

PHASE I AND II GEOENVIRONMENTAL SITE ASSESSMENT

Site:	Hareshill Road, South Heywood
References:	18-435-R1-2
Date:	21 November 2025
Client:	Northstone





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QUALITY ASSURANCE

Report references

18-435-R1

REV REF	DESCRIPTION	DATE
01	First issue	08/09/25
02	Updated development layout	21/11/25

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EXECUTIVE SUMMARY

SITE DESCRIPTION AND HISTORY

Site Address	Land off Hareshill Road, South Heywood, OL10 2TP
Grid Reference	E385216, N409293
Site Area	8.19 Ha
Proposed Development	Northstone intends to construct a low-rise residential development with associated gardens, estate roads and infrastructure.
Current Site Use	The subject site is an irregularly shaped parcel of land located off Hareshill Road in Heywood. The Phase 3 development area comprises undeveloped agricultural fields used mainly for livestock pasture. Farming buildings, which previously occupied the southwest of the site, have subsequently been demolished to ground level. Floor slabs, wall remnants and below ground structures are present. Foundations to the existing buildings likely remain. An overgrown spoil mound is present to the north of the former farm buildings, which may be associated with the demolition. Evidence of a water-filled slurry drain was observed. It is unknown whether this leads to a slurry tank or whether this was historically pumped out. No other structures are present within the site boundary
Site History	Historical mapping suggests that the site has largely remained undeveloped agricultural land. Hares Hill Farm is recorded in the southwest of the site from the earliest available mapping. The farm buildings were demolished in 2021.

ENVIRONMENTAL SETTING

Geology	Superficial Geology	Till (Devensian) – CLAY, SAND, GRAVEL
	Bedrock Geology	Pennine Lower Coal Measures Formation – MUDSTONE, SILTSTONE, SANDSTONE
	Faults	None identified on site.
Geomorphology	With the exception of the development Hares Hill Farm, the site has not undergone significant historical development, and the land broadly represents natural landform.	
Hydrogeology	Secondary undifferentiated (superficial) overlying Secondary A aquifer (bedrock). The site is not located in a groundwater source protection zone and there are no groundwater abstractions within a 1km radius.	
Hydrology	An unnamed water course/drainage ditch is present circa 50 m south of the site. Whittle Brook is located approximately 325m to the south east.	
Utility Locations	There is a BT cable which runs north east to south west of this development area. Utility connections are available throughout Hareshill Road to the south. Anecdotal evidence suggests a drainage/sewerage pipe running north to south bisecting the site, however this is not supported through service plans.	



Landfill Sites and Waste Sites	There are no historical or authorised landfill sites within 500 m of the site. The Envirocheck report identified Harehill Farm Equestrian Centre off Harehill Road (located circa 330 m west), as a licensed Waste Management Facility that has been operational since 2012. This facility operated a Deposit for Recovery Environmental Permit, which remains active.
Radon	A site-specific radon report has been obtained for the site, which indicates that the majority of the site falls within an area where less than 1% of properties are above action level and therefore no radon protection measure would be required. However, a strip of land inside the western boundary falls within an area where between 3 and 5% of properties are at or above the action level, and development plots within this area will require basic radon protection measures.
Unexploded Ordnance	Low risk – no further assessment required.
Hazardous Installations	No hazardous installations precluding the development of highly sensitive residential developments have been identified within an influencing distance of the site.

E3P GROUND INVESTIGATION

Ground Investigation Works	E3P has completed an intrusive ground investigation comprising: ✦ 39 x Mechanically Excavated Trial Pits; ✦ 13 x Window Sample Probeholes; ✦ 1 x Cable Percussive Borehole; ✦ 3 x BRE365 Soakaways; ✦ 2 x Rotary Open Holes; and ✦ Construction of environmental monitoring installations.
Ground Conditions	Made Ground Made Ground was encountered as two distinct types. During the supplementary investigation beneath the former far buildings, Made Ground deposits were encountered in all exploratory hole locations to depths of between 0.20 m and 1.10 m bgl. Made Ground deposits were noted to comprise brown gravelly fine to medium sand or brown/black sandy gravel with brick, concrete, sandstone, ash and clinker. Cobbles of brick and concrete were noted. Across the remaining site area, Made Ground comprised reworked topsoil deposits comprising soft brown slightly gravelly sandy clay with gravel of wood and sandstone. The reworked topsoil was generally encountered to depths of between 0.20 m – 0.30 m bgl. Superficial The majority of exploratory hole locations were underlain by cohesive superficial deposits between 0.30 m and 4.00 m bgl, comprising firm medium strength to stiff high strength orange brown slightly gravelly sandy CLAY with gravel of sandstone and mudstone and cobbles of mudstone. Sand deposits were identified in localised lenses across the site between 0.30 m and 2.20 m bgl and generally comprised medium dense orange clayey fine to medium SAND.



**Ground
Conditions**
...Continued

Several exploratory holes were also underlain by orange sandy GRAVEL of sandstone and mudstone between 0.80 and 5.70 m bgl.

Soft low strength CLAY was identified in TP209 between 0.70 m and 1.10 m bgl. Very soft silty CLAY was also encountered in WS101 at 1.00 m bgl in the location of the former pond.

Bedrock

The bedrock geology was encountered between 1.40 m and 30.00 m bgl. The bedrock comprised interbedded SANDSTONE and MUDSTONE with coal traces. The depth to bedrock generally increased from west to east.

During the supplementary investigation, bedrock geology was encountered in TP204 – TP210 and was encountered as a weathered SANDSTONE GRAVEL, which was recovered as a granular material within the base of the excavations, to depths of between 1.00 – 3.20 m bgl.

Weathered MUDSTONE was encountered in TP204 between 2.00 – 3.20 m bgl.

Groundwater

Groundwater strikes were identified as seepages within the granular superficial deposits between 1.50 m bgl to 4.00 m bgl. Perched water was encountered within the Made Ground deposits in TP201 at 0.30 m bgl, and within former land drains in TP106 and TP115 at 0.60 m and 1.40 m bgl, respectively.

Subsequent monitoring recorded groundwater between ground level and 2.01 m bgl.

Visual/Olfactory Evidence of Contamination

A mild hydrocarbon odour was noted in TP201 to 0.80 m bgl where a fast water ingress was noted. A mild hydrocarbon odour was also noted in TP208 between 0.20 m and 0.70 m bgl.

Isolated pieces of cement bound roof/cladding sheeting were identified on the surface, in the area of the former farm buildings, during the recent site visit which may potentially contain asbestos fibres.

CONTAMINATED LAND ASSESSMENT

Potential Contamination Sources	The following potential on-site sources of contamination have been identified ✚ Hareshill Farm (Made Ground), Former Pond – Heavy Metals, PAHs, TPHs, Asbestos ✚ Hareshill Farm (Slurry Pit) – Heavy Metals, Pathogens, Nitrates, Phosphates, Ground Gas
Human Health Risk Assessment	Exceedances for non-volatile PAH compounds were identified within the shallow Made Ground deposits in the vicinity of the former farm buildings at depths of between 0.30 - 0.50 m bgl. All of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion of soils. The risk to chronic human health associated with the elevated concentrations of non-volatile PAH compounds can be mitigated through the installation of a suitable cover system where Made



Human Health Risk Assessment ...Continued	Ground remains in proposed private gardens, landscaping and public open space to remove any potential for direct exposure to impacted soils. A watching brief should be completed during remediation works to monitor the locations where visual or olfactory hydrocarbon impact has been identified in TP201. No specific clean cover to mitigate risk from contaminants is required in the greenfield area of the site, however the NHBC will require the construction of gardens with a suitable growing medium that comprises as a minimum 150mm topsoil over 150mm sub-soil. Topsoil deposits are reworked; however, initial chemical testing suggests that the topsoil may be suitable for re-use following screening and further chemical analysis to meet the required sampling frequency.
Controlled Waters Risk Assessment	In the absence of any significant sources, viable receptors and complete pollutant linkage, the site is considered to pose a low risk to controlled waters.
Ground Gas Risk Assessment	There is no viable source of persistent ground gas, and the site can be classified as Characteristic Situation 1 (CS1) under BS 8485, meaning no specific ground gas protection measures are required. However, basic radon mitigation measures will be required for all proposed plots located along the western boundary of the site within an area where between 3% and 5% of homes are above the Action Level.
Potable Water Infrastructure	It is likely that PE Pipe will be suitable for the proposed development. This will need to be confirmed following the completion of a UKWIR risk assessment.

COAL MINING ASSESSMENT

Coal Mining Assessment	The Coal Authority does not record either the potential for unrecorded shallow mine workings or coal seams beneath the site, however coal seams and probable shallow workings are recorded within 250 m to the north east. In due consideration of the potential presence of the Arley Coal seam, two rotary boreholes were advanced in accordance with Coal Authority Permission ref: 16633 to assess the potential presence of shallow workings within this seam and the potential for ground instability to induce a future subsidence event within the proposed development. The rotary boreholes have confirmed that sufficient rock cover is present above any coal seams, therefore there is considered to be no risk of instability.
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GEOTECHNICAL ASSESSMENT

Underground Obstructions & Subterranean Hazards	No obstructions were identified during the course of the intrusive investigation. Farming buildings, which previously occupied the southwest of the site, have subsequently been demolished to ground level. Floor slabs, wall remnants and below ground structures are present. It is likely that foundations of the existing buildings remain. As part of the process of creating a suitable platform for development, all subterranean obstructions will need to be excavated and removed beneath new structures and infrastructure. This will facilitate the construction of the proposed plots as intended.
Allowable Bearing Capacity	The underlying natural clay deposits have been assessed as being firm low strength to very stiff very high strength with a net ABP in the order of 83 – 470 kN/m² between 1.00 – 3.00 m bgl. Localised areas of very soft to soft clays were identified at 1.00 m bgl with an ABC of less than 72 kN/m². The clayey sand deposits in WS101 have been assessed as being medium dense to dense with a net ABC of 174 – 435 kN/m². The sandstone bedrock identified in CP101 is dense at 4.00 m bgl with an ABC of 417 kN/m².
Foundation Options	Based on existing data and given the predominantly cohesive ground conditions, it is considered that the majority of the proposed dwellings could be constructed using traditional spread footings bearing in the firm to stiff Clay at a depth from 1.00 m to 1.50 m below current ground levels. Where deeper variable soft natural clays, or loose sand and gravels are identified, dependent on development levels, plots may require locally deepened to Mass Trench Fill. Alternatively, it is recommended that Ground Improvement by VSC be considered to ensure a safe and uniform ABP for a doubly reinforced strip foundation bearing within the treated sub-stratum. In the location of soft clays, plots will require a driven pile foundation due the incompatibility with VSC. It is recommended that at working drawing stage, a foundation schedule is prepared for the development taking account of the physical change of natural clay soils and the current/proposed locations of trees.
Foundation Near Trees	Foundation depths within the conjectured influence of former, existing or proposed trees will need to be deepened to ensure that structural loading bears within the underlying target founding stratum, which cannot be subject to volumetric instability associated with fluctuation in moisture content.
Heave Precautions Near Trees	The clay soils are classified as Medium Volume Change Potential, and where present at a shallow depth within the conjectured zone of potential tree influence, heave precautions will be required within the construction of a shallow foundation and to the underside of floor residential floor slabs.
Building Floor Slabs	Ground-bearing floor slabs are not considered viable given the shallow cohesive soils.
Soakaway Drainage	The geological appraisal and BRE365 infiltration testing suggests that soakaways will not be suitable for the proposed development.



Sulphate Assessment	The soils generally meet class DS-1 AC-1s. Elevated concentrations meeting class DS-3, AC-1s were identified in the Made Ground in TP205 at 0.30 m bgl.
Highway & Infrastructure Construction	Shallow bedrock is present in the western sector, therefore consideration must be given to the need to break and excavate this material to install drainage infrastructure. The in-situ CBR will be highly dependent on the climatic conditions, however an allowance should be made for addition capping to the highway sub-grade where clays will soften during periods of prolonged rainfall.
CBR Design %	Granular soils can be re-engineered to ensure 5% within the subgrade during favourable climatic conditions. Natural clay soils will provide a CBR in the order 3-5% during drier climatic periods. However, if water is allowed to shed onto the formation, the CBR will reduce to <2%, which will require specialist engineering of the subgrade.
Enabling Earthworks	Development levels are unknown at this time; however, cut-and-fill works will be required to prepare the development platform. As part of the earthworks design, materials should be assessed and characterised prior to re-use in the construction of upfill to a geotechnical design. All future earthworks should be completed in accordance with a Geotechnical Design Report (GDR) that will consider the ground model within the context of the potential for settlement induced by surcharge from earthworks, dynamic and permanent loading of the development and all known hazards.
Civil Engineering Excavations	The E3P Intrusive Ground Investigation has identified the presence of weathered/competent bedrock at a shallow depth, the presence of which will impede the excavation materials to form sewerage and drainage infrastructure and foundations.
Waste Characterisation	Any material that is to be disposed off-site should undergo assessment using Technical Guidance. WM3: <i>Waste Classification – Guidance on the classification and assessment of waste</i> . This can be done upon request and in line with the Environment Agency sampling frequencies.

RECOMMENDATIONS

Based on the findings of the Geoenvironmental site assessment and the various conclusions drawn, the following additional works are recommended to be completed in due course.

-  Plot-specific foundation schedule (upon receipt of the final development levels).
-  Geotechnical Design Report.
-  Remediation and Enabling Works Strategy.
-  Specification for Mitigation of Hazardous Ground Gases & Verification Plan.
-  CL:AIRE Materials Management Plan



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DRAWING LIST

18-435-001 - Site Location Plan
 15-435-002 - Proposed Development Plan
 18-435-003 - Historical Features Plan
 18-435-006 - Exploratory Hole Location Plan
 18-435-007 - Depth of Made Ground Plan
 18-435-009 - Depth to Founding Strata Plan
 18-435-011 - Conceptual Site Model
 18-435-012 - Depth to Bedrock Plan
 18-435-014 - Contamination Exceedances and Olfactory Evidence of Contamination Plan
 18-435-015 - Development Constraints Plan
 18-435-032 - Radon Affected Area Plan
 18-435-033 - Build Phase Issues Plan



1. INTRODUCTION

1.1. BACKGROUND

Northstone (the client) commissioned E3P to undertake a Phase I and II Geoenvironmental Site Assessment at Harehill Road, South Heywood, OL10 2TP. The factual ground investigation data has been derived from previous investigations completed by E3P on behalf of Russell Homes which has been used to prepare a full interpretive report. The previous works have been reported in the following reports

AUTHOR	TITLE/REFERENCE	CLIENT	DATE
E3P	Phase I Geo-Environmental Site: South Heywood Development Area. Report Ref: 11-094-R1-1	Russell Homes	November 2016
E3P	Phase II Geo-Environmental Site: Phase 3 - South Heywood Development Area. Report Ref: 13-222-R1-1	Russell Homes	July 2019
E3P	Ground Gas Addendum Report: Phase 3 - South Heywood Development Area. Report Ref: 13-222-R2-1	Russell Homes	July 2020
E3P	Supplementary Ground Investigation: Phase 3 - South Heywood Development Area. Report Ref: 13-222-L1-1	Russell Homes	October 2021

This report is required to determine potential contaminated land liabilities, remediation requirements and geotechnical engineering works that will be required as a part of the proposed development for a low-rise residential development.

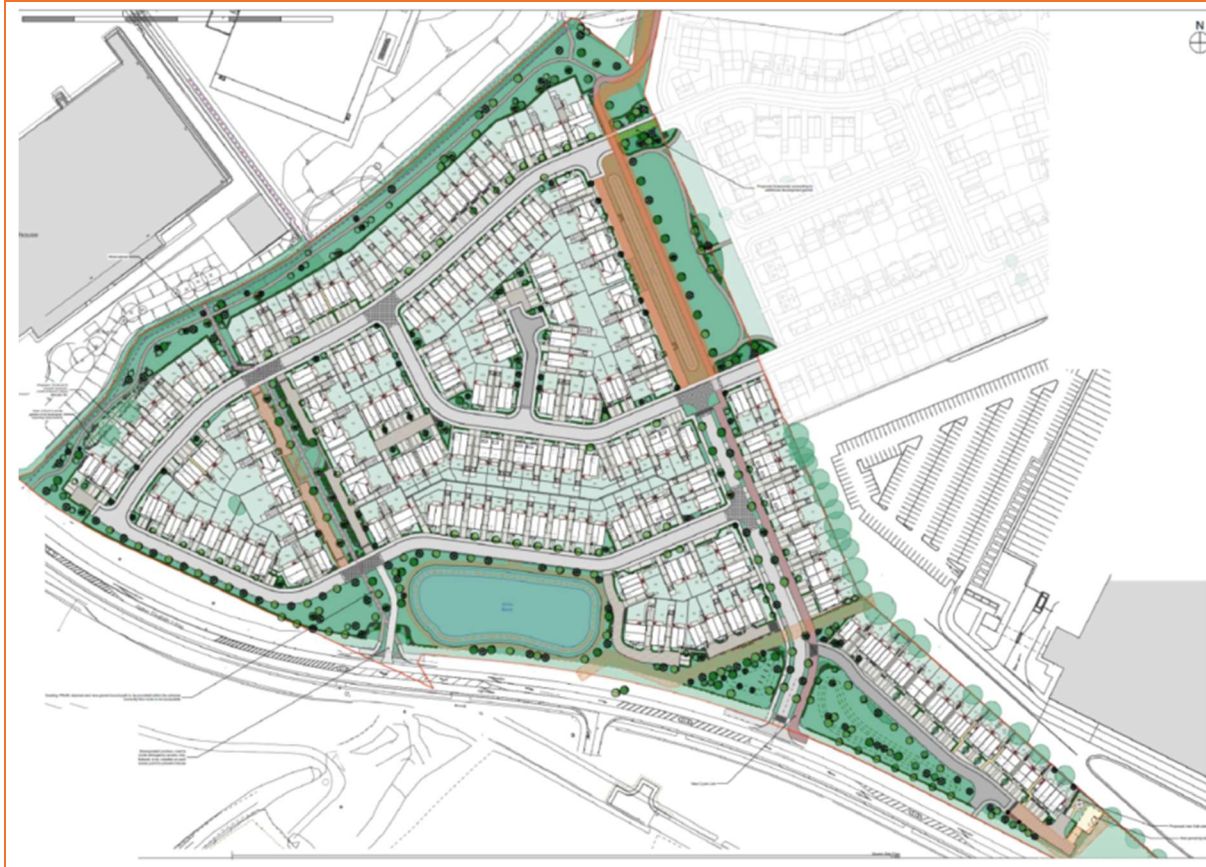
1.2. PROPOSED DEVELOPMENT

Northstone intends to construct a low-rise residential development with associated gardens, estate roads and infrastructure. Drawing (18-435-002) (APPENDIX IV) identifies the proposed development layout.

A snapshot of the proposed development layout is indicated in Figure 1.1.



Figure 1.1 Proposed Development Layout





1.3. OBJECTIVES

The objectives of the geoenvironmental investigation are as follows:

- ❖ Review historical plans, geology, hydrogeology, site sensitivity, floodplain issues, mining records and any local authority available to complete a desk study in line with the Environment Agency (EA) document Land Contamination: Risk Management (LCRM) (updated June 2025).
- ❖ Undertake a phase of sampling and analysis to provide an overview of the environmental issues identified.
- ❖ Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site concerning the site's future use and off-site receptors.
- ❖ Assess the geotechnical information and provide recommendations concerning foundations, pavement construction and floor slabs.
- ❖ Assess the coal mining-related information and provide recommendations regarding any future treatment; and
- ❖ Provide recommendations regarding future work required.

1.4. SCOPE OF WORKS

The scope of work includes the elements included in Table 1.1.

Table 1.1 Scope of Works

Preliminary Reporting	❖ Phase 1 Geoenvironmental Assessment
Ground Investigation	❖ Design of suitable ground investigation ❖ Window sample probeholes with the construction of environmental monitoring installations ❖ Deep cable percussive borehole ❖ Mechanically excavated trial pits ❖ BRE365 soakaway test locations ❖ Soil and groundwater sampling
Testing and Monitoring	❖ In-situ geotechnical testing ❖ Chemical and geotechnical analysis ❖ Groundwater monitoring ❖ Ground gas monitoring
Assessment and Reporting	❖ Factual and interpretative reporting ❖ Contamination risk assessment and conceptual site model ❖ Geotechnical assessment and interpretation

1.5. LIMITATIONS

The limitations of this report are presented in APPENDIX I.



1.6. RISK CLASSIFICATION

The description of risk classification and the likely action required as set out in CIRIA C552 are included in APPENDIX III.

1.7. CONFIDENTIALITY

E3P has prepared this report solely for the use of the client and those parties with whom a warranty agreement has been executed or with whom an assignment has been agreed. Should any third party wish to use or rely upon the report's contents, written approval must be sought from E3P; a charge may be levied against such consent.



2. SITE SUMMARY

2.1. SITE DETAILS

Table 2.1 Site Details

Site Address	Land off Harehill Road, South Heywood, OL10 2TP
National Grid Reference	E385216, N409293
Site Area	8.19 Ha
Site Ownership	Northstone purchasing the site from Russell Homes

The Glossary presented in APPENDIX II defines all acronyms used within the report.

A site location map is presented in APPENDIX IV as Drawing 18-435-001

2.2. CURRENT SITE USE

A site walkover was completed by an E3P representative in November 2016 as part of the initial Phase I assessment, a further visit was undertaken on 10th July 2025 to determine whether any changes to the site had taken place since the initial assessment. The full details are included in Table 2.2 and selected photographs are presented in appendix V.



Table 2.2 Site Description

FEATURE	DESCRIPTION
Occupancy/Use	The subject site is an irregularly shaped parcel of land located off Hareshill Road in Heywood. The Phase 3 development area comprises undeveloped agricultural fields largely used for livestock pasture. An overgrown spoil mound is present to the north of the former farm buildings, which may be associated with the demolition.
Structures	Farming buildings, which previously occupied the south west of the site, have subsequently been demolished to ground level. Floor slabs, wall remnants and below ground structures are present. It is likely that foundations to the existing buildings remain. Evidence of a water-filled slurry drain was observed. It is unknown whether this leads to a slurry tank or whether this was historically pumped out. No other structures are present within the site boundary
Retaining Structures	None present.
Access	Access is from Hareshill Road to the south.
Slope	The site falls gently from circa 132 m AOD in the north and west to 126 – 128 m AOD in the east.
Vegetation/Ecology	Rough scrub vegetation is present across the site with areas of overgrown grasses. Hedgerows and a series of sporadic semi-mature trees are present along field boundaries. Himalayan Balsam was observed within the spoil mound and along the western boundary of the site. An ecological, invasive plant survey and arboricultural assessment of the site has been undertaken separately and is outside the scope of this report.
Hazardous Material and Storage	Bulk Storage No Above Ground Storage Tanks (AST) or Underground Storage Tanks (UST) were observed at the site during the preliminary site walkover or the subsequent visit. As noted above, slurry drainage was observed which may lead to a slurry tank or may have historically been pumped out. Due to the previously undeveloped nature of the site it is unlikely hazardous materials storage will have occurred across the wider site. Non-Bulk Storage No drums, containers or IBCs were observed. Electrical Substations No electrical substations are present on-site or within close proximity. PFAS/PFOA No sources of PFAS or PFOA have been identified.
Asbestos-Containing Material (ACM)	Isolated pieces of cement-bound roof/cladding sheeting were identified on the surface, in the area of the former farm buildings, during the recent site visit which may potentially contain asbestos fibres.
Waste Storage	Potentially hazardous waste streams are unlikely to be generated at the site, and none were observed during the preliminary site inspection.
Drainage	Drainage connections are available throughout Hareshill Road to the south. A drainage survey was underway during the recent walkover, and anecdotal



FEATURE	DESCRIPTION
	evidence suggests that drainage runs along the inside of the southern boundary with a pipe running south to north bisecting the site. However, this pipe is not confirmed on available service plans.

2.3. SURROUNDING LAND USE

The immediate surrounding area land uses are summarised in Table 2.3.

Table 2.3 **Surrounding Land Uses**

DIRECTION	DESCRIPTION
North	Agricultural Fields / Industrial buildings
East	Industrial buildings and Agricultural Fields
South	Harehill Road/Queen Elizabeth II Way with Agricultural land beyond
West	Warehouses

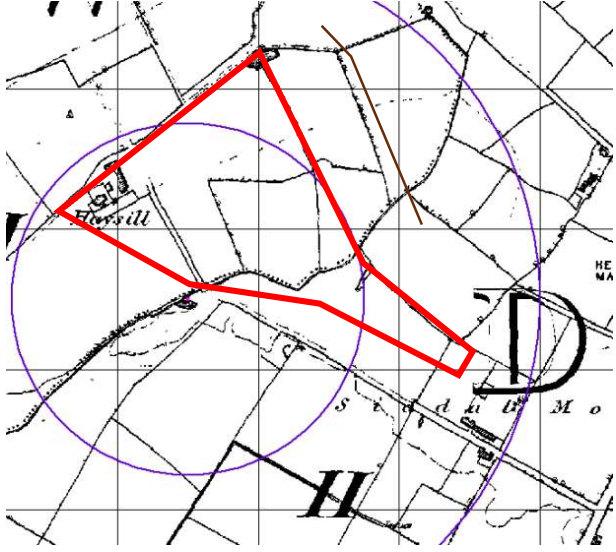


3. SITE HISTORY

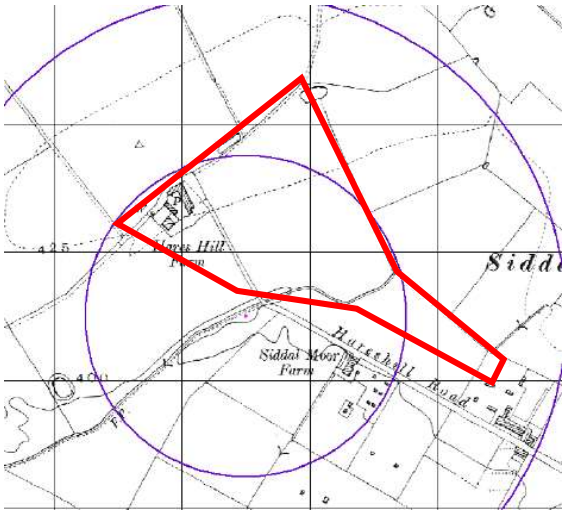
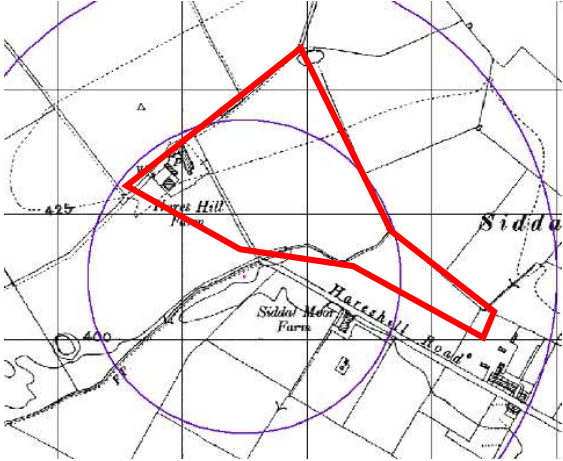
3.1. ON-SITE HISTORICAL DEVELOPMENT

A review of historical mapping and historical aerial imagery pertinent to the site is summarised in Table 3.1. In addition, historical site features are presented in Drawing No 18-435-003 in APPENDIX IV.

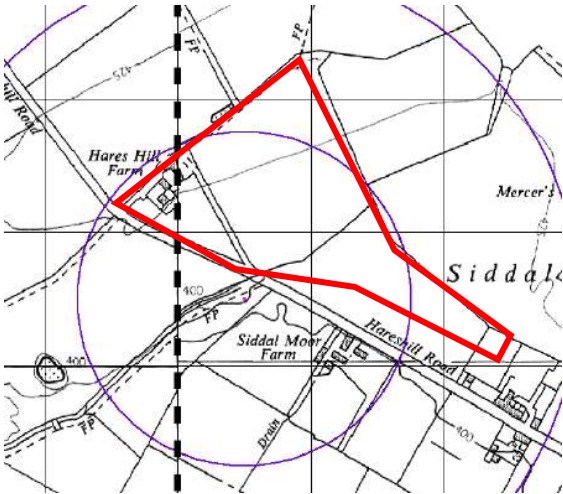
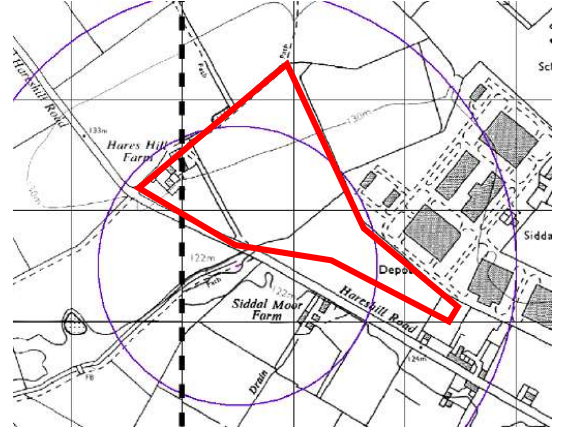
Table 3.1 Historical Development

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1848 1:10,560	The majority of the site is recorded as undeveloped agricultural land with Harehill farm located in the west of the site. A pond is recorded at the northern tip of the site.	

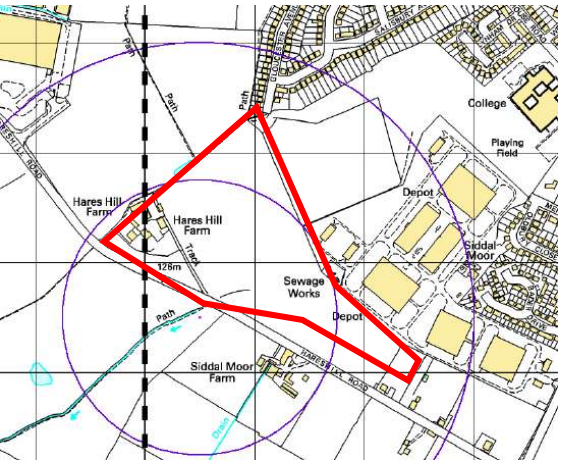


MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1894 1:10,560	A field boundary through the central sector is no longer present.	
1938 1:10,560	No significant changes are recorded to the subject site.	



MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1965 1:10,000	No significant changes are recorded to the subject site. The pond adjacent to the northern boundary is no longer recorded.	
1974-77 1:10,000	No significant changes are recorded to the subject site.	



MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1999 1:10,000	A field boundary in the south of the site is no longer present.	
April 2021 Google Earth Aerial Imagery	The farm buildings in the west of the site have been demolished.	



MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
April 2022 Google Earth Aerial Imagery	Ground workings are shown in the south of the site associated with the construction of the new link road to the south.	



3.2. OFF-SITE HISTORICAL DEVELOPMENT

A review of potentially contaminative uses identified on historical Ordnance Survey maps within a 100 m radius of the site is summarised in Table 3.2.

Table 3.2 Surrounding Historical Development

SURROUNDING FEATURE	DISTANCE	DATES	DIRECTION
Hares Hill Farm	On-site	Pre 1848-Present	On-site
Sewage Works	20 m	Pre 1983-Present	North
Siddal Moor Farm	30 m	Pre 1983-Present	South

3.3. PLANNING HISTORY

The site and wider South Heywood development site have previously been subject to planning applications. The construction of equestrian facilities, stables for 40 horses and associated development, a horse cross country track and the formation of fishing lodges for recreational use was submitted in 2004 and rejected in April 2005. This development was then granted subject to conditions on appeal.

Russell Homes was granted Outline Planning Consent (ref: 16/01399/HYBR) for a strategic mixed-use development that will comprise a 2.2km link road, residential housing and commercial/industrial land use. Hareshill Farm is located in the northern sector of the wider development.

3.4. PREVIOUS REPORTS

The following previous site investigation report has been provided to E3P for review:

Table 3.3 Previous Reports

AUTHOR	TITLE/REFERENCE	CLIENT	DATE
Ian Farmer Associates	Report of Ground Investigation Junction 19 Link Road, Heywood Report Ref: W15/41711-V1	Rochdale Borough Council	October 2015

The report relates to the Junction 19 Link Road (Queen Elizabeth Way), which runs adjacent to the southern boundary of the site. A ground investigation was completed along two proposed routes (one follows the existing Hareshill Road and the other crosses agricultural land to the south of Hareshill Road).

The key findings of the previous site investigation report are summarised below:

The site investigation identified the following with respect to the area where the proposed highway will be located:

- ✿ Made Ground varies in thickness between 0.24 m and 5.60 m bgl with Made Ground in the east being <1.0m thick. In the west, within the permitted waste facility, Made Ground was recorded to 5.60 m bgl.
- ✿ The Made Ground within the west of the site comprised sandy, gravelly clay and gravelly sand. Gravel included sandstone, ash, clinker, siltstone, brick, glass, plastic and wood fragments.



- ✦ Superficial deposits were encountered beneath surface coverings to the full depth of the site investigation and comprised of gravelly sand and gravelly clay. The coarse deposits (sand) were encountered as interbedded horizons within clay strata and were recorded as being absent in the west of the proposed route.
- ✦ Groundwater was recorded in most the exploratory locations at significantly varying depths between 1.00 m bgl and 11.80 m bgl. The water is described as related to sand horizons within clay strata. Thirty-three locations are described as dry along the proposed route.
- ✦ Contamination testing of soil samples was completed with the results compared within commercial and industrial land use guideline values. The results were all below these screening criteria and were not considered to pose a risk to human health.
- ✦ One sample Made Ground (WS19) identified a fragment of bituminous material that contained chrysotile asbestos. Subsequent quantification of this ACM identified that it contained 0.056% total mass asbestos. As such, it was considered that asbestos risk management may be needed within any construction activities.



4. ENVIRONMENTAL SETTING

4.1. GEOLOGY

The British Geological Survey (BGS) map (Sheet 85) for the site (1:50,000, Solid and Drift editions) and online records indicate the area is underlain by the geological sequence presented in Table 4.1.

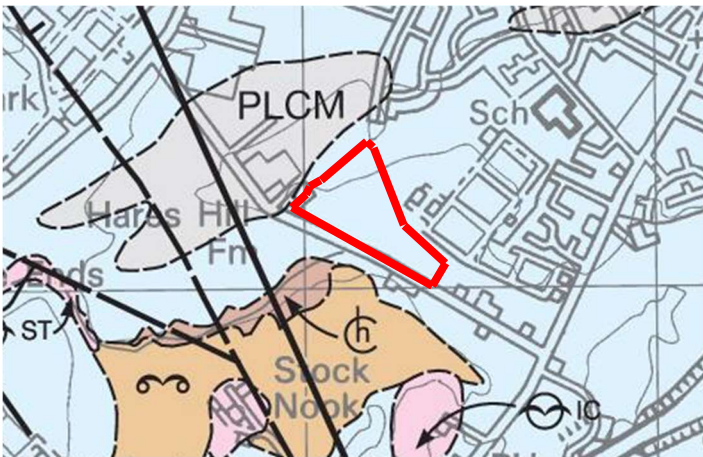
Table 4.1 Summary of Underlying Geology

GEOLOGICAL UNIT	CLASSIFICATION	DESCRIPTION	AQUIFER CLASSIFICATION
Superficial	Diamicton (Glacial Till)	CLAY, SAND and GRAVEL	Secondary Undifferentiated
Bedrock	Pennine Lower Coal Measures Formation	MUDSTONE, SILTSTONE and SANDSTONE	Secondary A Aquifer

E3P has reviewed the BGS database, which identified no available boreholes in close proximity, from which to compare the published geology above.

The BGS mapping also identifies the location of faults that cross the site, as presented in Table 4.2.

Table 4.2 Faulting

DESCRIPTION	GEOLOGICAL MAP EXCERPT
Two Faults (approximately 225m SW and 300m SW) – Trending NW – SE, with a downthrow to the NE.	

4.2. HYDROGEOLOGY

The Envirocheck Report indicates that the site is not located within a Groundwater Source Protection Zone. There are no groundwater abstractions within a 1 km radius.

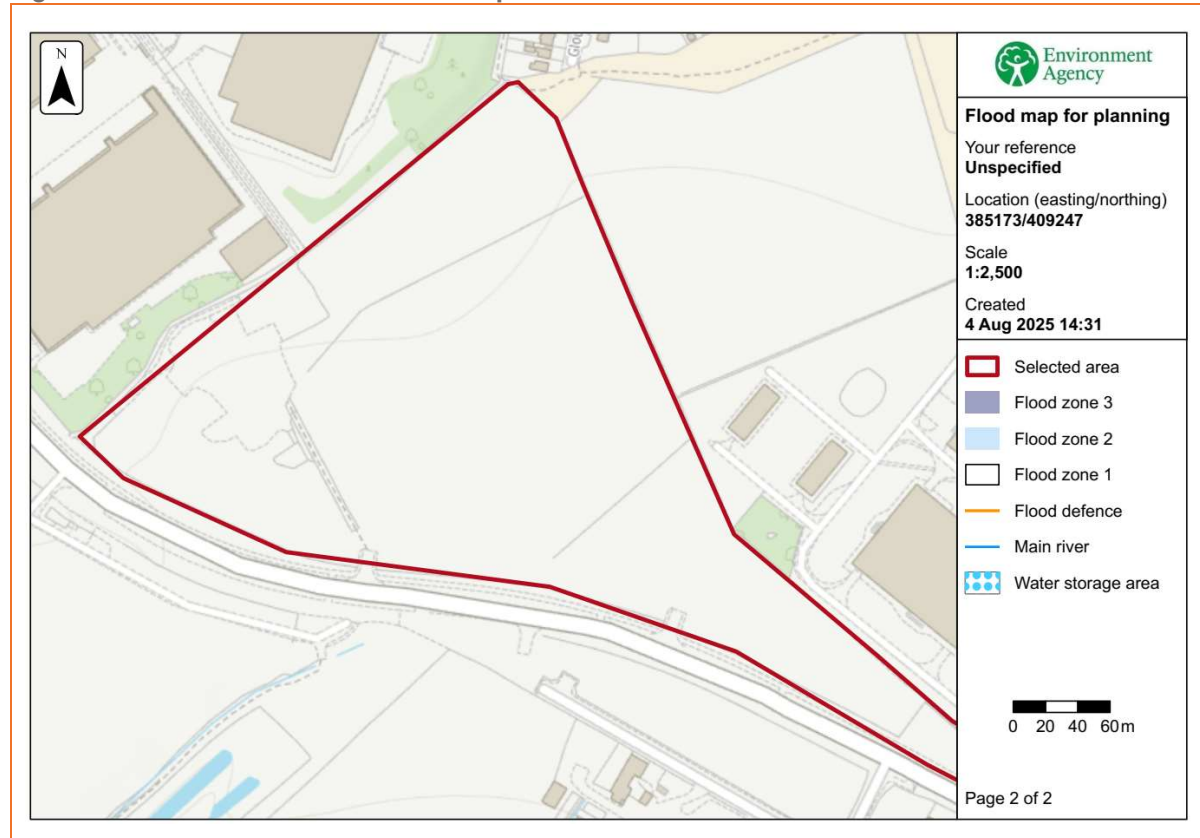
4.3. HYDROLOGY

An unnamed water course/drainage ditch is present circa 50 m south of the site. Whittle Brook is located approximately 325m to the south east.



The site is predominantly located within a currently defined “Flood Risk Zone 1”, defined as land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (<0.1%) and, as such, is considered to be unaffected by river flooding. The Envirocheck report states there is a potential for groundwater flooding of property below ground level at the site. The Flood Risk Maps for the site are presented in Figure 4.1 and Figure 4.2.

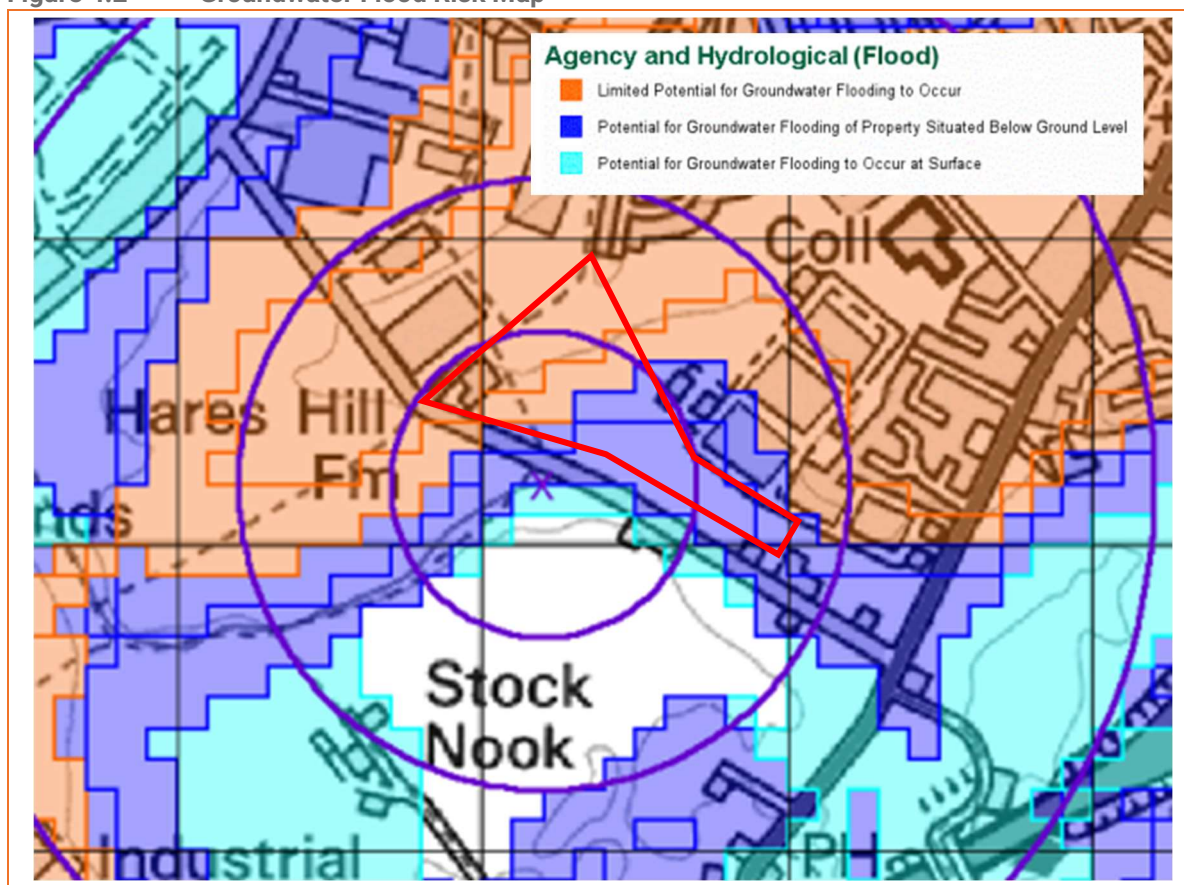
Figure 4.1 EA Fluvial Flood Risk Map



Source – <https://flood-map-for-planning.service.gov.uk/>



Figure 4.2 Groundwater Flood Risk Map



Source – BGS Flood GFS Data (Envirocheck Report)

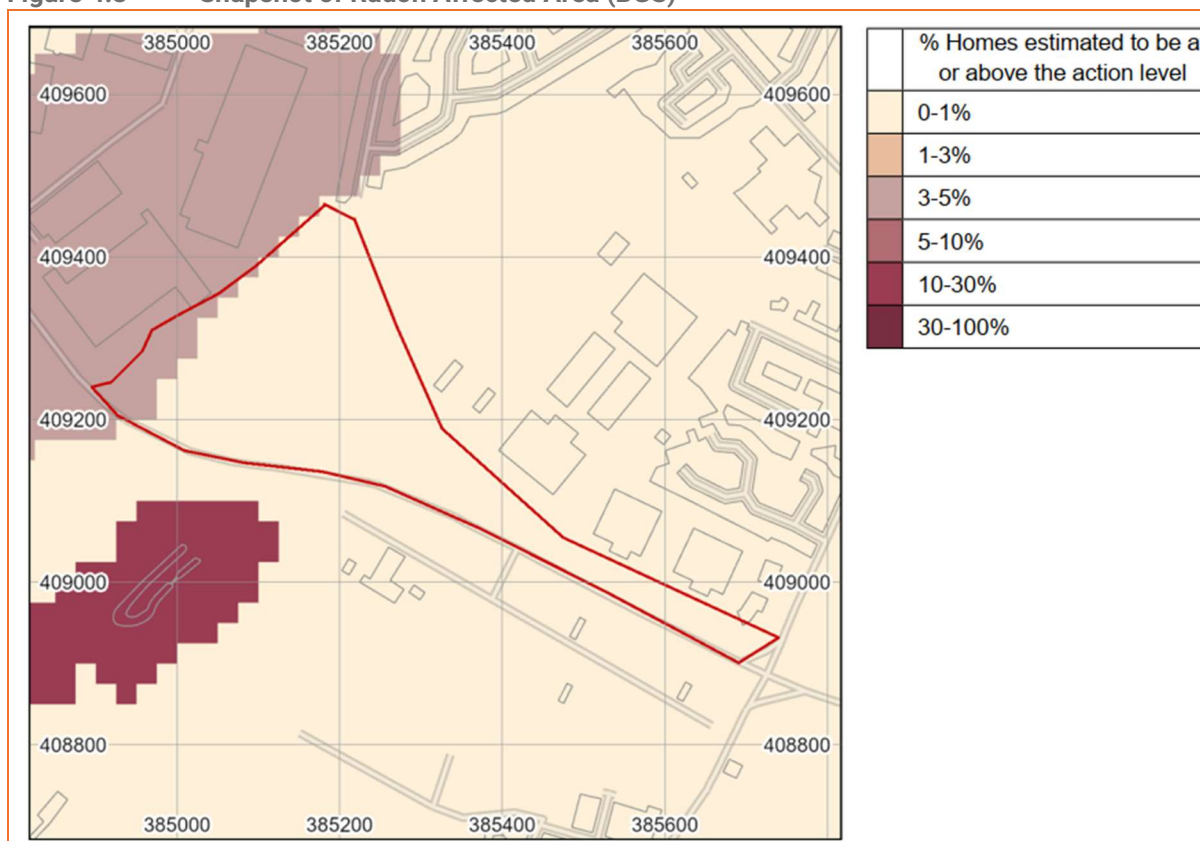
4.4. RADON RISK

Groundsure mapping confirms that the site is located within an area where between 10-30 % of properties are above the Action Level. Consequently, a site-specific Radon report (ref: BGS_343214/61010, dated June 2025) has been obtained and is included as APPENDIX XI.

The report indicated that the majority of the site is classified as low risk (less than 1% properties are above the Action Level) and full radon protective measures are not necessary for the construction of new dwellings or extensions. However, an area along the western boundary falls within an area where between 3 and 5% of properties are above the Action Level and development plots within this area will require basic radon protection measures. A snapshot of the radon affected area is presented as Figure 4.3, overleaf.



Figure 4.3 Snapshot of Radon Affected Area (BGS)



4.5. LANDFILL SITES AND WASTE TREATMENT SITES

There are no historical or active landfill sites within 500 m.

The Envirocheck report identified Harehill Farm Equestrian Centre off Harehill Road (circa 330 m west of the site) as a licenced Waste Management Facility that has been operational since 2012. No other details are provided. A review of aerial photography suggests that this is a large earthworks operation and anecdotal information indicates that the works are for the formation of an equestrian centre.

A review of the waste permit for this facility (EPR/CB37 38AC) states the following:

The permit authorises a deposit for recovery activity allowing the importation of waste engineering fill, which will consist of inert waste only. The site has planning permission for the construction of equestrian facilities within associated horse cross country track and formation of fishing lodges for recreational use.

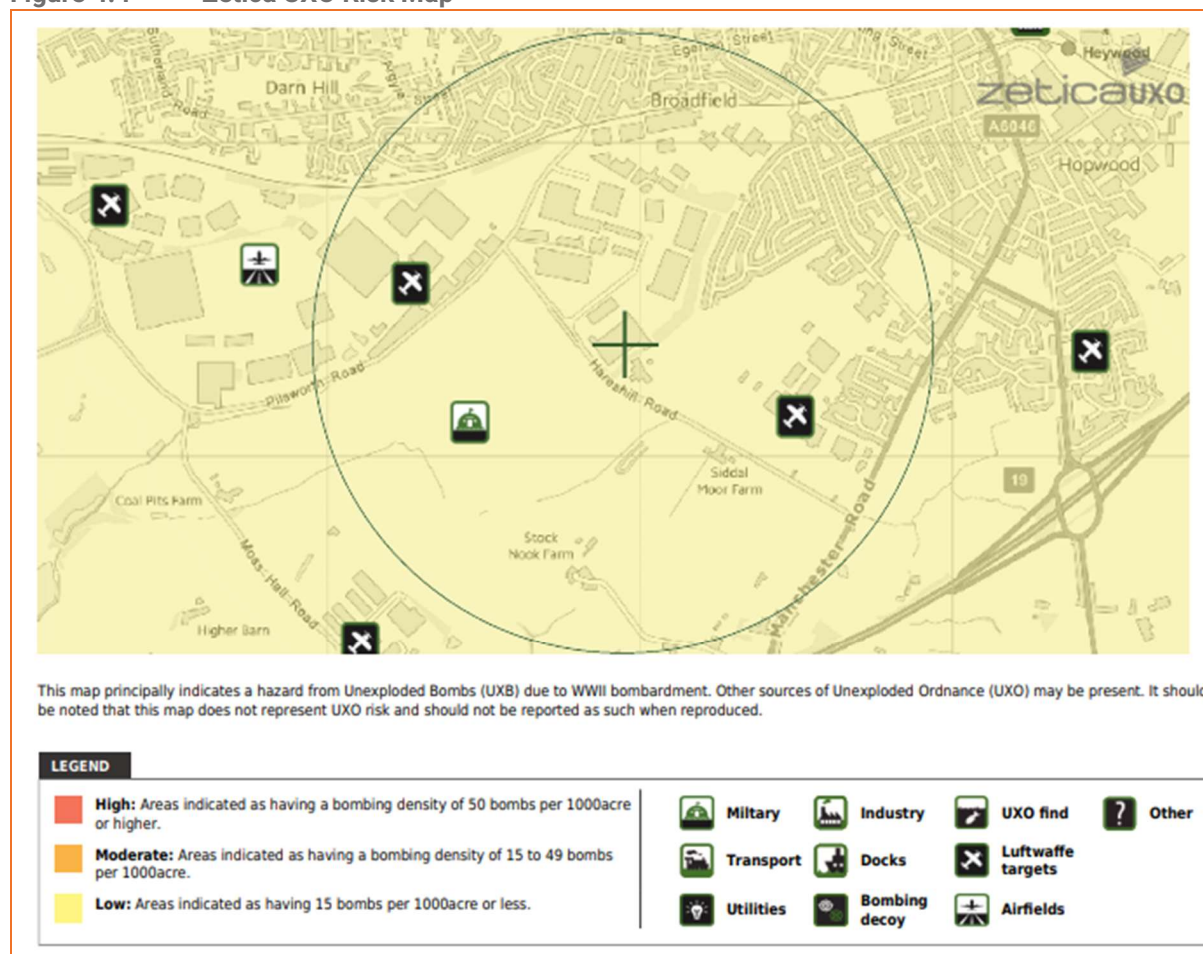
The permit will authorise up to 306,000 tonnes of waste construction material to achieve the approved reclamation levels and complete the project. Permitted wastes do not include hazardous wastes. The activity will be carried out in accordance with the approved waste recovery plan.

4.6. UNEXPLODED ORDNANCE

The regional unexploded bomb risk map from Zetica (2014) indicates that the site is in an area at low risk from possible unexploded ordnance (UXO) resulting from the Second World War. The Zetica UXO Risk Map is presented in Figure 4.3.



Figure 4.4 Zetica UXO Risk Map



Source - <https://zeticauxo.com/downloads-and-resources/risk-maps/>

4.7. INDUSTRIAL LAND USES

There are no current industrial land uses listed within the Trade Directory within the South Heywood Development Area.

A number of entries are listed to the north of the development area at Harehill and Pennine Business Parks. The majority of the entries appear to be associated with haulage and distribution.



4.8. SITE SENSITIVITY ASSESSMENT

The site is assessed to be located within a “Moderate” sensitivity setting, as discussed in Table 4.3.

Table 4.3 Site Sensitivity Assessment

SENSITIVITY PROFILE	DISCUSSION	RATING
Groundwater source protection zone or drinking water	The site is not located within a Source or Drinking Water Protection Zone	Low
Distance to the closest groundwater abstraction point	There are no groundwater abstractions within 1km of the site boundary.	Low
Aquifer classification in superficial drift deposits	Secondary (Undifferentiated)	Low
Aquifer classification in bedrock	Secondary A	Moderate
In the site underlain by low-permeability drift to depths in excess of 10 m?	Shallow bedrock is present at depths from 1.00 m bgl.	Moderate
In the site located within 50m of a surface watercourse?	An unnamed water course/drainage ditch is present circa 50 m south of the site.	Low
Sensitive land uses	Residential properties are present to the north west of the site boundary.	Low
Sensitive ecological receptors	A number of trees and hedgerows are present on site which may be home to sensitive ecological receptors. Furthermore, the site is located within an area of adopted Green Belt.	Moderate
Overall Site Environmental Sensitivity		Low to Moderate

4.9. REGULATORY DATABASE

The information summarised in Table 4.4 has been obtained from a commercially available environmental database. The summary table only includes records from within 250m of the subject site and is not otherwise detailed in the report.

Table 4.4 Summary of Environmental Data

RECORD	ENTRIES WITHIN 250 m	DETAILS
Contaminated Land Register Entries and Notices	0	None Identified (N/A).
Authorised industrial processes (IPC/IPPC/LAPPC).	1	INX International Ltd have an LAPPC for the manufacture of coating materials located 210 m to the north.
Fuel Stations Entries	0	N/A
Licensed Radioactive Substances	0	N/A



RECORD	ENTRIES WITHIN 250 m	DETAILS
Enforcements, Prohibitions or Prosecutions	1	One prosecution relating to controlled waters has been identified following a breach of a discharge consent relating to Whittle Brook in September 2005.
Discharge Consents	5	Two sewage discharge consents are located within the South Heywood Development Area, one is for Siddal Moor Farm and the other relating to discharge of sewage from three residential properties located on Harehill Road. The remainder are located outside of the site boundary but all relate to sewage or storm water discharges.
Pollution Incidents	6	There are two pollution incidents recorded within the South Heywood Development Area. One related to the release of crude sewage to Whittle Brook following a blocked sewer from close to Hares Hill Farm (Plot G1). The other related to manure from a property close to Saxon Farm (Plot M). These incidents were classified as Category 2 (Significant) and Category 3 (Minor) respectively.
Consents Issued Under the Planning (Hazardous Substances Act 1990	0	N/A
Control Of Major Accident Hazard (COMAH) Sites	0	N/A



5. PRELIMINARY MINING ASSESSMENT

5.1. COAL MINING

The Mining Remediation Authority (MRA) mapping and records indicate that the site is in an area that may be affected by coal mining.

A MRA mining report was obtained (Ref: 51002321219001) dated November 202.

The MRA operates a risk-based approach to assessing potential instability issues associated with future land development located within the predefined MRA consultation areas. This risk-based approach subdivides the potential risk into “low” and “high” risk categories.

The risk categories can be defined as:

Low-Risk Sites – Deemed to be land where coal mining has taken place, however, it was at such depth not to pose a risk to new development, and it, therefore, contains no known recorded risks and as such, no further assessment is required.

For low-risk site, the MRA categorically states:

*If your proposed development is within the Development Low Risk Area, **there is no need for you to submit any coal mining information with your planning application** and The Mining Remediation Authority will not be consulted by the LPA. The LPA will include our Standing Advice as an informative note within the decision notice.*

High-Risk Sites – Deemed to be landholdings located within an area known to contain legacy risks that include:

- ✦ Mine entries (shaft or adit);
- ✦ Shallow coal working (recorded and probably);
- ✦ Workable coal seam outcrops;
- ✦ Mine gas sites and areas;
- ✦ Recorded coal-mining -related hazards;
- ✦ Geological features (fissures and break lines); and
- ✦ Former surface mining sites (sometimes using historic opencast extraction methods).

5.2. COAL MINING INFORMATION

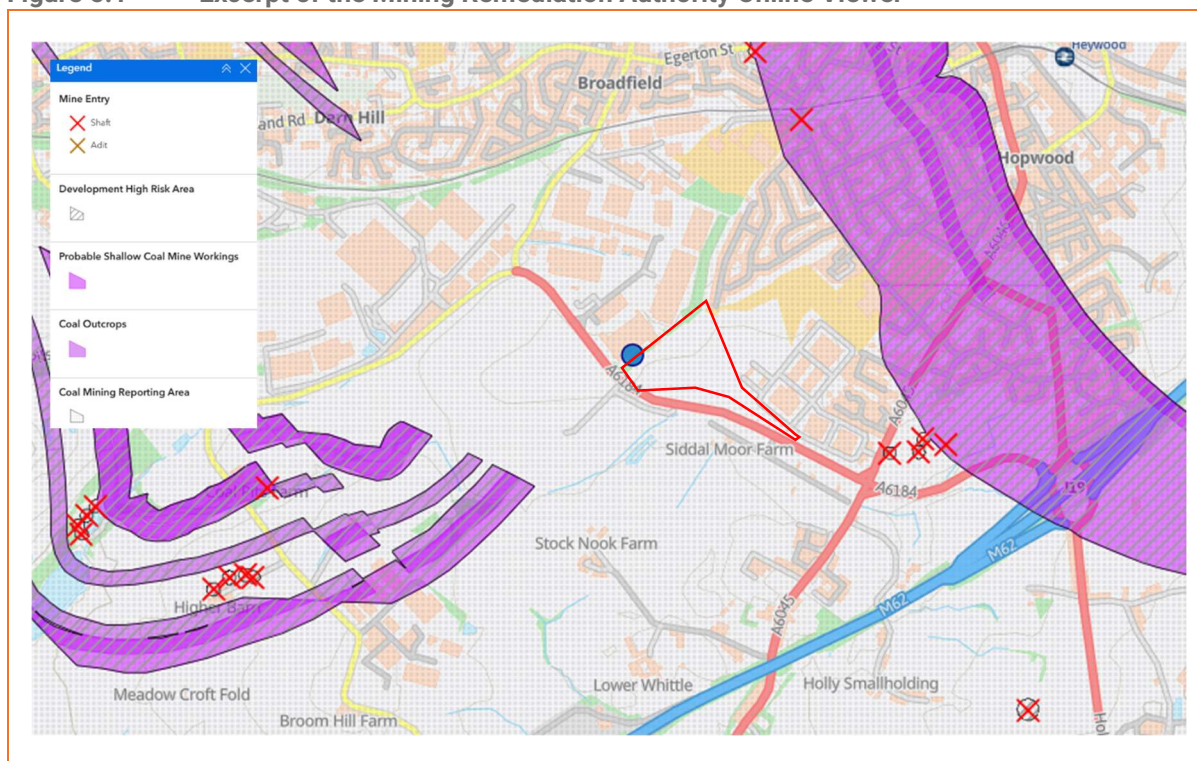
Prior to the enactment of the Coal Mines Regulation Act (1872), which came into force on the 1st of January 1883, there was no statutory requirement to record the extent of abandoned mine workings and as such the MRA has no knowledge of extensive workings throughout the UK Coal Fields where shallow workings are present at a depth that could result in a subsidence event in the future (through successive cavitation) associated with failure of support mechanism.

Determining if a site may have unrecorded or recorded coal mine workings requires the consideration of a wide range of information, and E3P has completed a review of relevant information in relation to potential coal mining activities.

In the first instance, E3P has reviewed the Mining Remediation Authority Online Viewer, and an excerpt of this is presented in Figure 6. This map shows that the site lies within a Coal Mining reporting area but not a high-risk development area. Extensive mining is shown to the northeast and southwest of the site. The Arley coal seam is shown to outcrop to the north east of the site, dipping in a south westerly direction. No recorded workings or probable shallow workings are shown on site.



Figure 5.1 Excerpt of the Mining Remediation Authority Online Viewer



As the site is within an area affected by coal mining E3P has obtained a Consultant Coal Mining Report for the site (ref: 51002103708001.)

Table 5.1 provides a summary of pertinent coal mining information with this report.

