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investigate design resolve

PHASE 2 – ADDITIONAL GROUND INVESTIGATION REPORT

FOR A PROPOSED EDUCATIONAL DEVELOPMENT

AT

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Prepared For

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Report Reference Number:	3163, GI, RS /GROUND/FS,JD/29-6-18/V2
Project Number:	3163,GI, RS
Issue Number	2
Issue Date:	29 June 2018




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DOCUMENT ISSUED RECORD

Report Number:	3163,GI,RS/FS,JD/29-06-2018/V2
Client:	Kier Construction Ltd – London
Project:	Maria Fidelis School, 34 Phoenix Road, London, NW1 1TA
Project Number:	3163,GI,RS
Report Type:	Ground Investigation
Date of Report:	29 June 2018

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REVISION RECORD

Revision	Date	Document	Prepared By:	Admin
V1	20/06/2018	3163,GI,RS/FS,JD/20-06-2018/V1	FS,JD	CJ
V2	29/06/2018	3163,GI,RS/FS,JD/29-06-2018/V2	JD	Cj

AMENDMENT RECORD

Revision	Date	Amendments
V2	29/06/2018	Additional site development proposals considerations and recommendations

EXECUTIVE SUMMARY

Project Details	Geosphere Environmental Ltd was commissioned by Kier Construction Ltd - London to undertake an additional Phase 2 Site Investigation Report within the playground area of Maria Fidelis School, 34 Phoenix Road, London, NW1 1TA. It is understood that the site is to be developed into open hardstanding space for the school. This will include removal of the existing hardstanding / flexible surface layer(s) and replacement with a new playground surface (flexible surfacing or similar). This will involve a combination of import/removal of materials to increase/reduce elevations to create the required play area. In addition to which there are localised areas of proposed in-ground "planters" to be created.
Site Location / Description	The site is in the London Borough of Camden at Maria Fidelis School, 34 Phoenix Road, London, NW1 1TA. The surface of the site is made of hard black flexible paving. The subject area was roughly 0.5 hectares (ha). The site existed at an approximate elevation of 25mAOD and can be located with the grid reference (NGR) TQ 29685 82924. Parts of the site have not been investigated due to extant structures, which are due to be removed as part of the overall redevelopment; recommendations are provided where possible.
Geology	The geological records indicated the site to be underlain by the London Clay Formation. The site data indicates variable thicknesses of Made Ground overlying the London Clay.
Hydrogeology	The hydrogeological records indicated that the site was located upon unproductive strata and not located within source protection zone.
Hydrology	Within 500m of the site no surface water features or rivers are recorded.
Summary of Previous Investigation Data	The site was part of a previous investigation of the wider redevelopment scheme (report reference 1445,GI/SG,PD/15-01-16/V1) which encountered variable thicknesses of Made Ground between 0.95 to 2.90m bgl underlain by London Clay formation to depths of up to 26mbgl. The data included three investigation points within the subject site and the chemical analysis of the Made Ground included marginally to moderately elevated lead concentrations at two of these locations.
Basic Conceptual Model	These localised elevated concentrations of lead and potential for other poor quality Made Ground pose a potential risk to human health receptors of this part of the redevelopment scheme. However, it can be considered from the outset that the proposed surfacing for the school playground will create a pathway break between any poor quality soil materials and the end user receptors. Construction workers and the general public may be a potential risk from unsuitable soils. Proposal for areas with proposed planters are included herein.
Site Works	Site works were carried out on 31 May 2018 and comprised of the following works within the subject area, where access was possible: ○ Breaking out hardstanding ground, reinstating with coldlay; ○ Formation of five windowless sampling holes (WS1 to WS5) to depths of between depth of 2-3 mbgl; ○ Undertaking environmental soil sampling and logging.

Laboratory Results	The chemical analyses were carried out on eight soil samples, in addition to the data for the area from the previous report, indicate that no further significantly elevated concentrations of analytes are present in the sampled Made Ground soils. No asbestos in the soils is reported within the samples.
Advanced Conceptual Model	Within the main play area of the site: a low risk exists to end user receptors due to the pathway break installation preventing exposure and in addition to which, there is a low risk to controlled waters. The localised elevated lead concentrations and Made Ground pose a potential moderate risk to construction workers and general public via various pathways including direct contact and dust creation respectively. Based upon this, in areas where planters are proposed, the risk to end users remains low (due to, in effect, a soil cover system of the planter); where no soil data exists in parts of the site, recommendations are included herein.
Recommendations	A Discovery Strategy and any other relevant control measures should be applied during the soil exposure period of works to retain the risk to construction workers (and general public) to low levels. No specific remedial or validation measures are necessary in the area to be re-surfaced, due to the pathway break installation preventing exposure to the end users.

This Executive Summary only provides a summary of the site data and its assessment. It does not provide a definitive engineering analysis and is for guidance only. It is recommended that the reader reviews the reporting in its entirety and any material referenced therein.

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1. INTRODUCTION

Geosphere Environmental Ltd was commissioned by Kier Construction Ltd - London to undertake a Phase 2 Ground Investigation of a targetted area of the school (re)development at Maria Fidelis School, 34 Phoenix Road, London, NW1 1TA.

It is understood that the investigated, subject area of the premises is to be developed into a hard-standing open space or play area, updating the existing play or outdoor communal area, also currently comprising of flexible surfacing ("tarmac") at ground level. Within this subject area there are no new proposed areas of soft standing. This report also addresses other sections of the site that are subject to site clearance and emplacement of localised zones of "planters", referred to within this report as "proposed planted ones". Further discussion and recommendations are provided herein.

1.1 Area of intrusive Investigation

Previous site investigation at the premises focussed on the wider school and neighbouring properties and this phase of investigation targets the accessible area of the play/communal area as outlined in Figure 2.

The primary objectives of this ground investigation are to:

- Assess the ground conditions at the site;
- Assess the potential risk to human health and the environment;
- Develop any necessary remedial or mitigating strategy.

These are to be achieved by:

- Undertaking an intrusive investigation of the site, based upon the findings of previous site data and the proposed development layout and the scope agreed with the client;
- Logging and sampling the soils on the site and noting any visual or olfactory evidence of contamination;
- Undertaking laboratory chemical analysis of selected soil to assess the soil quality and suitability;
- Creating a / Updating the Conceptual Site Model for the specific area of the site and assessing suitable remedial/mitigating and verification actions.

1.2 Proposed Planted Zones

Localised areas of the site are due to have small-scale landscaping to be completed following further site clearance. These are indicated within the appended Drawings (references 1566_LL_105 and 1566/LD/503 and will be discussed in more detail within relevant sections of the report. Structures exist upon these areas of the site and there are other constraints to the ground-conditions data of these areas; relevant recommendations are provided accordingly.

2. SITE SETTINGS

2.1 Site Description

The subject site was situated in the London Borough of Camden, adjacent and to the east of Euston station, and is located at National Grid Reference, (NGR), TQ 29685 82924.

A Site Location Plan, Drawing ref. 3163,GI,RS,001/Rev 1 is included in Appendix 7, and in Figure 1 below:

Figure 1 – Site Location Plan

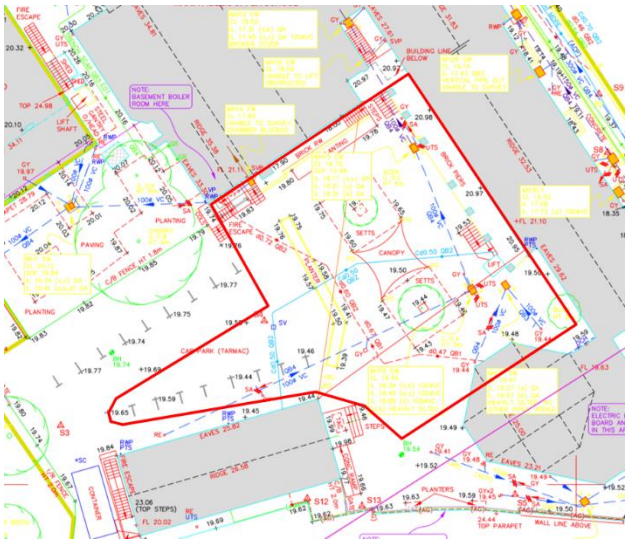

Figure 2 – Site Plan
Subject area as anticipated by the client.

2.1.1 Existing School Play Area

The investigated, subject area of the school is used as a school playground, thus is predominantly hard standing. A Site Plan, Drawing ref. 3163,GI,RS 002/Rev 0, is included in Appendix 7 and in Figure 2 above. The red line within Figure 2, indicates the area subject to intrusive investigation; see section 3.3 for further information.

The area was roughly irregular in shape and comprised of an area of 0.5 hectares (ha). The site existed at an approximate elevation of 25mAOD and no significant changes in topography were noted across the outlined site. At the time of the investigation the area was a hardstanding playground with localised trees, benches and a canopy near the centre.

To the north west of the site was the existing Maria Fidelis Catholic Schools buildings. Phoenix Road lay to the north just beyond the school, this of which was the main vehicular access point for the site. Euston Underground Station exists south east of the Maria Fidelis Catholic School just passed Eversholt Street.

2.1.2 Proposed Planted Zones

As illustrated by appended Drawings 1566_LL_105 and 1566/LD/503, including the annotated version, the areas of proposed planters are to a large extent underneath the extant school structures or the hardstanding

/ playground areas. As a result of which, a proportion of these areas cannot be investigated at this stage but outline assessments and recommendations are provided based upon the available data.

2.2 Previous Site Reports

The following report has previously been produced by Geosphere Environmental Limited for the wider redevelopment site which included the subject site:

- *"Ground investigation report for a proposed school development at Maria Fidelis School, 34 Phoenix Rd, London, NW1 1TA and Metropolitan Police Depot, Drummond Crescent, London"*, - 1445,GI/SG,PD/15-01-16/V1.

The previous ground investigation site works were undertaken during October 2015 and the report includes a number of soil samples within the areas of the subject site.

A summary of the analysis of soil samples within the subject site:

- Elevated lead concentrations of 479mg kg-1 in WS1 at 0.50m and 1250mg kg-1 in WS3 at 0.70m are reported.

See Report No. 1445,SI Drawing No. 006b / Rev 0 and appended Drawing 3163,GI,RS 004/ Rev 1 where the site locations are combined.

Where applicable this data within or in the proximity of the subject site is considered in the risk assessments below.

3. SITE WORKS

3.1 Methodology

This ground investigation was carried out on the basis of the practices set out in BS 10175: 2011+A1:2013, (ref. **R.3**) and BS 5930: 2015 (ref. **R.4**). The location of exploratory holes has been planned, where possible, in general accordance with CLR 4 and CLR11, (ref. **R.5**).

