SYSTEMS LTD

APPLICATION NO:
C/2000/1305

LOCATION:
Land Rear Of 72-90 Grazeley Road, Three Mile Cross Reading.

APPLICANT:
Linden Homes South East Ltd C/O BDG Design

PROPOSAL:
Details to comply with conditions 18 & 19 of consent 99/70568/F for the approval of site assessment report.

EARLIEST DATE FOR DECISION: **29/05/2000**

APPLICATION EXPIRY DATE: **07/06/2000**

CASE OFFICER: **Angela Odell**

Tel. 0118 974 6445 (Direct Line)
E-mail: Angela.Odell@wokingham.gov.uk
Date. 12 October, 2000
My ref. AO/99/70568/F

Linden Homes
Linden House
Guards Avenue
The Village
Caterham-on-the-Hill
Surrey
CR3 5ZB

Environmental Services Department
Planning Services
P.O. Box 157
Shute End, Wokingham
Berkshire RG40 1WR
Tel: (0118) 974 6000
Fax: (0118) 974 6484
Minicom No: (0118) 977 8909
DX: 33506 – Wokingham

Dear Mr Elliot

PLANNING APPLICATION NO. 99/70568/F
ERECTION OF 44 DWELLINGS ON LAND TO REAR OF 72-90 GRAZELEY ROAD, SHINFIELD - CONDITIONS 18 & 19

I confirm the Report submitted by BDG Design is acceptable for discharge of the above conditions.

Yours sincerely

John Mitchell
Development Control Manager

WOKINGHAM DISTRICT COUNCIL

MEMORANDUM

From: John Mullaney
Environmental Health

My Ref: JRM

To: Angela Odell
Planning Department

Date: 11/10/00

LAND REAR OF 72-90GRAZELEY ROAD, SHINFIELD. DETAILS TO COMPLY WITH CONDITIONS 18 & 19.

Having considered the report submitted by BDG Design on behalf of Linden Homes I can recommend discharge of conditions 18 & 19 of approval 99/70568/F.

John Mullaney

John Mullaney
Environmental Health Officer

Our ref: SP\2000\001707\001
Your ref: C/2000/1305

Date: 20th July 2000

ENVIRONMENT AGENCY

PLANNING SERVICES	HPT 32140
POL	TLS
DC AB	ENF
APP	
CS	
2	
COPIES TO:	

District Planning Officer
Wokingham District Council
Council Offices,
Shute End,
Po Box 157
Wokingham
Berkshire
RG11 1BN

For the attention of: Angela Odell

Dear Sir/Madam

DETAILS TO COMPLY WITH CONDITIONS 18 & 19 OF CONSENT 99/70568/F REAR OF 72 - 90 GRAZELEY ROAD, THREE MILE CROSS

Thank you for your letter dated 5 May 2000 and additional information dated 18 May 2000. You are asked to quote the following reference in any correspondence: **SU76NW/12/12**. The Environment Agency has the following comments:

Groundwater Protection: Contact Brian Penny on 01276 45 4370.

I note the findings of the March 2000 investigation report produced by Southern Testing, in regard to the above conditions, and have no further comments or additional requirements.

If you have any further queries please do not hesitate to contact myself on 01276 454 323 quoting the reference cited at the beginning of this letter.

Yours faithfully

Sarah Paxman
Development Planning Officer

Environment Agency
Swift House, Frimley Business Park, Frimley, Camberley, Surrey GU16 5SQ
Telephone : 01276 454300 Fax : 01276 454301

STL 6421J
31 March 2000

Report on a Site Investigation

at

86-90 Grazeley Road, Three Mile Cross

for

Linden Homes South-East Limited

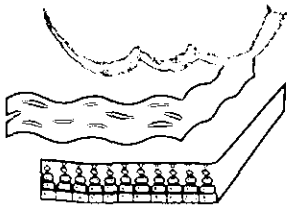
REPORT ON A SITE INVESTIGATION

at Grazeley Road, Three Mile Cross, nr.Reading

for Linden Homes

Table of Contents

	SUMMARY		2
A	**INTRODUCTION**		3
	1	Authority	3
	2	Proposed Construction	3
	3	Object	3
	4	Method	3
	5	Weather Conditions	4
	6	Scope	4
B	**THE SITE**		4
	7	Location	4
	8	Geology	5
	9	Soils as Found	5
C	**FIELD TESTING AND SAMPLING**		6
	10	In Situ California Bearing Ratio Test (CBR Test)	6
	11	Standard Penetration Test	6
	12	Undisturbed U100 Samples	7
	13	Hand Penetrometer Test	7
	14	Mexe Cone Penetrometer	7
D	**LABORATORY TESTS**		7
	15	Atterberg Limit Tests	7
	16	Sulphate Test	8
	17	Triaxial Compression Test	8
	18	Contamination Analysis	8
E	**DISCUSSION OF TEST RESULTS AND RECOMMENDATIONS**		9
	19	Soil Classification and Properties	9
	20	Swelling and Shrinkage	10
	21	Topsoil	11
	22	Ground Water	11
	23	Soakaways	11
	24	Sulphates	12
	25	Bearing Capacity	12
	26	Settlement	12
	27	Excavations	13
	28	Landslip	13
	29	Road Construction	13
	30	Contamination	14



SOUTHERN TESTING

Keeble House, Stuart Way,
East Grinstead, West Sussex, RH19 4QA
Telephone 01 342 313 156
Fax 01 342 410 321

Directors M B Scott BSc MSc CEng MICE MIHT MConsE (Chairman)
J M Hickmott BSc CEng MICE FGS (Managing Director)
P F Martin BSc DIC CEng FICE MConsE
M W Stevenson BSc MBA CEng MICE CGeol FGS MConsE (Technical Director)
R C Smith BSc MSc CGeol FGS
Helen L Smith BSc MSc CGeol DIC FGS ARSM
D Vooght BSc (Civ Eng) MSc
Company Secretary J W Kent ARICS MIMgt
Consultants Eur Ing Eur Geol Neil Duncan BSc CEng CGeol FIMM MInstWM MCIWEM
Alan Parker BSc CChem FRSC MInstWM
Dr Derek Petley PhD DIC BSc MIHT FGS

SUMMARY

This report concerns the back gardens of 86 - 90 Grazeley Road, a flat area of land used as amenity land or for smallholdings. The soil on site consists of 2m of head (clay with scattered gravel and sandy lenses) over stiff fissured clay.

The soils are clays of high to very high plasticity and foundation depths will require to be deepened to provide protection for NHBC 'HIGH'shrinkage potential. The upper soils contain sandy lenses and are water bearing so deep excavations are likely to be unstable, except when the water table drops below 2m, perhaps in periods of dry summer weather.

Ground water was encountered at about 1.5m bgl, but this level will vary from season to season. Soakaway drainage is unlikely to be successful.

Concrete should be protected against BRE Class II sulphates.

A bearing capacity of 90kPa is given at a depth of 1m. Piling may be a better option for foundations near trees, both because piles perform better in shrinkable soils, and because of the problems associated with deep excavations in potentially unstable ground. Pile bearing capacity tables are included.

Roads may be designed to a CBR of 3%.

The site is barely trafficable in wet weather because of a superficial layer of sandy clay and roads will be required early.

Four samples of soil were analysed for the ICRCL full suite and were found to be uncontaminated with respect to the ICRCL parameters.

Richard Brinkworth B.Eng

M.B.Scott MICE

Southern Testing Laboratories Limited

STL : 6421J
31 March 2000

A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in a letter dated 16th November 1999, and follow up telephoned instructions on February 4th 2000.

2 Proposed Construction

It is proposed to develop the rear gardens of 72-90 Grazeley Road Three Mile Cross with housing, together with highways and sewerage infrastructure. The work for this report concerns 86-90 Grazeley Road.

Building Type		Loading (kN/m run)		Bearing Pressure (normal foundations)	
	Width (mm)	Ground Bearing Floors	Suspended Ground Floor	Ground Bearing Floor kPa	Suspended Ground Floor kPa
Detached housing	500	50	50	80	100
2 storey flats / terraced housing	600	50	70	85	120

3 Object

The object of the investigation was to assess foundation bearing conditions and other relevant soil parameters for the proposed structure development, to determine the CBR values of the sub soil, and provide some contaminations data.

4 Method

This report is an addendum to our extended assessment report A1567 of April 1999 which provided information on the soils in the gardens of 72-84 Grazeley Road.

The strategy adopted for the investigation comprised the following

4.1 4 No 15m deep boreholes were drilled using a light percussion, 150mm diameter, shell and auger boring rig.

4.2 A series of 3 test pits were excavated using a hydraulic backhoe excavator.

4.3 6 in situ CBR tests were carried out along proposed roads, at locations as shown on the attached plan Fig 1.

4.4 4 Nr Contamination tests were carried out on samples from specified locations

4.5 Reference was made to report A1567.

5 Weather Conditions

The field work was carried out between 9 February 2000 and 18 February 2000 at which time the weather was mild and changeable.

The rainfall in early 2000 was within the normal range.

6 Scope

This report presents our trial hole and borehole logs and test results and our interpretation of those logs and results.

As with any site there may be differences in soil conditions between trial hole positions.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

It is impossible to state categorically that there is no contaminated fill on site due to the discrete number of sampling locations. A careful watch should therefore be kept for suspect materials during the construction phase.

Land-gas and contamination issues are not considered in this report.

B THE SITE

7 Location

The site is situated 1.2km south of Junction 11 on the M4 and 6km south of the centre of Reading alongside the A33. The approximate National Grid Reference of the site is SU 710 676.

7.1 General Description and Boundaries

The site comprises the grounds of a number of houses in Grazeley Road that are used as smallholdings and amenity land. The overall extent of the land is about 140m x 100m. The north boundary is irregular, marked by fences behind the existing houses. The south boundary is undefined, in an area containing sheds, trees, bushes and rubbish, at the toe of a north facing slope. The east boundary is a former garden fence with an existing Linden Homes development beyond. There is a skip depot on the west boundary.

There is a transverse ditch along the toe of the slope near the south boundary.

7.2 Topography . . Local and Regional

The ground is relatively flat and level in the north part of the site. From 50m short of the south boundary the land rises gently to the south and beyond the boundary the land rises more steeply to the south (7-8°). There is a bank on the south boundary.

7.3 Vegetation and Drainage

The vegetation is mainly grass lawn and pasture with scattered trees with occasional areas overgrown with scrub saplings. The main trees are oak, sycamore, ash, fruit and willow.

7.4 Buildings on Site and Nearby

The houses along Grazeley Road are from 80 years old to recent. Some slight foundation movement was noted in some of the houses. There is a substantial crack in blockwork to the rear of No.9.

8 Geology

The British Geological Survey Map No 268 indicates that the site geology consists of Londen Clay.

8.1 London Clay

London Clay is a well known stiff, fissured blue-grey clay which weathers to a brown colour near the surface. It contains thin layers of nodular calcareous mudstone - "claystone" - from place to place, and crystals of water clear calcium sulphate (selenite) are common. Although slopes will stand in the clay at steep angles in the short term, the long term stable slope angle is about 7° for grassed, or cleared slopes, and a few degrees more for wooded slopes.

9 Soils as Found

The soils encountered were consistent with the published geology. They were found to consist of 150 - 300 mm of topsoil, over soft or very soft sandy silty clay to 800mm over stiff clay with silty gravelly sand lenses to 1.6-2m, followed by stiff clay containing pale grey gravel sized silty inclusions, over stiff, fissured, blue grey and brown clay. Below a depth of 4 - 5m, the clay became greenish grey, and stiff to very stiff. The deep clay contained scattered fossil shells. The topsoil was churned by site traffic at the time of boring and some had been removed. The upper 1.6 - 2m of soil is a head deposit, and the deeper clay is consistent with the description of London Clay.

Water was encountered as slow seepage in some of the trial pits, at the base of the head, i.e. at a depth of around 1.6m. The seepage was never enough to allow a puddle to form in the base of the trial pits, Some water collected in the bore holes after standing overnight.

C FIELD TESTING AND SAMPLING

10 In Situ California Bearing Ratio Test (CBR Test)

The CBR value is the result of an empirical test on a soil, which can be used for road design purposes. In the test, a cylindrical plunger which is 1935 mm^2 in area, is forced into the soil at a uniform rate of 1 mm per minute. The CBR is the ratio of the force required to cause a standard penetration divided by the force required to cause the same penetration in a standard material, expressed as a percentage.

11 Standard Penetration Test

The Standard Penetration (SPT) Test is specified in BS 1377 Part 9 1990, Test 3.3. In this test, a 50 mm diameter open ended tube is driven into the ground by a 63.5 kg hammer falling freely through 760 mm. The tube is seated by driving to a penetration of 150mm, or by 25 standard blows, whichever occurs first. It is then driven for a maximum of a further 300mm and the number of blows is termed the penetration resistance (N). If 300mm penetration cannot be achieved in 50 blows (100 blows in soft rock), the test drive is terminated.

When testing in gravels, a conical end piece is attached to the tube. The test is then called an SPT(C) or a cone penetration test.

This test provides an indirect method of assessing the properties of cohesionless soils, and the following table (after Terzaghi and Peck) gives the approximate condition:-

Number Blows(N)	Density
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
Over 50	Very Dense

Clay

An approximate value for the shear strength of clay may be obtained using Stroud (1974), which paper indicates that the cohesive strength is a function of plasticity and SPT 'N' value. The relation is:

$C_u = f_i \times N$ kPa

C_u = undrained shear strength

f_i = factor related to plasticity index and ranging from 4 to more than 6.

12 Undisturbed U100 Samples

Undisturbed U100 samples were taken in the clay soils at appropriate intervals. These samples are taken in a 100 mm diameter, 450 mm long, thin-walled steel tube, and are sealed with paraffin wax and tightly fitting end caps for transporting to the laboratory.

13 Hand Penetrometer Test

The hand penetrometer consists of a spring loaded and calibrated plunger which is forced into the soil. A reading of unconfined compression strength (equal to twice cohesion) is given on a calibrated scale. In common with other hand methods of strength assessment (eg. the shear vane) it does not give an accurate indication of bearing capacity in stiff or fissured soils, because of the small test area. The figures are used for strength classification according to the table below, in lieu of, or in addition to, the descriptive method given in BS 5930 Table 6.

Penetrometer Value (kPa)	Undrained Shear Strength (kPa)	Term
Less than 40	Less than 20	Very soft
40 - 80	20 - 40	Soft
80 - 100	40 - 50	Soft to firm
100 - 150	50 - 80	Firm
150 - 200	75 - 100	Firm to stiff
200 - 300	100 - 150	Stiff
300 - 400	150 - 200	Very stiff or hard
More than 400	More than 200	Extremely stiff

14 Mexe Cone Penetrometer

This is a tool which was designed by the Military Experimental Establishment to give direct readings of either the CBR or the 'Cone Index' of soils in the field. In the test one of two cones is attached to the end of marked rods and is pushed into the ground at a steady rate, and the reading on the measurement dial is noted.

The smaller cone (129mm^2 in area)is used for CBR determination, and to supplement standard in situ CBR tests. The value is read from the (non linear) CBR scale on the instrument. Local experience by this laboratory indicates that the readings correlate fairly well with the *in situ* test, although the strength of weaker soils is underestimated.

D LABORATORY TESTS

15 Atterberg Limit Tests

This is a valuable classification test in which an arbitrary procedure is used to determine the moisture contents at which a soil changes from a liquid through a plastic to a solid

state and gives an indication of the clay quantities present in the soil.

16 Sulphate Test

The sulphate content of groundwater or of a 2:1 water to soil extract is determined by passing the solution through an ion exchange column and titrating the effluent with NaOH solution.

The method cannot be used if the soil or ground water contains anions of other strong acids, such as chloride, nitrates and phosphates. If the site is near an estuary or close to the sea, it may lead to erroneous results because of the high concentration of chloride in sea water.

17 Triaxial Compression Test

Shear characteristics of the soil are obtained by the undrained triaxial test. In this test, 38 mm. diameter or 100 mm. diameter samples were tested in compression under a series of varied lateral pressures, and the angle of shearing resistance and apparent cohesion obtained.

18 Contamination Analysis

Soil samples were analysed for parameters specified in the DOE publication "Guidance on the Assessment and Redevelopment of Contaminated Land (ICRCL 5983, 2nd Edition, July 1987)" as follows:-

Group A: Zootoxic Metals

Total Arsenic, Total Cadmium, Total Chromium, [Hexavalent Chromium], total Lead, Total Mercury, Total Selenium

Group B: Phytotoxic Metals

Total Copper, Total Nickel, Total Zinc, Water-Soluble Boron

Table 4 Parameters:

[Total Polyaromatic Hydrocarbons], Freon Extract, Total (mono) Phenols, Total Cyanide, [Free & Complex Cyanide], [Thiocyanate], Water Soluble Sulphate, Total Sulphide, [Sulphur], pH Value.

PAHs determined by GCFID.

Brackets [] show dependent options which are determined as follows:

Hexavalent chromium	if total CR > 25mg/kg

Free, complex cyanide	if total cyanide > 25mg/kg
Elemental sulphur	if toluene extract > 0.5%
PAH screen	if toluene extract > 0.2%

E DISCUSSION OF TEST RESULTS AND RECOMMENDATIONS

19 Soil Classification and Properties

19.1 Upper 2m of soil

The upper 2m of soil varied from sand to clay. Five soil classification tests were carried out in the two phases of the work. The recorded liquid limit varied from 24 - 72, averaging 52 and the plasticity index from 13 - 46, averaging 33.

The soil is expected to have the following properties:-

1. High swelling and shrinkage
2. Poor value as a road foundation
3. Non frost susceptible
4. Poor drainage characteristics
5. Because of the sand content the sides of excavations are likely to be very unstable, particularly in wet weather.
6. The soil will soften very rjapidly when wetted.

The deeper clay was more consistent, with a liquid limit ranging from 64 - 74, average 69 and the plasticity index 23 - 25, average 25.

19.2 Soil below 2m

The anticipated properties are:-

1. Very high swelling and shrinkage
2. Poor value as a road foundation
3. Non frost susceptible
4. Very poor drainage characteristics (with negligible permeability when remoulded)
5. In excavations the soil is prone to failure along fissures.

20 Swelling and Shrinkage

Overall the soil is in the NHBC 'HIGH' Classification and appropriate precautions are required noting the number of trees and saplings through the site. It is anticipated that the soils will return quickly to equilibrium after trees and saplings are removed because much of the superficial 2m of head soil is sandy and slightly permeable and the water table is high.

Noting the number of trees care is required with trench fill foundations to ensure that there is a layer of buffer material on the inside faces of the foundations. Piling should also be considered as piles perform better in shrinkable soils, when compared with deep trench fill. Piled foundations would also obviate problems in constructing deep foundations in unstable soils.

NHBC Chapter 5.2 provides details of footing depth and control of lateral forces. For convenience the depth requirements are replicated in the tables below.

Table of Foundation Depths. . . . Deciduous Trees. . High Shrinkage Potential								
	Distance from the dwelling as a proportion of the tree height							
(D/H Ratio)	0.0	0.1	0.2	0.4	0.5	0.7	1.0	1.25
Tree Species	Depth of foundation in m/mm							
Oak, Poplar, Willow, Elm, Eucalyptus.(High demand)	3.5	3.3	3.1	2.7	2.5	2.1	1.5	1.0
Ash, Plane, Cherry, Fruit (Moderate demand)	2.4	2.2	2.0	1.65	1.45	1.1	1.0	1.0
Beech, Holly, Magnolia, Mulberry (Low demand)	1.8	1.65	1.5	1.15	1.0	1.0	1.0	1.0

Table of Foundation Depths. . . . Conifers . . . High Shrinkage Potential.								
	Distance from dwelling as a proportion of the tree height							
(D/H Ratio)	0.0	0.1	0.2	0.3	0.35	0.4	0.5	0.6
Tree Species	Depth of foundation in metres/mm							
Lawsons, Monterey Cypress (High Demand)	3.5	3.1	2.65	2.2	2.0	1.85	1.40	1.00
Cedar, Pine, Spruce, Douglas Fir, Wellingtonia, & Yew (Moderate Demand)	2.4	2.00	1.6	1.2	1.00	1.00	1.00	1.00

Minimum depth = 1000mm.

21 Topsoil

The topsoil on site is very clayey and will therefore compact to an incompressible mass if trafficked by heavy plant. It was noted when drilling the boreholes that the soil was churned and difficult to distinguish from the underlying clay.

