

**GEO-ENVIRONMENTAL ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
LAND OFF WORKSOP ROAD, MASTIN MOOR
CHATSWORTH SETTLEMENT TRUSTEES
GEA-19412-17-201
SEPTEMBER 2020**

IDOM



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Current Document Details

Authors

Siobhan Jackson

Approved by



.....
Dr Lisa Horsley

Issued by



.....
Simon Edwards

Document2

Document Revisions

Rev	Date	Author	Approved	Issued	Remarks
0	24-05-17	SMJ	LMH	SMJ	-
A	18-09-20	SMJ	LMH	SE	Revised Masterplan and updates

Report issued from

Choose Office

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SECTION 1 INTRODUCTION

1.1 PURPOSE

- 1.1.1 The purpose of this Report is to explain and support an outline planning application for residential development of land at Mastin Moor, Chesterfield. It outlines the context within which the application is made and provides a detailed assessment of the main geo-environmental considerations, together with a reasoned justification in support of the development.

1.2 STRUCTURE OF REPORT

- 1.2.1 This Report addresses the following:

- Context
- The Site and surrounding area
- Development proposal
- Planning policy considerations
- Key benefits
- Assessment of geo-environmental considerations
- Summary and conclusion.

- 1.2.2 The Report concludes that no significant soil contamination has been recorded to date and consequently there are no geo-environmental reasons why residential development should not be supported on the site.

1.3 OTHER REPORTS

- 1.3.1 The proposal has been informed by a range of technical evidence. As such, the planning application comprises a suite of information which includes:

- Supporting Planning Statement
- Design and Access Statement
- Landscape and Visual Impact Assessment
- Transport Assessment
- Flood Risk Assessment and Drainage Statement
- Ecological Surveys
- Archaeological Assessment

- Geo-Environmental Assessments (appended)
- Noise Assessment
- Air Quality Assessment
- Topographical Survey

1.4 **AUTHOR**

- 1.4.1 This Report has been prepared by IDOM Merebrook Limited ('Merebrook'). Merebrook is an environmental and engineering consultancy with extensive experience of providing high quality, practical and pragmatic advice and solutions across many sectors. Our contact details are as follows:

IDOM Merebrook Limited

Cromford Mills, Mill Lane, Cromford, Matlock, Derbyshire DE4 3RQ

T: 01773 829988 Email: consulting@merebrook.co.uk

SECTION 2 CONTEXT

2.1 **APPLICANT**

- 2.1.1 The land subject of this application is owned and managed by Devonshire Property (MM) Limited (DPMML). DPMML is part of the Devonshire Group.
- 2.1.2 The Devonshire Group, known technically as the Chatsworth Settlement Trustees (CST), owns the land and estates of the Dukedom of Devonshire. Its main estates are in the vicinity of Chatsworth in Derbyshire and Bolton Abbey in North Yorkshire. It also runs visitor and other businesses on these estates, including hotels; retail and catering outlets; forestry; livestock and arable farming. It employs over 600 full time employees. It is committed to quality in all its activities and takes a responsible approach to development; as such, it measures performance in social and environmental as well as financial terms
- 2.1.3 Together with the Chatsworth House Trust (registered charity no.1511149), CST's Derbyshire Estate provides over 450 full time equivalent jobs and contributes c.£50m of enabled Gross Value Added to the local economy each year (Source: New Economics Foundation 2014). Its income funds socio-economic facilities (e.g. village shop/post office) and environmental management activities (e.g. architectural conservation) without grant support. CST thereby provides benefits far beyond "just the estate".
- 2.1.4 CST has a range of interests in the Borough of Chesterfield including: agricultural land supporting modern farming; commercial properties supporting local employment; farmsteads supporting smaller scale rural enterprises; and the majority of the former Staveley Works site (including both the Clocktower Business Centre

(leased to CBC and providing flexible term offices and workspaces) and the Devonshire Building (home to a gym and other enterprises).

- 2.1.5 Whilst maintaining a long-term perspective, CST manages a diverse range of landholdings to achieve corporate and wider social and environmental objectives. It has thereby identified that the best long-term use for the land subject to this application would be for residential development. This will help deliver its own objective to deliver 1,000 new homes over the next ten years, and also meet the needs and aspirations of the local community and wider Borough, subject to securing a planning permission that is both attractive to the development market and commercially viable.

2.2 THE SITE

- 2.2.1 This section provides a summary of key features of the site. The site is more fully described within the Design and Access Statement submitted as part of the application.

- 2.2.2 The site is located at Mastin Moor, to the south of Worksop Road (A619) to both the east and west of Bolsover Road, with part of the site extending southwards to Woodthorpe Road. It encompasses some 46.2 ha of mainly agricultural land. The overall site forms a shallow valley sloping from the ridge lines along Worksop Road and Woodthorpe Road towards a watercourse that runs in a westerly direction through the site. The highest part of the site is around 119m AOD in the north-east with the lowest part in the south-west at around 56m AOD.

- 2.2.3 The site is primarily comprised of undulating arable fields with limited features. The main features of note include:

- An unnamed watercourse which flows in a westerly direction through the site.
- Bolsover Road which runs through the site on a north-south axis.
- Pumphouse Farm (dwelling and curtilage) which is surrounded by the development proposal but does not form part of it.
- Field boundaries which are a mixture of hedgerows, stone walls and woodland.
- Isolated trees.

- 2.2.4 The main part of the settlement of Mastin Moor is located to the north of the site, on the northern side of Worksop Road. The settlement of Woodthorpe is located generally to the west of the site. The site abuts a limited number of residential properties, as well as the Mastin Moor Community Garden.

Photo 1: View over site from South-Eastern corner (adjacent Woodthorpe Road) looking towards Woodthorpe



Photo 2: View over site from Bolsover Road (close to Community Garden) looking towards Woodthorpe



Photo 3: View over site from Northern boundary (rear of former Community Building adjacent to Worksop Road) looking towards Woodthorpe Road and Woodthorpe



Photo 4: View over site from near North Eastern boundary adjacent to Worksop Road looking towards Bolsover Road and Woodthorpe



2.3 **DESIGN PROCESS**

- 2.3.1 CST first considered residential development options for its land at Mastin Moor in 2011 when it was identified in the Strategic Housing Land Availability Assessment by Chesterfield Borough Council. This formed part of the evidence base for what was at the time the emerging Local Plan: Core Strategy. CST appointed planning and masterplan specialists to explore these options. Outputs from that process formed part of CST's response to consultation on the Local Plan: Core Strategy.
- 2.3.2 Following adoption of the Local Plan: Core Strategy in 2013 which confirmed Mastin Moor as a focus for regeneration and growth, CST appointed an expanded team of specialists. Resulting technical surveys and reports contributed to a detailed appreciation of the development opportunity and potential constraints. These informed a masterplan-led approach that fully explored design options. The process had regard to the wider setting of the site and existing development in the locality.
- 2.3.3 Draft proposals were subject to extensive consultation with Chesterfield Borough Council, Derbyshire County Council and Staveley Town Council. Meetings were held with groups representing local residents and interest groups including Friends of Mastin Moor, the Woodthorpe Village Community Group and Mastin Moor Gardens and Allotments (formerly Mastin Moor Allotments Association). The resulting proposals were presented at two community consultation events in July 2016, held at the Eventide Rest Room (Mastin Moor) and the Albert Inn (Woodthorpe), and were available to view at the same time on a website.
- 2.3.4 An outline planning application for 650 dwellings and other development was subsequently submitted to Chesterfield Borough Council (ref. CHE/17/00469/OUT) in June 2017. Contrary to the unequivocal recommendation of the Officer's report, and despite no objections being received from any statutory consultees, the application was refused by the Council's Planning Committee in October 2019. At the time of writing, an appeal against that refusal remains extant.
- 2.3.5 Feedback received during the course of the determination of the above application has informed the current proposals. The design process that has led to the proposals for which planning permission is now sought is more fully described within the Design and Access Statement.

2.4 DEVELOPMENT PROPOSAL

2.4.1 The proposed development seeks outline planning permission for residential development of up to 650 dwellings, a residential care facility with extra care, a Local Centre (including local retail, health facilities, leisure facilities, other local facilities and services, offices), open space, community garden extension, community building, parking and associated infrastructure and earthworks with all matters reserved except access. Details of scale, layout and landscaping are reserved for future consideration.

2.4.2 For illustrative purposes, an indicative layout has been prepared to show how the site could be developed. Further explanation of the design principles that have been incorporated into the proposals, and how the design has been informed and influenced by the comprehensive suite of technical information and analysis, is set out in the Design and Access Statement.

2.4.3 Key aspects of the proposal include:

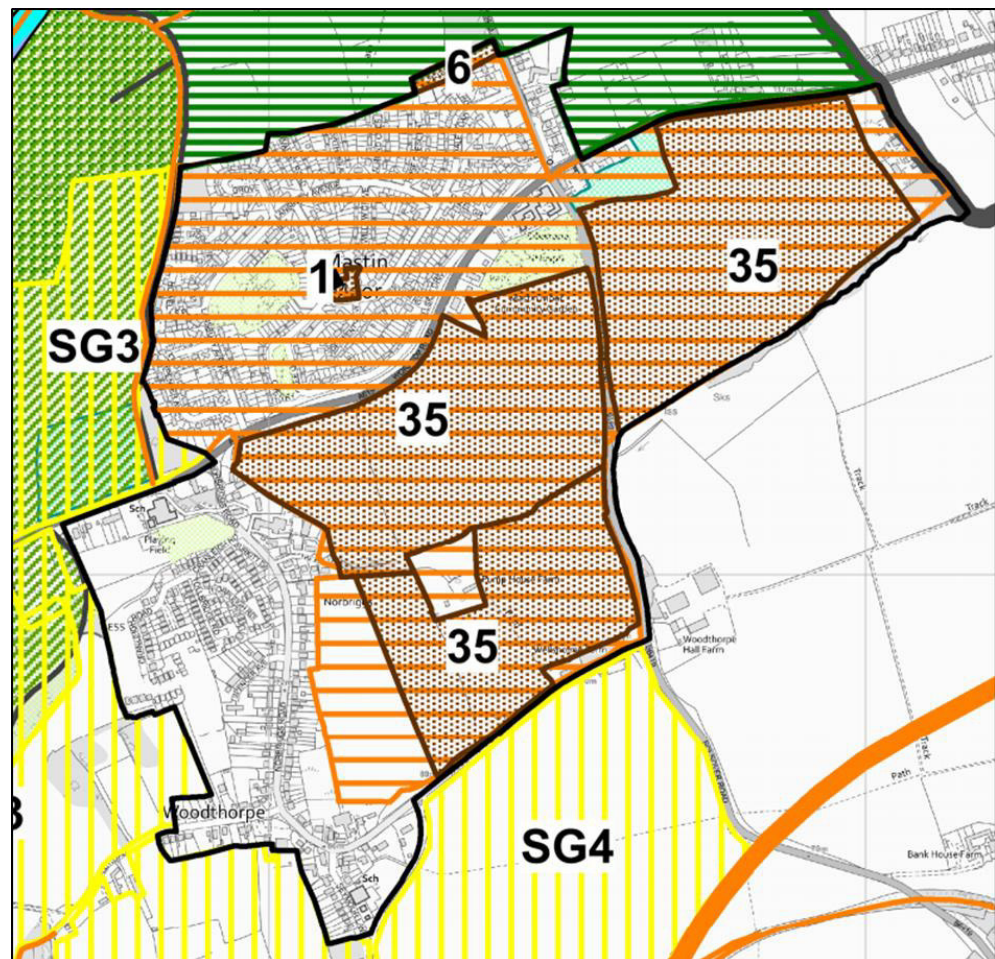
- Up to 650 dwellings located on land to the south of Worksop Road (east and west of Bolsover Road) extending to Woodthorpe Road
- A residential care facility with extra care
- A Local Centre (including local retail, health facilities, leisure facilities, other local facilities and services, offices) located adjacent to Worksop Road
- A new signal-controlled junction on Worksop Road providing access to the new Local Centre and residential areas, incorporating pedestrian and cyclist crossing facilities
- New priority-controlled junctions on Bolsover Road and Woodthorpe Road
- An extension to the Community Garden (approximately doubling its existing size), including provision for a new community building and associated car park
- Significant new areas of parkland, play areas and other open space
- Retention of existing hedgerows and trees wherever possible
- Additional landscape planting and ecological enhancements
- New walking and cycling connections
- New drainage infrastructure including surface water storage ponds
- Financial contributions to allow the expansion of existing local services including Norbriggs Primary School.

- 2.4.4 The proposal therefore comprises a high quality development scheme designed to: address multiple deprivation issues at Mastin Moor; help regenerate the area in line with key related Local Plan policy; respect but integrate with the distinct communities of Woodthorpe and Mastin Moor; acknowledge and address the specific physical challenges and constraints of the site (e.g. topography, drainage).

2.5 PLANNING POLICY

- 2.5.1 Section 38 (6) of the Planning and Compulsory Purchase Act 2004 requires that the determination of planning application is undertaken in accordance with the development plan, unless material considerations indicate otherwise. The relevant document for this application is the Chesterfield Local Plan (2020) (the Local Plan).
- 2.5.2 The Local Plan allocates the site for development by way of Policy CLP3 Flexibility in Delivery of Housing. Table 4 within the Local Plan references the site as H35 (Land South of Worksop Road, and East and West of Bolsover Road, Mastin Moor), having a capacity of 650 dwellings, the extent of which is shown on the Local Plan Policies Map. Policy RP1 Regeneration Priority Areas sets out further specific requirements for any development within site H35.
- 2.5.3 Other relevant policies of the Local Plan include: CLP1 Spatial Strategy, CLP2 Principles for Location of Development, CLP4 Range of Housing, CLP6 Economic Growth, CLP8 Vitality and Viability of Centres, CLP9 Retail, CLP10 Social Infrastructure, CLP11 Infrastructure Delivery, CLP13 Managing the Water Cycle, CLP14 A Healthy Environment, CLP15 Green Infrastructure, CLP16 Biodiversity, Geodiversity and the Ecological Network, CLP17 Open Space, Play Provision, Sports Facilities and Allotments, CLP20 Design, CLP21 Historic Environment, CLP22 Influencing the Demand for Travel.
- 2.5.4 An extract from the Local Plan Policies Map showing the extent of the allocation and the wider Mastin Moor Regeneration Priority Area is shown below.

Figure 1: Local Plan Policies Map (extract)



2.5.5 The National Planning Policy Framework (NPPF) 'sets out the Government's planning policies for England and how these are expected to be applied'. Paragraph 10 of the NPPF sets out that 'at the heart of the [NPPF] is a presumption in favour of sustainable development'. Paragraph 11 states that 'For decision-taking this means:

c) approving development proposals that accord with an up-to-date development plan without delay; or

d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:

- i. the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or

- ii. *any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole.'*

2.6 PLANNING ASSESSMENT

2.6.1 The proposal performs well against relevant Local Plan policies. In particular, it will deliver development in accordance with Policies CLP1 Spatial Strategy, CLP2 Principles for Location of Development, Policies CLP3 Flexibility in Delivery of Housing and Policy RP1 Regeneration Priority Areas.

2.6.2 It is also considered that there are no material considerations that indicate anything other than the fact that the LPA should determine the application in line with the extant plan as outlined above.

2.6.3 In addition, key benefits of the proposal would include:

- Provision of new, high quality housing
- New development in an area with acknowledged regeneration needs
- Greater variety of housing type and tenure (including Affordable Housing) to meet the diverse needs of the local community (including housing to buy and rent)
- Extension of the Community Garden (approximately doubling its existing size) including provision for a new community building and parking area
- Improved local services and facilities (including provision for retail, health and other local and community services within a new Local Centre)
- Significant new areas of parkland, play areas and other open greenspace available to existing and new residents
- New housing in a location where future residents will have a realistic choice of walking, cycling or using public transport, in preference to using private motor vehicles
- Additional capacity at local schools
- Opportunities for skills and learning through training programmes during construction and operational phases of the development
- New employment opportunities during construction and operational phases of the development
- Additional landscape planting and ecological enhancements
- New traffic signal-controlled junction on Worksop Road to include pedestrian and cyclist crossing facilities

- On-site water storage to help reduce existing off-site flood risk.

2.6.4 The proposal will therefore provide opportunities and benefits for all sections of the local community, including existing and future residents. Benefits will accrue in the short and longer term. It will help to overcome issues that can lead to deprivation and will contribute to regeneration in line with Local Plan objectives.

SECTION 3 GEO-ENVIRONMENTAL ASSESSMENTS

- 3.1.1 A non-intrusive, desk-based assessment of the site was completed by Merebrook in October 2014. The report, 'Phase 1 Geo-Environmental Assessment' ref. DS-MER00810-14-138 Rev A is presented in Appendix 1.
- 3.1.2 Subsequently, in August and September 2015 Merebrook undertook an intrusive investigation and results are reported in 'Geo-Environmental Assessment' ref. GEA-19412-15-256 Rev A dated January 2016, which is presented in Appendix 2. The purpose of the assessment was to identify any contaminative or geotechnical issues associated with former land use at *Land off Worksop Road, Mastin Moor, Chesterfield* which might impact on the site's redevelopment.
- 3.1.3 The reader is referred to these technical reports for full details.
- 3.1.4 Since the time these assessments were undertaken, the masterplan has been revised and now covers a smaller area than was investigated. However, the overall conclusions remain unaltered.

SECTION 4 SUMMARY AND CONCLUSIONS

- 4.1.1 The desk-based study and site walkover have not highlighted potential for significant chemical contamination that would cause a constraint on any development. However, the report identified that localised contamination may be present which could require remedial actions and the area is indicated to be affected by naturally occurring radon gas.
- 4.1.2 A Phase 2 Intrusive Investigation was recommended to confirm the contamination status and to derive an appropriate remedial strategy. This took the form of a general widely spaced sampling strategy across the site with additional targeting for former structures and areas adjacent to former mining-related features (such as mineral rail lines, shafts and to determine the chemical quality of materials used to backfill the opencast area). A programme of soil gas monitoring was also undertaken.
- 4.1.3 The results of the intrusive investigation indicate that no significant soil contamination has been identified and gas monitoring has not recorded elevated concentrations of hazardous gases, however the site lies in an area affected by naturally occurring radon gas. Basic protection in the form of a membrane and sub-floor void will be required in the floor construction of new dwellings and the proposed health centre.
- 4.1.4 Additional exploratory investigation will be required to confirm the depth and extent of the opencast mining area in the north of the site for detailed foundation design, however this will not prevent or preclude the development progressing.

APPENDIX 1 ▪ Phase 1 Geo-environmental Assessment

**PHASE 1 GEO-ENVIRONMENTAL ASSESSMENT
MASTIN MOOR
CHATSWORTH SETTLEMENT TRUSTEES
DS-MER00810-14-138REVA
10 OCTOBER 2014**



PHASE 1 GEO-ENVIRONMENTAL
ASSESSMENT
MASTIN MOOR
CHATSWORTH SETTLEMENT
TRUSTEES
DS-MER00810-14-138REVA

Current Document Details

Authors

Siobhan Jackson

Issued by



Keith Paramor

Approved by



Keith Paramor

Document1

Document Revisions

Rev	Date	Author	Checked	Approved
A	10.10.14	SMJ	KRP	KRP

Report issued from

East Mill,
Bridgefoot,
Belper,
Derbyshire
DE56 2UA
01773 829988

Peter House,
Oxford Street,
Manchester
M1 5AN
0161 209 3415

Churchgate Court,
3 Church Road,
Whitchurch,
Cardiff
CF14 2DX
02920 610309

1 Leonard Place,
Westerham Road,
Keston
BR2 6HQ
01689 889980





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EXECUTIVE SUMMARY

A Phase 1 Geo-Environmental Assessment (Desk Study) was requested by Chatsworth Settlement Trustees. The purpose of the assessment was to identify potential contaminative or geotechnical hazards associated with former land use at *Mastin Moor, Chesterfield* which might impact on the site's redevelopment.

SITE DETAILS	
Approximate site area	52.5 ha
Current/previous use	Undeveloped – open fields/agricultural
Proposed use	Broadly, it is likely to comprise residential with private and communal gardens, soft landscaping and associated roads and parking

PHASE 1 NON-INTRUSIVE INVESTIGATION	
Expected geology	Drift deposits absent, solid geology comprises Pennine Middle Coal Measures. Possible worked/made ground.
Groundwater	Pennine Middle Coal Measures are classified as a Secondary A aquifer. There are no groundwater abstractions within 2 km of the site. The site does not lie within a groundwater source protection zone.
Surface water	An unnamed tertiary watercourse flows in a westerly direction across the western land parcel and along the southern boundary of the eastern land parcel. There are no surface water abstraction licences within 1 km of the site. Online data provided by the Environment Agency indicates the site to be within a flood risk zone 1 (low risk) area. This is covered more fully in Merebrook's flood risk assessment report which is to be issued separately.
Other	Site lies in a radon affected area – basic radon protective measures required. Site lies in an area affected by coal mining – Coal Mining Report in Appendix 3 notes presence of filled and capped mine entries on site – mine entry data sheets provided for three mine entries in Appendix 3. Opencast mining identified in northwest of site (see plan provided in Appendix 3). Existing mine drainage within site.

RECOMMENDATIONS	
Further Assessment	Recommend Phase 2 Intrusive Investigation to confirm founding stratum depths, confirm absence of made ground and include a small number of shallow soil samples analysed for broad contamination suite and minimum NHBC recommended soil gas measurements.

**SECTION 1 INTRODUCTION**

- 1.1 Chatsworth Settlement Trustees proposes to develop an area of land located at Mastin Moor near Staveley, Chesterfield for residential development purposes. Outline development proposals have been provided at this time for the area of the site west of Bolsover Road, comprising residential development, a health centre and associated landscaping and infrastructure. It is noted that there is an area within the western site which is outside the development area currently occupied by buildings associated with Pump House Farm.
- 1.2 Idom Merebrook Limited (Merebrook) has been commissioned by Chatsworth Settlement Trustees to undertake a non-intrusive, desk-based assessment of the site and to advise on the geo-environmental implications of the site for the proposed end use.
- 1.3 The objectives of the investigation are to:
 - i.* Identify likely surface and sub-surface ground conditions;
 - ii.* Identify the potential for contaminative land uses on the site and surrounding areas;
 - iii.* Identify potential pollutant linkages associated with past and current uses; and
 - iv.* Provide advice on further phases of assessment as necessary.
- 1.4 A Phase 1 (Non-intrusive Investigation) has been undertaken for the subject site.
- 1.5 This report presents the findings of the geo-environmental investigation and provides an interpretation of the geo-environmental conditions that exist at the site. The contaminative status of the site and the implications with respect to development has been interpreted in accordance with the current government guidance on source-pathway-receptor risk assessment. This report uses a Tier 1 risk assessment to ascribe a conservative qualitative appraisal of the hazards associated with the site.
- 1.6 This report has been prepared for Chatsworth Settlement Trustees for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Chatsworth Settlement Trustees and Merebrook as to the extent to which the findings may be appropriate for their use.

**SECTION 2 PHASE 1 (NON-INTRUSIVE INVESTIGATION)****2.1 INTRODUCTION**

- 2.1.1 The non-intrusive investigation has been conducted with reference to the documents and sources detailed in Table 1 below:

Table 1: Published Data and Information Sources

SOURCE DATA	GROUNDSURE DATA
British Geological Survey (BGS) 1:50,000 Series Geological Sheet 100 Sheffield	Ordnance Survey (OS) historical maps scaled at 1:10,560, 1:10,000, 1:2,500 and 1:1,250 dated 1876-2012
BGS Geology of Britain 1:50,000 online maps	Water abstraction, discharge and pollution data
Radon: guidance on protection measures for new dwellings	Registered waste management sites
Environment Agency (EA) online data maps	Mining records and natural ground stability data
UK National Air Quality Archive, online	Protected areas of environmentally sensitive land use or conservation
Coal Authority Mining Report	Other relevant designations and/or authorisations and Trade Directory entries

- 2.1.2 The above sources are all authoritative and it is believed that they are reasonably reliable. However, independent verification of the information supplied has not necessarily been carried out and Merebrook cannot be held liable for inaccuracies or deficiencies in the information.

2.2 SITE LOCATION AND SETTING

- 2.2.1 The site is located to the south of the A619 Worksop Road in Mastin Moor, to the northeast of Chesterfield. The site comprises two land parcels (eastern and western) divided by Bolsover Road (B6419).
- 2.2.2 The site occupies an area of approximately 52.5 hectares located at National Grid Reference 445867,375570 and indicated on drawing MER00810-001-001, presented in Appendix 1 of this report.
- 2.2.3 The site is currently in agricultural use and comprises undulating fields of little feature with standing cereal and rapeseed crops. Within the site itself, the main feature of note is an unnamed (tertiary) tree-lined watercourse which flows through the site to the west of the Bolsover Road. The channel was noted to be around 800 mm wide and only around 200 mm deep. Anecdotally, this feature was reported to be susceptible to flooding where it coincides with residences to the west. The site is bounded by a mixture of drystone walls, hedges and trees where alongside existing highways and the boundaries of residential properties bounding



the site to the west. A property which does not form part of the development land, but is surrounded by it, is occupied by Pump House and outbuildings. This was the location of former coal mining-related structures and is discussed in later sections.

- 2.2.4 To the rear of 50a Worksop Road is a roughly triangular leased grass field which lies outside the area which has been subject to concept masterplanning to date. During survey of the site, a concrete marker post for a mine water pipeline was observed. Anecdotal evidence from the resident indicated that this was a 1 m diameter pipe/conduit which was at full flow. A resident also indicated an additional mine water pipe either as a different feature or continuation of the same pipe, located in the far southwest of the site indicating that the pipeline may continue down through the site.

SITE HISTORY

- 2.3.1 The site history, based on a review of the historic and current maps, dating from 1876 to 2012 is summarised below. Potentially contaminative land uses are shown in **bold**. Copies of key maps used in this review are provided in Appendix 2.

Table 2: Summary of the key features shown on historic maps

DATA SOURCE	SITE / SURROUNDINGS
County Series 1876-1880 (1:2,500) and 1876 (1:10,560 scale)	<p>The site largely comprises a series of open fields, some of which are delineated by hedgerows.</p> <p>A Pumping Engine, Old Shaft and several buildings are noted towards the centre of the western section of the site (within the area excluded from development). A Tramway intersects the site running approximately parallel to Norbriggs Road and linking the Old Shaft with Seymour Colliery approximately 600 m south.</p> <p>Several wells are shown either adjacent to or just within the northern boundary, associated with various off-site properties.</p> <p>Several buildings are present on site adjacent to the southern boundary, these are assumed to be residential.</p> <p>There are three named hamlets surrounding the site; Norbriggs, Woodthorpe and Mastin Moor.</p> <p>The surrounding area appears largely rural/agricultural with evidence of a coal mining history. The Jovial Collier public house is present approximately 150 m north. In addition to Seymour Colliery and Cottages approximately 500-550 m south, Old Quarries are noted 270 m west of study site and an Old Shaft 550 m west. An Air Shaft is located 550 m north and a further shaft, Woodhouse Lane Colliery and an Old Coal Mine are present between 600 and 900 m north east.</p> <p>A Reservoir (Staveley Water Works) is shown adjacent to the northern boundary.</p> <p>A Spade and Shovel Manufactory is located in Norbriggs, immediately adjacent to the western boundary.</p> <p>A railway line lies approximately 400 m south.</p>



DATA SOURCE	SITE / SURROUNDINGS
County Series 1897 (1:10,560 scale)	<p>The buildings adjacent to the Old Shaft and Pumping Engine are identified as Norbriggs Cottages (not included in this assessment). The Tramway still remains on site. A well is shown near the properties along the southern boundary.</p> <p>Worksop Road, Norbriggs Road and Woodthorpe Road are labelled along the northern, western and southern boundaries respectively. An Old Quarry is identified 300 m north east. Several (covered) sewage tanks are identified in the vicinity of the site: 80 m north, 200 m south and 500 m west, and a Sewage Bed is located 100 m north east.</p> <p>The Spade and Shovel manufactory is still present near the western boundary.</p> <p>A school is present adjacent to the northern boundary (south of Worksop Road).</p>
County Series 1914 (1:10,560 scale)	<p>Allotment gardens are now present in the north of the site. The remainder of the site is largely undeveloped. The watercourse which flows along the southern boundary of the eastern land parcel is shown to flow in a westerly direction.</p> <p>Mastin Moor District Hospital (infectious diseases) has been built within 20 m of the site to the north east, and a Sewage Works with associated covered tanks and filter bed is located to the south of this hospital. An Old Shaft (coal) is shown on the opposite side of Norbriggs Road, approximately 100 m west.</p> <p>The tramway and Seymour Colliery are still shown.</p>
County Series 1947 (1:10,560 scale)	<p>The site generally remains as previously however a number of small buildings (possibly cottages) in the southern edge of the site are no longer shown. The route of the tramway is still shown but the track is no longer present.</p> <p>There has been residential development along Norbriggs Road and Worksop Road with properties bordering the western site boundary.</p>
1967 (1:10,560 scale)	<p>The allotment gardens are no longer shown in the north of the site. No properties are now present along the southern boundary. There is no evidence of the tramway, and the pumping station and old shaft are no longer shown near Norbriggs Cottages.</p> <p>There has been significant residential development to the north of the site (Norbriggs/Mastin Moor). The old quarries to the west have been backfilled (c.250 m west). The sewage works to the east is no longer present (absent by 1951). Seymour Colliery to the south is no longer marked (labelled as disused in 1951 map series). Mastin Moor Hospital is still present to the east (no longer labelled as infectious diseases) and the buildings appear to have been extended or replaced.</p>
National Grid 1971-1973 (1:10,000 scale)	<p>The site remains as open fields.</p> <p>Allotment gardens are now shown immediately to the north. The M1 motorway has been built to the southwest and passes approximately 500 m from the site at its closest point. Mastin Moor Hospital is still shown to the east and buildings appear to have been extended or replaced.</p>



DATA SOURCE	SITE / SURROUNDINGS
2002 (1:10,000 scale)	The site remains as open fields. Norbiggs Cottages are still shown towards the centre of the western land parcel.
	Mastin Moor Hospital to the east has been replaced by a nursing home.
2012 (1:10,000 scale)	Norbiggs Cottages have been renamed as Pump House Farm. The Allotment Gardens to the north are now labelled as Mastin Moor Community Garden. There are no other significant changes to the site.
	The railway to the southeast is now labelled as dismantled.

