.8		
WS2	0.30m	6.4	6.9	6.2	5.9	1.3	4.1
TP1	0.80m						
WS3	0.40m						
Exposure Level		3.1	6	5.6	0.83	0.76	3.2

* Indicates the value which forms the lowest trigger level.

Indicates Leachable Contamination above UK Drinking Water Standards as a Tier One Assessment.

All measurements are given in mg/kg⁻¹

	Made Ground
	Natural Soils

10.3 Source

Based on the information gained, it can be seen that contamination is recorded as elevated above GQRA levels considered appropriate for the site. The contamination is likely present as a result of ash and clinker within the soils make up within the site and therefore selective to certain soils within the site where ash is present.

Statistical analysis should be considered the next appropriate assessment tool to consider whether risk is in place from initial assessment of source pollutants. This is included within the report.

The statistical analysis has been completed utilising the dataset from the entire site and as such, the conclusion of the statistical analysis will relate to the entire site.

10.4 Statistical Analysis

Based on the information present, we can confirm the following results were achieved from the assessment:-

Table 6 Statistical Analysis

Pollutant	No of samples tested	Confidence Level	Outliers Present	Upper 95th Percentile	GQRA Value	Test Results, (Pass / Fail)
Benzo[a]anthracene	4	52%	No	3.03	3.1	Sample Mean Passes. Confidence is Low. More data required.
Chrysene	4	92%	No	3.32	6	Sample Mean Passes. Confidence is high. No risk
Benzo[b]fluoranthene	4	28%	Yes	8.725	5.6	Sample Mean Fails. Confidence is Low. More data required.
Benzo(a)pyrene	4	10%	No	2.84	0.83	Sample Mean Fails. Confidence is Low. More data required.
Dibenzo[ah]anthracene	4	60%	No	0.69	0.76	Sample Mean Passes. Confidence is Low. More data required.
Indeno[1,2,3-cd]perylene	4	88%	No	1.93	3.2	Sample Mean Passes. Confidence is high. No risk in place

Considering the above information, we can confirm that at present, the information confirms the data used in the statistical assessment is insufficient. The Evidence Against a Null Hypothesis has generally been returned as low which would suggest that additional soils assessment are required. It is also recorded that outliers are present, although, only for Benzo[b]fluoranthene.

If sufficient sampling can be completed to confirm low 'mean values' and outliers classed as areas of soil which are specific to zones, specific remediation cells could be adopted for the site. All testing is considered likely to confirm soils will fail for the identified contamination and more specifically fail for Benzo[a]pyrene.

As such, risk is considered from the identified pollutants as widespread.

10.5 Ground and Surface Water Source

The assessment of the contamination dataset confirms that the risks associated with contamination identified is not recorded at concentrations which are significant. It is also unlikely that PAH pollutants are highly mobile.

Whilst this is the case, two factors must be considered which will reduce the impact of any contamination which are as follows :-

- Remediation of the areas of soft landscaping will remove soils which are noted as contaminated from the site as part of the risk removal;
- The site records superficial made ground and isolated gravel deposits which in turn overlie a significant thickness of London Clay. Migration will be reduced as a result.

10.6 Land Gas Assessments

In accordance with CLR11, BS 10175:2011, CIRIA C665 and CIRIA R149, we can confirm that the assessment of land gas is **NOT** required. No land gas risk is in place.

10.7 General Source Risk Conclusions

At present, the site as a whole must be considered a potential risk and therefore all areas of the site should be considered contaminated.

Based on the assessment undertaken, we would suggest that the potential for toxicological data to be derived and used within a Detailed Qualitative Risk Assessment which would alter

the GQRA assessment are low due to the significant exceedances of the GQRA values. The improvement of site data through the recovery of toxicological data or site profiling to alter the end use characteristics would not alter the site assessment greatly. As such, the GQRA assessment would seem sufficient, although, the requirement for additional sampling is recommended.

Additional sampling is required for the site such that statistical analysis can be completed with sufficient evidence to assess risk appropriately. We would suggest that non targeted spatial sampling is completed across the site and tested to confirm the state of the site.

We would suggest that this additional soil sampling should be undertaken to confirm the level and extent of Speciated PAH's only across the site in say between 10 and 20 locations. As confirmed within the statistical analysis discussions, it is likely that any additional contamination assessment will likely return a 'FAIL' result and as such the existing data should be considered sufficient.

11 *Risk Assessment Based on Source Risk*

Considering the presence of contamination which has been identified above, we confirm the following outlines the assessment of the site completed and way forward for the site.

Table 7 Risk Assessment A

Source	Receptors	Pathway	Mitigation / Discussion
PAH's	Site Users, (current and future); Construction Workers; Adjacent Site Users, Fauna.	Direct contact	Risk is in place – Additional assessment required through further sampling and testing for PAHs across the site.
		Ingestion dust and soil	
		Ingestion of soils attached to vegetation	
		Inhalation of asbestos fibers	Not Applicable
		Inhalation of vapours, (gas and organic)	No vapour risk from PAH contamination identified*
		Explosive risk from Land Gas	Not Applicable
		Ingestion of contaminated water through water main pipework	No risk in place from PAH contamination identified*
		Inhalation of vapours through contaminated ground waters	No vapour risk from PAH contamination identified*
		Direct contact with contaminated ground waters	
		Lateral migration of shallow groundwater to a target receptor.	On site soils do not pose a significant risk to ground waters or surface waters.
		Migration through fissures / cracks which may migrate to a groundwater receptor.	
		Plant uptake; Direct contact.	Plant Risks are considered Low based on assessments with ICRL old exposure levels. No specific plant risk assessment criteria in place
Buildings; Construction Materials.	Direct contact with contaminated soils; Direct contact with contaminated groundwater	Direct contact with contaminated soils;	PAH's pose a low risk to the built environment.
		Direct contact with contaminated groundwater	No groundwater contamination is likely

* Some PAH pollutants can form Volatile Organic Compounds, although, none of the identified pollution forms a VOC.

12 *Implications of the End Use of the Site*

Within the assessment of the site completed within this report, we can confirm that existing source – pathway – receptor risk assessments are now in place based on actual site data. Based on the change in use of the site through this proposed development, it is possible that pathways to receptors will be either removed or enhanced such that risk may be in place / removed.

The end use risks based on pathways are discussed below :-

- **Hard Landscaping** - will effectively cap off any contamination and remove risk, although, the placement of hard surfaces across the site should be confirmed as part of the planning application and not form a system of remediation that homeowners could remove as part of the ongoing habitation.
- **Soft Landscaping** - will form an area where risk is in place and as such, remedial measures are likely to be required.
- **Under Buildings** – will effectively cap off any contamination and remove risk. With no vapour risk from soils in place within the site, risk is considered low, although land gas assessments are ongoing and will classify the risk from off site infilled land.

13 *Outline Remediation Measures*

Considering the above, we would suggest that the following outline remediation measures could be employed in order to develop the site based on the existing data. This will be based on the assumption that the entire site is contaminated.

13.1 *Cover Systems - NHBC*

The remedial measures are likely to include one of the following cover systems for the site :-

Engineered cover systems – designed to provide the complete separation of the receptor from the hazard and to perform a number of functions including limiting upward migration of contaminants due to capillary rise and controlling the downward infiltration of water.

Simple cover systems – to provide a reduction of the hazard to human health and to provide a suitable medium for plant growth.

Consultation within NHBC guidance documents, (Cover Systems for Land Regeneration), confirm that maximum depths of cover will be required for residential sites and overcome the inherent issues with earthworm activity, burrowing animals, effects of trees and plants, digging during garden activities and intermixing of leaf fall. Justification of this is included within the NHBC guidance document.

It is also recorded that as part of the review, a questionnaire was sent out to various Developers, Consultants and Regulators who all confirmed variable degrees of cover system based on the level of contamination which ranged from 0.30 meters to 3.00 meters, although, the report by NHBC removes these as conservative and the suggestion of a 0.60 meter cover system adopted by the report as a maximum depth of cover required to be sufficient.

It should be noted that these cover systems do not overcome the risks from soil gases, hydrocarbons, highly elevated Mercury or Arsenic, the groundwater or any controlled waters, significant contamination, deep excavations, services, slopes or areas where rabbit or badger populations are significant.

