Tender Documents and Specification for Ground Investigation

Middlesex Hospital Annexe

University College London Hospitals Charity

Project Number: 60516144 60516144/GEO/DOC/GISPEC/001

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Quality information

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Checked by



Regional Director

Approved by

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Figure 1	Site Location Plan
Figure 2	Proposed Exploratory Hole Location Plan

Instruction to Tenderers

- 1. Tenders are invited for the work required as hereinafter described, based on the following Documents:
 - (a) The Form of Tender
 - (b) The Conditions of Contract
 - (c) Contract Data Parts 1 and 2
 - (d) The Specification
 - (e) The Bills of Quantities
 - (f) Pre-tender health and safety plan (Hazard Identification Risk Assessment and SISG Risk Assessment)
 - (g) Site Information Figures
- 2. These Tender Documents entirely supersede any advance information that may have been supplied to the Tenderers.
- 3. The rates and prices inserted by the Tenderers in the Bills of Quantities and the amount of the Tender are to include for provision and use of all plant, fuels, power, electricity, water, materials, labour, supervision, insurances, establishment charges, profits and all other costs and obligations of every kind to cover the execution of the work in accordance with this Contract.
- 4. The Tenderer shall not in any way amend or alter the Tender Documents, nor shall he attach any special conditions or reservations to his Tender except in a covering letter to the completed documents.
- 5. Arrangements to inspect the Site shall be made as specified in the letter of Invitation to Tender. Tenderers will be deemed to have visited and inspected the site of the proposed works.
- 6. The Bills of Approximate Quantities shall be fully priced out and the Tender Total computed and carried to the Form of Tender. Any items left unpriced should have either the word 'Nil' or 'Included' inserted in the rates column. Unpriced items will be held to have had their costs included in the prices for other items of work.
- 7. The Tender must be submitted on the Form of Tender accompanying this invitation and be accompanied by the priced Bills of Quantities.
- 8. The filling-in and completion of the Form of Tender and the Bills of Approximate Quantities shall be done electronically or, where in hard copy, in typescript or written in ink.
- 9. Access will be by arrangement with the Employer.
- 10. The Contractor shall allow for any special working surface or access which he may require.
- 11. The Works must be carried out in one continuous operation, and in a sequence to be agreed with the Project Manager before the work is commenced. The Tenderers must submit a detailed program with their Tender in accordance with the NEC3 Conditions of Contract.
- 12. Tenders shall remain open for acceptance for a period of Ninety (90) days from the Tender Closing Date.
- 13. The Employer is not bound to accept the lowest or any of the Tenders submitted.
- 14. The successful Tenderer will be required to submit without delay copies of completed policies and current premium receipts for insurance and similar matters.
- 15. The successful Tenderer accepts that this site investigation is construction work under CDM 2015 and that they will comply with their duties as a contractor under CDM 2015 and will prepare and issue a Construction Phase Plan as required under Regulation 15(5) Regulation in compliance with Regulation 12 prior to commencement on site.
- 16. The Employer will not be responsible for any expense or loss which may be incurred by any Tenderer in the preparation of his Tender.

- 17. Tenderers are warned that non-compliance with any of the foregoing requirements may invalidate their Tenders.
- 18. All queries and requests for clarification or further information in connection with this Tender shall be addressed to Jessica Cheng at the following address:

AECOM Limited AECOM House 63-77 Victoria Street St Albans Hertfordshire AL1 3ER Tel: 01727 535732 E-mail: jessica.cheng@aecom.com

Form of Tender

	The works:	Contract for Ground Investigation at the Middlesex Hospital Annexe
TENDER		
	To: Address:	University College London Hospitals Charity (The Employer) UCLH Charity, 5/F East, 250 Euston Road, London NW1 2PG

We offer to provide the Works in accordance with the Contract Data part one and the attached Contract Data part two for a sum to be determined in accordance with the *conditions of contract*.

You may accept this offer on or before 90 days from the date of this offer.

Yours faithfully,

Signature	
Name	
Position	
On behalf of	 (The Contractor)
Address	
Date	

Conditions of Contract

The Conditions of Contract shall be the NEC3 Engineering and Construction Contract (June 2005) – Option B Priced contract with bill of quantities.

Add the following additional conditions of contract as Z clauses.

Z Clauses

Z1 Reference on dissatisfaction

Z1.1 If the Contractor is dissatisfied by reason of any act or instruction of the *Site Supervisor* he shall be entitled to refer the matter to the *Project Manager* for his decision which shall be given in writing within 21 days of such reference.

Z2 Pollution

- Z2.1 The *Contractor* shall be aware of the statutory responsibilities of the Environment Agency for the protection of water resources. Notwithstanding this subject and without prejudice to any other provision of the contract the *Contractor* shall take all necessary precautions in connection with any underground water resources (including percolating water) river streams, ditches, drains, cuts, culverts, dykes, sluices, lakes, ponds, reservoirs, docks, channels, creeks, bays, estuaries or arms of the sea and the like to prevent:
 - (i) any interference with the supply to or abstraction from such sources
 - (ii) silting
 - (iii) erosion of their beds or banks
 - (iv) pollution of the water so as to affect adversely the quality or appearance thereof or cause injury or death to animal aquatic or plant life.
- Z2.2 The Contractor shall take all necessary measures to prevent damage loss, injury or nuisance caused by:
 - (i) mud, dirt, stones or other material used or generated whilst carrying out the Works. This shall include but not be limited to ensuring that no fuel or lubricant, mud, dirt, stones or other material is spilled or deposited on the surfaced areas of the site or public highways
 - (ii) smoke or dust generated whilst carrying out the Investigation

Z3 Clearance of Site on completion

Z3.1 On the completion of the Works the *Contractor* clears away and removes from the site all *Contractor*'s equipment, surplus material, rubbish and temporary works of every kind. The *Contractor* makes good avoidable damage whether in the vicinity of the Works or on the access route thereto and leave the whole of the site clean and in a workmanlike condition to the satisfaction of the *Project Manager*.

CONTRACT DATA

Part One - Data provided by the Employer

Completion of the data in full, according to the Options chosen, is essential to create a complete contract.

Statements given in all contracts

- General
 The conditions of contract are the core clauses and the clauses for main Option B, dispute resolution Option W2 of the NEC3 Engineering and Construction Contract June 2005 (with amendments June 2006 and April 2013).
 - The works are to carry out the ground investigation as specified in Schedules 1 and 2.
 - The Employer is

Name University College London Hospitals Charity

Address UCLH Charity 5/F East 250 Euston Road London NW1 2PG

• The Project Manager is

Name Daniel Wallington

Address AECOM Limited Aldgate Tower 2 Leman Street London E1 8FA

• The Supervisor is

Name Jessica Cheng

Address AECOM Limited AECOM House 63-77 Victoria Street St Albans Hertfordshire AL1 3ER

- The Adjudicator is TBC.
- The Works Information is in Specification Schedules 1 and 2 and accompanying Figures.
- The Site Information is in Specification Schedules 1 and 2 and accompanying Figures.
- The boundaries of the site are shown in Figure 1.
- The language of this contract is English.
- The law of the contract is the law of England and Wales subject to the jurisdiction of the courts of England and Wales.
- The period for reply is 1 week.

- The Adjudicator nominating body is the Institution of Civil Engineers (ICE).
- The tribunal is arbitration.
- The following matters will be included in the Risk Register

..... 2 Time The starting date is TBC. The access dates are Part of the Site Date TBC All Areas 1 The Contractor submits revised programmes at intervals no longer than 1 week. 3 Testing and Defects The defects date is 4 weeks after Completion of the whole of the works ٠ 4 Payment The currency of this contract is the Pound Sterling. The assessment interval is 4 weeks. The interest rate is 2.0% per annum above the base rate in force at the Bank of England. 5 Risks and insurance The minimum limit of indemnity for insurance in respect of failure of the contractor ٠ to use the skill and care normally used by professionals providing services similar to these services is £1million in respect of each claim, without limit to the number of claims. • The minimum limit of indemnity for insurance in respect of loss of or damage to property (except the works, Plant and Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the Contractor) caused by activity in connection with this contract for any one event is £5million. The minimum limit of indemnity for insurance in respect of death of or bodily injury • to employees of the Contractor arising out of and in the course of their employment in connection with this contract for any one event is £10million. If the tribunal is arbitration **Optional statements** The arbitration procedure is the latest version of the ICE Arbitration Procedure or ٠ any amendment to in force when the arbitrator is appointed. The place where arbitration is to be held is London. • The person or organisation who will choose an arbitrator is the Institution of Civil Engineers (ICE). If no programme is identified in part two of the Contract Data The Contractor is to submit a first programme for acceptance within 1 week of the Contract Date.

