Homes and Communities Agency

Stockton Events Car Park

Ground Investigation Contract Documents

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Job number 242531-00

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ARUP

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SHORT DESCRIPTION OF INVESTIGATION

The Homes & Communities Agency wish to carry out an intrusive ground investigation for a site identified for potential development at the Occasional Events Car Park in Stockton-On-Tees (see Figure 1).

The ground investigation will be carried out in two separate stages of work:

- **Phase 1** – **Exploratory Investigation –**To investigate the prevailing ground and contamination conditions on the site and identify potential constraints to the proposed development.
- **Phase 2** – **Additional Investigation** – To further investigate any particular conditions or constraints that may impact on the proposed development. The scope of works will be dependent on and targeted based on the findings of the Phase 1 Investigation. The Phase 2 scope within this Specification is therefore an indicative only, and will be subject to confirmation following the completion of the Phase 1 works.

It is proposed that the Phase 1 Investigation site works will be carried out commencing in early January 2016. The Stage 2 investigation will be carried out following the completion of Phase 1. Based upon current programme, it is envisaged that it will be carried out during Spring 2016.

The aims of the investigation are to identify the thickness, nature and variability of made ground and drift deposits, and confirm the depth of bedrock. The investigation will also aim to characterise levels of soil and groundwater contamination and soil gas spatially and vertically across the site.

A desk study of previous GI information available for the site has indicated extensive made ground up to 8m thick on the site, underlain by alluvium, localised glacial deposits and Sherwood Sandstone bedrock.

The made ground is indicated to be highly variable, with cobbles and boulders of concrete and fused slag frequently reported. Resonance (sonic) drilling is therefore proposed for boreholes to enable such materials to be penetrated and the underlying materials investigated.

Due to the depth of investigation required and the nature of made ground materials identified, it is anticipated that a JCB 3CX will be unable to complete the proposed trial pitting works. Previous trial pitting on the site has successfully been completed using a 20T tracked excavator.

In order to provide information on the chemical and geotechnical variability of the made ground and alluvial deposits, it will be necessary to recover continuous soil cores from a number of boreholes, with high quality open tube samples obtained elsewhere. A number of boreholes will be extended into rockhead to enable investigation and installation of groundwater sampling instruments in bedrock.

For the purposes of tender, the scope of works shall comprise:

Scope	Phase 1	Phase 2
Sonic drilled boreholes, with recovery of cores/continuous samples to depths of between 20m and 25mbgl to investigate ground conditions at depth and penetrate slag	11 No.	6 No.
Machine excavated trial pits to depths of up to 6mbgl to investigate near surface ground conditions	21 No.	10 No.
In situ standard penetration testing in selected boreholes	✓	✓
Sampling of soils for geotechnical and chemical testing, (including UT100 and Piston samples in selected boreholes)	✓	✓
Geotechnical laboratory testing	✓	✓
Chemical laboratory testing	✓	✓
Installation of 50mm groundwater or combined gas/groundwater standpipes, as specified, in boreholes	✓	✓
In situ permeability testing (variable head) in selected groundwater instruments	✓	✓
Post siteworks groundwater level, gas monitoring and sampling of groundwater and ground gas	✓	✓
Provision of a Factual Report, including PDF Report	✓	✓
Provision of AGS data, including Preliminary, Draft and Final data	✓	✓

Unless instructed otherwise, to conform to Environment Agency restrictions, all boreholes shall be constructed so as the rig is not positioned within 10m of the top of the river bank.

The site specific Hazard Risk Register for the works is provided within Appendix A.

FORM OF TENDER (APPENDIX)

(NOTE: Relevant Clause numbers of the Conditions of Contract are shown in brackets)

APPENDIX - PART 1 (to be completed prior to the invitation of Tenders)

1. Name of the Employer (Clause 1(1)(a)) Homes and Communities Agency

   Address: St Georges House, Kingsway, Team Valley Trading Estate, Gateshead, NE11 0NA

2. Name of the Investigation Supervisor (Clause 1(1)(c)) Ove Arup & Partners Limited.

   Address: Central Square, Forth Street, Newcastle upon Tyne, NE1 3PL.

3. Defects Correction Period (Clause 1(1)(w)) 14 Weeks

4. Parts or Sections of the Investigation which shall not be sub-contracted without the Investigation Supervisor's prior written approval (Clause 4(2))

   All Parts or Sections of the Investigation

5. Number and type of copies of Drawings to be provided (Clauses 6(1)(b))

   Zero (Contractor to retain one set of tender documents).

6. Form of Agreement (Clause 9) Required

   If required Signed

7. Performance Bond (Clause 10(1)) Not required

   Amount of Bond (if required) to be % of Tender Total

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))

   TBC (Provisionally 06/01/16)

10. Time for Completion calculated from the Commencement Date (Clause 43)[a]

    Sections of the Investigation (Clause 1(1)(y))[b]

    Section A the whole of the Site Operations (TBC by contractor in tender programme) ...3.... Weeks

    Section B Laboratory Testing .....4.... Weeks

    Section C Draft Report ....1.... Weeks

    Section D Final Report (Final monitoring to be reported separately) ....1.... Weeks

11. Liquidated damages for delay (Clause 47)

	per day	limit of liability[c]
Section A (as above)	£250.00	£2500
Section B (as above)	£250.00	£2500
Section C (as above)	£250.00	£2500
Section D (as above)	£250.00	£2500

12. Vesting of materials not on Site (Clauses 54(4) and 60(1)(c)) (if required by the Employer)d

N/A

13. Method of measurement adopted in preparation of Bills of Quantities (Clause 57).

Clause 57 is deleted and substituted by the following:

"The method of measurement is defined in the Specification and attached Bill of Quantities".

14. Percentage of the value of goods and materials to be included in Interim Certificates (Clause 60(2)(b)) N/A %

15. Minimum amount of Interim Certificates (Clause 60(3)) £15,000.00

16. Rate of retention (% of estimated amount due to the Contractor on account of Clauses 60(1)(a) and 60(1)(d))(Clause 60(5)) 25%

17. Limit of retention (% of Tender Total) (Clause 60(5)) 15%

18. Bank whose Base Lending Rate is to be used (Clause 60(7)) HSBC Bank plc

19. Requirement for prior approval by the Employer before the Investigation Supervisor can act.

DETAILS TO BE GIVEN AND CLAUSE NUMBER STATED (Clause 2 (1)(b))[f]

.....

20. Name of the Principal Designer: Arup

Address: Central Square, Forth Street, Newcastle upon Tyne, NE1 3PL

21. Name of the Principal Contractor (if appointed) (Clause 71(1)(c))

Successful Tenderer

22. Period For Approval (14(7))

Testing Schedule	1 week
Draft Report	1 week
Final Report	1 week

23. Maximum sum for the contractor to make changes without an instruction (Clause 13(4)) £200

24. The arbitration procedure to be used is (Clause 66C(2)(a)

(a) The Institution of Civil Engineers' Arbitration Procedure 1997 or.

(b) The Construction Industry Model Arbitration Rules [g].

[a] If not stated is to be completed by Contractor in Part 2 of the Appendix.

[b] To be completed if required, with brief description. The item for "the Remainder of the Investigation" must be used to cover the balance of the Investigation if the Sections described do not in total comprise the whole of the Investigation.

[c] Delete where not required.

[d] (If used) Materials to which the Clauses apply must be listed in Part 1 (Employer's option) or Part 2 (Contractor's option).

[e] Insert here any amendment or modification adopted if different from that stated in Clause 57.

[f] Insert here any requirement that the Investigation Supervisor has to obtain prior approval from the Employer before he can act full particulars of such requirements must be set out above.

[g] Delete one as appropriate.

APPENDIX - PART 2 (to be completed by Contractor)

1. Insurance Policy Excesses (Clause 25(2))

   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 of the Site Operations..... ..... Weeks

   Section B .... Weeks

   Section C .... Weeks

   Section D .... Weeks

   the Remainder of the Investigation ..... Weeks

3. Vesting of materials not on Site (Clauses 54(4) and 60(1)(c)) (at the option of the Contractor - see [d] in Part 1)

   N/A

4. Sub-contractors to be used by the Contractor (Clause 4(3))

   .....

5. Percentage(s) for adjustment of PC sums (Clauses 59(5)(c)) (with details if required)

   .....

CONDITIONS OF CONTRACT

FOR GROUND INVESTIGATIONS

1. GENERAL

The Conditions of Contract referred to in the Tender shall be:

“Infrastructure Conditions of Contract, Ground Investigation Version, August 2011” published for the Association of Consultancy and Engineering and the Civil Engineering Contractors Association with amendments as detailed in:

“Amendments to the Infrastructure Conditions of Contract Payment Provisions”, reference ICC/Payment/October 2011, also published for the Association of Consultancy and Engineering and the Civil Engineering Contactors Association.

Sub-Clause 1(1)(bb)

Insert a new clause as follows:

"Personal Data" means personal data as defined in the DPA which is supplied by one party to the other party pursuant to their Contract.".

Sub-Clause 1(1)(cc)

Insert a new clause as follows:

"DPA" means the Data Protection Act 1998.". Insert a new clause as follows:

Sub-Clause 1(1)(dd)

“FIA" means the Freedom of Information Act 2000.".

ENGINEER AND ENGINEER’S REPRESENTATIVE

Sub-Clause 2(6)(b)

For, "forthwith" substitute, "within 3 days of receipt".

ASSIGNMENT AND SUB-CONTRACTING

Clause 3

Delete and substitute:

"3 (1) The Employer shall be entitled to assign the benefit of this Contract or any part, share or interest herein without the consent of the Contractor.

(2) The Contractor shall not be entitled to assign the benefit of this Contract or any part, share or interest herein.

(3) For the purposes of the Contracts (Rights of Third Parties) Act 1999 the parties do not intend to confer, and nothing in this Contract shall be construed as conferring, on a third party a benefit or a right to enforce a term of this Contract without derogation from clause 3.1.".

Sub-Clause 4(1)

In line 1 after “the whole” add “or part”.

Sub-Clause 4(4)

Delete clause 4(4) and substitute:

"The Contractor shall be and remain liable to the Employer for the acts and omissions (including those in tort) of any person to whom the Contractor sub-lets any portion of work (including any sub-contractor, his agents servants or work people of such person).".

Sub-Clause 4(6)

Insert a new clause 4 (6) as follows:

"All sub-contractors shall be deemed to be domestic sub-contractors to the Contractor, and not nominated sub-contractors.".

CONTRACT DOCUMENTS

Clause 5

Delete the words, "which shall be . . . 13".

Insert at the end:

"The Contractor shall act in accordance with such instructions at no cost to the Employer and the Contractor shall bear the risk of any costs or delay or disruption or loss caused by any such instructions or any such ambiguities or discrepancies.".

Sub-Clause 6(1)

Delete and substitute:

"As soon as reasonably practicable following award of the Contract the Contractor shall be furnished free of charge with the number and type of documents as entered in the Appendix to the Form of Tender.".

Consequently, point 5 in the Appendix, Part I, is amended by inserting after the word, "Drawings" the words, "and documents".

Sub-Clause 7(1)

Delete entire sub-clause and replace with “The Contractor shall designate or establish bench marks and on-Site reference from Ordnance Survey (OS) benchmarks or from values given (as nominated in the Form of Tender)

Sub-Clause 7(3)

Delete “Drawing Specification or instructions" and substitute:

"Drawings, Specification or instructions".

Sub-Clause 7(4)(a)

Delete the words, "subject to clause 53" and after the words "amount of such" insert the word "direct".

Sub-Clause 7(5)

Delete, "Drawings and Specification" and substitute:

"Drawings, Specifications or instructions".

Sub-Clause 7(6)

Insert after the words "Contractor he shall" as follows:

"on the dates or on or before the expiry of the period shown on the programme referred to in clause 14 or, if no date or period is shown on the programme then the date which is prior to (and having regard to the periods of completion of the Works shown on such programme), proximate to the date on which it is reasonably necessary for the Engineer to receive them for acceptance".

Insert after the words "Engineer for acceptance" as follows:

"in accordance with the procedure set out in the Specification (if any) or as the Engineer may reasonably direct in writing".

Insert new sub-clauses after sub-clause (b) as follows:

"(c) the Contractor warrants and undertakes in respect of its design that:

(i) it will satisfy any performance specification included or referred to in the Contract; and

(ii) it will comply with any statutory requirements as referred to in clause 26(3).

(d) the warranties and undertakings contained in clause (c) above shall be without prejudice to any warranties implied by law or statute or otherwise.".

Clause 10

Delete.

Sub-Clause 10(1)

At the end of the first sentence add "or prior to the Commencement Date whichever is earlier".

Sub-Clause 11(1)

Delete entire sub-clause.

Sub-Clause 11(2)

After the words, "satisfied himself" in the first paragraph delete the words, "so far as is practicable and reasonable" and substitute, "in all respects".

Sub-Clause 11(2)(a)

After the words "sub-soil" insert the words, "and physical conditions or artificial obstructions."

Sub-Clause 11(2)(b)

After the words "necessary for" insert the words, "designing (in so far as the Contractor is responsible therefore)".

Sub-Clause 11(3)(a)

Delete the words "by him or made available by the Employer" and insert the words:

"or obtained by the Contractor, whether as a result of its own enquiries or whether obtained from or on behalf of the Employer".

Sub-Clause 11(3)(b)

After the words "obligations under the Contract" insert, "; and"

Sub-Clause 11(3)(c)

Insert a new paragraph, 11(3)(c), as follows:

"The Contractor shall not be entitled to any extension of time or any addition to the Contract Price on the grounds of any incorrect information, misunderstanding or misinterpretation of any such matter nor shall the

Contractor be released from any of the risks accepted or obligations undertaken by it under the Contract on the grounds that it did not or could not have foreseen or discovered any matter which might affect or have affected the execution of the Works. The Contractor shall bear all such risks.".

Sub-Clause 12(1)

Insert after, "give written notice thereof to the Engineer" as follows:

"as soon as reasonably practicable and in any event within 3 days of encountering the physical conditions or artificial obstructions".

Clause 12 Option A or Option B

12(2) Delete the words “additional payment or”

Delete the words, "Clause 53 and/or".

Delete "as may be appropriate".

12(3) Delete the words "their estimated cost".

12(4) In sub clause (a) delete the word “cost”

In sub-clause (d) add the words "provided that the Contractor shall not be entitled to any additional payment by reason of such suspension or variation".

12(5) Delete the words, "but the value of...included in the contract price.”

12(6) Delete the words "or additional payment”.

Delete "and" in sub-sub clause (a).

Delete, sub-sub clause (b) "determine the amount ... in respect of profit)".

Delete the words, "and the Contractor shall subject to Clause 53 be paid in accordance with Clause 60 the amount so determined".

12(7) Add a new sub-clause

"Except as aforesaid the Contractor shall be deemed to have taken into account in his Tender all physical conditions or artificial obstructions in the site. For the avoidance of doubt the Contractor shall not be entitled to any additional payment under clause 53 or otherwise on account of such physical conditions of artificial obstructions".

Sub-Clause 13(3)

Delete from the side heading, "and extra cost".

Delete the words, "Clause 5 or" and, "so as to cause him to incur cost".

Delete the words, "and the Contractor shall subject ... pursuant to Clause 51" inclusive and insert:

", except to the extent that such delay results from the Contractor's default".

Sub-Clause 14(1)(a)

After the words "showing the order" insert the words "and sequence".

Sub-Clause 14(1)(a)

In line 4 after "... Clause 42(1)." add the following sentence:

"The programme shall allow a period of not less than seven days after receipt by the Investigation Supervisor of a draft report from the Contractor and within which period the Investigation Supervisor shall approve or request in writing modifications of the draft report."

Sub-Clause 20(1)(d)

At the end of line 4 add:

"after which the Contractor shall gain consent from the Investigation Supervisor to dispose of the samples and cores."

Sub-Clause 20(2)

Delete and substitute:

"The Contractor shall, unless it is otherwise provided for in the Contract, take full responsibility for the security, care and storage of the samples and cores obtained from the Investigation. The Contractor is required at its own cost, to store all samples obtained from the Investigation for a period of 21 days after written approval by the Engineer of the Report. In the case of phased investigation the storage of samples and cores will be further specified in the Contract. After the said period the Contractor shall give the Engineer 14 days written notice of its

intention to charge rental for the storage of samples and cores. The Engineer shall then give written instructions for the immediate disposal of the samples and cores at the Contractors expense or state the storage or other requirements giving an indication of his programme. The rental charged for the cores and samples stored shall commence after the expiry of the said 14 days notice and shall continue until the Engineer gives disposal instructions. If it is the Contractors intention to charge rental for the storage of samples and cores beyond the said periods then it should indicate these charges in the letter accompanying his tender."

Clause 21

Delete the words in clause 21(a) and substitute:

"The Ancillary Works, structures on or to be erected on the Site necessary for the carrying out and completion of the Investigation, and any unfixed materials or things delivered to the Site, to its full value".

Delete the proviso

Sub-Clause 23(1)

In line 2 delete “in the joint names of the Contractor and the Employer”.

Sub-Clause 26(2)

Delete.

Sub-Clause 26(3)(c)

Insert after "planning permission" as follows:

"(except as provided for in the Contract or for off-site tips and borrow pits or in respect of design elements in respect of which the Contractor is responsible)".

Clause 27

Delete, and substitute:

“27 New Roads and Street Works Act 1991 – Definitions’

(1)(a)In this clause “the Act" shall mean the New Roads and Street Works Act 1991 and any statutory modification or re-enactment thereof for the time being in force.

(b) For the purpose of obtaining any licence under the Act required for the Investigation the undertaker shall be the Employer who for the purposes of the Act will be the licensee. For the purpose of obtaining any licence under the Act required for the Investigation the undertaker shall be the Employer who for the purposes of the Act will be the licensee. For the purpose of obtaining any licence under the Act required for the Investigation the undertaker shall be the Employer who for the purposes of the Act will be the licensee. For all other purposes the undertaker under the licence shall be the Contractor.

(c)For all other purposes the undertaker under the licence shall be the Contractor.

(d)All other expressions common to the Act and to this clause shall have the same meaning as those assigned to them by the Act.

(2)(a)The Employer shall obtain any street works licence and any other consent licence or permission that may be required for the carrying out of the Investigation and shall supply the Contractor with copies thereof including details of any conditions or limitations imposed.

(b)Any condition or limitation in any licence obtained after the award of the Contract shall be deemed to be an instruction under clause 13.

(3)The Contractor shall be responsible for giving to any relevant authority any required notice (or advance notice where prescribed) of his proposal to commence any work. A copy of each such notice shall be given to the Employer".

Sub-Clause 29(1)

After the words, "All operations necessary for the carrying out of the investigation " insert the words, "including the completion of outstanding works".

After the words, "unnecessarily or improperly with" insert the words, "or cause any nuisance, whether public or private to".

Sub-Clause 29(4)

Delete.

Sub-Clause 29(5)

Insert a new clause 29(5) as follows:

"(5) When the Contractor wishes traffic to be diverted in order to carry out part of the Works it shall give adequate notice in writing to the Engineer and identify in detail the parts of the highway affected. The inability to obtain any closure or diversion of highway will in no way relieve the Contractor of its responsibilities.".

Sub-Clause 31(1)

Add a new sentence at the end of sub-clause 31(1) as follows:

"For the avoidance of doubt the Contractor shall not be entitled to any additional payment resulting from or connected with compliance with this clause.".

Sub-Clause 31(3)

Add new sub-clause 31(3) as follows:

"For the avoidance of doubt the Contractor shall not be entitled to any additional payment resulting from or connected with compliance with sub-clause (1) of this clause."

PROVISIONAL AND PRIME COST SUMS AND NOMINATED SUB-CONTRACTS

Sub-Clause 42(2)(b)

At the end of the Sub-Clause add:

"This Clause 42(2) shall be deemed not to prevent Clause 49 having its full force and effect".

Sub-Clause 44(1)

Delete subclause 44(1)(e) and substitute:

"(e) a breach of this Contract by the Employer which actually delays the Contractor,".

Delete clause 44(1)(f).

After the words, "any delay has arisen" insert the words, "deliver to the Engineer a notice in writing claiming an extension of time which shall contain".

Delete the words, "or as soon thereafter as is reasonable deliver to the Engineer".

Clause 45

Insert after "in writing of the Engineer" as follows:

"provided that any additional costs resulting from Works executed during the night or on Sundays or any public holiday shall be borne by the Contractor (unless such costs are caused by delay or disruption for which the Employer or the Engineer are directly responsible)".

Sub-Clause 46(4)

Insert a new clause 46(4) as follows:

"In the case of default or delay on the part of the Contractor to take such steps as are necessary under clause 46(1) or to agree to an accelerated completion under clause 46(3) the Engineer may arrange for any part or parts of the Works to be undertaken by others. The Employer shall be entitled to recover from the Contractor any additional costs incurred in pursuance of the terms of this clause unless, in the case of clause 46(3) agreement cannot be reached as to any special terms and conditions or amounts of payment.".

LIQUIDATED DAMAGES

Sub-Clause 47(5)

After the words, "orders a variation under clause 51", delete the words, "or unforeseen adverse conditions . . . are encountered" inclusive.

OUTSTANDING WORK AND DEFECTS

Sub-Clause 49(3)

After, "under the Contract" insert the words, "or to any other circumstances within the Contractor's control".

Sub-Clause 51(2)

Prior to the existing text insert the following:

"When requested by the Engineer the Contractor shall in anticipation of a variation order under clause 51 submit a quotation for the revised time for completion for the Works as varied together with an estimate of the cost of such a variation. Wherever possible the delay and cost consequences of such variation shall be agreed before the order is issued or before the work commences.".