Table 5.1 Coal Mining Information

SOURCES OF INFORMAITON	SUMMARY
Known Past Underground Mining	No past mining recorded
Portable Unrecorded Shallow Workings	None
Spine Roadways at Shallow Depth	No spine roadways recorded at shallow depth
Mine Entries Within 100m Of the Site	One recorded within 100 m of the enquiry boundary (located circa 250 m east of the subject site area).
Mine Abandonment Plans	None consulted
Known Outcrops	No outcrops recorded
Faults / Fissures	No faults, fissures or breaklines recorded
Opencast Mines	None recorded within 500 metres of the enquiry boundary



SOURCES OF INFORMATION	SUMMARY
Mining Remediation Authority Managed Tips	None recorded within 500 metres of the enquiry boundary
Remediated Sites	None recorded within 50 metres of the enquiry boundary
Coal Mining Subsidence	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, 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
Mine Gas	None recorded within 500 metres of the enquiry boundary
Mine Water	None recorded within 500 metres of the enquiry boundary
Future Underground Mining	None recorded
British Geological Survey Mapping	The 1:10,000 geological mapping for the area indicates the presence of the Arley coal seam outcropping at its closest point approximately 580 m north east of the site. The seam is understood to be dipping in a south westerly direction beneath the site. It is likely that there are workings within the identified coal seam.
Review Of Mining Remediation Authority Archive	No Coal Authority archives / Mine Abandonment Plans are made available.
Historical Ordnance Survey Mapping	A review of the 1:10,000 Ordnance Survey mapping from c. 1850 which has records of mine workings which pre-dated the Mining & Regulation Act of 1872 has not identified any coal mining features.
Historical Site Investigations	E3P has not been provided with any historic site investigation reports.

5.3. MINING REMEDIATION AUTHORITY PLAN

The Mining Remediation Authority plan referenced: MR-LARGE-PLOT-GS-7294009 shows there are no mine shafts or notable mining features within the vicinity of the site as illustrated in Figure 5.2.



Figure 5.2 Mining Remediation Authority Plan



5.4. MINE ABANDONMENT PLANS

Mine abandonment plans are not currently available for the site.

5.5. OPEN CAST MINING

There are no records of open-cast mining related to the site.

5.6. PRELIMINARY MINE GAS ASSESSMENT

If coal mining is present below the site, this may be a potential source of ground gas that could pose a risk to site end users. A preliminary mine gas assessment is provided in Table 5.2.



Table 5.2 Preliminary Mine Gas Assessment

SCENARIO	DISCUSSION	RATING
Are There Known Coal Seams Beneath the Site?	No.	Low
Are There Coal Seams Within 150m of the Top of the Bedrock?	No.	Low
Are There Any Known Workings Below the Site?	No.	Low
Are The Underlying Drift Deposits Impermeable?	Yes – the majority of locations encountered CLAY, however, granular deposits in some locations and shallow bedrock has been identified from 1.00 m bgl.	Moderate
Are There Any Mine Entrances Within the Site Boundary or Within 50m Of the Site?	No.	Low
Are There Any Faults Below the Site or In Close Proximity?	None located within 200 m.	Low
Is There Any Records of Mine Gas Emission on Or Within 50m Of the Site	No.	Low
Is There Any Record of Historical Mine Stabilisation Works?	No.	Low
Evidence Of Rising Groundwater in Flooded Mine Workings?	Not known.	Moderate
Overall Mine Gas Risk		Low

Conclusion

Source

Whilst the site is located in an area of mining activity, the site is not underlain by known coal mining.

Pathway

Granular horizons and shallow bedrock are present at the site which provide a potential pathway for mine gases.

Recommendations

Whilst a potential pathway has been identified the absence of any historical mining suggests that mine gases are not being generated and therefore the risk from mine gas generation is considered to be low.

5.7. COAL MINING RISK ASSESSMENT

This risk assessment comprises a desk-based review of all available information on coal mining issues that are relevant to the application site deemed to be within a high-risk area. This includes:



- ✿ Interpretation of information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact of issues;
- ✿ Setting out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development; and
- ✿ Demonstrating 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.

The coal mining risk assessment is summarised in Table 5.3.

Table 5.3 Summary of Coal Mining Risk

COAL MINING RISK	YES/NO	RISK ASSESSMENT
Recorded Underground Coal Mining at Shallow Depth (<30 m)	No	Low
Recorded Underground Coal Mining at Shallow Depth (>30 m)	No	Low
Evidence Of Unrecorded Surface Extraction of Coal Outcrop	No	Low
Unrecorded Underground Coal Mining at Shallow Depth (<30 m)	Yes	Moderate/High
Mine Entries (Shaft/Adits)	No	Low
Coal Mining Geology – Fractures/Fissures	No	Low
Recorded Gas Emissions	No	Low
Recorded Mining Surface Hazard	No	Low
Surface Mining (Opencast)	No	Very Low / Low

Further investigation is recommended to confirm the absence of unrecorded shallow mine workings associated with the Arley seam to the north east of the site.



6. PRELIMINARY GEOTECHNICAL ASSESSMENT

6.1. GEOTECHNICAL DATA

Geotechnical data presented within a commercially available environmental database is summarised in Table 6.1.

Table 6.1 Summary of Geotechnical Data

HAZARD	DESIGNATION
Shrink-Swell Clay	Very Low Risk
Landslides	Very Low Risk
Ground Dissolution	No Hazard
Compressible Ground	No Hazard
Collapsible Deposits	Very Low Risk
Running Sand	Very Low to Low Risk
Anthropogenic Cavities	None recorded
Sinkholes and Natural Cavities	None recorded

6.2. ARTIFICIAL LANDFORM AND GEOMORPHOLOGY

Based on the initial geological assessment, a review of available topographic data and pertinent mapping, E3P has undertaken a preliminary geomorphological evaluation of the landform and its possible mechanism for formation.

With the exception of the development Hares Hill Farm, the site has undergone no significant historical development and the land broadly represents natural landform.

Figure 6.1 Surface Lidar Data





6.3. GEOTECHNICAL RISK ASSESSMENT

Based on the desk-study information, the following geotechnical assessment has been made:

- ✦ Given the predominantly undeveloped nature of the site, it is likely there will be limited Made Ground fill deposits and obstructions. Existing buildings have been demolished to ground level, however, all relict foundations and sub-surface structures will require grubbing out before the proposed development's construction.
- ✦ Mature trees are present along the western boundary of the site, consideration should be given to the potential influence of tree removal on low permeability deposits.
- ✦ A historically infilled or silted-up pond is present at the northern tip of the site which is a potential source of alluvial deposits, silts and possible organic deposits, and potential depths of Made Ground. An investigation will be required to undertake in-situ geotechnical testing to determine the potential foundation solution for plots in this area.
- ✦ Earthworks will be required to create the required development platform to construct a low-rise residential development.



7. INITIAL CONCEPTUAL SITE MODEL

Under EA LCRM (updated June 2025) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), and BS EN ISO 21365:2021 (Soil Quality – Conceptual models for potentially contaminated sites), E3P has developed a Tier 1 risk assessment comprising an initial conceptual site model (CSM) to identify potential contamination sources, migration pathways and receptors within the study area. An initial screening of the on and potential off-site sources of contamination has been undertaken in Table 7.1, with the more detailed initial CSM included overleaf in Table 7.2.

Table 7.1 Initial Contaminant Source Screening

SOURCE	SOIL	GROUNDWATER	GROUND GAS/VAPOUR
On-Site			
Harehill Farm – Made Ground	Heavy Metals, PAHs, TPHs, Asbestos	Heavy Metals, PAHs, TPHs	Unlikely
Harehill Farm - Slurry Pit	Heavy Metals, Pathogens, Nitrates, Phosphates	Heavy Metals, Pathogens, Nitrates, Phosphates	CH ₄ /CO ₂
Former Pond	Heavy Metals, PAHs, TPHs, Asbestos	Unlikely	CH ₄ /CO ₂ (Unlikely – low risk source)
Off-Site			
Sewerage Work	Heavy Metals, Pathogens, Nitrates, Phosphates, VOCs	Heavy Metals, Pathogens, Nitrates, Phosphates	CH ₄ /CO ₂ /H ₂ S/VOCs
Siddal Moor Farm	Heavy Metals, PAHs, TPHs, Asbestos	Heavy Metals, PAHs, TPHs	Unlikely

After reviewing all environmentally pertinent information and the potential contaminant sources, the following initial conceptual site model has been developed for the site:



Table 7.2 Initial Conceptual Model

CONTAMINANT SOURCE	MIGRATION PATHWAY	RECEPTOR
HUMAN HEALTH		
Made Ground (Former farm, former pond and field boundaries) – Heavy metals, PAHs, TPH	Accidental ingestion and/or dermal contact with contaminated soil and/or leachate. PL1/PL2	Human Health – construction workers
	Inhalation of contaminated dust PL3	Human Health – end users

Discussion

Made Ground associated with the former farm in the west of the site is a potential source of heavy metals, non-volatile PAH and TPH compounds. It is possible that localised infilling may have occurred in the location of former pond and field boundaries

If present the heavy metals, non-volatile PAHs and TPH may pose a short-term risk to construction workers who may come into contact with impacted soils during earthworks.

Future site users may come into contact with impacted soils in gardens or landscaping.

Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
Made Ground – Former Farm Hydrocarbons, volatile PAHs (naphthalene)	Inhalation of vapours PL4	Human Health – end users
	Migration through permeable strata and preferential pathways PL5	Human Health – Off-site receptors

Discussion

No significant sources of volatile contamination have been identified. Localised Made Ground associated with the former farm and infilled features is a potential source of hydrocarbon compounds and volatile PAHs, however the presence of volatile contaminants is considered unlikely. Localised spillages from agricultural machinery cannot be discounted given the sites historical land use.

Hydrocarbon compounds and PAHs may pose a risk to construction workers if they come into contact with impacted soils during further earthworks, however appropriate PPE/ Respiratory Protective Equipment (RPE) will ensure they are at no unacceptable risk.

Future end users may come into contact with impacted soils in garden and landscaped areas, though the main pathway of volatile compounds is considered to be vapour inhalation indoors.

Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
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CONTAMINANT SOURCE	MIGRATION PATHWAY	RECEPTOR
Made Ground Asbestos (Asbestos containing materials (ACM) and loose fibres)	Inhalation (of fibres) Construction works disturbing bound material and releasing fibres. PL3	Human Health – construction workers, end land users, and users of adjacent sites

Discussion

Asbestos containing material may be present within localised areas of infilling, however the risk is considered to be very low.

ACMs present risk through fibre and dust inhalation and if present they may pose a risk to construction workers during any feature earthworks/demolition and to adjacent third-party properties due to dust generation.

Isolated pieces of cement bound roof/cladding sheeting were identified on the surface, in the area of the former farm buildings, during the recent site visit which may potentially contain asbestos fibres.

Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
Made Ground Organic contaminants such as hydrocarbons	Ingestion of tainted water supply. PL7	Human Health – End users Water pipeline

Discussion

Localised Made Ground may contain organic contaminants such as hydrocarbons which pose a risk to future site users through the ingestion of tainted water supply.

The risk is considered to be low.

Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
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CONTROLLED WATERS

Localised Made Ground, Former Farm (Mobile contaminants)	Contact with contaminated groundwater PL2 Migration to the secondary A aquifer PL5 Migration to surface water courses PL5	Human Health – site personnel Human Health – Consumer Aquatic ecosystems
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Discussion

The site largely comprises undeveloped agricultural land, therefore no likely sources of mobile contamination have been identified. Localised spillages from agricultural machinery and fuel storage cannot be discounted given the sites historical land use. The presence of Glacial Till (CLAY) will inhibit downward and lateral migration towards the controlled waters receptors.



CONTAMINANT SOURCE	MIGRATION PATHWAY	RECEPTOR
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The overall risk to controlled waters is considered to be low.

Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
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GROUND GAS

Ground Gases (Methane and carbon dioxide associated with localised Made Ground, infilled pond)	Inhalation of ground gas PL4 Accumulation of ground gas in confined spaces (asphyxiation or explosion) PL4	Human Health – site personnel Human Health – end users Infrastructure and services
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Discussion

No likely source of ground gas has been identified, however if shallow mine workings are present this will represent a potential source of ground gas.

Infilled ponds can contain degrading material, which can produce methane and carbon dioxide, however, this is considered to be a low-risk source and significant ground gas generation is unlikely.

Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
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Radon	Inhalation of ground gas PL4 Accumulation of ground gas in confined spaces (carcinogenic)	Human Health – site personnel Human Health – end users
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Discussion

A site-specific radon report has been obtained for the site which indicates that the majority of the site falls within an area where less than 1% of properties are above action level and therefore no radon protection measure would be required. However, a strip of land inside the western boundary falls within an area where between 3 and 5% of properties are at or above the action level and development plots within this area will require basic radon protection measures.

Probability: Likely	Consequence: Medium	Level of Risk: Moderate/Low
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INFRASTRUCTURE AND DEVELOPMENT

Made Ground Sulphate from potential ash within the Made Ground	Sulphate attack on PL6	Building concrete
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Discussion



CONTAMINANT SOURCE	MIGRATION PATHWAY	RECEPTOR
Sulphate in ash deposits (associated with localised Made Ground) may impact the proposed building concrete.		
Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
Made Ground Phytotoxic contaminants	Direct contact (plant uptake) PL8	Flora
Discussion Localised Made Ground is a potential source of phytotoxic contaminants. There is a low risk due to the presence of existing vegetation across the majority of the site.		
Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low

Main Exposure Pathways

PL1 = Soil Ingestion, PL2 = Dermal Contact and Ingestion, PL3 = Dust Inhalation, PL4 = Vapour/Gas Inhalation, PL5 = Vertical/Lateral Migration, PL6 = Corrosion of Concrete, PL7 = Tainting of Water Supply, PL8 = Uptake by Plants

FROM CIRA 552 (2001)		RISK ASSESSMENT MATRIX			
		Consequence			
		SEVERE	MEDIUM	MILD	MINOR
Probability	HIGH LIKELIHOOD	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



8. E3P GROUND INVESTIGATION

8.1. GENERAL OVERVIEW

A ground investigation has been designed based on the findings of the desk study, with exploratory holes advanced to target specific potential contaminant sources summarised in Section 7.0. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

Exploratory fieldwork was completed between 29th April and 7th May 2019. A supplementary investigation was carried out on 23rd September 2021; within the area of Hares Hill Farm following demolition of the farm buildings.

The works are summarised in Table 8.1.

8.1. LIMITATIONS OF INVESTIGATION

Following the supplementary investigation undertaken post demolition of the buildings associated with Hares Hill Farm, all areas of the site have been investigated and the site fully classified.

8.2. SCOPE OF INVESTIGATION

A summary of the fieldwork completed are included in Table 8.1.

Table 8.1 Summary of Fieldwork

POTENTIAL SOURCE / RAIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
General Ground Conditions including the presence/nature of obstructions (2019 SI)	WS101	Window Sample Probehole	3.45	1.0-3.0
	WS102		3.45	N/A
	WS103		2.45	1.0-2.0
	WS104		2.45	1.0-2.0
	WS105		3.45	1.0-3.0
	WS106		3.45	1.0-3.0
	WS107		3.45	1.0-3.0
	WS108		3.45	1.0-3.0
	WS109		3.45	1.0-3.0
	WS110		2.45	1.0-2.0
	WS111		2.45	N/A
	WS112		1.45	0.5-1.0
	WS113		1.45	0.5-1.0
	TP101-TP129	Mechanically Excavated Trial Pit	2.30	N/A



POTENTIAL SOURCE / RAIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
General Ground Conditions including the presence / nature of obstructions and infiltration rates. (2019 SI)	SA101-SA103	Mechanically Excavated Soakaway	1.90	N/A
Investigation of deeper soil horizons. (2019 SI)	CP101	Cable Percussion Borehole	5.00	N/A
Investigation of deeper rock horizons. (2019 SI)	RB102	Rotary Borehole	30.00	N/A
	RB103		30.00	N/A
General Ground Conditions including the presence/nature of obstructions (2021 SI)	TP201	Mechanically Excavated Trial Pit	0.80	N/A
	TP202		2.80	N/A
	TP203		2.60	N/A
Former Farm Buildings (2021 SI)	TP204		3.20	N/A
	TP205		2.50	N/A
	TP206		1.60	N/A
	TP207		2.10	N/A
	TP208		1.70	N/A
	TP209		2.60	N/A
	TP210		3.10	N/A

Mechanically excavated trial pits were advanced to investigate ground conditions and to retrieve environmental samples, spatially distributed to offer the maximum site coverage whilst also being advanced to target specific contaminant sources.

Window sample probeholes were advanced to undertake in-situ detailed geotechnical testing, obtain environmental samples and install groundwater and ground gas monitoring wells.

The cable percussion borehole was advanced to undertake in-situ geotechnical testing and to investigate the deeper soil horizons.

The series of rotary boreholes were advanced to investigate the potential presence of shallow mine workings. These boreholes were drilled in accordance with the MRA permissions process and industry best practices.

The sampling locations are illustrated in Drawing 18-435-006 (APPENDIX IV). The ground conditions encountered are indicated on the logs, which are provided in APPENDIX VII.



Return visits were made to monitor installations for groundwater level and gas concentrations. In addition, selected wells were purged and samples of groundwater recovered for chemical analysis.

8.3. INSITU STANDARD PENETRATION TEST (SPT)

In-situ geotechnical testing was conducted using the standard penetration test (SPT) and, where the ground is granular, a 60-degree cone (SPT(C)) was used instead of the sampling tube. The results are shown in the probehole logs in APPENDIX VI, presented in Table 12.2 and discussed in Section 12.0.

8.4. INSITU CALIFORNIA BEARING RATIO (CBR)

In-situ CBR tests were undertaken at selected locations using a TRL probe. Tests were undertaken at depths of between 0.3m and 1m below ground level in order to intersect the likely pavement sub-formation level. The results are presented in Table 12.5 and test certificates are included within APPENDIX XII.

8.5. PERMEABILITY TESTS

Three soakaway tests were undertaken within trial pits SA101-SA103 in order to assess the likely permeability of the underlying strata to determine the potential suitability for soakaway drainage within the proposed development. The results are presented in Table 12.3 and the test certificates are included within Appendix XIII.

8.6. LABORATORY ANALYSIS

Selected soil samples were submitted for a range of chemical geotechnical analysis, summarised in Table 8.2.

Table 8.2 Summary of Laboratory Analysis

CHEMICAL ANALYSIS

- ✿ Metals
 - ✿ pH, total sulphate, water-soluble sulphate (2:1 extract)
 - ✿ Sulphide
 - ✿ Cyanide
 - ✿ Phenols
 - ✿ Total and speciated polycyclic aromatic hydrocarbons (PAHs)
 - ✿ Asbestos identification
 - ✿ Banded total petroleum hydrocarbons (TPHs)
 - ✿ Volatile organic compounds (VOCs)
 - ✿ Semi-volatile organic compounds (SVOCs)
 - ✿ Total Organic Carbon (TOC)
-



GEOTECHNICAL ANALYSIS

✦ Atterberg limits determinations

✦ Moisture content

8.7. STORAGE, PRESERVATION AND TRANSPORT OF SAMPLES

Measures taken to ensure the quality and integrity of the collected samples, from collection to receipt of the samples by the laboratory, are summarised in Table 8.3.

Table 8.3 Sample Integrity Information

SUBJECT	CHEMICAL SAMPLING	
	Soil	Groundwater
Storage	Glass jars supplied by the laboratory were used for the collection of soil samples to be analysed for VOCs. Plastic tubs were used to collect soil samples for metals analysis, and asbestos screening. Glass vials supplied by the laboratory were used for the collection of samples to be analysed for VOCs. Samples to be analysed for lower volatility compounds were stored in laboratory-prepared glass jars.	Glass vials supplied by the laboratory were used for the collection of samples to be analysed for VOCs. Samples to be analysed for lower volatility compounds were stored in laboratory-prepared glass jars.
Preservation	Soil and groundwater sample containers were filled to minimise headspace prior to sealing and stored at a low temperature within cool boxes with cooling aids to minimise the loss of volatile contaminants and reduce microbial activity during the collection of samples.	
Sample Integrity	Dedicated disposable nitrile gloves were worn and changed between sample collections to prevent cross-contamination.	Groundwater samples were collected using dedicated plastic tubing, which was changed between monitoring well locations to prevent cross-contamination.
Transport	Samples were stored and shipped in dedicated sample boxes provided by the laboratory. Sample details were recorded on the laboratory chain of custody form enclosed with the samples prior to dispatch. Scheduling information for the samples was confirmed with the laboratory via email.	

Chemical analysis has been undertaken by an accredited laboratory with the testing results summarised and discussed in Section 10 and the testing certificates included in APPENDIX VIII.

Geotechnical samples were collected as required per location immediately after excavation, labelled and sealed to minimise moisture loss. The geotechnical samples were collected and couriered by a dedicated courier to an accredited geotechnical testing laboratory. The testing results are summarised and discussed in Section 12 and the testing certificates included in APPENDIX IX.



9. GROUND AND GROUNDWATER CONDITIONS

9.1. SUMMARY OF GROUND CONDITIONS

The ground investigation generally confirms the published geology and identifies the strata set out in Table 9.1.

Table 9.1 Summary of Strata

HOLE	DEPTH TO STRATUM (m bgl)						
	MADE GROUND	MG: TOPSOIL	CLAY	SAND	GRAVEL	WEATHERED SANDSTONE	WEATHERED MUDSTONE
WS101	–	0.00-0.30	0.30-2.20	2.20-3.45	–	–	–
WS102	–	0.00-0.30	0.30-3.45	–	–	–	–
WS103	–	0.00-0.30	0.30-2.45	–	–	–	–
WS104	–	0.00-0.30	0.30-2.45	–	–	–	–
WS105	–	0.00-0.30	0.30-3.45	–	–	–	–
WS106	–	0.00-0.30	0.30-3.45	–	–	–	–
WS107	–	0.00-0.30	0.30-3.45	–	–	–	–
WS108	–	0.00-0.30	0.30-3.45	–	–	–	–
WS109	–	0.00-0.30	0.30-3.45	–	–	–	–
WS110	–	0.00-0.30	0.30-2.45	–	–	–	–
WS111	–	0.00-0.30	0.30-2.45	–	–	–	–
WS112	–	0.00-0.30	–	0.30-0.80	0.80-1.45	–	–
WS113	–	0.00-0.30	–	0.30-0.80	0.80-1.45	–	–
TP101	–	0.00-0.30	0.30-1.50	–	–	–	–
TP102	–	0.00-0.60	0.60-1.60	–	–	–	–
TP103	–	0.00-0.30	0.30-1.70	–	–	–	–
TP104	–	0.00-0.30	–	0.30-2.30	–	–	–
TP105	–	0.00-0.30	0.30-2.00	–	–	–	–
TP106	–	0.00-0.30	0.30-2.20	–	–	–	–
TP107	–	0.00-0.30	–	0.30-0.70	0.70-1.30	–	–
TP108	–	0.00-0.30	–	0.30-1.60	–	–	–
TP109	–	0.00-0.30	0.30-2.00	–	–	–	–
TP110	–	0.00-0.20	0.20-2.20	–	–	–	–
TP111	–	0.00-0.30	0.30-2.00	–	–	–	–
TP112	–	0.00-0.30	0.30-2.10	–	–	–	–
TP113	–	0.00-0.30	0.30-2.00	–	–	–	–
TP114	–	0.00-0.70	0.70-2.10	–	–	–	–
TP115	–	0.00-0.30	0.30-1.40	–	–	–	–
TP116	–	0.00-0.30	0.30-1.70	–	–	–	–
TP117	–	0.00-0.30	0.30-2.10	–	–	–	–
TP118	–	0.00-0.40	0.40-2.00	–	–	–	–



HOLE	DEPTH TO STRATUM (m bgl)						
	MADE GROUND	MG: TOPSOIL	CLAY	SAND	GRAVEL	WEATHERED SANDSTONE	WEATHERED MUDSTONE
TP119	–	0.00-0.30	0.30-2.20	–	–	–	–
TP120	–	0.00-0.30	0.30-2.00	–	–	–	–
TP121	–	0.00-0.30	0.30-2.00	–	–	–	–
TP122	–	0.00-0.30	0.30-2.00	–	–	–	–
TP123	–	0.00-0.30	0.30-1.60	–	–	–	–
TP124	–	0.00-0.30	0.30-1.50	–	–	–	–
TP125	–	0.00-0.30	0.30-1.40	–	–	–	–
TP126	–	0.00-0.30		0.30-0.70	0.70-0.90	–	–
TP127	–	0.00-0.20	0.20-2.00	–	–	–	–
TP128	–	0.00-0.30	0.30-1.40	–	–	–	–
TP129	–	0.00-0.30		0.30-0.80	0.80-1.30	–	–
SA101	–	0.00-0.30	0.30-1.80	–	–	–	–
SA102	–	0.00-0.30	0.30-1.85	–	–	–	–
SA103	–	0.00-0.30		0.30-1.90	–	–	–
CP101	–	0.00-0.90	0.90-4.00	–	–	4.00-5.00	–
RB102	–	0.00-0.20	0.20-2.70	–	–	13.10-15.30	2.70-13.10 15.30-30.00
RB103	–	0.00-0.20	0.20-4.00	–	4.00-5.70	5.70-16.40	16.40-30.00
TP201	0.00-0.80	–	–	–	–	–	–
TP202	0.00-0.60	–	–	0.60-2.80	–	–	–
TP203	0.00-0.60	–	–	0.60-2.60	–	–	–
TP204	0.00-1.10	–	1.10-1.30	1.30-2.00	–	–	2.00-3.20
TP205	0.00-0.70	–	–	0.70-1.90	–	1.90-2.50	–
TP206	0.00-0.20	–	–	0.20-1.00	–	1.00-1.60	–
TP207	0.00-0.90	–	–	0.90-1.30	–	1.30-2.10	–
TP208	0.00-0.70	–	0.70-1.20	–	–	1.20-1.70	–
TP209	0.00-0.70	–	0.70-1.10	1.10-2.40	–	2.40-2.60	–
TP210	0.00-0.90	–	0.90-1.40	1.40-2.60	–	2.60-3.10	–

9.2. MADE GROUND

Made Ground was encountered as two distinct types. During the supplementary investigation beneath the former farm buildings, Made Ground deposits were encountered in all exploratory hole locations to depths of between 0.20 m and 1.10 m bgl, and were noted to comprise brown gravelly fine to medium sand or brown/black sandy gravel with brick, concrete, sandstone, ash and clinker. Cobbles of brick and concrete were noted.

Concrete boulders from former foundations were identified in TP207 between 0.15 m and 0.90 m bgl.

A mild hydrocarbon odour was noted in TP201 to 0.80 m bgl where a fast water ingress was noted. A mild hydrocarbon odour was also noted in TP208 between 0.20 m and 0.70 m bgl.



Across the remaining site area, Made Ground comprised reworked topsoil deposits comprising soft brown slightly gravelly sandy clay with gravel of wood and sandstone. The reworked topsoil was generally encountered to depths of between 0.20 m – 0.30 m bgl.

9.3. SUPERFICIAL GEOLOGY

The majority of exploratory hole locations were underlain by cohesive superficial deposits between 0.30 m and 4.00 m bgl, comprising firm, medium strength to stiff high strength orange brown slightly gravelly sandy CLAY with gravel of sandstone and mudstone and cobbles of mudstone.

Sand deposits were identified in localised lenses across the site between 0.30 m and 2.20 m bgl and generally comprised medium dense orange clayey fine to medium SAND.

Several exploratory holes were also underlain by orange sandy GRAVEL of sandstone and mudstone between 0.80 and 5.70 m bgl.

Soft low strength CLAY was identified in TP209 between 0.70 m and 1.10 m bgl. Very soft silty CLAY was also encountered in WS101 at 1.00 m bgl in the location of the former pond.

9.4. BEDROCK GEOLOGY

The bedrock geology was encountered between 1.40 m and 30.00 m bgl. The bedrock comprised interbedded SANDSTONE and MUDSTONE with coal traces. The depth to bedrock generally increased from west to east. A depth of bedrock plan is included as Drawing 18-435-012 in Appendix IV.

During the supplementary investigation, bedrock geology was encountered in TP204 – TP210 and was encountered as a weathered SANDSTONE GRAVEL, which was recovered as a granular material within the base of the excavations, to depths of between 1.00 – 3.20 m bgl.

Weathered MUDSTONE was encountered in TP204 between 2.00 – 3.20 m bgl.

9.5. GROUNDWATER

Groundwater strikes were identified as seepages within the granular superficial deposits between 1.50 m bgl to 4.00 m bgl. Perched water was encountered within the Made Ground deposits in TP201 at 0.30 m bgl, and within former land drains in TP106 and TP115 at 0.60 m and 1.40 m bgl respectively. The depth of the groundwater strikes are shown on the exploratory hole records and are summarised in Table 9.2.



Table 9.2 Summary of Groundwater Strikes

LOCATION	DEPTH TO STRIKE (m)	OBSERVATIONS
2019 Investigation		
TP106	0.60	Field Drain
TP115	1.40	Field Drain
CP101	2.30	Seepage
CP101	4.00	
2021 Supplementary Investigation		
TP201	0.30	Perched in Made Ground
TP202	2.80	Minor Ingress
TP205	2.40	In weathered SANDSTONE
TP206	1.50	In weathered SANDSTONE
TP207	2.00	In weathered SANDSTONE
TP208	1.60	In weathered SANDSTONE
TP209	1.40	In weathered SANDSTONE

Monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product, if present. These results are summarised in Table 10.7.

9.6 VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

Visual and olfactory evidence of potential contamination was not identified during the initial site investigation in 2019; however, mild hydrocarbon odours were identified in two locations during the 2021 supplementary investigation and these are summarised in Table 9.3.

Table 9.3 Summary of Visual and Olfactory Evidence of Contamination

LOCATION	DEPTH (m)	STRATUM	OBSERVATIONS
TP201	0.00 – 0.80	Made Ground	Mild hydrocarbon odour noted
TP208	0.20 – 0.70	Made Ground	Mild hydrocarbon odour noted

9.7 OBSTRUCTIONS

No obstructions were identified during the course of the intrusive investigation.

Farming buildings which previously occupied the south west of the site, have subsequently been demolished to ground level. Floor slabs, wall remnants and below ground structures are present. It is likely that foundations to the existing buildings remain.



10 TIER 2 QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

E3P has undertaken a Tier 2 qualitative land risk assessment with respect to human health, controlled waters and ground gas to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

10.6 DEVIATING SAMPLES

Best practice sampling procedures including the use of appropriate sampling containers and adhering to the laboratory holding times for each contaminant analysis, were undertaken in order to avoid samples being deviating.

10.7 SAMPLE ANALYSIS POPULATION

Table 10.1 summarises the chemical analysis testing scheduled.

Table 10.1 Summary of Testing Schedule

TYPE OF SAMPLE	NUMBER OF SAMPLES	DETERMINANDS
Made Ground	5	Heavy Metals, Asbestos ID, Speciated PAHs, Banded TPHs, Total Organic Carbon, Sulphates, pH, Total Cyanide
	1	VOCs, SVOCs
Made Ground (Topsoil)	14	Heavy Metals, Speciated PAHs, Banded TPHs, Total Organic Carbon, Sulphates, pH, Total Cyanide
	2	Pesticides/Herbicides Screen
Natural CLAY	6	Heavy Metals, Speciated PAHs, Total Organic Carbon, Sulphates, pH, Total Cyanide
	7	Banded TPHs
Natural SAND/GRAVEL	4	Heavy Metals, Speciated PAHs, Banded TPHs, Total Organic Carbon, Sulphates, pH, Total Cyanide

10.8 HUMAN HEALTH RISK ASSESSMENT

At Tier 2 stage, the long-term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published in LQM/CIEH S4UL (S4UL3267).

Where Tier 2 screening values are not provided by LQM, other screening values have been used as referenced.



The Tier 2 screening values for residential with plant uptake have been utilised for this assessment due to the proposed development being a residential end-use. To remain conservative at an early stage, the screening values based on a 1% SOM have been utilised for this assessment.

The results of the comparison have been summarised in Table 10.2.

Table 10.2 Summary of Inorganic and Hydrocarbon Toxicity Assessment for a Residential End Use (with plant uptake)

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PL	ASSESSMENT
Arsenic	mg/kg	37	30	37	-	1	No Further Action
Cadmium	mg/kg	11	30	0.4	-	1	No Further Action
Chromium (VI)	mg/kg	6.1	30	<4.0	-	1	No Further Action
Lead**	mg/kg	200	30	180	-	1	No Further Action
Mercury	mg/kg	11	30	0.9	-	4	No Further Action
Nickel	mg/kg	180	30	110	-	1	No Further Action
Selenium	mg/kg	250	30	2.2	-	1	No Further Action
Copper	mg/kg	2400	30	180	-	1	No Further Action
Zinc	mg/kg	3700	30	310	-	1	No Further Action
Cyanide – Total	mg/kg	791	30	<1.0	-	1	No Further Action
Phenols – Total	mg/kg	210	20	<1.0	-	1	No Further Action
Asbestos	mg/kg	NFD	18	NAD	-	3	No Further Action
Naphthalene	mg/kg	2.3	28	0.22	-	4	No Further Action
Acenaphthylene	mg/kg	170	28	<0.05	-	2	No Further Action
Acenaphthene	mg/kg	210	28	0.42	-	1	No Further Action
Fluorene	mg/kg	170	28	0.32	-	1	No Further Action
Phenanthrene	mg/kg	95	28	3.6	-	2	No Further Action
Anthracene	mg/kg	2400	28	0.42	-	2	No Further Action
Fluoranthene	mg/kg	280	28	9.3	-	2	No Further Action
Pyrene	mg/kg	620	28	8.0	-	2	No Further Action
Benzo(a) Anthracene	mg/kg	7.2	28	5.9	-	2	No Further Action
Chrysene	mg/kg	15	28	3.9	-	2	No Further Action
Benzo(b) Fluoranthene	mg/kg	2.6	28	7.7 7.1	TP201 0.5 m TP205 0.3 m	2	Further Action
Benzo(k) Fluoranthene	mg/kg	77	28	1.9	-	2	No Further Action
Benzo(a) Pyrene	mg/kg	2.2	28	5.8 5.6	TP201 0.5 m TP205 0.3 m	2	Further Action
Indeno (123-cd) Pyrene	mg/kg	27	28	3.1	-	2	No Further Action
Dibenzo (a,h) Anthracene	mg/kg	0.24	28	0.92 0.77 0.32	TP205 0.3 m TP201 0.5 m TP201 0.3 m	2	Further Action
Benzo(ghi) Perylene	mg/kg	320	28	3.6	-	2	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	42	28	<1.0	-	4	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	100	28	<0.1	-	4	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	27	28	<0.1	-	4	No Further Action



DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PL	ASSESSMENT
TPH C10-C12 (aromatic)*	mg/kg	74	28	6.2	-	4	No Further Action
TPH C12-C16 (aromatic)*	mg/kg	140	28	6.6	-	4	No Further Action
TPH C16-21 (aromatic)*	mg/kg	260	28	24	-	1	No Further Action
TPH C21-35 (aromatic)*	mg/kg	1100	28	120	-	1	No Further Action

Notes

PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas inhalation

Abbreviations: GAC = general assessment criteria, N = number of samples, MC = maximum concentration; Loc of Ex = location of exceedance; PL = Contaminant pathway of that contaminant.

*The Tier 2 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 2 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 2 values for aromatic compound for the non-volatile fractions (C12-C35). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

**The Tier 2 GAC for lead has been taken from CL:AIRE C4SL.

Referring to Table 4.1, the result of this direct comparison indicates that the data exceeds the screening criteria for a residential end use for the following contaminants:

-  Benzo(b)Fluoranthene;
-  Benzo(a)Pyrene;
-  Dibenzo(a,h)Anthracene.

Asbestos was not detected in any of the soils submitted for analysis.

No VOCs were identified above the limit of detection.

No pesticides/herbicides were detected in the topsoil samples submitted for analysis.

In relation to these exceedances, the following can be determined:

-  The main exposure pathways based on the Tier 2 exceedances are:
 - Soil ingestion;
 - Dermal contact and ingestion;

The exceedances for all determinands are associated with shallow Made Ground deposits at depths of between 0.30 - 0.50 m.

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

All of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion of soils. The risk to chronic human health associated with the elevated concentrations of non-volatile PAH compounds can be mitigated through the installation of a suitable cover system where Made Ground remains in proposed private gardens, landscaping and public open space to remove any potential for direct exposure to impacted soils.

The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy.



A watching brief should be completed during remediation works to monitor the locations where visual or olfactory hydrocarbon impact has been identified in TP201.

No specific clean cover to mitigate risk from contaminants is required in the greenfield area of the site, however the NHBC will require the construction of gardens with a suitable growing medium that comprises as a minimum 150mm topsoil over 150mm sub-soil.

Topsoil deposits are reworked, however initial chemical testing suggests that the topsoil may be suitable for re-use following screening and further chemical analysis to meet the required sampling frequency.



10.9 CONTROLLED WATERS SENSITIVITY

E3P has undertaken a controlled waters risk assessment for the site based on the consideration of the conceptual site model and the sensitive receptors which are summarised in Table 10.3.

Table 10.3 Controlled Waters Conceptual Model and Sensitivity Profile

DISCUSSION		SENSITIVITY RATING
Contaminant Source		
Made Ground Localised deeper Made Ground deposits are present in the location of the former farm buildings. Soil analysis identified elevated non-volatile PAH compounds in the shallow Made Ground in this location.		Low
Pathway		
Vertical Migration The majority of the site is underlain by cohesive deposits. The presence of this low permeability drift will offer some protection to the underlying aquifer. Granular deposits will afford less protection to the underlying aquifer.		Moderate
Lateral Migration Lateral migration of contaminants is considered possible due to the presence of interbedded cohesive and granular deposits.		Moderate
Receptors		
Aquifer Classification in Superficial Drift Deposits	Secondary Undifferentiated	Low
Aquifer Classification in Bedrock	Secondary A Aquifer	Moderate
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not affected.	Low
Distance to the closest Groundwater Abstraction Point	None identified within a 1km radius.	Low
Is the Site Located Within 50 m of a Surface Watercourse?	An unnamed watercourse/drainage ditch is present circa 50 m south of the site. Whittle Brook is located approximately 325 m to the south east.	Low

The ICSM developed within the context of the site setting has identified viable pollutant pathways, which would be the lateral migration towards the nearby surface watercourse and the downward migration of potentially mobile phase-soluble contaminants towards the underlying secondary A bedrock aquifer. However, the sensitivity of the aquifer is reduced as there are no groundwater abstractions in the vicinity of the site.



10.10 CONTROLLED WATERS RISK ASSESSMENT

The Tier 2 assessment in line with LCRM (2025) has included a comparison of 1 groundwater samples to drinking water standards (DWS) and environmental quality standards (EQS).

EQS will be viewed as a priority given the pollutant linkage is with the nearby surface watercourse, however where there are no regulatory guidance values for EQS, the DWS will be utilised in their absence.

Water samples were obtained utilising a bailer.

These are presented in Table 10.4.



Table 10.4 Comparison of Groundwater Analysis with Tier 2 Screening Levels

DETERMINAND	UNIT	EQS AA 1,2	DWS 3,4	NO OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	ASSESSMENT
Arsenic	µg/l	50	10	2	6.51	-	No Further Assessment
Cadmium	µg/l	0.08- 0.25	5	2	0.04	-	No Further Assessment
Chromium (VI)	µg/l	3.4	–	2	<5.0	-	No Further Assessment
Chromium (III)	µg/l	4.7	50	2	3.1	-	No Further Assessment
Copper	µg/l	1	2000	2	5.2 2.4	WS106 WS101	Further Assessment
Total Cyanide	µg/l	1	50	2	<1.0	-	No Further Assessment
Lead	µg/l	1.2	10	2	2.4	WS101	Further Assessment
Mercury	µg/l	–	1.0	2	<0.5	-	No Further Assessment
Nickel	µg/l	4	20	2	9.7 6.9	WS106 WS101	Further Assessment
Selenium	µg/l	–	10	2	1.4	-	No Further Assessment
Zinc	µg/l	10.9	–	2	12	WS101	Further Assessment
pH	6–9			2	6.6 – 6.9	-	No Further Assessment
Polycyclic Aromatic Hydrocarbons							
Naphthalene	µg/l	2	10*	2	<0.01	-	No Further Assessment
Anthracene	µg/l	0.1		2	<0.01	-	No Further Assessment
Benzo (b) Fluoranthene	µg/l	0.00017*		2	<0.01	-	No Further Assessment
Benzo (k) Fluoranthene	µg/l	0.00017*		2	<0.01	-	No Further Assessment
Benzo(a) Pyrene	µg/l	0.00017*		2	<0.01	-	No Further Assessment
Indeno(123-cd)pyrene	µg/l	0.00017*		2	<0.01	-	No Further Assessment
Fluoranthene	µg/l	0.0063		2	<0.01	-	No Further Assessment
Benzo(ghi) Perylene	µg/l	1.7–4		2	<0.01	-	No Further Assessment
Aromatic Hydrocarbon							



DETERMINAND	UNIT	EQS AA ^{1,2}	DWS ^{3,4}	NO OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	ASSESSMENT
TPH C5-C7 (Benzene)	µg/l	10	1	2	<1.0	-	No Further Assessment
TPH C7-C8 (Toluene)	µg/l	74	700	2	<1.0	-	No Further Assessment
TPH C8-C10 (Xylene)	µg/l	30	300	2	<1.0	-	No Further Assessment
TPH C10-C12 (Naphthalene)	µg/l	2	90	2	<1.0	-	No Further Assessment
TPH C12-C16	µg/l	-	90	2	<1.0	-	No Further Assessment
TPH C16-C35	µg/l	-	90	2	<1.0	-	No Further Assessment
Aliphatic Hydrocarbon							
TPH C5-C6	µg/l	-	10005	2	<1.0	-	No Further Assessment
TPH C6-C8	µg/l	-	10005	2	<1.0	-	No Further Assessment
TPH C8-C10	µg/l	-	300	2	<1.0	-	No Further Assessment
TPH C10-C12	µg/l	-	300	2	<1.0	-	No Further Assessment
TPH C12-C16	µg/l	-	300	2	<1.0	-	No Further Assessment
TPH C16-C21	µg/l	-	300**	2	<1.0	-	No Further Assessment
TPH C21-C35	µg/l	-	300**	2	<1.0	-	No Further Assessment
Volatile Organic Compounds							
--Tetrachlorethylene	µg/l	0.4	10	2	<1.0	-	No Further Assessment
Trichloroethylene	µg/l	10	10	2	<1.0	-	No Further Assessment
Trichlorobenzene	µg/l	0.4	-	2	<1.0	-	No Further Assessment
Trichloromethane	µg/l	2.5	-	2	<1.0	-	No Further Assessment
Dichloromethane	µg/l	20	200	2	<1.0	-	No Further Assessment
Carbon Tetrachloride	µg/l	12	3	2	<1.0	-	No Further Assessment
Vinyl Chloride	µg/l	-	0.3	2	<1.0	-	No Further Assessment

#Solubility <0.01µg/l

AA – Annual Average

*Polyaromatic hydrocarbons (PAH) – Benzo(a)pyrene (BaP), Benzo(b)fluoranthene,

Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water.

**There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.

1. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (legislation.gov.uk)
2. The Water Supply (Water Quality) Regulation 2018 (legislation.gov.uk)



3. *Guidelines for drinking-water quality, 4th edition, incorporating the 1st addendum (who.int)*
4. *CL:AIRE publishes Petroleum Hydrocarbons in Groundwater guidance (claire.co.uk)*
5. *A total TPH criteria of 1000 mg/kg will act as a surrogate criterion for remaining aliphatic and aromatic TPH fractions.*



The Tier 2 controlled waters risk assessment identified minor exceedances of the EQS for the following inorganic compounds:

-  Copper
-  Lead
-  Nickel
-  Zinc

There are no exceedances of the drinking water standards.

The site is underlain by low permeability predominantly cohesive Glacial Till Deposits which will inhibit migration and will afford protection to the underlying Secondary A Aquifer. The sensitivity of the aquifer is reduced given there are no groundwater abstractions within 1km.

An unnamed water course/drainage ditch is present circa 50 m south of the site, however the identified heavy metals are of low solubility and mobility, therefore migration towards the controlled waters receptors is unlikely.

There is considered to be a low risk to controlled waters and the wider environ as no complete pollutant linkage can be determined.

Based on the above, there is considered to be no unacceptable level of risk to the controlled waters receptors.



10.11 GROUND GAS RISK ASSESSMENT

10.11.1 RATIONALE

Hazardous ground gas qualitative risk assessment is based on a conceptual site model (CSM) similar to that used for soil and groundwater contamination sources (i.e., source pathway receptor pollutant linkages).

The risk can be assessed based on knowledge of the ground conditions and CSM and a measure of hazardous gas concentrations and gas flow at the site within monitoring standpipes.

9.5.1. SOURCES AND PATHWAYS OF GROUND GAS

Table 10.5 summarises the potential sources and pathways of ground gas within the context of the recorded site setting and proposed development.

Table 10.5 Identified Potential Sources of Ground Gas

SOURCE

Made Ground

During the supplementary investigation beneath the former farm buildings, Made Ground deposits were encountered in all exploratory hole locations to depths of between 0.20 m and 1.10 m bgl. NF94 (NHBC – Hazardous Ground Gas – An Essential Guide for Housebuilders. A. Juden, S. Wilson and H. Mallett – April 2023) notes that shallow Made Ground deposits are not considered to be a significant source of ground gas.

A mild hydrocarbon odour was noted in TP201 to 0.80 m bgl where a fast water ingress was noted. A mild hydrocarbon odour was also noted in TP208 between 0.20 m and 0.70 m bgl.

Superficial Strata

No gassing sources have been identified in the superficial deposits.

Bedrock Strata

The bedrock geology was encountered between 1.00 m and 30.00 m bgl. The bedrock comprised interbedded SANDSTONE and MUDSTONE with coal traces. The depth to bedrock generally increased from west to east.

No coal workings are recorded beneath the site and no mine entries are recorded in close proximity to the site.

The intrusive ground investigations comprising three deep rotary boreholes did not identify any evidence of historic mine workings to the base of the boreholes and no coal seams were identified. There are no recorded mine workings beneath the site.

The risk from underground coal workings is therefore considered to be low.

Landfill Sites

There are no historical or authorised landfill sites within 250 m of the site.

Other Gases

A site-specific radon report has been obtained for the site which indicates that the majority of the site falls within an area where less than 1% of properties are above action level and therefore no radon protection measure would be required. However, a strip of land inside the western boundary falls within an area where between 3 and 5% of properties are at or above the action level and development plots within this area will require basic radon protection measures.



10.11.2 MONITORING FREQUENCY

The CIRIA C665 guidance on gas risk assessment includes recommendations for periods frequencies for monitoring visits. These recommendations take into account the nature of the proposed development and the likely generation potential of the source.

The proposed development comprises private residential properties, which would be classified as a Type A development (high sensitivity) in accordance with BS8485:2015+A1:2019. However, it is considered that the likely generation potential of the identified gas sources (taking into account the likelihood of future increases in gas generation) would be best classified as low.

Therefore, within the context of the proposed residential end-use and ground gas generation potential, the gas assessment requires nine visits over six months, with at least two sets of readings at low or falling atmospheric pressure.

10.11.3 GROUND GAS RISK ASSESSMENT METHODOLOGY

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in:

- ✿ CIRIA Report 665 – Assessing risks posed by hazardous ground gases to buildings (2007).
- ✿ BS8485:2015+A1:2019 – Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
- ✿ CL:AIRE Publication “Good Practice for Risk Assessment for Coal Mine Gas Emissions” (October 2021)

BS8485 provides guidance on the level of gas protection requirements based upon the characteristic situation (CS) and the proposed development based on building type.

Therefore, in accordance with BS8485, based on the measured flow rates and hazardous gas concentrations, individual hazardous gas flow rates (Q_{hg}) shall be derived for each monitoring point, from which the site characteristic hazardous gas flow rate (Q_{hgs}), and then the Characteristic Situation (CS) can be determined.

The following equation should be utilised:

$$Q_{hg} = q \left(\frac{C_{hg}}{100} \right)$$

Where:

q is the measured flow rate (in litres per hour) of combined gases from the monitoring standpipe.

C_{hg} is the measured hazardous gas concentration (in percentage volume/volume).

The subsequent derived gas screening value (GSV) should be the maximum Q_{hg} (flow rate x concentration as a percentage volume) for all the monitoring events.

A ‘worst case check’ may be carried out using the maximum recorded flow in any hole with the maximum concentration in any hole with the maximum concentration in any hole to present the plausible worst case conditions. Adoption of the worst case Q_{hg} requires thorough justification and reference to the CSM.

The final derived GSV can then be used to characterise the site as summarised in Table 10.6.



Table 10.6 Site Characterisation by GSV (BS8485:2015+A1:2019)

CS	HAZARD POTENTIAL	GSV (L/HR) FOR METHANE AND CARBON DIOXIDE	ADDITIONAL FACTORS
CS1	Very Low	< 0.07	Typically <1% methane concentration and <5% carbon dioxide concentration (otherwise consider an increase to CS2)
CS2	Low	< 0.70	Typical measured flow rate <70 l/h (otherwise consider an increase to CS3)
CS3	Moderate	< 3.5	N/A
CS4	Moderate to High	< 15	N/A
CS5	High	< 70	N/A
CS6	Very High	> 70	N/A

Notes

- 1) The CS is equivalent to the characteristic GSC in CIRIA C665.
- 2) The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst-case temporal conditions that the site may be expected to encounter should be considered.
- 3) Gas Screening Value is the Borehole Gas Volume Flow Rate, in litres per hour, multiplied by the concentration in the air stream of the particular gas being considered.
- 4) The Gas Screening Value thresholds should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.

10.11.4 MONITORING FREQUENCY

Concentrations of methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) were measured using a calibrated infrared gas analyser (GFM435) with gas flow rates measured using an integrated flow meter.

Gas measurements were recorded for a minimum of 300 seconds (5 minutes) at each location, increasing to 600 seconds if elevated concentrations identified, at which points the maximum concentration of CH₄ and CO₂, together with the lowest concentration of O₂ were recorded.

In addition to the raw data, results for each individual standpipe have been assessed with reference to guidance provided in BS8485:2015+A1:2019. Based on the initial peak measured flow rates and hazardous gas concentrations, individual hazardous gas flow rates (Q_{hg}) have been derived for each monitoring point, from which an individual Characteristic Situation (CS) can be determined.

10.11.5 SUMMARY OF MONITORING RESULTS

Table 10.7 presents the ground gas and groundwater monitoring results to date.



Table 10.7 Summary of Ground Gas Monitoring Results

WELL	STRATA	DATE	CH ₄ PEAK (%V/V)	CH ₄ STEADY (%V/V)	CH ₄ Q _{hg} (l/hr)	CO ₂ PEAK (%V/V)	CO ₂ STEADY (%V/V)	CO ₂ Q _{hg} (l/hr)	O ₂ (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)	
WS101	CLAY/ SAND	15/05/19	0.10	0.10	0.0001	1.80	1.80	0.0018	19.40	1008	Falling	0.10	0.10	1.00-3.00	2.10	0.48	
		13/06/19	0.10	0.10	0.00013	1.50	1.50	0.0020	19.60	1005	Steady	0.13	0.13		2.10	0.43	
		11/07/19	0.10	0.10	-0.00244	0.10	0.10	-0.0024	20.70	994	Steady	-2.44	-2.44		2.02	0.50	
		02/08/19	0.10	0.10	0.00052	1.10	1.10	0.0057	19.50	1002	Steady	0.52	0.52		2.04	0.54	
		04/09/19	0.10	0.10	0.00026	1.30	1.30	0.0034	19.10	999	Steady	0.26	0.26		2.05	0.61	
		27/09/19	0.10	0.10	0.00052	1.60	1.60	0.0083	19.70	989	Falling	0.52	0.52		-	-	
		18/10/19	0.10	0.10	0.00013	1.30	1.30	0.0017	19.90	966	Falling	0.13	0.13		-	-	
		04/11/19	0.10	0.10	0.0001	2.10	2.10	0.0021	19.60	966	Rising	0.10	0.10		-	-	
		19/11/19	0.10	0.10	0.00026	1.80	1.80	0.0047	19.70	987	Falling	0.26	0.26		-	-	
WS103	CLAY	15/05/19	0.10	0.10	0.0001	0.10	0.10	0.0001	20.40	1008	Falling	0.10	0.10	1.00-2.00	3.50	Dry	
		13/06/19	0.10	0.10	0.0001	0.20	0.20	0.0002	20.30	1005	Steady	0.10	0.10		3.50	Dry	
		11/07/19	0.10	0.10	0.00026	0.20	0.10	0.0003	20.80	994	Steady	0.26	0.26		1.52	1.51	
		02/08/19	0.10	0.10	0.00013	0.30	0.30	0.0004	20.20	1002	Steady	0.13	0.13		3.50	Dry	
		04/09/19	0.10	0.10	0.00078	0.20	0.20	0.0016	20.40	999	Steady	0.78	0.78		3.50	Dry	
		27/09/19	Monitoring Well Destroyed												-	-	
		18/10/19													-	-	
		04/11/19													-	-	
		19/11/19													-	-	
WS104	CLAY	15/05/19	0.10	0.10	0.0001	2.30	2.30	0.0023	18.50	1008	Falling	0.10	0.10	1.00-3.00	1.71	Dry	
		13/06/19	0.10	0.10	0.00026	2.10	2.10	0.0055	18.90	1005	Steady	0.26	0.26		1.71	Dry	
		11/07/19	0.10	0.10	0.0001	1.20	1.20	0.0012	19.90	994	Steady	0.10	0.10		1.73	Dry	
		02/08/19	0.10	0.10	0.00052	1.40	1.40	0.0073	19.40	1002	Steady	0.52	0.52		1.72	Dry	
		04/09/19	0.10	0.10	0.00013	1.20	1.20	0.0016	19.60	999	Steady	0.13	0.13		1.71	Dry	
		27/09/19	0.10	0.10	0.0032	5.40	5.40	0.1728	12.10	989	Falling	3.20	3.20		-	-	
		18/10/19	0.10	0.10	0.0029	4.90	4.90	0.1421	13.60	991	Falling	2.90	2.90		-	-	
		04/11/19	0.10	0.10	0.00485	7.40	7.40	0.3589	9.30	966	Rising	4.85	4.85		-	-	
		19/11/19	0.10	0.10	0.00296	6.90	6.90	0.2042	10.20	987	Falling	2.96	2.96		-	-	
WS105	CLAY	15/05/19	0.10	0.10	-0.00359	0.10	0.10	-0.0036	20.90	1011	Falling	-3.59	-3.59	1.00-3.00	2.62	1.00	
		13/06/19	0.10	0.10	-0.0017	0.20	0.20	-0.0034	20.80	1005	Steady	-1.70	-1.70		2.62	1.04	
		11/07/19	0.10	0.10	0.0001	0.10	0.10	0.0001	20.90	995	Steady	0.10	0.10		2.62	0.90	
		02/08/19	0.10	0.10	0.00013	0.30	0.30	0.0004	20.70	1002	Steady	0.13	0.13		2.62	0.94	
		04/09/19	0.10	0.10	0.00026	0.50	0.50	0.0013	20.20	999	Steady	0.26	0.26		2.61	0.91	
		27/09/19	0.10	0.10	0.00052	0.20	0.20	0.0010	20.40	989	Falling	0.52	0.52		2.60	GL	
		18/10/19	0.10	0.10	0.00026	0.40	0.40	0.0010	20.10	991	Falling	0.26	0.26		2.60	GL	
		04/11/19	0.10	0.10	0.00013	0.10	0.10	0.0001	20.50	966	Rising	0.13	0.13		2.59	GL	
		19/11/19	0.10	0.10	0.00052	0.30	0.30	0.0016	20.20	987	Falling	0.52	0.52		2.60	GL	



WELL	STRATA	DATE	CH ₄ PEAK (%V/V)	CH ₄ STEADY (%V/V)	CH ₄ Q _{hg} (l/hr)	CO ₂ PEAK (%V/V)	CO ₂ STEADY (%V/V)	CO ₂ Q _{hg} (l/hr)	O ₂ (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS106	CLAY	15/05/19	0.10	0.10	0.0001	0.10	0.10	0.0001	20.80	1011	Falling	0.10	0.10	1.00-3.00	2.17	0.89
		13/06/19	0.10	0.10	0.0001	0.10	0.10	0.0001	20.70	1005	Steady	0.10	0.10		2.18	0.91
		11/07/19	0.10	0.10	0.0001	0.10	0.10	0.0001	20.70	995	Steady	0.10	0.10		1.80	0.80
		02/08/19	0.10	0.10	0.00026	0.10	0.10	0.0003	20.60	1002	Steady	0.26	0.26		1.85	0.83
		04/09/19	0.10	0.10	0.0013	0.30	0.30	0.0039	20.20	999	Steady	1.30	1.30		1.84	0.86
		27/09/19	0.10	0.10	0.00013	0.10	0.10	0.0001	20.50	989	Falling	0.13	0.13		1.40	0.10
		18/10/19	0.10	0.10	0.00052	0.10	0.10	0.0005	20.60	991	Falling	0.52	0.52		1.61	0.14
		04/11/19	0.10	0.10	0.0001	0.10	0.10	0.0001	20.60	966	Rising	0.10	0.10		1.26	GL
		19/11/19	0.10	0.10	0.00026	0.20	0.20	0.0005	20.50	987	Falling	0.26	0.26		1.30	GL
WS107	CLAY	15/05/19	0.10	0.10	0.0001	0.10	0.10	0.0001	20.80	1011	Falling	0.10	0.10	1.00-3.00	2.08	1.73
		13/06/19	0.10	0.10	0.00013	0.30	0.30	0.0004	20.70	1005	Steady	0.13	0.13		2.08	1.77
		11/07/19	0.10	0.10	0.0001	0.90	0.90	0.0009	19.50	995	Steady	0.10	0.10		-	-
		02/08/19	0.10	0.10	0.00013	0.80	0.80	0.0010	19.60	1002	Steady	0.13	0.13		-	-
		04/09/19	0.10	0.10	0.00066	0.70	0.70	0.0046	19.70	999	Steady	0.66	0.66		-	-
		27/09/19	3.20	3.20	0.00832	2.10	2.10	0.0055	19.10	989	Falling	0.26	0.26		-	-
		18/10/19	3.40	3.40	0.02992	1.10	1.10	0.0097	19.20	991	Falling	0.88	0.88		-	-
		04/11/19	0.10	0.10	0.00013	0.10	0.10	0.0001	20.50	966	Rising	0.13	0.13		2.59	GL
		19/11/19	0.10	0.10	0.00026	0.90	0.90	0.0023	19.30	987	Falling	0.26	0.26		2.60	GL
WS108	CLAY	15/05/19	Monitoring Well Damaged and Repaired										1.00-3.00	-	-	
		13/6/19	0.10	0.10	0.00026	0.20	0.20	0.0005	20.60	1005	Falling	0.26		0.26	2.58	2.01
		11/07/19	0.10	0.10	-0.00133	1.30	1.30	-0.0173	19.60	995	Steady	-1.33		-1.33	-	-
		2/08/19	0.10	0.10	-0.00098	1.10	1.10	-0.0108	19.70	1002	Steady	-0.98		-0.98	-	-
		4/09/19	0.10	0.10	-0.00052	0.90	0.90	-0.0047	19.90	999	Steady	-0.52		-0.52	-	-
		27/09/19	0.10	0.10	-0.00126	1.50	1.50	-0.0189	19.10	989	Steady	-1.26		-1.26	-	-
		18/10/19	0.10	0.10	-0.00013	1.20	1.20	-0.0016	19.40	991	Falling	-0.13		-0.13	-	-
		4/11/19	0.10	0.10	-0.00816	1.80	1.80	-0.1469	18.90	966	Falling	-8.16		-8.16	-	-
		19/11/19	0.10	0.10	-0.0064	1.30	1.30	-0.0832	19.10	987	Rising	-6.40		-6.40	-	-
WS109	CLAY	15/05/19	Monitoring Well Destroyed										1.00-3.00	-	-	
		13/06/19												-	-	
		11/07/19												-	-	
		02/08/19												-	-	
		04/09/19												-	-	
		27/09/19												-	-	
		18/10/19												-	-	
		04/11/19												-	-	
		19/11/19												-	-	



WELL	STRATA	DATE	CH ₄ PEAK (%V/V)	CH ₄ STEADY (%V/V)	CH ₄ Q _{hg} (l/hr)	CO ₂ PEAK (%V/V)	CO ₂ STEADY (%V/V)	CO ₂ Q _{hg} (l/hr)	O ₂ (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)	
WS110	CLAY	15/05/19	0.10	0.10	0.0001	0.10	0.10	0.0001	21.00	1011	Falling	0.10	0.10	1.00-2.00	1.96	1.26	
		13/06/19	0.10	0.10	0.00013	0.20	0.20	0.0003	20.80	1005	Steady	0.13	0.13		1.95	1.30	
		11/07/19	Monitoring Well Damaged and Repaired												-	-	
		02/08/19													-	-	
		04/09/19													-	-	
		27/09/19	0.10	0.10	0.00013	0.10	0.10	0.0001	20.60	989	Falling	0.13	0.13		1.93	0.59	
		18/10/19	0.10	0.10	0.00026	0.20	0.20	0.0005	20.40	991	Falling	0.26	0.26		1.94	0.42	
		04/11/19	0.10	0.10	0.00013	0.10	0.10	0.0001	20.50	966	Rising	0.13	0.13		1.92	0.42	
		19/11/19	0.10	0.10	0.00052	0.20	0.20	0.0010	20.30	987	Falling	0.52	0.52		1.93	0.37	
WS112	SAND/ GRAVEL	15/05/19	0.10	0.10	0.0001	1.30	1.30	0.0013	19.80	1011	Falling	0.10	0.10	0.50-1.00	0.78	Dry	
		13/06/19	0.10	0.10	0.00026	1.00	1.00	0.0026	19.70	1005	Steady	0.26	0.26		0.77	Dry	
		11/07/19	0.10	0.10	0.00088	1.10	1.10	0.0097	19.90	995	Steady	0.88	0.88		0.83	Dry	
		02/08/19	0.10	0.10	0.00052	0.90	0.90	0.0047	19.90	1002	Steady	0.52	0.52		0.84	Dry	
		04/09/19	0.10	0.10	0.00026	0.80	0.80	0.0021	19.90	999	Steady	0.26	0.26		0.85	Dry	
		27/09/19	0.10	0.10	0.00026	1.40	1.40	0.0036	19.70	989	Falling	0.26	0.26		0.82	0.26	
		18/10/19	0.10	0.10	0.00013	1.10	1.10	0.0014	19.90	991	Falling	0.13	0.13		0.83	0.31	
		04/11/19	0.10	0.10	0.00013	0.10	0.10	0.0001	20.60	966	Rising	0.13	0.13		0.80	0.20	
		19/11/19	0.10	0.10	0.00013	0.80	0.80	0.0010	19.80	987	Falling	0.13	0.13		0.81	0.15	
WS113	SAND/ GRAVEL	15/05/19	0.30	0.10	0.0001	3.30	3.30	0.0033	18.20	1011	Falling	0.10	0.10	0.50-1.00	1.02	Dry	
		13/06/19	0.20	0.10	0.0001	3.10	3.10	0.0031	18.50	1005	Steady	0.10	0.10		1.01	Dry	
		11/07/19	0.10	0.10	0.0001	0.30	0.30	0.0003	20.70	995	Steady	0.10	0.10		1.05	Dry	
		02/08/19	0.10	0.10	0.00013	2.10	2.10	0.0027	19.10	1002	Steady	0.13	0.13		1.05	Dry	
		04/09/19	0.10	0.10	0.00026	1.80	1.80	0.0047	19.40	999	Steady	0.26	0.26		1.04	Dry	
		27/09/19	0.10	0.10	0.00052	0.20	0.20	0.0010	20.10	989	Falling	0.52	0.52		1.01	0.54	
		18/10/19	0.10	0.10	0.00013	1.40	1.40	0.0018	19.50	991	Falling	0.13	0.13		1.02	0.61	
		04/11/19	0.10	0.10	0.0001	0.10	0.10	0.0001	20.30	966	Rising	0.10	0.10		1.00	0.68	
		19/11/19	0.10	0.10	0.00026	1.10	1.10	0.0029	19.80	987	Falling	0.26	0.26		1.01	0.62	

Notes

CIRIA Characteristic Situation		Q _{hg}		
CS1	<0.07	Typical Max CO ₂ <5 % Typical Max CH ₄ <1 %	Values in BOLD exceed CS1 Thresholds	
CS2	<0.7	Flow rate not to exceed 70 l/hr otherwise consider increase to CS3	Values in BLUE denote water above level of response zone (flooded)	
CS3	<3.5			
CS4	<15	Quantitative Risk Assessment required to evaluate scope of protective measures		



10.11.6 GROUNDWATER

Groundwater levels were observed to fluctuate over the monitoring period, with levels generally increasing over the monitoring period.

