MEMO

City Consultants

architecture engineering surveying

"... a Division of Commercial Services"

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TO:
Pollution Control Team
Env. & Dev.
New Walk Centre

Please ask for:
Extension: 8505
Ref: CC/D/DD/TMA/10620
Date: 2 April 1998

STOKESWOOD PARK CONTAMINATED LAND SITE INVESTIGATION

Following successful completion of the above project, I enclose two copies of the final report, as submitted to me by consulting engineers Pick Everard.

The report details all aspects of the investigation work carried out on, and regarding, the site, and gives the results of all the specified tests. Interpretation and conclusions to be drawn from the observations regarding the make up, and hazards presented by the existing site conditions, are also given. The report concludes with recommendations for the future of the site.

Having studied the report thoroughly I am generally happy with its contents, although slightly disappointed with some of the presentation of data. I would be pleased to receive your comments on these presentation issues. After analysis of the test results I would concur with the opinion that the site does not, at this time, present a hazard to both park users and residents/users of the surrounding properties. It would be prudent, however, to continue with a program of monitoring in order to ascertain the no changes are taking place which may affect the public. I do not consider that further investigation or remedial works are necessary at the moment.

Pick Everard have requested instruction on whether to dispose of the samples which were collected but not tested, and I would be happy to discuss this with you.

If you would like to discuss any of the findings of the report, please do not hesitate to contact me.

Acting Principal Engineer-Drainage Design

ISO 9001
NAMAS
Leicester City Council

PRIVATE & CONFIDENTIAL

FINAL

REPORT

CONTAMINATED LAND

SITE INVESTIGATION

OF

STOKESWOOD PARK

NEW PARKS LEICESTER

MARCH 1998

PICK EVERARD
Environmental Management
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Halford House
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Leicester
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QA Checked
In accordance with QA Procedure ADM 06
Documents and Data

Signature .....

Date 30th March 1998

1.0 EXECUTIVE SUMMARY

Pick Everard were commissioned by Leicester City Council to carry out a Contaminated Land Site Investigation of Stokeswood Park in the New Parks area of Leicester. The design of the site investigation was set out in the Invitation to Tender Documentation. The investigation involved a review of all information available, discussions with park users who offered anecdotal information, a site reconnaissance and an intrusive investigation comprising forty six completed boreholes and seven trial pits.

Based on the information reviewed, potential for the site to cause a significant risk to humans, or the environment is assessed to be low. It is therefore concluded that no further intrusive investigation is warranted. Recommendations are made to continue monitoring the boreholes until the pattern of gas generation can be determined.

2.0 INTRODUCTION

Pick Everard were instructed by Leicester City Council on 23rd of December 1997 to undertake a site investigation comprising of a historical review, site reconnaissance and an intrusive investigation, in accordance with their specification of the site known as Stokeswood Park at New Parks Leicester. The aim of the survey was to identify any possible contamination and environmental liabilities associated with the site. The significance of any contamination was to be assessed with respect to the intended use of the site and the requirements for any further site investigation work reviewed.

The site work was started on the 5th January 1998 when the site area was visually inspected, accompanied by Mr Tim Andrews the City Council Engineer's Representative.

The following organisations were contacted or visited to determine the history of the site: Leicester City Council Environmental Health Department and the Environment Agency.

3.0 DESCRIPTION OF SITE

3.1 The Location

Stokeswood Park (NGR SK 568 056) is located in North Leicester in the New Parks Area to the South of the A50 Groby Road and to the East of the A563 New Parks Way. Allotments and residential areas neighbour the sites to the North and East. The site is further neighboured by housing to the South and Stokes Wood Junior & Infants School and New Parks House Junior and Infants School to the West.

3.2 Site Description

The site is approximately 6.25 hectares of open space consisting of both rough and close cut grass and is encircled and crossed by a series of lighted pathways and cycle tracks.

The ground drops away from a high point at the South of the site to a low point at the North of the site. The topographic survey and sample point levels can be found in the figures section.

3.3 Geology

The British Geological Survey map (Ref sheet 156) indicates that the underlying geology consists of Keuper Marl of the Jurassic period. This marl is overlain by glacial sands and gravels across the middle of the site. At the South of the site the marl is overlain by boulder clay.

On site sampling and observations confirm that the site is made up of boulder clay overlaying marl. On occasion, the boulder clay was itself overlain by fill. Glacial sands and gravels were not encountered on site however the BGS map shows that only a thin band of these sands and gravels exist on the site. It is likely that these occurred on the steep slope that runs across the site where no sampling was specified.

3.4 Groundwater Vulnerability

Stokeswood park is situated on a minor aquifer but is not within any source protection zone.

3.5 Surface Waters

The closest surface water is the River Soar which is located approximately 1km away to the East.

4.0 SITE HISTORY

4.1 Map Review

1886 The site of the park is open space. New Parks House which is now part of New Parks House School is situated to the West of the Site. The Borough fever hospital is situated to the East of the site.

1904 No change from above.

1915 An old sandpit is located to the South-East of the site between Fosse Lane and Stephenson Drive. No further changes are noted.

1930 No change from above.

1938 No change from above.

1954 The area to the South of the site close to the current houses on Samson Road is

utilised as allotment gardens.

1966 No change in usage but the map now shows a sharp gradient at the centre of the site, with the land dropping away to the North. This would be indicative of a ground profile similar to the one that can be observed today.

Present No Change

4.2 Anecdotal Information

During the course of the site investigation, information was offered by users of the site. The general consensus was that some dumping had occurred in the area although the account of specific location was largely conflicting. The general consensus of opinion from those that offered information was that only inert construction type rubble had been dumped on the site. One individual did suggest that in the past slag had been dumped adjacent to the former railway that ran to the North of the site.

A member of the City Council Parks Wardens Department suggested that a Victorian dump did exist to the North-East of the site, and that the area was still popular today with bottle collectors.

Any anecdotal information must be considered in context, however it can be of use to later confirm findings.

5.0 SITE OBSERVATIONS

The site is an area of public open space and is used as an access route for pedestrians and cyclists. The site is also utilised extensively by dog walkers.

No operations occur on the site that would suggest the site could be contaminated by its present use. However the site is accessible by pedestrians and by motorists if the vehicle access is not made secure. Therefore a potential for unauthorised activities to occur on the site leading to a polluting incident does exist.

6.0 CONSULTATIONS

6.1 Leicester City Council Environmental Health Department

Leicester City Council hold information from a local resident who suggested that the site had been utilised in the past for the dumping of construction waste.

During the course of their works, the City Council's Leisure Services department unearthed deposits of glass bottles. The exact location of this find is not recorded, but this

discovery lead to a doubt over the nature of the material deposited on the site.

Subsequent to these findings, the City Council undertook some spike tests on the site in February 1990. Of the eleven tests carried out on the site, two elevated readings of 20ppm and 40ppm were noted to the East of the site.

6.2 Environment Agency

No Integrated Pollution Control (IPC) processes have been located at the site.

6.2.1 Waste Regulation

The Environment Agency is not aware of any incidents of fly tipping at this site. However they do have records that show that the site was tipped on. The site, known at the time of tipping as Off Samson Road, New Parks, Leicester, ceased operations prior to the implementation of licensing under the 1974 Control of Pollution Act, therefore no Waste Management Licences either operational or surrendered exist. The Agency therefore have no information as to the nature of the fill material. An aerial photograph clearly shows that the site was operational in 1969.

The Agency is not aware of any planning applications or enforcement activity with regards to waste regulation either at or in the vicinity of the site.

6.2.2 Water Regulation

The Agency does not know of any water pollution incidents associated with the site.

7.0 SITE INVESTIGATION

7.1 Strategy

The site investigation was carried out in accordance with the City Council's specification as outlined in the tender document for the investigation issued in October 1997.

Service plans provided by Transco, East Midlands Electricity, Severn Trent Water and the City Council (street lighting) were consulted and available on site during excavations.

In some instances, it was necessary to move the locations of boreholes and trial pits from the positions outlined on the Council's Plan due to inaccessibility, or due to the ground conditions causing concern for the integrity of the site. Under these circumstances, movement was kept to a minimum, and the new location was agreed with the Engineer's Representative.

The locations of the boreholes and trial pits are shown in figure 1.

7.1.1 **Drilling** (Borehole logs can be found in appendix G)

Forty Eight boreholes were drilled between January 5th and January 16th. The two additional boreholes were drilled with the authority of the Engineer's Representative when obstructions were encountered in the fill. The new boreholes were drilled adjacent to the obstruction.

The general strategy for the drilling operation was to excavate two metres past the depth of any fill encountered into natural ground. If no fill was encountered then the borehole was to be excavated to a minimum depth of 5m unless instructed differently by the Engineer's representative.

Variations to this strategy did occur in three instances:-

i. The ground level to the South of the site was higher than the area where suspected filling had occurred. It was therefore necessary to excavate these boreholes deeper so that any gas that may be produced could not migrate under these boreholes undetected. Four boreholes (8,9,22 and 23) were in place before this strategy was discussed and were aborted at 5m.

ii. The ground level to the North of the site was lower than the rest of the site. This meant that harder strata was encountered at a shallower depth. For this reason, the Engineer's Representative authorised the early completion of the boreholes in this area rather than authorising chiselling.

iii. The exception to the above was in Boreholes 37, 53 and 54 which were located adjacent to Stokes Wood Junior & Infants School. In these boreholes excavation was deepened to ensure that any migration of potential gases towards the school would be detected.

7.1.2 **Trial Pits** (Trial pit logs can be found in appendix F)

The trial pits were excavated by an JCB 3X on January 16th. The excavations were carried out in the presence of the Engineer's Representative. The locations outlined in the tender document were altered due to concern over the damage to the maintained grass by the JCB in the wet conditions. The trial pits were moved so they could be excavated in rough grass areas and movement about the site could be achieved on the path network. The decision on the location and depth of each trial pit was agreed with the Engineer's Representative.

Samples were taken and submitted for analysis from three levels of each borehole (top, middle and bottom). Furthermore a bulk sample was removed from trial pit five so leachability tests could be carried out

7.1.3 Groundwater

No water infiltration was noticed during the drilling of the boreholes. So to determine the extent contamination of the groundwater on site, samples were taken at a later date after groundwater was detected. Four boreholes were bailed to obtain samples. Prior to the sample being taken, the boreholes were emptied and allowed to recharge to ensure that the sample was in fact groundwater and not water used to lubricate the tools during drilling. The four boreholes (22, 30, 39 and 43) were selected primarily because they contained sufficient groundwater to allow a sample to be taken, but they also allowed samples to be taken from within the fill area and from outside the suspected fill area. They also represented boreholes from the three distinct levels of the site; borehole 22 was located to the high south of the site, boreholes 30 and 39 on the flat centre of the site and borehole 43 the low north of the site.

7.1.4 Gas Samples

The boreholes were monitored over a ten week period from the completion of drilling to the last week of March 1998 when the contract ended. The weekly analysis was carried out using a Geotechnical Instruments GA94 Infra-red Gas Analyser.

Four gas samples were removed from boreholes in Gresham tubes and analysed by gas chromatography. At the time these samples were being taken methane had been detected at low concentrations in borehole 39 so a sample of the gas from this borehole was sent for analysis. No further methane had been recorded on the site so the further three samples were taken from random boreholes, 36, 40 and 41.

Ten gas flow readings were recorded on the site. The boreholes selected for these readings represented the boreholes located in the centre of the site where fill material had been identified, boreholes 15, 17, 19, 30, 32, 34, 39, 40 and 41. In addition a further reading was taken from borehole 3 as an appreciable flow could be heard when the gas tap was opened.

7.2 Findings

As suspected from the information gathered prior to the intrusive investigation, the fill was detected on the flat area at the centre of the park. The fill encountered appeared to be construction waste such as brick, concrete, granite, limestone and soil. The maximum depth at which fill was encountered was 5.7m.

8.0 RESULTS AND INTERPRETATIONS

The analytical results can be found in appendices A to C the standards against which they have been compared can be found in appendix D and the gas monitoring results can be found in appendix E.

8.1 Analysis of Soil Samples

8.1.1 Trial Pits

21 samples were submitted for analysis. The following elevated readings were noted:-

Boron

Boron exceeds the ICRCL trigger level in trial pit 5 at 2.40m depth and trial pit 7 at 2.90m depth.

Lead and PAH

Lead and PAH exceed the ICRCL trigger level for parks/Playing fields and open spaces in trial pit 5 at a depth of 2.40m.

Sulphate

Sulphate exceeds the ICRCL trigger level for play areas in trial pit 1 at depths of 0.30m and 1.50m, in trial pit 3 at a depth of 1.40m, in trial pit 6 at 3.60m and in trial pit 7 at 1.60m depth.

Interpretations

Boron is a phytotoxin and can therefore affect plant growth. The pH of the soil can influence the degree to which the phytotoxin affects plants, the affect is increased as the soil becomes more acidic. In this case the soil is alkaline and the boron occurs at depth. Furthermore grass is more resistant to phytotoxins than most plant, and its condition did not appear to have been affected.

It is likely that the isolated incidence of elevated lead and PAH concentrations has been caused by a constituent of the fill at this particular point and the lower levels indicated in the remaining results suggest that this is not indicative of the site. This isolated incident occurs at depth and is assessed not to constitute a significant risk to site users.

Sulphate is of primary concern if concrete structures are present as sulphate can increase the decomposition rate of concrete. As this site is an open space the limited elevated sulphate levels are assessed not to pose a significant risk. One noted occurrence of elevated concentration near the surface is assessed not to constitute significant risk to site users.

8.2.1 Boreholes

78 samples were submitted for analysis. The following elevated readings, i.e. readings that exceed the ICRCL trigger concentrations were noted:-

Arsenic

Concentrations of arsenic exceeding the trigger level for parks/playing fields and open spaces were noted in boreholes 41 and 54 at depths of 1.0m and 0.5m respectively.

PAH

Concentrations of PAH exceeding the ICRCL trigger level for play areas were noted in borehole 17 (depths 0.5m, 1.5m and 2.0m), 32 (depth 1.5m) and 36 (depth 2.0m). The concentrations present at a depth of 2.0m in borehole 17 and at 2.0m in borehole 36 exceed the ICRCL action level for play areas.

Phenol

Concentrations of phenol exceeding the ICRCL trigger level, but not the action level for play areas were noted in borehole 17 at a depth of 2.0m.

Phytotoxins

Concentrations exceeding the ICRCL trigger concentrations for:-

Boron were detected in boreholes 17 (at 1.5m), 34 (at 1.5m and 3.0m) and 41 (at 1.0m);
Copper were detected in boreholes 15 (at 1.0m and 2.0m), 36 (at 1.0 and 3.0m) and 41 at (1.0m); and
Zinc were detected in boreholes 34 (at 1.5m) and 41 (at 1.0m).

Sulphate

Sulphate exceeds the ICRCL trigger level for play areas in boreholes 34 (at depths of 1.5m and 3.0m), 36 (at a depth of 3.5m), 39 (at depths of 2.0m and 3.0m), 40 (at a depth of 2.9m) and 52 (at a depth of 1.0m).

Interpretations

The two incidents of increased arsenic concentration are likely to have been caused by a constituent of the fill at this particular point and the lower levels indicated in the remaining results suggest that this is not indicative of the site. These isolated incidents occur at depth and do are assessed not to constitute a significant risk to site users.

The elevated concentration of PAH occurs in one borehole only. It is therefore likely that it has been caused by a constituent of the fill at this particular point, such as the binder in the blacktop, and the lower levels indicated in the remaining results suggest that this is not indicative of the site. The concentration of PAH increases with depth within the fill layer in this borehole. These isolated occurrences are assessed not to pose a significant risk to site users.

The incident of increased phenol concentration are likely to have been caused by a constituent of the fill at this particular point and the lower levels indicated in the remaining results suggest that this is not indicative of the site. This isolated incident occurs at depth and is assessed not to constitute a significant risk to site users.

Phytotoxins affect plant growth. The pH of the soil can influence the degree to which the phytotoxin affects plants, the affect is increased as the soil becomes more acidic. In this case the soil is alkaline and the boron occurs at depth. Furthermore grass is more resistant to phytotoxins than most plant, and its condition did not appear to have been effected. The near surface elevated concentration of copper in borehole 15 may effect the growth and condition of the trees and shrub an the vicinity.

