Plots A & B, Cargo Fleet, Middlesbrough

Ground Investigation Tender

November 2015

47075211

Prepared for: Homes and Communities Agency (HCA)

REVISION SCHEDULE					
Rev	**Date**	**Details**	**Prepared by**	**Reviewed by**	**Approved by**
0	November 2015	Issue 01	Adam Yusaf Graduate Environmental Consultant	Phillip Parker Project Manager	Dr Lawrence Bowden Associate

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DRAWINGS

Cargo Fleet, Middlesbrough
Ground Investigation

INSTRUCTIONS TO TENDERERS

1	Tenderers will receive Tender Documents as listed in the letter of invitation to tender. The Tenderer shall promptly acknowledge receipt of the Tender Documents.	**THE TENDER DOCUMENTS AND ACKNOWLEDGEMENT OF RECEIPT**
2	If there is any query regarding the meaning of the Tender Documents the Tenderer shall set out such queries in writing for clarification by the Engineer. If, nevertheless, at the time of tendering any such doubt should remain, the Tenderer shall submit such statement setting out these doubts with his tender.	**CLARIFICATION**
3	Prior to the date for the submission of Tenders the Engineer may issue Addenda or Corrigenda to clarify, modify or add to the Tender Documents. A copy of each Addendum or Corrigendum will be issued to every Tenderer and shall become part of the Tender Documents. No addition or alteration shall be made to the Tender Documents unless it is the subject of an addendum or corrigendum. The Tenderer shall promptly acknowledge receipt of each Addendum or Corrigendum.	**ADDENDA OR CORRIGENDA**
4	Tenderers, before entering upon any land or premises being the Site of any of the works comprised in this Contract to inspect same, shall make prior arrangements to do so through the Engineer.	**PRE TENDER INSPECTION**
5	The Tender documents shall be returned to the offices of the **Employer** not later than 13:00hr on the date stated in the letter of invitation to tender.	**RETURN OF TENDERS**
6	Tenders shall be submitted by completion of the Form provided and Declaration relating to Collusive Tendering which shall not be detached from the associated documents. Every item in any Schedules of Rates upon which the Tender has been based for which the Tenderer would expect to be paid under any ensuing Contract shall be legibly priced in ink.	**SUBMISSION OF TENDERS**
7	If a Tenderer decides that he is unable to submit a tender he shall immediately notify the person responsible for the project (as stated in the letter of invitation). The Tenderer shall then return all Tender Documents to the Engineer, including any copies. The Tenderer shall state in writing the reasons for withdrawal.	**WITHDRAWAL**
8	The Employer does not bind himself to accept the lowest or any Tender, nor be responsible for, or pay for, any expenses or losses incurred by the Tenderer in the preparation of his Tender.	**ACCEPTANCE OF TENDERS**
9	The name and CV of the proposed supervising Engineering geologist / Geo-environmental Scientist shall be submitted with the Tender.	**SUPERVISION**

COLLUSIVE TENDERING CERTIFICATE

The essence of tendering is that the Employer shall receive *bona fide* competitive tenders from those tendering. In recognition of this principle, we certify that this is a bona fide tender, intended to be competitive, and that we have not fixed or adjusted the amount of tender by or under or in accordance with any agreement or arrangement with any other person. We also certify that we have not done and we undertake that we will not do at any time before the hour and date specified for the return of this tender any of the following acts :-

a) communicating to a person other than the person calling for those tenders the amount or approximate amount of the proposed tender, except where the disclosure, in confidence, of the approximate amount of the tender was necessary to obtain insurance premium quotations required for the preparation of the tender;

b) entering into any agreement or arrangement with any other person that he shall refrain from tendering or as to the amount of any tender to be submitted;

c) offering or paying or giving or agreeing to pay or give any sum of money or valuable consideration directly or indirectly to any person for doing or having done or caused or having caused to be done in relation to any other tender or proposed tender for the said work any act or thing of the sort described above.

In this certificate the word "person" includes any person or any body or association, corporate or unincorporate; and "any agreement or arrangement" includes any such, transaction, formal or informal, and whether legally binding or not.

Signed : .....

on behalf of: .....

.....

Date: .....

FORM OF TENDER APPENDIX – PART 1
(NOTE: Relevant Clause numbers are shown in brackets)

Appendix – Part 1 (to be completed prior to the invitation to tender)

1	Name and Address of the Employer (Clause 1(1)(a)	Homes and Communities Agency (HCA)	
2	Name and Address of the Engineer (Clause 1(1)(c)	AECOM	
3	Defects Correction period (Clause 1 (1) (w))	4	Weeks
4	Parts or Sections of the Investigation which shall not be sub-contracted without the Engineer's prior written approval (Clause 4(2))	Full-time supervision of fieldwork by suitably qualified engineer/ competent person	
5	Number and type of copies of drawings to be provided (Clause 6(1)(b))	Figure 1 – Plot A Site Location Plan Figure 2 – Plot B Site Location Plan 47070945-PlotA-MCR-14-08-15 – Plot A Exploratory Hole Location Plan 47070945-PlotB-MCR-14-08-15 – Plot B Exploratory Hole Location Plan	
6	Form of Agreement (Clause 9) If Agreement required		Not required N/A
7	Performance Bond (Clause 10(1)) Amount of Bond (if required) to be	% %	Not required N/A
8	Minimum amount of third party insurance (persons and property) (Clause 23(3)) for each and every occurrence		£5,000,000
9	Commencement Date (if known) (Clause 41(1)(a)	One week from Award	
10	Time for completion calculated from the Commencement Date (Clause 43) Section A the whole of the Site Operations Section B Laboratory Results Section C Final Report	 4 Weeks 7 Weeks 8 Weeks	
11	Liquidated damages for delay (Clause 47) Section A (as above) Section B (as above) Section C (as above)	Per day/week £350/day £175/day £175/day	Limit of liability £3500 £1750 £1750
	The total of the Liquidated Damages shall not exceed (Clause 47(3))		£7000

12	Vesting of materials not on site (Clauses 54(4) and 60(1)(c) (if required by the Employer)	1. 2. 3.	
13	Method of measurement adopted in preparation of Bills of Quantities (Clause 57)	N/A	
14	Percentage of the value of goods and materials to be included in Interim Certificates (Clause 60(2)(b))		Not required
15	Minimum amount of Interim Certificates (Clause 60(3))		£5000
16	Rate of retention (recommended not to exceed 5%) (Clause 60(5))		5%
17	Limit of retention (% of Tender Total) (Clause 60(5)) (recommended not to exceed 3%)		3%
18	Bank whose Base Lending Rate is to be used (Clause 60(7))	Royal Bank of Scotland	
19	Requirement for prior approval by the Employer before the Engineer can act. Details to be given and clause number stated (Clause 2(1)(b))		
20	Name and address of CDM Co-ordinator (Clause 71(1)(b))	Contact: N/A	
21	Name and address of the Principal Contractor (if appointed) (Clause 71(1)(b)	Contact:	
22	Not applicable		
23	Maximum sum for the Contractor to make changes without an instruction (Clause 13(4))		£100
24	The arbitration procedure to be used is (Clause 66(11)(a))		The Institution of Civil Engineers Arbitration Procedure 1997

FORM OF TENDER APPENDIX – PART 2
(To be completed by the Contractor)

1	Insurance Policy Excess (Clause 25(2)) if required by Contractor Insurance of the Investigation (Clause 21(1)) Third Party (property damage) (Clause 23(1))	 £ £	
2	Time for completion calculated from the Commencement Date (Clause 43) (if not completed in Part 1 of the Appendix) Sections of the Investigation (Clause 1(1)(y)) (as detailed in Part 1 of the Appendix)	Section A the whole site Operations Section B Section C	As show in Part 1
3	Vesting of materials not on site (Clause 54(4) and 60(1)(c)) (at the option of the Contractor see in part 1)	1 2 3	4 5 6
4	Sub-contractors to be used by the Contractor (Clause 4(3))		
5	Percentages for adjustment of PC sums (clauses 59(5)(c)) (with details if required)		

CONDITIONS OF CONTRACT

The Conditions of Contract referred to in the Tender shall be the Infrastructure Conditions of Contract for Ground Investigation (First Edition) issued in 2011, jointly by the Institution of Civil Engineers, the Association of Consulting Engineers and the Civil Engineering Contractors Association, modified and added to by subsequent amendments and modified and added to as follows:

THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2007

CLAUSE 71 CDM Regulations 2015

(1) In this Clause

(a) "The Regulations" means the Construction (Design and Management) Regulations 2015 or any statutory re-enactment or amendment thereof for the time being in force.

(b) "Principal Designer" and "Principal Contractor" mean the persons so described in Regulation 2 (1) of the Regulations.

(c) "Pre-Construction Information" means the plan prepared by virtue of Regulation 11 of the Regulations.

(2) Where and to the extent that the Regulations apply to the Investigation and the Contractor is appointed Principal Contractor.

(3) (a) Any action under the Regulations taken by either the Principal Designer or the Principal Contractor and in particular any alteration or amendment to the Pre-Construction Information shall be deemed to be an Employer's instruction pursuant to Clause 13. Provided that the Contractor shall be entitled to any additional payment and/or extension of time in respect of any such action to the extent that it results from any action lack of action or default on the part of the Contractor.

(b) If any such action of either the Principal Designer or the Principal Contractor could not in the Contractor's opinion reasonably have been foreseen by an experienced contractor the Contractor shall as early as practicable give written notice thereof to the Employer."

In accordance with Regulation 2 (1) (b) of Construction (Design & Management) Regulations 2015, the completion of a ground investigation ('investigation') is classified as a 'construction work' activity and requires an appropriate level of consideration with respect to management of health and safety throughout the project appointment.

In accordance with Regulation 6, should the construction work activity be deem to be notifiable to the Health & Safety Executive (HSE), the Principal Contractor will be responsible under his duties as set out in Regulation 13 to make the necessary arrangements for notification.

SCHEDULES

Specification

The Specification shall be the UK Specification for ground investigation (Second Edition, 2012) published by ICE Publishing, with information amendments and additions as described in the Schedules.

Schedule 1: Information and site-specific requirements

Schedule 2: Exploratory holes

Schedule 3: Investigation Supervisor's facilities

Schedule 4: Specification amendments

Schedule 5: Specification additions

SCHEDULE 1 INFORMATION

S1.1 Name of contract

Plots A and B, Cargo Fleet, Middlesbrough, Ground Investigation

S.1.2 Investigation Supervisor

Dr Lawrence Bowden
Associate
AECOM
4th Floor Bridgewater House
Whitworth Street
Manchester, M1 6LT
Tel. 0161 907 3500
Mob. 07825 363321

S1.3 Description of sites

Plots A and B, Cargo Fleet are located off Shepherdson Way in Middlesbrough.

Plot A

Plot A comprises a roughly triangular parcel of land which occupies approximately 1.2 hectares (Ha) at National Grid Reference (NGR) 450730, 520325 and is located to the east of Shepherdson Way. A site location plan is provided in Figure 1.

The site has a broadly level topography at approximately 5 meters Above Ordnance Datum (mAOD) with a small slope (~1m) in the west of the site immediately adjacent to Shepherdson Way. The site is predominantly covered by grass with occasional trees.

Ormesby Beck flows adjacent to the northern boundary of the site.

Plot B

Plot B comprises a roughly triangular parcel of land and occupies approximately 3.4 hectares (Ha) at National Grid Reference (NGR) 450659, 520145. Shepherdson Way is located along the eastern boundary of the site and the A66 is located along the southern boundary of the site. A site location plan is provided in Figure 2.

The site elevation is at approximately 5 meters Above Ordnance Datum (m AOD) and slopes gently towards the west. The site is currently an area of overgrown grassland including reeds (indicating areas of wet and boggy ground). The northern finger of the site is covered by dense trees and vegetation and was inaccessible during a site walk over. A large portion of the west of the site is covered by thick reeds and has been noted to have an uneven surface. A track runs approximately north-south along the length of the site.

Ormesby Beck flows adjacent to the northern and western boundaries of the site.

Historically, Ormesby Beck flowed across the northern sections of plots A and B, but was diverted around the sites to allow development.

Giant hogweed has been noted close to and potentially extending over, the southern boundary of the site.

S1.4 Main works proposed and purpose of this contract

The Homes and Communities Agency (HCA) wants to compile information to aid with the divestment of both sites to interested third parties. It is likely that the sites will be developed as a commercial development in the future.

The purpose of the Contract is to obtain information on ground and groundwater conditions to aid with the divestment of the sites. The information will be specifically used to:

- Confirm the ground profile including the depth to rock head so that foundation depths and design parameters can be determined in the future.
- To obtain samples for chemical testing for human health, controlled waters risk assessment and specification of concrete class.
- To install monitoring equipment to characterise the risk posed by ground gases on any future development.

S1.5 Scope of investigation

The ground investigation shall comprise a detailed geotechnical and geo-environmental investigation of the ground conditions at both sites. The investigation shall comprise the following:

Plot A

- 3No. cable percussive boreholes – comprising 3No. to rock head (anticipated to be approximately 20-25m bgl) or to a maximum depth of 30m bgl.
- 1No. rotary follow-on, 10m core below rockhead, or to maximum depth of 40m bgl;
- 3No. windowless sample boreholes to a target depth of 4m bgl.
- 1No. machine excavated trial trench – comprising 1No. to 4m bgl and extending until the full extent of the infilled Ormesby Beck is determined i.e. full channel width and depth.
- Combined ground gas and groundwater monitoring wells in all three boreholes.
- Ground gas monitoring wells to be installed in 2No.selected windowless sample boreholes.
- Geotechnical and chemical testing of selected samples.

Plot B

- 3No. cable percussive boreholes – comprising 3No. to rock head (anticipated to be approximately 20-25m bgl) or to a maximum depth of 30m bgl.
- 1No. rotary follow-on, 10m core below rockhead, or to maximum depth of 40m bgl;
- 9No. windowless sample boreholes to a target depth of 4m bgl.
- Combined ground gas and groundwater monitoring wells in all three boreholes.
- Ground gas monitoring wells to be installed in 5No.selected windowless sample boreholes.
- Geotechnical and chemical testing of selected samples.

In situ tests including Standard Penetration Tests and UT100 undisturbed samples and hand vane (HV) will be performed within the exploratory holes.

Where available, the utilities information will be provided before the start of the ground investigation.

For reporting requirements refer to Sections S1.17.

S1.6 Geology and ground conditions

The following assessment of the geology of the sites and ground conditions has been inferred from available information. No assurance is given to its accuracy.

Plot A

The BGS 1:50,000 map (Sheet Number 33, solid and drift edition) infers that the site is underlain by superficial Tidal Flat Deposits of sand, silt and clay. The bedrock geology is noted to be mudstones of the Mercia Mudstone Group.

The table below shows the anticipated ground conditions at Plot A, taken from a BGS borehole log located approximately 25m to the west of the site.

Strata	Description
Made Ground	Loose very clayey sand and gravel with cobbles of brick and pockets of firm gravelly clay up to a maximum depth of 4m bgl.
Superficial Deposits (Tidal Flat Deposits)	Very soft to soft peaty organic rich clays extending from 4m bgl to 20.9m bgl.
Superficial Deposits (Tidal Flat Deposits)	Sandy clays extending from 20.9m bgl to 24m bgl
Solid Geology (Mudstone)	Weathered bedrock was encountered at 24m bgl.
Solid Geology (Sandstone)	Sherwood Sandstone Ground has been proven from 75m bgl to a depth of approximately 140m bgl.

Plot B

The BGS 1:50,000 map (Sheet Number 33, solid and drift edition) infers that the majority of the site is underlain by superficial Tidal Flat Deposits of sand, silt and clay. The south-western corner of the site in noted to have a superficial geology comprising clays and silts. The bedrock geology is noted to be mudstones of the Mercia Mudstone Group.

The table below shows the anticipated ground conditions in the north of Plot B.

Strata	Description
Made Ground	Loose very clayey sand a gravel with cobbles of brick and pockets of firm gravelly clay up to a maximum depth of 4m bgl
Superficial Deposits (Tidal Flat Deposits)	Very soft to soft peaty organic rich clays extending from 4m bgl to 20.9m bgl.
Solid Geology (Mudstone)	Mercia Mudstone bedrock was encountered at depths between 22.5m bgl and 27m bgl. This unit has been proven to be approximately 53m in thickness.
Solid Geology (Sandstone)	Sherwood Sandstone Group has been proven to a depth of approximately 140m bgl.

