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Forge Lane, Former Steelworks, Thornhill, Dewsbury

Volume One, Factual Report on Ground Investigation

127001
May 1997

Client:
Kirklees Metropolitan Council
Property Services Consultancy
Kirkgate Buildings
Byram Street
Huddersfield
West Yorkshire. HD1 1BY

CONTENTS

VOLUME ONE
127001

1. INTRODUCTION

It is proposed to develop the site of a former steelworks for combined residential housing and light industrial use. On the instructions of Kirklees Metropolitan Council, Property Services Consultancy an investigation was made by Exploration Associates Limited to provide information on the ground conditions for the design and construction of the proposed works. A report to include the interpretation of quantitative soil parameters, the detailed assessment of the ground conditions and recommendations on design and construction was confirmed in a letter ref CC & C/AT/DY/CTS97-7 dated 20th January 1997.

The report is presented in two volumes. This volume, Volume One, the Factual Report contains descriptions of the fieldwork and laboratory testing carried out, and results of tests, measurements and descriptions made in the field and in the laboratory. Detailed assessments of the ground and groundwater conditions and recommendations on design and construction are given in the Interpretive Report (Volume 2).

The investigation was carried out in general accordance with the relevant British Standards[1,2]. General notes on the techniques employed during site investigations carried out by Exploration Associates Limited are given in the Enclosures.

2 THE SITE

The site is located at National Grid reference SE237198 as shown on the Site Location Plan (Drawing 1). It occupies an area of derelict industrial land comprising predominantly hardstanding on the western third of the site and vegetation and water courses on the central and eastern sections of the site. A flooded gravel pit occupies the south central area of the site.

The site is bounded along its north western side by the Calder and Hebble navigation, along its western boundary by Forge Lane, along its southern boundary by houses and allotments and along its eastern boundary by land associated with a disused factory.

3 FIELDWORK

The fieldwork was carried out during the period 20th January to 28th January 1997.

Fifteen boreholes were sunk at the positions shown on the Exploratory Hole Location Plan (Drawing 2) by soft ground cable percussive boring techniques to depths of between 6.30m (Borehole 6) and 11.15m (Borehole 15). Thirteen trial pits were excavated mechanically to depths of between 2.40m (Trial Pits 5 and 12) and 5.00m (Trial Pit 13) at positions also shown on Exploratory

Hole Location Plans. The depths of the boreholes and trial pits, descriptions of the strata encountered and comments on the groundwater conditions revealed during the fieldwork operations are given on the borehole and trial pit records (Enclosure A).

Disturbed and undisturbed samples were taken at the depths shown on the records. Small disturbed samples were obtained from throughout the boreholes and trial pits, primarily for identification purposes. Bulk disturbed samples were recovered to enable more representative descriptions to be made. General purpose undisturbed samples of 100mm nominal diameter were taken in cohesive materials. Groundwater samples were recovered from all exploratory holes with the exception of Boreholes 7 and 8 and Trial Pits 7 and 13. Additional water samples are obtained from the Calder Hebble Navigation, the gravel pit and drainage ditch. The location of these additional water samples are indicated on the exploratory hole location plan.

Six shallow pits were mechanically excavated to obtain samples for laboratory CBR testing. The positions of these pits are also shown on the Exploratory Hole Location Plan.

Standard Penetration Tests (split barrel sampler and cone) were carried out in granular strata to assess the relative density of the materials in cohesive strata to obtain an indication of their consistency and in rock to obtain an indication of its hardness. Values of penetration resistance are presented in Enclosure A, both on the borehole records and on sheets SPT1 to SPT15.

Standpipe piezometers and standpipes were installed in all boreholes to enable subsequent measurements of groundwater levels and gas concentrations to be made. Details of the installations are given on the relevant borehole records and water levels and gas concentrations recorded in the instruments during the fieldwork and subsequent monitoring are given in Enclosure B.

At the time of reporting a programme of monthly water and gas monitoring visits was ongoing. Available results at the time of reporting are presented in Enclosure B.

Insitu permeability tests were not carried out in the boreholes due to the free draining nature of the strata encountered. In situ permeability tests were subsequently carried out in piezometers and standpipes. The results of these tests are presented in Enclosure B.

The disturbed samples were examined on site prior to despatch of all the samples to the laboratory at Deeside, Flintshire for testing. The descriptions of strata, given on the records, were made in general accordance with the recommendations given in BS 5930; 1981[1] but modified in accordance with the procedures outlined in the Enclosures.

The exploratory hole positions were set out by taping from existing features in general accordance with the information given on drawing no. EU603467 provided by Kirklees Metropolitan Council, Property Services Consultancy. The ground levels at the exploratory hole positions, given on the records, were obtained by levelling from a bench mark located on the gable end of house No. 334 Lees Hall Road, the value of which was understood to be 45.31m OD. Its position has been indicated on the Exploratory Hole Location Plan (Drawing 2).

4 LABORATORY TESTING

The laboratory work was scheduled by Exploration Associates and approved by the Engineer.

The principal objectives of the testing programme were to classify the deposits, to determine the shear strength and compressibility of the cohesive materials and to determine the aggressiveness of the strata and groundwater with respect to chemical attack on construction materials. Tests were also made to provide information for pavement design.

Contaminant analyses were carried out on selected samples by CAS Limited to provide a preliminary assessment of the degree of chemical contamination present within the near surface and made ground materials.

The soil tests were carried out generally according to BS 1377; 1990[2] unless indicated otherwise.

The tests carried out were:-

- Natural moisture content
- Natural wet density
- Liquid and plastic limit
- Particle size distribution
- Unconsolidated undrained triaxial compression
- California bearing ratio
- Consolidation
- Sulphate concentration and pH value
- Organic Content
- Contaminant analyses

The results of the laboratory tests are given in Enclosure C.

5. GROUND CONDITIONS

5.1 Published Geology

Geological records[3] indicate that the site is underlain by made ground overlying drift deposits comprising alluvium. The bedrock beneath the site area comprises Coal Measures strata of Upper Carboniferous age.

5.2 Strata Encountered

General

The strata encountered across the site may be summarised as the following units:-

Made Ground
Alluvial Clay
Peat
Sand/gravel/cobbles
Glacial Till
Bedrock

The distribution of these units and their general characteristics are outlined below. In general, beneath an average of 2.00m of loose granular fill at a level of around 36.0mOD, soft alluvial, occasionally organic, clays are present across approximately half the site parallel to the Calder and Hebble Navigation. The approximate lateral extent of these deposits is indicated on Drawing 3. The alluvial deposits thicken from approximately 0.60m to around 5.00m at the Northern site boundary. The alluvial deposits are typically underlain by medium dense sand and gravels (possibly fluvio glacial) which rest on mudstone bedrock although cohesive glacial till was also encountered at the location of Borehole 15 and occasionally as a basal layer between the sand and gravels and bedrock. The rock surface appears to dip toward the south and east from approximately 32.0mOD to 28.0mOD. Removal of the fluvioglacial sand and gravel deposits where they would originally have been encountered at the surface, has taken place along the central southern site area. The resulting pit appears to have been infilled predominantly with very soft silt, possibly dredgings from the Calder and Hebble Navigation.

Made Ground

Made ground was encountered in Boreholes 1 to 7, 9, 10, 14 and 15 and Trial Pits 1 to 5, 8 to 10 and 13. With the exception of Trial Pit 13 the thickness of made ground varied from 0.80m (Borehole 10) to 3.90m (Borehole 1).

The made ground may be broadly subdivided into rubble fill, sandstone fill, ash/slag fill and black clayey silt fill.

General rubble fill was encountered in Boreholes 1, 3 and 5 and Trial Pits 1, 2, 4 and 9 to depths of between 0.60m (Borehole 15) and 2.20m (Trial Pit 9). Mudstone fill was encountered in Boreholes 1 and 3, and Trial Pit 1, beneath rubble fill and in Trial Pit 8 beneath clayey silt fill, to depths of between 3.10m (Trial Pit 8) and 4.20m (Trial Pit 1). A maximum thickness of mudstone fill of 3.00m was encountered in Trial Pit 1. Ash and ash/slag fill was encountered, locally beneath topsoil, in Boreholes 2, 4, 5, 6 and 7 and Trial Pits 3 and 5 to depths of between 1.00m (Borehole 6) and 2.75m (Borehole 2). Peaty ash was encountered in Borehole 14 to a depth of 0.80m. Black clayey silt fill was encountered in Trial Pit 8 to a depth of 2.30m. A similar deposit was encountered in Borehole 8 and Trial Pit 6 to depths of 2.60m and 1.55m respectively, although it was unclear whether this was made ground.

Borehole 10 and Trial Pit 9 encountered clayey fill to 0.80m and 1.90m respectively. This may represent reworked locally derived natural deposits.

Trial Pit 13 was excavated in the backfilled gravel pit and encountered very soft black clayey silt to a depth of approximately 5.00m. The base of the gravel pit was not proven.

Alluvial Clay

Alluvial clay was encountered in Boreholes 1, 2, 3, 6, 7 and 9 and Trial Pits 1, 2, 3, 4, 7, 9, 10 and 11, generally beneath made ground. The thickness of the Alluvium was greatest along the north east site boundary, adjacent to the Calder and Hebble Navigation. The thickness varied from 0.25m (Borehole 2) to >3.50m (Trial Pit 7). The Alluvium generally comprised soft silty clay with local peaty horizons.

Peat

Peat was encountered in Borehole 9 and Trial Pit 4 adjacent to the Calder and Hebble Navigation. A thickness of 1.20m and 0.50m was proved in Borehole 9 and Trial Pit 4 respectively.

Sand/Gravel/Cobbles

The majority of the drift encountered across the site comprised variably graded granular deposits including sand, gravel and cobbles.

Granular strata was encountered in all exploratory holes, with the exception of Trial Pit 7, and generally increased in thickness towards the south and east. Boreholes 3 and 9 encountered only 0.70m and 0.30m of granular strata

respectively. A maximum of 9.00m was encountered in Borehole 8.

Within the granular strata, lenses/layers of clay were encountered. These may represent clay matrix within the gravel/cobbles or locally, sandy clay layers.

Glacial Till

Borehole 15 encountered stiff clay between 1.30m and 7.60m, softening from 7.60m to 8.00m adjacent to the confined water level observed in the underlying gravels at this location.

Boreholes 3 and 9 encountered, stiff and very stiff clay from 5.40m to 7.30m, 4.90m to 7.10m respectively. This may in part represent glacially reworked and/or weathered mudstone bedrock.

Bedrock

Bedrock was encountered in all boreholes except Borehole 6, at depths between 6.30m (Borehole 5) and 11.60m (Borehole 8). Bedrock was not encountered in the trial pits. With the exception of Borehole 15, the bedrock encountered across the site comprised mudstone. The bedrock encountered in Borehole 15 comprised sandstone.

Boreholes 2, 4, 5, 7, 10, 11 and 14 encountered a thin layer of clay, overlying mudstone. This may represent a thin weathered mantle or partial glacial reworking and lodgement deposition.

5.3 Groundwater

Groundwater was encountered in all exploratory holes at depths ranging from 1.10m (Trial Pit 12) to 9.00m (Borehole 14) in made ground, alluvial deposits and granular strata. The presence of confined water within the gravel sequence indicates that the clay horizons noted are laterally extensive.

The groundwater encountered was generally confined.

Monitoring of the standpipes subsequent to site works indicate that the phreatic surface across the site varies only slightly between 36.20m AOD (Borehole 12) and 36.70m AOD (Boreholes 4, 7 and 9).

The water level in the canal and gravel pit at the time of site works was 37.76m AOD and 37.26m AOD respectively. The water in the drain entered the site at a level of about 37.40m AOD and was measured at about 36.40m AOD at its exit point into the culvert.

For and on behalf of Exploration Associates Limited

T.J. Downes
Project Geologist

J.P. Leavy
Principal Engineer

Exploration Associates Limited
JPL/TJD/MLK/127001/May 1997

REFERENCES

1. BS 5930 ; 1981. Code of Practice for Site Investigations. British Standards Institution.

2. BS 1377 Parts 1 to 9; 1990. Methods of Test for Soils for Civil Engineering Purposes. British Standards Institution.

3. British Geological Survey. 1:63,360 series, Sheet No 77, Huddersfield.

ENCLOSURE A

Exploratory Hole Records

Summary of Descriptive Methods

1. Terminology used in Soil Descriptions

The procedure and principles given in BS 5930; 1981, Section 8 have generally been adopted in producing soil descriptions but most of the modifications detailed by Norbury et al (1984) have been incorporated. These generally relate to the description of composite soil types referred to in Table 6 and Section 41.3.3.3 of BS 5930. The modifications relating to various mixtures of soil types are summarised below.

i) Predominantly Coarse Soils

BS 5930 Section 8 recommends that the secondary constituents of coarse soils should precede the main soil type. This may become ambiguous if qualifying adjectives also form part of the description. Norbury et al overcame this by suggesting that the secondary constituent may be placed after the main soil type, as outlined in Table B1.

ii) Mixtures of Coarse and Fine Soils

BS 5930 Section 8 Section 41.3.2.1 states that mixtures of coarse and fine soils with more than 35% of fine soil shall be described as clay or silt, otherwise they should be described as sand or gravel. This may lead to misleading descriptions, if strictly adhered to, since a material that in engineering terms behaves as clay may only have a clay content of between 10% and 20%. Thus the above approach is not adopted where it would lead to a description which would not reflect the engineering behaviour of the material. In such cases the percentage unit is relaxed.

iii) Predominantly Fine Soils

Fine soils generally consist of mixtures of silt and clay and are described in BS 5930 as either silt or clay with classification in accordance with plasticity. Borderline cases between silt and clay materials are often difficult to distinguish and where secondary constituent fine soils have an influence on mass behaviour the qualifying terms "very silty" and "very clayey" are used. Coarse secondary constituents may be included either before or after the main soil type, as outlined in Table B2, depending on the grain sizes of the secondary constituents.

Term Before	Principal Term	Term After	Approx % of Secondary Constituent
Slightly (sandy*)	SAND, GRAVEL COBBLES or BOULDERS	with a little (sand*) or occasional (cobbles+)	<5
(Sandy*)		with some (sand*) or some (cobbles+)	5 - 20#
Very (Sandy*)		with much (sand*) or many (cobbles+)	20 - 40#
		and (sand*) or and (cobbles+)	about 50#

* Fine or coarse soil type as appropriate
\+ Very coarse soil type as appropriate
\# Or described as a fine soil depending on mass behaviour

Table B1
Scale of Secondary Constituents with coarse soils

For clays, the extended strength scale is outlined in Table B3. The term hard is not assigned a specific range of shear strengths by BS5930 which indicates that soils possessing shear strengths greater than 150 kPa may be either very stiff or hard. The terms are defined more precisely in Table B3.

References

BS 5930 ; 1981 Code of Practice for Site Investigations
Norbury D.R., GH Child and T.W. Spink ; 1984 A Critical review of Section 8 (BS 5930) Soil and Rock Description. Proc 20th Regional Meeting of the Geological Society. Site Investigation Practice.
Assessing BS 5930. Univ of Surrey pp 353-369 (original proceedings).

Term Before	Principal Term	Term After	Approx % of Secondary Constituent
Slightly (sandy*)		with a little (sand*) or occasional (cobbles+)	<35
(Sandy*)	CLAY or SILT	with some (sand*) or some (cobbles+)	35 - 65
Very (Sandy*)		with much (sand*) or many (cobbles+)	>65#

* Coarse soil type as appropriate
\+ Very coarse soil type as appropriate
\# Or described as a coarse soil depending on mass behaviour.

Table B2
Scale of Secondary Constituents with fine soils

Term	Field Identification	Undrained Shear Strength (kPa)
Very soft	Exudes between fingers when squeezed in hand.	<20
Soft	Moulded by light finger pressure.	20 - 40
Soft to firm	Can be moulded by strong finger pressure.	40 - 50
Firm		50 - 75
Firm to Stiff	Cannot be moulded by finger pressure	75 - 100
Stiff	Can be indented by thumb.	100 - 150
Very Stiff	Can be indented by thumbnail	150 - 300
Hard	No manual indentation possible.	>300

Table B3
Field Assessment of Strength of Clays

KEY TO SYMBOLS ON EXPLORATORY HOLE RECORDS

All linear dimensions are in metres or millimetres

DESCRIPTIONS

**	:	Drillers Description

SAMPLES

U ( )	:	Undisturbed 102mm diameter sample, ( ) denotes number of blows to drive sampler
U ( )F, U ( )P	:	F - not recovered, P - partially recovered
U38	:	Undisturbed 38mm diameter sample
P(F),(P)	:	Piston sample, F - not recovered, P - partially recovered
B	:	Bulk sample - disturbed
D	:	Jar Sample - disturbed
W	:	Water Sample
CBR	:	California Bearing Ratio mould sample
G	:	Gas Sample and depth of hole at time of sampling

CORE RECOVERY AND ROCK QUALITY

TCR	:	Total Core Recovery %
SCR	:	Solid Core Recovery %
RQD	:	Rock Quality Designation %
FI	:	Fracture Index (discontinuities per metre) NI - not intact, NR - not recordable, NA - not applicable

GROUNDWATER

∇	:	Groundwater strike
$\blacktriangledown$	:	Groundwater level after standing period
Date/Water	:	Date of shift (day/month)/Depth to water at end of previous shift shown above the date and depth to water at beginning of shift given below the date.

IN SITU TESTING

S	:	Standard Penetration Test - split barrel sampler
C	:	Standard Penetration Test - solid 60° cone
V(H)(R)	:	Vane Test (Hand) (R) demonstrates remoulded strength
K(F), (C), (R), (P)	:	Permeability Test (falling, constant or rising head, packer)
PT	:	Pressuremeter Test
HP	:	Hand Penetrometer Test

MEASURED PROPERTIES

N	:	Standard Penetration Test - blows required to drive 300mm after seating drive
$^{x}/_{y}$	:	Denotes x blows for y mm within the Standard Penetration Test
$^{x*}/_{y}$	:	Denotes x blows for y mm within the seating drive
c_u	:	Undrained Shear Strength (kN/m^2)
CBR	:	California Bearing Ratio

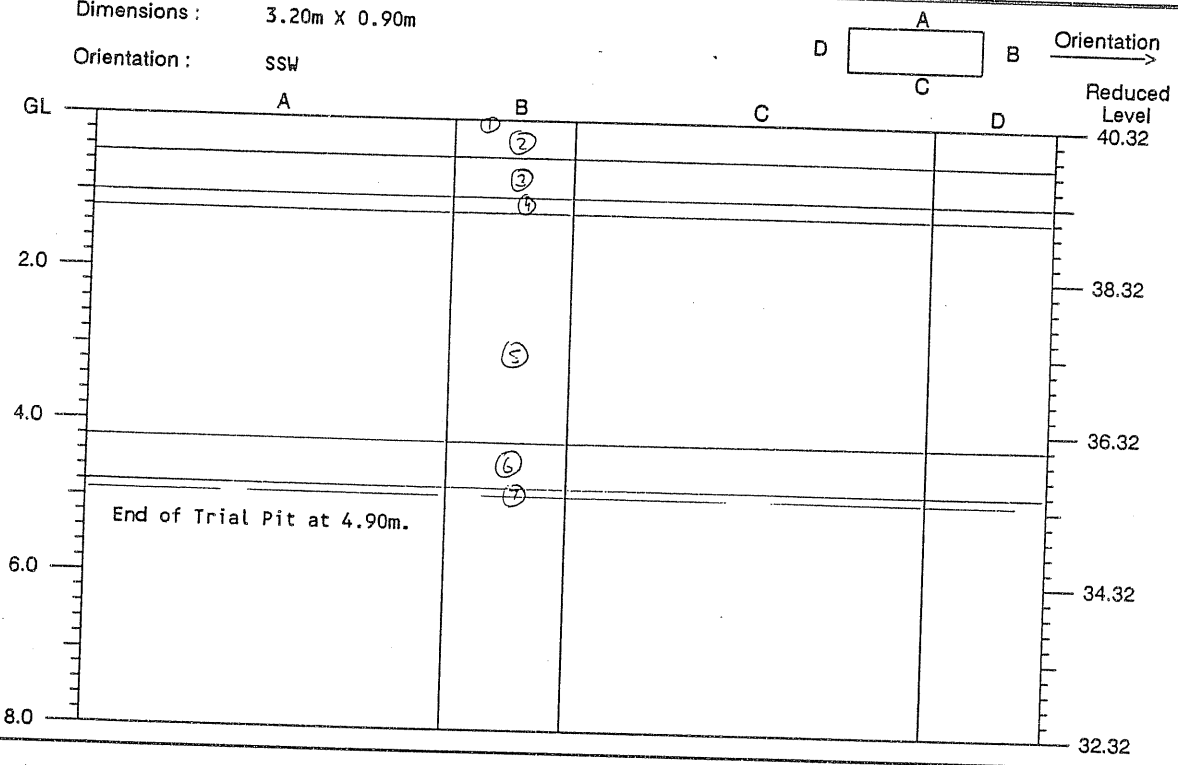
ROTARY DRILLING SIZES

Index Letter	NOMINAL DIAMETER (mm)	
	Borehole	Core
N	75	54
H	99	76
P	120	92
S	146	113

Exploratory Hole Symbols	Project Forge Lane, Former Steelworks, Thornhill Dewsbury Kirklees Metropolitan Council	Contract 127001
Exploration Associates		Figure Key Sheet

Dimensions : 3.20m X 0.90m

Orientation : SSW



Strata

Depth (m)	No.	Description
0.00-0.05	1	Turf.
0.05-0.45	2	MADE GROUND: Moderately compact dark grey brown slightly silty fine to coarse sand with much subangular and subrounded fine to coarse gravel and occasional cobbles including sandstone and brick.
0.45-1.00	3	MADE GROUND: Compact yellow brown sandy subangular fine to coarse sandstone gravel with many cobbles.
1.00-1.20	4	MADE GROUND: Dark grey brown slightly silty fine to coarse sand with much subangular fine to coarse gravel.
1.20-4.20	5	MADE GROUND: Compact grey clayey silty angular fine to coarse mudstone gravel with occasional cobbles locally very clayey.
4.20-4.80	6	Soft grey, mottled black very silty organic CLAY.
4.80-4.90	7	Yellow brown slightly silty medium and coarse SAND.

Samples and Tests

Depth (m)	Type	Results
0.30	D	
1.00-1.50	B	
1.40	D	
2.00	D	
2.50-3.00	B	
3.80	D	
4.30	D	
4.50	HV	28,25,32kPa
4.80	D	
4.60	W	

Date of Excavation 21/01/97
Equipment JCB 3CX
Stability Walls remained vertical

Groundwater

No.	Struck	Behaviour
1	4.80	Standing at 4.80m after 10 minutes

Ground Level 40.32 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

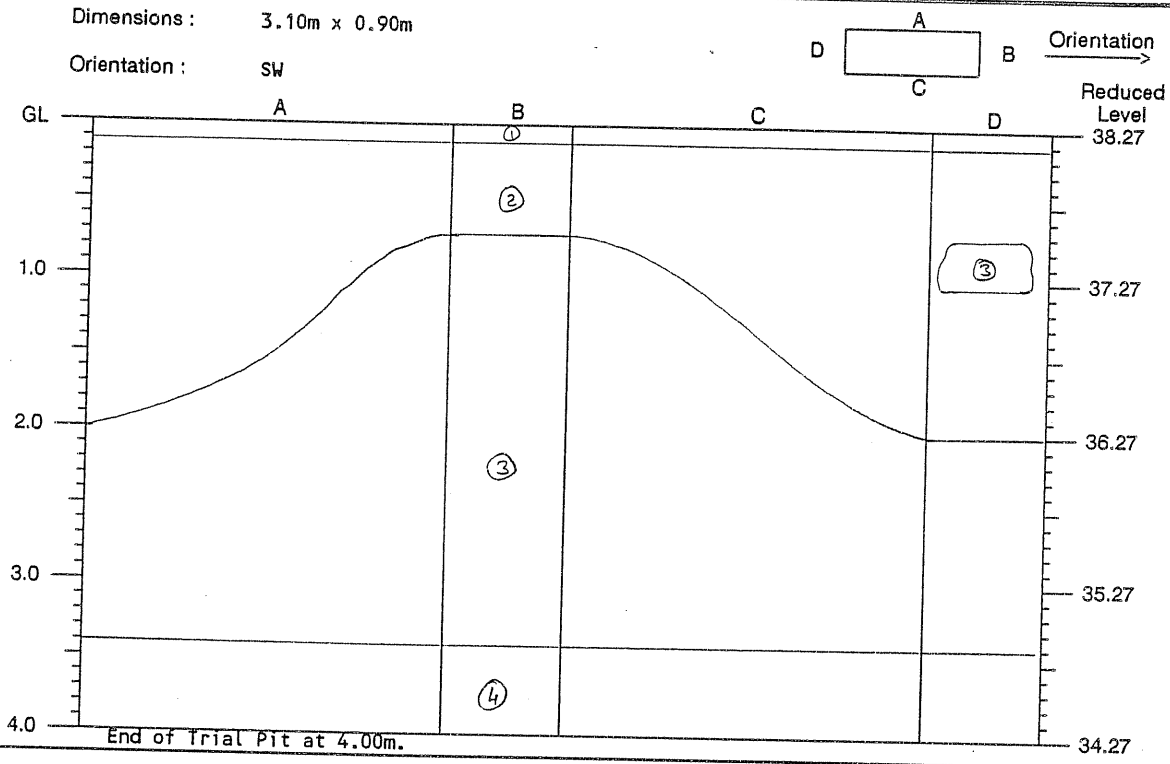
Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP1

Dimensions : 3.10m x 0.90m

Orientation : SW



Strata

Depth (m)	No.	Description
0.00-0.13	1	MADE GROUND: Reinforced concrete.
0.13-2.00	2	MADE GROUND: Loose dark grey brown slightly silty fine to coarse sand with much subangular fine to coarse gravel and some cobbles including sandstone, brick and concrete.
0.70-3.40	3	Soft brown sandy silty CLAY with occasional roots. below about 1.80m: grey, mottled orange brown.
3.40-4.00	4	Brown very sandy rounded medium and coarse GRAVEL with occasional cobbles.

Samples and Tests

Depth (m)	Type	Results
0.20	D	
0.50	D	
0.80	D	
0.50-0.70	B	
1.90	D	
2.00	HV	18,21,22kPa
3.00	D	
3.50-4.00	B	
2.20	W	

Date of Excavation 21/01/97
Equipment JCB 3CX
Stability Walls collapsed below water level

Groundwater

No.	Struck	Behaviour
1	1.70	Inflow
2	2.20	Standing level

Ground Level 38.27 m OD

Logged by TJD
Checked by

Remarks 1. All depths from top of slab.

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

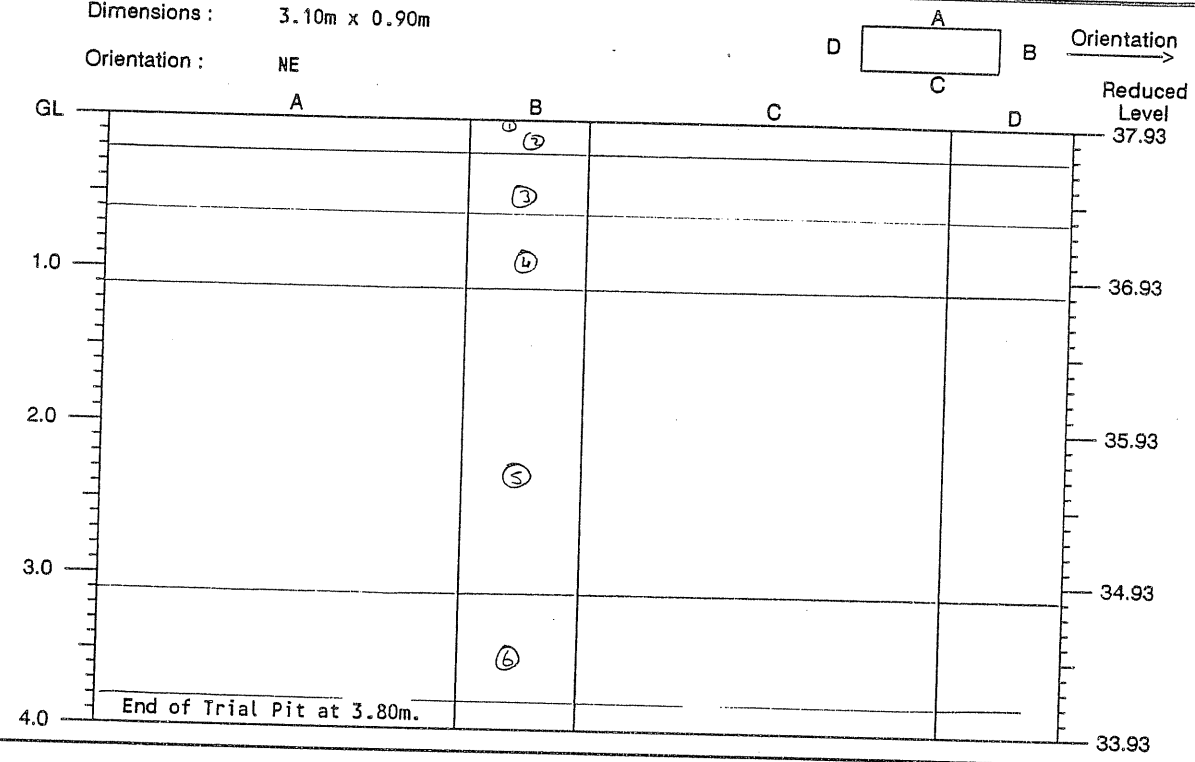
Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP2

Dimensions : 3.10m x 0.90m

Orientation : NE



Strata

Depth (m)	No.	Description
0.00-0.05	1	Turf.
0.05-0.22	2	MADE GROUND: Loose light grey sandy coarse gravel (hardcore).
0.22-0.60	3	MADE GROUND: Dark grey clayey sandy silt, locally peaty, with occasional angular fine gravel.
0.60-1.10	4	MADE GROUND: Moderately compact dark grey silty very sandy subangular fine and medium gravel, predominantly of ash and clinker. Some cobbles on Face D.
1.10-3.10	5	Very soft and soft grey and blue grey mottled with black veining, very silty CLAY. Locally peaty.
3.10-3.80	6	Grey brown very sandy subrounded and rounded medium and coarse GRAVEL with occasional cobbles.

Samples and Tests

Depth (m)	Type	Results
0.30	D	
0.80	D	
1.20	D	
2.00-2.50	B	
2.00	HV	18, 20, 21kPa
3.00	D	
3.00	HV	23, 18, 23kPa
3.10-3.50	B	
3.10	W	

Date of Excavation 21/01/97
Equipment JCB 3CX
Stability Collapsing below water level

Groundwater

No.	Struck	Behaviour
1	3.10	Standing water

Ground Level 37.93 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project

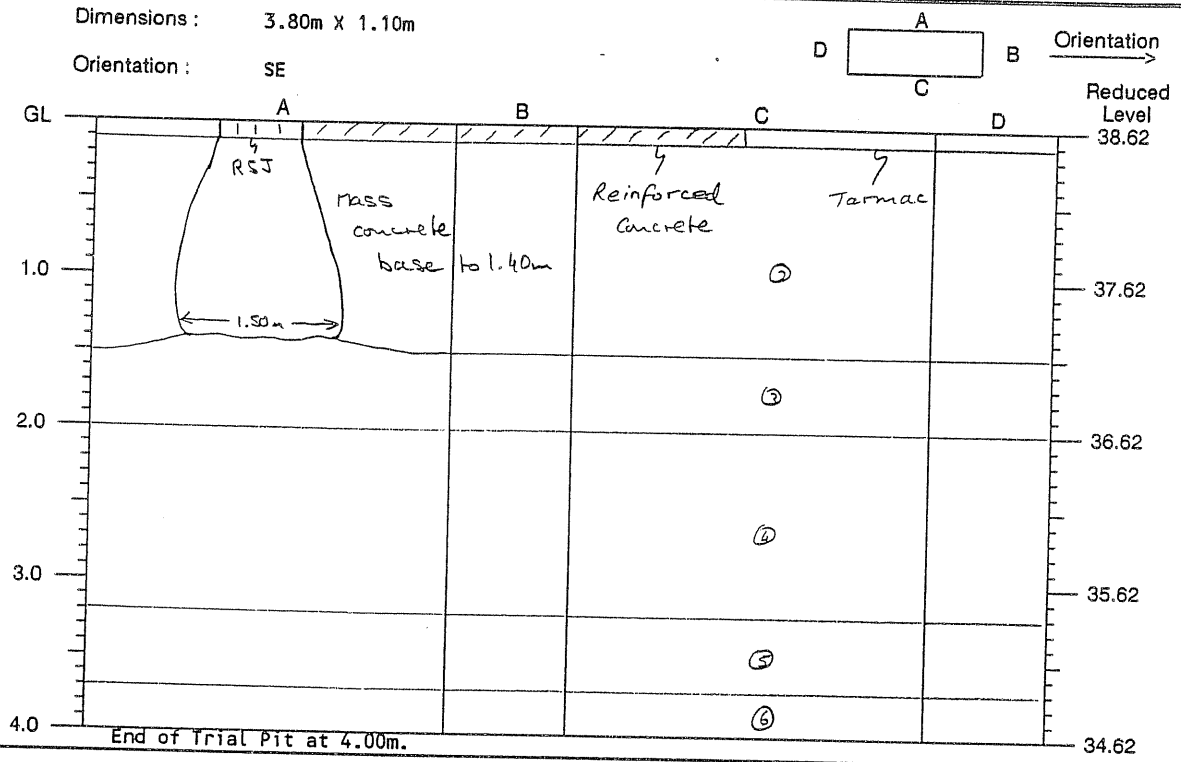
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP3

Dimensions : 3.80m X 1.10m

Orientation : SE



Strata

Depth (m)	No.	Description
0.00-0.12	1	MADE GROUND: Reinforced concrete and tarmac.
0.12-1.50	2	MADE GROUND: Loose brown and grey, mottled red brown, silty fine to coarse sand with much subangular fine to coarse gravel. Locally brick cobbles with some sand matrix.
1.50-2.00	3	Firm grey, mottled brown slightly sandy CLAY with occasional subangular fine and medium gravel. (Possible Made Ground).
2.00-3.20	4	Soft to firm grey slightly sandy very silty CLAY with occasional plant fragments. Locally sandy.
3.20-3.70	5	Firm brown mottled grey clayey fibrous PEAT. Locally tending to peaty clay.
3.70-4.00	6	Grey brown very sandy subrounded fine to coarse GRAVEL with occasional cobbles.

Samples and Tests

Depth (m)	Type	Results
0.40	D	
1.20	D	
1.70	HV	57, 52, 54kPa
2.50	D	
3.00	HV	38, 42, 32kPa
3.50	D	
3.20-3.70	B	
3.70	W	

Date of Excavation 21/01/97
Equipment JCB 3CX
Stability Walls remained vertical

Groundwater

No.	Struck	Behaviour
1	1.50	Slight seepage
2	3.70	Standing level

Ground Level 38.62 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project

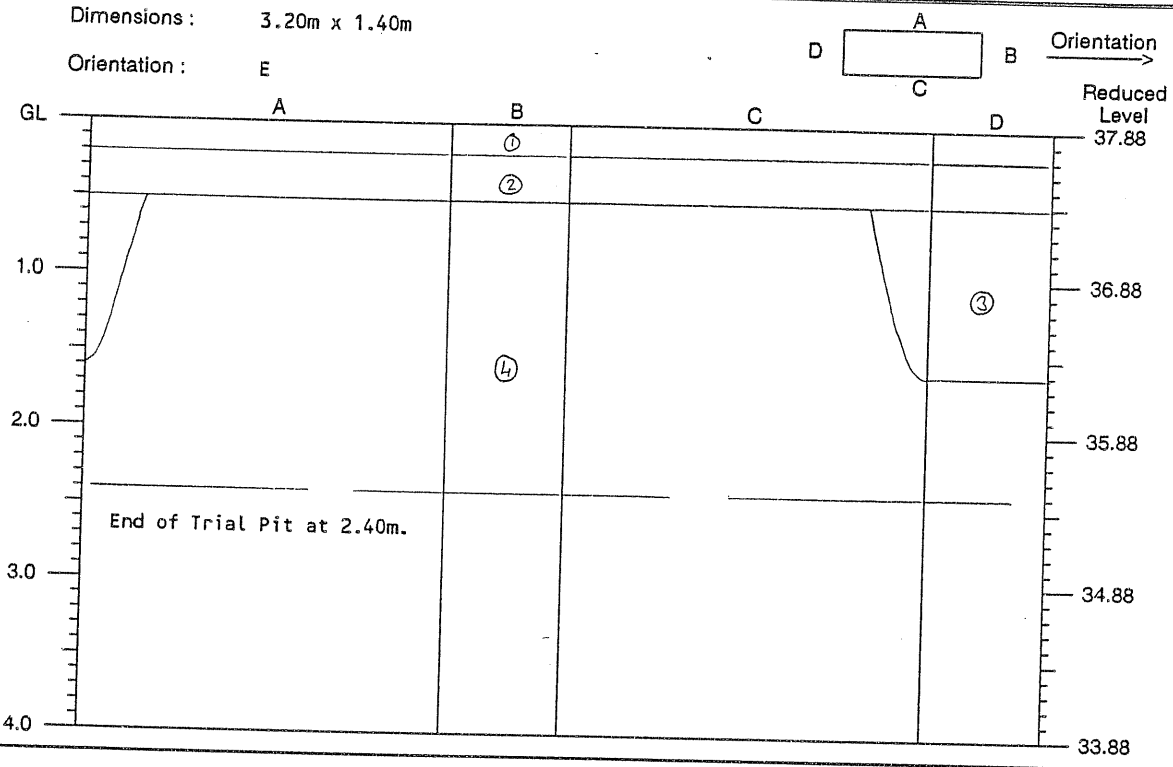
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP4

Dimensions : 3.20m x 1.40m

Orientation : E



Strata

Depth (m)	No.	Description
0.00-0.20	1	Turf over sandy topsoil.
0.20-0.50	2	Black friable organic clayey SILT. Timbers up to 0.60m x 0.30m x 0.20m.
0.50-1.60	3	Face D only: MADE GROUND: Loose black sandy angular fine to coarse ash gravel.
0.50-2.40	4	Brown slightly silty predominantly medium and coarse SAND.