Sub-Clause 51(4)

After the words, "shall in any way vitiate or invalidate the Contract" delete the remainder of clause 51(4).

Sub-Clause 52(4)

Insert a new sub-clause (c) as follows:

"For the avoidance of doubt the establishment of the value of the variation shall be the difference between (1) the value extrapolated from the construction drawings issued in accordance with the clause 7(1) together with any relevant Contract instructions and (2) the final issue of the Tender Drawings which become the Contract Drawings together with any further amendment confirmed by the Engineer during the tender process. The value shall be determined in accordance with sub-clause 52(4)(a) and 52(4)(b) above subject to sub-clause (d) below.".

Insert a new sub-clause (d) as follows:

"Reference to prices and rates in sub-clause 52(4)(a) and 52(4)(b) shall be deemed to be the rates inserted against measured items in the Bill of Quantities only, without any lump sum additions or any other uplifts.".

Clause 53

Delete and substitute:

"For the avoidance of doubt any variations ordered by the Engineer that are not designated as Employer's Works Changes shall not be so valued and there shall be no consequent increase to the Tender Total nor shall the Contractor be entitled to any other reimbursement therefore whether pursuant to the terms of the Contract or otherwise.".

PROVISIONAL AND PRIME COST SUMS AND NOMINATED SUB-CONTRACTS

Clause 59

Delete.

Sub-Clause 60(1)

Delete the words, “Nominated Sub-contractors" where ever it appears in this clause, and substitute in each case:

“a sub-contractor".

Sub-Clause 60(2)

Delete the sentence beginning, “The amounts certified in respect of . .".

Sub-Clause 60(4)

Replace “The final date for payment is 14 days later” with “The final date for payment is 28 days later”.

CERTIFICATE AND PAYMENT

Sub-Clause 60(5A)

Insert a new sub-clause 60(5A):

"The retention shall be retained by the Employer without obligation to invest and without creating any fiduciary obligations on the part of the Employer to the Contractor or any person with whom the Contractor may have contracted. The Contractor shall have no interest (either legal or equitable) in the retained amount or its produce.".

REMEDIES AND POWERS

Sub-Clause 63(1)

Delete the words, "after giving 7 days' notice to the Contractor" inclusive and substitute:

"forthwith on giving notice or at any time thereafter".

AVOIDANCE AND SETTLEMENT OF DISPUTES

Sub-Clause 63(5)

Delete.

Sub-Clause 65(1)

Sub-Clause 65(1)(ba)

Insert a new clause 65(1) (ba) as follows:

"has failed to comply with the requirements of the Construction (Design and Management) Regulations 2015 or any remaking thereof or any amendment to a regulation therein, or".

Sub-Clause 65(1)(c) (v)

Delete all after the word, "liquidation" in that sub-clause and substitute:

"(whether voluntary or otherwise), or makes or proposes a voluntary arrangement or composition for its creditors, or there is an administrator appointed or an administrative or other receiver is appointed, or there is presented a petition for the Contractor's winding up which is not discharged with 7 days of presentation, or".

Sub-Clause 65(1)(i)

Delete the words, "previous warnings" and substitute, "a previous warning".

Delete, "persistently or fundamentally" and substitute, "howsoever".

Sub-Clause 65(1)

Delete the words, "then the Employer may after giving 7 days' notice . . specifying the event relied on" (inclusive), and substitute:

"then the Contractor shall be in breach of this Contract, and without prejudice to the Employer's other rights and remedies, if clause 65(1)(c) applies the employment of the Contractor is determined, and in the case of any other subclause in clause 65(1) applying, the Employer may after giving 3 days' notice

in writing to the Contractor specifying the breach determine the employment of the Contractor, and may thereafter".

Clause 66
Delete and substitute:

"66(1) The proper law of this Contract is English law. The courts of England shall have jurisdiction in relation to this Contract, and a court or judge thereof shall have jurisdiction to open up, review and revise any decision or opinion or certificate under the Contract.

(2) Where pursuant to this Contract or Part II of the Housing Grants, Construction and Regeneration Act 1996 a dispute or difference is referred to adjudication, that adjudication shall be governed by and conducted in accordance with the Adjudication Rules of the Technology and Construction Solicitors Association, which are incorporated herein by reference. The decision of the adjudicator shall be binding on the parties until the dispute or difference is finally determined by a court or judge thereof.

(3) Any reference in the Contract to arbitration or to an arbitrator shall be deleted and substituted with a reference to the English courts or a judge thereof.".

APPLICATION TO SCOTLAND AND NORTHERN IRELAND

Clause 67

Delete and insert, "Not used".

Clause 69

Delete and insert, "Not used".

Sub-Clause 70(2)

Add at the end of clause 70(2):

"upon production to the Employer of a valid VAT invoice".

SPECIAL CONDITIONS

Clause 73

Insert a new clause 72, as follows:

"Third Parties

(1) The Contractor shall at all times prevent any public or private nuisance (including, without limitation, any such nuisance caused by noxious

fumes, noisy working operations or the deposit of any material or debris on the public highway) or other interference with the rights of any adjoining or neighbouring landowner, tenant or occupier or any statutory undertaking arising out of the carrying out of the Works or of any obligation pursuant to clause 49 and shall assist the Employer in defending any action or proceedings which may be instituted in relation thereto. The Contractor shall be responsible for and shall indemnify the Employer from and against any and all expenses, liabilities, losses, claims and proceedings whatsoever resulting from any such nuisance or interference, save only where such nuisance or interference is the consequence of an instruction of the Employer.

(2) Without prejudice to the Contractor's obligations under clause 72(1), the Contractor shall ensure that there is no trespass on or over any adjoining or neighbouring property arising out of or in the course of or caused by the carrying out of the Works or of any obligation pursuant to clause 49.

(3) The Contractor shall, following consultation with the Employer and at no cost to the Employer, obtain all necessary consents and licences for the carrying out of the Works (except planning consent) including any consents and licences which may be required from any adjoining owners, tenants or occupiers. Without prejudice to the generality of the foregoing, the Contractor shall carry out all negotiations with adjoining owners, tenants or occupiers, and obtain any consents or licences which may be required for the oversailing of tower crane jibs and or erection of scaffolding and/or footpath and/or road closures.".

ADDITIONAL CONDITIONS

The following additional conditions shall have effect:

A.l. PROFESSIONAL INDEMNITY INSURANCE

A1.1 Without prejudice to the Contractor's obligations under this Contract or otherwise at law, the Contractor undertakes and warrants that it will forthwith procure and maintain at its own cost professional indemnity insurance for a sum not less than £5,000,000 in respect of each and every claim (except in respect of any claim for pollution or contamination where the cover shall be in the aggregate) to cover the Contractor's obligations relating to the Contract, the insurance to be with a reputable insurance company carrying on insurance business in the United Kingdom, not to be subject to any unusual terms or excesses having regard to the cover which is available in the insurance market to competent contractors with good claims records and who are of similar size and experience as the Contractor, to be maintained for a period of twelve years from Completion (as defined in the Completion Certificate) and for such period as it may have any liability to the Employer (howsoever arising), and for so long as cover remains available on commercial rates and terms to competent contractors with good claims records and who are of a similar size and experience as the Contractor.

A1.2 The Contractor shall produce to the Employer on demand (but not less than once in any period of 12 months) reasonably satisfactory evidence that the insurance required is in force, and in any event notify the Employer as soon as reasonably practicable upon its inability to obtain cover, or the cancellation of the insurance, or its inability to renew the insurance.

A1.3 The Contractor shall in respect of a claim by or on account of the Employer hold any such money received from such insurance (except for the Contractor's legal costs in respect of that particular claim) on trust for the Employer, and shall not make any deduction from those monies without first obtaining the Employer's consent in writing.

A.2 COLLATERAL WARRANTIES

A2.1 At the request of the Employer or its successor from time to time, whether before or after the completion of the Investigation, the Contractor shall execute as deeds and deliver to the Employer, within twenty-one days of any such request any or all of the following one or more deeds of warranty in the form set out in Appendix 1A to this Contract with such amendments as the Employer or its successor may reasonably require in favour of:

(a) a party or parties purchasing the premises comprising the Investigation or any part thereof;

(b) a party or parties taking a lease or underlease of the premises comprising the Investigation or any part thereof;

(c) a party or parties providing finance to the Employer in connection with the Investigation;

(d) a party or parties providing finance to any such purchaser or lessee of any part of the Investigation; and

(e) the Employer or its successors, in the event the Employer or its successor assigns or novates the Contract.

A2.2 If the Contractor fails to execute and deliver any such deed pursuant to additional condition A2.1 above, within a further seven days of the Employer's request, the Employer may execute such deed on the Contractor's behalf, and the Contractor hereby appoints the Employer as the Contractor's attorney for the purpose of executing any such deed and the Contractor agrees to ratify and confirm any act done by the Employer pursuant to this power of attorney, and agrees that this power is irrevocable pursuant to Section 4, Powers of Attorney Act 1971.

A2.3 The Contractor shall when requested by the Employer or its successor procure that any sub-contractor employed by it in relation to this Contract shall, whether before or after the completion of the Investigation, execute as a deed in the form set out in Appendix 1B to this Contract with such amendments as the Employer or its successor may reasonably require and deliver to the Employer within a further twenty-one days of any such request the deed to be in favour of the Employer or its successor, and any person:

(a) purchasing the premises comprising the Investigation or any part thereof;

(b) taking a lease or underlease of the premises comprising the Investigation or any part thereof; and

(c) providing finance to the Employer in connection with the Investigation, or any such purchaser or lessee of any part of the Investigation.

A3 PARENT COMPANY GUARANTEE

It shall be a condition precedent to the obligation of the Employer to pay any sums under this Contract that the Contractor shall have delivered to the Employer a parent company guarantee in the form set out in Appendix IC to this Contract duly executed as a Deed by the Contractor's ultimate parent.

A4 PERFORMANCE BOND

It shall be a condition precedent to the obligation of the Employer to any sums under this Contract that the Contractor shall have delivered to the Employer a performance bond in the form set out in Appendix 1D to this Contract from one of the Employer's approved sureties set out in the list annexed hereto or as the Employer may in its absolute discretion approve in an amount equivalent to 10% of the Contract Price.

A5 COPYRIGHT

A5.1 The Contractor grants to the Employer, with full title guarantee, an irrevocable, non- exclusive, royalty free "licence to use and reproduce any of the drawings, details, specifications and calculations which have been

or are prepared by or on behalf of the Contractor relating to the Investigation and the designs contained in them ("Documents") for the carrying out of the Investigation and the advertisement, sale, letting, maintenance, repair, reinstatement, construction, reconstruction and extension of the Investigation or any premises or the Site, and to grant sub-licences in the terms of this licence but the copyright in the Documents shall remain vested in the C:ontractor. The Contractor will not be liable for any use of the Documents for any purposes other than those for which the same are or were prepared. The Employer shall on written request and upon paying a reasonable copying charge therefore, be entitled to be supplied by the Contractor with copies of the Documents.

A5.2 The Contractor warrants that 1he use of the Documents for the purposes of the Investigation will not infringe the rights of any third person.

A6 APPROVALS

No inspection, testing, approval or review nor any omission to inspect, test, approve or review on the part of the Employer shall diminish any duty or liability hereunder of the Contractor.

A7 SET-OFF AND OTHER REMEDIES

A7.1 Nothing contained in this Contract (other than as to the giving of notices) shall oust or limit any right of the Employer under any statute or rule of law or of equity in the nature of set-off or abatement of price.

A7.2 If the Contractor fails to comply with the requirements of additional condition A2 (Collateral Warranties) or if the Contractor becomes insolvent so that its covenant is impaired, then without prejudice to any other remedy it may have, the Employer shall be entitled to recover from the Contractor any premiums reasonably incurred to effect insurance (such as inherent defects insurance or other suitable cover) in order to arrange suitable alternative protection.

A8 CONFIDENTIALITY

The Contractor must at all times keep confidential, treat as privileged, and not directly or indirectly make or allow any disclosure of, any provision of this Contract or any information relating to any provision or subject matter of the Investigation or the Site, or any information directly or indirectly obtained from another party under or in connection with the Investigation or the Site, except to the extent:

(a) required by law;

(b) that the parties to this Contract otherwise agree in writing;

(c) necessary to carry out its duties in relation to the Investigation, or in order to make full frank and proper disclosure to its insurers or intended insurers, or to obtain legal or accounting advice.

A9 HEALTH & SAFETY

The Contractor must in pursuance of its obligations under this Contract comply at all times with the provisions of the Health & Safety at Work etc Act 1974 ("HS Act") and in particular the Construction (Design and Management) Regulations 2015 ("CDM Regulations"), and insofar as they touch upon or concern its obligations under this Contract (but without prejudice to the generality of the foregoing):

1. Where the Contractor is also the Principal Contractor under the CDM Regulations, the Contractor must comply with the obligations of the Principal Contractor under those regulations;
2. Where the Contractor is also a "designer" as defined under the CDM Regulations, the Contractor must comply with the obligations of a "designer" under those regulations;
3. Co-operate fully with the Principal Designer and the Principal Contractor (if it is not either or both of those people) under the CDM Regulations;
4. Ensure that it allocates adequate resources to enable it to comply with its obligations in this Contract and the CDM Regulations;
5. Co-operate with all other persons involved in the Investigation as "designers" to consider the prevention of risks and protection of persons who may be exposed to risks,

and it must not by an act or omission do anything that would cause the Employer to breach or be prosecuted under the HS Act, and/or the CDM Regulations.

A10 CORRUPT PRACTICES

The Contractor shall not:

- offer or give to any person in the service of the Employer any gift or consideration of any kind as an inducement or reward in relation to the obtaining or execution of this Contract or any other contract with the Employer or for showing favour or disfavour to any person in relation to this Contract or any other contract with the Employer, or
- enter into this Contract or any other contract with the Employer if, in connection with this Contract or any such other contract, commission has been paid or an agreement for the payment of commission has been made by him or on his behalf or to his knowledge.

A11 PARTNERING

No partnering agreement which the parties may enter into (with or without other parties) in connection with the Investigation is intended to create legally enforceable rights or obligations between the parties or affect the terms of this Contract.

A12 DATA PROTECTION

A12.1 In relation to all Personal Data, the Contractor shall at all times comply with the DPA as a data controller if necessary, including maintaining a valid and up to date registration or notification under the DPA covering the data processing to be performed by the Contractor in connection with the Investigation or this Contract.

A12.2 The Contractor shall procure that any sub-contractor shall only undertake processing of Personal Data reasonably required in connection with the Investigation or this Contract.

A12.3 The Contractor understands that under the FIA the Employer has certain obligations which may mean that certain parts of this Contract may be disclosed to third parties.

SPECIFICATION

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

Schedule 1. Information

Schedule 2. Exploratory holes

Schedule 3. Investigation Supervisor's facilities

Schedule 4. Specification amendments, additions and deletions

Schedule 5. Specification for further items of work (divided into Arup Annexes A to J as required)

Schedule 1: Information

S1.1 Name of Contract

The Contract is to be called 'Stockton Events Car Park – Ground Investigation',

with correspondence and reports subtitled as "Phase 1" and "Phase 2" as appropriate

S1.2 Investigation Supervisor

The Investigation Supervisor is Claire Barnfather at address Arup, Central Square, Forth Street, Newcastle-upon-Tyne, NE1 3PL.

S1.3 Description of site

The site is located in Stockton-On-Tees and is centred about an approximate National Grid Reference of NZ 459 189. The site location is shown in Figure 1.

The site is currently occupied by a number of areas of car parking, access roads and soft landscaped areas. The areas of soft landscaping predominantly comprise grassed areas, with localised trees and bushes. The area of car park appear is surfaced with gravel.

The site is bounded to the north by the River Tees. To the west, the site is bordered by an unnamed road, identified as part of the site of Davy Process Technology Ltd, and to the south by Princeton Drive. It is bounded to the east by undeveloped scrub land. The site is situated approximately 600m from the A66 Stockton-On-Tees exit for Teesside Park/ Teesdale.

The site is broadly rectangular in shape, covering approximately 3.8ha, The site layout is shown in Figure 2. It is approximately 225m in a north-south direction, narrowing to the east of the site, and approximately 240m to 270m wide in an east-west direction. Approximately 200m of the northern site boundary runs along the banks of the River Tees.

The site generally slopes downwards towards the river, from south to north. The southern and northern car park areas are generally even underfoot. A series of gentle slopes and slightly mounded areas of soft landscaping are present between the car parks and associated access roads. A number of low height (0.3m) timber retaining walls are present in the north of the site .In the south west corner of the site, a grassed mound/bund is present, up to approximately 2-4m in height.

Historical maps indicate the site to have been undeveloped agricultural land until the 1890's. After this time, areas of the site were progressively developed with slag heaps, with rail tracks across the site to these locations. An iron works was present on the site from the late 1920s until the late 1960s/early 1970s. An asbestos works was present from the 1950s to the southwest of the site. It is understood that waste from the works was placed locally within the southwest of the site. In the 1980s/1990s, the site is understood to have been extensively reclaimed, with materials on the site reworked. It is understood that the asbestos waste and any other materials affected by "significant" contamination were removed from site as part of the reclamation works. No detailed records of the reclamation works, however, are available to confirm the works undertaken.

S1.4 Main works proposed and purpose of this contract

At the time of writing, the form and layout of the proposed development was yet to be confirmed. It is understood, however, that it is proposed that the development will comprise a residential or development, with associated areas of hardstanding and soft landscaping. The purpose of the ground investigation is to provide information to support the masterplanning of the site and develop an appropriate remediation strategy for the development.

S1.5 Scope of investigation

The ground investigation will be carried out in two separate stages of work:

- **Phase 1 – Exploratory Investigation –**To investigate the prevailing ground and contamination conditions on the site and identify potential constraints to the proposed development.
- **Phase 2 – Additional Investigation** – To further investigate any particular conditions or constraints that may impact on the proposed development. The scope of works will be dependent on and targeted based on the findings of the Phase 1 Investigation. The Phase 2 scope within this Specification is therefore indicative only, and will be subject to confirmation following the completion of the Phase 1 works.

The made ground is indicated to be highly variable, with cobbles and boulders of concrete and fused slag frequently reported. Resonance (sonic) drilling is therefore proposed for boreholes to enable such materials to be penetrated and the underlying materials investigated.

Due to the depth of investigation required and the nature of made ground materials identified, it is anticipated that a JCB 3CX will be unable to complete the proposed trial pitting works. Previous trial pitting on the site has successfully been completed using a 20T tracked excavator.

In order to provide information on the chemical and geotechnical variability of the made ground and alluvial deposits, it will be necessary to recover continuous soil cores from a number of boreholes, with hiqh quality open tube samples obtained elsewhere. A number of boreholes will be extended into rockhead to enable investigation and installation of groundwater sampling instruments in bedrock.

For the purposes of tender, the scope of works shall comprise:

Scope	Phase 1	Phase 2
Sonic drilled boreholes, with recovery of cores/continuous samples to depths of between 20m and 25mbgl to investigate ground conditions at depth and penetrate slag	11 No.	6 No.
Machine excavated trial pits to depths of up to 6mbgl to investigate near surface ground conditions	21 No.	10 No.
In situ standard penetration testing in selected boreholes	✓	✓
Sampling of soils for geotechnical and chemical testing, (including UT100 and Piston samples in selected boreholes)	✓	✓
Geotechnical laboratory testing including slag evaluation tests	✓	✓
Chemical laboratory testing	✓	✓
Installation of 50mm groundwater or combined gas/groundwater standpipes, as specified, in boreholes	✓	✓
In situ permeability testing (variable head) in selected groundwater instruments	✓	✓
Post siteworks groundwater level, gas monitoring and sampling of groundwater and ground gas	✓	✓
Provision of a Factual Report, including PDF Report	✓	✓
Provision of AGS data, including Preliminary, Draft and Final data	✓	✓

S1.6 Geology and ground conditions

The following summary of ground conditions is based upon a review of available desk study information. No assurances can be given to its accuracy.

Stratum	Depth to top (mbgl)	Thickness (m)	Description/Comments
Made Ground	0	2.8 – 8.4	Variable, comprising soft to stiff sandy gravelly clay to very dense very sandy gravel with cobbles and boulders. Containing slag, demolition waste, clinker, plastic and glass.

			Slag boulders generally common below approx. 2.0mbgl, particularly dense below c. 5mbgl in the west of the site. Made ground generally thickening southwards. Made ground not fully penetrated in areas of slag boulders in west of site.
Alluvium	2.8 – 6.7	2.6 – 11.3	Cohesive alluvium, including peat deposits, overlying granular alluvium
Glacial Deposits	10.4 – 25.8	0.4 – 13	Glacial till, locally overlying gravels. Glacial deposits absent locally
Sherwood Sandstone	17.7 – 26.3	–	Described as "weak sandstone". Penetrated up to 2.3m using cable percussion methods

S1.7 Schedule of drawing(s) and documents

Figure 1 – Site location

Figure 2 – Site Layout.

Figure 3 – Indicative Exploratory Hole Plan

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

The boreholes indicated as requiring Continuous Soil Coring (indicated as "CSC" in Schedule 2) shall be prioritised and carried out in advance of all other boreholes. The remaining exploratory holes may be made in any order. However once an exploratory hole has commenced, it shall be completed continuously and without undue delay.

Notice of entry (Clause 3.9) and access to the site should be arranged through the Investigation Supervisor.

No exploratory holes shall be completed within 10m of the river edge without prior approval from the Environment Agency. All currently proposed locations are greater than 10m from the river edge.

