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ECUS

Phase 1 and 2 Site Investigations

Helensburgh Close

Pogmoor

Barnsley

Report Reference: SM/1932/080320/P1+2

April 2008

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Report to: **Beaumont & Cowling
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Report Title: **Phase 1 and 2 Site Investigations: Helensburgh Close, Pogmoor, Barnsley.**

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Executive Summary

Location and Description:	The site is a roughly square-shaped parcel of land located off Pogmoor Road, Barnsley. The site is currently occupied by Helensburgh Close, residential cul-de-sac; with associated houses, gardens and landscaped areas.
History:	The site comprised undeveloped fields until at least 1931, when allotment gardens are indicated in the area. The site remained unchanged until at least 1971 when it became developed with a residential estate of semi-detached houses. The historic maps indicate that no significant change has occurred since this time.
Geology	Sandstone of the Carboniferous Middle Coal Measures. The site is unlikely to be affected by instability due to shallow coal mine workings.
Environmental Considerations:	Landfills: There is one landfill site within 250m of the site. Radon: Protection measures not required. Pollution: No pollution incidents recorded that would affect the site. Groundwater: A minor aquifer, not within a source protection zone. Sensitive site uses: None affect the site.
Contamination Assessment:	The risk of soil contamination is very low, and remediation is not required.
Pavement Design:	A design CBR value of 1.5% to 2% should be adopted.

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1 Introduction

1.1 Terms of Reference

- 1.1.1 ECUS Ltd (hereafter ECUS) was commissioned by Beaumont & Cowling (email dated 27th March 2008) to carry out Phase 1 and 2 site investigations for an area of land surrounding Helensburgh Close, Pogmoor, Barnsley, hereafter referred to as 'the site'.
- 1.1.2 Figure A1, Appendix A shows the location of the site which centres on National Grid Reference (NGR) 433340, 406840. Figure A2, Appendix A shows the current site layout.

1.2 Objectives of the Phase 1 and 2 Site Investigations

- 1.2.1 It is understood that the Phase 1 and 2 Site Investigations have been completed with the aim of facilitating the development of a car parking area.
- 1.2.2 This report is relevant to this end use and additional interpretation may be required should any change in the proposed use be considered.
- 1.2.3 Detailed objectives for each of the separate phases of the investigation are detailed in the Sections 2 and 5 of this report.
- 1.2.4 Details of the Phase 1 investigation are presented in Section 2 of this report and the results are presented in Section 3. Section 4 introduces a preliminary conceptual model and risk assessment.
- 1.2.5 An outline of the Phase 2 investigation is presented in Section 5 and the results are presented in Section 6. Section 7 provides a revised conceptual model and risk assessment. Section 8 presents conclusions and recommendations. Appendices A – G provide supporting information.

2 The Phase 1 Site Investigation

2.1.1 The Phase 1 investigation has been carried out in general accordance with the requirements of BS10175 (2001) – Code of Practice for the Investigation of Potentially Contaminated Sites.

2.2 Objectives of the Phase 1 Investigation

2.2.1 To provide information to inform the planning process, the following set of objectives for the Phase 1 investigation have been adopted:

- To provide information on past and current uses of the site and surrounding area, and the nature of hazards and physical constraints;
- To identify receptors, potential sources of contamination, likely pathways and any features of immediate concern;
- To provide information on the geology, hydrogeology and hydrology of the site to assist in establishing the conceptual model and in identifying constraints to the redevelopment of the site;
- To provide an initial conceptual model of the nature and extent of potential contamination and data for a preliminary qualitative risk assessment;
- To provide data to assist in the design of exploratory investigations and to provide information relevant to worker health and safety;
- To identify and provide sufficient information to satisfy the requirements of regulatory bodies and other interested parties at the Phase 1 Site Investigation stage of the assessment of the site.

2.3 Sources of Information

2.3.1 Table 1 presents sources of information that have been consulted in producing this Phase 1 site investigation.

Table 1: Sources of Information and Search Results

Source	Results
Site Walkover	Information about the site was gained from visual inspection during a site walkover.
Landmark Envirocheck report	Presented in Appendix C and containing historical mapping and records of environmental information for the surrounding area.
British Geological Survey (BGS) Geological map	Sheet 87, Barnsley, Solid and Drift edition, 1:50,000 scale, Drift Edition was consulted.
The Coal Authority	A coal mining report (Appendix D) for the site was obtained.
BGS borehole logs	Existing borehole logs were used to infer the depths of coal seams underlying the site.
MAGIC website	The Multi Agency Geographic Information for the Countryside website (www.magic.gov.uk) was used to provide information on sensitive land uses.

3 Findings of the Phase 1 Investigation

3.1 Site Location and Current Condition

- 3.1.1 Figure A1, Appendix A shows the location of the site which centres on NGR 433340, 406840. Figure A2, Appendix A shows the current site layout. Photographs of the site are presented in Appendix B.
- 3.1.2 A site walkover was carried out on Thursday 27th March 2008.
- 3.1.3 The site is a roughly square-shaped parcel of land located off Pogmoor Road, Barnsley. The site is currently occupied by Helensburgh Close, a cul-de-sac; the approximately 26 houses surrounding it, with associated gardens and landscaped areas and an unnamed cul-de-sac leading off Helensburgh Close.
- 3.1.4 The majority of the houses are believed to be currently unoccupied, and the roadways within the site are used informally for parking, apparently mainly by staff of the neighbouring hospital.
- 3.1.5 Helensburgh Close leads off the south side of Pogmoor Road, and splits into two - a generally straight branch runs north to south along the western side of the site, while the main road curves through the centre of the site terminating in a "hammerhead".
- 3.1.6 The properties all front onto the main hammerhead road, and are formed of semi-detached pairs with front and rear lawned gardens. A disused nursery building was located in the northeast corner of the site.
- 3.1.7 Between the houses and the two branches of the road, grassed areas crossed by tarmac paths are present, with some trees in the centre of the site. A concreted parking area is present along the western site boundary.

3.2 Topography

- 3.2.1 The site slopes down generally from north to south, reaching a low point in the southeastern corner of the site.
- 3.2.2 A series of level areas are present across the site, with houses being set above or below surrounding ground levels on different sides of the house. The adjoining land to the south of the site is set below the level of the site.

3.3 Current Surrounding Land Use

- 3.3.1 The site is located in an area of mixed land use. To the north is Barnsley District General Hospital, itself set within a mainly residential area, which continues to the east and west of the site. To the south are playing fields with both residential and industrial buildings beyond.

3.4 Visual Evidence of Contamination Noted During the Site Walkover

- 3.4.1 No visual evidence of contamination was noted during the site walkover.

3.5 Potential Sources of Contamination Noted During the Site Walkover

- 3.5.1 No potential sources of contamination were noted during the site walkover.

3.6 Underground Structures and Services

- 3.6.1 Numerous service ducts were noted in footways and grassed areas across the site. At this stage no further assessment of underground structures has been carried out.

3.7 Historical Land Use

3.7.1 Historical Ordnance Survey (OS) mapping, presented in Appendix C, was obtained by commissioning a Landmark Envirocheck report on the site. A description of the historical use of the site is presented in Table 2. Table 2 also describes surrounding land uses where they may influence the contamination potential of the site.

Table 2: Historical Use of the Site and Surrounding Land

Date	Information Source	Land use within the site boundary	Potentially significant surrounding land use
1855	County Series Map (1:10,560)	The site is part of an area of open fields.	The surrounding area comprises open fields with two sandstone quarries 80 m north and 10 m northwest of the site. A railway track is 350 m south of the site.
1891 - 1894	County Series Map (1:2,500, 1:10,560)	No significant change.	The quarries located to the north of the site have been replaced with large buildings stated to be the Barnsley Union Workhouse. Slackhills Colliery is located 180 m south of the site. Foundries (iron and brass) are located 300 m southeast of the site.
1906 - 1907	County Series Maps (1:2,500, 1:10,560)	No significant change.	No significant change.
1931 - 1938	County Series Maps (1:2,500, 1:10,560)	The site is part of an area of allotment gardens.	Significant residential development has occurred in the surrounding area, particularly to the southeast of the site. An infirmary is located 100 m northwest of the site. Large brickworks are located approx 150 m southwest of the site beyond which lies a refuse destructor. Empire Mills (shirts etc) is located 200 m southeast of the site.
1956 - 1961	County Series Maps (1:1,250, 1:2,500, 1:10,560)	No significant change.	The brickworks located southwest of the site are now shown to be a large pond with an adjacent large works located 200 m southwest of the site.
1965	County Series Maps (1:1,250)	No significant change.	The pond is shown to have been infilled. The large works located southwest of the site is now Pogmoor Works.
1971 - 1983	County Series Maps (1:1,250, 1:10,000)	The site is occupied by a residential estate of semi-detached houses with Helensburgh Close running through the centre of the site.	Allotment gardens occupy the area of the former pond.
1993 - 2007	OS Maps (1:1,250, 1:10,000)	No significant change.	No significant change.

NB - All distances are approximate.

Summary of Site History

- 3.7.2 The site comprised undeveloped fields until at least 1931, when allotment gardens are indicated in the area. The site remained unchanged until at least 1971 when it became developed with a residential estate. The historic maps indicate that no significant change has occurred since this time.
- 3.7.3 The immediate and surrounding area has undergone significant residential development since the beginning of the twentieth century with some industrial land uses mainly being located south of the site. The industrial land uses have included foundries, brickworks and refuse destructors.

3.8 Geology, Hydrogeology and Hydrology

Geology

- 3.8.1 The British Geological Survey (BGS) 1:50,000 geological map for the area (Sheet 87 Barnsley, Solid and Drift edition) has been used to provide the geological information for the site.
- 3.8.2 The BGS geological map indicates that the site is underlain by sandstone of the Carboniferous Middle Coal Measures. The shallowest named coal seam beneath the site is the Barnsley Seam, indicated to be approximately 70 m below ground level.
- 3.8.3 A geological fault is indicated on or adjacent to the southeast corner of the site. The fault trends northeast to southwest and strata are downthrown to the northwest.
- 3.8.4 A Mining Report has been obtained from the Coal Authority. This states that the property is in the likely zone of influence from workings in four seams of coal at 70 m to 380 m depth, last worked in 1978. Any ground movement from these workings should have stopped by now.
- 3.8.5 In addition the site is in an area where the Coal Authority believes there is coal at or close to the surface and that the site is not in an area that is likely to be affected at the surface from any planned future workings.
- 3.8.6 There are no known coal mine entries located within 20 metres of the site.
- 3.8.7 The records for four old boreholes in the area of the Hospital have been reviewed to gain information on coal seams below the site. The boreholes show the Barnsley Coal Seam to lie at depths between 50 m and 62 m below ground level (bgl) with a maximum thickness of 3 m.
- 3.8.8 Boreholes in the vicinity show the Barnsley Rider Coal to lie 23.5 m above the Barnsley Coal, putting the Barnsley Rider Coal at a minimum depth of 32.5 m below the site. The Barnsley Rider Coal is 0.6 m thick.
- 3.8.9 It is generally considered that an intact rock cover of ten times worked seam thickness is sufficient to provide protection from the effects of mine working. The rock cover is therefore sufficient to discount the risk of surface instability due to old shallow coal mine workings.

Hydrogeology

- 3.8.10 The strata underlying the site are classified by the Environment Agency as a minor aquifer, which could be important for local supplies and supplying base flow to rivers. These are variably permeable formations usually with a known or probable presence of fracturing.
- 3.8.11 The site is not located within a Source Protection Zone set by the Environment Agency for the protection of groundwater resources.
- 3.8.12 According to the Envirocheck Report presented in Appendix C, there is currently one active abstraction from groundwater located within 1 km of the site. It is located

approximately 790 m southeast of the site and is operated by Sheldale Developments Ltd for bottling water.

- 3.8.13 The Envirocheck report also provides details of discharge consents to groundwater. Only one is recorded, approximately 500 m west of the site - a soakaway for treated sewage effluent.

Hydrology

- 3.8.14 The nearest surface water feature to the site is an unnamed watercourse located approximately 370 m south of the site.
- 3.8.15 The Envirocheck report indicates that there are two discharge consents to surface water, both over 900 m from the site, draining to tributaries of the Red Brook and Carr Dyke.
- 3.8.16 There are currently no abstractions from surface water located within 1 km of the site.

3.9 Landfill Sites and Waste Management Facilities

- 3.9.1 One licensed landfill site is recorded within 250 m of the site. This corresponds to the clay pits of the former brickworks identified from the historic maps, located approximately 100 m southwest of the site. No further details on the fill materials are recorded.
- 3.9.2 The Envirocheck report also states that there is a landfill site located approximately 270 m south of the site. Authorised wastes have included inert, industrial and commercial waste. A further three landfills are recorded between 250 m and 500 m from the site.
- 3.9.3 Historical sandstone quarrying is known to have occurred in the area, including locations close to the site; however no records of the infilling of these quarries are detailed in the Envirocheck report. This is likely to have occurred prior to the recording and licensing of landfills.

3.10 Sensitive Land Uses

- 3.10.1 According to the Envirocheck report, there are no Sites of Special Scientific Interest (SSSI) located within 500 m of the site.
- 3.10.2 The Multi Agency Geographic Information for the Countryside (MAGIC) website was consulted in order to provide information on sensitive land uses. The website indicated that there are no sensitive land uses located within 500 m of the site.

3.11 Other Potentially Significant Information Relating to the Site

- 3.11.1 Land uses that are considered to be potentially significant in terms of their potential to act as a source of, or a receptor for, contamination are identified in the Landmark Envirocheck report presented in Appendix C. Those that are considered important to the Phase 1 Investigation of the site are summarised in this section.
- 3.11.2 The Envirocheck Report states that there has been a BGS Recorded Mineral Site located approximately 210 m southwest of the site. It was an opencast common clay and shale excavation site.
- 3.11.3 There is one Integrated Pollution Prevention and Control licence located within 250 m of the site. It is located approximately 215 m south of the site and is registered to Royston Lead Ltd (located at Pogmoor Works) for the non-ferrous metals: production from raw materials by metallurgical activities etc, producing lead and alloys with release to air and producing lead and alloys greater than 23 percent lead (with copper) or 2 percent lead (without).



- 3.11.4 According to the Envirocheck report there are ten currently active contemporary trade directory entries recorded for the area located within 250 m. The entries include Barnsley NHS departments, roofing services, plumbing services, an engineers and disability equipment suppliers.

Radon

- 3.11.5 The BRE guidance¹ indicates the site is in an area where a geological assessment should be carried out to assess the potential for radon to affect the site.
- 3.11.6 British Geological Survey data in the Envirocheck Report indicates the site is in a radon affected area, with between 1% and 3% of homes above the Radon Action Level. The report however states that no radon protection measures are necessary in the construction of new dwellings or extensions on the site.

Flooding

- 3.11.7 According to the Envirocheck report, site is not located within Flood Risk Zone 2 or Zone 3, as defined by the Environment Agency.

¹ Radon: guidance on protective measures for new dwellings, BRE, 1999.

4 Preliminary Risk Assessment and Conceptual Model

4.1 Potential Contaminants and Sources

4.1.1 The following sections use the information gathered during the Phase 1 investigation to provide an indication of the potentially contaminative activities that have been carried out throughout the duration of the use of the site and surrounding land. Likely associated contaminants are also identified. It should be noted that the activities identified may not necessarily have resulted in contamination of the ground.

On-Site

4.1.2 The historic maps indicate that the site remained clear of buildings until at least 1931 where the site then consisted of allotment gardens and then became a residential estate in approximately 1971. The historic maps indicate that no significant change has occurred since this time.

4.1.3 Due to the nature of the site history and the fact that no significant evidence of potential sources of contamination were identified during the site walkover it is considered that there is a low probability of contamination arising from on-site sources.

Off-Site

4.1.4 The site is situated in an area which has historically been a mixture of residential, commercial and industrial land use. Potential contaminants associated with the current and historic use of the surrounding area of the site are discussed in Table 3.

Table 3: Potentially Contaminative Off-Site Uses and Likely Associated Contaminants

Site Use	Location	Comments	Potential Contaminants
Infilled sandstone quarries	Located approximately 10 m & 80 m north of the site.	Historic maps indicate that the sandstone quarries were infilled from at least 1891.	Unknown. - Possibly a wide variety of potentially contaminative materials. Landfill gas from any possible biodegrading materials within the fill.
Brickworks & Landfill	Located approximately 150 m southwest of the site.	Historic maps indicate that the works was infilled and the Envirocheck report shows a recorded landfill at the same location.	Contaminants associated with ash from brick firing. Particularly metals including cadmium, chromium, copper, lead, mercury, zinc, arsenic, selenium. Also possible polyaromatic hydrocarbons, pH.
		It is located down gradient from the site and is considered unlikely to affect the site.	Unknown landfill material (see above).
Royston Lead Ltd (Pogmoor Works)	Located approximately 200 m southwest of the site	Produces lead and alloys. Located down gradient from the site (see above).	Metals, in particular cadmium, chromium, copper, lead, nickel, zinc and arsenic. Sulphate, sulphide, asbestos, pH, Total Petroleum Hydrocarbons (TPH) and Polycyclic Aromatic Hydrocarbon (PAH) and Polychlorinated Biphenyls (PCBs)

4.2 Potential Pathways and Receptors

4.2.1 Table 4 details and discusses the potential pathways and receptors identified during the Phase 1 investigation for any contaminants that may be present in the ground.

4.2.2 Some pathway-receptor linkages highlighted in the table are not considered likely to be active at the site for the reasons specified in the comments section.

Table 4: Potential Pathways and Receptors

Potential Pathway	Potential Receptor	Comment
Dermal contact with soil.	Site users.	The site is to be hard-surfaced due to the nature of the proposed development and so contact with ground contaminants is considered unlikely.
Intake via direct ingestion of soil.	Site users.	See above.
Intake via inhalation of vapours or dust from soil.	Site users.	It is considered unlikely that site users may be affected by inhalation of soil vapours outdoors from ground contaminants.
Migration through soil/ groundwater.	Controlled waters, groundwater within the minor aquifer.	Soluble contaminants may impact on groundwater quality although direct infiltration will be minimised due to hard-standing areas.
	Controlled waters, surface water.	An unnamed watercourse is located approximately 370 m south of the site. Migration of contaminants to the surface water is considered unlikely due to the distance.
	Off site residents.	Off site migration of contaminants in groundwater may occur if pathways to groundwater are active. Residential and commercial developments are both present in proximity to the site.
	Off site workers	

4.3 Conceptual Model

- 4.3.1 The conceptual model for the site identifies all of the potential pollutant linkages based on the information collated in this desk study and an understanding of the way that the potential contaminants at the site are likely to behave in the environment.
- 4.3.2 For the purpose of the conceptual model, groups of contaminants that (in most circumstances) behave in a similar way in the environment have been chosen and linked to potential pathways and receptors. Table 5 shows the identified potential organic contaminants. Table 6 shows the identified potential inorganic contaminants. It should be noted however that not all the potential contaminants have been included in the conceptual model, only those that are considered important at this stage.

