

# **REPORT ON A GROUND INVESTIGATION AT CHAPELTON, ABERDEENSHIRE (PHASE 1A)**

**Contract No. 9935167**

**ERS** *land regeneration*  
Westerhill Road  
Glasgow  
G64 2QH  
0141 772 2789  
[www.ersremediation.com](http://www.ersremediation.com)

**REPORT ON A**

**GROUND INVESTIGATION**

**AT**

**CHAPELTON, ABERDEENSHIRE (PHASE IA)**

**Employer:**

Elsick Development Company Ltd  
Estate Office  
Haughs of Kinnaird  
Brechin  
Angus  
DD9 6UA

**Consulting Engineer:**

Fairhurst  
Westerton of Craigie  
Southampton Road  
Dundee  
DD4 7PN

**Date of Issue:** 27 March 2013

**Contract No.:** 9935167

**Report Issue:** Final

*Fairhurst on behalf of Elswick Development Company Ltd commissioned ERS to undertake an intrusive ground investigation and prepare a factual report based on the findings, for a site known as Chapelton, Aberdeenshire.*

*This report has been prepared and written on behalf of Elswick Development Company Ltd in the context of the purpose stated above and should not be used in any other context. New information, improved practices and changes to legislation may necessitate an alteration to the report in whole or in part after its submission and, therefore, with any change in circumstances or after the expiry of one year from the date of the report, it should be referred to us for reassessment and, if necessary, amendment.*

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**Written By:**

A handwritten signature in black ink, appearing to be 'AB'.

**Date:** 27 March 2013

.....  
Andrew Biggerstaff BSc (Hons) FGS  
*Senior Engineering Geologist*

**Checked &  
Approved By:**

A handwritten signature in black ink, appearing to be 'CW'.

**Date:** 27 March 2013

.....  
Callum Whitelaw BSc (Hons) FGS  
*Senior Engineering Geologist*

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Infiltration Test Results
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Test Report No.(s)

In-situ CBR Results:

02/13/02-1; 02/13/02-2; 02/13/02-3

Laboratory Test Results:

13/075-01

APPENDIX E: GEOCHEMICAL RESULTS

Test Report No.(s)

312785-1; 312786-1; 314670-1;

316180-1; 316947-1; 319987-2

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## **1.0 INTRODUCTION**

ERS were commissioned by Fairhurst (The Engineer) acting on behalf of Elsieck Development Company Ltd (The Client) to undertake an intrusive ground investigation at Chapelton, Aberdeenshire. The investigation was required to obtain geotechnical and geoenvironmental information for the construction of 800 new dwelling houses and associated infrastructure (Phase 1A). The investigation comprised of ninety-four trial pits, fifty-one California Bearing Ratio (CBR) test positions, twelve infiltration tests and eighteen windowless sample borehole positions.

The intrusive fieldwork was carried out between 9 January and 6 February 2013. This report presents the factual records of the fieldwork and laboratory testing undertaken together with information on the subsurface ground and groundwater conditions encountered.

## **2.0 SCOPE OF INVESTIGATION**

The scope of the site investigation comprises the following:

1. To form exploratory holes on site
2. To install gas and groundwater monitoring installations
3. To undertake site monitoring and sampling
4. Undertake laboratory testing scheduled by the Engineer on samples recovered from exploratory holes

The sources of information used in the compilation of this report are detailed in the list of references on page 6.



### **3.0 THE SITE AND GEOLOGY**

#### **3.1 Site Location and Setting**

The site is located to the west of the A90 between Newtonhill and Portlethen and is identified as Phase 1A of the development. The site is irregular in shape and is located within a rural setting with associated steadings and dwelling houses. A substation is present to the north east of the site. The location of a proposed rising main extends further to the north and north east of the site. The location of the main development site and rising main route is presented on Figure A1 within Appendix A.

#### **3.2 Published Geology**

The published geological map covering the site Sheet 67 Stonehaven (1:50 000), shows superficial deposits of the Banchory Till Formation comprising of stiff, stony sandy clayey diamicton with clasts of Dalradian and Highland Border Complex metamorphic rocks and Caledonian Igneous rocks. Locally to the south of the site there are alluvial superficial deposits comprising of clay, silt, sand and gravel.

The underlying solid geology comprises of the Aberdeen Formation semi-pelite biotite-rich coarsely bedded with inter-bedded micaceous and feldspathic psammite. Additionally there are known local outcrops of the Glen Effock Schist Formation.

#### **3.3 Previous Investigations**

No other information was available at the time of writing this report.