• The method of measurement is Specification for Ground Investigation.

Part Two - Data provided by the Contractor

Completion of the data in full, according to the Options chosen, is essential to create a complete contract.

Statements given in all contracts

The Con	The Contractor is				
Name					
Address					

The working areas are the Site and

.....

.....

The key people are

(1)	Name			•••						•••		•••	••••	••••	•••	
				•••	• • • •		• • • •	••••	• • • •		• • • •	•••	••••	••••	• • •	•••
	Responsibilities	•••••	• • • • •	• • •	• • • •	• • • •	• • • •	• • • •	• • • •	• • •	• • • •	•••	• • • •	• • • •	• •	• • •
	Qualifications				• • • •					•••					• •	•••
	Experience			•••	• • • •				••••	•••		•••	••••	••••	• •	•••
(2)	Name															
(4)	lah			•••	• • • •		••••					••••	••••	••••	• • •	•••
	JOD	•••••	• • • • •	•••	• • • •	• • • •	• • • •	• • • •	• • • •	• • •	• • • •	•••	• • • •	• • • •	• •	• • •
	Responsibilities			•••	• • • •					•••		• • • •			•••	•••
	Qualifications															
	Experience			•••	••••					•••		•••	• • • •	• • • •	• •	•••

The following matters will be included in the Risk Register

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Specification

ICE Site Investigation Steering Group

Site Investigation in Construction

UK Specification for Ground Investigation Second Edition (2012) – published by Thomas Telford

Specification Schedules

Schedule 1: Information Schedule 2: Exploratory Holes Schedule 3: Engineers Facilities – Not Required Schedule 4: Specification Amendments Schedule 5: Specification Additions

Schedule 1: Information

S1.1 Name of Contract	Ground Investigation at the Middlesex Hospital Annexe.				
S1.2 Investigation Supervisor	Jessica Cheng AECOM Limited Tel: 01727 535000 AECOM House E-mail: jessica.cheng@aecom.com 63-77 Victoria Street St Albans Hertfordshire AL1 3ER				
S1.3 Description of Site	The site is located within the London Borough of Camden. It is centred on National Grid Reference 529262, 181811. Site location plans are presented in Figure 1. The site is located off Cleveland Street, approximately 250m west of the Goodge				
	Street London Underground Station. The site boundary encloses an area of approximately 0.32ha.				
	The site consists of North House located in the northwest corner of the site; South House located in the southwest corner of the site; and the Grade II listed Middlesex Hospital Annexe (the Union Work House) located in the centre of the site with two wing buildings at the rear.				
	According to regional unexploded bomb (UXB) mapping published by Zetica, the site lies within a zone that experiences a high risk of UXB.				
S1.4 Main works proposed and purpose of this contract	It is proposed to undertake refurbishment of some of the buildings on site, demolish the wing buildings at the rear and construct multi-storey mixed-use buildings with a single-level basement. The site investigation is required to provide information to assess the geotechnical, geo-environmental, geological and or hydrogeological ground conditions. The				
	investigation is intended to be a main ground investigation.				
S1.5 Scope of Investigation	 Cable percussion boreholes Hand dug inspection pits (for services) Hand dug observation pits (for structural inspection) 				
	 Concrete coring may be required 				
	UXO Downhole Magnetometer Survey				
	19mm piezometers				
	50mm gas/water monitoring boreholes				
	In situ testing – SPT, UT100, PID, borehole permeability testing				
	Survey of exploratory hole location and level				
	Monitoring of instrumentation after end of fieldworks				
	Geotechnical laboratory testing				
	Chemical laboratory testing				
	AGS data				
	Geotechnical and Geo-environmental Interpretative Report (This may be omitted from the scope of works, in which case a factual report is required)				

S1.6 Geology and Ground Conditions	The following general assessment of the geology of the site and ground conditions has been inferred from available information. No assurance is given to its accuracy.
	Drift deposits:
	Made Ground (up to 3.5m) Lynch Hill Gravel (up to 4.0m)
	Solid:
	London Clay Formation (approx. 20m)
	Lambeth Group (15.0-20.0m)
	Mapping produced by the EA and supplied with the Envirocheck report shows that the site does not lie within a Source Protection Zone.
S1.7 Schedule of	Figure 1 – Site Location Plan
Drawing(s) and documents	Figure 2 – Proposed Exploratory Hole Location Plan
	Specific routes across the site have not been indicated on the drawings, but the Contractor shall restrict movement to/from individual locations in order to minimise any damage. The location of all plant and equipment on site, including a works compound if required, shall be agreed in advance of the main works with the Employer or his Agent.
	Utility Service Plans are to be provided to the successful contractor prior to commencement of fieldworks.
	An electronic copy of AECOM's Phase 1 Geotechnical and Geo-environmental Desk Study Report will be provided to the successful Contractor.
S1.8 General requiremen	ts (Specification section 3) Particular restrictions/relaxations
S1.8.1 Quality	Quality management to BS EN ISO 9001, BS EN ISO 14001 and BS OHSAS
(Clause 3.3)	
	Alcontrol Laboratories), Scientific Analysis Laboratories or Chemtest.
S1.8.2 Professional Attendance (Clause 3.5.2)	The Contractor shall provide an experienced ground engineer full time on site for the supervision of all activities, logging exploratory holes, taking samples and providing daily records and preliminary logs. The ground engineer shall be contactable at all times during the works by mobile phone. The Supervisor shall be contacted for further instructions with respect to backfilling or installation details when the scheduled depth for each borehole is reached. All personnel associated with the contract will be required to complete a site
	induction on the first day prior to commencing work. The Contractor shall complete daily site diaries documenting staff present on site and working hours. Diaries shall also document any site issues that affected progress.
S1.8.3 Provision of ground practitioners and other personnel (Clause 3.6.1 and 3.6.2)	No other personnel (see Specification CI 3.6.2) are required during the course of the site operations.
S1.8.4 Hazardous ground, land affected by contamination and notifiable and invasive weeds (Clauses 3.7.1 and 3.22)	The site is classified as 'Category Yellow' for the purpose of the Contract (Reference: BDA Guidance for Safe Intrusive Activities on Contaminated or Potentially Contaminated Land – 2008). Personal and Site Safety Equipment to be provided in accordance with this BDA classification. Invasive weeds – none suspected based on observations to date.

S1.8.5 Additional information on	Available statutory service plans and below ground services survey plans will be provided to the successful Contractor.
Contract drawings (Clause 3.7.2)	The Contractor is required to carry out all necessary enquiries in order to ensure that the requirements of HSG47 have been met and enough information is available to proceed with the permit to dig. It is recommended that the Contractor carry out a site walkover prior to commencement of works at the site to confirm that the location of each exploratory hole is accessible and free of below ground services.
	The Contractor must comply with relevant statutory distances, or safe distances if they exceed statutory distances, from any known or suspected services.
S1.8.6 Known/ suspected mine workings, mineral extraction, etc (Clause 3.7.3)	None.
S1.8.7 Protected Species (Clause 3.7.4)	None.
S1.8.8 Archaeological Remains (Clause 3.7.5)	The Museum of London Archaeology (MoLA) was commissioned to carry out a historic environment assessment of the site. Although the site is not situated within an archaeological priority area, previous archaeological investigation identified a number of buried structural remains relating to former phases of the workhouse and one test pit revealed human remains. No intact burials were found.
	Based on these findings, a watching brief may be required during the ground investigation.
S1.8.9 Security of Site (Clause 3.11)	All observation pits and boreholes shall have temporary fencing (Heras fencing) to demarcate the working area and to limit public access and create a safe work zone.
	If a compound is established this too shall be demarcated with fencing with entry points locked when the compound is unoccupied by personnel and /or outside working hours.
S1.8.10 Traffic management measures (Clause 3.12)	None.
S1.8.11 Restricted working hours (Clause 3.13)	Daytime working hours are restricted to weekdays only between the hours of 08.00 to 18.00 unless otherwise advised.
S1.8.12 Trainee site operatives (Clause 3.14.1)	Not permitted. All site operatives shall be able to demonstrate having achieved the required level of competence for operating plant and equipment, and for works undertaken on construction sites hold a CITB card. In addition, evidence of current appropriate health and safety training shall be provided, including current CSCS card.
	The competence of the driller shall be confirmed to the Supervisor before the commencement of Siteworks. Both the Lead Driller and the Driller should hold a valid BDA Audit Card and should also hold a current CSCS Blue Skilled Card in Land Drilling. The Lead Driller's BDA Audit Card should be endorsed to suit the works being conducted.
S1.8.13 Contamination avoidance and/or	Provision shall be made for the use of aquifer protection measures, where appropriate.
aquiter protection measures required (Clauses 3.15.2 and	During boring all reasonable measures shall be taken to prevent the spread of soil and water/slurry affecting areas outside the defined working area and affecting

