Beswick Housing Regeneration – Gleeson 'G5' Site Investigation Technical Note

1. Introduction

This document describes a phase of supplementary site investigation works undertaken as part of the Beswick Housing Regeneration on land referred to as 'Gleeson G5', licensed for development by Gleeson Regeneration Limited. The area comprises land to the north of Bell Crescent and Hartwell Close, the east of Brennock Close and Charlesworth Street, the south of Shefford Close and Windcroft Close, and the west Harvey Close. The site investigation was undertaken on behalf of the main contractor Birse Civils by Ian Farmers Associates. The works were overseen by Entec.

Previous investigation works have been undertaken on the site and are detailed in the following documents and are referred to in this report:

- Parkman Site Investigation Interpretative Report, dated December 2002. Report ref: 25873/OR/04D;
- C.C. Geotechnical Factual Report, dated June 2003. Report ref. 03/2299.

The most recent site investigation work undertaken by Ian Farmer Associates is detailed in the following report:

- Ian Farmer Associates, Report on Ground Investigation carried out at Gleeson G5, dated November 2005. Report ref: W05/4667 A.

This document should be read in conjunction with the following documents prepared for adjacent site areas:

- Beswick Housing Regeneration Phase 1 Remediation Strategy, Prepared by Entec for Northwest Development Agency, dated July 2003. Report ref: 07980rr176i2.

The location of the exploratory holes relating to the latest phase of site investigation is shown on Drawing No 1 (07980-S99), attached.

2. Objectives and Scope of Works

The objectives of the supplementary site investigation were to provide additional data to design a remedial strategy for the site for residential development, building on existing data and filling in data gaps where they are perceived to exist. The work was undertaken in order to determine if the remedial strategy prepared for adjacent sites would be appropriate for the 'G5' area.

In order to achieve the objectives fifteen trial pits and seven shallow window sample holes, in areas of limited accessibility, were excavated in order to characterise the physical and chemical composition of the Made Ground. A further three boreholes were drilled in order to penetrate the boulder clay and provide geotechnical data on the underlying ground conditions.

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Additional topsoil sampling was undertaken in areas of limited accessibility to determine the chemical composition of the shallow topsoil.

The preliminary phase of site investigation works were undertaken on 8 August to 12 August 2005 by Ian Farmer Associates and supervised by an Environmental Engineer from Entec. Chemical testing was undertaken by SAL.

3. Ground Conditions

Ground conditions are interpreted based on the most recent site investigation information, plus historical boreholes and trial pits undertaken by Geotechnics/ Parkman in 2002. The most recent exploratory hole locations are shown on Drawing No 1 (07980-S99) attached. Logs of exploratory holes are included in Appendix A.

The ground conditions encountered comprised Made Ground overlying Glacial Till (Clay) and are similar to the ground conditions encountered in previous site investigations within this and adjacent site areas.

A layer of topsoil was encountered sporadically across the site investigation area, ranging from 0.1 m to 0.4 m thick. At four locations across the investigation area (TP3, TP4, TP5 and HDP4) ash and occasional coal was detected.

Made Ground was encountered in all but one location where Glacial Till was overlain by topsoil. Made ground generally comprised sandy gravel or gravely clay including sandstone, brick, glass, concrete, ash and some clinker, limestone and clay bands and ranged in thickness from 0.9 m (TP3, TP4 and TP12) to 2.3 m (TPI2/1, Parkman/ Geotechnics 2002).

Natural deposits were encountered in the majority of exploratory hole locations. Glacial Till was encountered at depths ranging from 0.6 m bgl (TPI2/3, Parkman/ Geotechnics 2002) to 2.1 m bgl (TP7) and comprised firm to stiff gravely slightly sandy clay. Trial pit G5 TP10 encountered sands and gravels at 1.8 m bgl, above stiff clay at 2.2 m bgl.

Groundwater was locally encountered within the Made Ground in four trial pits (TP3, TP5, TP9 and TP10).

4. Contaminant Conditions

Chemical analysis screened against Tier 1 screening criteria is presented in Appendix B. The tier 1 screening exercise has been undertaken in accordance with that carried out for the Beswick Housing Regeneration Phase 1 Remediation Strategy which relates to adjacent site areas.

Twenty six samples of Topsoil were analysed as part of the site investigation. These identified consistently elevated concentrations of arsenic, zinc and benzo(a)pyrene. Localised elevated concentrations of cadmium, chromium, lead and were also identified. All samples analysed indicated levels of Total Petrolem Hydrocarbons (TPH) Diesel Range Organics (DRO) greater than the limit of detection. TPH (DRO) ranged from 1 mg/kg (G5 BH2, 0.0 m) to 480 mg/kg (G5 TP15, 0.1 m).

Twenty nine samples of Made Ground were analysed as part of the site investigation. These identified consistently elevated concentrations of arsenic, zinc and benzo(a)pyrene. Localised

elevated concentrations of chromium, copper, lead and nickel were also encountered. Concentrations of TPH (DRO) were encountered above detection limits in all but one location.

Twenty one samples of Glacial Till were also analysed as part of the site investigation. Two samples (G5 TP13, 1.8 m and G5 BH2, 1.7 m) identified nickel above the Tier 1 screening criteria and one sample (G5 TP12, 1.2 m) identified pH less than pH 6.

5. Ground Gas/ Groundwater Monitoring

Ground gas monitoring was undertaken in all the boreholes and window samples after the site investigation (G5 BH1 to G5 BH3 and G5 WS1 to G5 WS7). The results are presented in Appendix C.