2.3.2 In summary, a review of historic mapping from the 1870s to 2012 shows that the site itself has remained largely undeveloped, although buildings were present along the southern boundary and a tramway linked the old shaft near Pump House Farm with Seymour Colliery to the south. Land in close proximity to the site has been subject to several potentially contaminative land uses including a spade and shovel manufacturer, allotments, hospital, a sewage works and various sewage tanks/beds, railway, motorway, a coal shaft and pumping engine, filled quarries and a colliery.

2.3.3 Given the nature of the historical mapping process (scale, representation of conditions at discrete time intervals frequency etc.), any such maps and plans may not provide a comprehensive account of a site's history. Identification of pertinent land uses and associated potentially contaminative activities may therefore be absent from mapping records. For example, post-war period mapping is absent or partial in a number of 1:2500 scale plans covering both northern and southern sections. There is documentary evidence of open cast mining affecting the site which is however, not indicated on these published OS maps. An opencast mine abandonment plan obtained from the Coal Authority records office in Mansfield is provided in Appendix 3.

2.4 GEOLOGY

2.4.1 Of natural deposited formations, the BGS 1:50 000 Sheet 100 (Sheffield) and BGS online geology viewer indicate that superficial drift deposits are absent from the subject site. The underlying sedimentary bedrock strata comprise Pennine Middle Coal Measures Formation (consisting of mudstone, siltstone and sandstone). The Groundsure report indicates that there is a geological fault present on site and three coal seams (two inferred, one observed). Shallow coal seams (ca <5 m of the surface) may be present in the far north and far south of the site.



- 2.4.2 For possible worked or made ground, there are records of eleven historical surface ground working features on and adjacent to the site (dated between 1876-1947). These include sewage works (north-east of site), cuttings, a reservoir (north of site), unspecified heap, gravel pit (30 m south-west, dated 1876) and two filter beds 48 m east and 54 m north east from the site (1923, 1947 respectively).
- 2.4.3 A further thirteen historical surface ground workings are located within 250 m of the site. These include a refuse heap (55 m to the west), sewage covered tanks (58-61 m north-west and 194 m south), a canal (136 m to the west), a sewage bed (213 m west of site) and an unspecified quarry (221 m to the west).
- 2.4.4 Groundsure records indicate that there are three ground workings within 500 m of the site boundary; two to the west (252 m and 375 m) and one 346 m north-east, relating to sandstone quarries or pits. However these workings have all now ceased.
- 2.4.5 Using data derived from Groundsure there are four historical underground working records (also included in records of Historical Mining areas) within the site boundary, dated between 1876-1947, relating to an unspecified old shaft and an old coal shaft. However, these are located in the land parcel belonging to Pump House Farm which is currently excluded from further development. One further old coal shaft is recorded 117 m west (1923). Additional data on opencast workings and mine entries are discussed in later sections of the report.
- 2.4.6 The site lies within an area which may have been subject to non-coal historic mining, relating to bedded Iron Ore, however this is assessed as being highly unlikely (small scale mining may have occurred but restricted in extent).

2.5 HYDROGEOLOGY

- 2.5.1 The online Environment Agency maps indicate that the Pennine Middle Coal Measures Formation is classified as a Secondary A Aquifer. Secondary A Aquifers are classified as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classed as minor aquifers.
- 2.5.2 There are no groundwater abstraction licences within 2 km of the study site.
- 2.5.3 The site does not lie within an EA designated groundwater source protection zone.

2.6 HYDROLOGY AND FLOOD RISK

- 2.6.1 The closest surface water feature is a tertiary watercourse which runs along the southern boundary of the eastern land parcel (culverted in part), and across the western land parcel.
- 2.6.2 There are no surface water abstraction licences within 1 km of the site.



- 2.6.3 On-line data provided by the Environment Agency indicates the site to be within a flood risk zone 1 (low risk) area. This is covered more fully in Merebrook's flood risk assessment report which is to be issued separately.
- 2.6.4 The site is classed by the BGS as being within 50 m of an area with susceptibility to groundwater flooding (low confidence level), which relates to flooding risk from fluctuation in groundwater levels within unconfined aquifers.
- 2.7 **CURRENT SITE ISSUES**
- 2.7.1 Potentially significant environmental issues have been investigated within relevant distances of the site, based on the database of records supplied by Groundsure. These relate to the following searches:
- i.* Water discharge or pollution incidents within 250 m of the site;
 - ii.* Waste management sites within 250 m of the site;
 - iii.* Statutory authorisations within 50 m of the site;
 - iv.* Trade directory entries of possible contaminative use within 50 m of the site;
 - v.* Special protection or conservation areas within 50 m of the site; and
 - vi.* Any other relevant issues.
- 2.7.2 Potentially significant environmental issues identified by the above searches are summarised in Table 3 below.

Table 3: Potentially significant environmental issues

ENVIRONMENTAL CATEGORY	DESCRIPTION
Water discharge or pollution incidents within 250 m	<p>There was a pollution incident 21 m north of the site involving oils and fuels dated 14/11/2001 however the impact was stated as category 3 (minor) impact to water and no impact to land or air. Given the length of time since the incident, this is considered unlikely to impact the subject site.</p> <p>There are two records of licensed discharge consents within 250 m of the site, 214 m south (revoked) and 244 m south; both relate to discharging sewage effluent from a pumping station into a tributary of the River Doe Lea. These are not considered likely to have adversely affected the site.</p>
Waste management sites within 250 m	<p>There are no records of historic or operational landfill sites within 250 m of the site. There are no records of waste treatment, transfer or disposal sites within 250 m.</p>



ENVIRONMENTAL CATEGORY	DESCRIPTION
Statutory authorisations within 50 m	There is one record of a historical Part B permit for a coal/gypsum/carbon process 14 m south of the study site, addressed to UK Coal Mining Ltd. It is understood this relates to a coal stocking yard.
Trade directory entries of possible contaminative use within 50 m	There are no potentially contaminative activities/industries recorded on site. Off site, a vehicle hire and rental company (Regency Wedding Cars) is located 15 m west of the study site. This is considered unlikely to impact the subject site.
Special protection or conservation areas within 50 m	There are no records of special protection or conservation areas within 50 metres of the subject site.
Other relevant issues	The site lies within a DEFRA designated nitrate vulnerable zone. This classification relates to restrictions on the application of fertilizers and would be unlikely to place constraints on residential development of the site. The site lies within a Coal Mining Area.

2.8 INDICATIVE GROUND STABILITY HAZARDS

- 2.8.1 The Groundsure report indicates that the site lies within an area of very low or negligible susceptibility to shrink/swell clays as the ground conditions are of low to non-plasticity. However, mudstone when completely weathered to clay may result in shrinkable deposits, The risk of landslides is low to very low. Ground dissolution, compressible deposits, collapsible deposits and running sands are all categorised under the hazard rating of null to very low.

2.9 RADON GAS

- 2.9.1 The site lies within a Radon Affected Area as defined by the Health Protection Agency (3 and 5% of houses are above the action level). Guidance issued by the Buildings Research Establishment (BRE-211) indicates that basic radon protective measures are required within new dwellings.

2.10 AIR QUALITY

- 2.10.1 The site does not lie within a designated Air Quality Management Area (AQMA) for Chesterfield Borough Council according to DEFRA.

2.11 ECOLOGY

- 2.11.1 Information from environmental and ecological datasets was obtained from a review of the MAGIC (Multi-Agency Geographic Information for the Countryside) website and the Groundsure report. The data assessed indicates that there are no sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites,



World Heritage Sites, National Parks or Areas of Outstanding Natural Beauty (AONB) within 1km of the site.

2.11.2 There are two records of Ancient Woodland within 1 km of the site; Romeley Wood 646m east and Robinsons Lumb 834 m north east - both are described as Ancient and Semi-Natural Woodland.

2.11.3 Norbriggs Flash Local Nature Reserve (LNR) is located 189 m northwest.

2.12 COAL MINING

2.12.1 The site lies within a wider area which may have been affected by Coal Mining. A Coal Mining Report has been obtained from the Coal Authority and is provided in Appendix 3.

2.12.2 Underground Mining

2.12.2.1 According to the Coal Mining Report, the site is in the likely zone of influence from seven seams of coal at 30 m to 490 m bgl which were last worked in 1986. It is considered that any movement from these coal workings should by now have ceased. The potential presence of coal workings at or close to the surface should be considered when developing this site.

2.12.2.2 The site is not in the likely zone of influence of current underground coal workings. Furthermore, the site is not in an area where the Coal Authority is determining or has granted a licence to remove coal using underground methods.

2.12.2.3 From records available to the Coal Authority, there are twelve coal mine entries on site or within 20 m of the site boundary. The approximate locations are shown on the plan provided in Appendix 3 and are indicated to include entries within proposed development areas. The majority of these mine entries were all filled and capped between 1967 and 1994 and are no longer in use. Treatment details are not provided for three of these entries located to the east of Bolsover Road. Further mine entries may also exist for which the Coal Authority does not have records.

2.12.3 Opencast Mining

2.12.3.1 Records indicate that the site lies within the boundary of a historic opencast coal site. The extent of this feature is not shown within the Coal Mining Report or on historical map data. However, an extract from Chesterfield Borough Council *Assessment of Potential Greenfield Housing Sites for Emerging Core Strategy* (August 2010) states: *'Around 1/3 of the site has been subject to opencasting in 1946, but given the time which has elapsed, the risk of future subsidence is anticipated to be slight. Development should not take place over the 'high wall' but elsewhere suitable foundations would be required. Elsewhere a shallow coal seam would need to be investigated.'* A Coal Authority mine abandonment plan is provided in Appendix 3 indicating the extent of the opencast coal site to which the above statement refers. This was located in the north-western part of the site.



2.12.3.2 The site does not lie within 200 m of an operational opencast mine or 800 m of an opencast mine for which the Coal Authority is determining whether to grant a licence.

2.12.3.3 There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the site. Claims for subsidence damage relating to two properties along Norbrigg Road were rejected.

2.13 PREVIOUS INVESTIGATIONS

2.13.1 No known previous investigation data exists for the site.

2.14 PRELIMINARY CONCEPTUAL SITE MODEL AND RISK ASSESSMENT

2.14.1 From the Phase 1 assessment a preliminary site conceptual model and risk assessment have been produced using the framework established in Part IIA of the *Environmental Protection Act 1990* and detailed in Contaminated Land Report CLR11 - *Model Procedures for the Management of Land Contamination*.

2.14.2 Risk from contamination has been assessed using the source-pathway-receptor and pollutant linkage methodology, whereby a risk can only exist if a “*source-pathway-receptor*” pollutant linkage is present. Geotechnical and engineering constraints are characterised within a separate section.

2.14.3 Potential Sources

2.14.4 The potential sources identified on the site and its surroundings include:

2.14.4.1 On site:

2.14.4.2 Desk-based study has shown that the site is currently undeveloped and under crop. There is evidence of opencasting on site but such features are anticipated to have been filled by replacement with inert overburden. From the other historic coal mining and related activities on and around the site, it is possible that mining related waste (spoil, coal ash from the steam pump) may have been deposited on the site. This desk study is not able to confirm the precise location, type or depth of such material but any such deposits are likely to be concentrated in the vicinity of Pumphouse Farm, access tracks and former tramways to/from that site. As such, the site is considered to have a low potential for widespread made ground and associated anthropogenic contamination. Where natural ground conditions prevail, contamination levels are likely to be within residential land use criteria. However, it is possible that herbicides/pesticides may have been used on the land which can leave residual contaminant levels.

2.14.4.3 Other than open cast backfill, made ground may be present as a result of the limited historical structures on the site and their subsequent demolition. The chemical quality of the Made ground is unknown; however previous land uses including a tramway and allotment gardens may have given rise to contamination of this material (where present). Potential contaminants within the made ground



include localised heavy metals, polyaromatic hydrocarbons, and possible asbestos from demolition of former buildings along southern boundary.

2.14.4.4 The potential for hazardous gas arising from coal bearing strata is low but should be considered, particularly given the presence of filled mine entries within the site and open cast backfill.

2.14.4.5 Off site:

2.14.4.6 Historical surrounding land uses such as the pumping engine, old Shaft, Spade and Shovel Manufacturer, Seymour colliery, old quarries, covered sewage tanks, colliery and Mastin Moor Hospital could have given rise to contamination from a range of contaminants including metals and hydrocarbons.

2.14.5 The infilled reservoir off-site to the north and backfilled former quarries to the west are potential sources of ground gas.

2.14.6 Potential Pathways

2.14.7 The potential pathways for contaminant exposure at the site include direct contact, inhalation, leaching and lateral/vertical migration as well, as gaseous and vapour flow pathways.

2.14.8 Potential Receptors

2.14.9 The potential impacts of contamination sources have been considered with respect to the following site specific receptors:

- i.* The general public and present site users;
- ii.* Demolition/construction workers;
- iii.* Occupants of any future development- commercial and residential scenarios;
- iv.* Groundwater in the strata;
- v.* Surface water courses;
- vi.* Adjacent land; and
- vii.* Infrastructure.

2.14.10 From the Phase 1 assessment a preliminary site conceptual model has been produced as Table 4 which identifies the potential pollutant linkages. These have been used to inform the Phase 2 intrusive investigation presented in the subsequent sections.



Table 4: Preliminary Conceptual Model

POSSIBLE POLLUTANT LINKAGE			RISK CHARACTERISATION
POTENTIAL SOURCES	PATHWAYS	RECEPTORS	
Heavy metals and hydrocarbons (made ground)	Contact with contaminated soil	Human health (current users)	Low risk identified Potential for localised made ground which can contain elevated metals and hydrocarbons, however limited potential for exposure.
	Ingestion and inhalation of contaminated soil and dust	Human health (current users)	
Heavy metals and hydrocarbons (made ground)	Contact with contaminated soil	Human health (future residents and construction workers)	Low to moderate risk identified Localised made ground anticipated, including backfilled opencast mining area, which can contain elevated metals and hydrocarbons.
	Ingestion and inhalation of contaminated soil and dust	Human health (future residents and construction workers)	
Asbestos (made ground)	Ingestion and inhalation of contaminated soil and dust	Human health (future residents and construction workers)	Low risk identified Low potential for made ground near southern boundary to contain asbestos from demolition of buildings.
Contamination (all forms)	Vertical migration to aquifer	Controlled waters	Low risk identified Any contamination likely to be low level.
Contamination (all forms)	Horizontal migration to surface water	Controlled waters	Low risk identified Risk to watercourse likely to be low as no significant contamination anticipated.
Hydrocarbons	Direct contact	Permeation of plastic water pipes and potable water quality	Low risk identified Unlikely but cannot rule out presence of localised hydrocarbon contamination at this stage.
Hazardous Gas/Vapours In soil	Ingress into buildings and voids	Human health (future residents and construction workers)	Moderate risk identified Potential for made ground which could act as source of hazardous gas. Coal bearing strata are also a potential source of hazardous gas, particularly disturbed coal measures as indicated by the presence of filled mine entries on site.



SECTION 3 CONCLUSIONS AND RECOMMENDATIONS

- 3.1 Desk based study and site walkover have not highlighted potential for significant chemical contamination that would cause a constraint on any development. However, localised contamination may be present which could require remedial actions and the area is indicated to be affected by naturally occurring radon gas. Basic protection in the form of a membrane and subfloor void is likely to be required in the floor construction of new dwellings and proposed health centre.
- 3.2 A Phase 2 Intrusive Investigation is recommended to confirm the contamination status and to derive an appropriate remedial strategy. This would likely take the form of a general widely spaced sampling strategy across the site with additional targeting for former structures and areas adjacent to former mining-related features (such as mineral rail lines, shafts and to determine the chemical quality of materials used to backfill the opencast area). A programme of soil gas monitoring is also recommended. A low or possibly moderate risk gas regime is anticipated but should be confirmed by measurement.
- 3.3 Potential geotechnical constraints are of more significance to this site, particularly following identification of the area of opencast workings in the north-west of the site. Given the age of the workings the majority of self-weight settlement is likely to have occurred, however, there is no record on the method of backfilling (engineered and compacted or loosely placed) nor proof that the backfill wholly comprised natural overburden. The presence of such workings poses the risk of excessive settlements once loaded with new structures without abnormal foundations and of differential settlements where structures span deep fill and shallow fill areas (opencast high wall zones). Intrusive investigation is therefore recommended to delineate the high wall zones. It may then be preferable to design development layouts to take these features into account should they prove problematic. In unworked areas, shallow coal may exist which has been subject to informal or unrecorded extraction. Loose or voided ground whilst not indicated by the presence of surface features cannot, therefore, be excluded. Most mine entries are shown to be outside of proposed development zones however, three shafts without treatment details are present east of Bolsover Road which require further attention. In addition, the likelihood of geotechnical constraints posed by shrinkable soils and the presence of trees and hedges will require intrusive investigation and testing. Coal measures soils and made ground may also contain elevated sulphate levels which may affected buried concrete.
- 3.4 We recommend a programme of trench excavations to locate the edge of the open cast area. The abandonment plan does not give the slope of quarry face and trenches may need to be extended to several metres in length. We also recommend boreholes with *in situ* testing to confirm depth and density of backfill. If loose conditions are identified, possibly installation of settlement gauges/load tests would be required. Trial pits are also recommended in case of bouldery material in backfill which could hamper pile installations (should piles prove necessary).

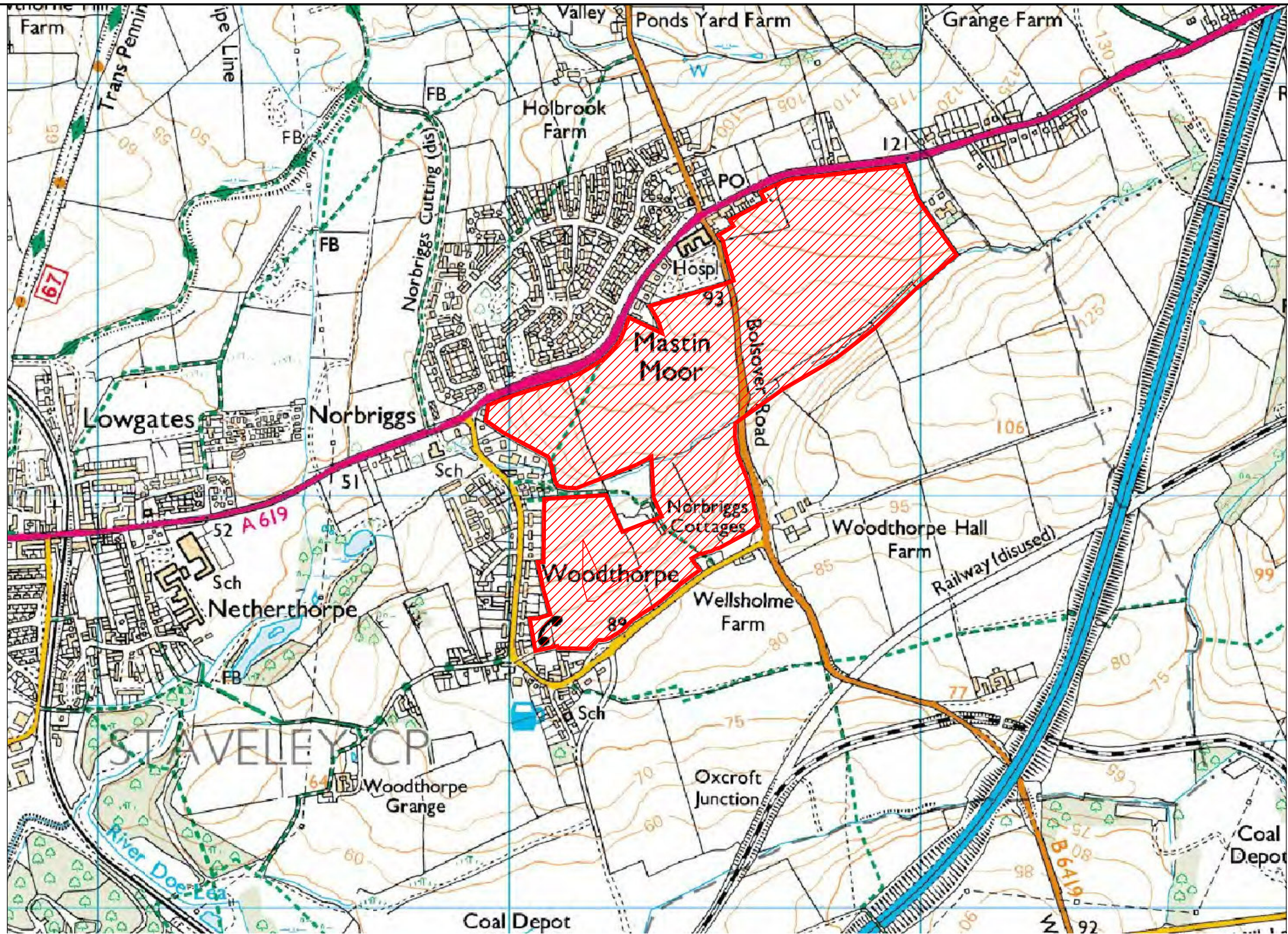


Precautionary installation of pipes and monitoring for gas also recommended. Generally the site would benefit from a low density trial pit investigation to confirm shallow founding stratum. Also, to confirm plasticity and resulting influence that trees have on foundation depths if clay soils present. We would also advise a low density soil testing exercise to confirm site soils are clean. Previously mentioned areas of possible made ground around Pumphouse Cottages and the former tramway would warrant an increased density of sampling.

- 3.5 Live buried mine drainage infrastructure is also indicated to be present (possible mine water pipeline discussed in 2.2.4) and such features will need to be located, surveyed and assessed for retention, diversion, decommissioning or avoidance within the future development scheme.



APPENDIX 1 ▪ Drawings



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Based on OS	06-05-2014		-
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Scale 1:10000	Date April 2014	Frame Dimensions mm (A3) 400 x 280	
Drawn PDT	Checked -	Approved -	

London
Kent
Derby
Cardiff
Manchester



East Mill, Bridgefoot, Belper, Derbyshire, England. DE56 2UA
tel +44(0)1773 829988 fax +44(0)1773 829393 email info@merebrook.co.uk

Client/Project

Mastin Moor

Dwg Title

Site Location Plan



APPENDIX 2 ▪ Historic Plans

Site Details:

Mastin Moor

Client Ref: 14/S435/SMJ/MER00810
Report Ref: HMD-154-1457651
Grid Ref: 445500, 375200

Map Name: National Grid

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Printed at: 1:10,000

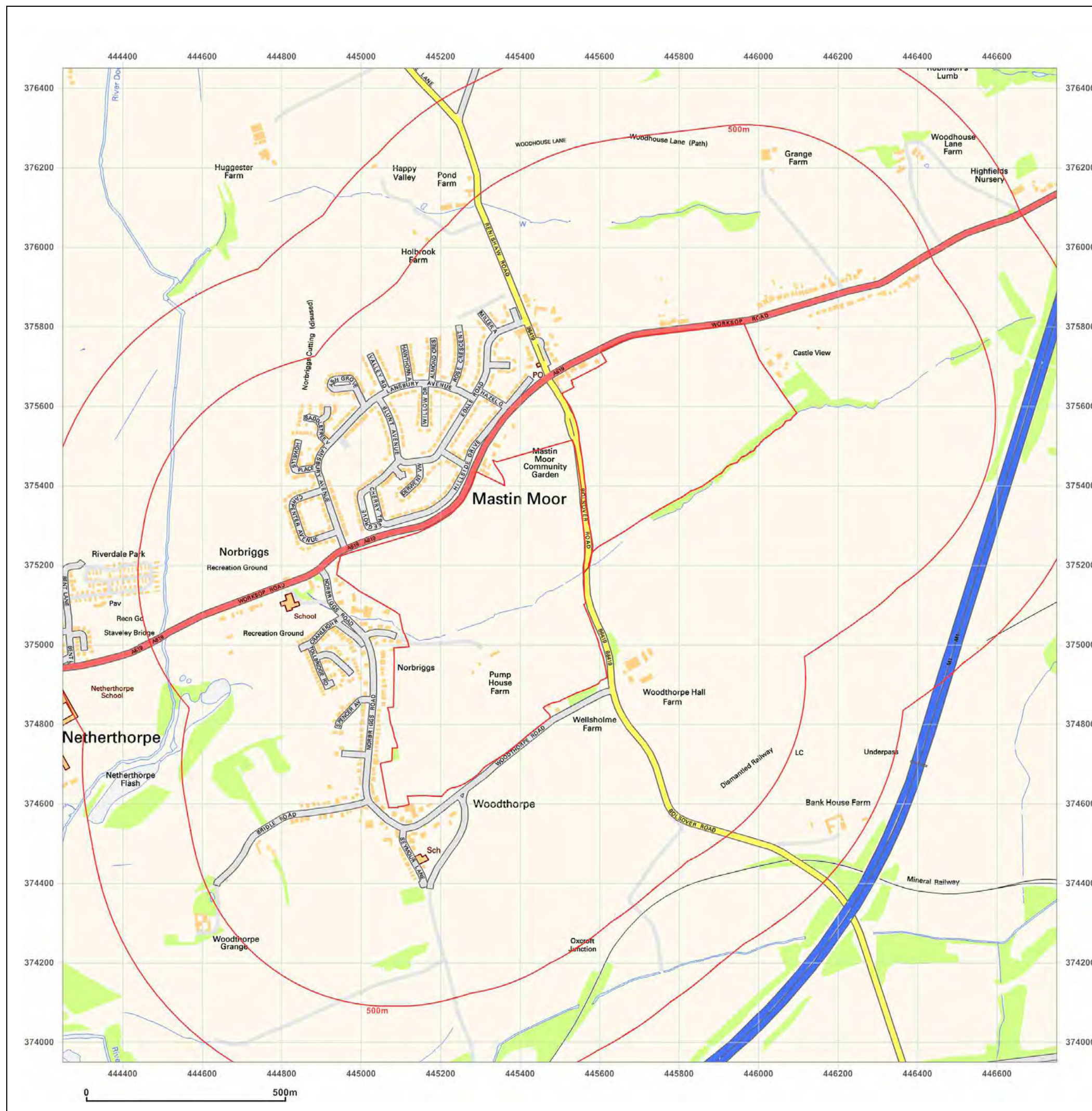


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Site Details:

Mastin Moor

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Report Ref: HMD-154-1457651
Grid Ref: 445500, 375200

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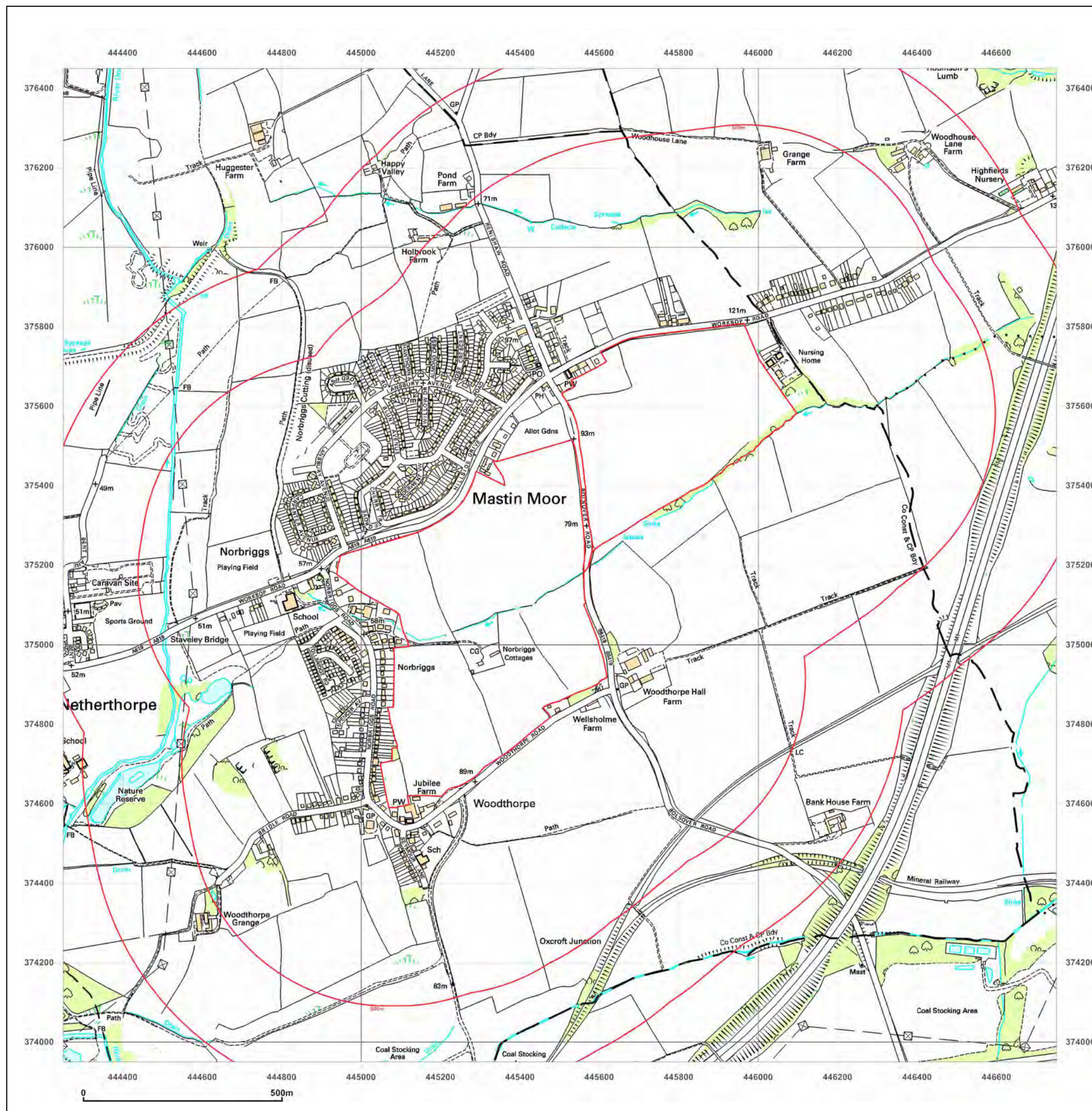


