ARP GEOTECHNICAL LTD
CHARTERED CONSULTING ENGINEERS

STAGE 2 GEO-ENVIRONMENTAL REPORT

AT

STATION ROAD
BARNSLEY

ON BEHALF OF

AIRES TRADING LTD

DECEMBER 2013

Report No: ATR/01r1	Name	Signature	Date
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C O N T E N T S

1.0 EXECUTIVE SUMMARY

The pertinent information obtained during the investigation is tabulated below.

Proposed Development	Residential dwellings with private gardens.
Existing Site Description	Undeveloped land covered with rough grass and sporadic bushes and trees.
Site History	No prior development. Old quarry along southwestern margin of site.
Geology	Mexborough Rock (sandstone) of the Pennine Middle Coal Measures.
Coal Mining	Site can be considered stable.
Hydrogeology	Site underlain by Secondary A Aquifer. No abstractions within 1km.
Hydrology	Nearest watercourse is a drain, 110m to west. No abstractions within 1km. Site is not at risk of river flooding.
Radon	Basic radon protection measures required.
Landfill Gas	Monitoring ongoing due to presence of landfills/made ground.
Ground Conditions	Natural gravelly sands and cobbly gravels of weathered sandstone, overlying sandstone bedrock.
Contamination	No made ground encountered and no contamination detected. If any suspect material is found during development works, it should be tested for a suite of contaminants.
Foundations	Traditional strip/trench fill foundations should be acceptable.
Excavations	Faces remained stable throughout, no groundwater seepages encountered. Hard rock possibly present as shallow as 1.0m in some areas. Excavation may require a breaker.
Concrete	GEN 1 designation for unreinforced foundations.

2.0 TERMS OF REFERENCE

2.1 Aires Trading Ltd are considering developing the site at Station Road, Barnsley with 30No. residential properties and private gardens. It was considered appropriate to provide information to aid viability assessment and design of any subsequent development. In August 2010, RSK STATS Geoconsult Limited (RSK) issued a Preliminary Risk Assessment Report (Reference 350064-R01 (00)). This involved an assessment of the geological and coal mining aspects, Ordnance Survey archive maps, radon gas, indicative flood risk, hydrogeology, landfill, and other environmental issues, primarily by assessment of a Landmark Envirocheck Report. The report recommended intrusive investigation and assessment.

2.2 In November 2013, ARP Geotechnical Ltd were appointed by Aires Trading Ltd to undertake the recommended investigation, and this comprised trial pits and windowless sample boreholes to assess the subsoil conditions.

2.3 The investigation was implemented generally in accordance with BS 5930 : 1999 "Code of practice for site investigations", NHBC Standard Chapter 4.1 "Land quality - managing ground conditions", Environment Agency CLR 11 "Model Procedures for the Management of Land Contamination" and BS10175 : 2011 "Code of practice - investigation of potentially contaminated sites". This report is limited to the data obtained. It should be noted that there is a possibility of variation in ground conditions between test locations and interpretation of strata is given for guidance only. No liability is accepted for changes to site conditions after the preparation of this report.

2.4 The findings or contents of the RSK Report are not reproduced here. However, it is recommended that this report is read in conjunction with the RSK Report.

2.5 The general observation and assessment of the ground surface, and the identification/classification of vegetation is made in general terms only. It would be prudent for a specialist arboriculturist to undertake a more detailed survey.

2.6 The assessment of any topsoil is carried out in terms of potential chemical effects on human health only, and no account is taken of aesthetic or horticultural properties. Such considerations should be referred to a horticulturist or landscape architect.

2.7 The Stage 2 investigation was carried out in November and December 2013.

2.8 The report has been prepared for the sole use and reliance of the Client. The report shall not be relied upon or transferred to any other parties without the written agreement of ARP Geotechnical Ltd. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

3.0 THE SITE

Site Location

3.1 The site, which is centred on Ordnance Survey Grid Reference 435940, 412140, is located off Station Road, in Barnsley, and is an irregularly shaped piece of land extending to an area of approximately 1Ha. A site location plan and site plan are presented in Appendix A.

Site Description

3.2 The site is currently an undeveloped piece of land covered with rough grass and sporadic small to large sized bushes, across the site and its boundaries, and small to medium trees along the northeastern and southwestern boundaries. Towards the northwestern corner, there are dense medium to large trees and bushes. The site is bounded to the northeast by agricultural fields and to the southeast by new residential properties. The western boundary is formed by an embankment which slopes down to Station Road, approximately 3-4 metres lower than the site. To the northwest, there is a single residential property. The site and surrounding area slopes to the northwest.

Site History

3.3 Ordnance Survey archive maps show the southwestern margin has previously been quarried, prior to 1854. This area, along with the southwestern boundary, are later shown as an embankment from 1976 onwards. The rest of the site has remained undeveloped.

3.4 There is no indication of any potentially contaminating use of the site. However, there is the possibility that contamination may be present in any fill material used as backfill on the southwestern corner.

4.0 ENVIRONMENTAL SETTING

Geology

4.1 The geological maps show the site to be underlain by Mexborough Rock (sandstone) of the Pennine Middle Coal Measures. A fault is shown to cross the site in a northeast southwest direction, with the down throw to the southeast. An area of made ground is shown to underlie a strip of land within the southeastern boundary.

Coal Mining and Coal Recovery

4.2 The Coal Mining Report indicates the site is stable with regard to coal mining. Any coal present beneath the site is at significant depth, beneath the sandstone. Therefore, there will be no arisings of coal during proposed development works, and it will not be possible to win any coal from the site by excavation before development.

Hydrogeology

4.3 The Landmark Envirocheck Report indicates the Bedrock Aquifer Designation to be a "Secondary A" Aquifer. These Aquifers comprise "permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers".

4.4 The soils overlying the site are automatically classed as High Leaching Potential, due to the urban nature of the area. However, actual Leaching Potential will be dependent on the specific ground conditions found on the site.

4.5 There are no groundwater abstractions within 1km of the site.

4.6 The site is not within a groundwater Source Protection Zone.

Hydrology

4.7 There are no watercourses on or adjacent to the site. The nearest watercourse downslope is a drain, at 110m to the west. A small area of marshland is located 105m to the north. Any surface water run-off, which is not intercepted by drainage, is likely to eventually reach road drainage on Station Road to the west. The site is not within an area at risk from river flooding.

4.8 There are no surface water abstractions within 1km of the site.

Other Relevant Environmental Data

4. 9 There are no closed or currently licensed landfills within 250m of the site. However, there is an old infilled quarry on the southwestern margins of the site, and an area of made ground covering a strip of land within the southeastern boundary. These may be a source of gas generation and soil contaminants.

4. 10 The Desk Study Report by RSK indicates that basic radon protection is required for the site.

Potential Contamination Sources

4.11 The following potential sources of contamination were identified in the Tier 1 Desk Study Report

4.11.1 Possible made ground – metals, inorganics, TPH, PAH, phenol, asbestos .

4.11.2 Landfill gas.

5.0 SITE INVESTIGATION

5.1 The purpose of the investigation undertaken on 22nd November 2013 was to produce an assessment of the site in accordance with BS10175 : 2011 "Code of practice - investigation of potentially contaminated sites", and to provide geotechnical information to aid design of the development.

5.2 The site was gridded on a maximum 25m spacing and trial pits and windowless sample boreholes were sampled on the grid, along with any targeted locations. 9No. trial pits were excavated, to depths of between 1.1m and 2.1m (TP1 to TP9) and 5No. windowless sample boreholes, to depths of between 1.0m and 2.0m (WS1 to WS5). The trial pits and boreholes were organised, supervised and logged by an Engineer from ARP Geotechnical Ltd. Justifications for the trial pit locations are given below.

LOCATION	REASON
TP1, TP6, TP8, and TP9	Part of grid and targeting areas of suspected made ground.
TP2, TP3, TP4, TP5, TP7	Part of grid.
WS1, WS2 and WS3	Part of grid and targeting areas of suspected made ground. Installation of gas wells for monitoring.
WS4, WS5	Part of grid. Installation of gas well in WS5 for monitoring.

5.3 4No. gas monitoring wells were installed in WS1, WS2, WS3 and WS5, and subsequently monitored by ARP Geotechnical Ltd. The wells were installed to between 1.0m and 2.0m depth, with the bottom half comprising slotted pipe with gravel surround, and the upper half comprising plain pipe with bentonite seal and lockable flush cover.

5.4 Standard Penetration Tests (SPT's) were carried out at one metre intervals within WS1 to WS5 in order to give an indication of ground density.

5.5 The trial pit and borehole logs are included in Appendix B, along with the location plan.

5.6 6No. percolation tests were carried out in TP1, TP2 and TP3. The test readings, curves and calculation are included in Appendix C.

5.7 Chemical analysis of 13No. soil samples for metals, inorganics, speciated PAH, TPH, phenols, and asbestos was undertaken by the UKAS accredited Derwentside Environmental Testing Services in Consett. The test certificates are included in Appendix D.

5.8 Analysis for pH and water soluble sulphate was also undertaken by the UKAS accredited Derwentside Environmental Testing Services in Consett. The test certificates are included in Appendix D.

6.0 SUMMARY OF GROUND CONDITIONS

Strata and Groundwater

6.1 All trial pit and borehole locations were covered by rough grass. A summary of the materials encountered, and the relevant depths, is presented below.

Location:	**TP1**	**TP2**	**TP3**	**TP4**	**TP5**	**TP6**	**TP7**	**TP8**	**TP9**	**WS1**	**WS2**	**WS3**	**WS4**	**WS5**
Topsoil to:	0.4	0.5	0.2	0.2	0.35	0.3	0.2	0.15	0.4	0.2	0.2	0.25	0.4	0.45
Brown gravelly SAND to:	0.8	-	0.5	-	-	-	1.5	1.1	-	0.6	0.5	1.5	0.9	1.4
Light brown cobbly GRAVEL to:	1.6	1.2	1.85	1.1	1.8	0.8	1.8	-	1.1	1.0	1.0	-	1.5	2.0
SANDSTONE to:	1.8	1.9	-	1.5	2.1	1.1	2.1	1.2	1.3	-		-	-	-
Seepages from:	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
Impenetrable at base?	Y	Y	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Stable Faces?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

6.2 There was no indication of the suspected made ground. It is possible that the extent of the made ground to the southeast, shown on geology maps, was recorded into the site as a conservative buffer, and the material may not actually encroach onto the site. The suspected made ground on the southwestern margin may be confined to the embankment slope, which was not accessible during the investigation.

6.3 The granular content of the gravelly sand and sandy gravel was angular, sometimes tabular, and comprised sandstone. The excavations generally remained stable for the short period of exposure and the pits were backfilled with the arisings on completion. No groundwater seepages were encountered in any of the trial pits or boreholes.

Gas Assessment

6.4 Gas monitoring and assessment was carried out in accordance with BS 8485 : 2007 "Code of practice for the characterization and remediation from ground gas in affected developments".

6.5 The monitoring carried out on 1No. occasion to date, showed no methane (CH_4) to be present, a maximum carbon dioxide (CO_2) concentration of 0.1%, and a maximum 0.4 l/hr flow rate. However, a further 5No. visits, over a two month period, are still to be carried out, and the full results will be reported by separate letter.

6.6 The British Standard utilises the concept of hazardous gas flow rates (Q_{hg}), in litres per hour, which are obtained by multiplying the borehole flow rate by the concentration in the air stream of the particular gas being considered. Table 1 in Section 6.3 of the Standard allows the selection of a "Characteristic Gas Situation" based on the hazardous gas flow rates, using a numbering system of 1 to 6, where 1 equates to a very low hazard potential and 6 equates to a very high hazard potential.

6.7 A table showing the Characteristic Gas Situations is identified below.

Characteristic Gas Situation	Hazard Potential	Site Characteristic Hazardous Gas Flow Rate, Q_{hgs} (l/hr)	Additional Factors
1	Very Low	<0.07	Typically <1% CH_4 and <5% CO_2, otherwise consider an increased Characteristic Gas Regime
2	Low	>0.07, <0.7	Typical Measured Flow Rate <70l/hr, otherwise consider an increased Characteristic Gas Regime
3	Moderate	>0.7, <3.5	
4	Moderate to high	>3.5, <15	
5	High	>15, <70	
6	Very High	>70	

6.8 Therefore, for the gas regime identified on the site, where zero CH_4 and 0.1% CO_2 were detected, along with zero borehole flow rate, a negligible Q_{hg} is the result. This equates to a Characteristic Gas Situation of 1.