Samples and Tests

Depth (m)	Type	Results
0.30	D	
1.00	D	
0.80	D	
1.50-2.00	B	
1.50	W	

Date of Excavation 21/01/97
Equipment JCB 3CX
Stability Walls collapsed to ground level

Groundwater

No.	Struck	Behaviour
1	1.50	Standing level

Ground Level 37.88 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

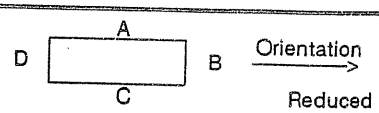
Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

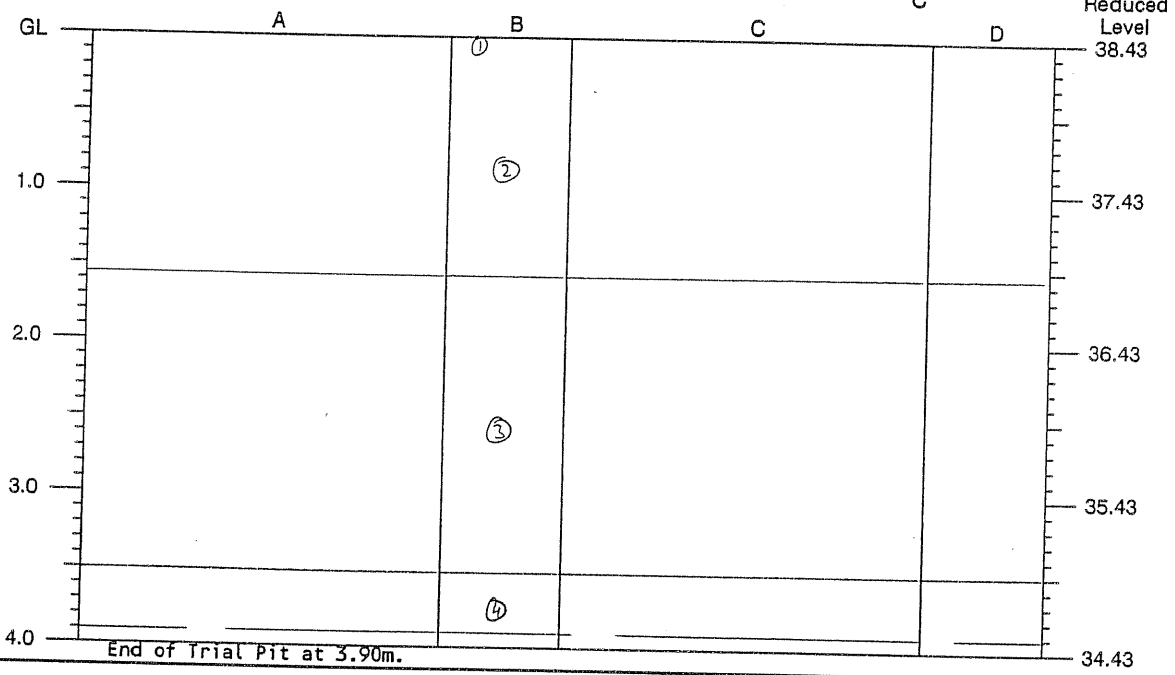
Contract 127001

Trial Pit TP5

Dimensions : 3.40m X 0.90m

Orientation : NW





Strata

Depth (m)	No.	Description
0.00-0.05	1	Turf.
0.05-1.55	2	Soft friable black silty CLAY, locally organic, with occasional roots.
1.55-3.50	3	Brown and orange brown very clayey very silty fine and medium SAND. Below 2.60m: silty. Below 3.00m: mottled grey and orange brown.
3.50-3.90	4	Brown sandy subrounded and rounded medium and coarse GRAVEL with occasional cobbles.

Samples and Tests

Depth (m)	Type	Results
0.30	D	
1.20	D	
1.60	D	
2.30-2.80	B	
3.50	D	
3.40	W	

Date of Excavation 21/01/97
Equipment JCB 3CX
Stability Walls collapsed to 2.40m.

Groundwater

No.	Struck	Behaviour
1	3.50	Fast inflow.
2	3.40	Standing level

Ground Level 38.43 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

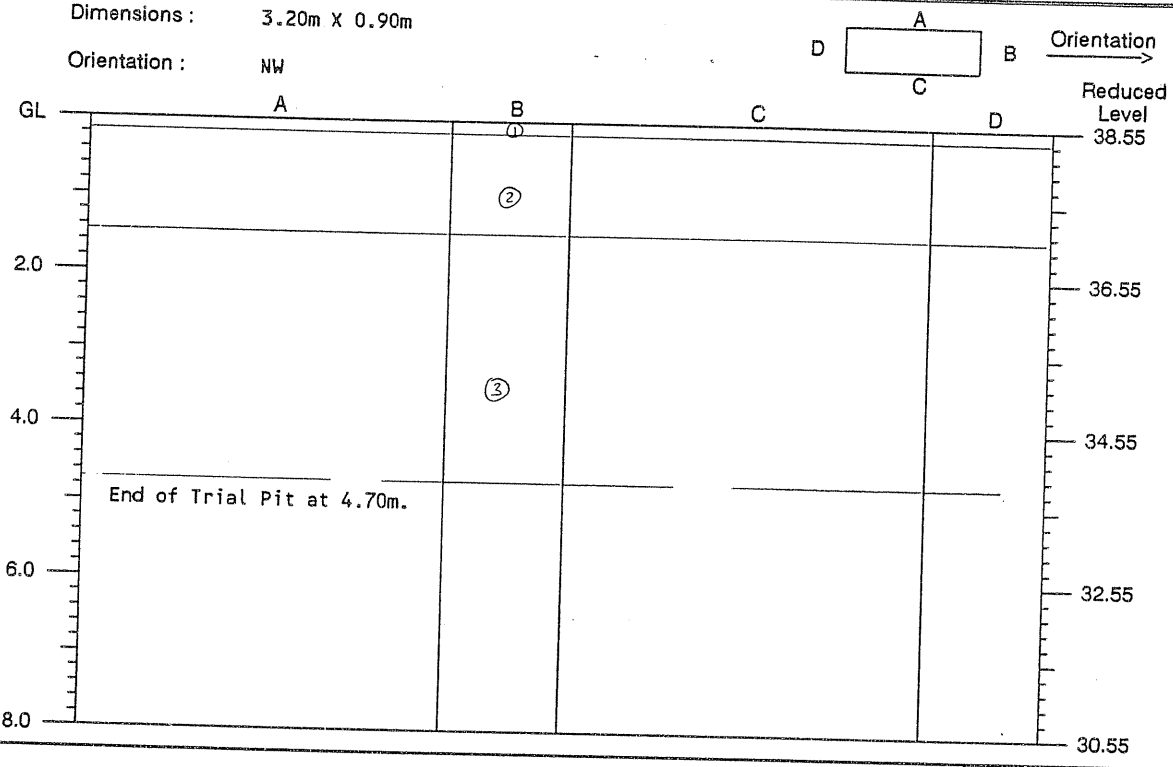
Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP6

Dimensions : 3.20m X 0.90m

Orientation : NW



Strata

Depth (m)	No.	Description
0.00-0.15	1	MADE GROUND: Reinforced concrete.
0.15-1.45	2	Soft to firm, locally firm grey mottled brown and orange brown slightly sandy CLAY with occasional subrounded fine and medium gravel.
1.45-4.70	3	Soft, locally very soft, grey slightly sandy CLAY. From 2.50m to 3.20m: sandy. Below about 3.50m: with some plant fragments, locally peaty.

Samples and Tests

Depth (m)	Type	Results
0.30	D	
1.00-1.40	B	
1.60	D	
2.70	D	
3.60	D	
3.50	HV	28, 26, 28kPa
4.50	HV	24, 22, 28kPa

Date of Excavation 21/01/97
Equipment JCB 3CX
Stability Walls remained vertical

Groundwater

No.	Struck	Behaviour
1	2.50	Locally damp between 2.50m and 3.20m
2	4.20	Slight seepage

Ground Level 38.55 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

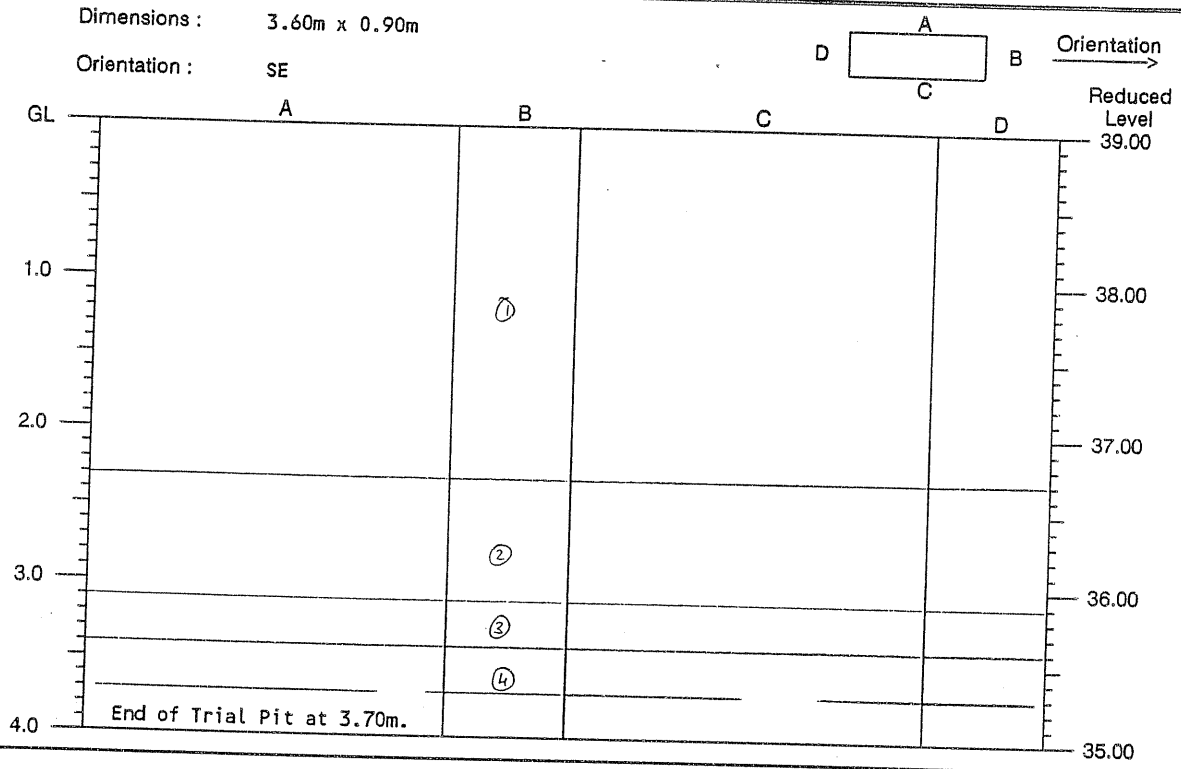
Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP7

Dimensions : 3.60m x 0.90m

Orientation : SE



Strata

Depth (m)	No.	Description
0.00-2.30	1	MADE GROUND: Dark grey and black sandy clayey silt with occasional roots. From 0.50m to 0.70m: lenses of brown medium sand up to 0.15m thick x 0.70m long
2.30-3.10	2	MADE GROUND: Grey brown and orange brown silty sandy angular fine to coarse gravel of mudstone and ash.
3.10-3.40	3	Brown and orange brown silty fine to coarse SAND.
3.40-3.70	4	Brown very sandy rounded and subrounded fine to coarse GRAVEL.

Samples and Tests

Depth (m)	Type	Results
0.20	D	
1.00	D	
1.50-2.00	B	
2.50	D	
2.50-3.00	B	
3.20	D	
3.50	D	
2.50	W	

Date of Excavation 22/01/97
Equipment JCB 3CX
Stability Collapsing below 2.50m

Groundwater

No.	Struck	Behaviour
1	2.50	Standing level

Ground Level 39.00 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project

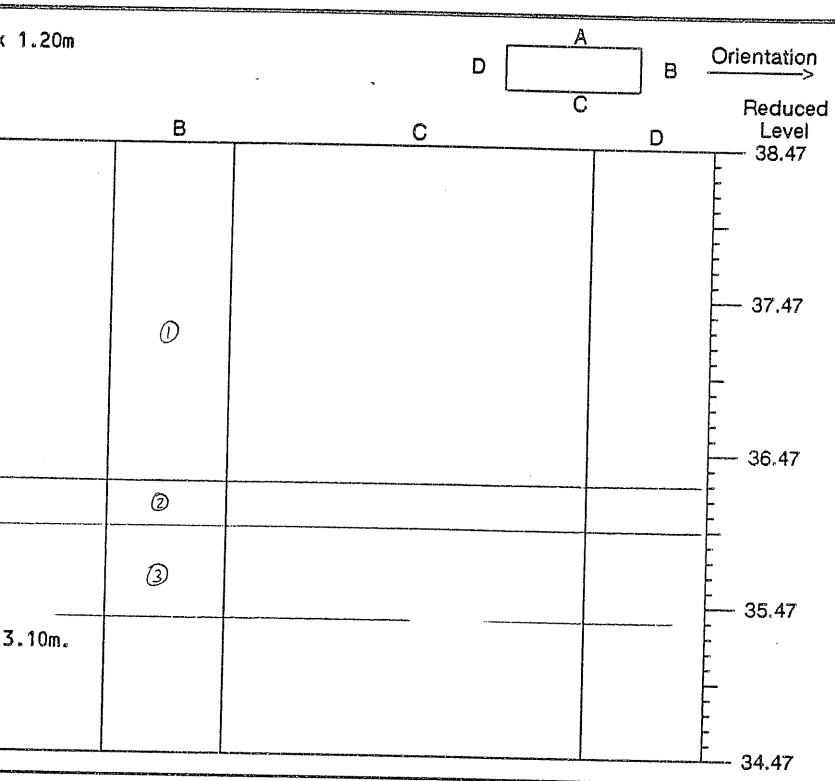
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP8

Dimensions : 3.40m x 1.20m

Orientation : WNW



Strata

Depth (m)	No.	Description
0.00-2.20	1	MADE GROUND: Loose brown grey and grey brown clayey silty sand with much subangular fine to coarse gravel and some cobbles including brick, mudstone, slag, concrete and sandstone. Occasional sandstone boulders up to 0.80m x 0.30m x 0.40m. Between about 1.20m and 1.70m: intermittent layer of soft friable brown sandy clay with occasional gravel.
2.20-2.50	2	Very soft grey, mottled orange brown very sandy CLAY.
2.50-3.00	3	Brown and red brown silty predominantly medium SAND.

Samples and Tests

Depth (m)	Type	Results
0.30	D	
0.50-1.00	B	
1.50	D	
2.30	D	
2.60	D	
2.50-3.00	B	
2.60	W	

Date of Excavation 21/01/97
Equipment JCB 3CX
Stability Walls A and C collapsed

Groundwater

No.	Struck	Behaviour
1	2.60	Standing level

Ground Level 38.47 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project

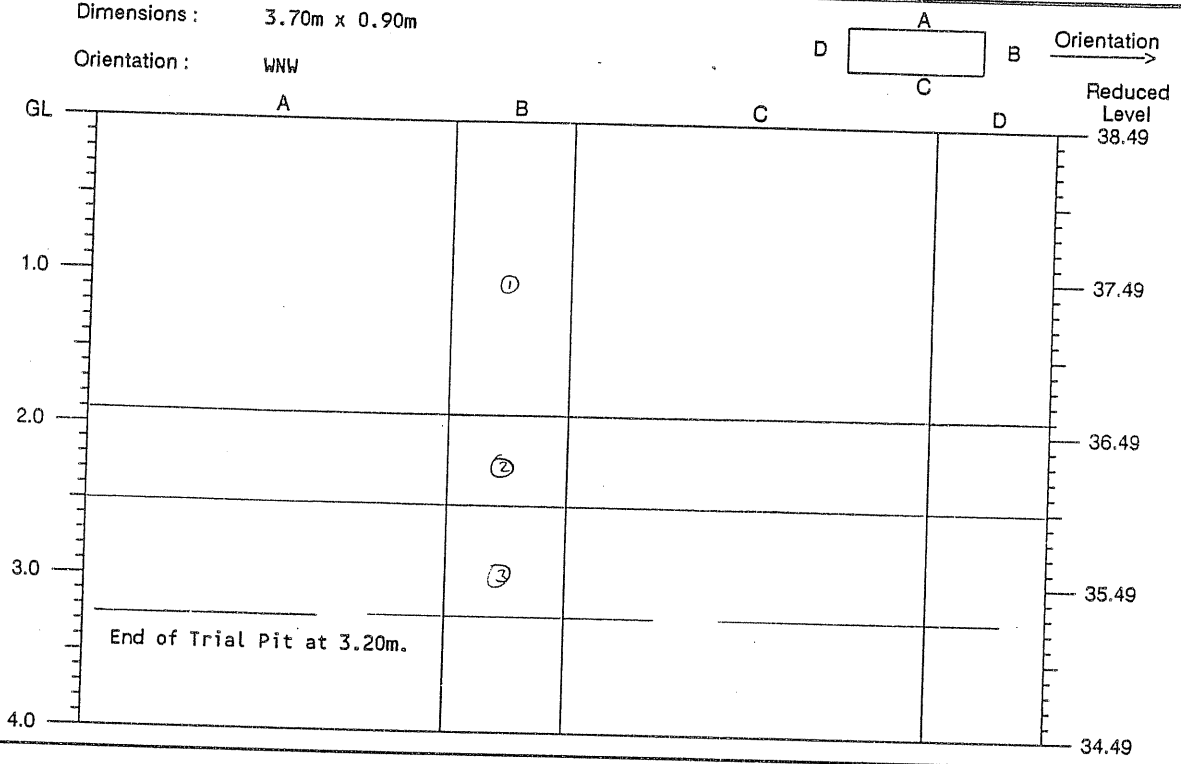
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP9

Dimensions : 3.70m x 0.90m

Orientation : WNW



Strata

Depth (m)	No.	Description
0.00-1.90	1	MADE GROUND: Firm friable grey brown, mottled orange brown and grey slightly sandy silty clay with occasional angular fine to coarse gravel and cobbles.
1.90-2.50	2	Soft grey, with orange brown veining, very silty CLAY.
2.50-3.20	3	Brown mottled orange brown clayey silty fine to coarse SAND with occasional subrounded fine to coarse gravel.

Samples and Tests

Depth (m)	Type	Results
0.40	D	
1.00	D	
1.30-1.70	B	
1.90	D	
2.70	D	
2.70	W	

Date of Excavation 22/01/97
Equipment JCB 3CX
Stability Collapsing below 2.50m

Groundwater

No.	Struck	Behaviour
1	2.70	Standing level

Ground Level 38.49 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project

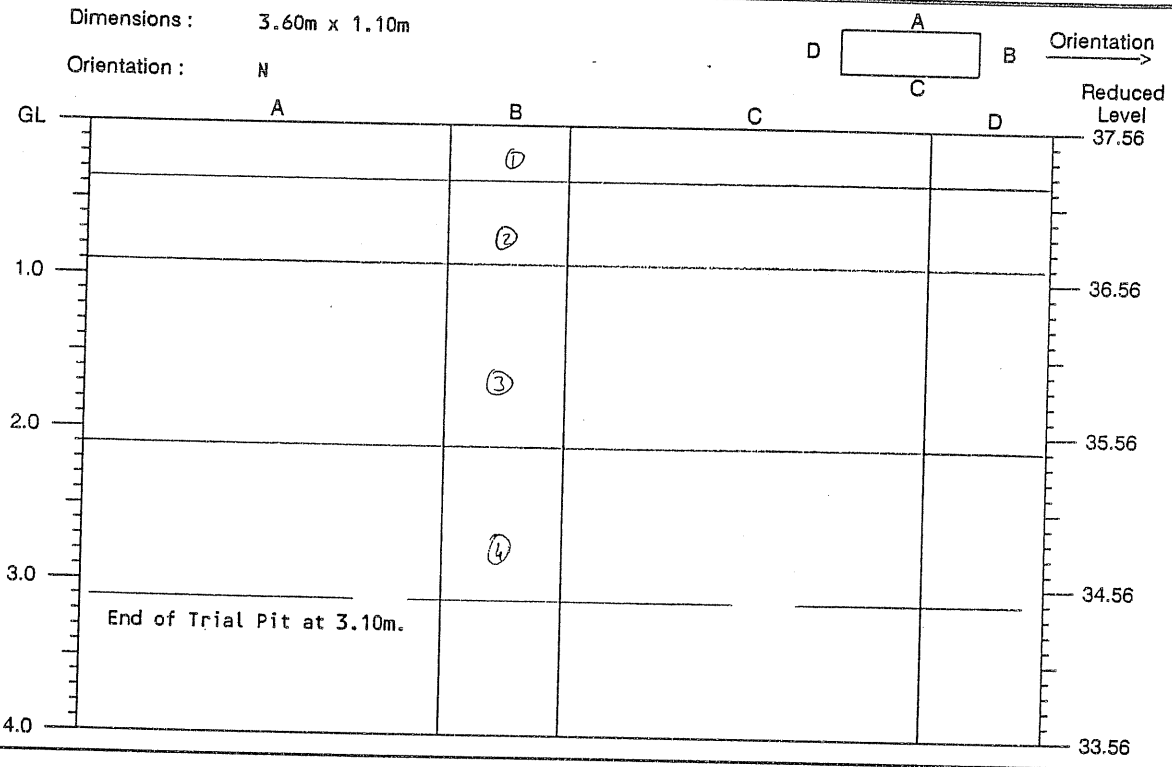
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP10

Dimensions : 3.60m x 1.10m

Orientation : N



Strata

Depth (m)	No.	Description
0.00-0.35	1	Turf over sandy topsoil.
0.35-0.90	2	Dark grey and dark grey brown sandy, locally peaty SILT with occasional roots (possible Made Ground).
0.90-2.10	3	Brown mottled grey and red brown very clayey very silty fine to coarse SAND locally tending to sandy clay. Below 1.20m: clayey, silty.
2.10-3.10	4	Brown and grey brown very sandy subrounded and rounded fine to coarse GRAVEL with occasional cobbles.

Samples and Tests

Depth (m)	Type	Results
0.30	D	
0.60	D	
1.00	D	
1.50-2.00	B	
2.40	D	
2.10	W	

Date of Excavation 22/01/97
Equipment JCB 3CX
Stability Walls A and C collapsed to ground level

Groundwater

No.	Struck	Behaviour
1	2.10	Standing level

Ground Level 37.56 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project

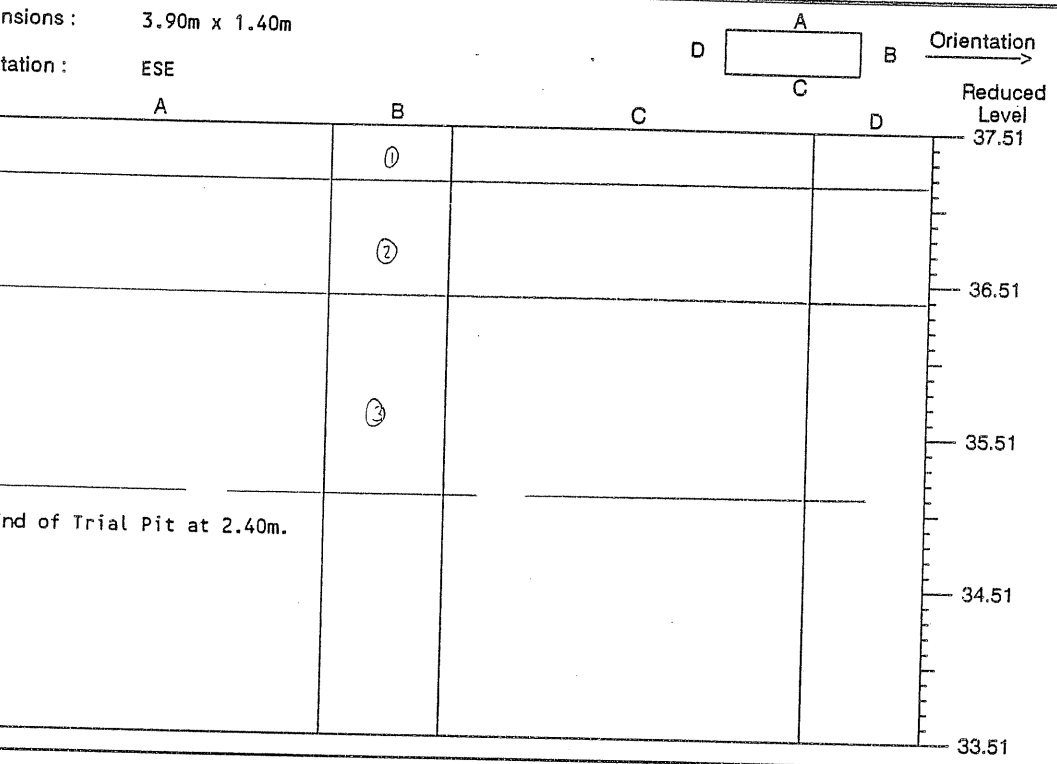
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP11

Dimensions : 3.90m x 1.40m

Orientation : ESE



Strata

Depth (m)	No.	Description
0.00-0.35	1	Turf over sandy topsoil.
0.35-1.10	2	Brown clayey silty fine to coarse SAND with occasional subrounded fine gravel.
1.10-2.40	3	Brown and grey brown fine medium and predominantly coarse SAND and subrounded fine to coarse GRAVEL. Below about 1.50m: tending to very sandy gravel.

Samples and Tests

Depth (m)	Type	Results
0.40	D	
0.50-1.00	B	
1.50-2.00	B	
1.10	W	

Date of Excavation 22/01/97
Equipment JCB 3CX
Stability Walls collapsed to ground level

Groundwater

No.	Struck	Behaviour
1	1.30	Fast inflow
2	1.10	Standing level

Ground Level 37.51 m OD

Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

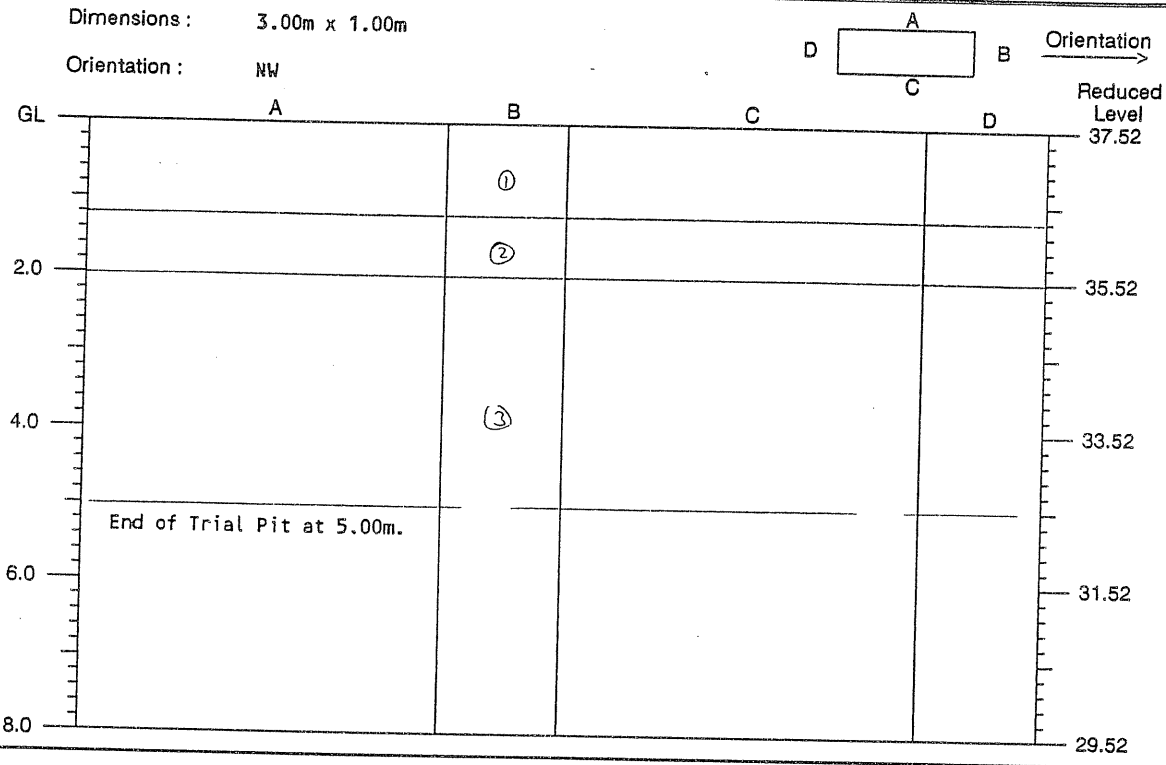
Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP12

Dimensions : 3.00m x 1.00m

Orientation : NW



Strata

Depth (m)	No.	Description
0.00-1.10	1	MADE GROUND: Brown and grey angular cobbles and boulders of concrete brick and sandstone up to 1.40m x 0.30m x 0.40m. Some matrix of dark brown silty sand.
1.10-2.00	2	Very soft thinly interlaminated dark grey and yellow brown CLAY, very silty CLAY and SILT.
2.00-5.00	3	Very soft black organic very silty CLAY.

Samples and Tests

Depth (m)	Type	Results
0.50	D	
1.50	D	
2.50	D	
4.00	D	

Date of Excavation 22/01/97
Equipment JCB 3CX
Stability Not known

Groundwater

No.	Struck	Behaviour
1	0.30	Excavated in flooded gravel pit

Ground Level 37.52 m OD

Logged by TJD
Checked by

Remarks 1. Trial Pit excavated below water level in flooded gravel pit. All depths approximate.

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Trial Pit TP13

Sampling					Strata			
Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)	Description	Depth (Thickness)	Level	Legend
0.00-0.90	B		20/01 1997		MADE GROUND: Dark grey to black, mottled orange brown very sandy subangular fine to coarse gravel including brick, slag, ash and concrete. Occasional cobbles and pockets of clayey silt.	G.L.	39.61	
0.90-1.10 1.10-1.55	D SDB	1.00	DRY	45		(2.00)		
1.90-2.10 2.10-2.55	D SDB	1.70	DRY	11	MADE GROUND: Loose and medium dense grey very clayey fine to coarse sand with some angular fine to coarse mudstone gravel. Locally tending to firm friable clay with some gravel.	2.00	37.61	
2.90-3.20 3.20-3.65	D SDB	3.00	DRY	8		(1.90)		
3.92	W				Soft grey, with black and orange brown veining, organic very silty CLAY. Below about 4.50m: locally very thinly laminated, peaty.	3.90	35.71	
4.30-4.40 4.40-4.85	D U(29)	4.40	DRY					
4.85-5.05	D					(1.50)		
5.60-5.80	D				Medium dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles. Locally tending to medium and coarse sand with much gravel.	5.40	34.21	
6.00-6.45	SDB	6.00	3.00	18				
7.60-7.70 7.70-8.15	D SDB	7.50	4.20	20		(3.20)		
8.90-9.00 9.00-9.30	D SD	9.00	7.90	50/ 150	Grey thinly laminated MUDSTONE recovered as clayey angular fine to coarse gravel.	8.60	31.01	
9.30		9.00	7.90		End of Borehole.	9.30	30.31	

Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 9.30m

Casing Dia (mm): 150 to 9.00m

Groundwater

No.	Struck	Behaviour	Sealed
1	5.40	Rose to 3.92m in 20 mins	

Ground Level 39.61 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

1. Water added from 0.00m to 3.00m to assist boring.
2. Chiselling from 8.90m to 9.00m (½ hour).
3. Monitoring well installed to 8.80m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 1(1 of 1)

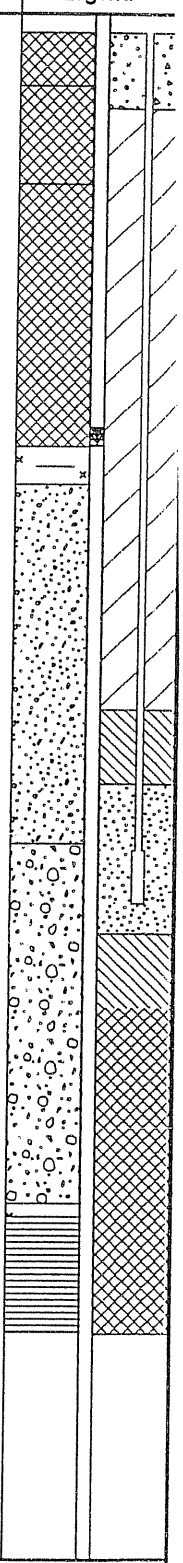
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			20/01 1997	
0.50-1.00	B			
1.00-1.45	SDB	1.00	DRY	6
1.80	D			
2.00-2.45	SDB	2.00	DAMP	8
2.60	W			
2.80	D			
3.00-3.45	U(14)	3.00	2.71	
3.65	D			
4.00-4.45	SB	4.00	3.05	11
4.80	D			
5.00-5.45	SD	5.00	3.05	20
6.00-6.50	B			
6.50-6.95	SDB	6.50	4.80	62
7.20	D			
7.35-7.80	SDB	7.35	4.80	41
7.90	D			
7.90-8.50	B			
8.50-8.67	SD	8.50	7.95	50/ 96
8.67		8.50	7.95	

Strata

Description	Depth (Thickness)	Level
Topsoil and black ash fill**	G.L.	38.40
MADE GROUND: Black very sandy subangular fine to coarse ash and slag gravel.	0.35	38.05
	(0.65)	
MADE GROUND: Soft friable dark red brown sandy clay with some subangular fine to coarse gravel including brick and ash.	1.00	37.40
	(1.75)	
	2.75	35.65
Very soft grey, locally brown, very silty CLAY.	3.00	35.40
Medium dense grey clayey very silty fine and medium SAND with occasional subrounded fine and medium gravel and occasional plant fragments. Below 3.65m: slightly clayey, slightly silty.	(2.40)	
	5.40	33.00
Medium dense and dense, brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles. Below 6.50m: locally with some matrix of firm friable brown sandy clay.	(2.41)	
	7.81	30.59
Stiff, indistinctly thinly laminated orange brown and grey very silty CLAY.	7.90	30.50
Grey thinly laminated MUDSTONE recovered as clayey angular fine and medium gravel.	8.67	29.73
End of Borehole.		

Legend



Equipment: Cable tool percussion

Borehole Dia (mm) 150 to 8.67m

Casing Dia (mm) 150 to 8.50m

Groundwater

No.	Struck	Behaviour	Sealed
1	2.75	Rose to 2.71m in 20 mins	

Ground Level 38.40 m OD

Drilled by PA
Logged by TJD
Checked by

Remarks

1. Water added from 0.00m to 2.00m to assist boring.
2. Chiselling from 8.35m to 8.50m (¼ hour).
3. Piezometer installed on completion. Tip at 5.80m.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 2(1 of 1)

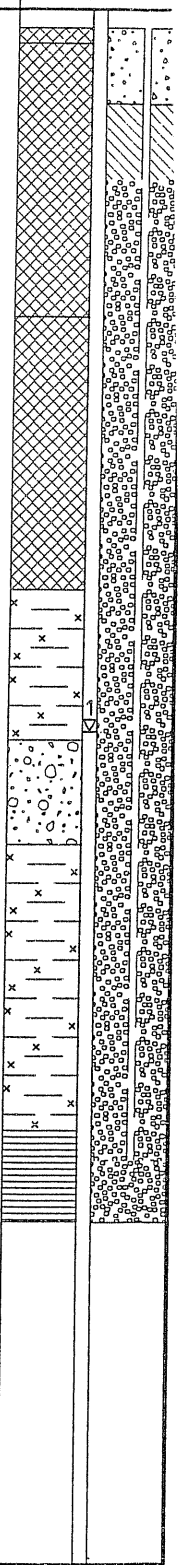
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-1.00	B		20/01 1997	
1.00-1.10	D			
1.00-1.45	SDB	1.00	DRY	6
1.90-2.00	D			
2.00-2.45	SDB	1.70	DRY	23
2.90-3.00	D			
3.00-3.45	SB	3.00	DRY	15
3.70	W			
3.90-4.00	D			
4.00-4.45	U(32)	3.70	DRY	
4.45-4.65	D			
		3.70	DRY	
4.65			21/01 3.70	
4.80-5.00	D			
5.00-5.45	SB	4.70	3.80	17
6.40-6.50	D			
6.50-6.95	SDB	6.20	3.90	30
7.50-7.60	D			
7.70-7.91	SD	7.50	7.00	50/ 90
		7.50	7.00	
7.91				

Strata

Description	Depth (Thickness)	Level
MADE GROUND: Reinforced concrete.	G.L. 0.10	39.26 39.16
MADE GROUND: Loose dark grey clayey silty very sandy subangular fine to coarse gravel including ash, slag and brick with some cobbles.	(1.80)	
MADE GROUND: Medium dense grey clayey very silty very sandy angular fine to coarse gravel of coal, mudstone and brick, locally becoming a firm to stiff friable sandy clay with some mudstone gravel.	1.90	37.36
	(1.80)	
Soft brown grey very silty CLAY with some gravel in upper part. Below about 4.00m: very soft, peaty.	3.70	35.56
	(1.00)	
Medium dense to dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles.	4.70	34.56
	(0.70)	
Very stiff friable thinly laminated light grey, mottled orange brown very silty CLAY. (Possible weathered mudstone).	5.40	33.86
	(1.90)	
Blue grey thinly laminated MUDSTONE recovered as clayey angular fine to coarse gravel.	7.30	31.96
End of Borehole.	7.91	31.35

Legend



Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 7.91m

Casing Dia (mm): 150 to 7.50m

Groundwater

No.	Struck	Behaviour	Sealed
1	4.65	Rose to 3.70m overnight	

Ground Level 39.26 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

1. Water added from 0.00m to 4.65m to assist boring.
2. Chiselling from 7.60m to 7.70m (½ hour).
3. Monitoring well installed to 7.50m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 3(1 of 1)

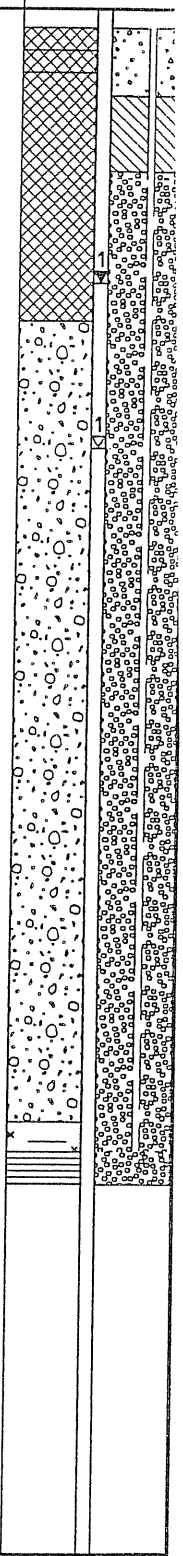
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			21/01 1997	
0.50-1.00	B			
1.00-1.45	SDB	NIL	DRY	17
1.70	W			
1.80	D			
2.00-2.45	SDB	2.00	DRY	23
2.80	D			
3.00-3.45	SDB	3.00	1.70	54
3.80	D			
4.00-4.45	SDB	4.00		50/ 30
4.80	D			
5.00-5.45	SDB	5.00		17
5.70-6.50	B			
6.50-6.95	SB	6.50		26
7.20	D			
7.30	D			
7.50-7.72	SD	7.50		50/ 87
7.72		7.50	5.00	

Strata

Description	Depth (Thickness)	Level
	G.L.	38.20
MADE GROUND: Reinforced concrete.	0.15	38.05
MADE GROUND: White stone fill**	0.30	37.90
MADE GROUND: Medium dense red brown and grey fine to coarse ash sand with much subangular fine and medium gravel including ash, slag, brick and glass.	(1.65)	
Medium dense to very dense brown slightly clayey silty very sandy subrounded fine to coarse GRAVEL with cobbles.	1.95	36.25
Below about 4.00m: with some matrix of firm friable brown sandy clay.	(5.35)	
From 5.70m to 6.50m: tending to sand with much gravel.		
Firm to stiff light grey very silty CLAY with some angular gravel of mudstone.	7.30	30.90
Grey, mottled orange brown, thinly laminated mudstone, recovered as clayey angular fine to coarse gravel.	7.50	30.70
End of Borehole.	7.72	30.48