The table below shows the anticipated ground conditions in the south-west of Plot B.

Strata	Description
Made Ground	Clays with pockets of gravel with cobbles of brick and rubble extending to depths between 0.9m bgl and 1.25m bgl.
Superficial Deposits (Alluvium)	Soft to stiff laminated clays with silt partings, sand lenses and gravel inclusions to between 12.25m bgl and 13.6m bgl.
Solid Geology (Mudstone)	Mercia Mudstone bedrock was encountered at depths between 12.25m bgl and 25m bgl.

S1.7 Schedule of drawing(s) and documents

Where available, services information will be provided to the Contractor prior to the commencement of works.

The following drawings have also been made available, appended to this specification:

- Figure 1 – Plot A Site Location Plan
- Figure 2 – Plot B Site Location Plan
- 47070945-PlotA-MCR-14-08-15 – Plot A Exploratory Hole Location Plan
- 47070945-PlotB-MCR-14-08-15 – Plot B Exploratory Hole Location Plan
- *Appendix A - Service Information – To be provided in advance of works*

S1.8 General requirements (Specification Section 3) particular restrictions/relaxations

Contract specific restrictions/relaxations, if any, shall be inserted below

S1.8.1 Quality management system (Clause 3.3)

Quality management to BS EN ISO 9001, BS EN ISO 14001 and BS OHSAS 18001 required, where appropriate.

S1.8.2 Professional attendance (Clause 3.5.2)

Full time supervision of the site works is required by a suitably qualified and experienced Engineering Geologist, Geotechnical Engineer or Environmental Scientist with **at least** three years post graduate experience.

S1.8.3 Provision of ground practitioners and other personnel (Clauses 3.6.1 and 3.6.2)

The Bill of Quantities shall be used to detail the Contractors expected cost to prepare the factual report.

S1.8.4 Hazardous ground, land affected by contamination and notifiable and invasive plant species (Clauses 3.7.1 and 3.22)

The following are considered to be sources of potential contamination at the site of the proposed development.

Made Ground – It is anticipated that approximately 4m of made ground will be present across the site. It is not known whether there is contamination present, however, the historical industrial nature, including a

Bridge and Engineering Works across Plots A and B is such that contaminants must be considered to be likely to be present

It should be expected that the near surface soils (especially any made ground) may be affected by local contamination resulting from previous uses of the land.

All work shall be carried out in accordance with the Site Investigation Steering Group "Guidelines for the Safe Investigation by Drilling of Landfills and Contaminated Land, 1993".

The suggested BDA classification for the site is YELLOW, tenderer please advise if not in agreement with this BDA classification.

The Contractor shall provide on-site all protective plant and equipment necessary for work on a **YELLOW** site.

Site Designation	**Green**	**Yellow**	**Red**
Personal Protective Equipment			
Hard Hat	*	*	*
Eye Protection		*	*
Face Shield		*	*
Hand Protection	*	*	*
Overalls	*	*	
Disposable Overalls			*
Waterproofs		*	*
Disposable Waterproofs			*
Industrial Boots with Sole and Toe Protection	*	*	*
Wellington Boots with Sole and Toe Protection	*	*	*
Respiratory Equipment		*	*
Site Equipment/Services			
Mobile telephone (outside contaminated area)		*	*
Ropes, Cones and Barriers			*
Safety/Warning Signs	*	*	*
Clean Water Supply	*	*	*
Changing Room/Washing Facilities		*	*
Decontamination Room/Washing Facilities			*
Emergency Equipment			
Fire Extinguisher	*	*	*
Fire Blanket	*	*	*
First Aid Kit	*	*	*

A Principal Designer may need to be appointed by the client for this project, in accordance with CDM 2015 regulations. The Contractor will be appointed as the Principal Contractor under CDM 2015 regulations during the investigation.

The Principal Contractor and Sub-Contractors shall comply with the Health and Safety at Work Act, (1974), the Control of Pollution Act, (1974), the Control of Substances Hazardous to Health Regulations, 1999, the Environmental Protection Act, (1990), and all other relevant statutory requirements.

S1.8.5 Additional information on services not shown on Contract drawings (Clause 3.7.2)

The Contractor will be provided with a plan showing the location of known buried services. The position and depths of the apparatus are approximate only and the Contractor shall not be relieved of any liability of any damage caused by reason of the actual position and/or depth being different from those indicated on the contract drawings. There is also a probability that other, unrecorded services, exist at the site. Appropriate steps shall be taken by the Contractor to satisfy himself that avoidance of buried and overhead services has been carried out.

All borehole locations will commence with a hand dug inspection pit to 1.2m with continuous CAT scanning.

S1.8.6 Known/suspected mine workings, mineral extractions etc (Clause 3.7.3)

None reported.

S1.8.7 Protected species (Clause 3.7.4)

None reported.

S1.8.8 Archaeological remains (Clause 3.7.5)

None recorded

S1.8.9 Security of site (Clause 3.11)

The Contractor shall be responsible for providing secure stores for his own plant and equipment for the duration of the site works. In addition. The contractor will be responsible for securing their equipment on site and providing appropriate security and fencing, if required.

The contractor shall also be responsible for preventing unauthorised access to the site by members of the public.

S1.8.10 Traffic management measures (Clause 3.12)

None

S1.8.11 Restricted working hours (Clause 3.13)

Working hours shall be between 8am and 6pm Monday to Friday.

S1.8.12 Trainee site operatives (Clause 3.14.1)

Not permitted

S1.8.13 Contamination avoidance and/or aquifer protection measures required (Clauses 3.15.2 and 3.15.3)

Suitable wash-down facilities shall be provided for percussion boring, and trial pitting plant / equipment to be decontaminated on completion of each exploratory hole and on completion of site works. This could be achieved at the boring location or in a separate wash-down area.

A 1m thick bentonite seal shall be placed at the interface at the base of the made ground at all borehole locations and the borehole continued using smaller diameter casing to limit the potential for downward migration of contamination at the site.

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)

A maximum of 1 hrs should be spent followed by SPT test in accordance with Clause 2.8.

S1.8.15 Reinstatement requirements (Clause 3.16)

The Contractor shall be required to back fill each exploratory hole in accordance with the approved method statement and the requirement of the specification. The Contractor shall remove any surplus spoil from site and leave the area in clean and tidy condition.

The original turf/topsoil will be set-aside prior to the excavation of trial trench. The turf/topsoil will then be reused for reinstatement. Reinstatement must be carried out to the satisfaction of the Engineer.
The proposed method of placing and compacting trial pit backfill should be included with the Contractor's method statement.

S1.8.16 Hygiene facilities required (Clauses 2.20 and 3.16.1)

Hygiene facilities are to be provided by the Contractor shall to be commensurate with a 'YELLOW' site.

S1.8.17 Unavoidable damage to be reinstated by Contractor (Clause 3.16.1)

To be made good by the Contractor.

S1.8.18 Accuracy of exploratory hole locations (Clauses 3.19 and 3.20)

The Contractor is required to set out the locations of all boreholes and trial pits/trenches as given on Drawing Numbers 47070945-PlotA-MCR-14-08-15 and 47070945-PlotB-MCR-14-08-15 to +/- 3m accuracy. Locations of exploratory holes may be re-positioned on site, with the agreement of the Engineer, to ensure the required clearance to existing services and avoid access points or other areas where the Engineer deems fit.

Coordinates shall be established for each installation and the centre of each trial pit to the nearest 0.001m +/- 0.001m accuracy.

S1.8.19 Photography requirements (Clause 3.25)

Sufficient photographs to show the condition of the whole site prior to the start of the investigation works and an analogous set of photographs on completion of the investigation.

Further particular Contract restrictions

S1.8.20 Access and Security

The trial trench and boreholes shall have temporary fencing to define the working area and to limit public access and create a safe work zone.

Any holes left open overnight shall be protected using measures as detailed in the Contractor's risk assessment.

S1.8.21 Site Induction

On arrival all Contractors must have a full site induction prior to starting work on site.

S1.8.22 Order of Works

The Contractor should provide in advance of the works a programme detailing the proposed order of works in order for access arrangements to be made.

S1.8.23 Method Statements

Method statements should be submitted by the Contractor for each aspect of the works.

- Proposed method for identifying and avoiding buried services.
- The proposed excavation method for trial pits.
- The type of drilling equipment to be used including details on the capability of obtaining undisturbed samples.
- Proposed method of placing and compacting backfill and reinstating surface.
- Risk Assessment and proposed safety method for undertaking the works.

S1.8.24 Health and Safety

The Contractor will be responsible for insuring and maintaining that all site staff and visitors are given an appropriate site induction upon arrival on to the site and where deemed necessary updates are undertaken duration the programme of the site works.

S1.9 Percussion boring (Specification Section 4) Particular restrictions/relaxations

Contract specific restrictions/relaxations, if any, shall be inserted below.

Method and diameter

The method of advancement and the diameter of a borehole shall be such that the boring can be completed (without undue disturbance or ground loss) and logged to the specified depth, and samples of the specified diameter can be obtained, in situ testing carried out and instrumentation installed as described in Schedule S2. For all cable percussion boreholes, the hole shall be commenced in a diameter that allows for reduction at the made ground/ natural ground interface. Drilling methods and equipment will be clearly stated within the Contractor's Method Statement. The proposed method of working must take into account the ground conditions, testing requirements, required depth and installations.

The Contractor shall ensure that boreholes remain open at all times to allow the installation of groundwater/gas monitoring wells (where specified).

All logging shall be in accordance with BS EN ISO 14688/14689 Part 1.

Full time supervision of all drilling operations is required.

No boreholes will be terminated without the consent of the Engineer.

Addition of water to the borehole

Water shall not generally be used to assist advancement of the borehole through clay strata except as detailed in the Clause below or where approved by the Engineer.

Where the borehole penetrates below the water table in laminated clay strata and disturbance of the soils is likely, a positive head of water shall be maintained in the borehole and the Engineer shall immediately be informed of the details.

Where the borehole penetrates through granular strata above the standing groundwater level, water may be added to the borehole to assist boring.

Where the borehole penetrates through granular strata below the standing groundwater level, a positive hydraulic head shall be maintained in the borehole.

Hard stratum or obstruction in percussion boring

Where a hard stratum or obstruction is encountered the Contractor shall employ hard boring techniques for a period of up to one hour or as specified in Schedule S1.8.14. Should this not penetrate through the hard stratum or obstruction the Contractor shall inform the Engineer who may instruct the use of one or more of the following.

a) the continuation of appropriate techniques (e.g. chisel/shell with additional weights);

b) the abandonment of the borehole and a further borehole started nearby, with sampling and/or in situ testing commencing at the termination depth of the original borehole.

The progress rate observations and driving tests necessary to demonstrate that a 'hard stratum' or 'obstruction' has been encountered shall be included on the daily record.

Artesian water

Where artesian water is encountered the Contractor shall cease progressing the hole, immediately inform the Engineer and attempt to contain the artesian head by extending the casing above the existing ground level by as much as is practical.

Backfilling

No artesian head

Except on land potentially affected by contamination or as required in Schedule S1.9.2, the Contractor shall backfill boreholes on completion of the boring with arisings in such a manner as to minimise subsequent depression at the ground surface due to settlement of the backfill. On land affected by contamination, or where specified in Schedule S1.9.2, backfill shall comprise either bentonite pellets or cement/bentonite grout as specified or otherwise required by the Engineer.

Artesian head less than 1m above ground level

On completion of the boring, the exploratory hole shall be sealed using bentonite pellets or a grout mix injected through a tremmie pipe. The method to be used shall be approved by the Engineer. If it is not possible to extract the casing it shall be left in the hole permanently.

Artesian head more than 1m above ground level

On completion of the boring the exploratory hole shall be grouted up as specified in clause 4.5.2 except that grouting operations shall be carried out by appropriate methods approved by the Engineer.

S1.9.1 Permitted methods and restrictions (Clauses 4.1 to 4.4)

As specified.

S1.9.2 Backfilling (Clause 4.5)

The Engineer shall be contact for instructions with respect to in-situ testing, backfilling or installation details when the scheduled depth of the borehole is reached. Backfilling of borehole with soil arising is not permitted (Clause 4.5), unless otherwise agreed with the Engineer. All boreholes shall be backfilled with cement bentonite grout, following the requirements of the Engineer, with standpipes and piezometers together with their response zones installed at the depths specified by the Engineer.

Standpipe installations are to be installed in all cable percussion/rotary boreholes and ten selected windowless soil borehole locations. Exact details of the installation are to be agreed between the Contractor and the Engineer on completion of drilling.

S1.9.3 Dynamic sampling (Clause 4.6)

Not required.

S1.10 Rotary drilling (Specification Section 5) Particular restrictions/relaxations

Rotary core drilling will be required in all cable percussive boreholes if rock head is proved at a depth no greater than 30m.

Rotary drilling shall be commenced from the base of the cable percussion borehole at each of these locations for an additional depth as summarised below:

Plot A

- 1No. rotary coring borehole for an additional 10 metres

Plot B

- 1No. rotary coring borehole for an additional 10 metres

S1.10.1 Augering requirements and restrictions (Clauses 5.1)

Not Required

S1.10.2 Particular rotary drilling techniques (Clause 5.2)

Rotary drilling shall be carried out to obtain continuous cores in bedrock. Care should be taken to obtain a minimum of 90% core recovery or the maximum possible recovery under the prevailing ground conditions.

Where 90% core recovery is not achieved a Standard Penetration Test (SPT) shall be carried out in the rotary cored hole. The following cored run will not be greater than 1m. This sequence will be continued until 90% or greater core recovery is achieved. Any changes to the method of recovery shall be discussed and agreed with the Engineer prior to the commencement of works.

Rotary drilling shall be carried out using the appropriate flushing method (air flush unlikely to be suitable in the Mercia Mudstone Group).

S1.10.3 Drilling fluid type and collection (Clause 5.3)

Rotary drilling shall be carried out using the appropriate flushing method to ensure the Clause 5.2 is achieved (summarised in Section S1.10.2 above).

S1.10.4 Rotary core drilling equipment and core diameter (Clauses 5.4.1 and 5.4.2)

Rotary core drilling shall be undertaken using a triple tube barrel to produce a core with a diameter not less than 87mm.

S1.10.5 Core logging (Clause 5.4.6)

Cores shall be photographed and then logged by a geotechnical engineer or an engineering geologist with not less than 3 years post graduate experience, in accordance with BS EN 14689-1: Geotechnical investigation and testing — Identification and classification of rock.

S1.10.6 Core sub-samples for laboratory testing (Clause 5.4.7)

Cores may be selected on site for laboratory testing. Such samples should be wrapped in cling film and sealed to prevent drying out and labelled. The core samples should then be placed in suitable containers to prevent damage during transit. This may include core boxes divided into sections with the individual samples placed between spacers and protected by packing at each end.

S1.10.7 Address for delivery of selected cores (Clauses 5.4.8 and 5.4.9)

Not required.

S1.10.11 Resonance (sonic) drilling with sampling or continuous coring (Clause 5.6.2)

Not required

S1.10.12 Backfilling (Clause 5.7)

The Engineer shall be contacted for further instructions with respect to in-situ testing, backfilling or installation details when the scheduled depth of the borehole is reached. Backfilling of boreholes with soil arisings is not permitted (Clause 4.5), unless otherwise agreed with the Engineer. All boreholes shall be backfilled with cement bentonite grout, following the requirements of the Engineer, with standpipes and piezometers together with their response zones installed at the depths specified by the Engineer.

Backfilling of the cored section of boreholes completed by rotary core drilling shall be carried out using a 2:1 bentonite cement grout.

S1.10.13 Core photographic requirements (Clause 5.8.)

Cores are to be photographed and the photographs presented in the Factual Report. Each box of core shall be photographed with a photo board clearly labelled with the Contract name and number, the Clients name, the borehole number box number, number of boxes of core from the borehole, and the depth to the top and base of the core. Wooden blocks shall be placed in the channels within the core showing the depths at the top and base of the core box and the depths at the beginning/ end of each core run. Spacers will be used to show the extent of any assumed zones of core loss, the top and base of these zones will be shown on the spacers.

S1.11 Pitting and trenching (Specification Section 6) Particular restrictions/relaxations

Trial pits and trenches are to be excavated to a depth of 4m bgl. One trial trench which is proposed within the north-west corner of Plot A is to be excavated to a depth of 4m bgl and extended to delineate the extent and depth of the former Ormesby Beck channel. Hand vane tests are required at 1.0m intervals and /or change of strata. All machine excavated trial pits and trenches must be completed and backfilled during the same shift. No excavation shall be left unattended.