Audited Land Drilling Operatives

All drilling operatives (Lead Drillers and Drillers) employed on the Contract shall hold a valid and current Audit card of competence applicable to the work and specific drilling operation on which they are engaged, as issued by the British Drilling Association Limited under its BDA Audit or an equivalent body in a State of the European Union.

All drilling operatives (Lead Drillers and Drillers) employed on the contract shall hold a valid and current CSCS blue skilled (Land Drilling) card as issued by Construction Skills Certification Scheme Limited or an equivalent body in a State of the European Union.

All Lead Drillers shall be suitably qualified , holding as a minimum a NVQ in Land Drilling.

Contamination

The aspects of this investigation related to contaminated land investigation are specified in Schedule 5, Annex H with particular details provided in the various Schedule below.

Description of Peat

Peat materials encountered during the works shall be described in accordance with the Modified von Post scheme, after Hobbs (1986).

S1.8.1 Quality management system (Clause 3.3)

The Contractor is required to work to a Quality Management system established in accordance with BS EN ISO 9001:2000 (Clause 3.3). Details shall be provided prior to the commencement of work on site.

S1.8.2 Professional Attendance (Clause 3.5.2)

Full-time professional attendance on Site is required.

The Contractor's representative shall ensure that the requirements of the Specification are fully met (Clause 3.5.2), in particular in relation to the taking, handling, storing and transport of chemical and geotechnical samples, and ensuring that subsampling and resealing of continuous cores is carried out as required by the specification.

The Contractor's representative shall be a geotechnical or geo-environmental engineer or engineering geologist, with a minimum of 5 years relevant experience in managing sites affected by contamination, including appropriate sampling, environmental and health and safety best practice. Previous experience of piston sampling in soft ground is also required.

All logging engineers shall have a minimum of 3 years of relevant experience in the logging, description and sampling of soils on sites affected by contamination. They shall be appropriately trained and experienced in the identification of asbestos containing materials. Suitable training may include BOHS P401, P402 or equivalent RSPH qualifications. They shall be experienced at chemical sampling, including quality control and chain of custody requirements, and be competent at logging in accordance with BS EN ISO 14688, 14689 and BS 5930.

The CVs of the proposed Contractor's representative and Logging engineers, detailing relevant experience, shall be provided to the Investigation Supervisor for acceptance a minimum of 7 working days in advance of the siteworks. Substitute personnel will not be acceptable without prior agreement of the Investigation Supervisor.

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

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

The desk study for the site and surrounding area details the potential for ground contamination or other hazardous ground conditions. A summary of potentially hazardous ground and land affected by contamination and non-native invasive plant species is provided below.

The site has an extensive history of past industrial use, including stockpiling of waste materials from iron/steel works in the area. An asbestos works was formerly present to the southwest of the site and asbestos waste may have previously been stored on the site. It is understood that extensive reclamation works were carried out on the site during the 1980s/1990s, where materials affected by "significant" contamination, including identified asbestos waste, were removed from the site. No detailed records of these works are available. A number of landfill licences, dated between 1975 and 1990, exist for the site, probably associated with the iron works and reclamation.

Previous contamination testing, carried out post reclamation, recorded generally relatively low levels of contamination, with only elevated heavy metals, phenols and sulphates recorded locally. The results of limited available asbestos testing did not identify the presence of asbestos. Cyanide, sulphate and polyaromatic hydrocarbons (PAH) were also identified to be slightly elevated within some groundwater samples.

Based on the site history, it is considered that a range of contaminants, including heavy metals, sulphur compounds, acidic/alkaline conditions, fuel hydrocarbons, PAHs, PCBs and asbestos residues could feasibly be present locally on the site.

On the basis of the recent site reclamation and available laboratory testing, the Guidance for Safe Investigation of Potentially Contaminated Land (SISG, 2012) site designation of the potentially contaminated area is considered to be YELLOW. In light of the previous site history, however, the conditions encountered should be continuously reviewed during the investigation, with a view to upgrading to RED should any evidence of significant contamination be encountered during the siteworks.

Appropriate measures shall be taken during the works to prevent the spread of contamination at the ground surface, or into surface water courses. Good housekeeping is required to prevent trafficking of potentially contaminated materials. Any materials encountered during the trial pitting works that are considered to be potentially contaminated with asbestos or other significant contaminants should not be left exposed at the ground surface.

Topsoil should be stripped from trail pits and spoil heap location and separately stockpiled prior to trial pit excavation and replaced on completion.

No invasive plants are known to be present on the site, however, vigilance should be adopted throughout the siteworks for any evidence of such plants.

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

Available service records will be made available to the Contractor in advance of the works. No assurances can be made to the accuracy or completeness of this information and the Contractor will need to adopt appropriate working procedures to satisfy himself of the location of buried services.

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

There are no mineworkings known or suspected to be present beneath the site at a depth that may be impacted by the works.

S1.8.7 Protected species (Clause 3.7.4)

There are no known or identified protected species or sensitive ecological receptors.

S1.8.8 Archaeological remains (Clause 3.7.5)

There are no known or identified archaeological or heritage constraints.

S1.8.9 Security of site (Clause 3.11)

No requirements over Clause 3.11.

S1.8.10 Traffic management measures (Clause 3.12)

The contractor will provide traffic cones to close the car park for the duration of the works.

Temporary fencing will be used to protect temporary working areas from pedestrian access.

S1.8.11 Restricted working hours (Clause 3.13)

Work may take place on site between the hours of 8am and 6pm, Monday to Friday. Work outside these hours may take place only with the prior agreement of the Investigation Supervisor (Clause 3.13).

S1.8.12 Trainee site operatives (Clause 3.14.1)

Trainee site operatives shall only be permitted on site following agreement with the Investigation Supervisor and subject to full time supervision by an appropriately qualified and experienced, competent member of the Contractor's staff.

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

All equipment shall be thoroughly cleaned before being used on site. Jet washing equipment shall be provided to wash down relevant equipment and tools before starting each exploratory hole. A clean stainless steel trowel shall be used to collect soil samples for chemical testing, which shall be cleaned between samples. When working on land affected by contamination the contractor shall clean equipment (including wheels/tracks) before leaving the site.

If significant contamination is encountered, sampling equipment and tools shall be cleaned between strata, specifically at the boundary between made ground and natural strata, in order to prevent cross contamination occurring.

The contractor may only use vegetable oil-based lubricants.

Unless agreed otherwise with the Investigation Supervisor, aquifer protection as defined in 3.15.3 is required at the base of the made ground. Further protection may also be required to protect the underlying Sherwood Sandstone aquifer, should any evidence of contamination be encountered within the natural deposits.

The protection measures will be formed by:

(a) boring or drilling (both with temporary casing) a suitable depth into but not penetrating through the aquiclude;

(b) forming a bentonite plug in the base of the hole then pulling back the temporary casing to just below the top of the bentonite seal;

(c) installing a secondary smaller diameter temporary casing through the seal to the depth required.

The Contractor shall describe the details of the proposed aquifer protection measures in accordance with Clause 3.15.3 in their method statement.

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)

The Contractor shall inform the Investigation Supervisor upon commencing any boring or pitting in obstructions.

S1.8.15 Reinstatement requirements (Clause 3.16)

All reinstatement shall be to the requirements of Clause 3.16.

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

The Contractor shall provide hygiene and decontamination facilities appropriate for a YELLOW designated site in accordance with The Guidance for Safe Investigation of Potentially Contaminated Land (SISG, 2012) to control the risks to health and safety of site operatives and site visitors, with a contingency for this to be elevated to a RED site should any significant contamination be identified.

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

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

The accuracies specified for setting out (Clause 3.19) and levelling (Clause 3.20) are appropriate.

S1.8.19 Photography requirements (Clause 3.25)

Colour photographs are required (Clause 3.25.1) of all trial pits and of the boreholes identified in Schedule 2 as "CSC" boreholes.

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

A borehole remaining open overnight shall be covered. Before the first sample of the new day is taken the boring shall be advanced for at least 0.3m.

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

If percussion drilling is required, it is envisaged that light cable percussion boring will be used. Any other proposed methods should be submitted to the Investigation Supervisor for approval. The minimum nominal casing diameter shall be 150mm. At ground level before boring commences, the initial casing diameter shall be sufficiently large to ensure that the borehole can be completed to its scheduled depth.

S1.9.2 Backfilling (Clause 4.5)

Backfilling of boreholes with soil arisings is not permitted (Clause 4.5), unless otherwise agreed with the Investigation Supervisor. All boreholes shall be backfilled with cement bentonite grout, following the requirements of Annex H and in the Bill of Quantities, with standpipes and piezometers together with their response zones installed at the depths specified in Schedule 2 or as instructed by the Investigation Supervisor.

S1.9.3 Dynamic sampling (Clause 4.6)

Dynamic sampling shall be carried out and recorded in accordance with Annex A.

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

S1.10.1 Augering requirements and restrictions (Clauses 5.1)

Not required

S1.10.2 Particular rotary drilling techniques (Clause 5.2)

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

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

The core diameter shall be at least 100mm for soils or 75mm for rock (Clause 5.4.1 and 5.4.2). Core recovery of less than 90% is not acceptable. If the measured core recovery is less than 90%, the subsequent core run shall be halved (subject to a minimum core run length of 0.5m).

Core is required from all rotary drilling operations, unless explicitly stated as not being required in Schedule 2. Where core is not required, the diameter of the open hole will be adequate for the collection of core of the requisite diameter at greater depth (Clause 5.5).

S1.10.5 Core logging (Clause 5.4.6)

Cores shall be split (where required), logged in detail and photographed in advance of subsampling for geotechnical and contamination testing. Care shall be taken to ensure that no cross contamination of samples can occur during the logging process.

Core liners shall be capped and re-sealed following logging to preserve moisture contents and avoid loss of sample.

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

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

S1.10.8 Rotary open-hole drilling general requirements (Clause 5.5.1)

S1.10.9 Rotary open-hole drilling for locating mineral seams, mine workings, etc. (Clause 5.5.2)

S1.10.10 Open-hole resonance (sonic) drilling (Clause 5.6.1)

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

Unless specified otherwise, boreholes shall be formed using sonic drilling techniques, using a rig capable of drilling in hard and soft materials, and, where required, carrying out Standard Penetration Tests and obtaining “undisturbed” open tube samples (UT100 and Piston Samples).

Except where specified, boreholes shall recover cores in both soft/drift and hard strata. Cores shall be obtained within semi-rigid core liners, capped to prevent loss of moisture or volatile organic compounds.

S1.10.12 Backfilling (Clause 5.7)

Backfilling of boreholes with soil arisings is not permitted (Clause 4.5), unless otherwise agreed with the Investigation Supervisor. All boreholes shall be backfilled with cement bentonite grout, following the requirements of Annex H and in the Bill of Quantities, with standpipes and piezometers together with their response zones installed at the depths specified in Schedule 2 or as instructed by the Investigation Supervisor.

S1.10.13 Core photographic requirements (Clause 5.8)

All cores obtained from boreholes shall be photographed.

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

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

The Contractor shall excavate inspection pits of sufficient size for the location of underground services if it is believed they are necessary (Clause 3.8.3 and 6.1).

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

The use of machine excavators is permitted (Clauses 6.2 and 6.3). The selection of excavators and buckets to undertake the works shall take into account the anticipated presence of boulders within the ground.

A breaker shall be provided to break out obstructions/hard strata, where required.

S1.11.3 Entry of personnel (Clause 6.5)

No entry into pits is proposed.

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

Trial pits and Observation pits shall have the minimum dimensions specified in Clause 6.7.

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

S1.11.6 Backfilling (Clause 6.10)

Pits and trenches shall be backfilled using excavation plant in the manner specified in Clause 6.10.

S1.11.7 Photographic requirements (Clause 6.12)

Photographs of all trial pits and spoil heaps are required.

S1.11.8 Artificial lighting (Clause 6.12.2)

Artificial lighting shall be used where necessary when taking photographs of pits and trenches (Clause 6.12.2).

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

Not required

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

All samples shall be removed from the site of the boreholes at the end of each day's work and shall be protected from frost damage or excessive heat by being stored on or near the site in a structure which is under cover and secure from interference. All samples shall be removed from the site so as to reach the laboratory within four days of being taken.

GEOTECHNICAL SAMPLES

S1.12.1 Address for delivery of selected GEOTECHNICAL samples (Clause 7.6.1)

Selected samples (Clauses 7.6.1) required to be delivered to the Investigation Supervisor's offices shall be sent to:

Ove Arup & Partners

Central Square, Forth Street, Newcastle, NE1 3PL

and marked for the attention of Claire Barnfather.

S1.12.2 Retention and disposal of geotechnical samples (Clause 7.6.2)

Samples shall not be disposed of until 28 days after submission of the approved final report. The Investigation Supervisor shall be given notice of at least 1 week before the disposal of samples (Clause 7.6.2).

S1.12.3 Frequency of sampling for geotechnical purposes (Clauses 7.6.3 to7.6.11)

The geotechnical sampling and testing frequency shall be as detailed below. Where insufficient core is available for subsampling, priority for sampling shall be given to chemical samples over geotechnical samples.

Sample / Test Type	Trial Pits	CSC Boreholes*	Other Boreholes
Small disturbed (Jar) sample	Of every strata and thereafter at 1m intervals	Sub samples shall be taken where instructed by Investigation Supervisor	Subsampled from continuous cores within every strata and thereafter within every 1.5m
Bulk disturbed sample	Of every strata and thereafter at 2m intervals	Sub samples shall be taken where instructed by Investigation Supervisor	Subsampled from continuous cores within every strata and thereafter within every 1.5m. To be taken over depth of SPT where SPT has been taken.

Sample / Test Type	Trial Pits	CSC Boreholes*	Other Boreholes
Large disturbed sample	Where instructed by Investigation Supervisor	Not required	Not required
Open Tube samples	Not required	Not required	At the start of every alternate core run in cohesive strata (maximum interval 3m). UT100s required as standard, but to be replaced with Piston samples in alluvial deposits where instructed by Investigation Supervisor
Continuous sample/core	Not required	Throughout borehole	Throughout borehole (subsamples to be taken as detailed above)
Standard Penetration Tests	Not required	Not required	At the start of every alternate core run in cohesive strata (maximum interval 3m) Where instructed, at the start of every core run in granular strata (maximum interval 1.5m).
Hand Vane Tests	Every 1m in cohesive strata	Not required	In ends of piston samples
Chemical Samples	See S1.12.1	See S1.12.1	See S1.12.1

*CSC boreholes as detailed in Schedule 2.

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

Open tube and piston samples are to have a 100mm internal diameter (Clause 7.6.5). Sample tubes shall be made of steel or aluminium. Plastic lining tubes shall not be used in substitution for steel or aluminium sampling tubes. Soil samples shall be at least 300mm long from UT100 samples, with a nominal minimum length of 1000mm from Piston samples.

Unless specified otherwise, open tube samples shall comprise UT100 samples. UT100 samples should, where feasible, be progressed via hydraulic ram in preference to drop hammer. The method of progression shall be agreed with the Investigation Supervisor as the works proceed.

Where instructed by the Investigation Supervisor, UT100 samples within soft to firm cohesive alluvium shall be replaced with Piston samples in accordance with Annex A.

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

S1.12.7 Groundwater level measurements during exploratory hole construction (Clause 7.7)

As per Clause 7.7.

S1.12.8 Special geotechnical sampling (Clause 7.8)

Not used

CONTAMINATION / WAC SAMPLES

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

All untested contamination samples and remaining sample portions shall be retained for 28 days from receipt at the laboratory. Untested samples for WAC analysis shall be retained for 28 days after submission of the approved final report.

S1.12.11 Frequency of sampling (Clause 7.9.4)

The frequency of sampling for contamination/WAC sampling is set out below.

- A sample is required of each soil type, including topsoil.
- The first sample shall be taken at varying depths between the surface and 0.3m (at the instruction of the Investigation Supervisor). Subsequent samples shall be taken at approximately 1.0m intervals thereafter in Made Ground.
- A sample is required at 0.5m and 1.0m beneath the top of the Cohesive Alluvium, Granular Alluvium and Glacial Deposits.
- In addition to the above, a sample is also required where colour, odour or consistency indicate a change in the nature of the strata and/or the potential presence of contamination.

Samples for contamination testing shall be representative of the conditions encountered and shall not be collected at the strata boundaries.

Samples from boreholes shall be subsampled from recovered continuous cores following completion of the logging and photographing of cores, and dispatched to the testing laboratory within 24 hours of sampling. Cores shall remain sealed and be protected from light and heat prior to logging/subsampling.

Where there is insufficient sample recovered in borehole cores, priority shall be given to chemical sampling over geotechnical sampling, unless otherwise instructed by the Investigation Supervisor.

S1.12.12 Sampling method (Clause 7.9.5)

All samples for contamination/WAC testing shall be taken by or under the supervision or direction of an environmental scientist, geoenvironmental engineer or geochemist meeting the requirements of Clause 2.3 item (c).

A sample collected for contamination/WAC testing shall comprise, as a minimum, the following:

- Vial(s) for volatile hydrocarbon analysis;
- Amber glass jar(s) for hydrocarbon soil analysis (depending on size multiple jars may be required to achieve analysis); and
- Plastic tub(s) for inorganic, metals and WAC leachability soil analysis (depending on size and soil type multiple tubs may be required to achieve analysis including leachability)

The vial(s) for volatile hydrocarbon analysis shall be collected first, followed by the amber glass jar(s) and then the plastic tub(s).

The amount and type of soil containers taken in each case should be sufficient to allow all the full suite of potential contaminants defined in S1.20 to be analysed. The Contractor is responsible for liaising with their nominated testing laboratory to confirm that this requirement is met.

S1.12.13 Headspace testing (Clause 7.9.8)

Where required, samples for contamination/WAC testing shall be subject to screening by PID (one test per representative sample location). The method is defined in Clause 7.9.8.

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

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

The following in situ tests scheduled in Clause 10.3 shall be carried out:

Selected boreholes (as specified in Schedule 2):

- SPTs at intervals specified in S1.12.3 (the water surface and casing levels in the borehole at the time of the test shall be reported).

When an SPT test is carried out, the Contractor shall record and include in their Report the blowcount for each 75mm increment of penetration (or part-thereof).

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

Trial/Observation Pits and Trenches

- Vane shear strength at 1m depth intervals in cohesive strata.

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

S1.15.8 Interface probes (Clause 10.8)

Where required, groundwater level monitoring shall be carried out using an interface probe, with top and bottom depth of any free product recorded in addition to groundwater level.

S1.15.9 Contamination screening tests (Clause 10.9)

Field-based screening using portable test kits is not required.

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

S1.16.1 Protective covers for installations (Clause 11.2)

Flush, lockable standpipe/piezometer cover types are required.

S1.16.2 Protective fencing (Clause 11.3)

Not required

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

Where specified in Schedule 2, Discrete Depth Groundwater Monitoring Standpipes are required as per Figure H4.

Where specified in Schedule 2, Combined Gas Groundwater Monitoring Standpipes are required as per Figure H2.

S1.16.4 Other piezometer installations (Clause 11.4.3)

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

Unless instructed otherwise, all instruments shall be developed by over pumping.

S1.16.6 Ground gas standpipes (Clause 11.5)

Combined groundwater/ground gas standpipes are required. The requirements for gas monitoring are specified in Schedule 5, Annex H (Clause 7 as applicable).

Samples of gas shall be taken from all gas instruments for laboratory analysis during the first round of post siteworks monitoring. Thereafter, samples shall be obtained as agreed with the Investigation Supervisor.

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

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

Water levels in boreholes during boring/drilling shall be measured at the beginning and end of each shift or other rest periods (Clause 12.2).

Daily monitoring of all standpipes and piezometers shall be carried out during the fieldwork (Clause 12.2).

After the completion of the fieldwork period and until completion of laboratory testing and submission of the draft factual report, the Contractor shall return to site once a week to measure the water level in each and every standpipe and piezometer. The Contractor shall give one day's notice of his visit to all occupiers of land on which piezometers and standpipes are situated (Clause 12.2).

S1.17.2 Groundwater sampling from installations (Clause 12.3.1)

Groundwater sampling for contamination testing is required. The requirements for groundwater sampling are specified in Schedule 5, Annex H.

Sampling shall be carried out within selected groundwater instruments and monitoring rounds as instructed by the Investigation Supervisor.

The Contractor shall liaise with the Investigation Supervisor in advance of each monitoring round to confirm sampling and testing requirements for that round. Samples shall be dispatched for laboratory testing directly after the samples are taken, for testing in accordance with the requirements determined in advance of the monitoring round. This is to prevent the potential for samples to fail retention/holding times as a result of the need to schedule testing post sampling.

Groundwater samples shall be stored in the dark at 4°C±2°C.

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

Purging/micro-purging is required of all groundwater instruments prior to sampling of groundwater in accordance with Annex H. Should any evidence of free product be identified, micro-purging may be required.

S1.17.4 Ground gas monitoring (Clause 12.4)

Ground gas monitoring is required in all combined gas/groundwater standpipes. Gas monitoring is not required in discrete depth groundwater standpipes. The requirements for ground gas monitoring are specified in Schedule 5, Annex H.

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

Sampling for ground gas is required. The requirements for ground gas sampling are specified in Schedule 5, Annex H.

Samples of gas shall be taken from all monitored instruments during the first round of monitoring. In subsequent monitoring rounds, selected instruments shall be sampled, as agreed with the Investigation Supervisor.

S1.17.6 Other monitoring (Clause 12.8)

S1.17.7 Sampling and testing of surface water bodies (Clause 12.9)

Sampling of surface water bodies may be required. The requirements for water sampling are specified in Schedule 5, Annex H.

