tasou associates

architects + structural engineers

4 Murray Mews – Site Contamination Assessment

Previous Application 2010/1303/P - 4 Murray Mews, London, NW1 9RL July 2013

Condition 4 of the above previously approved application dealt with the issue of Site Contamination and was successfully discharged in 2013. As the site has remained vacant in the interim there is no reason to believe that the conditions will have changed with regard to site contamination.

Please find attached all information previously submitted when successfully discharging the condition relating to site contamination. The previous cover letter dated July 2013 sets out all of information included.

tasou associates architects + structural engineers

DISCHARGE OF CONDITIONS STATEMENT

Site: 4 Murray Mews, London, NW1 9RL July 2013
Application ref: 2010/1303/P

CONDITION FOUR
Soil contamination

Part (a) Programme of ground investigation

The following have been submitted in support of the application as the ground investigation has been carried out:

- Phase II Environmental Report dated March 2007 prepared by Herts and Essex Site Investigation (HESI)
- Letter from HESI dated 10 April 2007 regarding WAC (Waste Acceptance Criteria)

Part (b) Results/remediation measures

- The Phase II Environmental Report includes results of soil tests and options for remedial measures.
- Further to the above, we had further correspondence with HESI and enclose our email of 2nd March 2011 along with HESI response confirming its contents*. This should be read in conjunction with the Phase II report.
- The email confirms the proposed remediation as removal of the affected soil, safe disposal and validation. (For safe disposal of soil, refer to section 22 of Phase II report).
- A further email of 29.07.2013 confirms that the contents of the above email apply to the 4 Murray Mews site also.
- The need for validation/safe disposal is subject to outcome of further tests, prior to removal, to ascertain the nature of the hydrocarbons present in the soil.
- As noted in the email, if the hydrocarbons present are deemed to be of no risk, it is proposed that, whilst the top fill is still to be removed, the soil can be disposed of in the usual fashion.
- The area for soil removal applies to the whole site.
- If any unforeseen contamination is found during the works, i.e. obvious visual or olfactory contaminants/hazards, Environmental Health will be notified immediately.
- If any changes need to be made to the Remediation Works/Strategy then approval will be sought in writing from Environmental Health
- The original soil sampling strategy is outlined in Section 12 of the Phase II Report

(*NB: email refers to submission of info to contractor – this is for pricing purposes only)

HERTS & ESSEX SITE INVESTIGATIONS

'THE OLD POST OFFICE', WELLPOND GREEN,
STANDON, WARE, HERTS, SG11 1NJ

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GEOTECHNICAL ASSESSMENTS – ENVIRONMETAL ASSESSMENT - DESKTOP STUDY – CONTAMINATED LAND

Report For :

Tasou Associates

Phase II ENVIRONMENTAL REPORT

Site location :

Site at
4 Murray Mews &
3 Augustines Road
London
NW1

March 2007
Report No. 7769

Contents

INDEX OF TABLES

EXECUTIVE SUMMARY

Client	***Tasou Associates***	
Site Location	Site at 4 Murray Mews & 3 St Augustines Road, London	
Proposed Development	The site is proposed to be developed from an area of open land to form residential unit with areas of soft landscaping and parking areas.	
Site Settings and Previous Uses	The site is underlain by a Non Aquifer formed by the London Clay The site has formed residential housing, with rear garden until 1969 when the site was redeveloped to form a Vehicle Garages, at the time of the site visit the site was open land, signs that a strip of the site had taken place to remove 0.40m off the site level. Surrounding the site there has been residential housing. Railway lines to the west of the site at a reduced level. The lines go underground just to the north and south of the site.	
Ground Conditions	***Made Ground***	Nominal and shallow depths of made ground were recorded within the site with certain locations incorporating an ash material.
	London Clay	London Clay is present from between 0.20-0.50m and present to the close of all excavations to a maximum depth of 20m.
Groundwater	The site is underlain by a Non Aquifer and as such, the risk of pollutants migrating to a lower body of water is limited. Within the excavations made, no groundwater was encountered within the scope of the works. As such, no receptor is present that may be impacted on by any pollutants. Additionally, the risk of migration off site is minimal. With this in mind, we would suggest that the risk to a groundwater or surface water feature is removed from the assessment	
Contamination Assessment and Mitigation	Within the assessment undertaken, it has been revealed that various factors may impact on the end use of the development of the site. These include the presence of railway land surrounding the site and the former use of the site as lock up garages . The information gained suggest that the depth of FILL within the site should be nominal, although, will increase locally around the area of a sewer traversing the site. This will incorporate an additional depth of FILL. Within the assessment of the site, it is recorded that elevated levels of contamination have been identified as relatively random within the site. Considering the spatial variation in areas of contamination within the site, we would suggest that whilst it is possible to limit the areas of contamination through further sampling and testing, it is more likely that the contamination should be classed as widespread. On completion of a decision relating to which method of assessment would be required, (i.e. delineation or assumption that widespread contamination is in place), we would suggest that a remediation strategy report should be undertaken to devise and report the most appropriate method of remediation. A brief outline remedial statement is made within this report which devises appropriate methods of remediation.	

Continued.....

Further Considerations	During contamination removal or development of the site, dust and vapours can be produced and considered a nuisance and should be mitigated through the dampening down of the site when dry or dusty conditions prevail.
Waste Disposal	In the event that contamination would be encountered within the site, we would suggest that Waste Acceptance Criteria Testing should be undertaken on samples recovered and subsequently proven as contaminated, such that the material can be removed off site. It is anticipated that the classification waste materials removed off site will form Stable Non-Reactive Hazardous Waste.
Further Works	Additional, we would suggest that a remedial strategy report should be compiled to send to the Local Council and the Environment Agency for approval of the remediation process and further works specified.

INVESTIGATION WORKS AND RISK ASSESSMENT REPORTING

Section 1 Introduction

We have been asked by Tasou Associates, the Engineers of the site, to undertake an investigation of the above site in order to assess the potential environmental impact of the historical use within the site on the proposed development.

Set procedures are in place through Local Government in order to undertake this assessment which has been followed in order to derive this report and the remedial action required in order to develop the site with all risks to the environment, human health, plant and vegetation growth and construction materials taken into account.

We would suggest that for the purposes of completion of the reporting process, the report format should form the desk top study, already undertaken, this environmental report, a remedial strategy report and validation report.

Section 2 Report Objectives

This report has been undertaken in order to assess the above site for the purposes of development of the site as residential houses. Within this report, an assessment of the likely sources, pathways and targets of contamination have been gleaned from a desk top study, which has revealed certain factors that may influence either the environment, end user, construction materials or plant growth.

The information gained from the desk top study involved the following :-

- A site walk over survey reconnaissance survey;
- Liaison, where possible, with the current occupiers of the site;
- A search of the Statutory Registers for potentially contaminative land uses and licenses in the vicinity of the site, in the form of an environmental report supplied by 'Groundsure Limited' and 'Envirocheck';
- A study of the history of the site and current land use/industry, including reference to archival Ordnance Survey mapping and other sources, where available, of historical information.
- The identification of local water abstraction points from the Environment Agency records;
- A study of the local geology and hydrogeology and geological hazards;
- An overall assessment of the likely sources, pathways and targets in place, in and around the site. This will include an assessment of proposed excavation points within the site to best identify the above.

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.

Contaminated Land is defined under Part IIA of the Environmental Protection Act 1990, (EPA). Within this report, the term, 'contaminant' is taken to mean " a substance that is in, on or under the land and which has the potential to cause harm or to cause pollution of controlled water systems. The presence of contaminants may therefore result in contamination of the ground, but the land will only be designated 'Contaminated Land', when the requirements of the strict definition of Part IIA of the EPA are met.

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.

Section 3 ***Site Location and National Grid Reference***

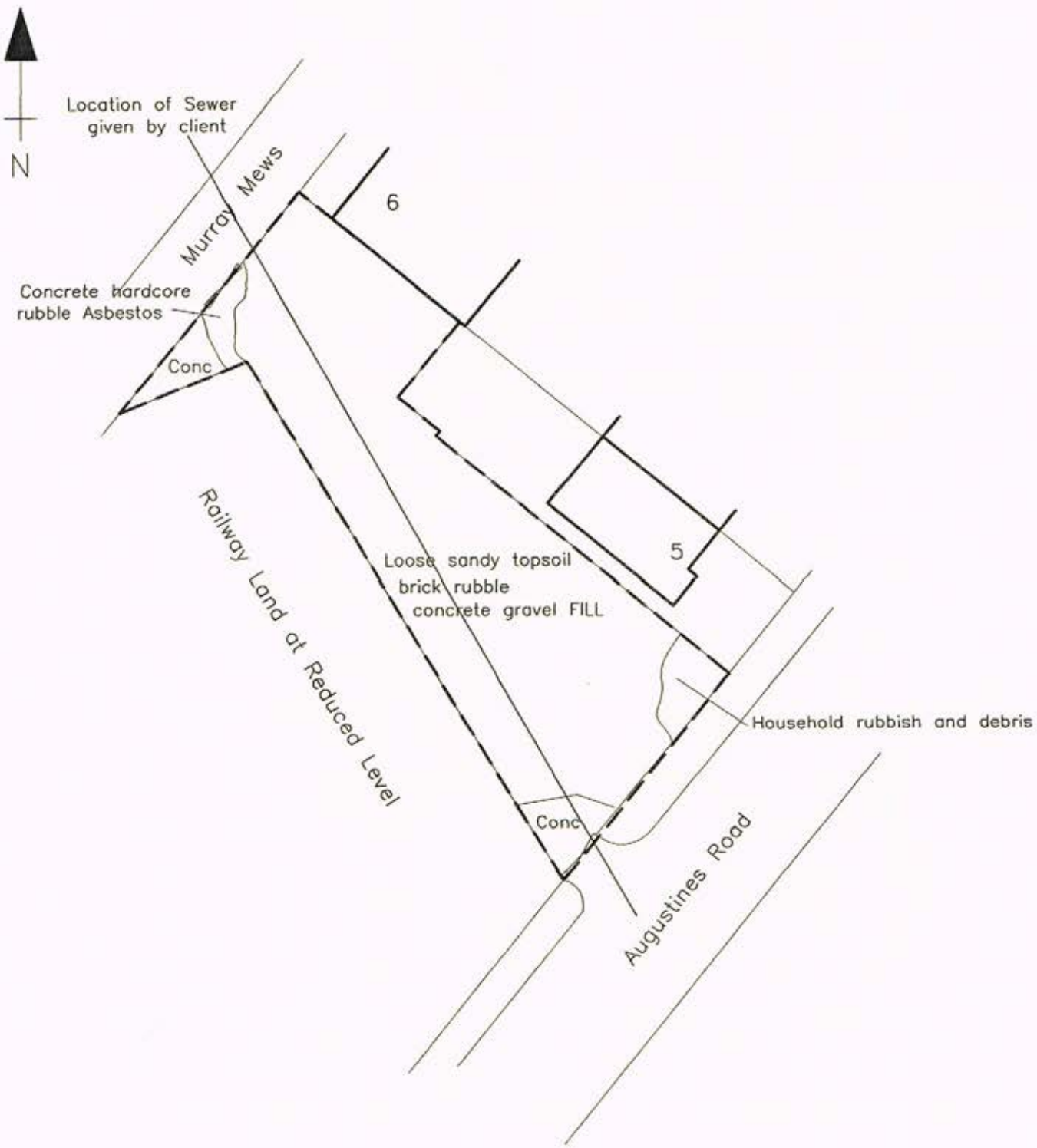
The site is located at National Grid Reference 529670E, 184410N, and is located within Camden, North London.

The site is formed by an area of open land. The site forms an area of approximately 0.09 Hectares.

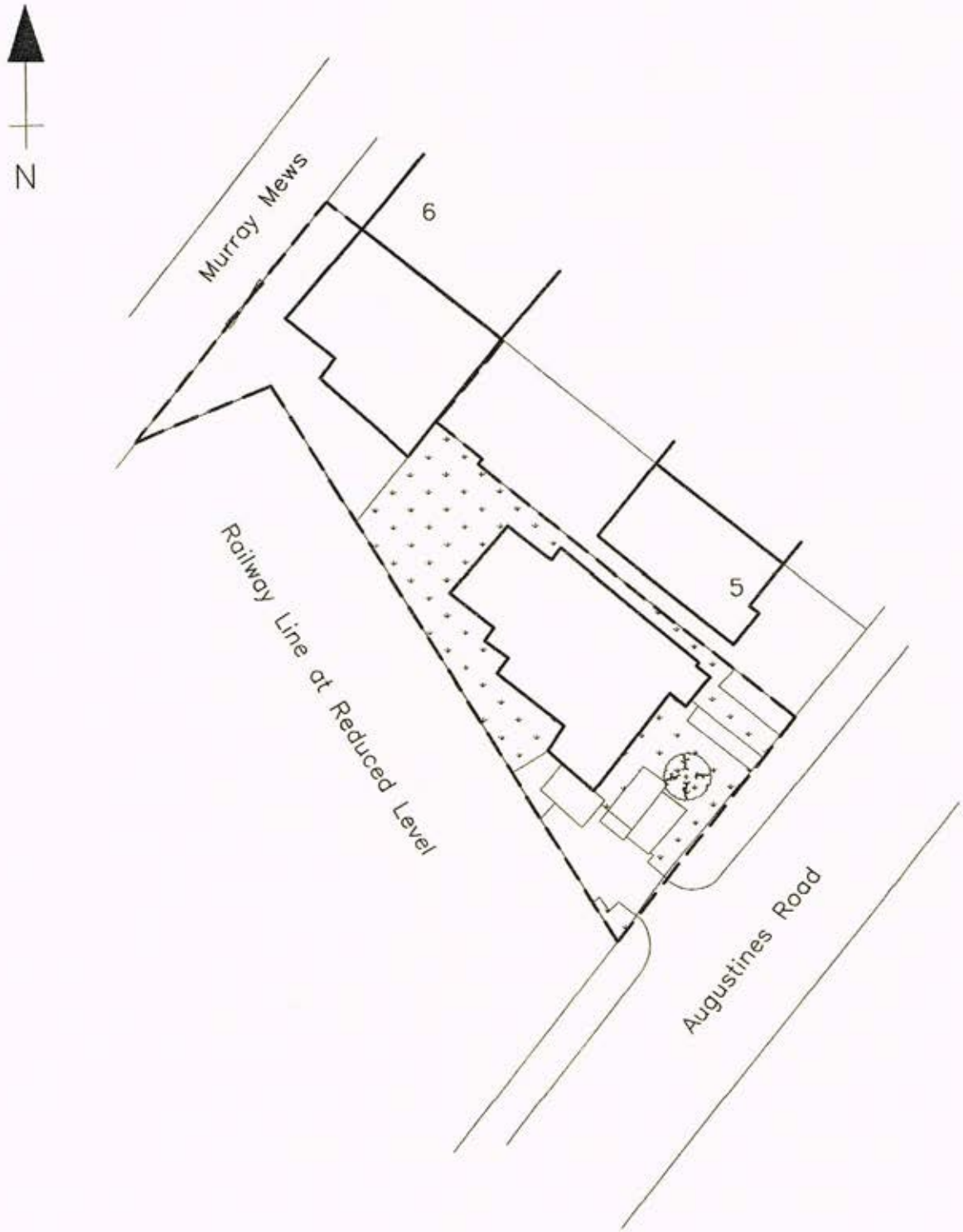
It is proposed to develop the site to form residential units with communal gardens around the buildings and parking area to the northern corner.