Legend



Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 7.72m

Casing Dia (mm): 150 to 7.50m

Groundwater

No.	Struck	Behaviour	Sealed
1	2.80	Rose to 1.70m in 20 mins	4.05

Ground Level 38.20 m OD

Drilled by PA
Logged by TJD
Checked by

Remarks

1. Water added from 0.00m to 2.80m to assist boring.
2. Chiselling from 7.35m to 7.50m (½ hour).
3. Monitoring well installed to 7.50m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 4(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-1.00	B		21/01 1997	
1.40-1.50	D			
1.50-1.95	SDB	1.50	DRY	5
2.40-2.50	D			
2.50-2.95	SB	2.20	DRY	4
2.99	W			
3.40-3.50	D			
3.50-3.95	SDB	3.00	DAMP	27
4.50-4.70	D			
4.70-5.15	SDB	4.70	2.90	11
6.20-6.30	D			
6.50-6.92	SDB	6.00	6.00	50/ 270
7.20-7.40	SD	6.30	6.90	50/ 90
7.40		6.30	6.90	

Strata

Description	Depth (Thickness)	Level
MADE GROUND: Reinforced concrete.	G.L. 0.10	38.51 38.41
MADE GROUND: Loose dark grey slightly clayey silty fine to coarse ash sand and subangular fine to coarse gravel including brick, coal and slag. Occasional roots. Locally clayey.	(2.20)	
Loose brown clayey silty fine to coarse SAND with much subangular and subrounded fine to coarse gravel and cobbles, locally with some matrix of firm friable brown sandy clay. Locally becoming gravelly cobbles with much matrix of silty sand.	2.30	36.21
Medium dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles.	(1.10)	
	3.40	35.11
Firm to stiff blue grey very silty CLAY with some angular fine and medium gravel of mudstone.	(2.50)	
Grey thinly laminated MUDSTONE recovered as angular fine to coarse gravel.	5.90 (0.40) 6.30	32.61 32.21
End of Borehole.	7.40	31.11

Legend

Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 7.40m

Casing Dia (mm): 150 to 6.30m

Groundwater

No.	Struck	Behaviour	Sealed
1	3.40	Rose to 2.99m in 20 mins	6.00

Ground Level 38.51 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

1. Chiselling from 7.00m to 7.20m (½ hour).
2. Monitoring well installed to 7.20m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 5(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			21/01 1997	
0.50-1.00	B			
1.00-1.45	SDB	1.00	DRY	2
1.40	W			
1.80	D			
2.00-2.45	U(6)	2.00	DRY	
2.65	D			
2.80	D			
3.00-3.45	SDB	3.00	1.40	21
3.80	D			
4.00-4.45	SDB	4.00	1.40	64
4.80	D			
5.00-5.45	SDB	5.00	1.40	64
5.80	D			
5.90-6.10	SB	5.90	1.40	50*/ 40
6.10-6.30	B	6.25	1.40	
6.30				

Strata

Description	Depth (Thickness)	Level
MADE GROUND: Topsoil over dark grey very sandy subangular fine to coarse gravel of ash and slag.	G.L.	37.68
	(1.00)	
From 0.80m to 1.00m: with some soft brown clay pockets.	1.00	36.68
Very soft black slightly sandy very silty CLAY.		
	(1.85)	
Medium dense to very dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles.	2.85	34.83
End of Borehole.	6.30	31.38

Legend

Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 6.30m

Casing Dia (mm): 150 to 6.25m

Groundwater

No.	Struck	Behaviour	Sealed
1	3.00	Rose to 1.40m in 20 mins	

Ground Level 37.68 m OD

Drilled by PA
Logged by TJD
Checked by

Remarks

1. Water added from 0.00m to 1.00m to assist boring.
2. Chiselling from 5.90m to 6.20m (1 hour).
3. Monitoring well installed to 6.30m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 6(1 of 1)

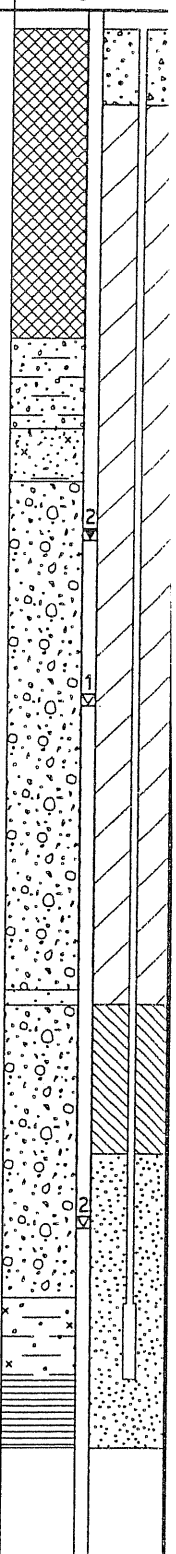
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			21/01 1997	
0.50-1.00	B			
1.00-1.45	SDB	1.00	DAMP	2
1.80	D			
2.00-2.45	U(8)	2.00	DAMP	
2.65	D			
2.80	D			
3.00-3.45	SDB	3.00	WET	9
3.40	D			
3.40	W			
4.00-4.45	SDB	4.00	WET	20
4.50		4.50	WET 22/01 3.78	
5.00-5.45	SB	5.00	WET	50/ 95
5.80	D			
6.30-6.34	SDB	6.30	WET	50*/ 40
6.45	D			
7.00-8.00	B			
8.00-8.45	SD	8.00	3.40	29
8.45-9.00	B			
9.00-9.45	SD	9.00	DRY	59
9.45		9.00	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	38.03
MADE GROUND: Very loose dark grey brown clayey silty very sandy subangular fine to coarse gravel including slag and brick.	(2.05)	
Soft dark brown sandy CLAY with occasional subrounded fine and medium gravel.	2.05	35.98
	(0.60)	
Brown very clayey silty fine and medium SAND with occasional subrounded fine and medium gravel.	2.65	35.38
	3.00	35.03
Medium dense to very dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles. Locally with some matrix of firm to stiff friable brown sandy clay.	(3.40)	
Soft grey, mottled orange brown sandy CLAY.	6.40	31.63
	6.50	31.53
Medium dense to very dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles. Locally with some matrix of firm to stiff friable brown sandy clay.	(1.95)	
Stiff grey very silty CLAY with occasional angular fine to coarse gravel of mudstone.	8.45	29.58
	(0.55)	
Grey silty MUDSTONE recovered as angular fine and medium gravel.	9.00	29.03
	9.45	28.58
End of Borehole.		

Legend



Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 9.45m

Casing Dia (mm): 150 to 9.00m

Groundwater

No.	Struck	Behaviour	Sealed
1	4.50	Rose to 3.78m overnight	
2	8.00	Rose to 3.40m in 20 mins	9.00

Ground Level 38.03 m OD

Drilled by PA
Logged by TJD
Checked by

Remarks

1. Water added from 0.00m to 4.80m to assist boring.
2. Chiselling from 6.00m to 6.30m (½ hour).
3. Piezometer installed on completion. Tip at 8.50m.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 7(1 of 1)

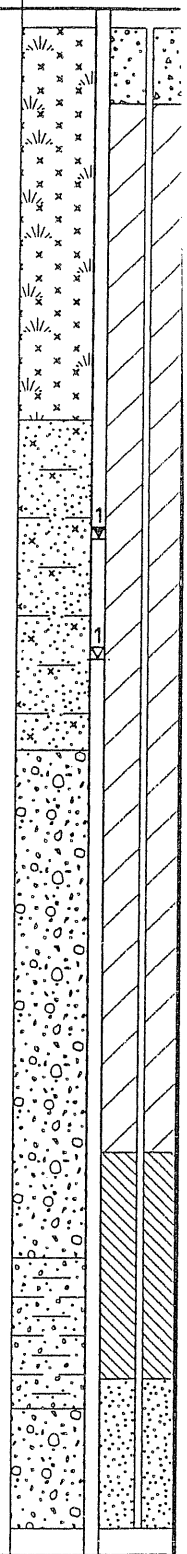
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-1.00	B		26/01 1997	
1.00-1.10	D			
1.10-1.55	U(17)	NIL	DRY	
1.55-1.75	D			
1.90-2.00	D			
2.20-2.65	SBD	NIL	DRY	8
3.10-3.20	D			
3.40	W			
3.20-3.65	U(17)	3.00	DRY	
3.65-3.85	D			
4.20-4.30	D			
4.30-4.70	S	4.20	3.40	0
4.70-5.15	SDB	4.20	3.40	28
5.90-6.00	D			
6.00-6.45	SDB	6.00	5.40	21
7.50-7.60	D			
7.60-8.01	SDB	7.50	5.70	50/ 260
8.70-8.80	D			
9.10-9.20	D			
9.20-9.65	SB	9.20	3.80	23

Strata

Description	Depth (Thickness)	Level
Turf over soft friable black peaty very clayey SILT (possible Made Ground). Below about 0.50m: with partings of yellow brown fine sand and occasional fine and medium gravel.	G.L.	39.60
	(2.60)	
Below about 2.00m: with occasional fine to coarse sand, possibly of ash.		
Brown clayey very silty fine and medium SAND. Locally tending to soft brown grey sandy clay.	2.60	37.00
	(2.20)	
Medium dense to very dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles. Locally with some matrix of firm sandy clay.	4.80	34.80
	(3.40)	
Firm grey sandy CLAY with some subrounded fine to coarse gravel.	8.20	31.40
	(1.00)	
Medium dense brown very sandy subrounded fine to coarse GRAVEL with cobbles.	9.20	30.40

Legend



Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 12.40m

Casing Dia (mm): 150 to 11.60m

Groundwater

No.	Struck	Behaviour	Sealed
1	4.20	Rose to 3.40m in 20 mins	

Ground Level 39.60 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

1. SPT at 4.30m sank under weight of hammer.
2. Piezometer installed on completion. Tip at 10.50m.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 8(1 of 2)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			26/01	
10.60-10.70 10.70-11.15	D SB	10.70	6.30	32
12.00-12.10 12.10-12.40	D SD	11.60	7.00	50/ 150
		11.60	7.00	
12.40				

Strata

Description	Depth (Thickness)	Level	Legend
(GRAVEL as from 9.20m)	(2.40)		
Grey thinly laminated MUDSTONE recovered as angular fine to coarse gravel.	11.60	28.00	
End of Borehole.	12.40	27.20	

Equipment: Cable tool percussion

Borehole Dia (mm) 150 to 12.40m

Casing Dia (mm) 150 to 11.60m

Groundwater

No. Struck Behaviour Sealed

Ground Level 39.60 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 8(2 of 2)

Sampling					Strata			
Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)	Description	Depth (Thickness)	Level	Legend
0.00-0.60	B		21/01 1997		MADE GROUND: Turf over dark grey clayey fine to coarse ash sand with much subangular fine to coarse gravel.	G.L. (0.60)	38.55	
0.80-1.00	D				MADE GROUND: Firm friable grey slightly sandy silty clay with occasional angular fine to coarse gravel of mudstone.	0.60	37.95	
1.30-1.40	D							
1.40-1.85	SDB	1.40	DRY	4		(1.40)		
					Soft blue grey sandy CLAY with occasional subangular fine and medium gravel (possible made ground).	2.00 (1.00)	36.55	
2.40-2.50	D							
2.50-2.95	U(10)F	1.70	DRY					
2.50-3.15	B							
3.00-3.20	D							
		1.70	DRY					
3.00			22/01 DRY		Soft brown grey clayey silty PEAT.	3.00 (1.20)	35.55	
3.20-3.65	U(26)	3.00	DRY					
3.65-3.85	D							
4.20-4.40	D							
4.40-4.85	SDB	4.20	DRY	17	Very soft grey and grey brown very silty CLAY, locally peaty.	4.20 (0.40)	34.35	
					Medium dense brown slightly silty very sandy subrounded fine to coarse GRAVEL.	4.60	33.95	
						4.90	33.65	
5.40-5.50	D							
5.50-5.95	SB	5.40	DRY	17	Firm to stiff grey, mottled grey green sandy CLAY with occasional angular fine and medium gravel of mudstone.	(2.20)		
6.40-6.50	D							
6.50-6.95	SDB	6.00	DRY	35				
						7.10	31.45	
7.40-7.50	D				Grey thinly laminated MUDSTONE recovered as clayey angular fine and medium gravel.			
7.50-7.71	SD	6.00	DRY	50/ 90		7.71	30.84	
		6.00	DRY		End of Borehole.			
7.71								

Equipment: Cable tool percussion

Borehole Dia (mm) 150 to 7.71m

Casing Dia (mm) 150 to 6.00m

Groundwater

No.	Struck	Behaviour	Sealed
1	4.60	Rose to 4.40m in 20 mins	

Ground Level 38.55 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

1. Water added from 0.00m to 7.00m to assist boring.
2. Chiselling from 7.30m to 7.50m (½ hour).
3. Monitoring well installed to 7.30m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 9(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			22/01 1997	
0.80-1.00	B			
1.00-1.45	U(14)	NIL	DRY	
1.50	D			
1.50-2.00	B			
2.00-2.45	SB	1.50	1.49	22
2.80	D			
3.00-3.45	SDB	3.00	1.49	19
3.80	D			
4.00-4.45	SDB	4.00	1.50	21
4.80	D			
5.00-5.45	SDB	5.00		36
6.00	D			
6.50-6.95	SB	6.00	5.50	30
7.50	D			
8.00-8.45	SB	8.00	5.50	25
8.60	D			
9.00-9.13	SD	9.00	DRY	50/ 59
		9.00	DRY	
9.13				

Strata

Description	Depth (Thickness)	Level
Topsoil over clay fill**	G.L.	37.53
	(0.80)	
Soft to firm brown slightly sandy silty CLAY with roots.	0.80	36.73
	(0.70)	
Brown clayey silty fine to coarse SAND with some subrounded fine and medium gravel.	1.50	36.03
	(0.50)	
Medium dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles. Locally with some matrix of firm friable sandy clay.	2.00	35.53
	(6.60)	
Firm to stiff grey mottled red brown very silty CLAY with occasional angular gravel of mudstone.	8.60	28.93
	8.80	28.73
Grey thinly laminated MUDSTONE recovered as angular fine to coarse gravel.	9.13	28.40
End of Borehole.		

Legend

Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 9.13m

Casing Dia (mm): 150 to 9.00m

Groundwater

No.	Struck	Behaviour	Sealed
1	1.50	Rose to 1.49m in 20 mins	8.70

Ground Level 37.53 m OD

Drilled by PA
Logged by TJD
Checked by

Remarks

1. Chiselling from 8.80m to 9.00m (½ hour).
2. Monitoring well installed to 9.00m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 10(1 of 1)

Sampling					Strata			
Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)	Description	Depth (Thickness)	Level	Legend
			24/01 1997			G.L.	37.48	
0.20-0.30	D				Turf over dark brown sandy peaty topsoil.	(0.50)		
						0.50	36.98	
0.90-1.10	D				Medium dense brown clayey silty fine and medium SAND.			
1.00-1.45	SDB	1.00	DRY	14		(1.30)		
1.30	W				Below about 1.30m: with some subrounded fine and medium gravel.			
						1.80	35.68	
1.90-2.00	D							
2.00-2.45	SDB	1.80	0.70	11	Loose and medium dense brown very sandy subrounded fine to coarse GRAVEL with cobbles.			
2.90-3.10	D					(2.60)		
3.10-3.55	SDB	3.00	1.00	8				
4.20-4.30	D							
4.30-4.75	SDB	4.20	3.40	40		4.40	33.08	
					Medium dense grey brown subrounded fine to coarse GRAVEL with some matrix of firm friable sandy clay.	(1.80)		
5.60-5.80	D							
5.80-6.25	SDB	5.80	1.50	7				
						6.20	31.28	
					Soft grey sandy CLAY.	(0.70)		
						6.90	30.58	
					Dense brown and grey brown very sandy subrounded fine to coarse GRAVEL with cobbles.			
7.40-7.50	D							
7.50-8.00	S	7.50	1.70	0	From about 7.60m to 8.10m: tending to sand with much gravel.			
8.00-8.45	SD	7.50	1.70	35				
7.50-8.50	B					(2.40)		
						9.30	28.18	
9.40-9.50	D					(0.40)		
9.70-10.11	SD	9.50	1.50	50/ 260	Firm blue grey silty CLAY with some angular fine and medium gravel of mudstone.	9.70	27.78	

Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 10.11m

Casing Dia (mm): 150 to 9.50m

Groundwater

No.	Struck	Behaviour	Sealed
1	1.80	Rose to 1.30m in 20 mins	

Ground Level 37.48 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

1. SPT at 7.50m sank 0.50m under weight of rods.
2. Chiselling from 4.70m to 4.90m (½ hour) and from 9.10m to 9.20m (½ hour).
3. Monitoring well installed to 9.70m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 11(1 of 2)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
10.11		9.50	24/01 1.50	

Strata

Description	Depth (Thickness)	Level	Legend
Grey thinly laminated MUDSTONE.	10.11	27.37	
End of Borehole.			

Equipment: Cable tool percussion

Borehole Dia (mm) 150 to 10.11m

Casing Dia (mm) 150 to 9.50m

Groundwater

No. Struck Behaviour Sealed

Ground Level 37.48 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 11(2 of 2)

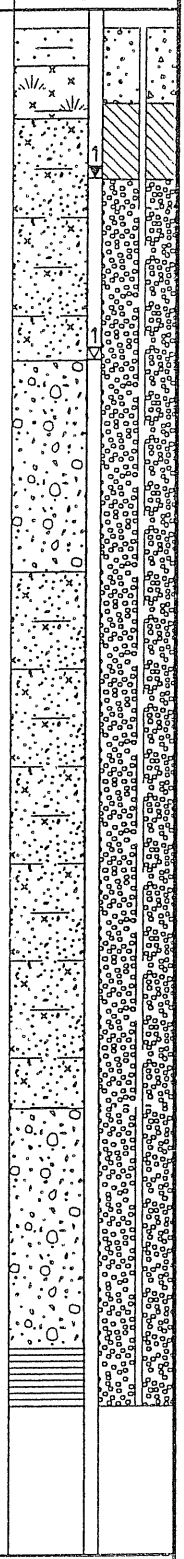
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.20	D		22/01 1997	
0.30-0.50	D			
0.60-0.70	D			
0.90-1.00	D			
1.00	W			
1.20-1.65	SDB	1.20	DRY	9
1.90-2.00	D			
2.40-2.85	SB	2.40	1.00	6
3.40-3.50	D			
3.50-3.95	SDB	3.20	1.20	26
4.40-4.50	D			
4.50-4.95	SDB	4.50	1.50	33
5.80-5.90	D			
5.90-6.35	U(141)	5.90	2.90	
6.35-6.55	D			
7.40-7.50	D			
7.50-7.95	SDB	7.50	4.00	12
		8.00	4.0	
8.00			23/01 2.98	
8.30-8.40	D			
8.60-8.70	D			
8.80-9.19	SD	8.80	4.50	48/ 240
		8.80	4.50	
9.19				

Strata

Description	Depth (Thickness)	Level
	G.L.	37.41
Turf over soft grey, mottled light brown, sandy CLAY with roots.	0.25	37.16
Soft friable dark brown clayey peaty SILT with occasional roots.	0.60	36.81
Loose brown clayey silty fine to coarse SAND. Below about 1.50m: with much subrounded fine to coarse gravel.	(1.60)	
Medium dense and dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles. Locally tending to sand with much gravel.	2.20	35.21
Grey very clayey very silty fine to coarse SAND, locally with some subrounded fine to coarse gravel.	(1.40)	
	3.60	33.81
	(3.60)	
Medium dense grey brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles.	7.20	30.21
	(1.60)	
Grey thinly laminated MUDSTONE recovered as angular fine to coarse gravel.	8.80	28.61
End of Borehole.	9.19	28.22

Legend



Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 9.19m

Casing Dia (mm): 150 to 8.80m

Groundwater

No.	Struck	Behaviour	Sealed
1	2.20	Rose to 1.00m in 20 mins	

Ground Level 37.41 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

1. Chiselling from 8.60m to 8.70m (45 minutes).
2. Monitoring well installed to 8.80m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 12(1 of 1)

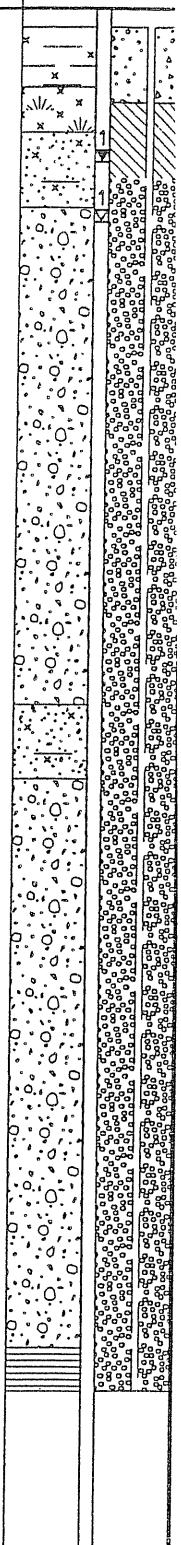
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			23/01 1997	
0.20-0.40	D			
0.40-0.60	D			
0.90	W			
0.90-1.00	D			
1.10-1.20	D			
1.20-1.65	SB	1.00	DAMP	6
1.90-2.10	D			
2.20-2.65	SDB	2.20	1.00	16
3.10-3.20	D			
3.30-3.75	SDB	3.20	0.95	25
4.20-4.30	D			
4.50-4.60	D			
5.00-5.39	SDB	4.70	1.90	50/ 240
6.40-6.50	D			
6.50-6.95	SDB	6.20	1.00	20
7.50-7.60	D			
7.60-8.05	SDB	7.50	1.20	39
8.90-9.00	D			
9.00-9.09	C	8.90	4.30	50/ 40
9.09		8.90	4.30	

Strata

Description	Depth (Thickness)	Level
	G.L.	37.46
Turf over firm indistinctly thinly laminated grey and light brown very silty CLAY with roots.	(0.40)	
	0.40	37.06
Dark grey brown friable clayey peaty SILT with occasional subrounded fine and medium gravel.	0.70	36.76
	(0.50)	
Grey brown clayey silty fine to coarse SAND.	1.20	36.26
Medium dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles.	(3.30)	
	4.50	32.96
Grey brown clayey silty fine and medium SAND with some subrounded fine and medium gravel.	(0.50)	
	5.00	32.46
Medium dense to very dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles locally with some matrix of firm friable sandy clay.	(3.80)	
	8.80	28.66
Dark grey thinly laminated shaley MUDSTONE recovered as angular medium and coarse gravel.	9.09	28.37
End of Borehole.		

Legend



Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 9.09m

Casing Dia (mm): 150 to 8.90m

Groundwater

No.	Struck	Behaviour	Sealed
1	1.30	Rose to 0.90m in 20 mins	

Ground Level 37.46 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

1. Chiselling from 8.90m to 9.00m (½ hour).
2. Monitoring well installed to 9.00m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 13(1 of 1)

Sampling					Strata			
Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)	Description	Depth (Thickness)	Level	Legend
			23/01 1997		Turf.	G.L. 0.10	37.71 37.61	
0.50-1.00	B				MADE GROUND: Black clayey ash sand with some pockets of brown sandy peat and fibrous brown clay.	(0.70)		
1.00-1.45	U(12)	1.00	DRY		Soft brown slightly sandy CLAY (Possible Made Ground).	0.80 (0.70)	36.91	
1.65	D					1.50	36.21	
1.65-2.00	B				Medium dense and dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles. Locally with some matrix of firm friable sandy clay.			
2.00-2.45	SDB	2.00	WET	35				
2.80	D							
2.80	W							
3.00-3.45	SDB	3.00	2.80	24				
3.80	D							
4.00-4.45	SB	4.00	2.80	38				
4.80	D							
5.00-5.45	SDB	5.00	2.80	50/ 135		(7.90)		
6.00-6.45	SDB	6.00	2.80	50/ 200				
6.45-7.45	B				From 6.20m to 6.50m: grey with some matrix of firm friable sandy clay.			
7.50-7.95	SB	7.50	5.75	24				
8.50	D							
8.80-9.25	SB	8.80	DRY	28				
9.40-9.70	B							
9.70-9.82	SD	9.40	7.40	50/ 51	Firm blue grey very silty CLAY with some angular fine to coarse gravel.	9.40	28.31	
		9.40	7.40			9.70 9.82	28.01 27.89	

Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 9.82m

Casing Dia (mm): 150 to 9.40m

Groundwater

No.	Struck	Behaviour	Sealed
1	1.09	No rise in 20 minutes	2.00
2	3.00	Rose to 2.80m in 20 mins	7.50
3	9.00	Rose to 4.10m in 5 mins	

Ground Level 37.71 m OD

Drilled by PA
Logged by TJD
Checked by

Remarks

1. Chiselling from 6.00m to 6.20m (½ hour) and 9.40m to 9.70m (½ hour).
2. Piezometer installed on completion. Tip at 9.35m.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 14(1 of 2)

Sampling					Strata			
Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)	Description	Depth (Thickness)	Level	Legend
9.82					Grey thinly laminated MUDSTONE recovered as clayey angular fine to coarse gravel. End of Borehole.			

Equipment: Cable tool percussion

Borehole Dia (mm) 150 to 9.82m

Casing Dia (mm) 150 to 9.40m

Groundwater

No. Struck Behaviour Sealed

Ground Level 37.71 m OD

Drilled by PA
Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

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Borehole 14(2 of 2)

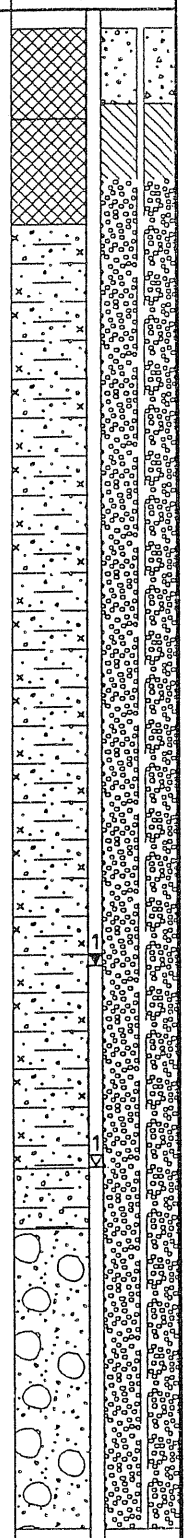
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.00-0.60	B		27/01 1997	
0.90-1.10	D			
1.20-1.65	SDB	1.20	DRY	21
1.90-2.10	D			
2.10-2.55	SDB	1.70	DRY	21
3.00-3.20	D			
3.20-3.65	SDB	3.20	DRY	24
4.00-4.10	D			
4.10-4.55	U(100)	3.90	DRY	
4.55-4.75	D			
5.00-5.10	D			
5.10-5.55	SDB	4.70	DRY	21
6.25	W			
6.50-6.60	D			
6.60-7.05	SDB	6.00	DRY	15
7.90-8.00	D			
8.00-8.45	SDB	7.80	6.00	44
9.00-9.20	D			
9.30-9.75	SDB	9.20	6.50	59

Strata

Description	Depth (Thickness)	Level
Turf over MADE GROUND: Dark grey to black sandy angular fine to coarse gravel with cobbles including brick ash and concrete.	G.L. (0.60)	41.34
MADE GROUND: Dark grey to black very silty fine to coarse sand with some subangular fine and medium gravel including ash and slag.	0.60 (0.70)	40.74
Stiff brown, mottled blue grey slightly sandy silty CLAY with occasional subangular fine and medium gravel.	1.30 (6.30)	40.04
Below about 4.00m: locally firm and firm to stiff grey and brown, locally orange brown.		
Below 6.50m: locally indistinctly thinly laminated.	7.60 (0.40)	33.74
Soft brown grey slightly sandy CLAY with some subrounded medium and coarse gravel.	8.00 (2.80)	33.34
Dense and very dense brown slightly silty very sandy subrounded fine to coarse GRAVEL with cobbles and boulders.		

Legend



Equipment: Cable tool percussion

Borehole Dia (mm): 150 to 11.15m

Casing Dia (mm): 150 to 10.60m

Groundwater

No.	Struck	Behaviour	Sealed
1	7.60	Rose to 6.25m in 20 mins	

Ground Level 41.34 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

1. Water added from 0.00m to 7.50m to assist boring.
2. Chiselling from 10.40m to 10.50m (½ hour) and from 10.90m to 11.00m (½ hour).
3. Monitoring well installed to 11.00m on completion.

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Borehole 15(1 of 2)

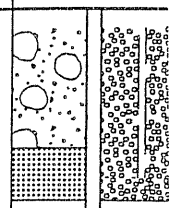
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			27/01	
10.50-10.60	D			
10.60-11.15	SDB	10.60	7.00	43
11.15-11.20	C	10.90	6.30	50/ 25
		10.60	7.00	
11.15				

Strata

Description	Depth (Thickness)	Level
(GRAVEL as from 8.00m)		
Brown thinly laminated fine grained SANDSTONE recovered as angular medium and coarse gravel.	10.80	30.54
End of Borehole.	11.15	30.19

Legend



Equipment: Cable tool percussion

Borehole Dia (mm) 150 to 11.15m

Casing Dia (mm) 150 to 10.60m

Groundwater

No. Struck Behaviour Sealed

Ground Level 41.34 m OD

Drilled by JF
Logged by TJD
Checked by

Remarks

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project

Forge Lane Former Steelworks
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Borehole 15(2 of 2)

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
1	1.10 - 1.55	S	5	5	6	12	12	15	45
1	2.10 - 2.55	S	2	3	4	3	2	2	11
1	3.20 - 3.65	S	2	1	2	2	2	2	8
1	6.00 - 6.45	S	6	6	6	4	4	4	18
1	7.70 - 8.15	S	1	2	3	3	5	9	20
1	9.00 - 9.30	S	11	14	18	30	2/ 0		50/ 150

Remarks N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

Exploration Associates

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

SPT/1

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
2	1.00 - 1.45	S	1/ 150		1	2	1	2	6
2	2.00 - 2.45	S	1/ 150		2	2	2	2	8
2	4.00 - 4.45	S	1	1	1	2	4	4	11
2	5.00 - 5.45	S	8	5	5	5	5	5	20
2	6.50 - 6.95	S	8	10	15	17	15	15	62
2	7.35 - 7.80	S	7	14	12	10	9	10	41
2	8.50 - 8.67	S	25		35	15/ 21			50/ 96

Remarks

N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

Exploration Associates

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Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

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SPT/2

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
3	1.00 - 1.45	S	2	2	2	1	2	1	6
3	2.00 - 2.45	S	3	3	3	6	8	6	23
3	3.00 - 3.45	S	3	6	8	3	2	2	15
3	5.00 - 5.45	S	2	2	4	4	4	5	17
3	6.50 - 6.95	S	5	5	5	6	8	11	30
3	7.70 - 7.91	S	13	12/ 45	36	14/ 15			50/ 90

Remarks N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

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Thornhill, Dewsbury
Kirklees M.B.C.

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SPT/3

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
4	1.00 - 1.45	S	1	3	4	4	5	4	17
4	2.00 - 2.45	S	5	6	5	7	6	5	23
4	3.00 - 3.45	S	25	6	6	19	18	11	54
4	4.00 - 4.45	S	7	19	50/ 30				50/ 30
4	5.00 - 5.45	S	4	4	7	3	4	3	17
4	6.50 - 6.95	S	3	5	5	5	7	9	26
4	7.50 - 7.72	S	3	19	39	11/ 12			50/ 87

Remarks N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

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Kirklees M.B.C.

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SPT/4

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
5	1.50 - 1.95	S	2	1	2	1	1	1	5
5	2.50 - 2.95	S	1/ 225			1	1	2	4
5	3.50 - 3.95	S	4	4	5	7	9	6	27
5	4.70 - 5.15	S	6	4	3	3	3	2	11
5	6.50 - 6.92	S	8	11	11	13	13	13/ 45	50/ 270
5	7.20 - 7.40	S	11	14/ 35	32	18/ 15			50/ 90

Remarks

N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

Exploration Associates

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Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

SPT/5

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
6	1.00 - 1.45	S	1		1		1		2
6	3.00 - 3.45	S	7	6	6	5	5	5	21
6	4.00 - 4.45	S	6	12	15	15	19	15	64
6	5.00 - 5.45	S	6	12	15	15	19	15	64
6	5.90 - 6.10	S	50/ 40						50*/ 40

Remarks N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

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Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

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SPT/6

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
7	1.00 - 1.45	S	1		1		1		2
7	3.00 - 3.45	S	2	2	2	2	2	3	9
7	4.00 - 4.45	S	3	5	4	5	5	6	20
7	5.00 - 5.45	S	4	19	15	35/ 20			50/ 95
7	6.30 - 6.34	S	50/ 40						50*/ 40
7	8.00 - 8.45	S	2	4	5	8	8	8	29
7	9.00 - 9.45	S	5	7	9	15	15	20	59

Remarks N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

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Thornhill, Dewsbury
Kirklees M.B.C.

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SPT/7

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
8	2.20 - 2.65	S	1	1	2	2	2	2	8
8	4.70 - 5.15	S	1	4	7	8	7	6	28
8	6.00 - 6.45	S	3	3	6	6	5	4	21
8	7.60 - 8.01	S	5	11	13	15	15	7/ 35	50/ 260
8	9.20 - 9.65	S	2	3	5	5	6	7	23
8	10.70 - 11.15	S	3	8	8	8	8	8	32
8	12.10 - 12.40	S	12	13	25	25/ 75			50/ 150

Remarks N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

Exploration Associates

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Thornhill, Dewsbury
Kirklees M.B.C.

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SPT/8

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
9	1.40 - 1.85	S	1	1		1	2	1	4
9	4.40 - 4.85	S	1	1	1	2	7	7	17
9	5.50 - 5.95	S	2	4	4	4	5	4	17
9	6.50 - 6.95	S	6	12	8	8	9	10	35
9	7.50 - 7.71	S	12	13/ 45	31	19/ 15			50/ 90

Remarks

N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

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SPT/9

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
10	2.00 - 2.45	S	7	19	5	7	5	5	22
10	3.00 - 3.45	S	4	4	5	4	5	5	19
10	4.00 - 4.45	S	5	4	5	5	5	6	21
10	5.00 - 5.45	S	15	19	8	9	8	11	36
10	6.50 - 6.95	S	3	4	11	7	7	5	30
10	8.00 - 8.45	S	18	14	7	5	5	8	25
10	9.00 - 9.15	S	19	6/7	50/59				50/59

Remarks N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

Exploration Associates

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SPT/10

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
11	1.00 - 1.45	S	1/ 150		3	3	4	4	14
11	2.00 - 2.45	S	2	2	3	3	2	3	11
11	3.10 - 3.55	S	3	3	2	1	2	3	8
11	4.30 - 4.75	S	3	6	7	9	11	13	40
11	5.80 - 6.25	S	5	3	2	1	1	3	7
11	7.50 - 8.00	S	Sank 0.50m under weight of hammer						0
11	8.00 - 8.45	S	1	5	6	7	10	12	35
11	9.70 - 10.11	S	5	9	11	13	16	10/ 35	50/ 260

Remarks

N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

Exploration Associates

Project
Forge Lane Former Steelworks
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Kirklees M.B.C.

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SPT/11

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
12	1.20 - 1.65	S	2	3	3	2	2	2	9
12	2.40 - 2.85	S	1/ 150		1	2	1	2	6
12	3.50 - 3.95	S	2	7	7	6	6	7	26
12	4.50 - 4.95	S	5	7	8	10	7	8	33
12	7.50 - 7.95	S	1	3	2	2	4	4	12
12	8.80 - 9.19	S	5	8	13	13	15	7/ 15	48/ 240

Remarks

N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Form 4/0

Standard Penetration Test

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

SPT/12

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
13	1.20 - 1.65	S	1	2	2	1	2	1	6
13	2.20 - 2.65	S	3	3	3	4	4	5	16
13	3.30 - 3.75	S	3	4	5	8	6	6	25
13	5.00 - 5.39	S	5	8	15	15	15	5/ 15	50/ 240
13	6.50 - 6.95	S	1	1	2	4	5	9	20
13	7.60 - 8.05	S	4	8	10	8	10	11	39
13	9.00 - 9.09	C	25/ 50		50/ 40				50/ 40

Remarks

N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Standard Penetration Test

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Form 4/0

Contract 127001

SPT/13

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
14	2.00 - 2.45	S	9	15	18	7	5	5	35
14	3.00 - 3.45	S	5	7	5	6	6	7	24
14	4.00 - 4.45	S	3	7	9	10	9	10	38
14	5.00 - 5.45	S	7	15	25	25/60			50/135
14	6.00 - 6.20	S	7	9	15	19	16/50		50/200
14	7.50 - 7.95	S	18	7	7	6	6	5	24
14	8.80 - 9.25	S	3	4	7	7	7	7	28
14	9.70 - 9.82	S	25/76		50/51				50/51

Remarks

N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Standard Penetration Test

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

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SPT/14

Test			Blows						
BH	Depth	Type	Seating Drive		Test Drive				'SPT' N
			75mm	75mm	75mm	75mm	75mm	75mm	
15	1.20 - 1.65	S	2	2	3	5	4	9	21
15	2.10 - 2.55	S	2	2	5	5	5	6	21
15	3.20 - 3.65	S	2	3	4	5	7	8	24
15	5.10 - 5.55	S	2	3	5	5	5	6	21
15	6.60 - 7.05	S	2	2	3	4	4	4	15
15	8.00 - 8.45	S	6	8	10	10	12	12	44
15	9.30 - 9.75	S	5	10	12	13	16	18	59
15	10.60 - 11.15	S	4	4	4	4	5	30	43
15	11.15 - 11.20	C	25/ 25		50/ 25				50/ 25

Remarks

N Value: x*/y denotes x blows for y mm penetration within the seating drive.
x/y denotes x blows for y mm penetration beyond the seating drive.

