

Market Area, Penistone (Phase 1)

**Golden Living Ltd &
Dransfield Properties Ltd.**

Site Investigation Report

Solmek

Job No. S50632

August 2005

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Solmek is a trading name for Hymas GeoEnvironmental Ltd



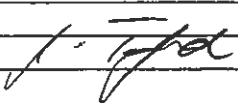
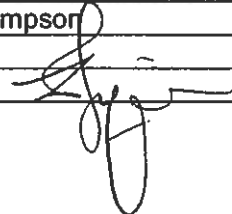
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Status	Prepared by	Checked	Date
Final	S D Telford	D Simpson	August 2005
			

Market Area, Penistone (Phase 1)

1 INTRODUCTION

Authorisation

The site investigation described in this report was carried out by Solmek to the instructions of Met Consulting Engineers on behalf of Golden Living Ltd & Dransfield Properties Ltd in relation to the development of residential buildings with hardstanding and car park areas. A drawing showing the position of the site is included in Appendix A.

Scope of Works

The fieldwork and testing was generally carried out according to the recommendations of BS5930: 1999 "Code of Practice for Site Investigations" and all stratum descriptions are as recommended in that publication.

The information provided in this report is based on the investigation fieldwork, and are subject to the comments and approval of the various regulatory authorities.

A limited geotechnical and environmental report was requested. A desk study relating to the site was previously carried out by Met Consulting Engineers. There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report. Solmek reserve the right to alter conclusions and recommendations should further information be available or provided. Any schematic representation or opinion of the possible configuration of ground conditions between exploratory holes is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

Extent of Investigation

The extent of the investigation, as agreed with the Client, was to provide geotechnical and contamination information based on the drilling of three shell and auger boreholes (referenced BHs 13, 14 and 18) to a maximum depth of 3.6m below ground level (bgl) with associated sampling, insitu and laboratory testing. The boreholes were expected to be drilled to depths up to

10mbgl, however to the presence of very weak highly weathered siltstone/sandstone, drilling was terminated. Two rotary boreholes (referenced R7 and 8) were drilled to maximum depth of 40.0mbgl. A third rotary borehole was proposed, however on the day of drilling, it was located in very close proximity to an electrical sub station, and was not drilled as cables were detected. A series of trial pits (referenced TPs 1 to 6) were also excavated.

Samples were obtained for laboratory contamination and geotechnical testing purposes. The information obtained together with the results of the laboratory testing was then collated in the provision of this report.

The fieldwork was carried out on between 11th and 22nd of July 2004.

2 GROUND CONDITIONS

A summary of the ground conditions encountered is given below. The shell and auger and rotary boreholes along with trial pit logs are presented in Appendix B.

FROM SHELL & AUGER BOREHOLES AND TRIAL PITS

Made Ground

Made Ground was encountered in both boreholes and trial pits to depths ranging from 0.4mbgl to 1.4mbgl. Made ground generally comprised concrete in TP1, 2, 4, 5, and BH's 13, 14 and 18, over loose black/brown clayey/sandy ash fill to depths of ranging from 0.4 to 1.4mbgl. This layer was encountered from the surface of TP3 and TP6. In TP6, this fill layer extended to a depth of 1.4mbgl and contained brick, concrete, ceramics, plastic and slag. In TP1, 2 and 5, black ash/slag was encountered to depths of up to 0.8mbgl.

Natural Deposits

Underlying the Made Ground is firm and stiff sandy gravelly clay to depths of up to 3.1mbgl (BH18). Solid geology consisting of highly weathered sandstone and siltstone was encountered in TP's 1, 2, 4, 5 and BH's 13, 14 and 18 at depths ranging from 1.2m (TP4) and 3.1mbgl (BH18).

FROM ROTARY BOREHOLES

Two rotary boreholes (referenced R7 and R8) were drilled to 40mbgl. Made ground was encountered to 0.7mbgl (R7) and 1.7mbgl (R8), comprising of rubble fill. In R7, a sandstone slab and red ash was encountered between 0.2 and 0.3mbgl. Made ground in R7 was underlain by natural brown sandstone and brown mudstone with clay/silt bands to 7.0mbgl. In R8, made ground was underlain by natural brown clay, over brown sandstone with clay bands to 4.3mbgl. Both boreholes consisted of successions of mudstone/ironstone, siltstone and sandstone to 40mbgl. No coal deposits, voided or broken ground was encountered during the rotary drilling survey.

Groundwater

Groundwater was only encountered in R8 at a depth 12.5mbgl as a water strike. The water level after 20mins was 9.9mbgl.

3 CONTAMINATION ANALYSIS & RESULTS

To provide information upon the possibility of residual contamination five made ground samples and one natural sample were obtained from the boreholes and trial pits. The made ground samples were selected because they are most likely to contain contamination given the ash, slag and rubble content. The soil samples were tested for a range of potential contaminants, based on recent Contaminated Land Exposure Assessment (CLEA) listed by the Environment Agency.

The site is expected to be developed with residential housing, with hardstanding and car parking. There is no soft landscaping proposed, therefore giving minimal or no exposure to possible contaminated soil. The residential (without plant uptake) Soil Guideline Values (SGV) have been used and where applicable lower tier threshold values for open spaces, based on EA derived lower tier threshold guidelines.

Chemical contamination results revealed three raised arsenic concentrations recorded at 35mg/kg (BH13), 23mg/kg (TP3) and 50mg/kg (TP6). The threshold for arsenic is 20mg/kg. All other Group A metals (those potentially harmful to humans) were low and within relevant guidelines. Group B heavy elements such as copper, nickel, zinc and boron were present at variable but low concentrations. These group B elements are regarded as phytotoxic elements (harmful to plant growth) and as such pose little risk to human health.

Samples underwent testing for PAH (Polyaromatic Hydrocarbons) and TPH (Total Petroleum Hydrocarbons). There is no SGV for PAH at present. It was revealed that two samples were above the 50mg/kg EA derived threshold in BH13 at 57mg/kg, and BH18 at 184mg/kg. For TPH, threshold level of 600mg/kg based on Kelly's indices was used. It was revealed that one raised TPH concentration was recorded in BH18 at 1115mg/kg.

Phenols and cyanide were recorded at minimum detection levels of less than 2.3 and 2mg/kg respectively.

4 CONTAMINATION GUIDELINES

There are various guidelines which relate to contamination of water, soils and gas in the UK.

The CLEA values provide the most recent and appropriate guidance on soil contamination that applies to the UK. These give soil guideline values (SGV) at which a risk to human health may exist and are primarily intended as a guide to site redevelopment. Values are given for different land uses; these include residential gardens and commercial areas where the risks are less. EA derived lower tier threshold values are used where no SGV are available. A list of the SGV for commercial and domestic land use is provided.

Parameter	SGV – Domestic	SGV- Commercial
Arsenic	20	500
Cadmium	1 to 8 (ph dependent)	1400
Chromium	130	5000
Lead	450	750
Mercury	8	480
Nickel	50	5000
Selenium	35	8000

These figures need to be compared with the modified average given in the Environment Agency document CLR7 "Assessment of risks to human health from land contamination. An overview of the development of soil guideline values and related research".

There are various guidelines employed for assessing water quality. There are some UK guidelines which are derived from EC Regulations. In addition, Dutch ground water quality thresholds are commonly referred to due to their ease of use and the stringent nature of the need for ground water quality control in a country which is low lying. Other information and guidelines used are taken from waste management and are termed leachate quality thresholds. However, some professional judgement and modelling may be required where the contamination is in close proximity to a sensitive receptor such as a lake, river or aquifer.

5 CONTAMINATION, DEVELOPMENT AND LIABILITIES

Requirements of parties within the Development process

Interested parties involved in the development process may use the data in different ways and there may be varying views and interpretation of the factual data. Local Authority staff may have a view on contamination and human health and the wider environment. The Environment Agency are concerned principally with the protection of surface and groundwater. Building Insurers, funders and purchasers may be primarily concerned with issues of potential commercial blight. Purchasers are also not always fully informed, and perceptions on issues associated with risk can affect the decision to purchase. Developers and construction organisations will focus on financial aspects of dealing with the contamination in the context of the development and construction programme.