Excavation methods and equipment will be clearly stated within the Contractor's Method Statement. The proposed method of working must take into account the ground conditions, testing requirements, required depth and reinstatement requirements.

All logging shall be in accordance with BS EN ISO 14688/14689.

Full time supervision of all trial pit and trenching operations is required.

S1.11.1 Indirect detection of buried services and inspection pits (Clauses 3.8.3 and 6.1)

All exploratory hole locations are to be CAT scanned by a qualified CAT scan operator.

Inspection pits are required to a depth of 1.2m at all exploratory locations, with the exception of trial trenching where the upper 1.2m shall be excavated in 150mm layers using a toothless bucket.

S1.11.2 Restrictions on plant or pitting/trenching methods (Clauses 6.2 and 6.3)

Trial pits are to be backfilled as soon as the pit has been logged and photographed unless otherwise agreed with by the Engineer. If it is necessary to leave a trial pit backfilled and unattended, even for a short period, the trial pit should be fenced off by a barrier at least 1.8m high.

S1.11.3 Entry of personnel (Clause 6.5)

Not permitted

S1.11.4 Alternative pit and trench dimensions (Clause 6.7)

One trial trench which is proposed in the north-west corner of Plot A is to be excavated to a depth of 4m bgl and extended to delineate the extent and depth of the former Ormesby Beck channel.

S1.11.5 Abstracted groundwater from land affected by contamination (Clause 6.9.2)

An IBC should be provided for collection and temporary storage (prior to laboratory test results for appropriate disposal) of ground water prior to disposal.

S1.11.6 Backfilling (Clause 6.10)

As specified in Schedules S1.8.15

S1.11.7 Photographic requirements (Clause 6.12)

One “down the hole” photograph orientated to show any particular features of interest, and one photograph of the spoil at each trial pit should be presented in the report.

One photograph before commencement of site clearance, one immediately before drilling/ excavation and one after completion of reinstatement at each exploratory hole.

All recovered rock core will be photographed and clearly include specific site information including as a minimum the date and time and the depth interval of the rock core recovery.

S1.11.8 Artificial lighting (Clause 6.12.2)

Not required.

S1.11.9 Provision of pitting equipment and crew for Investigation Supervisor's use (Clause 6.13)

Not required.

Further particular Contract restrictions/relaxations shall be entered below, using sequential numbers to those above

None.

S1.12 Sampling and monitoring during intrusive investigation (Specification Section 7) Particular restrictions / relaxations

Contract specific restrictions/relaxations, if any, shall be inserted below.

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 (Clause 7.6.3 to 7.6.11)

Sampling shall start immediately below the topsoil.

Cable Percussion Boreholes

One small disturbed sample and one large (25kg) bulk sample shall be taken from each stratum identified in the hand dug inspection pit at each cable percussion borehole.

Where an SPT straddles more than one soil type, each soil shall be placed in its own sample container. Where a bulk sample is taken over the same depth range as a SPT/SPTC, then different soils shall be placed in different bags.

The following sampling/testing intervals should be used as shown in the table below.

Sample Type	**Cohesive Soils**		**Granular Soils**	
	First Sample/ Test at:	**Intervals thereafter**	**First Sample/ Test at:**	**Intervals thereafter**
Small Disturbed (D)	Upon entering each cohesive stratum encountered	Midway between successive undisturbed samples and SPT's	Upon entering each stratum encountered	
Undisturbed (UT100) thin wall sample	After taking first small disturbed sample in stiff and very stiff cohesive strata	2.0m (for depth range 0m – 5m) then 3.0m (for depths greater than 5m)		
25kg Bulk Disturbed (B)			Each soil encountered over range of first SPT	Each soil encountered and over length of each SPT
SPT	1m or 1.5m after first U100 sample depending as to whether depth is above or below 5m depth.	Intermediately between each U100 sample	After hand pitting is completed (1.2m bgl).	1.0m (for depth range 1.2m – 5m) then 1.5m (for depths greater than 5m)

Trial Trenching

The following samples should be taken as shown in the table below

Sample Type	**All soil types**
Small Disturbed (D)	On entering each stratum and at 1.5m thereafter or change of strata
25kg large bulk sample (B)	From 0.5m below each small disturbed sample or change of strata

S1.12.4 Open-tube and piston sample diameters (Clause 7.6.5)

100mm diameter samples to be taken with thick wall driven tube sampler with plastic liner in firm and very stiff cohesive strata. Piston samples not anticipated.

S1.12.5 Retention of cutting shoe samples (Clause 7.6.5)

Not required.

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 in Clause 7.7.1 only. When groundwater is encountered in exploratory holes, the depth from ground level shall be recorded together with the depth of any casing. Exploratory hole operations shall be stopped and the depth from ground level to water level recorded with an approved instrument after 20 minutes.

S1.12.8 Special geotechnical sampling (Clause 7.8)

Not required.

S1.12.9 Address for delivery of selected samples (Clause 7.9.2)

As specified by Contractor.

S1.12.10 Retention and disposal of contamination/WAC samples (Clause 7.9.3)

As specified

S1.12.11 Frequency of environmental sampling (Clause 7.9.4)

Cable Percussion Boreholes:

Samples shall be taken regardless of depth with EVERY change in strata which may include changes in Made Ground composition.

If the above frequency is less than specified below then the following sampling frequency protocol should be utilised:

- Within the top 5m of excavation: a minimum of three samples will be taken from within the top 1m at approximate depths of 0.3m, 0.5m and 1.0m depth within the made ground. Samples are to be taken at approximate 1m intervals to 5m bgl;
- Greater than 5m bgl: sampling at 1.5 m intervals (where possible)
- Additional samples are to be collected from all strata where visual or olfactory evidence of contamination is observed.

Windowless Sample Boreholes & Machine Excavated Trench

Samples shall be taken regardless of depth with EVERY change in strata which may include changes in Made Ground composition.

If the above frequency is less than specified below then the following sampling frequency protocol should be utilised:

- Within the top 4m of excavation: a minimum of three samples will be taken from within the top 1m at approximate depths of 0.3m, 0.5m and 1.0m depth within the made ground. Samples are to be taken at approximate 1m intervals to 4m bgl;

- Additional samples are to be collected from all strata where visual or olfactory evidence of contamination is observed.

S1.12.12 Sampling method (Clause 7.9.5)

Sampling is to be undertaken under the supervision of a suitable qualified and experienced Engineering Geologist, Geotechnical Engineer or Environmental Scientist with at least three years post graduate experience meeting the requirements of Clause 3.5.2.

Samples taken from boreholes and trial pits shall use the procedures identified in BS 10175 (2013) to avoid cross-contamination between samples. Disposable nitrile gloves are to be worn at each location.

Soil samples for laboratory testing shall be undertaken using a stainless steel trowel which shall be decontaminated between sampling events.

S1.12.13 Headspace testing (Clause 7.9.8)

PID soil headspace readings are required for all environmental samples.

Further particular Contract restrictions/relaxations shall be entered below, using sequential numbers to those above

S1.12.14 Sample Containers (Clause 7.9.6)

All soil geo-environmental samples shall be placed in the laboratory provided sampleware appropriate for the chemical analyses required by the contract as supplied by the Contractors' appointed laboratory. The amount of sample required for contamination sampling is to be confirmed by the Contractor with the UKAS and MCERTS accredited laboratory undertaking the analysis.

Water geo-environmental samples are to be placed in laboratory supplied vials, bottles and plastic containers as per the sampling requirements for those tests required under the contract.

S1.12.15 Protection of Samples (Clause 7.9.1)

Geo-environmental samples shall be protected to ensure that their temperature is kept within the range of 1 – 4^{o} C and that samples are delivered to the laboratory within appropriate timescales to ensure that samples do not deviate. The Contractor must inform the Engineer of the deviation times. Geo-environmental samples shall also be protected from direct heat and sunlight.

S1.12.16 Transportation and Storage of Samples (Clause 7.9.2)

Geo-environmental samples shall be transported to the laboratory under chain of custody documentation and in accordance with S1.12.15, within the recommended holding times for analysis required under the contact.

S1.13 Probing and cone penetration testing (Specification Section 8) Particular restrictions/relaxations

Not required.

S1.14 Geophysical testing (Specification Section 9) Particular restrictions/relaxations

Not required.

S1.15 In situ testing (Specification Section 10) Particular restrictions/relaxations

Contract specific restrictions/relaxations, if any, shall be inserted below.

S1.15.1 Tests in accordance with British Standards (Clause 10.3)

SPTs in accordance with Clause 10.3 (BS EN ISO 22476-3)

S1.15.2 Hand penetrometer and hand vane for shear strength (Clause 10.4.1)

Hand shear vane tests should be undertaken in any cohesive strata encountered in the trial pits. A set of three hand shear vane tests shall be undertaken to determine the peak shear stress every 0.5m on excavated material from within each cohesive stratum encountered. For each set of three tests the individual results and the mean shear strength shall be presented on the trial pit logs.

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)

Not required.

S1.15.7 Special in situ testing and reporting requirements (Clause 10.7)

Not required.

S1.15.8 Interface probes (Clause 10.8)

Not required .

S1.15.9 Contamination screening tests (Clause 10.9)

Photo Ionisation Detector testing should be undertaken on each environmental sample taken.

S1.15.10 Metal detection (Clause 10.10)

Not required.

Further particular Contract restrictions/relaxations shall be entered below, using sequential numbers to those above

S1.16 Instrumentation (Section 11) Particular restrictions/relaxations

Contract specific restrictions/relaxations, if any, shall be inserted below.

S1.16.1 Protective covers for installations (Clause 11.2)

Raised lockable covers will be required for all boreholes for ease of relocation.

S1.16.2 Protective fencing (Clause 11.3)

Not required.

S1.16.3 Standpipe and standpipe piezometer installations (Clause 11.4.1 and 11.4.2)

As generally described in *Appendix I AI.1 Standpipes* of the ICE specification for general principles, but also meeting the requirements of *Appendix II AII.1 Ground-gas Monitoring Standpipes* of the ICE specification, for the standpipes which will also be used for ground-gas monitoring purposes.

Installations to be carried out using 50mm diameter HDPE pipe with installation details (filter lengths, depths, etc) to be agreed during site-works with the Engineer and to manufacturer specifications.

S1.16.4 Other piezometer installations (Clause 11.4.3)

Not required.

S1.16.5 Development of standpipes and standpipe piezometers (Clause 11.4.5)

Groundwater installations shall be developed by any of the methods outlined in Clause 11.4.5. Each standpipe shall be purged immediately after monitoring the groundwater level during the first round of monitoring within the site work period

S1.16.6 Ground gas standpipes (Clause 11.5)

As generally described in *Appendix II AII.1 Ground-gas Monitoring Standpipes* of the ICE specification. Ground-gas standpipes are also to be used for groundwater monitoring purposes.

Installations to be carried out using 50mm diameter HDPE pipe with installation details (filter lengths, depths, etc) to be agreed during site-works with the Engineer and in accordance with the manufacturers specification.

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)

Not required.

S1.16.12 Other instrumentation (Clause 11.11)

Not required.

Further particular Contract restrictions/relaxations shall be entered below, using sequential numbers to those above

S1.17 Installation monitoring and sampling (Specification Section 12) Particular restrictions/relaxations

Contract specific restrictions/relaxations, if any, shall be inserted below.

S1.17.1 Groundwater level readings in installations (Clause 12.2)

Groundwater level readings are to be taken in all standpipes during ground-gas monitoring events.

S1.17.2 Groundwater sampling from installations (Clause 12.3.1)

One round of groundwater sampling is to be undertaken from all installations two weeks following installation.

S1.17.3 Purging/micro-purging (Clause 12.3.2)

Micro-purging is the preferred method of sampling and should be measured using a low flow cell until conductivity, pH, temperature, dissolved oxygen and redox potential have stabilised. During purging, a record of the field parameters shall be kept.

S1.17.4 Ground gas monitoring (Clause 12.4)

At the end of each week of site works ground gas monitoring is to be undertaken at all completed installations. The final set of monitoring during the site works period should include all of the installations at the site.

A minimum of 6 rounds of ground-gas monitoring is to be undertaken weekly for a period of 8 weeks commencing one week after installation of the monitoring wells.

S1.17.5 Sampling from ground gas installations (Clause 12.5)

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.

Further particular Contract restrictions/relaxations shall be entered below, using sequential numbers to those above

S1.18 Daily records (Specification Section 13) Particular restrictions/relaxations

Daily drilling records shall be sent to the Engineer by email or post to arrive at the Engineer's within two working days of completion of the shift to which they refer.

S1.18.1 Information for daily records (Clause 13.1)

In addition to the requirements set out in Clause 13.1 in the absence of an Engineer on site the Contractor shall email at the end of each working day to report on progress. The Engineer shall be informed as soon as each borehole has reached its scheduled depth and if any part of the Specification cannot be carried out.

S1.18.2 Special in situ tests and instrumentation records (Clause 13.4)

Instrument installation records shall clearly include the hole diameter, installation casing and perforated screen diameter and installed depths, material descriptions and installed depths of the filter(s) and seal(s) and cover arrangements.

S1.19 Geotechnical laboratory testing (Specification Section 14) Particular restrictions/relaxations

Contract specific restrictions/relaxations, if any, shall be inserted below.

S1.19.1 Investigation Supervisor or Contractor to schedule testing (Clause 14.1.1)

The Engineer shall prepare the test schedules within three working days of receipt of the Contractors Draft Engineers Exploratory Hole Logs. The Contractor shall provide the Draft Engineer's Log for each exploratory hole within two working days of the completion of each borehole, including instrumentation, together with a testing schedule sheet showing all of the samples available from the exploratory hole.

S1.19.2 Tests required (Clause 14.1.2)

It must be accepted that laboratory testing quantities cannot be accurately predicted at tender stage before detailed ground conditions are known. It may be necessary to specify additional testing once the results of the original tests are available. The additional testing may comprise more of the original tests and/or different tests.

The geotechnical laboratory testing requirements are given in Section K of the Bill of Quantities.

S1.19.3 Specifications for tests not covered by BS 1377 and options under BS 1377 (Clauses 14.2.1 and 14.4)

Not required.

S1.19.4 UKAS accreditation to be adopted (Clause 14.3)

The testing shall be carried out by a laboratory being accredited by United Kingdom Accreditation service (UKAS).

S1.19.5 Rock testing requirements (Clause 14.5)

Not required.

S1.19.6 Chemical testing for aggressive ground/groundwater for concrete (Clause 14.6) (Test suites A-D are overleaf)

It is anticipated that Test Suite D (Brownfield pyrite present) will be required for aggressive ground/groundwater testing (see Schedules present in the following pages).

Test Suites A,B and C are not required.

S1.19.7 Laboratory testing on site (Clause 14.7)

Not required.

S1.19.8 Special laboratory testing (Clause 14.8)

Further particular Contract restrictions/relaxations shall be entered below, using sequential numbers to those above

None.

CHEMICAL TESTS ON POTENTIALLY AGGRESSIVE GROUND/GROUNDWATER

SUITE D Brownfield site (pyrite present)			
Sample type	**Determinand**	**Recommended test methods**	**Test method offered[1]**
Soil	pH in 2.5 : 1 water/soil extract	BR 279 Electrometric	
		BS 1377 Part 3, Method 9	
	SO_4 in 2 : 1 water/soil extract	BR 279 Gravimetric method, cation exchange or ion chromatography	
		BS 1377 Part 3 Method 5.3 + 5.5	
		TRL 447 Test 1	
	Acid soluble SO_4	BR 279 Gravimetric method	
		BS 1377 Part 3, Method 5.2 + 5.5	
		TRL 447 Test 2	
	Total sulphur	BR 279 Ignition in oxygen	
		TRL 447 Test 4A	
		TRL 447 Test 4B	
	Mg (only required if water soluble SO_4 > 3000 mg/l)	BR 279 AAS[2] method	
		Commercial lab in-house procedure – variant of BR 279 using ISP-AES[3]	
	NO_3 in 2 : 1 water/soil extract (only required if pH < 5.5)	BR 279	
	Cl in 2 : 1 water/soil extract (only required if pH < 5.5)	BR 279	
		BS 1377 Part 3, Method 7.2	
Groundwater	pH	BR 279 Electrometric	
		BS 1377 Part 3, Method 9	
	SO_4	BR 279 Gravimetric method, cation exchange or ion chromatography	
		BS 1377 Part 3 Method 5.4 + 5.5	
		Commercial lab in-house procedure – determination of sulphur by ICP-AES[3]	
	Mg (only required if water soluble SO_4 ≥ 3000 mg/l)	BR 279 AAS method[2]	
		Commercial lab in-house procedure – Mg in solution by ICP-AES	
	NO_3 (only required if pH < 5.5)	BR 279	
	Cl (only required if pH < 5.5)	BR 279	
		BS 1377 Part 3, Method 7.2	

[1] Contractor to indicate method(s) offered.