Table 5: Summary Conceptual Model - Organic Contaminants

Receptors and pathways	Total petroleum hydrocarbons	Polycyclic aromatic hydrocarbons	polychlorinated biphenyls	Notes
Human health				
Dermal contact with soil	x	x	x	Direct contact of site users with soil is considered unlikely due to the site being hard-surfaced.
Ingestion of soil	x	x	x	
Inhalation of soil vapours/gases	x	x	x	
Inhalation of soil dust	x	x	x	Hydrocarbon volatility varies and will be dependant on the individual species present.
Controlled Waters				
Migration to groundwater	✓	✓	✓	Groundwater can be considered as both a pathway for contamination and as a receptor. Groundwater in the area is of relatively low resource value.
Migration to surface water	x	x	x	

NB: A tick indicates that a potential source-pathway-receptor linkage may be present on site
A cross indicates that a source-pathway-receptor linkage is unlikely to be present on site.

Table 6: Summary Conceptual Model - Inorganic Contaminants

Receptors and pathways	Metals	Sulphate	pH	Asbestos	Notes
Human health					
Dermal contact with soil	x	x	x	x	Direct contact of site users with soil is considered unlikely due to the site proposed to be hard-surfaced.
Ingestion of soil	x	x	x	x	
Inhalation of soil vapours/gases	x	x	x	x	
Inhalation of soil dust	x	x	x	x	
Controlled Waters					
Migration to groundwater	✓	✓	✓	x	Groundwater can be considered as both a pathway for contamination and as a receptor.
Migration to surface water	x	x	x	x	The unnamed stream is not in proximity to the site.

NB: A tick indicates that a potential source-pathway-receptor linkage may be present on site.
A cross indicates that a source-pathway-receptor linkage is unlikely to be present on site.

5 The Phase 2 Site Investigation

5.1 Objectives of the Phase 2 Investigation

- 5.1.1 The Phase 2 Site Investigation has been carried out in general accordance with the requirements of BS10175 (2001) – Code of Practice for the Investigation of Potentially Contaminated Sites.
- 5.1.2 The general objectives of the Phase 2 Investigation are as follows:
- To obtain actual data on the ground conditions at the site;
 - To obtain actual data about the extent of contamination at the site;
 - To provide data in order to review and, if necessary, to revise the conceptual model of the site produced as part of the Phase 1 site investigation and provide an actual assessment of the risks from contamination to relevant environmental and human health receptors at and in the vicinity of the site.
 - To obtain Californian bearing ratio (CBR) data on the soil at car park formation level to aid in pavement design.
- 5.1.3 The investigation works undertaken are described in this Section; the findings of the investigation are described in Section 6. Appendices A - G provide supporting information and interpretation of the results is presented in Section 7.

5.2 Preparatory Works

- 5.2.1 An underground service location survey was carried out by specialist contractors (SVS Ltd) prior to the commencement of site works to clear the trial pit areas of buried services.
- 5.2.2 A health and safety plan for the works (1932 Health and Safety Plan) and a method statement was also produced by ECUS and included risk assessments for the activities undertaken.

5.3 Intrusive Investigation Works

- 5.3.1 The intrusive site investigation occurred on 5th April 2008. The layout of the site at the time of the intrusive works, and the excavation locations, are shown on Figure A3, Appendix A. Logs for each of the excavations are provided in Appendix E. The works carried out at the site are detailed in this section.

Trial Pitting

- 5.3.2 Six trial pits (TP1 to TP6) were excavated to depths of between 1.0 m and 1.7 m bgl using a JCB 3CX type mechanical backhoe excavator with 0.60m toothed bucket. Trial pits were backfilled on completion.
- 5.3.3 Trial pitting was used to facilitate an assessment of the shallow ground conditions and to recover samples for contamination testing.

On-site Assessment and Measurement

- 5.3.4 Visual and olfactory examination of retrieved samples was carried out to identify any signs of contamination. Ground materials encountered were characterised and logged.

Soil Sampling

- 5.3.5 Ground samples were recovered from the trial pits for chemical analyses. Samples were selected from each strata in order to gain representative samples of the site.
- 5.3.6 Selected soil samples were collected by hand and immediately packed into pre-cleaned plastic pots and amber glass jars supplied by the laboratory. A new pair of

disposable nitrile gloves was worn for each sample collection to prevent cross contamination between samples. The sample containers were packed into a cool box and transported by courier to the laboratory for analyses.

Plate Load CBR Testing

- 5.3.7 A specialist geotechnical testing laboratory (Soil Mechanics Civils) was employed to undertake four plate load Californian Bearing Ratio (CBR) tests at the site to provide data for the design of hard standing areas. The JCB 3CX type excavator was used in order to provide a shallow trial pit in which to carry out the tests. The tests were conducted at depths of 200mm, 250mm and 600mm bgl.
- 5.3.8 The results were converted into CBR values in accordance with the Design Manual for Highways and Bridges. The results are presented in Appendix G. The test locations are shown in Figure A3, Appendix A.

5.4 Chemical Analysis

- 5.4.1 The chemical analysis suite and the number and type of samples analysed were chosen using the results of the Phase 1 Site Investigation and to meet the objectives of the Phase 2 Site Investigation, outlined in Section 5.1. The analytical methods used are presented in the laboratory reports in Appendix F.

Solid Sample Analysis

- 5.4.2 Chemical analyses were conducted, by ECoS Environmental Ltd, a UKAS and MCERTS accredited testing laboratory, on a total of twelve soil samples collected from the trial pits. The analyses were selected to obtain data to inform the assessment of risks associated with the presence of contaminants at the site.
- 5.4.3 Chemical analysis was carried out on each of the twelve solid samples as follows:
- Metals suite: arsenic, cadmium, chromium (total), chromium (hexavalent), copper, lead, mercury, nickel, selenium, zinc;
 - Fraction of Organic Carbon (FOC);
 - pH;
 - Speciated polyaromatic hydrocarbons (PAHs).
- 5.4.4 The location and depth of the samples selected for analysis is presented in Table 7.

Table 7: Solid Sample Analysis

Trial Pit	Sample Depth (m)
TP1	0.1
TP1	0.5
TP2	0.2
TP2	0.6
TP3	0.1
TP3	0.8
TP4	0.1
TP4	0.7
TP5	0.3
TP5	1.0
TP6	0.1
TP6	0.4

6 Findings of the Phase 2 Site Investigation

6.1 Ground Conditions

- 6.1.1 Trial pit logs are presented in Appendix E and the excavation location plan is presented in Figure A3, Appendix A.
- 6.1.2 Made ground was encountered in all excavations, extending to depths between 0.2 m to 0.5 m bgl. This generally comprised of slightly sandy slightly gravelly topsoil with gravel of sandstone, coal and brick. In addition, rare glass was encountered in trial pit TP2, rare cobbles of sandstone and gravel of hardcore was noted in trial pit TP5 and rare glass and rare cobbles of brick were encountered in trial pit TP6.
- 6.1.3 Generally, beneath the made ground, firm to stiff grey and orange sandy gravelly clay was then encountered in all excavations, becoming stiff with many cobbles of moderately strong sandstone to the base of the pits. The gravel comprised sandstone, coal and ironstone.
- 6.1.4 Moderately strong orange-brown sandstone was recovered as clayey cobbles of iron stained sandstone in trial pits TP1 to TP3 at depths between 0.6 m to 1.4 m bgl and continued to the base of the trial pits to depths between 1.1 m to 1.7 m bgl.
- 6.1.5 California Bearing Ratio tests were carried out within four of the trial pits excavated. The values are listed in Table 8 below. Full details can be seen in Appendix G.

Table 8: CBR Test Results

Trial Pit	Test Depth (m)	CBR Value (%)
TP2	0.2	1.1
TP3	0.2	2.1
TP4	0.25	0.3
TP5	0.6	3.7

6.2 Visual and Olfactory Observations of Contamination

- 6.2.1 No visual or olfactory observations were noted during the excavation of the trial pits.

6.3 Chemical Analytical Results

- 6.3.1 Laboratory analysis and data sheets for solid samples are presented in Appendix F.
- 6.3.2 Table 9 provides a summary of the chemical analysis results for solid samples.

Table 9: Summary of Analytical Results – Solid Samples

Analyte	Number of Samples	Minimum Concentrations	Maximum Concentrations
Arsenic	12	<1.5	19.4
Cadmium	12	<0.2	1.6
Chromium (total)	12	17.2	32.8
Copper	12	14.9	86.1
Lead	12	9.8	245
Mercury	12	<0.1	0.8
Nickel	12	16	24
Selenium	12	1.3	2.7
Zinc	12	51.6	296.7
pH (units)	12	4.9	7.3
PAH (sum of PAH 17)	12	<0.1	23.5
Naphthalene	12	<0.1	0.4
Acenaphthylene	12	<0.1	0.1
Acenaphthene	12	<0.1	0
Fluorene	12	<0.1	0
Phenanthrene	12	<0.1	1.6
Anthracene	12	<0.1	0.3
Fluoranthene	12	<0.1	3.8
Pyrene	12	<0.1	3.3
Benzo(a)anthracene	12	<0.1	2.4
Chrysene	12	<0.1	2
Benzo(b)+(j)fluoranthene	12	<0.1	2.8
Benzo(k)fluoranthene	12	<0.1	1.3
Benzo(a)pyrene	12	<0.1	3.1
Indeno(1,2,3-cd)pyrene	12	<0.2	2
Dibenz(a,h)anthracene	12	<0.2	0.4
Benzo(g,h,i)perylene	12	<0.3	1.7
Chromium (hexavalent)	12	<1	2.3
Fraction of Organic Carbon (decimal)	2	0.002	0.047

NB - All concentrations are in mg/kg unless otherwise stated.

7 Revised Conceptual Model and Risk Assessment

7.1 Introduction

7.1.1 The conceptual model and risk assessment presented in the Phase 1 Site Investigation identified a number of potential receptors for contaminants that may be present at the site. They are as follows:

- Site users following redevelopment;
- Groundwater beneath the site,
- Site workers during the redevelopment work (short term risk).

7.1.2 Risks to each of these receptors are considered in turn in the following sections.

7.2 Risks to Site End Users

7.2.1 An assessment of the risks to site users at the site following redevelopment has been undertaken within the framework set out in guidance published by DEFRA and the Environment Agency for the assessment of risks to human health associated with chronic (long term) exposure to contaminated soils. This guidance is presented in the CLR 7-10 series of reports and the framework set out there has been used to establish a relevant conceptual exposure model and subsequently to assess risks to human health associated with this conceptual exposure model.

7.2.2 The Contaminated Land Exposure Assessment (CLEA) model (set out in CLR10²) provides a mechanism for establishing concentrations of contamination in soils at a site, above which 'intervention' may be required to mitigate potential risks to human health from chronic exposure. For a number of contaminants, and a number of standard land uses, DEFRA and the Environment Agency have published soil guideline values or SGVs, for use in the assessment of risks associated with sites where the conceptual exposure model indicates that the standard land use scenario is relevant.

Conceptual Exposure Model

7.2.3 There are several potential exposure pathways by which site users may be exposed to concentrations of contaminants in soil. These exposure pathways, coupled with information about the future use of the site (exposure frequency, age class of users etc), combine to form a conceptual exposure model for each of the contaminants identified as potentially significant.

7.2.4 The proposed future use of the site has been examined and in the first instance has been compared with the standard land use scenarios provided in CLR10 (i.e. those for which published SGVs exist). Standard land use scenarios are presented for the following land uses:

- Commercial and industrial land use;
- Residential land use (with and without gardens); and
- Allotments.

7.2.5 The commercial/industrial standard land use scenario is relevant for small retail and light industrial parks where workers spend the majority of their time indoors with the exception of meal and rest breaks during the summer months. In deriving SGVs for

² Department of the Environment, Food and Rural Affairs and the Environment Agency. 2002. CLR10: The Contaminated Land Exposure Assessment (CLEA) Model: Technical Basis and Algorithms.

this land use scenario, a female worker has been chosen as the critical receptor, with exposure duration considered over a working lifetime

- 7.2.6 This standard land use scenario is considered relevant for this site following redevelopment. The duration of time that site users will be on site while it is used as a car park will be far less than that modelled in the CLEA model for commercial site use.

Assessment of Risks to Future Site Users

- 7.2.7 An initial assessment of the risks to site end users has been carried out using relevant SGVs and is presented in Table 10. In the first instance, maximum concentrations of contaminants which have the potential to affect human health (as identified with reference to CLR8) have been compared to the relevant SGV.
- 7.2.8 In cases where the SGV has been exceeded, the maximum value test set out in CLR7³ has been performed on the full set of analytical results for the relevant substance to identify an upper 95th percentile for the analysis results (US₉₅). Following the guidance set out in CLR7, the US₉₅ has then been compared to the SGV. Where no exceedances of the US₉₅ have been observed, no further action to assess the significance of the relevant contaminant is considered necessary.

Table 10: Assessment of Risks to Human Health following Redevelopment

Analyte	Max. conc. (mg/kg)	US ₉₅ * (mg/kg)	SGV** (mg/kg)	Comments
Arsenic	19.4	-	500	Maximum concentration does not exceed SGV. No further assessment necessary.
Cadmium	1.6	-	1,400	
Chromium	32.8	-	5,000	
Lead	245	-	750	
Mercury	0.8	-	480	
Nickel	24	-	5,000	
Selenium	2.7	-	8,000	

* For those analytes above the SGV

** Commercial / Industrial

- 7.2.9 No elevated levels of metals have been identified in the samples analysed.
- 7.2.10 For a wide range of substances, no SGV have been published. To assist in an initial screening of the potential significance of the remainder of the analytical results to human receptors, an alternative set of screening criteria has been adopted.
- 7.2.11 The screening criteria or Generic Assessment Criteria (GAC) have been developed by Land Quality Management Ltd in conjunction with the Chartered Institute of Environmental Health (CIEH) using the CLEA UK (beta) model⁴ which was published by the Environment Agency in 2005. Full details of the methods used in the development of the GAC, the assumptions and input parameters are presented in a document titled 'Generic Assessment Criteria for Human Health Risk Assessment'⁵.
- 7.2.12 The methods used in producing the GAC are considered to represent current UK best practice with the exposure assessment tool endorsed by the Environment Agency for use in human health risk assessment. It is not considered that they offer

³ Department of the Environment, Food and Rural Affairs and the Environment Agency. 2002. CLR7 Assessment of Risks to Human Health from Land Contamination.

⁴ The Environment Agency. CLEA UK Beta Version 1.0 for Microsoft Excel 97, 2002/XP and 2003.

⁵ Land Quality Management and the CIEH. 2006. Generic Assessment Criteria for Human Health Risk Assessment. Land Quality Press.

a replacement for, or have the same status as, the SGV. However, they are considered to represent a best available alternative for an initial screening of analytical results. It must be noted though that, as for SGV, the GAC are only appropriate for the assessment of long term risks to human health.

- 7.2.13 The samples were analysed for Fraction of Organic Carbon (FOC). This allowed a soil organic matter composition to be calculated and used in order to compare the contamination concentrations with the GAC for organic contaminants. For organic contaminants, GAC presented for soil conditions containing 1% soil organic matter (SOM) have been adopted.
- 7.2.14 An initial assessment of the risks to site end users has been carried out for determinands where no SGV exists using the relevant GAC (commercial/industrial) and is presented in Table 11. Concentrations in bold indicate contaminants exceeding the GAC.

Table 11: Comparison of Soil Analysis with Generic Assessment Criteria

Analyte	Max. conc. (mg/kg)	US ₉₅ (mg/kg)	GAC* (mg/kg)	Comments
Copper	86.1		45,700	Max concentration does not exceed GAC. No further assessment necessary.
Zinc	296.7		188,000	
Benzo(a)pyrene	3.1	-	29.70	
Dibenzo(a,h)anthracene	0.4	-	29.70	
Fluorene	3.8	-	59,000	
Naphthalene	0.4	-	290	

* Commercial/industrial

- 7.2.15 No elevated levels were encountered in any of the samples.
- 7.2.16 No contaminants have been recorded in concentrations greater than the relevant SGVs and GACs. It is therefore concluded that the chronic risk to human health is very low, and that there is no requirement for any remediation, further site investigation or risk assessment.

7.3 Risks to Groundwater beneath the Site

- 7.3.1 The above assessment shows that no significant contamination was encountered within the trial pits excavated. In conjunction with the fact that firm to stiff clay was encountered underlying the site, it is considered very unlikely that soil contamination will affect the groundwater beneath the site.

7.4 Risks to Site Workers during Development at the Site

- 7.4.1 Site workers may be at risk of short term exposure to contaminants within the ground. It is considered that protection of site workers can be achieved through the provision of appropriate personal protective equipment for the period of any below ground works. Relevant guidance from the Health and Safety Executive⁶ for the protection of workers and the general public should be followed.

⁶ The Health and Safety Executive. 1991. Protection of Workers and the General Public during the Development of Contaminated Land. HMSO.

8 Conclusions and Recommendations

8.1 Conclusions

8.1.1 The Phase 1 and 2 Site Investigations have revealed the following:

- The site is set within a mixed land use area consisting of residential and industrial/commercial properties. No significant potential sources of contamination have been identified.
- Historical Ordnance Survey maps show that the site comprised undeveloped fields until at least 1931, when allotment gardens were located on site. The site remained unchanged until at least 1971 and has since comprised a residential estate.
- The site is situated over a minor aquifer and is not located within a Source Protection Zone (SPZ) set by the Environment Agency.
- One licensed landfill site is located approximately 100 m southwest of the site and corresponds to the clay pits of the former brickworks identified from the historic maps.
- Six trial pits were excavated to provide information on ground conditions, and solid samples were collected for analysis.
- Four plate load Californian Bearing Ratio (CBR) tests were conducted at the site to provide data for the design of hard standing areas.
- The investigation revealed a thin layer of made ground overlying sandy gravelly clay and sandstone bedrock.
- Chemical analysis revealed low levels of contaminants within the ground.
- CBR values ranging from 0.3% to 3.7% have been recorded.