Sulphate is of primary concern if concrete structures are present as sulphate can increase the decomposition rate of concrete. As this site is an open space the limited elevated sulphate levels are assessed not to pose a significant risk. One noted occurrence of elevated concentration near the surface is assessed not to constitue significant risk to site users.

Overall Interpretation

Although isolated incidents of elevated contaminant concentrations in the solid phase do exist, they do not appear to extend over the entire site. The results obtained suggest that the fill material was inert as suspected and the solid phase contamination for the site, in its current use, is assessed not pose a significant risk to users.

8.2 Analysis of Groundwater and Leachate Samples

A comparison of the results to the Dutch Intervention Standards (where applicable) shows that the aqueous samples submitted were largely uncontaminated. The phenol concentration in the groundwater from borehole 30 reached but did not exceed the intervention level. However the sensitivity of the groundwater in the are is low and therefore the site is assessed not to pose a significant risk to the groundwater environment.

8.3 Gas Regime

When compared with the later results, the results obtained during week 1 of monitoring do not appear reliable. It is possible that the gas regime had been effected by the drilling operation.

The gas concentration levels observed in many of the boreholes, in particular those in the waste suggests that decomposition is occurring. However the decomposition is primarily occurring in an aerobic environment so any decomposing hydrocarbons present are oxidised by the available oxygen to form carbon dioxide and water.

The exception to this can be observed in borehole 39 where decomposition is occurring in an anaerobic environment. This means that the oxygen has depleted to the extent where

it is no longer available to oxidise the carbon, so the decomposition results in methane production. It is likely that the source of this methane is the decomposition of localised organic material (as noted in the log for borehole 39).

The gas flow readings show that gas present within the waste is under no appreciable pressure. However the reading obtained from borehole 3 shows that the potential for a pressure build up does exist in this area of the site.

9.0 PRELIMINARY ASSESSMENT

The preliminary risk assessment considers the hazards, that is the potential for causing harm, which are present on the site, the targets that could be effected by any contamination and the pathway that would create the "pollution linkage". The main target groups include humans, employees and future site redevelopment workers, and the environment, surface and groundwaters.

The preliminary assessment is based on the information collated during the Contaminated Land Site Investigation. Any assumptions made are clearly stated as such and are based on our professional interpretation of the information collated and our experience of other contaminated sites.

Our research indicates that whilst this site has been subjected to a degree of infilling, the findings of the desk top study supported by the observations of the material exposed during intrusive investigations and the monitoring data, suggests that the potential for ground contamination and/or landfill gas production is assessed to be low. This assessment is based on the sites current land-use as a park/open space and should not be relied upon should that land-use change.

Although methane is present in a significant concentration (more than 1% by volume) in borehole 39, the flow rate shows that it is not currently under any pressure and the nine weeks of data confirms that no migration is occurring and therefore does not currently pose a significant risk.

10.0 RECOMMENDATIONS

The gas concentrations detected in borehole 39 show that decomposition is occurring on site, and the presence of methane shows that the potential for decomposition in an anaerobic environment exists. Methane gas is being generated in one borehole and the results from the surrounding boreholes confirm that no migration has been detected. It is recommended that monitoring continue until the gassing regime is fully understood.

Based on the 9 weeks data presented in this report it would appear that the frequency of the monitoring could be reduced, although this should be reviewed if changes occur in the gasing regime.

Whilst the site can be considered uncontaminated for everyday site users, some isolated incidents of minor contamination were noted, and some of these were present near the surface. It would therefore be prudent to advise anyone carrying out excavations on the site, such as employees of the Leisure Services Department that suitable protective equipment, such as gloves, should be worn while these activities are occurring.

It is recommended that the findings of this site investigation as detailed in this report do not warrant any further intrusive investigation.

FIGURES

NO DIMENSIONS TO BE SCALED FROM THIS DRAWING
N
KEY
Borehole
Trial-pit
Extent of site
Allotment Gardens
NEW PARKS CRESCENT
VEHICULAR ACCESS
STOKES DRIVE
HARRY ROAD
JOYCE ROAD
GARLAND CRESCENT
Forest Way (Cycle Track & Path)
Paddling Pool
PINDAR ROAD
COMET CLOSE
Path
CAD REF.
REVISIONS
BY/DATE
CH'KD/DATE
REV
Leicester City Council.
STOKESWOOD PARK
SITE INVESTIGATION
BH & TP positions.
DRAWN RH
CHECKED/DATE
DATE 5. 2. 98.
JOB NO. 970635
SCALE 1:1000
ORIG SIZE A1
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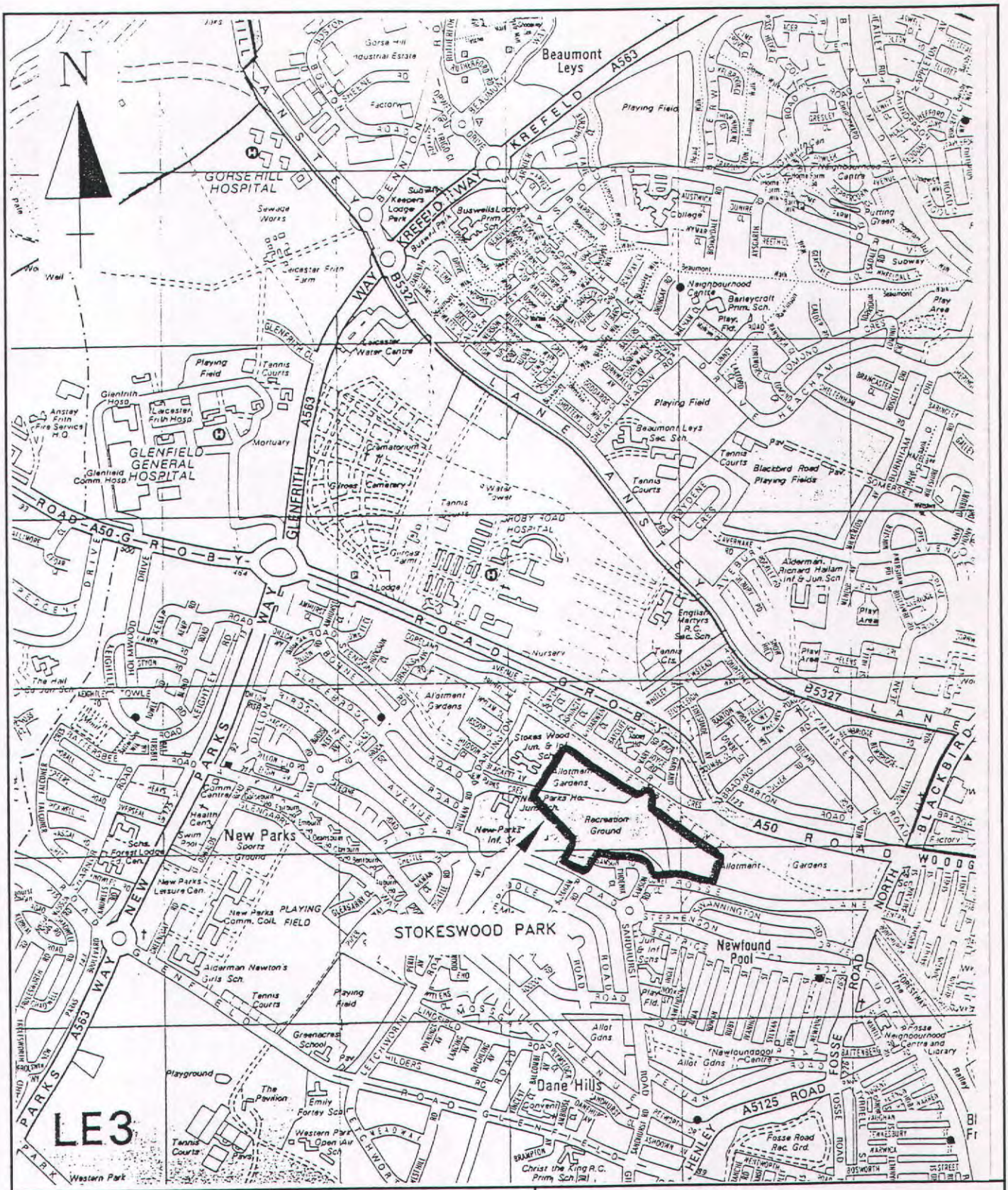
DRAWING NO.
970635/01.
PRELIM
TENDER
CONST'N
AS BUILT

TYPE	NUMBER	LEVEL AOD (m)	TYPE	NUMBER	LEVEL AOD (m)
BOREHOLE	1	84.38	BOREHOLE	36	79.07
BOREHOLE	2	83.91	BOREHOLE	37	78.73
BOREHOLE	3	82.83	BOREHOLE	38	72.71
BOREHOLE	4	82.23	BOREHOLE	39	75.38
BOREHOLE	5	82.98	BOREHOLE	40	75.31
BOREHOLE	6	83.38	BOREHOLE	41	75.24
BOREHOLE	7	82.77	BOREHOLE	42	68.14
BOREHOLE	8	81.28	BOREHOLE	43	68.05
BOREHOLE	9	80.40	BOREHOLE	44	74.16
BOREHOLE	10	80.97	BOREHOLE	45	64.06
BOREHOLE	12	81.10	BOREHOLE	46	67.22
BOREHOLE	13	80.18	BOREHOLE	47	64.34
BOREHOLE	14	79.85	BOREHOLE	48	66.74
BOREHOLE	15	79.93	BOREHOLE	49	67.07
BOREHOLE	17	79.06	BOREHOLE	50	67.29
BOREHOLE	19	78.46	BOREHOLE	51	69.74
BOREHOLE	20	78.28	BOREHOLE	52	69.87
BOREHOLE	22	79.41	BOREHOLE	53	74.35
BOREHOLE	23	78.61	BOREHOLE	54	72.49
BOREHOLE	24	77.86	TRIAL PIT	1	75.08
BOREHOLE	25	78.01	TRIAL PIT	2	76.91
BOREHOLE	26	77.87	TRIAL PIT	3	75.29
BOREHOLE	27	77.78	TRIAL PIT	4	76.39
BOREHOLE	28	77.16	TRIAL PIT	5	77.63
BOREHOLE	30	76.17	TRIAL PIT	6	78.24
BOREHOLE	32	77.54	TRIAL PIT	7	79.39
BOREHOLE	34	78.16			



PICK EVERARD

CONSULTING ENGINEERS. ARCHITECTS. SURVEYORS

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TEL. 0116 223 4400 FAX. 0116 223 4411

SITE LOCATION

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98		970635/02

APPENDIX A

CONTAMINANT (mg/kg)		SAMPLE NUMBER AND DEPTH (m)											
		TP1/1	TP1/2	TP1/3	TP2/1	TP2/2	TP2/3	TP3/1	TP3/2	TP3/3	TP4/1	TP4/2	TP4/3
		0.30m	1.50m	3.00m	0.40m	1.30m	1.70m	0.40m	0.80m	1.40m	0.40m	0.70m	1.40m
Arsenic (total)	As	19.0	12.0	4.9	8.8	7.7	6.5	5.3	4.4	5.6	11.0	7.1	11.0
Boron (water soluble)	B	1.30	1.50	0.25	0.14	0.80	0.23	0.47	0.37	0.26	0.51	0.55	0.70
Cadmium (total)	Cd	0.70	0.52	<0.5	0.51	0.59	0.52	0.61	0.57	0.56	0.89	0.67	0.86
Chromium (total)	Cr	7.9	16.0	7.7	5.9	11.0	<5.0	11.0	5.5	8.1	16.0	8.2	6.4
Copper (total)	Cu	21	15	14	14	20	14	19	12	15	26	29	91
Cyanide (total)	CN^-	<0.10	<0.10	<0.10	0.16	0.16	<0.10	<0.10	<0.10	<0.10	0.10	0.12	<0.10
Lead (total)	Pb	33	22	11	16	74	12	40	21	12	61	90	61
Mercury (total)	Hg	<0.10	<0.10	<0.10	<0.10	0.52	<0.10	0.45	0.24	0.17	0.23	0.33	0.18
Nickel (total)	Ni	15.0	11.0	9.2	11.0	9.7	14.0	12.0	9.4	12.0	12.0	8.4	18.0
PAH (total)		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
pH (Ph Units)		7.6	7.6	7.8	8.0	7.5	8.1	7.9	8.1	7.7	7.7	7.7	8.1
Phenols (total)	PhOH	1.20	0.80	1.50	2.10	1.30	0.92	0.73	1.10	1.30	1.90	1.30	1.10
Selenium (total)	Se	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	0.52	0.41	0.35	0.36	0.41	0.34
Sulphate (total) (%)	SO_3	**0.23**	**0.34**	0.18	0.12	0.12	0.12	0.12	0.11	**0.60**	0.15	0.14	0.10
Sulphide	S	8	<5	12	20	12	8	8	8	20	8	<5	<5
Sulphur (elemental)	S	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Zinc (total)	Zn	45	33	13	44	29	20	44	25	23	100	66	120

N.B BOLD indicates trigger value exceeded

CONTAMINANT (mg/kg)		SAMPLE NUMBER AND DEPTH (m)								
		TP5/1	TP5/2	TP5/3	TP6/1	TP6/2	TP6/3	TP7/1	TP7/2	TP7/3
		0.50m	1.70m	2.40m	0.50m	2.60m	3.60m	0.50m	1.60m	2.90m
Arsenic (total)	As	8.0	6.2	12.0	6.1	9.0	9.6	12.0	12.0	9.0
Boron (water soluble)	B	0.32	0.74	**3.70**	0.73	1.9	2.5	1.0	1.4	**3.9**
Cadmium (total)	Cd	0.63	<0.50	0.90	<0.50	0.62	0.84	0.64	0.66	0.68
Chromium (total)	Cr	5.3	7.6	9.0	7.9	7.3	7.4	7.1	9.9	<5.0
Copper (total)	Cu	19	43	98	23	60	98	74	63	30
Cyanide (total)	CN^-	<0.10	<0.10	0.21	0.10	0.14	0.19	0.19	0.12	<0.1
Lead (total)	Pb	321	180	**2700**	90	220	270	280	270	100
Mercury (total)	Hg	0.19	0.58	2.20	0.40	0.80	0.44	0.48	0.50	0.20
Nickel (total)	Ni	10.0	8.3	18.0	7.5	8.8	11.0	8.4	10.0	18.0
PAH (total)		<10	<10	**54**	<10	<10	<10	<10	<10	<10
pH (Ph Units)		8.1	7.9	7.7	7.5	7.8	7.7	7.8	7.6	7.8
Phenols (total)	PhOH	1.6	1.1	1.6	1.4	1.2	1.2	1.7	1.6	1.2
Selenium (total)	Se	0.40	0.37	0.54	0.39	0.14	<0.10	0.14	0.18	<0.10
Sulphate (total) (%)	SO_3	0.10	0.11	0.14	0.13	0.18	**0.20**	0.11	**0.22**	0.11
Sulphide	S	<5.0	8.0	<5.0	8.0	<5.0	<5.0	<5.0	12.0	16.0
Sulphur (elemental)	S	<100	<100	<100	<100	<100	<100	<100	<100	<100
Zinc (total)	Zn	23.0	100.0	66.0	120.0	88.0	260.0	150.0	130.0	8.9

