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YOUR HOUSING GROUP LIMITED

LAND OFF LICKERS LANE, WHISTON

GROUND INVESTIGATION REPORT

AUGUST 2023

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GROUND INVESTIGATION REPORT

AUGUST 2023

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DRAWING NO.	TITLE	SCALE
GM11373-001	Site Location Plan	1:2,500 @ A3
GM11373-010	Ground Investigation Location Plan	1:2,500 @ A3

1 INTRODUCTION

1.1 Instruction and Background

1.1.1 Wardell Armstrong LLP (WA) were commissioned on 4 April 2023 via email from Keiron Moore of Your Housing Group Limited (YHG), hereafter referred to as the 'Client', to undertake a ground investigation (GI) to support the proposed residential development of the site.

1.1.2 The GI report follows an earlier GI undertaken by Brownfield Solutions Limited (BSL) in 2017 and drilling and grouting works undertaken by WA in 2022. The site comprises of two parcels of land, referred to as the Windy Arbour Road garden centre area and Lickers Lane area.

1.1.3 The Windy Arbor Road area (Area A) is located off Windy Arbor Road, Whiston, L35 3SG (National Grid Reference: SJ 46862 90286). The main Lickers Lane area (Area B) is located off Lickers Lane, Whiston, L35 3PW (National Grid Reference SJ 47131 90498). The locations of both Area A and B is shown on WA Drawing Number GM11373-010.

1.2 Proposed Development

1.2.1 It is understood that the proposed development will be for a residential end use. Whilst the final layout will be subject to final design an indictive layout is shown on Barton Willmore drawing entitled 'Testing Layout' (Drawing No.: MR-M-DWG-03-R Rev R) dated 10 November 2022, attached in Appendix A.

1.3 Scope and Objectives

1.3.1 The purpose of this GI report is to further identify any geotechnical and land contamination issues that will need to be considered following the BSL GI undertaken in 2017. The report provides information relating to the following:

- The environmental setting including geology, mining, hydrogeology and hydrology;
- The potential contamination sources, pathways and receptors through the production of a preliminary conceptual model; and
- A provisional assessment of the potential geotechnical and contamination issues that need to be taken into account for the proposed end use of the site.

1.3.2 This report does not consider broader development constraints such as services, land drainage, detailed flood risk, ecology, invasive weeds and archaeology.

1.4 Limitations

1.4.1 This report has been prepared for the exclusive benefit of the Client for the purpose of providing geo-environmental and geotechnical recommendations for the site. The report contents shall only be used in that context. Furthermore, new information, changes in practice or new legislation may necessitate revised interpretation of the report after the date of its production.

1.4.2 It should be noted that GI relies upon the determination of information from trial pits and boreholes and the interpretation of data between their locations. The actual conditions at and between investigation points can differ spatially and temporally. The assessments and recommendations given in this report are based upon the interpretation of the results from the GI at a specific point and time and therefore any conclusions drawn would need to be reviewed should significant time elapse following issue of this report.

1.4.3 It should be noted that the GI positions are based upon the indicative layout. During the detailed design and/or development works it should be considered by the developer whether further GI may be needed.

1.4.4 The GI was restricted in places due to the presence underground services, previous BSL GI locations, field boundaries and dense vegetation. Exploratory hole locations were positioned at locations to avoid these constraints and minimise disruption to the current land uses.

1.4.5 WA has carried out an appropriate level of checking third party supplied information; however, WA cannot be held liable for any inaccuracies, inconsistencies or omissions in such information (should there be any).

1.4.6 WA has used reasonable skill and care in the design of the site investigation work for the proposed development area to comply with currently available industry guidance and to meet the requirements of the commission.

2 BASELINE CONDITIONS

2.1 Summary of Previous Reports

2.1.1 A number of reports and investigations have been undertaken on site in previous years, there are listed below:

- BSL 'Desk Study Assessment Report' (reference: LC/C3593/7001) dated July 2017, contained in Appendix B;
- BSL 'Coal Mining Risk Assessment' (reference: LC/C3593/7004) dated July 2017, contained in Appendix B;
- BSL 'Geo-environmental Assessment Report' (reference: LC/C3593/7018) dated July 2017, contained in Appendix B; and
- WA 'Mine Workings and Mine Shaft Treatment Report' (reference: GM11373-RPT-002 V0.3) dated May 2023.

2.1.2 As the Geo-environmental Assessment Report was BSLs final report, a summary of the salient conclusions and recommendations is present below in Section 2.2.

2.2 Summary of BSL Geo-environmental Assessment Report

2.2.1 The BSL Geo-environmental Assessment Report concluded the following:

- Risk to human to health was considered to be moderate to low in Area A and can be mitigated through source removal or the implementation of a cover system in gardens and soft landscaping areas;
- No considered human health risk from contamination in Area B;
- No asbestos recorded on either site;
- Ground gas monitoring (incomplete at the time of writing) concluded basic ground gas precautionary measures for carbon dioxide are likely to be required within Area A however no elevated concentrations were identified within Area B;
- Area A foundations are likely to be shallow unreinforced strip foundations founding on natural clays or weathered bedrock between 1.20m and 1.50m. Further consideration is required where trees may be present;
- Likely that suspended floor slabs will be required in Area A due to ground gas precautionary measures being required;

- Treatment of mine workings required in Area B. Following treatment, it is likely that reinforced strip foundations will be a suitable foundation solution;
- Where shallow mining such as bell pits are identified, trench fill or vibro-improvement ground may be required (subject to additional investigations) and
- Soakaways are not considered feasible based on current data.

2.2.2 The BSL Geo-environmental Assessment Report recommended the following:

- Complete gas monitoring programme;
- Additional GI required in inaccessible areas in Area A;
- Mine working treatments;
- Demolition Asbestos survey;
- Tree survey by a qualified arboriculturist;
- Detailed Foundation design; and
- Confirmation of Remedial Strategy with Local Authority.

2.3 Summary of WA Mine Workings and Mine Shaft Treatment Report

2.3.1 The Mine Workings and Mine Shaft Treatment Report should be read in conjunction with this report, however a summary of the report's conclusions and recommendations are outlined below:

- Based on the work undertaken, it is considered that the historical mining situation within Areas A & B have been satisfactorily investigated and treated in accordance with accepted practices and guidelines.
- The location of two recorded mine shafts (347390-002 and 347390-004) has been proven by probe drilling and were subsequently stabilised by pressure grouting.
- A search for shaft 347390-005 was searched for but not located, although the search area was not completed due to the presence of overhead cables. It is recommended that the search for shaft 347390-005 is completed, under the supervision of an Engineer experienced in shaft location works, following the removal of the overhead cables. If found, then the shaft should be treated by drilling and pressure grouting to the same standard as the other shafts if considered necessary.

- The two recorded shafts (346390-026 and 346390-029) on Area A were not searched for due to being located within dense trees and vegetation and not located beneath the proposed housing development layout. However, shaft 346390-026 is potentially beneath the location of a proposed road. Should the road be constructed then this shaft should be searched for and if located within influencing distance of the road then it should be treated.
- Should the development proposals be revised at any stage in the future the recorded location of shafts 346390-026 and 346390-029 should be re-assessed, by an Engineer experienced in mining issues, against any development proposals, and if consider a potential risk they should be investigated further and potentially treated if considered necessary.
- An additional 18 unrecorded mine shaft/crown hole were proven by probe drilling. These were subsequently stabilised by pressure grouting, with 13 additionally stabilised using a grout plug.
- The shafts identified to be capped will need the capping to be undertaken prior to any development proceeding. The caps should be designed by a suitably qualified Structural Engineer experienced in the design of mine shaft caps to best practice standards.
- If the area beneath the overhead cables in the south of Area B is to contain housing development, then it is recommended that following removal of the cables drilling and grouting works should be undertaken at a future date beneath the proposed development.
- WA is satisfied that development Areas A & B can now proceed within the treated zones without further regard to the risk of future collapse or settlement of shallow abandoned mine workings within the seams investigated.
- If any future development on Areas A & B, outside the areas investigated and treated, are proposed then advice from an Engineer experienced in mining issues should be sought to establish the requirement for additional investigation of the potential shallow mining situation.
- Any future development should avoid construction of buildings on or within influencing distance of mine shafts.

- The potential for additional unrecorded shafts/crown holes to be present cannot be discounted and there is a need for a careful watching brief during any excavation works. If any anomalies or suspect features are encountered, then advice and guidance from a suitably qualified Engineer should be sought.
- Any future works to investigate and treat coal seams or shafts will require a Coal Authority Permit.
- Due to the shallow depth to rockhead, coal may be encountered in some excavation work. This work would require an Incidental Coal Agreement Licence for coal mining operations from the Coal Authority.

3 SCOPE OF WA GROUND INVESTIGATION WORKS

3.1 General

3.1.1 The GI was designed to investigate and further assess the ground conditions of the near surface soils following the 2017 BSL GI.

3.1.2 The GI locations were positioned taking into account the existing GI undertaken by BSL in order to provide sufficient coverage across the site. The WA GI consisted of the following:

- 8 No. windowless samples (WS) boreholes drilled under the full-time supervision of a WA Engineering Geologist between 18 and 19 April 2023 to a maximum depth of 4.00mbgl. They were drilled in order to:
  - Assist with the future foundation design of the site;
  - Obtain samples for laboratory geotechnical testing;
  - Allow for the installation of gas and groundwater monitoring wells;
  - Enable in-situ Standard Penetration Testing (SPT) to be carried out.

  The borehole logs are attached at Appendix C.

- 19 No. trial pits (TP) were excavated under the full-time supervision of a WA Engineering Geologist between the 18 and 20 April 2023 to a maximum depth of 4.20mbgl. They were excavated in order to:
  - Investigate the nature, distribution and thickness of the near-surface deposits;
  - Obtain samples for laboratory chemical testing.

  Selective trial pits were positioned in areas of known contamination and on the in-situ bunds located in the east of Area B.

  The trial pit logs are attached at Appendix C.

- 8 No. Light Cable percussive (LCP) boreholes drilled under the part-time supervision of a WA Engineering Geologist between 19 and 20 April 2023 to a maximum depth of 4.00mbgl. They were drilled in order to:
  - Assist with the future foundation design of the site;
  - Obtain samples for laboratory geotechnical testing;
  - Allow for the installation of gas and groundwater monitoring wells;
  - Enable in-situ SPT to be carried out.

The drillers logs are attached at Appendix D.

- Gas and groundwater monitoring installations were installed in all 8 WS No. boreholes in order to:
  - Investigate the presence or absence of ground gases;
  - Investigate, and assess the potential for the migration of gas to the site; and
  - Determine the depth of groundwater beneath the site.
- Laboratory chemical analysis was undertaken on selected samples of the natural superficial deposits collected from the WS boreholes across the site. The following suite of laboratory chemical testing was undertaken:
  - Heavy Metals;
  - Total Organic Carbon (TOC);
  - Soil Organic Matter (SOM);
  - Water Soluble Sulphate;
  - pH;
  - USEPA 16 Polycyclic Aromatic Hydrocarbons (PAH's);
  - Total Petroleum Hydrocarbons (TPH's) (TPH CWG);
  - Asbestos ID and Quantification.

  In total, 20 No. solid and 12 No. leachate tests were subject to analysis. A summary of the laboratory chemical testing is attached at Appendix E.
- Laboratory geotechnical testing was undertaken on selected samples of the made ground and natural superficial deposits taken from boreholes across the site. The following testing suite was undertaken:
  - 23 No. Natural moisture contents.
  - 21 No. Liquid limit, plastic limit and plasticity index;
  - 5 No. Particle size distribution (+ sedimentation);
  - 2 No. Undrained Shear Strength in Triaxial Compression

  A summary of the laboratory geotechnical testing is attached at Appendix F.
- Groundwater and gas monitoring of the borehole installations undertaken over a total of 6 visits. The gas monitoring data is attached at Appendix G

4 RESULTS OF PHASE II GROUND INVESTIGATION

4.1 Ground Conditions

4.1.1 The results of the GI have confirmed the geological setting of the site detailed within the BSL 2017 GI report with the general sequence of strata being topsoil and/or made ground overlying natural superficial deposits of clays and sands. A summary of the ground conditions encountered during the GI works are presented below. Engineer's logs of the trial pits and WS boreholes are contained within Appendix C, and the drillers logs for the CP boreholes are contained within Appendix D..

4.2 Made Ground

4.2.1 Made ground was recorded in Area A in in the following locations: WS01, WS03, TP12, TP15, TP16 and TP17 and in Area B within TP4 and TP5. The made ground is summarised in table 4.1 below:

Table 4.1: Summary of Made Ground Deposits Across The Site

Strata	Descriptions	Depth Range (mbgl)	Thickness Range (m)
Made Ground	Yellowish brown mottled CLAY; Dark grey sandy GRAVEL of brick and concrete; Soft dark black sandy fine to coarse subangular GRAVEL of coal; Dark brown clayey very gravelly fine to coarse SAND with frequent cobbles of angular brick Orange sandy gravelly angular brick COBBLES.	0.00 – >4.45	1.10 – >4.45

4.2.2 The made ground was generally free from visual or olfactory evidence of contamination.

4.3 Natural Superficial Deposits

4.3.1 Natural superficial deposits (NSD) were encountered in all of the WS locations (except WS1), LCP and TP locations across the site and proven to a maximum recorded depth of 4.20mbgl. A summary of the distribution of the NSDs is shown in Table 4.2.

Table 4.2: Summary of Natural Superficial Deposits Across The Site			
Strata	**Descriptions**	**Depth Range (mbgl)**	**Thickness Range (m)**
Topsoil	Dark brown sandy SILT with frequent rootlets. Sand is fine. Dark brown sandy SILT with frequent rootlets and occasional wood fragments. Sand is fine. Dark grey slightly gravelly sandy CLAY with occasional rootlets. Sand is fine. Gravel is fine subangular to subrounded of mudstone.	0.00 – 0.50	0.10 – 0.50
Clay	(Firm to stiff) reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine subrounded of mudstone. (Firm to stiff) brown sandy CLAY. Sand is very fine to coarse. (Firm) reddish brown mottled orangish brown sandy CLAY with frequent sand lenses. Sand is fine to coarse. (Stiff) brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to coarse subangular of mudstone and coal. (Stiff) greyish brown sandy slightly gravelly CLAY. Gravel is fine subangular of mudstone.	0.20 – 4.20	0.40 – 3.00
Sand	Orange clayey fine to coarse SAND. Brown clayey slightly gravelly fine to coarse SAND. Gravel is fine subrounded of siltstone. Yellowish brown clayey fine SAND with occasional coarse subangular siltstone gravel. Yellowish brown fine to coarse SAND. Light brown gravelly fine to medium SAND. Gravel is fine to medium subangular to subrounded of mudstone.	0.10 – 3.40	0.50 – 3.40
Silt	Dark brown fine sandy SILT.	0.20 – 0.50	0.30

4.4 Solid Geology

4.4.1 Rockhead was generally recorded as a weathered mudstone in all GI locations aside from TP4, TP5, TP9, TP10, TP17, TP18 and WS1. The weathered mudstone was encountered at depths between 3.00mbgl – 3.50mbgl in Area A and between 1.90mbgl – 3.60mbgl in Area B.

4.4.2 Coal was encountered within TP12 (Area A) and TP3, TP7, TP11 and TP13 (Area B). The coal was encountered at depths of between 1.50m – 3.70m, and thickness of 0.10m – 0.40m.

4.5 In-situ Geotechnical Testing

Standard Penetration Tests (SPTs)

4.5.1 SPT were undertaken across a variety of strata on site ranging in depths from 1.00 – 4.00m mbgl. A summary of the SPT results for each strata is summarised in Table 4.3.

Table 4.3: Summary of SPT Results

Strata	Average (N value)	Range	Inferred Average Strength Description (BS EN ISO 14688)
Area A			
Clay	17	17	Stiff
Made ground (cohesive)	11	4-12	Soft – Stiff
Area B			
Clay	15	6-45	Firm – Very Stiff
Sand	50	13-50	Medium Dense – Very Dense
Mudstone	50	47-50	Very Weak
Made Ground	10	4-12	Soft – Stiff

Hand Shear Vane

4.5.2 Hand shear vane testing was undertaken during the trial pitting to provide an indication of the likely undrained shear strength (c_u) of the NSDs. The results of the hand shear vane testing are detailed in Table 4.4:

Table 4.4: Summary of Hand Vane Results

Strata	Average (peak kPa)	Range	Inferred Average Strength Description (BS EN ISO 14688)
Area A			
Clay	59	47 – 81	Stiff
Area B			
Clay	63	47 – 135	Stiff – Very Stiff

4.6 Laboratory Geotechnical Testing

4.6.1 A summary of the laboratory geotechnical testing undertaken, along with the range and average test results are shown below. The laboratory geotechnical test results are contained in Appendix F.

Natural Moisture Content (NMC)

4.6.2 In total, 21 No. samples of the NSDs were scheduled for NMC. The NMC ranged from 7.6– 25% , the range per strata is shown in Table 4.5. Area A and Area B have an average NMC of 16% and 15% respectively.

Index Testing

4.6.3 In total, 20 No. samples of the NSDs were scheduled for index testing. A summary of the test results is shown in the Plasticity A-Line Chart (Figure 4.2) and the range of results is shown in Table 4.5.

Table 4.5: Summary of Plasticity Indices

Strata	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing .425mm (%)	Modified Plasticity Index (I'p)	Volume Change Potential
Area A							
Clay	14 – 20	33 – 49	15 – 24	18 – 25	98 – 100	17-25	Low to Medium*
Area B							
Clay	8.3 – 20	20 – 49	12 – 24	5 – 25	72 – 100	4.95-22	Low to Medium**
Silt	25	52	32	20	78	15.6	Low
Sand	7.6 – 16	19	0 – 12	0 – 7	95 – 100	0-8.46	Low

Notes:
* Medium volume change recorded in WS3 @ 2.50m.
** Medium volume change recorded in WS5 @ 1.70m and WS7 @ 2.00m.

4.6.4 On the basis of the geotechnical testing results, the clays can be described as being generally low to intermediate plasticity with one sample taken from WS05 at 0.70m recorded as high plasticity.

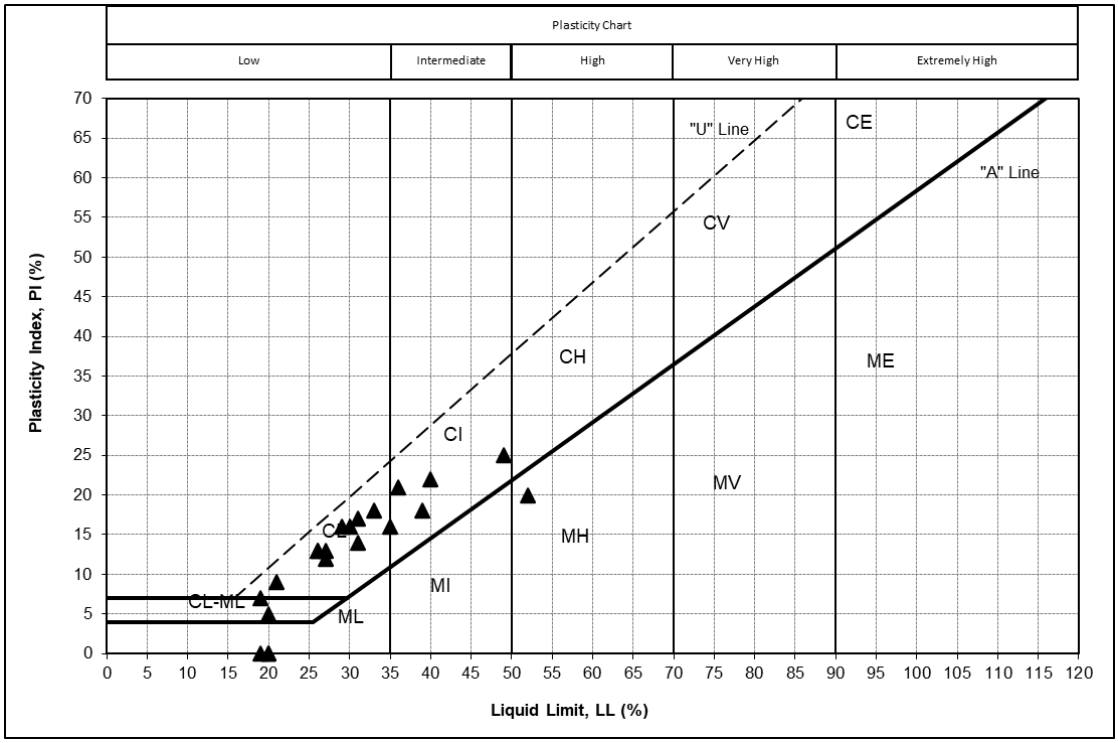


Figure 4.2: Plasticity A-Line Chart.

Undrained Shear Strength in Triaxial Compression

4.6.5 In total, 2 No. tests were undertaken which recorded shear strengths (c_u) of

- Area A: CP8: 2.00 – 2.45 = 47kPa
- Area B: CP1: 3.00 – 3.45 = 148kPa

Particle Size Distribution (PSD) and Sedimentation

4.6.6 In total, 5 No. samples of the NSDs were scheduled for PSD and sedimentation testing. A summary of the material classifications according to Table 6/2 of the Manual of Contract Documents For Highway Works Volume 1 Specification For Highway Works (SHW) is detailed below in Table 4.6. This shows that of the samples tested, all were classified as Class 2.

Table 4.6: Material Classification According to SHW

Investigation Location	Depth (mbgl)	Classification	Material type main constitute
CP1	1.00 – 1.45	2C	CLAY.
CP3	1.00 – 1.45	2A & 2B	CLAY.
CP4	2.00 – 2.45	2A & 2B	CLAY.
CP5	1.00 – 1.45	2A & 2B	CLAY
CP6	1.00 – 1.45	2A & 2B	CLAY.

4.7 Groundwater Monitoring

4.7.1 Groundwater was not recorded in any of WS or CP boreholes during the on-site GI works. However, it was encountered trial pits in TP16 (Area A) and in TP4, TP5, TP11 and TP13 (Area B). Summarised in table 4.7 below.

Table 4.7: Summary Groundwater Ingress		
Location (Area)	**Depth (m)**	**Ingress**
TP16 (Area A)	3.60	Fast flowing
TP4 (Area B)	1.40	Fast flowing
TP5 (Area B)	1.20	Fast flowing
TP11 (Area B)	1.40	Fast flowing
TP13 (Area B)	1.30	Fast flowing

4.7.2 The results of the groundwater monitoring are attached at Appendix G and summarised in Table 4.8.

Table 4.8: Summary of Groundwater Monitoring Data						
Investigation Location	**Monitoring Date**					
	27/04/23	**04/05/23**	**11/05/23**	**18/05/23**	**24/05/23**	**31/05/23**
WS01	2.36m	2.50m	2.41m	2.50m	2.50m	2.56m
WS02	Dry	Dry	Dry	Dry	Dry	Dry
WS03	Dry	Dry	Dry	Dry	Dry	Dry
WS04	Dry	Dry	Dry	Dry	Dry	Dry
WS05	2.36m	2.30m	2.15m	2.30m	2.34m	2.40m
WS06	Dry	Dry	Dry	Dry	Dry	Dry
WS07	1.40m	1.63m	1.61m	1.15m	1.23m	1.24m
WS08	Dry	Dry	Dry	Dry	Dry	Dry

4.8 Gas Monitoring

4.8.1 Following completion of the borehole drilling, a total of 6 No. gas monitoring visits have been undertaken on the site. The gas monitoring data is attached at Appendix G and summarised in Table 4.9.

Table 4.9: Summary of Gas Monitoring Summary			
Determined		**Minimum Gas by Volume (%)**	**Maximum Gas by Volume (%)**
CH4 (%)		0.00	0.00
CO2 (%)		0.00	12.60
O2 (%)		0.50	22.00
Flow Rate (l/h)	Peak	0.00	7.70
	Steady	0.00	0.00

5 GEOTECHNICAL ASSESSMENT

5.1 General

5.1.1 The GI work comprised the undertaking of TP, WS and LCP boreholes to investigate and further assess the ground conditions of the near surface soils following the 2017 BSL GI. The geotechnical testing was conducted to determine soil strength parameters to enable advice and recommendations to be made regarding the choice and design of foundation types to support residential dwellings.

5.1.2 A summary of the ground conditions encountered on site is detailed within Section 4 of this report.

5.2 Foundations

5.2.1 Various foundation options have been considered for the site. The most appropriate solution for the development will depend on the anticipated structural loadings and the tolerance of the proposed development to differential settlement. All foundations should be designed by a suitably qualified engineer to meet current design standards.

5.2.2 Based upon a review of the ground conditions proved in the investigation locations it is likely that the sites founding strata will vary for each area.

Area A

5.2.3 The near surface deposits consist of made ground ranging from 1.10 – > 4.45mbgl in depth. Due to the nature of made ground, the variations in depth, and how it can act variably under loading, it is likely this area will require deeper foundation solutions such as trench fill or piling. The type of foundation required will depend on the proposed finished levels and the outcome of an assessment of the potential influence of trees.

5.2.4 With the exception of the area around WS1, where made ground in excess of 4.45m was proven, deepened trench fill foundations are likely to be acceptable. Foundation greater than 2.50m will require a structural engineers design.

5.2.5 Due to the presence of shallow coal on site any foundation design will need to take into account its presence.

Area B

5.2.6 Across Area B firm to stiff clays and shallow rockhead were encountered in all of the site investigation locations and traditional shallow strip foundations are likely to be acceptable. The SPTs from across this part of the site record firm to stiff and dense deposits within the clays and sands at 1.00m depth. Based on the results of the SPT's and undrained shear strength tests an allowable bearing capacity of 100kPa can be utilised for design purposes, subject to detailed design.

5.2.7 Any foundations will need to consider the potential presence of solid strata (rock) at shallow depth. Dependant on proposed finished levels some excavation of rock may be required. In addition, some foundations may also straddle varying ground conditions, such as superficial deposits and solid strata. In such cases the foundations design should consider the potential for differential settlement and incorporation of reinforcing may be required.

Area A and B

5.2.8 Where coal seams are conjectured to subcrop beneath the superficial deposits there is potential that coal may be encountered within excavations for foundations. Foundation designs should consider the potential presence of coal.

5.2.9 Whilst treatment of shallow mine workings has been undertaken beneath the proposed development area foundations should be designed to consider their presence. Foundations should be designed tin accordance with guidance contained with The Construction Industry Research and Information Association (CIRIA) Publication C758D "Abandoned Mine Workings Manual" and NHBC/LABC Standards and guidance.

5.2.10 Across much of the site, beneath any made ground present, near surface NSDs comprise firm to very stiff strength clays and medium dense sands. In accordance with NHBC Standards Chapter 4.2 Building near trees, many of the soils on site are classified as shrinkable soils with a low volume change potential however samples taken from WS3 at 2.50mbgl (Area A), WS5 at 1.70mbgl and WS7 at 2.00mbgl (Area B) records a medium volume change potential. Where there are shrinkable soils present with a low volume change potential, there is potential for heave to occur, therefore the minimum underfloor void ventilation requirement should be increased by 50mm. In areas of medium volume change potential, the minimum underfloor void ventilation requirement should be increased by 100mm.

5.2.11 Although not part of this commission, should shallow foundations be installed over parts of the site, a further assessment will be required to determine the heave precaution requirements for individual properties in advance of construction by reference to the final site building layout, the NHBC standards and an appropriately detailed Arboricultural Survey.

5.3 Excavation and Dewatering

5.3.1 Throughout the GI, groundwater was not recorded in any of the borehole locations. However, it was encountered in several trial pits in TP16 (Area A) and in TP4, TP5, TP11 and TP13 (Area B). In addition, during the monitoring period, groundwater was recorded at depths between 1.15 (WS07) – 2.56mbgl (WS01) these results are summarised in table 4.7.

5.3.2 During construction excavations, based on the shallow groundwater in some areas, it is likely that dewatering or pumping may be required to control groundwater. Surface water will need to be controlled in accordance with a Construction Water Management Plan. The groundworks contractor should review the results of the GI and groundwater monitoring and design their temporary works accordingly.

5.3.3 The Trial pit except for TP11 remained stable throughout the excavations. During excavation of TP11 it is noted that there was “Spalling on northern face from 0.5m to 1.5m”. The requirements for stabilising any excavations should be reviewed by the groundworks contractor.

5.4 Road Pavement and Infrastructure

5.4.1 Across the site, topsoil and made ground lies directly onto the natural superficial deposits. The topsoil thickness at the site ranges from 0.10 to 0.50mbgl with an average thickness of 0.30mbgl.

5.4.2 Where present at formation level topsoil beneath road/hardstanding areas should be stripped and stockpiled in accordance with a Soil Handling Plan/Materials Management Plan prior to road construction, for retention and re-use on site within garden or landscape areas of the proposed residential development.

5.4.3 The proposed road pavement design should be informed following the completion of in-situ CBR tests and additional soil index tests once final development layout and levels are known.

5.5 Buildings and Infrastructure

5.5.1 Sulphates and acids within the ground can be destructive to concrete and result in expansion and/or softening. The laboratory chemical analysis along with the soil type and water levels have been used to assess the potential for chemical attack on buried concrete to be used in new structures on the site.

5.5.2 The current method in use to determine the correct classification of a Sulphate resistant concrete to control this risk of attack is detailed in the BRE Special Digest 1:2005 3rd Edition "Concrete in Aggressive Ground" document.

5.5.3 The rate of chemical attack depends upon the concentration of aggressive ions and their replenishment rate. The replenishment rate is dependent upon water levels and the permeability of the ground.

5.5.4 Water strikes recorded during the monitoring period suggest groundwater levels range from 1.15 – 2.56mbgl.

5.5.5 The sampling and testing of the soil have recorded the following:

- The soil pH level across the site ranges from pH 5.66 to pH 8.2 (average pH 6.97); and
- Water soluble sulphate levels across the site range from <0.01 g/l to 0.27 g/l (average 0.16 g/l).

5.5.6 Based upon the use of the methodology set out in BRE Special Digest 1:2005 3rd Edition "Concrete in Aggressive Ground", the Design Sulphate class for Area A and B is DS-1 and the Aggressive Chemical Environment for Concrete (ACEC) class is AC-1 for Area A and AC-2z for Area B.

5.6 Mine shaft and Mine working

5.6.1 The mine workings beneath the proposed planning layout have been investigated in accordance with accepted practices. Broken ground attributed to legacy coal mining was encountered across the site.

5.6.2 In summary, the works involved the drilling of 2533 boreholes which resulted in 79,516.50 metres of drilling and 1,433.97 tonnes of grout injected. The ground stabilisation works were completed in accordance with the WA Specification entitled 'Coal Workings Stabilisation Works at Lickers Lane, Whiston' and all reasonable steps have been taken to protect and stabilise the ground beneath the site.

5.6.3 The location of two recorded mine shafts (347390-002 and 347390-004) has been proven by probe drilling and were subsequently stabilised by pressure grouting. A third recorded shaft (347390-005) was searched for but not located, although the search area was not completed due to the presence of overhead cables.

5.6.4 It is recommended that the search for shaft 347390-005 is completed, under the supervision of an Engineer experienced in shaft location works, following the removal of the overhead cables. If found, then the shaft should be treated by drilling and pressure grouting to the same standard as the other shafts if considered necessary.

5.6.5 The two recorded shafts (346390-026 and 346390-029) on the Windy Arbor Road area were not searched for due to being located within dense trees and vegetation and not located beneath the proposed housing development layout. However, shaft 346390-026 is potentially beneath the location of a proposed road. Should the road be constructed then this shaft should be searched for and if located within influencing distance of the road then it should be treated.

5.6.6 Should the development proposals be revised at any stage in the future the recorded location of shafts 346390-026 and 346390-029 should be re-assessed, by an Engineer experienced in mining issues, against any development proposals, and if consider a potential risk they should be investigated further and potentially treated if considered necessary.

5.6.7 The location of a further 18 unrecorded mine shafts/crown holes has been proven by probe drilling. These were subsequently stabilised by pressure grouting, with 13 additionally stabilised using a grout plug.

5.6.8 The shafts identified will need the capping to be undertaken prior to any development proceeding. The caps should be designed by a suitably qualified Structural Engineer experienced in the design of mine shaft caps to best practice standards.

5.6.9 Based on the work undertaken, it is considered that the historical mining situation within the Windy Arbor Road and Lickers Lane areas have been satisfactorily investigated and treated in accordance with accepted practices and guidelines.

5.6.10 It is advised that the following precautions should be taken when undertaking development works:

- No building to constructed on recorded shafts.
- Buildings shall only be built within treated area. If any future development on the Site, outside the areas investigated and treated, are proposed then advice from an Engineer experienced in mining issues should be sought to establish the requirement for additional investigation of the potential shallow mining situation.
- If the area beneath the overhead cables is to contain housing development, then it is recommended that following removal of the cables drilling and grouting works should be undertaken at a future date beneath the proposed development.
- Remain vigilant for unrecorded shaft and should a unrecorded shaft be encountered then advice from an Engineer experienced in mining issues should be sought to establish the requirement for additional investigation of the potential shallow mining situation.
- The potential for additional unrecorded shafts/crown holes to be present cannot be discounted and there is a need for a careful watching brief during any excavation works. If any anomalies or suspect features are encountered, then advice and guidance from a suitably qualified Engineer should be sought.
- Any future works to investigate and treat coal seams or shafts will require a Coal Authority Permit
- Due to the shallow depth to rockhead, coal may be encountered in some excavation work. This work would require an Incidental Coal Agreement Licence for coal mining operations from the Coal Authority, which has a flat application fee and a fee per tonne of coal extracted.

5.6.11 This report should not be relied on for mining within the area and should be read in conjunction with the GM11373 Report 002 Mine Workings and Mine Shaft Treatment Report.

5.7 Drainage

5.7.1 Soakaways were not undertaken on this site due to nature of superficial deposits being mostly cohesive deposits. When planning drainage layout and conditions additional testing may be required. However, the superficial deposits comprised mainly clays, with solid strata underlying this at shallow depth. It is therefore considered that soakaways are unlikely to be viable on the site.

6 CONTAMINATION ASSESSMENT

6.1 Introduction

6.1.1 A primary purpose of the GI was to provide an assessment of the significance of any ground contamination that may be encountered during the development of the site.

6.1.2 In the UK, contaminated land is regulated by the planning and development control system and the contaminated land regime set out in Part 2A of the Environmental Protection Act (EPA) 1990.

6.1.3 When considering an application for development, land contamination is a material consideration, and the local planning authority should satisfy itself that any contamination is properly assessed and adequately remediated, based on a suitable for use approach.

6.1.4 Environment Agency guidance 'Land Contamination Risk Assessment (LCRM)' provides advice on the approach for the investigation and assessment of contamination on a site. This approach includes the production of a conceptual site model depicting the environmental processes that occur on and in the vicinity of the site and identifying the potential pollution linkages. The assessment of the significance of these pollution linkages can then be carried out through the risk assessment process.

6.2 Human Health

Initial Screening Criteria

6.2.1 Laboratory chemical analysis has been undertaken on samples of topsoil, natural superficial deposits, and made ground taken from across the site. The significance of the recorded concentrations has been determined through a comparison with published Generic Assessment Criteria (GACs).

6.2.2 GACs are derived based on generic conceptual site models for a number of land-uses and making generic assumptions about receptor type and behaviour and building and soil properties.

6.2.3 The land uses included under the GAC include residential development, with and without the consumption of homegrown vegetables, allotments, commercial and industrial, open space and parks and playing fields. The assessment for this development i.e. construction of residential units, will therefore be undertaken using the values for Residential with plant uptake.

6.2.4 There is no one source that publishes values for all contaminants and so the following sources have been used in the following order of preference. Results that are reported lower than the limit of detection have been discounted.

Category 4 Screening Levels (C4SL)

6.2.5 In March 2014, the Department for Environment, Food and Rural Affairs published six Category 4 Screening Levels within their report "Development of Category 2 Screening Levels for Assessment of Land Affected by Contamination". These GACs are generated using the CLEA model, although the toxicology and exposure parameters have been modified so that the values represent "a more pragmatic approach to contaminated land risk assessment (albeit still strongly precautionary)". DEFRA state that the Category 4 Screening Levels will be used as generic screening criteria.

Suitable For Use Levels (S4UL)

6.2.6 Land Quality Management (LQM) and Chartered Institute of Environmental Health (CIEH) have published Suitable for Use Levels (S4UL's) for 82 substances. These values, contained within the publications "LQM/CIEH S4Uls for Human Health Risk Assessment" (2015), replace the previous values contained within "Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition)" dated 2009, and reflect the greater knowledge of relevant toxicology and further consideration of exposure scenarios.

6.2.7 Separate S4UL values have been published for three soil organic matter (SOM) contents (i.e. 1%, 2.5% and 6%). The average SOM for the site is 4.2%, however due to its variable nature (ranging from 0.01% to 20.6%) a value of 1% has been chosen for the initial screen as it is the most conservative approach.

6.3 Laboratory Chemical Analysis Human Health Risk Assessment

Metals

6.3.1 There were no recorded GAC exceedances for metals within the 20No samples analysed in the WA investigation. Elevated arsenic and lead were recorded by BSL within the made ground in area A.

Asbestos

6.3.2 During the investigation, no Asbestos Containing Materials (ACMs) were observed on site. Asbestos identification analysis was undertaken on 10No. samples taken from across the site to see if any ACMs were present within the soils of the samples tested.

One sample taken from TP15 at 0.60mbgl within Area A at 0.60m contained chrysotile fibres that made up around <0.001% of the sample. The made ground at this location was described as containing material associated with demolished brick and concrete.

6.3.3 Due to the low concentration and the depth asbestos was recorded, the risk from asbestos is considered to be low. Notwithstanding the anticipated low risk from asbestos given the history of Area A and the fact that similar made ground is found elsewhere in this area the potential for asbestos to be present elsewhere cannot be discounted.

6.3.4 Should visible ACMs be encountered during either any enabling works or construction works, works should stop, then this material should be isolated, sampled and analysed for asbestos and the risk assessment for asbestos should be updated accordingly.

Polycyclic Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbons (TPH)

6.3.5 There were no recorded exceedances of PAHs or TPHs within the 20 No samples analysed in the WA investigation. Elevated PAH and TPH were recorded with the made ground the made ground at locations by BSL with area A.

Risk Mitigation

6.3.6 The results of the GI have proven low concentrations of contaminants across the site within solid samples.

6.3.7 Where elevated concentrations of contaminants are recorded the are restricted to isolated location in made ground deposits in Area A rather than being reflective of the made ground conditions across the site. On this basis, it appears unlikely that sufficient volumes of contaminants are present beneath the site to represent a significant redevelopment constraint, although it would not be considered best practice for the made ground to remain exposed within garden and landscaped areas.

6.3.8 During redevelopment works, it is recommended that a material discovery strategy is employed and should any material that is visually or olfactory different from that encountered elsewhere be encountered, it should be sampled, and additional risk assessment should be undertaken.

6.3.9 For the protection of human health, it is recommended that no made ground remains within the upper 600m with private gardens or 300m within landscaped areas.

6.4 Plant and Vegetation Risk Assessment

6.4.1 The proposed end use is residential with public landscaping, and we assume this will include trees, gardens and greenspace. Given the relatively low concentrations of contaminants, the potential that plant growth will be inhibited as a direct consequence of contaminants present is considered low although there are areas of significant thickness of made ground in Area A. Detailed consideration should be made as part of any future landscape detailed design of the suitability of the made ground conditions.

6.5 Summary

6.5.1 Whilst the full assessment of the suitability of the various materials will need to be considered as part of the future detailed design, the results of this preliminary assessment indicate:

- Natural topsoil is likely to be suitable for re-use
- NSDs are likely to be suitable for re-use; and
- Made ground may not be suitable for use within the upper 600mm in private garden and 300mm with landscaped areas, although testing suggests it would be suitable to remain beneath hardstanding or a suitably designed cover layer.

6.6 Controlled Waters Risk Assessment

6.6.1 The superficial deposits on site are designated by the Environment Agency as a Secondary Undifferentiated Aquifer. This classification is assigned where it is not possible to attribute either category A or B to a strata type. Generally, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the strata type.

6.6.2 The underlying solid strata are classified as a Secondary A Aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

6.6.3 In order to assess the potential risk to controlled waters, leachability analysis was undertaken on 12 No. soil samples taken from across the site. As an initial screen of the significance of the recorded concentrations, the results of this testing have been compared to Environmental Quality Standards (EQS) derived from The River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2015. As there are no potable water abstractions with 500m or surface water abstractions within 1km of the site, the

contaminants have not been screened against the UK Drinking Water Standards (DWS). It should be noted that the direct comparison of the leachate concentrations with these water quality values is considered conservative, since in reality there will be attenuation of contaminants within the saturated and unsaturated zones before they reach the sensitive receptors.

6.6.4 It should be noted that in some instances, the laboratory limit of detection is greater than the appropriate EQS value. In these instances, only measured concentrations in excess of the laboratory limit of detection have been considered likely to potentially present a possible significant risk to controlled waters.

6.6.5 The majority of the leachate contaminants were recorded to be lower than the respective EQS screening values however, exceedances of copper, lead, nickel and zinc have been reported in excess of the EQS. A summary of exceedances is detailed in Table 6.1.

Table 6.1: Summary of Exceedances in Leachate Testing

Contaminant	Max Concentration (ug/l)	EQS (ug/l)	EQS Source	Number of Exceedances	Locations
Copper	48	1	WFD Freshwater AA	10	Area A: TP12 @ 0.10, TP12 @ 3.60, TP15 @ 0.60, TP17 @ 1.80, TP18 @ 0.80 Area B: TP3 @ 0.10, TP8 @ 0.50, TP10 @ 0.10, TP11 @ 1.00, TP14 @ 0.50
Lead	54	14	WFD Freshwater AA	9	Area A: TP12 @ 0.10, TP12 @ 3.80, TP15 @ 0.60, TP17 @ 1.80 Area B: TP3 @ 0.10, TP8 @ 0.50, TP10 @ 0.10, TP11 @ 1.00, TP14 @ 0.50
Nickel	15	4	WFD Freshwater AA	3	Area B: TP8 @ 0.50, TP11 @ 1.00, TP14 @ 0.50
Zinc	161	13.8	WFD Freshwater AA	6	Area A: TP15 @ 0.60 Area B: TP3 @ 0.10, TP8 @ 0.50, TP10 @ 0.10, TP11 @ 1.00, TP14 @ 0.50

6.6.6 Where exceedances occur, the above table shows that copper, nickel, chromium, lead and zinc are relatively minor in quantity and are not restricted to a particular material type or area of the site.

6.6.7 Generally, the majority of leachate concentrations are in accordance with the annual average EQS standards and, where there are leachate exceedances, the solid analysis has proved the reservoir of contaminants within the soils to be low. Given the significant thickness' of low permeability clay beneath the site the overall risk to controlled waters is considered low.

6.6.8 The exceedances in testing are reported to be in excess of their respective EQSs. Furthermore, as these testing results are obtained using a leachate test which is considered conservative when compared to real-world conditions, once natural attenuation and dilution within the saturated and unsaturated zone is considered, it is concluded that these marginal exceedances will not present a future risk to the controlled waters environment.

6.6.9 Whilst further consideration should be made as part of the detailed design and regulatory agreements for the development, the main area of focus for the protection of controlled waters is likely to be environmental best practice during construction works (e.g. control of run off, stockpiling etc.).

6.7 Preliminary Ground Gas Risk Assessment

Source and Pathway Assessment

6.7.1 The primary potential gas source beneath the site has been identified as arisings from organic materials with the made ground, organic materials in natural superficial deposits, and any mine gas being produced within the shallow mineworking beneath the site.

6.7.2 Whilst the made ground and natural superficial deposits are generally free from significant volumes of organic type materials (e.g. Peat, Timber etc) laboratory testing did record organic concentrations in isolated samples with a maximum concentration of 20.6% SOM in the made ground and 16% SOM in the superficial deposits. It should, however, be noted that the SOM in the superficial was generally very low. Consequently, the decomposition of organic materials with the made ground and superficial deposits was proven to be a viable source of ground gas.

6.7.3 As part of the 2022 mineworking and shaft treatment works, the site was proven to be underlain by open historic coal workings. All reasonable steps have been made to

treat, through pressure grouting, the working and shafts beneath the development footprint, however open working may remain outside of these areas. The main gases of concern from old coal mine are methane, carbon monoxide and oxygen deprived air. Consequently, the mine working is considered potential sources of ground gas beneath site.

6.7.4 In order for these sources of gas to represent a risk to the end user of the site they would need to migrate to the properties and accumulate in sufficient concentration in confined spaces. The pathway assessment is determined by a number of factors, including the nature of the soils beneath the site and the potential presence of preferential pathways.

6.7.5 The superficial deposits beneath the site predominately include a significant thickness of soils with a lower permeability (e.g. clayey soils). The exemption is in the eastern area where the superficial geology changes to be more sandy in nature. The migration of gas being generated within the superficial deposits and or made ground is likely to be constrained by the presence of low permeability deposits.

6.7.6 CLAIRE within their report "Good practices for risk assessment for coal mine gas emissions" (date 2021). Identifies emissions of mine as being associated with:

- A point source emission from specific abandoned mine entry.
- A localised emission where gas has escaped from a specific entry and migrated along shallow permeable migration pathways; or
- A extended area of emission where gas is migrating to the surface through permeable ground overlying an extensive area of shallow gassy mineworking.

6.7.7 Taking each of these in turn, firstly all reasonable steps have been taken to locate and treat recorded and unrecorded mine entries. The development layout takes into account the locations of mine entries and properties have been located away from entries. The areas of potential shallow mining are underlain by varying thickness of clay deposits. Where more permeable material was encountered they were not found to be continuous and consequently there does not appear to be any obvious shallow migration pathways either related to mine entries or a wider area of emission from shallow workings, consequently the mining treatment work that have been undertaken and the natural superficial deposits will act as a mitigation factor in the pathway associated with mine gas.

6.7.8 Further consideration will need to be made once the final foundation solution is known, particularly if they penetrate the clay deposits.

Gas Monitoring

6.7.9 Given that potential sources of ground gas are present beneath the site, the ground investigation included the monitoring of ground gas within the near surface deposits. Whilst response zones did not extent into the mine workings some boreholes did extend to rockhead and therefore would intercept any gases migrating upward through the rock.

6.7.10 In order to assess the potential risk posed by the recorded gas concentrations of the site as an initial screen the methodology presented in CIRIA C665 "Assessing risk posed by hazardous ground gases to buildings 2007" has been used.

6.7.11 In assessing the risk, a Gas Screening Value (GSV) (litres of gas per hour) has been calculated using the formula:

Borehole flow rate (l/hr) x gas concentration (%) = GSV (l/hr)

6.7.12 No methane, carbon monoxide or hydrogen sulphate was recorded in any position on any occasion. Carbon dioxide was recorded in varying concentrations and consequently has been used within this risk assessment.

6.7.13 Elevated flows were restricted to a single peak flow in WS6 (7.7 l/hr) and WS7 (0.31 l/hr) on a single occasion, with the flow quickly reducing to a steady state of 0.1 l/hr. All other peak concentrations and every steady state reading made were 0.1 l/hr. There was no change in atmosphere pressure or ground conditions that would explain this anomalous peak reading consequently, while this reading shouldn't be ignored it is not considered representative of the gassing regime beneath the site and therefore not a good indicator of risk.

6.7.14 If the GSV is calculated for the maximum recorded concentration of CO_2 and assuming the instrument limit for detection for flow of 0.1 l/hr (i.e. the reading for all steady state reading) a result below is obtained:

Carbon Dioxide GSV = 12.60%/100% x 0.1l/hr = 0.013 l/hr

6.7.15 Using the guidance within CIRIA C665 ""Assessing risk posed by hazardous ground gases to buildings 2007" this would result in the site being classified as CS1 "very low risk" using the modified Wilson and Cord or "green" using the NHBC traffic light system classification. Under this classification no special protection measures are required

within the houses. However, given the recorded concentration of carbon dioxide, the presence of viable sources, the anomalous gas flow reading and the more sensitive nature of the final development it is recommended that the site is classified as CS2 or Amber 1, where basic gas protection measures are required. These are likely to include a ventilated sub floor void, as well constructed and installed gas resistant membrane and the sealing of the service ducts. However, this will be subject to detailed foundation design.

6.7.16 Further consideration of the gassing risks and appropriate protection measure should be made as part of the detailed foundation design. This is especially true in Area A where deeper foundation solution area recommended.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Geotechnical Assessment

Foundations

7.1.1 Based upon a review of the ground conditions proved in the GI locations it is likely that the sites founding strata will vary for each area:

Area A:

7.1.2 Due to the significant thicknesses of made ground and how it can act variably under loading, it is likely this area would require deeper foundation solutions such as trench fill or piling.

Area B:

7.1.3 This part of the site records firm to stiff and dense deposits within the sand and clay at c. 1.00m depth beneath existing site levels. Due to this it is likely that traditional shallow foundations would be suitable, subject to detailed design.

Areas A and B

7.1.4 Foundation designs should consider the potential for coal to be encountered at formation level.

7.1.5 Foundations should be designed to consider the presence of the treated shallow mine workings. Foundations should be designed in accordance with guidance contained with The Construction Industry Research and Information Association (CIRIA) Publication C758D" Abandoned Mine Workings Manual" and NHBC/LABC Standards and guidance.

Heave Precautions

7.1.6 In accordance with NHBC Standards Chapter 4.2 Building near trees, many of the soils on site are classified as shrinkable soils with a low to medium volume change potential. Where there are shrinkable soils are present there is potential for heave to occur, therefore the minimum underfloor void ventilation requirement should be increased by in accordance with the NHBC Standards.

7.1.7 Further assessment will be required to determine the heave precaution requirements for individual properties in advance of construction by reference to the final site building layout, the NHBC standards and an appropriately detailed Arboricultural Survey.

Roads

7.1.8 The proposed road pavement design should be informed following the completion of in-situ CBR tests and additional soil index tests once final development layout and levels are known.

Infrastructure

7.1.9 Based upon the use of the methodology set out in BRE Special Digest 1:2005 3rd Edition "Concrete in Aggressive Ground", the DS class for Area A and B is DS-1 and the AC class is AC-1 for Area A and AC-2z for Area B.

Stability

7.1.10 The GI shows that excavations should easily be achievable using conventional hydraulic excavation techniques. The pits remained stable during the investigation.

Groundwater

7.1.11 Based upon the conditions observed during the GI works and subsequent groundwater monitoring, groundwater is considered to be a constraint during the construction works. Also, localised perched water may be intersected and if necessary appropriate remedial measures taken such as using trench support or benching of excavations should be considered.

Mine workings / mine shafts

7.1.12 Should the development proposals be revised at any stage in the future the recorded location of shafts 346390-026 and 346390-029 should be re-assessed, by an Engineer experienced in mining issues, against any development proposals, and if consider a potential risk they should be investigated further and potentially treated if considered necessary.

7.1.13 It is recommended that the search for shaft 347390-005 is completed, under the supervision of an Engineer experienced in shaft location works, following the removal of the overhead cables. If found, then the shaft should be treated by drilling, pressure grouting and capping to the same standard as the other shafts if considered necessary.

7.1.14 No buildings to be constructed on or within influencing distance of mine shafts.

7.1.15 Buildings shall only be built within treated areas. If any future development on the Site, outside the areas already investigated and treated, are proposed then advice from an Engineer experienced in mining issues should be sought to establish the requirement for additional investigation and remediation of the potential shallow mining situation.

7.1.16 If the area beneath the overhead cables is to contain housing development, then it is recommended that following removal of the cables, drilling and grouting works should be undertaken at a future date beneath the proposed development.

7.1.17 The potential for additional unrecorded shafts/crown holes to be present cannot be discounted and there is a need for a careful watching brief during any excavation works. If any anomalies or suspect features are encountered, then advice and guidance from a suitably qualified Engineer should be sought.

7.1.18 Any future works to investigate and treat coal seams or shafts will require a Coal Authority Permit

7.1.19 Due to the shallow depth to rockhead, coal may be encountered in some excavations. This work would require an Incidental Coal Agreement Licence for coal mining operations from the Coal Authority, which has a flat application fee and a fee per tonne of coal extracted.

7.2 Contamination Assessment

7.2.1 The results of the ground investigation and risk assessment suggest that the overall risk associated with soil contamination is low.

7.2.2 Made ground was generally limited at the site to Area A and whilst generally free from significant contamination, exceedances of heavy metals, above the health based GAC, were recorded. Given the variable nature of the made ground and sensitivity of a residential end use, it is concluded that, whilst the made ground can remain on site, it would be prudent for it remain below a suitably designed cover system, within garden and landscaped areas, and/or hardstanding.

7.2.3 Of the 10 No. samples tested across the site for asbestos, one sample was shown to contain asbestos. This asbestos was recorded in the made ground and providing it remains below a cover system/ hardstanding the risk to end users will be mitigated. Any contractor who is moving/handling the made ground should be aware for the potential for ACMS on site.

7.2.4 Should suspect material (i.e. material showing unusual olfactory evidence of contamination or be different from that characterised within this investigation) be encountered during the construction works then this material should be isolated, investigated to further risk assessment undertaken.

7.2.5 Marginal exceedances of lead, nickel, copper and zinc were reported in the leachate analysis for Water Framework Directive (WFD) Freshwater Annual Average (AA). However, it is concluded that once natural attenuation and dilution within groundwater, and in some areas impermeable clay layer between the ground surface and rockhead are considered, the marginal exceedances will not represent a future risk to controlled waters. However, it is likely that as part of the proposed development, surface water will be collected and discharged off site and not allowed to pass through near surface soils, consequently reducing water infiltrating through the soil and production of leachate and further lowering the risk to controlled waters.

7.2.6 The gas monitoring results which have taken place over a 6-week period indicate the site to be of low risk. However, given the recorded concentration of carbon dioxide, the presence of viable gas sources and the anomalous gas flow readings, it is recommended that the site is classified as a CS2/ Amber 1 and the foundation includes basic gas protection measures.

7.3 Reuse Of Site Won Material And Material Management Plan.

7.3.1 It is expected that the site enabling/construction works will include the stripping of surface topsoil materials and the regrading of some made ground. Testing has proven the suitability of the made ground to remain on site beneath cover system (600mm in garden and 300mm in landscaped areas). Consequently, it is recommended that construction works make provision for the sustainable re-use of these materials under the appropriate licensing controls. It is anticipated that these works, together with import of topsoil/subsoil material if required, would be undertaken in accordance with CLAIRES'S Definition of Waste Code of Practice and controlled under material management plan.

7.4 Additional Comments

7.4.1 There may be matters relating to the site that have not been identified by the researches or the intrusive investigation work carried out to date, which might affect the future development of the site. Regardless of this, if any such matters do come to light, then they will need to be investigated and dealt with by seeking appropriate professional advice.

7.5 Recommendations

7.5.1 It is recommended that when the development proposals (layout and final ground levels) are finalised, consideration is made to the requirement for additional targeted investigations to confirm the most appropriate foundation type(s).

APPENDICES

Appendix A

Barton Willmore Drawing 'Testing Layout' (Drawing No.: MR-M-DWG-03-R Rev R)

The scaling of this drawing cannot be assured

Revision	Date	Drn	Ckd
-	-	-	-

N

0 20 40 60 80 100m

NOTE:

LAYOUT SUBJECT TO FURTHER ALTERATION SHOULD CONSTRAINTS BE REVEALED BY ON GOING TECHNICAL STUDIES

SKETCH DESIGN

Project
Halsnead Garden Village

Drawing Title
Testing Layout

Date	Scale	Drawn by	Check by
10/11/22	1:2000 @A2	SM	SW

Project No	Drawing No	Revision
32322	MR-M-DWG-03-R	R

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J:\33000\33678 - Halsnead Park RM App\A4 - Drawings & Registers\Masterplanning\CAD\33678-MR-M-DWG-03T-Feasability Layout.dwg - A2(1.2000)

Appendix B

Brownfield Solutions Limited Reports

BROWNFIELD SOLUTIONS LTD

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

STEWART MILNE HOMES

Halsnead Park, Whiston

Coal Mining Risk Assessment

LC/C3593/7004

July 2017

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173-183 Witton Street
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PROJECT QUALITY CONTROL DATA SHEET

Site Name:	Halsnead Park, Whiston		
Report Title:	Coal Mining Risk Assessment		
Report No:	LC/C3593		
Status:	Final		
Date:	7th July 2017		
Revision:			

Client: Stewart Milne Homes	**Engineer:**
Harrier House 2 Lumsdale Road Cobra Business Park Trafford Park Manchester M32 0UT	
Contact: Mr Steve Daniel	Contact:

Written by:	Checked by:	Approved by:
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DRAWINGS

Drawing Number	Rev	Title
C3593/01	-	Site Location Plan
C3593/03	-	Geology Extract
C3593/05	-	Postulated Coal Seams and Shaft Plan

APPENDICES

APPENDIX A **Coal Authority Report**
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**COAL MINING RISK ASSESSMENT
FOR A SITE AT HALSNEAD PARK,
WHISTON**

1.0 INTRODUCTION

1.1 Objectives

1.1.1 Brownfield Solutions Limited have been commissioned by Stewart Milne Homes to undertake a Coal Mining Risk Assessment to assess the land stability of the subject site due to coal mining.

1.2 Site Details

1.2.1 The site is centred on National Grid Reference 347218, 390362 as shown on the Site Location Plan C3593/01.

1.3 Proposed Development

1.3.1 The proposed development is for residential end use forming part of a new large scale garden village development.

1.4 Scope

1.4.1 The purpose of the Coal Mining Risk Assessment is as follows:

- Review of all available information on the coal mining issues which are relevant to the application site;
- Identify and assess the risks to the proposed development from coal mining, including the cumulative impact of issues;
- Recommend mitigation measures to address the coal mining issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development;
- Demonstrate to the Local Planning Authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land.

2.0 THE SITE

2.1 Location & Access

2.1.1 The site covers an area of approximately 11.5 hectares and is situated approximately 12.6 kilometres east of Liverpool City Centre.

2.1.2 The site is centred on National Grid Reference 347218, 390362 as shown on the Site Location Plan C3593/01.

2.1.3 Access to the site is gained off Windy Arbour Road to the west and Lickers Lane to the north.

2.2 Site Description

2.2.1 The site is split into two separate parcels of land Area A and Area B. Area A is located in the west with Area B occupying the east of the site. The two area are not connected and are separated by a road known as Main Drive and two private residential properties and associated out buildings. The areas are described separately below.

Area A

2.2.2 The smaller parcel known as Area A is accessed via a set of Palisade gates off Windy Arbour Road to the west. This area is a former garden centre and is irregular in shape with the west of the site generally higher than the east.

2.2.3 Area A is largely overgrown and access to areas of the site was difficult due to the dense vegetation. A tarmac car park is present at the site entrance to the west with a derelict bungalow present in the south western corner of the site.

2.2.4 A larger steel framed warehouse with steel cladding and with a possible asbestos cement roof is present behind the bungalow.

2.2.5 Across the western area evidence of fly tipping was noted although this was noted as being household waste with no evidence of potential contaminants present.

2.2.6 The car park area is at a higher elevation than the remainder of the site and the neighbouring properties to the south. A small retaining wall is present in the east of the car park with a concrete ramp present to gain access to the rest of the former garden centre. Across the remainder of the site several hardstanding terraces constructed from breeze block and concrete are present with numerous areas of flags and gravel consistent with greenhouse bases present.

2.2.7 The south east of Area A extends out in a semi-circular shape and was heavily wooded with mature trees.

2.2.8 The site boundaries of Area A were defined by a mixture of steel palisade fencing, concrete panel fencing and sandstone walls.

Area B

2.2.9 The larger parcel of land known as Area B is made up of a large cropped field accessed from Lickers Lane to the north. A wooded area approximately 50m wide and 190m long is present running along the majority of the northern boundary of site.

2.2.10 The east of Area B is a smaller field which extends beyond the main field to the site. This area is partially open with sporadic vegetation present in the north becoming denser in the south. Two bunds are present with evidence of dirt biking and off road driving taking place.

2.2.11 Area B is bordered by fields to the east and south with a metal wire fencing marking the boundary in the south. Residential properties bound the site in the north western corner with Lickers Lane marking the remaining northern edge of Area B. To the west the site is also bordered by fields.

2.2.12 Pertinent site features can be found on the Site Location Plan Drawing Ref C3593/02.

3.0 GEOLOGICAL SETTING

3.1 Sources of Information

3.1.1 The following sources of information have been obtained to undertake the Assessment:

- Coal Authority Non-Residential Coal and Brine Report
- Interactive Coal Authority Map
- Geological Survey 1:50,000 Scale Geological Sheet 97, Runcorn-Solid and Drift Editions.
- 1:2,500 Scale Historical Maps
- 1:10,000 Scale Historical Maps
- Mine Abandonment Plans
- An Historical, Geological and descriptive view of the coal trade of the north of England", Matthius Dunn, 1844

3.2 Geology

Superficial Deposits

3.2.1 The site is indicated to be underlain by superficial deposits of glacial till. This strata typically comprises a sandy gravelly clay.

Solid Geology

3.2.2 The deeper solid geology beneath the site is the Pennine Middle Coal Measures with this strata comprising interbedded mudstone, siltstone and sandstone with coal seams and is Carboniferous in age with strata indicated to be dipping 12 degrees to the south west.

3.2.3 The north eastern portion of Area B is shown to be underlain by Sandstone of the Pemberton Rock Formation.

3.2.4 Based on geological mapping, information gained from mine abandonment plans and from the 1844 publication "An historical, Geological and descriptive view of the coal trade in the North of England" the following seams are shown to subcrop beneath Area B and their approximate thicknesses are taken from thicknesses known at Halsnead Colliery (located circa 650m to the south west of Area B at its nearest point). The seams are shown from youngest to oldest moving from east to west.

Seam	Thickness (m)	Vertical distance between seams
Felcroft	2.60	-
Pastures	1.76	20.1
Discovery	Unknown	Unknown
Yard	1.00	21.9
Earthy Delph (Kennel)	1.80	10.9
Higher Florida (Bug)	2.10	19
Lower Florida (Bug)	1.10	1.14

3.2.5 Mine abandonment plans obtained for Whiston Colliery located 732m to the west of Area B at its nearest point show some slight variations in seam thicknesses and distance between seams compared to those observed at Halsnead Colliery. The details of which are presented in the table below.

Seam	Thickness (m)	Vertical distance between seams from surface of bedrock at site
Felcroft	N/A	N/A
Pastures	2.43	-
Discovery	2.10	9.14
Yard	0.91	16.30
Earthy Delph	2.74	14.76
Higher Florida (Bug)	2.28	18.45
Lower Florida (Bug)	0.76	2.04

3.2.6 The mine abandonment plans from Whiston and Halsnead Colliery show the next workable seam beneath the Lower Florida to be the Tenlands/Engine Pit which is located between 94m and 121m below Lower Florida.

3.2.7 No coal seams are shown to subcrop beneath Area A however the Felcroft seam is shown to subcrop to the north east of the site dipping south west below Area A. Assuming a dip of 12 degrees the Felcroft seam is anticipated to be 10m below rockhead at its shallowest point.

3.2.8 Three faults are shown on or within an influencing distance of the site. The first runs north to south through the centre of Area A down throwing to the west. The second fault encountered beneath the site also runs north to south through the west of Area B and downthrows to the east. Both of these faults are regarded as local minor faults.

3.2.9 The third fault encountered abuts the eastern boundary of Area B and is a large regional fault known as the Eccleston West Fault. This fault runs north to south down throwing to the east and marks the boundary between the Pennine Middle Coal Measures and unconformable Kinnerton Sandstone to the east. The Eccleston West Fault branches beneath the site with a smaller fault trending to the north west shown to split from the main seam.

3.2.11 An extract of the published geology is presented on Drawing No. C3593/03. The postulated subcrops of coal seams beneath the site along with notable geological and mining features are shown on Drawing No. C3593/05.

3.4 Coal Authority Search

3.4.1 The site lies in an area where the Law Society and Coal Authority recommends a mining search be undertaken as the site could be affected by past or current mining.

3.4.2 Therefore a search was carried out with the Coal Authority, which is presented in Appendix B, the main findings of which are presented overleaf.

Past Mining

3.4.3 The site is a in a surface area that could be affected by recorded underground mining in seven seams of coal at 80m to 440m depth, and last worked in 1903.

3.4.4 Any ground movement from these workings should have now stopped.

Present Mining

3.4.5 The site is not within a surface area that could be affected by current underground mining.

Future Mining

3.4.6 The property is not in an area where the Coal Authority are determining whether to grant a licence to remove coal by underground workings.

3.4.7 The property is not in an area likely to be affected from any planned future underground coal mining.

3.4.8 Reserves of coal exist in the local area that may be worked in the future.

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

Mine Entries

3.4.10 There are 6 mine entries on or within 20 metres of the site boundary. Of the 6 shafts no treatment details are held for five with one shaft located off site indicated to have been capped and filled to an unknown specification at some time in the past.

3.4.11 There may however be additional mine entries in the local area which the coal authority has no knowledge of.

Coal Mining Geology

3.4.12 The Authority is not aware of any damage arising to geological faults or lines of weakness that have been affected by coal mining.

Opencast Coal Mining

3.4.13 The property is not in an area affected by past or present coal mining extracted by opencast methods. The property is also not in an area affected by a proposed opencast coal mine.

Subsidence

3.4.14 The Coal Authority has not received a damage notice or claim for the subject property or within 50m since 31 October 1994.

Mine Gas

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

Hazards related to coal mining

3.4.16 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

3.4.17 The property is not in an area which notice of entitlement to withdraw support has been given.

4.0 RISK ASSESSMENT

4.1 Summary

4.1.1 A summary of the assessment of the risks is presented in the table below and they are discussed in more detail in the subsequent sections.

Coal Mining Issue	Known Issue	Risk Assessment
Recorded Coal Workings	YES	**Low**
Unrecorded Coal Workings	NO	**High**
Recorded Mine Entries	YES	**High**
Unrecorded Mine Entries	NO	**Moderate to High**
Coal Mining Geology (fissures)	NO	**Low**
Records of mine gas emissions	NO	**Moderate to High**
Recorded coal mining surface hazard	NO	**Low**
Surface mining (opencast workings)	NO	**Low**

4.2 Recorded Coal Workings

4.2.1 The Coal Authority Report states the site is in the likely zone of influence from the workings of 7 seams of coal at 80m to 440m last worked in 1903. A previous mining report was carried out for the main field within Area B showing workings in four seams worked between 130m and 440m. The shallowest workings of 80m are therefore anticipated to be located within Area A.

4.2.2 Mining abandonment plans show the shallowest seam to be worked in Area A to be the Yard Mine with the Higher Florida also mined.

4.2.3 The deepest seam to be mined across the site is the Rushy Park located 440m below the surface.

4.2.4 In addition the CA Report states any movement from these workings should now have stopped and there has been no reports of subsidence at the property. This is substantiated by the lack of evidence of subsidence in the existing structure on-site.

4.2.5 The risk to the proposed development is considered to be **low**.

4.3 Unrecorded Coal Workings

4.3.1 Geological mapping and seams recorded within mining abandonment plans show seven seams to subcrop beneath Area B with these seams also dipping below Area A. A geological cross section is shown to intersect the site and shows very little superficial cover to be present across the site.

4.3.2 The Coal Authority interactive map indicates the entire site with the exception of the far west of Area A to be within a Development High Risk Area and within areas of probable shallow mine workings. Surface mining has also occurred up to the western boundary of Area A.

4.3.3 Coal mining abandonment plans show three shafts to be present within Area B. These are not known to be associated with any recorded workings and therefore further confirm that unknown workings are present beneath parts if not all of the site.

4.3.4 The presence of the shallow coal would likely have been known due to the mining activities in the area and shallow depths due to the lack of overburden, the risk to the proposed development from unrecorded mine workings is considered to be **high.**

4.4 Recorded Mine Entries

4.4.1 There are five recorded mine shafts located on the site with an additional shaft located within 20m of the site boundary.

4.4.2 Mine abandonment plans indicate the two shafts within Area A to be associated with recorded workings of the Yard and Higher Florida seams and are therefore anticipated to be a minimum depth of 80m.

4.4.3 Within Area B three mine entries known as Old Shafts are shown on one mine abandonment plan for the Higher Florida Seam although they are not shown as having workings within this seam associated with them. The shaft shown within the main seam is recorded as being "25 yards to the Higher Florida" and therefore is considered to be a minimum depth of 22m from the surface.

4.4.4 Having consulted with Coal Authority engineers no information is held as to what steps if any have been taken to fill or cap any of the seams located on the site.

4.4.5 The risk from recorded mine entries is therefore considered to be **High.**

4.5 Unrecorded Mine Entries

4.5.1 Due to shallow coals seams, recorded entries and underground workings indicated to be present below the site there are potentially unrecorded mines on and within the vicinity of the site from prior to records. Therefore the risk is considered to be **Moderate to High.**

4.6 Other Mining Issues

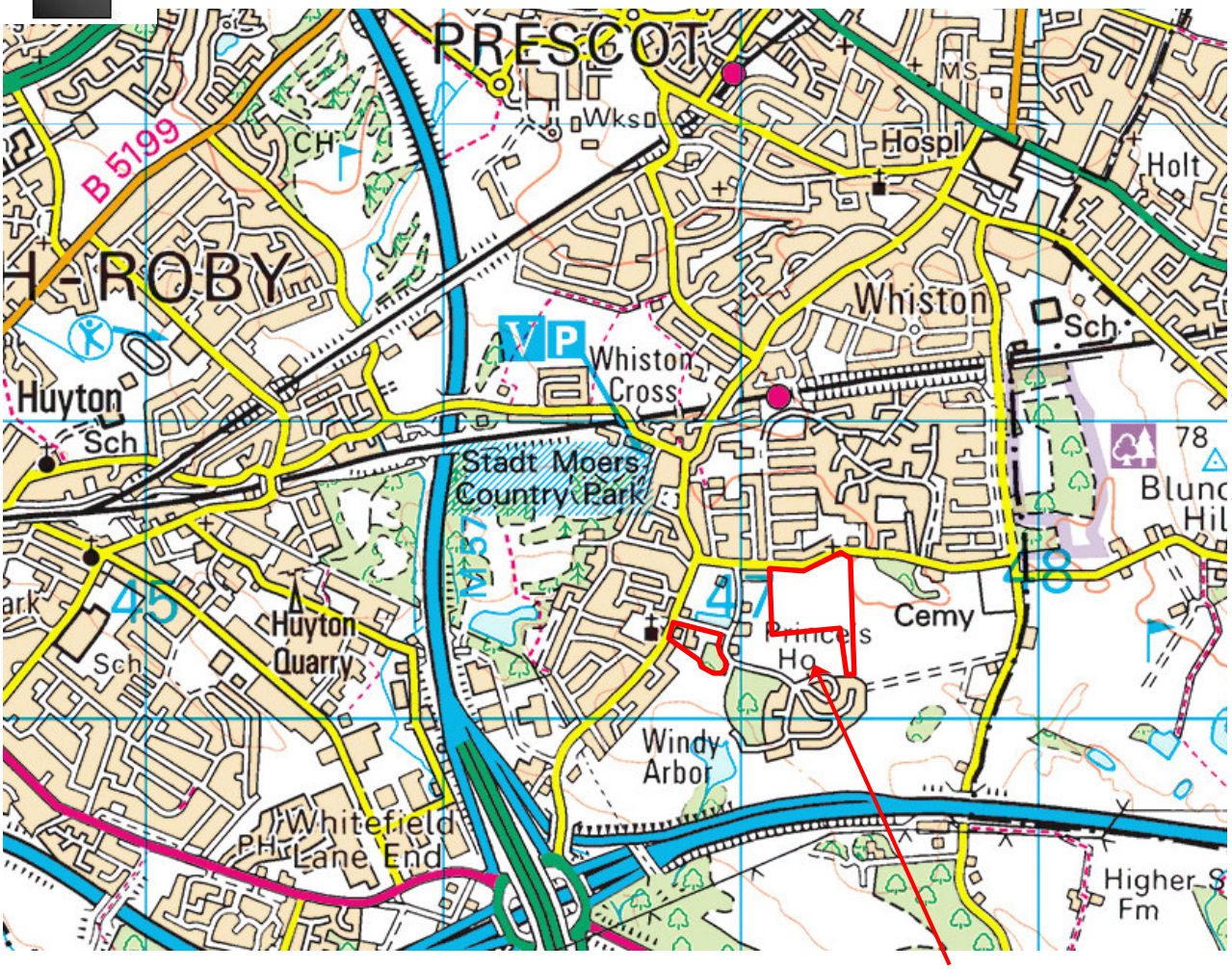
4.6.1 The Coal Authority does not have any evidence of mine gas being an issue at the site however as several mine entries are located on site risk is considered to be **Moderate to High** and further information is required to quantify the risk.

4.6.2 The Coal Authority report indicates that the site is not within the boundary of an opencast site from which coal has been extracted. The historic maps show no indication of opencast mines within the site boundary. Therefore the risk from opencast mining is considered to be **Low.**

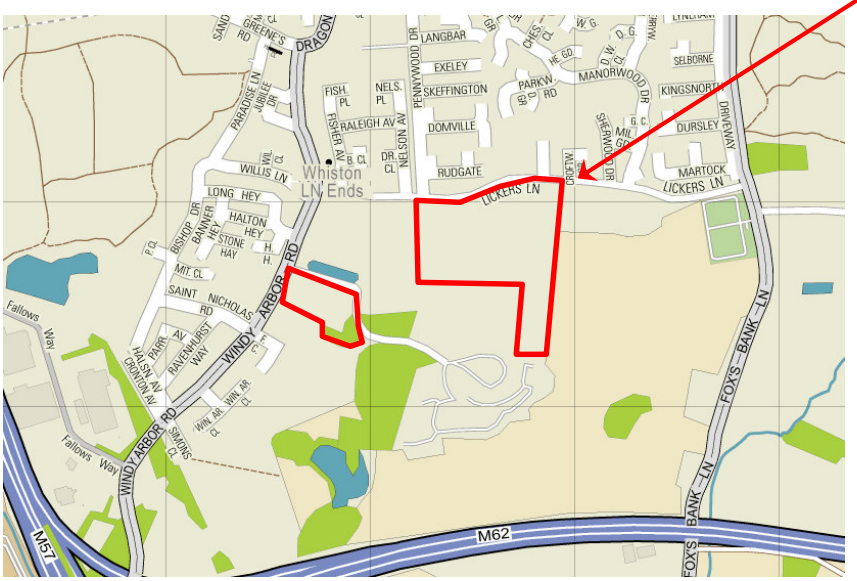
4.6.3 Several faults exist in the vicinity of the site with one located on site to the west of the development area. The reactivation of faults is unlikely to occur due to their age. Any movement associated with workings is also likely to have ceased.

DRAWINGS





SITE



BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

STEWART MILNE HOMES

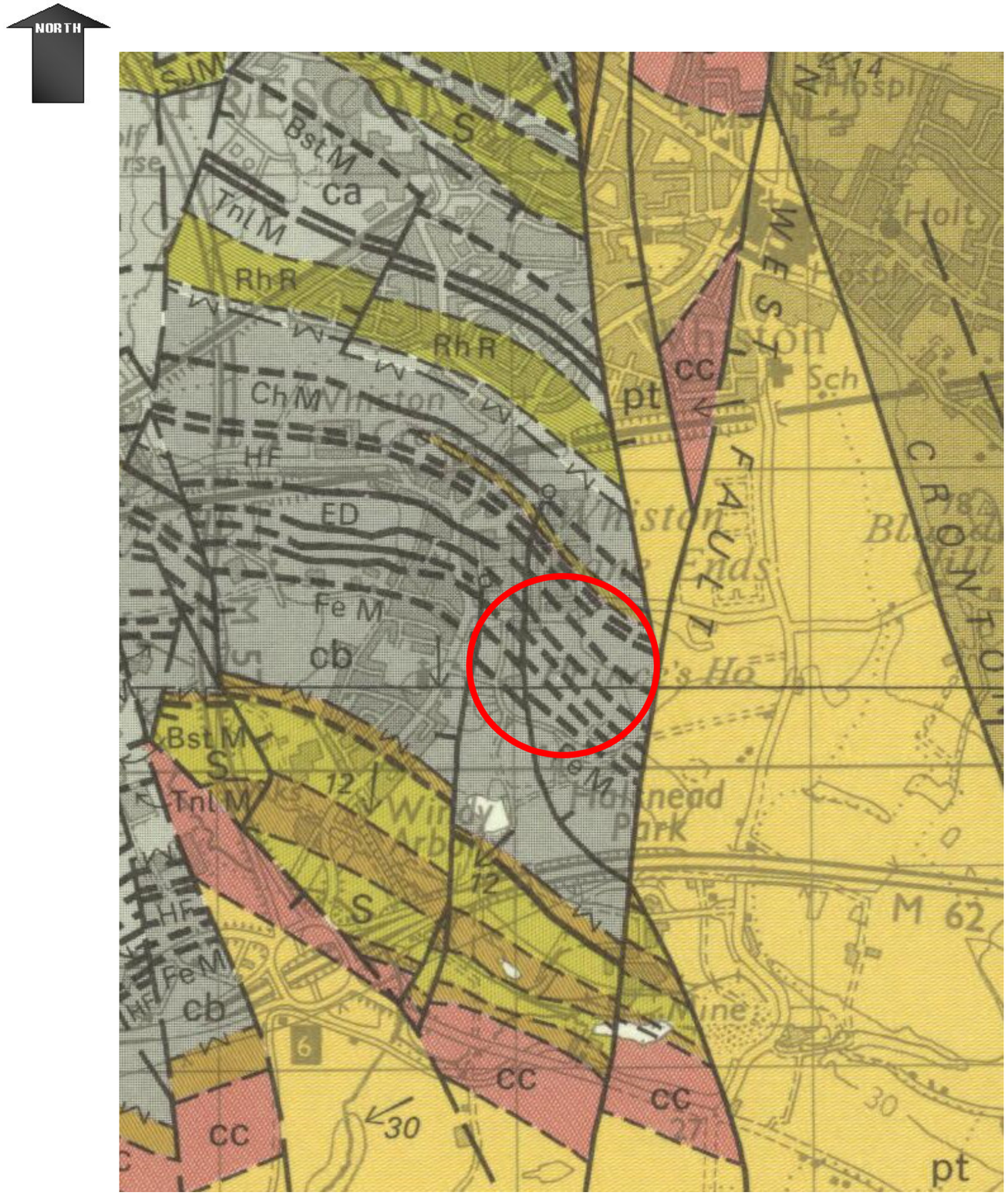
Halsnead Park, Whiston

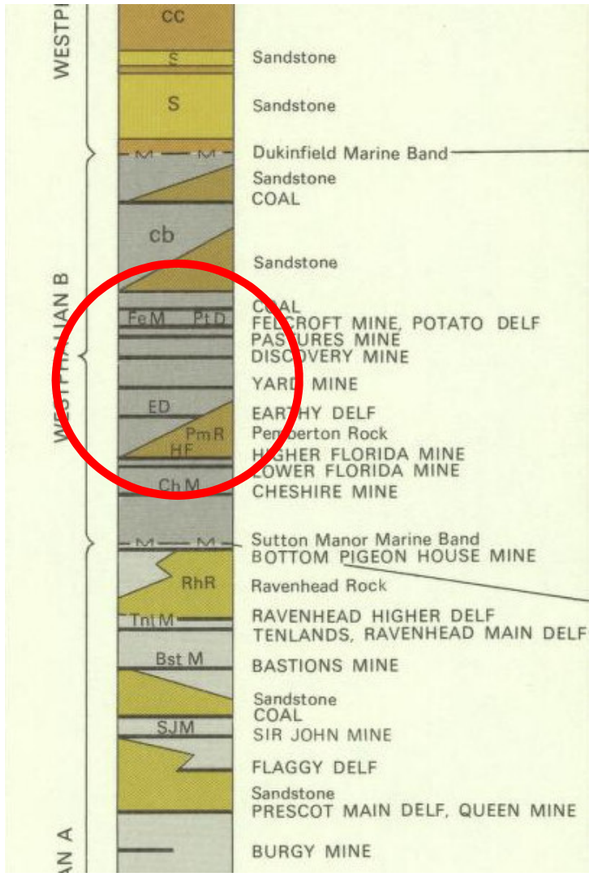
Site Location Plan

Drawing Number C3593/01

Scale: NTS

Drawn By: LC	Checked By: AJH





BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

STEWART MILNE HOMES

Halsnead Park, Whiston

Geology Extract

Drawing No. C3593/03

Scale: NTS

Drawn By: AJH	Checked By:

NORTH

Lower Florida
Higher Florida
Earthy Delph
Yard
Discovery
Pastures
Felcroft
Pastures
Felcroft
Felcroft
12

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KEY

- Site Boundary
- Approximate Location of Mine Shafts Based on Coal Authority Data
- Approximate Location of Coal Seam subcrops
- Approximate Location of Fault

Seam Thicknesses (estimated based on third party information)

- **Felcroft – 2.4m**
- **Pastures – 1.5m**
- **Discovery – unknown**
- **Yard – 0.91m**
- **Earthy Delph – 1.80m**
- **Higher Florida – 1.82m**
- **Lower Florida – 0.91m**

BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

STEWART MILNE HOMES

HALSNEAD PARK, WHISTON

Postulated Subcrops of Coal Seams and Shaft Locations

Drawing No. C3593/05

Scale: NTS

Drawn By: LC | Checked By: AJH

APPENDIX A
Coal Authority Report

The Coal Authority

Resolving the impacts of mining

CON29M Non-Residential Mining Report







1 OLD ORCHARD
WHISTON
KNOWSLEY
L35 3QA

Date of enquiry:	02 May 2017
Date enquiry received:	02 May 2017
Issue date:	02 May 2017
Our reference:	51001463180001
Your reference:	LC/C3593/4930

CON29M Non-Residential Mining Report

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.

Client name

BROWNFIELD SOLUTIONS LIMITED

Enquiry address

1 OLD ORCHARD, WHISTON, KNOWSLEY, L35 3QA



Approximate position of property

Map data

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www.groundstability.com

/company/the-coal-authority
/thecoalauthority
/coalauthority

Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	Yes
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	No
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

Further recommended reports
Mine entry interpretive report
Mine entry plan and data sheets

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 7 seams of coal at 80m to 440m depth, and last worked in 1903.

Any movement in the ground due to coal mining activity should have stopped.

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. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on the Coal Authority information section of the report.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

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

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

4. Mine entries

Within, or within 20 metres of, the boundary of the property there are 6 mine entries, the approximate positions of which are shown on the enquiry boundary plot.

Our records disclose the following information:
347390-005. No treatment details.

346390-029. No treatment details.

347390-002. No treatment details.

347390-004. No treatment details.

346390-026. No treatment details.

347390-006. this shaft has been proved to be filled and may have been capped to an unknown specification at some time in the past.

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

For an additional fee, the Coal Authority can provide a Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry/entries referred to in this report. It gives an opinion on the likelihood of mining subsidence damage caused from ground movement as a consequence of the mine entry/entries. It also gives details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie for development sites and new build).

For further advice on how to order this additional information please visit www.groundstability.com.

5. Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

6. Past opencast coal mining

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

7. Present opencast coal mining

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

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

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.

9. Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. 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.

12. Withdrawal of support

The property is not in an area where a notice to withdraw support has been given.

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

13. Working facilities order

The property is not in an area where 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.

14. Payments to owners of former copyhold land

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

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Comments on the Coal Authority information

The Coal Authority own the copyright in this report and the information used is protected by our database right.

The boundary plot shows the approximate location of the disused mine entry/entries referred to in this report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991*). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by visiting www.groundstability.com.

If you wish to discuss the relevance of any of the information contained in this report, you should seek the advice of a qualified mining engineer or surveyor. If you or your advisor wish to examine the source plans from which the information has been taken, these are available to view, free of charge, at our Head Office in Mansfield. To book an appointment please ring 01623 637225. Should you or your advisor wish to carry out a physical investigation that may enter, disturb or interfere with any disused mine entry, prior permission of the owner must be sought. For coal mine entries, the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number is 01623 646333.

*Note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment 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. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. 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 applicable at the time the report was produced.

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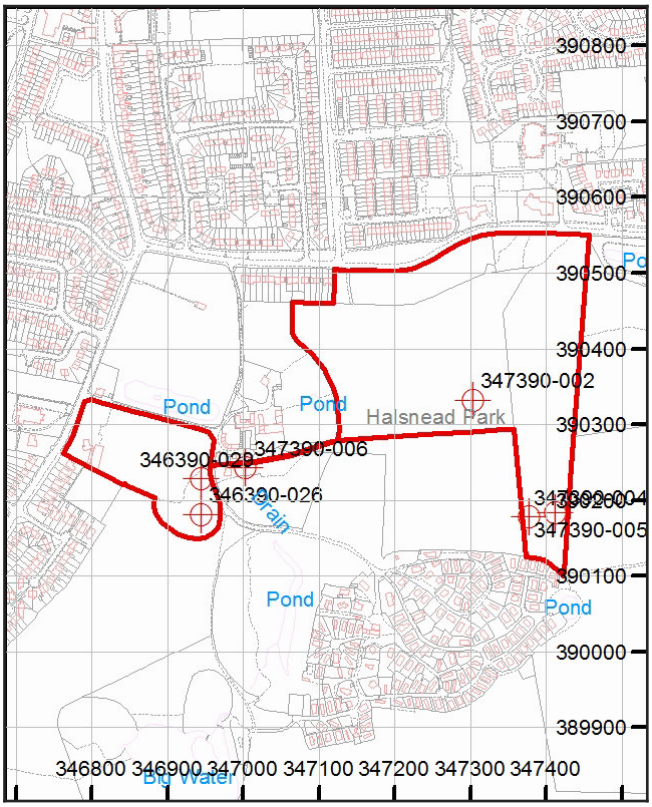
If you would like this report in an alternative format, please contact our communications team.

Enquiry boundary

Key

Approximate position of enquiry boundary shown

Disused mineshaft



Map data

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/thecoalauthority
/coalauthority

APPENDIX B
Legislative Background

Environmental liabilities and risks have been evaluated in terms of a source -pathway - target relationship in accordance with the approach set out in:

- The 1995 Environment Act;
- The Contaminated Land (England) Regulations 2000;
- The DETR circular 02/2000 Environmental Protection Act 1990: Part IIA Contaminated Land.

Contaminated land is defined within the legislative framework as land which is in such condition by reason of substances in, on or under the land that:

1) Significant harm is being caused or there is a significant possibility of such harm being caused;
2) Significant pollution of controlled waters is being or is likely to be caused.

The potential for harm is based on the presence of three factors:

- **Source** - substances that are potential contaminants or pollutants that may cause harm;
- **Pathway** - a potential route by which contaminants can move from the source to the receptor;
- **Receptor** - a receptor that may be harmed, for example the water environment, humans and water.

Where a source, pathway and target are all present a pollutant linkage exists and there is potential for harm to be caused. The presence of a source does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors are site specific and will vary according to the intended end use of the site, its characteristics and its surroundings.

The key principle which supports the SPR approach is 'suitable for use' criteria. This requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and, taking into account the proposed use of the site.

Relevant Guidance Documents

This report has been prepared in accordance with the list of guidance below however the list is not exhaustive:

- CLR11 – Model Procedures;
- Contamination and Environmental Matters - Their implications for Property Professionals (2nd Edition RICS Nov 2003);
- Brownfields – Managing the development of previously developed land – A client's guide, CIRIA 2002;
- DEFRA and Environment Agency publications CLR7 – 10, supported by the TOX guides and SGV guides, dated March 2002;
- DETR Circular 02/2000, Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990;
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002;

Relevant Legislative Documents

The following is a non-exhaustive list of legislative framework documents that has been considered in the production of this report:

- The Environment Act (1995);
- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012);
- The Environment Protection Act (1990);
- The Contaminated Land (England) Act (2000);
- Contaminated Land (England) Regulations (2012);
- The Water Resources Act (1991);
- The Pollution Prevention and Control (England and Wales) Regulations (2000);
- The Landfill Regulations (England and Wales) Regulations (2002);
- The Landfill (England and Wales) (Amendment) Regulations (2004);
- Health and Safety at Work Act.

APPENDIX C
Limitations

Standard Limitations

This Coal Mining Risk Assessment report was conducted and has been prepared for the sole internal use and reliance of the Client, Stewart Milne Homes Ltd. This report shall not be relied upon or transferred to any other parties without the express written authorisation of BSL. If an unauthorised third party comes into possession of this report they rely on it at their risk and the authors owe them no duty of care or skill.

The findings and opinions conveyed via the desk study are based on information obtained from a variety of sources as detailed within this report, which BSL believes are reliable. Nevertheless, BSL cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

Any recommendations made in this report should be confirmed with the Regulatory bodies and Planning Authority prior to implementation to ensure compliance.

The site plans enclosed in this report should not be scaled off.

BROWNFIELD SOLUTIONS LTD

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

STEWART MILNE HOMES

Halsnead Park, Whiston

Desk Study Assessment Report

LC/C3593/7001

July 2017

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PROJECT QUALITY CONTROL DATA SHEET

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DRAWINGS

Drawing Number	Rev	Title
C3593/01	-	Site Location Plan
C3593/02	-	Pertinent Site Features Plan
C3593/05	-	Postulated subcrop of coal seams and shaft locations

APPENDICES

APPENDIX A Historical Maps
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**DESK STUDY ASSESSMENT REPORT
FOR A SITE AT HALSNEAD PARK,
WHISTON**

1.0 INTRODUCTION

1.1 Objectives

1.1.1 This report describes a Desk Study Assessment carried out by Brownfield Solutions Limited (BSL) for Stewart Milne Homes on a site at Halsnead Park, Whiston.

1.1.2 The objectives of the Desk Study Assessment were to determine the sites environmental setting and likely site conditions, highlighting potential areas of concern that may govern the sites redevelopment.

1.1.3 The report has been completed to fulfil the requirements of a preliminary risk assessment in accordance with CLR11 "Model Procedures for the Management of Land Contamination".

1.2 Proposed Development

1.2.1 The proposed development is residential end use comprising traditional housing and associated gardens, soft landscaping and hardstanding.

1.3 Limitations

1.3.1 This Desk Study Assessment has been carried out based on information obtained from a number of areas, BSL have assumed that this information is correct.

1.3.2 There may be other conditions prevailing on the site which are outside the scope of work and have not been highlighted by this assessment and therefore not been taken into account by this report. Responsibility cannot be accepted for such site conditions not revealed by the assessment.

1.3.3 This report has been prepared for the sole use of the client. No other third parties may rely upon or reproduce the contents of this report without the written permission of Brownfield Solutions Ltd (BSL). If any unauthorised third party comes into possession of this report they rely on it at their own risk and BSL do not owe them any Duty of Care.

2.0 THE SITE

2.1 Location & Access

2.1.1 The site covers an area of approximately 11.5 hectares and is situated approximately 12.6 kilometres east of Liverpool City Centre.

2.1.2 The site is centred on National Grid Reference 347218, 390362 as shown on the Site Location Plan C3593/01.

2.1.3 Access to the site is gained off Windy Arbour Road to the west and Lickers Lane to the north.

2.2 Site Description

2.2.1 The site is split into two separate parcels of land Area A and Area B. Area A is located in the west with Area B occupying the east of the site. The two area are not connected and are separated by a road known as Main Drive and two private residential properties and associated out buildings. The areas are described separately below.

Area A

2.2.2 The smaller parcel known as Area A is accessed via a set of Palisade gates off Windy Arbour Road to the west. This area is a former garden centre and is irregular in shape with the west of the site generally higher than the east.

2.2.3 Area A is largely overgrown and access to areas of the site was difficult due to the dense vegetation. A tarmac car park is present at the site entrance to the west with a derelict bungalow present in the south western corner of the site.

2.2.4 A larger steel framed warehouse with steel cladding and with a possible asbestos cement roof is present behind the bungalow.

2.2.5 Across the western area evidence of fly tipping was noted although this was noted as being household waste with no evidence of potential contaminants present.

2.2.6 The car park area is at a higher elevation than the remainder of the site and the neighbouring properties to the south. A small retaining wall is present in the east of the car park with a concrete ramp present to gain access to the rest of the former garden centre. Across the remainder of the site several hardstanding terraces constructed from breeze block and concrete are present with numerous areas of flags and gravel consistent with greenhouse bases present.

2.2.7 The south east of Area A extends out in a semi-circular shape and was heavily wooded with mature trees.

2.2.8 The site boundaries of Area A were defined by a mixture of steel palisade fencing, concrete panel fencing and sandstone walls.

Area B

2.2.9 The larger parcel of land known as Area B is made up of a large cropped field accessed from Lickers Lane to the north. A wooded area approximately 50m wide and 190m long is present running along the majority of the northern boundary of site.

2.2.10 The east of Area B is a smaller field which extends beyond the main field to the site. This area is partially open with sporadic vegetation present in the north becoming denser in the south. Two bunds are present with evidence of dirt biking and off road driving taking place.

2.2.11 Area B is bordered by fields to the east and south with a metal wire fencing marking the boundary in the south. Residential properties bound the site in the north western corner with Lickers Lane marking the remaining northern edge of Area B. To the west the site is also bordered by fields.

2.2.12 Pertinent site features can be found on the Site Location Plan Drawing Ref C3593/02.

3.0 ENVIRONMENTAL SETTING

3.1 Geological Search

3.1.1 The following publications of the British Geological Survey (BGS) were examined in respect of the geology underlying the site:

- 1:50,000 Scale Geological Sheet 97, Runcorn, Drift edition
- 1:50,000 Scale Geological Sheet 97, Runcorn, Solid edition

Superficial Deposits

3.1.2 The site is indicated to be underlain by superficial deposits of glacial till. This strata typically comprises a sandy gravelly clay.

Solid Geology

3.1.3 The deeper solid geology beneath the site is the Pennine Middle Coal Measures with this strata comprising interbedded mudstone, siltstone and sandstone with coal seams and is Carboniferous in age.

3.1.4 The north eastern portion of Area B is shown to be underlain by Sandstone of the Pemberton Rock Formation.

3.1.5 Seven coal seams are shown to subcrop beneath Area B, dipping south west at approximately 12 degrees. Further detail relating to the coal seams and associated mining activities can be found in the accompanying Coal Mining Risk Assessment Referenced LC/3593/7004.

3.1.6 No coal seams are shown to subcrop beneath Area A however one seam is shown to subcrop immediately to the north east of the site dipping south west below this area.

3.1.7 Three faults are shown on or within an influencing distance of the site. The first runs north to south through the centre of Area A down throwing to the west. The second fault encountered beneath the site also runs north to south through the west of Area B and downthrows to the east. Both of these faults are regarded as local minor faults.

3.1.8 The third fault encountered abuts the eastern boundary of Area B and is a large regional fault known as the Eccleston West Fault. This fault runs north to south down throwing to the east and marks the boundary between the Pennine Middle Coal Measures and unconformable Kinnerton Sandstone to the east. The Eccleston West Fault branches beneath the site with a smaller fault trending to the north west shown to split from the main seam.

3.1.9 The postulated subcrops of coal seams beneath the site along with notable geological and mining features are shown on Drawing No. C3593/05.

3.2 Hydrogeology

3.2.1 The superficial deposits in this area are classified by the Environment Agency as a Secondary Aquifer (Undifferentiated). This classification is assigned where it is not possible to attribute either category A or B to a strata type. In general these layers

have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the strata type.

3.2.2 The bedrock is classified as a Secondary A Aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

3.2.3 The far north east of the site and the area immediately to the east is classified as a Principal Aquifer. This is geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale.

3.2.4 The far north east site and area abutting the eastern boundary is within a Source Protection Zone, Zone III, Total Catchment (the area needed to support the discharge from the protected groundwater source) for a groundwater abstraction well.

3.2.5 There are no groundwater or potable water abstraction licences within 500m of the site, the nearest is located 988m to the north east and is a historical licence for potable water supply from 2 wells and connecting boreholes at Cumber Lane.

3.3 Hydrology

3.3.1 The nearest watercourse to the site is an unnamed tertiary river located 47m to the south of the site.

3.3.2 Several ponds and manmade lakes are present within 250m of the site with the nearest located 12m to the north.

3.3.3 Information obtained from the Environment Agency indicates that the site will not be affected by an extreme flood event.

3.3.4 There are no surface water abstraction licenses within 1000m of the site, the nearest is located 1101m to the south of the site at Ochre and Dog Clog Brooks, Tarbock Hall Farm, Prescot to T.H Critchley and Son and pertains to spray irrigation.

3.3.5 Information obtained from the Environment Agency indicates the site will not be affected by an extreme flooding event.

3.4 Historical Setting

3.4.1 Information has been obtained from historical Ordnance Survey Maps with the pertinent issues that may have affected the site or its environs summarised below.

3.4.2 The following plans produced by the Ordnance Survey were examined.

Scale	Date
1:1250	1973, 1984, 1987, 1993, 1994
1:2500	1892, 1907, 1927, 1937, 1958, 1980, 1985, 1989, 1993

Scale	Date
1:10000/10560	1850, 1891, 1906, 1925, 1938, 1947, 1956, 1967, 1978, 1990, 2002, 2010, 2014

The Site

3.4.3 The earliest map dated 1850 indicates both Area A and Area B to be undeveloped and forming part of the larger Halsnead Park Estate. Lickers Lane borders Area B to the north Area A bordered by a road later known as Windy Arbour to the west and an access road for the estate to the north. Wooded areas are shown in the west and south of Area A, along the northern boundary of Area B with a smaller area of woodland present in the south eastern portion of Area B. Within Area A a **ruin** is shown in the south west, this is not shown on any subsequent maps.

3.4.4 The maps of 1891 and 1892 show the east of Area A to be completely wooded with two **ponds** present on the edge of the wooded area in the north. A small building is also present at the edge of the wooded area to the West. No changes are noted within Area B.

3.4.5 The map of 1907 shows one of the ponds in Area A to no longer be present with the north east of Area A no longer shown as wooded.

3.4.6 There are no changes to the site between 1907 and 1958. The map of 1958 shows the woodland and building in the west of Area A to no longer be present with a drain running north to south through this portion of the site. The central portion of Area A is occupied by several small **buildings** accessed via a road entering from the north. A single small building is present in the north west of this area. In Area B the site remains largely unchanged although woodland is not shown in the south eastern corner. No further changes are shown within Area B.

3.4.7 The map of 1966 shows the **pond** located in Area A to no longer be present.

3.4.8 By 1973 a residential property known as Oaklea is present in the south west of Area A with two **greenhouses** serving an associated **nursey** also shown in the west. Oaklea is accessed via a new access road entering the site from the north. Additional greenhouses are added to the site by the map of 1984 being published with access now gained from Windy Arbour Road to the west.

3.4.9 By 1993 the greenhouses in the west and buildings in the east are removed and a larger building is now present in the west of the site. This is annotated on later maps as being a greenhouse.

3.4.10 The map of 2010 shows the greenhouse to no longer be shown although a smaller building is shown in the south west of the site.

3.4.11 There are no further pertinent changes to the site between the map of 2010 and most recent map of 2014 being published.

Surrounding Area

3.4.12 The earliest map available of 1850 shows the site to be surrounded by The Halsnead Park Estate consisting of a series of open areas, wooded areas and ornamental

ponds and **lakes** the nearest of which is located immediately to the north of Area A in the east. A large property known as Prince's House is present in the area separating Area A and Area B. The property has several associated out buildings. A **coal pit** is present to the south of Prince's House approximately 50m from the eastern boundary of Area A. The main estate house known as Halsnead Hall is located to the south of the site at a distance of circa 175m from Area B at its nearest point.

3.4.13 The map of 1850 also shows coal mining activity to be taking place to the west and south west of the site. Three **collieries** (Hig Hey, Houghtons Hey and Halsnead) are located within 500m of Area A with the nearest being Halsnead located circa 200m form the boundary to the south west. A mineral **railway** serving these collieries is also shown to the west. Further **coal mines** are located to the north west beyond 500m from the site boundary. To the north of Area B at a distance of circa 50m is a Stone Quarry Plantation and **Sandstone Quarry**. The Liverpool to Manchester **Railway** is located to the north of the site at a distance of 500m running east to west.

3.4.14 The maps of 1891 and 1892 show a St. Nicholas's church and **graveyard** to have been constructed to the west of Area A at a distance of circa 15m. The collieries to the south west are shown to have been amalgamated to form Halsnead Colliery located 300m to the west with the former Halsnead Colliery now shown as 'old colliery'. Further collieries are shown to the north and north west beyond 500m of the site. The sandstone quarry located to the north of Area B is shown as Old Quarry.

3.4.15 By the map of 1906 being published all of the collieries to the west and north west are shown as being disused. Whiston **Metallic Brickworks** is shown at the site of the former Whiston **Colliery** located circa 400m to the north west of the site.

3.4.16 The map of 1906 shows Cronton **Colliery** to be shown on the map of 1906 circa 700m to the south of the site. A mineral **railway** utilising the former line for Halsnead Colliery is shown 400m to the south west of Area A.

3.4.17 The map of 1927 shows **pits** associated with the brick works is present to the north west at a distance of circa 375m. The pit size increases between the maps of 1927 and 1958.

3.4.18 The map of 1958 shows Halsnead Hall to have largely been demolished with a ruin and disused **well** present. To the east of Area A, Halsnead Villa has been constructed at a distance of approximately 25m. Residential development has also occurred between 1937 and the map of 1958. A single row of residential properties are shown immediately to the west of Area B along Lickers Lane with larger development taking place to the north west on the opposite side of Lickers Lane. Residential development has also taken place the south of Area A with residential properties shown within the former colliery areas.

3.4.19 A **nursery** known as Halsnead Park Nursery is shown immediately to the east of Area B on the map of 1966.

3.4.20 By 1977 further residential development has taken place to the north of Area B on the adjacent side of Lickers Lane and to the west of Area A. The brick works and clay

pits to the north west are shown as being disused. The 1977 map also shows the M62 motorway to have been constructed to the south at a distance of circa 450m running east to west with the M57 motorway running north to south at a distance of circa 475m to the west.

3.4.21 The map of 1984 shows the disused clay pits to north west to be a **refuse tip**. By 1989 the brickworks buildings are no longer shown with the entire area to the north west shown as a **gravel pit.** This is shown on later mapping as Stadt Moers Park.

3.4.22 Mapping in 1989 also shows Cronton Colliery to be disused with the majority of mine buildings removed and pits being backfilled. The associated mineral railway is shown as disused. Halsnead Park Nursery to the east of the site is not shown on the 1989 mapping with a Caravan Park shown to the south at the former Halsnead Hall. To the south west of Area A at a distance of approximately 475m an industrial park is shown.

3.4.23 The area surrounding the site remains largely unchanged between the maps of 1989 and the most recent map of 2014 being published although some additional residential development is undertaken in the wider surrounding area.

3.4.24 Historical maps are presented in Appendix A.

3.5 Environmental Searches

3.5.1 A formal request was also been made to Knowlsey Metropolitan Borough Contaminated Land Department for information pertaining to the site. The information is pending at the time of issuing the report and will be reported as an addendum following receipt.

3.5.2 An Environmental Search has been conducted through Groundsure, which utilises British Geological Survey and Environment Agency databases. The full report can be found in Appendix C, although a summary of the more relevant findings is presented below.

Entry	0 – 249m	250 – 500m	Details
Authorised industrial processes (IPC/IPPC/LAPPC)	0	0	
Pollution Incidents	2	0	The nearest occurred 10m to the north of Area A in 2002 and had a minor impact on water. The pollutant is unknown.
Landfill and Waste treatment	0	4	The nearest landfill from the site is a historic landfill located 301m to the north west at Coalgate Lane Landfill. The received waste was Inert, Industrial, Commercial, Household, liquid and sludge with the last recorded use in 1983.
Discharge consent	0	0	

Entry	0 – 249m	250 – 500m	Details
Control of Major Accident Hazard (COMAH) sites	0	0	
Consents issued under planning (Hazardous substances) Act 1990	0	0	
Radioactive substances	0	0	
Fuel Station entries	0	0	
Other Current industrial land uses	8	-	The nearest is an electricity substation located 41m to the north west.

3.6 Radon

3.6.1 Map 13 Northern Welsh Marches and Liverpool was inspected which defines areas which require radon protective measures. Whiston is not an area requiring Radon precautions in foundations in accordance with BRE Report 211 'Radon – Guidance on protective measures for new dwellings' 2007 Edition.

3.6.2 BRE Report 211 provides a general indication of which areas require radon protection, a site specific assessment can be carried out through UK Radon or BGS.

3.7 Coal Authority Search

3.7.1 The site lies in an area where the Law Society and Coal Authority recommends a mining search be undertaken as the site could be affected by past or current mining.

3.7.2 Therefore a search was carried out with the Coal Authority, which is presented in Appendix D, the main findings of which are presented below.

Past Mining

3.7.3 The site is a in a surface area that could be affected by recorded underground mining in seven seams of coal at 80m to 440m depth, and last worked in 1903.

3.7.4 Any ground movement from these workings should have now stopped.

Present Mining

3.7.5 The site is not within a surface area that could be affected by current underground mining.

Future Mining

3.7.6 The property is not in an area where the Coal Authority are determining whether to grant a licence to remove coal by underground workings.

3.7.7 The property is not in an area likely to be affected from any planned future underground coal mining.

3.7.8 Reserves of coal exist in the local area that may be worked in the future.

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

Mine Entries

3.7.10 There are 6 mine entries on or within 20 metres of the site boundary. Of the 6 shafts no treatment details are held for five with one shaft located off site indicated to have been capped and filled to an unknown specification at some time in the past.

3.7.11 There may however be additional mine entries in the local area of which the coal authority has no knowledge.

Coal Mining Geology

3.7.12 The Authority is not aware of any damage arising to geological faults or lines of weakness that have been affected by coal mining.

Opencast Coal Mining

3.7.13 The property is not in an area affected by past or present coal mining extracted by opencast methods. The property is also not in an area affected by a proposed opencast coal mine.

Subsidence

3.7.14 The Coal Authority has not received a damage notice or claim for the subject property or within 50m since 31 October 1994.

Mine Gas

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

Hazards related to coal mining

3.7.16 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

3.7.17 The property is not in an area which notice of entitlement to withdraw support has been given.

4.0 DESK STUDY SUMMARY AND RISK ASSESSMENT

4.1 Introduction

4.1.1 The risk posed by any contaminants in soil or groundwater will depend on the nature and level of the source, the probability of exposure occurring, the potential pollution pathway and the likely effects on the receptors.

4.1.2 A contaminant is defined as a substance that has the potential to cause harm, a risk is considered to exist if such a substance is present at sufficient concentrations to cause harm and if a pathway is present a receptor could be exposed to the contaminant.

4.1.3 The following sections discuss the identified potential on-site and off-site sources, and any pollution that could impact receptors associated with the proposed development. Pollution linkages are assessed which may represent a risk to human health and/or controlled water receptors from the information gained from the desk study searches. The assessment has been carried out on a qualitative basis and aims to produce a complete and comprehensive Preliminary Conceptual Site Model.

4.1.4 Three potential impacts exist for any given site and all three need to be considered in the qualitative risk assessment, these are:

- On- site impacts;
- The site impacting its surroundings;
- Off-site sources impacting the subject site.

4.2 Potential Contaminative Sources

<u>On-Site</u>

4.2.1 From the information obtained during the desk study several sources of contamination which may affect the redevelopment of the site for residential end use were identified. Within Area B three mine shafts are thought to be present on the site which may be a potential contaminative source. In addition, due to coal reserves being anticipated at or near to the surface there is potential for made ground to be present if the coal has been extracted from the surface and/or shallow mined.

4.2.2 Within Area A two mine shafts are also expected to be present in the south east. Made ground associated with former development and backfilled ponds may also be a potential source of contamination. The former garden centre located in Area A is also considered to be a potential source of contamination.

<u>Off-Site</u>

4.2.3 Potential off-site sources of contamination include the neighbouring graveyard, electricity substation, potentially backfilled ponds and wells and backfilled pits, sandstone quarry and landfill.

4.2.4 Due to the distance from the site the former collieries with associated workings and shafts, landfill located 301m to the north west are and railway lines are not considered to be a potential source of contamination to the site.

Associated Contaminants

4.2.5 The contaminants commonly associated with the potential sources of contamination identified on-site include made ground possibly containing asbestos, metals and PAHs, coal, clinker and ash from potential workings associated with unrecorded coal mining activities. In addition in Area A hydrocarbons, herbicides and pesticides associated with the former garden centre may be a potential source.

4.2.6 Potentially backfilled ponds, well and mine shafts from both on-site and off-site sources are possible sources of ground gas.

4.2.7 The graveyard located to the west and former sandstone quarry to the north of the site are also potential sources of ground gas. The electricity substation located 44m north west is a possible source of PCB contamination.

4.3 Pathways

4.3.1 A pathway is defined as a medium by which a contaminant comes into contact with, or otherwise impacts a receptor. Due to the sites proposed end use being residential potential pollution pathways for contaminant migration at the site will exist.