6.9 A Characteristic Gas Situation of 1 requires no special precautions.

Percolation Testing

6.10 Percolation testing was implemented in TP1, TP2 and TP3 using an approximate 1,500 gallon tractor-towed water bowser to discharge water quickly into each hole. The commission was to monitor the water levels for a period until either the level had fallen to below 25% of the maximum filled level, or when the end of the working day had been reached. If time permitted, a further two tests were to be carried out in each pit. In TP2 and TP3 pits, 3No. tests and 2No. tests respectively were successfully carried out. Only 1No. test was possible in TP1.

6.11 The water levels fell by up to 0.3m in TP1, 0.72m in TP2 and 0.87m in TP3, over periods of 120 minutes, 50 minutes, and 70 minutes respectively. The results have been calculated generally in accordance with BRE Digest 365 "Soakaway Design", and reveal

infiltration rates up to 1.22 x 10^{-5} m/s, 6.45 x 10^{-5} m/s, and 6.43 x 10^{-5} m/s in TP1, TP2 and TP3 respectively.

6.12 In the light of the above rates, it is possible that disposal of surface water by soakaway drainage will be feasible on the site, subject to the extent of the impermeable areas and the size of soakaway.

7.0 CONTAMINATION ANALYSIS

Screening Values - Soils

7.1 Where possible, a Soil Guideline Value (SGV), derived from the DEFRA "CLEA" Contaminated Land Exposure Model, has been used for the Screening Value. The SGVs provide intervention values for assessing the degree of contamination. The determinands for which an official SGV currently exists are:- arsenic, cadmium, mercury, nickel, selenium, phenol, BTEX (benzene, toluene, ethylbenzene, o-xylene, m-xylene, p-xylene), and the sum of dioxins, furans and dioxin-like PCBs. Some of the organic determinands are not included within our testing suite unless a specific need has been identified by the desk study. In the absence of a current SGV, values have been used from the document published by Land Quality Management / Chartered Institute of Environmental Health: "Generic Assessment Criteria for Human Health Risk Assessment", 2009 (LQM/CIEH). Values in the document are considered to be a conservative first stage screening tool. The CIEH screening values for phenol have been used in preference to the published SGV, as they are lower (more conservative) and have been calculated for soil organic matter contents of 1% and 2.5%, as well as 6%.

7.2 For lead, there is no current SGV or LQM/CIEH value. An SGV was once issued, but has since been withdrawn, and in the absence of any other suitable guidance, the old lead SGV is used as a screening value in this report.

7.3 A table showing the screening values utilised is included in Appendix D.

Soils Analysis

7.4 13No. soil samples of topsoil (no made ground was encountered on the site) were issued to the UKAS accredited Derwentside Environmental Testing Services in Consett for the suite of testing. The results are included in Appendix D.

7.5 Comparison of all the results against the relevant screening values reveals all the determinands to be below the relevant values for residential use. It is, therefore, concluded that the site is free of contamination and the soils are suitable for re-use on the proposed residential development.

8.0 UPDATED RISK ASSESSMENT AND CONCEPTUAL MODEL

8.1 The conceptual model can be updated to take account of the findings of the site investigation and laboratory tests. The main refinements are given below:-

8.1.1 There was no indication of the suspected made ground on the site. It is possible that the extent of the made ground to the southeast, shown on geology maps, was recorded into the site as a conservative buffer, and the material may not actually encroach onto the site. The suspected made ground on the southwestern margin may be confined to the embankment slope, which was not accessible during the investigation.

8.1.2 The site is underlain by up to 0.5m thickness of topsoil, overlying sand and gravel of weathered sandstone overlying Mexborough Rock sandstone.

8.1.3 The site is underlain by a Secondary A Aquifer and the soils are of High Leaching Potential. The nearest surface water is a drain 110m to the west. There are no surface water or groundwater abstractions within 1km of the site.

8.1.4 The topsoil was found to be uncontaminated, and suitable for re-use on the proposed residential development.

8.2 It is concluded there are no sources of contamination on the site, and there is no requirement for remediation of further risk assessment.

9.0 GEOTECHNICAL TESTING

9.1 Selected samples of the natural strata were delivered to the UKAS accredited Derwentside Environmental Testing Services in Consett for testing with regard to sulphate and pH. Laboratory test certificates are presented in Appendix D and a summary of the results, with some additional information, is given below.

Trial Pit	Depth (m)	Stratum	SO_4	pH
TP1 D2	0.8-1.2	GRAVEL	10	7.2
TP2 D2	0.5-1.2	GRAVEL	13	6.6
TP4 D2	1.1-1.5	SANDSTONE	10	7.2
TP8 D2	0.5-1.0	SAND	12	7.3
TP9 D2	0.5-1.0	GRAVEL	10	8.3
WS4 D2	0.4-0.9	SAND	10	7.7

MC = Moisture Content % LL = Liquid Limit % PL = Plastic Limit %
PI = Plasticity Index I'p= Modified Plasticity Index (PI x % < 425µm sieve/100)
SO_4 = Sulphate content in mg/l on a 2:1 water : soil extract pH = Acidity

9.2 The chemical analyses show the natural strata to have low sulphate content and slightly alkaline pH. In accordance with the BRE Special Digest 1 "Concrete in aggressive ground", the Aggressive Chemical Environment for Concrete (ACEC) class is AC-1.

10.0 COMMENT AND CONCLUSION

Site Description

10.1 The site is currently an undeveloped piece of land covered with rough grass and sporadic small to large sized bushes, across the site and its boundaries, and small to medium trees along the northeastern and southwestern boundaries. Towards the northwestern corner, there are dense medium to large trees and bushes. The site is bounded to the northeast by agricultural fields and to the southeast by new residential properties. The western boundary is formed by an embankment which slopes down to Station Road, approximately 3-4 metres lower than the site. To the northwest, there is a single residential property. The site and surrounding area slopes to the northwest.

Site History

10.2 Ordnance Survey archive maps show the southwestern corner has previously been quarried prior to 1854. This area, along with the southwestern boundary, are later shown as an embankment from 1976 onwards. The rest of the site has remained undeveloped.

Geological Map

10.3 The geological map shows the site to be underlain by Mexborough Rock (sandstone) of the Pennine Middle Coal Measures. A fault is shown to cross the site in a northeast to southwest direction, with the down throw to the southeast. An area of made ground is shown to underlie a strip of land within the southeastern boundary.

Coal Mining and Coal Recovery

10.4 The Coal Mining Report indicates the site is stable with regard to coal mining. Any coal present beneath the site is at significant depth, beneath the sandstone. Therefore, there will be no arisings of coal during proposed development works, and it will not be possible to win any coal from the site by excavation before development.

Environmental Data

10.5 The strata beneath the site are classed as a Secondary A Aquifer. There are no groundwater abstractions within 1km of the site.

10.6 The nearest surface water is a drain, approximately 110m to the west. However, there are no surface water abstractions within 1km of the site.

10.7 The Desk Study Report by RSK indicates that basic radon protection is required for the site. This is usually achieved by incorporating an appropriate barrier within a solid floor system, lapping through the cavity wall.

10.8 There are no landfills within 250m of the site. There is, however, an area of made ground to the southeast, which is shown to encroach onto the site (although none was found during the investigation), and an old backfilled quarry along the southwestern margin of the site (probably on the embankment slope, which was inaccessible). Gas monitoring to date has identified no carbon dioxide, no methane, and zero flow rate, and based on these results, no special precautions will be required. However, this will be confirmed by separate letter report on completion of monitoring.

10.9 The site is not within an area at risk from river flooding. The risks of flooding from other causes such as adverse topography or insufficient surface water drainage, are not considered here, and a separate specialist Flood Risk and Drainage Report should be commissioned if such risk needs to be quantified.

Ground Conditions Encountered

10.10 The ground investigation revealed no indication of the suspected made ground.

10.11 A covering of topsoil was present across the site, to depths of between 0.2m and 0.5m. Underlying the topsoil, natural gravelly sand and cobbly gravel of weathered sandstone was encountered down to depths of between 0.8m and 2.1m. Beneath, intact sandstone

bedrock was present, which became too difficult to penetrate at depths of between 1.0m and 2.1m. TP3 was halted before rock was reached.

10.12 No groundwater seepages were encountered in any of the trial pits or boreholes, and remained stable throughout.

Contamination Assessment

10.13 There is no evidence of any previous development on the site, no made ground was encountered during the investigation, and laboratory testing on the samples of topsoil identified no contamination to be present. The soils on the site are, therefore, considered environmentally suitable for residential use. However, if any soils are encountered, during site works, which are suspected of being contaminated, then work on the material should cease and samples should be taken for testing for a suite of contaminants.

Foundations

10.14 The natural sands and gravel of weathered sandstone are considered suitable to provide support for traditional strip/trench fill foundations. An allowable bearing pressure of 100kN/m² is considered applicable. The underlying solid sandstone, encountered from depths as shallow as 0.8m, should provide an allowable bearing pressure of 250kN/m².

10.15 The founding strata are non plastic, and, therefore, the minimum foundation depths given in NHBC Standard Chapter 4.2 "Building Near Trees" do not apply. However, to protect against fines washing subsidence in the event of a burst water supply pipe, it is recommended that a foundation depth of 0.9m, or rock head, is adopted for the site, whichever is shallower.

10.16 The whole plan area of the foundation should be placed on similar material. If bedrock is encountered on part of a foundation excavation, the rest of the plot should be deepened to ensure founding on similar material. The foundation should also be taken below the depth of any existing foundations or obstructions, onto natural ground.

Excavations

10.17 Excavation faces within the natural material can be expected to be stable in the short term, requiring minimum statutory support.

10.18 No groundwater seepages were recorded in any of the trial pits or boreholes.

10.19 Excavations should be readily achieved using conventional hydraulic plant. However, excavations into intact bedrock may require the use of a hydraulic breaker.

Chemical Precautions

10.20 The Aggressive Chemical Environment for Concrete (ACEC) class is AC-1 for the natural strata. Therefore, the use of GEN 1 designated concrete will be satisfactory for unreinforced foundations, in accordance with BS 8500-1:2006.

Road Pavement Construction

10.21 For any areas of road pavement, including parking areas, the formation will be the sand and gravel. Below any obvious soft spots, and at equilibrium moisture content, a design CBR value of 20% is considered applicable.

Soakaways

10.22 Percolation tests were carried out in TP1, TP2, and TP3. The results reveal infiltration rates up to 1.22×10^{-5} m/s, 6.45×10^{-5} m/s, and 6.43×10^{-5} m/s respectively, in accordance with BRE Digest 365 "Soakaway Design". It is possible, therefore, that disposal of surface water by soakaway drainage will be feasible on the site, subject to the extent of the impermeable areas and the size of soakaway.

A P P E N D I X A

SITE LOCATION PLAN AND SITE PLAN

Rev	By	Date	Amendment	Chk
/			Issued for approval	

Title

SITE LOCATION PLAN

Project/Client

STATION ROAD, BARNSLEY.