[2] AAS: atomic absorption spectrometry.

[3] ICP-AES: inductively coupled plasma atomic emission spectroscopy.

S1.20 Geoenvironmental laboratory testing (Specification Section 15) Particular restrictions/relaxations

Contract specific restrictions/relaxations, if any, shall be inserted below.

S1.20.1 Investigation Supervisor or Contractor to schedule testing (Clause 15.1)

The Engineer is to schedule laboratory testing from schedules provided by the Contractor within the deviation time of the samples. Deviation times are to be clearly stated on the schedules, and hence the return date for the schedule to the Contractor.

S1.20.2 Accreditation required (Clause 15.2)

MCERTS and UKAS where available.

S1.20.3 Chemical testing for contamination (Clause 15.3) (Test suites E-F and K-L are overleaf)

Test Suites E and F testing required.

Test Suite G (Gas Samples) not required and has been deleted.

Additional Suites (Suite K, Suite L and Suite M).

CHEMICAL LABORATORY TESTING FOR CONTAMINATION

Nominated Test Laboratory To be specified by the Contractor, subject to requirements and agreement of the employer.

Required Testing Turnaround Times 10 days unless test procedure requires extended time, which is to be stated in tender return.

NB 1. This proforma Schedule MUST be reviewed in the light of site-specific desk study results and amended accordingly to include any additional determinands likely to be required.

2. Limits of detection should reflect the guideline/threshold values against which the test results will be compared.

SUITE E – Soil samples			
Determinand (Procurer to list required determinands)	**Limit of detection required[1] (mg/kg)**	**Test method required[1]**	**Accreditation required[1]**
Arsenic	1	NA	MCERTS/UKAS
Barium	1	NA	MCERTS/UKAS
Beryllium	1	NA	MCERTS/UKAS
Boron	1	NA	MCERTS/UKAS
Cadmium	1	NA	MCERTS/UKAS
Chromium (total)	1	NA	MCERTS/UKAS
Chromium VI	1	NA	MCERTS/UKAS
Copper	1	NA	MCERTS/UKAS
Lead	1	NA	MCERTS/UKAS
Mercury	1	NA	MCERTS/UKAS
Nickel	1	NA	MCERTS/UKAS
Selenium	1	NA	MCERTS/UKAS
Vanadium	1	NA	MCERTS/UKAS
Zinc	1	NA	MCERTS/UKAS
pH	0.1 pH units	NA	MCERTS/UKAS
Sulphide	1	NA	MCERTS/UKAS
Water soluble sulphate (as SO_4)	0.3mg/L	NA	MCERTS/UKAS
Sulphur	1	NA	MCERTS/UKAS
Total petroleum hydrocarbons (CWG)	0.1	NA	MCERTS/UKAS
Speciated polyaromatic hydrocarbons (USEPA 17)	0.1 (for each speciation)	NA	MCERTS/UKAS
Phenol	1	NA	MCERTS/UKAS
Fraction Organic Carbon	0.1%	NA	MCERTS/UKAS
Cyanide (total)	1	NA	MCERTS/UKAS
Cyanide (free)	1	NA	MCERTS/UKAS
Asbestos	Screen & identification	NA	MCERTS/UKAS

SUITE K – Additional Soil Suite samples			
SVOCs Suite	0.1 (for each analyte)	NA	MCERTS/UKAS
VOCs Suite including BTEX	0.1 (for each analyte)	NA	MCERTS/UKAS
Creosotes			
Asbestos Screen		NA	MCERTS/UKAS

[1] **Either** Engineer to specify the test method (except testing under MCERTs), limit of detection and accreditation required **or** Contractor to detail what can be offered under each of these categories. See also Specification Note for Guidance 15.3.

CHEMICAL LABORATORY TESTING FOR CONTAMINATION

Nominated Test Laboratory To be specified by the Contractor, subject to requirements and agreement of the employer.

Required Testing Turnaround Times 10 days unless test procedure requires extended time.

NB 1. This proforma Schedule MUST be reviewed in the light of site specific desk study results and amended accordingly to include any additional determinands likely to be required.

2. Limits of detection should reflect the guideline/threshold values against which the test results will be compared.

SUITE F - Water samples			
Determinand (Procurer to list required determinands)	**Limit of detection required[1] (ug/L)**	**Test method required[1]**	**Accreditation required/offered[1]**
Arsenic	1	NA	UKAS
Barium	1	NA	UKAS
Beryllium	1	NA	UKAS
Boron	1	NA	UKAS
Cadmium	1	NA	UKAS
Calcium	1	NA	UKAS
Chromium (total)	1	NA	UKAS
Chromium VI	1	NA	UKAS
Copper	1	NA	UKAS
Lead	1	NA	UKAS
Magnesium	1	NA	UKAS
Mercury	1	NA	UKAS
Nickel	1	NA	UKAS
Potassium	1	NA	UKAS
Selenium	1	NA	UKAS
Sodium	1	NA	UKAS
Vanadium	1	NA	UKAS
Zinc	1	NA	UKAS
pH	0.1 pH units	NA	UKAS
Sulphide	1	NA	UKAS
Sulphate (as SO_4)	0.3mg/L	NA	UKAS
Sulphur	1	NA	UKAS
Total petroleum hydrocarbons (CWG)	0.1	NA	UKAS
Speciated polyaromatic hydrocarbons (USEPA 17)	0.01 (for each speciation)	NA	UKAS
Phenol	1	NA	UKAS
Cyanide (total)	1	NA	UKAS
Cyanide (free)	1	NA	UKAS
Ammoniacal Nitrogen	1	NA	UKAS
Hardness	NA	NA	UKAS
Electrical conductivity	1 (us/cm)	NA	UKAS
Chloride	1	NA	UKAS
Nitrate	1	NA	UKAS

SUITE L – Additional Water Suite samples			
SVOCs Suite	0.01 (for each analyte)	NA	UKAS
VOCs Suite including BTEX	0.01 (for each analyte)	NA	UKAS

[1] **Either** Engineer to specify the test method, limit of detection and accreditation required **or** Contractor to detail what can be offered under each of these categories. See also Specification Note for Guidance 15.3.

S1.20.4 Waste characterisation (Clause 15.4)

Not required.

S1.20.5 Waste Acceptance Criteria testing (Clause 15.5)

Test Suites H, I and J (Waste Acceptance Criteria Samples) not required and have been deleted.

S1.20.6 Laboratory testing (Clause 15.6)

Not required.

S1.20.7 Special laboratory testing (Clause 15.7)

Not required.

S1.20.8 Soil leachability testing (Clause 15.7)

Test suite M required.

S1.20.9 Specific Soil nutrient testing (Clause 15.7)

Test suite N not required and has been deleted.

CHEMICAL TESTING FOR SOIL LEACHABILITY (BS(EN)12457 Part 1)

SUITE M – Soil Leachability			
Determinand (Procurer to list required determinands)	**Limit of detection required[1] (ug/L)**	**Test method required[1]**	**Accreditation required/offered[1]**
Leachate Preparation	BS(EN)12457 Part 1		
Arsenic	1	NA	UKAS
Barium	1	NA	UKAS
Beryllium	1	NA	UKAS
Boron	1	NA	UKAS
Cadmium	1	NA	UKAS
Chromium (total)	1	NA	UKAS
Chromium VI	1	NA	UKAS
Copper	1	NA	UKAS
Lead	1	NA	UKAS
Mercury	1	NA	UKAS
Nickel	1	NA	UKAS
Selenium	1	NA	UKAS
Vanadium	1	NA	UKAS
Zinc	1	NA	UKAS
pH	0.1 pH units	NA	UKAS
Sulphide	1	NA	UKAS
Sulphate (as SO_4)	0.3mg/L	NA	UKAS
Sulphur	1	NA	UKAS
Total petroleum hydrocarbons (CWG)	0.1	NA	UKAS
Speciated polyaromatic hydrocarbons (USEPA 17)	0.01 (for each speciation)	NA	UKAS
Phenol	1	NA	UKAS
Cyanide (total)	1	NA	UKAS
Cyanide (free)	1	NA	UKAS
Ammoniacal Nitrogen	1	NA	UKAS
Electrical conductivity	0.1 us/cm	NA	UKAS
Chloride	1	NA	UKAS
Nitrate	1	NA	UKAS

[1] **Either** Engineer to specify the test method, limit of detection and accreditation required **or** Contractor to detail what can be offered under each of these categories.

CHEMICAL TESTING FOR SPECIFIC SOIL NUTRIENT TESTING

Not required.

S1.21 Reporting (Specification Section 16) Particular restrictions/relaxations

Contract specific restrictions/relaxations, if any, shall be inserted below.

S1.21.1 Form of exploratory hole logs (Clauses 16.1 and 16.2.1)

AGS 4 format required.

S1.21.2 Information on exploratory hole logs (Clause 16.2.2)

As specified.

S1.21.3 Variations to final digital data supply requirements (Clause 16.5.1)

Data to be in AGS 4 and ESdat format.

S1.21.4 Preliminary digital data (Clause 16.5.3)

Data to be in AGS 4 and ESdat format.

S1.21.5 Type(s) of report required (Clause 16.6)

Factual part of a Ground Investigation Report only is required in accordance with Clause 16.8.1. Separate reports are required for Plot A and Plot B.

S1.21.6 Electronic report requirements (Clause 16.6.3)

DVD ROM/ESDAT compatible chemical data file.

S1.21.7 Format and contents of Desk Study Report (Clause 16.7)

Not required.

S1.21.8 Contents of Ground Investigation Report (or specified part thereof) (Clause 16.8)

In accordance with Clause 16.8.1. The Factual report shall comprise:

a) A statement on the purpose and rationale of the investigation
b) A description of the work carried out, including reference to the Specification and standards adopted and any deviations from them
c) Exploratory hole logs, including details of instruments installed
d) Measurements, observations and test results
e) Laboratory test results
f) Monitoring data
g) Site Location Plan
h) Detailed Site plan showing all exploratory hole locations
i) A single copy of the photographs

S1.21.9 Contents of Geotechnical Design Report (or specified part thereof) (Clause 16.9)

Not required.

S1.21.10 Times for supply of electronic information (Clause 16.10.1)

With final approved copy of report.

S1.21.11 Electronic information transmission media (Clause 16.10.2)

DVD ROM.

S1.21.12 Report approval (Clause 16.11)

One copy of the draft factual report is required for submission to the Engineer within 1 week of completing the environmental and geotechnical laboratory testing.

The Engineer's comments on draft Factual Report are to be issued within 1 week from receipt of the draft, and one copy of the approved report to be submitted.

SCHEDULE 2 EXPLORATORY HOLES

(note: this table does not constitute a formal testing schedule)

Ref Number	Approximate Depth	In-Situ Geotechnical Testing	Sampling	Indicative Laboratory Testing	Installations
CFA/BH01-CFA/BH03 and CFB/BH01-CFB/BH03	Refusal in bedrock (~25m) + 10m of rotary core (one selected 10m rotary from each plot)	SPT's at 1m centres for the first 5m alternating with U100's in cohesive materials. SPT's at 1.5m centres thereafter alternating with U100's in cohesive materials. Hand Vane tests in cohesive material at 1m intervals and change of strata.	• Small disturbed • Chemical sampling • Bulk disturbed • Undisturbed samples at 1.0m and 1.5m intervals in cohesive soil alternating with SPT's • Collection of intact rock specimens for UCS and Point Load laboratory testing and any other required rock tests.	Classification (PI, MC, PSD, pipette), strength (total stress), compressibility, chemical (BRE), contamination, unconfined compressive strength, point load testing	Standpipe Piezometer
CFA/WS01-CFA/WS04 and CFB/WS01-CFB/WS09	4m bgl	Hand Vane tests to be undertaken at the end of each unsplit windowless liner in cohesive material at 1m intervals and change of strata. SPT's at 1m centres.	• Small disturbed • Bulk disturbed • Chemical sampling • In situ PID readings on all environmental samples.	Classification (PI, MC, PSD, sieve), Organic Matter Content, chemical (BRE) and contamination	Selected Standpipe Piezometer
CFA/TT01	4m bgl	Hand Vane tests in cohesive material at 1m intervals and change of strata.	• Small disturbed • Large bulk disturbed • Chemical sampling • In situ PID readings on all environmental samples.	Classification (PI, MC, PSD, sieve), Organic Matter Content, chemical (BRE) and contamination	Backfill with arisings

SCHEDULE 3 INVESTIGATION SUPERVISORS FACILITIES

S3.1 Accommodation

Contractor's welfare facilities and office to be available for use by The Engineer and the Client.

S3.2 Furnishings

Not required.

S3.3 Services

Not required.

S3.4 Equipment

Not required.

S3.5 Transport

Not required.

S3.6 Personal Protective Equipment for Investigation Supervisor

Not required.

SCHEDULE 4 SPECIFICATION AMENDMENTS

The following clauses are amended			
Section number	**Clause number**	**Add the following**	**Substitute the following**
3	5.2	The professional attendant shall be responsible for informing all personnel on site employed by the Contractor of the specific requirements of this Specification.	
3	15	The professional attendant shall be responsible for informing all personnel on site employed by the Contractor of the specific requirements of this Specification.	
3	18	The Contractor shall obtain the greatest possible information from each exploratory hole and careful drilling, excavation, sampling and observation shall take priority over speed of working. All reasonable precautions shall be taken to prevent surface materials entering the hole during boring or excavation. If such contamination should occur, the exploratory hole shall be cleaned out before advancing it further and a note made on the daily report.	
6	1		Delete “an appropriate depth” and replace with “a depth of 1.2m”
7	6.7		Small disturbed samples weighing not less than 1kg shall be placed in jars with air tight lids. The jar shall be fully filled to leave no free space within the jar. The jar shall be clearly labelled using indelible ink on waterproof labels, one placed inside the jar and the other securely attached to the outside.
7	6.10		Delete 0.5 and replace with 1.0 litre
7	9.2	The Contractor shall be responsible for the packing of samples and their transport to the laboratory. Samples shall be packaged for transit in such a manner as to minimise the likelihood of breakage. Preservatives shall be added to samples of groundwater in accordance with the requirements of the analytical laboratory,	

		or as directed by the Engineer.	
7	9.5	Soil Soil samples shall be taken using for a steel trowel which should be cleaned prior to each sample location. Quality Control Samples The Contractor will be responsible for developing a quality control and quality assurance programme for chemical analysis based on guidance given in Guidance on Monitoring Landfill Leachate, Groundwater and Surface Water, Environment Agency 2003	
12	4.1	The ground gas monitoring should include readings of the following: Methane % vol./vol. Methane Lower Explosive Limit (LEL)% LEL Carbon Dioxide % vol./vol. Oxygen % vol./vol. Hydrogen Sulphide ppm Flow Rate l/h Downhole Pressure mB Ambient Pressure mB	

SCHEDULE 5 SPECIFICATION ADDITIONS

The following clauses are added to the Specification		
Section number	**Clause number**	**Clause wording**
		No Additions

PREAMBLE TO THE BILL OF QUANTITIES

1. In this Bill of Quantities the sub-headings and item descriptions identify the work covered by the respective items. The exact nature and extent of the work to be performed shall be ascertained by reference to the Specification, and the Schedules and the Appendices to the Specification, as appropriate. The rates and prices entered in the Bill of Quantities shall be deemed to be the full inclusive value of the work covered by the several items, including the following unless stated otherwise:

(a) Supervision, labour and all costs in connection therewith;
(b) the supply of materials, goods storage, facilities and services, and all costs in connection therewith including wastage and delivery to site;
(c) plant and all costs in connection therewith;
(d) fixing, erecting and installing or placing of materials and goods in position;
(e) all temporary works;
(f) all general obligations, requirements, liabilities, and risks involved in the execution of the investigation as set forth or implied in the documents on which the tender is based;
(g) establishment charges, overheads and profit;
(h) bringing plant and sampling and in situ testing equipment to the site of each exploratory hole, erecting, dismantling and removing on completion;
(i) removal of all equipment and services from site on completion.