N.B BOLD indicates trigger value exceeded

APPENDIX B

CONTAMINANT (mg/kg)		SAMPLE NUMBER AND DEPTH (m)										
		BH1/1	BH2/1	BH3/1	BH4/1	BH5/1	BH6/1	BH7/1	BH8/1	BH9/1	BH10/1	BH12/1
		0.5m	1.0m	1.0m	0.5m	1.0m	1.0m	0.5m	0.6m	1.0m	1.0m	0.5m
Arsenic (total)	As	7.8	10.3	8.9	9.8	9.3	10	7.9	4.1	8.2	4.2	8.8
Boron (water soluble)	B	0.53	0.55	0.13	0.53	0.36	0.33	0.59	0.19	0.30	0.52	0.15
Cadmium (total)	Cd	0.75	0.99	0.67	0.75	0.69	0.85	0.61	<0.5	0.69	0.57	0.86
Chromium (total)	Cr	8.1	7.9	5.1	7.5	6.2	7.1	7.0	5.4	5.3	8.2	8.3
Copper (total)	Cu	21	20	16	18	18	19	16	5.8	17	12	11
Cyanide (total)	CN^-	<0.1	<0.1	<0.1	<0.1	<0.1	0.23	<0.1	0.13	0.1	0.13	<0.1
Lead (total)	Pb	17	18	7.5	17	10	17	11	16	13	10	23
Mercury (total)	Hg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel (total)	Ni	28	20	12	25	17	21	13	3.5	14	12	9.3
PAH (total)		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
pH (Ph Units)		7.5	7.0	8.1	7.5	8.0	7.6	7.5	7.8	7.8	7.7	7.3
Phenols (total)	PhOH	0.77	<0.5	0.69	0.50	0.50	<0.5	0.57	0.53	0.57	0.69	0.75
Selenium (total)	Se	0.11	0.22	0.14	<0.1	0.16	0.18	0.19	<0.1	0.14	0.12	0.23
Sulphate (total) (%)	SO_3	0.09	0.10	0.08	0.10	0.08	0.08	0.08	0.08	0.10	0.09	0.08
Sulphide	S	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Sulphur (elemental)	S	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Zinc (total)	Zn	41	28	25	31	25	28	27	27	25	17	20

N.B BOLD indicates trigger value exceeded

CONTAMINANT (mg/kg)		SAMPLE NUMBER AND DEPTH (m)							
		BH13/1	BH14/1	BH15/1	BH15/2	BH15/3	BH17/1	BH17/2	BH17/3
		1.0m	0.7m	1.0m	2.0m	3.0m	0.5m	1.5m	2.0m
Arsenic (total)	As	7.5	9.1	13	14	8.7	16	18	15
Boron (water soluble)	B	0.4	0.41	0.98	0.9	0.36	1.7	**5.2**	2.5
Cadmium (total)	Cd	0.79	0.88	0.86	0.79	0.97	0.79	1.0	0.97
Chromium (total)	Cr	6.0	7.3	9.7	9.9	8.1	8.4	10	9.1
Copper (total)	Cu	8.1	14	**200**	**210**	24	120	120	76
Cyanide (total)	CN^-	<0.1	<0.1	0.14	0.22	<0.1	<0.1	<0.1	0.36
Lead (total)	Pb	16	17	1100	760	26	210	230	180
Mercury (total)	Hg	<0.1	<0.1	1.3	0.89	<0.1	<0.1	<0.1	<0.1
Nickel (total)	Ni	6.7	23	12	13	28	18	21	15
PAH (total)		<10	<10	25	26	<10	**51**	**170**	**2000**
pH (Ph Units)		7.3	7.4	7.8	7.7	7.8	7.6	7.7	7.5
Phenols (total)	PhOH	0.84	1.0	1.6	1.6	2.4	2.4	2.8	**190**
Selenium (total)	Se	0.19	0.17	0.25	0.18	<0.10	0.22	0.26	<0.1
Sulphate (total) (%)	SO_3	0.09	0.12	0.12	0.12	0.12	0.11	0.17	0.15
Sulphide	S	<5	<5	<5	<5	<5	<5	<5	40
Sulphur (elemental)	S	<100	<100	<100	<100	<100	<100	<100	<100
Zinc (total)	Zn	25	17	20	23	71	140	130	120

N.B BOLD indicates trigger value exceeded

CONTAMINANT (mg/kg)		SAMPLE NUMBER AND DEPTH (m)								
		BH17a/1	BH17a/2	BH17a/3	BH17a/4	BH19/1	BH20/1	BH20/2	BH22/1	BH23/1
		1.0m	1.5m	2.2m	3.0m	0.1m	0.5m	1.0m	1.0m	1.0m
Arsenic (total)	As	14	11	8.9	6.7	18	12	7.8	8.1	9.5
Boron (water soluble)	B	0.76	1.3	0.38	<0.1	1.4	<0.1	0.15	<0.1	0.49
Cadmium (total)	Cd	0.63	0.74	0.59	<0.5	0.61	0.75	0.63	0.58	0.69
Chromium (total)	Cr	6.0	15	5.1	13	7.8	6.1	6.5	6.3	8.7
Copper (total)	Cu	54	29	13	11	60	14	10	11	16
Cyanide (total)	CN^-	0.18	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Lead (total)	Pb	150	70	9.7	7.7	150	12	8.1	6.6	15
Mercury (total)	Hg	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Nickel (total)	Ni	14	18	14	15	11	18	14	17	23
PAH (total)		**98**	**150**	16	<10	20	12	<10	<10	11
pH (Ph Units)		8.9	7.3	8.0	8.3	7.8	7.9	8.0	8.1	7.9
Phenols (total)	PhOH	3.1	3.2	1.4	1.0	0.82	1.1	0.63	0.73	1.0
Selenium (total)	Se	<0.1	<0.1	<0.1	<0.1	0.17	<0.1	<0.1	<0.1	<0.1
Sulphate (total) (%)	SO_3	0.13	0.16	0.12	0.12	0.15	0.14	0.10	0.12	0.13
Sulphide	S	<5	12	<5	<5	<5	<5	<5	<5	<5
Sulphur (elemental)	S	<100	<100	<100	<100	<100	<100	<100	<100	<100
Zinc (total)	Zn	100	49	20	23	78	25	17	29	21

N.B BOLD indicates trigger value exceeded

CONTAMINANT (mg/kg)		SAMPLE NUMBER AND DEPTH (m)									
		BH24/1	BH25/1	BH26/1	BH27/1	BH28/1	BH30/1	BH30/2	BH32/1	BH32/2	BH32/3
		1.0m	1.0m	1.0m	1.0m	0.5m	1.0m	2.0m	1.5m	3.0m	4.7m
Arsenic (total)	As	9.3	8.7	8.4	3.1	7.4	11	8.2	9.5	9.7	3.5
Boron (water soluble)	B	<0.1	0.33	0.14	<0.1	0.30	<0.1	<0.1	2.3	1.6	0.33
Cadmium (total)	Cd	0.74	0.66	0.98	0.64	0.79	0.86	0.73	0.66	0.57	<0.5
Chromium (total)	Cr	10	6.3	8.2	8.2	7.1	5.9	7.8	8.1	8.9	<5.0
Copper (total)	Cu	17	16	19	6.4	17	13	15	80	86	12
Cyanide (total)	CN^-	0.19	<0.1	0.31	<0.1	0.72	0.54	<0.1	0.16	0.39	0.56
Lead (total)	Pb	12	10	15	20	23	10	9.8	390	27	22
Mercury (total)	Hg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.67	0.48	<0.1
Nickel (total)	Ni	25	17	20	10	18	14	18	9.6	9.8	5.8
PAH (total)		<10	<10	<10	<10	17	<10	<10	**71**	49	<10
pH (Ph Units)		7.5	7.3	7.5	7.7	7.1	7.8	7.9	8.1	7.8	7.8
Phenols (total)	PhOH	0.92	0.67	1.8	0.98	1.4	0.94	0.84	1.4	1.1	0.84
Selenium (total)	Se	0.11	0.22	0.14	<0.1	<0.1	0.24	<0.1	0.12	0.15	<0.1
Sulphate (total) (%)	SO_3	0.09	0.11	0.07	0.07	0.11	0.11	0.08	0.12	0.15	0.09
Sulphide	S	<5	<5	<5	<5	<5	8.0	<5	<5	<5	<5
Sulphur (elemental)	S	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Zinc (total)	Zn	22	19	28	31	40	33	36	140	110	21

N.B BOLD indicates trigger value exceeded

CONTAMINANT (mg/kg)		SAMPLE NUMBER AND DEPTH (m)										
		BH34/1	BH34/2	BH34/3	BH34/4	BH36/1	BH36/2	BH36/3	BH36/4	BH36/5	BH37/1	BH38/1
		0.5m	1.5m	3.0m	4.2m	1.0m	2.0m	3.0m	3.5m	4.3m	1.0m	1.0m
Arsenic (total)	As	9.8	15	8.5	5.4	10	9.4	17	23	6.4	5.9	5.5
Boron (water soluble)	B	1.1	**3.7**	**4.2**	1.0	0.57	0.90	1.5	**3.5**	0.74	<0.1	<0.1
Cadmium (total)	Cd	0.57	0.98	<0.5	<0.5	0.63	0.57	0.77	0.55	<0.5	0.56	<0.5
Chromium (total)	Cr	<5.0	8.4	7.2	6.4	8.0	7.3	9.3	7.2	6.3	5.8	<5.0
Copper (total)	Cu	61	100	43	16	**130**	80	**130**	22	14	17	11
Cyanide (total)	CN^-	0.46	0.39	0.44	0.12	0.25	0.27	0.46	0.31	<0.1	<0.1	0.18
Lead (total)	Pb	230	440	220	21	520	570	370	72	13	13	8.4
Mercury (total)	Hg	0.57	0.78	0.29	<0.1	0.74	0.61	1.3	0.30	<0.1	<0.1	<0.1
Nickel (total)	Ni	7.3	16	10	11	10	9.2	17	6.9	10	9.6	8.1
PAH (total)		13	41	39	<10	27	**1000**	37	13	<10	<10	<10
pH (Ph Units)		7.5	7.6	7.7	7.4	7.7	7.8	7.6	5.2	7.4	7.3	8.0
Phenols (total)	PhOH	1.3	1.3	1.8	2.4	1.1	10	1.5	2.4	2.9	1.2	1.3
Selenium (total)	Se	0.26	0.22	<0.1	0.11	<0.1	<0.1	0.15	<0.1	<0.1	<0.1	<0.1
Sulphate (total) (%)	SO_3	0.15	**0.21**	**0.22**	0.12	0.16	0.12	0.14	**0.33**	0.10	0.10	0.06
Sulphide	S	8.0	<5	8.0	<5	<5	<5	<5	<5	<5	<5	<5
Sulphur (elemental)	S	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Zinc (total)	Zn	69	**330**	94	21	120	100	290	59	19	33	13

N.B BOLD indicates trigger value exceeded

CONTAMINANT (mg/kg)		SAMPLE NUMBER AND DEPTH (m)										
		BH39/1	BH39/2	BH39/3	BH39/4	BH39/5	BH39/6	BH40/1	BH40/2	BH40/3	BH41/1	BH41/2
		1.0m	2.0m	3.0m	4.0m	5.0m	6.0m	0.5m	1.5m	2.9m	1.0m	2.0m
Arsenic (total)	As	8.2	8.3	10	6.9	7.8	2.9	6.8	13	12	**58**	16
Boron (water soluble)	B	<0.1	0.37	0.30	0.46	<0.1	0.21	<0.1	0.74	1.2	**4.1**	1.5
Cadmium (total)	Cd	0.59	0.52	0.62	0.68	0.59	<0.5	0.61	0.92	0.85	2.9	1.0
Chromium (total)	Cr	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	7.5	6.2	17	11
Copper (total)	Cu	16	16	16	14	14	5.8	15	17	17	**600**	50
Cyanide (total)	CN^-	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.22	<0.1
Lead (total)	Pb	17	13	16	13	11	5.0	11	16	18	900	72
Mercury (total)	Hg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.64	<0.1
Nickel (total)	Ni	9.7	10	11	12	11	3.9	9.4	16	13	62	22
PAH (total)		<10	<10	<10	<10	<10	<10	<10	<10	12	36	<10
pH (Ph Units)		7.2	7.3	7.1	7.5	7.1	7.5	7.8	7.5	7.3	7.3	7.6
Phenols (total)	PhOH	0.77	0.96	1.8	1.2	1.9	0.96	0.90	1.5	1.7	1.7	1.1
Selenium (total)	Se	<0.1	0.12	0.21	0.12	0.17	<0.1	0.1	0.13	0.25	0.59	0.21
Sulphate (total) (%)	SO_3	0.08	**0.45**	**0.26**	0.11	0.18	0.06	0.10	0.14	**0.21**	0.19	0.18
Sulphide	S	<5	<5	<5	<5	<5	<5	<5	12	8.0	<5	<5
Sulphur (elemental)	S	<100	<100	<100	<100	360	<100	<100	350	540	<100	<100
Zinc (total)	Zn	27	27	32	26	25	8.4	36	37	33	**790**	91

N.B BOLD indicates trigger value exceeded

CONTAMINANT (mg/kg)		SAMPLE NUMBER AND DEPTH (m)									
		BH41a/1	BH41a/2	BH41a/3	BH42/1	BH43/1	BH43/2	BH43/3	BH44/1	BH45/1	BH46/1
		1.0m	2.0m	2.7m	1.0m	1.0m	1.3m	1.8m	0.8m	0.5m	1.0m
Arsenic (total)	As	16	10	5.3	4.6	21	7.6	2.6	6.5	4.6	9.6
Boron (water soluble)	B	0.40	1.1	0.33	<0.1	1.1	0.64	0.14	0.28	0.44	0.17
Cadmium (total)	Cd	0.93	0.64	<0.5	<0.5	1.5	<0.5	<0.5	0.58	0.89	0.59
Chromium (total)	Cr	6.4	<5.0	5.2	<5.0	63	5.4	6.3	6.0	9.1	5.6
Copper (total)	Cu	46	17	17	4.7	50	17	8.7	15	11	6.9
Cyanide (total)	CN^-	<0.1	<0.1	<0.1	<0.1	0.13	<0.1	<0.1	0.14	0.34	<0.1
Lead (total)	Pb	72	35	9.5	8.2	100	60	7.3	9.5	14	14
Mercury (total)	Hg	<0.1	0.10	<0.1	<0.1	0.82	0.37	<0.1	<0.1	<0.1	<0.1
Nickel (total)	Ni	17	8.9	9.9	3.8	15	4.7	7.3	13	8.8	4.8
PAH (total)		<10	<10	<10	<10	15	15	<10	<10	<10	<10
pH (Ph Units)		7.6	7.6	7.6	7.7	7.5	6.8	7.8	8.0	7.5	7.4
Phenols (total)	PhOH	0.75	1.2	0.67	0.86	1.2	1.3	0.77	0.96	0.77	0.82
Selenium (total)	Se	0.30	<0.1	<0.1	0.13	0.29	0.17	<0.1	0.10	0.21	0.20
Sulphate (total) (%)	SO_3	0.14	0.14	0.13	0.10	0.09	0.13	0.11	0.12	0.09	0.07
Sulphide	S	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Sulphur (elemental)	S	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Zinc (total)	Zn	79	35	16	9.3	130	20	26	31	20	20

N.B BOLD indicates trigger value exceeded

CONTAMINANT (mg/kg)		SAMPLE NUMBER AND DEPTH (m)							
		BH47/1	BH48/1	BH49/1	BH50/1	BH51/1	BH52/1	BH53/1	BH54/1
		0.5m	0.5m	0.5m	0.5m	1.0m	1.0m	0.5m	0.5m
Arsenic (total)	As	6.1	4.1	7.4	9.1	3.2	4.9	8.2	**46**
Boron (water soluble)	B	0.72	<0.1	0.36	0.19	<0.1	<0.1	<0.1	<0.1
Cadmium (total)	Cd	0.63	<0.5	0.73	0.68	0.53	<0.5	0.68	1.1
Chromium (total)	Cr	6.7	<5.0	25	5.7	<5.0	5.6	7.7	<5.0
Copper (total)	Cu	12	3.0	21	12	5.8	7.9	15	17
Cyanide (total)	CN^-	<0.1	<0.1	0.29	0.21	0.10	0.23	0.10	0.12
Lead (total)	Pb	19	<5.0	24	8.9	10	0.23	0.10	0.12
Mercury (total)	Hg	<0.1	<0.1	0.13	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel (total)	Ni	5.8	2.4	14	7.3	7.1	4.3	11	19
PAH (total)		<10	<10	<10	<10	<10	<10	<10	<10
pH (Ph Units)		7.3	7.4	7.6	7.3	8.2	7.1	7.5	7.8
Phenols (total)	PhOH	0.69	0.61	0.65	0.96	<0.5	0.55	0.50	<0.5
Selenium (total)	Se	<0.1	<0.1	0.14	0.13	0.14	0.28	0.18	0.14
Sulphate (total) (%)	SO_3	0.07	0.07	0.10	0.09	0.10	**0.8**	0.06	0.06
Sulphide	S	<5	<5	<5	<5	8.0	<5	<5	<5
Sulphur (elemental)	S	<100	<100	<100	<100	<100	<100	<100	<100
Zinc (total)	Zn	24	8.6	45	24	16	14	35	40