Risks & liabilities from Contamination

In simple terms, risks associated with contamination may be considered in terms of 1) statutory risks and 2) development related risks. If contamination is severe or forms a potential hazard based on its potential to affect groundwater, surface water or human health, a statutory risk may be present, and as such, if the risk is not reduced a government body or local authority may instigate criminal proceedings.

If the contamination is less severe or not considered to be mobile, it may be considered a commercial liability which could, in theory remain untreated, but which may at a later date affect the value of the property, or, with changing legislation, become a statutory risk. Commercial liabilities could give rise to civil proceedings by third parties if there are grounds for action.

6 CONTAMINATION ASSESSMENT

Proposed land use

The site is expected to be developed with a residential development. There are no soft landscaped areas proposed. The ground will be covered over by the structures and possibly parking areas, this in effect creates a barrier between users of the site and insitu contamination and removes the pathway for contaminant spread. The levels of contamination in the ground are generally low and below relevant guidelines apart from three raised arsenic, two raised PAH and one TPH samples from the made ground source. Those areas with slightly raised contaminants should be stripped and exported off site. This material must first be categorised in accordance with the recently published Waste Acceptance Criteria (WAC) before being exported to an approved tip.

If any zones of odorous, brightly coloured or suspected contaminated ground is encountered then work should cease in that area until the material has been tested. The results of the tests will determine whether or not remediation will be required.

Brick and concrete rubble fragments within the made ground can be screened, crushed and used as engineered fill under the building footprint or less sensitive areas such as beneath parking bays.

If a raft design is to be considered a crushed stone blanket across the site will provide an additional barrier to the insitu contamination.

Construction Workers

It is not considered that contamination resulting in significant harm will be encountered. The levels of heavy metals are not sufficiently high in our opinion to pose a potential hazard to workers or the public at large. Simple hygiene precautions should be implemented such as washing hands before eating and drinking. In addition ppe will be required.

Site users

It is most unlikely that residents or workers will be exposed to contaminants in the ground once the development is complete. However screening out of other deletrious materials in the made ground will be beneficial.

Gardens/Soft landscaping

Given the end use of the site it is most unlikely that soft landscaping would be required. However if such landscaping is to be incorporated into part of the development then it is suggested that both topsoil and subsoil is brought to the site from an external source. It is in our opinion that 300mm of clean subsoil and 200mm of topsoil should be placed in all landscaped areas to sustain plant growth.

Building Materials and Underground Services

The results of the pH analysis from the chemical contamination testing ranged from 7.7 to 8.4 with soluble sulphates of between 0.014 and 0.206g/l. Acid ground conditions and contamination from petroleum based products accelerate corrosion and damage concrete. This investigation has indicated that the site is not aggressive, and no special measures are anticipated for service fabrics.

7 GROUND GAS ASSESSMENT

Gas monitoring has been undertaken on two occasions on 22nd and 27th July. The gas was monitored by measuring emissions from one monitoring point installed in BH 18 during the site investigation. The results are tabulated in Appendix D.

The atmospheric pressure has an impact on the concentrations of gas released. Atmospheric pressure was between 983 and 998 millibars during the surveys. This is considered to be low to moderate for the time of year, so gas results during the surveys are likely to be representative of normal or moderate weather/atmospheric conditions.

Carbon dioxide concentrations varied between 0.4% and 0.8% volume, and oxygen between 19.0% and 19.5% volume. Methane was not detected during any monitoring survey. No significant flows were recorded.

The lower explosive limit for methane is 5%. The results obtained have been compared with relevant guidance that includes the following:

- The Building Regulations 1991, Approved Document C, Section 2;
- Protecting Development from Methane, CIRIA Report 149, 1995;
- Landfill Gas, Waste Management Paper Number 27;

- Construction of New Buildings on Gas-Contaminated Land, BRE Report, 1991.

Gas Regime	Methane (%V/V)	Carbon Dioxide (%V/V)	Flow (metres/sec)	Summary of Gas Control Systems
1	<0.1	<1.5	No flow	No special precautions
2	>0.1 – 1	>1.5 – 5	No flow	Ventilation of confined spaces within the building Well constructed ground slab Low permeability gas membrane Minimum penetration of the ground slab by services
3	>1 – 5	>5	No flow	As regime 2 plus: Passive venting to building – under slab void
4	>5 – 20	<20	<0.01	As regime 2 plus: passive in ground venting active in ground venting gas monitoring of installed measures with alarms
5	>20	>20	>0.01 - 0.50	Reduce gas regime prior to development
6	>20	>20	>0.50	Reduce gas regime prior to development

TABLE 1: CIRIA 149 GAS REGIMES

The Building Regulations set action levels for both methane and carbon dioxide from which an initial assessment can be made. The action threshold for methane is 1% while for carbon dioxide an initial consideration should be undertaken if gas concentrations exceed 1.5%. Action might be required if carbon dioxide concentrations exceed 5%. If these thresholds are exceeded, reference should be made to specific documentation to determine the nature and extent of the gas control measures required.

Guidance within the CIRIA 149 Report entitled "Protecting Developments from Methane", identifies six gas regimes based on the gas concentrations recorded during monitoring. The gas regimes and the protection measures required are summarised in Table 1. The gas levels accord with Gas Regime 1.

8 GEOTECHNICAL TESTING

The laboratory geotechnical testing carried out was undertaken in accordance with BS1377 (1990).

Triaxial testing was undertaken on three samples of natural clay from depths of between 0.8 and 1.5mbgl, these were supplemented by shear vane results during the fieldwork. The results of the triaxial testing indicate c_u values of between 55kN/m² and 254kN/m². The results are indicative of firm

to very stiff clay. The shear vane results were comparable with the laboratory testing, and ranged from

One sample of soil was tested for acidity and soluble sulphate content to assess whether the soil may be potentially aggressive to building fabric. The results of the testing for pH was 5.5, with a soluble sulphate of 0.03g/l.

Results of the two Atterberg Limit tests have shown the cohesive materials to be clay of low plasticity according to the Plasticity Chart published in BS5930. Liquid Limits were 29%. Plasticity indices of the samples ranged from 9 and 10. The clay can be regarded as having a low shrinkage potential in accordance with NHBC guidance.

One sample (BH14 at 1.5mbgl) was selected for particle size distribution analysis. The result showed that the material was predominantly clay, with a poorly graded sand and gravel content.

The results of the geotechnical laboratory testing are summarised in Appendix C.

9 CONCLUSIONS AND SUMMARY

The site is expected to be developed with a residential development. The ground conditions consisted of made ground generally comprising concrete over loose black/brown clayey/sandy ash fill to depths of ranging from 0.4 to 1.7mbgl. In TP6, this fill layer extended to a depth of 1.4mbgl and contained brick, concrete, ceramics, plastic and slag. In TP1, 2 and 5, black ash/slag was encountered to depths of up to 0.8mbgl. Underlying the Made Ground is firm and very stiff sandy gravelly clay to depths of up to 3.1mbgl (BH18). Solid geology consisting of highly weathered sandstone and siltstone was encountered at depths ranging from 1.2m (TP4) and 3.1mbgl (BH18).

Rotary Boreholes

From the rotary boreholes, no coal seams, voided or broken ground was encountered.

Foundations

The proposed development is assumed to be of conventional construction, where it is assumed that structural loads will be relatively light to moderate for the proposed housing.

The thickness and consistency of made ground precludes a shallow foundation without ground improvement. Deep strip footing foundations would be a suitable option for the proposed development. A conservative shear strength value was used to calculate a safe bearing capacity of 130kN/m^2 . Given the made ground encountered, the strip footings should be founded at a depth of 1.4mbgl in order to avoid potential settlement problems.