To retain the topsoil for later use in gardens a topsoil management scheme would prove beneficial. Clayey topsoil is difficult to maintain in good condition, and when compacted by site traffic may become indistinguishable from the underlying clay, and imported soil may be required.

22 Ground Water

Ground water was encountered as seepage at about 1.5m bgl. The true water table can only be established by long term monitoring from standpipes, but it is antiicpated that the water level will rise close to the surface during wet weather and may fall to 2m or more during extended summer periods. There are clear advantages in opening excavations during dry summer weather as the excavation sides would be expected to be stable.

23 Soakaways

The high ground water table and low soil permeability means that soakaways would not be acceptable for highway and house drainage. Soakaway drainage for ancillary buildings may be acceptable but inundation is likely after heavy rain. There is a deep transverse ditch near the south boundary and it is understood that this was dug to control water problems on site.

24 Sulphates

The sulphate concentrations were in the upper part of BRE Class II. One result was obtained in Class III. This sample was found to contain chloride so the result has been discounted.

Protection to BRE Class II is recommended for this site.

25 Bearing Capacity

25.1 Shallow Footings

The shallow soil, up to 2m deep, is variable and contains sand lenses. It is prone to rapid softening below the water table or during inclement weather.

A bearing capacity of 90kPa may be adopted based on the results of triaxial tests. Foundations should be nominally reinforced to allow the foundations to span soft spots in the upper 2m. Below 2m the reinforcement may be omitted. Foundation excavations must be kept dry, to avoid softening.

25.2 Piled Foundations

Piles may be more cost effective where foundations have to be deepened below the water table, near trees, both because of the cost of the forming deep trench fill, but also because the problems from potentially unstable ground are avoixed.

With any piling scheme discussions should be held with selected piling contractors to discuss the technical and financial merits of their various systems, and overall resources with respect to equipment available for the soils described and anticipated, and to achieve depths and diameters considered, with an adequate safety margin.

In this case any pile type can be used noting that the uppermost 2m would require to be cased to prevent water seepage into the pile shaft.

Graphs of cohesion (based on triaxial tests) and cohesion (based on SPT tests) versus depth have been drawn. Both plots show a consistent increase in strength with depth and the pile calculations give similar results, with the SPT method giving 10% lower pile bearing capacities. The triaxial method is the definitive method and the higher results would be appropriate for preliminary estimating purposes. The pile contractor will provide final bearing capacity figures, but in the interim the triaxial results indicate a 280kN load bearing capacity for a 12m x 400mm diameter pile.

26 Settlement

The anticipated settlement is less than 25mm, which is within acceptable limits for housing.

27 Excavations

Statutory support will be required in all excavations where men must work. It is noted that wedge shaped failures occur in stiff fissured clays, even at shallow depth. Excavations can be particularly unstable in stiff fissured clays in wet winter weather as the vertical shrinkage fissures fill with water, causing clay to peel into the excavation. A rise in ground water level in granular strata may have considerable cost implications as dewatering may be required, and piling may be a more economic solution for foundations.

In this case it is anticipated that excavation sides will be unstable in wet conditions and excavation would be better carried out in dry weather.

28 Landslip

Landslip is not envisaged as a problem, as there are no steep slopes on site, except for a limited area in the south. Some regrading will be required in this area and it is anticipated that the slopes will become shallower. It is essential that no works are undertaken that might destabilise the existing slopes.

29 Road Construction

29.1 General Comments on Road Construction

The most important element of any road construction is drainage and attention must be given not only to the drainage of the subsoil, but to the various layers of construction. To this end the formation should be shaped to a camber or crossfall to allow water movement out of the sub-base. Silty soils soften extremely quickly if allowed to become wet or if they are excavated below the water table and this softening can give rise to a very substantial increase in costs.

Sub-base and coarse capping materials tend to segregate during placing operations, particularly when end tipped. On soft clay subgrades this can lead to punching and softening of the formation. The use of a layer of sand or geofabric will minimise the problem.

Useful information on compaction of formations is given in the DOT Brown (1986) Specification, Pase 2, Clause 616. It should be noted that if concrete is to be used in construction, sulphate tests should be carried out. Construction traffic should be kept off formations and it is often advisable to leave a protective layer of soil above formation level until the last moment before placing the sub-base.

29.2 Road Design

In this case, six in situ CBR tests were carried out and consistent values in the range 2.4 - 3.9 were obtained (average 2.9). Atterberg Limit tests were carried out and they indicate that a CBR value in the range 2.5 - 3.5 may be adopted.

On balance it is recommended that a design CBR of 3% is used and the Berkshire County Council design figures used. Alternatively a design to Road Note 29 is appended.

These figures may be used for private streetworks, drives and hardstandings.

30 Contamination

30.1 Sampling Regime

The overall site area is about 1¾ hectares, roughly one third of which is likely to be domestic garden.

The site has not been the subject of a contaminative uses desk study. Historic maps were researched for the initial investigation, A1567, and these indicated thatt the site has been used for agriculture and residential purposes, with no significant potential sources of contamination apparent

A series of eight samples of the near surface soils were submitted for analysis for report A1567, with an additional four from specified locations for the current work. In the light of the former uses of the site and its surroundings, and on the basis of the soils found, the samples were tested for a range of contaminants usually associated with general industrial waste in accordance with tables 3 and 4 of ICRCL 59/83[1].

30.2 Analytical Framework

In assessing the degree of contamination of each determinant, reference must be made to a number of different published guidelines. The ICRCL have developed guidelines which largely relate the acceptable levels of certain parameters to the proposed end use. Trigger values are used. They cover a very limited range of contaminants. For a more general classification of contamination, reference is made to the tables developed by Kelly[2] and widely referred to as "Kelly's tables". Again the range of contaminants is limited.

Dutch figures[3] are available for a wider range of contaminants and these are now widely used in this country. These are based on a policy of clean-up to a level suitable for any use.

They provide a means of quantitatively assessing contamination levels. The three sources given above are not consistent with each other and considerable judgement is required in relating levels of contamination both to the existing site conditions and to the proposed end use.

---

1 Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL)(1987), Guidance Note 59/83, Guidance on the Assessment and Redevelopment of Contaminated Land, Department of the Environment

2 Kelly, R T (1980), Site Investigation and Material Problems, in: *Reclamation of Contaminated Land*, B2/1-B2/13, Society of Chemical Industry

3 Environmental Quality Objectives in the Netherlands (1994)

30.3 Test Results

The four samples tested for the current investigation were free of contamination in respect of the hazards from the ICRCL suite of contaminants, and the measured concentrations were within the guide lines for soil for use in domestic gardens or allotments.

30.4 Conclusions and Recommendations

A careful watch should be kept for suspect materials during the construction phase and those encountered should be investigated and dealt with by appropriately qualified persons.

Four samples of soil were analysed, as specified, for the ICRCL full suite, Tables 3 and 4. Combined with testing carried out on the remainder of the site 12 analyses have been carried out, eight for the full suite and four for metals only. For convenience, the results for both the current investigation and the previous are included.

When the test results are considered in conjunction with the results obtained in the previous investigation, and noting that the land has been used for agricultural and residential purposes in the past, it is considered that recommendations given in report A1567 stand. That is to say that the land may be considered uncontaminated for the range of contaminants set out in ICRCL 59/83.

SOUTHERN TESTING

Geotechnical Consultancy, Site Investigation & Environmental Survey

TEST HOLE LOG

National Grid Reference		SU 711 676	
Job No	6241J	Date	09/02/2000
Logged by	mbs	Engineer	mbs

Site : 86 - 90 Grazeley Road, Three Mile Cross

Client : Linden Homes

Excavation Method : 3 Tonne Kubota KX71-2

Hole No TP 1

Water strikes: **Slight water seepage at 1.6m**
Water level: **nil**
Pit sides: **STABLE**

Depth m/mm	Sample Type	Test Type & Value	Depth (Thickness)	Key	Soil Description
150	D		(300)		TOPSOIL
300					
450	D	⊥ 90 X 1.5%	(500)		SILT: Soft to firm, grey brown, sandy clay SILT /very silty CLAY with scattered gravel
800					
1.0	D	⊥ 230	(1.0)		CLAY: Stiff grey brown slightly gravelly silty CLAY. . . . with approx 20% flint gravel from 1.6m
1.5		⊥ 260			
1.8					
2.0	D		(1.0)		CLAY: Stiff grey and brown weathered fissured CLAY.
2.8	D		2.8		

Hole No TP 2

Water strikes: **Nil**
Water level: **Nil**
Pit sides: **STABLE**

Depth m/mm	Sample Type	Test Type & Value	Depth (Thickness)	Key	Soil Description
150	D		(250)		TOPSOIL
250					
400		X 150.0%	(550)		SILT: Soft to firm pale brown sandy, slightly gravelly, clay SILT
500	D	⊥ 80			
800					
1.0	D	⊥ 190	(800)		CLAY: Stiff orange and grey brown sandy silty CLAY with scattered gravel . . . Sandy lense from 1.4 - 1.6m. Some polished fissure surfaces
1.5		⊥ 240			
1.6					
2.0	D	⊥ 280	(800)		CLAY: Stiff grey and brown, weathered fissured silty CLAY with gravel sized pale grey silty inclusions. Some polished fissure surfaces.
2.4					
2.8	D		(400)		CLAY: Stiff blue grey and brown, weathered, fissured, silty CLAY.
			2.8		

Hole No TP 3

Water strikes: **Seeps from 1.6m**
Water level: **Nil**
Pit sides: **Stable**

Depth m/mm	Sample Type	Test Type & Value	Depth (Thickness)	Key	Soil Description
150	D		(250)		TOPSOIL
250					
400	D	⊥ 60 X 0.5%	(550)		SILT: Soft, yellow brown sandy, slightly gravelly, clayey SILT
800					
1.0	D	⊥ 60	(900)		CLAY: Stiff brown gravelly sandy very silty CLAY, with large lenses of clayey gravelly fine SAND Approx 50/50 SILT/SAND
1.5		⊥ 240			
1.7					
2.0	D	⊥ 280	(700)		CLAY: Stiff grey and brown fissured silty CLAY with abundant gravel sized speroidal pale grey silt inclusions
2.4					
2.8	D	⊥ 250	(400)		CLAY: Stiff blue grey and brown fissured silty CLAY
			2.8		

Hole No

Water strikes:
Water level:
Pit sides:

Depth m/mm	Sample Type	Test Type & Value	Depth (Thickness)	Key	Soil Description

* ▽: Perth Penetration Test, 'N' value; ▼: Standard Penetration Test, 'N' values; ⊥: Unconfined Compression Strength by hand penetrometer, kN/m2; V: Shear Vane test, kN/m2; X: CBR by Mexe cone penetrometer, %; D: Disturbed sample; U: Undisturbed sample; B: Bulk sample; W: Water sample

SOUTHERN TESTING

Geotechnical Consultancy, Site Investigation & Environmental Survey

Job No: **6421** Hole No: **1**

National Grid Reference		SU 711 675	
Start date	14/02/2000	End date	14/02/2000
Ground level		Backfill date	
Logged by	MBS	Engineer	MBS
Final depth	15.00	Page	1 of 1

Site : Grazeley Road, Three Mile Cross

Client : **Linden Homes South-East Limited**

Drilling Method : Shell and Auger (150mm)

Piezometer or Monitoring well	Testing Depth	Testing SPT(N value) CPT(N value) U(blows)	Samples Depth	Samples Type	Strata Thickness	Strata Level	Strata Legend	Strata Depth	Strata Descriptions	
			0.15	D	0.15			0.15	TOPSOIL	TOPSOIL.
			0.50	D	0.75				CLAY	Soft pale grey brown and red brown silty CLAY, becomming gravelly from 0.7m.
			0.80	D				0.90		
	1.10	U (16)	1.10	D					CLAY	Firm to stiff brown silty CLAY with lenses of grey silty sand.
			1.10	U	1.00					
			1.60	D				1.90		
									CLAY	Stiff, fissured, brown grey and blue grey silty CLAY. Sulphate crystals noted at 4.7m.
	2.60	SPT (10)								
			3.10	D						
			3.70	D	3.30					
	4.20	U (22)	4.20	U						
			4.70	D						
			5.30	D				5.20	CLAY	Stiff to very stiff fissured greenish grey CLAY.
	5.80	SPT (16)								
			6.30	D						
	7.50	U (32)	7.50	U						
			8.00	D						
	9.00	SPT (18)								
			9.50	D						
					9.80					
	10.50	U (34)	10.50	U						
			11.00	D						
	12.00	SPT (26)								
			12.50	D						
	13.80	U (36)	13.80	U						
			14.00	D						
	14.50	SPT (26)								
			15.00	D				15.00		End of Borehole

Hole Diameters

Depth (m)	Hole (mm)	Casing (mm)
1.50	150	150

Water Strikes

Date	Water (m)	Casing (m)	Time (mins)	Rose to (m)	Sealed (m)
14/02/00	14m o'night				

Chiselling Time

From (m)	To (m)	Time (hrs)

General Remarks

Winching to access Bore Hole.

Cased to 1.5m.

SOUTHERN TESTING

Geotechnical Consultancy, Site Investigation & Environmental Survey

Job No: **6421** Hole No: **2**

National Grid Reference		SU 711 675	
Start date	15/02/2000	End date	15/02/2000
Ground level		Backfill date	
Logged by	MBS	Engineer	MBS
Final depth	15.00	Page	1 of 1

Site : Grazeley Road, Three Mile Cross

Client : **Linden Homes South-East Limited**

Drilling Method : Shell and Auger (150mm)

Piezometer or Monitoring well	Testing Depth	Testing SPT(N value) CPT(N value) U(blows)	Samples Depth	Samples Type	Strata Thickness	Strata Level	Strata Legend	Strata Depth	Strata Descriptions	
					0.15			0.15	TOPSOIL	Grass and TOPSOIL.
			0.50	D	0.65				CLAY	Soft to firm brown sandy silty CLAY.
			0.90	D				0.80	CLAY	Stiff brown sandy CLAY with scattered small gravel.
	1.20	U (18)	1.20	U	0.80					
			1.70	D	0.30			1.60	CLAY	Stiff fissured brown mottled silty CLAY with gravel sized calcareous nodules.
			2.00	D				1.90	CLAY	Stiff fissured, grey brown silty CLAY, blue grey on fissures.
			2.30	D						
	2.70	U (22)	2.70	U	1.60					
			3.20	D				3.50	CLAY	Stiff, fissured, grey brown silty CLAY.
	4.20	U (24)	4.20	U	1.40					
			4.70	D				4.90	CLAY	Stiff to very stiff fissured greenish grey silty CLAY.
	5.50	SPT (17)								
			6.00	D						Fine fossilised root remains noted at 6.0m.
	7.00	U (28)	7.00	U						
			7.50	D						
	8.50	SPT (20)								
			9.00	D						
	10.00	U (28)	10.00	U	10.10					Small shells noted at 10.0m.
			10.50	D						
	11.50	SPT (21)								
			12.00	D						
	13.00	U (34)	13.00	U						
			13.40	D						
	14.50	SPT (29)								
			15.00	D				15.00		End of Borehole

Hole Diameters

Depth (m)	Hole (mm)	Casing (mm)
1.60	150	150

Water Strikes

Date	Water (m)	Casing (m)	Time (mins)	Rose to (m)	Sealed (m)
	8.00				

Chiselling Time

From (m)	To (m)	Time (hrs)

General Remarks

Winching in soft ground 1 hour.

SOUTHERN TESTING

Geotechnical Consultancy, Site Investigation & Environmental Survey

Job No: **6421** Hole No: **3**

National Grid Reference		SU 711 675	
Start date	16/02/2000	End date	16/02/2000
Ground level		Backfill date	
Logged by	MBS	Engineer	MBS
Final depth	15.00	Page	1 of 1

Site : Grazeley Road, Three Mile Cross

Client : **Linden Homes South-East Limited**

Drilling Method : Shell and Auger (150mm)

Piezometer or Monitoring well	Testing Depth	Testing SPT(N value) CPT(N value) U(blows)	Samples Depth	Samples Type	Strata Thickness	Strata Level	Strata Legend	Strata Depth	Strata Descriptions	
			0.30	D	0.80				CLAY	Grass and topsoil over very soft very sandy silty CLAY with scattered gravel
			1.00	D				0.80		
	1.20	U (13)	1.20	U	0.70				CLAY	Stiff brown silty CLAY with scattered coarse sand/grit
			1.70	D	0.30			1.50	SAND	Brown very silty medium sized SAND
			2.00	D				1.80	CLAY	Stiff brown, grey brown and grey silty CLAY, gritty over top 300 - 500mm
	2.50	U (18)	2.50	U						
			3.00	D	2.10					
	4.00	U (18)	4.00	U				3.90	CLAY	Stiff becoming very stiff fissured greenish grey silty CLAY
			4.50	D						
	5.50	SPT (16)								
			6.00	D						
	7.00	U (24)	7.00	U						
			7.50	D						Shells noted at 7.5m.
	8.50	SPT (23)								
			9.00	D						Pale grey silt partings and occasional fossilised lenses at 9m.
					11.10					
	10.00	U (28)	10.00	U						
			10.50	D						
	11.50	SPT (19)								
			12.00	D						
	13.00	U (35)	13.00	U						
			13.50	D						
	14.50	SPT (26)								
			15.00	D				15.00		End of Borehole

Hole Diameters

Depth (m)	Hole (mm)	Casing (mm)
2.60	150	150

Water Strikes

Date	Water (m)	Casing (m)	Time (mins)	Rose to (m)	Sealed (m)
16/02/00	1.80	1.50			

Chiselling Time

From (m)	To (m)	Time (hrs)

General Remarks

SOUTHERN TESTING

Geotechnical Consultancy, Site Investigation & Environmental Survey

Job No: **6421** Hole No: **4**

National Grid Reference		SU 711 675	
Start date	17/02/2000	End date	17/02/2000
Ground level		Backfill date	17/02/2000
Logged by	MBS	Engineer	MBS
Final depth	15.00	Page	1 of 1

Site : Grazeley Road, Three Mile Cross

Client : **Linden Homes South-East Limited**

Drilling Method : Shell and Auger (150mm)

Piezometer or Monitoring well	Testing Depth	Testing SPT(N value) CPT(N value) U(blows)	Samples Depth	Samples Type	Strata Thickness	Strata Level	Strata Legend	Strata Depth	Strata Descriptions	
					0.60				CLAY	Very soft brown sandy silty CLAY with scattered gravel
								0.60		
	0.90	U (15)	0.90	D	0.70				CLAY	Soft brown silty CLAY with scattered gravel and grit
			0.90	U						
			1.40	D	0.50			1.30	CLAY	Stiff brown silty CLAY with scattered gravel and occasional sandy lenses
								1.80	CLAY	Firm brown, orange brown and grey CLAY with calcareous nodules and claystone
	2.00	U (12)	2.00	D						
			2.00	U	1.00					
			2.50	D						
								2.80		
	3.00	U (12)	3.00	U					CLAY	Stiff fissured grey brown, orange brown and grey silty CLAY
			3.50	D	1.50					
								4.30		
									CLAY	Stiff to very stiff fissured greenish grey silty CLAY
	4.80	U (14)	4.80	U						Intact fossil turret shells noted at 4.5m.
			5.30	D						
	5.80	SPT (12)								
			6.30	D						
	7.50	U (20)	7.50	U						
			8.00	D						
	9.00	SPT (17)								
			9.50	D	10.70					
	10.50	U (28)	10.50	U						Intact fossil turret shells noted at 10.5m.
			11.00	D						
	12.30	SPT (23)								
			12.80	D						
	13.50	U (30)	13.50	U						
			14.00	D						
	14.50	SPT (24)								
			15.00	D				15.00		
										End of Borehole

Hole Diameters

Depth (m)	Hole (mm)	Casing (mm)
3.00	150	150

Water Strikes

Date	Water (m)	Casing (m)	Time (mins)	Rose to (m)	Sealed (m)
17/02/00	2.70	3.00			

Chiselling Time

From (m)	To (m)	Time (hrs)

General Remarks

Grazeley Road

BEARING CAPACITY of BORED PILES in KN

Pile Length	Factor of Safety=2 Pile Diameter 300 mm	350 mm	400 mm	450 mm	500 mm	600 mm	Factor of Safety=2.5 Pile Diameter 300 mm	350 mm	400 mm	450 mm	500 mm	600 mm	Factor of Safety=3 Pile Diameter 300 mm	350 mm	400 mm	450 mm	500 mm	600 mm
6.0	80	95	115	135	160	210	65	75	95	110	130	165	50	65	80	90	105	140
7.0	105	125	150	175	200	260	80	100	120	140	160	210	70	85	100	115	135	175
8.0	130	155	185	215	250	320	105	125	150	175	200	255	85	105	125	145	165	210
9.0	155	190	225	260	295	380	125	150	180	205	240	305	105	125	150	175	200	250
10.0	185	225	265	305	350	445	150	180	210	245	280	355	125	150	175	205	235	295
11.0	220	260	305	355	405	510	175	210	245	285	325	410	145	175	205	235	270	340
12.0	250	300	355	405	465	585	200	240	280	325	370	465	170	200	235	270	310	390

The ASSUMED cohesion depth line has a zero intercept of 12kPa and slope of 9.12kPa/m
Nil shaft adhesion was assumed to a depth of 3m.
A value of .45 was used for adhesion,and 7.5 for Nc,for the clay.
An adhesion value of 0.45 assumes good site practice, otherwise a lower value would be appropriate.