8.2 Recommendations

8.2.1 No remediation is required in order to make the site safe for use as a car park.

8.2.2 During the redevelopment works at the site, it is considered that protection of site workers can be achieved through the provision of appropriate personal protective equipment for the period of any below ground works. Guidance from the Health and Safety Executive for the protection of workers and the general public should be followed.

8.2.3 A representative CBR value of 1.5% to 2% should be adopted for car park pavement design.



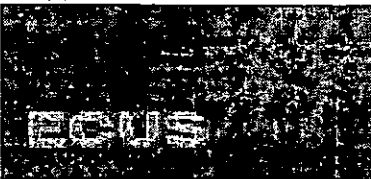
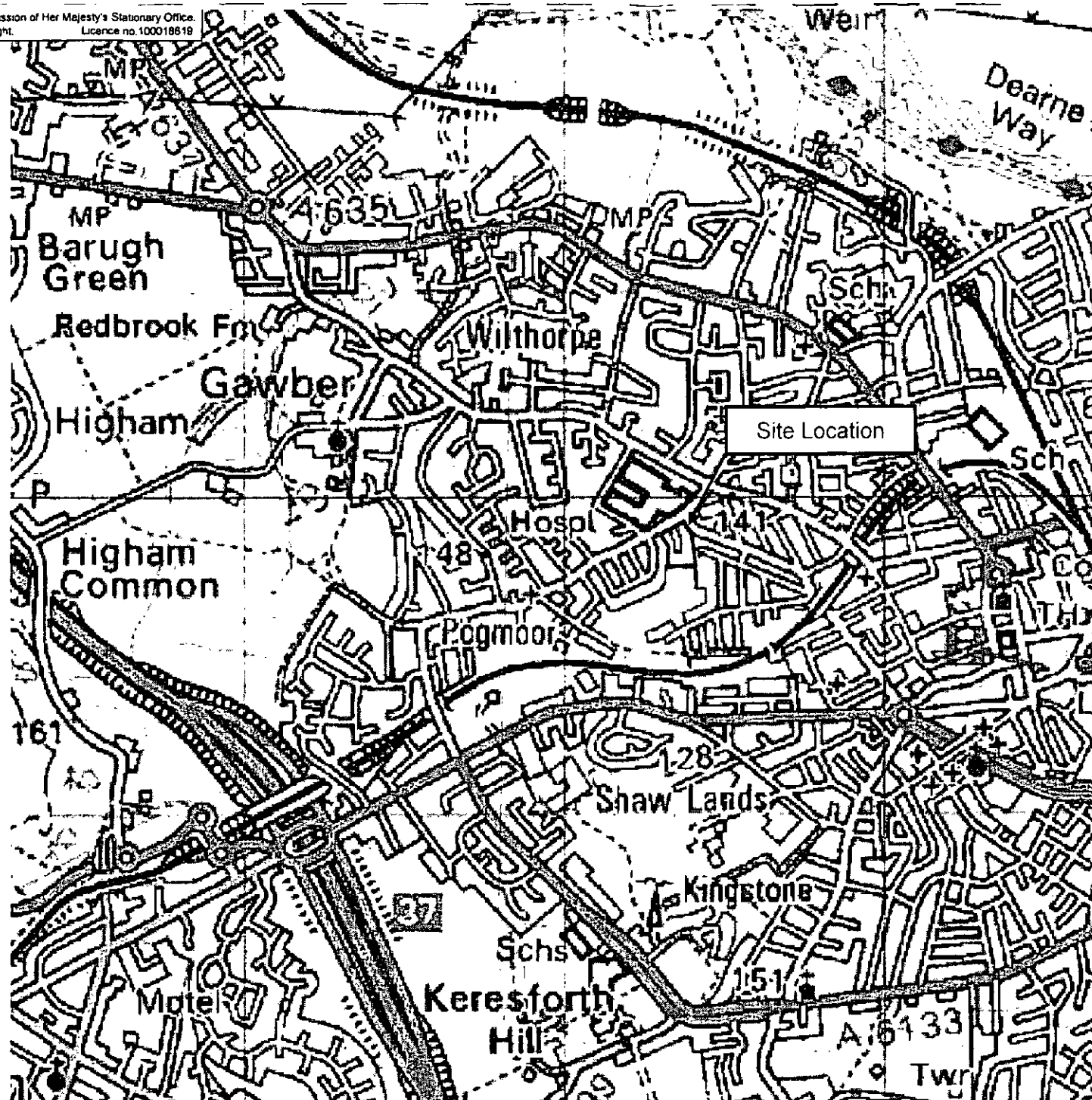
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Appendix A: Site Location and Layout Plans



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ENVIRONMENTAL CONSULTANCY
Endcliffe Holt
343 Fulwood Road
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Fax : (0114) 2668243
www.ecusltd.co.uk

Job: Phase 1 & 2 Site
Investigations

Site: Helensburgh Close,
Pogmoor, Barnsley

Ref: 1932

Client: Beaumont & Cowling

Figure A1

Site Location Plan

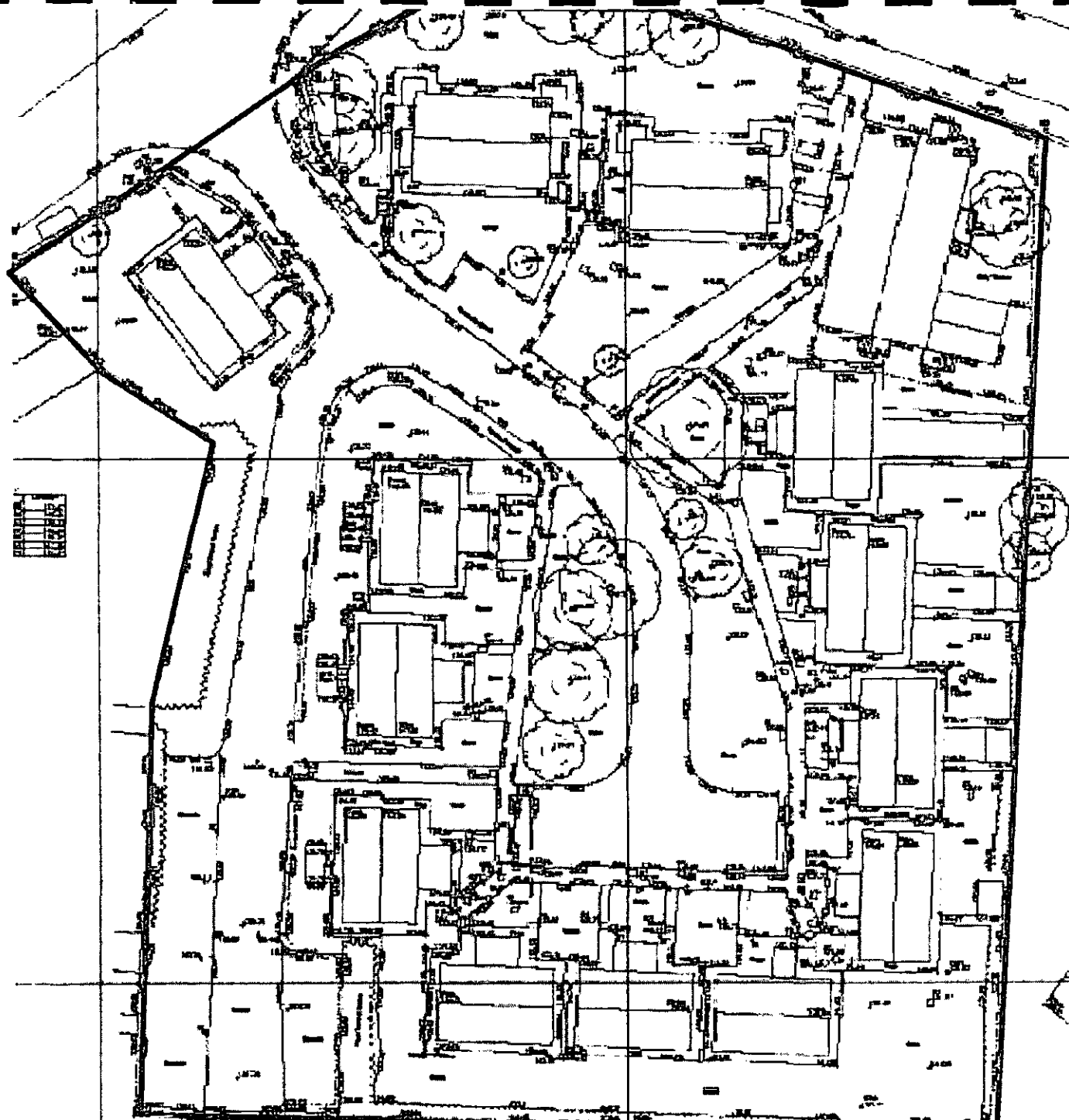
Scale: Not to Scale



Approximate Site Bour



N (indicative)



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Job: Phase 1 & 2 Site
Investigations

Site: Helensburgh Close,
Pogmoor, Barnsley

Ref: 1932

Client: Beaumont & Cowling

Figure A2

Current Site Layout

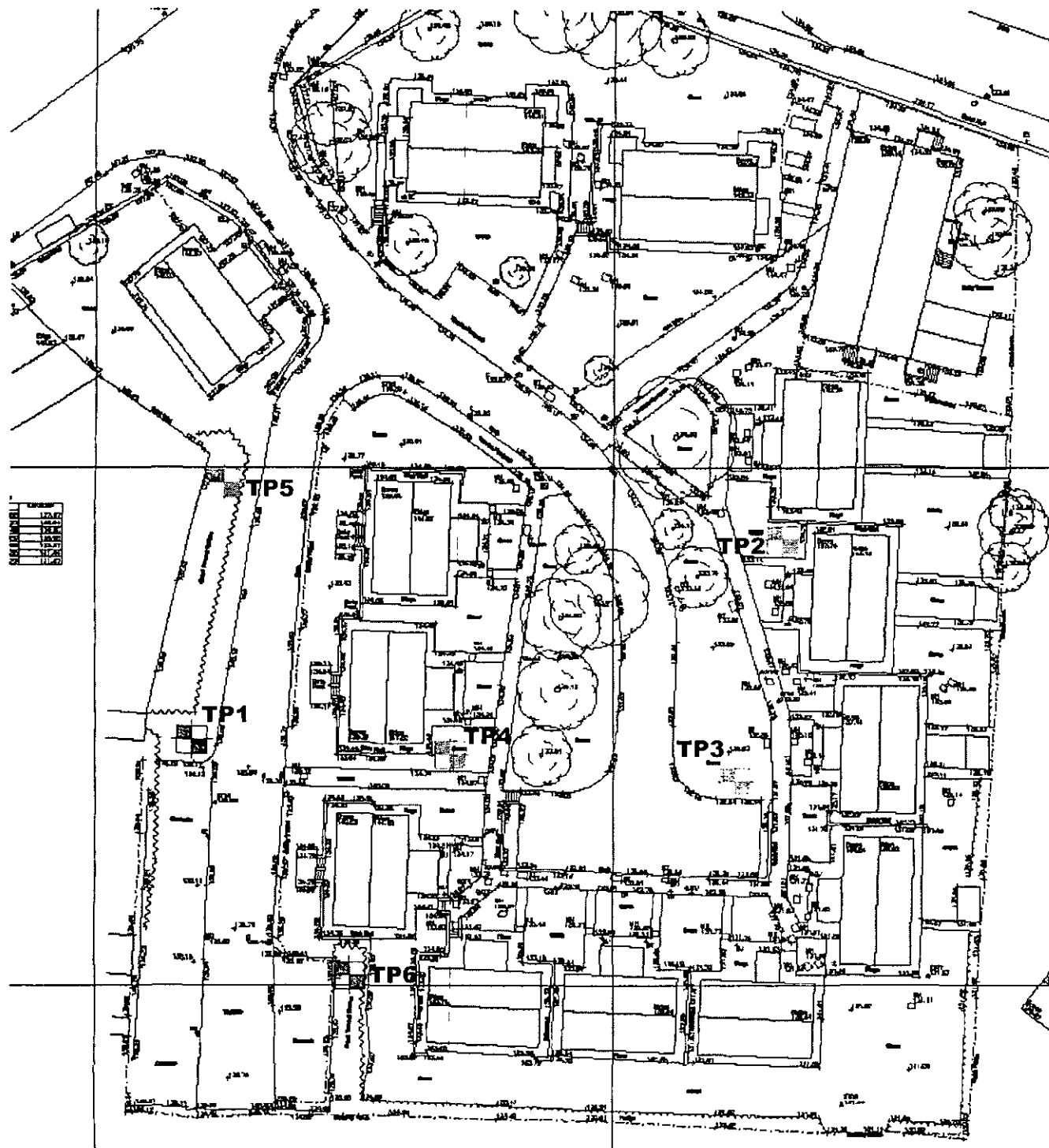
Scale: Not to Scale



Site Boundary



N (indicative)



KEY

-  Trial pit
-  Trial pit with CBR Test

		Endeavour Hall 343 Fulwood Road Sheffield S10 3BO Tel. (0114) 2669292 Fax. (0114) 2669243 www.ecustd.co.uk	
		Client	
Beaumont & Cowling		Project	
Helensburgh Close, Pogmoor, Barnsley		Drawing Title	
Trial Pit Location Plan		Drawn by	
SM	Date	Scale	Dwg. no.
APRIL 08	NTS	Figure A3	



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Appendix B: Site Photographs



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Job: Phase 1 & 2 Site Investigation
 Site: Helensburgh Close, Pogmoor, Barnsley
 Ref: 1932

Photograph 1: Looking southeast along Helensburgh Close towards the hammerhead.



Job: Phase 1 & 2 Site Investigation
 Site: Helensburgh Close, Pogmoor, Barnsley
 Ref: 1932

Photograph 2: Looking south along the second branch of the cul-de-sac. The change in level of the houses can be seen.

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Job: Phase 1 & 2 Site Investigation
 Site: Helensburgh Close, Pogmoor, Barnsley
 Ref: 1932

Photograph 3: The hammerhead with a typical small retaining wall used in site level changes.



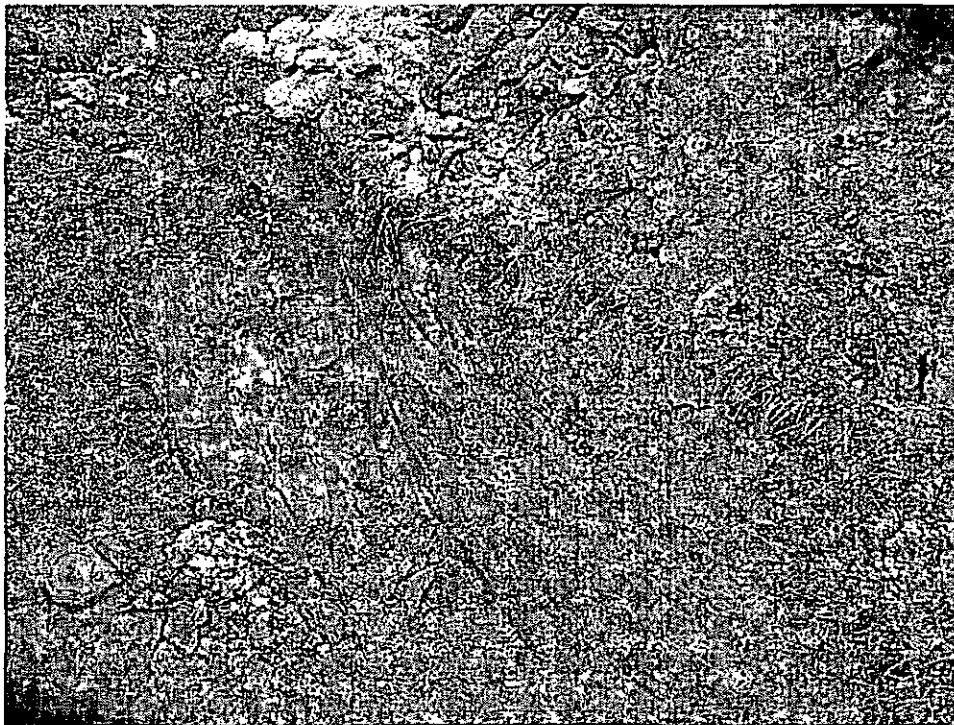
Job: Phase 1 & 2 Site Investigation
 Site: Helensburgh Close, Pogmoor, Barnsley
 Ref: 1932

Photograph 4: Front garden areas, with service runs clearly visible.

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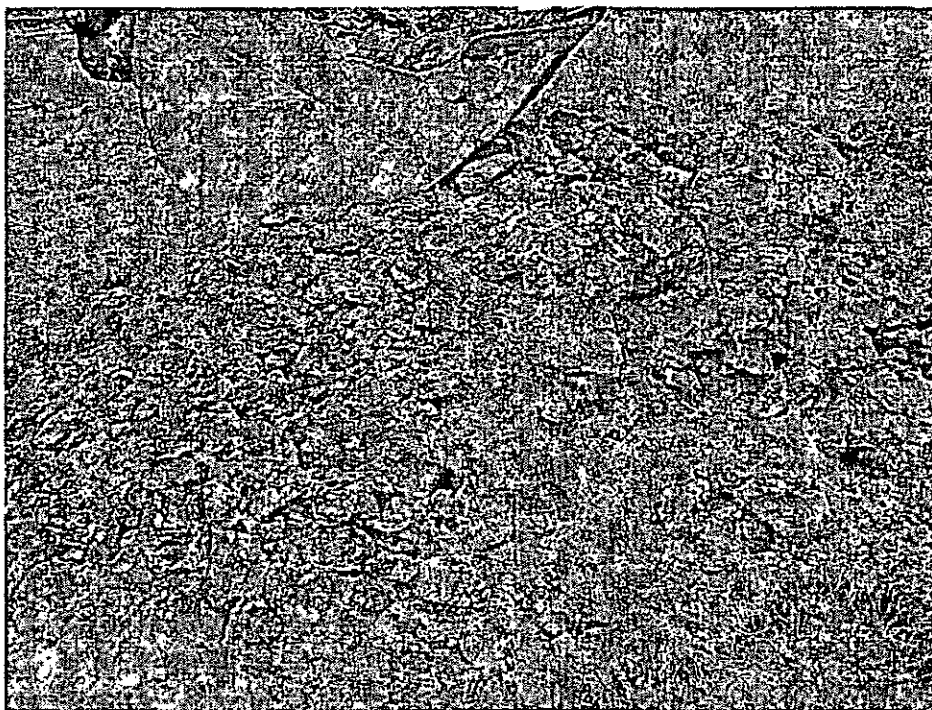
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Job: Phase 1 & 2 Site Investigation
 Site: Helensburgh Close, Pogmoor, Barnsley
 Ref: 1932

Photograph 5: A typical trial pit (TP6).