The water level within several of the monitoring wells (WS101, WS105, WS106, WS107, WS110, WS112, WS113) was recorded to be above the top of the response zone or within 0.50 m of the top of the response zone (flooded) on a number of occasions, thus rendering some of the monitoring data unreliable.

Due to the predominantly low permeability cohesive drift stratum, it is likely that water levels are representative of surface water collecting within the standpipes and not a true representation of groundwater.

10.11.7 BAROMETRIC PRESSURE

Visits were undertaken during periods of falling, steady and rising pressure, with atmospheric pressure ranging from between 966 – 1011 mb.

It is therefore considered that the visits have been undertaken over representative conditions.

10.11.8 GAS FLOW

During the monitoring, a positive flow was noted in all wells. The measure of positive flow is considered to be the result of groundwater fluctuations and flooding of the well causing compression – as opposed to gas generation – as the highest flows are recorded during periods of high groundwater levels.

Negative flows are indicative of back pressure from wind being greater than the active flow from the wells. Negative flows were recorded in WS101, WS105 and WS108.

10.11.9 GAS CONCENTRATIONS

Methane has been recorded within monitoring wells WS107 and WS113 at concentrations ranging from 0.2% v/v and 3.4% v/v (WS107). No elevated concentrations were recorded within any of the remaining monitoring wells.

Carbon dioxide concentrations were recorded within all the monitoring wells at concentrations ranging from 0.20% v/v to 7.4% v/v (WS104). The maximum carbon dioxide levels were also associated with low oxygen concentrations.

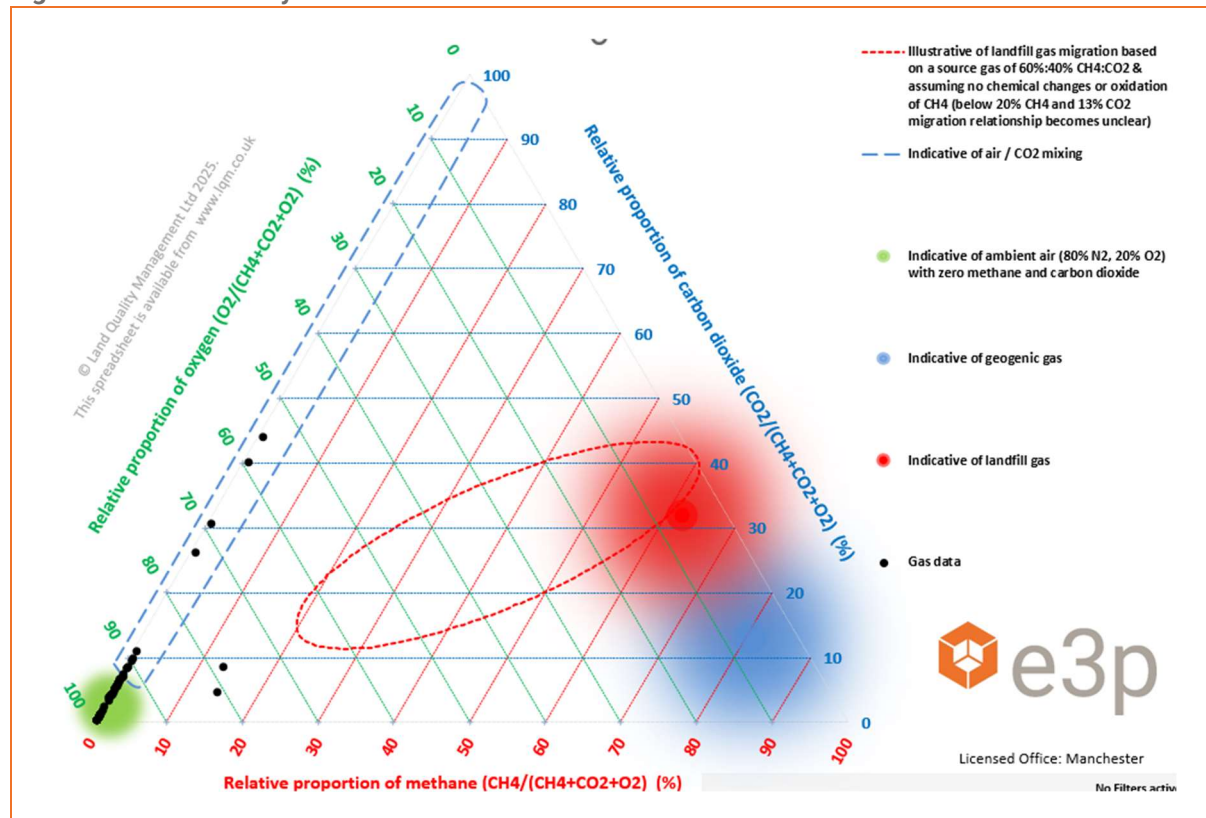
9.5.1. TERNARY PLOT FOR GROUND GAS

A ternary gas plot is a triangular plot of three variable which equal 100%. They allow the composition of gas to be identified and can help to identify the potential source of gas. As carbon dioxide is present in natural soils (such as Glacial Till), this can lead to uncertainty about whether it is necessary to increase the gas regime. On this basis, a ternary plot has been used as an assessment tool for the gas monitoring data to identify if there is a true risk.

Figure 10.1 shows the ternary gas plot for the gas monitoring data.



Figure 10.1 Ternary Gas Plot



The ternary gas plot suggests that the ground gas concentrations are indicative of ambient air and air/ CO_2 mixing, therefore there is considered to be a low risk.

10.11.10 RADON RISK

A site-specific radon report has been obtained for the site which indicates that the majority of the site falls within an area where less than 1% of properties are above action level and therefore no radon protection measure would be required. However, a strip of land inside the western boundary falls within an area where between 3 and 5% of properties are at or above the action level and development plots within this area will require basic radon protection measures.

All sites registered from 1st December 2022 onwards will have been assessed against the updated radon maps by NHBC and will be required to have radon protection measures installed in accordance with the updated mapping.

Figure 10.2 indicates that based on the 3%-5% area observed along the western boundary, the site falls under a Radon Potential Class of 3 within the User Guide for the HPA-BGS Joint Radon Potential Dataset for Great Britain (Ref: IR/11/044, dated 2011). A Radon potential class of 3 indicates that basic Radon Measures are required in all new dwellings, as shown in Figure 10.3.



Figure 10.2 Radon Affected Area Potential Class

Radon Potential Class*	Is the property in a Radon Affected Area?	Additional information
1	No	The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). The property is not in a radon affected area.
2	Yes	The property is in an Intermediate probability radon area (1 to 3% of homes are estimated to be at or above the Action Level). The property is in a radon affected area.
3	Yes	The property is in an Intermediate probability radon area (3 to 5% of homes are estimated to be at or above the Action Level). The property is in a radon affected area.
4	Yes	The property is in an Intermediate probability radon area (5 to 10% of homes are estimated to be at or above the Action Level). The property is in a radon affected area.
5	Yes	The property is in a Higher probability radon area (10 to 30% of homes are estimated to be at or above the Action Level). The property is in a radon affected area.
6	Yes	The property is in a Higher probability radon area (more than 30% of homes are estimated to be at or above the Action Level). The property is in a radon affected area.

*The Radon Potential Class number should not be included in answers.

Source: User Guide for the HPA-BGS Joint Radon Potential Dataset for Great Britain (Ref: IR/11/044, dated 2011)

Figure 10.3 Radon Affected Area Measures Required

Radon Potential Class*	What level of radon protective measures are required for new buildings in England and Wales?	What level of radon protective measures are required for new dwellings in Scotland?
1	None**	None**
2	None	Stage 1
3	Basic	Stage 1
4	Basic	Stage 1
5	Full	Stage 2
6	Full	Stage 2

*The Radon Potential Class number should not be included in answers.

** in 2008 HPA recommended that building regulations be amended to ensure that all new buildings, extensions etc. include basic radon protective measures. At the time of writing, relevant UK authorities were considering this advice.

*in 2008 HPA recommended that building regulations be amended to ensure that all new buildings, extensions etc. include basic radon protective measures. At the time of writing, relevant UK authorities were considering this advice.



Basic radon protection measures are required to be installed as Section 5.1 of BRE211_2015: Radon Guidance on protective measures for new buildings.

10.11.11 CONCLUSION

The determined Characteristic Situation for each standpipe is presented in Table 10.8.

Where the monitoring well was flooded, the data has been excluded from the assessment.

Table 10.8 Gas Profile and Location

WELL	MAX FLOW (l/hr)	MAX CH ₄ (%V/V)	MAX CH ₄ QHG (l/hr)	MAX CO ₂ (%V/V)	MAX CO ₂ QHG (l/hr)	CHARACTERISTIC SITUATION
WS101	Flooded					
WS103	0.78	0.1	0.00078	0.3	0.0016	CS1
WS104	4.85	0.1	0.00485	7.4	0.3589	CS1 (Further discussion below)
WS105	Flooded					
WS106	Flooded					
WS107	0.88	3.4	0.02992	2.1	0.0097	CS1 (Further discussion below)
WS108	-8.16	0.1	-0.00816	1.8	-0.1469	CS1
WS110	Flooded					
WS112	0.88	0.1	0.00088	1.4	0.0097	CS1
WS113	0.52	0.3	0.00052	3.3	0.0047	CS1

The elevated ground gas concentrations in WS104 and WS107 appear to be associated with higher flow rates recorded during a number of the monitoring visits which may be associated with rising groundwater levels. The groundwater level rose from 1.77 m to ground level in WS107 over the course of the monitoring which may have caused compression in the well. The gas bung was jammed in the monitoring well when the elevated readings were recorded, therefore it was not possible to record the groundwater level on these occasions, however it is likely that the wells were flooded.

No significant source of ground gas has been identified. Made Ground is limited in depth and extent, with no significant organic or degradable material capable of generating persistent gas.

There are no historical or active landfill sites within close proximity and no coal workings are recorded beneath the site.

Based on these factors, there is no viable source of persistent ground gas, and the site is anticipated to be classified as Characteristic Situation 1 (CS1) under BS 8485, meaning no specific ground gas protection measures are required.

However, basic radon mitigation measures will be required for selected plots along the western boundary given the site is located within an area where between 3-5% of homes are above the Action Level.

A Gas Protection Design Report (GPDR) will be required to be read in conjunction with this report.



10.12 POTABLE WATER SUPPLY

This section provides a summary of the site investigation data with reference to the selection of potable water supply pipework. The assessment is made with reference to the UK Water Industry Research (UKWIR) publication "Guidance on the selection of Water Supply Pipes to be used in Brownfield Sites."

Table 10.9 Pipeline Selection Assessment

CONTAMINANT GROUP	PE THRESHOLD (mg/kg)	CONCENTRATIONS AT CURRENT PIPELINE DEPTH (mg/kg)
Total VOC	0.5	N/A
Total BTEX And MTBE	0.1	N/A
Total SVOCs (Excluding PAH and those substances marked with an *)	2	N/A
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	<1.2
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	<6.0
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	<12
Phenols (From SVOC Analysis)*	2	N/A
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	N/A
Ethers*	0.5	N/A
Nitrobenzene*	0.5	N/A
Ketones*	0.5	N/A
Aldehydes*	0.5	N/A
Amines	Fail	N/A
Other Considerations		
Are there any exceedances of the PE threshold outside of the pipeline depth?	Yes – TP101 at 0.10 m (11.7 mg/kg for TPH C10-C16)	
Is free product present in soil and groundwater?	None identified.	
Could hydrocarbon impact at greater depth than current pipeline depth be mobilised by rising groundwater levels?	No significant hydrocarbon impact has been identified.	
Will soils impacted with above determinands likely be utilised elsewhere on site?	Currently unknown.	
Will soils be imported to site as part of any future earthworks?	Currently unknown. The importation of materials may affect the pipeline selection.	

Notes pipe line depth normally between 0.75m – 1.35 m

Chemical analysis completed to date suggests that PE pipe is likely to be suitable for the proposed development. This will need to be confirmed following the completion of a UKWIR risk assessment.



10.13 DEVELOPED CONCENTPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 10.10 has been prepared for the site.



Table 10.10 Developed Conceptual Site Model

CONTAMINANT SOURCE	MIGRATION PATHWAY	RECEPTOR
HUMAN HEALTH		
Made Ground (Former Farm Buildings) Non-volatile PAHs	Accidental ingestion and/or dermal contact with contaminated soil and/or leachate. PL1/PL2 Inhalation of contaminated dust PL3	Human Health – construction workers Human Health – end users
Discussion Elevated concentrations of non-volatile PAH compounds have been identified in the shallow Made Ground in TP201 and TP205. All of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion of soils. The risk to chronic human health associated with the elevated concentrations of non-volatile PAH compounds can be mitigated through the installation of a suitable cover system where Made Ground remains in proposed private gardens, landscaping and public open space to remove any potential for direct exposure to impacted soils.		
Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
Made Ground (Former Farm Buildings) Hydrocarbons, volatile PAHs (naphthalene)	Inhalation of vapours PL4 Migration through permeable strata and preferential pathways PL5	Human Health – end users Human Health – Off-site receptors
Discussion No elevated concentrations of volatile contaminants have been identified. A mild hydrocarbon odour was noted in TP201 to 0.80 m bgl where a fast water ingress was noted. A mild hydrocarbon odour was also noted in TP208 between 0.20 m and 0.70 m bgl. A watching brief should be completed in these locations during the remediation and enabling works.		
Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
Made Ground (Former Farm Buildings) Asbestos (Asbestos containing materials (ACM) and loose fibres)	Inhalation (of fibres) Construction works disturbing bound material and releasing fibres. PL3	Human Health – construction workers, end land users, and users of adjacent sites
Discussion		



CONTAMINANT SOURCE	MIGRATION PATHWAY	RECEPTOR
Asbestos has not been identified in any samples submitted for analysis. Isolated pieces of cement bound roof/cladding sheeting were identified on the surface, in the area of the former farm buildings, during the recent site visit which may potentially contain asbestos fibres. Further assessment of this material will be required.		
Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
Made Ground Organic contaminants such as hydrocarbons	Ingestion of tainted water supply. PL7	Human Health – End users Water pipeline
Discussion Chemical analysis completed to date suggests that PE pipe is likely to be suitable for the proposed development. This will need to be confirmed following the completion of a UKWIR risk assessment.		
Probability: Unlikely	Consequence: Minor	Level of Risk: Very Low
CONTROLLED WATERS		
Mobile Contaminants (Made Ground)	Contact with contaminated groundwater PL2 Migration to the secondary A aquifer PL5 Migration to surface water courses PL5	Human Health – site personnel Human Health – Consumer Aquatic ecosystems
Discussion The Tier 2 controlled waters risk assessment completed by E3P identified marginal exceedances of the EQS for heavy metals. An unnamed water course/drainage ditch is present circa 50 m south of the site, however the identified heavy metals are of low solubility and mobility, therefore migration towards the controlled waters receptors is unlikely. The site is underlain by low permeability predominantly cohesive Glacial Till Deposits which will afford protection to the underlying Secondary A Aquifer. The sensitivity of the aquifer is reduced given there are no groundwater abstractions within 1km. There is considered to be no unacceptable level of risk to the controlled waters receptors.		
Probability: Unlikely	Consequence: Minor	Level of Risk: Very Low
GROUND GAS		
Ground Gases (methane and carbon dioxide)	Inhalation of ground gas PL4	Human Health – site personnel Human Health – end users



CONTAMINANT SOURCE	MIGRATION PATHWAY	RECEPTOR
	Accumulation of ground gas in confined spaces (asphyxiation or explosion) PL4	Infrastructure and services

Discussion

No significant source of ground gas has been identified. Made Ground is limited in depth and extent, with no significant organic or degradable material capable of generating persistent gas.

There are no historical or active landfill sites within close proximity and no coal workings are recorded beneath the site.

It is considered that the site can be classified as Characteristic Situation 1 (CS1) under BS 8485, meaning no specific ground gas protection measures are required.

However, full radon mitigation measures will be required for all proposed plots given the site is located within an area where between 10-30% of homes are above the Action Level.

Probability: Low Likelihood	Consequence: Mild	Level of Risk: Low
Radon	Inhalation of ground gas PL4 Accumulation of ground gas in confined spaces (carcinogenic)	Human Health – site personnel Human Health – end users

Discussion

A site-specific radon report has been obtained for the site which indicates that the majority of the site falls within an area where less than 1% of properties are above action level and therefore no radon protection measure would be required. However, a strip of land inside the western boundary falls within an area where between 3 and 5% of properties are at or above the action level and development plots within this area will require basic radon protection measures

Probability: Low likelihood	Consequence: Medium	Likelihood: Moderate/Low
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INFRASTRUCTURE AND DEVELOPMENT

Made Ground Sulphate from potential ash within the Made Ground	Sulphate attack on PL6	Building concrete
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Discussion

The soils generally meet class DS-1 AC-1s. Elevated concentrations meeting class DS-3, AC-1s were identified in the Made Ground in TP205 at 0.30 m bgl.



CONTAMINANT SOURCE	MIGRATION PATHWAY	RECEPTOR
Probability: Low Likelihood	Consequence: Mild	Likelihood: Low
Made Ground Phytotoxic contaminants	Direct contact (plant uptake) PL8	Flora

Discussion

Made Ground is a potential source of phytotoxic contaminants. A suitable growing medium will be required in gardens and areas of soft landscaping.

Probability: Low Likelihood	Consequence: Mild	Likelihood: Low
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Main Exposure Pathways

PL1 = Soil Ingestion, PL2 = Dermal Contact and Ingestion, PL3 = Dust Inhalation, PL4 = Vapour/Gas Inhalation, PL5 = Vertical/Lateral Migration, PL6 = Corrosion of Concrete, PL7 = Tainting of Water Supply, PL8 = Uptake by Plants

FROM CIRA 552 (2001)

		RISK ASSESSMENT MATRIX			
		Consequence			
		SEVERE	MEDIUM	MILD	MINOR
Probability	HIGH LIKELIHOOD	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



11 MINING ASSESSMENT

Based on the preliminary coal mine risk assessment detailed within Section 5.0, an intrusive coal mining assessment is required to determine the potential risk of shallow coal workings, with the details provided within the following section.

11.6 SCOPE OF INTRUSIVE GROUND INVESTIGATION

In due consideration of the potential presence of the Arley Coal seam, rotary boreholes have been advanced in accordance with Coal Authority Permission ref: 16633 to assess the potential presence of shallow workings within this seam and the potential for ground instability to induce a future subsidence event within the proposed development.

11.7 SUMMARY OF GROUND INVESTIGATION WORK

Rotary Boreholes to Investigate Workings in Coal

Two rotary boreholes have been advanced at the locations detailed within the E3P exploratory borehole location plan at positions to interject the potential coal seams and assess the potential for any workings.

Table 11.1 Rotary Boreholes

ROTARY BOREHOLE	DEPTH TO ROCKHEAD (m bgl)	DEPTH TO COAL (m bgl)	EVIDENCE OF MINING ACTIVITY/SEAM	REMARKS
RB102	2.70	N/A	No	Low Risk
RB103	5.70	N/A	No	Low Risk

9.1. SUMMARY OF COAL MINING ISSUES

E3P has reviewed the BGS Geological Mapping and CA information, in addition to completing two 30m rotary boreholes to investigation shallow mine workings; a summary of which is detailed below:

- ✦ The intrusive ground investigations comprising three deep rotary boreholes did not identify any evidence of historic mine workings to the base of the boreholes;
- ✦ Coal seams were not identified in any rotary borehole or exploratory hole.

The rotary boreholes have confirmed that there is more than the required 10x seam thickness rock cover over the main Arley seam to mitigate any subsidence induced by the consolidation of unrecorded and abandoned mine workings.



12 GEOTECHNICAL ASSESSMENT

12.6 SOIL CONSISTENCY

Undrained shear strength values were measured using field hand shear vane tests. Results of the tests are presented in Table 12.1 which indicates the clay soils vary between soft and very stiff. Strength test data is generally consistent with the field descriptions of the aforementioned soils.

Table 12.1 Summary of Hand Shear Vane Tests

LOCATION	DEPTH	SHEAR STRENGTH (kPA)	CALCULATED ALLOWABLE BEARING CAPACITY (kN/m ²)
TP101	0.5	121	278.3
TP101	1.0	112	257.6
TP101	1.5	121	278.3
TP102	0.8	130	299.0
TP102	1.2	109	250.7
TP102	1.6	128	294.4
TP103	0.5	93	213.9
TP105	0.6	56	128.8
TP105	1.0	126	289.8
TP105	1.4	133	305.9
SA101	0.5	102	234.6
SA101	1.0	105	241.5
SA101	1.5	140	322.0
SA102	0.5	151	347.3
SA102	1.0	132	303.6
SA102	1.5	137	315.1
TP109	0.5	77	177.1
TP109	1.0	84	193.2
TP109	1.5	77	177.1
TP110	0.5	56	128.8
TP110	1.0	49	112.7
TP110	1.5	93	213.9
TP111	0.5	65	149.5
TP111	1.0	67	154.1
TP111	1.5	45	103.5
TP113	0.5	72	165.6
TP113	1.0	37	85.1
TP113	1.5	74	170.2
TP119	0.6	91	209.3
TP119	1.2	81	186.3
TP119	1.6	112	257.6
TP119	2.0	114	262.2
TP120	0.5	84	193.2
TP120	1.0	91	209.3
TP120	1.5	98	225.4
TP121	0.5	93	213.9
TP121	1.0	91	209.3
TP121	1.5	102	234.6
TP122	0.5	71	163.3
TP112	1.0	109	250.7
TP122	1.5	105	241.5



LOCATION	DEPTH	SHEAR STRENGTH (kPA)	CALCULATED ALLOWABLE BEARING CAPACITY (kN/m ²)
TP127	0.5	70	161.0
TP127	0.9	88	202.4
TP127	1.3	109	250.7
TP127	1.8	93	213.9
TP209	1.0	31	72.9
TP210	1.0	50	117.5
TP210	1.3	75	176.3

Notes: ABC Calculated using Stroud and Butler et al 1974.

*Granular content within soil tests may underestimate true shear strength.

Results of the standard penetration tests, including undrained shear strengths derived from SPTs are included in Table 12.2.



Table 12.2 Standard/Cone Penetration Test Results

LOCATION	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N1)60	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m ²)	ALLOWABLE BEARING CAPACITY (kN/m ²)*
WS101	1.00	Silty CLAY	0.1	0.10	N/A	Extremely low strength	Very Soft	0.50	1.04
WS101	2.00	Fine SAND	19	17.36	Medium Dense	N/A	N/A	N/A	173.57
WS101	3.00	Fine SAND	50	43.48	Dense	N/A	N/A	N/A	434.83
WS102	1.00	Sandy CLAY	19	19.15	N/A	High strength	Very Stiff	95.77	196.91
WS102	2.00	Sandy CLAY	9	8.22	N/A	Medium strength	Stiff	41.11	84.52
WS102	3.00	Sandy CLAY	50	43.48	N/A	Very high strength	Very Stiff	217.41	447.00
WS103	1.00	Sandy CLAY	35	35.29	N/A	Very high strength	Very Stiff	176.43	362.73
WS103	2.00	Sandy CLAY	50	45.68	N/A	Very high strength	Very Stiff	228.38	469.56
WS104	1.00	Sandy CLAY	19	19.15	N/A	High strength	Very Stiff	95.77	196.91
WS104	2.00	Sandy CLAY	50	45.68	N/A	Very high strength	Very Stiff	228.38	469.56
WS105	1.00	Sandy CLAY	8	8.07	N/A	Medium strength	Stiff	40.33	82.91
WS105	2.00	Sandy CLAY	12	10.96	N/A	Medium strength	Stiff	54.81	112.69
WS105	3.00	Sandy CLAY	50	43.48	N/A	Very high strength	Very Stiff	217.41	447.00
WS106	1.00	Sandy CLAY	8	8.07	N/A	Medium strength	Stiff	40.33	82.91
WS106	2.00	Sandy CLAY	14	12.79	N/A	Medium strength	Stiff	63.95	131.48



LOCATION	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N1)60	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m ²)	ALLOWABLE BEARING CAPACITY (kN/m ²)*
WS106	3.00	Sandy CLAY	50	43.48	N/A	Very high strength	Very Stiff	217.41	447.00
WS107	1.00	Sandy CLAY	8	8.07	N/A	Medium strength	Stiff	40.33	82.91
WS107	2.00	Sandy CLAY	14	12.79	N/A	Medium strength	Stiff	63.95	131.48
WS107	3.00	Sandy CLAY	50	43.48	N/A	Very high strength	Very Stiff	217.41	447.00
WS108	1.00	Sandy CLAY	7	7.06	N/A	Low strength	Firm	35.29	72.55
WS108	2.00	Sandy CLAY	13	11.88	N/A	Medium strength	Stiff	59.38	122.09
WS108	3.00	Sandy CLAY	50	43.48	N/A	Very high strength	Very Stiff	217.41	447.00
WS109	1.00	Sandy CLAY	11	11.09	N/A	Medium strength	Stiff	55.45	114.00
WS109	2.00	Sandy CLAY	12	10.96	N/A	Medium strength	Stiff	54.81	112.69
WS109	3.00	Sandy CLAY	50	43.48	N/A	Very high strength	Very Stiff	217.41	447.00
WS110	1.00	Sandy CLAY	11	11.09	N/A	Medium strength	Stiff	55.45	114.00
WS110	2.00	Sandy CLAY	50	45.68	N/A	Very high strength	Very Stiff	228.38	469.56
WS111	1.00	Sandy CLAY	11	11.09	N/A	Medium strength	Stiff	55.45	114.00
WS111	2.00	Sandy CLAY	50	45.68	N/A	Very high strength	Very Stiff	228.38	469.56
WS112	1.00	Sandy GRAVEL	50	50.41	Very Dense	N/A	N/A	N/A	504.07
WS113	3.00	Sandy GRAVEL	50	43.48	Dense	N/A	N/A	N/A	434.83



LOCATION	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N1)60	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m ²)	ALLOWABLE BEARING CAPACITY (kN/m ²)*
CP101	1.00	Sandy CLAY	3	3.02	N/A	Very low strength	Soft	15.12	31.09
CP101	2.00	Sandy CLAY	9	8.22	N/A	Medium strength	Stiff	41.11	84.52
CP101	3.00	Sandy CLAY	11	9.57	N/A	Medium strength	Stiff	47.83	98.34
CP101	4.00	Sandstone	50	42.24	Dense	N/A	N/A	N/A	422.43
CP101	4.70	Weathered SANDSTONE	50	41.67	Dense	N/A	N/A	N/A	416.74

NOTES

* The Allowable Bearing Capacity (ABC) should be considered indicative.

The interpretation of in situ mass undrained shear strength (cu) data from SPT Blow Count (N) results and the influence of the Plasticity Index (PI) was reported in Standard Penetration Test in Insensitive Clays and Soft Rocks. Stroud (1974). The standard penetration test and the engineering properties of glacial materials subsequently. Stroud and Butler (1975) and (1989). Allowable bearing capacity on sands. Soil Mechanics in Engineering Practice Terzaghi, K. & Peck, R.B. 1996.

**Where the SPT fell through under self-weight, the N-value has been recorded as 1 for comparative purposes.



12.7 SIDE STABILITY AND EASE OF EXCAVATION

The sides of the exploratory trial pit excavations appeared to be generally stable during excavation, however trial pits were less stable in granular drift deposits. The natural strata was excavated with relative ease, however when stiff clays and weathered bedrock were encountered excavation slowed.

12.8 SOIL INFILTRATION

In-situ BRE 365 Soakaway tests were undertaken within trial pits completed as SA101-SA103.

The results are presented in Table 12.3, and the test certificates are included within APPENDIX XII.

Table 12.3 Soil Infiltration Results

LOCATION	DEPTH (m)	MATERIAL	TEST NO.	SOIL INFILTRATION RATE (m/s)
SA101	1.80	CLAY	1	1.52 E-07
SA102	1.90	CLAY	1	N/A
SA103	1.90	CLAY	1	N/A

Two of the tests did not reach 25% or 75% effective storage depth over the testing period and therefore have failed.

Test 1 in SA101 was extrapolated to achieve the 25% effective depth, however this shows poor soakage potential.

Therefore, considering the significant volumes of low permeability clay on the site, it is considered that soakaway drainage is not suitable for the proposed development.

The BRE 365 soakaway tests undertaken (SA101–SA103) demonstrate negligible infiltration potential, with two tests failing and the third returning an extremely low infiltration rate (1.52×10^{-7} m/s). This reflects the underlying geological conditions of glacial till (clay-dominated) over low-permeability Coal Measures bedrock. On this basis, infiltration drainage is not a suitable option for the site. Any future consideration of infiltration design would require extensive geological and hydrogeological feasibility assessment; however, alternative engineered drainage solutions should be progressed for the proposed development.

12.9 SOIL PLASTICITY

The Atterberg limits determinations, summarised in Table 12.4, show the clay to be of low to moderate plasticity.

Table 12.4 Summary of Plasticity Index Test Results

LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425µm SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
WS102	1.00 – 1.45	8.5	18	35	17	81	13.77	Low
WS105	2.00 – 2.45	25	20	43	23	100	23	Medium
WS108	1.00 – 1.45	14	16	32	16	100	16	Low



WS111	1.00 – 1.45	17	18	34	16	97	15.52	Low
CP101	2.00 – 2.45	15	15	30	15	100	15	Low

Although individual test results span low to medium NHBC classifications, the variability is not considered geologically significant. All samples were recovered from the same superficial unit of Glacial Till (Diamicton), which is typically a highly heterogeneous deposit comprising a clay matrix with variable proportions of sand and gravel. Localised variations in PI values are therefore expected due to natural textural differences within the till rather than distinct stratigraphic or lithological changes.

Given this depositional context, it is not possible to reliably delineate discrete zones of “low” and “medium” shrink-swell potential across the site. From a geotechnical design and foundation risk perspective, it is more appropriate to adopt a conservative uniform classification. On this basis, the Glacial Till is considered likely to exhibit medium volume change potential across the site.

12.10 CALIFORNIA BEARING RATIO (CBR)

The California bearing ratio (CBR) for the soils were measured using an in-situ TRL probe. The results are summarised in Table 12.5.

The result sheets are included in APPENDIX XI and the locations are shown on Drawing (18-435-006) (APPENDIX IV). CBR results have been averaged from the blow counts across the strata tested and any abnormally high blow counts ignored as these are likely to be from larger granular material and so represent anomalies.

Table 12.5 Summary of DCP Results

LOCATION	DEPTH (m)	STRATA	IN-SITU OR LAB TEST	CBR (%)
DCP101	0.238-0.562	CLAY	IN-SITU	11.73
DCP106	0.243-0.558	CLAY		9.55
DCP106	0.558-0.901	CLAY		6.44
DCP107	0.103-0.477	CLAY		8.67
DCP108	0.343-0.601	CLAY		8.70
DCP108	0.601-0.896	CLAY		6.67
DCP109	0.154-0.451	CLAY		6.62
DCP109	0.451-0.887	CLAY		3.26
DCP110	0.142-0.608	CLAY		6.31
DCP110	0.608-0.891	CLAY		7.89
DCP111	0.184-0.532	CLAY		6.34
DCP111	0.532-0.864	CLAY		6.66
DCP112	0.323-0.690	CLAY		3.91

It should be noted that the reported CBR results were obtained from soils in highly undisturbed state. If however the topsoil and surface cover is removed during periods of wetter climatic conditions, the formation will soften, reducing the CBR.



12.11 PH AND SULPHATE

Chemical analyses for pH and soluble sulphate content contained in APPENDIX VIII (summarised in Table 12.6), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE *Special Digest 1* (2005).

Elevated concentrations meeting class DS-3, AC-1s were identified in the Made Ground in TP205 at 0.30 m bgl.

Table 12.6 Summary of pH and Sulphate Data

LOCATION	DEPTH (m)	SO ₄ IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
TP102	0.30	0.013	5.6	DS-1, AC-1s
TP105	1.00	0.012	4.9	DS-1, AC-1s
TP108	0.10	0.016	6.3	DS-1, AC-1s
TP110	1.00	0.014	6.5	DS-1, AC-1s
TP111	0.10	0.011	6.9	DS-1, AC-1s
TP115	1.00	0.034	7.0	DS-1, AC-1s
TP117	0.40	0.058	7.2	DS-1, AC-1s
TP118	0.10	0.023	6.9	DS-1, AC-1s
TP121	1.00	0.015	7.2	DS-1, AC-1s
TP124	1.00	0.025	6.9	DS-1, AC-1s
TP127	0.10	0.022	6.2	DS-1, AC-1s
TP129	0.50	0.015	6.7	DS-1, AC-1s
TP201	0.30	0.083	10.9	DS-1 AC-1s
TP201	0.50	0.16	7.8	DS-1 AC-1s
TP205	0.30	1.6	7.4	DS-3, AC-1s
TP206	0.80	0.016	6.8	DS-1 AC-1s
TP207	0.60	0.028	7.9	DS-1 AC-1s
TP209	0.40	0.061	7.9	DS-1 AC-1s
TP210	1.00	0.010	5.5	DS-1 AC-1s

12.11.1 HIGHWAYS AND CONCRETE

MCHW Series 600 provides a criteria of 1500 mg/l for water-soluble sulphate within 500mm of any concrete surface. A second criteria of 300mg/l is given with respect to soils within 500mm of steel structures.

12.12 SITE PREPARATION

Our assessment has been based on the fact that the site will be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the *Manual of Contract Document for Highway Works (MCHW)*. This should include the following:

- ✦ Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
- ✦ Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill.
- ✦ Removal of all hardstanding.
- ✦ Buried structures and old foundations should be excavated from below the proposed development footprint with the resulting void backfilled.



12.13 FOUNDATION CONDITIONS AND ASSESSMENT OF POTENTIAL BEARING CAPACITIES

In due consideration of the identified ground conditions, in-situ and laboratory geotechnical testing, E3P has undertaken an assessment of the safe allowable bearing capacity (ABC) within the underlying natural stratum to assist in the detailed design of foundations and infrastructure and determine the target founding stratum. The results of this assessment are summarised in Table 12.7.

Table 12.7 Summary of ABC

GRANULAR SOILS			
DESCRIPTION	DEPTH (RANGE m bgl)	RELATIVE DENSITY	ALLOWABLE BEARING CAPACITY (kN/m ²)
Clayey SAND (WS101)	1.00 – 3.00	Medium Dense – Dense	173.57 – 434.83
Sandy GRAVEL	1.00 – 3.00	Dense – Very Dense	434.83 – 504.07
SANDSTONE (CP101)	4.00	Dense	416.74
COHESIVE SOILS			
DESCRIPTION	DEPTH (RANGE m bgl)	UNDRAINED SHEAR STRENGTH (CU) (kN/m ²)	ALLOWABLE BEARING CAPACITY (kN/m ²)
Very Soft CLAY (WS101, CP101)	1.00	0.50 – 15.12	1.04 – 31.09
Soft CLAY (WS108)	1.00	35.29	72.55
Firm CLAY	1.00 – 3.00	40.33 – 63.95	82.91 – 131.48
Stiff to very stiff CLAY	1.00 – 3.00	95.77 – 228.38	196.91 – 469.56

The underlying natural clay deposits have been assessed as being firm low strength to very stiff very high strength with a net ABP in the order of 83 – 470 kN/m² between 1.00 – 3.00 m bgl. Localised areas of very soft to soft clays were identified at 1.00 m bgl with an ABC of less than 72 kN/m².

The clayey sand deposits in WS101 have been assessed as being medium dense to dense with a net ABC of 174 – 435 kN/m².

The sandstone bedrock identified in CP101 is dense at 4.00 m bgl with an ABC of 417 kN/m².

12.14 FOUNDATION OPTIONS APPRAISAL

Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe allowable bearing capacity, the following recommendations have been developed for the site of the potential foundation solutions that may be adopted for the future residential development. The suitable target founding stratum has been identified as the underlying stiff to very stiff glacial clays and localised areas of medium dense sands.

To determine if VSC is viable at the subject site, E3P has completed a Ground Improvement Design Risk Matrix that is summarised in Table 12.8.



Table 12.8 Ground Improvement Design Risk Matrix

RISK ITEM	COMMENT	PASS/FAIL
Soft clay with an undrained shear strength less than 30 kN/m²	CLAY soils are generally firm to stiff with $C_u > 40$ kN. Isolated areas of softer clay soils were encountered with $C_u > 30$ kN/m ² , however it is considered that these will either be piled or soft material excavated to remove the organic deposits.	PASS – on completion of enabling works
Ground with peat layers close to foundation level or the base of the stone column, or where intermediate layers of peat are thicker than 200mm, either as a single layer or the sum of the thickness of individual layers throughout the length of the stone column	None identified.	PASS
Voided filled ground, e.g. old water tanks, pottery, glass bottles, concrete rubble or brick fill of unsuitable grading	Made Ground in the vicinity of the former farm buildings will require removal and processing to render the site suitable for VSC.	PASS
Loose or non-engineered fill not previously subject to rising fluctuating water levels saturation	None identified.	PASS
Filled ground still settling or expected to settle under its own weight or due to the effects of surcharging/upfilling where there is a high organic content or where decay is continuing	None identified.	PASS
Fill, containing degradable material where organic material forms more than 15% of fill by volume	None identified.	PASS
Clays with a plasticity index greater than 40%	None identified.	PASS
Highly sensitive soils liable to collapse or remoulding	None identified.	PASS
Cohesive soils with trees in influencing distance	Plots where tree influence has been modelled and will either be subject to a piled or mass trench-fill solution.	PASS
Overall Risk Rating and Suitability for Vibratory Ground Improvement		PASS

Vibro stone columns (VSCs) are designed to extend through compressible soils to at least the depth of significant influence beneath a foundation, typically taken as approximately twice the footing width (2B) below formation level, or until a competent stratum is reached, whichever is deeper. This ensures adequate confinement and bulbing of load to achieve settlement control.



On this site, shallow bedrock is present close to proposed foundation levels. Where bedrock is encountered above the estimated influence depth, VSCs cannot develop their full mechanism of reinforcement and settlement reduction, and therefore are not considered effective beneath strip foundations.

Accordingly, VSCs are not recommended in areas of shallow bedrock.

It is advisable to consult with geotechnical engineers and foundation specialists who can assess the specific ground conditions and design an appropriate Vibro Stone Column system to meet the project's requirements. They will consider factors such as soil composition, depth, and spacing of the stone columns to ensure effective ground improvement and proper load distribution for the strip foundation.

Based on existing data and given the predominantly cohesive ground conditions, it is considered that the majority of the proposed dwellings could be constructed using traditional spread footings bearing in the firm to stiff Clay at a depth from 1.00 m to 2.0m below current ground levels.

Where deeper variable soft natural clays, or loose sand and gravels are identified, dependent on development levels, plots may require locally deepened to Mass Trench Fill. Alternatively, it is recommended that Ground Improvement by VSC be considered to ensure a safe and uniform ABP for a doubly reinforced strip foundation bearing within the treated sub-stratum.

In the location of soft clays, plots will require a driven pile foundation due the incompatibility with VSC.

Foundation depths should take account of the presence of existing and proposed trees with foundations deepened locally, to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards.

It is recommended that at the working drawing stage, a foundation schedule is prepared for the development taking account of the physical change of natural clay soils and the current / proposed locations of trees

12.15 GROUND FLOOR SLABS

Current building control regulations that where infilled ground is present to depths in excess of 600mm, or where the substratum is variable in terms of the structure and settlement potential, or where clay soils are present within the influence of existing or proposed trees, a suspended floor slab is required.

In this instance, shallow cohesive soils are present and, as such, a suspended floor slab will be required.

Where a cast in-situ suspended slab is utilised with no subfloor void, appropriate compressible material (heave precautions) will be required in the construction of the substructure.

In clay soils allowance should be made in the design for heave. This must be incorporate either a clear void of a specified minimum depth under the suspended floor, or a proprietary compressible material/void former below the underside of the floor construction.

Ground bearing slabs should not be used in ground conditions where heave can occur or where the foundation depth is greater than 1.5m. Under these circumstances, a suspended floor construction should be used.

12.16 SETTLEMENT

The site has been appraised through desk based information and site investigation data in order to inform geotechnical risk where possible. Table 12.9 below has been formulated to determine if settlement risks are required to be further appraised. Where any item is determined to be appraised a settlement appraisal for the site should be prepared upon receipt of development levels and layout.



Table 12.9 Summary of Geotechnical Information for Settlement

RISK	COMMENT	ASSESSMENT
Site is located in an area deemed to be at Risk from Ground Dissolution from desk based information	No risk identified.	No further assessment
Site is in an area where geology is reported as having a compressible risk from desk based information	No risk identified.	No further assessment
Do historical maps indicate relic excavation features such as opencast or ponds that have been infilled.	A small, infilled pond is recorded at the northern site boundary. Very soft CLAY was encountered in WS101 in this location.	Further assessment
Has the site been proven to be underlain by anthropogenic materials to an unknown specification?	Shallow Made Ground is present in the location of the former farm buildings.	No further assessment
Have oedometers and/or ground conditions reported compressible stratum on site?	Localised soft clays have been identified at a depth of circa 1.00 m bgl.	Further assessment
Have High walls been identified on site that could result in differential settlement?	None identified.	No further assessment
Has any evidence been observed on site indicating settlement (non-structural assessment)	None identified.	No further assessment
Is voided ground present beneath the site?	None identified.	No further assessment
Is the site in an area where a mobile groundwater regime is present in influencing distance of foundations and infrastructure?	Low permeability cohesive superficial deposits are present which will restrict groundwater movement.	No further assessment
Will the site be subject to changes in site levels that may induce heave or settlement?	An element of cut/fill works is anticipated.	No further assessment

The site has been appraised as having a low potential future settlement risk. No further assessment is considered to be required.

12.17 HEAVE PRECAUTIONS

Foundations constructed within the conjectured zone of influence of existing or removed trees will require appropriate heave precautions due to the potential for ground movement associated with moisture change in shrinkable clay soils. As desiccated soils recover moisture following tree removal or pruning, volumetric expansion (heave) can occur, posing a risk to the structural integrity of foundations. In accordance with NHBC Chapter 4.2 and relevant guidance, foundations should incorporate measures such as increased foundation depths, compressible void formers, or reinforced ground beams designed to accommodate potential upward ground movement. These considerations must be incorporated into the detailed, plot-specific geotechnical foundation design, taking into account factors such as clay



plasticity, tree species, maturity, and proximity to structures to ensure long-term stability and compliance with design standards.

In addition to the requirements of the 'Drainage' sections, drainage near trees should incorporate additional provisions. Where there is a volume change potential within the ground, the provisions include:

- ✦ Increased falls to cater for any ground movement.
- ✦ Deeper and wider backfill of granular material.
- ✦ A drainage system that is capable of movement should heave and shrinkage occur.
- ✦ Drainage pipes should not be encased in concrete.
- ✦ Additional clearance is required where drains pass through the structure of a building to allow for additional movement.

12.18 DRAINAGE

Where loose or soft materials have been identified at drainage levels, there will need to be consideration for the use of reinforced pipe bedding.

Shrinkage and heave of clay soils can affect pipelines. To protect against the effects of heave, drainage should be designed:

- ✦ To take account of potential ground movement as shown in Table 12.X, including where pipes and services pass through substructure walls or foundations.
- ✦ With gradients which may need to be steeper.
- ✦ To use alternative means of catering for the movement when sufficient falls cannot be provided, for example, by deepening the excavation and laying pipework on a granular bedding of suitable thickness to reduce the extent of potential movement.

Table 12.12 Potential Ground Movement for Drainage

VOLUME CHANGE POTENTIAL	HIGH	MEDIUM	LOW
Potential Ground Movement	150mm	100mm	50mm

12.19 EXCAVATIONS

Trial pits were generally stable in both granular Made Ground and natural strata; as such, it is considered that near-surface excavations will be feasible. In areas where Made Ground exceeded 2m, excavations were generally less stable.

Site observations indicated that excavations should be feasible in the near surface with normal plant; however, obstructions were identified in the near surface, including former foundations and former floor slabs. It is anticipated that any obstructions will be grubbed out during the reduced-level dig for the substructure works.

However, due to the depth and variability of the Made Ground and the likelihood of trench collapse, it is considered that all excavations are supported or battered back in accordance with guidance contained in CIRIA R97.

If local pumping of groundwater is required during the advancement of excavations for the proposed foundations, then consideration should be given to the potential for dewatering gravels in the



surrounding areas that may cause structural damage to building substructures in close proximity to the site.

Table 12.13 Civil Engineering Excavation Risk Matrix

RISK ITEM	PRESENT	COMMENT
Running Sand	No	Running sands were not identified during the ground investigation.
Water Ingress to Excavation	Yes	Minor water ingress will require localised dewatering/sump pumping during the construction of site drainage infrastructure.
Shallow Bedrock	Yes	Shallow weathered bedrock was identified between 1.00 m bgl and 2.60 m bgl.

12.20 CONSTRUCTION ACTIVITY AND INSPECTION

The following activities and inspections should be incorporated into the site works:

- ✦ Due to the variability of the soils at the site, it is recommended that sufficient allowance is made for the inspection of formations and sub formations to foundations and pavement construction.
- ✦ Excavations where access is required should be subject to a risk assessment from a competent person and, where appropriate, mitigation measures such as benching back the sides or use of support system in accordance with CIRIA R97 should be utilised.
- ✦ It is considered that dewatering may be required, especially following periods of heavy rainfall. Removal of surface water and water withing trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required, and consideration should be given to provision of space for settling tanks or an attenuation pond.
- ✦ Where access to confined spaces is required, appropriate mitigation measures should be addressed within the construction stage health and safety plan. Particular account should be taken of the gas results.
- ✦ The presence of potential contamination and mitigation measures should be addressed within the construction stage health and safety plan. Particular account should be taken of the gas results.
- ✦ The presence of potential contamination and mitigation measures should be addressed as part of the construction stage health and safety plan and should include measures to design out the risk, reduce their impact and finally, to include the use of personnel protective equipment (PPE).



12.21 DEVELOPED GEOTECHNICAL RISK REGISTER

POTENTIAL CONSTRAINT	LOCATION ON-SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of contaminated soils	West (Former Farm Buildings)	10	Elevated non-volatile PAH compounds identified in the Made Ground can be mitigated by the construction of a clean cover system to remove any potential for direct exposure.
Bedrock	All	100	Shallow bedrock is identified, this represents a significant risk in terms of the viability for excavations to install infrastructure using standard construction equipment.
Cohesive Stratum overlying shallow Bedrock (<3.00m)	All	TBC	Where a potential for volumetric instability is present in cohesive deposits over shallow bedrock a specialist pile design is required in order to prevent pile failure generate from heave. Piles may need to be socketed into the underlying bedrock through CFA method or a sleeve design applied to a pile precast.
Obstructions	West (Former Farm Buildings)	10	Limited obstructions are anticipated in the location of the former farm buildings.
Artificially levelled and filled platforms	West (Former Farm Buildings)	20	The area of the former farm buildings appears to have been levelled and artificially backfilled.
Trench collapse	TBC	TBC	There is the potential for trench collapse in areas where Made Ground or loose granular deposits are present.
Drainage Invert levels	TBC	TBC	Loose materials present at drainage invert levels – reinforced pipe bedding will be required.
Mature Trees/Vegetation	Periphery	TBC	Hedgerows and a series of sporadic semi-mature trees are present along field boundaries. Himalayan Balsam was observed with the spoil mound and along the western boundary of the site.



POTENTIAL CONSTRAINT	LOCATION ON-SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Volume Change Potential Clay	All	100	The clay soils are classified as medium volume change potential.
Concrete Design	West (Former Farm Buildings)	5	Elevated concentrations meeting class DS-3, AC-1s were identified in the Made Ground in TP205 at 0.30 m bgl.
Low-Permeability Ground	All	100	Soakaway testing confirms that the clay soils will not provide an effective permeability.
Services/Sensitive Structures	TBC	TBC	Piling may not be possible within close proximity to any sensitive infrastructure.
Abnormal Foundation Solutions	TBC	10	An engineered foundation solution is likely to be required in the location of soft clays.
Historically Infilled Pond	North	5	A former pond is recorded in the far north of the site.
Mining	N/A	N/A	The rotary boreholes have confirmed that sufficient rock cover is present above any coal seams, therefore there is considered to be no risk of instability.
Consolidation & Settlement	N/A	N/A	The site has been appraised as having a low potential future settlement risk. No further assessment is considered to be required.
Enabling Earthworks	All	100	All proposed earthworks will need to be designed by a suitably qualified geotechnical engineer. The earthworks design will incorporate a Geotechnical Specification for Earthworks that will define protocols to ensure no unacceptable future risk.



12.22 FURTHER WORK

Based on the findings of the intrusive site investigation, the following additional works are recommended to be completed in due course:

- ✦ Plot-specific foundation schedule (upon receipt of the final development levels).
- ✦ Geotechnical Design Report.
- ✦ Remediation and Enabling Works Strategy.
- ✦ Specification for Mitigation of Hazardous Ground Gases & Verification Plan.
- ✦ CL:AIRE Materials Management Plan

END OF REPORT

Appendix I: Limitations





GENERAL

This report and any associated works (together comprising the "Services") were compiled and carried out by E3P for the client (as present in Section 1) under the E3P "Terms of Business" or with those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

Unless explicitly agreed otherwise, in writing, this report has been prepared under E3P Standard Terms and Business as included within our proposal to the Client.

Project-specific appointment documents may be agreed upon at our discretion and a charge may be levied for both the time to review and finalise appointment documents and also for associated changes to the appointment terms. E3P reserves the right to amend the fee should any changes to the appointment terms create an increased risk to E3P.

The report needs to be considered in light of the proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEOENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

Coverage: This section covers reports with the following titles or combination of titles: Phase 1; Desktop Study; Geoenvironmental Assessment; Development Appraisal; Preliminary Environmental Risk Assessment; Constraints Report; Due Diligence Report; Geotechnical Development Review; Environmental Statement; Environmental Chapter; Baseline Environmental Assessment; Project Scope Summary Report (PSSR), Program Environmental Impact Report (PEIR), Geotechnical Development Risk Register; Agricultural Land Assessment; Mineral Safeguarding Assessment; Desk Top Coal Mining Risk Assessment; Hydrogeological Appraisal; Construction Environmental Management Plan; and Site Water Management Plan.

The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walkover inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects' responses may not have been received from all parties. E3P cannot be held responsible for any disclosures that are provided post-production of our report and will not automatically update our report.

The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, E3P reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and does not constitute or replace full and proper surveys completed by suitably qualified and experienced specialists in these fields.

E3P does not warrant work/data undertaken/provided by others.



INTRUSIVE INVESTIGATION REPORTS

Coverage: The following report titles (or combination) may cover this category of work: Geoenvironmental Site Investigation; Geotechnical Assessment; GIR (Ground Investigation Reports); Preliminary Environmental and Geotechnical Risk Assessment; Preliminary Summary; Coal Mining Risk Assessment; Ground Gas Addendum; and Geotechnical Risk Register.

The investigation has been undertaken to provide information concerning either:

- The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
- Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

Unless otherwise specified in the scope of works, any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

For geotechnical investigations, the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report

The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, E3P has used reasonable skill and care to extrapolate conditions between these points based on assumptions to develop our interpretation and conclusions.

The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation and at the time of the investigation.

Conditions can change between investigation points both spatially and over time and these interpretations should therefore be considered indicative. The assessment of extreme weather events and their impact on ground conditions is not within the scope of E3P's work

The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of



any future changes or amendments to these values. Specific assumptions associated with the risk assessment process have been outlined within the body or associated appendix of the report.

Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

Where soil contamination concentrations recorded as part of this investigation are used for commentary on the potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed and the waste classification and any subsequent disposal option agreed upon with licenced subcontractors and/or the relevant regulators.

The results of the asbestos testing are factually reported and interpretation is given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and/or trace loose asbestos fibres within the soil matrix at the site.

If costs have been included in relation to additional site works, and/or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIATION AND ENABLING WORK STRATEGY REPORTS

These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected based on the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

The outputs of the Detailed Quantitative Risk Assessments are based upon the manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

Before adoption on-site, assessment criteria will need to be discussed and agreed upon with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales



associated with the Regulatory Authority engagement are not within the control of E3P. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

E3P does not accept liability for any subcontract work that has not been completed in strict accordance with an approved E3P Remediation and Enabling Works Strategy.

GEOTECHNICAL DESIGN REPORT (GDR)

The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

MONITORING (INCLUDING REMEDIATION MONITORING REPORTS AND BUILD PHASE MITIGATION)

These reports are factual and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of earthworks or remedial works.

The data is presented and will be compared with assessment criteria.

Appendix II: Glossary





ACM	Asbestos-containing material	MMP	Materials management plan
ADS	Acoustic design statement	ND	Not detected
AST	Above-ground storage tank	NDP	Nuclear density probe
BGS	British Geological Survey	NMP	Noise management plan
BSI	British Standards Institute	NPSE	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	NR	Not recorded
MRA	Mining Remediation Authority	PAH	Polycyclic aromatic hydrocarbon
CBR	California bearing ratio	PCB	Polychlorinated biphenyl
CIEH	Chartered Institute of Environmental Health	PI	Plasticity index
CIRIA	Construction Industry Research Association	PID	Photo ionisation detector
CLEA	Contaminated land exposure assessment	POS	Public open space
CML	Council of Mortgage Lenders	PPE	Personnel protective equipment
CoC	Contaminants of concern	ProPG	Professional practice guidance
CSM	Conceptual site model	QA	Quality assurance
DNAP L	Dense non-aqueous phase liquid (chlorinated solvents, PCB)	SGV	Soil guideline value
DWS	Drinking water standard	SPH	Separate-phase hydrocarbon
EA	Environment Agency	SPT	Standard penetration test
EQS	Environmental quality standard	SVOC	Semi-volatile organic compound
FFL	Finished floor level	TPH	Total and speciated petroleum hydrocarbon
GAC	General assessment criteria	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
GL	Ground level	UKWIR	United Kingdom Water Infrastructure Risk
GSV	Gas screening value	UST	Underground storage tank
HCV	Health criteria value	VCC	Vibro-concrete column
ICSM	Initial conceptual site model	VOC	Volatile organic compound
LEL	Lower explosive limit	VRSC	Vibro-replacement stone columns
LMRL	Lower method reporting limit	VSC	Vibro-stone columns
LNAP L	Light non-aqueous phase liquid (petrol, diesel, kerosene)	WHO	World Health Organisation



MCV	Moisture condition value	WRAP	Waste and Resources Action Programme
MIBK	Methyl isobutyl ketone	WTE	Water table elevation
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	kN/m²	Kilonewtons per metre squared
ppb	Parts per billion	µm	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	SSRT	Site Specific Remediation Target
PSD	Particle Size Distribution	DD	Dry Density
CL:AI RE	Contaminated Applications in Land: Real Environments	Mc	Moisture Content
ρ	Bulk Density	GPR	Ground Penetrating Radar
NDP	Nuclear Density Probe	FFL	Finished Floor Level
LEL	Lower Explosive Limit	UKWIR	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	LOD	Limit of Detection
PFAS	Per- and Poly-Fluorinated Substances	PFOA	Perfluorooctanoic Acid

Appendix III: CIRIA 552 Risk Classification





CIRIA C552:2001 – Classification of Consequence

CLASSIFICATION	CATEGORY	DEFINITION
SEVERE	Humans	Short-term (acute) risk to human health likely to result in “significant harm” as defined by the Environmental Protection Act 1990, Part 2a
	Controlled Water	Short-term risk of pollution of sensitive water resource
	Property	Catastrophic damage to buildings/property
	Ecology	Short-term risk to a particular ecosystem or organism forming part of such ecosystem
MEDIUM	Humans	Chronic damage to human health (“significant harm” as defined in DEFRA, 2006)
	Controlled Waters	Pollution of sensitive water resources
	Ecological Systems	Significant change in a particular ecosystem or organism forming part of such ecosystem
	Humans	Chronic damage to human health (“significant harm” as defined in DEFRA, 2006)
MILD	Controlled Waters	Pollution of non-sensitive water resources
	Property	Significant damage to buildings, structures, crops and services (“significant harm” as defined in DEFRA, 2006) and damage to sensitive buildings/structures and services
	Ecological Systems	Damage to the environment
MINOR	Humans	Non-permanent health effects to human health that are easily prevented by the use of PPE
	Property	Easily repairable effects of damage to buildings, structures and services
	Financial / Project	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve

CIRIA 552:2001 Classification of Probability

RISK	DEFINITION
LOW	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property.
LOW MODERATE	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property with regard to the proposed use. However, minor issues may require further consideration in the event of future redevelopment of the Site.
MODERATE	Some potential contaminated land liabilities/geotechnical constraints are likely to affect the property as a result of historical and/or current activities. The risks identified are unlikely to pose an immediate significant issue but the purchaser/developer may wish to make further enquiries of the vendor or



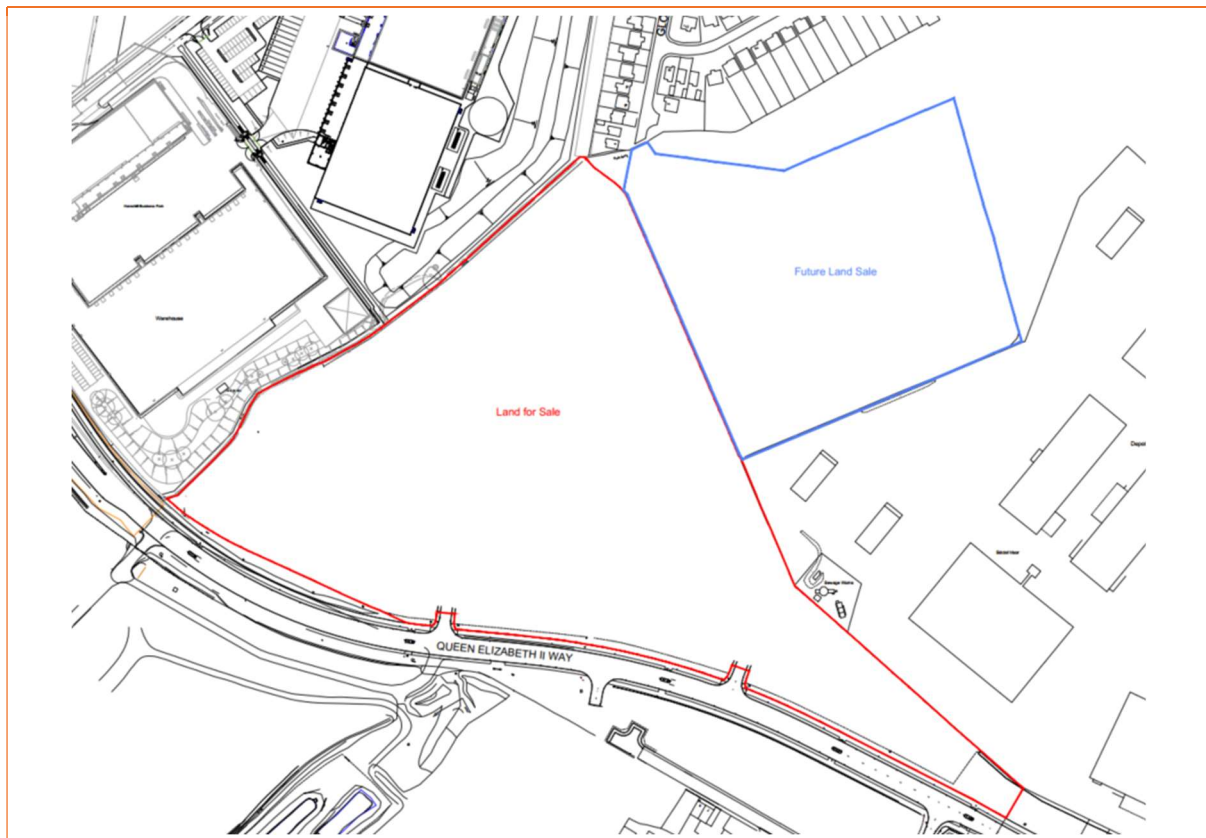
	undertake further environmental improvements. Redevelopment of the Site will likely require further site investigation.
MODERATE HIGH	Some potentially significant contaminated land liabilities/geotechnical constraints have been identified at the property that requires further assessment, including intrusive ground investigations.
HIGH	Significant potential contaminated land liabilities/geotechnical constraints have been identified at the property. Further assessment including intrusive ground investigation will be required to determine the level of risk and associated liability.