Type: S = Split Barrel
C = Solid Cone

Standard Penetration Test

Exploration Associates

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Form 4/0

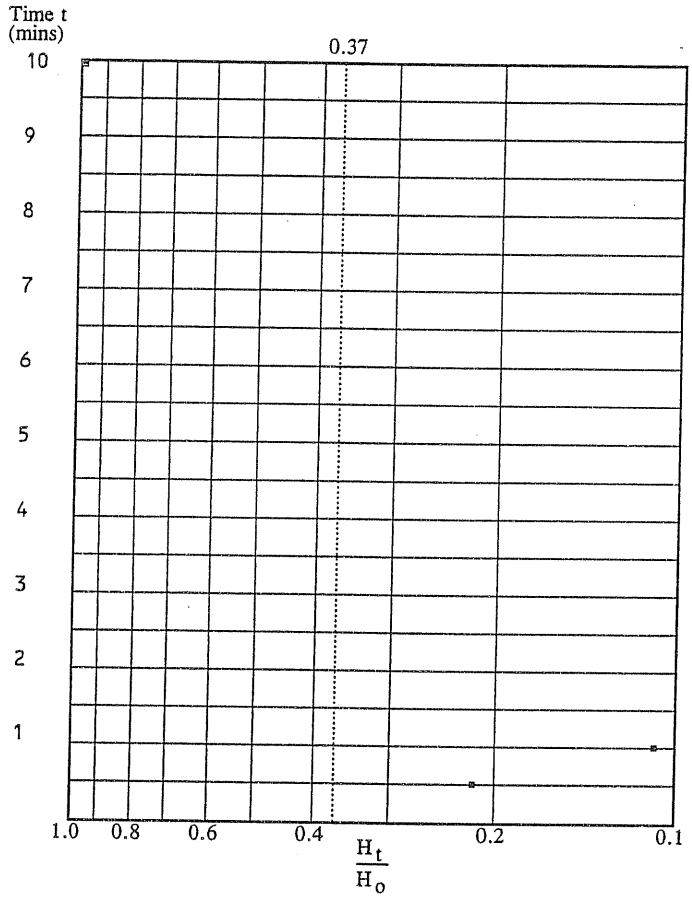
Contract 127001

SPT/15

ENCLOSURE B

In situ tests and measurements

	Sheet
Falling head permeability test results	P1 to P5
Groundwater Levels in Piezometers and Standpipes	WL1 to WL2
Gas concentrations in standpipes	G1 - G3



Time Elapsed (t) mins	Depth Below Datum at Time t (m)	H_t	$\frac{H_t}{H_o}$
0.00	0.000	1.800	1.000
0.50	1.400	0.400	0.222
1.00	1.600	0.200	0.111
1.50	1.720	0.080	0.044
2.00	1.760	0.040	0.022
3.00	1.780	0.020	0.011
4.00	1.785	0.015	0.008
5.00	1.790	0.010	0.006
10.00	1.800	0.000	0.000

Borehole No: 2

Date: 27/01/97

Type of Test: Falling Head

Diameter of Borehole/Piezo Pipe d:	0.019	m
Area of Borehole/Standpipe tubing A:	0.0003	m^2
Depth to Base of Casing:	5.00	m
Depth to Base of Borehole Before Test:	6.00	m
Depth to Base of Borehole After Test	6.00	m
Test Section	1.00m response zone	m
Test Length L:	1.00	m
Diameter of Test Length D:	0.150	m
Datum:	0.00	

Note: Depths given below are measured from **Datum.**

Depth to Standing Water Level:	1.80	m
Depth to Induced Water Level:	0.00	m

H_o = Differential Head at Start of Test: 1.80 m

H_f = Differential Head at End of Test: 0.00 m

t_f = Time Elapsed at End of Test: 10.00 mins

Shape Factor

Based on Figure 7 a - f (Cases 1-6), and Figure 8 (Case 7) of BS5930 1981

Case: 7 F = 2.73

PERMEABILITY CALCULATION

Time Lag Approach

T = Basic time lag when $(H_t/H_o) = 0.37$: 15 sec

Permeability k = A/FT = 6.9×10^{-6} m/sec

General Approach

H_1 selected at t = mins (= t_1 = secs)

H_2 selected at t = mins (= t_2 = secs)

Permeability

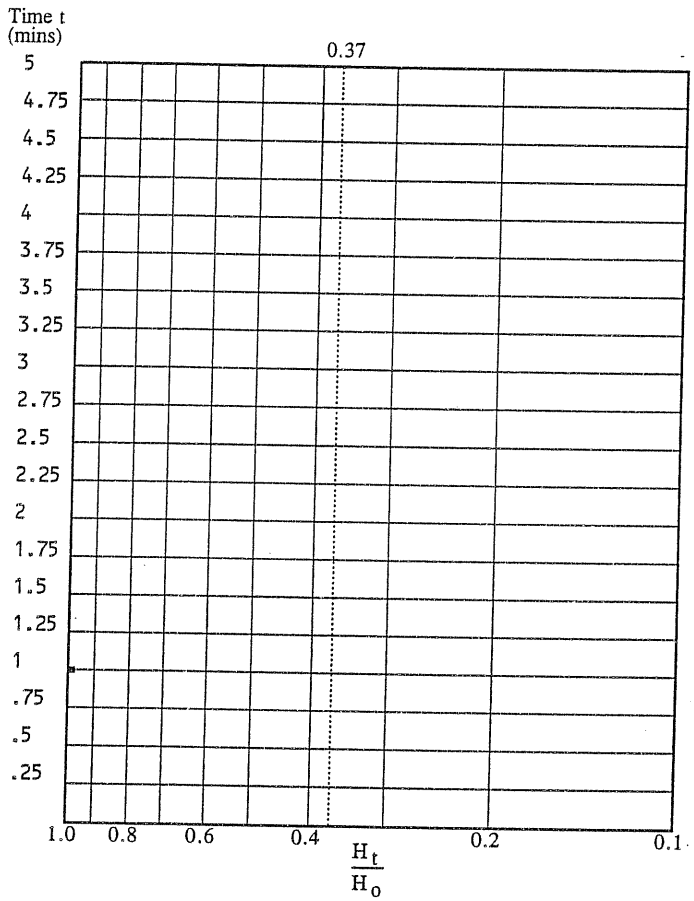
$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2} =$$ m/sec

Remarks Test carried out in 19mm diameter piezometer. Response zone from 5.00m to 6.00m.

Form 5/0

Notation: Measurements from Ground Level downwards +ve (upwards - ve)

Variable Head Permeability Test	Project: Forge Lane Former Steelworks, Thornhill, Dewsbury, Kirklees M.B.C.	Contract 127001
Exploration Associates		Figure P1



Time Elapsed (t) mins	Depth Below Datum at Time t (m)	H_t	$\frac{H_t}{H_o}$
0.00	0.000	2.030	1.000
0.25	1.970	0.060	0.030
0.50	2.010	0.020	0.010
1.00	2.030	0.000	0.000

Borehole No: 5

Date: 27/01/97

Type of Test: Falling Head

Diameter of Borehole/Piezo Pipe d:	0.150	m
Area of Borehole/Standpipe tubing A:	0.0177	m^2
Depth to Base of Casing:	1.00	m
Depth to Base of Borehole Before Test:	6.80	m
Depth to Base of Borehole After Test	6.80	m
Test Section	1.00m to 7.20m	m
Test Length L:	6.20	m
Diameter of Test Length D:	0.150	m
Datum:	0.00	

Note: Depths given below are measured from **Datum.**

Depth to Standing Water Level:	2.03	m
Depth to Induced Water Level:	0.00	m

H_o = Differential Head at Start of Test:	2.03	m
H_f = Differential Head at End of Test:	0.00	m
t_f = Time Elapsed at End of Test:	1.00	mins

Shape Factor

Based on Figure 7 a - f (Cases 1-6), and Figure 8 (Case 7) of BS5930 1981

Case: 4 F = 8.82

PERMEABILITY CALCULATION

Time Lag Approach

T = Basic time lag when $(H_t/H_o) = 0.37$: sec

Permeability k = A/FT = m/sec

General Approach

H_1 selected at t = 0.0 mins (= t_1 = 0 secs)

H_2 selected at t = 0.0 mins (= t_2 = 0 secs)

Permeability

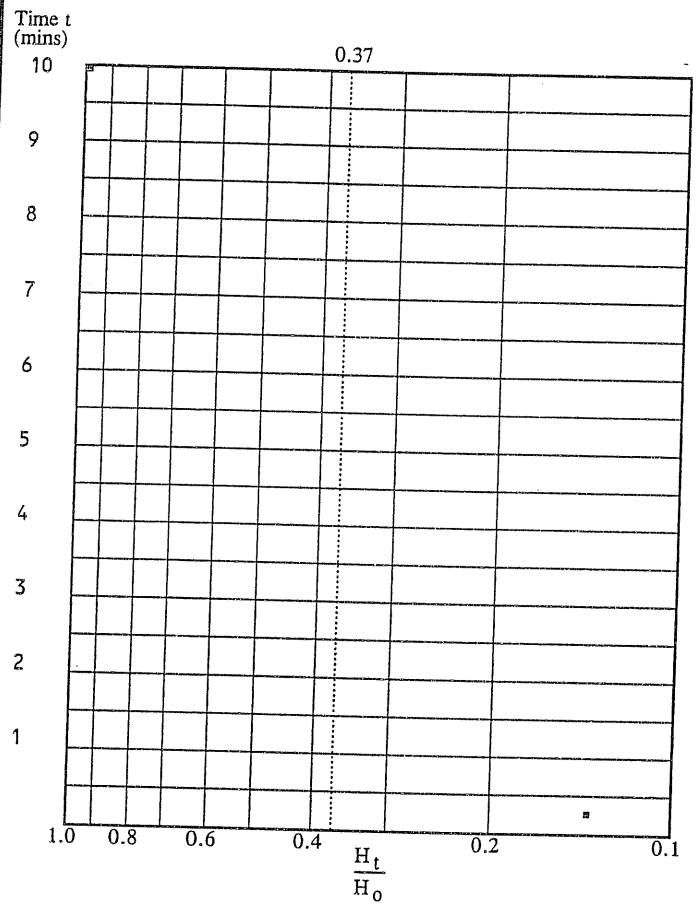
$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2} =$$ m/sec

Remarks Test carried out in 50mm diameter standpipe installed in gravel filter in 150mm diameter borehole. Unable to calculate permeability due to short interval between t1 and t2.

Form 5/0

Notation: Measurements from Ground Level downwards +ve (upwards - ve)

Variable Head Permeability Test	Project: Forge Lane Former Steelworks, Thornhill, Dewsbury, Kirklees M.B.C.	Contract 127001
Exploration Associates		Figure P2



Time Elapsed (t) mins	Depth Below Datum at Time t (m)	H_t	$\frac{H_t}{H_0}$
0.00	0.000	1.280	1.000
0.25	1.100	0.180	0.141
0.50	1.220	0.060	0.047
1.00	1.240	0.040	0.031
1.50	1.260	0.020	0.016
2.00	1.265	0.015	0.012
3.00	1.270	0.010	0.008
4.00	1.273	0.007	0.005
5.00	1.275	0.005	0.004
10.00	1.280	0.000	0.000

Borehole No: 7

Date: 27/01/97

Type of Test: Falling Head

Diameter of Borehole/Piezo Pipe d:	0.019	m
Area of Borehole/Standpipe tubing A:	0.0003	m^2
Depth to Base of Casing:	7.50	m
Depth to Base of Borehole Before Test:	9.00	m
Depth to Base of Borehole After Test	9.00	m
Test Section	1.50m response zone	m
Test Length L:	1.50	m
Diameter of Test Length D:	0.150	m
Datum:	0.00	

Note: Depths given below are measured from **Datum.**

Depth to Standing Water Level:	1.28	m
Depth to Induced Water Level:	0.00	m

H_0 = Differential Head at Start of Test: 1.28 m

H_f = Differential Head at End of Test: 0.00 m

t_f = Time Elapsed at End of Test: 10.00 mins

Shape Factor

Based on Figure 7 a - f (Cases 1-6), and Figure 8 (Case 7) of BS5930 1981

Case: 7 F = 3.56

PERMEABILITY CALCULATION

Time Lag Approach

T = Basic time lag when $(H_t/H_0) = 0.37$: 10 sec

Permeability $k = A/FT$ = 8.0×10^{-6} m/sec

General Approach

H_1 selected at t = mins (= t_1 = secs)

H_2 selected at t = mins (= t_2 = secs)

Permeability

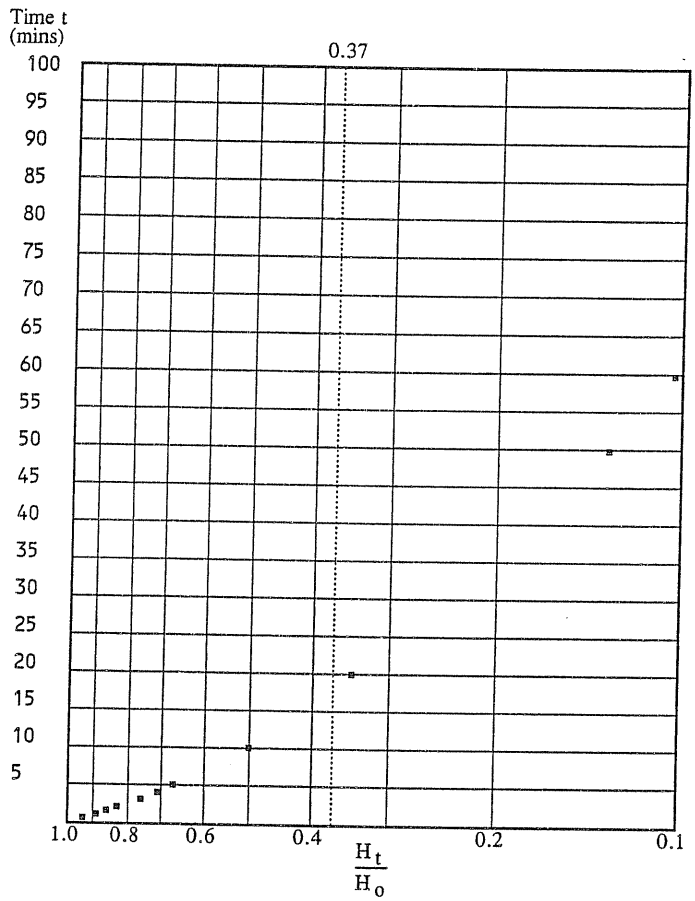
$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2} = \quad \text{m/sec}$$

Remarks Test carried out in 19mm diameter piezometer. Response zone from 7.50m to 9.00m.

Form 5/0

Notation: Measurements from Ground Level downwards +ve (upwards - ve)

Variable Head Permeability Test	Project: Forge Lane Former Steelworks, Thornhill, Dewsbury, Kirklees M.B.C.	Contract 127001
Exploration Associates		Figure P3



Time Elapsed (t) mins	Depth Below Datum at Time t (m)	H_t	$\frac{H_t}{H_o}$
0.00	0.175	1.705	1.000
0.50	0.250	1.630	0.956
1.00	0.330	1.550	0.909
1.50	0.390	1.490	0.874
2.00	0.450	1.430	0.839
3.00	0.570	1.310	0.768
4.00	0.650	1.230	0.721
5.00	0.720	1.160	0.680
10.00	1.005	0.875	0.513
20.00	1.280	0.600	0.352
50.00	1.650	0.230	0.135
60.00	1.700	0.180	0.106

Borehole No: 9

Date: 27/01/97

Type of Test: Falling Head

Diameter of Borehole/Piezo Pipe d:	0.150	m
Area of Borehole/Standpipe tubing A:	0.0177	m^2
Depth to Base of Casing:	1.00	m
Depth to Base of Borehole Before Test:	7.50	m
Depth to Base of Borehole After Test	7.50	m
Test Section	1.00m to 7.50m.	m
Test Length L:	6.50	m
Diameter of Test Length D:	0.150	m
Datum:	0.00	

Note: Depths given below are measured from **Datum.**

Depth to Standing Water Level:	1.88	m
Depth to Induced Water Level:	0.18	m
H_o = Differential Head at Start of Test:	1.71	m
H_f = Differential Head at End of Test:	0.18	m
t_f = Time Elapsed at End of Test:	60.00	mins

Shape Factor

Based on Figure 7 a - f (Cases 1-6), and Figure 8 (Case 7) of BS5930 1981

Case: 4 F = 9.15

PERMEABILITY CALCULATION

Time Lag Approach

T = Basic time lag when $(H_t/H_o) = 0.37$: 1080 sec

Permeability $k = A/FT$ = 1.8×10^{-6} m/sec

General Approach

H_1 selected at t = mins (= t_1 = secs)

H_2 selected at t = mins (= t_2 = secs)

Permeability

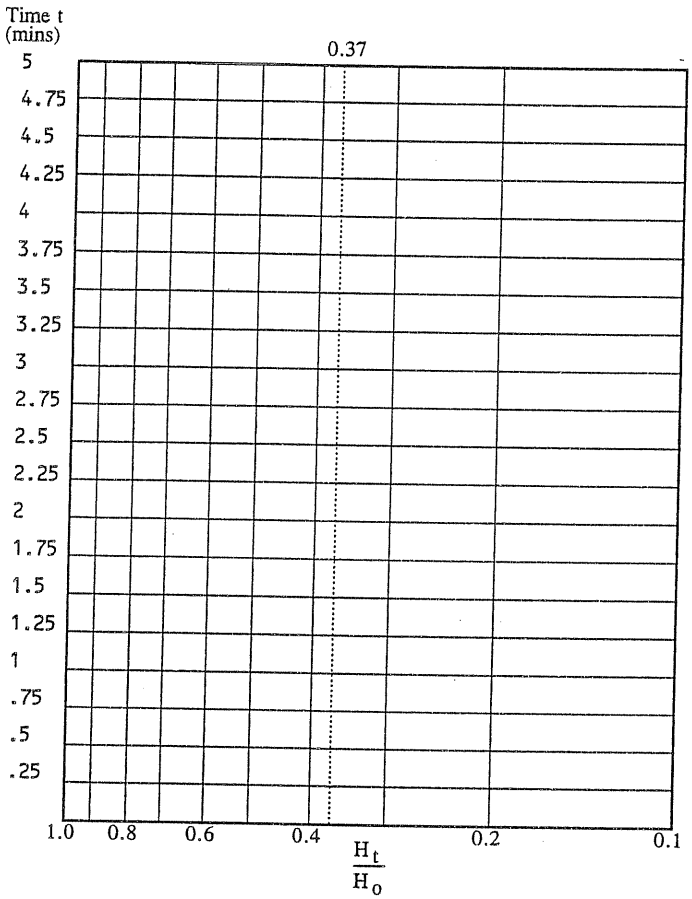
$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2} =$$ m/sec

Remarks Test carried out in 50mm diameter standpipe in gravel filter installed in 150mm diameter barehole.

Form 5/0

Notation: Measurements from Ground Level downwards +ve (upwards - ve)

Variable Head Permeability Test	Project: Forge Lane Former Steelworks, Thornhill, Dewsbury, Kirklees M.B.C.	Contract 127001
Exploration Associates		Figure P4



Time Elapsed (t) mins	Depth Below Datum at Time t (m)	H_t	$\frac{H_t}{H_o}$

Borehole No: 11

Date: 27/01/97

Type of Test: Falling Head

Diameter of Borehole/Piezo Pipe d:	0.150	m
Area of Borehole/Standpipe tubing A:	0.0177	m^2
Depth to Base of Casing:	1.00	m
Depth to Base of Borehole Before Test:	9.70	m
Depth to Base of Borehole After Test	9.70	m
Test Section	8.70	m
Test Length L:	8.70	m
Diameter of Test Length D:	0.150	m
Datum:	0.00	

Note: Depths given below are measured from **Datum.**

Depth to Standing Water Level:	0.78	m
Depth to Induced Water Level:	0.78	m

H_o=Differential Head at Start of Test:	0.00	m
H_f=Differential Head at End of Test:	0.00	m
t_f =Time Elapsed at End of Test:	0.00	mins

Shape Factor

Based on Figure 7 a - f (Cases 1-6), and Figure 8 (Case 7) of BS5930 1981

Case: 4 F = 11.50

PERMEABILITY CALCULATION

Time Lag Approach

T = Basic time lag when $(H_t/H_o) = 0.37$: sec

Permeability $k = A/FT$ = m/sec

General Approach

H_1 selected at t = 0.0 mins (= t_1 = 0 secs)

H_2 selected at t = 0.0 mins (= t_2 = 0 secs)

Permeability

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2} = \text{m/sec}$$

Remarks Test carried out in 50mm diameter standpipe installed in 150mm diameter borehole.
Unable to raise level of water above standing level.
Unable to calculate permeability as t1=t2=0.

Form 5/0

Notation: Measurements from Ground Level downwards +ve (upwards - ve)

Variable Head Permeability Test	Project: Forge Lane Former Steelworks, Thornhill, Dewsbury, Kirklees M.B.C.	Contract 127001
Exploration Associates		Figure P5

Installation Details

Borehole No.	1	2	3	4	5	6	7	8	9	10
Type	S	P	S	S	S	S	P	P	S	S
Date Installed	20/01/97	20/01/97	21/01/97	21/01/97	21/01/97	21/01/97	22/01/97	28/01/97	22/01/97	22/01/97
Depth to Base (m)	8.80	5.80	7.50	7.50	7.00	6.30	8.50	10.50	7.30	9.00
Ground Level m OD	39.61	38.40	39.26	38.20	38.51	37.68	38.03	39.60	38.55	37.53

Date/Time	Depth to Water (m)									
23/01/97	3.06	1.58	2.82	1.55	2.03	1.02			1.84	
27/01/97		1.80			2.03		1.28		1.88	0.72
28/01/97							1.28		1.89	
06/02/97	3.13	1.81	2.85	1.44	1.90	1.21	1.34	3.14	1.87	0.92
09/04/97	3.38	2.05	3.12	1.88	2.25	1.18	1.60	3.20	2.05	1.08
23/05/97	3.08	1.81	2.82	1.63	1.93	1.21	1.30	3.20	1.91	1.97

Remarks Type: P - Piezometer, S - Standpipe, G - Gas Standpipe, H - Hydraulic, R - Remote Readout (Pneumatic, vib. wire, etc.)

Form 50/1

Water Level Readings

Exploration Associates

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract
127001

WL/1

Installation Details

Borehole No.	11	12	13	14	15					
Type	S	S	S	P	S					
Date Installed	24/01/97	23/01/97	23/01/97	23/01/97	28/01/97					
Depth to Base (m)	9.70	8.70	9.00	9.35	11.00					
Ground Level m OD	37.48	37.41	37.46	37.71	41.34					

Date/Time	Depth to Water (m)									
23/01/97										
27/01/97		0.60	0.78	1.06						
28/01/97					4.80					
06/02/97	0.98	0.72	0.96	1.11	4.88					
09/04/97	1.08	0.88	1.08	1.31	5.08					
23/05/97	1.02	0.84	1.00	1.18	4.84					

Remarks Type: P - Piezometer, S - Standpipe, G - Gas Standpipe, H - Hydraulic, R - Remote Readout (Pneumatic, vib. wire, etc.)

Form 50/1

Water Level Readings	Project	Contract
Exploration Associates	Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	127001 WL/2

Date	6/2/97
Time	
Operator	SL

Meteorological and Site Conditions

State of ground:		Dry	X	Moist		Wet		
Wind:		Calm		Light	X	Moderate		Strong
Wind Direction:	SE-SW							
Cloud Cover:		None		Slight		Cloudy	X	Overcast
Precipitation:		None	X	Slight		Moderate		Heavy

Barometric Pressure (mbars): 1012 Air Temp °C: 8°C

Instrumentation Details: 50mm diameter standpipes in gravel filter

Equipment Used: GI Infra Red Gas Analyser [X] GMI Landsurveyor [ ] GMI CO_2 Portable [ ]

Others (specify):

Borehole / Instrument	Depth of Installation (m)	Explosive Gases / CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Depth to Groundwater (m)	Others / Comments
1	8.80	0	0.7	16.2	3.13	
5	7.20	0	2.5	14.8	1.90	
6	6.30	0	0.0	20.1	1.21	
11	9.70	0	0.0	19.9	0.98	
12	8.70	0	0.0	20.0	0.72	
13	9.00	0	0.0	20.1	0.96	
15	11.00	0	0.0	20.1	4.88	

Remarks

The concentrations of gases recorded above are subject to the accuracy, as specified by the manufacturer, of the instrumentation adopted. If concentration accuracies of less than +/- 2% are required, it is recommended that gas samples are recovered and laboratory analyses are undertaken.

Form 11/1

Gas Monitoring Record	Project: Forge Lane, Former Steelworks, Thornhill, Dewsbury	Contract: 127001
Exploration Associates		Figure: G1

Date	9/4/97
Time	A.M.
Operator	TJD

Meteorological and Site Conditions

State of ground:	X	Dry		Moist		Wet		
Wind:		Calm	X	Light		Moderate		Strong
Wind Direction:	W							
Cloud Cover:		None	X	Slight		Cloudy		Overcast
Precipitation:	X	None		Slight		Moderate		Heavy

Barometric Pressure (mbars): 1029 Air Temp °C: 17

Instrumentation Details: 50mm diameter pipe in gravel filter

Equipment Used: GI Infra Red Gas Analyser [X] GMI Landsurveyor [ ] GMI CO_2 Portable [ ]

Others (specify):

Borehole / Instrument	Depth of Installation (m)	Explosive Gases / CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Depth to Groundwater (m)	Others / Comments
1		0	1.00	19.3	3.38	
5		0	2.2	19.4	2.25	
6		0	0	20.9	1.18	
11		0	1.2	17.7	1.08	
13		0	0.0	20.7	1.08	

Remarks

The concentrations of gases recorded above are subject to the accuracy, as specified by the manufacturer, of the instrumentation adopted. If concentration accuracies of less than +/- 2% are required, it is recommended that gas samples are recovered and laboratory analyses are undertaken.

Form 11/1

Gas Monitoring Record	Project: Forge Lane Former Steelworks, Kirklees MBC	Contract: 127001
Exploration Associates		Figure: G2

Date	23/5/97
Time	1.00pm
Operator	SL

Meteorological and Site Conditions

State of ground:	X	Dry		Moist		Wet		
Wind:		Calm	X	Light		Moderate		Strong
Wind Direction:								
Cloud Cover:		None		Slight	X	Cloudy		Overcast
Precipitation:	X	None		Slight		Moderate		Heavy

Barometric Pressure (mbars): 1019 Air Temp °C: 16

Instrumentation Details: 50mm diameter pipe in gravel filter

Equipment Used: GI Infra Red Gas Analyser [X] GMI Landsurveyor [ ] GMI CO_2 Portable [ ]

Others (specify):

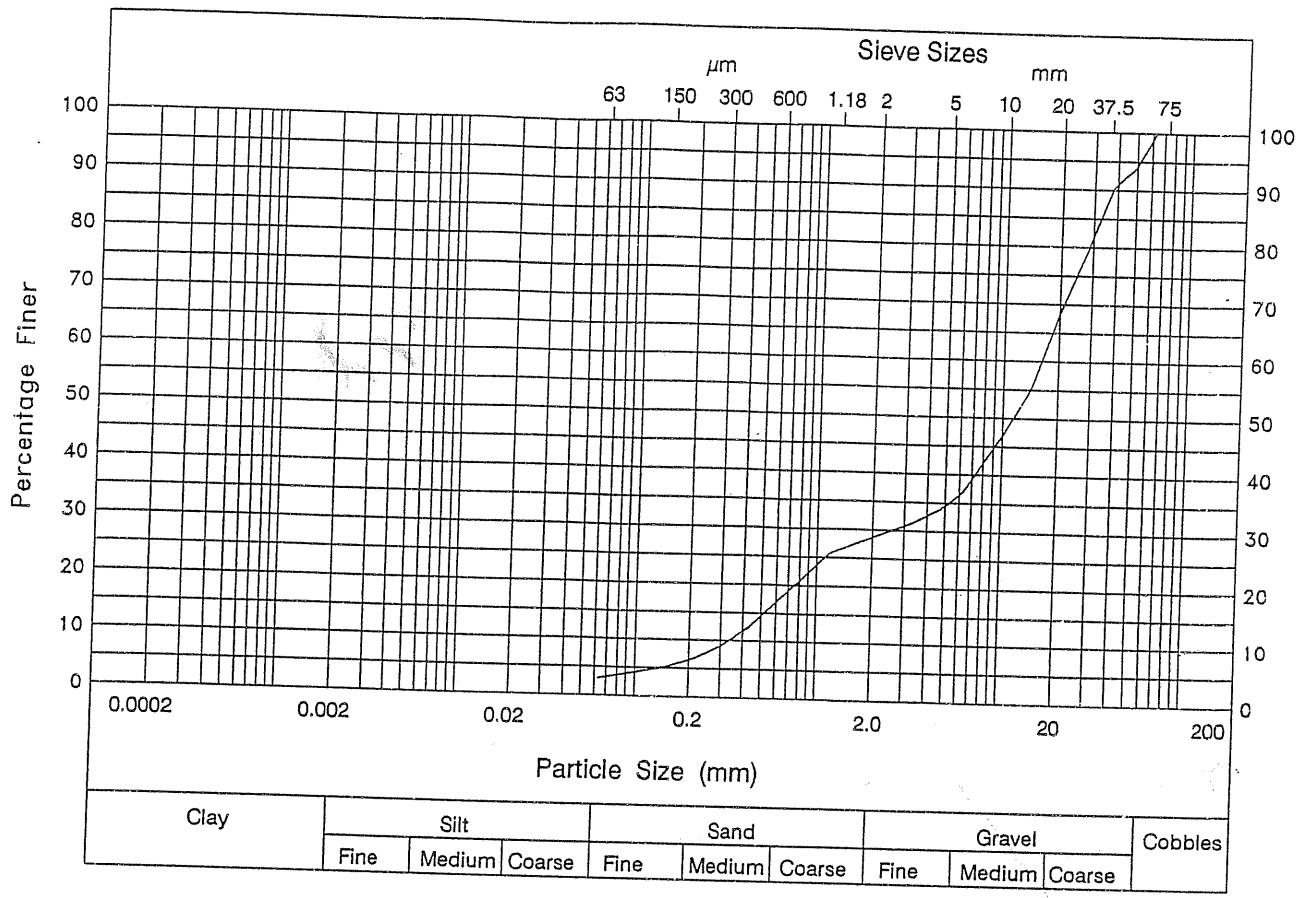
Borehole / Instrument	Depth of Installation (m)	Explosive Gases / CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	Depth to Groundwater (m)	Others / Comments Water Level
1		0	0	20.5		3.08 (Cover vandalised)
5		0	00.2	18.7		1.93
6		0	0	20.4		1.21
11		0	0	20.5		1.02
12		0	0	20.4		0.84 (Valve removed)
13		0	0	20.4		1.00
15		0	0	20.3		4.84 (Valve removed)

Remarks

The concentrations of gases recorded above are subject to the accuracy, as specified by the manufacturer, of the instrumentation adopted. If concentration accuracies of less than +/- 2% are required, it is recommended that gas samples are recovered and laboratory analyses are undertaken.

Form 11/1

Gas Monitoring Record	Project: Forge Lane Former Steelworks, Kirklees MBC	Contract: 127001
Exploration Associates		Figure: G3



Particle Size	% Passing	Particle Size	% Passing
63 mm	100	3.35 mm	31
50 mm	94	2 mm	29
37.5 mm	90	1.18 mm	26
28 mm	79	600 µm	17
20 mm	68	425 µm	12
14 mm	55	300 µm	9
10 mm	47	212 µm	7
6.3 mm	37	150 µm	5
5 mm	34	63 µm	3

Hole 13	WET
Depth 2.20-2.65	Description Brown slightly silty very sandy GRAVEL
Type B	
Test Performed	

Form 25/4

Laboratory - Particle Size Plot

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Sheet L2/17

ENCLOSURE C

Laboratory Test Results

KEY TO SYMBOLS ON LABORATORY TEST RESULTS SHEETS

U	Undisturbed Sample
P	Piston Sample
B	Bulk Sample - Disturbed
D	Jar Sample - Disturbed
W	Water Sample
pH	Acidity/Alkalinity Index
SO_3	Total Sulphate Content (acid) - Soluble Sulphate
++	Soluble Sulphate Content (2:1 Water/Soil extract)
I_p	Plasticity Index
%	% of material in sample passing 425 micron sieve
w_L	Liquid Limit
w_p	Plastic Limit
w	Water Content
γ_b	Bulk Density
U	Undrained Triaxial
CU	Consolidated Undrained Triaxial
CD	Consolidated Drained Triaxial
T	Single Stage Triaxial
M	Multistage Triaxial
100/40	Sample Diameter (mm)
REM	Remoulded Triaxial Test Specimen
LVT	Laboratory Vane Test
DSB	Drained Shear Box
RSB	Residual Shear Box
σ_3	Cell Pressure
σ_1-σ_3	Deviator Stress
c	Cohesion
c'	Effective Cohesion Incercept
ϕ	Angle of Shearing Resistance - Degrees
ϕ'	Effective Angle of Shearing Resistance
m_v	Coefficient of Volume Decrease
c_v	Coefficient of Consolidation
γ_d	Dry Density
Opt	Optimum
Std	Standard Compaction
Hvy	Heavy Compaction
CBR	California Bearing Ratio
*	Failed under 1st Load
**	Failed under 2nd Load
#	Untestable
##	Excessive Strain
+	Calcareous Reaction
¶	CBR Remoulded with 2.5kg rammer
§	CBR Remoulded with 4.5kg rammer
•	CBR Undisturbed Sample
••	CBR Remoulded to 5% air voids at Natural Moisture Content
VT	Hand Vane Test
Cl	Chloride Content
Ps	Particle Density
Sat m.c.	Saturation Moisture Content
p'o	Effective Overburden Pressure

Laboratory Symbols	Project Forge Lane, Former Steelworks, Thornhill Dewsbury Kirklees Metropolitan Council	Contract 127001
Exploration Associates		Figure Key Sheet

Samples				Classification					Strength			Other Tests
Hole	Depth	Type	Description	<425 I_P	Prep w_L	w_P	Water %	γ_{b_3} Mg/m	Test	σ_3 kPa	C kPa	
TP1	1.00 - 1.50	B	MADE GROUND: Dark grey brown slightly silty fine to coarse sand with much gravel				16					Ps=2.03 Measured w% / Dry Density
TP5	1.50 - 2.00	B	Brown slightly silty medium and coarse SAND									w% / Dry Density
TP7	1.00 - 1.40	B	Soft to firm grey slightly sandy CLAY with occasional gravel									w% / Dry Density
TP8	1.50 - 2.00	B	MADE GROUND: Dark grey sandy clayey silt									w% / Dry Density
TP10	1.30 - 1.70	B	MADE GROUND: Firm grey brown slightly sandy silty CLAY with occasional gravel and cobbles									w% / Dry Density

Remarks

Form 10/2

Laboratory - Results Summary

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Sheet L1/1

Samples				Classification					Strength			Other Tests
Hole	Depth	Type	Description	<425 I_P	Prep w_L	w_P	Water %	γ_{b_3} Mg/m	Test	σ_3 kPa	C kPa	
1	1.10 - 1.55	B	MADE GROUND: Dark grey very sandy gravel with pockets of clayey silt									Particle Size Analysis
1	2.90	D	MADE GROUND: Firm grey clay with some gravel	75% 16	Wet sieve 39	23	11					
1	4.30	D	Soft grey organic very silty CLAY				56					
1	4.40 - 4.85	U	Soft grey organic very silty CLAY				84	1.36	UUM 100	50 100 200	20 25 30	Oedometer test
1	4.85	D	Soft grey organic very silty CLAY	92% 66	Natural 138	72	86					
1	7.70 - 8.15	B	Brown slightly silty very sandy GRAVEL									Particle Size Analysis
2	1.80	D	MADE GROUND: Soft dark red brown sandy clay with some gravel	58% 22	Wet sieve 66	44	42					
2	2.80	D	Very soft grey very silty CLAY	100% 15	Natural 40	25	37					
2	3.00 - 3.45	U	Grey clayey very silty fine and medium SAND with ocasional gravel				72	1.48	UUM 100	#		
2	4.00 - 4.45	B	Grey clayey very silty fine and medium SAND with occasional gravel									Particle Size Analysis
3	1.00 - 1.45	B	MADE GROUND: Dark grey clayey silty very sandy gravel with some cobbles									Particle Size Analysis

Remarks

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Laboratory - Results Summary

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Sheet L1/2

Samples				Classification					Strength			Other Tests
Hole	Depth	Type	Description	<425 I_P	Prep w_L	w_P	Water %	γ_{b_3} Mg/m	Test	σ_3 kPa	C kPa	
3	2.00 - 2.45	B	MADE GROUND: Grey clayey very silty very sandy gravel									Particle Size Analysis
3	4.00 - 4.45	U	Soft brown grey very silty CLAY with some gravel in upper part				34		UUM 100	#		# - Oedometer, too gravelly
3	4.45	D	Soft brown grey very silty CLAY	96% 40	Natural 95	55	80					
3	6.40	D	Very stiff thinly laminated light grey very silty CLAY	98% 13	Natural 34	21	14					
4	1.00 - 1.45	B	MADE GROUND: Red brown and grey fine to coarse ash sand with much gravel				11					Ps=2.58 Measured w% / Dry Density
4	2.00 - 2.45	B	Brown slightly clayey silty very sandy GRAVEL									Particle Size Analysis
4	7.30	D	Firm to stiff light grey very silty CLAY wiyh some gravel	98% 15	Natural 34	19	17					
5	0.00 - 1.00	B	MADE GROUND: Dark grey slightly clayey silty fine to coarse sand and gravel									Particle Size Analysis
5	2.50 - 2.95	B	Brown gravelly COBBLES with much matrix of silty sand									Particle Size Analysis
5	3.40	D	Firm brown sandy CLAY	76% 11	Wet sieve 32	21	30					
6	2.00 - 2.45	U	Very soft black slightly sandy very silty CLAY				43	1.39	UUM 100	15 30 60	12 ## ##	Oedometer test

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Sheet L1/3

Samples				Classification					Strength			Other Tests
Hole	Depth	Type	Description	<425 I_P	Prep w_L	w_P	Water %	γ_{b_3} Mg/m	Test	σ_3 kPa	C kPa	
6	2.65	D	Very soft black slightly sandy very silty CLAY	83% 25	Wet sieve 61	36	48					
6	4.00 - 4.45	B	Brown slightly silty very sandy GRAVEL with some cobbles									Particle Size Analysis
7	1.00 - 1.45	B	MADE GROUND: Dark grey clayey silty very sandy gravel									Particle Size Analysis
7	2.00 - 2.45	U	Soft dark brown sandy CLAY with occasional gravel	85% 12	Wet sieve 34	22	26	1.79	UUM 100	25 50 100	20 ## ##	Oedometer test
7	8.45 - 9.00	B	Stiff grey very silty CLAY with occasional gravel	97% 20	Natural 42	22	19					
8	0.00 - 1.00	B	Soft black peaty very clayey SILT with occasional gravel and partings of sand									Particle Size Analysis
8	1.55	D	Soft black peaty very clayey SILT with occasional gravel and sand partings	89% 17	Natural 55	38	40					
8	3.20 - 3.65	U	Brown clayey very silty fine and medium SAND				26	1.89	UUM 100	50 100 200	27 ## ##	Particle Size Analysis
8	3.65	D	Brown clayey very silty fine and medium SAND	97%	Natural 28	NP	24					
8	8.70	D	Firm grey sandy CLAY with some gravel	45% 13	Wet sieve 31	18	11					

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Sheet L1/4

Samples				Classification					Strength			Other Tests
Hole	Depth	Type	Description	<425 I_P	Prep w_L	w_P	Water %	γ_{b_3} Mg/m	Test	σ_3 kPa	C kPa	
9	1.30	D	MADE GROUND: Firm grey slightly sandy silty clay with occasional gravel	68% 15	Wet sieve 35	20	23					
9	2.40	D	Soft blue grey sandy CLAY with occasional gravel	76% 15	Wet sieve 32	17	18					
9	3.20 - 3.65	U	Soft brown grey clayey silty PEAT				167	1.22	UUM 100	25 50 100	31 * *	<2mm = 100% Org = 23.60% Oedometer test
9	3.65	D	Soft brown grey clayey silty PEAT	82% 57	Natural 123	66	97					
9	4.20	D	Very soft grey and grey brown very silty CLAY	99% 33	Natural 87	54	80					
9	5.40	D	Firm to stiff grey sandy CLAY with occasional gravel				26					
9	6.40	D	Firm to stiff grey sandy CLAY with occasional gravel	78% 12	Wet sieve 31	19	20					
10	1.00 - 1.45	U	Soft to firm brown slightly sandy silty CLAY				20	1.91	UUM 100	10 20 40	47 59 ##	
10	1.50 - 2.00	B	Brown clayey silty fine to coarse SAND with some gravel									Particle Size Analysis
10	1.50	D	Brown clayey silty fine to coarse SAND with some gravel	7.7%	Natural NL	NP	22					
11	1.00 - 1.45	B	Brown clayey silty fine and medium SAND with some gravel									Particle Size Analysis

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Samples				Classification					Strength			Other Tests
Hole	Depth	Type	Description	<425 I_P	Prep w_L	w_P	Water %	γ_b Mg/m^3	Test	σ_3 kPa	C kPa	
12	1.20 - 1.65	B	Brown clayey silty fine to coarse SAND with much gravel									Particle Size Analysis
12	5.90 - 6.35	U	Grey very clayey very silty fine to coarse SAND with some gravel				14	2.15	UUM 100	50 100 200	75 ## ##	Particle Size Analysis
12	6.35	D	Grey very clayey very silty fine to coarse SAND with some gravel	79%	Natural NL	NP	16					
13	0.40	D	Dark grey brown clayey peaty SILT with occasional gravel	83% 17	Wet sieve 41	24	25					
13	2.20 - 2.65	B	Brown slightly silty very sandy GRAVEL									Particle Size Analysis
14	1.00 - 1.45	U	Brown very clayey silty fine and medium SAND	94% 14	Wet sieve 33	19	22	1.82	UUM 100	20 40 80	21 ## ##	# - Oedometer, sand
15	1.90	D	Stiff brown slightly sandy silty CLAY with occasional gravel	81% 15	Wet sieve 32	17	15					
15	4.10 - 4.55	U	Firm brown slightly sandy silty CLAY with occasional gravel				17	2.13	UUM 100	50 100 200	56 ## ##	Oedometer test
15	6.50	D	Firm to stiff brown slightly sandy silty CLAY with occasional gravel	91% 28	Wet sieve 51	23	18					

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Samples				Classification					Strength			Other Tests
Hole	Depth	Type	Description	<425 I_P	Prep w_L	w_P	Water %	γ_b Mg/m^3	Test	σ_3 kPa	C kPa	
CBR1	0.50 - 1.00	B	MADE GROUND: Black very sandy ash gravel				28					CBR
CBR2	0.70 - 1.00	B	Brown clayey silty fine and medium SAND				17					CBR
CBR3	0.50 - 1.00	B	MADE GROUND: Dark grey very sandy ash and slag gravel				18					CBR
CBR4	0.50 - 1.00	B	MADE GROUND: Red brown and grey ash sand and gravel with clay pockets				19					CBR
CBR5	0.50 - 1.00	B	Brown clayey silty fine and medium SAND				13					CBR
CBR6	0.50 - 1.00	B	Brown fine to coarse SAND and GRAVEL				25					CBR

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Kirklees M.B.C.