2. All Items not deleted from Section A of the Bill of Quantities (General items and provisional sums) shall be priced and all items in subsequent sections against which quantities are entered shall be priced.

3. Where rates are not priced they shall have £0.00 placed against them.

4. When full-time professional attendance on site is required in accordance with Clause 3.12 this shall be paid for under Addendum A of the Bill of Quantities.

6. Rates for moving plant and equipment to the site of each exploratory hole shall allow for the formation of access routes, and making-good access routes and working areas on completion as required by the Contract.

7. The rates for moving rotary drilling plant to the site of each hole shall include for setting up over a previously formed borehole.

8. Payment for forming exploratory holes shall be based on:

(a) Full thickness of strata investigated and described in accordance with the Specification;
(b) depths measures from ground level,
(c) depth measured from original ground level where an inspection pit has been excavated;
(d) that part of a drillhole below the bottom of a borehole where a drill hole has been ordered to continue from the bottom of a borehole;
(e) core recovery of at least 90% in any core run, unless the Engineer is satisfied it cannot be achieved;
(f) measured depth for a specified width for trial and observation trenches.

9. Rates for forming exploratory holes shall allow for:

(a) Casing installation where necessary, and removal;
(b) dealing with surface water;
(c) backfilling with arisings;
(d) supply of daily report and preliminary log;
(e) additional site supervision of non-accredited drillers;
(f) disposal off site of excavated material not required for reuse.

10. Standing time shall be measured as the duration of time for which plant, equipment and personnel are standing on the instruction of the Engineer or in accordance with the Contract. Standing time shall be paid for interruption of the formation of exploratory holes to record groundwater entry in accordance with Clause 9.1.1. The rates for standing time shall allow for:

(a) Plant equipment and personnel;
(b) consequential costs;
(c) changes in the programme of working;
(d) recording information and preparing daily report.

11. The rates for hourly provision of pitting and trenching crews and equipment at locations as directed by the Engineer shall allow for compliance with the requirements of the Contract, including preparation of records.

12. The rates for sampling and in situ testing shall allow for the standing time of associated plant. Where in situ testing is paid for on an hourly basis, the time measured shall be the actual time taken to carry out the test in accordance with the Engineer's instruction and/or the Specification but excluding the time taken to erect and dismantle test equipment where this is itemised separately.

13. The rates for installation of instruments shall allow for:

(a) clearing and keeping hole free of unwanted materials;
(b) all costs associated with equipment, installation, specified seals, surround and backfill materials excluding backfill below the instrument;
(c) proving correct functioning;
(d) delays due to installations.

14. The rates for testing shall include for:

(a) The supply of a copy of the preliminary test results to the Engineer;
(b) the cost of moisture content or density determinations where they form part of the test procedure as detailed in recognised standard.

15. The rates for recording of water level or gas measurement shall allow for notices of re-entry to the Engineer, owners or occupiers affected by the location or access route.

16. Addendum A to the Bill of Quantities (Rates for geotechnical and other personnel) should be priced. The rates given will be used by the Engineer to make an initial estimate of costs where applicable of employing the Contractor's staff in accordance with Clause 3.13 of the Specification.

17. Items for the supply of the master and copies of the interpretative report shall exclude costs covered by Appendix A to the Bill of Quantities.

18. Units of measurement

The following abbreviations shall be used for the units of measurements:-

Millimetres:	mm
Metre:	m
Kilometre:	km
Square millimetres:	mm^2
Square metre:	m^2
Cubic metre:	m^3
Square metre per day:	m^2/day
Kilogramme:	kg
Tonne:	t
Sum:	sum
Number:	nr
Hour:	h
Week:	wk
Vehicle week:	v.wk
Item:	item
Day:	day
Specimen day	sp.day

Form B4 – Pricing Schedule
BILL OF QUANTITIES

Number	Item description	Unit	Quantity	Rate	Amount £
A	**General items, provisional services and additional items**				
A1	Offices and stores for the Contractor	sum	1.00		0.00
A2	Establish on site all plant, equipment and services for a Yellow Category site	sum	1.00		0.00
A3	Extra over Item A2 for a Red Category site	sum			0.00
A4	Maintain on site all site safety equipment for a Red Category site	week			0.00
A5	Decontamination of equipment during and at end of intrusive investigation for a Red Category site	sum			0.00
A6	Appropriate storage, transport and off-site disposal of arisings including potentially contaminated arisings (waste classification testing [WAC] to be undertaken by Contractor)	sum	1.00		0.00
A7	Provide professional attendance in accordance with Clause 3.5.2				0.00
A7.1	Provide Technician	p.day			0.00
A7.2	Provide graduate ground engineer	p.day			0.00
A7.3	Provide Experienced Ground Engineer	p.day	18.00		0.00
A7.4	Provide Registered Ground Engineering Professional	p.day			0.00
A7.5	Provide Registered Ground Engineering Specialist	p.day			0.00
A7.6	Provide Registered Ground Engineering Advisor	p.day			0.00
A8	Establish the location and elevation of the ground at each exploratory hole	sum	1.00		0.00
A9	Preparation of Health and Safety documentation and Safety Risk Assessment.in accordance with CDM Regs	sum	1.00		0.00
A10	Facilities for the Investigation Supervisor	sum			0.00
A11	Vehicle(s) for the Investigation Supervisor	v.wk			0.00
A12	Fuel for vehicle for the Investigation Supervisor	provisional sum			0.00
A13	Investigation Supervisor's telephone and facsimile charges	provisional sum			0.00
A14	Deliver selected cores and samples to the specified address	provisional sum			0.00
A15	Special testing and sampling required by Investigation Supervisor	provisional sum			0.00
A16	Traffic safety and management	provisional sum			0.00
A17	One master copy of the Desk Study Report	sum			0.00
A18	Additional copies of the Desk Study Report	nr			0.00
A19	One master copy of the Ground Investigation Report (Electronic) (one for each site)	sum	2.00		0.00
A20	Additional copies of the Ground Investigation Report (or specified part thereof)	nr	rate only		0.00
A21	Electronic copy of Ground Investigation Report (or specified part thereof)	sum			0.00
A22	One master copy of the Geotechnical Design Report (or specified part thereof)	sum			0.00
A23	Additional copies of the Geotechnical Design Report (or specified part thereof)	nr			0.00
A24	Electronic copy of Geotechnical Design Report (or specified part thereof)	sum			0.00
A25	Digital data in AGS transfer format	sum	1.00		0.00
A26	Hard copy photographs	nr			0.00
A27	Photographs (Electronic)	sum	1.00		0.00
A28	Long-term storage of geotechnical samples (Appendix B)	provisional sum			0.00
A29	Long-term storage of geoenvironmental samples (Appendix B)	provisional sum			0.00
Add Items					0.00
E/O	Provision for wet and boggy ground conditions	sum	1.00		0.00
					0.00
				Total section A carried to summary:	0.00

Number	Item description	Unit	Quantity	Rate	Amount £
B	**Percussion boring**				
B1	Move boring plant and equipment to the site of each exploratory hole and set up	nr	6.00		0.00
B2	Extra over Item B1 for setting up on a slope of gradient greater than 20%	nr			0.00
B3	Break out surface obstruction where present at exploratory borehole	h			0.00
B4	Advance borehole between existing ground level and 10 m depth	m	60.00		0.00
B5	As Item B4 but between 10 m and 20 m depth	m	60.00		0.00
B6	As Item B4 but between 20 m and 30 m depth	m	30.00		
B7	As Item B4 but between 30 m and 40 m depth	m			0.00
B8	As Item B4 but between 40 m and 50 m depth	m			0.00
B9	Advance borehole through hard stratum or obstruction	h	6.00		0.00
B10	Provide aquifer protection measures at a single aquiclude/aquifer boundary or cross-contamination control measures at a single soil boundary in a borehole	nr	6.00		0.00
B11	Backfill borehole with cement/bentonite grout or bentonite pellets	m			0.00
B12	Standing time for borehole plant, equipment and crew	h	6.00		0.00
	Dynamic sampling (Windowless Sampling)				0.00
B13	Move dynamic sampling equipment to the site of each exploratory hole and set up	nr	12.00		0.00
B14	Extra over Item B13 for setting up on a slope of gradient greater than 20%	nr			0.00
B15	Advance dynamic sample hole between existing ground level and 5 m depth	m	48.00		0.00
B16	As Item B15 but between 5 and 10 m depth	m			0.00
B17	As Item B15 but between 10 and 15 m depth	m			0.00
B18	Standing time for dynamic sampling equipment and crew	hr	12.00		0.00
B19	Provision of dynamic sampling equipment and crew for sampling as directed by the Investigation Supervisor; maximum depth 15 m	day			0.00
B20	Backfill dynamic sampling hole with cement/bentonite grout or bentonite pellets	m	20.00		0.00

Total section B carried to summary: 0.00

Number	Item description	Unit	Quantity	Rate	Amount £
C	**Rotary drilling**				
	Hand augering				
C1	Bring hand auger equipment to the position of each exploratory hole	nr			0.00
C2	Bore with hand auger from existing ground level to 2m depth	m			0.00
C3	As Item C2 but between 2 and 4m depth	m			0.00
C4	Standing time for hand auger equipment and crew	h			0.00
C5	Provision of hand augering equipment and crew for augering as directed by the Investigation Supervisor maximum depth 4m	day			0.00
C6	Backfill hand auger hole with cement/bentonite grout or bentonite pellets	m			0.00
	Continuous flight and hollow-stem flight augering				
C7	Move mechanical augering plant and equipment to the site of each exploratory hole and set up	nr			0.00
C8	Extra over Item C7 for setting up on a slope of gradient greater than 20%	nr			0.00
C9	Break out surface obstructions where present at auger hole	h			0.00
C10	Standing time for rotary auger equipment and crew	h			0.00
C11	Auger in materials other than hard strata at the specified diameter between existing ground level and 10m depth	m			0.00
C12	As Item C11 but between 10 and 20m depth	m			0.00
C13	As Item C11 but between 20 and 30m depth	m			0.00
C14	Backfill auger hole with cement/bentonite grout or bentonite pellets	m			0.00
	Rotary drilling with and without core recovery				
C15	Move rotary drilling plant and equipment to the site of each exploratory drillhole and set up	nr	2		0.00
C16	Extra over Item C15 for setting up on a slope of gradient greater than 20%	nr			0.00
C17	Extra over Item C15 for setting up drilling plant for inclined drillhole	nr			0.00
C18	Break out surface obstructions where present at exploratory drillhole	h			0.00
C19	Standing time for rotary drilling plant, equipment and crew	h	2		0.00
C20	Provide aquifer protection measures at a single aquiclude/aquifer boundary in a drillhole	nr			0.00
	Drilling without cores				
C21	Rotary drill in materials other than hard strata at the specified diameter, from which cores are not required, between existing ground level and 10m depth	m			0.00
C22	As Item C21 but between 10 and 20m depth	m			0.00
C23	As Item C21 but between 20 and 30m depth	m			0.00
C24	As Item C21 but between 30 and 40m depth	m			0.00
C25	As Item C21 but between 40 and 50m depth	m			0.00
C26	Extra over Items C21 to C25 for inclined rotary drillhole	m			0.00
C27	Rotary drill in hard strata at the specified diameter, from which cores are not required, between existing ground level and 10m depth	m			0.00
C28	As Item C27 but between 10 and 20m depth	m			0.00
C29	As Item C27 but between 20 and 30m depth	m			0.00
C30	As Item C27 but between 30 and 40m depth	m			0.00
C31	As Item C27 but between 40 and 50m depth	m			0.00
C32	Extra over Items C27 to C31 for inclined drillhole	m			0.00
C33	Backfill rotary drillhole with cement/bentonite grout or bentonite pellets	m			0.00
	Drilling to obtain cores				
C34	Rotary drill in materials other than hard strata to obtain cores of the specified diameter between existing ground level and 10m depth	m			0.00
C35	As Item C34 but between 10 and 20m depth	m			0.00
C36	As Item C34 but between 20 and 30m depth	m	10		0.00
C37	As Item C34 but between 30 and 40m depth	m	10		0.00
C38	As Item C34 but between 40 and 50m depth	m			0.00
C39	Extra over Items C34 to C38 for use of semi-rigid core liner	m			0.00
C40	Extra over Items C34 to C38 for coring inclined rotary drillhole	m			0.00
C41	Rotary drill in hard strata to obtain cores of the specified diameter between existing ground level and 10m depth	m			0.00
C42	As Item C41 but between 10 and 20m depth	m			
C43	As Item C41 but between 20 and 30m depth	m			0.00
C44	As Item C41 but between 30 and 40m depth	m			0.00
C45	As Item C41 but between 40 and 50m depth	m			0.00
C46	Extra over Items C41 to C45 for use of semi-rigid liner	m	20		0.00
C47	Extra over Items C41 to C45 for coring inclined rotary drillhole	m			0.00
C48	Backfill rotary drillhole with cement/bentonite grout or bentonite pellets	m			0.00
C49	Core box	nr	7		0.00
	Rotary percussive drilling				
C50	Move rotary percussive drilling plant and equipment to the site of each drill hole and set up	nr			0.00
C51	Extra over Item C50 for setting up on a slope of gradient greater than 20%	nr			0.00
C52	Rotary percussive drill at the specified diameter in any material between existing ground level and 10m depth	m			0.00
C53	As Item C52 but between 10 and 20m depth	m			0.00
C54	As Item C52 but between 20 and 30m depth	m			0.00
C55	As Item C52 but between 30 and 40m depth	m			0.00
C56	As Item C52 but between 40 and 50m depth	m			0.00
C57	Standing time for rotary percussive drilling plant, equipment and crew	h			0.00
C58	Backfill rotary percussive drillhole with cement/bentonite grout or bentonite pellets	m			0.00
	Resonance (Sonic) drilling				
C59	Move sonic drilling plant and equipment to the site of each exploratory drillhole and set up	nr			0.00
C60	Extra over Item C59 for setting up on a slope of gradient greater than 20%	nr			0.00
C61	Extra over Item C59 for setting up sonic drilling plant for inclined drillhole	nr			0.00
C62	Break out surface obstructions where present at exploratory drillhole	h			0.00
C63	Standing time for sonic drilling plant, equipment and crew	h			0.00
	Sonic drilling without cores				

C64	Sonic drill in materials other than hard strata at the specified diameter, from which cores are not required, between existing ground level and 10m depth	m	0.00
C65	As Item C64 but between 10 and 20m depth	m	0.00
C66	As Item C64 but between 20 and 30m depth	m	0.00
C67	As Item C64 but between 30 and 40m depth	m	0.00
C68	As Item C64 but between 40 and 50m depth	m	0.00
C69	Extra over Items C64 to C68 for inclined sonic drillhole	m	0.00
C70	Sonic drill in hard strata at the specified diameter, from which cores are not required, between existing ground level and 10m depth	m	0.00
C71	As Item C70 but between 10 and 20m depth	m	0.00
C72	As Item C70 but between 20 and 30m depth	m	0.00
C73	As Item C70 but between 30 and 40m depth	m	0.00
C74	As Item C70 but between 40 and 50m depth	m	0.00
C75	Extra over Items C70 to C74 for inclined sonic drillhole	m	0.00
C76	Backfill sonic drillhole with cement/bentonite grout or bentonite pellets	m	0.00
	Sonic drilling to obtain cores		
C77	Sonic drill in materials other than hard strata to obtain cores of the specified diameter between existing ground level and 10m depth	m	0.00
C78	As Item C77 but between 10 and 20m depth	m	0.00
C79	As Item C77 but between 20 and 30m depth	m	0.00
C80	As Item C77 but between 30 and 40m depth	m	0.00
C81	As Item C77 but between 40 and 50m depth	m	0.00
C82	Extra over Items C77 to C81 for use of semi-rigid core liner	m	0.00
C83	Extra over Items C77 to C81 for coring inclined sonic drillhole	m	0.00
C84	Sonic drill in hard strata to obtain cores of the specified diameter between existing ground level and 10m depth	m	0.00
C85	As Item C84 but between 10 and 20m depth	m	0.00
C86	As Item C84 but between 20 and 30m depth	m	0.00
C87	As Item C84 but between 30 and 40m depth	m	0.00
C88	As Item C84 but between 40 and 50m depth	m	0.00
C89	Extra over Items C84 to C88 for use of semi-rigid liner	m	0.00
C90	Extra over Items C84 to C88 for coring inclined sonic drillhole	m	0.00
C91	Backfill sonic drillhole with cement/bentonite grout or bentonite pellets	m	0.00
Contract specific additional bill items			
			0.00
			0.00
		Total section C carried to summary:	0.00