3.15.3)	surface water drains.
S1.8.14 Maximum period for boring, pitting or trenching through hard material, hard stratum or obstruction (Clauses 2.8, 4.3 and 6.4)	1 hour, following which AECOM should be consulted.
S1.8.15 Reinstatement requirements (Clause 3.16)	Reinstatement of exploratory holes and their associated access routes to as found condition.
S1.8.16 Hygiene facilities required (Clauses 2.20 and 3.16.1)	Welfare facilities to be in accordance with Category Yellow working.
S1.8.17 Unavoidable damage to be reinstated by Contractor (Clause 3.16.1)	Any damage to the ground surface, third party property etc. should be minimised as much as possible. Where unavoidable damage occurs, such as rutting of access routes, these shall be made good.
S1.8.18 Accuracy of exploratory hole locations (Clauses 3.19 and 3.20)	The location and elevation of all exploratory holes shall be defined in relation to National Grid Co-ordinates and Ordnance Datum to an accuracy of 0.01m (location) and 0.001m (elevation).
S1.8.19 Photography requirements (Clause 3.25)	All hand dug observation pits for structural inspection. Sufficient photographs to show the condition of the whole of the site prior to the start of the investigation works and an equivalent set of photographs on completion. Digital photographs to be submitted to the Supervisor within 1 working day of the photographs being taken.
S1.9 Percussion boring (Specification Section 4) Particular restrictions/relaxations
S1.9.1 Permitted	As specified.
restrictions (Clauses 4.1 to 4.4)	No lubricating oil or grease is allowed on the drilling tools or borehole casings (Notwithstanding the accepted minimal application of vegetable oil on threads of drilling rods) and all necessary precautions shall be taken to prevent spillage. Boreholes to start in appropriate casing diameter to allow for aquifer protection reduction.
S1.9.2 Backfilling (Clause 4.5)	Arisings or Cement bentonite grout – as directed by the Supervisor.
S1.9.3 Dynamic Sampling (Clause 4.6)	Dynamic sampling to be carried out using Terrier Rig or similar may be required if access does not allow the use of a cable percussion rig.
S1.10 Rotary drilling (Sp	ecification section 5) Particular restrictions/relaxations
Not Required	
S1.11 Pitting and trenchi	ng (Specification section 6) Particular restrictions/relaxations
S1.11.1 Indirect detection of buried	The Contractor shall ensure that a safe system of work is put in place for all exploratory holes following the guidance set out in HSG47 – Avoiding Danger from

services and inspection pits (Clauses 3.8.3 and 6.1)	Underground Services. The contractor shall consult all relevant record drawings of existing services including those obtained from the statutory undertakers and the Employer. All exploratory hole locations to be checked by a suitably trained operative using a CAT before starting work.				
	All boreholes are to be preceded by a hand dug pit to a minimum depth of 1.2m to check for buried services.				
S1.11.2 Restrictions on plant or pitting/trenching	Excavation of observation pits to comply with recommended method of excavation described in Specification Note for Guidance 6.2. All pits to be backfilled on day of excavation.				
and 6.3)	Hand dug observation pits are required to achieve for the full depth of the foundations discovered (anticipated to be approximately 1m deep), but should not extend beyond the formation levels to avoid risk of undermining. Required pit dimensions to be approximately $1.2 \times 0.6 \times 1.0$ m deep.				
	Observation pit logs should record the following information in a format to be agreed prior to the start of works:				
	- Depth, outstand width and material of existing retaining wall and boundary wall foundations				
	- Any foreign materials encountered during pitting				
	 Condition of concrete or masonry foundations where encountered (i.e. granular/solid, estimated maximum aggregate size) 				
	 Ground conditions local to foundations both at formation of the footing and at ground level 				
	- Any groundwater seepage				
S1.11.3 Entry of personnel (Clause 6.5)	Not permitted. Method statement to include precautions relating to risks arising from pit stability and fall from height.				
S1.11.4 Alternative pit and trench dimensions (Clause 6.7)	As specified.				
S1.11.5 Abstracted groundwater from land affected by contamination (Clause 6.9.2)	On site measures for collection and temporary storage (prior to the availability of laboratory test results to determine appropriate disposal) to be agreed with Investigation Supervisor.				
S1.11.6 Backfilling (Clause 6.10)	As specified.				
S1.11.7 Photographic Requirements (Clause 6.12)	Photographs should be taken of all sides of an observation pit to show the structures encountered.				
S1.11.8 Artificial lighting (Clause 6.12.2)	Not required.				
S1.11.9 Provision of pitting equipment and crew for Investigation Supervisors use (Clause 6.13)	Not required.				

S1.12 Sampling and monitoring during intrusive investigation (Specification section 7) Particular restrictions/relaxations		
S1.12.1 Address for delivery of selected geotechnical samples (Clause 7.6.1)	Not required.	
S1.12.2 Retention and disposal of geotechnical samples (Clause 7.6.2)	As specified.	
S1.12.3 Frequency of sampling for geotechnical purposes (Clauses 7.6.3-7.6.11)	Sampling shall be in accordance with Clause 7.6.4 except. In boreholes, UT100 samples shall be taken in cohesive strata at 1.0m intervals immediately followed by an SPT in the first 5m. Thereafter, UT100 samples to be undertaken at 1.5m intervals immediately followed by an SPT. In granular strata, SPTs to be undertaken at 1.0m intervals for the first 5m and at 1.5m intervals thereafter. UT100 sample tubes to be in accordance with BS EN ISO 22475-1:2006 and manufactured from metal. Use of plastic liners not permitted. Area ratio of cutting shoe not to exceed 15%.	
S1.12.4 Open-tube and piston sample diameters (Clause 7.6.5)	Sampling shall be in accordance with Clause 7.6.5: 100mm diameter samples to be taken using thin-wall sampler type UT100 (OS-T/W).	
S1.12.5 Retention of cutting shoe samples (Clause 7.6.5)	Soil from the cutting shoe of an open tube sample shall be retained as a small disturbed sample.	
S1.12.6 Delft and Mostap sampling (Clause 7.6.12)	Not required.	
S1.12.7 Groundwater level measurements during exploratory hole construction (Clause 7.7)	As specified.	
S1.12.8 Special geotechnical sampling (Clause 7.8)	Not required.	
S1.12.9 Address for delivery of selected samples (Clause 7.9.2)	Not required.	
S1.12.10 Retention and disposal of contamination/WAC samples (Clause 7.9.3)	As specified.	
S1.12.11 Frequency of sampling (Clause 7.9.4)	Samples for contamination testing shall be recovered in all exploratory holes from any Made Ground encountered at surface, 0.3m, 0.5m, and 1.0m and thereafter at intervals of depth not exceeding 0.5m and at least one sample from the underlying natural stratum. Further sampling undertaken on the instructions of the Supervisor. Contamination samples shall also be taken from strata where contamination might be suspected due to visual or olfactory assessment.	

	Soil contamination sample containers to consist of a 1ltr amber glass jar, with Teflon or foil sealed cap (or 2 x 500ml amber glass jar with foil sealed caps), 1ltr air tight plastic tub and a 40ml amber glass vial.			
S1.12.12 Sampling method (Clause 7.9.5)	As specified.			
S1.12.13 Headspace testing (Clause 7.9.8)	Photoionisation Detector (PID) readings required at 0.5m intervals in Made Ground and 1m intervals thereafter for the full depth of the exploratory holes. Ionisation potential of PID to be not less than 10.2eV.			
S1.13 Probing and cone	penetration testing (Specification section 8) Particular restrictions/relaxations			
Not required.				
S1.14 Geophysical testin	g (Specification section 9) Particular restrictions/relaxations			
Not required.				
S1.15 In Situ testing (Spe	ecification section 10) Particular restrictions/relaxations			
S1.15.1 Tests in accordance with British Standards (Clause 10.3)	As specified.			
S1.15.2 Hand penetrometer and hand vane for shear strength (Clause 10.4.1)	Not required.			
S1.15.3 Self boring pressuremeter and high pressure dilatometer testing and reporting (Clause 10.5.1)	Not required.			
S1.15.4 Driven or push- in pressuremeter testing and reporting requirements (Clause 10.5.2)	Not required.			
S1.15.5 Menard pressuremeter tests (Clause 10.5.3)	Not required.			
S1.15.6 Soil infiltration test (Clause 10.6)	 Three infiltration tests to be carried out – as detailed in Schedule 2. A single variable head permeability test to be carried out in each cable percussion borehole in accordance with BS EN ISO 22282-2:2012. Test depths to be determined by Investigation Supervisor following a review of the geology encountered. Maximum test duration to be 1.5 hours. Only clean potable water to be used for testing. No exploratory locations to be left unattended during infiltration tests. 			
S1.15.7 Special in situ testing and reporting requirements (Clause 10.7)	Not required.			