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

S1.18.1 Information for daily records (Clause 13.1)

Daily records shall be submitted at the start of the following working day (Clause 13.1)

Grid north may be taken as magnetic north (Clause 13.2).

Details of all subsamples obtained from borehole cores shall be provided no later than the start of the following day after logging/subsampling, which shall itself be carried out as required by S1.10.5. This is essential to enable rapid scheduling of chemical testing within required laboratory retention times.

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

Not required.

S1.19 GEOTECHNICAL LABORATORY TESTING (Specification Section 14) Particular restrictions/relaxations

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

The Contractor is required to prepare a blank geotechnical test schedule (Clause 14.1.1), giving on one axis the following information:

- borehole number
- sample number
- sample type
- sample depth

and on the other axis the following standard laboratory tests shall be listed:

- moisture content
- atterberg limits
- particle size distribution by dry sieving
- particle size distribution by wet sieving
- particle size distribution by pipette
- specific gravity of soil particles
- organic matter content
- sulfate and ph of water sample
- sulfate and pH of soil sample
- quick triaxial test on 100mm diameter specimen (leave space for cell pressure to be specified)
- oedometer (leave space for pressure range to be specified)
- compaction test (dry density–moisture content relationship)
- four blank columns for other tests.

An example schedule sheet shall be provided to the Investigation Supervisor for approval prior to commencement of the Investigation.

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

Testing of selected slag samples is required in order to evaluate the origins and potential expansivity of slag. The range of tests required may comprise some or all of the following:

- Petrology
- Water soluble and Acid soluble sulphate
- Total sulphur
- Free lime (CaO)
- Free magnesia (MgO)

- Thermal Analysis
- Accelerated Expansion Test

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

Unless agreed otherwise with the Investigation Supervisor, UKAS accreditation is required for all testing.

S1.19.5 Rock testing requirements (Clause 14.5)

S1.19.6 Chemical testing for aggressive ground/groundwater for concrete (Clause 14.6)

Test Suites A to D are overleaf.

Testing to determine the Aggressive Chemical Environment for Concrete (ACEC) class of the ground (e.g. sulfates, pH) shall be carried out in accordance with BRE Special Digest 1 'Concrete in Aggressive Ground' Part 1, Box C10, reproduced below.

A preliminary assessment of the anticipated ground conditions has been made. On this basis, it is anticipated that the tests required will be those identified with a tick in the table below.

This testing shall be additional to any testing for sulfates etc. carried out in accordance with Schedule S1.18, unless otherwise instructed by the Investigation Supervisor.

SCHEDULE 1.19.6 (Derived from BRE Special Digest SD1)

CHEMICAL TESTS ON POTENTIALLY AGGRESSIVE GROUND AND GROUNDWATER

Sample type	Determinand	Recommended test methods	Method specified
SUITE B Greenfield site (pyrite present)			
Soil	pH in 2.5:1 soil/water extract	BR 279 Electrometric method	✓
		BS 1377-3 Section 9 Electrometric method	
	SO_4 in 2:1 water/soil extract WS (g/l SO4)	BR 279 Procedures for gravimetric method, cation exchange or ion chromatography.	✓
		BS 1377-3, Section 5Gravimetric or ion exchange methods. (Values determined as g/l SO3 should be multiplied by 1.2.)	
		TRL Report 447, Test 1 Sulfate extraction procedure as BS 1377-1, but ICP-AES used to determine sulfur in solution.	
	Acid soluble sulfate AS (% SO4)	BR 279 Gravimetric method	✓
		BS 1377-3, Section 5 Gravimetric methods. (Values determined as g/l SO3 should be multiplied by 1.2.)	
	Total sulfur TS (% S)	TRL Report 447, Test 2 Preparation and extraction of sulfate as BS 1377-3, ICP-AES used to determine sulfur in solution.	✓
		BR 279 Only Ignition in oxygen method recommended.	
		TRL Report 447, Test 4A Microwave digestion method.	
		TRL Report 447, Test 4B Ignition in oxygen method (e.g. with sulphur-carbon determinator).	
Water	pH	BR 279 Electrometric method	✓
		BS 1377-3 Section 9 Electrometric method	
	Soluble sulfate GWS (SO_4)	BR 279 Procedures for gravimetric method, cation exchange or ion chromatography.	✓
		BS 1377-3, Section 5 Gravimetric or ion exchange methods. (Values determined as g/l SO3 should be multiplied by 1.2.)	
		Commercial test lab in-house procedure Determination of sulfur by inductively coupled plasma atomic emission spectroscopy (ICP-AES)	
SUITE D Brownfield site (pyrite present)			
Soil	pH in 2.5:1 soil/water extract	BR 279 Electrometric method	✓
		BS 1377-3 Section 9 Electrometric method	
	SO_4 in 2:1 water/soil extract WS (g/l SO4)	BR 279 Procedures for gravimetric method, cation exchange or ion chromatography.	✓
		BS 1377-3, Section 5Gravimetric or ion exchange methods. (Values determined as g/l SO3 should be multiplied by 1.2.)	

Sample type	Determinand	Recommended test methods	Method specified
		TRL Report 447, Test 1 Sulfate extraction procedure as BS 1377-1, but ICP-AES used to determine sulfur in solution.	
	Acid soluble sulfate AS (% SO4)	BR 279 Gravimetric method	✓
		BS 1377-3, Section 5 Gravimetric methods. (Values determined as g/l SO3 should be multiplied by 1.2.)	
		TRL Report 447, Test 2 Preparation and extraction of sulfate as BS 1377-3, ICP-AES used to determine sulfur in solution.	
	Total sulfur TS (% S)	BR 279 Only Ignition in oxygen method recommended.	✓
		TRL Report 447, Test 4A Microwave digestion method.	
		TRL Report 447, Test 4B Ignition in oxygen method (e.g. with sulphur-carbon determinator).	
	Soluble magnesium (g/l Mg)	BR 279 Atomic absorption spectrometry (AAS) method.	✓
		Commercial test lab in-house procedure Determination of magnesium in solution by ICP-AES.	
	Nitrate (g/l NO3)	BR 279	✓
	Chloride (g/l CI)	BR 279	✓
		BS 1377-3 Section 7	
Water	pH	BR 279 Electrometric method	✓
		BS 1377-3 Section 9 Electrometric method	
	Soluble sulfate GWS (SO_4)	BR 279 Procedures for gravimetric method, cation exchange or ion chromatography.	✓
		BS 1377-3, Section 5 Gravimetric or ion exchange methods. (Values determined as g/l SO3 should be multiplied by 1.2.)	
		Commercial test lab in-house procedure Determination of sulfur by inductively coupled plasma atomic emission spectroscopy (ICP-AES)	
	Soluble magnesium (g/l Mg)	BR 279 Atomic absorption spectrometry (AAS) method.	✓
		Commercial test lab in-house procedure Determination of magnesium in solution by ICP-AES.	
	Nitrate (g/l NO3)	BR 279	✓
	Chloride (g/l CI)	BR 279	✓
		BS 1377-3 Section 7	

S1.19.7 Laboratory testing on site (Clause 14.7)

S1.19.8 Special laboratory testing (Clause 14.8)

S1.20 GEO-ENVIRONMENTAL LABORATORY TESTING (Specification Section 15) Particular restrictions/relaxations

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

The Contractor is required to prepare a blank geoenvironmental test schedule (Clause 15.1), giving on one axis the following information:

- borehole number
- sample number
- sample type
- sample depth

and on the other axis the following shall be listed:

- All suites of chemical tests identified with quantities in the Bill of Quantities with separate sheets for soil, groundwater, and gases.

The Contractor shall provide the blank schedule suite, along with draft exploratory hole logs to the Investigation Supervisor within three days of soil sampling for contamination testing. The Investigation Supervisor will schedule the required tests.

Where sampling of water from standpipes is required the Contractor shall agree the suite of tests before commencing purging and sampling. The water sample and the completed test schedule shall then be sent to the laboratory on the same days as the sampling occurred.

An example schedule sheet shall be provided to the Investigation Supervisor for approval prior to commencement of the Investigation.

S1.20.2 Accreditation required (Clause 15.2)

Chemical laboratory testing should be carried out to International Standard BSENISO/IEC 17025. Laboratory test on soil samples must conform to the MCERTs standard where applicable. MCERTs is required for, but not limited to, those analytes listed in Annex A of Environment Agency publication 'Performance Standard for Laboratories undertaking Chemical Testing of Soil', Version 3, March 2006.

S1.20.3 Chemical testing for contamination (Clause 15.3)

Test Suites E to G are overleaf.

Where not specified in Schedule S1.20.3, the Contractor shall confirm within their tender the retention times, test methods and detail what accreditation will be provided.

SCHEDULE 1.20.3
CHEMICAL LABORATORY TESTING FOR CONTAMINANTS

(*where not specified, Contractor to complete)

Determinand	Detection level required/offered	Test method required/offered*	Accreditation required/offered*	Maximum Retention Time*
SUITE E1 – Soil samples general				
Arsenic	1 mg/kg			
Cadmium	0.5 mg/kg			
Chromium - total	10 mg/kg			
Copper	10 mg/kg			
Lead	10 mg/kg			
Mercury	0.1 mg/kg			
Nickel	10 mg/kg			
Selenium	0.5 mg/kg			
Zinc	10 mg/kg			
Antimony	0.1 mg/kg			
Beryllium	1 mg/kg			
Vanadium	0.5mg/kg			
Cyanide - total	1 mg/kg			
pH	0.1 units			
Boron (water soluble)	0.5 mg/kg			
Phenols - total	1 mg/kg			
Total Organic Carbon	0.1% w/w	ASTM D2974-87		
SUITE E2 – Soil samples Asbestos				
Asbestos presence and identification	0.001% w/w	Note E2		
Asbestos quantification HSG248	0.001%w/w			
SUITE E3 – Soil samples TPHCWG				
TPHCWG	10 mg/kg	GC-FID Note E3a		
SUITE E4 – Soil samples PAH and BTEX				
BTEX	0.05 mg/kg	GCMS		
USEPA 16 Polyaromatic Hydrocarbons	0.1 mg/kg	CGMS		
SUITE E5 – Soil samples VOC and SVOC				
Semi-Volatile Hydrocarbons (sVOCs)	0.01 mg/kg	GC-MS US EPA Method 8270		
Volatile Hydrocarbons (VOCs)	0.01 mg/kg	GC-MS US EPA Method 8260		
SUITE E6 – Soil samples PCB				

Determinand	Detection level required/offered	Test method required/offered*	Accreditation required/offered*	Maximum Retention Time*
Polychlorinated Biphenyls	0.001 mg/kg	WHO 12		
SUITE E8 – Soil samples cyanide speciation				
Cyanide - ferro and ferri-cyanide	0.5 mg/kg			
Cyanide - free	0.5 mg/kg			
Cyanide - thiocyanates	0.5 mg/kg			
SUITE E9 – Soil samples hexavalent chromium				
Chromium - hexavalent	1 mg/kg			
SUITE E10 – Soil samples speciated phenols				
Speciated phenol	1mg/kg	HPLC		
Other tests				
Free Sulphur	100 mg/kg			
Sulphides	10 mg/kg			
Chloride	5 mg/kg			

Method notes

Note E2

Asbestos testing shall be carried out in accordance with latest best practice, including the requirements of the Environment Agency Draft "Blue Book" ("Determination of asbestos in soils and associated materials" 2015), or subsequent revisions thereof.

Initial (Stage 1) identification of asbestos is required in all scheduled samples. Where any evidence of asbestos is identified, the amount shall be quantified as appropriate.

Initial identification of asbestos shall include visual examination of each sample for any obvious asbestos material and analysis under stereo binocular microscope and by Polarised Light Microscopy (PLM) using the method described in HSG 248.

Where any evidence of asbestos is identified, the amount shall be quantified by gravimetric (Stage 2) and/or free fibre analysis (Stage 3) as appropriate, as determined by the evidence of asbestos identified.

Note E3a

Aliphatic: EC5-EC6; >EC6-EC8; >EC8-EC10; >EC10-EC12; >EC12-EC16 ;>EC16-EC35;>EC35-EC44

Aromatic: >EC6-EC7; >EC7-EC8; >EC8-EC10; >EC10-EC12; >EC12-EC16; >EC16-EC21; >EC21-EC35; >EC35-EC44

Determinand	Detection level required/offered*	Test method required/offered*	Accreditation required/offered*
SUITE F1 – Water samples general			
pH value	0.1 pH units		
Hardness	2 mg/l		
Arsenic	5 µg/l		
Cadmium	1 µg/l		
Chromium	10 µg/l		
Copper	10 µg/l		
Lead	10 µg/l		
Mercury	0.02 µg/l		
Nickel	10 µg/l		
Selenium	5 µg/l		
Zinc	20 µg/l		
Antimony	10 µg/l		
Beryllium	10 µg/l		
Vanadium	10 µg/l		
Ammoniacal nitrogen	0.1 mg/l		
Chloride	20 mg/l		
Cyanide - total	1 µg /l		
Phenols - total	0.1 µg/l		
SUITE F2 – Water samples speciated TPH			
TPH CWG	5 µg/l	Note F2a GC-FID	
SUITE F3 – Water samples PAH and BTEX			
BTEX	0.1 µg/l	GCMS	
16 USEPA Polyaromatic Hydrocarbons	0.05 µg/l	GCMS	
SUITE F4 – Water samples VOC and SVOC			
Volatile Organic compounds	0.1 µg/l	GC-MS US EPA Method 8260	
Semi-Volatile Organic compounds	0.1 µg/l	GC-MS US EPA Method 8270	
SUITE F5 – Water samples PCB			
Polychlorinated biphenyls	0.001 µg/l		
SUITE F7 – Water samples cyanide speciation			
Cyanide - ferro and ferri-cyanide	1 µg/l		
Cyanide - free	1 µg/l		
Cyanide - thiocyanates	1 µg/l		
SUITE F8 – Water samples hexavalent chromium			

Determinand	Detection level required/offered*	Test method required/offered*	Accreditation required/offered*
Chromium - hexavalent	10 µg/l		
SUITE F9 – Water samples speciated phenols			
Speciated phenols	0.1 µg/l	HPL	
SUITE F10 – Water samples oxygen demand			
BOD	2 mg O2/l		
COD	10 mg O2/l		
SUITE F14 – Water samples other parameters			
Calcium	10 µg/l		
Iron	10 µg/l		
Magnesium	30 µg/l		
Manganese	10 µg/l		
Sodium	10 µg/l		
Potassium	10 µg/l		
Sulphates	2000 µg SO4/l		
Sulphides	200 µg S/l		
Nitrate	0.3 mg/l		
Nitrite	0.01 mg/l		
Alkalinity	2 mg/l		

Note F2a

Aliphatic: EC5-EC6; >EC6-EC8; >EC8-EC10; >EC10-EC12; >EC12-EC16 ;>EC16-EC35;>EC35-EC44

Aromatic: >EC6-EC7; >EC7-EC8; >EC8-EC10; >EC10-EC12; >EC12-EC16; >EC16-EC21; >EC21-EC35; >EC35-EC44

Determinand	Detection level required/offered[1]	Test method required/offered[1]	Accreditation required/offered[1]
SUITE G1 – Ground gas sample general			
Carbon dioxide	0.01 % v/v		
Hydrogen	0.01 % v/v		
Hydrogen sulphide	0.001 % v/v		
Methane	0.1 % v/v		
Nitrogen	0.1 % v/v		
Oxygen	0.1 % v/v		
Carbon monoxide	0.001% v/v		

S1.20.4 Waste characterisation (Clause 15.4)

S1.20.5 Waste Acceptance Criteria testing (Clause 15.5)

Waste Acceptance Criteria shall be carried out in accordance with Test Suites H and I**.**

The Contractor shall confirm the test methods and detail what accreditation requirement will be provided.

SCHEDULE 1.20.5
CHEMICAL TESTING FOR WASTE ACCEPTANCE CRITERIA TESTING (from STWAPs 2003)

Determinand	Detection level required	Test method required/ offered*	Accreditation required/offered*
SUITE H – Waste acceptance total soils			
Total organic carbon	0.1%		
BTEX	0.1mg/kg		
PCBs (7 congeners)	0.1mg/kg		
Mineral oil (C10–C40)	10 mg/kg		
Polyaromatic hydrocarbons	0.1 mg/kg		
SUITE I – Leachability			
Arsenic	0.5 mg/kg		
Barium	20 mg/kg		
Cadmium	0.04 mg/kg		
Chromium	0.5 mg/kg		
Copper	2 mg/kg		
Mercury	0.01 mg/kg		
Molybdenum	0.5 mg/kg		
Nickel	0.4 mg/kg		
Lead	0.5 mg/kg		
Antimony	0.06 mg/kg		
Selenium	0.1 mg/kg		
Zinc	4 mg/kg		
Chloride	800 mg/kg		
Fluoride	10 mg/kg		
Sulphate	1,000 mg/kg		
Total dissolved solids (TDS)	4,000 mg/kg		
Phenol Index	1 mg/kg		
Dissolved organic carbon at own pH or pH 7.5 - 8.05	500 mg/kg		

S1.20.6 Laboratory testing (Clause 15.6)

S1.20.7 Special laboratory testing (Clause 15.7)

CHEMICAL TESTING FOR WATER SUPPLY PIPE ASSESSMENT

The following tests are required in accordance with the methodologies and detection limits required by UKWIR, 2010. *Guidance on the Selection of Water Supply Pipes to be used in Brownfield Sites.* (UKWIR Report 10/WM-03/21)

The Contractor is to confirm the test methods and detail what accreditation will be provided.

SUITE J – Soils testing for UKWIR Assessment
Extended suite of volatile organic compounds (VOCs) by "purge and trap" or "head-space" and CMS, with tentative identification of compounds present at concentrations greater than 20 µg/kg. Extended suite of semi-volatile organic compounds (sVOCs) by GCMS, with tentative identification of compounds present at concentrations greater than 20 µg/kg. Mineral oil with quantification of total carbon compounds in the following ranges C5-C10, C11-C20 and C20-C40 Conductivity, pH and redox potential. As specified in the UKWIR document, the results shall be reported as sums of the concentrations of individual chemicals in the following groups, with detection limits as specified: Group 1: Total VOCs minus total concentration of Group 1a (Detection limit 0.01mg/kg) Group 1a: BTEX and MTBE (Detection limit 0.003mg/kg) Group 2: Total sVOCs minus total concentration of Groups 2e and 2f (Detection limit 0.1mg/kg) Group 2e: Phenols (Detection limit 0.04mg/kg) Group 2f: Cresols and chlorinated phenols (Detection limit 0.004mg/kg) Group 3: Mineral Oils C11 to C20 (Detection limit 1mg/kg) Group 4: Mineral Oils C21 to C24 (Detection limit 50mg/kg) Group 5: Corrosive (Conductivity, Redox and pH)

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

The locations of the exploratory holes shall be related to National Grid Coordinates (Clause 16.2.2).

One fast-bound copies of the draft and final factual report is required (Clause 16.11), containing enprints of photographs (Clause 3.25). In addition, an electronic report is required (S1.21.6)

The copyright of the Report shall be deemed to be vested in the Employer.

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

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

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

S1.21.4 Preliminary digital data (Clause 16.5.3) S1.21.5 Type(s) of report required (Clause 16.6)

Digital data of all ground investigation, laboratory testing and monitoring are required (Clause 16.5 and Schedule 5, Annex J).

One set of preliminary digital data is to be issued upon completion of the fieldwork, and shall represent all exploratory holes and correspond with the preliminary paper records. It shall be issued at the same time as the preliminary paper records.

Draft and final digital data is to be issued along with the draft or final report, as specified in Annex J.

S1.21.6 Electronic report requirements (Clause 16.6.3)

The factual report, both draft and final, shall also be presented in digital format as a single collated file which includes text, all the test results, exploratory hole records, laboratory test data and location plans. This shall be compiled as a bookmarked, non-copy protected portable document file (pdf) and be compatible with the latest version of Adobe Acrobat™ and presented on CD ROM.

The chemical test data shall be presented as both hard copy and in Microsoft Excel® format. The Excel® spreadsheet shall contain data collated on the basis on the type of test carried out

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)

An interpretative report is not required (Clause 16.6). No additional information is required in the factual report (Clause 16.6).

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

Not required

Schedule 2: Exploratory holes

Locations of exploratory holes are shown on Figure 2.

All locations, depths and details are indicative only and will be confirmed based on access and ground conditions encountered during works

Hole Ref.	Type	Scheduled depth (m)	Installations (response zones and depths (m))	Existing Ground Surface	Remarks*
Phase 1					
BH101	SC	25	GW (6)	Grass	CSC**
BH102	SC	20	GW (15)	Grass	UT100s and SPTs
BH103	SC	25	GW (6)	Grass	CSC**
BH104	SC	20	GW (15)	Grass	Piston samples, UT100s and SPTs
BH105	SC	20	GW (6)	Grass	UT100s and SPTs
BH106	SC	20	GW (6)	Grass	UT100s and SPTs
BH107	SC	25	DW (25)	Hardstanding	Piston samples, UT100s and SPTs
BH108	SC	25	DW (25)	Grass	UT100s and SPTs
BH109	SC	20	GW (15)	Hardstanding	Piston samples, UT100s and SPTs
BH110	SC	25	GW (6)	Grass	CSC**
BH111	SC	25	GW (6)	Grass	CSC**
TP201	TP	6		Grass	
TP202	TP	6		Grass	
TP203	TP	6		Grass	
TP204	TP	6		Grass	
TP205	TP	6		Grass	
TP206	TP	6		Grass	
TP207	TP	6		Hardstanding	
TP208	TP	6		Grass	
TP209	TP	6		Grass	
TP210	TP	6		Grass	
TP211	TP	6		Hardstanding	
TP212	TP	6		Grass	
TP213	TP	6		Grass	
TP214	TP	6		Grass	
TP215	TP	6		Grass	
TP216	TP	6		Grass	
TP217	TP	6		Grass	

Hole Ref.	Type	Scheduled depth (m)	Installations (response zones and depths (m))	Existing Ground Surface	Remarks*
TP218	TP	6		Grass	
TP219	TP	6		Grass	
TP220	TP	6		Grass	
TP221	TP	6		Grass	
Phase 2 (To Be Confirmed)					
BH301 to BH306	SC/CP	TBC	TBC	TBC	TBC
TP401 to TP 410	TP	TBC	TBC	TBC	TBC

SC – Sonic borehole	CP – Cable percussion borehole
TP – Trial Pit	
GW - combined gas and groundwater standpipe	DW – discrete depth groundwater sampling standpipe
CSC- Continuous Soil Cores (no insitu tests)	SPTs- Standard Penetration Test

* Including details of testing in addition to those required in schedules and annexes.