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Site Details:

Mastin Moor

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Report Ref: HMD-154-1457651

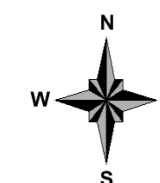
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Edition N/A
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Site Details:

Mastin Moor

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Report Ref: HMD-154-1457651
Grid Ref: 445500, 375200

Map Name: National Grid

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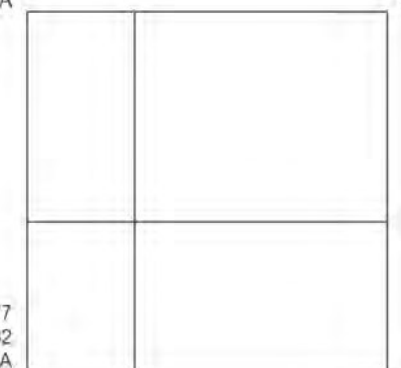
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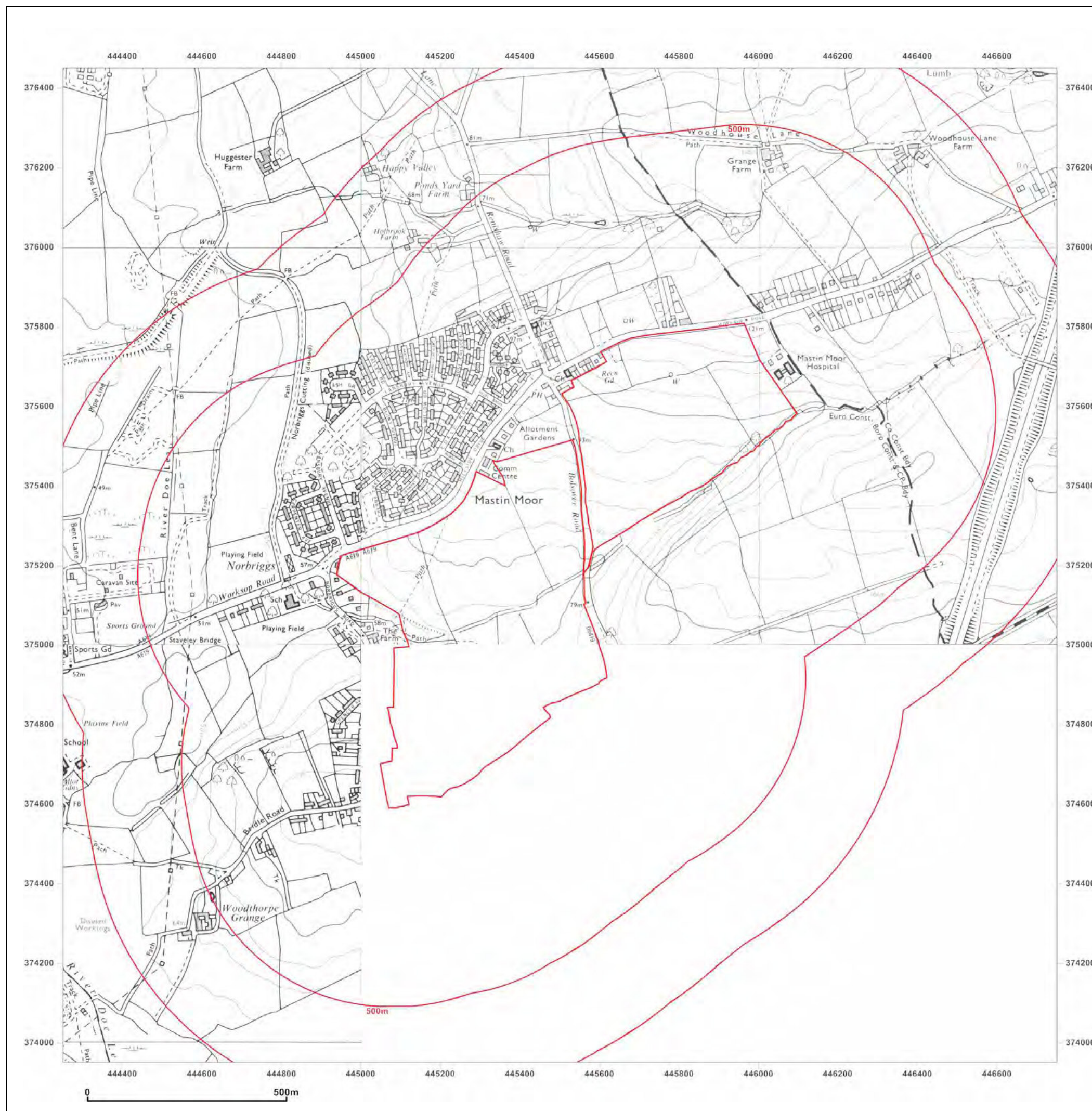


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Site Details:

Mastin Moor

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Report Ref: HMD-154-1457651
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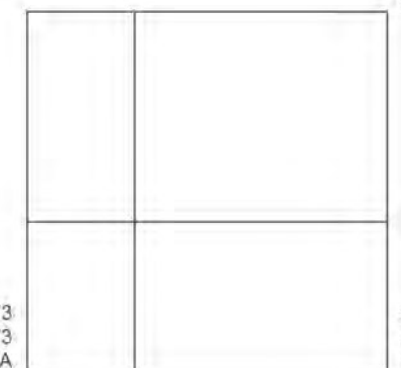
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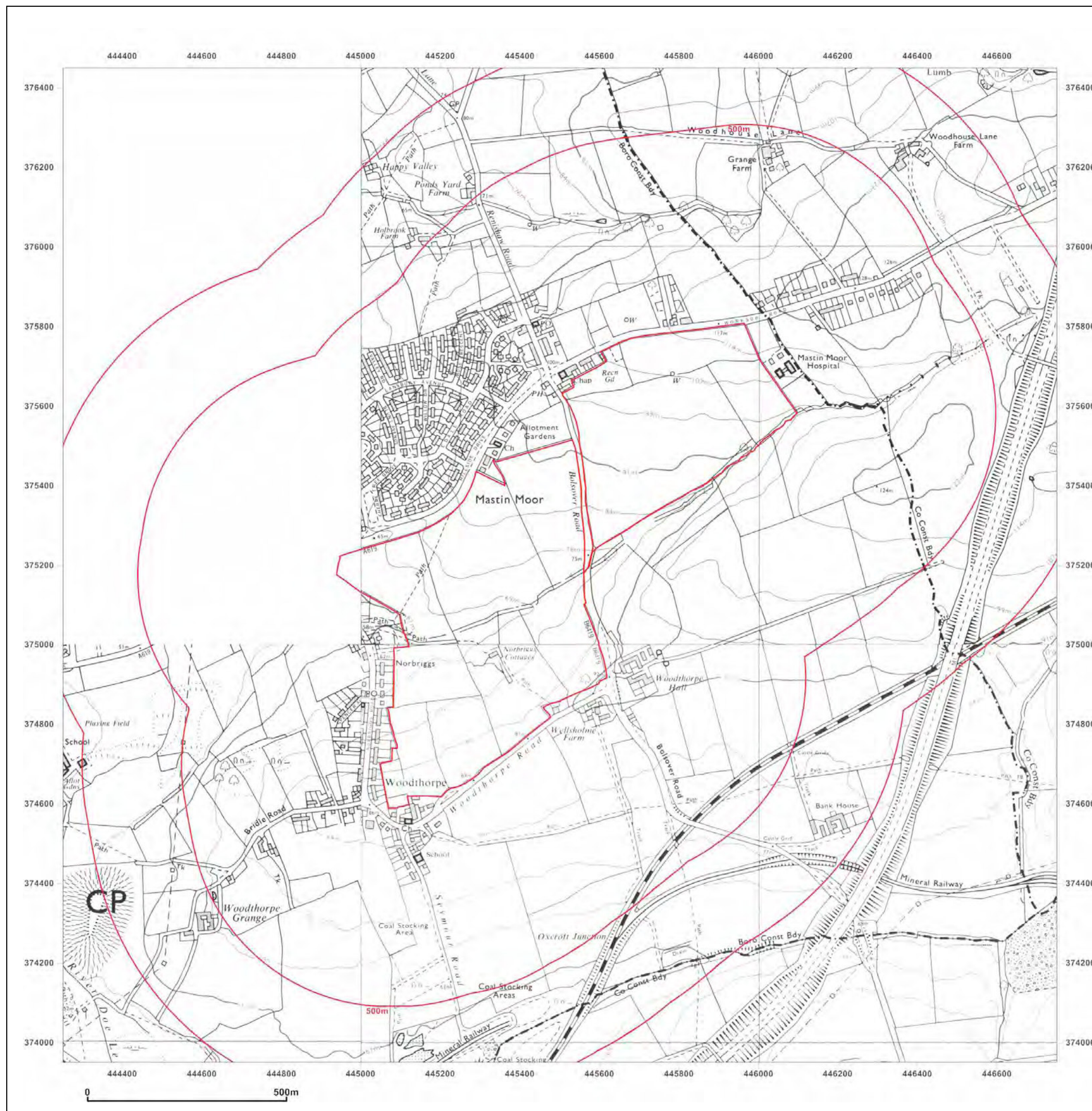


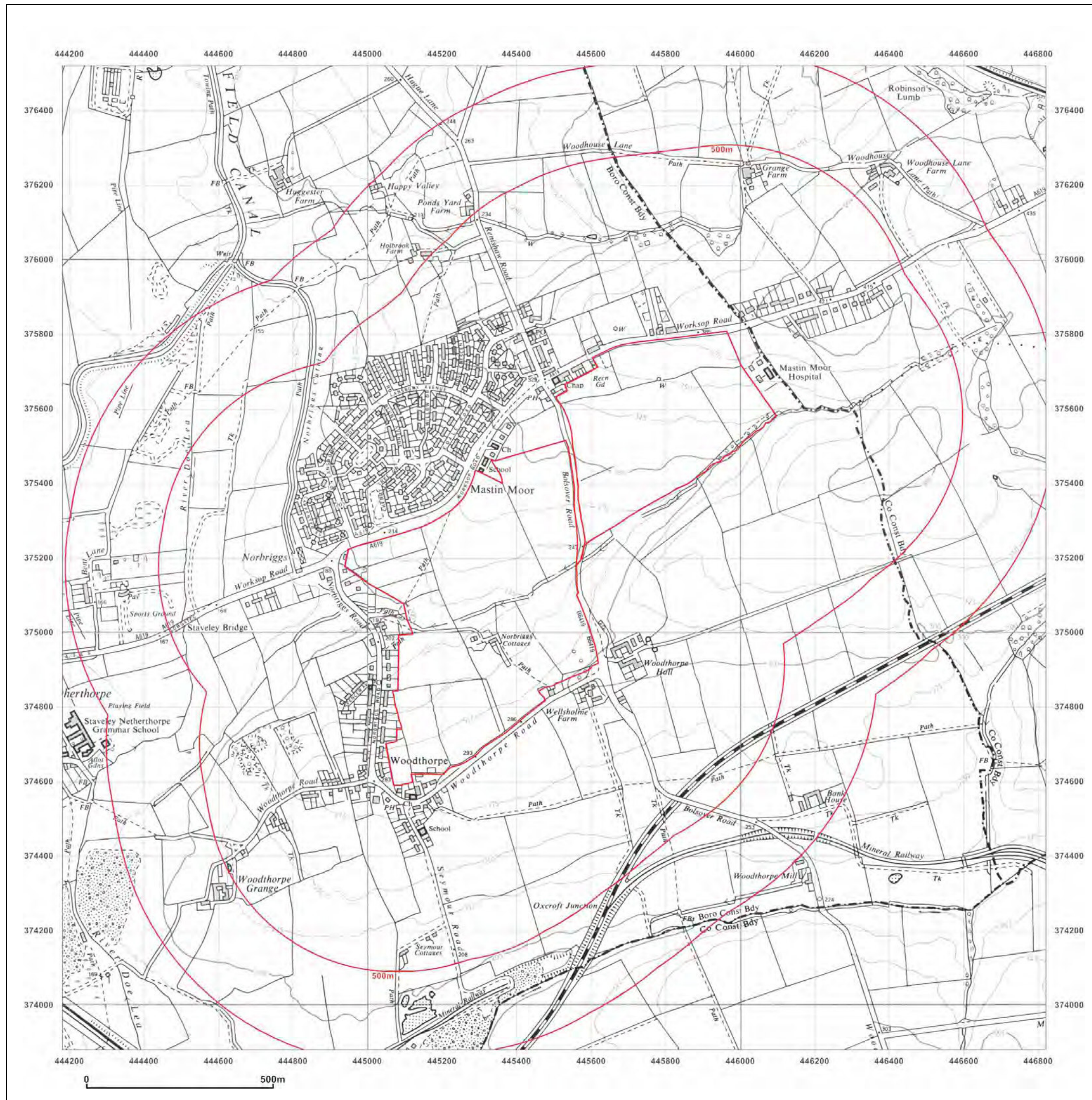
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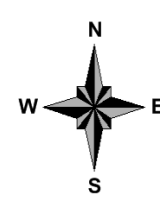




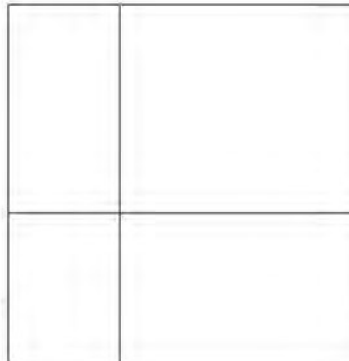
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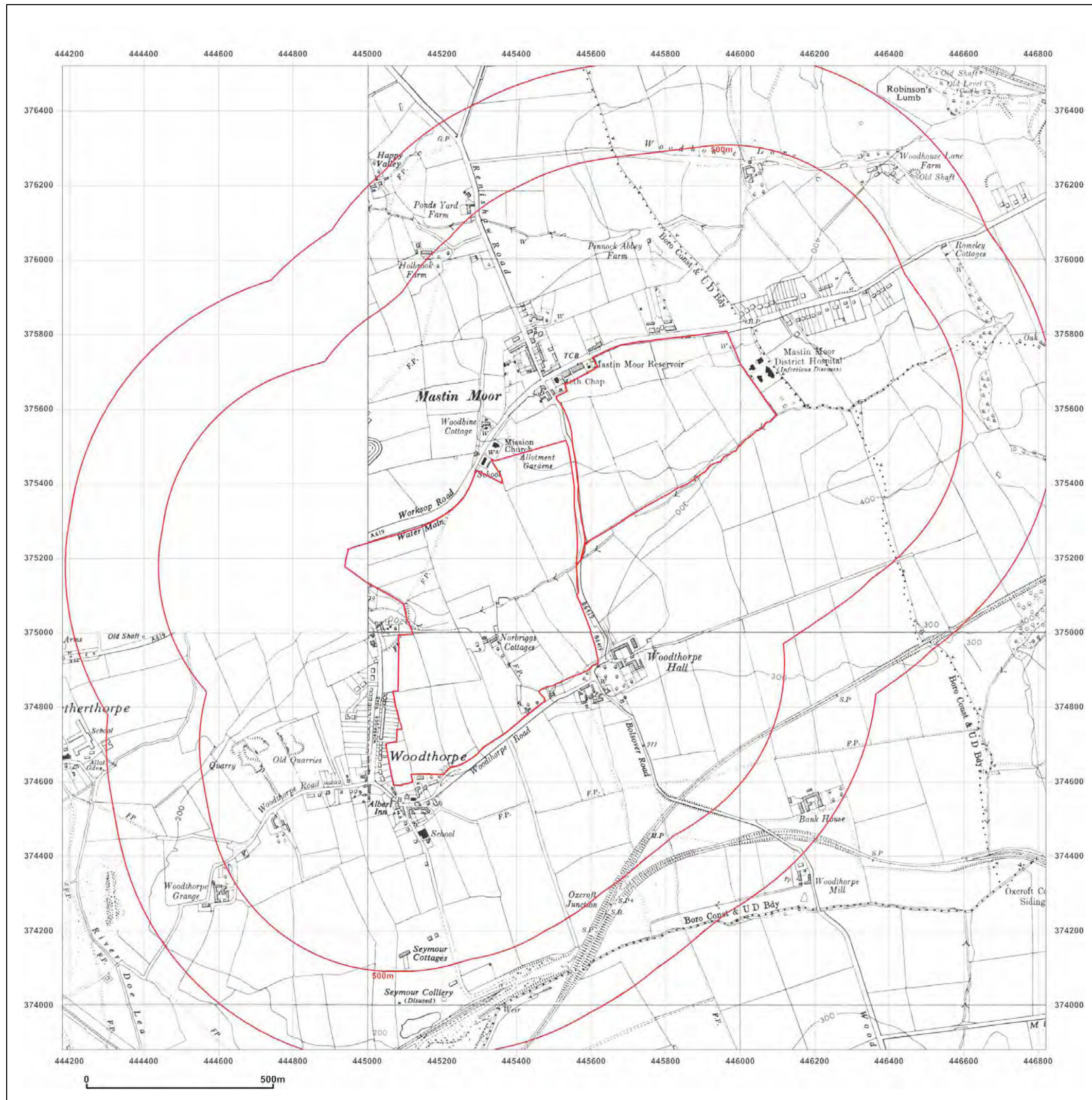
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Site Details:
Mastin Moor

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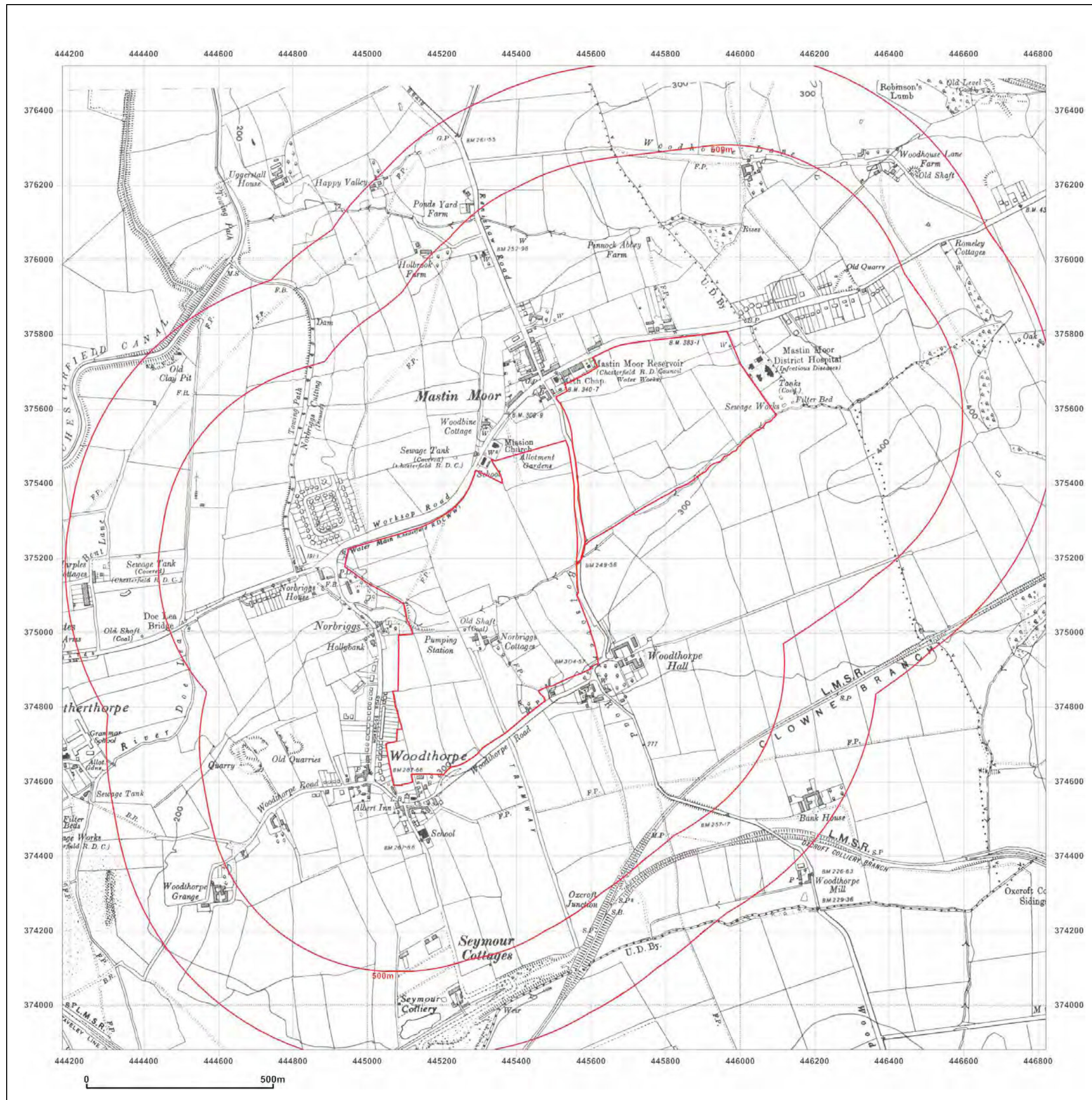
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Site Details:

Mastin Moor

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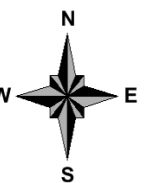
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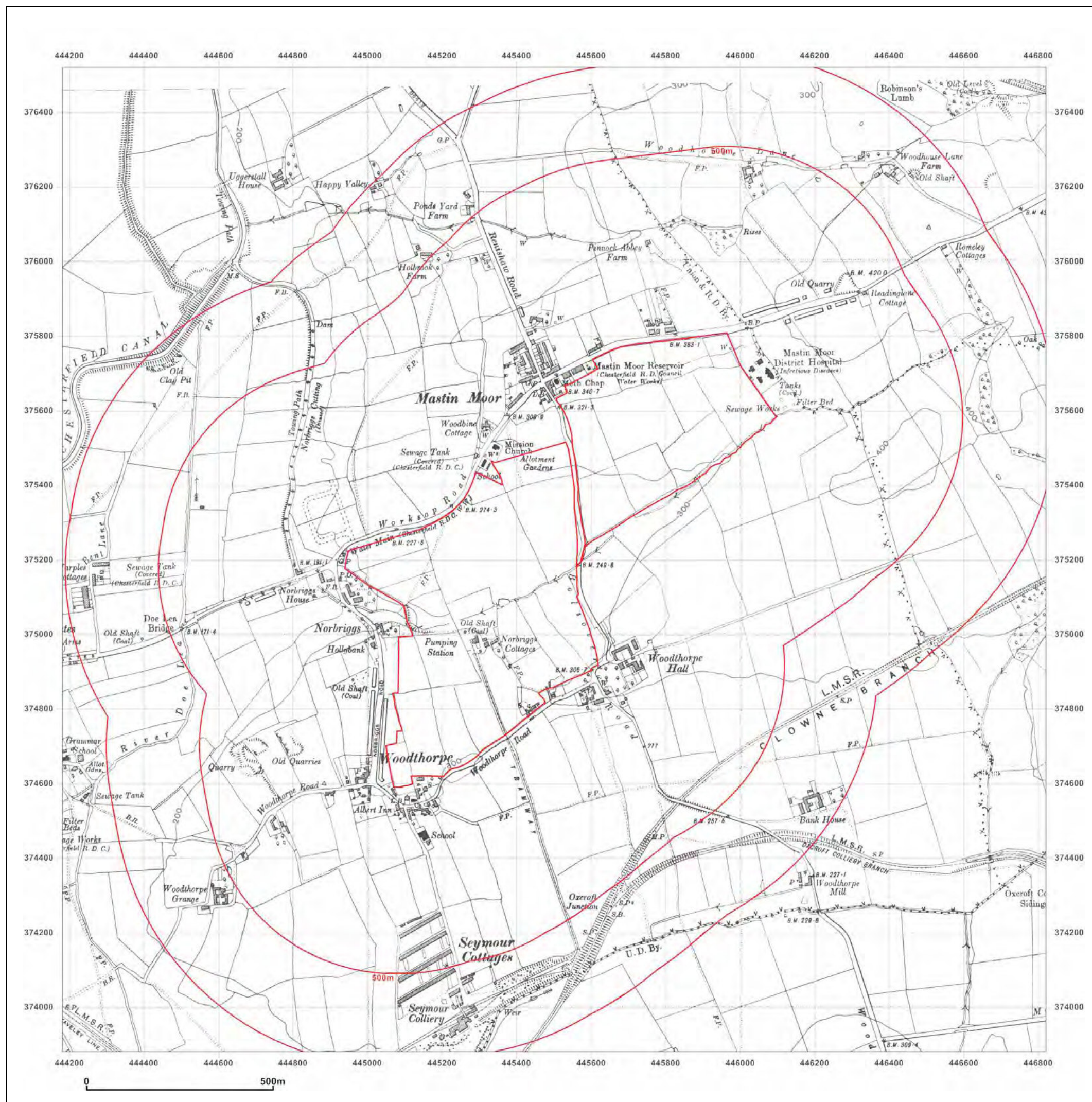
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Mastin Moor

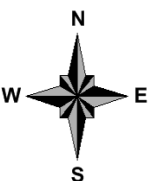
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Surveyed 1875
Revised 1938
Edition 1938
Copyright N/A
Levelled N/A

Site Details:

Mastin Moor

Client Ref: 14/S435/SMJ/MER00810
Report Ref: HMD-154-1457651
Grid Ref: 445500, 375200

Map Name: County Series

Map date: 1923

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1875
 Revised 1923
 Edition N/A
 Copyright N/A
 Levelled N/A

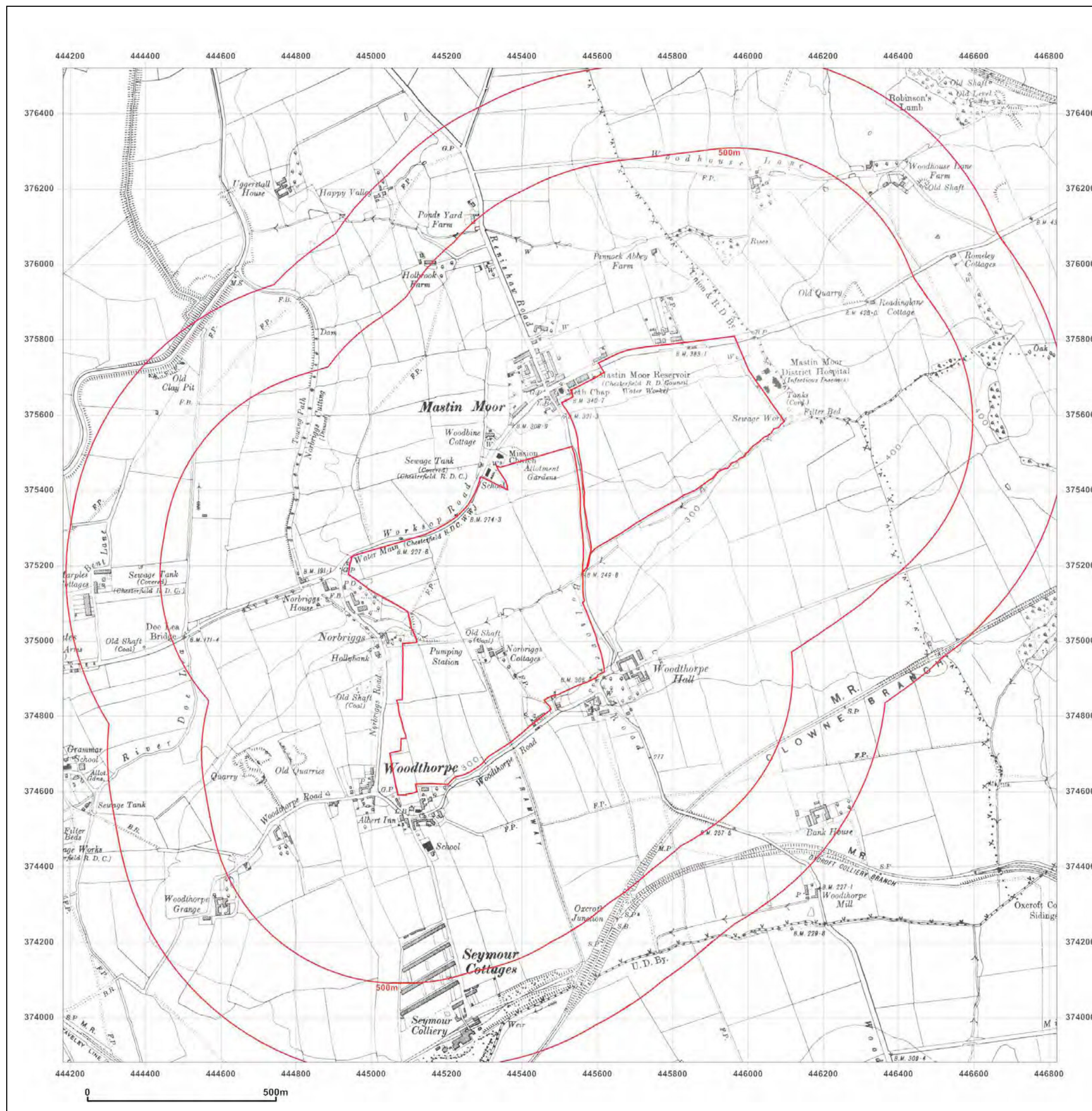


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Site Details:

Mastin Moor

Client Ref: 14/S435/SMJ/MER00810
Report Ref: HMD-154-1457651
Grid Ref: 445500, 375200

Map Name: County Series

Map date: 1914

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1875
 Revised 1914
 Edition N/A
 Copyright N/A
 Levelled N/A

Surveyed 1875
 Revised 1914
 Edition N/A
 Copyright N/A
 Levelled N/A

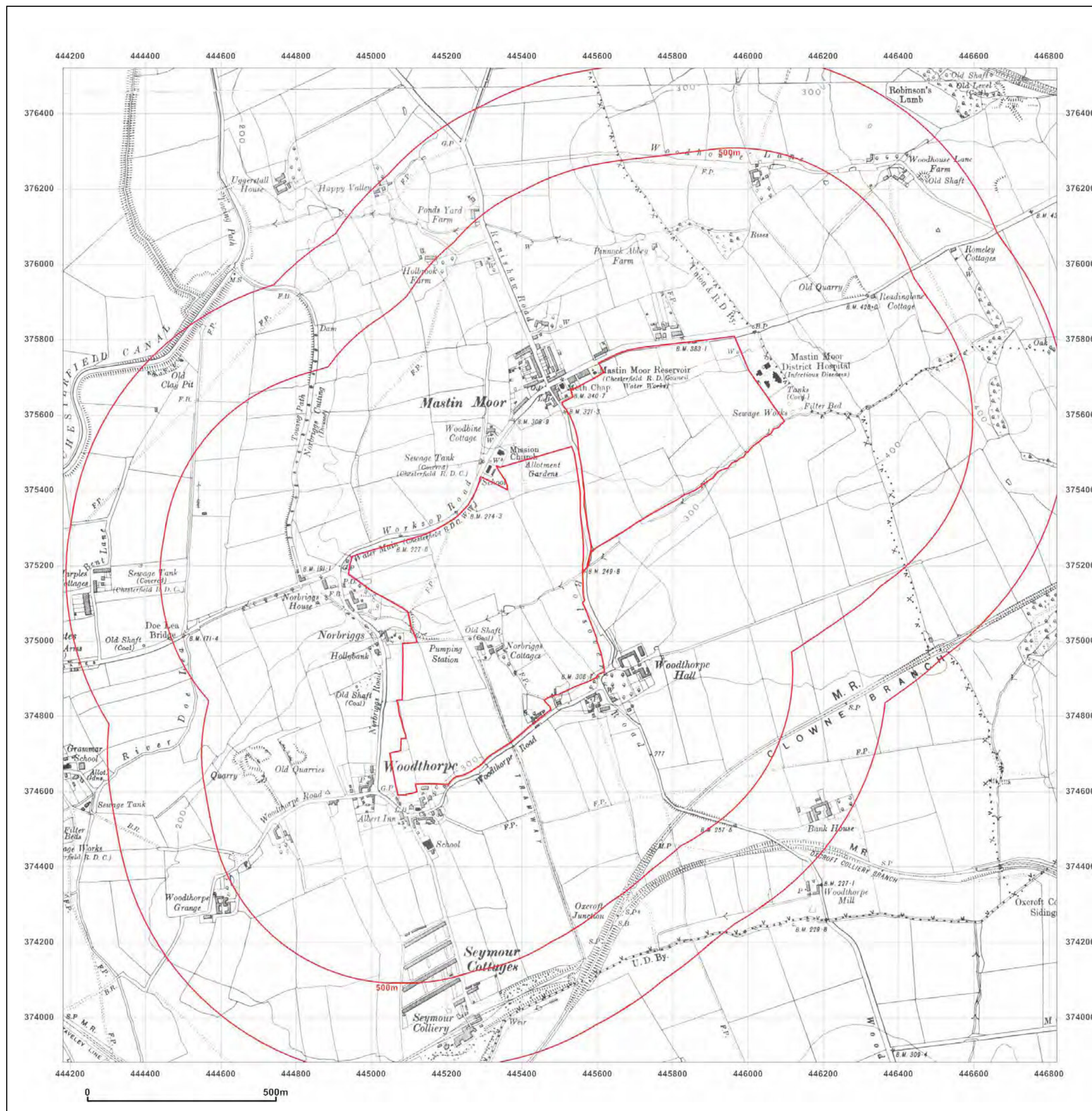


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Site Details:

Mastin Moor

Client Ref: 14/S435/SMJ/MER00810
Report Ref: HMD-154-1457651
Grid Ref: 445500, 375200

Map Name: County Series

Map date: 1897

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1875
 Revised 1897
 Edition N/A
 Copyright N/A
 Levelled N/A

Surveyed 1876
 Revised 1897
 Edition N/A
 Copyright N/A
 Levelled N/A

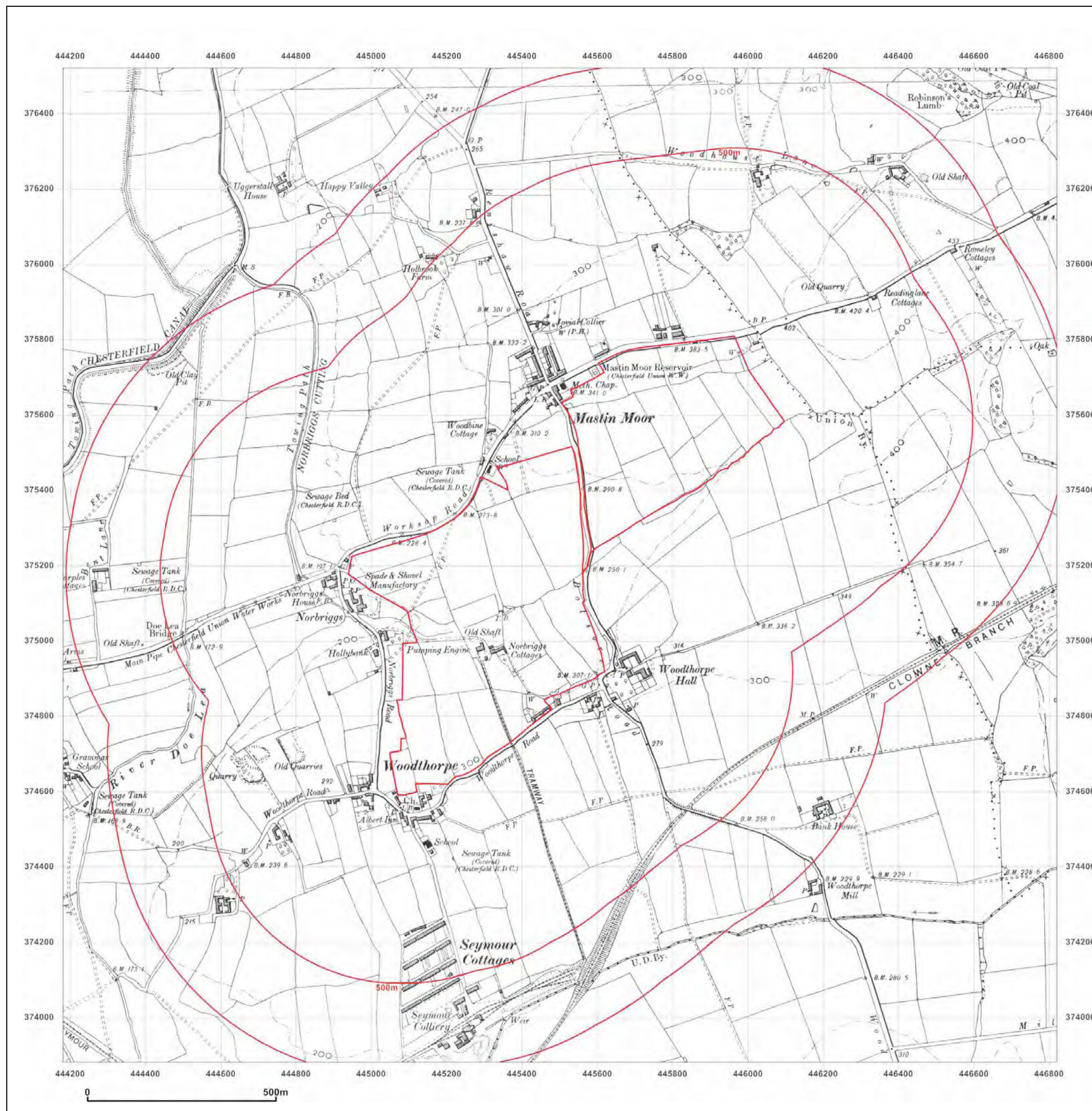


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Site Details:

Mastin Moor

Client Ref: 14/S435/SMJ/MER00810
Report Ref: HMD-154-1457651
Grid Ref: 445500, 375200

Map Name: County Series

Map date: 1876

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1876
 Revised 1876
 Edition N/A
 Copyright N/A
 Levelled N/A

Surveyed 1876
 Revised 1876
 Edition N/A
 Copyright N/A
 Levelled N/A

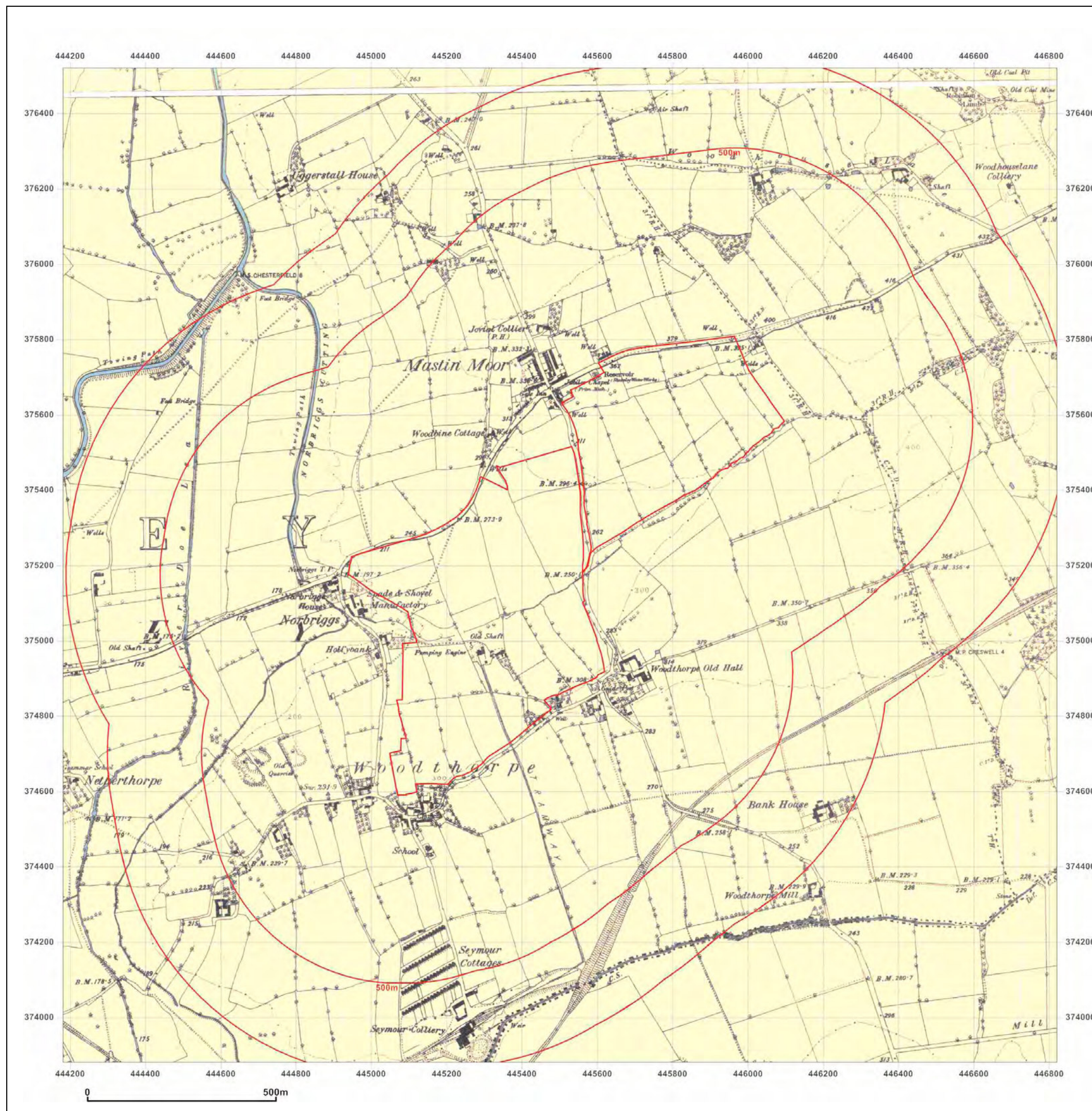


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APPENDIX 3

- Coal Mining Report
- Coal Authority plan
- Mine entry report
- Coal Authority opencast mine abandonment plan

Issued by:

The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

**IDOM MEREBROOK
EAST MILL
BRIDGE FOOT
BELPER
DERBYSHIRE
DE56 2UA**

Our reference: **51000550322001**
Your reference: **14/S451/SMJ/MER00810**
Date of your enquiry: **02 June 2014**
Date we received your enquiry: **02 June 2014**
Date of issue: **02 June 2014**

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

Non-Residential Coal Authority Mining Report

MASTIN MOOR, DERBYSHIRE, S433DJ

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

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 7 seams of coal at 30m to 490m depth, and last worked in 1986.

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

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on Coal Authority Information section of the report.

Present

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

Future

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

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

Location map



Approximate
position of
property



Enquiry boundary

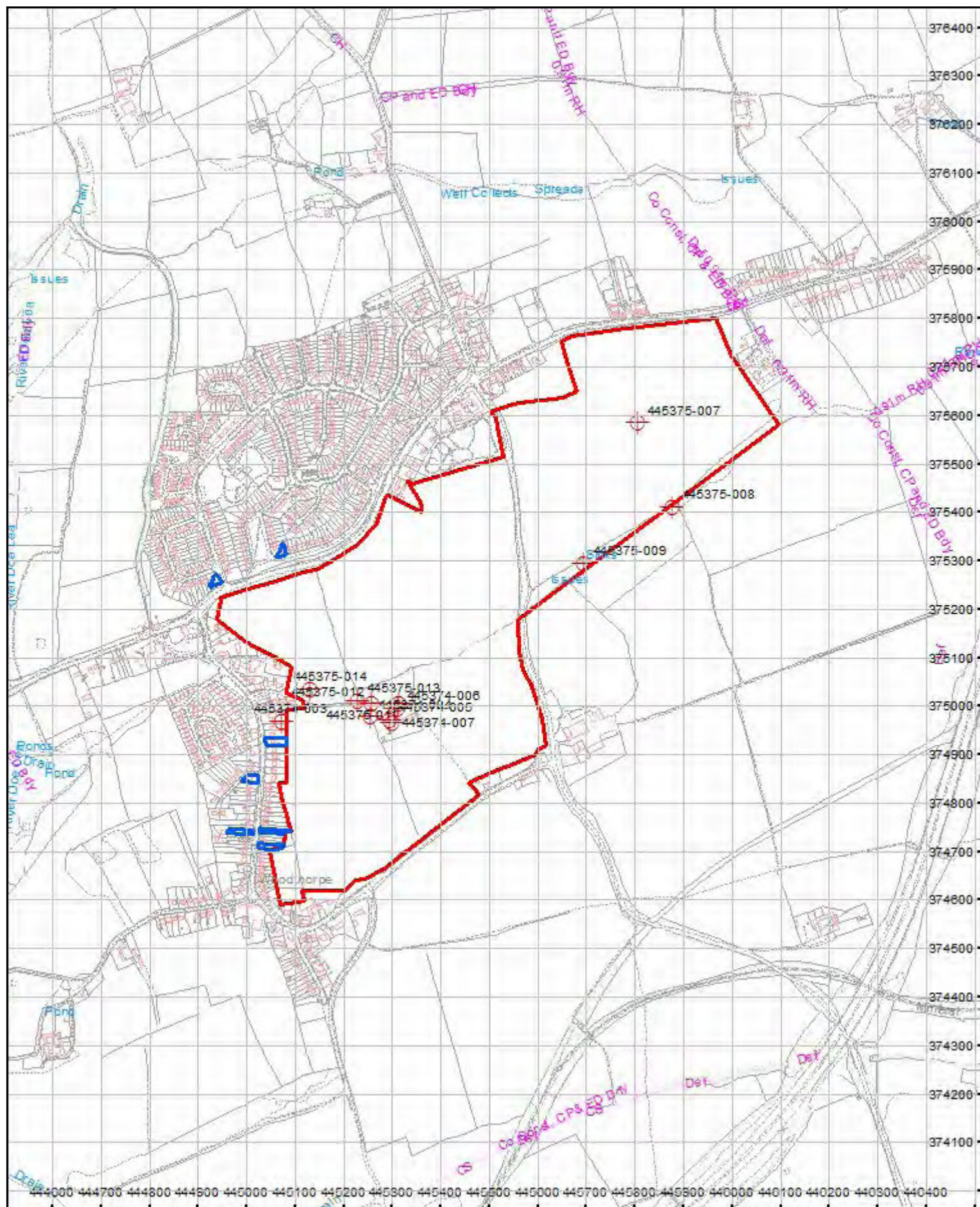
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Key

Approximate position of enquiry boundary shown

Disused Adit or Mineshaft

Coal Claims



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

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

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

Mine entries

Within, or within 20 metres of, the boundary of the property there are 12 mine entries, the approximate positions of which are shown on the attached plan.

Our records disclose the following information:

445375-012. was filled and capped in 1974.

445374-007. was found filled and subsequently capped (3.96m sq x 0.22m thick) at 1.1m bgl in 1979.

445374-003. was found filled and subsequently capped with a 4.0m square cap at 0.9m below ground level in 1974.

445374-004. was found filled and subsequently capped at 0.9m bgl in 1974.

445375-009. No treatment details.

445375-007. No treatment details.

445375-014. was filled with 40mm clean limestone in 1994.

445374-006. was found filled and subsequently capped at 3.4m bgl in 1974.

445375-011. is filled and capped at 5.5m bgl.

445374-005. was capped in 1967.

445375-013. was filled and capped in 1974.

445375-008. No treatment details.

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

For an additional fee, the Coal Authority will provide a supplementary Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry (entries) referred to in this report. It will give details based on information in the Coal Authority's possession, together with an opinion on the likelihood of mining subsidence damage arising from ground movement as a consequence of the existence of the mine entry/entries. It will also give details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

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

For further advice on how to order this additional information visit www.groundstability.com or telephone 0845 7626 848.

Coal mining geology

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

Opencast coal mining

Past

The property is within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

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

Future

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

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

Coal mining subsidence

A damage notice or claim for alleged subsidence damage was made in September 2012 for 23 NORBRIGGS ROAD, WOODTHORPE, CHESTERFIELD, DERBYSHIRE S43 3BT. However, the claim was rejected.

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

A damage notice or claim for alleged subsidence damage was made in May 1995 for 63 NORBRIGGS ROAD, WOODTHORPE MASTIN MOOR, CHESTERFIELD, DERBYSHIRE, S43 3BT. However, the claim was rejected.

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

A damage notice or claim for alleged subsidence damage was made in April 1997 for 55 NORBRIGGS ROAD, WOODTHORPE, MASTIN MOOR, CHESTERFIELD, DERBYSHIRE, S43 3BT. However, the claim was rejected.

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

There are a further 4 claim(s) within 50 metres of the property boundary that do not match the property address. These are shown on the attached plan.

The 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.

If further subsidence damage claims information is required in addition to that provided in this report, the Authority need to manually search their records. For further advice on how to order this additional information visit www.groundstability.com or telephone 0845 7626 848.

Mine gas

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

Hazards related to coal mining

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

Withdrawal of support

The property is in an area for which notices of entitlement to withdraw support were published in 1943, 1976.

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

Working facilities orders

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

Payments to owners of former copyhold land

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

Comments on Coal Authority information

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

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence act 1991*). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and the obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by telephoning 0845 762 6848 or online at www.coal.decc.gov.uk/en/coal/cms/services/claims.

If you wish to discuss the relevance of any of the information contained in this report you should seek the advice of a qualified mining engineer or surveyor. If you or your adviser wish to examine the source plans from which the information has been taken these are normally available at our Mansfield office, free of charge, by prior appointment, telephone 01623 637235. Should you or your adviser wish to carry out any physical investigations that may enter, disturb or interfere with any disused mine entry the prior permission of the owner must be sought. For coal mine entries the owner will normally be the Coal Authority.

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

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

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

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006. The Coal Authority owns the copyright in this report. The information we have used to write this report is protected by our database right. All rights are reserved and unauthorised use is prohibited. If we provide a report for you, this does not mean that copyright and any other rights will pass to you. However, you can use the report for your own purposes.

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Tax Point Date:	02 June 2014
Issued to:	IDOM MEREBROOK EAST MILL BRIDGE FOOT BELPER DERBYSHIRE DE56 2UA
Property Search for:	MASTIN MOOR, DERBYSHIRE, S433DJ
Reference Number:	51000550322001
Date of Issue:	02 June 2014
Cost:	£177.00
VAT @ 20%:	£35.40
Total Received:	£212.40
VAT Registration	598 5850 68

Map images are being sent under separate cover

Location map



Approximate
position of
property



Enquiry boundary

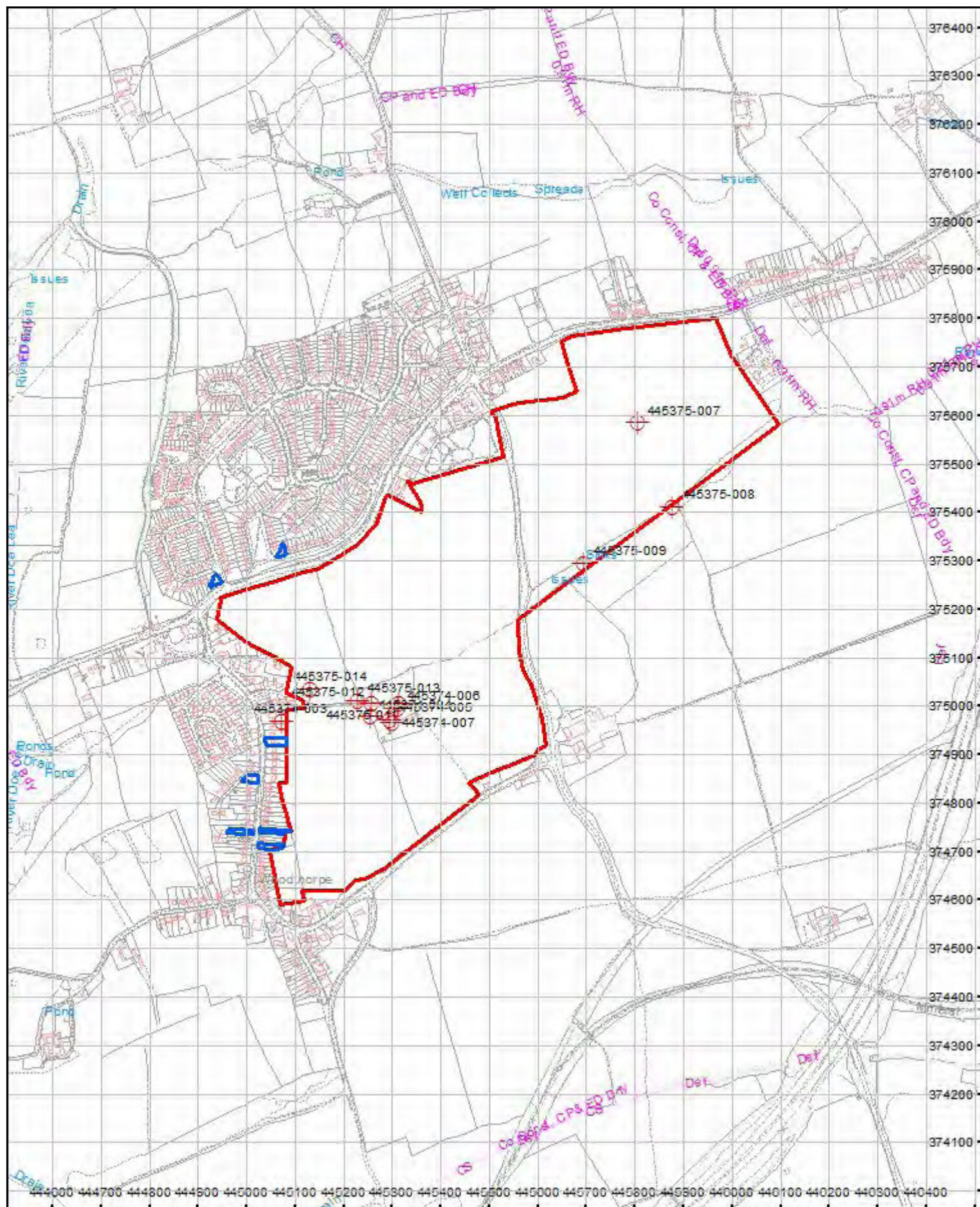
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Key

Approximate position of enquiry boundary shown

Disused Adit or Mineshaft

Coal Claims



Issued by:

The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

**IDOM MEREBROOK
EAST MILL
BRIDGE FOOT
BELPER
DERBYSHIRE
DE56 2UA**

Our reference:	51000626764001
Your reference:	14/S792/SMJ/MER00810
Date of your enquiry:	11 September 2014
Date we received your enquiry:	11 September 2014
Date of issue:	11 September 2014

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

Shaft Plan and Data Sheets

SITE AT, WORKSOP ROAD, MASTIN MOOR, DERBYSHIRE, S43 3DJ

I refer to the enquiry dated 11 September 2014, received 11 September 2014, in connection with the above.

As requested I enclose the mine entry data sheet(s) held for the mine entry/entries referred to.

Mine Entry Data

Shaft/adit:	Shaft
Reference:	445375-013
Source:	Ab plans pwEM335, EM336
Colliery name:	Unknown
Entry name:	Unknown
Date abandoned:	Unknown
Depth of superficial deposits (m):	Unknown
Depth of shaft (m):	18.3
Diameter of shaft (m):	2.1
Probable adit azimuth:	Not Applicable
Treatment details:	was filled and capped in 1974
Conveyance:	Not Applicable
Easting:	445229
Northing:	375010
Other information:	None

Mine Entry Data (continued)

Shaft/adit:	Shaft
Reference:	445375-014
Source:	Located
Colliery name:	Unknown
Entry name:	Unknown
Date abandoned:	Unknown
Depth of superficial deposits (m):	Unknown
Depth of shaft (m):	6.1
Diameter of shaft (m):	2.4
Probable adit azimuth:	Not Applicable
Treatment details:	was filled with 40mm clean limestone in 1994
Conveyance:	Not Applicable
Easting:	445131
Northing:	375034
Other information:	None

Mine Entry Data (continued)

Shaft/adit:	Shaft
Reference:	445374-004
Source:	Ab plan pwEM335
Colliery name:	NORBRIGGS
Entry name:	Unknown
Date abandoned:	Unknown
Depth of superficial deposits (m):	Unknown
Depth of shaft (m):	70.1
Diameter of shaft (m):	2.4
Probable adit azimuth:	Not Applicable
Treatment details:	was found filled and subsequently capped at 0.9m bgl in 1974
Conveyance:	Not Applicable
Easting:	445255
Northing:	374976
Other information:	None

Issued by:	The Coal Authority, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG
Tax Point Date:	11 September 2014
Issued to:	IDOM MEREBROOK EAST MILL BRIDGE FOOT BELPER DERBYSHIRE DE56 2UA
Property Search for:	SITE AT, WORKSOP ROAD, MASTIN MOOR, DERBYSHIRE, S43 3DJ
Reference Number:	51000626764001
Date of Issue:	11 September 2014
Cost:	£35.00
VAT @ 20%:	£7.00
Total Received:	£42.00
VAT Registration	598 5850 68

Location map

Approximate position of enquiry



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

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A DTI leaflet setting out the rights and obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by telephoning 0845 762 6848.