The above figures must not supercede the Engineer's design

Site: Grazeley Road, Three Mile Cross.	STL: 6421	Fig No:
Date: 29 March 2000	Based on triaxial tests.	

Southern Testing Laboratories Limited
Geotechnical Consulting Engineers

Grazeley Road

BEARING CAPACITY of BORED PILES in kN

	Factor of Safety=2 Pile Diameter						Factor of Safety=2.5 Pile Diameter						Factor of Safety=3 Pile Diameter					
Pile Length	300 mm	350 mm	400 mm	450 mm	500 mm	600 mm	300 mm	350 mm	400 mm	450 mm	500 mm	600 mm	300 mm	350 mm	400 mm	450 mm	500 mm	600 mm
5.0	50	65	80	95	110	145	40	50	65	75	90	115	35	45	55	65	75	100
6.0	70	90	105	125	145	190	55	70	85	100	115	150	50	60	70	85	95	125
7.0	95	115	135	160	180	235	75	90	110	125	145	190	60	75	90	105	120	155
8.0	115	140	165	195	220	285	90	110	130	155	175	225	75	95	110	130	150	190
9.0	140	170	200	230	265	335	110	135	160	185	210	270	95	110	130	155	175	225
10.0	165	200	235	270	310	390	130	160	185	215	245	310	110	130	155	180	205	260
11.0	190	230	270	310	355	450	155	185	215	250	285	360	130	155	180	210	235	300
12.0	220	265	310	355	405	510	175	210	245	285	325	405	145	175	205	235	270	340

The ASSUMED cohesion depth line has a zero intercept of 45kPa and slope of 7.0kPa/m
Mil shaft adhesion was assumed to a depth of 3m.
A value of .45 was used for adhesion,and 7.5 for Nc,for the clay.
An adhesion value of 0.45 assumes good site practice, otherwise a lower value would be appropriate.

The above figures must not supercede the Engineer's design

Site: Grazeley Road, Three Mile Cross.	STL: 6421	Fig No:
Date: 29 March 2000	Based on SPT values.	

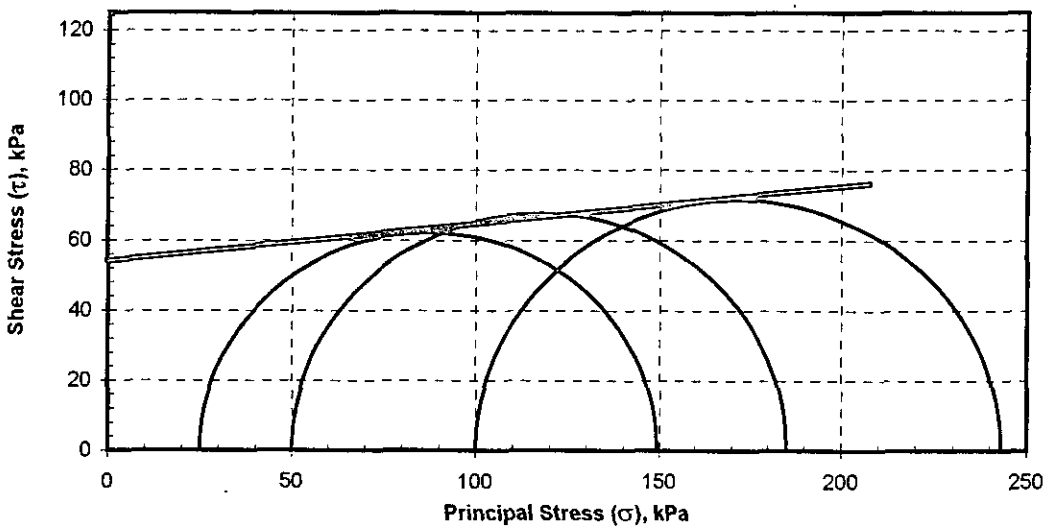
Southern Testing Laboratories Limited
Geotechnical Consulting Engineers

Summary Sheet ... Triaxial Compression Test Results

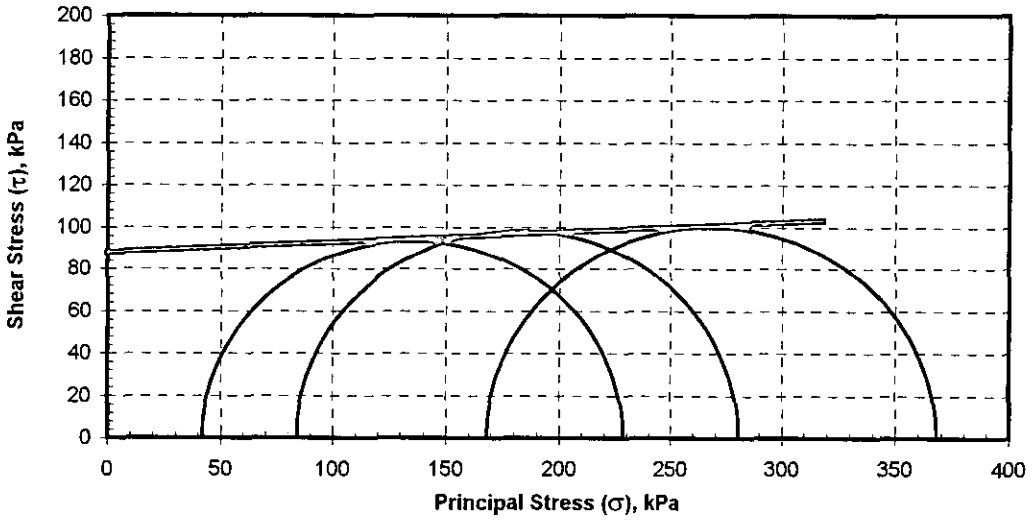
Job No: 6421j **Site:** Three Mile Cross, Reading **Date:** 01/03/00 **Checked by:**

Hole No	Depth	Moisture Content	Bulk Density	Dry Density	Cell Pressure	Compressive Strength	Apparent Cohesion; C_u	Apparent Angle of Friction; ϕ_u	Soil Description	UCS
	(m)	*(%)*	*(Mg/m^3)*	*(Mg/m^3)*	*(kPa)*	*(kPa)*	*(kPa)*	*(deg)*		*(kN/m^2)*
BH3	7.0	25.1	2.00	1.60	70 140 280	264.0 272.2 280.5	136.1 or 125.3	0.0 or 2.1	Very stiff very dark grey CLAY with fine sandy layers and polished surfaces.	375
BH3	10.0	27.1	2.01	1.58	100 200 400	183.3 205.2 227.2	102.6 or 80.6	0.0 or 3.8	Very stiff very dark grey plastic CLAY with fine sandy lenses and polished surfaces.	450
BH3	13.0	26.2	2.02	1.60	130 260 520	282.6 296.6 307.4	147.8 or 134.6	0.0 or 1.7	Very stiff very dark grey CLAY with fine sandy layers, polished surfaces and occasional fine calcareous fragments.	580
BH4	2.0	28.3	1.98	1.54	25 50 100	65.3 85.5 90.3	40.2 or 27.1	0.0 or 7.8	Firm light brown with some orange patches plastic CLAY wiht sandy lenses and occasional fine flints.	200
BH4	7.5	29.1	1.98	1.53	75 150 300	189.5 203.6 208.4	100.3 or 90.1	0.0 or 2.1	Very stiff to stiff very dark grey CLAY with polished surfaces.	300
BH4	10.5	25.4	2.06	1.64	105 210 420	251.6 270.1 298.0	136.6 or 111.0	0.0 or 3.9	Very stiff very dark grey CLAY with occasional very fine sandy lenses.	520

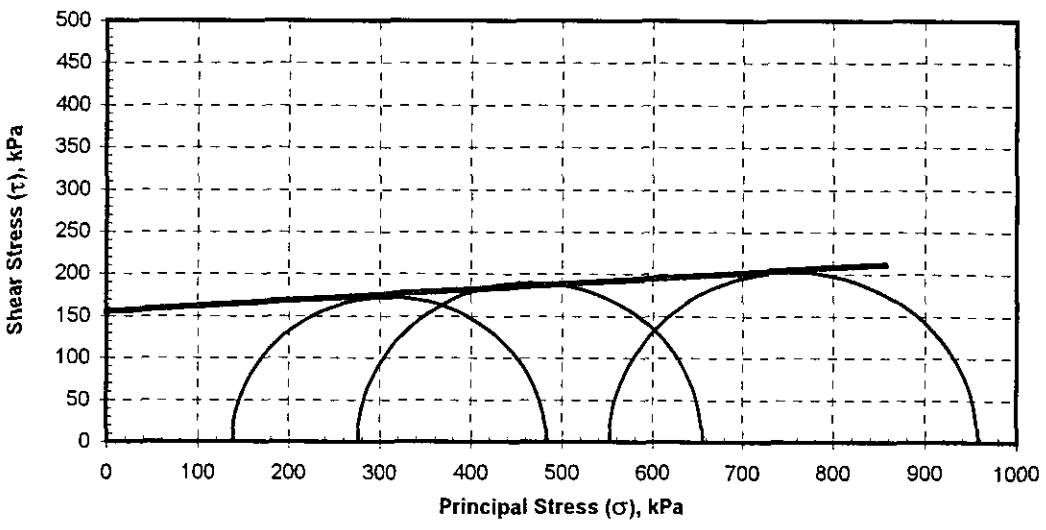
Triaxial Tests, Mohr's Circles



Hole No: BH1 **Depth:** 1.1m **Cav=** 67.1kPa , (ϕ=0) or **C=** 54.0kPa and ϕ= 6.1



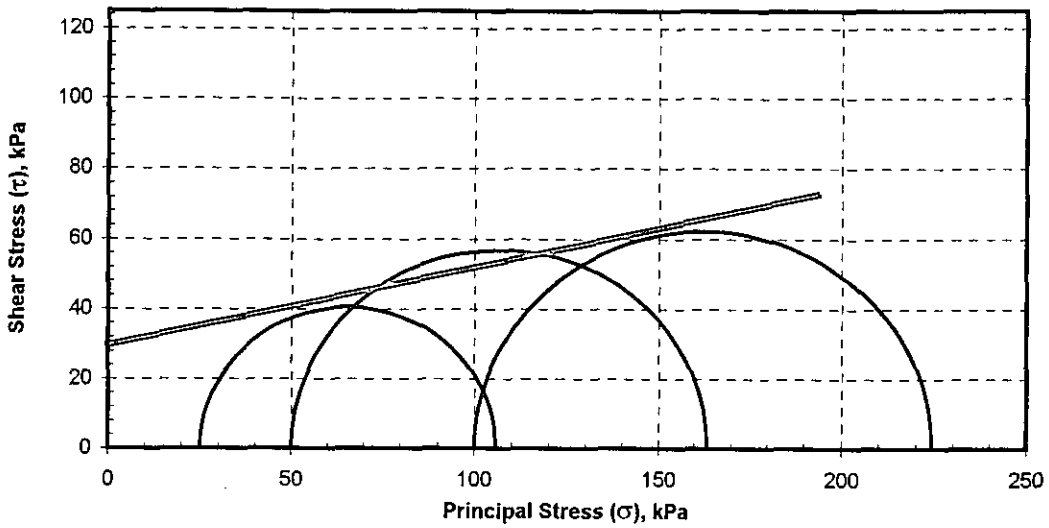
Hole No: BH1 **Depth:** 4.2m **Cav=** 97.1kPa , (ϕ=0) or **C=** 87.9kPa and ϕ= 2.7



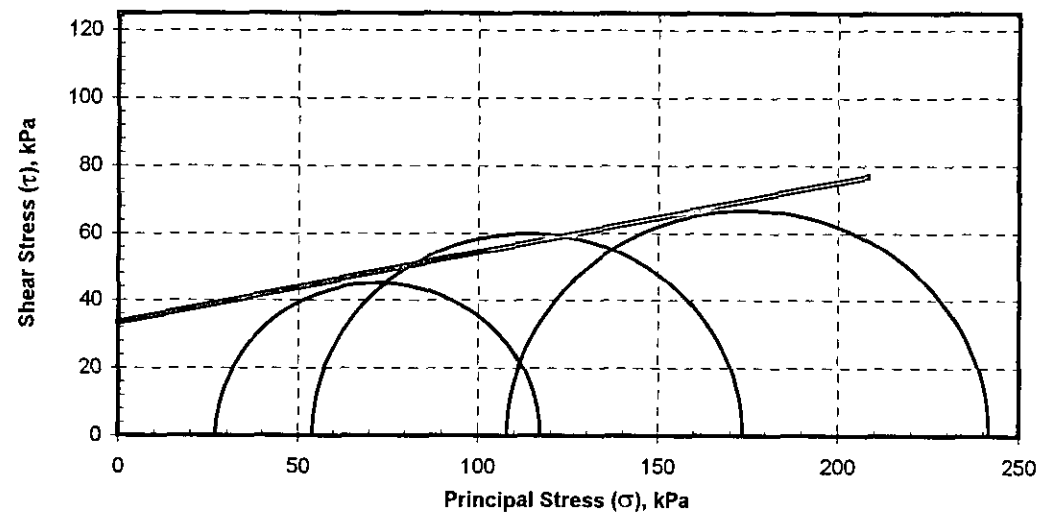
Hole No: BH1 **Depth:** 13.8m **Cav=** 188.4kPa , (ϕ=0) or **C=** 155.2kPa and ϕ= 3.8

Client: Linden Homes South East	**Site:** d, Three Mile Cross, Reading
Southern Testing	**Job No:** 6421j **Date:** 01/03/2000

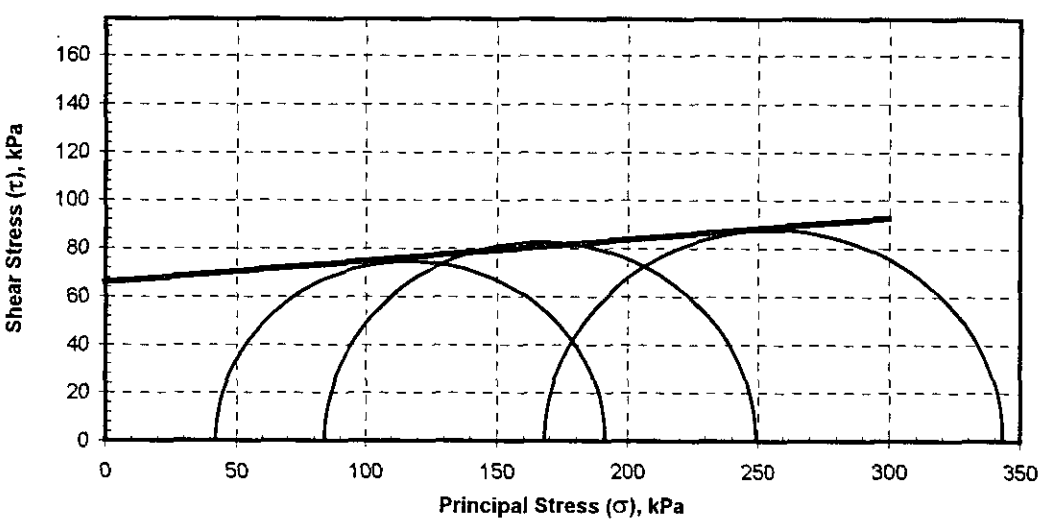
Triaxial Tests, Mohr's Circles



Hole No: BH2 **Depth:** 1.2m **Cav=** 53.1kPa , (ϕ=0) or **C=** 29.5kPa and ϕ= 12.6



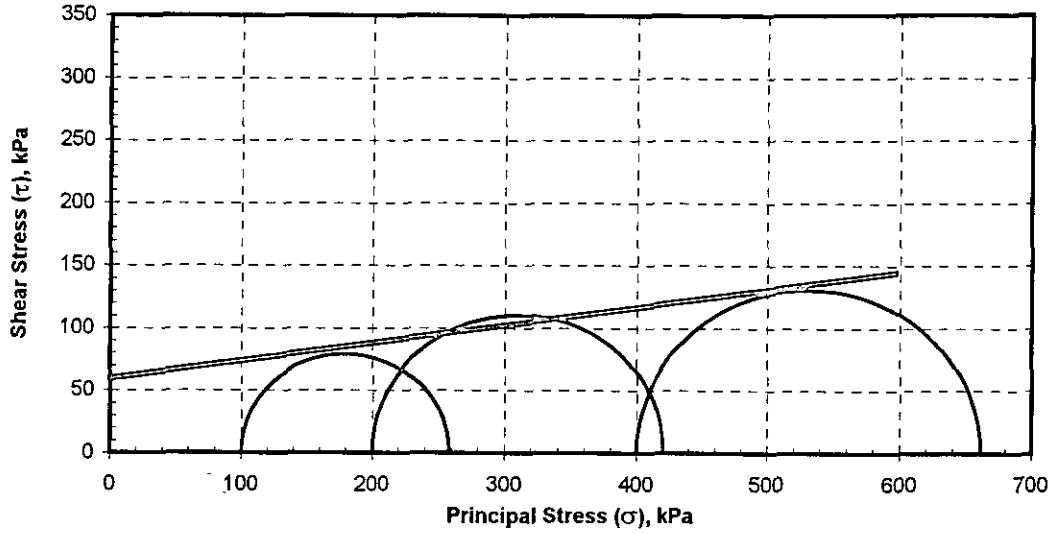
Hole No: BH2 **Depth:** 2.7m **Cav=** 57.2kPa , (ϕ=0) or **C=** 33.4kPa and ϕ= 11.8



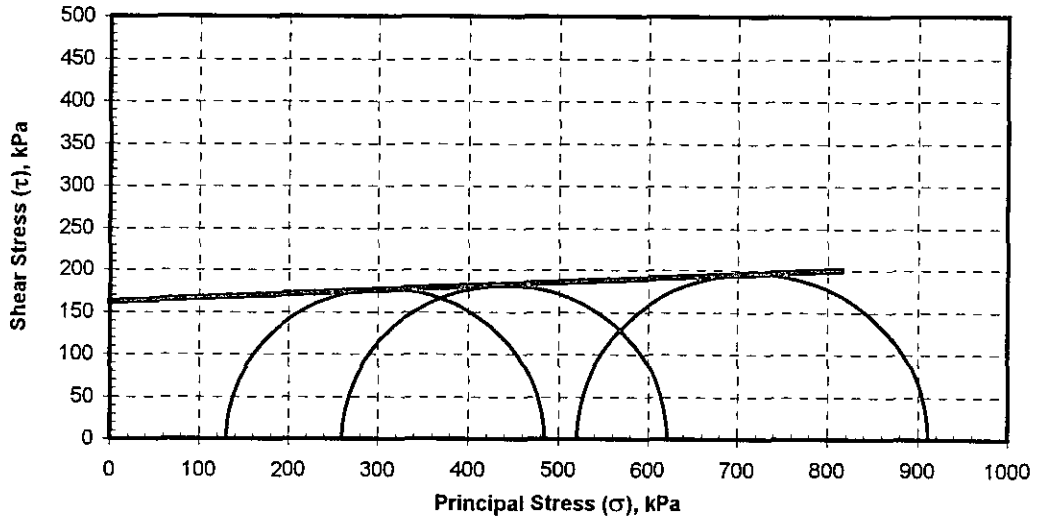
Hole No: BH2 **Depth:** 4.2m **Cav=** 81.6kPa , (ϕ=0) or **C=** 65.8kPa and ϕ= 5.1