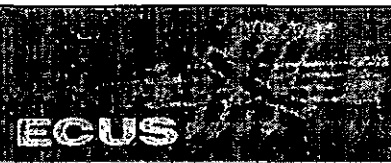


Job: Phase 1 & 2 Site Investigation
 Site: Helensburgh Close, Pogmoor, Barnsley
 Ref: 1932

Photograph 6: Typical excavated material (TP6).

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Appendix D: Coal Authority Mining Report



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Appendix D: Coal Authority Mining Report



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**Issued by:**

The Coal Authority, Mining Reports Office, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire NG18 4RG
On-Line Service: www.coalminingreports.co.uk - Phone: 0845 762 6848 - DX 716176 MANSFIELD 5

ADRIAN GRANT,
ECUS LTD,
343 FULWOOD ROAD,
SHEFFIELD,
S10 3BQ

Person dealing with this matter:

Darren Moody

Our reference:

00023762-08

Your reference:

1932

Electronic Ref:

EME_00009171060001_005

RRUID:

005.00009171060001

Date of your enquiry:

26 March 2008

Date we received your enquiry:

26 March 2008

Date of issue:

28 March 2008

This report is for the property described in the address below and the attached plan.

Coal and Brine Report

Site At, Helensburgh Close, Pogmoor, Barnsley, South Yorkshire

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	Yes
Brine extraction	No

Information from the Coal Authority

Underground Coal Mining

Past

The property is in the likely zone of influence from workings in 4 seams of coal at 70m to 380m depth, and last worked in 1978.

Any ground movement from these coal workings should have stopped by now.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

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The property is not in an area for which a licence has been granted to remove coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

Coal-mining geology

At the surface, there are no known faults or other lines of weakness due to coal mining that have made the property unstable.

Opencast Coal Mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal-mining subsidence

The Coal Authority has not received a damage notice or claim for the property since 1 January 1984. There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority has not received a request to carry out preventive work before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of Support

The property is in an area for which notices of entitlement to withdraw support were published in 1956, 1948, 1944.

The property is not in an area for which a notice has been given under section 41 of the Coal Industry Act 1994, revoking the entitlement to withdraw support.

Working Facilities Orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to Owners of Former Copyhold Land

The property is not in an area for which a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Comments on Coal Authority information

Where development proposals are being considered, technical advice should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. This is necessary due to the Public Safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006. The report is compliant with Home Information Pack requirements.

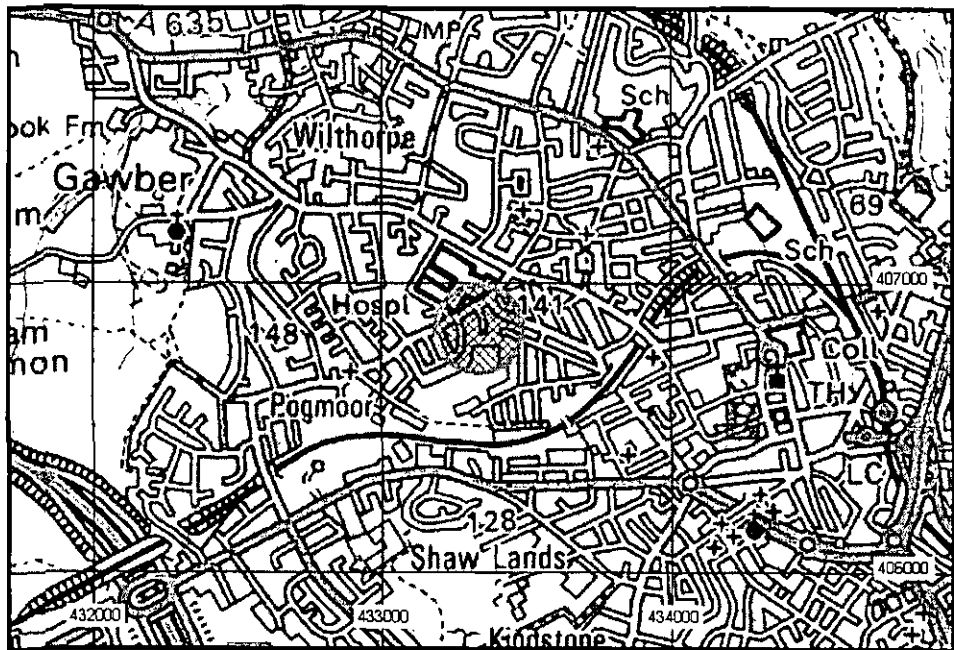
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Issued by:	The Coal Authority, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG
Date:	28 Mar 2008
Ground stability report at:	Site At, Helensburgh Close, Pogmoor, Barnsley, South Yorkshire
Reference number:	00023762-08
Cost:	£42.56
Plus VAT:	£7.44
Total received:	£50.00
VAT registration number:	598 5850 68

Location map



Approximate
position
of property

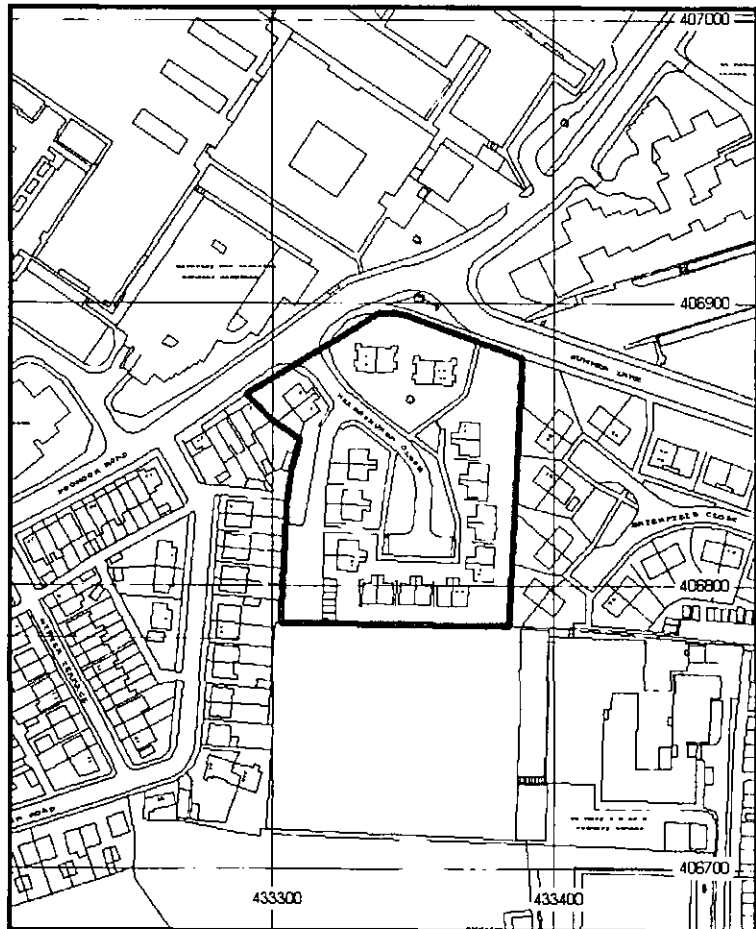


Enquiry boundary

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Key

Approximate position of enquiry boundary shown





Appendix E: Trial Pit Logs



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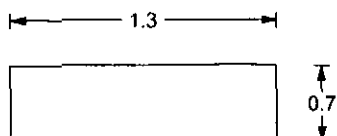
TRIAL PIT LOG



Project Phase 1 and 2 Site Investigation, Helensburgh Close, Barnsley				TRIAL PIT No TP1	
Job No 1932	Date 05-04-08	Ground level (m)	Co-Ordinates ()		
Method/Plant Used JCB 3CX mechanical backhoe excavator with 0.6m toothed bucket.					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.10	D					(0.20) 0.20	MADE GROUND. Grass-covered soft light brown sandy slightly gravelly topsoil. Gravel is fine of sandstone, coal and brick.		
						(0.30) 0.50	MADE GROUND. Soft to firm brown slightly sandy slightly gravelly clay. Gravel is of sandstone, rare brick and rounded pebbles.		
0.50	D					(0.40) 0.90	Soft to firm light grey and orange slightly sandy slightly gravelly CLAY. Gravel is of sandstone, ironstone and coal.		
						(0.50) 1.40	With cobbles of moderately strong sandstone with some ironstaining.		
						(0.30) 1.70	Moderately strong orange-brown SANDSTONE recovered as clayey cobbles of ironstained sandstone.		
							End of trial pit		

Shoring/Support: None.
Stability: Moderately stable.



GENERAL REMARKS

SVS employed to check for service locations.
Moderately easy dig. Dry. Backfilled with arisings.

TRIAL PIT 1932.GPJ NEW/GDT 14/04/08

All dimensions in metres
Scale 1:25

Client
Beaumont and Cowling

Contractor
William Gosney Ltd

Logged By
SM

ECUS Ltd
Endcliffe Holt
343 Fulwood Road
Sheffield S10 3BQ

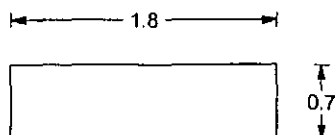
TRIAL PIT LOG



Project Phase 1 and 2 Site Investigation, Helensburgh Close, Barnsley				TRIAL PIT No TP3	
Job No 1932	Date 05-04-08	Ground level (m)	Co-Ordinates ()		
Method/Plant Used JCB 3CX mechanical backhoe excavator with 0.6m toothed bucket.					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.10	D					(0.20)	MADE GROUND. Grass-covered soft grey-brown sandy slightly gravelly topsoil. Gravel is fine of sandstone, coal and brick.		
0.20	CBR	2.1%				0.20			
						(0.80)	Stiff light grey and orange slightly sandy gravelly CLAY. Gravel is of sandstone and ironstone.		
0.80	D					1.00			
						1.10	Moderately strong orange-brown SANDSTONE recovered as clayey cobbles of sandstone.		
							End of trial pit at 1.1 m bgl.		

Shoring/Support: None.
Stability: Moderately stable.



GENERAL REMARKS

SVS employed to check for service locations. Moderately easy dig. Dry. Plate load test undertaken at top of clay. Backfilled with arisings.

TRIAL PIT 1932.GPJ NEW.GDT 14/04/08

All dimensions in metres
Scale 1:25

Client
Beaumont and Cowling

Contractor
William Gosney Ltd

Logged By
SM

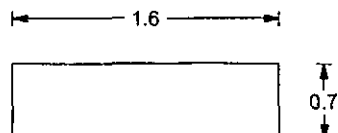
TRIAL PIT LOG



Project Phase 1 and 2 Site Investigation, Helensburgh Close, Barnsley				TRIAL PIT No TP4	
Job No 1932	Date 05-04-08	Ground level (m)	Co-Ordinates ()		
Method/Plant Used JCB 3CX mechanical backhoe excavator with 0.6m toothed bucket.					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.10	D	0.3%				(0.25) 0.25	MADE GROUND. Grass-covered soft grey-brown slightly sandy slightly gravelly topsoil. Gravel is fine of brick, sandstone and coal.		
0.25	CBR					(0.45) 0.70	Stiff grey and orange sandy slightly gravelly CLAY. Gravel is of coal and sandstone.		
0.70	D					(0.30) 1.00	Becoming very stiff with many cobbles of moderately strong sandstone.		
							End of trial pit at 1.0 m bgl.		

Shoring/Support: None.
Stability: Moderately stable.



GENERAL REMARKS

SVS employed to check for service locations. Moderately easy dig. Dry. Plate load test undertaken at top of clay. Backfilled with arisings.

TRIAL PIT 1932.GPJ NEW.GDT 14/04/08

All dimensions in metres
Scale 1:25

Client
Beaumont and Cowling

Contractor
William Gosney Ltd

Logged By
SM

TRIAL PIT 1932.GPJ NEW.GDT 14/04/08

TRIAL PIT LOG



Project Phase 1 and 2 Site Investigation, Helensburgh Close, Barnsley				TRIAL PIT No TP6	
Job No 1932	Date 05-04-08	Ground level (m)	Co-Ordinates ()		
Method/Plant Used JCB 3CX mechanical backhoe excavator with 0.6m toothed bucket.					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.10	D					(0.20) 0.20	MADE GROUND. Grass-covered soft grey-brown slightly sandy slightly gravelly topsoil. Gravel is fine of sandstone, coal and brick. Rare cobbles of brick and glass.		
0.40	D					(0.30) 0.50	Stiff grey and orange slightly sandy slightly gravelly CLAY. Gravel is fone of sandstone, coal and ironstone.		
						(0.60) 1.10	Becoming light grey and orange with cobbles of moderately strong sandstone.		
							End of trial pit at 1.1 m bgl.		

Shoring/Support: None. Stability: Moderately stable. 		GENERAL REMARKS SVS employed to check for service locations. Moderately easy dig. Dry. Backfilled with arisings.			
All dimensions in metres Scale 1:25		Client Beaumont and Cowling		Contractor William Gosney Ltd	Logged By SM



Appendix F: Chemical Analysis Results



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Client: ECUS Limited
Endcliffe Holt
343 Fulwood Road
Sheffield
S10 3BQ

FAO: Ms S Mossman

Test Report Number: R08/0540

Client Project Name: Helensburgh Close
Client Project Number: 1932
Your Order Number: 2954
Order Receipt Date: 09/04/08
Reporting Date: Wednesday 23 April 2008

If you have any queries regarding this report please contact our Customer Services Section



Client Project Name: Helensburgh Close

Client: ECUS Limited

Project Number: 1932

Reporting Date: Wednesday 23 April 2008

Comments

All analyses are carried out using the laboratory's standard methods unless otherwise agreed.

The test results in this report refer only to the actual samples on which testing has been performed.

Any opinions and/or interpretations expressed herein are outside the scope of the testing laboratory's UKAS accreditation.

The test report shall not be reproduced, except in full, without the testing laboratory's written approval.

This testing laboratory cannot be held responsible for the condition or suitability of samples submitted for testing by a third party or for the competency of personnel other than its own staff.

This laboratory cannot be held responsible for the accuracy of test sample locations or descriptions when supplied by a third party.

Soil Samples

Results are expressed on a dry mass basis. Assisted drying carried out @ 40°C.

See key in Notes section for explanation of numerical categories for asbestos results, if applicable.

All material is crushed if possible after assisted drying. Material which cannot be crushed is removed prior to analysis. See Notes section for details, if applicable.

Samples submitted for leachate determination were prepared using agreed procedures and analysed using UKAS accredited methodology where appropriate.

Results are expressed without correction for recovery factors.

All results marked with an ^M meet the criteria of the Environment Agency performance standard for laboratories undertaking chemical testing of soil (MCERTS V3).

Sample Pretreatment (as listed in method statement)

AD = Assisted drying @ 40°C

R = As Received

Sample Type

B = Bulk disturbed sample

C = Core Sample

D = Small disturbed sample

ES = Environmental Soil Sample

P = Piston sample

U = Undisturbed sample - open drive

W = Water Sample

EW = Environmental Water Sample

Sample Results

Analysis not requested

*** Test not completed. Please see notes on last page

Signed: _____

For and on behalf of ECOS Environmental Limited

Approved signatories:

Name	Position
J R Brown	Business Development Manager
L Dewell	Production Manager
J Stoddart	Technical Manager



Client Project Name: Helensburgh Close
Project Number: 1932

Client: ECUS Limited
Reporting Date: Wednesday 23 April 2008

Soil Samples

Method Statement

Determinand	Method of Detection	Sample Pretreatment	Limit of Detection	UKAS Accreditation	Sub-Contracted	Result Date
Arsenic	ICP-OES	AD	1.5 mg/kg	Yes	No	16/04/08
Cadmium	ICP-OES	AD	0.2 mg/kg	Yes	No	16/04/08
Chromium (total)	ICP-OES	AD	2.0 mg/kg	Yes	No	16/04/08
Copper	ICP-OES	AD	0.5 mg/kg	Yes	No	16/04/08
Lead	ICP-OES	AD	1.0 mg/kg	Yes	No	16/04/08
Mercury	ICP-OES	AD	0.1 mg/kg	Yes	No	17/04/08
Nickel	ICP-OES	AD	1.0 mg/kg	Yes	No	16/04/08
Selenium	ICP-OES	AD	1.0 mg/kg	Yes	No	16/04/08
Zinc	ICP-OES	AD	3.0 mg/kg	Yes	No	16/04/08
pH	pH-meter	AD	N/A	Yes	No	18/04/08
PAH (sum of PAH 17)	GC-MS	R	0.1 mg/kg	No	No	22/04/08
Naphthalene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Acenaphthylene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Acenaphthene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Fluorene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Phenanthrene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Anthracene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Fluoranthene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Pyrene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Benzo(a)anthracene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Chrysene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Benzo(b)+(j)fluoranthene	GC-MS	R	0.1 mg/kg	No	No	22/04/08
Benzo(k)fluoranthene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Benzo(a)pyrene	GC-MS	R	0.1 mg/kg	Yes	No	22/04/08
Indeno(1,2,3-cd)pyrene	GC-MS	R	0.2 mg/kg	Yes	No	22/04/08
Dibenz(a,h)anthracene	GC-MS	R	0.2 mg/kg	Yes	No	22/04/08
Benzo(g,h,i)perylene	GC-MS	R	0.3 mg/kg	Yes	No	22/04/08
Fraction Organic Carbon	Titration	AD	0.001 N/A	No	No	16/04/08
Chromium (hexavalent)	Colorimetry	AD	1.0 mg/kg	Yes	Yes	18/04/08