S1.15.8 Interface probe (Clause 10.8)	Not required.			
S1.15.9 Contamination screening tests (Clause 10.9)	Not required.			
S1.15.10 Metal detection (Clause 10.10)	Not required.			
S1.16 Instrumentation (S	pecification Section 11) Particular restrictions/relaxations			
S1.16.1 Protective covers for installations (Clause 11.2)	Flush lockable cast iron protective steel stop cock covers, 152mm diameter which are approved to EN124 B125 are required. Headworks to be installed in accordance with EA Guidance publication Guidance on the Design and Installation of Groundwater Quality Monitoring Points, SC020093, 2006.			
S1.16.2 Protective fencing (Clause 11.3)	Not required.			
S1.16.3 Standpipe and standpipe piezometer installations (Clauses	Monitoring well installations to be based on 50mm diameter HDPE or UPVC well screen and plain casing. Screen sections to have a maximum slot size of 0.5mm. Filter geo-wrap may be required.			
11.4.1 anu 11.4.2)	Filter pack to comprise clean washed 10mm shingle – grading to meet filter specification CIRIA C515.			
	Standpipe piezometers to be based on 19mm PVC tubing.			
	Actual installation depths of response zone and seals to be determined by the Investigation Supervisor.			
S1.16.4 Other piezometer installations (Clause 11.4.3)	Not required.			
S1.16.5 Development of standpipes and standpipe piezometers	At the completion of drilling and well installation, the well shall be cleaned and developed prior to any subsequent sampling for groundwater – see BS ISO 14686 (2003).			
(Clause 11.4.5)	Well development to be achieved by either removing 3 well volumes of water, or by measuring the chemical quality of the pumped water until the following parameters stabilize:			
	Electrical conductivity			
	pH, temperature			
	Dissolved oxygen			
	Cleaning and development shall take place at least one week prior to sampling			
S1.16.6 Ground gas standpipes (Clause 11.5)	Ground gas standpipes to be based on 50mm diameter HDPE or UPVC well screen and plain casing. Filter pack to comprise clean washed non-calcareous 10mm shingle. Gas valve required.			
S1.16.7 Inclinometer installations (Clause 11.6)	Not required.			

S1.16.8 Slip indicators (Clause 11.7)	Not required.			
S1.16.9 Extensometers and settlement gauges (Clause 11.8)	Not required.			
S1.16.10 Settlement monuments (Clause 11.9)	Not required.			
S1.16.11 Removal of installations (Clause 11.10)	No installations to be removed.			
S1.16.12 Other instrumentation (Clause 11.11)	Not required.			
S1.17 Installation monito	ring and sampling (Specification section 10) Particular restrictions/relaxations			
S1.17.1 Groundwater level reading in	Groundwater level readings to be taken weekly in all groundwater/ground gas monitoring wells during fieldwork period.			
installations (Clause 12.2)	Readings also to be taken during six weekly return visits to site as part of gas/groundwater monitoring programme. The first visit shall be carried out one week after the completion of site works.			
	Both water level and base of hole/installation tip to be recorded on field records.			
	The frequency of return visits to be agreed in advance with the Investigation Supervisor.			
S1.17.2 Groundwater sampling from installations (Clause 12.3.1)	Groundwater sampling required from the monitoring wells specified by the Investigation Supervisor. If possible, groundwater sampling is also required in the boreholes BH01A and WS01 as part of a previous ground investigation carried out by GeoCon (locations to be provided by Investigation Supervisor).			
	Sampling to be carried out in accordance with BS EN ISO 22475-1. Programme to be agreed with the Investigation Supervisor.			
	The procedure for groundwater sampling shall be based on the following key stages:			
	1. Well cleaning and development – as a precursor to groundwater sampling			
	2. Groundwater Level survey			
	3. Purge			
	4. Sample			
	5. Well cleaning and development			
	6. At the completion of drilling and well installation, the well shall be cleaned and developed prior to any subsequent sampling for groundwater.			
	7. Well development to be achieved by either removing 3 well volumes of water, or by measuring the chemical quality of the pumped water until the following parameters stabilize:			
	8. Electrical conductivity			
	9. pH, temperature			
	10. Dissolved oxygen.			

11. Cleaning and development shall take place at least one week prior to sampling – see S1.16.5.
Groundwater Level
Groundwater levels in all monitoring boreholes shall be recorded on the same day, wherever possible. Before any purged water is removed from the well, the depth to the surface of the groundwater shall be measured using a dip meter. The depth to the bottom of the well shall also be recorded. The point of reference (or datum) for the depth measurements shall be recorded. See S1.17.1.
Where non-aqueous phase liquids (NAPL) are suspected or present, an interface probe shall be used to measure the depth to the top and bottom of any free product. Should free product be present, care should be taken to avoid cross contaminating boreholes.
Purging
In order to gain a representative groundwater sample, and to remove stagnant water, the well shall be purged prior to sampling. The method of purging depends on the sampling equipment to be used (See S1.17.3) and the ability of the ground to yield water.
If the well yield (rate of water entry into the well) is greater than the purge rate, then the well may be purged by either of the following methods:
removal of three well volumes
micro-purging
If the well yield is less than the purge rate, the well should be de-watered, and then sampled after the water level has recovered to at least 50% of its original level.
If free product is present, only micro-purging should be considered, and samples taken pre- and post-purging.
Micro-purging should be adopted where the removal of three well volumes is impractical, hazardous, or environmentally detrimental.
During micro purging, the following groundwater parameters shall be measured using a low flow cell:
Electrical conductivity, pH, temperature, dissolved oxygen.
During purging, a record of the field parameters shall be kept.
Water samples are to be taken on completion of purging. Water samples should be taken in amber glass jars and vials as specified by the receiving laboratory. The quantity of sample shall be commensurate with the laboratory testing identified in the Bill of Quantities and the stated detection limits. As a minimum, water sample containers to consist of 2×1 ltr amber glass jars with Teflon lined cap, 1 ltr plastic bottle and duplicate 40ml amber glass vials.
Laboratory protocols shall be followed in relation to the preservation and handling of samples.
All samples should be clearly and unambiguously labelled with job number, sample location, date and analysis required. Chain of custody (COC) forms shall be used for all samples. All samples to be stored in cool boxes following sampling and whilst in transit to the laboratory.
All monitoring data should be clearly recorded, together with the date and reference to the project number in a field notebook. Comments on any odour, sheens, colours etc should also be recorded.

	between boreholes:		
	use a clean pair of disposable gloves for each different well		
	dedicate a pump and tubing to each well		
	clean all sampling equipment between exploratory holes.		
S1.17.3 Purging/micro- purging (Clause 12.3.2)	Purging or micro purging of all monitoring well installations is required as a precursor to sampling – see S1.17.2. Investigation Supervisor to be notified if purge time exceeds 3 hours.		
S1.17.4 Ground gas monitoring (Clause 12.4)	Monitoring required weekly in combined groundwater/gas standpipes during fieldwork period.		
12.7)	Readings also to be taken during six return visits to site. Monitoring programme to be agreed with Investigation Supervisor. At least one visit should coincide with a period of falling barometric pressure when rain is forecast.		
	Gas monitoring should include:		
	Methane (CH4) % v/v		
	Carbon Dioxide (CO2) % v/v		
	Carbon Monoxide (CO) ppm		
	• Oxygen (O2) % v/v		
	Hydrogen Sulphide (H2S) ppm		
	Gas flow (I/hr)		
	Atmospheric pressure (mb)		
	Differential Pressure (mb or Pa)		
	Monitoring to be undertaken in accordance with the following procedures:		
	Record Borehole location, number and type of installation. Note condition of gas well and record any unusual features (i.e. damage to headworks, condition of gas tap/cap or bung (open/shut), missing gas tap etc). Notify Investigation Supervisor of any defects. Do not remove gas tap/bung prior to monitoring;		
	Follow manufacturer's instruction for energising gas detector, zero all gas channels;		
	Record atmospheric pressure from the monitoring equipment, weather, air temperature and ground condition;		
	Connect gas flow line to gas tap, open tap and monitor positive/negative gas flow (I/hr), atmospheric (mb) and differential pressure (mb or Pa) until steady state conditions. Sampling period shall not be less than 3 minutes, close gas tap and record findings;		
	Close gas tap and disconnect gas flow meter or gas monitor. Attach monitoring equipment to gas tap and open;		
	Monitor gas concentrations of Carbon Dioxide, Methane, Oxygen, Carbon Monoxide and Hydrogen Sulphide until steady state conditions achieved. Monitoring at 15 second intervals for the first three minutes then 1 minute intervals for five minutes then at 2 minute intervals to ten minutes and then at five minute intervals – if required;		
	Carry out PID monitoring – if specified;		
	Close gas tap. Purge monitoring equipment to vent until reading atmospheric conditions;		
	Remove bung. Water level readings shall be taken detailing depth of water below		