Table 8 Outline Remediation Measures for end use of the site

Land Use	Mitigation Measure	Depth to remove risk	Confirmation required.
Private Gardens	Excavate and remove soils which are assessed to form a risk and placement of clean inert soils to a minimum depth of 0.60 meters. (See Cover Systems above for justification)	0.60m excavation and replacement of clean inert soils tested to confirm the infilled soils fall below the human health residential land use standards	Validation Works will be required. Validation of sides and base of excavation and validation of any soils brought onto the site
Communal Gardens			
Shrub Planting Areas			
Hard Landscaping	Hard landscaping will remove any risks through pathway removal. Additionally, confirmation will be required from the Local or relevant Authority that hard landscaping areas will require specific permission to remove any and / or all hard surfaces which may expose contamination to human receptors.	None	Confirmation from relevant authority
Under Buildings	No specific risks from soils have been identified below areas of the proposed structures Land gas mitigation measures may be required - land gas assessments are on going	None	None
Water Main	No specific risks have been identified which would affect the integrity of a conventional water main system.	None	None
Controlled Waters – Surface Water	No obvious surface water features are recorded surrounding the site	None	None
Controlled Waters – Ground Water	No obvious risks are considered to be in place to a groundwater system. Clay soils underlying contaminated deposits will offer protection.	None	No obvious risk no works required.

14 *Waste Disposal*

For the purposes of disposal of the contaminated waste off site, we would suggest that as of the 16th July 2005, the Waste Acceptance Criteria came into force which classifies waste soils within landfill sites.

We would suggest that this could be undertaken by testing subsoil / muck away samples for 'CLR8 Metals', (which is more economical), where soils are to be taken to a 'Lined Landfill Site'. Where open landfills are in place, full WAC assessments will be required.

Considering the upper FILL and lower natural subsoil across the site, we would suggest that the classification for the purposes of muck away should be confirmed with the closest relevant landfill site where pricing should be sought dependant upon the individual characteristics of the landfill site and haulier.

We would suggest that records are retained of any materials removed off site with confirmation of any imported materials brought onto the site for the purposes of placement in soft landscaped areas.

15 *Overview*

It has been identified that the site has levels of contamination which promote a human health risk. As such, risk is in place and remedial measures will be required.

The extent of site assessment and classification of risk within the site is recorded as follows :-

- Contamination is recorded from Speciated PAH's;
- Outline remediation measures have been suggested within this report.

The extent of further works are detailed below :-

- Confirmation from the Local Authority that the level and extent of risk to a groundwater system is reduced;
- Confirmation from the Local Authority that the level and extent of contamination risk to human health is in place and appropriately assessed;
- Submission of this report as an interim report to the EA for consultation and Local Authority to confirm the condition of the site and the level and extent of assessment and proposals within this report are acceptable.

HERTS & ESSEX SITE INVESTIGATIONS

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Appendix No. 1

Sheet No. 1

Job No. 11051

Date Oct 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

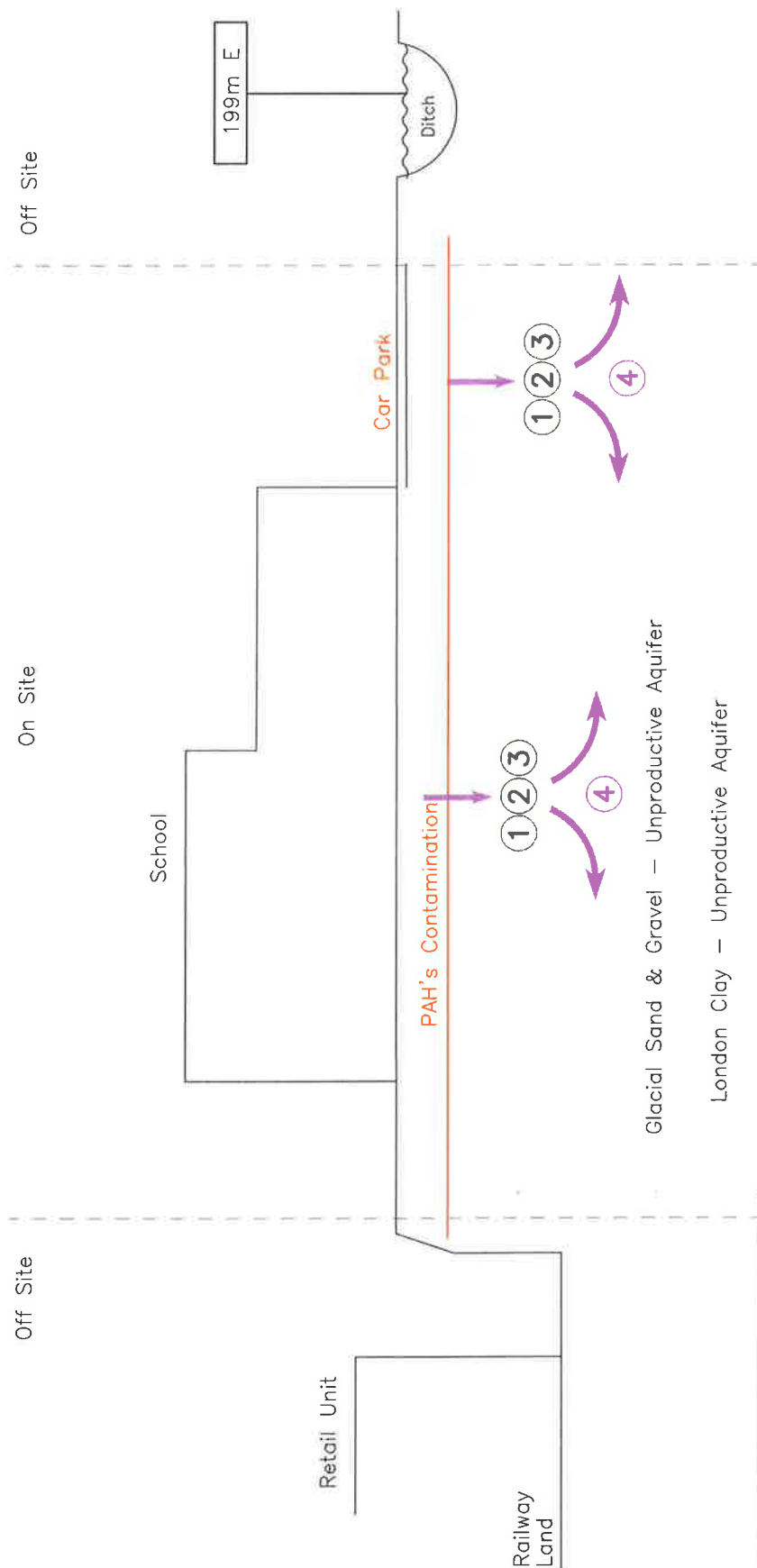
Site Specific Source-Pathway-Receptor - Post Desk Top Study

Key

- Purple = Potential pathways applicable to site
- Green = Potential receptors applicable to site
- Red = Potential sources applicable to site

Potential Pathways

- ① Migration of contamination to the soil
- ② Migration of contamination to the groundwater
- ③ Migration of land gas and Vapours
- ④ Migration onto or off site of pollutants to groundwater and through vapour/gas