Prior to placing any foundation concrete all exposed formations should be well compacted and any obvious soft spots should be removed and replaced with hardcore. Furthermore, all excavations should be inspected to ensure that they fully penetrate any areas of disturbed ground.

Excavation and Groundwater

Based on the borehole and trial pit records, excavations down to foundation depth can be anticipated to encounter made ground of concrete over sandy/clayey ash fill. Shallow excavations in the made ground are likely to be unstable in the short term and shoring may be required if the excavations are to be left open for long periods and during inclement weather. Conventional mechanical plant should be suitable for excavation purposes, although a breaker may be required for the concrete. All excavations should be designed in accordance with the recommendations of CIRIA Report No. 97.

Groundwater was not encountered during the rotary borehole (R8) progression until 12.5mbgl. It appears unlikely that dewatering will be required for shallow excavations. However, groundwater conditions can reflect seasonal climatic variations and can vary as a result of local dewatering schemes and abstractions. Furthermore it should be recognised that the clay formations could deteriorate quite rapidly on exposure, particularly to inclement weather conditions. It would be prudent to protect all exposed formations with a blinding layer, especially if they are to remain open for any extended period of time.

Sulphate results

No pyritic soils were noted during the fieldwork and pH values were acidic to slightly alkaline, being of pH 5.5 or higher with soluble sulphate falling within the negligible range. Based on these results, no special measures are required to mitigate against adverse sulphate or acid attack of buried concrete. Design Sulphate Class DS-1 should be appropriate and assuming static groundwater conditions the Aggressive Chemical Environment for Concrete (ACEC) assessment for the site should be taken as AC-2z, as prescribed in current BRE Special Digest 1.

Contamination Analysis

The site is expected to be developed with a residential development. The ground will be covered over by the structures and possibly parking areas, this in effect creates a barrier between users of the site and insitu contamination and removes the pathway for contaminant spread. The levels of contamination in the ground are generally low and below relevant guidelines apart from three raised arsenic, two raised PAH and one TPH samples from made ground source. Those areas with slightly raised contaminants should be stripped and exported off site. This material must first be categorised in accordance with the recently published Waste Acceptance Criteria (WAC).

If soft landscaping is to be incorporated into part of the development then it is suggested that both topsoil and subsoil is brought to the site from an external source. It is in our opinion that 300mm of clean subsoil and 200mm of topsoil should be placed in all landscaped areas to sustain plant growth.

If any zones of odorous, brightly coloured or suspected contaminated ground is encountered then work should cease in that area until the material has been tested. The results of the tests will determine whether or not remediation will be required.

SOLMEK

APPENDIX A

APPENDIX B

BOREHOLE LOG

Project Market Area, Penistone				BOREHOLE No BH13	
Job No S50632	Date 11-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.50-0.60	B					0.10	MADE GROUND. Concrete.		
						(1.30)	MADE GROUND. Loose black clayey very ashy sand with much sandstone cobbles and brick backfill.		
1.00-1.10	B					1.40			
1.50-1.95	B	N19				(1.30)	Stiff dark yellowish brown sandy CLAY with much weathered sandstone.		
2.50-2.60	B					2.70			
3.00-3.20	J	N50+				(0.50)	Very weak highly weathered brown SILTSTONE possibly very fine sandstone.		
						3.20			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.

GRD BOREHOLE LOG S50632 GPJ AGS3 ALL GDT 23/02/07

All dimensions in metres
Scale 1:25

Client Golden Living Ltd /
Dransfield Properties Ltd

Method/
Plant Used

Logged By
ST

BOREHOLE LOG

Project Market Area, Penistone				BOREHOLE No BH14	
Job No S50632	Date 20-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
						0.10	MADE GROUND. Concrete.		
						(0.30)	MADE GROUND. Loose black sandy very ashy rubblely clay.		
0.50-0.60	B					0.40	Stiff dark yellowish brown slightly mottled grey sandy gravelly CLAY. Gravel is angular weathered sandstone.		
1.00-1.10	B								
1.50-1.95	B J	N32				(2.50)			
2.50-2.60	B					2.90			
3.00-3.20	J	N50+				(0.70)	Very weak highly weathered dark yellowish brown friable SILTSTONE.		
3.50-3.60		N50+				3.60			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.

All dimensions in metres Scale 1:25	Client Golden Living Ltd / Dransfield Properties Ltd	Method/ Plant Used	Logged By ST
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GRD BOREHOLE LOG S50632 GPJ AGS3 ALL GDT 23/02/07

BOREHOLE LOG

Tel 01642 607083
Fax 01642 612355

Project Market Area, Penistone				BOREHOLE No BH18	
Job No S50632	Date 20-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.50-0.60	B	N50+				0.10	MADE GROUND. Concrete.		
						(0.50)	MADE GROUND. Loose black clayey sandy ashy rubblely fill.		
						0.60	No recovery - Possible sandstone boulder.		
1.50						(1.80)			
2.50-2.60	B					2.40	Firm to stiff dark orangey brown sandy slightly gravelly CLAY. Gravel is weathered brown sandstone.		
						(0.70)			
3.00-3.45	J	N50+				3.10	Very weak highly weathered dark yellowish brown SILTSTONE. Possible very fine sandstone.		
						(0.40)			
						3.50			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.

All dimensions in metres Scale 1:25	Client Golden Living Ltd / Dransfield Properties Ltd	Method/ Plant Used	Logged By ST
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GRD_BOREHOLE_LOG_S50632.GPJ AGSS ALL GDT 23/02/07

BOREHOLE LOG

Project Market Area, Penistone				BOREHOLE No R7	
Job No S50632	Date 22-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 1 of 4	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
						0.10	MADE GROUND. Concrete		
						0.20	MADE GROUND. Sandstone slab.		
						0.30	MADE GROUND. Red ash.		
						0.70	MADE GROUND. Rubble and clay fill.		
						(0.70)	Brown SANDSTONE with clay.		
						1.40			
						(5.60)	Brown MUDSTONE with silty bands.		
						7.00			
							Grey MUDSTONE.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:62.5			Client Golden Living Ltd / Dransfield Properties Ltd			Method/ Plant Used			Logged By ST		

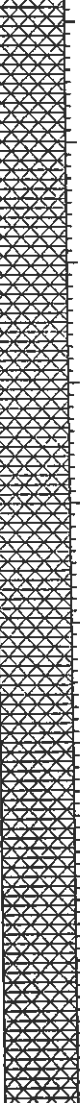
GRD BOREHOLE LOG S50632 GPJ AGS3 ALL GDT 23/02/07

Project				BOREHOLE No R7
Market Area, Penistone				
Job No	Date	Ground Level (m)	Co-Ordinates ()	
S50632	22-07-05			
Contractor				Sheet 2 of 4

3RD BOREHOLE LOG S50632.GPJ AGS3_ALL.GDT 23/02/07

BOREHOLE LOG

Project Market Area, Penistone				BOREHOLE No R7	
Job No S50632	Date 22-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 3 of 4	

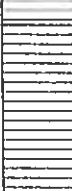
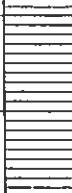
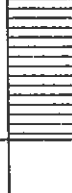
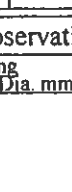
SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
					xxxxx xxxxx xxxxx xxxxx xxxxx	(0.90) 20.80	Grey SILTSTONE. (continued)		
						(9.70)	Grey silty MUDSTONE		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:62.5			Client Golden Living Ltd / Dransfield Properties Ltd			Method/ Plant Used			Logged By ST		

GRD BOREHOLE LOG S50632 GPJ AGS3 ALL GDT 23/02/07

BOREHOLE LOG

Project Market Area, Penistone				BOREHOLE No R7	
Job No S50632	Date 22-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 4 of 4	

