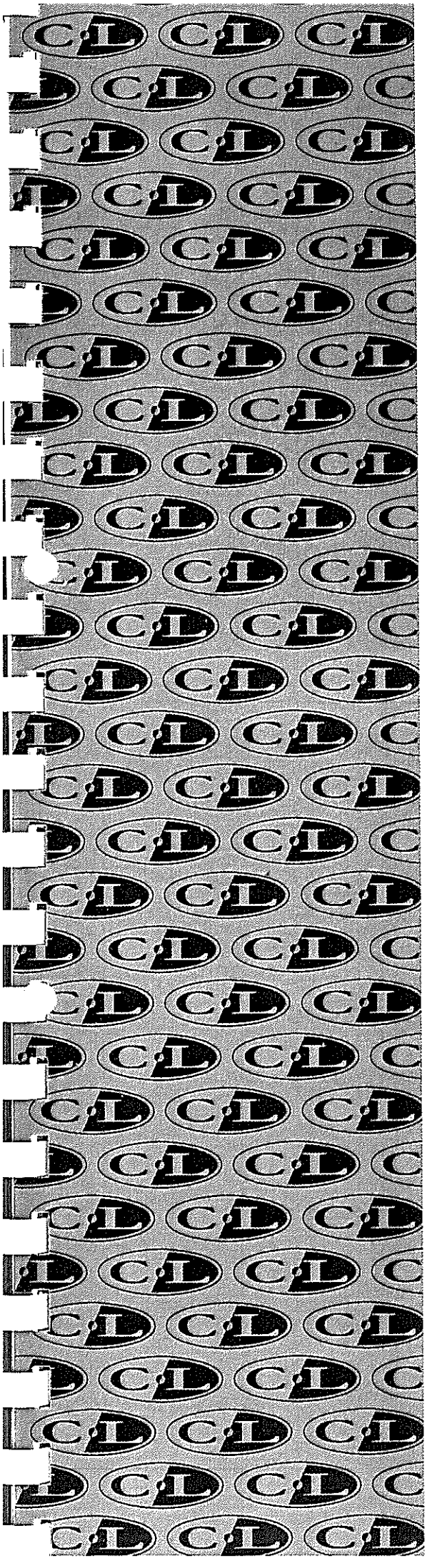


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REPORT

CONTAMINATION INVESTIGATION OF SITE FORMERLY OCCUPIED BY A PETROL FILLING STATION, LANGLEY COMMON ROAD, ARBORFIELD, BERKSHIRE

Carried out for : Staysure Tyres Limited and
National Westminster Bank Plc

July 2002 **Report No : 252095**

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Carried out for : Staysure Tyres Limited and
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CONTAMINATION INVESTIGATION OF SITE FORMERLY OCCUPIED BY A PETROL FILLING STATION, LANGLEY COMMON ROAD, ARBORFIELD, BERKSHIRE

1 INTRODUCTION

It is proposed to purchase the plot of land formerly occupied by a petrol filling station at 58-60 Langley Common Road, Arborfield, Berkshire.

In July 2002, CL Associates (CLA) were instructed by Staysure Tyres Ltd, to carry out an investigation of the site to determine the extent and level of contamination of the site and to provide recommendations for remediation.

The offer by CLA to undertake the investigation was contained in Estimate No A4494, dated 17 June 2002 and instructions to proceed with the work were given by Staysure Tyres in their fax dated 1 July 2002.

The scope of the investigation comprised the excavation of trial pits together with on site vapour monitoring and laboratory testing. This report presents the findings of the investigation, an assessment of contamination levels and location, and recommendations for remediation.

2 SITE DESCRIPTION

The site can be located by National Grid Reference SU 766 663 and is situated approximately 0.90 km south east of the village of Arborfield Cross, located 5 km south-west of Wokingham in Berkshire. The site lies approximately 50 m north of the Arborfield Garrison and the location is shown on the Key Plan, Figure 1.

The site is approximately 0.06 hectares in plan and is bounded to the south by Langley Common Road, to the west and north by the Staysure Tyres garage and forecourt and to the north-east by a police house and garden. The site slopes gently to the north west. Access to the site can be obtained from Langley Common Road through two gates.

The site is currently unoccupied apart from a portacabin set on bricks which remains in the northern part of the site from the site's previous use as a car dealership forecourt. The remainder of the site south of the portacabin comprises concrete or hardcore hardstanding overlain by shingle. It appears that a small amount of fly tipping has been carried out at the rear and eastern end of the portacabin, including a number of small engine parts with asbestos identification stickers. A number of small trees and shrubs were present along the eastern boundary of the site.

Details of the site layout are shown on the Site Plan, Figure 2.

3 PETROL STATION LAYOUT

A site plan provided by Staysure Tyres shows the original outline of the petrol station (see Figure 3). Three tanks appear to be present under the site. The tank trending approximately north south in the western corner of the site had a capacity of 2000 gallons and apparently contained diesel. A second triple compartment tank trending south-west north-east (parallel to the road) in the centre of the northern half of the site had a capacity of 3000 gallons and contained petrol. The third tank was present in the north of the site and had a capacity of 12,000 gallons. Interceptors, venting towers and tank fillers were also marked in the north of the site. However due to lack of evidence on site, it appears that the plan provided was a redevelopment plan and that the proposed modifications, including the 12,000 gallon tank and vent towers were not enacted. A concrete apron was located in the centre of the site which comprised the petrol station tanker stand and is presently visible under the shingle. No other evidence of the petrol station was observed on the ground surface except for a manhole cover to what is believed to be the infill pipe to the 2000 gallon tank in the north western corner of the site.

4 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

The 1: 50,000 scale geological map of the area (BGS: 2000) shows the site to be directly underlain by the London Clay Formation. The 1:100 000 Groundwater Vulnerability map for the area (NRA : 1995) classes the London Clay as a non-aquifer.

There are no significant water courses within the vicinity of the site. However a small pond is present 10 m south east of the site on the opposite side of Langley Common Road.

5 SITE HISTORY

5.1 General

A review of the available historic maps was undertaken to determine previous landuses at the site and the surrounds to assess the potential for contamination at the site. The following maps were reviewed and are attached as Appendix A.

Date	Scale	Reference
1911	1:2,500	County Series Berks Sheet XLVI.1
1932	1:10,560	County Series Berks Sheet XLVI.NW
1968	1:2500	Ordnance Survey Sheet SU7666
1981	1:15000	Ordnance Survey SU66/76

5.2 The Site

From the earliest available map of 1911 the site was undeveloped fields (greenfield land). By 1932 a small building was present in the vicinity of the site and is thought to be the adjacent police house. A garage was present on site by 1968. The forecourt and concrete tanker stand apron was marked with a single garage building to the north west. The site remained unchanged on the map of 1981.

5.3 The Surrounding Area

The first available map of 1911 showed the surrounding area to be surrounded by mainly undeveloped farm land. Langley Common Road was present in its current configuration and a building marked as Langley Common Farm was present opposite the site on the south side of Langley Common Road. A pond was marked adjacent to the farm. By 1932 two small buildings were present in the fields adjacent to the site and a well was present 70 m to the north-east. Langley Common Farm remained unchanged but to the south-east of this was a building marked as "Langley Sick Lines". The remainder of the surrounding area remained relatively undeveloped. By 1968 the surrounding area had become more developed with residential properties present along the north of Langley Common Road. The Arborfield Garrison had been constructed south of Langley Common Road and it appears that Langley Common Farm (now marked as Langley House) is part of the garrison. A mushroom farm was present north-west of the site, a police house to the east of the site and a building with a large fore-court was present to the west. Tanks are also present to the rear of Langley House, some 100 m east of the site and 120 m south. A building with a number of above

ground tanks to the rear was present 70 m to the west. The surrounding area remained relatively unchanged on the map of 1981.

5.4 Regulatory Authority Information

The Petroleum Officer from Wokingham District Council was contacted regarding the disused underground storage tanks present on the site. It was confirmed that the site was decommissioned in the early 1990's. Records show that the tanks were filled with water in October 1992. The Council did not have any records regarding the locations of the tanks.

6 FIELDWORK AND LABORATORY TESTING

6.1 Fieldwork

Six trial pits, TP1 to TP6, were excavated to depths ranging from 1.00 m to 2.50 m, using a wheeled backhoe excavator (JCB 3CX), on 11 July 2002. Concrete was broken out where necessary to facilitate access. The exploratory hole locations are marked on the Site Plan, Figure 2.

Trial pits TP2, TP3 and TP4 were excavated in the northern part of the site adjacent to the known locations of the tanks with the purpose of locating any hydrocarbon contamination which may have leaked from the tanks. The remainder of the trial pits were spread across the remainder of the site to ascertain if contamination had migrated from the tank area.

It was not possible to undertake trial pits adjacent to the petrol station interceptors due to the presence of the portacabin. Live services were also detected in the far north-western corner, therefore trial pits were not attempted in this area. Due to the thickness of the concrete tanker stand apron in the centre of the site trial pits were not attempted in this area.

During trial pit excavations a MiniRae Photoionisation Detector (PID) was utilised to monitor volatile organic compounds (VOC's) from the hydrocarbon contaminated soil present in the trial pits. Results from the PID survey are presented in Section 7.7.

The soils exposed in the trial pits were described by an engineering geologist using terms in accordance with BS 5930 (1999). Small disturbed samples of the soils were taken from the trial pits. Descriptions of the strata encountered, together with details of the samples taken, groundwater observations and pit stability are given in the Exploratory Hole Records,

Appendix B. Details of the symbols and terms used are presented in the Key to Exploratory Hole Records also in Appendix B.

On completion of the logging and sampling the trial pits were backfilled with arisings.

6.2 Laboratory Testing

On completion of the fieldwork, a programme of laboratory testing was scheduled by CLA to determine the chemical properties of the soils encountered. Where appropriate the test procedures used were in accordance with BS 1377 (1990).

Three samples of Made Ground, six samples of London Clay with visual and olfactory evidence of hydrocarbon contamination, and one sample of visually clean London Clay were analysed to determine the concentrations of total petroleum hydrocarbons (TPH), diesel range organics (DRO), gasoline range organics (GRO), benzene, toluene, ethyl-benzene, xylene (BTEX) and methyl tertiary butyl ether (MTBE) within them. The analysis was undertaken using the GC FID method.

A further six samples were analysed to determine their pH and the concentrations of arsenic, water-soluble boron, cadmium, total chromium, copper, lead, mercury, nickel, selenium, zinc, total cyanide, sulphide, total (acid-soluble) sulphate, elemental sulphur, phenols and polynuclear aromatic hydrocarbons within them. The results of the chemical testing are presented in Appendix C.

7 GROUND AND GROUNDWATER CONDITIONS

7.1 Strata Encountered

The trial pits encountered Made Ground overlying London Clay.

Concrete slab or hardcore hardstanding was encountered in all trial pits to depths ranging from 0.10 to 0.40 m. Made Ground was encountered in all trial pits below the slab or hardstanding. The London Clay was encountered in all exploratory locations, beneath the Made Ground at depths ranging from 0.20 to 0.60 m. The base of the London Clay was not proved, although it was present at the base of the deepest pit at 2.50 m below the surface.

7.2 Concrete and Hardcore Hardstanding

A concrete slab was encountered in Trial Pits TP1 and TP3. The concrete was reinforced and was 0.15 m thick in TP1 and 0.40 m thick in TP3. In the remainder of the trial pits the ground surface comprised compacted pink purple angular crushed rock coarse gravel with a sand matrix (Type 1 material). This material occasionally contained concrete, brick and wire material. No visual or olfactory evidence of contamination was observed.

7.3 Made Ground

Made Ground was encountered in all trial pits and comprised a variety of materials. In Trial Pits TP2, TP4 and TP5 the Made Ground comprised dark grey sandy clay (and in trial pit TP4 clayey sand) with various inclusions including bricks, wood, wire, plastic bags and gravel. The Made Ground was present at depths of 0.45, 0.15 and 0.20 m respectively.

A layer of crushed and whole brick and a layer of black ash with wood, tar bonded gravel and brick was present in Trial Pit TP2 at depths of 0.10 and 0.20 m respectively, the latter extending to a depth of 0.45 m.

A layer of yellow sand with brick and pockets of clay was present in Trial Pit TP1 from 0.15 to 0.35 m depth.

A faint hydrocarbon odour and dark grey staining was detected in the dark grey clayey sand in TP4 at 0.15 m and from dark grey very sandy clay in TP2 at 0.45 m.

7.4 London Clay

London Clay was encountered in all trial pits beneath the Made Ground. The base of the layer was not penetrated at 2.50 m depth; the maximum depth of investigation. The stratum generally consists of a firm grey orange mottled sandy clay.

In Trial Pit TP2 a blue grey very soft layer with a slight organic odour was encountered at 1.00 m.

In Trial Pits TP1, TP2, TP3, TP4 and TP6 grey staining was noted in the clay. This extended to a maximum depth of 1.60 m in Trial Pit TP6. Brown smearing was encountered in Trial Pit TP2 at 0.50 to 0.80 m.

A diesel odour of varying strengths was encountered in Trial Pits TP1, TP2, TP4 and TP6. The strongest odour was present in Trial Pit TP6. An organic odour was encountered in TP5 at 0.20 to 0.60m however this was thought to originate from the moderate quantities of rotting wood in the clay.

7.5 Groundwater

Groundwater was encountered in Trial Pit TP2 as a slight seepage from a gravelly layer at 0.40 m and in Trial Pit TP6 as a slight seepage in the base of the trial pit at 2.10 m. Groundwater was not encountered in any of the other trial pits and it is possible the water observed was from perched water trapped in gravel pockets.

7.6 Underground Features

The old tanks or tank surrounds were not encountered in the trial pits during the investigation. The site plan shows two tanks present under the site, one trending approximately north south in the western part of the site, one trending south-west north-east (parallel to the road) in the centre of the northern half of the site. To locate any evidence of the below ground tanks the surface layer of gravel was scraped off. Only one manhole cover was found which protected the single inlet valve into the smaller tank. The valve was marked with a 'Four Star' tag. No evidence of the other larger tanks, interceptors, vent towers or filler pipes were located. However, a cluster of approximately 6 metal pipes were found in Trial Pit TP5 at a depth of 0.60 m. It is thought these were pipes linking one of the tanks and the vent pipes which would have been situated on the eastern site boundary. A number of disused services including drains filled with clay, cables and water pipes were encountered in many of the trial pits, therefore it can be assumed that no sub-surface features of the petrol station were removed when it was decommissioned.

7.7 Soil Vapour Survey

During the trial pit excavations CL Associates undertook a soil vapour survey over the site using a MiniRae Photoionisation Detector (PID). This instrument detects most gasoline derived volatile organic compounds (VOC), but does not identify individual compounds. It provides a reading of the concentration of the VOC in parts per million (ppm) on the assumption that the VOC is the calibration gas, isobutylene. The atmosphere within each trial pit was tested as the works progressed to monitor the possible presence of vapour build up

within the trial pits. Headspace testing was carried out on samples taken from the disturbed spoil heap. The results of the survey are presented in the table below.

Table 1 Results of Soil Vapour Survey Results

Trial Pit	Location of Test	Evidence of Contamination	Maximum PID Reading (ppm)
TP1	Within Pit	Diesel odour and staining	5
TP1	Headspace from 0 to 1.0 m	Diesel odour and staining	16
TP2	Within Pit to 1.00 m	Slight hydrocarbon odour and staining	<0.1
TP3	Within Pit	Grey staining	<0.1
TP4	Within Pit	Very slight hydrocarbon odour and staining	<0.1
TP5	Within Pit	None	<0.1
TP6	Within Pit at 1.0 m	Moderate hydrocarbon odour and grey staining	<0.1
TP6	Headspace samples from 0 to 1.0 m.	Moderate hydrocarbon odour and grey staining	6
TP6	Headspace samples from 1.00 m	Strong hydrocarbon odour and grey staining	103

8 PROPOSED DEVELOPMENT

There is no development proposed for the site at the present time. However, possible future development could feasibly include residential or commercial properties. The purpose of this investigation is to assess the condition of the site prior to purchase.