3.2 Scope

Site works were carried out on 31 May 2018 and comprised of the following:

- Excavation of five boreholes, (WS1 to WS5) and soil logging and sampling, extended to depths ranging from 2.0m to 3.0m using Windowless Sampler techniques;
- Breaking out and reinstating each position with "coldlay" flexible surfacing;
- Analysis of selected soil samples for a standard suite of analytes (see below).

This report does not assess the soil gas regime as this is addressed within the previous report.

3.2.1 Constraints to Working Area

During the site works part of the area for the targeted investigation was not accessible due to the ongoing site works including site cabins, structures or site school furniture, while also taking into consideration the extant buried services. As a result the area investigated is indicated within the appended drawings.

3.3 Ground Conditions Encountered

The sequence of the strata encountered during the investigation generally confirms the anticipated geology as interpreted from the British Geological Survey (BGS) digital mapping, at a scale of 1:50,000 and the previous site data. The sequence and indicative thickness of strata are provided in Table 1 below:

Table 1 - Ground Conditions

Strata	Depth Encountered (mgl)		Strata Thickness (m)	Composition
	From	To		
Made Ground	0.0	0.0 to > 0.10	0.07-0.10	Flexible surfacing / "tarmac" or similar.
Made Ground (Granular)	0.07 to 0.10	0.50 to 0.57	0.40-0.47	Black/orange/yellow/brown/grey gravelly, fine to coarse SAND. Gravel is fine to coarse brick, flexible black paving, concrete, plastic, timber and flint.

Table 1 - Ground Conditions				
Strata	Depth Encountered (mgl)		Strata Thickness (m)	Composition
	From	To		
Made Ground (Cohesive)	0.50 to 0.57	1.00 to 1.30	0.44-0.80	Soft to firm brown, slightly gravelly sandy CLAY. Gravel is brick, concrete, ash and flint.
Clay (weathered London Clay)	1.00 to 1.30	2.00 to 3.00	>0.80-1.90 as encountered	Firm mottled grey and brown CLAY. Relict rootlets present.

3.4 Groundwater

Groundwater was encountered as small inflows of seepages in WS4 at 1.9mbgl and in WS5 at 1.05mbgl during the ground investigation. Groundwater was not encountered in any of the other exploratory holes.

3.5 Visual and Olfactory Evidence of Contamination

Made Ground at all boreholes was encountered, this included brick, concrete, timber, ash and black flexible paving. No significant olfactory signs of contamination were noted.

4. LABORATORY TESTING

4.1 Methodology

Representative disturbed samples were taken at the depths shown on the exploratory hole records and despatched to the laboratory. The exploratory hole logs are included in Appendix 4.

Samples were collected for environmental purposes in amber glass jars and tubs then kept in a cool box with cooling aid. Twenty samples were collected during the investigation. The exploratory investigation comprised of targeted sampling of the overlying Made Ground at locations of potential contamination. Also samples were taken across the site to identify areas of potential contamination.

No field techniques were undertaken for the soil samples, all analyses of the soil samples took place in the laboratory.

4.2 Environmental Testing Suite

4.2.1 Quality Control

The environmental laboratory used (DETS Ltd) was an accredited laboratory by the United Kingdom Accreditation Service (UKAS), and at least 50% of individual parameters are from methods pending accreditation to the Environment Agency Monitoring Certification Scheme (MCERTS) for the range of analyses undertaken as part of this investigation. The MCERTS performance standard for the chemical testing of soil is an application of ISO 17025: 2005 specifically for the chemical testing of soil.

4.2.2 Environmental Testing Suite – Soils

The chemical analyses was carried out on eight samples of soil. The nature of the analyses is detailed below:

- Metals screen - arsenic, cadmium, chromium, lead, mercury, selenium, boron (water soluble), beryllium, copper, nickel, vanadium and zinc;
- Organic screen - total petroleum hydrocarbons (TPH) – with specific carbon banding; benzene, toluene, ethylbenzene and xylenes (BTEX); polyaromatic hydrocarbons (PAH) – USEPA 16 suite; monohydric phenols;
- Inorganics screen - cyanide (total), sulphate (water soluble);
- Others - pH, organic matter, asbestos screen.

A copy of the laboratory test results data for this phase of works is included in Appendix 6, as report reference 18-76148. In addition to which, for reference, the soil dataset from the previous report is included (laboratory report reference 15-37171), however data for exploratory holes WS1, WS3 and TP1 should be considered for the subject area.

5. RISK ASSESSMENT

5.1 Risk to Human Health

5.1.1 Methodology

The current guidance requires that a conceptual model be formulated, based upon the findings of the research. The conceptual model is limited at this stage to the identification and assessment of potential 'hazards', identified or suspected from the results of the research; the potential 'receptors' that may be affected and the anticipated 'pathways' to those receptors. The findings are summarised in the following subsections.

The guidance proposes a four-stage approach for the assessment of contamination and the associated risks. The four stages are listed below:

- Hazard Identification;
- Hazard Assessment;
- Risk Estimation;
- Risk Evaluation.

5.2 Site Specific Land Use Considerations

The subject site was previously the school recreation / play area, with flexible surfacing (acting as a pathway break to any poor quality soils) and will return to this use following completion of replacement / renewal of a flexible surfacing material.

It is understood that the proposal for the subject area is to remove the existing hard surfacing, amend final elevations slightly and re-surface the area, thus re-instating a "pathway break" between the Made Ground soils and the end users. These receptors are still considered herein but, to a large extent, can be considered at low risk from any elevated concentrations within the soils due to the pathway break.

Drawing ref. 3163,RS,VA 003/Rev 0 is included at Appendix 7, to indicate the propose redevelopment / reinstatement for the subject area. Following removal of the existing surface covers, a combination of soil removal and import will be undertaken to achieve the proposed finished levels and as outlined above, the subject area will be capped by flexible surfacing or similar to create the playground and pathway break.

As a conservative consideration the land use scenario considered here is Residential without Plant Uptake; this takes into account the remaining human Receptors of Construction Workers and the general public, during the construction period (plus any future maintenance of the area).

5.3 Soil Quality Data

The results of the soil analyses have been compared to soil quality screening values where deemed applicable, such as:

- The LQM/CIEH S4ULs for Human Health Risk Assessment, (ref. **R.15**);
- Defra/CL:AIRE Final C4SLs, (ref. **R.14**);
- The LQM/CIEH, EIC/AGS/CL:AIRE Generic Assessment Criteria (GAC), (ref.**R.10**).

Where the concentrations determined on site are at or below the respective screening concentrations, they are considered not to pose a risk and are removed from further consideration, unless otherwise stated. The determinant groups are assessed in Table 2 below:

Table 2 Summary of Soil Quality Data and Comparison with Screening Values

Analyte	Analyte Concentration Range (mg/kg)		Screening Value (mg/kg) for Land Use	No. of Elevated Concentrations	Location of Samples with Elevated Concentrations (in mg/kg)
	Minimum	Maximum	Residential without plant uptake (1%SOM assumed)		
Arsenic	3	14	40	0	None elevated
Cadmium	<0.2	<0.2	85	0	None elevated
Chromium III	6	23	910	0	None elevated
Chromium VI	<2	<2	6	0	None elevated
Copper	5	75	7100	0	None elevated
Lead	20	330 (Δ1250)	130-330	2	WS1Δ - 0.5m (479) WS3Δ - 0.7m (1250)
Mercury	<1	3.4	40	0	None elevated
Nickel	3	23	180	0	None elevated
Selenium	<3	<3	430	0	None elevated
Vanadium	10	56	1200	0	None elevated
Zinc	45	93	40000	0	None elevated
Total PAHs	<0.1	35.4	Nominal value of 5mg/kg*	1	WS4 (see individual indicator PAHs)
Benzo(a)pyrene	<0.1	2.82	3.2	0	None elevated
Dibenzo(a,h)anthracene	<0.1	0.34	0.31	1	WS4 0.17m (0.34)
Naphthalene	<0.1	<0.1	2.3	0	None elevated
EPH or TPH	<0.01	97	Nominal value of 100mg/kg*	0	None elevated
Asbestos	Not detected		n/a	0	None elevated

Cyanides	<2	<2	Nominal value of 5mg/kg	0	None elevated
*Where total values exceed the nominal threshold, individual congener, compound or equivalent carbon chain group screening values are assessed further where necessary. Δ previous site investigation data points.					

It can be noted that within report reference 18-37171 a number of lead concentrations are within the C4SL (lead) range for this land use but do not exceed the upper bound. With the factors considered, these are considered to not pose an elevated risk to end users. Construction workers are considered below.

5.3.1 Human Health Receptors

Risks to humans include construction workers and end users of the site. Theoretically, exposure to contaminants can take the form of direct contact with the skin, or the inhalation of contaminants through wind-blown soils or vapours.

To reduce the risks of exposure and transfer of contaminants during construction, short term mitigation measures specified in the Additional Information (B) section of this report should be adhered to and, where applicable, incorporated into the development Construction Phase Health and Safety Plan or similar document.

Based upon the assumption that there will be hard surfacing/ a pathway break between the Made Ground and end users, the risk to end users from the identified poor soils quality is likely to be low to negligible however, the current risk to construction workers is moderate to high.

End Users:
As outlined above and within Table 3 below, considering the results of chemical analysis of shallow soils and proposed development plans, including a pathway break formation in the form of re-surfacing of the subject area, it is assessed that a low to negligible risk to end user human receptors (pupils, school staff) exists.

Therefore the site may be developed without the need for any measures classed as “remediation”; the mitigating measure (pathway break) is concomitant or concurrent with the redevelopment scheme.

Construction workers and General Public

In order to reduce or mitigate the risk to these receptors, the following actions should be undertaken:

- All site workers and visitors, until the ground is sealed by the final surfacing or similar, should be made aware of the Made Ground and the potential for contact with detectable but not significantly elevated concentrations. This applies in particular to all groundworkers, piling operators, utilities installation personnel etc., in contact with the soils and groundwater.
- Appropriate PPE should be work by those personnel in contact with the soils and groundwater; in addition to which, appropriate gloves being worn, good practice such as maintaining a good hygiene regime should be in place (to prevent soil particle ingestion during breaks/mealtimes).
- Dust production at and from the site should be minimised and prevented throughout the construction phase; this can include damping down of large areas of bare soil, covering of any soil stockpiles (as applicable or if likely to produce dust), control of mud/dust transfer to the highway via vehicles, in particular during the excavation phase. This is standard practice and is likely to be applied to the scheme methods already.