Client: Linden Homes South East	**Site:** d, Three Mile Cross, Reading
Southern Testing	**Job No:** 6421j **Date:** 01/03/2000

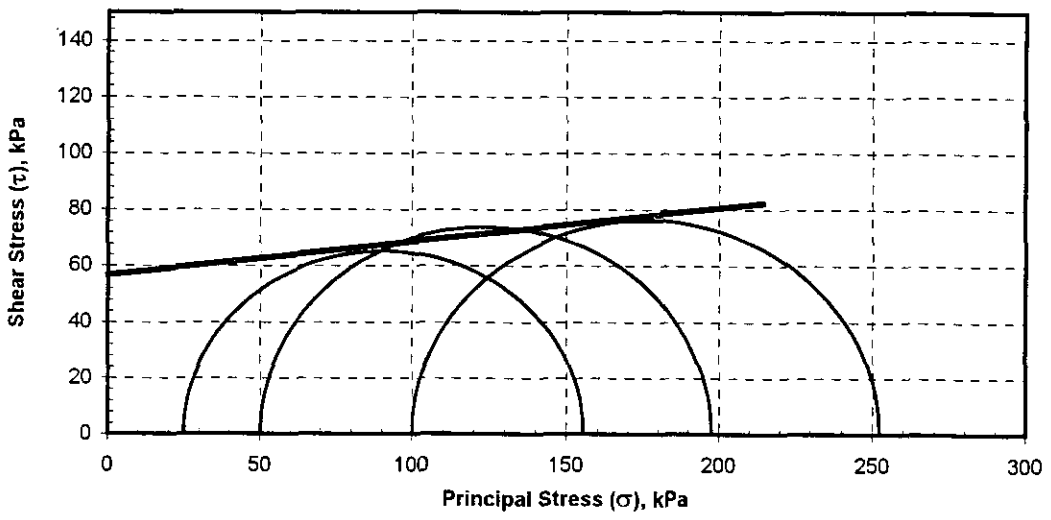
Triaxial Tests, Mohr's Circles



Hole No: BH2 **Depth:** 10m **Cav=** 106.8kPa , (ϕ=0) or **C=** 59.5kPa and ϕ= 8.1



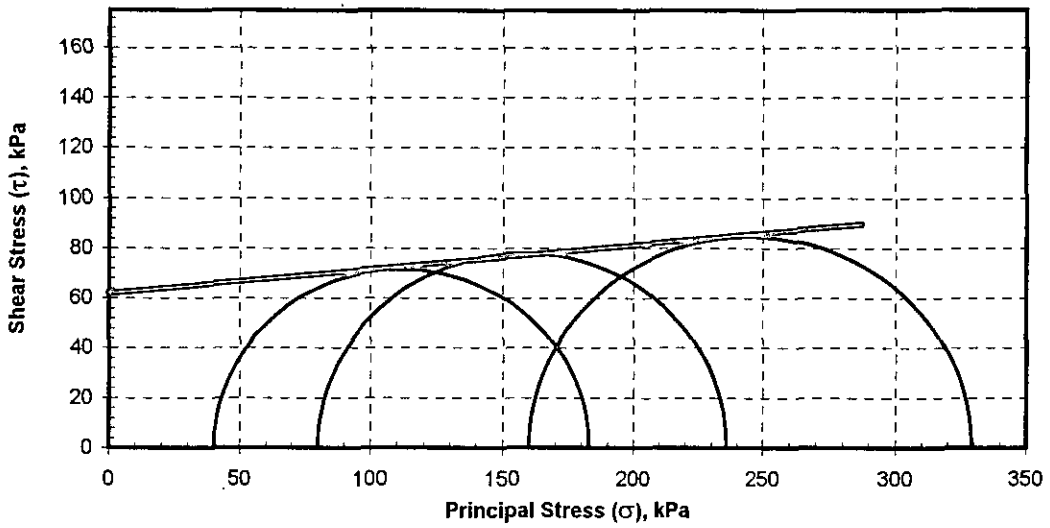
Hole No: BH2 **Depth:** 13m **Cav=** 184.5kPa , (ϕ=0) or **C=** 161.9kPa and ϕ= 2.7



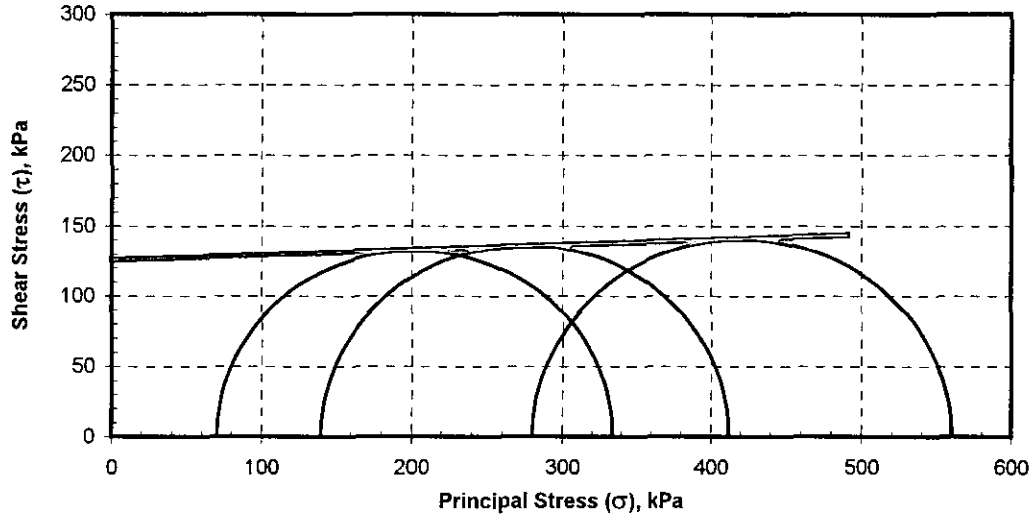
Hole No: BH3 **Depth:** 2.5m **Cav=** 71.7kPa , (ϕ=0) or **C=** 56.6kPa and ϕ= 6.9

Client: Linden Homes South East	**Site:** d, Three Mile Cross, Reading
Southern Testing	**Job No:** 6421j **Date:** 01/03/2000

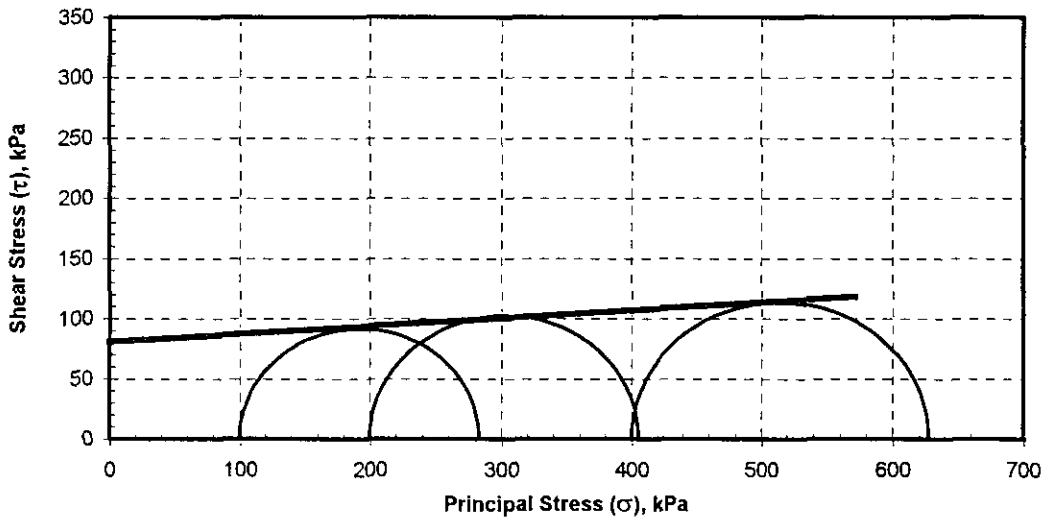
Triaxial Tests, Mohr's Circles



Hole No: BH3 **Depth:** 4m **Cav=** 78.0kPa , (ϕ=0) or **C=** 61.9kPa and ϕ= 5.5



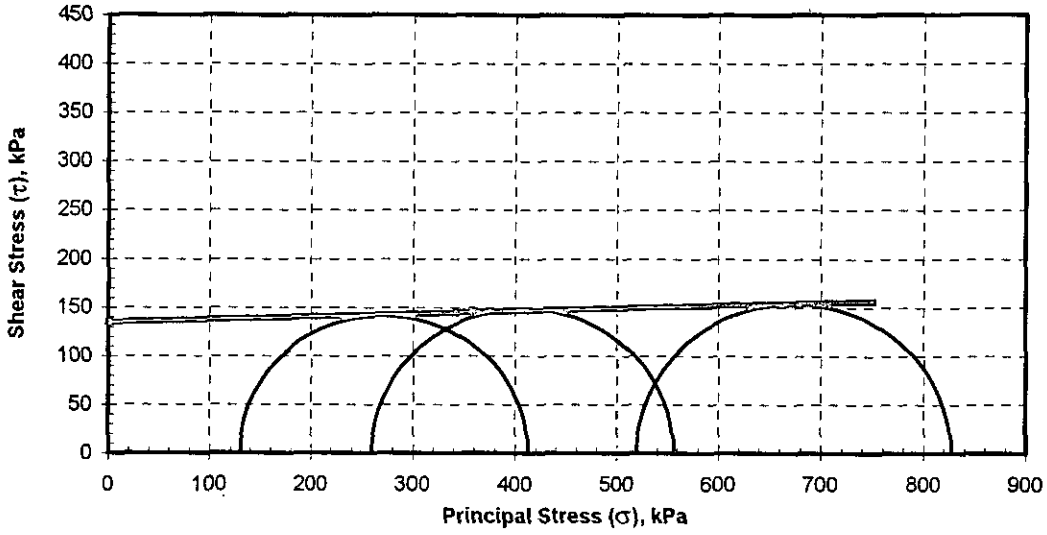
Hole No: BH3 **Depth:** 7m **Cav=** 136.1kPa , (ϕ=0) or **C=** 125.3kPa and ϕ= 2.1



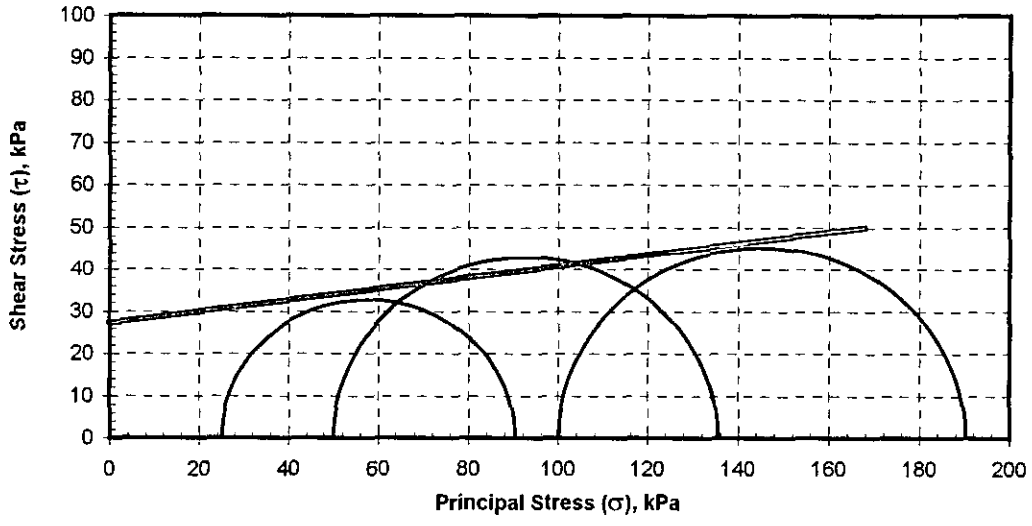
Hole No: BH3 **Depth:** 10m **Cav=** 102.6kPa , (ϕ=0) or **C=** 80.6kPa and ϕ= 3.8

Client: Linden Homes South East	**Site:** d, Three Mile Cross, Reading
Southern Testing	**Job No:** 6421j **Date:** 01/03/2000

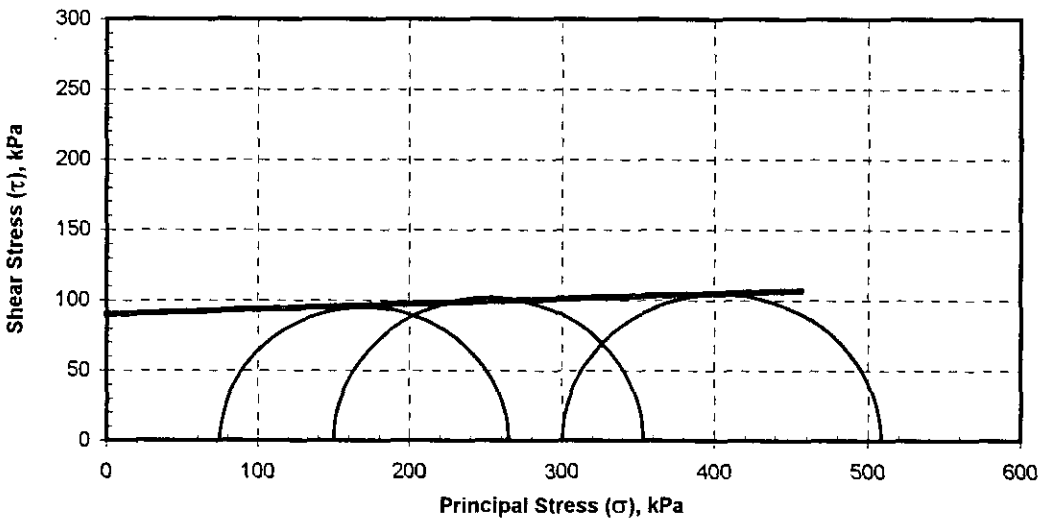
Triaxial Tests, Mohr's Circles



Hole No: BH3 **Depth:** 13m **Cav=** 147.8kPa , (ϕ=0) or **C=** 134.6kPa and ϕ= 1.7



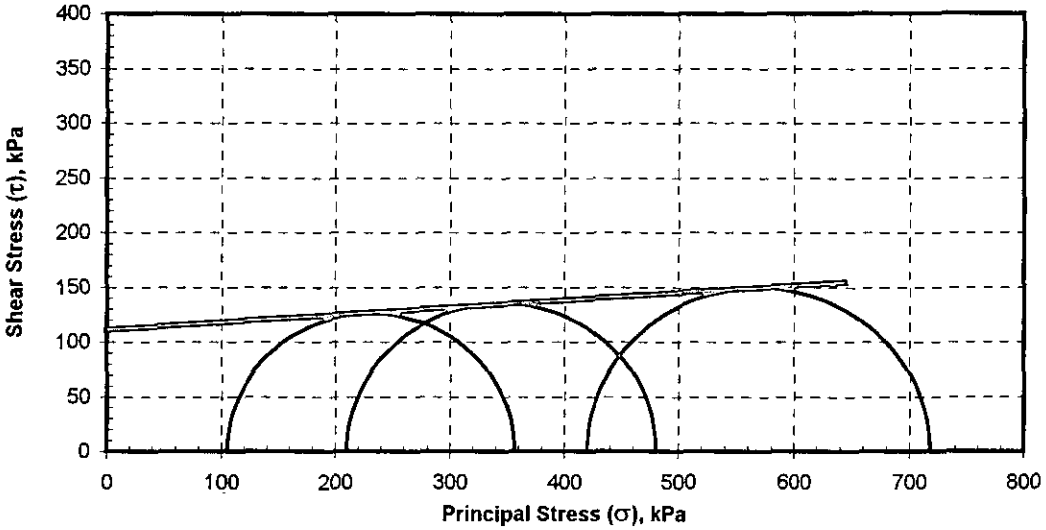
Hole No: BH4 **Depth:** 2m **Cav=** 40.2kPa , (ϕ=0) or **C=** 27.1kPa and ϕ= 7.8



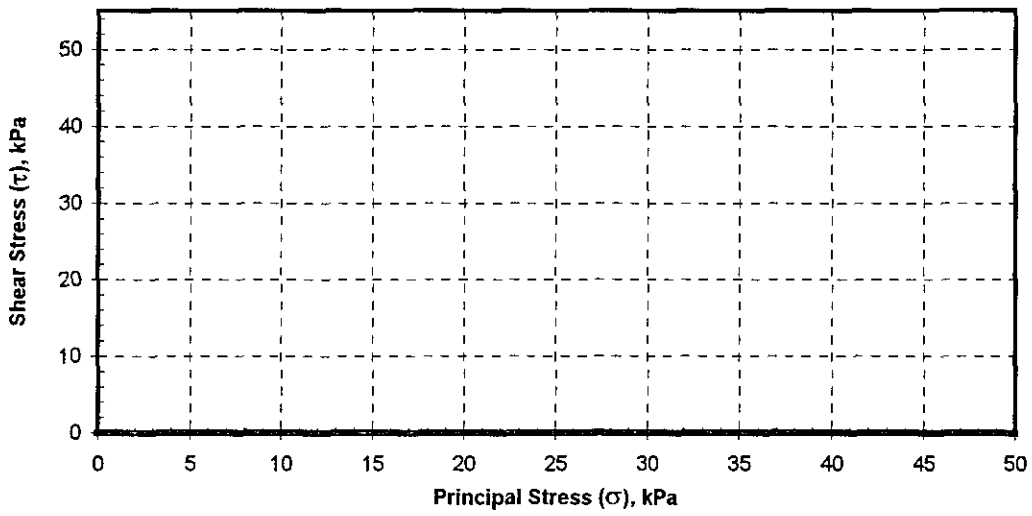
Hole No: BH4 **Depth:** 7.5m **Cav=** 100.3kPa , (ϕ=0) or **C=** 90.1kPa and ϕ= 2.1

Client: Linden Homes South East	**Site:** d, Three Mile Cross, Reading
Southern Testing	**Job No:** 6421j **Date:** 01/03/2000

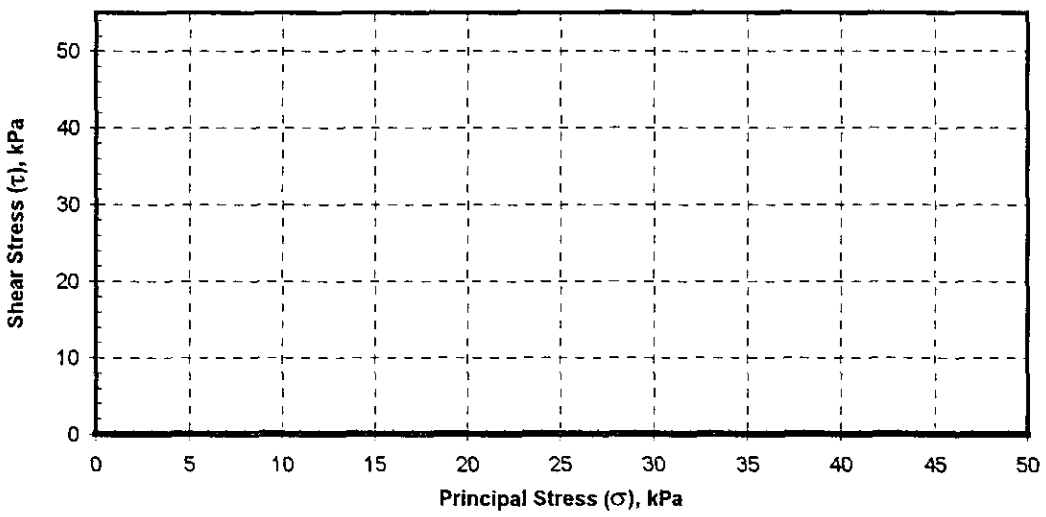
Triaxial Tests, Mohr's Circles



Hole No: BH4 **Depth:** 10.5m **Cav=** 136.6kPa , (ϕ=0) or **C=** 111.0kPa and ϕ= 3.9



Hole No: **Depth:** **Cav=** , (ϕ=0) or **C=** and ϕ=



Hole No: **Depth:** **Cav=** , (ϕ=0) or **C=** and ϕ=

Client: Linden Homes South East	**Site:** d, Three Mile Cross, Reading
Southern Testing	**Job No:** 6421j **Date:** 01/03/2000