## **4.0 FIELDWORK**

### **4.1 General**

The scope of the fieldwork was specified by the Engineer and was undertaken in general accordance with BS EN 1997-2:(2007) and its related technical standards together with the relevant sections of BS5930:(1999 +A2:2010) and ERS' own in-house procedures. Where applicable, ERS conducts all ground investigations in accordance with BS 10175:(2011).

ERS set out all exploratory holes and the Engineer determined all in-situ testing and sampling strategies employed to suit the requirements of this investigation. Trial Pits, Infiltration Pits and CBR pits were formed together with Windowless Sample Boreholes. The co-ordinates and reduced levels were surveyed by ERS to National Grid and Ordnance Datum. The trial pit, infiltration pit, CBR pits and windowless sample borehole positions are shown on the site plan given in Appendix A.

Representative disturbed samples of all materials encountered were obtained and placed in sealed containers. Geotechnical samples were transported to ERS' storeroom for temporary retention and testing whilst geoenvironmental samples were transported from site directly to SAL Limited.

The soil samples recovered from the trial pits, CBR pits, infiltration pits and boreholes were described by an Engineering Geologist in accordance with BS EN ISO 14688-1:(2002) and BS EN ISO 14688-2:(2004). The detailed description of all strata encountered, groundwater conditions and the position and type of samples taken and the volatile concentrations recorded are included on the trial pit and borehole logs contained in Appendix B.

### **4.2 Inspection Pits**

It is ERS policy to hand excavate an inspection pit to 1.20m below ground level in order to ascertain the absence of underground services at the location of each exploratory borehole. The base of each pit was scanned using a cable avoidance tool (CAT).

### **4.3 Trial Pits**

Ninety trial pits (Nos. TP01 to TP90) were excavated employing a mechanical excavator to depths between 0.38mbgl and 3.40mbgl. The locations of the trial pits were predetermined by The Engineer to provide a reasonable indication of the presence of any made ground and in particular, to assess the mass soil fabric of the near surface deposits in addition to assessing potential soil and groundwater contamination. An additional seven trial pits (Nos. QTP01 to QTP07) were also excavated to depths between 0.30mbgl and 1.30mbgl to provide information on the existing bedrock profile. The trial pits were not shored and were logged from the surface by an Engineering Geologist.

Photographs of the trial pit excavations are presented in Appendix F of this report.

Fifteen trial pits (Nos. CBR01, CBR03, CBR05, CBR07, CBR09, CBR11, CBR13, CBR15, CBR17, CBR19, CBR21, CBR23, CBR25 & CBR29) were mechanically excavated employing a JCB type backhoe excavator to depths between 0.50mbgl and 1.00mbgl. The locations of the trial pits were predetermined by The Engineer to obtain samples for UKWIR and CBR (California Bearing Ratio) testing.

### **4.4 Windowless Sample Boreholes**

Eighteen boreholes (Nos. WBH01 to WBH18) were formed to depths between 0.50mbgl and 3.80mbgl employing conventional light hydraulic percussive techniques together with 128mm diameter temporary steel casings. These are presented as a summary in Appendix B of this report. The boreholes were sunk in order to obtain samples for laboratory testing and to provide geotechnical information for foundation design. Boreholes WBH04 to WBH18 were used for the installation of gas and groundwater monitoring wells.

Standard Penetration Tests (SPT) were carried out using either a split spoon sampler or a solid 60° cone, depending on the material encountered. The results of these tests are given as a Standard Penetration "N" value or as a blow count for a given penetration at the appropriate position on the borehole logs, where the use of either the sampler or cone is also recorded.

#### **4.5 Installation/Instrumentation**

WBH04 to WBH18 were installed with 50mm diameter HDPE pipe. The Engineer provided installation instructions for all boreholes on completion of drilling operations to the predetermined depth. Each installation included a lower section of slotted pipe surrounded by pea gravel and an upper section comprising solid pipe surrounded by a bentonite seal. A metal upstand cover was concreted into place on each of the installations and a plastic cap with a valve was placed onto each pipe to facilitate long term groundwater and gas monitoring. A schematic indication of each installation is shown on the relevant borehole log given in Appendix B.



## **5.0 SITE MONITORING & TESTING**

### **5.1 PID Analysis**

In addition, sealed plastic bags of soil samples recovered from the borehole positions were screened for Volatile Organic Compounds (VOC`s) utilizing a Photo-Ionization Detector (PID) during the ground investigation. The headspace within these samples were analysed for the presence of volatiles in accordance with CIRIA C682:2009. The results are presented within the borehole logs in Appendix B of this report.