	ground level and depth to base of the hole (noting any obstructions);
	Replace bung, close gas tap and secure well headworks.
	Evidence of portable equipment calibration shall be supplied with the results of the monitoring. Where the equipment is used to monitor landfill gas emission for Environment Agency regulation purposes the portable equipment selected shall be MCERTS certified unless otherwise agreed with the Investigation Supervisor.
S1.17.5 Sampling from ground gas installations	Not required.
S1.17.6 Other monitoring (Clause 12.8)	Not required.
S1.17.7 Sampling and testing of surface water bodies (Clause 12.9)	Not required.
S1.18 Daily records (Spe	cification section 13) Particular restrictions/relaxations
S1.18.1 Information for	As specified.
daily records (Clause 13.1)	The Contractor's site engineer shall telephone the Investigation Supervisor at the end of each working day, prior to leaving site, to advise of progress on site, any delays or obstructions and the following day's schedule.
	Drillers' daily record sheets shall be e-mailed to the Investigation Supervisor.
	Contact details for the Investigation Supervisor shall be as follows:
	Tel: 01727 535732
	Email: jessica.cheng@aecom.com
S1.18.2 Special in situ tests and instrumentation records (Clause 13.4)	Not required.
S1.19 Geotechnical labor	atory testing (Specification Section 14) Particular restrictions/relaxations
S1.19.1 Investigation Supervisor or Contractor to Schedule testing (Clause 14.1.1)	The Investigation Supervisor, in conjunction with the Contractor will schedule the testing on the basis of the daily records. Contractor to provide blank laboratory schedules.
S1.19.2 Tests required (Clause 14.1.2)	Reference the Bill of Quantities attached.
S1.19.3 Specification for tests not covered by BS 1377 and options under BS1377 (Clauses 14.2.1 and 14.4)	Not required.
S1.19.4 UKAS accreditation to be adopted (Clause 14.3)	All testing to be UKAS accredited.

S1.19.5 Rock testing requirements (Clause 14.5)	As specified.		
S1.19.6 Chemical Testing for aggressive ground/groundwater for concrete (Clause 14.6)	Test Suites A to D may be required – details to be confirmed at time of scheduling.		
S1.19.7 Laboratory testing on site (Clause 14.7)	Not required.		
S1.19.8 Special laboratory testing (clause 14.8)	Not required.		
S1.20 Geo-environmenta	l laboratory testing (Specification section 15) Particular restrictions/relaxations		
The detection limits for che	emical testing shall be as advised in Schedule 5.		
S1.20.1 Investigation Supervisor or Contractor to schedule testing (Clause 15.1)	The Investigation Supervisor, in conjunction with the Contractor will schedule the testing on the basis of the daily records. Contractor to provide blank chemical laboratory schedule within 24 hours of the samples being taken. Laboratory receipt confirmations shall be provided within 24 hours of submitting the testing schedules.		
S1.20.2 Accreditation required (Clause 15.2)	2 Accreditation MCERTS where available, otherwise UKAS. ed (Clause 15.2)		
S1.20.3 Chemical Testing for contamination (Clause 15.3)	Test Suites E to G are not required and have been deleted. Test suites likely to be adopted are identified in Bill of Quantities attached. AECOM Minimum Detection Limits to be adopted are detailed in Schedule 5. Contractor to confirm limits of detection, test methods and accreditation for each individual determinand. Contractor to also detail laboratory to be used for the testing and the testing turnaround times.		
S1.20.4 Waste characterisation (Clause 15.4)	Not required.		
S1.20.5 Waste Acceptance Criteria Testing (Clause 15.5)	Test suites H to J may be required.		
S1.20.6 Laboratory testing on site (Clause 15.6)	Not required.		
S1.20.7 Special laboratory testing (Clause 15.7)	Not required.		
S1.21 Reporting (Specific	cation section 16) Particular restrictions/relaxations		
S1.21.1 Form of exploratory hole logs (Clauses 16.1 and 16.2.1)	Preliminary logs shall be submitted to the Investigation Supervisor within 3 working days of completion of the explorations to which they refer.		
S1.21.2 Information on exploratory hole logs	As specified.		

(Clause 16.2.2) S1.21.3 Variations to final digital data supply requirements (Clause	As specified.		
16.5.1)	Derviced		
digital data (Clause	Required. Drillers logs are required 24 hours after each exploratory hole completion.		
16.5.3)	Draft engineering logs are required 3 days after each exploratory hole completion		
	Return monitoring results are required 3 days after each visit, except in the case of a sampling visit when results are required 24 hours after the visit.		
	A preliminary or draft factual report is required on completion of all laboratory testing.		
	Draft AGS data is required 3 days after completion of fieldworks and is to be provided at time of issue of the draft factual report. AECOM may request AGS updates as the programme progresses.		
	Preliminary laboratory results should be provided as specified in Clause 3.		
	Final Geotechnical and Geo-environmental Interpretative Report report to be issued on completion of monitoring and laboratory testing.		
S1.21.5 Type(s) of report required (Clause	Geotechnical and Geo-environmental Interpretative Report to include the followings in addition to those specified in Clause 16.8.1:		
16.6)	- Interpretation of geotechnical aspects of the investigation works;		
	- Interpretation of the geo-environmental aspects of the investigation;		
	 Derivation of geotechnical design parameters for design of the permanent works; 		
	- Assessment of options and recommendations for foundation design;		
	- Advice on excavation and earthworks;		
	- Advice on groundwater issues;		
	- Assessment of the geotechnical risks associated with the development;		
	 Consideration of ground-related risk posed from the soil in accordance with current practice and current guidance; 		
	 Consideration of risk, both, from and to controlled waters in accordance with current guidance; 		
	 Preliminary advice on the disposal classification for arisings from the proposed construction works; 		
	- Assessment of the risk of gas to the development;		
	 Report on contamination investigation findings (including gas and groundwater monitoring); 		
	 Report on geotechnical investigation results with design parameters and foundation recommendations; and 		
	 Comment as to the requirement for remedial action (if required). Remediation strategy if required is additional to this. 		
S1.21.6 Electronic	As specified except:		
report requirements (Clause 16.6.3)	Photographs to be JPG format. The exploratory hole layout shall be provided in PDF format and in electronic format compatible with AutoCAD 2015.		
S1.21.7 Format and contents of Desk Study report (Clause 16.7)	Not required.		
S1.21.8 Contents of	As specified in Schedule S1.21.5.		

Ground Investigation report (or specified part thereof) (Clause 16.8) S1.21.9 Contents of Geotechnical Design Report (or specified part thereof) (Clause 16.9)	As specified in Schedule S1.21.5.
S1.21.10 Times for supply of electronic information (Clause 16.10.1)	Draft engineering logs and AGS format data to be submitted within 3 working days of site works completion. Complete set of digital data to be supplied with draft and approved final copies of the report.
S1.21.11 Electronic information transmission media (Clause 16.10.2)	Email and DVD ROM.
S1.21.12 Report approval (Clause 16.11)	One electronic copy of the draft factual report required for submission to the Investigation Supervisor one week after the completion of laboratory testing (excluding monitoring). Investigation Supervisor's comments on the draft to be issued within one week of receipt. One hard and one electronic copy of the final approved report to be submitted by the Contractor within one week of completion of the final return monitoring visit.