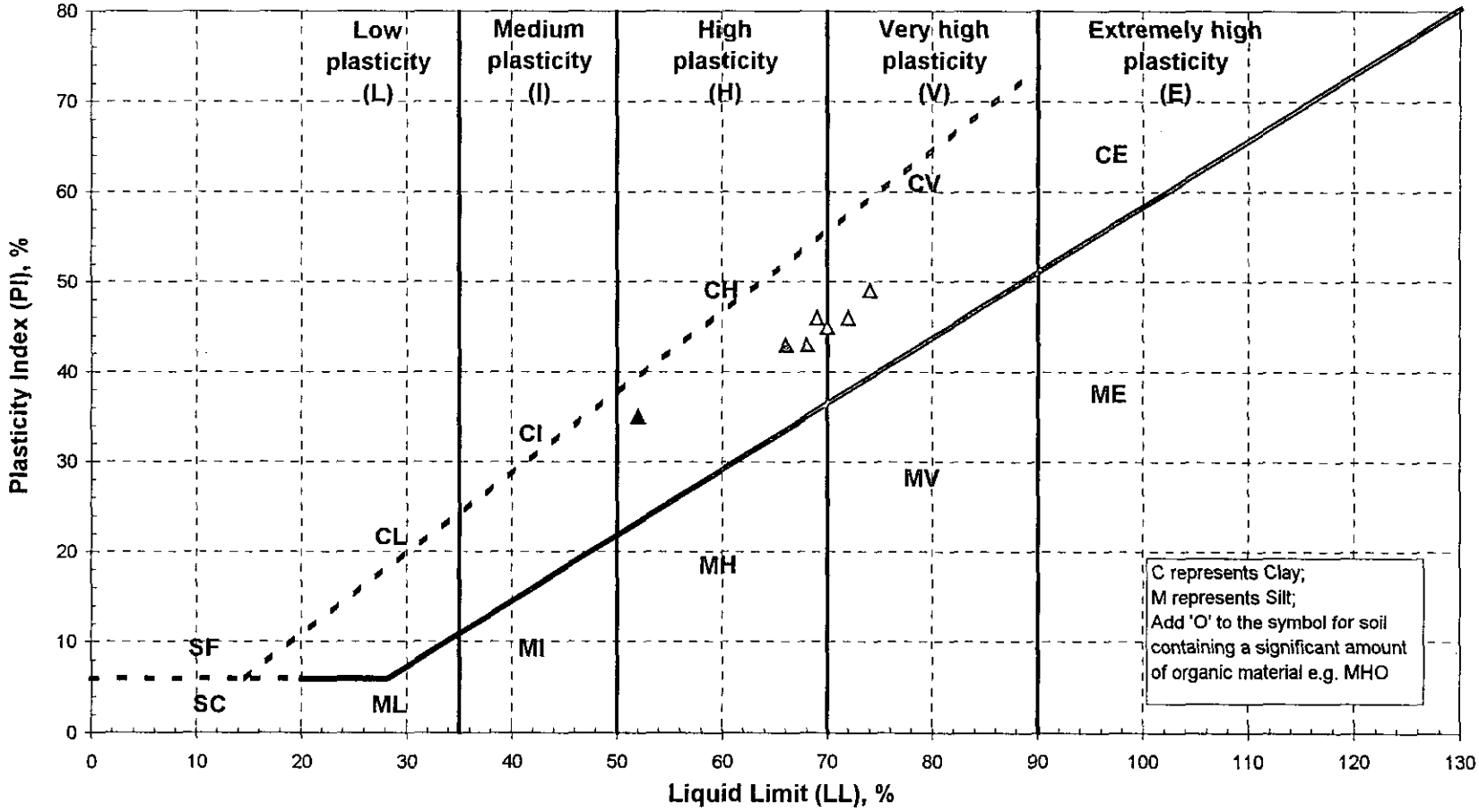
Summary Sheet ... Classification, Sulphate and pH Values

Test carried out in accordance with BS 1377: 1990: Part2 Tests 4 & 5; Part 3 Test 5

Job No: 6421J **Site:** 3 Mile Cross **Date:** 15/03/2000 **Checked By**

Hole No	Depth (m)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Class-ification	Percentage Passing 425µm (%)	Soil Sulphate g/l 2:1 Water Extract (as SO_3)	Water Sulphate g/l (as SO_3)	*BRE* Class-ification	pH Value	Sample Description
BH1	1.10	22.0	52	17	35	CH	97					Stiff, brown and orange mottled, slightly sandy silty CLAY, with occasional gravel and rootlets.
BH1	4.20	30.5	69	23	46	CH	100					Stiff, fissured, brown, calcareous silty CLAY.
BH1	Water								1.22	III	7.50	Ion exchange method
BH1	Water								1.10	II	7.50	Gravimetric Method
BH2	2.70	34.8	74	25	49	CV	100					Stiff, fissured, brown and grey streaked silty CLAY.
BH3	2.50	30.5	68	25	43	CH	100					Stiff, brown and orange mottled silty CLAY.
BH3	Water								1.16	II	7.60	Ion Exchange Method
BH3	Water								0.91	II	7.60	Gravimetric Method
BH4	7.50	25.2	66	23	43	CH	100					Stiff, grey speckled black, silty CLAY.
BH4	Water								1.14	II	6.90	Ion Exchange Method
BH4	Water								0.86	II	6.90	Gravimetric Method
TP 1	1.00	29.4	72	26	46	CV	100	0.20		I	8.07	Hard, brown, fissured silty CLAY, with scattered calcareous concretions.
TP 2	2.00	28.8	70	25	45	CH/CV	100					Hard, brown, fissured silty CLAY, with scattered calcareous concretions.

Plasticity Chart for Atterberg Limit Test Results

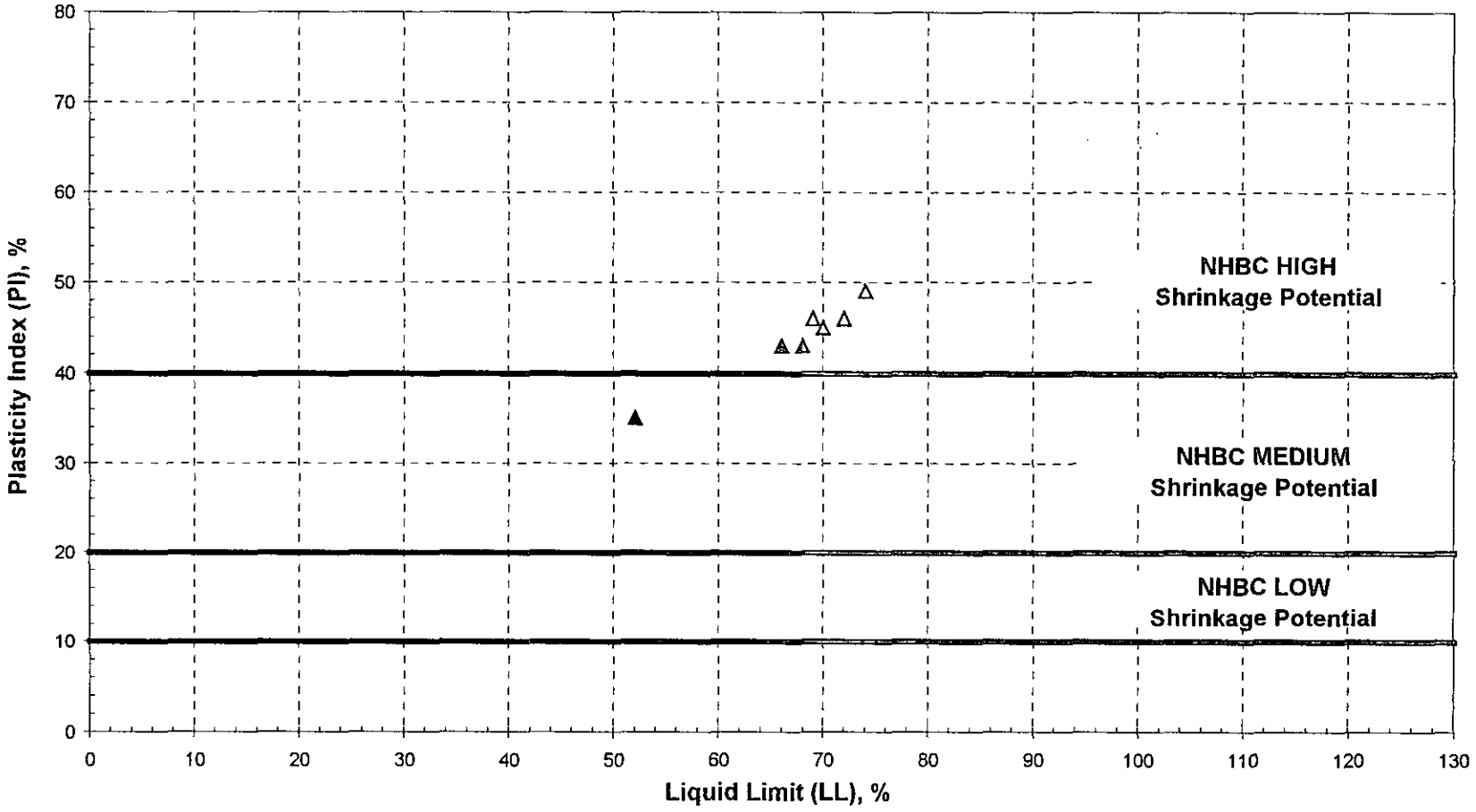


Statistics

Liquid Limit	
Max	74
Min	52
Average	67
Plastic Limit	
Max	26
Min	17
Average	23
Plasticity Index	
Max	49
Min	35
Average	44

SOUTHERN TESTING *Geotechnical Consulting Engineers*	Site: 3 Mile Cross		Client: Linden		
	Job No: 6421J	Engineer:	Checked: JW	Date: 15/03/2000	Fig. 2

Plot Relating Soil Plasticity to NHBC Shrinkability Classification



Statistics

Liquid Limit

Max	74
Min	52
Average	67

Plastic Limit

Max	26
Min	17
Average	23

Plasticity Index

Max	49
Min	35
Average	44

SOUTHERN TESTING *Geotechnical Consulting Engineers*	Site: 3 Mile Cross		Client: Linden		
	Job No: 6421J	Engineer:	Checked: JW	Date: 15/03/2000	Fig. 3

Summary Sheet ... Results of *in situ* CBR Tests

Job No: 6421j **Site:** Grazeley Road, Three Mile Cross, Re **Date:** 02/09/2000 **Checked By:**

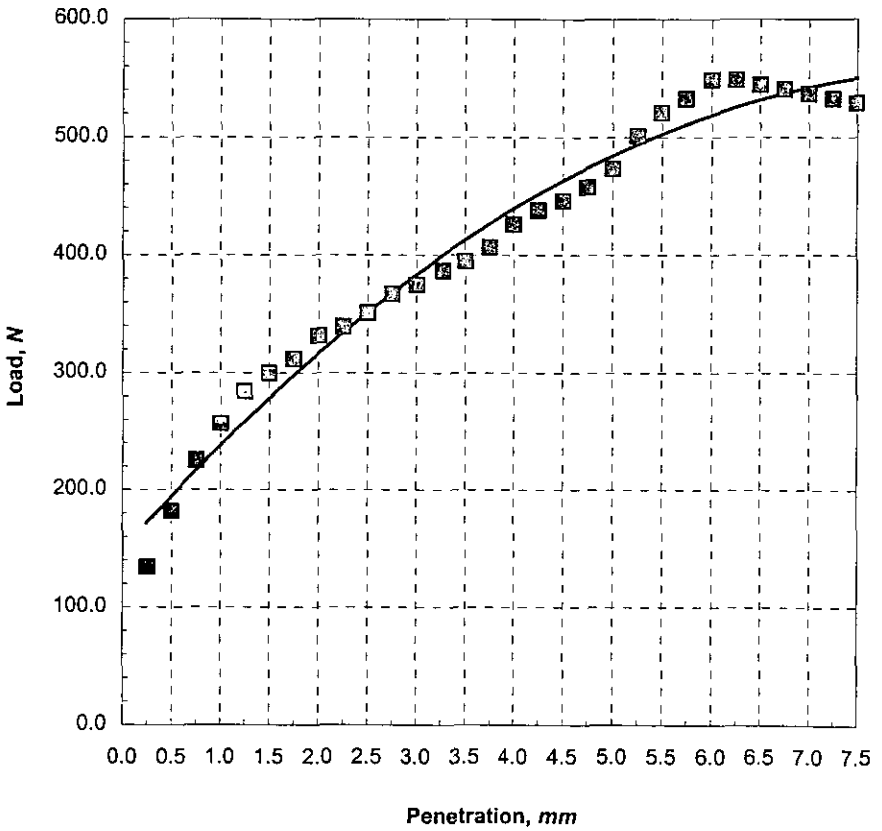
Test No	Depth *mm*	Moisture Content %	Liquid Limit	Plastic Limit	Plasticity Index	Classification	% Passing 75 Micron Sieve	CBR at 2.5*mm* Pen, %	CBR at 5.0*mm* Pen, %	Design CBR %	Soil Description		MEXE %
CBR1	700	26.6						2.7	2.4	2.7	0-200 200-350 350-600 600-800	Topsoil Loose pale brown silty SAND subsoil. Firm to stiff rust brown and brown mottled sandy CLAY. Firm to stiff grey brown silty CLAY.	1.5
CBR2	850	31.7						2.7	2.2	2.7	0-200 200-350 350-700 700-850	Topsoil Firm pale brown clayey SAND Stiff brown and rust brown mottled sandy silty CLAY Firm to stiff grey brown silty CLAY.	1.5
CBR3	700	25.9						3.1	2.8	3.1	0-100 100-500 500-700	Topsoil Pale brown fine silty SAND Stiff brown and rust brown mottled silty CLAY	2
CBR4	700	23.4						2.4	2.2	2.4	0-100 100-400 400-700	Topsoil Pale brown silty fine SAND with occasional medium flints Firm rust brown and pale brown mottled very sandy CLAY with occasional medium flints	1.5
CBR5	700	19.1						3.9	3.1	3.9	0-100 100-350 350-700	Topsoil Pale brown fine silty SAND Firm rust brown and brown mottled fine sandy CLAY	1
CBR6	700	22.8						2.6	2.3	2.6	0-100 100-450 450-700	Topsoil Firm pale brown silty slightly clayey SAND Firm rust brown and pale brown mottled sandy CLAY with occasional fine flints	1

In Situ CBR Test Results

Job Name	eley Road, Three Mile Cross, Reading							**Job NO.**	**6421j**
Client :	Linden Homes S.E. Limited							**Hole Ref**	**CBR1**
Penetr *mm*	**Dial Rdg** *divs*	**Force, *N*** *reading*	**Zero Shift**	**Force, *N*** *Curve*	**Standard Force, *N***	**CBR, %** *calculated*	**CBR, %** *design*	**Depth, *mm***	700
2.50	89	351.1	/	351.4	13,200	2.7		**Water Content,%**	26.6
5.00	120	473.4	/	484.3	20,000	2.4	2.7	**Date**	02/09/00

Pen, *mm*	Dial	Force, *N*
0.25	34	134.1
0.50	46	181.5
0.75	57	224.9
1.00	65	256.4
1.25	72	284.0
1.50	76	299.8
1.75	79	311.7
2.00	84	331.4
2.25	86	339.3
2.50	89	351.1
2.75	93	366.9
3.00	95	374.8
3.27	98	386.6
3.50	100	394.5
3.75	103	406.3
4.00	108	426.1
4.25	111	437.9
4.50	113	445.8
4.75	116	457.6
5.00	120	473.4
5.25	127	501.0
5.50	132	520.7
5.75	135	532.6
6.00	139	548.4
6.25	139	548.4
6.50	138	544.4
6.75	137	540.5
7.00	136	536.5
7.25	135	532.6
7.50	134	528.6

Force-Penetration Relationship for CBR Test



** No correction required for the curve.*

Depth, *mm*	Soil Description	Water	Samples
0-200	Topsoil		
200-350	Loose pale brown silty SAND subsoil.		
350-600	Firm to stiff rust brown and brown mottled sandy CLAY.		
600-800	Firm to stiff grey brown silty CLAY.	DRY	

Notes:	* Load Ring No:	*InSitu, 2574*	Ring Factor:	*3.9450*	Tested by:	
	* Surcharge Mass:	5x250mm	MEXE, % :	1.5	Checked by:	
	** BS 1377 1990 Test No 4.3*				Approved by:	

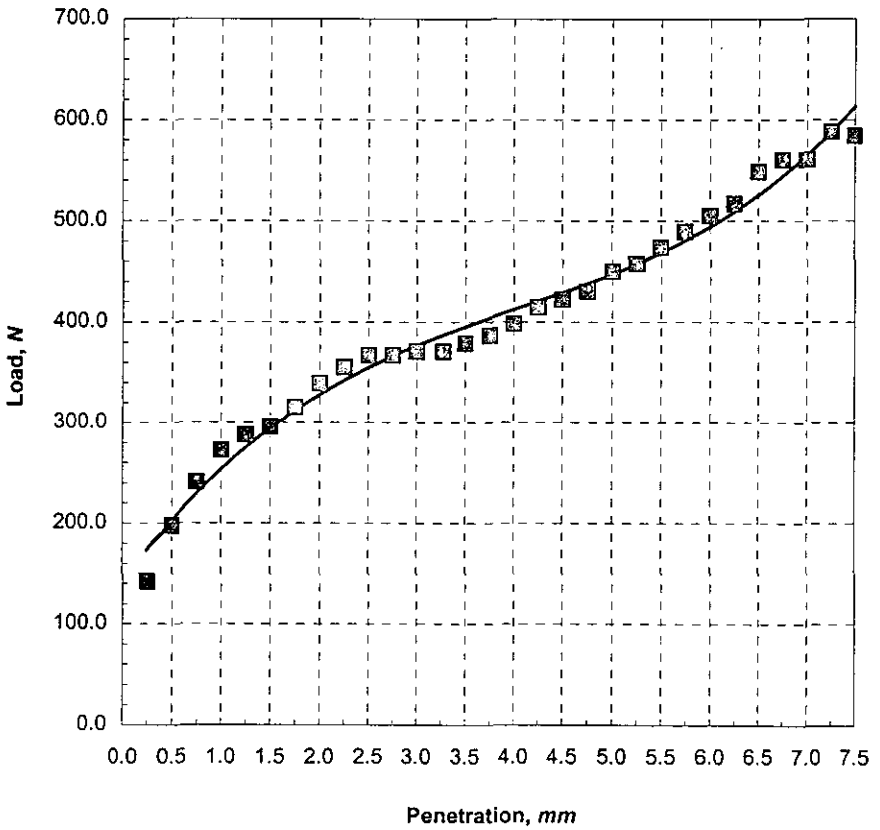
In Situ CBR Test Results

Job Name	eley Road, Three Mile Cross, Reading	**Job NO.**	**6421j**
Client :	Linden Homes S.E. Limited	**Hole Ref**	**CBR2**
		Depth, *mm*	850
		Water Content,%	31.7
		Date	02/09/00

Penetr *mm*	Dial Rdg *divs*	Force, *N* *reading*	Zero Shift	Force, *N* *Curve*	Standard Force, *N*	CBR, % *calculated*	CBR, % *design*
2.50	93	366.9	/	354.6	13,200	2.7	
5.00	114	449.7	/	447.2	20,000	2.2	2.7

Pen, *mm*	Dial	Force, *N*
0.25	36	142.0
0.50	50	197.3
0.75	61	240.6
1.00	69	272.2
1.25	73	288.0
1.50	75	295.9
1.75	80	315.6
2.00	86	339.3
2.25	90	355.1
2.50	93	366.9
2.75	93	366.9
3.00	94	370.8
3.27	94	370.8
3.50	96	378.7
3.75	98	386.6
4.00	101	398.4
4.25	105	414.2
4.50	107	422.1
4.75	109	430.0
5.00	114	449.7
5.25	116	457.6
5.50	120	473.4
5.75	124	489.2
6.00	128	505.0
6.25	131	516.8
6.50	139	548.4
6.75	142	560.2
7.00	142	560.2
7.25	149	587.8
7.50	148	583.9

Force-Penetration Relationship for CBR Test



** No correction required for the curve.*

Depth,*mm*	Soil Description	Water	Samples
0-200	Topsoil		
200-350	Firm pale brown clayey SAND		
350-700	Stiff brown and rust brown mottled sandy silty CLAY		
700-850	Firm to stiff grey brown silty CLAY.	DRY	