4.3.2 At this stage the potential contaminants identified above are considered to present potential risks to site end users and controlled waters through the following pathways:

- Ingestion of contaminated soils;
- Dermal contact with contamination;
- Inhalation of gases or vapours in both indoor and outdoor air;
- Direct contact by buried structures such as services pipes;
- Surface run-off;
- Leaching of mobile contamination into groundwater;
- Migration of perched groundwater in any permeable soils or along existing or proposed service runs

4.4 Receptors

4.4.1 Receptors generally fall into the categories of human health or controlled waters. The identified receptors are listed below:

- Site end users (residential)
- Secondary A and Principal Aquifer in bedrock
- Surface waters

4.4.2 Contaminants within the soil and groundwater could potentially attack the clean potable water supply pipe, the contaminants should be assessed to determine the correct pipe material and level of precautions.

4.5 Preliminary Conceptual Site Model

4.5.1 The information obtained in the previous sections has been used to compile a Preliminary CSM. The identified potential contaminants and receptors have been assessed in the table below as to whether a plausible source-pathway-receptor

pollutant linkage for the proposed end use of the site exists. The risk classification has been estimated in accordance with information in Appendix E.

Human Health

4.5.2 The Preliminary CSM for human health is presented in the table below:

Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk
ON-SITE					
Made Ground	Ingestion, direct contact, inhalation of dusts.	End-users	Likely to Low Likelihood	Medium	Moderate/Low
Garden Centre (Area A)	Ingestion, direct contact, inhalation of dusts.	End-users	Likely to Low likelihood	Medium	Moderate/Low
Backfilled Ponds (Area A)	Migration of ground gases into confined spaces.	End-users	Low likelihood	Medium to Severe	Moderate /Low
Mine Shaft	Migration of mine gas into confined spaces.	End-users	Likely to Low Likelihood	Medium to Severe	High/Moderate
OFF-SITE					
Graveyard	Migration of ground gases into confined spaces.	End-users	Unlikely	Medium to Severe	Moderate/ Low
Backfilled Ponds/Quarry	Migration of ground gases into confined spaces.	End-users	Unlikely	Medium to Severe	Moderate/Low
Electricity Substation	Ingestion, direct contact, inhalation of dusts.	End-users	Unlikely	Medium	Low

Human Health Justification

4.5.3 Area B has not been previously developed, however as reserves of coal from seven seams exist at or near to the surface within this area it is possible that unrecorded mine workings and therefore colliery spoil and made ground associated with these workings may be present. The risk is from made ground within Area B is therefore assessed as moderate to low at this stage.

4.5.4 Within Area A made ground associated with former construction and the garden centre are considered to more likely, given the apparent changes in site levels and hardstanding areas that were noted during the site walkover. However processes associated with garden centres are not considered to be especially contaminative and therefore the risk is considered to be moderate to low at this stage from made ground. The garden centre was first established in the 1960s therefore pesticides and herbicides may have been used at the site. The risk from the garden centre is considered to be moderate to low at present and should be confirmed by site intrusive investigations.

4.5.5 Five mine shafts are thought to be present beneath the site (two within Area A and three within Area B). The Coal Authority holds no records as to what measures, if any have been taken to fill and cap the mine shafts, however as these are not shown

on historical mapping it is considered likely that the shafts are pre 1850s and therefore unlikely to have been backfilled with putrescible materials conducive to producing ground gases. If the shafts have not been backfilled and workings have been flooded there is a possibility for mine gas to be produced. Therefore the risk to site end users from mine shafts is considered to be high to moderate at this stage and a detailed assessment and monitoring is required.

4.5.6 Two ponds were located in the north east of Area A with the first not shown post 1907 and the second not shown post 1966. The type and nature of the backfill material, if any is unknown however given the relatively small size of the ponds and age of backfill it is unlikely that large amounts of material conducive to the production of ground gases are likely to be present. The risk is currently assessed as moderate to low and should be confirmed by site intrusive investigations.

4.5.7 Off site sources of contamination are also generally related to the production of ground gases from the neighbouring graveyard to the west and former quarry to the north.

4.5.8 The cemetery located to the west of the site is also a potential ground gas risk. Cemeteries are known to produce carbon dioxide and methane gases as organic material breaks down. However, gases are produced over a short span of time with levels of gases produced regarded as low and generally venting vertically directly into the atmosphere. In addition geological records indicate superficial deposits of Glacial Till to be present beneath the site with these deposits being relatively impermeable and inhibiting lateral migration of ground gases to the site. The risk from ground gases from the cemetery is therefore considered to be moderate to low.

4.5.9 A former quarry and several small backfilled ponds are present within 250m of the site. However as the area to the north of the site has been largely developed for residential end use it is unlikely that ground gas generation would occur from these sources in addition superficial deposits of Glacial Till are anticipated beneath the site which will inhibit the migration of any potential off site gas sources. The risk is therefore assessed as moderate to low.

4.5.10 The nearest electricity substation is located circa 40m from the site. PCBs which were present within substations before being outlawed in 1981 are a potential contaminative source. However, PCBs are relatively immobile and given the distance and relatively impermeable superficial strata underlying the site the risk is considered to be low from this source.

Controlled Waters

4.5.11 The Preliminary CSM for controlled waters is presented in the table below:

Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk
Made Ground	Migration through groundwater or granular soils	Controlled waters	Unlikely	Medium	Low

Controlled Waters Justification

4.5.12 Several buildings existed historically on Area A with two buildings still present in the west. Several terraced areas are also present with this part of the site indicating site levels may have been altered in the past and therefore there is potential for made ground to exist. Although surface water features are present within 50m of the site boundaries no known contaminative processes are thought to have taken place on the site. The superficial clay deposits will inhibit migration of any contaminants towards the watercourse the risk is considered to be low to surface waters.

4.5.13 Limited, if any contamination associated with the made ground is likely present at the site the superficial clay deposits will prevent vertical migration into the Secondary (A) Aquifer which is located across the majority of the site. In the far north east and area abutting the eastern site boundary the bedrock is classified as a Principal Aquifer within a Source Protection Zone. However in this area the site is considered to be greenfield and contamination is considered to be highly unlikely, and there are no abstraction licences within the vicinity of the site. Therefore the risk to groundwater is considered to be low.

4.6 Ground Gas Risk Assessment

4.6.1 Several potential on-site gas source has been identified and the preliminary CSM considers it to be a high to medium risk to site end users.

4.6.2 In accordance with CIRIA C665 as set out in Appendix F of this report, the recommended gas monitoring should comprise 12 visits over a 6 month period. However the risk is based on an unknown gas risk therefore it is recommended that the ground gas risk is reassessed following site works and an initial period of monitoring.

5.0 DEVELOPMENT CONSTRAINTS

5.1 Foundations

5.1.1 At this stage, due to unknown depths of made ground and the potential for unrecorded shallow coal workings to be present beneath the site if is not possible to provide preliminary foundation recommendations.

5.1.2 However it is anticipated that a mixed foundation solution comprising shallow spread foundations and deeper foundations where made ground or workings are present will likely be required.

5.1.3 This should be confirmed by on site intrusive investigations.

5.2 Other Constraints

5.2.1 Asbestos was not covered in this report. It should be noted that an intrusive survey will be required prior to demolition of existing buildings.

5.2.2 The site is in a Development High Risk Area, mining will be covered in the Coal Mining Risk Assessment under a separate cover.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Environmental

6.1.1 Coal Authority records show five coal shafts exist on the site although these are not shown on historic maps and therefore are anticipated to predate 1850. The shafts are a potential source of mine gas and/or permanent gases and gas monitoring is required to determine if it is considered a risk.

6.1.2 Area A was historically a garden centre with Area B being Greenfield with no development noted, however as coal reserves exist beneath Area B at or near to the surface there may be unrecorded workings and possible made ground present.

6.1.3 Due to previous uses generally being limited with no particularly contaminative processes having occurred at the site and limited off-site sources the risk to site end users is generally considered to be moderate to low.

6.1.4 A risk from ground gas may still impact the proposed development and requires further investigation and assessment.

6.1.5 The water resources in the vicinity of the site are generally considered to be of low sensitivity and the risk from the subject site is considered to be low. Where more sensitive resources exist in the Far East no development has occurred historically therefore a source is not likely to be present.

6.2 Geotechnical

6.2.1 Shallow foundations are anticipated, however this will need to be confirmed by site intrusive investigations.

6.2.2 The risk from coal mining will be assessed by the Coal Mining Risk Assessment under a separate cover.

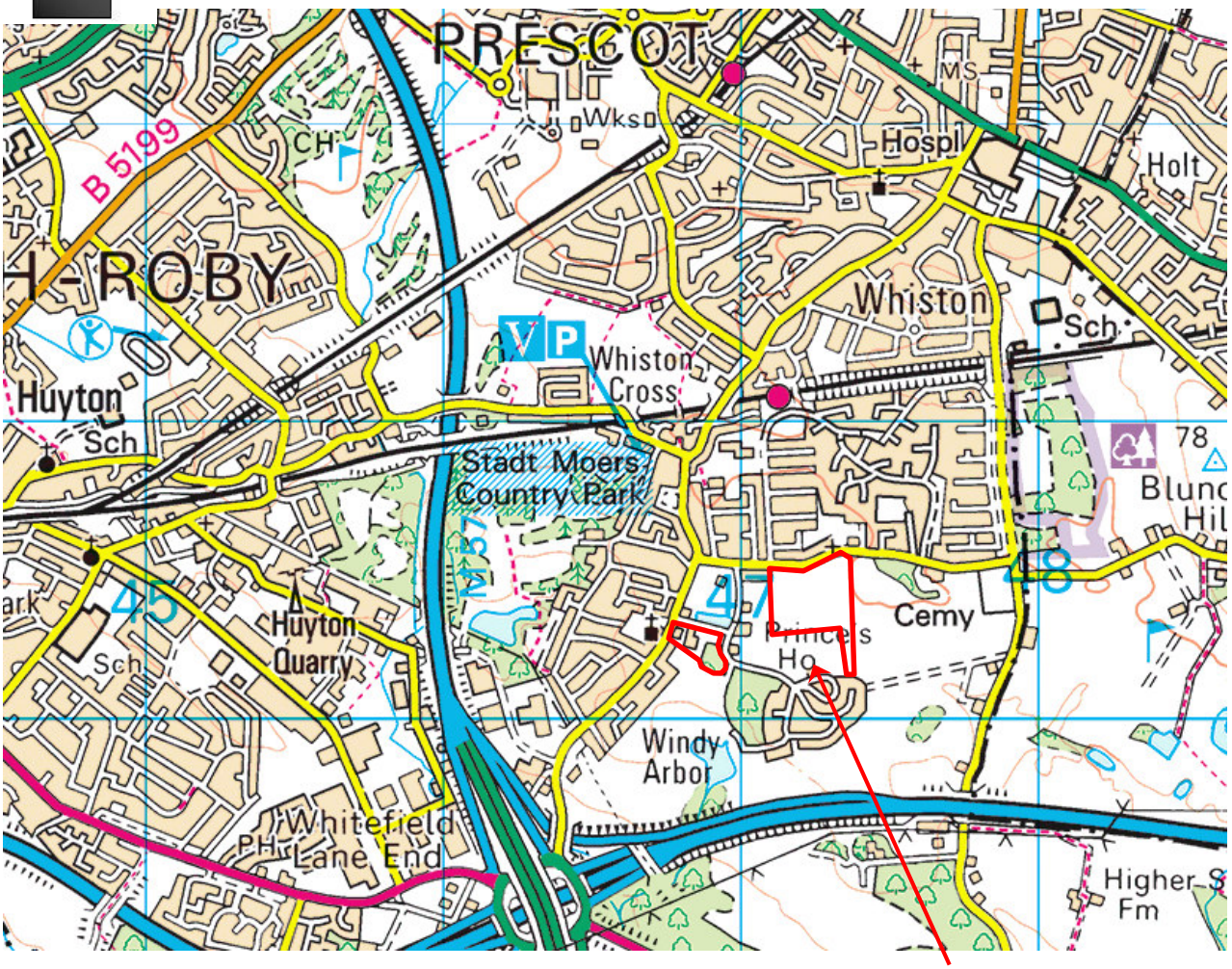
6.3 Further Work

6.3.1 Therefore to allow future development of the site the following further works are recommended, although this list is not exhaustive and should be read in conjunction with any planning conditions that are applicable to the site.

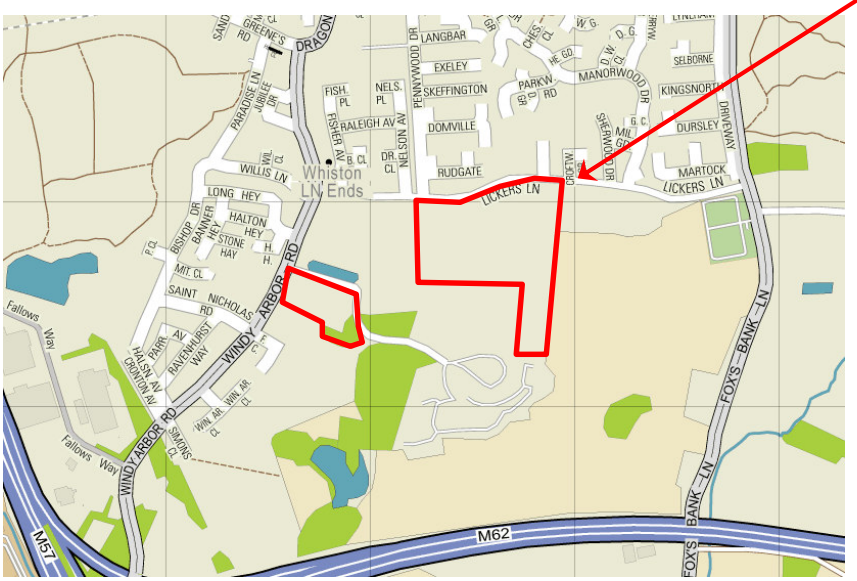
- Coal Mining Risk Assessment.
- Topographical survey
- Intrusive site investigations comprising window sampling, trial pitting.
- Mining Investigation.
- Demolition Asbestos survey.
- Foundation design
- Design of remedial strategy if required.
- Confirmation of remedial strategy with the Local Authority

DRAWINGS





SITE



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GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

STEWART MILNE HOMES

Halsnead Park, Whiston

Site Location Plan

Drawing Number C3593/01

Scale: NTS

Drawn By: LC	Checked By: AJH

NORTH

Site Access

Woodland Area

AREA B

Main cropped Field

Bunds

Site Access

Tarmac Car Park

Ramp to rest of site

AREA A

Derelict Bungalow

Steel framed storage building

Road Bump

Road Bump

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KEY

Densely vegetated areas

Lightly vegetated area

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STEWART MILNE HOMES

HALSNEAD PARK, WHISTON

Pertinent Site Features Plan

Drawing No. C3593/02

Scale: NTS

Drawn By: LC	Checked By: AJH

NORTH

Lower Florida
Higher Florida
Earthy Delph
Yard
Discovery
Pastures
Felcroft
Pastures
Felcroft
Felcroft
12

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KEY

- Site Boundary
- Approximate Location of Mine Shafts Based on Coal Authority Data
- Approximate Location of Coal Seam subcrops
- Approximate Location of Fault

Seam Thicknesses (estimated based on third party information)

- **Felcroft – 2.4m**
- **Pastures – 1.5m**
- **Discovery – unknown**
- **Yard – 0.91m**
- **Earthy Delph – 1.80m**
- **Higher Florida – 1.82m**
- **Lower Florida – 0.91m**

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STEWART MILNE HOMES

HALSNEAD PARK, WHISTON

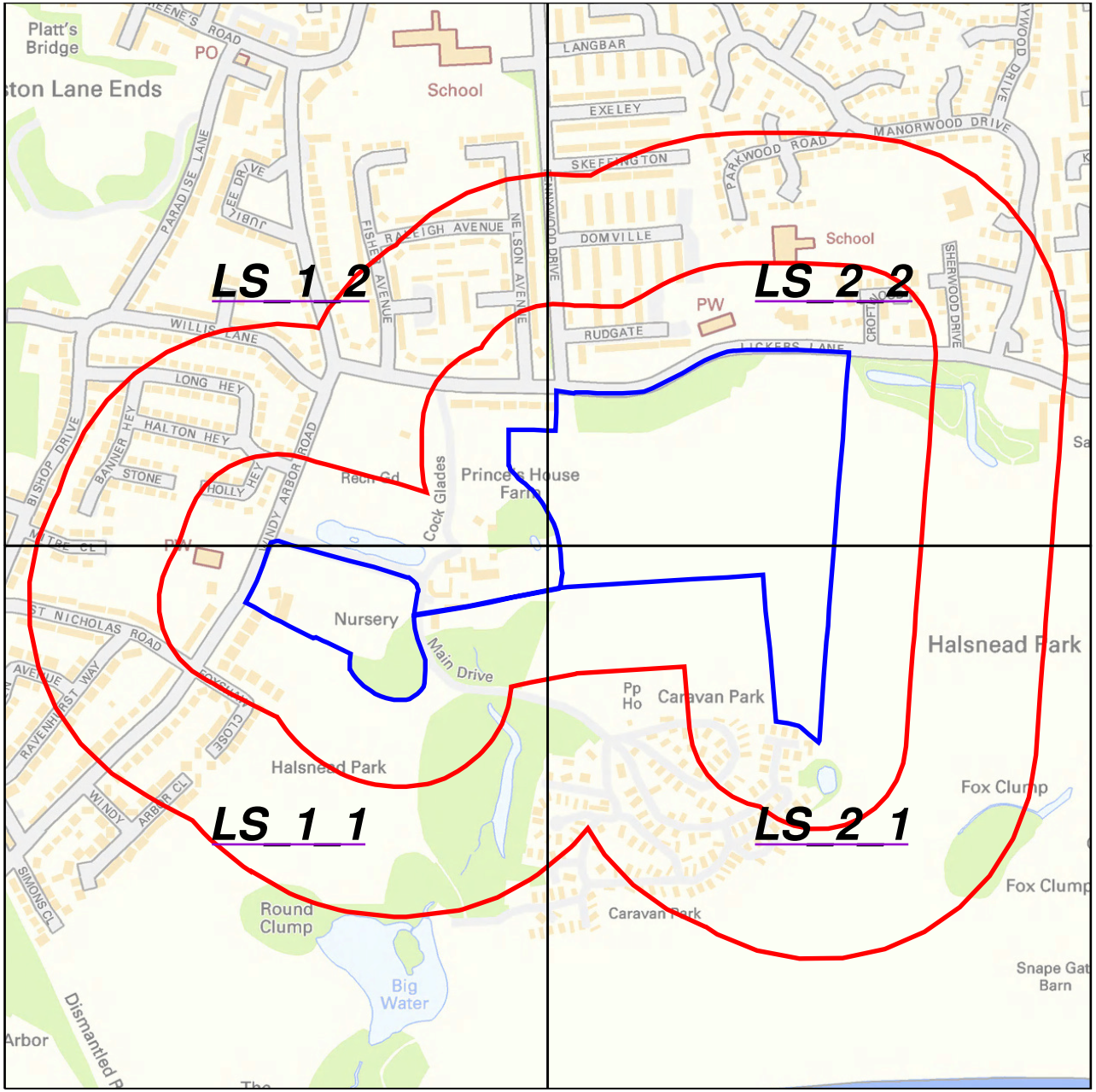
Postulated Subcrops of Coal Seams and Shaft Locations

Drawing No. C3593/05

Scale: NTS

Drawn By: LC | Checked By: AJH

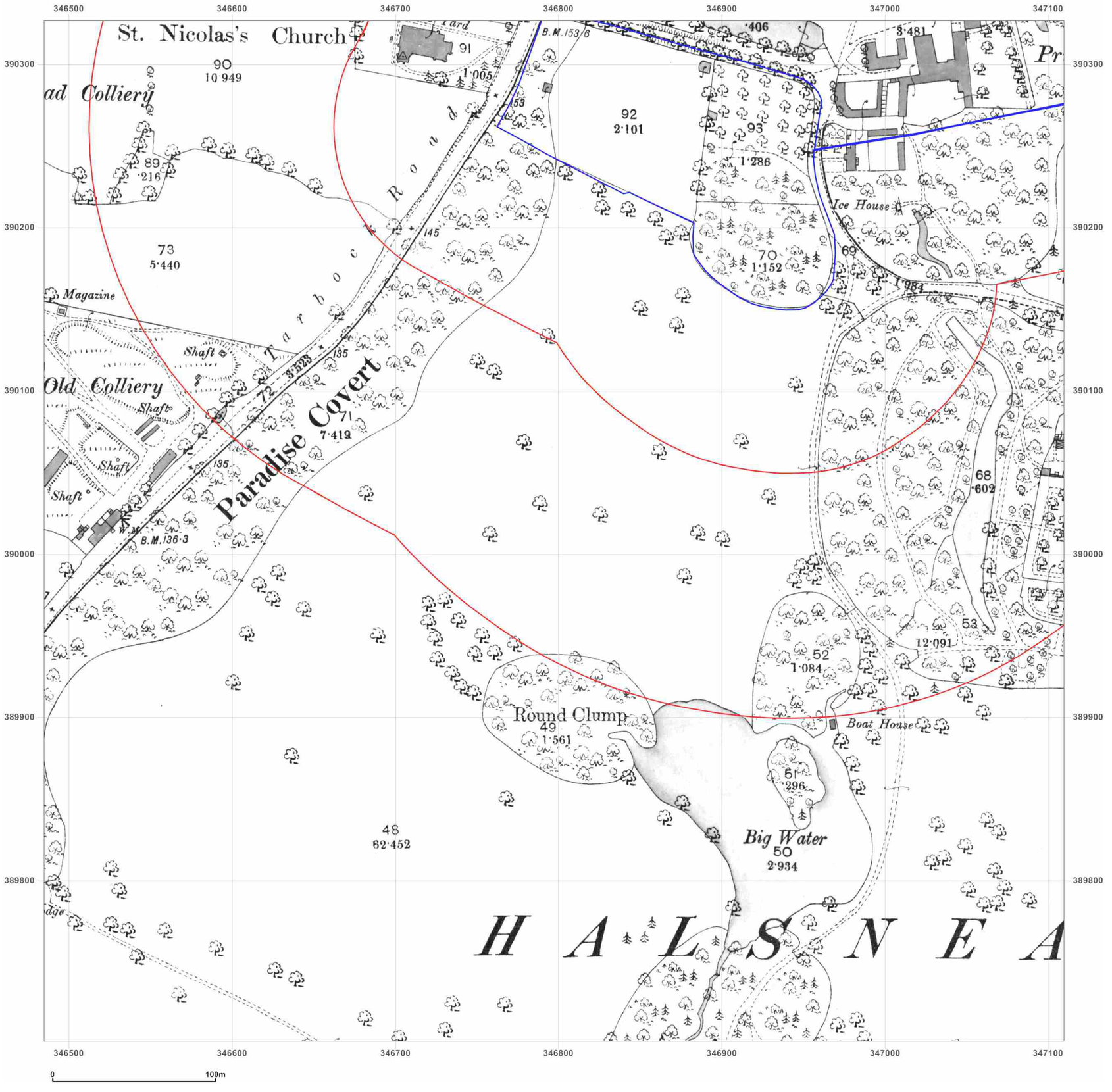
APPENDIX A
Historical Maps



Groundsure
INSIGHTS

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1:2500 Scale Grid Index



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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_1_1
Grid Ref: 346797, 390014

Map Name: County Series

Map date: **1892**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1892
Revised 1892
Edition N/A
Copyright N/A
Levelled N/A

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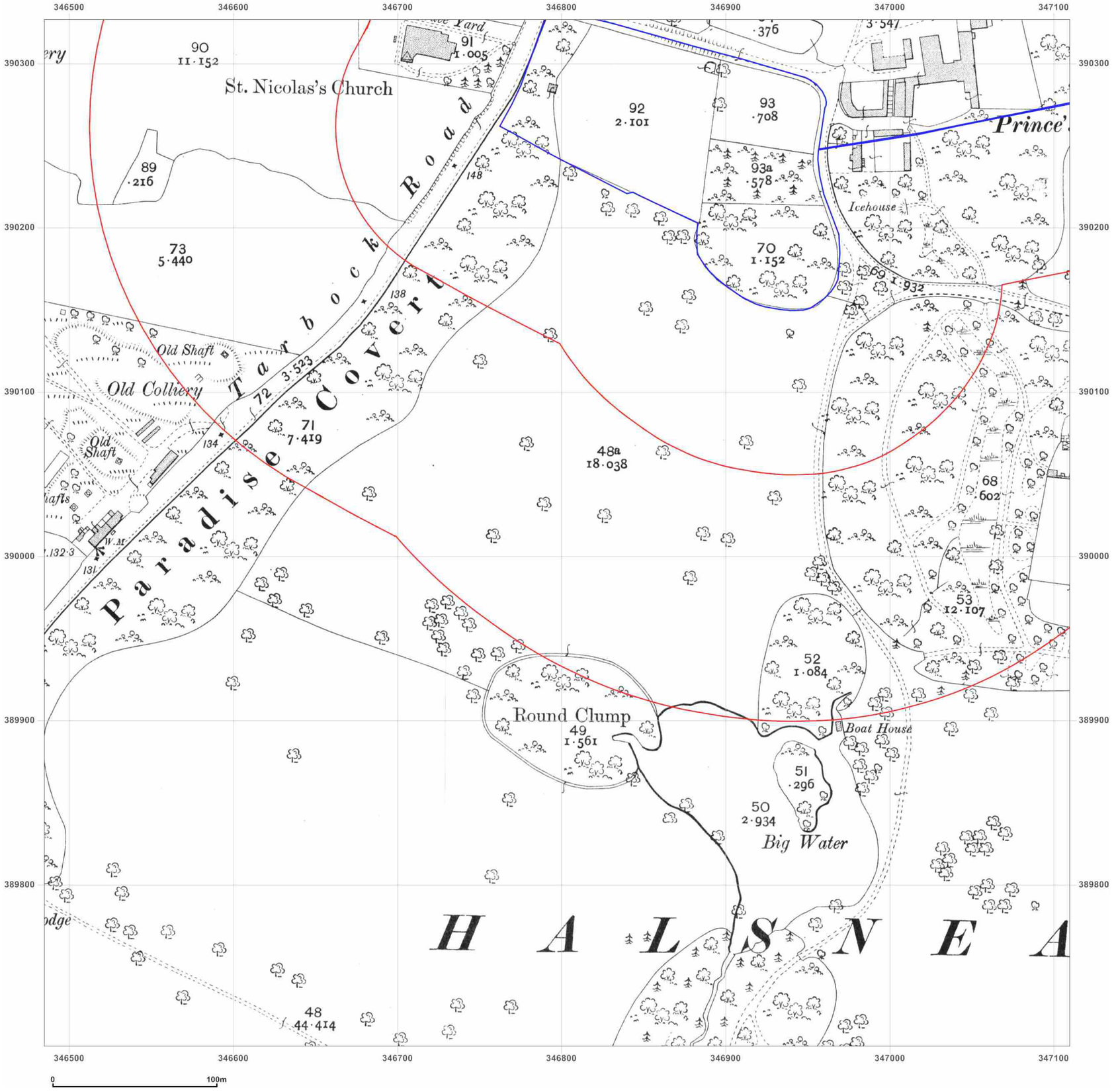
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Report Ref: EMS-418542_559267_LS_1_1
Grid Ref: 346797, 390014

Map Name: County Series

Map date: **1907**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1907
Revised 1907
Edition N/A
Copyright N/A
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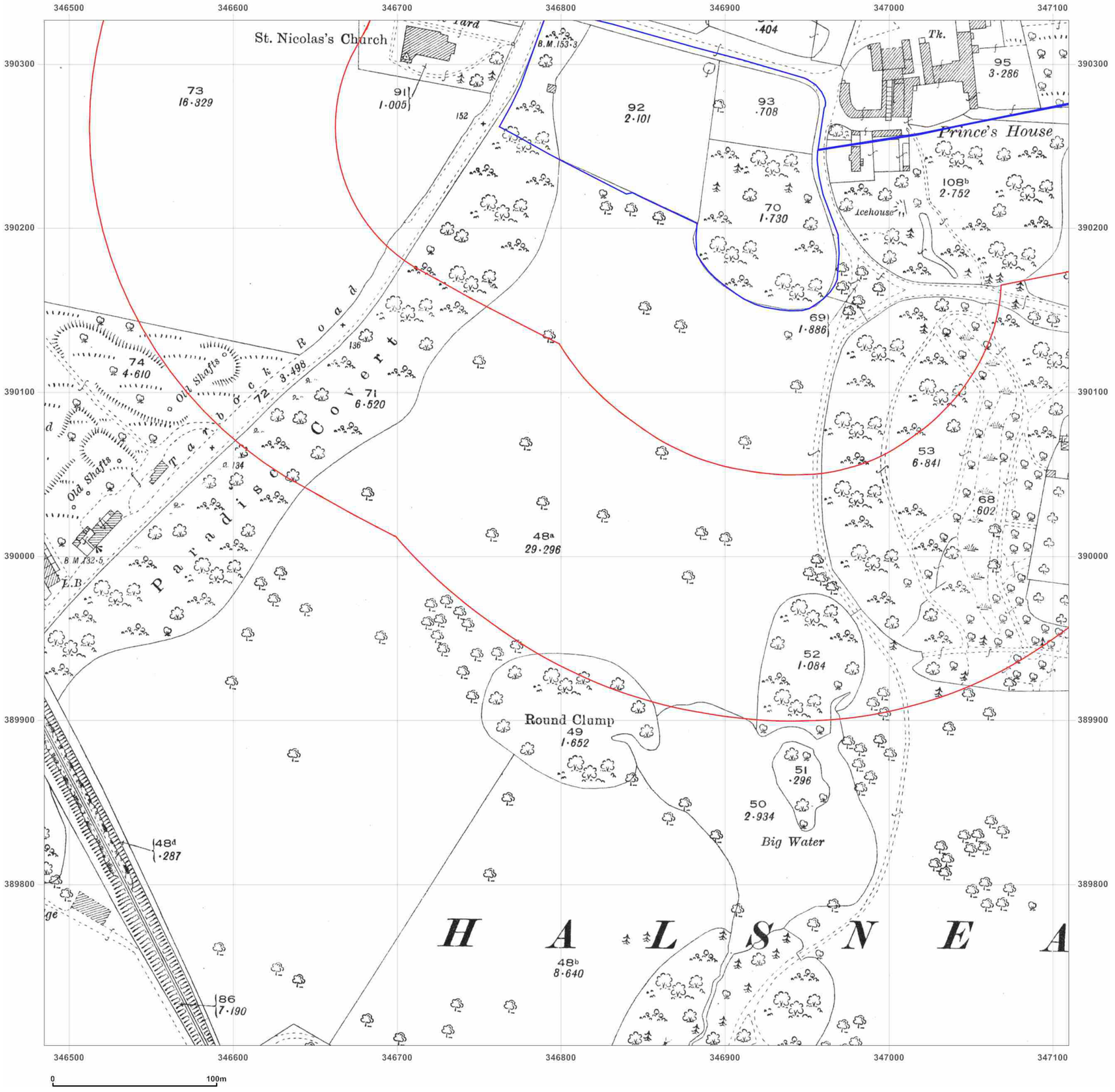
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Report Ref: EMS-418542_559267_LS_1_1
Grid Ref: 346797, 390014

Map Name: County Series

Map date: **1927**

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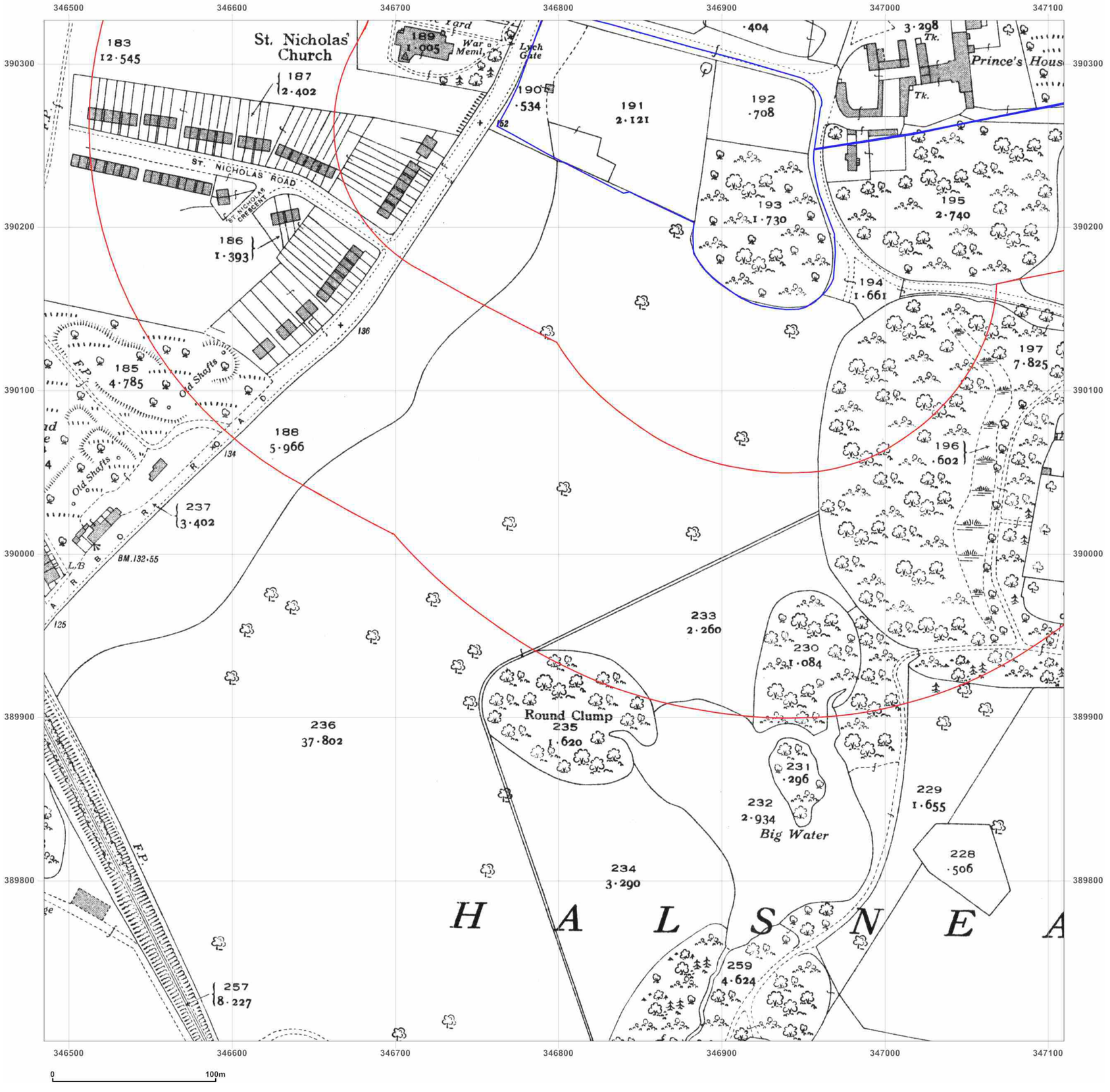
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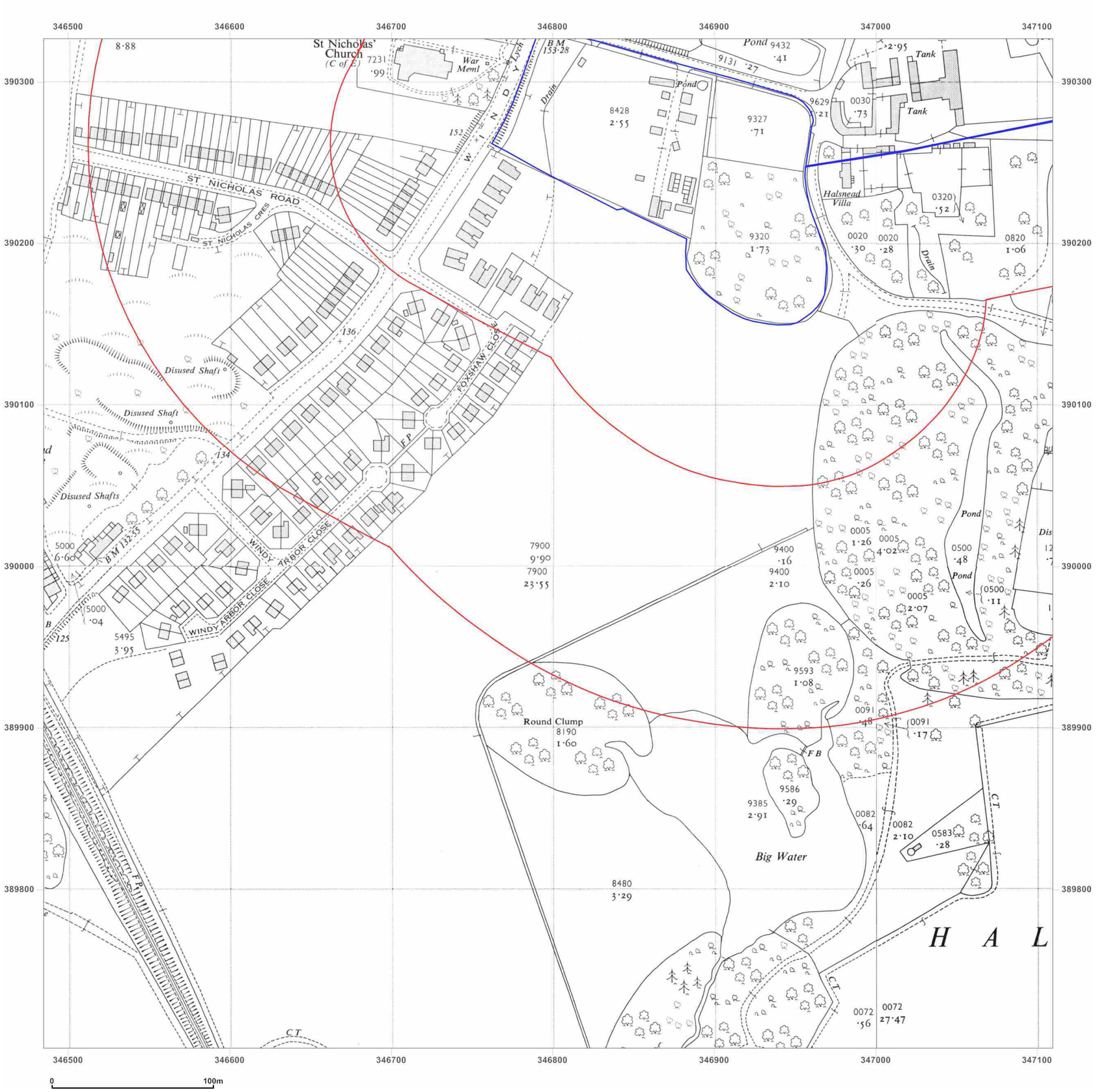
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Map Name: National Grid

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Edition N/A
Copyright 1959
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Revised 1958
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Revised 1958
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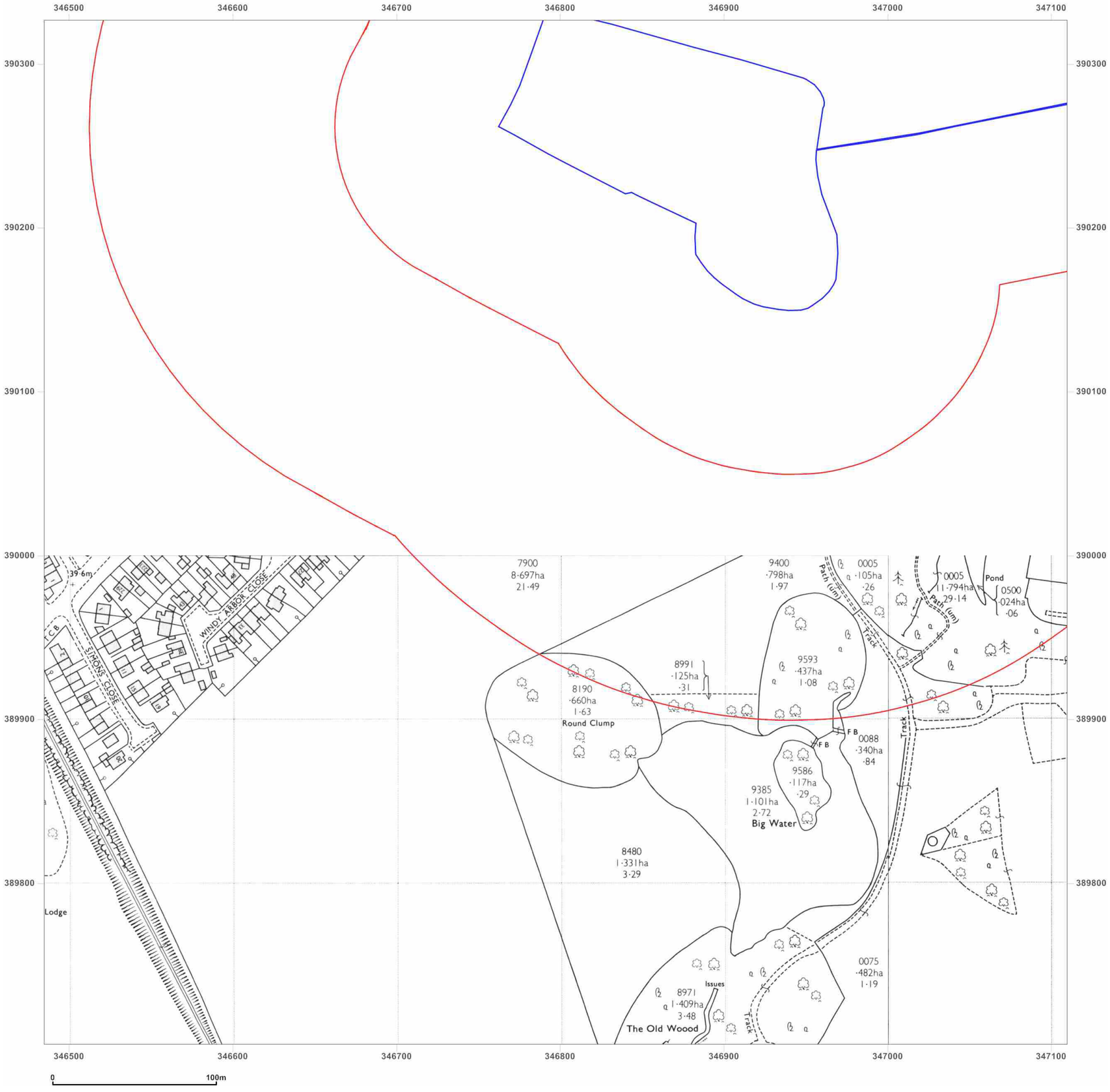
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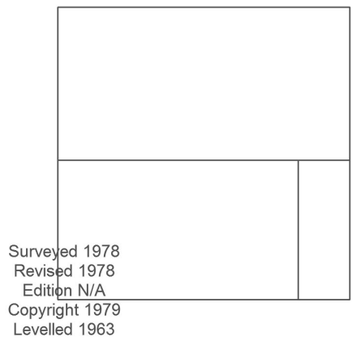
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Map Name: National Grid
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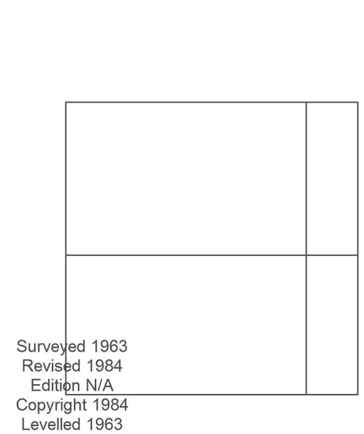
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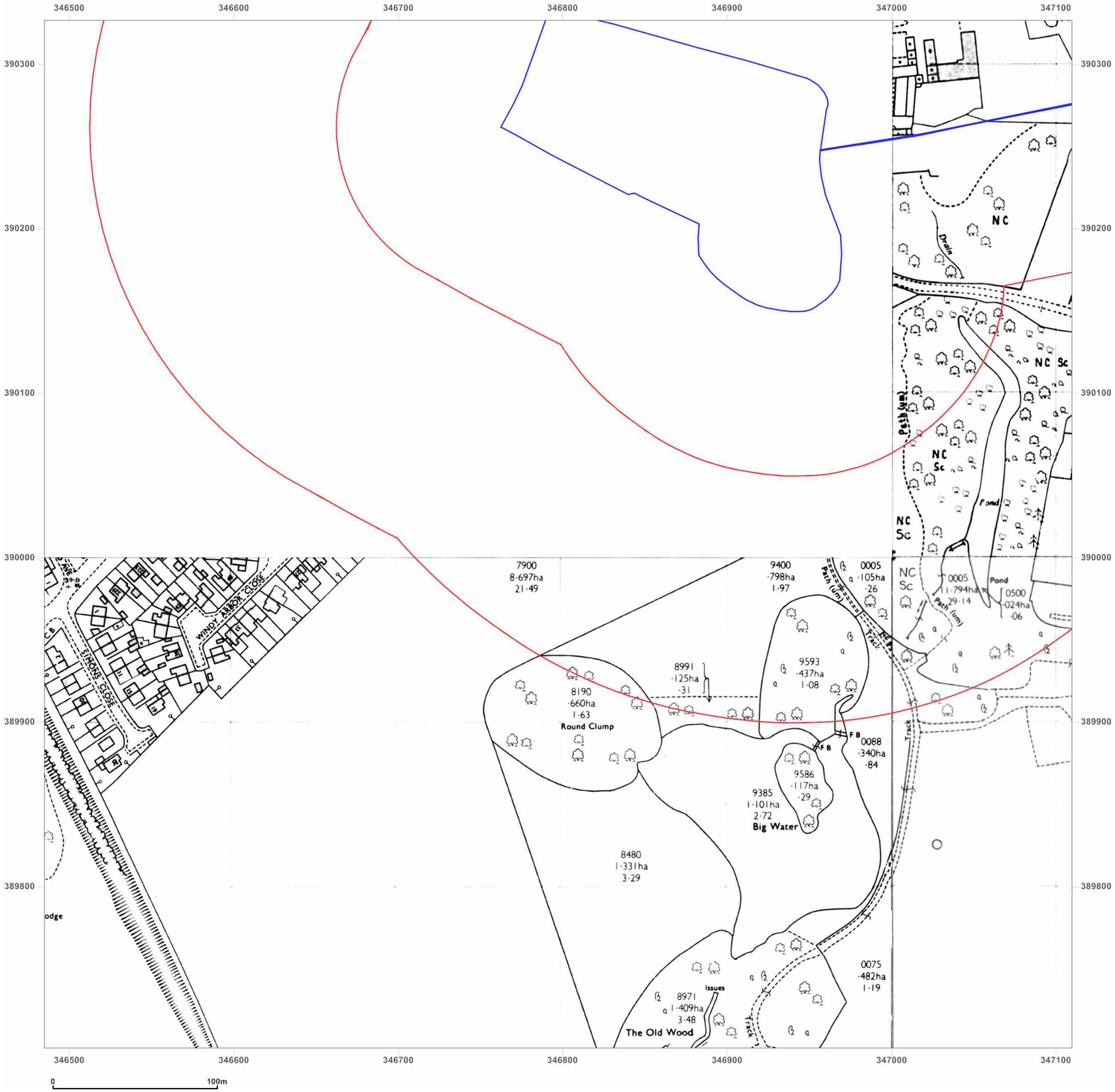
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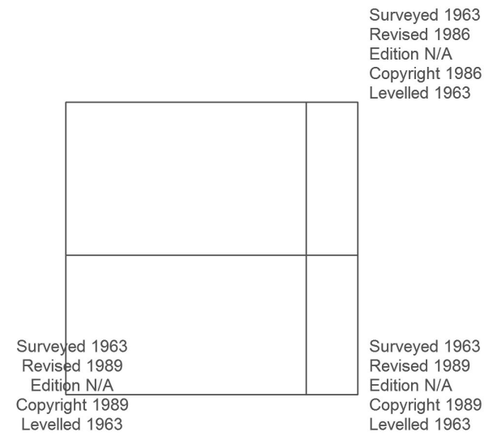
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Map Name: National Grid
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Printed at: 1:2,500

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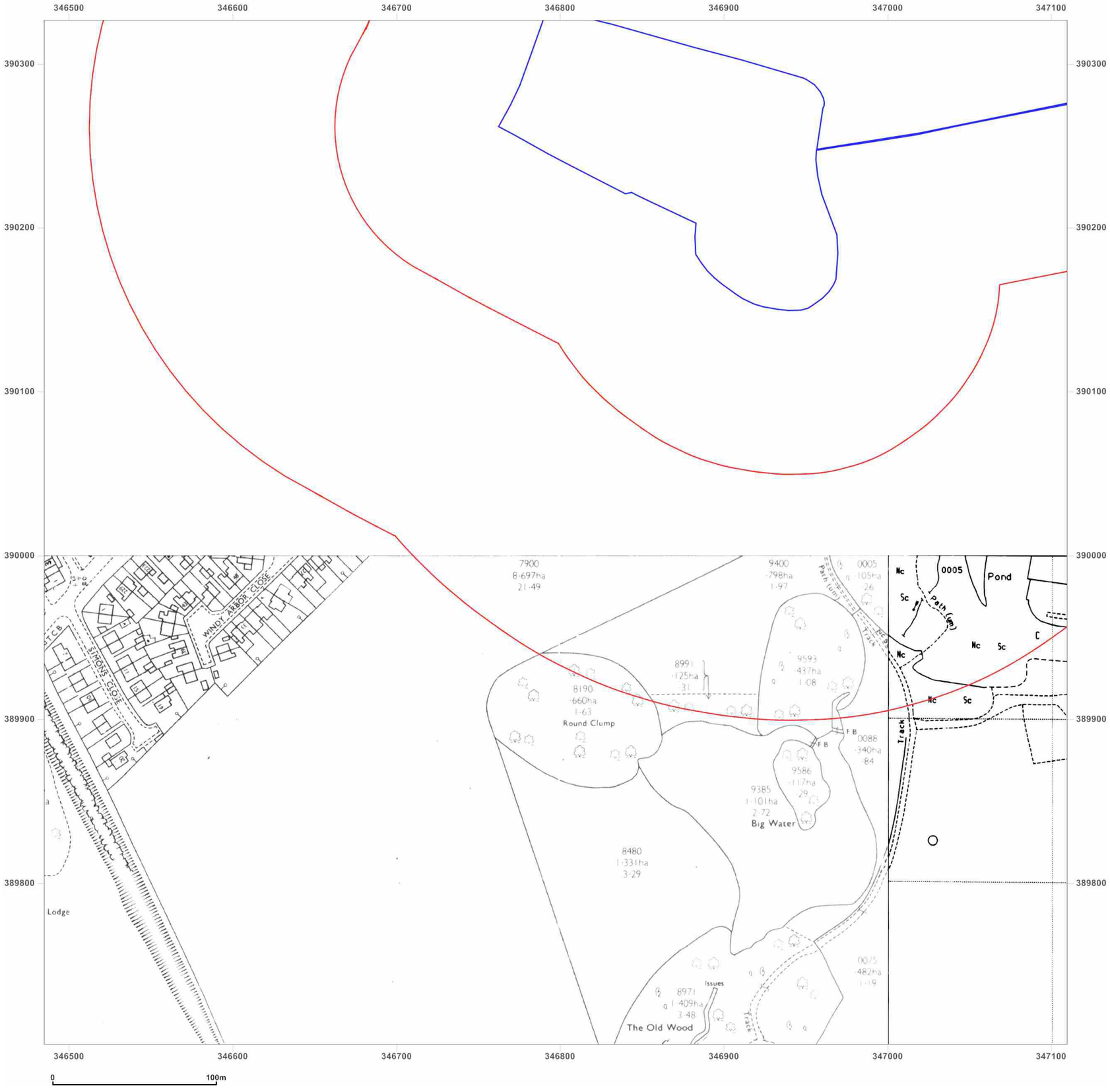
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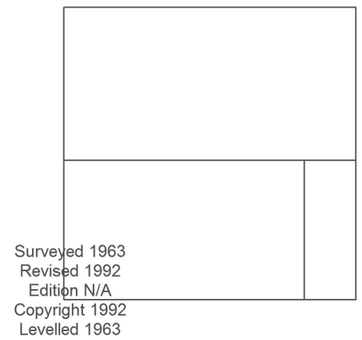
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Map date: **1992-1993**

Scale: 1:2,500

Printed at: 1:2,500

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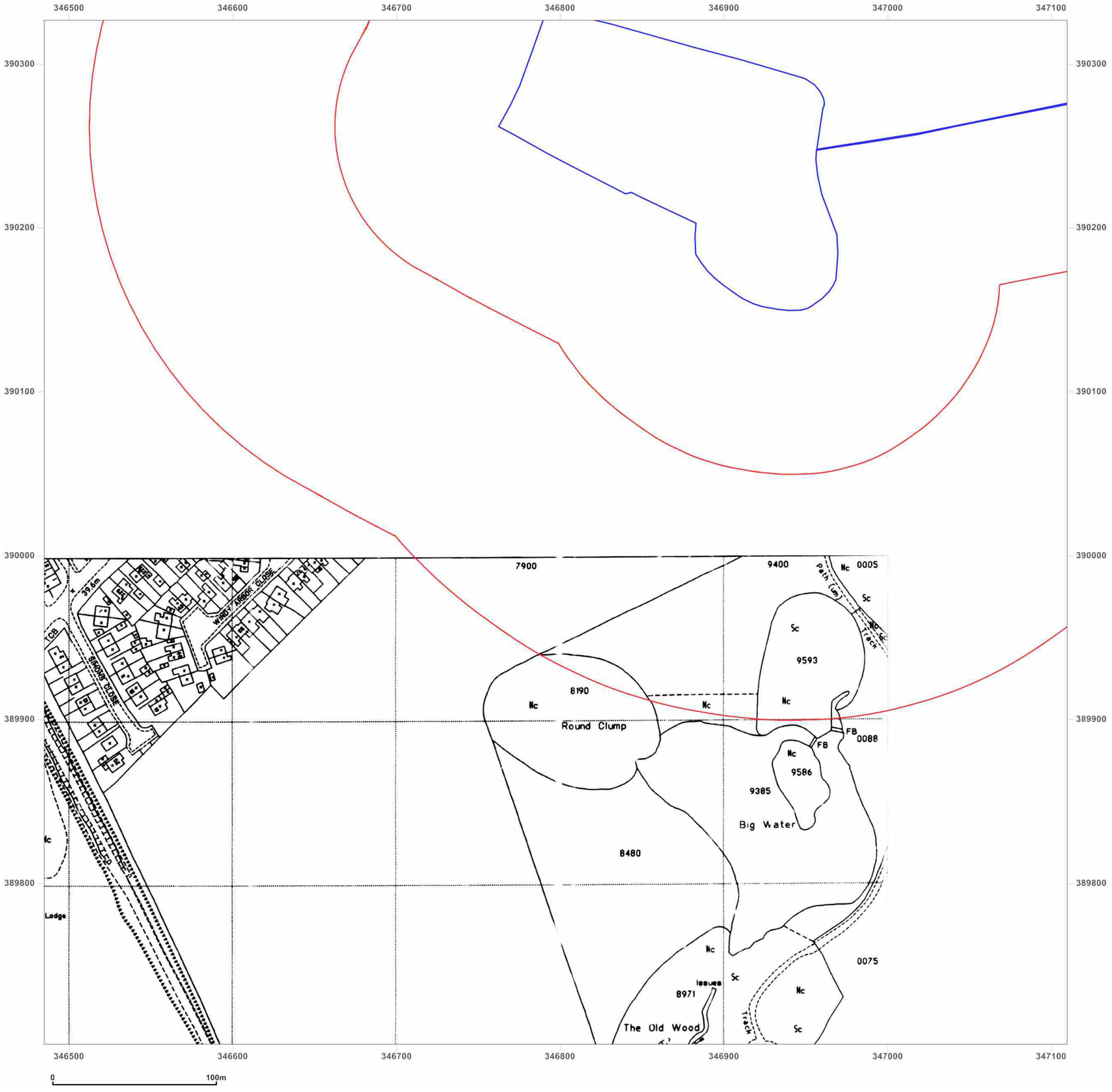
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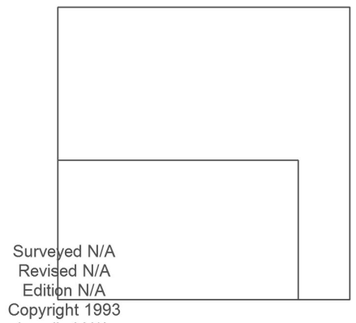
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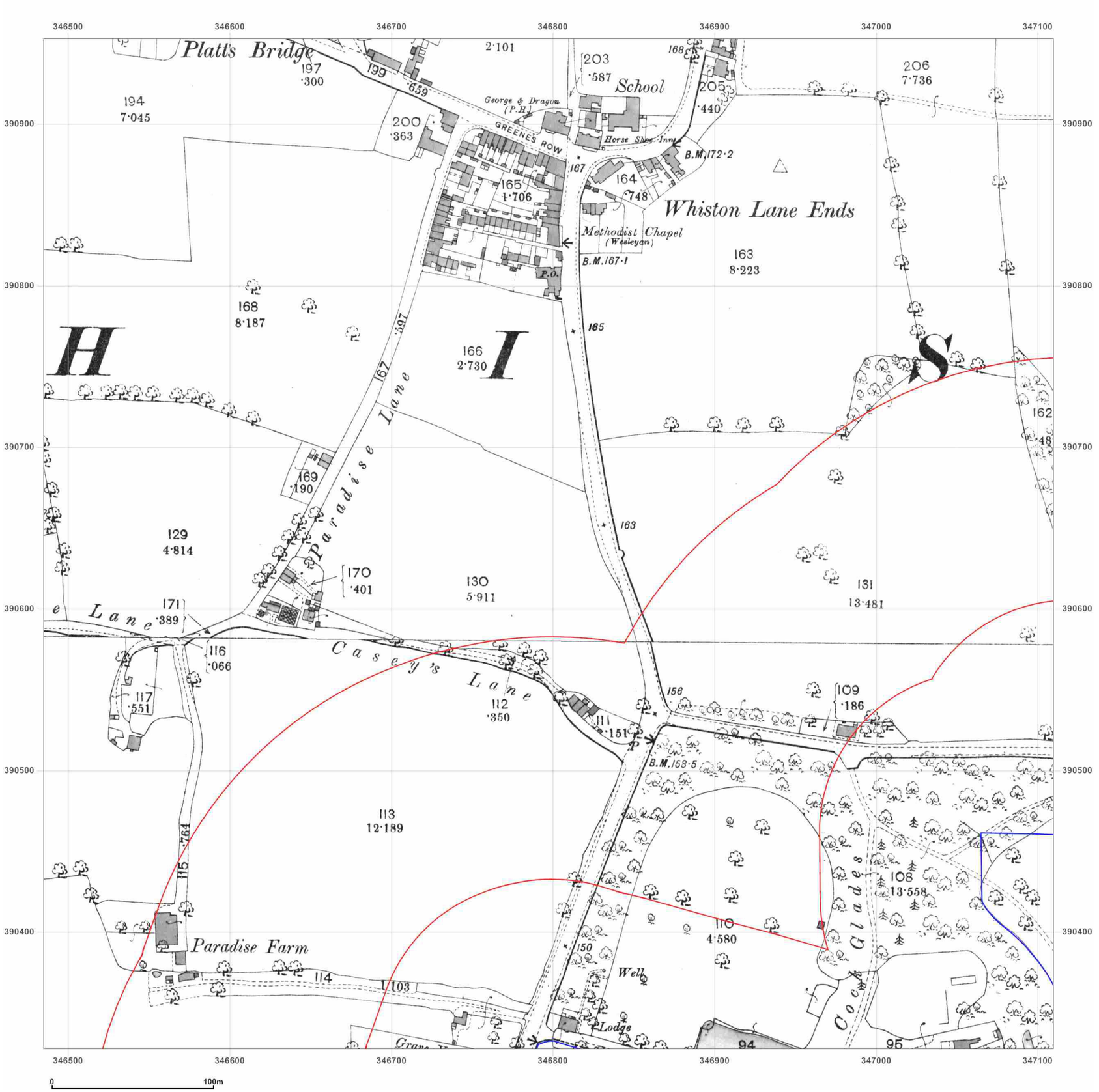
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Site Details:

HALSNEAD PARK WHISTON

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Report Ref: EMS-418542_559267_LS_1_2
Grid Ref: 346797, 390640

Map Name: County Series

Map date: **1892**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1892
Revised 1892
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1892
Revised 1892
Edition N/A
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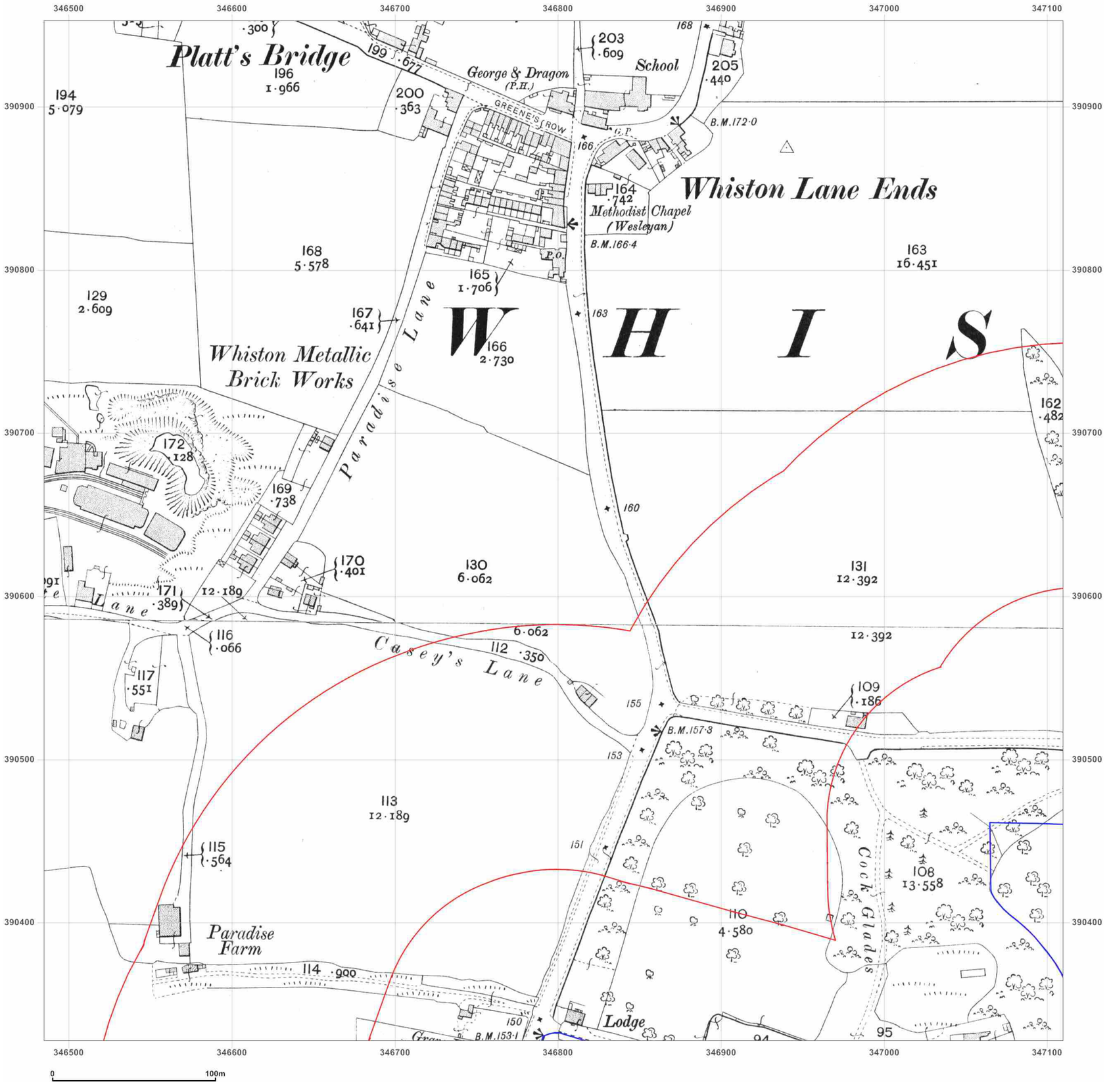
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Report Ref: EMS-418542_559267_LS_1_2
Grid Ref: 346797, 390640

Map Name: County Series

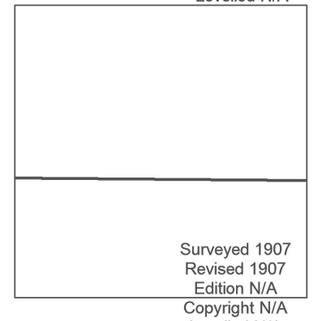
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Surveyed 1907
Revised 1907
Edition N/A
Copyright N/A
Levelled N/A



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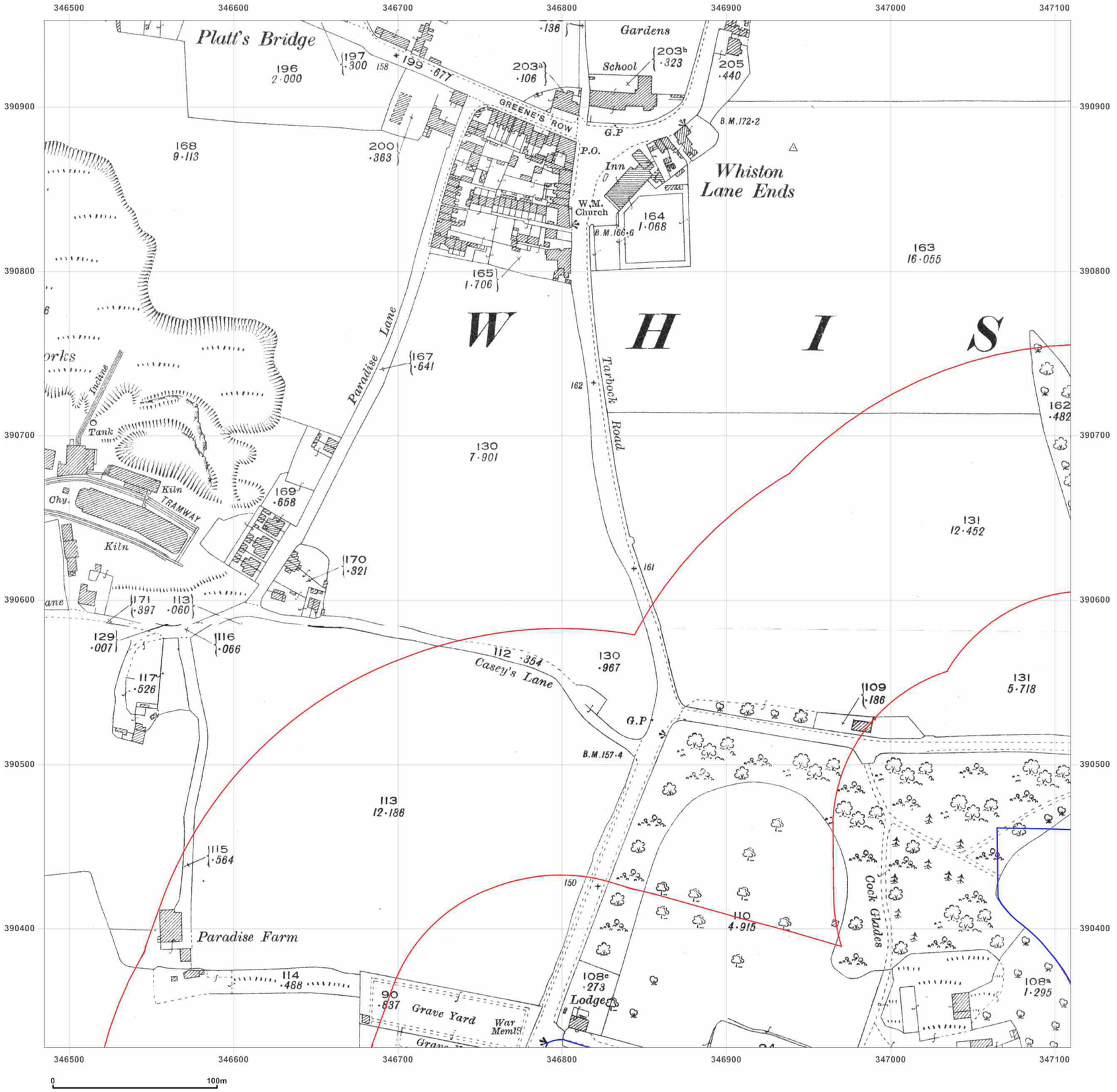
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_1_2
Grid Ref: 346797, 390640

Map Name: County Series

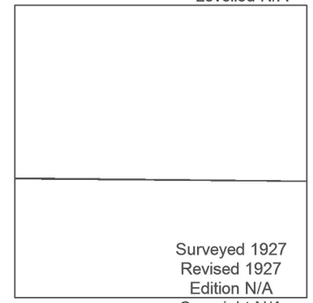
Map date: **1927**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1927
Revised 1927
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1927
Revised 1927
Edition N/A
Copyright N/A
Levelled N/A

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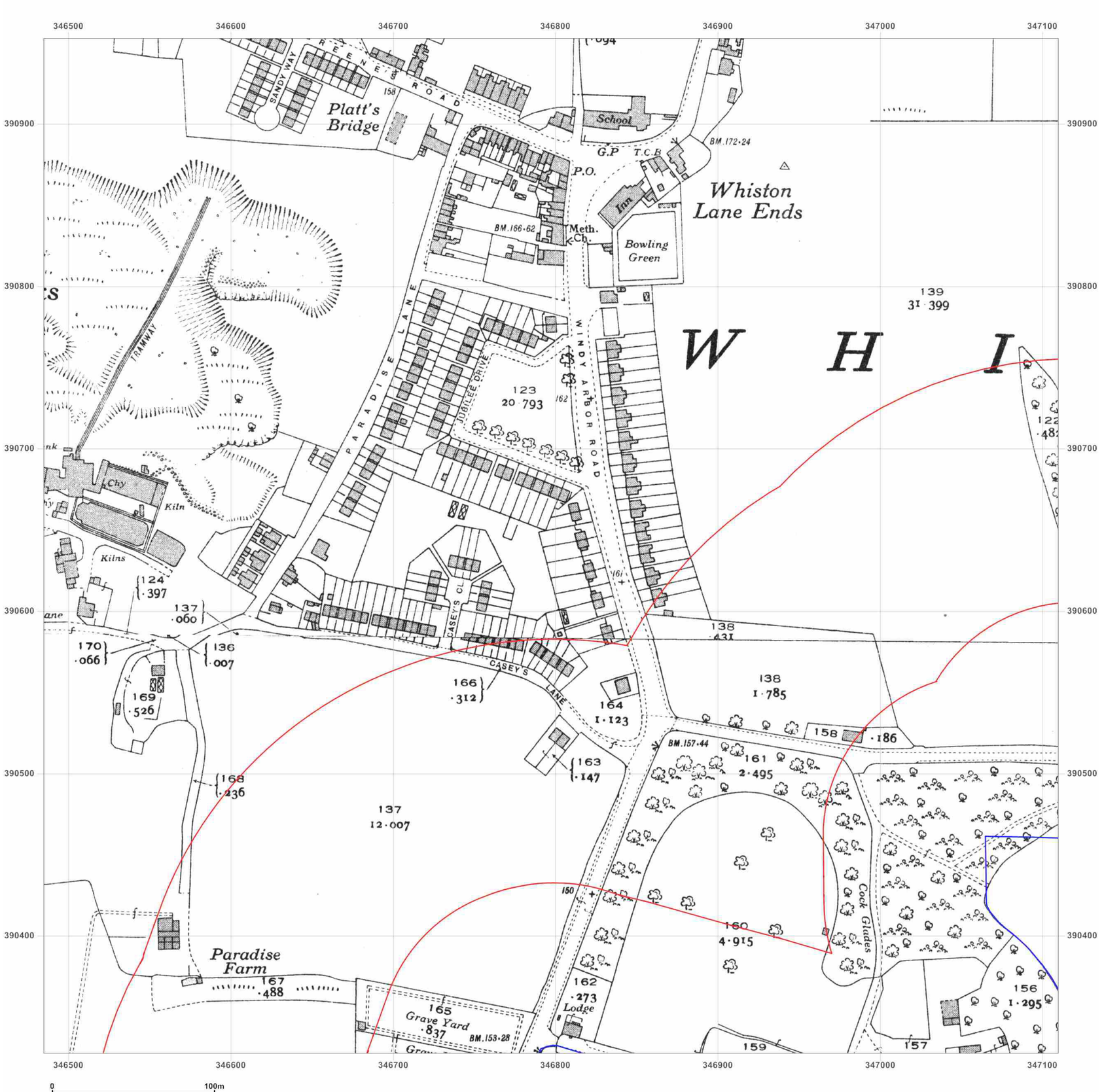
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_1_2
Grid Ref: 346797, 390640

Map Name: County Series

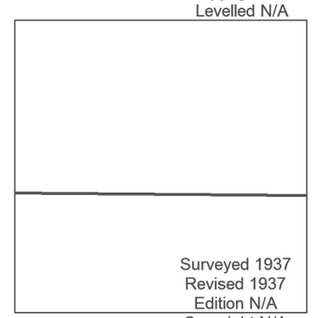
Map date: **1937**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1937
Revised 1937
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1937
Revised 1937
Edition N/A
Copyright N/A
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_1_2
Grid Ref: 346797, 390640

Map Name: National Grid

Map date: **1958**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1958
Revised 1958
Edition N/A
Copyright 1959
Levelled 1926

Surveyed 1958
Revised 1958
Edition N/A
Copyright 1959
Levelled 1926

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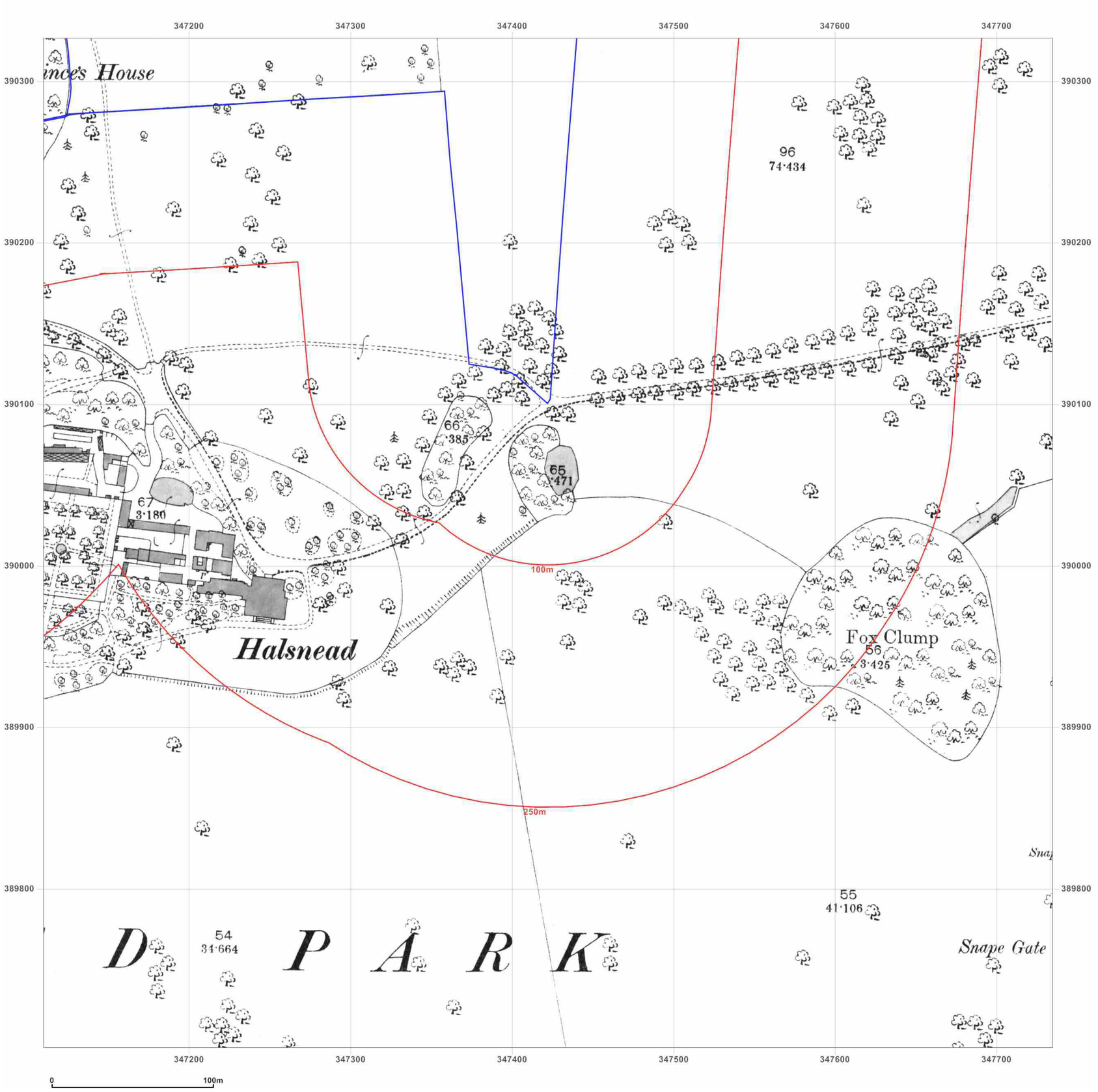
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_1
Grid Ref: 347422, 390014

Map Name: County Series

Map date: **1892**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1892
Revised 1892
Edition N/A
Copyright N/A
Levelled N/A

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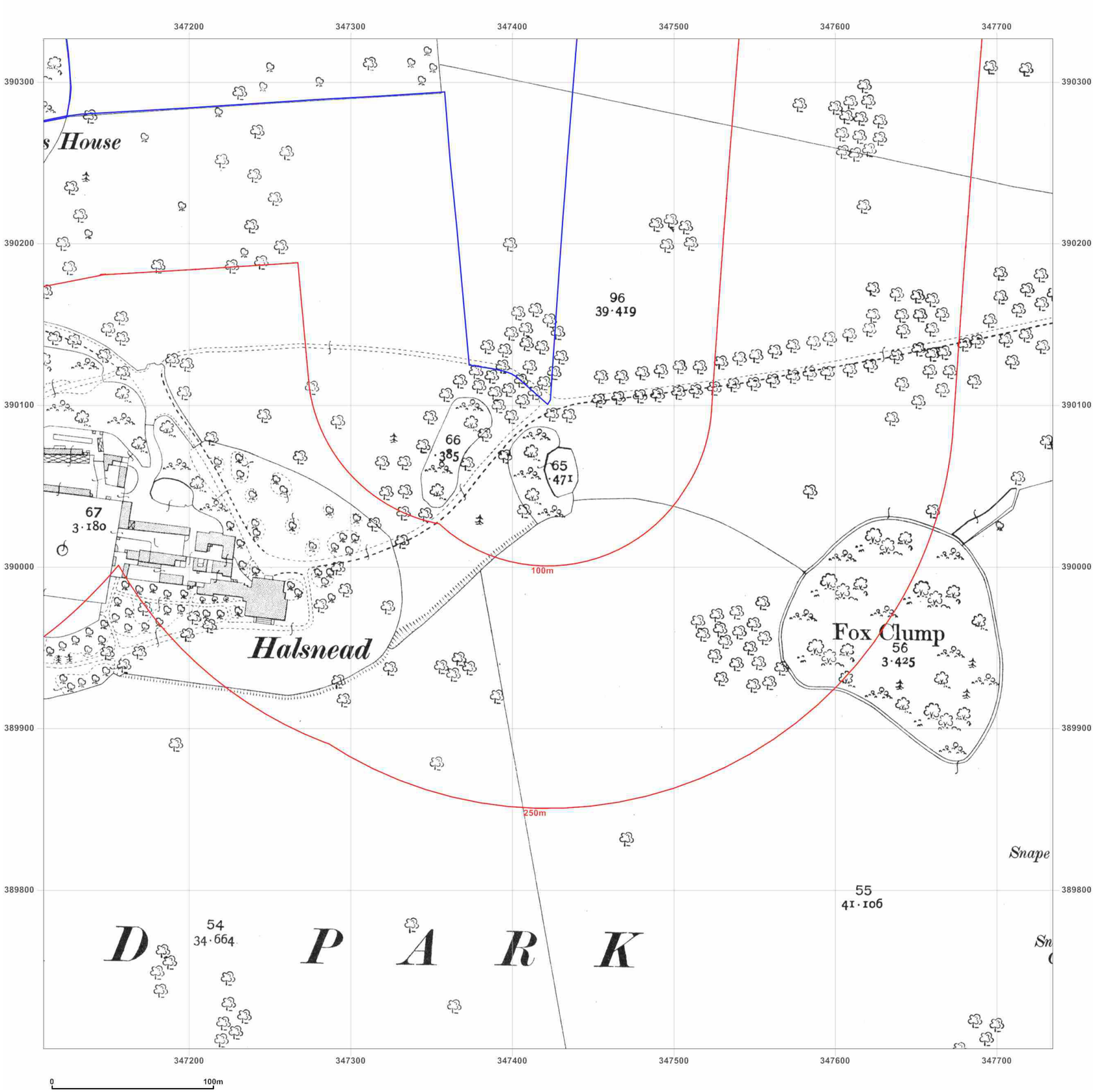
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_1
Grid Ref: 347422, 390014

Map Name: County Series

Map date: **1907**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1907
Revised 1907
Edition N/A
Copyright N/A
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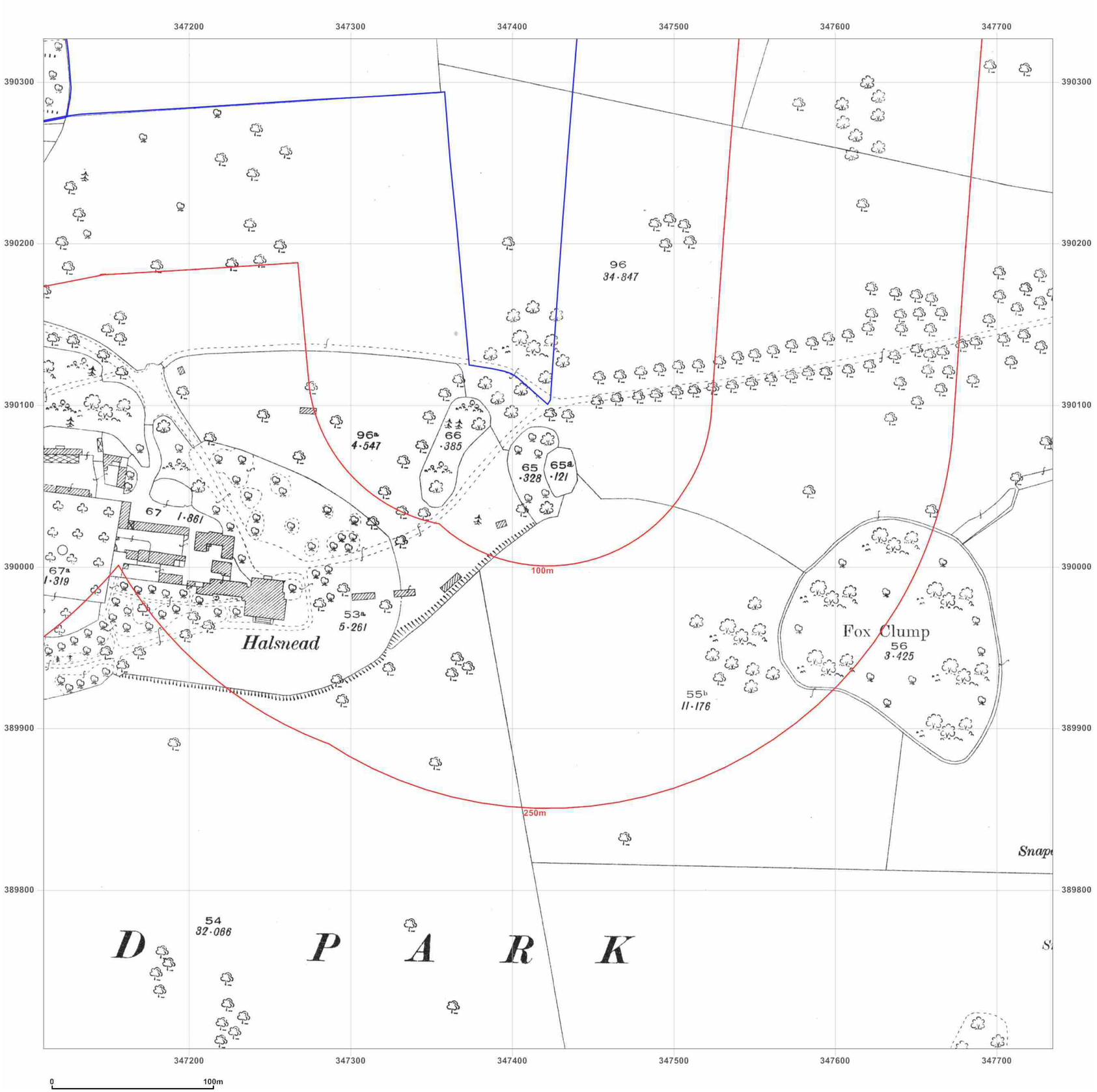
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_1
Grid Ref: 347422, 390014

Map Name: County Series

Map date: **1927**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1927
Revised 1927
Edition N/A
Copyright N/A
Levelled N/A

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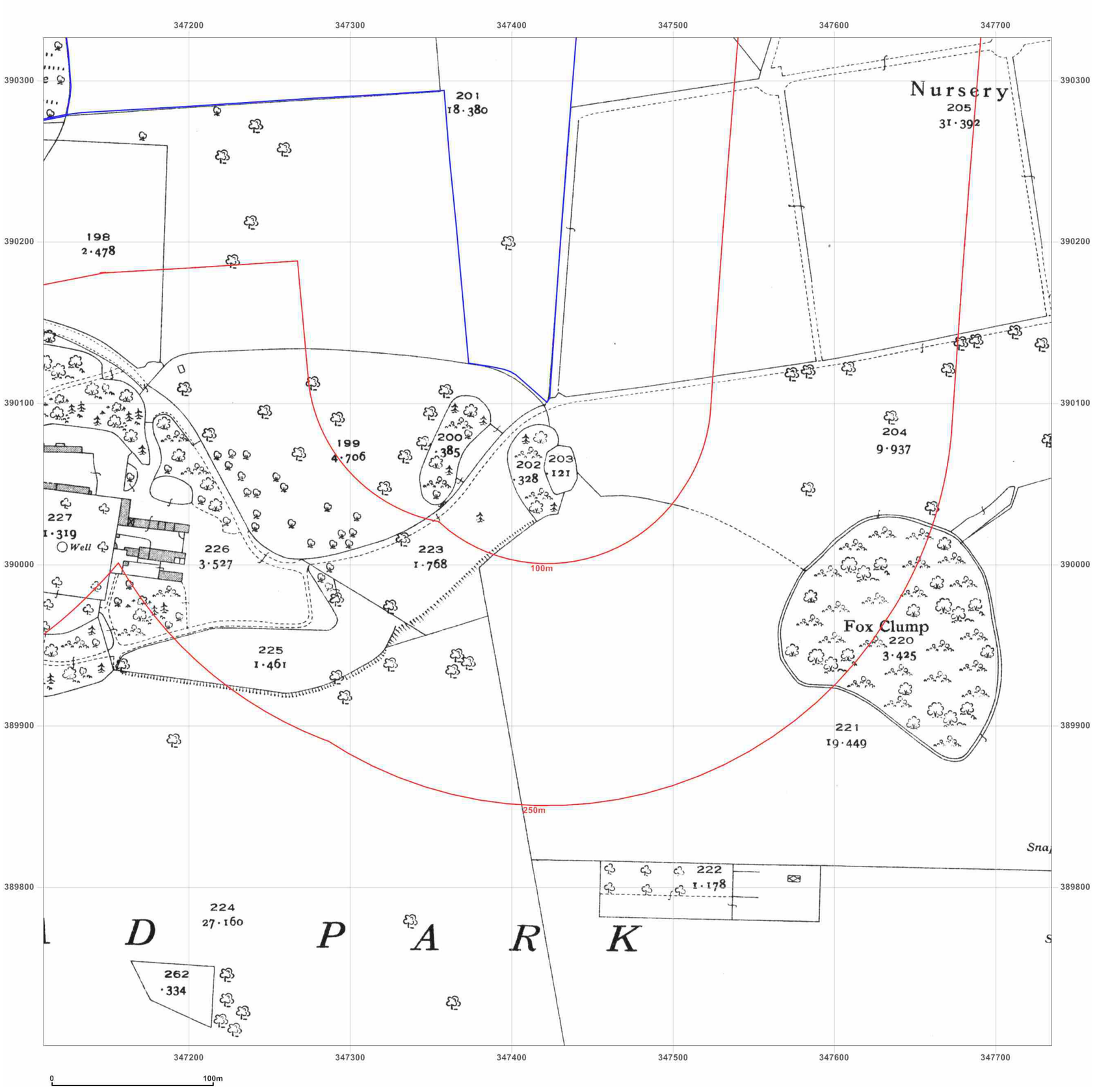
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HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_1
Grid Ref: 347422, 390014

Map Name: County Series
Map date: **1937**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1937
Revised 1937
Edition N/A
Copyright N/A
Levelled N/A

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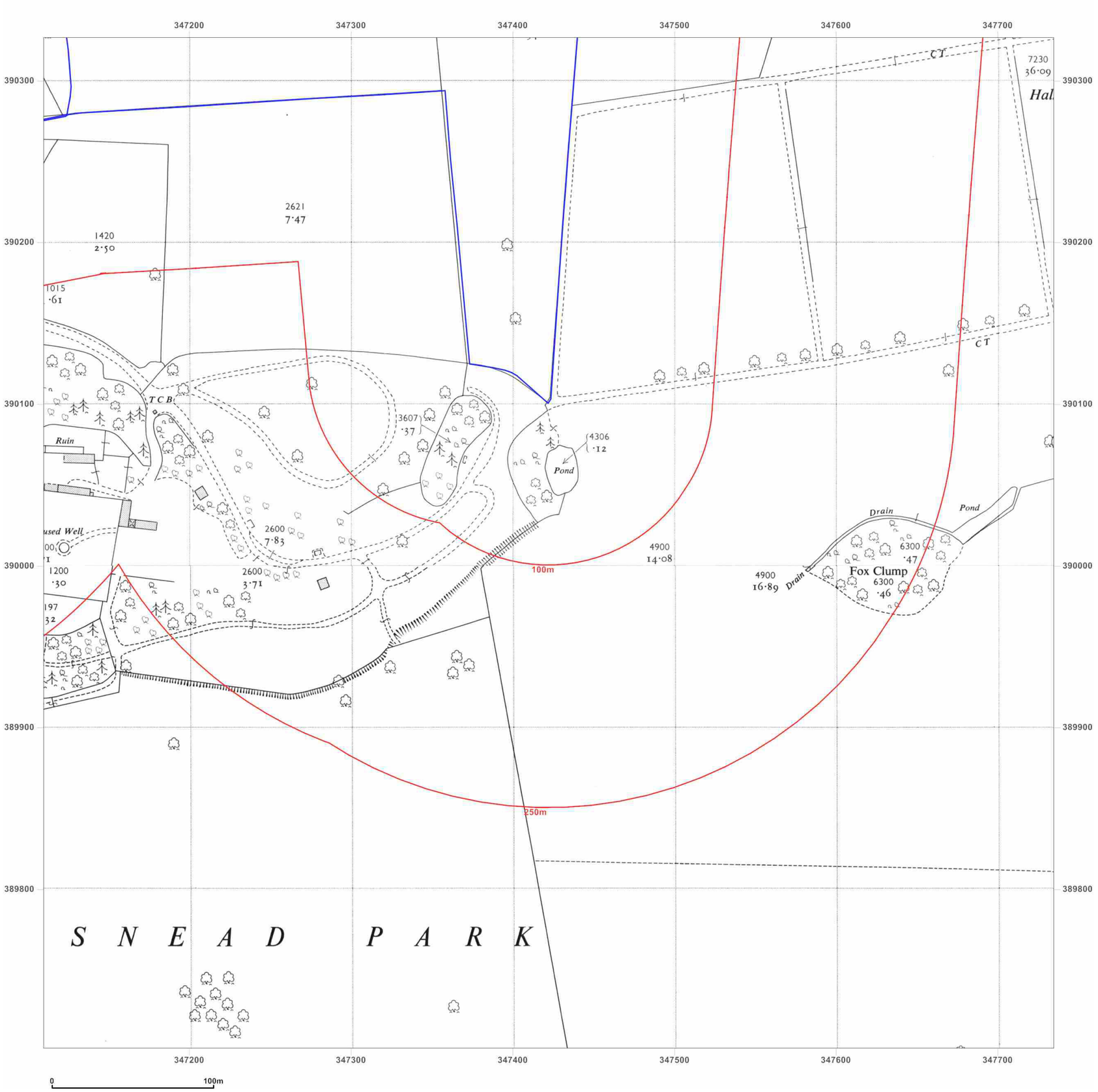
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HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_1
Grid Ref: 347422, 390014

Map Name: National Grid

Map date: **1958**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1958
Revised 1958
Edition N/A
Copyright 1959
Levelled 1926

Surveyed 1958
Revised 1958
Edition N/A
Copyright 1959
Levelled 1957

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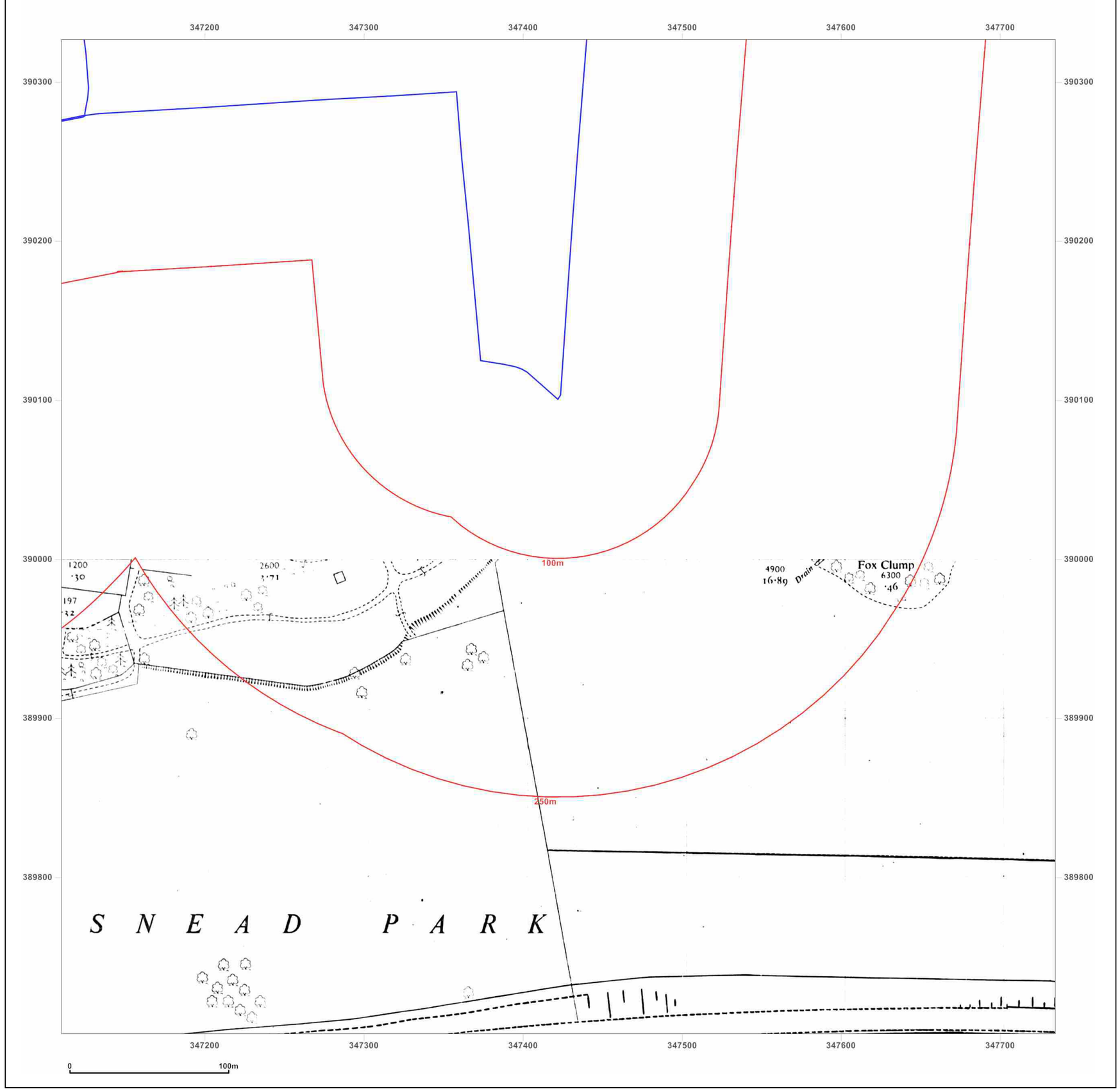
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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_1
Grid Ref: 347422, 390014

Map Name: National Grid

Map date: **1980**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1980
Levelled 1963

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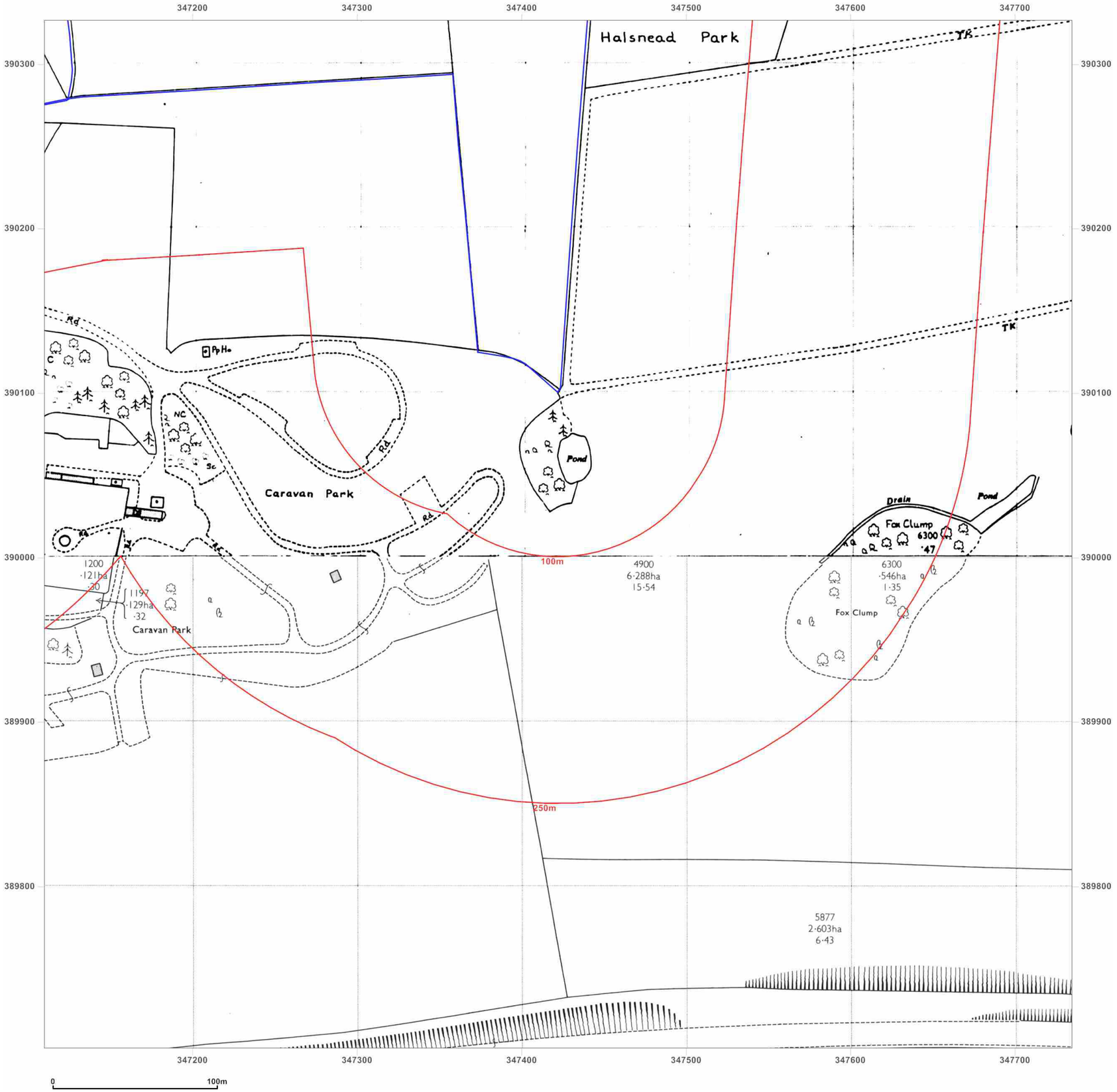
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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_1
Grid Ref: 347422, 390014

Map Name: National Grid

Map date: **1980-1985**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1963
Revised 1985
Edition N/A
Copyright 1985
Levelled 1963

Surveyed 1980
Revised 1980
Edition N/A
Copyright 1981
Levelled 1963

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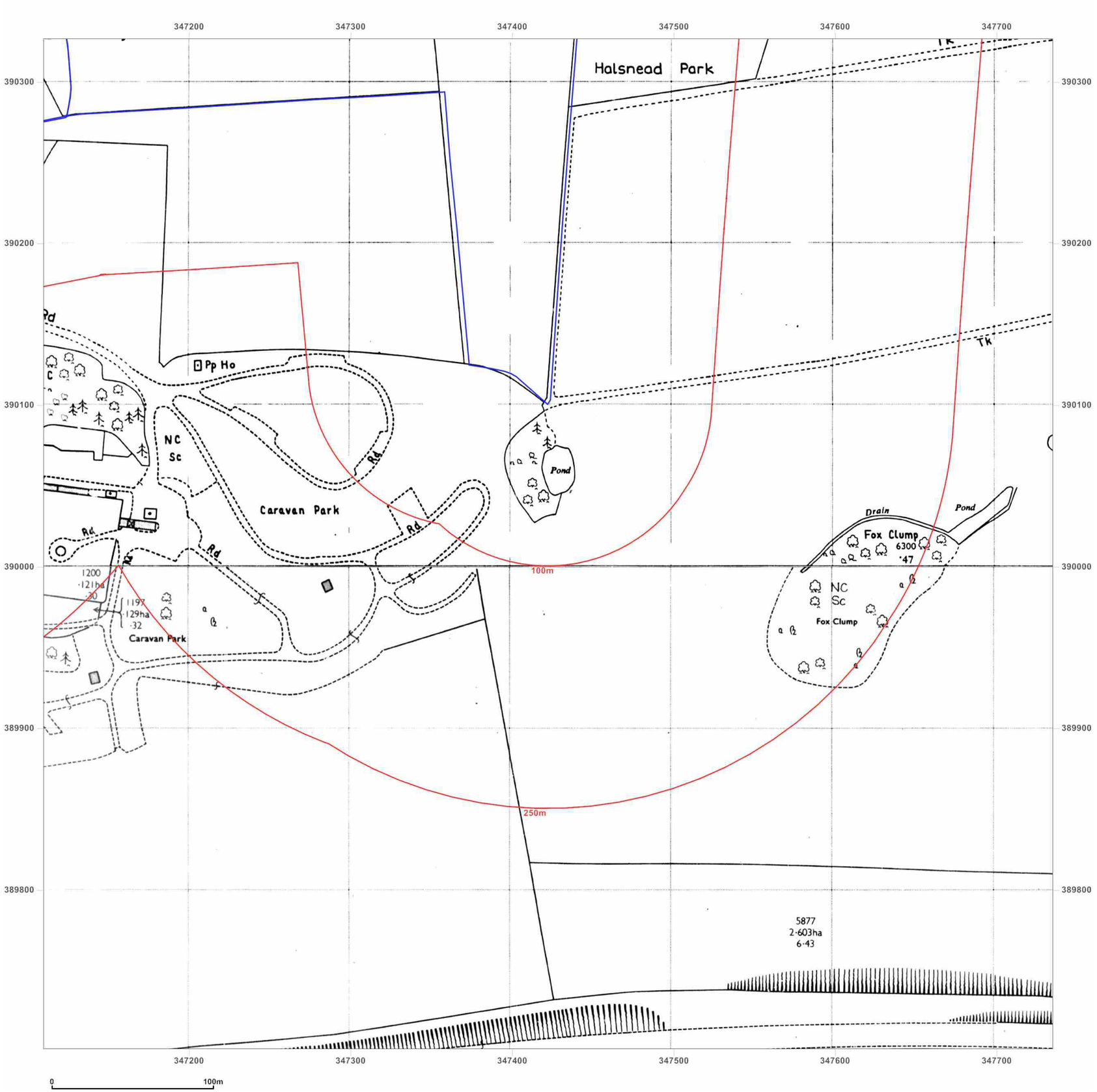
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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_1
Grid Ref: 347422, 390014

Map Name: National Grid

Map date: **1986-1989**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1963
Revised 1986
Edition N/A
Copyright 1986
Levelled 1963

Surveyed 1963
Revised 1989
Edition N/A
Copyright 1989
Levelled 1963

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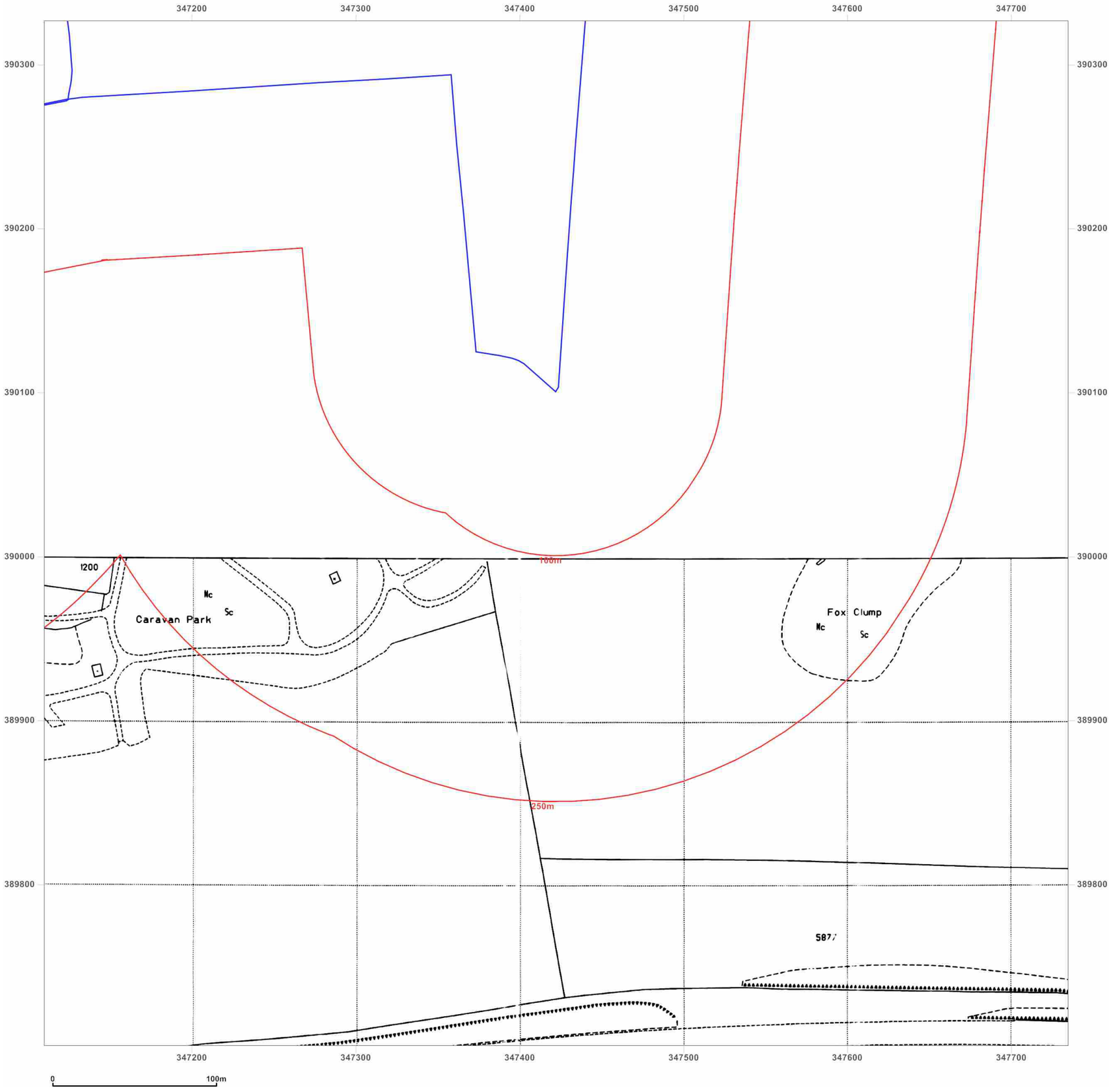
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_1
Grid Ref: 347422, 390014