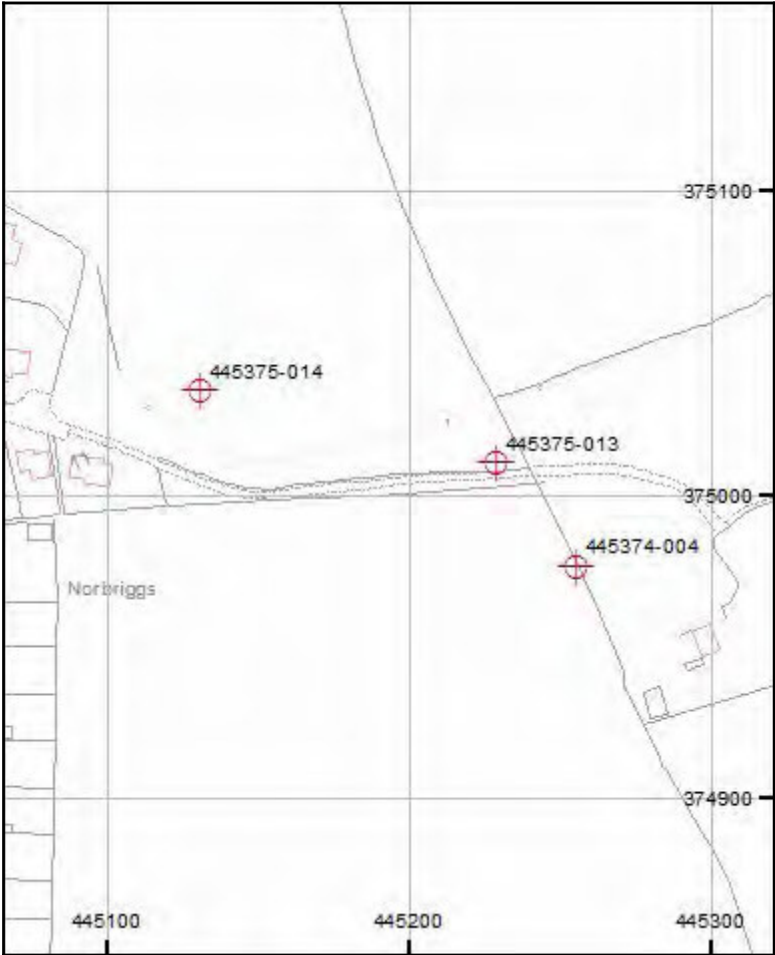
If you wish to discuss the relevance of any of the information contained in the attached report you should seek the advice of a qualified mining engineer or surveyor. If you or your advisor wish to examine the source plans from which the information has been taken these are available at our Mansfield office, free of charge by prior appointment, telephone 01623 637235. Should you or your advisor wish to carry out any physical investigations that may enter, disturb or interfere with any disused mine entry the prior permission of the owner must be sought. For coal mine entries the owner will normally be the Coal Authority.

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

Our emergency telephone number at all times is 01623 646333.

Key

Disused Adit or Mineshaft



ABANDONMENT PLAN MASTIN MOOR

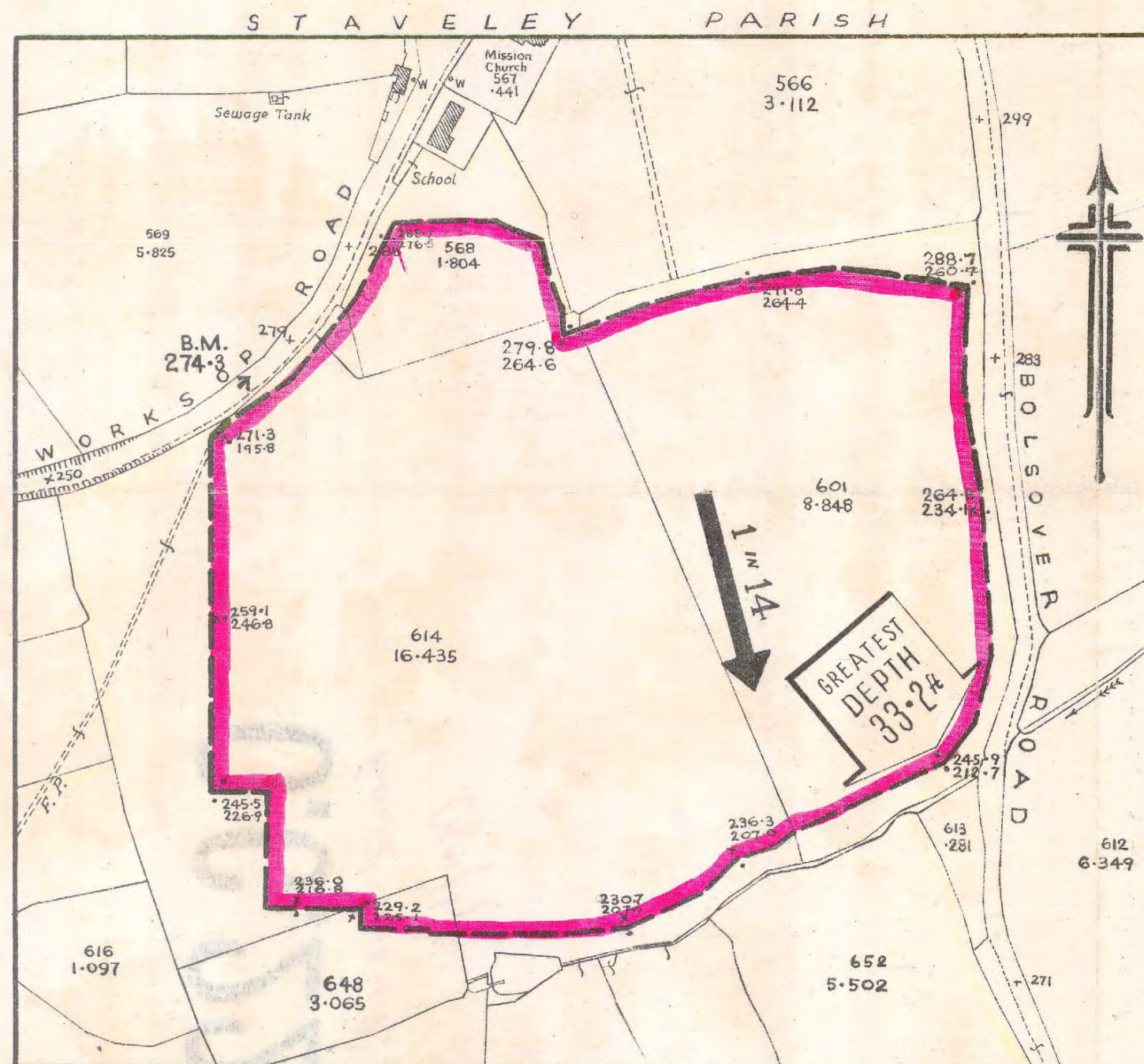
NR: STAVELEY NM/3/161

DATA

ORDNANCE SHEET.....	DERBY 19-9 1916
COUNTY.....	DERBYSHIRE
PARISH.....	STAVELEY
NAME OF SEAM.....	ST. JOHN'S (HAZEL GROUP)
SURFACE LEVELS.....	• 408.7
MAIN CONTRACTOR.....	EARTH MOVER LTD.
TONNAGE EXTRACTED.....	57,018
ACREAGE EXTRACTED.....	22.00
SEAM FLOOR LEVELS.....	X 377.0
EXCAVATION AREA SHEWN.....	
COAL EXTRACTION AREA EDGED.....	PINK
AV. IN SITU-SEAM THICKNESS.....	2 ft. 5 ins.
AV. RECOVERED SEAM THICKNESS.....	1 ft. 11 ins.
GREATEST DEPTH OF SEAM FLOOR.....	33.2 feet
RATE & DIRECTION OF DIP SHEWN.....	1 in 14
DATE OF FINAL COAL EXTRACTION.....	17 MAY 1945
DATE OF COMPLETION-BACK FILLING.....	JULY 1945
DATE OF FINAL RESTORATION.....	JUNE 1947
DATE DE-REQUISITIONED.....	MAY 1948

DRAWN BY: *AB* CHECKED BY: *H.O.* DATE: 18/4/48

DRAWING NO 1645 SCALE 1/2500
MINISTRY OF FUEL & POWER - D.O.C.P - NOTTINGHAM.



MINING RECORD OFFICE
BUXTON

RECD. 29 APR 1948

REF.

40 CHAINS



The Coal

Catalogue No.: OC22 Sheet Info: 2 OF 2

Date: 30/09/2014

Scale: 1 TO 2500

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2/2



AN **idom** GROUP COMPANY

Idom Merebrook Ltd East Mill, Bridgefoot, Belper, Derbyshire, DE56 2UA
t +44 (0)1773 829 988 **f** +44 (0)1773 829 393 **e** consulting@merebrook.co.uk merebrook.co.uk idom.com

Registered in England No: 02740216 Registered office: Belper

offices London Kent Derby Cardiff Manchester Moray

APPENDIX 2 ▪ Phase 2 Geoenvironmental Assessment

GEO-ENVIRONMENTAL ASSESSMENT
MASTIN MOOR
CHESTERFIELD
CHATSWORTH SETTLEMENT TRUSTEES
GEA-19412-15-256REVA
JANUARY 2016



GEO-ENVIRONMENTAL ASSESSMENT
MASTIN MOOR
CHESTERFIELD
CHATSWORTH SETTLEMENT TRUSTEES
GEA-19412-15-256REVA
JANUARY 2016

Current Document Details

Authors

Siobhan Jackson
Scott Marriott

Issued by



.....
Siobhan Jackson

Approved by



.....
Keith Paramor

Document2

Document Revisions

Rev	Date	Author	Checked	Approved
INTERIM	23.10.15	SMJ/SM	DCE	KRP
A	11.01.16	SMJ/SM	KRP	KRP

Report issued from

DERBYSHIRE East Mill, Bridgefoot, Belper, Derbyshire. DE56 2UA Tel: 01773 829988



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APPENDIX 3.....

- Soil Chemistry
- Laboratory Analysis Certificates

APPENDIX 4.....

- Geotechnical Laboratory Certificates

APPENDIX 5.....

- Field Monitoring Records
- Groundwater Level Data
- Hazardous Soil Gas Data

APPENDIX 6.....

- Gas Risk Assessment

APPENDIX 7.....

- Surface Water Laboratory Certificate



EXECUTIVE SUMMARY

A Phase 2 Geo-Environmental Assessment was requested by Chatsworth Settlement Trustees. The purpose of the assessment was to identify any contaminative or geotechnical issues associated with former land use at *Mastin Moor, Chesterfield* which might impact on the site's redevelopment.

A Phase 1 Geo-Environmental Assessment (Desk Study) was carried out prior to the intrusive investigation and the results were reported in Idom Merebrook report reference DS-MER00810-14-138revA.

This information has been used to design a preliminary remedial strategy in accordance with current legislation (Part IIA of The Environmental Protection Act 1990) and to inform initial foundation design.

SITE DETAILS	
Approximate site area	52.5 ha
Current/previous use	Undeveloped – open fields/agricultural
Proposed use	Broadly, it is likely to comprise residential with private and communal gardens, soft landscaping and associated roads and parking

PHASE 1 NON-INTRUSIVE INVESTIGATION	
Expected geology	Drift deposits absent, solid geology comprises Pennine Middle Coal Measures. Possible worked/made ground.
Groundwater	Pennine Middle Coal Measures are classified as a Secondary A aquifer. There are no groundwater abstractions within 2 km of the site. The site does not lie within a groundwater source protection zone.
Surface water	An unnamed tertiary watercourse flows in a westerly direction across the western land parcel and along the southern boundary of the eastern land parcel. There are no surface water abstraction licences within 1 km of the site. Online data provided by the Environment Agency indicates the site to be within a flood risk zone 1 (low risk) area. This is covered more fully in Merebrook's flood risk assessment report which is to be issued separately.
Other	Site lies in a radon affected area – basic radon protective measures required. Site lies in an area affected by coal mining – Coal Mining Report notes presence of filled and capped mine entries on site. Opencast mining identified in northwest of site. Existing mine drainage identified within site.



PHASE 2 EXPLORATORY INVESTIGATION	
Contamination	Contamination generally absent. One exceedance of arsenic within made ground at a depth of 0.7 m and demeton-s (insecticide) recorded in one sample at 0.2 m.
Geotechnical issues	Investigations carried out to date have revealed deep made ground within the historical opencast coal mining area. Further investigation is needed to ascertain the full depth and extent of the made ground in this area.

RECOMMENDATIONS	
Geotechnical	Traditional shallow foundations are likely to be feasible for the majority of the site. However in the historical opencast coal mining area deep made ground has been encountered, with the base not proven (>6.45 m bgl), an alternative foundation solution such as ground improvement or piles will need to be considered. Further investigation will be required to delineate the affected area. An initial geophysical survey has been undertaken by others and provided to Merebrook for information. The scanning survey has identified various potential archaeological anomalies, several of which may relate to historic mining remains (including mine shafts). The report recommends that the further investigation is undertaken prior to any development works on the site, and states <i>"the most effective form of archaeological evaluation in this instance would be a detailed gradiometer survey to further identify features highlighted in order to inform a trial trenching or open area evaluation"</i> . This information could then be used to inform more detailed subsequent site investigation works.
Remediation	No specific soil remediation required on the basis of results obtained to date. It is recommended that a site-specific screening level is derived for demeton-s and the recorded concentration is assessed to determine whether localised remediation is necessary.
Waste classification	Based on the solid concentrations recorded to date, made ground soils would generally be classified as non-hazardous for waste disposal purposes. WAC testing would be required for made ground soils destined for landfill to determine whether they would be classified as suitable for inert landfill disposal (excluding topsoil). Natural as-dug arisings could be classed as suitable for inert landfill disposal without the requirement for WAC testing.



SECTION 1 INTRODUCTION

- 1.1 Chatsworth Settlement Trustees proposes to develop an area of land located at Mastin Moor near Staveley, Chesterfield for mainly residential development purposes. Outline development proposals have been provided at this time for the area of the site west of Bolsover Road, comprising residential development, a health centre and associated landscaping and infrastructure. It is noted that there is an enclave within the western site which is outside the development area, currently occupied by buildings associated with Pump House Farm.
- 1.2 The objectives of the investigation are to:
- i.* Assess surface and sub-surface ground conditions present at the site;
 - ii.* Identify hazards associated with ground contamination which may place constraints on the site and the proposed development;
 - iii.* Evaluate the risks associated with any identified hazards;
 - iv.* Provide preliminary recommendations for the mitigation of any significant risks identified; and
 - v.* Provide preliminary geotechnical recommendations.
- 1.3 A Phase 1 (Non-intrusive Investigation) and a Phase 2a (Preliminary Exploratory Investigation) have been undertaken for the subject site. The Phase 1 Geo-environmental Assessment was completed in October 2014 and reported under separate cover in Merebrook report reference DS-MER00810-14-138revA.
- 1.4 This report presents the findings of the Phase 2a geo-environmental investigation and provides an interpretation of the geo-environmental conditions that exist at the site. The contaminative status of the site and the implications with respect to development have been interpreted in accordance with the current government guidance on source-pathway-receptor risk assessment. This report uses a Tier 1 risk assessment to ascribe a conservative qualitative appraisal of the hazards associated with the site.
- 1.5 This report has been prepared for Chatsworth Settlement Trustees for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Chatsworth Settlement Trustees and Merebrook as to the extent to which the findings may be appropriate for their use.



SECTION 2 SITE SETTING

2.1 GENERAL

- 2.1.1 The site is located to the south of the A619 Worksop Road in Mastin Moor, to the northeast of Chesterfield. The site comprises two land parcels (eastern and western) divided by Bolsover Road (B6419).
- 2.1.2 The site occupies an area of approximately 52.5 hectares located at National Grid Reference 445867,375570 and indicated on drawing MER00810-001-001, presented in Appendix 1 of this report.
- 2.1.3 Details of the site including, *inter alia*, current condition, developmental history, geology and hydrogeology are presented in detail in the previous Idom Merebrook Phase 1 (desk study) report, DS-MER00810-14-138revA which should be read in conjunction with this report.

SECTION 3 PRELIMINARY CONCEPTUAL MODEL & SITE INVESTIGATION RATIONALE

3.1 PRELIMINARY CONCEPTUAL SITE MODEL

- 3.1.1 The Phase 1 assessment included a preliminary risk assessment and identification of potential pollutant linkages. A preliminary conceptual model was presented (see Table 1 below) which informed the scope of the Phase 2 assessment.

Table 1: Preliminary Conceptual Model

POSSIBLE POLLUTANT LINKAGE			RISK CHARACTERISATION
POTENTIAL SOURCES	PATHWAYS	RECEPTORS	
Heavy metals and hydrocarbons (made ground)	Contact with contaminated soil	Human health (current users)	Low risk identified Potential for localised made ground which can contain elevated metals and hydrocarbons, however limited potential for exposure.
	Ingestion and inhalation of contaminated soil and dust	Human health (current users)	
Heavy metals and hydrocarbons (made ground)	Contact with contaminated soil	Human health (future residents and construction workers)	Low to moderate risk identified Localised made ground anticipated, including backfilled opencast mining area, which can contain elevated metals and hydrocarbons.
	Ingestion and inhalation of contaminated soil and dust	Human health (future residents and construction workers)	
Asbestos (made ground)	Ingestion and inhalation of contaminated soil and dust	Human health (future residents and construction workers)	Low risk identified Low potential for made ground near southern boundary to contain asbestos from demolition of buildings.



POSSIBLE POLLUTANT LINKAGE			RISK CHARACTERISATION
POTENTIAL SOURCES	PATHWAYS	RECEPTORS	
Contamination (all forms)	Vertical migration to aquifer	Controlled waters	Low risk identified Any contamination likely to be low level.
Contamination (all forms)	Horizontal migration to surface water	Controlled waters	Low risk identified Risk to watercourse likely to be low as no significant contamination anticipated.
Hydrocarbons	Direct contact	Permeation of plastic water pipes and potable water quality	Low risk identified Unlikely but cannot rule out presence of localised hydrocarbon contamination at this stage.
Hazardous Gas/Vapours In soil	Ingress into buildings and voids	Human health (future residents and construction workers)	Moderate risk identified Potential for made ground which could act as source of hazardous gas. Coal bearing strata are also a potential source of hazardous gas, particularly disturbed coal measures as indicated by the presence of closed mine entries on site.

3.2 SITE INVESTIGATION RATIONALE

- 3.2.1 In accordance with the findings of the Phase 1 investigation, a site investigation rationale was drawn up. Priority contaminants were identified as metals, sulphates, hydrocarbons and asbestos within any made ground, including the backfilled opencast mining area.
- 3.2.2 It was proposed that a general intrusive investigation be undertaken to characterise soil quality and geotechnical properties. The scope of works was limited by the site's continued agricultural use and comprises a preliminary investigation for planning submission purposes.
- 3.2.3 Exploratory hole locations were selected to provide general coverage and also to target areas of previous mining related activities including opencast mining and the route of a former mineral tramway.



SECTION 4 PHASE 2 (EXPLORATORY INVESTIGATION)

4.1 SITE INVESTIGATION METHODS

- 4.1.1 An intrusive investigation was carried out by Merebrook on 24 to 26 August and 2 to 4 September 2015 (to coincide with crop harvests) comprising the following exploratory holes:
- i.* 18 shallow windowless sample probe holes (MWS1 to MWS18) to depths of between 2.80 and 6.45 m bgl.
- 4.1.2 Exploratory hole locations are indicated on drawing 19412-304-001 in Appendix 1. Logging of exploratory holes was undertaken by a Merebrook Engineer. Exploratory hole logs are contained in Appendix 2.
- 4.1.3 A tracked windowless sampling rig was used to advance MWS1 to MWS18. This comprised a rig-mounted drop hammer to drive a hollow steel barrel into the ground. The barrel is recovered along with a removable plastic sleeve, which lines the barrel and holds a core of soil which is retracted for logging and sampling.
- 4.1.4 Standard Penetration Tests (SPTs) were performed at approximate 1 metre intervals within the window sample boreholes. The tests involved driving a steel cone tipped series of rods into the ground over a distance of 450 mm using the repeated blows of a 63.5 kg weight allowed to free fall over a distance of 760 mm. The total number of blows required for the final 300 mm penetration (the 'N' value) is recorded on the window sample logs.
- 4.1.5 Standpipes were installed in MWS1, MWS2, MWS4, MWS5, MWS8, MWS9, MWS13, MWS14, MWS16 and MWS17 for gas and groundwater monitoring purposes, each comprising plain section pipe from ground level to 1.0 m sealed with bentonite and slotted section pipe from 1.0 m to the base with a gravel surround.
- 4.1.6 Representative soil samples were taken from various depths and strata to assess the contaminative status of the site. Soil samples were submitted to an MCERTS/UKAS accredited laboratory for chemical analysis of a broad suite of potential contaminants. Several samples of made ground were also screened for asbestos (as both fibres and asbestos containing materials) although no visible fragments were noted during the site investigation. Selected samples were also analysed for pesticides and herbicides given the site's continued agricultural use. The results are provided in Appendix 3.
- 4.1.7 A programme of geotechnical laboratory testing was performed on selected soil samples obtained from the boreholes, comprising classification and strength tests. Chemical testing was also undertaken to assess the aggressiveness of the ground with respect to buried concrete. The results are provided in Appendix 4.



SECTION 5 GROUND CONDITIONS

5.1 SURFACE GROUND CONDITIONS

- 5.1.1 The site is currently used for agricultural purposes. At the time of the site investigation crops of wheat and oil seed rape had recently been harvested from the site. The majority of the site's boundaries are marked by hedgerows with occasional mature trees; wooden post fencing was also present along the far western site boundaries. A small stream dissected the centre of the site flowing from the east to the west of the site generally.

5.2 SUB-SURFACE GROUND CONDITIONS

- 5.2.1 The intrusive investigation undertaken to date has encountered ground conditions which are generally consistent with the published geology. The ground conditions differed by way of deep made ground encountered from ground level within the northern area of the site, consistent with the inferred area of opencast mining indicated on the mine abandonment plan presented in Appendix 3 of the Desk Study, and shown on drawing 19412-313-001 in Appendix 1.
- 5.2.2 A summary of the ground conditions encountered in the Merebrook investigation is presented in Table 2, whilst a more detailed assessment of the strata is contained in the following sections.

Table 2: Summary of Sub-surface Ground Conditions

STRATA	DEPTH TO TOP RANGE (m bgl)	THICKNESS RANGE (m)
Made Ground	0.00	0.30 - > 6.45
Topsoil	0.00	0.30 – 0.40
Weathered Pennine Middle Coal Measures	0.30 - > 6.45	> 3.45
Coal	0.98 – 1.20	0.05 – 1.00

5.2.3 Made Ground

- 5.2.3.1 Re-worked weathered Pennine Middle Coal Measures largely comprising variably gravelly variably sandy often silty clays were predominantly present within the historical open-cast mining area within the northern central field area of the site. The made ground was not bottomed out in this area due to the constraints on exploratory methods employed, although information obtained from The Coal Authority suggests the base of extraction to be at approximately 10 m bgl. This area is highlighted on drawing ref: 19412-313-001 which is presented within Appendix 1 of this report.
- 5.2.3.2 There was no visual or olfactory evidence of contamination noted in the made ground strata. Occasional man-made materials such as brick were observed.



- 5.2.3.3 No significant groundwater ingress was noted in the made ground strata during the site investigation although groundwater was noted within one location, MWS8, struck at 3.20 m and subsequently measured in standpipes in MWS8 and MWS13 at an average depth of 2.91 m bgl.
- 5.2.3.4 Within the made ground SPT 'N' values varied from 3 to 20, recorded at between 1.0 and 6.0 m depth with an average value of 10.5, indicating the presence of variable ground conditions. Some materials were indicated to be soft or loose from penetration tests and the variability in test results will be influenced by the presence of coarse granular materials. Taken as a whole the visual assessment of consistency indicated a degree of consolidation has occurred.
- 5.2.3.5 Atterberg limit tests carried out on five samples of cohesive made ground indicate that the soil can be classified as clay of low to intermediate plasticity. The plasticity index of the soil was found to range between 14 and 18 % and in accordance with NHBC guidelines, this soil is of low volume change potential. Moisture contents were also determined and ranged from 7.9 to 18 %.
- 5.2.4 Natural Ground – Weathered Pennine Middle Coal Measures
 - 5.2.4.1 Weathered Pennine Middle Coal Measures comprising variably gravelly variably sandy often silty clays were encountered to the base of all exploratory holes outside of the northern central former opencast coal mining area.
 - 5.2.4.2 Rockhead was encountered as weak weathered mudstone and siltstone within the base of MWS6, MWS15 and MWS18 at depths of between 1.90 to 2.50 m bgl.
 - 5.2.4.3 Coal was noted within MWS4 at depths of 0.98 to 1.03 m and 1.20 to 2.20 m bgl. The coal was identified to lie within the Weathered Pennine Middle Coal Measures deposits.
 - 5.2.4.4 There was no visual or olfactory evidence of contamination noted in the natural superficial deposits.
 - 5.2.4.5 No significant groundwater ingress was noted in the natural weathered Pennine Middle Coal Measures strata during the site investigation although groundwater has been logged during gas and groundwater monitoring within one location, MWS17, at an average depth of 2.71 m bgl.
 - 5.2.4.6 Atterberg limit tests carried out on eight samples of natural clay deposits indicate that the soil can be classified as clay ranging from low to very high plasticity. The plasticity index of the soil was found to range between 11 and 47 % and in accordance with NHBC guidelines, this soil is generally of low and medium volume change potential. However, one result suggests high volume change potential. Moisture contents were also determined and ranged from 8.3 to 24 %.



- 5.2.4.7 SPT 'N' values ranging from 11 to 51 were recorded within the weathered Pennine Middle Coal Measures indicating the presence of stiff to hard, medium to high strength, competent ground conditions.

SECTION 6 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

6.1 FOUNDATIONS

- 6.1.1 The proposed new development is expected to comprise predominantly low rise housing with associated infrastructure and open space.
- 6.1.2 As discussed in Section 5.2 the preliminary intrusive ground investigation carried out revealed significant thicknesses of made ground (> 3.45 – > 6.45 m thick) within the central northern historical opencast coal mining area, consisting of re-worked weathered Pennine Middle Coal Measures (likely replaced overburden and spoil from coal extraction). Weathered Pennine Middle Coal Measures (> 3.45 m thick) were encountered across the remainder of the site comprising variably gravelly variably sandy clay and revealed competent ground conditions.
- 6.1.3 Based on the ground conditions encountered across the majority of the site (excluding the historical open-cast coal mining area) it is considered that shallow strip/trench footings will be suitable for the majority of the site. All footings would need to be extended through any surficial made ground and soft / loose natural soils to found within underlying stiff clay.
- 6.1.4 A number of Atterberg limit tests have been performed to date on the natural cohesive soils. Test results indicate that the clays are generally of low or medium volume change potential, however, one result indicated clay of high volume change potential. Prior to finalising foundation designs it is recommended that, in light of the limited results, further testing should be undertaken in order to confirm the volume change potential classification for the clay soils.
- 6.1.5 Footings will need to be deepened in accordance with NHBC guidelines where footings are to be placed in stiff clay and are located within 8.0 m of existing mature trees and hedges of high water demand. The extent of deepening due to existing trees of high water demand shall be limited to the periphery of the site and along field boundaries within the site where hedges and mature trees are present. In the vicinity of these boundaries footings may need to be engineer designed in accordance with NHBC Standards Chapter 4.2.
- 6.1.6 Allowable bearing pressures (ABPs) of 150 kN/m² would be achievable for footings up to one metre wide founded within stiff cohesive soils. Total and differential settlements are expected to remain within acceptable limits at these pressures.
- 6.1.7 Given the deep made ground (> 6.45 m bgl) encountered within the historical opencast mining area of the site traditional strip/trench footings will not be feasible in this area. Therefore, an alternative foundation solution will need to be adopted.



- 6.1.8 A possible solution to consider will be ground improvement (vibro stone columns). This would involve installing stone columns along the lines of all load bearing walls and would enable reinforced strip footings to be constructed on the improved ground. This option may not be feasible close to site boundaries or field boundaries where existing trees and hedges would require deepened footings. In order to assess the suitability of using ground improvement a specialist contractor should ideally be invited to attend site to view the ground conditions for themselves.
- 6.1.9 Careful consideration will need to be given to areas where proposed units straddle the high wall as differential settlements could occur if buildings were founded partly on strip/trench footings bearing in natural ground and partly within improved ground. If ground improvement is deemed suitable then one option would be to install stone columns beneath the entire footprint of each unit straddling the high wall.
- 6.1.10 Another option could be the use of dynamic compaction (DC) techniques. DC techniques involve dropping heavy weights onto the ground in order to compact and strengthen soils up to depths of 8 m. This would reduce the risk of large long term settlements, enabling reinforced rafts to be constructed on the treated fill. This technique does however cause large vibration effects (both airborne and groundborne) so local authorities would need to be consulted to determine the feasibility of using DC at this site.
- 6.1.11 Alternatively, bored / Continuous Flight Auger (CFA) piles could be adopted in this area of the site. Driven piles could possibly be adopted as they have the advantage that no arisings are generated, however, the effects of noise/vibrations are likely to be an issue given the proximity of existing residential development, especially along the northern site boundary.
- 6.1.12 The advantage of using bored / CFA piles is the low noise/vibration of the system, however, arisings are generated by these piles. Piles would need to be taken through the made ground and any weak natural soils to found within underlying competent strata. The full extent of the made ground was not proven during the recent preliminary site investigation although consultation of historical mining records specific to this area indicate that the base of the opencast mine is expected to be at approximately 10 m bgl, although this cannot be proven at this point and is only given as a guide.
- 6.1.13 It is recommended that the advice of a specialist contractor be sought in order to determine the most appropriate / cost effective system and to advise on pile diameters, depths and safe working capacity. A guide to safe working loads for individual bored / CFA piles of varying diameter and length is presented in the table below. Pile calculations have been based on assessing skin friction and end bearing resistance in the expected undisturbed natural strata. No allowance has been made at this stage for any potential drag down (negative skin friction). This should be assessed and allowed for by the designer. The calculations assume a pile penetrating through the made ground and at least 2 m into mudstone, whilst no



contribution from existing overlying made ground materials has been allowed for in the calculations.

- 6.1.14 A factor of safety of 2.5 has been applied to the calculated ultimate capacities. Greater safe working capacities would be achievable if piles were taken to greater depth thereby benefiting from increased skin friction contribution and possible greater end bearing resistance due to the presence of very stiff clay and potentially solid strata.
- 6.1.15 As discussed these values are for guidance purposes only. Further investigation into the depths of the made ground and the competency of the underlying strata in this area is necessary and values are for preliminary guidance purposes only.
- 6.1.16 In addition any values given should be verified by a specialist contractor. The safe working loads given are for individual isolated piles. The group effect should be assessed during the design stage.