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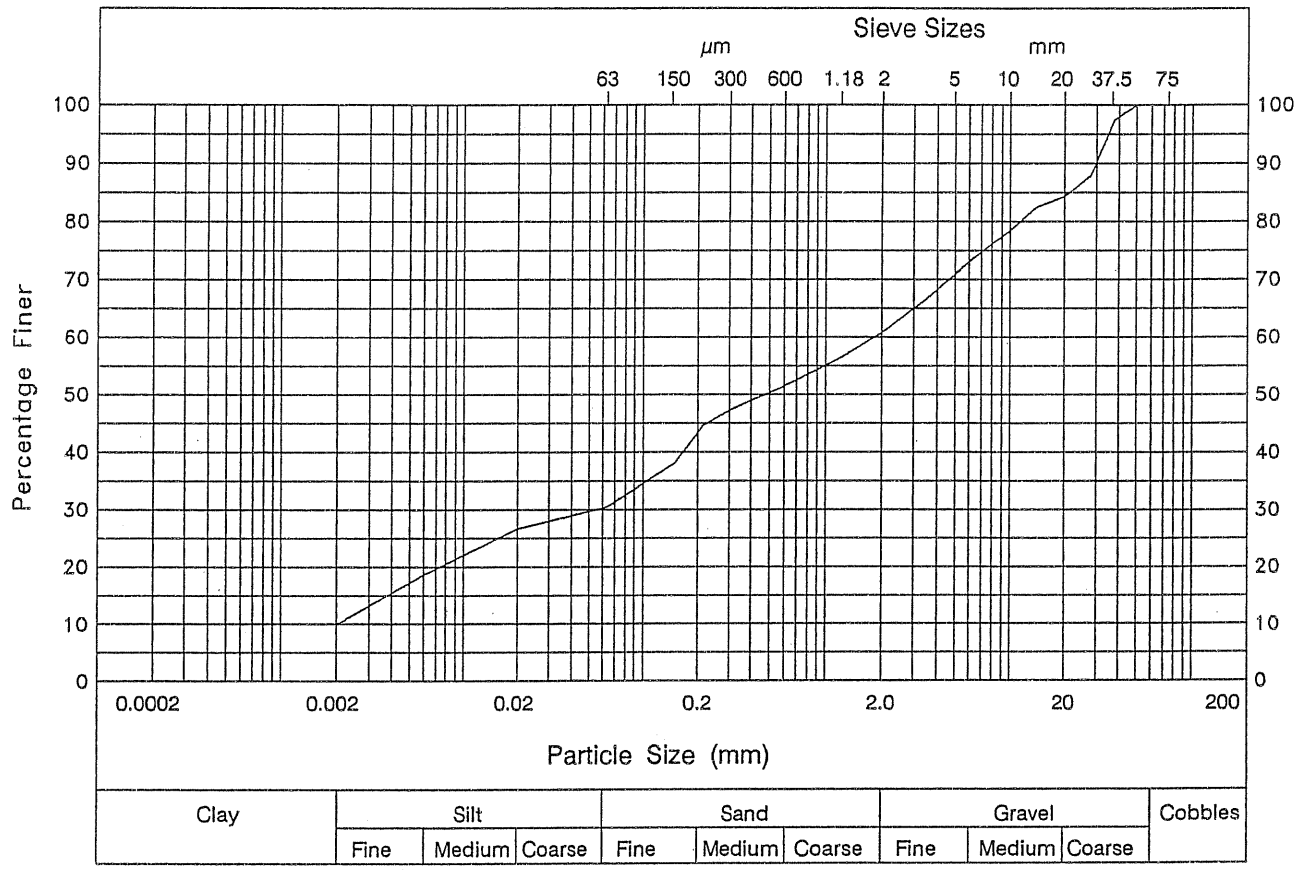
Sheet L1/7



Particle Size	% Passing	Particle Size	% Passing
50 mm	100	1.18 mm	56
37.5 mm	97	600 µm	51
28 mm	88	425 µm	49
20 mm	84	300 µm	47
14 mm	82	212 µm	45
10 mm	78	150 µm	38
6.3 mm	74	63 µm	30
5 mm	71	20 µm	27
3.35 mm	66	6 µm	19
2 mm	61	2 µm	10

Hole 1	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 1.10-1.55	Description MADE GROUND: Dark grey very sandy gravel with pockets of clayey silt
Type B	
Test Performed	

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Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
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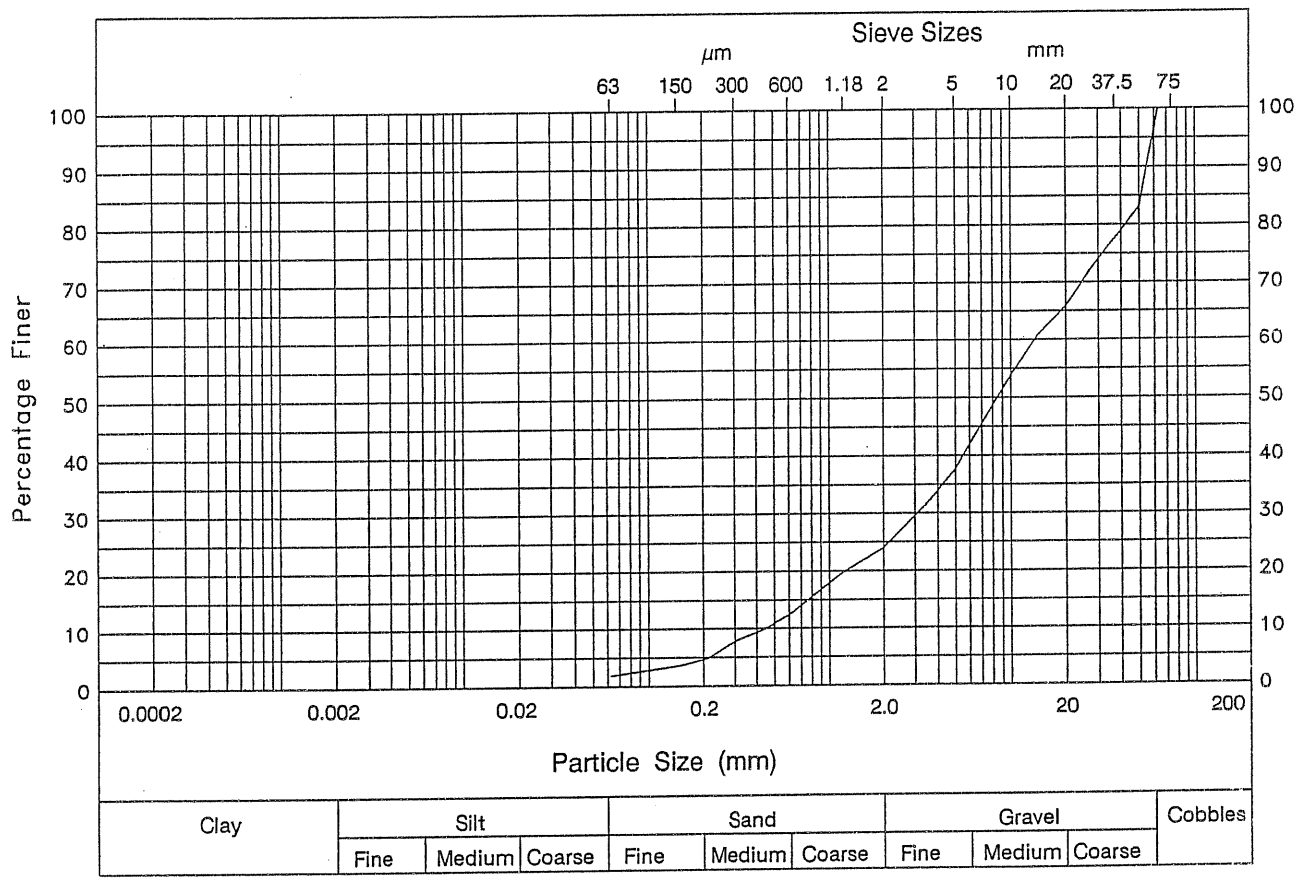

Particle Size	% Passing	Particle Size	% Passing
63 mm	100	3.35 mm	31
50 mm	83	2 mm	24
37.5 mm	78	1.18 mm	20
28 mm	73	600 µm	12
20 mm	66	425 µm	10
14 mm	61	300 µm	8
10 mm	54	212 µm	5
6.3 mm	43	150 µm	4
5 mm	38	63 µm	2

Hole 1	WET
Depth 7.70-8.15	Description Brown slightly silty very sandy GRAVEL
Type B	
Test Performed	

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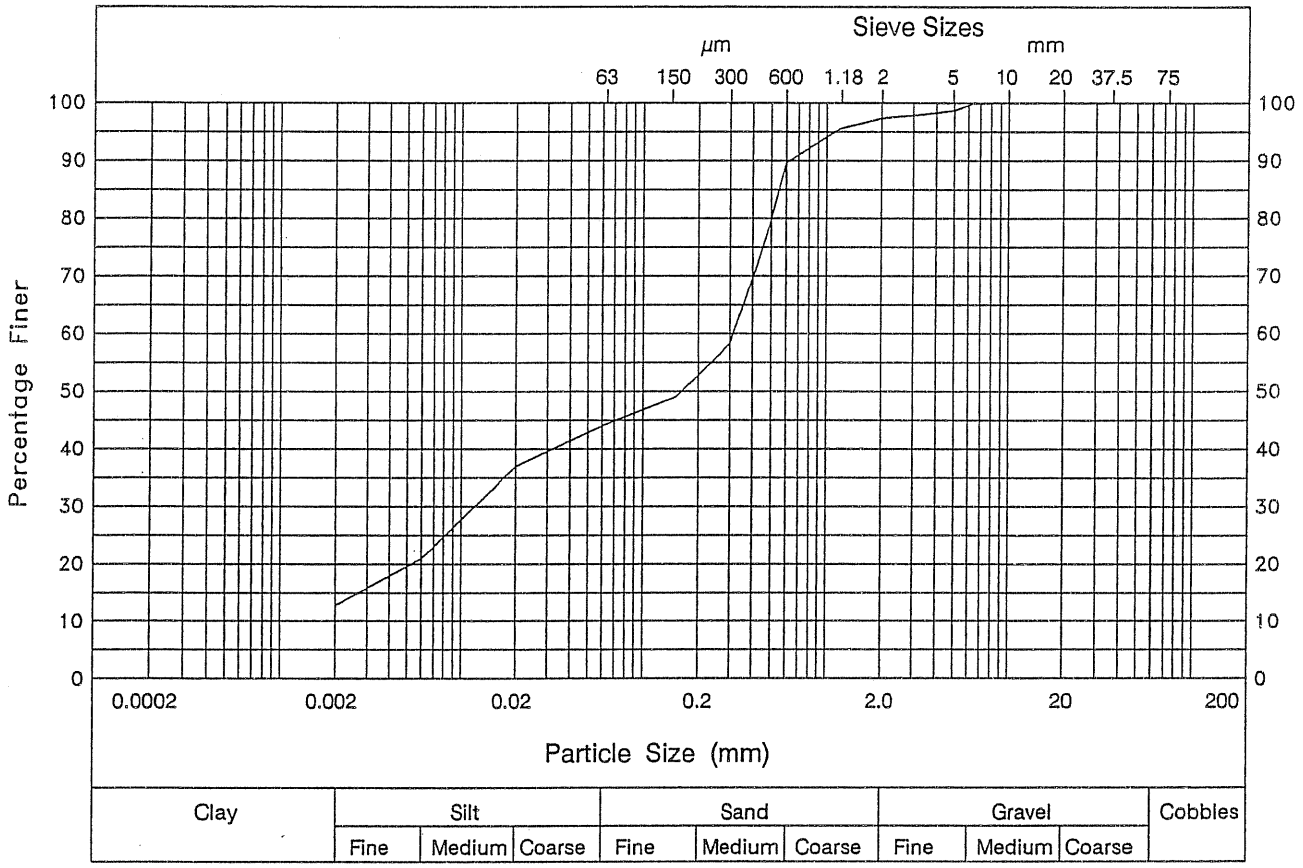
Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
Exploration Associates		**Sheet** L2/2



Particle Size	% Passing	Particle Size	% Passing
10 mm	100	300 µm	58
6.3 mm	100	212 µm	54
5 mm	99	150 µm	49
3.35 mm	98	63 µm	44
2 mm	97	20 µm	37
1.18 mm	95	6 µm	21
600 µm	90	2 µm	13
425 µm	72		

Hole 2	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 4.00-4.45	Description Grey clayey very silty fine and medium SAND with occasional gravel
Type B	
Test Performed	

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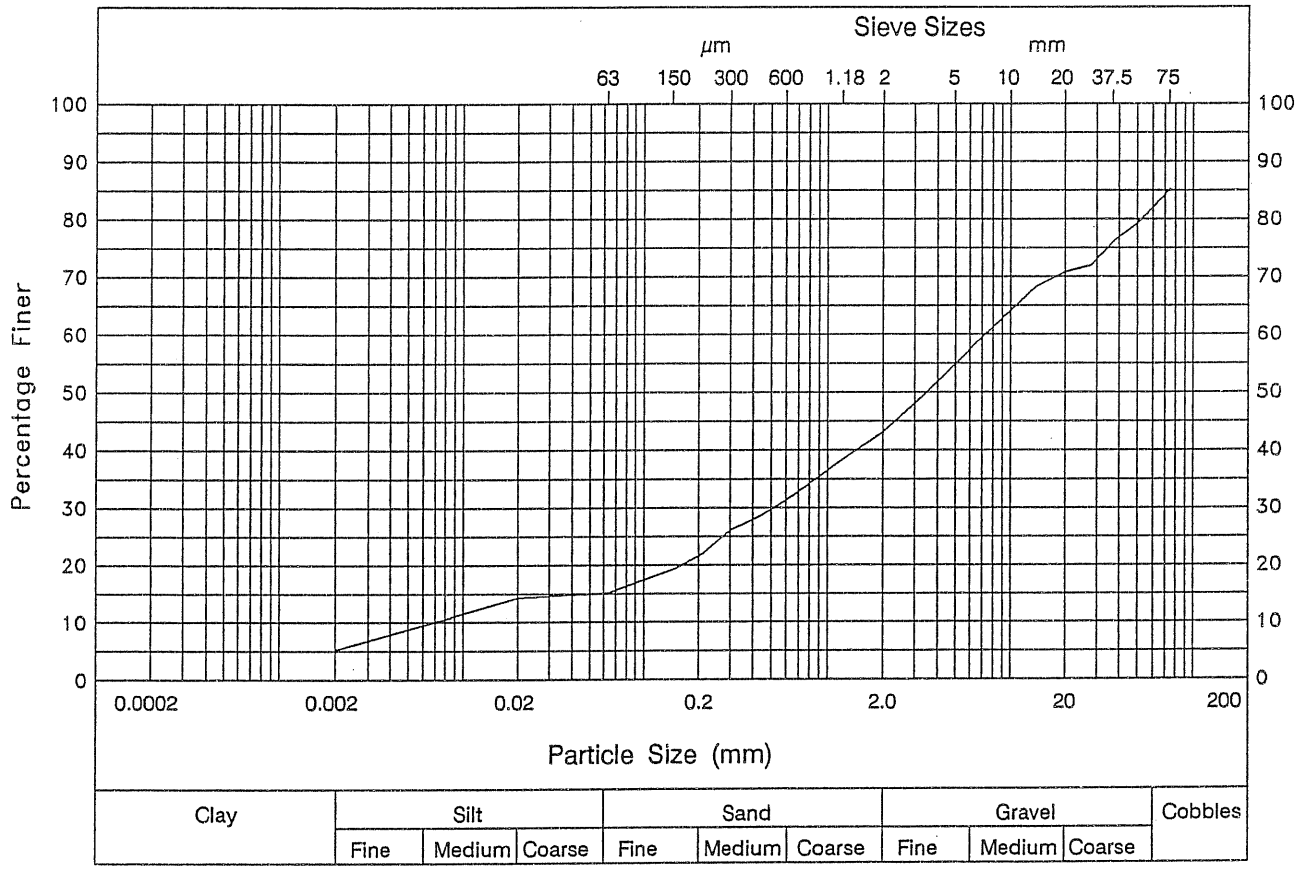
Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
Exploration Associates		**Sheet** L2/3



Particle Size	% Passing	Particle Size	% Passing
75 mm	85	1.18 mm	38
50 mm	79	600 µm	31
37.5 mm	76	425 µm	28
28 mm	72	300 µm	26
20 mm	71	212 µm	22
14 mm	68	150 µm	19
10 mm	64	63 µm	15
6.3 mm	58	20 µm	14
5 mm	55	6 µm	10
3.35 mm	49	2 µm	5
2 mm	43		

Hole 3	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 1.00-1.45	Description MADE GROUND: Dark grey clayey silty very sandy gravel with some cobbles
Type B	
Test Performed	

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Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
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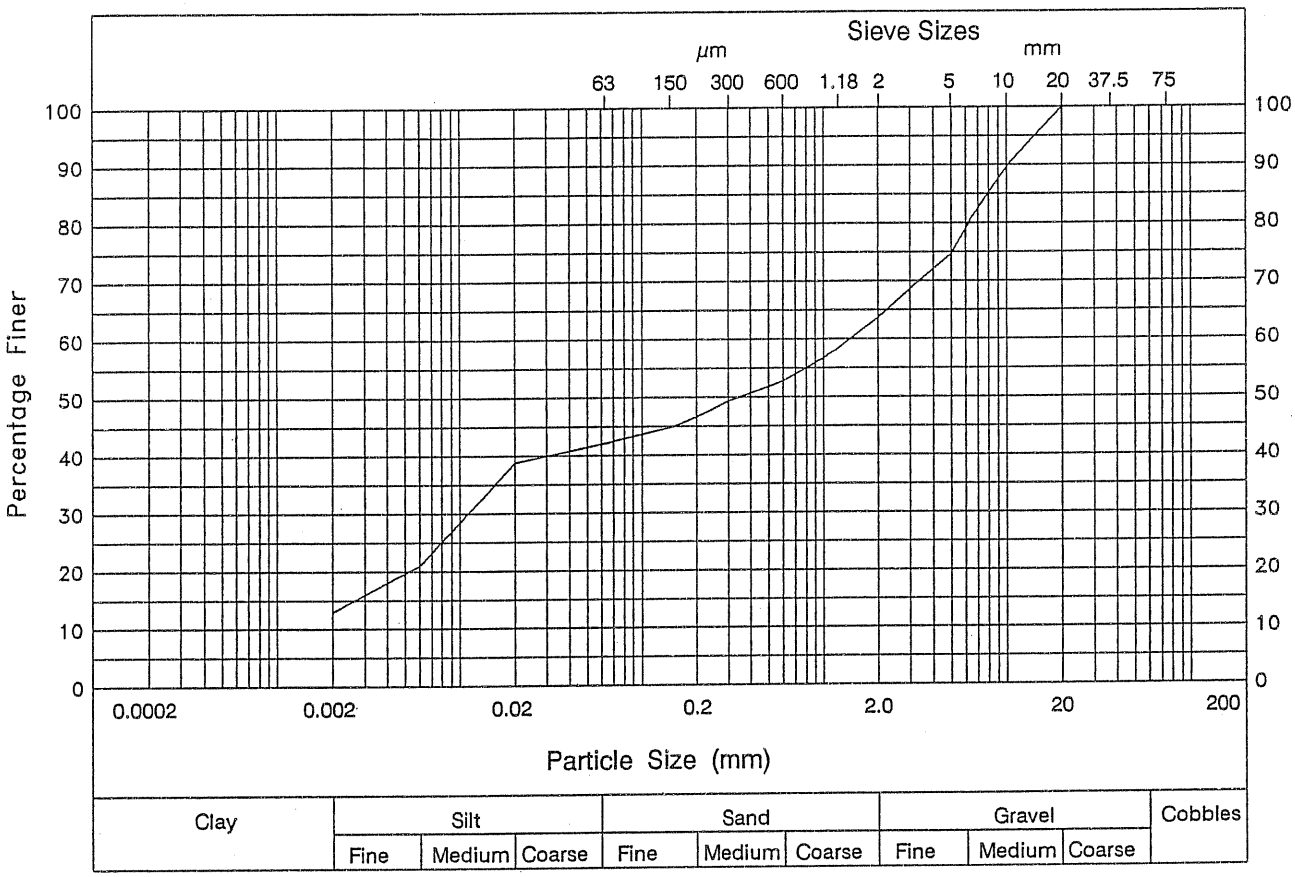

Particle Size	% Passing	Particle Size	% Passing
20 mm	100	425 µm	51
14 mm	95	300 µm	49
10 mm	90	212 µm	47
6.3 mm	80	150 µm	45
5 mm	75	63 µm	42
3.35 mm	70	20 µm	39
2 mm	64	6 µm	21
1.18 mm	58	2 µm	13
600 µm	53		

Hole 3	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 2.00-2.45	Description MADE GROUND: Grey clayey very silty very sandy gravel
Type B	
Test Performed	

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Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
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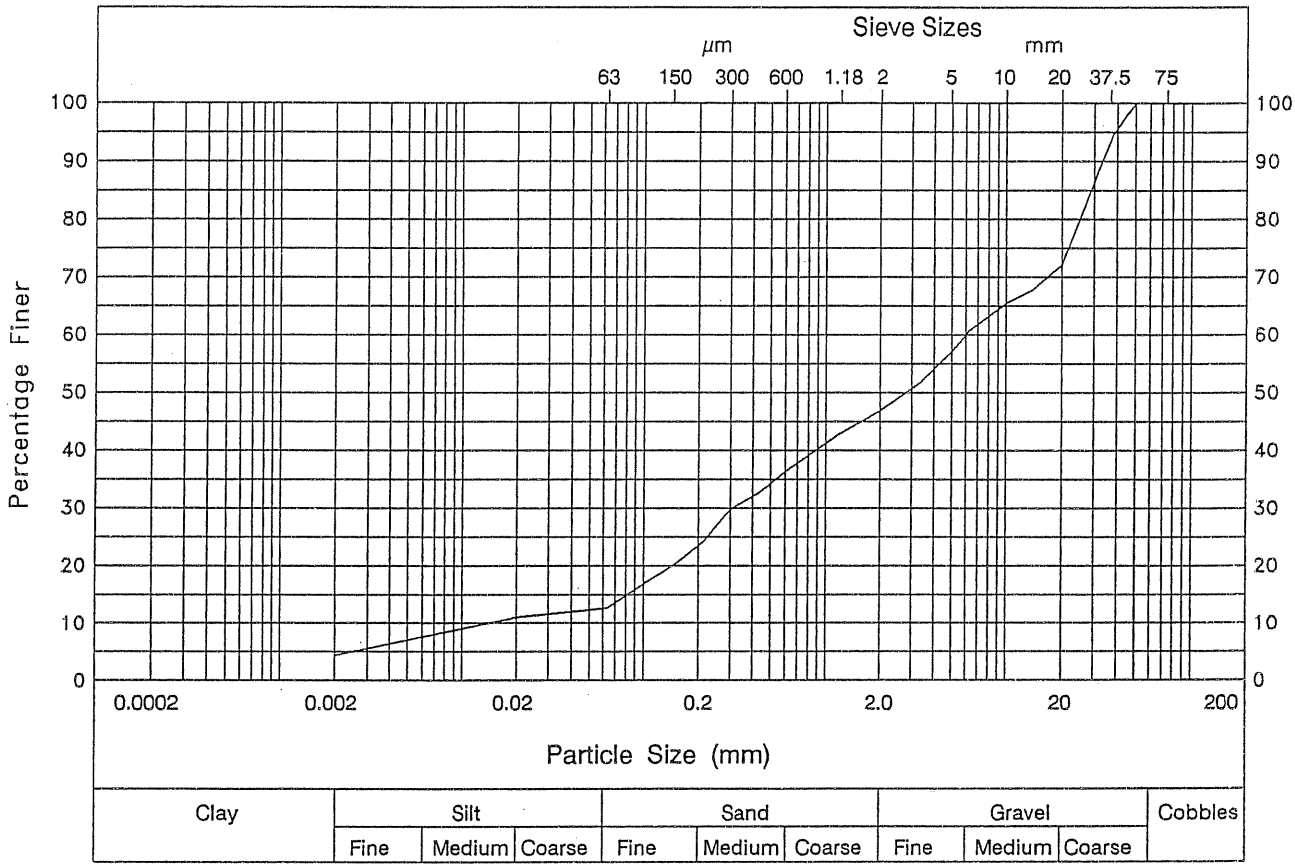

Particle Size	% Passing	Particle Size	% Passing
50 mm	100	1.18 mm	43
37.5 mm	94	600 µm	36
28 mm	84	425 µm	33
20 mm	72	300 µm	30
14 mm	68	212 µm	24
10 mm	65	150 µm	20
6.3 mm	61	63 µm	13
5 mm	57	20 µm	11
3.35 mm	52	6 µm	8
2 mm	47	2 µm	4

Hole 4	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 2.00-2.45	Description Brown slightly clayey silty very sandy GRAVEL
Type B	
Test Performed	

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Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
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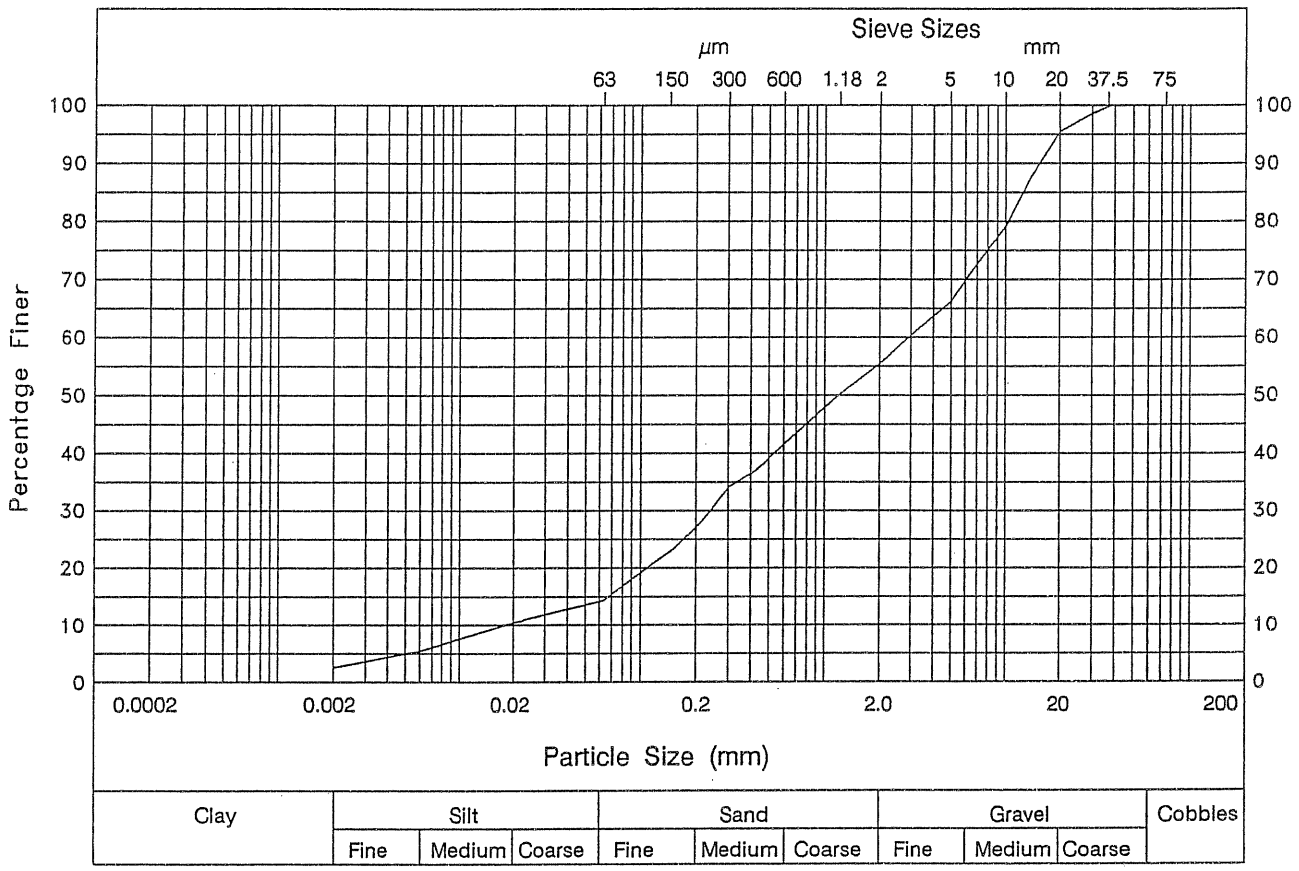

Particle Size	% Passing	Particle Size	% Passing
37.5 mm	100	600 µm	42
28 mm	98	425 µm	37
20 mm	95	300 µm	34
14 mm	88	212 µm	28
10 mm	79	150 µm	23
6.3 mm	71	63 µm	14
5 mm	66	20 µm	11
3.35 mm	62	6 µm	6
2 mm	55	2 µm	3
1.18 mm	50		

Hole 5	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 0.00-1.00	Description MADE GROUND: Dark grey slightly clayey silty fine to coarse sand and gravel
Type B	
Test Performed	

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Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
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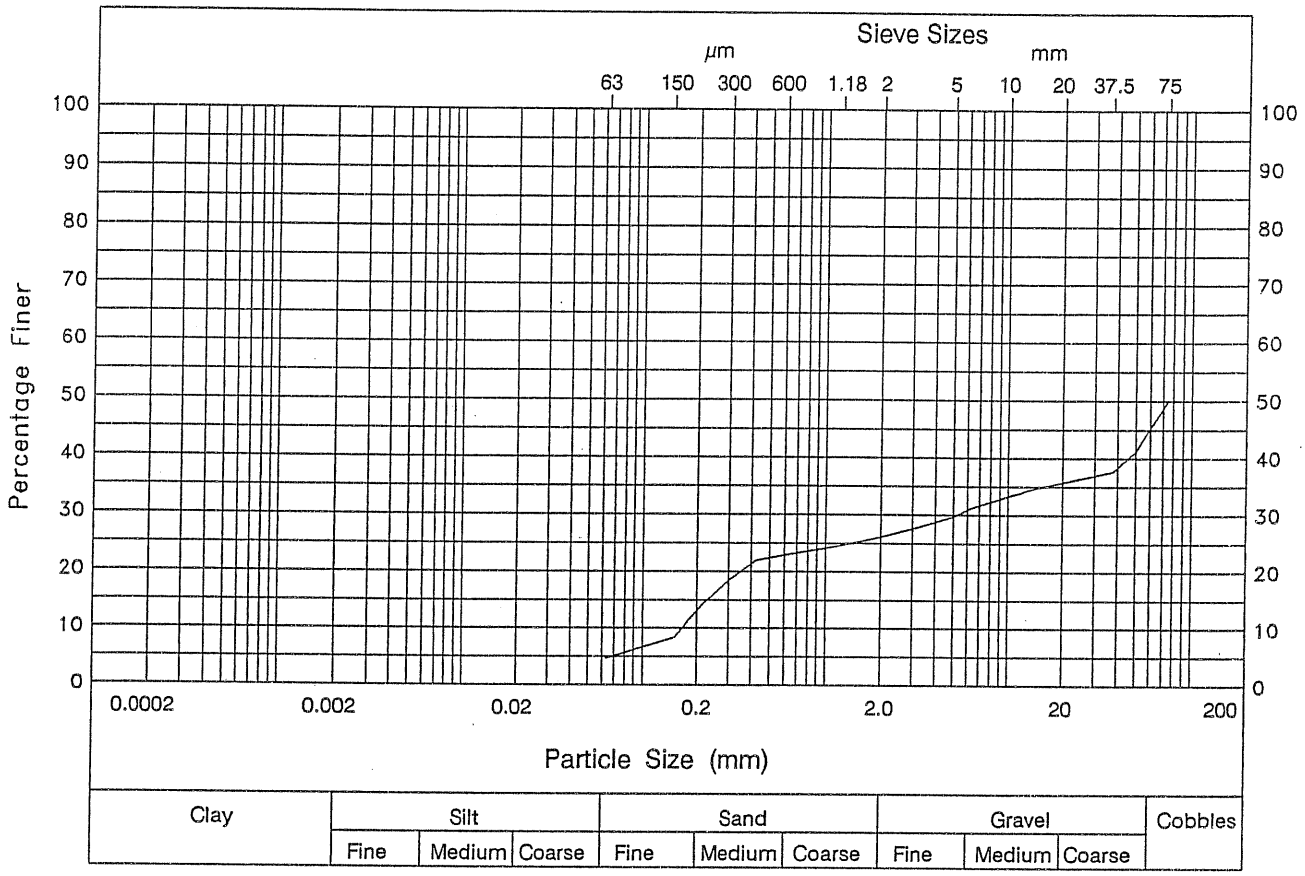
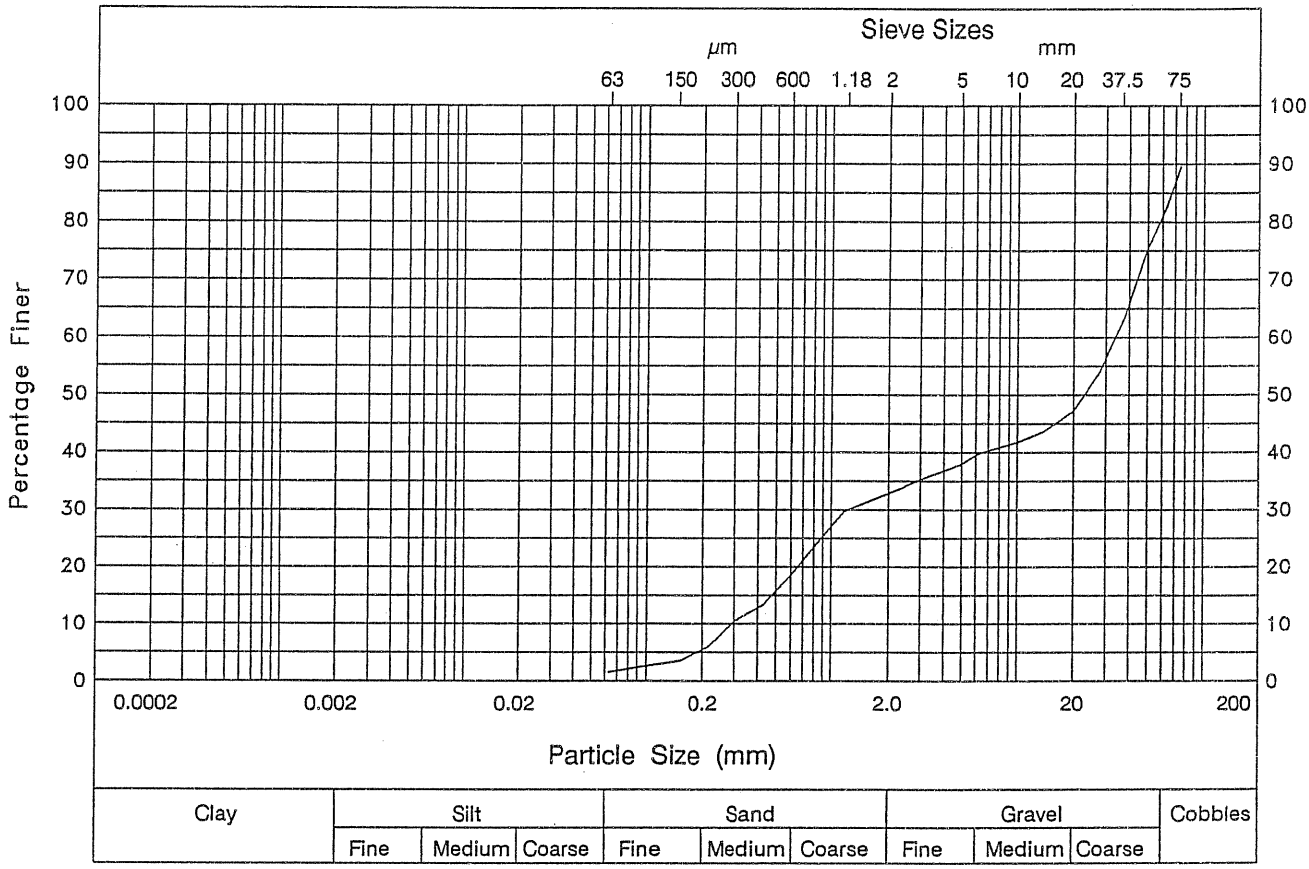


Particle Size	% Passing	Particle Size	% Passing
75 mm	50	2 mm	26
50 mm	41	1.18 mm	25
37.5 mm	38	600 μm	23
14 mm	35	425 μm	22
10 mm	33	300 μm	18
6.3 mm	31	212 μm	14
5 mm	30	150 μm	8
3.35 mm	28	63 μm	5

Hole 5	WET
Depth 2.50-2.95	Description Brown gravelly COBBLES with much matrix of silty sand
Type B	
Test Performed	

Form 25/4

Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
Exploration Associates		**Sheet** L2/8



Particle Size	% Passing	Particle Size	% Passing
75 mm	90	3.35 mm	36
63 mm	83	2 mm	33
50 mm	75	1.18 mm	30
37.5 mm	64	600 μm	18
28 mm	54	425 μm	13
20 mm	47	300 μm	11
14 mm	44	212 μm	6
10 mm	42	150 μm	4
6.3 mm	40	63 μm	2
5 mm	38		

Hole 6	WET
Depth 4.00-4.45	Description: Brown slightly silty very sandy GRAVEL with some cobbles
Type B	
Test Performed	