Client Project Name: Helensburgh Close
Project Number: 1932

Client: ECUS Limited
Reporting Date: Wednesday 23 April 2008

Sample Location		TP1	TP1	TP2	TP2	TP3
Top Depth / m		0.10	0.50	0.20	0.60	0.10
Bottom Depth / m						
Sample No.						
Sample Type						
Date Sampled						
Receipt Date		09/04/08	09/04/08	09/04/08	09/04/08	09/04/08
ECoS Sample ID		S0803563	S0803564	S0803565	S0803566	S0803567
Matrix Type		Soil	Soil	Soil	Soil	Soil
Principle Soil Type (for MCERTS)		LOAM	CLAY	LOAM	CLAY	LOAM
Determinand	Units					
Arsenic	mg/kg	17.6 ^M	7.3 ^M	17.4 ^M	<1.5 ^M	15.7 ^M
Cadmium	mg/kg	1.6 ^M	<0.2 ^M	0.4 ^M	<0.2 ^M	0.6 ^M
Chromium (total)	mg/kg	28.5 ^M	21.5 ^M	20.0 ^M	17.2 ^M	32.8 ^M
Copper	mg/kg	86.1 ^M	14.9 ^M	58.7 ^M	19.2 ^M	60.2 ^M
Lead	mg/kg	149.3 ^M	11.9 ^M	180.4 ^M	13.4 ^M	160.2 ^M
Mercury	mg/kg	0.8	<0.1	0.2	<0.1	0.2
Nickel	mg/kg	18.8 ^M	16.0 ^M	18.2 ^M	21.2 ^M	19.8 ^M
Selenium	mg/kg	2.5	1.6	2.3	1.9	2.4
Zinc	mg/kg	296.7 ^M	70.6 ^M	179.6 ^M	74.6 ^M	163.4 ^M
pH	N/A	7.1 ^M	6.8 ^M	7.1 ^M	4.9 ^M	6.3 ^M
PAH (sum of PAH 17)	mg/kg	10.8	<0.1	23.5	<0.1	13.7
Naphthalene	mg/kg	0.3 ^M	<0.1 ^M	0.3 ^M	<0.1 ^M	0.2 ^M
Acenaphthylene	mg/kg	<0.1 ^M	<0.1 ^M	0.1 ^M	<0.1 ^M	<0.1 ^M
Acenaphthene	mg/kg	<0.1 ^M	<0.1 ^M	<0.1 ^M	<0.1 ^M	<0.1 ^M
Fluorene	mg/kg	<0.1 ^M	<0.1 ^M	<0.1 ^M	<0.1 ^M	<0.1 ^M
Phenanthrene	mg/kg	0.8 ^M	<0.1 ^M	1.3 ^M	<0.1 ^M	1.0 ^M
Anthracene	mg/kg	0.1 ^M	<0.1 ^M	0.3 ^M	<0.1 ^M	0.2 ^M
Fluoranthene	mg/kg	1.6 ^M	<0.1 ^M	3.0 ^M	<0.1 ^M	2.3 ^M
Pyrene	mg/kg	1.3 ^M	<0.1 ^M	2.8 ^M	<0.1 ^M	1.8 ^M
Benzo(a)anthracene	mg/kg	1.0 ^M	<0.1 ^M	2.4 ^M	<0.1 ^M	1.2 ^M
Chrysene	mg/kg	0.8 ^M	<0.1 ^M	2.0 ^M	<0.1 ^M	1.4 ^M
Benzo(b)+(j)fluoranthene	mg/kg	1.3	<0.1	2.8	<0.1	1.8
Benzo(k)fluoranthene	mg/kg	0.6 ^M	<0.1 ^M	1.3 ^M	<0.1 ^M	0.6 ^M
Benzo(a)pyrene	mg/kg	1.4 ^M	<0.1 ^M	3.1 ^M	<0.1 ^M	1.5 ^M
Indeno(1,2,3-cd)pyrene	mg/kg	0.8 ^M	<0.2 ^M	2.0 ^M	<0.2 ^M	1.0 ^M
Dibenz(a,h)anthracene	mg/kg	<0.2 ^M	<0.2 ^M	0.4 ^M	<0.2 ^M	<0.2 ^M
Benzo(g,h,i)perylene	mg/kg	0.7 ^M	<0.3 ^M	1.7 ^M	<0.3 ^M	0.8 ^M
Chromium (hexavalent)	mg/kg	1.0	1.0	1.2	1.0	<1.0
Fraction Organic Carbon	N/A	0.047	#	#	#	#



Client Project Name: Helensburgh Close
Project Number: 1932

Client: ECUS Limited
Reporting Date: Wednesday 23 April 2008

Sample Location		TP3	TP4	TP4	TP5	TP5
Top Depth / m		0.80	0.10	0.70	0.30	1.00
Bottom Depth / m						
Sample No.						
Sample Type						
Date Sampled						
Receipt Date		09/04/08	09/04/08	09/04/08	09/04/08	09/04/08
ECoS Sample ID		S0803568	S0803569	S0803570	S0803571	S0803572
Matrix Type		Soil	Soil	Soil	Soil	Soil
Principle Soil Type (for MCERTS)		CLAY	LOAM	CLAY	LOAM	CLAY
Determinand	Units					
Arsenic	mg/kg	<1.5 ^M	19.4 ^M	2.1 ^M	15.0 ^M	8.8 ^M
Cadmium	mg/kg	<0.2 ^M	0.6 ^M	<0.2 ^M	0.3 ^M	<0.2 ^M
Chromium (total)	mg/kg	19.1 ^M	20.3 ^M	19.0 ^M	25.7 ^M	19.2 ^M
Copper	mg/kg	22.3 ^M	65.1 ^M	18.6 ^M	30.2 ^M	16.2 ^M
Lead	mg/kg	14.0 ^M	245.0 ^M	9.8 ^M	54.7 ^M	11.3 ^M
Mercury	mg/kg	<0.1	0.3	<0.1	0.3	<0.1
Nickel	mg/kg	24.0 ^M	16.6 ^M	20.8 ^M	18.2 ^M	19.5 ^M
Selenium	mg/kg	1.3	2.5	1.5	2.3	1.5
Zinc	mg/kg	79.0 ^M	188.5 ^M	63.2 ^M	101.5 ^M	51.6 ^M
pH	N/A	5.3 ^M	6.6 ^M	4.9 ^M	6.8 ^M	6.4 ^M
PAH (sum of PAH 17)	mg/kg	<0.1	12.6	<0.1	23.4	<0.1
Naphthalene	mg/kg	<0.1 ^M	0.2 ^M	<0.1 ^M	0.4 ^M	<0.1 ^M
Acenaphthylene	mg/kg	<0.1 ^M	<0.1 ^M	<0.1 ^M	<0.1 ^M	<0.1 ^M
Acenaphthene	mg/kg	<0.1 ^M	<0.1 ^M	<0.1 ^M	<0.1 ^M	<0.1 ^M
Fluorene	mg/kg	<0.1 ^M	<0.1 ^M	<0.1 ^M	<0.1 ^M	<0.1 ^M
Phenanthrene	mg/kg	<0.1 ^M	1.0 ^M	<0.1 ^M	1.6 ^M	<0.1 ^M
Anthracene	mg/kg	<0.1 ^M	0.2 ^M	<0.1 ^M	0.3 ^M	<0.1 ^M
Fluoranthene	mg/kg	<0.1 ^M	2.1 ^M	<0.1 ^M	3.8 ^M	<0.1 ^M
Pyrene	mg/kg	<0.1 ^M	1.7 ^M	<0.1 ^M	3.3 ^M	<0.1 ^M
Benzo(a)anthracene	mg/kg	<0.1 ^M	1.3 ^M	<0.1 ^M	2.2 ^M	<0.1 ^M
Chrysene	mg/kg	<0.1 ^M	1.2 ^M	<0.1 ^M	1.8 ^M	<0.1 ^M
Benzo(b)+(j)fluoranthene	mg/kg	<0.1	1.5	<0.1	2.6	<0.1
Benzo(k)fluoranthene	mg/kg	<0.1 ^M	0.5 ^M	<0.1 ^M	1.1 ^M	<0.1 ^M
Benzo(a)pyrene	mg/kg	<0.1 ^M	1.5 ^M	<0.1 ^M	2.9 ^M	<0.1 ^M
Indeno(1,2,3-cd)pyrene	mg/kg	<0.2 ^M	0.8 ^M	<0.2 ^M	1.6 ^M	<0.2 ^M
Dibenz(a,h)anthracene	mg/kg	<0.2 ^M	<0.2 ^M	<0.2 ^M	0.2 ^M	<0.2 ^M
Benzo(g,h,i)perylene	mg/kg	<0.3 ^M	0.7 ^M	<0.3 ^M	1.7 ^M	<0.3 ^M
Chromium (hexavalent)	mg/kg	<1.0	<1.0	<1.0	<1.0	2.3
Fraction Organic Carbon	N/A	0.002	#	#	#	#

Client Project Name: Helensburgh Close
Project Number: 1932

Client: ECUS Limited
Reporting Date: Wednesday 23 April 2008

Sample Location		TP6	TP6
Top Depth / m		0.10	0.40
Bottom Depth / m			
Sample No.			
Sample Type			
Date Sampled			
Receipt Date		09/04/08	09/04/08
ECoS Sample ID		S0803573	S0803574
Matrix Type		Soil	Soil
Principle Soil Type (for MCERTS)		LOAM	CLAY
Determinand	Units		
Arsenic	mg/kg	19.2 ^M	5.2 ^M
Cadmium	mg/kg	0.6 ^M	<0.2 ^M
Chromium (total)	mg/kg	21.1 ^M	21.5 ^M
Copper	mg/kg	59.9 ^M	19.0 ^M
Lead	mg/kg	175.1 ^M	12.1 ^M
Mercury	mg/kg	0.3	<0.1
Nickel	mg/kg	17.4 ^M	17.5 ^M
Selenium	mg/kg	2.7	1.8
Zinc	mg/kg	178.2 ^M	58.4 ^M
pH	N/A	7.3 ^M	6.7 ^M
PAH (sum of PAH 17)	mg/kg	11.4	<0.1
Naphthalene	mg/kg	0.1 ^M	<0.1 ^M
Acenaphthylene	mg/kg	<0.1 ^M	<0.1 ^M
Acenaphthene	mg/kg	<0.1 ^M	<0.1 ^M
Fluorene	mg/kg	<0.1 ^M	<0.1 ^M
Phenanthrene	mg/kg	0.8 ^M	<0.1 ^M
Anthracene	mg/kg	0.2 ^M	<0.1 ^M
Fluoranthene	mg/kg	1.9 ^M	<0.1 ^M
Pyrene	mg/kg	1.7 ^M	<0.1 ^M
Benzo(a)anthracene	mg/kg	1.0 ^M	<0.1 ^M
Chrysene	mg/kg	1.0 ^M	<0.1 ^M
Benzo(b)+(j)fluoranthene	mg/kg	1.3	<0.1
Benzo(k)fluoranthene	mg/kg	0.6 ^M	<0.1 ^M
Benzo(a)pyrene	mg/kg	1.3 ^M	<0.1 ^M
Indeno(1,2,3-cd)pyrene	mg/kg	0.8 ^M	<0.2 ^M
Dibenz(a,h)anthracene	mg/kg	<0.2 ^M	<0.2 ^M
Benzo(g,h,i)perylene	mg/kg	0.7 ^M	<0.3 ^M
Chromium (hexavalent)	mg/kg	<1.0	<1.0



Client Project Name: Helensburgh Close
Project Number: 1932

Client: ECUS Limited
Reporting Date: Wednesday 23 April 2008

Sample Description - Soil samples

EC&S Sample ID	Colour	Principle Type	Principle Size/mm
S0803563	N/A	LOAM	N/A
S0803564	MOTTLED ORANGE	CLAY	<0.06
S0803565	N/A	LOAM	N/A
S0803566	MOTTLED BROWN	CLAY	<0.06
S0803567	N/A	LOAM	N/A
S0803568	MOTTLED BROWN	CLAY	<0.06
S0803569	N/A	LOAM	N/A
S0803570	MOTTLED GREY	CLAY	<0.06
S0803571	N/A	LOAM	N/A
S0803572	MOTTLED BROWN	CLAY	<0.06
S0803573	N/A	LOAM	N/A
S0803574	MOTTLED ORANGE	CLAY	<0.06



Client Project Name: Helensburgh Close
Project Number: 1932

Client: ECUS Limited
Reporting Date: Wednesday 23 April 2008

Notes and Preservation Details

No preservation or stabilisation of test samples undertaken at sampling site.

Chromium (hexavalent) analyses undertaken by UKAS laboratory number 2531.

End of Test Report



Appendix G: CBR Testing Results



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Authorised signatories:

 D. Swindells—Operations Manager []
 S. Grayson—Lab Team Leader [1]

Vertical Deformation of Soil by Plate Load Test
 BS 1377: Part 9: 1990

 Page 1 of 1
 Date 10/04/2008
 Report Ref: 08FW0387

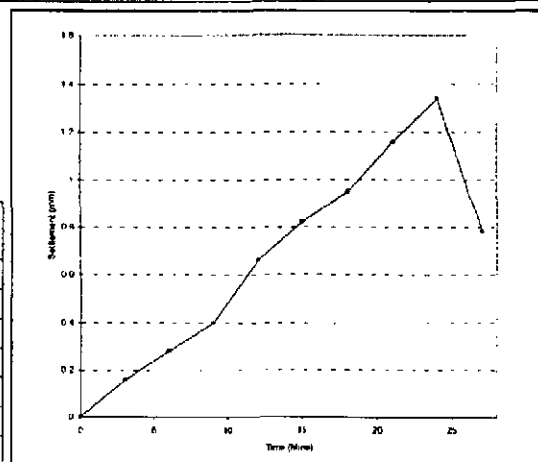
Lab Ref No.	08FW0387.1	Date Tested	05/04/2008
Scheme / Site	Heilensburgh Close, Pogmoor		
Test Location	1936/5	Client Reference	1936/5
Technician	RT	Weather	Overcast

TEST RESULTS

Soil Description :	Light brown SILT/CLAY and occasional cobbles
--------------------	--

 Depth of Test (mm) **600**
 Distance from excavation wall (mm) **200**
 Reaction Load Used **JCB**
 Plate Size (mm) **300**
 Test Method **Incremental**
 Moisture Content (%) **18.9**
 (If Requested)

Applied Load (kN/m ²)	Time (Mins)	Mean Deflection (mm)
0	0	0.00
20	3	0.16
30	6	0.28
40	9	0.40
50	12	0.66
60	15	0.82
70	18	0.95
80	21	1.16
90	24	1.34
0	27	0.78



Maximum Deflection (mm)	Recovery (%)	%CBR* (If Requested)
1.34	41.8	3.7

*Note: %CBR values calculated using methods given in Design Manual for Roads and Bridges – Volume 7.

 Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
 Results relate only to the samples tested. Client should ensure sampling is representative of material on site.
 This certificate shall not be reproduced except in full without written approval of the laboratory.

Remarks:

 Client Name **Ecus Ltd**
Endcliffe Holt
343 Fulwood Road
Sheffield
S10 3BQ

 FAO **Shona Mossman**
 Copies To

 Issuing laboratory:
Soil Mechanics Civils

 Unit 11b, Provincial Park
 Nether Lane
 Ecclesfield
Sheffield, S35 9ZX
 Tel: 0114 240 1901
 Fax: 0114 240 1744

Authorised By:



11 APR 2008

AG

Soil Mechanics
Civils

CERTIFICATE OF TEST



1015

Authorised signatories:

D. Swindells—Operations Manager []
S. Grayson—Lab Team Leader []Vertical Deformation of Soil by Plate Load Test
BS 1377: Part 9: 1990Page 1 of 1
Date 10/04/2008
Report Ref: 08FW0384

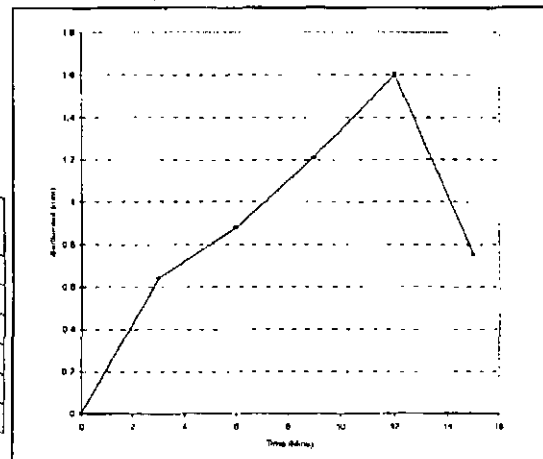
Lab Ref No.	08FW0384.1	Date Tested	05/04/2008
Scheme / Site	Helensburgh Close, Pogmoor		
Test Location	1932/2	Client Reference	1932/2
Technician	RT	Weather	Showers

TEST RESULTS

Soil Description :	Light brown SILT/CLAY
--------------------	-----------------------

Depth of Test (mm) 200mm
 Distance from excavation wall (mm) 200mm
 Reaction Load Used JCB
 Plate Size (mm) 300
 Test Method Incremental
 Moisture Content (%) 20.5
 (If Requested)

Applied Load (kN/m ²)	Time (Mins)	Mean Deflection (mm)
0	0	0.00
20	3	0.64
30	6	0.88
40	9	1.21
50	12	1.60
0	15	0.75



Maximum Deflection (mm)	Recovery (%)	%CBR* (If Requested)
1.60	53.1	1.1

*Note: %CBR values calculated using methods given in Design Manual for Roads and Bridges – Volume 7.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
 Results relate only to the samples tested. Client should ensure sampling is representative of material on site.
 This certificate shall not be reproduced except in full without written approval of the laboratory.