5.3.2 Asbestos

No asbestos was detected in any of the analysed soil samples from this phase or the previous phase of soil sampling. As a result of which, the risk to end users and other human health receptors from asbestos in soils is assessed to be low to very low.

However, due to the variable nature of Made Ground the presence of asbestos in soils cannot be fully discounted. It is recommended that, as standard practice, a Discovery Strategy (outlined within the Additional Information section of this report) is applied by the team exposing and disturbing soils, and/or those (predominantly groundworkers) in potential contact with the soils, so that in the event of any suspected ACMs being encountered, works can be halted and the materials and potential risks assessed by a suitably qualified person.

5.4 Risk to Controlled Waters

The risks to Controlled Waters have been assessed with respect to the available soil quality data contamination only as groundwater analysis was outside the scope of this investigation.

The risk to Controlled Waters from the concentrations of analytes within the analysed soil has been assessed on a qualitative basis utilising the available data and the hydrogeological seting*.

5.5 Risk to Plants

It is understood that there are no proposed areas of planting however, a review of the commonly occurring phytotoxic chemicals boron, copper, nickel and zinc, has been undertaken based upon the now superseded ICRCL guidance. Although the ICRCL trigger threshold levels have been withdrawn, there are no equivalent guidance values for phytotoxicity.

Concentrations of metals were recorded at concentrations below the thresholds considered to have phytotoxic effects; the risk to plants from phytotoxic chemicals is low

5.6 Waste Soil Classification Data

The results of the waste classification data, specifically the WAC data within laboratory report 18-76148, indicate that the soils due to be removed are inert waste classification; this is with the exception of some of the samples that are indicated to have leachable concentrations of antimony or sulphate marginally exceeding the inert screening threshold. These analytes are commonly exceeded within Made Ground soils of this region and it may be possible for the receiving destinations for the soil to assess the data in detail and retain the classification of the soils as inert if not, the soils at locations WS3 and WS4 would be classifiable as non-hazardous. In addition to which, the elevated concentration of lead at WS3 from the previous phase of site investigation (lab report 15-31717, 1250mg/kg) may also result in soil at that location to be classified as non—hazardous.

5.7 Proposed Planters Areas

As outlined in Sections 1.2 and 2.1.2 there are proposed areas of the site redevelopment to comprise of constructed, in-ground planted areas, these will line the north-eastern site boundary and bound the proposed MUGA to the north of the subject site. No intrusive works have been undertaken underneath the extant school structures.

5.7.1 Soil Quality Data Consideration

Some of the available site data can be considered to indicate the soil quality at the southern end of the MUGA (locations WS1 of this phase if intrusive works, WS2 and TP1 of the previous phase of investigation.) The soil quality data for these locations indicates no elevated soil concentrations for a land use scenario of residential without plant uptake other than an elevated concentration of lead at WS1.

5.7.2 Proposed Planter Details

The appended Drawing 1566/LD/503 indicates the creation of a 450mm deep planter (see drawing section "External Sports Pitch, Retaining Kerbs, Planting, PCC Edging and Pedestrian Asphalt") in the subject areas. Where the soil quality data is indicated i.e. WS1 location, this creation of a planter and soil cover layer will provide sufficient pathway break or mitigation.

It can be noted that the land-use scenario applied incorporates conservative factors reducing the risk to the receptors, further the exposure periods for the end users are likely to be very short to negligible. The planters are not proposed to be used as science gardens or similar where the pupils or staff will have reason to be in contact with the soils, imported or original.

5.7.3 Proposed Planter Areas: Risk Considerations and Recommendations

With the design of the planters in consideration this will provide sufficient mitigating factors to reduce the risk to end users to low to negligible.

Where there is no available site soil quality data (due to extant structures) the following consideration and factors can be emplaced:

- Soil sampling when access to the ground is available (post demolition) will assist waste disposal cost assessments and confirm (or enable re-assessment of) the suitability of the other recommendations.
- In addition, or alternatively, a Watching Brief and / or Discovery Strategy can be applied during slab removal and removal of Made Ground.
- The removal of Made Ground in these areas as part of the creation of the 450mm soil cover system is likely to provide sufficient risk reduction, in the event of poor quality soil being encountered in these areas.
- The considerations for Construction Workers and general public detailed in the sections above and the CSM below should be applied when the Made Ground is exposed.
- Validation of the narrow strips of planter / soil cover system may be required by the local authority or building warranty provider. However, in reality the localised nature of these areas may not warrant validation.

This part of the site can be assessed within a separate report and CSM as necessary.

5.8 Conceptual Site Model

Following the findings of the ground investigation the Conceptual Model for the site has been reviewed and the conclusions are presented in Table 3 below:

Table 3 – Updated Conceptual Site Model

Sources	PATHWAYS: Root Uptake	Direct Contact	Ingestion	Respiration	Gas Accumulation	RECEPTORS: Plants	End Users	Structures (Concrete)	Services/Utilities	Construction Workers	Controlled Waters (GW)	Risk Rating	Comments
Made Ground 1 (contact with Construction Workers)	U	L	U	L	-	n/a	n/a	N	N	Mi	N	LR-MR	See below
Made Ground 2 (contact with end users)	N	U	U	U	-	N	Mo	N	N	n/a	N	LR	See below

Legend:-

Probability:

- Negligible (N)
- Unlikely (U)
- Likely (L)
- Highly Likely (HL)

Consequence (Severity):

- Negligible (N)
- Mild (Mi)
- Moderate (Mo)
- Severe (S)

See Comparison of Consequence Against Probability within Appendix 5 for Key to Legend.

5.8.1 Discussion: Existing School Play Area

Some areas of the subject site were not accessible to the soil sampling works, however, for the purposes of this assessment and the proposed works it is assessed that the data for the site is sufficient to assess the risks to the relevant receptors, along with application of the Discovery Strategy applied during soil exposure and disturbance.

The risk to end user receptors is low to negligible based upon the available data, due to the absence of widespread and significantly elevated concentrations of analytes plus the pathway break that will be installed in order to complete the project.

The risk to Construction Workers and General public during the works (from various pathways including direct contact and potential fugitive dust emissions) can be retained as low if the actions described above are applied where necessary.

5.8.2 Discussion: Proposed Planter Areas

The recommendations provided above should be taken into consideration but, in terms of risk to End User receptors, in the event of unsuitable quality soils remaining underneath the planter areas, there will be limited exposure and a pathway break in place. An additional measure which can be considered would be a geotextile membrane at the base of the planter construction to prevent long term soil mixing and potential exposure.

6. CONCLUSIONS AND RECOMMENDATIONS

The school play area of the Maria Fidelis School is being redeveloped/ re-surfaced as part of wider redevelopment of the site. Following removal of the extant playground surfacing materials, these works will include a combination of soil removal and import to achieve the required final elevations. In general, however, the Made Ground will be exposed to facilitate the above.

The site was part of a previous investigation of the wider redevelopment scheme (report reference 1445,GI/SG,PD/15-01-16/V1) that encountered variable thicknesses of Made Ground underlain by London Clay Formation. The data included three investigation points within the subject site and the chemical analysis of the Made Ground included marginally to moderately elevated lead concentrations at two of these locations.

This investigation forms a localised part of the school site redevelopment. Some access restrictions to the subject area of the site but it can be considered that sufficient data is obtained, in combination with mitigating or risk-control considerations.

Sampling and analysis of near-surface soils (Made Ground) within this phase of investigation, considered with the relevant data from the previous phase of investigation, indicate localised evidence of poor quality soils with localised elevated concentrations of lead. No asbestos was identified within the sampled soils but the presence of this cannot be fully discounted.

These do not pose a significant risk to end user receptors because of the pathway break that will be created with the re-surfacing of the playground. However construction workers will be exposed to the poor quality soils during a limited period. A Discovery Strategy and any other relevant control measures should be applied during the soil exposure period of works to retain the risk to construction workers (and general public) to low levels. Controlled waters are considered to be a low risk from the identified soils concentrations.

No specific remedial or validation measures are necessary within the areas of proposed hard surfacing, re- instatement due to the pathway break installation preventing exposure to the end users.

In areas of proposed planters, the design of the planter (resulting in a 450mm deep soil cover system over any remaining Made Ground) will provide sufficient risk reduction or mitigation measures to provide a low risk to end users. Recommendations or mitigating measures for other receptors are provided above.

However, in areas where no soil data exists to data due to extant structures, it would be prudent to undertake soil sampling when access to the ground is available (post demolition). This will assist waste disposal cost and risk assessments and may confirm that the planter soil cover system will provide sufficient protection to end users.

ADDITIONAL INFORMATION

A. CONSULTATION

During the development of a contaminated site, consultation may be required for a number of reasons with a number of Regulatory Authorities. The following provides an indication as to the most likely Authorities with which consultation may be required. The remediation strategy would have to be agreed with the following:

- Local Authority. Consultation is likely to be required with a designated Contaminated Land Officer within the Environmental Health Department, as part of the planning process. The Local Authority is generally concerned with human health risks. Some Authorities now require 'Completion Certificates' to be signed off following remediation works.

- Environment Agency. Where a site is within a groundwater protection zone or has been designated as a special site, the Environment Agency is likely to be involved to ensure that controlled waters are protected.

In addition to which, the following may also be involved in the consultation process:
National House Building Council, NHBC. Section 4.1 of the NHBC Standards requires land management to be addressed.

- Water Authorities. They are likely to impose constraints on the nature of water supply pipes that are to be laid in contaminated land. Guidance on the selection of materials for water pipes is provided by the Water Regulations Advisory Scheme (ref. **R.12**).

Based upon the results of any consultation, there may be specific remediation requirements imposed by one or more of the aforementioned Authorities.

B. SHORT-TERM MITIGATION MEASURES

During site preparatory works of any potential development/construction works, some short-term mitigation measures will be required to protect the site workers, neighbouring sites users and the environment from the potential effects of exposure to potentially contaminated materials and soils. The majority of the proposed measures represent good practice for the construction industry and include:

- Briefing all of the site workers of the identified contamination on site, and ensuring they are aware of the potential health effects from exposure.

- Where appropriate, workers who are at potentially risk due to their working in areas of identified contamination will be provided with suitable PPE.

- Ensuring good hygiene is enforced on site and washing facilities are maintained on the site. Workers are discouraged from smoking, eating or drinking without washing their hands first.

- Ensuring site personnel report any unusual complaints, such as skin rashes, nausea, light-headedness etc. which may be attributable to the contamination on the site.

- Ensuring that dust suppression measures are put into practice where contamination is becoming airborne.

- Site drainage should be prevented from entering the adjacent watercourse.