Oxygen concentrations were found to be below 19% in 8 of the 10 boreholes installed with gas and groundwater monitoring standpipes. Over a seven week period, average oxygen concentrations were recorded between 17.6% and 20.7%. Minimum concentrations between 12.1% and 15.9% were encountered in G5 WS3, G5 WS5, G5 BH1 and G5 BH2.

Carbon dioxide concentrations peaked at 6.3% in G5 BH2. The average concentration in the borehole over the period August to October was 2.1%. Window samples G5 WS5 and G5 WS3 recorded peak concentrations of 5.6% and 4.4% respectively. The average concentrations of window samples were both below 2.8%. All other borehole and window samples encountered carbon dioxide levels less than 2.5%.

No elevated methane concentrations were recorded in any of the borehole and window sample locations.

Groundwater sampling was undertaken at six of the exploratory hole locations. Chemical analysis screened against the Environmental Quality Standards (EQS) for freshwater is presented in Appendix B. The samples consistently identified elevated concentrations of ammoniacal nitrogen, iron and zinc. Localised concentrations of copper, nickel and mercury were also encountered.

6. Conclusions

The ground conditions and soil chemistry for the Gleeson area 'G5' are similar to those encountered in adjacent Beswick site areas for which a remediation strategy has already been developed.

The tier 1 screening exercise has identified that the concentrations of arsenic, benzo(a)pyrene and cadmium in the Topsoil are likely to lead to representative concentrations above the Site Specific Assessment Criteria (SSAC) for residential gardens and public open space, derived for adjacent site areas. It is therefore considered that the Topsoil within the site will not be suitable for re-use at surface within the residential gardens and public open space areas.

The tier 1 screening exercise identified that the concentration of arsenic in the Made Ground is likely to lead to representative concentrations above the Site SSAC for residential gardens and public open space, derived for adjacent site areas. Consistent exceedences of the SSAC for benzo(a)pyrene were also identified within the Made Ground material. It is therefore concluded that Made Ground within the site will not be suitable for re-use at surface within residential

gardens and public open space areas. Elevated TPH (DRO) concentrations were identified consistently over the site area, generally associated with ash material.

Natural ground material (Glacial Till) is unlikely to be present at surface within the development.

In light of the above it is concluded that the remedial measures identified for adjacent site areas will be suitable for the Gleeson 'G5' site area. This would involve importation of a minimum 1 m thickness of clean cover material within garden areas to remove the contaminant pathway.

Author: Robin Hewat-Jaboor

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Reviewer: Julian Bromhead

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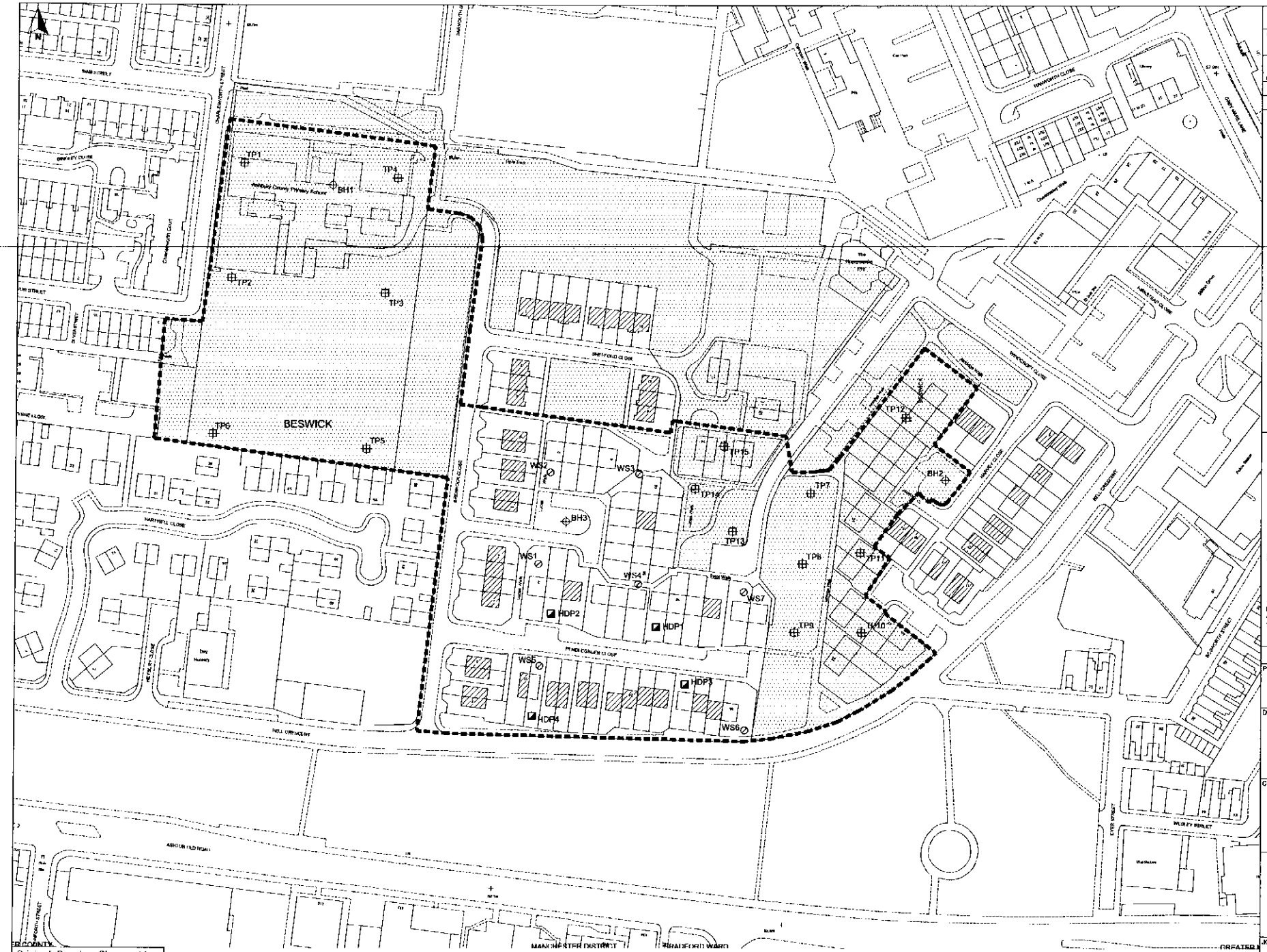
Drawing