Sketch No: 11051/01/01

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Appendix No. 2

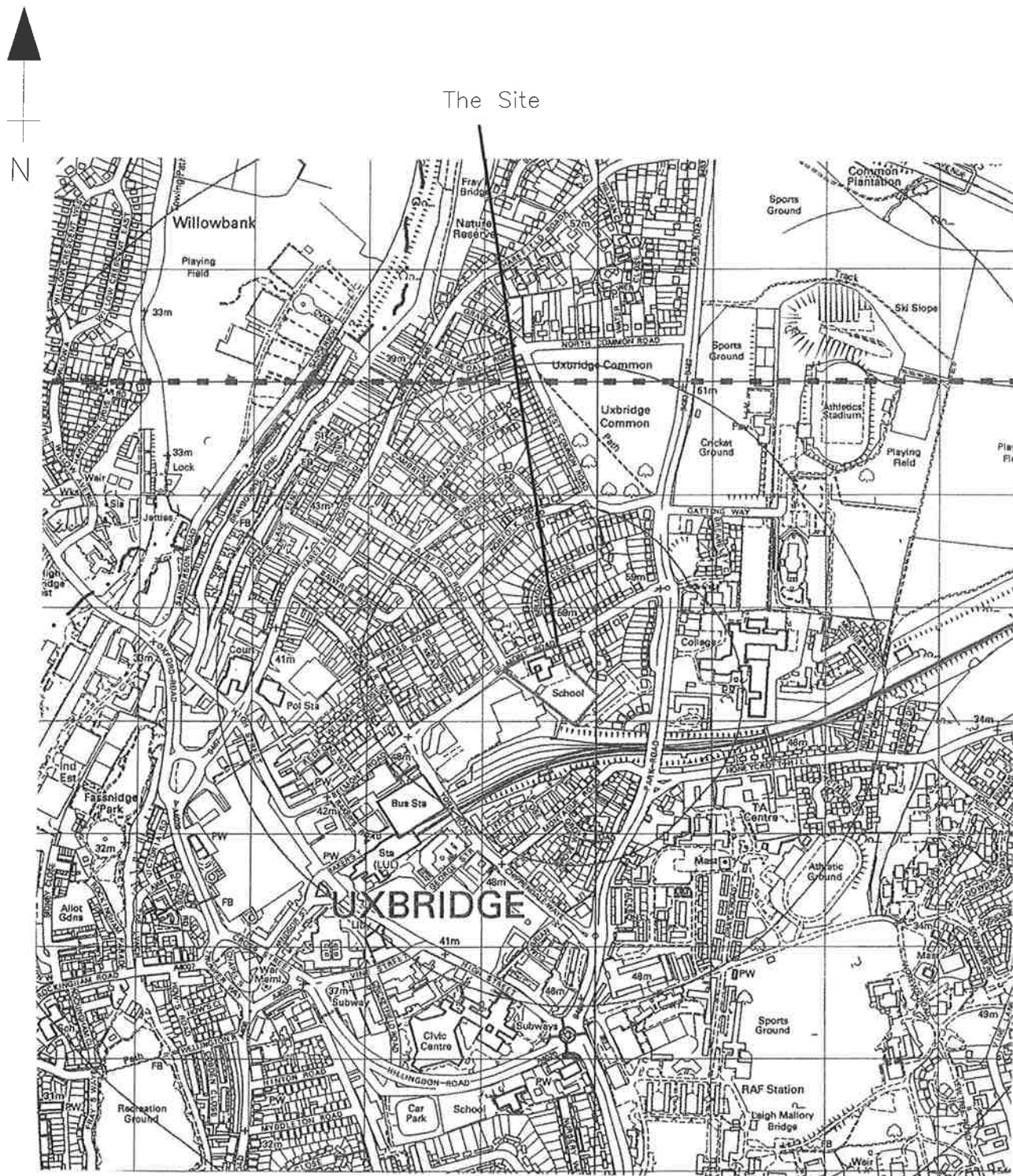
Sheet No. 1

Job No. 11051

Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Location Plan



Not To Scale
Sketch No: ENV/11051/02/01

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Appendix No. 2

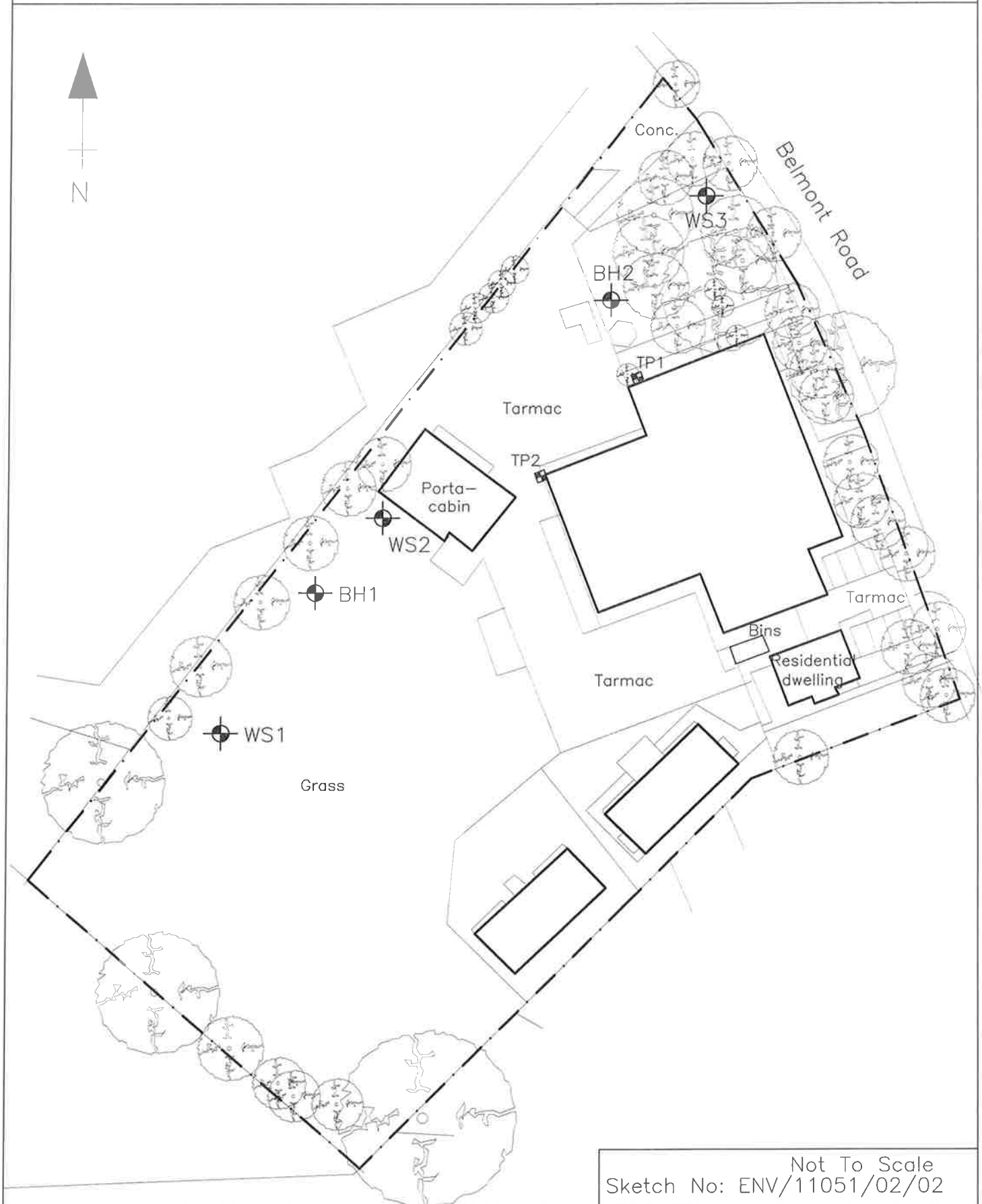
Sheet No. 2

Job No. 11051

Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Existing Site Plan with Sample Locations