9 CONTAMINATION ASSESSMENT

In line with current legislation, and with reference to the new regime for contaminated land set out in Part IIA of the Environmental Protection Act (1990), the ground should be assessed using a risk based approach. Under the Environmental Protection Act (1990), "contaminated land" is defined as "any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on, or under land, that :

a) significant harm is being caused or there is a significant possibility of harm being caused; or

b) pollution of controlled waters is being, or is likely to be caused..."

"Significant harm" is defined in the guidance on risk based criteria and for this to occur there must be the result of "pollutant linkage", that is a link from which material from an identified contamination source can migrate via a pathway to a sensitive receptor.

In order to assess whether there is a source of contamination samples of soil from the site were analysed. Four of these were taken from the Made Ground and eight were taken from the London Clay. Six of these samples were analysed for the following common contaminants : arsenic, water soluble boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, total cyanide, sulphate, sulphide, sulphur, polynuclear aromatic hydrocarbons (PAH) and phenols. Ten of these samples were analysed for total petroleum hydrocarbons (TPH), diesel range organics (DRO), gasoline range organics (GRO), benzene, toluene, ethyl-benzene, xylene (BTEX) and the petrol additive MTBE by GC FID.

The site is not considered to be located within a sensitive area with regard to groundwater as it is underlain by impermeable London Clay. The main potential receptors which may be relevant for the site are as follows:

- site workers during any future landscaping or redevelopment;
- future site occupants

The main potential pathways for any contamination would be by dermal contact, inhalation and ingestion of soil particles, ingestion of contaminated vegetables and inhalation of organic vapours.

The proposed end use of the site is not known. However, as a possible future use of the land is housing, for the purpose of this report this end use will be used. The most critical receptor in this case is a site worker and future user, and in particular a young child who could come into regular contact with the soil and eat home-grown vegetables.

Guidelines issued by the Department for Environment, Food and Rural Affairs (DEFRA, 2002) and by the Government's interdepartmental committee on the redevelopment of contaminated land (ICRCL, 1987) address the risks posed by soil contamination. DEFRA derive Soil Guideline Values (SGV) as generic assessment criteria for assessing the risks to human health from chronic exposure to soil contaminated with arsenic, selenium, lead, cadmium, chromium, nickel and mercury. SGV represent "intervention values" which act as indicators to an assessor that soil concentrations above this level might present an

unacceptable risk to the health of site-users and that further investigation and/or remediation is required.

The DEFRA Soil Guideline Values have been developed using the CLEA risk-based computer model using many critical assumptions about possible exposure to soil contamination to develop conceptual exposure models for four different land uses. These are :

- residential with gardens in which vegetables are grown
- residential with gardens but without vegetable uptake
- allotments
- commercial/industrial use where there are open areas which are not hard surfaced.

They do not perceive a hazard to end-users from a fully hard-surfaced development.

In the risk assessment to derive the SGV, DEFRA considers that all contaminants within the uppermost 1.00 m (based on final ground surface) are available. The current SGV are very conservative as they do not allow for variations in soil-type or pH (apart from cadmium) or the bio-availability of the contaminants. Generally the SGV for a metal is based on the most toxic and bio-available compound. SGV may be amended in the light of further research, but this report uses the current values.

DEFRA consider that in normal circumstances there should not be a pathway to the critical receptor for contaminants located more that 1.00 m below final ground level, although the validity of this assumption should be considered for each particular case.

DEFRA use a figure equal to the 95 percentile of the results of chemical analysis for most metals and the geometric mean of the results of analysis for lead in the risk assessment. If one of these figures for a layer or soil within a metre of the surface exceeds an SGV there can potentially be a significant risk to human health. However, this does not necessarily imply that there is an actual risk to health, and assessment of site-specific circumstances may be necessary.

The ICRCL guidelines define "threshold trigger" and "action trigger" concentrations for a number of the common contaminants. At concentrations below the threshold trigger concentration, there is no significant risk that a hazard will occur. The action trigger concentration is the value above which a contaminant should generally be regarded as undesirable and possibly unacceptable and some form of remedial action may be necessary.

Where the levels of contaminants are between the threshold and action trigger concentrations, consideration should be given to whether further investigation is justified and whether or not specific remedial action is required.

The ICRCL threshold trigger concentrations for metal ions have been superseded by the DEFRA values except for boron, copper and zinc which are considered to be phytotoxic (detrimental to plant growth) but not a hazard to human health at the levels likely to be encountered. The ICRCL threshold trigger concentrations for these metal ions are those for sandy acidic ground in which plants are to be grown and are only rough indicators of the degree of contamination, no action trigger concentrations are available. The remaining contaminants considered by the ICRCL are those commonly found in gasworks waste, for which trigger concentrations have been determined using a risk-based approach (Wilson and Stevens (1981), ERL, (1988)). Similarly to the DEFRA values, the assigned ICRCL trigger concentrations vary depending upon the proposed use of the land, with the trigger concentrations for domestic gardens (which take into account child ingestion of soil and contaminated vegetables) being lower than for parks and landscaped areas, with industrial and commercial development areas having the highest trigger concentrations. The guidance on statistical treatment of chemical analysis data for the ICRCL is not clear, ICRCL (1987) appears to suggest that the highest value should be taken, whilst ERL (1988), which provides the scientific basis for the ICRCL document, states that one should use the arithmetic mean of the highest 20% of the results.

Currently UK guidelines do not cover hydrocarbon contamination other than phenols and PAH. Concentrations of TPH, benzene, toluene, ethylbenzene and xylenes have therefore been compared with reference and intervention from Dutch guidelines (MoHPC, 1994). The reference value is that which would be typical of a natural soil and the intervention level is that above which clean up of the ground may be necessary.

The measured concentrations of the contaminants for the samples of Made Ground are summarised in Tables 3 and 4, together with the SGV for residential with plant uptake (DEFRA, 2002) and trigger values for domestic gardens and soil in which plants are to be grown (ICRCL, 1987).

Table 2 Summary of Results for Potentially Hazardous Metals

Contaminant	Units	Number of Analyses	Measured				Number Exceeding SGV	Soil Guideline Value**
			Min	Max	Geomean	95 percentile		
Arsenic	mg/kg	6	5	11	8.4	10.2	0	20
Cadmium	mg/kg	6	<1	<1	1.0	1.0	0	8*
Chromium (total)	mg/kg	6	16	48	27.0	37.9	0	130+
Lead	mg/kg	6	24	1010	62.6	478.1	1	450
Mercury	mg/kg	6	<0.5	<0.5	0.5	0.5	0	8
Nickel	mg/kg	6	8	35	14.0	22.6	0	50
Selenium	mg/kg	6	<0.5	0.63	0.5	0.6	0	35

Notes:

** SGV for end-use of residential with plant uptake
* SGV for cadmium corrected for pH
+ based on all chromium being hexavalent

Table 3 Summary of Results for Phytotoxic Metals, Radicals and Hydrocarbons

Contaminant	Units	Number of Analyses	Measured		Threshold Trigger Conc.	Number Exceeding Threshold Trigger Conc.	Action Trigger Conc.
			Min	Max			
Boron (water-soluble)	mg/kg	6	<0.5	0.9	3	0	*
Copper	mg/kg	6	9	19	130	0	*
Zinc	mg/kg	6	50	76	300	0	*
Cyanide (Total)	mg/kg	6	<1	<1	250	0	1000
Sulphate (acid-soluble)	mg/kg	6	62	406	2400	0	12000
Elemental Sulphur	mg/kg	6	<20	237	5000	0	20000
Sulphide	mg/kg	6	<5	142	250	0	1000
PAH	mg/kg	6	13	1650	50	3	500
Phenols (total)	mg/kg	6	<0.5	0.8	5	0	200
pH		6	7.3	9.2	<5	0	<3
Benzene	ug/kg	10		<10	50	0	1000‡
Toluene	ug/kg	10		<10	50	0	130000‡
Ethyl Benzene	ug/kg	10		<10	50	0	50000‡
Total Xylene	ug/kg	10		<20	50	0	25000‡
TPH	mg/kg	10	<10	232	50	5	5000†
GRO	mg/kg	10	<0.2	6.6	-	-	-
DRO	mg/kg	10	<10	217	-	-	-
MTBE	ug/kg	10	<20		-	-	-

Notes:

** Trigger concentrations for domestic gardens or acidic sandy soils in which plants are to be grown
* Not specified by ICRCL
† Dutch Guidelines value for mineral oils
‡ Based on Dutch Guidelines
TPH Total Petroleum Hydrocarbons
GRO Gasoline (Petrol) Range Organics
DRO Diesel Range Organics

All of the tested samples were in the neutral to slightly alkaline range with one alkaline sample of pH 9.2.

The results of the analysis reveal individual samples in which a concentration of lead exceeded their SGV and PAH exceed the threshold and action trigger concentrations. A

number of hydrocarbons exceeded the Dutch Target concentration of 50 mg/kg for mineral oils, although remain well below the intervention value.

The concentration of lead in one sample was above the SGV of 450 mg/kg for the proposed end-use. In this sample of dark grey clayey sand made ground from 0.20 m depth in Trial Pit TP4, the level of lead was 1010 mg/kg, over twice the SGV. The value for lead may be derived from ash or clinker in the Made Ground or exhaust emissions. In view of the high level of lead found in the sample from 0.20 m in TP4, the sample was re-tested five times to verify the result. The results of the re-test can be seen in the table below.

Table 4 Lead Re-Test Results

Initial Test	1010 mg/kg
Re-test 1	152 mg/kg
Re-test 2	591 mg/kg
Re-test 3	108 mg/kg
Re-test 4	107 mg/kg
Re-test 5	110 mg/kg

It is assumed from this scatter of results that there are small fragments of lead as its compounds disseminated through the sample. In order to assess the potential hazard, in line with DEFRA guidance, the geomean of the six Trial Pit TP4 sub-samples was determined. The geometric mean for this one sample was 221 mg/kg, substantially below the SGU of 450 mg/kg. If the single highest determined value of 1010 mg/kg is put into the original data set, the geomean of the six results is 62.6 mg/kg, well below the SGV of 450 mg/kg for residential use.

The concentration of PAH in two samples of Made Ground in TP1 at 0.30 m and TP4 at 0.20 m, exceeded the threshold trigger concentration of 50 mg/kg, but were well below the action trigger concentration. However, the concentration of PAH in one sample of black ash with tar-bonded gravel and wood, from 0.30m in Trial Pit TP2, exceeded the action trigger concentration of 500 mg/kg. The high value of 1650 mg/kg is likely to have been derived from the thick tar material in this layer which is easily identifiable in the soil.

Hydrocarbons were detected at slightly elevated concentrations in the following soil samples:

- Total Petroleum Hydrocarbons (TPH) were detected in TP6 at 0.40-0.50 and 1.40 m at a concentration of 139 and 232 mg/kg respectively. The hydrocarbons appeared to be

mainly diesel, as the concentrations of Diesel Range Organics (DRO) from these samples were 124 and 217 mg/kg respectively. The samples from this trial pit contained a very small gasoline (GRO) element of 6.6 and 1.4 mg/kg respectively.

- TPH was detected in TP1 at 1.1 m at a concentration of 171 mg/kg. Again, the hydrocarbon comprised mainly diesel, with a DRO concentration of 150 mg/kg against a GRO concentration of 2.3 mg/kg.

In the remainder of the samples analysed, the levels of hydrocarbons as TPH generally ranged from less than <10 mg/kg (TP2,3 and 4 at 1.8, 0.9 and 0.8 respectively) to 85 mg/kg (TP4 at 0.2 m). All hydrocarbons tested had concentrations below the Dutch intervention limit of 5000 mg/kg for mineral oil.

BTEX and MTBE concentrations were below the detection limits in all cases.

10 RECOMMENDATIONS FOR REMEDIATION

10.1 Soils

It is evident from the site investigation that some soil contamination by diesel fuel has occurred in the past from spillage or from leakage from the underground storage tanks, fuel lines, dispensers or interceptor. The site plan shows the tanks to be present in the north-west of the site, however the more elevated hydrocarbon contamination, present in Trial Pits TP1 and TP6 was present in the south-east of the site, near to the boundary with Langley Common Road. The trial pits undertaken adjacent to the probable location of the tanks, especially the diesel tank, had the lowest hydrocarbon concentrations. This suggests that the contamination source was related to the dispenser islands; either due to leaking underground fuel lines or accidental spillage on the forecourt during refuelling. The lower levels of hydrocarbons in the north-west of the site suggest only minor leaks from the tanks, however any contamination arising from spillages during filling, overfilling of the tanks or leaks from the interceptors may not have been observed as the area was obscured by the portacabin.

It is unlikely that groundwater will be impacted by the hydrocarbon contamination on site given that the site is directly underlain by the impermeable London Clay which will give a good level of protection. The clay will also ensure that the hydrocarbons have not migrated a significant distance from the source. However, evidence of hydrocarbon contamination was

present to a maximum depth of 1.60 m in the London Clay showing some infiltration has occurred.

The proposed end-use of the site has not been defined. If the land was to be used for residential properties and gardens it would be recommended that the hydrocarbon contaminated soil be excavated and replaced with clean topsoil in the garden areas of the site. The contaminated clay should be removed to the normal gardening depth of 600 mm.

If the proposed end-use of the site is left as hardstanding or commercial property without crop growth, remediation of the site will not be necessary generally, although the possibility of hydrocarbon attack on buried plastics should be considered.

If housing was built on the site, it would be expected that materials would be excavated from the site. The general bulk of the hydrocarbon-contaminated soil would not have to be removed as Special Waste, as none of the hydrocarbon concentrations exceed the threshold of 1000 mg/kg, however, such materials will be deemed contaminated. It is possible that the soil around TP2 at 0.30 m will have to be removed as Special Waste as PAH concentrations exceeded the threshold of 1000 mg/kg. This material is easily recognisable and can be separated from the bulk of the soil. However, additional analysis of the sample to quantify the percentage of carcinogens in the tar will probably enable it to be downgraded to a hazardous waste classification.

It would be prudent to remove the tanks, fuel lines and interceptors prior to redevelopment. It is not known if the tanks are double or single skinned, but the latter is more likely. If the tanks are single skinned they would normally be encased in 150 mm of concrete. Double skinned tanks should sit on a concrete slab and be surrounded by granular material. Any liquid held within the tanks or lines should be removed from site by tanker for specialist disposal. It should not be discharged to sewer or surface water drainage. It is recommended that a specialist contractor be employed to remove the tanks. It is possible that during the removal of the tanks and other underground services, areas of more severely contaminated soil are discovered. In this eventuality, the heavily contaminated soil should be removed. The excavated material should be tested to determine the waste classification.

10.2 Construction Workers

Hydrocarbon contamination of the ground and groundwater at the site should be considered to pose a risk to construction personnel through dermal contact, ingestion, inhalation and

possible explosion. Dermal contact with hydrocarbons should be avoided by the use of gloves and overalls. Vapour from light hydrocarbons such as benzene can be hazardous in confined spaces. Although the test results did not reveal any benzene, ethyl benzene, toluene on xylene, their presence cannot be ruled out entirely. Hence, entry to confined spaces should be avoided wherever possible. Where entry is essential forced ventilation should be provided. In no cases should a naked flame be allowed near any confined areas such as old tanks due to the risk of explosion.

Smoking should be banned in the working areas to reduce the inhalation and explosion hazard and prevent inadvertent ingestion of contaminated particles. Eating and drinking in the working areas should also be prohibited.

for CL Associates

Engineer

Managing Associate

KSG/KFH

REFERENCES

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BGS : 2000 : England and Wales Sheet 268, Reading. 1:50000 series Solid and Drift Geology. British Geological Survey, Keyworth, Notts.