DESCRIPTION					
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REVISIONS					
REV	DATE		DRN	CHK	APP

Key

- SITE INVESTIGATION AREA BOUNDRY
- BOREHOLE
- WINDOW SAMPLE
- TRIAL PIT
- HAND DUG PIT
- OPEN GRASSED AREA(INCLUDES PREVIOUSLY DEMOLISHED STRUCTURES)
- OCCUPIED HOUSING (11/a//ds)

Note:

1. BOREHOLES, TRIAL PITS AND SAMPLE LOCATIONS MAY BE RELOCATED TO AVOID EXISTING SERVICES AND UTILITIES ETC AND WHERE THEY ARE LOCATED IN OR IMMEDIATELY ADJACENT TO A OCCUPIED PROPERTY MAY BE RE-LOCATED TO A POSITION TO BE AGREED WITH THE PROJECT MANAGER.

SCALES: 1:500 @ A1

PROJECT TITLE:
BESWICK HOUSING REGENERATION
PHASE 2 REMEDIATION WORKS

DRAWING TITLE:
DRAWING 1
AREA G5 EXPLORATORY HOLE
LOCATION PLAN

CLIENT:
ENGLISH PARTNERSHIPS
ARLPEY HOUSE
110 BIRCHWOOD BOULEVARD
BIRCHWOOD
WARRINGTON
WA3 7QH

REF:

Entec
CANON COURT, ABBEY LAWN, ABBEY FOREGATE
SHROPSHIRE SY2 5DE
TEL: (01743) 342000 FAX: (01743) 342010

JOB No.	DRAWING No.
07980	S99

Original Drawing Size – A1

Appendix A
Exploratory Hole Logs

29 Pages

Entec

IAN FARMER ASSOCIATES

Site	Borehole Number
Gleeson G 5	G5BH1

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	1.50mm cased to 6.00m		Birse Civils Ltd	4667 A
	Location	**Dates** 09/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00	V						MADE GROUND: Dark brown very gravelly fine to coarse SAND. Gravel is angular to subrounded, fine to coarse including brick, coal and sandstone with occasional cobbles of sandstone.			
0.00	J									
0.50	J									
0.50	V									
0.50-1.00	B					(1.40)				
1.00	J									
1.00	V									
1.20-1.65	CPT N=9		DRY	2,3/2,2,3,2						
1.20-1.65	B					1.40	Stiff, increasing in stiffness with depth, brown slightly sandy, slightly gravelly CLAY. Gravel is angular to subrounded, fine to coarse of various lithologies with occasional cobbles and occasional sand bands.			
1.70	V									
1.70	J									
2.00-2.45	U			75 blows						
3.00-3.45	SPT N=29	3.00	DRY	4,4/4,7,8,10						
3.00-3.45	B									
3.00-3.45	D									
						(4.60)				
4.00-4.45	U			109 blows						
4.50	D									
5.00	D									
5.50-5.95	SPT N=35			4,6/7,8,10,10						
5.50-5.95	D									
						6.00	Complete at 6.00m			

Remarks
Excavating from 0.00m to 1.20m for 1 hour.
Standpipe installed. Slotted pipe in gravel filter from 1.00m to 6.00m.

Scale (approx)	Logged By
1:50	SW

Figure No. 4667 A.G5BH1

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Site	Borehole Number
Gleeson G 5	G5BH2

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	1.50mm cased to 6.00m		Birse Civils Ltd	4667 A
	Location	**Dates** 09/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00	V						MADE GROUND: Brown gravelly fine to coarse SAND. Gravel is angular to subrounded, fine and medium with occasional brick fragments. Occasional clay pockets (10 to 20mm) and wood fragments present.			
0.00	J									
0.50	J									
0.50	V									
0.50-1.00	B					(1.40)				
1.00	J									
1.00	V									
1.20-1.65	CPT N=11		DRY	2,2/2,3,3,3						
1.20-1.65	B					1.40	Stiff, increasing in stiffness with depth, brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded, fine and medium of various lithologies.			
1.70	V									
1.70	J									
2.00-2.45	U			73 blows						
2.50	D									
3.00-3.45	SPT N=41	3.00	DRY	5,7/9,10,10,12						
3.00-3.45	B									
3.00-3.45	D									
						(4.60)				
4.00-4.45	U			127 blows						
4.50	D									
5.00	D									
5.50-5.95	SPT N=38	3.00	DRY	5,5/7,10,11,10						
5.50-5.95	D									
						6.00	Complete at 6.00m			

Remarks
Excavating from 0.00m to 1.20m for 1 hour.
Standpipe installed. Slotted pipe in gravel filter from 1.00m to 6.00m.