SCHEDULE 1.19.6 (Derived from BRE Special Digest SD1)

Sheet 1 of 3

CHEMICAL TESTS ON POTENTIALLY AGGRESSIVE GROUND/GROUNDWATER

SUITE A Greenfield Site (pyrite absent) Sample Type Determinand **Recommended Test Methods** Test Method Specified / Offered** Soil pH in 2.5:1 water/soil BR279 Electrometric extract BS1377 Part 3, Method 9 SO4 in 2:1 water/soil BR279 Gravimetric method, cation exchange or extract ion chromatography BS1377 Part 3 Method 5.3 + 5.5 TRL447 Test 1 Groundwater pН BR279 Electrometric BS1377 Part 3, Method 9 SO4 BR279 Gravimetric method, cation exchange or ion chromatography BS1377 Part 3 Method 5.4 + 5.5 Commercial lab in-house procedure determination of sulphur by ICP-AES

SUITE B Greenfield Site (pyrite present)

Soil	pH in 2.5:1 water/soil	BR279 Electrometric
	extract	BS1377 Part 3, Method 9
	SO4 in 2:1 water/soil extract	BR279 Gravimetric method, cation exchange or ion chromatography
		BS1377 Part 3 Method 5.3 + 5.5
		TRL447 Test 1
	Acid soluble SO4	BR279 Gravimetric method
		BS1377 Part 3, Method 5.2 + 5.5
		TRL447 Test 2
	Total sulphur	BR279 Ignition in oxygen
		TRL447 Test 4A
		TRL447 Test 4B
Groundwater	рН	BR279 Electrometric
		BS1377 Part 3, Method 9
	SO4	BR279 Gravimetric method, cation exchange or ion chromatography
		BS1377 Part 3 Method 5.4 + 5.5
		Commercial lab in-house procedure – determination of sulphur by ICP-AES

ICP-AES : inductively coupled plasma atomic emission spectroscopy

** Either Investigation Supervisor to specify method required or Contractor to detail method(s) offered.

SCHEDULE 1.19.6 (Derived from BRE Special Digest SD1)

Sheet 2 of 3

CHEMICAL TESTS ON POTENTIALLY AGGRESSIVE GROUND/GROUNDWATER

			T (N () 10 () () ()
Sample Type	Determinand	Recommended Test Methods	Test Method Specified / Offered**
Soil	pH in 2.5:1 water/soil	BR279 Electrometric	
	extract	BS1377 Part 3, Method 9	
	SO4 in 2:1 water/soil	BR279 Gravimetric method, cation exchange or ion chromatography	
		BS1377 Part 3 Method 5.3 + 5.5	
		TRL447 Test 1	
	Mg (only required if	BR279 AAS method	
	water soluble SO4 > 3000 mg/l)	Commercial lab in-house procedure - variant of BR279 using ISP-AES	
	NO3 in 2:1 water/soil extract (only required if pH < 5.5)	BR279	
	Cl in 2:1 water/soil	BR279	
	extract (only required if pH < 5.5)	BS1377 Part 3, Method 7.2	
Groundwater	рН	BR279 Electrometric	
		BS1377 Part 3, Method 9	
	SO4	BR279 Gravimetric method, cation exchange or ion chromatography	
		BS1377 Part 3 Method 5.4 + 5.5	
		Commercial lab in-house procedure – determination of sulphur by ICP-AES	
	Mg (only required if	BR279 AAS method	
	water soluble SO4 ≥ 3000 mg/l)	Commercial lab in-house procedure – Mg in solution by ICP-AES	
	NO3 (only required if pH < 5.5)	BR279	
	CI (only required if pH < 5.5)	BR279	
		BS1377 Part 3, Method 7.2	

SUITE C Brownfield Site (pyrite absent)

ICP-AES : inductively coupled plasma atomic emission spectroscopy

AAS : atomic absorption spectrometry

** Either Investigation Supervisor to specify method required or Contractor to indicate method(s) offered.

SCHEDULE 1.19.6 (Derived from BRE Special Digest SD1)

Sheet 3 of 3

CHEMICAL TESTS ON POTENTIALLY AGGRESSIVE GROUND/GROUNDWATER

SUITE D Brownfield Site (pyrite present)

Sample Type	Determinand	Recommended Test Methods	Test Method Specified / Offered**					
Soil	pH in 2.5:1 water/soil	BR279 Electrometric						
	extract	Recommended Test Methods Test Method Specified / Offered** BR279 Electrometric BS1377 Part 3, Method 9 BR279 Gravimetric method, cation exchange or ion chromatography Estarrage and the starrage and the						
	SO4 in 2:1 water/soil	BR279 Gravimetric method, cation exchange or ion						
	extract	chromatography						
		BS1377 Part 3 Method 5.3 + 5.5						
		TRL447 Test 1						
	Acid soluble SO4	BR279 Gravimetric method						
		BS1377 Part 3, Method 5.2 + 5.5						
		TRL447 Test 2						
	Total sulphur	Offered** BR279 Electrometric BS1377 Part 3, Method 9 BR279 Gravimetric method, cation exchange or ion chromatography BS1377 Part 3 Method 5.3 + 5.5 TRL447 Test 1 BR279 Gravimetric method BS1377 Part 3, Method 5.2 + 5.5 TRL447 Test 2 BR279 Ignition in oxygen TRL447 Test 4A TRL447 Test 4B BR279 AAS method Commercial lab in-house procedure - variant of BR279 using ISP-AES BR279 BR279 Part 3, Method 9 BR279 Part 3 Method 5.4 + 5.5 Commercial lab in-house procedure – determination of sulphur by ICP-AES						
		TRL447 Test 4A	-447 Test 4A					
		TRL447 Test 4B						
	Mg (only required if water	BR279 AAS method						
	soluble SO4 > 3000 mg/l)	Commercial lab in-house procedure - variant of BR279 using ISP-AES						
	NO3 in 2:1 water/soil extract (only required if pH < 5.5)	BR279						
	Cl in 2:1 water/soil extract	act BR279 5.5) BS1377 Part 3, Method 7.2						
	(only required if pH < 5.5)							
Groundwater	рН	BR279 Electrometric						
		BS1377 Part 3, Method 9						
	SO4	BR279 Gravimetric method, cation exchange or ion chromatography						
		BS1377 Part 3 Method 5.4 + 5.5						
		Recommended Test Methods Test Method Specified / Offered** BR279 Electrometric BS1377 Part 3, Method 9 BR279 Gravimetric method, cation exchange or ion chromatography BS1377 Part 3 Method 5.3 + 5.5 TRL447 Test 1 BR279 Gravimetric method BS1377 Part 3, Method 5.2 + 5.5 TRL447 Test 2 BR279 Ignition in oxygen TRL447 Test 4A TRL447 Test 4B BR279 Junition in oxygen TRL447 Test 4B BR279 Junition in oxygen TRL447 Test 4B BR279 BR279 BR279 BR279 BS1377 Part 3, Method 7.2 BR279 BR279 BR377 Part 3, Method 5.4 + 5.5 Commercial lab in-house procedure – determination of sulphur by ICP-AES BR279 BR279 BR279 BR279 BR279 BR279 BR279 BR279 BR279 BR279 BR						
	Mg (only required if water	BR279 AAS method						
	soluble SO4 ≥ 3000 mg/l)	Commercial lab in-house procedure – Mg in solution by ICP-AES						
	NO3 (only required if pH < 5.5)	BR279						
	CI (only required if pH <	BR279						
	5.5)	BS1377 Part 3, Method 7.2						

ICP-AES : inductively coupled plasma atomic emission spectroscopy

AAS : atomic absorption spectrometry

** Either Investigation Supervisor to specify method required or Contractor to indicate method(s) offered.

Schedule 2: Exploratory Holes

Hole Number	Hole Type ¹	Scheduled Depth ² (m)	In-situ Testing³	Instrumentation	Remarks	
BH01	СР	35		50mm diameter	-	
BH02	СР	35		gas/g	gas/groundwater	-
BH03	СР	35	- SP1, 01100, PD	and 19mm standpipe piezometer	Replaced with a window sample rig if access proves difficult	
HP01-29	HP	1.0	-	-	Intended for structural inspection; only geo- environmental samples to be taken	
HP30-34	HP	1.0	-	-	These are proposed along the eastern boundary of the site, adjoining Astor College	

Notes:

- 1. CP denotes cable percussive borehole; HP denotes hand dug observation pit.
- 2. HP30-34 are provisional items subject to access to that part of the site.

Schedule 3: Investigation Supervisor's Facilities

Not required.

Clause 7.9.2 Transportation and storage of samples:

Insert: after last sentence:

Potential Asbestos Containing Material (pACM) shall be sampled and labelled in accordance with the requirements prescribed by The Control of Asbestos Regulations, 2012.