Extracts of the existing location plan are presented in figures 1 and 2.

Existing Site Plan
Figure 1



Proposed Site Plan
Figure 2



Section 4 Review of Previous Reports or Documents Relating to the Site

Outside the desk top study undertaken, no reports are currently available relating to the site from the information gathered.

Section 5 Description of Outline Conceptual Model

A description of the conceptual site model developed within the desk top study has been re-created below.

The information below incorporates a hazard assessment of the features surrounding the site that could potentially impact on the proposed development. This is based on the information below :-

Table 5.1 Hazard Assessment

Source	Potential Contaminant	Pathway(see note 1)	Receptor	Distance / Direction	Pollution link in place	Hazard Assessment
Walk Over Survey References - On Site						
Open Land – Rubbish and debris	• Metals & Metalloids, • PAH's, • Asbestos.	• Inhalation, • Ingestion, (dust and fibres if exposed) • Ingestion, (soil attached to vegetables), • Direct Contact, • Plant Uptake, • Pollution to Controlled Waters, • Building Structure, • Services Attack.	• Human Health, (Future Users), • Human Health, (Workforce), • Groundwater, • Surface Water, • Vegetation, • Wildlife, • New Buildings • Services	On Site	✓	Associated Hazard (Potential Severity) ***Mild*** Likelihood of Occurrence ***Low Likelihood*** Risk Classification ***Low Risk***
Asbestos	• Asbestos	• Inhalation, • Ingestion, (dust and fibres if exposed) • Ingestion, (soil attached to vegetables), • Direct Contact, • Plant Uptake, • Pollution to Controlled Waters, • Building Structure, • Services Attack.	• Human Health, (Future Users), • Human Health, (Workforce), • Groundwater, • Surface Water, • Vegetation, • Wildlife, • New Buildings • Services	On Site	✓	Associated Hazard (Potential Severity) ***Medium*** Likelihood of Occurrence ***High Likelihood*** Risk Classification ***High Risk***
Infilled Land, (Both the sewer and as a result of development of the railway)	• Metals & Metalloids, • PAH's, • Asbestos, • Inorganic, • Organic, • Hydrocarbons, • Land Gas.	• Inhalation, • Ingestion, (dust and fibres if exposed) • Ingestion, (soil attached to vegetables) • Direct Contact, • Plant Uptake, • Pollution to Controlled Waters, • Building Structure, • Services Attack.	• Human Health, (Future Users), • Human Health, (Workforce), • Groundwater, • Surface Water, • Vegetation, • Wildlife, • New Buildings • Services	On Site	✓	Associated Hazard (Potential Severity) ***Medium*** Likelihood of Occurrence ***High Likelihood*** Risk Classification ***High Risk***

Continued....

Walk Over Survey References - Off Site						
Railway Land	• Metals & Metalloids • PAH's • Asbestos, • Hydrocarbons. • PCBs	• Inhalation, • Ingestion, (dust and fibres if exposed) • Ingestion, (soil attached to vegetables), • Direct Contact, • Plant Uptake, • Pollution to Controlled Waters, • Building Structure, • Services Attack.	• Human Health, (Future Users), • Human Health, (Workforce), • Groundwater, • Surface Water, • Vegetation, • Wildlife, • New Buildings • Services	Off Site, (1m W), at reduced elevation	✓	Associated Hazard (Potential Severity) ***Medium*** Likelihood of Occurrence ***Low Likelihood*** Risk Classification ***Moderate / Low Risk***
Garage Works	• Metals & Metalloids, • PAH's, • Asbestos. • Hydrocarbons.	• Inhalation, • Ingestion, (dust and fibres if exposed) • Ingestion, (soil attached to vegetables), • Direct Contact, • Plant Uptake, • Pollution to Controlled Waters, • Building Structure, • Services Attack.	• Human Health, (Future Users), • Human Health, (Workforce), • Groundwater, • Surface Water, • Vegetation, • Wildlife, • New Buildings • Services	Off Site, (15m SW)	✓	Associated Hazard (Potential Severity) ***Medium*** Likelihood of Occurrence ***Low Likelihood*** Risk Classification ***Moderate / Low Risk***
Historical Map References - On Site						
Residential Houses	• Metals & Metalloids • PAH's • Asbestos,	• Inhalation, • Ingestion, (dust and fibres if exposed) • Ingestion, (soil attached to vegetables), • Direct Contact, • Plant Uptake, • Pollution to Controlled Waters, • Building Structure, • Services Attack.	• Human Health, (Future Users), • Human Health, (Workforce), • Groundwater, • Surface Water, • Vegetation, • Wildlife, • New Buildings • Services	On Site	X	Associated Hazard (Potential Severity) ***Mild*** Likelihood of Occurrence ***Low Likelihood*** Risk Classification ***Moderate / Low Risk***
Lock Up Garages	• Metals & Metalloids • PAH's • Asbestos, • Hydrocarbons.	• Inhalation, • Ingestion, (dust and fibres if exposed) • Ingestion, (soil attached to vegetables), • Direct Contact, • Plant Uptake, • Pollution to Controlled Waters, • Building Structure, • Services Attack.	• Human Health, (Future Users), • Human Health, (Workforce), • Groundwater, • Surface Water, • Vegetation • Wildlife, • New Buildings • Services	On Site	✓	Associated Hazard (Potential Severity) ***Medium*** Likelihood of Occurrence ***Low Likelihood*** Risk Classification ***Moderate / Low Risk***

Continued.....

Historical Map References - Off Site						
Builders Yard	• Metals & Metalloids • PAH's • Asbestos • Hydrocarbons.	• Inhalation. • Ingestion. (dust and fibres if exposed) • Ingestion. (soil attached to vegetables). • Direct Contact. • Plant Uptake. • Pollution to Controlled Waters. • Building Structure. • Services Attack.	• Human Health. (Future Users). • Human Health. (Workforce). • Groundwater. • Surface Water. • Vegetation. • Wildlife. • New Buildings • Services	Off Site, (5m N)	X	Associated Hazard (Potential Severity) ***Medium*** Likelihood of Occurrence ***Low Likelihood*** Risk Classification ***Moderate / Low Risk***
Groundsure & Envirocheck Reports						
Diamond Tool Manufactures	• Metals & Metalloids • PAH's • Asbestos • Hydrocarbons. • PCBs	• Inhalation. • Ingestion. (dust and fibres if exposed) • Ingestion. (soil attached to vegetables). • Direct Contact. • Plant Uptake. • Pollution to Controlled Waters. • Building Structure. • Services Attack.	• Human Health. (Future Users). • Human Health. (Workforce). • Groundwater. • Surface Water. • Vegetation. • Wildlife. • New Buildings • Services	Off Site, (5om SW)	X	Associated Hazard (Potential Severity) ***Mild*** Likelihood of Occurrence ***Low Likelihood*** Risk Classification ***Low Risk***

Note 1 The site is proposed to be developed as Residential Flats with no soft landscaping. The pathways potentially in place area Inhalation of vapours, Pollution to Controlled Waters, Building Structure and Services Attack.

Note 2 Not all trades have been discussed within the above due to some have limited risk of sources of contamination or pathways to the site.

Key factors within the above that may impact the writers assessment of the risk will form the Pathways for contamination to impact on the site and distance of the particular trade from the site. This will be expanded on further below :-

Potential Pathways

Pollution linkages provide pathways for contamination to migrate to a receptor at concentrations that are considered a significant risk to the development of the site. This may incorporate a pathway from a nearby receptor to the site or alternatively, from the site to a receptor. The relevant potential contaminant pathways for the proposed development site area as follows :-

- Direct Contact with shallow soils, e.g. oral or dermal contact during the construction phase,
- Direct Contact with groundwater, e.g. oral or dermal contact during the construction phase and periods of flooding.
- Volatilisation of contaminants from soils to indoor and outdoor air,
- Aggressive attack of on site drainage facilities and other buried services,
- Inhalation of particulates and Asbestos fibres during the construction phase,
- Direct discharge of contaminants to Groundwater / Surface Water
- Ingestion of dust fibres and particles within areas of soft landscaping,
- Ingestion of soil attached to home grown vegetation,
- Inhalation of vapours within areas of soft landscaping,
- Inhalation of vapours within areas of buildings,
- Direct contact with contaminated soils,
- Leaching of contaminants to Groundwater / Surface Water
- Migration of pollutants to adjacent land parcels.

Section 6 ***Results of Preliminary Risk Assessment***

The results of the preliminary risk assessment have revealed that risk is potentially in place from the various sources of historical and ongoing land use.

The previous land uses within and surrounding the immediate site would promote an increased risk associated with the potential deposition of pollutants into the subsoil as a result of re-working the ground within and surrounding the site. Additionally, it is possible that the use of certain chemical, organic and metal based products has a potential to promote risk within the site through pollution spills and prolonged use.

From initial inspections on the site, it is recorded that a shallow deposit of FILL is present on the site (Circa 0.30m), and from visual observations of excavations for foundation exposures in the site.

From inspection of the risk to a groundwater system, we would suggest that the site is underlain by a Non Aquifer and as such, the risk to a groundwater system is reduced.

When considering surface water features surrounding the site, limited surface water features are preset surrounding the site and as such, risk will be reduced through a limited pathway.

The final assessment to undertake will form an assessment for land gas to be in place within the site resulting from the presence of infilled section of land (sewers and railway land). We would consider this best undertaken through spike testing or assessments within the boreholes undertaken within the site.

Section 7 ***Details of Preparatory Work***

The surface geology forms concrete hardstanding and grassed areas, and as such, breaking/coring out of some locations will be undertaken.

Access was required within the site and as such, consultation with the client / builder was undertaken.

Section 8 ***Details of Investigation Objectives.***

It is proposed within this investigation to assess the suitability of the site for development of residential units which incorporates areas of hard landscaping, with communal garden also recorded as present.

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. This has been detailed within the desk top study report undertaken, a brief summary of which is included within the initial sections of this report.

Section 9 ***Summery of Work Undertaken***

It must be considered that over the site history, drainage may have occurred through joints and/or cracks in the surface concrete/hardcore. As such, excavations were undertaken across this site in order to identify contaminants of concern, (COC's), and whether these COC's were present in appreciable quantities.

The scope of the works involved excavation of window sampler boreholes to assess the subsoil conditions of both shallow and deeper soils. Samples were recovered for later testing for chemical conditions. The location of the works involved a number of boreholes sunk in the relative zones derived from the desk top study. A further deep borehole was also undertaken on the site in order to assess the soils at depth and to aid in foundation design.

Section 10 Investigation Methodology

The methodology of the investigation has been undertaken in accordance with various publications. These include the initial assessment of the site, (forming the desk top study), which has been undertaken in accordance with Contaminated Land Exposure Assessment, ***(CLR 11, Model Procedures for the Management of Contaminated Land)***. The main investigative section of the site works has been undertaken in accordance with ***BS 5930 : 1981, (Code of Practice for Site Investigations)***, although, the use with ***BS 10175:2001, (Code of Practice for the Investigation of Potentially Contaminated Sites)***, and ***NHBC Chapter 4.1, (Contaminated Land),*** has been considered within the scope of the works.

When considering the assessment and derivation of testing parameter selection, this has been undertaken in accordance with Contaminated Land Exposure Assessment, (***CLR 8, Potential Contaminants for the Assessment of Land***), and ***Department of Environment Industry Profiles***.

All samples were recovered by the use of the window sampling drilling rig in order to assess the soil conditions type and potential contaminants therein. On completion of the samples being taken, the samples being placed in appropriate containers, (dependant upon the nature of the analysis proposed). These samples were placed in cool boxes and transported directly to the analytical chemist for chemical analysis.

Chain of custody forms were completed detailing the range of chemical analysis to be undertaken and discharged to the chemist.

When considering the risk to the environment, an assessment of the risk should be made based on the site conditions. It will be discussed later within this report how mitigation of pathways has been considered.

The fieldwork has been undertaken during March 2007. The weather on which the site works were undertaken was good.

Section 11 Monitoring Strategy

In light of the presence of a non aquifer underlying the site, No standpipes were installed within the boreholes undertaken. As such, no long term monitoring has been undertaken. Assessments relating to the potential for land gas to be present within the site are proposed, although, this will form a short term assessment.

Section 12 Sampling Strategy

Sampling strategy for obtaining samples of subsoil in contaminated land will form document ***EA Report P5-066 – Technical Report, (Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies)***.

In addition to this, sampling procedures for obtaining samples in contaminated land have also been undertaken in accordance with ***CLR4, (Sampling Strategy for Contaminated Land).***

Within the development at the above site, sampling locations been derived and undertaken on site with samples being and sent for analysis from within the upper made ground. Leachate testing has also been undertaken on the elevated concentrations encountered with samples of the groundwater also recovered.

The purpose of this sampling regime is to ascertain the extent and concentrations of contamination within the site and how the concentrations may influence the receptors at the site.

The frequency of sampling within the site incorporated excavation of the subsoil via window sampler boreholes gaining both shallow and deeper soils information. The samples were logged and retained within a cool box for transport to the chemist the same day.

The sample tubes were visually assessed with any materials deemed questionable as to the extent of contamination sub sampled and retained for further testing.