Map Name: National Grid

Map date: **1993**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

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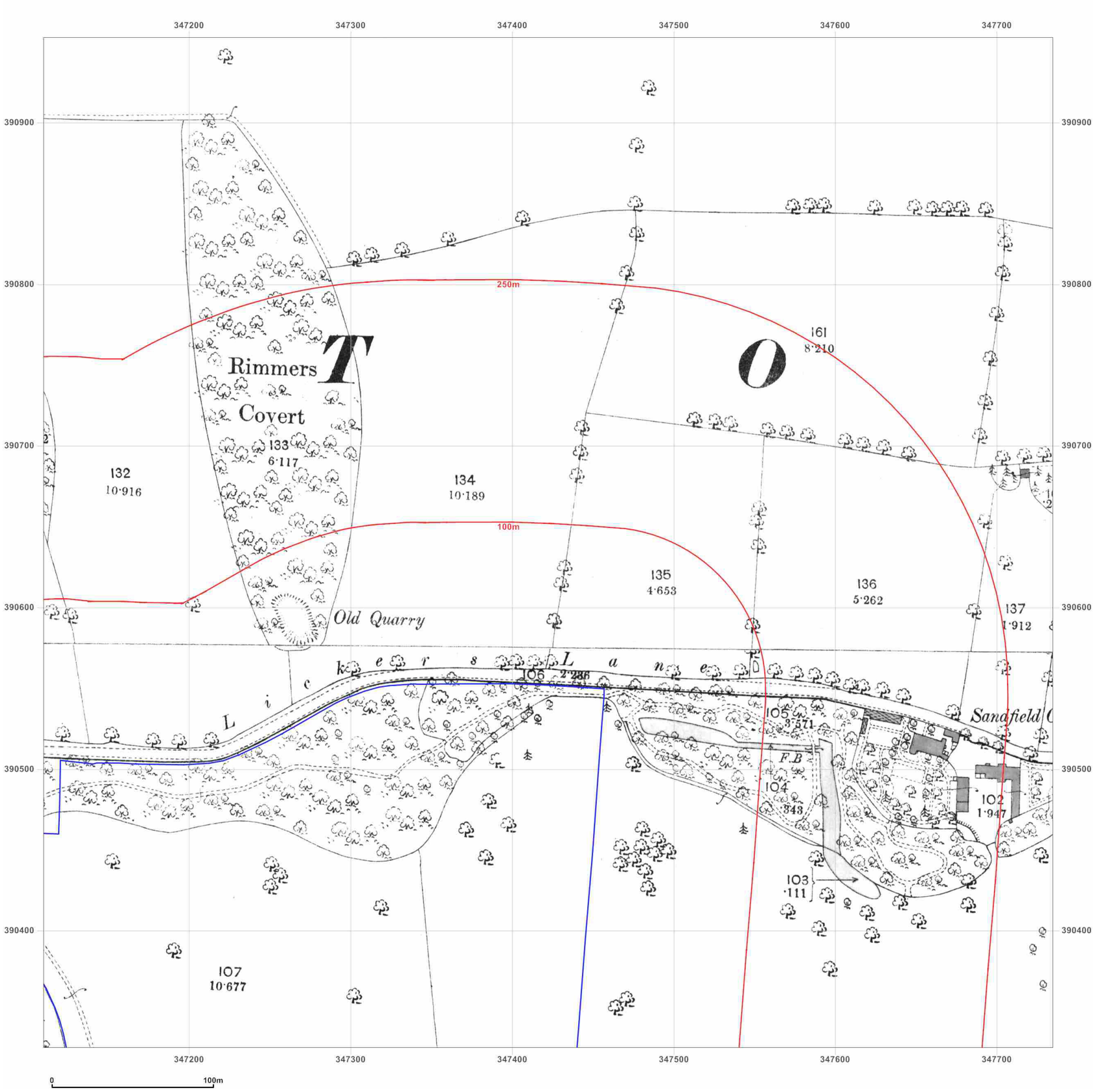
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_2
Grid Ref: 347422, 390640

Map Name: County Series

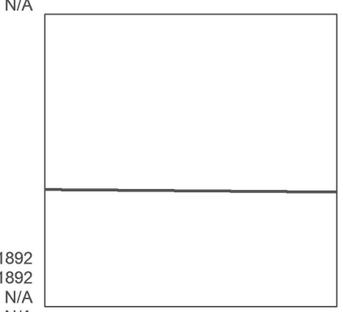
Map date: **1892**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1892
Revised 1892
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1892
Revised 1892
Edition N/A
Copyright N/A
Levelled N/A

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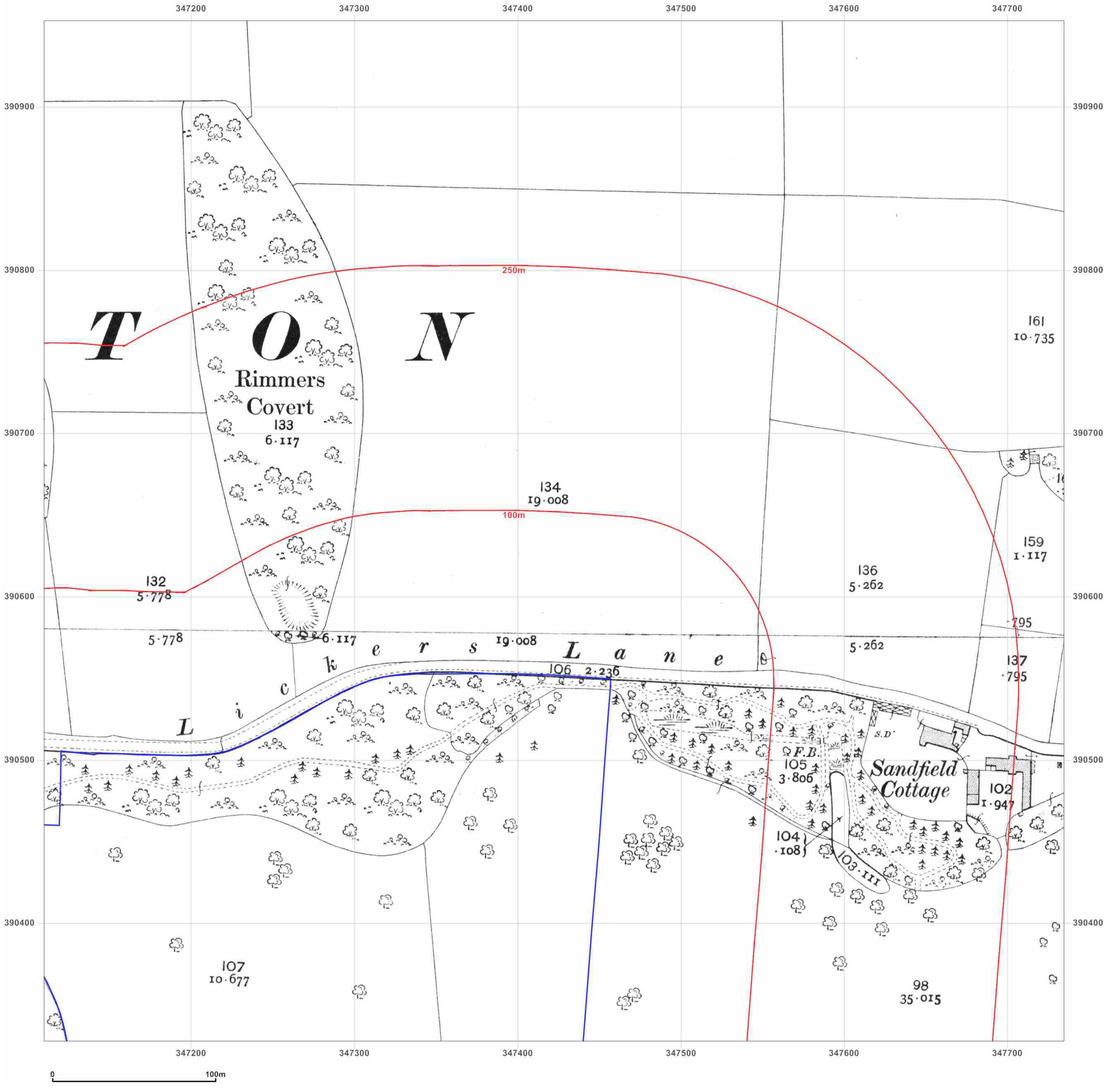
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_2
Grid Ref: 347422, 390640

Map Name: County Series

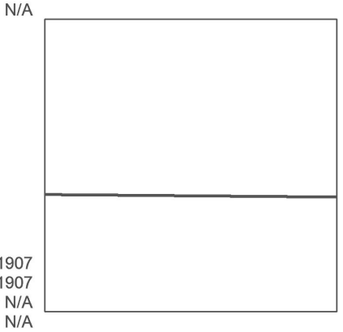
Map date: **1907**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1907
Revised 1907
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1907
Revised 1907
Edition N/A
Copyright N/A
Levelled N/A

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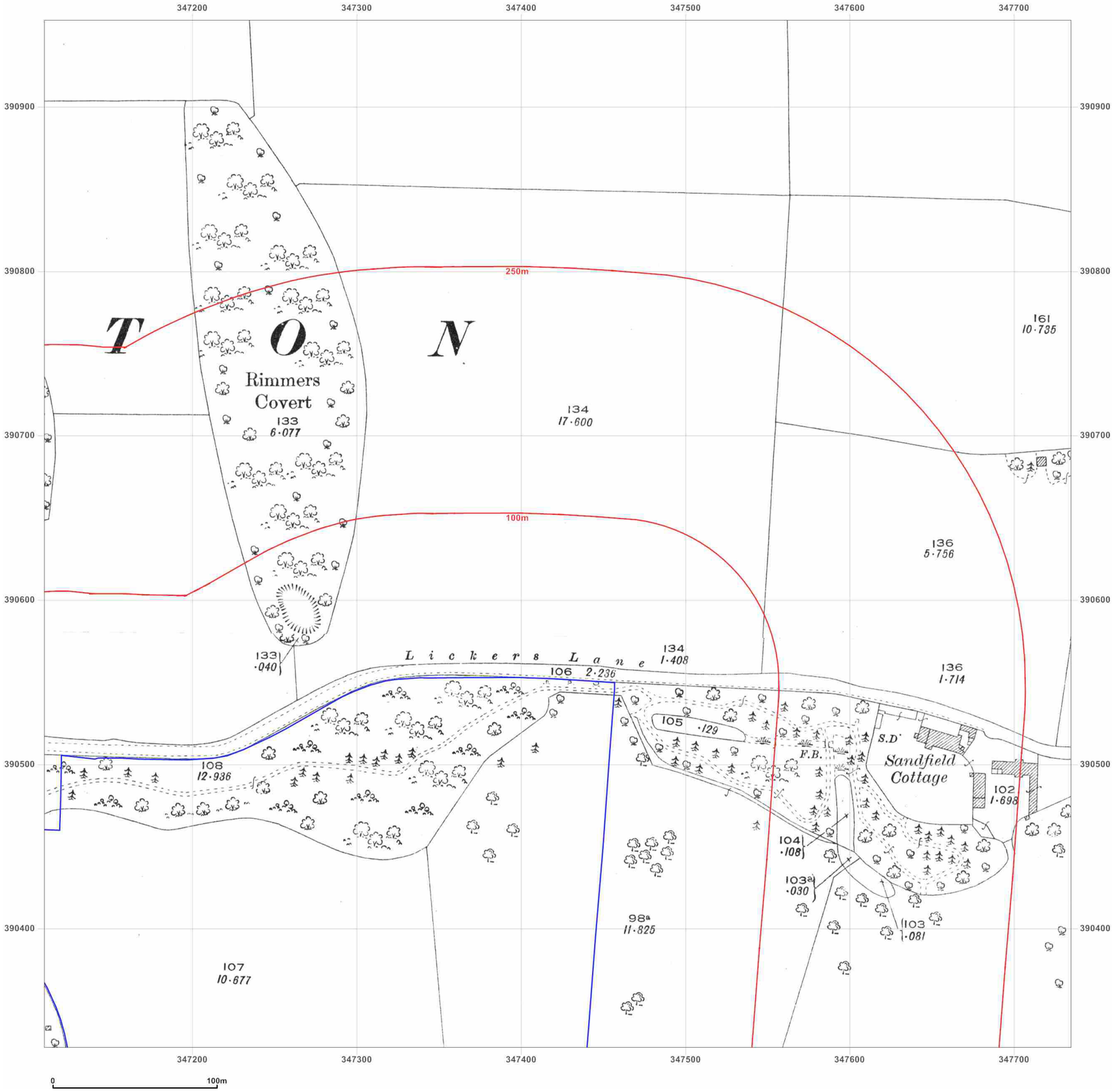
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_2
Grid Ref: 347422, 390640

Map Name: County Series

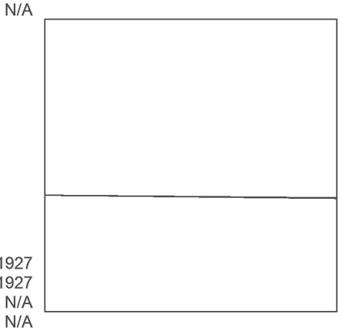
Map date: **1927**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1927
Revised 1927
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1927
Revised 1927
Edition N/A
Copyright N/A
Levelled N/A

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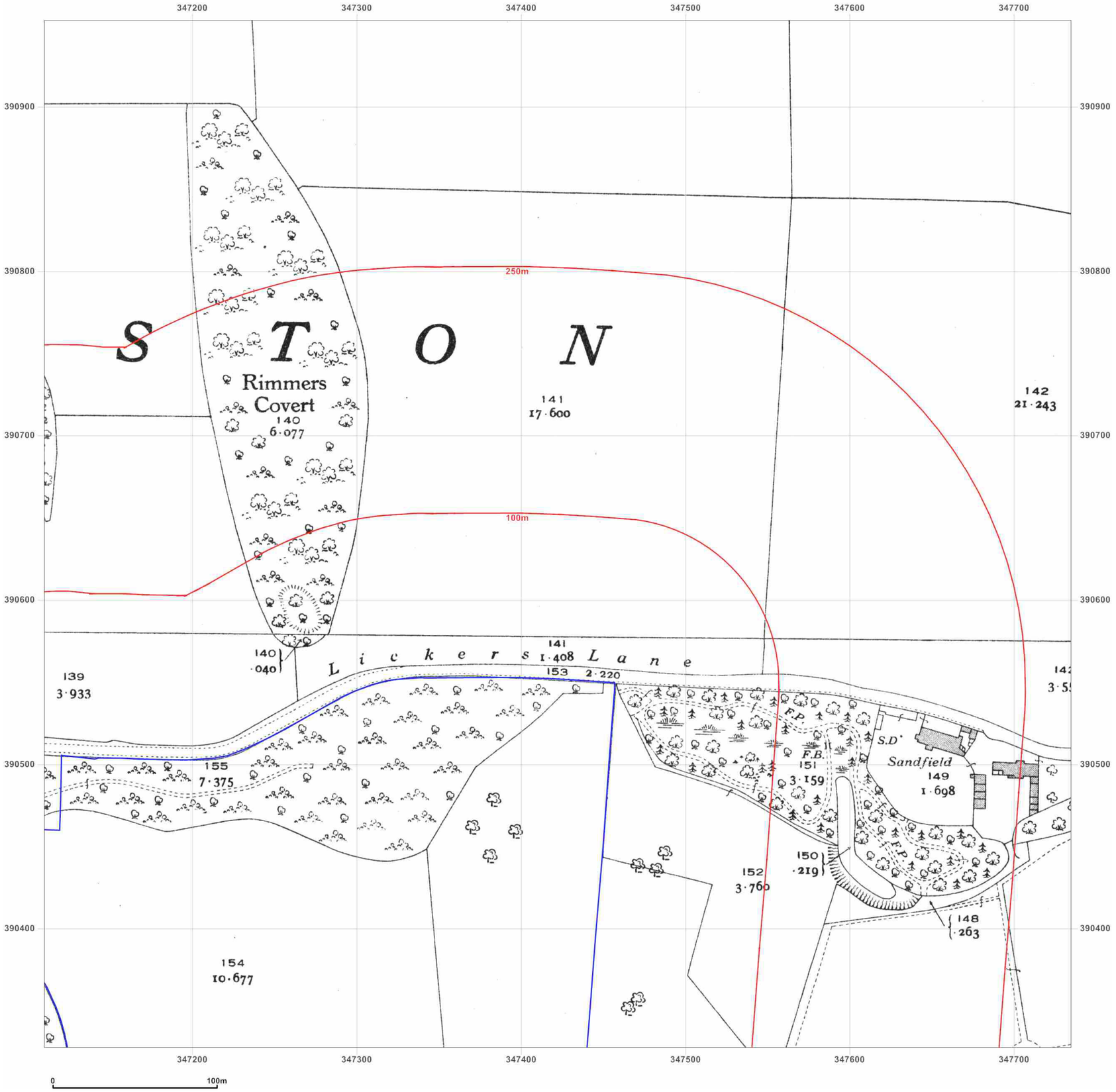
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_2
Grid Ref: 347422, 390640

Map Name: County Series

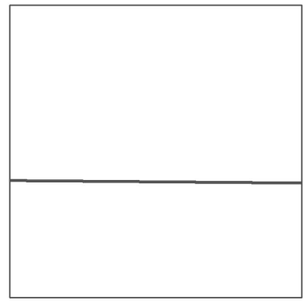
Map date: **1937**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1937
Revised 1937
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1937
Revised 1937
Edition N/A
Copyright N/A
Levelled N/A

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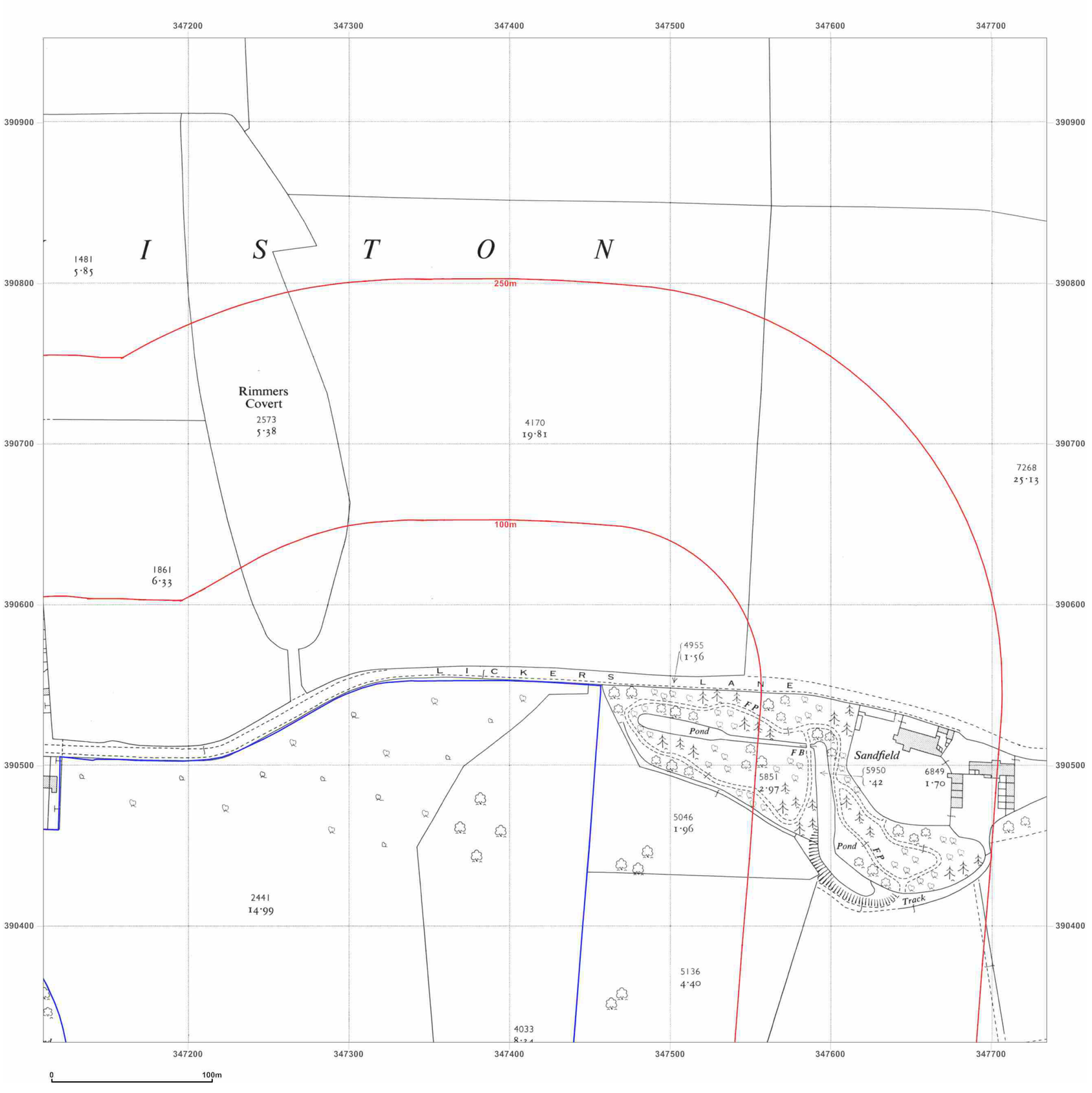
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_2
Grid Ref: 347422, 390640

Map Name: National Grid

Map date: **1958**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1958
Revised 1958
Edition N/A
Copyright 1959
Levelled 1926

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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_2
Grid Ref: 347422, 390640

Map Name: National Grid

Map date: **1985**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1963
Revised 1985
Edition N/A
Copyright 1985
Levelled 1963

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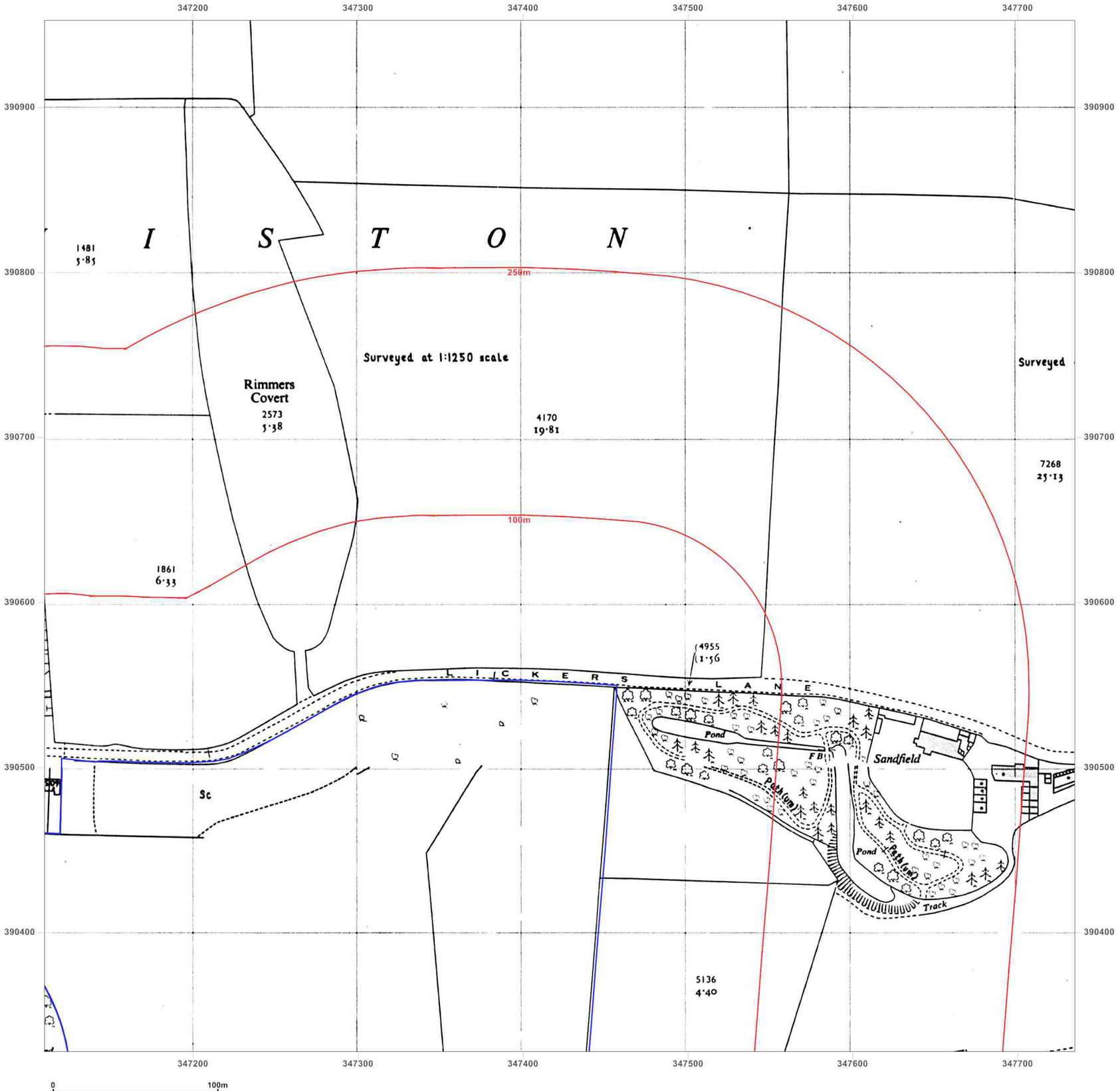
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_LS_2_2
Grid Ref: 347422, 390640

Map Name: National Grid
Map date: **1986**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1963
Revised 1986
Edition N/A
Copyright 1986
Levelled 1963

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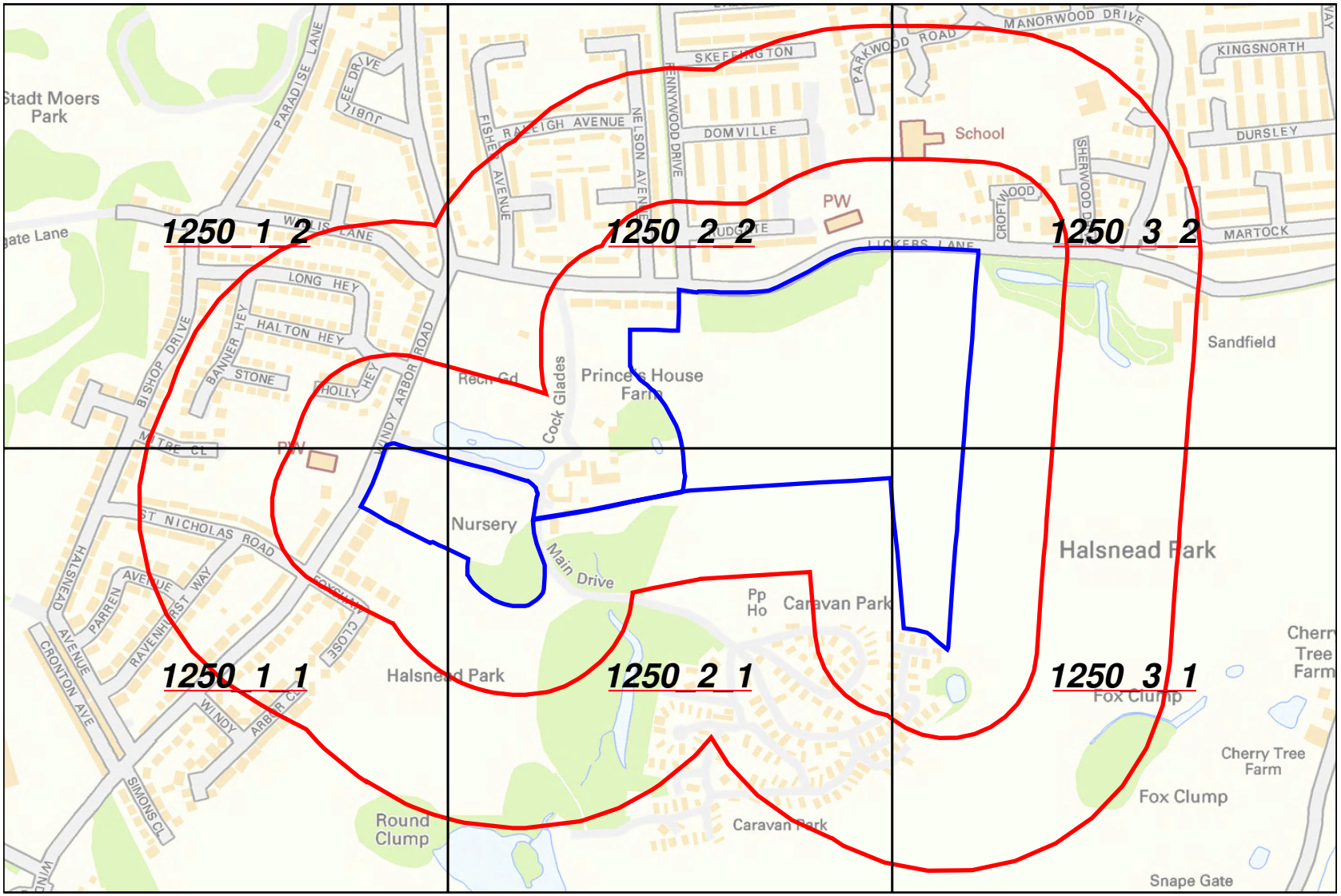
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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_1_1
Grid Ref: 346610, 390077

Map Name: National Grid

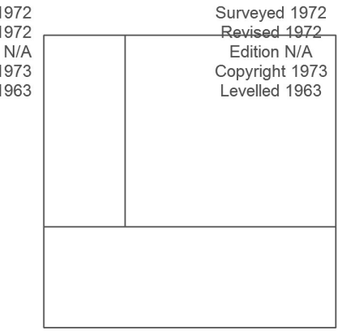
Map date: **1973**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed 1972
Revised 1972
Edition N/A
Copyright 1973
Levelled 1963



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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_1_1
Grid Ref: 346610, 390077

Map Name: National Grid

Map date: **1981-1984**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed N/A	Surveyed 1963
Revised N/A	Revised 1984
Edition N/A	Edition N/A
Copyright N/A	Copyright 1984
Levelled N/A	Levelled 1963

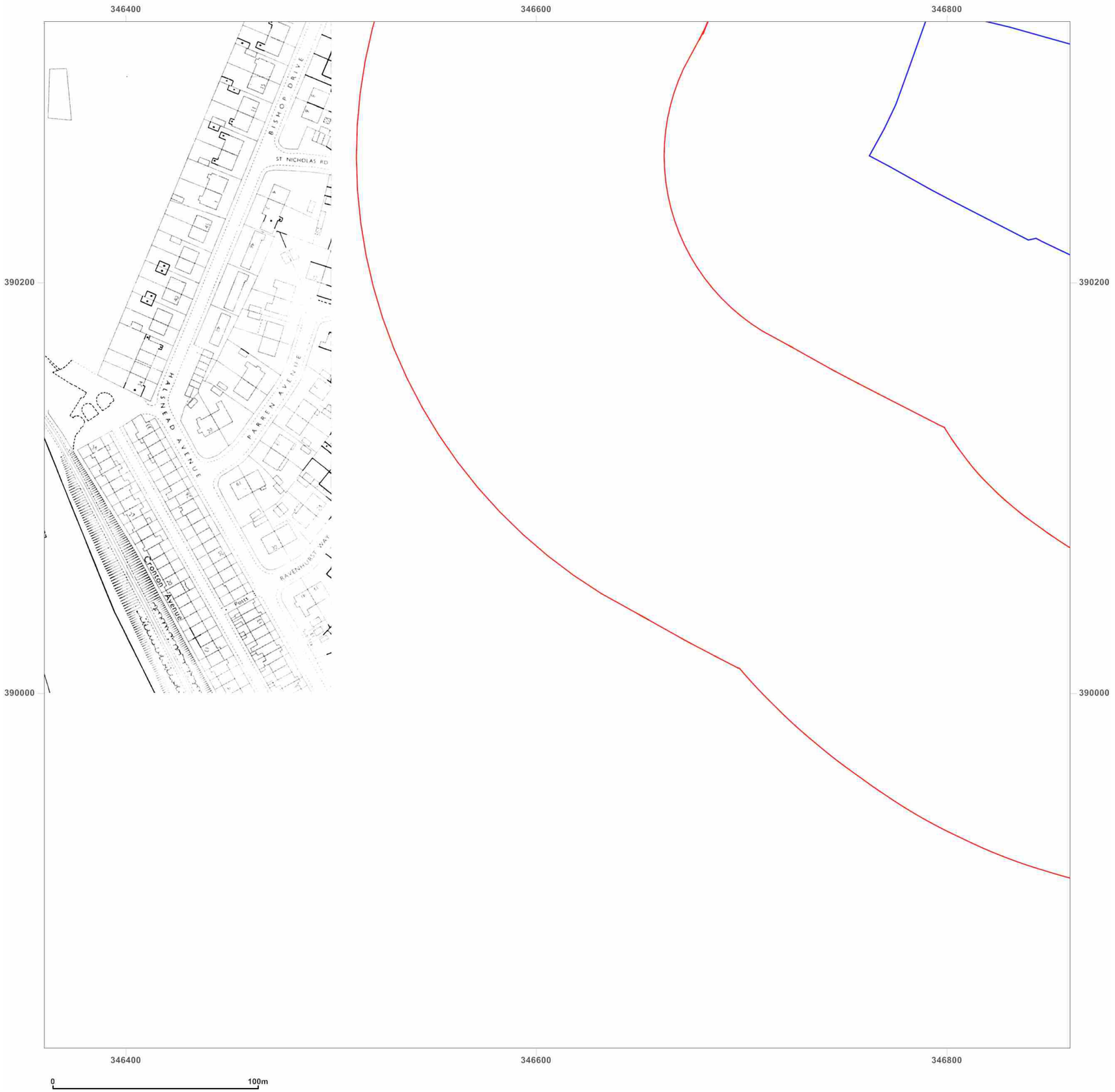
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_1_1
Grid Ref: 346610, 390077

Map Name: National Grid

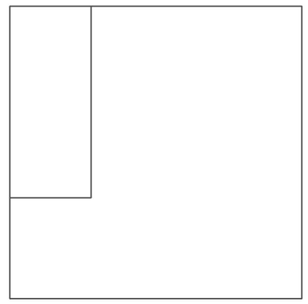
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Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1957
Revised 1987
Edition N/A
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_1_1
Grid Ref: 346610, 390077

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed N/A
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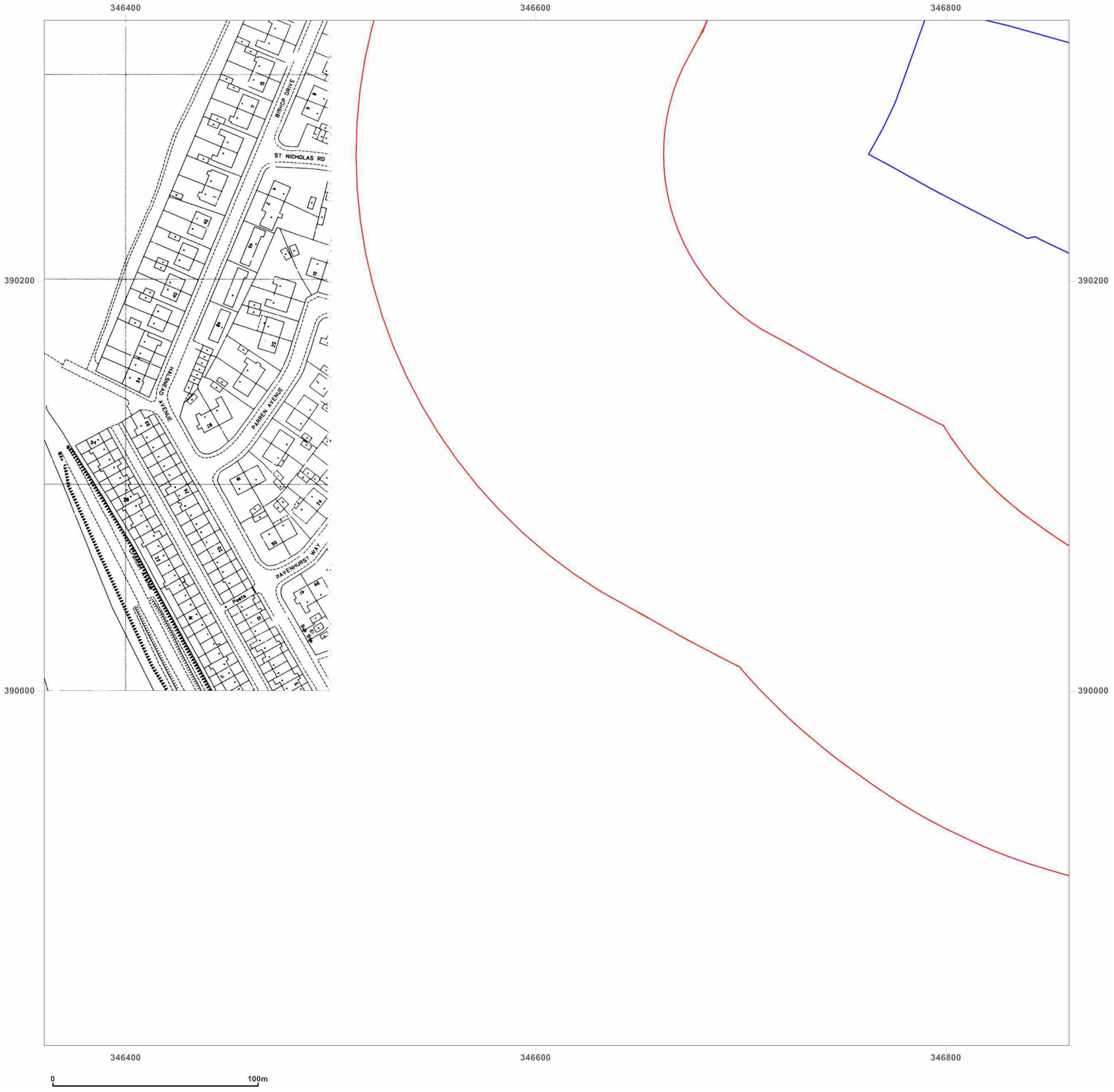
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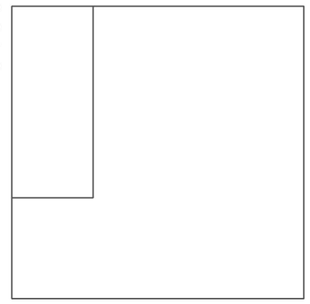
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Grid Ref: 346610, 390077

Map Name: National Grid
Map date: **1994**
Scale: 1:1,250
Printed at: 1:2,000

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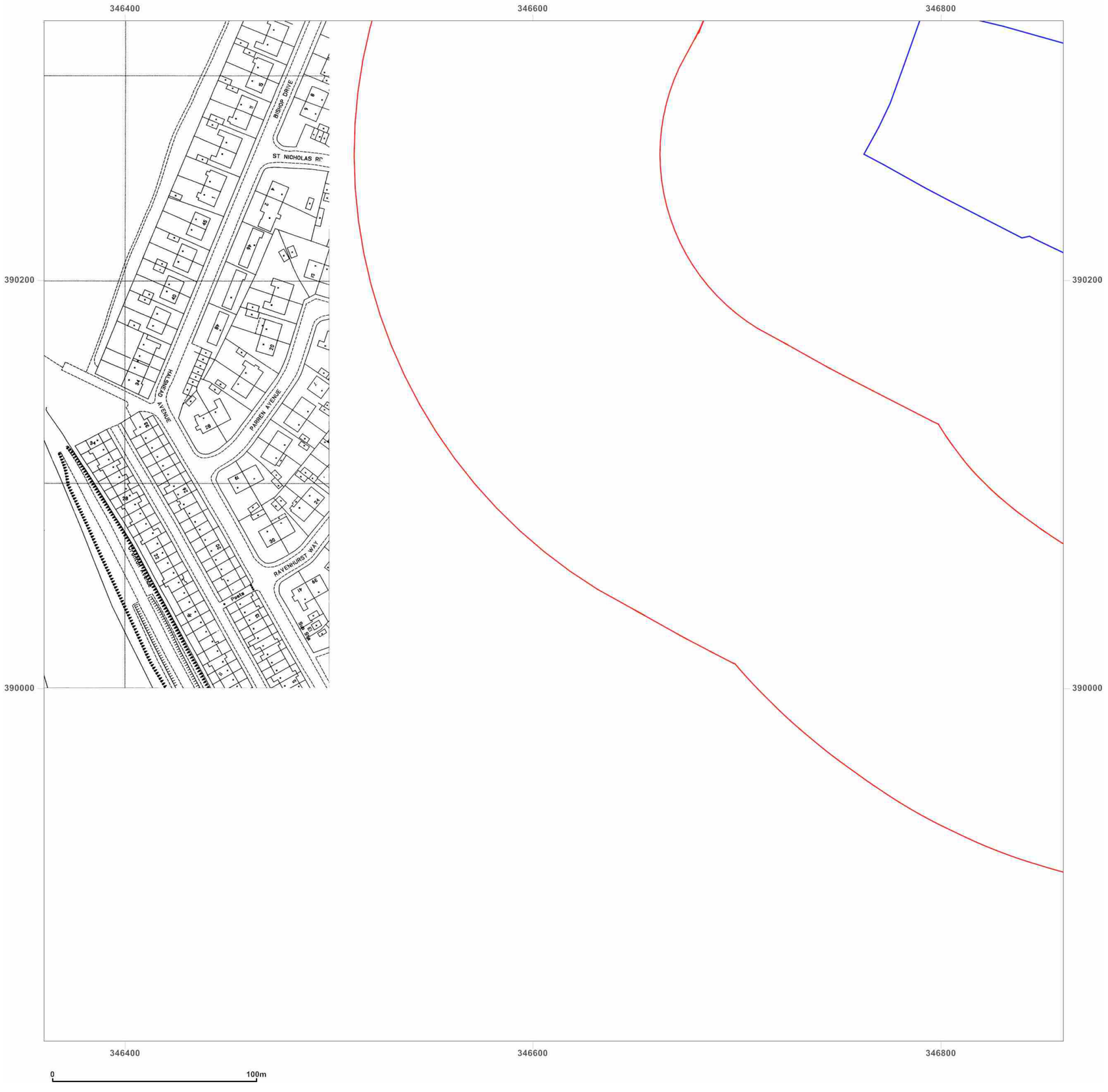
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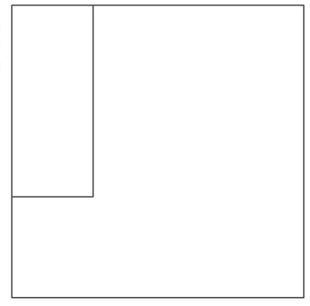
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Grid Ref: 346610, 390077

Map Name: National Grid
Map date: **1994**
Scale: 1:1,250
Printed at: 1:2,000

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_1_2
Grid Ref: 346610, 390577

Map Name: National Grid

Map date: **1973**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1972 Revised 1972 Edition N/A Copyright 1973 Levelled 1963	Surveyed 1972 Revised 1972 Edition N/A Copyright 1973 Levelled 1963

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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_1_2
Grid Ref: 346610, 390577

Map Name: National Grid
Map date: **1981-1984**
Scale: 1:1,250
Printed at: 1:2,000

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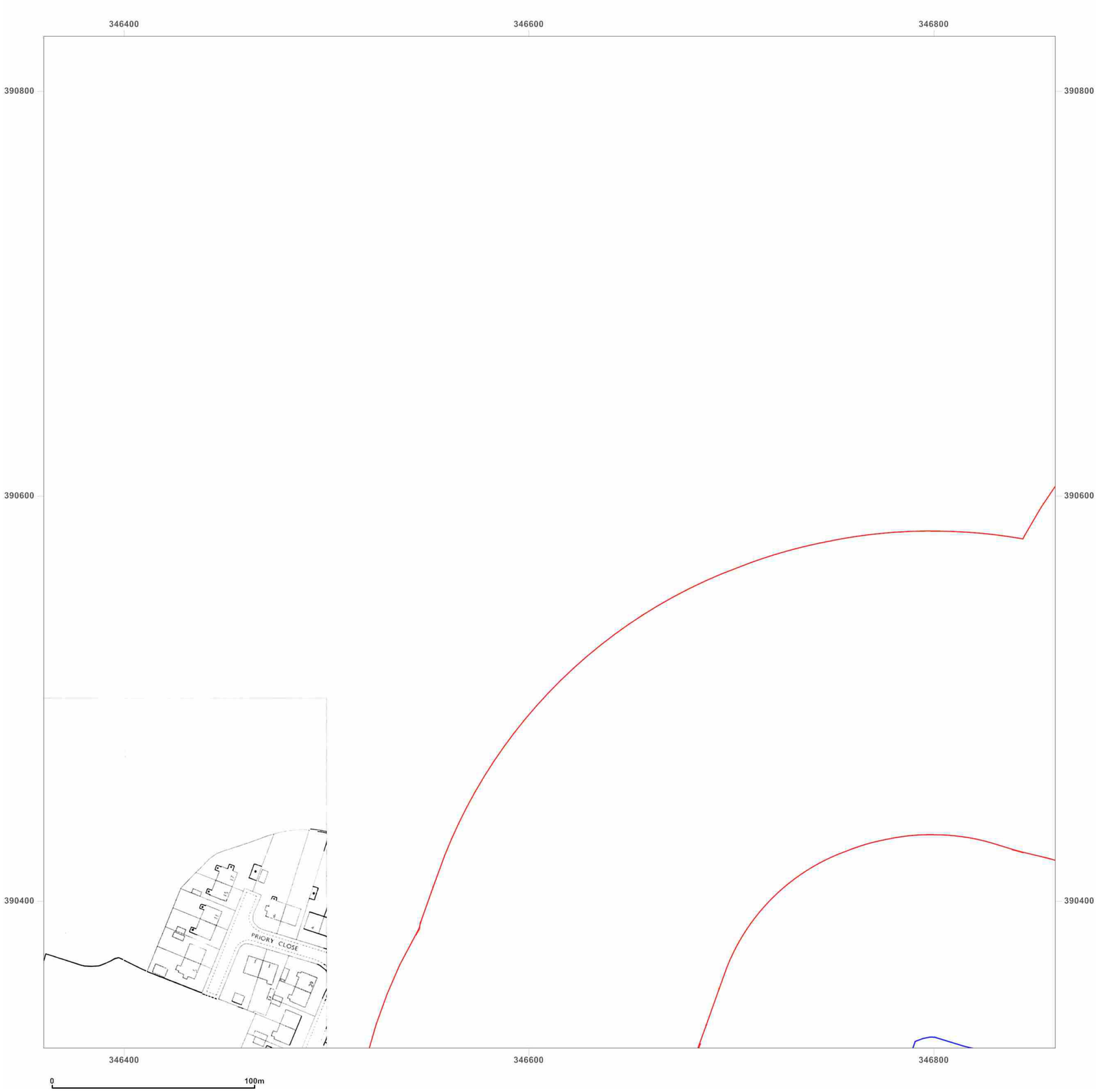
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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_1_2
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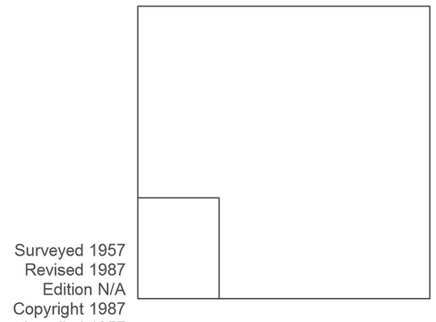
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Map date: **1987**

Scale: 1:1,250

Printed at: 1:2,000

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_1_2
Grid Ref: 346610, 390577

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1993 Revised 1993 Edition N/A Copyright N/A Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A
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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_1_2
Grid Ref: 346610, 390577

Map Name: National Grid

Map date: **1994**

Scale: 1:1,250

Printed at: 1:2,000

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_1_2
Grid Ref: 346610, 390577

Map Name: National Grid

Map date: **1994**

Scale: 1:1,250

Printed at: 1:2,000

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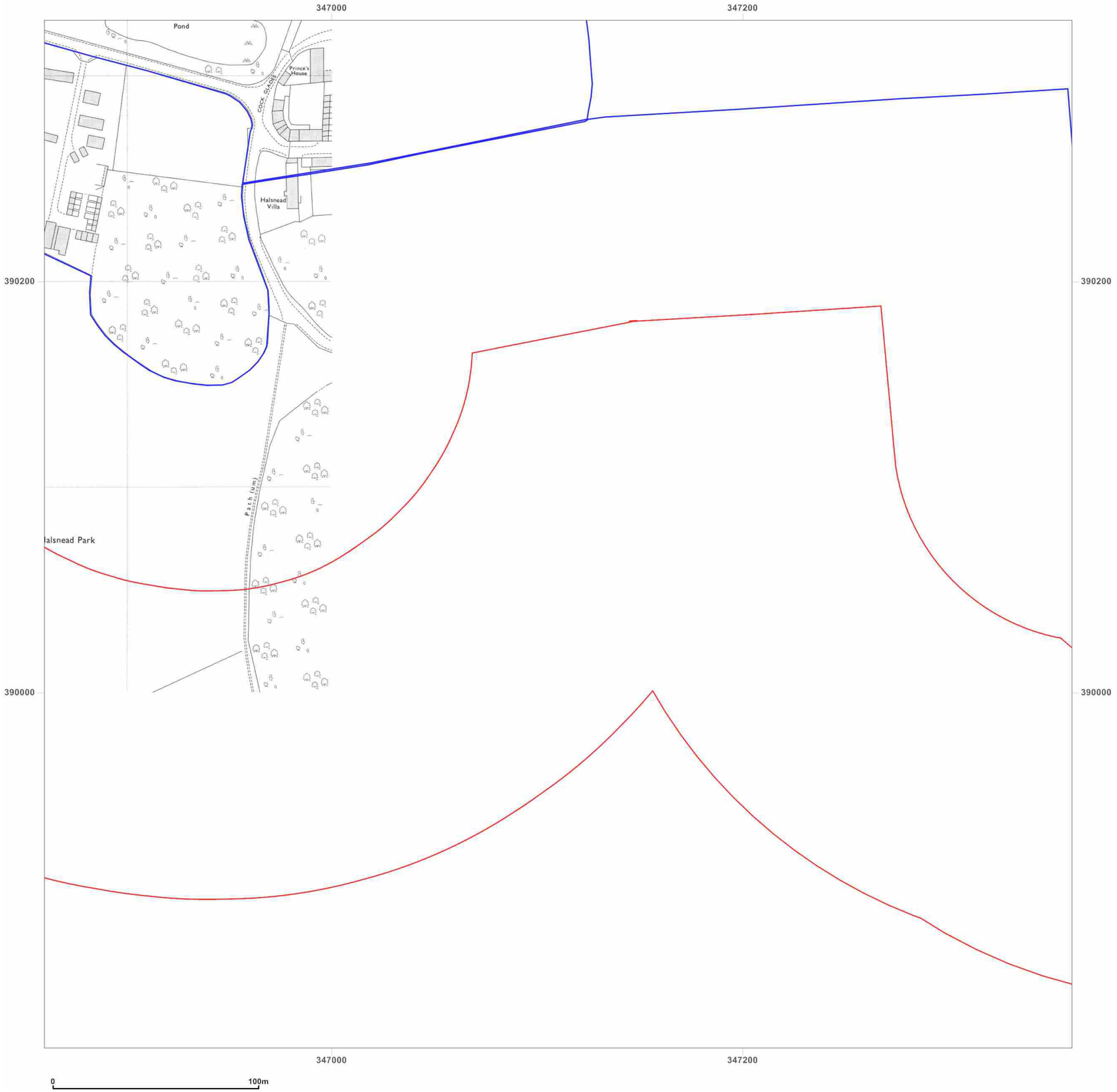
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Site Details:

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_2_1
Grid Ref: 347110, 390077

Map Name: National Grid

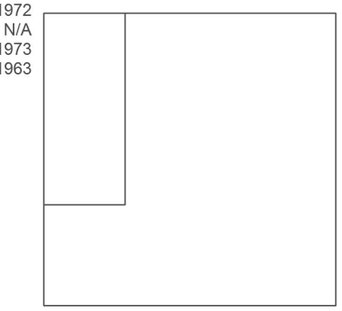
Map date: **1973**

Scale: 1:1,250

Printed at: 1:2,000

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Revised 1972
Edition N/A
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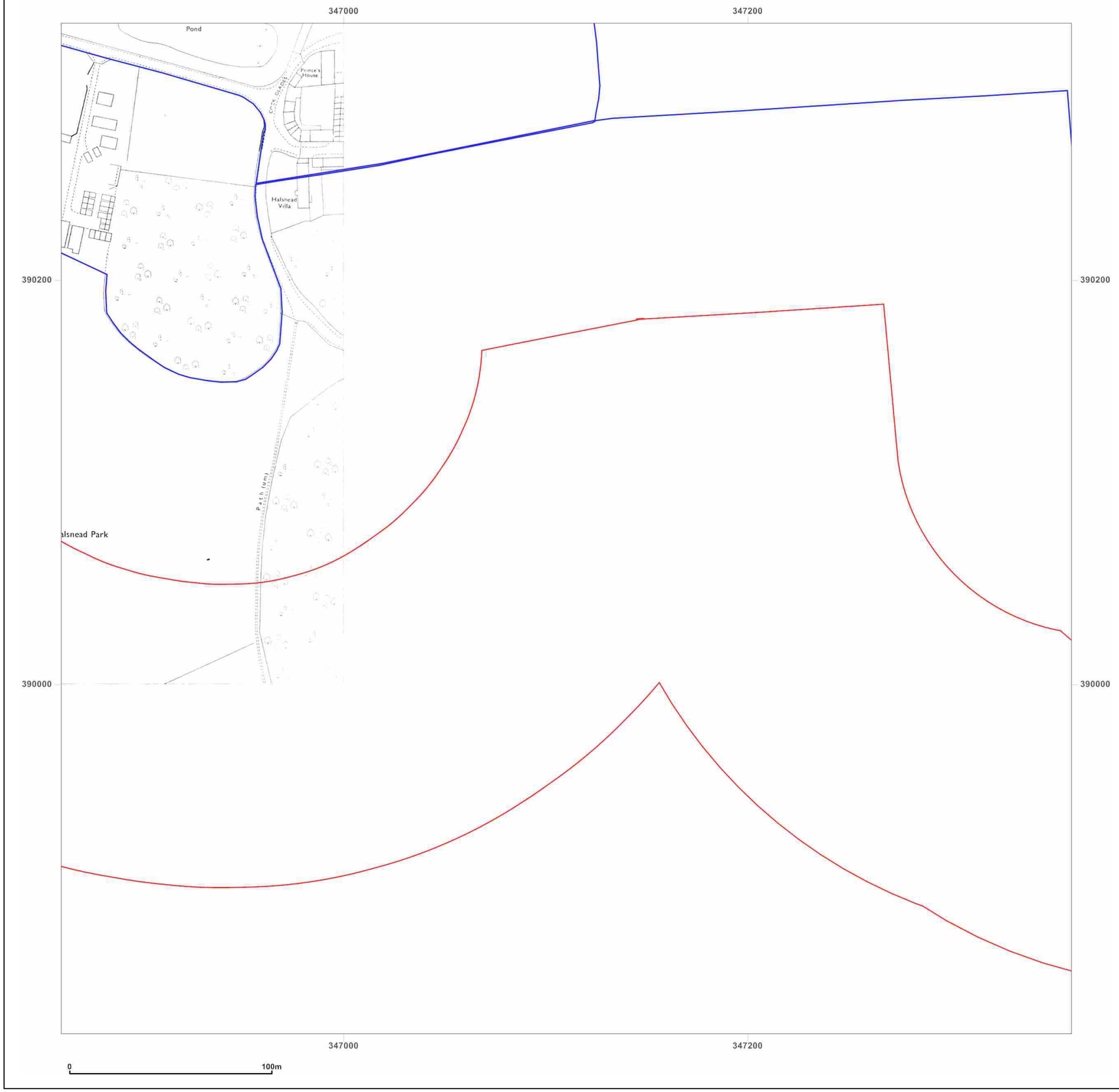
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Site Details:

HALSNEAD PARK WHISTON

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Report Ref: EMS-418542_559267_1250scale_2_1
Grid Ref: 347110, 390077

Map Name: National Grid

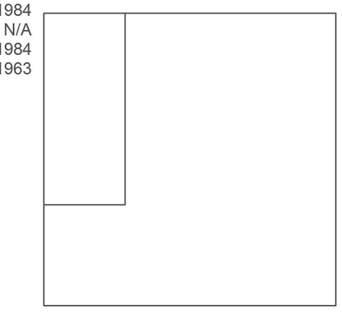
Map date: **1984**

Scale: 1:1,250

Printed at: 1:2,000

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Edition N/A
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_2_1
Grid Ref: 347110, 390077

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_2_2
Grid Ref: 347110, 390577

Map Name: National Grid

Map date: **1973-1974**

Scale: 1:1,250

Printed at: 1:2,000

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Revised 1972
Edition N/A
Copyright 1973
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Revised 1973
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Copyright 1974
Levelled 1963

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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_2_2
Grid Ref: 347110, 390577

Map Name: National Grid
Map date: **1974**
Scale: 1:1,250
Printed at: 1:2,000

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Revised N/A
Edition N/A
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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_2_2
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Map Name: National Grid

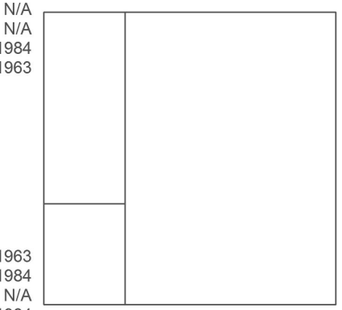
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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_2_2
Grid Ref: 347110, 390577

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A	Surveyed 1993 Revised 1993 Edition N/A Copyright N/A Levelled N/A

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_2_2
Grid Ref: 347110, 390577

Map Name: National Grid

Map date: **1994-1995**

Scale: 1:1,250

Printed at: 1:2,000

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_2_2
Grid Ref: 347110, 390577

Map Name: National Grid

Map date: **1994-1995**

Scale: 1:1,250

Printed at: 1:2,000

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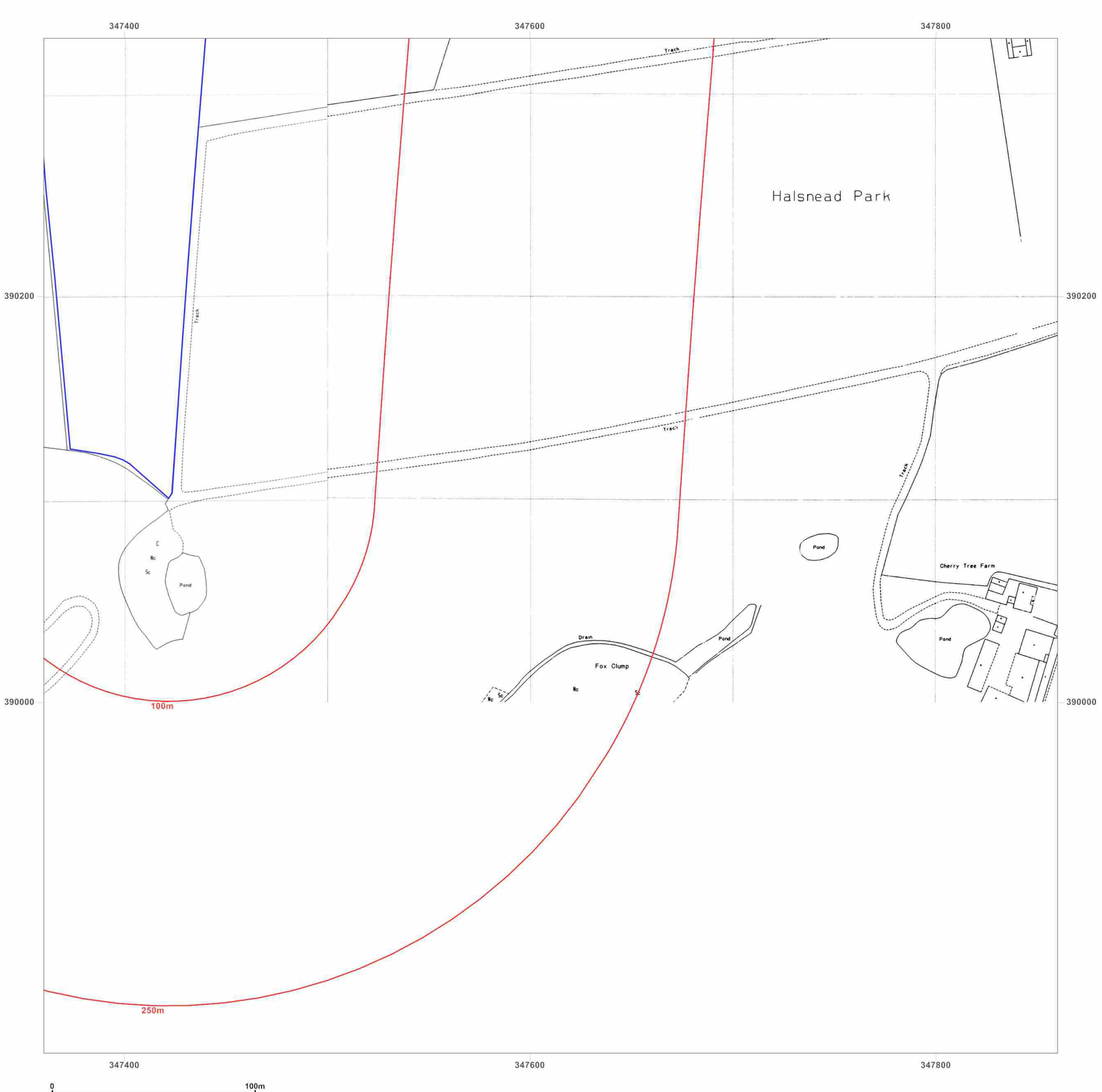
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HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_1
Grid Ref: 347610, 390077

Map Name: National Grid
Map date: **1993**
Scale: 1:1,250
Printed at: 1:2,000

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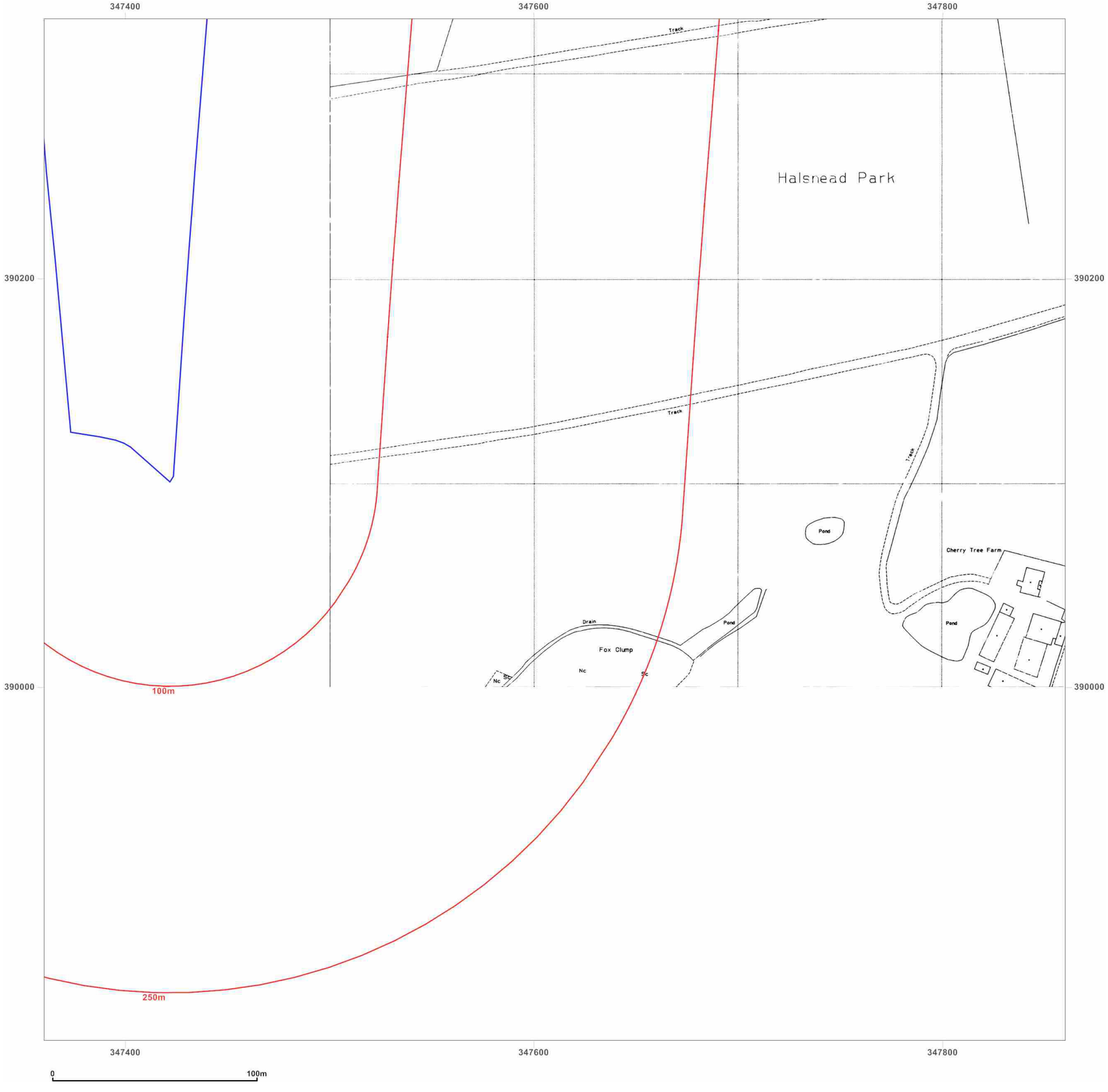
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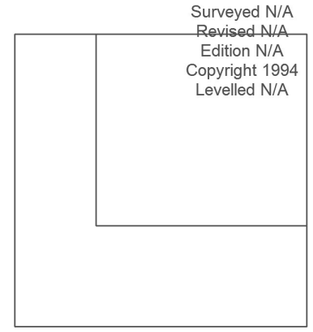
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Scale: 1:1,250

Printed at: 1:2,000

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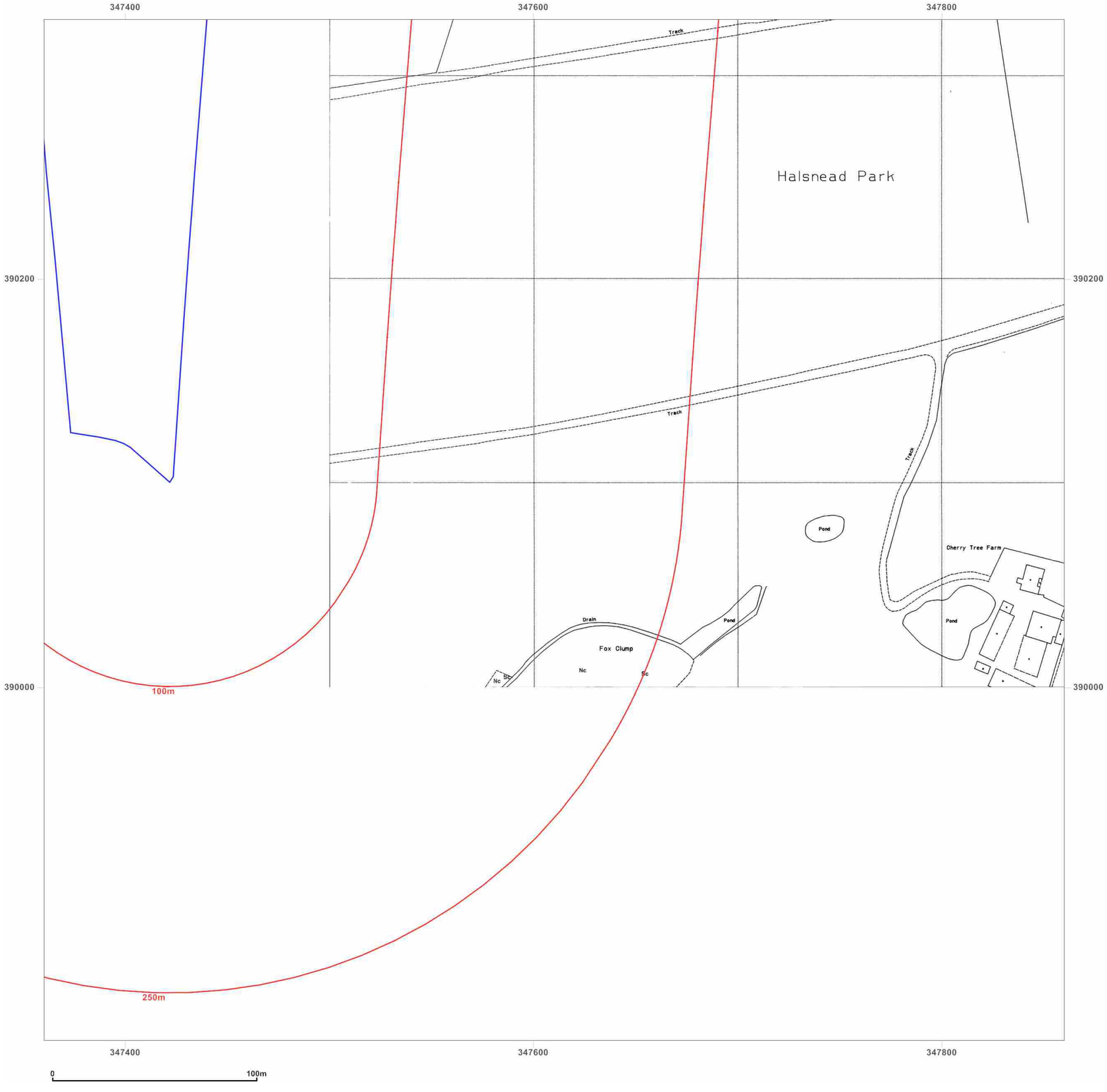
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_1
Grid Ref: 347610, 390077

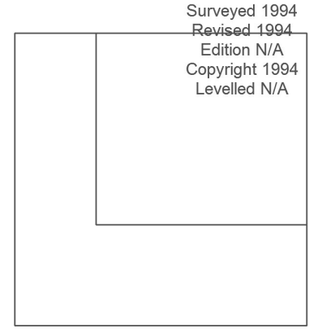
Map Name: National Grid

Map date: **1994**

Scale: 1:1,250

Printed at: 1:2,000

N
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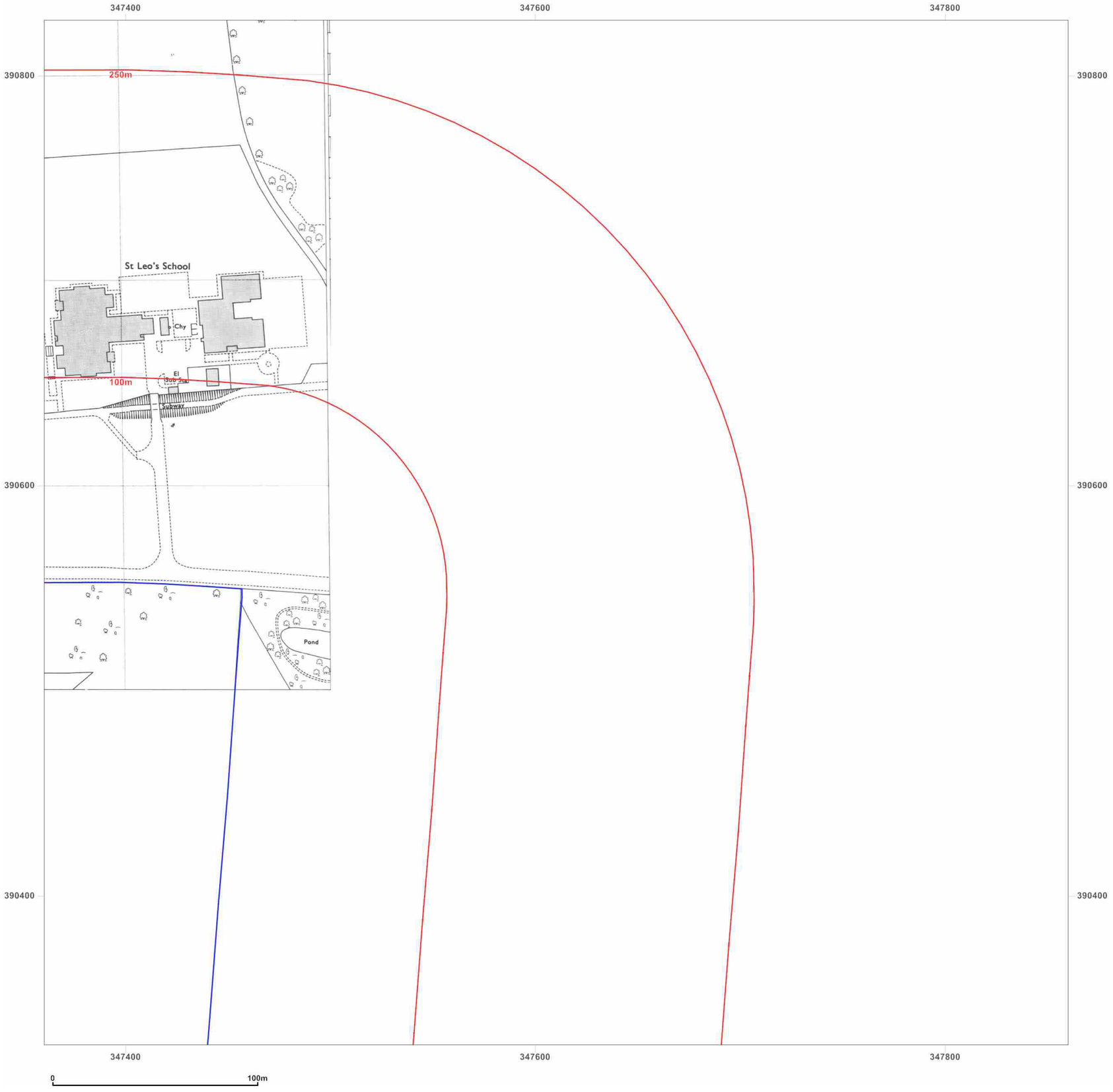
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

Map Name: National Grid

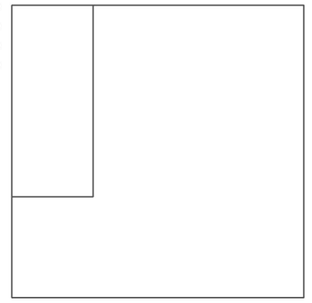
Map date: **1974**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



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Site Details:

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

Map Name: National Grid

Map date: **1974-1976**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed 1973	Surveyed 1975
Revised 1973	Revised 1975
Edition N/A	Edition N/A
Copyright 1974	Copyright 1976
Levelled 1963	Levelled 1963

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A
Surveyed 1993 Revised 1993 Edition N/A Copyright N/A Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

Map Name: National Grid

Map date: **1994**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
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Surveyed 1994
Revised 1994
Edition N/A
Copyright 1994
Levelled N/A

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

Map Name: National Grid

Map date: **1994**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
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Surveyed 1994
Revised 1994
Edition N/A
Copyright 1994
Levelled N/A

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

Map Name: National Grid

Map date: **1995**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed 1995
Revised 1995
Edition N/A
Copyright 1995
Levelled N/A

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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

Map Name: National Grid
Map date: **1994-1995**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

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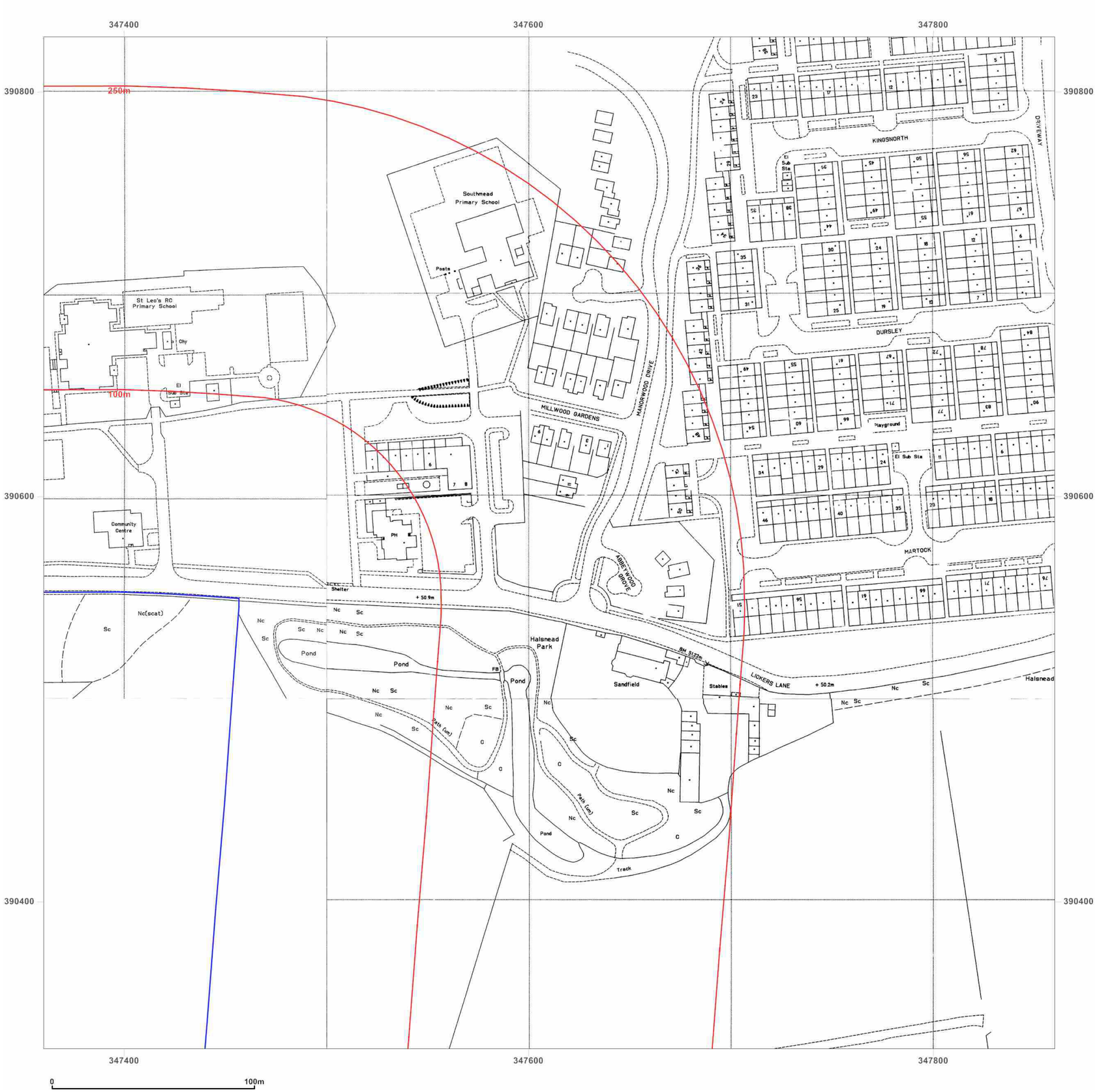
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

Map Name: National Grid
Map date: **1994-1995**
Scale: 1:1,250
Printed at: 1:2,000

N
W E
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Surveyed 1995
Revised 1995
Edition N/A
Copyright 1995
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed 1994
Revised 1994
Edition N/A
Copyright 1994
Levelled N/A

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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

Map Name: National Grid
Map date: **1995**
Scale: 1:1,250
Printed at: 1:2,000

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

Map Name: National Grid

Map date: **1995**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267_1250scale_3_2
Grid Ref: 347610, 390577

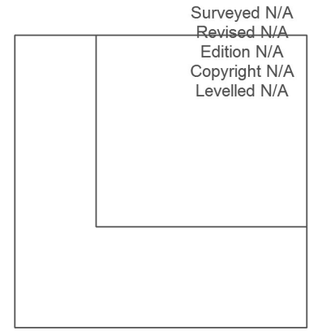
Map Name: National Grid

Map date: **1995**

Scale: 1:1,250

Printed at: 1:2,000

N
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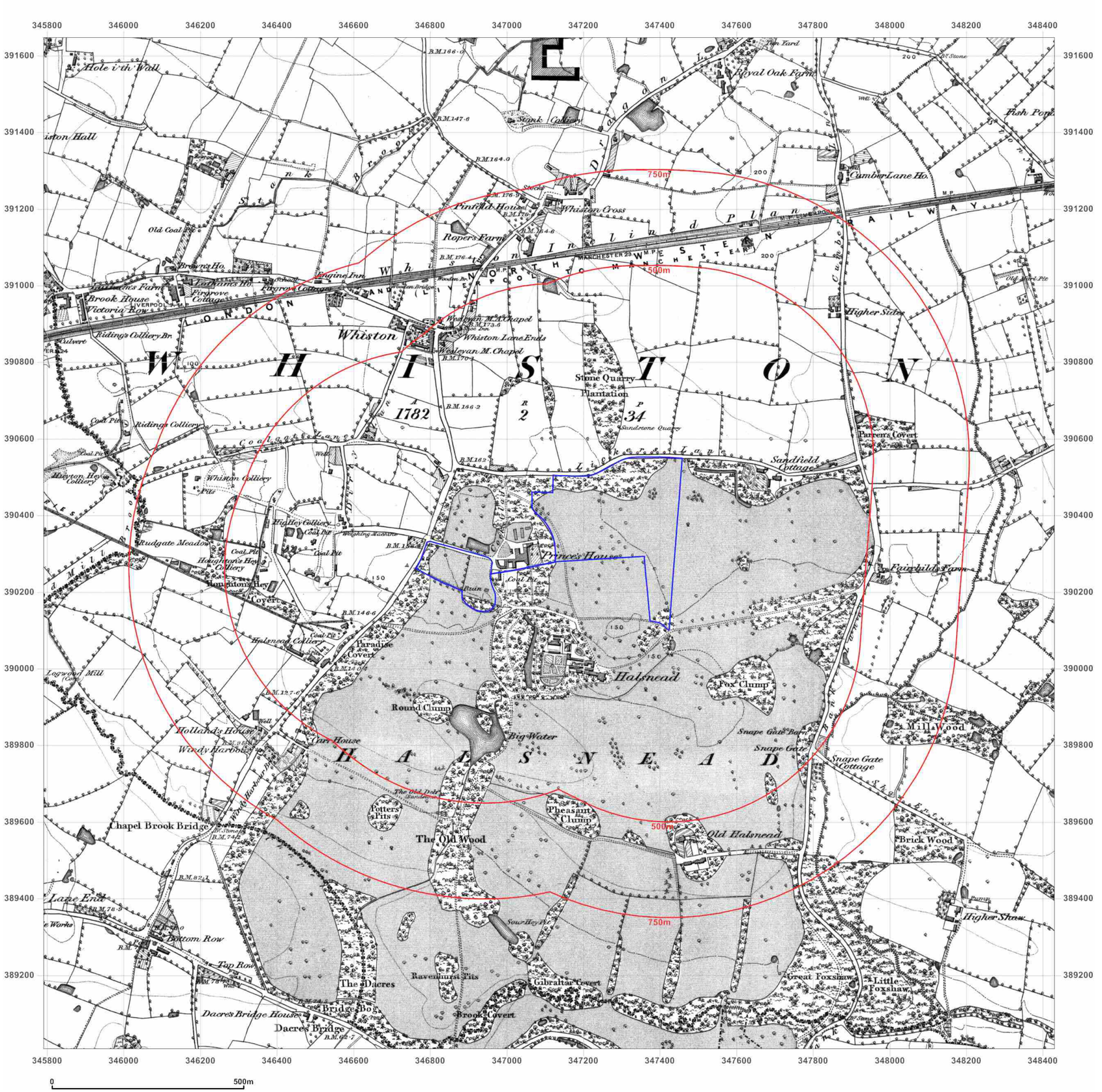
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: County Series

Map date: **1850**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1847
Revised N/A
Edition 1850
Copyright N/A
Levelled N/A

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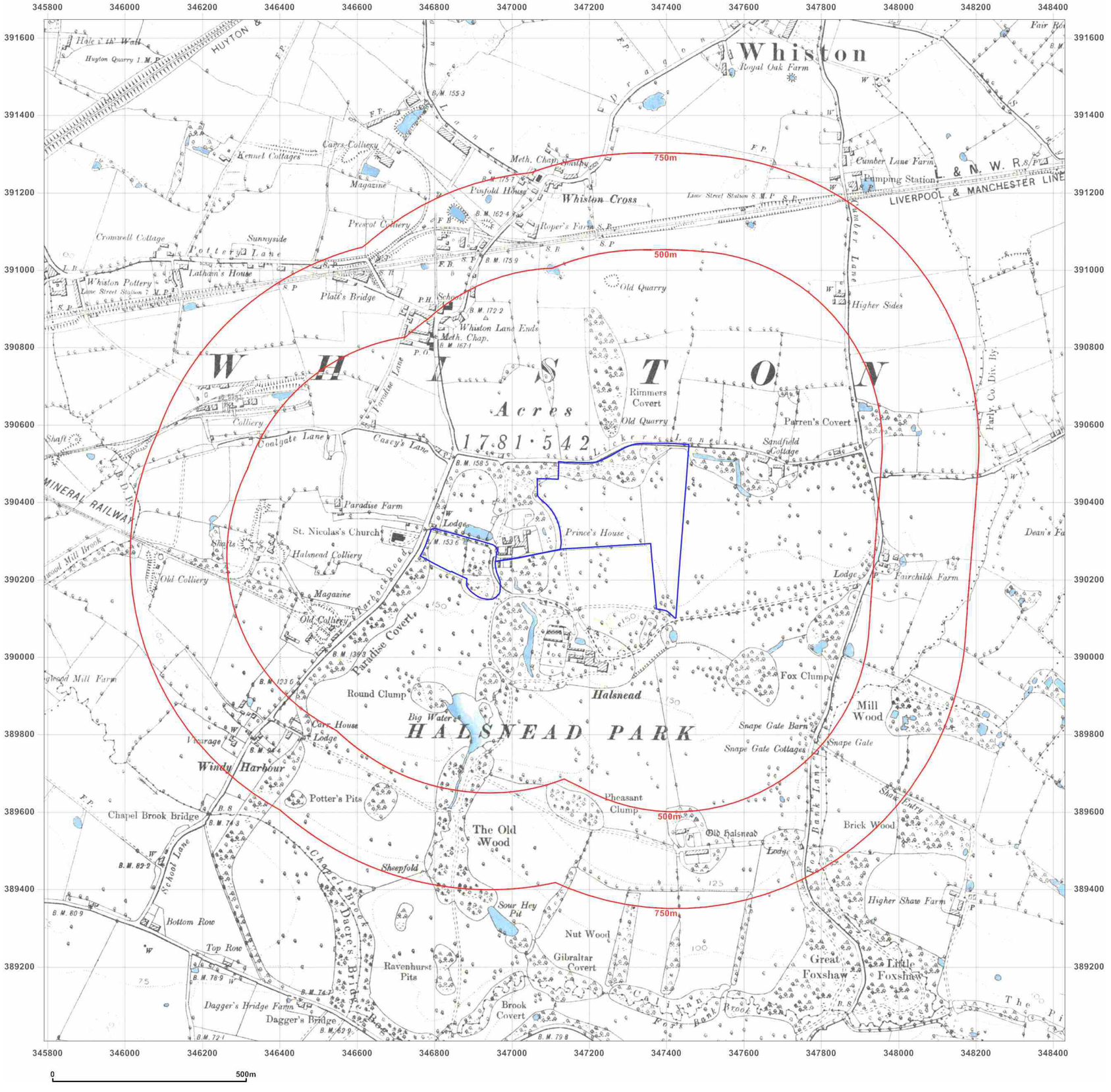
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: County Series

Map date: **1891**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1891
Revised 1891
Edition N/A
Copyright N/A
Levelled N/A

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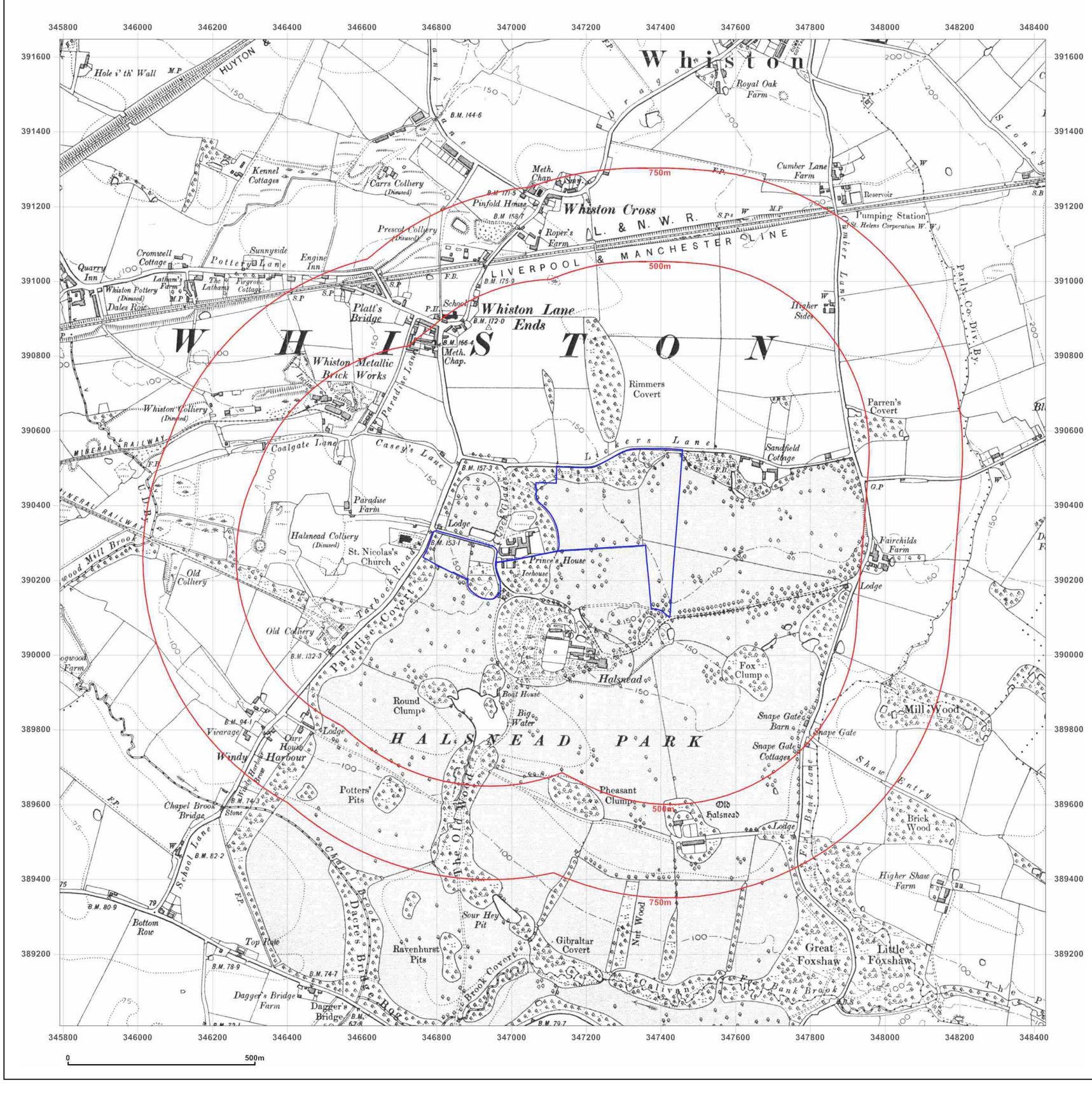
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: County Series

Map date: **1906**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1891
Revised 1906
Edition N/A
Copyright N/A
Levelled N/A

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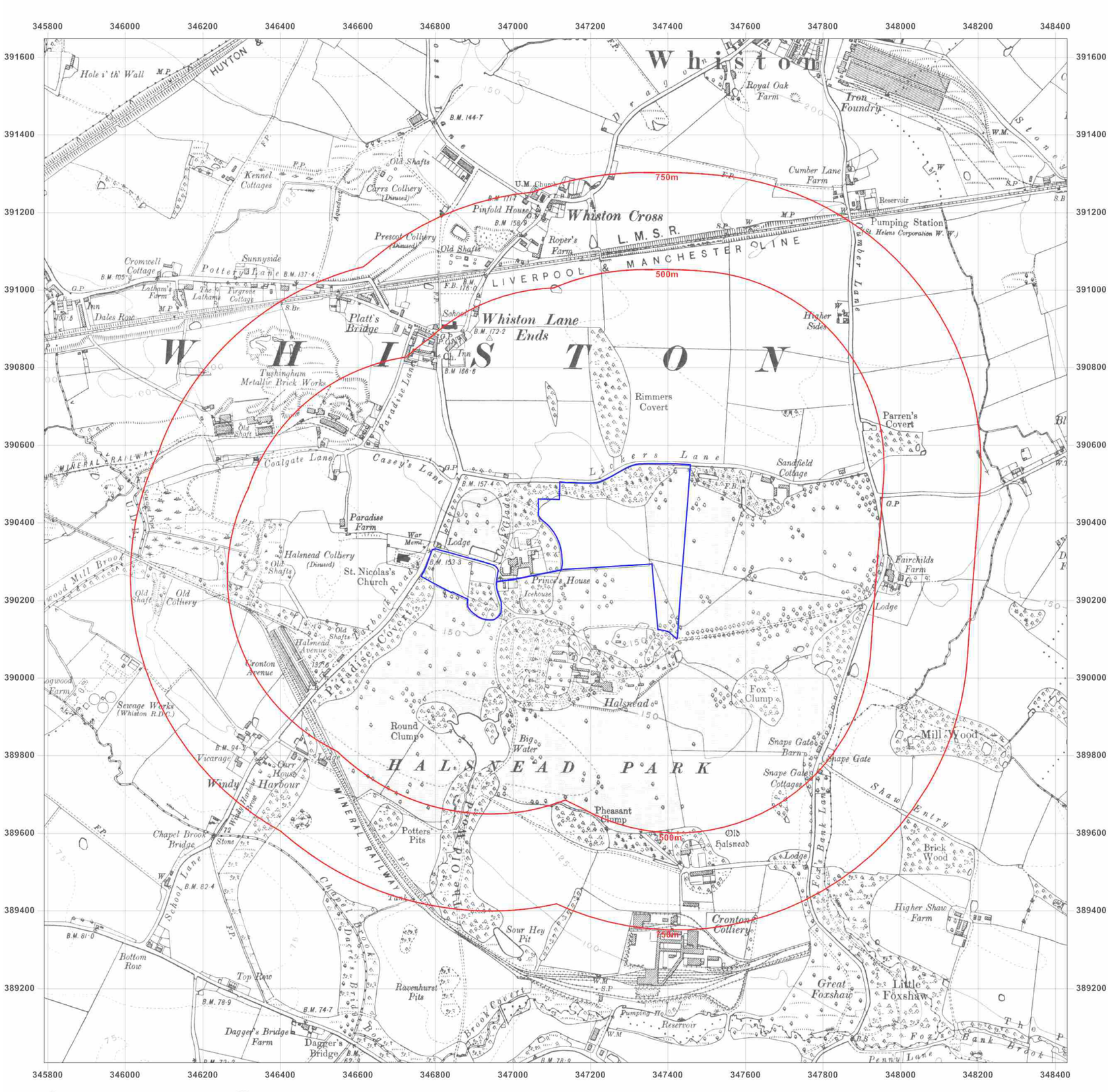
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HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: County Series

Map date: **1925**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1846
Revised 1925
Edition N/A
Copyright N/A
Levelled N/A

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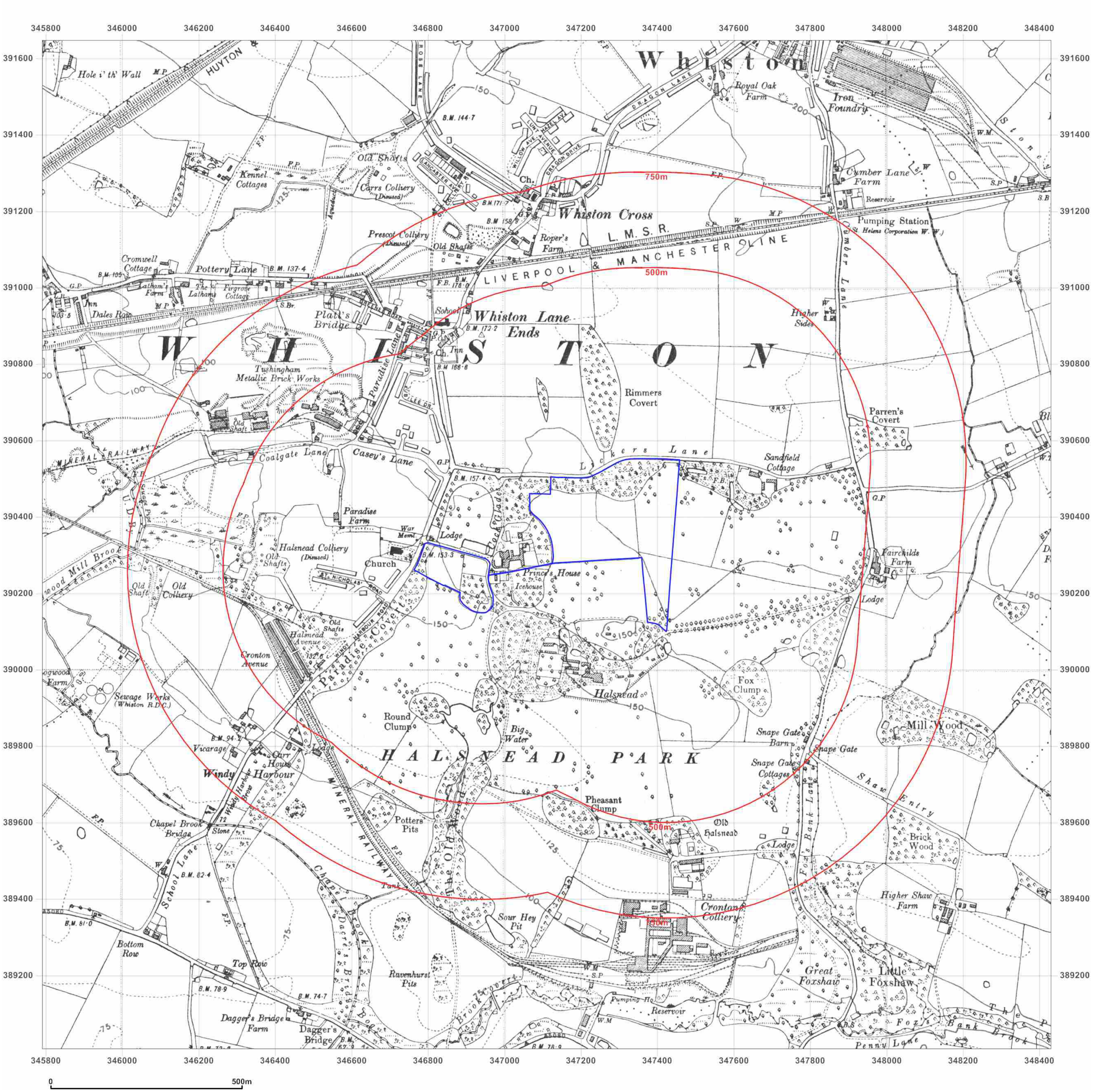
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1846
Revised 1938
Edition 1938
Copyright N/A
Levelled N/A

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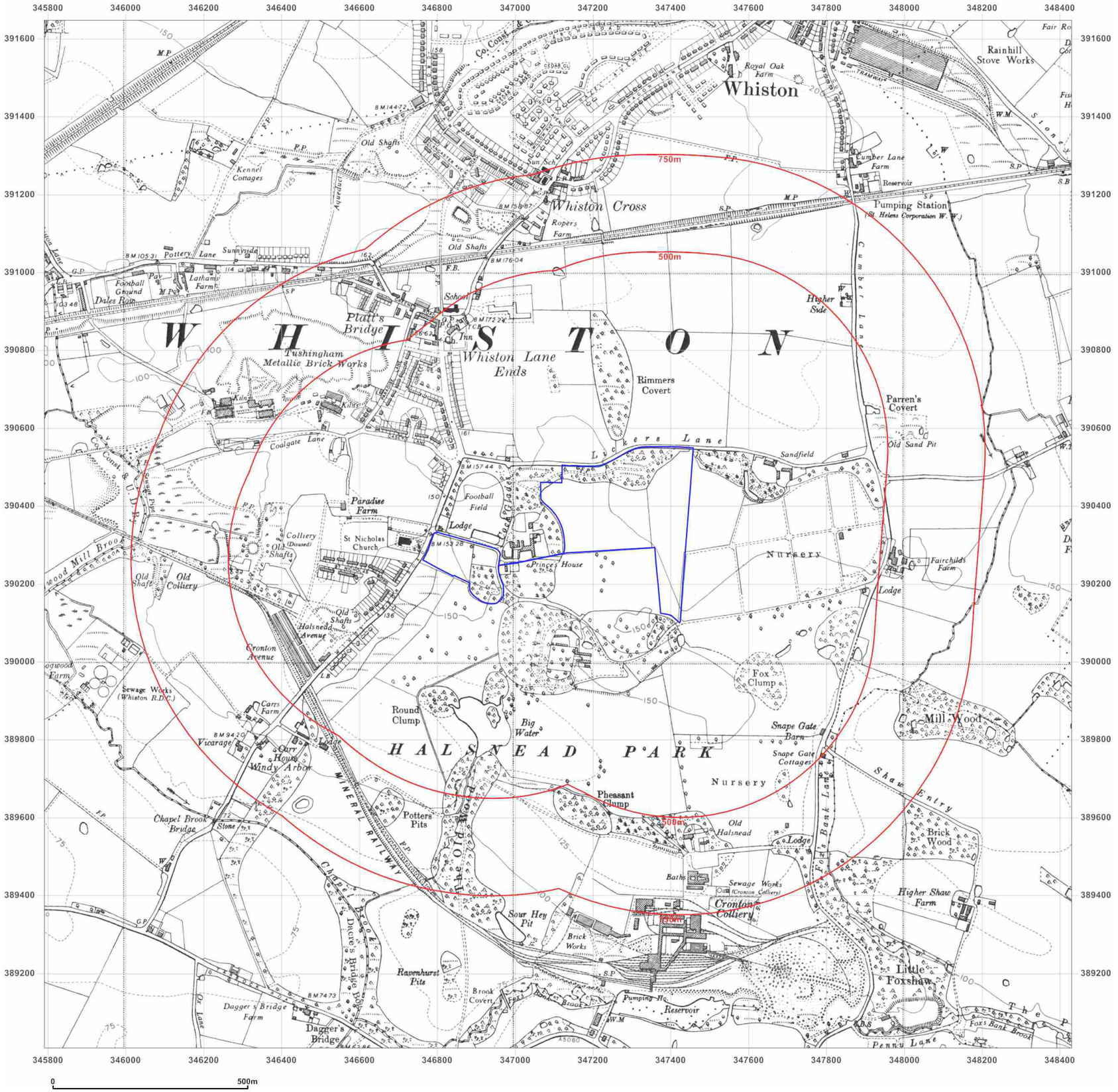
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: County Series

Map date: **1947**

Scale: 1:10,560

Printed at: 1:10,560

N
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Surveyed 1846
Revised 1947
Edition N/A
Copyright N/A
Levelled N/A

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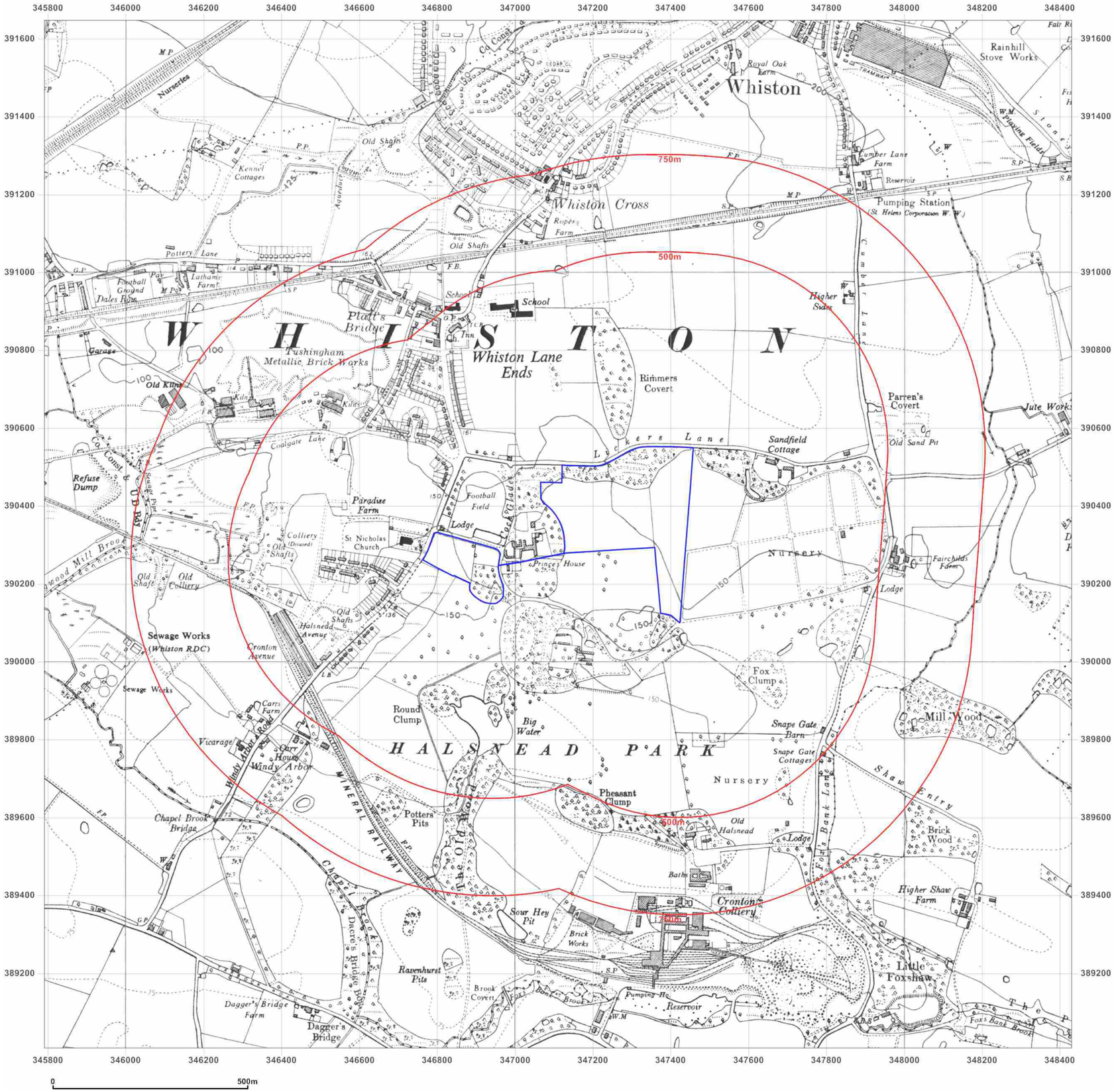
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: Provisional

Map date: **1955-1956**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1947
Revised 1955
Edition 1956
Copyright N/A
Levelled N/A