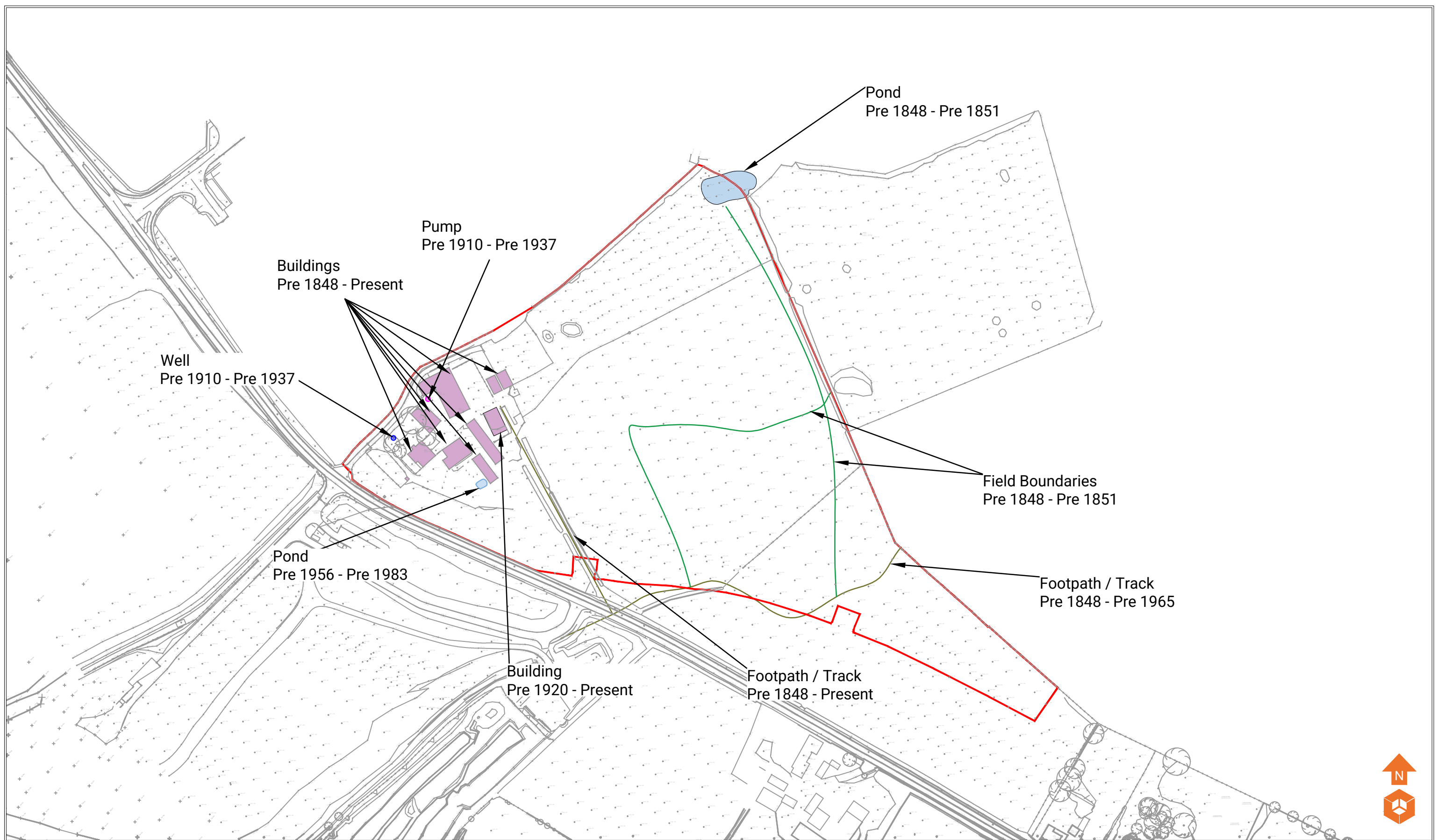
Appendix IV: Drawings





DRAWING 18-435-001 – SITE LOCATION PLAN





Historical Features

- Embankment
- Ruin
- Well
- Pump
- Field Boundary
- Footpath / Track

Notes:

Client:

Northstone

Job No:

18-435

Date:

23.10.2025

Drawing No:

003

Scale:

NTS



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P1	REVA	23.10.2025	TG	KK	KK
Phase	Issue	Date	Drawn	Checked	PM

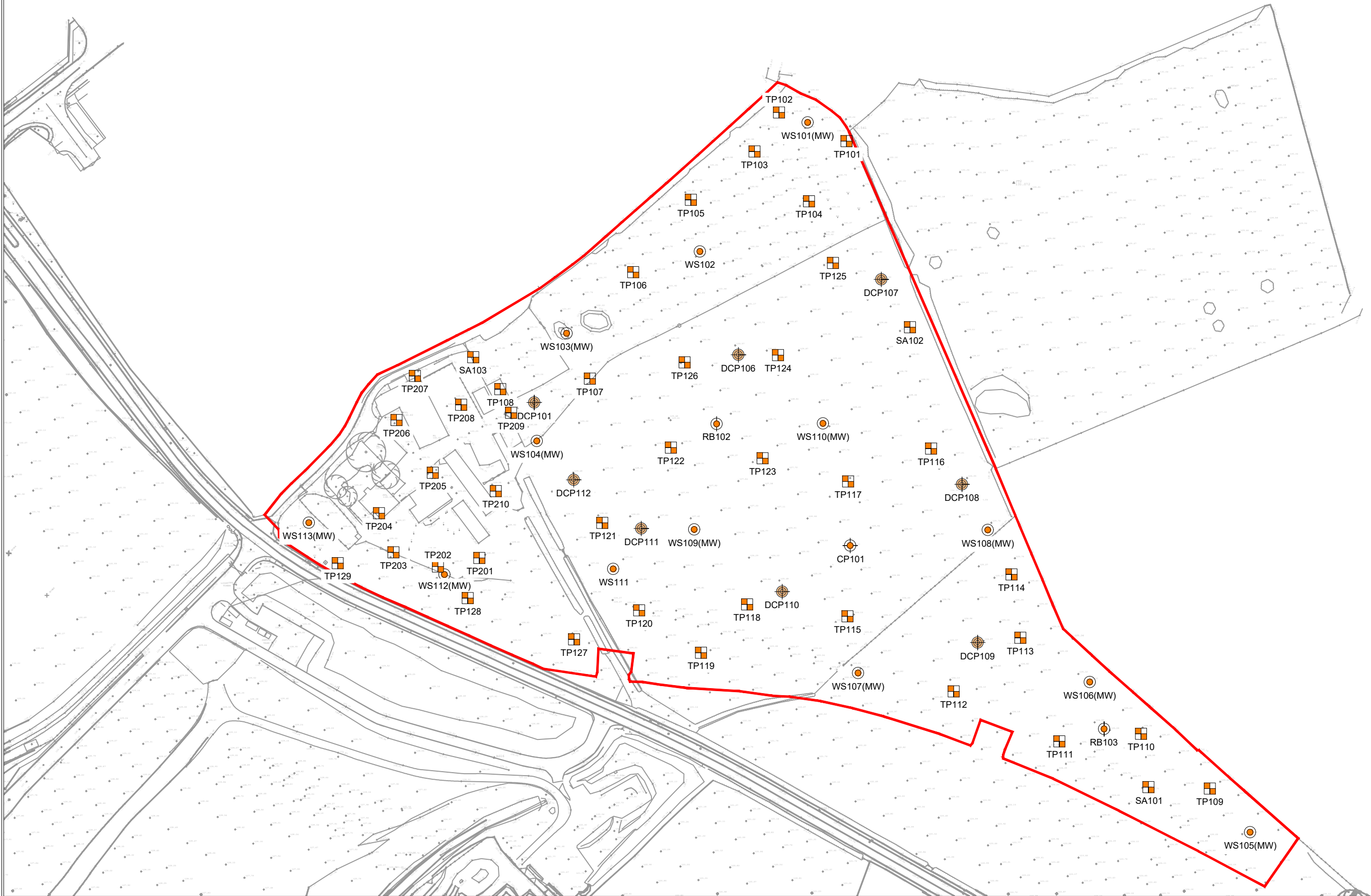
Job Title:

Hareshill Road

Drawing Title:

Historical Features Plan

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- Location Symbols**
- Approximate Window Sample Probehole Location
 - Approximate Window Sample Probehole Location with Install
 - Approximate Trial Pit Location
 - Approximate Soakaway Test Location
 - Approximate Rotary Borehole Location

<i>Notes:</i>					
P1	REVA	09.07.2025	TG	KK	KK
Phase	Issue	Date	Drawn	Checked	PM

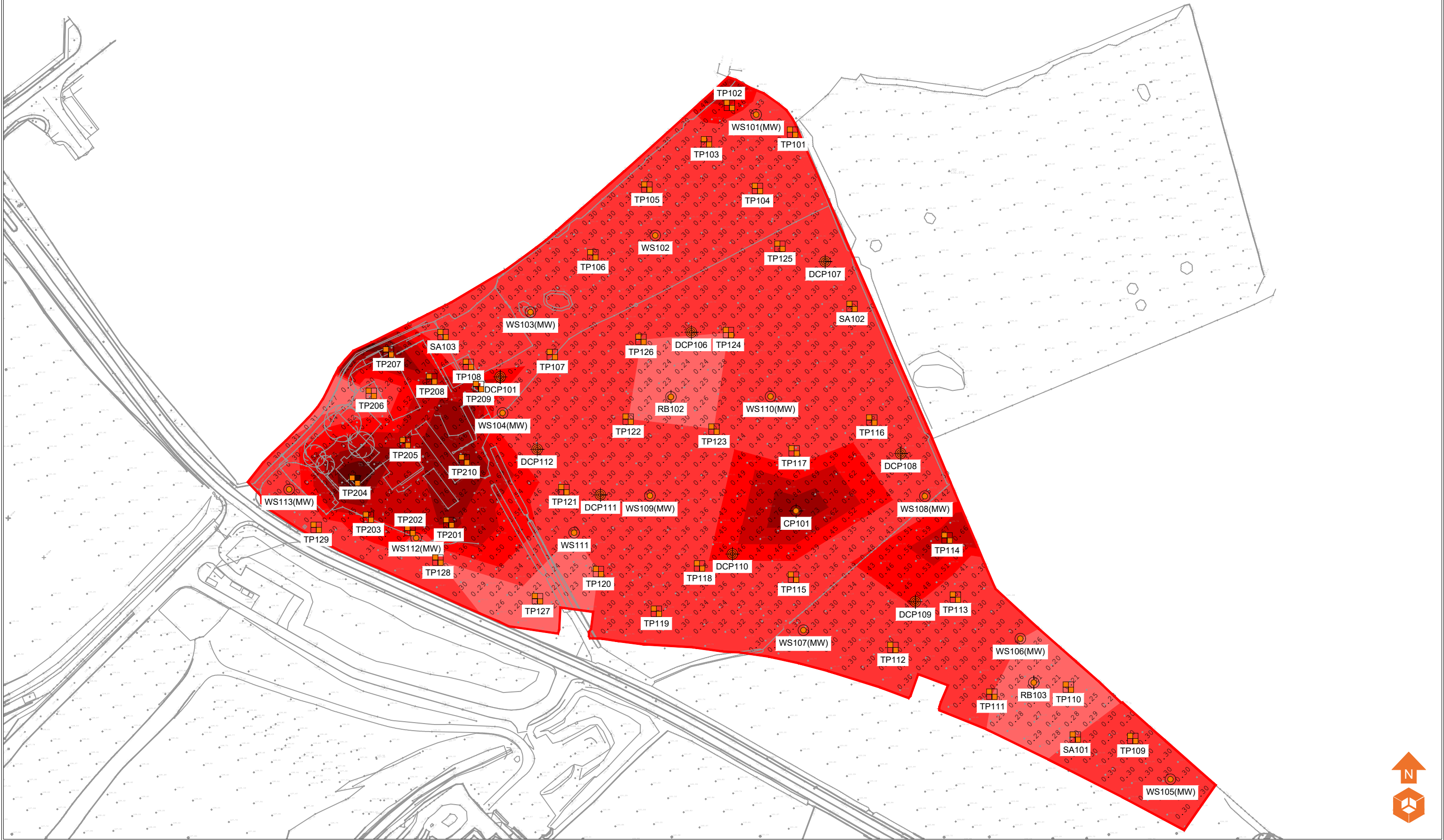
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<i>Job Title:</i>	Hareshill Road

<i>Job No.:</i>	18-435
<i>Drawing No.:</i>	006
<i>Date:</i>	09.07.2025
<i>Scale:</i>	NTS
<i>Drawing Title:</i>	Exploratory Hole Location Plan



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- Location Symbols**
- WS101 Approximate Window Sample Probehole Location
 - WS101(MW) Approximate Window Sample Probehole Location with Install
 - TP101 Approximate Trial Pit Location
 - SA101 Approximate Soakaway Test Location
 - RB101 Approximate Rotary Borehole Location

- Made Ground Depth (m)**
- Depth of Made Ground 0.00 - 0.14m
 - Depth of Made Ground 0.15 - 0.29m
 - Depth of Made Ground 0.30 - 0.44m
 - Depth of Made Ground 0.45 - 0.59m
 - Depth of Made Ground 0.60 - 0.74m
 - Depth of Made Ground 0.75 - 0.89m
 - Depth of Made Ground >0.90m

Notes:

P1	REVA	09.07.2025	TG	KK	KK
Phase	Issue	Date	Drawn	Checked	PM

Client:

Northstone

Job Title:

Hareshill Road

Job No:

18-435

Drawing No:

007

Date:

09.07.2025

Scale:

NTS

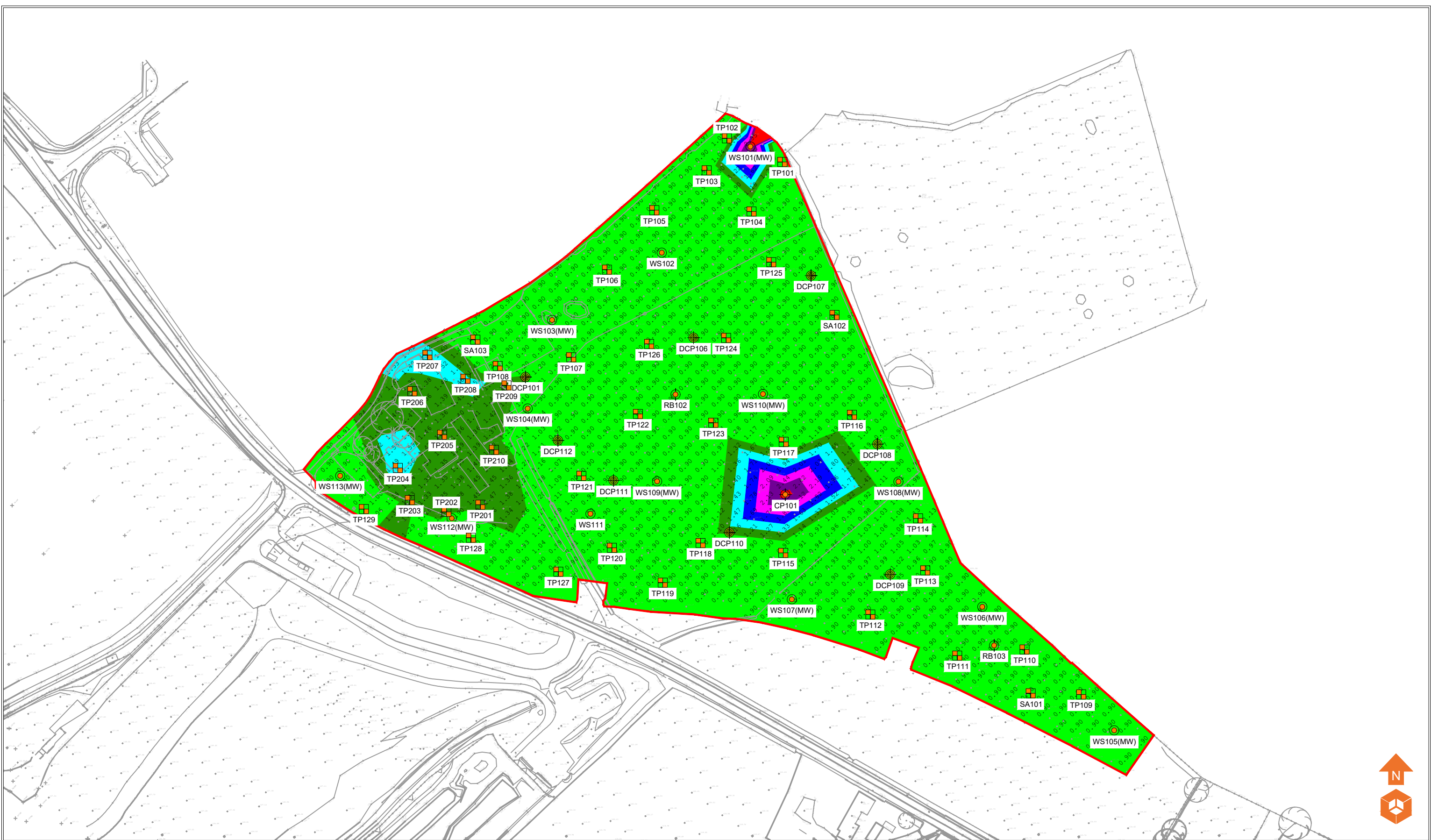


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Drawing Title:

Depth Of Made Ground Plan

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- Location Symbols**
- Approximate Window Sample Probehole Location
 - Approximate Window Sample Probehole Location with Install
 - Approximate Trial Pit Location
 - Approximate Soakaway Test Location
 - Approximate Rotary Borehole Location

- Shallow Spread Footings**
- Depth to Founding Strata 0.00 - 1.24m
 - Depth to Founding Strata 1.25 - 1.49m
- Mass Trench Fill Footings**
- Depth to Founding Strata 1.50 - 1.74m
 - Depth to Founding Strata 1.75 - 1.99m
 - Depth to Founding Strata 2.00 - 2.24m
- Engineered Footings**
- Depth to Founding Strata 2.25 - 2.49m
 - Depth to Founding Strata >2.50m

Notes:

Depth to Founding Strata does not Consider Anthropogenic Influence or Trees and is an Indicative Assessment

P1	REVA	09.07.2025	TG	KK	KK
Phase	Issue	Date	Drawn	Checked	PM

Client:

Northstone

Job Title:

Hareshill Road

Job No:

18-435

Drawing No:

009

Date:

09.07.2025

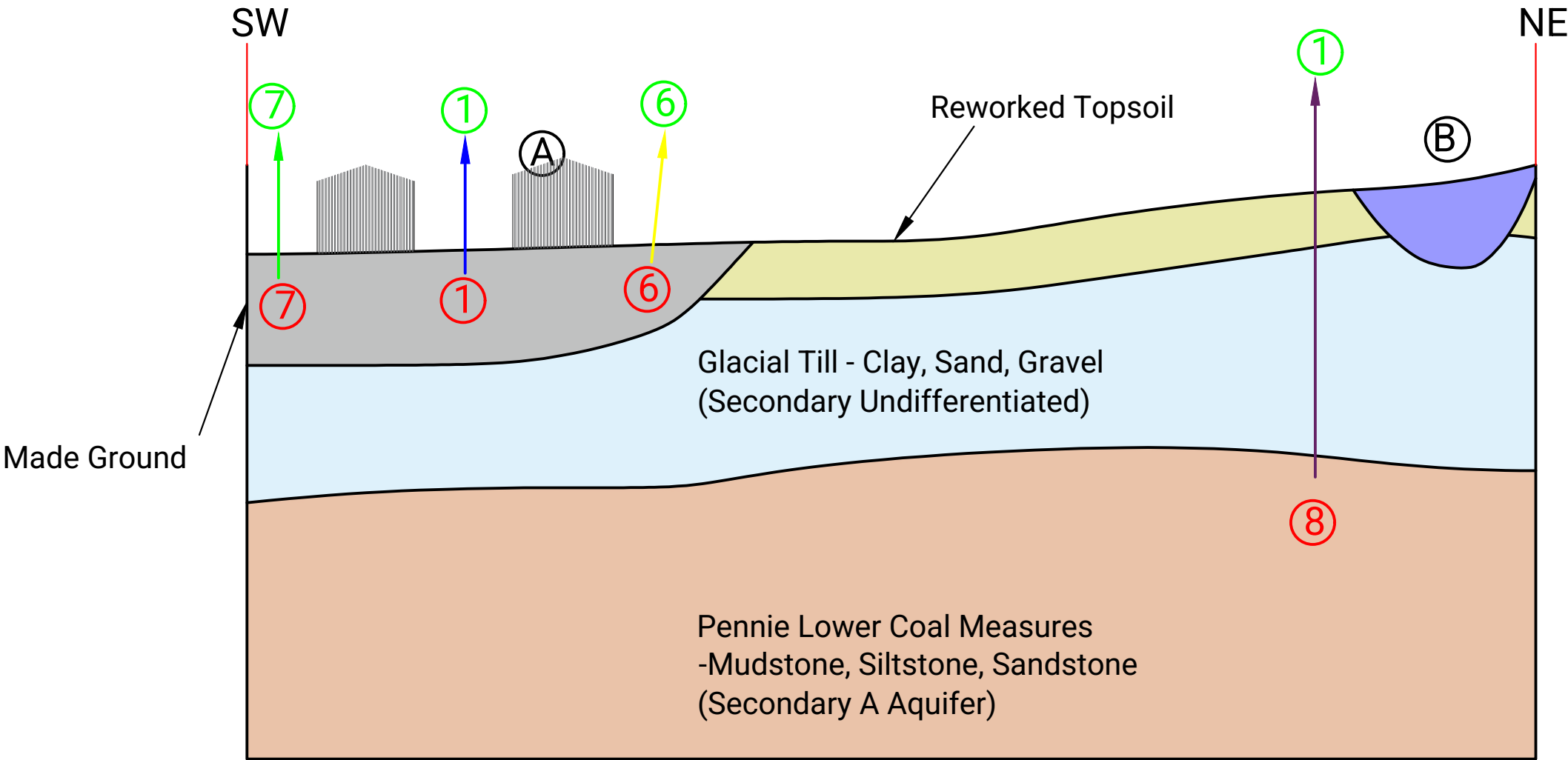
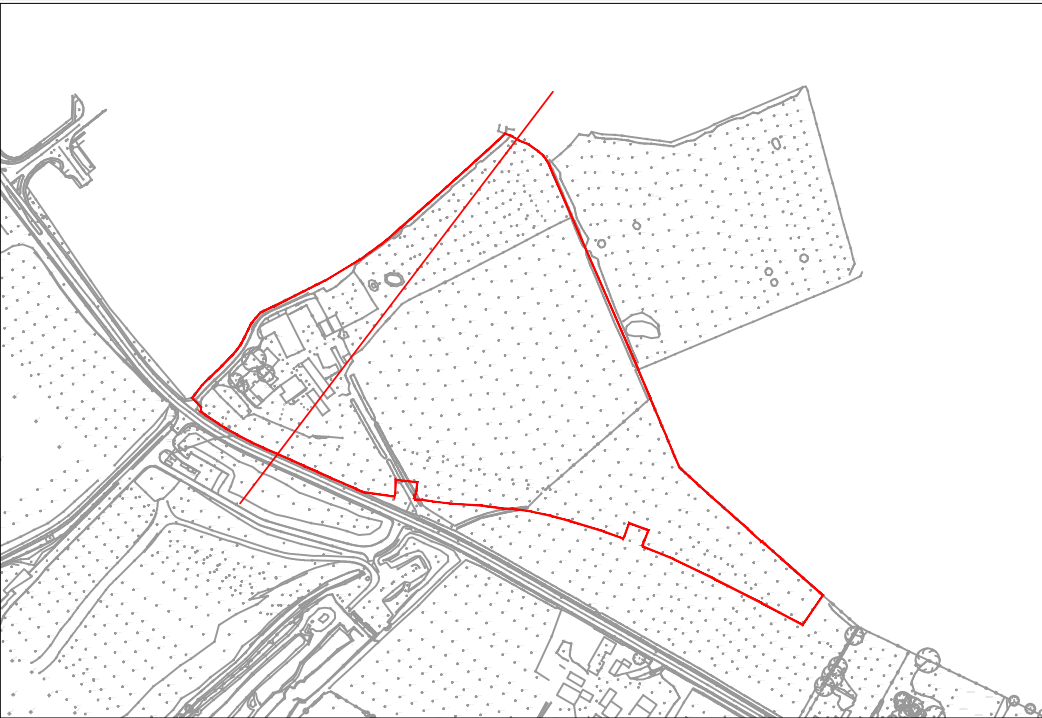
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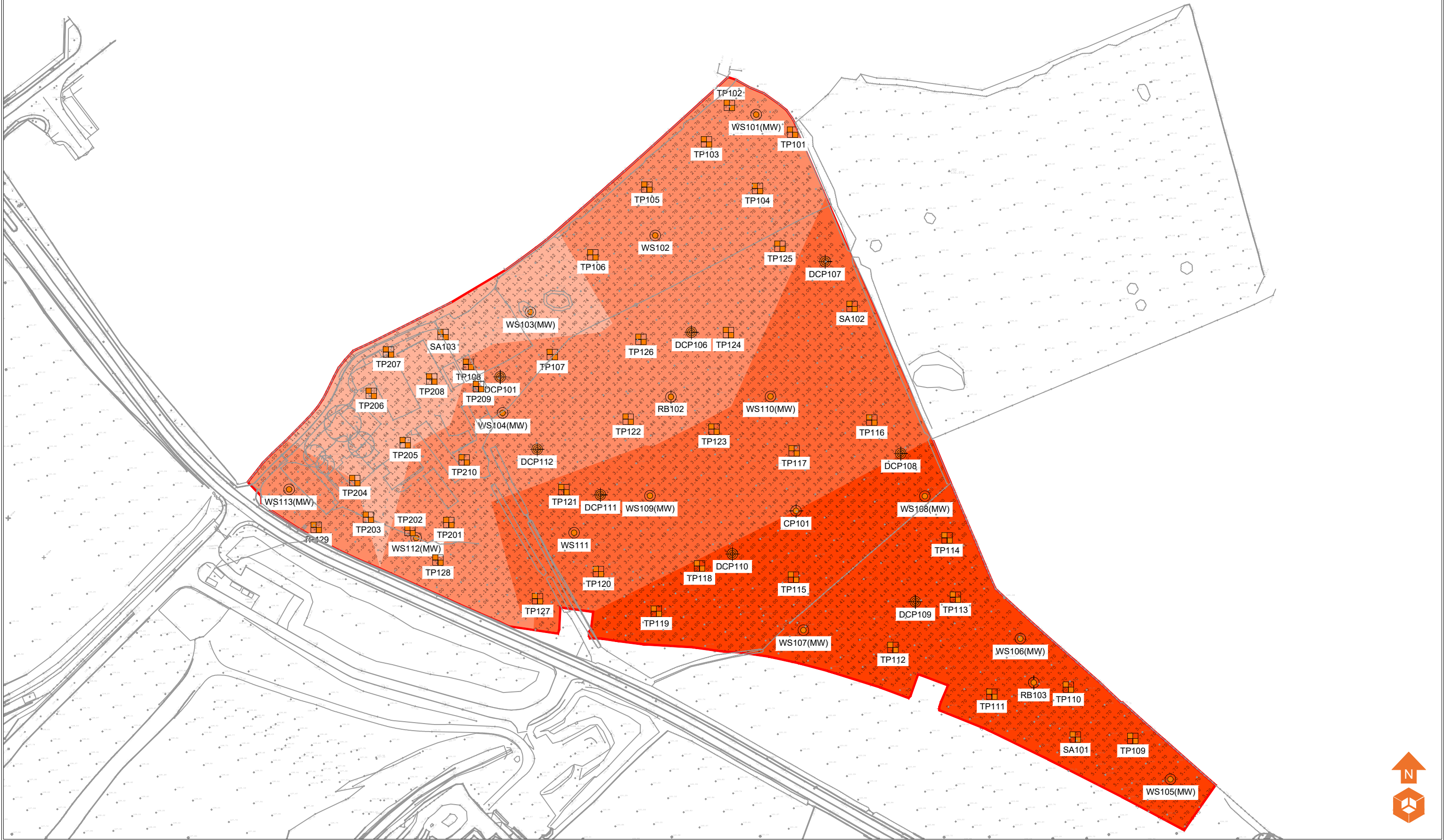


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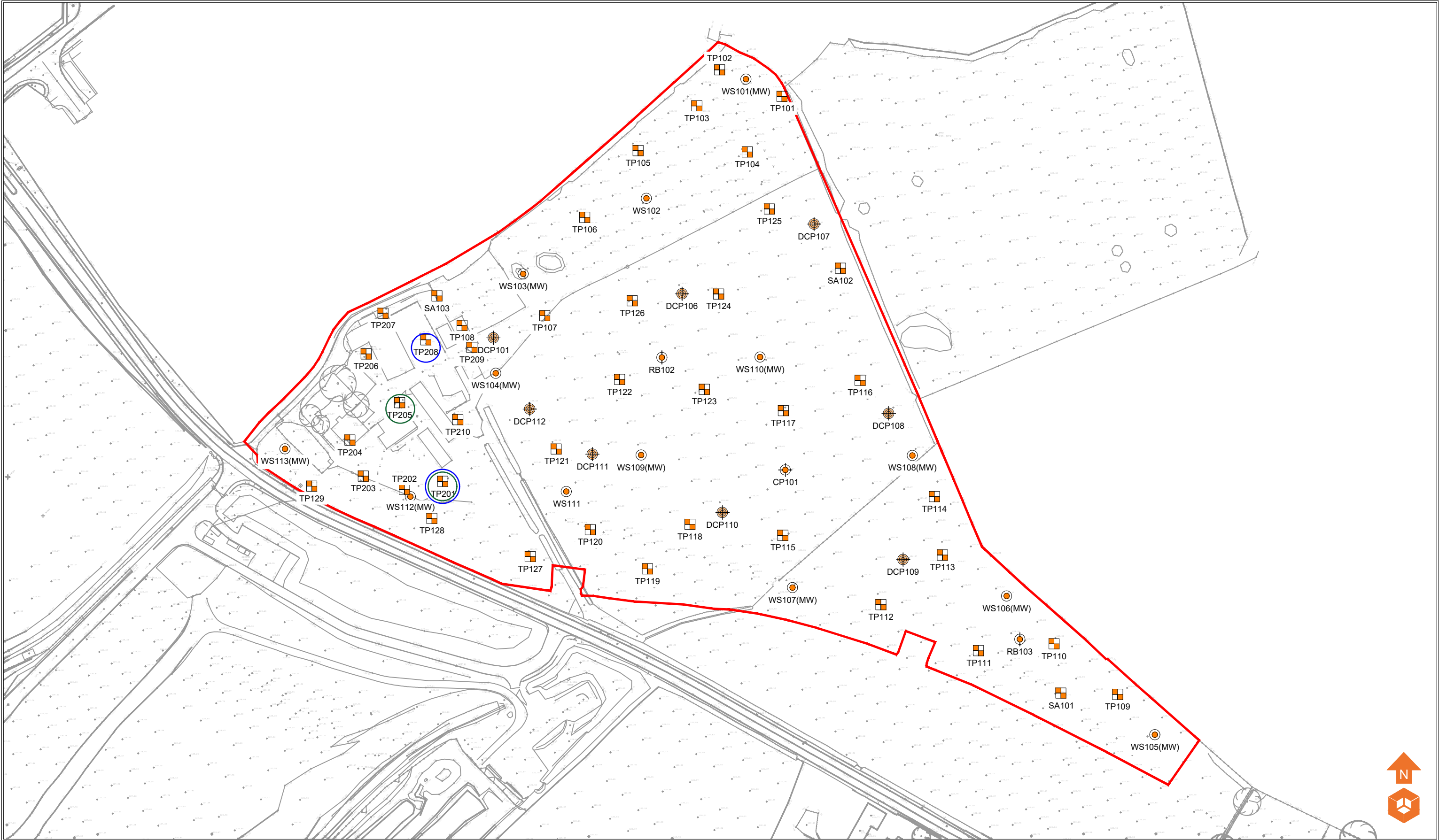
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Geology Key Made Ground Reworked Topsoil Glacial Till - Clay, Sand And Gravel Pennie Lower Coal Measures - Mudstone, Siltstone and Sandstone



Location Symbols Approximate Window Sample Probehole Location Approximate Window Sample Probehole Location with Install Approximate Trial Pit Location Approximate Soakaway Test Location Approximate Rotary Borehole Location Bedrock Depth (m) Depth to Bedrock 1.00 - 1.99m Depth to Bedrock 2.00 - 2.99m Depth to Bedrock 3.00 - 3.99m Depth to Bedrock 4.00 - 4.99m Depth to Bedrock >5.00m		Notes:						Client:		Job No:	Date:	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk	
		P1 REVA 23.10.2025 TG KK KK PhaseIssueDateDrawnCheckedPM						Northstone		18-435	23.10.2025		
								Job Title:		Drawing No:	Scale:	The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.	
								Hareshill Road		012	NTS		
										Depth To Bedrock Plan			



- Location Symbols**

 - Approximate Window Sample Probehole Location
 - Approximate Window Sample Probehole Location with Install
 - Approximate Trial Pit Location
 - Approximate Soakaway Test Location
 - Approximate Rotary Borehole Location
- Contamination Exceedances**

 - Hydrocarbon Odour
 - Non-Volatile PAHs

Notes:

Client:

Northstone

Job No:
18-435
Drawing No:
014

Date:
05.08.2025
Scale:
NTS



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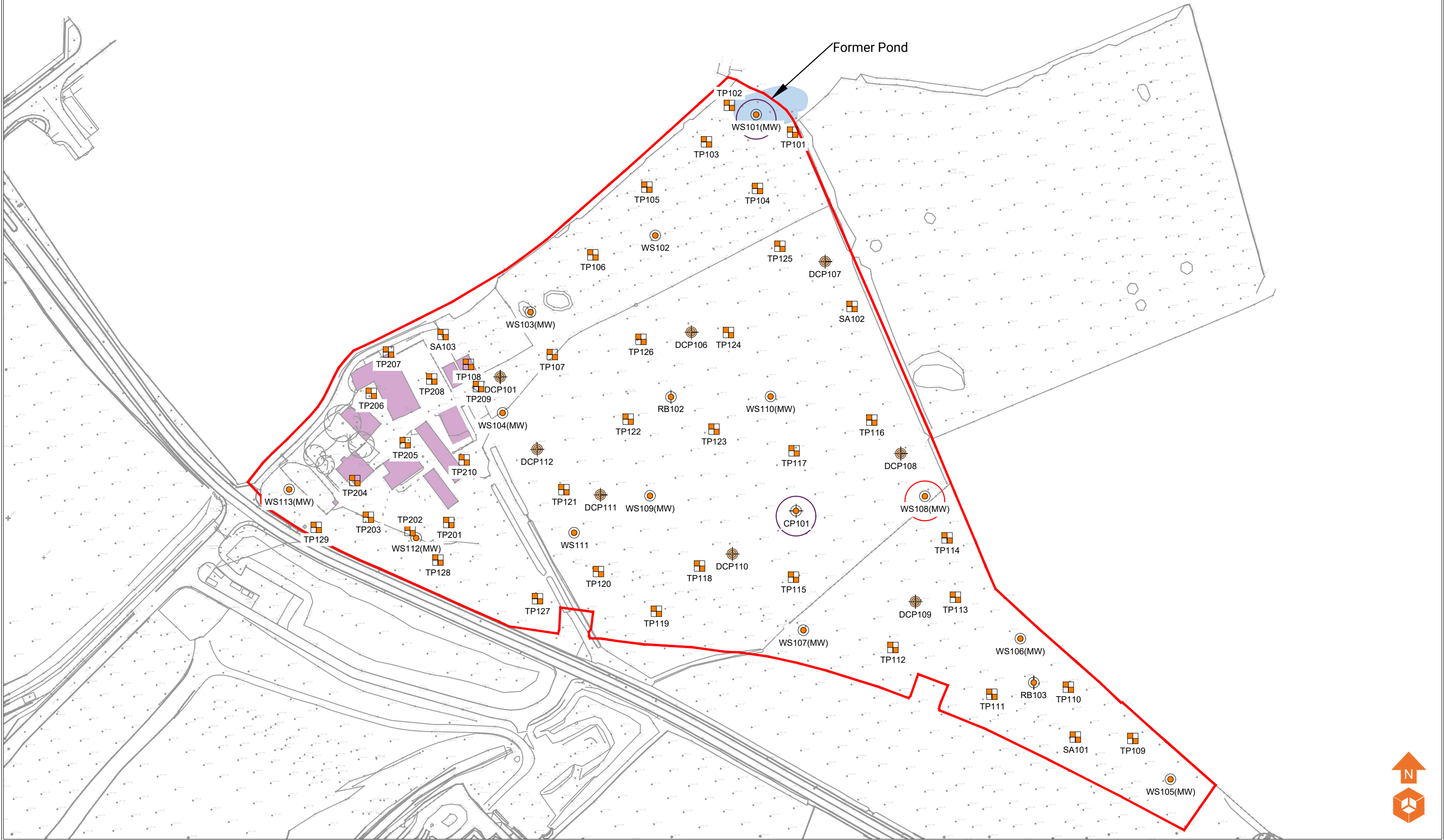
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Drawing Title:

Contamination Exceedances
Plan

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- Location Symbols**
- WS101: Approximate Window Sample Probehole Location
 - WS101(MW): Approximate Window Sample Probehole Location with Install
 - TP101: Approximate Trial Pit Location
 - SA101: Approximate Soakaway Test Location
 - RB101: Approximate Rotary Borehole Location

- Development Constraints**
- Low Strength Clay @ 1.00m bgl
 - Very Low / Extremely Low Strength Silty Clay @ 1.00m bgl
 - Remnant Foundations And Below Ground Obstructions, Including Former Slurry Pit, Associated With Hares Hill Farm

Notes:

Client:

Northstone

Job No:

18-435

Drawing No:

015

Date:

01.09.2025

Scale:

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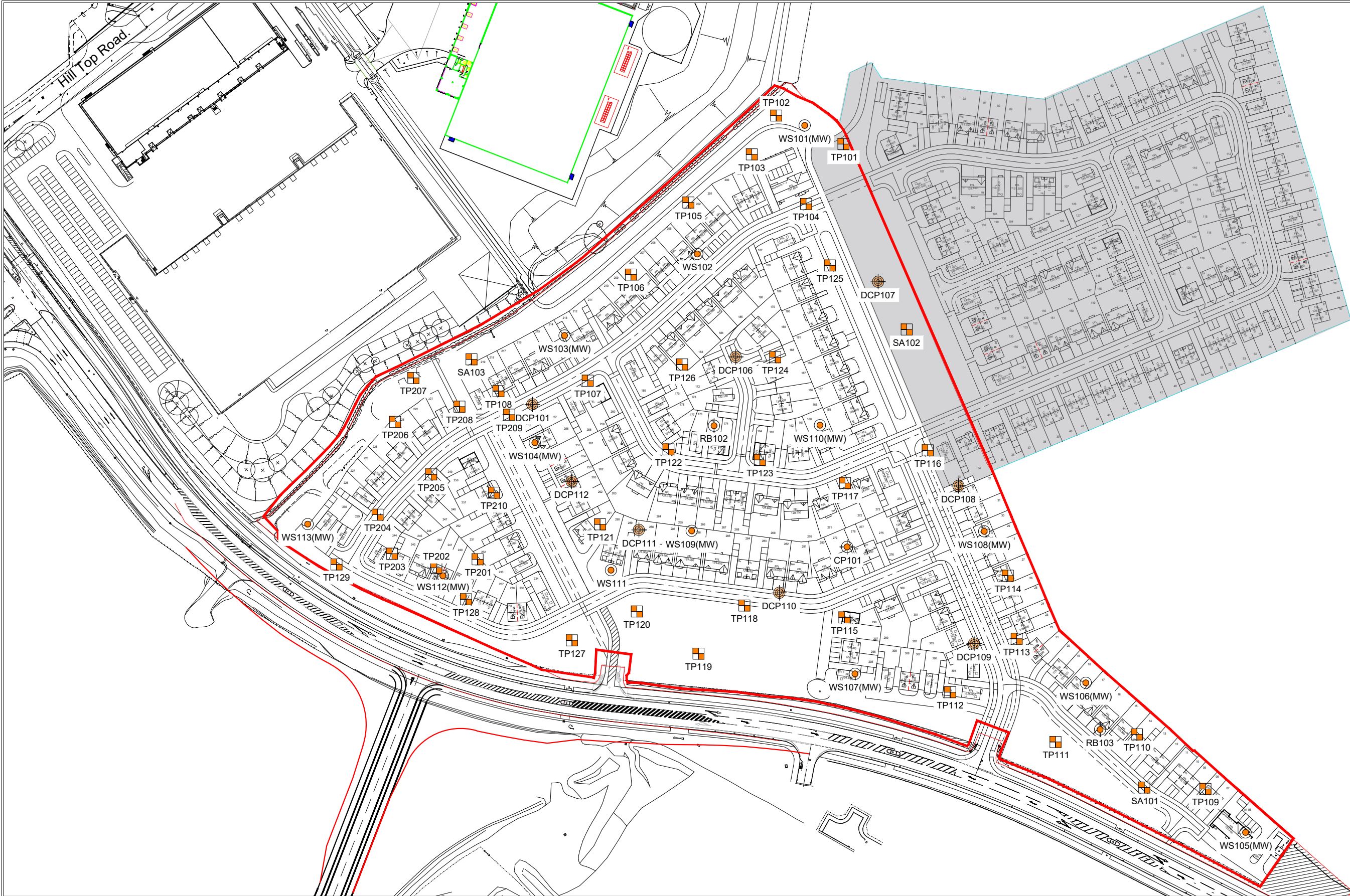
Job Title:

Harehill Road

Drawing Title:

Development Constraints Plan

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- Location Symbols
- WS101 Approximate Window Sample Probehole Location
 - WS101(MW) Approximate Window Sample Probehole Location with Install
 - TP101 Approximate Trial Pit Location
 - SA101 Approximate Soakaway Test Location
 - RB101 Approximate Rotary Borehole Location

Notes:

Client:

Northstone

Job No:
18-435
Drawing No:
031

Date:
04.09.2025
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Phase	Issue	Date	Drawn	Checked	PM

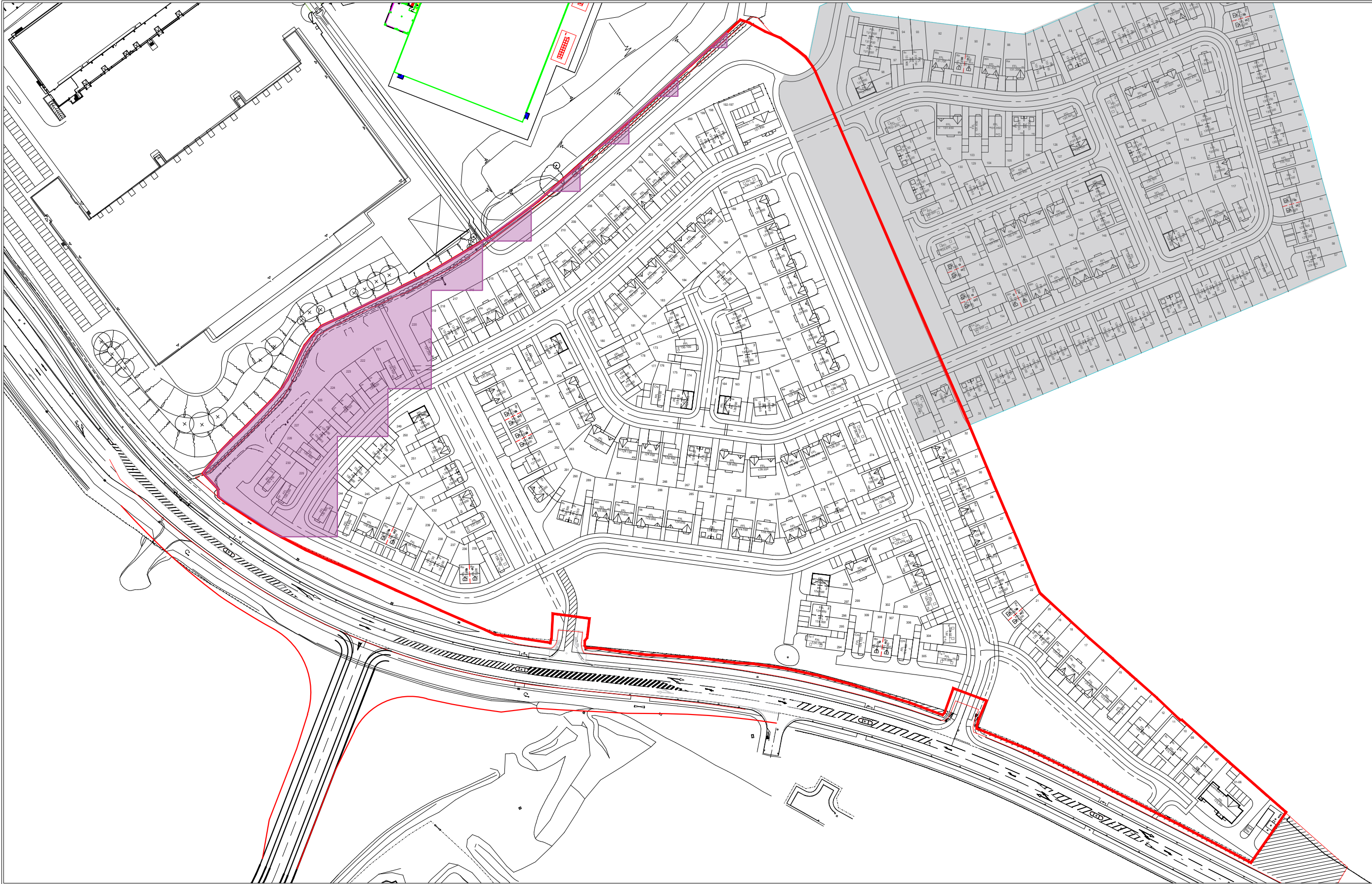
Job Title:

Hareshill Road

Drawing Title:

Proposed Development Plan
With Exploratory Hole Locations

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Key
Radon Affected Area

Notes:

Client:

Northstone

Job No:
18-435
Date:
04.09.2025
Drawing No:
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Scale:
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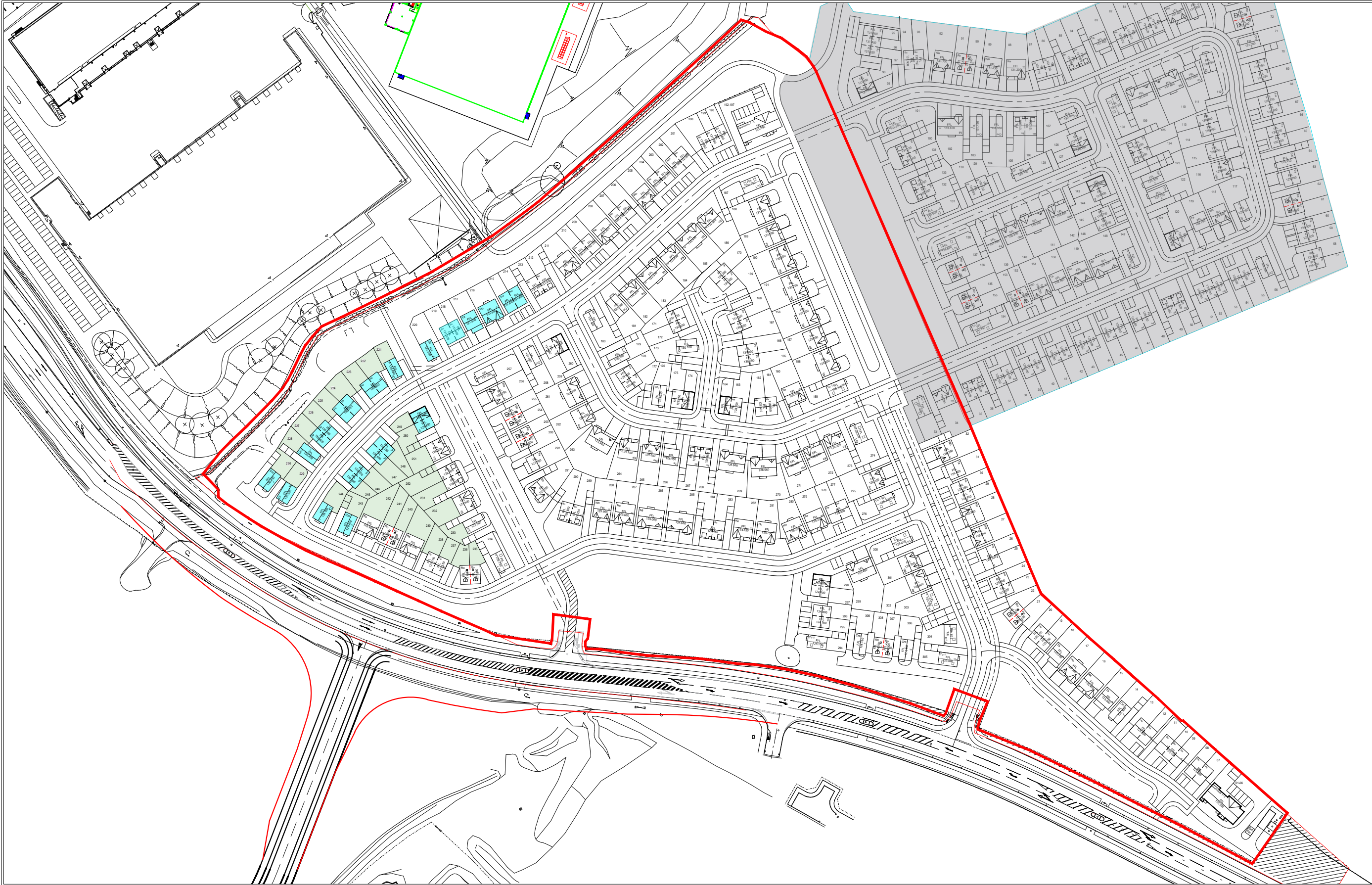
Job Title:

Hareshill Road

Drawing Title:

Radon Affected Area Plan

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- Key
- Plots Requiring 600mm Clean Cover System
 - Plots Requiring Basic Radon Protection Measures

Notes:

Client:

Northstone

Job No:
18-435
Date:
08.09.2025
Drawing No:
033
Scale:
NTS



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Partnership Ltd
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Website: www.e3p.co.uk

P1	REVA	08.09.2025	TG	KK	KK
Phase	Issue	Date	Drawn	Checked	PM

Job Title:

Hareshill Road

Drawing Title:

Build Phase Issues Plan

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Appendix V: Photographs





PLATE 1 – VIEW FROM WEST TO SOUTHEAST



PLATE 2 – VIEW FROM SOUTHERN BOUDARY TOWARDS THE WEST





PLATE 3 – Remnant floor slabs at former Hares Hill Farm



PLATE 4 – REMNANT SLABS AND WALLS AT FORMER HARES HILL FARM





PLATE 5 – REMNANT SLABS AND WALLS AT FORMER HARES HILL FARM



PLATE 6 – FORMER SLURRY PIT



Appendix VI: Historical Maps



Historical Mapping Legends

Ordnance Survey County Series 1:10,560

	Gravel Pit		Sand Pit		Other Pits
	Quarry		Shingle		Orchard
	Osiers		Reeds		Marsh
	Mixed Wood		Deciduous		Brushwood
	Fir		Furze		Rough Pasture
	Arrow denotes flow of water		Trigonometrical Station		
	Site of Antiquities		Bench Mark		
	Pump, Guide Post, Signal Post		Well, Spring, Boundary Post		
	•285 Surface Level				
	Sketched Contour		Instrumental Contour		
	Main Roads		Minor Roads		
	Sunken Road		Raised Road		
	Road over Railway		Railway over River		
	Railway over Road		Level Crossing		
	Road over River or Canal		Road over Stream		
	Road over Stream				
	County Boundary (Geographical)				
	County & Civil Parish Boundary				
	Administrative County & Civil Parish Boundary				
	County Borough Boundary (England)				
	County Burgh Boundary (Scotland)				
	Rural District Boundary				
	Civil Parish Boundary				

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Bracken		Heath
	Marsh		Reeds
	Building		Glasshouse
	Sloping Masonry		Pylon
	Cutting		Embankment
	Road Under		Road Over
	Level Crossing		Foot Bridge
	Standard Gauge Multiple Track		Standard Gauge Single Track
	Siding, Tramway or Mineral Line		Narrow Gauge
	Geographical County		Administrative County, County Borough or County of City
	Municipal Borough, Urban or Rural District, Burgh or District Council		Borough, Burgh or County Constituency
	Civil Parish		
	BP, BS Boundary Post or Stone		Police Station
	Church		Post Office
	Club House		Public Convenience
	Fire Engine Station		Public House
	Foot Bridge		Signal Box
	Fountain		Spring
	Guide Post		Telephone Call Box
	Mile Post		Telephone Call Post
	Mile Stone		Well

1:10,000 Raster Mapping

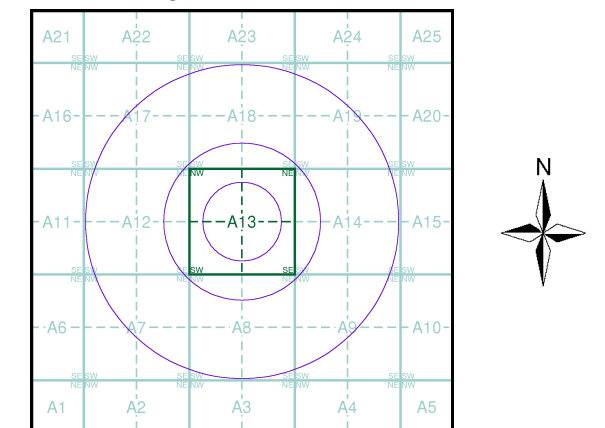
	Gravel Pit		Refuse tip or slag heap
	Rock		Rock (scattered)
	Boulders		Boulders (scattered)
	Shingle		Mud
	Sand		Sand Pit
	Slopes		Top of cliff
	General detail		Underground detail
	Overhead detail		Narrow gauge railway
	Multi-track railway		Single track railway
	County boundary (England only)		Civil, parish or community boundary
	District, Unitary, Metropolitan, London Borough boundary		Constituency boundary
	Area of wooded vegetation		Non-coniferous trees
	Non-coniferous trees (scattered)		Coniferous trees
	Coniferous trees (scattered)		Positioned tree
	Orchard		Coppice or Osiers
	Rough Grassland		Heath
	Scrub		Marsh, Salt Marsh or Reeds
	Water feature		Flow arrows
	Mean high water (springs)		Mean low water (springs)
	Telephone line (where shown)		Electricity transmission line (with poles)
	Bench mark (where shown)		Triangulation station
	Point feature (e.g. Guide Post or Mile Stone)		Pylon, flare stack or lighting tower
	Site of (antiquity)		Glasshouse
	General Building		Important Building



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:10,560	1848 - 1851	2
Lancashire And Furness	1:10,560	1894	3
Lancashire And Furness	1:10,560	1910	4
Lancashire And Furness	1:10,560	1923 - 1932	5
Lancashire And Furness	1:10,560	1932	6
Lancashire And Furness	1:10,560	1938	7
Ordnance Survey Plan	1:10,000	1955 - 1956	8
Ordnance Survey Plan	1:10,000	1965 - 1968	9
Ordnance Survey Plan	1:10,000	1974 - 1977	10
Ordnance Survey Plan	1:10,000	1983 - 1988	11
Ordnance Survey Plan	1:10,000	1993	12
10K Raster Mapping	1:10,000	1999	13
Street View	1:10,000	2016	14

Historical Map - Slice A



Order Details

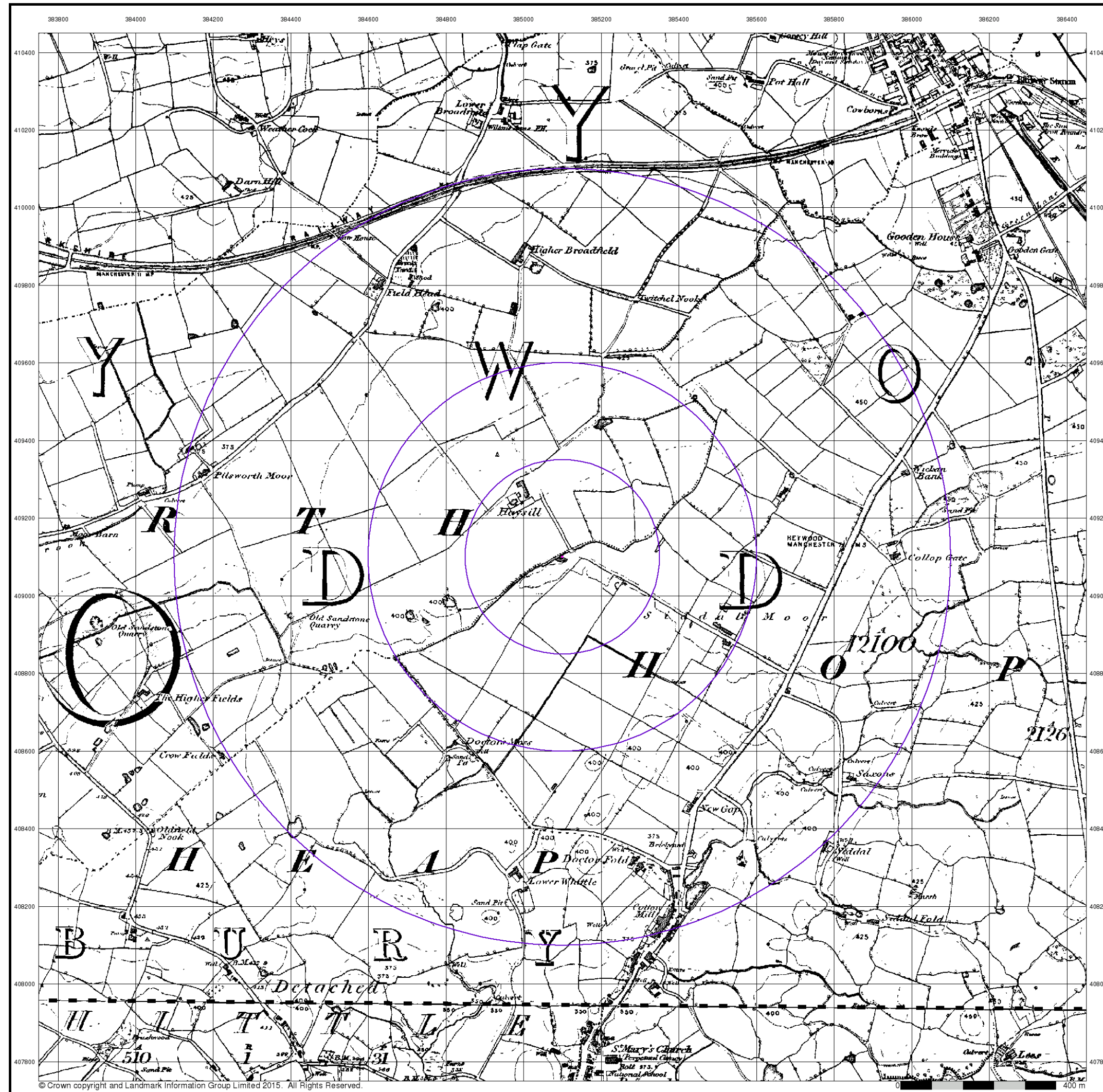
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