Scale (approx)	Logged By
1:50	SW

Figure No. 4667 A.G5BH2

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Site	Borehole Number
Gleeson G 5	G5BH3

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm cased to 6.00m		Birse Civils Ltd	4667 A
	Location	**Dates** 10/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00 0.00	V J					(0.40) 0.40	TOPSOIL. (Drillers' description).			
0.50 0.50 0.50-1.00	J V B					(1.30)	MADE GROUND: Brown gravelly fine to coarse SAND. Gravel is angular to subrounded, fine to coarse including clinker, coal and ash with clay bands. Sand is predominantly of ash.			
1.00 1.00 1.20-1.65 1.20-1.65	J V CPT N=15 B	1.20	DRY	2,2/3,4,3,5		1.70				
1.70 1.70 2.00-2.45	V J U 0.45	1.50	DRY	78 blows			Stiff brown slightly sandy, slightly gravelly CLAY. Gravel is angular to subrounded, fine, occasionally medium of various lithologies.			
2.50	D									
3.00-3.45 3.00-3.45 3.00-3.45	SPT N=29 B D	3.00	DRY	3,4/4,7,8,10						
4.00-4.45	U 0.30	3.00	DRY	123 blows		(4.30)				
4.50	D									
5.00	D									
5.50-5.95 5.50-5.95 5.50-5.95	SPT N=37 D B	3.00	DRY	5,7/7,9,10,11						
						6.00	Complete at 6.00m			

Remarks
Standpipe installed. Slotted pipe in gravel filter from 1.00m to 6.00m.
Excavating from 0.00m to 1.20m for 1 hour.

Scale (approx)	Logged By
1:50	MH

Figure No. 4667 A.BH3

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Site Gleeson G 5			**Trial Pit Number** G5TP1
Excavation Method Trial Pit	**Dimensions** 2.90m x 1.10m x 3.40m	**Ground Level (mOD)**	**Client** Birse Civils Ltd	**Job Number** 4667 A
	Location	**Dates** 08/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	J				(0.20)	MADE GROUND: Brown sandy, gravelly TOPSOIL. Gravel is angular to subangular, fine to coarse including brick and glass.		
0.10	D				0.20	MADE GROUND: Light brown sandy COBBLES of sandstone.		
0.50	B				(0.50)			
					0.70	MADE GROUND: Black gravelly fine to coarse SAND of ash. Gravel is angular to subangular, fine to coarse including brick, ash and glass.		
					(1.00)			
1.30	V					At 1.30m: land drain.		
1.30	J							
1.30	D					At 1.50m: brick, concrete structure and hydrocarbon odour.		
					1.70	Stiff brown mottled blue grey sandy, fissured, slightly gravelly CLAY. Gravel is subrounded to rounded, fine to medium including sandstone.		
2.30	V							
2.30	J							
2.30	D							
2.30	B				(1.70)			
3.20	V							
3.20	J							
3.20	D							
3.20	B				3.40			
						Complete at 3.40m		

Plan

Remarks

Trial pit remained dry and stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP1

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Site	Trial Pit Number
Gleeson G 5	G5TP2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.90m x 0.80m x 3.30m		Birse Civils Ltd	4667 A
	Location	**Dates** 08/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	V				(0.30)	MADE GROUND: Brown sandy, gravelly TOPSOIL. Gravel is angular to subangular, fine to coarse including brick and glass.		
0.20	J							
0.20	D				0.30	MADE GROUND: Light brown sandy subangular to rounded, coarse GRAVEL and COBBLES of sandstone.		
0.50	B				(0.70)			
					1.00	MADE GROUND: Black sandy, angular to subangular, fine to coarse GRAVEL of ash and clinker.		
1.30	V				(0.70)			
1.30	J							
1.30	D							
1.30	B				1.70	Stiff brown mottled blue grey sandy fissures, gravelly CLAY. Gravel is angular to rounded, fine to coarse including sandstone and coal.		
2.00	D							
2.00	B							
					(1.60)			
3.10	D							
3.10	B				3.30	Complete at 3.30m		

Plan

Remarks

Trial pit remained dry and stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP2

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Site	Trial Pit Number
Gleeson G 5	G5TP3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit			Birse Civils Ltd	4667 A
	Location	**Dates** 08/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20	V				(0.30)	MADE GROUND: Brown sandy angular to subangular, fine to coarse GRAVEL of brick, concrete, ash and glass.		
0.20	J							
0.20	D				0.30	MADE GROUND: Light brown sandy angular to subangular, fine to coarse GRAVEL of limestone and sandstone.		
0.50	B				(0.60)			
			Slight seepage(1) at 0.90m.		0.90	Stiff brown mottled blue grey sandy fissured slightly gravelly CLAY. Gravel is subrounded to rounded, fine to coarse including coal, sandstone and mudstone.		▽1
1.30	V							
1.30	J							
1.30	D							
1.30	B							
					(2.80)			
2.50	D							
2.50	B							
3.00	D							
3.50	B							
					3.70	Complete at 3.70m		

Plan

Remarks

Slight seepage at 0.90m.
Trial pit remained stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP3

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Site	Trial Pit Number
Gleeson G 5	G5TP4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit			Birse Civils Ltd	4667 A
	Location	**Dates** 08/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	MADE GROUND: Brown sandy angular to subangular, fine to coarse GRAVEL of brick, concrete, ash and glass.		
0.20	V				0.20			
0.20	J				(0.20)	MADE GROUND: Light brown sandy angular to rounded, fine to coarse GRAVEL of sandstone.		
					0.40			
					(0.50)	MADE GROUND: Firm black sandy, slightly gravelly organic CLAY with organic odour. Gravel is angular to subangular, fine to coarse including brick.		
0.70	V				0.90			
0.70	J							
0.70	D							
0.70	B					Stiff brown mottled blue grey sandy fissured CLAY.		
1.20	V							
1.20	J							
1.20	D							
1.20	B							
					(2.20)			
2.10	J							
2.10	B							
					3.10			
						Complete at 3.10m		

Plan

Remarks

Trial pit remained dry and stable.