### **5.2 Groundwater Sampling**

Groundwater sampling was undertaken on 12 February and 13 February 2013 by a qualified ERS engineer in accordance with BS 10175 and BS 6068. All boreholes were purged utilising a 12v submersible pump and sampled using a peristaltic pump. The purging and sampling results are presented in Appendix C of this report.

### **5.3 Ground Gas & Groundwater Monitoring**

Ground gas and groundwater monitoring was undertaken on three visits between 29 January and 26 February 2013. The monitoring was undertaken by The Engineer. The results are presented in Appendix C of this report.

### **5.4 In-situ California Bearing Ratio Testing (CBR)**

Thirty-six trial pit positions were utilised for in-situ CBR testing. These were CBR02, CBR04, CBR06, CBR08, CBR10, CBR12, CBR14, CBR16, CBR18, CBR20, CBR22, CBR24, CBR26, CBR28 and CBR30 to CBR51 at various depths. The results are presented within Appendix D of this report.

## 5.5 Infiltration Testing

Infiltration testing was carried out in thirteen positions (Nos SA01 to SA13) at depths between 1.00mbgl to 1.60mbgl. This was carried out in accordance with BRE Digest 365 and the results presented in Appendix C of this report.

## 6.0 LABORATORY TESTING

### 6.1 Scope of Testing

All geotechnical (soils) and chemical (contamination) testing was scheduled by the Engineer. The scope of the testing was required to enable comments regarding foundation design to be made and for potential site contamination levels, to be established.

### 6.2 Geotechnical Testing

The programme of laboratory testing was carried out in accordance with BS 1377. Testing was carried out at MatTest geotechnical testing laboratories in Shotts.

The tests listed below were carried out and the results are given on the summary sheets with individual test plots presented in Appendix D of this report.

B.S. TEST NO.	DESCRIPTION
<i>Part 2:3</i>	Moisture Content
<i>Part 2:4,5</i>	Atterberg Limits
<i>Part 2:9</i>	Particle Size Distribution
<i>Part 3:5 &amp; 9</i>	Sulphate Content and pH Value
<i>Part 4: 3</i>	Compaction Test
<i>Part 9</i>	California Bearing Ratio Test

### **6.3 Geochemical Testing**

The Engineer was responsible for the scheduling of all chemical analysis in order to assess the levels of potential contamination on the site. A total of 17 soil samples and 1 water sample were sent to Scientific Analytical Laboratories (SAL) and tested for a suite of UKAS accredited tests.

The Test Reports are included in Appendix E of this report.