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Fax: Ware (01920) 822200

Appendix No. 2

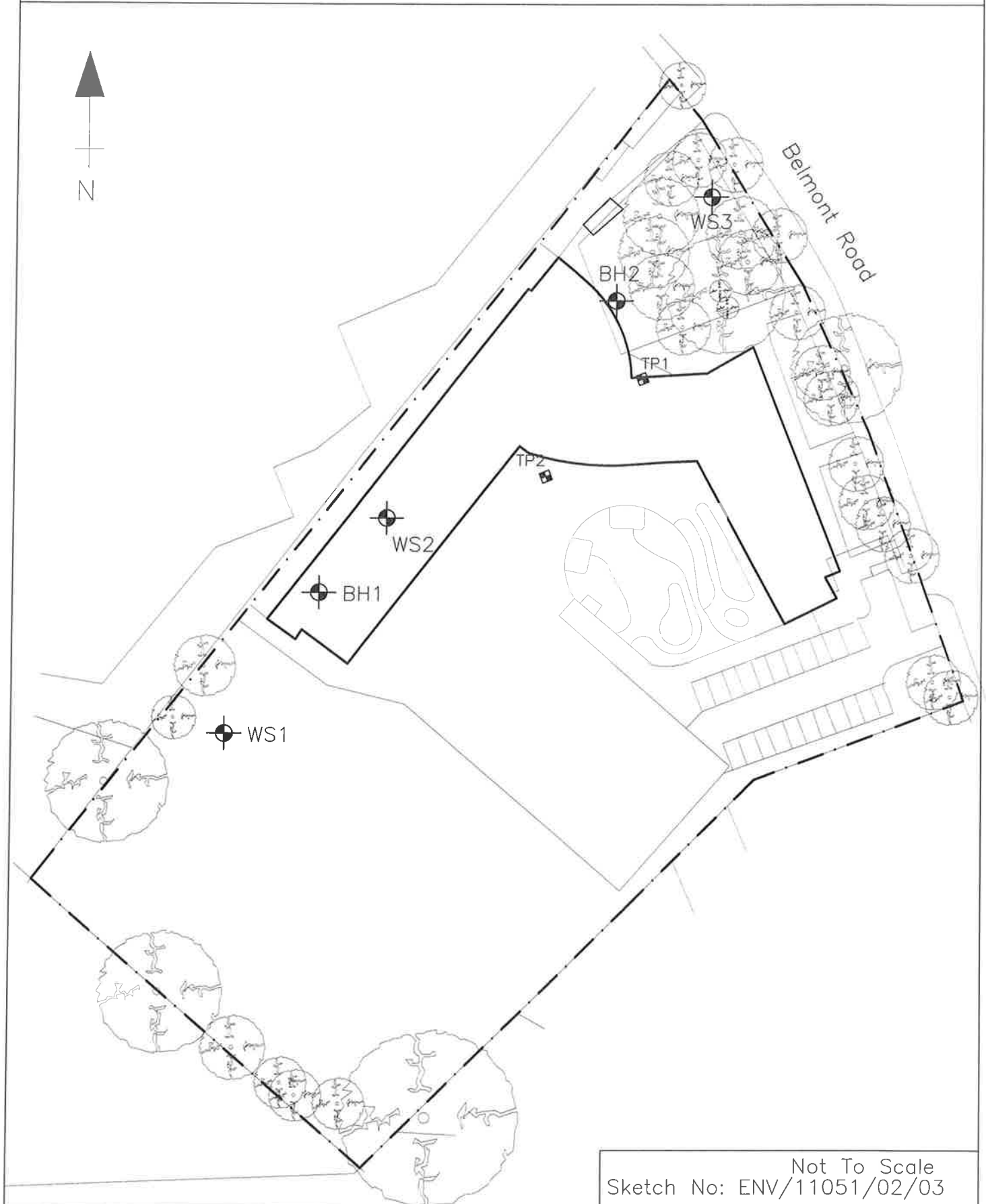
Sheet No. 3

Job No. 11051

Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Proposed Site Plan with Sample Locations



Fax: Ware (01920) 822200

Date Sept 2012

	WATER STRUCK
	WATER STANDING
W	WATER SAMPLE
N	SPT 'N' VALUE

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, SG11 1NJ

Telephone: Ware (01920) 822233

Fax: Ware (01920) 822200

Appendix No. 3

Sheet No. 2

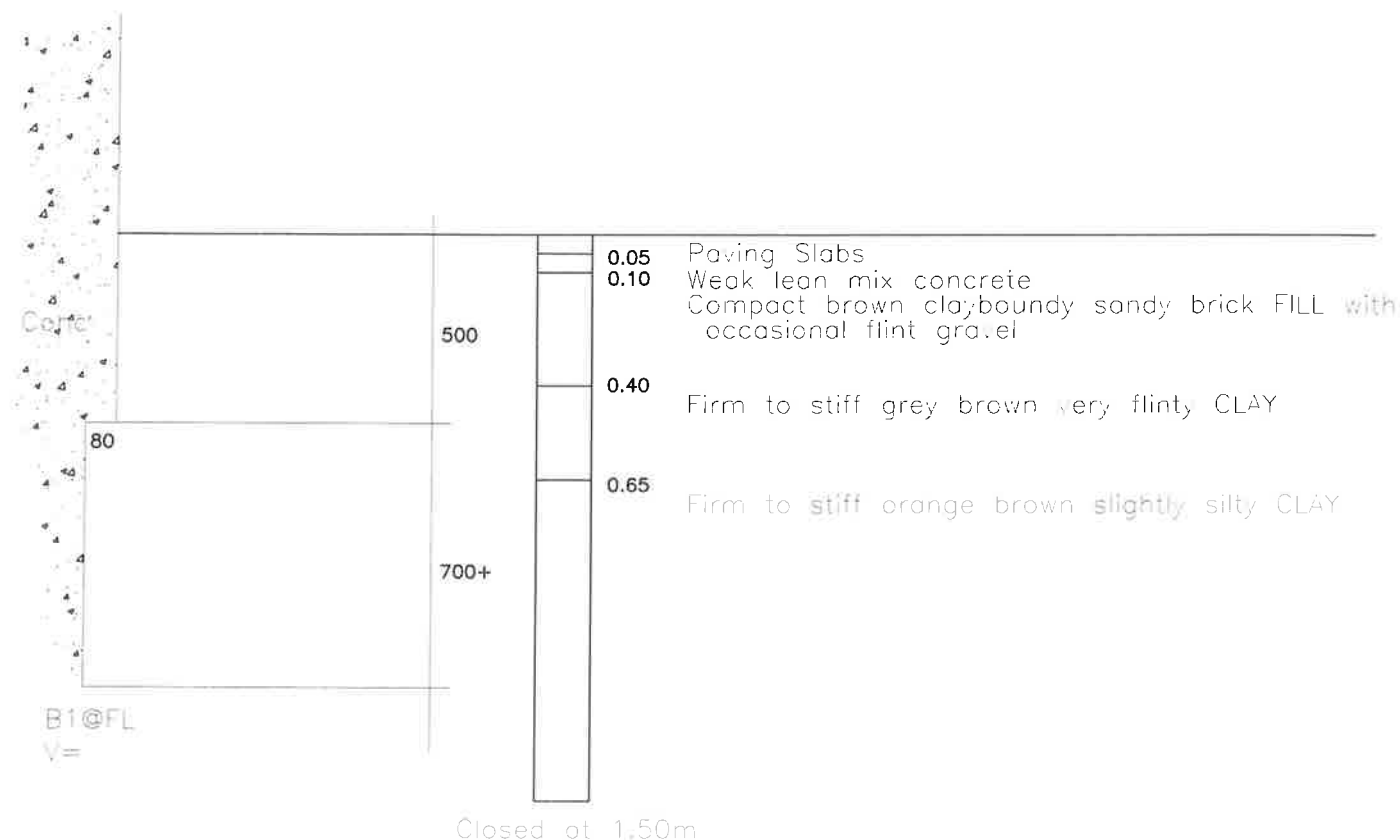
Job No. 11051

Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Existing Footing Detail

Trial Pit Two



SCALE: 1:20

B BULK SAMPLE
D DISTURBED SAMPLE
U UNDISTURBED SAMPLE
V SHEAR VANE TEST (Kn/m²)

WATER STRUCK
WATER STANDING
W WATER SAMPLE
N SPT 'N' VALUE

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, SG11 1NJ

Telephone: Ware (01920) 822233

Fax: Ware (01920) 822200

Appendix No. 3

Sheet No. 3

Job No. 11051

Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Window Sampler One

DEPTH BELOW G.L.	THICKNESS OF STRATA	DESCRIPTION OF STRATA	LEGEND	Installation installed	SAMPLES			WATER LEVELS	CASING LEVELS
					NO.	TYPE	DEPTH		
0.20	0.20	Loose dark brown sandy topsoil with flint gravel		NONE INSTALLED	1	U	G.L.-1.00m	DRY	1.00
		Firm to stiff orange brown mottled grey slightly silty CLAY			2	U	1.00-2.00m		
					3	U	2.00-3.00m		
					4	U	3.00-4.00m		
					5	U	4.00-5.00m		
5.00	4.80	Window sampler closed at 5.00m							