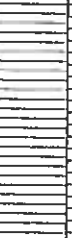
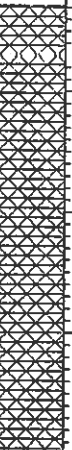
SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						30.50	Grey silty MUDSTONE. (continued)		
						(3.30)	Dark grey MUDSTONE.		
						33.80			
						(1.50)	Grey MUDSTONE.		
						35.30			
						(0.80)	Black MUDSTONE.		
						36.10			
						(1.80)	Grey IRONSTONE / MUDSTONE.		
						37.90			
						38.10	Black MUDSTONE.		
						(1.40)	Grey IRONSTONE / MUDSTONE.		
						39.50			
						(0.50)	Grey SANDSTONE.		
						40.00			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											No groundwater encountered.
All dimensions in metres Scale 1:62.5			Client Golden Living Ltd / Dransfield Properties Ltd			Method/ Plant Used			Logged By ST		

GRD BOREHOLE LOG S50632 GPJ AGS3 ALL GOT 23/02/07

BOREHOLE LOG

Project Market Area, Penistone				BOREHOLE No R8	
Job No S50632	Date 21-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 1 of 4	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
						(1.70)	MADE GROUND. Rubble backfill.		
						1.70 2.10	Brown CLAY		
						(1.10) 3.20	Brown SANDSTONE with clay bands.		
						(1.10) 4.30	Brown SANDSTONE with clay bands.		
						(2.00) 6.30	Brown weathered MUDSTONE		
							MUDSTONE with grey silty bands		

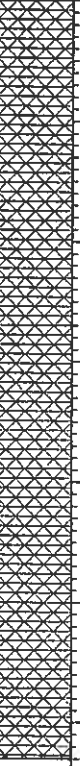
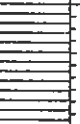
Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
											Groundwater encountered at 12.50m. After 20 mins water level is 9.93m.
All dimensions in metres Scale 1:62.5			Client Golden Living Ltd / Dransfield Properties Ltd			Method/ Plant Used			Logged By ST		

GRD BOREHOLE LOG S50632 GPJ AGS3 ALL GOT 23/02/07

BOREHOLE LOG

Tel 01642 607083
Fax 01642 612355

Project Market Area, Penistone				BOREHOLE No R8	
Job No S50632	Date 21-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 2 of 4	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
						(10.00)	MUDSTONE with grey silty bands. (continued)		
						16.30			
						16.60	Black MUDSTONE		
						(0.80)	Grey silty MUDSTONE		
						17.40			
						(1.20)	Grey SILTSTONE		
						18.60			
							Grey MUDSTONE / IRONSTONE with silty bands.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Groundwater encountered at 12.50m. After 20 mins water level is 9.93m.
All dimensions in metres Scale 1:62.5			Client Golden Living Ltd / Dransfield Properties Ltd			Method/ Plant Used			Logged By ST		

GRD BOREHOLE LOG S50632 GPJ AGS3 ALL GDT 23/02/07

BOREHOLE LOG

Tel 01642 607083
Fax 01642 612355

Project Market Area, Penistone				BOREHOLE No R8	
Job No S50632	Date 21-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 3 of 4	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
						(10.10)	Grey MUDSTONE / IRONSTONE with silty bands. (continued)		
						28.70	Dark grey MUDSTONE.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Groundwater encountered at 12.50m. After 20 mins water level is 9.93m.
All dimensions in metres Scale 1:62.5			Client Golden Living Ltd / Dransfield Properties Ltd			Method/ Plant Used			Logged By ST		

GRD BOREHOLE LOG S50632 GPJ AGS3 ALL GDT 23/02/07

BOREHOLE LOG

Project Market Area, Penistone				BOREHOLE No R8	
Job No S50632	Date 21-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 4 of 4	

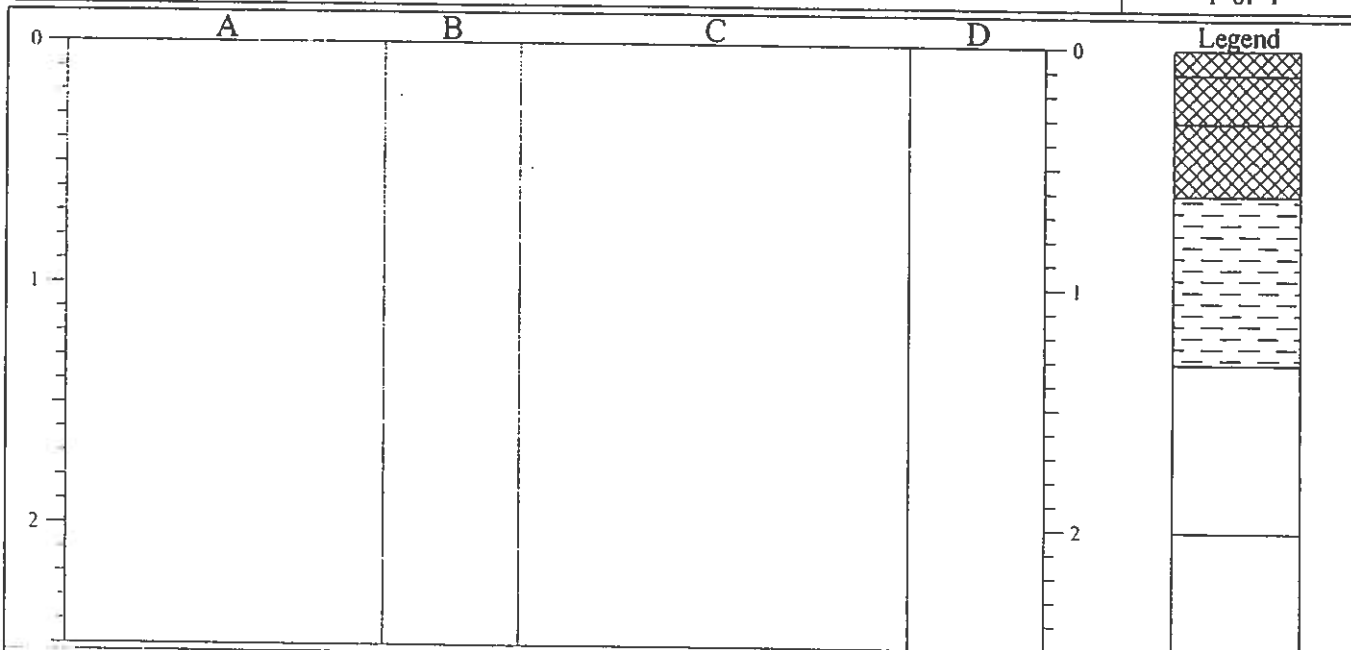
SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
						(2.80)	Dark grey MUDSTONE <i>(continued)</i>		
						31.50			
						(1.70)	Grey MUDSTONE.		
						33.20			
						(0.80)	Black MUDSTONE.		
						34.00			
						(1.80)	Grey silty MUDSTONE / IRONSTONE.		
						35.80			
						36.00	Black MUDSTONE.		
						(1.40)	Grey MUDSTONE / IRONSTONE.		
						37.40			
						(2.60)	Grey SANDSTONE.		
						40.00			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Groundwater encountered at 12.50m. After 20 mins water level is 9.93m.
All dimensions in metres Scale 1:62.5			Client Golden Living Ltd / Dransfield Properties Ltd			Method/ Plant Used			Logged By ST		

GRO BOREHOLE LOG S50632.GPJ AGS3 ALL GDT 23/02/07

TRIAL PIT LOG

Project Market Area, Penistone				TRIAL PIT No TP1
Job No S50632	Date 11-07-05	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1