- Where necessary contamination will be prevented from dirtying adjacent highways, a wheel-wash or other method for cleaning vehicles may be required.

Where contaminated materials are being removed from the site they should be disposed of at a suitably licensed landfill, with a 'duty of care' system in place and maintained throughout the disposal operations. The classification of contaminated soils for disposal is dependent upon the individual landfill operator, which is in term dependent upon the operator's license.

C. DISCOVERY STRATEGY

There is the possibility that other sources of contamination may be present on the site which were not detected during the investigation. Should such contamination be identified or suspected during the site clearance or ground works, these should be dealt with accordingly. A number of options are available for handling this material, which include:

- The removal from site and disposal to a suitably licensed tip of all material suspected of being contaminated.

- Short-term storage of the suspected material while undertaking verification testing for suspected contamination. The storage area should be a contained area to ensure that contamination does not migrate and affect other areas of the site. Depending upon the amounts of material under consideration, this could be either a skip or a lined area.

- Treatment of the identified contamination in accordance with the site-specific Remediation Method Statement.

- Having a suitably experienced Environmental Engineer either on-call or with a watching brief for the visual and olfactory assessment of the material, and sampling for verification purposes.

Should any anomalous materials be identified within the soils, the Regulatory Authorities should be informed and where necessary the remedial strategy agreed.

APPENDICES

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APPENDIX 1 - ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
ACM	Asbestos containing material
ADE	Average daily exposure
ASPT	Average score per Taxon
BOD	Biochemical oxygen demand
BH	Borehole
BRE	Building Research Establishment
BS	British Standard
BTEX	Benzene, Toluene, Ethyl benzene and Xylenes
CIRIA	Construction Industry Research and Information Association
CLEA	Contaminated Land Exposure Assessment
CLR	Contaminated Land Research reports
DEFRA	Department of the Environment, Food and Rural Affairs (formerly the DoE and DETR)
DETR	Department of the Environment, Transport and the Regions (formerly the DoE and now Defra)
DO	Dissolved oxygen
DoE	Department of the Environment (then DETR and later Defra)
DQRA	Detailed quantitative risk assessment (Tier 2)
EA	Environment Agency
EPH	Extractable petroleum hydrocarbons
EQI	Environmental Quality Index
EQS	Environmental Quality Standards
GQRA	Generic quantitative risk assessment (Tier 1)
mAOD	Metres above ordnance datum
mbgl	Metres below ground level
NGR	National grid reference
NHBC	National House Building Council
NRA	National Rivers Authority (now the Environment Agency)
PACM	Potentially asbestos containing material

APPENDIX 2 – REPORT LIMITATIONS AND CONDITIONS

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

The comments given in this report, and the opinions expressed herein, are based upon the readily available information collated for the report and an assessment based upon the current UK guidance, primarily the Contaminated Land Research (CLR) Reports including CLR11 (ref.**R.6**).

This report has been prepared for the sole use of the Client for the purposes described and no extended duty of care to any third party is implied or offered. Third parties using any information contained within this report do so at their own risk.

This report is prepared and written for the use stated herein; it should not be used for any other purposes without reference to Geosphere Environmental Limited. The report has been prepared in relation to the proposed end-use should another end-use been intended a further re-assessment may be required. It is likely that over time practises will improve and the relevant guidance and legislation be amended or superseded, which may necessitate a re-assessment of the site.

The report is limited to those aspects of land contamination specifically reported on and is necessarily qualified accordingly, no liability shall be accepted for other aspects which may be the result of gradual or sudden pollution incidents, past or present unrecorded land uses both on~ and off~ site and the potential for associated contaminant migration. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief.

The accuracy of any map extracts cannot be guaranteed. It is possible that different conditions existed on site, between and subsequent to the various map surveys appended.

Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes discussed or on the possible presence of features based upon visual, verbal or published evidence, this is for guidance only and no liability can be accepted for its accuracy.

The conceptual model is based on the information available at the time of conducting this assessment and is an interpretative assessment of the conditions at the site. It should be noted that the redevelopment and/or further investigation of the site may reveal additional information and therefore alter the conceptual model and the conclusion of this report.

APPENDIX 3 – REFERENCES

R.1. The Environmental Protection Act, Part IIA, Section 78, 1990.

R.2. Environment Act 1995, Section 57, DoE 1995.

R.3. British Standards Institute: BS 10175 'Code of practice for the investigation of potentially contaminated sites', BSI 2011+A1:2013.

R.4. British Standards Institute: BS 5930 'Code of practice for ground investigations', 2015.

R.5. CLR 4, 'Sampling strategies for contaminated land'. Report by The Centre for Research into the Built Environment, the Nottingham Trent University, DoE, 1994.

R.6. CLR 11, 'Model procedures for the management of contaminated land: Risk assessment procedure', DoE 2011.

R.7. Methods for the determination of hazardous substances (MDHS) "100 Surveying, sampling and assessment of asbestos-containing materials" HSE, July 2001.

R.8. Building Research Establishment, Special Digest 1, 'Concrete in Aggressive Ground', 2001.

R.9. Land Quality Management/Chartered Institute of Environmental Health Generic Assessment Criteria for Human Health Risk Assessment (2nd edition). Land Quality Press, Beeston, Nottingham, UK, 2009.

R.10. EIC/AGS/CL:AIRE. Soil Generic Assessment Criteria for Human Health Risk Assessment. Contaminated Land: Applications in Real Environments, London, UK, 2009.

R.11. BRE Digest 465, 'Cover Systems for Land Regeneration – Thickness Cover Systems for Contaminated Land', 2004.

R.12. Water Regulations Advisory Scheme, Information and Guidance Note, October 2002, 'The Selection of Materials for Water Supply Pipes to be Laid in Contaminated Land'.

R.13. BRE Special Digest 1, 'Concrete in Aggressive Ground, 2005.

R.14. SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, Final Project Report (Revision 2), Contaminated Land: Applications in Real Environments (CL:AIRE) September 2014.

R.15. Land Quality Press, The LQM/CIEH S4ULs for Human Health Risk Assessment.

APPENDIX 4 – EXPLORATORY HOLE LOGS

Windowless Sample Hole Logs

(WS1 to WS5)

CLIENT: Kier Construction London	**PROJECT: Maria Fidelis School**	**GROUND LEVEL m**	**HOLE No. WS1**
LOGGED BY: FS FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Window Sampler Uncased to 2.1 m	Coordinates: 529677, 182927 DATES 31/05/2018 - 31/05/2018	SHEET 1 OF 1 PROJECT NO. 3163,GI,RS

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				FLEXIBLE SURFACING			0.00		0											Groundwater not encountered during drilling
				Multicoloured gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to sub-rounded fragments of flexible surfacing, brick, concrete, timber and plastic (MADE GROUND)			0.07		0.15	J	1									
				Brown slightly gravelly sandy CLAY. Gravel is fine sub-angular to sub-rounded flint, brick and ash. Sand is fine to medium grained (MADE GROUND)			0.50		0.60	J	2									
									1.00	J	3									
				Brown slightly sandy CLAY with inactive roots. Sand is fine grained.			1.30		1.60	J	4									
							2.10													Borehole completed at 2.10m bgl

*WATER: Standing water level; Water strikes

PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample; B Bulk disturbed sample; U Undisturbed sample; P Piston sample; J Disturbed jar sample; ES Environmental soil sample; W Water Sample

S Standard penetration test; C Cone penetration test; K Permeability test

Blows: SPT blows for each 75mm increment (35) Undisturbed sample blow count

SPT N: N = SPT N value (blows after seating); N*120 = Total blows/penetration including seating

<425: Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental

HOLE No. WS1.

SHEET 1 OF 1

PROJECT No 3163,GI,RS

CLIENT: Kier Construction London

PROJECT: Maria Fidelis School

GROUND LEVEL m

HOLE No. WS2

LOGGED BY: FS
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Window Sampler
Uncased to 2.0 m

Coordinates: 529684, 182930
DATES 31/05/2018 - 31/05/2018

SHEET 1 OF 1
PROJECT NO. 3163,GI,RS

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	r Mg/m³	Cu kN/m²	Additional Tests and Notes
				FLEXIBLE SURFACING			0.00		0											Groundwater not encountered during drilling
				Multicoloured gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to sub-rounded flint and fragments of brick, flexible surfacing, concrete, plastic and timber (MADE GROUND)			0.08		0.16	J	1									
							0.50													
				Multicoloured gravelly sandy CLAY. Gravel is fine to coarse sub-angular to sub-rounded flint and brick and concrete fragments. Sand is fine to medium grained (MADE GROUND)			0.60		0.55	J	2									
							1.10		0.90	J	3									
				Multicoloured slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to sub-rounded brick, clinker and concrete fragments. Sand is fine to coarse grained (MADE GROUND)					1.70	J	4									
				Brorwn sandy CLAY with inactive rootlets. Sand is fine			2.00													Borehole completed at 2.0m bgl

*WATER: Standing water level; Water strikes
PIEZOMETER: Upper seal; Response zone; Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental

HOLE No. WS2.
SHEET 1 OF 1
PROJECT No 3163,GI,RS

CLIENT: Kier Construction London

PROJECT: Maria Fidelis School

GROUND LEVEL m

HOLE No. WS3

LOGGED BY: FS
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Window Sampler
Uncased to 3.0 m

Coordinates: 529690, 182919
DATES 31/05/2018 - 31/05/2018

SHEET 1 OF 1
PROJECT NO. 3163,GI,RS

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	ρ Mg/m³	Cu kN/m²	Additional Tests and Notes
				FLEXIBLE SURFACING			0.00													
				Multicoloured gravelly fine to coarse SAND. Gravel is fine to medium sub-angular to sub-rounded brick, concrete and flexible surfacing (MADE GROUND) 0.40 Timber fragments present			0.10		0.15	J	1										
				Multicoloured gravelly sandy CLAY. Gravel is fine to medium sub-angular to sub-rounded brick and concrete fragments. Sand is fine to coarse grained (MADE GROUND)			0.57		0.70	J	2										
				Brown grey and orange mottled slightly gravelly sandy CLAY with inactive rootlets. Gravel is fine to medium sub-angular to sub-rounded brick and clinker fragments. Sand is fine grained (MADE GROUND)			0.95 1.10		1.00	J	3										
				Grey mottled brown slightly sandy CLAY. Sand is fine grained					1.90	J	4										
									2.40	J	5										
							3.00														Borehole completed at 3.0m bgl

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY
D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental

HOLE No. WS3.