Table 3: Pile Safe Working Capacities

Pile Diameter (mm)	Pile Length (m)	Safe Working Capacity (kN)
300	12	75
	15	105
450	12	150
	15	200
600	12	250
	15	315

- 6.1.17 Based on the limited information at depth it is recommended that deep exploratory boreholes are undertaken in order to prove the thickness of deep made ground and to obtain parameters for pile design, whilst the extent of this area will also need to be confirmed with trial pits/trenches.

6.2 EXCAVATIONS AND GROUNDWATER

- 6.2.1 Based on the ground conditions observed at the site, shallow excavations are generally considered likely to remain stable in the short term across much of the site however, deep made ground was encountered across a significant proportion of the central northern area of the site and it is likely that open excavations within this area will become unstable in the short term. Despite the relative stability of the majority of the site, if man-entry is required, all excavations must be supported by shoring or



otherwise battered back to a safe angle in order to protect the workforce from possible collapse.

- 6.2.2 Groundwater was only encountered in one of the exploratory holes during site works and has subsequently been recorded within two exploratory holes, MWS8 and MWS17, at minimum depths of 2.91 and 2.71 m bgl, respectively. Despite this it is possible that groundwater ingress will occur in shallow excavations, therefore, provision for dewatering during the construction period should be considered.

6.3 FLOOR SLABS

- 6.3.1 In view of the presence of significant thicknesses of made ground within the central northern area of the site, with shrinkable natural soils at shallow depth across the majority of the rest of the site, it is recommended that suspended floor slabs are adopted for the whole of the proposed development.

6.4 BURIED CONCRETE

- 6.4.1 Recommendations given in BRE Special Digest 1:2005 "*Concrete in aggressive ground*" have been followed in order to give recommendations with respect to buried concrete.

- 6.4.2 Water soluble sulphate analysis was carried out on 34 soil samples obtained from depths of between 0.1 and 4.8 m bgl with soil pH determination also carried out on these samples. Water soluble sulphate contents ranged between <10 and 63 mg/l. In accordance with BRE guidelines the characteristic value is calculated by determining the mean of the highest 20 % of results. In this case the characteristic value is 49 g/l. On this basis the Design Sulphate Class is DS-1.

- 6.4.3 The pH values in the soil samples varied between 4.3 and 8.5. The mean of the lowest 20 % of values is 5.9 which represents the characteristic value. Mobile groundwater conditions have been assumed and on this basis the Aggressive Chemical Environment for Concrete (ACEC) class for the site is AC-1s.

6.5 ROADS AND PAVED AREAS

- 6.5.1 In the absence of *in situ* test data it is recommended that for preliminary design purposes a California Bearing Ratio (CBR) value of < 2 % is assumed for the made ground and locally shallow cohesive soils.

6.6 SOAKAWAYS

- 6.6.1 Soakage tests have not been carried out to date, however, it is considered unlikely that the use of shallow soakaways will be feasible at the site, due to the presence of predominantly cohesive deposits and localised deep made ground.



SECTION 7 ENVIRONMENTAL ASSESSMENT

7.1 SOIL QUALITY

- 7.1.1 A total of 35 soil samples were submitted to the laboratory for chemical analysis, including 12 samples from natural ground and 23 samples from made ground. The laboratory chemical analysis certificates are contained in Appendix 3. The results of the analysis are summarised in Table 4.
- 7.1.2 An initial screening exercise has been undertaken whereby contaminant concentrations recorded in soils have been assessed against *Suitable for Use Levels* (S4ULs) published in 2015 by LQM/CIEH¹. These precautionary screening levels are designed to be representative of minimal risk to human health in a number of land use scenarios. In this report S4ULs have been selected for a residential land use where the possibility of consumption of homegrown produce exists and assuming a soil organic matter of 1 %. For lead the DEFRA Category 4 Screening Level² has been used as this is based on updated toxicological data and a low risk to human health.
- 7.1.3 An additional set of phytotoxin screening levels have been adopted from 'The Code of Agricultural Practice for the Protection of Soil' Ministry of Agriculture, Fisheries and Food (MAFF), 1993, which are protective of healthy plant growth.

Table 4: Summary of Soils Chemical Analysis Results

CONTAMINANT	UNITS	MAX	MEAN	No of Tests	SCREENING LEVEL (SL)	No > SL*
HUMAN HEALTH RISK ASSESSMENT						
Asbestos in soil	-	-	-	12	Detected	0
pH	-	6.2 – 8.5 (range)	7.1	29	5 – 9	0
Arsenic	mg.kg ⁻¹	82	15	29	37	1
Cadmium	mg.kg ⁻¹	1.7	0.81	29	11	0
Chromium (total)	mg.kg ⁻¹	44	27	29	910	0
Hexavalent Chromium	mg.kg ⁻¹	<1	<1	29	6	0
Lead	mg.kg ⁻¹	84	27	29	200	0
Mercury	mg.kg ⁻¹	0.15	0.06	29	40	0
Nickel	mg.kg ⁻¹	39	24	29	130	0
Selenium	mg.kg ⁻¹	1	0.54	29	250	0
TPH Aliphatic >EC ₅ - EC ₆	mg.kg ⁻¹	<0.01	<0.01	29	42	0
TPH Aliphatic >EC ₆ - EC ₈	mg.kg ⁻¹	<0.01	<0.01	29	100	0
TPH Aliphatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	<0.01	<0.01	29	27	0

¹ Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. *The LQM/CIEH S4ULs for Human Health Risk Assessment*. Land Quality Press, Nottingham. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3100. All rights reserved. Including August 2015 nickel update.

² SP1010 *Development of Category 4 Screening Levels Main Report* (Dec 2013) and SP1010 *Policy Companion Document* (Mar 2014).



CONTAMINANT	UNITS	MAX	MEAN	No of Tests	SCREENING LEVEL (SL)	No > SL*
HUMAN HEALTH RISK ASSESSMENT						
TPH Aliphatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	<1.5	<1.5	29	130	0
TPH Aliphatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	<1.2	<1.2	29	1100	0
TPH Aliphatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	1.6	1.5	29	65000	0
TPH Aliphatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	9.1	3.6	29	65000	0
TPH Aromatic >EC ₅ - EC ₇	mg.kg ⁻¹	<0.01	<0.01	29	70	0
TPH Aromatic >EC ₇ - EC ₈	mg.kg ⁻¹	<0.01	<0.01	29	130	0
TPH Aromatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	<0.01	<0.01	29	34	0
TPH Aromatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	<0.9	<0.9	29	74	0
TPH Aromatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	<0.5	<0.5	29	140	0
TPH Aromatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	<0.6	<0.6	29	260	0
TPH Aromatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	<1.4	<1.4	29	1100	0
Benzene	mg.kg ⁻¹	<0.01	<0.01	29	0.087	0
Toluene	mg.kg ⁻¹	<0.01	<0.01	29	130	0
Ethylbenzene	mg.kg ⁻¹	<0.01	<0.01	29	47	0
Xylene	mg.kg ⁻¹	<0.01	<0.01	29	56	0
Acenaphthene	mg.kg ⁻¹	<0.03	<0.03	29	210	0
Acenaphthylene	mg.kg ⁻¹	<0.03	<0.03	29	170	0
Anthracene	mg.kg ⁻¹	0.04	0.03	29	2400	0
Benz(a)anthracene	mg.kg ⁻¹	0.13	0.03	29	7.2	0
Benzo(a)pyrene	mg.kg ⁻¹	0.07	0.03	29	2.2	0
Benzo(b)fluoranthene	mg.kg ⁻¹	0.11	0.03	29	2.6	0
Benzo(ghi)perylene	mg.kg ⁻¹	0.05	0.03	29	320	0
Benzo(k)fluoranthene	mg.kg ⁻¹	0.05	0.03	29	77	0
Chrysene	mg.kg ⁻¹	0.16	0.04	29	15	0
Dibenz(ah)anthracene	mg.kg ⁻¹	<0.03	<0.03	29	0.24	0
Fluoranthene	mg.kg ⁻¹	0.37	0.05	29	280	0
Fluorene	mg.kg ⁻¹	<0.03	<0.03	29	170	0
Indeno(123-cd)pyrene	mg.kg ⁻¹	0.05	0.03	29	27	0
Naphthalene	mg.kg ⁻¹	<0.03	<0.03	29	2.3	0
Phenanthrene	mg.kg ⁻¹	0.21	0.04	29	95	0
Pyrene	mg.kg ⁻¹	0.33	0.05	29	620	0
Phenol	mg.kg ⁻¹	0.6	0.33	29	120	0
PHYTOTOXICITY RISK ASSESSMENT						
	Units	Max	Mean	No of Test	Screening Level (SL)	No > SL
Copper	mg.kg ⁻¹	81	22	29	200	0
Nickel	mg.kg ⁻¹	39	24	29	110	0
Zinc	mg.kg ⁻¹	150	80	29	300	0

Notes: * Number of samples exceeding screening level

nd = not detected



- 7.1.4 Zootoxic Metals (harmful to human health)
 - 7.1.4.1 Arsenic was recorded above the residential screening level in one sample of made ground from MWS5 at 0.7 m. Described as *“stiff black to orange brown silty occasionally gravelly occasionally ashy clay. Gravel is fine to medium angular siltstone and coal”*.
- 7.1.5 Phytotoxic Metals (harmful to plant health)
 - 7.1.5.1 No phytotoxic metals were recorded above their respective screening levels.
- 7.1.6 Organic Contaminants
 - 7.1.6.1 No petroleum hydrocarbons or polyaromatic hydrocarbons were recorded above their respective screening levels in the samples analysed.
 - 7.1.6.2 Given the site’s continued agricultural use, selected samples were analysed for organochlorine and organophosphorus pesticides, triazine and acid herbicides. With the exception of Demeton-S, an organophosphorus pesticide which was recorded in the sample from MWS11 at 0.2 m, no other herbicides or pesticides were recorded above their respective screening levels. No published screening levels are available for this compound and a site-specific screening level should therefore be derived using available physico-chemical parameters.
- 7.1.7 Inorganic Contaminants
 - 7.1.7.1 Asbestos was not detected in any of the samples analysed and no visible fragments were noted during the site investigation.
- 7.1.8 Summary
 - 7.1.8.1 One exceedance of arsenic was noted within a sample from made ground. One detect of an organophosphorus pesticide was also recorded. Overall the sampling results indicate that contamination levels are generally consistent with natural soils.
 - 7.1.8.2 No contamination was identified in natural ground.
- 7.2 **LEACHABILITY**
 - 7.2.1 Given the low contaminant concentrations encountered in soils and low permeability soils, leachability testing was not undertaken as part of this investigation.
- 7.3 **GROUNDWATER**
 - 7.3.1 Only small quantities of water were present in boreholes and in view of the low levels of soil contamination identified, groundwater sampling has not been undertaken.



7.4 SURFACE WATER

- 7.4.1 Surface water monitoring was undertaken on one occasion, 14 October 2015. The sampling location is shown on drawing 19412-313-001 in Appendix 1.
- 7.4.2 The sample was submitted to the laboratory for analysis of a typical contamination suite. Screening levels for groundwater have been derived from the Maximum Allowable Concentrations (MAC) for Inland Surface Waters, or for those determinands not included the Water Supply (Water Quality) Regulations 2000 (where prescribed) or 1989 regulations. The laboratory chemical analysis certificate is contained in Appendix 7 and groundwater level data is contained in Appendix 5. A summary of groundwater contaminant concentrations is contained in Table 5.

Table 5: Summary of Groundwater Chemical Analysis Results

CONTAMINANT	UNITS	CONC	SCREEN LEVEL (SL)	>SL*
pH	-	8.0	6.5**	x
Arsenic	mg.l ⁻¹	0.00055	0.01	x
Cadmium	mg.l ⁻¹	<0.00003	0.00045	x
Chromium (total)	mg.l ⁻¹	<0.00025	0.032	x
Copper	mg.l ⁻¹	0.0004	0.00376	x
Lead	mg.l ⁻¹	<0.00009	0.014	x
Mercury	mg.l ⁻¹	<0.00001	0.00007	x
Nickel	mg.l ⁻¹	0.0005	0.034	x
Selenium	mg.l ⁻¹	<0.00025	0.01	x
Zinc	mg.l ⁻¹	0.00310	5	x
Cyanide	mg.l ⁻¹	<0.004	0.005	x
Sulphate	mg.l ⁻¹	110	250	x
TPH	mg.l ⁻¹	<0.01	0.01	x
BTEX	mg.l ⁻¹	<0.001	0.005	x
PAH (total)	mg.l ⁻¹	<0.00004	0.0001	x
Benzo(a)pyrene	mg.l ⁻¹	<0.00001	0.00027	x
Naphthalene	mg.l ⁻¹	<0.00001	-	x
Phenols	mg.l ⁻¹	<0.0005	0.046	x

Notes: * Samples exceeding screen level

** Minimum value applies (i.e. most acid)

*** Not detected above screening level

- 7.4.3 No determinands were recorded in excess of their respective screening levels.

7.5 HAZARDOUS GAS

- 7.5.1 Gas monitoring has been undertaken on six occasions – 8 and 29 September, 7 and 14 October, 25 November and 11 December 2015. Levels of methane, carbon dioxide and oxygen were recorded in each standpipe, together with associated



parameters including borehole flow and ambient air pressure. The results of these gas monitoring rounds are contained in Appendix 5.

- 7.5.2 The monitoring rounds were undertaken at barometric pressures ranging from 995 to 1032 mb. Positive flow was not recorded on any occasion. Over the six monitoring rounds methane (CH₄) was not detected on any occasion, carbon dioxide (CO₂) was detected to a maximum of 4.4 by volume (% v/v) in MWS8, with a corresponding minimum depleted oxygen concentration of 9.9 % v/v.

7.6 **WASTE CLASSIFICATION AND OFF-SITE DISPOSAL**

- 7.6.1 Based on the solid concentrations recorded to date, made ground soils would generally be classified as non-hazardous for waste disposal purposes.
- 7.6.2 WAC testing would be required for made ground soils destined for landfill to determine whether they would be classified as inert.
- 7.6.3 Natural as-dug arisings could be classed as inert waste without the requirement for WAC testing.
- 7.6.4 Materials, including waste soils which are not to be retained on site, should be removed and disposed of in accordance with all relevant statutes including the *Environmental Protection Act 1990*, *The Controlled Waste Regulations 2012* as amended, *The Waste Regulations 2011* as amended, *The List of Wastes Regulations 2005* as amended, *The Hazardous Waste Regulations 2005* as amended, *The Waste Management Regulations 2006* and *The Environmental Permitting Regulations 2010* as amended.
- 7.6.5 It is a requirement of these regulations that waste sent to landfill should have been subject to measures to reduce the amount of waste, reduce harmful or hazardous properties and facilitate recycling. These requirements may be satisfied by measures such as segregation and screening of wastes to recover suitable fill and material for crushing, segregation of inert materials and putrescible wastes.
- 7.6.6 As the investigation has indicated that large quantities of topsoil are present and that this may in part be displaced by the site construction activities it is recommended that a pre-start material movement plan is undertaken to enable all usable topsoil resources to be reserved for on-site or offsite usage. It is important that such usable resources are not discarded or treated in such a manner as may indicate an intention to discard them.
- 7.6.7 It may be possible to re-use soil arisings which may otherwise be classed as waste on site, provided that there is a requirement for the material and that it does not represent a potential risk to human health or the environment once it has been placed. Materials to be re-used should be managed through a Materials Management Plan produced under the Contaminated Land: Applications in Real Environments (CL:AIRE) Code of Practice: Definition of Waste.



SECTION 8 RISK ASSESSMENT

- 8.1 The identified sources of contamination at the site and the implications with respect to development have been interpreted in accordance with the current government guidance on source-pathway-receptor risk assessment.
- 8.2 The investigations demonstrate that the former uses of the site have resulted in contamination comprising arsenic within made ground in one location and one detectable level of demeton-s, an organophosphorus insecticide. These materials are considered for their potential to act as sources for a number of pollutant linkages.
- 8.3 The potential impacts of contamination sources have been considered with respect to the following receptors:
- i.* The general public and present site users,
 - ii.* Residents of future development,
 - iii.* Groundwater,
 - iv.* Surface water,
 - v.* Construction workers,
 - vi.* Adjacent land, and
 - vii.* Infrastructure.
- 8.4 In each case the existence of a pollutant linkage requires a pathway by which the receptor could be exposed to the source. A qualitative assessment of risk is thus considered in the first instance with respect to the site in its current condition and is summarised in the sections below.
- 8.5 **The general public and present site users**
- 8.5.1 The site is extensively ploughed/cropped arable land with public access restricted. Ploughing has disturbed the upper section of soil, however, no shallow soil contamination has been identified which may pose a risk to the general public and present site users.
- 8.6 **Residents of future development**
- 8.6.1 Soil contamination (chemical)
- 8.6.1.1 Arsenic has been recorded in one sample of made ground at a depth of 0.7 m bgl. No other exceedances were noted and the concentration is therefore considered to represent an 'outlier', relating to a localised pocket of contamination (silty gravelly occasionally ashy clay). However, at this depth the contamination is considered unlikely to affect future site users unless significant changes to site levels result from development. In this case a localised risk could occur from ingestion and inhalation



of soil and soil-derived dust and dermal contact with soil, if ashy made ground coincides with the upper soil profile of gardens.

- 8.6.1.2 The insecticide demeton-s-methyl was recorded above the limit of detection in one sample. It is recommended that a site-specific screening level is derived for this compound, and further soil testing may be required to obtain a larger data set to derive a more robust exposure concentration present on site. No remediation of soil is recommended at this time but this should be reviewed following the findings of the further assessment.

8.6.2 Hazardous Soil Gas/Vapours (including hydrocarbon vapours/radon)

- 8.6.2.1 CIRIA 665 guidance has been followed to assess the recorded soil gas and flow conditions. Following the NHBC traffic light guidance on gas risk assessment (for low-rise residential properties with a ventilated sub-floor void), a maximum limiting gas volume for carbon dioxide of 0.0044 l.hr^{-1} (assuming a flow rate of 0.1 l.hr^{-1}) gives a Characteristic Situation of 'Green'. The site would be classified as Characteristic Situation 1 under Wilson and Card guidance (for properties other than low-rise residential). Calculations are presented in Appendix 6.

- 8.6.2.2 Nevertheless, the site lies within a Radon Affected Area as defined by the Health Protection Agency (3 and 5% of houses are above the action level). Guidance issued by the Buildings Research Establishment (BRE-211) indicates that basic radon protective measures are required within new dwellings.

8.7 **Controlled waters**

- 8.7.1 Generally, no significant soil contamination has been identified in the majority of site soils and therefore significant risks to groundwater (as a result of leaching of contamination from soil) and surface water (as a result of surface run-off/lateral migration) are not considered to be present. Given that the site is regularly cultivated, it is unlikely that development would generate an increased risk from sediment laden run off, providing stockpiling of soils does not take place near open watercourses.

- 8.7.2 The watercourse which crosses the site from east to west has been sampled on one occasion and no determinands were recorded in excess of their respective screening levels, confirming that there is a low risk to surface waters as a result of run-off/lateral migration.

8.8 **Construction workers**

- 8.8.1 No significant contamination has been identified with the potential to cause risks to construction workers.
- 8.8.2 Providing that dust levels are kept within statutory limits and appropriate health and safety procedures are adhered to during the construction phase, the levels of



chemical contamination recorded to date are not considered to present an acute risk to human health.

8.9 Adjacent land

8.9.1 Given the low levels of contamination identified, and absence of significant hazardous gas generation, the site is not considered to pose a risk to adjacent land.

8.10 Infrastructure

8.10.1 This investigation has not identified any significant contamination which may pose risks to healthy plant growth in gardens and landscape areas.

8.10.2 No contamination with the potential to permeate polymeric services has been identified by this investigation, however it is recommended that the utility provider is consulted with respect to their requirements for water supply pipes.

8.10.3 Utility companies apply strict guideline levels on use of polymeric pipes and may consider all made ground unsuitable for typical plastic pipe materials to be used.

SECTION 9 UPDATED CONCEPTUAL MODEL

9.1 Following completion of phases 1 and 2 of the investigation and a qualitative risk assessment, the conceptual model for the site, with relation to pollutant linkages, has been updated. The revised model is presented in Table 6 below.

Table 6: Revised Conceptual Model

POSSIBLE POLLUTANT LINKAGE			RISK CHARACTERISATION
POTENTIAL SOURCES	PATHWAYS	RECEPTORS	
Heavy metals and hydrocarbons (made ground)	Contact with contaminated soil	Human health (current users)	Low risk identified No significant contamination recorded.
	Ingestion and inhalation of contaminated soil and dust	Human health (current users)	
Heavy metals and hydrocarbons (made ground)	Contact with contaminated soil	Human health (future residents and construction workers)	Low risk identified No significant contamination recorded. One arsenic exceedance recorded but below depth at which exposure likely to occur. Risk may increase if a reduction in site levels occurs and coincides with proposed gardens.
	Ingestion and inhalation of contaminated soil and dust	Human health (future residents and construction workers)	



POSSIBLE POLLUTANT LINKAGE			RISK CHARACTERISATION
POTENTIAL SOURCES	PATHWAYS	RECEPTORS	
Pesticides	Ingestion of soil and soil derived dust. Dermal contact with soil	Human health (future residents)	Low Risk identified Uncertainty on acceptable soil levels. However, data indicates that demeton-s has a relatively short half-life in soil. The occurrence was just above the limit of detection and an isolated occurrence, overall risk is considered to be low.
Asbestos (made ground)	Ingestion and inhalation of contaminated soil and dust	Human health (future residents and construction workers)	Low risk identified No asbestos detected and no visible asbestos noted during site investigation.
Contamination (all forms)	Vertical migration to aquifer	Controlled waters	Low risk identified No significant contamination recorded.
Contamination (all forms)	Horizontal migration to surface water	Controlled waters	Low risk identified No significant contamination recorded.
Hydrocarbons	Direct contact	Plastic water pipes	Low risk identified No significant hydrocarbon contamination identified at this stage.
Hazardous Gas/Vapours In soil	Ingress into buildings and voids	Human health (future residents and construction workers)	Moderate risk identified Levels and flow rates of hazardous gas generally low to negligible. However site lies in a radon affected area and basic radon protection required.
Adjacent Land	Lateral migration	Adjacent residents	Low risk identified No significant contamination recorded on site.



SECTION 10 PRELIMINARY REMEDIATION STRATEGY

- 10.1 The identified risks at the site can be mitigated by removal of either the source, pathway or receptor. With reference to the conceptual model for the site a remediation strategy, based on source or pathway removal, has been designed.
- 10.2 Based on the low contaminant concentrations recorded no specific soil remediation is considered necessary at this stage, however further assessment is required to derive a site-specific screening level for the insecticide demeton-s which was detected in one sample, to determine whether limited remediation is necessary. Where site levels are reduced which bring locally ashy made ground closer to finished levels in proposed gardens, localised made ground removal or clean cover would be required.
- 10.3 It is envisaged that site-derived topsoil will be re-used on site. This is considered to be acceptable in terms of contaminant concentrations.
- 10.4 Any additional material imported for the formation of domestic gardens and landscaped areas should be obtained from a validated source. The validation should incorporate an assessment of the provenance of the material and chemical analysis.
- 10.5 Potential risks to construction workers have not been identified. Providing that dust levels are kept within statutory limits and appropriate health and safety procedures are adhered to during the construction phase, the levels of chemical contamination recorded to date are not considered to present an acute risk to human health.
- 10.6 Materials, including waste soils which are not to be retained on site, should be removed and disposed of in accordance with all relevant statutes including the *Environmental Protection Act 1990*, *The Controlled Waste Regulations 2012* as amended, *The Waste Regulations 2011* as amended, *The List of Wastes Regulations 2005* as amended, *The Hazardous Waste Regulations 2005* as amended, *The Waste Management Regulations 2006* and *The Environmental Permitting Regulations 2010* as amended.
- 10.7 It is recommended that this report is submitted to the regulators (Local Authority EHO and Planners, Environment Agency Planning Liaison and NHBC) for approval prior to commencement of any further works.
- 10.8 Any observations of ground conditions atypical of those already described should be reported to Merebrook immediately so that an assessment of appropriate action can be made.



SECTION 11 CONCLUSIONS

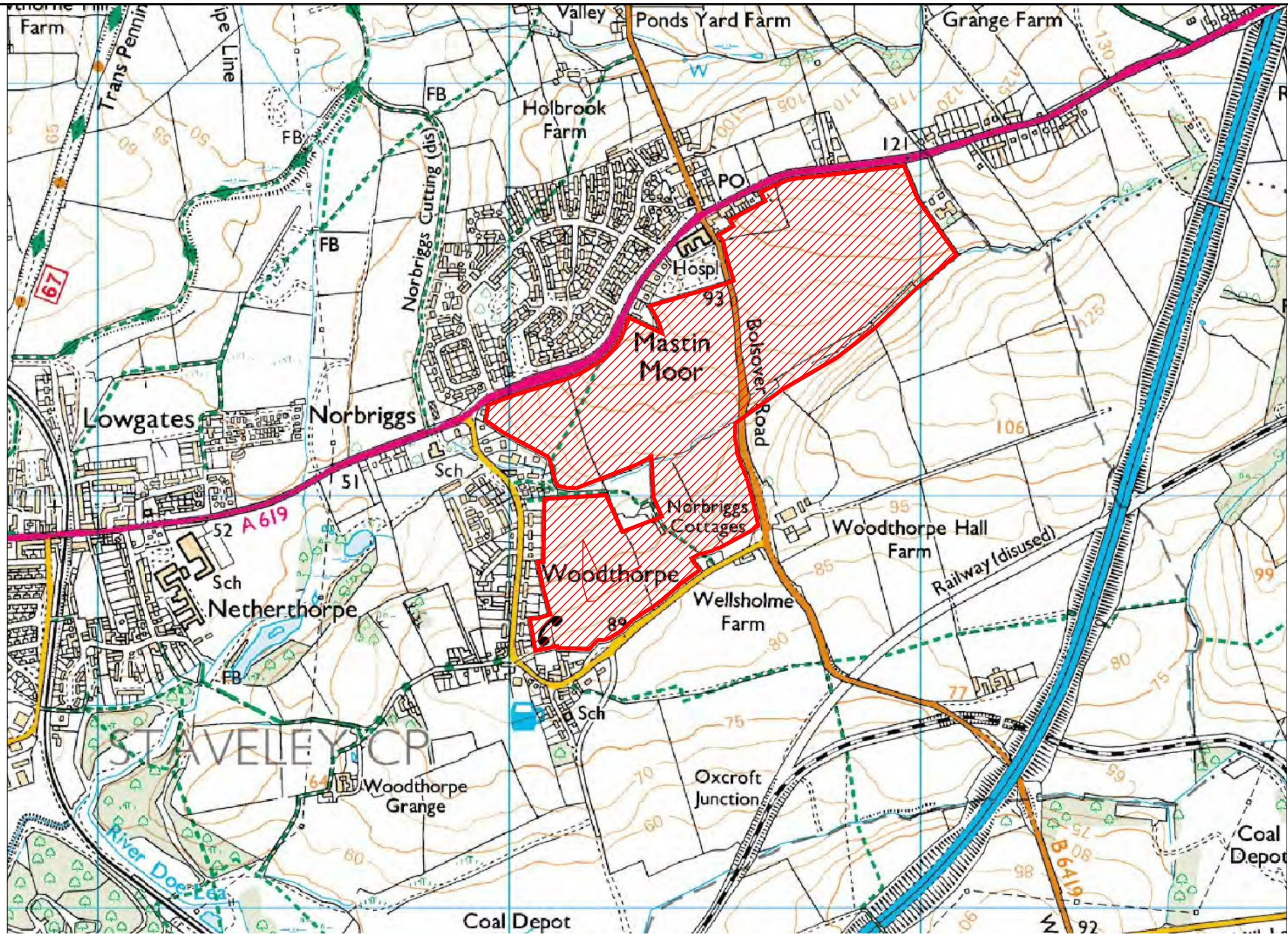
- 11.1 Significant thicknesses of made ground were located within the central northern historical opencast coal mining area, consisting of re-worked weathered Pennine Middle Coal Measures. Weathered Pennine Middle Coal Measures were encountered across the remainder of the site comprising variably gravelly variably sandy clay and revealed competent ground conditions.
- 11.2 Based on ground conditions revealed across the site, it is envisaged that traditional strip / trench footings will be feasible for a significant proportion of the development. In the historical opencast coal mining area made ground was proven to persist to a depth of more than 6.45 m bgl and is expected to extend to approximately 10 m bgl. In the area of historical opencast coal mine traditional footings will not be feasible, therefore, an alternative solution, such as piles, will need to be considered.
- 11.3 Due to the constraints imposed by the site's continued agricultural use on the scope and method of intrusive investigation, additional exploratory investigation will be required to confirm the depth and extent of the opencast mining area in the north of the site for detailed foundation design. However it is considered that this report is sufficient for outline planning submission purposes with a general widely spaced sampling strategy across the site with additional targeting for former structures and areas adjacent to former mining-related features (such as mineral rail lines, and to determine the chemical quality of materials used to backfill the opencast area).
- 11.4 Most mine entries are shown to be outside of proposed development zones however, three shafts without treatment details are present east of Bolsover Road which require further attention. Any supplementary investigation should include consideration of these features.
- 11.5 We have been provided with a copy of the geophysical survey report for works undertaken at the site by Wessex Archaeology; "Land off Worksop Road, Mastin Moor, Derbyshire – Recorded Scanning Survey Report", reference 104082.02 dated October 2015. The scanning survey has identified various potential archaeological anomalies, several of which may relate to historic mining remains (including mine shafts). The report recommends that the further investigation is undertaken prior to any development works on the site, and states "*the most effective form of archaeological evaluation in this instance would be a detailed gradiometer survey to further identify features highlighted in order to inform a trial trenching or open area evaluation*". This information can be used to inform more detailed subsequent site intrusive investigation works.
- 11.6 Subject to no significant changes in site levels and the derivation of a site-specific screening level for demeton-s greater than the concentration detected in one location, soil contamination has not been encountered to date which would require remediation. This should be reviewed following the findings of the further assessment.