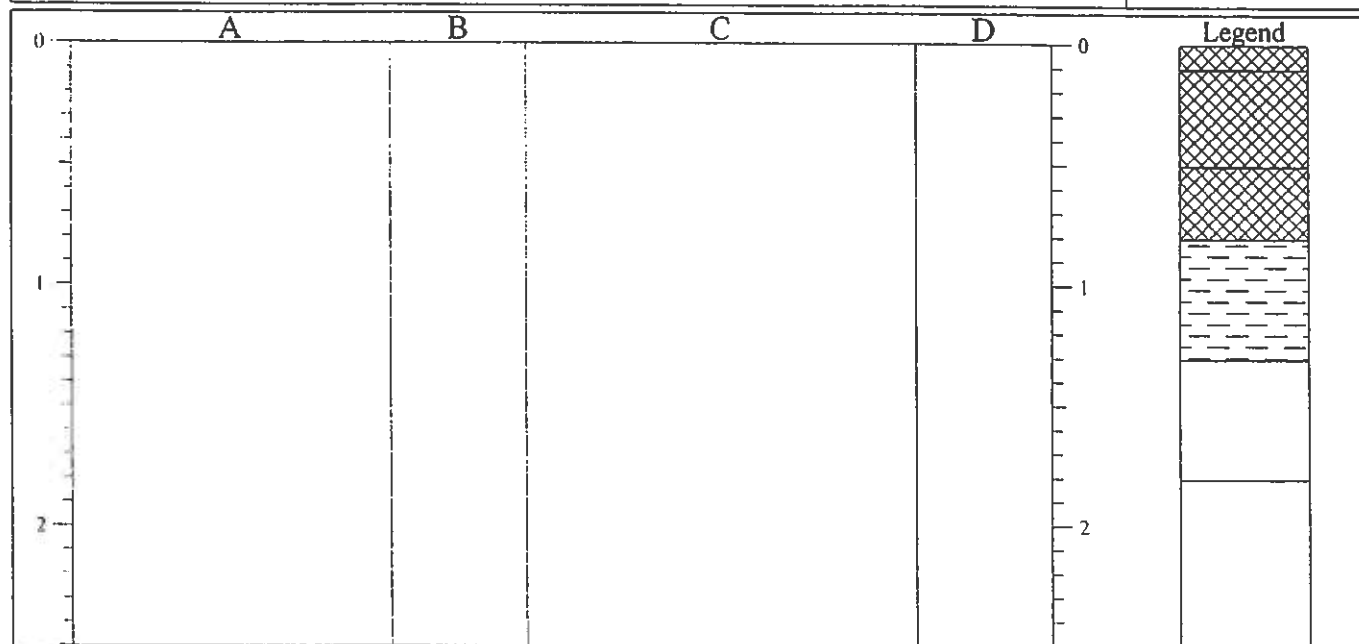


STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		MADE GROUND. Concrete.			
0.10-0.30		MADE GROUND. Brown sandy cobbled hardcore fill with much rubble.			
0.30-0.60		MADE GROUND. Black ashy very sandy slag fill.			
0.60-1.30		Firm orangey brown laminated slightly sandy CLAY with occasional coal fragments.			
1.30-2.00		Light brown highly weathered SANDSTONE.			

Shoring/Support: Stability:			GENERAL REMARKS No groundwater encountered.
All dimensions in metres Scale 1:31.25	Client Golden Living Ltd / Dransfield Properties Ltd	Method/ Plant Used	Logged By ST

TRIAL PIT LOG

Project Market Area, Penistone				TRIAL PIT No TP2
Job No S50632	Date 11-07-05	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



23/02/07

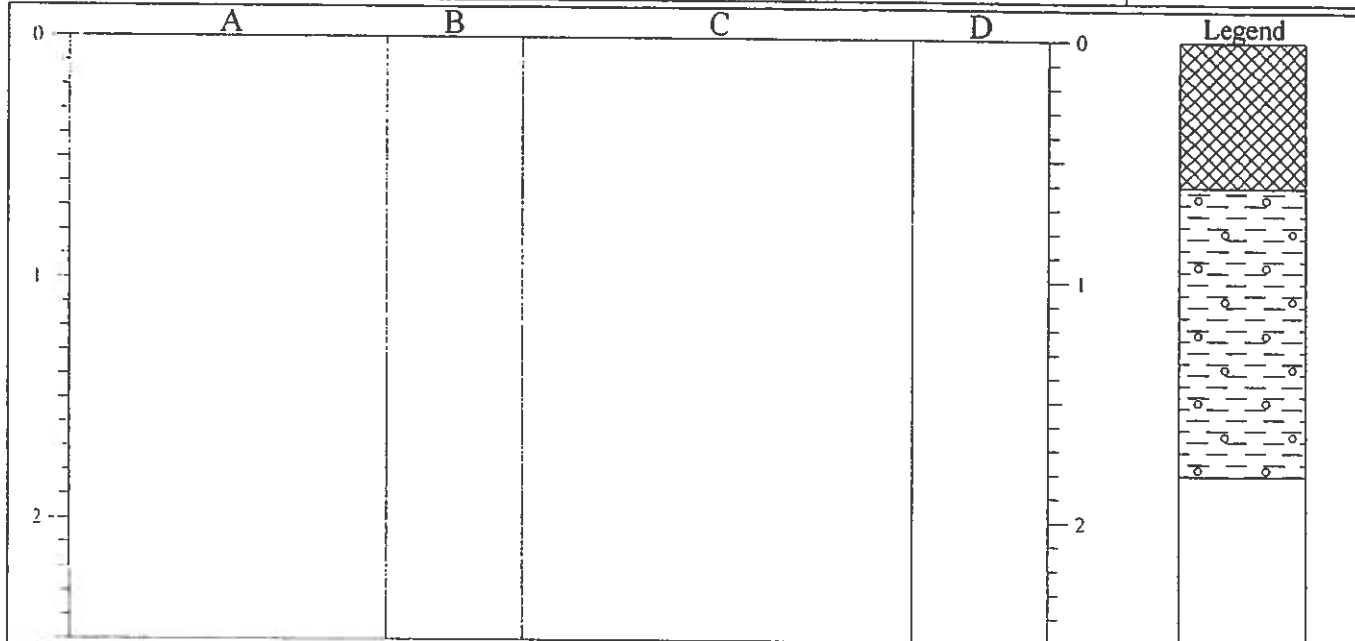
STRATA			SAMPLES & TESTS			
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.10		MADE GROUND. Concrete.	0.20-0.50	D	V=70kpa	
0.10-0.50		MADE GROUND. Dark brownish grey very sandy clayey gravel fill. Gravel is small to medium sub angular to angular.				
0.50-0.80		MADE GROUND. Band of black slag.	1.00			
0.80-1.30		Firm orangey brown laminated slightly sandy CLAY with occasional coal fragments.				
1.30-1.80		Light brown highly weathered SANDSTONE.				

Shoring/Support: Stability:			GENERAL REMARKS No groundwater encountered.
All dimensions in metres Scale 1:31.25	Client Golden Living Ltd / Dransfield Properties Ltd	Method/ Plant Used	

GRD TRIAL PIT LOG S50632.GPJ AGS3 ALL GDT 23/02/07

TRIAL PIT LOG

Project Market Area, Penistone				TRIAL PIT No TP3
Job No S50632	Date 20-07-05	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1