Surveyed N/A
Revised 1955
Edition N/A
Copyright 1955
Levelled N/A

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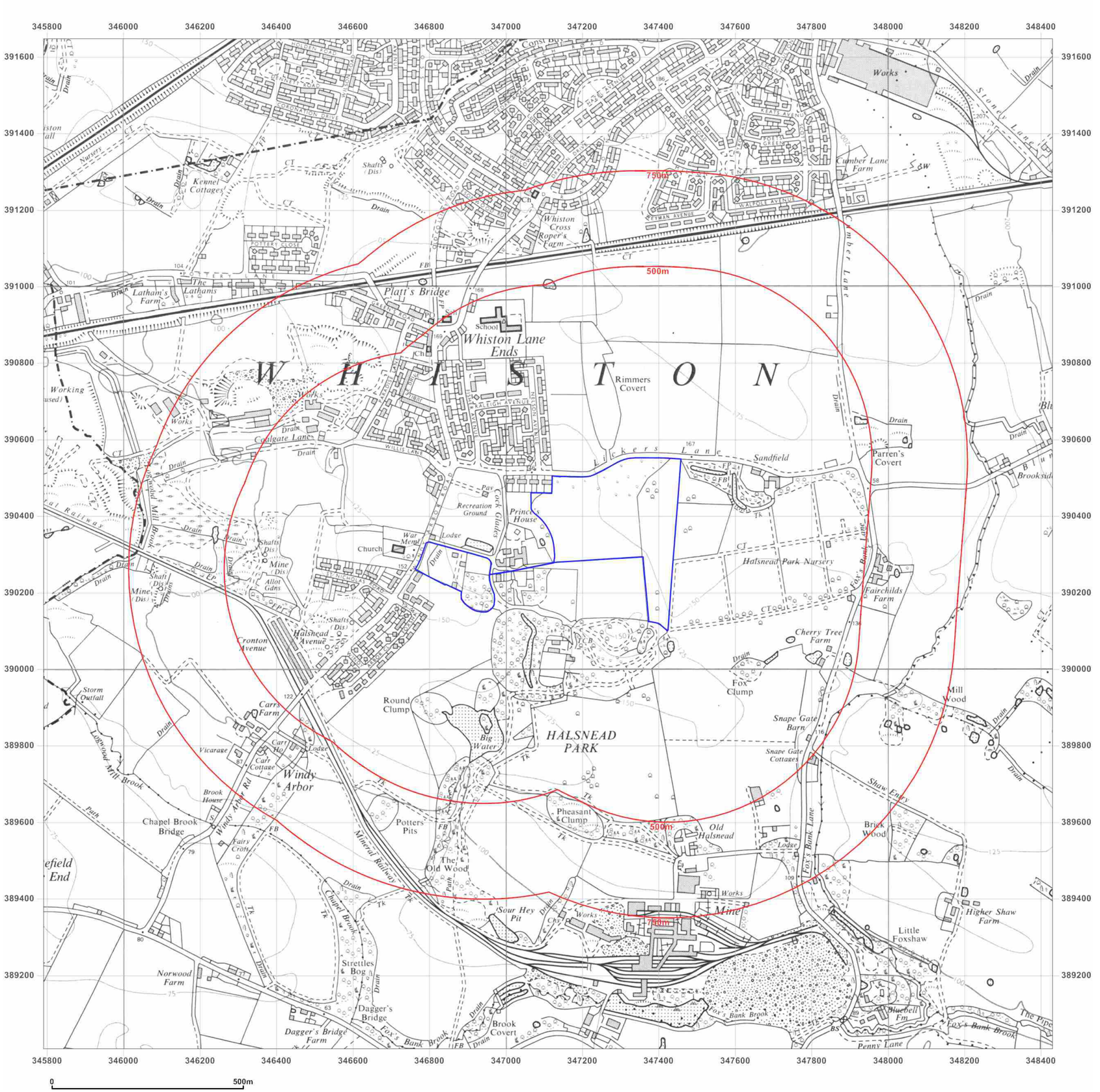
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HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: Provisional

Map date: **1966-1967**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1966
Revised 1966
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1967
Revised 1967
Edition N/A
Copyright N/A
Levelled N/A

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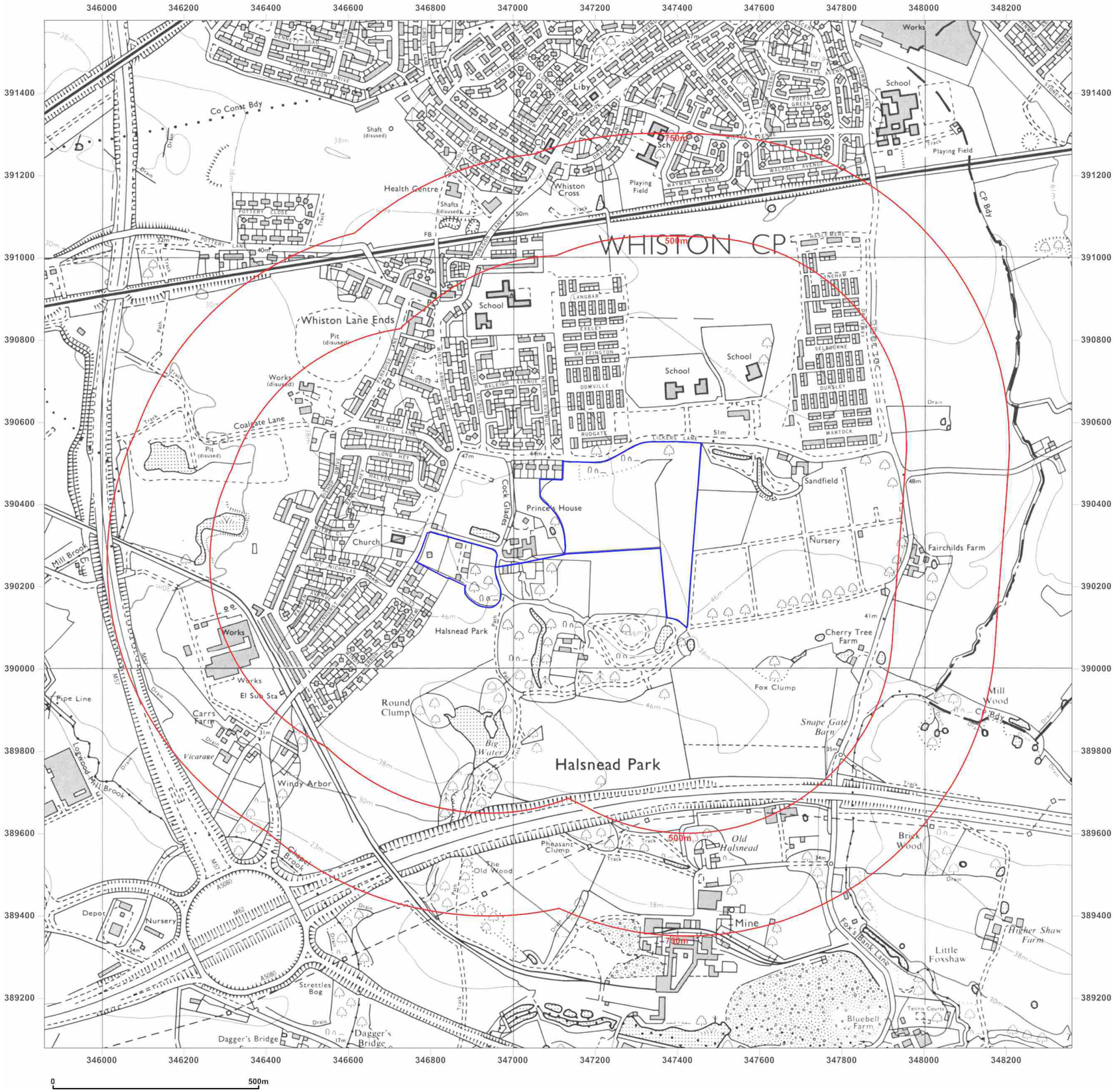
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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: National Grid

Map date: **1977-1978**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
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Surveyed 1975
Revised 1978
Edition N/A
Copyright 1978
Levelled 1964

Surveyed 1975
Revised 1977
Edition N/A
Copyright 1977
Levelled 1964

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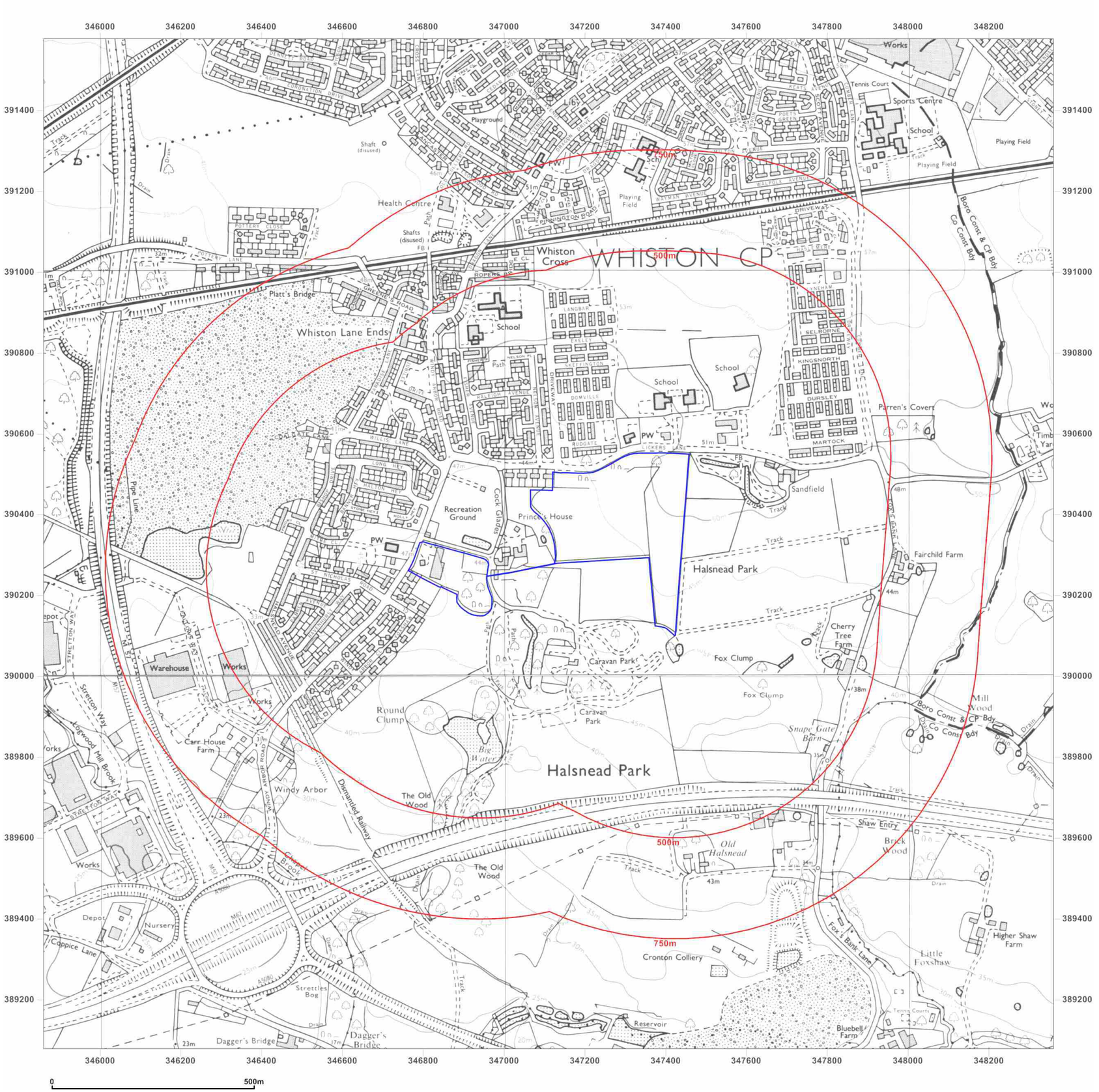
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HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: National Grid

Map date: **1989-1990**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
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Surveyed 1989
Revised 1990
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1986
Revised 1989
Edition N/A
Copyright N/A
Levelled N/A

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Site Details:

HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
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2002

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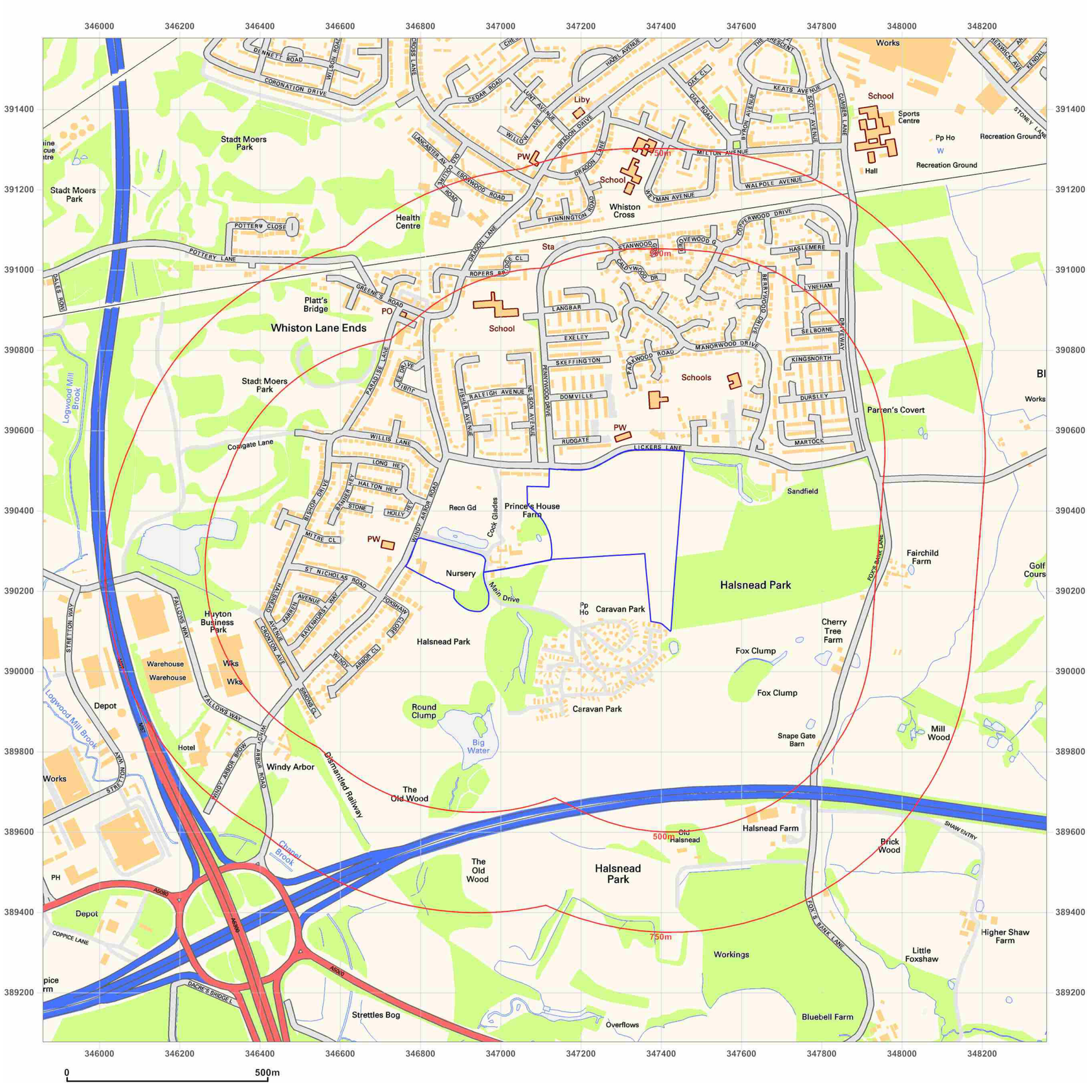
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Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

N
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2010

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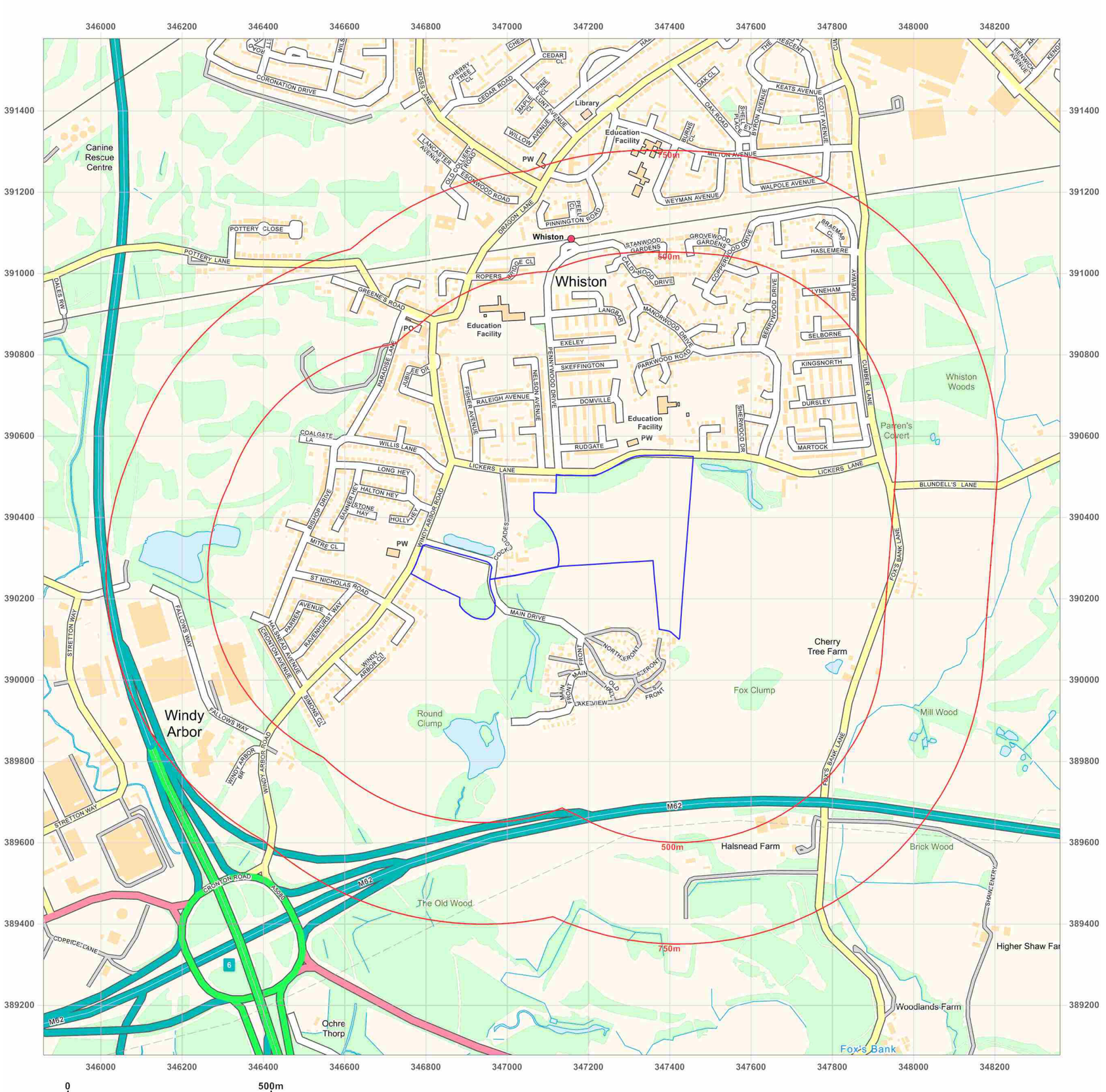
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HALSNEAD PARK WHISTON

Client Ref: EMS_418542_559267
Report Ref: EMS-418542_559267
Grid Ref: 347109, 390327

Map Name: National Grid

Map date: **2014**

Scale: 1:10,000

Printed at: 1:10,000

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APPENDIX B
Contaminated Land Officers Report (Pending)

APPENDIX C
GroundSure Report

emapsite

Masdar House, 1 Reading Road,
Eversley, RG27 0RP

Groundsure Reference:	EMS-418542_559268
Your Reference:	EMS_418542_559268
Report Date	2 May 2017
Report Delivery Method:	Email - pdf

Groundsure Enviro Insight

Address: HALSNEAD PARK WHISTON ,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you would like further assistance regarding this report then please contact the emapsite customer services team on 0118 9736883 quoting the above report reference number.

Yours faithfully,

emapsite customer services team

Enc.
Groundsure Enviroinsight

Groundsure Enviro Insight

Address:	**HALSNEAD PARK WHISTON ,**
Date:	**2 May 2017**
Reference:	**EMS-418542_559268**
Client:	**emapsite**

NW N NE



W E

SW S SE

Aerial Photograph Capture date:	11-Jun-2015
Grid Reference:	347218,390362
Site Size:	11.59ha

Report Reference: EMS-418542_559268
Client Reference: EMS_418542_559268

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Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	3	9	19	129
1.2 Additional Information – Historical Tank Database	0	2	11	9
1.3 Additional Information – Historical Energy Features Database	0	5	12	39
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	0
1.6 Potentially Infilled Land	0	28	37	142

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	0	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	0
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	2	0	0
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	4	1	5
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	1	2
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	2	0	2
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	7	10

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	1	7	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	No
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	1	10
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	5
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	1	4
6.6 Source Protection Zones (within 500m of the study site)	1	0	1	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	2	2	1	4	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	No	Yes
6.10 Detailed River Network entries within 500m of the site	0	1	4	4	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	No
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	No
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	Very Low
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	High

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	1	1	0
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	1	0	1	0	0	2
8.14 Records of Green Belt land	0	0	0	3	1	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Very Low
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Very Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Very Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Negligible
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Negligible
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Very Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	Yes
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	No
10.3 Are there any brine affected areas within 75m of the study site?	No

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

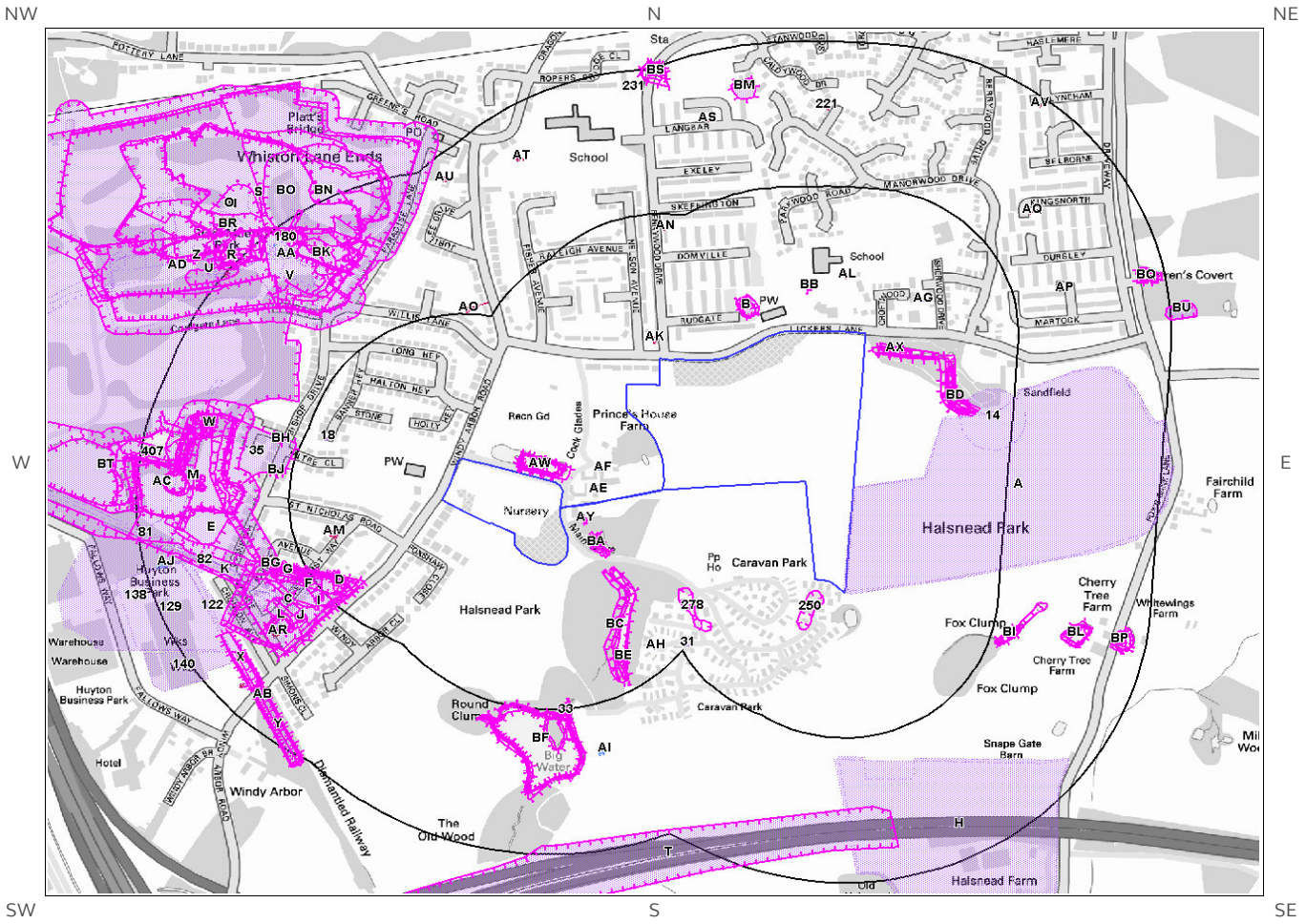
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier “A” on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as “Not Shown”.

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use



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Site Outline

250 500 Search Buffers (m)

Historical 1:10,000 and 1:10,560 scale mapping

Industrial Land Use

Potentially Infilled Land

Historical 1:2,500, 1:1,250 and 1:500 scale mapping

Energy Features

Petrol Stations

Tanks

Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 160

ID	Distance [m]	Direction	Use	Date
1A	0	On Site	Nursery	1966
2A	0	On Site	Nursery	1975
3A	0	On Site	Nursery	1955
4A	1	E	Nursery	1947
5AY	25	S	Coal Pit	1851
6B	42	NW	Unspecified Old Quarry	1891
7B	42	NW	Unspecified Pit	1925
8B	42	NW	Unspecified Pit	1906
9B	42	NW	Unspecified Pit	1947
10B	42	NW	Unspecified Pit	1955
11B	44	NW	Unspecified Pit	1938
12B	44	NW	Unspecified Pit	1938
13BB	71	N	Sandstone Quarry	1851
14	166	E	Unspecified Tank	1966
15C	188	SW	Old Colliery	1906
16C	197	SW	Old Colliery	1891
17C	203	SW	Colliery	1851
18	209	NW	Weighing Machine	1851
19D	210	SW	Unspecified Heap	1955
20F	210	SW	Unspecified Ground Workings	1906
21D	210	SW	Unspecified Ground Workings	1925
22D	212	SW	Unspecified Disused Shafts	1966
23E	213	SW	Disused Colliery	1947
24E	213	SW	Disused Colliery	1925
25F	213	SW	Unspecified Ground Workings	1947
26D	218	SW	Unspecified Old Shaft	1955
27D	220	SW	Unspecified Heap	1891
28D	221	SW	Unspecified Old Shafts	1947
29D	221	SW	Unspecified Old Shafts	1925
30	228	SW	Railway Sidings	1851
31	235	SW	Pump	1851

32F	252	SW	Unspecified Ground Workings	1955
33	253	S	Boat House	1906
34F	255	SW	Unspecified Disused Shafts	1966
35	256	W	Colliery	1851
36G	259	SW	Unspecified Ground Workings	1925
37G	260	SW	Unspecified Heap	1966
38F	260	SW	Unspecified Old Shaft	1955
39F	262	SW	Unspecified Old Shafts	1938
40F	262	SW	Unspecified Old Shafts	1938
41G	263	SW	Unspecified Heap	1938
42G	263	SW	Unspecified Heap	1938
43F	264	SW	Unspecified Old Shafts	1925
44F	264	SW	Unspecified Old Shafts	1947
45C	268	SW	Unspecified Heap	1891
46I	268	SW	Coal Pit	1851
47BJ	273	W	Coal Pit	1851
48BH	280	W	Coal Pit	1851
49Z	281	W	Refuse Heap	1990
50H	282	S	Nursery	1950
51AC	287	W	Disused Colliery	1955
52H	287	S	Nursery	1947
53C	291	SW	Unspecified Old Shaft	1955
54BG	298	W	Magazine	1891
55C	299	SW	Unspecified Ground Workings	1906
56O	300	NW	Brick Works	1955
57I	303	SW	Unspecified Disused Shafts	1966
58J	306	SW	Unspecified Old Shaft	1955
59J	308	SW	Unspecified Old Shafts	1938
60J	308	SW	Unspecified Old Shafts	1938
61J	310	SW	Unspecified Old Shafts	1947
62J	310	SW	Unspecified Old Shafts	1925
63L	311	SW	Unspecified Heaps	1891
64M	312	W	Disused Colliery	1906
65K	313	SW	Railway Sidings	1925
66K	318	SW	Railway Sidings	1938
67L	321	SW	Unspecified Ground Workings	1925
68L	321	SW	Unspecified Ground Workings	1938
69L	321	SW	Unspecified Ground Workings	1938
70M	321	W	Unspecified Disused Mine	1966
71P	322	SW	Mineral Railway Sidings	1891

72M	325	W	Disused Colliery	1938
73M	325	W	Disused Colliery	1938
74N	327	NW	Brick Works	1925
75N	327	NW	Brick Works	1947
76O	329	NW	Metallic Brick Works	1938
77O	329	NW	Unspecified Works	1966
78L	330	SW	Unspecified Disused Shafts	1966
79P	331	W	Colliery	1891
80L	338	SW	Coal Pit	1851
81	340	SW	Railway Sidings	1906
82	340	SW	Railway Sidings	1947
83R	340	NW	Brick Works	1906
84Q	347	W	Unspecified Ground Workings	1891
85V	347	NW	Unspecified Disused Works	1975
86Q	349	W	Colliery	1851
87R	356	NW	Mineral Railway Sidings	1925
88BK	361	NW	Unspecified Pit	1906
89U	363	NW	Railway Sidings	1938
90S	371	NW	Unspecified Pit	1938
91S	371	NW	Unspecified Pit	1938
92T	371	S	Cuttings	1975
93T	371	S	Cuttings	1989
94S	371	NW	Unspecified Pits	1925
95U	373	NW	Railway Sidings	1906
96N	374	NW	Unspecified Ground Workings	1947
97N	375	NW	Unspecified Ground Workings	1955
98V	383	NW	Railway Sidings	1955
99M	387	W	Unspecified Disused Shaft	1966
100M	388	W	Unspecified Disused Shaft	1966
101W	390	W	Unspecified Ground Workings	1966
102M	392	W	Coal Pit	1851
103W	394	W	Unspecified Ground Workings	1947
104W	394	W	Unspecified Ground Workings	1925
105W	395	W	Unspecified Ground Workings	1955
106W	395	W	Unspecified Ground Workings	1906
107M	395	W	Unspecified Old Shaft	1955
108M	395	W	Unspecified Old Shaft	1955
109W	396	W	Unspecified Ground Workings	1938

110W	396	W	Unspecified Ground Workings	1938
111M	396	W	Unspecified Old Shafts	1947
112M	396	W	Unspecified Old Shafts	1925
113M	397	W	Unspecified Old Shafts	1938
114M	397	W	Unspecified Old Shafts	1938
115M	397	W	Unspecified Old Shafts	1925
116M	397	W	Unspecified Old Shafts	1947
117M	397	W	Unspecified Old Shafts	1938
118M	397	W	Unspecified Old Shafts	1938
119W	403	W	Unspecified Heap	1891
120BM	407	N	Unspecified Old Quarry	1891
121M	409	W	Unspecified Shafts	1891
122	410	SW	Railway Sidings	1955
123M	414	W	Unspecified Heap	1966
124AB	415	SW	Cuttings	1938
125X	415	SW	Cuttings	1947
126X	415	SW	Cuttings	1925
127X	416	SW	Cuttings	1989
128X	416	SW	Cuttings	1950
129	418	W	Unspecified Works	1990
130M	419	W	Unspecified Heap	1938
131M	419	W	Unspecified Heap	1938
132M	419	W	Unspecified Old Shaft	1955
133BN	419	NW	Unspecified Disused Pit	1975
134M	420	W	Unspecified Heap	1906
135M	420	W	Unspecified Heap	1891
136M	420	W	Unspecified Heap	1925
137M	420	W	Unspecified Heap	1947
138	424	SW	Unspecified Works	1975
139BO	425	N	Unspecified Ground Workings	1966
140	433	SW	Unspecified Works	1989
141Y	435	SW	Cuttings	1950
142Y	436	SW	Cuttings	1947
143Y	436	SW	Cuttings	1925
144Y	441	SW	Cuttings	1989
145AD	443	NW	Railway Sidings	1891
146Z	443	NW	Colliery	1891
147AA	446	NW	Unspecified Kilns	1955
148AA	447	NW	Unspecified Kilns	1947
149AB	451	SW	Electric Substation	1975
150AJ	454	W	Unspecified Tanks	1975
151AA	462	NW	Unspecified Kilns	1955
152AA	463	NW	Unspecified Kilns	1947
153BR	475	NW	Unspecified Ground Workings	1906

154U	486	NW	Gravel Pit	1906
155R	488	NW	Unspecified Heap	1891
156AC	490	W	Unspecified Heap	1955
157BU	491	E	Unspecified Pit	1966
158U	495	NW	Unspecified Tank	1891
159AD	495	NW	Railway Sidings	1955
160Z	497	NW	Railway Sidings	1947

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary: 22

ID	Distance (m)	Direction	Use	Date
161AE	17	N	Unspecified Tank	1937
162AE	26	N	Unspecified Tank	1958
163AF	51	N	Unspecified Tank	1937
164AF	51	N	Unspecified Tank	1927
165AF	53	N	Unspecified Tank	1958
166AG	106	NE	Unspecified Tank	1997
167AG	106	NE	Unspecified Tank	1996
168AG	106	NE	Unspecified Tank	1994
169AG	106	NE	Unspecified Tank	1994
170AG	106	NE	Unspecified Tank	1995
171AG	106	NE	Unspecified Tank	1976
172AH	212	SE	Unspecified Tank	1892
173AH	212	SE	Unspecified Tank	1907
174AI	330	S	Unspecified Tank	1996
175AI	331	S	Unspecified Tank	1980
176AI	333	S	Unspecified Tank	1980
177AI	333	S	Unspecified Tank	1989
178AI	333	S	Unspecified Tank	1958
179AJ	458	W	Tanks	1973
180	472	NW	Unspecified Tank	1927
181AA	475	NW	Unspecified Tank	1937
182U	493	NW	Gasometer	1892

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary: 56

ID	Distance (m)	Direction	Use	Date
183AK	27	N	Electricity Substation	1996
184AK	27	N	Electricity Substation	1995
185AK	27	N	Electricity Substation	1996
186AK	27	N	Electricity Substation	1999
187AK	40	N	Electricity Substation	1974
188AL	92	N	Electricity Substation	1996
189AL	92	N	Electricity Substation	1995
190AL	92	N	Electricity Substation	1996
191AL	92	N	Electricity Substation	1999
192AL	92	N	Electricity Substation	1974
193AM	177	W	Electricity Substation	1973
194AM	177	W	Electricity Substation	1997
195AM	177	W	Electricity Substation	1984
196AN	222	N	Electricity Substation	1995
197AN	222	N	Electricity Substation	1996
198AN	222	N	Electricity Substation	1996
199AN	222	N	Electricity Substation	1999
200AO	252	N	Electricity Substation	1994
201AO	252	N	Electricity Substation	1973
202AO	253	N	Electricity Substation	1984
203AP	331	E	Electricity Substation	1997
204AP	331	E	Electricity Substation	1996
205AP	331	E	Electricity Substation	1994
206AP	331	E	Electricity Substation	1994
207AP	331	E	Electricity Substation	1995
208AP	332	E	Electricity Substation	1976
209AQ	339	NE	Electricity Substation	1994
210AQ	339	NE	Electricity Substation	1994
211AQ	339	NE	Electricity Substation	1997
212AQ	339	NE	Electricity Substation	1996
213AQ	339	NE	Electricity Substation	1995
214AR	348	SW	Electricity Substation	1994
215AR	348	SW	Electricity Substation	1973
216AR	352	SW	Electricity Substation	1987
217AS	381	N	Electricity Substation	1996
218AS	381	N	Electricity Substation	1995
219AS	381	N	Electricity Substation	1996
220AS	381	N	Electricity Substation	1999
221	382	N	Electricity Substation	1999
222AS	383	N	Electricity Substation	1974
223AT	409	NW	Electricity Substation	1973

224AT	412	NW	Electricity Substation	1994
225AT	413	NW	Electricity Substation	1984
226AB	453	SW	Electricity Substation	1984
227AB	455	SW	Electricity Substation	1978
228AU	458	NW	Electricity Substation	1994
229AU	458	NW	Electricity Substation	1984
230AU	458	NW	Electricity Substation	1973
231	465	N	Gas Substation	1974
232AV	482	NE	Electricity Substation	1994
233AV	482	NE	Electricity Substation	1997
234AV	482	NE	Electricity Substation	1996
235AV	482	NE	Electricity Substation	1994
236AV	482	NE	Electricity Substation	1995
237AV	482	NE	Electricity Substation	1976
238U	493	NW	Gasometer	1892

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 0

Database searched and no data found.

1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 207

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
239AW	7	N	Pond	1851
240AW	8	N	Pond	1891
241AW	8	N	Pond	1947
242AW	8	N	Pond	1925

243AW	9	N	Pond	1938
244AW	10	N	Pond	1906
245AW	11	N	Pond	1955
246AZ	12	E	Ponds	1891
247AW	14	N	Pond	1966
248AW	14	N	Pond	1975
249AW	14	N	Pond	1990
250	19	S	Pond	1975
251AX	22	E	Pond	1938
252AX	23	E	Pond	1925
253AY	25	S	Coal Pit	1851
254AZ	26	E	Ponds	1990
255AZ	26	E	Ponds	1966
256AZ	26	E	Ponds	1975
257BA	37	E	Pond	1891
258B	42	NW	Unspecified Old Quarry	1891
259B	42	NW	Unspecified Pit	1925
260B	42	NW	Unspecified Pit	1947
261B	42	NW	Unspecified Pit	1906
262B	42	NW	Unspecified Pit	1955
263B	44	NW	Unspecified Pit	1938
264B	44	NW	Unspecified Pit	1938
265BA	47	E	Pond	1938
266BA	47	E	Pond	1925
267BC	64	SE	Water Body	1891
268BB	71	N	Sandstone Quarry	1851
269BC	74	E	Pond	1966
270BC	74	E	Pond	1990
271BC	74	E	Pond	1975
272BC	81	E	Water Body	1851
273BD	132	E	Pond	1947
274BD	135	E	Ponds	1938
275BD	135	E	Pond	1906
276BD	136	E	Pond	1955
277BD	136	E	Pond	1925
278	172	S	Ponds	1955
279BE	179	SE	Pond	1989
280BE	179	SE	Pond	1967
281BE	180	SE	Pond	1975
282C	188	SW	Old Colliery	1906
283C	197	SW	Old Colliery	1891
284C	203	SW	Colliery	1851
285D	210	SW	Unspecified Heap	1955
286G	210	SW	Unspecified Ground Workings	1906

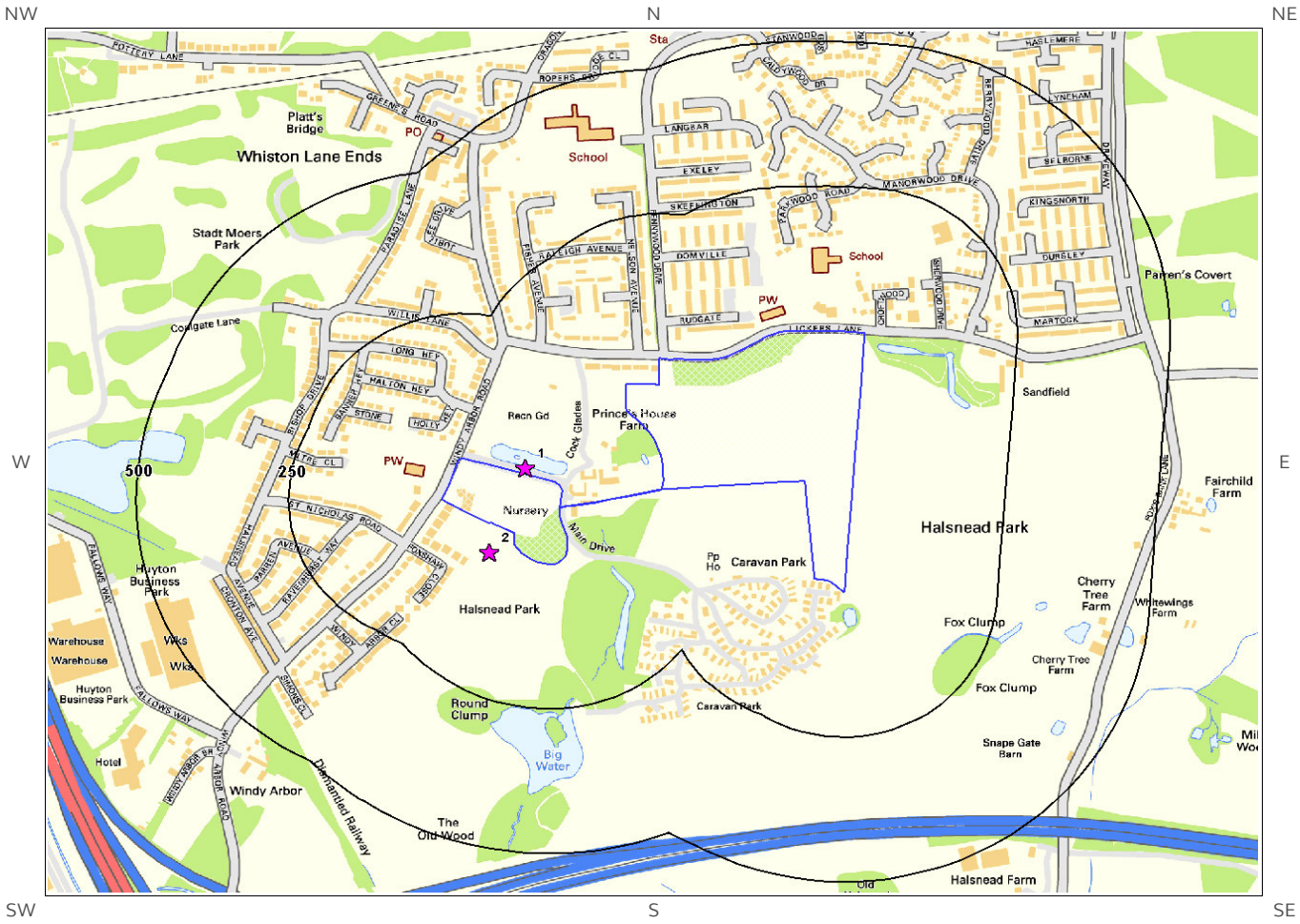
287D	210	SW	Unspecified Ground Workings	1925
288D	212	SW	Unspecified Disused Shafts	1966
289E	213	SW	Disused Colliery	1947
290E	213	SW	Disused Colliery	1925
291F	213	SW	Unspecified Ground Workings	1947
292D	218	SW	Unspecified Old Shaft	1955
293D	220	SW	Unspecified Heap	1891
294D	221	SW	Unspecified Old Shafts	1925
295D	221	SW	Unspecified Old Shafts	1947
296BF	235	S	Water Body	1950
297BF	235	S	Pond	1967
298BF	237	S	Water Body	1906
299BF	237	S	Water Body	1925
300BF	237	S	Water Body	1891
301BF	237	S	Water Body	1947
302BF	237	S	Water Body	1938
303BF	247	S	Water Body	1975
304BF	251	S	Water Body	1851
305BF	251	S	Pond	1989
306BG	252	SW	Unspecified Ground Workings	1955
307I	255	SW	Unspecified Disused Shafts	1966
308BH	256	W	Colliery	1851
309BI	259	E	Pond	1938
310BG	259	SW	Unspecified Ground Workings	1925
311BG	260	SW	Unspecified Heap	1966
312BI	260	E	Pond	1947
313BI	260	E	Pond	1925
314BI	260	E	Pond	1906
315BI	260	E	Pond	1891
316I	260	SW	Unspecified Old Shaft	1955
317I	262	SW	Unspecified Old Shafts	1938
318I	262	SW	Unspecified Old Shafts	1938
319BI	263	E	Ponds	1990
320BI	263	E	Ponds	1966
321BI	263	E	Ponds	1975
322BI	263	E	Ponds	1955
323BG	263	SW	Unspecified Heap	1938
324BG	263	SW	Unspecified Heap	1938
325I	264	SW	Unspecified Old Shafts	1925
326I	264	SW	Unspecified Old Shafts	1947
327C	268	SW	Unspecified Heap	1891
328I	268	SW	Coal Pit	1851

329BJ	273	W	Coal Pit	1851
330BH	280	W	Coal Pit	1851
331Z	281	W	Refuse Heap	1990
332AC	287	W	Disused Colliery	1955
333C	291	SW	Unspecified Old Shaft	1955
334J	299	SW	Unspecified Ground Workings	1906
335O	300	NW	Brick Works	1955
336I	303	SW	Unspecified Disused Shafts	1966
337J	306	SW	Unspecified Old Shaft	1955
338I	308	SW	Unspecified Old Shafts	1938
339I	308	SW	Unspecified Old Shafts	1938
340J	310	SW	Unspecified Old Shafts	1925
341J	310	SW	Unspecified Old Shafts	1947
342J	311	SW	Unspecified Heaps	1891
343M	312	W	Disused Colliery	1906
344J	321	SW	Unspecified Ground Workings	1925
345J	321	SW	Unspecified Ground Workings	1938
346J	321	SW	Unspecified Ground Workings	1938
347M	321	W	Unspecified Disused Mine	1966
348M	325	W	Disused Colliery	1938
349M	325	W	Disused Colliery	1938
350N	327	NW	Brick Works	1925
351N	327	NW	Brick Works	1947
352O	329	NW	Metallic Brick Works	1938
353J	330	SW	Unspecified Disused Shafts	1966
354P	331	W	Colliery	1891
355J	338	SW	Coal Pit	1851
356R	340	NW	Brick Works	1906
357Q	347	W	Unspecified Ground Workings	1891
358Q	349	W	Colliery	1851
359BL	361	E	Pond	1938
360BK	361	NW	Unspecified Pit	1906
361BL	361	E	Pond	1947
362BL	361	E	Pond	1906
363BL	361	E	Pond	1925
364BL	361	E	Pond	1891
365BL	366	E	Pond	1955
366BL	366	E	Pond	1990
367BL	366	E	Pond	1966
368BL	366	E	Pond	1975
369BL	370	E	Pond	1851

370S	371	NW	Unspecified Pit	1938
371S	371	NW	Unspecified Pit	1938
372T	371	S	Cuttings	1975
373T	371	S	Cuttings	1989
374S	371	NW	Unspecified Pits	1925
375N	374	NW	Unspecified Ground Workings	1947
376N	375	NW	Unspecified Ground Workings	1955
377BK	384	NW	Pond	1906
378M	387	W	Unspecified Disused Shaft	1966
379M	388	W	Unspecified Disused Shaft	1966
380W	390	W	Unspecified Ground Workings	1966
381M	392	W	Coal Pit	1851
382W	394	W	Unspecified Ground Workings	1947
383W	394	W	Unspecified Ground Workings	1925
384W	395	W	Unspecified Ground Workings	1955
385W	395	W	Unspecified Ground Workings	1906
386M	395	W	Unspecified Old Shaft	1955
387M	395	W	Unspecified Old Shaft	1955
388W	396	W	Unspecified Ground Workings	1938
389W	396	W	Unspecified Ground Workings	1938
390M	396	W	Unspecified Old Shafts	1925
391M	396	W	Unspecified Old Shafts	1947
392M	397	W	Unspecified Old Shafts	1938
393M	397	W	Unspecified Old Shafts	1938
394M	397	W	Unspecified Old Shafts	1947
395M	397	W	Unspecified Old Shafts	1925
396M	397	W	Unspecified Old Shafts	1938
397M	397	W	Unspecified Old Shafts	1938
398W	403	W	Unspecified Heap	1891
399BM	407	N	Unspecified Old Quarry	1891
400M	409	W	Unspecified Shafts	1891
401M	414	W	Unspecified Heap	1966
402AB	415	SW	Cuttings	1938
403X	415	SW	Cuttings	1925
404X	415	SW	Cuttings	1947
405X	416	SW	Cuttings	1989
406X	416	SW	Cuttings	1950
407	417	W	Pond	1975
408M	419	W	Unspecified Heap	1938
409M	419	W	Unspecified Heap	1938

410M	419	W	Unspecified Old Shaft	1955
411BN	419	NW	Unspecified Disused Pit	1975
412M	420	W	Unspecified Heap	1906
413M	420	W	Unspecified Heap	1891
414M	420	W	Unspecified Heap	1947
415M	420	W	Unspecified Heap	1925
416BT	425	W	Pond	1990
417BO	425	N	Unspecified Ground Workings	1966
418Y	435	SW	Cuttings	1950
419Y	436	SW	Cuttings	1947
420Y	436	SW	Cuttings	1925
421Y	441	SW	Cuttings	1989
422Z	443	NW	Colliery	1891
423BP	445	E	Pond	1891
424BP	452	E	Pond	1906
425BQ	453	E	Pond	1925
426BQ	453	E	Pond	1906
427BQ	453	E	Pond	1947
428BQ	453	E	Pond	1891
429BQ	453	E	Pond	1938
430BP	454	E	Pond	1925
431BP	454	E	Pond	1947
432BP	457	E	Pond	1990
433BP	457	E	Pond	1955
434BP	457	E	Pond	1966
435BQ	458	E	Pond	1966
436BQ	458	E	Pond	1955
437BS	462	N	Pond	1851
438BR	475	NW	Unspecified Ground Workings	1906
439BS	476	N	Pond	1891
440BS	478	N	Pond	1966
441U	486	NW	Gravel Pit	1906
442R	488	NW	Unspecified Heap	1891
443BT	490	W	Unspecified Heap	1955
444BU	491	E	Unspecified Pit	1966
445R	495	NW	Pond	1891

2. Environmental Permits, Incidents and Registers Map



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- Site Outline
- Search Buffers (m) — 250 / 500
- Recorded Pollution Incident
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- Hazardous Substance Consents and Enforcements

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

0

Database searched and no data found.

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: 0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations: 0

Database searched and no data found.

2.1.8 Records of Licensed Discharge Consents within 500m of the study site: 0

Database searched and no data found.

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site: 0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site: 0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 0

Database searched and no data found.

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

2

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
1	10	N	346899 390316	Incident Date: 15-Jul-2002 Incident Identification: 91608 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
2	45	W	346840 390170	Incident Date: 20-May-2002 Incident Identification: 79877 Pollutant: Specific Waste Materials Pollutant Description: Household Waste	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

Database searched and no data found.

2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site? 0

Database searched and no data found.

3. Landfill and Other Waste Sites Map

NW N NE

W E

SW S SE



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Site Outline

250 / 500 Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

10

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
4	301	NW	346200 390600	Site Address: Coalgate Lane Landfill Site, Ellis Ashton Street, Huyton, Knowsley, Merseyside Waste Licence: - Site Reference: R13/01, GDO 017, GDO M019, GDO 020 Waste Type: Inert, Industrial, Commercial, Household, Liquid, sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: Huyton Urban District Council and Merseyside County Council Licence Holder: Huyton Urban District Council and Merseyside County Council First Recorded: 01-Jan-1972 Last Recorded: 01-Jan-1983
5	330	NW	346500 390600	Site Address: Coalgate Lane Wimpeym, Tushinghams Quarry, Paradise Lane, Stadt-Moers Park, Knowsley, Merseyside Waste Licence: - Site Reference: GDO M017, 026/01 Waste Type: Industrial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: Bridle Road, Bootle Operator: G Wimpey and Company Limited Licence Holder: G Wimpey and Company Limited First Recorded: 31-Dec-1976 Last Recorded: 01-Jan-1979
6	351	NW	346500 390700	Site Address: Whiston Tip, St Helens, Lancashire Waste Licence: - Site Reference: - Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: Central Electricity Generating Board - North Western Region Licence Holder: - First Recorded: 07-Jan-1967 Last Recorded: -

ID	Distance (m)	Direction	NGR	Details	
7	377	NW	346600 390700	Site Address: Tushinghams Quarry, Coalgate Lane, Paradise Lane, Stadt-Moers Park, Whiston, Merseyside, Knowsley Waste Licence: Yes Site Reference: 026/01,GDO 020 Waste Type: Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 27-May-1977 Licence Surrendered: Licence Holder Address: Bridle Road, Bootle, Merseyside Operator: W F Doyle and Company Limited Licence Holder: George Wimpey and Company Limited First Recorded: 01-Apr-1976 Last Recorded: 31-Dec-1979
8	622	NW	346400 391200	Site Address: Whiston Tip, Knowsley, Merseyside Waste Licence: - Site Reference: 088 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: Whiston Rural District Council - Prescot Urban District Council - Huyton Urban District Council First Recorded: - Last Recorded: -
Not shown	1005	NW	345700 390600	Site Address: West View Tip, Knowsley, Merseyside Waste Licence: - Site Reference: GDO M194 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: Hoyton with Roby Urban District Council Licence Holder: - First Recorded: 31-Jan-1971 Last Recorded: 01-Jan-1978
Not shown	1031	NW	346200 391400	Site Address: Whiston Tip, Knowsley, Merseyside Waste Licence: - Site Reference: GDO M088 Waste Type: Industrial, Commercial, Household, Liquid, sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: Whiston Rural District Council, Prescot Urban District Council, Huyton U District Council Licence Holder: Whiston Rural District Council - Prescot Urban District Council - Huyton Urban District Council First Recorded: - Last Recorded: 01-Jan-1973
Not shown	1047	W	345400 390300	Site Address: Brickfields, Knowsley, Merseyside Waste Licence: - Site Reference: GDO M209 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: Tushingham Metallic Brick Works Licence Holder: Tushingham Metallic Brick Works First Recorded: - Last Recorded: -
Not shown	1122	E	348600 390400	Site Address: Deans Farm, Blundells Lane, Rainhill, St. Helens, Merseyside Waste Licence: - Site Reference: 165/01, GDO M064 Waste Type: Inert, Industrial, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: Harrison Street, Widnes, Cheshire Operator: K G B and M E Limited Licence Holder: K G B and M E Limited First Recorded: 01-Jan-1961 Last Recorded: -
Not shown	1197	W	345400 390600	Site Address: Huyton Quarry, Knowsley, Merseyside Waste Licence: - Site Reference: GDO M087 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: 01-Oct-1971 Last Recorded: -

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

3

The following landfill records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
1	507	N	346600.0 390800.0	Address: Whiston Tip, St Helens, Lancs BGS Number: 2786.0	Risk: No risk to aquifer Waste Type: N/A
Not shown	1149	W	345700.0 390700.0	Address: West View Tip, Huyton Quarry, Liverpool, M'Side BGS Number: 197.0	Risk: No risk to aquifer Waste Type: N/A
Not shown	1222	NW	346200.0 391400.0	Address: Whiston Tip, Pottery Lane, Prescot, M'Side BGS Number: 626.0	Risk: No risk to aquifer Waste Type: N/A

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

4

The following landfill records are represented as points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Site Address	Source	Data Type
31	289	W	346511 390465	Refuse Tip	1997 mapping	Polygon
32	317	NW	346511 390514	Refuse Tip	1994 mapping	Polygon
Not shown	1233	W	345515 390329	Refuse Tip	1967 mapping	Polygon
Not shown	1250	W	345513 390338	Refuse Tip	1969 mapping	Polygon

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

0

Database searched and no data found.

3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

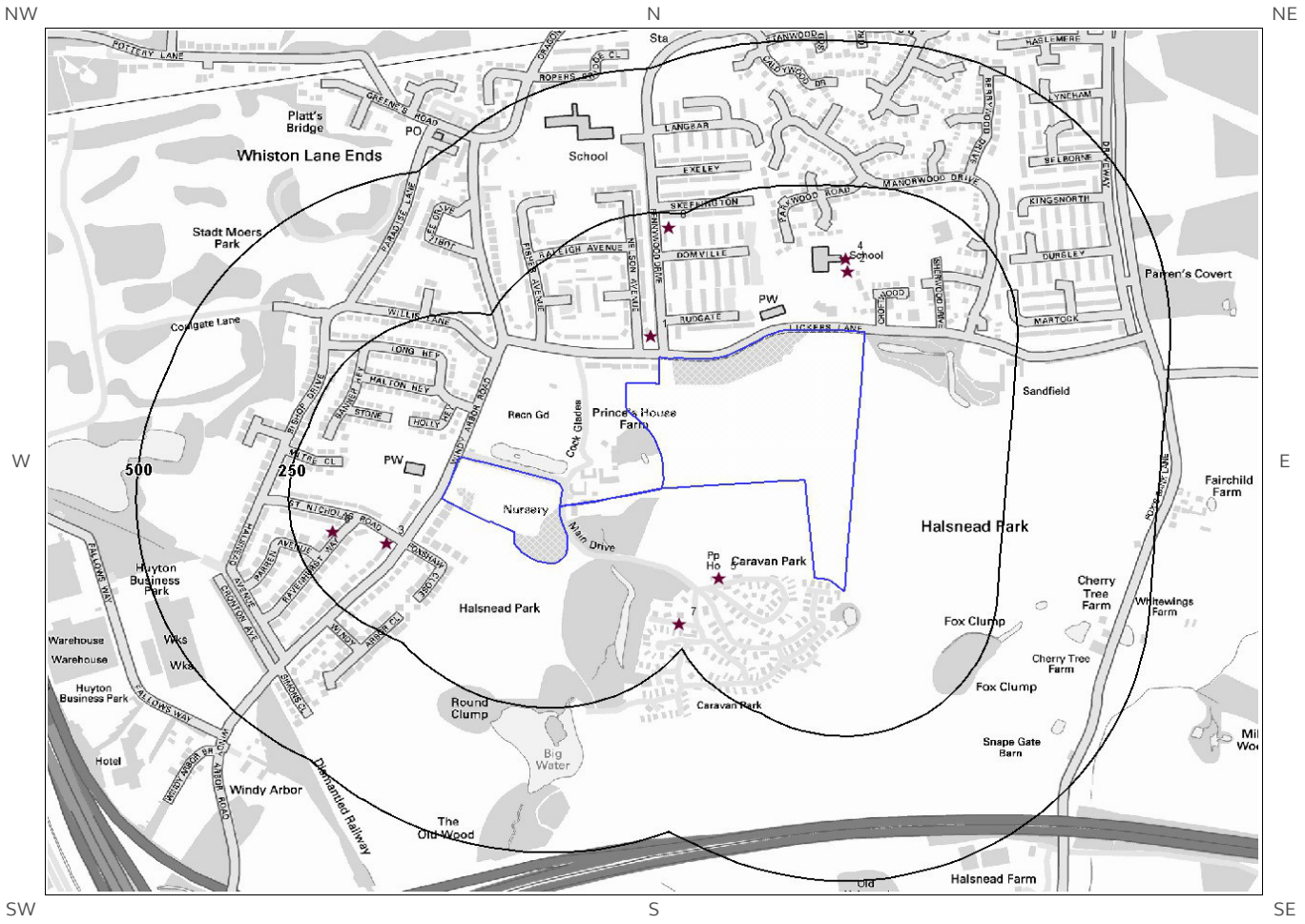
ID	Distance (m)	Direction	NGR	Details	
Not shown	885	SW	345981 389846	Site Address: Stretton Way Depot, Stretton Way, Huyton, Knowsley, Merseyside, L36 6JF Type: 75kte HCI Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: KNO020 EPR reference: EA/EPR/EP3491LE/A001 Operator: Knowsley Metropolitan Borough Council Waste Management licence No: 101122 Annual Tonnage: 0.0	Issue Date: 03/11/2009 Effective Date: - Modified: - Surrendered Date: 19/06/2015 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Stretton Way Bulking Station Correspondence Address: -
Not shown	901	W	345900 390000	Site Address: Stretton Way, Huyton Ind Est, Huyton, Merseyside, L36 6JF Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: FCC004 EPR reference: EA/EPR/JB3633RP/V002 Operator: F C C Recycling (U K) Limited Waste Management licence No: 104504 Annual Tonnage: 120000.0	Issue Date: 23/07/2012 Effective Date: - Modified: 18/12/2012 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Arpley 2 Correspondence Address: -
Not shown	901	W	345900 390000	Site Address: Stretton Way, Huyton Ind Est, Huyton, Merseyside, L36 6JF Type: 75kte HCI Waste TS + treatment Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: FCC004 EPR reference: EA/EPR/JB3633RP/A001 Operator: F C C Recycling (U K) Limited Waste Management licence No: 104504 Annual Tonnage: 74999.0	Issue Date: 23/07/2012 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Stretton Way Correspondence Address: -
Not shown	901	W	345900 390000	Site Address: Arpley 2, Stretton Way, Huyton Ind Est, Huyton, Merseyside, L36 6JF Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: FCC004 EPR reference: EA/EPR/JB3633RP/V003 Operator: F C C Recycling (U K) Limited Waste Management licence No: 104504 Annual Tonnage: 120000.0	Issue Date: 23/07/2012 Effective Date: - Modified: 08/06/2016 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: To PPC Site Name: Arpley 2 Correspondence Address: -
Not shown	910	W	345870 390080	Site Address: M W D A Treatment Facility, Stretton Way, Huyton, Nr Liverpool, Merseyside, L36 6JF Type: Physical Treatment Facility Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: FAI011 EPR reference: - Operator: Fairport Engineering Ltd Waste Management licence No: 50487 Annual Tonnage: 0.0	Issue Date: 10/05/2007 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: M W D A Treatment Facility Correspondence Address: Market Place, Adlington, Nr Chorley, Lancashire, PR7 4EZ

ID	Distance (m)	Direction	NGR	Details	
Not shown	910	W	345870 390080	Site Address: Land/premises At, Stretton Way, Huyton, Liverpool, Merseyside, L36 6JF Type: Physical Treatment Facility Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ORC009 EPR reference: EA/EPR/DP3794ST/V004 Operator: Orchid Environmental Ltd Waste Management licence No: 50487 Annual Tonnage: 49999.0	Issue Date: 10/05/2007 Effective Date: 14/01/2009 Modified: 24/09/2010 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Materials Recycling And Recovery Centre Correspondence Address: -
Not shown	914	W	345848 390245	Site Address: Huyton W T S, Ellis Ashton Street, Huyton Ind Est, Liverpool, Merseyside, L36 6BN Type: Household, Commercial & Industrial Waste T Stn Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: VEO092 EPR reference: EA/EPR/EP3695SH/V006 Operator: Veolia Environmental Services Merseyside & Halton Ltd Waste Management licence No: 53645 Annual Tonnage: 500000.0	Issue Date: 15/09/1995 Effective Date: 11/11/2009 Modified: 15/05/2013 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Huyton Waste Transfer Station Correspondence Address: -
Not shown	1023	W	345740 390220	Site Address: Ellis Ashton Street, Huyton, Liverpool, Merseyside, L36 6BJ Type: Household, Commercial & Industrial Waste T Stn Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MWA006 EPR reference: - Operator: Mersey Waste Holdings Ltd Waste Management licence No: 53645 Annual Tonnage: 6250.0	Issue Date: 15/09/1995 Effective Date: - Modified: 20/07/2006 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Huyton W T S / H W R C Correspondence Address: Port Of Liverpool Buildings, 2nd Floor, Pierhead, Liverpool, Merseyside, L3 1BY
Not shown	1023	W	345740 390220	Site Address: Ellis Ashton Street, Huyton, Liverpool, Merseyside, L36 6BJ Type: Special Waste Transfer Station Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MWA006 EPR reference: - Operator: Mersey Waste Holdings Ltd Waste Management licence No: 53645 Annual Tonnage: 6250.0	Issue Date: 15/09/1995 Effective Date: - Modified: 22/03/2002 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Huyton Waste Transfer Station & Waste Reception Centre Correspondence Address: Huyton Waste Transfer Station, Ellis Ashton Street, Huyton, Liverpool, Merseyside, L36 6BJ
Not shown	1137	SW	345735 389774	Site Address: Huyton Ind Est, Wilson Road, Huyton, Knowsley, Merseyside, L36 6AD Type: 75kte Non-hazardous & hazardous HWA Site Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: VEO167 EPR reference: EA/EPR/DB3833DK/A001 Operator: Veolia E S Merseyside & Halton Ltd Waste Management licence No: 103677 Annual Tonnage: 74999.0	Issue Date: 12/12/2011 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Huyton H W R C Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details	
Not shown	1220	S	346930 388930	Site Address: Cronton Quarry, Dacre's Bridge Lane, Tarbock, Prescot, Merseyside, L35 1QZ Type: Inert LF Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WAL168 EPR reference: EA/EPR/AB3909FA/V002 Operator: Grundy And Co Excavations Limited Waste Management licence No: 400986 Annual Tonnage: 20000.0	Issue Date: 03/04/2014 Effective Date: - Modified: 05/08/2014 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Cronton Quarry Correspondence Address: -
Not shown	1257	W	345506 390229	Site Address: Units 1-3 The Lombard Centre, Link Road, Huyton, Liverpool, Merseyside, L36 6AP Type: 75kte WEEE Treatment Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: RRL004 EPR reference: EA/EPR/AB3603LX/A001 Operator: Restart Recycling Limited Waste Management licence No: 400736 Annual Tonnage: 74999.0	Issue Date: 04/11/2013 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Restart Recycling Ltd Correspondence Address: -
Not shown	1257	W	345506 390229	Site Address: Unit 1, 2 & 3, The Lombard Centre, Link Road, Huyton, Merseyside, L36 6AP Type: 75kte Materials Recycling Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: LRL101 EPR reference: EA/EPR/CB3806XX/A001 Operator: Link Recycling Limited Waste Management licence No: 402341 Annual Tonnage: 75000.0	Issue Date: 22/07/2015 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Link Recycling Limited Correspondence Address: -
Not shown	1343	W	345420 390320	Site Address: Ellis Ashton Street, Huyton, Merseyside, L36 6AH Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MAI002 EPR reference: - Operator: Mainsway Ltd Waste Management licence No: 50376 Annual Tonnage: 0.0	Issue Date: 01/04/2005 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Mainsway Ltd Correspondence Address: Keith Lewis, Pearl Environmental Ltd, 13, Middleton Road, Reddish, Stockport, SK5 6SG
Not shown	1343	W	345420 390320	Site Address: Land/premises At, Ellis Ashton Street, Huyton, Merseyside, L36 6AH Type: Household, Commercial & Industrial Waste T Stn Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MAI002 EPR reference: EA/EPR/ZP3294CU/A001 Operator: Mainsway Ltd Waste Management licence No: 50376 Annual Tonnage: 75000.0	Issue Date: 01/04/2005 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Mainsway Ltd Correspondence Address: -

ID	Distance (m)	Direction	NGR	Details	
Not shown	1369	W	345400 390400	Site Address: Huyton Industrial Estate, Ellis Ashton Street, Huyton, Liverpool, Merseyside, L36 6BW Type: ELV Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WIL204 EPR reference: EA/EPR/FP3694CW/A001 Operator: Willis Peter James Waste Management licence No: 50354 Annual Tonnage: 2500.0	Issue Date: 10/08/2005 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Huyton Quarry Salvage Correspondence Address: -
Not shown	1415	W	345380 390564	Site Address: Units 1/2, Ellis Ashton Street, Huyton Industrial Estate, Liverpool, Merseyside, L36 6BJ Type: ELV Facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ROB006 EPR reference: EA/EPR/XP3294CL/A001 Operator: Robcliffe Limited Waste Management licence No: 50292 Annual Tonnage: 2500.0	Issue Date: 26/08/2004 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Robcliffe Ltd Vechicle Dismantling Correspondence Address: -

4. Current Land Use Map



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Site Outline

250
500
Search Buffers (m)

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 8

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	41	NW	Electricity Sub Station	347104 390543	Electricity Sub Station, L35	Electrical Features	Infrastructure and Facilities
2	103	N	Electricity Sub Station	347427 390655	Electricity Sub Station, L35	Electrical Features	Infrastructure and Facilities
3	117	SW	Underwater Vision R O V Services	346672 390185	Underwater Vision R O V Services, 112, Windy Arbor Road, Whiston, Prescot, L35 3SQ	Marine Engineers and Services	Engineering Services
4	125	N	Chimney	347424 390677	Chimney, L35	Chimneys	Industrial Features
5	156	W	Pumping House	347217 390124	Pumping House, L35	Water Pumping Stations	Industrial Features
6	188	W	Electricity Sub Station	346583 390205	Electricity Sub Station, L35	Electrical Features	Infrastructure and Facilities
7	221	SE	Electricity Sub Station	347152 390045	Electricity Sub Station, L35	Electrical Features	Infrastructure and Facilities
8	226	N	Electricity Sub Station	347134 390731	Electricity Sub Station, L35	Electrical Features	Infrastructure and Facilities

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 0

Database searched and no data found.

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

---

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON

5.3 Bedrock and Solid Geology

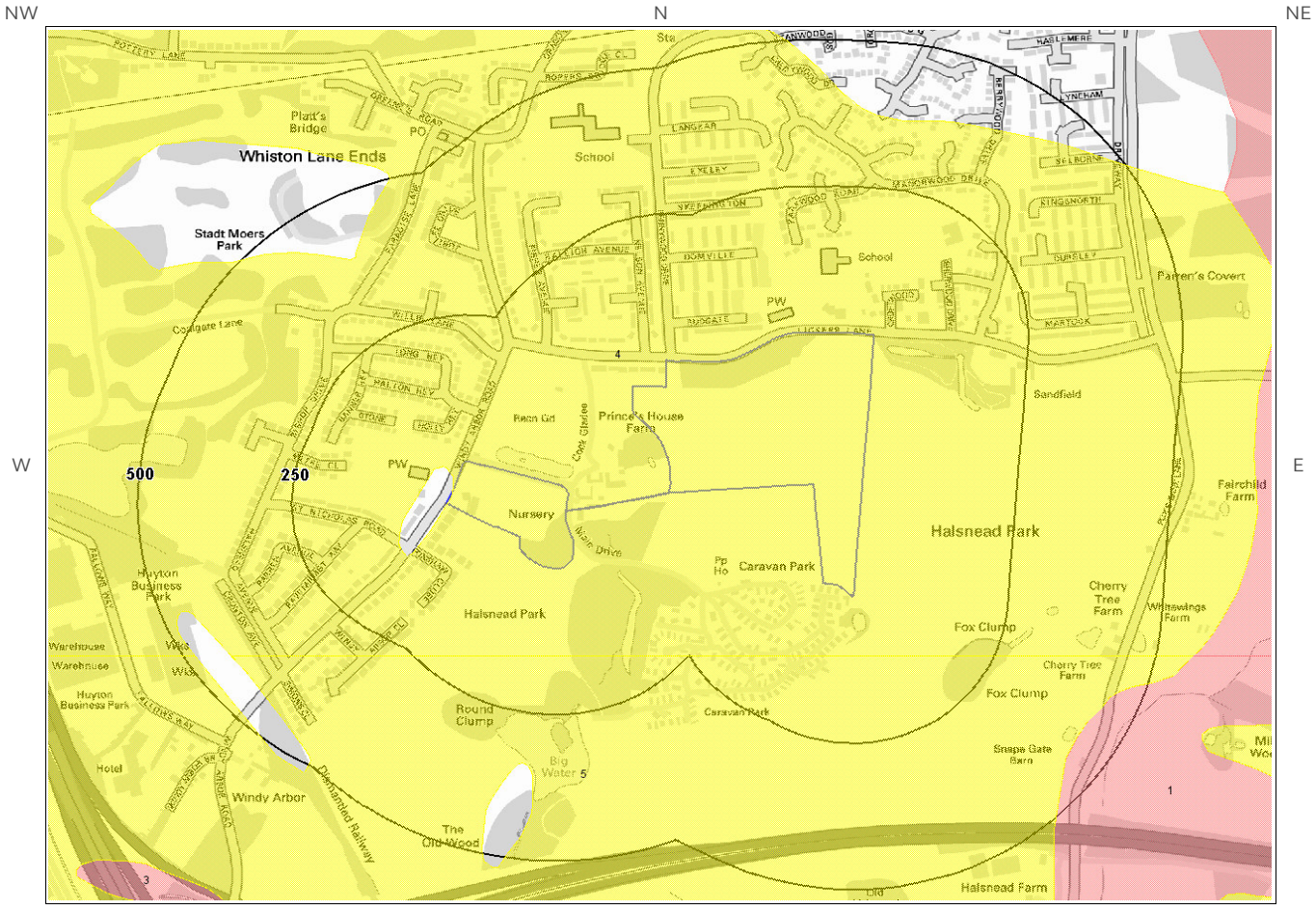
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
PMR-SDST	PEMBERTON ROCK	SANDSTONE
PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION	MUDSTONE, SILTSTONE AND SANDSTONE
PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION	MUDSTONE, SILTSTONE AND SANDSTONE
KNSF-SDST	KINNERTON SANDSTONE FORMATION	SANDSTONE
KNSF-SDST	KINNERTON SANDSTONE FORMATION	SANDSTONE

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



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Site Outline

Search Buffers (m)
250
500

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

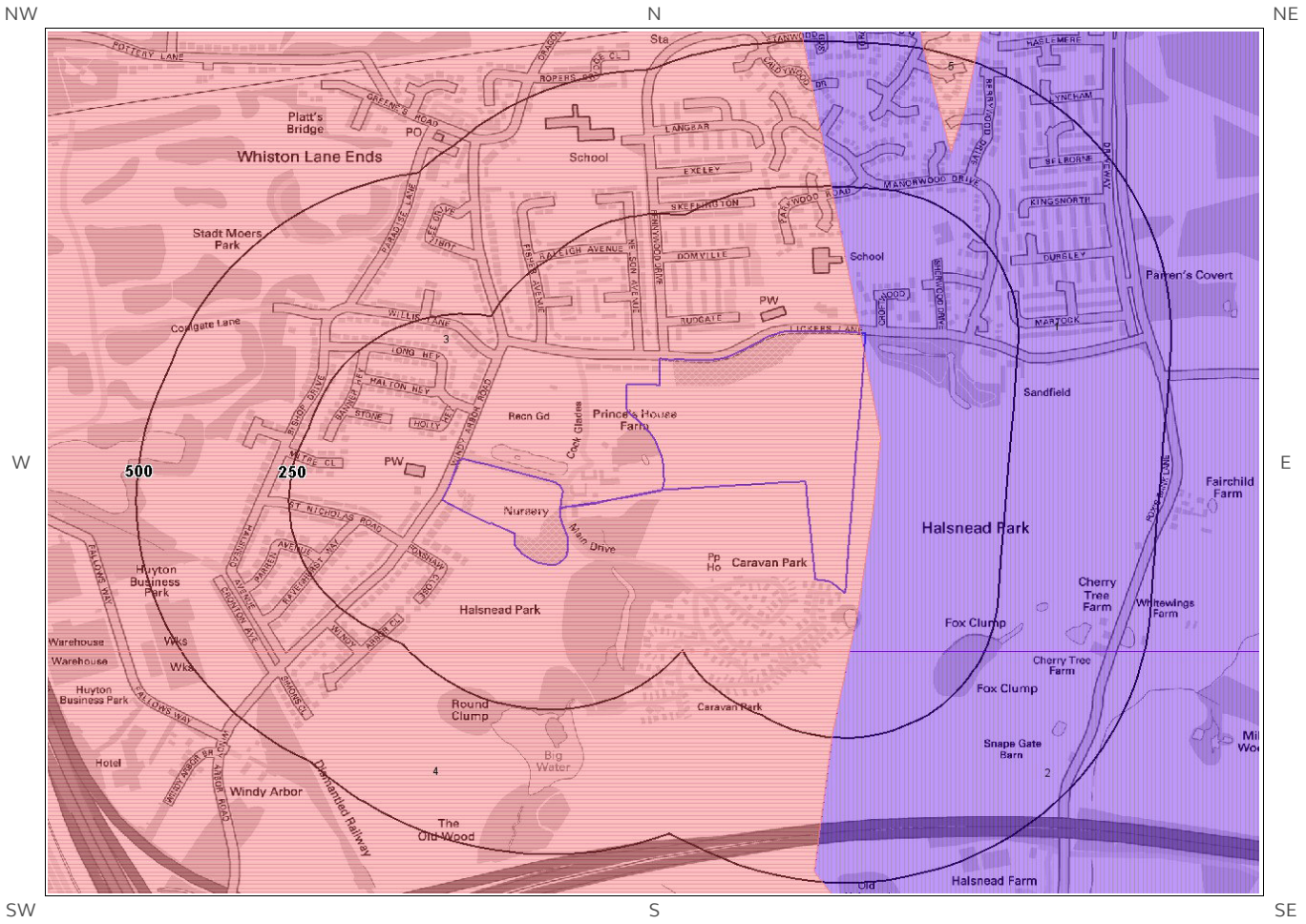
Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

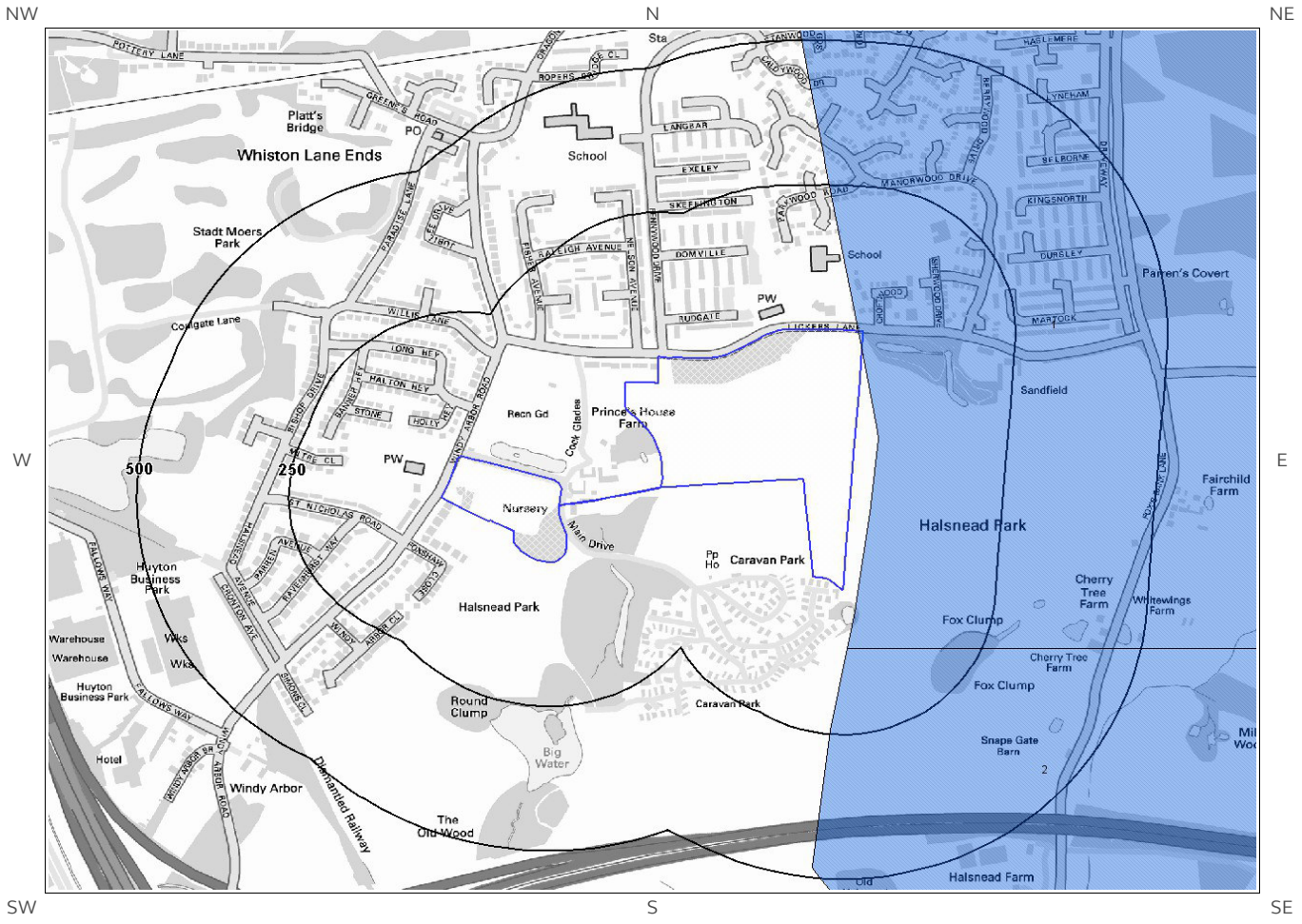
6b. Aquifer Within Bedrock Geology and Abstraction Licenses



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Site Outline
250
500
Search Buffers (m)
Principal Aquifer
Secondary (A) Aquifer - Permeable Layers
Secondary (B) Aquifer - Lower Permeability Layers
Groundwater Abstraction Licence
Secondary Aquifer - Undifferentiated Layers
Unproductive
Unknown (lakes and landslip)
Surface Water Abstraction Licence

6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



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Site Outline

250
500
Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

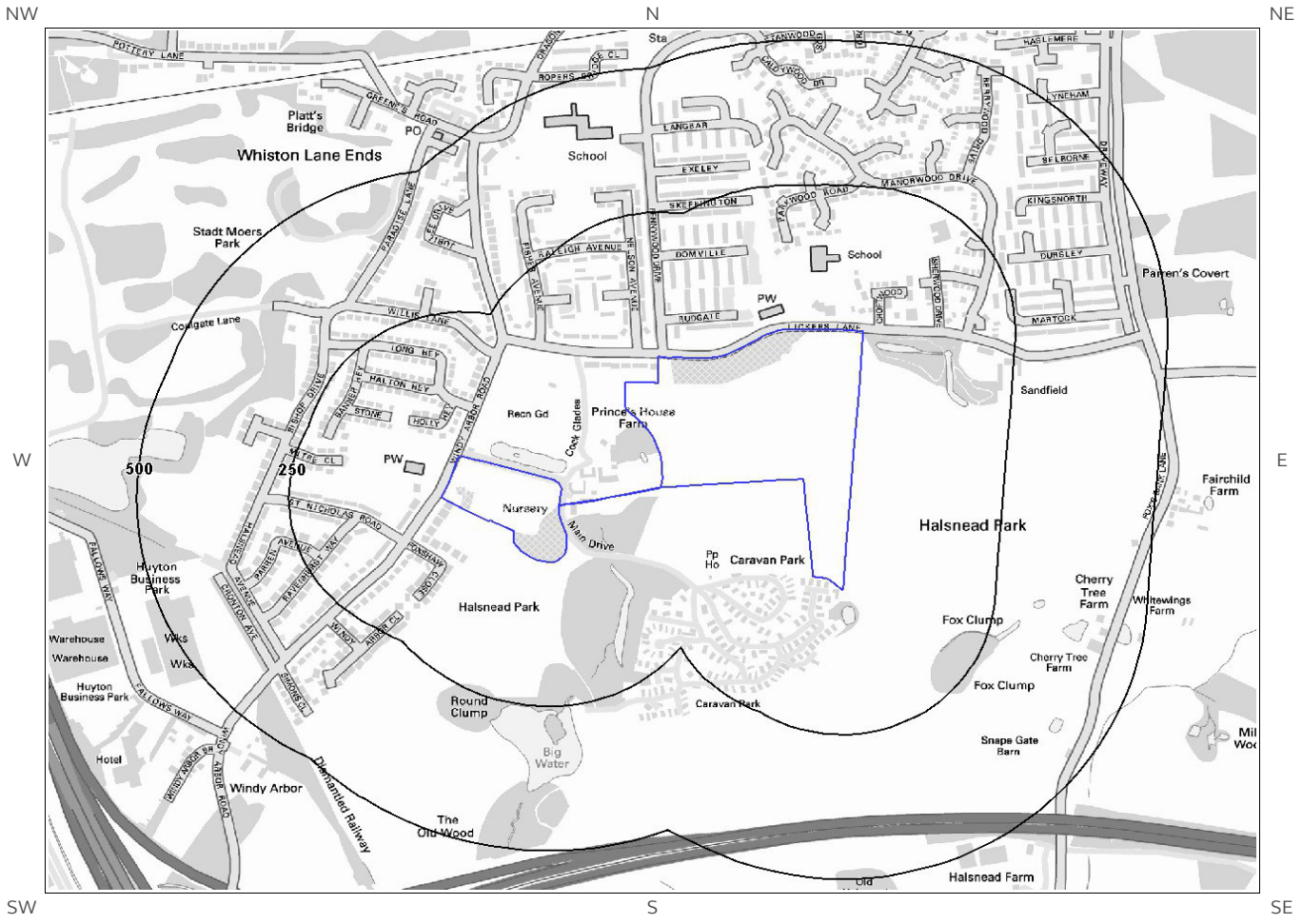
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer



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Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

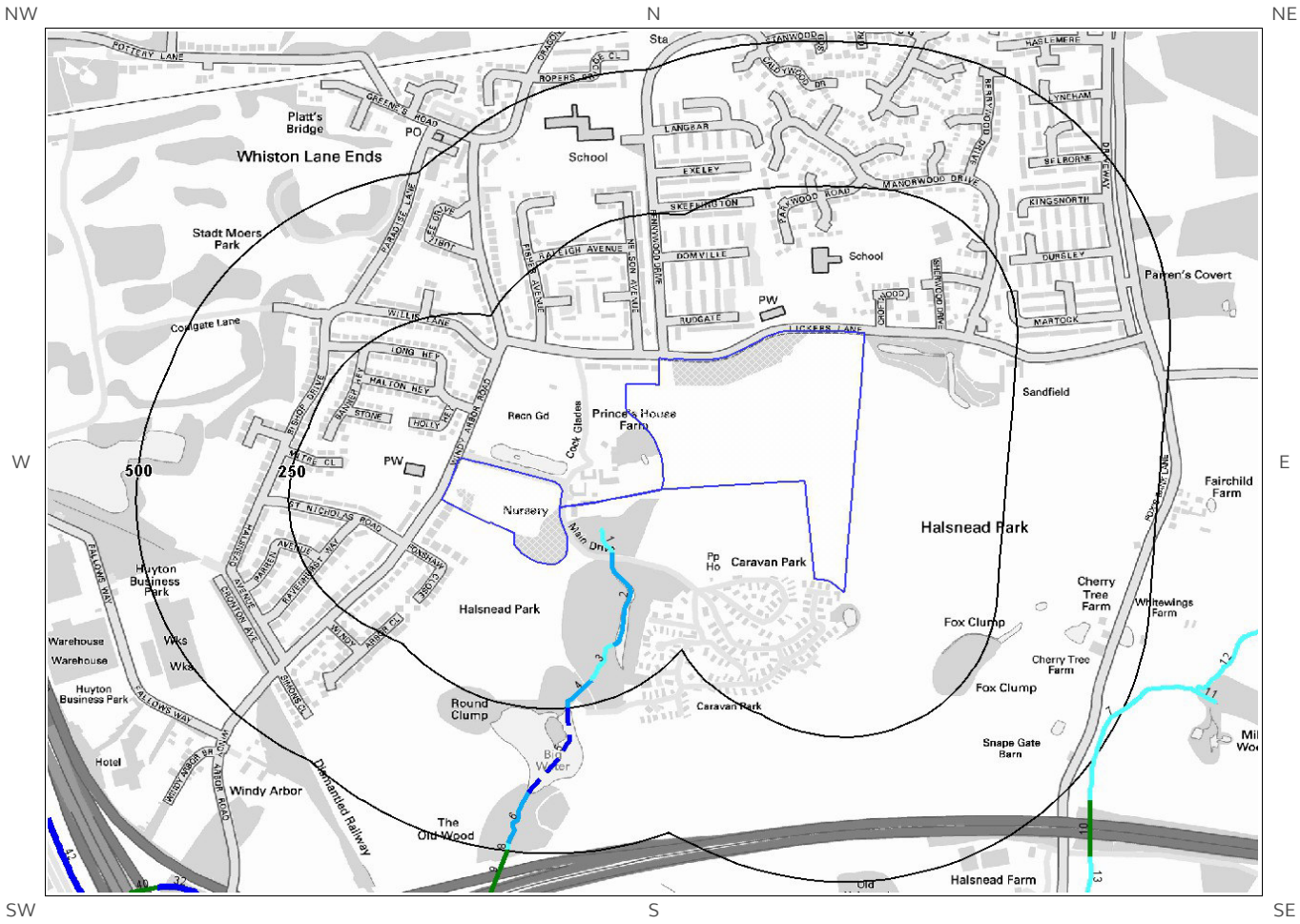
Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

Site Outline

250 500 Search Buffers (m)

6e. Hydrology – Detailed River Network and River Quality



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Site Outline

250 Search Buffers (m)
500

Primary River
Secondary River
Tertiary River
Lake/Reservoir
Underground River (inferred)
General Quality Assessment: Biology
General Quality Assessment: Chemistry

Canal
Canal Tunnel
Culvert
Multiple Channel Culvert
Underground River (Potential Sewer)
Underground River (local knowledge)

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
4	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
5	101	S	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
1	434	SE	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
3	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	101	S	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
4	101	S	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
5	342	NE	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? Yes

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
Not shown	988	NE	348100 391300	Status: Historical Licence No: 2569028008 Details: Potable Water Supply - Direct Direct Source: Ground Water - North West Region Point: 2 Wells + Connecting B/holes, Cumber La, Whiston, Merseyside Data Type: Point Name: NORTH WEST WATER LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 1599 Original Start Date: 16/3/1966 Expiry Date: - Issue No: 100 Version Start Date: 16/3/1966 Version End Date:
Not shown	1066	NE	348100 391400	Status: Historical Licence No: 2569028020 Details: Laundry Use Direct Source: Ground Water - North West Region Point: "borehole At Stoney Lane, Rainhill" Data Type: Point Name: THE SUNLIGHT SERVICES GROUP LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: S 7174 Original Start Date: 1/6/1993 Expiry Date: - Issue No: 101 Version Start Date: 24/10/1996 Version End Date:
Not shown	1066	NE	348100 391400	Status: Active Licence No: 2569028020 Details: Laundry Use Direct Source: Ground Water - North West Region Point: Borehole At Stoney Lane, Rainhill Data Type: Point Name: Berendsen UK Limited	Annual Volume (m^3): 118181.82 Max Daily Volume (m^3): 545.46 Original Application No: NPS/WR/013874 Original Start Date: 1/6/1993 Expiry Date: - Issue No: 102 Version Start Date: 22/7/2013 Version End Date:
Not shown	1106	E	348550 390340	Status: Historical Licence No: 2569028021 Details: Spray Irrigation - Direct Direct Source: Ground Water - North West Region Point: "b/hole At Blundells Hill Golf Club, Blundells Lane, Rainhill" Data Type: Point Name: BLUNDELLS HILL GOLF CLUB LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: S 7282 Original Start Date: 6/9/1994 Expiry Date: - Issue No: 101 Version Start Date: 19/2/2001 Version End Date:
Not shown	1106	E	348550 390340	Status: Historical Licence No: 2569028021 Details: "Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services" Direct Source: Ground Water - North West Region Point: "b/hole At Blundells Hill Golf Club, Blundells Lane, Rainhill" Data Type: Point Name: BLUNDELLS HILL GOLF CLUB LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: S 7282 Original Start Date: 6/9/1994 Expiry Date: - Issue No: 101 Version Start Date: 19/2/2001 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1106	E	348550 390340	Status: Active Licence No: 2569028021 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: B/hole At Blundells Hill Golf Club, Blundells Lane, Rainhill Data Type: Point Name: BLUNDELLS HILL GOLF CLUB LTD	Annual Volume (m^3): 21966.87 Max Daily Volume (m^3): 191.81 Original Application No: 7282 Original Start Date: 6/9/1994 Expiry Date: - Issue No: 102 Version Start Date: 11/2/2007 Version End Date:
Not shown	1106	E	348550 390340	Status: Active Licence No: 2569028021 Details: Spray Irrigation - Direct Direct Source: Ground Water - North West Region Point: B/hole At Blundells Hill Golf Club, Blundells Lane, Rainhill Data Type: Point Name: BLUNDELLS HILL GOLF CLUB LTD	Annual Volume (m^3): 21966.87 Max Daily Volume (m^3): 191.81 Original Application No: 7282 Original Start Date: 6/9/1994 Expiry Date: - Issue No: 102 Version Start Date: 11/2/2007 Version End Date:
Not shown	1643	N	348000 392100	Status: Historical Licence No: 2569025072 Details: "Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services" Direct Source: Ground Water - North West Region Point: "two Boreholes At Whiston Hospital, Prescot, Merseyside" Data Type: Point Name: ST HELENS AND KNOWSLEY HOSPITALS	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 7122 Original Start Date: 13/8/1992 Expiry Date: - Issue No: 100 Version Start Date: 13/8/1992 Version End Date:
Not shown	1643	N	348000 392100	Status: Historical Licence No: 2569025072 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Ground Water - North West Region Point: Two Boreholes At Whiston Hospital, Prescot, Merseyside Data Type: Point Name: ST HELENS AND KNOWSLEY HOSPITALS	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 7122 Original Start Date: 13/8/1992 Expiry Date: - Issue No: 100 Version Start Date: 13/8/1992 Version End Date:
Not shown	1643	N	348000 392100	Status: Historical Licence No: 2569025072 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Two Boreholes At Whiston Hospital, Prescot, Merseyside Data Type: Point Name: ST HELENS AND KNOWSLEY HOSPITALS	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 7122 Original Start Date: 13/8/1992 Expiry Date: - Issue No: 100 Version Start Date: 13/8/1992 Version End Date:
Not shown	1643	N	348000 392100	Status: Historical Licence No: 2569025072 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Ground Water - North West Region Point: "two Boreholes At Whiston Hospital, Prescot, Merseyside" Data Type: Point Name: ST HELENS AND KNOWSLEY HOSPITALS	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 7122 Original Start Date: 13/8/1992 Expiry Date: - Issue No: 100 Version Start Date: 13/8/1992 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? Yes

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
Not shown	1101	S	346600 389100	Status: Historical Licence No: 2569028018 Details: Spray Irrigation - Direct Direct Source: surface, Non-tidal - North West Region Point: ochre & Dog Clog Brks, Tarbock Hall Farm, Tarbock, Prescot Data Type: Line Name: T H CRITCHLEY & SON	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 2457 Original Start Date: 13/5/1976 Expiry Date: - Issue No: 100 Version Start Date: 1/4/1993 Version End Date:
Not shown	1101	S	346600 389100	Status: Historical Licence No: 2569028018 Details: Spray Irrigation - Direct Direct Source: Surface, Non-tidal - North West Region Point: Ochre & Dog Clog Brks, Tarbock Hall Farm, Tarbock, Prescot Data Type: Line Name: T H CRITCHLEY & SON	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 2457 Original Start Date: 13/5/1976 Expiry Date: - Issue No: 100 Version Start Date: 1/4/1993 Version End Date:
Not shown	1101	S	346600 389100	Status: Historical Licence No: 2569028018 Details: Spray Irrigation - Direct Direct Source: Surface, Non-tidal - North West Region Point: Ochre And Dog Clog Brooks Tarbock Hall Farm Prescot Data Type: Line Name: T H CRITCHLEY & SON	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 2457 Original Start Date: 13/5/1976 Expiry Date: - Issue No: 100 Version Start Date: 1/4/1993 Version End Date:
Not shown	1101	S	346600 389100	Status: Historical Licence No: 2569028018 Details: Spray Irrigation - Direct Direct Source: Surface, Non-tidal - North West Region Point: Ochre And Dog Clog Brooks Tarbock Hall Farm Prescot Data Type: Line Name: T H CRITCHLEY & SON	Annual Volume (m^3): 2098 Max Daily Volume (m^3): 636 Application No: 2457 Original Start Date: 13/5/1976 Expiry Date: - Issue No: 100 Version Start Date: 1/4/1993 Version End Date:
Not shown	1638	S	346400 388600	Status: Active Licence No: 2569028018 Details: Spray Irrigation - Direct Direct Source: Surface, Non-tidal - North West Region Point: Ochre And Dog Clog Brooks Tarbock Hall Farm Prescot Data Type: Line Name: BELPOOL DEVELOPMENTS LTD	Annual Volume (m^3): 2098 Max Daily Volume (m^3): 636 Application No: NPS/WR/006330 Original Start Date: 13/5/1976 Expiry Date: - Issue No: 102 Version Start Date: 31/1/2011 Version End Date:

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? Yes

The following Potable Water Abstraction Licences records are represented as points, lines and regions on the SPZ and Potable Water Abstraction Licences Map (6c):

ID	Distance (m)	Direction	NGR	Details	
Not shown	988	NE	348100 391300	Status: Historical Licence No: 2569028008 Details: Potable Water Supply - Direct Direct Source: Ground Water - North West Region Point: 2 Wells + Connecting B/holes, Cumber La, Whiston, Merseyside Data Type: Point Name: NORTH WEST WATER LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 1599 Original Start Date: 16/3/1966 Expiry Date: - Issue No: 100 Version Start Date: Version End Date:
Not shown	1106	E	348550 390340	Status: Historical Licence No: 2569028021 Details: "Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services" Direct Source: Ground Water - North West Region Point: "b/hole At Blundells Hill Golf Club, Blundells Lane, Rainhill" Data Type: Point Name: BLUNDELLS HILL GOLF CLUB LTD	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: S 7282 Original Start Date: 6/9/1994 Expiry Date: - Issue No: 101 Version Start Date: Version End Date:
Not shown	1106	E	348550 390340	Status: Active Licence No: 2569028021 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: B/hole At Blundells Hill Golf Club, Blundells Lane, Rainhill Data Type: Point Name: BLUNDELLS HILL GOLF CLUB LTD	Annual Volume (m^3): 21966.87 Max Daily Volume (m^3): 191.81 Original Application No: 7282 Original Start Date: 6/9/1994 Expiry Date: - Issue No: 102 Version Start Date: Version End Date:
Not shown	1643	N	348000 392100	Status: Historical Licence No: 2569025072 Details: "Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services" Direct Source: Ground Water - North West Region Point: "two Boreholes At Whiston Hospital, Prescot, Merseyside" Data Type: Point Name: ST HELENS AND KNOWSLEY HOSPITALS	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 7122 Original Start Date: 13/8/1992 Expiry Date: - Issue No: 100 Version Start Date: Version End Date:
Not shown	1643	N	348000 392100	Status: Historical Licence No: 2569025072 Details: Drinking, Cooking, Sanitary, Washing, (Small Garden) - Commercial/Industrial/Public Services Direct Source: Ground Water - North West Region Point: Two Boreholes At Whiston Hospital, Prescot, Merseyside Data Type: Point Name: ST HELENS AND KNOWSLEY HOSPITALS	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: 7122 Original Start Date: 13/8/1992 Expiry Date: - Issue No: 100 Version Start Date: Version End Date:

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? Yes

The following Source Protection Zones records are represented on the SPZ and Potable Water Abstraction Map (6c):

ID	Distance (m)	Direction	Zone	Description
1	0	On Site	3	Total catchment
2	101	S	3	Total catchment

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site? No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site? Yes

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
0	On Site	Minor Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.
3	E	Major Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
3	E	Major Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.
101	S	Major Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.
256	SW	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
413	E	Major Aquifer/High Leaching Potential	H3	Coarse textured or moderately shallow soils which readily transmit non-adsorbed pollutants and liquid discharges but have some ability to attenuate adsorbed pollutants because of their clay or organic matter content.
427	E	Major Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.
433	E	Major Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? Yes

6.9.1 Biological Quality:

Biological Quality data describes water quality in terms of 83 groups of macroinvertebrates, some of which are pollution sensitive. The results are graded from A ('Very Good') to F ('Bad').

The following Biological Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Biological Quality Grade				
					2005	2006	2007	2008	2009
Not shown	1101	S	346600 389100	River Name: Ditton Bk Reach: Prescot Stw To Fox's Bank Bk. End/Start of Stretch: End of Stretch NGR	E	E	E	E	E

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? Yes

The following Detailed River Network records are represented on the Hydrology Map (6e):

ID	Distance (m)	Direction	Details	
1	47	S	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
2	74	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
3	167	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
4	209	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
5	250	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Lake/Reservoir Main River Status: Currently Undefined
6	396	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
7	487	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
8	488	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
9	498	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined

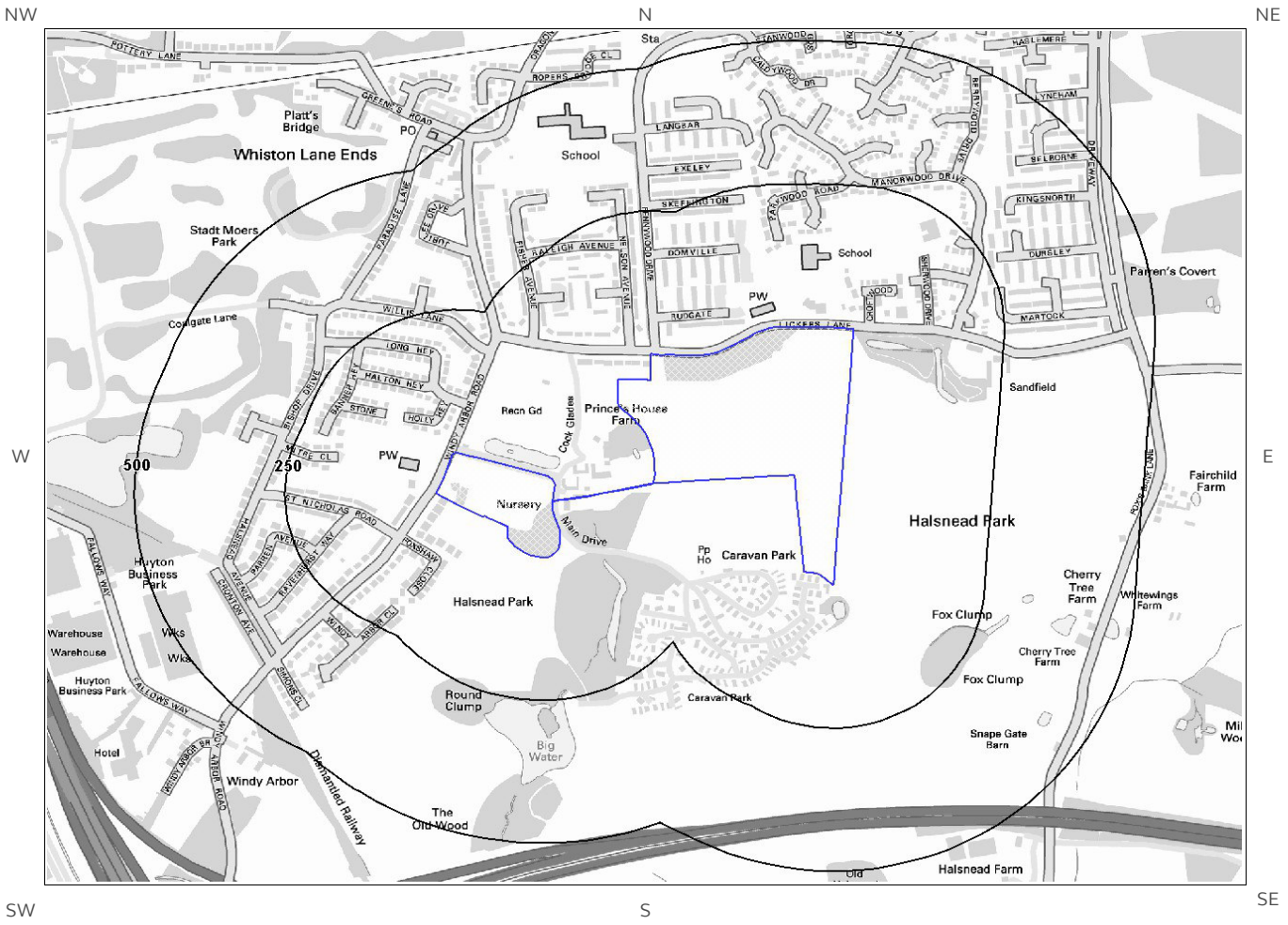
6.11 Surface Water Features

Are there any surface water features within 250m of the study site? Yes

The following surface water records are not represented on mapping:

Distance (m)	Direction
12	N
21	E
47	S
76	E
168	SE
191	S
233	S

7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



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Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

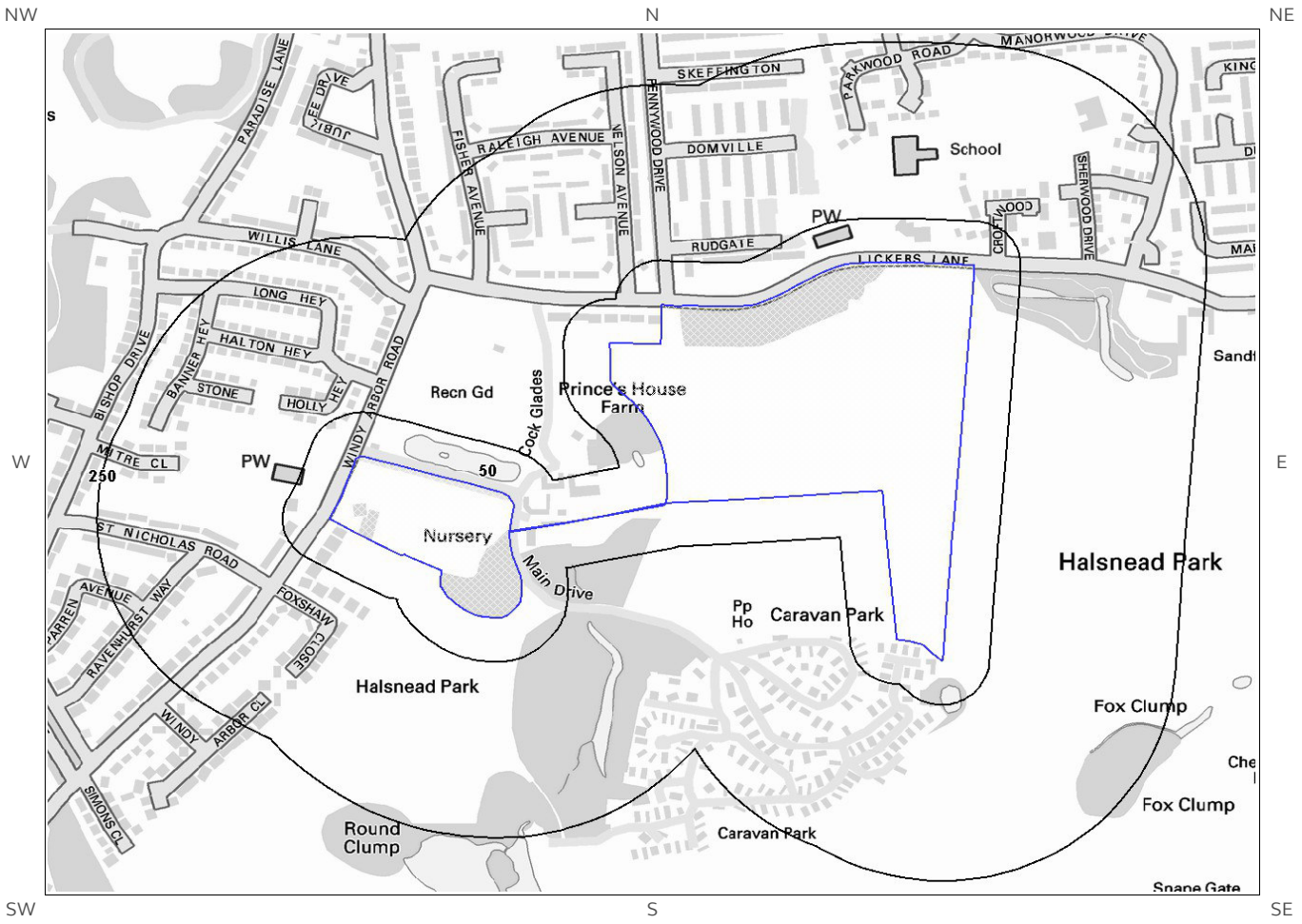
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



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Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

Very Low

Low

Medium

High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? No

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? No

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

Database searched and no data found.