** CSC boreholes to be carried out in advance of other boreholes

Schedule 3: Investigation Supervisor's facilities

S3.1 Accommodation

No accommodation need be provided.

S3.2 Furnishings

No Furnishings need be provided.

S3.3 Services

No services need be provided.

S3.4 Equipment

No equipment need be provided.

S3.5 Transport

No transport need be provided.

S3.6 Protective clothing for Investigation Supervisor

The Contractor shall provide the Investigation Supervisor or their representative with disposable PPE, commensurate with site designation and that required by the risk assessments and method statements for the works. The Contractor shall dispose of used PPE as appropriate following use by the Investigation Supervisor or their representative.

For the duration of the fieldwork, the Contractor shall provide two unmarked safety helmets for the use of the Investigation Supervisor and his visitors.

Schedule 4: Specification amendments, additions and deletions

Clause 1.1

Add new paragraph:

"Where there is conflict between the information given in the Schedules and the Specification or standards referred to in the Specification, the requirements of the Schedule shall take precedence".

Clause 3.2

Add:

"If an equivalent standard is to be used, full details are to be provided to the Investigation Supervisor at least 3 working days prior to the commencement of work on site".

Clause 3.17

Insert in line 2 after "reported".

"immediately and under no circumstances longer than 24 hours from the receipt of the complaint".

Clause 3.27

Add: new Clause 27 Standing Time

"The Investigation Supervisor shall be notified immediately that standing time starts to be incurred. The duration of standing time shall be agreed with the Investigation Supervisor."

Clause 16.11

Add:

"The number of copies of the final factual report which are required are specified in Schedule 1".

Appendix I

Add:

AI.3 Pneumatic or Vibrating Wire Piezometers

"Pneumatic or vibrating wire piezometers may be installed in boreholes. Only proprietary products specifically designed as piezometers by the manufacturer shall be used. The method of installation shall follow that for standpipe piezometers, except where there is conflict with the manufacturer's recommendations in which case the manufacturer's recommendations shall be followed. The porous piezometer tip shall be maintained so as to be completely saturated when it is installed in the borehole. The operation of the piezometer shall be verified before installation (where possible) by measuring the water pressure it records as it is installed in the borehole."

"For vibrating wire piezometers, the Contractor shall record the atmospheric pressure at the time of the water pressure reading and shall correct his reading to allow for atmospheric pressure".

Schedule 5: Specification additions

The following annexes are used:

Annex A : Special sampling

Annex E : In situ permeability tests

Annex H : Ground investigation on potentially contaminated land

Annex J : Digital data

BILL OF QUANTITIES FOR GROUND INVESTIGATION

Preamble

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 Conditions of Contract, the Specification and the Schedules and 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. Contract management and superintendence, 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, in situ testing and monitoring equipment to the site of each exploratory hole, erecting, dismantling and removing on completion

    i. on completion, removal of all equipment and services from site and disposal of arisings.

2. Unless identified as Not required, all items in section A of the Bill of Quantities (general items, provisional services and additional items), and also all items in subsequent sections against which quantities are entered shall be priced.

3. If lump-sum items are not required by the Contractor, this shall be stated against the rate item in the Bill of Quantities and £0.00 entered in the amount. Where rates are not priced they shall have £0.00 placed against them and £0.00 entered in the amount.

4. When full- or part-time professional attendance on site is required in accordance with Clause 3.5.2, this shall normally be paid for under Item A7 of the Bill of Quantities.

   Unless otherwise detailed in Schedule S1.8.2, the on-site professional attendance services provided by the technical staff shall comprise the technical supervision of site activities, site liaison, logistics, logging, in situ testing and sampling, photography and the preparation of daily records and preliminary logs (except where any of the above activities are carried out by site operatives and boring/drilling operatives).

   When individuals are not carrying out their specific duties or are otherwise away from site, then daily rates will not apply and these costs will be deemed to be covered under general items.

5. The rate entered under Item A3 shall include for the provision of any additional PPE, ground surface protection measures, additional welfare and hygiene facilities and plant and equipment decontamination facilities required as a direct result of the contamination or hazard(s) detailed in Schedule S1.8.4 and/or S1.8.6.

6. The item for photographs shall allow for the standing time of associated plant and supply of negatives, enprints and bound volume or electronic equivalents.

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

8. The rates for moving rotary drilling plant to the site of each hole shall include for setting up over a previously formed borehole, including for any additional costs arising from pulling casings left in the ground or providing temporary casings.

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

   a. full thickness of strata investigated and described in accordance with the Specification

   b. depths measured 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 Investigation Supervisor is satisfied it cannot be achieved

   f. volume calculated as measured length times measured depth times specified width for trial and observation trenches.

10. Rates for forming exploratory holes shall allow for:

a. temporary casing installation, where necessary, and removal

b. dealing with surface water

c. backfilling with arisings

d. taking information and supply of daily record for works carried by site operatives

e. additional site supervision of non-qualified operatives.

11. Rates for aquifer protection measures shall allow for the measures detailed in Schedule S1.8.13.

12. Standing time shall be measured as the duration of time for which plant, equipment and personnel are standing on the instruction of the Investigation Supervisor or in accordance with the Specification.

    Standing time shall be paid for interruption of the formation of exploratory holes to record groundwater entry in accordance with Clause 7.7. The rates for standing time shall include for:

    a. plant equipment and personnel

    b. consequential costs

    c. changes in the programme of working

    d. recording information and preparing daily record.

13. The rates for daily provision of dynamic sampling and probing, hand augering and pitting and trenching crews and equipment at locations as directed by the Investigation Supervisor shall allow for compliance with the requirements of the Contract, including preparation of records (unless the Investigation Supervisor takes responsibility for the logging and preparation of records).

    The rates for dynamic sampling Items B15–B17 and B19 shall include for the provision of liners.

14. The rates for sampling shall allow for the standing time of associated plant. The rates for sampling shall also include for the costs of the sample containers and transport and storage of the samples up to the specified time limits.

    The rate for taking a U100 or UT100 sample does not include for recovery of a sample from the cutting shoe.

    The rates for each of Items E14.1–E15.3 shall include for all necessary containers and collected samples for an individual determination of the specified contamination or WAC suite.

15. The rates for in situ testing shall allow for the standing time of associated plant and for interpretation and presentation of the results on preliminary logs/exploratory hole logs or on separate agreed report forms using the same dates of presentation as the exploratory hole to which they refer.

In the case of the self-boring pressuremeter, high-pressure dilatometer or Menard pressuremeter, the rates shall also allow for the mutual standing of the respective boring/drilling plant and specialist testing equipment and crews during the combined process.

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 Investigation Supervisor's instruction and/or the Specification but excluding the time taken to erect and dismantle test equipment where this is itemised separately.

The rate for carrying out an SPT (whether using a split spoon or solid cone) does not include for recovery of an associated sample.

16. The rates for cone penetration tests Items F15 and F21 shall allow for provision of daily records and for interpretation and presentation of the results on agreed report forms/exploratory hole logs in accordance with BS 1377 and Schedules 1.13.3 or 1.13.4.

    For the seismic cone, the recorded and presented data shall include the specified CPT data recorded between seismic test depths.

    The rates for dynamic probing shall allow for undertaking and reporting torque measurements at the prescribed vertical intervals.

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

    a. clearing and keeping the 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, including the setting time for grout

    e. recording information and preparing daily record and additional reports.

18. The rates for monitoring and sampling of installations during the fieldwork period shall allow for:

    a. purging and dealing with disposal of recovered water

    b. all costs associated with consumables and provision of data recording equipment to site

    c. proving correct calibration and recalibration

    d. recording information, preparing, updating and submitting additional reports successively and at the completion of monitoring, including notification of any unexpected readings and/or variation in readings

    e. delays due to interruptions of other site activities.

The rates for monitoring and sampling of installations during the post-fieldwork period shall allow for:

a. items (a)–(d) above

b. all costs associated with remobilising the appropriate (number and experience) staff to site and all travelling and accommodation expenses

The rates for recording of water level, ground gas or other monitoring measurements shall allow for notices of re-entry to the Investigation Supervisor, owners or occupiers affected by the location or access route.

19. The rates for laboratory testing shall include for:

    a. the supply of a copy of the preliminary test results to the Investigation Supervisor

    b. notification of unavailable test samples, failed tests and/or deviating samples (e.g. samples not correctly preserved)

    c. the cost of determining a parameter (e.g. moisture content or density) where that parameter forms part of the information to be reported for the specified test (e.g. undrained shear strength, consolidation test or unconfined compressive strength)

    d. the disposal of samples in accordance with the relevant regulations.

20. The provisional sum, Item A6, for the off-site disposal of contaminated waste shall include for temporary storage and for organising the transport and disposal by a suitably licenced waste disposal contractor. Payment shall be made only against receipted invoices.

    The costs of laboratory testing to determine the nature of the waste shall be covered by laboratory testing rates for tests actually completed and to an agreed schedule. Those sums shall be offset against the Provisional sum Item A6.

21. Appendix A to the Bill of Quantities (Rates for Ground Practitioners and other Personnel) shall be priced. The rates given will be used by the Investigation Supervisor to make an initial estimate of costs, where applicable, of employing the Contractor's staff in accordance with Clauses 3.5.2, 3.6.1 and/or 3.6.2 of the Specification.

22. Items for the supply of the master and copies of the Desk Study Report, Ground Investigation Report and/or Geotechnical Design Report shall include for the printing and supply of the specified number of draft and final copies (Specification Clause 16.11 and Schedule S1.21.12). All other duties in compiling, preparing and checking the draft and final reports shall normally be paid for either under Item A7 of the Bill of Quantities or using the rates given under Appendix A.

23. **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
Linear metre	: lin.m
Kilogramme	: kg
Tonne	: t
Sum	: sum
Number	: nr
Hour	: h
Week	: wk
Vehicle week	: v.wk
Item	: item
Day	: day
Specimen day	: sp.day
Person day	: p.day

Preamble amendments and additions

The following clauses are amended or added to the preamble:

Clause 1	Add at end of clause j) Reinstatement. k) Washing down of equipment as required to prevent cross contamination. l) Protection of the ground to prevent contamination from arisings as required.
Clause 4	Add after "...site liaison, logistics, logging", the following ", the logging of pits and trenches"
Clause 6	Add after "... supply of negative", the following "or electronic file"
Clause 10	Add to a) after "....and removal" and for any casing not recovered, including that necessary to prevent cross contamination as required Add to b) after "....surface water" and the formation of temporary grout plugs Add at end of clause f) disposal off site of excavated material not required for reuse but excluding material regarded as hazardous or special waste. g) washing down of equipment as specified h) measures to prevent cross-contamination between strata
Clause 17	Add to b) after "... below the instrument" and surface terminal (if appropriate)
Clause 19	Add to end of clause e) the time of the personnel carrying out the test.

Additional Clause 24 The rates for observation pits and trenches shall allow for all necessary shoring and shoring crew. For all hand-dug pits and trenches, the rates shall allow for working within a properly shored excavation. The size of a hand-dug pit or trench shall be sufficient to allow the excavation to be progressed to its scheduled depth. The rates for all pits and trenches should allow for the excavator, driver and technical assistant to log the pit and trench, take samples and carry out tests, and any washing down of equipment between locations.

Additional Clause 25 The rates for performing laboratory tests of long duration shall include for all costs incurred whilst working outside normal hours.

Additional Clause 26 Quantities associated with Items A12 and A13 will be reimbursed at cost on production of receipts.

Additional Clause 27 The rate for provision of an environmental scientist on site shall include provision of all equipment for taking of samples and for performing all the in-situ testing and measurements specified. The rate shall be per 8-hour day.

Additional Clause 28 The rate for photographs relates only to photographs taken and included within the factual report. The rate shall include all additional copies as specified.

Additional Clause 29 Where standard laboratory testing procedures recommend multiple tests to determine a single reported result, the rate for the laboratory testing shall include the recommended number of tests per sample.

Bill of Quantities works items

The Bill of Quantities has been included as an attached Excel File.

ANNEX A - SPECIAL SAMPLING

A1 100mm diameter thin-wall or piston sampling

Sampling should be carried out in accordance with BS 5930:2015, section 25.4, and the following:

A1.1 Sampling equipment

The sampling equipment shall be to the approval of the Investigation Supervisor. The Contractor shall state in his Tender the make and type of sampler he proposes to use. The Contractor shall also state in his Tender the range of soil strengths in which the system proposed can be used. The object is to obtain samples that are as nearly undisturbed as possible.

The sample tubes shall be of a minimum length of 600mm and shall have a minimum internal diameter of 100mm. Tubes shall be made of steel or aluminium. Plastic lining tubes shall not be used in substitution for steel or aluminium sampling tubes. Tubes should possess a sharp cutting edge and provide suitable inside clearance.

The interior of each sample tube shall be smooth, clean and resistant to corrosion. The cutting edge and the ring seals of the sampler (if any) shall be inspected for wear or evidence of any damage and rejected if worn or damaged. The interior face of the tube shall be parallel and the tube's area ratio (as defined in BS 5930:2015) shall lie in the range 10 to 15%.

The tube should be lightly coated inside and out with either petroleum jelly or vegetable oil before use. The Contractor shall state which he intends to use prior to commencement of the Investigation.

A check shall be made that the various moving parts of the sampler function freely before the sampler is lowered into the borehole.

A1.2 Supervision

When in use the piston sampler or thin-wall sampler shall be under the direct supervision of an experienced technical assistant from the Contractor's staff who is fully experienced in its use. The rig operator may take this role if suitably experienced in the sampling technique involved.

A Curriculum Vitae for the technical assistant or rig operator shall be provided to the Investigation Supervisor for his approval prior to the commencement of the Investigation. This shall provide details of recent experience in the use of this sampling method.

A1.3 Pushing the sampler

For both piston sampling and thin-wall sampling, accurate measurement of the depth from which each sample is recovered, the length of sampling stroke and the length of sample recovered shall be made and recorded.

If an obstruction is met the sampler shall be withdrawn and another sample taken when the obstruction has been removed. Immediately on completion of the sample stroke the sampler shall be withdrawn from the ground and the sample tube shall be separated from the sampler.

Precautions shall be taken to ensure that there is no movement of the sample inside the sample tube or other mechanical disturbance. Any distortion or damage of the sampling tube greater than 1mm shall be noted.

On the instruction of the Investigation Supervisor, a hand vane test shall be carried out in the top and bottom of each sample prior to sealing.

Piston sampling

The Contractor shall push the sampler down to the intended sampling levels if this is practical.

The sampler shall be advanced a minimum of 0.30m below the bottom of the boring before sampling commences. The sampler shall be pressed down smoothly and continuously whilst the piston is firmly secured so that it remains stationary. The tubes shall be advanced into the clay by hydraulic means in a continual push over a period of between 10 minutes and 30 minutes. The time taken shall be recorded. The sample tube shall be left in the ground for a further 5 minutes and then withdrawn vertically without shearing the sample base by rod rotation. A means for measuring the exact penetration of the tube and the maximum thrust achieved shall be provided.

Thin-walled sampling

The base of the borehole shall be carefully cleaned out prior to sampling. The tubes shall be advanced into the ground from the base of the borehole by hydraulic means in a continual push. The time taken to advance the tube shall be recorded. The tube shall be progressed beyond the base of the borehole so that the majority of the sample is taken from ground unaffected by drilling induced disturbance. The sample tube shall be left in the ground for 5 minutes and then withdrawn vertically without shearing the sample base by rod rotation. A means for measuring the exact penetration of the tube and the maximum thrust achieved shall be provided.

A1.4 Sealing of samples

Precautions shall be taken to ensure that there shall be no change in the moisture content of the sample after it is obtained. A small amount of melted low melting point wax shall be poured over each end of the sample and a wax sealing disc laid in the wax within 30 minutes of the sample being removed from the ground. When the wax has stiffened more wax shall be added to complete the seal. Any space between the wax and the ends of the sample tubes shall be packed and secure end caps fitted. The sample shall be clearly labelled with the project name, hole number, sample number and sample depth. The top of the sample shall also be clearly labelled.

A1.5 Written records

The Contractor's technical assistant responsible for the supervision of the sampling shall complete a record sheet, such as that included in Table A1. An

alternative record sheet maybe acceptable subject to prior approval of the Investigation Supervisor. This shall be submitted with the driller's daily record sheet.

Record of Piston/Thin-wall sampling

Contract Name									Supervisor				
Contract Number									Driller				
Date									Sheet				of
Borehole Number	Sample Number	Sample Depth	Sample Type	Length of sample strike	Length of sample recovered	Time taken to progress tube	Maximum thrust	Depth to base of borehole	Depth of casing	Depth to water (1)	Hand Vane result – top (2)	Hand Vane result – base (2)	Notes (eg type of lubricant used, sample disturbance, obstructions etc)

Notes:

(1) Water should be if necessary to prevent uplift at the base of the borehole

(2) Hand Vane tests to be carried out at the instruction of the Engineer

Table A1

A1.6 Storage and transportation of samples

Immediately after sealing, the sample tubes shall be placed upright in stout wooden boxes suitably divided and provided with resilient packing to prevent movement and damage of the samples during transportation to the laboratory. The boxes shall be handled to keep the samples upright until they are removed from the boxes for testing.

Great care shall be taken to ensure that the boxes containing the samples are protected from jarring, vibration and excessive temperature changes at every stage of transportation and storage.

ANNEX E - IN SITU PERMEABILITY TESTS

This section of the Annex to the Specification covers testing to determine permeability or hydraulic conductivity in site investigation boreholes and standpipe piezometers.

E3 Variable head standpipe piezometer test

E3.1 General

This section of the Annex to the Specification covers variable head permeability testing in ground investigation boreholes containing a Casagrande type standpipe piezometer installation. The test procedure shall conform to BS 5930:2015, Section 48.

E3.2 Piezometer installation

The piezometer installation shall be as specified in Appendix I and Annex A.

E3.3 Equipment

The Contractor shall provide a Geotechnical Instruments Ltd *SP 5.2 Standard 30m Dipmeter* or similar approved to measure water levels. All readings shall be recorded relative to an agreed and stable datum.

E3.4 Test procedure

Prior to the commencement of each test initial groundwater level in the standpipe piezometer shall be recorded.

i. Rising head test

The water level in the standpipe shall first be lowered (by pumping, bailing or other approved method) down to 1 to 3m below the groundwater level. The water level in the standpipe should not be drawn down to within the tip or slotted section. The colour and condition of the pumped water should be noted along with any changes. The system used to lower the groundwater shall then be stopped and the water level depth recorded every thirty seconds during the first five minutes, every minute for the following ten minutes and every two minutes for the next sixteen minutes. Additional readings or changes to the reading frequency shall be as directed by the Investigation Supervisor.

ii. Falling head test

The falling head test shall be performed after the standpipe rising head test, in the same manner, except that the water level in the standpipe shall be raised by about 1 to 3m above the groundwater level before the readings start. The water introduced into the standpipe must be free from sediment and be of potable quality.

E3.5 Results

The results of all tests shall be presented in hard copy and electronic formats as agreed with the Investigation Supervisor.

E4 Constant head standpipe piezometer test

E4.1 General

This section of the Annex to the Specification covers constant head permeability testing in ground investigation boreholes containing a Casagrande type standpipe piezometer installation. The test procedure shall conform to BS 5930:2015, Section 48.

E4.2 Piezometer installation

The piezometer installation shall be as specified in Annex A.

E4.3 Equipment

The Contractor shall provide a Geotechnical Instruments Ltd SP 5.2 Standard 30m Dipmeter or similar approved to measure water levels. All readings shall be recorded relative to an agreed and stable datum.

i. Negative head (outflow) test

The Contractor shall supply and operate a Geotechnical Instruments Ltd SP 6.5 Constant Negative Head Apparatus or similar approved. The suction tubing shall be unjointed below the top of the standpipe.

The flowmeter provided with the system shall be capable of measuring flows in the range 0.001l/minute to 1l/minute.

ii. Positive head (inflow) test

The Contractor shall supply and operate Geotechnical Instruments Ltd SP 6.4 Constant Positive Head Apparatus or similar approved.

The flowmeter provided with the system shall be capable of measuring flows in the range 0.001l/minute to 1l/minute.