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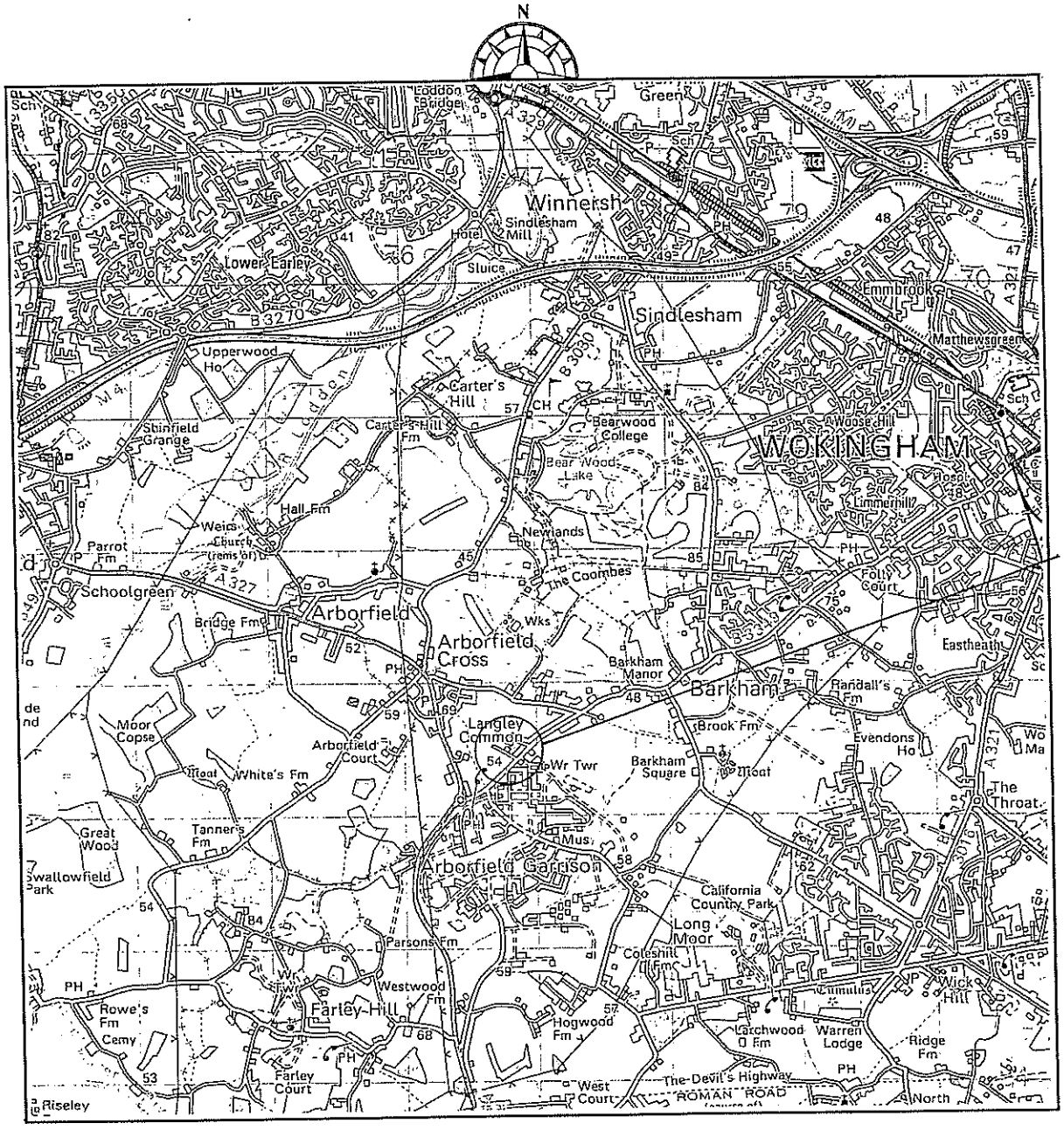
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NRA : 1994 : Sheet 39 : Groundwater Vulnerability West London, 1:100 000 scale National Rivers Authority Policy and Practice for the Protection of Groundwater. HMSO, London.

Wilson D C and C Stevens : 1981 : Problems arising from the redevelopment of gas works and similar sites. AERE Report R10366, HMSO, London

FIGURES

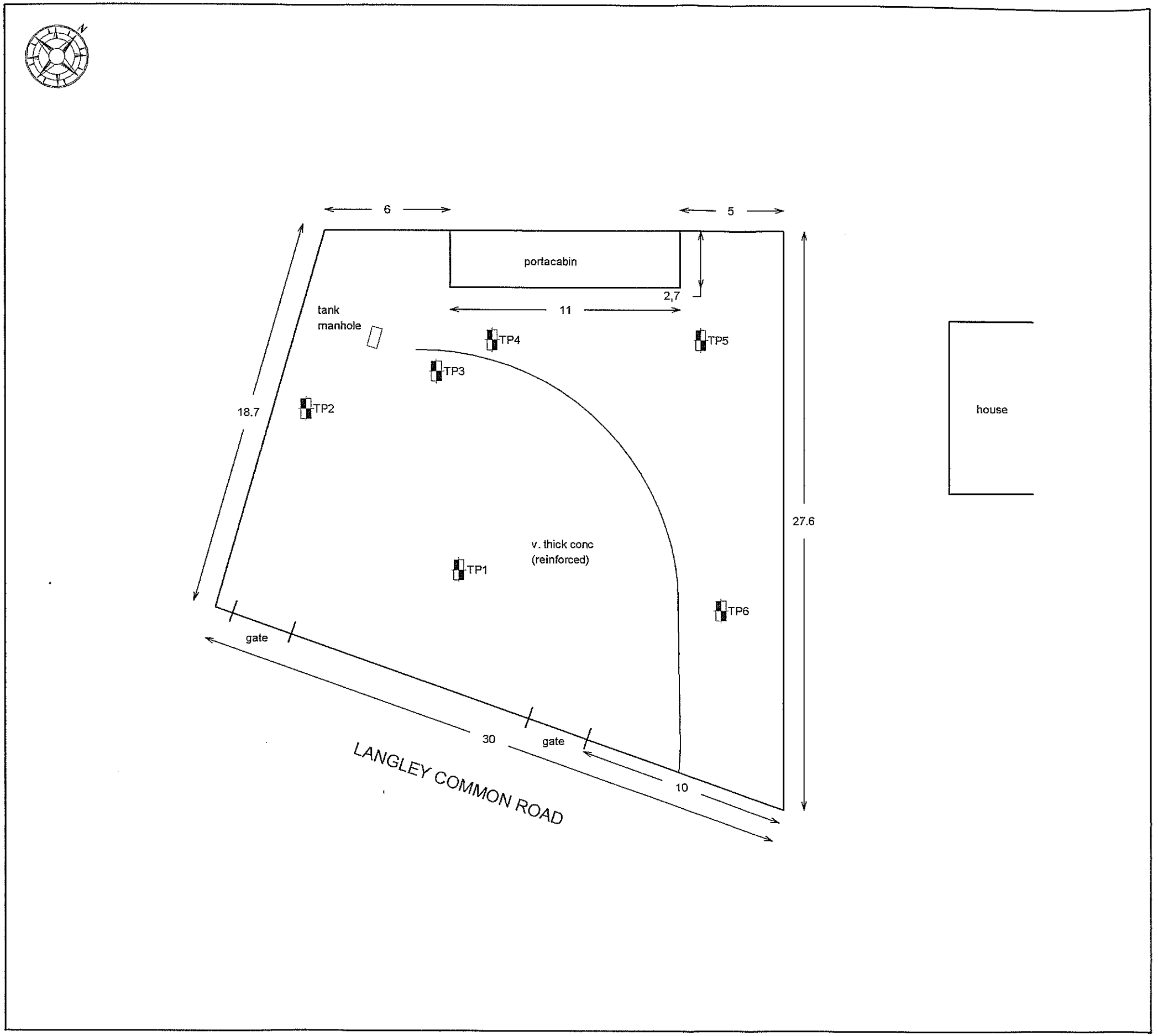
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Figure 1
Key Plan
58-60 Langley Common Road, Arborfield
Report No 252095

CL Associates



Notes:
1. Hole Locations to 'approximate' 'Local Site' Grid Co-ordinate Reference System.
2. All dimensions are in metres unless indicated otherwise.

Legend to symbols:

Trial Pit Location

Scale: 1:200

0 2m 4 6 8 10

Figure 2
Site Plan
58 - 60 Langley Common Rd,
Arborfield
Report No 252095

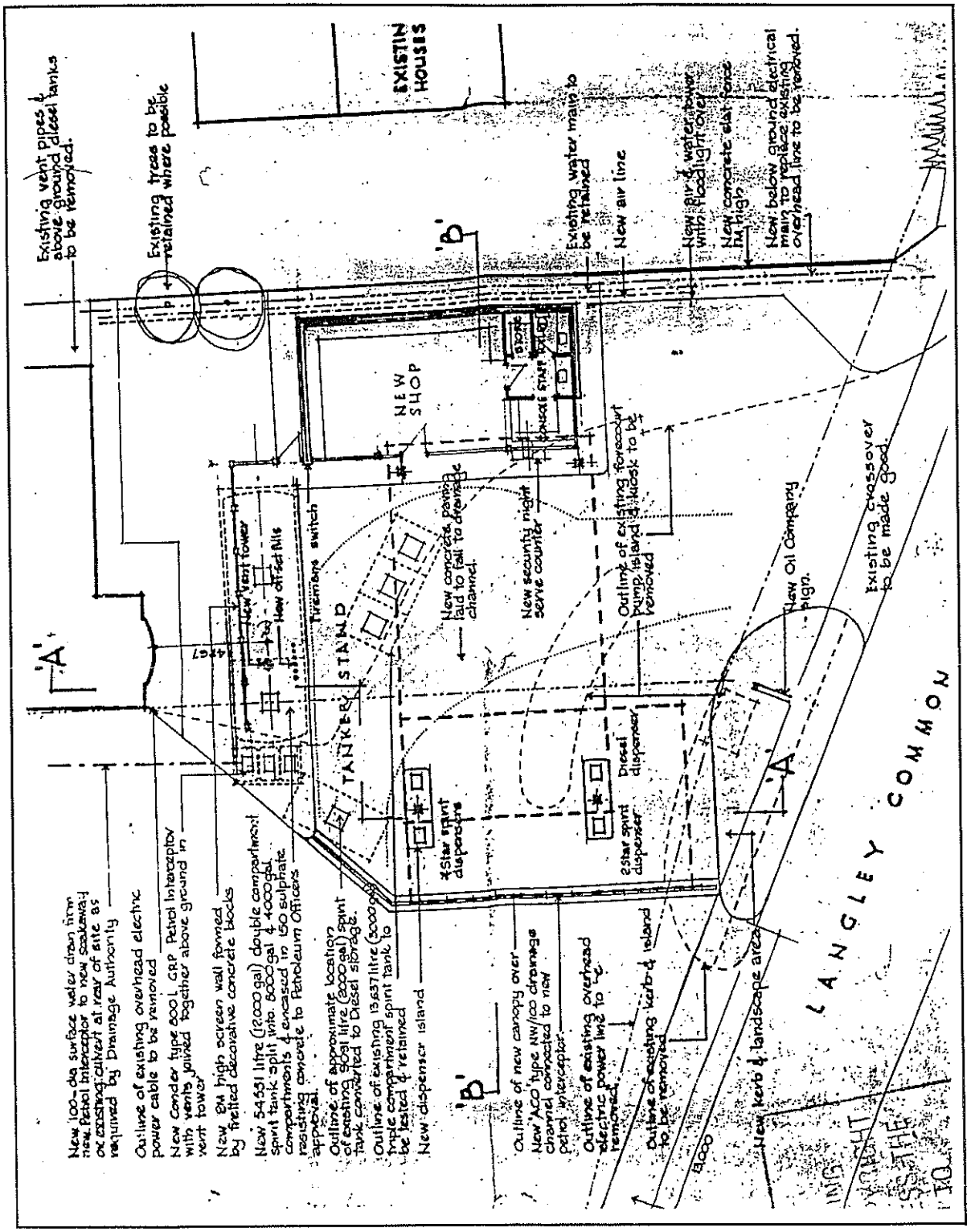
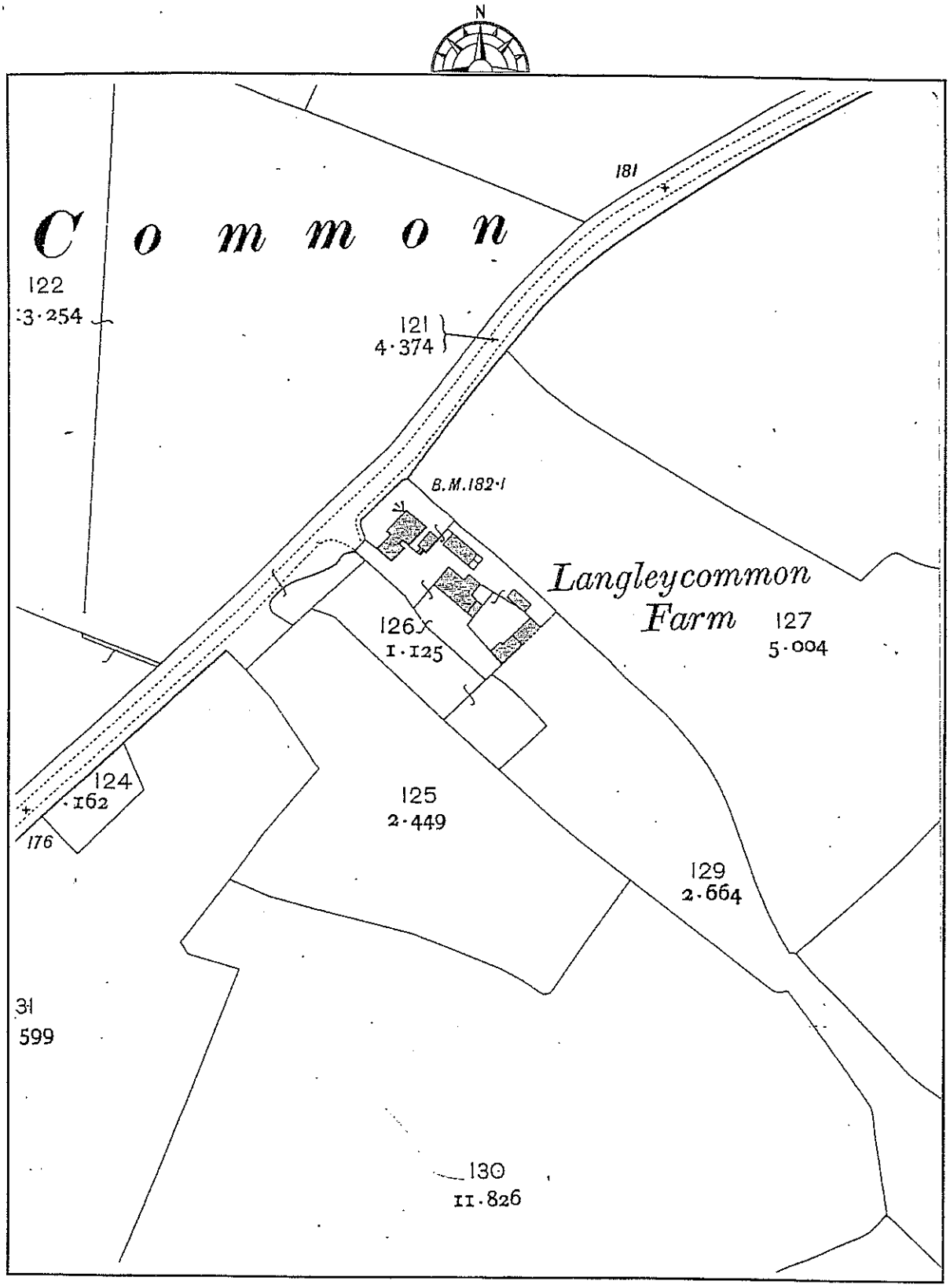


Figure 3
Layout of Former Petroi Station
58-60 Langley Common Road, Arborfield
Report No 252095