Section 13 Analytical Strategy

The analytical strategy for the site has been designed through the assessment of the site in the form of a desk top study research project. This has revealed the historical use of the site and the potential for the trade and industry within the historical site use to produce/use/store and subsequently, contaminate the development site. This strategy incorporates various publications to include the Contaminated Land Exposure Assessment, ***(CLR8, Potential Contaminants for the Assessment of Land)***, and ***Department of Environment Industry Profiles.***

Within these publications, the particular trade suggests a potential for the use of certain types of chemicals or materials within that trade that could be in use and subsequently contaminate the subsoil or water system within the site.

It should be noted that these lists are not exhaustive and as such, it is possible that certain chemicals may be in place that has not been revealed within these profiles.

It is the purpose of the historical research project to identify any additional sources of contamination that may be present within the site and assess the influence of these contaminants on the site and surrounding area.

Section 14 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. These are as follows :-

Table 14-1 Site Plans

Appendix No	*Plan Detail*
Appendix One, Sheet One	***Location Plan***
Appendix One, Sheet Two	***Existing Site Plan – Sample Locations***
Appendix One, Sheet Three	***Proposed Site Plan – Sample Locations***
Appendix One, Sheet Four	***Existing Site Plan – Contamination Locations***
Appendix One, Sheet Five	***Proposed Site Plan – Contamination Locations***
Appendix One, Sheet Six	***Remedial Plan***

Section 15 *Geotechnical Testing Relevant to the Risk Assessment Models*

Within the scope of the site investigation, geotechnical testing has been undertaken in order to ascertain details of the subsoil within the site, sufficient to enable a foundation design and other geotechnical information for the proposed development. Incorporated within the geotechnical testing has been testing sufficient to undertake risk assessment models within the site.

This testing has been undertaken in accordance with BS1377:1990, (Methods for Tests for Soils for Civil Engineering Purposes).

Section 16 *Description of Site Works and on/off Site Observations*

Within the scope of the site works, four window sampler boreholes were sunk across the site in order to ascertain details of the subsoil conditions.

By examination of the samples recovered from the site works, it is recorded that the upper subsoil formed a variable fill material to depths of 0.20-0.50m. This was seen to overlie a clay soil which was present to the close of the window sampler excavations at a depth of 3.00m. Within the shell an auger borehole, it is recorded the clay soil encountered is present until depth within the site, (20m+)

By examination of the upper made ground, the subsoil was visually and olfactorally examined to determine the presence of any obvious contamination. This is shown below :-

Table 16-1 Visual Observations of subsoil.

Window Sampler No	*Description – Potential Sources of contamination*
WS1	Nominal layer of brown brick rubble in a sandy matrix with occasional ash fragments. Fill extends to a depth of 0.30m. No obvious signs of contamination within this sample. Lower natural geology exhibited no obvious signs of contamination and appeared to be clean. Clay present until close of excavation. No water strikes recorded.
WS2	Similar FILL to window sampler one with ash deposits recorded within the material. No obvious signs of contamination within this sample. Lower natural geology exhibited no obvious signs of contamination and appeared to be clean. Clay present until close of excavation. No water strikes recorded.
WS3	Uniform Fill material present within this stratum with no obvious signs of contamination or ash material recorded. Lower natural geology exhibited no obvious signs of contamination and appeared to be clean. Clay present until close of excavation. No water strikes recorded.
WS4	Similar FILL to window sampler one, with ash recorded as present within this geology. No obvious signs of contamination within this sample. Lower natural geology exhibited no obvious signs of contamination and appeared to be clean. Clay present until close of excavation. No water strikes recorded.

Continued.....

WS5	Uniform Fill material present within this stratum with no obvious signs of contamination or ash material recorded. Lower natural geology exhibited no obvious signs of contamination and appeared to be clean. Clay present until close of excavation. No water strikes recorded.
WS6	Similar FILL to window sampler one with ash deposits recorded within the material. No obvious signs of contamination within this sample. Lower natural geology exhibited no obvious signs of contamination and appeared to be clean. Clay present until close of excavation. No water strikes recorded.

Table 16.2 Site Investigation Strategy

Location	*Location & Strategy*	*Termination Depth, (m)*	*Installation, (m)*
Window Sampler One	Undertaken adjacent to the retaining wall on the western boundary to assess potential infilled ground resulting from backfilling. Also undertaken adjacent to the area of infilled sewer to assess backfill to this.	3.00m	None
Window Sampler Two	Undertake adjacent to an area of dumping, (fridges and household rubbish). Also, historically in the location of garages previously on site to assess historical pollutants.	3.00m	None
Window Sampler Three	Undertaken to provide spatial coverage of the site. Also, in the location of entrances into the garages historically on the site.	3.00m	None
Window Sampler Four	Undertaken to provide spatial coverage of the site. Also, in the location of entrances into the garages historically on the site.	3.00m	None
Window Sampler Five	Untaken within the northern corner of the site to provide spatial coverage of the site.	3.00m	None
Window Sampler Six	Undertaken adjacent to the infilled sewer line and to the area of Asbestos sheeting to assess risk.	3.00m	None

Table 16.3 Summary of Fieldwork Activities

Phase of Works	*Activity*	*Contractor*	*Date*
Initial Site Inspection	Desk Top Study and Walkover Inspection	HESI	February 2007
Ground Investigation	Window Sampling	Cowan Drilling Services	March 2007
Site Supervision	Site supervision of the works undertaken	HESI	March 2007

Within the site, vegetation is present within adjacent land parcels and in a good state of growth. No obvious signs of pollution were evident within the assessment.

Section 17 Prevention of Cross Contamination

Due to the presence of a non-aquifer underlying the site, the provision of cross contamination preventative measures was not implemented.

Section 18 Description of Ground Conditions

By examination of the samples recovered from the site works, it is recorded that the upper subsoil formed a variable fill material to depths of 0.20-0.50m. This was seen to overlie a clay soil which was present to the close of the window sampler excavations at a depth of 3.00m. Within the shell an auger borehole, it is recorded the clay soil encountered is present until depth within the site, (20m+)

No groundwater was encountered within the scope of the works undertaken. All groundwater monitoring was undertaken over a short period of time.

Detailed logs of the strata encountered during the intrusive works are presented within this report. A summary of the geological strata encountered is presented in Table 18.1.

Table 18.1 Geological Stratum Encountered

Soil Type	Depth of Top of Stratum, (m bgl)	Thickness, (m)	Typical description
Made Ground	G.L	0.20-0.50m	Variable FILL encountered and likely to contain slight concentrations of contamination.
Head Deposits	0.20-0.50m	19.80+m	Clay.

Section 19 Chemical Test Data

Human Health Risk

Within this report, Contaminated Land Exposure Assessment has been used where toxalogical data has been provided. These give Soil Guideline Values, (SGV's), for various contaminants, the details of which are reported below.

Table 19-1 Contaminated Land Risk Assessment SGV's

Contaminant	Arsenic, (S.G.V)	Cadmium, (S.G.V)	Chromium, (S.G.V)	Lead, (S.G.V)	Mercury, (S.G.V)	Nickel, (S.G.V)	Selenium, (S.G.V)
Residential With plant uptake	20	1, 2, 8, (pH dependant)	130	450	8	50	35
Residential Without Plant Uptake	20	30	200	450	15	75	260
Allotments	20	1, 2, 8 (pH Dependant)	130	450	8	50	35
Commercial	500	1400	5000	750	480	5000	8000

All concentrations are measured in mg/kg^{-1}.

Table 19-2 Contaminated Land Risk Assessment SGV's, Cont'd.....

Contaminant	Ethylbenzene, (S.G.V)			Toluene, (S.G.V)			Phenol, (S.G.V)		
Soil Organic Matter, (%)	1%	2.5%	5%	1%	2.5%	5%	1%	2.5%	5%
Residential With plant uptake	9	21	41	3	7	14	78	150	280
Residential Without Plant Uptake	16	41	80	3	8	15	21,900	34,400	37,300
Allotments	18	43	85	31	73	140	80	155	280
Commercial	48,000			150	350	150	350	680	78,100

All concentrations are measured in mg/kg^{-1}.

Within the above, it can be seen that exposure limits for various land uses are recorded. Where contamination testing has been undertaken and results obtained, comparison with these values should be undertaken. Where exceedance of these values is recorded with appropriate pathway, risk of contamination is present.

When using the Contaminated Land Exposure Assessment software to determine the exposure level of Benzo(a)pyrene within the samples recovered and tested. The results of the analysis and risk assessment are enclosed within Contaminated Land Exposure Assessment Models. This reveals the following data : -

Table 19-3 Contaminated land Risk Assessment Model

Contaminant	Residential with plant uptake
Benzo(a)pyrene	1

All concentrations are measured in mg/kg^{-1}.

Vegetative Risk

Within the testing undertaken, certain contaminants pose limited risk to human health through the contaminants being 'Phytotoxic', (i.e. only harmful to plant growth and water systems). With this in mind, we enclose details of risk to the surrounding vegetation based on ICRCL guidance, which remains in publication. It is known that the human based risk was removed from publication within the ICRCL guidance notes, although the risk to vegetation is in place. These values are as follows :-

Table 19-4 Inter-Departmental Committee on the Re-Development of Contaminated Land, Vegetation Risk

Contaminant	Private Gardens	Open Spaces
Copper	130	130
Zinc	300	300
Boron	3	3
Sulfide	250	250

All concentrations are measured in mg/kg^{-1}.

Where the above values are exceeded, risk will be in place to vegetation and a water system within the site and as such, remedial measures will be required. In addition to this above, risk is considered in place to vegetation and plant growth from additional contaminants outside the ICRCL list. The human risk is not present from the contaminants and as such, requires no assessment. These form the following where Dutch Guidelines have been given as a comparison.

Table 19-5 WRAS – Material Selection for Water Main Supply Pipes in Contaminated land

Contaminant	Materials Selection Threshold	Contaminant	Materials Selection Threshold
Sulphate	2000	Mercury	1
Sulphur	5000	Selenium	3
Sulphide	250	Thiocyanate	50
PH	<5 or >8	Coal Tar	50
Antimony	10	Cyclohexane Extractable	50
Arsenic	10 *	Phenol	5
Cadmium	3	PAH's	50
Chromium, (Hexavalent)	25	Toluene Extractable	50
Chromium, (Total)	600	Petroleum Hydrocarbons	50
Cyanide	25 *		
Lead	500		

All concentrations are measured in mg/kg^{-1}.

* is not recommended that water pipes should be laid in sites where these substances are identified or suspected with protective measures.

When considering the above and making comparisons to the above exposure levels. The soil samples recovered from the site proved contaminated above the acceptable concentrations recorded above. It is known that certain water companies provide there own chemical data for the selection of pipework in contaminated soils and it is sometimes difficult to remove the requirement for protective pipework to be used.

It is recorded that the majority of the threshold values are the same as the human health risk level as devised by the, now removed publication, ICRCL and as such, the relevance of this data could be argued to some degree.

Total Petroleum Hydrocarbons

Considering the allowable level of Total Petroleum Hydrocarbons, we would suggest that the allowable concentration has been derived from assessing background concentrations of TPH in relation to specific sources of contamination, (i.e. TPH concentrations with no specific source and where source is present). Within this assessment we would suggest that the potential for TPH concentrations to be in place above 300 mg/kg^{-1} would be specifically sourced. This does not suggest that values above 300 mg/kg^{-1} would be harmful to human health, it is merely a level at which risk may be in place. Should a more detailed assessment be required to derive a site specific exposure level, this can be undertake upon request.

Contamination Assessment – Human Health Risk

Primarily, we have assessed the conditions of the subsoil in areas of the site in order to determine the extent of contamination.

From the results of the chemical test data, the following elevated contamination has been identified within the testing undertaken.

Table 19-6 Summary of Elevated Contaminants

Location	Depth	Boron, mg/kg^{-1}.	Arsenic, mg/kg^{-1}.	Copper, mg/kg^{-1}.	Lead, mg/kg^{-1}.	Zinc mg/kg^{-1}.	B.a.P, mg/kg^{-1}.
WS1	*0.20*				3200		
WS3	*0.30*				1400		1.5
WS4	*0.40*	3.1	49	170	1400	400	4.4
WS5	*0.40*		36				
WS6	*0.50*				1600		6.9
Allowable Level		***3***	***20***	***120***	***450***	***300***	***1***

All concentrations are measured in mg/kg^{-1}.

From the data recovered, it can be seen that metal contaminants are relatively widespread across the site and appear to be present where ash deposits are recorded. As such, we would suggest that it would be very difficult to isolate areas of contamination to specific zones as the ash debris may be scattered across the area.

We would suggest that further sampling could be undertaken in order to limit the extent of contamination, although, we would suggest that this will be unlikely to derive a specific zone of contamination.

With this in mind, we would suggest that the contamination should be classed as widespread within the site, (unless the above testing is undertaken) ad as such, remedial measures should be undertaken across the site.

From the assessment undertaken, certain factors show concern which are details as follows :-

- The contamination is present within scattered locations surrounding the site and as such, delineation of the areas of the contamination will be difficult to prove and validate. It is possible that through further testing, an area of the site could be classified as clean, although, we would anticipate that the cost if investigation may out way the cost of remediation.
- Has the contamination that has been recorded as present been derived from on site sources or as a result of historical deposition of the material in place. We would suggest that the contamination from the metal and Benzo(a)pyrene contamination is considered in place as a result of deposition of material. No specific source is present above ground.

Considering the above an taking into account the testing undertaken, we would suggest that further works would be required to assess and delineate the contamination and / or a remedial plan designed for the site. An alternative to this would be to assume that the site is contaminated and remediate all areas of the site, as required by current practice.

Statistical Analysis

In order to further assess the information recovered from the analytical chemist, statistical analysis has been undertaken on the results obtained and is enclosed within this report.

The statistical analysis has been undertaken on the separate contaminants proven as above the human health risk level. From the data recovered from the statistical analysis, we make the following comments regard the contamination.

Within the assessment of zoning which has been undertaken in order derive areas of contamination we would suggest that no specific on site features would cause the site to contain specific levels of contamination. As such, we can only surmise that the risk from Benzo(a)pyrene and metal contamination is present resulting from depositional placement. As such, we consider this as one zone with the remaining site forming a further zone.

Zone A, (Made Ground)

Within the upper FILL, Lead, Boron, Arsenic, Copper, Zinc and Benzo(a)pyrene are present. The assessment of this shows that no outliers are recorded as present and as such the samples tested are likely to be from the same underlying dataset. It is unlikely that hotspots or areas of contamination exist outside that already identified at significant concentrations.