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Date	**Chk.**
DEC 2013	MN

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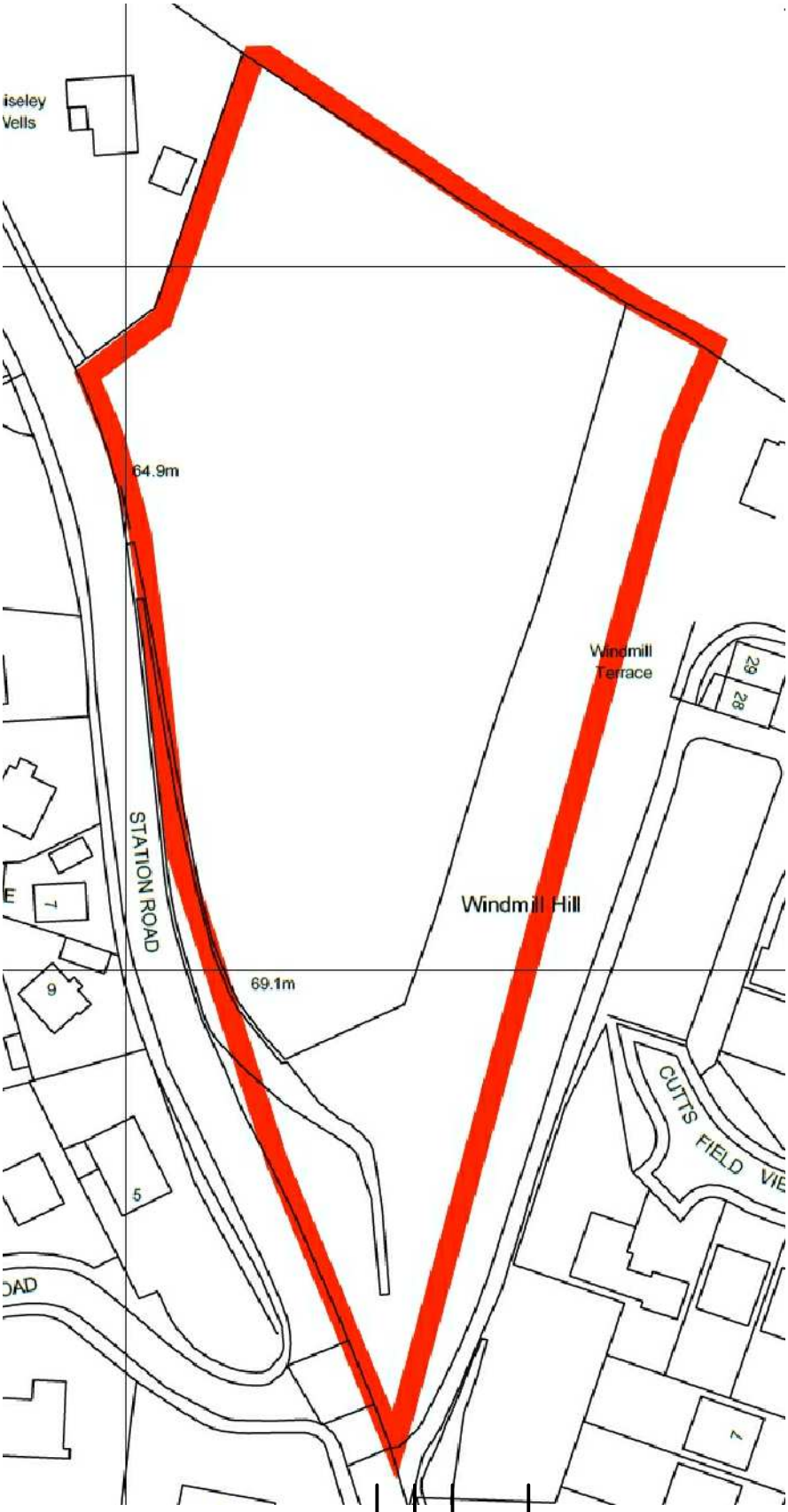

Rev	By	Date	Amendment	Chk
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Title

SITE PLAN

Project/Client

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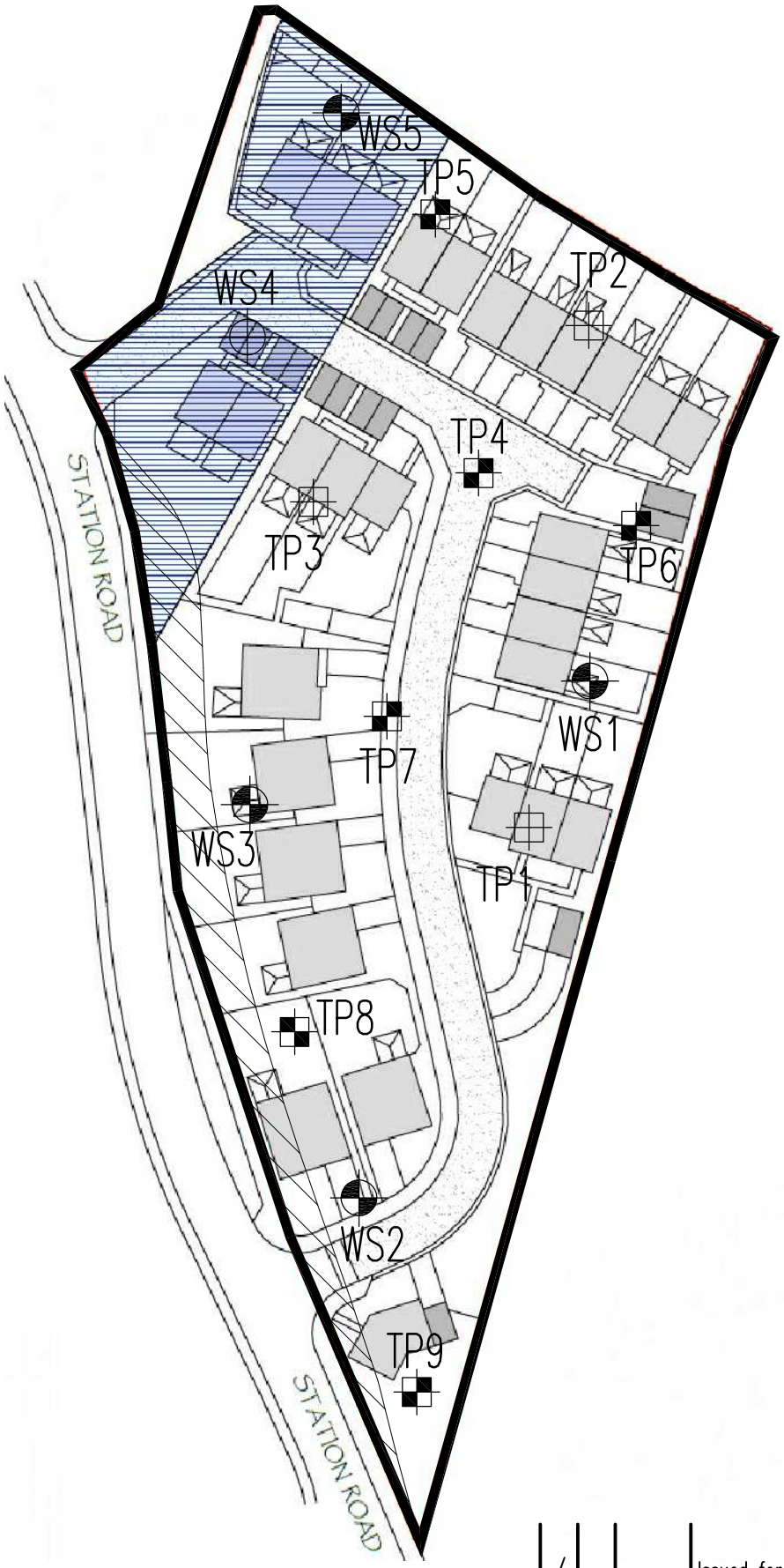
A P P E N D I X B

SITE INVESTIGATION LOCATION PLAN AND LOGS



KEY

- Trial Pit
- Trial Pit and Soakaway Test
- Window Sample
- Window Sample and Gas Monitoring Well
- Embankment

Rev	By	Date	Amendment	Chk
/			Issued for approval	

Title

INVESTIGATION LOCATION PLAN

Project/Client

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ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
Station Road, Barnsley	TP1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	D1				(0.40) 0.40	Dark brown clayey sandy slightly gravelly TOPSOIL. Gravel is angular, of sandstone.		
					(0.40) 0.80	Brown gravelly SAND. Gravel is angular, of sandstone (completely weathered sandstone).		
0.80-1.20	D2				(0.80) 1.60	Light brown sandy cobbly angular GRAVEL of sandstone (completely weathered sandstone).		
					(0.20) 1.80	Light brown SANDSTONE, arising as tabular gravel and cobbles. Terminated on impenetrable strata.		
						Complete at 1.80m		

Plan

Remarks

Hole backfilled with arisings on completion.
No groundwater seepages encountered.
Sides remained stable throughout.
Percolation test carried out.

Scale (approx)	Logged By	Figure No.
1:20	MCN	ATR/01.TP1

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
Station Road, Barnsley	TP2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	D1				(0.50)	Dark brown clayey slightly gravelly slightly sandy TOPSOIL. Gravel is angular, of sandstone.		
0.50-1.20	D2				0.50 (0.70)	Brown clayey sandy angular GRAVEL of sandstone (completely weathered sandstone).		
					1.20 (0.70)	Light brown SANDSTONE, arising as angular, gravel, cobbles and trace boulders.		
					1.90	Terminated on impenetrable strata. Complete at 1.90m		

Plan

Remarks

No groundwater seepages encountered.
Sides remained stable throughout.
Percolation test carried out.
Hole backfilled with arisings on completion.

Scale (approx)	Logged By	Figure No.
1:20	MCN	ATR/01.TP2

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
Station Road, Barnsley	TP3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Dark brown very sandy slightly gravelly TOPSOIL. Gravel is angular, of sandstone.		
					(0.30) 0.50	Light brown slightly clayey slightly gravelly SAND. Gravel is angular, of sandstone (completely weathered sandstone).		
					(1.35) 1.85	Light brown very sandy angular GRAVEL of sandstone (completely weathered sandstone).		
						Complete at 1.85m		

Plan

Remarks

Sides remained stable throughout.
No groundwater seepages encountered.
Percolation test carried out.
Hole backfilled with arisings on completion.

Scale (approx)	Logged By	Figure No.
1:20	MCN	ATR/01.TP3

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
Station Road, Barnsley	TP4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	D1				(0.20) 0.20	Dark brown clayey slightly sandy topsoil with occasional rootlets.		
					(0.90)	Light brown clayey very sandy slightly cobbly angular GRAVEL of sandstone (completely weathered sandstone).		
1.10-1.50	D2				1.10 (0.40) 1.50	Light brown SANDSTONE, arising as angular gravel and cobbles. Terminated on impenetrable strata.		
						Complete at 1.50m		

Plan

Remarks

No groundwater seepages encountered.
Sides remained stable throughout.
Hole backfilled with arisings on completion.

Scale (approx)	Logged By	Figure No.
1:20	MCN	ATR/01.TP4

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
Station Road, Barnsley	TP5

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	D1				(0.35)	Dark brown sandy slightly clayey TOPSOIL with occasional rootlets.		
					0.35			
0.50-1.00	D2				(1.45)	Light brown very sandy cobbly angular GRAVEL of sandstone (completely weathered sandstone).		
					1.80			
					(0.30)	Light brown SANDSTONE, arising as tabular gravel and cobbles.		
					2.10	Terminated on impenetrable strata.		
						Complete at 2.10m		

Plan

Remarks

No groundwater seepages encountered.
Sides remained stable throughout.
Hole backfilled wtih arisings on completion.

Scale (approx)	Logged By	Figure No.
1:20	MCN	ATR/01.TP5

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
Station Road, Barnsley	TP6

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	D1				(0.30)	Dark brown sandy slightly clayey TOPSOIL with occasional rootlets.		
					0.30			
					(0.50)	Light brown sandy angular GRAVEL of sandstone (completely weathered sandstone).		
					0.80			
					(0.30)	Light brown SANDSTONE, arising as tabular gravel and cobbles.		
					1.10	Terminated on impenetrable strata.		
						Complete at 1.10m		

Plan

Remarks

No groundwater seepages encountered.
Sides remained stable throughout.
Hole backfilled with arisings on completion.

Scale (approx)	Logged By	Figure No.
1:20	MCN	ATR/01.TP6

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
Station Road, Barnsley	TP7

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	D1				(0.20) 0.20	Dark brown sandy slightly clayey slightly gravelly TOPSOIL. Gravel is angular, of sandstone.		
					(1.30) 1.50	Light brown gravelly SAND. Gravel is angular, of sandstone (completely weathered sandstone).		
					(0.30) 1.80	Light brown sandy cobbly angular GRAVEL of sandstone (completely weathered sandstone).		
					(0.30) 2.10	Light brown SANDSTONE, arising as tabular gravel and cobbles. Terminated on impenetrable strata.		
						Complete at 2.10m		

Plan

Remarks

No groundwater seepages encountered.
Sides remained stable throughout.
Hole backfilled with arisings on completion.