N.B BOLD indicates trigger value exceeded

APPENDIX C

CONTAMINANT (mg/kg)	SAMPLE	UNITS	AQUEOUS SAMPLES					
			GW 22	GW 30	GW 39	GW 43	BULK 1	BULK 2
Ammonia	N	mg/l	-	-	-	-	<0.5	<0.5
Ammoniacal Nitrogen	N	mg/l	<0.5	<0.5	3.5	<0.5	-	-
Arsenic (soluble)	As	µg/l	<10	<10	<10	<10	<10	<10
Boron (soluble)	B	mg/l	<0.5	<0.5	0.17	<0.5	-	-
Cadmium (soluble)	Cd	µg/l	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chloride	Cl^-	mg/l	-	-	-	-	<5	<5
Chromium (soluble)	Cr	µg/l	<10	<10	<10	<10	<10	<10
COD (filtered)	O_2	mg/l	10	<10	30	<10	-	-
Copper (soluble)	Cu	µg/l	20	<10	10	<10	<10	<10
Cyanide (total)	CN^-	mg/l	0.02	0.01	<0.01	0.01	<0.01	<0.01
Dissolved Methane			<0.01	<0.01	<0.01	<0.01	-	-
Lead (soluble)	Pb	µg/l	10	<10	10	<10	10	<10
Mercury (soluble)	Hg	µg/l	<1.0	<1.0	<1.0	<1.0	-	-
Nickel (soluble)	Ni	µg/l	10	<10	10	<10	<10	<10
Nitrate	N	mg/l	-	-	-	-	0.17	0.13
Pet Ether Extract		mg/l	<2	<2	<2	<2	-	-
Phenols (total)	PhOH	mg/l	0.07	**0.20**	0.06	0.11	0.09	0.09
Selenium (soluble)	Se	µg/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Sulphate (total) (%)	SO_3	g/l	0.19	0.20	0.41	0.17	0.01	0.03
Sulphide	S	mg/l	<0.5	<0.5	<0.5	<0.5	-	-
Zinc (total)	Zn	µg/l	<10	<10	<10	<10	<10	<10

N.B **BOLD indicates trigger value exceeded** **GW signifies groundwater sample**
Bulk indicates a leachate sample prepared from the bulk sample

APPENDIX D

	ICRCL Trigger concentrations (mg/Kg)					Kellys (mg/Kg)					Dutch Intervention (mg/Kg)			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Arsenic	10	40				0-30	30-50	50-100	100-500	500+	29	55	10	60
Cadmium	3	15				0-1	1-3	3-10	10-50	50+	0.8	12	0.4	6
Chromium (VI)	25													
Chromium (T)	600	1000				0-100	100-200	200-500	500-2500	2500+	100	380	1	30
Lead	500	2000				0-500	500-1000	1000-2000	2000-10K	10K+	85	530	15	75
Mercury	1	20				0-1	1-3	3-10	10-50	50+	0.3	10	0.05	0.3
Selenium	3	6				0-1	1-3	3-10	10-50	50+				
Boron			3			0-2	2-5	5-50	50-250	250+				
Copper			130			0-100	100-200	200-500	500-2500	2500+	36	190	15	75
Nickel			70			0-20	20-50	50-200	200-1000	1000+	35	210	15	75
Zinc			300			0-250	250-500	500-1000	1000-5000	5000+	140	720	65	800
PAHs				50 (500)	1000 (10K)						1	40		
Phenols				5 (200)	5 (1000)	0-2	2-5	5-50	50-250	250+	0.05	40	-	2000
Cyanide (free)				25 (500)	100 (500)	0-1	1-5	5-50	50-100	100+	1	20	5	1500
Cyanide (complex)				250 (1000)	250 (5000)						5	50/650	10	1500
Thiocyanide				50 (NL)		0-10	10-50	50-100	100-500	500+	-	20	-	1500
Sulphate				2000 (10K)	2000 (50K)	0-2000	2000-5000	5000-10K	10K-50K	50K+				
Sulphide				250 (1000)		0-10	10-50	50-100	100-500	2500+				
Sulphur				5000 (20K)		0-100	100-500	500-1000	1000-5000	5000+				
Acidity				5 (3)	NL	6-7	5-6	4-5	2-4	>2				
TOLEX						0-5000	5000-10K	10K-50K	50K-250K	250K+				

A	Domestic Gardens/allotments	F	Typical value for Uncontaminated	K	Soil - Background
B	Parks/playing fields/open spaces	G	Slight Contamination	L	Soil - Intervention
C	Any uses where plants are to be grown	H	Contaminated	M	GW - Background ug/l
D	Domestic Gardens/Allotments/Play areas	I	Heavy Contamination	N	GW - Intervention ug/l
E	Lanscaped Areas/Buildings/Hard cover	J	Unusually Heavy Contamination		
	Threshold (Action)				

APPENDIX E

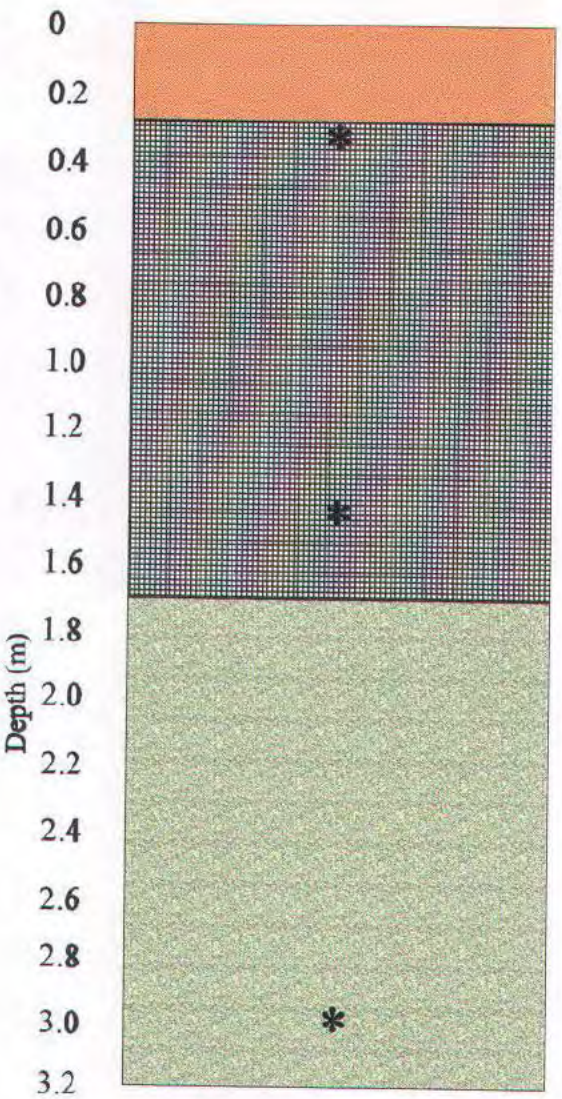
Stokeswood Park Monitoring Results											
Methane Concentrations - Measured as % concentration by volume											
Borehole	Week										
	1	2	3	4	5	6	7	8	9	10	Gas Flow l/hr
Pressure	1024	1015	1006	1009	1019	1017	1018	1015	1032	997	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	FLOOD	-
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	FLOOD	-
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
37	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	JAM	-
38	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
39	0.0	0.0	0.0	0.0	0.3	0.6	2.7	7.4	7.4	6.2	0.0
40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	FLOOD	-
47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
48	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
51	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
52	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
53	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
54	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	FLOOD	-
WL - waterlogged			FLOOD - borehole flooded				JAM - cover jammed shut				

Stokeswood Park Monitoring Results										
Carbon Dioxide Concentrations - Measured as % concentration by volume										
Borehole	Week									
	1	2	3	4	5	6	7	8	9	10
1	0.3	0.4	0.4	0.4	0.4	0.6	0.6	0.6	0.7	0.8
2	0.0	1.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	1.4
3	0.1	0.8	0.9	1.0	0.7	0.8	0.8	0.9	0.9	2.2
4	0.5	1.4	1.7	1.9	2.3	2.2	1.9	3.1	3.8	0
5	0.4	0.9	1.1	1.2	1.5	1.7	1.8	1.5	2.0	2.4
6	0.8	3.1	0.4	0.2	0.0	0.1	0.1	0.1	0.0	0.4
7	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.3	FLOOD
8	0.3	0.3	0.3	0.2	0.4	0.7	0.6	0.2	0.4	0.5
9	0.1	0.1	0.1	0.0	0.1	0.3	0.2	0.2	0.0	0.1
10	0.4	0.4	0.6	0.8	1.0	1.2	1.4	0.9	1.4	1.6
12	0.6	0.5	0.7	0.5	0.7	0.5	1	0.9	1.1	1.3
13	0.3	0.6	0.8	0.7	0.8	0.6	0.8	0.9	1.2	1.4
14	0.1	0.7	0.5	0.4	0.9	0.9	1.2	0.8	1.3	1.4
15	3.4	3.9	4.5	6.6	5.8	5.6	6.9	6.6	7.1	7.8
17	2.3	4.1	4.2	4.5	4.7	4.4	4.9	5.2	4.8	5.3
19	1.9	0.8	0.7	0.5	1.1	0.9	1.4	1.6	1.4	1.2
20	0.8	0.5	0.7	0.5	0.8	0.8	1.1	1.3	1.5	1.7
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
23	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.6
24	2.0	2.3	1.1	2.1	1.1	1.4	1.2	1.1	1.1	FLOOD
25	1.1	2.1	0.9	1.9	2.0	2.0	2.1	1.8	1.6	2.2
26	0.6	1.3	1.7	1.3	0.8	0.6	0.8	0.4	0.0	2.3
27	0.5	0.6	1.1	1.3	1.1	1.1	1.7	1.9	1.9	2.4
28	0.2	1.6	1.6	2.0	1.8	1.6	2.6	2.4	2.9	2.7
30	1.4	0.8	1.5	1.9	2.4	1.8	1.3	0.9	1.1	1.3
32	1.9	1.7	2.4	3.9	4.6	5.8	6.2	6.8	7.6	8.5
34	2.1	5.7	6.7	7.4	7.5	7.7	7.8	8.0	7.8	4.6
36	1.3	4.1	3.9	3.5	3.8	4.0	3.9	3.8	4.5	4.3
37	1.5	2.7	3.0	3.2	2.8	3.1	4.4	4.7	5.8	5.5
38	0.2	4.1	1.1	1.3	0.5	0.5	0.6	1.5	2.9	JAM
39	1.7	2.7	7.8	7.3	8.2	8.7	8.7	8.6	9.8	8.3
40	2.1	3.1	4.6	6.1	5.8	6.1	6.1	6.3	6.0	10.0
41	1.4	7.7	7.3	7.2	7.9	8.1	9.1	9.2	9.0	10.1
42	0.6	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	0.3	6.6	0.3	0.3	0.5	0.6	0.7	1.4	1.6	1.0
44	0.4	0.0	1.0	0.6	0.4	0.6	1.4	1.6	2.1	1.7
45	0.0	0.4	0.0	0.2	0.0	0.0	0.1	0.2	0.1	0.2
46	0.4	0.4	0.5	0.4	0.7	0.8	0.9	1.1	1.4	FLOOD
47	0.2	1.7	1.6	1.6	1.9	1.4	1.7	1.6	1.9	2.2
48	0.3	0.3	0.3	0.3	0.6	0.3	0.6	0.8	1.4	1.4
49	1.1	1.3	1.7	2.1	2.7	2.4	2.7	3.6	4.2	5.4
50	1.2	0.0	0.2	0.2	0.1	0.1	0.2	0.4	0.3	0.5
51	0.6	0.6	0.2	0.1	0.1	0.3	0.3	0.3	0.4	0.4
52	0.4	0.8	0.8	0.9	0.5	0.3	0.2	0.1	0.0	0.0
53	0.4	1.2	0.9	0.7	0.7	0.5	1.1	1.6	2.3	1.8
54	1.1	1.6	1.5	1.2	1.9	1.7	1.8	1.9	2.6	FLOOD
WL - waterlogged			FLOOD - borehole flooded				JAM - cover jammed shut			

Stokeswood Park Monitoring Results										
Oxygen Concentrations - Measured as % concentration by volume										
Borehole	Week									
	1	2	3	4	5	6	7	8	9	10
1	19.1	19.1	18.9	19.1	18.9	18.3	18.8	18.9	19.2	18.4
2	19.8	18.8	18.9	19.0	19.9	19.8	20.1	19.9	20.1	16.6
3	19.8	18.6	17.8	17.4	18.3	18.1	18.7	18.6	19.4	14.6
4	15.6	9.2	7.9	7.6	8.5	9.0	9.6	7.4	5.1	19.5
5	18.6	17.9	18.0	18.2	18.4	18.2	17.8	17.2	16.8	16.1
6	19.8	16.0	19.8	20.1	20.0	19.9	20.1	20.1	20.2	18.1
7	19.7	19.3	19.6	19.6	19.5	19.6	19.8	18.9	18.4	FLOOD
8	19.2	19.4	19.6	19.3	19.3	19.3	19.3	19.6	19.7	18.2
9	15.6	13.2	11.6	10.7	9.1	9.0	10.7	13.1	15.9	14.9
10	18.9	19.3	19.1	18.8	18.7	18.7	18.1	17.6	16.9	16.6
12	19.0	16.2	16.0	15.9	15.8	15.8	13.6	13.1	12.8	11.5
13	18.4	16.8	16.7	16.5	16.4	16.4	15.7	15.1	13.8	12.2
14	19.5	16.4	16.1	17.3	16.0	15.9	15.6	14.9	14.4	14.4
15	18.8	14.0	10.0	7.5	10.0	10.4	9.8	9.0	9.1	6.6
17	19.1	6.0	6.0	6.1	9.1	9.3	9.5	9.6	9.3	7.0
19	19.7	15.5	16.2	16.9	15.6	15.7	15.7	15.6	15.9	16.1
20	19.4	16.1	15.7	16.2	16.0	16.1	13.2	12.6	10.7	9.5
22	18.6	12.6	11.4	11.3	10.6	10.8	9.6	8.9	8.0	7.4
23	18.9	17.4	17.0	16.6	15.9	15.9	15.7	15.2	14.5	13.7
24	14.6	18.0	18.7	17.8	18.6	18.4	18.1	17.6	17.2	FLOOD
25	17.4	18.6	19.0	18.9	18.6	18.5	18.3	17.8	17.8	17.4
26	19.3	19.6	17.8	18.7	18.7	19.0	19.4	19.6	20.3	16.7
27	19.3	19.5	18.4	18.0	18.3	18.4	17.4	17.7	17.4	16.1
28	19.8	16.8	19.1	17.8	17.3	17.5	16.9	16.9	16.9	15.9
30	19.7	14.3	14.0	14.5	14.5	14.6	17.8	19.2	19.0	17.7
32	18.4	18.6	17.9	17.6	17.6	17.5	17.4	15.6	15.1	14.3
34	18.6	1.2	1.0	1.3	1.6	1.8	1.6	1.3	4.3	1.5
36	17.9	14.4	15.2	15.9	16.3	16.1	15.9	15.4	15.1	14.5
37	13.6	8.0	7.4	7.2	11.6	11.7	7.6	5.2	5.9	2.9
38	20.0	18.0	19.7	19.1	19.6	19.5	19.4	19.3	19.1	JAM
39	19.9	3.0	0.6	0.8	0.0	0.1	0.0	1.3	0.0	1.6
40	18.4	15.5	13.0	10.9	11.7	11.7	11.6	11.6	12.7	4.6
41	18.4	7.9	7.2	7.7	9.1	9.1	8.2	7.1	7.9	5.7
42	19.3	19.5	20.1	20.1	19.9	20.0	20.2	19.4	18.9	18.6
43	19.3	14.3	15.7	16.4	15.8	16.0	15.9	15.8	13.1	12.4
44	19.3	19.8	18.9	19.4	19.5	19.5	18.6	18.6	18.6	17.8
45	19.1	19.1	19.9	19.4	19.6	19.8	19.5	19.5	19.1	18.6
46	19.7	18.9	18.9	18.8	18.4	18.3	18.3	18.2	18.3	FLOOD
47	18.8	17.8	17.4	16.9	16.1	16.4	15.9	15.9	15.1	14.3
48	18.4	16.7	19.3	17.9	18.4	18.6	16.4	14.6	12.1	11.6
49	18.2	16.6	17.8	16.4	15.6	15.9	15.7	12.1	9.9	8.0
50	19.0	20.0	18.7	18.2	18.4	18.1	16.9	16.4	15.2	14.0
51	16.9	12.5	13.9	11.6	11.2	11.4	10.3	10.3	10.1	9.2
52	18.2	17.1	17.6	17.6	17.3	17.3	17.3	17.3	17.4	17.4
53	16.4	17.1	19.9	19.7	19.5	19.5	18.4	18.1	15.3	14.7
54	17.7	16.8	16.9	18.7	16.7	16.8	16.9	16.2	16.9	FLOOD
FLOOD - borehole flooded				JAM - cover jammed shut						

GAS	UNITS	SAMPLE ANALYSED BY GAS CHROMATOGRAPHY: SAMPLED 3rd MARCH 1998			
		BH 36	BH 39	BH 40	BH 41
Methane	%	0.16	0.69	<0.01	0.16
Carbon Dioxide	%	2.13	2.99	7.47	3.53
Oxygen	%	7.91	1.78	7.63	5.19
Nitrogen and other inert gases	%	89.80	94.95	84.90	91.12

APPENDIX F



Soft light brown organic CLAY topsoil containing plant roots.