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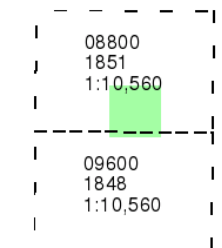
Lancashire And Furness

Published 1848 - 1851

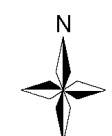
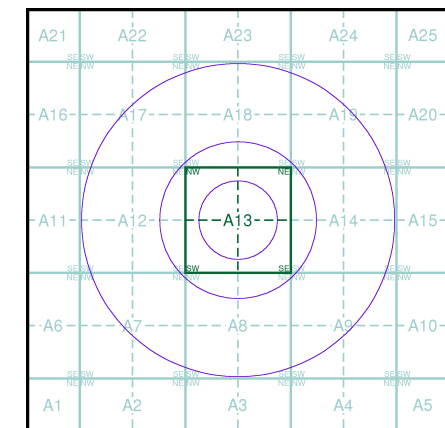
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

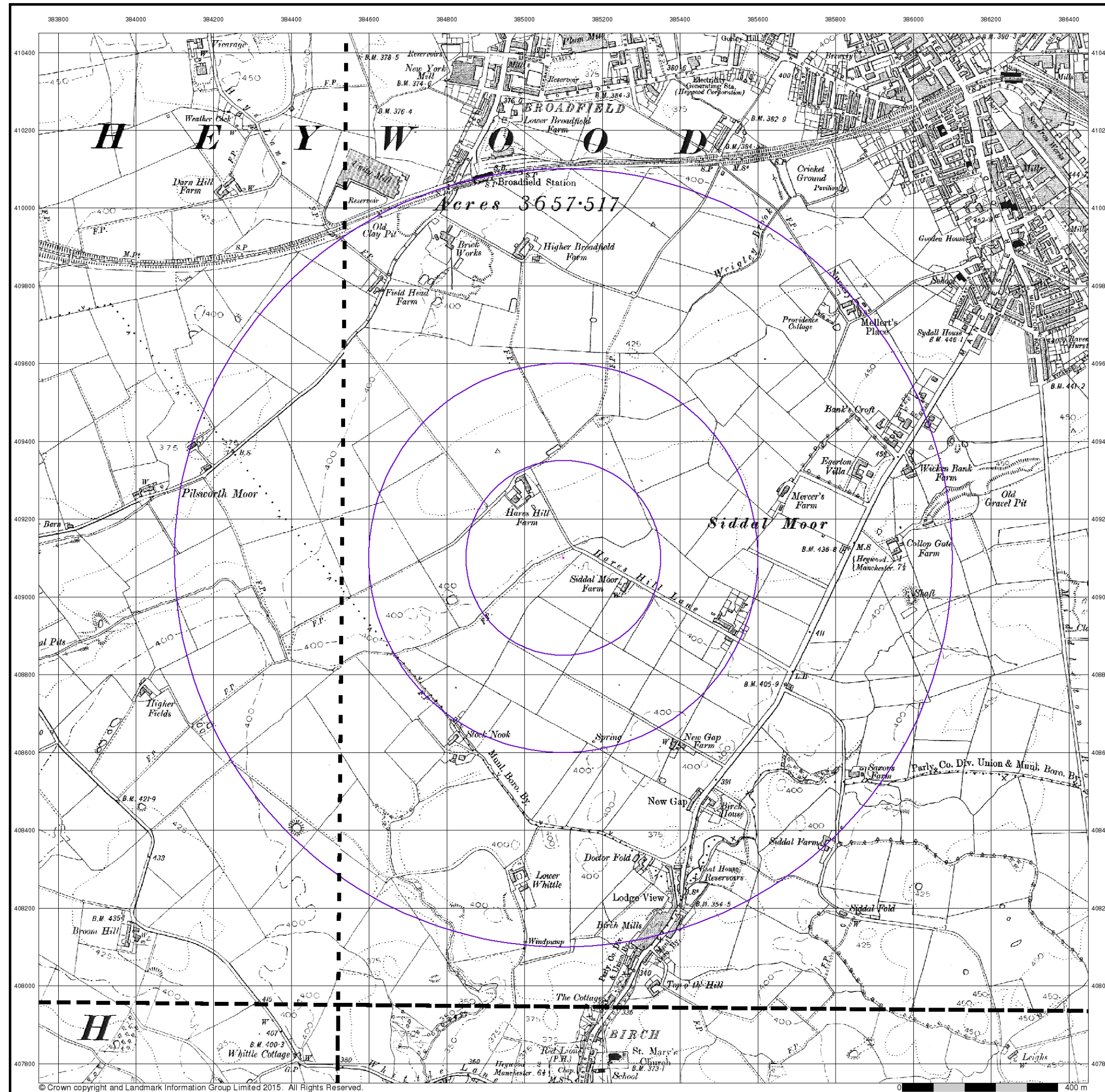
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National Grid Reference: 385100, 409100
Slice: A
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Lancashire And Furness

Published 1910

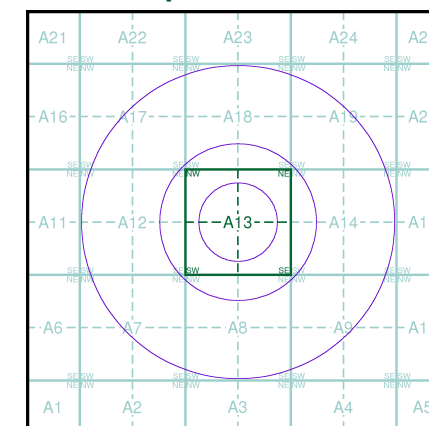
Source map scale - 1:10,560

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

Map Name(s) and Date(s)

088SW 1910 1:10,560	088SE 1910 1:10,560
096NW 1910 1:10,560	096NE 1910 1:10,560

Historical Map - Slice A



Order Details

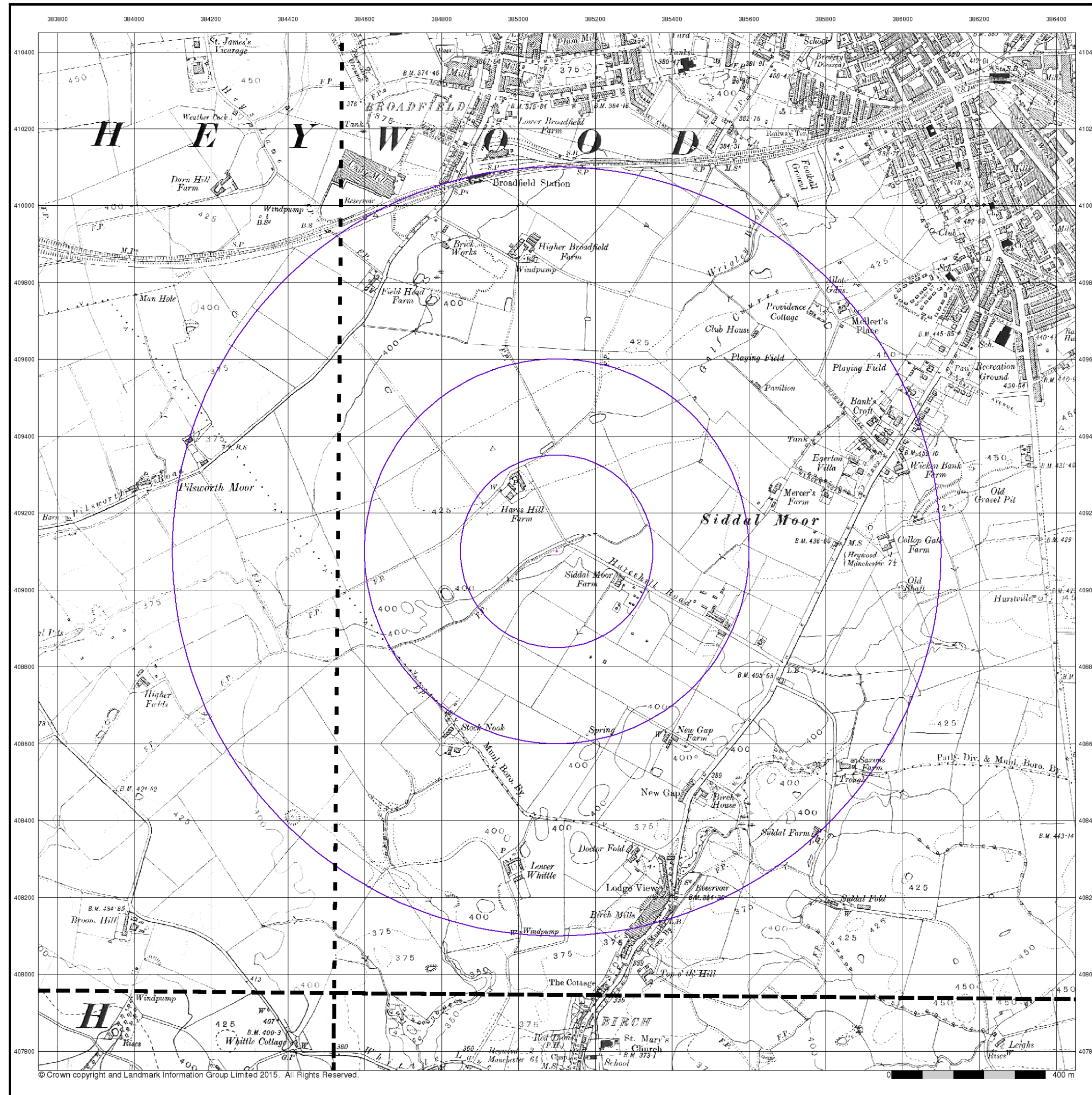
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Lancashire And Furness

Published 1923 - 1932

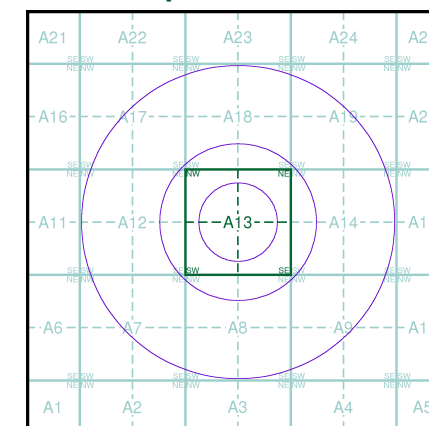
Source map scale - 1:10,560

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

Map Name(s) and Date(s)

088SW 1931 1:10,560	088SE 1932 1:10,560
096NW 1923 1:10,560	096NE 1923 1:10,560

Historical Map - Slice A



Order Details

Order Number: 91713737_1_1
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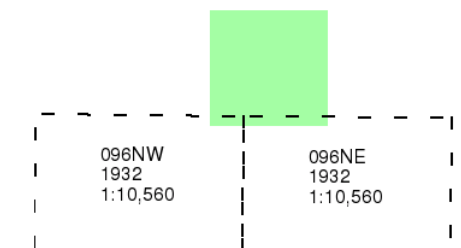
Lancashire And Furness

Published 1932

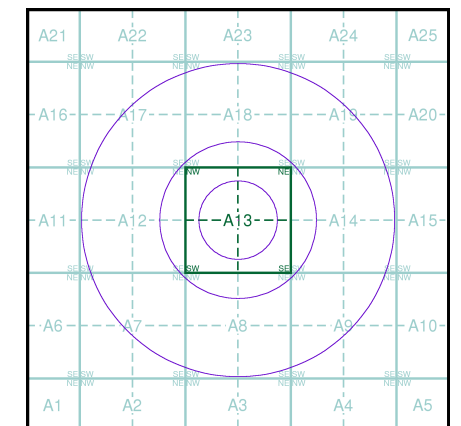
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

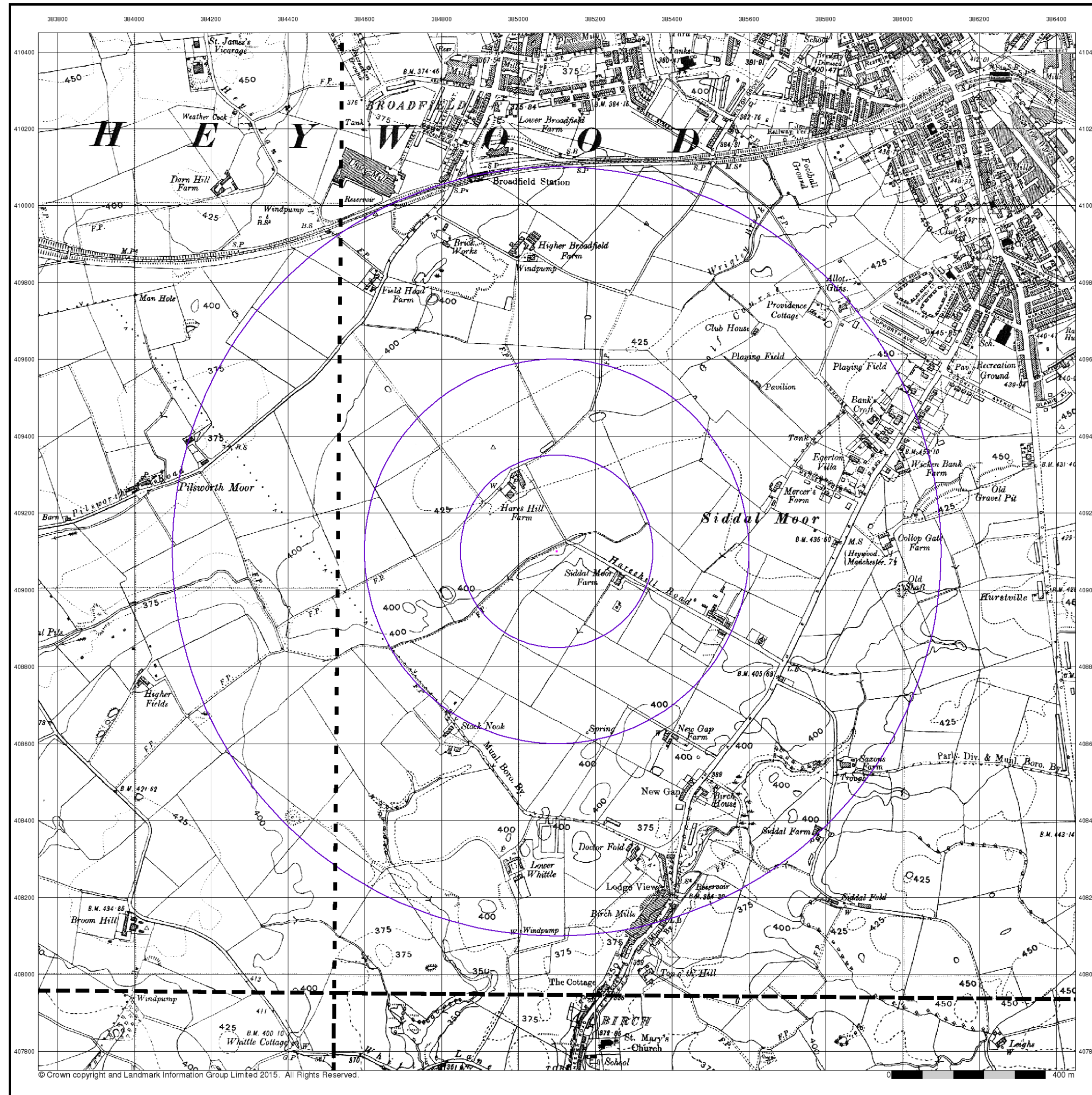
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Slice: A
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Search Buffer (m): 1000

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Lancashire And Furness

Published 1938

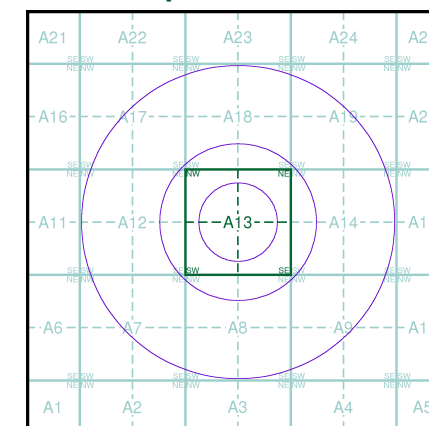
Source map scale - 1:10,560

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

Map Name(s) and Date(s)

088SW 1938 1:10,560	088SE 1938 1:10,560
096NW 1938 1:10,560	096NE 1938 1:10,560

Historical Map - Slice A



Order Details

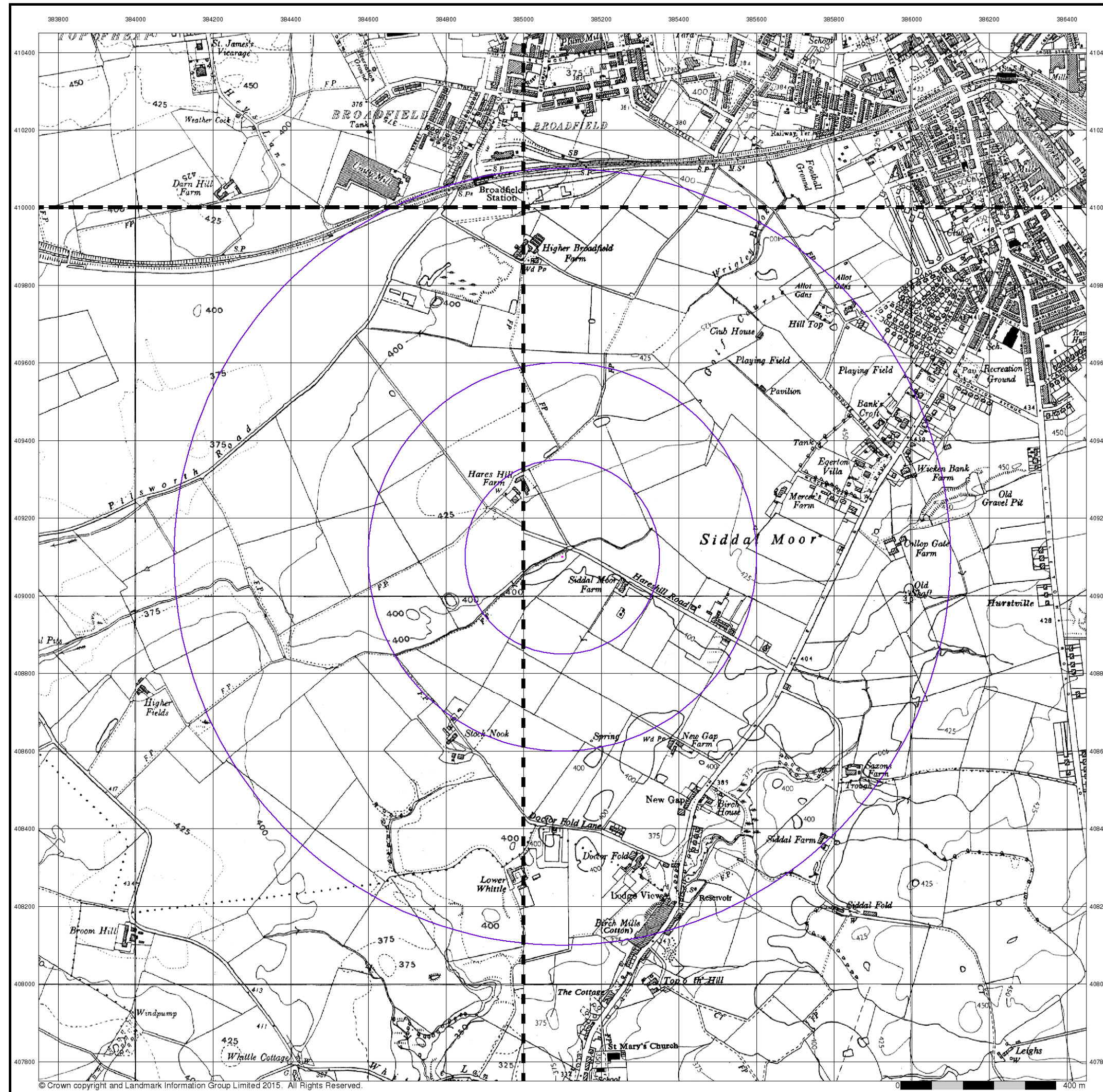
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National Grid Reference: 385100, 409100
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Search Buffer (m): 1000

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Ordnance Survey Plan

Published 1955 - 1956

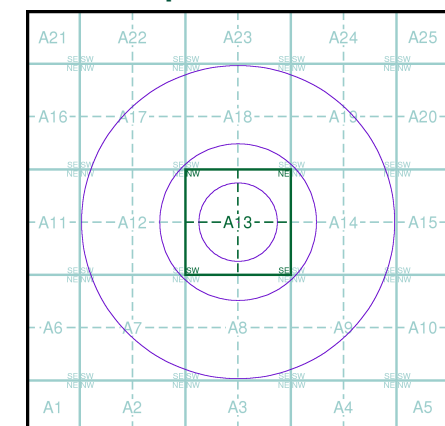
Source map scale - 1:10,000

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

Map Name(s) and Date(s)

SD81SW	SD81SE
1956	1956
1:10,560	1:10,560
SD80NW	SD80NE
1955	1956
1:10,560	1:10,560

Historical Map - Slice A



Order Details

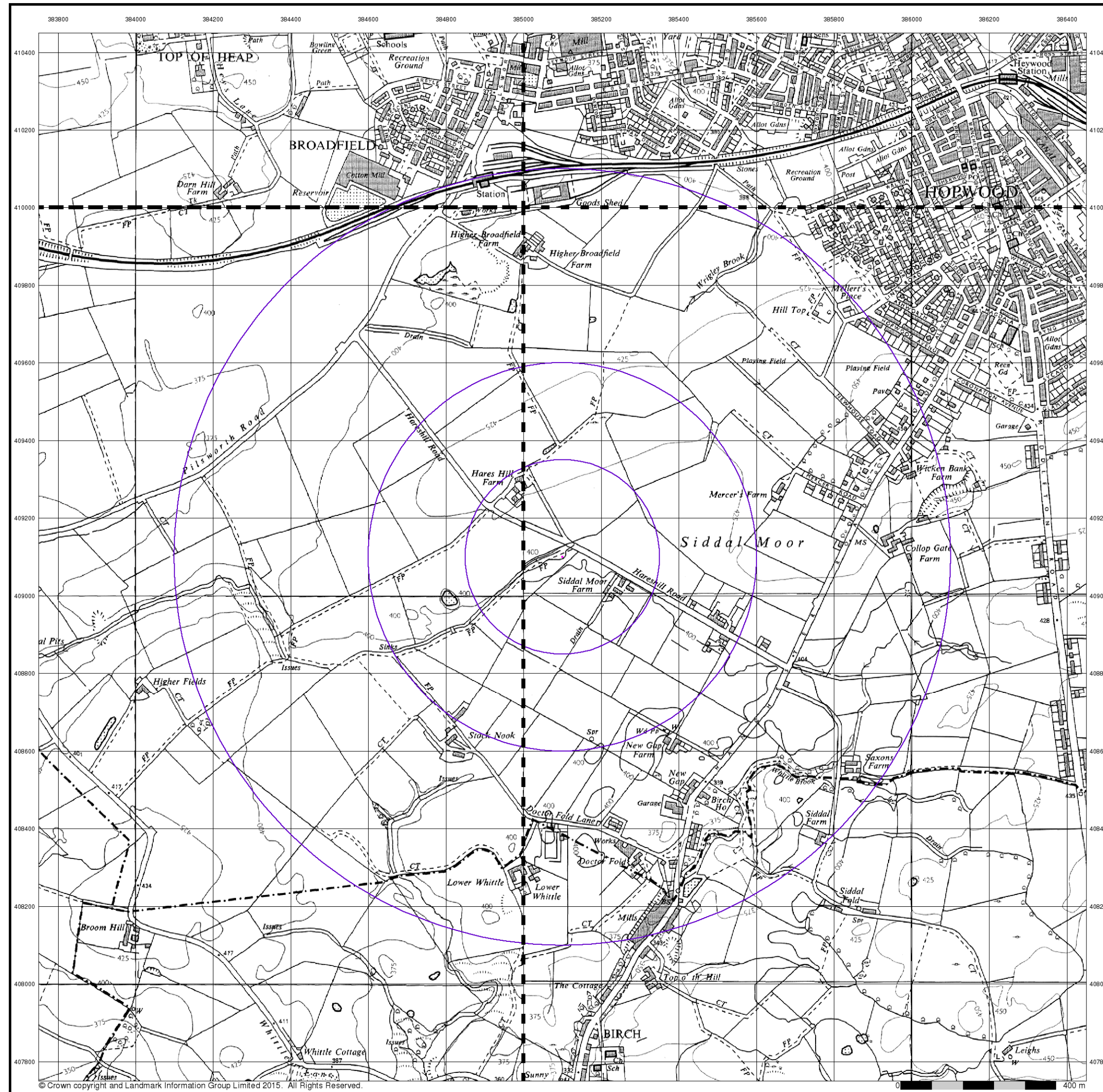
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Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
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Search Buffer (m): 1000

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Ordnance Survey Plan

Published 1965 - 1968

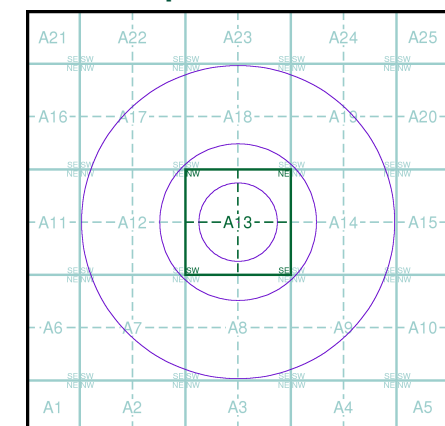
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps.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

Map Name(s) and Date(s)

SD81SW	SD81SE
1967	1968
1:10,560	1:10,560
SD80NW	SD80NE
1965	1965
1:10,560	1:10,560

Historical Map - Slice A



Order Details

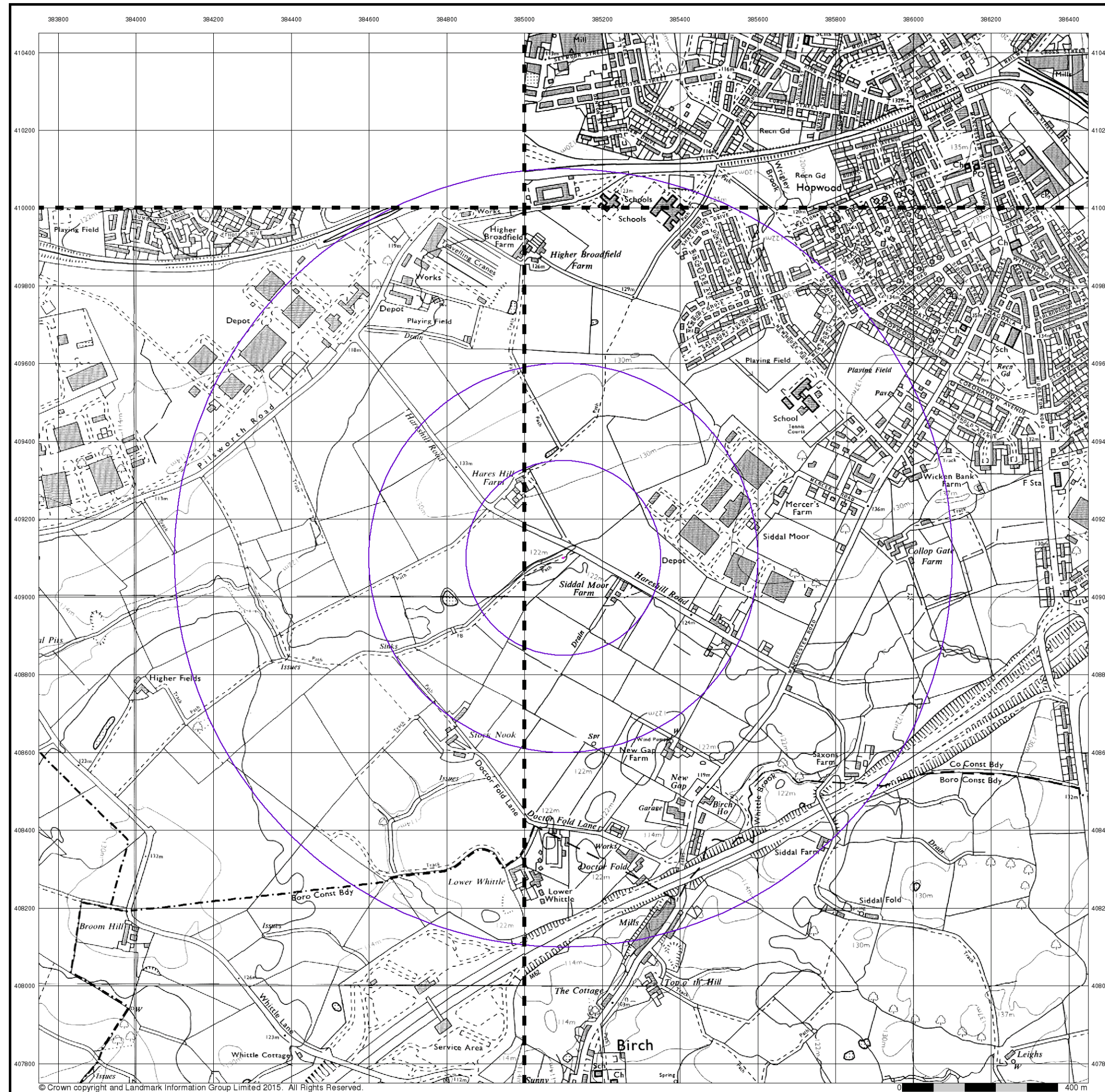
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National Grid Reference: 385100, 409100
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Ordnance Survey Plan

Published 1974 - 1977

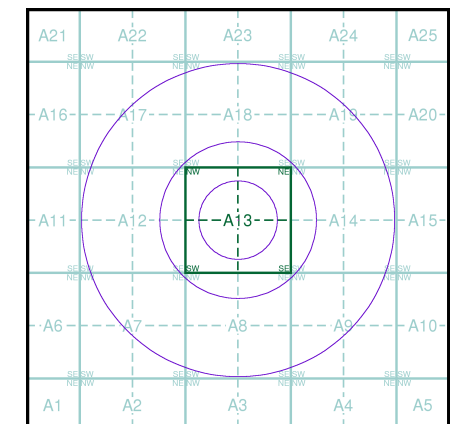
Source map scale - 1:10,000

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

Map Name(s) and Date(s)

SD81SE	1977	1:10,000
SD80NW	1974	1:10,000
SD80NE	1977	1:10,000

Historical Map - Slice A



Order Details

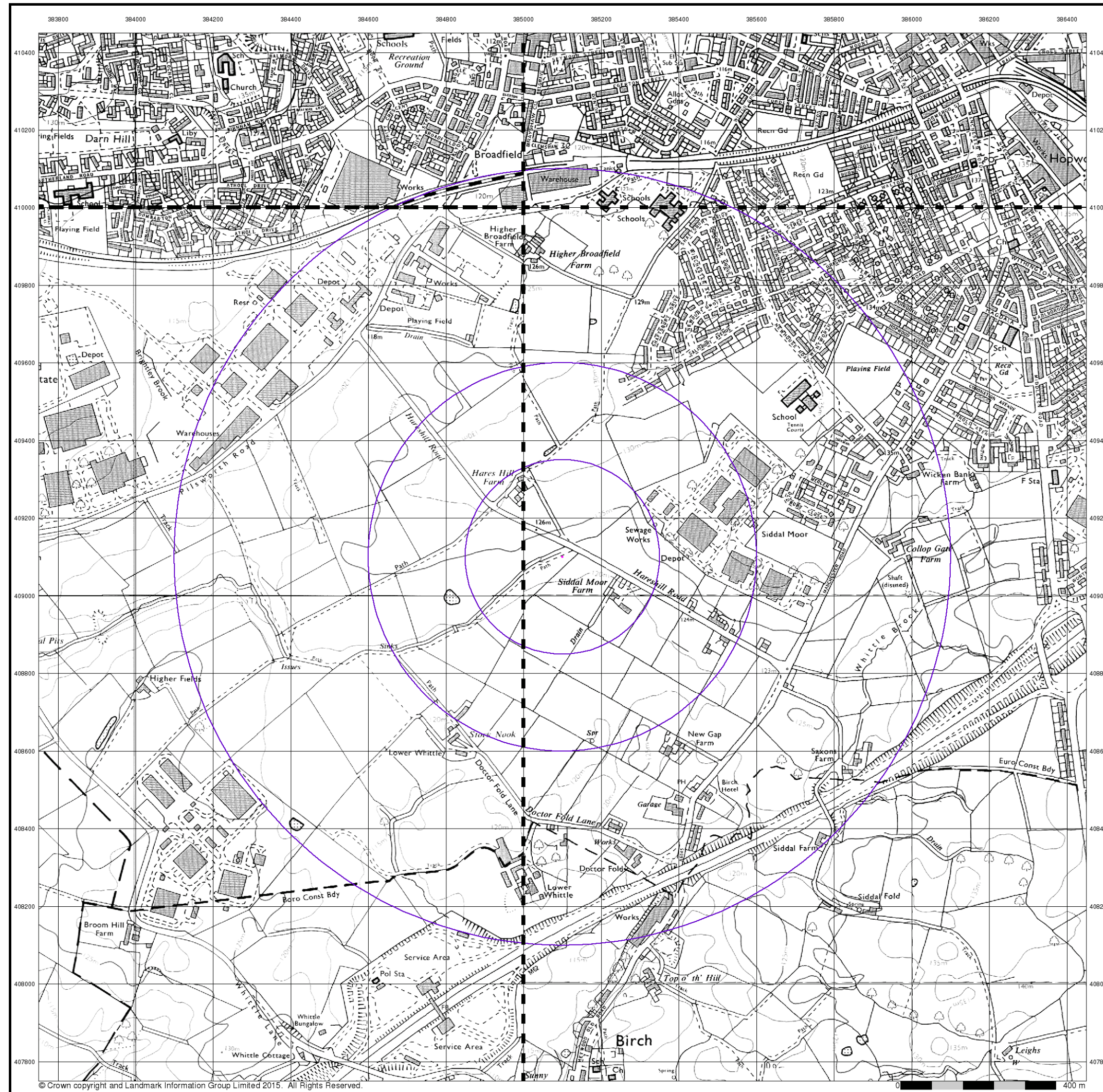
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
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Site Area (Ha): 0.01
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Ordnance Survey Plan

Published 1983 - 1988

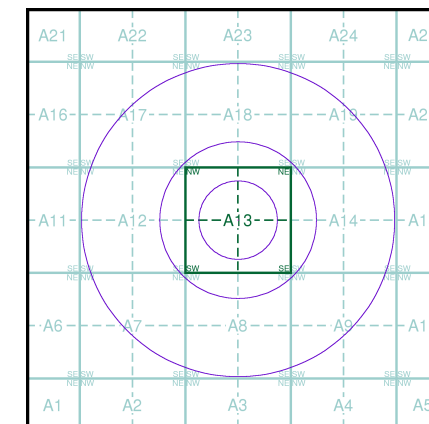
Source map scale - 1:10,000

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

Map Name(s) and Date(s)

SD81SW	SD81SE
1984	1988
1:10,000	1:10,000
SD80NW	SD80NE
1983	1984
1:10,000	1:10,000

Historical Map - Slice A



Order Details

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National Grid Reference: 385100, 409100
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Search Buffer (m): 1000

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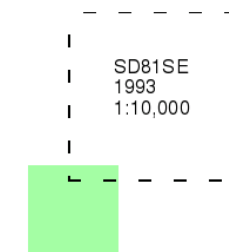
Ordnance Survey Plan

Published 1993

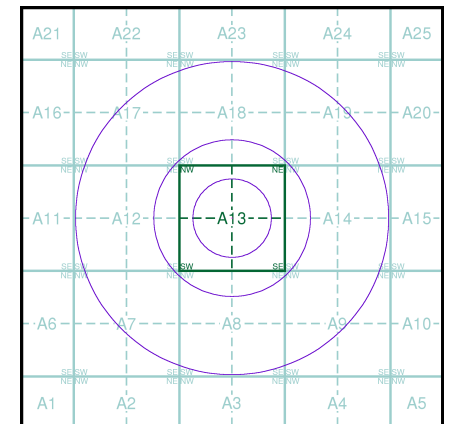
Source map scale - 1:10,000

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

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Slice: A
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10k Raster Mapping

Published 1999

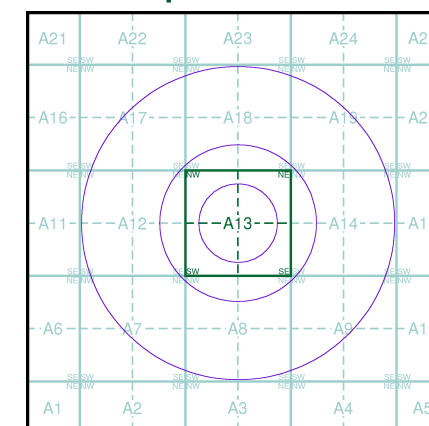
Source map scale - 1:10,000

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

Map Name(s) and Date(s)

SD81SW	SD81SE
1999	1999
1:10,000	1:10,000
SD80NW	SD80NE
1999	1999
1:10,000	1:10,000

Historical Map - Slice A



Order Details

Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

Site at 385100, 409100



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Street View

Published 2016

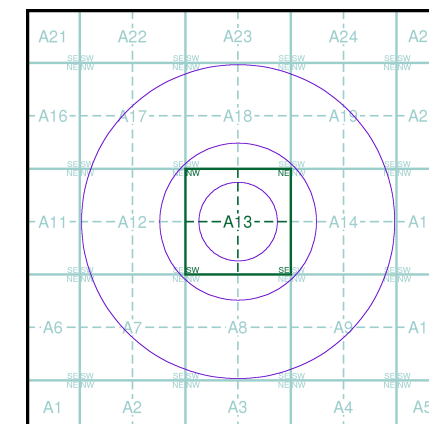
Source map scale - 1:10,000

Street View is a street-level map for the whole of Great Britain produced by the Ordnance Survey. These maps are provided at a nominal scale of 1:10,000

Map Name(s) and Date(s)

SD81SW 2016 1:10,000	SD81SE 2016 1:10,000
SD80NW 2016 1:10,000	SD80NE 2016 1:10,000

Street View Map - Slice A



Order Details

Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 1000

Site Details

Site at 385100, 409100



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Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



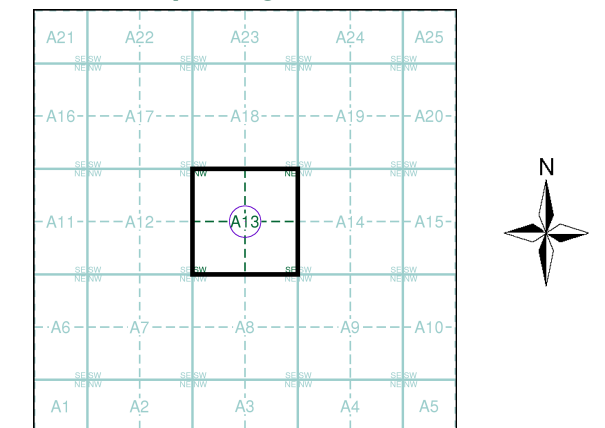
Large-Scale National Grid Data 1:2,500 and 1:1,250



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:2,500	1893	2
Lancashire And Furness	1:2,500	1910	3
Lancashire And Furness	1:2,500	1929	4
Lancashire And Furness	1:2,500	1937	5
Ordnance Survey Plan	1:1,250	1956	6
Ordnance Survey Plan	1:2,500	1956 - 1957	7
Ordnance Survey Plan	1:2,500	1969 - 1981	8
Additional SIMs	1:1,250	1977 - 1983	9
Large-Scale National Grid Data	1:1,250	1992	10
Large-Scale National Grid Data	1:2,500	1992	11

Historical Map - Segment A13



Order Details

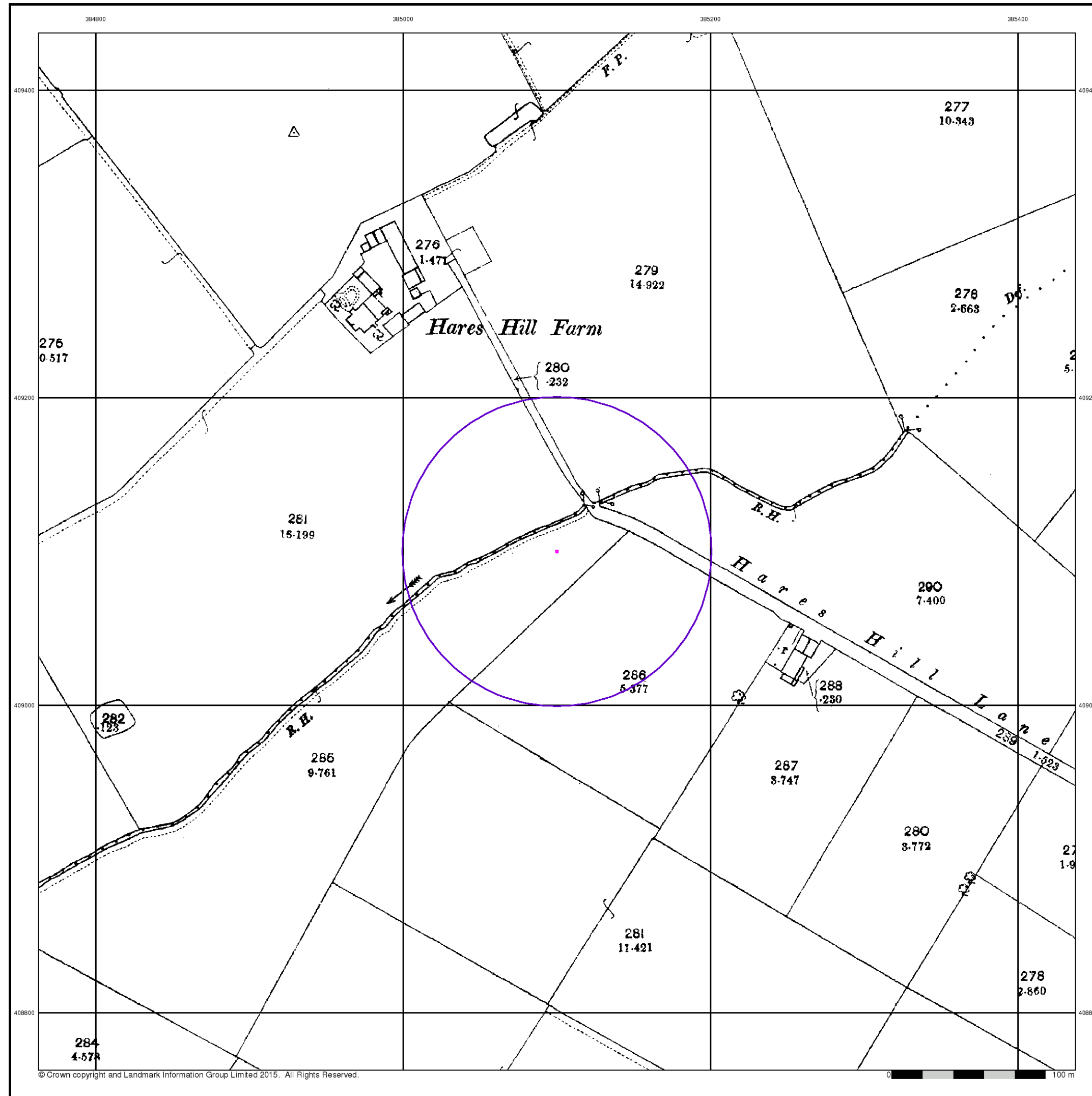
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Site at 385100, 409100



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Fax: 0844 844 9951
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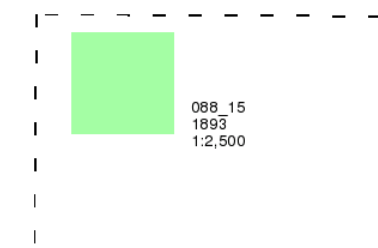
Lancashire And Furness

Published 1893

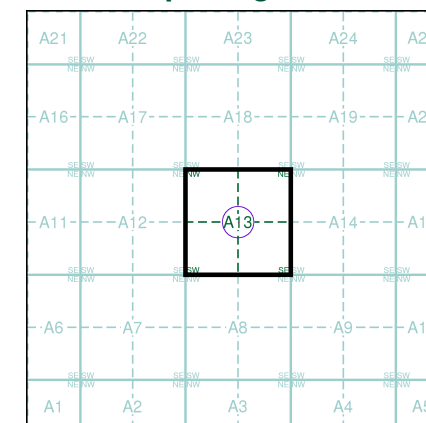
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

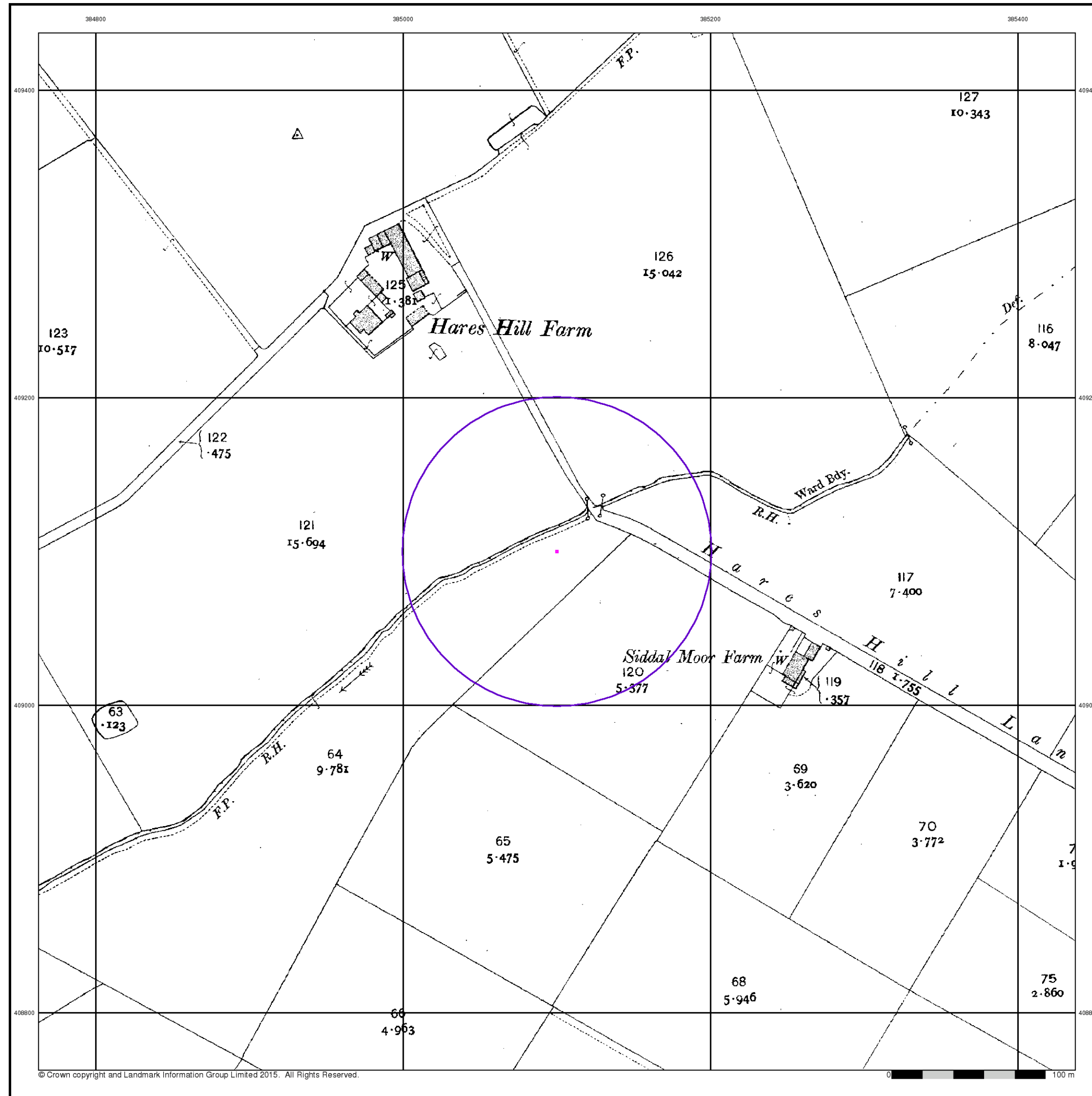
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Site at 385100, 409100



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Fax: 0844 844 9951
Web: www.envirocheck.co.uk



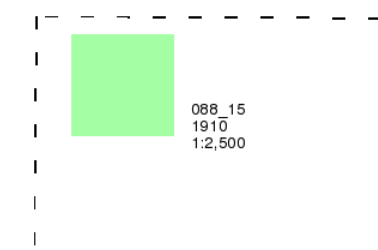
Lancashire And Furness

Published 1910

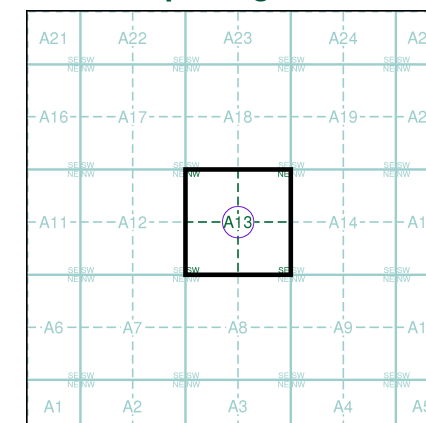
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

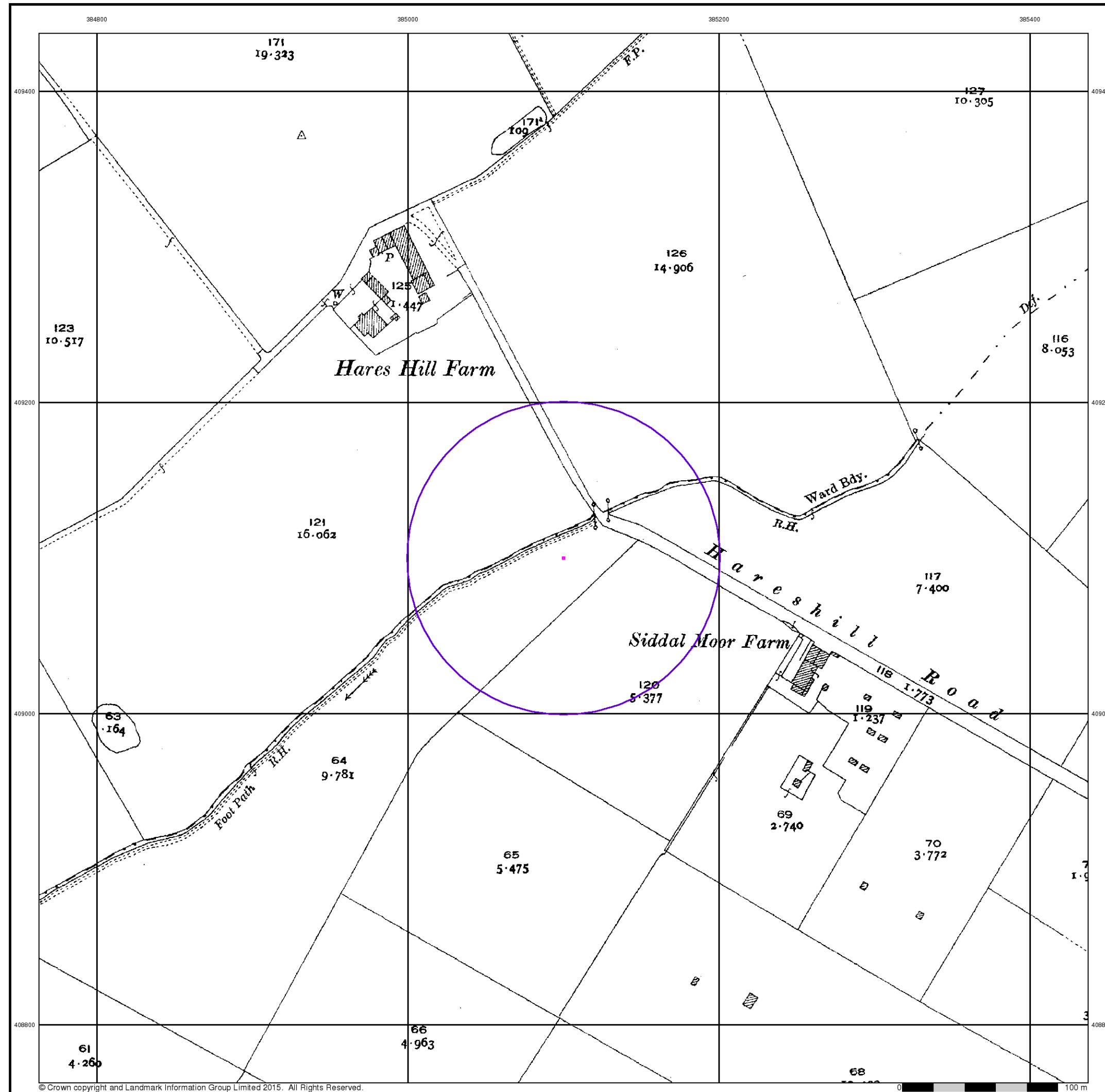
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Site at 385100, 409100



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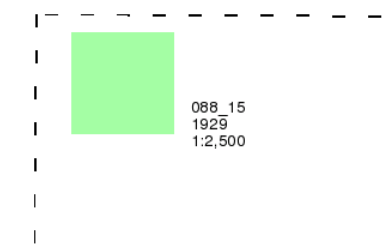
Lancashire And Furness

Published 1929

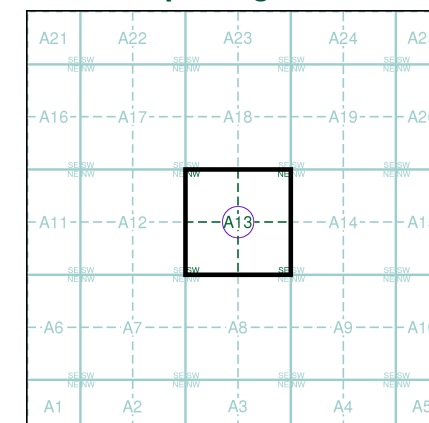
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

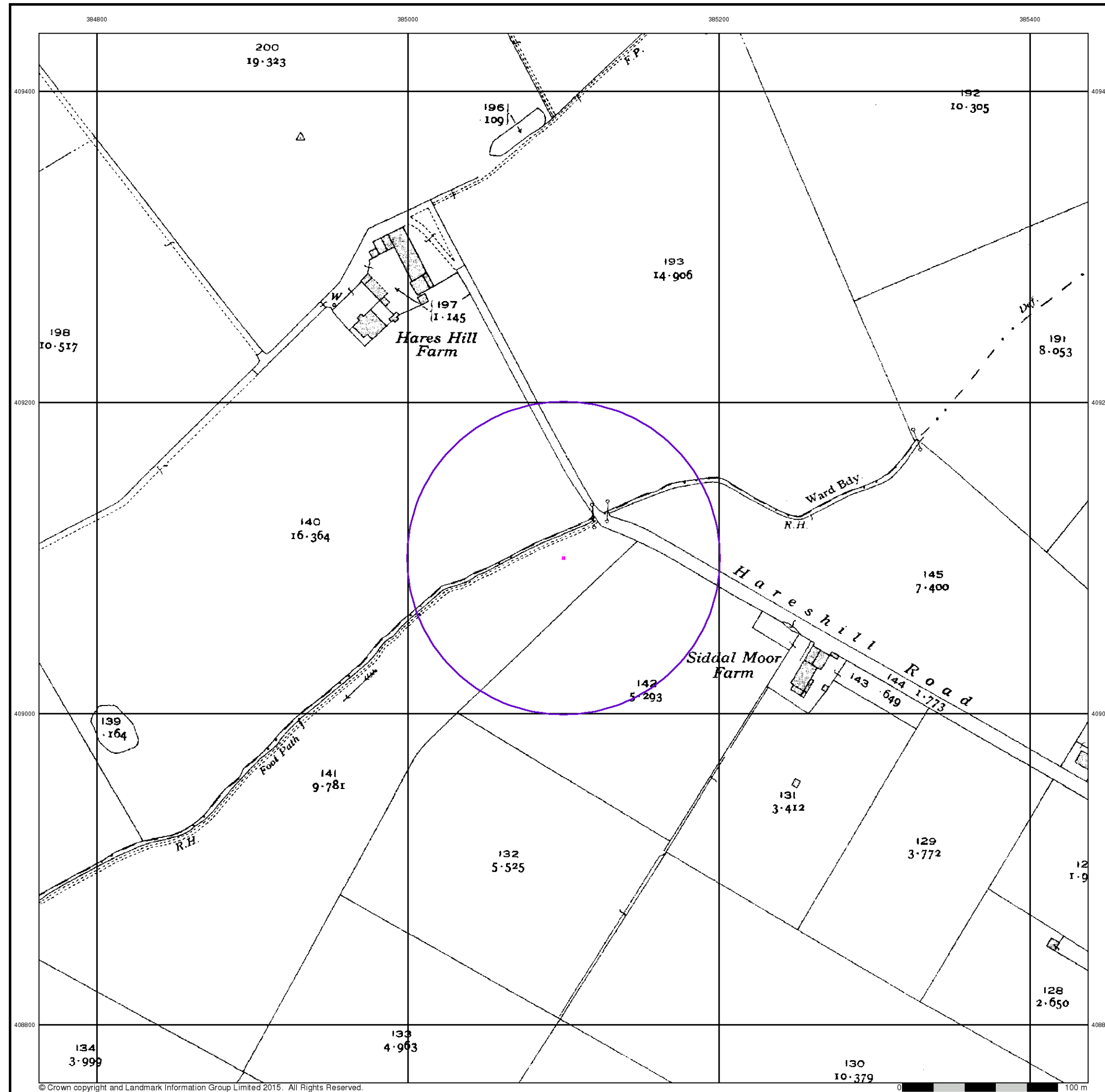
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Site at 385100, 409100



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Web: www.envirocheck.co.uk



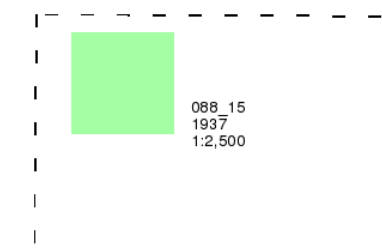
Lancashire And Furness

Published 1937

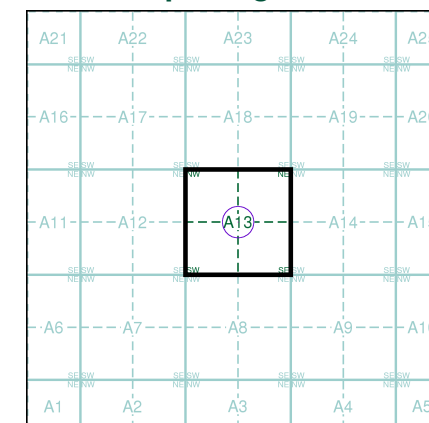
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Site at 385100, 409100



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Fax: 0844 844 9951
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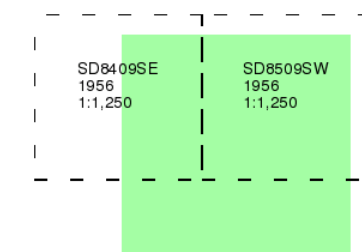
Ordnance Survey Plan