Scale (approx)	Logged By	Figure No.
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Site	Trial Pit Number
Gleeson G 5	G5TP5

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.70m x 0.80m x 3.40m		Birse Civils Ltd	4667 A
	Location	**Dates** 08/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.65)	MADE GROUND: Grass over brown sandy, angular to subangular, fine to coarse GRAVEL including brick and ash.		
0.50	J							
0.60	B				0.65	MADE GROUND: Black gravelly fine to coarse SAND. Gravel is angular to subangular, fine to coarse including ash and brick.		
0.60	D							
0.90	B				(0.55)			
0.90	D							
0.90	J							
0.90	V							
					1.20	MADE GROUND: Firm grey black sandy, gravelly organic CLAY with organic odour. Gravel is angular to subangular, fine to medium including sandstone.		
					(0.65)			
1.80	J				1.85			▽1
1.80	D		Moist(1) at 1.85m.		(0.10)	MADE GROUND: Black sandy angular to subangular, fine to coarse GRAVEL of ash and clinker.		
1.80	V				1.95			
1.80	B					Stiff brown mottled blue grey sandy fissured CLAY.		
1.90	J							
1.90	V							
					(1.45)			
2.80	B							
2.80	D							
2.80	J							
2.80	V							
					3.40			
						Complete at 3.40m		

Plan

Remarks

Moist between 1.85m and 1.95m.
Trial pit remained stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP5

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Site	Trial Pit Number
Gleeson G 5	G5TP6

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	3.40m x 0.80m x1.50m		Birse Civils Ltd	4667 A
	Location	**Dates** 08/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D				(0.20) 0.20	Grass over brown sandy, gravelly TOPSOIL. Gravel is angular to subangular, fine to coarse including brick.		
					(0.20) 0.40	MADE GROUND: Light grey sandy angular to subangular, fine to coarse GRAVEL of limestone.		
1.00	B				(1.10) 1.50	MADE GROUND: Firm brown sandy gravelly CLAY and angular to subangular, fine to coarse GRAVEL of ash, coal and clinker. Feint hydrocarbon odour.		
1.20	D							
1.20	J							
						Complete at 1.50m		

Plan

Remarks

Trial pit remained dry and stable.
Cast iron pipe 1.20m, clay pipe at 1.50m, broken with void below it to 2.80m.
Trial pit terminated at 1.50m due to drain with void and possible gas main.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP6

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IAN FARMER ASSOCIATES

Site	Trial Pit Number
Gleeson G 5	G5TP7

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.70m x 0.80m x 3.40m		Birse Civils Ltd	4667 A
	Location	**Dates** 09/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.05	D				0.10	Grass over brown sandy, gravelly TOPSOIL.		
0.20	V				(0.30)	MADE GROUND: Brown slightly clayey, gravelly fine to coarse SAND. Gravel is angular to subangular, fine to coarse including brick and ash.		
0.20	J				0.40			
0.20	D					MADE GROUND: Firm, locally stiff brown mottled dark grey sandy, gravelly CLAY. Gravel is angular to subangular, fine to medium including coal and sandstone.		
0.60	D							
					(1.70)			
1.50	J							
1.50	B					At 1.90m: 0.25m wide clay land drain.		
					2.10			
						Stiff brown mottled blue grey sandy, slightly gravelly CLAY. Gravel is angular to subangular, fine to medium including mudstone and sandstone.		
					(1.30)			
2.90	J							
2.90	D							
2.90	B							
					3.40			
						Complete at 3.40m		

Plan

Remarks

Trial pit remained dry and stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP7

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IAN FARMER ASSOCIATES

Site	Trial Pit Number
Gleeson G 5	G5TP8

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.90m x 0.80m x 3.10m		Birse Civils Ltd	4667 A
	Location	**Dates** 09/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	J				(0.20)	Grass over brown sandy gravelly TOPSOIL.		
0.10	V				0.20	MADE GROUND: Firm to stiff brown sandy, gravelly CLAY with band of brick, ash and concrete boulders.		
0.50	B				(0.90)			
					1.10	Stiff brown mottled blue grey fissured slightly gravelly CLAY. Gravel is angular to subrounded, fine to medium.		
1.50	J							
1.50	B							
1.50	D							
2.00	D				(2.00)			
2.50	J							
2.50	B							
2.50	D							
3.00	D				3.10	Complete at 3.10m		

Plan

Remarks

Trial pit remained dry and stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP8