E4.4 Test procedure

Prior to the commencement of each test initial groundwater level in the standpipe piezometer shall be recorded.

i. Negative head (outflow) test

The tubing shall be positioned in the standpipe 1 to 3m below the groundwater level as directed by the Investigation Supervisor. Water shall then be pumped from the standpipe at the maximum rate. When the water in the standpipe has been drawn down to the base of the tubing air will bubble rapidly through the measuring cylinders. The vacuum pump shall then be adjusted until only occasional bubbles appear in the cylinder. Measurements commence from the appearance of the first bubble.

ii. Positive head (inflow) test

The water level in the standpipe shall be raised to 1 to 5m above the groundwater level as directed by the Investigation Supervisor. The water level shall then be maintained constant by the addition of further water. Flow rate measurements shall be taken at intervals from the time the water level in the standpipe first reaches its test level.

E4.5 Results

The results of all tests shall be presented in hard copy and electronic format as agreed with the Investigation Supervisor.

ANNEX H - GROUND INVESTIGATION ON POTENTIALLY CONTAMINATED LAND

CONTENTS

H1 Definitions

H1.1 Potentially contaminated land

The term 'potentially contaminated land' shall mean that land designated as such on the Drawings. This land may contain substances which could give rise to hazards likely to affect human health, the natural environment or the proposed development.

H1.2 Contamination ground investigation

The term 'contamination ground investigation' shall mean those parts of the Investigation that are undertaken on potentially contaminated land to obtain information on the contamination of the ground.

H1.3 Hygiene facility

The term 'hygiene facility' shall mean designated washing and other specific facilities.

H1.4 Sampling well

The term 'sampling well' shall mean groundwater sampling standpipes and combined gas and groundwater sampling standpipes from which groundwater samples are taken for the contamination ground investigation.

H2 General requirements

H2.1 Potentially contaminated land

The presence and nature of the known areas of potentially contaminated land are noted in Schedule 1.8.4. If evidence of further potentially contaminated land is encountered the Contractor shall cease affected work and inform the Investigation Supervisor immediately. The Contractor shall agree a revised method of working appropriate to the nature and level of hazards encountered, with the Investigation Supervisor and any regulatory authority concerned.

H2.2 Working on potentially contaminated land

The Contractor shall take the necessary precautions to control and secure the Site Operations on potentially contaminated land. Access to and egress from such land shall be via a single designated point where a hygiene facility for personnel and a wheel wash facility for equipment shall be provided as defined in Schedule 1.18. The main site office and messing facilities shall be located outside the potentially contaminated land.

Arisings from exploratory holes shall be placed on heavy gauge polyethylene sheeting and/or boards, and covered in wet or windy weather so as to prevent the spread of contamination, or placed in covered skips.

At the end of the working day any exploratory hole not backfilled shall be securely covered and fenced so as to prevent human or animal access.

The Contractor shall dispose of all surplus excavated material in accordance with current waste disposal legislation.

H2.3 Statement of work

In accordance with the requirements of Clause 14 of the Conditions of Contract, and not less than 14 days before the commencement of Site Operations on potentially contaminated land the Contractor shall provide a statement describing in full the arrangements and methods he proposes to adopt in carrying out the Site Operations including full details of safety precautions.

The Contractor shall not subsequently amend the statement or any working practice or procedure contained therein, except as provided for in Clause H2.4 of this Annex, without the consent of the Investigation Supervisor.

H2.4 Liaison with authorities

Not less than 14 days prior to the commencement of the Site Operations on potentially contaminated land the Contractor shall liaise with the appropriate authorities including those listed in Schedule 1.8.4 and agree actual working practices and procedures to be adopted on potentially contaminated land. The Contractor shall, if necessary, subsequently amend and re-submit the statement of working methods to the Investigation Supervisor to take account of any variation agreed with the authorities. The Contractor shall advise the Investigation Supervisor at least one day prior to any meeting with the authorities to discuss working practices.

H2.5 COSHH assessment

Not less than 7 days prior to the commencement of the Site Operations on potentially contaminated land the Contractor shall submit a copy of his COSHH Statement relating to these site Operations to the Investigation Supervisor for information, together with any revised statement of working methods resulting from Clause H2.4 of this Annex.

H2.6 General safety precautions

On potentially contaminated land, the Contractor shall comply with the safety requirements of "Protection of Workers and the General Public During the Development of Contaminated Land" (1991) and follow the safety guidance in BS 10175 2001 Investigation of potentially contaminated sites Code of practice, Annex B and Section 7 of the Site Investigation Steering Group publication "Guidelines for the safe investigation by drilling of landfills and contaminated land" (1994). The following minimum requirements shall apply in addition to any requirements stipulated in Schedule 1.8.4:

i. Site personnel shall wear protective overalls, safety hat, safety boots, gloves and/or barrier cream and eye protection where appropriate. Any protective clothing and footwear shall be removed at the hygiene facilities before leaving the potentially contaminated land.

ii. Dust masks of suitable efficiency and artificial respiratory equipment shall be available on site for the duration of the Site Operations on potentially contaminated land.

iii. Instructions for use of safety equipment shall be prominently displayed and at least one member of staff who is conversant with the use of the safety equipment shall be on site at all times during working hours.

iv. An adequate range of appropriate first aid facilities shall be provided.

v. Adequate washing facilities shall be provided at the hygiene facilities.

vi. Activities which involve hand to mouth contact, such as eating and smoking, shall not be permitted on potentially contaminated land.

vii. No naked flames or other ignition sources shall be allowed on potentially contaminated land.

viii. Only suitably trained personnel shall be permitted to work in confined spaces or in excavations. Health and Safety Executive Guidance Note GS5 shall be strictly adhered to.

ix. The Contractor shall make adequate provision of both personnel and equipment for rescue should an incident occur. The Contractor shall inform the local hospital of the type of work in progress and the potential type of injuries.

The above list is not exclusive and does not remove from the Contractor any obligations to conform to Statutes etc under Clause 26 of the Conditions of Contract.

H2.7 Safety plan

The statement of working methods shall include a safety plan presenting details including, but not limited to, the following:

1. Specification for personal protective equipment to prevent ingestion of, inhalation of and skin contact with contaminated materials.

2. Details of decontamination facilities.

3. Statement of safe working practices which will be employed to avoid or minimise contact with contaminated materials.

4. Details of health and safety training undertaken by all levels of the work force.

5. A schedule for each potentially contaminated area giving the name, organisation, specialism, availability, location and proximity of specialist health and safety expertise within the Contractor's organisation and externally.

H3 Rotary drilling

Not used

H4 Pits and trenches

H4.1 Trial pits and trenches

Trial pits and trenches on potentially contaminated land shall be excavated by machine only.

H4.2 Observation pits and trenches

Observation pits and trenches on potentially contaminated land shall be excavated by machine, unless specified to be dug by hand in Schedule 2. All safety precautions as required under Clause H2.6 of this Annex shall be followed before and during personal entry into observation pits and trenches.

H4.3 Description

Pits and trenches shall be examined and described by a geotechnical person meeting the requirements of the Main Specification Clause 2.2 item (c). Ground from potentially contaminated land shall be described by an environmental or geotechnical person, as appropriate, meeting the requirements of the Main Specification Clause 2.2 item (c).

H4.4 Particular backfilling requirements on potentially contaminated land

Unless specified otherwise, backfill to trial pits and trenches on potentially contaminated land shall comprise of the solid arisings being replaced at the same depth and location from which they originated. Materials showing evidence of contamination should not be left at the ground surface.

Any deficit in material at a particular level shall be made up with inert material having a coefficient of permeability of less than 10-5m/sec as placed.

H5 Sampling

H5.1 Samples for contamination ground investigation

Solid and liquid samples for contamination testing shall be taken under the supervision of an environmental scientist meeting the requirements of the Main Specification Clause 2.2 item (c).

The size and type of sample and container, method of sampling and time limitations for carrying out specific analyses shall be commensurate with the range of tests to be carried out or as described in S1.12.12

The Contractor shall take all steps necessary to avoid cross contamination of sampling points.

The Contractor shall take samples which are representative of each of the materials encountered. As a minimum samples shall be taken as follows unless specified differently in Schedule S1.12.12:

(a) Solid Samples:

i. The first sample shall be taken at varying depths between the surface and 0.3m (at the instruction of the Investigation Supervisor). Subsequent samples should occur at approximately 1.0m intervals thereafter as required.

ii. A sample shall also be taken where colour, odour or consistency indicate a change in the nature of the strata and/or the potential presence of contamination.

Solid samples shall be taken by the chemist from the investigation position at the time of excavation. Sub-sampling from bags or from excavations left open for sampling shall not be deemed appropriate unless otherwise instructed by the Investigation Supervisor.

(b) Groundwater Samples:

Samples of groundwater shall be taken from each exploratory hole in accordance with S1.17.2 and from groundwater sampling and combined gas and groundwater sampling standpipes in accordance with Clause H5.3 of this Annex.

(c) Gas Samples:

Gas samples shall be taken from gas monitoring standpipes and exploratory holes in accordance with the procedures given in Clauses H5.5 and H6.5 of this Annex.

Specific requirements for sample containers are detailed in S1.12.12.

H5.2 Solid samples

Solid samples for the contamination ground investigation may be of any of the types covered by S1.12.12 and be taken from boreholes, trial pits and trenches, observation pits and trenches.

Sample tubes and split spoon samplers used for recovering material for contamination testing shall be washed with clean water immediately before use to minimise the potential for cross contamination.

Small disturbed samples shall be taken with clean stainless steel hand tools and placed in rigid containers made of a material that is non-reactive with the likely contaminants. The containers shall be filled to the brim to effectively exclude air.

H5.3 Water samples from sampling wells

Samples for the contamination ground investigation from standpipes, piezometers or gas standpipes shall only be taken after purging standing water from the installation. The water level shall be measured prior to purging.

A minimum of three well volumes of water shall be purged from sampling wells, or until the well is dry, unless otherwise specified by the Investigation Supervisor. Purging shall occur from the upper part of the water column. During purging pH and conductivity levels shall be monitored when the following approximate well volumes of water have been removed: 0.5, 1.0, 2.0 and 3.0 times well volume.

The sampling equipment and procedures used shall allow discrete depth sampling and shall cause minimum disturbance to the physical or chemical condition of the groundwater.

Field tests and measurements as described in Clause H6.6 of this Annex shall be carried out on all samples.

Depending on the suite of chemical or biological tests to be undertaken, several sub-samples of groundwater may be required to be placed in different types and sizes of container, and chemically fixed with an appropriate agent where necessary. Sufficient water samples should be taken to allow laboratory testing of the parameters and to the detection limits detailed in S1.20.3.

Unless otherwise specified by the Investigation Supervisor, water samples shall be filtered through a 0.45 micron membrane filter on site before any preservation fixing agents or techniques are applied.

Care shall be taken to ensure that no cross-contamination occurs either during extraction of the sample from the sampling well or whilst stored and handled prior to analysis.

Testing for BOD, COD and Ammoniacal Nitrogen should be started within 24 hours.

H5.4 Surface water samples

Water samples shall be taken from water courses or surface sources as instructed by the Investigation Supervisor. If chemical or biological tests are to be carried out the procedures described in Clauses H8.5 to H8.5.4 of this Annex shall apply.

H5.5 Gas sampling

Samples of gas for chromatographic analysis shall be obtained from exploratory holes or standpipes, and tested as specified in Schedule 1.18 or as directed by the Investigation Supervisor. The sampling method shall relate to the volume of gas available and the type of laboratory analysis. The sampler receptacle shall be airtight and may include lockable syringes, PTFE lined bags and gas bombs, or alternatives fit for the purpose.

Gas samples shall be not less than 0.075 litres in volume and shall be taken at the same time as in situ gas concentration monitoring, gas emission rate and pressure measurements in accordance with the procedure described in Clause H6.5 of this Annex.

H5.6 Description of samples

All solid samples shall be examined and described by a geotechnical person meeting the requirements of the Main Specification Clause S1.8.2. Descriptions shall include colour and smell with reference to specific inclusions. Particular care shall be taken to describe the type and frequency of anthropogenic materials in Made Ground and fill materials.

H5.7 Labelling, protection and transportation of samples

Samples shall be clearly labelled in accordance with BS 5930. Solid, liquid or gas samples suspected to be toxic or hazardous shall be tagged with a red label.

Samples shall be transported to the Contractor's premises. Where required, selected samples shall be delivered to the address given in Schedule 1.12. The Contractor shall be responsible for the protection of all samples and for their transport (including loading and unloading).

All samples taken as part of the contamination investigation shall be placed in rigid, air tight, clean containers and labelled to indicate the site, exploratory hole, depth, date and time o'clock of sampling. Containers for water samples shall be opaque, robust enough to avoid being damaged during handling and transportation, and shall not react with the sample. Containers for bacteriological sample collection shall be sterile.

All groundwater samples pertaining to the contamination ground investigation shall be stored in the dark and protected at all times from temperatures below 2°C and above 4°C

All solid samples pertaining to the contamination ground investigations shall be stored in cooler boxes.

Samples other than those referred to above shall be protected to ensure that their temperature does not fall below 2°C or rise above 25°C. They shall also be protected from direct heat and sunlight.

H5.8 Retention and disposal of samples

All samples from potentially contaminated land shall be disposed of in accordance with current waste legislation.

H6 In situ testing

H6.1 In situ gas concentration measurements

Where required, the Contractor shall carry out in situ measurements of gas concentration during the advancement of those exploratory holes designated in Schedule 2, at 1m intervals over the depth range specified in Schedule 2, or as otherwise directed by the Investigation Supervisor.

Measurements during the advancement of exploratory holes shall be taken by a person experienced in the use of the appropriate specialised equipment.

Concentrations of the following gases shall be measured:

- flammable gases
- hydrogen sulphide
- carbon dioxide
- oxygen

The monitoring equipment shall be capable of measuring gas concentrations to the following degrees of accuracy:

GAS TYPE	UNITS	DEGREE OF ACCURACY
Flammable Gases (incl. Methane)	%LEL	1.0

	%v/v	0.1
Hydrogen Sulphide	ppm	0.5
Carbon Dioxide	%v/v	0.1
Oxygen	%v/v	0.1

The selection of monitoring equipment and the method of testing shall be in accordance with the guidance given in Sections 7, 8, 9 and 10 of CIRIA Report 131 (1993).

H6.2 Monitoring of standpipes

All measurements taken in gas monitoring standpipes shall be taken by an environmental scientist meeting the requirements of Clause 2.2 item (c) of the Main Specification.

Concentrations of the following gases shall be measured:

- Methane
- Hydrogen Sulphide
- Carbon Dioxide
- Oxygen

The procedure shall be as follows:

1. Measure initial barometric pressure, ambient temperature and differential gas pressure in the standpipe.

2. Take initial gas concentration measurements from each tap valve with portable gas monitoring equipment. Record gas concentrations 5s, 30s and 60s after opening each valve.

3. Circulate gas from top of standpipe through the gas monitoring equipment and back into the standpipe via the tap valve with the suspended sampling tube taking readings at one-minute intervals until steady values are achieved or a maximum of 10 minutes.

4. If specified in Schedule 2, or instructed by the Investigation Supervisor, take a gas sample for subsequent laboratory analysis in accordance with Clause H5.5 of this Annex via the tap valve with the suspended tube.

5. Take final gas concentration measurements from each tap valve with portable gas monitoring equipment. Record gas concentrations 5s, 30s and 60s after opening each valve.

6. Carry out gas flow measurements.

7. Measure atmospheric pressure at the end of the procedure.

Gas flow (displacement) measurements shall be taken following gas concentration measurements with a suitable device as follows: Attach gas flow measuring device to the top valve and take measurements at 1 minute intervals for a period of not less than 10 minutes, unless gas flow is exhausted. Gas flow displacement measurements in units of l/hr. The detection limit shall be 0.1.

The information to be submitted shall be:

a. location and reference number of hole

b. depth of monitoring

c. weather conditions during monitoring, including ambient air temperature

d. standpipe installation details

e. depth to water

f. equipment used

g. operator name and responsibility

h. gas concentrations in the units described in the table in Clause H6.4.

i. atmospheric pressure in units of millibars

j. Differential gas pressure measurement in units of mm water gauge. The sensitivity shall be 0.5.

Concentrations of methane and carbon dioxide shall be measured using infrared monitoring equipment.

H6.3 Field tests on groundwater samples

The following field tests and measurements shall be carried out on groundwater samples obtained for the contamination ground investigation from exploratory holes, standpipes and piezometers:-

1. pH. The test equipment and procedure shall be in accordance with "The Measurement Treated and Waste Waters" (1978).

2. Temperature. The test equipment and procedure shall be in accordance with "Standard Methods of the Examination of Water and Waste-Water" 18th Edition (1992) Section 2550. The ambient temperature at the time of testing shall be measured and recorded.

3. Dissolved oxygen. The test equipment and procedure shall be in accordance with "Dissolved Oxygen in Natural and Waste Waters" (1980) - Method B - Instrument Method.

4. Electrical conductivity. The test equipment and procedure shall be in accordance with "The Measurement of Electrical Conductivity and the Laboratory Determination of the pH Value of Natural, Treated and Waste Waters" (1978) Method A.

5. Redox potential. In accordance with Clause H2.3 of this Annex, the Contractor shall submit to the Investigation Supervisor for his consent, a statement detailing the proposed procedure for the measurement of Redox Potential of groundwater.

The information shall be submitted as follows:

TEST	UNITS	DETECTION LIMIT	DEGREE OF ACCURACY
pH	pH units	0.1	±0.1
Temperature	°C	0.1	±0.1
Dissolved oxygen	mgO2/l	0.1	±0.1
Electrical conductivity	µS/cm	10	±2.0
Redox potential	mV	±1	±0.1

The time o'clock of sampling and carrying the test shall also be submitted.

H7 Instrumentation and monitoring

H7.1 Gas monitoring standpipe

Standpipes for monitoring gas concentration, pressure and gas flow velocity shall be installed in exploratory holes where indicated in Schedule 2, or as instructed by the Investigation Supervisor. They shall be as described below and on Drawing H1. All as-installed dimensions and depths shall be recorded.

The standpipe shall consist of uPVC or HDPE tubing according to BS 3506 Class D or BS 6437 Class 6.0, as applicable, and shall be not less than 50mm in diameter.

The base of the tubing shall be capped and the tubing perforated or slotted to provide an open area of between 10% and 15% or the surface area of the tubing. Holes shall not be greater than 5mm in diameter and slots shall not be greater than 5mm width.

The filter shall be pea gravel, or similar material, as approved by the Investigation Supervisor, 6-10mm in diameter. The pea gravel shall be quartz based and shall have been washed prior to use.

Where the depth of the exploratory hole is greater than the depth to which the filter and tubing are to be installed then the exploratory hole shall be backfilled below the base of the filter with cement/bentonite grout and a 1m plug of cement/bentonite paste in bags, or compressed bentonite pellets, in accordance with Clause 5.7 of the Main Specification. If compressed bentonite pellets are used as an alternative to grout balls they shall be partially saturated before being added to the borehole, and further clean water added to the borehole to complete saturation.

The tubing with centralising devices attached at 2m intervals shall be lowered carefully down the exploratory hole to the level of the filter material, and the exploratory hole backfilled to within 1m of ground level with pea gravel.

The top of the tubing shall be covered with a screw threaded plastic cap having two tap valves as indicated on Drawing H1. One of the two tap valve assemblies shall have a quick fit compression fitting to enable a 5mm internal diameter tube to be suspended on the underside of the tap valve assembly. The tube shall be hung to within 1m of the groundwater level or base of the standpipe, whichever is the higher.

The upper 1m of the uPVC or HDPE tubing shall be unperforated and the borehole backfilled by a 0.5m plug of cement/bentonite paste in bags, or compressed bentonite pellets, in accordance with Clause 5.7 of the Main Specification and 0.7m of concrete as specified below. If compressed bentonite pellets are used as an alternative to grout balls they shall be partially saturated before being added to the borehole, and further clean water added to the borehole to complete saturation.

Arrangements to prevent the ingress of surface water and to protect the top of the tubing and tap valves shall use a 150mm lockable stop cock cover which shall be set in a sufficiently stiff concrete mix standing slightly proud of the surrounding ground. Each gas standpipe shall be permanently labelled with a metal stamp or tag indicating the exploratory hole number. The manhole cover shall be painted with a lead free paint of an approved colour. Where required a timber post 100mm diameter and 2.0m long shall be erected adjacent to the cover to stand 1.5m above ground level. Protective fence, where required, shall be as specified in Clause 11.3 of the Main Specification.

The installation of gas standpipes shall be completed in a single day.

H7.2 Combined gas and groundwater sampling standpipe

Standpipes to allow both gas monitoring and groundwater sampling shall be installed in exploratory holes where indicated in Schedule 2, or as instructed by the Investigation Supervisor. They shall be as described below and on Drawing H2.

The details of the combined gas and groundwater sampling standpipe shall be as described in Clause H7.1 above. In addition, the slotted section shall be wrapped is a sewn sleeve or stocking having a pore size of between 100 and 250 microns. The fabric wrapping material shall be to the approval of the Investigation Supervisor. The slotted and wrapped section of pipe shall be surrounded by an inert filter material, as described in Clause H7.1 of this Annex.

H7.3 Discrete depth groundwater sampling standpipe

Standpipes to allow discrete sampling of natural groundwater in natural strata shall be installed in exploratory holes where indicated in Schedule 2, or as instructed by the Investigation Supervisor. They shall be as described below and on Figure H4.

The details of the discrete depth groundwater sampling standpipes shall be similar to that described in Clause H.7.2. In addition an unslotted section with grout surround shall be formed above the response zone. The response zone will be provided with well-formed bentonite seals above and below. The construction of the standpipe shall prevent any cross-contamination from potentially contaminated surface strata. The actual depth and length of the response zone may vary and shall be instructed by the Investigation Supervisor.