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

What is the highest risk of flooding onsite? Very Low

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Clearwater Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

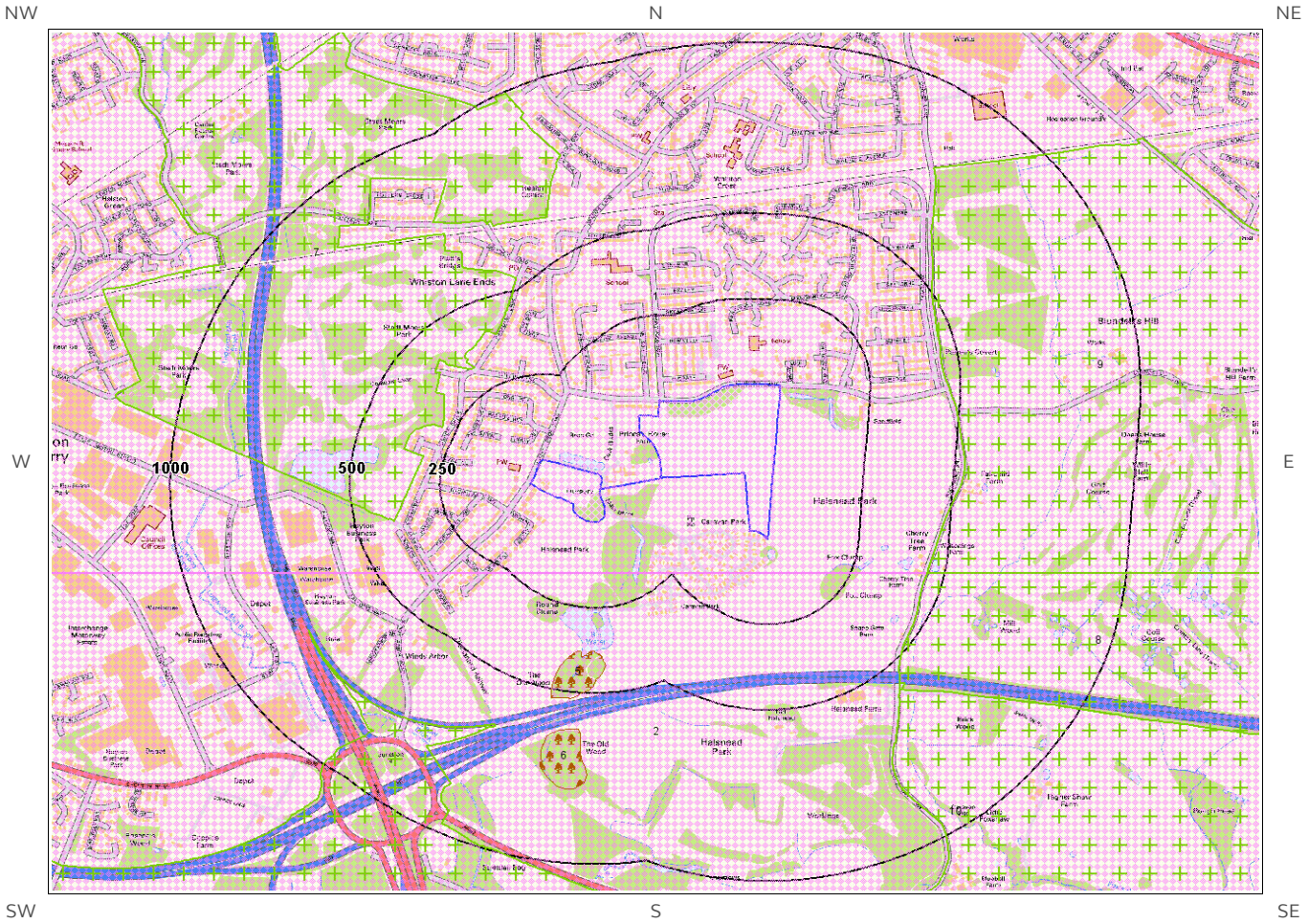
7.8 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? High

Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



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Site Outline

100 250 Search Buffers (m)

AONB

National Park

SSSI

Special Protection Areas

Nitrate Vulnerable Zones

Green Belt

Environmentally Sensitive Areas

Special Areas of Conservation

World Heritage Sites

Nitrate Sensitive Areas

Ancient Woodland

National Nature Reserve

Local Nature Reserves

Ramsar Sites

8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site? Yes

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

0

Database searched and no data found.

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

2

The following records of Designated Ancient Woodland provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
5	376	S	UNKNOWN	Ancient and Semi-Natural Woodland
6	605	S	UNKNOWN	Ancient and Semi-Natural Woodland

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

0

Database searched and no data found.

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

4

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
1	0	On Site	Existing	DEFRA
2	101	S	Existing	DEFRA
Not shown	1503	W	Existing	DEFRA
Not shown	1556	E	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

4

Green Belt data contains Ordnance Survey data © Crown copyright and database right [2015].

ID	Distance	Direction	Green Belt Name	Local Authority Name
7	289	W	Liverpool, Manchester and West Yorks Greenbelt	Knowsley
8	451	E	Liverpool, Manchester and West Yorks Greenbelt	St. Helens District (B)
9	452	E	Liverpool, Manchester and West Yorks Greenbelt	St. Helens District (B)
10	559	SE	Liverpool, Manchester and West Yorks Greenbelt	Knowsley

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure Geo Insight, available from our website. The following information has been found:

9.1.1 Shrink Swell

What is the maximum Shrink-Swell*[*] hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

What is the maximum Running Sand*[*] hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

* This indicates an automatically generated 50m buffer and site.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing
ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site? Yes

The following coal mining information provided by the Coal Authority is not represented on Mapping:

Distance (m)	Direction	Details
0	On Site	The study site is located within the specified search distance of an identified mining area. Further details concerning this can be obtained from the Coal Authority Helpline on 0845 762 6848.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? No

Database searched and no data found.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
Guidance: No Guidance Required.

Contact Details

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APPENDIX D
Coal Authority Report

The Coal Authority

Resolving the impacts of mining

CON29M Non-Residential Mining Report







1 OLD ORCHARD
WHISTON
KNOWSLEY
L35 3QA

Date of enquiry:	02 May 2017
Date enquiry received:	02 May 2017
Issue date:	02 May 2017
Our reference:	51001463180001
Your reference:	LC/C3593/4930

CON29M Non-Residential Mining Report

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.

Client name

BROWNFIELD SOLUTIONS LIMITED

Enquiry address

1 OLD ORCHARD, WHISTON, KNOWSLEY, L35 3QA



Approximate position of property

Map data

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/coalauthority

Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	Yes
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	No
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

Further recommended reports
Mine entry interpretive report
Mine entry plan and data sheets

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 7 seams of coal at 80m to 440m depth, and last worked in 1903.

Any movement in the ground due to coal mining activity should have stopped.

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. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on the Coal Authority information section of the report.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

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

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

4. Mine entries

Within, or within 20 metres of, the boundary of the property there are 6 mine entries, the approximate positions of which are shown on the enquiry boundary plot.

Our records disclose the following information:
347390-005. No treatment details.

346390-029. No treatment details.

347390-002. No treatment details.

347390-004. No treatment details.

346390-026. No treatment details.

347390-006. this shaft has been proved to be filled and may have been capped to an unknown specification at some time in the past.

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

For an additional fee, the Coal Authority can provide a Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry/entries referred to in this report. It gives an opinion on the likelihood of mining subsidence damage caused from ground movement as a consequence of the mine entry/entries. It also gives details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie for development sites and new build).

For further advice on how to order this additional information please visit www.groundstability.com.

5. Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

6. Past opencast coal mining

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

7. Present opencast coal mining

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

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

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.

9. Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. 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.

12. Withdrawal of support

The property is not in an area where a notice to withdraw support has been given.

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

13. Working facilities order

The property is not in an area where 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.

14. Payments to owners of former copyhold land

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

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Comments on the Coal Authority information

The Coal Authority own the copyright in this report and the information used is protected by our database right.

The boundary plot shows the approximate location of the disused mine entry/entries referred to in this report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991*). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by visiting www.groundstability.com.

If you wish to discuss the relevance of any of the information contained in this report, you should seek the advice of a qualified mining engineer or surveyor. If you or your advisor wish to examine the source plans from which the information has been taken, these are available to view, free of charge, at our Head Office in Mansfield. To book an appointment please ring 01623 637225. Should you or your advisor wish to carry out a physical investigation that may enter, disturb or interfere with any disused mine entry, prior permission of the owner must be sought. For coal mine entries, the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number is 01623 646333.

*Note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment 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. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. 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 applicable at the time the report was produced.

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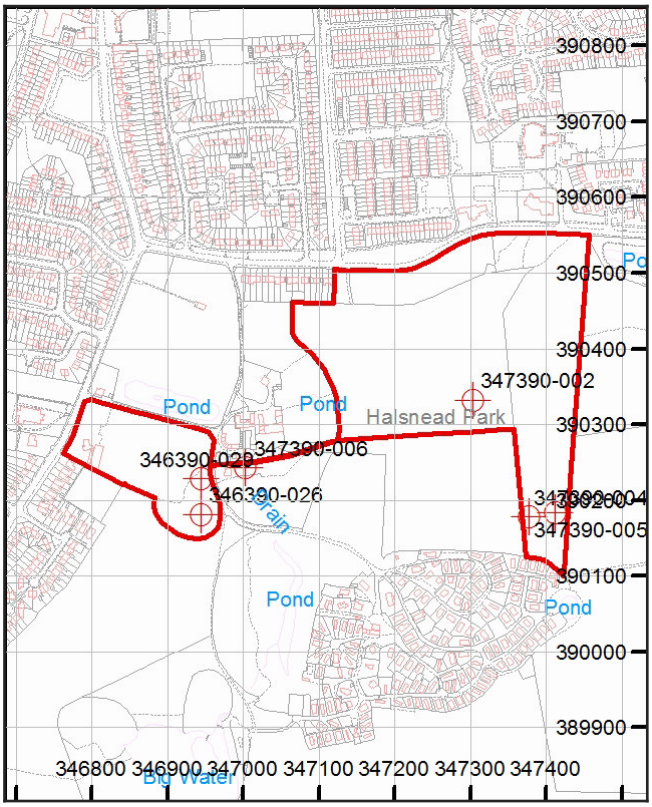
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Enquiry boundary

Key

Approximate position of enquiry boundary shown

Disused mineshaft



Map data

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APPENDIX E
Risk Assessment Methodology

Contaminated Land Risk Assessment

Contaminated Land Risk Assessment is a technique that identifies and considers the associated risk, determines whether the risks are significant and whether action needs to be taken. The four main stages of risk assessment are:

Hazard Identification ⇨ Hazard Assessment ⇨ Risk Estimation ⇨ Risk Evaluation

CLR11 outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. The starting point of the risk assessment is to identify the context of the problem and the objectives of the process. Under CLR11, three tiers of risk assessment exist - Preliminary, Generic Quantitative and Detailed Quantitative.

Formulating and developing a conceptual model for the site is an important requirement of risk assessment, this supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process.

Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk.

The risk assessment process needs to take into account the degree of confidence required in decisions. Identification of uncertainties is an essential step in risk assessment.

The likelihood of an event is classified on a four-point system using the following terms and definitions from CIRIA C552:

- **High likelihood**: There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution;
- **Likely**: There is a pollution linkage and all the elements are present and in the right place, which means it is probable that an event will occur. Circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;
- **Low likelihood**: There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain even over a longer period such event would take place, and is less likely in the short term;
- **Unlikely**: There is a pollution linkage but circumstances are such that it is improbable the event would occur even in the long term.

The severity is also classified using a system based on CIRIA C552. The terms and definitions are:

- **Severe**: Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. A short-term risk to a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);
  Examples – High concentrations of contaminant on surface of recreation area, major spillage of contaminants from site into controlled waters, explosion causing building to collapse;

- **Medium**: Chronic damage to human health ('significant harm' as defined in DETR 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);
  Examples - Concentrations of contaminants exceed the generic assessment criteria, leaching of contaminants from a site to a Principal or Secondary Aquifer, death of species within a designated nature reserve;

- **Mild**: Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures, services or the environment;
  Examples – Pollution of non-classified groundwater or damage to buildings rendering it unsafe to occupy.

- **Minor**: harm, not necessarily significant harm, which may result in financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by use of personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.
  Examples – Presence of contaminants at such concentrations PPE is required during site work, loss of plants in landscaping scheme or discolouration of concrete.

Once the likelihood and severity have been determined, a risk category can be assigned using the table below.

		Consequences			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly likely**	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very Low	Very low

Definitions of the risk categories obtained from the above table are as follows together with an assessment of the further work that might be required:

- **Very high**: There is a high probability that severe harm could arise to a designated receptor from an identified hazard or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability. Urgent investigation and remediation are likely to be required;

- **High**: Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the longer term;

- **Moderate**: It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it would be more likely to be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term;

- **Low**: It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild;

- **Very Low**: There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

APPENDIX F
Ground Gas Guidance Assessment Note

Ground Gas Guidance

Redevelopment on brownfield sites is an ever increasing occurrence, including those sites where a potential ground gas issue is present.

CIRIA C665 is the current guidance which gives up-to-date advice on all aspects of ground gas. It outlines good practice in investigation, the collection of relevant data and monitoring programmes in a risk-based approach to gas contaminated land. Two semi-quantitative methods are set out for the assessment of risk:

1 For low rise housing with a ventilated under floor void at minimum 150 mm (Boyle and Witherington);
2 For all other development types (Wilson and Card).

Both methods use the concept of Gas Screening Values (GSVs) to identify levels of risk. The mitigation and management of potentially unacceptable risk is described with reference to both passive and active systems of gas. Source removal is also discussed as an option.

CIRIA C665 and the advice it contains has been prepared to be generally consistent with CLR11 *Model Procedures for the management of land contamination* (Defra and Environment Agency, 2004a). The aim of CIRIA C665 is a consistent approach to decision making, particularly relating to the scope of protective design measures on a site specific basis.

Legislative Framework

CIRIA C665 provides technical guidance however also recognises the context into which the guidance has to be employed. Government policy is based upon a "suitable for use approach", which is relevant to both the current and proposed future use of land. When considering the current use of land, Part IIA of the Environment Protection Act 1990 provides the regulatory regime. The presence of hazardous ground gases could provide the "source" in a "pollutant linkage" which could lead the regulator to determine that considerable harm or there is a significant possibility of such harm being caused. Under such circumstances, the regulator would determine the land to be "contaminated land" under the provisions of the Act, setting out the process of remediation as described in the DETR Circular 02/2000 *Statutory guidance on contaminated land* (DETR, 2000a).

Frequency and Duration of Monitoring

The monitoring period for a specific site covers the "worst case" scenario. A "worst case" scenario will occur during falling atmospheric pressure and, in particular, weather conditions such as rainfall, frost and dry weather.

The benefits of the additional information and whether it is likely to change the scope of gas protection should be considered, as are the consequences of failing to characterise adequately pollutant linkages. Investigations concerned with soil gas are required to provide monitoring data sufficient to allow prediction of worst case conditions enabling the confident assessment of risk and subsequent design of appropriate gas protection schemes. Monitoring programmes should not be an academic exercise in data collection.

Below are matrices that will aid in determining an appropriate number of gas monitoring visits and the length of monitoring period.

Typical/idealised periods of monitoring

		Generation of Potential Source				
		Very Low	**Low**	**Moderate**	**High**	**Very High**
Sensitivity of Development	**Low (Commercial)**	1 month	2 months	3 months	6 months	12 months
	Moderate (Flats)	2 months	3 months	6 months	12 months	24 months
	High (Residential with Gardens)	3 months	6 months	6 months	12 months	24 months

Typical/idealised frequency of monitoring

		Generation of Potential Source				
		Very Low	**Low**	**Moderate**	**High**	**Very High**
Sensitivity of Development	**Low (Commercial)**	4	6	6	12	12
	Moderate (Flats)	6	6	9	12	24
	High (Residential with Gardens)	6	9	12	24	24

Note

1 NHBC guidance also recommends this period of monitoring (Boyle and Witherington, 2007).
2 There is no industry consent over "high", "medium" or "low" generation potential of source.
3 At least two sets of readings should be at low and falling atmospheric pressure (but not restricted to periods below <1000 mb) known as worst case conditions. Historical data can be used as part of the data set (Table 5.5b).

It is recommended that newly installed monitoring wells are left for 24 hours to allow the soil gas to reach equilibrium. It should be recognised, however, that some soil gas regimes could take considerably longer (up to seven days). Interpretation of any initial readings should take this equilibrium process into account.

APPENDIX G
Legislative Background

Environmental liabilities and risks have been evaluated in terms of a source -pathway - target relationship in accordance with the approach set out in:

- The 1995 Environment Act;
- The Contaminated Land (England) Regulations 2000;
- The DETR circular 02/2000 Environmental Protection Act 1990: Part IIA Contaminated Land.

Contaminated land is defined within the legislative framework as land which is in such condition by reason of substances in, on or under the land that:

1) Significant harm is being caused or there is a significant possibility of such harm being caused;
2) Significant pollution of controlled waters is being or is likely to be caused.

The potential for harm is based on the presence of three factors:

- **Source** - substances that are potential contaminants or pollutants that may cause harm;
- **Pathway** - a potential route by which contaminants can move from the source to the receptor;
- **Receptor** - a receptor that may be harmed, for example the water environment, humans and water.

Where a source, pathway and target are all present a pollutant linkage exists and there is potential for harm to be caused. The presence of a source does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors are site specific and will vary according to the intended end use of the site, its characteristics and its surroundings.

The key principle which supports the SPR approach is 'suitable for use' criteria. This requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and, taking into account the proposed use of the site.

Relevant Guidance Documents

This report has been prepared in accordance with the list of guidance below however the list is not exhaustive:

- CLR11 – Model Procedures;
- Contamination and Environmental Matters - Their implications for Property Professionals (2nd Edition RICS Nov 2003);
- Brownfields – Managing the development of previously developed land – A client's guide, CIRIA 2002;
- DEFRA and Environment Agency publications CLR7 – 10, supported by the TOX guides and SGV guides, dated March 2002;
- DETR Circular 02/2000, Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990;
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002;

Relevant Legislative Documents

The following is a non-exhaustive list of legislative framework documents that has been considered in the production of this report:

- The Environment Act (1995);
- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012);
- The Environment Protection Act (1990);
- The Contaminated Land (England) Act (2000);
- Contaminated Land (England) Regulations (2012);
- The Water Resources Act (1991);
- The Pollution Prevention and Control (England and Wales) Regulations (2000);
- The Landfill Regulations (England and Wales) Regulations (2002);
- The Landfill (England and Wales) (Amendment) Regulations (2004);
- Health and Safety at Work Act;

APPENDIX H
Limitations

Standard Limitations

This desk study report was conducted and has been prepared for the sole internal use and reliance of the Client, Stewart Milne Homes. This report shall not be relied upon or transferred to any other parties without the express written authorisation of BSL. If an unauthorised third party comes into possession of this report they rely on it at their risk and the authors owe them no duty of care or skill.

The findings and opinions conveyed via the desk study are based on information obtained from a variety of sources as detailed within this report, which BSL believes are reliable. Nevertheless, BSL cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

Any recommendations made in this report should be confirmed with the Regulatory bodies and Planning Authority prior to implementation to ensure compliance.

No existing manhole covers were lifted or drainage runs inspected during the course of this ground investigation.

The site plans enclosed in this report should not be scaled off.

BROWNFIELD SOLUTIONS LTD

GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

STEWART MILNE HOMES

Halsnead Park, Whiston

Geo-environmental Assessment Report

LC/C3593/7018

July 2017

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Northwich, Cheshire CW9 5LP

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EXECUTIVE SUMMARY – HALSNEAD PARK	
Location	The site covers an area of approximately 11.5 hectares and is situated approximately 12.6 kilometres east of Liverpool City Centre. The site is centred on National Grid Reference 347218, 390362.
Ground Conditions	The site is split into two parcels of Land referred to as Area A and Area B. Within Area A made ground was encountered to depths of between 0.30m and in excess of 1.50m. The made ground encountered was generally granular and comprising cobbles of brick and concrete within a sandy and or clayey matrix. No evidence of shallow mining issues were found within Area A during the site investigation. However access was limited within this portion of the site due to it being heavily vegetated and additional investigation may be required to further assess the risk from coal mining and to locate the two known mine shafts within this area. Interpretation of the result from Area B indicates that there should be shallow seams, although these have not been encountered. Area B is largely an open field. Made ground was present locally and this is interpreted to be associated with outcrop mining. Bedrock across the remainder of Area B consisted of siltstone and mudstone with coal seams present at shallow depths. The mining investigation identified soft and broken ground proving shallow mining to have been undertaken below the site. A risk at the surface from shallow workings was identified across the main field within Area B.
Foundations and Floor Slabs	Foundation recommendations are preliminary at this stage as no development layout or finished site levels are available. Within Area A foundations are likely to be shallow unreinforced strip foundations founding on natural clays or weathered bedrock between 1.20m and 1.50m. Foundations may need to be deepened locally where trees are present in accordance with NHBC Chapter 4.2 or where deeper pockets of made ground exist. It is considered that this will best be achieved by trench or mass fill foundations. Due to the likelihood of ground gas precautionary measures being required within Area A it is recommended that suspended floor slabs are implemented. Within Area B treatment of mine workings is required to prevent subsidence of foundations. The extents of the treatment areas relating to coal seams is unknown at this stage. Following treatment reinforced strip foundations are considered the most suitable solution for the majority of plots within Area B within clays and weathered bedrock at shallow depths are considered suitable founding strata at a depth of between 1.00m and 1.50m within the main field. Within the smaller field in the east where granular strata was encountered foundations should be a minimum depth of 0.60m. Shallow mining such as bell pits were identified locally at the site and within these areas a deeper foundation solution; trench fill or vibro improved ground may be required in these areas however additional investigation is required to fully assess this risk. Floor slabs within Area B can be ground bearing in areas where less than 600mm of suitably compacted granular material is present beneath finished floor levels however ground gas monitoring has not yet identified a consistent ground gas regime and therefore the need for suspended floor slabs cannot be ruled out at this stage.

Soil Contamination	Localised lead and arsenic contamination marginally in excess of residential screening values was identified within Area A. In addition elevated PAH and hydrocarbon contamination was also notified at one location within Area A. No elevated determinands were identified within Area B and there is no considered risk to site end users from contamination in this area. No asbestos was detected within any of the samples screened across the site.
Ground Gases	Ground gas monitoring is ongoing and a full assessment will be issued upon completion of the monitoring programme. At present basic ground gas precautionary measures for carbon dioxide are likely to be required within Area A. No elevated concentrations have been identified within Area B to date however a consistent gas regime has not yet been identified. In the vicinity of shafts on site gas precautions should be allowed for.
Highways	CBR values of 2% - 5% are likely to be achieved in undisturbed natural soils for pavement design purposes, unless proven otherwise by in-situ testing at sub-base level by a specialist geotechnical engineer.
Further Work	• Completion of gas monitoring programme. • Issue gas assessment. • Additional Intrusive site investigations within previously inaccessible areas (Area A) • Design of remedial strategy. • Treatment of mine workings and shafts. • Demolition Asbestos survey. • Tree survey by qualified aboriculturist. • Detailed Foundation design. • Confirmation of Remedial Strategy with Local Authority.

PROJECT QUALITY CONTROL DATA SHEET

Site Name:	Halsnead Park, Whiston	
Report Name:	Geo-Environmental Assessment Report	
Report Number:	LC/C3593/7018	
Date:	02nd August 2017	
Status:	Final	
Revision:		

Client: Stewart Milne Homes	**Engineer:**
Harrier House 2 Lumsdale Road Cobra Business Park Trafford Park, Manchester M32 0UT	
Contact: Mr Steve Daniel	Contact:

Written by:	Checked by:	Approved by:
L Crawford BSc (Hons) FGS	A J Hewitt BSc(Hons) MSc CGeol CSci EurGeol FGS	A J Hewitt BSc(Hons) MSc CGeol CSci EurGeol FGS

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C3593/02	-	Pertinent Site Features Plan
C3593/04A	-	Exploratory Hole Location Plan Area A
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C3593/06	-	Coal Seam Plan
C3593/07	-	Coal Mining Influence Plan

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APPENDIX B	**Chemical Testing Results**
APPENDIX C	**Geotechnical Testing Results**
APPENDIX D	**Ground Gas Monitoring Results**
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**GEO-ENVIRONMENTAL ASSESSMENT REPORT
FOR A SITE AT
HALSNEAD PARK,
WHISTON**

1.0 INTRODUCTION

1.1 Objectives

1.1.1 This report describes a Geo-environmental Assessment carried out by Brownfield Solutions Limited (BSL) for Stewart Milne Homes on a site at Halsnead Park, Whiston.

1.1.2 The objectives of the assessment were to determine the sites environmental setting and likely site conditions, highlighting potential areas of concern that may govern the sites redevelopment.

1.1.3 A main intrusive investigation was undertaken to confirm the findings of the preliminary CSM and risk assessment undertaken by BSL and meet any objectives that had not been satisfied. The main investigation was undertaken using trial pitting, window sampling and rotary open hole drilling.

1.1.4 The report has been completed to fulfil the requirements of a preliminary risk assessment in accordance with CLR11 "Model Procedures for the Management of Land Contamination".

1.1.5 This report should be read in conjunction with the following reports:

- Desk Study Assessment Report Document Reference No. LC/C3593/7001 Issued July 2017
- Coal Mining Risk Assessment Document Reference No. LC/C3593/7004 Issued July 2017

1.2 Proposed Development

1.2.1 The proposed development is residential end use comprising traditional housing and associated gardens, soft landscaping and hardstanding.

1.3 Limitations

1.3.1 This Assessment has been carried out based on information obtained from a number of areas, BSL have assumed that this information is correct.

1.3.2 There may be other conditions prevailing on the site which are outside the scope of work and have not been highlighted by this assessment and therefore not been taken into account by this report. Responsibility cannot be accepted for such site conditions not revealed by the assessment.

1.3.3 This report has been prepared for the sole use of the client. No other third parties may rely upon or reproduce the contents of this report without the written permission of Brownfield Solutions Ltd (BSL). If any unauthorised third party comes into possession of this report they rely on it at their own risk and BSL do not owe them any Duty of Care.

2.0 THE SITE

2.1 Location & Access

2.1.1 The site covers an area of approximately 11.5 hectares and is situated approximately 12.6 kilometres east of Liverpool City Centre.

2.1.2 The site is centred on National Grid Reference 347218, 390362 as shown on the Site Location Plan C3593/01.

2.1.3 Access to the site is gained off Windy Arbour Road to the west and Lickers Lane to the north.

2.2 Site Description

2.2.1 The site is split into two separate parcels of land labelled Area A and Area B. Area A is located in the west with Area B occupying the east of the site. The two area are not connected and are separated by a road known as Main Drive and two private residential properties with associated out buildings. The areas are described separately below.

Area A

2.2.2 The smaller parcel known as Area A is accessed via a set of Palisade gates off Windy Arbour Road to the west. This area is a former garden centre and is irregular in shape with the west of the site generally higher than the east.

2.2.3 Area A is largely overgrown and access to areas of the site was difficult due to the dense vegetation. A tarmac car park is present at the site entrance to the west with a derelict bungalow present in the south western corner of the site.

2.2.4 A larger steel framed warehouse with steel cladding and with a possible asbestos cement roof is present behind the bungalow.

2.2.5 Across the western area evidence of fly tipping was noted although this was noted as being general household rubbish with no evidence of potential contaminants present.

2.2.6 The car park area is at a higher elevation than the remainder of the site and the neighbouring properties to the south. A small retaining wall is present in the east of the car park with a concrete ramp present to gain access to the rest of the former garden centre. Across the remainder of the site several hardstanding terraces constructed from breeze block and concrete are present with numerous areas of flags and gravel consistent with greenhouse bases present.

2.2.7 The south east of Area A extends out in a semi-circular shape and was heavily wooded with mature trees.

2.2.8 The site boundaries of Area A were defined by a mixture of steel palisade fencing, concrete panel fencing and sandstone walls.

Area B

2.2.9 The larger parcel of land known as Area B is made up of a large cropped field accessed from Lickers Lane to the north. A wooded area approximately 50m wide and 190m long is present running along the majority of the northern boundary of site.

2.2.10 The east of Area B is a smaller field which extends beyond the main field to the site. This area is partially open with sporadic vegetation present in the north becoming denser in the south. Two bunds are present with evidence of dirt biking and off road driving taking place.

2.2.11 Area B is bordered by fields to the east and south with a metal wire fencing marking the boundary in the south. Residential properties bound the site in the north western corner with Lickers Lane marking the remaining northern edge of Area B. To the west the site is also bordered by fields.

2.2.12 Pertinent site features can be found on the Site Location Plan Drawing Ref C3593/02.

3.0 METHOD OF INVESTIGATION

3.1 Objectives

3.1.1 The aim of the fieldwork was to:

- Investigate ground conditions on the site.
- Assess the potential contamination on the site and obtain samples for contamination screening.
- Assess the potential impact of any contamination on controlled waters.
- Assess the need for detailed investigation.
- Obtain geotechnical information on the ground conditions at the site for preliminary foundation design and preliminary pavement design purposes.
- Install standpipes to allow future monitoring.
- Give an assessment of the geo - environmental risks associated with redevelopment of the site.
- Assess the coal mining risk to the site.

3.2 Site Works

3.2.1 Twelve Window sample boreholes (WS01 to WS12) were drilled to depths of between 1.13m and 3.85m using a tracked window sampling rig and liners (windowless) on 18th and 19th May 2017. Three window sample boreholes were drilled in Area A and nine in Area B.

3.2.2 Thirty trial pits were excavated between depths of between 1.50m and 4.10m using a wheeled excavator between 22nd May and 26th May 2017. Nine trial pits were excavated in Area A and twenty one in Area B.

3.2.3 Nineteen rotary open holes (three in Area A and sixteen in Area B) were drilled using water flush techniques to depths of between 15.00m and 35.00m using a tracked rotary between 13th and 16th June 2017.

3.2.4 The surveyed locations of the exploratory holes for both Area A and Area B are shown on the Exploratory Hole Location Plans. Drawing No. C3593/04A and C3593/04B. The exploratory hole logs are presented in Appendix A.

3.2.5 The exploratory holes were positioned to establish general ground conditions on the site and investigate areas of specific interest such as the former garden centre and coal mining risks. The exploratory holes were logged by an experienced geo-environmental engineer in general accordance with BS 5930 'Code of Practice for Site Investigations' 1999, BS EN 14688-1:2002 'Geotechnical Investigation and Testing – Identification and classification of soil' and BS EN ISO 14689:2002 "Geotechnical investigation and testing – Identification and classification of rock."

3.3 Sampling

3.3.1 During the drilling of the exploratory holes, representative samples were taken at regular intervals to assist in the identification of the soils and to allow subsequent laboratory testing.

3.3.2 A summary of the samples taken is presented in the table below:

Type	Number
Environmental	78
Disturbed	148

3.3.3 The type of sample is dependent upon the stratum and the purpose of analysis in accordance with current environmental and geotechnical guidance.

3.3.4 Disturbed samples of soil for chemical testing were placed in plastic tubs and amber jars as required by the UKAS accredited laboratory, and transported under secure refrigerated conditions.

3.3.5 The distribution of samples taken across the site is recorded on the exploratory logs.

3.4 Laboratory Testing

3.4.1 As part of the assessment for potential contamination of the site, selected samples were taken for the purpose of chemical contamination testing.

3.4.2 The potential contaminative process on site are outlined in the Preliminary Conceptual Site Model. The site works did not identify any visual or olfactory evidence of gross contamination therefore the following suites of determinands were chose to screen for potential site impacts at an UKAS approved laboratory.

Determinand	Matrix	Number
Soil Suite comprising: Arsenic, Cadmium, Chromium (total and hexavalent), Copper, Nickel, Mercury, Lead, Zinc, Selenium, speciated PAHs, phenols, cyanide, organic matter, sulphate and pH	Soil	12
Soil Suite comprising: Arsenic, Cadmium, Chromium (total and hexavalent), Copper, Nickel, Mercury, Lead, Zinc, Selenium, water soluble boron, total and free cyanide, total sulphate, sulphide, sulphur speciated PAHs, phenols, thiocyanate and pH	Soil	8
TPH CWG	Soil	6
Asbestos Screen	Soil	6
Combined Pesticides	Soil	2
Acid Herbicides	Soil	2

3.4.3 The Chemical Laboratory Testing Results are presented in Appendix B.

3.4.4 Representative disturbed samples were obtained for all soil types encountered. Selected samples were scheduled for testing at an approved laboratory in accordance with BS 1377 'Method of Test for Soils for Civil Engineering Purposes' 1990. The following tests were scheduled:

BS Test Number	Description	No of Samples
Part 2:	Natural Moisture Content	20

BS Test Number	Description	No of Samples
Part 2:	Plasticity Index Analysis	20
BRE	pH Value	20
BRE	Water Soluble Sulphate Content	20
BRE	BRE Suite D: Made ground with pyrite	5

3.4.5 The Geotechnical Laboratory Testing Results are presented in Appendix C.

3.5 Monitoring

3.5.1 Gas and water monitoring standpipes were installed in eight window sample boreholes and subsequently two monitoring visits have been undertaken to date. All gas monitoring was undertaken using GA5000 infrared gas meter with integral electronic flow analyser.

3.5.2 Measurements of the percentage volume in air (%v/v) of oxygen (O_2), carbon dioxide (CO_2) and methane (CH_4) were recorded in addition to the percentage Lower Explosive Limit (%LEL) of methane and the atmospheric pressure. Flow measurements on each standpipe (l/hr) were also taken. (Note: 100% LEL equates to 5% by volume).

3.5.3 The standpipes consisted of 35mm internal diameter pipe. A bentonite seal was made around the plain pipe and a clean gravel pack was placed around the slotted pipe. A summary of the installation construction is presented in the table below:

Location	Depth	Response Zone (m bgl)	Targeted Strata	Reason
WS01	1.50	0.50 – 1.50	Made Ground	Ground Gas
WS03	3.00	1.00 – 3.00	Residual and weathered bedrock	Mine Gas
WS04	3.80	1.00 – 3.80	Made Ground/Natural Strata	Ground Gas
WS07	2.30	0.50 – 2.30	Natural Strata/ Coal	Ground Gas/Mine Gas
WS08	2.90	1.00 – 2.90	Natural Strata / bedrock	Ground Gas
WS10	3.00	1.00 – 3.00	Natural Strata / bedrock	Ground Gas
WS11	1.68	0.50 – 1.68	Sand	Ground Gas
WS12	1.13	0.50 – 1.13	Sand	Ground Gas

3.5.4 The results monitored peak and steady state conditions. Peak results are those that occur on opening the valve on the borehole tap. Steady state conditions are those that occur a period of time afterwards when the initial (accumulated) gases have been purged from the borehole.

3.5.5 Interim gas monitoring results are presented in Appendix D of this report.

4.0 GROUND CONDITIONS

4.1 General

4.1.1 The site is split into two development areas, a former garden centre forming 'Area A' and 'Area B' comprising a large cropped field, wooded area and a further smaller elongated field and vegetated area.

4.1.2 Given the two areas being remote from each other with differing previous uses the ground conditions for the areas are described separately below.

4.2 Area A -Made Ground

4.2.1 Made Ground was encountered within all of the exploratory hole locations and was encountered to depths of between 0.30m and to depths in excess of 1.50m. Made ground was not bottomed out within TP26 and TP29 due to complete collapse of the trial pit sides.

4.2.2 In the west of Area A (WS01, TP22 and TP23) where the former car park was located Tarmac and a limestone hardcore subbase was encountered to depths of between 0.20m and 0.30m bgl.

4.2.3 Within TP22 and TP23 made ground was encountered to 0.40m and 0.45m respectively and consisted of a black brown gravelly sand or sandy gravel. The gravel primarily consisted of brick, slag and clinker with brick cobbles also noted locally. A hydrocarbon odour was noted within the made ground in TP22.

4.2.4 Within WS01 the made ground encountered was a soft to firm organic clay with fibrous plant matter, clinker and brick encountered to 0.90m which became a brown sandy clay with brick and plastic noted as being present to base of the made ground at 1.40m.

4.2.5 Across the remainder of Area A the made ground primarily consisted of topsoil or fine limestone gravel at the surface and was encountered to depths of between 0.05m and 0.60m although areas of concrete and flagstones were also present.

4.2.6 The Topsoil and gravel encountered was ashy across the site with localised anthropogenic gravel such as brick, terram, glass, plastic and pottery also present.

4.2.7 Deeper made ground was encountered in the north east of the site to depths of between 1.10m and in excess of 1.50m.

4.2.8 Within WS02 between 0.50m and the base of the made ground at 1.10m a soft to firm black sandy clay was encountered with sporadic limestone gravel and bitumen encountered.

4.2.9 Made ground comprising sandy gravel and cobbles of brick, concrete, flagstones and other mixed lithologies was encountered beneath the surfacing within TP26, TP27 TP29 and TP30.

4.3 Area A - Natural Ground

4.3.1 The natural strata underlying the made ground was generally a firm to stiff orange brown sandy clay with localised lenses and stringers of coal encountered to depths of between 1.20m and 2.85m.

4.3.2 Within several exploratory holes the clay was noted as grading into residual bedrock.

4.3.3 Within the east of Area A within WS03 a firm dark brown black sandy clay with coal fragments was encountered directly beneath the made ground to 0.90m with stiff clay present below. Similarly within WS02 and TP28 a soft grey or black sandy clay with coal fragments was encountered beneath the made ground to depths of 0.50m in TP26 and 1.60m in WS02.

4.3.4 TP28 encountered a thin silty sand band between 0.50m and 1.00m with this not observed elsewhere on the site.

4.3.5 A stiff black sandy organic clay was present within TP25 between 0.50m and 1.10m.

4.4 Area A – Bedrock

4.4.1 Bedrock was encountered between depths of 1.20m and 3.50m across Area A and consisted of a blue grey or brown grey Siltstone or an orange brown Mudstone across area. The bedrock encountered was very weak and highly weathered generally recovered as gravelly clay with the bedrock becoming stronger and less weathered with depth.

4.4.2 An inferior coal band 50mm thick was noted within the siltstone in WS03 between 1.50m and 1.55m.

4.4.3 Within TP25 a completely weathered band of siltstone, recovered soft grey sandy clay was encountered between 1.90m and 2.60m.

4.4.4 Within the deeper rotary boreholes drilled within Area A (RO17 – RO19) the bedrock encountered was interbedded mudstone and siltstone with occasional sandstone bands.

4.4.5 Within RO19 coal was present between 10.50m and 11.50m bgl and recorded as a dark grey siltstone with coal bands. The bedrock drilled within Area A was intact to the base of the holes at 15.00m with no loss of flush noted.

4.5 Area A - Groundwater

4.5.1 No groundwater was recorded within any of the exploratory holes drilled within Area A.

4.6 Area A - Observations

4.6.1 During the works undertaken by BSL observations for both visual and olfactory evidence of contamination were made.

4.6.2 Ash, clinker and slag were recorded as being present across the made ground within Area A.

4.6.3 In addition, a hydrocarbon odour was noted within TP22 within the made ground at 0.35m.

Side Stability and Ease of Excavation

4.6.4 The sides of the trial pits were generally stable, however where deep made ground primarily consisted of brick cobbles were present sides were unstable and complete collapse of pit sides was noted within TP26, TP29 and TP30.

4.7 Area B -Made Ground

4.7.1 Thirty window sample boreholes and trial pits were excavated within Area B at the site with made ground encountered within thirteen locations to depths of between 0.35m and 2.80m.

4.7.2 In the north west of Area B (TP18, TP19 and WS04) made ground was encountered to depths of between 0.35m and 2.60m bgl. Within TP19 made ground was encountered to 0.35m and consisted of 0.30m of topsoil over 0.05m of black brown subangular to subrounded fine to coarse gravel of coal and mudstone. WS04 consisted of 0.20m of brown sandy clayey topsoil over a stiff to very stiff grey brown sandy clay with fragments of coal and burnt shale present to 1.85m. Two thin coal bands were observed within WS04 at 1.20m to 1.22m and 1.80m to 1.84m. The deepest made ground in the north west of Area B was encountered within TP18 and consisted of topsoil to 0.30m over a firm to stiff orange brown mottled grey sandy gravelly clay with gravel of mixed lithologies to a depth of 0.55m. This was underlain by a black grey mottled red yellow gravel of mudstone, sandstone and seatearth in a sandy clay matrix to a depth of 2.60m.

4.7.3 Within TP14 in the south west of the site made ground was encountered to 2.30m bgl. The made ground consisted 0.40m of topsoil over a black grey clay bound gravel of coal and mudstone with the gravel noted as being erratically ordered. It was noted that within the east of the trial pit natural clay was encountered beneath the topsoil with the made ground appearing to infill a pit.

4.7.4 TP15 and TP16 located to the north of TP14 contained made ground to 0.60m bgl and 1.20m respectively. Within TP15 the made ground consisted of topsoil over grey brown gravel of weathered coal, mudstone and siltstone. Within TP16 topsoil was encountered to 0.40m and was underlain by a black gravel of coal and carbonaceous mudstone in a clay matrix. Natural clay strata was encountered beneath the topsoil in the north of the pit with a land drain encountered at 0.70m in the south.

4.7.5 In the south east of the main field within Area B (TP08 and WS10) made ground was encountered to a depth of 1.20m within both holes. Topsoil was encountered to 0.20m within WS10 and 0.40m in TP08. Below the topsoil in WS10 a grey ashy sandy gravelly clay was encountered. The gravel consisted of coal, burnt shale and other mixed lithologies. Within TP08 the made ground was a gravelly sandy clay with gravel of coal and seatearth.

4.7.6 A thin band of reworked coal and mudstone gravel was encountered within TP09 between 0.40m and 0.50m. TP09 was located to the north of TP08.

4.7.7 In the north east of the main field within Area B within TP01, TP02 and TP03 the topsoil was noted as containing anthropogenic material such as brick, plastic, clinker and pottery to depths of between 0.40m and 0.45m. Within TP02 below the topsoil a brown sandy gravelly clay containing coal, sandstone, siltstone and glass was present to 0.80m.

4.7.8 A land drain was encountered at within TP10 at 0.50m.

4.8 Area B - Natural Ground

4.8.1 Where made ground was absent in Area B a sandy gravelly topsoil was present to depths of between 0.15m and 0.50m. Coal fragments were observed locally within the topsoil.

4.8.2 The dominant superficial strata within Area B was a stiff to very stiff orange brown or red brown slightly sandy to sandy clay with varying amounts of gravel. This strata was encountered 0.75m and 3.30m. Within several exploratory holes the clay was noted as grading into residual bedrock. Within TP18 this clay was noted as being soft beneath the made ground to the base of the hole at 2.80m.

4.8.3 Superficial sand strata was encountered in the smaller field in the east within WS11, WS12, TP04 and TP05. This was observed as being a red brown or orange brown slightly clayey sand and was encountered to depths of between 0.50m and 1.30m. Within these holes the sand is considered to be completely weathered sandstone bedrock.

4.8.4 This strata was also encountered in the south east of the main field within TP08 and TP09 to depths of between 1.50m and 2.25m. Within TP09 this was underlain by clay.

4.8.5 Beneath the made ground in WS10 a soft to firm dark grey clay was encountered between 1.20m and 1.60m which was then underlain by a firm clay to 1.90m.

4.8.6 Superficial sand strata was also encountered in a large lens across the north of the investigated area within TP01, TP17 and TP04 to depths of between 0.60m and 1.10m with this sand observed as being brown and clayey. Within TP02 also located in the north, the clay strata was observed as being very sandy and clayey sand in parts.

4.9 Area B – Bedrock

4.9.1 Bedrock was encountered between depths of 0.75m and 3.30m across Area B and consisted of a grey Siltstone or an orange brown Mudstone across the main field. The bedrock encountered was very weak and highly weathered generally recovered as gravelly clay with the bedrock becoming stronger and less weathered with depth. A general trend of depth to bedrock was recorded as being deepening from north to south.

4.9.2 Within the smaller field sandstone bedrock was encountered generally at shallow depths of between 0.50m and 1.30m, within TP04 completely weathered Sandstone as not encountered until 2.40m bgl.

4.9.3 Coal subcrops were recorded at rockhead within WS07, TP01 and TP03 and are discussed further below.

4.9.4 Coal seams were encountered in ten of the rotary boreholes, four trial pits and one window sample boreholes across Area B. The locations, depths and seams is presented in the table below.

Location	Depth (m bgl)	Thickness (m)	Interpreted Coal Seam
WS07	1.75 – 2.34 (refusal)	0.59+	Yard
TP01	2.30 – 3.20	0.90	Lower Florida
TP03	1.20 – 3.70	2.50	Earthy Delph
TP08	3.10 – 3.30 (refusal)	0.20+	Yard
TP09	2.70 – 3.80 (refusal)	1.10	Yard
RO01	7.50- 8.70	1.20	Higher Florida
RO01	18.70 – 19.90	1.20	Lower Florida
RO02	15.70 – 16.90	1.20	Discovery
RO02	18.20 – 19.20	1.00	Discovery
RO03	20.90 – 21.90	1.00	Lower Florida
RO03	32.00 – 32.50	0.50	Unknown
RO04	16.10 – 17.20	1.10	Lower Florida
RO05	15.60 – 16.90	1.30	Lower Florida
RO06	4.50 – 5.20	0.70	Yard
RO08	1.50 – 3.00	1.50	Higher Florida
RO12	4.00 – 10.50	5.50	Interbedded very weak siltstone/mudstone and coal
RO12	18.30 – 19.50	1.20	Yard
RO13	10.40 – 11.60	1.20	Weak interbedded siltstone and coal
RO13	21.70 – 22.80	1.10	Lower Florida
RO13	31.70 – 32.40	0.70	Unknown
RO14	20.50 – 21.70	1.20	Earthy Delph
RO14	23.30 – 24.30	1.00	Higher Florida

4.9.5 Losses of flush during the borehole drilling were noted as below:

Location	Depth (m bgl)	Thickness (m)	Description
RO03	9.20 – 10.40	1.20	Soft drilling, loss of flush (regained)
RO05	3.50 – 6.00	2.50	Soft drilling, loss of flush (regained)
RO07	15.50 – 16.00	0.50	Weak/fractured, loss of flush
RO08	9.50 – 10.50	1.00	Broken Ground, loss of flush
RO09	5.00 – 9.50	4.50	Soft/broken ground total loss of flush
RO09	9.50 – 11.00	1.50	Weak Drilling no return
RO11	9.50 – 12.50	3.00	Soft/broken ground total loss of flush

Location	Depth (m bgl)	Thickness (m)	Description
RO16	3.50 – 6.50	3.00	Very weak ground (flush regained)
RO16	9.00 – 10.50	1.50	Soft/broken ground total loss of flush

4.9.6 The loss of flush was encountered from 3.50m to 6.50m within RO16 may be due to the ground conditions.

4.10 Area B- Groundwater

4.10.2 Groundwater was generally absent across exploratory holes drilled within Area B with localised strikes encountered in the north east and north west of the site.

Location	Depth (m bgl)	Thickness (m)	Description
WS04	2.50	Mudstone	Strike
TP01	2.30	Coal	Strike
TP02	1.80	Sandy Clay	Slow Seepage

4.10.3 Where laminated siltstone and mudstone was encountered the rock was observed as being damp along the laminae.

4.11 Area B - Observations

4.11.2 During the works undertaken by BSL observations for both visual and olfactory evidence of contamination were made.

4.11.3 Localised ash was noted within made ground within WS10 with no further evidence of contamination noted.

<u>Side Stability and Ease of Excavation</u>

4.11.3 The sides of the trial pits were generally stable, however within TP18 where deep made ground was present the sides were noted as being unstable.

5.0 TEST RESULTS

5.1 Chemical Test Results - Soils

5.1.1 The samples were tested for an assessment of the chemical contamination and results were examined with reference to a selection of guidance documents as detailed in Appendix E.

5.1.2 The apparent exceedence of the relevant Tier 1 generic screening value for a residential end use with plant uptake is taken as indicating further detailed assessment or remedial action is required.

5.1.3 All metals (with the exception of lead), PAHs and TPH were screened against the LQM/CIEH S4ULS and SGV's for a residential property. Lead was screened against a final C4SL value of 200mg/kg.

- **Metals**

The following elevated metal concentrations were recorded within Area A at the site.

Location/Depth (m)	Metal	Concentration (mg/kg)	Screening Value (mg/kg)
WS01 - 0.40	Arsenic	45.3	32 (C4SL)
	Lead	205	200 (S4UL)
TP27 - 0.50	Lead	246	200 (S4UL)

No elevated concentrations of metals were encountered within Area B.

- **PAHs**

Elevated concentrations of Polycyclic Aromatic Hydrocarbons were recorded above S4UL values within the made ground at one location within Area A.

Location/Depth (m)	Determinand	Concentration (mg/kg)	Screening Value (mg/kg)
TP22 – 0.25	Benzo(a)anthracene	65.58	7.2
	Chrysene	51.26	15
	Benzo(a)pyrene	68.07	2.2
	Ideno(123cd)pyrene	46.17	27
	Dibenzo(ah)anthracene	5.36	0.24
	Benzo(b)fluoranthene	85.55	2.6

Interpretative analysis undertaken indicates the levels of contaminant to be consistent with PAHs, lubricating oil and possible tarmac/bitumen.

No elevated concentrations of PAH's were identified within Area B.

- **Hydrocarbons**

Within TP22 at 0.25m elevated hydrocarbons were also identified as being in excess of the screening guideline values as outlined in the table below.

TPH Band	Concentration (mg/kg)	Screening Value (mg/kg)
Aromatic EC16-EC21	1772	260
Aromatic EC21-EC35	6689	1100

No concentrations of BTEX compounds above laboratory detection limits were identified at the site.

- **Asbestos**

No asbestos fibres were identified within any of the samples screened at the site.

- **Pesticides/Herbicides**

No concentrations of pesticides or herbicides above laboratory detection limits were recorded within samples tested at the site.

5.2 Geotechnical Testing

5.2.1 After modification of particle size in accordance with NHBC Chapter 4.2 the modified plasticity indices are tabulated below:

Area	PI (%)	Plasticity	Modified PI (%)	Volume Change Potential
A	10-33	Low to high	9-31	Low to medium
B	10-34	Low to high	10-31	Low to medium

5.2.2 Within Area A the plasticity index results were generally low between 10% and 15%. The shallowest sample tested within superficial clay within WS03 yielded a modified PI of 31% with a sample tested within the residually weathered to highly weathered mudstone at 2.20m having a modified PI of 24% showing a decrease in the volume change potential with depth.

5.3 Aggressive Ground Conditions/SD1 Testing

Area A

5.3.1 Water soluble sulphate testing was undertaken on two samples of made ground, two of the mudstone strata and two of the natural clay strata. The results are presented in the table below.

Determinand	Made Ground	Superficial Clay	Mudstone/Siltstone
Sulphate as SO_4 (g/l)	0.1015 - 0.3751	0.0172 – 0.0223	0.0105 – 0.0480
pH	7.81 - 7.88	7.58 – 8.03	6.59 – 7.82

Area B

5.3.2 Water soluble sulphate testing was undertaken on eight samples of made ground, three of topsoil, two of the siltstone strata, twelve of the natural clay strata and one of sand. The results are presented in the table below.

Determinand	Made Ground	Topsoil	Superficial Clay	Siltstone	Sand
Sulphate as SO_4 (g/l)	0.0087 - 0.052	0.0134 – 0.0640	0.0018 – 0.0508	0.0198 – 0.0277	0.0069
pH	5.03 – 7.03	6.35 – 7.94	6.93 – 8.43	6.46 – 7.42	7.48

5.3.3 Full BRE suite testing was undertaken on five sample of coal. Where low pHs were identified additional chloride and nitrate testing was undertaken. The results are presented in the table below.

DETERMINAND	LOCATION				
	WS07 – 1.80m	TP01 – 2.35m	TP03 – 1.25m	TP08 – 3.15m	TP09 – 2.80m
Soluble Chloride g/l	0.003	-	0.004	-	-
Soluble Nitrate g/l	<0.0025	-	0.0104	-	-
Soluble Sulphate g/l	0.7312	0.0270	0.0171	0.0555	0.2163
pH	2.72	6.41	4.70	6.77	6.62
Sulphur as S, Total %	3.55	0.22	0.19	1.50	1.24
Sulphate, as SO4, Total %	0.25	0.02	0.02	0.02	0.13

5.4 Gas Monitoring Results

5.4.1 Two gas monitoring visits have been carried out to date on 23rd May and 5th June 2017.

5.4.2 Within Area A peak carbon dioxide has been recorded at concentrations of between 6.5%v/v and 18.5%v/v with steady state concentrations ranging between 6.0%v/v and 17.7%v/v.

5.4.3 Within Area B peak carbon dioxide has been recorded at concentrations of between 0.1%v/v and 9.3%v/v with steady state concentrations ranging between 0.0%v/v and 9.0%v/v. Within Area B levels of carbon dioxide in excess of 5%v/v has been recorded within WS04 only.

5.4.4 To date methane has been recorded at a maximum concentration of 0.1%v/v within WS01 only.

5.4.5 Within Area A oxygen concentrations of between 0.8%v/v and 17.1%v/v have been recorded during the monitoring programme. Steady state concentrations have ranged between 0.8%v/v and 17.2%v/v. Within Area B oxygen concentrations of between 12.2%v/v and 21.2%v/v. Steady state concentrations have ranged between 12.3%v/v and 21.4%v/v.

5.4.6 A maximum positive gas flow of 0.2l/hr has been detected within Area A and of 0.2l/hr within Area B.

5.4.7 Atmospheric pressure has ranged between 1008mb and 1015mb.

5.4.8 Groundwater levels of between 0.84m and 2.66m bgl have been recorded in the standpipes to date. No groundwater has been recorded in Area A or in the east of Area B.

6.0 MINING ASSESSMENT

6.1 Coal Mine Workings

6.1.1 Evidence of coal mine workings can be represented by voids, broken ground and/or loss of flush with evidence of potential workings indicated by intact coal of a suitable workable thickness and quality. An assessment should be made based on all the available evidence.

6.1.1 Coal seams of a workable thickness were encountered across Area B at the site. Triangulation of the boreholes was undertaken to determine the approximate outcrop locations as well as dip and direction. The coal seams are shown on the Coal Seam Plan Drawing No. C3593/06.

6.1.2 The mining investigation did not identify any worked ground within Area A, however interpretation of the coal seams indicates coal could be at a workable thickness within Area A and it is therefore recommended that further investigation is undertaken following clearance of the site.

6.1.3 Broken ground, soft drilling and loss of flush indicative of underground workings was recorded within the Earthy Delph, Higher Florida, Lower Florida at the site.

Location	Depth (m bgl)	Thickness (m)	Coal Seam Worked	Description
RO03	9.20 – 10.40	1.20	Higher Florida	Soft drilling, loss of flush (regained)
RO05	3.50 – 6.00	2.50	Higher Florida	Soft drilling, loss of flush (regained)
RO07	15.50 – 16.00	0.50	Lower Florida	Weak/fractured, loss of flush
RO08	9.50 – 10.50	1.00	Lower Florida	Broken Ground, loss of flush
RO09	5.00 – 9.50	4.50	Earthy Delph	Soft/broken ground total loss of flush
RO09	9.50 – 11.00	1.50	Higher Florida	Weak Drilling no return
RO11	9.50 – 12.50	3.00	Earthy Delph	Soft/broken ground total loss of flush
RO16	3.50 – 6.50	3.00	Earthy Delph	Very weak ground (flush regained)
RO16	9.00 – 10.50	1.50	Higher Florida	Soft/broken ground total loss of flush

6.1.4 Reworked ground within trial pits and window samples and loose or soft overburden within the rotary boreholes it is suggestive of outcrop mining within the seams beneath the site.

6.1.5 All coal seams encountered were indicated to be intact in parts suggesting pillar and stall type workings, which would typically leave 60% of the seam in place.

6.1.6 The Pasture seam is not considered to have been encountered at the site and is anticipated to subcrop to the south east of the site.

6.2 Structure

6.2.1 Based on the boreholes to date the strata appear to dip down the south east. Comparing the coal seam inferred to be the Lower Florida encountered in holes RO1, RO4, RO7 and RO13 it can be seen the coal to the west is deeper than that to the east. Using the depth of the seam and proximity of the holes the dip of the strata is calculated as 7°.

6.2.2 The dip of the beds is shallower than what is indicated on the geological maps, this may be due to the faulting to the east and west of the site.

6.2.3 The large scale Eccleston West Fault which was indicated to run parallel with the eastern site boundary on geological mapping is likely further to the west than previously thought. Exploratory holes in the east of the site within the smaller field did not encounter coal measures with sandstone typical of the Kinnerton Rock identified within this area. The postulated termination of the coal seams based on the findings of the site investigation is shown on the Coal Seam Plan.

6.3 Subsidence Risk

6.3.1 The Coal Mining Risk Assessment (Ref: LC/C3593/7004) identified a risk to the proposed development from recorded mine entries, unrecorded mine entries and unrecorded mine workings.

6.3.2 Evidence of unrecorded mine workings was identified during the investigation in the form of shallow bell pits, soft or reworked ground and the absence of coal where it was anticipated within exploratory holes however intact coal at rockhead was encountered within several exploratory holes also indicating that workings are likely to be pillar and stall type..

6.3.3 Within the rotary boreholes drilled on site broken ground and soft ground indicative of collapsed workings were identified at the site. The workings were predominantly located in the east of the site with the Higher Florida seam appearing to be being the most extensively worked seam.

6.3.4 Evidence of potential bell pits were noted within TP14, TP18 and WS10 to a maximum recorded depth of 2.60m. Rotary boreholes in the east of the site within RO09 and RO16 identified weak or loose overburden and soft or broken ground at rockhead which is indicative of shallow mine workings accessed from the surface.

6.3.5 The mine shafts at the site where not investigated during this phase. The two shafts within Area A are at present anticipated to be outside the proposed development

layout as is the case for the two seams in the far south eastern corner of Area B however the shafts may have a zone of influence which would affect the proposed development layout and should therefore be investigated. Within the main field of Area B a shaft to the Higher Florida is shown to be present on coal mining abandonment plans. As the Higher Florida is the seam which has been most extensively worked at the site this information appears to be accurate and the location of the shaft can now be more accurately plotted and investigated during subsequent drilling and grouting. The depth of the shaft was 22m to the Higher Florida indicating its location to be in the vicinity of RO14.

6.3.6 CIRIA SP32 "Construction over abandoned mine workings" indicates that a void will not migrate to the surface where there is more than ten times the seam thickness of rock cover. Up to this depth the void will begin to choke with rock from the roof (represented by broken ground). Beyond 10 times the seam thickness the rock will tend to arch and prevent upwards migration of the void.

6.3.7 Coal seams are present below the site and have been proven to be worked in places, with insufficient rock cover over the workings meaning there is potential for foundations of the proposed buildings potentially being affected by crown holing. The anticipated zone of influence at the surface for each of the seams is shown on the Coal Mining Influence Plan Drawing No. C3593/07.

6.4 Mining Recommendations

6.4.1 The mineworks will require drilling and grouting underneath the plots to a depth where there is more than 10 times thickness of rock cover over the seam/workings.

6.4.2 As multiple seams have been worked there is a risk that seams can collapse into each other and this will involve the treatment of multiple seams below some plots.

6.4.3 The treatment is likely to involve a sequence of test drilling and grouting in some areas, this will determine on a plot by plot basis the sequence and also provide a better indication of where grout is likely to be required.

6.4.4 On completion of the drilling and grouting works the foundations will need to be designed to cope with any residual subsidence risk.

6.4.5 Geophysics should be considered as an initial phase of investigation of potential shaft, any anomalies can then be targeted for further investigation, this could be a site strip looking for visual evidence and then closely space boreholes to confirm the presence.

6.4.6 Once the shaft has been located, it should be filled with grout and capped at rockhead. Cap size is usually at least twice the diameter of the shaft. Once the cap is in place the Coal Authority will not generally permit any building over the top of the shaft.

7.0 GEOTECHNICAL ASSESSMENT

7.1 General

7.1.1 The site is split into two parcels of Land referred to as Area A and Area B which are described separately within this report.

7.1.2 Area A was a former garden centre with buildings and greenhouses bases still present. Made ground was encountered to depths of between 0.30m and in excess of 1.50m. The made ground encountered was generally granular and comprising cobbles of brick and concrete within a sandy and or clayey matrix.

7.1.3 No evidence of shallow mining issues were found within Area A during the site investigation. However access was limited within this portion of the site due to it being heavily vegetated and additional investigation may be required to further assess the risk from coal mining and to locate the two known mine shafts within this area. Interpretation of the result from Area B indicates that there should be shallow seams, although these have not been encountered.

7.1.6 Area B is largely an open field. Made ground is present locally and this is interpreted to be associated with outcrop mining. Bedrock across the remainder of Area B consisted of siltstone and mudstone with coal seams present at shallow depths.

7.1.7 The mining investigation identified soft and broken ground proving shallow mining to have been undertaken below the site. A risk at the surface from shallow workings was identified across the main field within Area B.

7.1.8 A detailed development layout is not yet available and therefore the recommendations below are preliminary. A detailed foundation assessment should be undertaken once finished site levels, development layout and mining remediation details are known.

7.2 Area A – Foundations

7.2.1 The most suitable foundations for houses within Area A are considered to be unreinforced strip foundations founding on residual/weathered bedrock or stiff clays at depths of between 1.20m and 1.50m begl. The clay on the site is of low to medium volume change potential, therefore the foundations should be at a minimum depth of 0.90m in the Clay, deeper near trees and hedges in accordance with NHBC Chapter 4.2.

7.2.2 Localised pockets of deeper made ground in excess of 1.50m were identified at the site and therefore foundations may need to be deepened in areas and it may be more cost effective for trench fill or mass fill foundations to be undertaken in these areas.

7.2.3 Foundations will need to be taken to the underside of any Made Ground to found on undisturbed natural ground this will be to approximately 1.20m to 2.00m bgl. A nett allowable bearing pressure not exceeding 125kN/m^2 should be assumed within stiff clays or weathered bedrock at these depths.

7.2.4 It is possible that a change in bearing stratum across individual plots may occur in this area. If any sudden changes from clay to sand, gravel or non-plastic bedrock are encountered reference should be made to a suitably qualified engineer, recommendations may include that the foundations should either be deepened to found on the same stratum, or reinforced to reduce the potential for differential settlement.

7.2.5 The bearing stratum should be inspected for 'soft spots' within the natural clay strata, resulting for instance from localised groundwater perched within the overlying fill materials. Any such soft spots should be dealt with in accordance with good site practice.

7.2.6 If the ground conditions encountered during the construction phase differ significantly to the conditions encountered during construction, work should cease and BSL contacted for further advice.

7.2.7 During the construction phase supervision should be on a continuous basis to check the design assumptions are correct and construction conforms to design. Supervision should include inspections, Control Ground Investigations and monitoring.

7.3 Area B – Foundations

7.3.1 Within Area B a mixed foundation solution is likely to be the most suitable solution as localised pockets of deep made ground associated with mine workings are present across the site.

7.3.2 Within the main field following drilling and grouting of workings and shafts the proposed development will not be affected by underground workings at the surface and therefore shallow strip foundations founding on superficial clays or weathered bedrock are considered to be the most suitable foundation solution for the majority of the site. As with Area A clays are of a low to medium volume change potential and therefore foundations should be a minimum of 900mm below existing ground levels. At a depth of between 1.00m and 1.50m within the main field of Area B a net allowable bearing pressure of 125kN/m^2 should be assumed. A large wooded area is present in the north of Area B and foundations may need to be deepened to found in non-plastic bedrock within the zone of influence in accordance with NHBC Chapter 4.2.

7.3.3 In the east of Area B superficial sand deposits were encountered at shallow depths and were underlain by sandstone bedrock. Within this area foundations should be a minimum of 600mm below finished ground levels. A net allowable bearing pressure of 200kN/m^2 should be assumed at this depth for granular strata.

7.3.4 Deeper pockets of reworked ground associated with shallow coal mining activities were identified locally within the main field of Area B. Once the development layout is known it is recommended further investigation to identify the extents of made ground followed by a foundation zonation plan is undertaken. Within trial pits and window sample boreholes excavated on site made ground was encountered to a

maximum depth of 2.60m and therefore trench fill foundations founding on competent bedrock below are anticipated to be the most suitable solution.

7.3.5 Rotary drilling identified potentially deeper or areas of made ground or poor ground conditions particularly in the vicinity of RO09, RO12 and RO16 to depths in excess of 5.00m. However due to the nature of the drilling method it is not possible to accurately determine made ground depths in these exploratory holes and made ground may not be present to these depths. Additional investigation is required in this area during treatment of mine workings to establish whether a deeper foundation solution or treatment such as vibro ground improvement is required.

7.4 Building Near Trees

7.4.1 If foundation excavations encounter cohesive strata in the vicinity of existing, proposed or recently removed trees, foundations should be adjusted in full accordance with NHBC Standards Chapter 4.2. All foundations should be deepened below roots of greater than 5mm diameter during excavations for footings. The clay is of a low to high volume change potential.

7.4.2 A survey of all trees and hedges on the site and within influencing distance of the site boundary should be undertaken to identify tree species and heights. This information will be required in order to assess the effects of trees on the cohesive strata.

7.4.3 Where foundation depths due to trees already present or recently removed exceeds 1.50m there is a possibility for heave to occur on removal of the tree. NHBC Guidance states that compressible material or void former is required against the inside face of all external wall foundations.

7.5 Floor Slabs

7.5.1 Ground bearing floor slabs may generally be adopted at the site provided that once finished levels have been established, less than 600mm of suitable appropriately compacted granular material exists beneath the slab. However due to ground gas precautions likely being required across large portions of the site we would recommend suspended floors throughout at this stage.

7.5.2 Where foundation depths due to trees already present exceeds 1.50m there is a possibility for heave to occur on removal of the tree. NHBC Guidance states that either a precast concrete floor, a suspended timber or in-situ concrete floor must be used. We recommend the former, the required void size for beneath floor slabs on this site is between 250mm and 300mm high depending on volume change of the different strata encountered.

7.5.3 Where made ground in excess of 600mm is generally present and floor slabs will need to be suspended or pre-cast concrete.

7.6 Construction

7.6.1 Instability of excavations through natural soils is not anticipated provided they are not exposed to adverse weather conditions for any substantial period of time.

Instability of the Made Ground should be allowed for. All excavations should be carried out in accordance with CIRIA Report 97 'Trenching Practice'.

7.6.2 Excavation depths should generally be readily achieved using conventional plant (JCB or similar) although high specification plant (tracked 360° or similar) is recommended to maintain the build programme. Breaking equipment may also be required locally to penetrate old foundations associated with former construction.

7.6.3 The results of laboratory pH and sulphate content indicate that ACEC Class AC-1 and sulphate class DS-1 conditions prevail within the superficial deposits and bedrock in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005.

7.6.4 ACEC Class AC-2Z and sulphate class DS-1 conditions prevail in coal due to low recorded pHs.

7.6.5 The specific concrete mixes (the Design Concrete Class) to be used on site will be determined by the site specific concrete requirements in terms of the durability and structural performance. These are assessed in terms of the Structural Performance Level (SPL) and any need for Additional Protective Measures (APM) detailed in Part D of BRE Special Digest 1 with further guidance in Pt E and F.

7.7 Highways

7.7.1 CBR values of 2% - 5% are likely to be achieved in undisturbed natural soils for pavement design purposes, unless proven otherwise by in-situ testing at sub-base level by a specialist geotechnical engineer.

7.7.2 Some reengineering of the subgrade will be required prior to highway construction to achieve the required design CBR value.

7.7.3 The soils are considered to frost susceptible due to the fines content, highway construction should be a minimum thickness of 450mm to mitigate against the risk.

7.8 Soakaways

7.8.1 The use of soakaways within the natural ground is not feasible at the site due to the presence of relatively impermeable strata underlying the site.

7.8.2 If drainage of the highway to soakaways is to be considered it is suggested that this is discussed with the Local Authority at the earliest opportunity, to confirm the adequacy of proposed testing and to allow their inspection of any testing.

8.0 ENVIRONMENTAL ASSESSMENT

8.1 General

8.1.1 The level of protection for the clean potable water supply pipes should be determined using the local water company risk assessment criteria in accordance with UKWIR.

8.2 Contamination

Soils

8.2.1 Within Area A made ground was encountered to depths of up to 1.50m although this was not bottomed out at two locations. The made ground encountered was generally granular fill predominantly comprising brick.

8.2.2 On the basis of the testing undertaken to date it would appear that there is localised metal PAH and hydrocarbon contamination above residential screening guideline values within the car parking area of Area A (WS01 and TP22). The contamination was located within the near surface made ground.

8.2.3 In addition a marginally elevated lead concentration was present within made ground in TP27 located in the north east of Area A.

8.2.4 Within Area B made ground was encountered to a maximum depth of 2.60m and was generally associated with shallow coal mining.

8.2.5 No elevated metal, PAH or hydrocarbon contamination was identified within samples tested in Area B.

8.2.6 No asbestos was identified within any samples tested from either area.

Permanent Ground Gases

8.2.7 In order to assess the ground gas situation and the requirement for ground gas precautionary measures at the site, guidance was taken from CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings' and BS8485:2015 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

8.2.8 The proposed residential end use dictates that the gas monitoring results are assessed in accordance with Boyle and Witherington (1998). The Boyle and Witherington method uses the concept of a Gas Screening Value (GSV) which is calculated using the maximum concentration of ground gas and flow rateThe GSVs are then compared to the NHBC traffic light system to determine the risk category of the site and the need for gas protection measures.

8.2.9 Based on the initial monitoring, typical carbon dioxide concentrations in excess of 5%v/v have been encountered in Area A and as such are likely to fall into Gas Characteristic Situation 2. Based on these results, gas protection measures will be required within Area A as a minimum.

8.2.10 No elevated concentrations have been identified to date within Area B however concentrations near to the 5%v/v threshold have been identified. It is recommended at this stage that ground gas precautions are allowed for. Additional precautions in the vicinity of any shafts may be required by the Coal Authority.

8.2.11 A full ground gas assessment will be issued on completion of the monitoring programme.

8.3 Qualitative Risk Assessment

8.3.1 The risk assessment methodology used in this instance is based on **Source – Pathway – Receptor** (SPR) philosophy. The **source** is the presence of contamination, or substance/event likely to cause harm. The **receptor** is the target that may be detrimentally affected by the source. The **pathway** is the means of the contamination to move from the source to the receptor. Where any of these three factors are removed there is deemed to be no risk.

8.3.2 The CSMs have been revised based on the findings of the site investigation and laboratory testing results.

Human Health

Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk
ON-SITE					
Made Ground	Ingestion, direct contact, inhalation of dusts.	End-users	Low Likelihood	Medium	Moderate/Low
Garden Centre (Area A)	Ingestion, direct contact, inhalation of dusts.	End-users	Unlikely	Medium	Low
Backfilled Ponds (Area A)	Migration of ground gases into confined spaces.	End-users	Low likelihood	Medium to Severe	Moderate /Low
Mine Shafts	Migration of mine gas into confined spaces.	End-users	Likely to Low Likelihood	Medium to Severe	High/Moderate

Human Health Justification

8.3.3 Within Area A localised slightly elevated lead and arsenic contamination was identified within made ground within WS01 with PAH and diesel range hydrocarbons identified within shallow made ground within TP22. Both of these exploratory holes are located within the former car parking area of Area A and are assessed as a moderate to low risk to site end users. A marginally elevated lead concentration was also identified within made ground within TP27 also located within Area A. Where gardens and soft landscaping are present it is recommended that a cover system is implemented to mitigate the risk and prevent undesirable contamination being brought to the surface. Alternatively source removal of contaminated soils from affected areas may be a viable solution. It is recommended that contaminated areas are further investigated and delineated to ensure sufficient remedial measures are implemented.

8.3.4 Within Area B no elevated contaminants were identified within made ground or topsoil and the risk within this area is considered to be Low.

8.3.5 No pesticides or herbicides above laboratory detection limits were identified within samples tested at the site and therefore the risk associated with the former garden centre is considered to be low.

8.3.6 Ground gas monitoring is ongoing at the site and a full assessment will be made upon completion of the gas monitoring programme. Based on current results elevated concentrations of carbon dioxide have been identified within Area A and therefore it is anticipated that gas precautionary measures are likely to be required within this portion of the site. The risk from ground gas is therefore still assessed as being moderate to low from backfilled ponds and high from mine shafts.

Controlled Waters

Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk
Made Ground	Migration through groundwater or granular soils	Controlled waters	Unlikely	Low	Low

Controlled Waters Justification

8.3.7 Although elevated concentrations of PAHs and hydrocarbons were identified within TP22 within Area A, the contamination was identified as being localised. No groundwater was encountered during drilling within Area A with no groundwater identified within subsequent gas and groundwater monitoring at the site. The natural superficial deposits of impermeable clay and mudstone will prevent the leaching and migration of any contaminants into both surface and groundwater. The risk to controlled waters is therefore considered to be low.

8.4 Remedial Measures

8.4.1 Across the majority of the site, where no made ground was no remedial measures are required. Good quality topsoil was present across the majority of the site and may be suitable for reuse within garden areas subject to confirmatory testing.

8.4.2 In Area A where contaminated made ground was present a cover system comprising clean subsoil and topsoil should be provided within gardens and soft landscaping area. Due to the presence of metals, PAHs and hydrocarbons. This should be 600mm thick in garden areas and 450mm in soft landscaping areas. This will allow plants to be grown and prevent undesirable soils being brought to the surface.

8.4.3 Alternatively it may be more cost effective to remove the source of contamination from the gardens and soft landscaping areas and potentially re-use under hardstanding or within public open space areas subject to additional testing or alternatively removed from site. The topography of Area A shows a fall in levels of approximately 4m from west to east and therefore a reduction in site levels may allow for contaminated material to be easily removed. If this is considered to be the desired option confirmatory samples of remaining natural material should be

undertaken to confirm no contaminants remain at the site and the cover system may be reduced to that of the rest of the site.

8.4.4 Ground gas monitoring is ongoing, at present ground gas precautionary measures are likely to be required within Area A however no consistent ground gas regime has been identified within Area B. A full assessment will be made upon completion of the ground gas monitoring programme.

8.4.5 A watching brief should be in place during the construction phase for any evidence of any contamination. If any contamination is encountered work should cease in that area and BSL consulted.

8.5 Asbestos

8.5.1 The investigation of asbestos issues within structures was beyond the scope of this report. However, guidance from UK Government indicates that asbestos should be assumed to be present in buildings unless proven otherwise.

8.5.2 Any asbestos within structures will require removal prior to re-development. This will need to be done by a suitably qualified experienced and licensed contractor, who ensures that adequate PPE is provided to operatives, and that all the relevant legislation is adhered to.

8.6 Health and Safety Issues

8.6.1 During the reclamation and construction phases of the site development it will be necessary to protect the health and safety of site personnel. The risk to construction and ground workers is assessed in the table below:

Potential Source	Potential Pathway	Potential Receptor	Likelihood	Severity	Level of Risk
ON-SITE					
Made Ground	Ingestion, direct contact, inhalation of dusts.	Construction Workers	Unlikely	Medium	Low

Discussion

8.6.2 The risk from made ground will be mitigated by standard PPE including gloves. Welfare facilities should be made available to wash before hand to mouth activities.

8.6.3 General guidance on these matters is given in the Health and Safety Executive (HSE) document “Protection of Workers and the General Public during the Redevelopment of Contaminated Land”. In summary, the following measures are suggested to provide a minimum level of protection:

- All ground workers should be issued with the relevant protective clothing, footwear and gloves. These protective items should not be removed from the site and personnel should be instructed as to why and how they are to be used.
- Hand-washing and boot-washing facilities should be provided.

- Care should be taken to minimise the potential for off-site migration of contamination by the provision of dust suppression control and wheel cleaning equipment during the construction works.
- Good practices relating to personal hygiene should be adopted on the site.
- The contractor shall satisfy the Health and Safety Executive with regard to any other matters concerning the health, safety and welfare of persons on the site.

8.7 Waste

8.7.1 Details of how material should be classified for waste disposal are presented in Appendix F.

8.7.2 Waste Acceptance Criteria (WAC) testing was outside the scope of this investigation and the guidance given below is general.

Waste Classification - Total Concentrations

8.7.3 Based on the total concentrations at the site made ground soils would generally be classified as non-hazardous. Potentially hazardous levels of hydrocarbons were identified within TP22 and this material should be carefully segregated from other made ground soils on the site and a waste assessment undertaken.

Waste Acceptance Criteria

8.7.4 If materials are to be removed from site a detailed waste assessment should be undertaken to determine the most suitable disposal route.

8.7.5 The possibility of automatic inert classification of the natural soils should be explored in accordance with Section 4.3 of the EA guidance document. The Council Decision includes a list of wastes in Section 2.1.1 of the document that are assumed to be inert and therefore acceptable at a landfill for inert waste without testing, this is the case if:

- *They are single stream waste of a single waste type (although different waste types from the list may be accepted together if they are from a single source) and*
- *There is no suspicion of material or substances such as metals, asbestos, plastics, chemicals, etc to an extent which increases the risk associated with the waste sufficiently to justify contamination and they do not contain other their disposal in other classes of landfill.*

General

8.7.6 If any additional gross hydrocarbon contaminated material is encountered during the construction phase, it is possible that this may be classified as hazardous and testing should be undertaken at that time.

8.7.7 Where it is necessary to dispose material off site it is recommended that materials are segregated and where necessary sufficient time is allowed to further classify the material properly, including discussion with landfill sites and waste transfer stations to find the best disposal route.

8.7.8 As a significant proportion of the soils likely to be generated on site are clean it is recommended that where possible that the soils could be recycled at a suitable local waste treatment plant or transfer station rather than a landfill disposal route.

8.7.9 Due to variations in site levels some earthworks or cutting and filling of areas may be undertaken. If the reuse of soils is proposed on the site this should be done in accordance with the CL:AIRE "Development Industry Code of Practice for the Definition of Waste" (CL:AIRE CoP). Further guidance is provided on this in Appendix G. Any re-use scheme should be designed to minimise disposal costs.

8.8 Compliance

8.8.1 It is recommended that the approval of the Local Authority and the Agency is obtained for to the proposed remedial scheme prior to any irrevocable action being taken.

8.8.2 Once the above bodies have approved the remedial proposals it would be useful to produce a short remediation specification. This will also give guidance to enable a suitably qualified contractor to carry out the works.

9.0 CONCLUSIONS

9.1 Summary

Environmental

9.1.1 Localised lead and arsenic contamination marginally in excess of residential screening values was identified within Area A with elevated PAH and hydrocarbon contamination also notified at one location within Area A. The risk to site end users is considered to be moderate to low and will be mitigated by source removal or the implementation of a cover system in gardens and soft landscaping areas.

9.1.2 No elevated determinands were identified within Area B and there is no considered risk to site end users from contamination in this area.

9.1.3 No asbestos was detected within any of the samples screened across the site.

9.1.4 Ground gas monitoring is ongoing and a full assessment will be issued upon completion of the monitoring programme. At present basic ground gas precautionary measures for carbon dioxide are likely to be required within Area A. No elevated concentrations have been identified within Area B to date however a consistent gas regime has not yet been identified.

9.1.5 Waste acceptance criteria was beyond the scope of works and should be carried out if material is to be removed from site. Based on total concentrations both made ground and natural soils are non-hazardous with the exception of made ground within TP22 which contains potentially hazardous levels of hydrocarbons.

Geotechnical

9.1.6 Foundation recommendations are preliminary at this stage as no development layout or finished site levels are available. Within Area A foundations are likely to be shallow unreinforced strip foundations founding on natural clays or weathered bedrock between 1.20m and 1.50m. Foundations may need to be deepened locally where trees are present in accordance with NHBC Chapter 4.2 or where deeper pockets of made ground exist. It is considered that this will best be achieved by trench or mass fill foundations.

9.1.7 Due to the likelihood of ground gas precautionary measures being required within Area A it is recommended that suspended floor slabs are implemented.

9.1.8 Within Area B treatment of mine workings is required to prevent subsidence of foundations. The extents of the treatment areas relating to coal seams is unknown at this stage. Following treatment reinforced strip foundations are considered the most suitable solution for the majority of plots within Area B within clays and weathered bedrock at shallow depths are considered suitable founding strata at a depth of between 1.00m and 1.50m within the main field. Within the smaller field in the east where granular strata was encountered foundations should be a minimum depth of 0.60m.

9.1.9 Shallow mining such as bell pits were identified locally at the site and within these areas a deeper foundation solution; trench fill or vibro improved ground may be

required in these areas however additional investigation is required to fully assess this risk.

9.1.10 Floor slabs within Area B can be ground bearing in areas where less than 600mm of suitably compacted granular material is present beneath finished floor levels however ground gas monitoring has not yet identified a consistent ground gas regime and therefore the need for suspended floor slabs cannot be ruled out at this stage.

9.1.11 The use of soakaways is not considered feasible at the site die to relatively impermeable strata at shallow depths. However this should be confirmed by in situ testing.

9.2 Further Work

9.2.1 The following further work is considered necessary to progress the site to construction phase:

- Completion of gas monitoring programme.
- Issue gas assessment.
- Additional Intrusive site investigations within previously inaccessible areas (Area A)
- Design of remedial strategy.
- Treatment of mine workings and shafts.
- Demolition Asbestos survey.
- Tree survey by qualified aboriculturist.
- Detailed Foundation design.
- Confirmation of Remedial Strategy with Local Authority.

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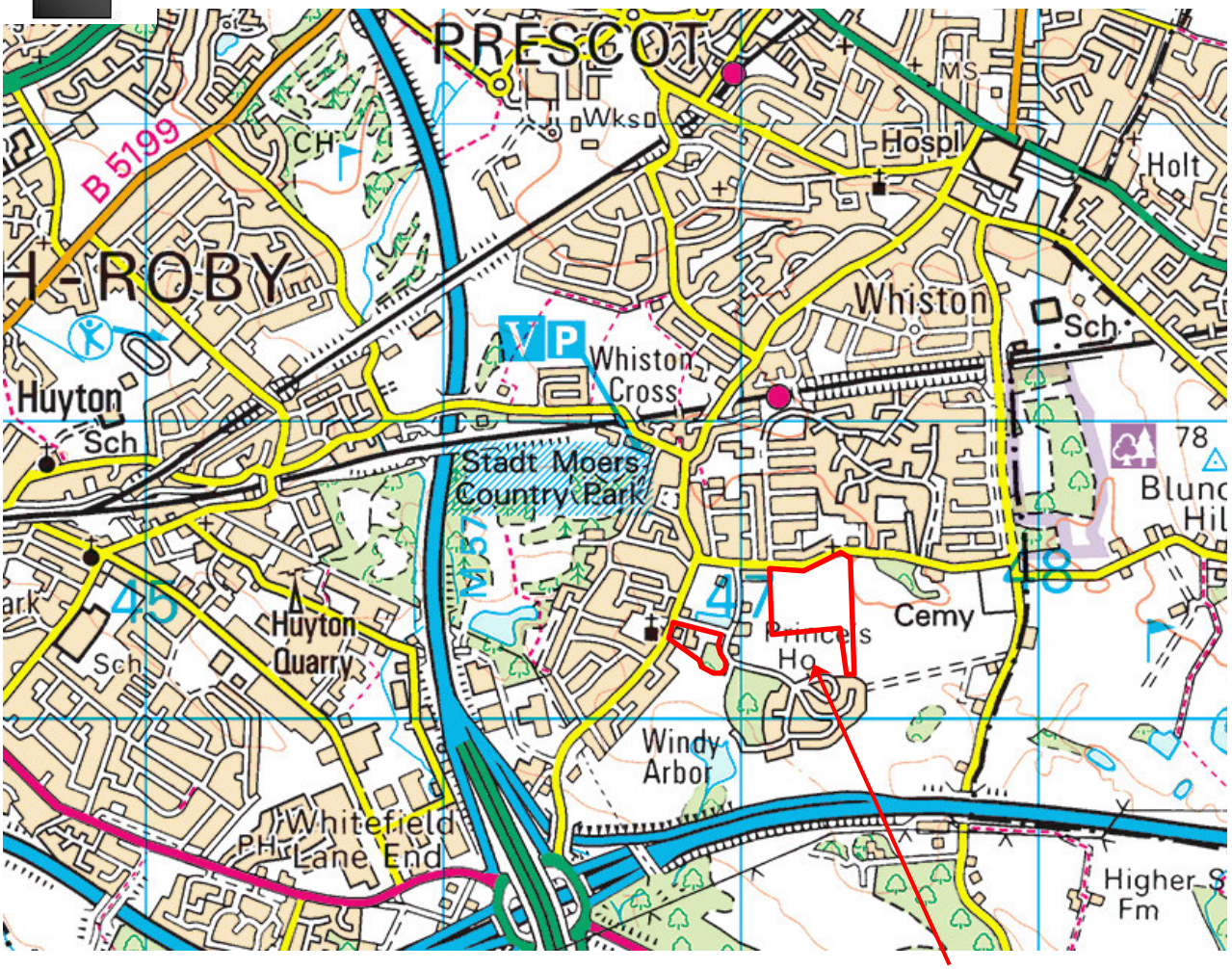
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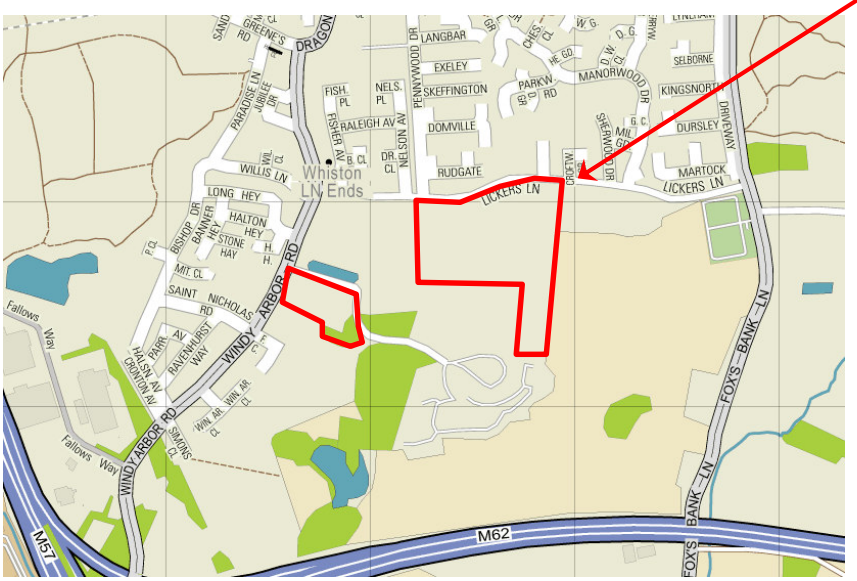
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DRAWINGS





SITE



BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

STEWART MILNE HOMES

Halsnead Park, Whiston

Site Location Plan

Drawing Number C3593/01

Scale: NTS

Drawn By: LC	Checked By: AJH

NORTH

Site Access

Woodland Area

AREA B

Main cropped Field

Bunds

Site Access

Tarmac Car Park

Ramp to rest of site

AREA A

Derelict Bungalow

Steel framed storage building

Road Bump

Road Bump

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KEY

Densely vegetated areas

Lightly vegetated area

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GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

STEWART MILNE HOMES

HALSNEAD PARK, WHISTON

Pertinent Site Features Plan

Drawing No. C3593/02

Scale: NTS

Drawn By: LC	Checked By: AJH

Pond

Shelter

WS01

TP23

TP25

RO19

TP26

TP27

RO17

TP30

TP22

Oaklee

TP29

WS02

RO18

WS03

TP24

TP28

Playground

25

Farm

Prince's Cottage

Prince's House Farm

COCK GLADES

Halsnead Villa Farm

MAIN DRIVE

KEY

- Window Sample Location
- Trial Pit Location
- Estimated Location of Mine Shafts
- Proposed Rotary Open Hole Locations

DESCRIPTION	REV	DATE

BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

CLIENT: STEWART MILNE HOMES

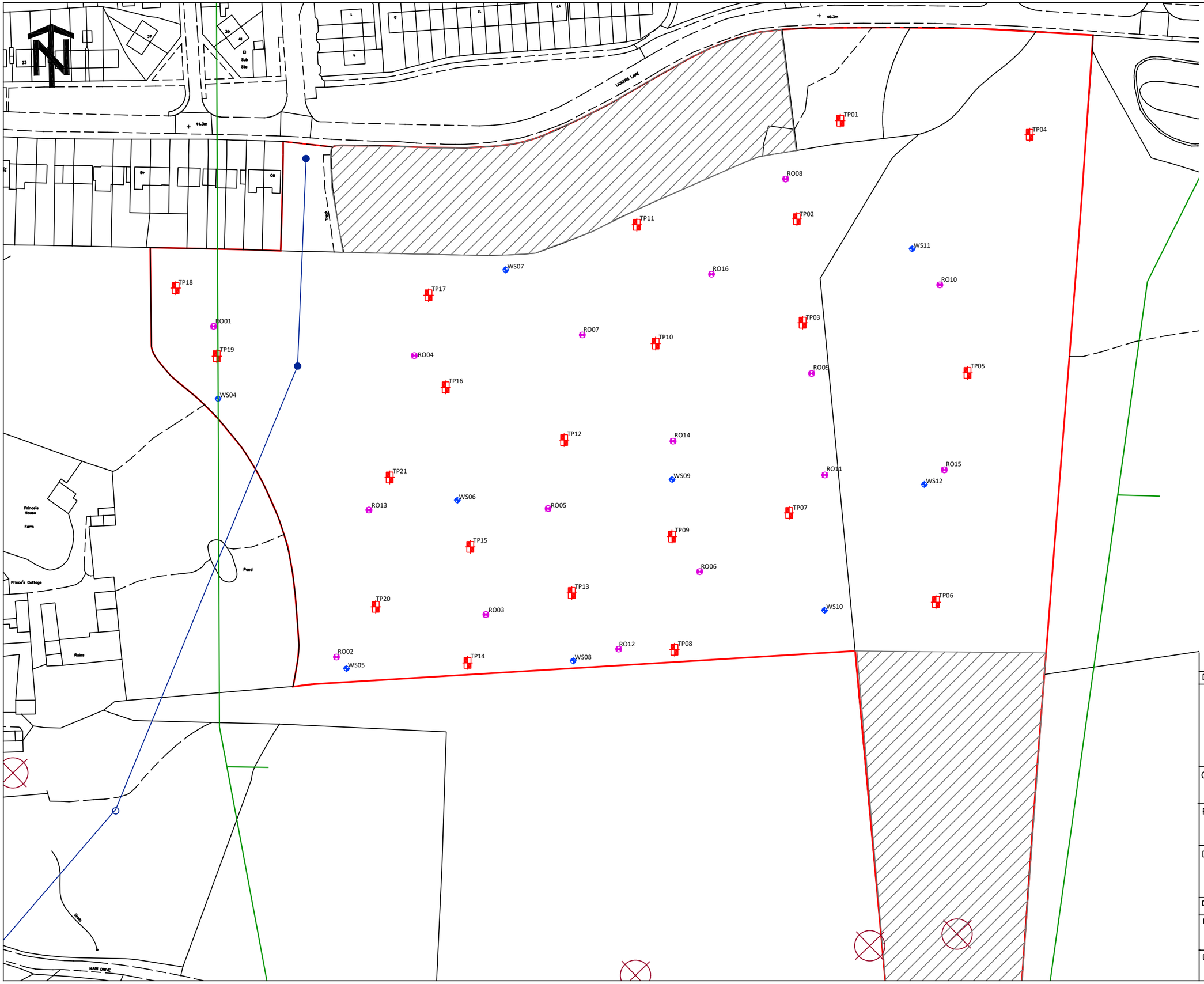
PROJECT TITLE: HALSNEAD PARK, WHISTON

DRAWING DETAIL: EXPLORATORY HOLE LOCATION PLAN

DRAWN	CHECKED
LC	–

DATE	SCALE
June 2017	NTS

DRAWING NUMBER	REVISION
C3593/04A	–


KEY
Window Sample Location
Trial Pit Location
Estimated Location of Mine Shafts
Proposed Rotary Open Hole Locations
TP01
TP04
RO08
TP11
TP02
WS11
WS07
RO16
RO10
TP18
TP17
TP03
RO01
RO07
TP10
TP19
RO04
RO09
TP05
TP16
WS04
TP12
RO14
TP21
RO11
RO15
WS09
WS12
WS06
RO13
RO05
TP07
TP09
TP15
RO06
TP13
TP06
TP20
RO03
WS10
RO02
RO12
TP08
WS05
TP14
WS08
Prince's House Farm
Prince's Cottage
Pond
Ruins
Path
MAIN DRIVE
LICKERS LANE
Trees
DESCRIPTION
REV
DATE
BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE
CLIENT
STEWART MILNE HOMES
PROJECT TITLE
HALSNEAD PARK, WHISTON
DRAWING DETAIL
EXPLORATORY HOLE LOCATION PLAN
DRAWN
LC
CHECKED
–
DATE
June 2017
SCALE
NTS
DRAWING NUMBER
C3593/04B
REVISION
–

KEY

- Window Sample Location
- Trial Pit Location
- Rotary Open Hole Locations
- Postulated subcrops of coal seams based on site investigation
- Postulated location of faults on site

LOWER FLORIDA

HIGHER FLORIDA

EARTHY DELPH

YARD

DISCOVERY

PASTURES

LICKERS LANE

Prince's House Farm

Prince's Cottage

Pond

Ruins

Drain

MAIN DRIVE

DESCRIPTION	REV	DATE

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GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

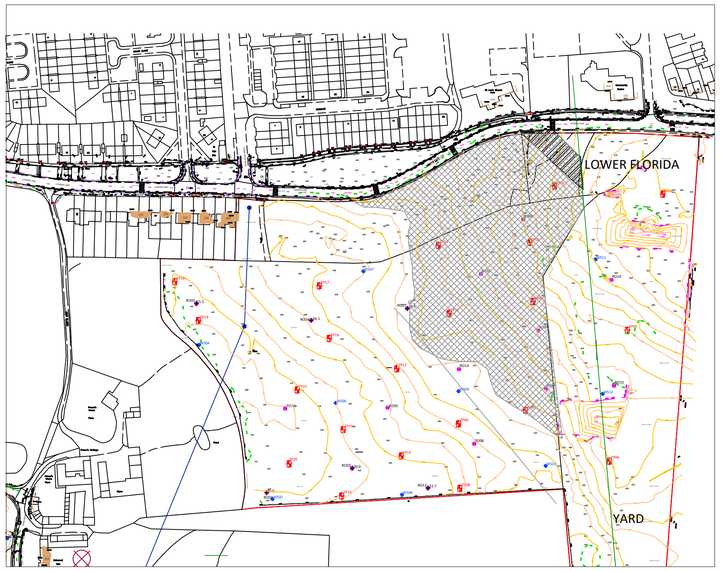
CLIENT
STEWART MILNE HOMES

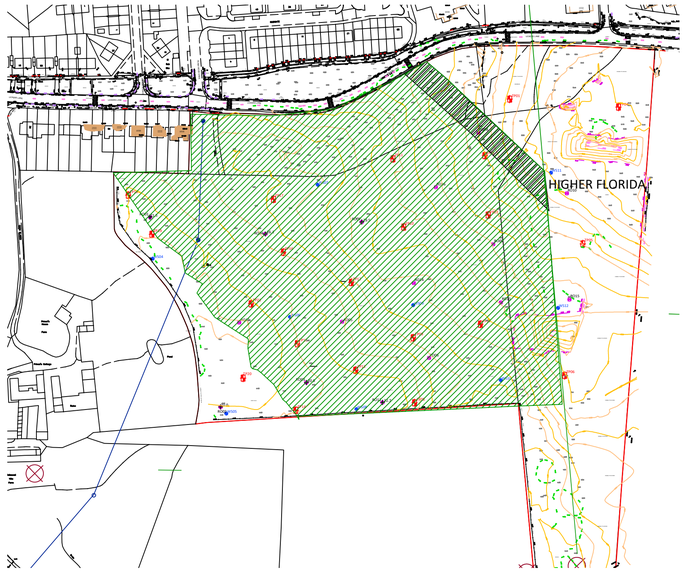
PROJECT TITLE
HALSNEAD PARK, WHISTON

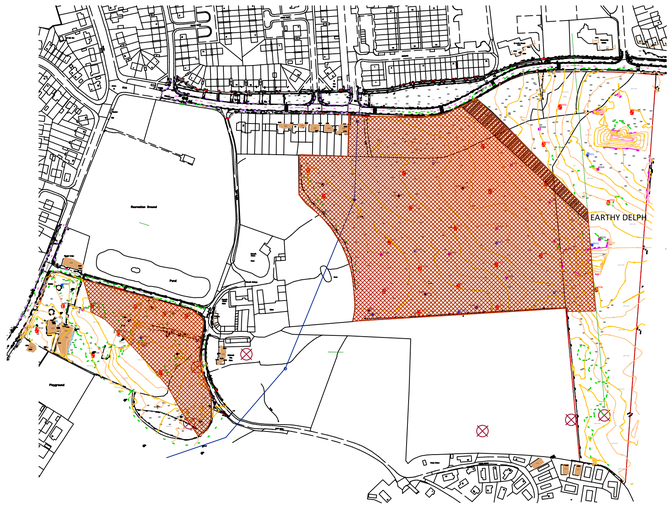
DRAWING DETAIL
Coal Seam Plan

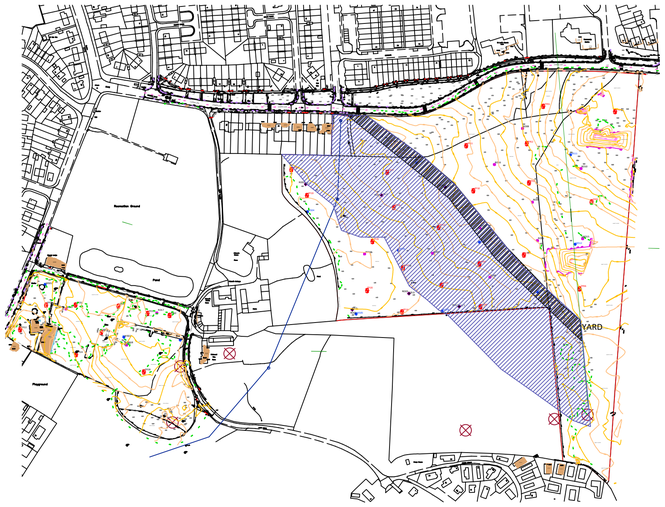
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LC	–
DATE	SCALE
June 2017	NTS

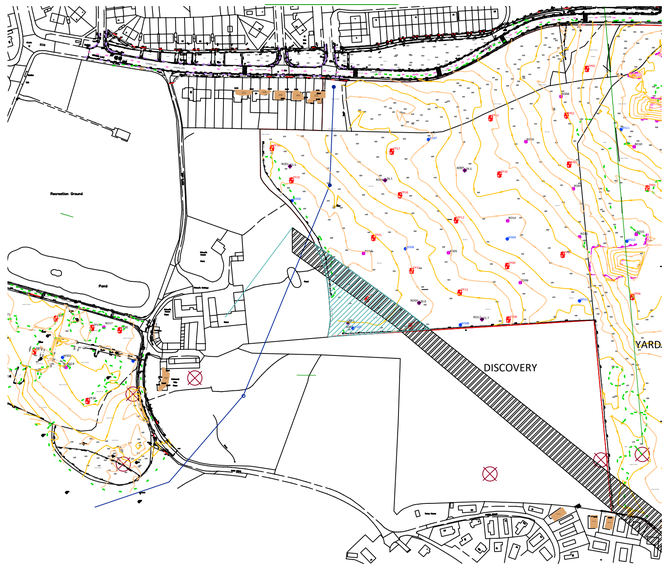
DRAWING NUMBER	REVISION
C3593/06	–











Zone of influence of each seam is shown as a worst case scenario based on maximum seam thickness and assuming all seams below are worked.

DESCRIPTION	REV	DATE

BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

CLIENT
STEWART MILNE HOMES

PROJECT TITLE
HALSNEAD PARK, WHISTON

DRAWING DETAIL
PLAN SHOWING ZONE OF INFLUENCE AT THE SURFACE FROM COAL SEAMS

DRAWN	CHECKED
LC	AJH
DATE	**SCALE**
July 2017	NTS
DRAWING NUMBER	**REVISION**
C3593/07	–

APPENDIX A
Exploratory Hole Logs

BROWNFIELD SOLUTIONS LTD
William Smith House,
173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Borehole Log

Borehole No.
WS01
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346805.10 - 390318.90	Hole Type WS
Location: WHISTON		Level: 46.82	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 18/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.05	46.77		MADE GROUND: Tarmac. MADE GROUND: Grey subangular medium to coarse gravel of limestone subbase.
		0.40	ES		0.30	46.52		MADE GROUND: Soft to firm dark brown black organic clay with occasional fibrous plant matter. *Gravel of clinker and brick above 0.60m.*
		0.70	ES					*Slight organic odour at 0.70m.* *Soft and sandy between 0.70m and 0.90m.*
		1.00	D		0.90	45.92		MADE GROUND: Soft to firm brown sandy clay with rare subangular fine to coarse gravel of brick and plastic. *Silty below 1.00m.*
		1.00		N=4 (1,1/1,1,1,1)				*Damp sand band at 2.25m.*
		1.50	D		1.40	45.42		Stiff orange brown sandy CLAY with coal stringers and sand veins throughout.
		2.00	D					
		2.00		N=8 (2,2/2,2,2,2)				
		2.90	D		2.85	43.97		Very weak orange brown micaceous MUDSTONE highly weathered (recovered as gravelly clay).
		3.00		36 (6,8/36 for 220mm)				
					3.38	43.44		End of borehole at 3.37 m

Remarks
1. No groundwater encountered.
2. Installation: Plain pipe from ground level to 0.50m, slotted pipe from 0.50m to 1.50m.

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Northwich,
Cheshire,
CW9 5LP

Borehole Log

Borehole No.
WS02
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346887.90 - 390253.00	Hole Type WS
Location: WHISTON		Level: 43.39	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 18/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.40	ES		0.50	42.89		MADE GROUND: Black red sandy ashy subangular to subrounded fine to coarse gravel of brick and clinker. *Clayey above 0.20m.*
		0.80	ES					MADE GROUND: Soft to firm black grey sandy clay. *Band of subangular fine limestone gravel between 0.80m and 0.90m.* *Small cobble of bitumen bound concrete at 0.90m.*
		1.00		N=5 (1,1/1,1,1,2)				
		1.15	D		1.10	42.29		Soft grey sandy damp CLAY with occasional coal fragments.
		1.65	D		1.60	41.79		Stiff to very stiff orange brown sandy CLAY with occasional subrounded fine to medium gravel of mixed lithologies.
		2.00 2.00	D	N=13 (2,3/3,3,3,4)				
		3.00 3.00	D	50 (4,7/50 for 295mm)	2.40	40.99		Very weak blue grey micaceous SILTSTONE highly weathered (recovered as laminated gravelly silty clay).
					3.45	39.94		End of borehole at 3.45 m

Remarks
1. No groundwater encountered.
2. Hole backfilled with arisings upon completion.

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Cheshire,
CW9 5LP

Borehole Log

Borehole No. **WS03**
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346953.30 - 390258.00	Hole Type WS
Location: WHISTON		Level: 43.86	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 18/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.50	ES					MADE GROUND: Topsoil over black brown ashy sandy subangular fine to coarse gravel of limestone and clinker.
		0.70	ES		0.60	43.26		*Band of subangular fine limestone gravel between 0.55m and 0.60m.*
		1.00	D		0.90	42.96		Firm dark brown black sandy CLAY with coal fragments.
		1.00		N=15 (2,3/3,4,4,4)				Stiff orange brown mottled grey sandy silty CLAY (possible residual bedrock).
		1.50	D					*Very stiff below 1.50m.*
		2.00	D		2.00	41.86		Very weak orange brown micaceous MUDSTONE with ferrous staining highly weathered (recovered as gravelly clay).
		2.00		N=26 (4,5/5,6,7,8)				
		2.20	D					
					2.50	41.36		Very weak black inferior COAL highly weathered (recovered as gravel).
					2.55	41.31		Very weak orange brown micaceous MUDSTONE with ferrous staining highly weathered (recovered as laminated gravel).
		3.00	D		3.00	40.86		Very weak grey micaceous SILTSTONE highly weathered (recovered as laminated gravel).
		3.00		50 (7,9/50 for 285mm)				
					3.44	40.42		End of borehole at 3.44 m

Remarks
1. No groundwater encountered.
2. Installation: Plain pipe from ground level to 1.00m, slotted pipe from 1.00m to 3.00m.

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Cheshire,
CW9 5LP

Borehole Log

Borehole No.
WS04
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347092.90 - 390398.60	Hole Type WS
Location: WHISTON		Level: 40.78	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 18/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.10	ES		0.20	40.58		MADE GROUND: Brown sandy clayey topsoil.
		0.30	ES					MADE GROUND: Stiff to very stiff grey brown sandy clay with fragments of coal and burnt shale. Reworked ground.
		0.60	D					
		1.00	D					
		1.00		N=8 (1,2/2,2,2,2)				*Thin coal band between 1.20m and 1.22m.*
		1.80	D		1.85	38.93		*Thin coal band between 1.80m and 1.84m.*
		2.00	D					Weak brown orange MUDSTONE weathered (recovered as laminated clayey gravel) with fine grained sandstone bands.
		2.00		N=17 (2,3/4,5,4,4)				*Very weak and highly weathered at 2.00m recovered as clayey gravel.*
	▼							*Saturated at 2.50m.*
		3.00	D					
		3.00		N=6 (1,1/2,1,1,2)				*Completely weathered clay band at 3.20m.*
		3.40	D					*Orange mudstone (possible seat earth) at 3.50m and 3.80m.*
		3.80		50 (25 for 0mm/50 for 5mm)	3.85	36.93		End of borehole at 3.85 m

Remarks
1. Groundwater encountered at 2.50m.
2. Installation: Plain pipe from ground level to 1.00m, slotted pipe from 1.00m to 3.80m.

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Cheshire,
CW9 5LP

Borehole Log

Borehole No.
WS05
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347146.20 - 390286.50	Hole Type WS
Location: WHISTON		Level: 41.57	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 18/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES					Brown sandy clayey TOPSOIL with coal fragments.
					0.40	41.17		
		0.50	ES					Stiff red brown mottled grey slightly sandy CLAY with occasional subrounded fine to coarse gravel of mixed lithologies.
		1.00 1.00	D	N=8 (1,2/2,2,2,2)				
								Damp below 1.75m.
		2.00 2.00	D	N=9 (1,2/2,2,2,3)				
					2.50	39.07		
		2.55	D					Very weak grey SILTSTONE highly weathered (recovered as blocky clayey gravel with occasional carbonaceous lenses and rare plant matter).
		3.00 3.00	D	50 (7,10/50 for 295mm)				
					3.44	38.13		End of borehole at 3.44 m

1
2
3
4
5

Remarks
1. No groundwater encountered.
2. Hole backfilled with arisings upon completion.

AGS

BROWNFIELD SOLUTIONS LTD
William Smith House,
173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Borehole Log

Borehole No. **WS06**
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347192.30 - 390356.30	Hole Type WS
Location: WHISTON		Level: 42.24	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 18/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.30	41.94		Brown sandy clayey TOPSOIL with coal fragments.
		0.50	ES					Stiff to very stiff orange brown sandy CLAY.
		1.00 1.00	D	N=11 (2,2/2,3,3,3)				*Coal lenses below 1.00m.*
		1.20	D					*Thin dull coal band between 1.20m and 1.22m.*
								Sand band between 1.35m and 1.40m.
		2.00 2.00	D	N=9 (1,2/2,2,2,3)				*Damp below 2.00m.*
		2.80		50 (28 for 15mm/50 for 55mm)	2.70 2.87	39.54 39.37		Weak light grey fine grained SANDSTONE/ SILTSTONE weathered (recovered as slightly sandy gravel with micaceous grains and laminated in parts). End of borehole at 2.87 m

Remarks
1. No groundwater encountered.
2. Hole backfilled with arisings upon completion.

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Cheshire,
CW9 5LP

Borehole Log

Borehole No.
WS07
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347212.40 - 390452.20	Hole Type WS
Location: WHISTON		Level: 43.99	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 18/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES					Brown sandy clayey TOPSOIL with coal fragments.
		0.50	ES		0.40	43.59		Firm to stiff orange brown mottled grey sandy CLAY.
		1.00	D		1.00	42.99		Very stiff light orange grey CLAY with frequent coal gravel.
		1.00		N=11 (2,2/2,3,3,3)				
		1.20	D					*Grey with abundant coal below 1.60m (Possible completely weathered coal).*
		1.60	D					
		1.80	D		1.75	42.24		Very weak black COAL highly weathered, dull with minor bright bands and carbonaceous mudstone bands (recovered as gravel).
		1.90	D					
		1.90		50 (7,8/50 for 285mm)				
					2.34	41.65		End of borehole at 2.34 m

Remarks
1. No groundwater encountered.
2. Installation: Plain pipe from ground level to 0.50m, slotted pipe from 0.50m to 2.30m.

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Borehole Log

Borehole No.
WS08
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347240.60 - 390289.70	Hole Type WS
Location: WHISTON		Level: 42.23	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 19/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.40	41.83		Brown sandy clayey TOPSOIL.
		0.50	D					Stiff red brown mottled grey slightly sandy CLAY with occasional coal fragments.
		1.00 1.00	D	N=14 (3,3/3,3,3,5)				
		1.50	D					*Damp sand bands below 1.50m.*
		2.00 2.00	D	N=16 (2,2/3,3,5,5)				*Slightly gravelly below 2.00m.*
		2.90 2.90	D	50 (25 for 85mm/50 for 75mm)	2.40 3.06	39.83 39.17		Very weak grey blue SILTSTONE highly weathered (recovered as clayey gravel). *Ferrous staining below 2.70m.* End of borehole at 3.06 m

Remarks
1. No groundwater encountered.
2. Installation: Plain pipe from ground level to 1.00m, slotted pipe from 1.00m to 2.90m.

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Borehole Log

Borehole No. **WS09**
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347281.60 - 390365.00	Hole Type WS
Location: WHISTON		Level: 44.94	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 19/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.40	44.54		Brown sandy clayey TOPSOIL.
		1.00 1.00	ES	N=12 (3,3/3,3,3,3)				Stiff orange brown sandy CLAY with occasional subangular to subrounded fine to medium gravel of coal and siltstone.
		1.60	D					
		2.00 2.00	D	50 (5,7/50 for 275mm)				
		2.25	D		2.20	42.74		Extremely weak orange grey SILTSTONE residually weathered (recovered as gravelly clay).
		2.50 2.50	D	50 (25 for 105mm/50 for 185mm)	2.40	42.54		Very weak grey blue SILTSTONE highly weathered (recovered as gravel). *Weak and weathered below 2.50m.*
					2.79	42.15		End of borehole at 2.79 m

Remarks
1. No groundwater encountered.
2. Hole backfilled with arisings upon completion.