Number	Item description	Unit	Quantity	Rate	Amount £
D	**Pitting and trenching**				
	Inspection pits				
D1	Excavate inspection pit by hand to 1.2m depth	nr	18		0.00
D2	Extra over Item D1 for breaking out surface obstructions	h			
	Trial pits and trenches				
D3	Move equipment to the site of each trial pit or trench	nr	1		0.00
D4	Extra over Item D3 for setting up on a slope of gradient greater than 20%	nr			0.00
D5	Extra over Item D3 for trial pit or trench between 4.5 and 6m depth	nr			0.00
D6	Excavate trial pit between existing ground level and 3m depth	m			0.00
D7	As Item D6 but between 3.0 and 4.5m depth	m			0.00
D8	As Item D6 but between 4.5 and 6m depth	m			0.00
D9	Excavate trial trench between existing ground level and 3.0m depth	m^3	30		0.00
D10	As Item D9 between 3.0 and 4.5m in depth	m^3	10		0.00
D11	As Item D9 between 4.5 and 6m depth	m^3			0.00
D12	Extra over Items D6 to D11 inclusive for breaking out hard material or surface obstructions	h			0.00
D13	Standing time for excavation plant, equipment and crew for machine dug trial pit or trench	h	1		0.00
	Observation pits and trenches				
D14	Move equipment to the site of each observation pit or trench of not greater than 4.5m depth	nr			0.00
D15	Extra over Item D14 for setting up on a slope of gradient greater than 20%	nr			0.00
D16	Extra over Item D14 for trial pit or trench between 4.5 and 6m depth	nr			0.00
D17	Excavate observation pit between existing ground level and 3.0m depth	m			0.00
D18	As Item D17 but between 3.0 and 4.5m depth	m			0.00
D19	As Item D17 but between 4.5 and 6m depth	m			0.00
D20	Extra over Item D17 for hand excavation	m			0.00
D21	Excavate observation trench between existing ground level and 3.0m depth	m^3			0.00
D22	As Item D21 but between 3.0 and 4.5m depth	m^3			0.00
D23	As Item D21 but between 4.5 and 6m depth	m^3			0.00
D24	Extra over Item D21 for hand excavation	m^3			0.00
D25	Extra over Items D17 to D19 and D21 to D23 for breaking out hard strata or obstructions	h			0.00
D26	Extra over Items D17 and D21 for breaking out hard strata or obstructions by hand	h			0.00
D27	Standing time for excavation plant, equipment and crew for machine dug observation pit or trench	h			0.00
D28	Standing time for excavation plant, equipment and crew for hand dug observation pit or trench	h			0.00
	Daily provision of pitting crew and equipment				
D29	Provision of excavation plant equipment and crew for machine dug trial pits or trenches as directed by the Investigation Supervisor, maximum depth 3.0m	day			
D30	As Item D29 but between 3.0 and 4.5m depth	day			0.00
D31	As Item D29 but between 4.5 and 6.0m depth	day			0.00
D32	Provision of excavation plant, equipment and crew for machine-dug observation pit or trench as directed by the Investigation Supervisor, maximum depth 3.0m	day			0.00
D33	As Item D32 but between 3.0 and 4.5m depth	day			0.00
D34	As Item D32 but between 4.5 and 6.0m depth	day			0.00
D35	As Item D32 but for hand excavation	day			0.00
D36	Extra over Items D32 to D34 for breaking out hard strata or obstructions	day			0.00
	General				
D37	Bring pump to the position of each exploratory pit or trench	nr			0.00
D38	Pump water from pit or trench	h			0.00
D39	Extra over Item D38 for temporary storage, treatment and disposal of contaminated water	item			0.00
D40	Leave open observation pit or trench	m^2/day			0.00
D41	Leave open trial pit or trench	m^2/day			0.00
Contract specific additional bill items					
					0.00
	Item D3 to include breakout and reinstatement of ground and concrete / tarmac	item			0.00
					0.00
					0.00
					0.00
				Total section D carried to summary:	0.00

Number	Item description	Unit	Quantity	Rate	Amount £
E	**Sampling and monitoring during intrusive investigation**				
	Samples for geotechnical purposes				
E1	Small disturbed sample	nr	172		0.00
E2	Bulk disturbed sample	nr	148		0.00
E3	Large bulk disturbed sample	nr			0.00
E4.1	Open tube sample using thick walled (OS-TK/W) sampler (plastic)	nr			0.00
	Open tube sample using thick walled (OS-TK/W) sampler (metal)	nr			
E4.2	Open tube sample using thin walled (OS-T/W) sampler	nr	60		
	Extra over for E4.2 for damage to shoe in Glacial Till	nr			Rate only
	Extra over for E4.2 for damage to catcher in Glacial Till	nr			Rate only
E5	Piston sample	nr			0.00
E6	Groundwater sample	nr	6		0.00
E7	Ground gas sample	nr			0.00
E8	Cut, prepare and protect core sub sample	nr			0.00
	Continuous or semi-continuous sampling				
E9	Move Delft continuous or Mostap semi-continuous sampling plant and equipment to the site of each exploratory hole and set up	nr			0.00
E10	Extra over Item E9 for setting up on a slope of gradient greater than 20%	nr			0.00
E11	Break out surface obstruction where present at exploratory hole	h			0.00
E12	Advance sampler between existing ground level and 10m depth	m			0.00
E13	As Item E12 but between 10 and 20m depth	m			0.00
	Containers for contamination assessment and WAC testing				
E14.1	Provision of containers and collection of samples for contamination Suite E (S1.20.3)	nr	150		0.00
E14.2	Provision of containers and collection of samples for contamination Suite F (S1.20.3)	nr	6		0.00
E14.3	Provision of containers and collection of samples for contamination Suite G (S1.20.3)	nr			0.00
E15.1	Provision of containers and collection of samples for WAC Suite H (S1.20.5)	nr			0.00
E15.2	Provision of containers and collection of samples for WAC Suite I (S1.20.5)	nr			0.00
E15.3	Provision of containers and collection of samples for WAC Suite J (S1.20.5)	nr			0.00
Contract specific additional bill items					
	Provision of containers and collection of samples for contamination soil Suite K (S1.20.7)	nr	150		0.00
	Provision of containers and collection of samples for contamination groundwater Suite L (S1.20.7)	nr	6		0.00
	Provision of containers and collection of samples for soil leachability schedule Suite M (S1.20.8)	nr	150		0.00
					0.00
					0.00
				Total section E carried to summary:	0.00

Number	Item description	Unit	Quantity	Rate	Amount £
F	**Probing and cone penetration testing**				
	Dynamic probing				
F1	Bring dynamic probe equipment to the site of each test location	nr			0.00
F2	Extra over Item F1 for setting up on a slope of gradient greater than 20%	nr			0.00
F3	Carry out dynamic probe test from existing ground level to 5m depth	m			0.00
F4	As Item F3 but between 5 and 10m depth	m			0.00
F5	As Item F3 but between 10 and 15m depth	m			0.00
F6	Standing time for dynamic probe test equipment and crew	h			0.00
F7	Provision of dynamic probing equipment and crew for probing as directed by the Investigation Supervisor; maximum depth 15m	day			
	Cone penetration testing				
F8	Bring static cone penetration test equipment to the site of each test location	nr			0.00
F9	Extra over Item F8 for setting up on a slope of gradient greater than 20%	nr			0.00
F10	Carry out static cone penetration test measuring both cone and sleeve resistance from existing ground level to 10m depth	m			0.00
F11	As Item F10 but between 10 and 20m depth	m			0.00
F12	As Item F10 but between 20 and 30m depth	m			0.00
F13	As Item F10 but between 30 and 40m depth	m			0.00
F14	Extra over Items F10 to F13 for use of piezocone	m			0.00
F15	Extra over Items F10 to F13 for interpretation of CPT/CPTU data	m			0.00
F16	Carry out dissipation test up to 1 hour duration	nr			0.00
F17	Extra over Item F16 for test duration exceeding 1 hour	h			0.00
F18	Standing time for static cone penetration test equipment and crew	h			0.00
F19	Extra over Items F10 to F13 for use of seismic cone	m			0.00
F20	Carry out seismic cone test	nr			0.00
F21	Extra over Item F20 for interpretation of seismic cone data	nr			0.00
F22	Standing time for seismic cone test equipment and crew	h			0.00
Contract specific additional bill items					
	Reinstate surface to original hardcover (tarmac) following DCP	nr			0.00
	Coring through road surface prior to DCP	nr			0.00

Total section F carried to summary: 0.00

Number	Item description	Unit	Quantity	Rate	Amount £
G	**Geophysical testing**				
	Land-based mapping techniques				
G1	Collect and process conductivity, magnetic or gravimetric data	lin.m			0.00
G2	Collect and process microgravity data at each measuring station	nr			0.00
	Land-based profiling techniques				
G3	Collect and process resistivity, seismic or ground probing radar data	lin.m			0.00
	Land-based borehole techniques				
G4	Move down-hole logging equipment to the site of each exploratory hole and set up	nr			0.00
G5	Carry out down-hole caliper, natural gamma, resistivity (where hole is uncased), fluid temperature, conductivity and fluid flow logging	m			0.00
	Overwater				
G6	Collect and process echo sounding, side-scan sonar, magnetic, conductivity, seismic reflection, seismic refraction, resistivity imaging or ground-probing radar data	day			0.00
Contract specific additional bill items					
					0.00
					0.00
					0.00
					0.00
					0.00
				Total section G carried to summary:	0.00

Number	Item description	Unit	Quantity	Rate	Amount £
H	**In situ testing**				
H1	Standard penetration test in borehole	nr	108		0.00
H2	Standard penetration test in rotary drillhole	nr			0.00
H3	In situ density testing				0.00
H3.1	Small pouring cylinder method	nr			0.00
H3.2	Large pouring cylinder method	nr			0.00
H3.3	Water replacement method	nr			0.00
H3.4	Core cutter method	nr			0.00
H3.5	Nuclear method	day			0.00
H4	California Bearing Ratio test	nr			0.00
H5	Vane shear strength test in borehole	nr			0.00
H6	Penetration vane test, penetration from ground level	nr			0.00
H7	Hand penetrometer test (set of 3 readings)	nr			0.00
H8	Hand vane test (set of 3 readings)	nr	39		0.00
	Other tests				
H9	Apparent resistivity of soil	nr			0.00
H10	Redox potential	nr			0.00
	Permeability testing				
H11	Set up and dismantle variable head permeability test in borehole	h			
H12	Set up and dismantle constant head permeability test in borehole	nr			0.00
H13	Carry out permeability test in borehole	h			
H14	Set up and dismantle variable head permeability test in standpipe/standpipe piezometer	nr			0.00
H15	Set up and dismantle constant head permeability test in standpipe/standpipe piezometer	nr			0.00
H16	Carry out permeability test in standpipe/standpipe piezometer	h			0.00
H17	Set up and dismantle variable head permeability test in rotary drillhole	nr			0.00
H18	Set up and dismantle constant head permeability test in rotary drillhole	nr			0.00
H19	Carry out permeability test in rotary drillhole	h			0.00
H20	Set up and dismantle single packer permeability test	nr			0.00
H21	Set up and dismantle double packer permeability test	nr			0.00
H22	Carry out single packer permeability test	h			0.00
H23	Carry out double packer permeability test	h			0.00
	Self-boring pressuremeter				
H24	Move and set up self-boring pressuremeter and exploratory hole forming equipment to site of each exploratory hole	nr			0.00
H25	Extra over Item H24 for setting up on a slope of gradient greater than 20%	nr			0.00
H26	Advance exploratory hole to pressuremeter test location between ground level and 10m depth	m			0.00
H27	As Item H26 but between 10 and 20m depth	m			0.00
H28	As Item H26 but between 20 and 30m depth	m			0.00
H29	Advance exploratory hole through hard stratum or obstruction	h			0.00
H30	Self-bore to form test pocket between ground level and 10m depth	m			0.00
H31	As item H30 but between 10 and 20m depth	m			0.00
H32	As item H30 but between 20 and 30m depth	m			0.00
H33	Carry out pressuremeter test, provision of data and report, test duration not exceeding 1.5 hours	nr			0.00
H34	Extra over Item H33 for test duration in excess of 1.5 hours	h			0.00
H35	Carry out additional calibrations as instructed by the Investigation Supervisor				0.00
H35.1	Displacement transducers	nr			0.00
H35.2	Pore pressure transducers	nr			0.00
H35.3	Total pressure transducers	nr			0.00
H35.4	Membrane stiffness	nr			0.00
H36	Carry out membrane compression calibrations as instructed by the Investigation Supervisor	nr			0.00
H37	Backfill exploratory hole for pressuremeter with cement/bentonite grout	m			0.00
H38	Standing time for self-boring pressuremeter and crew	h			0.00
	High pressure dilatometer				
H39	Move and set up high-pressure dilatometer and exploratory hole-forming equipment to site of each exploratory hole	nr			0.00
H40	Extra over Item H39 for setting up on a slope of gradient greater than 20%	nr			0.00
H41	Advance exploratory hole to dilatometer test depth between ground level and 10m depth	m			0.00
H42	As Item H41 but between 10 and 20m depth	m			0.00
H43	As Item H41 but between 20 and 30m depth	m			0.00
H44	Advance exploratory hole through hard stratum or obstruction	h			0.00
H45	Rotary core to form dilatometer test pocket between ground level and 10m depth	m			0.00
H46	As item H45 but between 10 and 20m depth	m			0.00
H47	As item H45 but between 20 and 30m depth	m			0.00
H48	Carry out dilatometer test, provision of data and report, test duration not exceeding 1.5 hours	nr			0.00
H49	Extra over Item H48 for test duration in excess of 1.5 hours	h			0.00
H50	Carry out additional calibrations as instructed by the Investigation Supervisor				0.00
H50.1	Displacement Transducers	nr			0.00
H50.2	Total Pressure Transducers	nr			0.00
H50.3	Membrane stiffness	nr			0.00
H51	Carry out membrane compression calibrations as instructed by the Investigation Supervisor	nr			0.00
H52	Backfill exploratory hole for high-pressure dilatometer with cement/bentonite grout	m			0.00
H53	Standing time for dilatometer equipment and crew	h			0.00
	Driven or push-in pressuremeter				
H54	Move and set up pressuremeter and exploratory hole-forming equipment to site of each exploratory hole	nr			0.00
H55	Extra over Item H54 for setting up on a slope of gradient greater than 20%	nr			0.00

H56	Advance exploratory hole to pressuremeter test location between ground level and 10m depth	m		0.00
H57	As Item H56 but between 10 and 20m depth	m		0.00
H58	As Item H56 but between 20 and 30m depth	m		0.00
H59	Advance exploratory hole through hard stratum or obstruction	h		0.00
H60	Install pressuremeter at base of exploratory hole between ground level and 10m depth	m		0.00
H61	As Item H60 but between 10 and 20m depth	m		0.00
H62	As Item H60 but between 20 and 30m depth	m		0.00
H63	Carry out pressuremeter test, provision of data and report, test duration not exceeding 1.5 hours	nr		0.00
H64	Extra over Item H63 for test duration in excess of 1.5 hours	h		0.00
H65	Carry out additional calibrations as instructed by the Investigation Supervisor			0.00
H65.1	Displacement transducers	nr		0.00
H65.2	Pore pressure transducers	nr		0.00
H65.3	Total pressure transducers	nr		0.00
H65.4	Membrane stiffness	nr		0.00
H66	Carry out membrane compression calibrations as instructed by the Investigation Supervisor	nr		0.00
H67	Backfill exploratory hole for pressuremeter with cement/bentonite grout	m		0.00
H68	Standing time for driven or push-in self-boring pressuremeter and crew	h		0.00
	Menard pressuremeter			
H69	Move and set up pressuremeter and exploratory hole forming equipment to site of each exploratory hole	nr		0.00
H70	Extra over Item H69 for setting up on a slope of gradient greater than 20%	nr		0.00
H71	Advance exploratory hole to pressuremeter test location between ground level and 10m depth	m		0.00
H72	As Item H71 but between 10 and 20m depth	m		0.00
H73	As Item H71 but between 20 and 30m depth	m		0.00
H74	Advance exploratory hole through hard stratum or obstruction	h		0.00
H75	Rotary core to form pressuremeter test pocket between ground level and 10m depth	m		0.00
H76	As Item H75 but between 10 and 20m depth	m		0.00
H77	As Item H75 but between 20 and 30m depth	m		0.00
H78	Carry out Menard pressuremeter test	nr		0.00
H79	Backfill exploratory hole for pressuremeter with cement/bentonite grout	m		0.00
H80	Standing time for Menard pressuremeter and crew	h		0.00
	Soil infiltration test			
H81	Provide equipment and carry out set of 3 infiltration tests at selected location up to 1 day, including hire of excavation equipment	nr		0.00
H82	Extra over Item H81 for additional days	day		0.00
H83	Calculation of infiltration rate for each tested location	nr		0.00
	Miscellaneous site testing			
H84	Reading of free product level in borehole using an interface probe	nr		0.00
H85	Provide contamination screening test kits per sample	nr		0.00
H86	Carry out headspace testing by FID/PID	nr	150	0.00
Contract specific additional bill items				
				0.00
				0.00
				0.00
				0.00
			Total section H carried to summary:	0.00