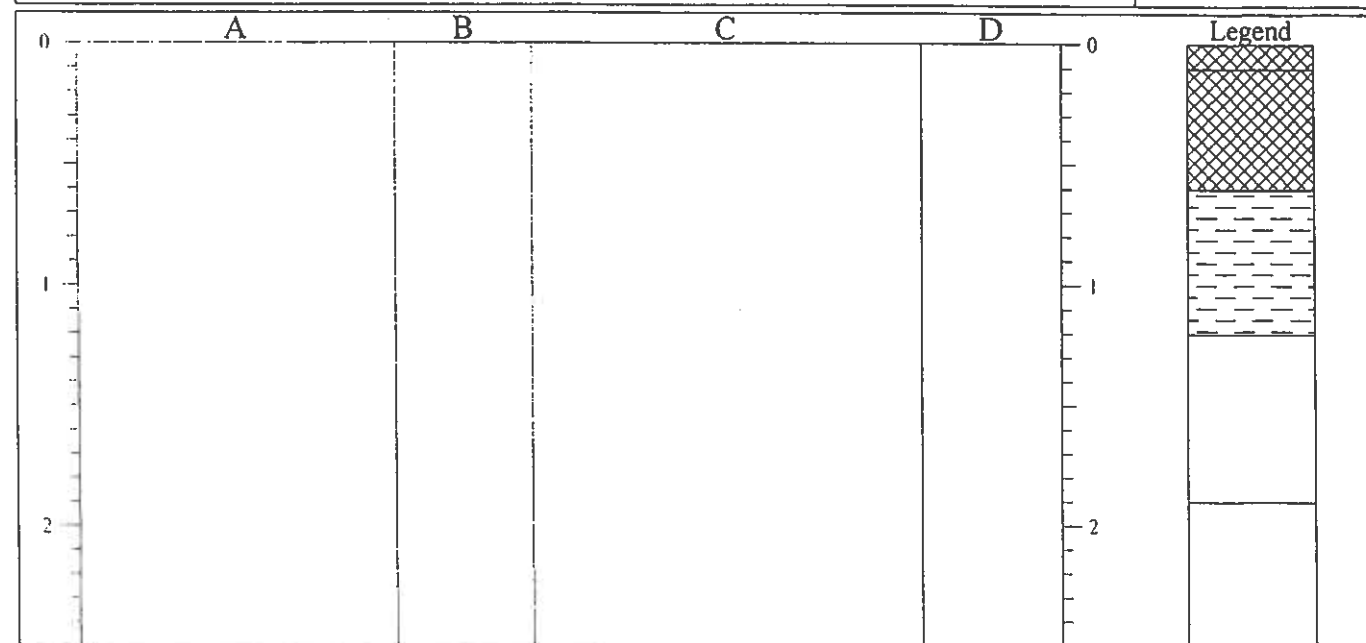


STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.60		MADE GROUND. Loose dark brown slightly clayey gravelly fine to coarse sand. Gravel is angular to rounded fine to coarse of brick, ceramics, plastic, slag, cinder, sandstone boulders and cobbles noted. Rootlets also noted.			
0.60-1.80		Firm Yellowy brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub angular to sub rounded fine to coarse of siltstone and sandstone.			

Shoring/Support: Stability: Pit walls unstable to 0.60m.			GENERAL REMARKS
All dimensions in metres Scale 1:31.25	Client Golden Living Ltd / Dransfield Properties Ltd	Method/ Plant Used	Logged By ST

TRIAL PIT LOG

Project Market Area, Penistone				TRIAL PIT No TP4
Job No S50632	Date 20-07-05	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



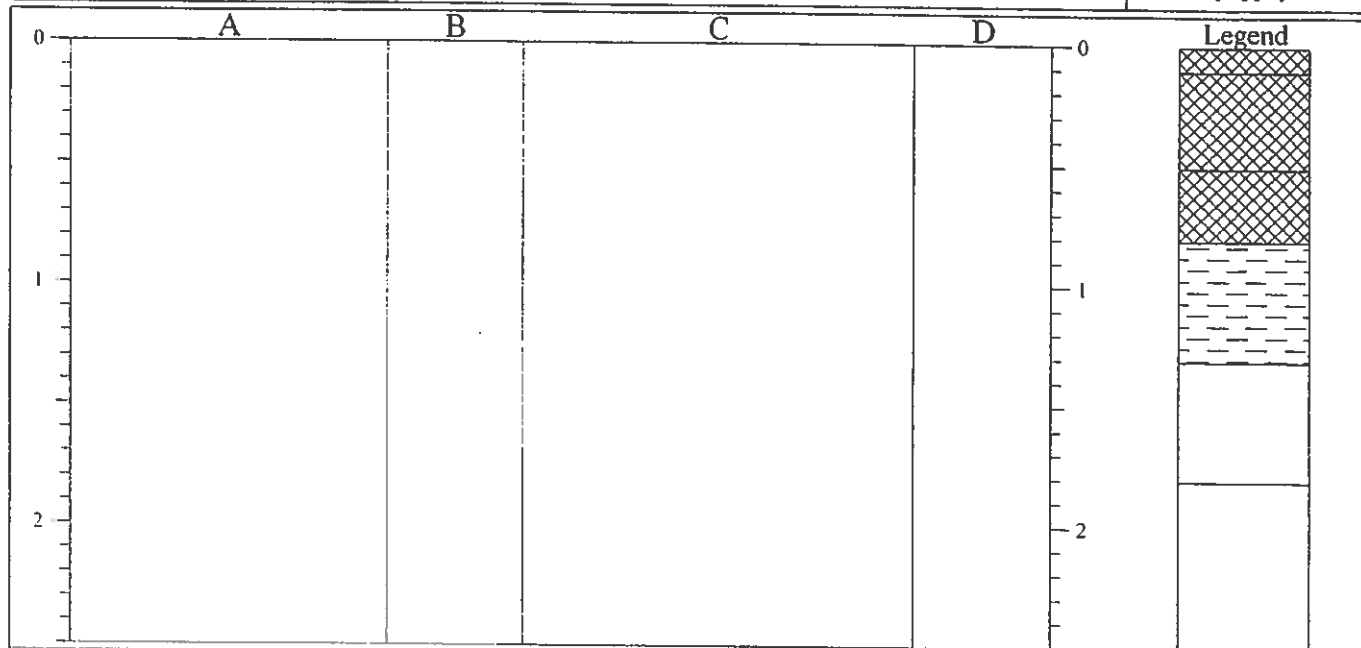
STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.10		MADE GROUND. Concrete				
0.10-0.60		MADE GROUND. Black very gravelly slightly ashy sand fill with slag and occasional brick fragments.	0.20-0.50	S		
0.60-1.20		Firm orangey brown laminated slightly sandy CLAY with occasional coal fragments. Becoming friable from 1.20m with medium sub angular gravel.	0.70		V=74kpa	
			0.90		V=69kpa	
1.20-1.90		Light brown highly weathered SANDSTONE.				

Shoring/Support: Stability:			GENERAL REMARKS No groundwater encountered.		
All dimensions in metres Scale 1:31.25		Client Golden Living Ltd / Dransfield Properties Ltd	Method/ Plant Used	Logged By ST	

GRD TRIAL PIT LOG S50632.GPJ AGS3 ALL GDT 23/02/07

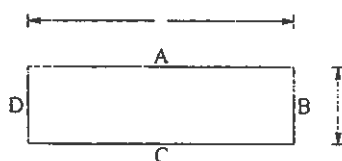
TRIAL PIT LOG

Project Market Area, Penistone				TRIAL PIT No TP5
Job No S50632	Date 20-07-05	Ground Level (m)	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.10		MADE GROUND. Concrete.			
0.10-0.50		MADE GROUND. Dark brownish grey very sandy slightly clayey gravel fill. Gravel is small to medium sub angular.	0.10-0.50	D	
0.50-0.80		MADE GROUND. Black slag.			
0.80-1.30		Firm becoming stiff orangey brown laminated slightly sandy CLAY with coal fragments.	1.00		V=72kpa
1.30-1.80		Light brown highly weathered SANDSTONE.	1.20		V=81kpa

Shoring/Support:
Stability:



GENERAL REMARKS

No groundwater encountered.