Table 1 AECOM Minimum Detection Limits for Soil & Water

Determinand	Minimum Detection Limits for Soil ¹	Minimum Detection Limits for Water ²
Acrylamide	10mg/kg	
Alkalinity (as CaCO ₃)	N/A	20mg/l
Aluminium	NA	200 µg/l
Ammonia	N/A	1mg/l
Ammoniacal Nitrogen	10mg/kg	0.2mg/l
Antimony	2.0mg/kg	5.0µg/l
Arsenic	2.0mg/kg	5.0µg/l
Asbestos identification + w/w	0.01%	N/A
Barium	5.0mg/kg	10µg/l
Benzo(a)pyrene	0.1mg/kg	<0.010µg/l
Beryllium	5.0mg/kg	5µg/l
Boron	1mg/kg	<1.0mg/l
Bromate	NA	<10µg/l
5 day BOD	N/A	3 mg/l
BTEX by GCMS	0.002 mg/kg	0.001mg/l
Cadmium	0.5mg/kg	1.0µg/l
Calcium	20mg/kg	500µg/l
Chloride	200mg/kg	2.0mg/l
Chromium - Hexavalent	5.0mg/kg	0.01mg/l
Chromium – Total	2.0mg/kg	10.0µg/l
Cobalt	1.0mg/kg	10µg/l
COD	N/A	5mg/l
Electrical Conductivity	NA	2500µS/cm
Copper	2.0mg/kg	5.0µg/l
Cyanide – Easily Liberated	5.0mg/kg	0.03mg/l
Cyanide – Total	5.0mg/kg	0.03mg/l
Cyanide complex	25mg/kg	0.25mg/l
Diesel Range Organics (C ₁₀ -C ₄₀)	5mg/kg	100µg/l
Dissolved Oxygen	N/A	1mg/l
Electrical Conductivity	10µScm ⁻¹	10µScm ⁻¹
Fluoride	1.0mg/kg	0.1mg/l
Iron	10mg/kg	20.0µg/l
Lead	5.0mg/kg	10.0µg/l
Loss on Ignition	0.1% w/w	N/A
Magnesium	10mg/kg	100.0µg/l
Manganese	5.0mg/kg	10.0µg/l
Mercury	0.3mg/kg	0.05µg/l
Methylene Blue AS	0.5mg/kg	0.05mg/l
Mineral Oil	50mg/kg	100µg/l
Molybdenum	5mg/kg	10.0µg/l
Nickel	2.0mg/kg	5.0µg/l
Nitrate	1.0mg/kg	0.05mg/l
Nitrite	1.0mg/kg	0.05mg/l
Organolead compounds	0.01mg/kg	0.01mg/l
Organotin compounds	0.05mg/kg	0.03µg/l
PAH EPA-16 BY GC-MS	0.05mg/kg per	0.0001mg/l.por.compound
(Low detection limit)	compound	
PAH EPA-19 BY GC-MS	0.05mg/kg per	0.0001mg/l per compound

Determinand	Minimum Detection Limits for Soil ¹	Minimum Detection Limits for Water ²
(Low detection limit)	compound	
PCB's (7 congeners)	0.005mg/kg	0.1µg/l
PCBs ICES-7 Congeners)	0.005mg/kg	0.001mg/l
PCTs	1mg/kg	0.05mg/l
Pesticides (individual)	0.1mg/kg	0.1 - 1µg/l
Pesticides / Herbicides (per suite)	0.1mg/kg dependant on compound and nominated methodology	0.001mg/l dependant on compound and nominated methodology
На	0.1 pH unit	0.1 pH unit
Phenols – monohydric	3ma/ka	0.02mg/l
Phenols – speciated by GC-MS	0.01mg/kg dependant on compound	0.001mg/l dependant on compound
Phenols – speciated by HPLC	0.02mg/kg	0.005mg/l
Phenols – total monohydric (4-AMP)	1mg/kg as phenol	0.02mg/l
Phenols – total by HPLC	0.02mg/kg	0.005mg/l
Phosphate	5.0mg/kg	0.05mg/l
Phosphorous – total by ICP	10mg/kg	0.02mg/l
Potassium	20mg/kg	500µg/l
Reduced TPH – CWG Package	50mg/kg	10 µg/l
Selenium	0.5mg/kg	0.01mg/l
Solvent Extractable Material (SEM) (Cyclohexane, Dichloromethane or Toluene)	500mg/kg	4mg/l
Sodium	20mg/kg	500µg/l
Sulphate – Acid soluble	200mg/kg	NA
Sulphate – Water Soluble	10mg/kg	2.0mg/l
Sulphide (acid volatile)	10mg/kg	0.05mg/l
Sulphur – Elemental	50mg/kg	NA
Sulphur - Total	50mg/kg	NA
Suspended solids	NA	1mg/l
SVOC – based on USEPA 8270	0.1mg/kg per component dependant on compound and methodology	Between 10µg/l and 60µg/l dependant on compound and methodology
SVOCs – based on USEPA 8270	0.01mg/kg	0.001mg/l
SVOCs + 10 prominent peaks	0.01mg/kg	0.001mg/l
Total Dissolved Solids	N/A	5mg/l
Thallium	5mg/kg	1.0µg/l
Tin	5mg/kg	1.0µg/l
Thiocyanate	5mg/kg	0.03mg/l
Total Organic Carbon (TOC)	100mg/kg	1mg/l
Total Organic Carbon	100mg/kg	1mg/l
TPH by GC-FID (Inc. description)	5mg/kg	0.1mg/l
TPH by GC-MS	5mg/kg	1mg/l
TPH by IR	10mg/kg	0.1mg/l
TPH with Basic Carbon Banding	5mg/kg	0.1mg/l
TPH with RBCA Carbon Banding	0.1mg/kg	0.1mg/l
TPH-CWG Banding + BTEX & MTBE	0.1/mg/kg	0.1mg/l
Total Suspended Solids	N/A	5mg/l
Vanadium	2.0mg/kg	20µg/l
VOC's (EPA 624/8260, individual)	Between 0.002mg/kg and 0.025mg/kg dependant on	Between 1µg/l and 25µg/l dependant on compound

Determinand	Minimum Detection Limits for Soil ¹	Minimum Detection Limits for Water ²	
	compound		
VOCs + 10 prominent peaks (TICS)	See above	See above	
VOCs by headspace GC-MS	See above	See above	
Water Soluble Boron	0.5mg/kg	50.0µg/l	
Vinyl Chloride	0.001mgkg	1µg/l	
Zinc	2.0mg/kg	5.0µg/l	

1. All metals reported as dissolved (<0.45 μ m) acid soluble fraction except where stated;

2. Where sediment constitutes >0.1% v/v the sample will be decanted and the sediment reserved for possible analysis subject to Supervisor's instruction;

Pre-tender H&S Plan – Assessment of Potentially Hazardous Site

Give details of where hazardous materials may be found

Checklist of hazards expected - tick as appropriate

1. Methane		
2. Carbon Dioxide		
3. Hydrogen Sulphide		
4. Other gases		
5. Heavy metals		
6. Polychlorinated biphenyls (PCB)	~	Associated with the presence of electricity sub-stations in the vicinity of the site
7. Free phase hydrocarbons		
8. Phenol and its compounds		
9. Pesticides		
10. Asbestos	~	There is evidence that asbestos was widely reported across the site
11. Domestic Refuse	~	Associated with current site use
12. Industrial Waste	~	Associated with former use of the site
13. Extreme pH conditions		
14. Coal tars/polyaromatic hydrocarbons (PAH)		
15. Cyanide		
16. Combustibility hazards (e.g. coal dust)		
17. Radioactive substances		
18. Weil's disease (rats)	~	
19. Other contaminants	~	Possible presence of unexploded ordnance

Assessment as part of the site under SISG Classification:	YELLOW	
Special precautions to be taken – as SISG recommendation:		
Additional precautions advised:		

Personal Protective & Site Safety Equipment¹

	ITEM	GREEN	YELLOW	RED
1	Hard Hat	•	•	•
2	Gloves and other forms of hand protection	•	•	•
3	Eye Protection (as necessary)	•	•	•
4	Ear Protection	•	•	•
5	Overalls	•	•	•
6	Waterproofs (as necessary)	•	•	•
7	Industrial Boots with Sole & Toe Protection	•	•	•
8	High Visibility Clothing	•	•	•
9	Fire Extinguisher	•	•	•
10	Fire Blanket	•	•	•
11	First Aid Kit	•	•	•
12	Mobile Telephone (outside contaminated area)	•	•	•
13	Clean Water Supply	•	•	•
14	Washing Facilities	•	•	•
15	Dust Mask ²		•	•
16	Gas Mask ²		•	•
17	Disposable Overalls (as necessary)		•	•
18	Ropes, Cones and Barriers		•	•
19	Safety / Warning Signs		•	•
20	Changing / Washing Facilities		•	•
21	Methane Detector (as necessary)		•	•
22	Carbon Dioxide Detector (as necessary)		•	•
23	Oxygen Deficiency Detector (as necessary)		•	•
24	Other Gas Detectors (as necessary)		•	•
25	Face Shield			•
26	Disposable Waterproofs			•
27	Wellington Boots with Sole and Toe Protection			•
28	Respiratory Equipment (as necessary)			•
29	Decontamination Unit			•

Other Safety Equipment

The following specialist equipment may be required:				
30	Spark Arrestors / Chalwin Valve			
31	Air Blower (as necessary)			
32	Vertical Exhaust Stacks (as necessary)			
33	Blow Out Preventer			

NOTE: The use of items 1 to 33 inclusive needs to be referenced to the contact Risk Assessment and the Site categorisation.