APPENDIX A

HISTORICAL MAPS

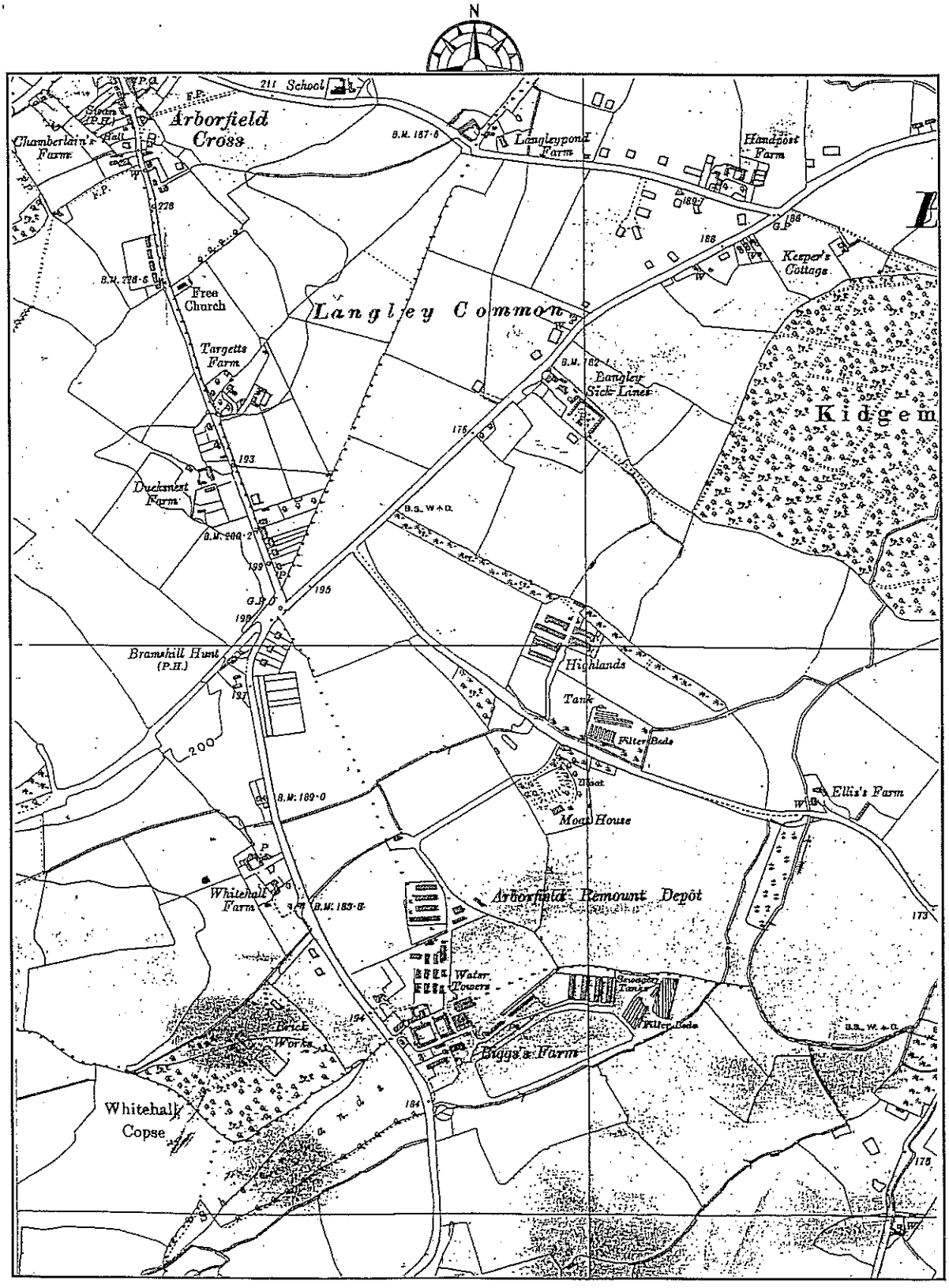
CL Associates



Reproduced from the 1911 Ordnance Survey 1:2500 scale map, Berkshire sheet XLVI.1

1911 Map Extract
58-60 Langley Common Road, Arborfield
Report No 252095

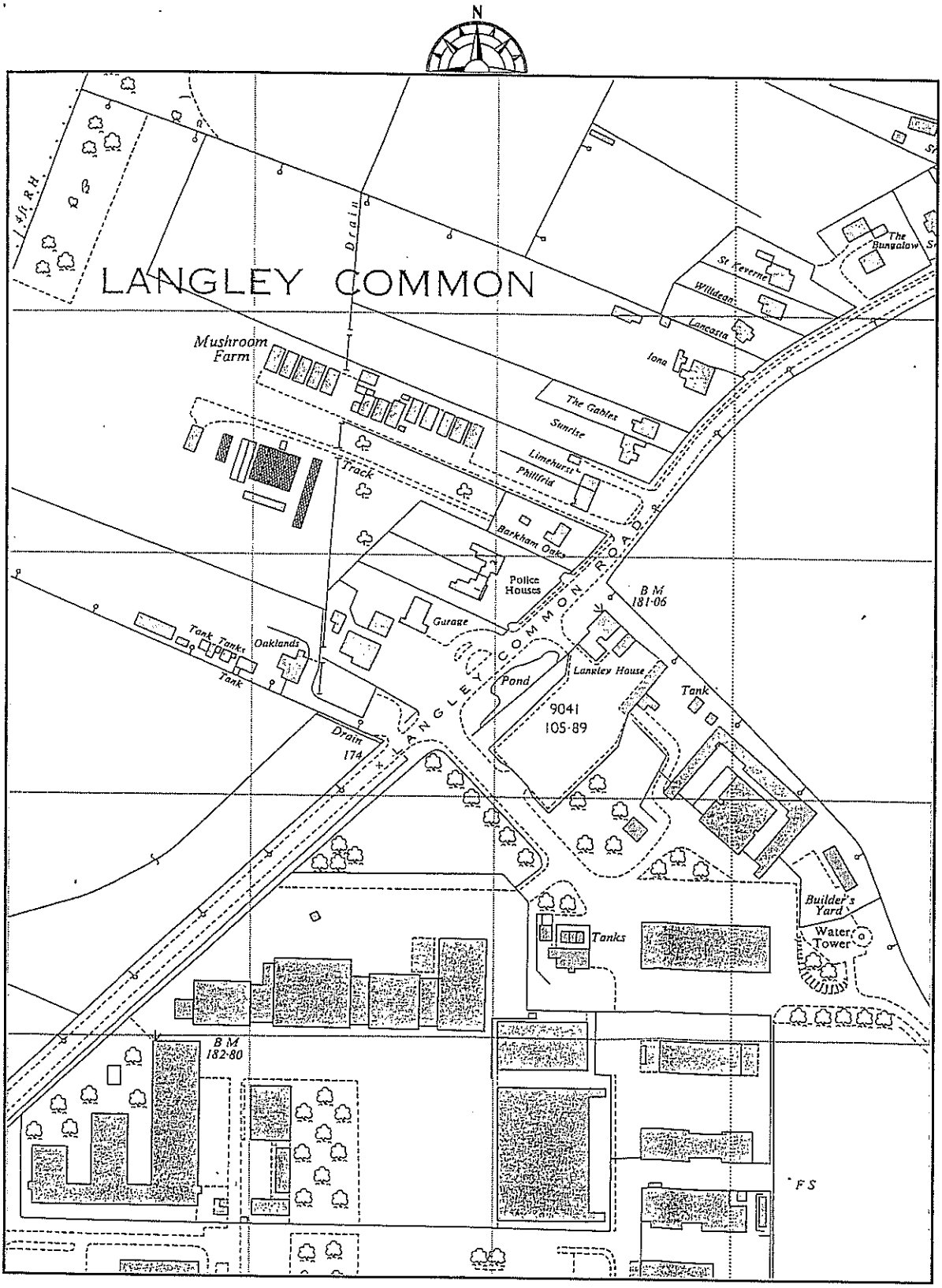
CL Associates



Reproduced from the 1932 Ordnance Survey 1:10,560 scale map, Berkshire sheet XLVI.NW

1932 Map Extract
58-60 Langley Common Road, Arborfield
Report No 252095

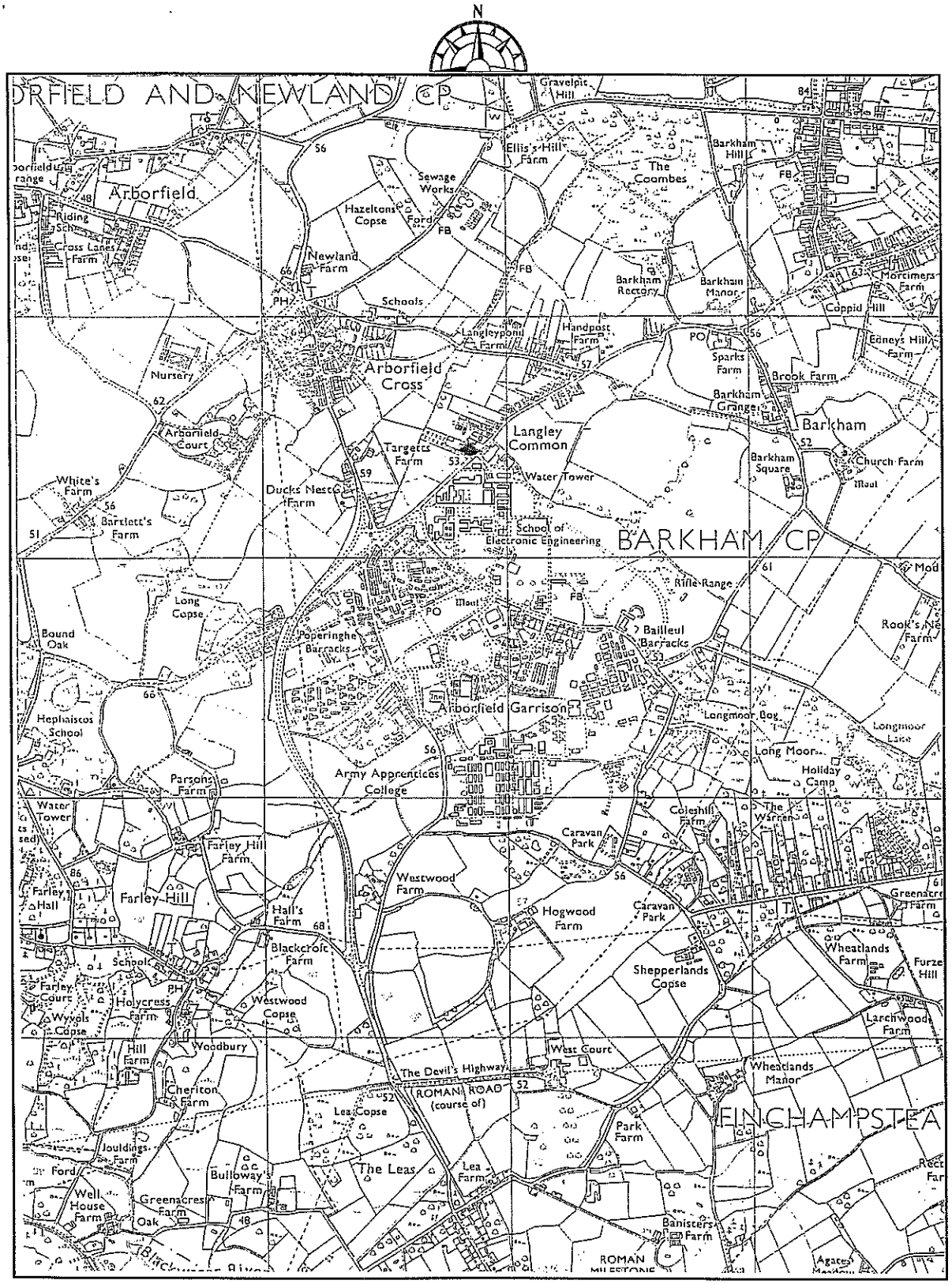
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1968 Map Extract
58-60 Langley Common Road, Arborfield
Report No 252095

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1981 Map Extract
58-60 Langley Common Road, Arborfield
Report No 252095

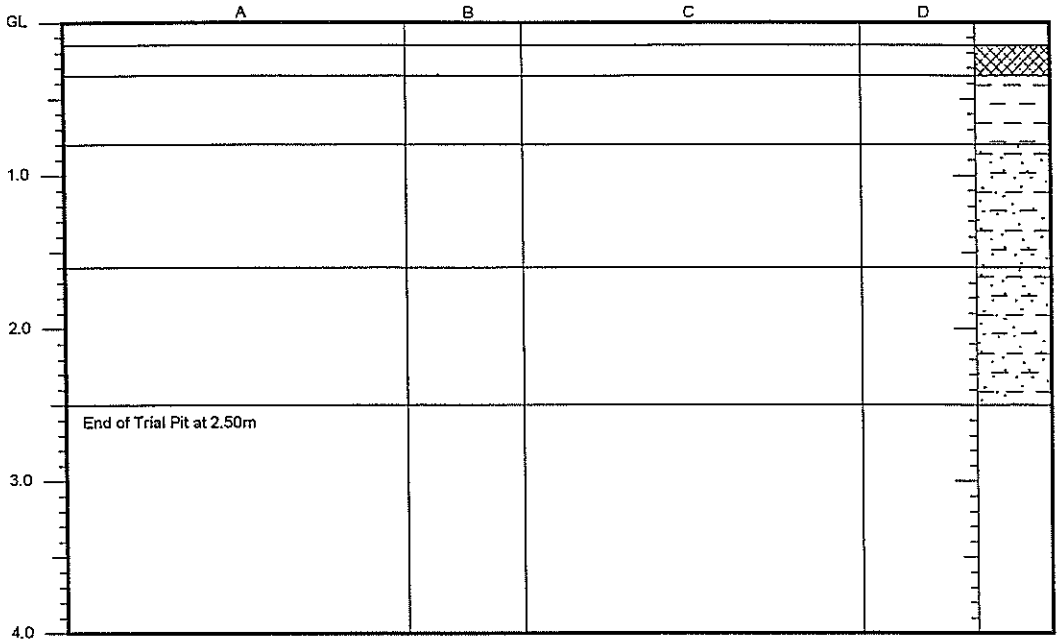
APPENDIX B

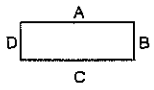
EXPLORATORY HOLE RECORDS

Trial Pit Log

CL Associates

Logged by KSG Checked by	Equipment and Methods Trial Pit/Trench from 0.00m to 2.50m excavated using JCB 3CX	Ground Level National Grid Coordinates





Dimensions 2.00m x 0.60
Excavation date 11/07/20

Samples and Tests

Depth (m)	Type & No.	Records
0.20	D2	
0.30	D1	
1.10	D3	

Strata

Depth (m)	No.	Description
0.00-0.15	1	Concrete - reinforced
0.15-0.35	2	Yellow sand with brick and brown pockets of clay (MADE GROUND).
0.35-0.80	3	Soft dark grey CLAY with black pockets, no hydrocarbon odour present until 0.50 m. Diesel odour then increases with depth (LONDON CLAY).
0.80-1.60	4	Firm dark brown grey mottled sandy CLAY with occasional orange sand pockets. Faint hydrocarbon odour and occasional grey staining (LONDON CLAY).
1.60-2.50	5	Firm/stiff blue mottled orange sandy CLAY. No staining or hydrocarbon odour (LONDON CLAY).

Groundwater
No Groundwater encountered.

Remarks
Pit remained stable. Trial pit backfilled with arisings.
PID measurements - Max 5ppm in pit and Max 18ppm in headspace sample from spoil heap.