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IAN FARMER ASSOCIATES

Site	Trial Pit Number
Gleeson G 5	G5TP9

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit			Birse Civils Ltd	4667 A
	Location	Dates 09/08/2005	Engineer: Entec	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10 0.10	V J				(0.30)	Grass over brown sandy gravelly TOPSOIL. Gravel is angular to subangular, fine to coarse including brick and glass. Roots present.		
					0.30			
1.00 1.00 1.00	V J B		Slight seepage(1) at 1.10m.		(1.10)	MADE GROUND: Firm brown sandy, gravelly CLAY. Gravel is angular to subangular, fine to coarse including brick, concrete and boulders. Light brown sandy gravelly bands locally, with strong hydrocarbon odour.		▽1
					1.40			
1.90 1.90 1.90 1.90	V J D B				(1.80)	Stiff brown mottled grey sandy, slightly gravelly CLAY. Gravel is subangular to subrounded, fine to medium including siltstone and sandstone. At 1.90m: feint hydrocarbon odour.		
2.50	D							
3.00 3.00 3.00 3.00	V J D B				3.20	Complete at 3.20m		

Plan

Remarks

Slight oily water seepage at 1.10m.
Trial pit remained stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP9

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Site	Trial Pit Number
Gleeson G 5	G5HDP1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand excavated.			Birse Civils Ltd	4667 A
	Location	**Dates** 19/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00	D				(0.30)	Grass over brown sandy gravelly TOPSOIL with roots present. Gravel is angular to subrounded fine to coarse of various lithologies		
0.30	D				0.30	Complete at 0.30m		

Plan

Remarks

Scale (approx)	Logged By	Figure No.
1:50	SW	4667 A.HP1

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Site	Trial Pit Number
Gleeson G 5	G5HDP2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand excavated.			Birse Civils Ltd	4667 A
	Location	**Dates** 19/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10 0.30	D D				(0.30) 0.30	Grass over brown sandy gravelly TOPSOIL with roots present. Gravel is angular to subrounded fine to coarse of various lithologies Complete at 0.30m		

Plan

Remarks

Scale (approx)	Logged By	Figure No.
1:50	SW	4667 A.HP2

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Site	Trial Pit Number
Gleeson G 5	G5HDP3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand excavated.			Birse Civils Ltd	4667 A
	Location	Dates 19/08/2005	Engineer: Entec	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D				(0.30)	Grass over brown sandy gravelly TOPSOIL with roots present. Gravel is angular to subrounded fine to coarse including brick fragments, plastic, wood.		
0.30	D				0.30	Complete at 0.30m		

Plan

Remarks

Scale (approx)	Logged By	Figure No.
1:50	SW	4667 A.HP3

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Site	Trial Pit Number
Gleeson G 5	G5HDP4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand excavated.			Birse Civils Ltd	4667 A
	Location	**Dates** 19/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10 0.30	D D				(0.30) 0.30	Grass over brown sandy gravelly TOPSOIL with roots present. Gravel is angular to subrounded fine to coarse including coal and ash		
						Complete at 0.30m		

Plan

Remarks

Scale (approx)	Logged By	Figure No.
1:50	SW	4667 A.HP4

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IAN FARMER ASSOCIATES

Site	Trial Pit Number
Gleeson G 5	G5TP10

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	2.70m x 0.80m x 3.10m		Birse Civils Ltd	4667 A
	Location	**Dates** 09/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D				(0.20)	Grass over brown sandy, gravelly TOPSOIL.		
0.20	D				0.20	MADE GROUND: Brown sandy, angular to subangular, fine to coarse GRAVEL with occasional cobbles of brick and ash.		
					(0.45)			
0.60	V				0.65	MADE GROUND: Firm brown sandy, gravelly CLAY. Gravel is angular to subangular, fine to coarse including brick.		
0.60	J							
0.60	D							
0.60	B							
					(1.15)			
			Wet(1) at 1.80m.		1.80	Light brown SAND and angular to subangular, fine to medium GRAVEL of limestone.		▽1
2.00	D				(0.40)			
					2.20	Stiff brown mottled blue grey sandy, slightly gravelly CLAY.		
2.50	B				(0.90)			
3.00	D				3.10	Complete at 3.10m		

Plan

Remarks

Trial pit wet between 1.80m and 2.20m
Trial pit remained stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP10

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IAN FARMER ASSOCIATES

Site	Trial Pit Number
Gleeson G 5	G5TP11

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit			Birse Civils Ltd	4667 A
	Location	**Dates** 09/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						Grass over brown sandy, gravelly TOPSOIL.		
0.10	J				(0.20) 0.20			
0.30	D				(0.20) 0.40	MADE GROUND: Light brown sandy, angular to subangular, fine to coarse GRAVEL of sandstone and limestone.		
0.70	B				(1.30)	Stiff brown mottled blue grey sandy, slightly gravelly CLAY , locally with sand and gravel band below which is a 0.10m wide land drain. Gravel is angular to subrounded, fine to medium including sandstone and mudstone.		
1.50 1.50 1.50-1.70	J D W				1.70	Complete at 1.70m		

Plan

Remarks

Land drain hit between 1.50m and 1.70m, water was black and muggy with no odour.
Trial pit terminated at 1.70m due to excessive water.
Trial pit remained stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP11

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Site	Trial Pit Number
Gleeson G 5	G5TP12

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit			Birse Civils Ltd	4667 A
	Location	**Dates** 08/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D				(0.20) 0.20	Grass over brown sandy, gravelly TOPSOIL.		
0.60	B				(0.70) 0.90	MADE GROUND: Black clayey, gravelly fine to coarse SAND with clay bands. Gravel is angular to subangular, fine to coarse of brick.		
1.20 1.20 1.20	J D B				(0.80) 1.70	Firm black sandy organic CLAY with organic odour. (Possible made ground)		
1.90	D					Stiff brown mottled blue/grey, sandy slightly gravelly fissured CLAY. Gravel is subrounded to rounded, fine to coarse including siltstone.		
2.20	B				(1.40)			
3.00	D				3.10			
						Complete at 3.10m		