Notes on PPE

- 1. The PPE indicated in the table above is the PPE that is required to be used on site unless there is agreement within the Construction Phase Plan that the PPE must be available on site but not necessarily worn at all times. This could be for certain activities or throughout the work.
- 2. In respect of YELLOW and RED sites, Items 15 and 16 must be available on site. Consideration should then be given in each individual case as to whether the contaminants can cause respiratory problems. If they can then respiratory PPE must be worn.
- 3. Respiratory Protective Equipment comprising half and full face masks must be face fitted in accordance with HSE requirements.

Pre-tender H&S Plan – Geotechnical Designer's Risk Assessment

The Contractor should be guided by the Principles of Protection suggested by the Designers to control the identified hazards and risks in preparing his Method Statements and executing the work, passing all relevant information on to his employees and Sub Contractors.

The risk rating indicated is Likelihood/Severity as follows:

Likelihood:	H = High	Certain or near certain to occur
	M = Medium	Reasonably likely to occur
	L = Low	Very seldom or never occurs
Severity:	H = High	Fatality, major illness or injury causing long term disability
	M = Medium	Injury or illness causing short term disability
	L = Low	Other injury or illness

The acceptance strategy is:

H/H	Design or avoid
L/L	May be ignored
Others	Control or minimise

The following sheets identify the significant risks which may be encountered during the course of the works. These should be considered as part of the works in formulating the most appropriate methods of carrying out the works.

Ref No.	Activity	Significant hazard	Persons at risk	Risk Rating Likelihood/Severity
1	General access/Site deliveries	Conflict with other site users	Site users and Contractor	L/H
	Principles of protection	Contractor to liaise with the site in statement including provision of working areas. Contractor staff to the movement of farm machinery crossing Church Lane.	representatives to prov suitable barriers etc. to o wear hi-vis vests in tr y on site. Extra caution	vide detailed method b keep site users from rafficked areas. Beware of h to be exercised when
2	Existing buried services	Damage to existing services causing disruption to user or injury, e.g. electrocution or gas leaks	Site users, Contractor and neighbouring site users	M/H
	Principles of protection	Available record drawings of exis Contractor to obtain further informaccuracy of records by tracing se hand-dug pits prior to commenci accordance with HSE47 publicat Services.	sting services to be pro mation as necessary. (ervices on site, e.g. CA ng boring. Service clea tion – Avoiding Danger	ovided to the Contractor. Contractor to check AT survey and excavate arance work undertaken in from Underground
3	Inspection Pit/ Trial Pit/ Observation Pit	Collapse of sides	Contractor & Site users	L/H
	Principles of protection	All pit locations cleared via CAT access to pits unless shored/ber personnel to stand back from tria All pits to be backfilled immediate method statement regarding all t	scan prior to dig. No conceed excavation with a al pit edge and avoid si ely following completion rial excavations.	ontractor/supervisory staff safe access/exit. All site tanding on 'long' side of pit. n. Contractor to submit
4	Contaminated Ground	Contact with contaminated soils, groundwater or surface water	Contractor	L/H
	Principles of protection	All Contractor staff to wear appropriate protective clothing and avoid direct contact with soil by wearing suitable PPE including gloves and overalls in accordance with BDA Guidance for Safe Intrusive Activities on Contaminated or Potentially Contaminated Land – 2008. If unexpected contaminated material suspected or identified contact Supervises for advise		
5	Cable Percussive Rig	Physical contact with drilling tools and ropes, exhaust, moving parts, noise hazard	Contractor/ Engineer	L/H
	Principles of protection	All operatives and supervisory staff to wear high visibility clothing, safety helmets, safety boots, eye protection, ear defenders and appropriate gloves. Working areas to be cordoned off as appropriate with signage as applicable. Contractor to comply with the Provision and Use of Work Equipment Regulations 1998 (PUWER) and the BDA Guidance Notes for the Protection of Persons from Rotating Parts & Ejected or Falling Material Involved in the Drilling Process.		
6	Tracked Window Sampler Rig	Tracked unit, drilling tools, exhaust, noise hazard	Contractor/ Engineer	L/H
	Principles of protection	All operatives and supervisory st safety boots, eye protection, ear and safety shields to be fitted to appropriate with signage as appl with the Provision and Use of We the BDA Guidance Notes for the Ejected or Falling Material Involv	aff to wear high visibili defenders and approp rig. Working areas to licable. Works should e ork Equipment Regula Protection of Persons red in the Drilling Proce	ty clothing, safety helmets, oriate gloves. Correct covers be cordoned off as ensure they are compliant tions 1998 (PUWER) and from Rotating Parts & ess

Tender Documents and Specification for Ground Investigation

Figures







	Station Information:
	Station Easting (m) Northing (m) Level (m) 1 1
	3
	4 5
	6 7
	8 9
j.	10
	Building Survey Legend:
	HHt 2.12 Head Height from FFL. SL 51.03m Sill Level from defined datum. HL 52.82m Head Level from defined datum.
	Susp CHt: 2.00 Suspended Ceiling Height from FFL. Struct CHt: 3.00 Structural Ceiling Height from FFL.
	Susp Ceil: 30.00m Suspended Ceiling Level from datum. Struct Ceil: 31.00m Structural Ceiling Level from datum. IFL: 100.00m Internal Floor Level (General).
27.30	+100.00m Internal Floor Level (Specific).
	Topographical Legend:
27.23 ⁺ 27.12 ^{<i>ic</i>} 27.12 ^{<i>ic</i>} 27.34	Although O.S. Coordinates may be shown on this plan the grid is to be treated as arbitrary. No scale factor has been applied to the survey therefore the any coordinates shown are not true O.S. Coordinates.
26.57 26.74^+ 27.32 27.32 26.74^+ 27.1 27.32 27.32	Please refer to Survey Station Coordinate Table above to enable correct establishment of the on-site grid used. OS Buildings Surveyed Buildings
26.51×10^{-2} 26.67×10^{-10} $26.67 \times 10^{$	Buildings / walls Kerb line Edge of surface Canopy / Overhang Line Marking
25.23 + 25.23 + 26.49	Bartler British Telecom Hedge Fire Hydrant Security Fence Photos Stop tap Hedge Open Fire Hydrant Hedge Stop tap
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26.74 26.38 + 26.61	
26.45 + + + + + 26.84	Gate Water level IC Inspection chamber Height CL Cover level Internal floor level IL Invert level Threshold level D lace 20.25
⁴ + 2 ^{26.75} 2 ^{6.2} 26.81	P.Inv 90.25 Pripe inver (gameter) ps Rodding Eye Gy Gully Drop keb Drop keb Bg Back Gully Gas Gas MH Manhole Er Earth rod
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26.45 31.0 726.29 760 7	91 High Street Amernyst Koda 40-761 Katowice Markyate Newcastle Bus. Park Poland St ALbans Necastle-U-Tyne AL3 8JG Net 7YL t. (01582) 842746 t. (01912) 736391 t. 0048 32 202 2292
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Cos	Composite Drawing.
accordance with "UK Specification for Ground	SCALEDATEDRAWNQUALITY REF1: 200June 2010LWB0350
ired to extend for the full denth of the foundations $5^{-26.39}$	9 Level datum Ordnance Survey GPS Grid orientation Ordnance Survey GPS
rond the formation levels to avoid risk of undermining.	Job number 13514 Drawing No. Rev.
mation to be outlined in the Ground Investigation Report:	13514_11_P A
or existing retaining wall and boundary wall foundations; g pitting;	This plan should only be used for its original purpose. GreenHatch Ltd accepts no responsibility for this plan if supplied to any party other than the original client.
undations where encountered (i.e. granular / solid,	All dimensions should be checked on site prior to design and construction. Drainage information (where applicable) has been
ns both at formation of the footing and at ground level.	Notes: Care is to be taken when scaling from hardcopies.
	Greenhatch cannot verify the accuracy of hardcopies.



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