Scale (approx)	Logged By	Figure No.
1:20	MCN	ATR/01.TP7

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
Station Road, Barnsley	TP8

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.15	D1				(0.15) 0.15	Dark brown sandy slightly clayey slightly gravelly TOPSOIL with frequent rootlets.		
0.50-1.00	D2				(0.95)	Light brown gravelly SAND. Gravel is angular, of sandstone (completely weathered sandstone).		
					1.10 (0.10) 1.20	Light brown SANDSTONE, arising as tabular gravel and cobbles. Terminated on impenetrable strata.		
						Complete at 1.20m		

Plan

Remarks

No groundwater seepages encountered.
Sides remained stable throughout.
Hole backfilled with arisings on completion.

Scale (approx)	Logged By	Figure No.
1:20	MCN	ATR/01.TP8

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Trial Pit Number
Station Road, Barnsley	TP9

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
JCB 3CX			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	D1				(0.40) 0.40	Dark brown sandy slightly clayey slightly gravelly TOPSOIL with frequent rootlets.		
0.50-1.00	D2				(0.70) 1.10	Light brown gravelly slightly cobbly SAND. Gravel is angular, of sandstone (completely weathered sandstone).		
					(0.20) 1.30	Light brown SANDSTONE, arising as tabular gravel and cobbles. Terminated on impenetrable strata.		
						Complete at 1.30m		

Plan

Remarks

No groundwater seepages encountered.
Sides remained stable throughout.
Hole backfilled with arisings on completion.

Scale (approx)	Logged By	Figure No.
1:20	MCN	ATR/01.TP9

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Number
Station Road, Barnsley	WS1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Tracked Windowless Sampling Rig			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	D1				(0.20) 0.20	Dark brown clayey slightly sandy slightly gravelly TOPSOIL. Gravel is angular, of sandstone.		
					(0.40) 0.60	Light brown gravelly SAND. Gravel is angular, of sandstone (completely weathered sandstone).		
					(0.40) 1.00	Light brown sandy angular GRAVEL of sandstone (completely weathered sandstone). Terminated on impenetrable strata.		
1.00-1.19	SPT 50/35		25/28,22			Complete at 1.00m		

Remarks
No groundwater seepages encountered.
Sides remained stable throughout.
Gas monitoring werll installed. Slotted from 1.0m to 0.5m, with gravel surround, and plain pipe from 0.5m to surface, with bentonite seal. Valve and flush cover provided.

Scale (approx)	Logged By
1:20	MCN

Figure No. ATR/01.WS1

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Number
Station Road, Barnsley	WS2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Tracked Windowless Sampling Rig.			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	D1				(0.20) 0.20	Dark brown sandy slightly clayey TOPSOIL with occasional rootlets.		
					(0.30) 0.50	Light brown slightly gravelly SAND. Gravel is angular of sandstone (completely weathered sandstone).		
					(0.50)	Light brown sandy angular GRAVEL of sandstone (completely weathered sandstone)		
1.00-1.11	SPT		25/50		1.00	Terminated on impenetrable strata Complete at 1.00m		

Remarks
No groundwater seepages encountered.
Sides remained stable throughout.
Gas monitoring well installed. Slotted from 1.0m to 0.5m, with gravel surround, and plain pipe from 0.5m to surface, with bentonite seal. Valve and flush cover provided.

Scale (approx)	Logged By
1:20	MCN

Figure No. ATR/01.WS2

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site Station Road, Barnsley			**Number** WS3
Excavation Method Tracked Windowless Sampling Rig.	**Dimensions**	**Ground Level (mOD)**	**Client** Aires Trading Ltd	**Job Number** ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.25	D1				(0.25)	Dark brown sandy clayey TOPSOIL with occasional rootlets.		
					0.25	Dense light brown clayey gravelly SAND. Gravel is angular, of sandstone (completely weathered sandstone).		
1.00-1.45	SPT N=48		3,4/5,8,13,22		(1.25)			
					1.50	Terminated on impenetrable strata.		
1.50-1.65	SPT		25/50			Complete at 1.50m		

Remarks
No groundwater seepages encountered.
Sides remained stable throughout.
Gas monitoring well installed. Slotted from 1.5m to 0.5, with gravel surround, and plain pipe from 0.5m to surface, with bentonite seal. Valvle and flush cover provided.

Scale (approx)	Logged By
1:20	MCN

Figure No. ATR/01.WS3

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Number
Station Road, Barnsley	WS4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Tracked Windowless Sampling Rig			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	D1				(0.40)	Brown clayey sandy TOPSOIL with rootlets.		
0.40-0.90	D2				0.40 (0.50)	Light brown slightly gravelly SAND. Gravel is angular, of sandstone (completely weathered sandstone).		
1.00-1.45	SPT N=25		3,4/4,6,6,9		0.90 (0.60)	Medium dense light brown sandy angular, GRAVEL of sandstone (completely weathered sandstone).		
1.50-1.74	SPT 50/90		14,11/32,18		1.50	Terminated on impenetrable strata. Complete at 1.50m		

Remarks
No groundwater seepages encountered.
Sides remained stable throughout.
Hole backfilled with arisings on completion.

Scale (approx)	Logged By
1:20	MCN

Figure No. ATR/01.WS4

ARP GEOTECHNICAL LIMITED
CHARTERED CONSULTING ENGINEERS

Site	Number
Station Road, Barnsley	WS5

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Tracked Windowless Sampling Rig			Aires Trading Ltd	ATR/01
	Location	**Dates** 22/11/2013	**Engineer** ARP	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.45	D1				(0.45)	Dark brown clayey sandy TOPSOIL, with rootlets.		
					0.45	Light brown slightly clayey slightly gravelly SAND. Gravel is angular, of sandstone (completely weathered sandstone).		
1.00-1.45	SPT N=22		3,5/5,5,6,6		(0.95)	From 1.0m: Confirmed to be medium dense.		
					1.40	Medium dense light brown sandy angular GRAVEL of sandstone (completely weathered sandstone).		
2.00-2.43	SPT 50/275		2,4/6,12,15,17		(0.60)	Terminated on impenetrable strata.		
					2.00	Complete at 2.00m		

Remarks
No groundwater seepages encountered.
Sides remained stable throughout.
Gas monitoring well installed. Slotted from 2.0m to 1.0m, with gravel surround, and plain pipe from 1.0m to surface, with bentonite seal. Valve and flush cover provided.

Scale (approx)	Logged By
1:20	MCN

Figure No. ATR/01.WS5

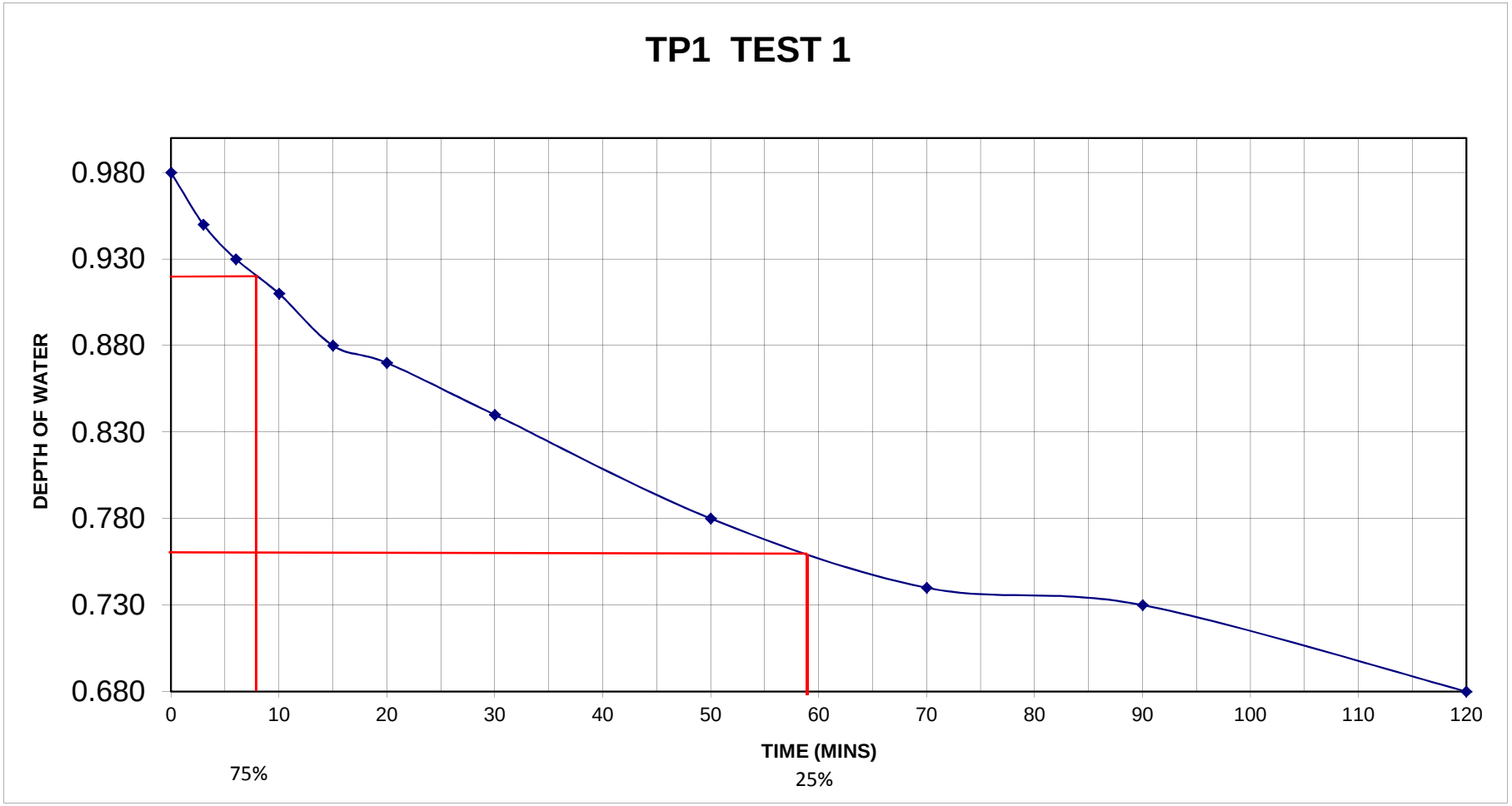
A P P E N D I X C

SOAKAWAY TEST RESULTS

SITE: **Station Road, Barnsley**
CLIENT: **Aires Trading Ltd**
JOB No: **ATR/01**

PIT DEPTHS	1.65				1.84				1.84				1.84				1.85				1.80			
EXISTING WATER DEPTH																								
DEPTH READING AT 25% OF MAX. FILLED DEPTH	1.41				1.63				1.63				1.61				1.56				1.58			
TEST TAKEN BELOW 25% OF MAX. FILLED DEPTH? (Y/N) *	N				Y				Y				Y				Y							
TP1 TEST 1	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Depth of water in hole**		**TP2 TEST 1**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Depth of water in hole**	**TP2 TEST 2**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Depth of water in hole**	**TP2 TEST 3**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Depth of water in hole**	**TP3 TEST 1**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Depth of water in hole**	**TP3 TEST 2**	**Time (mins)**	**Depth to Water Level (m.b.g.l)**	**Depth of water in hole**
	0	0.670	0.980			0	0.990	0.85		0	1.000	0.84		0	0.900	0.940		0	0.700	1.150		0	0.90	0.900
	3	0.700	0.950			2	1.100	0.74		2	1.100	0.74		2	1.050	0.790		1	0.725	1.125		2	0.94	0.860
	6	0.720	0.930			5	1.200	0.64		5	1.190	0.65		4	1.140	0.700		2	0.750	1.100		4	0.99	0.810
	10	0.740	0.910			7	1.250	0.59		8	1.220	0.62		7	1.190	0.650		5	0.830	1.020		6	1.02	0.780
	15	0.770	0.880			9	1.300	0.54		10	1.250	0.59		10	1.230	0.610		7	0.870	0.980		8	1.04	0.760
	20	0.780	0.870			15	1.380	0.46		20	1.390	0.45		15	1.300	0.540		9	0.900	0.950		10	1.05	0.750
	30	0.810	0.840			20	1.440	0.40		30	1.500	0.34		20	1.370	0.470		20	1.090	0.760		20	1.12	0.680
	50	0.870	0.780			30	1.490	0.35		50	1.600	0.24		30	1.470	0.370		30	1.200	0.650		25	1.19	0.610
	70	0.910	0.740			40	1.540	0.30		60	1.640	0.20		40	1.560	0.280		50	1.390	0.460		30	1.30	0.500
	90	0.920	0.730			50	1.590	0.25						50	1.620	0.220		60	1.48	0.370		40	1.35	0.450
	120	0.970	0.680			60	1.640	0.20										70	1.570	0.280		50	1.45	0.350
																						60	1.54	0.260
																						70	1.63	0.170