SHEET 1 OF 1

PROJECT No 3163,GI,RS

CLIENT: Kier Construction London

PROJECT: Maria Fidelis School

GROUND LEVEL m

HOLE No. WS4

LOGGED BY: FS
FIELDWORK BY: GEL
TEMPLATE REF: GEL AGS BH BETA

CHECKED BY:
DATE:

EXCAVATION METHOD: Window Sampler
Uncased to 2.0 m

Coordinates: 529683, 182917

DATES 31/05/2018 - 31/05/2018

SHEET 1 OF 1

PROJECT NO. 3163,GI,RS

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	r Mg/m³	Cu kN/m²	Additional Tests and Notes
				FLEXIBLE SURFACING			0.00		0											
				Multicoloured gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to sub-rounded brick, concrete, plastic and flexible surfacing fragments (MADE GROUND)			0.09		0.17	J	1									
							0.56		0.60	J	2									
				Brown orange and white gravelly sandy CLAY. Gravel is fine to medium brick sub-angular to sub-rounded concrete fragments and angular flint. Sand is fine to coarse grained (MADE GROUND)			0.80		0.90	J	3									
							1.00		1											
				Brown and orange mottled slightly gravelly sandy CLAY. Gravel is fine sub-angular to sub-rounded brick and clinker fragments. Sand is fine to medium grained (MADE GROUND)					1.50	J	4									
31/05		1.90																		
				Brown mottled grey CLAY			2.00		2											Seepage inflow of water at 1.9m Borehole completed at 2.0m bgl
									3											
									4											
									5											
									6											
									7											
									8											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal, Response zone, Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count
SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating
<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental

HOLE No. WS4.

SHEET 1 OF 1

PROJECT No 3163,GI,RS

CLIENT: Kier Construction London	**PROJECT: Maria Fidelis School**	**GROUND LEVEL m**	**HOLE No. WS5**
LOGGED BY: FS FIELDWORK BY: GEL TEMPLATE REF: GEL AGS BH BETA CHECKED BY: DATE:	EXCAVATION METHOD: Window Sampler Uncased to 2.0 m	Coordinates: 529685, 182922 DATES 31/05/2018 - 31/05/2018	SHEET 1 OF 1 PROJECT NO. 3163,GI,RS

Date/Time and Depth	Depth of Casing	Depth* of Water	Piez.	Description of Strata	Strata: Leg	Strata: Reduced Level	Strata: Depth	Graphical Representation: SPT 'N' Value (0 10 20 30 40)	Sampling/In-Situ Testing: Depths	Type	No.	Blows	SPT N	Laboratory Testing: <425 %	WC %	PL %	LL %	γ Mg/m³	Cu kN/m²	Additional Tests and Notes
				FLEXIBLE SURFACING			0.00		0											
				Multicoloured gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular to sub-rounded brick, flexible surfacing, concrete and clinker fragments (MADE GROUND)			0.10		0.10	J	1									
				Black brown and orange slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to sub-rounded brick and concrete fragments. Sand is fine grained (MADE GROUND)			0.50		0.60	J	2									
31/05		1.05							1											Seepage inflow of water at 1.05m
				Brown slightly sandy CLAY with inactive rootlets. Sand is fine grained			1.10		1.15	J	3									
							2.00		2											Borehole completed at 2.0m bgl
									3											
									4											
									5											
									6											
									7											
									8											

*WATER ▼ Standing water level ▽ Water strikes

PIEZOMETER Upper seal / Response zone / Lower seal

SAMPLE AND TEST KEY

D Small disturbed sample
B Bulk disturbed sample
U Undisturbed sample
P Piston sample
J Disturbed jar sample
ES Environmental soil sample
W Water Sample
S Standard penetration test
C Cone penetration test
K Permeability test

Blows SPT blows for each 75mm increment (35) Undisturbed sample blow count

SPT N N = SPT N value (blows after seating) N*120 = Total blows/penetration including seating

<425 Sample % passing 425 micron sieve

DEPTH All depths, level and thicknesses in metres

Geosphere Environmental

HOLE No. WS5

SHEET 1 OF 1

PROJECT No 3163,GI,RS

APPENDIX 5 – COMPARISON OF CONSEQUENCES AGAINST PROBABILITY

		Consequence (Severity of Linkage)			
		Severe (S)	Moderate (Mo)	Mild (Mi)	Negligible (N)
Probability (Likelihood of linkage from)	Highly Likely (HL)	Very High Risk (VH)	High Risk (HR)	Moderate Risk (MR)	Moderate/Low Risk (MR-LR)
	Likely (L)	High Risk (HR)	Moderate Risk (MR)	Moderate/Low Risk (MR-LR)	Low Risk (LR)
	Unlikely (U)	Moderate Risk (MR)	Moderate/Low Risk (MR-LR)	Low Risk (LR)	Negligible Risk (NR)
	Negligible (N)	Moderate/Low Risk (MR-LR)	Low Risk (LR)	Negligible Risk (NR)	Negligible Risk (NR)

This Table is to provide reference information in conjunction with the GEL Conceptual Model attached within the Hazard Risk Assessment section of this report, Table 3 – Conceptual Model.

Very High Risk (VH)

- There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is happening currently.
- Urgent investigation and remediation are likely to be required and advised.

High Risk (HR)

- Harm is likely to arise to a designated receptor from an identified hazard.
- Urgent investigation is required and remedial works are likely necessary in both the short to long term.

Moderate Risk (MR)

- It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild.
- Investigation is required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.

Low Risk (LR)

- It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. Limited investigation recommended.

Negligible Risk (NR)

- There is a minimal possibility that harm could arise to a receptor. In the event of such harm being realised it is high likely to not be severe. Investigation not deemed necessary.

APPENDIX 6 – ENVIRONMENTAL LABORATORY TEST RESULTS

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QTS Environmental Ltd
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Lenham Heath
Kent
ME17 2JN
t: 01622 850410
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 15-37171

Site Reference:	Maria Fidelis
Project / Job Ref:	1445, SI
Order No:	1445,SI
Sample Receipt Date:	30/10/2015
Sample Scheduled Date:	30/10/2015
Report Issue Number:	1
Reporting Date:	04/11/2015

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

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

4480

Soil Analysis Certificate							
QTS Environmental Report No: 15-37171	Date Sampled	28/10/15	28/10/15	28/10/15		
Geosphere Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Maria Fidelis	TP / BH No	WS1/J1	WS1/J2	WS3/J2		
Project / Job Ref: 1445, SI	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 1445,SI	Depth (m)	0.20	0.50	0.70		
Reporting Date: 04/11/2015	QTSE Sample No	175416	175417	175418		

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	9.3	7.7	7.4		
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	823	244	340		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.82	0.24	0.34		
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	0.3	1.4	1.8		
Arsenic (As)	mg/kg	< 2	MCERTS	11	14	20		
Beryllium (Be)	mg/kg	< 0.5	NONE	< 0.5	1	0.9		
W/S Boron	mg/kg	< 1	NONE	1.1	1.1	2.1		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	MCERTS	20	24	24		
Copper (Cu)	mg/kg	< 4	MCERTS	10	56	83		
Lead (Pb)	mg/kg	< 3	MCERTS	36	479	1250		
Mercury (Hg)	mg/kg	< 1	NONE	< 1	2.7	2.9		
Nickel (Ni)	mg/kg	< 3	MCERTS	13	17	17		
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3		
Vanadium (V)	mg/kg	< 2	NONE	31	51	47		
Zinc (Zn)	mg/kg	< 3	MCERTS	61	81	303		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2		
EPH (C10 - C40)	mg/kg	< 6	MCERTS	67	< 6	16		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Analysis carried out on the dried sample is corrected for the stone content
Subcontracted analysis $^{(S)}$

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Soil Analysis Certificate - Speciated PAHs							
QTS Environmental Report No: 15-37171	Date Sampled	28/10/15	28/10/15	28/10/15		
Geosphere Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Maria Fidelis	TP / BH No	WS1/J1	WS1/J2	WS3/J2		
Project / Job Ref: 1445, SI	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 1445,SI	Depth (m)	0.20	0.50	0.70		
Reporting Date: 04/11/2015	QTSE Sample No	175416	175417	175418		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	MCERTS	0.60	< 0.1	0.17		
Anthracene	mg/kg	< 0.1	MCERTS	0.18	< 0.1	< 0.1		
Fluoranthene	mg/kg	< 0.1	MCERTS	1.39	< 0.1	0.51		
Pyrene	mg/kg	< 0.1	MCERTS	1.15	< 0.1	0.42		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.64	< 0.1	0.21		
Chrysene	mg/kg	< 0.1	MCERTS	0.61	< 0.1	0.24		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.68	< 0.1	0.27		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.32	< 0.1	0.13		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.60	< 0.1	0.18		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.34	< 0.1	0.13		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.32	< 0.1	0.12		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	6.8	< 1.6	2.4		

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

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 15-37171	
Geosphere Environmental Ltd	
Site Reference: Maria Fidelis	
Project / Job Ref: 1445, SI	
Order No: 1445,SI	
Reporting Date: 04/11/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
175416	WS1/J1	None Supplied	0.20	10.4	Grey sand with concrete and brick
175417	WS1/J2	None Supplied	0.50	15.8	Grey sandy clay with brick
175418	WS3/J2	None Supplied	0.70	18.7	Black sandy clay

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

Insufficient Sample I/S

Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-37171
Geosphere Environmental Ltd
Site Reference: Maria Fidelis
Project / Job Ref: 1445, SI
Order No: 1445,SI
Reporting Date: 04/11/2015

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

D Dried
AR As Received

Flora Sutherland
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DETS Report No: 18-76148

Site Reference:	Maria Fidelis School Site, Pheonix Road, London, NW1 1TA
Project / Job Ref:	3163, GI, RS
Order No:	3163,GI
Sample Receipt Date:	04/06/2018
Sample Scheduled Date:	04/06/2018
Report Issue Number:	1
Reporting Date:	08/06/2018

Authorised by:

Russell Jarvis
Associate Director of Client Services

Authorised by:

Dave Ashworth
Deputy Quality Manager

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Soil Analysis Certificate								
DETS Report No: 18-76148	Date Sampled	01/06/18	01/06/18	01/06/18	01/06/18	01/06/18
Geosphere Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	TP / BH No	WS1	WS1	WS1	WS2	WS3
Project / Job Ref: 3163, GI, RS	Additional Refs	J1	J2	J3	J2	J1
Order No: 3163,GI	Depth (m)	0.15	0.60	1.00	0.55	0.15
Reporting Date: 08/06/2018	QTSE Sample No	337757	337758	337759	337760	337761