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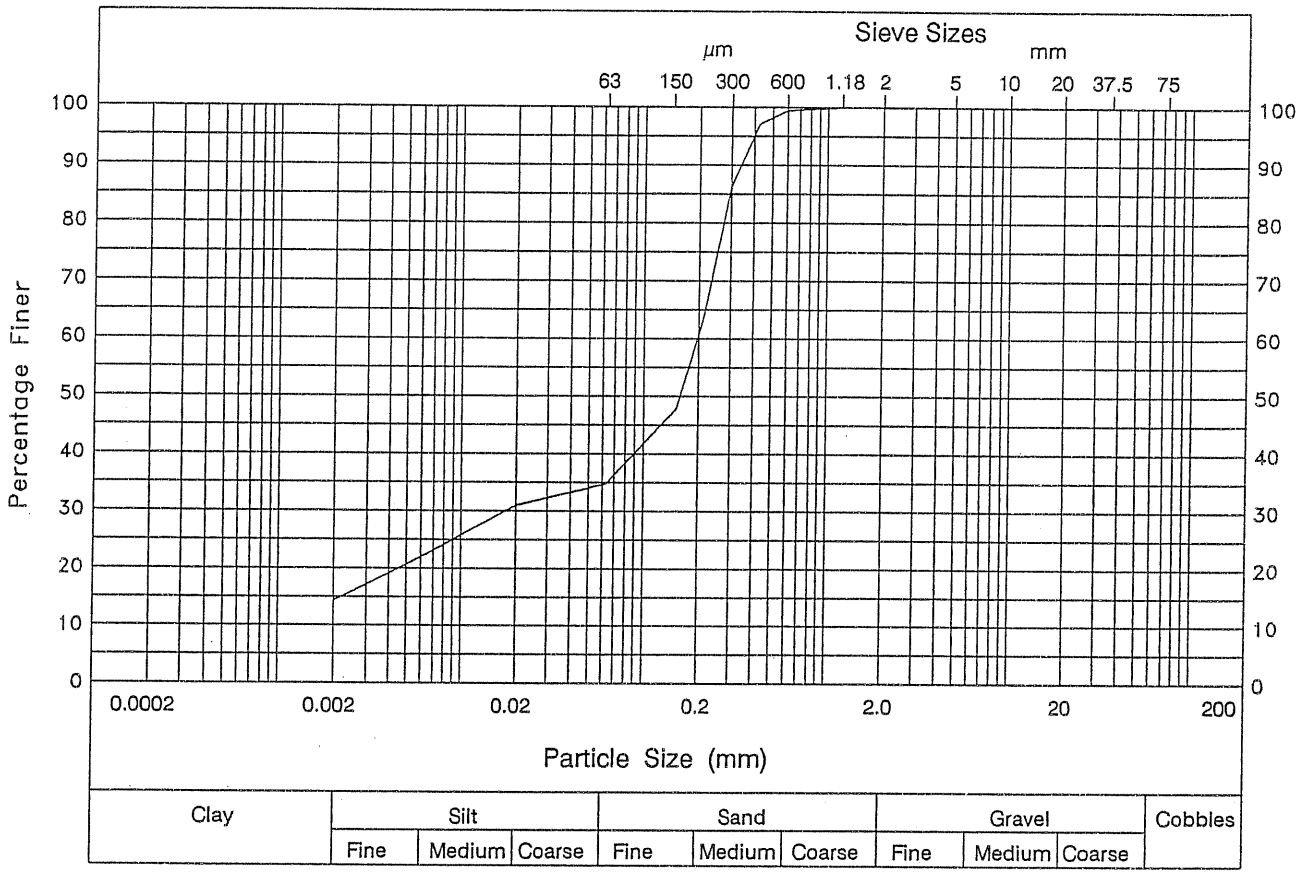
Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks, Thornhill, Dewsbury, Kirklees M.B.C.	**Contract** 127001
Exploration Associates		**Sheet** L2/9



Particle Size	% Passing	Particle Size	% Passing
1.18 mm	100	150 µm	48
600 µm	99	63 µm	35
425 µm	97	20 µm	31
300 µm	86	6 µm	22
212 µm	64	2 µm	14

Hole 8	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 3.20-3.65	Description Brown clayey very silty fine and medium SAND
Type U	
Test Performed	

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Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
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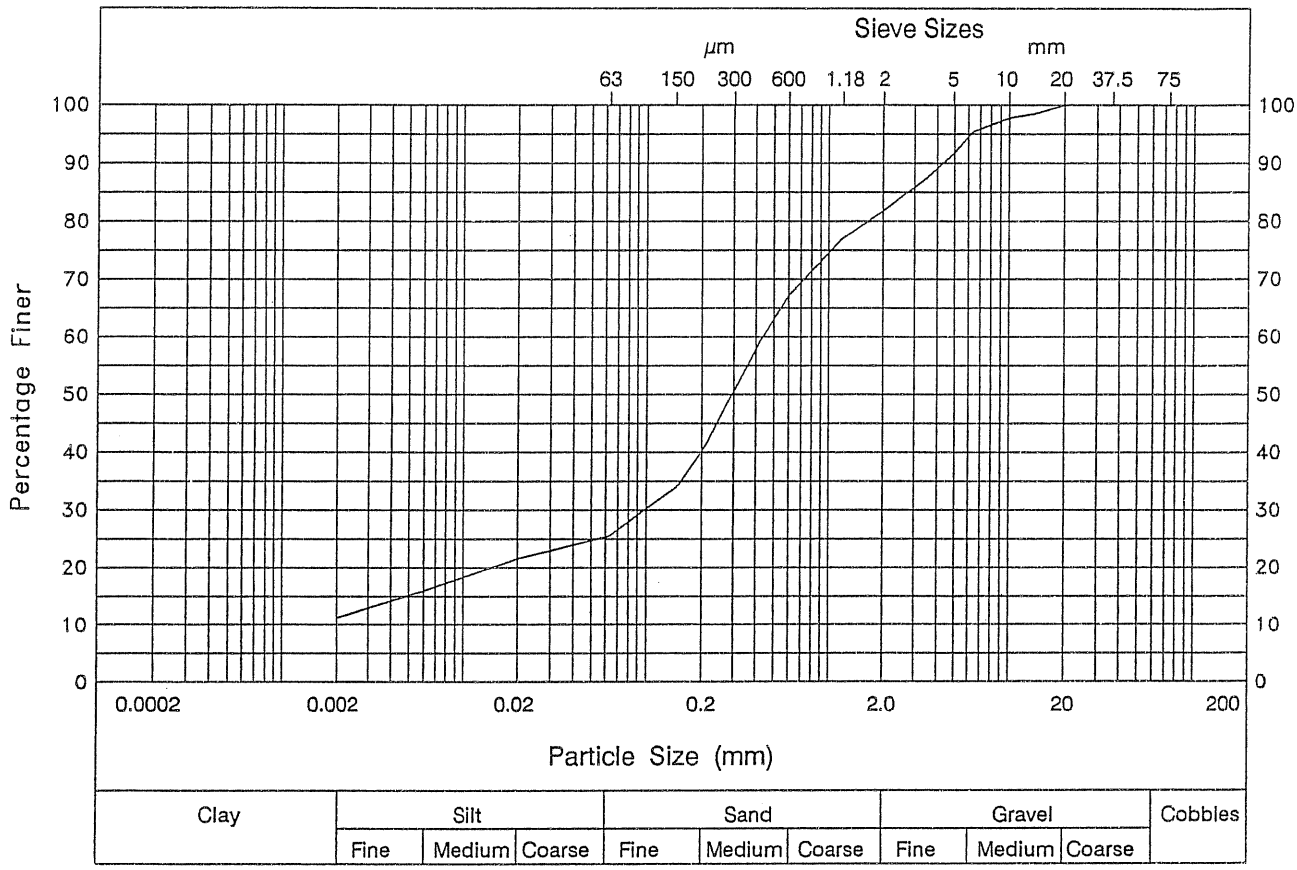

Particle Size	% Passing	Particle Size	% Passing
20 mm	100	425 µm	60
14 mm	99	300 µm	51
10 mm	98	212 µm	41
6.3 mm	95	150 µm	34
5 mm	92	63 µm	25
3.35 mm	87	20 µm	22
2 mm	82	6 µm	16
1.18 mm	77	2 µm	11
600 µm	67		

Hole 10	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 1.50-2.00	Description Brown clayey silty fine to coarse SAND with some gravel
Type B	
Test Performed	

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Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
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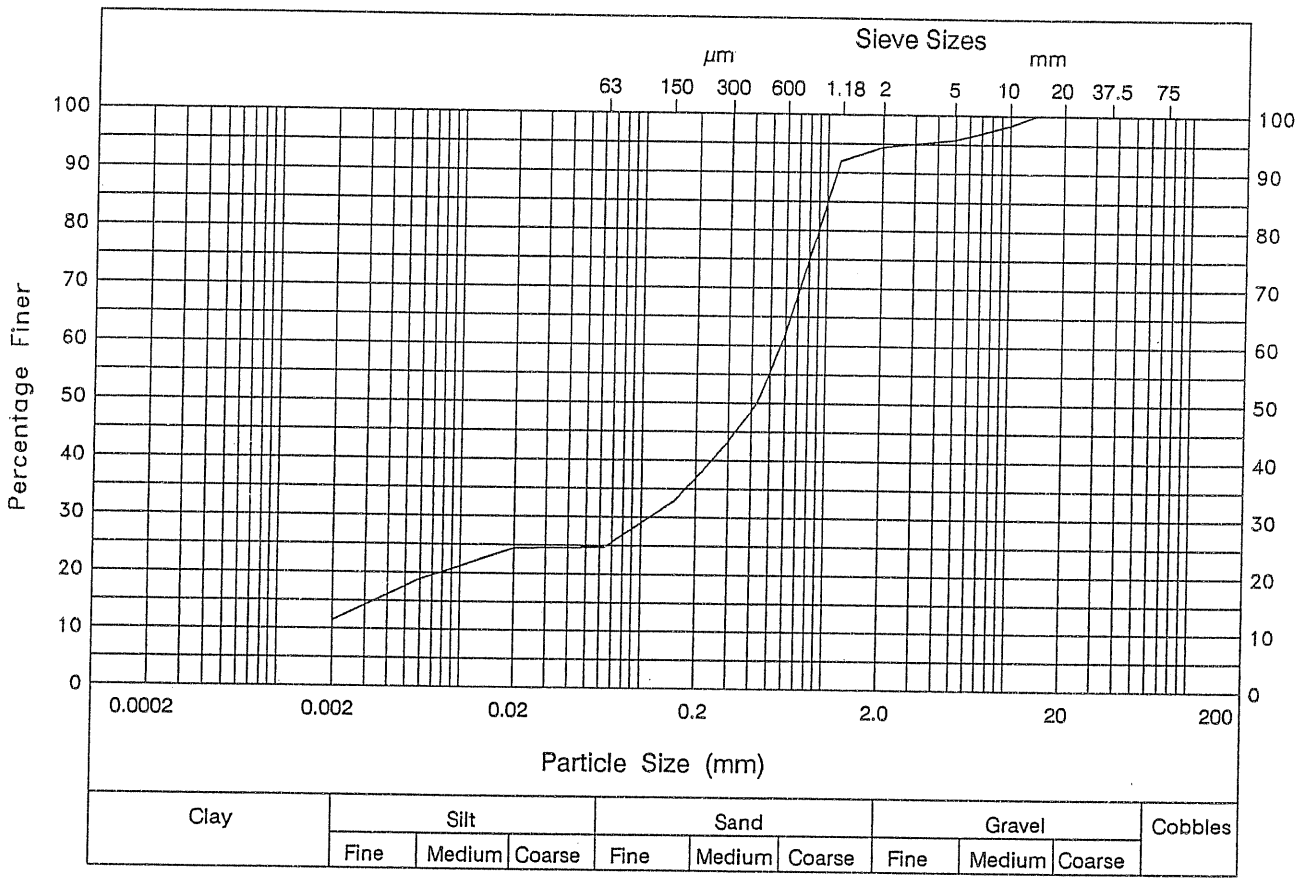

Particle Size	% Passing	Particle Size	% Passing
14 mm	100	425 µm	50
10 mm	98	300 µm	43
6.3 mm	97	212 µm	38
5 mm	96	150 µm	33
3.35 mm	95	63 µm	25
2 mm	94	20 µm	24
1.18 mm	92	6 µm	19
600 µm	62	2 µm	12

Hole 11	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 1.00-1.45	Description Brown clayey silty fine and medium SAND with some gravel
Type B	
Test Performed	

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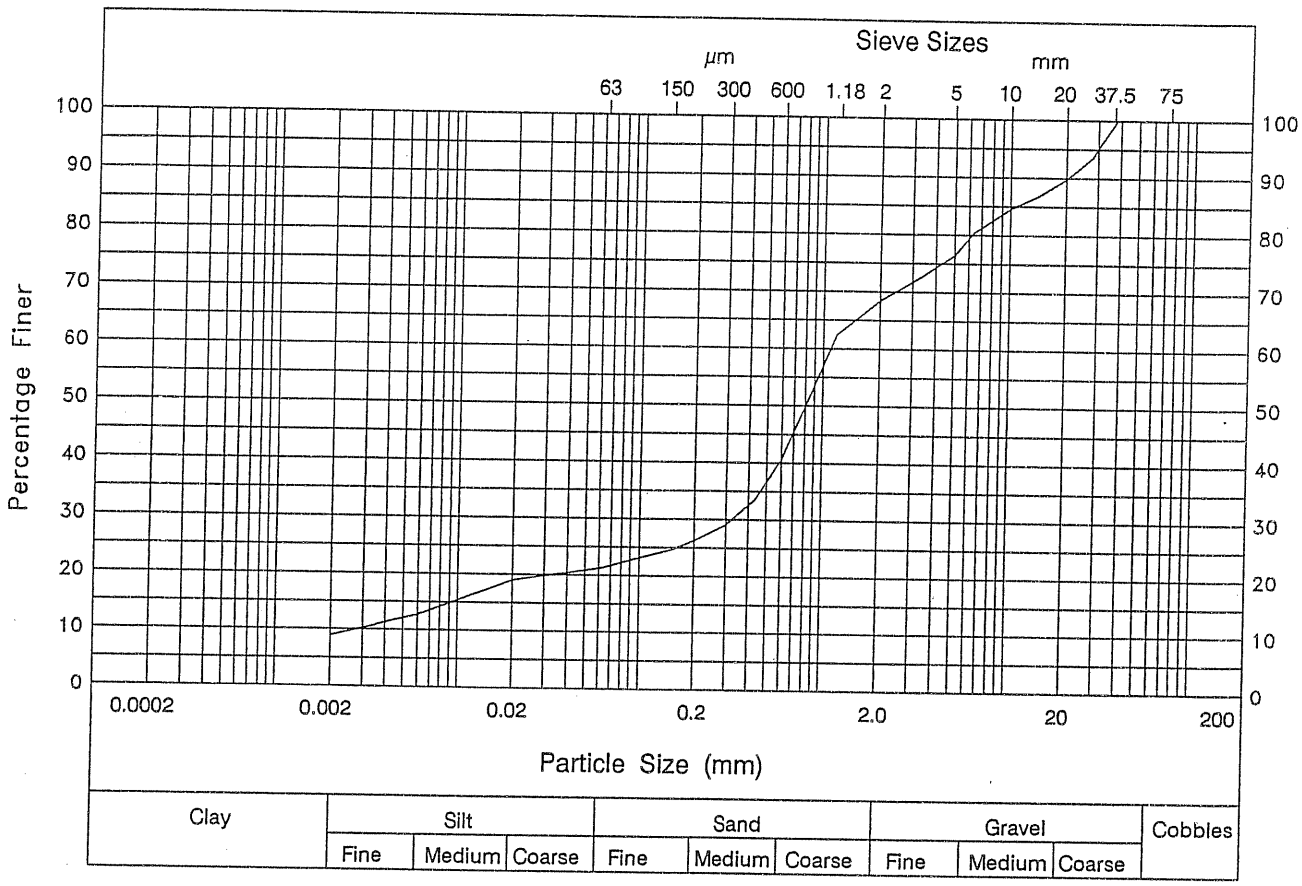
Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
Exploration Associates		**Sheet** L2/14



Particle Size	% Passing	Particle Size	% Passing
37.5 mm	100	600 µm	41
28 mm	94	425 µm	33
20 mm	90	300 µm	29
14 mm	87	212 µm	27
10 mm	85	150 µm	25
6.3 mm	80	63 µm	21
5 mm	76	20 µm	19
3.35 mm	73	6 µm	13
2 mm	68	2 µm	9
1.18 mm	62		

Hole 12	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 1.20-1.65	Description Brown clayey silty fine to coarse SAND with much gravel
Type B	
Test Performed	

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Laboratory - Particle Size Plot	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
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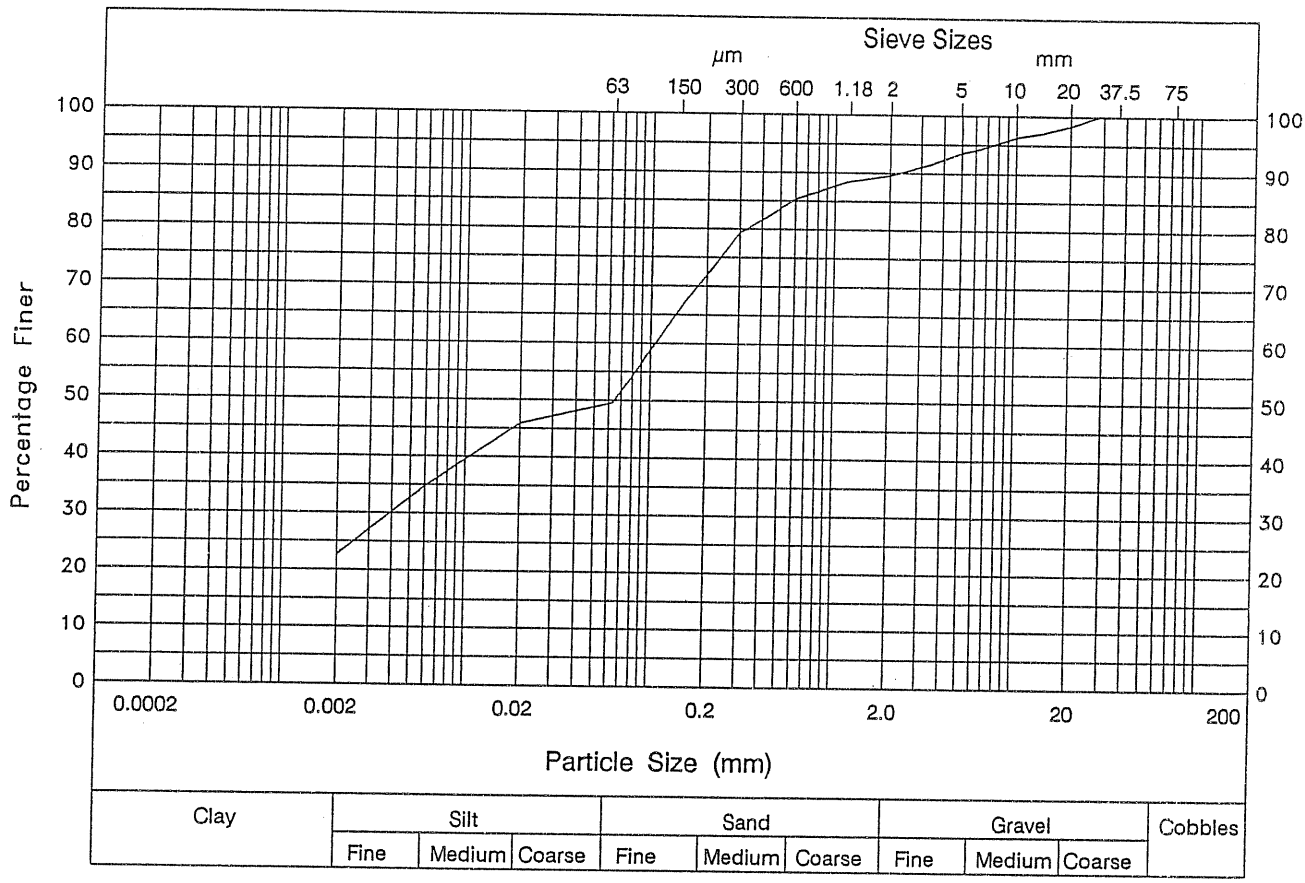

Particle Size	% Passing	Particle Size	% Passing
28 mm	100	600 µm	85
20 mm	98	425 µm	82
14 mm	97	300 µm	79
10 mm	96	212 µm	73
6.3 mm	94	150 µm	67
5 mm	94	63 µm	49
3.35 mm	92	20 µm	46
2 mm	90	6 µm	35
1.18 mm	88	2 µm	23

Hole 12	WET Sedimentation sample pretreated using hydrogen peroxide
Depth 5.90-6.35	Description Grey very clayey very silty fine to coarse SAND with some gravel
Type U	
Test Performed	

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Laboratory - Particle Size Plot Exploration Associates	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001 **Sheet** L2/16

Samples				CBR							Compaction				
Hole	Depth	Type	Description	Top	Base	Top w%	Base w%	Surch kg.	Nat w%	γ_b Mg/m^3	Type	Opt w%	γ_d Max Mg/m^3	γ_d At Nat w Mg/m^3	ρ_s
TP1	1.00 - 1.50	B	MADE GROUND: Dark grey brown slightly silty fine to coarse sand with much gravel						16	1.92	2.5kg	14	1.69		2.03
TP5	1.50 - 2.00	B	Brown slightly silty medium and coarse SAND							2.05	2.5kg	13	1.81		2.65
TP7	1.00 - 1.40	B	Soft to firm grey slightly sandy CLAY with occasional gravel							2.04	2.5kg	12	1.83		2.65
TP8	1.50 - 2.00	B	MADE GROUND: Dark grey sandy clayey silt							1.45	2.5kg	35	1.08		1.79
CBR1	0.50 - 1.00	B	MADE GROUND: Black very sandy ash gravel	12	3.4	27	30		28	1.67	Vib				
CBR2	0.70 - 1.00	B	Brown clayey silty fine and medium SAND	3.0	3.6	17	17		17	2.03	Vib				
CBR3	0.50 - 1.00	B	MADE GROUND: Dark grey very sandy ash and slag gravel	#	#	18	18		18	0.00	Vib				
CBR4	0.50 - 1.00	B	MADE GROUND: Red brown and grey ash sand and gravel with clay pockets	11	13	19	20		19	2.02	Vib				
CBR5	0.50 - 1.00	B	Brown clayey silty fine and medium SAND	32	14	12	13		13	2.10	Vib				
CBR6	0.50 - 1.00	B	Brown fine to coarse SAND and GRAVEL	#	#	0.0	0.0		25	0.00	Vib				
TP10	1.30 - 1.70	B	MADE GROUND: Firm grey brown slightly sandy silty CLAY with occasional gravel and cobbles							2.14	2.5kg	12	1.90		2.65

Remarks

Form 9/1

Laboratory - CBR/Compaction

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

L3/1

Samples				CBR							Compaction				
Hole	Depth	Type	Description	Top	Base	Top w%	Base w%	Surch kg.	Nat w%	γ_b Mg/m^3	Type	Opt w%	γ_d Max Mg/m^3	At Nat w	ρ_s
4	1.00 - 1.45	B	MADE GROUND: Red brown and grey fine to coarse ash sand with much gravel						11	1.88	2.5kg	21	1.55		2.58

Remarks

Form 9/1

Laboratory - CBR/Compaction

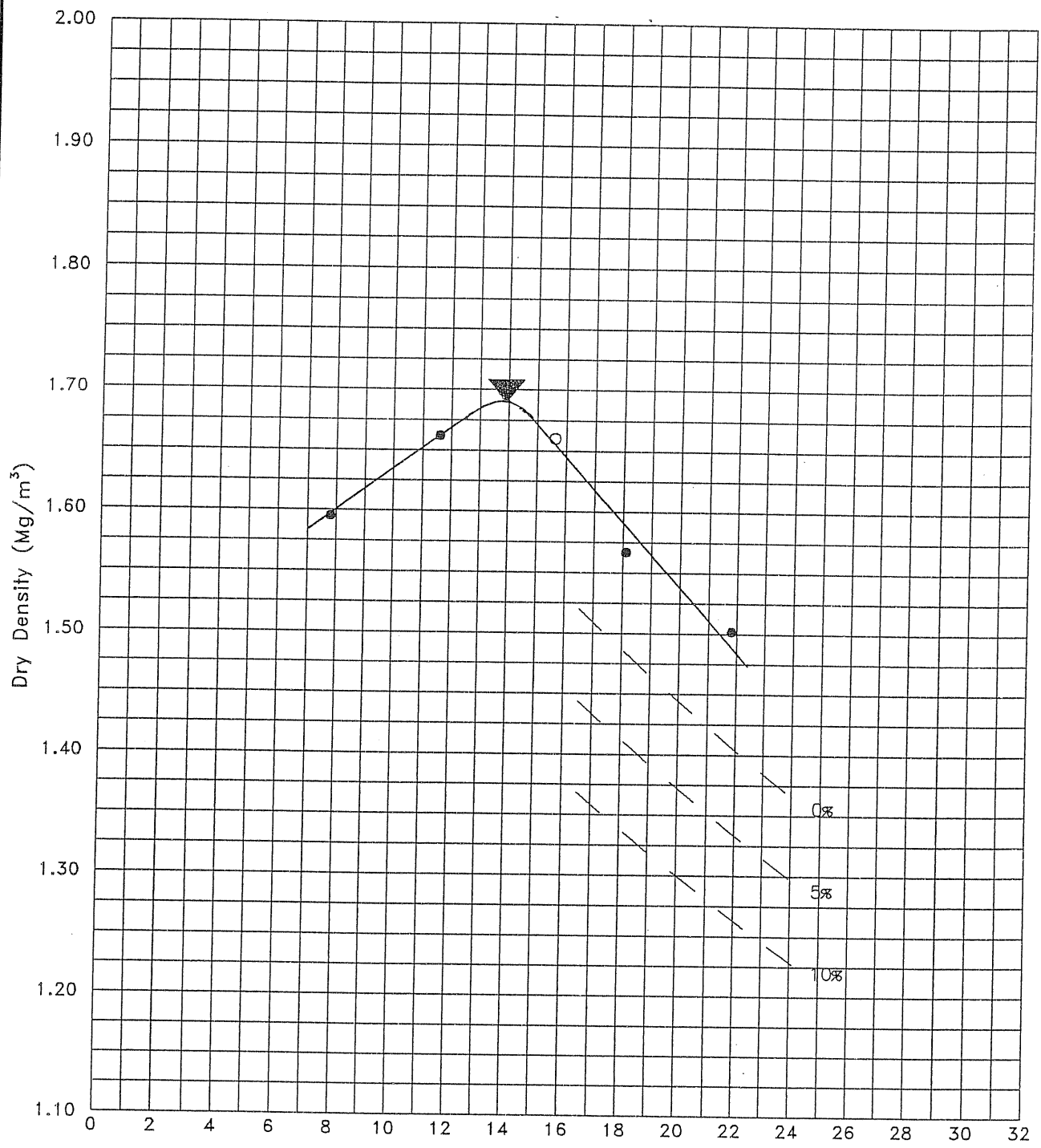
Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

L3/2



- Moisture Content/Dry Density
- Compaction at Natural Water Content
- Maximum Dry Density/Optimum Water Content

Type of Test/Mould	2.5kg/CBR		
Particle Density Measured	2.03	Mg/m^3	
Maximum Dry Density	1.69	Mg/m^3	
Optimum Water Content	14	%	
% retained 37.5mm sieve	12		
% retained 20mm sieve	21		

Description: MADE GROUND: Dark grey brown slightly silty fine to coarse sand with much gravel

Hole	TP1
Depth	1.00
Type	B

Form 54/0

Remarks

Laboratory - Moisture Content/ Dry Density Relationship

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

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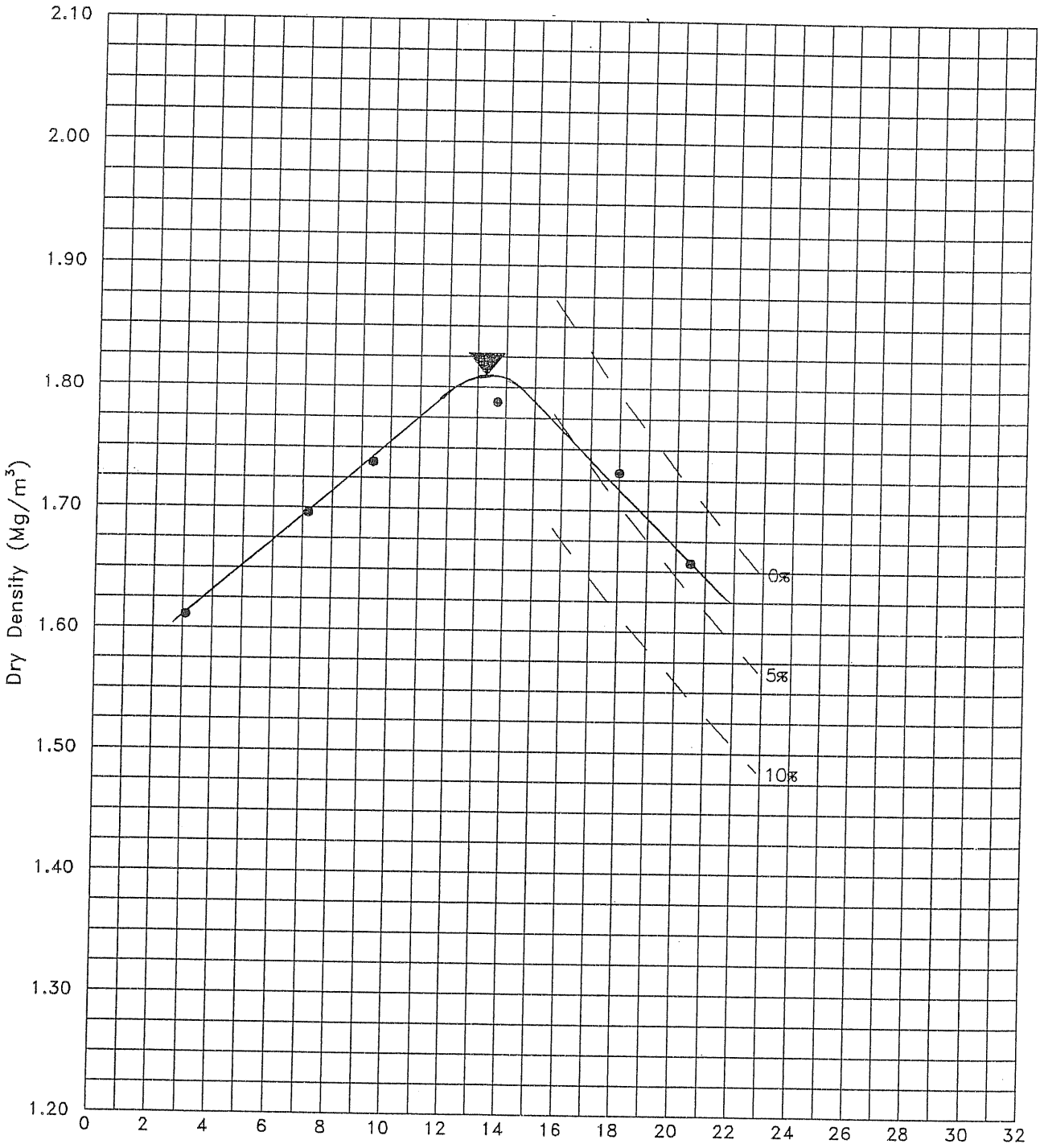
L3/3



- ● Moisture Content/Dry Density
- o Compaction at Natural Water Content
- ▼ Maximum Dry Density/Optimum Water Content

Type of Test/Mould	2.5kg/1 Litre		
Particle Density Assumed	2.65	Mg/m^3	
Maximum Dry Density	1.81	Mg/m^3	
Optimum Water Content	13	%	
% retained 37.5mm sieve	0		
% retained 20mm sieve	1		

Description: Brown slightly silty medium and coarse SAND

Hole: TP5
Depth: 1.50
Type: B

Form 54/0

Remarks

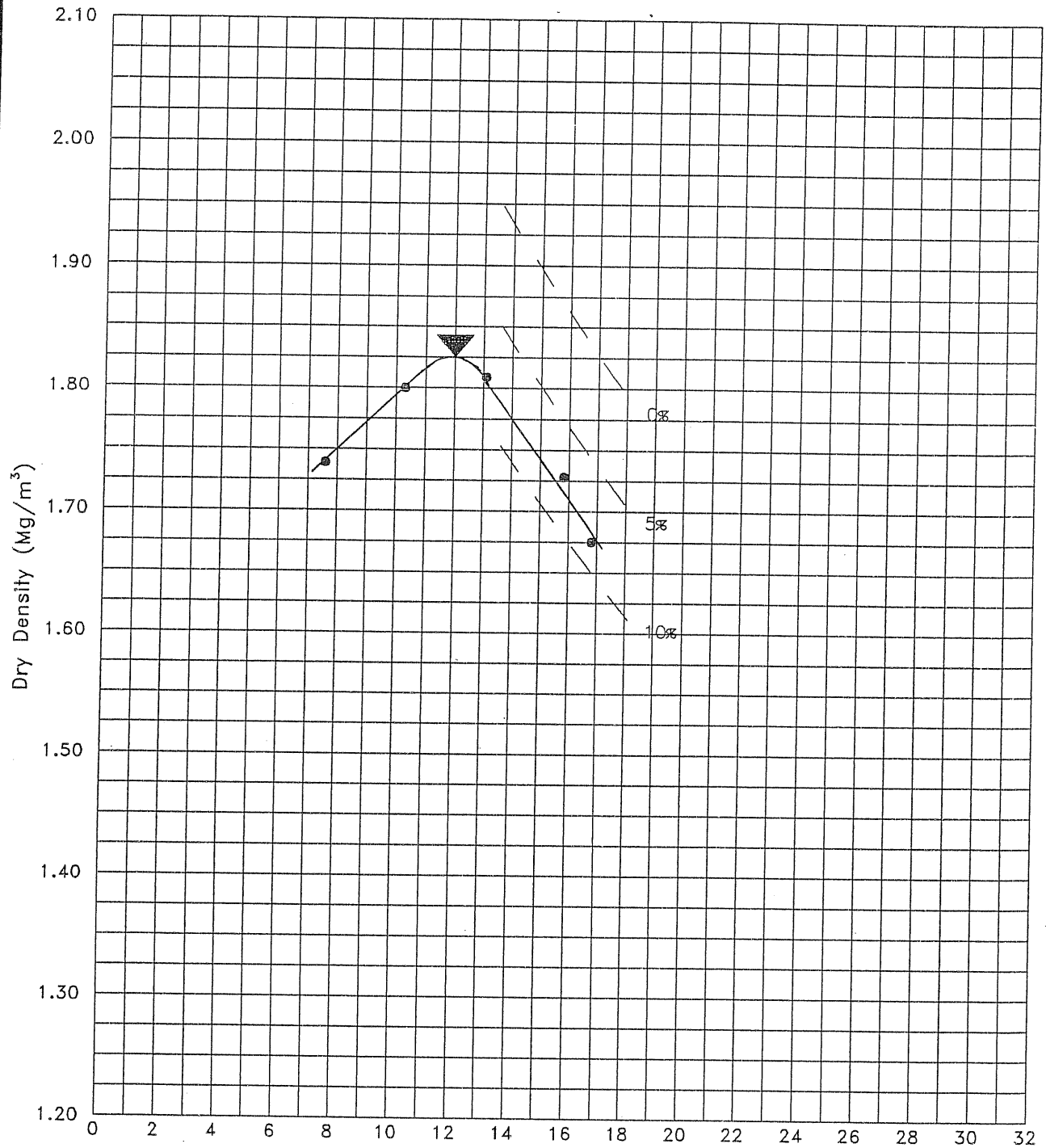
Laboratory - Moisture Content/ Dry Density Relationship

Exploration Associates

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

L3/4



- ● Moisture Content/Dry Density
- o Compaction at Natural Water Content
- ▼ Maximum Dry Density/Optimum Water Content

Type of Test/Mould	2.5kg/1 Litre	
Particle Density Assumed	2.65	Mg/m^3
Maximum Dry Density	1.83	Mg/m^3
Optimum Water Content	12	%
% retained 37.5mm sieve	0	
% retained 20mm sieve	0.4	

Description: Soft to firm grey slightly sandy CLAY with occasional gravel

Hole TP7
Depth 1.00
Type B

Form 54/0

Remarks

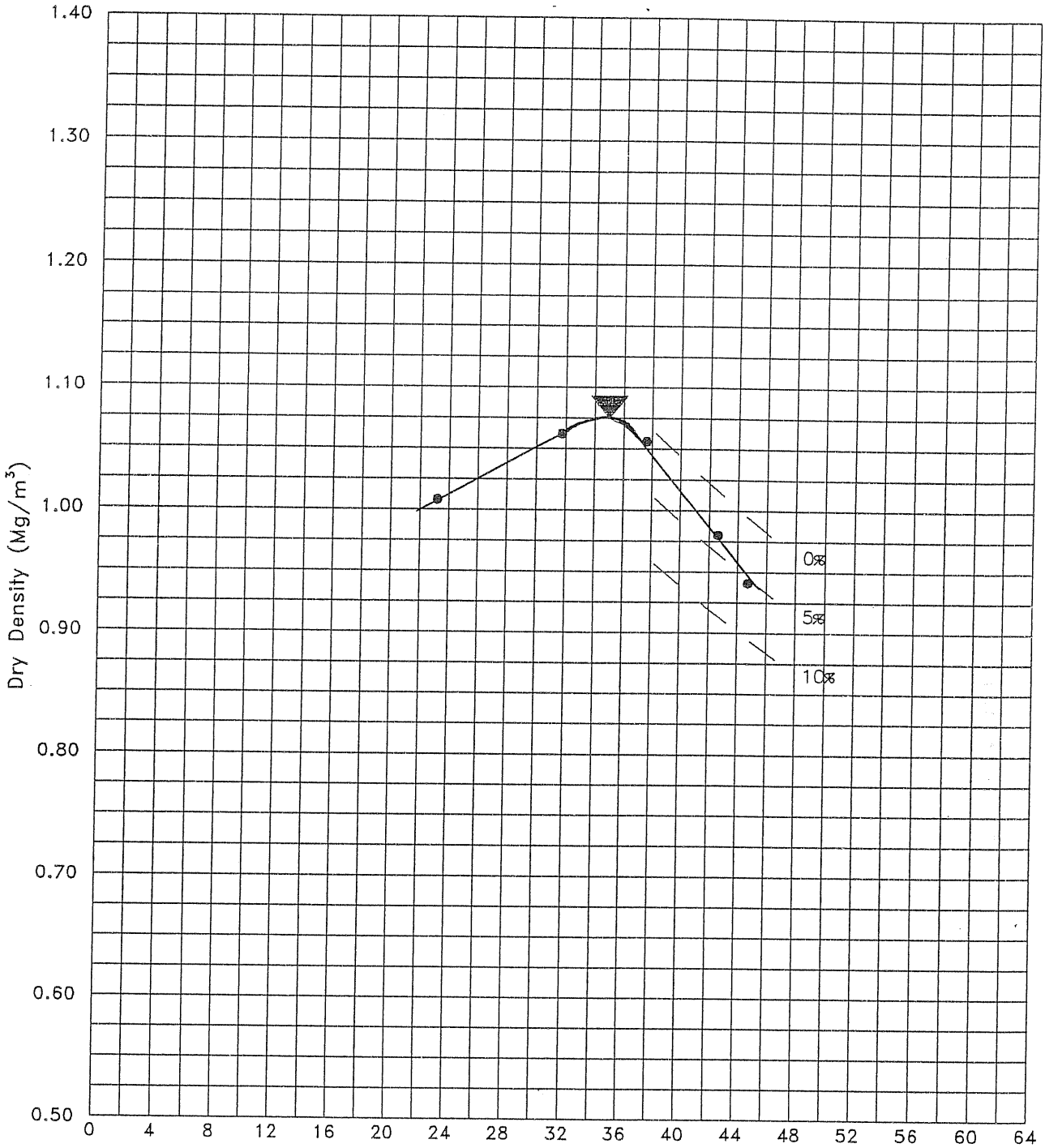
Laboratory - Moisture Content/ Dry Density Relationship