- 11.7 The six gas monitoring rounds undertaken have not recorded elevated concentrations of hazardous gases, however the site lies in an area affected by naturally occurring radon gas. Basic protection in the form of a membrane and sub-floor void will be required in the floor construction of new dwellings and the proposed health centre.
- 11.8 Live buried mine drainage infrastructure is indicated to be present (indicated on drawing 19412-313-001 in Appendix 1) and such features will need to be located, surveyed and assessed for retention, diversion, decommissioning or avoidance within the future development scheme.



APPENDIX 1 ▪ Drawings



Reproduced from the Ordnance Survey's 1:50000 map with the permission of the Controller of Her Majesty's Stationery Office, © Crown copyright.
Merebrook Consulting Limited AL 100015912

Based on OS		06-05-2014		-
		PDT	-	-
Issue Details		Dwn	Chd	App'd
Job No.	MER00810	Dwg No.	001-001	Revision
Scale	1:10000	Date	April 2014	Frame Dimensions mm (A3) 400 x 280
Drawn	PDT	Checked	-	Approved
				-

London
Kent
Derby
Cardiff
Manchester



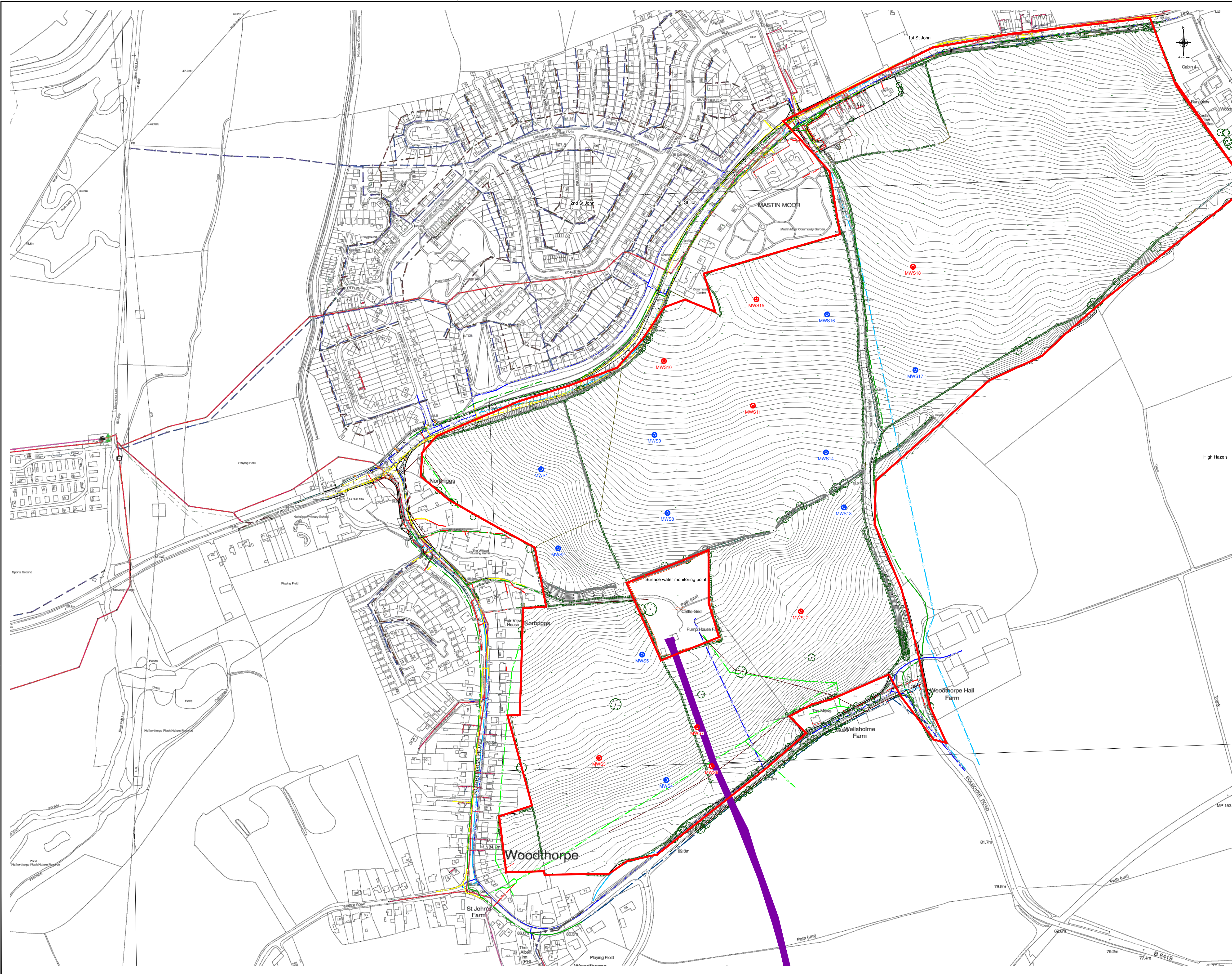
East Mill, Bridgefoot, Belper, Derbyshire, England. DE56 2UA
tel +44(0)1773 829988 fax +44(0)1773 829393 email info@merebrook.co.uk

Client/Project

Mastin Moor

Dwg Title

Site Location Plan



Legend

MWSref
MWSref

Merebrook windowless sample with location reference (approximate)

Merebrook windowless sample with location reference (approximate) - location installed with standpipe

Approximate location of disused tramway - reproduced from Ground Sure County Series map (1923)

Site Boundary

Services Legend

Combined Sewer

Surface Water Sewer

Foul Sewer

Abandoned Sewer

Water Main

Abandoned Water Main

British Telecom (Underground)

British Telecom (Overhead)

Electricity (Underground)

Electricity (Overhead)

Gas

Notes

- The information shown was provided by each Consultee at the time of issue of this Report. No guarantee of the accuracy or extent of the information provided by 3rd parties is given by Merebrook. Other services may exist that are not shown in these records.
- Tramway location digitised from Ground Sure drawing within report ref: HMD-154-1457651.
- This drawing is based upon overlaid and digitised information and should be considered as indicative and illustrative only.

MWS1	445110	375187
MWS2	445134	375077
MWS3	445191	374784
MWS4	445284	374753
MWS5	445246	374928
MWS6	445348	374772
MWS7	445330	374832
MWS8	445286	375126
MWS9	445268	375235
MWS10	445281	375338
MWS11	445406	375276
MWS12	445473	374989
MWS13	445533	375134
MWS14	445508	375211
MWS15	445411	375424
MWS16	445509	375403
MWS17	445633	375326
MWS18	445629	375470

First Issue	09-09-2015	-
Issue Details	RH	SJ
Client	Dwn	Chd
App'd		

Chatsworth Settlement Trustees

Project

Mastin Moor

Dwg Title

Site Investigation Locations

Job No.	Dwg No.	Revision
19412	304-001	A
Scale	Date	Frame Dimensions mm
1:2500	October 2015	(A1) 791 x 544
Drawn	Checked	Approved
GLJ	SM	SM

London

Kent

Derby

Cardiff



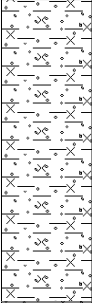
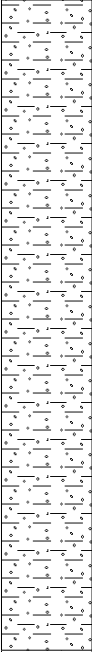
Manchester


dom
merebrook

East Mill, Bridgford, Belper, Derbyshire, England, DE56 2UA
tel +44(0)1773 629868 fax +44(0)1773 629593 email info@merebrook.co.uk



APPENDIX 2 ▪ Exploratory Hole Logs

 <div> Idom Merebrook Ltd, East Mill, Bridgefoot, Belper, Derbyshire, DE56 2UA t +44 (0) 1773 829 988 e consulting@merebrook.co.uk merebrook.co.uk idom.com AN idom GROUP COMPANY </div>						<div>Windowless Sample Log</div>		Borehole No. MWS1	
<div> offices London Kent Derby Cardiff Manchester Moray </div>								Sheet 1 of 1	
Project Name: Mastin Moor				Project No. 19412		Co-ords:		Hole Type WS	
Location: Mastin Moor				Level:		Scale 1:25			
Equipment: Tracked Windowless Sampling Rig				Dates: 27/08/2015		Logged By STM			
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D,J		0.30			MADE GROUND: Dense dark brown clayey gravelly fine sand topsoil. Gravel is fine to medium angular siltstone, sandstone and brick.	1
		0.70	D,J						
		1.00 1.00	D SPT(S)	N=12 (1,2/3,3,3,3)	1.30		Firm to stiff with depth orange brown mottled grey occasionally silty occasionally gravelly CLAY. Gravel is fine to coarse angular siltstone and sandstone.		
		2.00	SPT(S)	N=14 (3,2/4,3,3,4)					
		3.00	SPT(S)	N=33 (3,6/6,8,9,10)	3.45		Stiff to very stiff with depth dark orange brown very gravelly rare silty CLAY with intact siltstone and mudstone lithorelicts to base. Gravel is fine to coarse angular siltstone and mudstone.	2	
							1.7 to 1.8 m Moderately weathered shale.		3
							End of Borehole at 3.45m		4
									5
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div>						<div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>		Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.	



Idom Merebrook Ltd, East Mill, Bridgefoot, Belper, Derbyshire, DE56 2UA
t +44 (0) 1773 829 988 e consulting@merebrook.co.uk
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offices
London
Kent
Derby
Cardiff
Manchester
Moray

Project Name: Mastin Moor

Project No. 19412

Location: Mastin Moor

Equipment: Tracked Windowless Sampling Rig

Co-ords:

Dates: 26/08/2015

Borehole No. MWS10

Sheet 1 of 1

Hole Type WS

Scale 1:25


Logged By STM


Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	D,J		0.20		MADE GROUND: Stiff dark brown fine sandy gravelly clay topsoil. Gravel is fine to medium angular siltstone, sandstone and brick.		
		0.60	D				MADE GROUND: Stiff dark orange brown to buff brown silty fine sandy occasionally gravelly clay. Gravel is fine to coarse angular siltstone, sandstone, brick and occasional coal.		
		0.95 1.00	D,J SPT(S)	N=8 (2,2/2,2,2,2)			<u>0.95 to 0.98 m Coal and brick gravel.</u>	1	
		2.00	SPT(S)	N=10 (1,1/3,2,3,2)	1.90		MADE GROUND: Firm to soft grey to orange brown silty fine sandy occasionally gravelly clay. Gravel is fine to coarse angular siltstone, sandstone, brick and coal.	2	
		2.40	D,J						
		3.00	SPT(S)	N=5 (1,1/1,1,1,2)	3.10		MADE GROUND: Firm to stiff orange brown mottled grey silty fine sandy occasionally gravelly clay. Gravel is fine to coarse angular siltstone, sandstone, coal and rare brick.	3	
		3.60	D						
		4.00	SPT(S)	N=8 (1,1/1,1,3,3)				4	
					4.45				
							End of Borehole at 4.45m	5	

D = small disturbed sample (tub)
J = organic sample (amber glass jar)
V = volatile sample (amber glass vial)
B = bulk bag sample



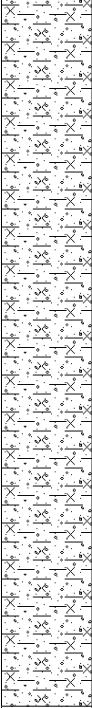

SPT(C) = Standard Penetration Test (Cone)
SPT(S) = Standard Penetration Test (Split Spoon)
HSV = hand shear vane (kPa)
PP = pocket penetrometer (kg.cm2)
PID = photoionisation detector (ppm)



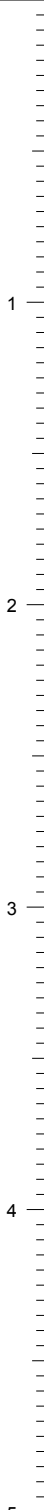
Remarks
1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1.


 <div> Idom Merebrook Ltd, East Mill, Bridgefoot, Belper, Derbyshire, DE56 2UA t +44 (0) 1773 829 988 e consulting@merebrook.co.uk merebrook.co.uk idom.com AN idom GROUP COMPANY </div>						<h1>Windowless Sample Log</h1>		Borehole No. MWS11	
offices London Kent Derby Cardiff Manchester Moray								Sheet 1 of 2	
Project Name: Mastin Moor				Project No. 19412		Co-ords:		Hole Type WS	
Location: Mastin Moor				Level:		Scale 1:25			
Equipment: Tracked Windowless Sampling Rig				Dates: 24/08/2015		Logged By STM			
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	D,J		0.30		MADE GROUND: Stiff dark brown fine sandy gravelly clay topsoil. Gravel is fine to medium angular siltstone, sandstone, coal and brick.		
		0.40	D,J				MADE GROUND: Stiff buff brown mottled orange and grey very silty very gravelly clay. Gravel is fine to coarse angular siltstone, sandstone and occasional coal. <i>0.3 to 1.4 m Very dry and closely fissured.</i>		
		0.80	D	N=13 (2,3/3,3,3,4)					1
		1.00	SPT(S)						
		2.00	SPT(S)	N=3 (1,1/0,1,1,1)	2.45				2
		2.60	D,J						
		2.90	D	N=4 (1,1/1,1,1,1)	3.10				3
		3.00	SPT(S)						
		4.00	SPT(S)	N=11 (1,1/2,2,4,3)	4.40				4
		4.50	D,J						
5.00	SPT(S)	N=17 (1,2/5,4,4,4)					5		
							Continued on Next Sheet		
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div> <div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>						Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.			


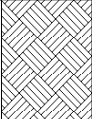
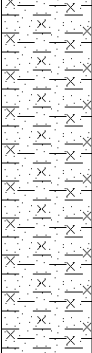

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<div> <div>offices</div> <div>London</div> <div>Kent</div> <div>Derby</div> <div>Cardiff</div> <div>Manchester</div> <div>Moray</div> </div>						Project Name: Mastin Moor			Project No. 19412		Co-ords:		Hole Type WS	
Location: Mastin Moor						Level:			Scale 1:25					
Equipment: Tracked Windowless Sampling Rig						Dates: 24/08/2015			Logged By STM					
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description						
		Depth (m)	Type	Results										
		6.00	SPT(S)	N=14 (1,1/2,2,4,6)	6.45		<div> <div>5.1 to 5.7 m Very gravelly and wet.</div> <div>6.4 to 6.45 m Thinly laminated coal.</div> <div>End of Borehole at 6.45m</div> </div>	<div>6</div> <div>7</div> <div>8</div> <div>9</div> <div>10</div>						
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div>						<div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>				Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.				


1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.

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<div> offices London Kent Derby Cardiff Manchester Moray </div>								Sheet 1 of 1			
Project Name: Mastin Moor				Project No. 19412		Co-ords:		Hole Type WS			
Location: Mastin Moor				Level:		Scale 1:25					
Equipment: Tracked Windowless Sampling Rig				Dates: 02/09/2015		Logged By STM					
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.10	D,J		0.30			MADE GROUND: Dense brown clayey gravelly fine sand topsoil. Gravel is fine to medium angular siltstone, sandstone and brick. <u>0.0 to 0.5 m Dry.</u>	1		
		0.90	D,J					MADE GROUND: Stiff dark orange brown silty fine sandy gravelly clay. Gravel is fine to coarse angular siltstone, sandstone, occasional coal and occasional brick. <u>0.95 to 0.98 m Fine sandstone.</u>			
		1.00	SPT(S)	N=8 (1,1/2,2,2,2)	1.10			Stiff to very stiff with depth orange brown mottled grey occasionally fine sandy occasionally silty occasionally gravelly CLAY with intact siltstone lithorelicts to base. Gravel is fine to medium angular siltstone and sandstone.			
		1.50	D								
		2.00	SPT(S)	N=14 (3,8/6,3,2,3)				2.6 to 3.45 m Common siltstone lithorelicts.			
3.00	SPT(S)	N=24 (4,5/6,6,6,6)	3.45			End of Borehole at 3.45m	4				
										5	
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div>						<div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>				Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.	

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<div> <div>offices</div> <div>London</div> <div>Kent</div> <div>Derby</div> <div>Cardiff</div> <div>Manchester</div> <div>Moray</div> </div>						Project Name: Mastin Moor		Project No. 19412		Co-ords:		Hole Type WS	
Location: Mastin Moor						Level:		Scale 1:25					
Equipment: Tracked Windowless Sampling Rig						Dates: 24/08/2015		Logged By STM					
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description					
		Depth (m)	Type	Results									
		0.10	D,J		0.20		MADE GROUND: Dense dark brown very clayey gravelly fine sand topsoil. Gravel is fine to medium angular siltstone, sandstone and brick.						
		0.30	D,J				MADE GROUND: Stiff orange brown silty gravelly clay. Gravel is fine to medium angular siltstone, sandstone, and mudstone.						
		0.50	D				0.4 to 1.4 m Very dry highly fissured and friable.						
		1.00	SPT(S)	N=12 (3,3/3,3,3,3)	1.40		1.0 to 1.2 m Very sandy sandstone gravel.						
		1.60	D				MADE GROUND: Very stiff orange-grey brown silty gravelly clay. Gravel is fine to medium angular siltstone, sandstone, mudstone and occasional coal.						
		2.00	SPT(S)	N=17 (1,4/5,4,4,4)									
		3.00	SPT(S)	N=6 (1,2/1,1,2,2)									
		4.00	SPT(S)	N=14 (1,1/4,4,3,3)									
	4.70	D		4.40		MADE GROUND: Soft to firm orange-grey brown very silty gravelly fine sandy clay. Gravel is fine to medium angular siltstone and occasional sandstone.							
	5.00	SPT(S)	N=5 (1,0/0,1,2,2)										
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div>						<div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>				<div>Remarks</div> 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.			

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offices London Kent Derby Cardiff Manchester Moray								Sheet 2 of 2	
Project Name: Mastin Moor				Project No. 19412		Co-ords:		Hole Type WS	
Location: Mastin Moor				Level:		Scale 1:25			
Equipment: Tracked Windowless Sampling Rig				Dates: 24/08/2015		Logged By STM			
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		6.00	SPT(S)	N=17 (4,3/4,4,5,4)	6.45				6
								End of Borehole at 6.45m	
									8
									9
									10
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample						SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)			
						Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.			

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offices London Kent Derby Cardiff Manchester Moray						Project Name: Mastin Moor Project No. 19412 Co-ords:			Hole Type WS	
Location: Mastin Moor						Level:			Scale 1:25	
Equipment: Tracked Windowless Sampling Rig						Dates: 24/08/2015			Logged By SJ	
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.10 - 0.30	D,J		0.40		 TOPSOIL: Stiff brown sandy gravelly clay. Gravel is fine to coarse angular sandstone.			
		0.60 - 0.80	D,J						 Stiff yellow grey sandy silty CLAY with fine rootlets. 1.0 to 1.6 m Mottled orange with ironstone cobbles.	
		1.00	SPT(S)	N=19 (4,4/4,5,5,5)	1.60		 Hard thinly laminated moderately weathered grey yellow orange and red SANDSTONE.	2		
		1.70 - 1.90	D							
		2.00	SPT(S)							N=51 (7,6/12,12,13,14)
		2.50 - 3.00	D							
		3.00	SPT(S)		50 (25,25/50 for 40mm)	3.00		End of Borehole at 3.45m	3	
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div> <div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>							Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1.			



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offices

London

Kent

Derby

Cardiff

Manchester

Moray

Project Name:

Mastin Moor

Location:

Mastin Moor

Equipment:

Tracked Windowless Sampling Rig

Project No.

19412

Co-ords:

Level:

Dates:

25/08/2015

Borehole No.

MWS16

Sheet 1 of 1

Hole Type






WS

Scale

1:25

Logged By

STM

Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	D,J		0.20		MADE GROUND: Dense dark brown very clayey gravelly fine sand topsoil. Gravel is fine to medium angular siltstone, sandstone and brick.		
							0.45		MADE GROUND: Very stiff orange brown very sandy very gravelly clay. Gravel is fine to medium angular siltstone and sandstone.
							0.2 to 0.7 m Very dry.		
		0.70	D,J		1.10		MADE GROUND: Very stiff grey-grey brown gravelly clay. Gravel is fine to medium angular siltstone and mudstone.		
		1.00	D				MADE GROUND: Very stiff orange-grey brown silty gravelly fine sandy clay. Gravel is fine to medium angular siltstone and sandstone.		
		1.00	SPT(S)	N=20 (5,5/5,5,5,5)					1.1 to 2.6 m Very dry.
		2.00	SPT(S)	N=11 (2,2/3,2,3,3)	3.45				
		2.60	D						
		3.00	SPT(S)	N=12 (1,2/3,3,3,3)					
		3.20	D,J						
						End of Borehole at 3.45m			

D = small disturbed sample (tub)

J = organic sample (amber glass jar)

V = volatile sample (amber glass vial)

B = bulk bag sample

SPT(C) = Standard Penetration Test (Cone)

SPT(S) = Standard Penetration Test (Split Spoon)



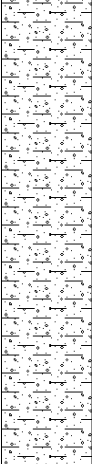
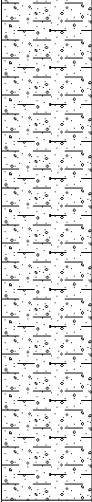
HSV = hand shear vane (kPa)


PP = pocket penetrometer (kg.cm2)




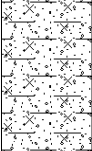
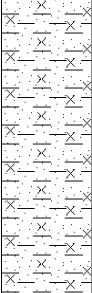
PID = photoionisation detector (ppm)


Remarks

1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.

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offices London Kent Derby Cardiff Manchester Moray								Sheet 1 of 1	
Project Name: Mastin Moor				Project No. 19412		Co-ords:		Hole Type WS	
Location: Mastin Moor				Level:		Scale 1:25			
Equipment: Tracked Windowless Sampling Rig				Dates: 25/08/2015		Logged By STM			
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	D,J		0.20			MADE GROUND: Dense dark brown very clayey gravelly fine sand topsoil. Gravel is fine to medium angular siltstone, sandstone and brick.	
		0.30	D,J						
		1.00	D					0.0 to 1.2 m Dry fissured. Very stiff orange mottled grey with occasional black speckling fine sandy occasionally gravelly CLAY. Gravel is fine to coarse angular siltstone and sandstone.	1
		1.00	SPT(S)	N=16 (4,5/4,4,4,4)					
2.00	SPT(S)	N=14 (3,3/3,3,4,4)				1.8 to 1.9 m Very sandy no black speckling.	2		
3.00	SPT(S)	60 (25,25/60 for 75mm)							
					3.45		End of Borehole at 3.45m	3	
								4	
								5	
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div> <div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>							Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.		

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offices London Kent Derby Cardiff Manchester Moray						Project Name: Mastin Moor Project No. 19412 Co-ords:			Hole Type WS	
Location: Mastin Moor						Level:			Scale 1:25	
Equipment: Tracked Windowless Sampling Rig						Dates: 25/08/2015			Logged By STM	
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.10	D,J		0.20		MADE GROUND: Dense dark brown very clayey gravelly fine sand topsoil. Gravel is fine to medium angular siltstone, sandstone and rare brick.			
		0.40	D,J		0.60		Stiff orange brown occasionally fine sandy gravelly CLAY. Gravel is fine to medium angular siltstone and sandstone.			
		0.70	D				Very stiff orange mottled grey very sandy gravelly CLAY. Gravel is fine to coarse angular siltstone.			
		1.00	SPT(S)	N=20 (4,4/6,4,4,6)				1		
		2.00	SPT(S)	N=18 (6,4/5,4,4,5)				2		
					2.50		Very weak thinly laminated moderately to completely weathered orange to grey arenaceous SILTSTONE.			
		3.00	SPT(S)	50 (25,25/50 for 75mm)	3.00		End of Borehole at 3.00m	3		
								4		
								5		
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample						SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)				
						Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1.				

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offices London Kent Derby Cardiff Manchester Moray						Project Name: Mastin Moor Project No. 19412 Co-ords:		Hole Type WS	
Location: Mastin Moor						Level:		Scale 1:25	
Equipment: Tracked Windowless Sampling Rig						Dates: 27/08/2015		Logged By STM	
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	D,J		0.10		 MADE GROUND: Dense brown clayey gravelly fine sand topsoil. Gravel is fine to medium angular siltstone, sandstone and brick.	 MADE GROUND: Stiff dark brown fine sandy gravelly clay subsoil. Gravel is fine to medium angular siltstone, sandstone and brick.	1
		0.30	D,J		0.50				
		0.70	D				 Dense orange brown very clayey silty occasionally gravelly fine SAND. Gravel is fine to coarse angular siltstone and sandstone.		
		1.00	SPT(S)	N=13 (3,4/4,3,3,3)	1.30				
		1.60	D						
		2.00	SPT(S)	N=16 (3,3/3,4,4,5)			 2.55 to 2.6 m Perched water within siltstone.	2	
3.00	SPT(S)	N=13 (3,3/3,3,4,3)	3.45		End of Borehole at 3.45m				
									4
									5
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div> <div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>							Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1.		



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Project Name: Mastin Moor

Project No. 19412

Location: Mastin Moor

Equipment: Tracked Windowless Sampling Rig

Co-ords:

Dates: 03/09/2015

Borehole No. MWS3

Sheet 1 of 1

Hole Type WS

Scale 1:25


Logged By STM

Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	D,J		0.40		TOPSOIL: Stiff dark brown sandy gravelly clay. Gravel is fine to medium angular siltstone and sandstone.		
		0.70	D				Very stiff orange brown mottled grey fine sandy occasionally gravelly CLAY. Gravel is fine to coarse angular siltstone, sandstone and coal.	1	
		1.00	SPT(S)	N=17 (3,4/4,5,3,5)	1.20				
		1.40	D				Very stiff dark orange brown mottled grey and black fine sandy gravelly CLAY with intact siltstone lithorelicts. Gravel is fine to coarse angular siltstone and coal.		
		2.00	SPT(S)	N=22 (3,3/4,5,5,8)				2	
					2.70				
		3.00	SPT(S)	N=20 (6,9/5,5,5,5)			Very stiff grey brown silty gravelly CLAY with intact siltstone lithorelicts. Gravel is fine to coarse angular siltstone.	3	
					3.45				
							End of Borehole at 3.45m	4	
								5	

D = small disturbed sample (tub)
J = organic sample (amber glass jar)
V = volatile sample (amber glass vial)
B = bulk bag sample

SPT(C) = Standard Penetration Test (Cone)
SPT(S) = Standard Penetration Test (Split Spoon)
HSV = hand shear vane (kPa)
PP = pocket penetrometer (kg.cm2)
PID = photoionisation detector (ppm)

Remarks
1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1.



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Project Name:

Mastin Moor

Location:

Mastin Moor

Equipment:

Tracked Windowless Sampling Rig

Project No.

19412

Co-ords:

Level:

Dates:

03/09/2015

Borehole No.

MWS4

Sheet 1 of 1

Hole Type

WS

Scale

1:25

Logged By


STM


Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	D,J	N=15 (2,3/3,3,4,5)	0.40		<div></div> TOPSOIL: Stiff dark brown sandy gravelly clay. Gravel is fine to medium angular siltstone and sandstone.	1	
		0.60	D,J		0.80		<div></div> Stiff orange brown mottled grey silty fine sandy gravelly CLAY. Gravel is fine to coarse angular siltstone and sandstone.		
		0.80	D,J		0.98		<div></div> Stiff purple grey mottled orange CLAY.		
		1.00	SPT(S)		1.03		<div></div> COAL: Dense black fine to coarse angular GRAVEL. Stiff purple grey mottled orange CLAY.		
		1.20		1.20	<div></div> COAL: Dense black fine to coarse angular GRAVEL.				
		1.50	D,J	N=16 (3,5/3,4,4,5)	2.20		<div></div> Stiff purple grey mottled orange silty gravelly CLAY with intact siltstone lithorelics and common thin coal seams.		2
		2.00	SPT(S)						
		2.60	D						
		3.00	SPT(S)	N=40 (2,4/4,3,7,26)	3.45		<div></div>		3
						End of Borehole at 3.45m	4		
								5	



D = small disturbed sample (tub)
J = organic sample (amber glass jar)
V = volatile sample (amber glass vial)
B = bulk bag sample

SPT(C) = Standard Penetration Test (Cone)
SPT(S) = Standard Penetration Test (Split Spoon)
HSV = hand shear vane (kPa)
PP = pocket penetrometer (kg.cm2)
PID = photoionisation detector (ppm)

Remarks
1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1.

 <div> Idom Merebrook Ltd, East Mill, Bridgefoot, Belper, Derbyshire, DE56 2UA t +44 (0) 1773 829 988 e consulting@merebrook.co.uk merebrook.co.uk idom.com AN idom GROUP COMPANY </div>						<div> <div>Windowless Sample Log</div> </div>		Borehole No. MWS5 Sheet 1 of 1			
offices London Kent Derby Cardiff Manchester Moray						Project Name: Mastin Moor Project No. 19412 Co-ords:		Hole Type WS			
Location: Mastin Moor						Level:		Scale 1:25			
Equipment: Tracked Windowless Sampling Rig						Dates: 02/09/2015		Logged By STM			
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		1.00	SPT(S)	N=21 (2,3/4,3,6,8)	0.20			MADE GROUND: Dense dark brown clayey gravelly fine sand topsoil. Gravel is fine to medium angular siltstone, sandstone and brick.	1		
					0.70			MADE GROUND: Stiff dark orange brown mottled grey fine sandy occasionally gravelly clay. Gravel is fine to coarse angular siltstone, sandstone and rare brick.			
					0.80			MADE GROUND: Stiff black to orange brown silty occasionally gravelly occasionally ashy clay. Gravel is fine to medium angular siltstone and coal. Stiff light grey mottled orange silty CLAY.			
		2.00	SPT(S)	N=48 (2,10/12,11,12,13)	1.00			Stiff to very stiff with depth buff to light orange mottled grey silty fine sandy CLAY.	2		
		2.80	SPT(S)	50 (16,9/50 for 75mm)	2.80			End of Borehole at 2.80m	3		
									4		
									5		
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div>						<div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>				Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.	