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Borehole Log

Borehole No. **WS10**
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347345.00 - 390310.70	Hole Type WS
Location: WHISTON		Level: 44.48	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 19/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.25	ES		0.20	44.28		MADE GROUND: Brown sandy clayey topsoil.
		0.75	ES					MADE GROUND: Stiff brown grey ashy sandy gravelly clay. Gravel is subangular to subrounded fine to coarse of coal, burnt shale and other mixed lithologies (reworked ground).
		1.00 1.00	D	N=7 (1,1/2,2,1,2)				
		1.30	D		1.20	43.28		Soft to firm dark grey slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to medium of coal.
					1.60	42.88		Firm brown grey sandy CLAY with occasional subangular fine to medium gravel of mudstone and siltstone.
		2.00 2.00	D	N=15 (5,3/4,3,4,4)	1.90	42.58		Very weak blue grey micaceous SILTSTONE highly weathered (recovered as clayey gravel). *Completely weathered saturated clay band between 2.00m and 2.50m.* *Weak and weathered below 2.60m.*
		2.80	D					
		3.00		50 (8,10/50 for 175mm)	3.33	41.15		End of borehole at 3.33 m

Remarks
1. No groundwater encountered.
2. Installation: Plain pipe from ground level to 1.00m, slotted pipe from 1.00m to 3.00m.

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Borehole Log

Borehole No.
WS11
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347381.40 - 390460.90	Hole Type WS
Location: WHISTON		Level: 50.78	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 19/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	50.58		Dark brown clayey sandy TOPSOIL.
		0.30	ES					Very stiff orange brown slightly sandy CLAY with occasional subangular to subrounded fine to coarse gravel of mixed lithologies including coal and siltstone.
		0.50	D					
		1.00	D		1.00	49.78		
		1.00		N=50 (4,6/9,13,18,10)				Dense red brown saturated slightly clayey fine to coarse SAND.
					1.30	49.48		Very dense light brown cream silty fine SAND (possible residual bedrock).
		1.50	D					
		1.50		50 (25 for 95mm/50 for 80mm)				
		1.67	D		1.68	49.10		End of borehole at 1.75 m

Remarks
1. No groundwater encountered.
2. Installation: Plain pipe from ground level to 0.50m, slotted pipe from 0.50m to 1.68m.

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Borehole Log

Borehole No.
WS12
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347386.50 - 390363.00	Hole Type WS
Location: WHISTON		Level: 47.62	Scale 1:25
Client: STEWART MILNE HOMES LTD		Dates: 19/05/2017 -	Logged By LC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 0.25	ES D		0.15	47.47		Dark brown clayey sandy TOPSOIL.
		0.55	D		0.50	47.12		Very dense orange brown silty SAND.
		1.00 1.00	D	50 (25 for 90mm/50 for 40mm)	1.13	46.49		Very dense light brown cream silty fine SAND (possible residual bedrock). End of borehole at 1.13 m

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Remarks
1. No groundwater encountered.
2. Installation: Plain pipe from ground level to 0.50m, slotted pipe from 0.50m to 1.13m.

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Trial Pit Log

Trialpit No
TP01
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347351.50 - 390514.20 Level: 46.99	Date 22/05/2017
Location: WHISTON		Dimensions (m): Depth 4.10	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.25	ES					MADE GROUND: Dark brown black clayey sandy topsoil with abundant roots and occasional subangular to subrounded fine to coarse gravel of brick and rare plastic and clinker.
	0.50	ES		0.45	46.54		Brown clayey silty fine to coarse SAND with rare gravel.
	1.00	D		1.00	45.99		Stiff to very stiff orange brown sandy friable CLAY with abundant sand bands.
							Coal fragments below 1.50m.
▼	2.35	D		2.30	44.69		Very weak black dark grey COAL dull with bright bands highly weathered interbedded with thin partings of carbonaceous mudstone (recovered as gravel).
							Sulphur odour noted at base of seam.
	3.25	D		3.20	43.79		Very weak grey SILTSTONE highly weathered (recovered as clayey sand and gravel).
				4.10	42.89		End of pit at 4.10 m

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Remarks: 1. Groundwater encountered at 2.30m.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP02
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347333.50 - 390473.30 Level: 48.46	Date 22/05/2017
Location: WHISTON		Dimensions (m): Depth 4.00	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	ES		0.40	48.06		MADE GROUND: Compacted brown sandy clayey topsoil with rare pottery fragments.
	0.50	ES					MADE GROUND: Brown mottled black red sandy gravelly clay. Gravel is subangular to subrounded fine to coarse of mixed lithologies including coal, sandstone, siltstone and with rare glass.
	0.85	D		0.80	47.66		Stiff red orange very sandy friable CLAY, clayey sand in parts.
▼	1.90	D		1.90	46.56		Very stiff dark brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mixed lithologies including mudstone and siltstone.
	2.90	D		2.70	45.76		Very weak grey SILTSTONE highly weathered (recovered as sand and gravel) with thin coal and carbonaceous bands. *Becoming carbonaceous siltstone below 3.20m.*
	4.00	D		4.00	44.46		End of pit at 4.00 m

Remarks: 1. Slow groundwater seepage encountered at 1.80m.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP03
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347335.80 - 390430.20 Level: 47.75	Date 22/05/2017
Location: WHISTON		Dimensions (m): Depth 3.90	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.35	ES		0.40	47.35		MADE GROUND: Dark brown black clayey sandy topsoil with abundant roots and occasional subangular to subrounded fine to coarse gravel of brick and rare plastic and clinker.
	0.50	ES					
	0.80	D					Firm orange brown slightly sandy CLAY.
	1.25	D		1.20	46.55		Very weak black COAL dull with bright bands highly weathered (recovered as gravel).
							Coal with thin red laminated mudstone partings below 2.00m.
	2.30	D					
							Coal recovered as cobbles and gravel below 2.80m.
	3.50	D		3.70	44.05		Moderately weak dark grey carbonaceous SILTSTONE slightly weathered (recovered as flaggy gravel and cobbles).
				3.90	43.85		End of pit at 3.90 m

1 2 3 4 5

Remarks: 1. No groundwater encountered.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP04
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347430.30 - 390508.30 Level: 51.62	Date 22/05/2017
Location: WHISTON		Dimensions (m): Depth 3.70	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.25	ES					Dark brown clayey sandy TOPSOIL with roots and rootlets.
	0.55	ES		0.50	51.12		Orange brown slightly clayey fine to coarse SAND with rare subrounded fine gravel.
	0.80	D					
	1.20	D		1.10	50.52		Stiff orange brown slightly gravelly very sandy CLAY with bands of clayey sand. Gravel is subangular to subrounded fine to coarse gravel of mixed lithologies.
							Very stiff below 2.00m.
	2.50	D		2.40	49.22		Orange slightly silty fine to medium SAND (completely weathered sandstone).
	3.60	D		3.70	47.92		End of pit at 3.70 m

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Remarks: 1. No groundwater encountered.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP05
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347404.50 - 390409.40 Level: 48.85	Date 22/05/2017
Location: WHISTON		Dimensions (m): Depth 2.65	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	ES		0.50	48.35		Dark brown slightly clayey sandy TOPSOIL.
	0.55 0.60	ES D		0.80	48.05		Orange brown fine to coarse SAND with occasional subrounded to subangular fine to coarse gravel of weathered sandstone. (Completely weathered bedrock).
	1.50	D					Very weak orange brown fine to medium grained SANDSTONE highly weathered (recovered as silty sand and gravel).
	2.30	D					*Recovered as fine to coarse gravel below 2.00m.*
				2.65	46.20		End of pit at 2.65 m

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Remarks: 1. No groundwater encountered.
2. Hole terminated at 2.65m due to no progress on bedrock.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP06
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347391.30 - 390314.10 Level: 47.66	Date 23/05/2017
Location: WHISTON		Dimensions (m): Depth 2.20	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	ES		0.30	47.36		Dark brown clayey sandy TOPSOIL.
	0.50	ES					Very stiff brown sandy gravelly friable CLAY. Gravel is subangular to subrounded fine to coarse of mixed lithologies including sandstone and mudstone.
	0.60	D	HVP=59				*Clay of medium strength at 0.65m.*
				0.75	46.91		Very weak yellow cream fine to medium grained SANDSTONE highly weathered (recovered as fine to medium sand and poorly cemented gravel).
	1.00	D					
							Band of orange brown fine to coarse weathered sandstone between 1.80m and 2.00m.
	2.00	D					*Becoming weak and weathered below 2.00m.*
				2.20	45.46		End of pit at 2.20 m

Remarks: 1. No groundwater encountered.
2. Hole terminated at 2.20m due to difficult excavation.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No **TP07**
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347330.30 - 390351.20 Level: 45.43	Date 23/05/2017
Location: WHISTON		Dimensions (m): Depth 3.40	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30	45.13		Dark brown clayey sandy TOPSOIL.
	0.40	ES					Stiff red brown mottled grey very sandy CLAY with occasional subangular to subrounded fine to coarse gravel of mixed lithologies.
	0.50	D	HVP=119				*Clay of high strength at 0.70m.*
	1.50	D					*Very friable with damp grey sand bands below 1.45m.*
	2.35	D		2.30	43.13		Very weak orange brown mottled grey MUDSTONE highly weathered (recovered as clayey gravel and cobbles).
				2.50	42.93		Very weak grey SILTSTONE highly weathered (recovered as flaggy gravel and cobbles).
							Carbonaceous siltstone below 2.80m.
	3.00	D					*Completely weathered clay band between 2.90m and 3.00m.*
				3.40	42.03		End of pit at 3.40 m

1 2 3 4 5

Remarks: 1. No groundwater encountered.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No **TP08**

Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347282.50 - 390294.30 Level: 42.73	Date 23/05/2017
Location: WHISTON		Dimensions (m): Depth 3.30	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES					MADE GROUND: Dark brown clayey sandy topsoil.
	0.50	ES		0.40	42.32		MADE GROUND: Brown orange gravelly very sandy clay with pockets of clayey sand. Gravel is subangular fine to coarse of coal and seatearth. (Strata appears unordered and possibly reworked).
	1.50	D		1.20	41.52		Orange brown clayey silty fine to medium SAND (damp).
	1.75	D					
	2.30	D		2.25	40.48		Very weak grey SILTSTONE highly weathered (recovered as clayey gravel).
	2.90	D		2.85	39.88		Weak dark grey carbonaceous SILTSTONE with iron banding and coal stringers weathered (recovered as gravel and cobbles).
	3.15	D		3.10	39.62		Moderately weak black COAL bright with iridescent lustre partially weathered to fresh (recovered as gravel and small cobbles).
				3.30	39.42		End of pit at 3.30 m

1 2 3 4 5

Remarks: 1. No groundwater encountered.
2. Hole terminated at 3.30m due to no progress on coal.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No **TP09**
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347281.60 - 390341.40 Level: 44.26	Date 23/05/2017
Location: WHISTON		Dimensions (m): Depth 3.80	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Dark brown clayey sandy topsoil.
	0.30	ES		0.40	43.86		
	0.50	ES		0.50	43.76		MADE GROUND: Band of black brown reworked coal and mudstone gravel running north to south across pit. *Band of reworked coal and mudstone gravel running north to south across pit between 0.40m and 0.50m.*
	0.70	D					Stiff to very stiff orange brown mottled grey sandy CLAY with occasional subrounded fine to medium gravel of mixed lithologies. *Clay of high strength at 0.90m.*
			HVP=117				
				1.20	43.06		Orange brown slightly clayey silty fine to medium SAND.
				1.50	42.76		Stiff red brown slightly gravelly sandy CLAY with clayey sand bands. Gravel is subangular to subrounded fine to coarse of mudstone. (Possible residual bedrock).
	1.80	D		1.75	42.51		Very weak grey SILTSTONE highly weathered with ferrous banding (recovered as clayey gravel).
	2.00	D					*Moderately weak band between 2.10m and 2.15m.*
				2.70	41.56		Moderately weak black COAL bright with iridescent lustre partially weathered to fresh (recovered as gravel and small cobbles).
	2.80	D					*Carbonaceous silstone bands below 3.50m.*
	3.80	D		3.80	40.46		End of pit at 3.80 m

Remarks: 1. No groundwater encountered.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP10
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347274.80 - 390421.60 Level: 45.70	Date 23/05/2017
Location: WHISTON		Dimensions (m): Depth 3.30	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.30	45.40		MADE GROUND: Dark brown sandy clayey topsoil.
	0.50	ES		0.50	45.20		MADE GROUND: Stiff orange brown sandy clay with sand bands.
	0.75	D	HVP=60				Very stiff orange brown sandy CLAY with sand bands. *Land drain at 0.50m.* *Clay of medium strength at 0.75m.*
	1.70	D	HVP=111	1.50	44.20		Very stiff grey brown slightly sandy CLAY with occasional subangular fine to medium mudstone gravel and micaceous grains. *Clay of high strength at 1.70m.*
	2.05	D					*Stiff blue grey clay with rare fibrous plant matter at 2.00m.*
	2.25	D		2.20	43.50		Very weak to weak blue grey MUDSTONE highly weathered to weathered (recovered as clayey gravel and small cobbles).
				3.00	42.70		Moderately weak grey SILTSTONE with ferrous staining and coal stringers weathered (recovered as gravel and cobbles)
				3.30	42.40		End of pit at 3.30 m

1 2 3 4 5

Remarks: 1. No groundwater encountered.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP11
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347266.90 - 390470.90 Level: 45.83	Date 23/05/2017
Location: WHISTON		Dimensions (m): Depth 2.30	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES					Dark brown clayey sandy TOPSOIL with coal fragments.
	0.65 0.70	ES D	HVP=140	0.60	45.23		Stiff to very stiff brown orange mottled grey slightly sandy CLAY. *Clay of high strength at 0.90m.* *Becoming red orange at 1.30m.*
				1.50	44.33		Residually weathered orange grey SILTSTONE (recovered as gravelly clay).
				1.70	44.13		Weak orange grey fine grained SANDSTONE with thin siltstone bands and coal stringers weathered (recovered as sandy gravel).
	2.00	D					*Recovered as flaggy gravel and cobbles below 2.20m.*
				2.30	43.53		End of pit at 2.30 m

1 2 3 4 5

Remarks: 1. No groundwater encountered.
2. Hole terminated at 2.30m due to no progress on bedrock.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP12
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347236.70 - 390381.40 Level: 43.98	Date 23/05/2017
Location: WHISTON		Dimensions (m): Depth 3.40	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.30	43.68		Dark brown clayey sandy TOPSOIL.
	0.50	ES					Stiff orange brown mottled grey very sandy CLAY, clayey sand in parts.
	0.60	D					
	1.00	D		0.95	43.03		Very stiff orange brown mottled grey sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mixed lithologies including sandstone and siltstone.
	1.80	D		1.70	42.28		Very weak grey SILTSTONE highly weathered (recovered as clayey gravel).
							Recovered as gravel and cobbles below 2.40m.
	2.60	D					
							Fossil assemblages containing ferns below 3.00m.
				3.40	40.58		End of pit at 3.40 m

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Remarks: 1. No groundwater encountered.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP13
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347239.90 - 390317.90 Level: 42.66	Date 24/05/2017
Location: WHISTON		Dimensions (m): Depth 3.30	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.40	ES		0.50	42.16		Dark brown clayey sandy TOPSOIL with coal fragments.
	0.60	ES					Light brown slightly gravelly clayey fine to coarse SAND.
	0.80	D		0.90	41.76		Very stiff orange brown very sandy friable CLAY.
	1.15	D					*Thin coal band at 1.10m.*
							Sandy gravelly clay below 1.20m.
							Mottled grey below 1.25m.
							Sand band between 2.00m and 2.10m.
	2.15	D	HVP=61				*Clay of medium strength at 2.20m.*
	2.80	D		2.70	39.96		Very weak orange grey interbedded SILTSTONE and MUDSTONE highly weathered (recovered as gravel).
							Recovered as cobbles and small boulders below 3.00m.
				3.30	39.36		End of pit at 3.30 m

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Remarks: 1. No groundwater encountered.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP14
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347196.50 - 390288.80 Level: 42.08	Date 24/05/2017
Location: WHISTON		Dimensions (m): Depth 3.90	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Dark brown clayey sandy topsoil with coal fragments.
	0.45 0.50	ES ES		0.40	41.68		MADE GROUND: Black grey clay bound subangular to subrounded fine to coarse gravel of coal and mudstone. Gravel is erratically ordered and appears reworked. *In east of pit natural ground encountered beneath topsoil consisting of orange brown clayey fine to coarse sand becoming stiff orange brown mottled grey clay below 1.00m. Evidence of bell shaped boundary between two stratas on northern pit face.*
	1.00	D					
	2.00	D					
	2.35	D		2.30	39.78		Stiff orange brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of siltstone.
	3.50	D		3.30	38.78		Very weak grey SILTSTONE highly weathered (recovered as clayey gravel with ferrous staining).
				3.90	38.18		End of pit at 3.90 m

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Remarks: 1. No groundwater encountered.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP15
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347193.70 - 390337.50 Level: 42.10	Date 24/05/2017
Location: WHISTON		Dimensions (m): Depth 3.05	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.10	ES					MADE GROUND: Dark brown clayey sandy topsoil with mudstone fragments.
				0.30	41.80		
	0.50	ES					MADE GROUND: Grey brown clayey subangular to subrounded fine to coarse gravel of weathered coal, mudstone and siltstone (reworked ground).
				0.60	41.50		
	0.70	D					Stiff orange brown mottled grey slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse of mxed lithologies.
			HVP=98				*Fine to coarse sand bands below 1.00m.*
							Clay of high strength at 1.10m.
	1.25	D					
							Becoming very stiff to hard clay below 2.00m.
	2.30	D					
	3.00	D					
				3.05	39.05		End of pit at 3.05 m

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Remarks: 1. No groundwater encountered.
2. Hole terminated at 3.05m due to no progress on bedrock.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No **TP16**

Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347187.40 - 390403.20 Level: 43.19	Date 24/05/2017
Location: WHISTON		Dimensions (m): Depth 3.60	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.45	ES		0.40	42.79		MADE GROUND: Dark brown clayey sandy topsoil with mudstone fragments.
	0.65	ES					MADE GROUND: Black subangular fine to coarse gravel of coal (dull with bright bands) and carbonaceous mudstone in clay matrix. *In north of pit strata is an stiff to very stiff orange brown sandy clay.* *Land drain at 0.70m.*
	1.00	D		1.20	41.99		Stiff to very stiff orange brown mottled grey sandy CLAY with occasional subrounded fine to medium gravel of mixed lithologies.
			HVP=120				*Clay of high strength at 1.50m.*
	1.90	D					
	2.75	D					
				3.10	40.09		Very weak grey SILTSTONE highly weathered with weak weathered bands (recovered as blocky clayey gravel).
	3.65	D		3.60	39.59		End of pit at 3.60 m

Remarks: 1. No groundwater encountered.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP17
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347180.20 - 390441.60 Level: 43.83	Date 24/05/2017
Location: WHISTON		Dimensions (m): Depth 2.50	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.15	ES					Dark brown clayey sandy TOPSOIL.
				0.30	43.53		
	0.40	ES					Brown clayey fine to medium SAND.
				0.60	43.23		
	0.70	D	HVP=92				Stiff orange brown sandy CLAY with occasional subangular to subrounded fine to coarse gravel of mixed lithologies. *Clay of high strength at 0.90m.*
				1.50	42.33		Very weak grey SILSTONE highly weathered (recovered as clay and gravel). *Micaceous with coal stringers and fossils below 1.80m.*
	1.60	D					
				2.50	41.33		End of pit at 2.50 m

Remarks: 1. No groundwater encountered.
2. Hole terminated at 2.50m due to no progress on bedrock.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP18
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347075.30 - 390444.60 Level: 41.58	Date 24/05/2017
Location: WHISTON		Dimensions (m): Depth 2.80	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.30	41.28		MADE GROUND: Dark brown clayey sandy topsoil.
	0.60	ES		0.55	41.03		MADE GROUND: Firm to stiff orange brown mottled grey sandy gravelly clay. Gravel is subangular to subrounded fine to coarse of mixed lithologies.
	1.30	D					MADE GROUND: Black grey mottled red yellow sandy subangular to subrounded fine to coarse gravel of mudstone, seatearth and sandstone in a sandy clayey matrix (reworked ground).
	2.40	D					*Natural clay encountered at 2.40m in the north of pit.*
	2.80	D		2.60 2.80	38.98 38.78		Soft brown sandy CLAY with occasional subangular to subrounded fine to coarse of mixed lithologies. End of pit at 2.80 m

Remarks: 1. Groundwater encountered at 2.70m.
2. Hole terminated at 2.80m due to collapse of pit sides.

Stability: Unstable sides above 2.60m.

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Trial Pit Log

Trialpit No
TP19
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347092.20 - 390416.30 Level: 41.05	Date 24/05/2017
Location: WHISTON		Dimensions (m): Depth 2.55	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Dark brown clayey sandy TOPSOIL.
	0.32	ES		0.30	40.75		
				0.35	40.70		MADE GROUND: Black brown subangular to subrounded fine to coarse gravel of coal and mudstone.
	0.50	D					Stiff orange brown sandy CLAY, clayey sand in parts.
							Very stiff slightly sandy clay below 1.20m.
	1.70	D					
				2.00	39.05		Extremely weak orange grey MUDSTONE residually weathered (recovered as gravelly clay).
							Weak and weathered mudstone below 2.40m.
	2.50	D		2.55	38.50		End of pit at 2.55 m

Remarks: 1. No groundwater encountered.
2. Hole terminated at 2.55m due to no progress on bedrock.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP20
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347158.40 - 390312.10 Level: 41.30	Date 24/05/2017
Location: WHISTON		Dimensions (m): Depth 2.70	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	ES					Dark brown clayey sandy TOPSOIL.
	0.50	ES		0.45	40.85		
	0.70	D	HVP=70				Stiff orange brown mottled grey sandy CLAY with occasional subangular to subrounded fine to coarse gravel of mixed lithologies. *Clay of medium strength at 0.80m.*
	1.70	D	HVP=110	1.50	39.80		Very stiff orange brown sandy CLAY, clayey sand in parts. *Clay of high strength at 1.75m.*
	2.65	D		2.70	38.60		End of pit at 2.70 m

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Remarks: 1. No groundwater encountered.
2. Hole terminated at 2.70 due to no progress on hard strata.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP21
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347164.20 - 390365.90 Level: 41.60	Date 24/05/2017
Location: WHISTON		Dimensions (m): Depth 2.50	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.40	41.20		Dark brown clayey sandy TOPSOIL.
	0.50	ES					Stiff orange brown mottled grey sandy CLAY with sand bands.
	0.80	D	HVP=90				*Clay of high strength at 1.00m.*
				1.20	40.40		Very stiff orange brown sandy CLAY, clayey sand in parts.
	1.50	D	HVP=112				*Clay of high strength at 1.60m.*
				2.00	39.60		Extremely weak red brown MUDSTONE residually weathered (recovered as gravelly clay).
	2.20	D					
				2.50	39.10		End of pit at 2.50 m

Remarks: 1. No groundwater encountered.
2. Hole terminated at 2.50m due to no progress on bedrock.

Stability: Sides Stable

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Trial Pit Log

Trialpit No
TP22
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346777.70 - 390269.30 Level: 49.04	Date 25/05/2017
Location: WHISTON		Dimensions (m): Depth 2.25	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10	48.94		MADE GROUND: Tarmac.
	0.25	ES		0.20	48.84		MADE GROUND: Grey subangular medium to coarse gravel of limestone subbase.
	0.45 0.50	ES D		0.40	48.64		MADE GROUND: Black ashy gravelly fine to coarse sand. Gravel is subangular to subrounded fine to coarse of mixed lithologies including brick, clinker and slag. *Hydrocarbon odour at 0.35m.* Firm grey orange sandy CLAY. *Dark grey black discolouration above 0.50m.*
	1.50	D		1.35	47.69		Extremely weak orange grey SILTSTONE residually weathered (recovered as clayey sand and gravel).
	2.00	D		1.85	47.19		Very weak orange grey micaceous SILSTONE highly weathered (recovered as laminated gravel and cobbles).
				2.25	46.79		End of pit at 2.25 m

Remarks:
1. No groundwater encountered.
2. Hole terminated at 2.25m due to no progress on bedrock.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP23
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346806.30 - 290296.30 Level: 46.90	Date 25/05/2017
Location: WHISTON		Dimensions (m): Depth 2.80	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10	46.80		MADE GROUND: Tarmac.
	0.25	ES		0.20	46.70		MADE GROUND: Grey subangular medium to coarse gravel of limestone subbase.
	0.50	ES		0.45	46.45		MADE GROUND: Black brown mottled red ashy sandy subangular to subrounded fine to coarse gravel of mixed lithologies including brick, slag and clinker with medium cobble content of brick.
	0.60	D					Stiff orange brown very sandy CLAY with pockets of very clayey fine to medium sand.
	1.25	D		1.20	45.70		Extremely weak light orange brown mottled grey MUDSTONE residually weathered (recovered as friable blocky clay).
	2.30	D		2.00	44.90		Very weak orange brown mottled grey MUDSTONE highly weathered (recovered as laminated gravel and cobbles).
				2.80	44.10		End of pit at 2.80 m

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Remarks: 1. No groundwater encountered.
2. Hole terminated at 2.80m due to no progress on bedrock.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP24
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346839.10 - 390242.00 Level: 46.42	Date 26/05/2017
Location: WHISTON		Dimensions (m): Depth 3.50	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.50	ES		0.55	45.87		MADE GROUND: Dark brown sandy clayey gravelly topsoil. Gravel is angular to subangular fine to coarse of brick, glass, plastic ducting, pottery and rope.
	0.60	ES					Very stiff orange brown mottled grey very sandy friable CLAY, clayey sand in parts. (Completely weathered mudstone).
	1.20	D		1.10	45.32		Extremely weak light orange brown mottled grey MUDSTONE residually weathered (recovered as laminated clay).
	2.10	D		2.00	44.42		Very weak dark grey brown SILTSTONE highly weathered (recovered as sandy clayey gravel)
	3.40	D		3.50	42.92		End of pit at 3.50 m

1 2 3 4 5

Remarks: 1. No groundwater encountered.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP25
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346838.60 - 390296.30 Level: 45.41	Date 26/05/2017
Location: WHISTON		Dimensions (m): Depth 2.90	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.40	ES		0.50	44.91		MADE GROUND: Brown slightly clayey gravelly sandy topsoil. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick, mudstone, terram, glass and rare ash.
	0.55	ES					
	0.75	D					Stiff black sandy organic CLAY.
	1.20	D		1.10	44.31		Very weak dark grey brown SILTSTONE highly weathered (recovered as sandy clayey gravel).
▼				1.90	43.51		Soft orange brown mottled grey sandy CLAY with sand bands with rare siltstone lithorelicts. (Completely weathered siltstone).
	2.30	D					
	2.60	D		2.60	42.81		Very weak dark grey brown SILTSTONE highly weathered (recovered as sandy clayey gravel).
				2.90	42.51		End of pit at 2.90 m

Remarks: 1. Fast groundwater ingress at 2.00m.
2. Hole terminated at 2.90m due to no progress on hard strata.

Stability: Sides Spalling.

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Trial Pit Log

Trialpit No
TP26
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346885.60 - 390295.10 Level: 45.02	Date 26/05/2017
Location: WHISTON		Dimensions (m): Depth 1.50	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05	44.97		MADE GROUND: Grey subangular medium to coarse gravel of limestone subbase over terram.
	0.50	ES					MADE GROUND: Brown red sandy subangular fine to coarse gravel of brick, plastic, metal and rare ash with high cobble content of brick.
	1.00	D					
				1.50	43.52		End of pit at 1.50 m

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Remarks: 1. No groundwater encountered.
2. Hole terminated at 1.50m due to very compacted material/concrete slab and complete collapse of sides.

Stability: Sides unstable.

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Trial Pit Log

Trialpit No
TP27
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346917.40 - 390287.10 Level: 43.86	Date 26/05/2017
Location: WHISTON		Dimensions (m): Depth 3.10	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.20	43.66		MADE GROUND: Black grey ashy fine to coarse sand and subangular fine to coarse gravel of limestone subbase with occasional glass, clinker and mudstone gravel.
	0.50	ES					MADE GROUND: Brown grey gravelly fine to coarse sand with high cobble content. Gravel is angular to subrounded fine to coarse of brick, glass, plastic, metal, concrete and rope. Cobbles are of brick and flagstones. *Clayey below 0.50m.*
				1.20	42.66		Stiff light orange brown mottled grey sandy CLAY.
	1.50	D		1.60	42.26		Stiff orange brown mottled grey sandy friable laminated CLAY with sand bands (Completely weathered siltstone).
	2.30	D		2.20	41.66		Extremely weak light orange brown mottled grey SILTSTONE residually weathered (recovered as silty friable laminated clay).
	3.00	D		2.70	41.16		Very weak orange brown mottled grey SILTSTONE interbedded with thin mudstone bands highly weathered (recovered as flaggy gravel and cobbles).
				3.10	40.76		End of pit at 3.10 m

1 2 3 4 5

Remarks: 1. No groundwater encountered.
2. Hole terminated at 3.10m due to no progress on bedrock.

Stability: Sides unstable above 1.00m.

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Trial Pit Log

Trialpit No
TP28
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346913.50 - 390222.90 Level: 43.37	Date 26/05/2017
Location: WHISTON		Dimensions (m): Depth 2.70	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.20	ES		0.30	43.07		MADE GROUND: Moss over dark brown gravelly clayey organic topsoil. Gravel is subangular fine to medium of limestone.
	0.40	ES					Soft black brown sandy CLAY.
	0.60	D		0.50	42.87		Grey clayey silty fine to coarse SAND.
	1.10	D		1.00	42.37		Very stiff red brown mottled grey sandy CLAY with grey sand bands and occasional coal lenses.
	2.00	D		1.70	41.67		Very weak grey SILTSTONE highly weathered (recovered as clayey sand and gravel). *Recovered as sandy flaggy laminated gravel and cobbles below 2.00m.*
				2.70	40.67		End of pit at 2.70 m

Remarks: 1. No groundwater encountered.
2. Hole terminated at 2.70m due to no progress on bedrock.

Stability: Sides Stable.

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Trial Pit Log

Trialpit No
TP29
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346866.60 - 390284.90 Level: 46.82	Date 26/05/2017
Location: WHISTON		Dimensions (m): Depth 1.50	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.07	ES		0.05 0.10	46.77 46.72		MADE GROUND: Flagstones and grey subangular medium to coarse gravel of limestone subbase over terrram.
	0.50	ES					MADE GROUND: Black grey ashy fine to coarse sand and angular to subangular fine to coarse gravel of brick and limestone.
	1.00	D					MADE GROUND: Red brown cobbles of brick with much gravelly fine to coarse sand. Gravel is angular to subangular of brick, limestone and other mixed lithologies.
				1.50	45.32		End of pit at 1.50 m

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Remarks: 1. No groundwater encountered.
2. Hole terminated at 1.50m due to concrete slab.

Stability: Sides unstable.

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Trial Pit Log

Trialpit No
TP30
Sheet 1 of 1

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346941.70 - 39028.90 Level: 45.02	Date 26/05/2017
Location: WHISTON		Dimensions (m): Depth 2.50	Scale 1:25
Client: STEWART MILNE HOMES LTD			Logged LC

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10	44.92		MADE GROUND: Black grey ashy sandy subangular fine to coarse gravel of limestone subbase with occasional glass, clinker and mudstone gravel.
	0.50	ES					MADE GROUND: Red brown cobbles of brick with much gravelly ashy fine to coarse sand. Gravel is angular to subangular of brick, limestone, rebar and other mixed lithologies.
	1.25	ES		1.20	43.82		Stiff to very stiff orange brown mottled grey sandy CLAY with occasional subrounded fine to medium gravel of mixed lithologies.
	1.50	D					
	2.30	D		2.00	43.02		Very stiff red brown silty friable CLAY with occasional subrounded fine to coarse gravel of mixed lithologies.
				2.50	42.52		End of pit at 2.50 m

Remarks: 1. No groundwater encountered.
2. Hole terminated at 2.50m due to unstable and collapsing sides.

Stability: Sides collapsing from surface.

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Borehole Log

Borehole No.
RO01
Sheet 1 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347091.00 - 390428.00	Hole Type RO
Location: WHISTON		Level: 41.37	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/SAND/WEAK LIGHT BROWN CLAY (OVERBURDEN).
					3.50	37.87		GREY SILTSTONE.
					7.50	33.87		WEAK COAL.
					8.70	32.67		GREY SILTSONE/MUDSTONE.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO01
Sheet 2 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347091.00 - 390428.00	Hole Type RO
Location: WHISTON		Level: 41.37	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								11 12 13 14 15 16 17 18 19 20
					18.70	22.67		COAL.
					19.90	21.47		Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO01
Sheet 3 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347091.00 - 390428.00	Hole Type RO
Location: WHISTON		Level: 41.37	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								GREY SILTSTONE.
					30.00	11.37		End of borehole at 30.00 m

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO02
Sheet 1 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347142.00 - 390291.20	Hole Type RO
Location: WHISTON		Level: 41.51	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL AND WEAK BROWN CLAY (OVERBURDEN).
					3.00	38.51		GREY SILTSTONE.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO02
Sheet 2 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347142.00 - 390291.20	Hole Type RO
Location: WHISTON		Level: 41.51	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.70	25.80		COAL
					16.90	24.60		GREY SILTSONE.
					18.20	23.30		COAL
					19.20	22.30		GREY DARK GREY SILTSTONE
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO02
Sheet 3 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347142.00 - 390291.20	Hole Type RO
Location: WHISTON		Level: 41.51	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					24.00	17.50		End of borehole at 24.00 m

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Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No. **RO03**

Sheet 1 of 4

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347204.20 - 390308.90	Hole Type RO
Location: WHISTON		Level: 41.94	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/SAND (OVERBURDEN).
					3.50	38.44		WEAK GREY SILTSTONE.
					4.50	37.44		FIRM GREY SILTSTONE.
					9.20	32.74		WEAK/SOFT GROUND GREY SILTSTONE WITH TRACES OF COAL (LOSS OF FLUSH REGAINGED).
								Continued on next sheet

1 2 3 4 5 6 7 8 9 10

Remarks
1. Drilled using water flush techniques.
2. Loss of flush 9.20m to 10.40m bgl. Flush regained below 10.40m.

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Borehole Log

Borehole No.
RO03
Sheet 2 of 4

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347204.20 - 390308.90	Hole Type RO
Location: WHISTON		Level: 41.94	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					10.40	31.54		GREY SILTSTONE/MUDSTONE.

11 12 13 14 15 16 17 18 19 20

Continued on next sheet

Remarks
1. Drilled using water flush techniques.
2. Loss of flush 9.20m to 10.40m bgl. Flush regained below 10.40m.

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Borehole Log

Borehole No. **RO03**

Sheet 3 of 4

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347204.20 - 390308.90	Hole Type RO
Location: WHISTON		Level: 41.94	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					20.90	21.04		COAL.
					21.90	20.04		GREY SILTSTONE.
								Continued on next sheet

21 22 23 24 25 26 27 28 29 30

Remarks
1. Drilled using water flush techniques.
2. Loss of flush 9.20m to 10.40m bgl. Flush regained below 10.40m.

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Borehole Log

Borehole No.
RO03
Sheet 4 of 4

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347204.20 - 390308.90	Hole Type RO
Location: WHISTON		Level: 41.94	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					32.00	9.94		COAL
					32.50	9.44		GREY SILTSTONE.
					35.00	6.94		End of borehole at 35.00 m

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Remarks
1. Drilled using water flush techniques.
2. Loss of flush 9.20m to 10.40m bgl. Flush regained below 10.40m.

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Borehole Log

Borehole No.
RO04
Sheet 1 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347174.40 - 390416.50	Hole Type RO
Location: WHISTON		Level: 43.32	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/SAND/WEAK BROWN CLAY (OVERBURDEN).
					4.50	38.82		GREY SILTSTONE WITH TRACES OF COAL
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO04
Sheet 2 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347174.40 - 390416.50	Hole Type RO
Location: WHISTON		Level: 43.32	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					16.10	27.22		COAL
					17.20	26.12		GREY DARK GREY SILTSTONE
					20.00	23.32		End of borehole at 20.00 m

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No. **RO05**

Sheet 1 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347230.00 - 390353.00	Hole Type RO
Location: WHISTON		Level: 42.69	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/SAND/WEAK CLAY (OVERBURDEN).
					3.50	39.19		WEAK GREY SILTSOTNE WITH COAL TRACES (LOST FLUSH BUT REGAINED).
					6.00	36.69		FIRM GREY SILTSTONE.
								Continued on next sheet

1 2 3 4 5 6 7 8 9 10

Remarks
1. Drilled using water flush techniques.
2. Loss of flush 3.50m to 6.00m. Flush regained below 6.00m.

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Borehole Log

Borehole No.
RO05
Sheet 2 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347230.00 - 390353.00	Hole Type RO
Location: WHISTON		Level: 42.69	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.60	27.09		COAL.
					16.90	25.79		GREY DARK GREY SILTSTONE.
								Continued on next sheet

11 12 13 14 15 16 17 18 19 20

Remarks
1. Drilled using water flush techniques.
2. Loss of flush 3.50m to 6.00m. Flush regained below 6.00m.

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Borehole Log

Borehole No.
RO05
Sheet 3 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347230.00 - 390353.00	Hole Type RO
Location: WHISTON		Level: 42.69	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					25.00	17.69		End of borehole at 25.00 m

Remarks
1. Drilled using water flush techniques.
2. Loss of flush 3.50m to 6.00m. Flush regained below 6.00m.

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Borehole Log

Borehole No.
RO06
Sheet 1 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347293.10 - 390326.70	Hole Type RO
Location: WHISTON		Level: 44.15	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/SAND (OVERBURDEN).
					3.00	41.15		GREY SILTSTONE.
					4.50	39.65		COAL.
					5.20	38.95		GREY SILTSTONE.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO06
Sheet 2 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347293.10 - 390326.70	Hole Type RO
Location: WHISTON		Level: 44.15	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					20.00	24.15		End of borehole at 20.00 m

11 12 13 14 15 16 17 18 19 20

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO07
Sheet 1 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347244.30 - 390425.20	Hole Type RO
Location: WHISTON		Level: 45.50	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/WEAK CLAY (OVERBURDEN).
					2.50	43.00		GREY SILTSTONE.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.
2. Loss flush from 15.50m bgl.

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Borehole Log

Borehole No.
RO07
Sheet 2 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347244.30 - 390425.20	Hole Type RO
Location: WHISTON		Level: 45.50	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.50	30.00		WEAK /FRACTURED, TOTAL LOSS OF FLUSH.
					16.00	29.50		FIRM/HARD DRILLING LOSS OF FLUSH.
								Continued on next sheet

11 12 13 14 15 16 17 18 19 20

Remarks
1. Drilled using water flush techniques.
2. Loss flush from 15.50m bgl.

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Borehole Log

Borehole No.
RO07
Sheet 3 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347244.30 - 390425.20	Hole Type RO
Location: WHISTON		Level: 45.50	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					21.00	24.50		End of borehole at 21.00 m

Remarks
1. Drilled using water flush techniques.
2. Loss flush from 15.50m bgl.

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Borehole Log

Borehole No.
RO08
Sheet 1 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347328.80 - 390489.90	Hole Type RO
Location: WHISTON		Level: 48.62	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/WEAK CLAY (OVERBURDEN).
					1.50	47.12		COAL.
					3.00	45.62		GREY SILTSTONE WITH SANDSTONE BANDS.
					9.50	39.12		BROKEN GROUND.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.
2.Loss of flush from 9.50m bgl.

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Borehole Log

Borehole No.
RO08
Sheet 2 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347328.80 - 390489.90	Hole Type RO
Location: WHISTON		Level: 48.62	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					10.50	38.12		FIRM/HARD DRILLING, LOSS OF FLUSH.
					15.00	33.62		End of borehole at 15.00 m

Remarks
1. Drilled using water flush techniques.
2.Loss of flush from 9.50m bgl.

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Borehole Log

Borehole No.
RO09
Sheet 1 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347339.60 - 390409.10	Hole Type RO
Location: WHISTON		Level: 47.10	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL AND WEAK CLAY (OVERBUREDEN).
					5.00	42.10		SOFT/BROKEN GROUND.
					9.50	37.60		WEAK DRILLING, LOSS OF FLUSH.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.
2. Loss of flush from 5.00m bgl.

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Borehole Log

Borehole No.
RO09
Sheet 2 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347339.60 - 390409.10	Hole Type RO
Location: WHISTON		Level: 47.10	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					11.00	36.10		FIRM HARD DRILLING, LOSS OF FLUSH.
					15.00	32.10		End of borehole at 15.00 m

Remarks
1. Drilled using water flush techniques.
2. Loss of flush from 5.00m bgl.

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Borehole Log

Borehole No.
RO10
Sheet 1 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347392.90 - 390445.90	Hole Type RO
Location: WHISTON		Level: 50.70	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/WEAK CLAY (OVERBURDEN).
					1.50	49.20		BROWN LIGHT BORWN SANDSTONE.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO10
Sheet 2 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347392.90 - 390445.90	Hole Type RO
Location: WHISTON		Level: 50.70	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				

11
12
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Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO10
Sheet 3 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347392.90 - 390445.90	Hole Type RO
Location: WHISTON		Level: 50.70	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					25.00	25.70		End of borehole at 25.00 m

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO11
Sheet 1 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347345.10 - 390367.00	Hole Type RO
Location: WHISTON		Level: 46.24	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/LIGHT BROWN CLAY (OVERBURDEN).
					2.50	43.74		LIGHT BROWN SANDTONE.
					9.50	36.74		SOFT BROKEN GROUND, LOSS OF FLUSH.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.
2. Loss of flush from 9.50m bgl.

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Borehole Log

Borehole No.
RO11
Sheet 2 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347345.10 - 390367.00	Hole Type RO
Location: WHISTON		Level: 46.24	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					12.50	33.74		HARD GROUND, LOSS OF FLUSH.
					20.00	26.24		End of borehole at 20.00 m

Remarks
1. Drilled using water flush techniques.
2. Loss of flush from 9.50m bgl.

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Borehole Log

Borehole No.
RO12
Sheet 1 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347259.40 - 390294.50	Hole Type RO
Location: WHISTON		Level: 42.17	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/SAND (OVERBURDEN).
					4.00	38.17		VERY WEAK GREY SILTSTONE/MUDSTONE AND COAL.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO12
Sheet 2 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347259.40 - 390294.50	Hole Type RO
Location: WHISTON		Level: 42.17	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					10.50	31.67		FIRM GREY SILSTONE.
					18.30	23.87		COAL.
					19.50	22.67		GREY SILTSTONE.
								Continued on next sheet

11 12 13 14 15 16 17 18 19 20

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO12
Sheet 3 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347259.40 - 390294.50	Hole Type RO
Location: WHISTON		Level: 42.17	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 14/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					21.00	21.17		End of borehole at 20.00 m

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO13
Sheet 1 of 4

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347155.60 - 390352.40	Hole Type RO
Location: WHISTON		Level: 41.05	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/SAND (OVERBURDEN).
					3.50	37.55		DARK GREY SILTSTONE WITH TRACES OF COAL
					6.00	35.05		GREY SILTSTONE.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No. **RO13**

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347155.60 - 390352.40	Hole Type RO
Location: WHISTON		Level: 41.05	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					10.40	30.65		WEAK GREY SILTSTONE AND COAL.
					11.60	29.45		GREY SILTSTONE/MUDSTONE.

Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO13
Sheet 3 of 4

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347155.60 - 390352.40	Hole Type RO
Location: WHISTON		Level: 41.05	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					21.70	19.35		COAL.
					22.80	18.25		GREY SILTSTONE WITH SANDSTONE BANDS.
								Continued on next sheet

21
22
23
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27
28
29
30

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO13
Sheet 4 of 4

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347155.60 - 390352.40	Hole Type RO
Location: WHISTON		Level: 41.05	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 13/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					31.70	9.35		COAL.
					32.40	8.65		GREY SILTSTONE.
					35.00	6.05		End of borehole at 35.00 m

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO14
Sheet 1 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347281.90 - 390381.00	Hole Type RO
Location: WHISTON		Level: 45.05	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/CLAY/SANDSTONE (OVERBURDEN).
					3.00	42.04		GREY SILTSTONE WITH SANDSTONE BANDS.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO14
Sheet 2 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347281.90 - 390381.00	Hole Type RO
Location: WHISTON		Level: 45.05	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				

11
12
13
14
15
16
17
18
19
20

Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO14
Sheet 3 of 3

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347281.90 - 390381.00	Hole Type RO
Location: WHISTON		Level: 45.05	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					20.50	24.54		COAL.
					21.70	23.34		CARBONACEOUS SILTSTONE.
					23.30	21.74		COAL.
					24.30	20.74		CARBONACEOUS SILTSTONE.
					26.00	19.05		End of borehole at 26.00 m

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO15
Sheet 1 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347394.80 - 390369.10	Hole Type RO
Location: WHISTON		Level: 48.58	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/WEAK CLAY (OVERBURDEN).
					1.50	47.08		BROWN LIGHT BROWN SANDSTONE.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO15
Sheet 2 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347394.80 - 390369.10	Hole Type RO
Location: WHISTON		Level: 48.58	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.00	33.58		End of borehole at 15.00 m

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO16
Sheet 1 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347298.00 - 390450.40	Hole Type RO
Location: WHISTON		Level: 46.93	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/WEAK CLAY (OVERBURDEN).
					3.50	43.43		VERY WEAK DARK GREY MUDSTONE AND COAL (LOST AND REGAINED FLUSH).
					6.50	40.43		GREY SILTSTONE
					9.00	37.93		SOFT/BROKEN GROUND, LOSS OF FLUSH.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.
2. Loss of flush from 9.00m bgl.

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Borehole Log

Borehole No.
RO16
Sheet 2 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 347298.00 - 390450.40	Hole Type RO
Location: WHISTON		Level: 46.93	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 15/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					10.50	36.43		FIRM/HARD GROUND, LOSS OF FLUSH.
					15.00	31.93		End of borehole at 15.00 m

Remarks
1. Drilled using water flush techniques.
2. Loss of flush from 9.00m bgl.

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Borehole Log

Borehole No.
RO17
Sheet 1 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346927.70 - 390287.60	Hole Type RO
Location: WHISTON		Level: 43.89	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 16/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/WEAK CLAY (OVERBURDEN).
					3.50	40.39		GREY SILTSONE AND MUDSTONE.
								Continued on next sheet

1 2 3 4 5 6 7 8 9 10

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO17
Sheet 2 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346927.70 - 390287.60	Hole Type RO
Location: WHISTON		Level: 43.89	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 16/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					12.00	31.89		GREY SILTSTONE WITH SANDSTONE BANDS.
					15.00	28.89		End of borehole at 15.00 m

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO18
Sheet 1 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346894.50 - 390252.40	Hole Type RO
Location: WHISTON		Level: 43.43	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 16/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/WEAK CLAY (OVERBURDEN).
					3.00	40.43		GREY SILTSONE AND MUDSTONE.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO18
Sheet 2 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346894.50 - 390252.40	Hole Type RO
Location: WHISTON		Level: 43.43	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 16/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.00	28.43		End of borehole at 15.00 m

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO19
Sheet 1 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346828.10 - 390292.00	Hole Type RO
Location: WHISTON		Level: 45.76	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 16/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								FILL/SAND/WEAK CLAY (OVERBURDEN).
					3.50	42.26		GREY SILSTONE.
								Continued on next sheet

Remarks
1. Drilled using water flush techniques.

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Borehole Log

Borehole No.
RO19
Sheet 2 of 2

Project Name: HALSNEAD PARK	Project No. C3593	Co-ords: 346828.10 - 390292.00	Hole Type RO
Location: WHISTON		Level: 45.76	Scale 1:50
Client: STEWART MILNE HOMES LTD		Dates: 16/06/2017 -	Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					10.50	35.26		DARK GREY SILTSTONE AND COAL.
					11.50	34.26		GREY SILTSTONE WITH SANDSTONE BANDS.
					15.00	30.76		End of borehole at 15.00 m

Remarks
1. Drilled using water flush techniques.

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APPENDIX B
Chemical Testing Results

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

Brownfield Solutions Limited
173-183 Witton Street
Northwich
Cheshire
CW9 5LP

Attention :	Lucy Crawford
Date :	12th June, 2017
Your reference :	C3593
Our reference :	Test Report 17/9143 Batch 1
Location :	Halsnead Park, Whiston
Date samples received :	24th May, 2017
Status :	Final report
Issue :	1

Thirty two samples were received for analysis on 24th May, 2017 of which ten were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford
JE Job No.: 17/9143

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	10-12	19-20	26-28	31-32	48-50	57-59	65-66	67-68	71-73	LOD/LOR	Units	Method No.
Sample ID	WS01	WS02	WS04	WS05	WS06	WS10	TP01	TP02	TP03	TP04			
Depth	0.40	0.80	0.10	0.50	0.50	0.75	0.25	0.50	0.35	0.25			
COC No / misc													
Containers	V J T	V J T	V J	V J T	V J	V J T	V J T	V J	V J	V J T			
Sample Date	18/05/2017	18/05/2017	18/05/2017	18/05/2017	18/05/2017	19/05/2017	22/05/2017	22/05/2017	22/05/2017	22/05/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017			
Arsenic #	45.3	18.7	24.4	18.3	6.4	13.9	26.7	7.7	11.0	7.5	<0.5	mg/kg	TM30/PM15
Cadmium #	0.7	0.8	1.8	<0.1	<0.1	0.3	2.1	0.4	0.2	0.8	<0.1	mg/kg	TM30/PM15
Chromium #	33.1	56.4	44.1	71.3	65.7	44.8	45.4	40.7	8.1	45.2	<0.5	mg/kg	TM30/PM15
Copper #	129	71	87	<1	<1	245$_{AA}$	136	24	102	28	<1	mg/kg	TM30/PM15
Lead #	205	67	106	12	8	37	90	28	194	41	<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Nickel #	52.9	43.0	40.5	75.8	44.2	46.1	23.8	35.8	11.6	12.4	<0.7	mg/kg	TM30/PM15
Selenium #	2	2	2	2	2	2	3	1	2	1	<1	mg/kg	TM30/PM15
Sulphur as S	-	-	-	-	-	0.05	-	-	-	-	<0.01	%	TM30/PM15
Total Sulphate as SO4 #	-	-	-	-	-	376	-	-	-	-	<50	mg/kg	TM50/PM29
Water Soluble Boron #	-	-	-	-	-	1.5	-	-	-	-	<0.1	mg/kg	TM74/PM32
Zinc #	130	198	164	84	42	80	77	84	33	41	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.44	0.13	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.05	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	0.08	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.31	0.94	0.04	<0.03	<0.03	<0.03	0.07	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene #	0.08	0.19	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.54	1.63	0.08	<0.03	<0.03	<0.03	0.13	0.05	<0.03	0.06	<0.03	mg/kg	TM4/PM8
Pyrene #	0.68	1.11	0.07	<0.03	<0.03	<0.03	0.13	0.05	<0.03	0.06	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.38	0.83	<0.06	<0.06	<0.06	<0.06	0.08	<0.06	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	0.36	1.06	0.07	<0.02	<0.02	<0.02	0.07	<0.02	<0.02	0.04	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.73	2.20	<0.07	<0.07	<0.07	<0.07	0.12	<0.07	<0.07	0.08	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.43	0.93	<0.04	<0.04	<0.04	<0.04	0.05	<0.04	<0.04	0.05	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.31	0.84	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	0.14	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.56	0.79	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 16 Total	4.9	11.0	<0.6	<0.6	<0.6	<0.6	0.7	<0.6	<0.6	<0.6	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.53	1.58	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	0.06	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.20	0.62	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	94	93	94	97	94	94	97	96	93	97	<0	%	TM4/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford
JE Job No.: 17/9143

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	10-12	19-20	26-28	31-32	48-50	57-59	65-66	67-68	71-73	LOD/LOR	Units	Method No.
Sample ID	WS01	WS02	WS04	WS05	WS06	WS10	TP01	TP02	TP03	TP04			
Depth	0.40	0.80	0.10	0.50	0.50	0.75	0.25	0.50	0.35	0.25			
COC No / misc													
Containers	V J T	V J T	V J	V J T	V J	V J T	V J T	V J	V J	V J T			
Sample Date	18/05/2017	18/05/2017	18/05/2017	18/05/2017	18/05/2017	19/05/2017	22/05/2017	22/05/2017	22/05/2017	22/05/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017			
TPH CWG													
Aliphatics													
>C5-C6 #	-	-	-	-	-	-	<0.1	-	-	-	<0.1	mg/kg	TM36/PM12
>C6-C8 #	-	-	-	-	-	-	<0.1	-	-	-	<0.1	mg/kg	TM36/PM12
>C8-C10	-	-	-	-	-	-	<0.1	-	-	-	<0.1	mg/kg	TM36/PM12
>C10-C12 #	-	-	-	-	-	-	<0.2	-	-	-	<0.2	mg/kg	TM5/PM16
>C12-C16 #	-	-	-	-	-	-	<4	-	-	-	<4	mg/kg	TM5/PM16
>C16-C21 #	-	-	-	-	-	-	<7	-	-	-	<7	mg/kg	TM5/PM16
>C21-C35 #	-	-	-	-	-	-	<7	-	-	-	<7	mg/kg	TM5/PM16
Total aliphatics C5-35	-	-	-	-	-	-	<19	-	-	-	<19	mg/kg	TM5/TM36/PM12/PM16
Aromatics													
>C5-EC7 #	-	-	-	-	-	-	<0.1	-	-	-	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	-	-	-	-	-	-	<0.1	-	-	-	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	-	-	-	-	-	-	<0.1	-	-	-	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	-	-	-	-	-	-	<0.2	-	-	-	<0.2	mg/kg	TM5/PM16
>EC12-EC16 #	-	-	-	-	-	-	<4	-	-	-	<4	mg/kg	TM5/PM16
>EC16-EC21 #	-	-	-	-	-	-	<7	-	-	-	<7	mg/kg	TM5/PM16
>EC21-EC35 #	-	-	-	-	-	-	<7	-	-	-	<7	mg/kg	TM5/PM16
Total aromatics C5-35 #	-	-	-	-	-	-	<19	-	-	-	<19	mg/kg	TM5/TM36/PM12/PM16
Total aliphatics and aromatics(C5-35)	-	-	-	-	-	-	<38	-	-	-	<38	mg/kg	TM5/TM36/PM12/PM16
MTBE #	-	-	-	-	-	-	<5	-	-	-	<5	ug/kg	TM31/PM12
Benzene #	-	-	-	-	-	-	<5	-	-	-	<5	ug/kg	TM31/PM12
Toluene #	-	-	-	-	-	-	<5	-	-	-	<5	ug/kg	TM31/PM12
Ethylbenzene #	-	-	-	-	-	-	<5	-	-	-	<5	ug/kg	TM31/PM12
m/p-Xylene #	-	-	-	-	-	-	<5	-	-	-	<5	ug/kg	TM31/PM12
o-Xylene #	-	-	-	-	-	-	<5	-	-	-	<5	ug/kg	TM31/PM12
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	mg/kg	TM26/PM21
Natural Moisture Content	19.3	25.7	32.9	29.5	17.5	26.1	31.0	17.2	20.5	18.5	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.1015	0.3751	0.0164	0.0182	0.0508	-	0.0087	0.0693	0.0572	0.0134	<0.0015	g/l	TM38/PM20
Free Cyanide	-	-	-	-	-	<0.5	-	-	-	-	<0.5	mg/kg	TM89/PM45
Total Cyanide #	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	mg/kg	TM89/PM45
Organic Matter	30.0	10.8	15.5	1.1	1.7	-	8.4	7.6	124.4	3.7	<0.2	%	TM21/PM24
Sulphide	-	-	-	-	-	<10	-	-	-	-	<10	mg/kg	TM106/PM119
Thiocyanate	-	-	-	-	-	<0.6	-	-	-	-	<0.6	mg/kg	TM107/PM119
pH #	7.88	7.81	7.68	7.85	6.93	7.03	6.90	7.01	6.64	6.35	<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford

Note:

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:



Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
17/9143	1	WS10	0.75	49	02/06/2017	**General Description (Bulk Analysis)**	soil/stones
					02/06/2017	**Asbestos Fibres**	NAD
					02/06/2017	**Asbestos Fibres (2)**	NAD
					02/06/2017	**Asbestos ACM**	NAD
					02/06/2017	**Asbestos ACM (2)**	NAD
					02/06/2017	**Asbestos Type**	NAD
					02/06/2017	**Asbestos Type (2)**	NAD
					02/06/2017	**Asbestos Level Screen**	NAD
17/9143	1	TP01	0.25	58	02/06/2017	**General Description (Bulk Analysis)**	soil/stones
					02/06/2017	**Asbestos Fibres**	NAD
					02/06/2017	**Asbestos Fibres (2)**	NAD
					02/06/2017	**Asbestos ACM**	NAD
					02/06/2017	**Asbestos ACM (2)**	NAD
					02/06/2017	**Asbestos Type**	NAD
					02/06/2017	**Asbestos Type (2)**	NAD
					02/06/2017	**Asbestos Level Screen**	NAD

Client Name: Brownfield Solutions Limited

Matrix : Solid

Reference: C3593

Location: Halsnead Park, Whiston

Contact: Lucy Crawford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
17/9143	1	WS01	0.40	1-3	Cyanide, PAH	Sample holding time exceeded
17/9143	1	WS02	0.80	10-12	Cyanide, PAH	Sample holding time exceeded
17/9143	1	WS04	0.10	19-20	Cyanide, PAH	Sample holding time exceeded
17/9143	1	WS05	0.50	26-28	Cyanide, PAH	Sample holding time exceeded
17/9143	1	WS06	0.50	31-32	Cyanide, PAH	Sample holding time exceeded
17/9143	1	WS10	0.75	48-50	Cyanide, PAH	Sample holding time exceeded
17/9143	1	TP01	0.25	57-59	EPH, GRO	Sample holding time exceeded
17/9143	1	TP01	0.25	57-59	GRO	Solid Samples were received at a temperature above 9°C.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/9143

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution

JE Job No: 17/9143

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM12/PM16	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis./Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM12/PM16	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis./Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes

JE Job No: 17/9143

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes		AD	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes

JE Job No: 17/9143

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes		AR	Yes
TM106	Determination of Sulphide by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes
TM107	Determination of Thiocyanate by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Brownfield Solutions Limited
173-183 Witton Street
Northwich
Cheshire
CW9 5LP

Attention :	Lucy Crawford
Date :	6th July, 2017
Your reference :	C3593
Our reference :	Test Report 17/9143 Batch 2
Location :	Halsnead Park, Whiston
Date samples received :	31st May, 2017
Status :	Final report
Issue :	2

Forty five samples were received for analysis on 31st May, 2017 of which twelve were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Bruce Leslie
Project Co-ordinator

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford
JE Job No.: 17/9143

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	98-100	119-121	131-133	137-139	143-145	155-157	164-166	173-175	197-199	200-202	LOD/LOR	Units	Method No.
Sample ID	TP09	TP12	TP14	TP15	TP16	TP18	TP20	TP22	TP27	TP27			
Depth	0.30	0.50	0.50	0.50	0.65	0.60	0.50	0.25	0.10	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	23/05/2017	23/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	25/05/2017	26/05/2017	26/05/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	2	2	2	2	2	2	2	2	2	2			
Date of Receipt	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017			
Arsenic #	15.2	7.5	26.2	16.7	16.4	7.4	7.6	3.8	-	12.4	<0.5	mg/kg	TM30/PM15
Cadmium #	0.8	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	0.8	-	0.3	<0.1	mg/kg	TM30/PM15
Chromium #	52.8	65.9	36.9	55.2	22.2	39.4	69.3	78.7	-	75.9	<0.5	mg/kg	TM30/PM15
Copper #	29	<1	30	62	40	48	<1	90	-	45	<1	mg/kg	TM30/PM15
Lead #	49	8	40	51	19	48	8	80	-	246	<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	0.2	<0.1	mg/kg	TM30/PM15
Nickel #	24.9	50.4	11.2	38.8	38.5	42.5	42.1	29.0	-	15.5	<0.7	mg/kg	TM30/PM15
Selenium #	2	<1	2	1	3	4	2	4	-	<1	<1	mg/kg	TM30/PM15
Sulphur as S	-	-	0.45	0.05	0.32	0.25	-	0.36	-	0.07	<0.01	%	TM30/PM15
Total Sulphate as SO4 #	-	-	4470	480	789	944	-	1973	-	1079	<50	mg/kg	TM50/PM29
Water Soluble Boron #	-	-	1.4	1.4	2.0	1.1	-	1.4	-	0.7	<0.1	mg/kg	TM74/PM32
Zinc #	71	41	18	83	33	242	40	320	-	210	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	1.85$_{AA}$	-	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	6.63$_{AA}$	-	0.05	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	12.64$_{AA}$	-	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	8.65$_{AA}$	-	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	49.88$_{AA}$	-	0.35	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	28.17$_{AA}$	-	0.12	<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.08	<0.03	<0.03	<0.03	<0.03	0.09	<0.03	155.01$_{AA}$	-	0.73	<0.03	mg/kg	TM4/PM8
Pyrene #	0.07	<0.03	<0.03	<0.03	<0.03	0.09	<0.03	123.41$_{AA}$	-	0.69	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	61.58$_{AA}$	-	0.41	<0.06	mg/kg	TM4/PM8
Chrysene #	0.06	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	51.26$_{AA}$	-	0.39	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	0.13	<0.07	118.82$_{AA}$	-	0.80	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	68.07$_{AA}$	-	0.44	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	46.17$_{AA}$	-	0.33	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	5.36$_{AA}$	-	0.05	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	0.05	<0.04	39.71$_{AA}$	-	0.30	<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	777.2$_{AA}$	-	4.7	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	85.55$_{AA}$	-	0.58	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	33.27$_{AA}$	-	0.22	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	98	95	95	98	94	91	94	88$_{AA}$	-	98	<0	%	TM4/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford
JE Job No.: 17/9143

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	98-100	119-121	131-133	137-139	143-145	155-157	164-166	173-175	197-199	200-202	LOD/LOR	Units	Method No.
Sample ID	TP09	TP12	TP14	TP15	TP16	TP18	TP20	TP22	TP27	TP27			
Depth	0.30	0.50	0.50	0.50	0.65	0.60	0.50	0.25	0.10	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	23/05/2017	23/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	25/05/2017	26/05/2017	26/05/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	2	2	2	2	2	2	2	2	2	2			
Date of Receipt	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017			
Pesticides													
Organochlorine Pesticides													
Aldrin	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Alpha-HCH (BHC)	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Beta-HCH (BHC)	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Delta-HCH (BHC)	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Dieldrin	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Endosulphan I	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Endosulphan II	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Endosulphan sulphate	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Endrin	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Gamma-HCH (BHC)	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Heptachlor	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Heptachlor Epoxide	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
p,p'-DDE	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
p,p'-DDT	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
p,p'-TDE	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Total Methoxychlor	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Organophosphorus Pesticides													
Azinphos methyl	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Diazinon	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Dichlorvos	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Disulfoton	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Ethion	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Ethyl Parathion (Parathion)	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Fenitrothion	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Malathion	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Methyl Parathion	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
Mevinphos	-	-	-	-	-	-	-	-	<100 AA	-	<10	ug/kg	TM42/PM8
2,3,6 - TBA	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
2,4 - D	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
2,4 - DB	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
2,4,5 - T	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
4 - CPA	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Benazolin	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Bentazone	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Bromoxynil	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Clopyralid	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Dicamba	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Dichloroprop	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Diclofop	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Fenoprop	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Flamprop	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford
JE Job No.: 17/9143

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	98-100	119-121	131-133	137-139	143-145	155-157	164-166	173-175	197-199	200-202	LOD/LOR	Units	Method No.
Sample ID	TP09	TP12	TP14	TP15	TP16	TP18	TP20	TP22	TP27	TP27			
Depth	0.30	0.50	0.50	0.50	0.65	0.60	0.50	0.25	0.10	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	23/05/2017	23/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	25/05/2017	26/05/2017	26/05/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	2	2	2	2	2	2	2	2	2	2			
Date of Receipt	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017			
Flamprop – isopropyl	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Ioxynil	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
MCPA	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
MCPB	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Mecoprop	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Pentachlorophenol	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Picloram	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
Triclopyr	-	-	-	-	-	-	-	-	<1.0 AA	-	<0.1	mg/kg	TM42/PM8
TPH CWG													
Aliphatics													
>C5-C6 #	-	-	<0.1 SV	-	<0.1 SV	<0.1 SV	-	<0.1 SV	-	-	<0.1	mg/kg	TM36/PM12
>C6-C8 #	-	-	<0.1 SV	-	<0.1 SV	<0.1 SV	-	<0.1 SV	-	-	<0.1	mg/kg	TM36/PM12
>C8-C10	-	-	<0.1 SV	-	<0.1 SV	<0.1 SV	-	<0.1 SV	-	-	<0.1	mg/kg	TM36/PM12
>C10-C12 #	-	-	<0.2	-	5.3	<0.2	-	<0.2	-	-	<0.2	mg/kg	TM5/PM16
>C12-C16 #	-	-	7	-	12	13	-	30	-	-	<4	mg/kg	TM5/PM16
>C16-C21 #	-	-	<7	-	14	19	-	140	-	-	<7	mg/kg	TM5/PM16
>C21-C35 #	-	-	<7	-	<7	27	-	1288	-	-	<7	mg/kg	TM5/PM16
Total aliphatics C5-35	-	-	<19	-	31	59	-	1458	-	-	<19	mg/kg	TM5/TM36/PM12/PM16
Aromatics													
>C5-EC7 #	-	-	<0.1 SV	-	<0.1 SV	<0.1 SV	-	<0.1 SV	-	-	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	-	-	<0.1 SV	-	<0.1 SV	<0.1 SV	-	<0.1 SV	-	-	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	-	-	<0.1 SV	-	<0.1 SV	<0.1 SV	-	<0.1 SV	-	-	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	-	-	<0.2	-	<0.2	<0.2	-	3.2	-	-	<0.2	mg/kg	TM5/PM16
>EC12-EC16 #	-	-	6	-	6	19	-	131	-	-	<4	mg/kg	TM5/PM16
>EC16-EC21 #	-	-	35	-	42	79	-	1772	-	-	<7	mg/kg	TM5/PM16
>EC21-EC35 #	-	-	83	-	88	163	-	6689	-	-	<7	mg/kg	TM5/PM16
Total aromatics C5-35 #	-	-	124	-	136	261	-	8595	-	-	<19	mg/kg	TM5/TM36/PM12/PM16
Total aliphatics and aromatics(C5-35)	-	-	124	-	167	320	-	10053	-	-	<38	mg/kg	TM5/TM36/PM12/PM16
MTBE #	-	-	<5 SV	-	<5 SV	<5 SV	-	<5 SV	-	-	<5	ug/kg	TM31/PM12
Benzene #	-	-	<5 SV	-	<5 SV	<5 SV	-	<5 SV	-	-	<5	ug/kg	TM31/PM12
Toluene #	-	-	<5 SV	-	<5 SV	<5 SV	-	<5 SV	-	-	<5	ug/kg	TM31/PM12
Ethylbenzene #	-	-	<5 SV	-	<5 SV	<5 SV	-	<5 SV	-	-	<5	ug/kg	TM31/PM12
m/p-Xylene #	-	-	<5 SV	-	<5 SV	<5 SV	-	<5 SV	-	-	<5	ug/kg	TM31/PM12
o-Xylene #	-	-	<5 SV	-	<5 SV	<5 SV	-	<5 SV	-	-	<5	ug/kg	TM31/PM12
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.44	-	<0.15	<0.15	mg/kg	TM26/PM21
Natural Moisture Content	17.0	14.3	22.0	19.4	17.0	14.7	14.1	8.2	9.5	17.0	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0640	0.0366	-	-	-	-	0.0274	-	-	-	<0.0015	g/l	TM38/PM20

Please see attached notes for all abbreviations and acronyms

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford
JE Job No.: 17/9143

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	98-100	119-121	131-133	137-139	143-145	155-157	164-166	173-175	197-199	200-202	LOD/LOR	Units	Method No.
Sample ID	TP09	TP12	TP14	TP15	TP16	TP18	TP20	TP22	TP27	TP27			
Depth	0.30	0.50	0.50	0.50	0.65	0.60	0.50	0.25	0.10	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	23/05/2017	23/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	24/05/2017	25/05/2017	26/05/2017	26/05/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	2	2	2	2	2	2	2	2	2	2			
Date of Receipt	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017	31/05/2017			
Free Cyanide	-	-	<0.5	<0.5	<0.5	<0.5	-	<0.5	-	<0.5	<0.5	mg/kg	TM89/PM45
Total Cyanide #	1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	-	<0.5	<0.5	mg/kg	TM89/PM45
Organic Matter	6.6	0.4	-	-	-	-	1.1	-	-	-	<0.2	%	TM21/PM24
Sulphide	-	-	<10	<10	<10	<10	-	<10	-	<10	<10	mg/kg	TM106/PM119
Thiocyanate	-	-	3.9	0.7	1.5	1.1	-	<0.6	-	<0.6	<0.6	mg/kg	TM107/PM119
pH #	7.94	7.49	5.03	7.72	6.55	6.69	7.13	7.65	-	8.24	<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford
JE Job No.: 17/9143

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	203-205	209-211											
Sample ID	TP28	TP29											
Depth	0.20	0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	26/05/2017	26/05/2017											
Sample Type	Soil	Soil											
Batch Number	2	2											
Date of Receipt	31/05/2017	31/05/2017											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Arsenic #	-	4.1									<0.5	mg/kg	TM30/PM15
Cadmium #	-	0.1									<0.1	mg/kg	TM30/PM15
Chromium #	-	88.2									<0.5	mg/kg	TM30/PM15
Copper #	-	13									<1	mg/kg	TM30/PM15
Lead #	-	24									<5	mg/kg	TM30/PM15
Mercury #	-	<0.1									<0.1	mg/kg	TM30/PM15
Nickel #	-	15.3									<0.7	mg/kg	TM30/PM15
Selenium #	-	<1									<1	mg/kg	TM30/PM15
Sulphur as S	-	0.07									<0.01	%	TM30/PM15
Total Sulphate as SO4 #	-	1298									<50	mg/kg	TM50/PM29
Water Soluble Boron #	-	0.8									<0.1	mg/kg	TM74/PM32
Zinc #	-	108									<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	-	<0.40 AA									<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	<0.30 AA									<0.03	mg/kg	TM4/PM8
Acenaphthene #	-	<0.50 AA									<0.05	mg/kg	TM4/PM8
Fluorene #	-	<0.40 AA									<0.04	mg/kg	TM4/PM8
Phenanthrene #	-	<0.30 AA									<0.03	mg/kg	TM4/PM8
Anthracene #	-	<0.40 AA									<0.04	mg/kg	TM4/PM8
Fluoranthene #	-	<0.30 AA									<0.03	mg/kg	TM4/PM8
Pyrene #	-	<0.30 AA									<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	-	<0.60 AA									<0.06	mg/kg	TM4/PM8
Chrysene #	-	0.51 AA									<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	-	<0.70 AA									<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	-	<0.40 AA									<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	-	<0.40 AA									<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	-	0.60 AA									<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	-	<0.40 AA									<0.04	mg/kg	TM4/PM8
PAH 16 Total	-	<6.0 AA									<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	<0.50 AA									<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	<0.20 AA									<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	81 AA									<0	%	TM4/PM8

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford
JE Job No.: 17/9143

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	203-205	209-211									LOD/LOR	Units	Method No.
Sample ID	TP28	TP29											
Depth	0.20	0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	26/05/2017	26/05/2017											
Sample Type	Soil	Soil											
Batch Number	2	2											
Date of Receipt	31/05/2017	31/05/2017											
Pesticides													
Organochlorine Pesticides													
Aldrin	<100 AA	-									<10	ug/kg	TM42/PM8
Alpha-HCH (BHC)	<100 AA	-									<10	ug/kg	TM42/PM8
Beta-HCH (BHC)	<100 AA	-									<10	ug/kg	TM42/PM8
Delta-HCH (BHC)	<100 AA	-									<10	ug/kg	TM42/PM8
Dieldrin	<100 AA	-									<10	ug/kg	TM42/PM8
Endosulphan I	<100 AA	-									<10	ug/kg	TM42/PM8
Endosulphan II	<100 AA	-									<10	ug/kg	TM42/PM8
Endosulphan sulphate	<100 AA	-									<10	ug/kg	TM42/PM8
Endrin	<100 AA	-									<10	ug/kg	TM42/PM8
Gamma-HCH (BHC)	<100 AA	-									<10	ug/kg	TM42/PM8
Heptachlor	<100 AA	-									<10	ug/kg	TM42/PM8
Heptachlor Epoxide	<100 AA	-									<10	ug/kg	TM42/PM8
p,p'-DDE	<100 AA	-									<10	ug/kg	TM42/PM8
p,p'-DDT	<100 AA	-									<10	ug/kg	TM42/PM8
p,p'-TDE	<100 AA	-									<10	ug/kg	TM42/PM8
Total Methoxychlor	<100 AA	-									<10	ug/kg	TM42/PM8
Organophosphorus Pesticides													
Azinphos methyl	<100 AA	-									<10	ug/kg	TM42/PM8
Diazinon	<100 AA	-									<10	ug/kg	TM42/PM8
Dichlorvos	<100 AA	-									<10	ug/kg	TM42/PM8
Disulfoton	<100 AA	-									<10	ug/kg	TM42/PM8
Ethion	<100 AA	-									<10	ug/kg	TM42/PM8
Ethyl Parathion (Parathion)	<100 AA	-									<10	ug/kg	TM42/PM8
Fenitrothion	<100 AA	-									<10	ug/kg	TM42/PM8
Malathion	<100 AA	-									<10	ug/kg	TM42/PM8
Methyl Parathion	<100 AA	-									<10	ug/kg	TM42/PM8
Mevinphos	<100 AA	-									<10	ug/kg	TM42/PM8
2,3,6 - TBA	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
2,4 - D	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
2,4 - DB	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
2,4,5 - T	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
4 - CPA	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Benazolin	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Bentazone	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Bromoxynil	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Clopyralid	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Dicamba	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Dichloroprop	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Diclofop	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Fenoprop	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Flamprop	<1.0 AA	-									<0.1	mg/kg	TM42/PM8

Please see attached notes for all abbreviations and acronyms

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford
JE Job No.: 17/9143

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	203-205	209-211											
Sample ID	TP28	TP29											
Depth	0.20	0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	26/05/2017	26/05/2017											
Sample Type	Soil	Soil											
Batch Number	2	2											
Date of Receipt	31/05/2017	31/05/2017											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Flamprop – isopropyl	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Ioxynil	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
MCPA	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
MCPB	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Mecoprop	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Pentachlorophenol	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Picloram	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
Triclopyr	<1.0 AA	-									<0.1	mg/kg	TM42/PM8
TPH CWG													
Aliphatics													
>C5-C6 #	-	<0.1									<0.1	mg/kg	TM36/PM12
>C6-C8 #	-	<0.1									<0.1	mg/kg	TM36/PM12
>C8-C10	-	<0.1									<0.1	mg/kg	TM36/PM12
>C10-C12 #	-	<0.2									<0.2	mg/kg	TM5/PM16
>C12-C16 #	-	<4									<4	mg/kg	TM5/PM16
>C16-C21 #	-	<7									<7	mg/kg	TM5/PM16
>C21-C35 #	-	<7									<7	mg/kg	TM5/PM16
Total aliphatics C5-35	-	<19									<19	mg/kg	TM5/TM36/PM12/PM16
Aromatics													
>C5-EC7 #	-	<0.1									<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	-	<0.1									<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	-	<0.1									<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	-	<0.2									<0.2	mg/kg	TM5/PM16
>EC12-EC16 #	-	<4									<4	mg/kg	TM5/PM16
>EC16-EC21 #	-	<7									<7	mg/kg	TM5/PM16
>EC21-EC35 #	-	109									<7	mg/kg	TM5/PM16
Total aromatics C5-35 #	-	109									<19	mg/kg	TM5/TM36/PM12/PM16
Total aliphatics and aromatics(C5-35)	-	109									<38	mg/kg	TM5/TM36/PM12/PM16
MTBE #	-	<5									<5	ug/kg	TM31/PM12
Benzene #	-	<5									<5	ug/kg	TM31/PM12
Toluene #	-	<5									<5	ug/kg	TM31/PM12
Ethylbenzene #	-	<5									<5	ug/kg	TM31/PM12
m/p-Xylene #	-	<5									<5	ug/kg	TM31/PM12
o-Xylene #	-	<5									<5	ug/kg	TM31/PM12
Total Phenols HPLC	-	<0.15									<0.15	mg/kg	TM26/PM21
Natural Moisture Content	13.7	13.7									<0.1	%	PM4/PM0
Hexavalent Chromium #	-	<0.3									<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	-	-									<0.0015	g/l	TM38/PM20

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford
JE Job No.: 17/9143

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	203-205	209-211											
Sample ID	TP28	TP29											
Depth	0.20	0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	26/05/2017	26/05/2017											
Sample Type	Soil	Soil											
Batch Number	2	2											
Date of Receipt	31/05/2017	31/05/2017											
Free Cyanide	-	<0.5										<0.5	mg/kg	TM89/PM45
Total Cyanide #	-	<0.5										<0.5	mg/kg	TM89/PM45
Organic Matter	-	-										<0.2	%	TM21/PM24
Sulphide	-	<10										<10	mg/kg	TM106/PM119
Thiocyanate	-	<0.6										<0.6	mg/kg	TM107/PM119
pH #	-	8.48										<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Brownfield Solutions Limited **Matrix : Solid**
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
17/9143	2	TP14	0.50	131-133	No interpretation possible
17/9143	2	TP16	0.65	143-145	Possible trace of degraded diesel
17/9143	2	TP18	0.60	155-157	Trace of PAH's Possible degraded diesel
17/9143	2	TP22	0.25	173-175	PAH's, Lubricating oil & Possible tarmac/bitumen
17/9143	2	TP29	0.50	209-211	Possible PAH's

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Halsnead Park, Whiston
Contact: Lucy Crawford

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:



Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
17/9143	2	TP14	0.50	132	02/06/2017	**General Description (Bulk Analysis)**	soil-stones
					02/06/2017	**Asbestos Fibres**	NAD
					02/06/2017	**Asbestos Fibres (2)**	NAD
					02/06/2017	**Asbestos ACM**	NAD
					02/06/2017	**Asbestos ACM (2)**	NAD
					02/06/2017	**Asbestos Type**	NAD
					02/06/2017	**Asbestos Type (2)**	NAD
					02/06/2017	**Asbestos Level Screen**	NAD
17/9143	2	TP18	0.60	156	02/06/2017	**General Description (Bulk Analysis)**	soil-stones
					02/06/2017	**Asbestos Fibres**	NAD
					02/06/2017	**Asbestos Fibres (2)**	NAD
					02/06/2017	**Asbestos ACM**	NAD
					02/06/2017	**Asbestos ACM (2)**	NAD
					02/06/2017	**Asbestos Type**	NAD
					02/06/2017	**Asbestos Type (2)**	NAD
					02/06/2017	**Asbestos Level Screen**	NAD
17/9143	2	TP22	0.25	174	02/06/2017	**General Description (Bulk Analysis)**	soil-stones
					02/06/2017	**Asbestos Fibres**	NAD
					02/06/2017	**Asbestos Fibres (2)**	NAD
					02/06/2017	**Asbestos ACM**	NAD
					02/06/2017	**Asbestos ACM (2)**	NAD
					02/06/2017	**Asbestos Type**	NAD
					02/06/2017	**Asbestos Type (2)**	NAD
					02/06/2017	**Asbestos Level Screen**	NAD
17/9143	2	TP29	0.50	210	02/06/2017	**General Description (Bulk Analysis)**	soil-stones
					02/06/2017	**Asbestos Fibres**	NAD
					02/06/2017	**Asbestos Fibres (2)**	NAD
					02/06/2017	**Asbestos ACM**	NAD
					02/06/2017	**Asbestos ACM (2)**	NAD
					02/06/2017	**Asbestos Type**	NAD
					02/06/2017	**Asbestos Type (2)**	NAD
					02/06/2017	**Asbestos Level Screen**	NAD

Client Name: Brownfield Solutions Limited

Matrix : Solid

Reference: C3593

Location: Halsnead Park, Whiston

Contact: Lucy Crawford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
17/9143	2	TP14	0.50	131-133	EPH	Sample holding time exceeded
17/9143	2	TP14	0.50	131-133	GRO	Solid Samples were received at a temperature above 9°C.
17/9143	2	TP16	0.65	143-145	EPH	Sample holding time exceeded
17/9143	2	TP16	0.65	143-145	GRO	Solid Samples were received at a temperature above 9°C.
17/9143	2	TP18	0.60	155-157	EPH	Sample holding time exceeded
17/9143	2	TP18	0.60	155-157	GRO	Solid Samples were received at a temperature above 9°C.
17/9143	2	TP22	0.25	173-175	GRO	Solid Samples were received at a temperature above 9°C.
17/9143	2	TP29	0.50	209-211	EPH	Sample holding time exceeded
17/9143	2	TP29	0.50	209-211	GRO	Solid Samples were received at a temperature above 9°C.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/9143

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x10 Dilution

JE Job No: 17/9143

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of BTEX and calculation of Aliphatic fractions.	PM12/PM16	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis./Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of BTEX and calculation of Aliphatic fractions.	PM12/PM16	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis./Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes

JE Job No: 17/9143

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM42	Modified US EPA method 8270. Pesticides and herbicdes by GC-MS	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes		AD	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	

JE Job No: 17/9143

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes		AR	Yes
TM106	Determination of Sulphide by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes
TM107	Determination of Thiocyanate by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes

APPENDIX C
Geotechnical Testing Results

LABORATORY REPORT

REPORT

4043

Contract Number: PSL17/2652

Report Date: 14 June 2017

Client's Reference: C3593

Client Name: Brownfield Solutions
William Smith House
173-183 Willton Street
Northwich
Cheshire
CW9 5LP

For the attention of: Lucy Crawford

Contract Title: Whiston

Date Received: 5/6/2017
Date Commenced: 5/6/2017
Date Completed: 14/6/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	C Marshall (Laboratory Manager)	A Fry (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS01		D	1.50		Brown slightly gravelly sandy CLAY.
WS02		D	1.15		Brown slightly gravelly sandy CLAY.
WS02		D	2.00		Brown slightly gravelly very sandy CLAY.
WS03		D	1.00		Brown slightly gravelly slightly sandy CLAY.
WS03		D	2.20		Brown gravelly slightly sandy CLAY.
WS04		D	1.00		Brown slightly gravelly sandy CLAY.
WS07		D	1.20		Brown mottled grey slightly gravelly slightly sandy CLAY.
WS09		D	1.60		Brown slightly gravelly sandy CLAY.
WS10		D	1.30		Grey slightly gravelly slightly sandy CLAY.
TP01		D	1.00		Brown slightly gravelly very sandy CLAY.
TP03		D	0.80		Brown slightly gravelly slightly sandy CLAY.
TP06		D	0.60		Brown slightly gravelly sandy CLAY.
TP10		D	1.70		Brown slightly gravelly slightly sandy CLAY.
TP11		D	0.70		Brown slightly gravelly very sandy CLAY.
TP12		D	1.00		Brown slightly gravelly sandy CLAY.
TP13		D	2.15		Brown slightly gravelly very sandy CLAY.
TP14		D	2.35		Brown slightly gravelly very sandy CLAY.
TP15		D	1.25		Brown slightly gravelly slightly sandy CLAY.
TP16		D	1.90		Brown slightly gravelly very sandy CLAY.

UKAS TESTING 4043	PSL Professional Soils Laboratory	WHISTON	Contract No: PSL17/2652 Client Ref: C3593

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP20		D	1.70		Brown slightly gravelly very sandy CLAY.

UKAS TESTING 4043

PSL Professional Soils Laboratory

WHISTON	Contract No:
	PSL17/2652
	Client Ref:
	C3593

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS01		D	1.50		18			35	20	15	94	Low plasticity CL.
WS02		D	1.15		23			38	21	17	94	Intermediate plasticity CI.
WS02		D	2.00		17			26	16	10	92	Low plasticity CL.
WS03		D	1.00		24			60	27	33	96	High plasticity CH.
WS03		D	2.20		34			56	27	29	84	High plasticity CH.
WS04		D	1.00		16			38	23	15	90	Intermediate plasticity CI.
WS07		D	1.20		30			61	27	34	92	High plasticity CH.
WS09		D	1.60		17			32	16	16	96	Low plasticity CL.
WS10		D	1.30		39			51	28	23	90	High plasticity CH.
TP01		D	1.00		17			27	17	10	96	Low plasticity CL.
TP03		D	0.80		28			55	28	27	97	High plasticity CH.
TP06		D	0.60		16			33	17	16	96	Low plasticity CL.
TP10		D	1.70		24			51	26	25	98	High plasticity CH.
TP11		D	0.70		19			31	16	15	92	Low plasticity CL.
TP12		D	1.00		15			32	18	14	96	Low plasticity CL.
TP13		D	2.15		15			28	14	14	92	Low plasticity CL.
TP14		D	2.35		18			29	15	14	94	Low plasticity CL.
TP15		D	1.25		24			51	23	28	97	High plasticity CH.
TP16		D	1.90		17			29	16	13	96	Low plasticity CL.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

WHISTON

Contract No:

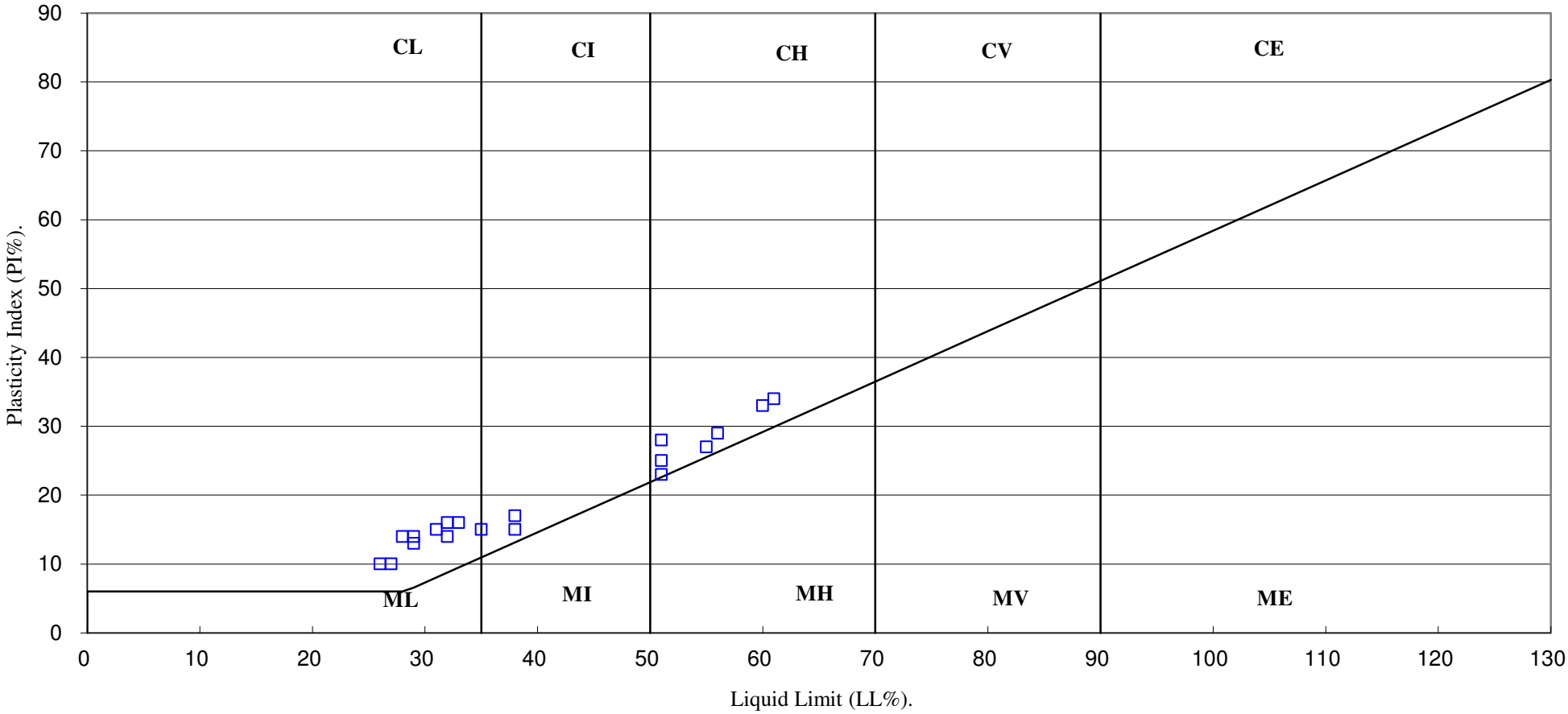
PSL17/2652

Client Ref:

C3593

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



UKAS TESTING 4043	PSL Professional Soils Laboratory	**WHISTON**

Contract No:
PSL17/2652
Client Ref:
C3593

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP20		D	1.70		15			28	14	14	94	Low plasticity CL.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

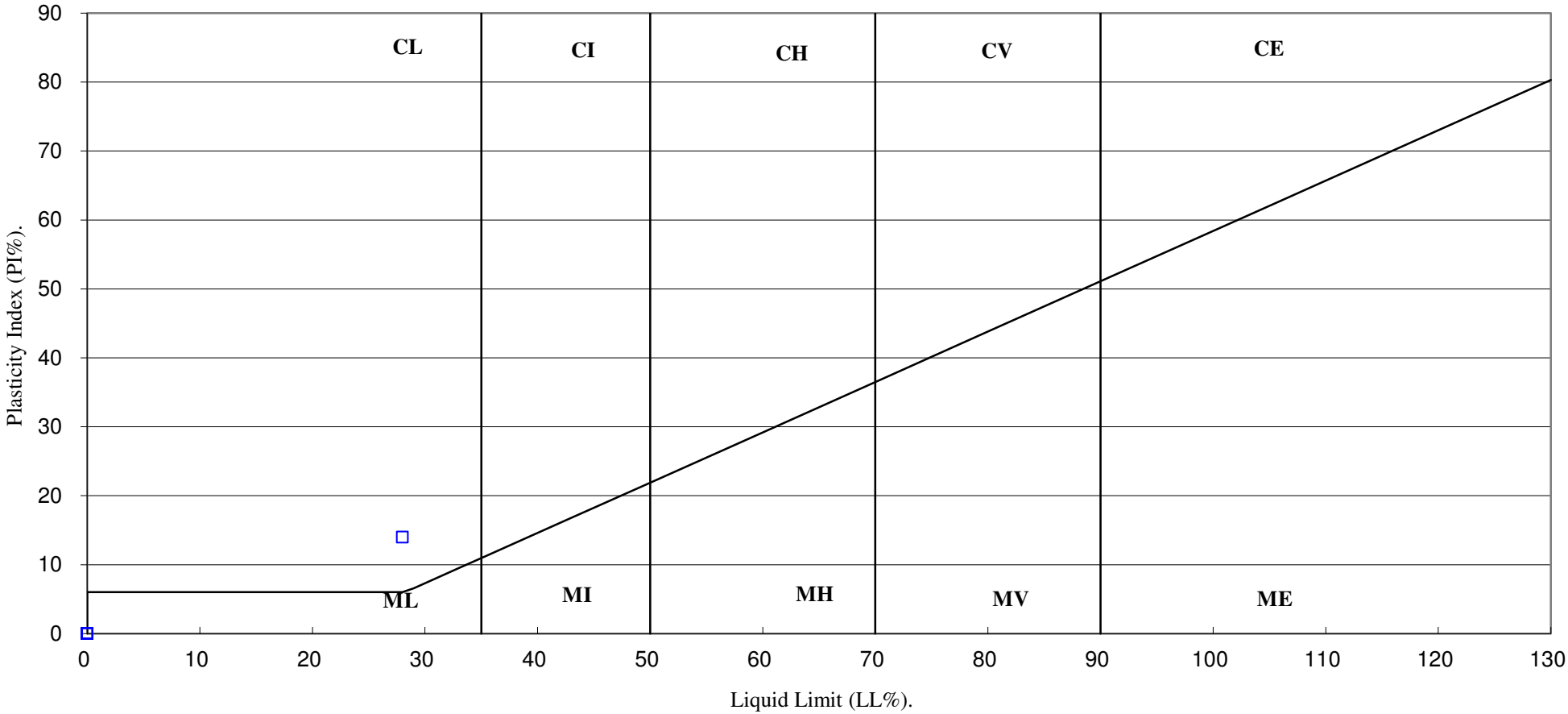
PSL Professional Soils Laboratory

WHISTON

Contract No:
PSL17/2652
Client Ref:
C3593

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



UKAS TESTING 4043	PSL Professional Soils Laboratory	**WHISTON**	**Contract No:** PSL17/2652 **Client Ref:** C3593

Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

Brownfield Solutions Limited
173-183 Witton Street
Northwich
Cheshire
CW9 5LP

Attention :	Lucy Crawford
Date :	16th June, 2017
Your reference :	C3593
Our reference :	Test Report 17/9774 Batch 1
Location :	Whiston
Date samples received :	3rd June, 2017
Status :	Final report
Issue :	1

Twenty samples were received for analysis on 3rd June, 2017 of which twenty were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:



Bruce Leslie
Project Co-ordinator

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Whiston
Contact: Lucy Crawford
JE Job No.: 17/9774

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1	2	3	4	5	6	7	8	9	10	LOD/LOR	Units	Method No.
Sample ID	WS07	TP01	TP03	TP08	TP09	WS04	WS05	WS06	WS09	WS10			
Depth	1.80	2.35	1.25	3.15	2.80	0.60	2.00	1.20	1.00	2.00			
COC No / misc													
Containers	T	T	T	T	T	T	T	T	T	T			
Sample Date	18/05/2017	22/05/2017	22/05/2017	23/05/2017	23/05/2017	18/05/2017	18/05/2017	18/05/2017	19/05/2017	19/05/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017			
Sulphur as S	3.55	0.22	0.19	1.50	1.24	-	-	-	-	-	<0.01	%	TM30/PM15
Total Sulphate as SO4 BRE	0.25	0.02	0.02	0.02	0.13	-	-	-	-	-	<0.01	%	TM50/PM29
Chloride (2:1 Ext BRE) #	0.003	-	0.004	-	-	-	-	-	-	-	<0.002	g/l	TM38/PM20
Nitrate as NO3 (2:1 Ext BRE) #	<0.0025	-	0.0104	-	-	-	-	-	-	-	<0.0025	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.7312	0.0270	0.0171	0.0555	0.2163	0.0106	0.0138	0.0192	0.0114	0.0277	<0.0015	g/l	TM38/PM20
pH #	2.72	6.41	4.70	6.77	6.62	7.09	8.43	7.24	7.41	6.46	<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Whiston
Contact: Lucy Crawford
JE Job No.: 17/9774

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	11	12	13	14	15	16	17	18	19	20	LOD/LOR	Units	Method No.
Sample ID	WS11	TP02	TP05	TP07	TP08	TP12	TP23	TP24	TP27	TP28			
Depth	1.00	1.90	1.50	1.50	1.50	1.80	1.25	1.20	1.50	1.10			
COC No / misc													
Containers	T	T	T	T	T	T	T	T	T	T			
Sample Date	19/05/2017	22/05/2017	22/05/2017	23/05/2017	23/05/2017	23/05/2017	25/05/2017	26/05/2017	26/05/2017	26/05/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017	03/06/2017			
Sulphur as S	-	-	-	-	-	-	-	-	-	-	<0.01	%	TM30/PM15
Total Sulphate as SO4 BRE	-	-	-	-	-	-	-	-	-	-	<0.01	%	TM50/PM29
Chloride (2:1 Ext BRE) #	-	-	-	-	-	-	-	-	-	-	<0.002	g/l	TM38/PM20
Nitrate as NO3 (2:1 Ext BRE) #	-	-	-	-	-	-	-	-	-	-	<0.0025	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0069	0.0073	0.0018	0.0062	0.0121	0.0198	0.0105	0.0480	0.0223	0.0172	<0.0015	g/l	TM38/PM20
pH #	7.48	8.27	7.05	7.32	6.99	7.42	7.82	6.59	8.03	7.58	<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Brownfield Solutions Limited
Reference: C3593
Location: Whiston
Contact: Lucy Crawford

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 17/9774						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/9774

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 17/9774

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.			AD	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

APPENDIX D
Interim Gas Monitoring Results

STEWART MILNE HOMES LTD

HALSNEAD PARK, WHISTON

C3593

23/06/2017

Ground Gas Monitoring Results

BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

Key	
ND	Not Detected
NA	Not Available
NGW	No Groundwater

	Percentage Concentrations				Parts per Million		mb				
Ambient	Oxygen (O_2)	Carbon Dioxide (CO_2)	Methane (CH4)	LEL	Hydrogen Sulphide (H2S)	Carbon Monoxide (CO)	Atm Pressure	Monitored by	Equipment	Weather	Pressure Trend
Start	21.4	0.0	0.0	0.0	0.0	NA	1008	JB	GA5000	Overcast	Steady
Finish	21.3	0.1	0.0	0.0	0.0	NA	1008				

		Percentage Concentrations				Parts Per Million		m bgl	litres/hour	mb		litres/hour	litres/hour	
Location	State (Peak/Steady)	Oxygen (O_2)	Carbon Dioxide (CO_2)	Methane (CH_4)	LEL	Hydrogen Sulphide (H_2S)	Carbon Monoxide (CO)	Water Level	Flow	Relative Pressure	Sheen (Y/N)	Q_{hg} CO_2	Q_{hg} CH_4	Notes
WS01	Peak	0.8	18.5	0.1	0.5	0.0	NA	NGW	0.2	-0.1	No	0.04	0.00	
	Steady	0.8	17.7	0.1	0.5	1.0	NA							
WS03	Peak	NA	NA	NA	NA	NA	NA	NA	NA	NA	No	NA	NA	couldn't Locate
	Steady	NA	NA	NA	NA	NA	NA							
WS04	Peak	12.4	9.3	0.0	0.0	0.0	NA	2.49	0.1	0.0	No	0.01	0.00	
	Steady	12.3	9.0	0.0	0.0	0.0	NA							
WS07	Peak	16.4	4.2	0.0	0.0	0.0	NA	1.91	0.1	0.0	No	0.00	0.00	
	Steady	16.4	4.2	0.0	0.0	0.0	NA							
WS08	Peak	18.7	2.4	0.0	0.0	0.0	NA	1.82	0.0	-1.6	No	0.00	0.00	
	Steady	18.5	2.4	0.0	0.0	0.0	NA							
WS10	Peak	21.2	0.2	0.0	0.0	0.0	NA	0.84	0.1	0.0	No	0.00	0.00	
	Steady	21.4	0.0	0.0	0.0	0.0	NA							
WS11	Peak	18.6	3.8	0.0	0.0	0.0	NA	NGW	0.1	-0.1	No	0.00	0.00	
	Steady	18.6	3.4	0.0	0.0	1.0	NA							
WS12	Peak	21.3	0.2	0.0	0.0	0.0	NA	NGW	0.1	0.0	No	0.00	0.00	
	Steady	21.3	0.2	0.0	0.0	0.0	NA							

STEWART MILNE HOMES LTD

HALSNEAD PARK, WHISTON

C3593

00/01/1900

Ground Gas Monitoring Results

BROWNFIELD SOLUTIONS LTD
GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

Key

ND	Not Detected
NA	Not Available
NGW	No Groundwater

	Percentage Concentrations				Parts per Million		mb					
Ambient	Oxygen (O_2)	Carbon Dioxide (CO_2)	Methane (CH4)	LEL	Hydrogen Sulphide (H2S)	Carbon Monoxide (CO)	Atm Pressure	Monitored by	Equipment	Weather	Pressure Trend	
Start	21.1	0.1	0.0	0.0	0.0	NA	1015	JB	GA5000	Clear	Steady	
Finish	20.8	0.0	0.0	0.0	0.0	NA	1015					

		Percentage Concentrations				Parts Per Million		m bgl	litres/hour	mb		litres/hour	litres/hour	
Location	State (Peak/Steady)	Oxygen (O_2)	Carbon Dioxide (CO_2)	Methane (CH_4)	LEL	Hydrogen Sulphide (H_2S)	Carbon Monoxide (CO)	Water Level	Flow	Relative Pressure	Sheen (Y/N)	Q_{hg} CO_2	Q_{hg} CH_4	Notes
WS01	Peak	2.1	16.7	0.0	0.0	0.0	NA	NGW	0.1	0.1	No	0.02	0.00	
	Steady	2.0	15.9	0.0	0.0	0.0	NA							
WS03	Peak	17.1	6.5	0.0	0.0	0.0	NA	NGW	0.1	0.1	No	0.01	0.00	
	Steady	17.2	6.0	0.0	0.0	0.0	NA							
WS04	Peak	14.9	7.5	0.0	0.0	0.0	NA	2.66	0.1	-0.1	No	0.01	0.00	
	Steady	14.9	7.0	0.0	0.0	0.0	NA							
WS07	Peak	16.2	2.6	0.0	0.0	0.0	NA	NGW	0.1	0.1	No	0.00	0.00	
	Steady	16.2	2.4	0.0	0.0	0.0	NA							
WS08	Peak	15.8	3.9	0.0	0.0	0.0	NA	1.98	0.1	0.0	No	0.00	0.00	
	Steady	15.8	3.9	0.0	0.0	0.0	NA							
WS10	Peak	20.6	0.1	0.0	0.0	0.0	NA	0.89	0.1	0.0	No	0.00	0.00	
	Steady	20.7	0.0	0.0	0.0	0.0	NA							
WS11	Peak	18.7	2.4	0.0	0.0	0.0	NA	NGW	0.1	-0.1	No	0.00	0.00	
	Steady	18.7	2.3	0.0	0.0	0.0	NA							
WS12	Peak	20.0	0.9	0.0	0.0	0.0	NA	NGW	0.0	0.0	No	0.00	0.00	
	Steady	20.0	0.9	0.0	0.0	0.0	NA							

APPENDIX E
Contaminated Land Screening Values

Contaminated Land Screening Values

In assessing the potential for contamination Brownfield Solutions Limited (BSL) follows UK guidance and current best practice.

General

The current recommended method for assessing contamination is on the basis of:

Source-Pathway-Receptor

Where any one of these "pollution linkages" is absent there is deemed to be no risk.

Fundamentally receptors can be considered as humans and controlled waters (surface and ground waters).

The purpose of using Tier 1 screening levels is to have a simple means of assessing the potential contamination of a site and to inform decisions on whether further investigation is warranted or whether an option to undertake clean up based on the data to hand is cost effective.

Human Health

Current UK guidance is provided by DEFRA and the Environment Agency (EA). Publications forming part of the guidance include; CLEA Model, toxicological reports and soil guideline values (SGV), collectively referred to as the CLEA Guidance. The CLEA Guidance has included a number of publications which have provided initial screening values for soil contamination based on standard land uses and soil assumptions.

CLEA guidance has gone through a number of revisions, all of the original SGV's that were published have been withdrawn and publication of new SGV's commenced in 2009.

For determinands where no SGVs are available, S4UL values have been published using the CLEA 1.06 Model. These are the third set of generic assessment criteria generated by CIEH, and replace the previous two sets of GACs. The revised S4UL values are based on greater knowledge of relevant toxicology and further consideration of exposure frequencies.

No SGV or S4UL is available for lead as this is derived based on blood lead levels. C4SL values for six determinands including lead was published by DEFRA/CL:AIRE in December 2014 and they represent a low risk as opposed to minimal risk. The C4SL values are based on a sandy loam with 6% Soil Organic Matter. These screening values were published by DEFRA for Part 2A use, although with the dual purpose for use under planning. However these have not been officially accepted by Local Government for use under planning. S4ULs remain the first reference due to the broader range of end uses and soil organic content.

The preference from the EA is that site specific screening levels are used wherever possible. Due to numerous factors it is not always possible to utilise site specific values. In these instances the following data sources are used in the order of preference given below:

- Current UK SGV's
- CIEH S4UL values (derived by CIEH/LQM)
- DEFRA/CL:AIRE C4SL's
- CL:AIRE GAC values
- Guidance from other European countries
- Guidance from the outside Europe.

Controlled Waters

The European Water Framework Directive (WFD) became UK law in December 2003. It was created to ensure that European countries manage their rivers, groundwater and lakes so that they stay healthy for people and for wildlife.

This is achieved by the use of chemical standards for surface waters and groundwater. These values describe concentrations of chemicals that are not expected to cause harm to environmental organisms or human health, provided they are not exceeded. The same chemical may have several standards for different environmental regimes, and for different protection objectives.

Statutory Standards are set in legislation and if exceeded, this constitutes non-compliance with statutory obligations. European Directives are implemented in England and Wales by corresponding statutory instruments (i.e. regulations). The statutory instruments can be the exact same standards as they appear in the Directive or be more stringent.

A number of non-statutory standards also exist, these are set by various organisations (including the EA) for chemicals that are considered to be of concern, but are not covered by any specific legislation.

The chemical standards used in the UK to control impaction of contamination on controlled waters are Environmental Quality Standards (EQS). The EQS's cover a large number of compounds.

Where certain compounds are not covered by the EQS these are commonly compared to the UK Drinking Water Standards (DWS).

Further Assessment

When screening values are exceeded then further consideration is required. This could include the use of simple measures to break the pollution pathway and mitigate the risk, further more detailed investigation, including the deriving of site specific values to better define the risk and to design appropriate remedial measures.

APPENDIX F
Waste Disposal Guidance Note

WASTE CLASSIFICATION FOR SOILS

Introduction

Waste producers have a duty of care classify the waste they are producing:

- before it is collected, disposed of or recovered.
- to identify the controls that apply to the movement of the waste.
- to complete waste documents and records.
- to identify suitably authorised waste management options.
- to prevent harm to people and the environment.

The most sustainable and economic method of dealing with waste soil is usually the retention and re-use on site. Where this is not possible there are three main options for the disposal of soils:

1. Disposal to a permitted waste recycling facility.
2. Re-use on another site (subject to the suitability).
3. Disposal to a landfill site.

The disposal to a permitted facility will be subject to the **specific conditions of the permits for each of individual facility** and will vary dependent on location and environmental sensitivity of the receiving site. Re-use on another site with also be subject to the acceptability criteria of that site.

The guidance below relates to disposal to **landfill sites only**.

Background for Landfill Disposal

In July 2005 the United Kingdom implemented the European Directive 1999/31/EC (The Landfill Directive), this introduced the current regime for waste and waste disposal to landfill. The Landfill Directive places controls on waste disposal. These controls include requirements to follow the waste acceptance procedures and criteria that have been agreed by the Council of the European Union and are laid out in Council Decision 2003/33/EC.

Before a waste can be accepted at a landfill site, the landfill **operator** must be satisfied that the waste meets his permit conditions, the waste acceptance procedures (WAP) and waste acceptance criteria (WAC).
If disposal to landfill is the best management option for the waste soils, these procedures **must** be followed or the operator may refuse to accept the waste.

Key Points

- Not all waste can be landfilled
- Landfills are classified according to whether they can accept **hazardous**, **non-hazardous** or **inert** wastes.
- Wastes can only be accepted at a landfill if they meet the waste acceptance criteria (WAC) for that class of landfill.
- Most wastes must be treated before you can send them to landfill.
- There are formal processes for identifying and checking wastes that must be followed before wastes can be accepted at a landfill site.

Classification

Wastes are listed in the European Waste Catalogue (EWC 2002) and grouped according to generic industry, process or waste types. Wastes within the EWC are either hazardous or non-hazardous. Some of these wastes are hazardous without further assessment (absolute entries) or are 'mirror' entries that require further assessment of their hazardous properties in order to determine whether they are hazardous waste.

Waste soil has mirror entries on the EWC and as such the first phase of the waste classification process is that of determining if the waste is hazardous or not ie the hazard assessment. The most common EWC waste codes related to soil are:

17 05	**soil (including excavated soil from contaminated sites), stones and dredging spoil**
17 05 03*	soil and stones containing dangerous substances
17 05 04	soil and stones other than those mentioned in 17 05 03

Soils may contain certain contaminants (eg asbestos, diesel) which have prescribed concentration thresholds, that if breached will render the material hazardous waste. These are based on "risk phrases" which can include risks such as carcinogenicity, flammability or toxicity.