TP 1/1

FILL (comprising soft to firm grey brown CLAY with flint gravels and cobbles and brick, chalk, sandstone and minor wood fragments).

TP 1/2

Odourless soft to firm greenish grey CLAY containing chalk fragments. BOULDER CLAY.

TP1/3

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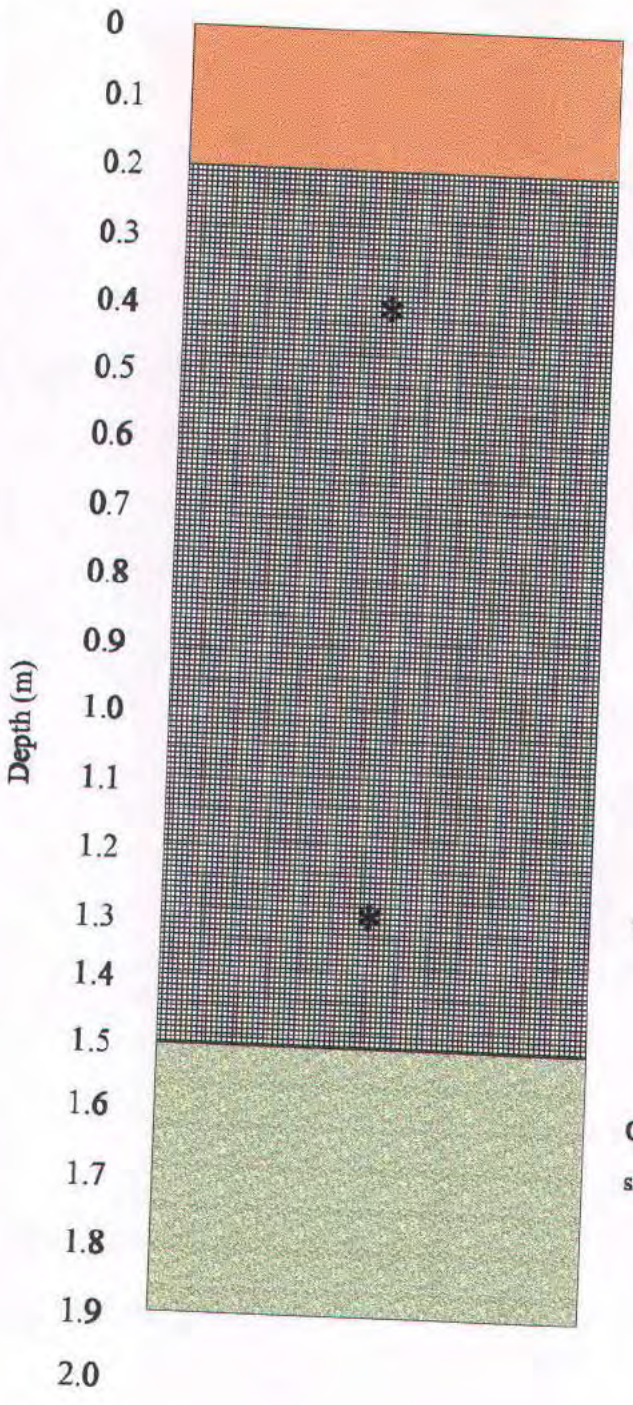
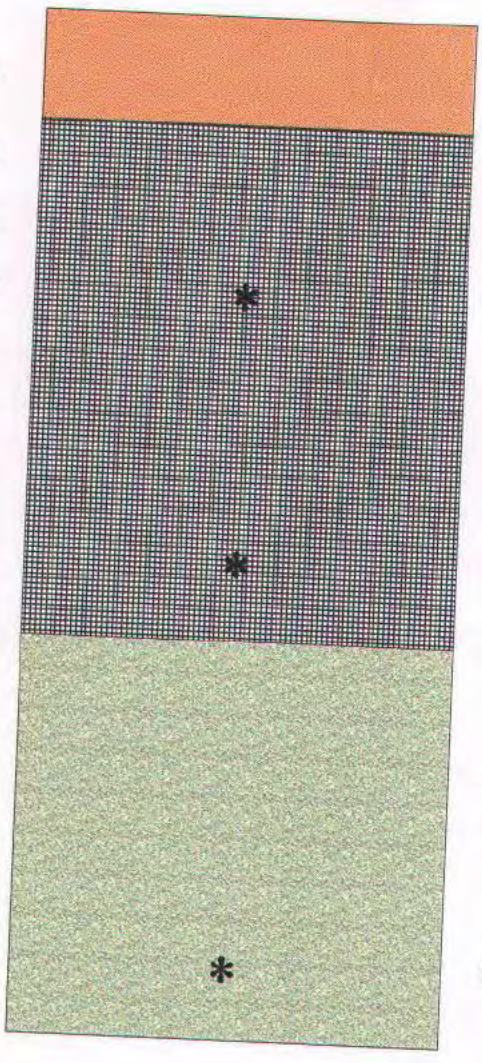
TRAIL PIT LOG:

TRIAL PIT 1

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 17/03/98	30/3/98	970635/03



PICK EVERARD CONSULTING ENGINEERS. ARCHITECTS. SURVEYORS HALFORD HOUSE, CHARLES ST. LEICESTER LE1 1HA TEL. 0116 223 4400 FAX. 0116 223 4411			**TRIAL PIT LOGS:** **TRIAL PIT 2**
SCALE NTS	DRAWN/DATE JS 17/03/98	CHECKED/DATE 30/3/98	DRAWING NUMBER 970635/04



Soft light brown CLAY topsoil containing plant roots.

TP 3/1

FILL (comprising stiff blueish grey BOULDER CLAY with chalk, glass brick and household lino fragments).

TP 3/2

Odourless soft to firm greenish grey CLAY containing small chalk fragments. BOULDER CLAY.

TP 3/3

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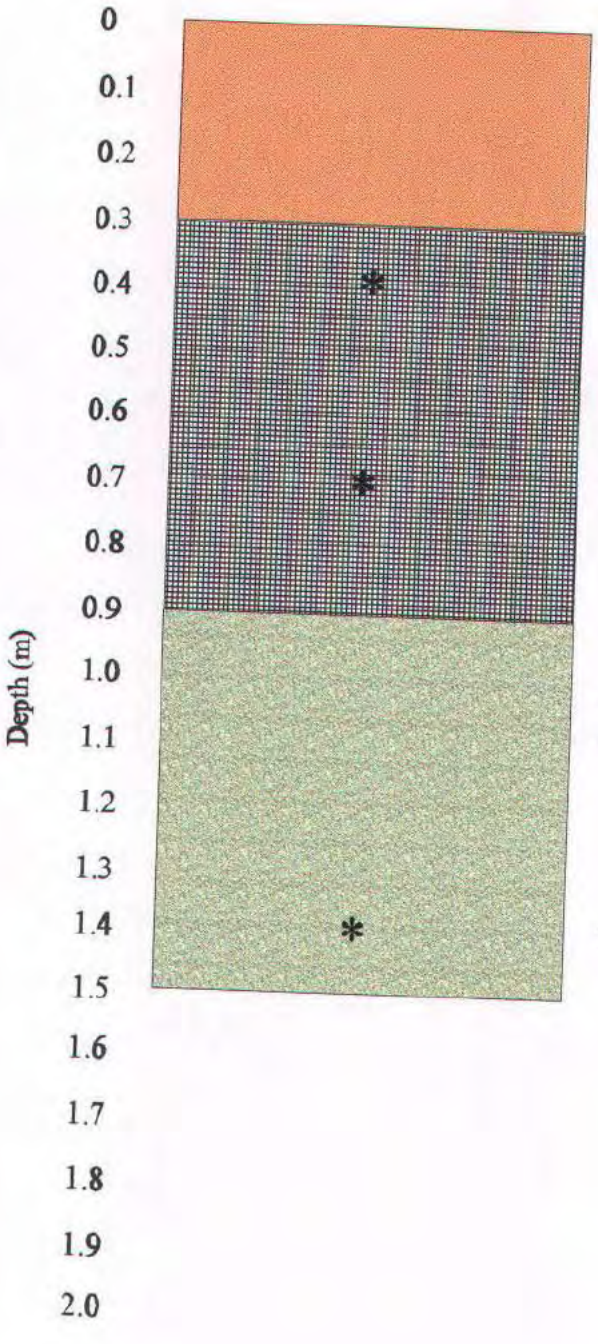
TRIAL PIT LOGS:

TRIAL PIT 3

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 17/03/98	30/3/98	970635/05



Light brown clayey topsoil containing plant roots.

TP4/1

FILL (consisting of minor cloth and glass fragments, brick, pottery and metal strapping/mesh in a matrix of dark brown soft to firm sandy CLAY).

TP 4/2

Odourless grey/green soft to firm CLAY containing chalk fragments. BOULDER CLAY.

TP 4/3

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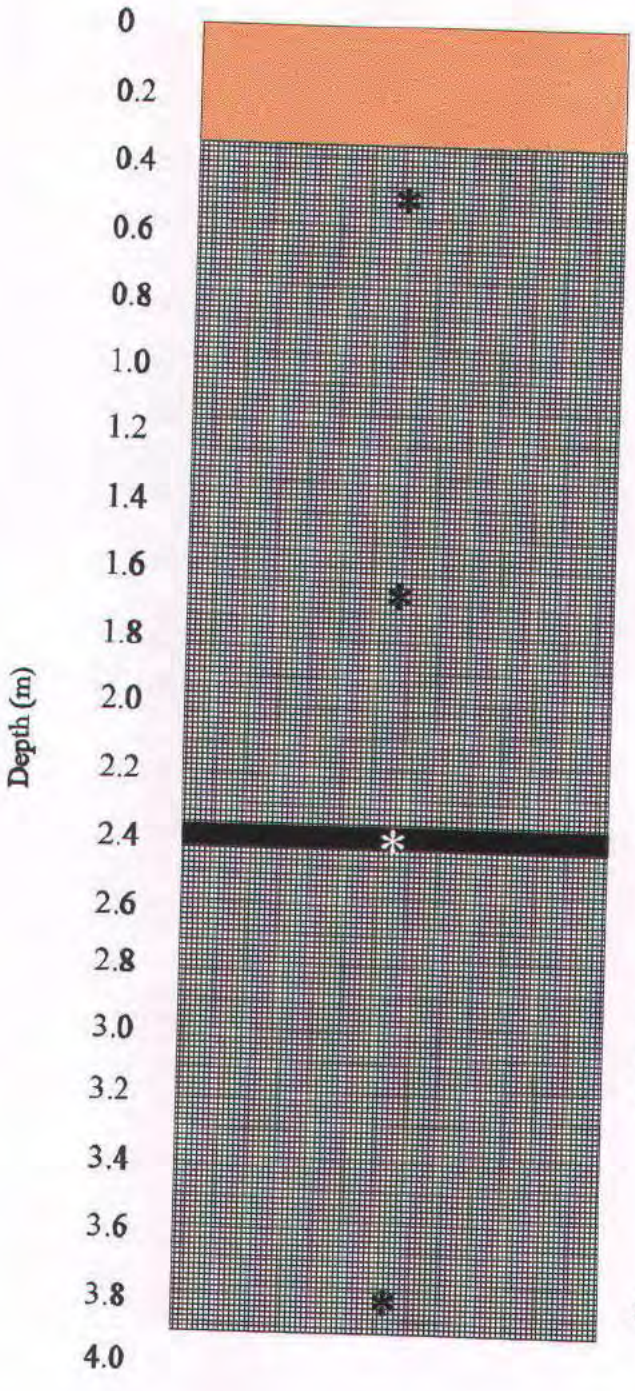
TRIAL PIT LOGS:

TRIAL PIT 4

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 17/03/98	30/3/98	970635/06



Soft light brown organic CLAY topsoil containing plant roots.

TP 5/1

FILL (comprising soft to firm yellowish brown mottled reddish brown CLAY with flint gravels and cobbles and brick, granite and chalk fragments. A large intact granite kerbstone was encountered).

TP 5/2

TP 5/3 Band of black organic material. This may be the original ground level

FILL (comprising soft to firm yellowish brown mottled reddish brown CLAY with flint gravels and cobbles and brick, granite and chalk fragments).

Bulk Sample

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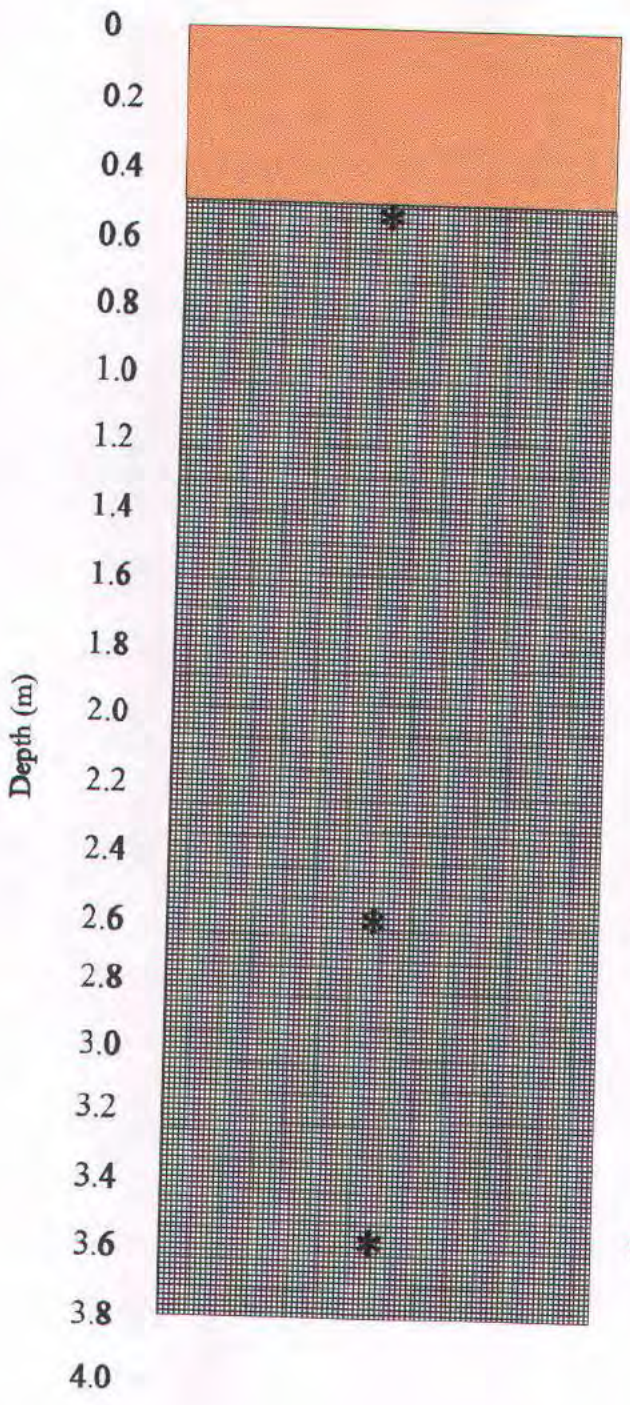
TRIAL PIT LOGS:

TRIAL PIT 5

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 17/03/98	30/3/98	970635/07



Soft light brown organic CLAY topsoil containing plant roots.