SCALE: 1:25

B BULK SAMPLE
D DISTURBED SAMPLE
U UNDISTURBED SAMPLE
V SHEAR VANE TEST (Kn/m²)

 WATER STRUCK
 WATER STANDING
W WATER SAMPLE
N SPT 'N' VALUE

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, SG11 1NJ

Telephone: Ware (01920) 822233

Fax: Ware (01920) 822200

Appendix No. 3

Sheet No. 4

Job No. 11051

Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Window Sampler Two

DEPTH BELOW G.L.	THICKNESS OF STRATA	DESCRIPTION OF STRATA	LEGEND	Installation installed	SAMPLES			WATER LEVELS	CASING LEVELS
					NO.	TYPE	DEPTH		
0.50	0.50	Loose dark brown sandy topsoil with flint gravel		NONE INSTALLED	1	U	G.L-1.00m	DRY	1.00
0.60	0.10	Medium dense brown SAND & GRAVEL							
		Firm to stiff orange brown mottled grey, slightly silty CLAY			2	U	1.00-2.00m		
					3	U	2.00-3.00m		
					4	U	3.00-4.00m		
					5	U	4.00-5.00m		
5.00		Window sampler closed at 5.00m							

SCALE: 1:25

B BULK SAMPLE
D DISTURBED SAMPLE
U UNDISTURBED SAMPLE
V SHEAR VANE TEST (Kn/m²)

 WATER STRUCK
 WATER STANDING
W WATER SAMPLE
N SPT 'N' VALUE

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, SG11 1NJ

Telephone: Ware (01920) 822233

Fax: Ware (01920) 822200

Appendix No. 3

Sheet No. 5

Job No. 11051

Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Window Sampler Three

DEPTH BELOW G.L.	THICKNESS OF STRATA	DESCRIPTION OF STRATA	LEGEND	Installation installed	SAMPLES			WATER LEVELS	CASING LEVELS
					NO.	TYPE	DEPTH		
0.60	0.60	Loose dark brown sandy topsoil with flint gravel and many roots		NONE INSTALLED	1	U	G.L.-1.00m	DRY	1.00
					2	U	1.00-2.00m		
					3	U	2.00-3.00m		
					4	U	3.00-4.00m		
					5	U	4.00-5.00m		
5.00	4.40	Firm to stiff orange brown mottled grey slightly silty CLAY							
		Window sampler closed at 5.00m							

SCALE: 1:25

B BULK SAMPLE
D DISTURBED SAMPLE
U UNDISTURBED SAMPLE
V SHEAR VANE TEST (Kn/m²)

 WATER STRUCK
 WATER STANDING
W WATER SAMPLE
N SPT 'N' VALUE

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, Herts, SG11 1NJ

Telephone: Ware (01920) 822233

Fax: Ware (01920) 822200

Appendix No. 3

Sheet No. 6

Job No. 11051

Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Borehole One

Description of Strata	Depth	Thickness (m)	Legend	Installation installed	Water Level	Samples			S.P.T N-Value or Vane Strength	Casing Depth (m)
						No.	Type	Depth (m)		
Grass over gravely sandy topsoil FILL with many fine roots	0.50	0.50		None installed						
Firm to stiff brown slightly silty CLAY		7.20				1	U	1.00		
						2	U	2.10		
						3	U	3.20		
						4	U	4.00		
						5	U	5.10		
						6	U	6.50		
					7.60	12.40			7	U
Stiff grey slightly silty CLAY			8		U			9.60		

Remarks:

Scale 1:50

Key : U—Undisturbed Sample (100mm diameter)

B —Bulk Sample
 —Water Struck

D —Disturbed Sample
 —Water Standing

W—Water Sample
P—Piston Sample

N—S.P.T. N—Value
V—Vane Strength (kN/m²)

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, Herts, SG11 1NJ
 Telephone: Ware (01920) 822233
 Fax: Ware (01920) 822200

Appendix No. 3
 Sheet No. 7
 Job No. 11051
 Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Borehole One Continued

Description of Strata	Depth	Thickness (m)	Legend	Installation installed	Water Level	Samples			S.P.T N-Value or Vane Strength	Casing Depth (m)
						No.	Type	Depth (m)		
As above				None installed		9	U	11.00		
						10	U	12.50		
						11	U	14.00		
						12	U	15.50		
Claystone at 16.20-16.40		12.40				13	U	17.00		
						14	U	18.50		
Borehole closed at 20.00m	20.00									

Remarks:

Scale 1:50

Key : U-Undisturbed Sample
(100mm diameter)

B -Bulk Sample
 -Water Struck

D -Disturbed Sample
 -Water Standing

W-Water Sample
 P-Piston Sample

N-S.P.T. N-Value
 V-Vane Strength (kN/m²)

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, Herts, SG11 1NJ
 Telephone: Ware (01920) 822233
 Fax: Ware (01920) 822200

Appendix No. 3
 Sheet No. 8
 Job No. 11051
 Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Borehole Two

Description of Strata	Depth	Thickness (m)	Legend	Installation installed	Water Level	Samples			S.P.T N-Value or Vane Strength	Casing Depth (m)
						No.	Type	Depth (m)		
Grass over gravelly sandy topsoil FILL	0.20	0.20		None installed						1.50
Firm to stiff brown slightly silty CLAY						1	U	1.00		
						2	U	2.00		
						3	U	3.00		
						4	U	4.00		
						5	U	5.00		
						6	U	6.50		
Claystone from 8.00 pushing down to 8.90m	8.00	8.70								
Stiff grey slightly silty CLAY		11.10				7	U	9.50		

Remarks:

Scale 1:50

Key : U—Undisturbed Sample (100mm diameter)

B —Bulk Sample
 —Water Struck

D —Disturbed Sample
 —Water Standing

W—Water Sample
 P—Piston Sample

N—S.P.T. N—Value
 V—Vane Strength (kN/m²)

HERTS & ESSEX SITE INVESTIGATIONS

The Old Post Office, Wellpond Green, Standon, Ware, Herts, SG11 1NJ
 Telephone: Ware (01920) 822233
 Fax: Ware (01920) 822200

Appendix No. 3
 Sheet No. 9
 Job No. 11051
 Date Sept 2012

Hermitage Primary School, Belmont Road, Uxbridge, Middlesex, UB81RB

Borehole Two Continued

Description of Strata	Depth	Thickness (m)	Legend	Installation installed	Water Level	Samples			S.P.T N-Value or Vane Strength	Casing Depth (m)
						No.	Type	Depth (m)		
As above				None installed		8	U	10.50		
						9	U	12.00		
						10	U	13.50		
						11	U	15.00		
						12	U	16.50		
						13	U	18.00		
						14	U	19.50		
Borehole closed at 20.00m	20.00	12.40								

Remarks:

Scale 1:50

Key : U—Undisturbed Sample (100mm diameter)

B —Bulk Sample
 —Water Struck

D —Disturbed Sample
 —Water Standing

W—Water Sample
 P—Piston Sample

N—S.P.T. N—Value
 V—Vane Strength (kN/m²)

[illegible]

*0.01 detection limited on speciated PAHs

Samples Relinquished by	Becks	Of HESI	Date	09/10/12	Page	1
Samples Received by		Of	Date		of	1

H 68067



The right chemistry to deliver results

Client	HESI	Order No.	11051	Quote No.	
Address	USUAL			Turnaround Required	3* 5*
				(Working Days)	7 10
Site Location	HERMITAGE PRIMARY SCHOOL, BELMONT ROAD UB8 1KB				
Report FAO	Chris Gray	* by prior arrangement			

[illegible]

COMMENTS

to arrange collection telephone 01638 606070

Samples relinquished by	name <u>Becks</u>	of <u>HFSI</u>	date <u>26/9</u>	page <u>1</u>
Samples received by	name <u>R. Darham</u>	of <u>ChemTest</u>	date <u>28/10/12</u>	of <u>1</u>

"The right chemistry to deliver results"

Herts & Essex Site Investigations
The Old Post Office
Wellpond Green, Standon
Ware, Hertfordshire
SG11 1NJ