Plan

Remarks

Trial pit remained dry and stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP12

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Site	Trial Pit Number
Gleeson G 5	G5TP13

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit			Birse Civils Ltd	4667 A
	Location	**Dates** 09/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						Grass over brown sandy, gravelly TOPSOIL.		
0.10	D				(0.20) 0.20			
						MADE GROUND: Brown SAND and angular to subrounded, fine to coarse GRAVEL including brick.		
0.50	J							
0.50	D							
0.50	B							
					(1.30)			
					1.50	Stiff brown grey sandy CLAY with occasional angular to subrounded, medium gravel.		
1.80	D							
1.80	B							
					(1.50)			
2.50	D							
3.00	B				3.00	Complete at 3.00m		

Plan

Remarks

Trial pit remained dry and stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP13

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Site	Trial Pit Number
Gleeson G 5	G5TP14

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit			Birse Civils Ltd	4667 A
	Location	Dates 08/08/2005	Engineer	Sheet
			Entec	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.05	D				0.10	Grass over brown sandy gravelly TOPSOIL. Gravel is angular to subangular, fine to coarse of various lithologies including brick and concrete.		
					(0.60)	MADE GROUND: Brown sandy angular to rounded, fine to coarse GRAVEL with occasional cobbles and iron base concrete brick. Locally with clay band.		
0.60	V				0.70	At 0.70m: sandstone / concrete slab.		
0.60	J							
0.60	D							
0.60	B					Complete at 0.70m		

Plan

Remarks

Trial pit remained dry and stable.
Trial pit terminated at 0.70m due to sandstone / concrete slab.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP14

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Site	Trial Pit Number
Gleeson G 5	G5TP15

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Trial Pit	3.70m x 0.90m x 3.00m		Birse Civils Ltd	4667 A
	Location	**Dates** 09/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15) 0.15	Grass over brown sandy, gravelly TOPSOIL with roots.		
0.10	D				(0.55)	MADE GROUND: Brown SAND and angular to subrounded, fine to coarse GRAVEL including concrete and brick with frequent cobbles of brick and occasional boulders of concrete, wood and metal pipes.		
0.60 0.60 0.60	V J B				0.70	MADE GROUND: Brown, red brown gravelly SAND. Gravel is angular to subrounded, fine to coarse including concrete, brick and occasional boulders of concrete.		
					(0.80)			
1.30 1.30	D B				1.50	Stiff brown mottled grey sandy CLAY with occasional medium gravel.		
1.90 1.90 1.90	J D B					At 1.50m: concrete slab.		
					(1.50)			
2.50	D							
					3.00	Complete at 3.00m		

Plan

Remarks

Trial pit remained dry and stable.

Scale (approx)	Logged By	Figure No.
1:25	IJ	4667 A.TP15

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Site	Number
Gleeson G 5	G5WS1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Birse Civils Ltd	4667 A
	Location	**Dates** 11/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	D				0.20	Brown sandy, gravelly TOPSOIL with wood fragments and roots.			
0.20	J					MADE GROUND: Dark brown SAND and angular to subrounded, fine to coarse GRAVEL including brick, tile, cement, ash and clinker fragments with occasional clay pockets.			
0.50	J				(1.20)				
1.00	J								
1.00-1.40	D								
1.40-2.00	D				1.40	MADE GROUND: Firm brown gravelly CLAY. Gravel is angular to rounded, fine to coarse including brick, tile fragments and wood. At 1.80m: sand bands. (20mm)			
					(0.60)				
2.00-3.00	D				2.00	Stiff brown slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse of various lithologies.			
					(1.00)				
					3.00	Complete at 3.00m			

Remarks
Standpipe installed. Slotted pipe in gravel filter from 0.50m to 3.00m.
Excavating from 0.00m to 1.00m.

Scale (approx)	Logged By
1:50	SW

Figure No. 4667 A.WS1

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Site	Number
Gleeson G 5	G5WS2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Birse Civils Ltd	4667 A
	Location	**Dates** 11/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	J				(0.50)	Brown sandy gravelly TOPSOIL with roots.			
0.50	J				0.50	MADE GROUND: Firm brown grey slightly sandy gravelly CLAY. Gravel is angular to subrounded, fine to coarse of various lithologies including brick.			
1.00	J				(1.00)				
1.00-1.50	D								
1.50-1.65	D				1.50	MADE GROUND: Angular to subangular, fine to coarse GRAVEL of cement, brick and ash.			
1.65-2.00	D				1.65	Firm grey sandy CLAY with occasional gravel of various lithologies.			
2.50-3.00	D				(1.35)				
					3.00	Complete at 3.00m			

Remarks
Standpipe installed. Slotted pipe in gravel filter from 0.50m to 3.00m.
Excavating from 0.00m to 1.00m.