Remarks:

Client Name Ecus Ltd
 Endcliffe Holt
 343 Fulwood Road
 Sheffield
 S10 3BQ

FAO Shona Mossman
 Copies To

Issuing laboratory:
 Soil Mechanics Civils

Unit 11b, Provincial Park
 Nether Lane
 Ecclesfield
 Sheffield, S35 9ZX
 Tel: 0114 240 1901
 Fax: 0114 240 1744

Authorised By:

Authorised signatories:

 D. Swindells—Operations Manager()
 S. Grayson—Lab Team Leader(✓)

Vertical Deformation of Soil by Plate Load Test
 BS 1377: Part 9: 1990

 Page 1 of 1
 Date 10/04/2008
 Report Ref 08FW0385

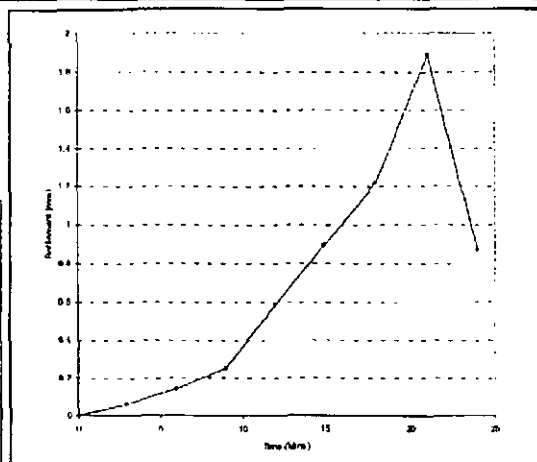
Lab Ref No.	08FW0385.1	Date Tested	05/04/2008
Scheme / Site	Helensburgh Close, Pogmoor		
Test Location	1932/3	Client Reference	1932/3
Technician	RT	Weather	Raining

TEST RESULTS

Soil Description :	Light brown SILT/CLAY
--------------------	-----------------------

Depth of Test (mm) **200**
 Distance from excavation wall (mm) **200**
 Reaction Load Used **JCB**
 Plate Size (mm) **300**
 Test Method **Incremental**
 Moisture Content (%) **28.4**
 (If Requested)

Applied Load (kN/m ²)	Time (Mins)	Mean Deflection (mm)
0	0	0.00
20	3	0.06
30	6	0.14
40	9	0.25
50	12	0.58
60	15	0.89
70	18	1.22
80	21	1.89
0	24	0.87



Maximum Deflection (mm)	Recovery (%)	%CBR* (If Requested)
1.89	75.7	2.1

*Note: %CBR values calculated using methods given in Design Manual for Roads and Bridges – Volume 7.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
 Results relate only to the samples tested. Client should ensure sampling is representative of material on site.
 This certificate shall not be reproduced except in full without written approval of the laboratory.

Remarks:

Client Name **Ecus Ltd**
Endcliffe Holt
343 Fulwood Road
Sheffield

S10 3BQ

FAO **Shona Mossman**
 Copies To

Issuing laboratory:
Soil Mechanics Civils

Unit 11b, Provincial Park
 Nether Lane
 Ecclesfield
Sheffield, S35 9ZX
 Tel: 0114 240 1901
 Fax: 0114 240 1744

Authorised By:

Authorised signatories:

D. Swindells-Operations Manager []
S. Grayson-Lab Team Leader [/]

Vertical Deformation of Soil by Plate Load Test

BS 1377: Part 9: 1990

Page 1 of 1
Date 10/04/2008
Report Ref: 08FW0386

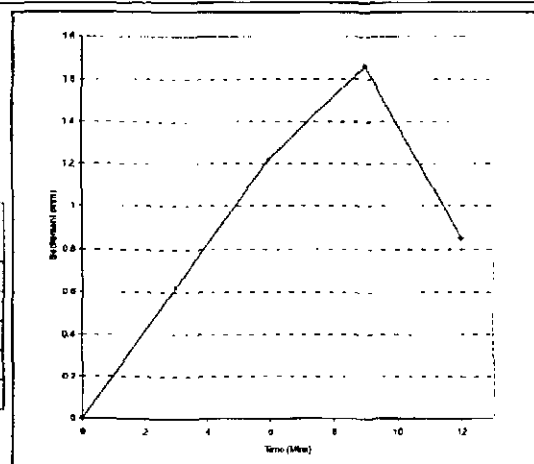
Lab Ref No.	08FW0386.1	Date Tested	05/04/2008
Scheme / Site	Helensburgh Close, Pogmoor		
Test Location	1936/4	Client Reference	1936/4
Technician	RT	Weather	Dry

TEST RESULTS

Soil Description :	Light brown SILT/CLAY
--------------------	-----------------------

Depth of Test (mm) **250**
Distance from excavation wall (mm) **200**
Reaction Load Used **JCB**
Plate Size (mm) **300**
Test Method **Incremental**
Moisture Content (%) **20.7**
(If Requested)

Applied Load (kN/m ²)	Time (Mins)	Mean Deflection (mm)
0	0	0.00
20	3	0.62
30	6	1.22
40	9	1.66
0	12	0.85



Maximum Deflection (mm)	Recovery (%)	%CBR* (If Requested)
1.66	48.8	0.3

*Note: %CBR values calculated using methods given in Design Manual for Roads and Bridges – Volume 7.

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Soil Mechanics Civils

Unit 11b, Provincial Park
Nether Lane
Ecclesfield
Sheffield, S35 9ZX
Tel: 0114 240 1901
Fax: 0114 240 1744

Authorised By: 



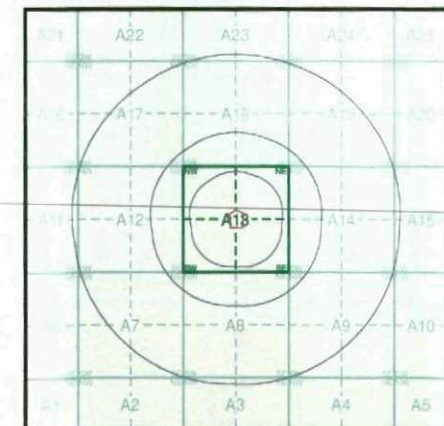
10K Raster Mapping
Published 2007
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 24763186_1_1
Customer Ref: 1932
National Grid Reference: 433340, 406840
Slice: A
Site Area (Ha): 0.85
Search Buffer (m): 1000

Site Details

Helensburgh Close, Pogmoor, Barnsley, South Yorkshire



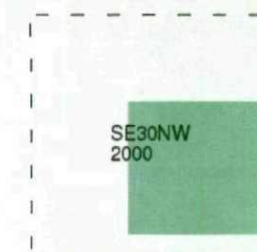
© Crown copyright. All Rights Reserved. Licence Number 100020245.



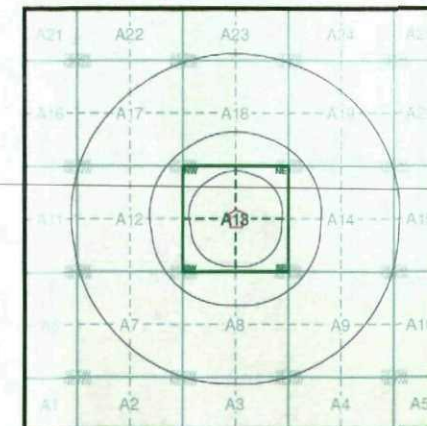
10K Raster Mapping Published 2000 Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 24763186_1_1
Customer Ref: 1932
National Grid Reference: 433340, 406840
Slice: A
Site Area (Ha): 0.85
Search Buffer (m): 1000

Site Details

Helensburgh Close, Pogmoor, Barnsley, South Yorkshire



Tel: 0870 850 6670
Fax: 0870 850 6671
Web: www.envirocheck.co.uk

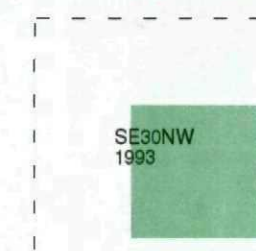
Ordnance Survey Plan

Published 1993

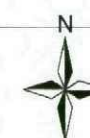
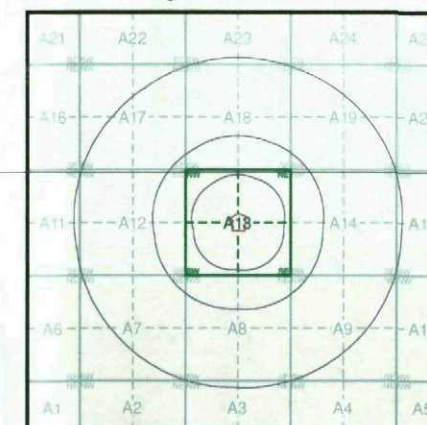
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 24763186_1_1
 Customer Ref: 1932
 National Grid Reference: 433340, 406840
 Slice: A
 Site Area (Ha): 0.85
 Search Buffer (m): 1000

Site Details

Helensburgh Close, Pogmoor, Barnsley, South Yorkshire



Ordnance Survey Plan

Published 1983

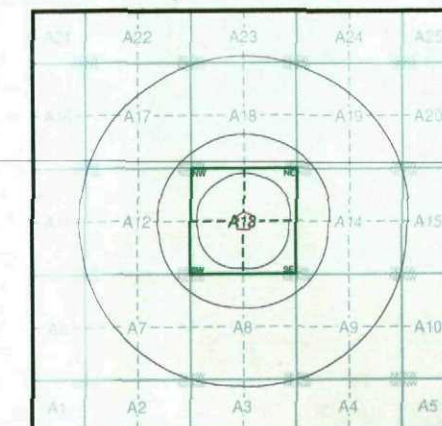
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 24763186_1_1
Customer Ref: 1932
National Grid Reference: 433340, 406840
Slice: A
Site Area (Ha): 0.85
Search Buffer (m): 1000

Site Details

Helensburgh Close, Pogmoor, Barnsley, South Yorkshire





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Ordnance Survey Plan
Published 1973

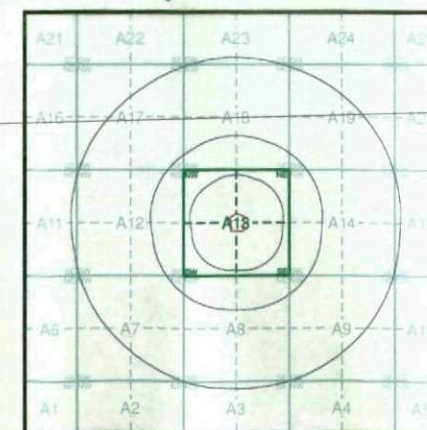
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 24763186_1_1
Customer Ref: 1932
National Grid Reference: 433340, 406840
Slice: A
Site Area (Ha): 0.85
Search Buffer (m): 1000

Site Details

Helensburgh Close, Pogmoor, Barnsley, South Yorkshire



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Ordnance Survey Plan

Published 1966

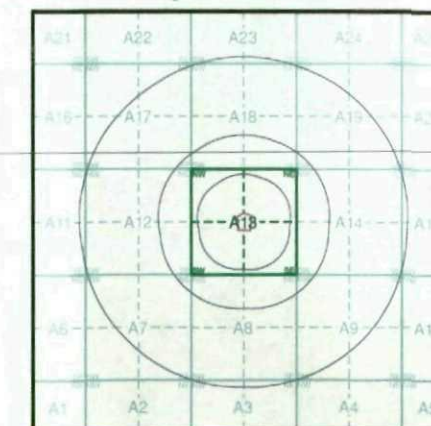
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 24763186_1_1
Customer Ref: 1932
National Grid Reference: 433340, 406840
Slice: A
Site Area (Ha): 0.85
Search Buffer (m): 1000

Site Details

Helensburgh Close, Pogmoor, Barnsley, South Yorkshire



Tel: 0870 850 6670
Fax: 0870 850 6671
Web: www.envirocheck.co.uk

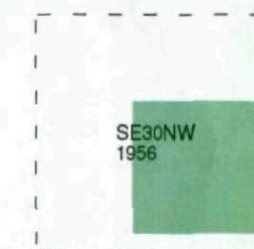


**Ordnance Survey Plan
Published 1956**

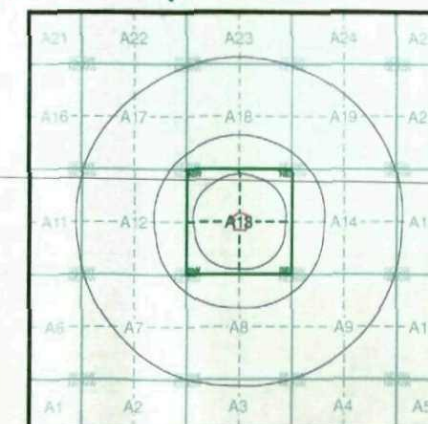
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 24763186_1_1
Customer Ref: 1932
National Grid Reference: 433340, 406840
Slice: A
Site Area (Ha): 0.85
Search Buffer (m): 1000

Site Details

Helensburgh Close, Pogmoor, Barnsley, South Yorkshire

Yorkshire

Published 1938

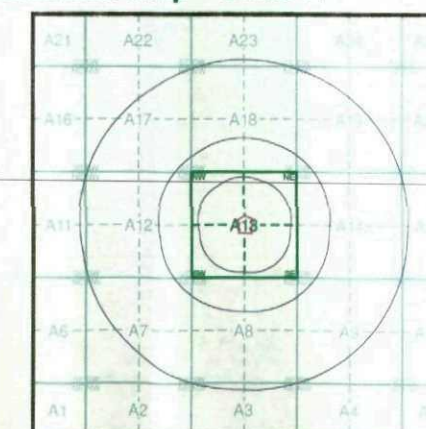
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

274 NW 1938	274 NE 1938
274 SW 1938	274 SE 1938

Historical Map - Slice A



Order Details

Order Number: 24763186_1_1
Customer Ref: 1932
National Grid Reference: 433340, 406840
Slice: A
Site Area (Ha): 0.85
Search Buffer (m): 1000

Site Details

Helensburgh Close, Pogmoor, Barnsley, South Yorkshire



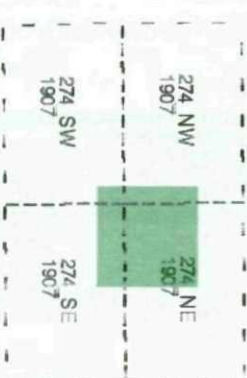
Yorkshire

Published 1907

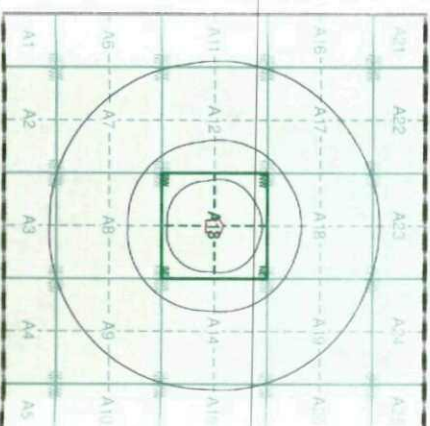
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published data given therefore is often some years later than the surveyed data. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in our first sheets. In 1940's, a Provisional Edition was produced which updated the 1:10,560 mapping from a number of sources. The maps appear unaltered - with all military camps and other strategic sites removed. These maps were initially overlaid with the National Grid. In 1971, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A

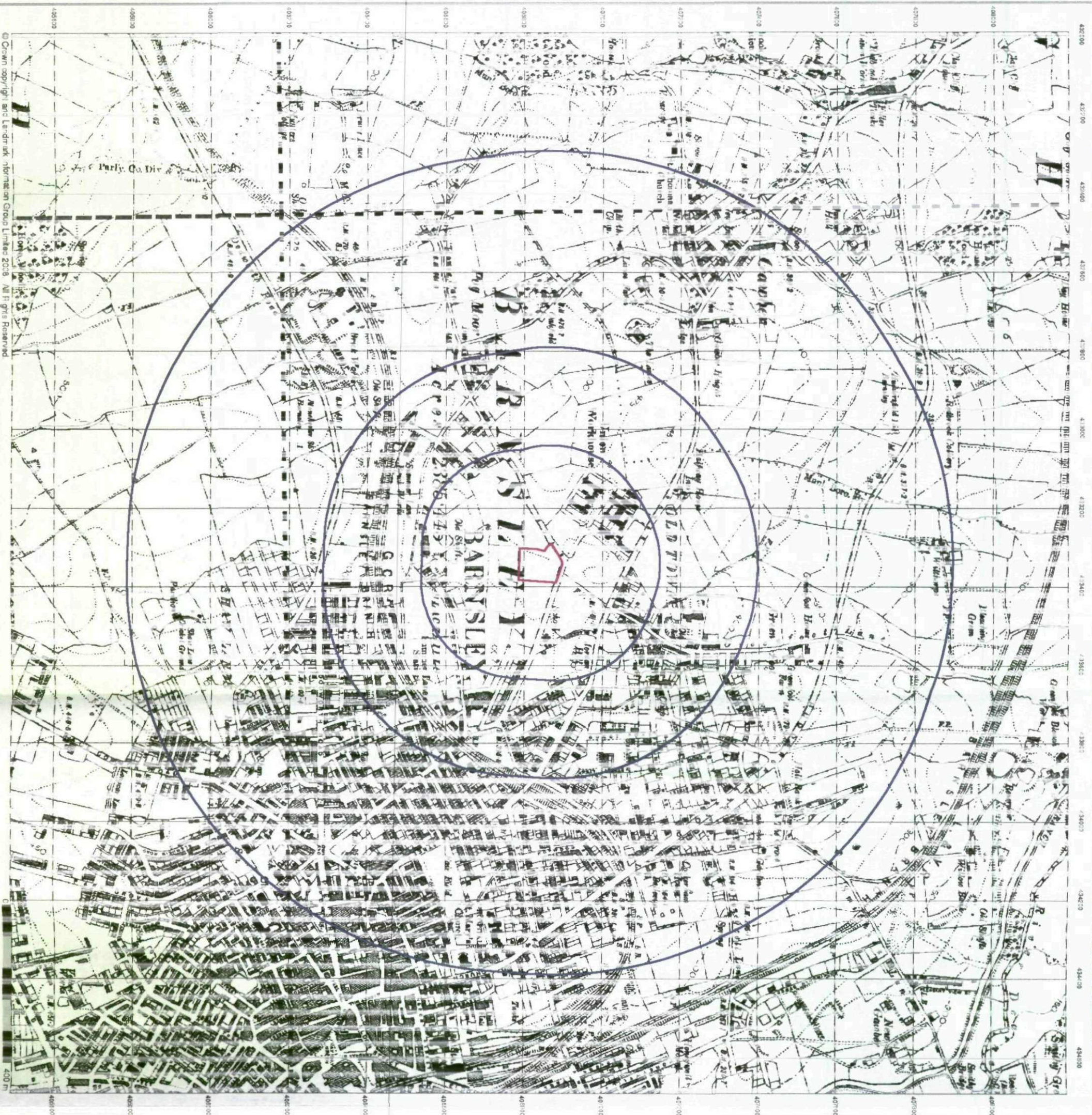


Order Details

Order Number: 24763166_1_1
Customer Ref: 1932
National Grid Reference: 433340, 406840
Slice: A
Site Area (Ha): 0.85
Search Buffer (m): 1000

Site Details

Heansburgh Close, Pognoor, Barnsley, South Yorkshire



Yorkshire

Published 1891 - 1894

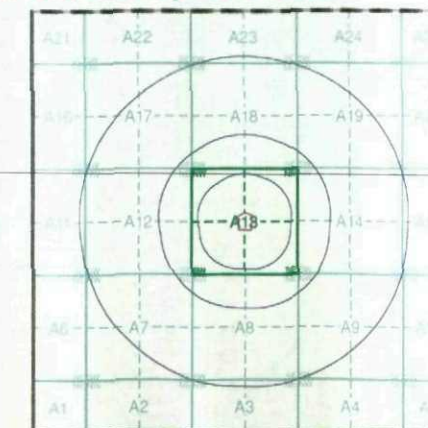
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1851 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished, with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