TP 6/1

FILL (comprising soft to firm dark brown sandy CLAY with flint gravels and cobbles and brick, concrete and minor metal fragments).

TP 6/2

TP 6/3

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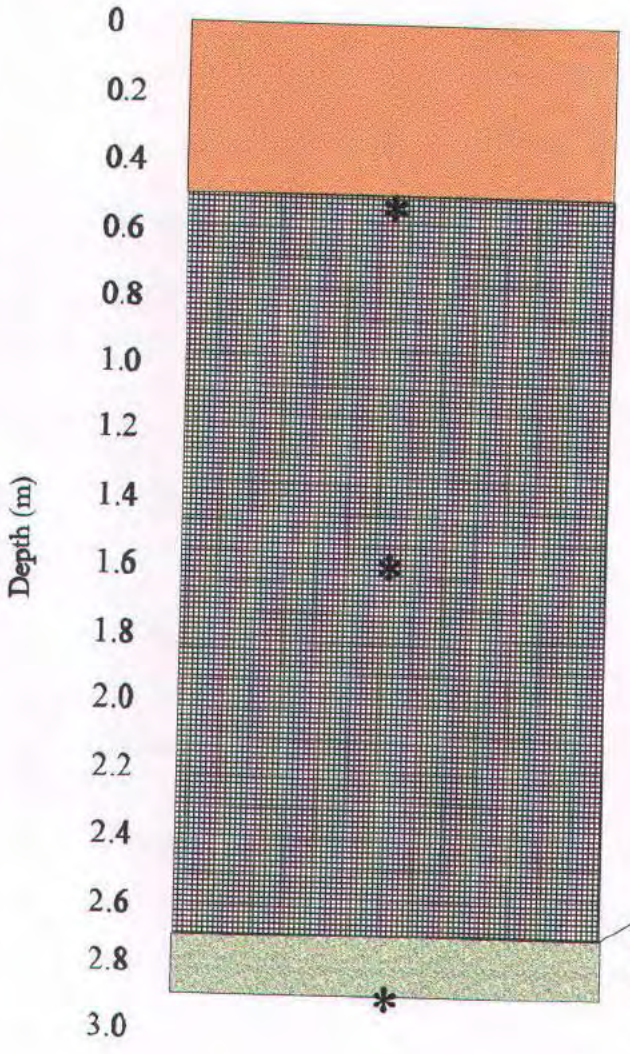
TRIAL PIT LOGS:

TRIAL PIT 6

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 17/03/98	30/3/98	970635/08



Soft light brown organic CLAY topsoil containing plant roots.

TP 7/1

FILL (comprising soft to firm dark brown sandy CLAY with flint gravels and cobbles and brick, slate and granite fragments).

TP 7/2

Odourless soft to firm greenish grey CLAY containing chalk fragments. BOULDER CLAY.
TP 7/3

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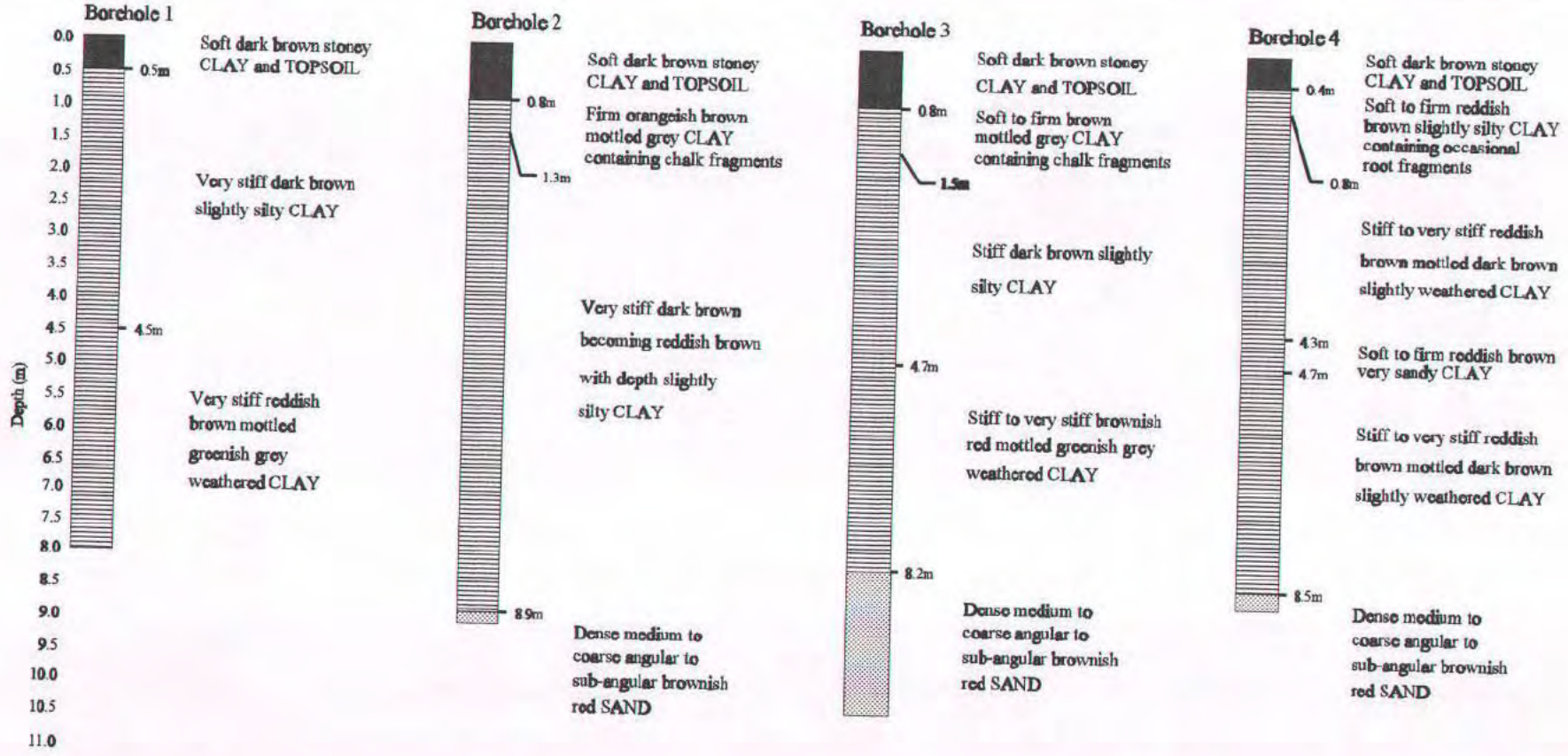
TRIAL PIT LOGS:

TRIAL PIT 7

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 17/03/98	30/3/98	970635/09

APPENDIX G



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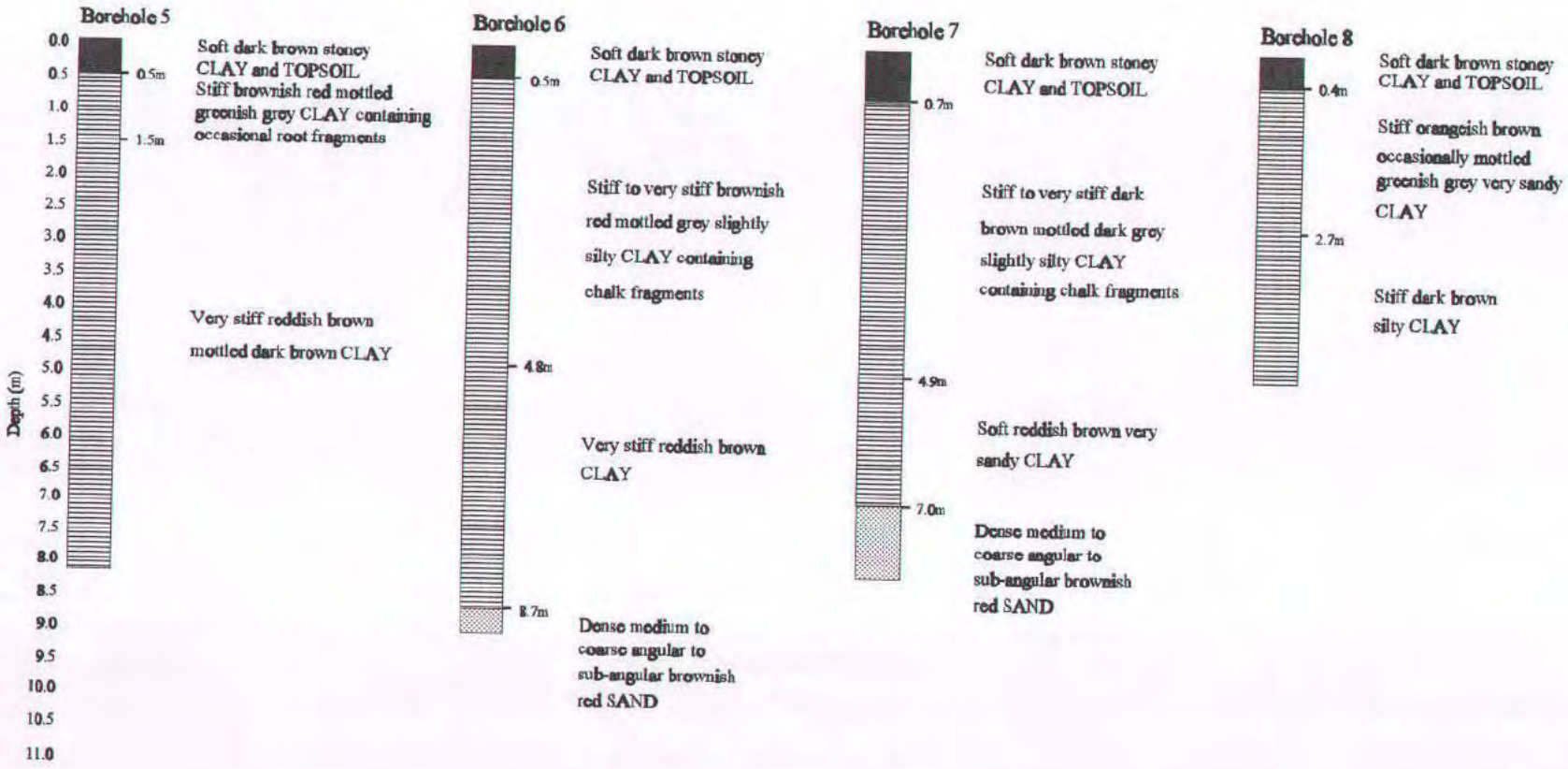
Borehole Logs

Boreholes 1 - 4

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/10



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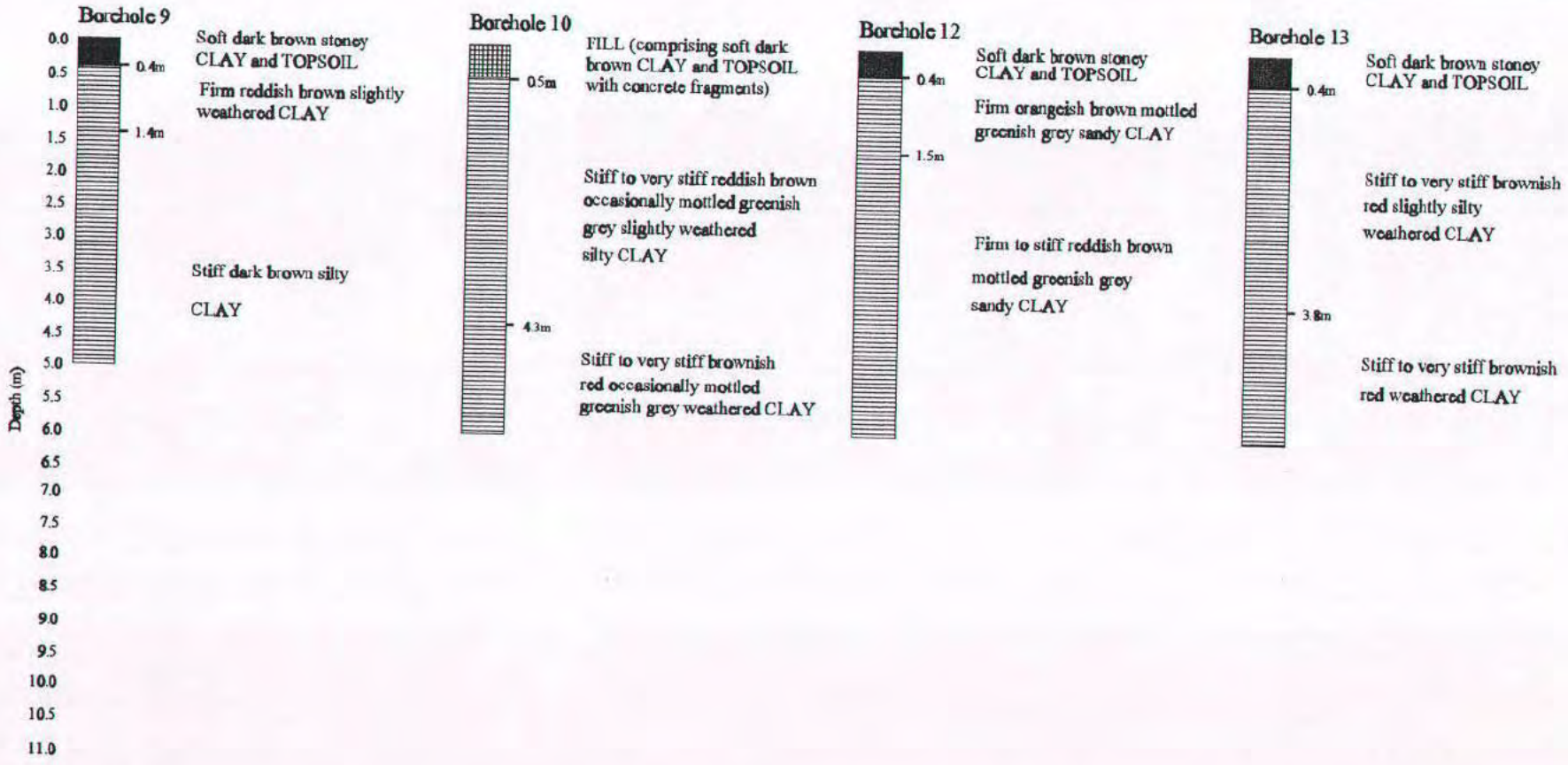
Borehole Logs