All dimensions in metres
Scale 1:31.25

Client Golden Living Ltd /
Dransfield Properties Ltd

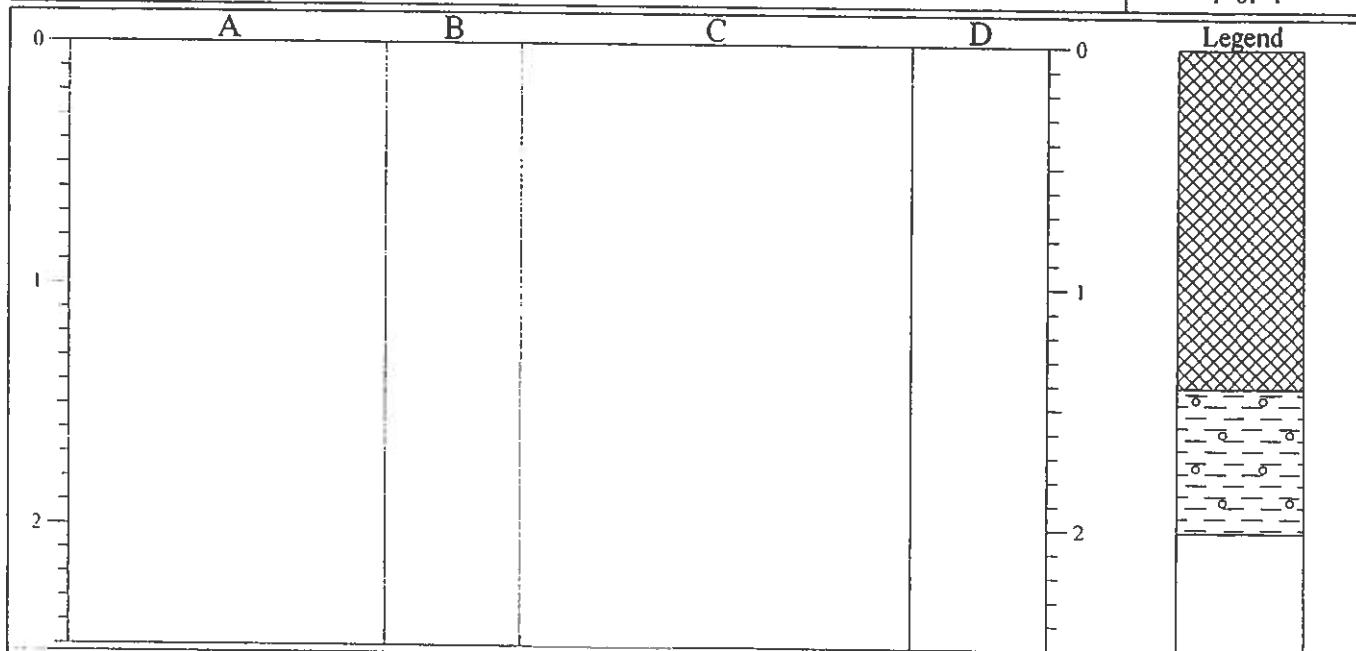
Method/
Plant Used

Logged By
ST

GRD_TRIAL_PIT_LOG_S50632.GPJ AGS3 ALL.GDT 23/02/07

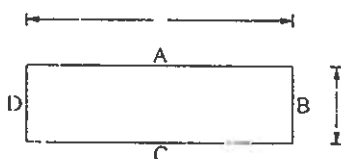
TRIAL PIT LOG

Project Market Area, Penistone				TRIAL PIT No TP6	
Job No S50632	Date 20-07-05	Ground Level (m)	Co-Ordinates ()		
Contractor				Sheet 1 of 1	



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.40		MADE GROUND. Loose dark brown slightly clayey gravelly fine to coarse sand. Gravel is angular to rounded fine to coarse of brick, concrete, ceramics, plastic, slag and sandstone. Boulders, cobbles and rootlets, noted			
1.40-2.00		Firm dark brown mottled yellow slightly sandy gravelly CLAY Sand is fine to coarse. Gravel is sub angular to sub rounded fine to coarse of sandstone, coal, red marl and limestone.			

Shoring/Support:
Stability: Pit walls unstable to 1.40m.



GENERAL
REMARKS

All dimensions in metres
Scale 1:31.25

Client **Golden Living Ltd /
Dransfield Properties Ltd**

Method/
Plant Used

Logged By
ST

GRD TRIAL PIT LOG S50632.GPJ AGS3 ALL GDT 23/02/07



APPENDIX C

SOILS

Solmek
12 Yarm Road
Sutton
Cheshire
TS18 3NA

Determinands	Lab Number Sample id Depth (m)	31360-1 BH 13 0.50-0.60	31360-2 BH 13 1.00-1.10	31360-3 BH 14 0.50-0.60	31360-4 BH 18 0.50-0.60	31360-5 TP 3	31360-6 TP 6
	Units						
Arsenic (total)	mg/kg As	35	14	10	17	23	50
Boron (water soluble)	mg/kg B	0.9	0.5	0.8	1.4	1.7	0.9
Cadmium (total)	mg/kg Cd	0.1	<0.1	<0.1	0.3	<0.1	<0.1
Chromium (total)	mg/kg Cr	37	18	27	79	35	29
Copper (total)	mg/kg Cu	75	27	17	31	40	74
Lead (total)	mg/kg Pb	195	66	20	107	138	143
Mercury (total)	mg/kg Hg	0.7	0.2	0.1	<0.1	0.4	0.5
Nickel (total)	mg/kg Ni	17	7	19	13	13	20
Selenium (total)	mg/kg Se	0.2	0.2	<0.1	0.4	0.3	0.3
Zinc (total)	mg/kg Zn	151	50	64	132	113	136
pH	units pH	8.2	7.7	7.9	8.4	8.1	8.0
Sulphate (2:1 water soluble)	mg/l SO ₄	108	206	40	42	14	31
Sulphide	mg/kg S ²⁻	158	226	48	79	204	106
Cyanide (total)	mg/kg CN	<2	<2	<2	<2	<2	<2
Phenols (total)	mg/kg PhOH	2.3	1.0	<0.5	2.1	1.5	<0.5
PAH (total)	mg/kg	57	38	<5	184	29	20
TPH (C10-C40)	mg/kg	266	159	30	1115	209	150

Solmek
 12 Yarm Road
 Stockton on Tees
 Cleveland, TS18 3NA
 Tel: 01642 607083
 Fax: 01642 612355