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project 58-60 LANGLEY COMMON ROAD, ARBORFIELD

Project no. 252095

Carried out for NATIONAL WESTMINSTER BANK PLC

Trial Pit **TP1**

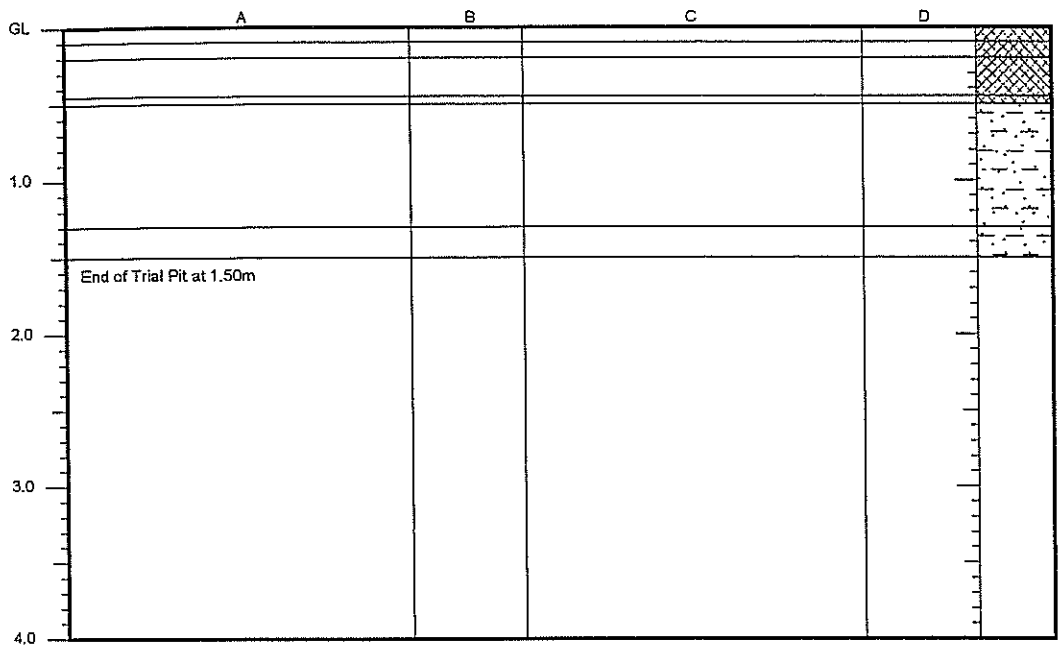
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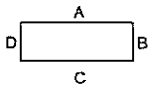
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Trial Pit Log

CL Associates

Logged by KSG Checked by	Equipment and Methods Trial Pit/Trench from 0.00m to 1.50m excavated using JCB 3CX.	Ground Level National Grid Coordinates





Dimensions 2.40m x 0.60m
Excavation date 11/07/2002

Samples and Tests

Strata

Depth (m)	Type & No.	Records	Depth (m)	No.	Description
			0.00-0.10	1	Purple hardcore sub base. (MADE GROUND)
0.10	D4		0.10-0.20	2	Whole and crushed bricks (MADE GROUND).
0.30	D1		0.20-0.45	3	Black ash with wood, tar bonded gravel and brick. (MADE GROUND)
			0.45-0.50	4	Firm dark grey very sandy CLAY with large amount of medium angular flint gravel which is grey stained at the surface. Faint hydrocarbon odour. (MADE GROUND).
0.60 0.80	D2 D3		0.50-1.30	5	Firm dark grey mottled orange sandy CLAY. Very slight hydrocarbon odour and grey staining . Brown smearing to 0.80 m, blue soft layer with organic odour at 1.00 m. (LONDON CLAY)
			1.30-1.50	6	Firm brown mottled orange sandy CLAY. No staining (LONDON CLAY).

Groundwater
Slight seepage from gravelly layer at 0.40 m.

Remarks
Stability. No support used, trial pit backfilled with arisings.
Plastic pipe filled with black gravelly sand under concrete.
Large blocks of concrete in the top 0.50 m.
PID reading <0.1 ppm at 0.50 m and 1.00 m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project 58-60 LANGLEY COMMON ROAD, ARBORFIELD

Project no. 252095

Carried out for NATIONAL WESTMINSTER BANK PLC

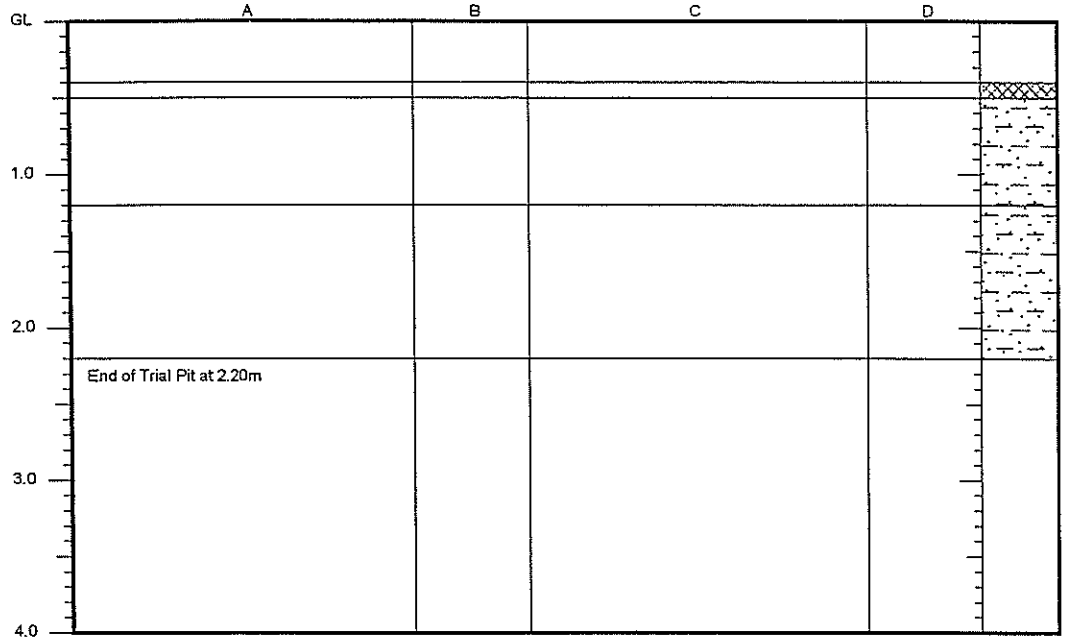
Trial Pit
TP2
Sheet 1 of 1

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Trial Pit Log

CL Associates

Logged by KSG Checked by	Equipment and Methods Trial Pit/Trench from 0.00m to 2.20m excavated using a JCB 3CX	Ground Level National Grid Coordinates





Dimensions 2.50m x 0.90m
Excavation date 11/07/2002

Samples and Tests

Depth (m)	Type & No.	Records
0.45	D1	
0.90	D2	
1.60	D3	

Strata

Depth (m)	No.	Description
0.00-0.40	1	Reinforced concrete 0.40 m thick
0.40-0.50	2	Very gravelly sub base containing whole and crushed brick (MADE GROUND).
0.50-1.20	3	Firm orange mottled grey sandy CLAY. Grey staining in places but no hydrocarbon odour. (LONDON CLAY)
1.20-2.20	4	Firm grey/blue mottled orange slightly sandy CLAY with occasional pockets of orange sand. No staining or hydrocarbon odour. (LONDON CLAY)

Groundwater
No Groundwater encountered.

Remarks
Stability. No support used, trial pit backfilled with arisings.
Plastic pipe filled with sand and gravel found running along face C at 0.60 m.
PID meter reading in pit = <0.1ppm

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project 58-60 LANGLEY COMMON ROAD, ARBORFIELD

Project no. 252095

Carried out for NATIONAL WESTMINSTER BANK PLC

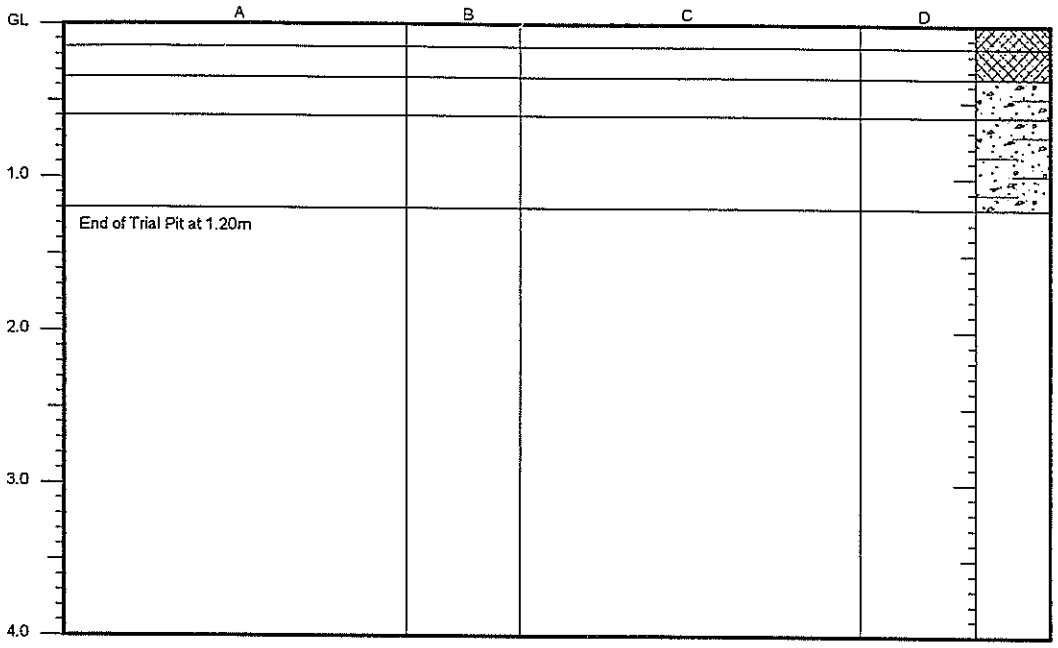
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TP3
Sheet 1 of 1

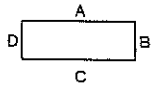
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Trial Pit Log

CL Associates

Logged by KSG Checked by RBL	Equipment and Methods Trial Pit/Trench from 0.00m to 1.20m excavated using JCB 3CX	Ground Level National Grid Coordinates





Dimensions 2.50m x 0.50
Excavation date 11/07/20

Samples and Tests

Depth (m)	Type & No.	Records
0.10	D1	
0.20	D2	
0.50	D3	
0.80	D4	

Strata

Depth (m)	No.	Description
0.00-0.15	1	Pink sandy gravel hardcore (MADE GROUND).
0.15-0.35	2	Dark grey very clayey sand with occasional brick fragments and pockets of orange/brown sand. Very slight HC/organic odour. (MADE GROUND).
0.35-0.60	3	Firm grey mottled orange sandy occasionally gravelly CLAY. Occasional grey staining but no hydrocarbon odour. (LONDON CLAY).
0.60-1.20	4	Firm/stiff grey mottled orange occasionally sandy and gravelly CLAY with common rootlet tracks. No staining or hydrocarbon odour, becomes stiffer around 1.00 m. (LONDON CLAY).

Groundwater
No Groundwater encountered.

Remarks
Trial pit remained stable. Pit backfilled with arisings on completion.
Trial pit moved 1 m to the west after finding bundle of cables which appeared to be dead.
PID reading in pit = <0.1 ppm

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project 58-60 LANGLEY COMMON ROAD, ARBORFIELD

Project no. 252095

Carried out for NATIONAL WESTMINSTER BANK PLC

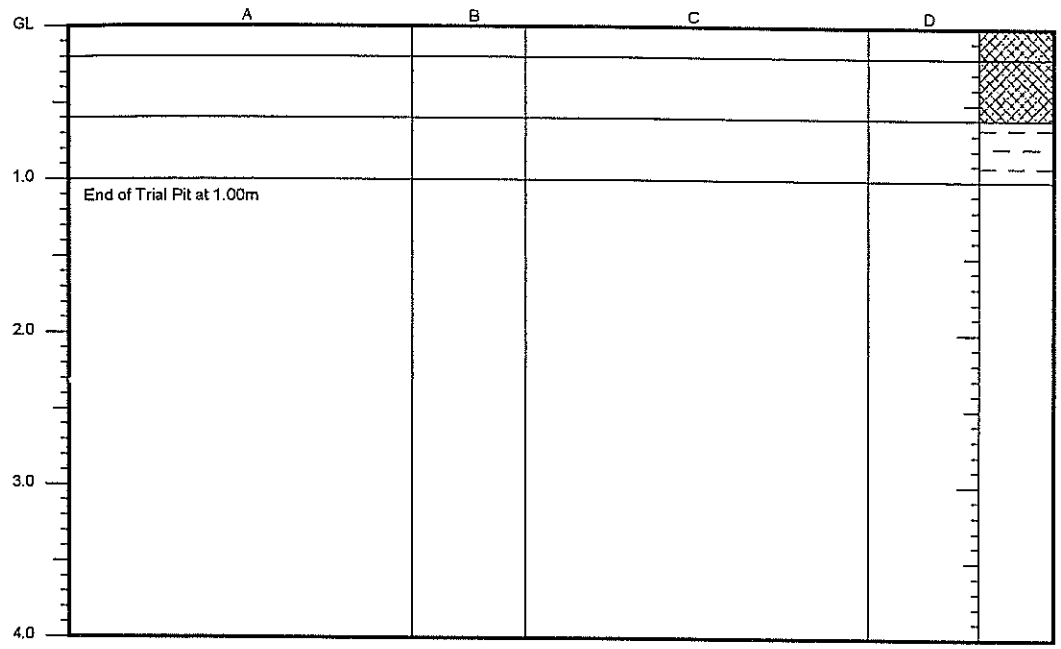
Trial Pit
TP4
Sheet 1 of 1

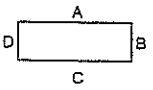
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Trial Pit Log

CL Associates

Logged by KSG Checked by RBL	Equipment and Methods Trial Pit/Trench from 0.00m to 1.00m excavated using JCB 3CX	Ground Level National Grid Coordinates





Dimensions 3.00m x 2.5
Excavation date 11/07/2

Samples and Tests

Depth (m)	Type & No.	Records
0.10	D1	
0.40	D2	
0.80	D3	

Strata

Depth (m)	No.	Description
0.00-0.20	1	Pink/purple hardcore sub base with bricks and wire (MADE GROUND).
0.20-0.60	2	Dark grey/green very sandy clay with occasional bricks and wood. Organic smell (rotting wood) present with wire, roots and plastic bags. (MADE GROUND).
0.60-1.00	3	Stiff/firm grey mottled orange CLAY with root tracks and occasional sand pockets. (LONDON CLAY).

Groundwater
No Groundwater encountered.

Remarks
Pit remained stable. Trial pit back filled with arisings on completion.
Trial pit moved to east to avoid possible tank feeder pipes (6 in a cluster) which were found at 0.6 m.
PID reading in pit = <0.1 ppm.

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project 58-60 LANGLEY COMMON ROAD, ARBORFIELD

Project no. 252095

Carried out for NATIONAL WESTMINSTER BANK PLC

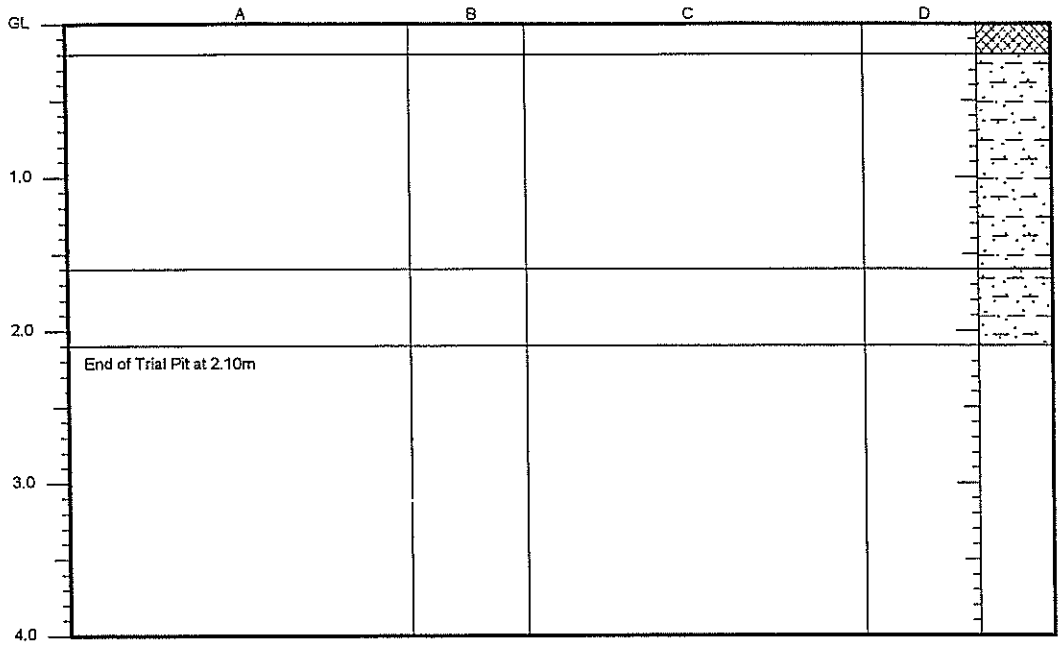
Trial Pit
TP5
Sheet 1 of 1

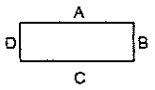
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Trial Pit Log

CL Associates

Logged by KSG Checked by RBL	Equipment and Methods Trial Pit/Trench from 0.00m to 2.10m excavated using JCB 3CX	Ground Level National Grid Coordinates





Dimensions 2.40m x 0.90m
Excavation date 11/07/200

Samples and Tests

Depth (m)	Type & No.	Records
0.10	D1	
0.45	D2	
1.40	D3	

Strata

Depth (m)	No.	Description
0.00-0.20	1	Pink sandy gravel hardcore fill with brick and wire. (MADE GROUND).
0.20-1.60	2	Firm orange mottled grey sandy CLAY with grey staining and moderate hydrocarbon odour. Crushed brick in the top 0.05 m and a layer of black staining from 0.40 to 0.50 with hydrocarbon odour being very strong from 1.00 m. (LONDON CLAY).
1.60-2.10	3	Firm orange brown mottled slightly sandy CLAY with no staining or hydrocarbon odour. (LONDON CLAY).