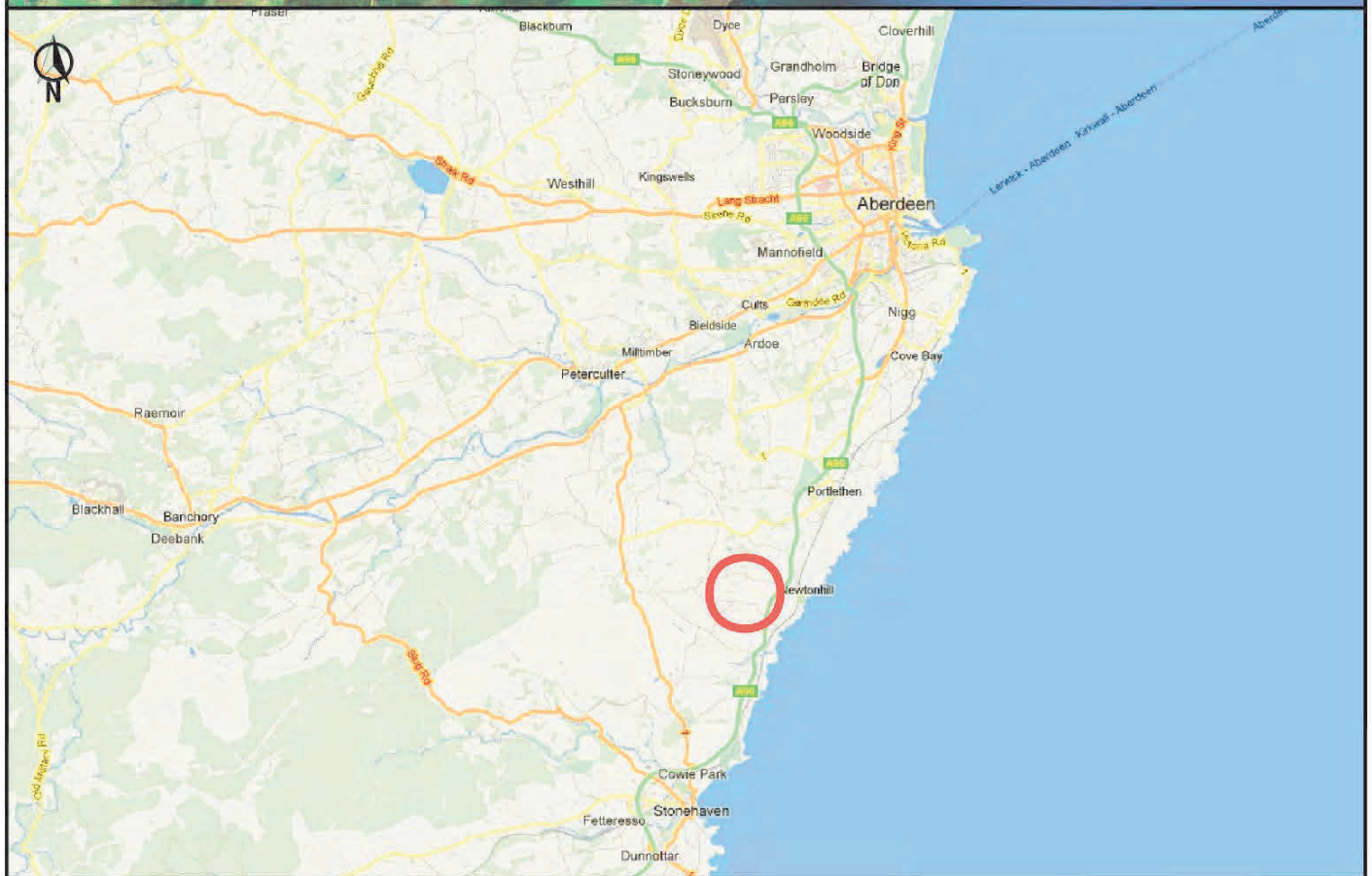


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2. BS 5930:(1999+A2:2010) Code of Practice for Site Investigation. British Standards Institution.
3. BS 10175:(2011) Code of Practice for Investigation of Potentially Contaminated Sites. British Standards Institution.
4. BS EN ISO 14688-1:(2002) Geotechnical Investigation and Testing – Identification and Classification of Soil - Part 1: Identification and Description. British Standards Institution.
5. BS EN ISO 14688-2:(2004) Geotechnical Investigation and Testing – Identification and Classification of Soil – Part 2: Principles for a Classification. British Standards Institution.
6. CIRIA C682:2009 The VOC's Handbook Investigations, Assessing & Managing Risks from Inhalation of VOC's at Land Affected by Contamination.
7. BS 6068: 1993: Guidance on Sampling of Groundwater. British Standards Institution.
8. BRE Digest 365: Soakaway Design
9. BS 1377:1990 Methods of Test for Soils for Civil Engineering Purposes

# **APPENDIX A**

## **Site Plans**



www.ersremediation.com

Glasgow Head Office  
Westhill Road  
Bishopbriggs  
Glasgow  
G64 2QH  
Tel: 0141 772 2789  
Fax: 0141 762 0212

Inverness Office  
23 Henderson Drive  
Inverness  
IV1 1TR  
Tel: 01463 241 222  
Fax: 0141 762 0212



Legend



Site Location Plan



Rising Main Location  
(See Fig A3)

Drawing Title

Site Location Plan

Project Name

Elsick, Aberdeen

Project#

9935167

Drawn By

MMc

App'd By

AB

Scales

NTS @ A4

Date

26/02/2013

Drawing Number

2119





**Legend**

- LOCATION OF TRIAL PIT
- LOCATION OF EX-SITU CBR SAMPLE
- LOCATION OF EX-SITU CBR SAMPLE + UNWR Sample
- LOCATION OF IN-SITU CBR TEST
- LOCATION OF BOREHOLE
- LOCATION OF INFILTRATION TEST