Geotechnical Test Results

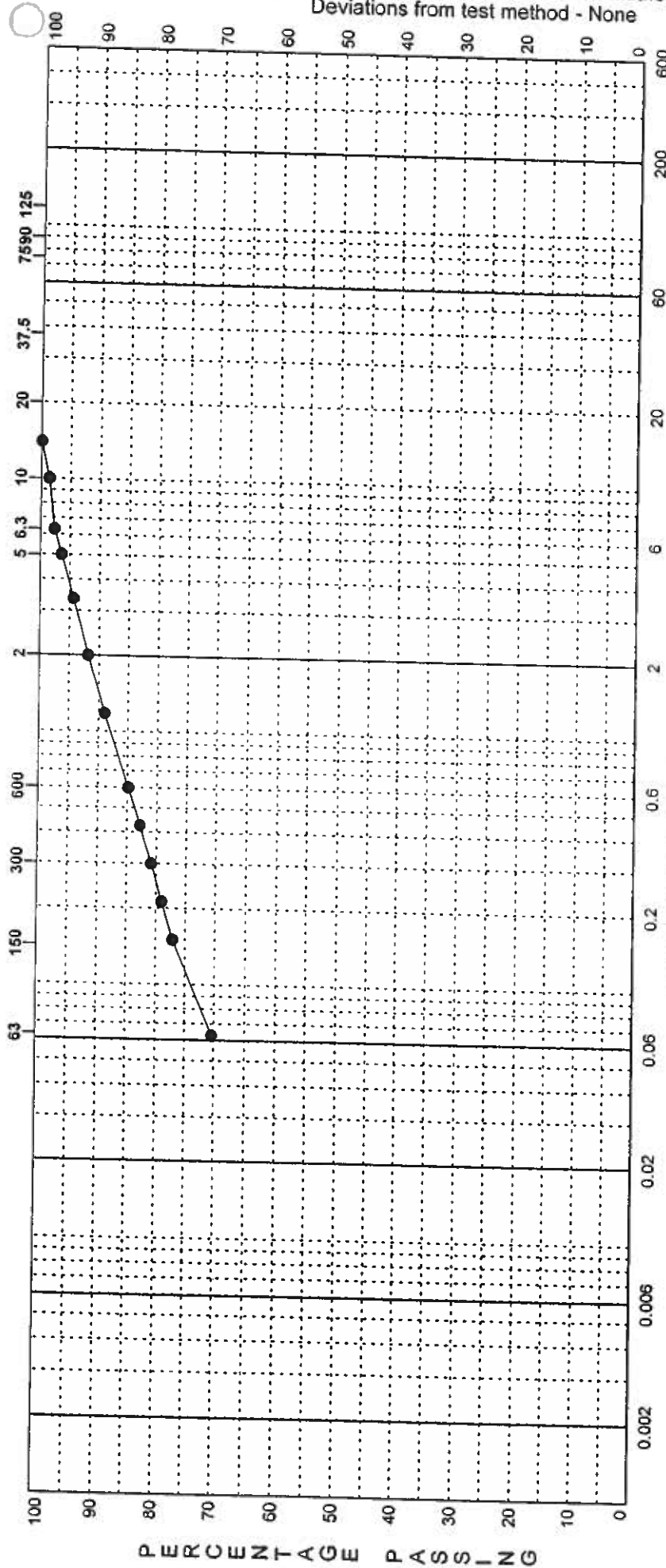
Testing in accordance with BS1377 1990

July 29th 2005

Penistone

Identification	pH	SO4 g/l	% Moisture	Liquid Limit	Plastic Limit	Plastic Index	Bulk Density Kg/m ³	Vane Test	Shear Strength kN/m ²	Shear Strength kN/m ²	Cell Pressure kN/m ²
									100 x 200	38 x 76	
BH13 1.50			19				2136				
BH14 1.00			15	29	20	9				55	50
BH14 1.50	5.5	0.03	15				2163			178	50
BH18 2.50			21	29	19	10					
TP3 0.80			15				2199			254	100

BS Test Sieves in mm and microns



CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse		

BH No.	Depth	M	LL	PL	PI	D100	D60	D30	D10	% GRAVEL	% SAND	% SILT	% CLAY
BH14	1.50	15				14.000				8.2			

Scheme : PENISTONE
Client : MET CONSULTING ENGINEERS

APPENDIX D

SOLMEK

12 Yarm Road
Stockton on Tees
Cleveland
TS18 3NE
Tel 01642 607 083 fax. 01642 612 355
Email: south@solmek.com
www.solmek.com

TEST : GAS MONITORING
CONDITIONS : GROUND WAS DRY WEATHER - OVERCAST
ATMOSPHERIC PRESSURE: 998mb
SPECIFICATION : WASTE MANAGEMENT PAPER NO. 27 & BS 5930 : 1981
CLIENT : MET CONSULTING ENGINEERS
LOCATION : MARKET AREA, PENISTONE
DATE : 22/07/05
OPERATOR : RW
EQUIPMENT : LANDSURVEYOR II

RESULTS

Position	Methane Gas %	Carbon Dioxide (CO ₂) %	Oxygen (O ₂) %	Flow Litres/hr	Water Level in BH (mbgl)
BH18	0.0	0.4	19.5	-	2.12

N.D. = Not Detected
N/A = Not applicable

* not measured
% = By volume

SOLMEK

12 Yarm Road
Stockton on Tees
Cleveland
TS18 3NE
Tel 01642 607 083 fax. 01642 612 355
Email: south@solmek.com
www.solmek.com

TEST : GAS MONITORING
CONDITIONS : ATMOSPHERIC PRESSURE: 983mb
SPECIFICATION : WASTE MANAGEMENT PAPER NO. 27 & BS 5930 : 1981
CLIENT : Met Consulting Engineers
LOCATION : Market Area, Penistone
DATE : 27/07/05
OPERATOR : RW
EQUIPMENT : LANDSURVEYOR II

RESULTS

Position	Methane Gas %	Carbon Dioxide (CO ₂) %	Oxygen (O ₂) %	Flow Litres/hr	Water Level in BH (mbgl)
BH18	0.0	0.8	19.0	-	2.08

N.D. = Not Detected
N/A = Not applicable

* not measured
% = By volume



APPENDIX E

CONTAMINATION GUIDELINES

A qualitative approach using the statutory definition of Contaminated land as defined within Section 78A (2) of Part 11A of the Environmental Protection Act has been adopted. This defines contaminated land as:

"*Land which appears to the local authority in whose area it is situated to be in such a condition by reason of substances in or on or under the land that "Significant harm is being caused or there is a significant possibility of such harm being caused; or pollution of controlled waters is being or is likely to be, caused".*"

The concept of "significant harm" is dealt with via the Government guidance DETR Circular 02/2000 Contaminated Land: "Implementation of Part IIA of the Environmental Protection Act 1990". The statutory guidance uses the concept of pollutant linkages set out in Section 2.4 of the Circular. Before the local authority can make a judgment on whether "significant harm" and the significant possibility of harm is being caused they are required identify a "significant pollution linkage". This means effectively that three elements (a source of contamination, a relevant receptor and a pathway) must be present. Without identification of all three elements together, land should not be regarded as "contaminated" in the statutory sense. See Appendix 6 for additional notes on contamination guidelines.

The contamination testing results have been compared to a range of site specific threshold values devised in relation to the nature of the site and the proposed development. These thresholds are based on the CLEA Soil Guideline Values (SGV). Current soil guideline values are given in the DEFRA and Environment Agency's R&D Publications SGV 1, 3, 4, 5, 7, 9, and 10.

Contaminated Land Report 10 "The Contaminated Land Exposure Assessment Model (CLEA): Technical basis and algorithms" and the various SGV Reports describe residential land use as land on which a people live in a wide range of dwellings including for example detached, semi detached, terraced, converted and purpose built flats. The land use takes into account several different house designs including houses based on suspended floors and ground bearing slabs. It assumes that residents have access to private gardens and/or community open space close to the home. Two SGV are provided, calculated with and without a contribution from eating home grown vegetables. This represents the key difference in potential exposure to contamination between those living in a house with or without a private garden.

Pathways and Receptors

The receptors listed below are considered in CLR8 to be potentially at risk from contamination related to industrial land due to the pathways also described.

Humans

Human exposure to contaminants present in soils can occur via several pathways. Direct exposure pathways include dermal absorption after contact with contaminated ground, inhalation of soil or dust, inhalation of volatised compounds, and inadvertent soil ingestion (or deliberate soil ingestion in the case of some children). Other indirect pathways include human ingestion of plants grown in contaminated soil or contaminated ground or surface water. Contaminants associated with wind blown dust can affect humans on surrounding sites.

Water

The principal pathway by which the contaminants in the made ground may reach the water environment is through a slow seepage or leaching to either groundwater or surface water. The potential for contaminants to migrate along such pathways is dependent on the chemical and physical characteristics of the contaminants and the local hydrogeology. Surface watercourses may also accumulate contamination as contaminated sediments are deposited within the water body.

Vegetation and the Ecosystem

Plants can be affected by soil contamination in a number of ways resulting in growth inhibition, nutrient deficiencies and yellowing of leaves. Contaminants are taken up by plants through the roots and through foliage. Contaminants may accumulate within the plant or be excreted naturally. Plants form a secondary pathway for contaminants if consumed by humans or animals.

Construction Materials

Materials at risk from possible soil contaminants include inorganic matrices such as cement and concrete and also organic material such as plastics and rubbers. Acid ground conditions and high levels of sulphates can accelerate the corrosion of building materials. Plastics and rubbers are generally used for piping and service ducts and are potentially attacked by a range of chemicals, most of which are organic, particularly petroleum based substances. Drinking water supplies can be tainted by substances that can penetrate piping and water companies enforce stringent threshold values.