In the first instance the concentrations of plausible contaminants within the soil should be identified and wastes should be **classified based on their total concentrations**.

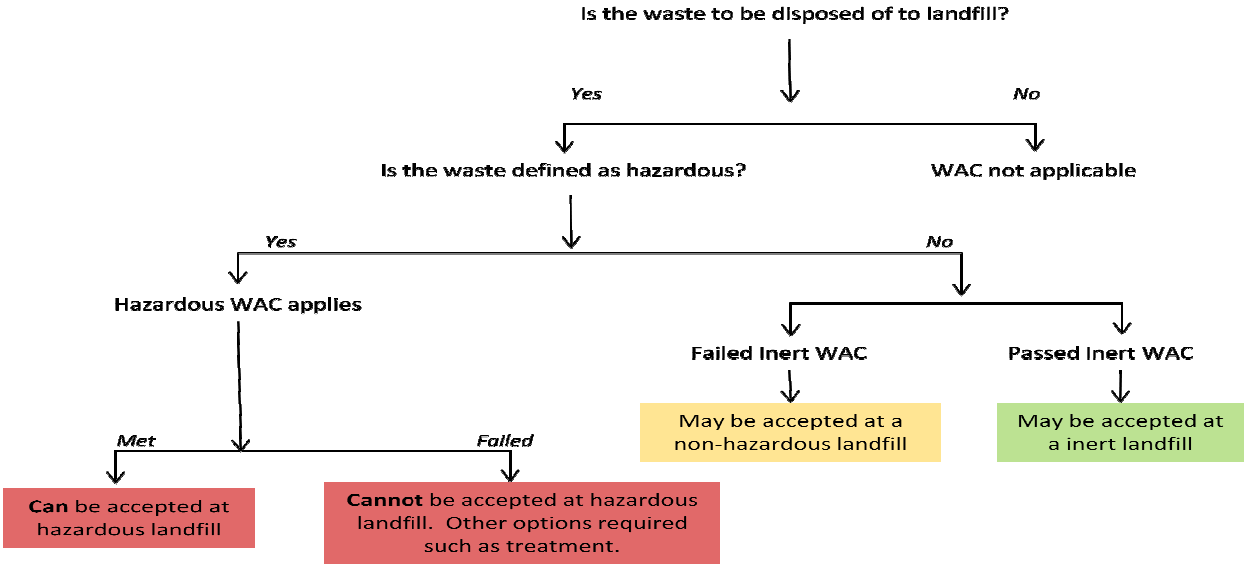
Waste Definitions

Inert	• Will not undergo any significant physical, chemical or biological transformations. • Will not dissolve. • Will not burn. • Will not physically or chemically react. • Will not biodegrade. • Will not adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health. • Has insignificant total leachability and pollutant content. • Produces a leachate with an ecotoxicity that is insignificant (if it produces leachate).
Non-Hazardous	Is not inert (see above) Is not hazardous (see below)
Hazardous	Soil has hazardous properties as defined in WM3 (.Guidance on the classification and assessment of waste (1st edition 2015)- Technical Guidance)
Stable Non-reactive hazardous waste[#]	Hazardous waste, the leaching behaviour of which will not change adversely in the long-term, under landfill design conditions or foreseeable accidents: in the waste alone (for example, by biodegradation); under the impact of long-term ambient conditions (for example, water, air, temperature or mechanical constraints); by the impact of other wastes (including waste products such as leachate and gas).

This option allows hazardous waste that has been stabilised and thus has a low leaching potential to be deposited in cells with a standard of containment consistent with non-hazardous wastes.

WAC Testing

The purpose of WAC analysis is to confirm that the waste complies with the relevant WAC for the receiving landfill. The WAC limits **cannot be used to make an assessment of whether a waste is hazardous**. WAC testing does however define if a non-hazardous waste is suitable for an inert landfill.



Hydrocarbons in Soils

WM3 uses the term Oil or Waste Oil to cover hydrocarbons products such as fuel oil, petrol or diesel. These are defined by WM3 as hazardous under an absolute entry in the List of Wastes. However hydrocarbons in soils are a mixture rather than a pure product and absolute entries are not relevant.

Known Oils

The simplest scenario is where the identity of the contaminating oil is known, or can be identified. If the oil is known the manufacturer's or supplier's REACH compliant safety data sheet for the specific oil can be obtained and the hazard statement codes on that Safety Data Sheet can be used for the hazardous waste assessment.

Where the identity of the oil can only be identified down to a petroleum group level (i.e. the contaminating oil is known to be diesel, but the specific type/brand is unknown), then the classification of that petroleum group should be used in the assessment. The marker compounds associated with that petroleum group may be used to confirm carcinogenicity.

Oils may contain a range of hydrocarbons, so the presence of for instance Diesel Range Organics (DRO) does not enable the assessor to conclude that diesel is present. These hydrocarbons may have arisen from other oils, the laboratory needs to provide an interpretation that the chromatograph is consistent with diesel or weathered diesel as a whole.

The concentration of known oils should be determined using a method that as a minimum spans the range in which the carbon numbers for that known oil fall.

Unknown Oils

Where hydrocarbons are contaminating soils it is likely that the oil will be unknown or cannot be determined.

WM3 states that:

> For contaminated land specific consideration must be given to the following before proceeding;
>
> - The presence of other organic contaminants, for example solvents or coal tar that could be detected as hydrocarbons. Coal Tar is not an oil and is considered separately in example 2. Where the site history or investigation indicates the presence of hydrocarbons from oil and other sources (e.g. coal tar), and the origin of the hydrocarbons cannot reliably be assigned to either, then a worst case approach of considering the hydrocarbons both as, waste oil (in accordance with this example) and from other sources, for example coal tar should be taken.
> - The presence of diesel, or weathered diesel, should be specifically considered by the laboratory and where this is confirmed by the hydrocarbon profile the oil should be assessed as a known or identified oil (diesel).

The use of **marker compounds** is optional; however it is recommended that where possible the marker compounds should be used.

WM3 states:

> If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic/mutagenic due to the presence of oil if all three of the following criteria are met:
>
> - The waste contains benzo[a]pyrene (BaP) at a concentration of less than 0.01% (1/10,000th) of the TPH concentration (This is the carcinogenic limit specified in table 3.1 of the CLP for BaP)
> - This has been determined by an appropriate and representative sampling approach in accordance with the principles set out in Appendix D, and
> - The analysis clearly demonstrates, for example by carbon bands or chromatograph, and the laboratory has reasonably concluded that the hydrocarbons present have not arisen from petrol or diesel.

For example:

TPH Concentration (mg/kg)	Petrol or Diesel	BaP (mg/kg)	Classification
10,000	No	0.9	Non- Hazardous
1,000	No	Not available	Hazardous
1,000	Yes	Not relevant	Hazardous

References

1. Environmental Permitting (England and Wales) Regulations 2010 (as amended) (EP Regulations), the Landfill Directive (1999/31/EC) and the Council Decision (2003/33/EC).
2. Environment Agency Environmental Permitting Regulations: "*Inert Waste Guidance- Standards and Measures for the Deposit of Inert Waste on Land*" 2009.
3. Environment Agency "*Waste acceptance at landfills - Guidance on waste acceptance procedures and criteria*" Nov 2010.
4. Environment Agency "*Guidance on the classification and assessment of waste (Technical Guidance WM3)*" 1st edition May 2015.
5. Classification, Labelling and Packaging of Substances Regulation (EC 1272/2008) (CLP).

APPENDIX G
CL:AIRE CoP Guidance Note

RE-USE OF WASTE - GUIDANCE NOTE

Definition of Waste:

The Environment Agency considers waste to be *"...any material that is discarded, or intended to be discarded..."* This includes any soil from trenches, footing, site strip etc. It is no longer required in its original location, therefore it is considered to be waste.

Re-use of Waste

Previously large scale earthworks and remedial schemes relied on waste management exemptions to allow the re-use of waste. However in 2010 the Environment Agency in England and Wales removed many of the waste management licence exemptions and severely restricted the quantity of materials available for other exemptions.

For purposes of earthworks and remediation, the previous exemptions available have been replaced by CL:AIRE Code of Practice (CoP), also commonly referred to as a "Materials Management Plan".

CL:AIRE: Code of Practice

Where materials are excavated for construction purposes, wherever possible these should be retained on site for engineering purposes if they are suitable for use. The developer/contractor is advised to complete all works under the CL:AIRE "Development Industry Code of Practice for the Definition of Waste" (CL:AIRE CoP).

Potential scenarios where soils may be able to be re-used:

- Material capable of being used in another place on the same site without treatment;
- Material capable of being used in another place on the same site following ex-situ treatment on site;
- Material capable of being used in another development site without treatment (Direct Transfer);
- Material capable of being used in another development site following ex-situ treatment on another site eg Hub site;

The Code of Practice requires 4 No. Factors to be addressed:

1. Protection of human health and protection of the environment.
2. Suitability of use, without further treatment.
3. Certainty of use.
4. Quantity of material.

In order to satisfy these requirements the following are required:

i) Consultation/approval with Local Authority & Environment Agency to confirm they have no objections to the proposed re-use of waste soils, or the risk assessments for the site.
ii) Risk Assessments to demonstrate that the site does not present an Environmental Hazard.
iii) Remediation Strategy for contaminated sites (or Design Statement for non-contaminated sites).
iv) Materials Management Plan (MMP) which details material generated stockpiles and the end use.
v) Volume calculations.
vi) Planning permission for the development.
vii) Contractual details to be clear, regarding who steps in is a contractor goes into administration/liquidation.

The use of the CoP is effectively industry regulated, there is a requirement to appoint an independent Qualified Person (QP) who checks all the requirements have been met and registers the documentation with the Environment Agency. This person must not have had any involvement with the preparing of the risk assessments or remedial strategy on the site.

Soils which require treatment on site (eg bioremediation, stabilisation) will require an Environmental Permit for treatment, together with justification and validation to prove, once treated, this material is suitable for use.

Site management procedures need to be in place to ensure that material is tracked through from excavation stockpiling, treatment and remediation processes. Should the process of material tracking be considered non-robust, or not adhered to, this may fail the test whether excavated materials may be considered non-waste.

APPENDIX H
Contaminated Land Legislative Background

Legislative Background

Environmental liabilities and risks have been evaluated in terms of a source -pathway - target relationship in accordance with the approach set out in:

- The 1995 Environment Act;
- The Contaminated Land (England) Regulations 2000;
- The DETR circular 02/2000 Environmental Protection Act 1990: Part IIA Contaminated Land.

Contaminated land is defined within the legislative framework as land which is in such condition by reason of substances in, on or under the land that:

1) Significant harm is being caused or there is a significant possibility of such harm being caused;
2) Significant pollution of controlled waters is being or is likely to be caused.

The potential for harm is based on the presence of three factors:

- **Source** - substances that are potential contaminants or pollutants that may cause harm;
- **Pathway** - a potential route by which contaminants can move from the source to the receptor;
- **Receptor** - a receptor that may be harmed, for example the water environment, humans and water.

Where a source, pathway and target are all present a pollutant linkage exists and there is potential for harm to be caused. The presence of a source does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors are site specific and will vary according to the intended end use of the site, its characteristics and its surroundings.

The key principle which supports the SPR approach is 'suitable for use' criteria. This requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and, taking into account the proposed use of the site.

Relevant Guidance Documents

This report has been prepared in accordance with the list of guidance below however the list is not exhaustive:

- CLR11 – Model Procedures;
- Contamination and Environmental Matters - Their implications for Property Professionals (2nd Edition RICS Nov 2003);
- Brownfields – Managing the development of previously developed land – A client's guide, CIRIA 2002;
- DEFRA and Environment Agency publications CLR7 – 10, supported by the TOX guides and SGV guides, dated March 2002;
- DETR Circular 02/2000, Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990;
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002;

Relevant Legislative Documents

The following is a non-exhaustive list of legislative framework documents that has been considered in the production of this report:

- The Environment Act (1995);
- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012);
- The Environment Protection Act (1990);
- The Contaminated Land (England) Act (2000);
- Contaminated Land (England) Regulations (2012);
- The Water Resources Act (1991);
- The Pollution Prevention and Control (England and Wales) Regulations (2000);
- The Landfill Regulations (England and Wales) Regulations (2002);
- The Landfill (England and Wales) (Amendment) Regulations (2004);
- Health and Safety at Work Act;

APPENDIX I
Limitations

Standard Limitations

This ground investigation was conducted and has been prepared for the sole internal use and reliance of the Client, Stewart Milne Homes. This report shall not be relied upon or transferred to any other parties without the express written authorisation of BSL. If an unauthorised third party comes into possession of this report they rely on it at their risk and the authors owe them no duty of care or skill.

The findings and opinions conveyed via the desk study within this report are based on information obtained from a variety of sources as detailed within this report, which BSL believes are reliable. In addition if information has been used from third parties and in particular other investigations and reports this information has been used in good faith. BSL cannot and does not guarantee the authenticity or reliability of third party information it has relied upon.

The investigation carried out on the site has been conducted to provide the best information and assessment on the ground conditions within site access and budgetary constraints. Exploratory holes only investigate a small area in relation to the overall site area and can therefore only provide a general indication of overall site conditions. Therefore the findings, opinions, geotechnical and environmental recommendations within this report are based on the ground conditions encountered at each location. It should be noted that different ground conditions may exist that have not been identified within this investigation.

The occurrence of and depths to groundwater may vary seasonally due to changes in weather, it should be noted that any observations and recommendations made on groundwater within this report are based on a select number of site visits over a limited period of time and may not be fully representative of groundwater conditions on the site.

Current UK guidance and legislation has been used in the geotechnical and environmental assessment of the site, BSL is not liable for any subsequent changes in the guidance and legislation.

The recommendations within this report are based upon the proposed site end use provided to BSL at the time of the investigation. If the end use or development layout changes from the proposal then the recommendations may change or become invalid.

Although every effort has been made to position exploratory holes in the least sensitive areas of the site, exploratory hole positions were located approximately as part of this investigation and no guarantee can be given as to their accuracy. Consideration should be given to the possibility that exploratory holes excavated as part of this investigation and indeed any previous ground investigation work by others may be encountered beneath or within the influence of individual foundations. BSL cannot be held responsible for structural failures caused by the location of foundations of any form of structure within the influence of exploratory holes.

No existing manhole covers were lifted or drainage runs inspected during the course of this ground investigation. The site plans enclosed in this report should not be scaled off.

Appendix C

Wardell Armstrong LLP Ground Investigation Logs

Trial Pit Log

TRIAL PIT REFERENCE
TP01
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347193.00 N390388.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.00m x 0.56m / Final Depth: 3.10m
Logged By: EC / Checked By: GH	Approved By: DB / Level	Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.10	ES		0.20			Dark brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
		1.00	ES					(Stiff) brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to coarse subangular of mudstone and coal.	1
		2.50	ES						2
					3.00			(Very stiff to extremely weak) distinctly weathered thinly laminated grey CLAY/MUDSTONE. (PENNINE MIDDLE COAL MEASURES)	3
					3.10			Base of Excavation at 3.10m	
									4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP02
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347312.00 N390400.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.00m x 0.56m / Final Depth: 2.40m
Logged By: EC / Checked By: GH	Approved By: DB / Level	Orientation: 0°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.10	ES		0.20			Dark brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
		0.90	ES					(Stiff) greyish brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine subangular of mudstone.	1
		2.20	ES						2
		2.20	HSV	66kPa	2.40			Base of Excavation at 2.40m	3
									4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was undertaken on samples recovered from excavator bucket at 2.20m. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP03
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347254.00 N390346.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.00m x 0.56m / Final Depth: 3.00m
Logged By: EC / Checked By: GH	Approved By: DB / Level	Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.10	ES		0.30			Dark brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
		0.80	ES		1.40			(Stiff) brown slightly sandy CLAY. Sand is fine.	1
		2.10	ES		2.50			(Firm to stiff) reddish brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine subrounded of mudstone.	2
					2.60			COAL.	
					3.00			(Soft) grey CLAY. (Possible Seat-earth/Weathered Mudstone)	3
								Base of Excavation at 3.00m	4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Groundwater not encountered. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP04
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 19/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347363.00 N390451.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.20m x 0.56m / Final Depth: 3.50m
Logged By: EC	Checked By: GH	Approved By: DB / Level / Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
					0.10			Dark brown SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
		0.60	ES					Orange clayey fine to coarse SAND.	
		1.00	HSV	66kPa					1
	▽								
		1.80	ES						2
		2.80	ES						3
					3.50			Base of Excavation at 3.50m	4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Groundwater encountered as fast flowing at 1.40m. TESTING: Hand vane testing was undertaken in samples recovered from excavator bucket at 1.00m. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP05
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 19/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347394.00 N390456.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.10m x 0.56m / Final Depth: 2.40m
Logged By: EC	Checked By: GH	Approved By: DB / Level / Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.10	ES		0.20			Dark brown sandy SILT with frequent rootlets. Sand is fine (TOPSOIL)	
		0.70	ES		0.90			(Soft to firm) slightly sandy CLAY. Sand is fine.	
	▽	1.40	ES					Orange clayey fine to coarse SAND.	1
		2.20	ES		2.40			Base of Excavation at 2.40m	2
									3
									4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Groundwater encountered as fast flowing at 1.20m. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP06
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347323.00 N390325.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.50m x 0.56m / Final Depth: 2.80m
Logged By: EC / Checked By: GH	Approved By: DB / Level	Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.10	ES		0.30			Dark brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
		1.10	ES		2.10			(Stiff) brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine subangular of mudstone and coal.	1
		2.30	ES		2.60			(Soft) grey CLAY.	2
					2.80			(Very stiff to extremely weak) distinctly weathered thinly laminated grey CLAY/MUDSTONE. (PENNINE MIDDLE COAL MEASURES)	3
								Base of Excavation at 2.80m	4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP07
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347183.00 N390313.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 0.56m x 2.00m / Final Depth: 3.80m
Logged By: EC	Checked By: GH	Approved By: DB / Level / Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
								Dark brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
					0.30			Brown clayey slightly gravelly fine to coarse SAND. Gravel is fine to medium subrounded of siltstone.	
		0.60	ES						
					0.80			(Stiff) brown slightly fine sandy CLAY.	1
		1.10	ES						
									2
		2.50	ES						
		2.50	HSV	63kPa					
									3
		3.50	ES						
		3.50	HSV	54kPa					
					3.70			COAL.	
					3.80			Base of Excavation at 3.80m	4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was undertaken on samples recovered from excavator bucket at 2.50m and 3.50m. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP08
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347149.00 N390422.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.00m x 0.56m / Final Depth: 2.70m
Logged By: EC	Checked By: GH	Approved By: DB / Level / Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
					0.10			Dark brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
		0.50	ES					(Soft) grey gravelly CLAY. Gravel is fine to coarse angular of coal.	
					0.80			(Stiff) brown slightly sandy CLAY. Sand is fine.	1
		1.50	ES						2
		2.50	ES						
					2.60			(Very stiff to extremely weak) distinctly weathered thinly laminated grey CLAY/MUDSTONE. (PENNINE MIDDLE COAL MEASURES)	3
					2.70			Base of Excavation at 2.70m	4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP09
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 19/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347372.00 N390368.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 1.80m x 0.56m / Final Depth: 1.50m
Logged By: EC / Checked By: GH	Approved By: DB / Level	Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.20	ES		0.30			Brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
		0.80	ES					Yellowish brown clayey fine SAND with occasional coarse subangular siltstone gravel.	1
		1.40	ES		1.50			Base of Excavation at 1.50m	2
									3
									4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP10
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 19/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347404.00 N390375.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 0.56m x 2.00m / Final Depth: 2.40m
Logged By: EC / Checked By: GH	Approved By: DB / Level	Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.10	ES		0.30			Dark brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
		0.90	ES					Brown clayey fine to coarse SAND.	1
		2.10	ES		2.40			Base of Excavation at 2.40m	2
									3
									4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP11
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347309.00 N390481.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.00m x 0.56m / Final Depth: 2.80m
Logged By: EC	Checked By: GH	Approved By: DB / Level / Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.20	ES		0.30			Dark brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
		1.00	ES					(Stiff) brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to coarse subangular mudstone.	1
	▽	1.00	HSV	66kPa	1.50			COAL.	
					1.90			(Very stiff to extremely weak) distinctly weathered thinly laminated grey CLAY/MUDSTONE. (PENNINE MIDDLE COAL MEASURES)	2
		2.20	ES						
					2.80			Base of Excavation at 2.80m	3
									4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Spalling on northern face from 0.5m to 1.5m.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Groundwater encountered as fast flowing at 1.40m. TESTING: Hand vane testing was undertaken in samples recovered from excavator bucket at 1.00m. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP12
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 19/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E346859.00 N390305.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.20m x 0.56m / Final Depth: 4.20m
Logged By: EC / Checked By: GH	Approved By: DB / Level	Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.10	ES					MADE GROUND: Brown silty gravelly fine to coarse SAND. Gravel is fine to coarse subangular of brick and concrete.	
					0.30			MADE GROUND: Grey slightly sandy gravelly COBBLES. Sand is fine to coarse. Gravel and cobbles are fine to coarse subangular of brick, concrete and siltstone.	
		0.60	ES						1
					2.10			(Stiff) reddish brown slightly sandy CLAY. Sand is fine.	2
		2.60	ES						
		2.60	HSV	52kPa					
					3.00			(Stiff) yellowish brown mottled grey CLAY.	3
		3.20	HSV	74kPa					
					3.50			COAL.	
					3.70			(Stiff) yellowish brown CLAY. (Possible Seat-earth/ Weathered Mudstone)	
		3.80	ES						4
		3.80	HSV	67kPa					
					4.20			Base of Excavation at 4.20m	

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was undertaken on samples recovered from excavator bucket at 2.60m, 3.20m and 3.80m. TERMINATION: Due to reaching schedule depth. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP13
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 20/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347397.00 N390152.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.40m x 0.56m / Final Depth: 3.50m
Logged By: EC	Checked By: GH	Approved By: DB / Level / Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
					0.00			Dark brown SILT with frequent rootlets and occasional wood fragments. Sand is fine. (TOPSOIL)	
		0.60	ES		0.30			(Firm to stiff) brown very sandy CLAY. Sand is fine to coarse.	1
	▽	1.40 1.40	ES HSV	113kPa	1.20			(Very stiff) grey slightly gravelly CLAY. Gravel is fine to coarse angular of coal.	
					1.70			COAL.	2
		2.50	ES		2.30			Grey gravelly CLAY. Gravel is fine to coarse angular of mudstone. (Possible Seat-earth/Weathered Mudstone)	
					3.00			(Very stiff to extremely) distinctly weathered weak thinly laminated grey CLAY/MUDSTONE. (PENNINE MIDDLE COAL MEASURES)	3
					3.50			Base of Excavation at 3.50m	4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Groundwater encountered as fast flowing at 1.30m. TESTING: Hand vane testing was undertaken on samples recovered from excavator bucket at 1.40m. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP14
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347257.00 N390447.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.10m x 0.56m / Final Depth: 2.50m
Logged By: EC / Checked By: GH	Approved By: DB / Level	Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
					0.10			Dark brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)	
		0.50	ES					(Stiff) brown slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to coarse subangular of mudstone.	1
		1.50	ES						2
		2.40	ES		2.40				
					2.50			(Very stiff to extremely weak) distinctly weathered thinly laminated grey CLAY/MUDSTONE. (PENNINE MIDDLE COAL MEASURES)	3
								Base of Excavation at 2.50m	4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP15
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 19/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E346807.00 N390294.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.30m x 0.56m / Final Depth: 3.80m
Logged By: EC / Checked By: GH	Approved By: DB / Level	Orientation: 0°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
					0.20			MADE GROUND: Grey fine to coarse angular to subangular GRAVEL of brick.	
		0.60	ES					MADE GROUND: Dark brown clayey gravelly fine to coarse SAND. Gravel is fine to coarse angular of brick and concrete.	1
					1.10			Yellowish brown mottled grey silty CLAY.	
		1.50	ES						2
					2.10			Yellowish brown silty CLAY with occasional cobbles. Cobbles are angular of siltstone.	
		2.80	ES						3
					3.20			(Very stiff to extremely weak) distinctly weathered thinly laminated grey CLAY/MUDSTONE. (PENNINE MIDDLE COAL MEASURES)	
					3.80			Base of Excavation at 3.80m	4

Trench Support and Comment

Pit Stability	Shoring Used	Remarks
Stable throughout.		

Pumping Data

Date	Rate	Remarks

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP16
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 19/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E346936.00 N390270.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.00m x 0.56m; Final Depth: 4.20m
Logged By: EC	Checked By: GH	Approved By: DB; Level; Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
								MADE GROUND: Orange sandy gravelly angular brick COBBLES. Sand is fine to coarse. Gravel is fine to coarse angular of brick.	
					0.30			MADE GROUND: Orangish brown very gravelly fine to coarse SAND. Gravel is fine to coarse angular brick.	
		0.60	ES						1
					1.10			(Stiff) yellowish brown mottled grey CLAY.	
		1.30 1.30	ES HSV	55kPa					
									2
		2.50	ES						
	▽				3.50			(Very stiff to extremely weak) distinctly weathered thinly laminated grey CLAY/MUDSTONE. (PENNINE MIDDLE COAL MEASURES)	3
		3.80	ES						
									4
					4.20			Base of Excavation at 4.20m	

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Groundwater encountered as fast flowing at 3.60m. TESTING: Hand vane testing was undertaken on samples recovered from excavator bucket at 1.30m. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP17
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 19/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E346878.00 N390266.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.00m x 0.56m / Final Depth: 4.00m
Logged By: EC	Checked By: GH	Approved By: DB / Level / Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.60	ES					MADE GROUND: Dark brown clayey very gravelly fine to coarse SAND with frequent cobbles of angular brick. Gravel is fine to coarse angular of brick, clinker and concrete.	1
		1.80	ES		1.70			MADE GROUND: Black silty gravelly fine to coarse SAND. Gravel is fine to coarse subrounded of mixed lithology.	2
		2.50 2.50	ES HSV	50kPa	2.30			(Stiff) yellowish brown mottled grey CLAY.	3
		3.80 3.80	ES HSV	72kPa					
					4.00			Base of Excavation at 4.00m	4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was undertaken on samples recovered from excavator bucket at 2.50m and 3.80m. TERMINATION: Due to reaching schedule depth. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP18
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 20/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347422.00 N390263.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.00m x 0.56m — Final Depth: 2.60m
Logged By: EC	Checked By: GH	Approved By: DB — Level — Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
					0.30			Dark brown sandy SILT with frequent rootlets and occasional wood fragments. Sand is fine. (TOPSOIL)	
		0.40	ES					(Firm to stiff) dark brown sandy CLAY. Sand is very fine to coarse.	
		0.80	ES		0.70			Orangish brown clayey fine to coarse SAND.	1
		2.00	ES		1.80			Yellowish brown fine to coarse SAND.	2
					2.60			Base of Excavation at 2.60m	3
									4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Trial Pit Log

TRIAL PIT REFERENCE
TP19
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347103.00 N390429.00
Project No. : GM11373	Excavator: JCB 3CX	Dimensions : 2.00m x 0.56m / Final Depth: 3.70m
Logged By: EC / Checked By: GH	Approved By: DB / Level	Orientation: 90°

Backfill	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.10	ES		0.20			Dark brown fine sandy SILT with frequent rootlets. (TOPSOIL)	
					0.50			Dark brown sandy SILT. Sand is fine.	
		0.80	ES					(Stiff) brown slightly fine sandy CLAY with occasional lenses (50 by 50 mm) of yellow clayey fine to coarse sand.	1
		2.00	ES						2
					3.60				3
					3.70			(Very stiff to extremely weak) distinctly weathered thinly laminated grey CLAY/MUDSTONE. (PENNINE MIDDLE COAL MEASURES)	
								Base of Excavation at 3.70m	4

Trench Support and Comment			Pumping Data		
Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
Stable throughout.					

General Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Hand vane testing was not undertaken. TERMINATION: Terminated due to hard digging. BACKFILL: Trial pit backfilled with arisings.

Log printed on 18/08/2023 at 10:08

Windowless Sample Borehole Log

BOREHOLE REFERENCE
WS1
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 19/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E346847.00 N390244.00
Project No. : GM11373	Drilling Equipment: Dart	Level :

Logged By	Checked By	Approved By	SPT Energy Ratio	Final Depth
XM	GH	DB	73%	4.45

Install. / Backfill	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.00	D					MADE GROUND: (Firm) light grey mottled yellowish brown CLAY.	
					0.70			MADE GROUND: (Soft) dark black sandy fine to coarse subangular GRAVEL of coal. Sand is fine.	
		1.00 1.00	D SPT(S)	N=6 (1,1/1,1,2,2)	1.00			MADE GROUND: (Stiff) light grey mottled yellowish brown gravelly CLAY. Gravel is fine to coarse subangular of brick.	1
		2.00 2.00	D SPT(S)	N=4 (0,0/1,1,1,1)	2.00			MADE GROUND: (Stiff) dark grey slightly sandy CLAY. Sand is fine to coarse.	2
		3.00 3.00	D SPT(S)	N=12 (2,2/2,3,3,4)					3
		4.00	SPT(S)	N=12 (2,2/2,3,3,4)	4.00			MADE GROUND: Grey mottled yellowish brown gravelly CLAY. Gravel is fine subangular of glass and brick.	4
					4.45			End of Borehole at 4.45m	

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Installation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Top	Base	Inclination	Orientation	Top	Base	Pipe Type	Diameter
												0.00m 1.00m	1.00m 4.00m	PLAIN SLOTTED	50mm 50mm

Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Standard Penetration Testing was undertaken at 1.00, 2.00, 3.00 and 4.00mbgl. TERMINATION: Hole terminated due to refusal 4.45mbgl. BACKFILL: Plain pipe from ground level to 1.00mbgl and slotted pipe from 1.00mbgl to 4.00mbgl.

Log printed on 18/08/2023 at 10:08

Windowless Sample Borehole Log

BOREHOLE REFERENCE
WS2
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347414.00 N390213.00
Project No. : GM11373	Drilling Equipment: Dart	Level :

Logged By	Checked By	Approved By	SPT Energy Ratio	Final Depth
XM	GH	DB	73%	2.00

Install. / Backfill	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.00	D					Dark grey slightly gravelly sandy CLAY with occasional rootlets. Sand is fine. Gravel is fine to coarse subangular to subrounded of mudstone. (TOPSOIL)	
					0.30				
		0.50	D					(Very dense) light brown clayey silty fine to coarse SAND with frequent reddish brown clay lenses.	
		1.00	SPT(S)	N=47 (7,8/9,11,13,14)					1
					1.30				
		1.50	D					(Very dense) light brown gravelly fine to medium SAND. Gravel is subangular to subrounded of mudstone.	
		2.00	SPT(S)	N=50 (17,22/25,25,0,0)	2.00			End of Borehole at 2.00m	2
									3
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Installation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Top	Base	Inclination	Orientation	Top	Base	Pipe Type	Diameter
												0.00m 0.50m	0.50m 1.80m	PLAIN SLOTTED	50mm 50mm

Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Standard Penetration Testing was undertaken at 1.00 and 2.00mbgl. TERMINATION: Hole terminated due to refusal 2.00mbgl. BACKFILL: Plain pipe from ground level to 0.50mbgl and slotted pipe from 0.50mbgl to 1.80mbgl.

Log printed on 18/08/2023 at 10:08

Windowless Sample Borehole Log

BOREHOLE REFERENCE
WS3
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 19/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E346846.00 N390306.00
Project No. : GM11373	Drilling Equipment: Dart	Level :

Logged By	Checked By	Approved By	SPT Energy Ratio	Final Depth
XM	GH	DB	73%	3.45

Install. / Backfill	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.00	D					MADE GROUND: (Stiff) light grey mottled yellowish brown gravelly CLAY. Gravel is fine subangular of brick and glass.	
		1.00	SPT(S)	N=11 (1,2/2,2,3,4)					1
		1.50	D						
		2.00	SPT(S)	N=17 (4,5/4,4,4,5)	2.00			(Stiff) light grey mottled yellowish brown CLAY.	2
		2.50	D						
		3.00	SPT(S)	N=50 (7,10/12,13,14,11)	3.00			Weathered MUDSTONE.	3
					3.45			End of Borehole at 3.45m	4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Installation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Top	Base	Inclination	Orientation	Top	Base	Pipe Type	Diameter
												0.00m 1.00m	1.00m 3.00m	PLAIN SLOTTED	50mm 50mm

Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Standard Penetration Testing was undertaken at 1.00, 2.00 and 3.00mbgl. TERMINATION: Hole terminated due to refusal at 3.45mbgl. BACKFILL: Plain pipe from ground level to 1.00mbgl and slotted pipe from 1.00mbgl to 3.00mbgl.

Log printed on 18/08/2023 at 10:08

Windowless Sample Borehole Log

BOREHOLE REFERENCE
WS4
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347366.00 N390411.00
Project No. : GM11373	Drilling Equipment: Dart	Level :

Logged By	Checked By	Approved By	SPT Energy Ratio	Final Depth
XM	GH	DB	73%	1.45

Install. / Backfill	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results					
		0.50	D					(Dense) light brown gravelly fine to medium SAND. Gravel is subangular to subrounded of mudstone.	
		1.00	SPT(S)	N=50 (11,12/14,16,17,3)					1
					1.45			End of Borehole at 1.45m	2
									3
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Installation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Top	Base	Inclination	Orientation	Top	Base	Pipe Type	Diameter
												0.00m 0.50m	0.50m 1.00m	PLAIN SLOTTED	50mm 50mm

Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Standard Penetration Testing was undertaken at 1.00mbgl. TERMINATION: Hole terminated due to refusal 1.45mbgl. BACKFILL: Plain pipe from ground level to 0.50mbgl and slotted pipe from 0.50mbgl to 1.00mbgl.

Log printed on 18/08/2023 at 10:08

Windowless Sample Borehole Log

BOREHOLE REFERENCE
WS5
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347236.00 N390402.00
Project No. : GM11373	Drilling Equipment: Dart	Level :

Logged By	Checked By	Approved By	SPT Energy Ratio	Final Depth
XM	GH	DB	73%	3.45

Install. / Backfill	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.00	D					Dark grey slightly gravelly sandy CLAY with occasional rootlets. Sand is fine. Gravel is fine to coarse subangular to subrounded of mudstone. (TOPSOIL)	
					0.50			(Stiff) reddish brown sandy CLAY with frequent sand lenses. Sand is fine to coarse.	
		0.70	D					*0.70m - 0.80m : Brownish grey slightly sandy SILT with fragments of coal.*	
		1.00	SPT(S)	N=18 (2,3/3,3,6,6)					1
					1.50			(Very stiff) reddish brown mottled orangish brown sandy CLAY with frequent sand lenses. Sand is fine to coarse.	
		1.70	D						
		2.00	SPT(S)	N=45 (5,7/9,10,10,16)					2
		2.30	D		2.30			Weathered MUDSTONE.	
		3.00	SPT(S)	N=50 (16,19/25,25,0,0)					3
					3.45			End of Borehole at 3.45m	
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Installation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Top	Base	Inclination	Orientation	Top	Base	Pipe Type	Diameter
												0.00m 0.80m	0.80m 3.00m	PLAIN SLOTTED	50mm 50mm

Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Standard Penetration Testing was undertaken at 1.00, 2.00 and 3.00mbgl. TERMINATION: Hole terminated due to refusal at 3.45mbgl. Plain pipe from ground level to 0.80mbgl and slotted pipe from 0.80mbgl to 3.45mbgl.

Log printed on 18/08/2023 at 10:08

Windowless Sample Borehole Log

BOREHOLE REFERENCE
WS6
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347202.00 N390326.00
Project No. : GM11373	Drilling Equipment: Dart	Level :

Logged By	Checked By	Approved By	SPT Energy Ratio	Final Depth
XM	GH	DB	73%	3.45

Install. / Backfill	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.00	D					Dark grey slightly gravelly sandy CLAY with occasional rootlets. Sand is fine. Gravel is fine to coarse subangular to subrounded of mudstone. (TOPSOIL)	
		0.40	D		0.40			Light brown gravelly fine to medium SAND. Gravel is subangular to subrounded of mudstone.	
		0.60	D		0.70			(Stiff) slightly gravelly sandy CLAY with frequent red sand lenses. Sand is fine to coarse. Gravel is subangular and fine of mudstone.	
		1.00	SPT(S)	N=12 (2,2/3,3,3,3)					1
		1.40	D						
		2.00	SPT(S)	N=13 (2,2/2,3,4,4)					2
		2.70	D						
		3.00	SPT(S)	N=50 (5,10/11,14,16,9)	3.00			Weathered MUDSTONE.	3
		3.30	D						
					3.45			End of Borehole at 3.45m	4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Installation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Top	Base	Inclination	Orientation	Top	Base	Pipe Type	Diameter
												0.00m 1.00m	1.00m 2.70m	PLAIN SLOTTED	50mm 50mm

Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Standard Penetration Testing was undertaken at 1.00, 2.00 and 3.00mbgl. TERMINATION: Hole terminated due to refusal 3.45mbgl. BACKFILL: Plain pipe from ground level to 1.00mbgl and slotted pipe from 1.00mbgl to 2.70mbgl.

Log printed on 18/08/2023 at 10:08

Windowless Sample Borehole Log

BOREHOLE REFERENCE
WS7
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347333.00 N390340.00
Project No. : GM11373	Drilling Equipment: Dart	Level :

Logged By	Checked By	Approved By	SPT Energy Ratio	Final Depth
XM	GH	DB	73%	2.00

Install. / Backfill	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.00	D					Dark grey slightly gravelly sandy CLAY with occasional rootlets. Sand is fine. Gravel is fine to coarse subangular to subrounded of mudstone. (TOPSOIL)	
					0.40			(Stiff) reddish brown sandy CLAY with frequent sand lenses. Sand is fine to coarse.	
		1.00	D						1
		1.00	SPT(S)	N=13 (2,2/2,3,4,4)					
		2.00	D		2.00			End of Borehole at 2.00m	2
		2.00	SPT(S)	N=50 (10,17/25,25,0,0)					
									3
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Installation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Top	Base	Inclination	Orientation	Top	Base	Pipe Type	Diameter
												0.00m 0.75m	0.75m 1.70m	PLAIN SLOTTED	50mm 50mm

Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Standard Penetration Testing was undertaken at 1.00 and 2.00mbgl. TERMINATION: Hole terminated due to refusal 2.00mbgl. BACKFILL: Plain pipe from ground level to 0.75mbgl and slotted pipe from 0.75mbgl to 1.70mbgl.

Log printed on 18/08/2023 at 10:08

Windowless Sample Borehole Log

BOREHOLE REFERENCE
WS8
Sheet 1 of 1

Project Name: Land off Lickers Lane, Whiston SI	Client: Your Housing Group Ltd	Date: 18/04/2023
Location: Lickers Lane, Whiston, L35 3PN	Contractor: GIP Ltd	Co-ords: E347087.00 N390446.00
Project No. : GM11373	Drilling Equipment: Dart	Level :

Logged By	Checked By	Approved By	SPT Energy Ratio	Final Depth
XM	GH	DB	73%	3.45

Install. / Backfill	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	Scale
		0.30	D		0.40			Dark grey slightly gravelly sandy CLAY with occasional rootlets. Sand is fine. Gravel is fine to coarse subangular to subrounded of mudstone. (TOPSOIL)	
		1.00	SPT(S)	N=9 (1,1/2,2,2,3)				(Firm to stiff) light brown slightly gravelly sandy CLAY with frequent red sand lenses. Sand is fine to coarse. Gravel is subangular and fine of mudstone.	1
		1.30	D						
		2.00	SPT(S)	N=18 (3,3/3,4,5,6)					2
		2.30	D						
		3.00	SPT(S)	N=50 (13,22/25,25,0,0)	3.00			Weathered MUDSTONE.	3
					3.45			End of Borehole at 3.45m	
									4

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation				Installation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Top	Base	Inclination	Orientation	Top	Base	Pipe Type	Diameter
												0.00m 1.00m	1.00m 3.00m	PLAIN SLOTTED	50mm 50mm

Remarks

SERVICES: Area was checked using a C.A.T and Genny prior to excavation. GROUNDWATER: Not encountered during excavation. TESTING: Standard Penetration Testing was undertaken at 1.00, 2.00 and 3.00mbgl. TERMINATION: Hole terminated due to refusal 3.45mbgl. BACKFILL: Plain pipe from ground level to 0.50mbgl and slotted pipe from 1.00mbgl to 3.00mbgl.

Log printed on 18/08/2023 at 10:08

Appendix D

GIP Drillers Logs

GIP Ltd
Ground Investigation & Piling Limited
Building 62, Third Avenue, The Pensnett Estate,
Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Driller's Daily Log Sheet

Contract Number	32172
Site Name	HALSNEAD PARK
Town	WHISTON
Equipment	
Date	THURS 20/4
Borehole Number.	1-5

Start of Shift: am — End of Shift: pm

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc	Sample /Test: Type	Number	Depth (m): From	To	U100: Blows	Length (m)	Standard Penetration Test (mm): 0-75	75-150	150-225	225-300	300-375	375-450	Casing Depth (m)	Water Level (m)
CP3						SD	1	1.0	1.45			1	1	1	2	2	3		
GL	TURF TOP SOIL					V	2	2.0	2.45	40	.40								
0.6	FIRM BROWN SANDY					SD	3	3.0	3.36										
	CLAY AT FIRST OLP											10	15	28	22	40			
1.9	STIFF GREY MUDSTONE																		
3.3																			
CP1						SD	1.0	1.45				1	1	1	2	1	2		
GL	TURF TOP SOIL					SD	2.0	2.45				1	1	2	1	2	2		
0.7	FIRM BROWN SANDY CLAY					U	3.0	3.45		12	.45								
						SD	4.0	4.45				1	2	2	3	4	4		
4.45																			
CP5																			
GL	TURF TOP SOIL					SD	1	1.0	1.45			1	1	3	6	8	10		
0.7	FIRM BROWN CLAY					SD	2	2.0	2.35			25	30	28	22	50			
1.3	DENSE YELLOW BROWN SANDSTONE																		
2.35																			

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling: Cause	Depth (m) From	To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe		
Slotted Pipe ALL	BACKFILL	
Gravel		
Bentonite		
Grout		
Cover	Yes	No

Remarks

Casing

Size (mm)	From (m)	To (m)
ALL	GL	1.5

Driller: D DONMOY

GIP Ltd
Ground Investigation & Piling Limited
Building 62, Third Avenue, The Pensnett Estate,
Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Driller's Daily Log Sheet

Contract Number	32172
Site Name	HALSWOOD PARK
Town	WHISTON
Equipment	
Date	TUES 20/4
Borehole Number.	2+4

Start of Shift ____ am End of Shift ____ pm

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc
CP2					
GL	TURF TOP SOIL				
0.8	FIRM BROWN CLAY				
1.8	STIFF GREY MUDSTONE/ STONEY CLAY.				
3.3					
CP4					
GL	TURF TOP SOIL				
0.7	FIRM BROWN CLAY				
3.50	MUDSTONE				
4.3					

Sample /Test Type	Number	Depth (m) From	To	U100 Blows	Length (m)	Standard Penetration Test (mm) 0 - 75	75 - 150	150 - 225	225 - 300	300 - 375	375 - 450	Casing Depth (m)	Water Level (m)
D	1	1.0	1.45			1	1	2	2	1	2		
D	2	2.0	2.45			1	3	6	6	8	6		
D	3	3.0	3.40			8	13	16	19	15	50		
D	1	1.0	1.45			1	2	2	3	2	3		
D	2	2.0	2.45			1	2	3	4	3	4		
D	3	3.0	3.45			1	2	2	3	4	4		
D	4	4.0	4.3			10	14	23	27	50/70			

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling: Cause	Depth (m) From	To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe		
Slotted Pipe		
Gravel		
Bentonite		
Grout		
Cover	Yes	No

Remarks

Casing

Size (mm)	From (m)	To (m)
'A'	GL	1.50

Driller D Dawson

GIP Ltd
Ground Investigation & Piling Limited
Building 62, Third Avenue, The Pensnett Estate,
Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Driller's Daily Log Sheet

Contract Number	32172
Site Name	HALSNEAD PARK
Town	WHISTON
Equipment	
Date	MON 17/4 NGD 19/4
Borehole Number.	

Start of Shift: am — End of Shift: pm

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc
CPB					
0.5	FIRM GREY CLAY FILL				
	FIRM BROWN CLAY				
2.0	SANDY BANDS				
4.30	STIFF GREY MUDSTONE				
CPT					
GL	DENSE SAND BRICK RUBBLE CONCRETE				
1.2	FIRM SAND CLAY				
2.5	MUDSTONE.				
4.30					

Sample /Test Type	Number	Depth (m) From	To	U100 Blows	Length (m)	Standard Penetration Test (mm) 0 - 75	75 - 150	150 - 225	225 - 300	300 - 375	375 - 450	Casing Depth (m)	Water Level (m)
SD	1	1	1.45			1	2	2	3	3	4		
SD	2	2	2.45			1	2	3	3	3	4		
SD	3	3.0	3.45			5	6	9	11	12	13		
SD	4	4.0	4.3			6	8	21	29				
SD	1	1.0	1.45			4	4	3	2	3	3		
U	2	2.0	2.45	11	40								
SD	3	3.0	3.4			4	8	16	18	16/50			
SD	1	1.0	1.45			5	4	3	2	1	1		
SD	2	2.0	2.45			5	6	4	3	4	4		
U	3	3.0	3.45	20	.40								
SD	4	4.0	4.3			10	14	22	28/70				

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling: Cause	Depth (m) From	To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe ALL		
Slotted Pipe BACKFILLED		
Gravel		
Bentonite		
Grout		
Cover	Yes	No

Remarks

MON 17/4 RIG BOGGED DOWN, NGD MACCOKA TO FREE RIG / 6 hrs

TUES 19/4 1 hr, MOVING RIG TO B/H 6, 7 + 8

" 1 hr MOVING RIG TO B/H 1-5

Casing

Size (mm)	From (m)	To (m)
ALL 150	GL	1.30

Driller: D DONNON

GIP Ltd. Ground Investigation & Piling Limited

Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Contract Number	32172	Borehole Number.	
Site Name	Halsnead Park		
Town	Liverpool		1
Equipment	Dart		
Date	18 04 23		

Driller's Daily Log Sheet

Start of Shift: am — End of Shift: pm

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc	Sample /Test: Type	Number	Depth (m): From	To	U100: Blows	Length (m)	Standard Penetration Test (mm): 0 - 75	75 - 150	150-225	225-300	300-375	375-450	Casing Depth (m)	Water Level (m)
	GL 4.45					B	1	GL	1.00										
						S	2	1.00	1.45			1	1	1	1	2	2		
						B	3	1.00	2.00										
						S		2.00	2.45			0	0	1	1	1	1		
						B		2.00	3.00										
						S		3.00	3.45			1	1	1	2	2	2		
						B		3.00	4.00										
						S		4.00	4.45			2	2	2	3	3	4		

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling

Cause	Depth (m) From	To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe	1 m	
Slotted Pipe	3m	
Gravel	3m	
Bentonite	1m	
Grout		
Cover	Yes	No

Remarks

1 meter plain pip above GL

Damp

Casing

Size (mm)	From (m)	To (m)

Driller: GW

GIP Ltd. Ground Investigation & Piling Limited
Building 62, Third Avenue, The Pensnett Estate,
Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Contract Number	32172
Site Name	Holsnead Park
Town	Liverpool
Equipment	Dart
Date	18.04.23

Borehole Number. 2

Driller's Daily Log Sheet

Start of Shift: ____ am End of Shift: ____ pm

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc	Sample /Test: Type	Number	Depth (m): From	To	U100: Blows	Length (m)	Standard Penetration Test (mm): 0 - 75	75 - 150	150-225	225-300	300-375	375-450	Casing Depth (m)	Water Level (m)
	GL 1.95					B	1	GL	100										
						S	2	100	145			7	8	9	11	13	14		
						B	3	100	150										
						S	4	150	195			17	22	25	20 mm				

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling

Cause	Depth (m) From	To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe	0.5	
Slotted Pipe	1	
Gravel	1	
Bentonite	0.5	
Grout		
Cover	Yes	No

Remarks

0.5 plain pipe
Dry

Casing

Size (mm)	From (m)	To (m)

Driller: GW

GIP Ltd.
Ground Investigation & Piling Limited
Building 62, Third Avenue, The Pensnett Estate,
Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Contract Number	32172	Borehole Number.	
Site Name	Halsnead Park		
Town	Liverpool		3
Equipment	Dart		
Date	18.04.23		

Start of Shift: | am | End of Shift | pm

Driller's Daily Log Sheet

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc	Sample /Test: Type	Number	Depth (m): From	To	U100: Blows	Length (m)	Standard Penetration Test (mm): 0 - 75	75 - 150	150-225	225-300	300-375	375-450	Casing Depth (m)	Water Level (m)
	GL			3.45		B	1	GL	1.00										
						S	2	1.00	1.45			1	2	2	2	3	4		
						B	3	1.00	2.00										
						S	4	2.00	2.45			4	5	4	4	4	5		
						B	5	2.00	3.00										
						S	6	3.00	3.45			7	10	12	13	14	15		
						B	NT												
						S	8												

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling: Cause	Depth (m) From	To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe	1 m	
Slotted Pipe	2 m	
Gravel	2 m	
Bentonite	1 m	
Grout		
Cover	Yes	No

Remarks

1 Meter Plain pipe above GL
Dry

Casing

Size (mm)	From (m)	To (m)

Driller: EW

GIP Ltd. Ground Investigation & Piling Limited
Building 62, Third Avenue, The Pensnett Estate,
Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Contract Number	32172
Site Name	Holsnead Park
Town	Liverpool
Equipment	Dart
Date	18-04-24

Borehole Number: 4

Driller's Daily Log Sheet

Start of Shift: ____ am End of Shift: ____ pm

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc	Sample /Test: Type	Number	Depth (m): From	To	U100: Blows	Length (m)	Standard Penetration Test (mm): 0-75	75-150	150-225	225-300	300-375	375-450	Casing Depth (m)	Water Level (m)
	GL					B	1	GL	1.0										
	S					S	2	1.0	1.45			11	12	14	16	17	19		
							3												

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling

Cause	Depth (m) From	Depth (m) To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe	1	2
Slotted Pipe	1	2
Gravel	1	2
Bentonite	1	2
Grout		
Cover	~~Yes~~	No

Remarks

0.5 Plain Pipe above GL

Dry

Casing

Size (mm)	From (m)	To (m)

Driller: GW

GIP Ltd.
Ground Investigation & Piling Limited
Building 62, Third Avenue, The Pensnett Estate,
Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Contract Number	32172
Site Name	Halsnead Park
Town	Liverpool
Equipment	Dart
Date	18.04.23

Borehole Number: 5

Driller's Daily Log Sheet

Start of Shift: ____ am End of Shift: ____ pm

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc	Sample/Test: Type	Number	Depth (m): From	To	U100: Blows	Length (m)	Standard Penetration Test (mm): 0-75	75-150	150-225	225-300	300-375	375-450	Casing Depth (m)	Water Level (m)
	GL 3.45					B	1	GL	100										
						S	2	100	145			2	3	3	3	6	6		
						B	3	100	200										
						S	4	200	245			5	7	9	10	10	10		
						B	5	200	300										
						S	6	300	345			16	19	25	40	m	m		

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling

Cause	Depth (m) From	Depth (m) To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe	0.8	
Slotted Pipe	2m	
Gravel	2m	
Bentonite	1m	
Grout		
Cover	~~Yes~~	No

Remarks

0.8 plain pipe above GL

Dry

Casing

Size (mm)	From (m)	To (m)

Driller: QW

GIP Ltd. Ground Investigation & Piling Limited

Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Contract Number	32172
Site Name	Halsnead Park
Town	Liverpool
Equipment	Dart
Date	18.04.23

Borehole Number. 6

Driller's Daily Log Sheet

Start of Shift ____ am End of Shift ____ pm

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc	Sample /Test: Type	Number	Depth (m): From	To	U100: Blows	Length (m)	Standard Penetration Test (mm): 0 - 75	75 - 150	150-225	225-300	300-375	375-450	Casing Depth (m)	Water Level (m)
	GL 3.45					B	1	GL	100										
						S	2	100	145			2	2	3	3	3	3		
						B	3	100	200										
						S	4	200	245			2	2	2	3	4	4		
						B	5	200	300										
						S	6	300	345			5	10	11	14	16	18		

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling

Cause	Depth (m) From	Depth (m) To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe	1 m	
Slotted Pipe	2 m	
Gravel	2 m	
Bentonite	1 m	
Grout		
Cover	~~Yes~~	No

Remarks

0.2 m plain pipe above GL

Casing

Size (mm)	From (m)	To (m)

Driller EW

GIP Ltd.
Ground Investigation & Piling Limited
Building 62, Third Avenue, The Pensnett Estate,
Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Contract Number	32172
Site Name	Halsnead Park
Town	Liverpool
Equipment	Dart
Date	18.04.22

Borehole Number. 7

Driller's Daily Log Sheet

Start of Shift [ ] am End of Shift [ ] pm

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc	Sample /Test: Type	Number	Depth (m): From	To	U100: Blows	Length (m)	Standard Penetration Test (mm): 0-75	75-150	150-225	225-300	300-375	375-450	Casing Depth (m)	Water Level (m)
	GL 1.95					B	1	GL	100										
						S	2	100	145			2	3	2	3	4	4		
						B	3	100	~~150~~										
						S	4	~~150~~	195			10	17	25	75	mm	mm		

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling: Cause	Depth (m) From	To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe	0.75	
Slotted Pipe	0.75	
Gravel	0.75	
Bentonite	0.75	
Grout		
Cover	~~Yes~~	No

Remarks

GL 0.25 Plain pipe above GL

Casing: Size (mm)	From (m)	To (m)

Driller GW

GIP Ltd. Ground Investigation & Piling Limited
Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT
T: 01902 459558 E: info@gipuk.com W: www.gipuk.com

Contract Number	32172	Borehole Number
Site Name	Halsnead Park	
Town	Liverpool	8
Equipment	Dart	
Date	18.04.23	

Driller's Daily Log Sheet

Start of Shift: ____ am End of Shift: ____ pm

Depth to Base of Strata (m)	Soil Description: Density or Strength	Colour	Clayey Silty Sandy	SOIL NAME	gravel, sand bands etc	Sample /Test: Type	Number	Depth (m): From	To	U100: Blows	Length (m)	Standard Penetration Test (mm): 0 - 75	75 - 150	150-225	225-300	300-375	375-450	Casing Depth (m)	Water Level (m)
	GL 3.45'					B	1	GL	100										
						S	2	100	145			1	1	2	2	2	3		
						B	3	100	200										
						S	4	200	245			3	3	3	4	5	6		
						B	5	200	300										
						S	6	300	345			13	22	25	10 mm				

U (Undisturbed) D (Disturbed) B (Bulk) W (Water) S (SPT) C (CPT)

Water Entries (m)	1	2	3
Depth Struck			
Casing Depth			
Depth 5mins			
Depth 10mins			
Depth 15mins			
Depth 20mins			
Sealed off			

Chiselling: Cause	Depth (m) From	To	Time

Piezometer / Standpipe	From (m)	To (m)
Piezometer Tip		
Plain Pipe	1 m	
Slotted Pipe	2 m	
Gravel	2 m	
Bentonite	1 m	
Grout		
Cover	Yes	No

Remarks

1 Meter Plain Pipe above GL

Dry

Casing

Size (mm)	From (m)	To (m)

Driller GW

Appendix E

Laboratory Contamination Testing Results

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 23/04111
Issue Number: 1 **Date:** 11 May, 2023

Client:
Wardell Armstrong (Bolton)
41-50 Futura Park
Aspinall Way
Middlebrook
Bolton
Lancashire
UK
BL6 6SU

Project Manager: George Huck/Laura Hoath
Project Name: Lickers Lane
Project Ref: GM11373
Order No: TBC
Date Samples Received: 18/04/23
Date Instructions Received: 28/04/23
Date Analysis Completed: 11/05/23

Approved by:



Richard Wong
Client Manager

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 1247

Envirolab Job Number: 23/04111

Client Project Name: Lickers Lane

Client Project Ref: GM11373

Lab Sample ID	23/04111/1	23/04111/5	23/04111/7	23/04111/11	23/04111/13	23/04111/17	23/04111/19	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP8	TP1	TP14	TP11	TP2	TP6	TP3			
Depth to Top	0.50	1.00	0.50	1.00	0.10	1.10	0.10			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	5AE	5A	4AE	5A	6AE			
% Stones >10mm$_A$	4.8	5.8	6.3	2.2	<0.1	3.4	<0.1	% w/w	0.1	A-T-044
Sulphate (water sol 2:1)$_D^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	g/l	0.01	A-T-026s
Organic Matter$_D^{M\#}$	16.1	0.7	0.3	0.6	5.9	1.0	10.3	% w/w	0.1	A-T-032s
Arsenic$_D^{M\#}$	<1	<1	2	<1	11	<1	9	mg/kg	1	A-T-024s
Cadmium$_D^{M\#}$	<0.5	0.6	<0.5	1.4	1.2	<0.5	1.5	mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	40	19	18	24	92	19	71	mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	25	37	41	39	26	34	26	mg/kg	1	A-T-024s
Lead$_D^{M\#}$	12	8	8	12	60	8	76	mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	36	36	41	31	18	43	24	mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	28	36	38	85	84	35	89	mg/kg	5	A-T-024s
Leachate Prep BS EN 12457-2 (10:1)$_A$	*	-	*	*	-	-	*			A-T-001
pH (leachable)$_A^{\#}$	7.00	-	6.94	5.66	-	-	7.09	pH	0.01	A-T-031w
Sulphate (leachable)$_A^{\#}$	3.19	-	31.56	6.34	-	-	13.11	mg/l	1	A-T-026w
DOC (leachable)$_A^{\#}$	4.0	-	7.6	9.5	-	-	9.0	mg/l	2	A-T-032w
Arsenic (leachable)$_A$	<1	-	1	2	-	-	6	µg/l	1	A-T-025w
Cadmium (leachable)$_A$	<1	-	<1	3	-	-	<1	µg/l	1	A-T-025w
Copper (leachable)$_A$	18	-	23	48	-	-	31	µg/l	4	A-T-025w
Chromium (leachable)$_A$	<1	-	2	2	-	-	2	µg/l	1	A-T-025w
Lead (leachable)$_A$	7	-	8	10	-	-	29	µg/l	1	A-T-025w
Mercury (leachable)$_A$	<0.1	-	<0.1	<0.1	-	-	<0.1	µg/l	0.1	A-T-025w
Nickel (leachable)$_A$	7	-	9	15	-	-	3	µg/l	2	A-T-025w
Selenium (leachable)$_A$	<1	-	2	1	-	-	<1	µg/l	1	A-T-025w
Zinc (leachable)$_A$	12	-	17	161	-	-	15	µg/l	2	A-T-025w

Envirolab Job Number: 23/04111

Client Project Name: Lickers Lane

Client Project Ref: GM11373

Lab Sample ID	23/04111/1	23/04111/5	23/04111/7	23/04111/11	23/04111/13	23/04111/17	23/04111/19	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP8	TP1	TP14	TP11	TP2	TP6	TP3			
Depth to Top	0.50	1.00	0.50	1.00	0.10	1.10	0.10			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	5AE	5A	4AE	5A	6AE			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045

Envirolab Job Number: 23/04111

Client Project Name: Lickers Lane

Client Project Ref: GM11373

Lab Sample ID	23/04111/1	23/04111/5	23/04111/7	23/04111/11	23/04111/13	23/04111/17	23/04111/19	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP8	TP1	TP14	TP11	TP2	TP6	TP3			
Depth to Top	0.50	1.00	0.50	1.00	0.10	1.10	0.10			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	5AE	5A	4AE	5A	6AE			
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	0.07	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	0.11	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	<0.06	<0.06	<0.06	<0.06	0.09	<0.06	0.09	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	<0.08	<0.08	<0.08	0.10	<0.08	0.12	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03	<0.03	<0.03	<0.03	0.05	<0.03	0.05	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	0.05	<0.03	<0.03	<0.03	0.05	<0.03	0.06	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	<0.07	<0.07	<0.07	<0.07	0.10	<0.07	0.12	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	<0.08	<0.08	<0.08	<0.08	0.54	<0.08	0.68	mg/kg	0.01	A-T-019s

Envirolab Job Number: 23/04111

Client Project Name: Lickers Lane

Client Project Ref: GM11373

Lab Sample ID	23/04111/1	23/04111/5	23/04111/7	23/04111/11	23/04111/13	23/04111/17	23/04111/19	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP8	TP1	TP14	TP11	TP2	TP6	TP3			
Depth to Top	0.50	1.00	0.50	1.00	0.10	1.10	0.10			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	5AE	5A	4AE	5A	6AE			
PAH 16MS (leachable)										
Acenaphthene (leachable)$_A$	<0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Acenaphthylene (leachable)$_A$	<0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Anthracene (leachable)$_A$	<0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Benzo(a)anthracene (leachable)$_A$	<0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Benzo(a)pyrene (leachable) $_A$	0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Benzo(b)fluoranthene (leachable)$_A$	<0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Benzo(ghi)perylene (leachable)$_A$	0.03	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Benzo(k)fluoranthene (leachable)$_A$	0.03	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Chrysene (leachable)$_A$	0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Dibenzo(ah)anthracene (leachable)$_A$	0.04	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Fluoranthene (leachable)$_A$	<0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Fluorene (leachable)$_A$	<0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Indeno(123-cd)pyrene (leachable)$_A$	0.03	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Naphthalene (leachable) $_A$	<0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Phenanthrene (leachable)$_A$	<0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Pyrene (leachable)$_A$	<0.02	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w
Total PAH 16MS (leachable)$_A$	0.17	-	<0.02	<0.02	-	-	<0.02	µg/l	0.02	A-T-019w

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Client Project Name: Lickers Lane

Client Project Ref: GM11373

Lab Sample ID	23/04111/1	23/04111/5	23/04111/7	23/04111/11	23/04111/13	23/04111/17	23/04111/19	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP8	TP1	TP14	TP11	TP2	TP6	TP3			
Depth to Top	0.50	1.00	0.50	1.00	0.10	1.10	0.10			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	5AE	5A	4AE	5A	6AE			
TPH CWG (leachable) with Clean Up										
Ali >C5-C6 (leachable)$_A$	<3	-	<3	<3	-	-	<3	µg/l	1	A-T-022w
Ali >C6-C8 (leachable)$_A$	<1	-	<1	<1	-	-	<1	µg/l	1	A-T-022w
Ali >C8-C10 (leachable)$_A$	<10	-	<10	<10	-	-	<10	µg/l	10	A-T-055w
Ali >C10-C12 (leachable)$_A$	<10	-	<10	<10	-	-	<10	µg/l	10	A-T-055w
Ali >C12-C16 (leachable)$_A$	<10	-	<10	<10	-	-	<10	µg/l	10	A-T-055w
Ali >C16-C21 (leachable)$_A$	<10	-	<10	<10	-	-	<10	µg/l	10	A-T-055w
Ali >C21-C35 (leachable)$_A$	<20	-	<20	<20	-	-	<20	µg/l	20	A-T-055w
Total Aliphatics (leachable)$_A$	<20	-	<20	<20	-	-	<20	µg/l	10	Calc-As Recd
Aro >C5-C7 (leachable)$_A$	<1	-	<1	<1	-	-	<1	µg/l	1	A-T-022w
Aro >C7-C8 (leachable)$_A$	<1	-	<1	<1	-	-	<1	µg/l	1	A-T-022w
Aro >C8-C10 (leachable)$_A$	<10	-	<10	<10	-	-	<10	µg/l	10	A-T-055w
Aro >C10-C12 (leachable)$_A$	<10	-	<10	<10	-	-	<10	µg/l	10	A-T-055w
Aro >C12-C16 (leachable)$_A$	<10	-	<10	<10	-	-	<10	µg/l	10	A-T-055w
Aro >C16-C21 (leachable)$_A$	<10	-	<10	<10	-	-	<10	µg/l	10	A-T-055w
Total Aromatics (leachable)$_A$	<20	-	<20	<20	-	-	<20	µg/l	20	Calc-As Recd
TPH (Ali & Aro >C5-C35) (leachable)$_A$	<20	-	<20	<20	-	-	<20	µg/l	20	Calc-As Recd
BTEX - Benzene (leachable)$_A$	<1	-	<1	<1	-	-	<1	µg/l	1	A-T-022w
BTEX - Toluene (leachable)$_A$	<1	-	<1	<1	-	-	<1	µg/l	1	A-T-022w
BTEX - Ethyl Benzene (leachable)$_A$	<1	-	<1	<1	-	-	<1	µg/l	1	A-T-022w
BTEX - o Xylene (leachable)$_A$	<1	-	<1	<1	-	-	<1	µg/l	1	A-T-022w
BTEX - m & p Xylene (leachable)$_A$	<1	-	<1	<1	-	-	<1	µg/l	1	A-T-022w
MTBE (leachable)$_A$	<1	-	<1	<1	-	-	<1	µg/l	1	A-T-022w
Aro >C21-C35 (leachable)$_A$	<20	-	<20	<20	-	-	<20	µg/l	20	A-T-055w

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Client Project Ref: GM11373

Lab Sample ID	23/04111/1	23/04111/5	23/04111/7	23/04111/11	23/04111/13	23/04111/17	23/04111/19	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP8	TP1	TP14	TP11	TP2	TP6	TP3			
Depth to Top	0.50	1.00	0.50	1.00	0.10	1.10	0.10			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23	18-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	5AE	5A	4AE	5A	6AE			
TPH CWG with Clean Up										
Ali >C5-C6$_A^{\#}$	-	-	-	<0.01	-	-	-	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	-	-	-	<0.01	-	-	-	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	-	-	-	<1	-	-	-	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	-	-	-	<1	-	-	-	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	-	-	-	<1	-	-	-	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	-	-	-	<1	-	-	-	mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	-	-	-	<1	-	-	-	mg/kg	1	A-T-055s
Total Aliphatics$_A$	-	-	-	<1	-	-	-	mg/kg	1	Calc-As Recd
Aro >C5-C7$_A^{\#}$	-	-	-	<0.01	-	-	-	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	-	-	-	<0.01	-	-	-	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	-	-	-	<1	-	-	-	mg/kg	1	A-T-055s
Aro >C10-C12$_A$	-	-	-	<1	-	-	-	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	-	-	-	<1	-	-	-	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	-	-	-	<1	-	-	-	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	-	-	-	<1	-	-	-	mg/kg	1	A-T-055s
Total Aromatics$_A$	-	-	-	<1	-	-	-	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_A$	-	-	-	<1	-	-	-	mg/kg	1	Calc-As Recd
BTEX - Benzene$_A^{\#}$	-	-	-	<0.01	-	-	-	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	-	-	-	<0.01	-	-	-	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	-	-	-	<0.01	-	-	-	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	-	-	-	<0.01	-	-	-	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	-	-	-	<0.01	-	-	-	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	-	-	-	<0.01	-	-	-	mg/kg	0.01	A-T-022s

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Client Project Ref: GM11373

Lab Sample ID	23/04111/21	23/04111/23	23/04111/26	23/04111/30	23/04111/34	23/04111/37	23/04111/40	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP3	TP7	TP15	TP17	TP16	TP12	TP12			
Depth to Top	2.10	1.10	0.60	1.80	1.30	0.10	3.80			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	4AB	4AB	5A	4AE	6A			
% Stones >10mm$_A$	2.1	1.8	<0.1	4.7	1.0	24.3	7.0	% w/w	0.1	A-T-044
Sulphate (water sol 2:1)$_D^{M\#}$	<0.01	<0.01	0.04	0.27	0.02	<0.01	<0.01	g/l	0.01	A-T-026s
Organic Matter$_D^{M\#}$	0.8	0.4	14.9	20.6	0.7	3.8	2.2	% w/w	0.1	A-T-032s
Arsenic$_D^{M\#}$	<1	4	27	11	<1	12	<1	mg/kg	1	A-T-024s
Cadmium$_D^{M\#}$	<0.5	<0.5	0.7	1.0	0.9	0.8	<0.5	mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	14	17	74	80	14	45	30	mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	26	34	12	22	29	17	20	mg/kg	1	A-T-024s
Lead$_D^{M\#}$	7	8	123	70	8	78	9	mg/kg	1	A-T-024s
Mercury$_D$	0.26	0.50	1.07	<0.17	<0.17	0.66	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	25	33	26	30	34	17	34	mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	28	32	139	141	43	95	26	mg/kg	5	A-T-024s
Leachate Prep BS EN 12457-2 (10:1)$_A$	*	-	*	*	*	*	*			A-T-001
pH (leachable)$_A^{\#}$	7.26	-	8.20	7.50	6.92	7.56	6.94	pH	0.01	A-T-031w
Sulphate (leachable)$_A^{\#}$	3.41	-	13.80	91.81	16.95	13.94	17.01	mg/l	1	A-T-026w
DOC (leachable)$_A^{\#}$	2.9	-	5.4	5.9	2.3	5.0	<2.0	mg/l	2	A-T-032w
Arsenic (leachable)$_A$	<1	-	28	9	<1	11	<1	µg/l	1	A-T-025w
Cadmium (leachable)$_A$	<1	-	<1	<1	<1	<1	<1	µg/l	1	A-T-025w
Copper (leachable)$_A$	<4	-	18	5	<4	10	7	µg/l	4	A-T-025w
Chromium (leachable)$_A$	<1	-	4	<1	<1	<1	<1	µg/l	1	A-T-025w
Lead (leachable)$_A$	<1	-	54	2	<1	10	2	µg/l	1	A-T-025w
Mercury (leachable)$_A$	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	µg/l	0.1	A-T-025w
Nickel (leachable)$_A$	<2	-	2	<2	<2	<2	<2	µg/l	2	A-T-025w
Selenium (leachable)$_A$	<1	-	1	2	<1	<1	<1	µg/l	1	A-T-025w
Zinc (leachable)$_A$	<2	-	33	4	<2	8	<2	µg/l	2	A-T-025w

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Lab Sample ID	23/04111/21	23/04111/23	23/04111/26	23/04111/30	23/04111/34	23/04111/37	23/04111/40	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP3	TP7	TP15	TP17	TP16	TP12	TP12			
Depth to Top	2.10	1.10	0.60	1.80	1.30	0.10	3.80			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	4AB	4AB	5A	4AE	6A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	Chrysotile	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	Loose Fibres	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing)$_{D}$	-	-	<0.001	-	-	-	-	% w/w	0.001	A-T-054

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Lab Sample ID	23/04111/21	23/04111/23	23/04111/26	23/04111/30	23/04111/34	23/04111/37	23/04111/40	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP3	TP7	TP15	TP17	TP16	TP12	TP12			
Depth to Top	2.10	1.10	0.60	1.80	1.30	0.10	3.80			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	4AB	4AB	5A	4AE	6A			
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	0.06	0.04	<0.01	0.07	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	<0.02	0.22	0.06	<0.02	0.15	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04	<0.04	0.41	0.10	<0.04	0.91	<0.04	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04	<0.04	0.46	0.15	<0.04	1.35	<0.04	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05	<0.05	0.57	0.22	<0.05	1.46	<0.05	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	<0.05	0.31	0.10	<0.05	0.87	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	0.18	<0.07	<0.07	0.42	<0.07	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	<0.06	<0.06	0.53	0.17	<0.06	1.06	<0.06	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	0.05	<0.04	<0.04	0.13	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	<0.08	0.86	0.29	<0.08	1.59	<0.08	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	0.05	0.03	<0.01	0.05	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03	<0.03	0.31	0.10	<0.03	0.90	<0.03	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	<0.03	0.06	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03	<0.03	0.59	0.12	<0.03	0.59	<0.03	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	<0.07	<0.07	0.88	0.26	<0.07	1.54	<0.07	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	<0.08	<0.08	5.54	1.64	<0.08	11.1	<0.08	mg/kg	0.01	A-T-019s

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Client Project Name: Lickers Lane

Client Project Ref: GM11373

Lab Sample ID	23/04111/21	23/04111/23	23/04111/26	23/04111/30	23/04111/34	23/04111/37	23/04111/40	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP3	TP7	TP15	TP17	TP16	TP12	TP12			
Depth to Top	2.10	1.10	0.60	1.80	1.30	0.10	3.80			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	4AB	4AB	5A	4AE	6A			
PAH 16MS (leachable)										
Acenaphthene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Acenaphthylene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Anthracene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Benzo(a)anthracene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Benzo(a)pyrene (leachable) $_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Benzo(b)fluoranthene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	0.02	<0.02	µg/l	0.02	A-T-019w
Benzo(ghi)perylene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Benzo(k)fluoranthene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Chrysene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	0.02	<0.02	µg/l	0.02	A-T-019w
Dibenzo(ah)anthracene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Fluoranthene (leachable)$_A$	<0.02	-	<0.02	0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Fluorene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Indeno(123-cd)pyrene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Naphthalene (leachable) $_A$	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Phenanthrene (leachable)$_A$	<0.02	-	<0.02	0.02	0.02	<0.02	<0.02	µg/l	0.02	A-T-019w
Pyrene (leachable)$_A$	<0.02	-	<0.02	<0.02	<0.02	0.02	<0.02	µg/l	0.02	A-T-019w
Total PAH 16MS (leachable)$_A$	<0.02	-	<0.02	0.04	0.02	0.06	<0.02	µg/l	0.02	A-T-019w

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Client Project Ref: GM11373

Lab Sample ID	23/04111/21	23/04111/23	23/04111/26	23/04111/30	23/04111/34	23/04111/37	23/04111/40	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP3	TP7	TP15	TP17	TP16	TP12	TP12			
Depth to Top	2.10	1.10	0.60	1.80	1.30	0.10	3.80			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	4AB	4AB	5A	4AE	6A			
TPH CWG (leachable) with Clean Up										
Ali >C5-C6 (leachable)$_A$	<3	-	<3	<3	<3	<3	<3	µg/l	1	A-T-022w
Ali >C6-C8 (leachable)$_A$	<1	-	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Ali >C8-C10 (leachable)$_A$	<10	-	<10	<10	<10	<10	<10	µg/l	10	A-T-055w
Ali >C10-C12 (leachable)$_A$	<10	-	<10	<10	<10	<10	<10	µg/l	10	A-T-055w
Ali >C12-C16 (leachable)$_A$	<10	-	<10	<10	<10	<10	<10	µg/l	10	A-T-055w
Ali >C16-C21 (leachable)$_A$	<10	-	<10	<10	<10	<10	<10	µg/l	10	A-T-055w
Ali >C21-C35 (leachable)$_A$	<20	-	<20	<20	<20	<20	<20	µg/l	20	A-T-055w
Total Aliphatics (leachable)$_A$	<20	-	<20	<20	<20	<20	<20	µg/l	10	Calc-As Recd
Aro >C5-C7 (leachable)$_A$	<1	-	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Aro >C7-C8 (leachable)$_A$	<1	-	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Aro >C8-C10 (leachable)$_A$	<10	-	<10	<10	<10	<10	<10	µg/l	10	A-T-055w
Aro >C10-C12 (leachable)$_A$	<10	-	<10	<10	<10	<10	<10	µg/l	10	A-T-055w
Aro >C12-C16 (leachable)$_A$	<10	-	<10	<10	<10	<10	<10	µg/l	10	A-T-055w
Aro >C16-C21 (leachable)$_A$	<10	-	<10	<10	<10	<10	<10	µg/l	10	A-T-055w
Total Aromatics (leachable)$_A$	<20	-	<20	<20	<20	<20	<20	µg/l	20	Calc-As Recd
TPH (Ali & Aro >C5-C35) (leachable)$_A$	<20	-	<20	<20	<20	<20	<20	µg/l	20	Calc-As Recd
BTEX - Benzene (leachable)$_A$	<1	-	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - Toluene (leachable)$_A$	<1	-	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - Ethyl Benzene (leachable)$_A$	<1	-	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - o Xylene (leachable)$_A$	<1	-	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
BTEX - m & p Xylene (leachable)$_A$	<1	-	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
MTBE (leachable)$_A$	<1	-	<1	<1	<1	<1	<1	µg/l	1	A-T-022w
Aro >C21-C35 (leachable)$_A$	<20	-	<20	<20	<20	<20	<20	µg/l	20	A-T-055w

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Lab Sample ID	23/04111/21	23/04111/23	23/04111/26	23/04111/30	23/04111/34	23/04111/37	23/04111/40	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP3	TP7	TP15	TP17	TP16	TP12	TP12			
Depth to Top	2.10	1.10	0.60	1.80	1.30	0.10	3.80			
Depth To Bottom										
Date Sampled	18-Apr-23	18-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5A	5A	4AB	4AB	5A	4AE	6A			
TPH CWG with Clean Up										
Ali >C5-C6$_A^{\#}$	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	-	-	5	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	-	-	4	<1	<1	<1	1	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	-	-	5	1	<1	<1	2	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	-	-	5	4	<1	2	3	mg/kg	1	A-T-055s
Ali >C21-C35$_A^{M\#}$	-	-	114	42	<1	178	9	mg/kg	1	A-T-055s
Total Aliphatics$_A$	-	-	132	47	<1	182	15	mg/kg	1	Calc-As Recd
Aro >C5-C7$_A^{\#}$	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	-	-	5	3	<1	2	1	mg/kg	1	A-T-055s
Aro >C10-C12$_A$	-	-	5	1	<1	2	1	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	-	-	14	6	<1	5	3	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	-	-	27	18	<1	20	5	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	-	-	105	37	<1	128	11	mg/kg	1	A-T-055s
Total Aromatics$_A$	-	-	155	65	<1	157	22	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35)$_A$	-	-	287	113	<1	339	37	mg/kg	1	Calc-As Recd
BTEX - Benzene$_A^{\#}$	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	mg/kg	0.01	A-T-022s

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Lab Sample ID	23/04111/41	23/04111/45	23/04111/48	23/04111/52	23/04111/55	23/04111/58		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP4	TP5	TP10	TP9	TP13	TP18				
Depth to Top	0.60	0.70	0.10	0.80	1.40	0.80				
Depth To Bottom										
Date Sampled	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	20-Apr-23	20-Apr-23				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil				
Sample Matrix Code	1	5AE	4AE	1A	6A	1E				
% Stones >10mm$_A$	<0.1	12.7	9.4	4.0	8.5	2.3		% w/w	0.1	A-T-044
Sulphate (water sol 2:1)$_D^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		g/l	0.01	A-T-026s
Organic Matter$_D^{M\#}$	2.1	0.5	<0.1	<0.1	2.0	0.2		% w/w	0.1	A-T-032s
Arsenic$_D^{M\#}$	9	3	3	15	2	14		mg/kg	1	A-T-024s
Cadmium$_D^{M\#}$	<0.5	<0.5	0.7	<0.5	<0.5	<0.5		mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	10	14	26	15	24	3		mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	5	23	13	2	33	4		mg/kg	1	A-T-024s
Lead$_D^{M\#}$	3	7	25	2	11	2		mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17		mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	3	25	9	4	45	2		mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	<1	<1	<1	<1	<1	<1		mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	6	31	41	<5	42	6		mg/kg	5	A-T-024s
Leachate Prep BS EN 12457-2 (10:1)$_A$	-	-	*	-	-	*				A-T-001
pH (leachable)$_A^{\#}$	-	-	6.36	-	-	6.49		pH	0.01	A-T-031w
Sulphate (leachable)$_A^{\#}$	-	-	18.56	-	-	20.94		mg/l	1	A-T-026w
DOC (leachable)$_A^{\#}$	-	-	9.7	-	-	14.0		mg/l	2	A-T-032w
Arsenic (leachable)$_A$	-	-	1	-	-	7		µg/l	1	A-T-025w
Cadmium (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-025w
Copper (leachable)$_A$	-	-	29	-	-	8		µg/l	4	A-T-025w
Chromium (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-025w
Lead (leachable)$_A$	-	-	25	-	-	<1		µg/l	1	A-T-025w
Mercury (leachable)$_A$	-	-	<0.1	-	-	<0.1		µg/l	0.1	A-T-025w
Nickel (leachable)$_A$	-	-	3	-	-	<2		µg/l	2	A-T-025w
Selenium (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-025w
Zinc (leachable)$_A$	-	-	26	-	-	5		µg/l	2	A-T-025w

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Lab Sample ID	23/04111/41	23/04111/45	23/04111/48	23/04111/52	23/04111/55	23/04111/58		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP4	TP5	TP10	TP9	TP13	TP18				
Depth to Top	0.60	0.70	0.10	0.80	1.40	0.80				
Depth To Bottom										
Date Sampled	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	20-Apr-23	20-Apr-23				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil				
Sample Matrix Code	1	5AE	4AE	1A	6A	1E				
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD	NAD	NAD	NAD	NAD				A-T-045
Asbestos Matrix (visual)$_{D}$	-	-	-	-	-	-				A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-	-	-	-	-				A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A	N/A	N/A	N/A	N/A				A-T-045

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Lab Sample ID	23/04111/41	23/04111/45	23/04111/48	23/04111/52	23/04111/55	23/04111/58		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP4	TP5	TP10	TP9	TP13	TP18				
Depth to Top	0.60	0.70	0.10	0.80	1.40	0.80				
Depth To Bottom										
Date Sampled	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	20-Apr-23	20-Apr-23				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil				
Sample Matrix Code	1	5AE	4AE	1A	6A	1E				
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07		mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06		mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08		mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07		mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08		mg/kg	0.01	A-T-019s

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Lab Sample ID	23/04111/41	23/04111/45	23/04111/48	23/04111/52	23/04111/55	23/04111/58		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP4	TP5	TP10	TP9	TP13	TP18				
Depth to Top	0.60	0.70	0.10	0.80	1.40	0.80				
Depth To Bottom										
Date Sampled	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	20-Apr-23	20-Apr-23				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil				
Sample Matrix Code	1	5AE	4AE	1A	6A	1E				
PAH 16MS (leachable)										
Acenaphthene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Acenaphthylene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Anthracene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Benzo(a)anthracene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Benzo(a)pyrene (leachable) $_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Benzo(b)fluoranthene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Benzo(ghi)perylene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Benzo(k)fluoranthene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Chrysene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Dibenzo(ah)anthracene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Fluoranthene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Fluorene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Indeno(123-cd)pyrene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Naphthalene (leachable) $_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Phenanthrene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Pyrene (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w
Total PAH 16MS (leachable)$_A$	-	-	<0.02	-	-	<0.02		µg/l	0.02	A-T-019w

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Lab Sample ID	23/04111/41	23/04111/45	23/04111/48	23/04111/52	23/04111/55	23/04111/58		Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP4	TP5	TP10	TP9	TP13	TP18				
Depth to Top	0.60	0.70	0.10	0.80	1.40	0.80				
Depth To Bottom										
Date Sampled	19-Apr-23	19-Apr-23	19-Apr-23	19-Apr-23	20-Apr-23	20-Apr-23				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil				
Sample Matrix Code	1	5AE	4AE	1A	6A	1E				
TPH CWG (leachable) with Clean Up										
Ali >C5-C6 (leachable)$_A$	-	-	<3	-	-	<3		µg/l	1	A-T-022w
Ali >C6-C8 (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-022w
Ali >C8-C10 (leachable)$_A$	-	-	<10	-	-	<10		µg/l	10	A-T-055w
Ali >C10-C12 (leachable)$_A$	-	-	<10	-	-	<10		µg/l	10	A-T-055w
Ali >C12-C16 (leachable)$_A$	-	-	<10	-	-	13		µg/l	10	A-T-055w
Ali >C16-C21 (leachable)$_A$	-	-	<10	-	-	<10		µg/l	10	A-T-055w
Ali >C21-C35 (leachable)$_A$	-	-	<20	-	-	<20		µg/l	20	A-T-055w
Total Aliphatics (leachable)$_A$	-	-	<20	-	-	<20		µg/l	10	Calc-As Recd
Aro >C5-C7 (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-022w
Aro >C7-C8 (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-022w
Aro >C8-C10 (leachable)$_A$	-	-	<10	-	-	<10		µg/l	10	A-T-055w
Aro >C10-C12 (leachable)$_A$	-	-	<10	-	-	<10		µg/l	10	A-T-055w
Aro >C12-C16 (leachable)$_A$	-	-	<10	-	-	13		µg/l	10	A-T-055w
Aro >C16-C21 (leachable)$_A$	-	-	<10	-	-	14		µg/l	10	A-T-055w
Total Aromatics (leachable)$_A$	-	-	<20	-	-	29		µg/l	20	Calc-As Recd
TPH (Ali & Aro >C5-C35) (leachable)$_A$	-	-	<20	-	-	42		µg/l	20	Calc-As Recd
BTEX - Benzene (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-022w
BTEX - Toluene (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-022w
BTEX - Ethyl Benzene (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-022w
BTEX - o Xylene (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-022w
BTEX - m & p Xylene (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-022w
MTBE (leachable)$_A$	-	-	<1	-	-	<1		µg/l	1	A-T-022w
Aro >C21-C35 (leachable)$_A$	-	-	<20	-	-	<20		µg/l	20	A-T-055w

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Wardell Armstrong (Bolton), 41-50 Futura Park, Aspinall Way, Middlebrook, Bolton, Lancashire, UK, BL6 6SU

Project: Lickers Lane

Clients Project No: GM11373

Project No: 23/04111

Date Received: 28/04/2023 (am)

Cool Box Temperatures (°C): 10.0 - 15.0

Lab Sample ID	23/04111/1	23/04111/5	23/04111/7	23/04111/11	23/04111/13	23/04111/17	23/04111/19	23/04111/21	23/04111/23	23/04111/40
Client Sample No										
Client Sample ID/Depth	TP8 0.50m	TP1 1.00m	TP14 0.50m	TP11 1.00m	TP2 0.10m	TP6 1.10m	TP3 0.10m	TP3 2.10m	TP7 1.10m	TP12 3.80m
Date Sampled	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	19/04/23
Deviation Code										
F	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key

F *Maximum holding time exceeded between sampling date and analysis for analytes listed below*

HOLDING TIME EXCEEDANCES

Lab Sample ID	23/04111/1	23/04111/5	23/04111/7	23/04111/11	23/04111/13	23/04111/17	23/04111/19	23/04111/21	23/04111/23	23/04111/40
Client Sample No										
Client Sample ID/Depth	TP8 0.50m	TP1 1.00m	TP14 0.50m	TP11 1.00m	TP2 0.10m	TP6 1.10m	TP3 0.10m	TP3 2.10m	TP7 1.10m	TP12 3.80m
Date Sampled	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	19/04/23
PAH-16MS	✓	✓	✓	✓	✓	✓	✓	✓	✓	
VPHCWG				✓						✓

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	23/04111/1	23/04111/5	23/04111/7	23/04111/11	23/04111/13	23/04111/17	23/04111/19	23/04111/21	23/04111/23	23/04111/26	23/04111/30	23/04111/34
Client Sample No												
Client Sample ID/Depth	TP8 0.50m	TP1 1.00m	TP14 0.50m	TP11 1.00m	TP2 0.10m	TP6 1.10m	TP3 0.10m	TP3 2.10m	TP7 1.10m	TP15 0.60m	TP17 1.80m	TP16 1.30m
Date Sampled	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	18/04/23	19/04/23	19/04/23	19/04/23
A-T-019s	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023
A-T-019w	11/05/2023		11/05/2023	11/05/2023			11/05/2023	11/05/2023		11/05/2023	11/05/2023	11/05/2023
A-T-022s				04/05/2023						04/05/2023	04/05/2023	04/05/2023
A-T-022w	10/05/2023		10/05/2023	10/05/2023			10/05/2023	10/05/2023		10/05/2023	10/05/2023	10/05/2023
A-T-024s	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023
A-T-025w	10/05/2023		10/05/2023	10/05/2023			10/05/2023	10/05/2023		10/05/2023	10/05/2023	10/05/2023
A-T-026s	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023
A-T-026w	10/05/2023		10/05/2023	10/05/2023			10/05/2023	10/05/2023		10/05/2023	10/05/2023	10/05/2023
A-T-031w	10/05/2023		10/05/2023	10/05/2023			10/05/2023	10/05/2023		10/05/2023	10/05/2023	10/05/2023
A-T-032s	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	04/05/2023	05/05/2023	05/05/2023
A-T-032w	10/05/2023		10/05/2023	10/05/2023			10/05/2023	10/05/2023		10/05/2023	10/05/2023	10/05/2023
A-T-044	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023
A-T-045	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023
A-T-054										05/05/2023		
A-T-055s				09/05/2023						09/05/2023	09/05/2023	09/05/2023
A-T-055w	11/05/2023		11/05/2023	11/05/2023			11/05/2023	11/05/2023		11/05/2023	11/05/2023	11/05/2023
Calc-As Recd	11/05/2023		11/05/2023	11/05/2023			11/05/2023	11/05/2023		11/05/2023	11/05/2023	11/05/2023

Lab Sample ID	23/04111/37	23/04111/40	23/04111/41	23/04111/45	23/04111/48	23/04111/52	23/04111/55	23/04111/58
Client Sample No								
Client Sample ID/Depth	TP12 0.10m	TP12 3.80m	TP4 0.60m	TP5 0.70m	TP10 0.10m	TP9 0.80m	TP13 1.40m	TP18 0.80m
Date Sampled	19/04/23	19/04/23	19/04/23	19/04/23	19/04/23	19/04/23	20/04/23	20/04/23
A-T-019s	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023
A-T-019w	11/05/2023	11/05/2023			11/05/2023			11/05/2023
A-T-022s	04/05/2023	05/05/2023						
A-T-022w	10/05/2023	10/05/2023			10/05/2023			10/05/2023
A-T-024s	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023
A-T-025w	10/05/2023	10/05/2023			10/05/2023			10/05/2023
A-T-026s	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023	09/05/2023
A-T-026w	10/05/2023	10/05/2023			10/05/2023			10/05/2023
A-T-031w	10/05/2023	10/05/2023			10/05/2023			10/05/2023
A-T-032s	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023	05/05/2023
A-T-032w	10/05/2023	10/05/2023			10/05/2023			10/05/2023
A-T-044	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023	04/05/2023
A-T-045	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023	03/05/2023
A-T-054								
A-T-055s	09/05/2023	09/05/2023						
A-T-055w	11/05/2023	11/05/2023			11/05/2023			11/05/2023
Calc-As Recd	11/05/2023	11/05/2023			11/05/2023			11/05/2023

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

Appendix F
Laboratory Geotechnical Testing Results

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

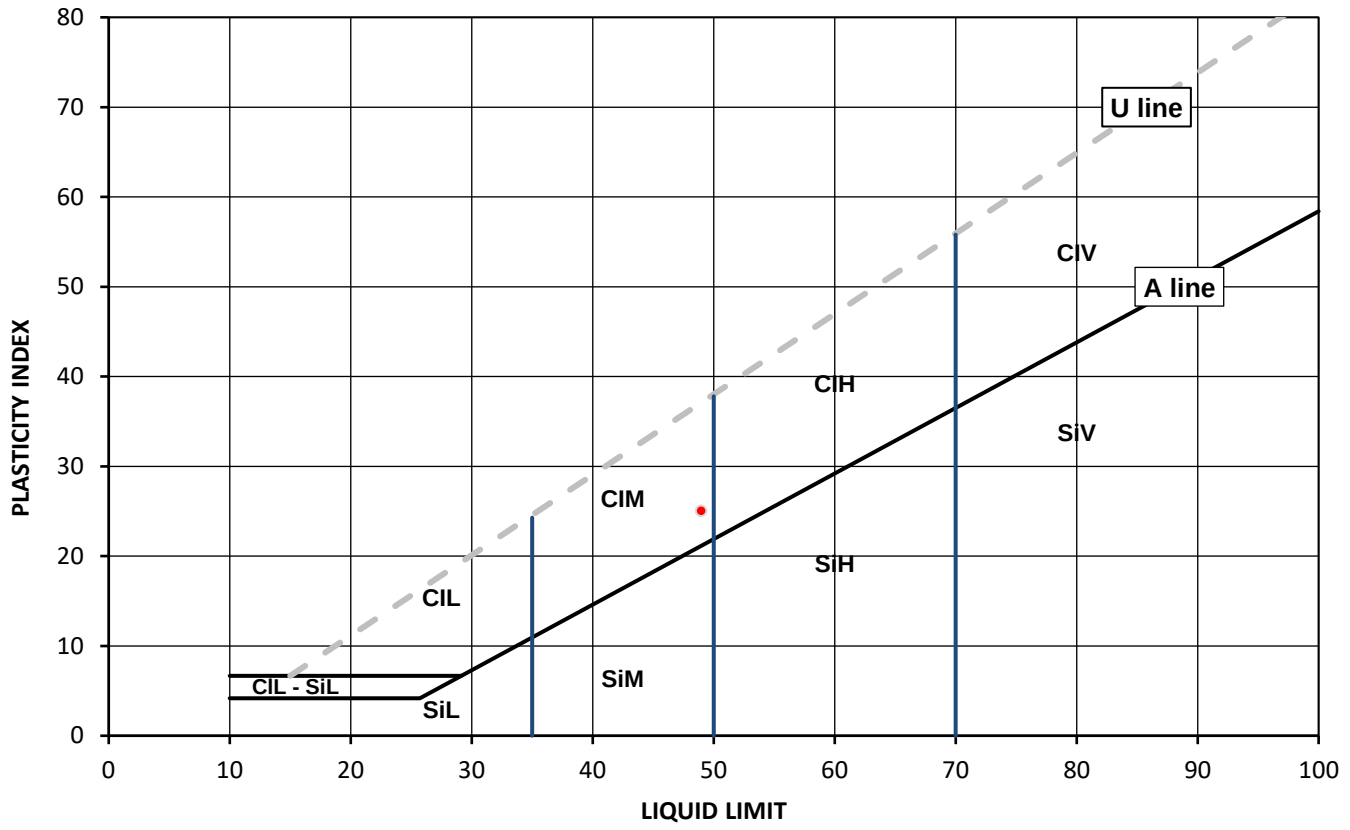
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	11/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668620	Depth Top [m]:	2.50
Hole No.:	WS3	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brownish grey slightly sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
20	49	24	25	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 24/05/2023

GF 232.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

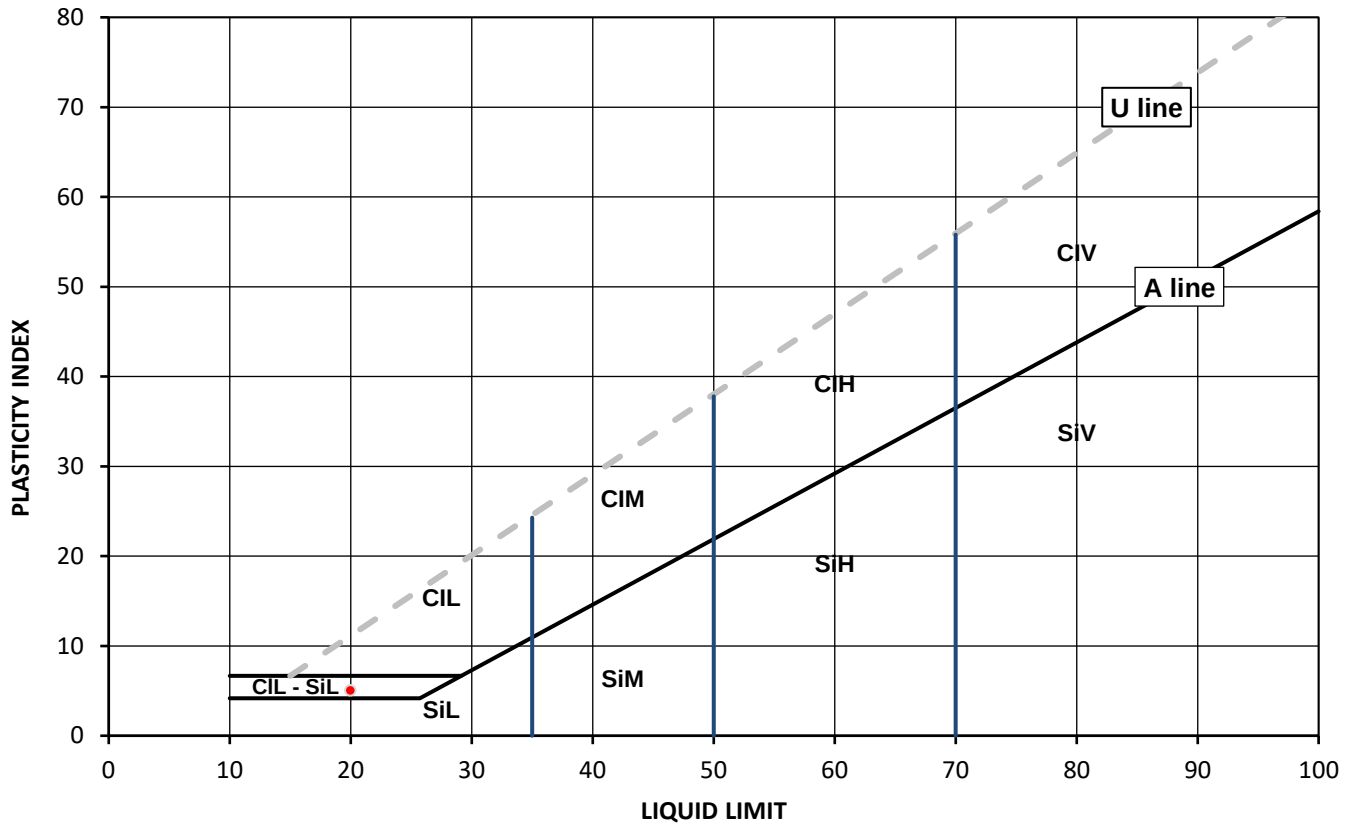
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	11/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668621	Depth Top [m]:	0.50
Hole No.:	WS2	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy very silty CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
15	20	15	5	99



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Signed:

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Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
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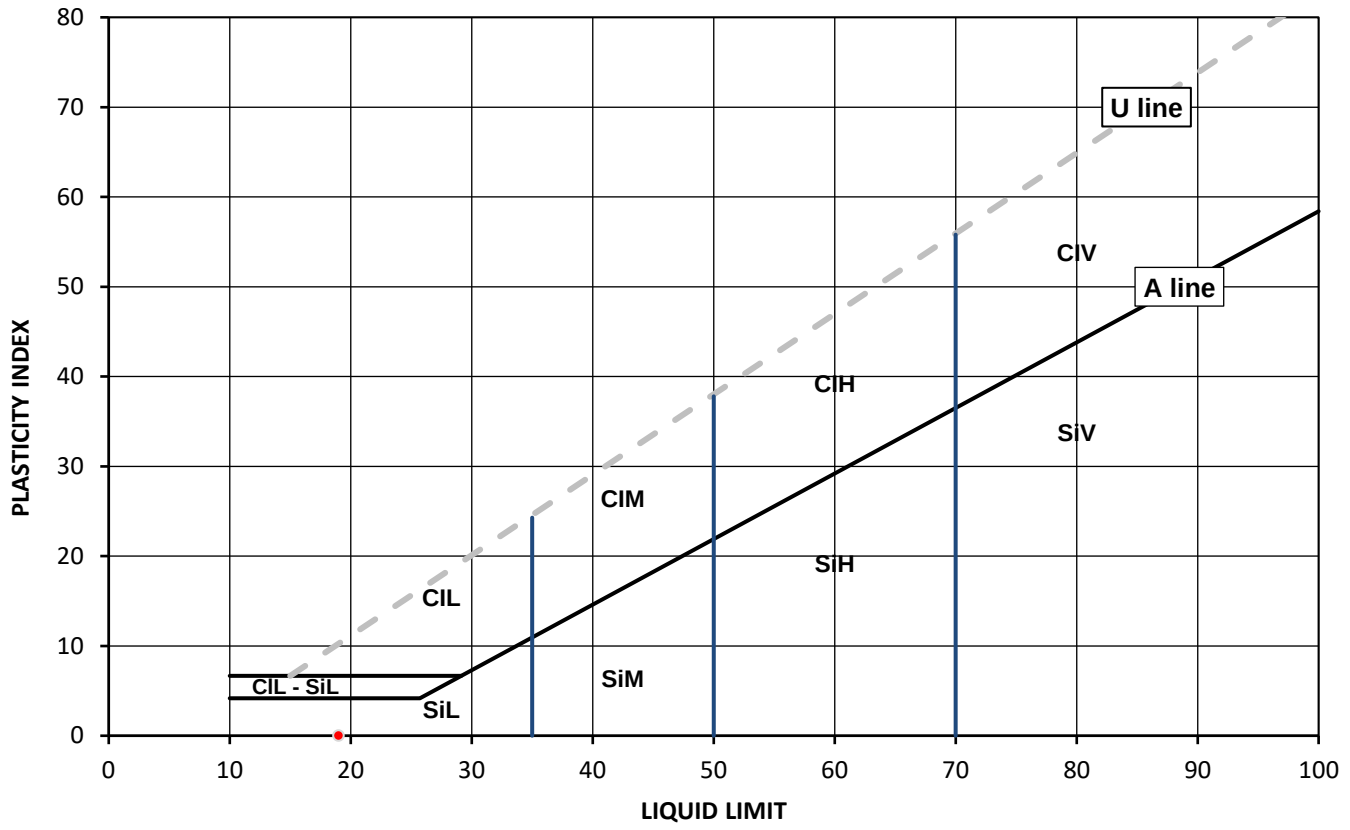
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	11/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668622	Depth Top [m]:	1.50
Hole No.:	WS2	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Light brown slightly gravelly SAND		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
7.6	19	NP	NP	97



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks: NP - non plastic

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Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 24/05/2023

GF 232.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

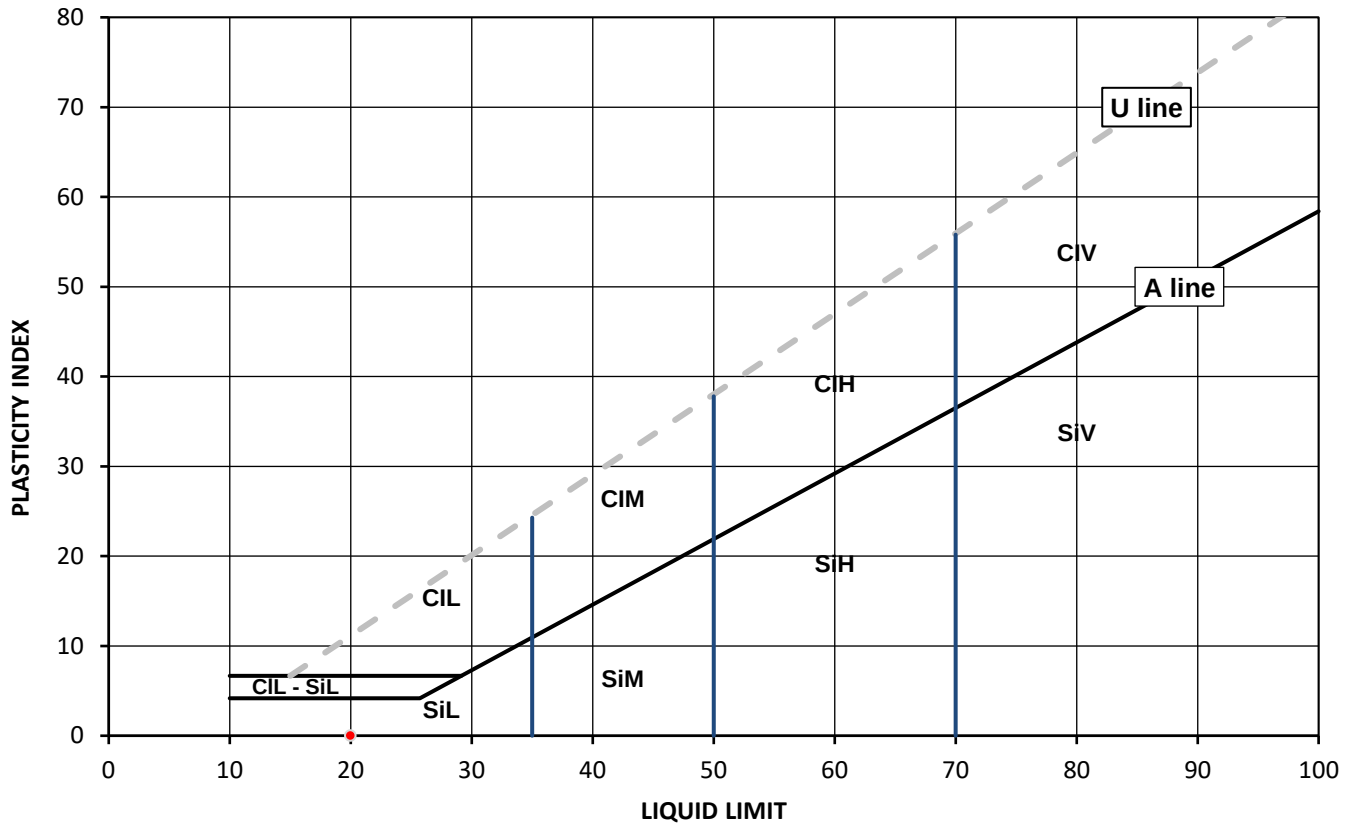
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668623	Depth Top [m]:	0.50
Hole No.:	WS4	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Light brown SAND		
Sample Preparation:	Tested in natural condition		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
7.9	20	NP	NP	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks: NP - non plastic

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 24/05/2023

GF 232.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

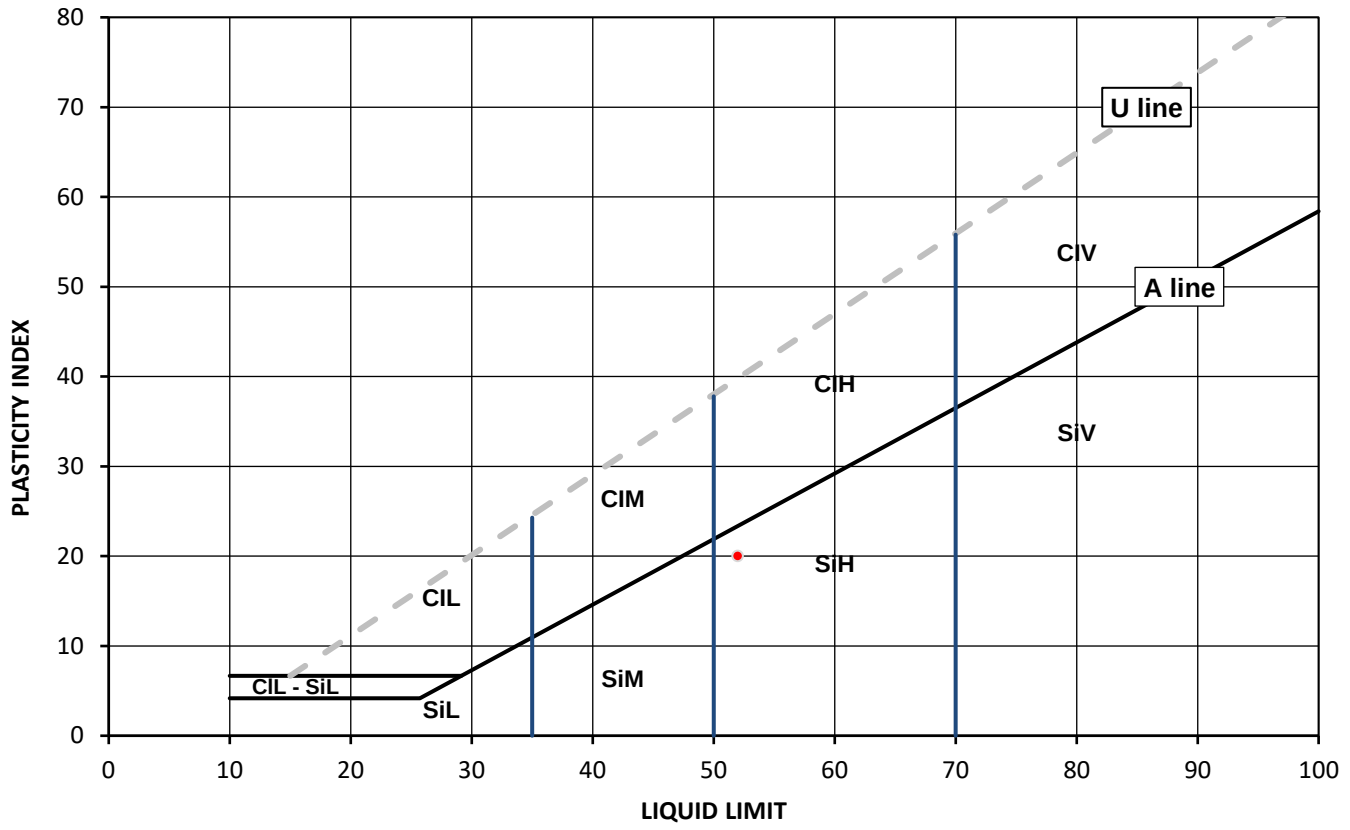
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668624	Depth Top [m]:	0.70
Hole No.:	WS5	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brownish grey slightly sandy SILT with fragments of coal		
Sample Preparation:	Tested after washing to remove >425um		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
25	52	32	20	78