Exploration Associates

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

L3/5



- Moisture Content/Dry Density
- o Compaction at Natural Water Content
- ▼ Maximum Dry Density/Optimum Water Content

Type of Test/Mould	2.5kg/1 Litre		
Particle Density Assumed	1.79	Mg/m^3	
Maximum Dry Density	1.08	Mg/m^3	
Optimum Water Content	35	%	
% retained 37.5mm sieve	0		
% retained 20mm sieve	0		

Description: MADE GROUND: Dark grey sandy clayey silt

Hole TP8
Depth 1.50
Type B

Form 54/0

Remarks

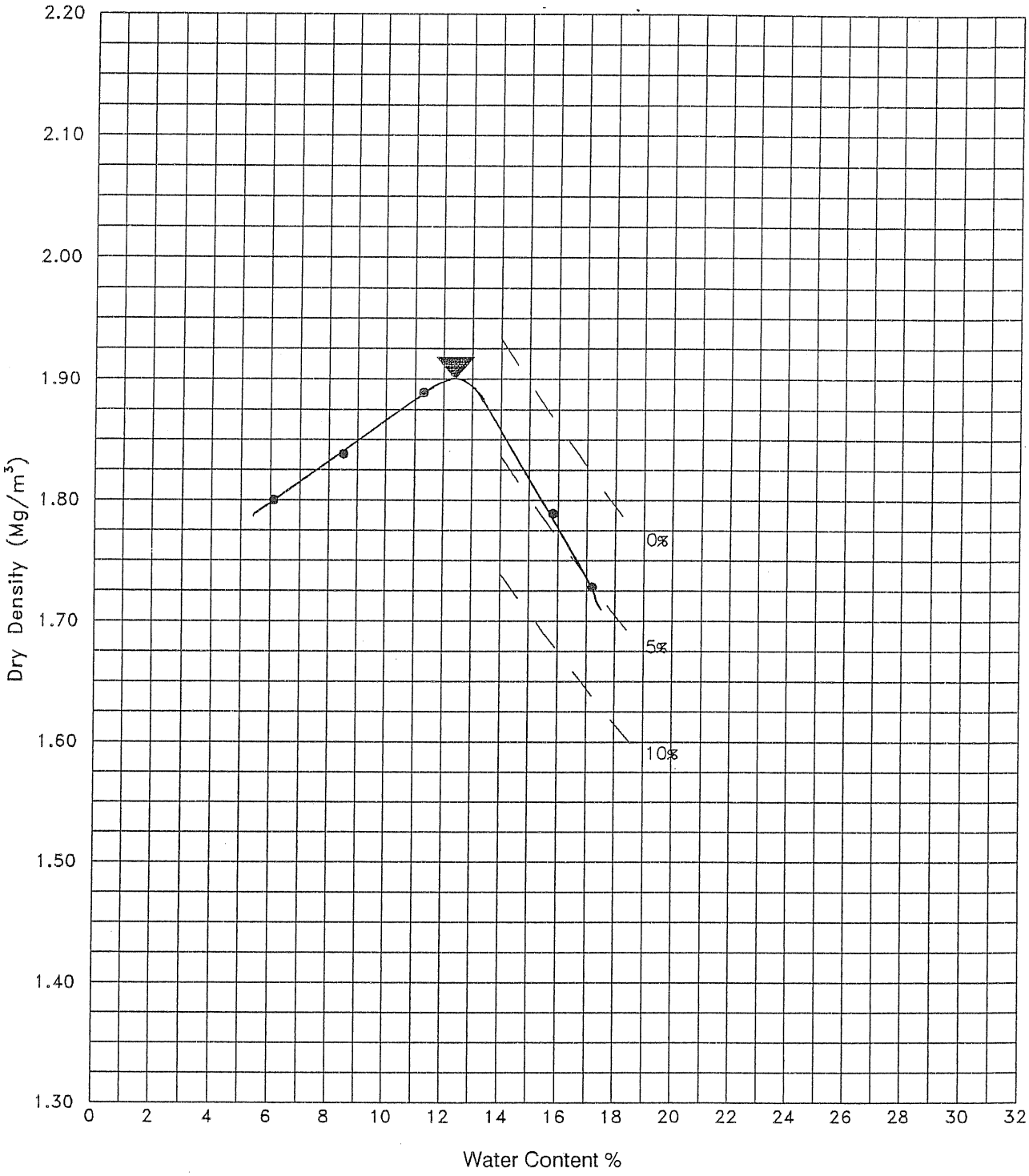
Laboratory - Moisture Content/ Dry Density Relationship

Exploration Associates

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

L3/6



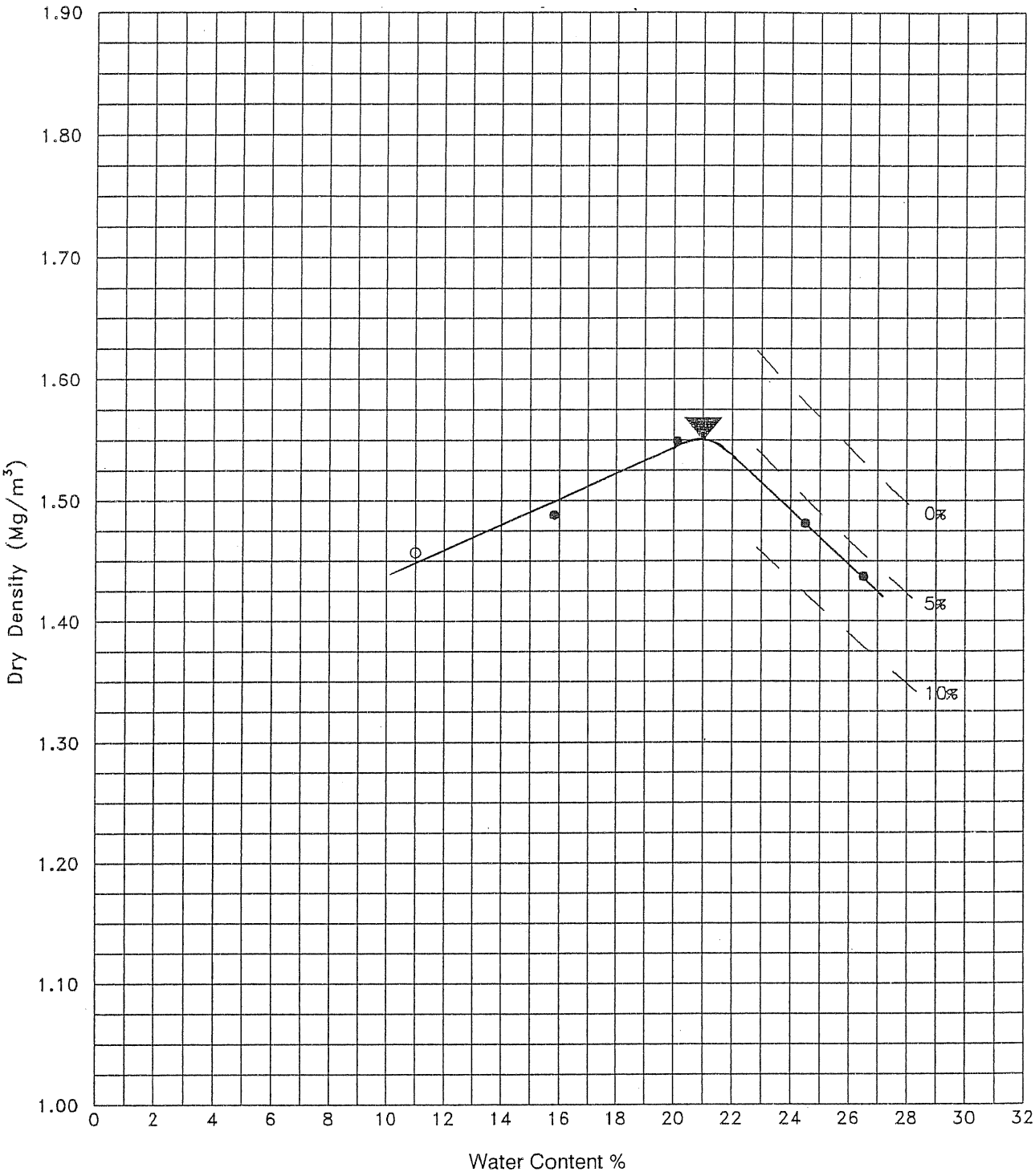
● Moisture Content/Dry Density
o Compaction at Natural Water Content
▼ Maximum Dry Density/Optimum Water Content

Type of Test/Mould	2.5kg/1 Litre		Description	MADE GROUND: Firm grey brown slightly sandy silty CLAY with occasional gravel and cobbles	Hole TP10
Particle Density Assumed	2.65	Mg/m^3			Depth 1.30
Maximum Dry Density	1.90	Mg/m^3			Type B
Optimum Water Content	12	%			
% retained 37.5mm sieve	0				
% retained 20mm sieve	0.4				

Form 54/0

Remarks

Laboratory - Moisture Content/ Dry Density Relationship	**Project** Forge Lane Former Steelworks Thornhill, Dewsbury Kirklees M.B.C.	**Contract** 127001
Exploration Associates		L3/7



- Moisture Content/Dry Density
- Compaction at Natural Water Content
- Maximum Dry Density/Optimum Water Content

Type of Test/Mould	2.5kg/CBR		
Particle Density Measured	2.58	Mg/m^3	
Maximum Dry Density	1.55	Mg/m^3	
Optimum Water Content	21	%	
% retained 37.5mm sieve	10		
% retained 20mm sieve	0		

Description: MADE GROUND: Red brown and grey fine to coarse ash sand with much gravel

Hole 4
Depth 1.00
Type B

Form 54/0

Remarks

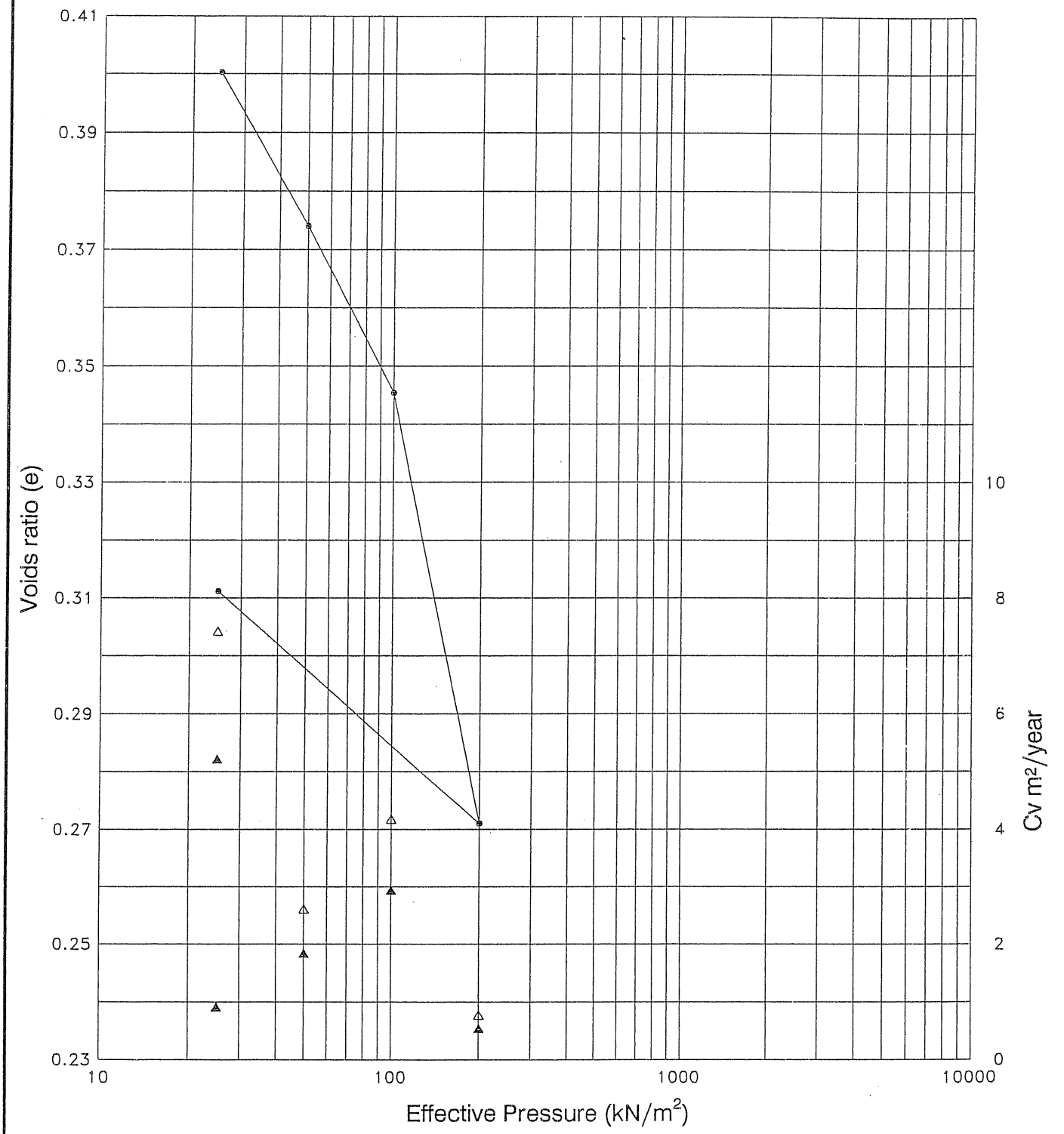
Laboratory - Moisture Content/ Dry Density Relationship

Exploration Associates

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

L3/8



Sample Dimensions	74.99	mm dia.	
	19.070	mm high	
Initial Voids Ratio	.429		
Final Voids Ratio	.311		
Swelling Pressure	-	kN/m²	
Initial Water Content	-18.07	%	
Final Water Content	-20.86	%	
Initial Saturation	111.72	%	
Bulk Density	1.52	Mg/m³	
Dry Density	1.86	Mg/m³	
Specific Gravity	2.65	ASSUMED	
Sample Type	UNDISTURBED		

Pressure	kN/m²	0 25	25 50	50 100	100 200	200 25	
M_v	m²/MN	.793	.749	.417	.553	.181	
C_v Log t_{50} ▲	m²/yr	5.22	1.84	2.94	.54	.91	
C_v Root t_{90} △	m²/yr	7.42	2.61	4.18	.77	-	
Final Voids Ratio		.400	.374	.345	.271	.311	

Description

Brown very silty CLAY with much organic matter

Hole 1

Depth 4.40 - 4.85 m

Sample Type U

Laboratory - Consolidation Test

Project

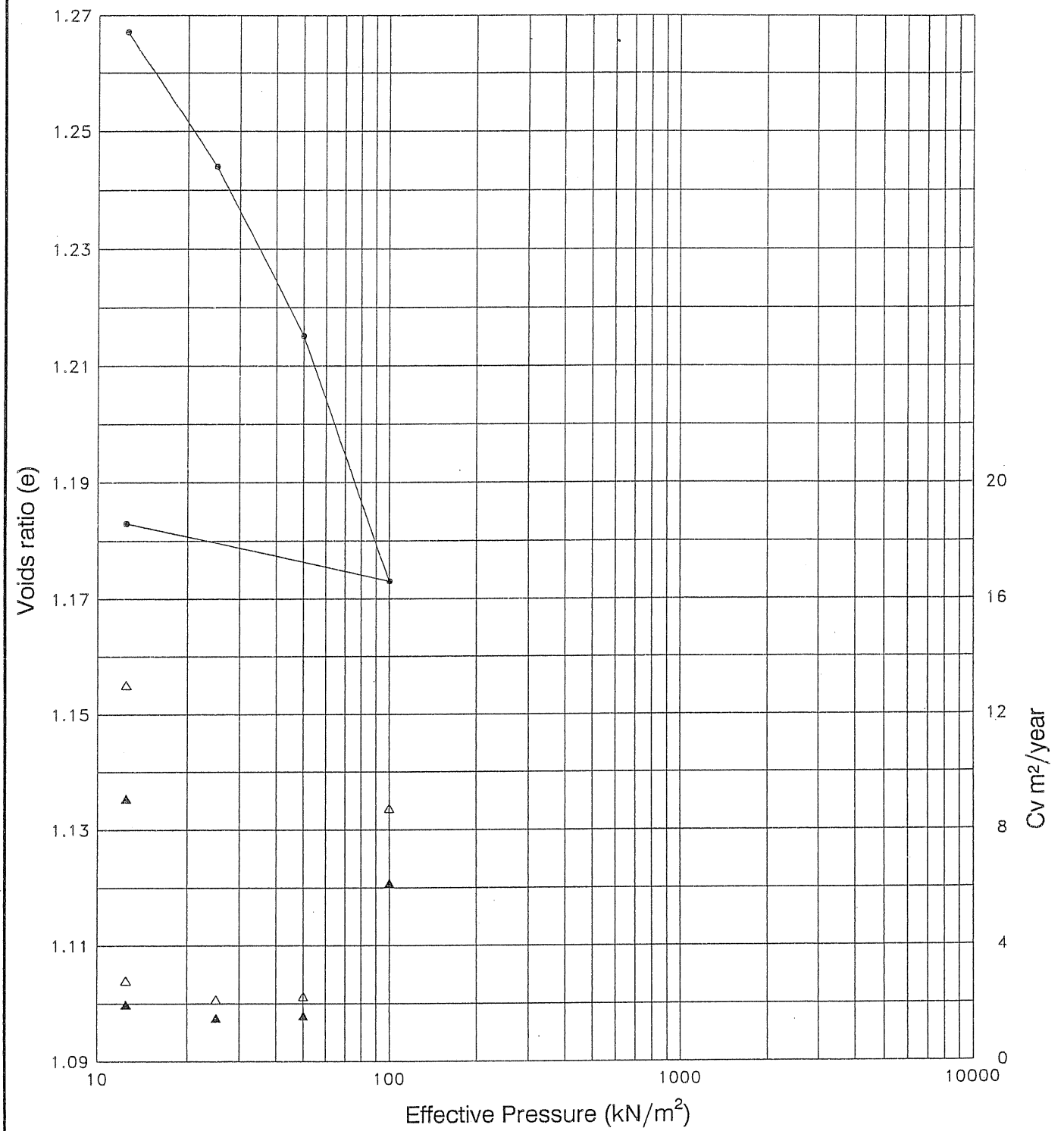
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Exploration Associates

Sheet L4/1

Form 45/0



Sample Dimensions	75.00	mm dia.
	19.108	mm high
Initial Voids Ratio	1.319	
Final Voids Ratio	1.183	
Swelling Pressure	-	kN/m²
Initial Water Content	41.17	%
Final Water Content	34.89	%
Initial Saturation	82.73	%
Bulk Density	1.61	Mg/m³
Dry Density	1.14	Mg/m³
Specific Gravity	2.65	ASSUMED
Sample Type	UNDISTURBED	

Pressure kN/m²	0	12.5	25	50	100
	12.5	25	50	100	12.5
M_v m²/MN	1.788	.814	.515	.380	.052
C_v Log t_{50} ▲ m²/yr	1.96	1.50	1.58	6.16	9.08
C_v Root t_{90} △ m²/yr	2.80	2.14	2.25	8.75	13.02
Final Voids Ratio	1.267	1.244	1.215	1.173	1.183

Description
Black silty CLAY with traces of fine and medium gravel

Hole 6
Depth 2.00 - 2.45 m
Sample Type U

Laboratory - Consolidation Test

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Sheet L4/2

Exploration Associates

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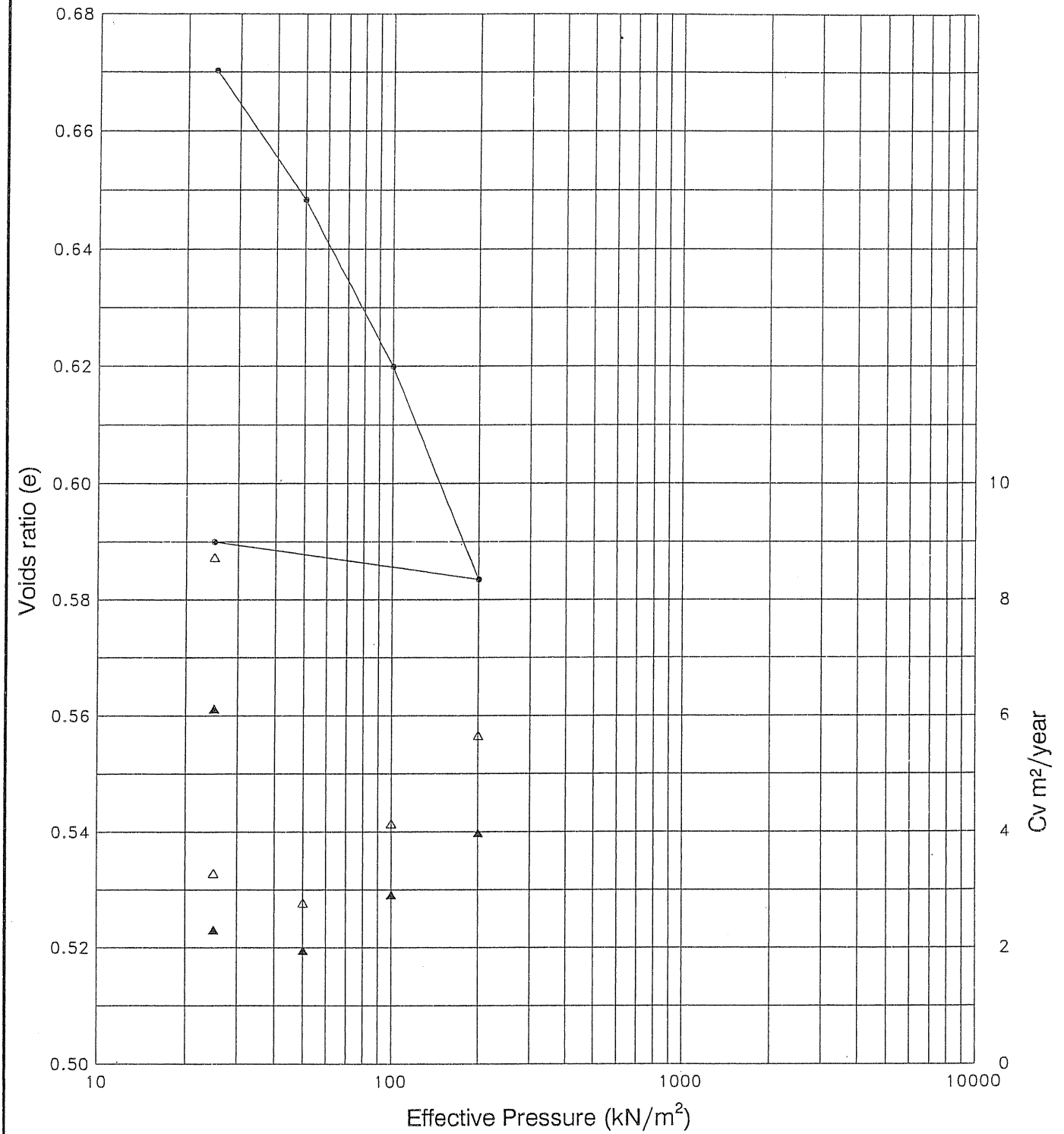

Sample Dimensions	75.00	mm dia.	
	19.055	mm high	
Initial Voids Ratio	.724		
Final Voids Ratio	.590		
Swelling Pressure	-	kN/m²	
Initial Water Content	28.98	%	
Final Water Content	23.25	%	
Initial Saturation	106.05	%	
Bulk Density	1.98	Mg/m³	
Dry Density	1.54	Mg/m³	
Specific Gravity	2.65	ASSUMED	
Sample Type	UNDISTURBED		

Pressure kN/m²	0	25	50	100	200
	25	50	100	200	25
M_V m²/MN	1.253	.524	.345	.225	.024
C_V Log t_{50} ▲ m²/yr	2.31	1.95	2.91	3.98	6.12
C_V Root t_{90} △ m²/yr	3.29	2.77	4.14	5.66	8.73
Final Voids Ratio	.670	.648	.620	.583	.590

Description

Brown very sandy silty CLAY with traces of organinc matter

Hole 7

Depth 2.00 - 2.45 m

Sample Type U

Laboratory - Consolidation Test

Exploration Associates

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

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Sheet L4/3

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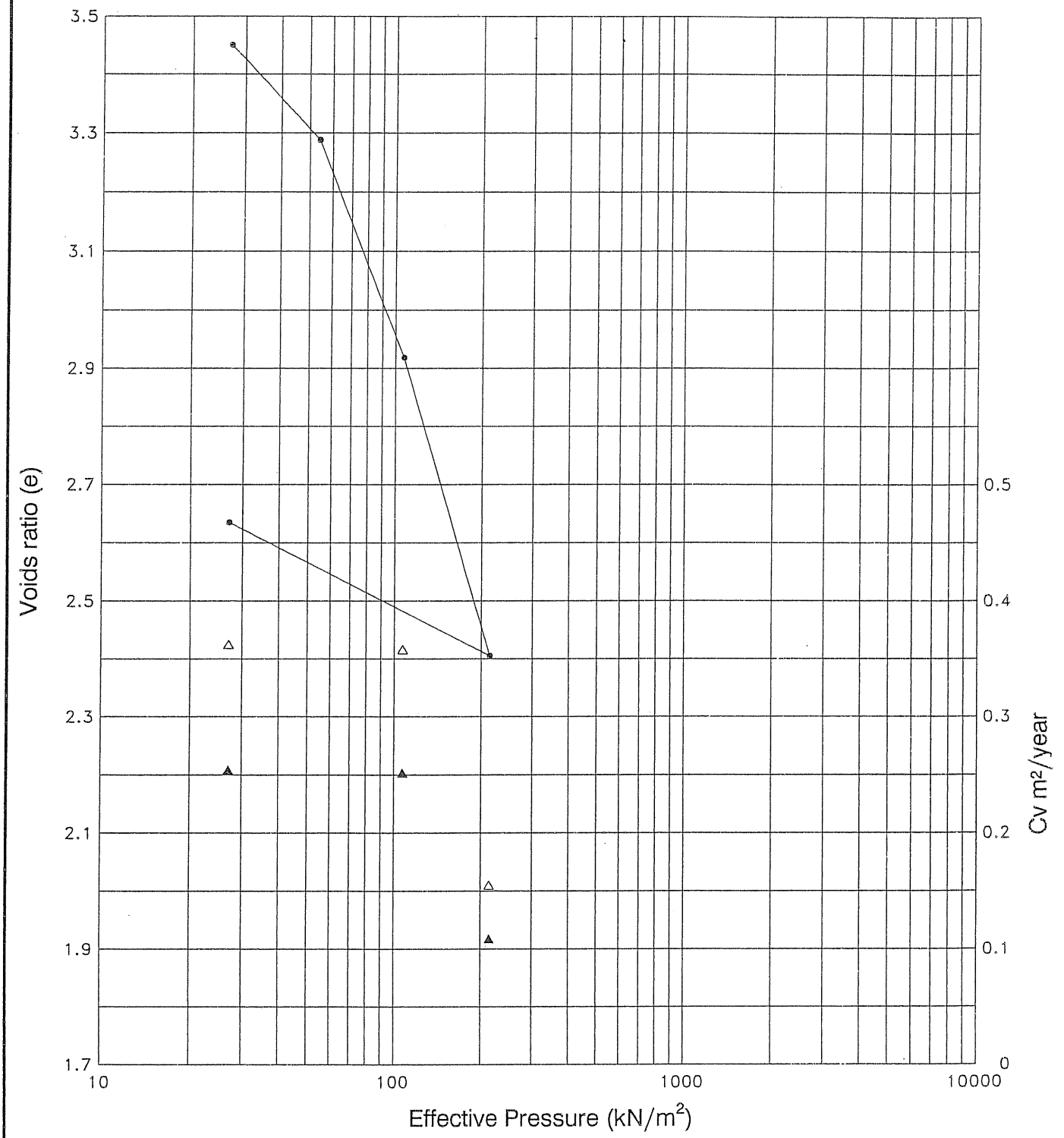

Sample Dimensions	74.84	mm dia.
	19.040	mm high
Initial Voids Ratio	3.621	
Final Voids Ratio	2.635	
Swelling Pressure	-	kN/m²
Initial Water Content	240.10	%
Final Water Content	102.00	%
Initial Saturation	175.70	%
Bulk Density	1.95	Mg/m³
Dry Density	.57	Mg/m³
Specific Gravity	2.65	ASSUMED
Sample Type	UNDISTURBED	

Pressure kN/m²	0	27	54	107	214
	27	54	107	214	27
M_v m²/MN	1.371	1.349	1.627	1.224	.361
C_v Log t_{50} ▲ m²/yr	-	-	.25	.11	.25
C_v Root t_{90} △ m²/yr	-	-	.36	.15	.36
Final Voids Ratio	3.450	3.288	2.918	2.405	2.635

Description
Brown silty CLAY with much organic matter

Hole 9
Depth 3.20 - 3.65 m
Sample Type U

Laboratory - Consolidation Test

Exploration Associates

Project
Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

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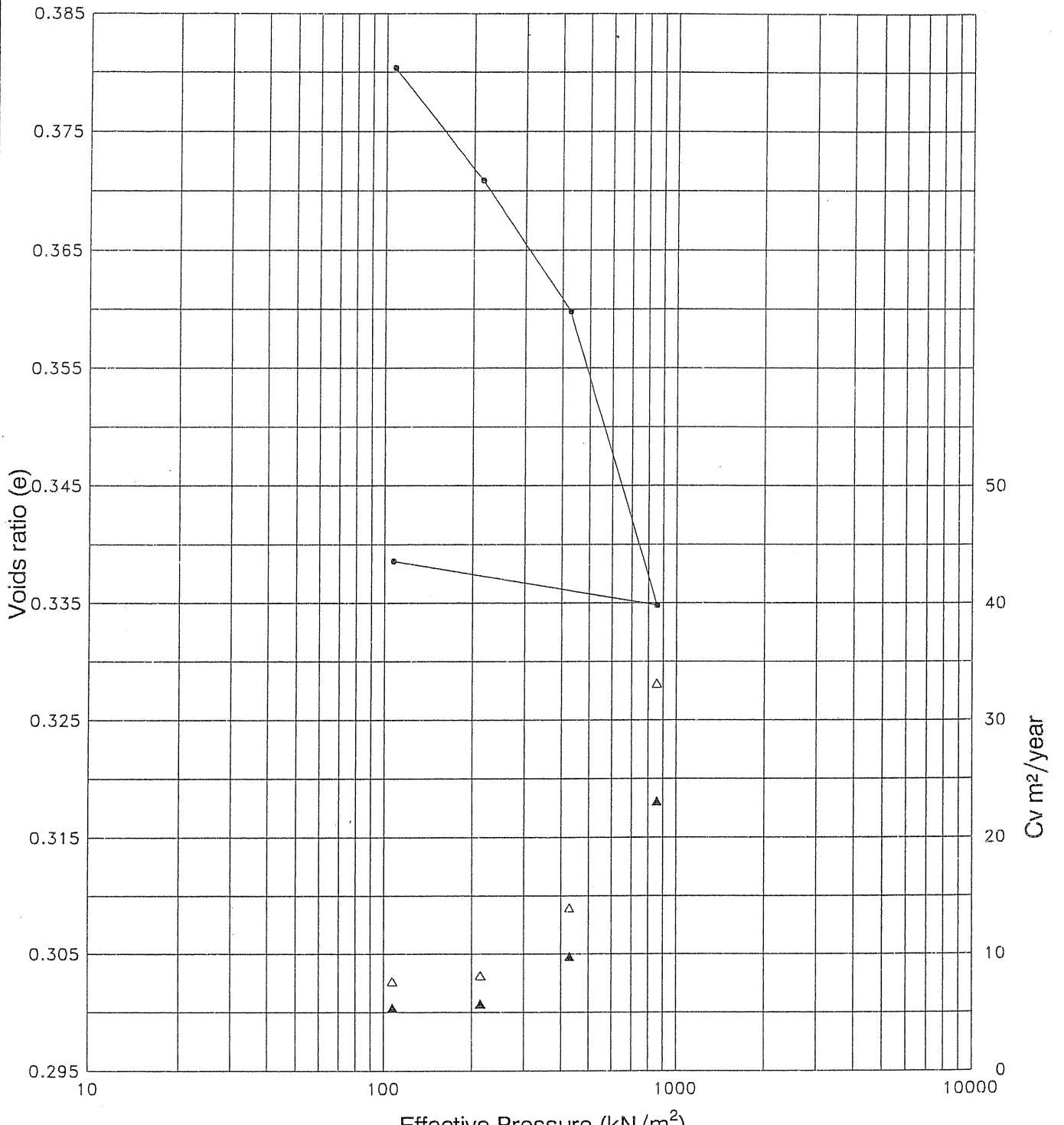

Sample Dimensions	76.11	mm dia.	
	19.000	mm high	
Initial Voids Ratio	.405		
Final Voids Ratio	.339		
Swelling Pressure	-	kN/m²	
Initial Water Content	16.80	%	
Final Water Content	14.12	%	
Initial Saturation	110.03	%	
Bulk Density	2.20	Mg/m³	
Dry Density	1.89	Mg/m³	
Specific Gravity	2.65	ASSUMED	
Sample Type	UNDISTURBED		

Pressure		kN/m²	0	107	214	428	856					
			107	214	428	856	107					
M_v		m²/MN	.162	.064	.038	.043	.004					
C_v Log t_{50}	▲	m²/yr	5.38	5.72	9.78	23.06	-					
C_v Root t_{90}	△	m²/yr	7.64	8.14	13.97	33.11	-					
Final Voids Ratio			.380	.371	.360	.335	.339					

Description

Brown silty CLAY with traces of fine and medium gravel

Hole 15

Depth 4.10 - 4.55 m

Sample Type U

Laboratory - Consolidation Test

Project

Forge Lane Former Steelworks
Thornhill, Dewsbury
Kirklees M.B.C.