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	9.3	7.6	7.7	7.7	9.6
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Complex Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Free Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	< 10	403	1740	492	399
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	< 0.01	0.40	1.74	0.49	0.40
Organic Matter	%	< 0.1	MCERTS	0.4	2.6	2.7	1.8	1.2
Arsenic (As)	mg/kg	< 2	MCERTS	3	14	14	14	8
Barium (Ba)	mg/kg	< 5	NONE	22	126	114	67	61
Beryllium (Be)	mg/kg	< 0.5	NONE	< 0.5	0.9	1	1	0.5
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	6	20	23	23	20
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	5	65	59	44	16
Lead (Pb)	mg/kg	< 3	MCERTS	20	296	180	165	101
Mercury (Hg)	mg/kg	< 1	NONE	< 1	2.4	2.3	1.2	< 1
Molybdenum (Mo)	mg/kg	< 1	NONE	< 1	1.4	1.6	1.1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	3	17	19	23	12
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 2	NONE	10	47	56	49	26
Zinc (Zn)	mg/kg	< 3	MCERTS	93	85	73	58	45
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2		< 2	< 2
EPH (C10 - C40)	mg/kg	< 6	MCERTS			< 6		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Subcontracted analysis (S)

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Soil Analysis Certificate							
DETS Report No: 18-76148	Date Sampled	01/06/18	01/06/18	01/06/18		
Geosphere Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	TP / BH No	WS3	WS4	WS4		
Project / Job Ref: 3163, GI, RS	Additional Refs	J2	J1	J2		
Order No: 3163,GI	Depth (m)	0.70	0.17	0.60		
Reporting Date: 08/06/2018	QTSE Sample No	337762	337763	337764		

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected		
pH	pH Units	N/a	MCERTS	8.0	10.0	8.1		
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2		
Complex Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2		
Free Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	272	386	121		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.27	0.39	0.12		
Organic Matter	%	< 0.1	MCERTS	2.9	1.4	2.6		
Arsenic (As)	mg/kg	< 2	MCERTS	14	12	13		
Barium (Ba)	mg/kg	< 5	NONE	106	82	108		
Beryllium (Be)	mg/kg	< 0.5	NONE	0.9	0.7	0.9		
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	MCERTS	19	14	19		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS	75	48	75		
Lead (Pb)	mg/kg	< 3	MCERTS	303	330	322		
Mercury (Hg)	mg/kg	< 1	NONE	3.4	1.9	2.6		
Molybdenum (Mo)	mg/kg	< 1	NONE	< 1	< 1	1.4		
Nickel (Ni)	mg/kg	< 3	MCERTS	16	12	16		
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3		
Vanadium (V)	mg/kg	< 2	NONE	45	32	47		
Zinc (Zn)	mg/kg	< 3	MCERTS	81	54	75		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2			
EPH (C10 - C40)	mg/kg	< 6	MCERTS			< 6		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30^{O}C
Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs							
DETS Report No: 18-76148	Date Sampled	01/06/18	01/06/18	01/06/18	01/06/18	01/06/18
Geosphere Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	TP / BH No	WS1	WS1	WS1	WS2	WS3
Project / Job Ref: 3163, GI, RS	Additional Refs	J1	J2	J3	J2	J1
Order No: 3163,GI	Depth (m)	0.15	0.60	1.00	0.55	0.15
Reporting Date: 08/06/2018	QTSE Sample No	337757	337758	337759	337760	337761

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.40
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.16	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.14	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	0.13	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

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

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Soil Analysis Certificate - Speciated PAHs							
DETS Report No: 18-76148	Date Sampled	01/06/18	01/06/18	01/06/18		
Geosphere Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	TP / BH No	WS3	WS4	WS4		
Project / Job Ref: 3163, GI, RS	Additional Refs	J2	J1	J2		
Order No: 3163,GI	Depth (m)	0.70	0.17	0.60		
Reporting Date: 08/06/2018	QTSE Sample No	337762	337763	337764		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	0.27	< 0.1		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	0.22	< 0.1		
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	2.70	< 0.1		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.79	< 0.1		
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	7.31	< 0.1		
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	6.51	< 0.1		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	3.34	< 0.1		
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	3.01	< 0.1		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	3.64	< 0.1		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	1.49	< 0.1		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	2.82	< 0.1		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	1.54	< 0.1		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.34	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	1.45	< 0.1		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	35.4	< 1.6		

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

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Soil Analysis Certificate - TPH CWG Banded							
DETS Report No: 18-76148	Date Sampled	01/06/18	01/06/18	01/06/18	01/06/18	01/06/18
Geosphere Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	TP / BH No	WS1	WS1	WS2	WS3	WS3
Project / Job Ref: 3163, GI, RS	Additional Refs	J1	J2	J2	J1	J2
Order No: 3163,GI	Depth (m)	0.15	0.60	0.55	0.15	0.70
Reporting Date: 08/06/2018	QTSE Sample No	337757	337758	337760	337761	337762

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

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

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Soil Analysis Certificate - TPH CWG Banded							
DETS Report No: 18-76148	Date Sampled	01/06/18					
Geosphere Environmental Ltd	Time Sampled	None Supplied					
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	TP / BH No	WS4					
Project / Job Ref: 3163, GI, RS	Additional Refs	J1					
Order No: 3163,GI	Depth (m)	0.17					
Reporting Date: 08/06/2018	QTSE Sample No	337763					

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01				
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05				
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2				
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2				
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3				
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3				
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10				
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21				
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01				
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05				
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2				
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2				
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2				
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	25				
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	72				
Aromatic (C5 - C35)	mg/kg	< 21	NONE	97				
Total >C5 - C35	mg/kg	< 42	NONE	97				

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

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Soil Analysis Certificate - BTEX / MTBE								
DETS Report No: 18-76148	**Date Sampled**	01/06/18	01/06/18	01/06/18	01/06/18	01/06/18
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	**TP / BH No**	WS1	WS1	WS2	WS3	WS3
Project / Job Ref: 3163, GI, RS	**Additional Refs**	J1	J2	J2	J1	J2
Order No: 3163,GI	**Depth (m)**	0.15	0.60	0.55	0.15	0.70
Reporting Date: 08/06/2018	**QTSE Sample No**	337757	337758	337760	337761	337762

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

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

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Soil Analysis Certificate - BTEX / MTBE							
DETS Report No: 18-76148	Date Sampled	01/06/18					
Geosphere Environmental Ltd	Time Sampled	None Supplied					
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	TP / BH No	WS4					
Project / Job Ref: 3163, GI, RS	Additional Refs	J1					
Order No: 3163,GI	Depth (m)	0.17					
Reporting Date: 08/06/2018	QTSE Sample No	337763					

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

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

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UKAS TESTING 4480

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 18-76148		**Date Sampled**	01/06/18				**Landfill Waste Acceptance Criteria Limits**			
Geosphere Environmental Ltd		**Time Sampled**	None Supplied				**Inert Waste Landfill**	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**	
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA		**TP / BH No**	WS1							
Project / Job Ref: 3163, GI, RS		**Additional Refs**	J1							
Order No: 3163,GI		**Depth (m)**	0.15							
Reporting Date: 08/06/2018		**QTSE Sample No**	337757							
Determinand	**Unit**	**MDL**								
TOC[MU]	%	< 0.1	0.3				3%	5%	6%	
Loss on Ignition	%	< 0.01	1.12				--	--	10%	
BTEX[MU]	mg/kg	< 0.05	< 0.05				6	--	--	
Sum of PCBs	mg/kg	< 0.1	< 0.1				1	--	--	
Mineral Oil[MU]	mg/kg	< 10	< 10				500	--	--	
Total PAH[MU]	mg/kg	< 1.7	< 1.7				100	--	--	
pH[MU]	pH Units	N/a	9.3				--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	2.4				--	To be evaluated	To be evaluated	
Eluate Analysis			**10:1 mg/l**			**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**			
Arsenic[U]			< 0.01			< 0.1	0.5	2	25	
Barium[U]			< 0.02			< 0.2	20	100	300	
Cadmium[U]			< 0.0005			< 0.005	0.04	1	5	
Chromium[U]			< 0.005			< 0.05	0.5	10	70	
Copper[U]			< 0.01			< 0.1	2	50	100	
Mercury[U]			< 0.0005			< 0.01	0.01	0.2	2	
Molybdenum[U]			0.003			0.03	0.5	10	30	
Nickel[U]			< 0.007			< 0.07	0.4	10	40	
Lead[U]			< 0.005			< 0.05	0.5	10	50	
Antimony[U]			0.005			0.05	0.06	0.7	5	
Selenium[U]			< 0.005			< 0.05	0.1	0.5	7	
Zinc[U]			< 0.005			< 0.05	4	50	200	
Chloride[U]			5			54	800	15000	25000	
Fluoride[U]			< 0.5			< 5	10	150	500	
Sulphate[U]			18			176	1000	20000	50000	
TDS			116			1160	4000	60000	100000	
Phenol Index			< 0.01			< 0.1	1	-	-	
DOC			6.6			66.2	500	800	1000	
Leach Test Information										
Sample Mass (kg)			0.09							
Dry Matter (%)			97.1							
Moisture (%)			3							
Stage 1										
Volume Eluate L10 (litres)			0.90							

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepencies with current legislation
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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 18-76148		**Date Sampled**	01/06/18				**Landfill Waste Acceptance Criteria Limits**			
Geosphere Environmental Ltd		**Time Sampled**	None Supplied				**Inert Waste Landfill**	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**	
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA		**TP / BH No**	WS1							
Project / Job Ref: 3163, GI, RS		**Additional Refs**	J2							
Order No: 3163,GI		**Depth (m)**	0.60							
Reporting Date: 08/06/2018		**QTSE Sample No**	337758							
Determinand	**Unit**	**MDL**								
TOC[MU]	%	< 0.1	1.5				3%	5%	6%	
Loss on Ignition	%	< 0.01	6.20				--	--	10%	
BTEX[MU]	mg/kg	< 0.05	< 0.05				6	--	--	
Sum of PCBs	mg/kg	< 0.1	< 0.1				1	--	--	
Mineral Oil[MU]	mg/kg	< 10	< 10				500	--	--	
Total PAH[MU]	mg/kg	< 1.7	< 1.7				100	--	--	
pH[MU]	pH Units	N/a	7.6				--	>6	--	
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.5				--	To be evaluated	To be evaluated	
Eluate Analysis			**10:1 mg/l**			**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**			
Arsenic[U]			< 0.01			< 0.1	0.5	2	25	
Barium[U]			< 0.02			< 0.2	20	100	300	
Cadmium[U]			< 0.0005			< 0.005	0.04	1	5	
Chromium[U]			< 0.005			< 0.05	0.5	10	70	
Copper[U]			0.01			0.1	2	50	100	
Mercury[U]			< 0.0005			< 0.01	0.01	0.2	2	
Molybdenum[U]			0.017			0.17	0.5	10	30	
Nickel[U]			< 0.007			< 0.07	0.4	10	40	
Lead[U]			< 0.005			< 0.05	0.5	10	50	
Antimony[U]			< 0.005			< 0.05	0.06	0.7	5	
Selenium[U]			< 0.005			< 0.05	0.1	0.5	7	
Zinc[U]			< 0.005			< 0.05	4	50	200	
Chloride[U]			6			55	800	15000	25000	
Fluoride[U]			< 0.5			< 5	10	150	500	
Sulphate[U]			34			337	1000	20000	50000	
TDS			154			1539	4000	60000	100000	
Phenol Index			< 0.01			< 0.1	1	-	-	
DOC			10.7			107	500	800	1000	
Leach Test Information										
Sample Mass (kg)			0.10							
Dry Matter (%)			88.5							
Moisture (%)			13							
Stage 1										
Volume Eluate L10 (litres)			0.89							