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Signed:
Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 24/05/2023

GF 232.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

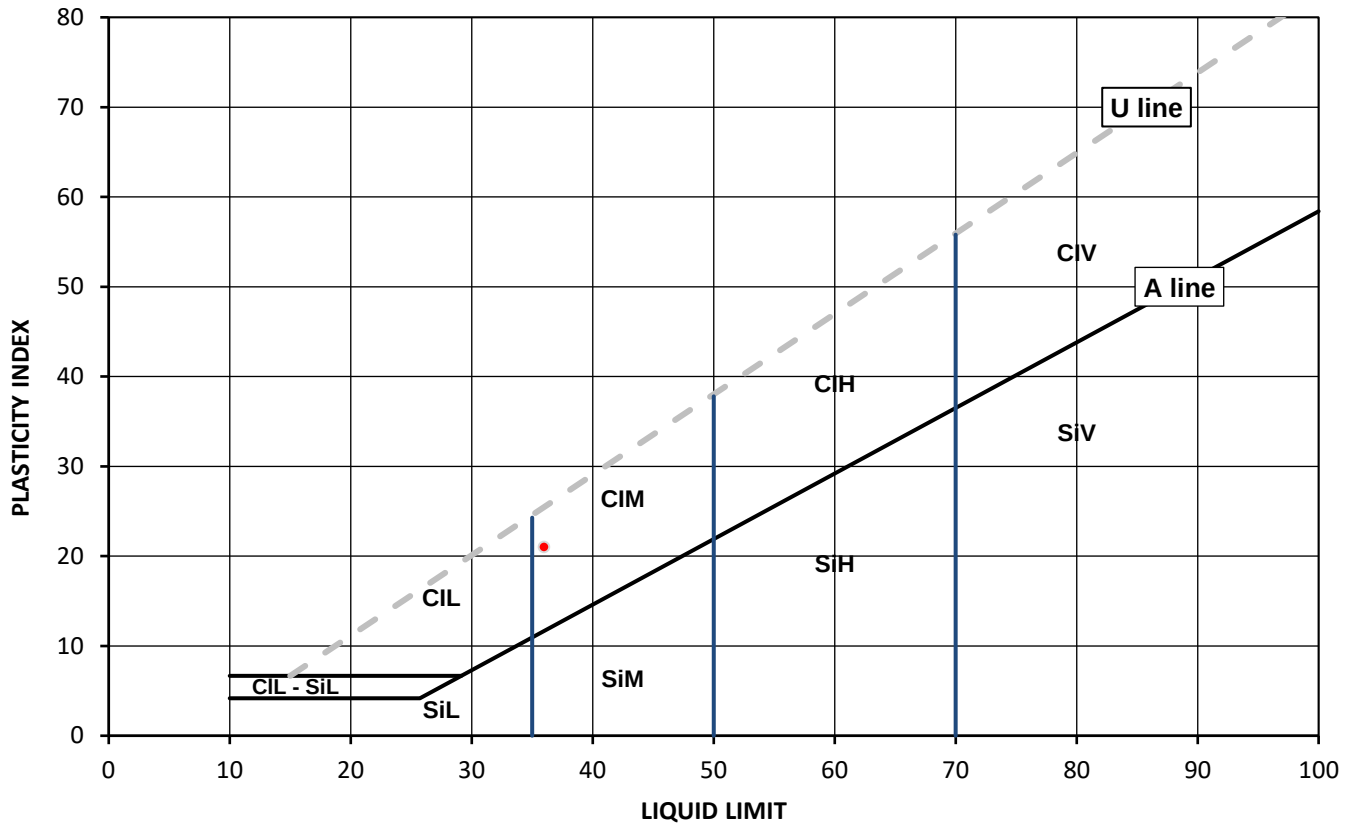
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	11/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668625	Depth Top [m]:	1.70
Hole No.:	WS5	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Bluish grey slightly gravelly sandy CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	36	15	21	96



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

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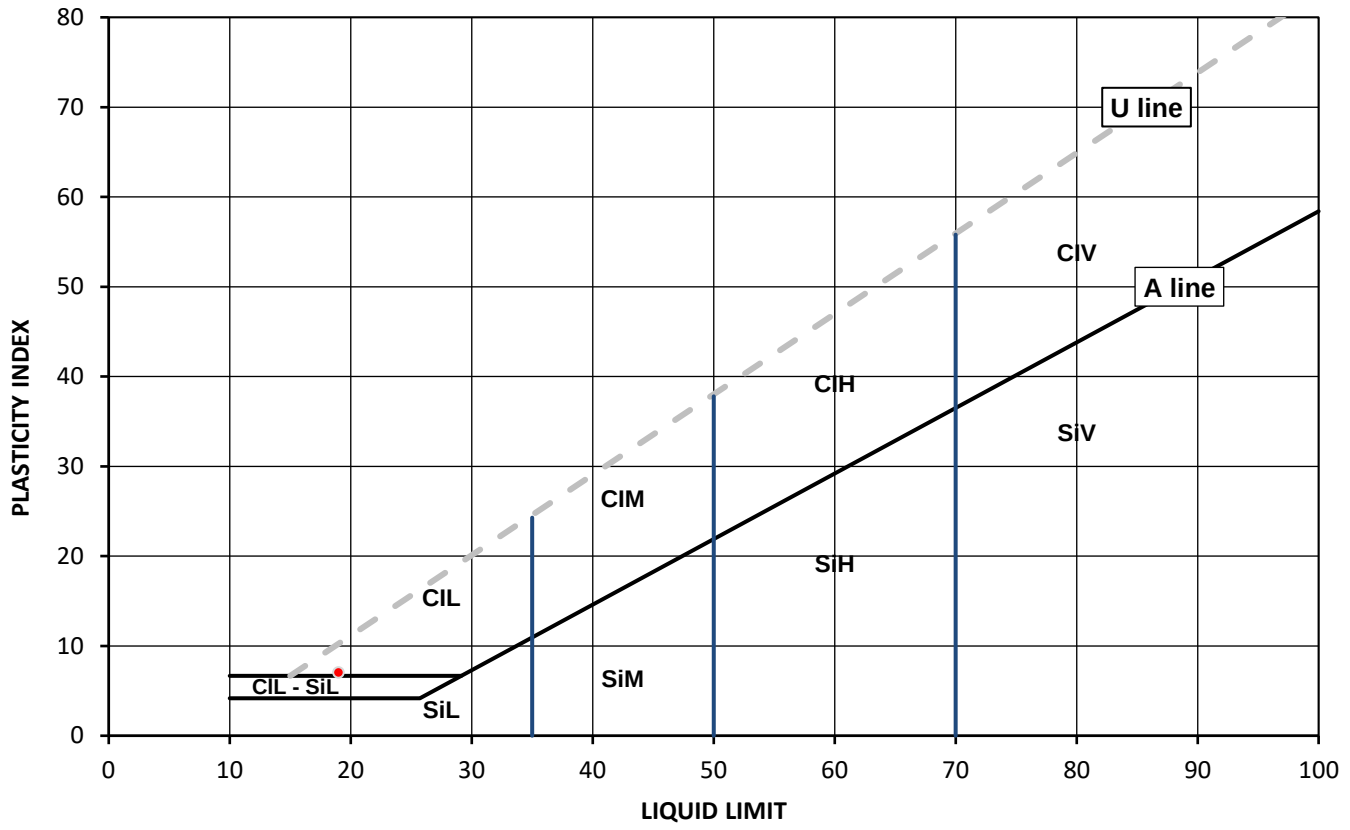
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Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	11/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668626	Depth Top [m]:	0.40
Hole No.:	WS6	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly slightly silty clayey SAND		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
16	19	12	7	95



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

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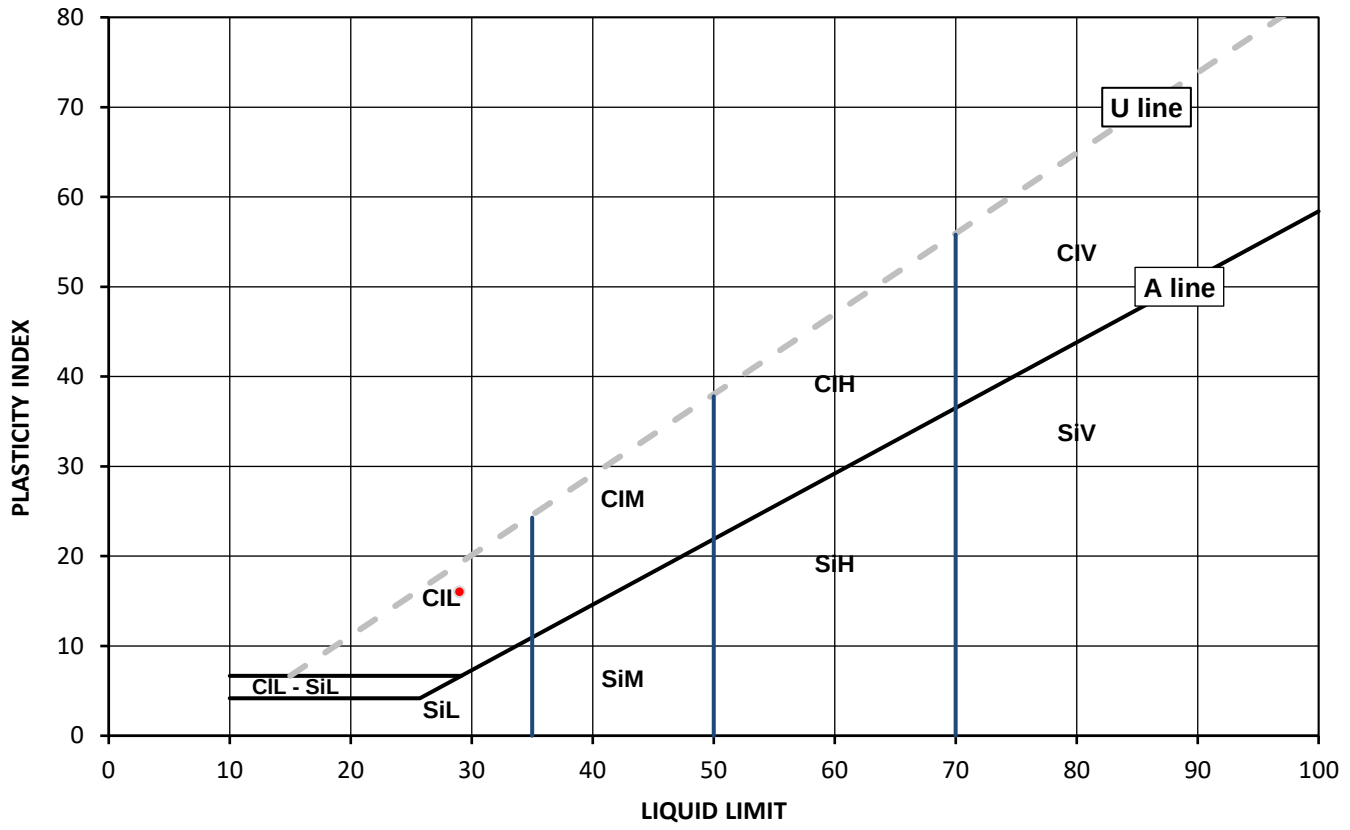
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668627	Depth Top [m]:	1.40
Hole No.:	WS6	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
13	29	13	16	86



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

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		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

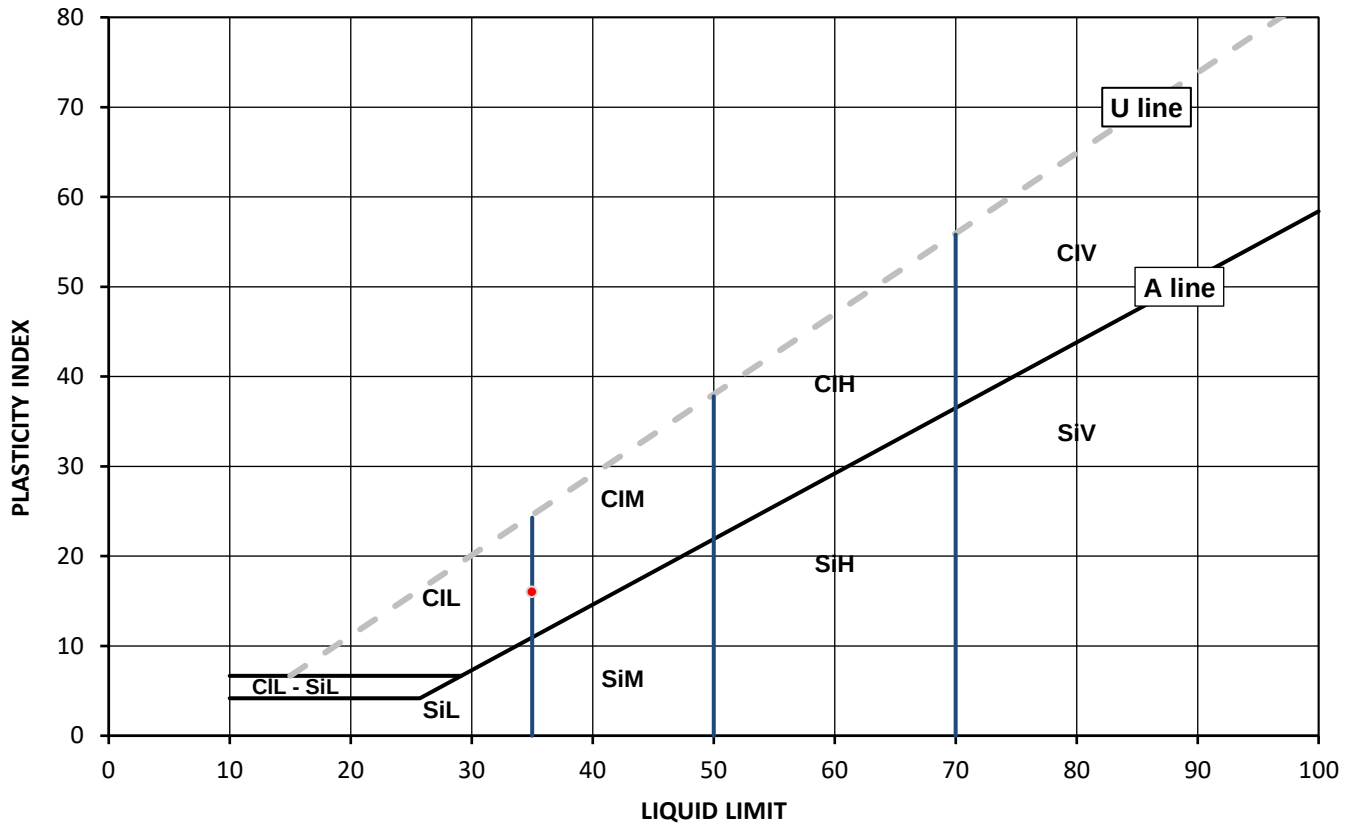
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668628	Depth Top [m]:	2.70
Hole No.:	WS6	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Grey sandy CLAY		

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
8.3	35	19	16	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

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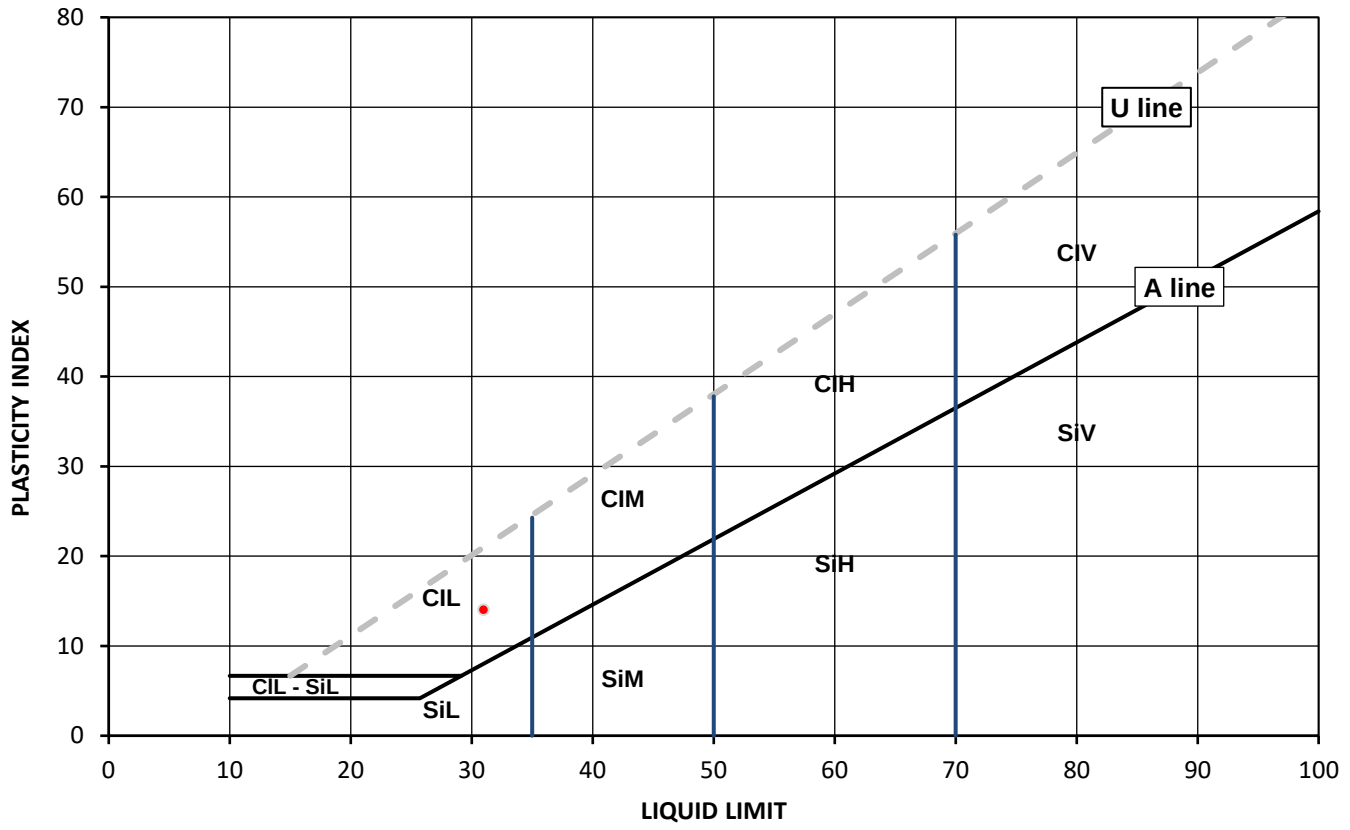
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668629	Depth Top [m]:	1.00
Hole No.:	WS7	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
14	31	17	14	88



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

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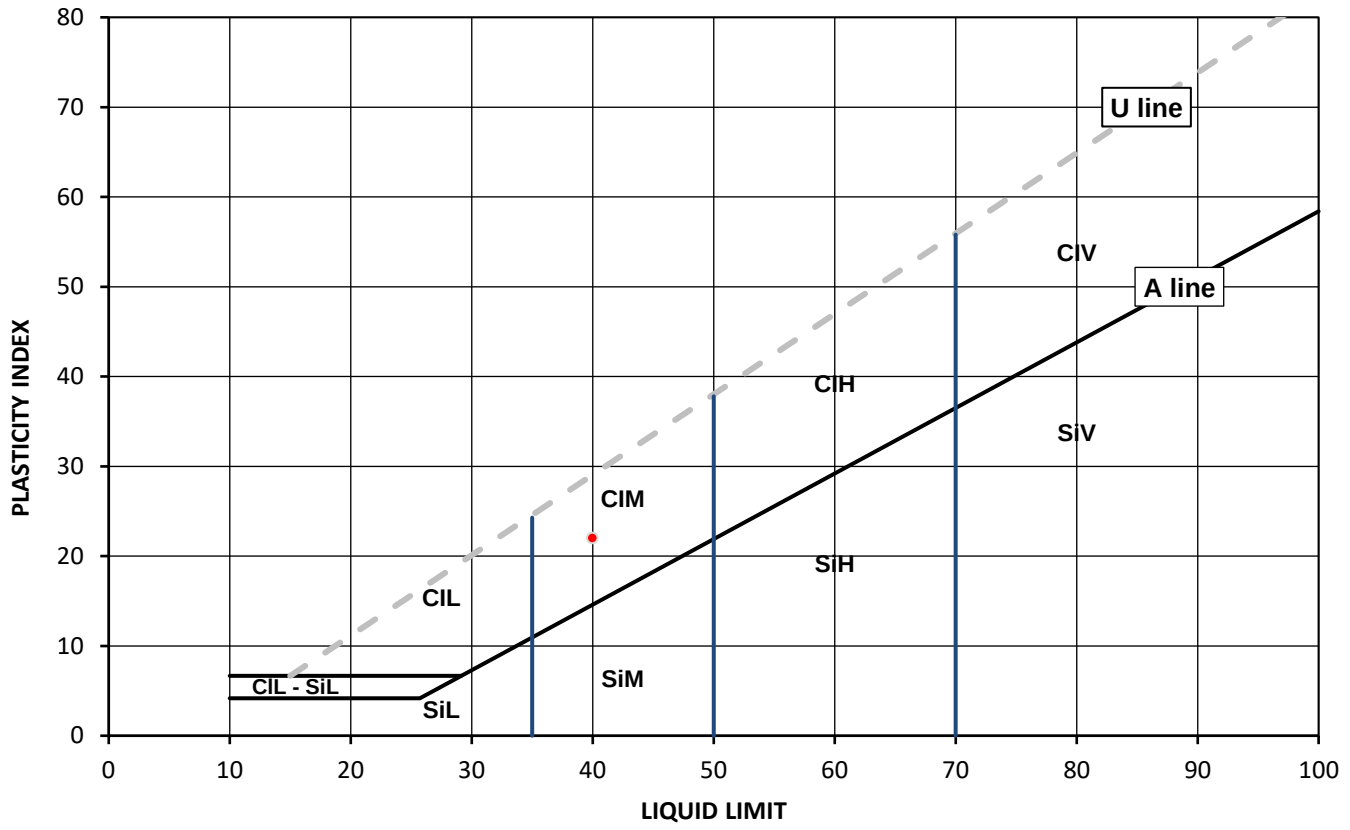
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	11/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668630	Depth Top [m]:	2.00
Hole No.:	WS7	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brownish grey sandy CLAY		
Sample Preparation:	Tested in natural condition		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
21	40	18	22	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

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UKAS TESTING
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Environmental Science

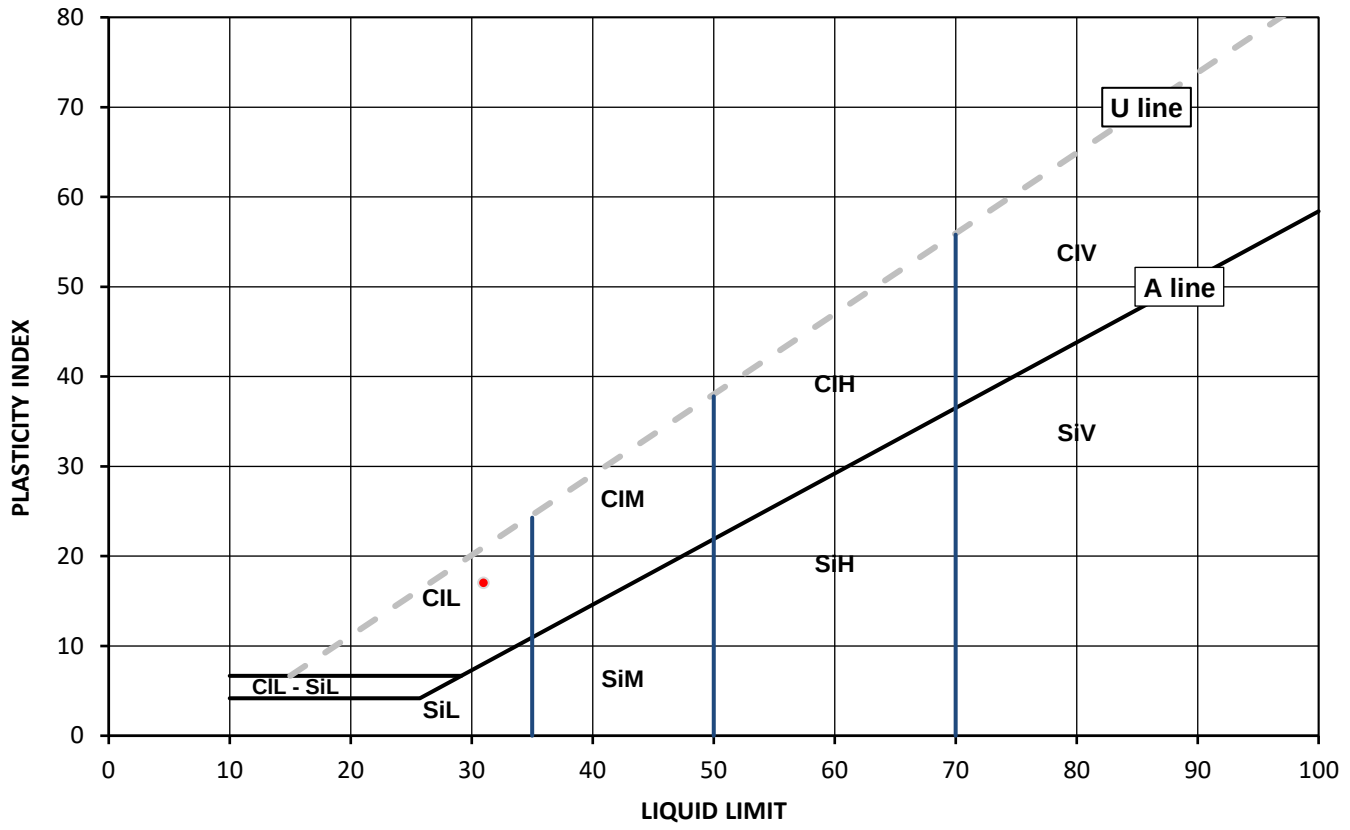
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	11/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668631	Depth Top [m]:	1.30
Hole No.:	WS8	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
14	31	14	17	86



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

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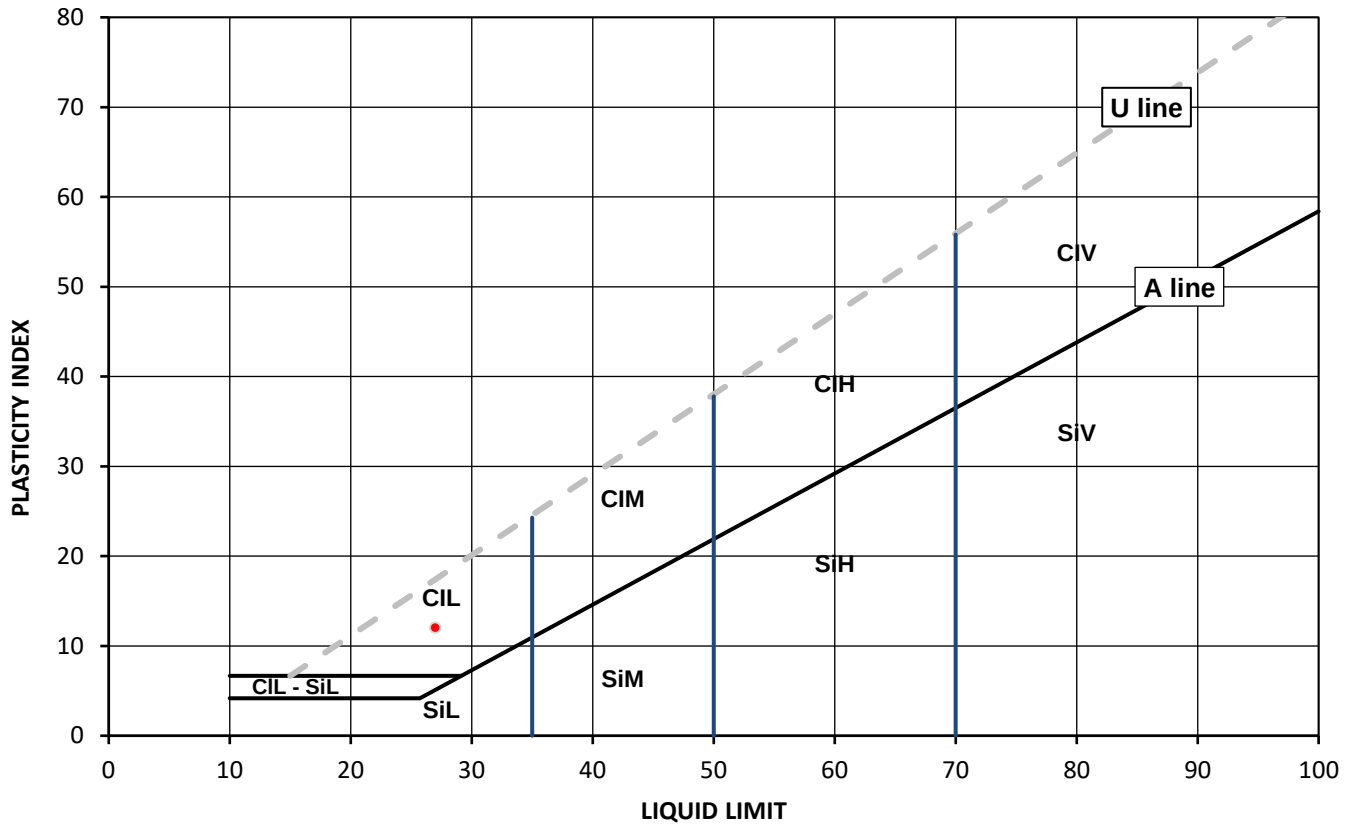
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	11/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668632	Depth Top [m]:	2.30
Hole No.:	WS8	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
11	27	15	12	87



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

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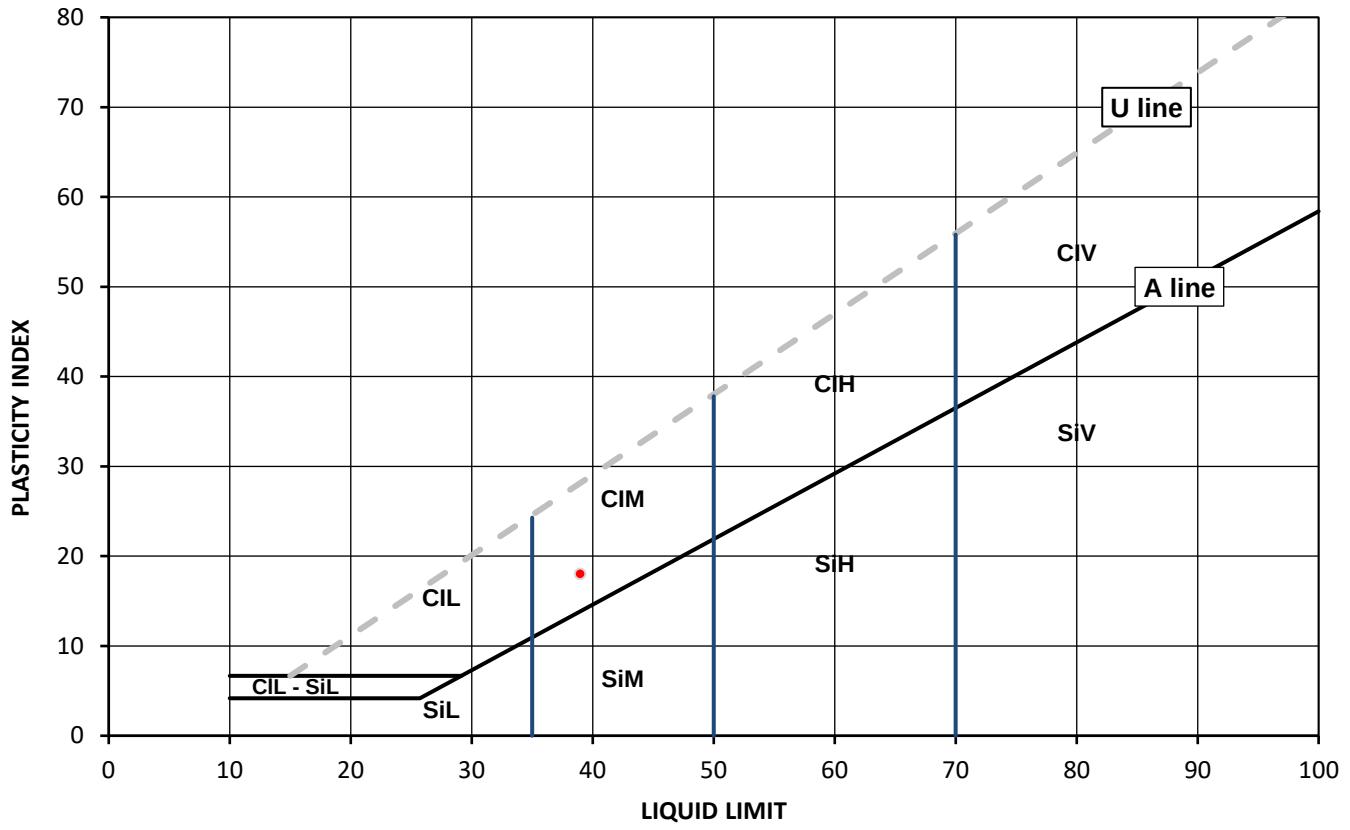
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668634	Depth Top [m]:	2.00
Hole No.:	CP1	Depth Base [m]:	2.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brownish grey slightly gravelly sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
21	39	21	18	72



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

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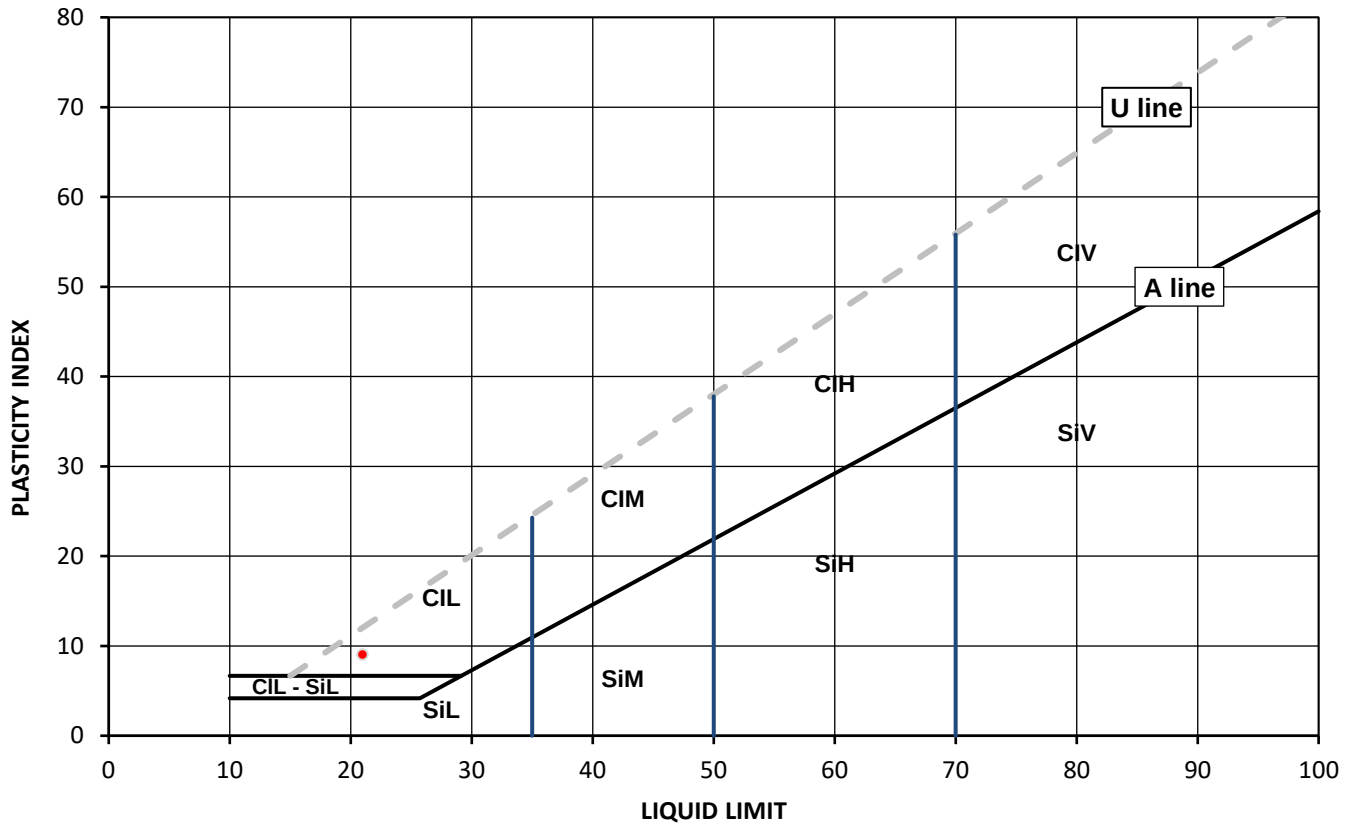
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668636	Depth Top [m]:	1.00
Hole No.:	CP2	Depth Base [m]:	1.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown slightly gravelly clayey SAND		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
15	21	12	9	94



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

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UKAS TESTING 4041

Environmental Science

Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

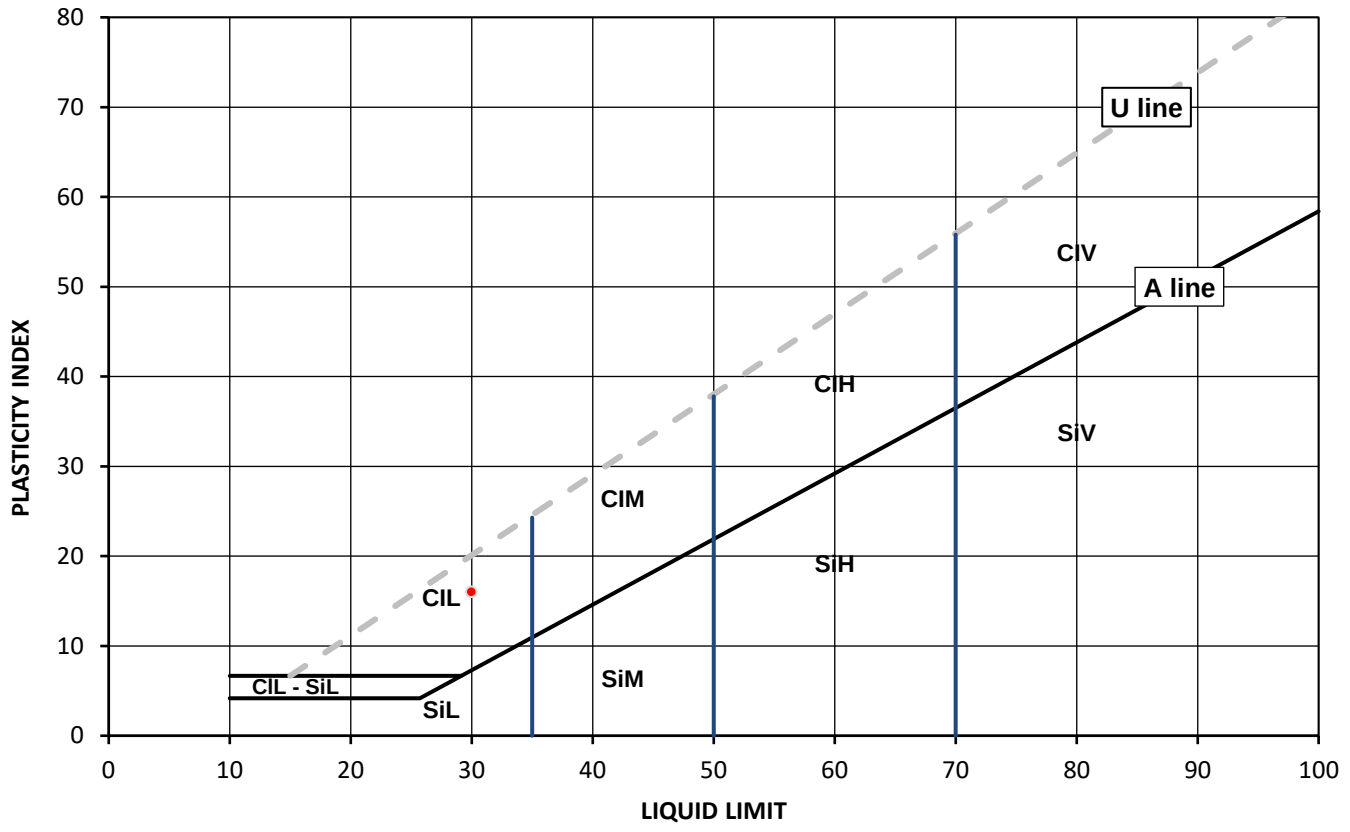
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668637	Depth Top [m]:	1.00
Hole No.:	CP3	Depth Base [m]:	1.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown sandy CLAY		

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
17	30	14	16	99



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Signed: Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 24/05/2023

GF 232.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

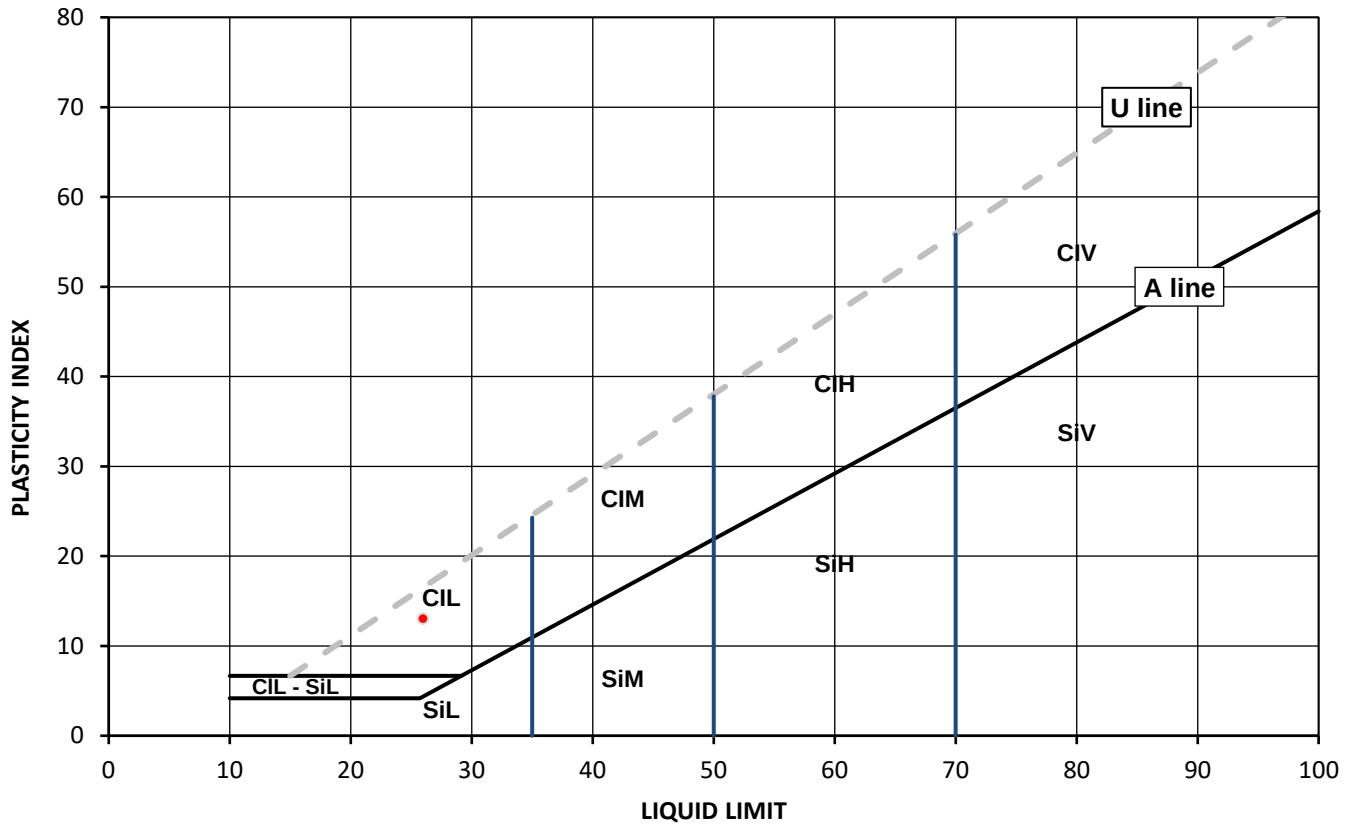
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668639	Depth Top [m]:	2.00
Hole No.:	CP4	Depth Base [m]:	2.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown gravelly sandy CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
13	26	13	13	75



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Signed: Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 24/05/2023

GF 232.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

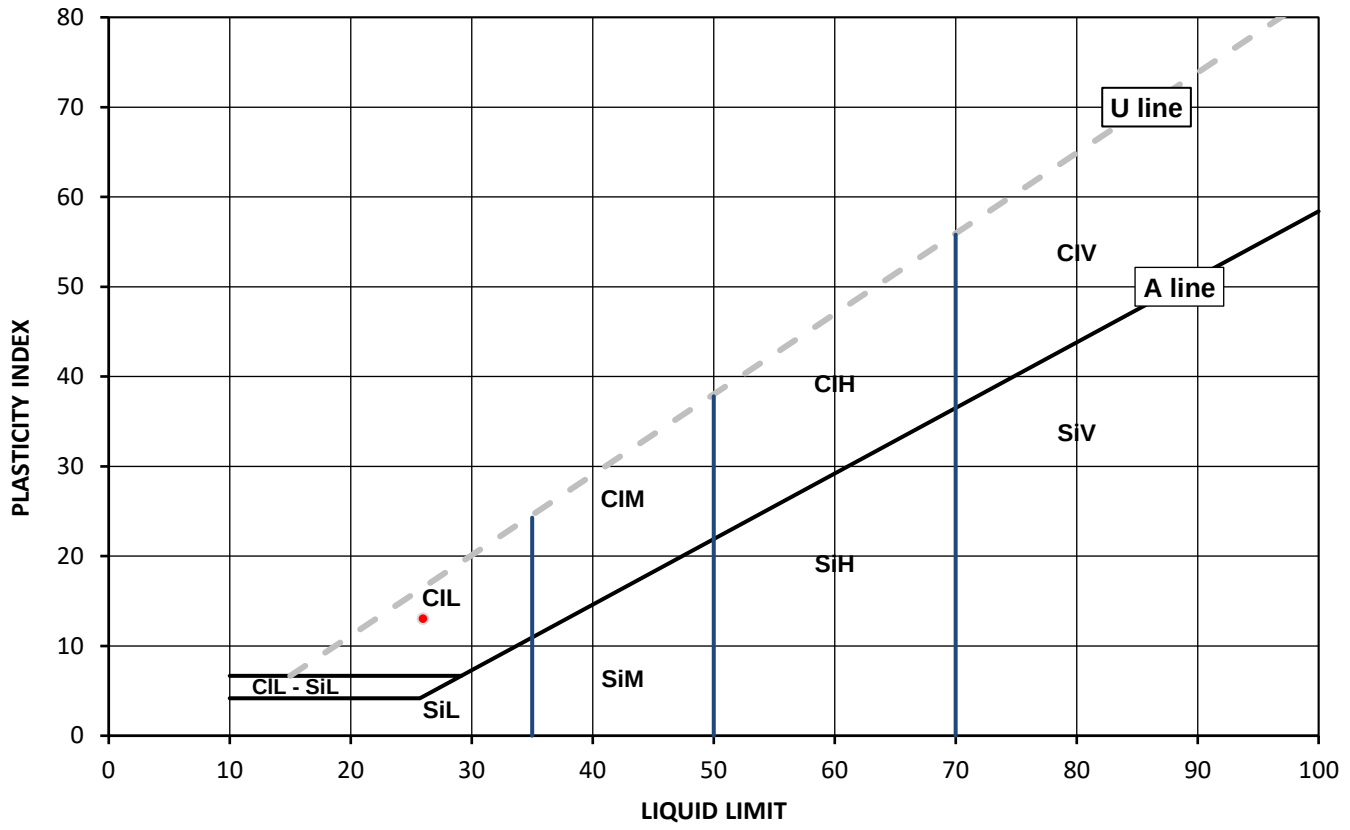
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668640	Depth Top [m]:	3.00
Hole No.:	CP4	Depth Base [m]:	3.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
15	26	13	13	95



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Reporting Specialist
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Date Reported: 24/05/2023

GF 232.12

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

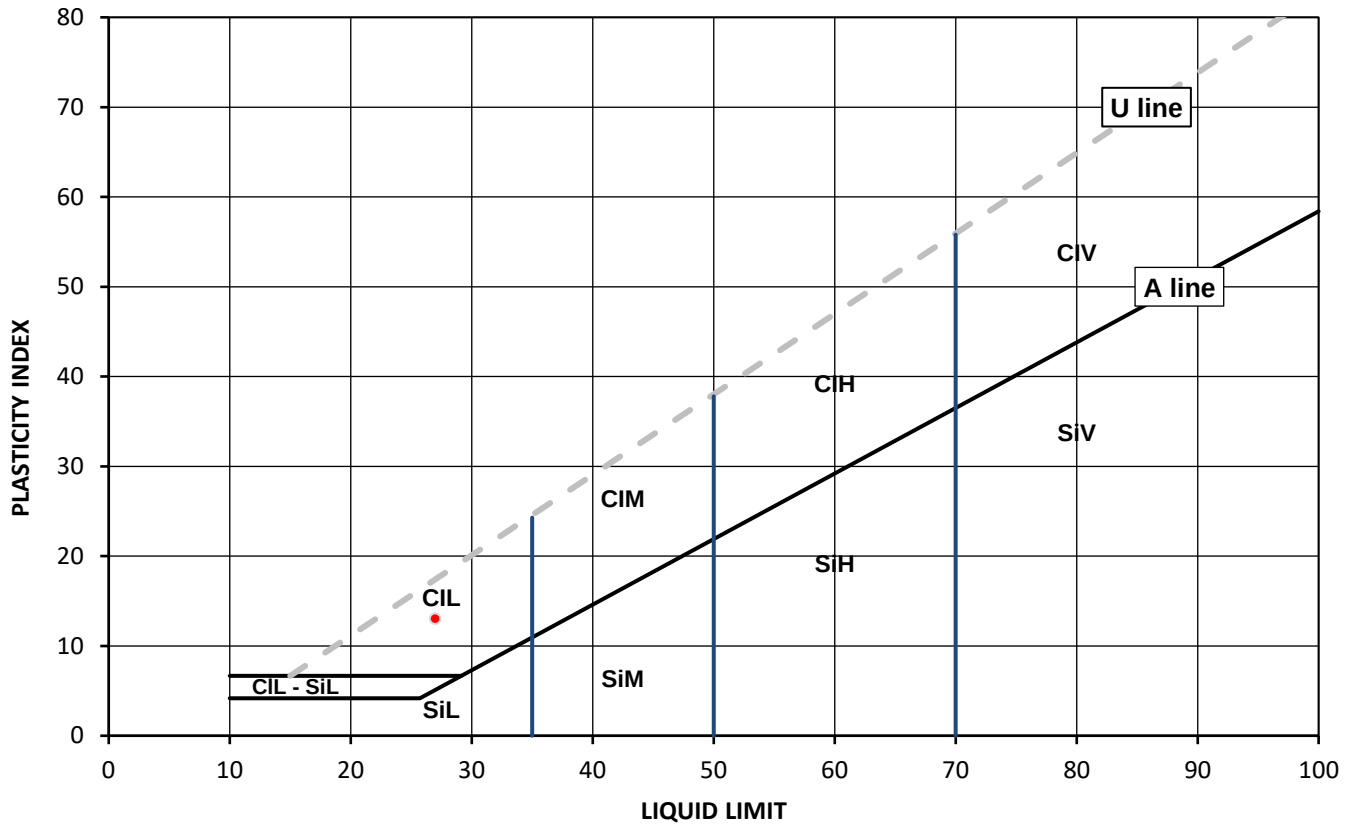
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668641	Depth Top [m]:	1.00
Hole No.:	CP5	Depth Base [m]:	1.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brownish grey sandy CLAY		

Sample Preparation: Tested after >425um removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
16	27	14	13	88



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with:BS 1377-2:1990:Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

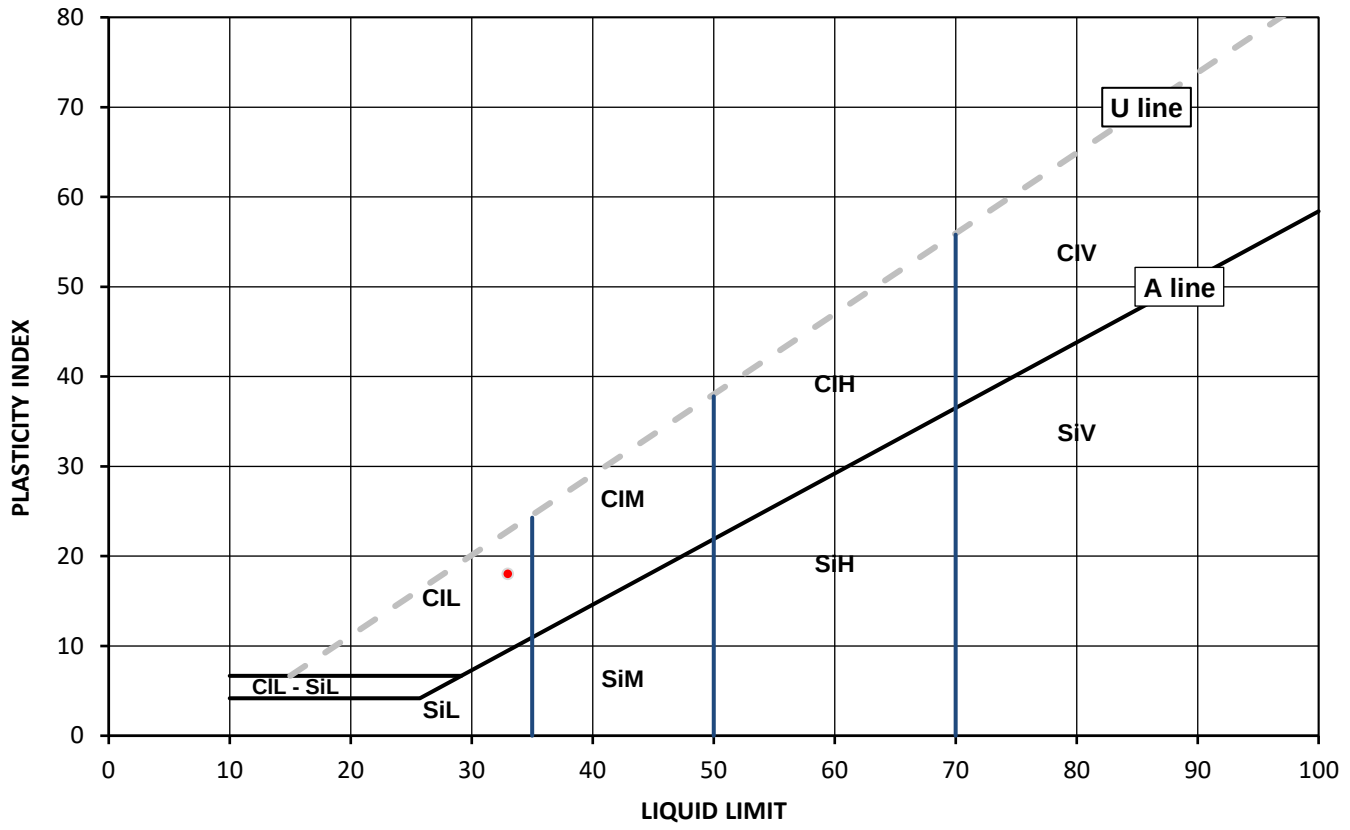
Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668643	Depth Top [m]:	2.00
Hole No.:	CP7	Depth Base [m]:	2.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown slightly gravelly very sandy CLAY		
Sample Preparation:	Tested after >425um removed by hand		

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
14	33	15	18	98



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 24/05/2023

GF 232.12

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: GIP Limited

Client Address: Building 62, Third Avenue,
The Pensnett Estate, Kingswinford,
West Midlands, DY6 7XT

Contact: Matt Laws

Site Address: Lickers Lane

Water Content by BS 1377-2:1990: Clause 3.2Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5

Client Reference: ML/32172
Job Number: 23-31926-1
Date Sampled: Not Given
Date Received: 03/05/2023
Date Tested: 10/05 - 11/05/2023
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W]	Water Content BS EN ISO 17892-1 [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%		
2668620	WS3	Not Given	2.50	Not Given	D	Brownish grey slightly sandy CLAY	Atterberg 1 Point	20		100	49	24	25						
2668621	WS2	Not Given	0.50	Not Given	D	Brown slightly gravelly very sandy very silty CLAY	Atterberg 1 Point	15		99	20	15	5						
2668622	WS2	Not Given	1.50	Not Given	D	Light brown slightly gravelly SAND	Atterberg 1 Point	7.6		97	19	NP	NP						
2668623	WS4	Not Given	0.50	Not Given	D	Light brown SAND	Atterberg 1 Point	7.9		100	20	NP	NP						
2668624	WS5	Not Given	0.70	Not Given	D	Brownish grey slightly sandy SILT with fragments of coal	Atterberg 1 Point	25		78	52	32	20						
2668625	WS5	Not Given	1.70	Not Given	D	Bluish grey slightly gravelly sandy CLAY	Atterberg 1 Point	18		96	36	15	21						
2668626	WS6	Not Given	0.40	Not Given	D	Brown slightly gravelly slightly silty clayey SAND	Atterberg 1 Point	16		95	19	12	7						
2668627	WS6	Not Given	1.40	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 1 Point	13		86	29	13	16						
2668628	WS6	Not Given	2.70	Not Given	D	Grey sandy CLAY	Atterberg 1 Point	8.3		100	35	19	16						
2668629	WS7	Not Given	1.00	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 1 Point	14		88	31	17	14						

Note: # Non accredited; NP - Non plastic

Comments:

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Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/05/2023

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: GIP Limited

Client Address: Building 62, Third Avenue,
The Pensnett Estate, Kingswinford,
West Midlands, DY6 7XT

Contact: Matt Laws

Site Address: Lickers Lane

Water Content by BS 1377-2:1990: Clause 3.2Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5

Client Reference: ML/32172
Job Number: 23-31926-1
Date Sampled: Not Given
Date Received: 03/05/2023
Date Tested: 10/05 - 11/05/2023
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W]	Water Content BS EN ISO 17892-1 [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%		
2668630	WS7	Not Given	2.00	Not Given	D	Brownish grey sandy CLAY	Atterberg 1 Point	21		100	40	18	22						
2668631	WS8	Not Given	1.30	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 1 Point	14		86	31	14	17						
2668632	WS8	Not Given	2.30	Not Given	D	Brown slightly gravelly very sandy CLAY	Atterberg 1 Point	11		87	27	15	12						
2668633	CP1	Not Given	1.00	1.45	B	Brownish grey gravelly silty CLAY		21											
2668634	CP1	Not Given	2.00	2.45	B	Brownish grey slightly gravelly sandy CLAY	Atterberg 1 Point	21		72	39	21	18						
2668636	CP2	Not Given	1.00	1.45	B	Brown slightly gravelly clayey SAND	Atterberg 1 Point	15		94	21	12	9						
2668637	CP3	Not Given	1.00	1.45	B	Brown sandy CLAY	Atterberg 1 Point	17		99	30	14	16						
2668639	CP4	Not Given	2.00	2.45	B	Brown gravelly sandy CLAY	Atterberg 1 Point	13		75	26	13	13						
2668640	CP4	Not Given	3.00	3.45	B	Brown slightly gravelly very sandy CLAY	Atterberg 1 Point	15		95	26	13	13						
2668641	CP5	Not Given	1.00	1.45	B	Brownish grey sandy CLAY	Atterberg 1 Point	16		88	27	14	13						

Note: # Non accredited; NP - Non plastic

Comments:

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Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/05/2023

GF 234.15

SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

Water Content by BS 1377-2:1990: Clause 3.2Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: GIP Limited

Client Address: Building 62, Third Avenue,
The Pensnett Estate, Kingswinford,
West Midlands, DY6 7XT

Contact: Matt Laws

Site Address: Lickers Lane

Client Reference: ML/32172
Job Number: 23-31926-1
Date Sampled: Not Given
Date Received: 03/05/2023
Date Tested: 10/05/2023
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W]	Water Content BS EN ISO 17892-1 [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%		
2668642	CP6	Not Given	1.00	1.45	B	Brown sandy CLAY		14											
2668643	CP7	Not Given	2.00	2.45	B	Brown slightly gravelly very sandy CLAY	Atterberg 1 Point	14		98	33	15	18						

Note: # Non accredited; NP - Non plastic

Comments:

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Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/05/2023

GF 234.15

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: GIP Limited

Client Address: Building 62, Third Avenue,
The Pensnett Estate, Kingswinford,
West Midlands, DY6 7XT

Contact: Matt Laws

Site Address: Lickers Lane

Client Reference: ML/32172
Job Number: 23-31926-1
Date Sampled: Not Given
Date Received: 03/05/2023
Date Tested: 10/05 - 11/05/2023
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type			%				
2668620	WS3	Not Given	2.50	Not Given	D	Brownish grey slightly sandy CLAY		20	Sample was quartered, oven dried at 106 °C			
2668621	WS2	Not Given	0.50	Not Given	D	Brown slightly gravelly very sandy very silty CLAY		15	Sample was quartered, oven dried at 106 °C			
2668622	WS2	Not Given	1.50	Not Given	D	Light brown slightly gravelly SAND		7.6	Sample was quartered, oven dried at 106 °C			
2668623	WS4	Not Given	0.50	Not Given	D	Light brown SAND		7.9	Sample was quartered, oven dried at 106 °C			
2668624	WS5	Not Given	0.70	Not Given	D	Brownish grey slightly sandy SILT with fragments of coal		25	Sample was quartered, oven dried at 106 °C			
2668625	WS5	Not Given	1.70	Not Given	D	Bluish grey slightly gravelly sandy CLAY		18	Sample was quartered, oven dried at 106.3 °C			
2668626	WS6	Not Given	0.40	Not Given	D	Brown slightly gravelly slightly silty clayey SAND		16	Sample was quartered, oven dried at 106.3 °C			
2668627	WS6	Not Given	1.40	Not Given	D	Brown slightly gravelly very sandy CLAY		13	Sample was quartered, oven dried at 106 °C			
2668628	WS6	Not Given	2.70	Not Given	D	Grey sandy CLAY		8.3	Sample was quartered, oven dried at 106 °C			
2668629	WS7	Not Given	1.00	Not Given	D	Brown slightly gravelly very sandy CLAY		14	Sample was quartered, oven dried at 106 °C			

Comments:

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Date Reported: 24/05/2023

GF 099.16

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Client: GIP Limited

Client Address: Building 62, Third Avenue,
The Pensnett Estate, Kingswinford,
West Midlands, DY6 7XT

Contact: Matt Laws

Site Address: Lickers Lane

Client Reference: ML/32172
Job Number: 23-31926-1
Date Sampled: Not Given
Date Received: 03/05/2023
Date Tested: 10/05 - 11/05/2023
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type			%				
2668630	WS7	Not Given	2.00	Not Given	D	Brownish grey sandy CLAY		21	Sample was quartered, oven dried at 106 °C			
2668631	WS8	Not Given	1.30	Not Given	D	Brown slightly gravelly very sandy CLAY		14	Sample was quartered, oven dried at 106 °C			
2668632	WS8	Not Given	2.30	Not Given	D	Brown slightly gravelly very sandy CLAY		11	Sample was quartered, oven dried at 106.3 °C			
2668633	CP1	Not Given	1.00	1.45	B	Brownish grey gravelly silty CLAY		21	Sample was quartered, oven dried at 106.3 °C			
2668634	CP1	Not Given	2.00	2.45	B	Brownish grey slightly gravelly sandy CLAY		21	Sample was quartered, oven dried at 106.3 °C			
2668636	CP2	Not Given	1.00	1.45	B	Brown slightly gravelly clayey SAND		15	Sample was quartered, oven dried at 106.3 °C			
2668637	CP3	Not Given	1.00	1.45	B	Brown sandy CLAY		17	Sample was quartered, oven dried at 106.3 °C			
2668639	CP4	Not Given	2.00	2.45	B	Brown gravelly sandy CLAY		13	Sample was quartered, oven dried at 106.3 °C			
2668640	CP4	Not Given	3.00	3.45	B	Brown slightly gravelly very sandy CLAY		15	Sample was quartered, oven dried at 106 °C			
2668641	CP5	Not Given	1.00	1.45	B	Brownish grey sandy CLAY		16	Sample was quartered, oven dried at 106 °C			

Comments:

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Date Reported: 24/05/2023

GF 099.16

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
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Northampton NN4 7EB

4041

Client: GIP Limited

Client Address: Building 62, Third Avenue,
The Pensnett Estate, Kingswinford,
West Midlands, DY6 7XT

Contact: Matt Laws

Site Address: Lickers Lane

Client Reference: ML/32172
Job Number: 23-31926-1
Date Sampled: Not Given
Date Received: 03/05/2023
Date Tested: 10/05/2023
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type			%				
2668642	CP6	Not Given	1.00	1.45	B	Brown sandy CLAY		14	Sample was quartered, oven dried at 106 °C			
2668643	CP7	Not Given	2.00	2.45	B	Brown slightly gravelly very sandy CLAY		14	Sample was quartered, oven dried at 106 °C			

Comments:

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Signed: Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 24/05/2023

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

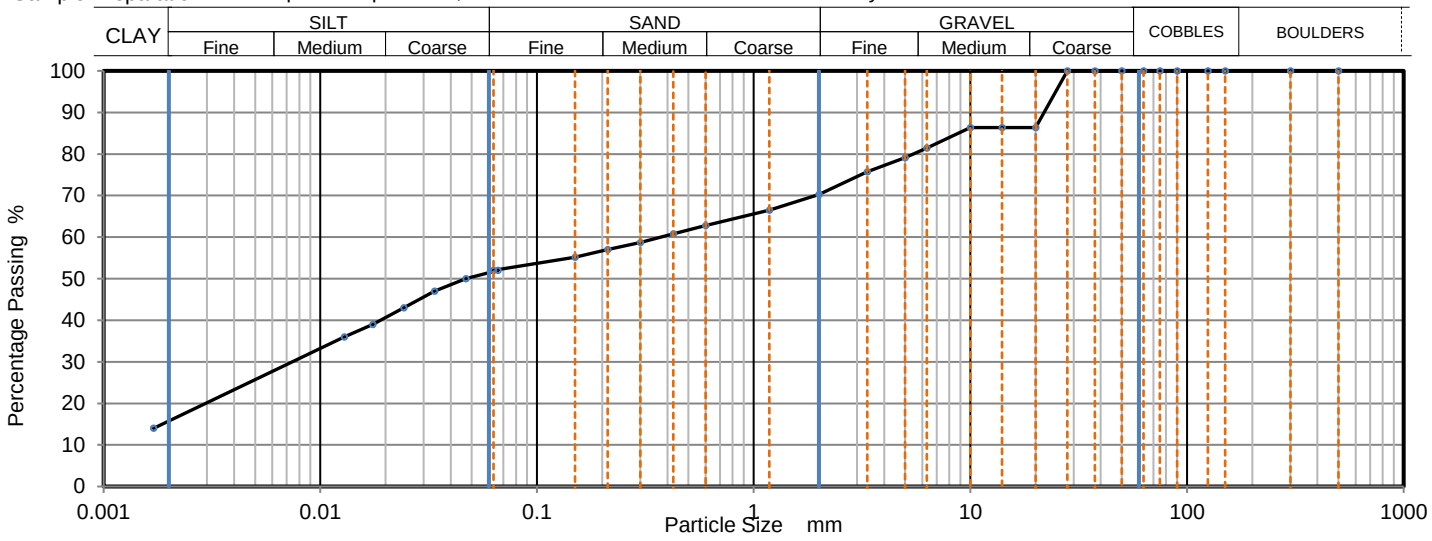
4041

Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668633	Depth Top [m]:	1.00
Hole No.:	CP1	Depth Base [m]:	1.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brownish grey gravelly silty CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.0 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0659	52
300	100	0.0469	50
150	100	0.0337	47
125	100	0.0243	43
90	100	0.0174	39
75	100	0.0129	36
63	100	0.0017	14
50	100		
37.5	100		
28	100		
20	86		
14	86		
10	86		
6.3	81		
5	79		
3.35	76	Particle density	(assumed)
2	70	2.65	Mg/m3
1.18	67		
0.6	63		
0.425	61		
0.3	59		
0.212	57		
0.15	55		
0.063	52		

Sample Proportions	% dry mass
Very coarse	0
Gravel	30
Sand	18
Silt	36
Clay	16

Grading Analysis		
D100	mm	28
D60	mm	0.371
D30	mm	0.00727
D10	mm	
Uniformity Coefficient		> 220
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

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Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/05/2023

GF 100.22

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

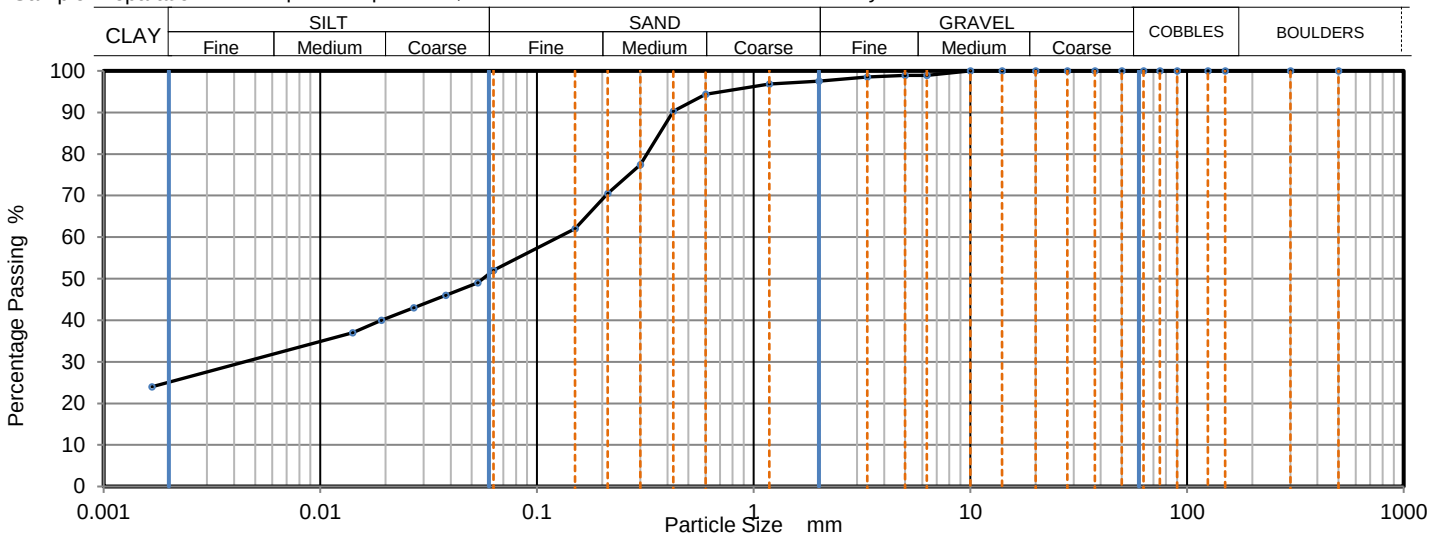
4041

Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668637	Depth Top [m]:	1.00
Hole No.:	CP3	Depth Base [m]:	1.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.0 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0630	52
300	100	0.0533	49
150	100	0.0379	46
125	100	0.0269	43
90	100	0.0192	40
75	100	0.0141	37
63	100	0.0017	24
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	99	Particle density	(assumed)
2	98	2.65	Mg/m3
1.18	97		
0.6	94		
0.425	90		
0.3	77		
0.212	71		
0.15	62		
0.063	52		

Sample Proportions	% dry mass
Very coarse	0
Gravel	2
Sand	46
Silt	27
Clay	25

Grading Analysis		
D100	mm	10
D60	mm	0.126
D30	mm	0.00442
D10	mm	
Uniformity Coefficient		> 75
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

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Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/05/2023

GF 100.22

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

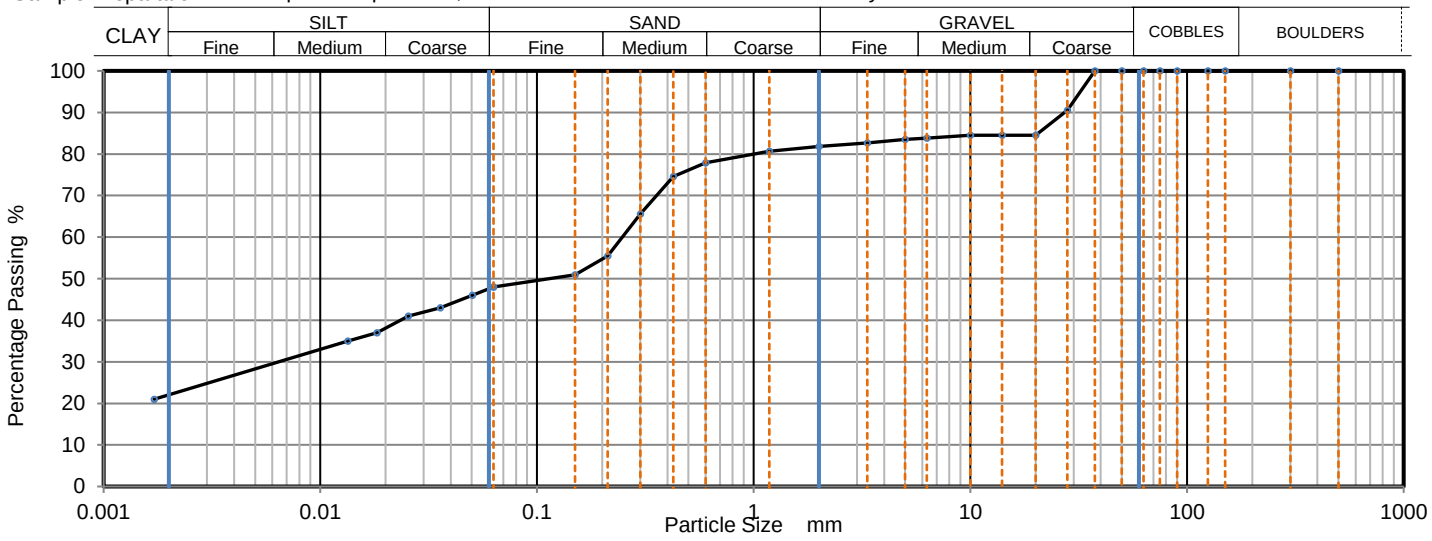
4041

Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668639	Depth Top [m]:	2.00
Hole No.:	CP4	Depth Base [m]:	2.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown gravelly sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.0 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0630	48
300	100	0.0503	46
150	100	0.0358	43
125	100	0.0255	41
90	100	0.0182	37
75	100	0.0134	35
63	100	0.0017	21
50	100		
37.5	100		
28	91		
20	85		
14	85		
10	85		
6.3	84		
5	84		
3.35	83	Particle density	(assumed)
2	82	2.65	Mg/m3
1.18	81		
0.6	78		
0.425	75		
0.3	66		
0.212	56		
0.15	51		
0.063	48		

Sample Proportions	% dry mass
Very coarse	0
Gravel	18
Sand	34
Silt	26
Clay	22

Grading Analysis		
D100	mm	37.5
D60	mm	0.247
D30	mm	0.00642
D10	mm	
Uniformity Coefficient		> 140
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

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Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/05/2023

GF 100.22

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

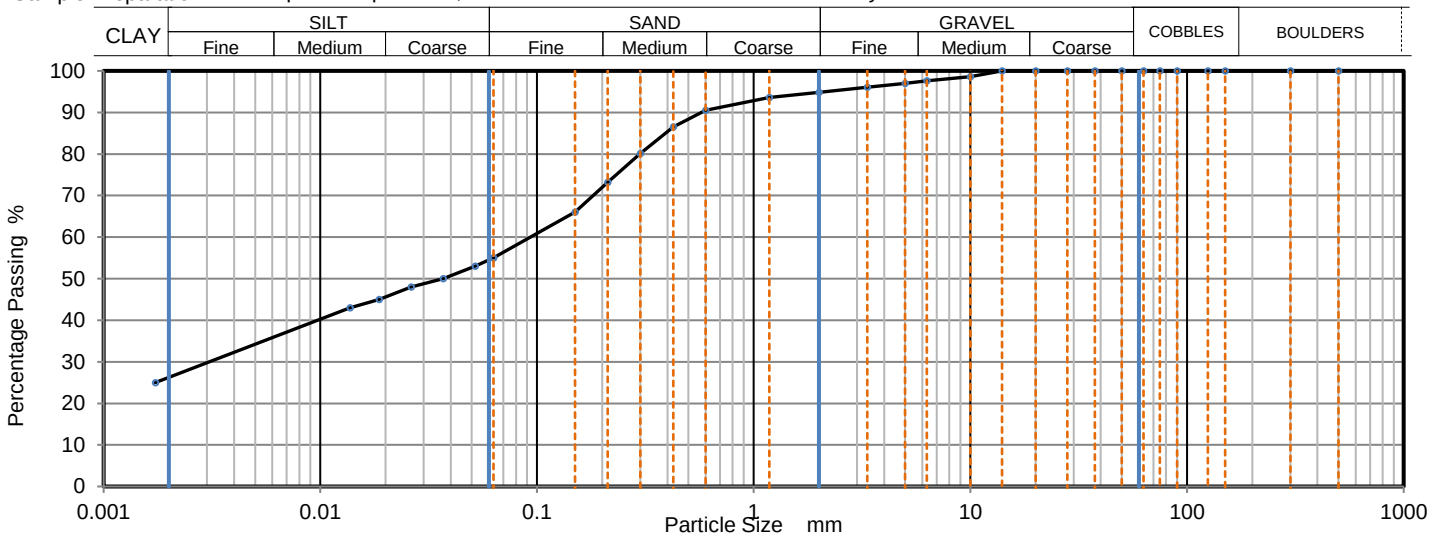
4041

Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668641	Depth Top [m]:	1.00
Hole No.:	CP5	Depth Base [m]:	1.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brownish grey sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.0 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0630	55
300	100	0.0519	53
150	100	0.0369	50
125	100	0.0263	48
90	100	0.0187	45
75	100	0.0137	43
63	100	0.0017	25
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	97		
3.35	96	Particle density	(assumed)
2	95	2.65	Mg/m3
1.18	94		
0.6	91		
0.425	87		
0.3	80		
0.212	73		
0.15	66		
0.063	55		

Sample Proportions	% dry mass
Very coarse	0
Gravel	5
Sand	40
Silt	29
Clay	26

Grading Analysis		
D100	mm	14
D60	mm	0.0933
D30	mm	0.00313
D10	mm	
Uniformity Coefficient		> 54
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

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Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/05/2023

GF 100.22

TEST CERTIFICATE

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

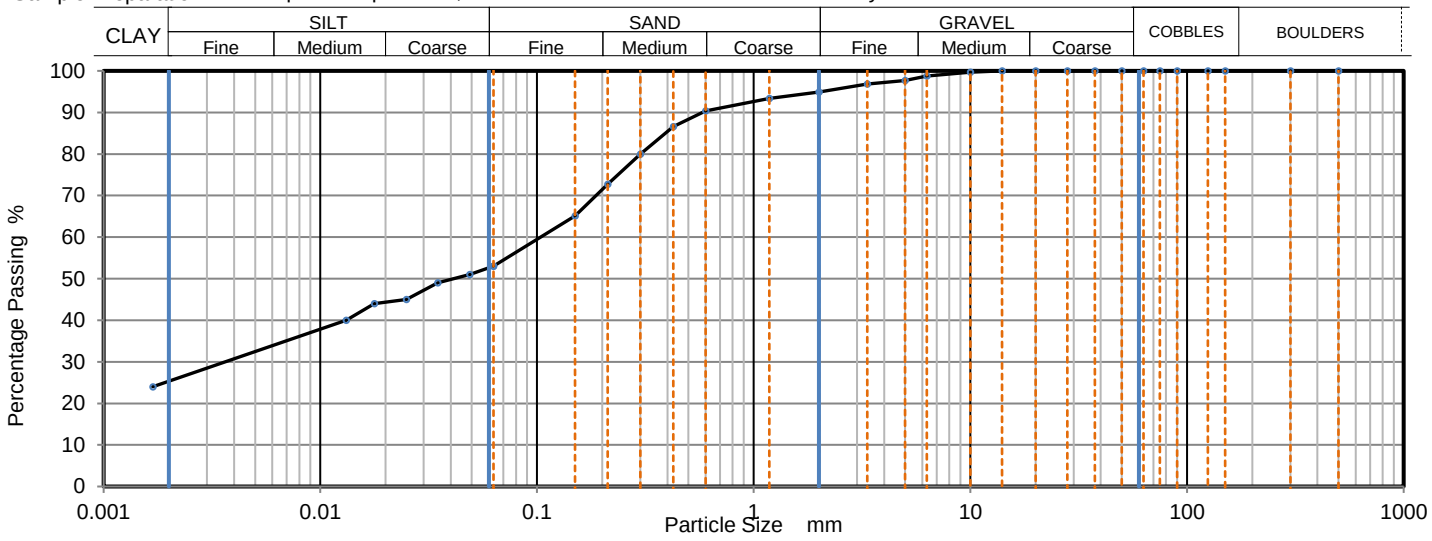
4041

Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	10/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	2668642	Depth Top [m]:	1.00
Hole No.:	CP6	Depth Base [m]:	1.45
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Brown sandy CLAY		
Sample Preparation:	Sample was quartered, oven dried at 106.0 °C and broken down by hand.		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0630	53
300	100	0.0489	51
150	100	0.0348	49
125	100	0.0250	45
90	100	0.0178	44
75	100	0.0131	40
63	100	0.0017	24
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	98		
3.35	97	Particle density	(assumed)
2	95	2.65	Mg/m3
1.18	93		
0.6	90		
0.425	87		
0.3	80		
0.212	73		
0.15	65		
0.063	53		

Sample Proportions	% dry mass
Very coarse	0
Gravel	5
Sand	41
Silt	29
Clay	25

Grading Analysis		
D100	mm	14
D60	mm	0.103
D30	mm	0.0038
D10	mm	
Uniformity Coefficient		> 61
Curvature Coefficient		

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

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Signed:

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 23/05/2023

GF 100.22

TEST CERTIFICATE

DETERMINATION OF THE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Tested in Accordance with: BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	16/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

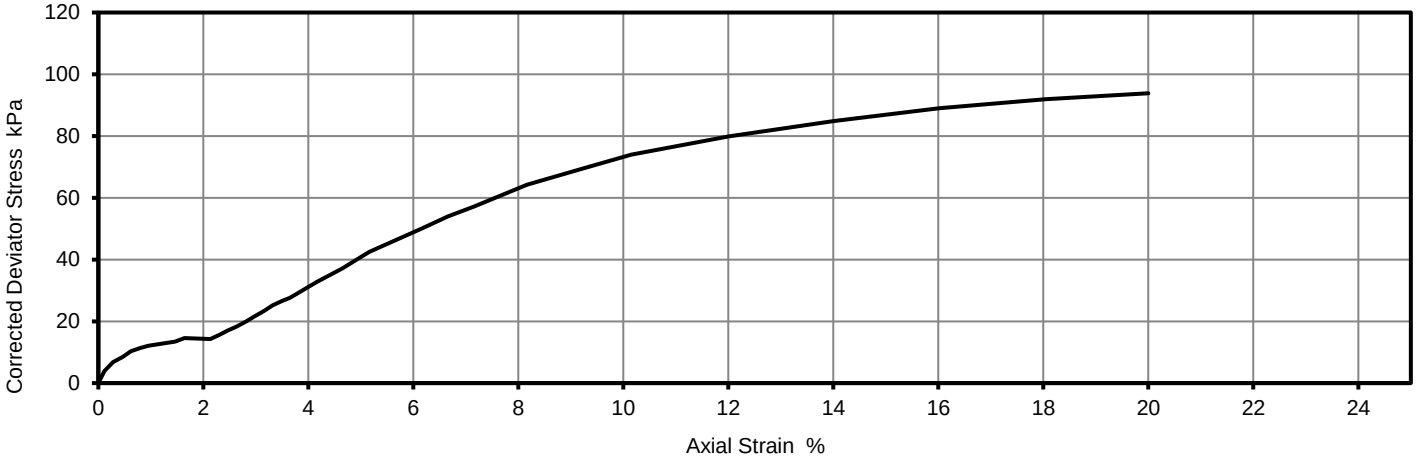
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

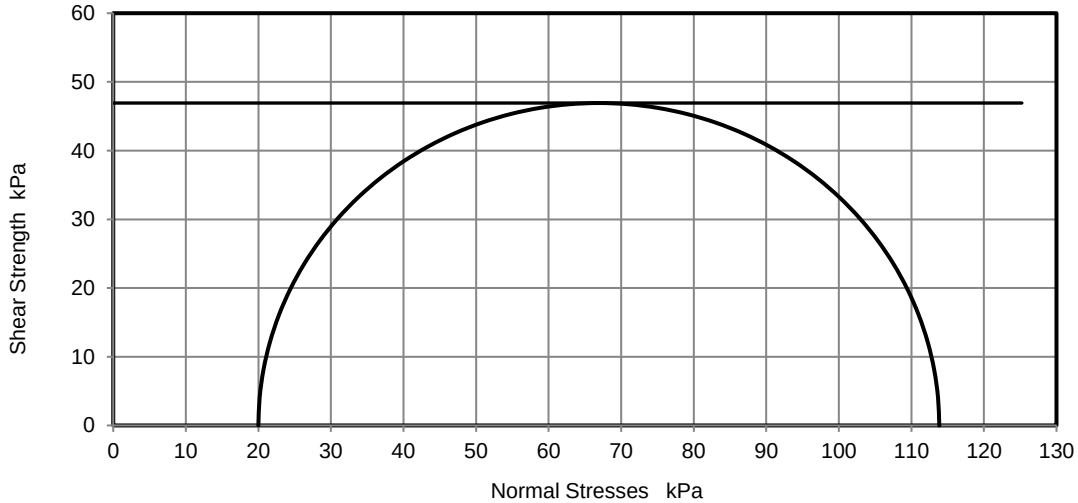
Laboratory Reference:	2668645	Depth Top [m]:	2.00
Hole No.:	CP8	Depth Base [m]:	2.45
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown slightly gravelly CLAY		
Sample Preparation:	Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.		

Test Number	1		Rate of Strain	2.00	%/min
Length	200.36	mm	Cell Pressure	20	kPa
Diameter	102.70	mm	Axial Strain at failure	20.0	%
Bulk Density	2.13	Mg/m3	Deviator Stress, (σ1 - σ3)f	94	kPa
Moisture Content	16	%	Undrained Shear Strength, cu	47	kPa ½(σ1 - σ3)f
Dry Density	1.84	Mg/m3	Mode of Failure	Compound	
Membrane Correction	0.97	kPa	Latex membrane thickness	0.26	mm

Deviator Stress v Axial Strain

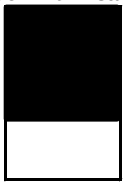


Mohr Circles





Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.

Remarks: No failure occured until 20% Axial Strain - reported as a single stage test.

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Signed: Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 24/05/2023

GF 184.13

TEST CERTIFICATE

DETERMINATION OF THE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Tested in Accordance with: BS 1377-7: 1990: Clause 9

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Client:	GIP Limited	Client Reference:	ML/32172
Client Address:	Building 62, Third Avenue, The Pensnett Estate, Kingswinford, West Midlands, DY6 7XT	Job Number:	23-31926-1
		Date Sampled:	Not Given
		Date Received:	03/05/2023
Contact:	Matt Laws	Date Tested:	16/05/2023
Site Address:	Lickers Lane	Sampled By:	Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

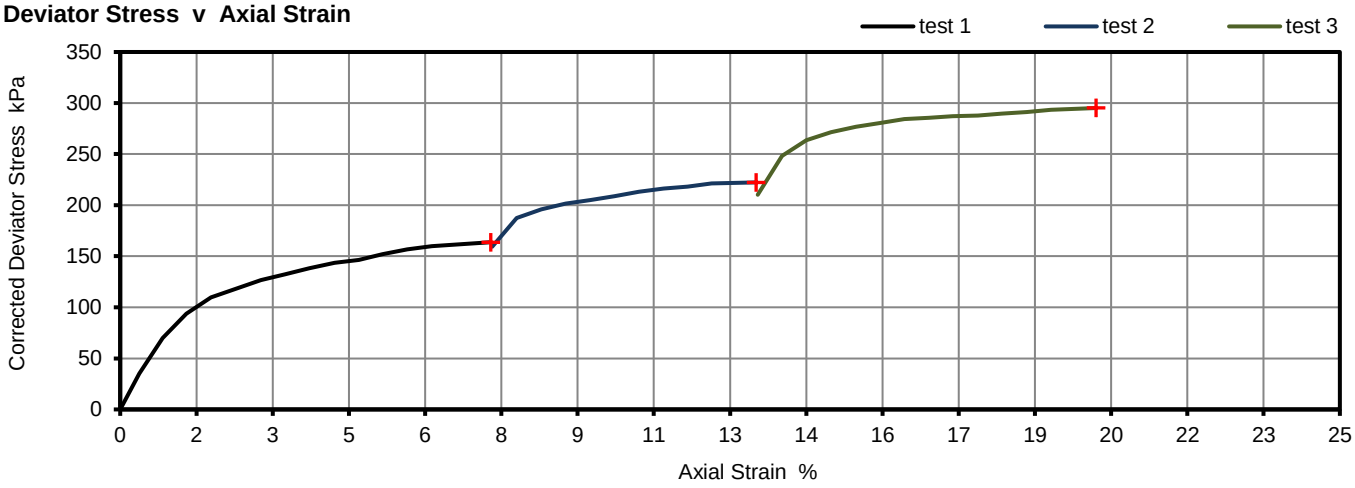
Test Results:

Laboratory Reference:	2668635	Depth Top [m]:	3.00
Hole No.:	CP1	Depth Base [m]:	3.45
Sample Reference:	Not Given	Sample Type:	U
Sample Description:	Brown CLAY		
Sample Preparation:	Sample prepared in accordance with BS 1377-1:2016 Clause 9.1.1.		

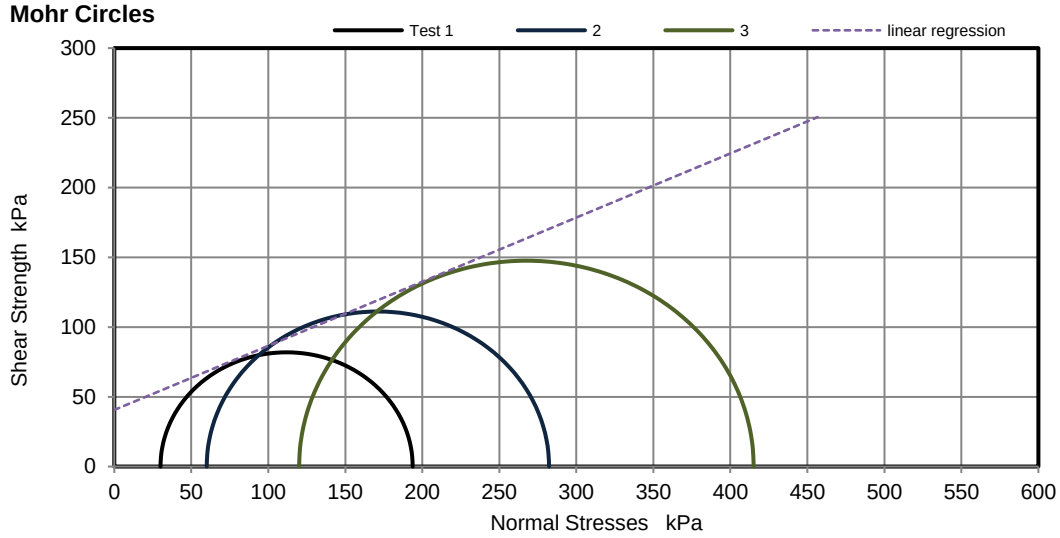
Length	140.20	mm
Diameter	69.97	mm
Bulk Density	2.03	Mg/m3
Moisture Content	17	%
Dry Density	1.74	Mg/m3
Latex membrane thickness	0.25	mm

Rate of Strain	2.00			%/min
Stage Number	1	2	3	
Cell Pressure	30	60	120	kPa
Axial Strain at failure	7.6	13.0	20.0	%
Deviator Stress, (σ1 - σ3)f	164	222	295	kPa
Shear strength, cu	82	111	148	kPa
Mode of failure	Compound			
Membrane Correction	0.66	0.97	1.37	kPa

Deviator Stress v Axial Strain

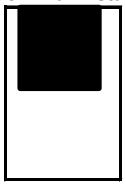


Mohr Circles





Position within sample



Linear Regression
ϕu 24.7 °
cu 41 kPa

Note: Mohr circles and their interpretation is not covered by BS1377. These are provided for information only.

Remarks: Correction values: 30kPa=13N, 60kPa=27N, 120kPa=55N.

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Signed: Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Date Reported: 24/05/2023

GF 186.13

Appendix G

Gas and Groundwater Monitoring Results

Client:	Your Housing group	**Job No:**	GM11373
Site:	Land off Lickers Lane	**Operator:**	XM
Date:	27/04/2023		

Monitoring Point	GAS CONCENTRATIONS								VOLATILES		FLOW DATA			WELL AND WATER DATA				Comments
	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	
	Peak	Steady	Peak	Steady	Peak	Peak	Peak	Steady			Peak	Steady						
WS1	0.00	0.00	0.80	0.80	0.00	0.00	19.90	19.90	1.00		0.00	0.00		2.36	4.00			
WS2	0.00	0.00	5.60	5.60	0.00	0.00	14.20	14.20	1.00		0.00	0.00		DRY	1.75			
WS3	0.00	0.00	1.70	1.60	0.00	0.00	13.50	13.50	1.00		0.00	0.00		DRY	3.00			
WS4	0.00	0.00	2.10	2.10	0.00	0.00	18.80	18.80	1.00		0.00	0.00		DRY	1.00			
WS5	-	-	-	-	-	-	-	-	-		-	-		2.36	2.80			Gas tap was missing from borehole. New gas tap installed.
WS6	0.00	0.00	2.90	2.90	0.00	0.00	17.70	17.70	1.00		0.00	0.00		DRY	2.71			
WS7	0.00	0.00	2.60	2.60	0.00	0.00	18.20	18.20	1.00		0.00	0.00		1.40	1.70			
WS8	0.00	0.00	1.70	1.70	0.00	0.00	19.50	19.50	1.00		0.00	0.00		DRY	3.08			
Max	**0.00**	**0.00**	**5.60**	**5.60**	**0.00**	**0.00**	**19.90**	**19.90**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.36**	**4.00**	**0.00**	**0.00**	
Min	**0.00**	**0.00**	**0.80**	**0.80**	**0.00**	**0.00**	**13.50**	**13.50**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.40**	**1.00**	**0.00**	**0.00**	
GSV (l/hr)	**0**		**0**															

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	1	Dry		Wet		Snow		Frozen
Wind:	1	Calm		Moderate		Strong		
Cloud cover:		None	1	Cloudy		Overcast		
Preciptation:	1	None		Moderate		Heavy		
Barometric pressure (mbar):			1012	Before	1011	After		
Pressure trend:	1	Falling		Steady		Rising		

Ground gas meter: Gas Data
Date of last calibration: 20.03.2023

Client:	Your Housing group	**Job No:**	GM11373
Site:	Land off Lickers Lane	**Operator:**	XM
Date:	04/05/2023		

Monitoring Point	GAS CONCENTRATIONS								VOLATILES		FLOW DATA			WELL AND WATER DATA				Comments
	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	
	Peak	Steady	Peak	Steady	Peak	Peak	Peak	Steady			Peak	Steady						
WS1	0.00	0.00	12.60	12.60	0.00	0.00	0.50	0.50	1.00		0.00	0.00		2,50	4.00			
WS2	0.00	0.00	6.90	6.90	0.00	0.00	12.80	12.60	1.00		0.00	0.00		DRY	1.75			
WS3	0.00	0.00	1.30	1.30	0.00	0.00	19.70	19.70	1.00		0.00	0.00		DRY	3.00			
WS4	0.00	0.00	2.50	2.40	0.00	0.00	18.30	18.30	1.00		0.00	0.00		DRY	1.00			
WS5	0.00	0.00	1.10	1.00	0.00	0.00	18.20	18.20	1.00		0.00	0.00		2.30	2.80			
WS6	0.00	0.00	3.50	3.50	0.00	0.00	16.50	16.50	1.00		0.00	0.00		DRY	2.71			
WS7	0.00	0.00	3.00	3.00	0.00	0.00	17.20	17.20	1.00		0.00	0.00		1.63	1.70			
WS8	0.00	0.00	2.10	1.90	0.00	0.00	18.00	18.00	1.00		0.00	0.00		DRY	3.08			
Max	**0.00**	**0.00**	**12.60**	**12.60**	**0.00**	**0.00**	**19.70**	**19.70**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.30**	**4.00**	**0.00**	**0.00**	
Min	**0.00**	**0.00**	**1.10**	**1.00**	**0.00**	**0.00**	**0.50**	**0.50**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.63**	**1.00**	**0.00**	**0.00**	
GSV (l/hr)	**0**		**0**															

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	04/0	1	Dry		Wet		Snow		Frozen
Wind:			Calm	1	Moderate		Strong		
Cloud cover:			None	1	Cloudy		Overcast		
Preciptation:		1	None		Moderate		Heavy		
Barometric pressure (mbar):				1017	Before	1016	After		
Pressure trend:		1	Falling		Steady		Rising		

Ground gas meter: Gas Data
Date of last calibration: 20.03.2023

Client:	Your Housing group	**Job No:**	GM11373
Site:	Land off Lickers Lane	**Operator:**	FL
Date:	11/05/2023		

Monitoring Point	GAS CONCENTRATIONS								VOLATILES		FLOW DATA			WELL AND WATER DATA				Comments
	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	
	Peak	Steady	Peak	Steady	Peak	Peak	Peak	Steady			Peak	Steady						
WS1	0.00	0.00	0.00	0.00	0.00	0.00	20.90	20.90	1.00		0.00	0.00		2.41	4.00			
WS2	0.00	0.00	0.00	0.00	0.00	0.00	21.20	21.00	1.00		0.00	0.00		DRY	1.75			
WS3	0.00	0.00	0.00	0.00	0.00	0.00	22.00	21.10	1.00		0.00	0.00		DRY	3.00			
WS4	0.00	0.00	0.00	0.00	0.00	0.00	21.10	21.00	1.00		0.00	0.00		DRY	1.00			
WS5	0.00	0.00	0.00	0.00	0.00	0.00	21.10	20.90	1.00		0.00	0.00		2.15	2.80			
WS6	0.00	0.00	0.00	0.00	0.00	0.00	21.00	21.00	1.00		7.70	0.00		DRY	2.71			
WS7	0.00	0.00	0.20	0.00	0.00	0.00	20.70	20.70	1.00		0.30	0.00		1.61	1.70			
WS8	0.00	0.00	0.00	0.00	0.00	0.00	20.80	20.80	1.00		0.00	0.00		DRY	3.08			
Max	**0.00**	**0.00**	**0.20**	**0.00**	**0.00**	**0.00**	**22.00**	**21.10**	**1.00**	**0.00**	**7.70**	**0.00**	**0.00**	**2.41**	**4.00**	**0.00**	**0.00**	
Min	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.70**	**20.70**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.61**	**1.00**	**0.00**	**0.00**	
GSV (l/hr)	**0**		**0.0154**															

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	1	Dry		Wet		Snow		Frozen
Wind:	1	Calm		Moderate		Strong		
Cloud cover:		None		Cloudy	1	Overcast		
Preciptation:	1	None		Moderate		Heavy		
Barometric pressure (mbar):			1010	Before	1010	After		
Pressure trend:		Falling	1	Steady		Rising		

Ground gas meter: Gas Data
Date of last calibration: 20.03.2023

Client:	Your Housing group	**Job No:**	GM11373
Site:	Land off Lickers Lane	**Operator:**	XM
Date:	18/05/2023		

Monitoring Point	GAS CONCENTRATIONS								VOLATILES		FLOW DATA			WELL AND WATER DATA				Comments
	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	
	Peak	Steady	Peak	Steady	Peak	Peak	Peak	Steady			Peak	Steady						
WS1	0.00	0.00	0.90	0.90	0.00	0.00	19.20	19.20	1.00		0.00	0.00		2.50	4.00			
WS2	0.00	0.00	7.70	7.70	0.00	0.00	12.00	12.00	1.00		0.00	0.00		DRY	1.80			
WS3	0.00	0.00	1.60	1.50	0.00	0.00	19.20	19.10	1.00		0.00	0.00		DRY	3.00			
WS4	0.00	0.00	2.90	2.80	0.00	0.00	19.40	19.40	1.00		0.00	0.00		DRY	1.00			
WS5	0.00	0.00	2.00	2.90	0.00	0.00	18.20	17.90	1.00		0.00	0.00		2.30	2.80			
WS6	0.00	0.00	4.40	4.40	0.00	0.00	16.70	16.70	1.00		0.00	0.00		DRY	2.70			
WS7	0.00	0.00	2.80	2.70	0.00	0.00	18.70	18.70	1.00		0.00	0.00		1.15	1.74			
WS8	0.00	0.00	2.90	4.00	0.00	0.00	18.30	18.20	1.00		0.00	0.00		DRY	3.08			
Max	**0.00**	**0.00**	**7.70**	**7.70**	**0.00**	**0.00**	**19.40**	**19.40**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.50**	**4.00**	**0.00**	**0.00**	
Min	**0.00**	**0.00**	**0.90**	**0.90**	**0.00**	**0.00**	**12.00**	**12.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.15**	**1.00**	**0.00**	**0.00**	
GSV (l/hr)	**0**		**0**															

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	1	Dry		Wet		Snow		Frozen
Wind:	1	Calm		Moderate		Strong		
Cloud cover:		None	1	Cloudy		Overcast		
Preciptation:		None	1	Moderate		Heavy		
Barometric pressure (mbar):			1026	Before	1027	After		
Pressure trend:		Falling		Steady	1	Rising		

Ground gas meter: Gas Data
Date of last calibration: 20.03.2023

Client:	Your Housing group	**Job No:**	GM11373
Site:	Land off Lickers Lane	**Operator:**	XM
Date:	24/05/2023		

Monitoring Point	GAS CONCENTRATIONS								VOLATILES		FLOW DATA			WELL AND WATER DATA				Comments
	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	
	Peak	Steady	Peak	Steady	Peak	Peak	Peak	Steady			Peak	Steady						
WS1	0.00	0.00	1.90	1.90	0.00	0.00	19.10	19.10	1.00		0.00	0.00		2.50	4.00			
WS2	0.00	0.00	2.00	2.00	0.00	0.00	19.00	18.90	1.00		0.00	0.00		DRY	1.80			
WS3	0.00	0.00	1.80	1.80	0.00	0.00	19.50	19.50	1.00		0.00	0.00		DRY	3.00			
WS4	0.00	0.00	1.90	1.90	0.00	0.00	20.00	19.90	1.00		0.00	0.00		DRY	1.00			
WS5	0.00	0.00	1.90	1.90	0.00	0.00	19.70	19.70	1.00		0.00	0.00		2.34	2.80			
WS6	0.00	0.00	4.20	4.10	0.00	0.00	17.70	17.70	1.00		0.00	0.00		DRY	2.70			
WS7	0.00	0.00	2.10	2.00	0.00	0.00	18.60	18.50	1.00		0.00	0.00		1.23	1.74			
WS8	0.00	0.00	2.30	2.30	0.00	0.00	19.00	18.90	1.00		0.00	0.00		DRY	3.08			
Max	**0.00**	**0.00**	**4.20**	**4.10**	**0.00**	**0.00**	**20.00**	**19.90**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.50**	**4.00**	**0.00**	**0.00**	
Min	**0.00**	**0.00**	**1.80**	**1.80**	**0.00**	**0.00**	**17.70**	**17.70**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.23**	**1.00**	**0.00**	**0.00**	
GSV (l/hr)	**0**		**0**															

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	1	Dry		Wet		Snow		Frozen
Wind:	1	Calm		Moderate		Strong		
Cloud cover:		None	1	Cloudy		Overcast		
Preciptation:	1	None		Moderate		Heavy		
Barometric pressure (mbar):			1026	Before	1026	After		
Pressure trend:		Falling	1	Steady		Rising		

Ground gas meter: Gas Data
Date of last calibration: 20.03.2023

Client:	Your Housing group	**Job No:**	GM11373
Site:	Land off Lickers Lane	**Operator:**	XM
Date:	31/05/2023		

Monitoring Point	GAS CONCENTRATIONS								VOLATILES		FLOW DATA			WELL AND WATER DATA				Comments
	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)	Hydrogen sulphide (ppm)	Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	
	Peak	Steady	Peak	Steady	Peak	Peak	Peak	Steady			Peak	Steady						
WS1	0.00	0.00	4.40	4.40	0.00	0.00	14.40	14.00	1.00		0.00	0.00		2.56	4.00			
WS2	0.00	0.00	8.20	8.20	0.00	0.00	13.70	13.60	1.00		0.00	0.00		DRY	1.80			
WS3	0.00	0.00	1.50	1.50	0.00	0.00	19.20	19.20	1.00		0.00	0.00		DRY	3.00			
WS4	0.00	0.00	1.90	1.50	0.00	0.00	19.10	19.10	1.00		0.00	0.00		DRY	1.00			
WS5	0.00	0.00	3.80	3.80	0.00	0.00	17.80	17.70	1.00		0.00	0.00		2.40	2.80			
WS6	0.00	0.00	3.60	3.60	0.00	0.00	18.50	18.50	1.00		0.00	0.00		DRY	2.70			
WS7	0.00	0.00	3.80	3.80	0.00	0.00	16.40	16.30	1.00		0.00	0.00		1.24	1.74			
WS8	0.00	0.00	2.70	2.60	0.00	0.00	19.00	18.80	1.00		0.00	0.00		DRY	3.08			
Max	**0.00**	**0.00**	**8.20**	**8.20**	**0.00**	**0.00**	**19.20**	**19.20**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.56**	**4.00**	**0.00**	**0.00**	
Min	**0.00**	**0.00**	**1.50**	**1.50**	**0.00**	**0.00**	**13.70**	**13.60**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.24**	**1.00**	**0.00**	**0.00**	
GSV (l/hr)	**0**		**0**															

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	1	Dry		Wet		Snow		Frozen
Wind:	1	Calm		Moderate		Strong		
Cloud cover:		None	1	Cloudy		Overcast		
Preciptation:	1	None		Moderate		Heavy		
Barometric pressure (mbar):			1025	Before	1024	After		
Pressure trend:	1	Falling		Steady		Rising		

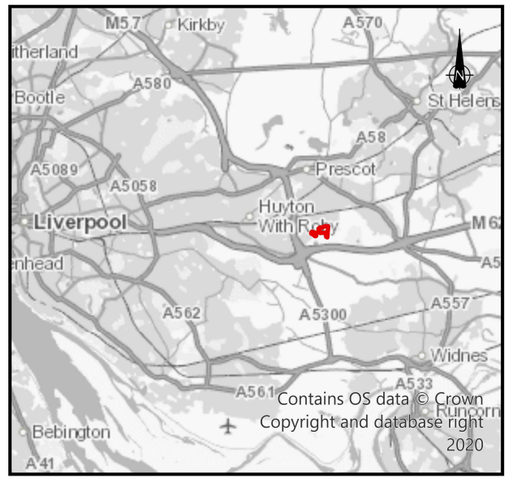
Ground gas meter: Gas Data
Date of last calibration: 20.03.2023

DRAWINGS



KEY

Site Boundary



Notes:

Boundaries are indicative. Aerial imagery shown for context purposes only.

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT

Your HOUSING GROUP

PROJECT

LAND OFF LICKERS LANE
WHISTON

DRAWING TITLE

SITE LOCATION PLAN

DRG No.		REV
GM11373-001		A
DRG SIZE	SCALE	DATE
A3	1:2,500	18/08/2023
DRAWN BY	CHECKED BY	APPROVED BY
EK	GH	DB

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KEY

- Site Boundary
- Windowless Sample Borehole
- Light Cable Percussive Borehole
- Trial Pit

Notes:

Boundaries are indicative. Aerial imagery shown for context purposes only.

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT

Your HOUSING GROUP

PROJECT

LAND OFF LICKERS LANE
WHISTON

DRAWING TITLE

GROUND INVESTIGATION LOCATION PLAN

DRG No.		REV
GM11373-010		A
DRG SIZE	SCALE	DATE
A3	1:2,500	18/08/2023
DRAWN BY	CHECKED BY	APPROVED BY
EK	GH	DB

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