Published 1956

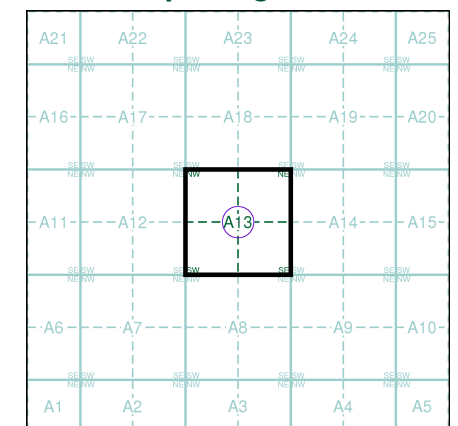
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

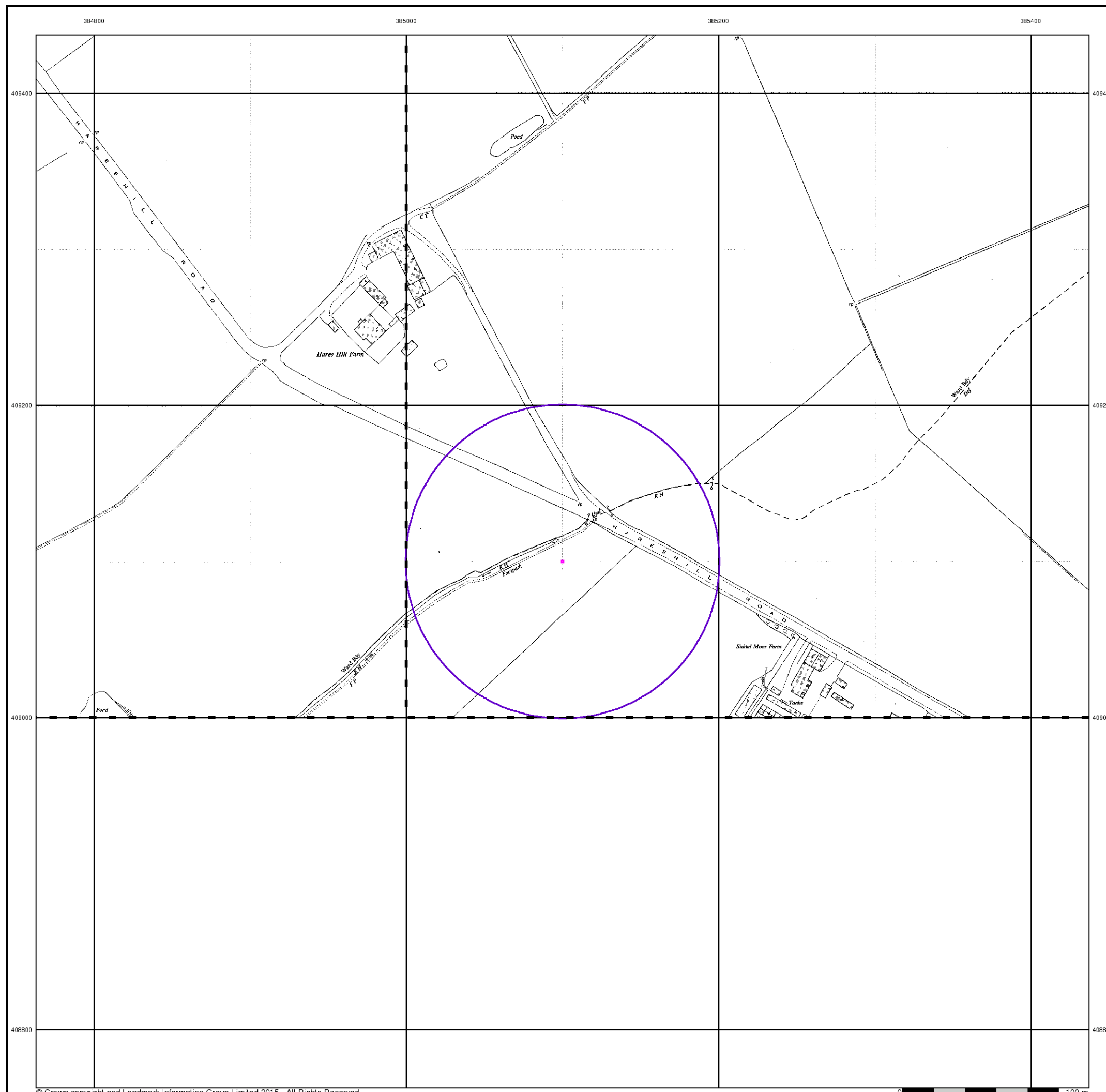
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

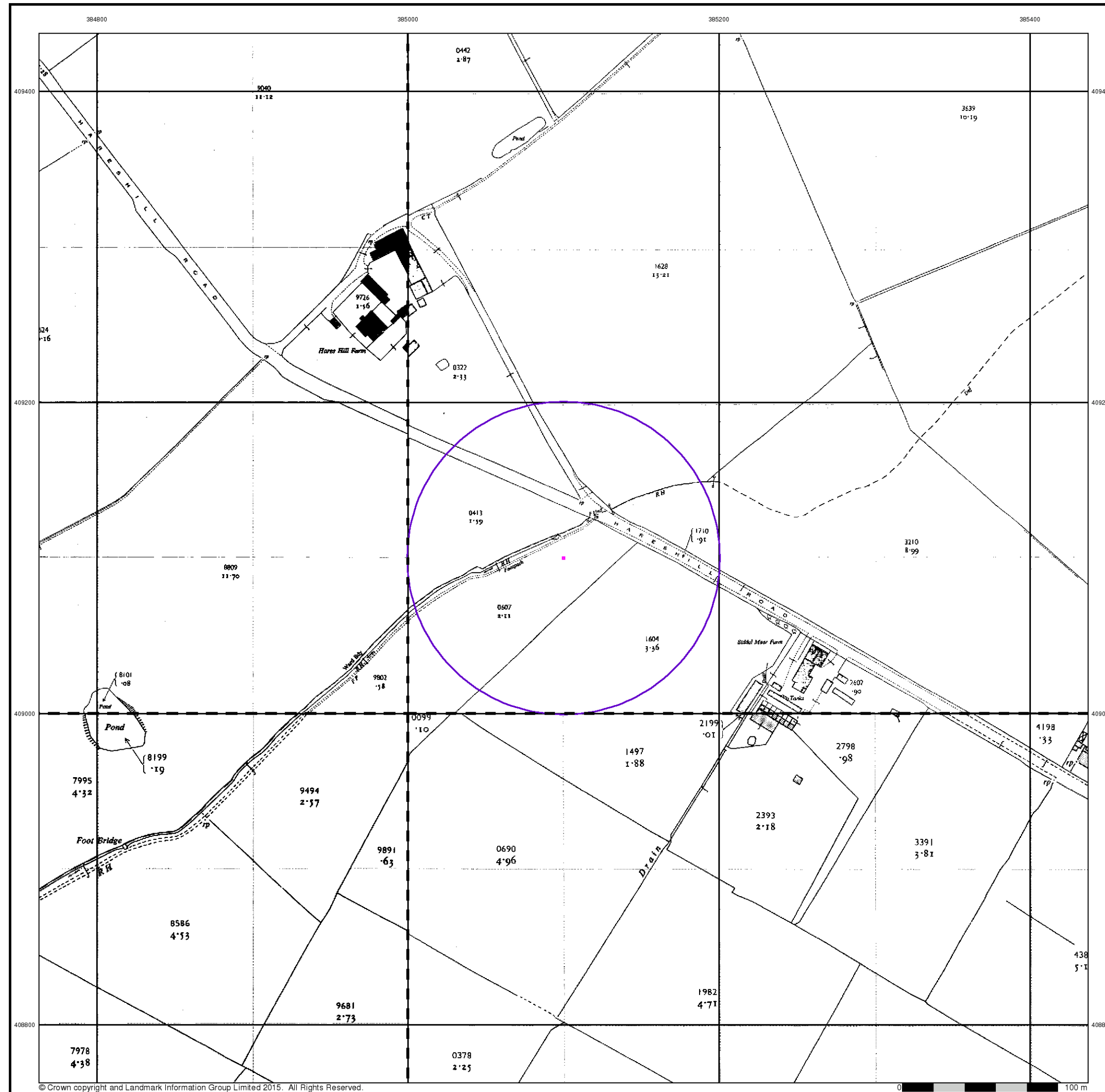
Site Details

Site at 385100, 409100



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Ordnance Survey Plan

Published 1956 - 1957

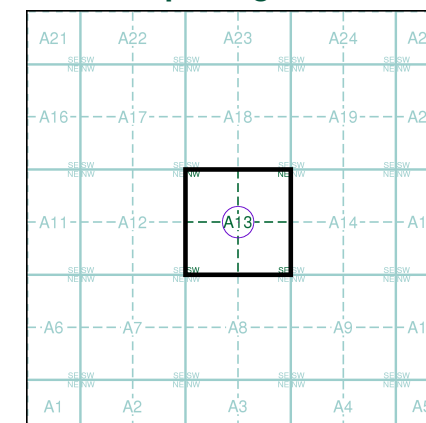
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SD8409 1957 1:2,500	SD8509 1957 1:2,500
SD8408 1956 1:2,500	SD8508 1956 1:2,500

Historical Map - Segment A13



Order Details

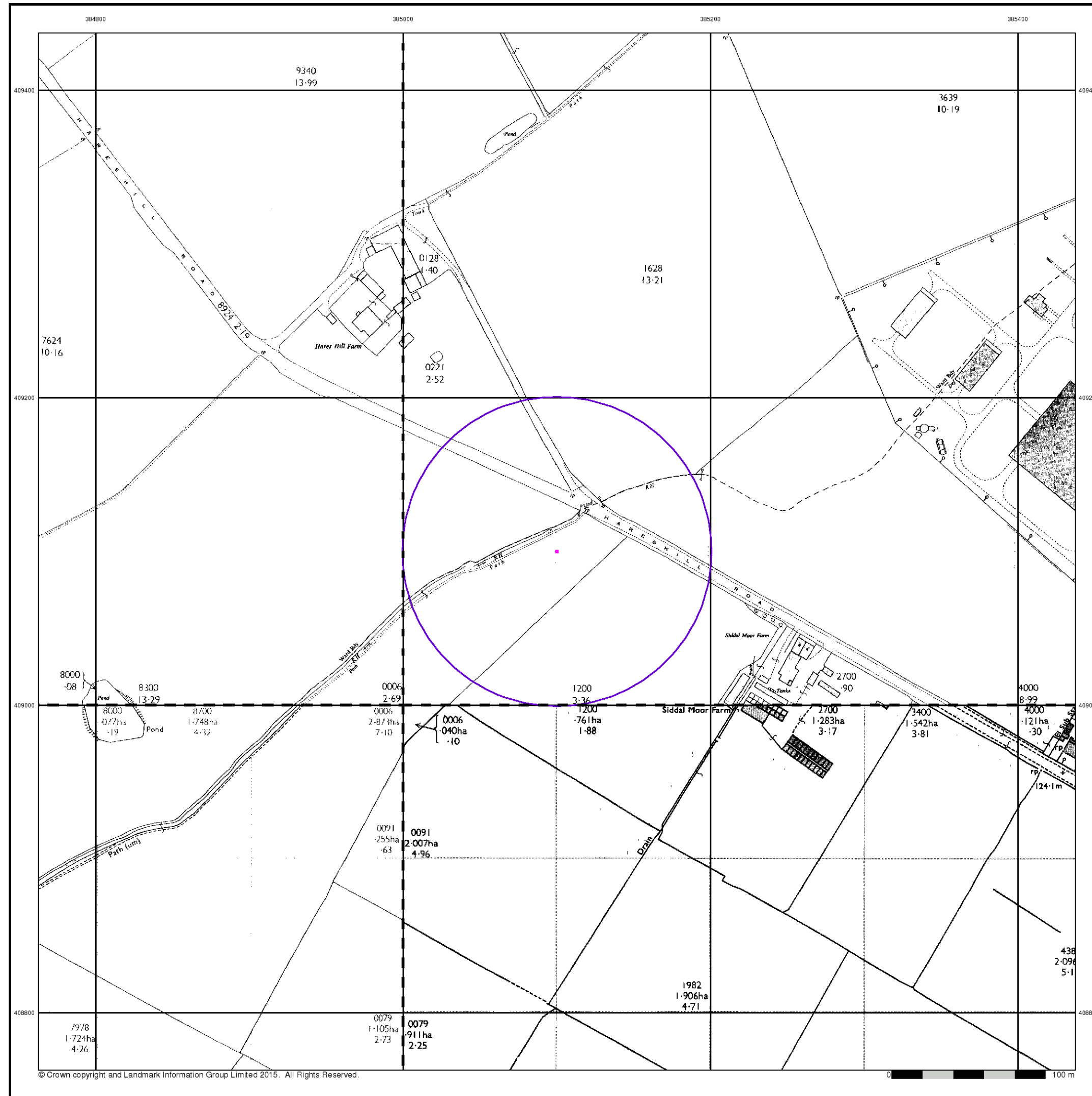
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Site at 385100, 409100



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Ordnance Survey Plan

Published 1969 - 1981

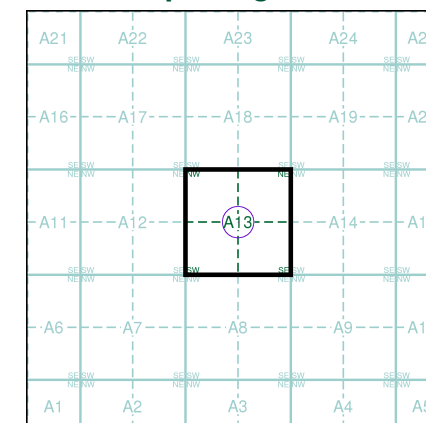
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SD8409 1969 12,500	SD8509 1969 12,500
SD8408 1981 12,500	SD8508 1977 12,500

Historical Map - Segment A13



Order Details

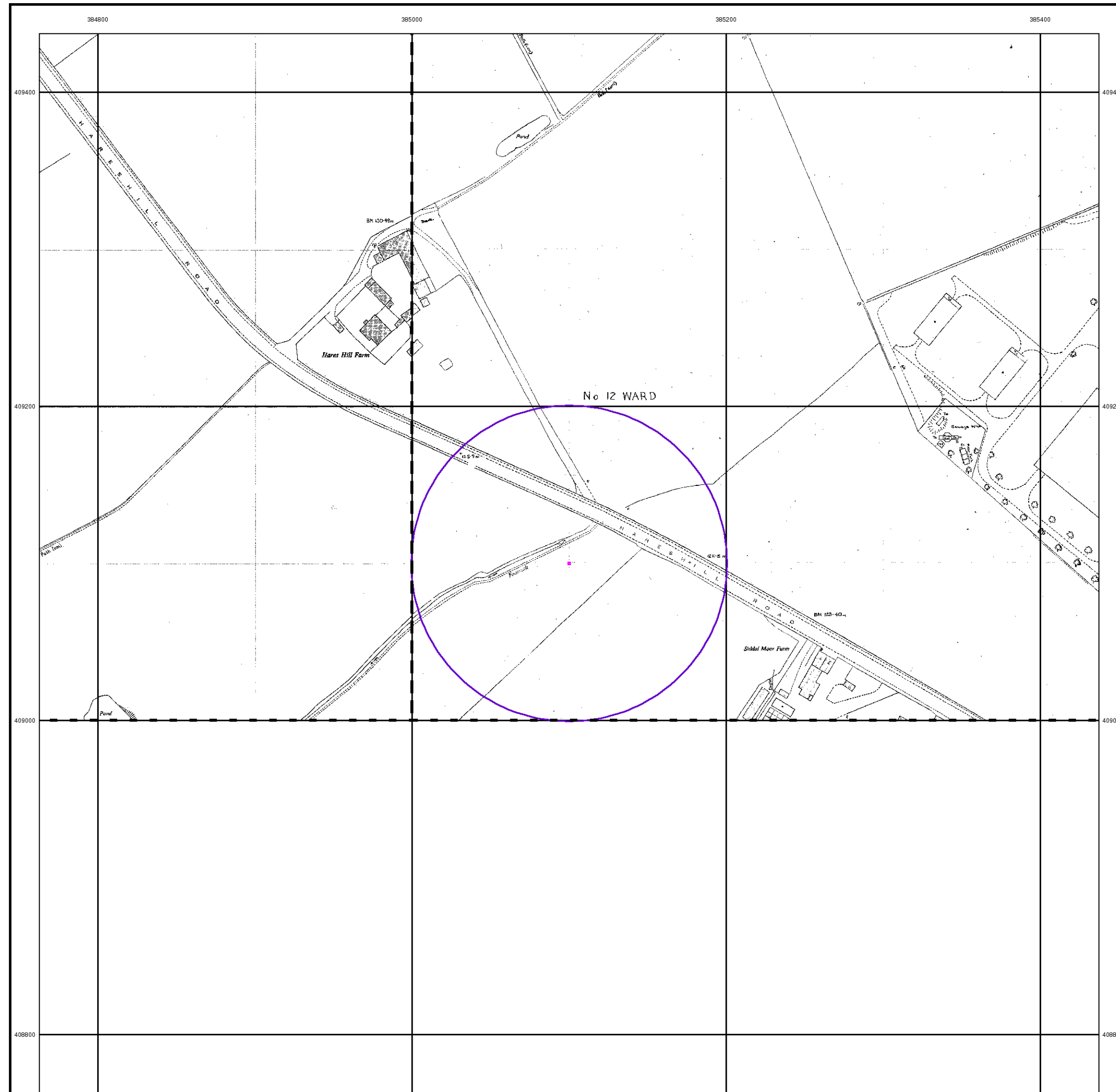
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Site at 385100, 409100



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Additional SIMs

Published 1977 - 1983

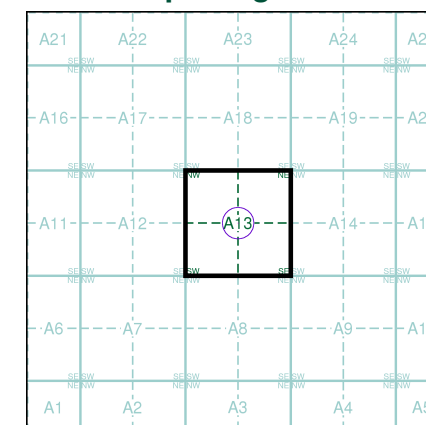
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SD8409SE 1983 1:1,250	SD8509SW 1977 1:1,250
-----------------------------	-----------------------------

Historical Map - Segment A13



Order Details

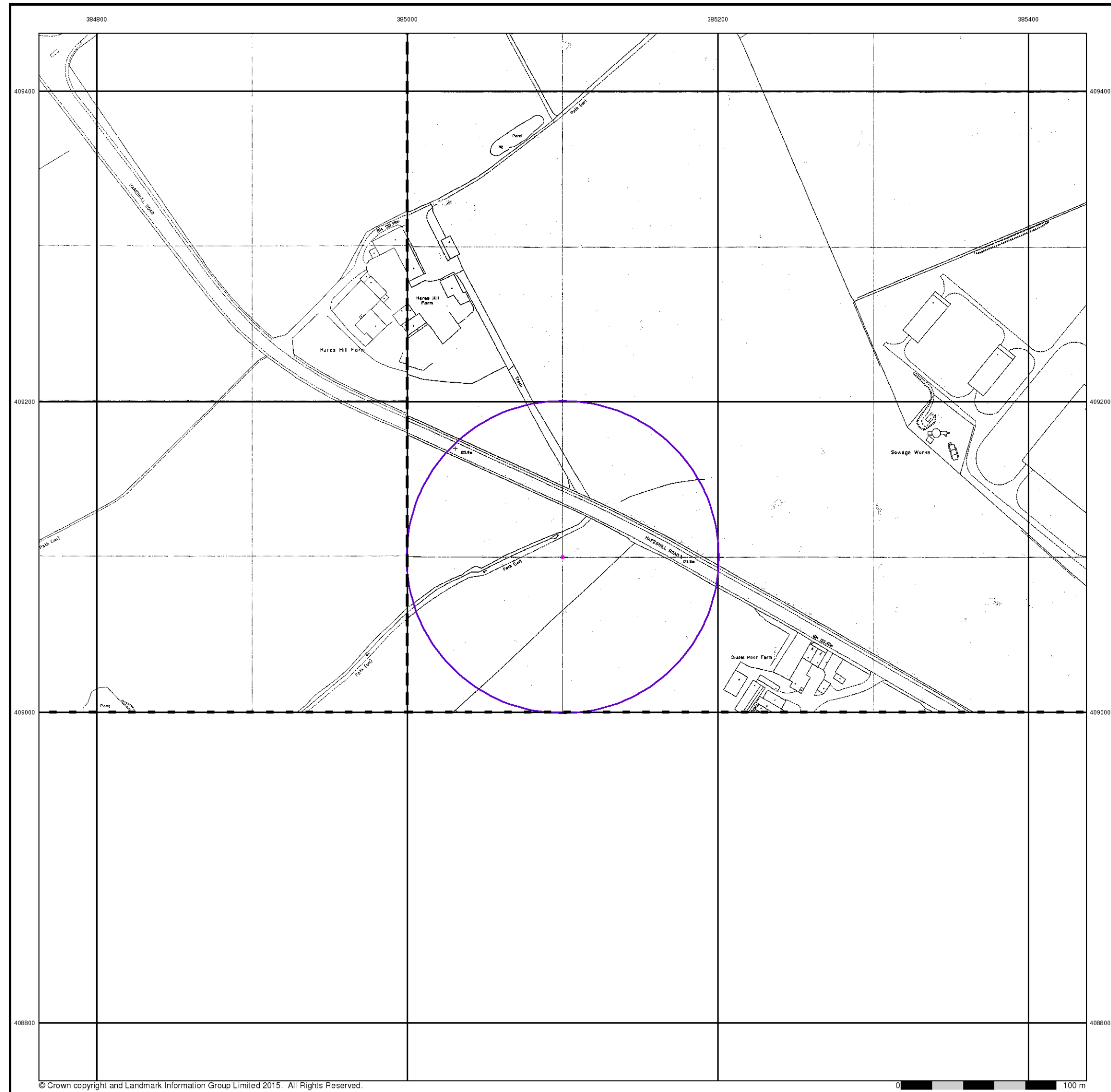
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Site at 385100, 409100



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Large-Scale National Grid Data

Published 1992

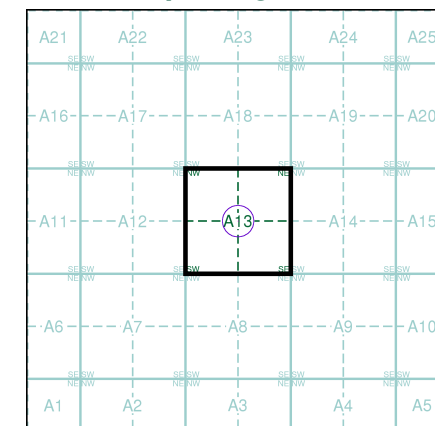
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SD8409SE 1992 1:1,250	SD8509SW 1992 1:1,250
-----------------------------	-----------------------------

Historical Map - Segment A13



Order Details

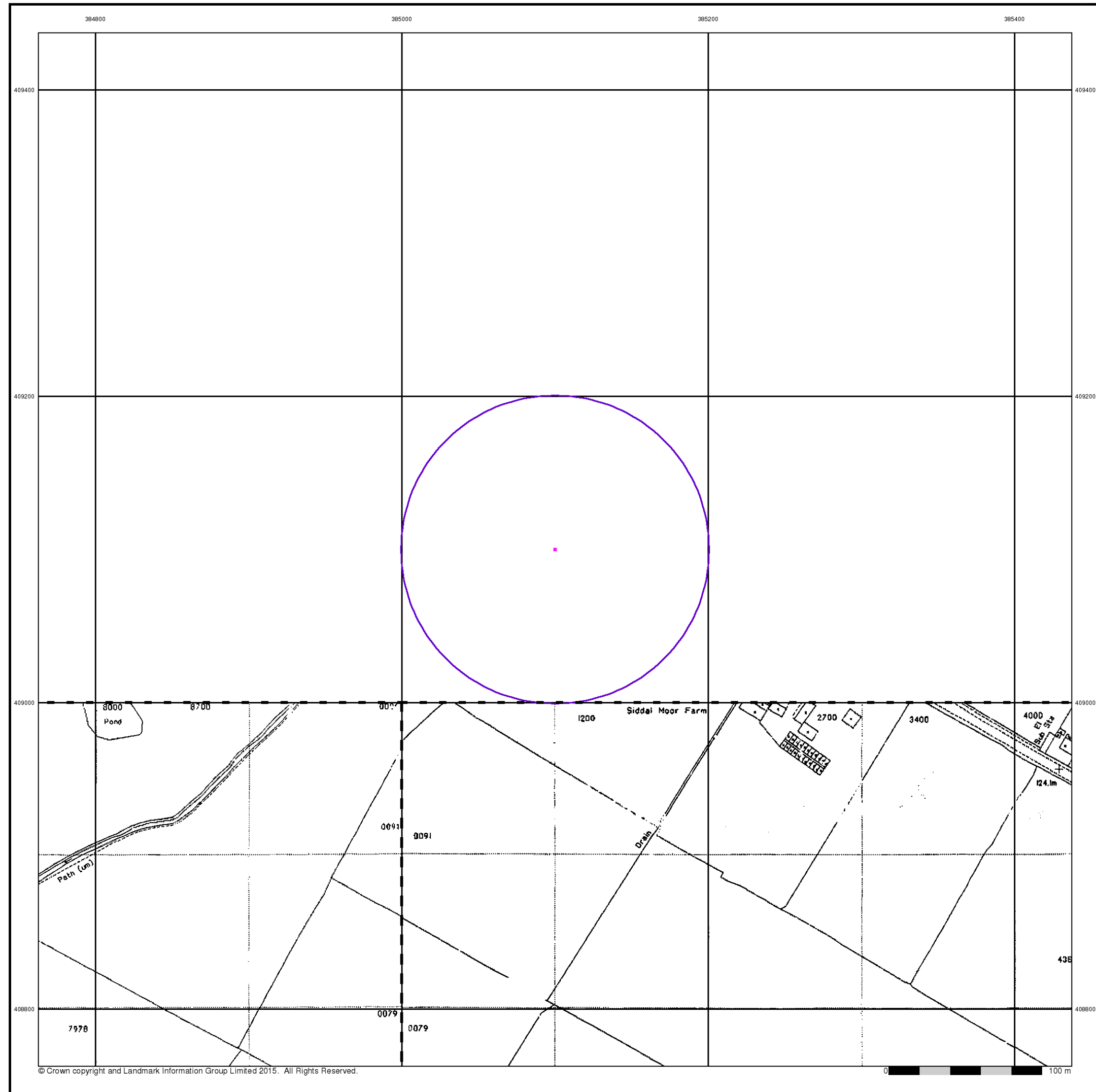
Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Site at 385100, 409100



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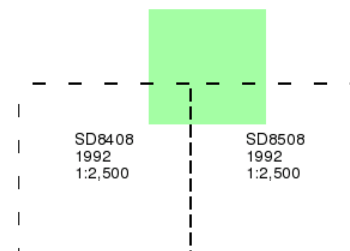
Large-Scale National Grid Data

Published 1992

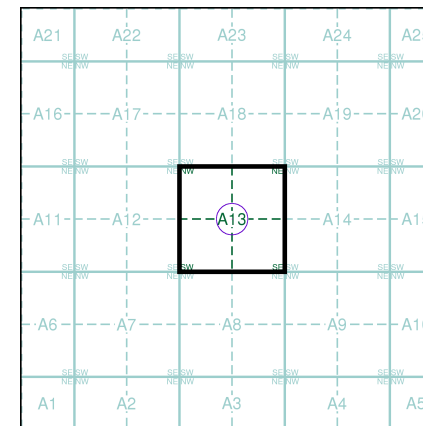
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 91713737_1_1
Customer Ref: 11094/4094/AG
National Grid Reference: 385100, 409100
Slice: A
Site Area (Ha): 0.01
Search Buffer (m): 100

Site Details

Site at 385100, 409100



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Web: www.envirocheck.co.uk

Appendix VII: Exploratory Hole Logs



Project Name: Phase 3	Project No. 13222	Co-ords: 385212.49 - 409430.63 Level: 130.50	Date 29/04/2019
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Location: South Heywood	Dimensions (m): 2.00	Scale 1:24
Client: Russell Homes		Depth 1.50 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	130.20		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	121				Stiff high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone.	1
	1.00 1.00	ES HVP	112					
	1.50	HVP	121	1.50	129.00		End of Pit at 1.50m	2
								3
								4
								5

Remarks: Terminated on very stiff clay.

Stability: Stable.

Trial Pit Log

TrialPit No
TP103
Sheet 1 of 1

Project Name: Phase 3 Project No. 13222 Co-ords: 385165.96 - 409425.45 Date 29/04/2019
Level: 130.94

Location: South Heywood Dimensions (m): 2.00 Scale 1:24

Client: Russell Homes Depth 1.70 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30			0.30	130.64		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	93				Stiff high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone	
	0.80			0.80	130.14		Stiff orange mottled grey gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone	1
	1.20	ES						
	1.70			1.70	129.24		End of Pit at 1.70m	2
								3
								4
								5

Remarks: Terminated on weathered bedrock.

Stability: Stable.

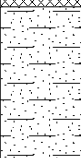
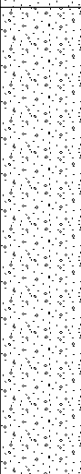
Trial Pit Log

TrialPit No
TP104
Sheet 1 of 1

Project Name: Phase 3 Project No. 13222 Co-ords: 385193.53 - 409400.27 Date 29/04/2019
Level: 130.97

Location: South Heywood Dimensions (m): 2.00 Scale 1:24

Client: Russell Homes Depth 2.30 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30	130.67		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
							Orange slightly clayey gravelly fine to medium SAND. Gravel is fine to medium angular to rounded of sandstone and mudstone.	
	1.00	ES		0.80	130.17		Orange gravelly fine to medium SAND. Gravel is fine to medium angular to rounded of sandstone and mudstone.	1
				2.30	128.67		End of Pit at 2.30m	2
								3
								4
								5

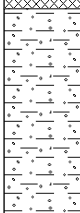
Remarks: Terminated on weathered bedrock.

Stability: Stable.

Trial Pit Log

TrialPit No
TP105
Sheet 1 of 1

Project Name: Phase 3	Project No. 13222	Co-ords: 385133.86 - 409401.01 Level: 130.95	Date 29/04/2019
Location: South Heywood		Dimensions (m): 2.00 Depth 2.00	Scale 1:24
Client: Russell Homes			Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	130.65		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	1
	0.60	HVP	56				Firm to stiff medium to high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone coal and sandstone	
	1.00	ES						
	1.00	HVP	126					
	1.40	HVP	133					
				2.00	128.95			2
								3
								4
								5

Trial Pit Log

TrialPit No
TP106
Sheet 1 of 1

Project Name: Phase 3

Project No.
13222

Co-ords: 385104.71 - 409364.53
Level: 132.18

Date
29/04/2019

Location: South Heywood

Dimensions (m): 2.00

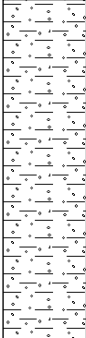
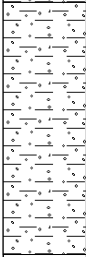
Scale
1:24

Client: Russell Homes

Depth
2.20

0.60

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
 0.60	0.10	ES		0.30	131.88		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.
				1.40	130.78		Stiff orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone
				2.20	129.98		Stiff grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone
							End of Pit at 2.20m

Remarks: Terminated on very stiff clay.

Stability: Stable.



e3p

Trial Pit Log

TrialPit No
TP107
Sheet 1 of 1

Project Name: Phase 3

Project No.
13222Co-ords: 385082.85 - 409310.75
Level: 131.23Date
29/04/2019

Location: South Heywood

Dimensions (m): 2.00

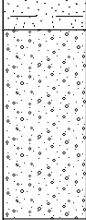
Scale
1:24

Client: Russell Homes

Depth
1.30

0.60

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30	130.93		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
				0.70	130.53		Orange slightly clayey gravelly fine to medium SAND. Gravel is fine to medium angular to rounded of sandstone and mudstone.	
	1.00	ES		1.30	129.93		Orange sandy GRAVEL. Gravel is fine to coarse angular to sub-rounded of sandstone.	1
							End of Pit at 1.30m	2
								3
								4
								5

Remarks: Terminated on weathered bedrock.

Stability: Stable.





Trial Pit Log

TrialPit No
TP108
Sheet 1 of 1

Project Name: Phase 3

Project No.
13222

Co-ords: 385037.63 - 409305.43
Level: 130.75

Date
29/04/2019

Location: South Heywood

Dimensions (m): 2.00

Scale
1:24

Client: Russell Homes

Depth
1.60

0.60

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.10	ES		0.30	130.45		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.
							Orange slightly clayey gravelly fine to medium SAND. Gravel is fine to medium angular to rounded of sandstone and mudstone.
				1.60	129.15		End of Pit at 1.60m

Remarks: Terminated on weathered bedrock.

Stability: Stable.



Trial Pit Log

TrialPit No
TP109
Sheet 1 of 1

Project Name: Phase 3	Project No. 13222	Co-ords: 385395.97 - 409103.74 Level: 125.35	Date 29/04/2019
Location: South Heywood		Dimensions (m): 2.00 Depth 2.00	Scale 1:24
Client: Russell Homes			Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	125.05		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	77				Stiff high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
	1.00	HVP	84					1
	1.50	HVP	77	2.00	123.35			
								
								
							End of Pit at 2.00m	2
								3
								4
								5

Remarks: Terminated on very stiff clay.

Stability: Stable.

Trial Pit Log

TrialPit No
TP110
Sheet 1 of 1

Project Name: Phase 3

Project No.
13222

Co-ords: 385361.22 - 409131.36
Level: 125.36

Date
29/04/2019

Location: South Heywood

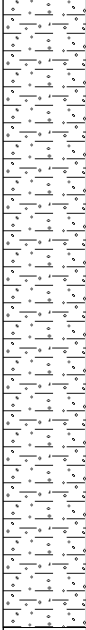
Dimensions (m): 2.00

Scale
1:24

Client: Russell Homes

Depth
2.20

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20			0.20	125.16		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	56				Firm to stiff medium to high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
	1.00	ES						
	1.00	HVP	49					
	1.50	HVP	93					2
				2.20	123.16		End of Pit at 2.20m	3
								4
								5

Remarks: Terminated on very stiff clay.

Stability: Stable.

Trial Pit Log

TrialPit No
TP111
Sheet 1 of 1

Project Name: Phase 3

Project No.
13222

Co-ords: 385319.90 - 409127.59
Level: 124.78

Date
29/04/2019

Location: South Heywood

Dimensions (m): 2.00

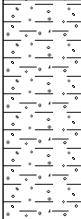
Scale
1:24

Client: Russell Homes

Depth
2.00

0.00

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	124.48		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	65				Firm medium strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
	1.00	HVP	67	1.00	123.78		Firm medium strength orange mottled grey slightly gravelly very sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
	1.50	HVP	45					
				2.00	122.78		End of Pit at 2.00m	2
								3
								4
								5

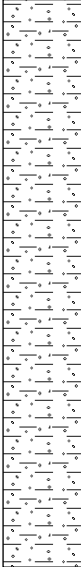
Remarks: Terminated on very stiff clay. Difficult to excavate.

Stability: Stable.

Project Name: Phase 3	Project No. 13222	Co-ords: 385266.57 - 409152.79 Level: 124.13	Date 29/04/2019
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Location: South Heywood	Dimensions (m): 2.00	Scale 1:24
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Client: Russell Homes	Depth 2.10	Logged B. Taylor
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Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30	123.83		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	1.00 1.00	ES HVP	109				Stiff high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
				2.10	122.03		End of Pit at 2.10m	2
								3
								4
								5

Remarks: Terminated on very stiff clay.

Stability: Stable.

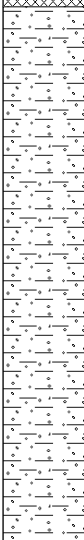
Trial Pit Log

TrialPit No
TP113
Sheet 1 of 1

Project Name: Phase 3 Project No. 13222 Co-ords: 385300.21 - 409179.91 Date 29/04/2019
Level: 124.89

Location: South Heywood Dimensions (m): 2.00 Scale 1:24

Client: Russell Homes Depth 2.00 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	124.59		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	72				Firm medium strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone (Becoming soft low strength at circa 1.00m bgl).	
	1.00	HVP	37					1
	1.50	HVP	74	2.00	122.89			
							End of Pit at 2.00m	2
								3
								4
								5

Remarks: Terminated on very stiff clay.

Stability: Stable.

Trial Pit Log

TrialPit No
TP114
Sheet 1 of 1

Project Name: Phase 3 Project No. 13222 Co-ords: 385295.81 - 409211.85 Date 30/04/2019
Level: 125.47

Location: South Heywood Dimensions (m): 2.00 Scale 1:24

Client: Russell Homes Depth 2.10 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES					MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.80	ES		0.70	124.77		Firm medium strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
	1.00	PP	PP=36.79					
	1.50	PP	PP=58.86					
	2.00	PP	PP=68.67	2.10	123.37		End of Pit at 2.10m	2
								3
								4
								5

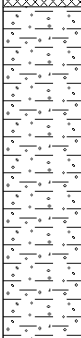
Remarks: Terminated on very stiff clay.

Stability: Stable.

Project Name: Phase 3 Project No. 13222 Co-ords: 385212.96 - 409190.67 Date 30/04/2019
Level: 124.13

Location: South Heywood Dimensions (m): 2.00 Scale 1:24

Client: Russell Homes Depth 1.40 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
▼ 1.40	1.00	ES		0.30	123.83		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	1
							Firm medium strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
				1.40	122.73		End of Pit at 1.40m	2
								3
								4
								5

Remarks: Terminated on very stiff clay.

Stability: Stable.



Trial Pit Log

TrialPit No
TP116
Sheet 1 of 1

Project Name: Phase 3 Project No. 13222 Co-ords: 385255.20 - 409275.41 Level: 127.35 Date 30/04/2019

Location: South Heywood Dimensions (m): 2.00 Scale 1:24

Client: Russell Homes Depth 1.70 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.10	ES		0.30	127.05		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.
							Firm medium strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.
				1.70	125.65		End of Pit at 1.70m

Remarks: Terminated on very stiff clay.

Stability: Stable.



Project Name: Phase 3	Project No. 13222	Co-ords: 385213.26 - 409258.80 Level: 127.28	Date 30/04/2019
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Location: South Heywood	Dimensions (m): 2.00	Scale 1:24
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Client: Russell Homes	Depth 2.10	Logged B. Taylor
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Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.40	ES		0.30	126.98		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
				0.50	126.78		Grey slightly clayey gravelly SAND. Gravel is fine to medium sub-round to round of sandstone and mudstone.	
							Firm orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
								1
								
				2.10	125.18			2
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								



Trial Pit Log

TrialPit No
TP118
Sheet 1 of 1

Project Name: Phase 3

Project No.
13222

Co-ords: 385162.22 - 409196.71
Level: 124.90

Date
30/04/2019

Location: South Heywood

Dimensions (m): 2.00

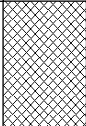
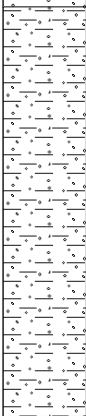
Scale
1:24

Client: Russell Homes

Depth
2.00

0.00

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES					MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
				0.40	124.50		Firm orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
				0.70	124.20		Firm orange mottled grey slightly gravelly sandy CLAY with cobbles of sandstone. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
				2.00	122.90		End of Pit at 2.00m	2
								3
								4
								5

Remarks: Terminated on very stiff clay.

Stability: Stable.



Trial Pit Log

TrialPit No
TP119
Sheet 1 of 1

Project Name: Phase 3 Project No. 13222 Co-ords: 385138.97 - 409172.35 Date 30/04/2019
Level: 124.26

Location: South Heywood Dimensions (m): 2.00 Scale 1:24

Client: Russell Homes Depth 2.20 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.10	ES		0.30	123.96		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.
	0.60	HVP	91				Stiff high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.
	1.20	HVP	81				
	1.60	HVP	112				
	2.00	HVP	114	2.20	122.06		
							End of Pit at 2.20m

Remarks: Terminated on very stiff clay.

Stability: Stable.



Trial Pit Log

TrialPit No
TP120
Sheet 1 of 1

Project Name: Phase 3 Project No. 13222 Co-ords: 385107.75 - 409193.74 Date 30/04/2019
Level: 125.93

Location: South Heywood Dimensions (m): 2.00 Scale 1:24

Client: Russell Homes Depth 2.00 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	125.63		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	84				Stiff orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
	1.00	HVP	91					1
	1.50	HVP	98	2.00	123.93			
							End of Pit at 2.00m	2
								3
								4
								5

Remarks: Terminated on very stiff clay.

Stability: Stable.



Trial Pit Log

TrialPit No
TP121
Sheet 1 of 1

Project Name: Phase 3 Project No. 13222 Co-ords: 385089.09 - 409237.87 Date 30/04/2019
Level: 128.32

Location: South Heywood Dimensions (m): 2.00 Scale 1:24

Client: Russell Homes Depth 2.00 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30			0.30	128.02		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	93				Stiff high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
	1.00 1.00	ES HVP	91					1
	1.50	HVP	102					
				2.00	126.32			
							End of Pit at 2.00m	2
								3
								4
								5

Remarks: Terminated on very stiff clay.

Stability: Stable.



e3p

Trial Pit Log

TrialPit No

TP122

Sheet 1 of 1

Project Name: Phase 3

Project No.
13222Co-ords: 385123.74 - 409275.90
Level: 129.21Date
30/04/2019

Location: South Heywood

Dimensions (m): 2.00

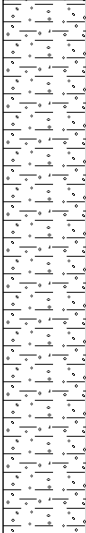
Scale
1:24

Client: Russell Homes

Depth
2.00

0.00

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	128.91		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	71				Firm to stiff medium to high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
	1.00	ES						
	1.50	HVP	105	2.00	127.21			
							End of Pit at 2.00m	2
								3
								4
								5

Remarks: Terminated on weathered bedrock.

Stability: Stable.





e3p

Trial Pit Log

TrialPit No
TP123
Sheet 1 of 1

Project Name: Phase 3

Project No.
13222Co-ords: 385170.08 - 409270.50
Level: 128.12Date
30/04/2019

Location: South Heywood

Dimensions (m): 2.00

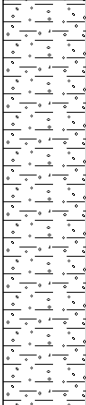
Scale
1:24

Client: Russell Homes

Depth
1.60

0.60

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	127.82		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.60	PP	PP=105.46				Stiff high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
	1.00	PP	PP=105.46					
	1.50	PP	PP=110.36	1.60	126.52			
							End of Pit at 1.60m	2
								3
								4
								5

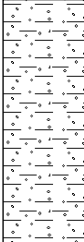
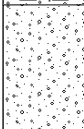
Remarks: Terminated on weathered bedrock.

Stability: Stable.



Project Name: Phase 3	Project No. 13222	Co-ords: 385177.88 - 409322.61 Level: 130.17	Date 30/04/2019
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Location: South Heywood	Dimensions (m): 2.00	Scale 1:24
Client: Russell Homes	Depth 1.50	Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	129.87		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
							Stiff orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
	1.00	ES		1.10	129.07		Orange sandy GRAVEL. Gravel is fine to coarse angular to rounded of sandstone and mudstone.	1
				1.50	128.67		End of Pit at 1.50m	
								2
								3
								4
								5

Remarks: Terminated on weathered bedrock.

Stability: Stable.

Trial Pit Log

TrialPit No
TP125
Sheet 1 of 1

Project Name: Phase 3

Project No.
13222

Co-ords: 385205.61 - 409369.12
Level: 131.12

Date
30/04/2019

Location: South Heywood

Dimensions (m): 2.00

Scale
1:24

Client: Russell Homes

Depth
1.40

0.00

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES					MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
				0.30	130.82		Stiff orange mottled grey slightly gravelly very sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
				1.00	130.12		Orange sandy GRAVEL. Gravel is fine to coarse angular to rounded of sandstone and mudstone.	1
				1.40	129.72		End of Pit at 1.40m	2
								3
								4
								5

Remarks: Terminated on weathered bedrock.

Stability: Stable.



Project Name: Phase 3	Project No. 13222	Co-ords: 385021.16 - 409199.91 Level: 127.50	Date 30/04/2019
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Location: South Heywood	Dimensions (m): 2.00	Scale 1:24
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Client: Russell Homes	Depth 1.40	Logged B. Taylor
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Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES					MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
				0.30	127.20		Stiff orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
				0.90	126.60		Stiff orange mottled grey gravelly very sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
				1.40	126.10		End of Pit at 1.40m	2
								3
								4
								5

Remarks: Terminated on weathered bedrock.

Stability: Stable.

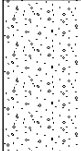
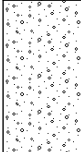
Trial Pit Log

TrialPit No
TP129
Sheet 1 of 1

Project Name: Phase 3 Project No. 13222 Co-ords: 384955.50 - 409217.56 Date 30/04/2019
Level: 129.37

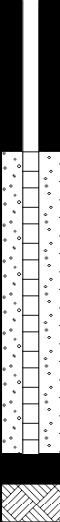
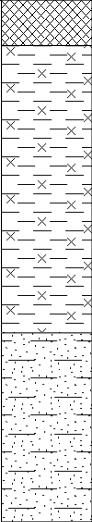
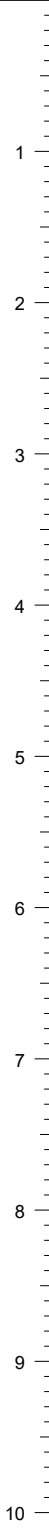
Location: South Heywood Dimensions (m): 2.00 Scale 1:24

Client: Russell Homes Depth 1.30 Logged B. Taylor

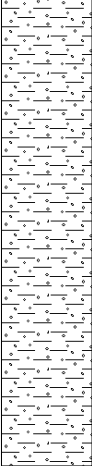
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.50	ES		0.30	129.07		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.
				0.80	128.57		Orange gravelly fine to medium SAND. Gravel is fine to coarse sub-angular to rounded of sandstone and mudstone.
				1.30	128.07		Orange sandy GRAVEL. Gravel is fine to coarse angular to sub-angular of sandstone.
							End of Pit at 1.30m

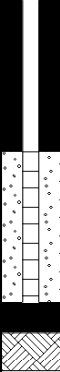
Remarks: Terminated on weathered bedrock.

Stability: Stable.

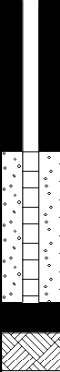
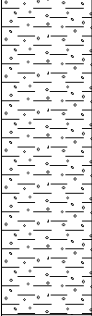
				Borehole Log				Borehole No. WS101 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 385193E - 409440N		Hole Type WS	
Location: South Heywood				Level: 129.92 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 29/04/2019		Logged By B. Taylor			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30			0.30	129.92		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone. Very soft very low strength dark brown silty CLAY.	
	0.50	ES							
	1.00	SPT	N=0 (0,0/0,0,0,0)						
	2.00	SPT	N=19 (1,2/5,5,5,4)	2.20	129.62	Medium dense to vey dense orange fine SAND.			
		3.00	SPT	50 (3,6/50 for 270mm)	3.45	127.72		End of Borehole at 3.45m	
Remarks Terminated on weathered bedrock.									



					Borehole Log			Borehole No. WS102 Sheet 1 of 1			
Project Name: Phase 3					Project No. 13222		Co-ords: 385138E - 409375N		Hole Type WS		
Location: South Heywood					Level: 131.84 m AOD		Scale 1:50				
Client: Russell Homes					Dates: 29/04/2019		Logged By B. Taylor				
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
					0.30	131.84	 	MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone. Very stiff high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone. (Becoming stiff medium strength at circa 2.00m bgl).			
		1.00	SPT	N=19 (3,4/4,5,6,4)						1	
		2.00	SPT	N=9 (0,1/2,2,2,3)						2	
		3.00	SPT	50 (3,5/50 for 260mm)					3		
					3.45	131.54		End of Borehole at 3.45m	4		
									5		
									6		
									7		
									8		
									9		
									10		
Remarks Terminated on weathered bedrock.											

				Borehole Log				Borehole No. WS103 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 385071E - 409334N		Hole Type WS	
Location: South Heywood				Level: 131.67 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 29/04/2019		Logged By B. Taylor			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	131.67		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	1
		1.00	SPT	N=35 (6,6/9,8,8,10)				Very stiff very high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	2
		2.00	SPT	50 (4,7/50 for 250mm)					
					2.45	131.37		End of Borehole at 2.45m	3
									4
									5
									6
									7
									8
									9
									10
Remarks Terminated on weathered bedrock.									

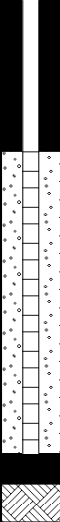
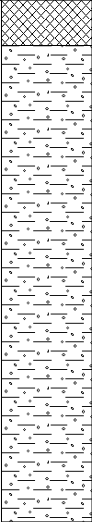
				Borehole Log				Borehole No. WS104 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 385056E - 409279N		Hole Type WS	
Location: South Heywood				Level: 130.22 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 29/04/2019		Logged By B. Taylor			

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	130.22		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
		1.00	SPT	N=19 (2,3/4,5,5,5)				Very stiff high to very high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
		2.00	SPT	50 (5,8/50 for 250mm)					2
					2.45	129.92		End of Borehole at 2.45m	3
									4
									5
									6
									7
									8
									9
									10

Remarks
 Terminated on weathered bedrock.



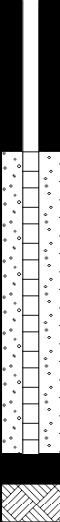
				Borehole Log				Borehole No. WS105 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 385416E - 409082N		Hole Type WS	
Location: South Heywood				Level: 125.43 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 29/04/2019		Logged By B. Taylor			

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	125.43		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone. Stiff medium strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
	1.00	SPT	N=8 (3,2/2,2,2,2)						1
	2.00 2.00	ES SPT	N=12 (2,2/2,3,3,4)			2			
	3.00	SPT	50 (4,4/50 for 270mm)			3			
					3.45	125.13		End of Borehole at 3.45m	4
									5
									6
									7
									8
									9
									10

Remarks
 Terminated on weathered bedrock.



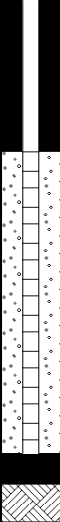
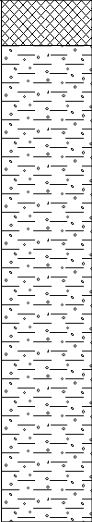
				Borehole Log				Borehole No. WS106 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 385335E - 409158N		Hole Type WS	
Location: South Heywood				Level: 125.10 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 29/04/2019		Logged By B. Taylor			

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	125.10		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	1
		1.00	SPT	N=8 (2,2/2,2,2,2)				Stiff medium strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
		2.00	SPT	N=14 (2,2/3,4,4,3)					2
		3.00	SPT	50 (3,4/50 for 270mm)					3
					3.45	124.80		End of Borehole at 3.45m	4
									5
									6
									7
									8
									9
									10

Remarks
 Terminated on weathered bedrock.

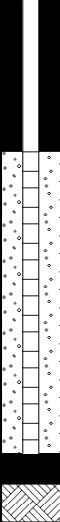
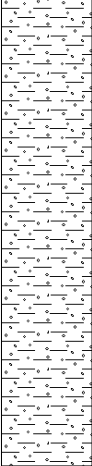


				Borehole Log				Borehole No. WS107 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 385218E - 409162N		Hole Type WS	
Location: South Heywood				Level: 123.42 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 30/04/2019		Logged By B. Taylor			

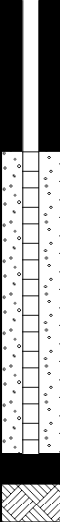
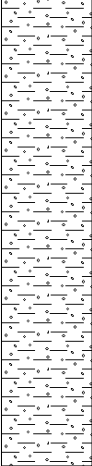
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	123.42		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone. Stiff medium strength orange mottled grey slightly gravelly slightly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
	1.00	SPT	N=8 (1,2/2,2,2,2)						1
	2.00	SPT	N=14 (2,2/3,4,4,3)						2
	3.00	SPT	50 (3,4/50 for 265mm)				3		
					3.45	123.12		End of Borehole at 3.45m	4
									5
									6
									7
									8
									9
									10

Remarks
 Terminated on weathered bedrock.



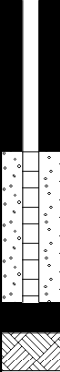
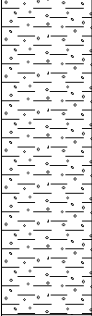
				Borehole Log				Borehole No. WS108 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 385284E - 409234N		Hole Type WS	
Location: South Heywood				Level: 125.60 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 30/04/2019		Logged By B. Taylor			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	125.60		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	1
		1.00	SPT	N=7 (1,2/1,2,2,2)				Firm low strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone. (Becoming stiff medium strength at circa 2.00m bgl).	2
		2.00	SPT	N=13 (2,2/3,3,3,4)					3
		3.00	SPT	50 (4,7/50 for 245mm)					4
					3.45	125.30		End of Borehole at 3.45m	5
									6
									7
									8
									9
									10
Remarks Terminated on weathered bedrock.									

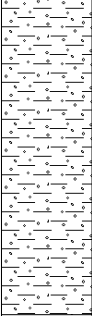
				Borehole Log				Borehole No. WS109 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 385136E - 409235N		Hole Type WS	
Location: South Heywood				Level: 127.20 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 30/04/2019		Logged By B. Taylor			

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	127.20		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
		1.00	SPT	N=11 (1,2/2,3,3,3)				Stiff medium strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
		2.00	SPT	N=12 (3,3/3,2,4,3)					2
		3.00	SPT	50 (3,5/50 for 260mm)					3
					3.45	126.90		End of Borehole at 3.45m	4
									5
									6
									7
									8
									9
									10

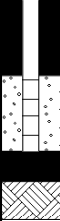
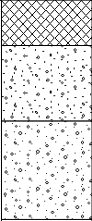
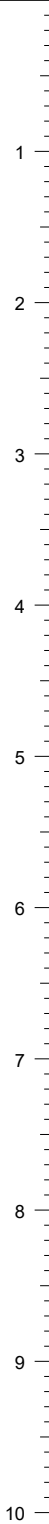
Remarks
 Terminated on weathered bedrock.



				Borehole Log				Borehole No. WS110 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 385201E - 409288N		Hole Type WS	
Location: South Heywood				Level: 128.23 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 30/04/2019		Logged By B. Taylor			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	128.23		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone. Stiff medium strength to very stiff very high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
	1.00	SPT	N=11 (1,2/2,3,3,3)				2		
	2.00	SPT	50 (5,5/50 for 255mm)				3		
					2.45	127.93		End of Borehole at 2.45m	4
									5
									6
									7
									8
									9
									10
Remarks Terminated on weathered bedrock.									

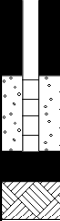
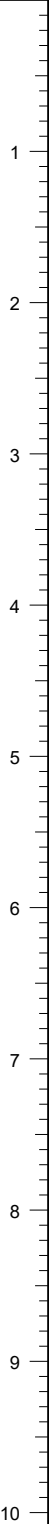
				Borehole Log				Borehole No. WS111 Sheet 1 of 1		
Project Name: Phase 3				Project No. 13222		Co-ords: 385095E - 409215N		Hole Type WS		
Location: South Heywood				Level: 127.10 m AOD		Scale 1:50				
Client: Russell Homes				Dates: 30/04/2019		Logged By B. Taylor				
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.10	ES		0.30	127.10	 	MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone. Stiff medium strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.		
		1.00 1.00	ES SPT	11 (1,2/11 for 255mm)						1
		2.00	SPT	N=50 (3,4/8,10,18,14)	2.45	126.80				2
								End of Borehole at 2.45m	3	
									4	
									5	
									6	
									7	
									8	
									9	
									10	
Remarks Terminated on weathered bedrock.										

				Borehole Log				Borehole No. WS112 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 385009E - 409212N		Hole Type WS	
Location: South Heywood				Level: 128.34 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 30/04/2019		Logged By B. Taylor			

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.30	128.34		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone. Orange gravelly fine to medium SAND. Gravel is fine to coarse sub-angular to rounded of sandstone and mudstone. Very dense orange sandy GRAVEL. Gravel is fine to coarse angular to sub-angular of sandstone.	
		1.00	SPT	50 (3,4/50 for 250mm)	0.80	128.04			
					1.45	127.54			
		End of Borehole at 1.45m							
Remarks Terminated on weathered bedrock.									



				Borehole Log				Borehole No. WS113 Sheet 1 of 1	
Project Name: Phase 3				Project No. 13222		Co-ords: 384941E - 409238N		Hole Type WS	
Location: South Heywood				Level: 129.70 m AOD		Scale 1:50			
Client: Russell Homes				Dates: 01/05/2019		Logged By B. Taylor			

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.30	129.70		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
					0.80	129.40		Orange gravelly fine to medium SAND. Gravel is fine to coarse sub-angular to rounded of sandstone and mudstone.	
		1.00	SPT	50 (3,5/50 for 260mm)				Dense orange sandy GRAVEL. Gravel is fine to coarse angular to sub-angular of sandstone.	
					1.45	128.90		End of Borehole at 1.45m	

Remarks
 Terminated on weathered bedrock.



Trial Pit Log

TrialPit No
SA101
Sheet 1 of 1

Project Name: Phase 3

Project No.
13222

Co-ords: 385364.95 - 409104.44
Level: 124.71

Date
29/04/2019

Location: South Heywood

Dimensions (m): 1.70

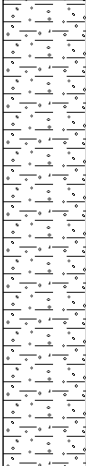
Scale
1:24

Client: Russell Homes

Depth
1.80

0.40

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	124.41		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	102				Stiff high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	1
	1.00 1.00	ES HVP	105					
	1.50	HVP	140	1.80	122.91			
							End of Pit at 1.80m	2
								3
								4
								5

Remarks: Terminated on weathered bedrock.

Stability: Stable.

Trial Pit Log

TrialPit No
SA102
Sheet 1 of 1

Project Name: Phase 3 Project No. 13222 Co-ords: 385244.48 - 409336.71 Date 29/04/2019
Level: 129.48

Location: South Heywood Dimensions (m): 1.80 Scale 1:24

Client: Russell Homes Depth 1.85 0.40 Logged B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.30	129.18		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
	0.50	HVP	151				Stiff to very stiff high to very high strength orange mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular to rounded of mudstone and sandstone.	
	1.00	HVP	132					1
	1.50	HVP	137					
				1.85	127.63			
							End of Pit at 1.85m	2
								3
								4
								5

Remarks: Terminated on weathered bedrock.

Stability: Stable.



Trial Pit Log

TrialPit No
SA103
Sheet 1 of 1

Project Name: Phase 3

Project No.
13222

Co-ords: 385023.91 - 409321.57
Level: 130.79

Date
29/04/2019

Location: South Heywood

Dimensions (m): 2.10

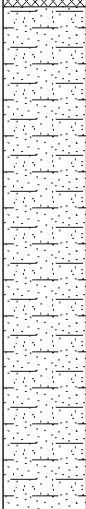
Scale
1:24

Client: Russell Homes

Depth
1.90

0.40

Logged
B. Taylor

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.10	ES		0.30	130.49		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.
							Orange slightly clayey gravelly fine to medium SAND. Gravel is fine to medium angular to rounded of sandstone and mudstone.
				1.90	128.89		End of Pit at 1.90m

Remarks: Terminated on weathered bedrock.

Stability: Stable.



Borehole Log

Borehole No.

CP101

Sheet 1 of 1

Project Name: Phase 3

Project No.
13222

Co-ords: 385214.32 - 409226.41

Hole Type
CP

Location: South Heywood

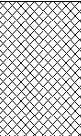
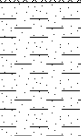
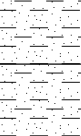
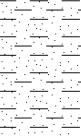
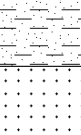
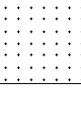
Level: 125.77

Scale
1:50

Client: Russell Homes

Dates: 29/04/2019 -

Logged By
B. Taylor

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	D					MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone.	
		1.00 1.00	SPT	N=3 (1,0/1,0,1,1)	0.90	124.87		Soft very low strength brownish grey sandy CLAY	1
		2.00 2.00	SPT	N=9 (1,1/2,2,2,3)	2.20	123.57		Stiff medium strength brown sandy CLAY.	2
		3.00 3.00	SPT	N=11 (1,2/2,3,3,3)					3
		4.00 4.00	SPT	50 (4,9/50 for 190mm)	4.00	121.77		Dense brown weathered SANDSTONE.	4
		4.70 4.70	C	50 (25 for 110mm/50 for 115mm)	5.00	120.77		End of borehole at 5.00 m	5
									6
									7
									8
									9
									10

Remarks

Terminated on weathered bedrock.