274 NW 1891	274 NE 1894
274 SW 1894	274 SE 1894

Historical Map - Slice A

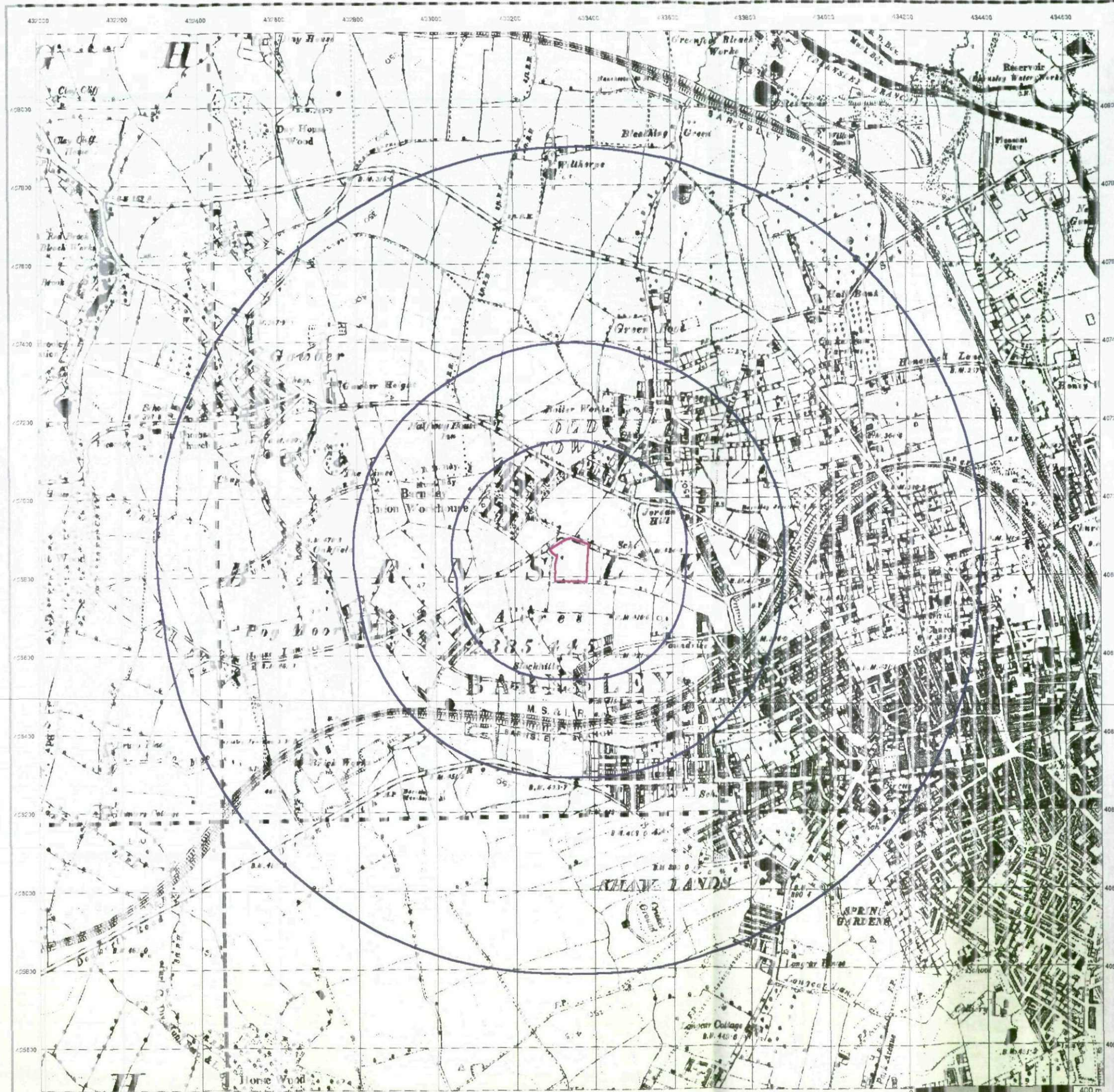


Order Details

Order Number: 24763186_1_1
Customer Ref: 1932
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Slice: A
Site Area (Ha): 0.85
Search Buffer (m): 1000

Site Details

Helensburgh Close, Pogmoor, Barnsley, South Yorkshire



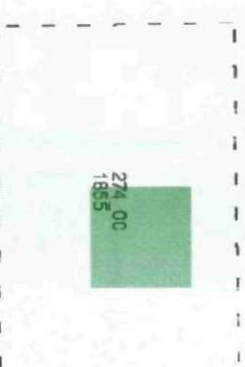
Yorkshire

Published 1855

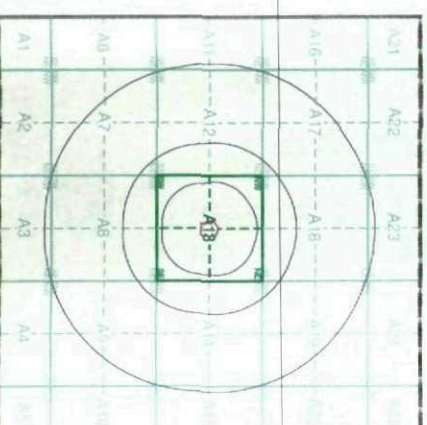
Source map scale - 1:10,560

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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

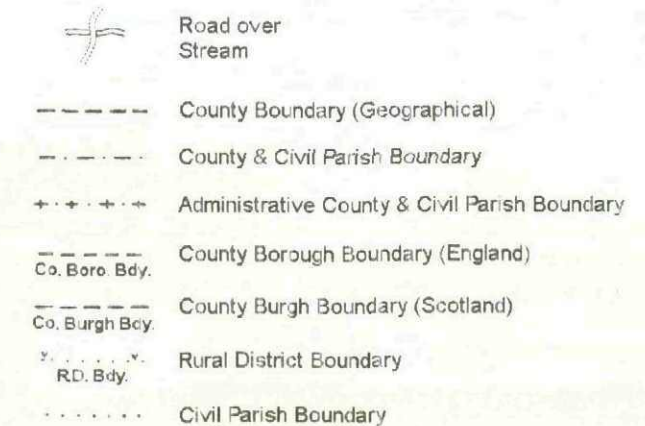
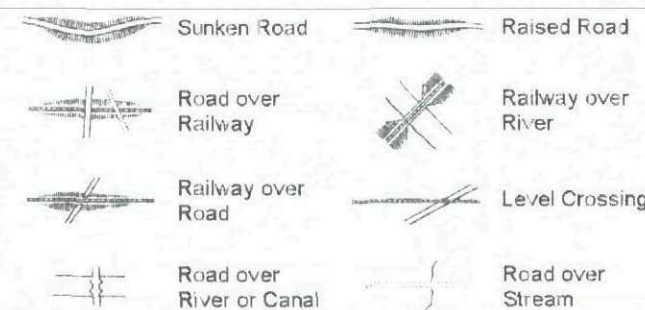
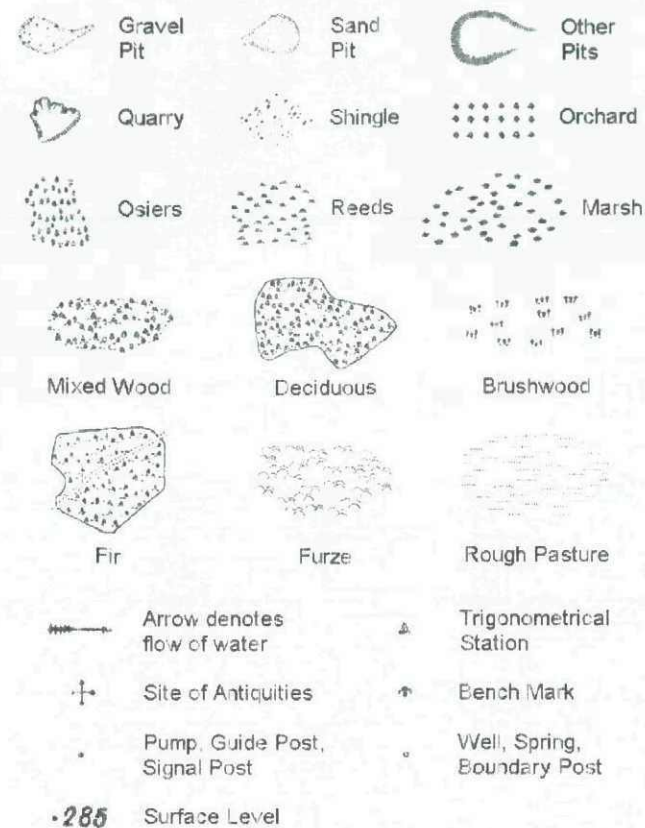
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Site Details

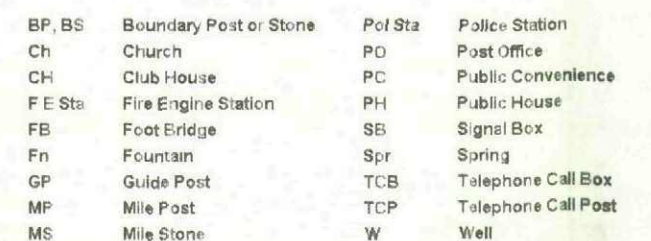
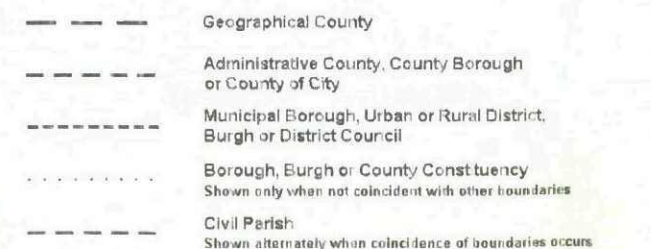
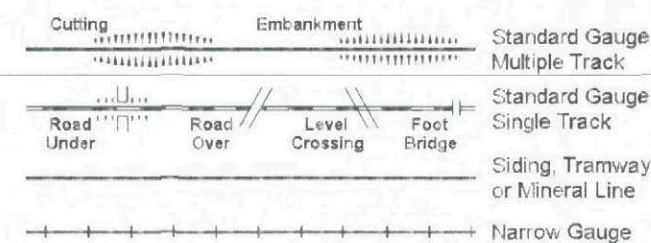
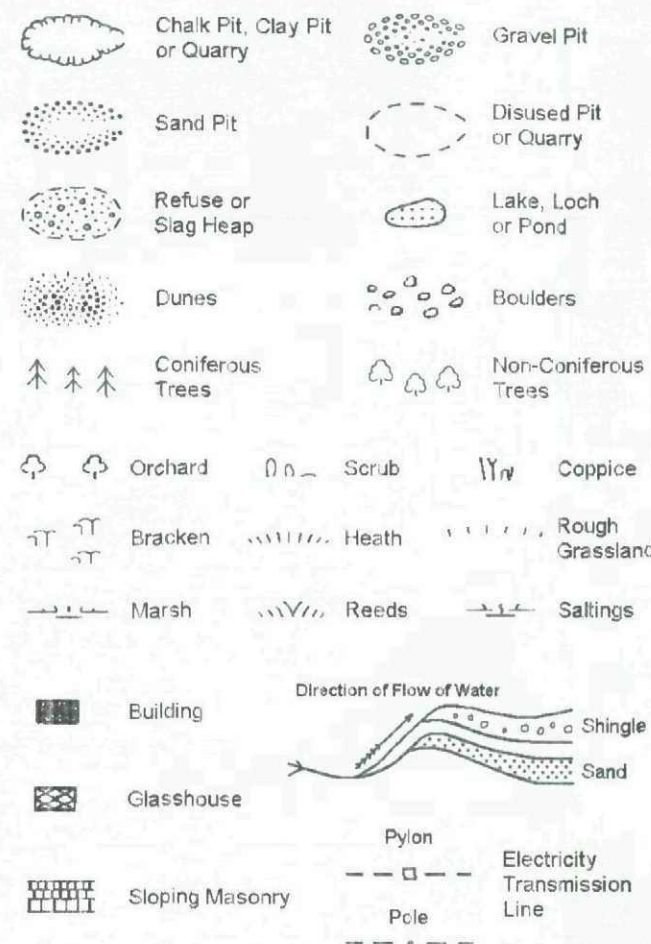
Helensburgh Close, Pogmoor, Barmesley, South Yorkshire

Historical Mapping Legends

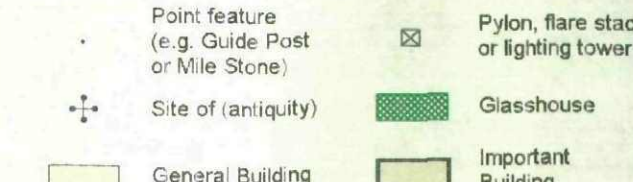
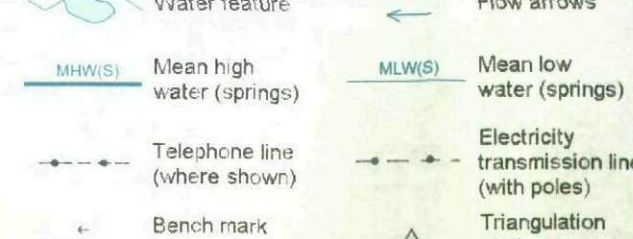
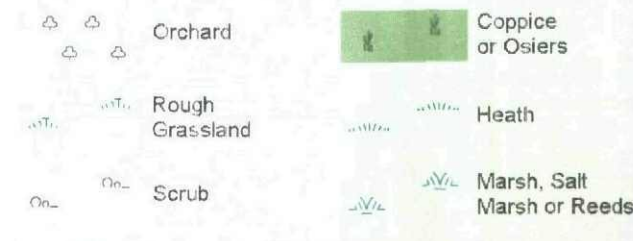
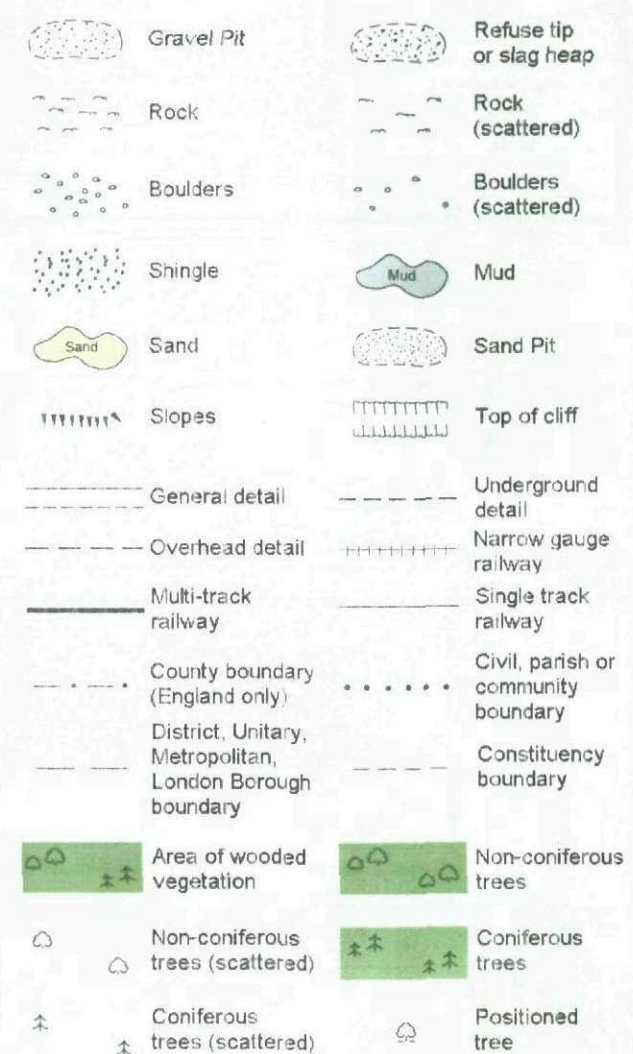
Ordnance Survey County Series and Ordnance Survey Plan 1:10,560



Ordnance Survey Plan 1:10,000



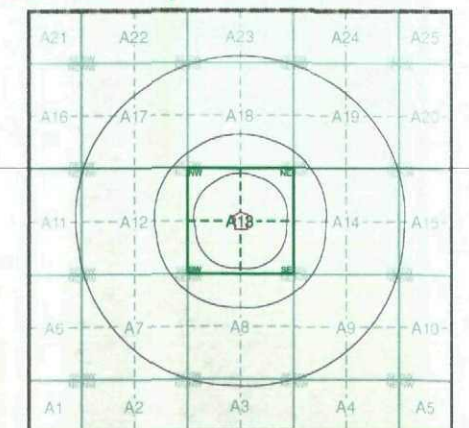
1:10,000 Raster Mapping



Ordnance Survey mapping included:

Mapping Type	Scale	Date	Pg
Yorkshire	1:10,560	1855	2
Yorkshire	1:10,560	1891 - 1894	3
Yorkshire	1:10,560	1907	4
Yorkshire	1:10,560	1938	5
Ordnance Survey Plan	1:10,560	1956	6
Ordnance Survey Plan	1:10,560	1966	7
Ordnance Survey Plan	1:10,000	1973	8
Ordnance Survey Plan	1:10,000	1983	9
Ordnance Survey Plan	1:10,000	1993	10
10K Raster Mapping	1:10,000	2000	11
10K Raster Mapping	1:10,000	2007	12

Historical Map - Slice A



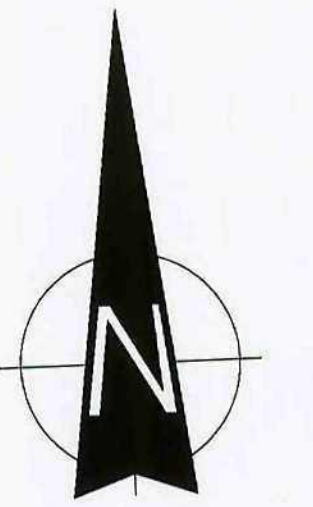
Order Details

Order Number: 24763186_1_1
Customer Ref: 1932
National Grid Reference: 433340, 406840
Slice: A
Site Area (Ha): 0.85
Search Buffer (m): 1000