Within the assessment of the underlying sample population, the averaging concentrations of Arsenic, Lead, Copper and Benzo(a)pyrene are above the allowable level and as such, it is highly likely that risk will be present.

Water Quality Risk

Considering the assessments undertaken to date, it is recorded that the site is underlain by a Non Aquifer formed by London Clay. This has been confirmed within the excavations made.

Considering the above, we would suggest that the risk to a groundwater system could be removed from the assessment.

Considering the potential risk to the surface water system present to the southwest of the site, we would suggest that the only significant pollution link will form surface water run off. At this distance, the migratory potential is significantly reduced and therefore also removed from the assessment.

Service Risk – Water Mains

When considering the risk to services, primarily, the risk to the water main system feeding the site is considered using the WRAS guidance to assess this risk. By comparison of this document, (Material Selection for Supply Pipes in Contaminated land), we enclose details of where elevated concentrations are in place.

From discussion with relevant water authorities, we have discussed the low exposure levels within the WRAS document which are attributed to the old ICRCL document relating to metal contamination. Within the discussions, it was suggested that the metal exposure values have limited relevance to the impact directly on water main pipes and is mainly to protect the workforce used in the installation of water mains. As such, where elevated metal concentrations are recorded, limited risk will be present to the water main and suitable protective clothing would reduce the impact on the workforce. Considering the concentrations of pH, we would suggest that the only impact to water mains would be through values below 5, where acidic conditions would be prevalent.

As such, we have removed the above conditions where we would consider risk reduced and will only report where organic based pollutants prevail or risk is considered in place due to the level of the contaminant.

Considering the testing undertaken at the site, it is recorded that one location recorded increased levels of PAH's and TPH's and as such, this is considered above the acceptable level set out by Local Statutory Authority and as such, protective pipework will be required.

Should a stringent clean up of the pollutants within the site be made, (incorporating appropriate validation testing), it is possible that the site could be developed in a conventional manner.

With this in mind, we would consider that the site will be classified as contaminated land by Statutory Authorities and as such, the provision for protective pipework should be included in the development to incorporate clean inert material as backfill. Confirmation of this should be sought from the relevant water authority at the earliest opportunity.

Land Gas

Due to the presence of an infilled stream surrounding the site, the potential for land gas to be present within the site is possible. As such, each location as been tested for the presence of land gas on a short term basis. The results of this testing are shown below.

Table 19-7 Land Gas Testing

Location	Oxygen, (%/vol)	Carbon Dioxide, (%/vol)	Methane, (%/vol)	Atmospheric Pressure, (mBar)
HA1	19.7	0.01	0.00	1022
HA2	19.7	0.02	0.01	
HA3	19.9	0.02	0.00	
HA4	19.9	0.02	0.00	

Considering the levels of land gas recorded within the works undertaken, we would suggest that the results are acceptable and the site is unaffected by land gas.

Table 19-8 Overview of Risk Present from Investigation

Receptor	Risk Assessed as present
Ground Water	X
Surface Water	X
Human Health	✓
Construction Materials	X
Services	✓
Vegetation	✓
Workforce	✓
Land Gas	X
Hydrocarbon Vapours, (in Buildings)	✓

From the above, it can be seen that risk is present from the contamination present within the site to human health, services, vegetation and the workforce used in the development of the site. With this in mind, remedial measures will be required in order to mitigate the risks associated with these receptors. These remedial measures will be discussed hereafter with Section 20.

Section 20 Outline Remedial Measures

For the purposes of this report, contamination has been detailed on the site plan forming appendix one, (Sheet four and five). The extent of contamination within the site is shown as within specific to areas of the site and as such it is possible that areas of the site could be deemed clean with appropriate validation testing.

In order to provide a clean environment, we would suggest that the following table considers specific proposed use and action required to the areas. It should be noted that the information below is only required where contamination has been identified, (See site plans for contaminant locations / Zones).

Table 20-1 Outline Remedial Measures Based on Source-Pathway-Receptor – Proposed Plans

Source	Pathway	Receptor	Risk Present	Action Required	Detail of Action Required
Grassed Areas	Ingestion, Inhalation, Dermal	Human	Yes	Yes	Excavate 0.50m, Incorporating 0.30m topsoil, 0.20m capillary break layer, or full removal of contamination, whichever is less.
	Plant Uptake	Vegetation	No	None	--
	Chemical Attack	Services	Yes	Yes	Provide clean trenches and/or protection to services, (i.e. ductile pipe work).
	Ingestion of Home Grown Vegetation	Human	No	None	--
	Leaching	Water System	No	None	--
	Chemical Attack	Construction Materials	No	None	--
Planting Areas	Ingestion, Inhalation, Dermal	Human	Yes	Yes	Excavate 0.70m, Incorporating 0.50m topsoil, 0.20m capillary break layer, or full removal of contamination, whichever is less.
	Plant Uptake	Vegetation	No	None	--
	Ingestion of Home Grown Vegetation	Human	No	None	--
	Chemical Attack	Services	Yes	Yes	Provide clean trenches and/or protection to services, (i.e. ductile pipe work).
	Leaching	Water System	No	None	--
	Chemical Attack	Construction Materials	No	None	--
Under Hardstan-ding	Ingestion, Inhalation, Dermal	Human	No	None	--
	Plant Uptake	Vegetation	No	None	--
	Chemical Attack	Services	Yes	Yes	Provide clean trenches and/or protection to services, (i.e. ductile pipe work).
	Leaching	Water System	No	None	--
	Chemical Attack	Construction Materials	No	None	--

Continued....

Under Buildings	Inhalation	Human	No	None	Provide a hydrocarbon barrier across the floor slab sealed at all service entries, (as specified by the provider).
	Plant Uptake	Vegetation	No	None	
	Chemical Attack	Services	Yes	Yes	Provide clean trenches and/or protection to services, (i.e. ductile pipe work).
	Leaching	Water System	No	None	--
	Chemical Attack	Construction Materials	No	No	--
Workforce	Ingestion, Inhalation, Dermal Contact	Human	Yes	Yes	Due to the presence of hydrocarbon vapours within the site and underground fuel tanks, it is likely that respirators will be required within the site in order to protect the workforce used in the development. Additional wetting down of contaminated areas in period of dry weather will also reduce the risk.

From the above, it can be seen that remedial measures will be required primarily for areas of soft landscaping, service trenches where protective pipework should be used for water main pipes and a hydrocarbon vapour barrier included within floor systems where hydrocarbon contamination has been identified.

Alternatives

An alternative to the above remedial measures will be to remediate and remove all contaminated materials from the site, (i.e. remove all of the upper FILL from the site), on completion of which, the site could be developed in a conventional manner. Validation of this would be required at the earliest opportunity.

Section 21 Validation Testing

We would suggest that validation testing will be required within the site due to the site recorded as contaminated within specific areas. Delineation of the contaminated area will be required prior to finalising the remedial plan for the site should the alterative site strip be undertaken.

Validation of any imported materials will be required to confirm that any materials that will form part of the proposed development will not form contaminated ground.

We would suggest that this report is sent to both the local Environmental Health officer and Environment Agency for confirmation that the proposals suggested within this report are acceptable and will be required in order to clear planning conditions for the site.

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. This has not been undertaken as a product of this report, although, we would suggest that should disposal of contaminated soil be undertaken after this time, the material should be classed as ***Stable Non Reactive Waste***. Obviously correct assessment would be require by the specific landfill site fo importation of waste from the site to the landfill.

Most hauliers will accept the soil test data incorporated within this report as a classification for the muck away soil within the site, although, the particular landfill site may require this additional information.

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.

Section 22 Waste Disposal

From the above information, it is recorded that as a result of contamination within the development, removal of some materials off site is required. Where materials are removed off site for disposal to a licensed waste facility, any materials must be removed using a licensed carrier.

It should be recorded that for the measurement of materials to be disposed off site, where excavation for foundations within the contaminated zone is undertaken, the excavated materials should be classed as contaminated waste and as such, disposed of in an appropriate manner. This may significantly affect the quantity of materials classed as contaminated.

Separating the made ground and natural subsoil on site may also reduce the quantities of contamination and as such, any ground workers should be made aware of the cost implications of disposing of contaminated waste and clean inert ground within the site

Section 23 Health and Safety

Measures will be necessary to protect the health and safety of site workers during any on-site works, although, this will incorporate general site safety standards adopted on construction sites and is further detailed below.

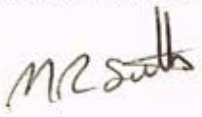
- All ground workers on-site should be issued with protective clothing, footwear and gloves. These should not be removed from site and advice should be given on when and how they are to be used.
- All ground workers should be made aware of the significance of the contaminated land and the impact contamination may have on human health.
- All plant and tools used within the contaminated site will be thoroughly cleaned before carrying out any further work outside the contaminated area.
- All personnel working within the site will not eat, drink or smoke unless within a designated clean area.
- All personnel will ensure that they wash their hands after leaving the site and avoid further contact with their skin.
- The provision or mechanical respirators when working within excavation in order to remove vapour risk within the site

Based on the information recorded within this report, we would suggest that considering the short-term basis on which the contamination within the site can be remediated, a decontamination unit will not be required within the development.

We would suggest that as a result of the nature of the contamination, care should be taken within the development to minimise the amount of dust generated within the development. This could be undertaken through a water system providing a dampening cover across the site in windy conditions.

Should any areas of the site be encountered within the development that appear potentially contaminated through visual or olfactory assessment, consultation with ourselves should be undertaken in order to identify the risk associated with the material.

Report Prepared	Name :	Chris Gray, M.Sc
	Designation :	Contract Engineer
	Signed :	
	Date :	March 2007

Report Reviewed	Name :	Martyn Smith, M.Sc
	Designation :	Principal Engineer
	Signed :	
	Date :	March 2007

APPENDIX ONE

SITE PLANS

HERTS & ESSEX SITE INVESTIGATIONS

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Telephone: Ware (01920) 822233
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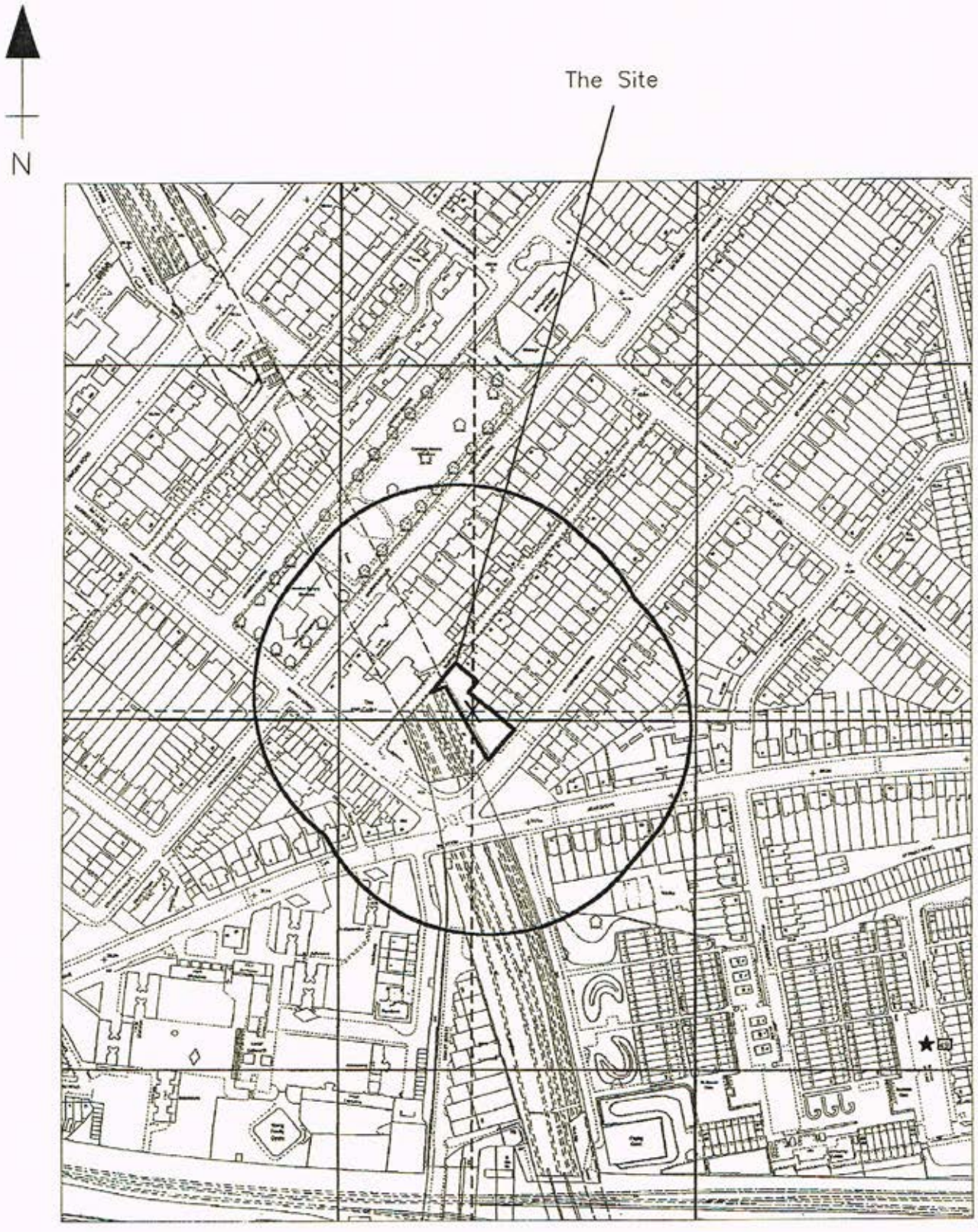
Appendix No.	1
Sheet No.	1
Job No.	7769
Date	March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Location Plan