FAO Chris Gray
16 October 2012

Dear Chris Gray

Test Report Number 213708
Your Project Reference 11051 - Hermitage Primary School, Belmont Road, UB8 1RB

Please find enclosed the results of analysis for the samples received 10 October 2012.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely



Keith Jones, Technical Manager



2183



Notes to accompany report:

- The sign < means 'less than'
- Tests marked 'U' hold UKAS accreditation
- Tests marked 'M' hold MCertS (and UKAS) accreditation
- Tests marked 'N' do not currently hold UKAS accreditation
- Tests marked 'S' were subcontracted to an approved laboratory
- n/e means 'not evaluated'
- i/s means 'insufficient sample'
- u/s means 'unsuitable sample'
- Comments or interpretations are outside of the scope of UKAS accreditation
- The results relate only to the items tested
- Stones represent the quantity of material removed prior to analysis
- All results are expressed on a dry weight basis
- The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, phenols
- For all other tests the samples were dried at < 37°C prior to analysis
- Uncertainties of measurement for the determinands tested are available upon request
- Soil descriptions, including colour and texture, are beyond the scope of MCertS accreditation
- None of the test results included in this report have been recovery corrected

LABORATORY TEST REPORT

Results of analysis of 3 samples
received 1 October 2012

11051 - Hermitage Primary School, Belmont Road, UB8 1RB

Report Date
16 October 2012

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓ Determinand↓

1700

Naphthalene

Acenaphthylene

Acenaphthene

Fluorene

Phenanthrene

Anthracene

Fluoranthene

Pyrene

Benzo[a]anthracene

Chrysene

Benzo[b]fluoranthene

Benzo[k]fluoranthene

Benzo[a]pyrene

Dibenzo[a,h]anthracene

Indeno[1,2,3-cd]pyrene

Benzo[g,h,i]perylene

Total (of 16) PAHs

213708

AH82809

WS1

WS2

WS3

AH82810

AH82811

WS1

WS2

WS3

25/9/2012

0.15m

LEACHATE

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CAS No↓

91203

208968

83329

86737

85018

120127

206440

129000

56553

218019

205992

207089

50328

53703

193395

191242

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LABORATORY TEST REPORT

Results of analysis of 7 samples
received 1 October 2012

11051 - Hermitage Primary School, Belmont Road, UB8 1RB

Report Date

16 October 2012

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP ↓ Determinand ↓

2030 Moisture

Stones content (>50mm)

2040 Soil colour

Soil texture

Other material

2010 pH

2020 Electrical Conductivity (2:1)

2300 Cyanide (free)

Cyanide (total)

2625 Organic matter

2120 Boron (hot water soluble)

Sulfate (2:1 water soluble) as SO₄

2490 Chromium (hexavalent)

2430 Sulfate (total) as SO₄

2450 Arsenic

Cadmium

Chromium

Copper

Mercury

Nickel

Lead

Zinc

2675 TPH aliphatic >C5-C6

213708

AH79246 AH79247 AH79248 AH79248

WS1

WS2

TP1

WS3

25/9/2012

0.15m

SOIL

13.5

<0.02

brown

clay

stones roots

7.6

430

<0.50

<0.50

3.6

1.3

0.05

<0.5

0.06

14

<0.10

31

40

1.2

14

160

100

83

<0.1¹

<0.1

25/9/2012

0.30m

SOIL

16

<0.02

brown

clay

stones roots

7.7

230

<0.50

<0.50

3.8

1.2

0.01

<0.5

0.04

11

<0.10

20

48

33

<0.10

47

31

84

<0.1¹

<0.1

25/9/2012

0.40m

SOIL

8

<0.02

brown

clay

stones

7.6

580

<0.50

<0.50

4.3

1.7

0.20

<0.5

0.07

13

<0.10

21

39

<0.10

12

150

77

<0.1

<0.1

25/9/2012

0.15m

SOIL

13.5

<0.02

brown

clay

stones roots

7.6

430

<0.50

<0.50

3.6

1.3

0.05

<0.5

0.06

14

<0.10

31

40

1.2

14

160

100

83

<0.1¹

<0.1

25/9/2012

0.30m

SOIL

16

<0.02

brown

clay

stones roots

7.7

230

<0.50

<0.50

3.8

1.2

0.01

<0.5

0.04

11

<0.10

20

48

33

<0.10

47

31

84

<0.1¹

<0.1

25/9/2012

0.40m

SOIL

8

<0.02

brown

clay

stones

7.6

580

<0.50

<0.50

4.3

1.7

0.20

<0.5

0.07

13

<0.10

21

39

<0.10

12

150

77

<0.1

<0.1

25/9/2012

0.15m

SOIL

13.5

<0.02

brown

clay

stones roots

7.6

430

<0.50

<0.50

3.6

1.3

0.05

<0.5

0.06

14

<0.10

31

40

1.2

14

160

100

83

<0.1¹

<0.1

25/9/2012

0.30m

SOIL

16

<0.02

brown

clay

stones roots

7.7

230

<0.50

<0.50

3.8

1.2

0.01

<0.5

0.04

11

<0.10

20

48

33

<0.10

47

31

84

<0.1¹

<0.1

25/9/2012

0.40m

SOIL

8

<0.02

brown

clay

stones

7.6

580

<0.50

<0.50

4.3

1.7

0.20

<0.5

0.07

13

<0.10

21

39

<0.10

12

150

77

<0.1

<0.1

25/9/2012

0.15m

SOIL

13.5

<0.02

LABORATORY TEST REPORT

Results of analysis of 7 samples
received 1 October 2012

11051 - Hermitage Primary School, Belmont Road, UB8 1RB

Report Date

16 October 2012

		213708			
		AH79246	AH79247	AH79248	AH79248
		WS1	WS2	TP1	WS3
		25/9/2012	25/9/2012	25/9/2012	25/9/2012
		0.15m	0.30m	0.90m	0.40m
		SOIL	SOIL	SOIL	SOIL
2675	TPH aliphatic >C6-C8	mg kg ⁻¹	N	< 0.1 ¹	< 0.1
	TPH aliphatic >C8-C10	mg kg ⁻¹	N	< 0.1 ¹	< 0.1
	TPH aliphatic >C10-C12	mg kg ⁻¹	M	< 1 ¹	< 1
	TPH aliphatic >C12-C16	mg kg ⁻¹	M	< 1 ¹	< 1
	TPH aliphatic >C16-C21	mg kg ⁻¹	M	< 1 ¹	< 1
	TPH aliphatic >C21-C35	mg kg ⁻¹	M	< 1 ¹	< 1
	TPH aliphatic >C35-C44	mg kg ⁻¹	N	< 1 ¹	< 1
	TPH aromatic >C5-C7	mg kg ⁻¹	N	< 0.1 ¹	< 0.1
	TPH aromatic >C7-C8	mg kg ⁻¹	N	< 0.1 ¹	< 0.1
	TPH aromatic >C8-C10	mg kg ⁻¹	N	< 0.1 ¹	< 0.1
	TPH aromatic >C10-C12	mg kg ⁻¹	M	< 1 ¹	< 1
	TPH aromatic >C12-C16	mg kg ⁻¹	M	8.7 ¹	< 1
	TPH aromatic >C16-C21	mg kg ⁻¹	M	8.2 ¹	11
	TPH aromatic >C21-C35	mg kg ⁻¹	M	< 1 ¹	24
	TPH aromatic >C35-C44	mg kg ⁻¹	N	< 1 ¹	< 1
	Total Petroleum Hydrocarbons	mg kg ⁻¹	N	17 ¹	35
2700	Naphthalene	mg kg ⁻¹	M	< 0.1	< 0.1
	Acenaphthylene	mg kg ⁻¹	M	0.18	0.24
	Acenaphthene	mg kg ⁻¹	M	0.14	0.22
	Fluorene	mg kg ⁻¹	M	< 0.1	0.25
	Phenanthrene	mg kg ⁻¹	M	0.94	1.9
	Anthracene	mg kg ⁻¹	M	0.33	0.65
	Fluoranthene	mg kg ⁻¹	M	3.1	5.9
	Pyrene	mg kg ⁻¹	M	2.5	4.9

¹The sample container/fill level was not appropriate for the specified analysis - these results may be compromised. The accreditation for these results remains unaffected.