Site Details

Helensburgh Close, Pogmoor, Barnsley, South Yorkshire

All dimensions in millimetres unless otherwise stated
The contractor must verify all dimensions on site before commencing on site
Architect must be notified of any suspected discrepancies or omissions
Any scaled dimensions to be confirmed by the Architect



No. [] - Car parking space designated for use between 07:00 and 18:00 hours

No. [] - Car parking space designated for use 24 hours

Revisions

A-12.06.08 Alterations following discussions with Highways
B-7.10.08 DRAINAGE ADDED AND 24-HOUR PARKING SPACES HIGHLIGHTED.
SIGHTLINES ADDED

Barnsley Metropolitan
Borough Council
11 AUG 2008
Corporate Mail Room

Barnsley NHS Trust
Land off Pogmore Road
Barnsley

Proposed car park

PROPOSED SITE PLAN

Scale 1:200 @A1

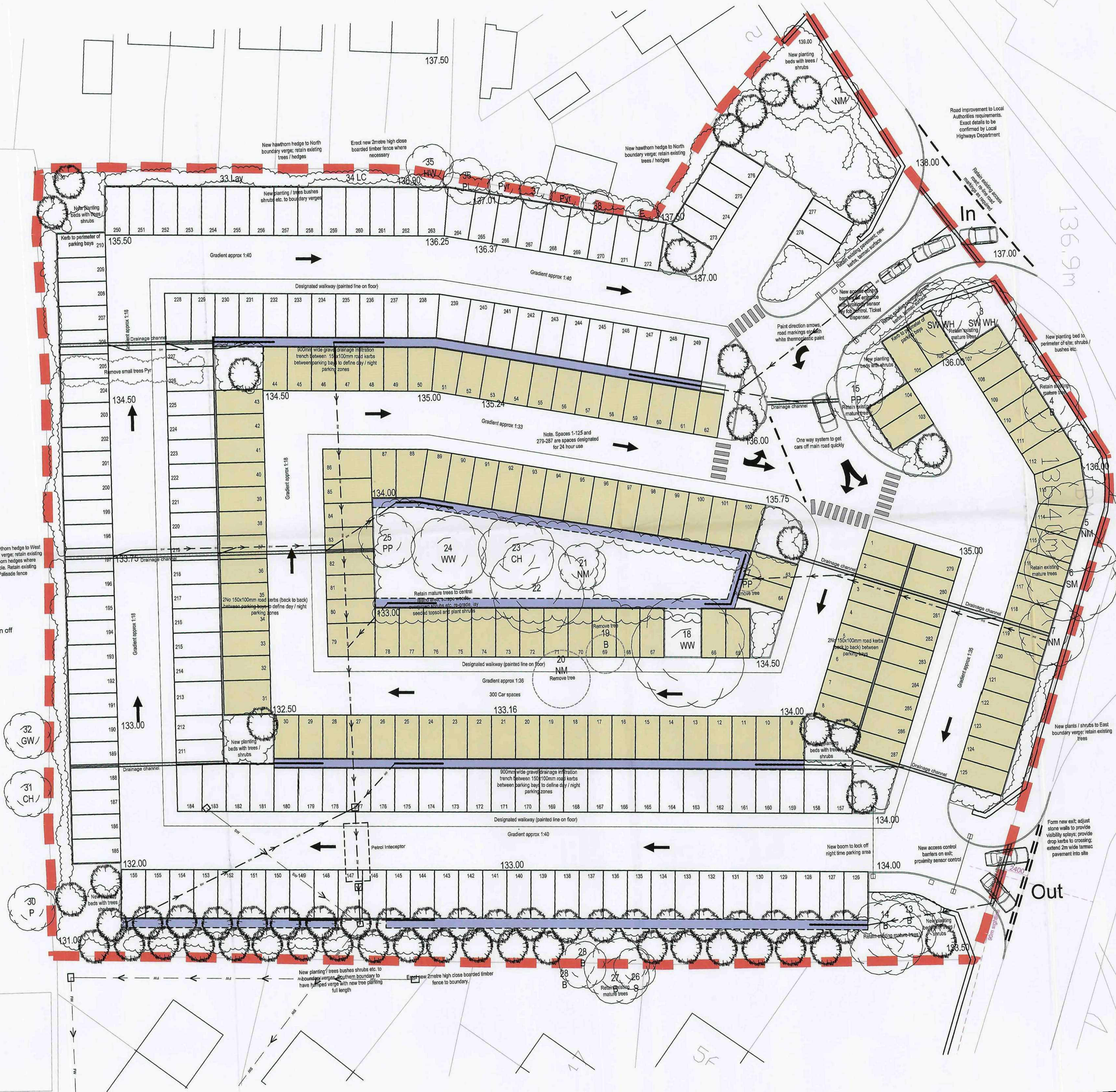
b&c
beaumont
& cowling
architects

15 collegiate crescent
sheffield
S10 2BA
t: 0114 266 3001
f: 0114 266 3002
w: www.beaumontandcowling.co.uk
e: sheffield@beaumontandcowling.co.uk

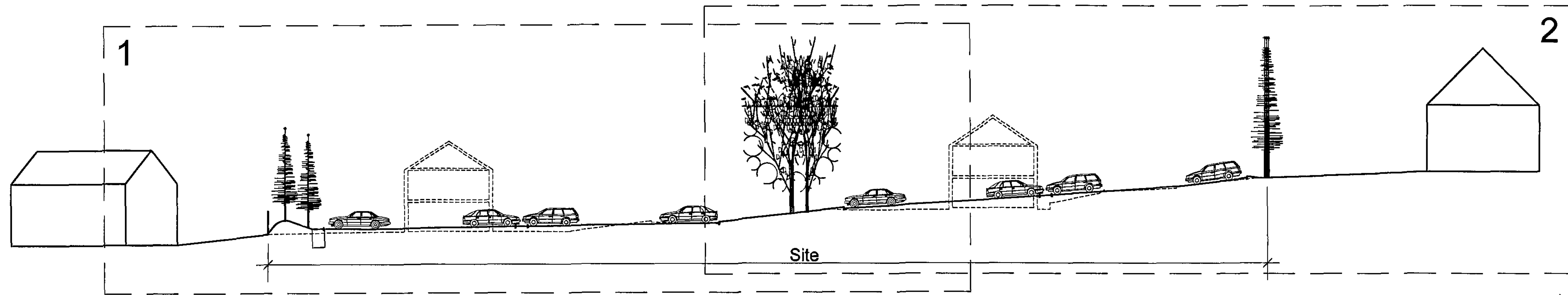
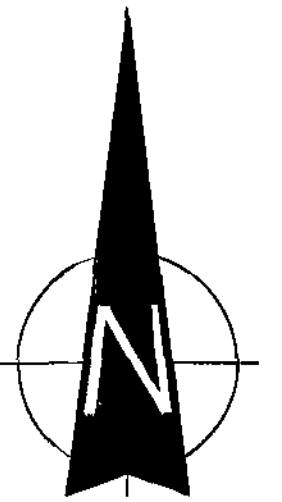
Date 25.04.08 No. 3133/3 Rev. B

Infiltration trenches
261 l/m of trench; 1.5m D x 0.9m W = 9 l/sec run off
assuming 20% discharge to SW sewer

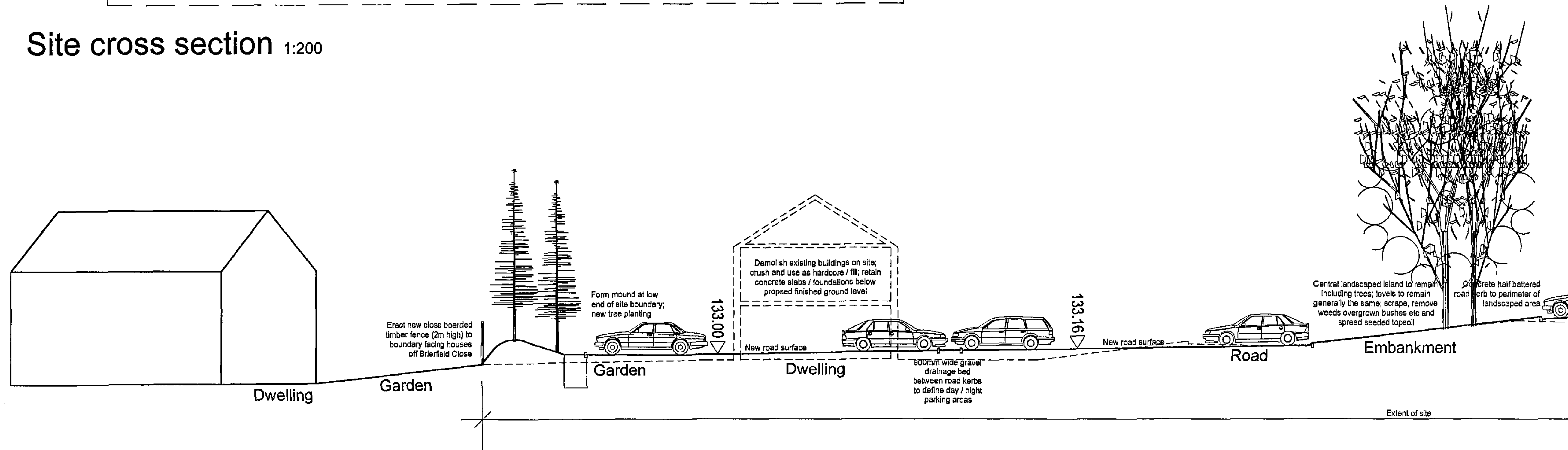
[] - Infiltration trench



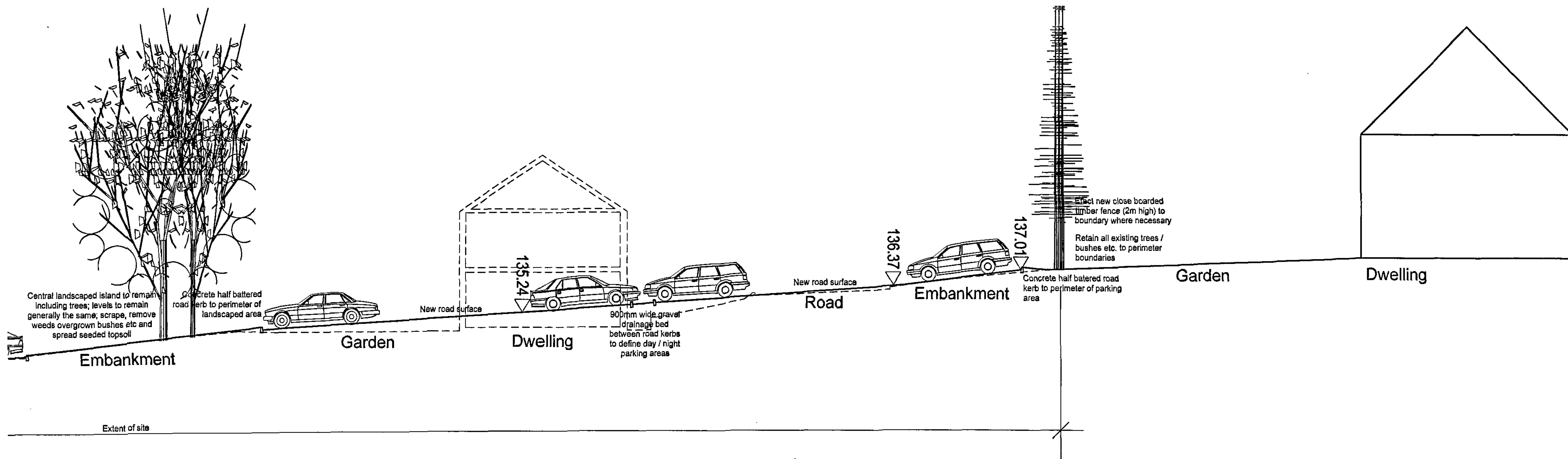
All dimensions in millimetres unless otherwise stated
The contractor must verify all dimensions on site before commencing on site
Architect must be notified of any suspected discrepancies or omissions
Any scaled dimensions to be confirmed by the Architect



Site cross section 1:200



Section 1 1:100



Section 2 1:100

Revisions
A-12.16.16 OR ADDITIONAL LANDSCAPING TO SOUTHERN BOUNDARY
B-12.16.16 TIMBER FENCE NOTE ALTERED AND GRAVEL DRAINAGE BED ADDED

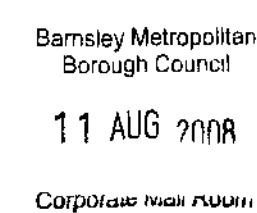
Barnsley Metropolitan
Borough Council
11 AUG 2019
Corporate main north

Barnsley NHS Trust
Land off Pogmore Road
Barnsley

Proposed car park
EXISTING & PROPOSED
COMBINED SITE SECTION

Scale 1:100 @A1

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Date 25.04.08 No. 3133/5 Rev. B



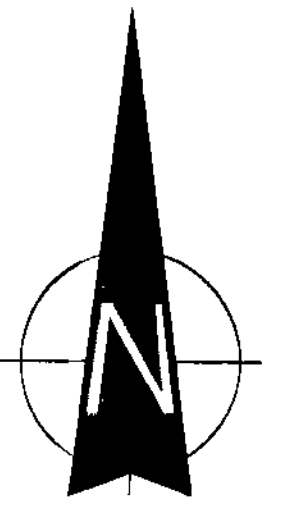
Proposed car park
EXISTING & PROPOSED
COMBINED SITE PLANS



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Date	No.	Rev.
25.04.08	3133/4	B

All dimensions in millimetres unless otherwise stated
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Any scaled dimensions to be confirmed by the Architect



Revisions
A-7.5.06 MODULAR BUILDING OMITTED

Barnsley Metropolitan
Borough Council
11 AUG 2008
Corporate main

Barnsley NHS Trust
Land off Pogmore Road
Barnsley

Proposed car park

EXISTING SITE PLAN

Scale 1:200 @A1

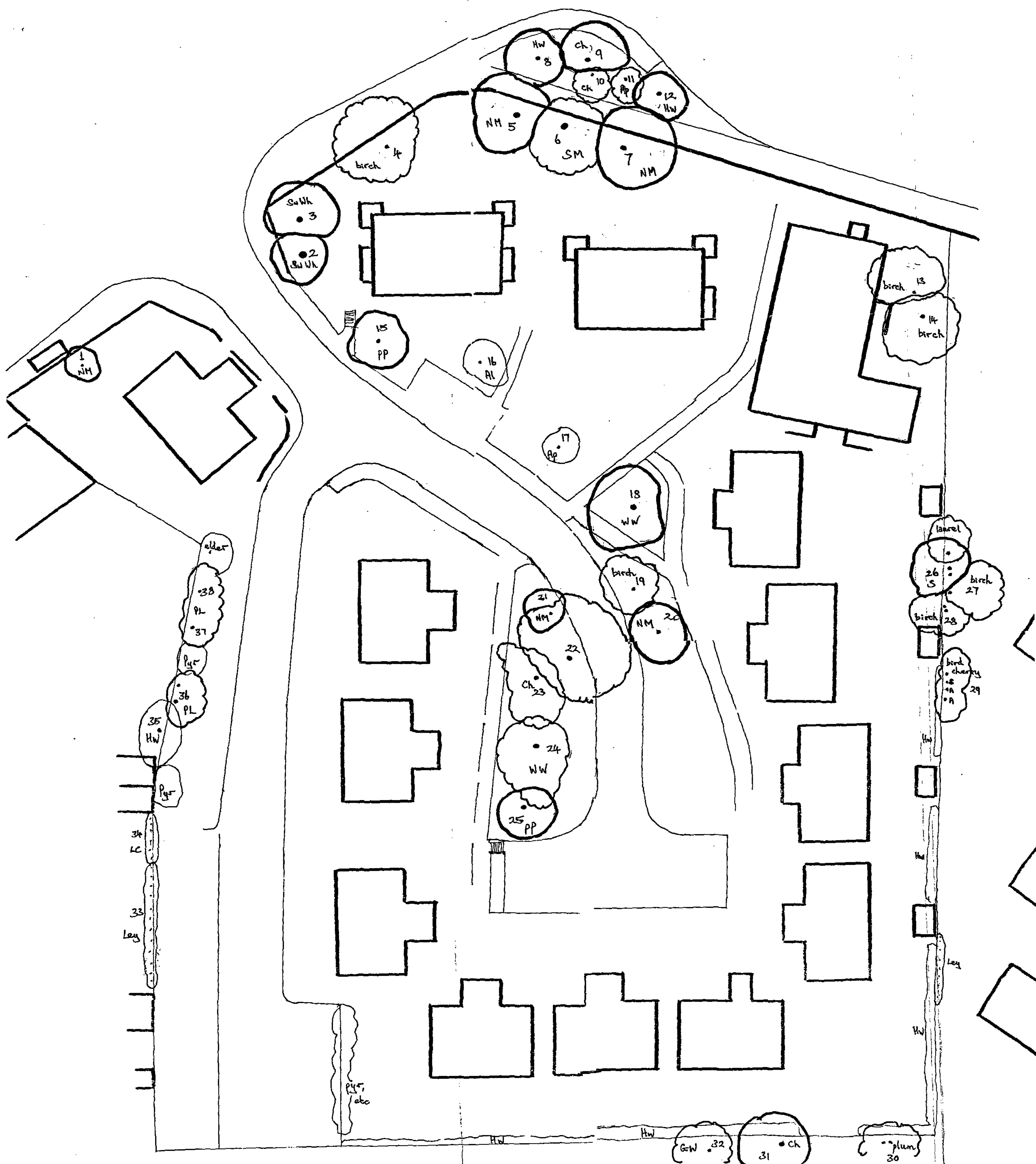


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Date	No.	Rev.
25.04.08	3133/2	A

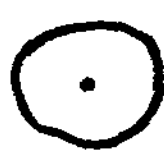
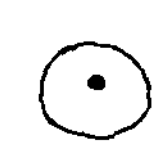


Helensborough Close Pogmoor, Barnsley

TREE SURVEY



- A ash
- Al almond
- Ap crab apple
- Ch cherry
- GW goat willow
- Hw hawthorn
- LC Leyland cypress
- Ley Leyland cypress
- NM Norway maple
- PL Portugal laurel
- PP purple plum
- Pyr Pyracantha
- S sycamore
- SM silver maple
- SwWl Swedish whitebeam
- WW weeping willow

-  Grade 1 and 2 trees
-  Grade 2-3 trees
-  Grade 3 trees

Scale 1:250

R Helliwell 18th April 2008

11 AUG 2008