Boreholes 5 - 8

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/11



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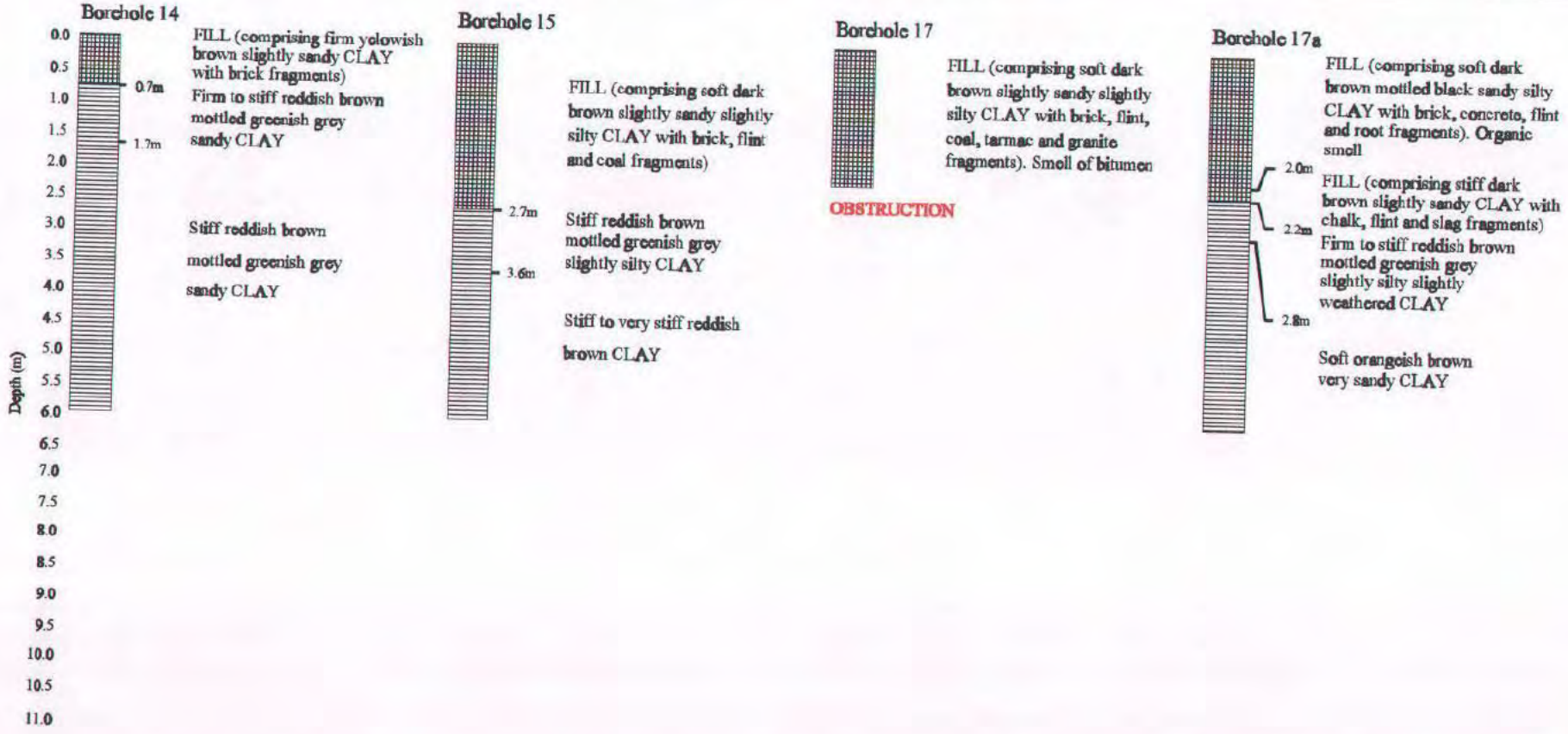
Borehole Logs

Boreholes 9, 10, 12 & 13

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/12



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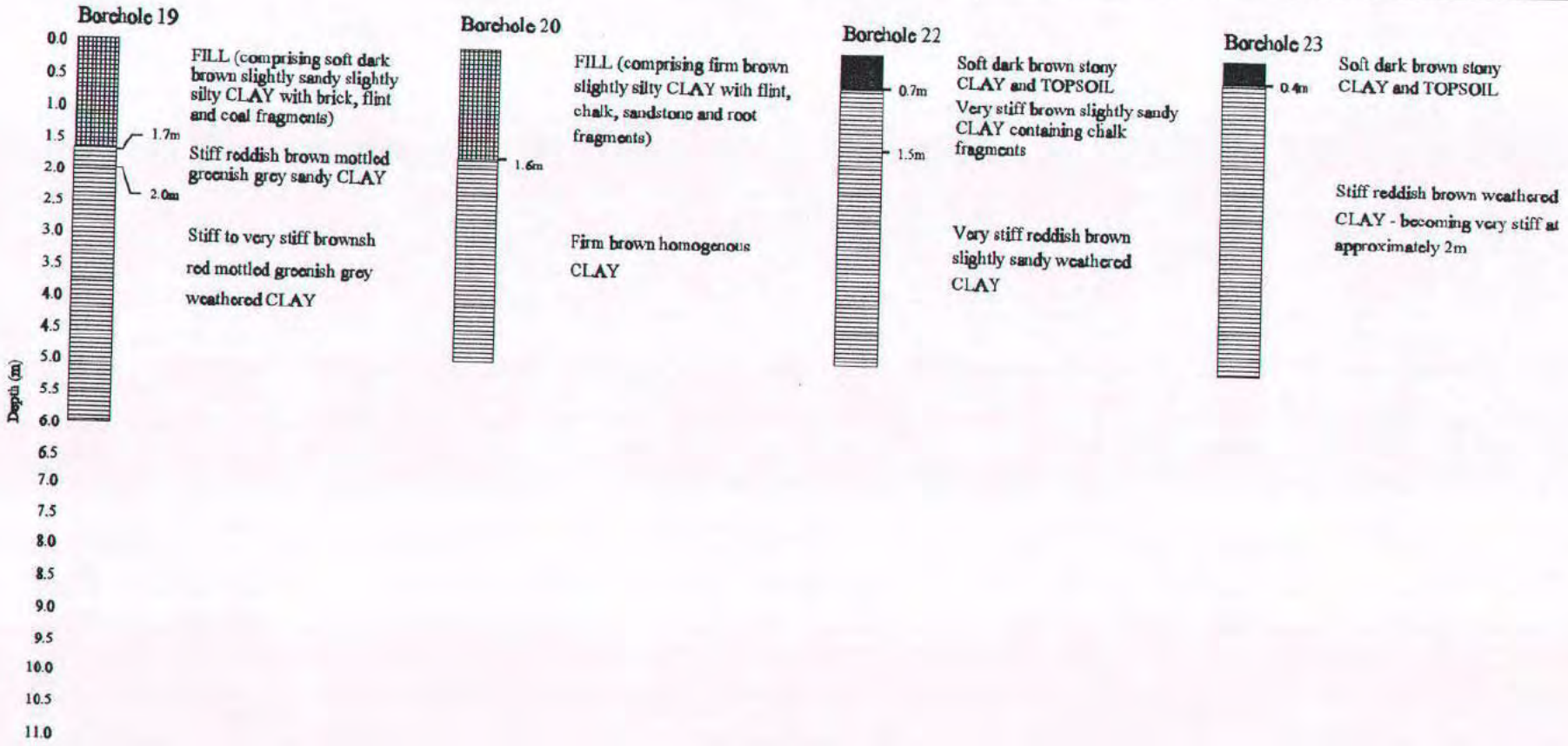
Borehole Logs

Boreholes 14, 15, 17 & 17a

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/13



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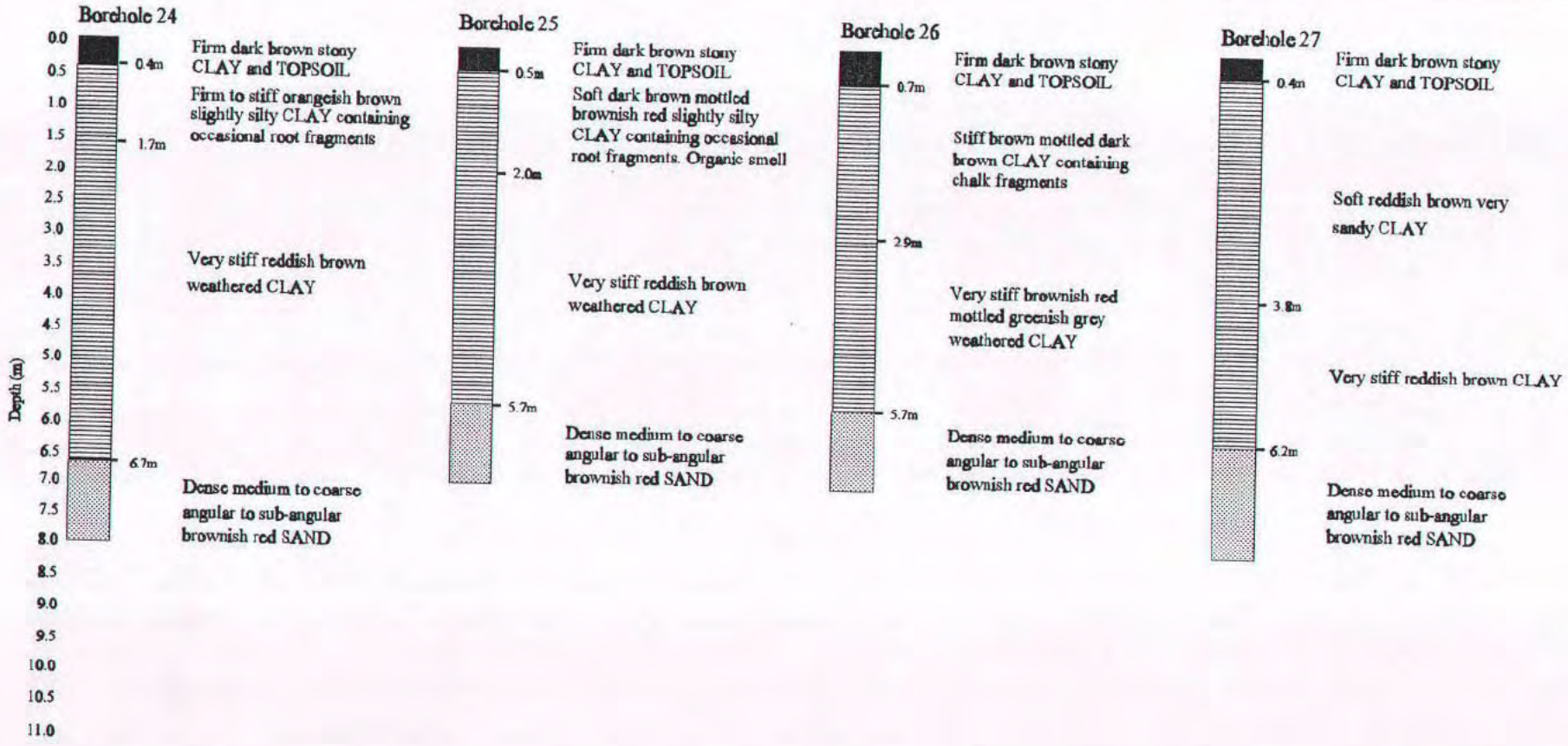
Borehole Logs

Boreholes 19, 20, 22 & 23

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	20/3/98	970635/14



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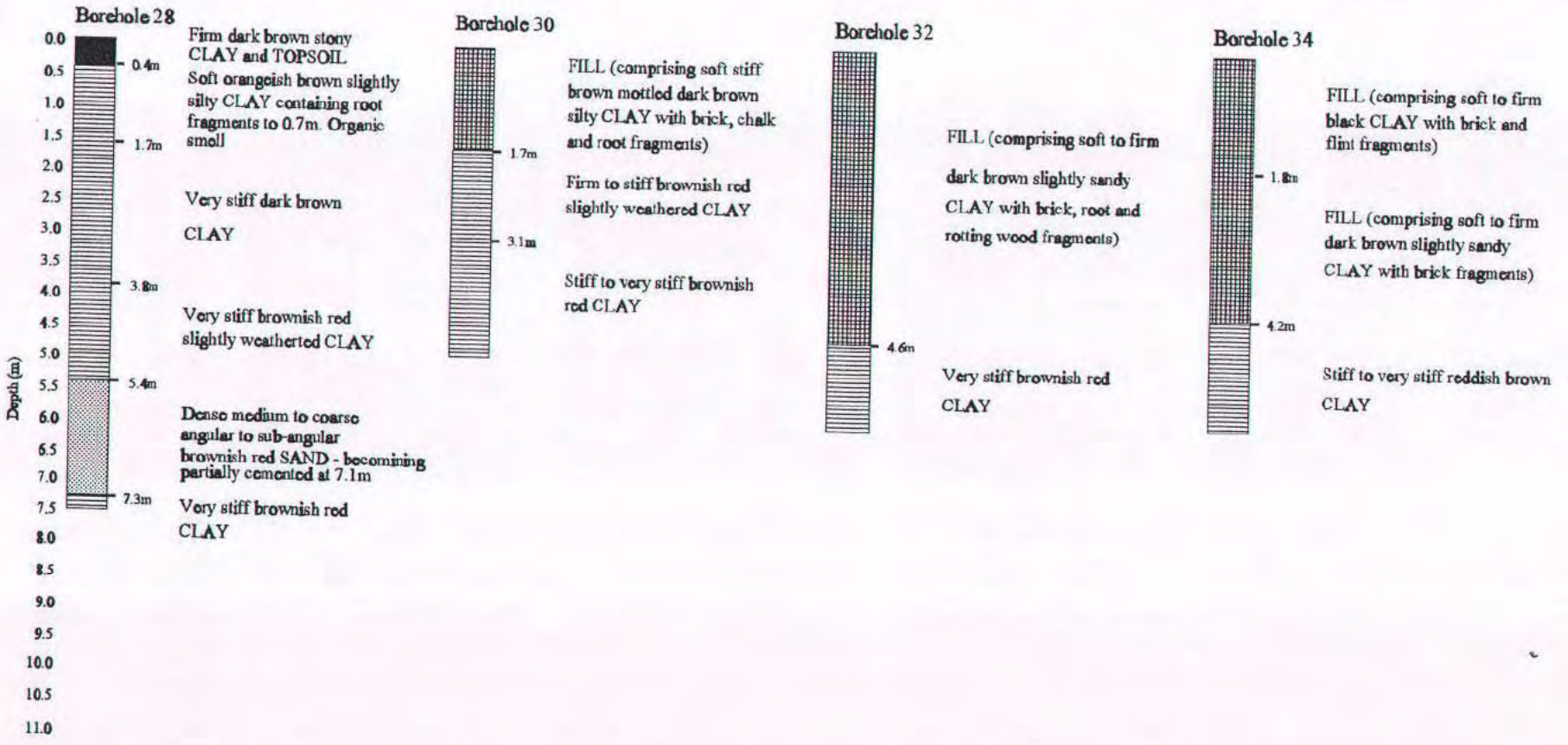
Borehole Logs

Boreholes 24 - 27

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/15



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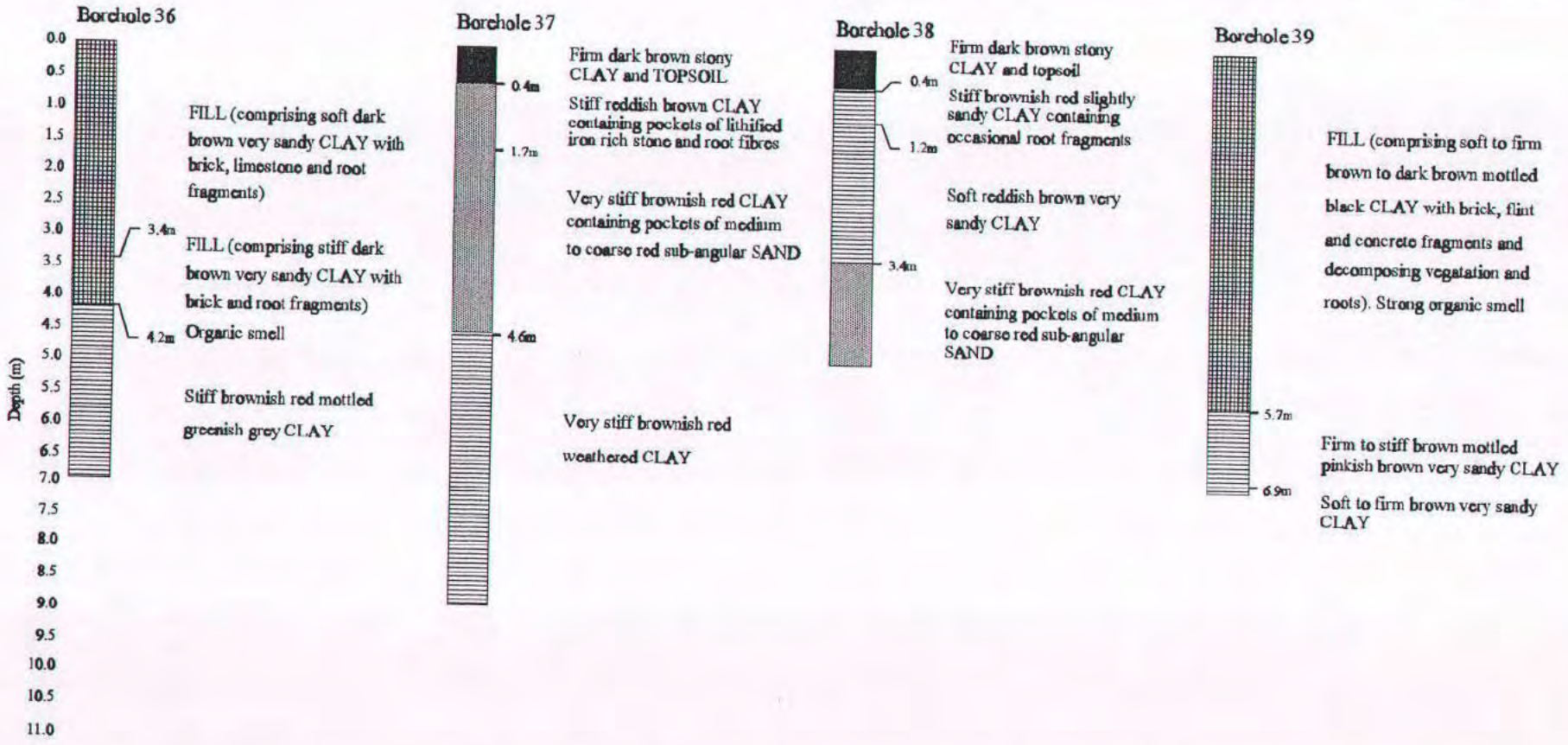
Borehole Logs