Contract 127001

Exploration Associates

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Form 45/0

EAD/18235
FORGE LANE THORNHILL
EXPLORATION ASSOCIATES DEESIDE
SOILS RECEIVED 07/02/97
YOUR REFERENCE 127001
YOUR ORDER NO

CAS
CERTIFICATE OF ANALYSIS SERVICE LTD

CAS SAMPLE No				1	2	3	4	5	6	7	8
SAMPLE No				BH 1	BH 1	BH 2	BH 2	BH 3	BH 3	BH 4	BH 5
DEPTH (m)				0.00	2.10	0.50	2.00	0.00	2.00	0.50	0.00
Method		as	units								
03A*	Ammonia	N	mg/kg	<5	<5	<5	<5	<5	<5	<5	<5
30C*	Arsenic (total)	As	mg/kg	59	9.4	42	25	70	58	180	120
04-S*	Asbestos		presence	ND				ND			ND
30*	Cadmium (total)	Cd	mg/kg	1.7	<0.5	1.2	1.0	2.0	2.3	1.1	3.6
09*	Calorific Value		kJ/kg								
12A*	Chloride (Water Soluble)	Cl^-	%	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30*	Chromium (total)	Cr	mg/kg	10	6.2	13	9.3	32	7.4	9.8	46
30*	Copper (total)	Cu	mg/kg	86	33	53	33	72	30	83	160
15*	Cyanide (free)	CN^-	mg/kg								
14*	Cyanide (total)	CN^-	mg/kg	<0.1		<0.1		<0.1		0.14	<0.1
---	Ferro-ferricyanide	CN^-	mg/kg								
30*	Lead (total)	Pb	mg/kg	220	24	110	34	91	34	130	850
30C*	Mercury (total)	Hg	mg/kg	0.10	<0.10	<0.10	0.12	<0.10	0.10	0.13	0.27
30*	Nickel (total)	Ni	mg/kg	15	18	12	23	20	9.6	28	43
307*	PAH (total)		mg/kg	14		95		15		<10	19
39	pH		pH units	7.8	7.8	7.6	7.6	10.0	7.0	9.5	8.0
311*	Phenols (speciated)	PhOH		see separate sheet							

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FORGE LANE THORNHILL
EXPLORATION ASSOCIATES DEESIDE
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YOUR ORDER NO

CAS
CENTRAL ANALYTICAL SERVICES LTD

CAS SAMPLE No				1	2	3	4	5	6	7	8
SAMPLE No				BH 1	BH 1	BH 2	BH 2	BH 3	BH 3	BH 4	BH 5
DEPTH (m)				0.00	2.10	0.50	2.00	0.00	2.00	0.50	0.00
Method		as	units								
40A*	Phenols (total)	PhOH	mg/kg	1.2	0.80	1.1	1.4	0.59	0.65	0.92	0.69
30C*	Selenium (total)	Se	mg/kg	0.66	<0.10	0.10	0.37	0.27	0.76	1.4	0.63
46*	Sulphate (water soluble)	SO_3	g/l	0.18	0.08	0.18	0.17	0.37	0.43	0.19	0.77
51*	Sulphur (elemental)	S	mg/kg	<500	<500	<500	<500	<500	<500	<500	<500
16*	Thiocyanate	CN^-	mg/kg								
30*	Zinc (total)	Zn	mg/kg	67	58	56	55	48	42	67	220

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CAS ANALYTICAL SERVICES LTD

CAS SAMPLE No				9	10	11	12	13	14	15	16
SAMPLE No				BH 5	BH 6	BH 6	BH 7	BH 8	BH 8	BH 9	BH 9
DEPTH (m)				2.50	0.50	1.00	1.00	0.00	2.20	0.00	1.40
Method		as	units								
03A*	Ammonia	N	mg/kg	<5	12	33	<5	<5	14	9.5	<5
30C*	Arsenic (total)	As	mg/kg	25	49	54	130	61	49	82	11
04-S*	Asbestos		presence								
30*	Cadmium (total)	Cd	mg/kg	1.5	1.6	0.63	4.2	<0.5	<0.5	1.5	<0.5
09*	Calorific Value		kJ/kg						5600		
12A*	Chloride (Water Soluble)	Cl^-	%	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30*	Chromium (total)	Cr	mg/kg	14	34	52	38	13	12	18	<5
30*	Copper (total)	Cu	mg/kg	34	86	46	140	39	62	74	20
15*	Cyanide (free)	CN^-	mg/kg					0.44			
14*	Cyanide (total)	CN^-	mg/kg		0.43		0.40	2.0		0.29	
---	Ferro-ferricyanide	CN^-	mg/kg								
30*	Lead (total)	Pb	mg/kg	53	440	100	320	52	60	680	18
30C*	Mercury (total)	Hg	mg/kg	<0.10	0.24	0.53	0.22	0.66	0.30	2.2	<0.10
30*	Nickel (total)	Ni	mg/kg	9.9	20	34	140	5.2	13	15	6.9
307*	PAH (total)		mg/kg		230		21	96		17	
39	pH		pH units	8.0	7.8	7.6	8.0	4.7	6.4	7.0	7.4
311*	Phenols (speciated)	PhOH		see separate sheet							

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FORGE LANE THORNHILL
EXPLORATION ASSOCIATES DEESIDE
SOILS RECEIVED 07/02/97
YOUR REFERENCE 127001
YOUR ORDER NO

CAS
CENTRE FOR ANALYTICAL SERVICES LTD

CAS SAMPLE No SAMPLE No DEPTH (m)				*9* BH 5 2.50	*10* BH 6 0.50	*11* BH 6 1.00	*12* BH 7 1.00	*13* BH 8 0.00	*14* BH 8 2.20	*15* BH 9 0.00	*16* BH 9 1.40
Method		as	units								
40A*	Phenols (total)	PhOH	mg/kg	0.55	2.7	4.8	1.3	1.8	2.0	1.0	0.69
30C*	Selenium (total)	Se	mg/kg	0.13	0.44	0.54	0.35	0.50	0.36	0.64	0.11
46*	Sulphate (water soluble)	SO_3	g/l	0.18	0.74	1.4	0.21	0.83	0.68	0.04	0.02
51*	Sulphur (elemental)	S	mg/kg	<500	<500	580	<500	<500	<500	<500	<500
16*	Thiocyanate	CN^-	mg/kg								
30*	Zinc (total)	Zn	mg/kg	88	190	110	71	52	75	97	34

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FORGE LANE THORNHILL
EXPLORATION ASSOCIATES DEESIDE
SOILS RECEIVED 07/02/97
YOUR REFERENCE 127001
YOUR ORDER NO

CAS
CHEMICAL ANALYTICAL SERVICES LTD

CAS SAMPLE No				17	18	19	20	21	22	23	24
SAMPLE No				BH 9	BH 10	BH 10	BH 11	BH 12	BH 13	BH 14	BH 15
DEPTH (m)				2.50	0.80	1.50	1.00	0.30	0.90	0.50	1.20
Method		as	units								
03A*	Ammonia	N	mg/kg	11	<5	<5	8.0		<5	<5	<5
30C*	Arsenic (total)	As	mg/kg	6.9	9.0	7.2	12		7.3	74	14
04-S*	Asbestos		presence								
30*	Cadmium (total)	Cd	mg/kg	<0.5	<0.5	<0.5	<0.5		<0.5	0.77	1.0
09*	Calorific Value		kJ/kg					5800			
12A*	Chloride (Water Soluble)	Cl^-	%	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
30*	Chromium (total)	Cr	mg/kg	5.6	6.0	6.9	5.4		5.9	13	6.3
30*	Copper (total)	Cu	mg/kg	22	13	10	18		11	56	20
15*	Cyanide (free)	CN^-	mg/kg							0.33	
14*	Cyanide (total)	CN^-	mg/kg	<0.1	<0.1		<0.1		0.14	2.8	0.19
---	Ferro-ferricyanide	CN^-	mg/kg								
30*	Lead (total)	Pb	mg/kg	15	16	15	30		6.7	110	33
30C*	Mercury (total)	Hg	mg/kg	<0.10	<0.10	<0.10	<0.10		<0.10	0.53	<0.10
30*	Nickel (total)	Ni	mg/kg	6.7	3.9	5.8	4.2		9.9	8.5	22
307*	PAH (total)		mg/kg	36	<10		<10		<10	72	<10
39	pH		pH units	6.7	7.2	7.5	7.1		6.9	6.3	6.6
311*	Phenols (speciated)	PhOH		see separate sheet							

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EAD/18235
FORGE LANE THORNHILL
EXPLORATION ASSOCIATES DEESIDE
SOILS RECEIVED 07/02/97
YOUR REFERENCE 127001
YOUR ORDER NO

CAS
CAS ANALYTICAL SERVICES LTD

CAS SAMPLE No				17	18	19	20	21	22	23	24
SAMPLE No				BH 9	BH 10	BH 10	BH 11	BH 12	BH 13	BH 14	BH 15
DEPTH (m)				2.50	0.80	1.50	1.00	0.30	0.90	0.50	1.20
Method		as	units								
40A*	Phenols (total)	PhOH	mg/kg	0.86	0.59	0.69	0.53		0.50	<0.5	0.53
30C*	Selenium (total)	Se	mg/kg	0.19	0.11	<0.10	0.10		0.18	0.45	0.10
46*	Sulphate (water soluble)	SO_3	g/l	0.03	0.02	0.03	0.02		0.02	0.07	0.04
51*	Sulphur (elemental)	S	mg/kg	<500	<500	<500	<500		<500	<500	<500
16*	Thiocyanate	CN^-	mg/kg								
30*	Zinc (total)	Zn	mg/kg	52	36	52	44		57	84	75

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YOUR ORDER NO

CAS
GEOTECHNICAL SERVICES LTD

CAS SAMPLE No				*25*
SAMPLE No				BH 15
DEPTH (m)				2.10
Method		as	units	
03A*	Ammonia	N	mg/kg	<5
30C*	Arsenic (total)	As	mg/kg	9.3
04-S*	Asbestos		presence	
30*	Cadmium (total)	Cd	mg/kg	<0.5
09*	Calorific Value		kJ/kg	
12A*	Chloride (Water Soluble)	Cl^-	%	<0.01
30*	Chromium (total)	Cr	mg/kg	7.4
30*	Copper (total)	Cu	mg/kg	17
15*	Cyanide (free)	CN^-	mg/kg	
14*	Cyanide (total)	CN^-	mg/kg	
---	Ferro-ferricyanide	CN^-	mg/kg	
30*	Lead (total)	Pb	mg/kg	20
30C*	Mercury (total)	Hg	mg/kg	<0.10
30*	Nickel (total)	Ni	mg/kg	15
307*	PAH (total)		mg/kg	
39	pH		pH units	6.6
311*	Phenols (speciated)	PhOH		see separate sheet

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YOUR ORDER NO

CAS

CAS SAMPLE No				25
SAMPLE No				BH 15
DEPTH (m)				2.10
Method		as	units	
40A*	Phenols (total)	PhOH	mg/kg	<0.5
30C*	Selenium (total)	Se	mg/kg	0.11
46*	Sulphate (water soluble)	SO_3	g/l	0.03
51*	Sulphur (elemental)	S	mg/kg	<500
16*	Thiocyanate	CN^-	mg/kg	
30*	Zinc (total)	Zn	mg/kg	47

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Symbol Key

▒▒▒ - Test not scheduled
ND - None Detected

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FORGE LANE THORNHILL
EXPLORATION ASSOCIATES LTD
SAMPLES RECEIVED 7/2/97
YOUR REFERANCE: 127001
YOUR ORDER NO:

PHENOL ANALYSIS

SAMPLE No		BH1	BH2	BH2	BH6	BH6	BH7	BH8	BH8
DEPTH (m)		0.00	0.50	2.00	0.50	1.00	1.00	0.00	2.20
	units								
phenol	mg/kg	<0.1	<0.1	<0.1	1.5	5.0	0.19	0.27	1.7
cresol	mg/kg	<0.1	<0.1	<0.1	2.7	5.4	<0.1	0.30	0.77
xylenols	mg/kg	<0.1	<0.1	<0.1	<0.1	2.9	<0.1	<0.1	0.87
naphthols	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
isopropyl phenols	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trimethyl phenols	mg/kg	<0.1	<0.1	<0.1	2.2	<0.1	<0.1	<0.1	<0.1

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EXPLORATION ASSOCIATES LTD
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YOUR ORDER NO:

PHENOL ANALYSIS

SAMPLE No		BH9
DEPTH (m)		0.00
	units	
phenol	mg/kg	<0.1
cresol	mg/kg	<0.1
xylenols	mg/kg	<0.1
naphthols	mg/kg	<0.1
isopropyl phenols	mg/kg	<0.1
trimethyl phenols	mg/kg	<0.1

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YOUR REFERENCE 127001
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CAS
CHEMICAL ANALYTICAL SERVICES LTD

TEST METHOD LIST.

Method Number	Method Name
03A*	AMMONIA
04-S*	ASBESTOS
09*	CALORIFIC VALUE
12A*	CHLORIDE (WATER SOLUBLE)
14*	CYANIDE ('TOTAL')
15*	CYANIDE (FREE)
16*	THIOCYANATE
30*	METALS ('TOTAL')
30C*	HYDRIDES ('TOTAL')
39	pH
40A*	PHENOLS ('TOTAL')
46*	SULPHATE (WATER SOLUBLE)
51*	SULPHUR (ELEMENTAL)
307*	PAH (SPECIATED)
311*	PHENOLS (SPECIATED)

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YOUR ORDER NO

CAS
CAS ANALYTICAL SERVICES LTD

CAS SAMPLE No				1	2	3	4	5	6	7	8
SAMPLE No				TP 1	TP 1	TP 1	TP 2	TP 2	TP 2	TP 2	TP 3
DEPTH (m)				0.30	1.40	4.30	0.20	0.30	0.80	1.90	0.30
Method		as	units								
03A*	Ammonia	N	mg/kg	<5	<5	23	5.5	<5	<5	<5	<5
30C*	Arsenic (total)	As	mg/kg	40	16	5.3	110	63	20	7.5	50
04-S*	Asbestos		presence	ND			#				
30*	Cadmium (total)	Cd	mg/kg	1.6	<0.5	0.59	0.50	<0.5	<0.5	<0.5	0.72
09*	Calorific Value		kJ/kg								3000
12A*	Chloride (Water Soluble)	Cl^-	%	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30*	Chromium (total)	Cr	mg/kg	9.8	<5.0	6.0	15	29	12	17	13
30*	Copper (total)	Cu	mg/kg	57	25	19	68	26	23	9.8	100
15*	Cyanide (free)	CN^-	mg/kg								
14*	Cyanide (total)	CN^-	mg/kg	<0.1		<0.1	<0.1		<0.1		<0.1
---	Ferro-ferricyanide	CN^-	mg/kg								
30*	Lead (total)	Pb	mg/kg	110	89	14	170	150	33	6.9	260
30C*	Mercury (total)	Hg	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.12
30*	Nickel (total)	Ni	mg/kg	8.4	11	6.8	14	3.4	<1.0	<1.0	30
307*	PAH (total)		mg/kg	<10		<10		<10		<10	
39	pH		pH units	8.5	8.1	6.9	10.0	8.4	7.9	7.5	7.1
311*	Phenols (speciated)	PhOH				see sheet					see sheet

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CAS
CHEMICAL ANALYTICAL SERVICES LTD

CAS SAMPLE No				1	2	3	4	5	6	7	8
SAMPLE No				TP 1	TP 1	TP 1	TP 2	TP 2	TP 2	TP 2	TP 3
DEPTH (m)				0.30	1.40	4.30	0.20	0.30	0.80	1.90	0.30
Method		as	units								
40A*	Phenols (total)	PhOH	mg/kg	<0.5	<0.5	2.4	0.73	<0.5	<0.5	0.59	1.6
30C*	Selenium (total)	Se	mg/kg	<0.1	<0.1	0.19	0.31	0.18	<0.1	<0.1	0.22
46*	Sulphate (water soluble)	SO_3	g/l	0.02	0.02	0.06	0.50	0.04	0.02	0.06	0.35
51*	Sulphur (elemental)	S	mg/kg	<100	<100	5900	<100	<100	<100	<100	270
16*	Thiocyanate	CN^-	mg/kg								
30*	Zinc (total)	Zn	mg/kg	50	59	40	120	48	43	28	200

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CAS
CERAMIC ANALYTICAL SERVICES LTD

CAS SAMPLE No				*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
SAMPLE No				TP 3	TP 3	TP 3	TP 4	TP 4	TP 4	TP 5	TP 5
DEPTH (m)				0.80	1.20	3.00	0.40	1.20	3.50	0.30	0.80
Method		as	units								
03A*	Ammonia	N	mg/kg	<5	28	19	<5	<5		<5	<5
30C*	Arsenic (total)	As	mg/kg	45	13	5.5	79	16		71	11
04-S*	Asbestos		presence	ND			ND				
30*	Cadmium (total)	Cd	mg/kg	3.6	0.92	<0.5	4.3	<0.5		1.3	<0.5
09*	Calorific Value		kJ/kg		<500				4100	14000	
12A*	Chloride (Water Soluble)	Cl^-	%	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01
30*	Chromium (total)	Cr	mg/kg	25	6.9	5.7	30	5.1		21	<5.0
30*	Copper (total)	Cu	mg/kg	76	20	14	250	27		85	8.2
15*	Cyanide (free)	CN^-	mg/kg							0.29	
14*	Cyanide (total)	CN^-	mg/kg		<0.1		<0.1	<0.1		5.5	
---	Ferro-ferricyanide	CN^-	mg/kg								
30*	Lead (total)	Pb	mg/kg	93	23	<5.0	300	12		400	7.9
30C*	Mercury (total)	Hg	mg/kg	0.14	<0.1	<0.1	3.8	<0.1		0.57	<0.1
30*	Nickel (total)	Ni	mg/kg	29	8.0	7.4	40	9.4		23	2.4
307*	PAH (total)		mg/kg	<10		<10	150			110	
39	pH		pH units	7.7	7.0	7.1	8.6	8.0		7.5	7.4
311*	Phenols (speciated)	PhOH			see sheet	see sheet	see sheet				

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CAS
CHEMICAL ANALYTICAL SERVICES LTD

CAS SAMPLE No				9	10	11	12	13	14	15	16
SAMPLE No				TP 3	TP 3	TP 3	TP 4	TP 4	TP 4	TP 5	TP 5
DEPTH (m)				0.80	1.20	3.00	0.40	1.20	3.50	0.30	0.80
Method		as	units								
40A*	Phenols (total)	PhOH	mg/kg	0.61	2.1	2.2	1.6	0.53		0.92	<0.5
30C*	Selenium (total)	Se	mg/kg	0.20	0.15	0.18	0.22	0.11		0.52	<0.1
46*	Sulphate (water soluble)	SO_3	g/l	0.03	0.04	0.04	0.27	0.02		0.61	0.06
51*	Sulphur (elemental)	S	mg/kg	<100	920	420	<100	<100		<100	<100
16*	Thiocyanate	CN^-	mg/kg								
30*	Zinc (total)	Zn	mg/kg	170	49	51	200	42		190	38

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EXPLORATION ASSOCIATES DEESIDE
SOILS RECEIVED 06/02/97
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CAS
CAS ANALYTICAL SERVICES LTD

CAS SAMPLE No				17	18	19	20	21	22	23	24
SAMPLE No				TP 5	TP 6	TP 6	TP 6	TP 7	TP 7	TP 8	TP 8
DEPTH (m)				1.00	0.30	1.20	1.60	0.30	1.60	0.20	1.00
Method		as	units								
03A*	Ammonia	N	mg/kg	<5	<5	<5	<5	<5	<5	<5	<5
30C*	Arsenic (total)	As	mg/kg	150	70	58	7.6	6.5	6.0	65	73
04-S*	Asbestos		presence								
30*	Cadmium (total)	Cd	mg/kg	1.8	<0.5	0.70	<0.5	<0.5	<0.5	<0.5	<0.5
09*	Calorific Value		kJ/kg		17000						16000
12A*	Chloride (Water Soluble)	Cl^-	%	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30*	Chromium (total)	Cr	mg/kg	<5.0	12	8.8	<5.0	9.7	6.9	21	10
30*	Copper (total)	Cu	mg/kg	45	42	40	10	16	16	22	23
15*	Cyanide (free)	CN^-	mg/kg	<0.1	0.31		<0.1				
14*	Cyanide (total)	CN^-	mg/kg	1.7	9.7		1.8	0.72	0.35	<0.1	
---	Ferro-ferricyanide	CN^-	mg/kg								
30*	Lead (total)	Pb	mg/kg	22	37	33	<5.0	<5.0	<5.0	34	38
30C*	Mercury (total)	Hg	mg/kg	0.28	0.60	0.61	<0.1	<0.1	<0.1	0.66	0.61
30*	Nickel (total)	Ni	mg/kg	19	<1.0	23	8.8	14	12	6.4	2.1
307*	PAH (total)		mg/kg	23		390		<10		92	
39	pH		pH units	7.9	4.4	3.8	5.3	6.1	6.5	4.1	4.0
311*	Phenols (speciated)	PhOH			see sheet	see sheet	see sheet		see sheet	see sheet	see sheet

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EXPLORATION ASSOCIATES DEESIDE
SOILS RECEIVED 06/02/97
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CAS

CAS SAMPLE No				17	18	19	20	21	22	23	24
SAMPLE No				TP 5	TP 6	TP 6	TP 6	TP 7	TP 7	TP 8	TP 8
DEPTH (m)				1.00	0.30	1.20	1.60	0.30	1.60	0.20	1.00
Method		as	units								
40A*	Phenols (total)	PhOH	mg/kg	0.75	1.1	5.1	1.4	0.73	4.4	1.5	1.5
30C*	Selenium (total)	Se	mg/kg	1.5	0.54	0.42	<0.1	<0.1	0.10	0.67	0.71
46*	Sulphate (water soluble)	SO_3	g/l	0.07	0.03	0.67	0.28	0.06	0.03	0.78	1.2
51*	Sulphur (elemental)	S	mg/kg	130	<100	180	<100	<100	720	<100	<100
16*	Thiocyanate	CN^-	mg/kg								
30*	Zinc (total)	Zn	mg/kg	40	52	110	46	41	46	52	69

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CAS ENVIRONMENTAL LTD

CAS SAMPLE No				25	26	27	28	29	30	31	32
SAMPLE No				TP 8	TP 8	TP 9	TP 9	TP 9	TP 10	TP 10	TP 10
DEPTH (m)				2.50	3.20	0.30	1.50	2.30	0.40	1.90	2.70
Method		as	units								
03A*	Ammonia	N	mg/kg	<5	<5	<5	<5	<5	<5	<5	20
30C*	Arsenic (total)	As	mg/kg	400	19	37	19	9.7	10	8.0	6.7
04-S*	Asbestos		presence								
30*	Cadmium (total)	Cd	mg/kg	5.1	<0.5	0.75	0.80	<0.5	<0.5	<0.5	<0.5
09*	Calorific Value		kJ/kg								
12A*	Chloride (Water Soluble)	Cl^-	%	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30*	Chromium (total)	Cr	mg/kg	5.0	<5.0	15	7.1	8.6	5.6	10	<5.0
30*	Copper (total)	Cu	mg/kg	110	21	45	25	13	20	13	8.1
15*	Cyanide (free)	CN^-	mg/kg	<0.1							
14*	Cyanide (total)	CN^-	mg/kg	3.4		0.31		0.16	<0.1		
---	Ferro-ferricyanide	CN^-	mg/kg								
30*	Lead (total)	Pb	mg/kg	100	11	110	60	<5.0	<5.0	8.0	<5.0
30C*	Mercury (total)	Hg	mg/kg	0.87	<0.1	0.11	0.13	<0.1	<0.1	<0.1	<0.1
30*	Nickel (total)	Ni	mg/kg	30	<1.0	16	15	3.0	14	3.0	<1.0
307*	PAH (total)		mg/kg	28		730		<10	<10		<10
39	pH		pH units	4.5	5.3	7.4	7.8	7.2	7.9	6.3	6.7
311*	Phenols (speciated)	PhOH			see sheet						

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EXPLORATION ASSOCIATES DEESIDE
SOILS RECEIVED 06/02/97
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CAS
CHEMICAL ANALYTICAL SERVICES LTD

CAS SAMPLE No				25	26	27	28	29	30	31	32
SAMPLE No				TP 8	TP 8	TP 9	TP 9	TP 9	TP 10	TP 10	TP 10
DEPTH (m)				2.50	3.20	0.30	1.50	2.30	0.40	1.90	2.70
Method		as	units								
40A*	Phenols (total)	PhOH	mg/kg	0.59	<0.5	4.0	0.65	<0.5	<0.5	<0.5	<0.5
30C*	Selenium (total)	Se	mg/kg	4.0	0.23	0.54	<0.1	<0.1	<0.1	0.16	<0.1
46*	Sulphate (water soluble)	SO_3	g/l	0.15	0.05	0.55	0.04	0.03	<0.01	0.07	0.02
51*	Sulphur (elemental)	S	mg/kg	490	<100	<100	<100	<100	<100	<100	<100
16*	Thiocyanate	CN^-	mg/kg								
30*	Zinc (total)	Zn	mg/kg	160	32	75	81	35	49	28	33

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EXPLORATION ASSOCIATES DEESIDE
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CAS
CHEMICAL ANALYTICAL SERVICES LTD

CAS SAMPLE No				33	34	35	36	37	38	39	40
SAMPLE No				TP 11	TP 11	TP 11	TP 12	TP 13	TP 13	TP 13	TP 13
DEPTH (m)				0.30	0.60	1.00	0.40	0.50	1.50	2.50	4.00
Method		as	units								
03A*	Ammonia	N	mg/kg	<5	<5	<5	<5	<5	<5	55	50
30C*	Arsenic (total)	As	mg/kg	160	120	15	13	74	57	70	190
04-S*	Asbestos		presence								
30*	Cadmium (total)	Cd	mg/kg	3.4	0.67	<0.5	<0.5	3.2	1.2	<0.5	1.1
09*	Calorific Value		kJ/kg		11000			3400		24000	
12A*	Chloride (Water Soluble)	Cl^-	%	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30*	Chromium (total)	Cr	mg/kg	12	25	5.9	6.1	47	<5.0	9.4	37
30*	Copper (total)	Cu	mg/kg	84	71	11	15	140	70	43	79
15*	Cyanide (free)	CN^-	mg/kg								
14*	Cyanide (total)	CN^-	mg/kg	<0.1			<0.1	0.23		0.42	
---	Ferro-ferricyanide	CN^-	mg/kg								
30*	Lead (total)	Pb	mg/kg	130	130	<5.0	28	1300	37	50	140
30C*	Mercury (total)	Hg	mg/kg	0.60	1.3	<0.1	<0.1	0.22	0.17	0.87	3.2
30*	Nickel (total)	Ni	mg/kg	65	22	6.2	5.3	44	19	14	28
307*	PAH (total)		mg/kg		130		<10		2500		450
39	pH		pH units	6.8	6.6	6.9	7.1	7.3	7.1	8.5	8.0
311*	Phenols (speciated)	PhOH							see sheet	see sheet	see sheet

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FORGE LANE THORNHILL
EXPLORATION ASSOCIATES DEESIDE
SOILS RECEIVED 06/02/97
YOUR REFERENCE 127001
YOUR ORDER NO

CAS
CLEAN ANALYTICAL SERVICES LTD

CAS SAMPLE No				33	34	35	36	37	38	39	40
SAMPLE No				TP 11	TP 11	TP 11	TP 12	TP 13	TP 13	TP 13	TP 13
DEPTH (m)				0.30	0.60	1.00	0.40	0.50	1.50	2.50	4.00
Method		as	units								
40A*	Phenols (total)	PhOH	mg/kg	0.65	0.67	<0.5	<0.5	0.67	9.8	7.1	8.0
30C*	Selenium (total)	Se	mg/kg	1.9	1.1	0.18	0.13	0.89	0.81	0.74	1.0
46*	Sulphate (water soluble)	SO_3	g/l	0.06	0.04	0.03	0.02	0.18	0.83	0.19	0.14
51*	Sulphur (elemental)	S	mg/kg	<100	<100	<100	<100	<100	1500	1900	3200
16*	Thiocyanate	CN^-	mg/kg								
30*	Zinc (total)	Zn	mg/kg	300	140	56	47	370	190	100	260

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CAS
CAS ANALYTICAL SERVICES LTD

CAS SAMPLE No				41
SAMPLE No				SS1
DEPTH (m)				
Method		as	units	
03A*	Ammonia	N	mg/kg	
30C*	Arsenic (total)	As	mg/kg	
04-S*	Asbestos		presence	#
30*	Cadmium (total)	Cd	mg/kg	
09*	Calorific Value		kJ/kg	
12A*	Chloride (Water Soluble)	Cl^-	%	
30*	Chromium (total)	Cr	mg/kg	
30*	Copper (total)	Cu	mg/kg	
15*	Cyanide (free)	CN^-	mg/kg	
14*	Cyanide (total)	CN^-	mg/kg	
---	Ferro-ferricyanide	CN^-	mg/kg	
30*	Lead (total)	Pb	mg/kg	
30C*	Mercury (total)	Hg	mg/kg	
30*	Nickel (total)	Ni	mg/kg	
307*	PAH (total)		mg/kg	
39	pH		pH units	
311*	Phenols (speciated)	PhOH		

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YOUR REFERENCE 127001
YOUR ORDER NO

CAS ANALYTICAL SERVICES LTD

CAS SAMPLE No				*41*
SAMPLE No				SS1
DEPTH (m)				
Method		as	units	
40A*	Phenols (total)	PhOH	mg/kg	
30C*	Selenium (total)	Se	mg/kg	
46*	Sulphate (water soluble)	SO_3	g/l	
51*	Sulphur (elemental)	S	mg/kg	
16*	Thiocyanate	CN^-	mg/kg	
30*	Zinc (total)	Zn	mg/kg	

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FORGE LANE THORNHILL
EXPLORATION ASSOCIATES DEESIDE
WATERS RECEIVED 06/02/97
YOUR REFERENCE 127001
YOUR ORDER NO

CAS
CITY ANALYTICAL SERVICES LTD

CAS SAMPLE No SAMPLE No DEPTH (m)	WATER		*42* TP 1 4.60	*43* TP 2 2.20	*44* TP 3 3.10	*45* TP 4 3.70	*46* TP 5 1.50	*47* TP 6 3.40	*48* TP 8 2.50	*49* TP 9 2.60
Method	as	units								
03-W* Ammonia	N	mg/l	1.9	0.52	2.1	2.4	0.46	0.86	0.39	0.40
25C-W* Arsenic (soluble)	As	µg/l	<10	<10	<10	<10	<10	<10	<10	<10
07-W* Boron (soluble)	B	mg/l	0.19	0.23	0.13	0.22	0.21	0.07	<0.05	0.17
25-W* Cadmium (soluble)	Cd	µg/l	<5	<5	<5	<5	<5	<5	<5	<5
25-W* Chromium (soluble)	Cr	µg/l	<10	<10	<10	<10	<10	<10	<10	<10
25-W* Copper (soluble)	Cu	µg/l	<10	<10	<10	<10	<10	10	<10	<10
25-W* Lead (soluble)	Pb	µg/l	<10	<10	<10	<10	<10	<10	<10	<10
25X-W* Mercury (soluble)	Hg	µg/l	<1	<1	<1	<1	<1	<1	<1	<1
35A-W* Mineral Oil		mg/l	<2	<2	<2	<2	<2	<2	<2	<2
25-W* Nickel (soluble)	Ni	µg/l	<10	<10	<10	<10	<10	<10	<10	<10
31-W pH		pH units	6.4	6.5	6.4	6.4	6.6	6.2	5.1	6.5
312-W* Phenols (speciated)										
32A-W* Phenols (total)	PhOH	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
25C-W* Selenium (soluble)	Se	µg/l	<2	<2	<2	<2	<2	<2	<2	<2
37-W Sulphate	SO_3	g/l	0.21	0.27	0.25	0.30	0.36	0.36	0.39	0.26
41-W* Total Organic Carbon	C	mg/l	5.3	3.7	5.1	4.1	4.7	3.1	1.9	3.7
25-W* Zinc (soluble)	Zn	µg/l	<10	<10	<10	<10	<10	<10	70	<10

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YOUR ORDER NO

CAS
CHEMICAL ANALYTICAL SERVICES LTD

CAS SAMPLE No SAMPLE No DEPTH (m)	WATER		50 TP 10 2.70	51 TP 11 2.10	52 TP 12 1.10	53 DD1	54 DD2	55 GRAVEL PIT	56 CANAL
Method	as	units							
03-W* Ammonia	N	mg/l	1.3	0.40	0.37	1.0	0.34	1.8	2.8
25C-W* Arsenic (soluble)	As	µg/l	<10	<10	<10	<10	<10	<10	<10
07-W* Boron (soluble)	B	mg/l	0.17	0.13	<0.05	<0.05	0.15	0.10	0.37
25-W* Cadmium (soluble)	Cd	µg/l	<5	<5	<5	<5	<5	<5	<5
25-W* Chromium (soluble)	Cr	µg/l	<10	<10	<10	<10	<10	<10	<10
25-W* Copper (soluble)	Cu	µg/l	<10	<10	<10	<10	<10	<10	<10
25-W* Lead (soluble)	Pb	µg/l	<10	<10	<10	<10	<10	<10	<10
25X-W* Mercury (soluble)	Hg	µg/l	<1	<1	<1	<1	<1	<1	<1
35A-W* Mineral Oil		mg/l	<2	<2	<2	<2	<2	<2	<2
25-W* Nickel (soluble)	Ni	µg/l	<10	<10	<10	<10	<10	<10	<10
31-W pH		pH units	6.2	5.9	6.1	6.3	6.3	6.4	6.9
312-W* Phenols (speciated)									
32A-W* Phenols (total)	PhOH	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
25C-W* Selenium (soluble)	Se	µg/l	<2	<2	<2	<2	<2	<2	<2
37-W Sulphate	SO_3	g/l	0.05	0.16	0.05				
41-W* Total Organic Carbon	C	mg/l	5.9	3.9	3.8	13	12	14	21
25-W* Zinc (soluble)	Zn	µg/l	<10	<10	<10	<10	<10	10	30

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Symbol Key

▒▒▒▒ - Test not scheduled
ND - None Detected
\# - Chrysotile

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FORGE LANE THORNHILL
EXPLORATION ASSOCIATES LTD
SAMPLES RECEIVED 6/2/97
YOUR REFERANCE: 127001
YOUR ORDER NO:

PHENOL ANALYSIS

SAMPLE No		TP1	TP3	TP3	TP3	TP4	TP6	TP6	TP6
DEPTH (m)		4.30	0.30	1.20	3.00	0.40	0.30	1.20	1.60
	units								
phenol	mg/kg	<0.1	<0.1	<0.1	<0.1	0.24	0.36	9.6	0.15
cresol	mg/kg	<0.1	<0.1	<0.1	<0.1	0.42	0.46	8.6	0.54
xylenols	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.23	2.2	<0.1
naphthols	mg/kg	<0.1	<0.1	<0.1	<0.1	0.10	<0.1	<0.1	<0.1
isopropyl phenols	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trimethyl phenols	mg/kg	<0.1	<0.1	<0.1	<0.1	0.20	<0.1	2.5	0.43

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FORGE LANE THORNHILL
EXPLORATION ASSOCIATES LTD
SAMPLES RECEIVED 6/2/97
YOUR REFERANCE: 127001
YOUR ORDER NO:

PHENOL ANALYSIS

SAMPLE No		TP7	TP8	TP8	TP9	TP13	TP13	TP13
DEPTH (m)		1.60	0.20	1.00	0.30	1.50	2.50	4.00
	units							
phenol	mg/kg	<0.1	<0.1	0.39	0.28	<0.1	18	4.9
cresol	mg/kg	<0.1	<0.1	0.34	0.10	7.7	10	10
xylenols	mg/kg	<0.1	<0.1	0.39	0.25	<0.1	20	25
naphthols	mg/kg	<0.1	<0.1	<0.1	<0.1	1.9	<0.1	<0.1
isopropyl phenols	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trimethyl phenols	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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FORGE LANE THORNHILL
EXPLORATION ASSOCIATES DEESIDE
YOUR REFERENCE 127001
YOUR ORDER NO

CAS
CHEMICAL ANALYTICAL SERVICES LTD

TEST METHOD LIST.

Method Number	Method Name
03-W*	AMMONIA
03A*	AMMONIA
04-S*	ASBESTOS
07-W*	BORON (SOLUBLE)
09*	CALORIFIC VALUE
12A*	CHLORIDE (WATER SOLUBLE)
14*	CYANIDE ('TOTAL')
15*	CYANIDE (FREE)
16*	THIOCYANATE
25-W*	METALS (SOLUBLE)
25C-W*	HYDRIDES (SOLUBLE)
25X-W*	MERCURY (SOLUBLE)
30*	METALS ('TOTAL')
30C*	HYDRIDES ('TOTAL')
31-W	pH
32A-W*	PHENOLS ('TOTAL')
35A-W*	MINERAL OIL
37-W	SULPHATE (SOLUBLE)
39	pH
40A*	PHENOLS ('TOTAL')
41-W*	TOTAL ORGANIC CARBON

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YOUR ORDER NO

CAS
CHEMICAL ANALYTICAL SERVICES LTD

TEST METHOD LIST.

Method Number	Method Name
46*	SULPHATE (WATER SOLUBLE)
51*	SULPHUR (ELEMENTAL)
307*	PAH (SPECIATED)
311*	PHENOLS (SPECIATED)
312-W*	PHENOLS (SPECIATED)

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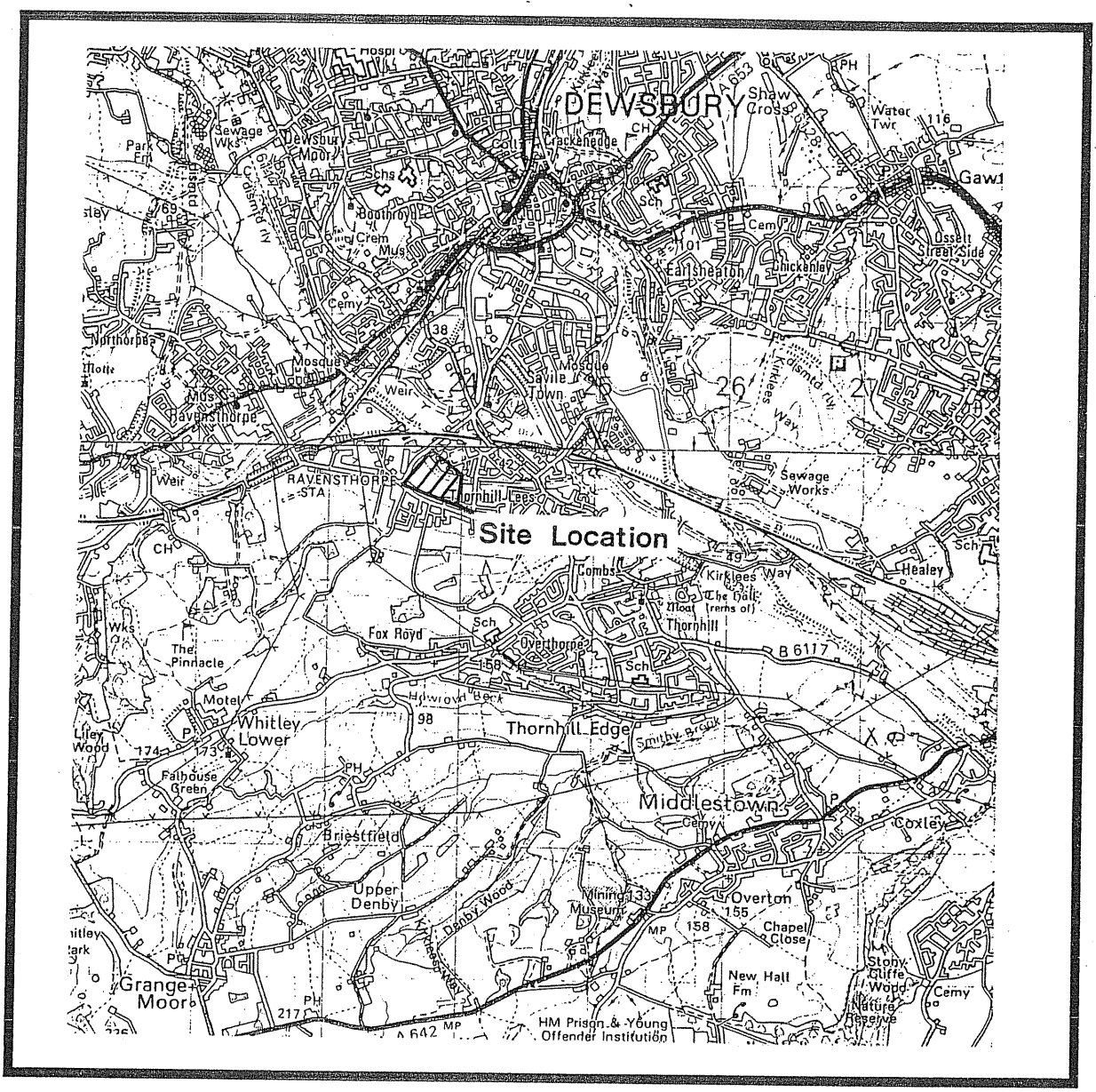
ENCLOSURE D

Drawings

	Drawings
Site Location Plan	1
Exploratory Hole Location Plan	2



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Scale 1:50,000

Site Location Plan	**Project** Forge Lane, Former Steelworks, Thornhill Dewsbury Kirklees Metropolitan Council	**Contract** 127001
Exploration Associates		**Drawing 1**

ENCLOSURE E.

General Notes

These notes, which accompany the ground investigation report, are intended to assist the user of the information contained in the report. They point out some inevitable shortcomings of any ground investigation and do not constitute a disclaimer of responsibility for the results obtained by Exploration Associates Limited.

1. The information in this report is based on the ground conditions encountered during the ground investigation work and the results of any field and laboratory testing. The exploratory records describe the ground conditions at their specific locations and should not be regarded as representative of the ground as a whole.

2. Ground investigations are performed by the company in general accordance with the recommendations in BS 5930 (1981) "Code of Practice for Site Investigations". The testing of soils, rocks and aggregates generally follow the recommendations of BS 1377 (1990) "Methods of test for soils for Civil Engineering Purposes", the International Society of Rock Mechanics (Brown, 1981) "Rock characterisation, testing and monitoring, ISRM suggested methods", and BS 812 (1975) "Methods of sampling and testing of mineral aggregates, sands and filters", respectively.

3. The primary purpose of ground investigation boreholes and trial pits is to probe the stratified sequences of soil and/or rock. From the results of these probings no conclusions should be drawn concerning the presence of size, lithological nature and numbers per unit volume of ground of cobbles and boulders in soil types such as glacial till (boulder clay).

4. When cable percussion boring techniques are used in superficial and drift deposits some mixing of thin-layered soils inevitably occurs. If strong randomly-occurring pieces of rock are encountered in soil material then the rock may be either pushed aside or penetrated and broken up in which case the arisings that are recovered may not be indicative of the nature of the material in situ.

5. Rotary drilling techniques may sometimes be used for drilling through superficial deposits and rocks in order to provide a very general indication of the nature of the ground. Where open-hole methods have been used for the ground investigation the description of the ground is based on the cuttings recovered from the flushing medium and the rate of progress in advancing the hole. Descriptions of strata and the depths of changes in strata may not be accurate under these conditions.

6. Groundwater conditions noted during boring may be subject to change through seasonal and/or other effects such as, for example, boring and constructional excavation. When a groundwater inflow is encountered during boring, work on the hole is suspended, typically for 20 minutes, and any change in level is recorded. The groundwater level recorded on resumption of boring may not be the natural pre-boring standing water level. When piezometers are installed in boreholes the reported groundwater levels may also be subject to variation due to seasonal and/or other effects.

7. The factual information contained within the ground investigation report should not be used for any purpose other than for the development project for which it was prepared unless a check has been carried out on its applicability. Where the ground investigation report contains an interpretation of the factual information that interpretation must be considered in the context of the stated development proposals and should not be used in any other context.

8. This report is for the use of the person or organisation that commissioned the work. Exploration Associates Limited accepts no responsibility if the information is used by any other party. The information is the property and copyright of the person or organisation that commissioned the investigation. It should not be reproduced or transmitted in any form without the owner's written permission.

March 1995