TP1 TEST 1


0.980
0.930
0.880
0.830
0.780
0.730
0.680
DEPTH OF WATER
0
10
20
30
40
50
60
70
80
90
100
110
120
TIME (MINS)
75%
25%

TP1 TEST 1

Depth of pit		1.650
Depth to filled water level immediately after filling		0.670
Depth to water or base of pit at finish (see note 3 below)		0.970
Length of hole at max. filled water level		1.900
Length of hole at base		1.600
Average		1.750
Width of hole at surface		0.800
Width of hole at base		0.800
Average		0.800
Maximum effective depth		0.980
	75%	**0.905**
	50%	0.830
	25%	**0.755**
Depth when empty or end of test		0.680
Depth of hole		1.650
50% Effective depth		0.830
Time in mins at 75% effective depth (see curve)		8.000
Time in mins at 25% effective depth (see curve)		59.000

Volume outflowing beween 75% and 25% effective depth: V_{p75}

V_{p75} = 0.21 m^3

Mean surface area through which outflow occurs, taken to be the pit sides to 50% effective depth and including the base of the pit: a_{p50}

a_{p50} = 5.633 m^2

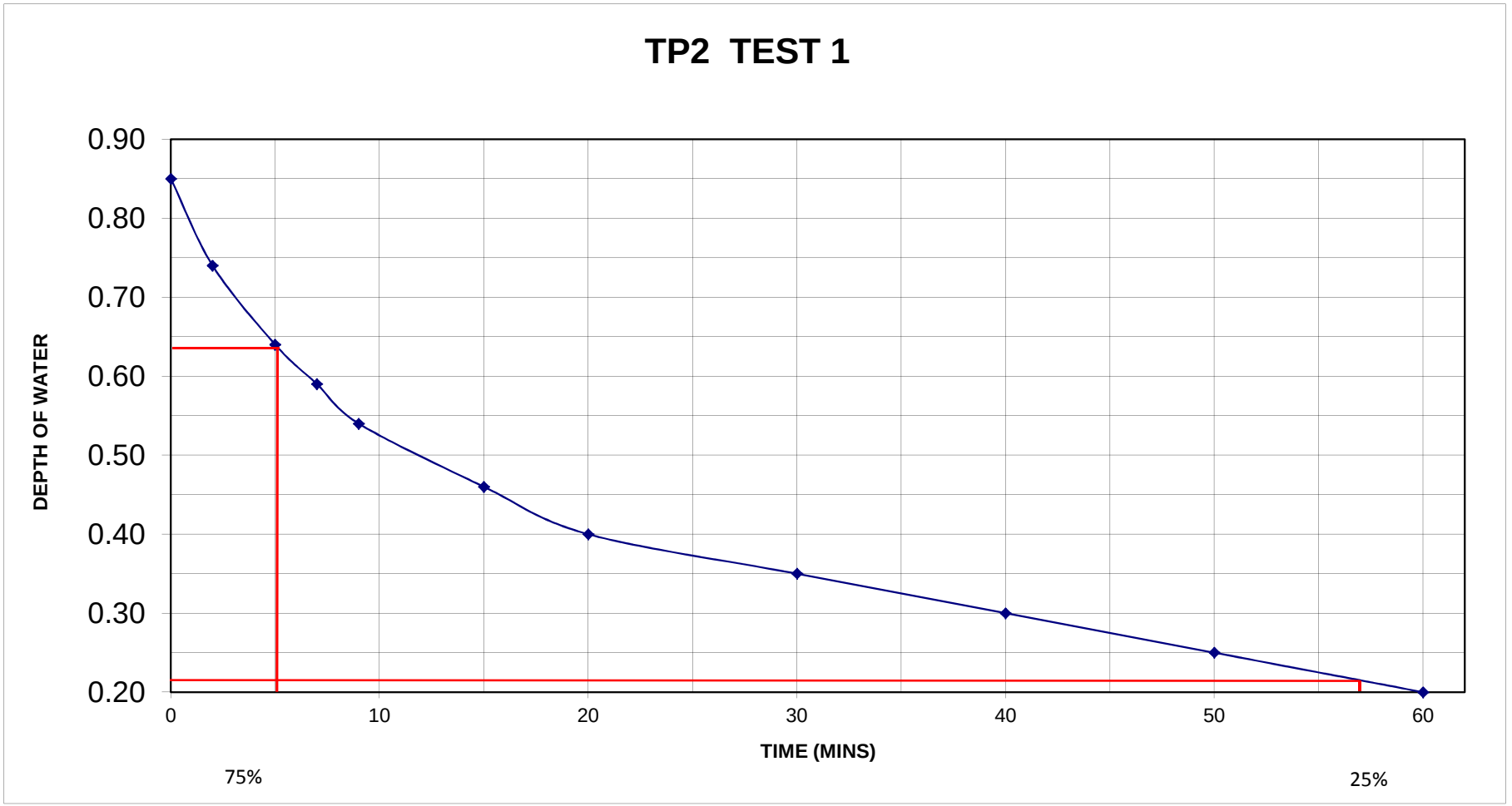
The time for outflow between 75% and 25% effective depth: t_{p75-25}

t_{p75-25} = 51 minutes

Soil infiltration rate: f

f = 1.22E-05

1. Entries are only required in the shaded fields
2. Plot the values in the cells highlighted in bold onto the curve as a line, to enable time to be read off and inserted into cells B25 and B26
3. Put the depth to water here, if it didn't drop below 25% of the max filled depth. Put the depth to the base of the pit here, if water level did fall below 25% of the max filled depth.


TP2 TEST 1
DEPTH OF WATER
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0
10
20
30
40
50
60
TIME (MINS)
75%
25%

TP2 TEST 1

Depth of pit		1.840
Depth to filled water level immediately after filling		0.990
Depth to water or base of pit at finish (see note 3 below)		1.840
Length of hole at max. filled water level		2.100
Length of hole at base		1.800
Average		1.950
Width of hole at surface		0.700
Width of hole at base		0.700
Average		0.700
Maximum effective depth		0.850
	75%	**0.638**
	50%	0.425
	25%	**0.213**
Depth when empty or end of test		0.000
Depth of hole		1.840
50% Effective depth		0.425
Time in mins at 75% effective depth (see curve)		5.000
Time in mins at 25% effective depth (see curve)		57.000

Volume outflowing beween 75% and 25% effective depth: V_{p75}

V_{p75} = 0.58 m^3

Mean surface area through which outflow occurs, taken to be the pit sides to 50% effective depth and including the base of the pit: a_{p50}

a_{p50} = 3.6175 m^2

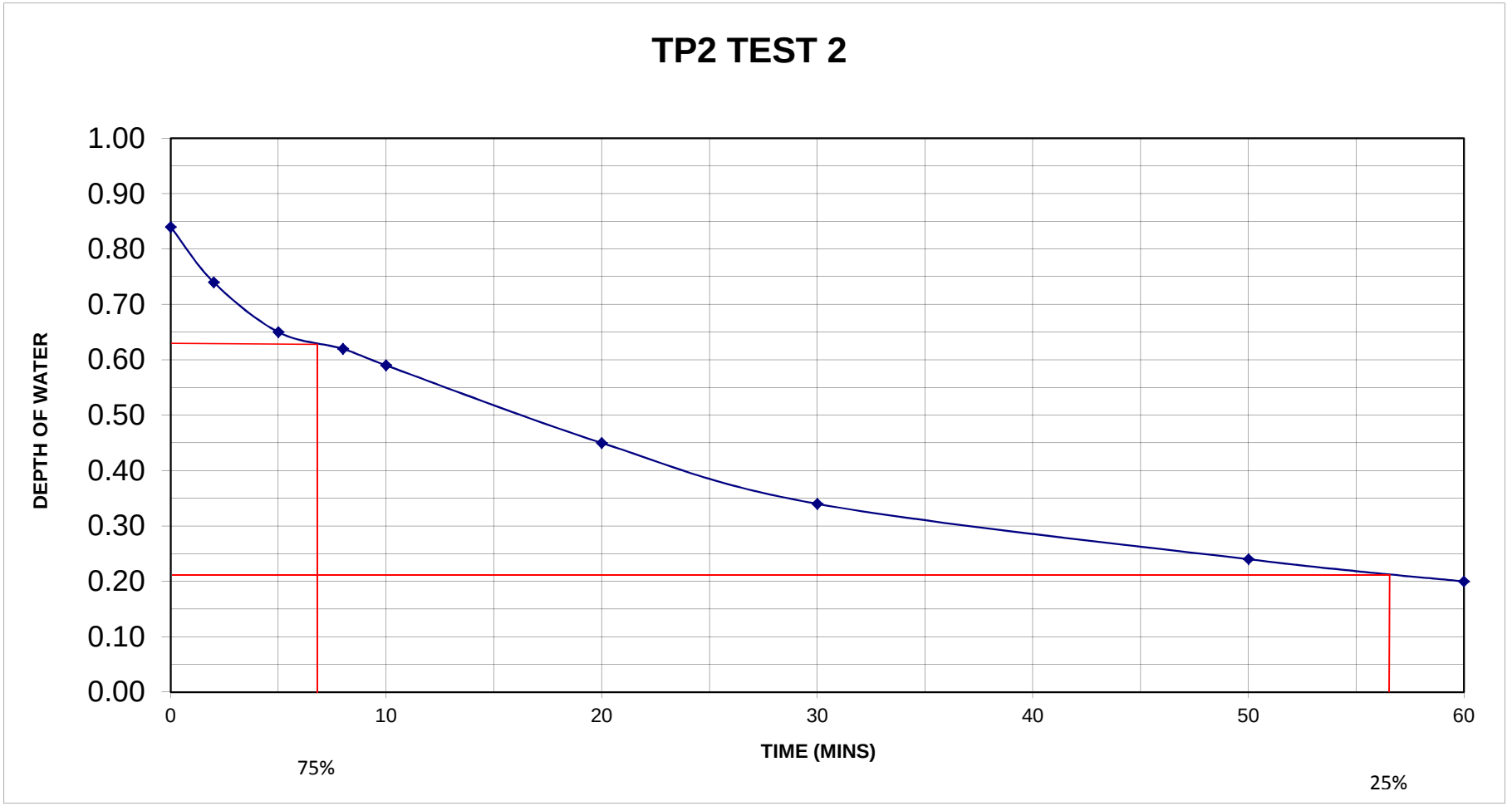
The time for outflow between 75% and 25% effective depth: t_{p75-25}

t_{p75-25} = 52 minutes

Soil infiltration rate: f

f = 5.14E-05

1. Entries are only required in the shaded fields
2. Plot the values in the cells highlighted in bold onto the curve as a line, to enable time to be read off and inserted into cells B25 and B26
3. Put the depth to water here, if it didn't drop below 25% of the max filled depth. Put the depth to the base of the pit here, if water level did fall below 25% of the


TP2 TEST 2
DEPTH OF WATER
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
10
20
30
40
50
60
TIME (MINS)
75%
25%

TP2 TEST 2

Depth of pit		1.840
Depth to filled water level immediately after filling		1.000
Depth to water or base of pit at finish (see note 3 below)		1.840
Length of hole at max. filled water level		2.100
Length of hole at base		1.800
Average		1.950
Width of hole at surface		0.700
Width of hole at base		0.700
Average		0.700
Maximum effective depth		0.840
	75%	**0.630**
	50%	0.420
	25%	**0.210**
Depth when empty or end of test		0.000
Depth of hole		1.840
50% Effective depth		0.420
Time in mins at 75% effective depth (see curve)		7.000
Time in mins at 25% effective depth (see curve)		56.500