Groundwater
Slight seepage from base.

Remarks
Trial pit remained stable. Trial pit backfilled with arisings.
Old water pipe found at 0.60 m.
PID meter showed readings of <0.1 ppm in the trial pit and 6 ppm in headspace sample from spoil heap.
A maximum reading of 103 ppm was recorded at a depth of 1.50 m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths in metres.

Scale 1 : 50

Project 58-60 LANGLEY COMMON ROAD, ARBORFIELD

Project no. 252095

Carried out for NATIONAL WESTMINSTER BANK PLC

Trial Pit **TP6**

Sheet 1 of 1

30/07/2002 15:34:43 ESGLog v2.11

APPENDIX C

LABORATORY TEST RESULTS

Units :		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Method Codes :		ELESULP	GROHSA	ICPACIDS	ICPMSS	ICPSOIL	ICPSOIL	ICPSOIL	ICPSOIL	ICPSOIL	ICPSOIL	ICPSOIL	ICPSOIL	ICTSCN28	ICTSCN28	PAHSCUV	TPHFID
Detection Limits :		20	0.1	10	0.5	3	1	2	1	5	0.5	2	2	1	1	10	10
UKAS Accredited :		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
TES ID Number CL/	Client Sample Description	Elemental Sulphur	GRO	SO4-- (acid sol)	Selenium (MS)	Arsenic	Cadmium	Chromium (total)	Copper	Lead	Mercury	Nickel	Zinc	CN- (total)	Sulphide	PAH (screening)	DRO (AR)
0215904	TP1 0.3	237	0.3	406	0.51	5	<1	20	9	57	<0.5	8	55	<1	<5	93	12
0215905	TP1 1.1		2.3														150
0215908	TP2 0.3	<20		422	0.63	8	<1	20	18	62	<0.5	16	76	<1	142	1650	
0215906	TP2 0.6		<0.2														22
0215907	TP2 1.8		<0.2														<10
0215909	TP3 0.9		<0.2														<10
0215910	TP3 1.6	<20		62	<0.50	11	<1	35	19	24	<0.5	35	66	<1	<5	13	
0215911	TP4 0.2	<20	<0.2	289	<0.50	8	<1	16	15	1010	<0.5	11	57	<1	<5	58	32
0215912	TP4 0.8		<0.2														<10
0215913	TP5 0.4	<20	0.2	129	<0.50	11	<1	36	10	26	<0.5	12	74	<1	<5	17	<10
0215914	TP6 0.4-0.5	<20	6.6	124	<0.50	9	<1	48	10	27	<0.5	13	50	<1	<5	16	124
0215915	TP6 1.4		1.4														217

TES Bretby

TES Bretby
PO Box 100, Bretby Business Park,
Burton-on-Trent, Staffordshire, DE15 0XD
Tel +44 (0) 1283 554400
Fax +44 (0) 1283 554422

Client Name	C L Associates
Contact	Ms K Goodhand

Staysure, Arborfield

Soils Sample Analysis

Date Printed	22 July 2002
Report Number	EFS/022274
Table Number	1
Page Number	1 of 2

UKAS TESTING
1252

Units :		mg/kg	pH Units	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg								
Method Codes :		TPHFID	WSLM3	WSLM4	ICPBOR	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA								
Detection Limits :		10.0		0.5	0.5	5	5	5	5	125								
UKAS Accredited :		yes	yes	yes	no	yes	yes	yes	yes	yes								
TES ID Number CL/	Client Sample Description	TPH GCFID (AR)	pH units	Phenol Index	Boron.	Benzene	Toluene	Ethyl Benzene	Xylenes	MTBE								
0215904	TP1 0.3	39	8.0	0.8	0.9	<10	<10	<10	<20	<20								
0215905	TP1 1.1	171				<10	<10	<10	<20	<20								
0215908	TP2 0.3		9.2	<0.5	0.7													
0215906	TP2 0.6	71				<10	<10	<10	<20	<20								
0215907	TP2 1.8	<10.0				<10	<10	<10	<20	<20								
0215909	TP3 0.9	<10.0				<10	<10	<10	<20	<20								
0215910	TP3 1.6		8.2	<0.5	0.6													
0215911	TP4 0.2	85	7.3	<0.5	<0.5	<10	<10	<10	<20	<20								
0215912	TP4 0.8	<10.0				<10	<10	<10	<20	<20								
0215913	TP5 0.4	32	7.5	<0.5	<0.5	<10	<10	<10	<20	<20								
0215914	TP6 0.4-0.5	139	7.5	<0.5	<0.5	<10	<10	<10	<20	<20								
0215915	TP6 1.4	232				<10	<10	<10	<20	<20								
		-																

TES Bretby

TES Bretby
PO Box 100, Bretby Business Park,
Burton-on-Trent, Staffordshire, DE15 0XD
Tel +44 (0) 1283 554400
Fax +44 (0) 1283 554422

Client Name: C L Associates

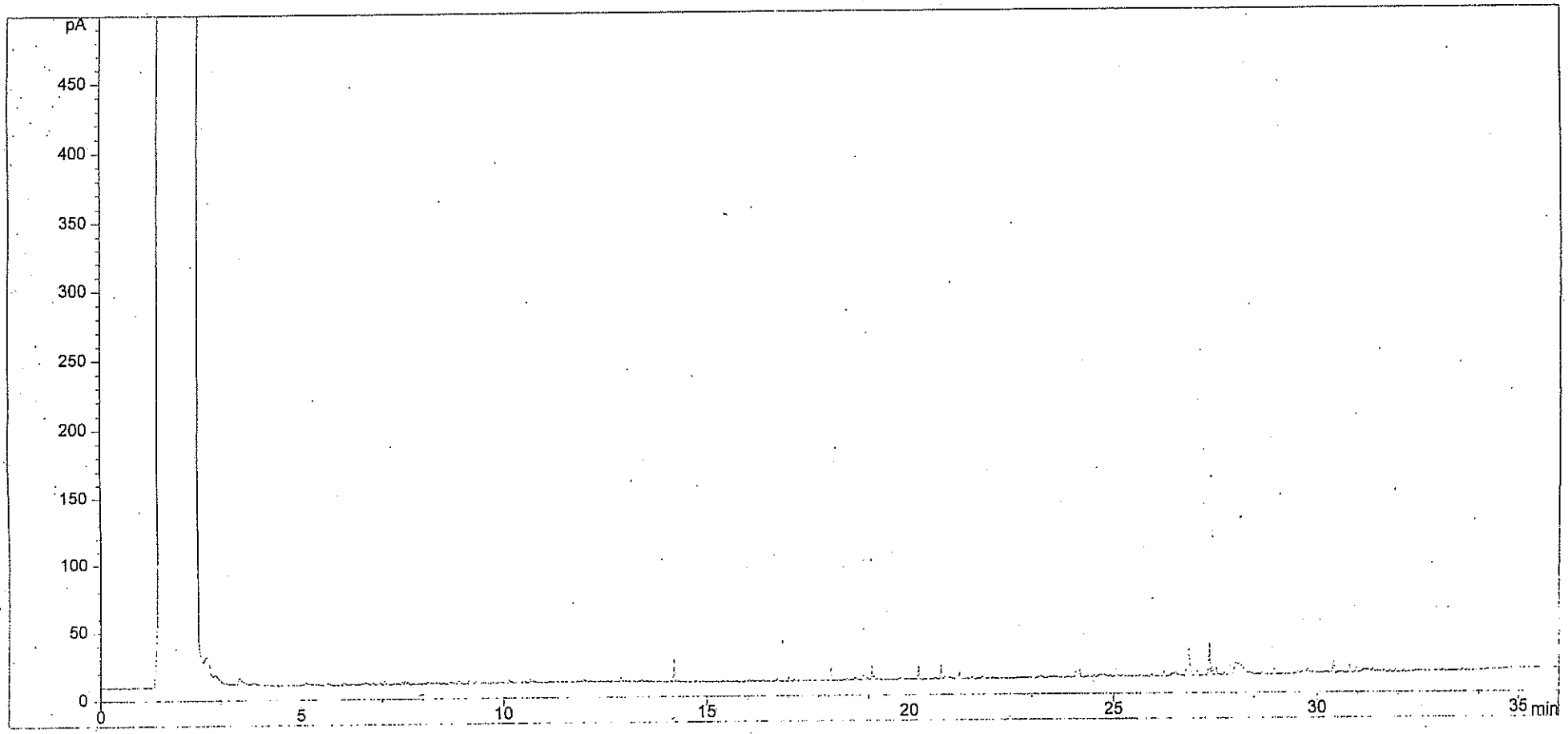
Contact: Ms K Goodhand

Staysure, Arborfield

Soils Sample Analysis

Date Printed	22 July 2002
Report Number	EFS/022274
Table Number	1
Page Number	2 of 2

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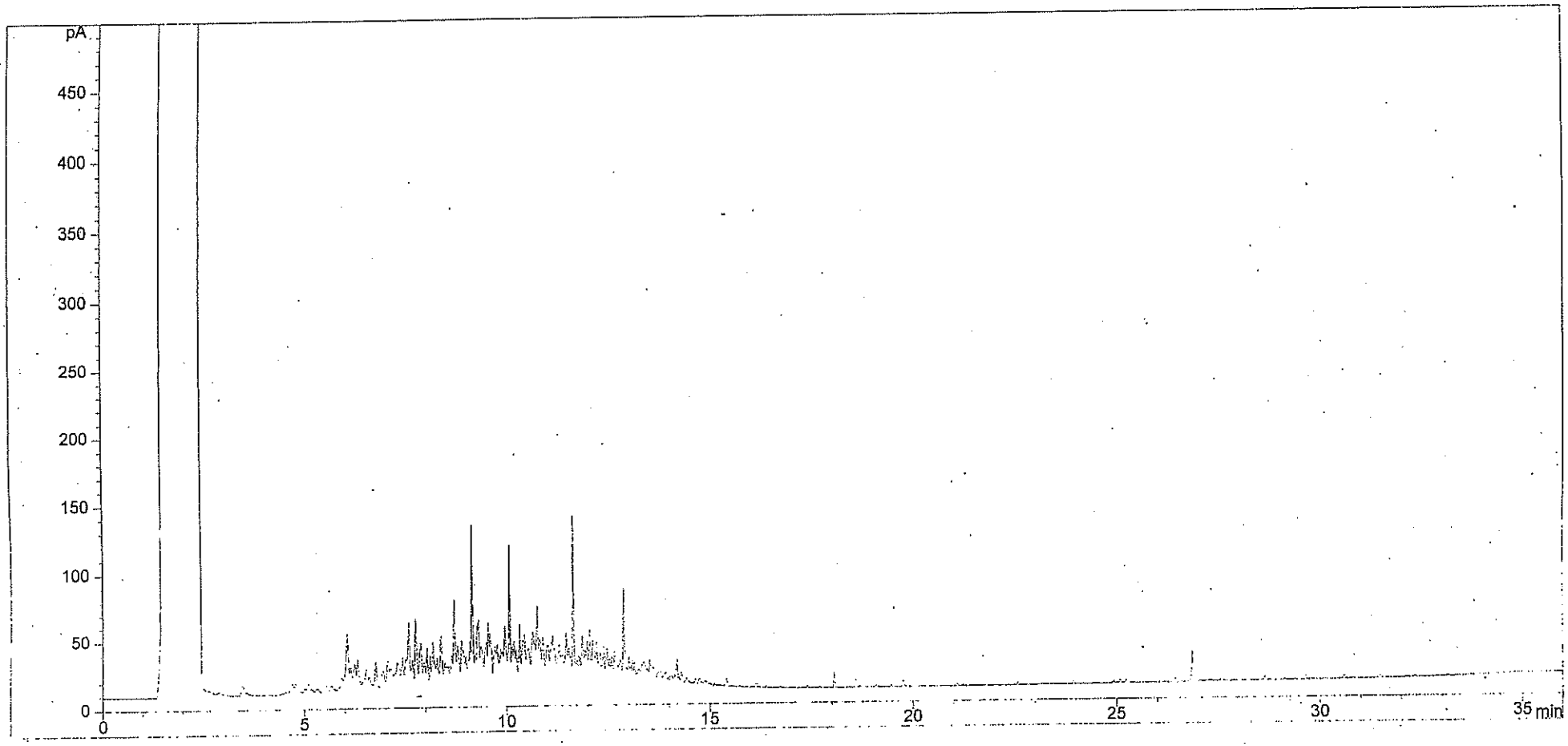


TES Bretby

Sample ID: CL0215904
Date: 18/7/02 6:17:36 AM
Method: L:\METHODS\DSL_HE.M
L:\DATA\0716DAO.GC4\033F1701.D

Instrument: Instrument 1
Operator:
Multiplier: 0.100
Dilution: 1.000

Petroleum Hydrocarbons (C8 to C37) by GC/FID

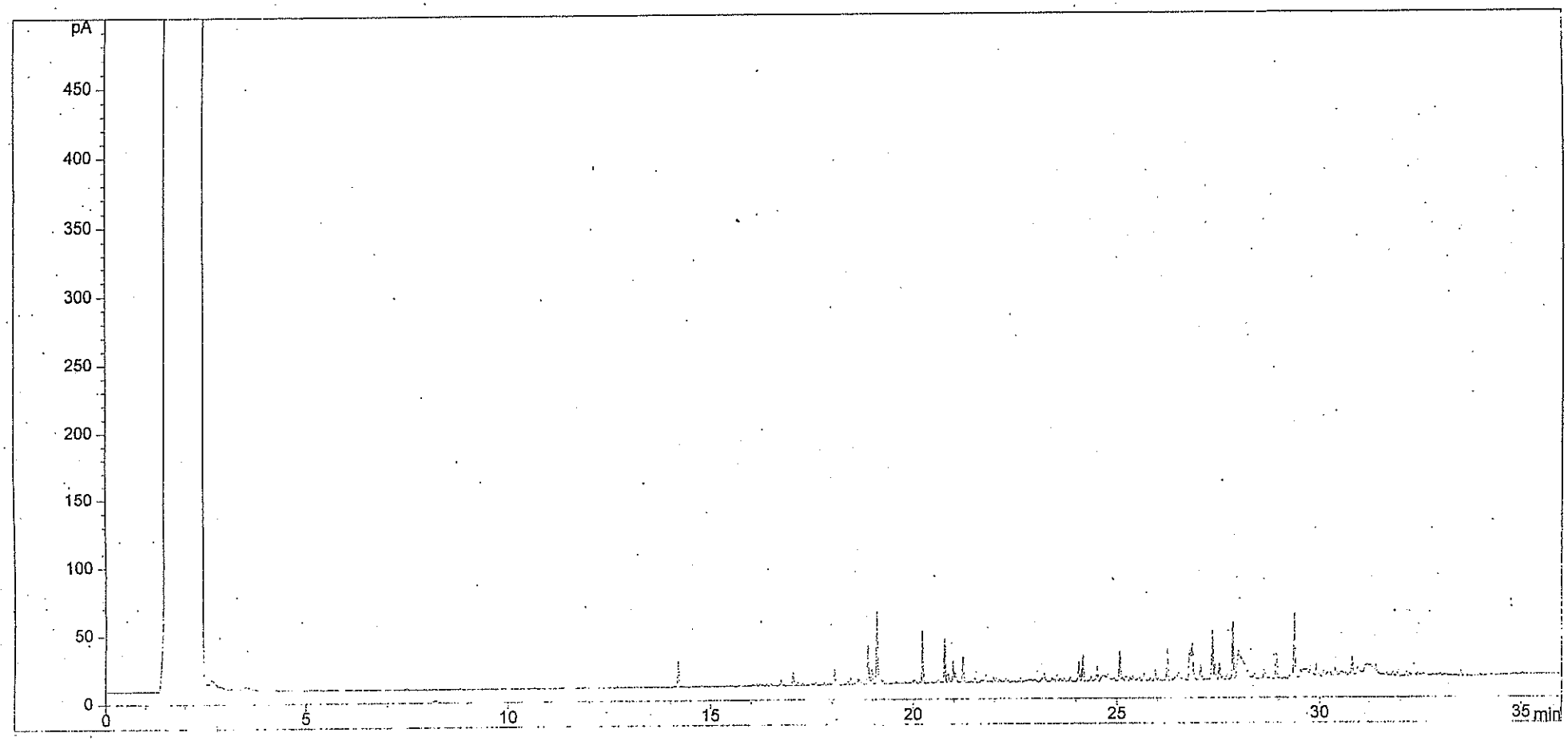


TES Bretby

Sample ID: CL0215905
Date: 18/7/02 7:13:04 AM
Method: L:\METHODS\DSL_HE.M
L:\DATA\0716DAO.GC4\034F1801.D