LABORATORY TEST REPORT

Results of analysis of 7 samples
received 1 October 2012

11051 - Hermitage Primary School, Belmont Road, UB8 1RB

Report Date

16 October 2012

		213708			
		AH79246	AH78247	AH79248	AH79249
		WS1	WS2	TP1	WS3
		25/9/2012	25/9/2012	25/9/2012	25/9/2012
		0.15m	0.30m	0.90m	0.40m
		SOIL	SOIL	SOIL	SOIL
2700 Benzo[a]anthracene	56553	1.9	6.4	0.12	3.7
Chrysene	218019	2.1	6.9	0.18	4.1
Benzo[b]fluoranthene	205992	1.8	6.2	0.23	3.9
Benzo[k]fluoranthene	207089	1.5	4.4	0.2	2.3
Benzo[a]pyrene	50328	1.8	5.9	0.26	3.4
Dibenzo[a,h]anthracene	53703	0.51	1.3	< 0.1	0.85
Indeno[1,2,3-cd]pyrene	193395	1.2	4.1	0.12	2.3
Benzo[g,h,i]perylene	191242	0.74	3.5	< 0.1	2.5
2920 Phenols (total)		<0.3	<0.3	<0.3	<0.3

*The sample container/fill level was not appropriate for the specified analysis - these results may be compromised. The accreditation for these results remains unaffected.

Herts & Essex Site Investigations
The Old Post Office
Wellpond Green, Standon
Ware, Hertfordshire
SG11 1NJ

FAO Chris Gray
05 October 2012

Dear Chris Gray

Test Report Number 213708
Your Project Reference 11051 - Hermitage Primary School, Belmont Road, UB8 1RB

Please find enclosed the results of analysis for the samples received 1 October 2012.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely



Keith Jones, Technical Manager



2183

Notes to accompany report:

- The in-house procedure is employed to identify materials and fibres in soils
- The sample is examined by stereo-binocular and polarised light microscopy
- Sample size is reduced by coning and quartering to obtain a representative sub-sample if necessary
- The bulk identification is in accordance with the requirements of the analyst guide (HSG 248)
- Samples associated with asbestos are retained for six months
- The results relate only to the items tested as supplied by the client
- Comments or interpretations are beyond the scope of UKAS accreditation



Herts & Essex Site Investigations
The Old Post Office
Wellpond Green, Standon
Ware, Hertfordshire
SG11 1NJ

FAO Chris Gray

LABORATORY TEST REPORT

Asbestos in Soils

Results of analysis of 4 samples
received 1 October 2012

11051 - Hermitage Primary School, Belmont Road, UB8 1RB



Report Date
05 October 2012

Login Batch No: 213708

Qualitative Results

Chemtest ID	Sample ID	Sample Desc	Depth (m)	ACM Type	SOP 2190
					Asbestos Identification
AH79246		WS1	0.15	-	No Asbestos Detected
AH79247		WS2	0.30	-	No Asbestos Detected
AH79248		TP1	0.90	-	No Asbestos Detected
AH79249		WS3	0.40	-	No Asbestos Detected

The detection limit for this method is 0.001%

Signed

Albert Vella
Senior Environmental Surveyor

Statistical Analysis

Client/client ref	London Borough of Hillingdon
Project ref	CSG/11051
Site ref	Site at Hermitage Primary School, Belmont Road, London, UB8 1RB
Data description	Samples of made ground
Contaminant(s)	PAH's
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)?
Date	1st November 2012
User details	CS Gray

Statistics calculator (version 1.1)

Input data

This spreadsheet has been produced based on the document 'Guidance on Comparing Soil Contamination Data with a Critical Concentration (CIEH/CL:AIRE, 2008)'. Users of this spreadsheet should always refer to this guidance, the User Manual and to relevant guidance on UK legislation and policy, in order to understand how the procedure should be applied in an appropriate context.

ESI Ltd (ESI) do not promise that the spreadsheet will provide any particular facilities or functions. The user must ensure that the spreadsheet meets their needs and they remain solely responsible for the competent use of the spreadsheet. Users are entirely responsible for the consequences of any use of the spreadsheet. ESI do not provide any warranty about the fitness for purpose or performance of any part of the spreadsheet. We do not promise that the media will always be free from defects, computer viruses, software locks or other similar code or that the operation of the spreadsheet will be uninterrupted or error free. The user should carry out all necessary virus checks prior to installing on their computing system.

Project details

Project details

[illegible]

Test scenario: Planning

● 1997年12月1日

Show individual summary

Test Results

Client/client ref: London Borough Site ref: Site at Hermitage Primary School, Belmont Date: 1st November 2012
Project ref: CSG/11051 Data description: Samples of made ground User details: CS Gray

Dataset:	Benzo[a]anthracene
Sample mean, $\bar{x}$	3.03
Sample standard deviation, s	2.6802
Sample size, n	4
Critical concentration, Cc	3.1

Use Normal distribution to test μ

Outliers & non-detects

Outliers present? NO

Significance level 5%

Outliers removed? 0

Non-detects 0

Normality test

Significance level: 5%

Normal distribution

Use: Auto: One-sample t-test

Test scenario: Planning: is true mean lower than critical concentration ($\mu < C_c$)

Null hypothesis: The true mean concentration is equal to or greater than the critical concentration: $\mu \geq C_c$

Alternative hypothesis: The true mean concentration is less than the critical concentration: $\mu < C_c$

Evidence against Null hypothesis: 52%

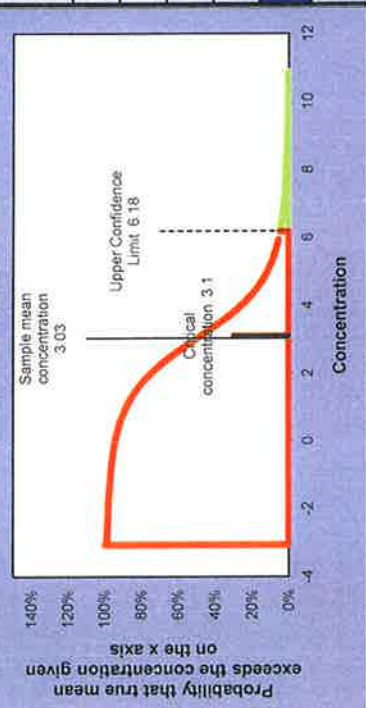
Base decision on: evidence level

Evidence level required: 95%

Balance of probability? N/A

Reject Null Hypothesis? No

Not enough evidence



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Test Results

Client/client ref: London Borough Site ref: Site at Hermitage Primary School, Belmont Date: 1st November 2012
 Project ref: CSG/11051 Data description: Samples of made ground User details: CS Gray

Dataset:	Chrysene
Sample mean, $\bar{x}$	3.32
Sample standard deviation, s	2.8736
Sample size, n	4
Critical concentration, Cc	6

Use Normal distribution to test for

Outliers & non-detects

Outliers present?	NO
Significance level	5%
Outliers removed?	0
Non-detects	0

Normality test

Significance level:	5%
Normal distribution	
Use:	Auto: One-sample t-test

Test scenario:

Planning:	is true mean lower than critical concentration ($\mu < C_c$)?
Null hypothesis:	The true mean concentration is equal to or greater than the critical concentration: $\mu \geq C_c$
Alternative hypothesis:	The true mean concentration is less than the critical concentration: $\mu < C_c$

Evidence against Null hypothesis:

Base decision on:	evidence level	92%
Evidence level required:		95%
Balance of probability?		N/A
Reject Null Hypothesis?		No

Not enough evidence

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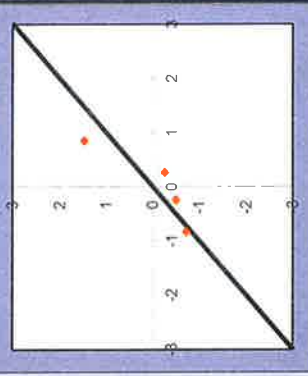
Test Results

Client/client ref: London Borough Site ref: Site at Hermitage Primary School, Belmont Date: 1st November 2012
Project ref: CSG/11051 Data description: Samples of made ground User details: CS Gray