Volume outflowing beween 75% and 25% effective depth: V_{p75}

$V_{p75 =}$ 0.57 m^3

Mean surface area through which outflow occurs, taken to be the pit sides to 50% effective depth and including the base of the pit: a_{p50}

$a_{p50 =}$ 3.591 m^2

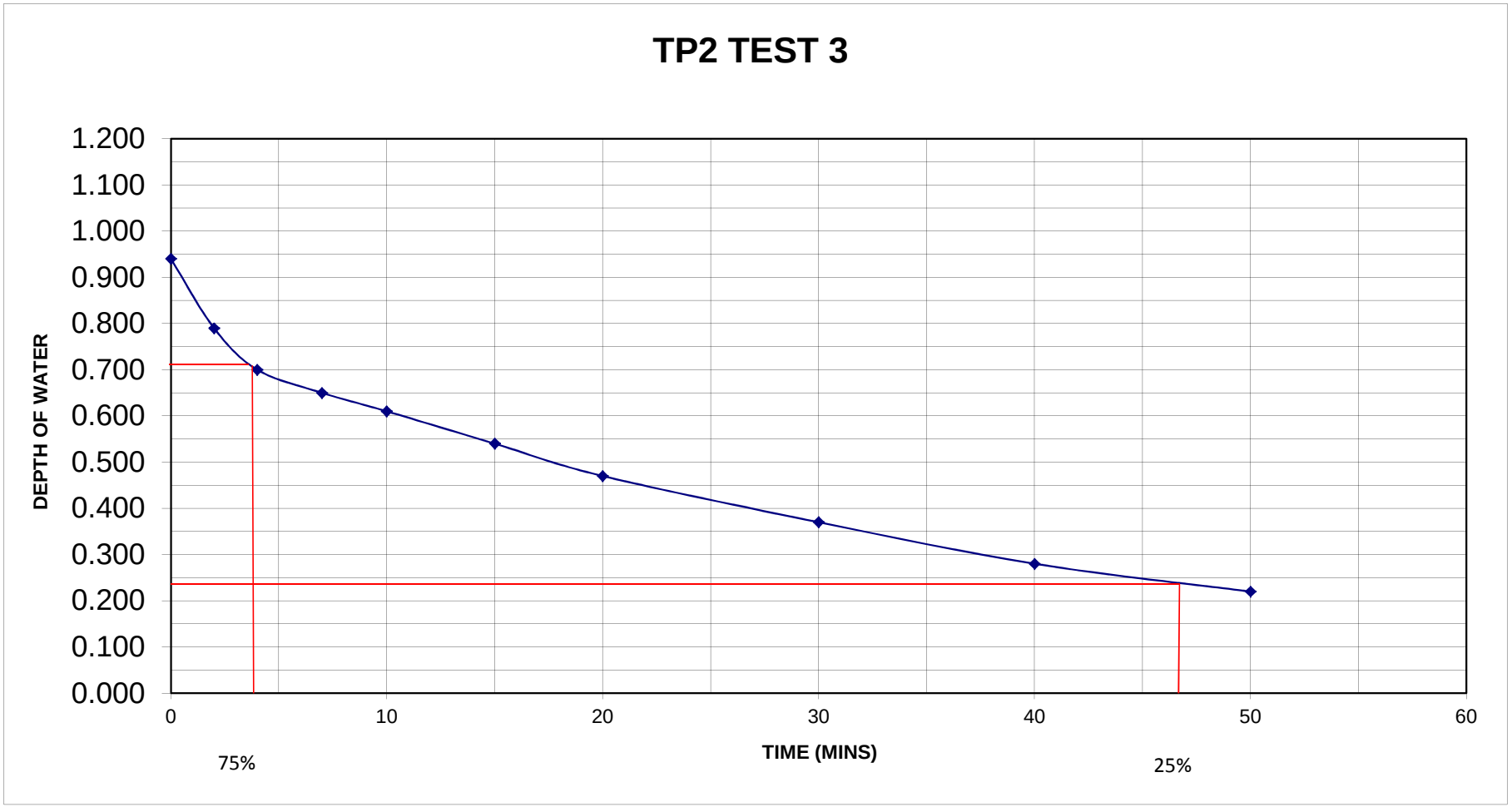
The time for outflow between 75% and 25% effective depth: t_{p75-25}

$t_{p75-25 =}$ 49.5 minutes

Soil infiltration rate: f

f = 5.38E-05

1. Entries are only required in the shaded fields
2. Plot the values in the cells highlighted in bold onto the curve as a line, to enable time to be read off and inserted into cells B25 and B26
3. Put the depth to water here, if it didn't drop below 25% of the max filled depth. Put the depth to the base of the pit here, if water level did fall below 25% of the


TP2 TEST 3
1.200
1.100
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
DEPTH OF WATER
0
10
20
30
40
50
60
TIME (MINS)
75%
25%

TP2 TEST 3

Depth of pit		1.840
Depth to filled water level immediately after filling		0.900
Depth to water or base of pit at finish (see note 3 below)		1.840
Length of hole at max. filled water level		2.100
Length of hole at base		1.800
Average		1.950
Width of hole at surface		0.700
Width of hole at base		0.700
Average		0.700
Maximum effective depth		0.940
	75%	**0.705**
	50%	0.470
	25%	**0.235**
Depth when empty or end of test		0.000
Depth of hole		1.840
50% Effective depth		0.470
Time in mins at 75% effective depth (see curve)		4.000
Time in mins at 25% effective depth (see curve)		47.000

Volume outflowing beween 75% and 25% effective depth: V_{p75}

$V_{p75 =}$ 0.64 m^3

Mean surface area through which outflow occurs, taken to be the pit sides to 50% effective depth and including the base of the pit: a_{p50}

$a_{p50 =}$ 3.856 m^2

The time for outflow between 75% and 25% effective depth: t_{p75-25}

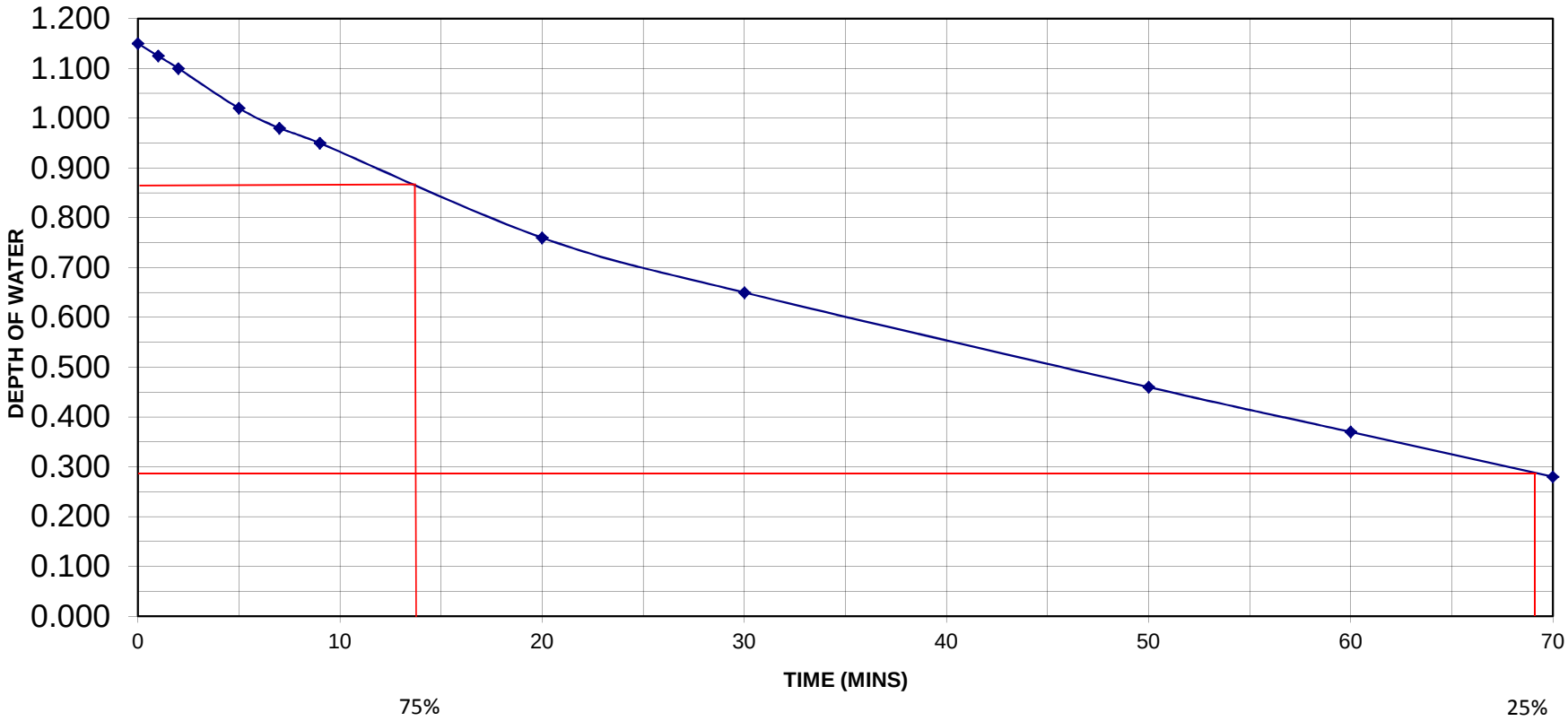
$t_{p75-25 =}$ 43 minutes

Soil infiltration rate: f

f = 6.45E-05

1. Entries are only required in the shaded fields
2. Plot the values in the cells highlighted in bold onto the curve as a line, to enable time to be read off and inserted into cells B25 and B26
3. Put the depth to water here, if it didn't drop below 25% of the max filled depth. Put the depth to the base of the pit here, if water level did fall below 25% of the

TP3 TEST 1


1.200
1.100
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
DEPTH OF WATER
0
10
20
30
40
50
60
70
TIME (MINS)
75%
25%

TP3 TEST 1

Depth of pit		1.850
Depth to filled water level immediately after filling		0.700
Depth to water or base of pit at finish (see note 3 below)		1.850
Length of hole at max. filled water level		1.900
Length of hole at base		1.600
Average		1.750
Width of hole at surface		0.750
Width of hole at base		0.750
Average		0.750
Maximum effective depth		1.150
	75%	**0.863**
	50%	0.575
	25%	**0.288**
Depth when empty or end of test		0.000
Depth of hole		1.850
50% Effective depth		0.575
Time in mins at 75% effective depth (see curve)		14.000
Time in mins at 25% effective depth (see curve)		69.000

Volume outflowing beween 75% and 25% effective depth: V_{p75}

$V_{p75 =}$ 0.75 m^3

Mean surface area through which outflow occurs, taken to be the pit sides to 50% effective depth and including the base of the pit: a_{p50}