Borehole Log

Borehole No.

RB101

Sheet 1 of 3

Project Name: Phase 3

Project No.
13222

Co-ords: 385385.26 - 409403.51

Hole Type
BH

Location: South Heywood

Level: 129.92

Scale
1:50

Client: Russell Homes

Dates: 07/05/2019 -

Logged By
B Taylor

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	129.72		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone. Firm brown sandy CLAY.	1
					1.80	128.12		Grey MUDSTONE with minor lenses of coal.	2
					2.30	127.62		Brown SANDSTONE.	3
					4.90	125.02		Light grey SANDSTONE.	5
									6
									7
									8
									9
									10

Continued on next sheet

Remarks

Terminated on weathered bedrock.





Borehole Log

Borehole No.

RB102

Sheet 1 of 3

Project Name: Phase 3

Project No.
13222

Co-ords: 385146.88 - 409287.90

Hole Type
BH

Location: South Heywood

Level: 128.88

Scale
1:50

Client: Russell Homes

Dates: 07/05/2019 -

Logged By
B Taylor

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	128.68		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone. Firm brown sandy CLAY.	1
					2.70	126.18		Grey MUDSTONE with very minor lenses of coal.	2
									3
									4
									5
									6
									7
									8
					9.00	119.88		Grey MUDSTONE within interbedding of sandstone.	9
									10

Continued on next sheet

Remarks

Terminated on weathered bedrock.





Borehole Log

Borehole No.

RB102

Sheet 2 of 3

Project Name: Phase 3

Project No.
13222

Co-ords: 385146.88 - 409287.90

Hole Type
BH

Location: South Heywood

Level: 128.88

Scale
1:50

Client: Russell Homes

Dates: 07/05/2019 -

Logged By
B Taylor

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					10.20	118.68		Dark grey MUDSTONE.	
					11.00	117.88		Grey MUDSTONE with very minor lenses of coal.	11
					13.10	115.78		Very hard Brown SANDSTONE.	13
					15.30	113.58		Grey MUDSTONE with interbedding of sandstone	15
					15.90	112.98		Grey MUDSTONE with interbedding of sandstone and very minor coal lenses.	16
					16.50	112.38		Grey MUDSTONE.	17
									18
									19
									20

Continued on next sheet

Remarks

Terminated on weathered bedrock.





Borehole Log

Borehole No.

RB102

Sheet 3 of 3

Project Name: Phase 3

Project No.
13222

Co-ords: 385146.88 - 409287.90

Hole Type
BH

Location: South Heywood

Level: 128.88

Scale
1:50

Client: Russell Homes

Dates: 07/05/2019 -

Logged By
B Taylor

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					21.70	107.18		Grey MUDSTONE with interbedding of sandstone.	21
									22
									23
									24
									25
									26
					26.80	102.08		Grey MUDSTONE.	27
									28
									29
					30.00	98.88		End of borehole at 30.00 m	30

Remarks

Terminated on weathered bedrock.





Borehole Log

Borehole No.

RB103

Sheet 1 of 3

Project Name: Phase 3

Project No.
13222

Co-ords: 385342.52 - 409133.82

Hole Type
BH

Location: South Heywood

Level: 125.09

Scale
1:50

Client: Russell Homes

Dates: 07/05/2019 -

Logged By
B Taylor

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	124.89		MADE GROUND: Soft brown slightly gravelly sandy clay (Topsoil) with rootlets. Gravel is fine sub-angular to rounded of wood and sandstone. Firm brown sandy CLAY.	1
					1.60	123.49		Firm grey sandy CLAY.	2
					4.00	121.09		Grey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular of mudstone and sandstone.	4
					5.70	119.39		Brown SANDSTONE.	6
								Continued on next sheet	10

Remarks

Terminated on weathered bedrock.





Borehole Log

Borehole No.

RB103

Sheet 2 of 3

Project Name: Phase 3

Project No.
13222

Co-ords: 385342.52 - 409133.82

Hole Type
BH

Location: South Heywood

Level: 125.09

Scale
1:50

Client: Russell Homes

Dates: 07/05/2019 -

Logged By
B Taylor

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description					
		Depth (m)	Type	Results									
					10.70	114.39		Very strong brown grey SANDSTONE.	11				
													12
													13
													14
													15
								16					
16.40	108.69						Grey MUDSTONE.	17					
17.20	107.89						Grey MUDSTONE with very minor lenses of coal.	18					
								19					
18.90	106.19						Dark grey MUDSTONE.	20					



Borehole Log

Borehole No.

RB103

Sheet 3 of 3

Project Name: Phase 3

Project No.
13222

Co-ords: 385342.52 - 409133.82

Hole Type
BH

Location: South Heywood

Level: 125.09

Scale
1:50

Client: Russell Homes

Dates: 07/05/2019 -

Logged By
B Taylor

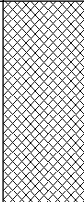
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					21.00	104.09		Grey MUDSTONE with interbedding of sandstone.	21
									22
									23
									24
					24.50	100.59		Grey MUDSTONE with very minor lenses of coal.	25
									26
					25.80	99.29		Grey MUDSTONE with interbedding of sandstone.	27
									28
									29
					30.00	95.09		End of borehole at 30.00 m	30

Remarks

Terminated on weathered bedrock.



Project Name: Phase 3	Project No. 13222	Co-ords: 385032.00 - 409225.00 Level:	Date 23/09/2021
Location: South Heywood	Dimensions (m): 2.00 Depth 0.80		Scale 1:30
Client: Russell Homes			Logged N.Dawson

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 0.30	0.30	ES		0.80			MADE GROUND: Dark brown sandy gravel with frequent cobbles and occasional boulders. Gravel is fine to coarse angular to subangular of brick, sandstone and concrete. Cobbles and boulders are angular to subangular of brick and concrete. (Mild hydrocarbon odour noted).	
							End of Pit at 0.80m	1 2 3 4

Trial Pit Photographs



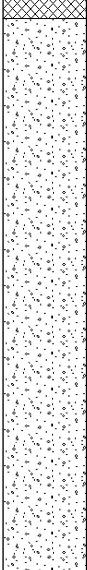
TP201

TP201 spoil

Remarks: 1. Terminated at 0.80 m bgl due to water ingress and instability within Made Ground. 2. Water strike encountered at 0.30m bgl. 3. Mild hydrocarbon odour encountered.

Stability: Unstable.

Project Name: Phase 3	Project No. 13222	Co-ords: 385013.00 - 409220.00 Level:	Date 23/09/2021
Location: South Heywood	Dimensions (m): 2.00 Depth 2.80		Scale 1:30
Client: Russell Homes			Logged N.Dawson

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.80	0.30	ES		0.15			MADE GROUND: Dark brown sandy gravel. Gravel is fine to coarse angular to subangular of mudstone, brick and concrete. Cobbles are subangular of brick.	
				0.60			MADE GROUND: Brown gravelly very clayey fine to medium sand. Gravel is fine to medium subangular to subrounded of mudstone and brick.	
	1.00	B					Greyish brown silty very gravelly fine to medium SAND with rare cobbles. Gravel is fine to coarse angular to subangular of sandstone. Cobbles are subangular of sandstone.	1
	1.50	ES						2
				2.80			End of Pit at 2.80m	3
								4

Trial Pit Photographs



TP202

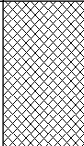
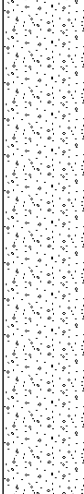


TP202 spoil

Remarks: 1. Complete. 2. Water strike encountered at 2.80 m bgl as minor ingress.

Stability: Stable.

Project Name: Phase 3	Project No. 13222	Co-ords: 384992.00 - 409225.00 Level:	Date 23/09/2021
Location: South Heywood	Dimensions (m): 2.00 Depth 2.60		Scale 1:30
Client: Russell Homes			Logged N.Dawson

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.40	ES		0.60			MADE GROUND: Brown very gravelly fine to medium sand with occasional cobbles. Gravel is fine to coarse angular to subrounded of brick, concrete paving and sandstone. Cobbles are subangular of concrete.	
	1.00	ES					Greyish orange mottled brown slightly clayey very gravelly fine to medium SAND with cobbles. Gravel is fine to coarse angular to subangular of sandstone. Cobbles are subangular of sandstone.	1
				2.60			End of Pit at 2.60m	2
								3
								4

Trial Pit Photographs



TP203



TP203 spoil

Remarks: 1. Complete.

Stability: Stable.

Project Name: Phase 3	Project No. 13222	Co-ords: 384983.00 - 409243.00 Level:	Date 23/09/2021
Location: South Heywood	Dimensions (m): 2.00 Depth 3.20		Scale 1:30
Client: Russell Homes			Logged N.Dawson

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10	ES		0.15			MADE GROUND: Reddish brown sandy gravel. Gravel is fine to coarse angular of brick.	
	0.50	ES					MADE GROUND: Dark brown slightly gravelly very clayey fine to medium sand. Gravel is fine to medium subangular of brick and sandstone.	
	1.20	D		1.10			Orangish brown mottled grey slightly sandy CLAY.	1
	1.50	ES		1.30			Reddish brown very gravelly fine to medium SAND. Gravel is fine to coarse angular to subangular of sandstone.	
				2.00			Brown slightly sandy clayey GRAVEL. Gravel is fine to coarse angular to subangular mudstone. (Weathered MUDSTONE).	2
				3.20			End of Pit at 3.20m	3
								4

Trial Pit Photographs



TP204

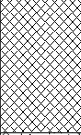


TP204 spoil

Remarks: 1. Complete.

Stability: Stable.

Project Name: Phase 3	Project No. 13222	Co-ords: 385007.00 - 409264.00 Level:	Date 23/09/2021
Location: South Heywood	Dimensions (m): 2.00 Depth 2.50		Scale 1:30
Client: Russell Homes			Logged N.Dawson

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.40	0.30	ES		0.15			MADE GROUND: Concrete.	
							MADE GROUND: Black sandy gravel. Gravel is fine to coarse angular to subangular of clinker, ash, brick and sandstone.	
	1.00	ES		0.70			Greyish brown slightly silty fine to medium SAND.	1
	1.50	B		1.90			Brown very sandy GRAVEL with cobbles and boulders. Gravel is fine to coarse angular of sandstone. Cobbles and boulders are angular to subangular of sandstone. (Weathered SANDSTONE).	2
				2.50			End of Pit at 2.50m	3
								4

Trial Pit Photographs



TP205



TP205 spoil

Remarks: 1. Complete. 2. Water strike encountered at 2.40 m bgl.

Stability: Stable.

Project Name: Phase 3	Project No. 13222	Co-ords: 384988.00 - 409288.00 Level:	Date 23/09/2021
Location: South Heywood	Dimensions (m): 2.00 Depth 1.60		Scale 1:30
Client: Russell Homes			Logged N.Dawson

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 1.50	0.10	ES		0.20			MADE GROUND: Brown sandy gravel with cobbles. Gravel is fine to medium subangular to subrounded of mudstone. Cobbles are rounded of mudstone. (Cobblestone paving)	
	0.80	ES		1.00			Greyish brown slightly clayey gravelly fine to medium SAND. Gravel is fine to medium angular of sandstone.	1
	1.50	B		1.60			Greyish brown sandy GRAVEL. Gravel is fine to medium angular of sandstone. (Weathered SANDSTONE).	2
							End of Pit at 1.60m	3
								4

Trial Pit Photographs



TP206



TP206 spoil

Remarks: 1. Complete. 2. Water strike encountered at 1.50 m bgl.

Stability: Stable.

Project Name: Phase 3	Project No. 13222	Co-ords: 384995.00 - 409311.00 Level:	Date 23/09/2021
Location: South Heywood	Dimensions (m): 2.00 Depth 2.10		Scale 1:30
Client: Russell Homes			Logged N.Dawson

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.15			MADE GROUND: Orangish brown slightly silty fine to medium sand.	
	0.60	ES					MADE GROUND: Brown sandy gravel with rare boulders. Gravel is fine to coarse angular of brick, concrete and sandstone. Boulders are angular to subangular of brick and concrete (former foundations).	
	1.00	ES		0.90			Light yellowish brown gravelly fine to medium SAND. Gravel is fine to medium subangular to angular of sandstone.	1
				1.30			Brown sandy GRAVEL. Gravel is fine to coarse angular of sandstone. (Weathered SANDSTONE).	
				2.10			End of Pit at 2.10m	2
								3
								4

Trial Pit Photographs



TP207



TP207 spoil

Remarks: 1. Complete. 2. Water strike encountered at 2.00 m bgl.

Stability: Stable.

Project Name: Phase 3	Project No. 13222	Co-ords: 385019.00 - 409298.00 Level:	Date 23/09/2021
Location: South Heywood		Dimensions (m): 2.00 Depth 1.70	Scale 1:30
Client: Russell Homes			Logged N.Dawson

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 1.60	0.10			0.10			MADE GROUND: Concrete.	
	0.20			0.20			MADE GROUND: Reddish brown sandy gravel. Gravel is fine to coarse angular to subangular of brick.	
	0.50	ES		0.70			MADE GROUND: Black slightly sandy gravel. Gravel is fine to medium angular of clinker, ash and brick. Mild hydrocarbon odour.	
	1.00	ES		1.20			Greyish brown gravelly sandy CLAY. Gravel is fine to coarse angular of sandstone.	1
				1.70			Grey brown sandy gravel. Gravel is fine to coarse angular of sandstone. (Weathered SANDSTONE).	2
							End of Pit at 1.70m	3
								4

Trial Pit Photographs



TP208

TP208 spoil

Remarks: 1. Complete. 2. Water strike encountered at 1.60 m bgl. 3. Mild hydrocarbon odour encountered.

Stability: Stable.

Project Name: Phase 3	Project No. 13222	Co-ords: 385044.00 - 409296.00 Level:	Date 23/09/2021
Location: South Heywood	Dimensions (m): 2.00 Depth 2.60		Scale 1:30
Client: Russell Homes			Logged N.Dawson

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.40	0.40	ES	31	0.15			MADE GROUND: Concrete.	
							MADE GROUND: Black slightly sandy gravelly clay. Gravel is fine to coarse angular to subangular of clinker, ash, brick and concrete. (Possible relic topsoil).	
				0.70				
	1.00	HVP		1.10			Soft low strength brown slightly gravelly sandy CLAY. Gravel is fine to medium angular to subrounded of mudstone and sandstone.	1
	1.50	ES					Reddish brown slightly clayey very gravelly fine to medium sand. Gravel is fine to coarse angular to subangular of sandstone.	2
				2.40			Grey sandy GRAVEL. Gravel is fine to coarse angular of sandstone. (Weathered SANDSTONE).	
				2.60			End of Pit at 2.60m	3
								4

Trial Pit Photographs



TP209

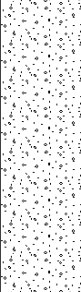
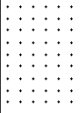


TP209 spoil

Remarks: 1. Complete. 2. Water seepage at 2.40m bgl.

Stability: Stable.

Project Name: Phase 3	Project No. 13222	Co-ords: 385038.00 - 409256.00 Level:	Date 23/09/2021
Location: South Heywood	Dimensions (m): 2.00 0.60		Scale 1:30
Client: Russell Homes	Depth 3.10		Logged N.Dawson

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.10			MADE GROUND: Concrete.	
	0.40	ES					MADE GROUND: Black sandy gravel with occasional cobbles. Gravel is fine to coarse angular to subrounded of brick, mudstone, clinker, rope, metal and wire. Cobbles are subangular of brick.	
	1.00	D		0.90			Firm medium strength grey brown mottled sandy CLAY. Gravel is fine to medium subangular to subrounded of mudstone and sandstone.	1
	1.00	ES	50					
	1.00	HVP						
	1.30	HVP	75					
				1.40			Brown slightly clayey gravelly fine to medium SAND. Gravel is fine to coarse angular of sandstone.	2
	2.00	ES						
				2.60			Brown sandy GRAVEL. Gravel is fine to medium angular of sandstone. (Weathered SANDSTONE).	3
				3.10			End of Pit at 3.10m	4

Trial Pit Photographs



TP210



TP210 spoil

Remarks: 1. Complete.

Stability: Stable.

Appendix VIII: Chemical Testing Results



**Ben Taylor**

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Analytical Report Number : 19-39850

Project / Site name:	Heywood 3	Samples received on:	02/05/2019
Your job number:	13-222	Samples instructed on:	03/05/2019
Your order number:		Analysis completed by:	13/05/2019
Report Issue Number:	1	Report issued on:	13/05/2019
Samples Analysed:	31 soil samples		

Signed: 

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Iss No 19-39850-1 Heywood 3 13-222

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The results included within the report are representative of the samples submitted for analysis.

Page 1 of 18



Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214420	1214421	1214422	1214423	1214424
Sample Reference				TP101	TP102	TP103	TP105	TP106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.30	1.20	1.00	0.10
Date Sampled				29/04/2019	29/04/2019	29/04/2019	29/04/2019	29/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	15	17	12	12	18
Total mass of sample received	kg	0.001	NONE	0.48	0.45	0.56	0.55	0.48

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	-	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	5.6	-	4.9	-
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	-	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	630	-	150	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	26	-	24	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.013	-	0.012	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	13.0	-	12.0	-
Sulphide	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
Total Sulphur	mg/kg	50	MCERTS	-	370	-	89	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	3.7	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.33	< 0.05	-	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.65	< 0.05	-	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.61	< 0.05	-	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.35	< 0.05	-	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.37	< 0.05	-	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.30	< 0.05	-	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.22	< 0.05	-	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.30	< 0.05	-	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.13	< 0.80	-	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	19	-	6.5	11
Barium (aqua regia extractable)	mg/kg	1	MCERTS	110	-	-	-	74
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.91	-	-	-	0.70
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	< 0.2	-	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	-	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	16	-	19	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	42	43	-	19	31
Lead (aqua regia extractable)	mg/kg	1	MCERTS	80	67	-	9.9	52
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	16	-	23	14
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.5	-	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	27	-	-	-	22
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	71	35	-	45	48

Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number	1214420	1214421	1214422	1214423	1214424
Sample Reference	TP101	TP102	TP103	TP105	TP106
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.10	0.30	1.20	1.00	0.10
Date Sampled	29/04/2019	29/04/2019	29/04/2019	29/04/2019	29/04/2019
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	-
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	-
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	-
TPH (C10 - C12)	mg/kg	2	MCERTS	6.2	< 2.0	< 2.0	< 2.0	-
TPH (C12 - C16)	mg/kg	4	MCERTS	5.5	< 4.0	< 4.0	< 4.0	-
TPH (C16 - C21)	mg/kg	1	MCERTS	11	3.5	< 1.0	< 1.0	-
TPH (C21 - C35)	mg/kg	1	MCERTS	29	32	< 1.0	< 1.0	-
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	-
TPH Total C5 - C40	mg/kg	10	MCERTS	60	39	< 10	< 10	-

Pesticide and Herbicide Screen

Pesticides/Herbicides Screen in Soil	P/A	N/A	NONE	-	-	-	-	-
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Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214425	1214426	1214427	1214428	1214429
Sample Reference				TP107	TP108	TP109	TP110	TP111
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.10	0.10	1.00	0.10
Date Sampled				29/04/2019	29/04/2019	29/04/2019	29/04/2019	29/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	20	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	11	13	17	19	17
Total mass of sample received	kg	0.001	NONE	0.53	0.47	0.45	0.53	0.47

Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	Not-detected	-	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	6.3	-	6.5	6.9
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	650	-	250	880
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	32	-	29	23
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.016	-	0.014	0.011
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	15.9	-	14.4	11.3
Sulphide	mg/kg	1	MCERTS	-	< 1.0	-	16	< 1.0
Total Sulphur	mg/kg	50	MCERTS	-	310	-	120	400
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	-	4.0

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	< 1.0	-	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.44	0.22	< 0.05	0.18
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.87	0.64	< 0.05	0.41
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.81	0.64	< 0.05	0.39
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.53	0.38	< 0.05	0.25
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.54	0.40	< 0.05	0.30
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.38	0.43	< 0.05	0.21
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.36	0.27	< 0.05	0.21
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.48	0.41	< 0.05	0.26
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	4.41	3.39	< 0.80	2.21
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	2.2	19	12	11	8.6
Barium (aqua regia extractable)	mg/kg	1	MCERTS	43	-	82	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.84	-	0.55	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	0.4	< 0.2	0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	18	-	18	9.8
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	44	35	13	37
Lead (aqua regia extractable)	mg/kg	1	MCERTS	15	78	63	16	45
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	0.7
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	17	9.8	15	8.6
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.5	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	41	-	21	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	47	61	60	38	43

Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214425	1214426	1214427	1214428	1214429
Sample Reference				TP107	TP108	TP109	TP110	TP111
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.10	0.10	1.00	0.10
Date Sampled				29/04/2019	29/04/2019	29/04/2019	29/04/2019	29/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	2.9	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	4.9	1.6	< 1.0	4.1
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	15	5.1	< 1.0	7.4
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	28	< 10	< 10	14

Pesticide and Herbicide Screen

Pesticides/Herbicides Screen in Soil	P/A	N/A	NONE	-	-	-	-	-
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Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214430	1214431	1214432	1214433	1214434
Sample Reference				TP115	TP116	TP117	TP118	TP121
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.10	0.40	0.10	1.00
Date Sampled				30/04/2019	30/04/2019	30/04/2019	30/04/2019	30/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	18	18	16	20	17
Total mass of sample received	kg	0.001	NONE	0.51	0.46	0.49	0.46	0.53

Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected	-
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.0	-	7.2	6.9	7.2
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	270	-	620	880	290
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	69	-	120	47	30
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.034	-	0.058	0.023	0.015
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	34.3	-	58.3	23.4	15.0
Sulphide	mg/kg	1	MCERTS	3.4	-	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	130	-	290	560	120
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	4.0	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.26	< 0.05	1.0	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.24	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.49	< 0.05	2.4	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.43	< 0.05	2.2	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.26	< 0.05	1.3	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.33	< 0.05	1.4	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.29	< 0.05	1.3	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.13	< 0.05	0.96	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.19	< 0.05	1.4	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.58	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.79	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	2.38	< 0.80	13.6	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	16	9.8	17	6.5
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	110	-	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	0.88	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	< 0.2	0.5	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	25	-	15	18	20
Copper (aqua regia extractable)	mg/kg	1	MCERTS	22	43	19	51	13
Lead (aqua regia extractable)	mg/kg	1	MCERTS	14	72	42	89	9.0
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	29	14	11	18	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	23	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	51	71	42	73	21

Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214430	1214431	1214432	1214433	1214434
Sample Reference				TP115	TP116	TP117	TP118	TP121
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.10	0.40	0.10	1.00
Date Sampled				30/04/2019	30/04/2019	30/04/2019	30/04/2019	30/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	2.4	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	4.7	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	3.3	< 1.0	21	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	15	< 1.0	71	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	20	< 10	100	< 10

Pesticide and Herbicide Screen

Pesticides/Herbicides Screen in Soil	P/A	N/A	NONE	-	-	-	-	-
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Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number	1214435	1214436	1214437	1214438	1214439
Sample Reference	TP122	TP124	TP124	TP127	TP128
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.10	0.10	1.00	0.10	0.10
Date Sampled	30/04/2019	30/04/2019	30/04/2019	30/04/2019	30/04/2019
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	15	22
Total mass of sample received	kg	0.001	NONE	0.45	0.47

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	6.9	6.2	-
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	320	830	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	-	51	45	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	0.025	0.022	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	-	25.4	22.3	-
Sulphide	mg/kg	1	MCERTS	-	-	4.6	< 1.0	-
Total Sulphur	mg/kg	50	MCERTS	-	-	130	480	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	2.2	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.77	0.39	< 0.05	0.17	< 0.05
Anthracene	mg/kg	0.05	MCERTS	0.14	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	1.0	0.55	< 0.05	0.42	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.90	0.47	< 0.05	0.40	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.55	0.31	< 0.05	0.27	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.45	0.29	< 0.05	0.30	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.51	0.29	< 0.05	0.40	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.26	0.13	< 0.05	0.14	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.40	0.25	< 0.05	0.31	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	5.00	2.68	< 0.80	2.41	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	12	5.2	16	11
Barium (aqua regia extractable)	mg/kg	1	MCERTS	130	82	-	-	76
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.80	0.77	-	-	0.91
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	0.3	< 0.2	0.5	0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	15	22	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	39	35	14	42	32
Lead (aqua regia extractable)	mg/kg	1	MCERTS	87	55	13	84	41
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.9	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	14	13	15	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	33	25	-	-	28
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	83	53	34	94	47

Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214435	1214436	1214437	1214438	1214439
Sample Reference				TP122	TP124	TP124	TP127	TP128
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.10	1.00	0.10	0.10
Date Sampled				30/04/2019	30/04/2019	30/04/2019	30/04/2019	30/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	12	1.6	< 1.0	4.8	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	38	4.2	< 1.0	17	21
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	54	< 10	< 10	24	23

Pesticide and Herbicide Screen

Pesticides/Herbicides Screen in Soil	P/A	N/A	NONE	-	Absent	-	-	-
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Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214440	1214441	1214442	1214443	1214444
Sample Reference				TP129	WS111	TP130	TP132	TP133
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.10	0.10	0.10	1.00
Date Sampled				30/04/2019	30/04/2019	01/05/2019	01/05/2019	01/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	11	15	17	17	18
Total mass of sample received	kg	0.001	NONE	0.54	0.43	0.44	0.50	0.55

Asbestos in Soil	Type	N/A	ISO 17025	-	-	Not-detected	Not-detected	-
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.7	-	5.9	5.9	6.5
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	250	-	420	400	190
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	30	-	15	27	23
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.015	-	0.0074	0.014	0.012
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	14.8	-	7.4	13.5	11.6
Sulphide	mg/kg	1	MCERTS	1.5	-	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	110	-	270	210	88
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	1.7	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	0.31	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	0.21	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	2.2	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.60	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	2.7	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	2.5	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.91	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	1.3	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	1.2	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.60	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	1.1	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	0.38	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	0.45	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	14.4	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	3.4	22	17	7.0	5.3
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	120	-	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	1.3	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	-	18	18	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	17	58	38	24	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	11	100	70	32	10
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.4	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	19	19	13	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.2	1.5	1.8	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	34	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	48	87	63	42	26

Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214440	1214441	1214442	1214443	1214444
Sample Reference				TP129	WS111	TP130	TP132	TP133
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.10	0.10	0.10	1.00
Date Sampled				30/04/2019	30/04/2019	01/05/2019	01/05/2019	01/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	-	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	-	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	-	7.7	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	-	9.7	< 1.0	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	-	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	-	19	< 10	< 10

Pesticide and Herbicide Screen

Pesticides/Herbicides Screen in Soil	P/A	N/A	NONE	-	-	-	Absent	-
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Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214445	1214446	1214447	1214448	1214449
Sample Reference				TP135	TP138	TP141	TP142	TP144
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	1.00	0.50	0.10	0.10
Date Sampled				01/05/2019	01/05/2019	01/05/2019	01/05/2019	29/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	19	14	16	18	17
Total mass of sample received	kg	0.001	NONE	0.46	0.55	0.56	0.46	0.47

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	5.9	5.5	6.1	-
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	190	200	570	-
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	20	24	34	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.0098	0.012	0.017	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	9.8	11.9	17.0	-
Sulphide	mg/kg	1	MCERTS	-	23	< 1.0	< 1.0	-
Total Sulphur	mg/kg	50	MCERTS	-	88	100	330	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	3.3	-	0.6	-	2.5

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	< 1.0	< 1.0	< 1.0	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.51
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.28
Phenanthrene	mg/kg	0.05	MCERTS	0.42	< 0.05	< 0.05	0.28	3.2
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.0
Fluoranthene	mg/kg	0.05	MCERTS	0.70	< 0.05	< 0.05	0.60	3.3
Pyrene	mg/kg	0.05	MCERTS	0.70	< 0.05	< 0.05	0.59	3.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.34	< 0.05	< 0.05	0.38	1.3
Chrysene	mg/kg	0.05	MCERTS	0.38	< 0.05	< 0.05	0.34	1.4
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.45	< 0.05	< 0.05	0.45	1.2
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.17	< 0.05	< 0.05	0.20	0.65
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.36	< 0.05	< 0.05	0.37	1.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.18	0.57
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.20
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.22	0.64

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.52	< 0.80	< 0.80	3.61	18.5
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	6.5	3.3	13	17
Barium (aqua regia extractable)	mg/kg	1	MCERTS	100	-	-	-	120
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.93	-	-	-	0.80
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	< 0.2	0.3	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	15	20	16	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	36	12	22	51	34
Lead (aqua regia extractable)	mg/kg	1	MCERTS	68	10	11	60	69
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	0.5	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	11	13	15	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	1.2	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	24	-	-	-	36
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	66	25	31	59	68

Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214445	1214446	1214447	1214448	1214449
Sample Reference				TP135	TP138	TP141	TP142	TP144
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	1.00	0.50	0.10	0.10
Date Sampled				01/05/2019	01/05/2019	01/05/2019	01/05/2019	29/04/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	3.5	< 1.0	< 1.0	7.2	18
TPH (C21 - C35)	mg/kg	1	MCERTS	16	< 1.0	< 1.0	28	18
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	22	< 10	< 10	37	38

Pesticide and Herbicide Screen

Pesticides/Herbicides Screen in Soil	P/A	N/A	NONE	-	-	-	-	-
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Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214450				
Sample Reference				TP113				
Sample Number				None Supplied				
Depth (m)				0.10				
Date Sampled				29/04/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	19				
Total mass of sample received	kg	0.001	NONE	0.40				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.2				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1200				
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	43				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.022				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	21.6				
Sulphide	mg/kg	1	MCERTS	< 1.0				
Total Sulphur	mg/kg	50	MCERTS	540				
Total Organic Carbon (TOC)	%	0.1	MCERTS	-				

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	0.32				
Anthracene	mg/kg	0.05	MCERTS	0.08				
Fluoranthene	mg/kg	0.05	MCERTS	0.74				
Pyrene	mg/kg	0.05	MCERTS	0.68				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.39				
Chrysene	mg/kg	0.05	MCERTS	0.41				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.39				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.27				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.40				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.21				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.27				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	4.16				
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13				
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-				
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	40				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	67				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	74				



Analytical Report Number: 19-39850

Project / Site name: Heywood 3

Lab Sample Number				1214450				
Sample Reference				TP113				
Sample Number				None Supplied				
Depth (m)				0.10				
Date Sampled				29/04/2019				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0				
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1				
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1				
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0				
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0				
TPH (C16 - C21)	mg/kg	1	MCERTS	5.1				
TPH (C21 - C35)	mg/kg	1	MCERTS	37				
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10				
TPH Total C5 - C40	mg/kg	10	MCERTS	44				

Pesticide and Herbicide Screen

Pesticides/Herbicides Screen in Soil	P/A	N/A	NONE	Absent				
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Analytical Report Number : 19-39850

Project / Site name: Heywood 3

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1214420	TP101	None Supplied	0.10	Brown loam and clay with gravel and vegetation.
1214421	TP102	None Supplied	0.30	Brown loam and clay with gravel and vegetation.
1214422	TP103	None Supplied	1.20	Brown clay and sand with vegetation.
1214423	TP105	None Supplied	1.00	Brown clay and sand.
1214424	TP106	None Supplied	0.10	Brown loam and clay with gravel and vegetation.
1214425	TP107	None Supplied	1.00	Brown clay and sand with gravel and stones.
1214426	TP108	None Supplied	0.10	Brown clay and loam with vegetation.
1214427	TP109	None Supplied	0.10	Brown loam and clay with vegetation.
1214428	TP110	None Supplied	1.00	Brown clay and sand.
1214429	TP111	None Supplied	0.10	Brown loam and clay with vegetation.
1214430	TP115	None Supplied	1.00	Brown clay and sand.
1214431	TP116	None Supplied	0.10	Brown loam and clay with vegetation.
1214432	TP117	None Supplied	0.40	Brown loam and clay with vegetation.
1214433	TP118	None Supplied	0.10	Brown loam and clay with vegetation.
1214434	TP121	None Supplied	1.00	Brown clay and sand.
1214435	TP122	None Supplied	0.10	Brown loam and clay with vegetation.
1214436	TP124	None Supplied	0.10	Brown loam and clay with vegetation.
1214437	TP124	None Supplied	1.00	Brown clay and sand with vegetation.
1214438	TP127	None Supplied	0.10	Brown loam and clay with vegetation.
1214439	TP128	None Supplied	0.10	Brown loam and clay with vegetation.
1214440	TP129	None Supplied	0.50	Brown sand with gravel.
1214441	WS111	None Supplied	0.10	Brown loam and clay with gravel and vegetation.
1214442	TP130	None Supplied	0.10	Brown loam and clay with gravel and vegetation.
1214443	TP132	None Supplied	0.10	Brown loam and clay with vegetation.
1214444	TP133	None Supplied	1.00	Brown clay.
1214445	TP135	None Supplied	0.10	Brown loam and clay with vegetation.
1214446	TP138	None Supplied	1.00	Brown clay and sand.
1214447	TP141	None Supplied	0.50	Brown clay.
1214448	TP142	None Supplied	0.10	Brown loam and clay with vegetation.
1214449	TP144	None Supplied	0.10	Brown loam and clay with gravel and vegetation.
1214450	TP113	None Supplied	0.10	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 19-39850

Project / Site name: Heywood 3

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Pesticides and Herbicides in soil screening	In-house method	In-house method		W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

Iss No 19-39850-1 Heywood 3 13-222

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 19-39850

Project / Site name: Heywood 3

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 19-41246

Project / Site name:	South Heywood Phase 3	Samples received on:	14/05/2019
Your job number:	13-222	Samples instructed on:	14/05/2019
Your order number:	13222-32443NS	Analysis completed by:	21/05/2019
Report Issue Number:	1	Report issued on:	21/05/2019
Samples Analysed:	2 water samples		

Signed:

Katarzyna Lewicka
Head of Reporting Section
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Iss No 19-41246-1 South Heywood Phase 3 13-222

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number: 19-41246

Project / Site name: South Heywood Phase 3

Your Order No: 13222-32443NS

Lab Sample Number				1221977	1221978			
Sample Reference				WS101	WS106			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				13/05/2019	13/05/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

pH	pH Units	N/A	ISO 17025	6.6	6.9			
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0			

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	2.3			
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	0.15	ISO 17025	6.51	3.66			
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.03	0.04			
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0			
Chromium (dissolved)	µg/l	0.2	ISO 17025	3.1	2.0			
Copper (dissolved)	µg/l	0.5	ISO 17025	2.4	5.2			
Lead (dissolved)	µg/l	0.2	ISO 17025	2.4	0.5			
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05			
Nickel (dissolved)	µg/l	0.5	ISO 17025	6.9	9.7			
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.2	1.4			
Zinc (dissolved)	µg/l	0.5	ISO 17025	12	5.3			

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0			

Petroleum Hydrocarbons

TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10			



Analytical Report Number: 19-41246

Project / Site name: South Heywood Phase 3

Your Order No: 13222-32443NS

Lab Sample Number				1221977	1221978			
Sample Reference				WS101	WS106			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				13/05/2019	13/05/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

VOCs

Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0			
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0			
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Trichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Styrene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Tribromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
o-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0			
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Bromobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0			
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0			



Analytical Report Number: 19-41246

Project / Site name: South Heywood Phase 3

Your Order No: 13222-32443NS

Lab Sample Number				1221977	1221978			
Sample Reference				WS101	WS106			
Sample Number				None Supplied	None Supplied			
Depth (m)				None Supplied	None Supplied			
Date Sampled				13/05/2019	13/05/2019			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05	< 0.05			
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05			
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05			
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05			
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05			
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05			
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05			
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05			
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05			
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05			
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05			
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05			
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05			
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05			
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05			
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05			
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05			
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05			
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05			
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05			
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05			
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05			
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05			
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05			
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05			
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05			
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05			
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05			
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05			
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05			
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05			
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05			
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05			
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05			
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05			
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Carbazole	µg/l	0.05	NONE	< 0.05	< 0.05			
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05			
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05			
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05			
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 19-41246

Project / Site name: South Heywood Phase 3

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

**Nicola Dawson**

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Analytical Report Number : 21-13485

Project / Site name:	South Heywood Phase 3	Samples received on:	30/09/2021
Your job number:	13-222	Samples instructed on/ Analysis started on:	30/09/2021
Your order number:	13222-ND-A	Analysis completed by:	07/10/2021
Report Issue Number:	1	Report issued on:	07/10/2021
Samples Analysed:	7 soil samples		

Signed:

Izabela Wójcik

Izabela Wójcik
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-13485
Project / Site name: South Heywood Phase 3
Your Order No: 13222-ND-A

Lab Sample Number				2030640	2030641	2030642	2030643	2030644
Sample Reference				TP101	TP101	TP105	TP106	TP107
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.50	0.30	0.80	0.60
Date Sampled				27/09/2021	27/09/2021	27/09/2021	27/09/2021	27/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	9.2	11	17	11	9.4
Total mass of sample received	kg	0.001	NONE	0.30	1.0	0.30	0.30	0.30

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	-	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	10.9	7.8	7.4	6.8	7.9
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1600	700	5600	190	240
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.083	0.16	1.6	0.016	0.028
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	170	310	3300	33	55
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	82.6	157	1630	16.3	27.7
Sulphide	mg/kg	1	MCERTS	9.3	8.1	28	1.6	< 1.0
Total Sulphur	mg/kg	50	MCERTS	950	520	4600	110	120
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.5	2.1	4.2	0.3	0.7

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	0.22	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	0.37	0.42	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	0.32	0.30	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	3.6	1.8	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	-	0.90	0.60	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	9.3	6.7	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	-	8.0	6.8	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	5.9	4.8	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	-	3.9	3.9	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	7.7	7.1	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	1.9	1.8	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	5.8	5.6	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	2.9	3.1	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	0.77	0.92	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	3.4	3.6	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	54.6	47.7	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.9	12	37	9.4	4.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	24	37	27	42
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	36	180	6.5	16
Lead (aqua regia extractable)	mg/kg	1	MCERTS	45	180	180	10	16
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	19	110	16	29
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	77	110	310	45	63

Analytical Report Number: 21-13485
Project / Site name: South Heywood Phase 3
Your Order No: 13222-ND-A

Lab Sample Number				2030640	2030641	2030642	2030643	2030644
Sample Reference				TP101	TP101	TP105	TP106	TP107
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.50	0.30	0.80	0.60
Date Sampled				27/09/2021	27/09/2021	27/09/2021	27/09/2021	27/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	4.2	6.6	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	19	24	16	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	120	72	50	< 1.0	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	85	< 10	20	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	230	100	86	< 10	< 10

VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	-	-	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	-	-	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-

Analytical Report Number: 21-13485
 Project / Site name: South Heywood Phase 3
 Your Order No: 13222-ND-A

Lab Sample Number				2030640	2030641	2030642	2030643	2030644
Sample Reference				TP101	TP101	TP105	TP106	TP107
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.50	0.30	0.80	0.60
Date Sampled				27/09/2021	27/09/2021	27/09/2021	27/09/2021	27/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	< 0.2	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	0.22	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	0.19	-	-	-	-

Analytical Report Number: 21-13485
Project / Site name: South Heywood Phase 3
Your Order No: 13222-ND-A

Lab Sample Number				2030640	2030641	2030642	2030643	2030644
Sample Reference				TP101	TP101	TP105	TP106	TP107
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.50	0.30	0.80	0.60
Date Sampled				27/09/2021	27/09/2021	27/09/2021	27/09/2021	27/09/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	2.0	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	0.37	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	3.0	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	2.9	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.8	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	1.7	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.2	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.89	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.9	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.2	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.32	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.3	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-13485
 Project / Site name: South Heywood Phase 3
 Your Order No: 13222-ND-A

Lab Sample Number				2030645	2030646
Sample Reference				TP109	TP110
Sample Number				None Supplied	None Supplied
Depth (m)				0.40	1.00
Date Sampled				27/09/2021	27/09/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	7.0	13
Total mass of sample received	kg	0.001	NONE	0.30	0.30

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	5.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	520	150
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.061	0.010
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	120	21
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	61.0	10.4
Sulphide	mg/kg	1	MCERTS	1.8	2.0
Total Sulphur	mg/kg	50	MCERTS	360	110
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.3	0.6

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.62	0.29
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.69	0.22
Pyrene	mg/kg	0.05	MCERTS	0.60	0.22
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.40	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.33	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.28	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.20	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.32	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.44	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	6.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	30
Copper (aqua regia extractable)	mg/kg	1	MCERTS	33	20
Lead (aqua regia extractable)	mg/kg	1	MCERTS	45	14
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	23
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	44	51

Analytical Report Number: 21-13485
Project / Site name: South Heywood Phase 3
Your Order No: 13222-ND-A

Lab Sample Number				2030645	2030646
Sample Reference				TP109	TP110
Sample Number				None Supplied	None Supplied
Depth (m)				0.40	1.00
Date Sampled				27/09/2021	27/09/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Petroleum Hydrocarbons					
TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	< 10

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	-
Chloroethane	µg/kg	1	NONE	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-
Vinyl Chloride	µg/kg	1	NONE	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-
Benzene	µg/kg	1	MCERTS	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-
Trichloroethene	µg/kg	1	MCERTS	-	-
Dibromomethane	µg/kg	1	MCERTS	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-
Toluene	µg/kg	1	MCERTS	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-
Tetrachloroethene	µg/kg	1	NONE	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	-
Styrene	µg/kg	1	MCERTS	-	-
Tribromomethane	µg/kg	1	NONE	-	-
o-Xylene	µg/kg	1	MCERTS	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-

Analytical Report Number: 21-13485
Project / Site name: South Heywood Phase 3
Your Order No: 13222-ND-A

Lab Sample Number				2030645	2030646
Sample Reference				TP109	TP110
Sample Number				None Supplied	None Supplied
Depth (m)				0.40	1.00
Date Sampled				27/09/2021	27/09/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
2-Chlorotoluene	µg/kg	1	MCERTS	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-
Butylbenzene	µg/kg	1	MCERTS	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-

Analytical Report Number: 21-13485
Project / Site name: South Heywood Phase 3
Your Order No: 13222-ND-A

Lab Sample Number				2030645	2030646
Sample Reference				TP109	TP110
Sample Number				None Supplied	None Supplied
Depth (m)				0.40	1.00
Date Sampled				27/09/2021	27/09/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Azobenzene	mg/kg	0.3	MCERTS	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-13485

Project / Site name: South Heywood Phase 3

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2030640	TP101	None Supplied	0.3	Brown clay and loam with gravel and vegetation.
2030641	TP101	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
2030642	TP105	None Supplied	0.3	Brown clay and sand with gravel and vegetation.
2030643	TP106	None Supplied	0.8	Brown clay and sand with gravel.
2030644	TP107	None Supplied	0.6	Brown loam and clay with gravel and vegetation.
2030645	TP109	None Supplied	0.4	Brown loam and clay with gravel and vegetation.
2030646	TP110	None Supplied	1	Brown clay and sand with gravel.

Analytical Report Number : 21-13485

Project / Site name: South Heywood Phase 3

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS

Analytical Report Number : 21-13485

Project / Site name: South Heywood Phase 3

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Appendix IX: Geotechnical Testing Results





LABORATORY REPORT



4043

Contract Number: PSL19/2834

Report Date: 24 May 2019
Client's Reference: 13-222-32354-EF
Client Name: E3P
Heliport Business Park
Liverpool Road
Eccles
Manchester
M30 7RU

For the attention of: Ben Taylor

Contract Title: South Heywood Phase 3

Date Received: 8/5/2019
Date Commenced: 8/5/2019
Date Completed: 24/5/2019

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)

S Royle
(Laboratory Manager)

A Watkins
(Director)

S Eyre
(Senior Technician)

R Berriman
(Quality Manager)

L Knight
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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

PSL
Professional Soils Laboratory

South Heywood Phase 3

Contract No:

PSL19/2834

Client Ref:

13222-32354-1

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



4043

PSL

Professional Soils Laboratory

South Heywood Phase 3

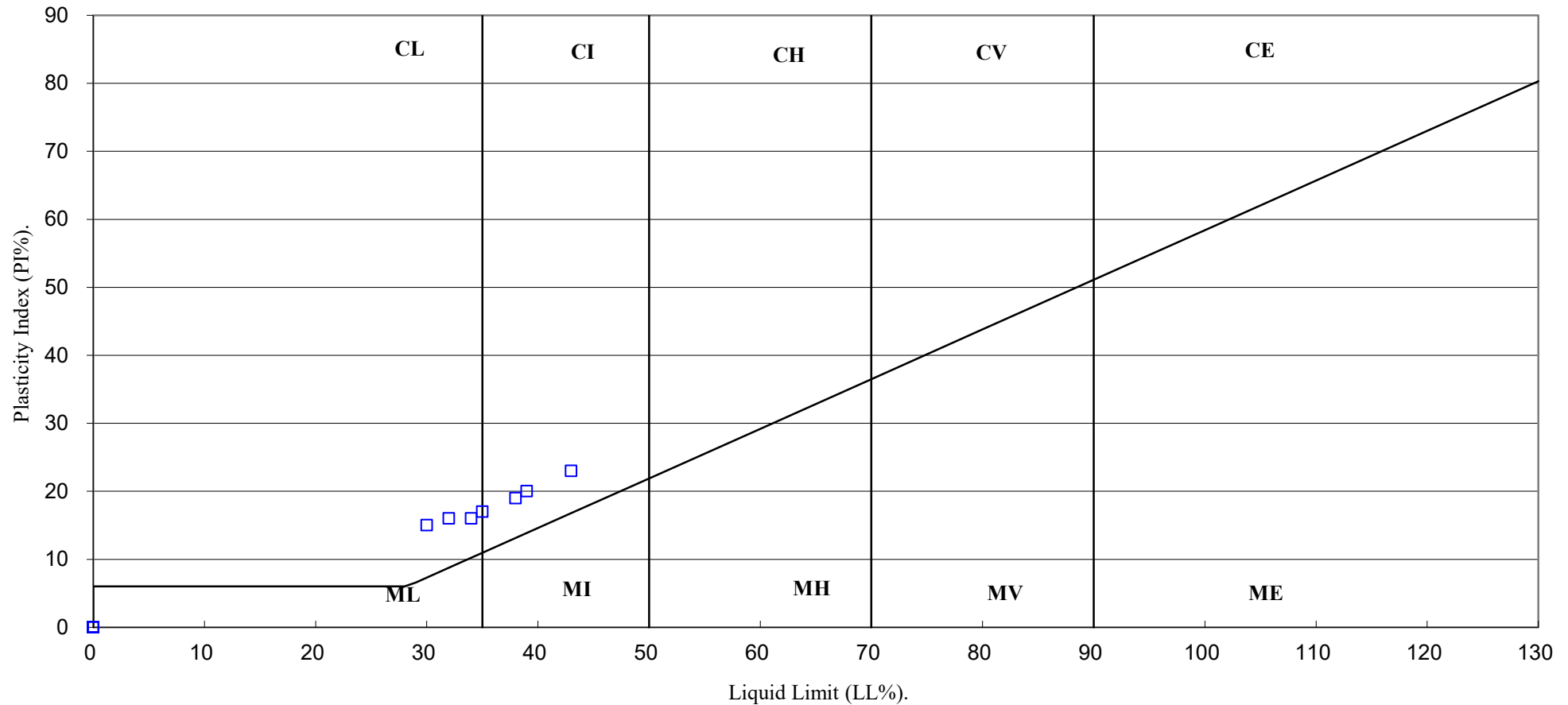
Contract No:

PSL19/2834

Client Ref:

13222-32354-1

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL
Professional Soils Laboratory

South Heywood Phase 3

Contract No:

PSL19/2834

Client Ref:

13222-32354-1

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

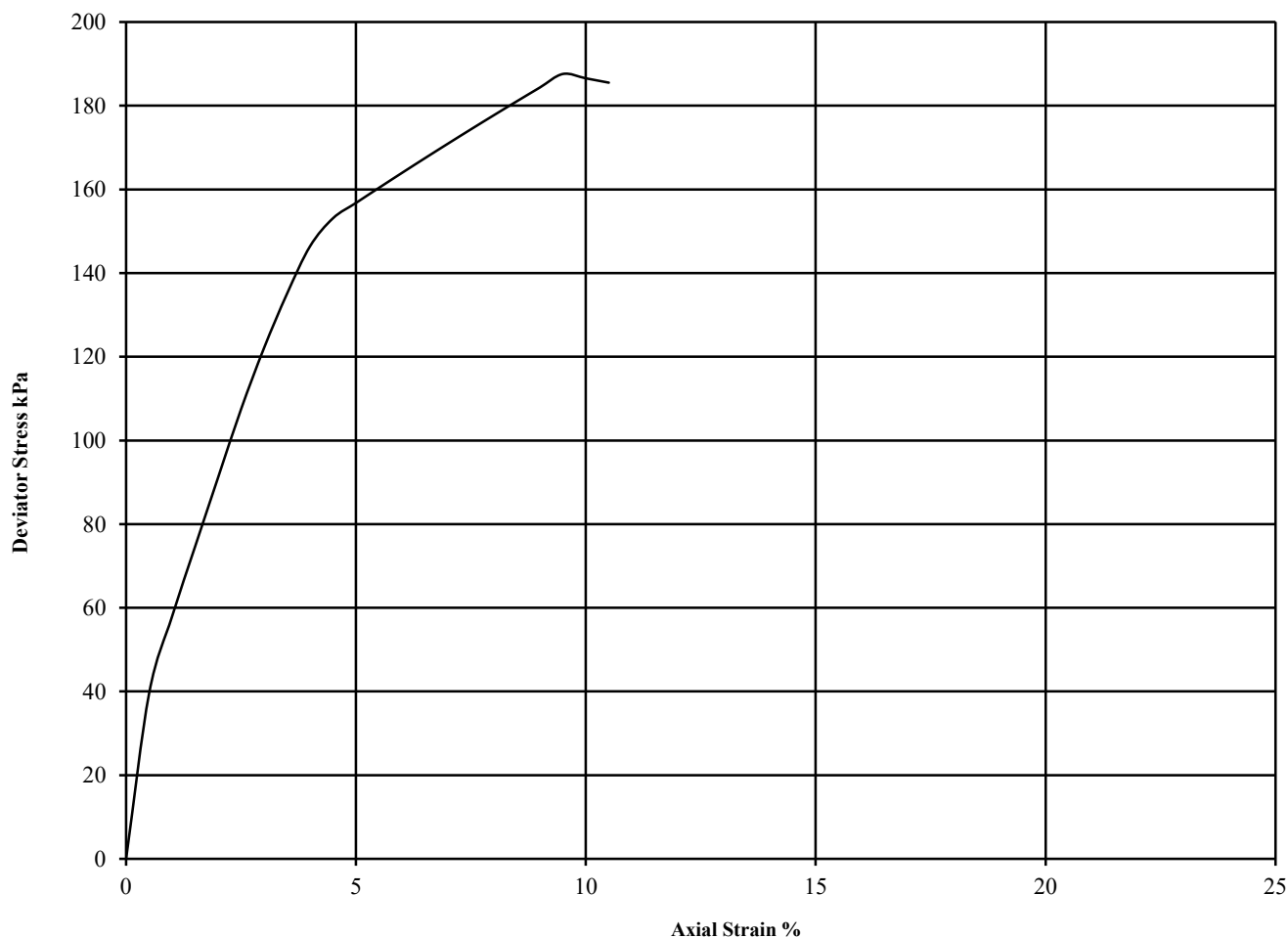
Hole Number: CP102

Top Depth (m): 1.00

Sample Number:

Base Depth (m): 1.45

Sample Type U100



Diameter (mm):		38	Height (mm):		76	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample
									Sample taken from top of tube
									Rate of strain = 2 %/min
									Latex Membrane used 0.2 mm thick,
				θ_3	$(\theta_1-\theta_3)_f$	$^{1/2}(\theta_1-\theta_3)_f$			Correction applied 0.87
1	14	2.13	1.87	24.5	188	94	9.5	Brittle	See summary of soil descriptions



4043

PSL

Professional Soils Laboratory

South Heywood Phase 3

Contract No:

PSL19/2834

Client Ref:

13222-32354-1

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: CP102

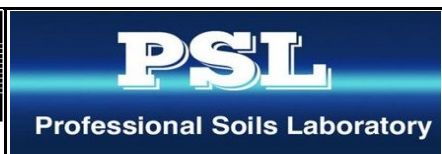
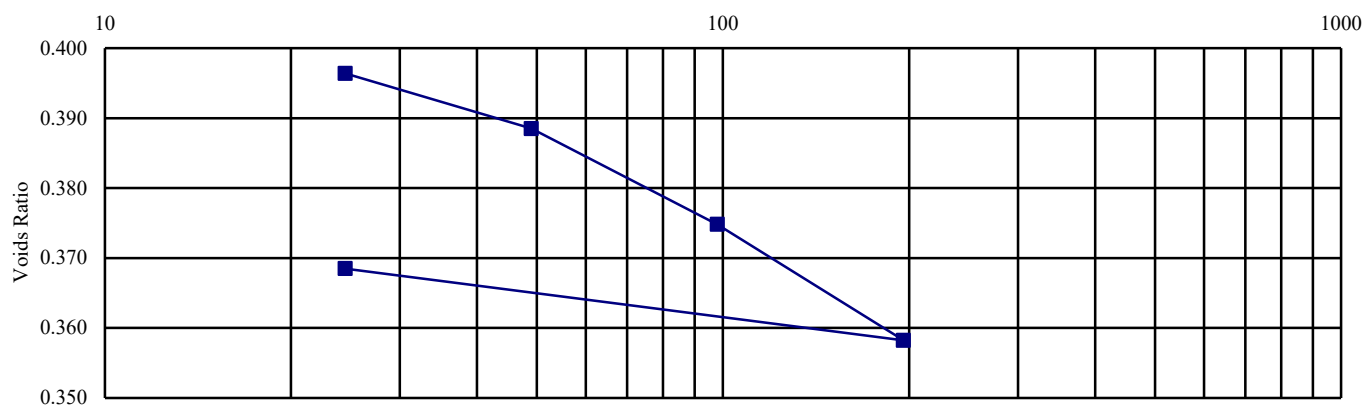
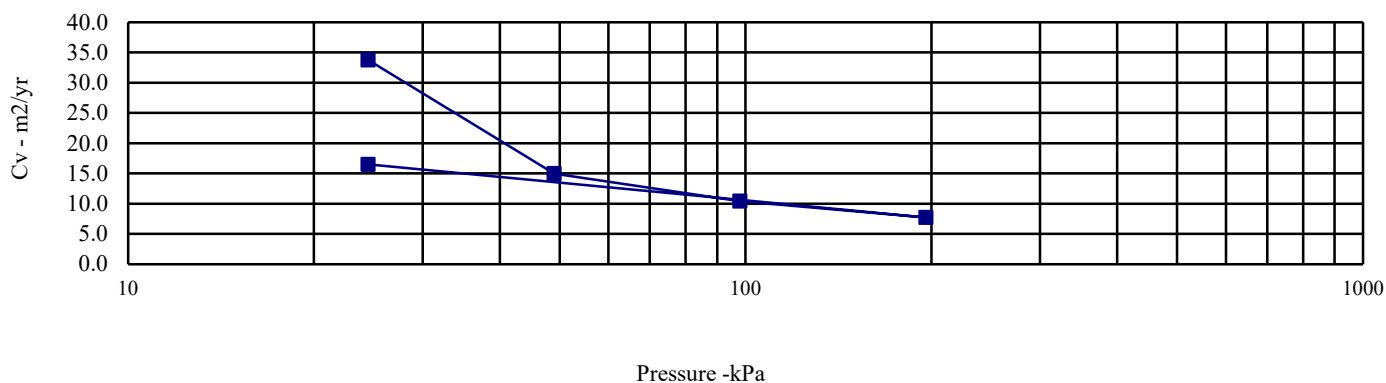
Top Depth (m): 1.00

Sample Number:

Base Depth (m) : 1.45

Sample Type: U100

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	14	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	2.15	0	24.5	0.231	33.742	Method used to	
Dry Density (Mg/m3):	1.89	24.5	49	0.231	14.945	determine CV:	T90
Voids Ratio:	0.404	49	98	0.201	10.398	Nominal temperature	
Degree of saturation:	91.0	98	196	0.123	7.707	during test ' C:	20
Height (mm):	19.572	196	24.5	0.044	16.491	Remarks:	
Diameter (mm)	75.03					See summary of soil descriptions	
Particle Density (Mg/m3):	2.65						
Assumed							



South Heywood Phase 3

Contract No:
PSL19/2834
Client Ref:
13222-32354-1

Appendix X: Origin of Chemical Assessment Criteria





CONSTITUENT	ORIGIN OF RISK ASSESSMENT VALUE
Arsenic	2014 LQM/CIEH S4ULs
Cadmium	2014 LQM/CIEH S4ULs
Chromium	2014 LQM/CIEH S4ULs
Lead	PROVISIONAL C4SL
Mercury	2014 LQM/CIEH S4ULs – methylmercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide – Total	2014 LQM/CIEH S4ULs
Phenols – Total	2014 LQM/CIEH S4ULs
Naphthalene	General assessment criteria (GAC) developed by CIEH/LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM.
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene	
Chrysene	
Benzo(b/k)Fluoranthene (iii)	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C5-C6 (aliphatic)	
TPH C6-C8 (aliphatic)	
TPH C8-C10 (aliphatic)	
TPH C10-C12 (aliphatic)	
TPH C21-C35 (aromatic)	

Appendix XI: Dynamic Cone Penetrometer Tests



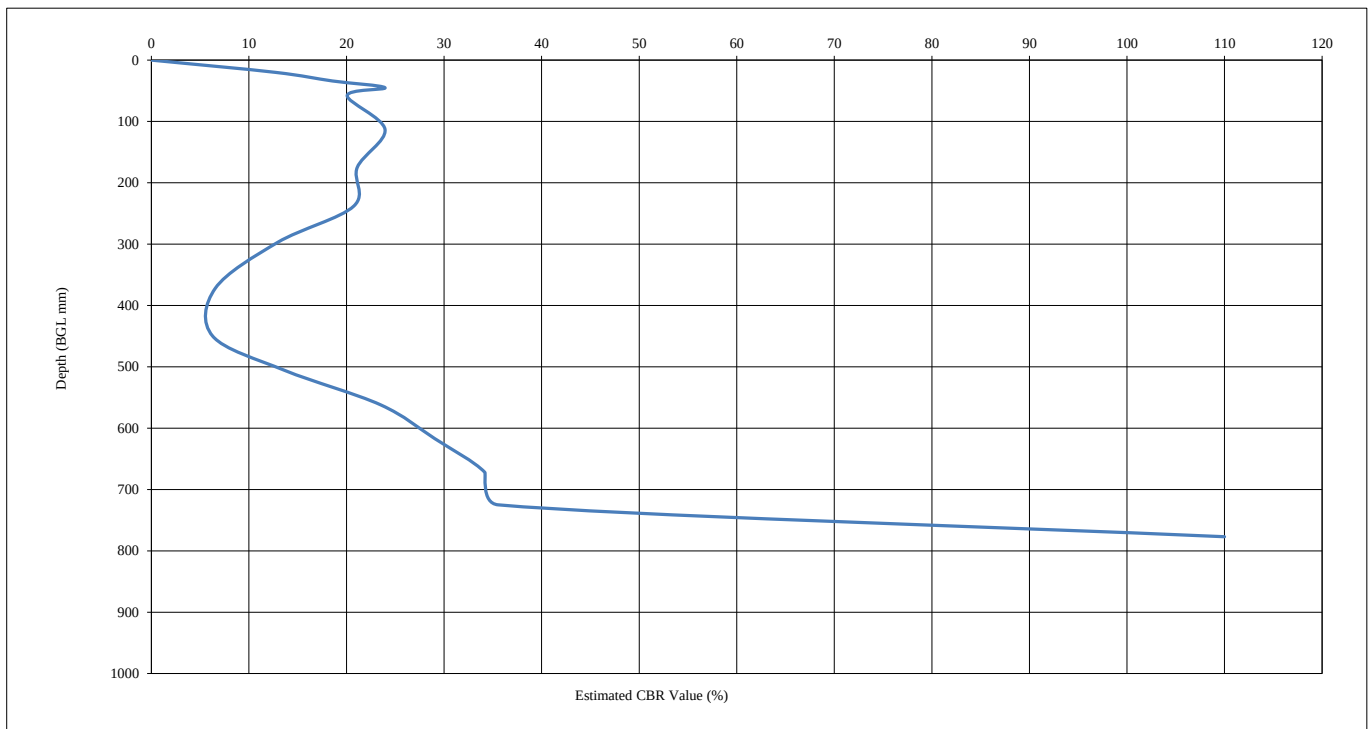


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP101	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	777		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	238	19	19	12.53	20.87
238	562	34	15	21.60	11.73
562	777	74	40	5.38	51.05