H7.4 Shallow groundwater sampling standpipe

Standpipes to allow discrete sampling of perched groundwater shall be installed in exploratory holes where indicated in Schedule 2, or as instructed by the Investigation Supervisor. They shall be as described below and on Figure H5.

The details of the combined gas and groundwater sampling standpipe shall be as described in Clause H.7.1 above. In addition, the slotted section shall be wrapped is a sewn sleeve or stocking having a pore size of between 100 and 250 microns. The fabric wrapping material shall be to the approval of the Investigation Supervisor. The slotted and wrapped section of pipe shall be surrounded by an inert filter material, as described in Clause H.7.1 of this Annex. The top of the tubing shall be covered with a screw threaded plastic cap with a single valve. Suspended tubing is not required.

H7.5 Gas readings

Gas measurements shall be made by the Contractor at a range of depths during construction of exploratory holes and in gas monitoring standpipes as described in Clauses H6.4 and H6.5 of this Annex.

H8 Laboratory testing

The laboratory shall work within the framework of suitable Quality Assurance scheme which shall be approved by the Investigation Supervisor.

H8.1 Testing schedules

The Investigation Supervisor will decide the laboratory tests required and will provide the Contractor with one or more schedules of laboratory tests from the range of analyses given in Schedule 1.18. It may be necessary to specify additional testing after the results of the original tests are available.

The Contractor shall provide suitable containers and undertake the sampling in such a manner to ensure that the samples are suitable for the provisional schedule of tests identified in Schedule 1.18

Scheduling of analysis will normally take place once the Investigation Supervisor has been provided with the exploratory hole logs, sample lists and location plan. Scheduling may take place in batches or as a single activity on completion of the Investigation. The programme of scheduling shall be agreed at the start of the Investigation.

H8.2 Geotechnical testing procedures

Prior to undertaking any geotechnical testing on samples from potentially contaminated land a safe method of working shall be agreed with the Investigation Supervisor. It should be noted that this may include but is not limited to the safe storage and handling of all material.

H9 Reporting

Test results for the contamination ground investigation shall be accompanied by an unambiguous description of sample preparation, extraction and analysis method used.

Draft results of the chemical analysis shall be reported to the Investigation Supervisor as they become available.

The Contractor shall provide the additional details in the Report (this shall be regarded as the data quality assessment report):

i. The full analytical procedure for each parameter determined, including the detection limit and susceptibility to interference of the method and an appropriate reference to the method.

ii. Details of the chain of custody between sampling and analysis, including the time between sampling and analysis, storage procedures, procedures for quantifying analytical errors including data quality assessments and quality management procedures.

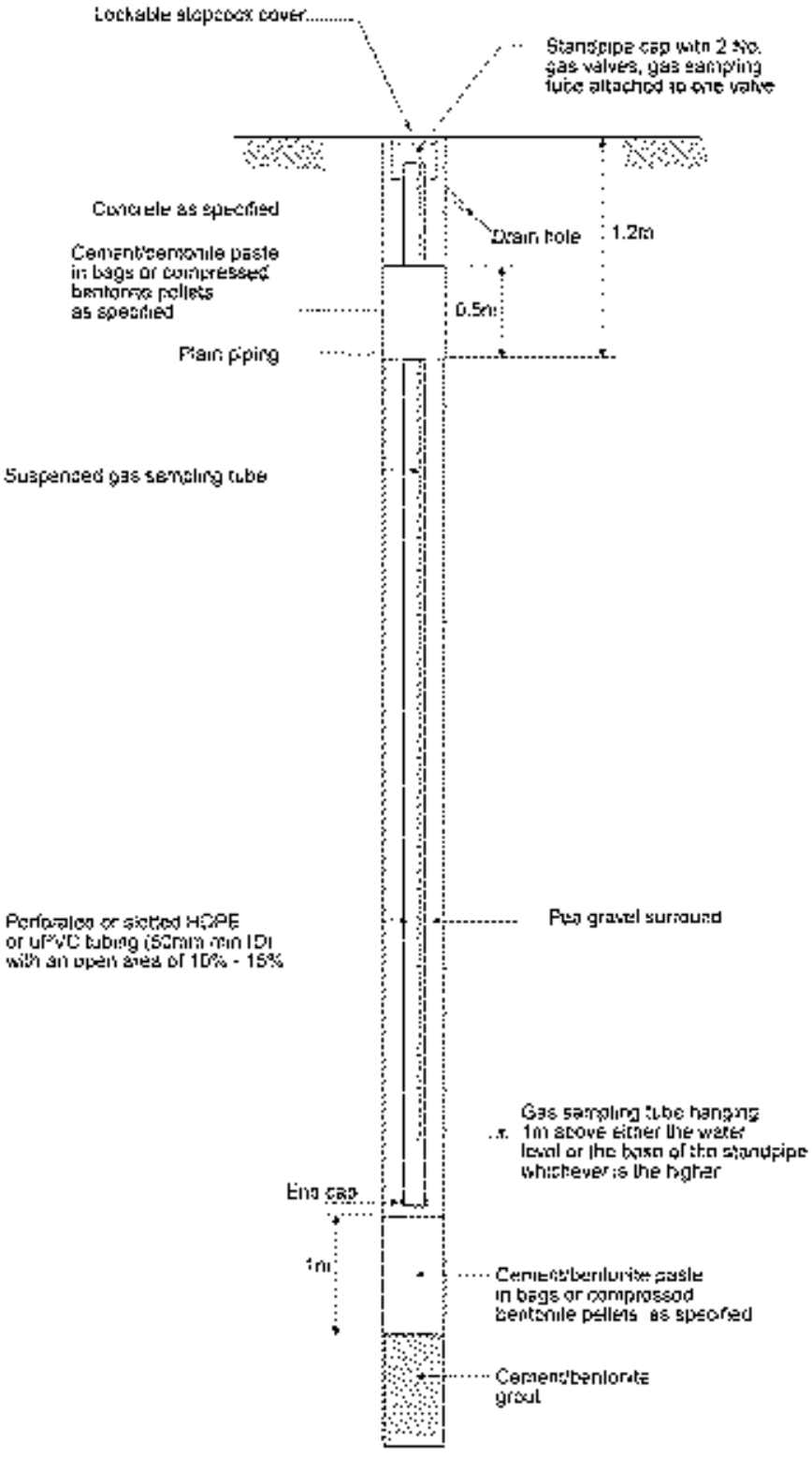


Figure H1: Gas monitoring standpipe detail

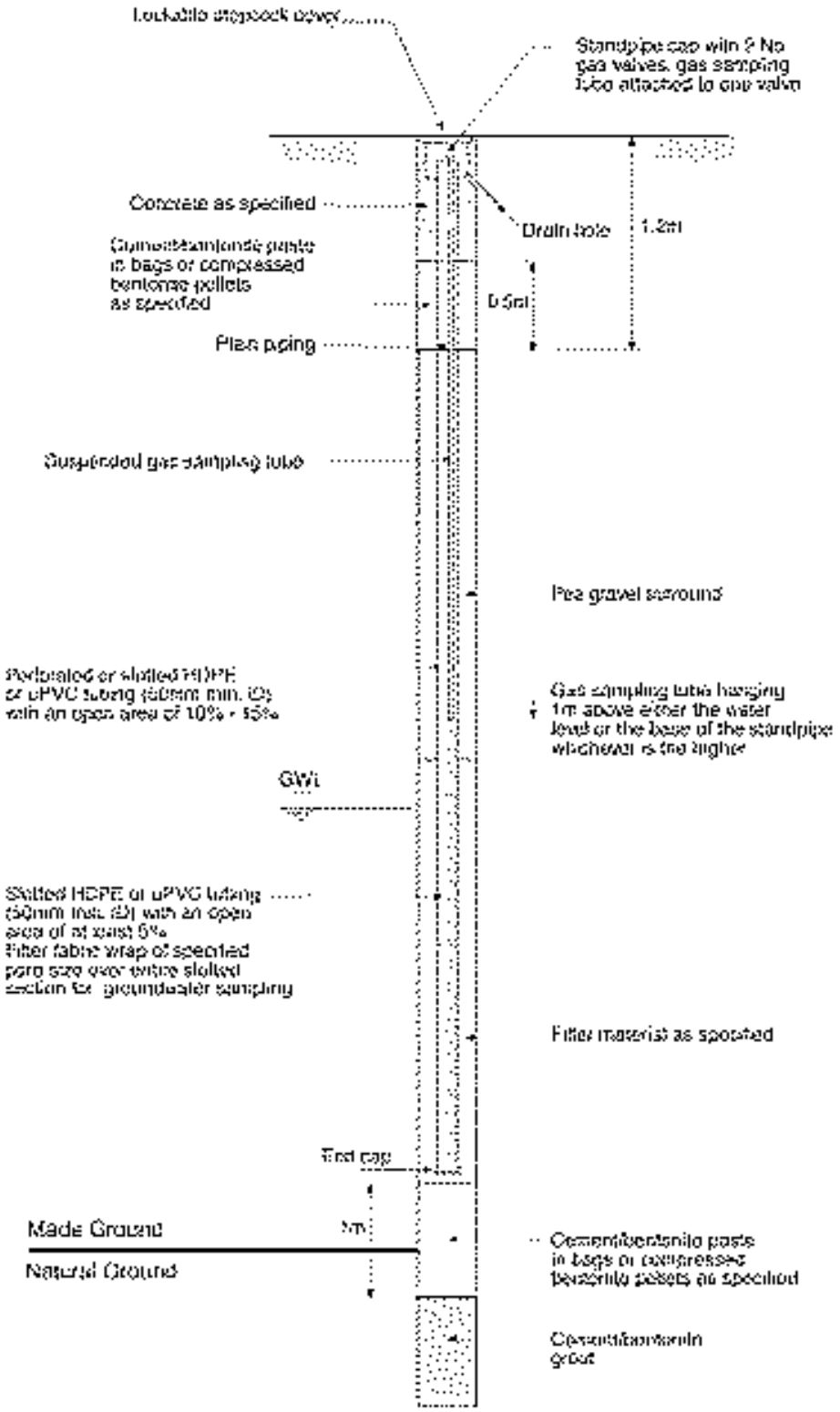


Figure H2: Combined gas and groundwater detail

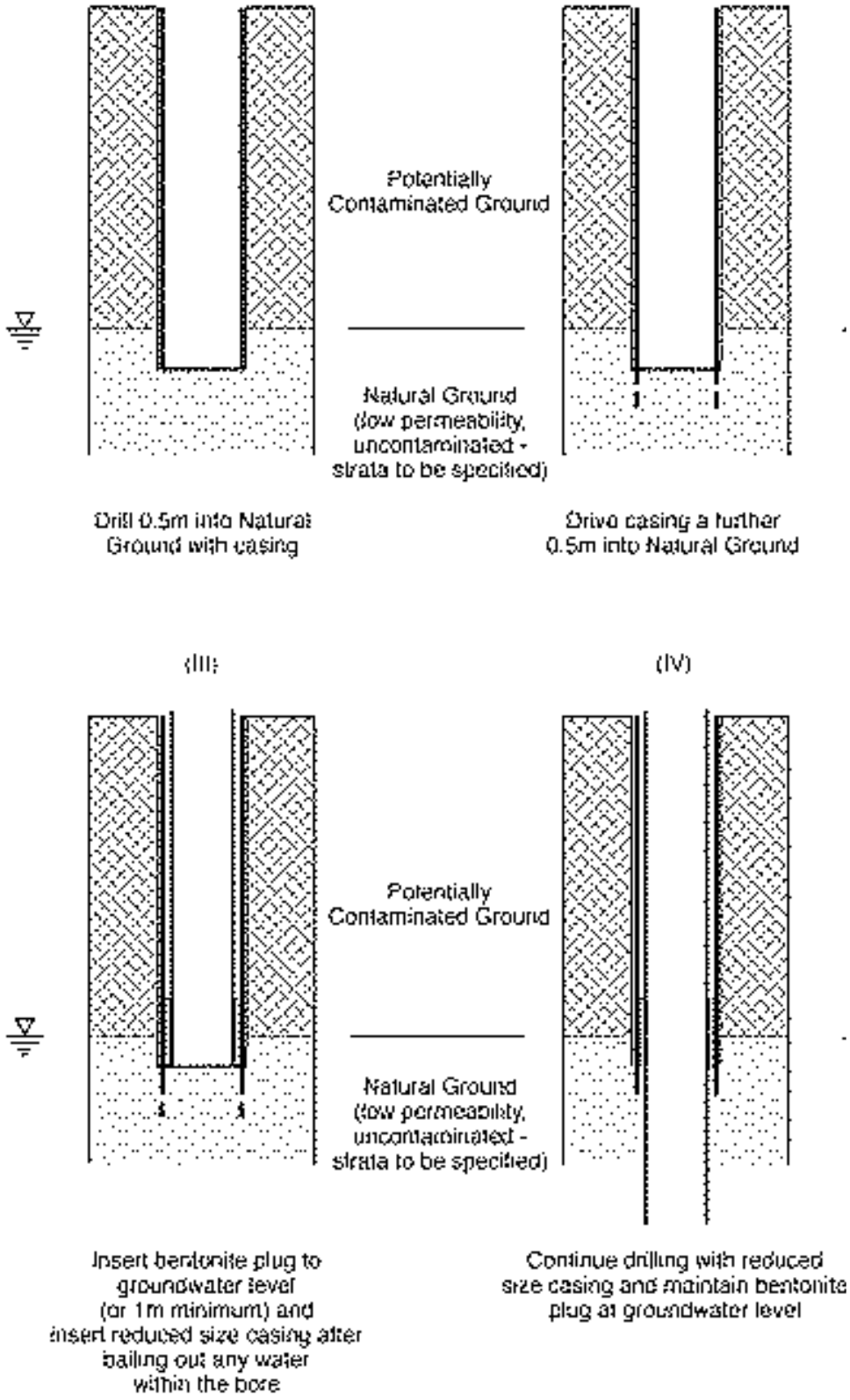


Figure H3: Typical borehole construction sequence for drilling through contaminated ground

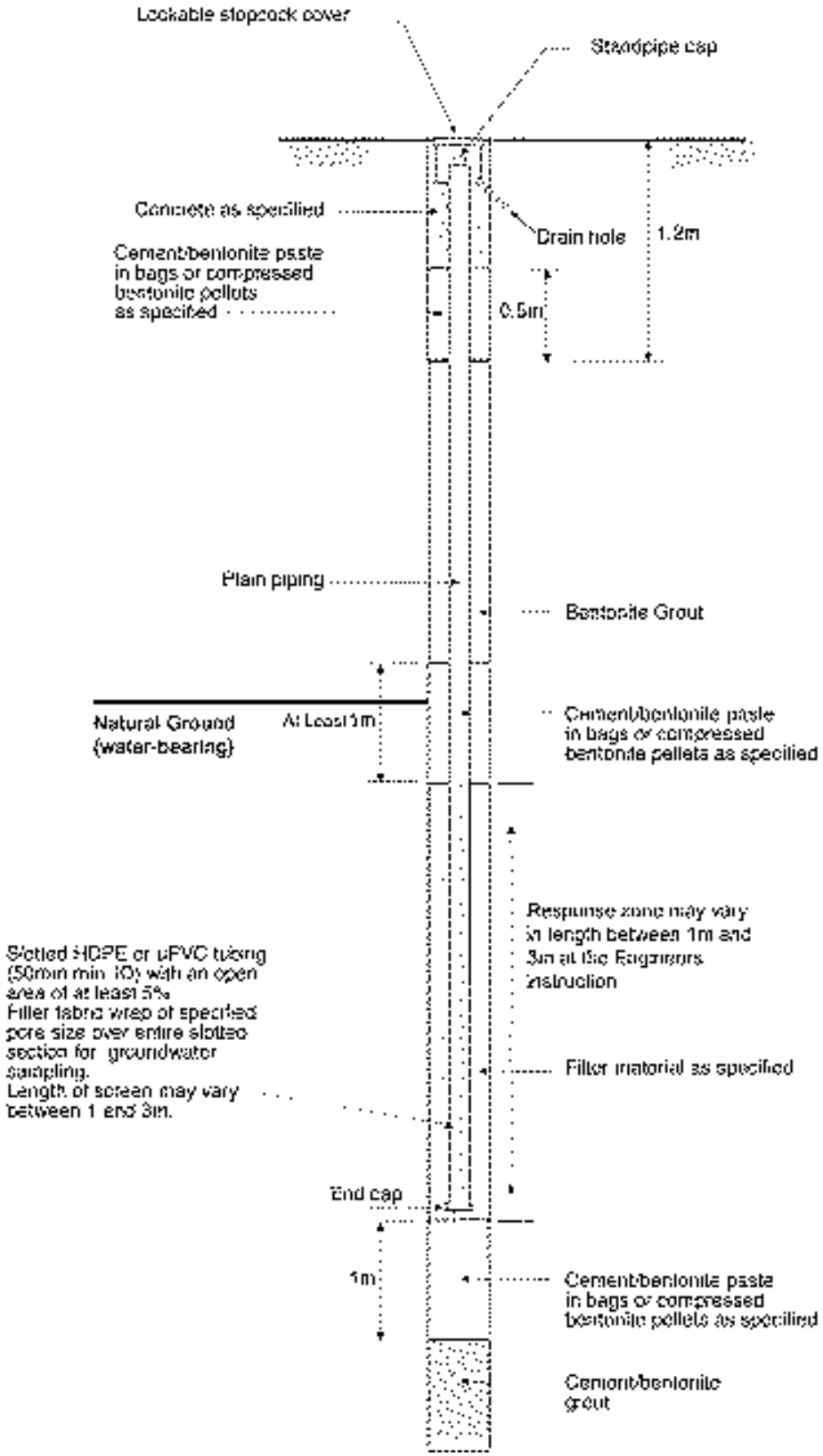


Figure H4: Discrete depth groundwater sampling standpipe detail

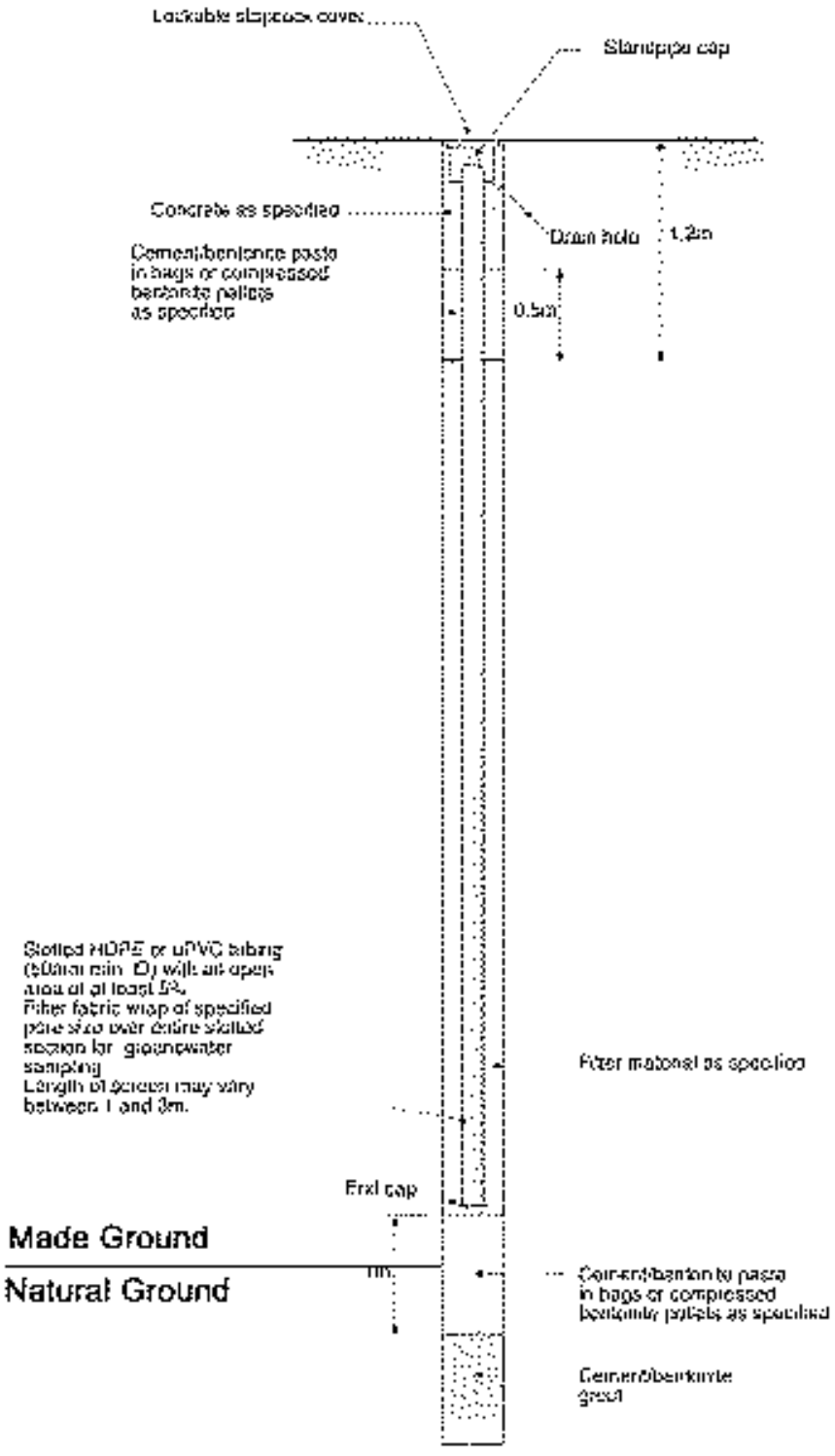


Figure H5: Shallow groundwater sampling standpipe detail

H10 References

UK Standards (published by British Standards Institution)

Note: Latest editions of British Standards shall apply when available unless indicated in Schedule 1.8.