$a_{p50 =}$ 4.1875 m^2

The time for outflow between 75% and 25% effective depth: t_{p75-25}

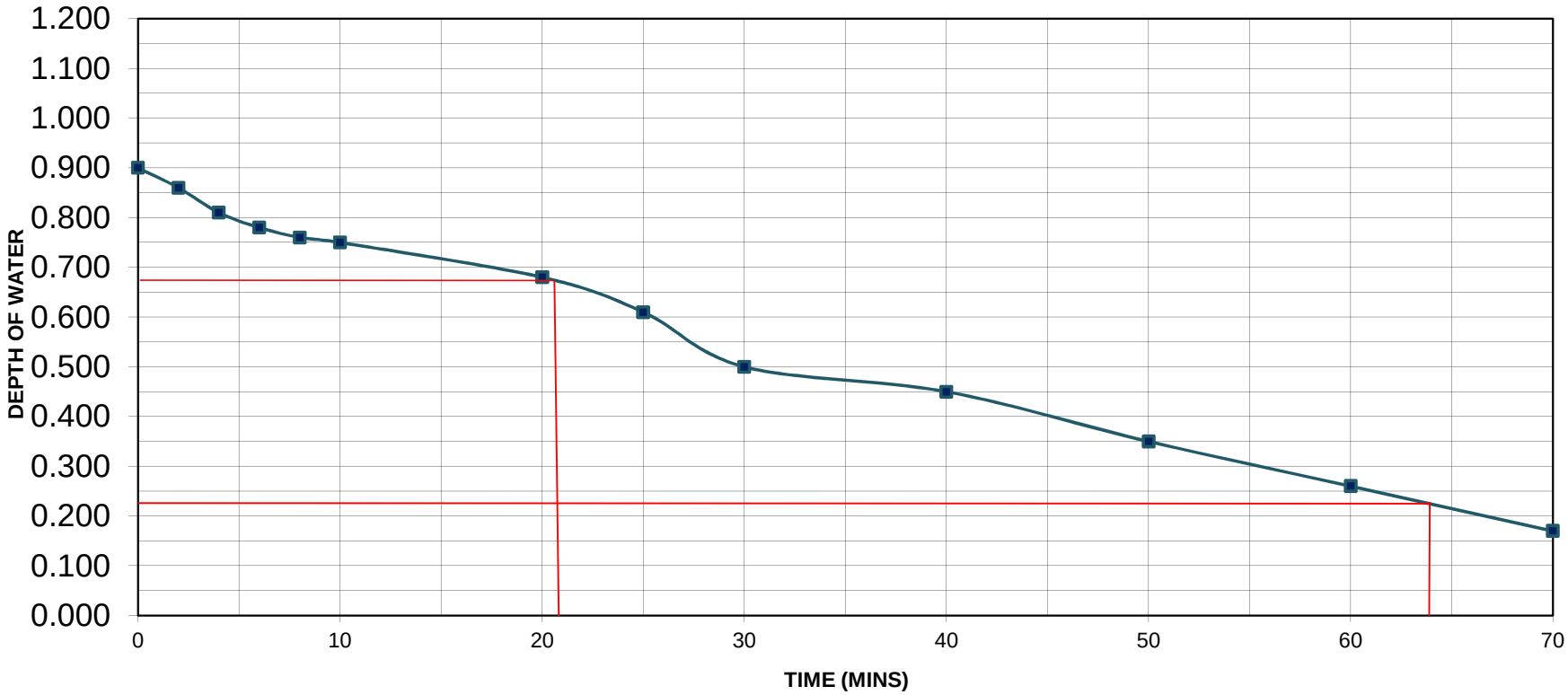
$t_{p75-25 =}$ 55 minutes

Soil infiltration rate: f

f = 5.46E-05

1. Entries are only required in the shaded fields
2. Plot the values in the cells highlighted in bold onto the curve as a line, to enable time to be read off and inserted into cells B25 and B26
3. Put the depth to water here, if it didn't drop below 25% of the max filled depth. Put the depth to the base of the pit here, if water level did fall below 25% of the

TP3 TEST 2


1.200
1.100
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
DEPTH OF WATER
0
10
20
30
40
50
60
70
TIME (MINS)
75%
25%

TP3 TEST 2

Depth of pit		1.800
Depth to filled water level immediately after filling		0.900
Depth to water or base of pit at finish (see note 3 below)		1.800
Length of hole at max. filled water level		1.900
Length of hole at base		1.600
Average		1.750
Width of hole at surface		0.750
Width of hole at base		0.750
Average		0.750
Maximum effective depth		0.900
	75%	**0.675**
	50%	0.450
	25%	**0.225**
Depth when empty or end of test		0.000
Depth of hole		1.800
50% Effective depth		0.450
Time in mins at 75% effective depth (see curve)		21.000
Time in mins at 25% effective depth (see curve)		64.000

Volume outflowing beween 75% and 25% effective depth: V_{p75}

V_{p75} = 0.59 m^3

Mean surface area through which outflow occurs, taken to be the pit sides to 50% effective depth and including the base of the pit: a_{p50}

a_{p50} = 3.5625 m^2

The time for outflow between 75% and 25% effective depth: t_{p75-25}

t_{p75-25} = 43 minutes

Soil infiltration rate: f

f = 6.43E-05

1. Entries are only required in the shaded fields
2. Plot the values in the cells highlighted in bold onto the curve as a line, to enable time to be read off and inserted into cells B25 and B26
3. Put the depth to water here, if it didn't drop below 25% of the max filled depth. Put the depth to the base of the pit here, if water level did fall below 25% of the ma

A P P E N D I X D

LABORATORY TEST CERTIFICATES AND SCREENING VALUES

Derwentside Environmental Testing Services

2139

Certificate of Analysis

Date: 03/12/2013

Certificate Number: 13-93250

Client:	ARP Geotechnical 5/6 Northwest Business Park Servia Hill Leeds LS6 2QH
Our Reference:	13-93250
Client Reference:	ATR/01
Contract Title:	Station Road, Barnsley
Description:	19 soil samples
Date Received:	26 November 2013
Date Started:	26 November 2013
Date Completed:	03 December 2013
Test Procedures:	Identified by prefix DETSn (details on request), Asbestos Analysis (DETS 082).
Notes:	Observations and interpretations are outside the scope of UKAS accreditation
Approved By:	Rob Brown, Business Manager

Information in Support of the Analytical Results

Analysis

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425um sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28oC +/-2oC.

Key

*	Denotes test not included in laboratory scope of accreditation
#	Denotes test that holds MCERTS accreditation, however, MCERTS accreditation is only implied if the report carries the MCERTS logo
$	Denotes tests completed by an approved subcontractor
I/S	Denotes insufficient sample to carry out test
U/S	Denotes that the sample is not suitable for testing

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month
Liquids - 2 weeks
Asbestos (test portion) - 6 months

Summary of Chemical Analysis
Soil Samples

Our Ref: 13-93250
Client Ref: ATR/01
Contract Title: Station Road, Barnsley

			Lab No.	580689	580690	580691	580692	580693
			Sample ID	TP1	TP2	TP4	TP5	TP6
			Depth	0.00-0.30	0.00-0.40	0.00-0.20	0.00-0.20	0.00-0.20
			Sample Ref	1	1	1	1	1
			Sample Type	D	D	D	D	D
			Sampling Date	22/11/2013	22/11/2013	22/11/2013	22/11/2013	22/11/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Arsenic	mg/kg	DETSC2301#	0.2	14	15	14	17	13
Cadmium	mg/kg	DETSC2301#	0.1	0.7	0.8	0.6	0.7	0.7
Chromium III	mg/kg	DETSC2301*	0.15	12	19	13	14	16
Hexavalent Chromium	mg/kg	DETSC 2204*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	mg/kg	DETSC2301#	0.2	23	23	26	29	22
Lead	mg/kg	DETSC2301#	0.3	44	50	55	42	38
Mercury	mg/kg	DETSC 2325#	0.05	0.11	0.11	0.19	0.09	0.22
Nickel	mg/kg	DETSC2301#	1	15	19	15	15	17
Selenium	mg/kg	DETSC2301#	0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5
Zinc	mg/kg	DETSC2301#	1	130	58	50	41	76
pH		DETSC 2008#		7.1	5.7	5.6	5.2	5.9
Organic matter	%	DETSC 2002#	0.1	3.1	5.6	3.8	4.1	5.2
Total Sulphate as SO4	%	DETSC 2321#	0.01	0.05	0.06	0.05	0.06	0.06
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10	15	26	18	20	18
EPH (C10-C40)	mg/kg	DETSC 3311#	10	210	220	43	17	140
Acenaphthene	mg/kg	DETSC 3301	0.1	< 0.1	0.5	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	DETSC 3301	0.1	< 0.1	0.4	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	DETSC 3301	0.1	< 0.1	1.2	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1	< 0.1	1.9	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1	< 0.1	2.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1	< 0.1	0.8	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1	< 0.1	0.6	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1	< 0.1	1.0	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	DETSC 3301	0.1	< 0.1	1.7	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	DETSC 3301	0.1	0.9	6.1	< 0.1	< 0.1	0.3
Fluorene	mg/kg	DETSC 3301	0.1	< 0.1	0.7	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1	< 0.1	1.2	< 0.1	< 0.1	< 0.1
Naphthalene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	DETSC 3301	0.1	0.4	6.4	< 0.1	< 0.1	0.1
Pyrene	mg/kg	DETSC 3301	0.1	0.7	4.3	< 0.1	< 0.1	0.1
PAH	mg/kg	DETSC 3301	1.6	2.1	29	< 1.6	< 1.6	< 1.6
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3	0.4	0.4	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref: 13-93250
Client Ref: ATR/01
Contract Title: Station Road, Barnsley

			Lab No.	580694	580695	580696	580697	580698
			Sample ID	TP7	TP8	TP9	WS1	WS2
			Depth	0.00-0.20	0.00-0.15	0.00-0.40	0.00-0.20	0.00-0.20
			Sample Ref	1	1	1	1	1
			Sample Type	D	D	D	D	D
			Sampling Date	22/11/2013	22/11/2013	22/11/2013	22/11/2013	22/11/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Arsenic	mg/kg	DETSC2301#	0.2	11	10	14	12	12
Cadmium	mg/kg	DETSC2301#	0.1	0.5	0.6	0.7	0.6	0.4
Chromium III	mg/kg	DETSC2301*	0.15	10	13	13	11	10
Hexavalent Chromium	mg/kg	DETSC 2204*	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	mg/kg	DETSC2301#	0.2	19	15	25	19	19
Lead	mg/kg	DETSC2301#	0.3	30	24	40	31	44
Mercury	mg/kg	DETSC 2325#	0.05	0.07	< 0.05	0.11	0.08	0.07
Nickel	mg/kg	DETSC2301#	1	12	13	14	12	11
Selenium	mg/kg	DETSC2301#	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	mg/kg	DETSC2301#	1	36	31	76	32	33
pH		DETSC 2008#		5.5	5.1	7.1	6.0	5.0
Organic matter	%	DETSC 2002#	0.1	2.6	1.9	4.9	3.9	5.4
Total Sulphate as SO4	%	DETSC 2321#	0.01	0.04	0.04	0.06	0.05	0.07
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10	18	22	< 10	30	24
EPH (C10-C40)	mg/kg	DETSC 3311#	10	13	< 10	35	< 10	100
Acenaphthene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	0.2	< 0.1	0.1
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	0.5	< 0.1	0.4
Fluorene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Naphthalene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	0.3	< 0.1	0.2
Pyrene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	0.4	< 0.1	0.3
PAH	mg/kg	DETSC 3301	1.6	< 1.6	< 1.6	1.6	< 1.6	< 1.6
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref: 13-93250
Client Ref: ATR/01
Contract Title: Station Road, Barnsley

			Lab No.	580699	580700	580701	580702	580703
			Sample ID	WS3	WS4	WS5	TP1	TP2
			Depth	0.00-0.20	0.00-0.20	0.00-0.20	0.80-1.20	0.50-1.20
			Sample Ref	1	1	1	2	2
			Sample Type	D	D	D	D	D
			Sampling Date	22/11/2013	22/11/2013	22/11/2013	22/11/2013	22/11/2013
			Sampling Time					
Test	**Units**	**DETSxx**	**LOD**					
Arsenic	mg/kg	DETSC2301#	0.2	14	12	16		
Cadmium	mg/kg	DETSC2301#	0.1	0.5	0.6	0.7		
Chromium III	mg/kg	DETSC2301*	0.15	13	13	16		
Hexavalent Chromium	mg/kg	DETSC 2204*	1	< 1.0	< 1.0	< 1.0		
Copper	mg/kg	DETSC2301#	0.2	20	36	27		
Lead	mg/kg	DETSC2301#	0.3	48	110	53		
Mercury	mg/kg	DETSC 2325#	0.05	0.07	0.07	0.12		
Nickel	mg/kg	DETSC2301#	1	13	16	15		
Selenium	mg/kg	DETSC2301#	0.5	< 0.5	< 0.5	< 0.5		
Zinc	mg/kg	DETSC2301#	1	33	52	43		
pH		DETSC 2008#		5.3	6.2	5.0	7.2	6.6
Organic matter	%	DETSC 2002#	0.1	3.1	3.2	4.6		
Total Sulphate as SO4	%	DETSC 2321#	0.01	0.05	0.04	0.05		
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10	21	12	17	< 10	13
EPH (C10-C40)	mg/kg	DETSC 3311#	10	37	24	56		
Acenaphthene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Anthracene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Chrysene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1	< 0.1	< 0.1	< 0.1		
Fluoranthene	mg/kg	DETSC 3301	0.1	0.3	< 0.1	0.1		
Fluorene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Naphthalene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Phenanthrene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 0.1		
Pyrene	mg/kg	DETSC 3301	0.1	0.1	< 0.1	0.1		
PAH	mg/kg	DETSC 3301	1.6	< 1.6	< 1.6	< 1.6		
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3	< 0.3	< 0.3	< 0.3		