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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 18-76148	**Date Sampled**	01/06/18
Geosphere Environmental Ltd	**Time Sampled**	None Supplied
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	**TP / BH No**	WS2
Project / Job Ref: 3163, GI, RS	**Additional Refs**	J2
Order No: 3163,GI	**Depth (m)**	0.55
Reporting Date: 08/06/2018	**QTSE Sample No**	337760

Determinand	**Unit**	**MDL**		**Landfill Waste Acceptance Criteria Limits**		
				Inert Waste Landfill	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
TOC[MU]	%	< 0.1	1	3%	5%	6%
Loss on Ignition	%	< 0.01	4.20	--	--	10%
BTEX[MU]	mg/kg	< 0.05	< 0.05	6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--
Mineral Oil[MU]	mg/kg	< 10	< 10	500	--	--
Total PAH[MU]	mg/kg	< 1.7	< 1.7	100	--	--
pH[MU]	pH Units	N/a	7.7	--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.9	--	To be evaluated	To be evaluated

Eluate Analysis	**10:1 mg/l**			**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
Arsenic[U]	< 0.01			< 0.1	0.5	2	25
Barium[U]	< 0.02			< 0.2	20	100	300
Cadmium[U]	< 0.0005			< 0.005	0.04	1	5
Chromium[U]	< 0.005			< 0.05	0.5	10	70
Copper[U]	< 0.01			< 0.1	2	50	100
Mercury[U]	< 0.0005			< 0.01	0.01	0.2	2
Molybdenum[U]	0.008			0.08	0.5	10	30
Nickel[U]	< 0.007			< 0.07	0.4	10	40
Lead[U]	< 0.005			< 0.05	0.5	10	50
Antimony[U]	< 0.005			< 0.05	0.06	0.7	5
Selenium[U]	< 0.005			< 0.05	0.1	0.5	7
Zinc[U]	< 0.005			< 0.05	4	50	200
Chloride[U]	5			53	800	15000	25000
Fluoride[U]	0.5			5	10	150	500
Sulphate[U]	25			248	1000	20000	50000
TDS	146			1460	4000	60000	100000
Phenol Index	< 0.01			< 0.1	1	-	-
DOC	4.7			47.2	500	800	1000

Leach Test Information					
Sample Mass (kg)	0.10				
Dry Matter (%)	87.3				
Moisture (%)	14.6				
Stage 1					
Volume Eluate L10 (litres)	0.89				

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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 18-76148	**Date Sampled**	01/06/18	
Geosphere Environmental Ltd	**Time Sampled**	None Supplied	
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	**TP / BH No**	WS3	
Project / Job Ref: 3163, GI, RS	**Additional Refs**	J1	
Order No: 3163,GI	**Depth (m)**	0.15	
Reporting Date: 08/06/2018	**QTSE Sample No**	337761	

Determinand	**Unit**	**MDL**		**Landfill Waste Acceptance Criteria Limits**		
				Inert Waste Landfill	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
TOC[MU]	%	< 0.1	0.7	3%	5%	6%
Loss on Ignition	%	< 0.01	3	--	--	10%
BTEX[MU]	mg/kg	< 0.05	< 0.05	6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--
Mineral Oil[MU]	mg/kg	< 10	< 10	500	--	--
Total PAH[MU]	mg/kg	< 1.7	< 1.7	100	--	--
pH[MU]	pH Units	N/a	9.6	--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	2.4	--	To be evaluated	To be evaluated

Eluate Analysis	**10:1 mg/l**			**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
Arsenic[U]	< 0.01			< 0.1	0.5	2	25
Barium[U]	< 0.02			< 0.2	20	100	300
Cadmium[U]	< 0.0005			< 0.005	0.04	1	5
Chromium[U]	0.017			0.17	0.5	10	70
Copper[U]	< 0.01			< 0.1	2	50	100
Mercury[U]	< 0.0005			< 0.01	0.01	0.2	2
Molybdenum[U]	0.009			0.09	0.5	10	30
Nickel[U]	< 0.007			< 0.07	0.4	10	40
Lead[U]	< 0.005			< 0.05	0.5	10	50
Antimony[U]	0.006			0.06	**0.06**	0.7	5
Selenium[U]	< 0.005			< 0.05	0.1	0.5	7
Zinc[U]	< 0.005			< 0.05	4	50	200
Chloride[U]	4			44	800	15000	25000
Fluoride[U]	< 0.5			< 5	10	150	500
Sulphate[U]	143			1431	**1000**	20000	50000
TDS	256			2559	4000	60000	100000
Phenol Index	< 0.01			< 0.1	1	-	-
DOC	5.9			58.7	500	800	1000
Leach Test Information							
Sample Mass (kg)	0.10						
Dry Matter (%)	90.2						
Moisture (%)	11						
Stage 1							
Volume Eluate L10 (litres)	0.89						

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UKAS TESTING 4480

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 18-76148	**Date Sampled**	01/06/18
Geosphere Environmental Ltd	**Time Sampled**	None Supplied
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	**TP / BH No**	WS3
Project / Job Ref: 3163, GI, RS	**Additional Refs**	J2
Order No: 3163,GI	**Depth (m)**	0.70
Reporting Date: 08/06/2018	**QTSE Sample No**	337762

Determinand	**Unit**	**MDL**		**Landfill Waste Acceptance Criteria Limits**		
				Inert Waste Landfill	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
TOC[MU]	%	< 0.1	1.7	3%	5%	6%
Loss on Ignition	%	< 0.01	8.60	--	--	10%
BTEX[MU]	mg/kg	< 0.05	< 0.05	6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--
Mineral Oil[MU]	mg/kg	< 10	< 10	500	--	--
Total PAH[MU]	mg/kg	< 1.7	< 1.7	100	--	--
pH[MU]	pH Units	N/a	8.0	--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.2	--	To be evaluated	To be evaluated

Eluate Analysis	**10:1 mg/l**			**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
Arsenic[U]	< 0.01			< 0.1	0.5	2	25
Barium[U]	< 0.02			< 0.2	20	100	300
Cadmium[U]	< 0.0005			< 0.005	0.04	1	5
Chromium[U]	< 0.005			< 0.05	0.5	10	70
Copper[U]	< 0.01			< 0.1	2	50	100
Mercury[U]	< 0.0005			< 0.01	0.01	0.2	2
Molybdenum[U]	0.007			0.07	0.5	10	30
Nickel[U]	< 0.007			< 0.07	0.4	10	40
Lead[U]	< 0.005			< 0.05	0.5	10	50
Antimony[U]	< 0.005			< 0.05	0.06	0.7	5
Selenium[U]	< 0.005			< 0.05	0.1	0.5	7
Zinc[U]	< 0.005			< 0.05	4	50	200
Chloride[U]	2			21	800	15000	25000
Fluoride[U]	0.5			5	10	150	500
Sulphate[U]	35			352	1000	20000	50000
TDS	146			1460	4000	60000	100000
Phenol Index	< 0.01			< 0.1	1	-	-
DOC	4.9			48.7	500	800	1000

Leach Test Information						
Sample Mass (kg)	0.10					
Dry Matter (%)	86.3					
Moisture (%)	16					
Stage 1						
Volume Eluate L10 (litres)	0.89					

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepencies with current legislation
M Denotes MCERTS accredited test
U Denotes ISO17025 accredited test

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mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

UKAS TESTING 4480

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 18-76148	**Date Sampled**	01/06/18
Geosphere Environmental Ltd	**Time Sampled**	None Supplied
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	**TP / BH No**	WS4
Project / Job Ref: 3163, GI, RS	**Additional Refs**	J1
Order No: 3163,GI	**Depth (m)**	0.17
Reporting Date: 08/06/2018	**QTSE Sample No**	337763

Determinand	**Unit**	**MDL**		**Landfill Waste Acceptance Criteria Limits**		
				Inert Waste Landfill	**Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
TOC[MU]	%	< 0.1	0.8	3%	5%	6%
Loss on Ignition	%	< 0.01	3.30	--	--	10%
BTEX[MU]	mg/kg	< 0.05	< 0.05	6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1	1	--	--
Mineral Oil[MU]	mg/kg	< 10	< 10	500	--	--
Total PAH[MU]	mg/kg	< 1.7	35.4	100	--	--
pH[MU]	pH Units	N/a	10.0	--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	2.5	--	To be evaluated	To be evaluated

Eluate Analysis	**10:1 mg/l**			**Cumulative 10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
Arsenic[U]	< 0.01			< 0.1	0.5	2	25
Barium[U]	< 0.02			< 0.2	20	100	300
Cadmium[U]	< 0.0005			< 0.005	0.04	1	5
Chromium[U]	< 0.005			< 0.05	0.5	10	70
Copper[U]	0.02			0.2	2	50	100
Mercury[U]	< 0.0005			< 0.01	0.01	0.2	2
Molybdenum[U]	0.008			0.08	0.5	10	30
Nickel[U]	< 0.007			< 0.07	0.4	10	40
Lead[U]	< 0.005			< 0.05	0.5	10	50
Antimony[U]	0.011			0.11	**0.06**	0.7	5
Selenium[U]	< 0.005			< 0.05	0.1	0.5	7
Zinc[U]	< 0.005			< 0.05	4	50	200
Chloride[U]	2			21	800	15000	25000
Fluoride[U]	< 0.5			< 5	10	150	500
Sulphate[U]	56			556	1000	20000	50000
TDS	160			1600	4000	60000	100000
Phenol Index	< 0.01			< 0.1	1	-	-
DOC	13.3			133	500	800	1000