Not To Scale

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Appendix No.	1
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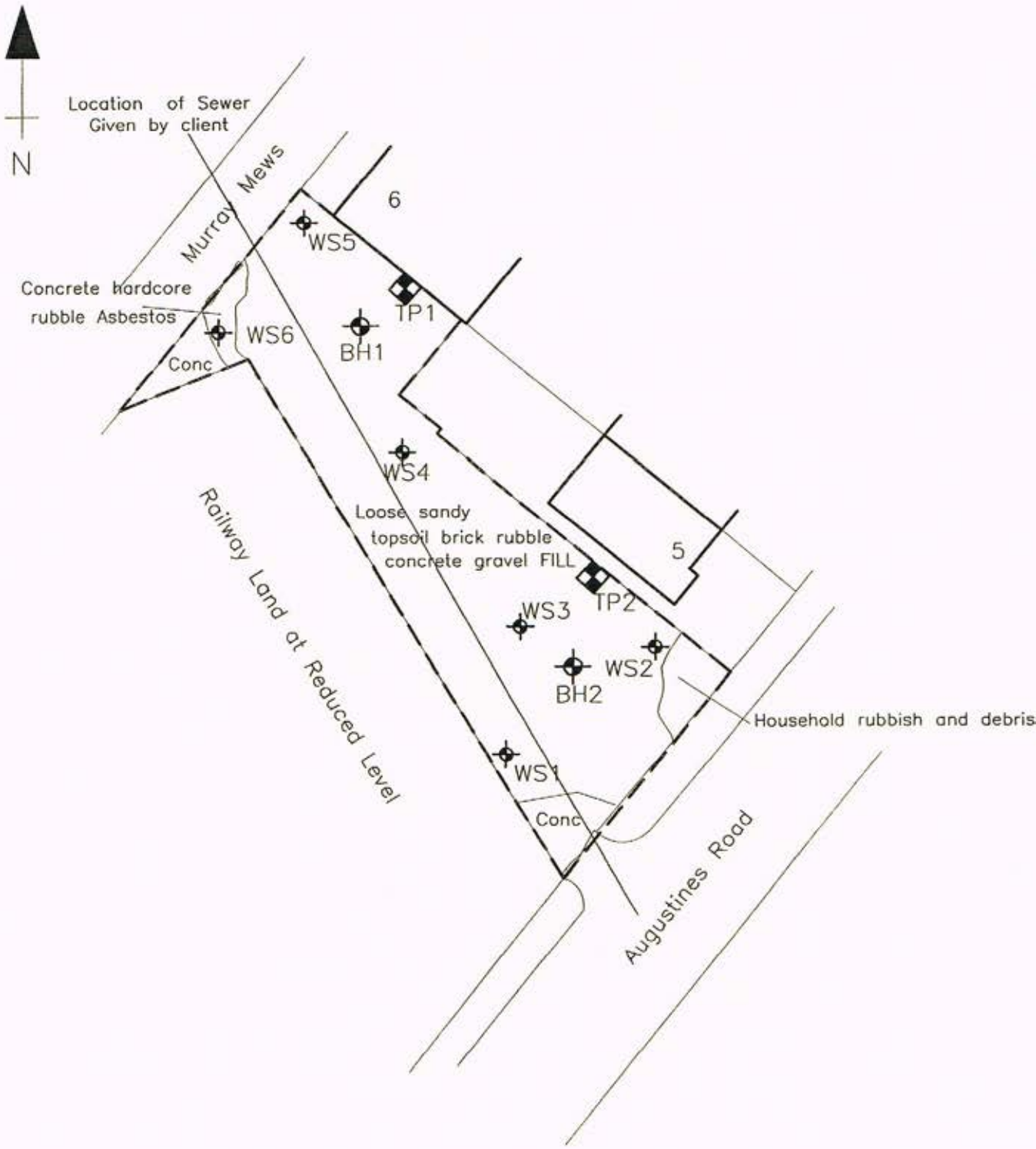
Site at 3 Augustines Road & 4 Murray Mews, London NW1

Existing Site Plan with Sample Location



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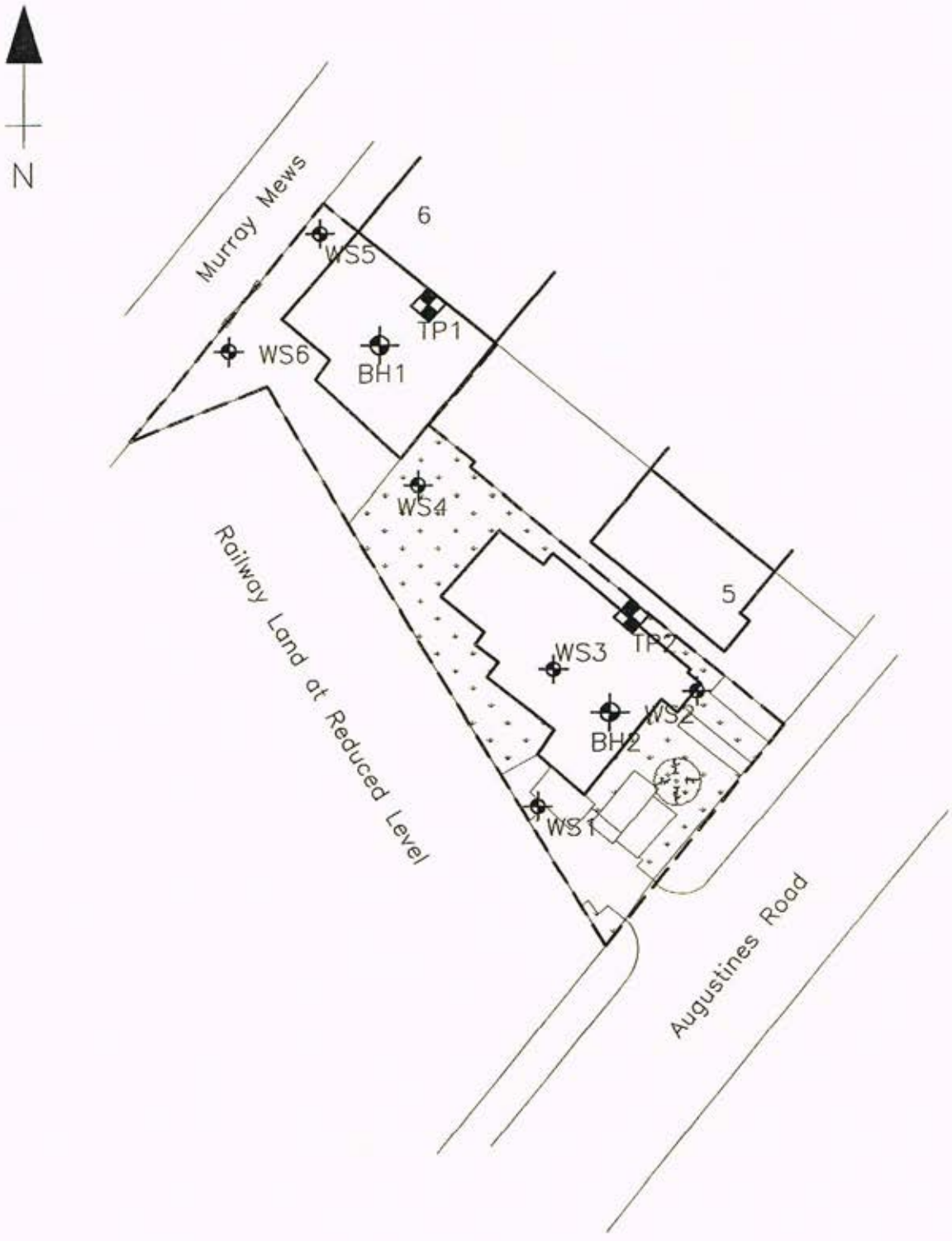
Appendix No.	1
Sheet No.	3
Job No.	7769
Date	March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Proposed Site Plan with Sampler Locations



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Appendix No.	1
Sheet No.	4
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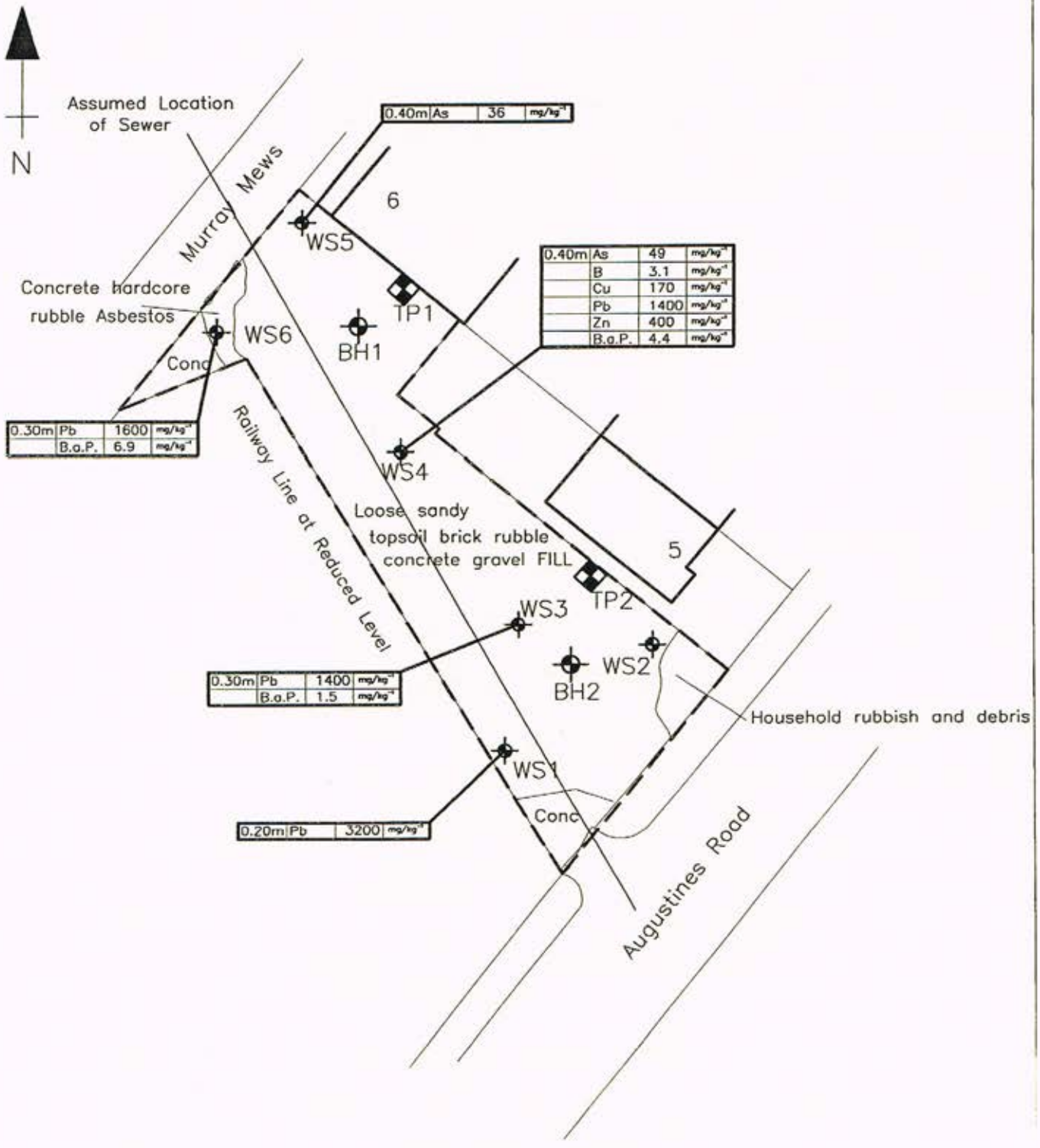
Site at 3 Augustines Road & 4 Murray Mews, London NW1

Existing Site Plan with Contamination Location



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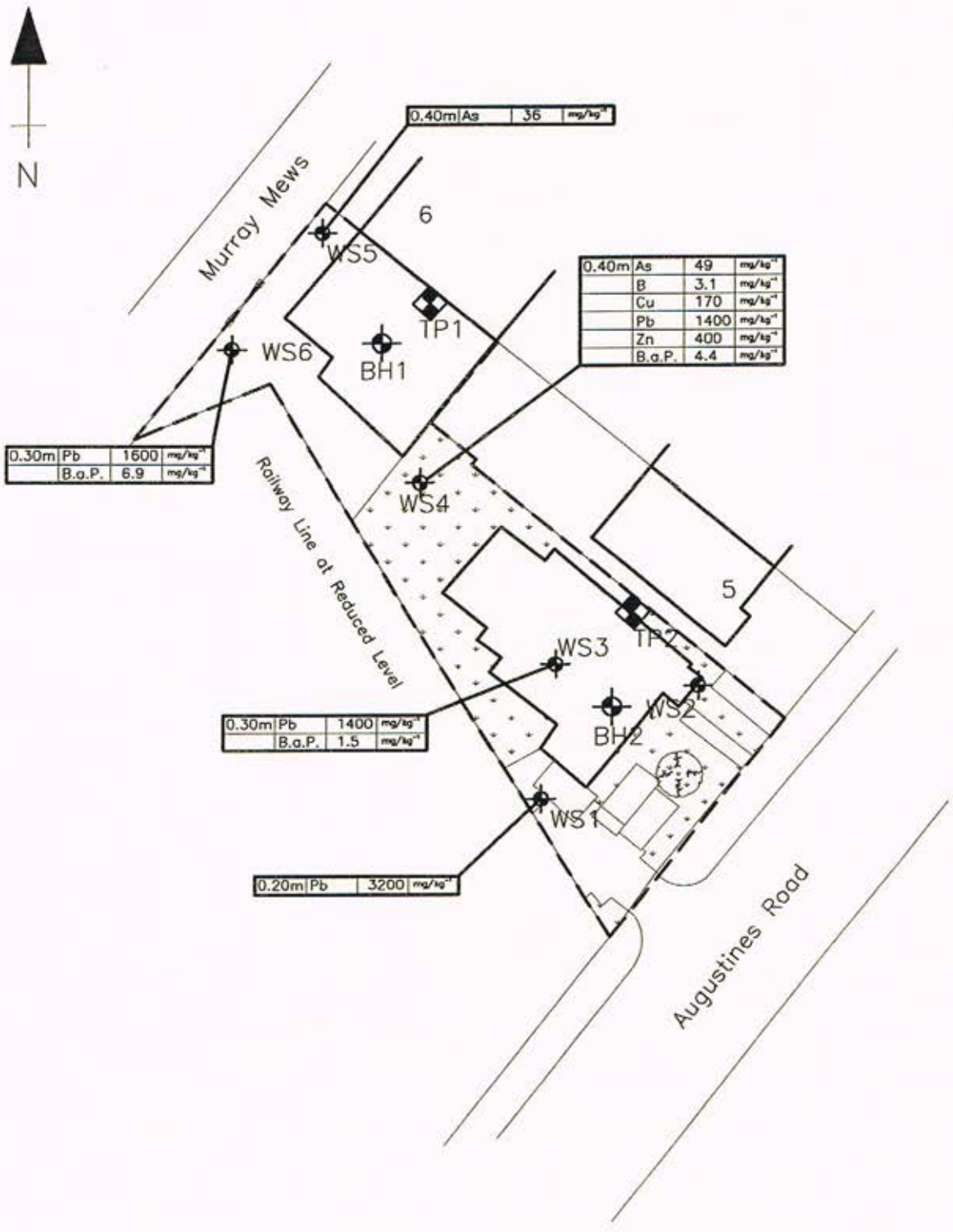
Site at 3 Augustines Road & 4 Murray Mews, London NW1