Number	Item description	Unit	Quantity	Rate	Amount £
I	**Instrumentation**				
	Standpipes and piezometers				
I1	Backfill exploratory hole with cement/bentonite grout below standpipe or standpipe piezometer	m	46		0.00
I2	Provide and install standpipe (19mm)	m			0.00
I3	Provide and install standpipe piezometer (25mm)	m			0.00
I4	Provide and install standpipe piezometer (50mm)	m	144		0.00
I5	Provide and install standpipe piezometer (75mm)	m			0.00
I6	Provide and install ground gas monitoring standpipe (19mm)	m			0.00
I7	Provide and install ground gas monitoring standpipe (50mm)	m	52		0.00
I8	Provide and install ground gas monitoring standpipe (75mm)	m			0.00
I9	Provide and install headworks for ground gas monitoring standpipe, standpipe or standpipe piezometer	nr	19		0.00
I10	Provide and install protective cover (flush)	nr			0.00
I11	Provide and install protective cover (raised)	nr	13		0.00
I12	Extra over Item I10 for heavy duty cover in highways	nr			0.00
I13	Supply and erect protective fencing around standpipe or piezometer installation	nr			0.00
I14	Supply and erect 1.5m high marker post	nr			0.00
I15	Standpipe and piezometer development				0.00
I15.1	Supply equipment and personnel to carry out development by purging	sum			0.00
I15.2	Develop standpipe or piezometer by purging	h			0.00
I15.3	As Item I15.1 but by airlift pumping	nr			0.00
I15.4	As Item I15.2 but by airlift pumping	h			0.00
I15.5	As Item I15.1 but by over pumping	nr			0.00
I15.6	As Item I15.2 but by over pumping	h			0.00
I15.7	As Item I5.1 but by jetting	nr			0.00
I15.8	As Item I15.2 but by jetting	h			0.00
I15.9	Disposal of development water, not including chemical testing	Provisional sum			0.00
	Inclinometer				
I16	Supply and install inclinometer tubing in exploratory hole, not including hole formation	m			0.00
I17	Hire of inclinometer readout unit	day			0.00
I18	Carry out base set of inclinometer readings per installation and installation report	h			0.00
I19	Provide and install protective cover (flush)	nr			0.00
I20	Provide and install protective cover (raised)	nr			0.00
	Slip indicators				
I21	Supply and install slip indicators in exploratory hole, including brass probe and not including hole formation	m			0.00
I22	Provide and install protective cover (flush)	nr			0.00
I23	Provide and install protective cover (raised)	nr			0.00
Contract specific additional bill items					
					0.00
					0.00
					0.00
					0.00
					0.00
				Total section I carried to summary:	0.00

Number	Item description	Unit	Quantity	Rate	Amount £
J	**Installation monitoring and sampling** (during Fieldwork Period)				
J1	Reading of water level in standpipe or standpipe piezometer during fieldwork period	nr			0.00
J2	Ground gas measurement in gas monitoring standpipe during fieldwork period	nr			0.00
J3	Set of inclinometer readings (as defined in Specification Clause 11.6.5 or Schedule S1.16.7) per installation during fieldwork period and report results	nr			0.00
J4	Check for ground slippage in slip indicator installation during fieldwork period	nr			0.00
J5	Water sample from standpipe or standpipe piezometer during fieldwork period, including purging or micro-purging up to 3.0 hours	nr			0.00
J6	Extra over Item J5 for purging or micro-purging in excess of 3.0 hours	h			0.00
J7	Ground gas sample from gas monitoring standpipe during fieldwork period	nr			0.00
J8	Reading of free product level in standpipe using an interface probe during fieldwork period	nr			0.00
	Installation monitoring and sampling (post Fieldwork Period)				
J9	Return visit to site following completion of fieldwork to take readings in, or recover samples from, installations	nr	6		0.00
J10	Extra over Item J9 for reading of water level in standpipe or standpipe piezometer during return visit	nr	114		0.00
J11	Extra over Item J9 for ground gas measurement in ground gas monitoring standpipe during return visit	nr	78		0.00
J12	Extra over Item J9 for set of inclinometer readings (as defined in Specification Clause 11.6.5 or Schedule S1.16.7) per installation during return visit and report results	nr			0.00
J13	Extra over Item J9 to check for ground slippage in slip indicator installation during return visit to site	nr			0.00
J14	Extra over Item J9 for water sample from standpipe or standpipe piezometer during return visit to site, including purging or micro-purging up to 3.0 hours	nr	6		0.00
J15	Extra over Item J14 for purging or micro-purging in excess of 3.0 hours	h			0.00
J16	Extra over Item J9 for ground gas sample from gas monitoring standpipe during return visit to site	nr			
J17	Extra over Item J9 for reading of free product level in standpipe using an interface probe during return visit to site	visit	6		0.00
	Surface water body sampling and testing				
J18	Surface water body sample taken during fieldwork period	nr			0.00
J19	Surface water body sample taken during return visit to site	nr			0.00
J20	Determination of dissolved oxygen, conductivity, pH and temperature of surface water body during fieldwork period	nr			0.00
J21	Determination of dissolved oxygen, conductivity, pH and temperature of surface water body during return visit to site	nr			0.00
Contract specific additional bill items					
					0.00
					0.00
					0.00
					0.00
				Total section J carried to summary:	0.00

Number	Item description	Unit	Quantity	Rate	Amount £
K	**Geotechnical laboratory testing**				
K1	Classification				
K1.1	Moisture content	nr	24		0.00
K1.2	Liquid limit, plastic limit and plasticity index	nr	24		0.00
K1.3	Volumetric shrinkage	nr			0.00
K1.4	Linear shrinkage	nr			0.00
K1.5	Density by linear measurement	nr			0.00
K1.6	Density by immersion in water or water displacement	nr			0.00
K1.7	Dry density and saturation moisture content for chalk	nr			0.00
K1.8	Particle density by gas jar or pycnometer	nr			0.00
K1.9	Particle size distribution by wet sieving	nr	24		0.00
K1.10	Particle size distribution by dry sieving	nr			0.00
K1.11	Sedimentation by pipette	nr	24		0.00
K1.12	Sedimentation by hydrometer	nr			0.00
K2	Chemical and electrochemical				
K2.1	Organic matter content	nr	24		0.00
K2.2	Mass loss on ignition	nr			0.00
K2.3	Sulphate content of acid extract from soil	nr			0.00
K2.4	Sulphate content of water extract from soil	nr			0.00
K2.5	Sulphate content of groundwater	nr			0.00
K2.6	Carbonate content by rapid titration	nr			0.00
K2.7	Carbonate content by gravimetric method	nr			0.00
K2.8	Water soluble chloride content	nr			0.00
K2.9	Acid soluble chloride content	nr			0.00
K2.10	Total sulphur content	nr			0.00
K2.11	Total dissolved solids	nr			0.00
K2.12	pH value	nr			0.00
K2.13	Resistivity	nr			0.00
K2.14	Redox potential	nr			0.00
K3	Compaction related				
K3.1	Dry density/moisture content relationship using 2.5 kg rammer	nr			0.00
K3.2	Dry density/moisture content relationship using 4.5 kg rammer	nr			0.00
K3.3	Dry density/moisture content relationship using vibrating rammer	nr			0.00
K3.4	Extra over Items K3.1, K3.2 and K3.3 for use of CBR mould	nr			0.00
K.3.5	Maximum and minimum dry density for granular soils	nr			0.00
K3.6	Moisture Condition Value at natural moisture content	nr			0.00
K3.7	Moisture Condition Value/moisture content relationship	nr			0.00
K3.8	Chalk crushing value	nr			0.00
K3.9	California Bearing Ratio on re-compacted disturbed sample	nr			0.00
	Extra over for recompacting a soil sample to a specified moisture content	nr			
K3.10	Extra over Item K3.9 for soaking	day			
K4	Compressibility, permeability and durability				
K4.1	One-dimensional consolidation properties, test period 5 days	nr			0.00
K4.2	Extra over Item K4.1 for test period in excess of 5 days	day			0.00
K4.3	Measurements of swelling pressure, test period 2 days	nr			0.00
K4.4	Measurement of swelling, test period 2 days	nr			0.00
K4.5	Measurement of settlement on saturation, test period 1 day	nr			0.00
K4.6	Extra over Items K4.3 to K4.5 for test period in excess of 2 or 1 day (s)	day			0.00
K4.7	Permeability by constant head method	nr			0.00
K4.8	Dispersibility by pinhole method	nr			0.00
K4.9	Dispersibility by crumb method	nr			0.00
K4.10	Dispersibility by dispersion method	nr			0.00
K4.11	Frost heave of soil	nr			0.00
K5	Consolidation and permeability in hydraulic cells				
K5.1	Consolidation properties of a 76mm diameter specimen using a hydraulic cell, test period 4 days	nr	6		0.00
K5.2	As Item K5.1 but using a 100mm diameter specimen	nr			0.00
K5.3	As Item K5.1 but using a 150mm diameter specimen	nr			0.00
K5.4	As Item K5.1 but using a 250mm diameter specimen	nr			0.00
K5.5	Extra over Items K5. 1 to K5.4 for test period in excess of 4 days	day			0.00
K5.6	Permeability of a 76mm diameter specimen in hydraulic consolidation cell, test period 4 days	nr			0.00
K5.7	As Item K5.6 but using a 100mm diameter specimen	nr			0.00
K5.8	As Item K5.6 but using a 150mm diameter specimen	nr			0.00
K5.9	As Item K5.6 but using a 250mm diameter specimen	nr			0.00
K5.10	Extra over Items K5.6 to K5.9 for test period in excess of 4 days	day			0.00
K5.11	Isotropic consolidation properties in a triaxial cell, test period 4 days	nr			0.00
K5.12	Extra over Item K5.11 for test periods in excess of 4 days	day			0.00
K5.13	Permeability in a triaxial cell, test period 4 days	nr			0.00
K5.14	Extra over Item K5.13 for test period in excess of 4 days	day			0.00
K6	Shear strength (total stress)				
K6.1	Shear strength by the laboratory vane method (set of 3)	nr			0.00
K6.2	Shear strength by hand vane (set of 3)	nr			0.00
K6.3	Shear strength by hand penetrometer (set of 3)	nr			0.00
K6.4	Shear strength of a set of three 60mm × 60mm square specimens by direct shear, test duration not exceeding 1 day per specimen	nr			0.00
K6.5	Extra over Item K6.4 for test durations in excess of 1 day per specimen	sp.day			0.00
K6.6	Shear strength of a single 300mm × 300mm square specimen by direct shear, test duration not exceeding 1 day	nr			0.00
K6.7	Extra over Item K6.6 for test durations in excess of 1 day	day			0.00
K6.8	Residual shear strength of a set of three 60mm × 60mm square specimens by direct shear, test duration not exceeding 4 days per specimen	nr			0.00
K6.9	Extra over Item K6.8 for test durations in excess of 4 days per specimen	sp.day			0.00

K6.10	Residual shear strength of a 300mm square specimen by direct shear, test duration not exceeding 4 days	nr		0.00
K6.11	Extra over Item K6. 10 for test duration in excess day of 4 days	day		0.00
K6.12	Residual shear strength using the small ring shear apparatus at three normal pressures, test duration not exceeding 4 days	nr		0.00
K6.13	Extra over Item K6.12 for test duration in excess of 4 days	day		0.00
K6.14	Unconfined compressive strength of 38mm diameter specimen	nr		0.00
K6.15	Undrained shear strength of a set of three 38mm diameter specimens in triaxial compression without the measurement of pore pressure	nr		0.00
K6.16	Undrained strength of a single 100mm diameter specimen in triaxial compression without the measurement of pore pressure	nr		0.00
K6.17	Undrained shear strength of single 100mm diameter specimen in triaxial compression with multi-stage loading and without measurement of pore pressure	nr	12	0.00
K7	Shear strength (effective stress)			
K7.1	Consolidated undrained triaxial compression test with measurement of pore pressure (set of three 38mm specimens), test duration not exceeding 4 days per specimen	nr		0.00
K7.2	As K7.1 but single-stage or multi-stage test using 100mm diameter specimen	nr		0.00
K7.3	Consolidated drained triaxial compression test with measurement of volume change (set of three 38mm specimens), test duration not exceeding 4 days per specimen	nr		0.00
K7.4	As Item K7.3 but single-stage or multi-stage test using 100mm diameter specimen, test duration not exceeding 4 days	nr		0.00
K7.5	Extra over Items K7.1 and K7.3 for test duration in excess of 4 days per specimen	sp.day		0.00
K7.6	Extra over Items K7.2 and K7.4 for test duration in excess of 4 days	day		0.00
K8	Rock testing			
K8.1	Natural water content of rock sample	nr		0.00
K8.2	Porosity/density using saturation and calliper techniques	nr		0.00
K8.3	Porosity/density using saturation and buoyancy	nr		0.00
K8.4	Slake durability index	nr		0.00
K8.5	Soundness by magnesium sulphate	nr		0.00
K8.6	Magnesium sulphate test	nr		0.00
K8.7	Shore scleroscope	nr		0.00
K8.8	Schmidt rebound hardness	nr		0.00
K8.9	Resistance to fragmentation	nr		0.00
K8.10	Aggregate abrasion value	nr		0.00
K8.11	Polished stone value	nr		0.00
K8.12	Aggregate frost heave	nr		0.00
K8.13	Resistance to freezing and thawing	nr		0.00
K8.14	Uniaxial compressive strength	nr	10	0.00
K8.15	Deformability in uniaxial compression	nr		0.00
K8.16	Indirect tensile strength by Brazilian test	nr		0.00
K8.17	Undrained triaxial compression without measurements of porewater pressure	nr		0.00
K8.18	Undrained triaxial compression with measurement of porewater pressure	nr		0.00
K8.19	Direct shear strength of a single specimen	nr		0.00
K8.20	Swelling pressure test	nr		0.00
K8.21	Measurement of point load strength index of rock specimen (set of ten individual determinations)	nr	6	0.00
K8.22	Single measurement of point load strength on irregular rock lump or core sample (either axial or diametral test)	nr		0.00
	Ground/groundwater aggressivity			0.00
K9.1	Suite A (Greenfield site – pyrite absent Schedule 1.19.6)	nr		
K9.2	Suite B (Greenfield site – pyrite present Schedule 1.19.6)	nr		0.00
K9.3	Suite C (Brownfield site – pyrite absent Schedule 1.19.6)	nr		0.00
K9.4	Suite D (Brownfield site – pyrite present Schedule 1.19.6)	nr	14	0.00
Contract specific additional bill items				
	Aggregate crushing value (using LA coefficient)	nr		0.00
				0.00
				0.00
				0.00
				0.00
			Total section K carried to summary:	0.00