BS 5930: 2015 Code of practice for site investigations.

British Standard Code of Practice (Published by BSI)

DD 10175: 2001 Investigation of potentially contaminated sites Code of practice.

HMSO Publications

CIRIA Report 132. A Guide for Safe Working on Contaminated Sites. CIRIA 1996.

Classification, packaging and labelling of dangerous substances regulations. HMSO, London, 1984.

Dissolved Oxygen in Natural and Waste Waters Methods for examination of water and associated materials. HMSO, 1980.

General principles of sampling and accuracy of results Methods for examination of waters and associated materials. HMSO, 1980.

Manual of contract documents for highway works. Volume 1: Specification for Highway Works. (MCHW 1) HMSO, 1993.

Protection of workers and the general public during the development of contaminated land. HMSO, 1991.

The Measurement of Electrical Conductivity and the Laboratory Determination of the pH value of Natural Treated and Waste Waters Methods for examination of water and associated materials. HMSO, 1978.

The Measurement of Electrical Conductivity and the Laboratory Determination of the pH Value of Natural, Treated and Waste Waters Methods for examination of water and associated materials. HMSO, 1979.

Miscellaneous

Crowhurst D. and Manchester S.J. The measurement of methane and other gases from the ground. CIRIA Report 131, CIRIA, 1993.

Health and Safety Executive. Guidance Note GS5. Entry into confined spaces.

Site Investigation Steering Group. Guidelines for the safe investigation by drilling of landfills and contaminated land. Thomas Telford, London, 1993.

ANNEX J - DIGITAL DATA

J1 General

1. The following project information will be used:

PROJ_ID	242531
PROJ_NAME	STOCKTON EVENTS CAR PARK
PROJ_LOC	STOCKTON ON TEES
PROJ_CLNT	HCA

2. Unless otherwise required in the Contract, the Contractor and all sub-contractors are to provide field and laboratory data in digital form, as well as in paper form.

3. The definitive copy of the field and laboratory data shall be the paper copy.

4. All data shall be checked for errors / integrity prior to issue.

5. The format of the digital data files shall comply with the Association of Geotechnical and Geoenvironmental Specialists (AGS) publication 'Electronic transfer of geotechnical and geoenvironmental data' 3rd edition.

6. The following shall be referenced in the associated file (FILE_FSET) fields.

- Factual reports (including any reports issued by sub-contractors)
- Digital photographs

7. Any new groups or fields shall only be created with the Investigation Supervisor's approval.

8. All disks, or other agreed transmission media, shall be securely labelled and clearly marked with:

- The title 'AGS Format Data'
- The project identification (PROJ_ID)
- The project location (PROJ_LOC)
- The date of issue to the Investigation Supervisor (PROJ_DATE)
- The name of the Contractor (PROJ_CONT)
- The name of the Investigation Supervisor (PROJ_ENG)
- The unique issue sequence number

If more than one disk, or other agreed transmission medium, is required, then each shall be clearly labelled to indicate the order in which the Investigation Supervisor should read the data. The split of the data into separate files shall be decided by the Contractor. The unique sequence number shall run sequentially from the start of the contract.

Where more than one disk is required for a particular issue of digital data, this fact shall be clearly identified on the labels in that issue.

9. Until the completion of the maintenance period, the Contractor shall keep an index detailing:

- The heading 'AGS Format Data'
- The title 'Media Index Record'
- The project identification (PROJ_ID)
- The unique issue sequence number
- The date of issue to the Investigation Supervisor (PROJ_DATE)
- The name of the Contractor issuing the transmission media (PROJ_CONT)
- The name of the Investigation Supervisor to whom the transmission media was issued (PROJ_ENG)
- A general description of the data transferred and/or a file listing for associated files.
- For each AGS Format data set, including all associated files, the index will detail:
- The file name including the extension
- The date the file was created
- The time the file was created
- The file size in bytes
- A general description of the data contained in each file and/or a file listing for associated files.

The Contractor shall retain one copy of the index sheet and shall issue to the Investigation Supervisor a copy of the completed index sheet with the disk(s), or other agreed transmission medium.

10. All data files shall be checked for viruses before issue using a recent proprietary anti-virus program.

J2 Preliminary data

1. Preliminary data is required.

2. The Contractor shall issue digital copies of all preliminary data whenever required by the Investigation Supervisor, as defined in S1.17 of the Tender Document.

3. The preliminary data may be subject to update as necessary in the light of laboratory testing and the further examination of samples and cores. When available, laboratory data shall be included.

4. The preliminary data set shall include all current data, including previous preliminary data sets.

5. In addition to the labelling given in Clause 10.2.1, the disks shall be labelled 'PRELIM' and a unique sequence number given to the disk for each issue of digital data to the Investigation Supervisor.

6. A list of data items not included in the digital data but included in the paper copy shall be provided.

7. All preliminary data in digital form shall be able to be presented in the same form as it is to be used for the Factual Report. The digital data must be produced from the same source/program as that used to produce the factual report.

J3 Draft digital data

1. The draft digital data shall be submitted immediately preceding or upon submission of the draft factual report.

2. The draft digital data provided by the Contractor with the draft factual report is required to be a complete copy, in digital form, of the draft factual report and shall be a total replacement of any previous preliminary data.

3. In addition to the labelling given in Clause 10.2.2 of this specification, the disk(s), or other agreed transmission media, submitted with the Factual Report shall be labelled 'DRAFT'.

J4 Final data and factual report

1. The final digital data shall be submitted immediately preceding or upon submission of the final factual report.

2. In addition to the labelling given in Clause 10.2.2 of this specification, the disk(s), or other agreed transmission media, submitted with the Factual Report shall be labelled 'FINAL'.

3. The digital data provided by the Contractor with the Factual Report is required to be complete and a total replacement of any previous preliminary / draft data.

4. In addition to the paper copies of the Factual Report, the Contractor shall provide a Report with a digital copy of those field and laboratory data and associated files specified in the Contract to be in digital form. This report shall consist of a disk(s), or other agreed transmission medium, containing the digital data and associated files, paper copies of any data or drawings not included in digital form. The file format for associated files shall be agreed in advance between the Contractor and the Investigation Supervisor. The paper copies shall be firmly bound within stiff covers.

J5 Dummy set of data

Prior to the start of work on the Contract the Contractor shall submit to the Investigation Supervisor a dummy set of data, including any data produced by sub-contractors, in the required format for the approval of the Investigation Supervisor.

J6 Submitting data

Updated disks, or other agreed media, shall be provided at the periods defined in this specification. The Contractor shall make two identical copies of each disk, whether preliminary, draft or final. The first copy shall be retained by the Contractor until the expiry of the contract maintenance period. The second copy will be issued to the Investigation Supervisor.

J7 Units of measurement

The preferred units of measurement shall be those given in the AGS publication 'Electronic transfer of geotechnical and geoenvironmental data' unless other units of measurement for digital data are given in the Contract. The units of measurement must be given in the AGS Format files, and must be the same as those used in the paper version of the report.

J8 Specific AGS data fields

1. The legend codes (GEOL_LEG) given in Table J1 will be used and included in the ABBR group.

2. The contractor shall interpret the geological strata encountered in the ground investigation and include geology codes (GEOL_GEOL), as given in Table J2. Geology code abbreviations shall be included in the ABBR group. Where the interpretation of geological strata is unclear, combinations of likely strata should be used, i.e. MG / RTD.

3. The GEOL_GEO2 fields shall be defined by the main constituents as given in Table J3. Any abbreviations shall be included in the ABBR group.

4. When full penetration of 450mm has been achieved, the N value shall be reported in the ISPT_NVAL field as a whole number. When full penetration has not been achieved, this field shall remain empty.

5. The ISPT_REP field shall be used to present incomplete tests, i.e. 50/160mm.

6. The WETH group shall be used to define the weathering grade

7. The ABBR group given in the AGS publication 3rd edition (Appendix 1) shall be used and shall include the additional abbreviations given in tables J1 to J4.

J9 Specified and calculable fields

The specified fields given in Table J5 will be used and shall be defined in the DICT group.

Table J1: Geol_leg

101	TOPSOIL	509	Clayey sandy GRAVEL
102	MADE GROUND	510	Clayey cobbly GRAVEL
104	CONCRETE	511	Clayey bouldery GRAVEL
201	CLAY	512	Clayey organic GRAVEL
203	Sandy CLAY	517	Clayey sandy organic GRAVEL
204	Gravelly CLAY	520	Silty sandy GRAVEL
205	Cobbly CLAY	521	Silty cobbly GRAVEL
206	Bouldery CLAY	522	Silty bouldery GRAVEL
220	Sandy gravelly CLAY	523	Silty organic GRAVEL
222	Sandy cobbly CLAY	524	Silty organic sandy GRAVEL
223	Sandy bouldery CLAY	525	Sandy cobbly GRAVEL
224	Sandy gravelly cobbly CLAY	526	Sandy bouldery GRAVEL
225	Sandy gravelly bouldery CLAY	527	Sandy organic GRAVEL
226	Sandy gravelly cobbly bouldery CLAY	528	Silty sandy cobbly GRAVEL
227	Sandy organic CLAY	601	PEAT
228	Sandy gravelly organic CLAY	602	Clayey PEAT
229	Organic CLAY	603	Silty PEAT
301	SILT	604	Sandy PEAT
302	Clay/Silt	605	Gravelly PEAT
303	Sandy SILT	606	Cobbly PEAT
304	Gravelly SILT	608	Clayey sandy PEAT
305	Organic SILT	609	Clayey gravelly PEAT
310	Sandy gravelly SILT	612	Silty sandy PEAT
314	Clayey sandy gravelly organic cobbly SILT	613	Silty sandy gravelly PEAT
316	Sandy cobbly SILT	614	Sandy gravelly PEAT
317	Sandy bouldery SILT	701	COBBLES
318	Sandy organic SILT	702	Clayey COBBLES
319	Sandy gravelly organic SILT	703	Silty COBBLES
320	Sandy gravelly cobbly SILT	704	Sandy COBBLES
321	Sandy gravelly organic cobbly SILT	705	Gravelly COBBLES
322	Gravelly cobbly SILT	706	Organic COBBLES
323	Gravelly bouldery SILT	708	Clayey sandy COBBLES
324	Gravelly organic SILT	709	Clayey gravelly COBBLES

325	Gravelly organic cobbly SILT	713	Silty sandy COBBLES
326	Cobbly SILT	714	Silty gravelly COBBLES
327	Cobbly bouldery SILT	715	Silty organic COBBLES
328	Organic cobbly SILT	716	Silty gravelly sandy COBBLES
331	Bouldery SILT	717	Silty sandy organic COBBLES
401	SAND	718	Silty sandy gravelly organic COBBLES
402	Clayey SAND	719	Sandy gravelly COBBLES
403	Silty SAND	720	Sandy organic COBBLES
404	Gravelly SAND	721	Gravelly organic COBBLES
405	Cobbly SAND	725	COBBLES and BOULDERS
406	Bouldery SAND	730	BOULDERS
410	Clayey gravelly SAND	731	Gravelly cobbly BOULDERS
411	Clayey gravelly cobbly SAND	801	MUDSTONE
412	Silty gravelly SAND	802	SILTSTONE
413	Silty gravelly cobbly SAND	803	SANDSTONE
414	Silty gravelly cobbly bouldery SAND	804	LIMESTONE
415	Gravelly cobbly SAND	805	CHALK
416	Gravelly cobbly bouldery SAND	806	COAL
417	Gravelly bouldery SAND	807	BRECCIA
418	Cobbly bouldery SAND	808	CONGLOMERATE
430	SAND and GRAVEL	809	Fine grained IGNEOUS
431	Organic SAND	810	Medium grained IGNEOUS
433	Silty organic SAND	811	Course grained IGNEOUS
434	Gravelly organic SAND	812	Fine grained METAMORPHIC
435	Cobbly organic SAND	813	Course/medium grained METAMORPHIC (SCHIST)
436	Bouldery organic SAND	814	Pyroclastic (volcanic ash)
501	GRAVEL	815	Gypsum, Rocksalt
502	Clayey GRAVEL	892	Piezo Sand
503	Silty GRAVEL	893	Piezo Gravel
504	Sandy GRAVEL	988	Bentonite
505	Organic GRAVEL	989	Grout
506	Cobbly GRAVEL	990	Arisings
507	Bouldery GRAVEL		

Table J2: Geol_geol codes

Recent / Quaternary			
MG	Madeground	TOP	Topsoil
ALV	Alluvium	PEAT	Peat
HDD	Head deposits	CF	Clay with flints
SD	Slope deposits	BRK	Brickearth
RTD	River terrace deposits	GTD	Glacial till deposits
Palaeogene / Neogene			
NC	Norwich Crag	RC	Red Crag
BAR	Barton Beds	BKB	Bracklesham Beds
BAG	Bagshot Formation	CGM	Claygate Member
LC	London Clay Formation	HAR	Harwich Formation
LMG	Lambeth Group	USB	Upper Shelly Beds (Lambeth Group)
	Use LMG for whole group - or subdivide (UMB, LMB, USB, LSB, UP) if required.	UMB	Upper Mottled Beds (Lambeth Group)
		LSB	Lower Shelly Beds (Lambeth Group)
TS	Thanet Sand Formation	LMB	Lower Mottled Beds (Lambeth Group)
BUL	Bulhead Beds	UP	Upnor Formation (Lambeth Group)
Cretaceous			
UCHK	Upper Chalk	MCHK	Middle Chalk
LCHK	Lower Chalk	UGF	Upper Greensand Formation
GLT	Gault Formation	WOB	Woburn Sand Formation
LGF	Lower Greensand Formation	WLD	Wealden Group
Jurassic			
PUR	Purbeck Formation	PRT	Portland Formation
COR	Corrallian Group	KIM	Kimmeridge Clay Formation
AMP	Ampthill Clay Formation	OXF	Oxford Clay Formation
KEL	Kellaways Formation	GOG	Great Oolite Group
IOG	Inferior Oolite Group	LIA	Lias Group
Railway Definitions			
EFC	Embankment Fill - Cohesive	ASH	Ash
EFG	Embankment Fill - Granular	RB	Railway ballast
Others			
MM	Mercia Mudstone	SSB	Sherwood Sandstone, Bromsgrove Formation
SSW	Sherwood Sandstone, Wildmoor Formation	SSKD	Sherwood Sandstone, Kidderminster Formation
SSM	Sherwood Sandstone - Mudstone band	HPB	Hopwas Breccia

UCME	Upper Carboniferous - Enville Beds	UCMK	Upper Carboniferous - Keele Beds
UCMM	Upper Carboniferous - Etruria Marl		
CM-SS	Coal Measures - Sandstone / Siltstone	CM-MS	Coal Measures - Mudstone
CM-CO	Coal Measures - Coal seam	CM-MW	Coal Measures - Mine workings

Table J3: Geol_Geo2 codes

CL	Clay / cohesive	GR	Gravel
SL	Silt	CB	Cobbles
SD	Sand / Granular		
Where significant organic material is encountered, the prefix ORG shall be used, i.e. ORG-CL			

Table J4: Additions to AGSvs3 Abbr group

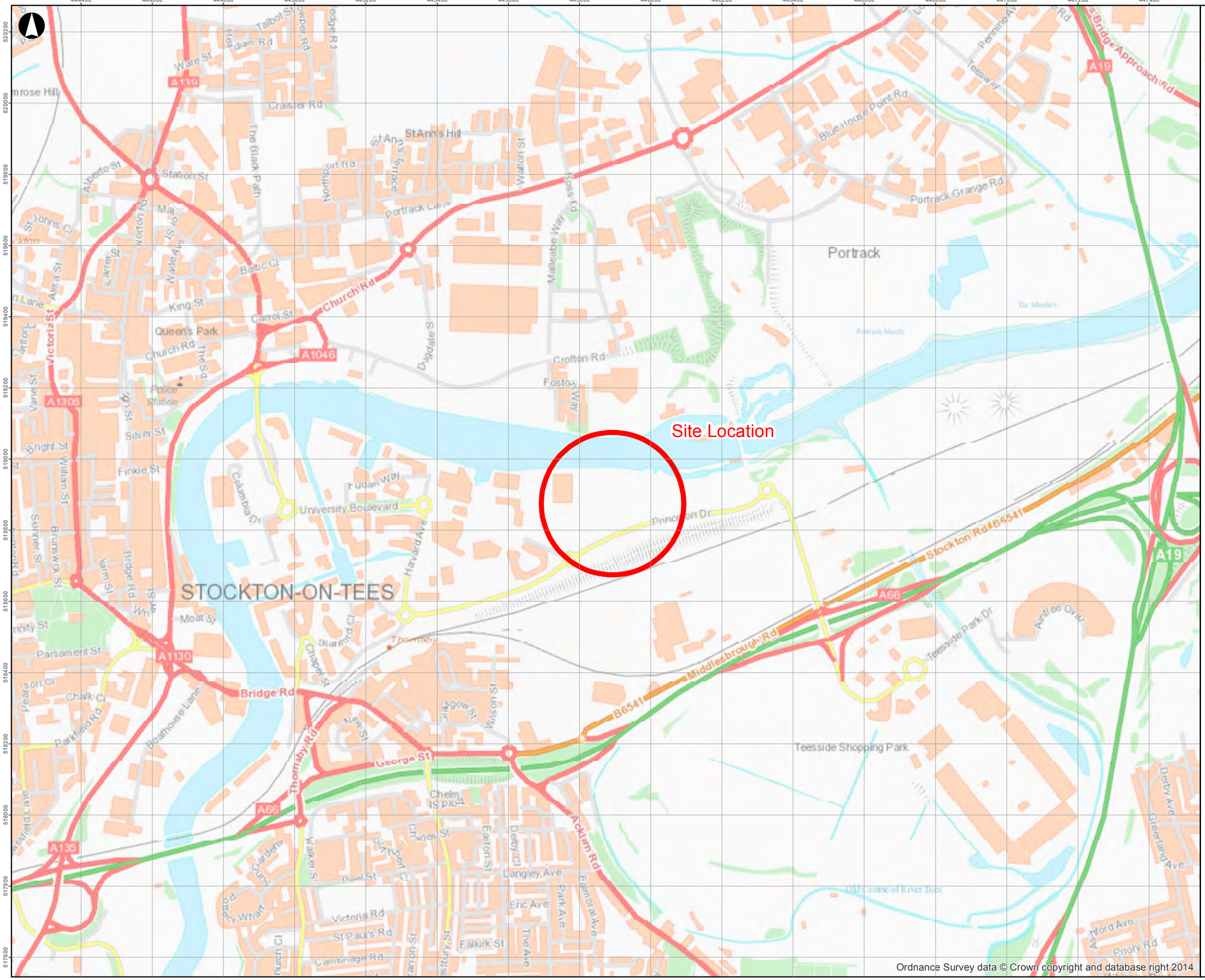
TT	Trial Trench	WS	Window Sample
J	Jar sample	CC	Concrete core hole
V	Vial sample	PM	Pressuremeter test hole

Table J5: Specified fields

Type DICT _TYPE	Group DICT _GRP	Heading DICT _HDNG	Status DICT _STAT	Description DICT _DESC	Units DICT _UNIT	Example DICT _EXMP	Calculation
HEADING	HOLE	HOLE _CHAN	COMMON	Line direction and chainage	m	M094/MSB 0560	
HEADING	HOLE	HOLE _OFST	COMMON	Offset from cess / outside rail	m	5	

Figures

A3



MXD Location

Legend

Site Location

06/11/2015 16:37:02

Issue	Date	By	Chkd	Appd
F1	2015-11-02	HB	HB	HB

Metres

0 135 270 540

ARUP

Central Square, Forth Street
Newcastle upon Tyne NE1 3PL
Tel +44 (0) 191 261 6080 Fax +44 (0) 191 261 7879
www.arup.com

Client

Homes and Communities Agency

Job Title

Stockton Events Car Park
- Ground Investigation

Site Location

Scale at A3

1:10,000

Job No	Drawing Status
242531-00	**For Issue**

Drawing No	Issue
1	**F1**

A3

Legend

Site Layout

06/11/2015 16:37:05

Issue	Date	By	Chkd	Appd
F1	2015-11-02	HB	HB	HB

Metres
0 30 60 120

ARUP

Central Square, Forth Street
Newcastle upon Tyne NE1 3PL
Tel +44 (0) 191 261 6080 Fax +44 (0) 191 261 7879
www.arup.com

Client

Homes and Communities Agency

Job Title

Stockton Events Car Park
- Ground Investigation

Site Layout

Scale at A3

1:2,500

Job No	Drawing Status
242531-00	**For Issue**

Drawing No	Issue
2	**F1**

MXD Location

A3

445800

446000

519000

518800

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

MXD Location

06/11/2015 16:37:10

Legend

Type

- Borehole
- Trial Pit
- Site Layout

Issue	Date	By	Chkd	Appd
F1	2015-11-02	HB	HB	HB

Metres

0 15 30 60

ARUP

Central Square, Forth Street
Newcastle upon Tyne NE1 3PL
Tel +44 (0) 191 261 6080 Fax +44 (0) 191 261 7879
www.arup.com

Client

Homes and Communities Agency

Job Title

Stockton Events Car Park - Ground Investigation

Indicative Exploratory Hole Location

Scale at A3

1:1,250

Job No	Drawing Status
242531-00	**For Issue**

Drawing No	Issue
3	**F1**