Proposed Site Plan with Contamination Location



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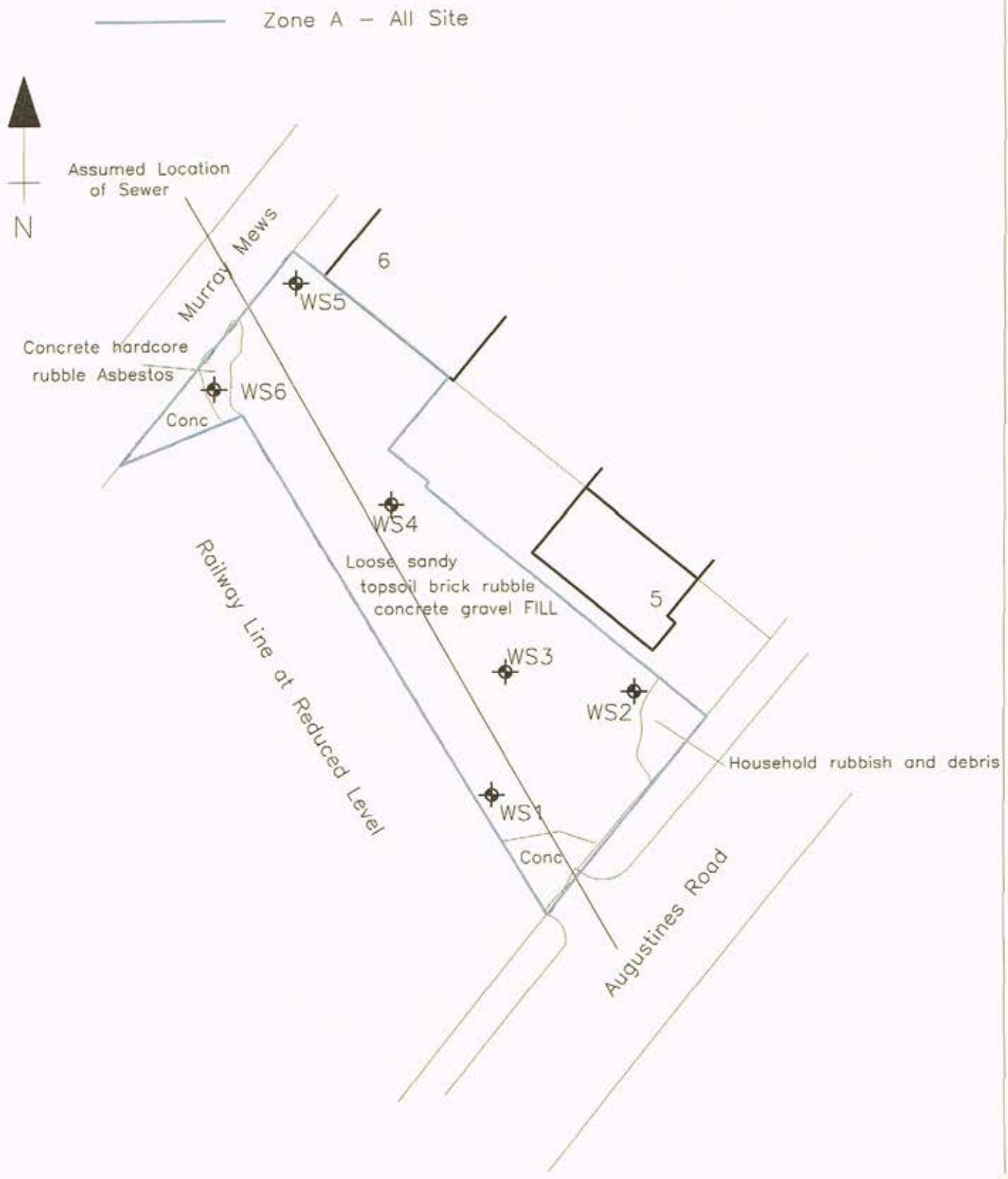
Site at 3 Augustines Road & 4 Murray Mews, London NW1

Zone used in Statistical Analysis



Not To Scale

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Site at 3 Augustines Road & 4 Murray Mews, London NW1

Remedial Plan

Not To Scale

APPENDIX TWO

BOREHOLE LOGS

HERTS & ESSEX SITE INVESTIGATIONS

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Appendix No. 2
Sheet No. 1
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Date March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Window Sampler One

LEGEND	DEPTH BELOW G.L.	LEVEL A.O.D	THICKNESS OF STRATA	DESCRIPTION OF STRATA	SAMPLES NO.	SAMPLES TYPE	SAMPLES DEPTH	WATER LEVELS	CASING LEVELS
			0.30	Loose dark brown sandy topsoil FILL with brick fragments ash and flint gravel	1	U	G.L–1.00m		
	0.30								
			2.70	Firm bercoming stiff orange brown sandy CLAY with occasional gravel	2	U	1.00–2.00m	DRY	1.00
					3	U	2.00–3.00m		
	3.00								
				Window Sampler closed at 3.00m					

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

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Sheet No. 2
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Date March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Window Sampler Two

LEGEND	DEPTH BELOW G.L.	LEVEL A.O.D	THICKNESS OF STRATA	DESCRIPTION OF STRATA	SAMPLES NO.	SAMPLES TYPE	SAMPLES DEPTH	WATER LEVELS	CASING LEVELS
	0.20		0.20	Loose dark brown sandy topsoil FILL with brick fragments ash and flint gravel	1	U	G.L–1.00m		
	3.00		2.80	Firm bercoming stiff orange brown sandy CLAY with occasional gravel	2	U	1.00–2.00m	DRY	1.00
					3	U	2.00–3.00m		
				Window Sampler closed at 3.00m					

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

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Date March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Window Sampler Three

LEGEND	DEPTH BELOW G.L.	LEVEL A.O.D	THICKNESS OF STRATA	DESCRIPTION OF STRATA	SAMPLES NO.	SAMPLES TYPE	SAMPLES DEPTH	WATER LEVELS	CASING LEVELS
			0.40	Loose dark brown sandy topsoil FILL with brick fragments and flint gravel	1	U	G.L–1.00m		
	0.40								
			2.60	Firm becoming stiff orange brown mottled brown slightly sandy CLAY with occasional gravel	2	U	1.00–2.00m	DRY	1.00
					3	U	2.00–3.00m		
	3.00			Window Sampler closed at 3.00m					

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

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Appendix No. 2
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Job No. 7769
Date March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Window Sampler Four

LEGEND	DEPTH BELOW G.L.	LEVEL A.O.D	THICKNESS OF STRATA	DESCRIPTION OF STRATA	SAMPLES NO.	SAMPLES TYPE	SAMPLES DEPTH	WATER LEVELS	CASING LEVELS
			0.50	Loose dark brown sandy topsoil FILL with brick fragments ash and flint gravel	1	U	G.L–1.00m		
	0.50								
			2.50	Firm becoming stiff orange brown mottled brown slightly sandy CLAY with occasional gravel	2	U	1.00–2.00m	DRY	1.00
					3	U	2.00–3.00m		
	3.00								
				Window Sampler closed at 3.00m					

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. 2
Sheet No. 5
Job No. 7769
Date March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Window Sampler Five

LEGEND	DEPTH BELOW G.L.	LEVEL A.O.D	THICKNESS OF STRATA	DESCRIPTION OF STRATA	SAMPLES NO.	SAMPLES TYPE	SAMPLES DEPTH	WATER LEVELS	CASING LEVELS
			0.50	Loose dark brown sandy topsoil FILL with brick fragments and flint gravel	1	U	G.L–1.00m		
	0.50								
			2.50	Firm becoming stiff orange brown mottled brown slightly sandy CLAY with occasional gravel	2	U	1.00–2.00m	DRY	1.00
					3	U	2.00–3.00m		
	3.00			Window Sampler closed at 3.00m					

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

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Fax: Ware (01920) 822200

Appendix No. 2
Sheet No. 6
Job No. 7769
Date March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Window Sampler Six

LEGEND	DEPTH BELOW G.L.	LEVEL A.O.D	THICKNESS OF STRATA	DESCRIPTION OF STRATA	SAMPLES NO.	SAMPLES TYPE	SAMPLES DEPTH	WATER LEVELS	CASING LEVELS
	0.30		0.30	Loose dark brown sandy topsoil FILL with brick fragments ash and flint gravel	1	U	G.L–1.00m		
	1.00		0.70	Firm orange brown claybound brick rubble FILL				DRY	1.00
				Window Sampler closed at 1.00m No further progress					

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

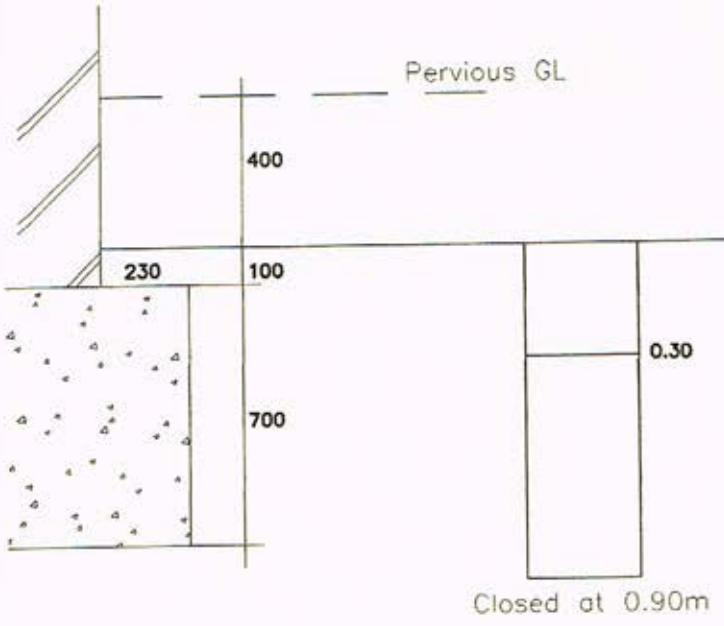
H&E.S.I

Site at 3 Augustines Road &
4 Murray Mews, London NW1

Existing Footing Detail

Appendix No 2
Sheet No 7
Job No. 7769
Date March 2007

Trial Pit One

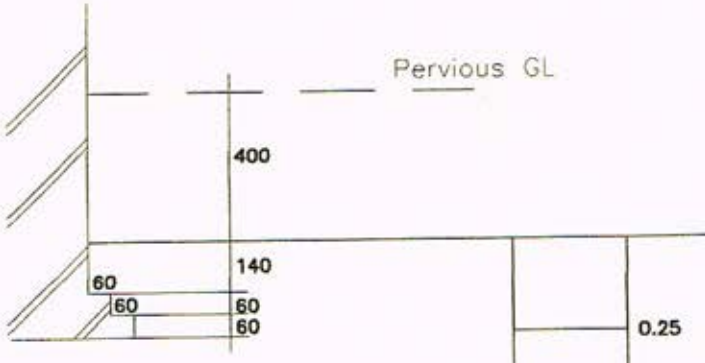


Loose dark brown sandy topsoil FILL with brick rubble concreete and gravel

Firm to stiff orange brown slightly sandy CLAY

Closed at 0.90m

Trial Pit One



Loose dark brown sandy topsoil FILL with brick rubble concreete and gravel

Firm to stiff orange brown slightly sandy CLAY

Closed at 0.50m

NOTES

Scale 1 : 20

WATER STRUCK
WATER STANDING
W WATER SAMPLE

B = Bulk Sample
V = Shear Vane Test (kN/M²)
N = SPT 'N'-Value

HERTS & ESSEX SITE INVESTIGATIONS

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Appendix No. 2
Sheet No. 8
Job No. 7769
Date March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Borehole One

Description of Strata	Depth	Reduced Level	Legend	Thickness (m)	Water Level	Samples No.	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	Casing Depth (m)
Loose dark brown sandy topsoil FILL with brick fragments and flint gravel	0.50			0.50	Borehole Dry					
Firm to stiff brown mottled brown slightly sandy CLAY with much flint gravel				2.40		1	U	1.00		1.50
						1	B	2.00	N=30	
	2.90									
Firm becoming stiff with depth brown silty CLAY				7.00		2	U	3.00		
						3	U	4.00		
						4	U	5.00		
						5	U	6.50		
						6	U	8.00		
	9.70									
Stiff grey silty CLAY				12.30		7	U	9.70		

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

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Appendix No. 2
Sheet No. 9
Job No. 7769
Date March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Borehole One .... Continued

Description of Strata	Depth	Reduced Level	Legend	Thickness (m)	Water Level	Samples No.	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	Casing Depth (m)
As above										
						8	U	11.00		
						9	U	12.50		
						10	U	14.00		
				12.30	Borehole Dry					
						11	U	15.60		
						12	U	17.00		
						13	U	18.60		
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

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Appendix No. 2
Sheet No. 10
Job No. 7769
Date March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Borehole Two

Description of Strata	Depth	Reduced Level	Legend	Thickness (m)	Water Level	Samples No.	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	Casing Depth (m)
Loose dark brown sandy topsoil FILL with brick fragments and flint gravel	0.50			0.50	Borehole Dry					
Firm brown slightly sandy CLAY	1.30			0.80		1	U	1.10		1.50
Firm becoming stiff with depth brown mottled grey silty CLAY	5.60			4.30		2	U	2.10		
						3	U	3.00		
						4	U	4.00		
						5	U	5.00		
Stiff brown silty CLAY	9.00			3.40		6	U	6.50		
						7	U	8.00		
Stiff grey brown silty CLAY				11.00		8	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

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Appendix No. 2
Sheet No. 11
Job No. 7769
Date March 2007

Site at 3 Augustines Road & 4 Murray Mews, London NW1

Borehole Two .... Continued

Description of Strata	Depth	Reduced Level	Legend	Thickness (m)	Water Level	Samples No.	Samples Type	Samples Depth (m)	S.P.T N-Value or Vane Strength	Casing Depth (m)
As above										
						9	U	11.00		
						10	U	12.50		
						11	U	14.00		
				11.00	Borehole Dry					
Claystone 14.80–15.50										
						12	U	15.60		
						13	U	17.00		
						14	U	18.50		
						15	U	19.50		
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)

APPENDIX THREE

CHEMICAL TEST DATA

Chemtest

Willie Snaith Road Newmarket CB8 7SQ
Tel: 01638 606070 Fax: 01638 606071
Email: admin @ chemtest.co.uk

Herts & Essex Site Investigations
The Old Post Office
Wellpond Green, Standon
Ware, Hertfordshire
SG11 1NJ
FAO Chris Gray
27 March 2007

Dear Chris Gray

Test Report Number 43139
Your Project Reference 3 Augustines Road, + 4 Murray Mews, London

Please find enclosed the results of analysis for the samples received 21 March 2007.