Scale (approx)	Logged By
1:50	SW

Figure No. 4667 A.WS2

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Site	Number
Gleeson G 5	G5WS3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Birse Civils Ltd	4667 A
	Location	**Dates** 11/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	D				0.20	Brown sandy gravelly TOPSOIL with roots.			
0.20	J					MADE GROUND: Firm brown sandy, slightly gravelly CLAY. Gravel is angular to subrounded, fine, occasionally medium of various lithologies including ash and brick.			
0.50	J				(1.00)				
1.00-1.20	D				1.20	At 1.20m: ash boundary. (10mm thick)			
1.20-2.00	D					Firm, locally soft slightly sandy CLAY with frequent bioturbation worm casts and organic fragments.			
					(0.80)				
2.10-2.37	D				2.00	Firm fibrous brown PEAT with clay bands, remolds as soft brown clay with plant fragments.			
2.37-3.00	D				(0.40)				
					2.40	Firm, increasing stiffness with depth, brown slightly sandy gravelly CLAY. Gravel is angular to subrounded, fine to coarse of coal and sandstone.			
					(0.60)				
					3.00	Complete at 3.00m			

Remarks
Standpipe installed. Slotted pipe in gravel filter from 0.50m to 3.00m.
Excavating from 0.00m to 1.00m.

Scale (approx)	Logged By
1:50	SW

Figure No. 4667 A.WS3

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Site	Number
Gleeson G 5	G5WS4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Birse Civils Ltd	4667 A
	Location	**Dates** 11/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	J				(0.50)	Brown sandy gravelly TOPSOIL with roots.			
0.50	J				0.50	Stiff, locally firm slightly sandy slightly gravelly CLAY. Gravel is fine, occasionally medium to coarse of coal and sandstone.			
1.00-2.00	D				(2.50)				
2.00-3.00	D				3.00	Complete at 3.00m			

Remarks
Standpipe installed. Slotted pipe in gravel filter from 0.50m to 3.00m.
Excavating from 0.00m to 1.00m.

Scale (approx)	Logged By
1:50	SW

Figure No. 4667 A.WS4

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Site	Number
Gleeson G 5	G5WS5

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Birse Civils Ltd	4667 A
	Location	**Dates** 12/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.20	D				(0.50)	Sandy gravelly TOPSOIL including brick, cement and roots.			
0.50	J				0.50				
					(0.80)	MADE GROUND: Light brown fine to coarse SAND and angular to subrounded, fine to coarse GRAVEL including brick, sandstone, coal, bitumus maccadus material, charcoal, ceramic fragment and occasional organic bands and clay pockets.			
1.00	J				1.30				
1.00-1.26	D				(0.30)	MADE GROUND: Firm grey slightly sandy, slightly gravelly CLAY. Gravel is angular to subrounded, fine to coarse including brick and ash. Sand is predominantly ash.			
1.26-1.60	D								
1.60-2.00	D				1.60				
2.00-3.00	D					Stiff brown mottled slightly sandy, gravelly CLAY. Gravel is angular to subrounded, fine to medium, occasional coarse including coal.			
					(1.40)				
					3.00	Complete at 3.00m			

Remarks
Standpipe installed. Slotted pipe in gravel filter from 0.20m to 3.00m.

Scale (approx)	Logged By
1:50	SW

Figure No. 4667 A.WS5

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Site	Number
Gleeson G 5	G5WS6

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Birse Civils Ltd	4667 A
	Location	**Dates** 12/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	D				0.20 (0.30)	Brown sandy, gravelly TOPSOIL.			
0.50-1.00	B				0.50	MADE GROUND: Grey angular, medium GRAVEL of limestone.			
1.40-2.00	D				(1.50)	Stiff brown slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to medium of various lithologies including sandstone and coal.			
					2.00	At 2.00m: obstruction. Complete at 2.00m			

Remarks
Standpipe installed. Slotted pipe in gravel filter from 0.20m to 2.00m.

Scale (approx)	Logged By
1:50	SW

Figure No. 4667 A.WS6

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Site	Number
Gleeson G 5	G5WS7

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Window Sampler			Birse Civils Ltd	4667 A
	Location	**Dates** 12/08/2005	**Engineer** Entec	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10	D				0.20	Sandy, gravelly TOPSOIL with clay pockets.			
0.20	J				(0.30)	MADE GROUND: Firm dark brown sandy gravelly CLAY. Gravel is angular to subrounded, fine to medium including brick.			
0.50	J				0.50	MADE GROUND: Brown slightly sandy angular to subrounded, fine to medium GRAVEL including brick and ash.			
1.00-1.30	D				(0.80)				
1.30-1.65	D				1.30	MADE GROUND: Firm brown sandy, gravelly CLAY. Gravel is angular to subrounded, fine to coarse including brick, ash and coal.			
1.65-1.75	D				(0.35) 1.65				
1.75-2.00	D				1.75	MADE GROUND: Grey sandy angular to subrounded, fine to coarse GRAVEL including sandstone and occasional cobble size fragments of sandstone.			
2.00-2.30	D				(0.10) (0.55)				
2.30-2.56	D				2.30	MADE GROUND: Light red brown fine to coarse SAND and angular to subrounded, fine to coarse GRAVEL of sandstone and brick.		▽1	
2.60-3.00	D		Seepage(1) at 2.50m.		(0.30) 2.60	Dark grey gravelly fine to coarse SAND. Gravel is angular to subrounded, fine to coarse including brick, ash and clinker.			
3.00-4.00	D				(1.40)	Stiff brown grey, mottled slightly sandy, slightly gravelly CLAY. Gravel is angular to rounded, fine to medium of various lithologies.			
					4.00	Complete at 4.00m			

Remarks
Standpipe installed. Slotted pipe in gravel filter from 0.60m to 4.00m.
Excavating from 0.00m to 1.00m.

Scale (approx)	Logged By
1:50	SW

Figure No. 4667 A.WS7

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