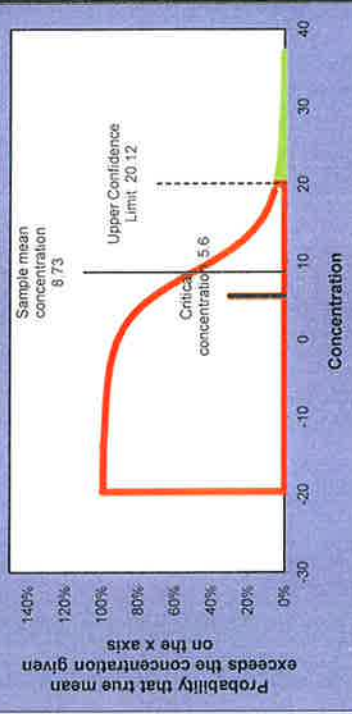
Dataset:	Benzo[a]fluoranthene
Sample mean, $\bar{x}$	8.725
Sample standard deviation, s	9.6848
Sample size, n	4
Critical concentration, Cc	5.6



Normality test
Significance level: 5%
Normal distribution
Use: Auto: One-sample t-test



Test scenario:	Planning: is true mean lower than critical concentration ($\mu < C_c$)
Null hypothesis:	The true mean concentration is equal to or greater than the critical concentration: $\mu \geq C_c$
Alternative hypothesis:	The true mean concentration is less than the critical concentration: $\mu < C_c$
Evidence against Null hypothesis:	28%
Base decision on:	evidence level
Evidence level required:	95%
Balance of probability?	N/A
Reject Null Hypothesis?	No



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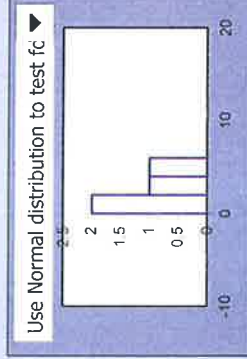
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[Go to normality test](#)

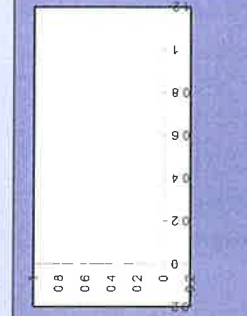
Test Results

Client/client ref: London Borough Site ref: Site at Hermitage Primary School, Belmont Date: 1st November 2012
Project ref: CSG/11051 Data description: Samples of made ground User details: CS Gray

Dataset:	Benzo[a]pyrene
Sample mean, $\bar{x}$	2.84
Sample standard deviation, s	2.4094
Sample size, n	4
Critical concentration, Cc	0.83

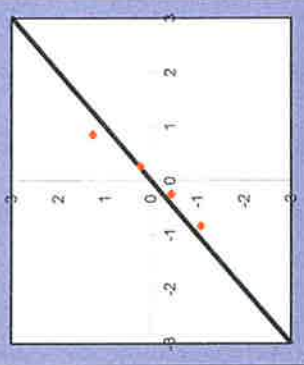


Outliers & non-detects	
Outliers present?	NO
Significance level	5% ▼
Outliers removed?	0
Non-detects	0



Normality test

Significance level:	5% ▼
Normal distribution	
Use:	Auto: One-sample t-test ▼



Test scenario:

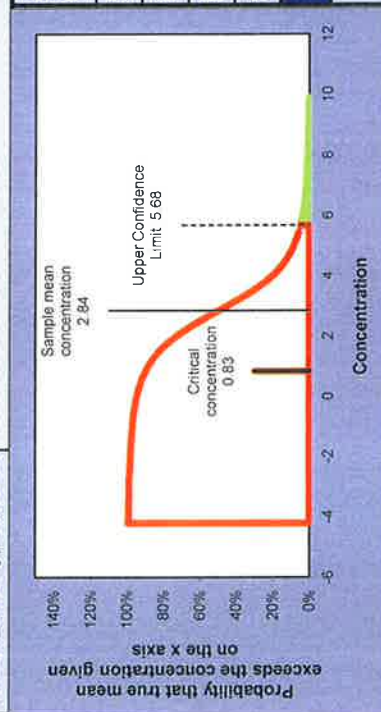
Planning: is true mean lower than critical concentration ($\mu < C_c$)?

Null hypothesis:

The true mean concentration is equal to or greater than the critical concentration: $\mu \geq C_c$

Alternative hypothesis:

The true mean concentration is less than the critical concentration: $\mu < C_c$



Evidence against Null hypothesis:	10%
Base decision on:	evidence level ▼
Evidence level required:	95%
Balance of probability?	N/A
Reject Null Hypothesis?	No

$\mu \geq C_c$

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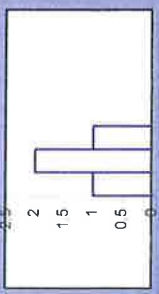
[Go to normality test](#)

Test Results

Client/client ref: London Borough Site ref: Site at Hermitage Primary School, Belmont Date: 1st November 2012
Project ref: CSG/11051 Data description: Samples of made ground User details: CS Gray

Dataset:	Dibenzo[ah]anthracene
Sample mean, $\bar{x}$	0.69
Sample standard deviation, s	0.5093
Sample size, n	4
Critical concentration, Cc	0.76

Use Normal distribution to test μ



Outliers & non-detects

Outliers present?	NO
Significance level	5%
Outliers removed?	0
Non-detects	0

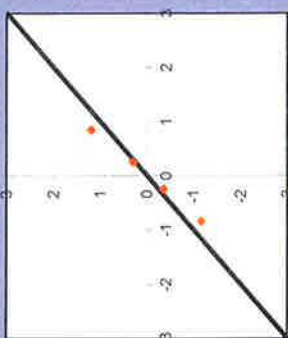


Normality test

Significance level: 5%

Normal distribution

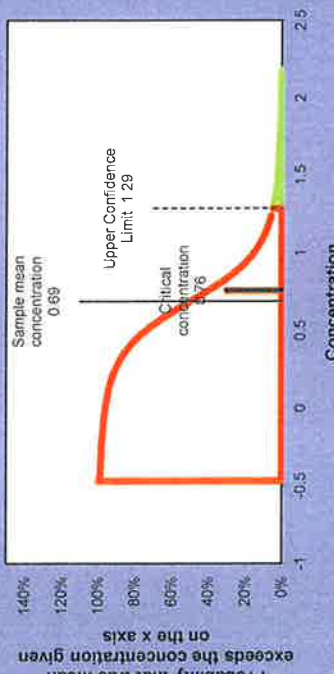
Use: Auto: One-sample t-test



Test scenario: Planning: is true mean lower than critical concentration ($\mu < C_c$)

Null hypothesis: The true mean concentration is equal to or greater than the critical concentration: $\mu \geq C_c$

Alternative hypothesis: The true mean concentration is less than the critical concentration: $\mu < C_c$



Evidence against Null hypothesis: 60%

Base decision on: evidence level

Evidence level required: 95%

Balance of probability? N/A

Reject Null Hypothesis? No

Not enough evidence

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Go to outlier test

Go to normality test

Test Results

Client/client ref: London Borough Site ref: Site at Hermitage Primary School, Belmont Date: 1st November 2012
 Project ref: CSG/11051 Data description: Samples of made ground User details: CS Gray

Dataset:	Indeno[123-cd]pyrene
Sample mean, $\bar{x}$	1.93
Sample standard deviation, s	1.6985
Sample size, n	4
Critical concentration, Cc	3.2

Use Normal distribution to test for

Outliers & non-detects

Outliers present?	NO
Significance level	5%
Outliers removed?	0
Non-detects	0

Normality test

Significance level: 5%

Normal distribution

Use: Auto: One-sample t-test

Test scenario: Planning: is true mean lower than critical concentration ($\mu < C_c$)?

Null hypothesis: The true mean concentration is equal to or greater than the critical concentration: $\mu \geq C_c$

Alternative hypothesis: The true mean concentration is less than the critical concentration: $\mu < C_c$

Evidence against Null hypothesis:

Base decision on:	evidence level
Evidence level required:	95%
Balance of probability?	N/A
Reject Null Hypothesis?	No

Not enough evidence

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