All soil samples will be retained for a period of one month and all water samples will be retained for 14 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 Daniel Woods in Customer Services.

Yours sincerely

Darrell Hall - Laboratory Manager
Authorised Signatory

UKAS TESTING
2183

MCERTS

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'*
- *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*

xplor
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Registered in England & Wales
Registration Number 3006780
Reg Office 7 Laureate Paddocks
Newmarket Suffolk CB8 0AP

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

FAO Chris Gray

LABORATORY TEST REPORT

Results of analysis of 7 samples received 21 March 2007

3 Augustines Road, + 4 Murray Mews, London

Chemtest

Report Date 27 March 2007

Login Batch No					43139						
Chemtest LIMS ID					AB83150	AB83151	AB83152	AB83153	AB83154	AB83155	AB83156
Sample ID					WS1	WS2	WS3	WS4	WS4	WS5	WS6
Sample No											
Depth					0.20m	0.15m	0.30m	0.40m	0.60m	0.40m	0.50m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*							
2020	Electrical Conductivity (2:1)	EC	µS cm-¹	U	400	390	540	440	640	950	320
2030	Moisture		%	n/a	19.2	21.9	20	16.9	28.2	23.2	13.6
	Stone content (as received)		%	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2300	Cyanide (total)	57125	mg kg-¹	M	1.8	1.0	1.2	1.2	0.6	<0.5	0.5
2310	Cyanide (free)	57125	mg kg-¹	M	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2610	Loss on ignition		%	N	4.2	4.67	4.75	11.4	7.53	8.4	4.05
2120	Boron (hot water soluble)	7440428	mg kg-¹	U	1	0.6	1.6	3.1	2.6	1.1	2.8
2210	Sulfate (2:1 water soluble)	14808798	g l-¹	M	0.03	0.01	0.11	0.04	0.12	0.12	0.05
2430	Sulfate (total)	14808798	%	U	0.31	0.09	0.36	0.25	0.15	0.18	0.29
2450	Arsenic	7440382	mg kg-¹	M	4.6	<2	14	49	16	36	18
	Cadmium	7440439	mg kg-¹	M	<0.1	<0.1	0.13	0.22	<0.1	<0.1	0.10
	Chromium	7440473	mg kg-¹	U	14	17	19	28	29	30	26
	Copper	7440508	mg kg-¹	M	36	18	74	170	54	130	85
	Mercury	7439976	mg kg-¹	M	3.3	0.42	1.3	1.3	1.1	1.1	1.4
	Nickel	7440020	mg kg-¹	M	12	10	19	34	18	19	24
	Lead	7439921	mg kg-¹	M	3200	430	1400	1400	330	260	1600
	Zinc	7440666	mg kg-¹	M	63	57	290	400	77	100	180
2490	Chromium (hexavalent)	18540299	mg kg-¹	N	< 5	< 5	< 5	< 5	< 5	< 5	< 5
2673	TPH >C6-C10		mg kg-¹	U	<1	<1	<1	35	<1	<1	<1
	TPH >C10-C21		mg kg-¹	M	14	28	25	38	19	35	64
	TPH >C21-C40		mg kg-¹	M	31	64	76	96	150	27	95
	Total Petroleum Hydrocarbons		mg kg-¹	M	45	92	100	170	170	62	160
2700	Naphthalene	91203	mg kg-¹	M	4.8	3.4	2.3	1.9	2.1	2.9	12
	Acenaphthylene	208968	mg kg-¹	M	0.3	0.1	0.4	0.4	0.2	0.2	<0.1
	Acenaphthene	83329	mg kg-¹	M	2	0.9	1	0.9	0.5	0.6	2.9
	Fluorene	86737	mg kg-¹	M	0.9	0.5	0.6	0.4	0.2	0.1	1.8
	Phenanthrene	85018	mg kg-¹	M	1.8	0.9	2.6	2.8	0.4	0.3	13
	Anthracene	120127	mg kg-¹	M	1.2	0.5	0.9	1.1	0.2	0.1	2.6
	Fluoranthene	206440	mg kg-¹	M	2.6	1.2	4.2	6.7	0.3	0.1	16
	Pyrene	129000	mg kg-¹	M	2	0.9	3.3	6	0.3	0.1	13

All tests undertaken between 19-Mar-2007 and 26-Mar-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

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

FAO Chris Gray

LABORATORY TEST REPORT

Results of analysis of 7 samples received 21 March 2007

3 Augustines Road, + 4 Murray Mews, London

Chemtest

Report Date 27 March 2007

					43139						
					AB83150	AB83151	AB83152	AB83153	AB83154	AB83155	AB83156
					WS1	WS2	WS3	WS4	WS4	WS5	WS6
					0.20m	0.15m	0.30m	0.40m	0.60m	0.40m	0.50m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2700	Benzo[a]anthracene	56553	mg kg-1	M	1.1	0.5	1.8	3.6	0.3	0.2	7
	Chrysene	218019	mg kg-1	M	1.1	0.5	2.1	4.1	0.3	0.2	8.1
	Benzo[b]fluoranthene	205992	mg kg-1	M	0.9	0.5	1.9	4.3	0.2	0.2	6.5
	Benzo[k]fluoranthene	207089	mg kg-1	M	0.6	0.4	1.3	3.5	0.3	<0.1	5.3
	Benzo[a]pyrene	50328	mg kg-1	M	0.7	0.4	1.5	4.4	0.3	0.1	6.9
	Dibenzo[a,h]anthracene	53703	mg kg-1	M	<0.1	<0.1	0.3	0.8	<0.1	<0.1	1.2
	Indeno[1,2,3-cd]pyrene	193395	mg kg-1	M	0.5	0.3	1.4	3.1	0.2	<0.1	5
	Benzo[g,h,i]perylene	191242	mg kg-1	M	0.7	0.8	1.7	3.4	1	1.2	4.6
	Total (of 16) PAHs		mg kg-1	M	21	12	27	47	6.6	6.3	110
2920	Phenols (total)		mg kg-1	M	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
2010	pH		-	M	8.3	7.9	8.3	7.7	7.7	7.7	8.4
2140	Soil colour			n/a	brown	brown	brown	grey	brown	brown	brown
	Soil texture			n/a	sand	clay	clay	sand	clay	clay	sand
	Other material			n/a	stones	stones	stones	stones	none	none	brick, stones
2186	Asbestos (presence/absence)		-	N	not detected	not detected	not detected	not detected	not detected	not detected	not detected

All tests undertaken between 19-Mar-2007 and 26-Mar-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

APPENDIX FOUR

STATISTICAL ANALYSIS

HERTS & ESSEX SITE INVESTIGATIONS

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

Telephone (01920) 822233
Fax (01920) 822200

DEFRA/CLEA : Assessment of Risks to Human Health From Land Contamination, (CLR 7)

Upper 95th Percentile and Outlier Analysis

Site Address: *Site at 3 Augustines Road & 4 Murray Mews, London NW1*

Job No: 7769

Contaminant :	Soil Type	Zone	Outlier Test Statistic	T_{crit}	Are Outliers Present?	Upper 95th Percentile	Log of Relevent Trigger Level	Mean Value Test is Passed
Lead	Fill	All Site	1.23	1.82	NO	3.34	2.65	×

Contaminant :	Soil Type	Zone	Outlier Test Statistic	T_{crit}	Are Outliers Present?	Upper 95th Percentile	Relevent Trigger Level	Mean Value Test is Passed
Boron	Fill	All Site	1.20	1.82	NO	2.54	3.00	✓
Arsenic	Fill	All Site	1.11	1.82	NO	35.75	20.00	×
Copper	Fill	All Site	1.12	1.82	NO	132.41	130.00	×
Zinc	Fill	All Site	1.30	1.82	NO	295.47	300.00	✓
B.a.P.	Fill	All Site	1.20	1.82	NO	4.58	1.00	×

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DEFRA/CLEA : Assessment of Risks to Human Health From Land Contamination, (CLR 7)

Upper 95th Percentile and Outlier Analysis

Site Address: *Site at 3 Augustines Road & 4 Murray Mews, London NW1*

Job No: *7769*

Soil Type :	**Fill**
Contaminant :	**Boron**
No of Samples	6
Unbiased Standard Deviation	1.02
Arithmetic Mean	1.70
t value	2.015
Arithmetic Mean of Log Values	0.16
Unbiased Standard Deviation Log	0.28
Maximum Value of Log Values	0.49
Outlier Test Statistic	***1.20***
T_{crit}	***1.820***
Upper 95th Percentile	***2.54 mg/kg^{-1}***
Relevent Trigger Level	***3.00 mg/kg^{-1}***

Sample Location	*Sample Number*	*Soil Concentration*	*Log of Soil Concentration*
WS1	*1*	1	0.00
WS2	*2*	0.6	-0.22
WS3	*3*	1.6	0.20
WS4	*4*	3.1	0.49
WS5	*5*	1.1	0.04
WS6	*6*	2.8	0.45

Soil Type :	**Fill**
Contaminant :	**Arsenic**
No of Samples	6
Unbiased Standard Deviation	18.42
Arithmetic Mean	20.60
t value	2.015
Arithmetic Mean of Log Values	1.10
Unbiased Standard Deviation Log	0.53
Maximum Value of Log Values	1.69
Outlier Test Statistic	***1.11***
T_{crit}	***1.820***
Upper 95th Percentile	***35.75 mg/kg^{-1}***
Relevent Trigger Level	***20.00 mg/kg^{-1}***

Sample Location	*Sample Number*	*Soil Concentration*	*Log of Soil Concentration*
WS1	*1*	4.6	0.66
WS2	*2*	2	0.30
WS3	*3*	14	1.15
WS4	*4*	49	1.69
WS5	*5*	36	1.56
WS6	*6*	18	1.26

HERTS & ESSEX SITE INVESTIGATIONS

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Hertfordshire, SG11 1NJ

Telephone (01920) 822233
Fax (01920) 822200

DEFRA/CLEA : Assessment of Risks to Human Health From Land Contamination, (CLR 7)

Upper 95th Percentile and Outlier Analysis

Site Address: *Site at 3 Augustines Road & 4 Murray Mews, London NW1*

Job No: 7769

Soil Type :	Fill
Contaminant :	**Lead**
No of Samples	6
Unbiased Standard Deviation	1050.57
Arithmetic Mean	1381.67
t value	2.02
Arithmetic Mean of Log Values	3.01
Unbiased Standard Deviation Log	0.40
Maximum Value of Log Values	3.51

Outlier Value	***1.23***
T_{crit}	***1.820***
Upper 95th Percentile	***3.341 mg/kg^{-1}***
Log of Soil Guidline Value	***2.653 mg/kg^{-1}***
Soil Guideline Value	***450.00 mg/kg^{-1}***

Sample Location	*Sample Number*	*Soil Concentration*	*Log of Soil Concentration*
WS1	*1*	3200	3.51
WS2	*2*	430	2.63
WS3	*3*	1400	3.15
WS4	*4*	1400	3.15
WS5	*5*	260	2.41
WS6	*6*	1600	3.20

HERTS & ESSEX SITE INVESTIGATIONS

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Hertfordshire, SG11 1NJ

Telephone (01920) 822233
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DEFRA/CLEA : Assessment of Risks to Human Health From Land Contamination, (CLR 7)

Upper 95th Percentile and Outlier Analysis

Site Address: *Site at 3 Augustines Road & 4 Murray Mews, London NW1*
Job No: *7769*

Soil Type :	Fill
Contaminant :	**Copper**
No of Samples	6
Unbiased Standard Deviation	57.03
Arithmetic Mean	85.50
t value	2.015
Arithmetic Mean of Log Values	1.83
Unbiased Standard Deviation Log	0.36
Maximum Value of Log Values	2.23
Outlier Test Statistic	***1.12***
T_{crit}	*1.820*
Upper 95th Percentile	***132.41 mg/kg^{-1}***
Relevent Trigger Level	***130.00 mg/kg^{-1}***

Sample Location	*Sample Number*	*Soil Concentration*	*Log of Soil Concentration*
WS1	*1*	36	1.56
WS2	*2*	18	1.26
WS3	*3*	74	1.87
WS4	*4*	170	2.23
WS5	*5*	130	2.11
WS6	*6*	85	1.93

Soil Type :	Fill
Contaminant :	**Zinc**
No of Samples	6
Unbiased Standard Deviation	138.35
Arithmetic Mean	181.67
t value	2.015
Arithmetic Mean of Log Values	2.15
Unbiased Standard Deviation Log	0.35
Maximum Value of Log Values	2.60
Outlier Test Statistic	***1.30***
T_{crit}	*1.820*
Upper 95th Percentile	***295.47 mg/kg^{-1}***
Relevent Trigger Level	***300.00 mg/kg^{-1}***

Sample Location	*Sample Number*	*Soil Concentration*	*Log of Soil Concentration*
WS1	*1*	63	1.80
WS2	*2*	57	1.76
WS3	*3*	290	2.46
WS4	*4*	400	2.60
WS5	*5*	100	2.00
WS6	*6*	180	2.26

HERTS & ESSEX SITE INVESTIGATIONS

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

Telephone (01920) 822233
Fax (01920) 822200

DEFRA/CLEA : Assessment of Risks to Human Health From Land Contamination, (CLR 7)

Upper 95th Percentile and Outlier Analysis

Site Address: *Site at 3 Augustines Road & 4 Murray Mews, London NW1*

Job No: *7769*

Soil Type :	**Fill**
Contaminant :	**B.a.P.**
No of Samples	6
Unbiased Standard Deviation	2.73
Arithmetic Mean	2.33
t value	2.015
Arithmetic Mean of Log Values	0.02
Unbiased Standard Deviation Log	0.68
Maximum Value of Log Values	0.84
Outlier Test Statistic	***1.20***
T_{crit}	***1.820***
Upper 95th Percentile	***4.58 mg/kg^{-1}***
Relevent Trigger Level	***1.00 mg/kg^{-1}***

Sample Location	*Sample Number*	*Soil Concentration*	*Log of Soil Concentration*
WS1	*1*	0.7	-0.15
WS2	*2*	0.4	-0.40
WS3	*3*	1.5	0.18
WS4	*4*	4.4	0.64
WS5	*5*	0.1	-1.00
WS6	*6*	6.9	0.84

HERTS & ESSEX SITE INVESTIGATION

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

Telephone : Ware (01920) 822233
Fax: Ware (01920) 822200

10th April 2007

Our ref : CSG/7769

Tasou Associates
4 Amwell Street
London
EC1R 1UQ

RECEIVED
19 APR 2007

For the Attention of A.Lau Esq.