Summary of Chemical Analysis
Soil Samples

Our Ref: 13-93250
Client Ref: ATR/01
Contract Title: Station Road, Barnsley

			Lab No.	580704	580705	580706	580707
			Sample ID	TP4	TP8	TP9	WS4
			Depth	1.10-1.50	0.50-1.00	0.50-1.00	0.40-0.90
			Sample Ref	2	2	2	2
			Sample Type	D	D	D	D
			Sampling Date	22/11/2013	22/11/2013	22/11/2013	22/11/2013
			Sampling Time				
Test	**Units**	**DETSxx**	**LOD**				
Arsenic	mg/kg	DETSC2301#	0.2				
Cadmium	mg/kg	DETSC2301#	0.1				
Chromium III	mg/kg	DETSC2301*	0.15				
Hexavalent Chromium	mg/kg	DETSC 2204*	1				
Copper	mg/kg	DETSC2301#	0.2				
Lead	mg/kg	DETSC2301#	0.3				
Mercury	mg/kg	DETSC 2325#	0.05				
Nickel	mg/kg	DETSC2301#	1				
Selenium	mg/kg	DETSC2301#	0.5				
Zinc	mg/kg	DETSC2301#	1				
pH		DETSC 2008#		7.2	7.3	8.3	7.7
Organic matter	%	DETSC 2002#	0.1				
Total Sulphate as SO4	%	DETSC 2321#	0.01				
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10	< 10	12	< 10	< 10
EPH (C10-C40)	mg/kg	DETSC 3311#	10				
Acenaphthene	mg/kg	DETSC 3301	0.1				
Acenaphthylene	mg/kg	DETSC 3301	0.1				
Anthracene	mg/kg	DETSC 3301	0.1				
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1				
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1				
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1				
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1				
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1				
Chrysene	mg/kg	DETSC 3301	0.1				
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1				
Fluoranthene	mg/kg	DETSC 3301	0.1				
Fluorene	mg/kg	DETSC 3301	0.1				
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1				
Naphthalene	mg/kg	DETSC 3301	0.1				
Phenanthrene	mg/kg	DETSC 3301	0.1				
Pyrene	mg/kg	DETSC 3301	0.1				
PAH	mg/kg	DETSC 3301	1.6				
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3				

Summary of Asbestos Analysis
Soil Samples

Our Ref: 13-93250
Client Ref: ATR/01
Contract Title: Station Road, Barnsley

Lab No	Sample Ref	Material Type*	Result	Comment	Analyst
580689	TP1 1 0.00-0.30	Soil	NAD	na	Jeff Cruddas
580690	TP2 1 0.00-0.40	Soil	NAD	na	Jeff Cruddas
580691	TP4 1 0.00-0.20	Soil	NAD	na	Jeff Cruddas
580692	TP5 1 0.00-0.20	Soil	NAD	na	Jeff Cruddas
580693	TP6 1 0.00-0.20	Soil	NAD	na	Jeff Cruddas
580694	TP7 1 0.00-0.20	Soil	NAD	na	Jeff Cruddas
580695	TP8 1 0.00-0.15	Soil	NAD	na	Jeff Cruddas
580696	TP9 1 0.00-0.40	Soil	NAD	na	Jeff Cruddas
580697	WS1 1 0.00-0.20	Soil	NAD	na	Jeff Cruddas
580698	WS2 1 0.00-0.20	Soil	NAD	na	Jeff Cruddas
580699	WS3 1 0.00-0.20	Soil	NAD	na	Jeff Cruddas
580700	WS4 1 0.00-0.20	Soil	NAD	na	Jeff Cruddas
580701	WS5 1 0.00-0.20	Soil	NAD	na	Jeff Cruddas

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. NAD = No Asbestos Detected. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETS 082 using polarised light microscopy in accordance with HSG248 and documented in-house methods. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'.

Sample Comments

DETS cannot be held responsible for the integrity of sample(s) received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating.

Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note "Guidance on Deviating Samples".

All samples received are listed below. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations.

If no sampled date (soils) or date/time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters), this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Lab No.	Sample ID	Date Sampled	Containers Received	Deviating due to holding time being exceeded for test(s)	Deviating due to inappropriate container for test(s)	Deviating due to headspace presence in container for test(s)
580689	TP1 0.00-0.30 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580690	TP2 0.00-0.40 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580691	TP4 0.00-0.20 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580692	TP5 0.00-0.20 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580693	TP6 0.00-0.20 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580694	TP7 0.00-0.20 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580695	TP8 0.00-0.15 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580696	TP9 0.00-0.40 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580697	WS1 0.00-0.20 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580698	WS2 0.00-0.20 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580699	WS3 0.00-0.20 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580700	WS4 0.00-0.20 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580701	WS5 0.00-0.20 SOIL	22/11/2013	Glass Jar 1L (1 litre)			
580702	TP1 0.80-1.20 SOIL	22/11/2013	Plastic Bag			
580703	TP2 0.50-1.20 SOIL	22/11/2013	Plastic Bag			
580704	TP4 1.10-1.50 SOIL	22/11/2013	Plastic Bag			
580705	TP8 0.50-1.00 SOIL	22/11/2013	Plastic Bag			
580706	TP9 0.50-1.00 SOIL	22/11/2013	Plastic Bag			
580707	WS4 0.40-0.90 SOIL	22/11/2013	Plastic Bag			

SCREENING VALUES FOR RESIDENTIAL USE

Determinand	Screening Value (mg/kg)			Source
Arsenic	32			CLEA SGV 2009
Cadmium	10			CLEA SGV 2009
Chromium (trivalent)	3,000			CIEH 2009
Chromium (hexavalent)	4.3			CIEH 2009
Lead	450			CLEA SGV
Mercury	170			CLEA SGV 2009
Selenium	350			CLEA SGV 2009
Copper	2,330			CIEH 2009
Nickel	130			CLEA SGV 2009
Zinc	3,750			CIEH 2009
Acidity (pH)[2]	Should be greater than 5			CLEA
	1% SOM	**2.5% SOM**	**6% SOM**	
Acenaphthene	210	480	1,000	CIEH 2009
Acenaphthylene	170	400	850	CIEH 2009
Anthracene	2,300	4,900	9,200	CIEH 2009
Benzo(a)anthracene	3.1	4.7	5.9	CIEH 2009
Benzo(a)pyrene	0.83	0.94	1.0	CIEH 2009
Benzo(b)fluoranthene	5.6	6.5	7.0	CIEH 2009
Benzo(g,h,I)perylene	44	46	47	CIEH 2009
Benzo(k)fluoranthene	8.5	9.6	10	CIEH 2009
Chrysene	6.0	8.0	9.3	CIEH 2009
Dibenzo(a,h)anthracene	0.76	0.86	0.90	CIEH 2009
Fluoranthene	260	460	670	CIEH 2009
Fluorene	160	380	780	CIEH 2009
Indeno(1,2,3-cd)pyrene	3.2	3.9	4.2	CIEH 2009
Naphthalene	1.5	3.7	8.7	CIEH 2009
Phenanthrene	92	200	380	CIEH 2009
Pyrene	560	1,000	1,600	CIEH 2009
Phenols	210	390	780	CIEH 2009
Total TPH	Above 500, speciate and compare with below:			In-house Standard
C5 to C6 Aliphatic	30	55	110	CIEH 2009
C6 to C8 Aliphatic	73	160	370	CIEH 2009
C8 to C10 Aliphatic	19	46	110	CIEH 2009
C10 to C12 Aliphatic	93	230	540	CIEH 2009
C12 to C16 Aliphatic	740	1,700	3,000	CIEH 2009
C16 to C35 Aliphatic	45,000	64,000	76,000	CIEH 2009
C35 TO C44 Aliphatic	45,000	64,000	76,000	CIEH 2009
C5 to C7 Aromatic	65	130	280	CIEH 2009
C7 to C8 Aromatic	120	270	611	CIEH 2009
C8 to C10 Aromatic	27	65	151	CIEH 2009
C10 to C12 Aromatic	69	160	346	CIEH 2009
C12 to C16 Aromatic	140	310	593	CIEH 2009
C16 to C21 Aromatic	250	480	770	CIEH 2009
C21 TO C35 Aromatic	890	1,100	1,230	CIEH 2009
C35 TO C44 Aromatic	890	1,100	1,230	CIEH 2009
Asbestos	Should be none detected			In-house Standard

SGV = Soil Guideline Value from the Environment Agency JANUARY 2013

CIEH = Land Quality Management / Chartered Institute of Environmental Health Generic Assessment Criteria

A P P E N D I X E

GAS MONITORING RESULTS

ARP GEOTECHNICAL BOREHOLE MONITORING RESULTS

JOB NO. ATR/01 **CLIENT:** Aires Trading Ltd

SITE: Station Road, Barnsley

BH:WS1

Date	BH Peak Flow (l/hr)*	Peak CH_4 %	Qhg CH_4 (l/hr)	Peak CO_2 %	Qhg CO_2 (l/hr)	Min. O_2 %	Peak VOC (ppm)	Depth to G Water (m)	Comment
06/12/2013	0.2	0	0.000	0.1	0.000	20.8		Dry	

* Where no flow is detected, detection limit of 0.1l/hr should be inserted

Qhg = Hazardous gas flow rate, in accordance with BS8485:2007

ARP GEOTECHNICAL BOREHOLE MONITORING RESULTS

JOB NO. ECL 03 **CLIENT:** Aires Trading Ltd

SITE: Station Road, Barnsley

BH:WS2

Date	BH Peak Flow (l/hr)*	Peak CH_4 %	Qhg CH_4 (l/hr)	Peak CO_2 %	Qhg CO_2 (l/hr)	Min. O_2 %	Peak VOC (ppm)	Depth to G Water (m)	Comment
06/12/2013	0.4	0.0	0.00	0.0	0.000	20.9		Dry	

* Where no flow is detected, detection limit of 0.1l/hr should be inserted

Qhg = Hazardous gas flow rate, in accordance with BS8485:2007

ARP GEOTECHNICAL BOREHOLE MONITORING RESULTS

JOB NO. **CLIENT:** Aires Trading Ltd

SITE: Station Road, Barnsley

BH:WS3

Date	BH Peak Flow (l/hr)*	Peak CH_4 %	Qhg CH_4 (l/hr)	Peak CO_2 %	Qhg CO_2 (l/hr)	Min. O_2 %	Peak VOC (ppm)	Depth to G Water (m)	Comment
06/12/2013	0.2	0.0	0.00	0.0	0.000	20.8		Dry	

* Where no flow is detected, detection limit of 0.1l/hr should be inserted

Qhg = Hazardous gas flow rate, in accordance with BS8485:2007

ARP GEOTECHNICAL BOREHOLE MONITORING RESULTS

JOB NO. **CLIENT:** Aires Trading Ltd

SITE: Station Road, Barnsley

BH:WS5

Date	BH Peak Flow (l/hr)*	Peak CH_4 %	Qhg CH_4 (l/hr)	Peak CO_2 %	Qhg CO_2 (l/hr)	Min. O_2 %	Peak VOC (ppm)	Depth to G Water (m)	Comment
06/12/2013	0.1	0.0	0.00	0.0	0.000	20.9		Dry	

* Where no flow is detected, detection limit of 0.1l/hr should be inserted

Qhg = Hazardous gas flow rate, in accordance with BS8485:2007

ARP GEOTECHNICAL BOREHOLE MONITORING RESULTS

JOB NO. ATR/01 **CLIENT:** Aires Trading Ltd

SITE: Station Road, Barnsley

BAROMETRIC PRESSURES

Monitor Date	Pressure on Site	Pressure on Day	Day minus 1	Day minus 2	Trend
06/12/2013	1026	1027	1007	1028	Falling

Pressures at midday, Dishforth, corrected to sea level.