Notes:
- * Load Ring No: *InSitu, 2574* — Ring Factor: *3.9450*
- * Surcharge Mass: 5x250mm — MEXE, % : 1.5
- ** BS 1377 1990 Test No 4.3*

Tested by:	
Checked by:	
Approved by:	

In Situ CBR Test Results

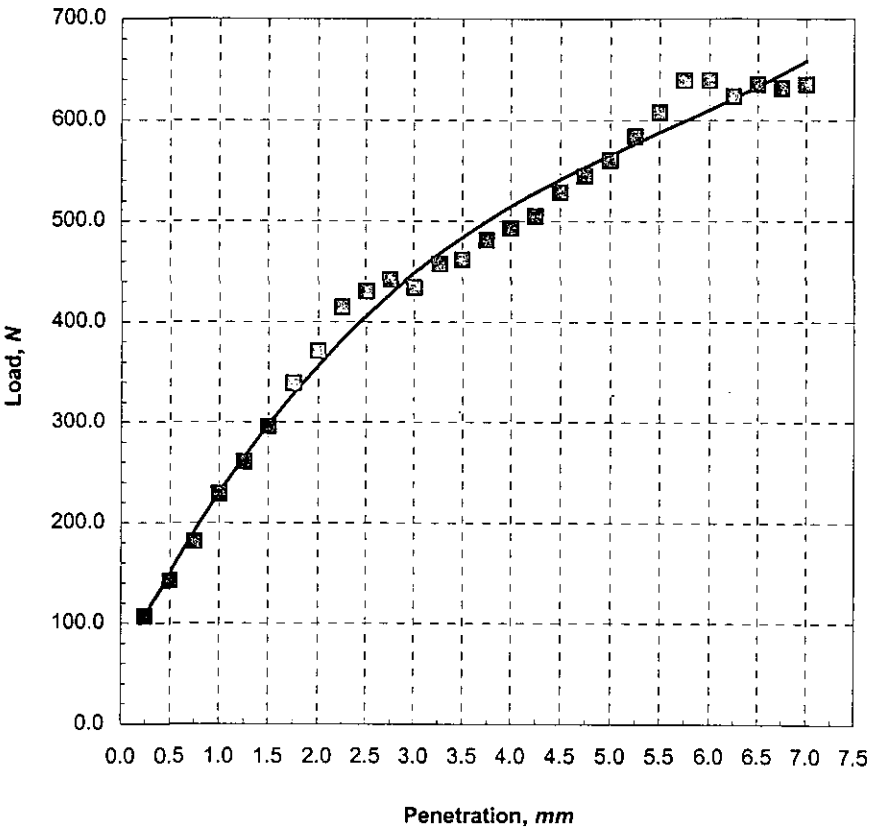
Job Name	eley Road, Three Mile Cross, Reading	**Job NO.**	**6421j**
Client :	Linden Homes S.E. Limited	**Hole Ref**	**CBR3**

Penetr *mm*	Dial Rdg *divs*	Force, *N* *reading*	Zero Shift	Force, *N* *Curve*	Standard Force, *N*	CBR, % *calculated*	CBR, % *design*
2.50	109	430.0	/	405.7	13,200	3.1	
5.00	142	560.2	/	565.1	20,000	2.8	3.1

Depth, *mm*	700
Water Content,%	25.9
Date	02/09/00

Pen, *mm*	Dial	Force, *N*
0.25	27	106.5
0.50	36	142.0
0.75	46	181.5
1.00	58	228.8
1.25	66	260.4
1.50	75	295.9
1.75	86	339.3
2.00	94	370.8
2.25	105	414.2
2.50	109	430.0
2.75	112	441.8
3.00	110	434.0
3.27	116	457.6
3.50	117	461.6
3.75	122	481.3
4.00	125	493.1
4.25	128	505.0
4.50	134	528.6
4.75	138	544.4
5.00	142	560.2
5.25	148	583.9
5.50	154	607.5
5.75	162	639.1
6.00	162	639.1
6.25	158	623.3
6.50	161	635.1
6.75	160	631.2
7.00	161	635.1
7.25	/	/
7.50	/	/

Force-Penetration Relationship for CBR Test



** No correction required for the curve.*

Depth, *mm*	Soil Description	Water	Samples
0-100	Topsoil		
100-500	Pale brown fine silty SAND		
500-700	Stiff brown and rust brown mottled silty CLAY		
		DRY	

Notes:	* Load Ring No:	*InSitu, 2574*	Ring Factor:	*3.9450*	Tested by:
	* Surcharge Mass:	5x250mm	MEXE, % :	2.0	Checked by:
	** BS 1377 1990 Test No 4.3*				Approved by:

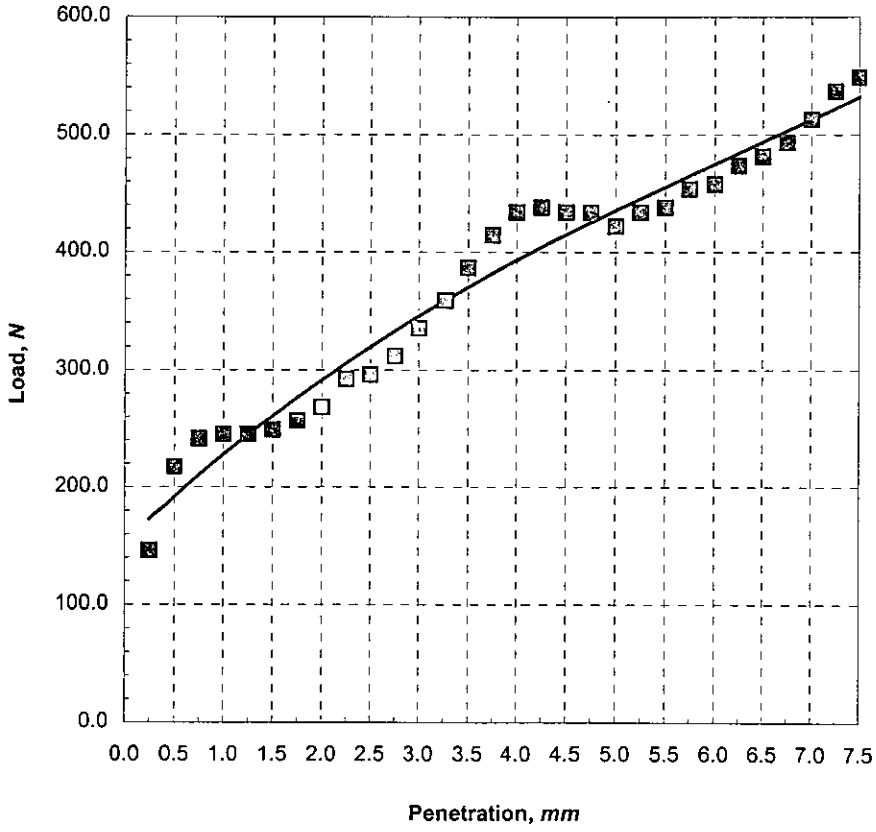
In Situ CBR Test Results

Job Name	eley Road, Three Mile Cross, Reading	**Job NO.**	**6421j**
Client :	Linden Homes S.E. Limited	**Hole Ref**	**CBR4**
		Depth, *mm*	700
		Water Content,%	23.4
		Date	02/09/00

Penetr *mm*	Dial Rdg *divs*	Force, *N* *reading*	Zero Shift	Force, *N* *Curve*	Standard Force, *N*	CBR, % *calculated*	CBR, % *design*
2.50	75	295.9	/	319.5	13,200	2.4	
5.00	107	422.1	/	435.5	20,000	2.2	2.4

Pen, *mm*	Dial	Force, *N*
0.25	37	146.0
0.50	55	217.0
0.75	61	240.6
1.00	62	244.6
1.25	62	244.6
1.50	63	248.5
1.75	65	256.4
2.00	68	268.3
2.25	74	291.9
2.50	75	295.9
2.75	79	311.7
3.00	85	335.3
3.27	91	359.0
3.50	98	386.6
3.75	105	414.2
4.00	110	434.0
4.25	111	437.9
4.50	110	434.0
4.75	110	434.0
5.00	107	422.1
5.25	110	434.0
5.50	111	437.9
5.75	115	453.7
6.00	116	457.6
6.25	120	473.4
6.50	122	481.3
6.75	125	493.1
7.00	130	512.9
7.25	136	536.5
7.50	139	548.4

Force-Penetration Relationship for CBR Test



** No correction required for the curve.*

Depth,*mm*	Soil Description	Water	Samples
0-100	Topsoil		
100-400	Pale brown silty fine SAND with occasional medium flints		
400-700	Firm rust brown and pale brown mottled very sandy CLAY with occasional medium flints		
		DRY	

Notes:	* Load Ring No:	*InSitu, 2574*	Ring Factor:	*3.9450*	Tested by:
	* Surcharge Mass:	6x250mm	MEXE, % :	1.5	Checked by:
	** BS 1377 1990 Test No 4.3*				Approved by:

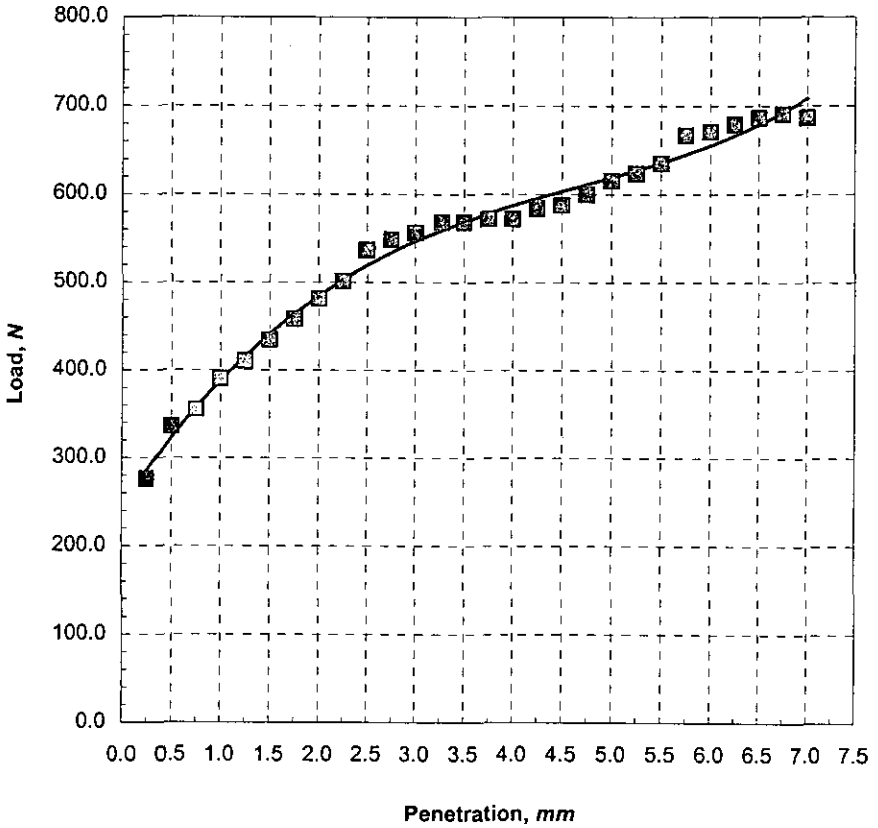
In Situ CBR Test Results

Job Name	eley Road, Three Mile Cross, Reading	**Job NO.**	**6421j**
Client :	Linden Homes S.E. Limited	**Hole Ref**	**CBR5**
		Depth, *mm*	700
		Water Content,%	19.1
		Date	02/09/00

Penetr *mm*	Dial Rdg *divs*	Force, *N* *reading*	Zero Shift	Force, *N* *Curve*	Standard Force, *N*	CBR, % *calculated*	CBR, % *design*
2.50	136	536.5	/	518.8	13,200	3.9	
5.00	156	615.4	/	619.1	20,000	3.1	3.9

Pen, *mm*	Dial	Force, *N*
0.25	70	276.2
0.50	85	335.3
0.75	90	355.1
1.00	99	390.6
1.25	104	410.3
1.50	110	434.0
1.75	116	457.6
2.00	122	481.3
2.25	127	501.0
2.50	136	536.5
2.75	139	548.4
3.00	141	556.2
3.27	144	568.1
3.50	144	568.1
3.75	145	572.0
4.00	145	572.0
4.25	148	583.9
4.50	149	587.8
4.75	152	599.6
5.00	156	615.4
5.25	158	623.3
5.50	161	635.1
5.75	169	666.7
6.00	170	670.7
6.25	172	678.5
6.50	174	686.4
6.75	175	690.4
7.00	174	686.4
7.25	/	/
7.50	/	/

Force-Penetration Relationship for CBR Test



** No correction required for the curve.*

Depth,*mm*	Soil Description	Water	Samples
0-100	Topsoil		
100-350	Pale brown fine silty SAND		
350-700	Firm rust brown and brown mottled fine sandy CLAY		
		DRY	

Notes:
- * Load Ring No: *InSitu, 2574* — Ring Factor: *3.9450*
- * Surcharge Mass: 6x250mm — MEXE, % : 1.0
- ** BS 1377 1990 Test No 4.3*

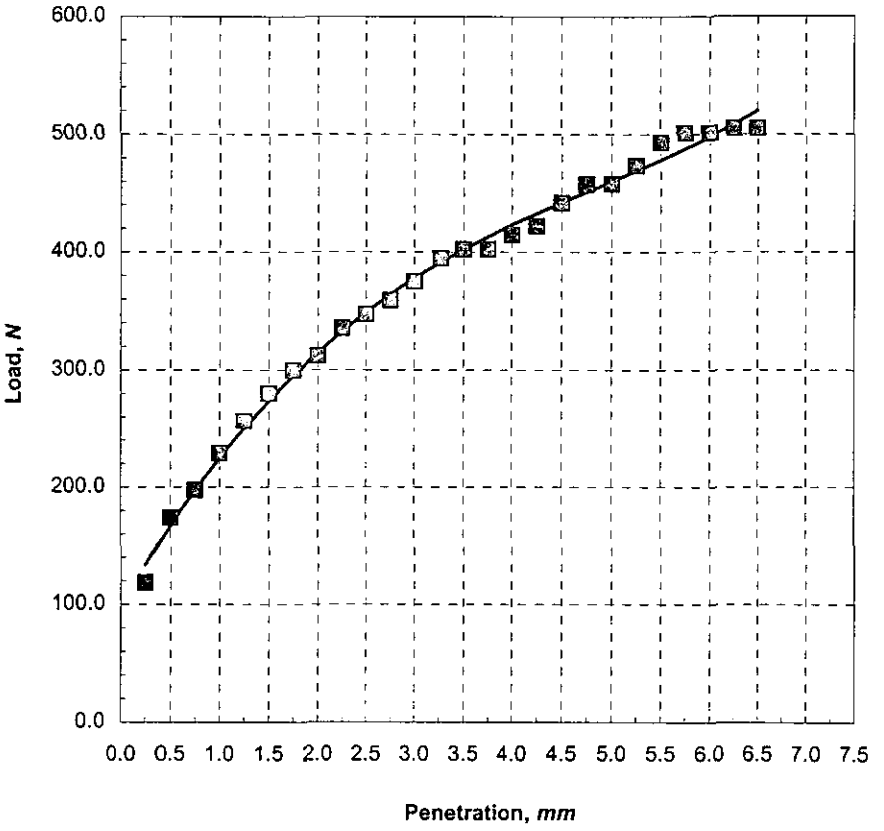
Tested by:	
Checked by:	
Approved by:	

In Situ CBR Test Results

Job Name	eley Road, Three Mile Cross, Reading							**Job NO.**	**6421j**
Client :	Linden Homes S.E. Limited							**Hole Ref**	**CBR6**
Penetr *mm*	**Dial Rdg** *divs*	**Force, *N*** *reading*	**Zero Shift**	**Force, *N*** *Curve*	**Standard Force, *N***	**CBR, %** *calculated*	**CBR, %** *design*	**Depth, *mm***	700
2.50	88	347.2	/	348.9	13,200	2.6		**Water Content,%**	22.8
5.00	116	457.6	/	460.0	20,000	2.3	2.6	**Date**	02/09/00

Pen, *mm*	**Dial**	**Force, *N***
0.25	30	118.4
0.50	44	173.6
0.75	50	197.3
1.00	58	228.8
1.25	65	256.4
1.50	71	280.1
1.75	76	299.8
2.00	79	311.7
2.25	85	335.3
2.50	88	347.2
2.75	91	359.0
3.00	95	374.8
3.27	100	394.5
3.50	102	402.4
3.75	102	402.4
4.00	105	414.2
4.25	107	422.1
4.50	112	441.8
4.75	116	457.6
5.00	116	457.6
5.25	120	473.4
5.50	125	493.1
5.75	127	501.0
6.00	127	501.0
6.25	128	505.0
6.50	128	505.0
6.75	/	/
7.00	/	/
7.25	/	/
7.50	/	/

Force-Penetration Relationship for CBR Test



** No correction required for the curve.*

Depth,*mm*	Soil Description	Water	Samples
0-100	Topsoil		
100-450	Firm pale brown silty slightly clayey SAND		
450-700	Firm rust brown and pale brown mottled sandy CLAY with occasional fine flints		
		DRY	

Notes:
* Load Ring No: *InSitu, 2574* Ring Factor: *3.9450*
* Surcharge Mass: 6x250mm MEXE, % : 1.0
** BS 1377 1990 Test No 4.3*

Tested by:	
Checked by:	
Approved by:	

Certificate of Analysis

Job Number: **6421**

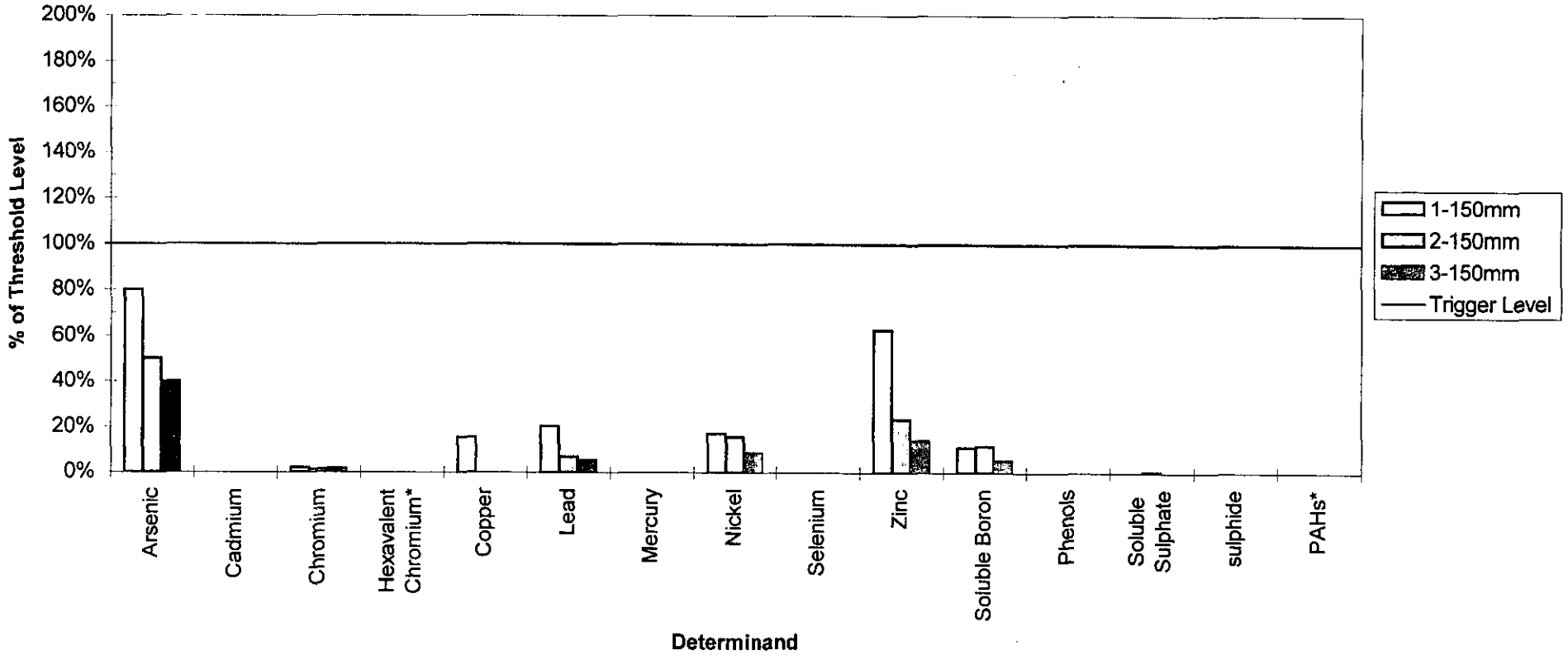
Site: **Three Mile Cross**

Sample ID		1	2	3
Sample Depth		150mm	150mm	150mm
Type		Soil	Soil	Soil
	Units			
pH Value		7.1	5.9	6.3
Asbestos		-	-	-
Arsenic (total)	mg/kg	8	5	4
Cadmium (total)	mg/kg	<1	<1	<1
Chromium (total)	mg/kg	12	9	10
Chromium (VI)	mg/kg	-	-	-
Copper (total)	mg/kg	20	<5	<5
Lead (total)	mg/kg	102	34	27
Mercury (total)	mg/kg	<0.10	<0.10	<0.10
Nickel (total)	mg/kg	12	11	6
Selenium (total)	mg/kg	<3	<3	<3
Zinc (total)	mg/kg	188	71	43
Phenols mono (total)	mg/kg	<1	<1	<1
Cyanide (total)	mg/kg	<1	<1	<1
Free cyanide	mg/kg	-	-	-
Soluble Boron	mg/kg	0.33	0.35	0.16
Sulphate (soluble)	g/l	<0.01	0.01	<0.01
Sulphide	mg/kg	<0.5	<0.5	<0.5
TEM	mg/kg	280	460	300
Total of 16 PAHs	mg/kg	-	-	-
Elemental Sulphur	mg/kg	-	-	-
Wt loss on drying	% of wet	20.7	17.7	17.1
Retained on 2mm sieve	% of dry	19.8	16.2	12.6