Number	Item description	Unit	Quantity	Rate	Amount £
L	**Geoenvironmental laboratory testing**				
	Contamination testing				
L1.1	Suite E (Soil samples Schedule S1.20.3)	nr	25		0.00
L1.2	Suite F (Water/Leachate samples Schedule S1.20.3)	nr	6		0.00
L1.3	Suite G (Gas samples Schedule S1.20.3)	nr			0.00
	Waste acceptance criteria testing				
L2.1	Suite H (Inert waste landfill Schedule S1.20.5)	nr			0.00
L2.2	Suite I (Stable, non-reactive hazardous waste in non-hazardous waste landfill Schedule S1.20.5)	nr			0.00
L2.3	Suite J (Hazardous waste landfill Schedule S1.20.5)	nr			0.00
Contract specific additional bill items					
	Suite K (Additional Soil Suite Schedule S1.20.7)	nr	13		0.00
	Suite L (Additional Groundwater Suite Schedule S1.20.7)	nr	3		0.00
	Suite M (Soil Leachability Schedule S1.20.8)	nr	8		0.00
					0.00
					0.00
				Total section l carried to summary:	0.00

Summary of Bill of Quantities

		£
A.	General items, provisional services and additional items	0.00
B.	Percussion boring	0.00
C.	Rotary drilling	0.00
D.	Pitting and trenching	0.00
E.	Sampling and monitoring during intrusive investigation	0.00
F.	Probing and cone penetration testing	0.00
G.	Geophysical testing	0.00
H.	In situ testing	0.00
I.	Instrumentation	0.00
J.	Installation monitoring and sampling	0.00
K.	Geotechnical laboratory testing	0.00
L.	Geoenvironmental laboratory testing	0.00
	Total tender:	**0.00**
	10% Contingency	**0.00**
	Total including Contingency	**0.00**

Appendix A. Rates for Ground Practitioners and other Personnel

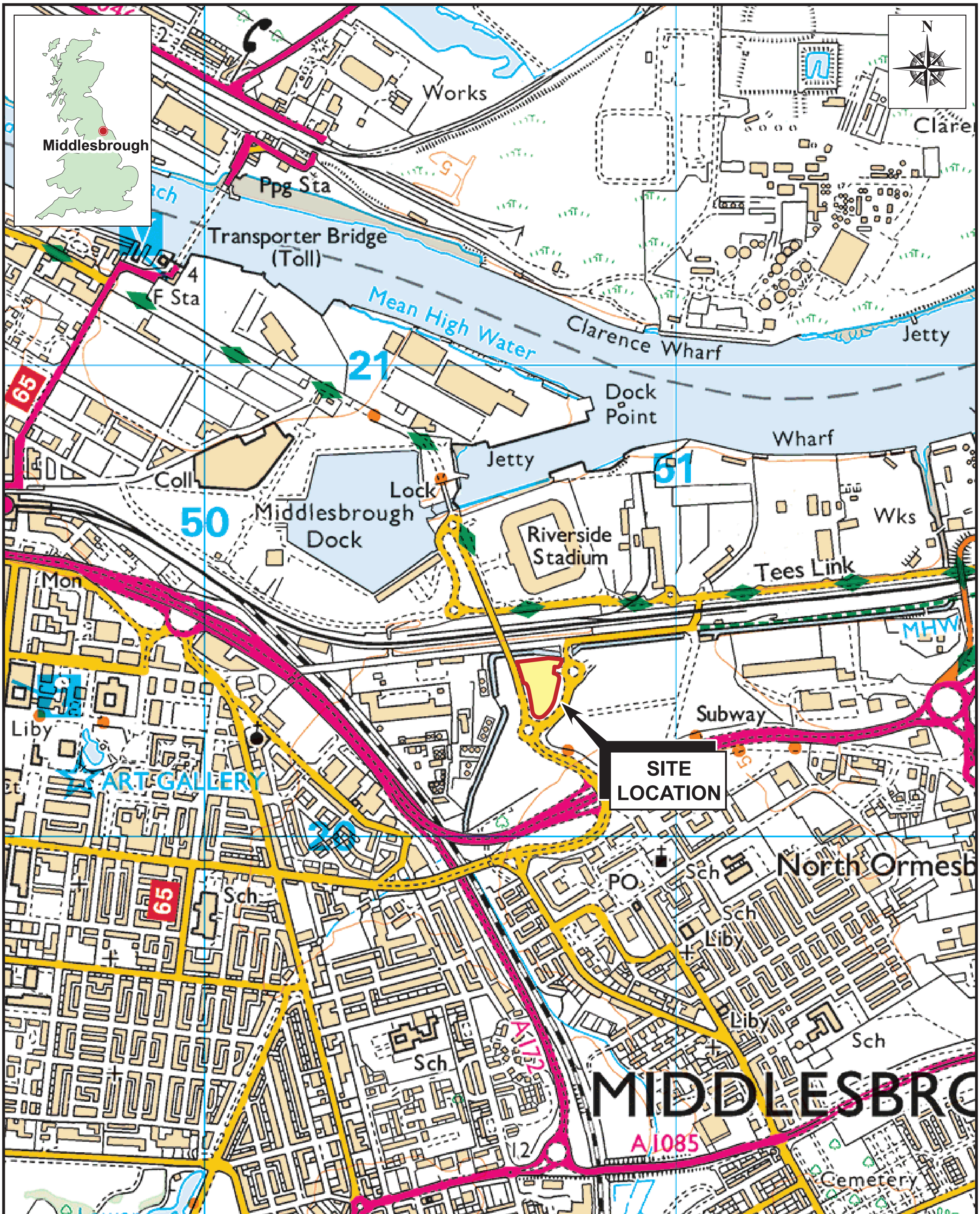
Item	Item description	Unit	Rate £
1	Technician	h	
2	Graduate ground engineer	h	
3	Experienced ground engineer	h	
4	Registered Ground Engineering Professional	h	
5	Registered Ground Engineering Specialist	h	
6	Registered Ground Engineering Advisor	h	
7	Expenses incurred by staff on site visits or who are resident by agreement with the Investigation Supervisor	day	
8	Fare per kilometre* from Contractor's premises and return for Items 1, 2 and 3	km*	
9	As above but for Items 4, 5 and 6	km*	
10	All other expenses incurred in conjunction with a site visit where a return journey is made on the same day for Items 1, 2 and 3	visit	
11	As above but for Items 4, 5 and 6	visit	
12	All other expenses incurred in connection with visit where an overnight stay is necessary for Items 1, 2 and 3	overnight	
13	As above but for Items 4, 5, and 6	overnight	

Appendix B. Long-term sample storage

Item	Item description	Unit	Rate/month £
Geotechnical samples			
1	Dynamic (windowless) samples	nr	
2	Rotary drilling core in core box	nr	
3	Rotary drilling core sub-samples	nr	
4	Bulk samples	nr	
5	Large bulk samples	nr	
6	Open-tube samples (thick-wall sampler)	nr	
7	Open-tube samples (thin-wall sampler)	nr	
8	Disturbed samples	nr	
9	Groundwater samples	nr	
10	Delft samples	nr	
11	Mostap samples	nr	
12	Piston samples	nr	
Contamination samples			
13	Soil samples in plastic tubs	nr	
14	Soil samples in glass containers	nr	
15	Groundwater samples	nr	
16	Gas samples	nr	

Where samples comprise more than one container, the rate entered shall be per container

FIGURES



Title SITE LOCATION MAP

Location PLOT A, CARGO FLEET, MIDDLESBROUGH

Client HCA

App'd:	Drawn:	Date:
PP	SQ	JULY 2015
		Ref: AY/SQ/MCH
Scale: AS SHOWN		Job No: TBA
Drg. Size: A4		FIGURE 1

AECOM

Based upon an Ordnance Survey map with the permission of the Controller of Her Majesty's Stationery Office. Crown copyright reserved. Licence No. AL 100017812

0 400m

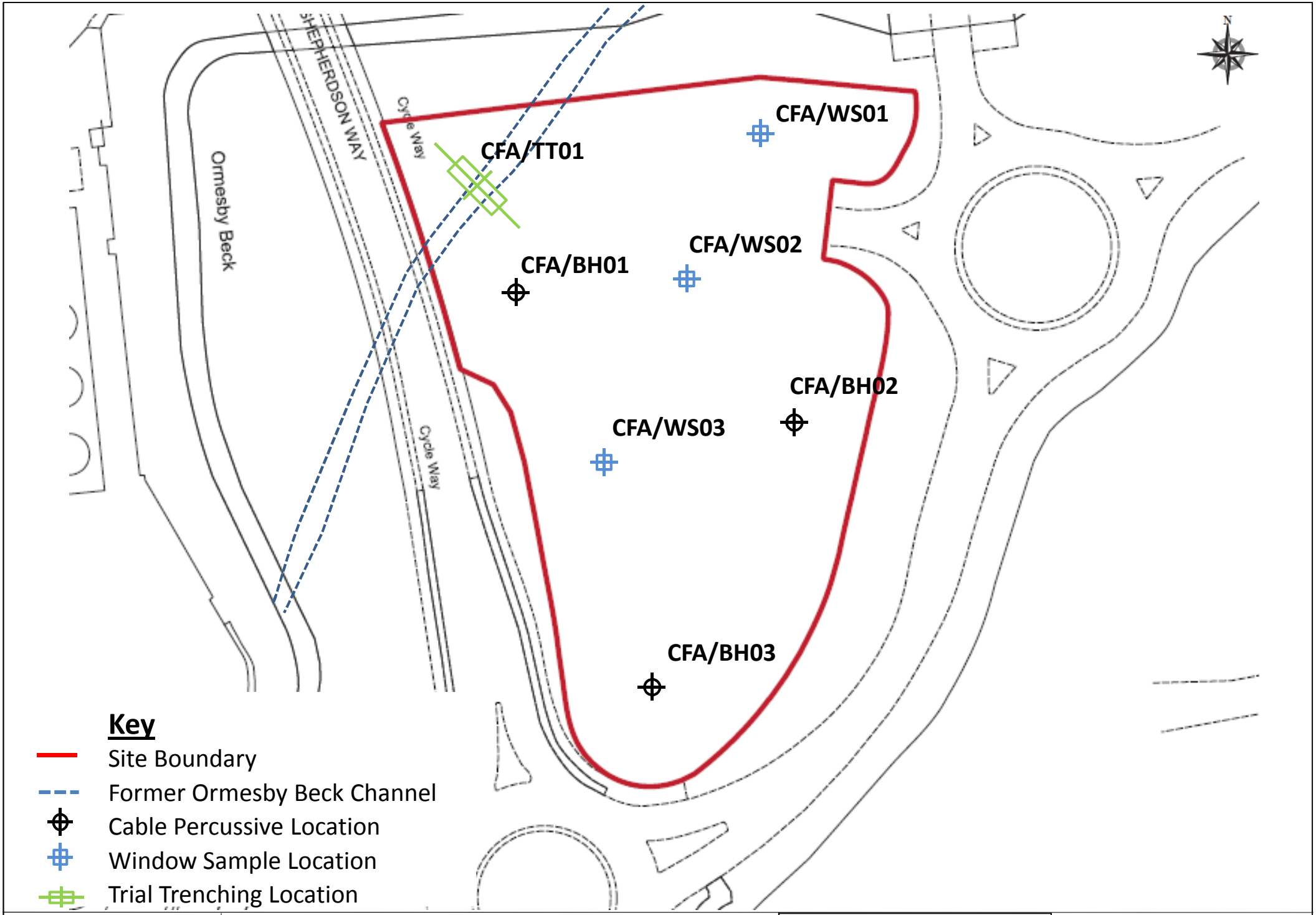
APPROXIMATE SCALE

Title	SITE LOCATION MAP
Location	PLOT B, CARGO FLEET, MIDDLESBROUGH
Client	HCA

AECOM

App'd:	Drawn:	Date:
PP	RH	JULY 2015
		Ref: AY/RH/MCH
Scale: AS SHOWN		Job No: TBA
Drg. Size: A4		**FIGURE 2**

DRAWINGS



Project: Cargo Fleet – Plot A	Drawing title: Proposed Exploratory Hole Location Plan.	47070945-PlotA-MCR-14-08-15	
		Scale at A3: NTS	
		Drw AY / App PP / Rev	
		Chk LB / Date 20/07/2015 / Date	

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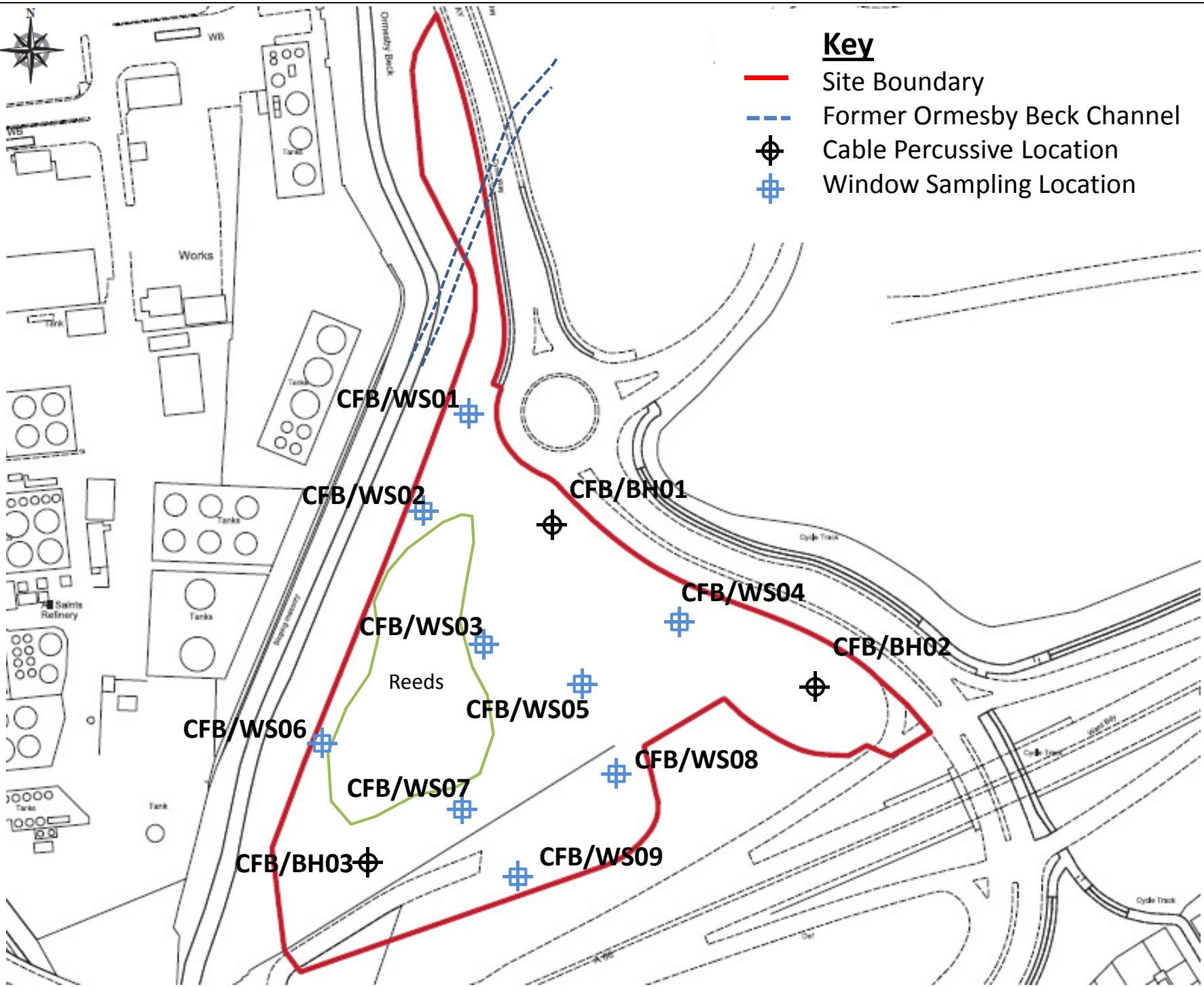

Project: Cargo Fleet – Plot B	Drawing title: Proposed Exploratory Hole Location Plan.	47070945-PlotB-MCR-14-08-15	
		Scale at A3: NTS	
		Drw AY / App PP / Rev	
		Chk LB / Date 14/08/2015 / Date	

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APPENDIX A
TO BE PROVIDED IN ADVANCE OF WORKS

ABOUT AECOM

In a complex and unpredictable world, where growing demands have to be met with finite resources, AECOM brings experience gained from improving quality of life in hundreds of places.

We bring together economists, planners, engineers, designers and project managers to work on projects at every scale. We engineer energy efficient buildings and we build new links between cities. We design new communities and regenerate existing ones. We are the first whole environments business, going beyond buildings and infrastructure.

Our Europe teams form an important part of our worldwide network of nearly 100,000 staff in 150 countries. Through 360 ingenuity, we develop pioneering solutions that help our clients to see further and go further.

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