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

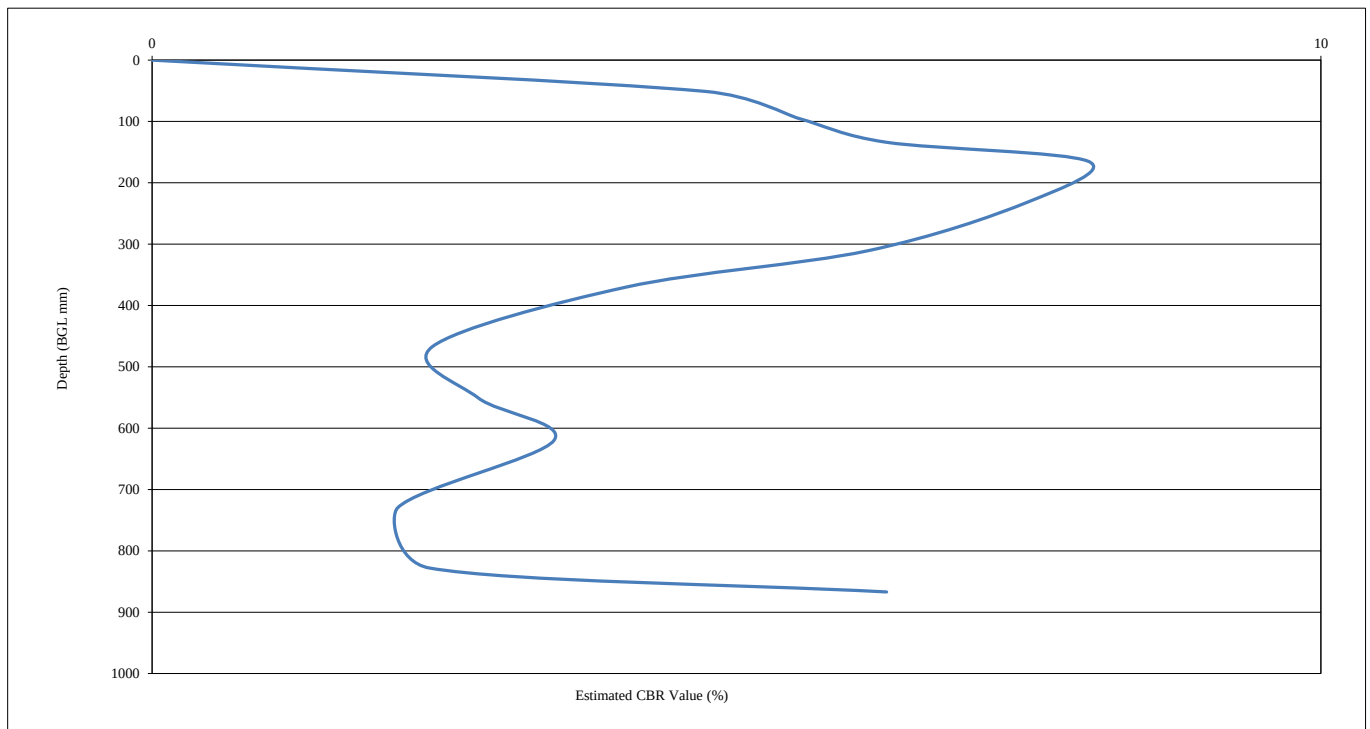


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP102	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	867		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	370	9	9	41.11	5.94
370	620	12	3	83.33	2.82
620	867	15	3	82.33	2.85

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

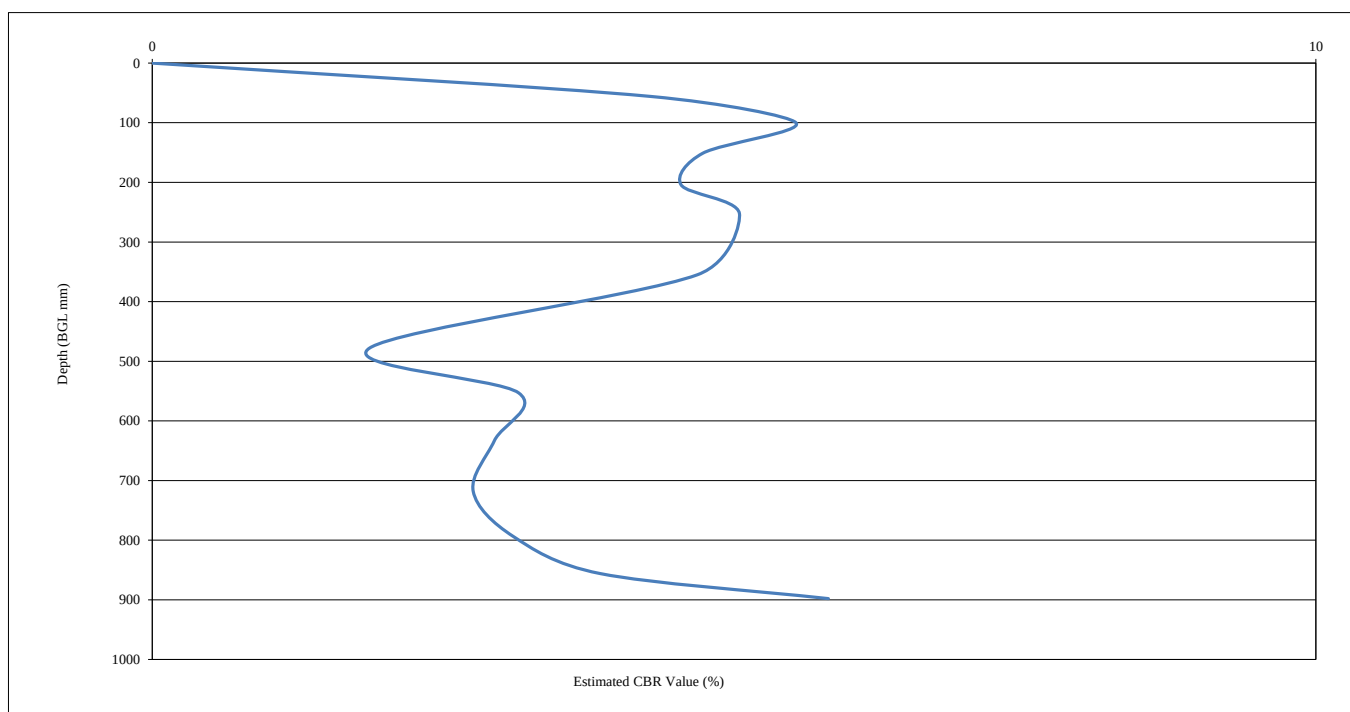


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP103	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	898		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	355	7	7	50.71	4.76
355	633	10	3	92.67	2.52
633	898	14	4	66.25	3.59

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

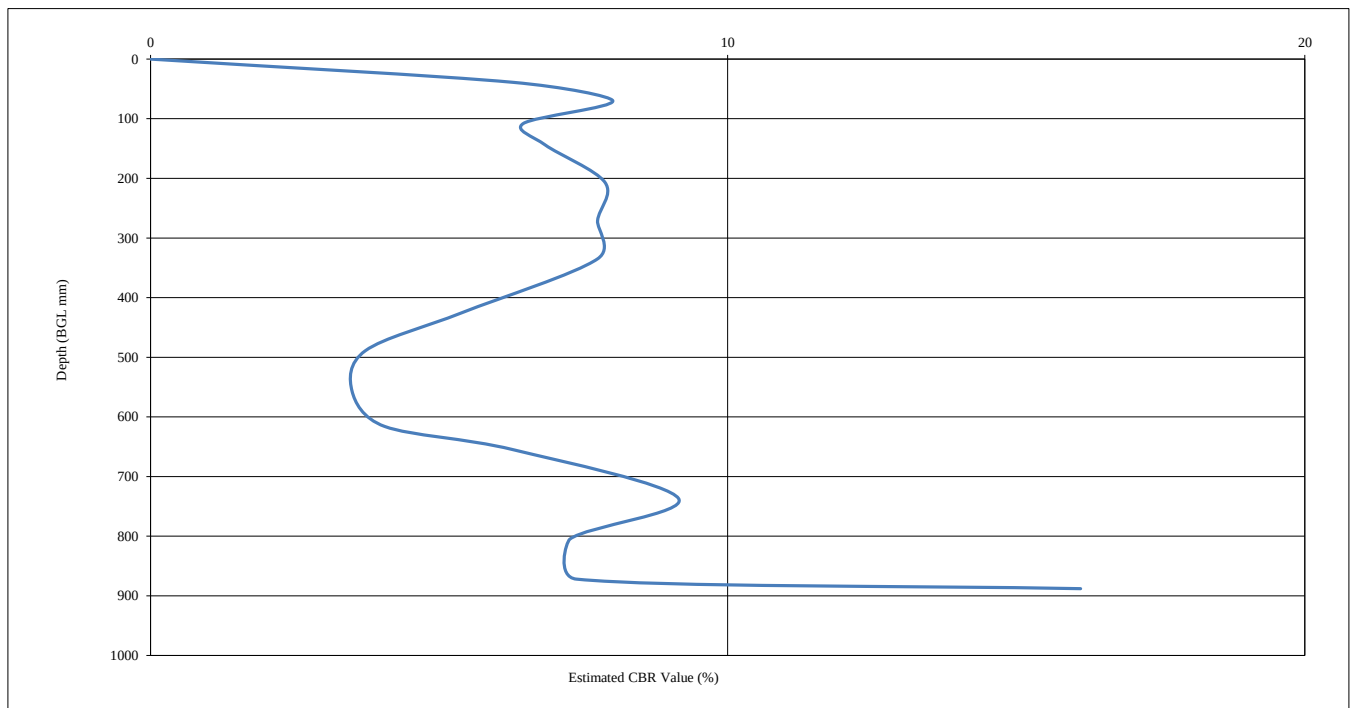


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP104	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	888		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	335	10	10	33.50	7.38
335	737	19	9	44.67	5.44
556	888	24	5	66.40	3.58

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

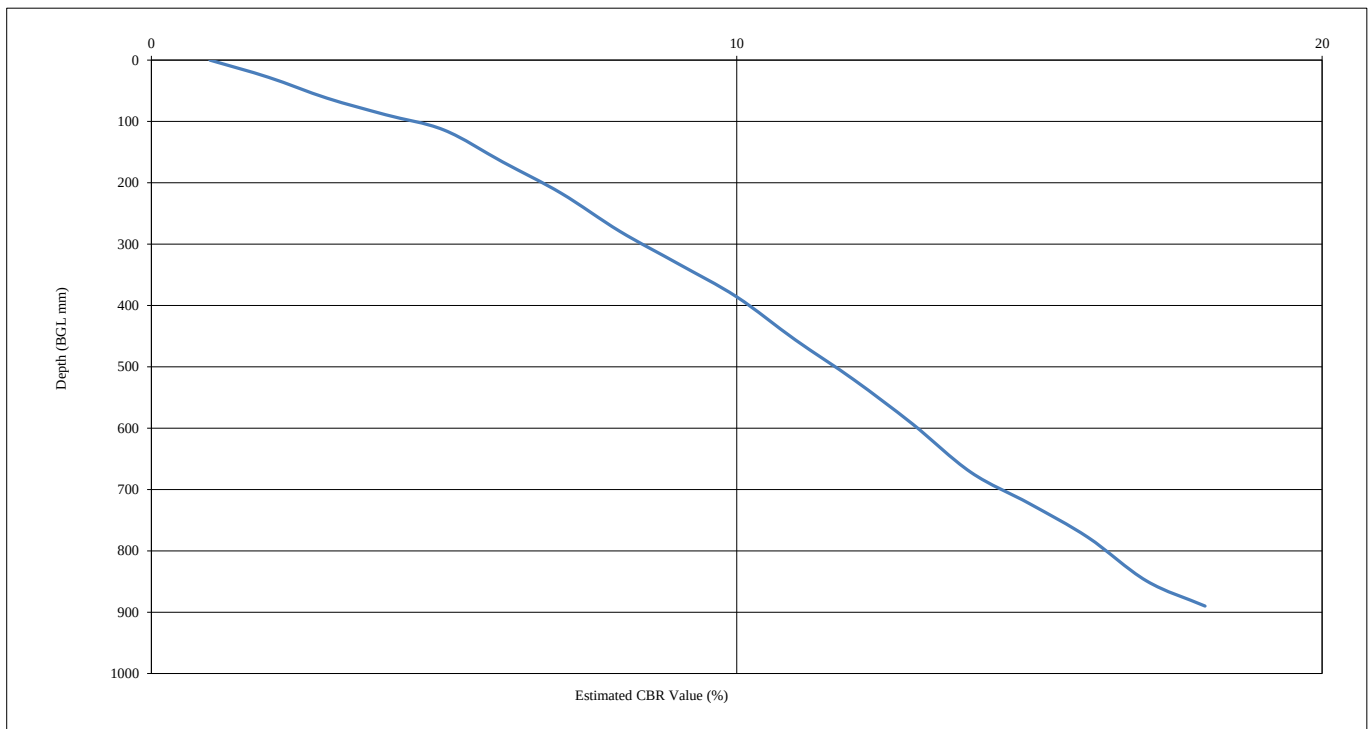


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP105	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	890		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	114	4	4	28.50	8.75
114	521	19	15	27.13	9.22
521	890	39	20	18.45	13.86

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

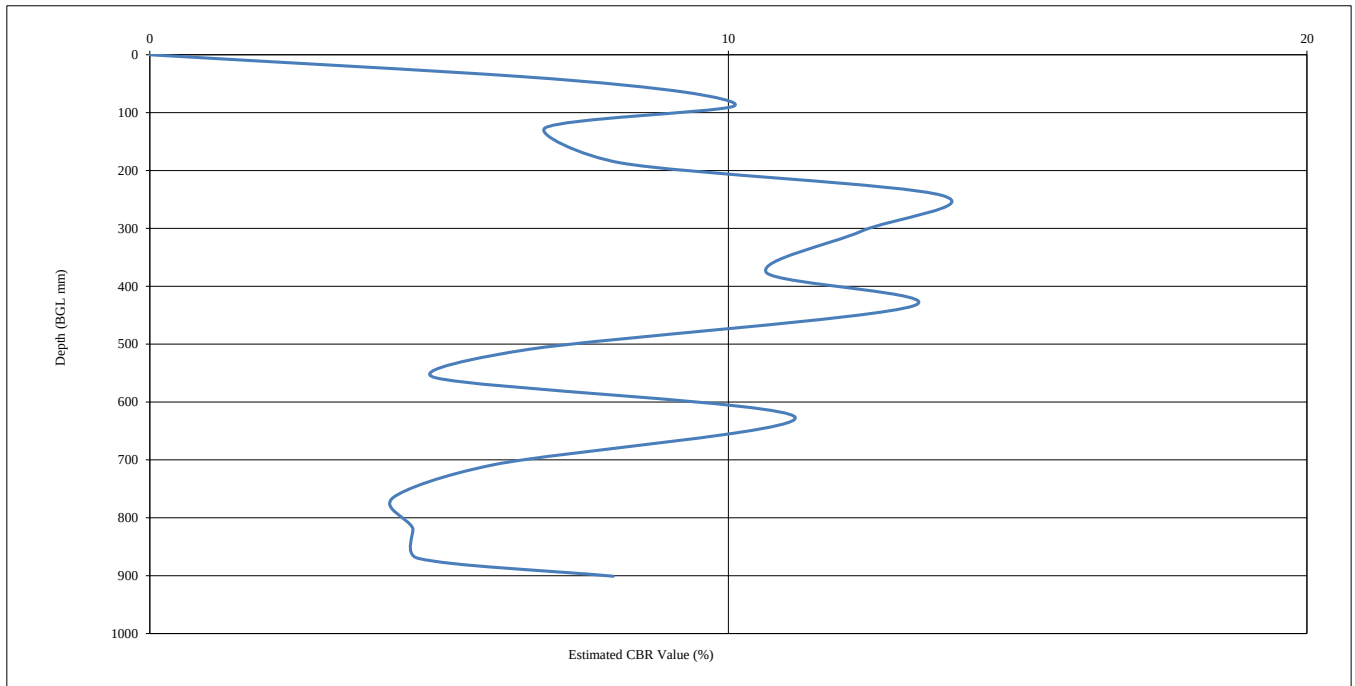


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP106	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	901		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	243	9	9	27.00	9.27
243	558	21	12	26.25	9.55
558	901	30	9	38.11	6.44

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

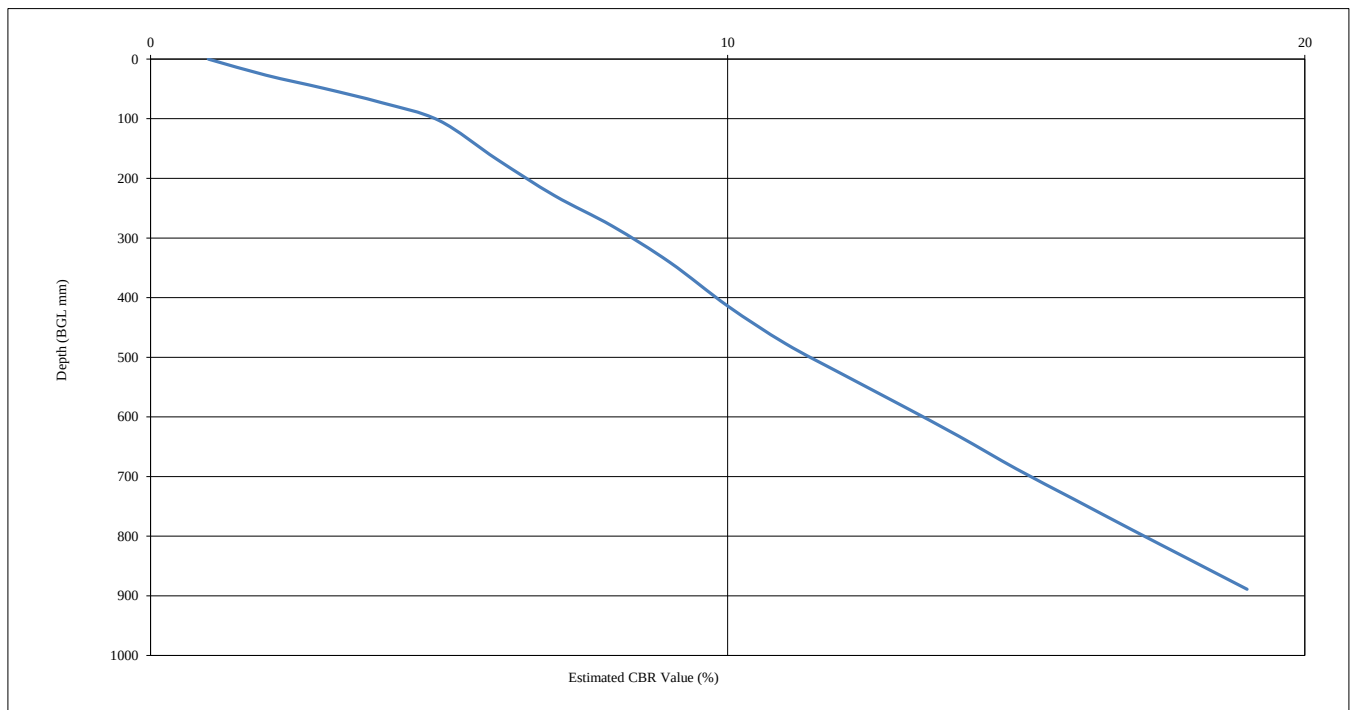


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP107	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	889		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	103	4	4	25.75	9.75
103	477	17	13	28.77	8.67
477	889	95	78	5.28	52.00

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

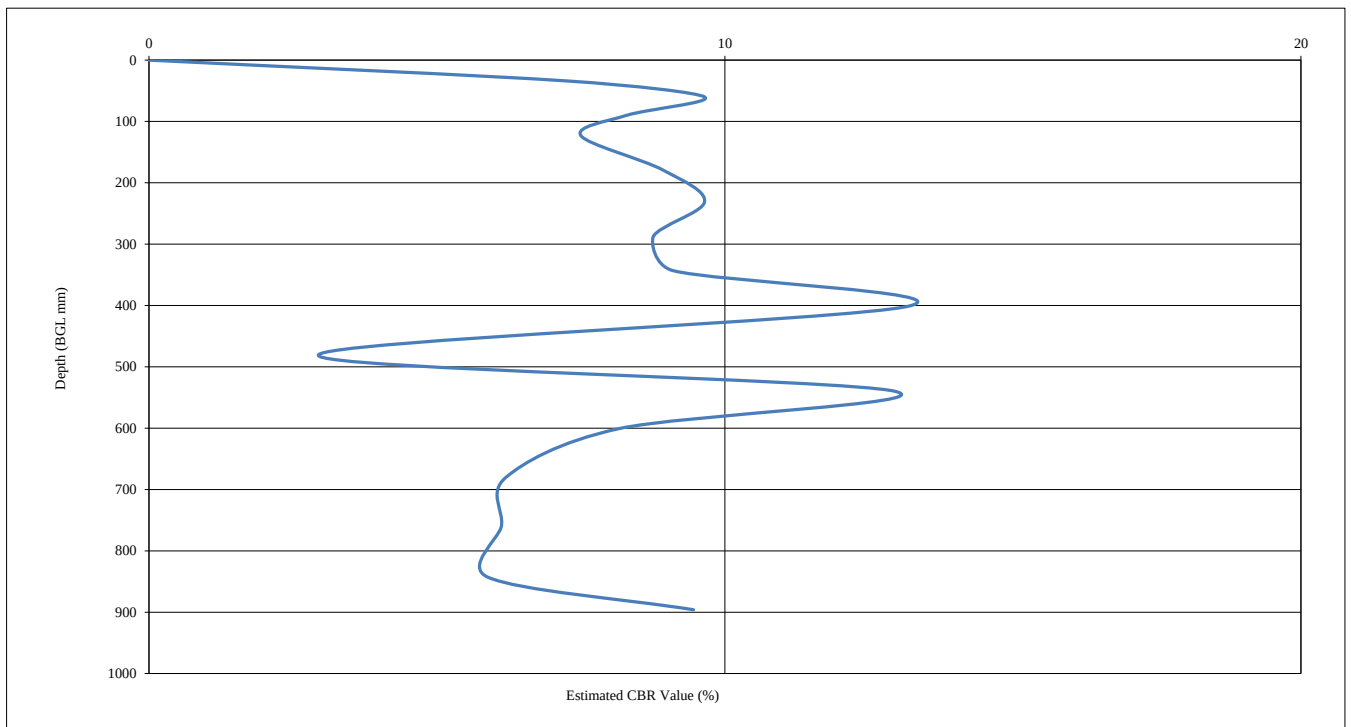


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP108	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	896		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	343	12	12	28.58	8.73
343	601	21	9	28.67	8.70
601	896	29	8	36.88	6.67

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

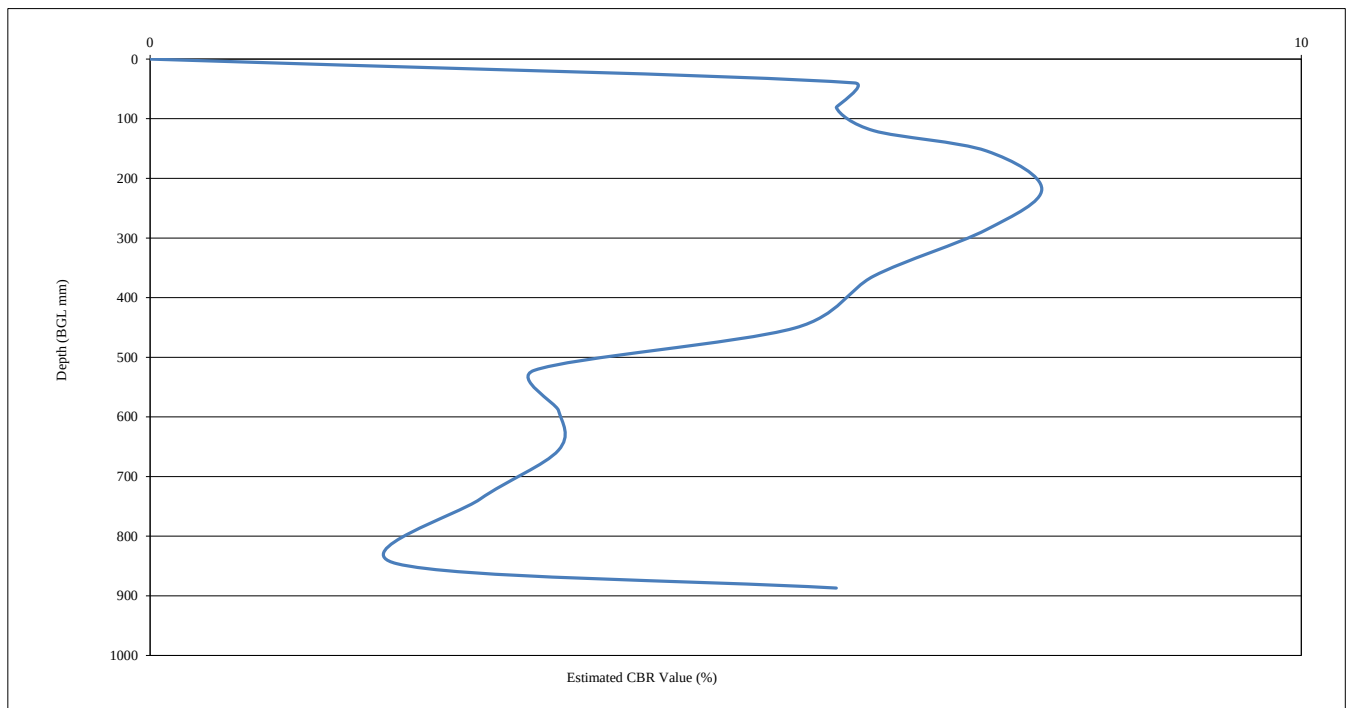


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP109	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	887		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	154	4	4	38.50	6.37
154	451	12	8	37.13	6.62
451	887	18	6	72.67	3.26

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

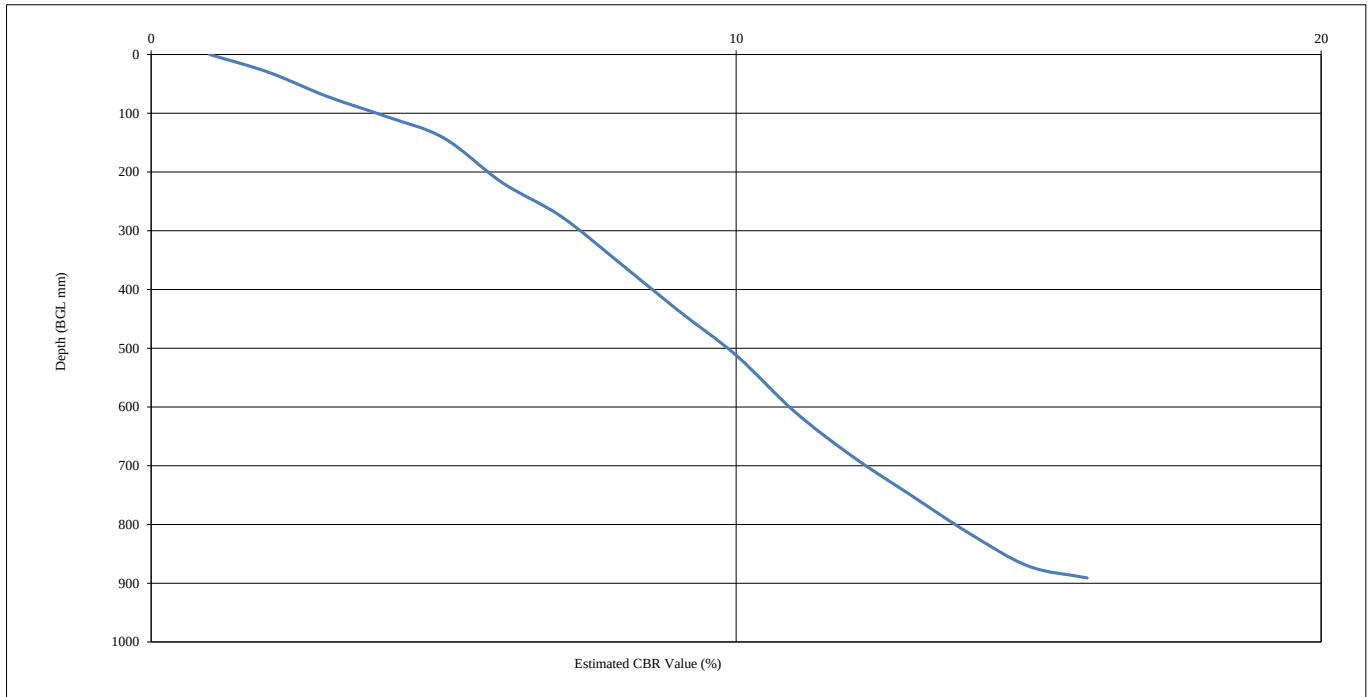


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP110	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	891		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	142	4	4	35.50	6.94
142	608	16	12	38.83	6.31
608	891	25	9	31.44	7.89

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

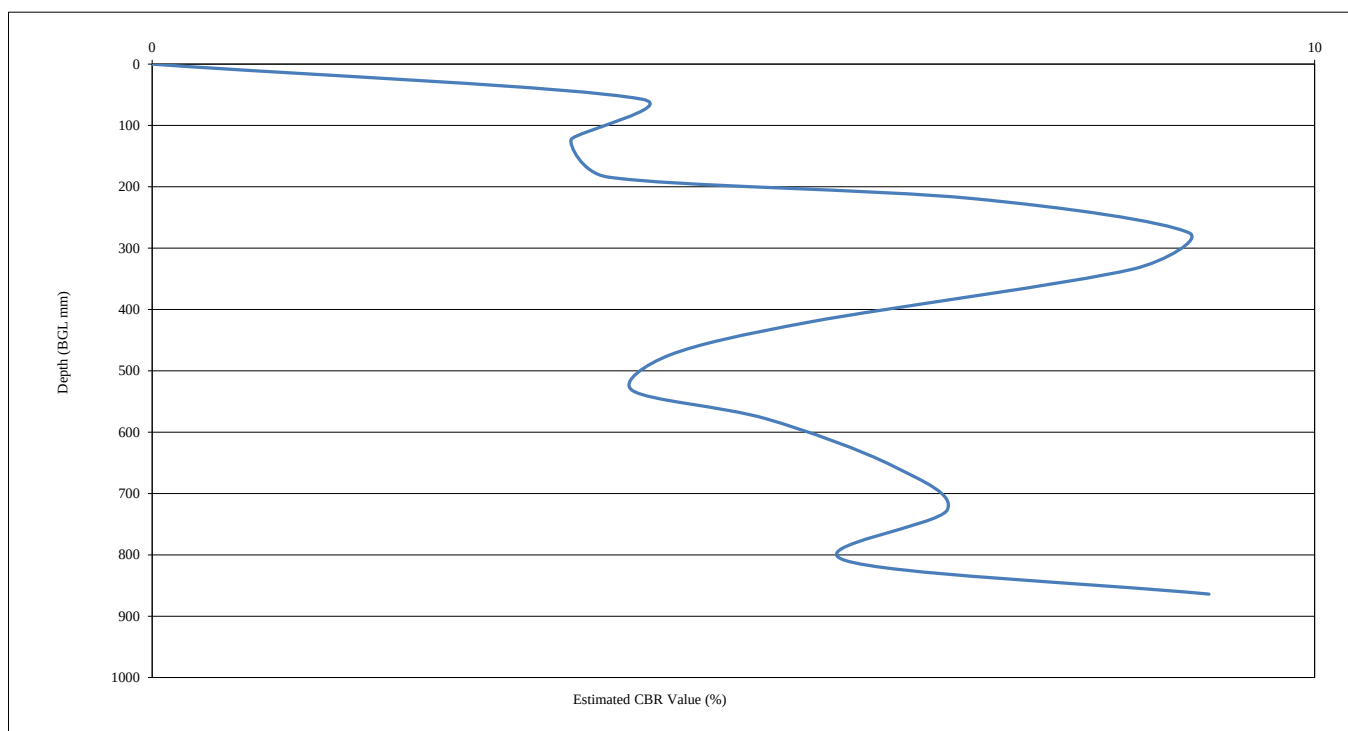


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP111	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	864		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	184	3	3	61.33	3.89
184	532	12	9	38.67	6.34
532	864	21	9	36.89	6.66

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

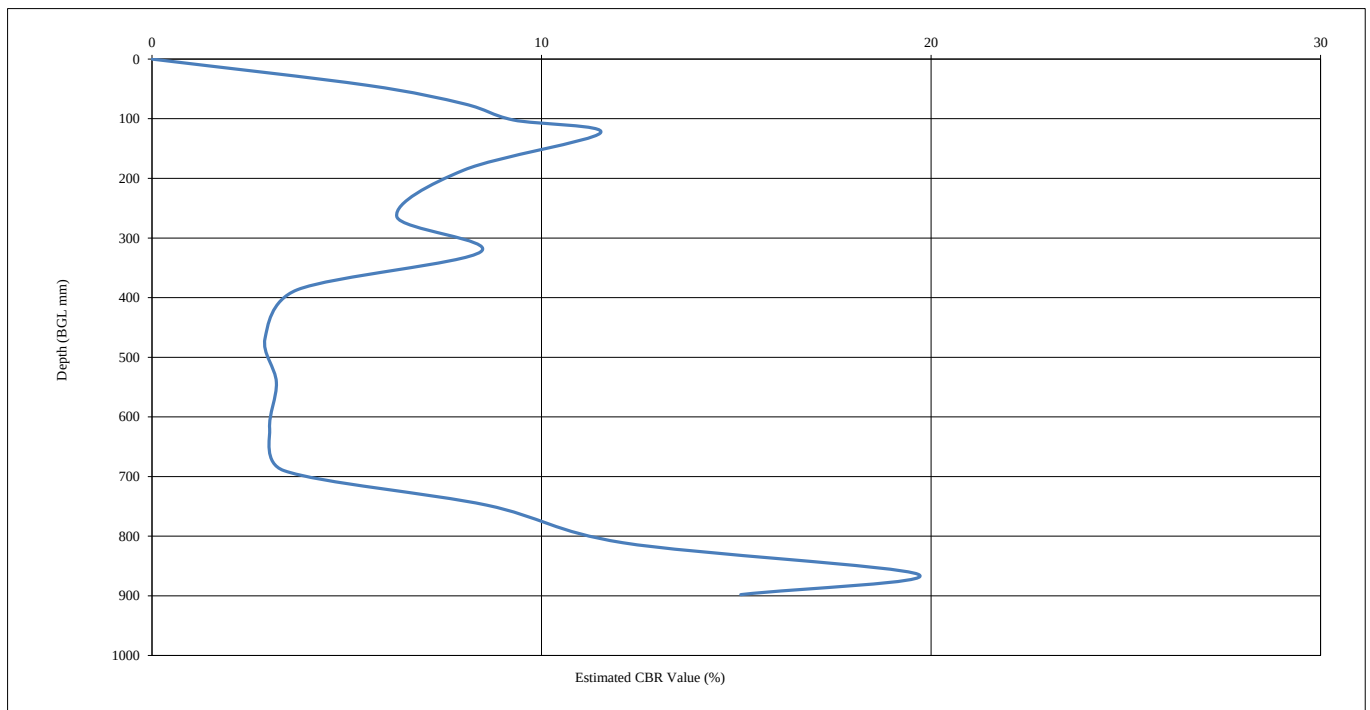


Determination of Dynamic Cone Penetrometer - Estimated CBR Value (%)

In Accordance with TRL Report PR/INT/277/04

Site Name	South Heywood Phase 3	Test Date:	24/05/2019
Site Ref	13-222	Test Location:	Heywood
Test No.:	DCP112	Easting:	0
Initial Depth (mm BGL):	0	Northing:	0
Final Depth (mm BGL):	898		

Estimated California Bearing Ratio Graph



Start Depth (mm) BGL	Finish Depth (mm) BGL	No. of Blows	Blows Per Layer	DCP mm/Blows	Ave Estimated Layer (CBR %)
0	323	8	8	40.38	6.06
323	690	14	6	61.17	3.91
690	898	26	12	17.33	14.81

Comments

Site Engineer:	Checked By:	Date:	Approved By:	Date:
T Preston	N Sellars	05/07/2019	M Dyer	05/07/2019

Appendix XII: BRE 365 Soakaway Test Certificates



		Site: South Heywood Phase 3 Job Number: 13-222 Date of Test: 29/04/2019		Trial Pit Number: SA101 Length: 1.70 m Width: 0.40 m Depth: 1.80 m Groundwater Level: m		
The time to fall to 25% effective storage depth has been extrapolated.	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
	0.00	0.16				
	1.00	0.16				
	2.00	0.18				
	3.00	0.19				
	4.00	0.19				
	5.00	0.2				
	10.00	0.21				
	20.00	0.26				
	30.00	0.3				
	60.00	0.35				
	120.00	0.51				
	180.00	0.69				
	1260.00	0.72				
	1320.00	0.72				
	1380.00	0.72				
1440.00	0.72					
12000.00	1.30					
15000.00	1.39					
Effective Storage Depth	m	1.64				
75% Effective Storage Depth	m	1.23				
(i.e. depth below GL)	m	0.57				
25% Effective Storage Depth	m	0.41				
(i.e. depth below GL)	m	1.39				
Effective Storage Depth 75%-25%	m	0.82				
Time to fall to 75% effective depth	mins	140.00				
Time to fall to 25% effective depth	mins	15000.00				
V (75%-25%)	m3	0.56				
a (50%)	m2	4.12				
t (75%-25%)	mins	14860.00				
SOIL INFILTRATION RATE	m/s	1.52E-07				

DESIGN SOIL INFILTRATION RATE, f

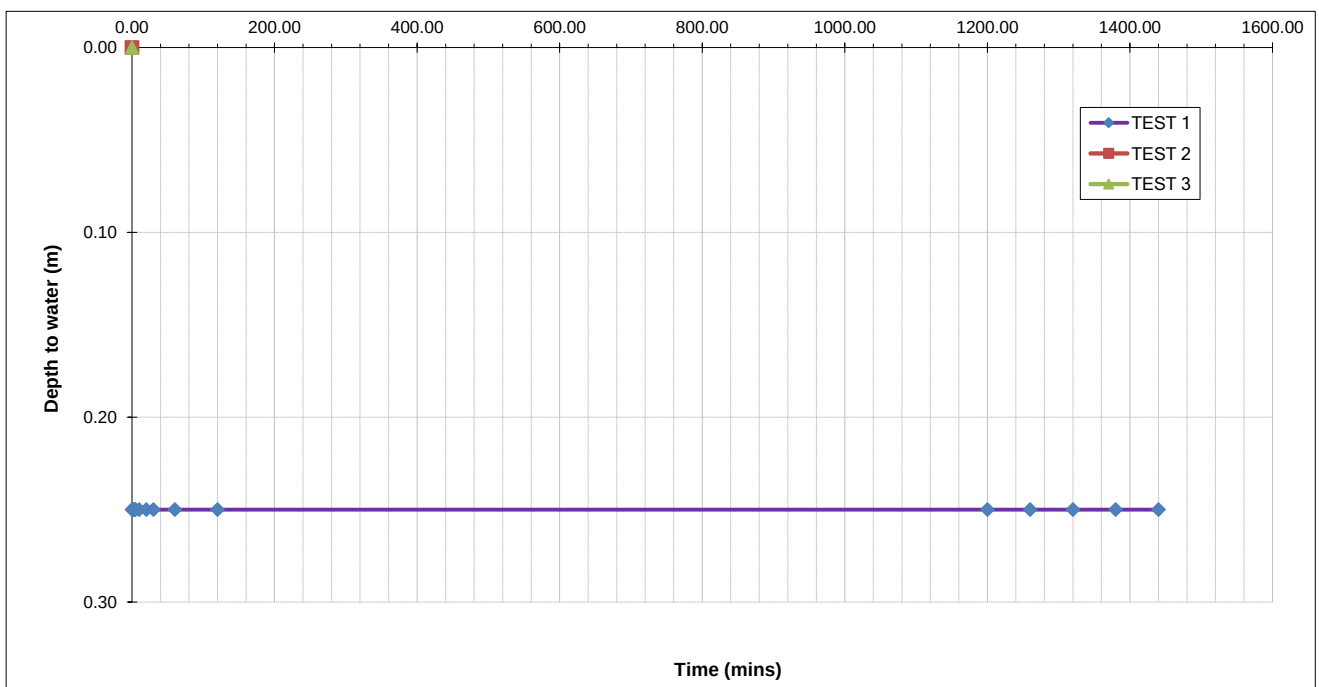
1.52E-07



		Site: South Heywood Phase 3 Job Number: 13-222 Date of Test: 29/04/2019		Trial Pit Number: SA102 Length: 1.80 m Width: 0.40 m Depth: 1.85 m Groundwater Level: m		
The test has failed.	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
	0.00	0.25	0.00	0.00	0.00	0.00
	1.00	0.25				
	2.00	0.25				
	3.00	0.25				
	4.00	0.25				
	5.00	0.25				
	10.00	0.25				
	20.00	0.25				
	30.00	0.25				
	60.00	0.25				
	120.00	0.25				
	1200.00	0.25				
	1260.00	0.25				
1320.00	0.25					
1380.00	0.25					
1440.00	0.25					
Effective Storage Depth	m	1.60				
75% Effective Storage Depth	m	1.20				
(i.e. depth below GL)	m	0.65				
25% Effective Storage Depth	m	0.40				
(i.e. depth below GL)	m	1.45				
Effective Storage Depth 75%-25%	m	0.80				
Time to fall to 75% effective depth	mins	N/A				
Time to fall to 25% effective depth	mins	N/A				
V (75%-25%)	m3	0.58				
a (50%)	m2	4.24				
t (75%-25%)	mins	N/A				
SOIL INFILTRATION RATE	m/s	N/A				

DESIGN SOIL INFILTRATION RATE, f

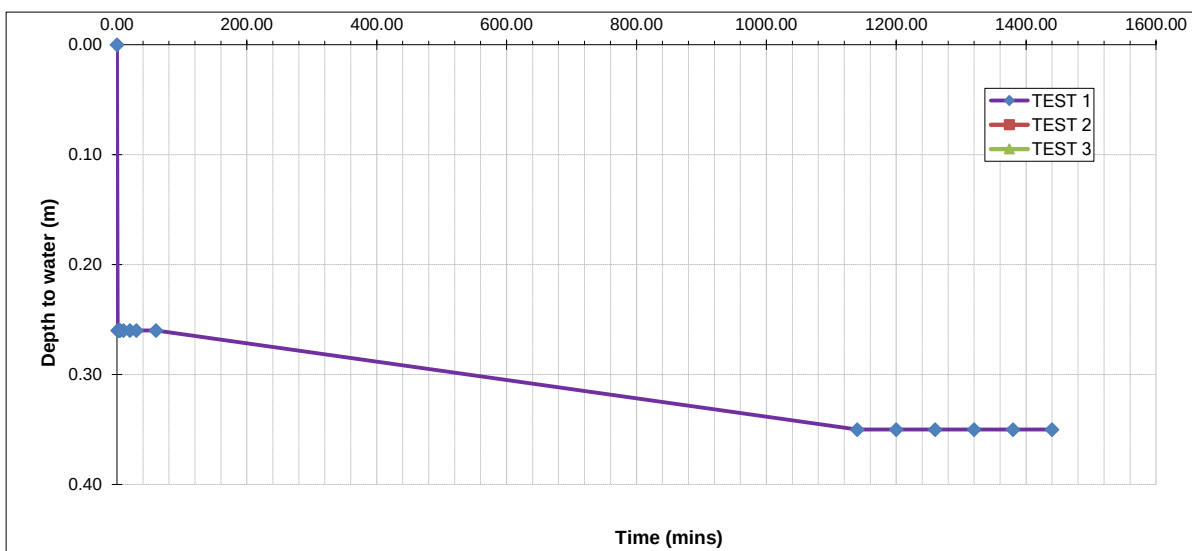
N/A



		Site: South Heywood Phase 3 Job Number: 13-222 Date of Test: 29/04/2019		Trial Pit Number: SA103 Length: 2.10 m Width: 0.40 m Depth: 1.90 m Groundwater Level: m		
The test has failed.	TEST 1		TEST 2		TEST 3	
	Time(min)	Depth to Water (m)				
	0.00	0.00				
	1.00	0.26				
	2.00	0.26				
	3.00	0.26				
	4.00	0.26				
	5.00	0.26				
	10.00	0.26				
	20.00	0.26				
	30.00	0.26				
	60.00	0.26				
	1140.00	0.35				
	1200.00	0.35				
	1260.00	0.35				
1320.00	0.35					
1380.00	0.35					
1440.00	0.35					
Effective Storage Depth	m	1.90				
75% Effective Storage Depth	m	1.43				
(i.e. depth below GL)	m	0.48				
25% Effective Storage Depth	m	0.48				
(i.e. depth below GL)	m	1.43				
Effective Storage Depth 75%-25%	m	0.95				
Time to fall to 75% effective depth	mins	0.00				
Time to fall to 25% effective depth	mins	0.00				
V (75%-25%)	m3	0.80				
a (50%)	m2	5.59				
t (75%-25%)	mins	0.00				
SOIL INFILTRATION RATE	m/s	N/A				

DESIGN SOIL INFILTRATION RATE, f

N/A



Appendix XIII: Mining Remediation Authority Report



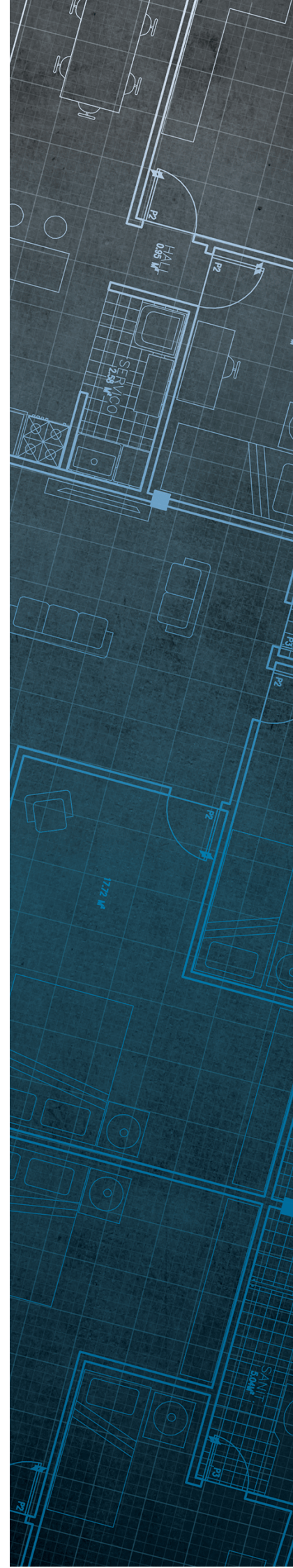


The Coal
Authority

Consultants Coal Mining Report

South Heywood Phase 3
Heywood
Rochdale
OL10 2PU

Date of enquiry:	12 April 2019
Date enquiry received:	12 April 2019
Issue date:	12 April 2019
Our reference:	51002103708001
Your reference:	13-222/NS/32118



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

E3P

Enquiry address

South Heywood Phase 3
Heywood
Rochdale
OL10 2PU

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

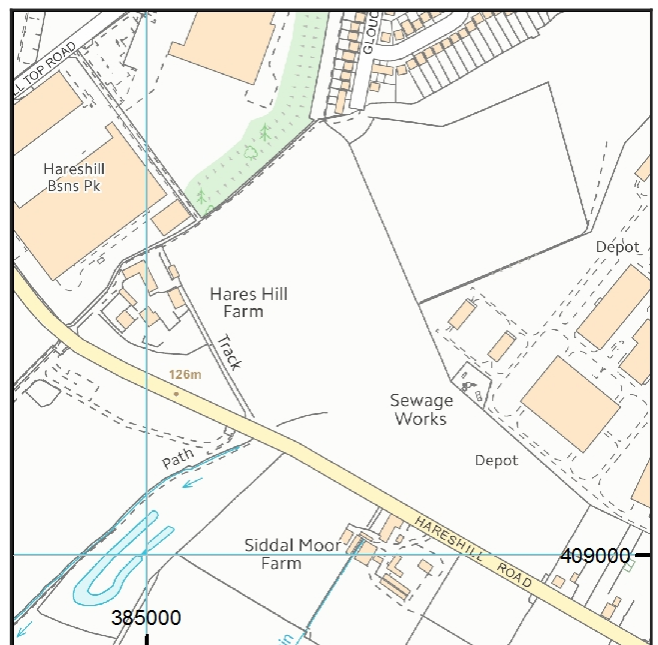
www.groundstability.com

 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

No past mining recorded.

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

16820		
-------	--	--

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

No outcrops recorded.

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, 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.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

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

Withdrawal of support notices

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.

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.

Section 4 – Further information

Based on the responses in this report, no further information has been highlighted.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices

Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land

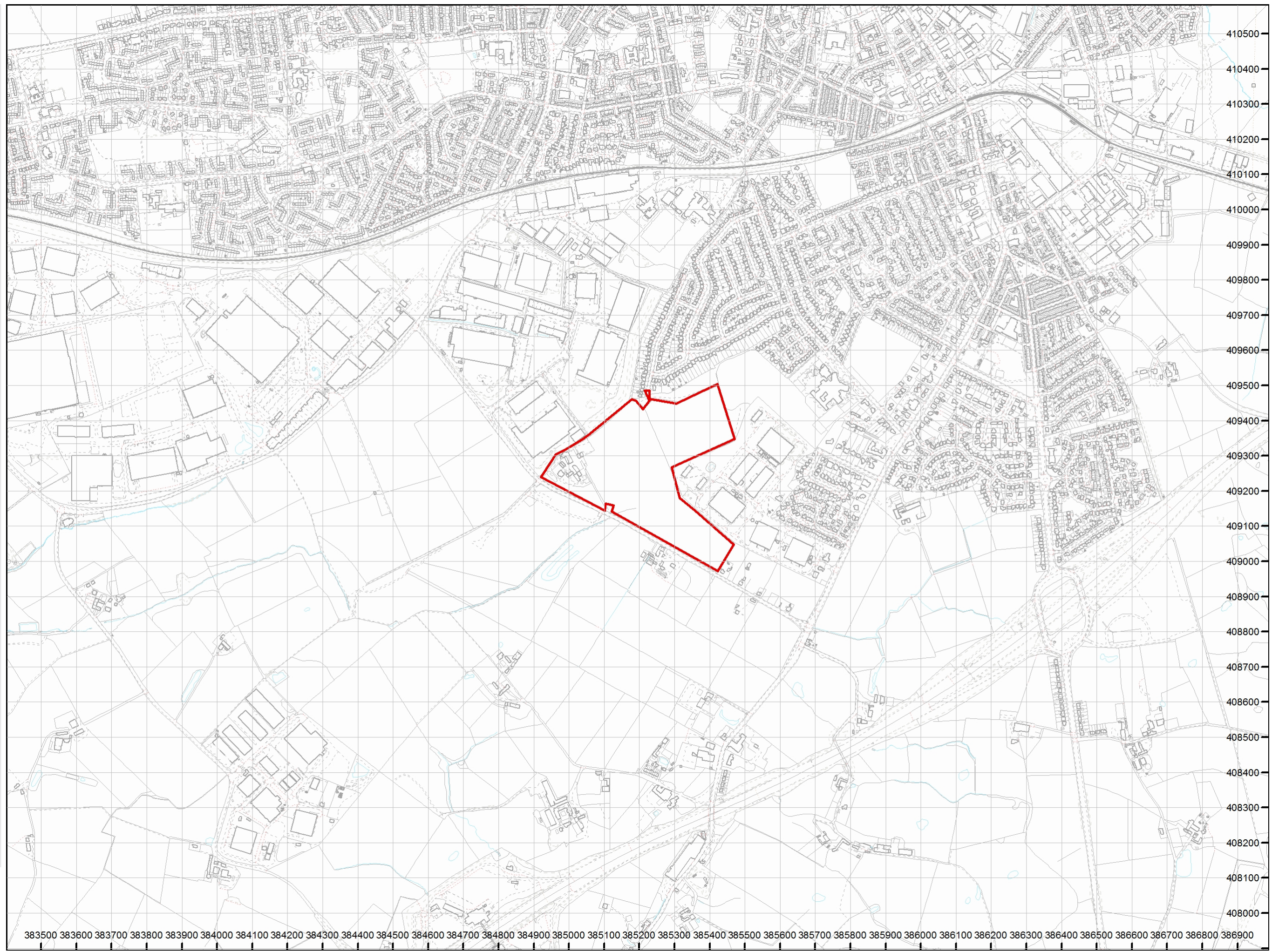
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

Approximate position of the enquiry boundary shown 

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Appendix XIV: Site Specific Radon Report



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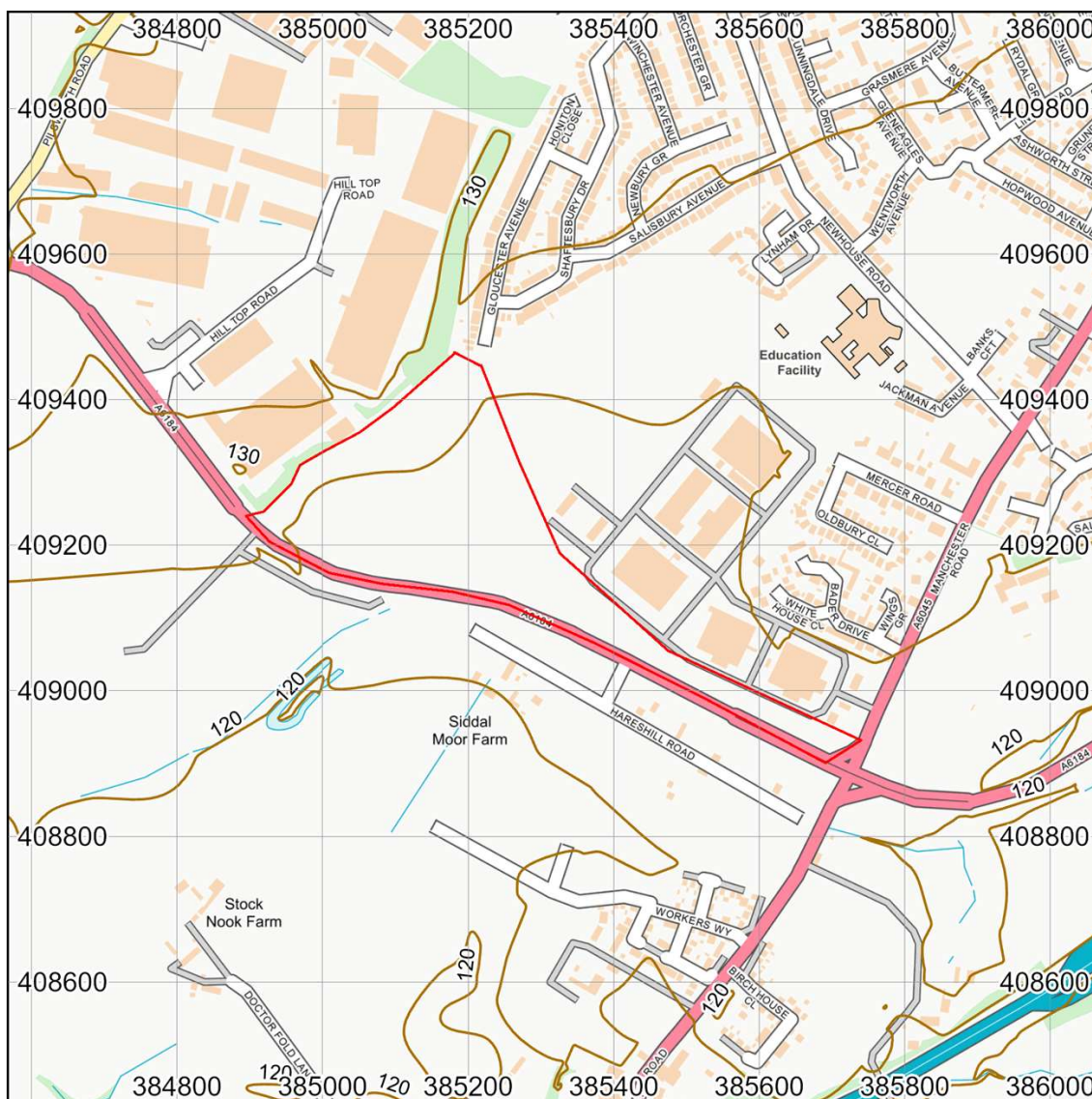
Radon Report

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

Report Id: *BGS_343214/61010*

Client reference: 13222

Search location



Contains OS data © Crown Copyright and database right 2025. OS OpenMap Local: Scale: 1:10 000 (1cm = 100 m)

Search location indicated in red

This report describes a site located at National Grid Reference 385318, 409183.

Note that for sites of irregular shape, this point may lie outside the site boundary.

Where the client has submitted a site plan the assessment will be based on the area given.

Radon Report: UK

When extensions are made to existing buildings in high radon areas, or new buildings are constructed in these areas, the Building Regulations for England, Wales, Scotland and Northern Ireland require that protective measures are taken against radon entering the building.

This report provides information on whether radon protective measures are required. Depending on the probability of buildings having high radon levels, the Regulations may require either:

1. No protective measures
2. Basic protective measures
3. Full protective measures

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

Requirement for radon protective measures

The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2023 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required.

Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2023 edition) Radon: Guidance on protective measures for new buildings?

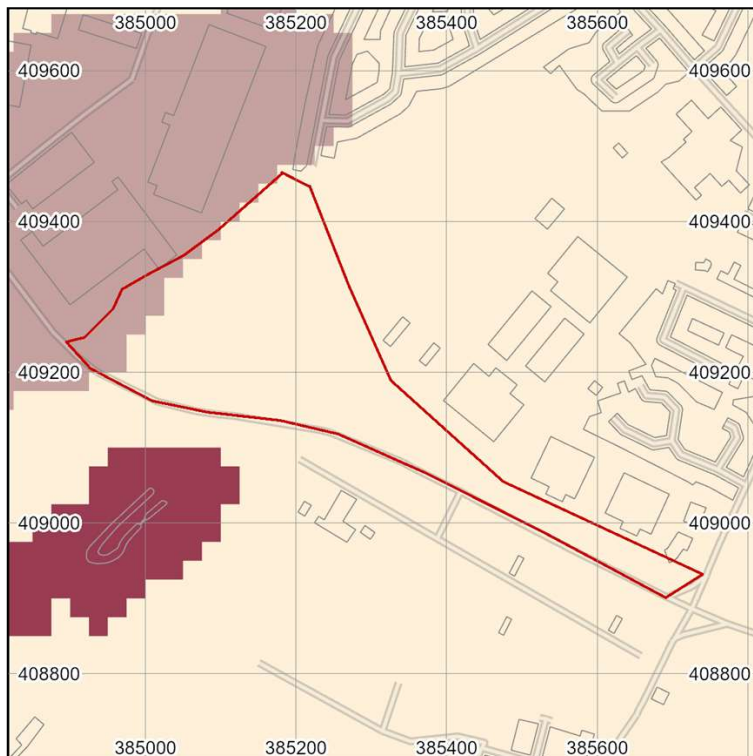
BASIC RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

More details of the protective measures required are available in *BR211 Radon: Guidance on protective measures for new buildings (2023 Edition)*.

Whether or not the radon level in a building is above or below the radon Action Level can only be established by having the building tested. The UKHSA provides a radon testing service which can be accessed at www.ukradon.org or by telephone (01235 822622).

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

Radon Affected Area



% Homes estimated to be at or above the action level
0-1%
1-3%
3-5%
5-10%
10-30%
30-100%

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Scale: 1:10 000 (1cm = 100 m)

Search area indicated in red

Is the property in a radon Affected Area as defined by the UK Health Security Agency (UKHSA) and if so what percentage of homes are estimated to be at or above the Action Level? YES

Additional Information

THE PROPERTY IS IN A RADON AFFECTED AREA WHERE 3 TO 5% OF HOMES ARE ESTIMATED TO BE AT OR ABOVE THE ACTION LEVEL.

The UKHSA recommends a radon 'Action Level' of 200 Becquerels per cubic metre of air (Bq m^{-3}) for the annual average of the radon gas concentration in a home. Where 1% or more of homes are estimated to be at or above the Action Level the area should be regarded as a radon Affected Area.

This report informs you whether the property is in a radon Affected Area and the percentage of homes that are estimated to be at or above the radon Action Level at this location. Being in an Affected Area does not necessarily mean there is a high radon level within the property; the only way to determine the radon level is to carry out a radon measurement.

The UKHSA advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels at or above the Action Level (200 Bq m⁻³) should be remediated. Householders with levels between the Target Level (100 Bq m⁻³) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. The UKHSA provides a validated radon testing service which can be accessed at www.ukradon.org.

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a “Radon Affected Area” as identified by the UKHSA. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were at or above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from the UKHSA at www.ukradon.org.

What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m⁻³). The Government advises householders that, where the radon level is at or above the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations 2017 require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293): **Radon in the workplace**. BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.uk website: www.brebookshop.com

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