'– Dependent Option * 1:2 Extract - Not Determined'

SOUTHERN TESTING
Keeble House, Stuart Way, East Grinstead, West Sussex, RH19 4QA Telephone 01 342 313 156

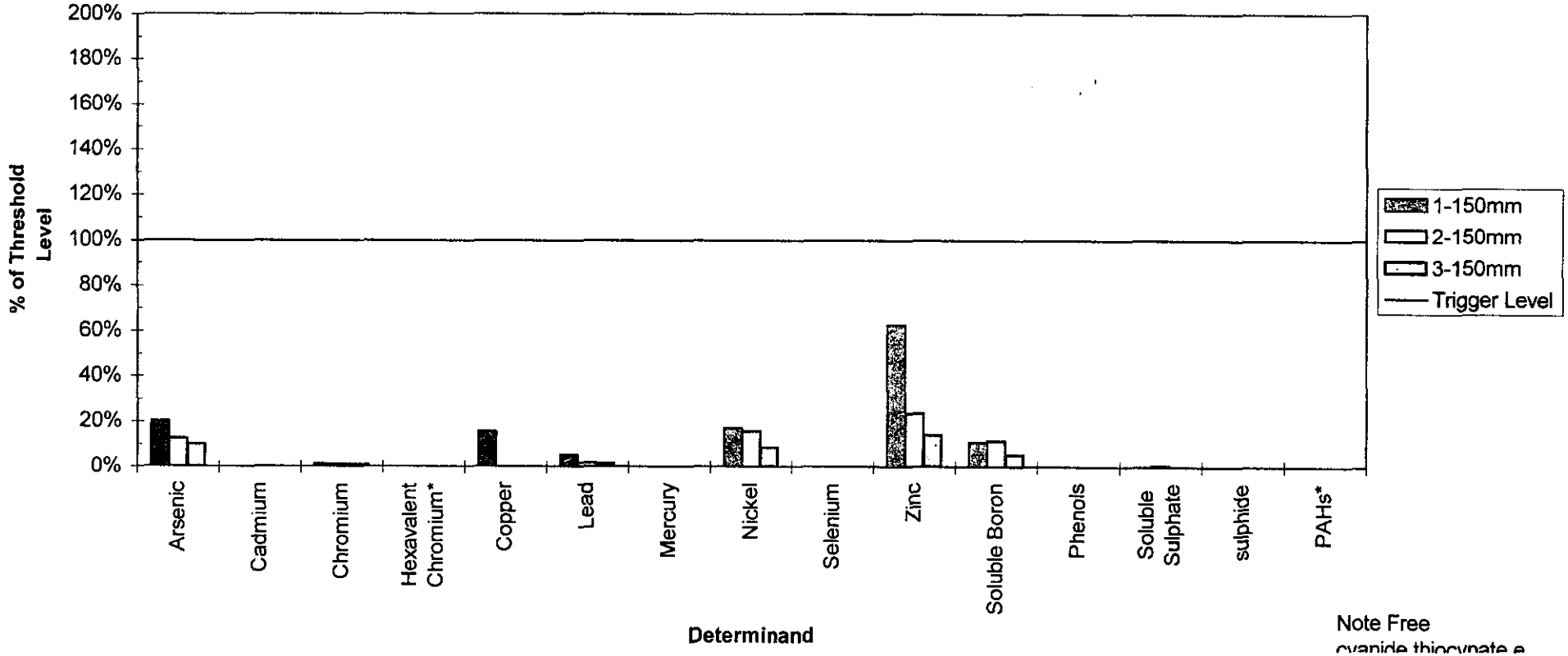
Contamination Levels Related to ICRCL 59/83 Trigger Values for Domestic Gardens



*Note: Dependent options (not determined:Free Cyanide, Thiocyanate,Elemental Sulphur)

Client: Linden Homes (SE) Ltd	**Site:** Grazeley Road, Three Mile Cross		
SOUTHERN TESTING Consulting Geotechnical Engineers	**Job No:** 6421J	**Date:** 13-Mar-2000	Fig. 1

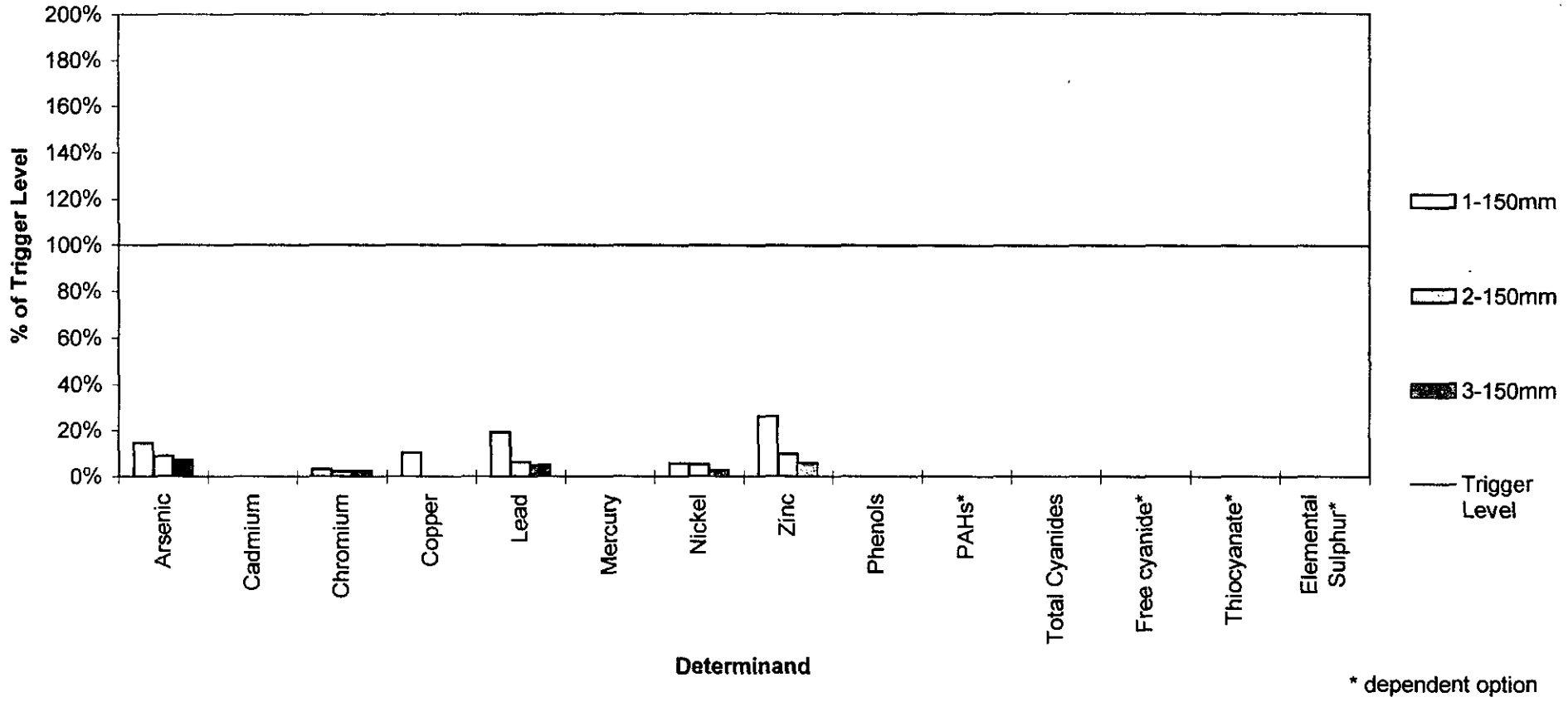
Contamination Levels Related to ICRCL 59/83 Trigger Values for Parks, Playing Fields and Open Space



*Note: Dependent options (not determined:Free Cyanide, Thiocyanate,Elemental Sulphur)

Client: Linden Homes (SE) Ltd		**Site:** Grazeley Road, Three Mile Cross	
SOUTHERN TESTING Consulting Geotechnical Engineers	**Job No:** 6421J	**Date:** 13-Mar-2000	Fig. 2

Contamination Levels related to Dutch Intervention Levels



* dependent option

Client Linden Homes (SE) Ltd	Site Grazeley Road, Three Mile Cross
SOUTHERN TESTING Consulting Geotechnical Engineers	Job No 6421J Date 13-Mar-00 Fig. 3

Certificate of Analysis

Job Number: 6421

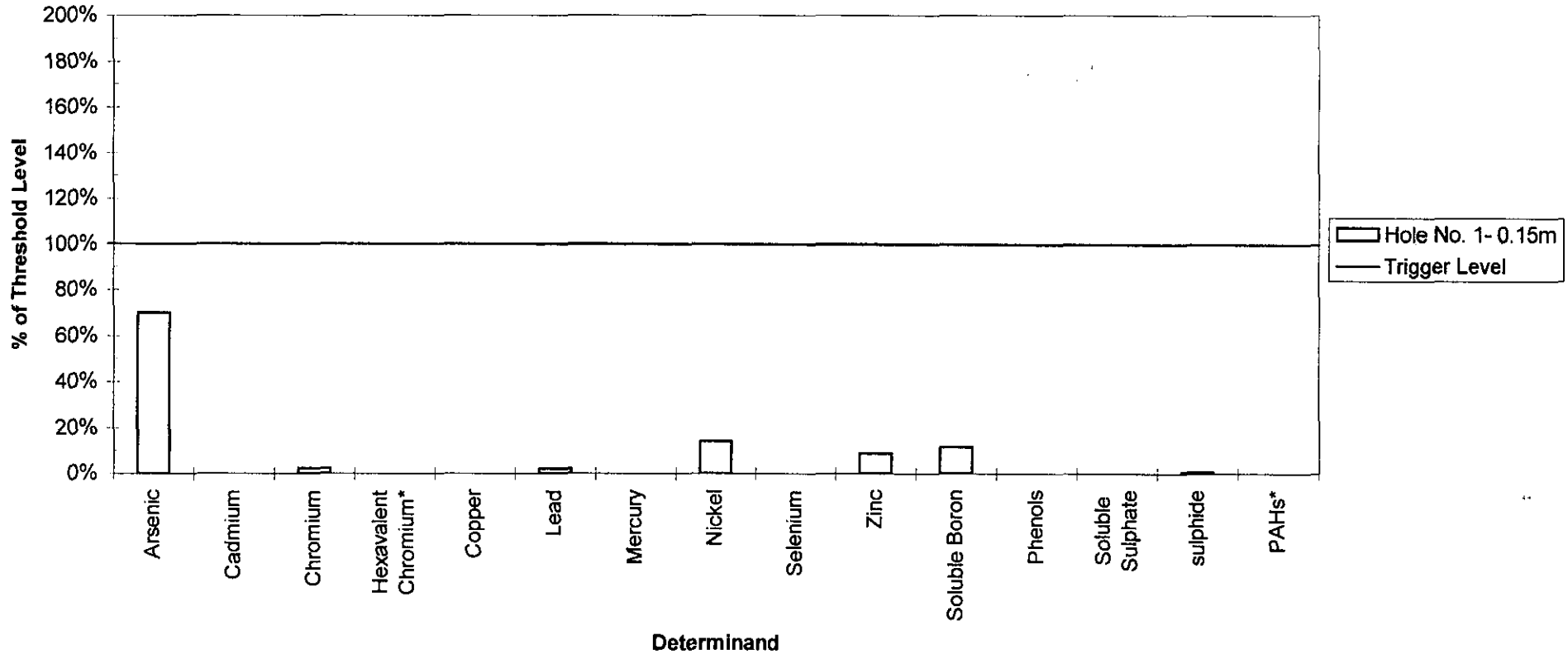
Site: Three Mile Cross

	Units	
Sample ID		Hole No. 1
Sample Depth		0.15m
Type		Soil
pH Value		6.8
Asbestos		-
Arsenic (total)	mg/kg	7
Cadmium (total)	mg/kg	<1
Chromium (total)	mg/kg	14
Chromium (VI)	mg/kg	-
Copper (total)	mg/kg	<5
Lead (total)	mg/kg	11
Mercury (total)	mg/kg	<0.10
Nickel (total)	mg/kg	10
Selenium (total)	mg/kg	<3
Zinc (total)	mg/kg	27
Phenols mono (total)	mg/kg	<1
Cyanide (total)	mg/kg	<1
Free cyanide	mg/kg	-
Soluble Boron	mg/kg	0.35
Sulphate (soluble)	g/l	<0.01
Sulphide	mg/kg	1.6
TEM	mg/kg	<100
Total of 16 PAHs	mg/kg	-
Elemental Sulphur	mg/kg	-
Wt loss on drying	% of wet	13.3
Retained on 2mm sieve	% of dry	7

'-- Dependent Option * 1:2 Extract - Not Determined'

SOUTHERN TESTING
Keeble House, Stuart Way, East Grinstead, West Sussex, RH19 4QA Telephone 01 342 313 156

Contamination Levels Related to ICRCL 59/83 Trigger Values for Domestic Gardens



*Note: Dependent options (not determined:Free Cyanide, Thiocyanate,Elemental Sulphur)

Client: Linden Homes (SE) Ltd		**Site:** Grazeley Road, Three Mile Cross		
SOUTHERN TESTING	Consulting Geotechnical Engineers	**Job No:** 6421J	**Date:** 13-Mar-2000	Fig.

PREVIOUS CONTAMINATION TEST RESULTS

Certificate of Analysis

Job Number: A1567

Site: Three Miles Cross

Sample ID		1	3	5	6	7	8
Sample Depth		0.2m	0.2m	0.1m	0.1m	0.1m	0.2m
Type		Soil	Soil	Soil	Soil	Soil	Soil
	Units						
pH Value		5.8	-	-	-	7.1	-
Asbestos		-	-	-	-	-	-
Arsenic (total)	mg/kg	10	9	8	8	17	9
Cadmium (total)	mg/kg	<1	<1	<1	<1	<1	<1
Chromium (total)	mg/kg	12	12	12	11	16	13
Chromium (VI)	mg/kg	--	--	--	--	--	--
Copper (total)	mg/kg	14	10	18	12	37	15
Lead (total)	mg/kg	30	21	31	32	114	86
Mercury (total)	mg/kg	0.15	<0.10	<0.10	<0.10	0.2	<0.10
Nickel (total)	mg/kg	7	5	8	5	14	9
Selenium (total)	mg/kg	<3	<3	<3	<3	<3	<3
Zinc (total)	mg/kg	52	48	44	59	110	164
Phenols mono (total)	mg/kg	<1	-	-	-	<1	-
Cyanide (total)	mg/kg	<1	-	-	-	<1	-
Free cyanide	mg/kg	--	-	-	-	--	-
Soluble Boron	mg/kg	0.69	0.36	0.53	0.51	0.92	0.81
Sulphate (soluble)	g/l	0.01	-	-	-	0.01	-
Sulphide	mg/kg	<0.5	-	-	-	<0.5	-
TEM	mg/kg	140	-	-	-	270	-
Total of 16 PAHs	mg/kg	--	-	-	-	--	-
Elemental Sulphur	mg/kg	--	-	-	-	--	-
Wt loss on drying	% of wet	13.3	13.7	16.3	18.7	14.4	12.5
Retained on 2mm sieve	% of dry	21.8	24.5	14.3	15	36.8	22

' - Dependent Options * 1:2 Extract - Not Determined

SOUTHERN TESTING

Keeble House, Stuart Way, East Grinstead, West Sussex, RH19 4QA Telephone 01 342 313 156

Certificate of Analysis

Job Number: A1567

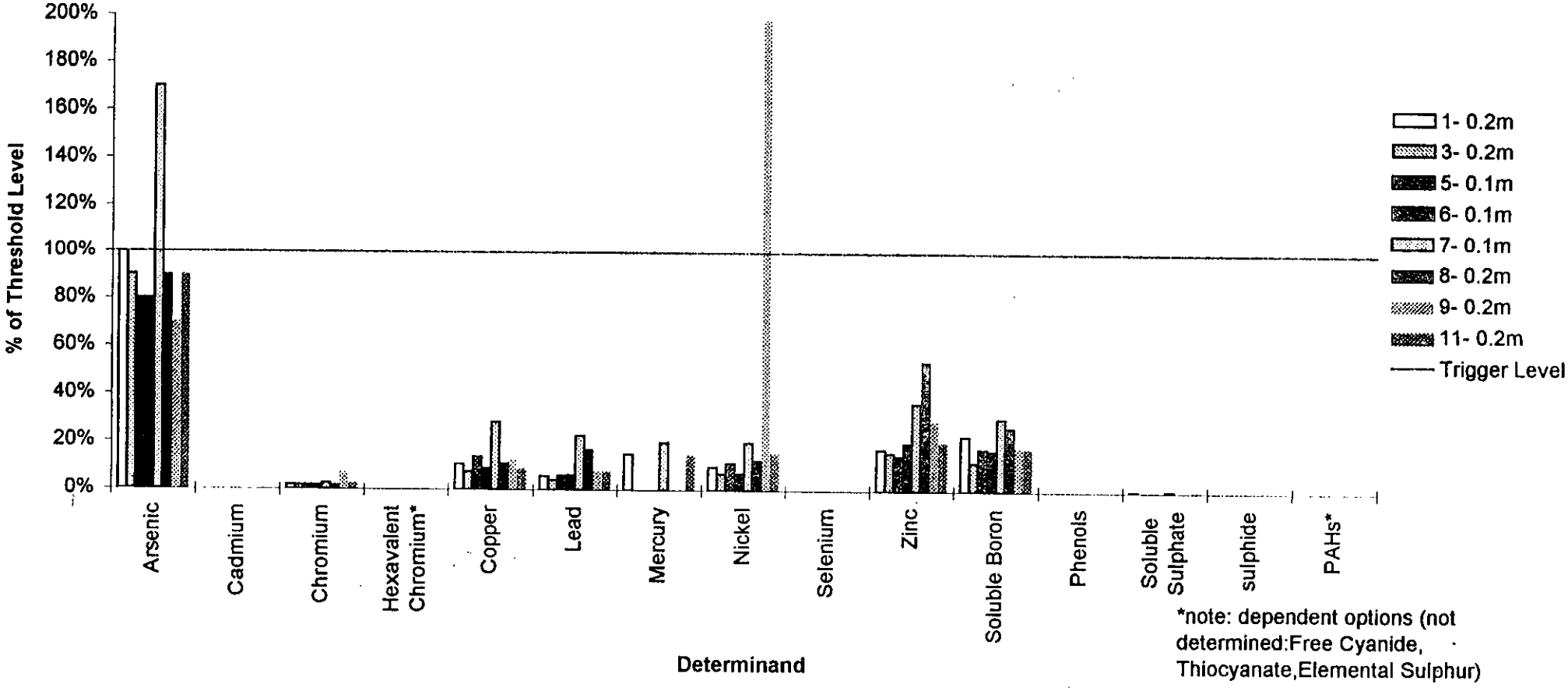
Site: Three Miles Cross

Sample ID		9	11
Sample Depth		0.2m	0.2m
Type		Soil	Soil
	Units		
pH Value		6.9	4.8
Asbestos		-	-
Arsenic (total)	mg/kg	7	9
Cadmium (total)	mg/kg	<1	<1
Chromium (total)	mg/kg	45	16
Chromium (VI)	mg/kg	<0.10	--
Copper (total)	mg/kg	16	12
Lead (total)	mg/kg	39	39
Mercury (total)	mg/kg	<0.10	0.15
Nickel (total)	mg/kg	139	11
Selenium (total)	mg/kg	<3	<3
Zinc (total)	mg/kg	89	61
Phenols mono (total)	mg/kg	<1	<1
Cyanide (total)	mg/kg	<1	<1
Free cyanide	mg/kg	--	--
Soluble Boron	mg/kg	0.56	0.54
Sulphate (soluble)	g/l	<0.01	0.01
Sulphide	mg/kg	<0.5	<0.5
TEM	mg/kg	<100	530
Total of 16 PAHs	mg/kg	--	--
Elemental Sulphur	mg/kg	--	--
Wt loss on drying	% of wet	16.5	16.7
Retained on 2mm sieve	% of dry	29	17.3