Boreholes 28, 30, 32 & 34

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/16



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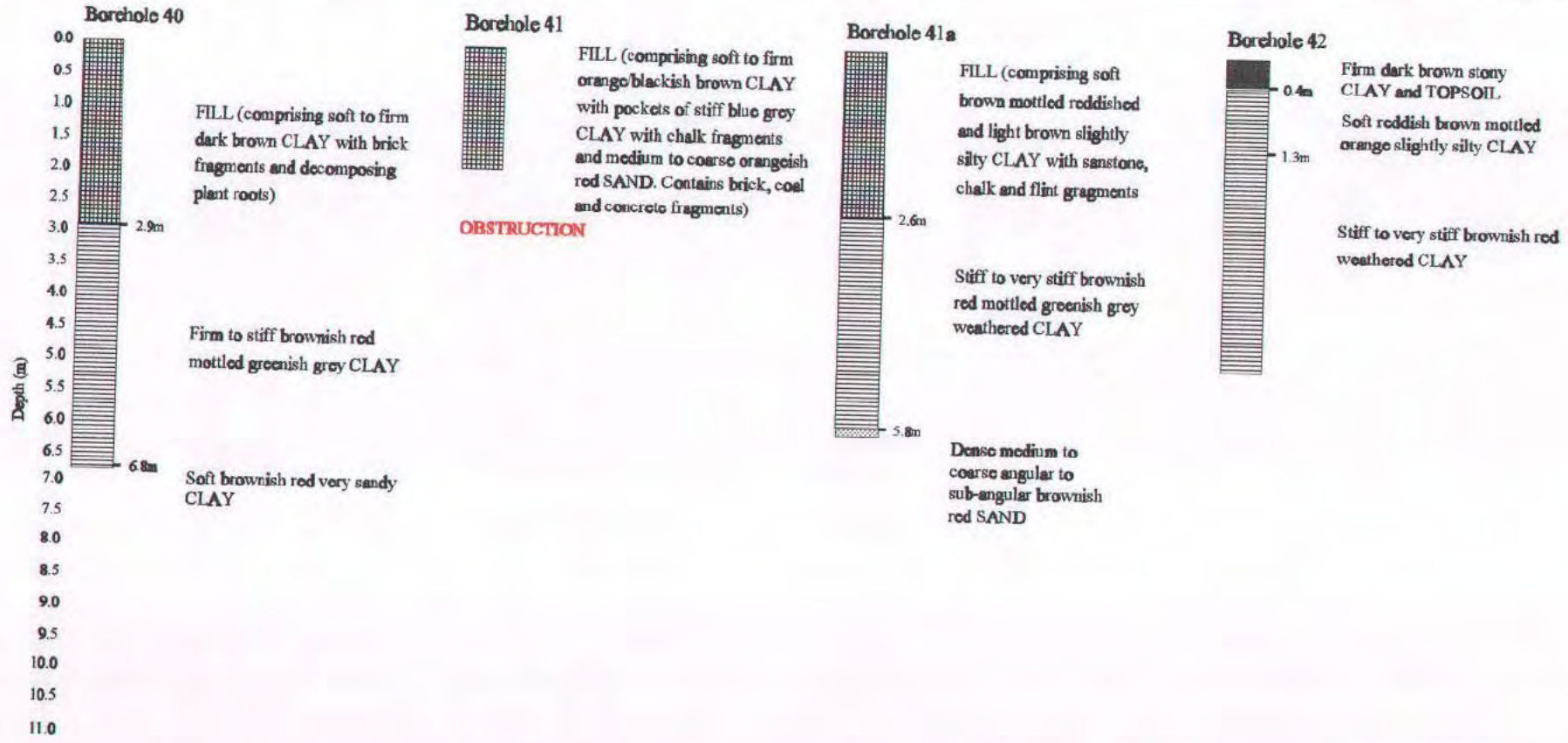
Borehole Logs

Boreholes 36 - 39

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/17



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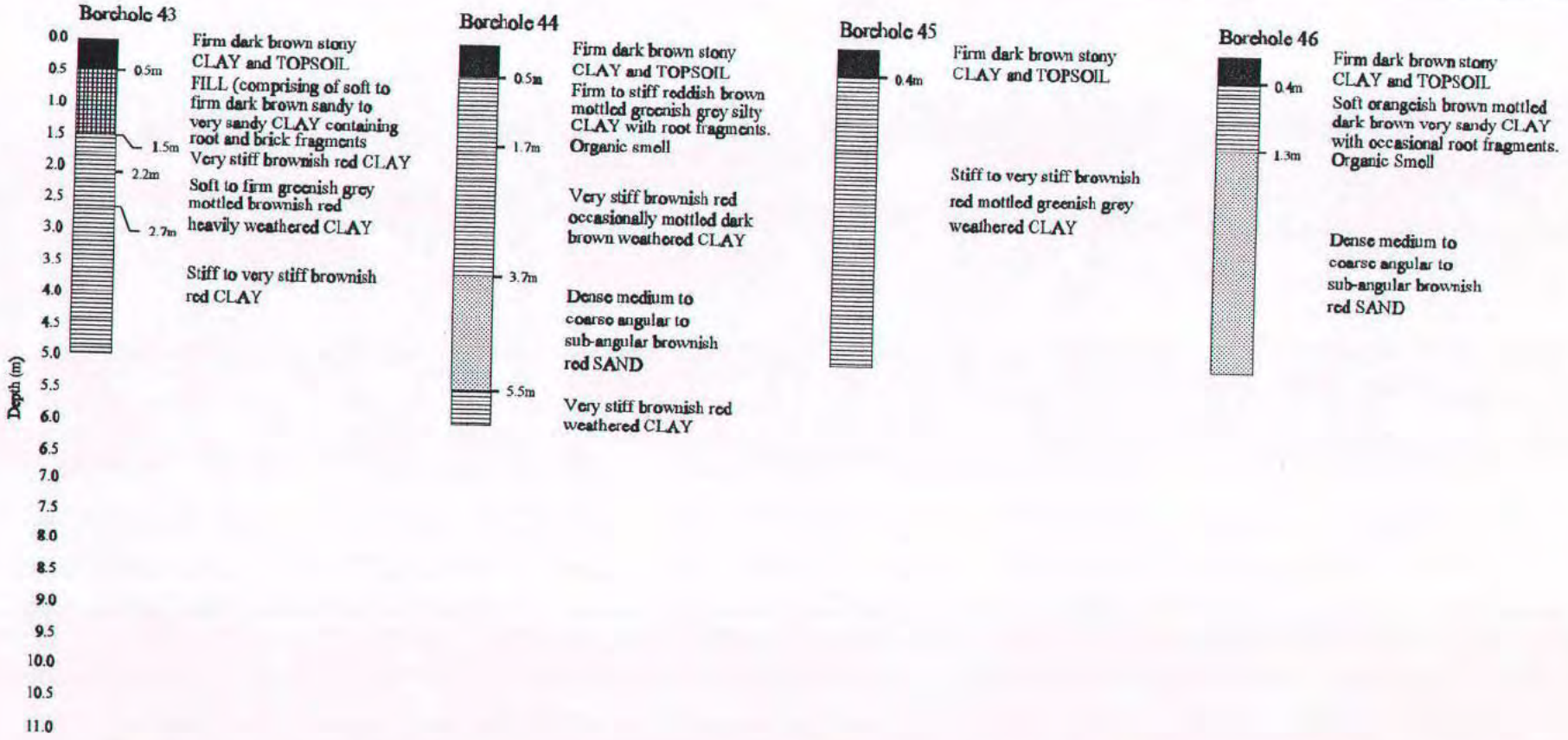
Borehole Logs

Boreholes 40 - 42

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/18



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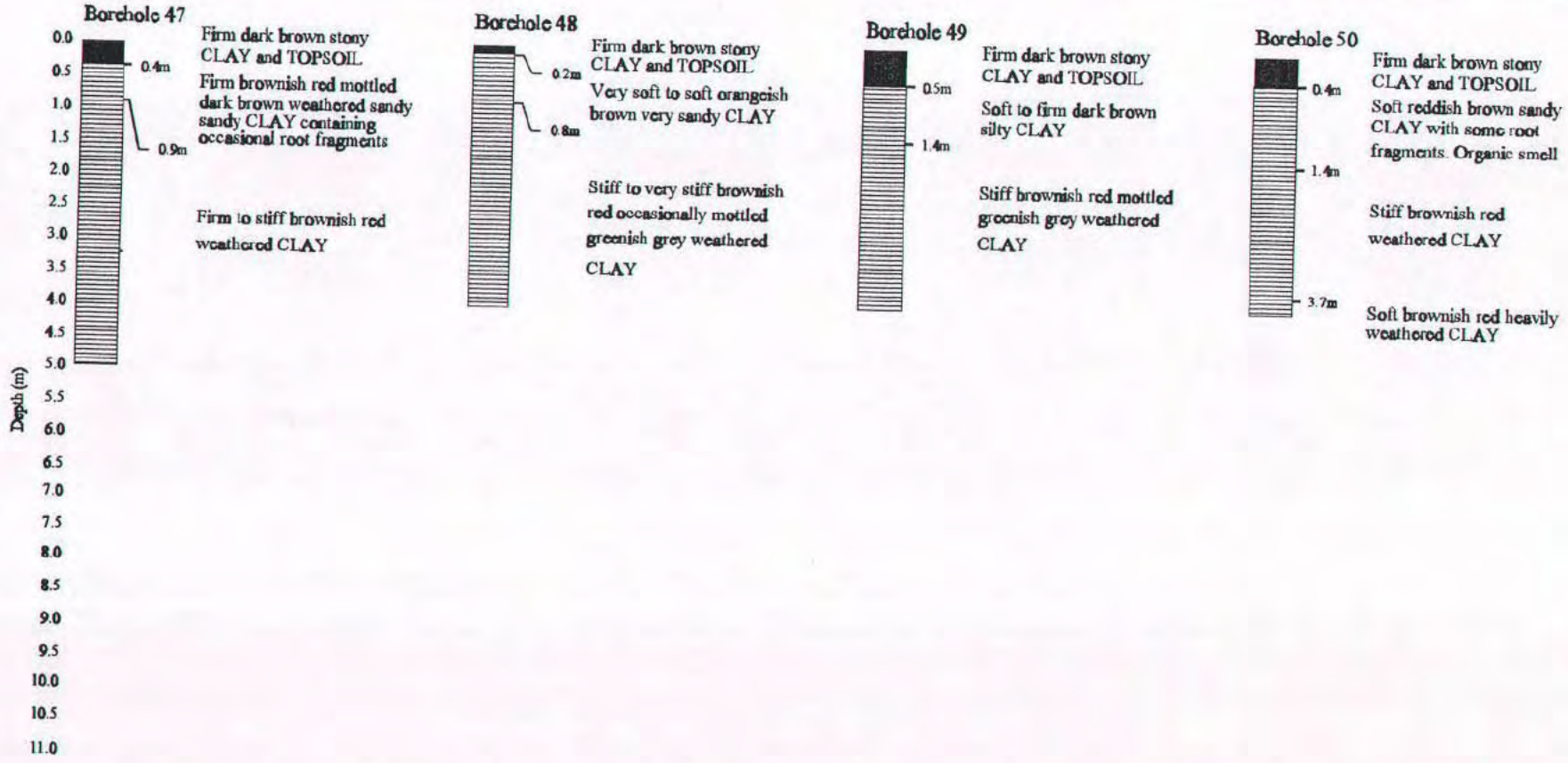
Borehole Logs

Boreholes 43 - 46

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/19



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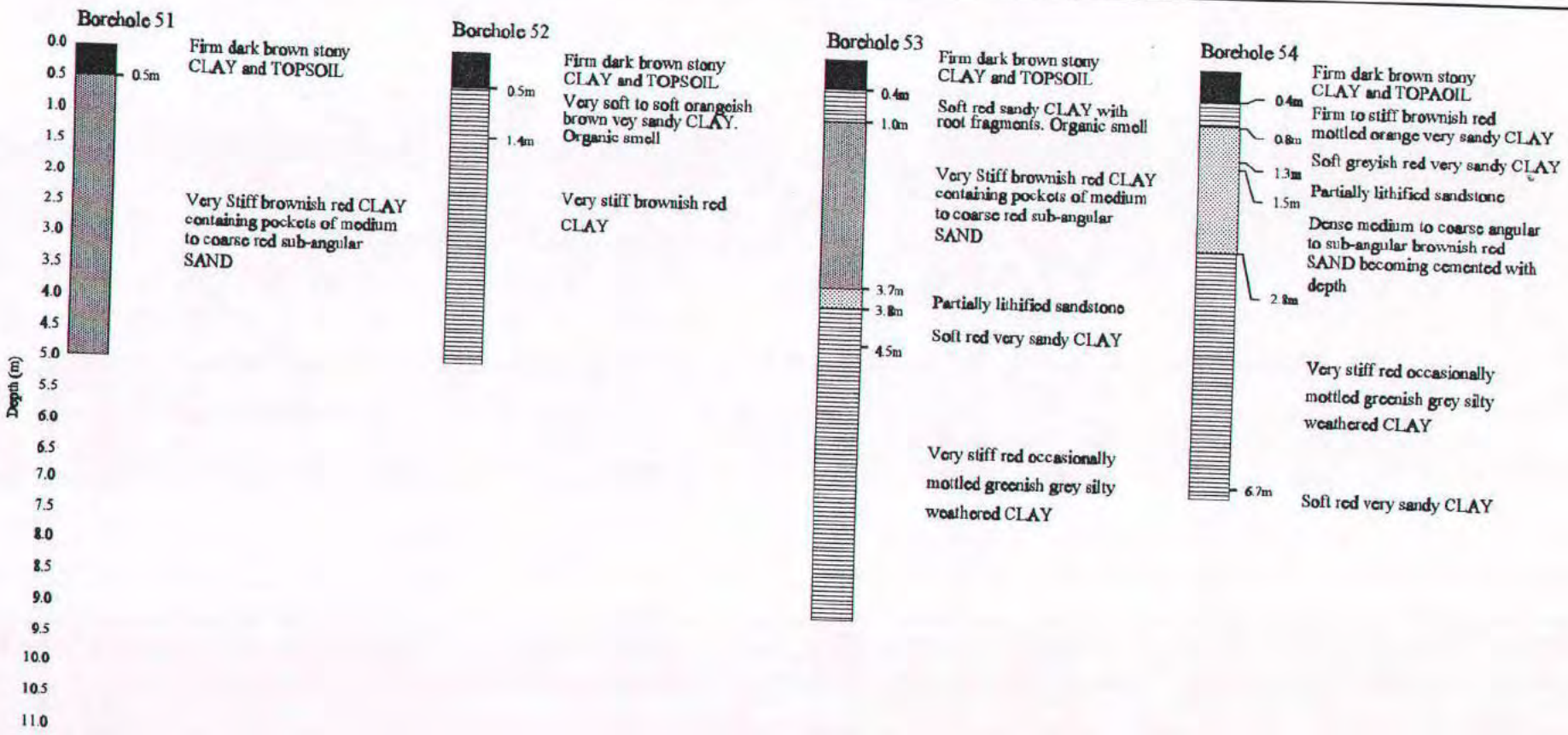
Borehole Logs

Boreholes 47 - 50

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/20



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Borehole Logs

Boreholes 51 - 54

SCALE	DRAWN/DATE	CHECKED/DATE	DRAWING NUMBER
NTS	JS 18/03/98	30/3/98	970635/21