Leach Test Information						
Sample Mass (kg)	0.10					
Dry Matter (%)	88.1					
Moisture (%)	13.6					
Stage 1						
Volume Eluate L10 (litres)	0.89					

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepencies with current legislation
M Denotes MCERTS accredited test
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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 18-76148	
Geosphere Environmental Ltd	
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA	
Project / Job Ref: 3163, GI, RS	
Order No: 3163,GI	
Reporting Date: 08/06/2018	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
337757	WS1	J1	0.15	2.9	Brown sandy clay with stones and concrete
337758	WS1	J2	0.60	11.5	Brown sandy clay with stones and brick
337759	WS1	J3	1.00	13.1	Brown sandy clay with brick
337760	WS2	J2	0.55	12.7	Brown sandy clay with chalk
337761	WS3	J1	0.15	9.8	Brown sandy clay with stones and concrete
337762	WS3	J2	0.70	13.7	Brown sandy clay with brick and concrete
337763	WS4	J1	0.17	11.9	Brown sandy clay with stones and brick
337764	WS4	J2	0.60	13.9	Brown sandy clay with brick and concrete

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

Insufficient Sample [I/S]

Unsuitable Sample [U/S]

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 18-76148
Geosphere Environmental Ltd
Site Reference: Maria Fidelis School Site, Pheonix Road, London, NW1 1TA
Project / Job Ref: 3163, GI, RS
Order No: 3163,GI
Reporting Date: 08/06/2018

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

D Dried
AR As Received

APPENDIX 7 – DRAWINGS

Site Location Plan – Drawing ref. 3163,GI,RS,001/Rev 0

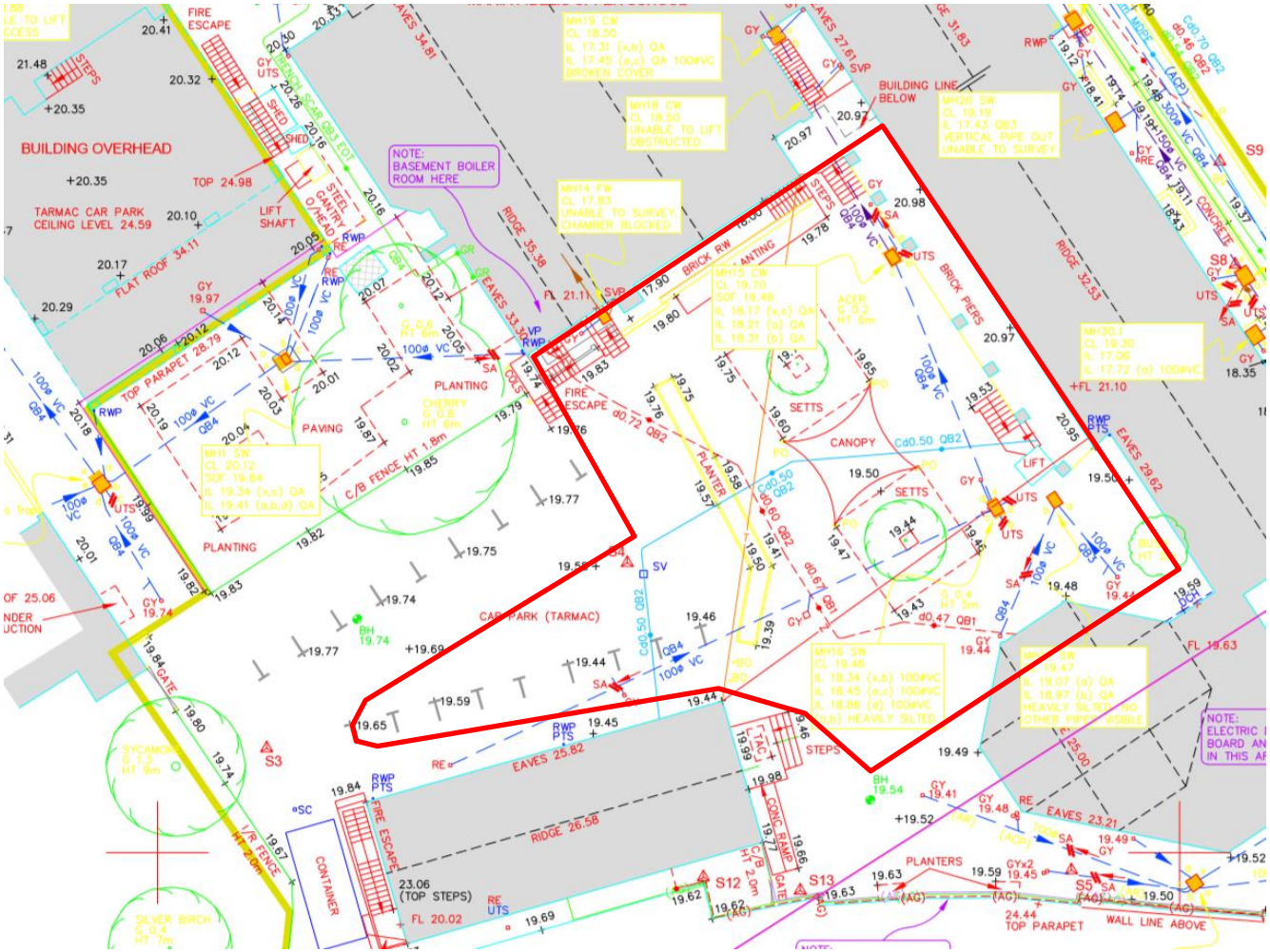
Exploratory Hole Location Plan – Drawing ref. 3163,GI,RS,002/Rev/0

Description of proposed site redevelopment. Elevation variations– Drawing ref. 3163,GI 003/Rev 0

Combined Exploratory Hole Location Plan– Drawing ref. 3163,GI 004/Rev 1

Proposed Development (Landscape Levels Plan East) (Wynne Williams Associates drawing reference) 1566_LL_105

Proposed Development (Landscape Levels Plan East) (Wynne Williams Associates drawing reference) 1566/LD/503



LEGEND:

Site Location

Site Boundary for this phase of sampling works

N

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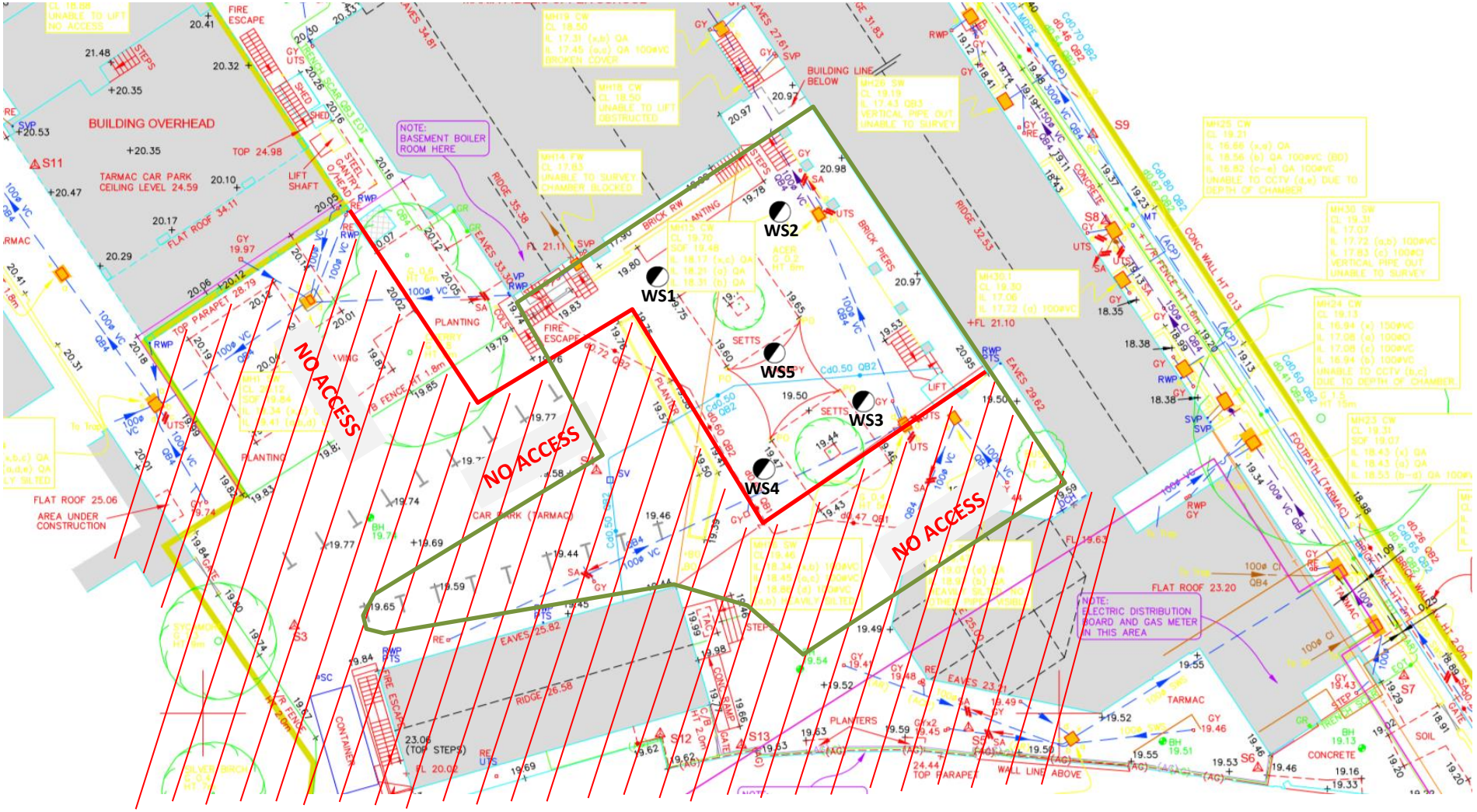
SITE	TITLE	REPORT NO.	DRAWING NO.	DATE
Maria Fidelis, 34 Phoenix Road, London, NW1 1TA	Site Location Plan	3163, GI, RS	001 / Rev 1	June 2018
	CLIENT Kier Construction London	**DRAWN BY** FS	**CHECKED** JD	**SCALE** Not to scale



LEGEND:

Window sample location and number

Requested sampling location

Area of no access due to welfare facilities and cabins

NOTE: Drawing based upon drawing provided by the Client

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SITE	TITLE	REPORT NO.	DRAWING NO.	DATE
Maria Fidelis, 34 Phoenix Road, London, NW1 1TA	Exploratory Hole Location Plan	3163, GI, RS	002 / Rev 0	June 2018
	CLIENT Kier Construction London	**DRAWN BY** FS	**CHECKED** JD	**SCALE** Not to scale