' - Dependent Options * 1:2 Extract - Not Determined

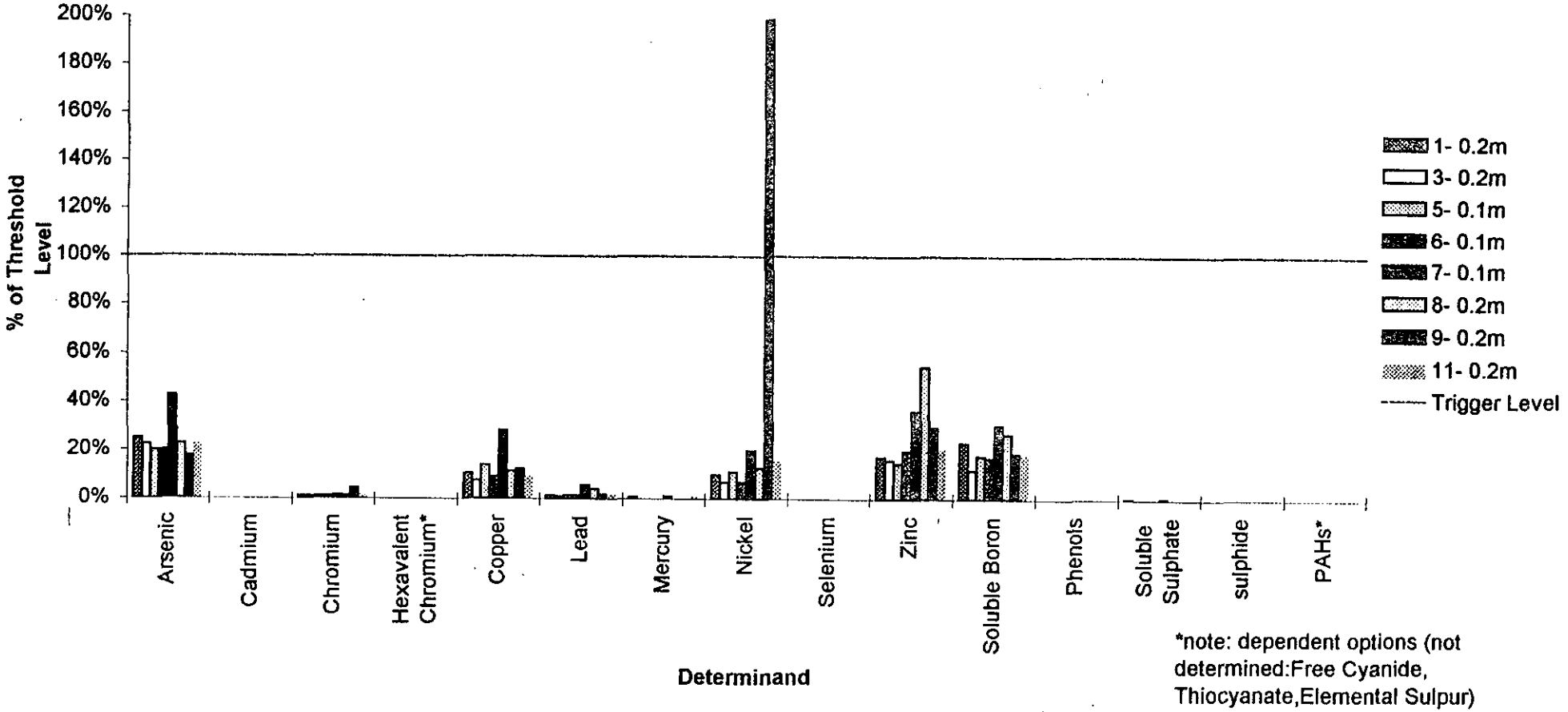
SOUTHERN TESTING
Keeble House, Stuart Way, East Grinstead, West Sussex, RH19 4QA Telephone 01 342 313 156

Contamination Levels Related to ICRCL 59/83 Trigger Values for Domestic Gardens



Client	Linden Homes South East Ltd	Site	Three Mile Cross, Reading
SOUTHERN TESTING	Consulting Geotechnical Engineers	Job No A1567	Date 28-May-99 Fig. 1

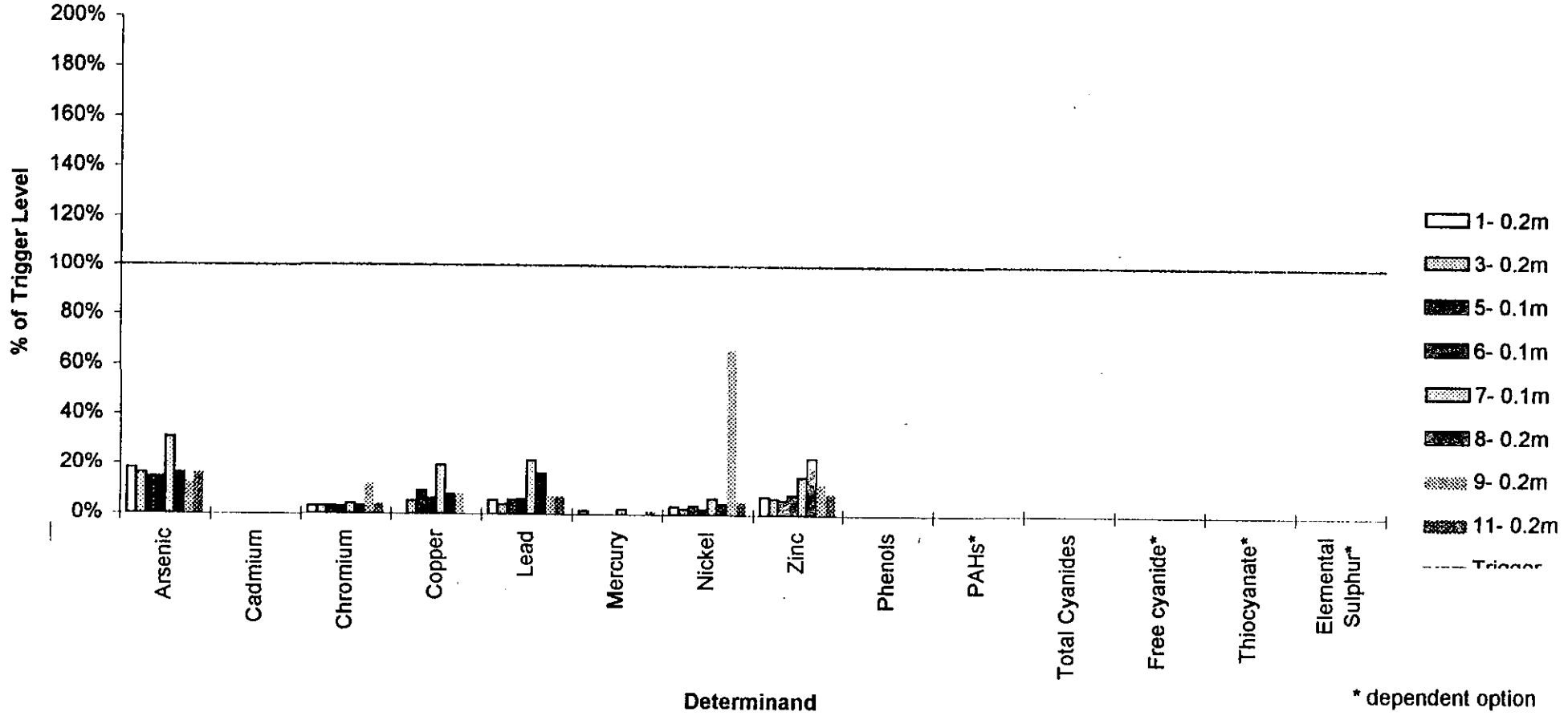
Contamination Levels Related to ICRCL 59/83 Trigger Values for Parks, Playing Fields and Open Space



*note: dependent options (not determined:Free Cyanide, Thiocyanate,Elemental Sulpur)

Client Linden Homes South East Ltd	Site Three Mile Cross, Reading
SOUTHERN TESTING Consulting Geotechnical Engineers	Job No A1567 Date 28-May-99 Fig. 2

Contamination Levels related to Dutch Intervention Levels



Client	Linden Homes South East Ltd	Site	Three Mile Cross, Reading
SOUTHERN TESTING	Consulting Geotechnical Engineers	Job No A1567	Date 28-May-99 Fig. 3

WORK SHEET FOR : Angela Odell

Application Number : C/2000/1305

Applicant : Linden Homes South East Ltd C/O BDG Design.

Location : Land Rear Of 72-90 , Grazeley Road, Three Mile Cross, Reading.

Proposal : Details to comply with conditions 18 & 19 of consent 99/70568/F for the approval of site assessment report.

Site Notice Displayed ? :	YES	NO	DATE

Date of Neighbour Notifications : .....

Date of Site Visit : .....

Date Registered : 12/04/2000

Earliest Date for Decision : 29/05/2000

Latest Consultation Date/Site Notice Expiry Date : 29/05/2000

Application Expiry Date: 07/06/2000

Consultation Responses :

Planning Issues :

Application Number: C/2000/1305

Appraisal :

Recomendation : Approval: ☐ **Refusal:** ☐
(tick appropriate box)

Application Number C/2000/1305
Conditions/Reasons for Refusal

No	Std Con	Std Reas	Non Std Conditions / Reasons for Refusal

RECORD OF SITE VISIT

SITE ADDRESS: Land Rear Of 72-90 Grazeley Road Three Mile Cross Reading.

APPLICATION NUMBER: C/2000/1305

OFFICER: Angela Odell

DATE OF SITE VISIT:.....

1 SITE/STATUTORY NOTICE DISPLAYED ?

2. DESCRIPTION OF SURROUNDINGS

3. DESCRIPTION OF SITE/BUILDING

4. RELATIONSHIP TO ADJOINING PROPERTIES

5. SITE CONSTRAINTS

TREES

ACCESS/PARKING

LEVELS

BOUNDARY TREATMENT

OTHERS

29969

PLANNING
POL
DC
APP
CS

30 MAY 2000

COPIES TO:

ACK:
FILE:

WOKINGHAM DISTRICT COUNCIL

MEMORANDUM

From: John Mullaney
Environmental Health

My Ref: JRM

To: Angela Odell
Planning Department

Date: 22/05/00

72-90 GRAZELEY ROAD, SHINFIELD. C/2000/1305

With reference to details to comply with the condition regarding contaminated land, I am satisfied with the report submitted and have no further comments to make.

The statement from Southern Testing regarding land gas is unsatisfactory as in paragraph 3 it states that there are no operational or non-operational landfill sites within 500m. In fact there is an ex landfill site located within 200 metres to the south west of the site adjacent to the A33. Having consideration to this information, Southern Testing may wish to re-examine their risk assessment.

J Mullaney

John Mullaney
Environmental Health Officer

Our Ref: DK/MS/98.215/LA

20th April 2000

1305 1

Wokingham District Council
Environmental Services Department
Council Offices
Shute End
PO Box 157
Wokingham
Berkshire
RG40 1WR

cc. T. Elliott – Linden Caterham

PLANNING SERVICES	HPT 29191
POL AO	TLS
DC	ENF
APP	
CS	
10 MAY 2000	
COPIES TO:	ACT:
	FILE:

F.A.O: Mrs Odell – Planning Officer

Dear Sir

Re: Grazeley Road Phase 2 – Approval N° 99/70568/F

We refer to our letter of 11th April 2000 enclosing site investigation report for the above.

We now enclose four copies of a supplementary statement from Southern Testing regarding land gas. We would be pleased if this could be considered in association with the site investigation report as forming the documents required for clearance of conditions N°s 18 and 19 under the above approval.

Yours faithfully

D.V Kingsley

DOUG KINGSLEY
BDG Design (South) Ltd

DK Grazeley Road Phase 2.doc

Pl. send copies to
Env. agency &
Env. Health.
+ return original to me.
Thanks
Aga-
✓ Penny 18/5

Additional Plans on conditions. 10/5

BDG DESIGN
Estate Planning Consultants
Architectural Design
C.A.D. Bureau
Planning Consultants
Design and Build
Landscape Design
Engineering Design

BDG Design
Anglia House
North Station Road
Colchester
Essex CO1 1SB
Tel: 01206 561436
Fax: 01206 574821
Email:
enquiries@bdg-design.co.uk
Visit our WEB site at:
http://www.bdg-design.co.uk/

Directors
Stephen M. Gook FFB M.Inst.D
Graham Warren

Associates
Graham A. Edwards B.Sc (Hons)
Ian J. Robinson

BDG Design (South) Ltd.,
Registered in England No. 2870675
Registered Office: 2 Bath Place,
London EC2A 5JJ

SOUTHERN TESTING

Keeble House, Stuart Way,
East Grinstead, West Sussex, RH19 4QA
Telephone 01 342 313 156
Fax 01 342 410 321

RECEIVED
13 APR 2000

Directors
M B Scott BSc MSc CEng MICE MIHT MConsE (Chairman)
J M Hickmott BSc CEng MICE FGS (Managing Director)
P F Martin BSc DIC CEng FICE MConsE
M W Stevenson BSc MBA CEng MICE CGeol FGS MConsE (Technical Director)
R C Smith BSc MSc CGeol FGS
Helen L Smith BSc MSc CGeol DIC FGS ARSM
D Vooght BSc (Civ Eng) MSc
Company Secretary J W Kent ARICS MIMgt
Consultants Eur Ing Eur Geol Neil Duncan BSc CEng CGeol FIMM MInstWM MCIWEM
Alan Parker BSc CChem FRSC MInstWM
Dr Derek Petley PhD DIC BSc MIHT FGS

6 April 2000

Linden Homes
Linden House
The Village at Caterham Barracks
Coulsdon Road
Caterham on the Hill
Surrey CR3 5YB

Our Ref:MBS/LAW/6421
Your Ref:

For the attention of Terry Elliot

Dear Sirs

Re: 72 - 90 Grazeley Road, Three Mile Cross

1305

Land Gas Issues

We are pleased to respond to your request for a statement regarding land gas.

1. During the site investigation works no significant amounts of fill material were detected

2. A historic maps search indicated that the previous land use had been as farmland, or residential small holdings, neither of which activities would be likely to result in production of land gas.

3. A sitescope data base search was carried out. This indicated that there were no operational or non operational land fills within 500m.

4. The soil on site is clay, with a high ground water table. Clay has very poor transmissitivity to land gas and the high water table also detracts from potential lateral migration of land gas.

In conclusion all four of the indicators we examined that might indicate the presence of gas were negative and it is considered that land gas will not prove to be a significant problem on the subject site, and that precautions are not required. This of course does not preclude the necessity of careful inspection of all excavations by a competent person, and appropriate action taken if fill is encountered.

Yours faithfully

M. B. Scott
Southern Testing Laboratories Limited

DOE 1

WOKINGHAM D.C. DEVELOPMENT CONTROL

Start date: 12|4|00	
Officer: AO	Application No. C|2000|1305

Map No. ..... Site .....
Easting: ..... Flood Pln .....
Northing: ..... Mineral .....

Level: ☑ **Sub Committee** ☐ **Delegated** ☐ **Sec. State**
☐ **Incorrect Fee** ☐ **Invalid** ☐ **PD**

Description:
Details to comply with conditions 18 & 19 of consent 99/70568/F for the approval of site assessment report

Location: Land rear of 72-90 Grazeley Road

Parish: Shinfield Ward: Shinfield

Applicant: Linden Homes South East Ltd

Fee Received..... Required ..... Additional ..... Refund .....

Enforcement Section to be notified ☐ tick if required

Additional information required for validation

		Reason	Requested	Received
1	1:2500 OS location plan showing property edged in blue/red			
2	1:500 block plan showing existing & proposed dev. + adj. Properties	please consult:		
3	Forms unsigned	Env. Agency		
4	Correct S 66 certificate			
5	Elevation plans	+ Env. Health		
6	Floor plans			
7	Metric scale disclaimer	Thames		
8	Encroachment letter	Ag.		
9	Miscellaneous			

APPLN NO. _____

ACTION REQUIRED BY DEVELOPMENT CONTROL

Conservation Area .....

Listed Building 1 2 2*

Advertisement Required .....

Date Site Notice Sent : ..... Parish Council Informed - YES / NO

INTERNAL CONSULTATIONS

Building Control	NF: .....
Landscape	NK: .....
Trees	NK: .....
Conservation Officer	NK: .....
Environmental Health	NA: ✓ 5/5
Housing	NA: .....
Leisure & Cultural services	PA: .....
Public Rights of Way	PA: .....
Property	NG: .....
District Secretary (only if called in by SOS)	MA: .....
Policy & Plans	QA: .....
Strategic Planning (JSPU)	HA: .....
Minerals (BABTIE)	GA: .....
Archaeological Site (BABTIE)	: .....
Education	AP: .....
Social Services	BT: .....
Highways	XA: .....

EXTERNAL CONSULTATIONS

Adjacent D P A	: .....
Adjacent Parish	: .....
Southern Electricity Board	BN: .....
British Gas	BM: .....
PSA Oil Pipeline	BD: .....
Transco	: .....
Environment Agency	BP: ✓ 5/5

Rail Track	BI: .....
Police Arch. Liaison Officer	PC: .....

HERITAGE BODIES

The Georgian Group	KC: .....
Ancient Monuments Society	KA: .....
Council for British Arch.	KB: .....
RCHME	KF: .....
Telecommunications (NRPB)	: .....
Sport England	: .....

OTHERS:

.....

.....

.....

NEIGHBOURS:

.....

.....

.....

.....

.....

.....

.....

.....

.....

BDG DESIGN
Estate Planning Consultants
Architectural Design
C.A.D. Bureau
Planning Consultants
Design and Build
Landscape Design
Engineering Design

BDG Design
Anglia House
North Station Road
Colchester
Essex CO1 1SB
Tel: 01206 561436
Fax: 01206 574821
Email:
enquiries@bdg-design.co.uk
Visit our WEB site at:
http://www.bdg-design.co.uk

PLANNING SERVICES 28253
POA
DC VAO
APP
GS
12 APR 2000
COPIES TO: ACK:
FILE:

Our Ref: DK/MS/98.215/LA

11th April 2000

Wokingham District Council
Environmental Services Department
Council Offices
Shute End
PO Box 157
Wokingham
Berkshire
RG40 1WR

F.A.O: Mrs Odell – Planning Officer

Dear Sirs

Re: Grazeley Road, Phase 2 – Approval N° 99/70568/F

We refer to the Planning Approval for the above and earlier submission of details for clearance of conditions.

Further to this we now enclose a copy of the site Investigation Report reference STL 6421 J dated 31st March 2000, and would be pleased if this could be considered for clearance of condition N°s 18 & 19 under the above approval.

Yours faithfully

D.V. Kingsley

DOUG KINGSLEY
BDG Design (South) Ltd

DK Grazeley Road - Wokingham District Council.doc

Directors
Stephen M. Gook FFB M.Inst.
Graham Warren

Associates
Graham A. Edwards B.Sc (Hons
Ian J. Robinson

BDG Design (South) Ltd.,
Registered in England No. 2870675
Registered Office: 2 Bath Place,
London EC2A 3JJ