REV	DATE	DETAIL

Project Name  
**Chapelton, Newtonhill**

Project#9955167

Drawing Title  
**Figure A2,  
Borehole and Trial Pit  
Location Plan**

Drawing Number  
**2120.1**

Drawn By  
**MMc**

App'd By  
**PA**

Scale  
**1:5000 @ A3**

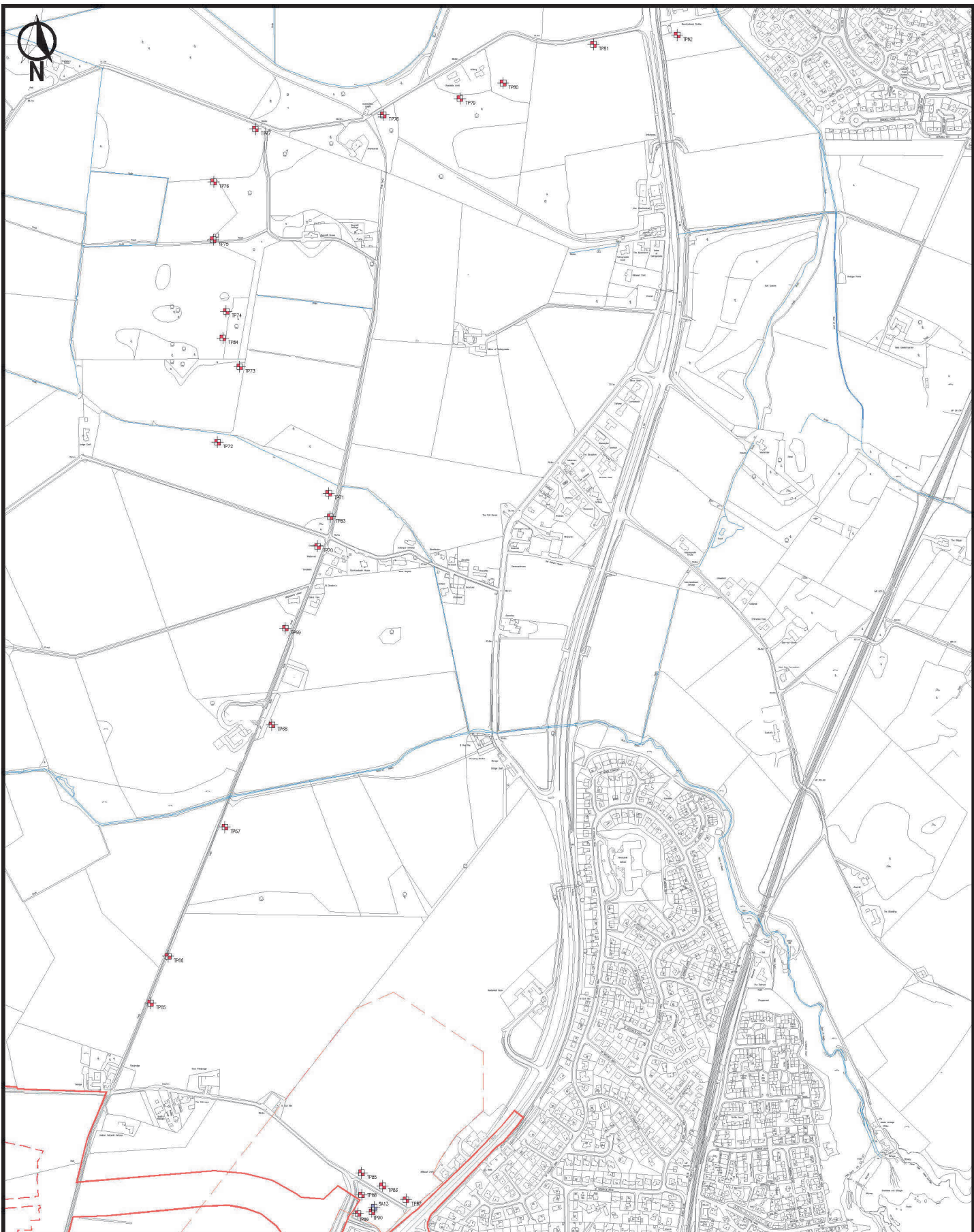
Date  
**27/03/2013**

www.arsremediation.com

Glasgow Head Office  
Wendell Road  
Broomhall  
Glasgow  
G84 2QH  
Tel:0141 772 2799  
Fax:0141 752 0212

Inverness Office  
23 Henderson Drive  
Inverness  
IV1 1TR  
Tel:01463 241 222  
Fax:0141 752 0212

**ers**



www.ersremediation.com

Glasgow Head Office  
Westerhill Road  
Bishopbriggs  
Glasgow  
G64 2QH  
Tel:0141 722 2789  
Fax:0141 782 0212

Inverness Office  
23 Henderson Drive  
Inverness  
IV1 1TR  
Tel:01463 241 222  
Fax:0141 782 0212



LOCATION OF TRIAL PIT

Legend

Drawing Title

Figure A3,  
Trial Pit Location Plan

Project Name

Chapelton, Newtonhill

Project#

9935167

Drawn By

MMc

App'd By

PA

Scales

NTS @ A3

Date

27/03/2013

Drawing Number

2120.2