Instrument: Instrument 1
Operator:
Multiplier: 0.100
Dilution: 1.000

Petroleum Hydrocarbons (C8 to C37) by GC/FID

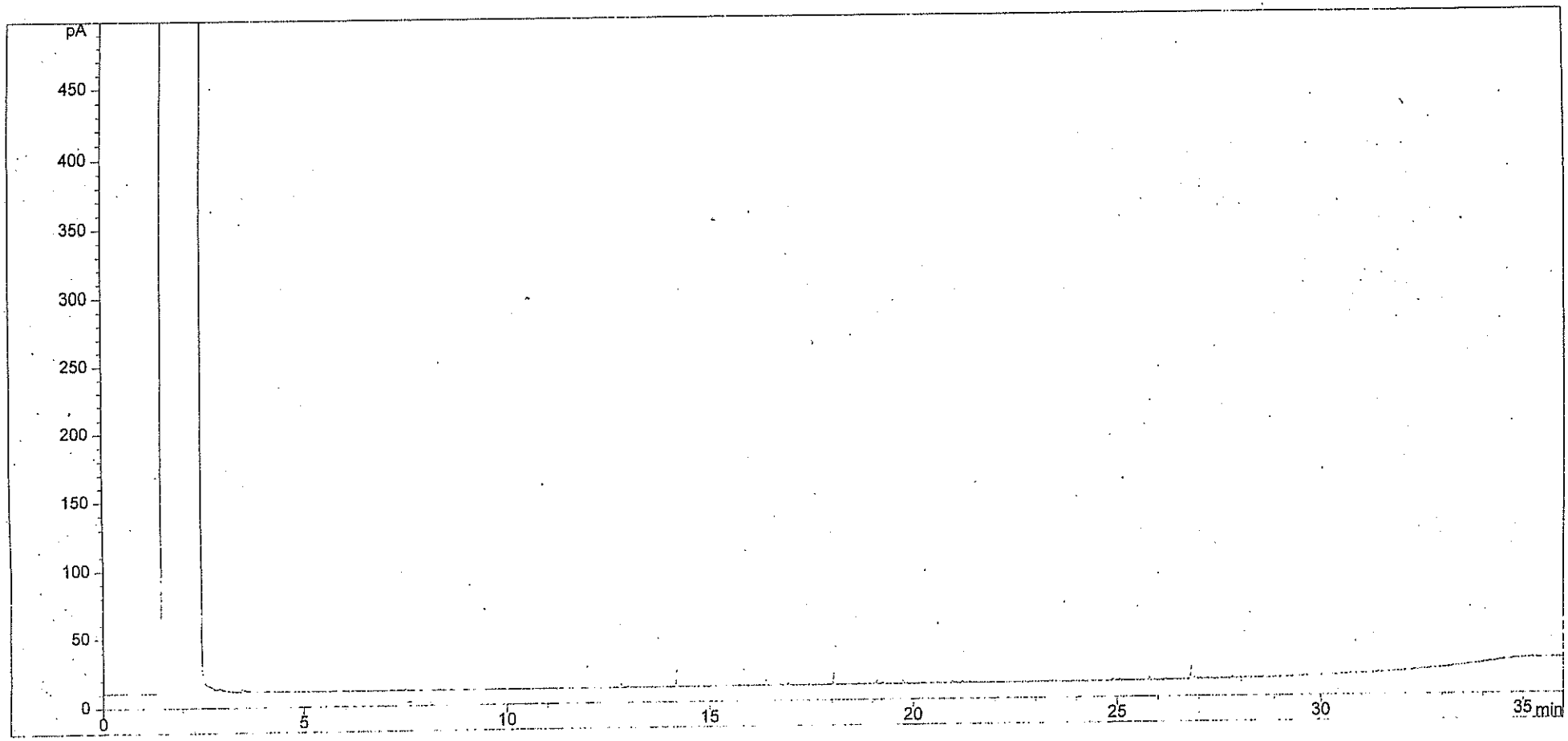


TES Bretby

Sample ID: CL0215906
Date: 18/7/02 8:07:00 AM
Method: L:\METHODS\DSL_HE.M
L:\DATA\0716DAO.GC4\035F1901.D

Instrument: Instrument 1
Operator:
Multiplier: 0.100
Dilution: 1.000

Petroleum Hydrocarbons (C8 to C37) by GC/FID

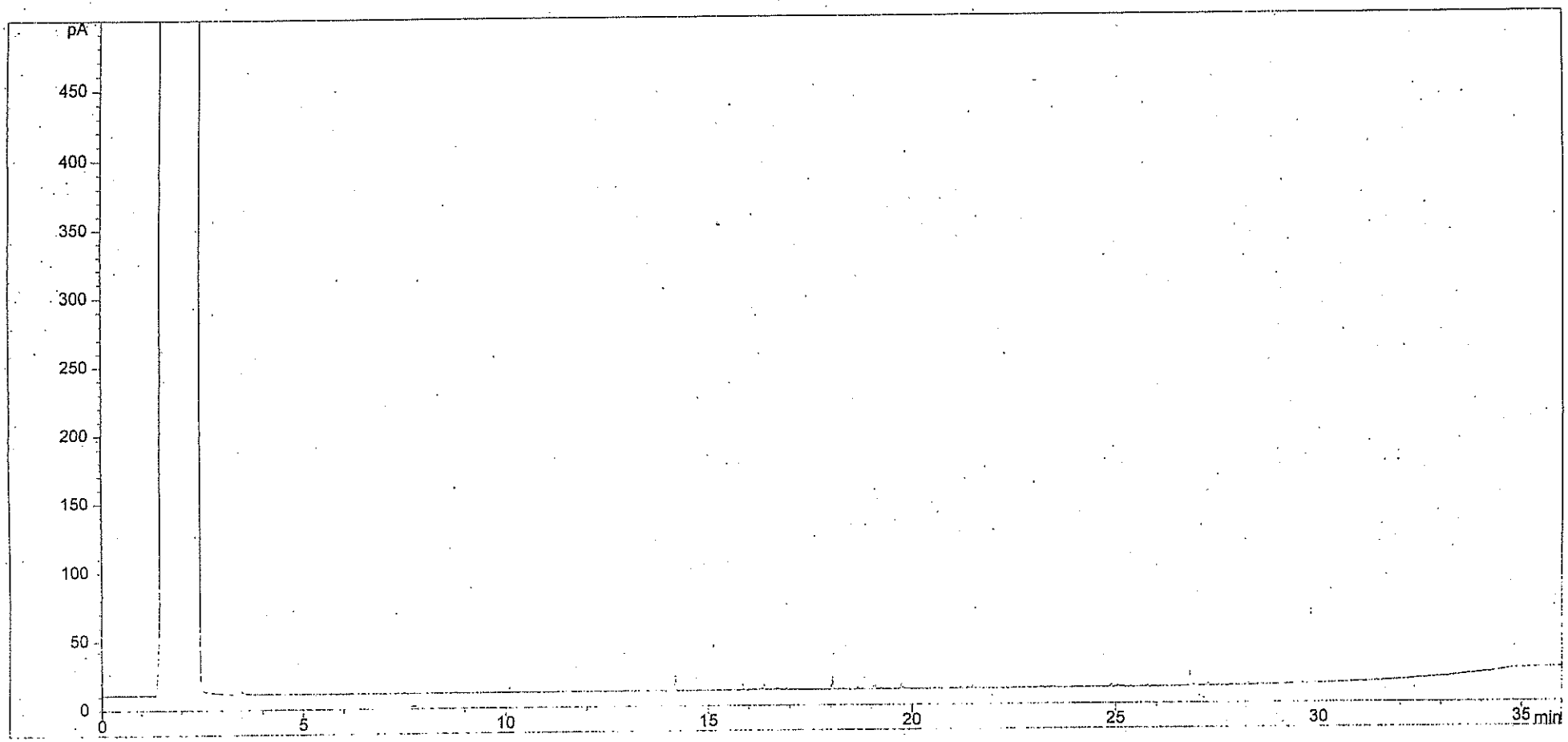


TES Bretby

Sample ID: CL0215907
Date: 17/7/02 6:46:17 PM
Method: L:\METHODS\DSL_HE.M
L:\DATA\0716DAO.GC4\070B0501.D

Instrument: Instrument 1
Operator:
Multiplier: 0.100
Dilution: 1.000

Petroleum Hydrocarbons (C8 to C37) by GC/FID

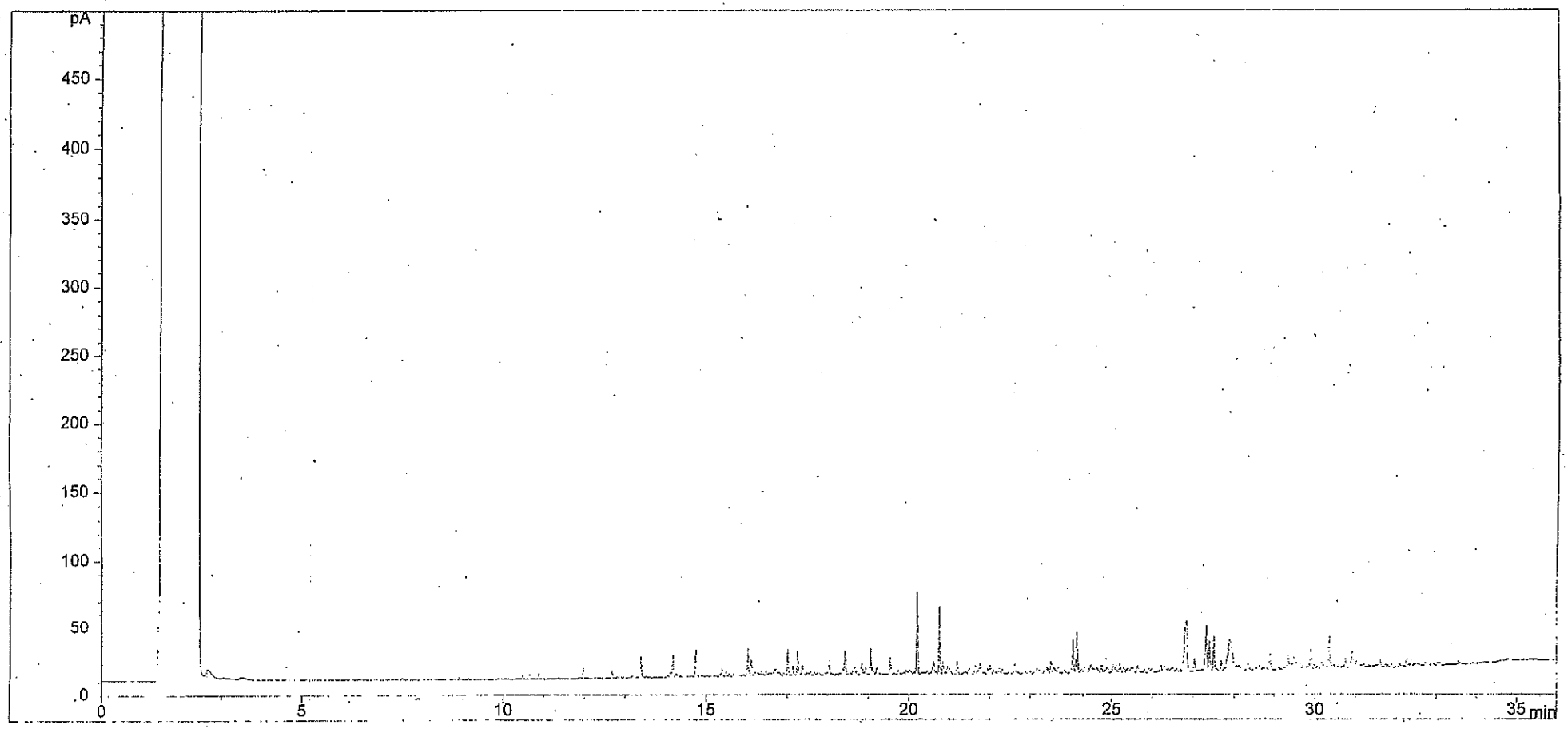


TES Bretby

Sample ID: CL0215909
Date: 17/7/02 7:45:26 PM
Method: L:\METHODS\DSL_HE.M
L:\DATA\0716DAO.GC4\071B0601.D

Instrument: Instrument 1
Operator:
Multiplier: 0.100
Dilution: 1.000

Petroleum Hydrocarbons (C8 to C37) by GC/FID

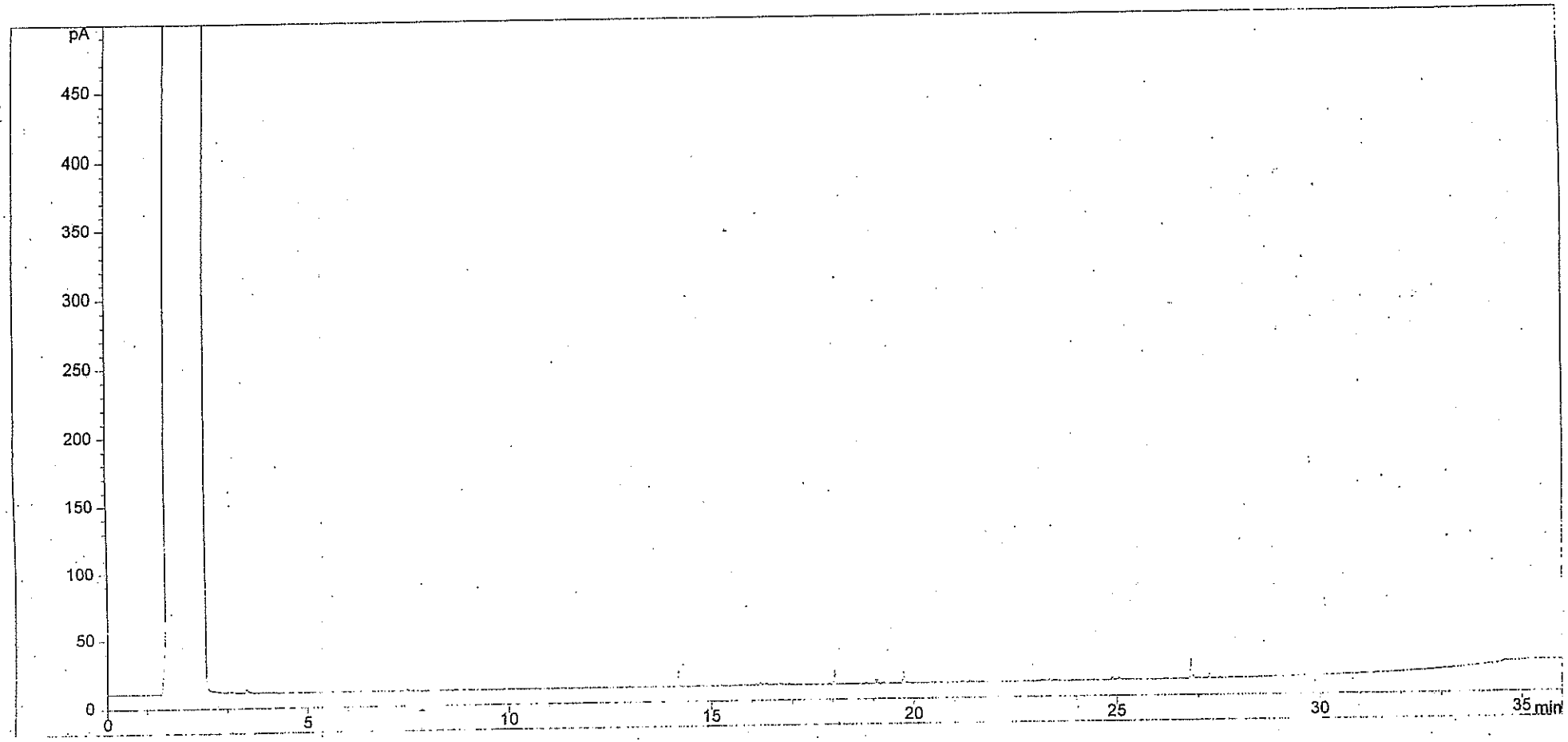


TES Bretby

Sample ID: CL0215911
Date: 17/7/02 8:44:25 PM
Method: L:\METHODS\DSL_HE.M
L:\DATA\0716DAO.GC4\072B0701.D