Dear Sirs,

Re: Site at 3 Augustines Road & 4 Murray Mews, London NW1.

Please find enclosed the results of the WAC (Waste Acceptance Criteria) test carried out on a sample of the fill from the above site.

The results show the material to be **Hazardous Waste.**

Should you require any further information or assistance, please do not hesitate to contact us.

Yours Faithfully

C.S.Gray M.Sc
Contract Engineer

Chemtest

Willie Snaith Road Newmarket CB8 7SQ
Tel: 01638 606070 Fax: 01638 606071
Email: admin @ chemtest.co.uk

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

03 April 2007

Dear Chris Gray

Test Report Number 43140
Your Project Reference 3 Augustines Road, Murray Mews, London

Please find enclosed the results of analysis for the samples received 21 March 2007.

All soil samples will be retained for a period of one month and all water samples will be retained for 14 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 Daniel Woods in Customer Services.

Yours sincerely

KTJones

Keith Jones
Authorised Signatory

UKAS TESTING
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'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

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

FAO Chris Gray

LABORATORY TEST REPORT

Waste Acceptance Criteria BS EN 12457 Part 3 2 Stage

Results of analysis of 1 sample received 21 March 2007

3 Augustines Road, Murray Mews, London

Chemtest

Report Date 03 April 2007

Login Batch No					43140
Chemtest LIMS ID					AB83162
Sample ID					WS4
Sample No					
Depth					0.30m
Matrix					*LEACHATE*
Determinand↓	SOP↓	*	CAS No↓	Units↓	
As (arsenic) L/S=2	1450		7440382	mg kg-¹	0.1
As (arsenic) L/S=10	1450	N	7440382	mg kg-¹	<0.05
Ba (barium) L/S=2	1450		7440393	mg kg-¹	0.6
Ba (barium) L/S=10	1450	N	7440393	mg kg-¹	<0.5
Cd (cadmium) L/S=2	1450		7440439	mg kg-¹	<0.01
Cd (cadmium) L/S=10	1450	N	7440439	mg kg-¹	<0.01
Cr (chromium) L/S=2	1450		7440473	mg kg-¹	<0.05
Cr (chromium) L/S=10	1450	N	7440473	mg kg-¹	<0.05
Cu (copper) L/S=2	1450		7440508	mg kg-¹	0.1
Cu (copper) L/S=10	1450	N	7440508	mg kg-¹	0.1
Hg (mercury) L/S=2	1450		7439976	mg kg-¹	<0.005
Hg (mercury) L/S=10	1450	N	7439976	mg kg-¹	<0.005
Mo (molybdenum) L/S=2	1450		7439987	mg kg-¹	0.1
Mo (molybdenum) L/S=10	1450	N	7439987	mg kg-¹	<0.05
Ni (nickel) L/S=2	1450			mg kg-¹	<0.05
Ni (nickel) L/S=10	1450	N	7440020	mg kg-¹	<0.05
Pb (lead) L/S=2	1450		7439921	mg kg-¹	<0.05
Pb (lead) L/S=10	1450	N	7439921	mg kg-¹	0.5
Sb (antimony) L/S=2	1450		7440360	mg kg-¹	<0.01
Sb (antimony) L/S=10	1450	N	7440360	mg kg-¹	<0.01
Se (selenium) L/S=2	1450		7782492	mg kg-¹	<0.01
Se (selenium) L/S=10	1450	N	7782492	mg kg-¹	<0.01
Zn (zinc) L/S=2	1450		7440666	mg kg-¹	<0.5
Zn (zinc) L/S=10	1450	N	7440666	mg kg-¹	<0.5
Cl (chloride) L/S=2	1210	N	16887006	mg kg-¹	4.1
Cl (chloride) L/S=10	1210	N	16887006	mg kg-¹	28
F (fluoride) L/S=2	1210	N	16984488	mg kg-¹	1.7
F (fluoride) L/S=10	1210	N	16984488	mg kg-¹	4.6
SO4 (sulfate) L/S=2	1210	N	14808798	mg kg-¹	45

All tests undertaken between 02-Apr-2007 and 2-Apr-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

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

FAO Chris Gray

LABORATORY TEST REPORT

Waste Acceptance Criteria BS EN 12457 Part 3 2 Stage

Results of analysis of 1 sample
received 21 March 2007

3 Augustines Road, Murray Mews, London

Chemtest

Report Date
03 April 2007

					43140
					AB83162
					WS4
					0.30m
					LEACHATE
SO4 (sulfate) L/S=10	1210	N	14808798	mg kg^{-1}	140
Total Dissolved Solids L/S=2	1610	N	TDS	mg kg^{-1}	510
Total Dissolved Solids L/S=10	1610	N	TDS	mg kg^{-1}	1100
Phenol index L/S=2	1920	N		mg kg^{-1}	<0.5
Phenol index L/S=10	1920	N		mg kg^{-1}	<0.5
Dissolved Organic Carbon L/S=2	1610	N	DOC	mg kg^{-1}	<50
Dissolved Organic Carbon L/S=10	1610	N	DOC	mg kg^{-1}	200

All tests undertaken between 02-Apr-2007 and 2-Apr-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

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

FAO Chris Gray

LABORATORY TEST REPORT

Results of analysis of 1 sample received 21 March 2007

3 Augustines Road, Murray Mews, London

Chemtest

Report Date 03 April 2007

Login Batch No					**43140**
Chemtest LIMS ID					AB83161
Sample ID					WS4
Sample No					
Depth					0.30m
Matrix					*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*	
	Acid Neutralisation Capacity	ANC	mol kg-1	N	0.012
2610	Loss on ignition		%	N	10.8
2630	Total Organic Carbon		%	N	6.8
2675	TPH >C10-C40		mg kg-1	M	150
2700	Naphthalene	91203	mg kg-1	M	2.9
	Acenaphthylene	208968	mg kg-1	M	0.7
	Acenaphthene	83329	mg kg-1	M	0.7
	Fluorene	86737	mg kg-1	M	0.3
	Phenanthrene	85018	mg kg-1	M	2.4
	Anthracene	120127	mg kg-1	M	0.8
	Fluoranthene	206440	mg kg-1	M	4.7
	Pyrene	129000	mg kg-1	M	4.1
	Benzo[a]anthracene	56553	mg kg-1	M	2.4
	Chrysene	218019	mg kg-1	M	2.8
	Benzo[b]fluoranthene	205992	mg kg-1	M	2.6
	Benzo[k]fluoranthene	207089	mg kg-1	M	1.3
	Benzo[a]pyrene	50328	mg kg-1	M	2.9
	Dibenzo[a,h]anthracene	53703	mg kg-1	M	1.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg-1	M	0.7
	Benzo[g,h,i]perylene	191242	mg kg-1	M	1.8
	Coronene	191071	mg kg-1	N	<0.1
	Total (of 17) PAHs		mg kg-1	N	32
2760	Benzene	71432	µg kg-1	M	<1
	Toluene	108883	µg kg-1	M	<1
	Ethyl benzene	100414	µg kg-1	M	<1
	m- & p-Xylene	1330207	µg kg-1	M	<1
	o-Xylene	95476	µg kg-1	M	<1
2810	2,4,4'-Trichlorobiphenyl	7012375	mg kg-1	N	<0.1
	2,2',5,5'-Tetrachlorobiphenyl	35693993	mg kg-1	N	<0.1
	2,2',4,5,5'-Pentachlorobiphenyl	37680732	mg kg-1	N	<0.1

All tests undertaken between 23-Mar-2007 and 30-Mar-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

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

FAO Chris Gray

LABORATORY TEST REPORT

Results of analysis of 1 sample received 21 March 2007

3 Augustines Road, Murray Mews, London

Chemtest

Report Date 03 April 2007

					43140
					AB83161
					WS4
					0.30m
					SOIL
2810	2,3,4,4',5-Pentachlorobiphenyl	31508006	mg kg-1	N	<0.1
	2,2',3,4,4',5-Hexachlorobiphenyl	35065282	mg kg-1	N	<0.1
	2,2',4,4',5,5'-Hexachlorobiphenyl	35065271	mg kg-1	N	<0.1
	2,2',3,4,4',5,5'-Heptachlorobiphenyl	35065293	mg kg-1	N	<0.1
2010	pH		-	M	7.9

All tests undertaken between 23-Mar-2007 and 30-Mar-2007

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Andrew Petty

From: chris Gray <csgray@hesi.co.uk>
Sent: 02 March 2011 12:30
To: Andrew Petty
Cc: Tom Tasou; 'Glenn Kinnersley (E-mail)'
Subject: RE: 3 St Augustines Road, London, NW1 9RL : Soil Report (2007)

Andrew,

We can confirm that your comments in relation to assessments of the site are correct. The costs of £200 will be shallow exposed sampling and two tests of the subsoil to consider hydrocarbon risks.

Remediation options are also confirmed as correct. Confirm the hydrocarbons are at a level where risk is not in place to human health or if indeed the levels are increased remove them off site or install a hydrocarbon barrier.

I hope this clarifies the situation.

Regards,

C.S.Gray, M.Sc
Contract Engineer

Herts & Essex Site Investigations, 'The Old Post Office', Wellpond Green, Standon, Herts SG11 1NJ | Tel: 01920 822233 | Fax: 01920 822200 | www.hesi.co.uk

---

From: Andrew Petty [mailto:andrewpetty@tasou.co.uk]
Sent: 02 March 2011 10:06
To: csgray@hesi.co.uk
Cc: Tom Tasou; Glenn Kinnersley (E-mail)
Subject: 3 St Augustines Road, London, NW1 9RL : Soil Report (2007)

Dear Chris

Thanks for talking though the above with me recently. My understanding of the soil report from what we discussed is as follows:

- The soil report found hydrocarbons present in the soil.
- Your recommendation was to introduce a hydrocarbon barrier under the buildings and remediation to landscaped areas OR removal of the contamination.
- The contamination present was found to be within the first 0.2 - 0.5 m of top fill.
- Removing this top fill would therefore remove the need for a hydrocarbon barrier and ventilation under the slab - subject to validation testing once the soil is removed from the site.
-

- You mentioned that when the investigation was carried out in 2007, limitations in technology meant whilst you could detect hydrocarbons, you could not easily assess how volatile they are (and therefore the risk to humans). Therefore a worst case was assumed.
- You said that for around £200 pounds new samples could be taken and the nature of the hydrocarbons confirmed. Potentially, they may be of a type that presents no risk.

As we will be excavating at least 0.5m of fill from the site, could our strategy be as follows:

1. Test the type of hydrocarbons present in the soil
2. If found to be risk to humans then validation testing is carried out on removal of soil (and I assume precautions are taken in disposal?)
3. If found to be no risk, then no action is required.

I would be grateful for your comments/feedback on the above as we are detailing up the ground works package now for issue to the contractor next week and this has a significant effect on the design. We also need to confirm our remediation strategy to the planners to discharge a pre-commencement condition.

Many thanks

Kind regards

Andrew Petty
Architect
E: andrewpetty@tasou.co.uk

tasou associates
architects & structural engineers

4 Amwell Street, London, EC1R 1UQ | T: 020 7713 7070 | F: 020 7713 7071 | www.tasou.co.uk

Andrew Petty

From: Rebecca Chamberlain <blue@hesi.co.uk>
Sent: 29 July 2013 09:45
To: Andrew Petty
Cc: Tom Tasou; 'Glenn Kinnersley (Glenn Kinnersley)'; Chris Gray
Subject: RE: 4 Murray Mews, London, NW1 : Soil Report
Attachments: RE: 3 St Augustines Road, London, NW1 9RL : Soil Report (2007)

Andrew,

We can confirm that the attached comments and assessments (email dated 02.03.2011) headed, 3 St Augustines Road, will also apply to 4 Murray Mews.

Should you require any further information or assistance please feel free to contact us.

Regards,

Rebecca Chamberlain

From: Andrew Petty [mailto:AndrewPetty@tasou.co.uk]
Sent: 29 July 2013 09:32
To: 'blue@hesi.co.uk'
Cc: Tom Tasou; Glenn Kinnersley (Glenn Kinnersley (glenn@kkd.co.uk))
Subject: FW: 4 Murray Mews, London, NW1 : Soil Report

Rebecca,

As discussed, please find attached my email to Chris. I look forward to hearing from you.

Kind regards

Andrew Petty
Architect
E: andrewpetty@tasou.co.uk

tasou associates
architects & structural engineers

News: Our design for the "School 4 Burma" international competition has been awarded an honourable mention. Click for more

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---

From: Andrew Petty
Sent: 22 July 2013 13:29
To: Chris Gray <csgray@hesi.co.uk> (csgray@hesi.co.uk)
Cc: Tom Tasou; Glenn Kinnersley (Glenn Kinnersley (glenn@kkd.co.uk))
Subject: 4 Murray Mews, London, NW1 : Soil Report

Dear Chris,

You may recall our attached correspondence with regards to the development at St Augustine's Road. We are discharging conditions for the scheme at 4 Murray Mews. As it is on the same site as outlined in the reports to date, I presume the attached email from you dated 02.03.2011 applies to 4 Murray Mews also, but would be grateful for your confirmation to avoid confusion when we approach the planners.

Many thanks

Andrew Petty
Architect
E: andrewpetty@tasou.co.uk

tasou associates
architects & structural engineers

News: Our design for the "School 4 Burma" international competition has been awarded an honourable mention. Click for more

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