Instrument: Instrument 1
Operator:
Multiplier: 0.100
Dilution: 1.000

Petroleum Hydrocarbons (C8 to C37) by GC/FID

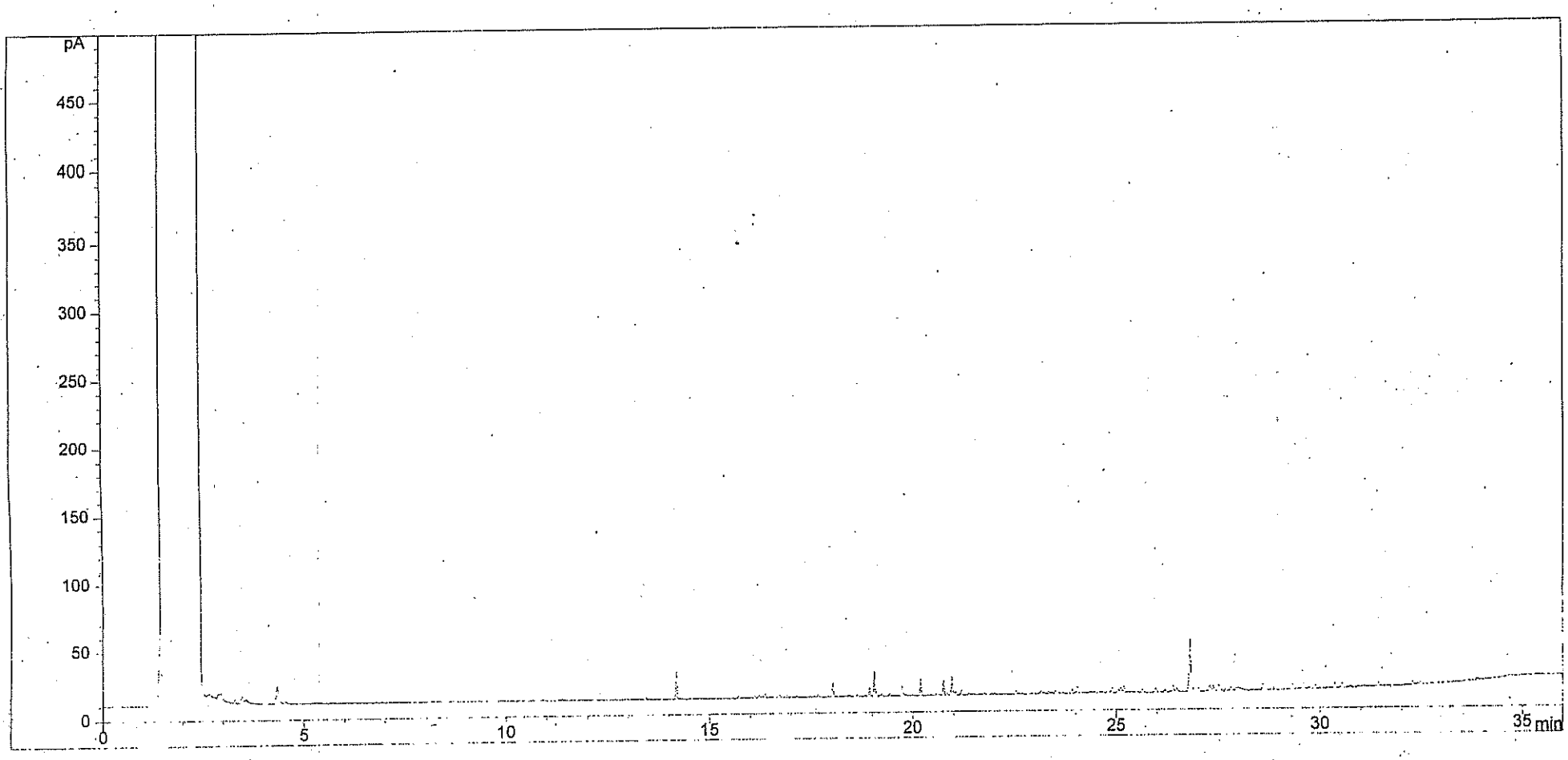


TES Bretby

Sample ID: CL0215912
Date: 17/7/02 9:42:56 PM
Method: L:\METHODS\DSL_HE.M
L:\DATA\0716DAO.GC4\073B0801.D

Instrument: Instrument 1
Operator:
Multiplier: 0.100
Dilution: 1.000

Petroleum Hydrocarbons (C8 to C37) by GC/FID

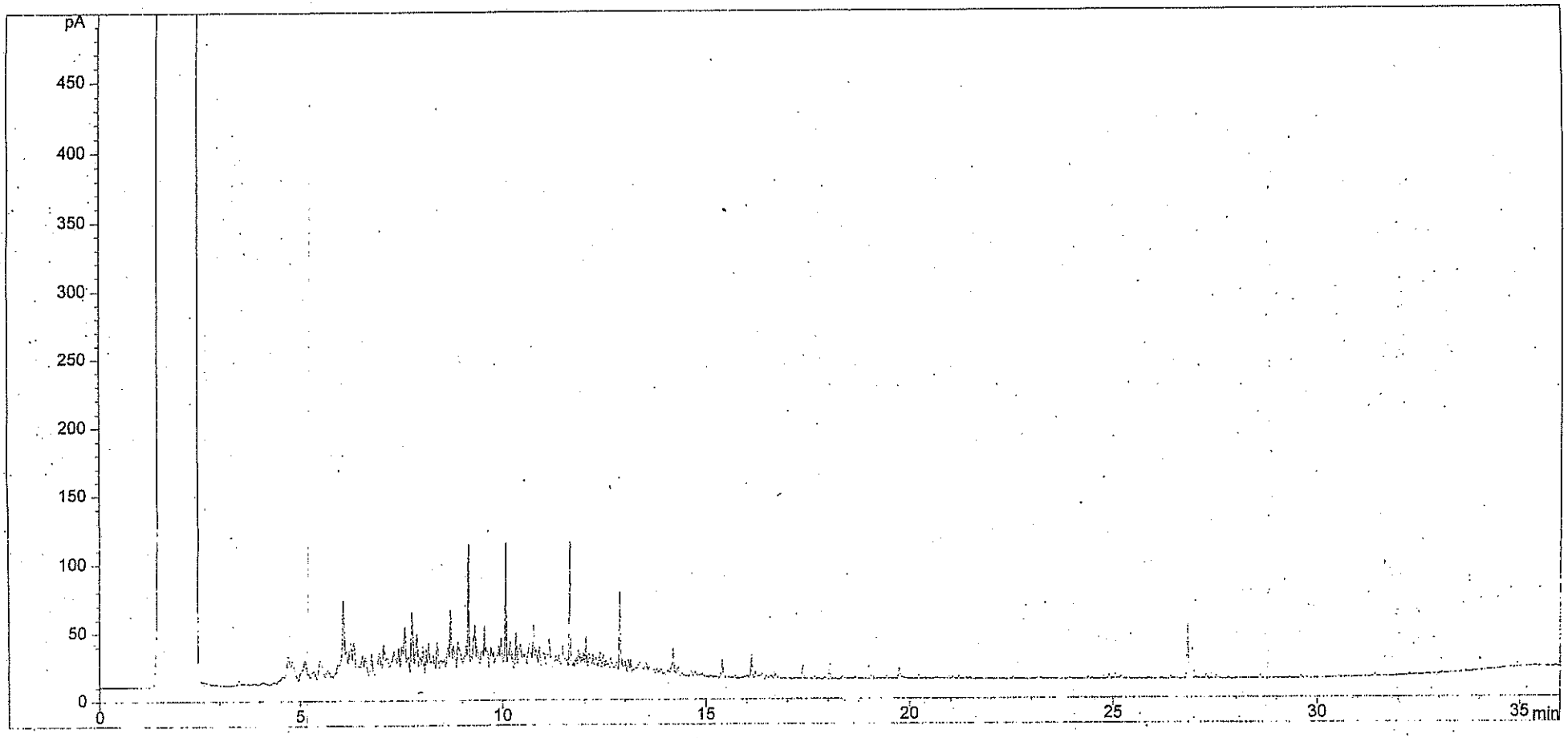


TES Bretby

Sample ID: CL0215913
Date: 17/7/02 10:41:03 PM
Method: L:\METHODS\DSL_HE.M
L:\DATA\0716DAO.GC4\074B0901.D

Instrument: Instrument 1
Operator:
Multiplier: 0.100
Dilution: 1.000

Petroleum Hydrocarbons (C8 to C37) by GC/FID

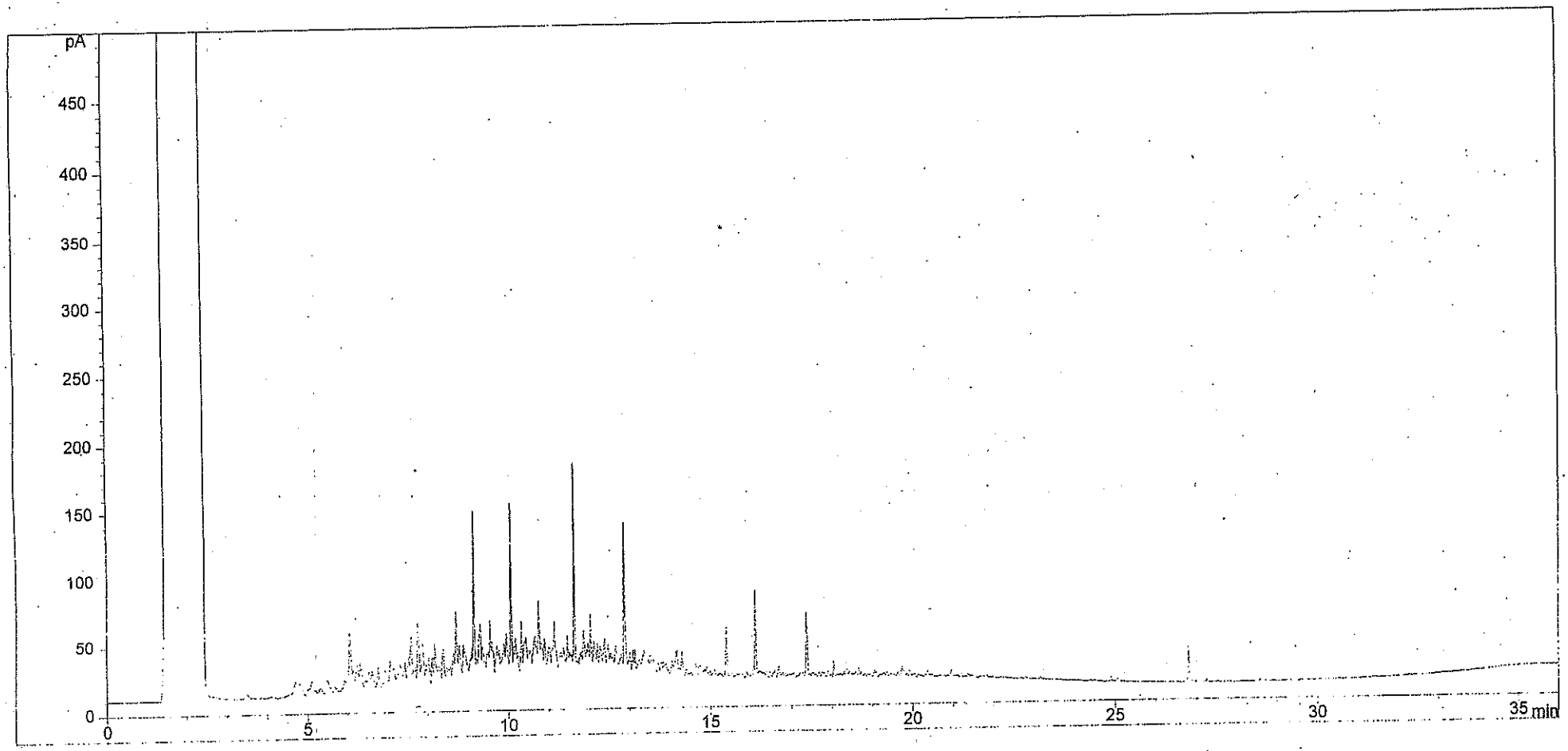


TES Bretby

Sample ID: CL0215914
Date: 17/7/02 11:38:44 PM
Method: L:\METHODS\DSL_HE.M
L:\DATA\0716DAO.GC4\075B1001.D

Instrument: Instrument 1
Operator:
Multiplier: 0.100
Dilution: 1.000

Petroleum Hydrocarbons (C8 to C37) by GC/FID



TES Bretby

Sample ID: CL0215915
Date: 18/7/02 12:36:17 AM
Method: L:\METHODS\DSL_HE.M
L:\DATA\0716DAO.GC4\076B1101.D

Instrument: Instrument 1
Operator:
Multiplier: 0.100
Dilution: 1.000

Petroleum Hydrocarbons (C8 to C37) by GC/FID

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SOIL SAMPLE ANALYSIS

Report Notes

Results expressed as mg/kg air dried unless stated otherwise
SO4 analysis not conducted in accordance with BS1377
Water Soluble Sulphate on 2:1 water:soil extract
AR denotes analysis conducted on the As Received sample
Req Analysis Requested, see attached sheet for results
^ This analysis was subcontracted to another laboratory
I.S Insufficient sample for analysis
NBFO denotes No Bulk Fibres Observed
$$ Unable to analyse due to nature of sample
co-eluted with benzo(b)fluoranthene
co-eluted with Indeno(123-cd)pyrene
Intf Unable to analyse due to interferences
BTEX analysis expressed as µg/kg As Received
Phenol HPLC results expressed as mg/kg As Received
* denotes this result not UKAS accredited on this sample

End of Report

Repeat analysis results

Customer and Site Details: CL Associates: Staysure, Arborfield
TES Job Number: EFS/022274

TES ID Number	CL/0215911			
Client ID	TP4 0.2			

Analyte					
Lead	Original Result	1010			
	Repeat 1	152			
	Repeat 2	591			
	Repeat 3	108			
	Repeat 4	107			
	Repeat 5	110			

Results expressed as mg/kg air dried unless stated otherwise
SO4 Analysis not conducted in accordance with BS1377
AR denotes analysis conducted on the As Received sample