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<div> offices London Kent Derby Cardiff Manchester Moray </div>								Sheet 2 of 2	
Project Name: Mastin Moor				Project No. 19412		Co-ords:		Hole Type WS	
Location: Mastin Moor				Level:		Scale 1:25			
Equipment: Tracked Windowless Sampling Rig				Dates: 26/08/2015		Logged By STM			
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		6.00	SPT(S)	N=20 (8,6/5,6,5,4)	6.45		<div> and rare brick. Slight humic odour noted. MADE GROUND: Firm to stiff orange to grey fine sandy occasionally gravelly clay. Gravel is fine to coarse angular siltstone, sandstone and brick. </div>	6	
		End of Borehole at 6.45m						7	
								8	
								9	
								10	
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div>							<div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>		
<div>Remarks</div> 1. Groundwater encountered from 3.20 m. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.									

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offices London Kent Derby Cardiff Manchester Moray								Sheet 1 of 1	
Project Name: Mastin Moor				Project No. 19412		Co-ords:		Hole Type WS	
Location: Mastin Moor				Level:		Scale 1:25			
Equipment: Tracked Windowless Sampling Rig				Dates: 26/08/2015		Logged By STM			
Well	Wtr Strk	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10		MADE GROUND: Dense dark brown clayey gravelly fine sand topsoil. Gravel is fine to medium angular siltstone, sandstone and brick. MADE GROUND: Very stiff dark orange brown to buff silty fine sandy gravelly clay. Gravel is fine to coarse angular siltstone, sandstone and occasional coal. <i>0.1 to 0.9 m Very dry and fissured.</i>	1	
		0.50	D,J						
		1.00	SPT(S)	N=5 (1,1/2,1,1,1)					
		1.30	D						
		2.00	SPT(S)	N=8 (1,2/2,2,2,2)	1.90		MADE GROUND: Firm to stiff grey to orange brown very gravelly fine sandy clay. Gravel is fine to coarse angular siltstone and sandstone.	2	
		2.50	D,J						
	3.00 3.00	D SPT(S)	N=8 (1,1/2,2,2,2)						
					3.45		End of Borehole at 3.45m	3	
								4	
								5	
<div> D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample </div> <div> SPT(C) = Standard Penetration Test (Cone) SPT(S) = Standard Penetration Test (Split Spoon) HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm) </div>							Remarks 1. Groundwater not encountered. 2. Log based on field engineers log to BS EN ISO 14688-1. 3. Gas/groundwater monitoring standpipe installed on completion.		



APPENDIX 3

- Soil Chemistry
- Laboratory Analysis Certificates



Certificate of Analysis

Certificate Number 15-43854

23-Sep-15

Client Idom Merebrook Ltd
Suite 2B
East Mill
Belper
DE56 2UA

Our Reference 15-43854

Client Reference 19412

Contract Title Mastin Moor

Description 8 Soil samples.

Date Received 27-Aug-15

Date Started 28-Aug-15

Date Completed 23-Sep-15

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read 'Rob Brown'.

Rob Brown
Business Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 15-43854

Client Ref 19412

Contract Title Mastin Moor

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
MWS11	1	0.2	859885	23/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS11	2	0.4	859886	23/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS11	4	2.6	859887	23/09/2015	Dark grey, gravelly, sandy CLAY
MWS11	6	4.5	859888	23/09/2015	Dark grey, gravelly, sandy CLAY
MWS14	1	0.1	859889	23/09/2015	Brown, gravelly, sandy CLAY and odd rootlets
MWS14	2	0.3	859890	23/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS15	1	0.10-0.30	859891	23/09/2015	Brown, gravelly, sandy CLAY and odd rootlets
MWS15	2	0.60-0.80	859892	23/09/2015	Light brown, gravelly, sandy CLAY including odd rootlets

Summary of Chemical Analysis

Soil Samples

Our Ref 15-43854
 Client Ref 19412
 Contract Title Mastin Moor

Lab No	859885	859886	859887	859889	859890	859891	859892
Sample ID	MWS11	MWS11	MWS11	MWS14	MWS14	MWS15	MWS15
Depth	0.20	0.40	2.60	0.10	0.30	0.10-0.30	0.60-0.80
Other ID	1	2	4	1	2	1	2
Sample Type	ES	ES	ES	ES	ES	D	D
Sampling Date	24/08/15	24/08/15	24/08/15	24/08/15	24/08/15	24/08/15	24/08/15
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units							
Preparation										
Moisture Content	DETSC 1004*	0.1	%	12	10	14	16	10	15	15
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	8.7	25	12	14	11	17	11
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	1.0	0.8	0.7	0.7	0.5	0.6
Chromium	DETSC 2301#	0.15	mg/kg	30	35	28	35	33	24	32
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	18	42	19	25	18	26	19
Lead	DETSC 2301#	0.3	mg/kg	20	84	36	30	31	20	20
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.15	0.06	< 0.05	0.06	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	19	24	22	29	24	32	27
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	0.7	0.5	< 0.5	0.6	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	68	150	92	91	88	82	77
Inorganics										
pH	DETSC 2008#			8.5	6.9	7.2	6.9	6.9	7.5	7.0
Cyanide Total	DETSC 2130#	0.1	mg/kg	0.1	0.6	0.4	0.3	0.5	< 0.1	0.2
Organic matter	DETSC 2002#	0.1	%	1.1	4.8	4.1	2.7	3.9	3.8	1.9
Sulphate Aqueous Extract as SO ₄	DETSC 2076#	10	mg/l	73	58	21	22	28	49	11
Sulphide	DETSC 2024#	10	mg/kg	20	16	16	20	24	12	12
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	1.6
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis

Soil Samples

Our Ref 15-43854
 Client Ref 19412
 Contract Title Mastin Moor

Lab No	859885	859886	859887	859889	859890	859891	859892
Sample ID	MWS11	MWS11	MWS11	MWS14	MWS14	MWS15	MWS15
Depth	0.20	0.40	2.60	0.10	0.30	0.10-0.30	0.60-0.80
Other ID	1	2	4	1	2	1	2
Sample Type	ES	ES	ES	ES	ES	D	D
Sampling Date	24/08/15	24/08/15	24/08/15	24/08/15	24/08/15	24/08/15	24/08/15
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units							
PAHs										
Naphthalene	DETC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETC 3303#	0.03	mg/kg	0.04	0.03	< 0.03	< 0.03	< 0.03	0.21	< 0.03
Anthracene	DETC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03	< 0.03
Fluoranthene	DETC 3303#	0.03	mg/kg	0.08	0.03	< 0.03	0.05	0.03	0.37	< 0.03
Pyrene	DETC 3303#	0.03	mg/kg	0.07	< 0.03	< 0.03	0.03	< 0.03	0.33	< 0.03
Benzo(a)anthracene	DETC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.13	< 0.03
Chrysene	DETC 3303	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03	< 0.03	0.16	< 0.03
Benzo(b)fluoranthene	DETC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.11	< 0.03
Benzo(k)fluoranthene	DETC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.05	< 0.03
Benzo(a)pyrene	DETC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.07	< 0.03
Indeno(1,2,3-c,d)pyrene	DETC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.05	< 0.03
Dibenzo(a,h)anthracene	DETC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.05	< 0.03
Total PAH - USEPA 16	DETC 3303	0.1	mg/kg	0.23	< 0.10	< 0.10	< 0.10	< 0.10	1.6	< 0.10
Phenols										
Phenol - Monohydric	DETC 2130#	0.3	mg/kg	< 0.3	0.4	0.4	0.3	0.5	< 0.3	0.6
OCPs										
alpha-BHC	DETC 3441*	0.1	mg/kg	< 0.1						
gamma-BHC (Lindane)	DETC 3441*	0.1	mg/kg	< 0.1						
beta-BHC	DETC 3441*	0.1	mg/kg	< 0.1						
delta-BHC	DETC 3441*	0.1	mg/kg	< 0.1						
Heptachlor	DETC 3441*	0.1	mg/kg	< 0.1						
Aldrin	DETC 3441*	0.1	mg/kg	< 0.1						
Heptachlor epoxide	DETC 3441*	0.1	mg/kg	< 0.1						
gamma-Chlordane	DETC 3441*	0.1	mg/kg	< 0.1						
Endosulphan I & Alpha-chlorodane	DETC 3441*	0.1	mg/kg	< 0.1						
4,4-DDE	DETC 3441*	0.1	mg/kg	< 0.1						
Dieldrin	DETC 3441*	0.1	mg/kg	< 0.1						
Endrin	DETC 3441*	0.1	mg/kg	< 0.1						
Endosulphan II & 4,4-DDD	DETC 3441*	0.1	mg/kg	< 0.1						
Endrin aldehyde	DETC 3441*	0.1	mg/kg	< 0.1						
4,4-DDT	DETC 3441*	0.1	mg/kg	< 0.1						
Endosulphan sulphate	DETC 3441*	0.1	mg/kg	< 0.1						
Methoxychlor	DETC 3441*	0.1	mg/kg	< 0.1						
Endrin ketone	DETC 3441*	0.1	mg/kg	< 0.1						

Summary of Chemical Analysis

Soil Samples

Our Ref 15-43854
 Client Ref 19412
 Contract Title Mastin Moor

Lab No	859885	859886	859887	859889	859890	859891	859892
Sample ID	MWS11	MWS11	MWS11	MWS14	MWS14	MWS15	MWS15
Depth	0.20	0.40	2.60	0.10	0.30	0.10-0.30	0.60-0.80
Other ID	1	2	4	1	2	1	2
Sample Type	ES	ES	ES	ES	ES	D	D
Sampling Date	24/08/15	24/08/15	24/08/15	24/08/15	24/08/15	24/08/15	24/08/15
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
OPPs									
Dichlorvos	DETS 3443*	0.1	mg/kg	< 0.1					
Mevinphos	DETS 3443*	0.1	mg/kg	< 0.1					
Demeton-O	DETS 3443*	0.1	mg/kg	< 0.1					
Ethoprop	DETS 3443*	0.1	mg/kg	< 0.1					
Naled	DETS 3443*	0.1	mg/kg	< 0.1					
Phorate	DETS 3443*	0.1	mg/kg	< 0.1					
Demeton-S	DETS 3443*	0.1	mg/kg	0.4					
Diazinon	DETS 3443*	0.1	mg/kg	< 0.1					
Disulfoton	DETS 3443*	0.1	mg/kg	< 0.1					
Methylparathion	DETS 3443*	0.1	mg/kg	< 0.1					
Ronnel	DETS 3443*	0.1	mg/kg	< 0.1					
Fenthion	DETS 3443*	0.1	mg/kg	< 0.1					
Chlopyrifos	DETS 3443*	0.1	mg/kg	< 0.1					
Trichlorinate	DETS 3443*	0.1	mg/kg	< 0.1					
Merphos	DETS 3443*	0.1	mg/kg	< 0.1					
Stirofos	DETS 3443*	0.1	mg/kg	< 0.1					
Tokuthion	DETS 3443*	0.1	mg/kg	< 0.1					
Fensulfothion	DETS 3443*	0.1	mg/kg	< 0.1					
Bolstar	DETS 3443*	0.1	mg/kg	< 0.1					
Azinphos methyl	DETS 3443*	0.1	mg/kg	< 0.1					
Coumaphos	DETS 3443*	0.1	mg/kg	< 0.1					
Triazines									
Atraton	DETS 3445*	0.1	mg/kg	< 0.1					
Prometon	DETS 3445*	0.1	mg/kg	< 0.1					
Simazine	DETS 3445*	0.1	mg/kg	< 0.1					
Atrazine	DETS 3445*	0.1	mg/kg	< 0.1					
Propazine	DETS 3445*	0.1	mg/kg	< 0.1					
Terbutylazine	DETS 3445*	0.1	mg/kg	< 0.1					
Secbumeton	DETS 3445*	0.1	mg/kg	< 0.1					
Symetryn	DETS 3445*	0.1	mg/kg	< 0.1					
Ametryn	DETS 3445*	0.1	mg/kg	< 0.1					
Prometryne	DETS 3445*	0.1	mg/kg	< 0.1					
Terbutryn	DETS 3445*	0.1	mg/kg	< 0.1					
Subcontracted Analysis									
2,4,5-TP (fenoprop, silvex)	\$*	0.1	mg/kg	< 0.10					
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	\$*	0.1	mg/kg	< 0.10					
2,4-DB	\$*	0.1	mg/kg	< 0.10					
dichlorprop (2,4-DP)	\$*	0.1	mg/kg	< 0.10					
2,4-dinitrophenol	\$*	0.1	mg/kg	< 0.10					
2,4-D (2,4-dichlorophenoxyacetic acid)	\$*	0.1	mg/kg	< 0.10					
4-chlorophenoxyacetic acid (4-CPA)	\$*	0.1	mg/kg	< 0.10					
bromoxynil	\$*	0.1	mg/kg	< 0.10					
2-methyl-4,6-dinitrophenol (DNOC)	\$*	0.1	mg/kg	< 0.10					
dinoseb (DNBP)	\$*	0.1	mg/kg	< 0.10					
ioxynil	\$*	0.1	mg/kg	< 0.10					
MCPA (4-chloro-o-tolylxyacetic acid)	\$*	0.1	mg/kg	< 0.10					
MCPB	\$*	0.1	mg/kg	< 0.10					
mecoprop (MCP)	\$*	0.1	mg/kg	< 0.10					
phenoxyacetic acid (PAA)	\$*	0.1	mg/kg	< 0.10					
2-phenoxybutyric acid (PBA)	\$*	0.1	mg/kg	< 0.10					
3-phenoxypropionic acid (PPA)	\$*	0.1	mg/kg	< 0.10					

Summary of Asbestos Analysis

Soil Samples

Our Ref 15-43854

Client Ref 19412

Contract Title Mastin Moor

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
859886	MWS11 2 0.40	SOIL	NAD	none	J Woodmansey
859891	MWS15 1 0.10-0.30	SOIL	NAD	none	J Woodmansey

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 15-43854
 Client Ref 19412
 Contract Mastin Moor

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
859885	MWS11 0.20 SOIL	24/08/15	GJ 250ml, PT 1L		
859886	MWS11 0.40 SOIL	24/08/15	GJ 250ml, PT 1L		
859887	MWS11 2.60 SOIL	24/08/15	GJ 250ml, PT 1L		
859888	MWS11 4.50 SOIL	24/08/15	GJ 250ml, PT 1L		
859889	MWS14 0.10 SOIL	24/08/15	GJ 250ml, PT 1L		
859890	MWS14 0.30 SOIL	24/08/15	GJ 250ml, PT 1L		
859891	MWS15 0.10-0.30 SOIL	24/08/15	GJ 250ml, PT 1L		
859892	MWS15 0.60-0.80 SOIL	24/08/15	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS 2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.



Certificate of Analysis

Certificate Number 15-44074

21-Sep-15

Client Idom Merebrook Ltd
East Mill
Bridgefoot
Belper
Derbyshire
DE56 2UA

Our Reference 15-44074

Client Reference 19412

Contract Title Mastin Moor

Description 17 Soil samples.

Date Received 01-Sep-15

Date Started 01-Sep-15

Date Completed 21-Sep-15

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read 'Rob Brown'.

Rob Brown
Business Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 15-44074
 Client Ref 19412
 Contract Title Mastin Moor

Sample ID	Depth	Lab No	Completed	Matrix Description
MWS1	0.2	861044	21/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS1	0.7	861045	21/09/2015	Brown, sandy CLAY
MWS2	0.1	861046	21/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS8	0.1	861047	21/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS8	0.4	861048	21/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS8	2.3	861049	21/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS8	4.8	861050	21/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS9	0.5	861051	21/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS10	0.95	861053	21/09/2015	Brown, gravelly, sandy CLAY
MWS16	0.7	861055	21/09/2015	Grey, gravelly, very clayey SAND including odd rootlets
MWS16	2.4	861056	21/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS17	0.1	861057	21/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS17	0.3	861058	21/09/2015	Brown, gravelly, sandy CLAY including odd rootlets
MWS18	0.1	861059	21/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS18	0.4	861060	21/09/2015	Brown, gravelly, sandy CLAY

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44074
 Client Ref 19412
 Contract Title Mastin Moor

	Lab No											
	Sample ID		Depth		Other ID		Sample Type		Sampling Date			
	Sampling Time		LOD		Units							
	861044	861045	861046	861047	861048	861049	861050	861051	861053	861054		
	MWS1	MWS1	MWS2	MWS8	MWS8	MWS8	MWS8	MWS9	MWS10	MWS16		
	0.20	0.70	0.10	0.10	0.40	2.30	4.80	0.50	0.95	0.10		
	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL		
	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15		
	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s		
Test	Method	LOD	Units									
Preparation												
Moisture Content	DETSC 1004*	0.1	%	17	19	11	16	7.4	19	19	10	16
Metals												
Arsenic	DETSC 2301#	0.2	mg/kg	16	7.8	9.8	13	12	9.4	6.4	11	13
Cadmium	DETSC 2301#	0.1	mg/kg	0.9	0.8	0.8	0.8	0.6	0.6	0.7	0.6	0.8
Chromium	DETSC 2301#	0.15	mg/kg	29	21	24	24	16	17	16	18	23
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	25	13	15	23	22	20	15	25	16
Lead	DETSC 2301#	0.3	mg/kg	45	11	31	26	13	20	25	12	14
Mercury	DETSC 2325#	0.05	mg/kg	0.10	< 0.05	0.07	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	21	18	19	26	27	23	20	31	27
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	99	58	77	83	64	65	65	68	66
Inorganics												
pH	DETSC 2008#			6.7	7.6	6.4	6.6	6.7	6.4	7.1	7.2	7.3
Cyanide Total	DETSC 2130#	0.1	mg/kg	0.4	< 0.1	0.4	0.3	< 0.1	0.2	0.1	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	0.6	0.6	3.7	4.6	2.1	4.4	3.7	3.2	2.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	45	18	15	14	< 10	63	27	< 10	16
Sulphide	DETSC 2024#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	12
Petroleum Hydrocarbons												
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	9.1	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44074
Client Ref 19412
Contract Title Mastin Moor

Lab No	861044	861045	861046	861047	861048	861049	861050	861051	861053	861054
Sample ID	MWS1	MWS1	MWS2	MWS8	MWS8	MWS8	MWS8	MWS9	MWS10	MWS16
Depth	0.20	0.70	0.10	0.10	0.40	2.30	4.80	0.50	0.95	0.10
Other ID										
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units										
PAHs													
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04	0.05	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Anthracene	DETSC 3303	0.03	mg/kg	0.04	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	0.07	0.05	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Pyrene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	0.06	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Total PAH - USEPA 16	DETSC 3303	0.1	mg/kg	0.12	< 0.10	0.17	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Phenols													
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	
OCPs													
alpha-BHC	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
gamma-BHC (Lindane)	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
beta-BHC	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
delta-BHC	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Heptachlor	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Aldrin	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Heptachlor epoxide	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
gamma-Chlordane	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Endosulphan I & Alpha-chlorodane	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
4,4-DDE	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Dieldrin	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Endrin	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Endosulphan II & 4,4-DDD	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Endrin aldehyde	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
4,4-DDT	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Endosulphan sulphate	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Methoxychlor	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1
Endrin ketone	DETSC 3441*	0.1	mg/kg	< 0.1			< 0.1						< 0.1

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44074
Client Ref 19412
Contract Title Mastin Moor

	Lab No									
	Sample ID		Depth		Other ID		Sample Type		Sampling Date	
	Sampling Time		LOD		Units					
Test	Method	LOD	Units							
OPPs										
Dichlorvos	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Mevinphos	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Demeton-O	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Ethoprop	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Naled	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Phorate	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Demeton-S	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Diazinon	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Disulfoton	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Methylparathion	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Ronnel	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Fenthion	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Chlopyrifos	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Trichlorinate	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Merphos	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Stirofos	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Tokuthion	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Fensulfothion	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Bolstar	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Azinphos methyl	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Coumaphos	DETS 3443*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Triazines										
Atraton	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Prometon	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Simazine	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Atrazine	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Propazine	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Terbutylazine	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Secbumeton	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Symetryn	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Ametryn	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Prometryne	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Terbutryn	DETS 3445*	0.1	mg/kg	< 0.1			< 0.1			< 0.1
Subcontracted Analysis										
dry solids (at 105°C)	\$*	0.1	mg/kg	78.6			82.4			83.2
2,4,5-TP (fenoprop, silvex)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
2,4-DB	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
dichlorprop (2,4-DP)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
2,4-dinitrophenol	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
2,4-D (2,4-dichlorophenoxyacetic acid)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
4-chlorophenoxyacetic acid (4-CPA)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
bromoxynil	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
2-methyl-4,6-dinitrophenol (DNOC)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
dinoseb (DNBP)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
ioxynil	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
MCPA (4-chloro-o-tolylloxyacetic acid)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
MCPB	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
mecoprop (MCP)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
phenoxyacetic acid (PAA)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
2-phenoxybutyric acid (PBA)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10
3-phenoxypropionic acid (PPA)	\$*	0.1	mg/kg	< 0.10			< 0.10			< 0.10

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44074
 Client Ref 19412
 Contract Title Mastin Moor

				Lab No	861055	861056	861057	861058	861059	861060
				Sample ID	MWS16	MWS16	MWS17	MWS17	MWS18	MWS18
				Depth	0.70	2.40	0.10	0.30	0.10	0.40
				Other ID						
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units							
Preparation										
Moisture Content	DETSC 1004*	0.1	%	5.1	11	12	13	11	19	
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	25	7.2	12	10	14	5.5	
Cadmium	DETSC 2301#	0.1	mg/kg	0.6	0.5	1.0	1.3	1.0	1.7	
Chromium	DETSC 2301#	0.15	mg/kg	23	20	35	32	35	26	
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
Copper	DETSC 2301#	0.2	mg/kg	25	17	14	14	19	26	
Lead	DETSC 2301#	0.3	mg/kg	11	8.8	32	16	35	8.3	
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	0.07	< 0.05	0.07	< 0.05	
Nickel	DETSC 2301#	1	mg/kg	30	27	18	18	21	14	
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Zinc	DETSC 2301#	1	mg/kg	68	64	83	79	94	84	
Inorganics										
pH	DETSC 2008#			7.3	7.2	7.1	7.9	6.3	7.4	
Cyanide Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	31	0.1	0.5	< 0.1	
Organic matter	DETSC 2002#	0.1	%	1.3	0.9	3.5	1.5	7.9	0.9	
Sulphate Aqueous Extract as SO ₄	DETSC 2076#	10	mg/l	< 10	33	27	< 10	22	18	
Sulphide	DETSC 2024#	10	mg/kg	12	< 10	< 10	12	12	< 10	
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	
TPH Ali/Aro	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44074
 Client Ref 19412
 Contract Title Mastin Moor

				Lab No	861055	861056	861057	861058	861059	861060
				Sample ID	MWS16	MWS16	MWS17	MWS17	MWS18	MWS18
				Depth	0.70	2.40	0.10	0.30	0.10	0.40
				Other ID						
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units							
PAHs										
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.10	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.06	< 0.03	0.12	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04	< 0.03	0.09	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.06	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.04	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Total PAH - USEPA 16	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	0.10	< 0.10	0.45	< 0.10	< 0.10
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
OCPs										
alpha-BHC	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
gamma-BHC (Lindane)	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
beta-BHC	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
delta-BHC	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Heptachlor	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Aldrin	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Heptachlor epoxide	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
gamma-Chlordane	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Endosulphan I & Alpha-chlorodane	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
4,4-DDE	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Dieldrin	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Endrin	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Endosulphan II & 4,4-DDD	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Endrin aldehyde	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
4,4-DDT	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Endosulphan sulphate	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Methoxychlor	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	
Endrin ketone	DETSC 3441*	0.1	mg/kg			< 0.1			< 0.1	

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44074
Client Ref 19412
Contract Title Mastin Moor

				Lab No	861055	861056	861057	861058	861059	861060
				Sample ID	MWS16	MWS16	MWS17	MWS17	MWS18	MWS18
				Depth	0.70	2.40	0.10	0.30	0.10	0.40
				Other ID						
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15	27/08/15
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units							
OPPs										
Dichlorvos	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Mevinphos	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Demeton-O	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Ethoprop	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Naled	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Phorate	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Demeton-S	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Diazinon	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Disulfoton	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Methylparathion	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Ronnel	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Fenthion	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Chlopyrifos	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Trichlorinate	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Merphos	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Stirofos	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Tokuthion	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Fensulfothion	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Bolstar	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Azinphos methyl	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Coumaphos	DETSC 3443*	0.1	mg/kg			< 0.1				< 0.1
Triazines										
Atraton	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Prometon	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Simazine	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Atrazine	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Propazine	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Terbutylazine	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Secbumeton	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Symetryn	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Ametryn	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Prometryne	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Terbutryn	DETSC 3445*	0.1	mg/kg			< 0.1				< 0.1
Subcontracted Analysis										
dry solids (at 105øC)	\$*	0.1	mg/kg			82.8				82.4
2,4,5-TP (fenoprop, silvex)	\$*	0.1	mg/kg			< 0.10				< 0.10
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	\$*	0.1	mg/kg			< 0.10				< 0.10
2,4-DB	\$*	0.1	mg/kg			< 0.10				< 0.10
dichlorprop (2,4-DP)	\$*	0.1	mg/kg			< 0.10				< 0.10
2,4-dinitrophenol	\$*	0.1	mg/kg			< 0.10				< 0.10
2,4-D (2,4-dichlorophenoxyacetic acid)	\$*	0.1	mg/kg			< 0.10				< 0.10
4-chlorophenoxyacetic acid (4-CPA)	\$*	0.1	mg/kg			< 0.10				< 0.10
bromoxynil	\$*	0.1	mg/kg			< 0.10				< 0.10
2-methyl-4,6-dinitrophenol (DNOC)	\$*	0.1	mg/kg			< 0.10				< 0.10
dinoseb (DNBP)	\$*	0.1	mg/kg			< 0.10				< 0.10
ioxynil	\$*	0.1	mg/kg			< 0.10				< 0.10
MCPA (4-chloro-o-tolyloxyacetic acid)	\$*	0.1	mg/kg			< 0.10				< 0.10
MCPB	\$*	0.1	mg/kg			< 0.10				< 0.10
mecoprop (MCPBP)	\$*	0.1	mg/kg			< 0.10				< 0.10
phenoxyacetic acid (PAA)	\$*	0.1	mg/kg			< 0.10				< 0.10
2-phenoxybutyric acid (PBA)	\$*	0.1	mg/kg			< 0.10				< 0.10
3-phenoxypropionic acid (PPA)	\$*	0.1	mg/kg			< 0.10				< 0.10

Summary of Asbestos Analysis

Soil Samples

Our Ref 15-44074
 Client Ref 19412
 Contract Title Mastin Moor

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
861044	MWS1 0.20	SOIL	NAD	none	Jeff Cruddas
861049	MWS8 2.30	SOIL	NAD	none	Jeff Cruddas
861052	MWS9 3.00	SOIL	NAD	none	Jeff Cruddas
861053	MWS10 0.95	SOIL	NAD	none	Jeff Cruddas
861054	MWS16 0.10	SOIL	NAD	none	Jeff Cruddas
861057	MWS17 0.10	SOIL	NAD	none	Jeff Cruddas

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 15-44074
Client Ref 19412
Contract Mastin Moor

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
861044	MWS1 0.20 SOIL	27/08/15	No containers logged		Cannot evaluate
861045	MWS1 0.70 SOIL	27/08/15	No containers logged		Cannot evaluate
861046	MWS2 0.10 SOIL	27/08/15	No containers logged		Cannot evaluate
861047	MWS8 0.10 SOIL	27/08/15	No containers logged		Cannot evaluate
861048	MWS8 0.40 SOIL	27/08/15	No containers logged		Cannot evaluate
861049	MWS8 2.30 SOIL	27/08/15	No containers logged		Cannot evaluate
861050	MWS8 4.80 SOIL	27/08/15	No containers logged		Cannot evaluate
861051	MWS9 0.50 SOIL	27/08/15	No containers logged		Cannot evaluate
861052	MWS9 3.00 SOIL	27/08/15	No containers logged		Cannot evaluate
861053	MWS10 0.95 SOIL	27/08/15	No containers logged		Cannot evaluate
861054	MWS16 0.10 SOIL	27/08/15	No containers logged		Cannot evaluate
861055	MWS16 0.70 SOIL	27/08/15	No containers logged		Cannot evaluate
861056	MWS16 2.40 SOIL	27/08/15	No containers logged		Cannot evaluate
861057	MWS17 0.10 SOIL	27/08/15	No containers logged		Cannot evaluate
861058	MWS17 0.30 SOIL	27/08/15	No containers logged		Cannot evaluate
861059	MWS18 0.10 SOIL	27/08/15	No containers logged		Cannot evaluate
861060	MWS18 0.40 SOIL	27/08/15	No containers logged		Cannot evaluate

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS 2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.



Certificate of Analysis

Certificate Number 15-44561

28-Sep-15

Client Idom Merebrook Ltd
Suite 2B
East Mill
Belper
DE56 2UA

Our Reference 15-44561

Client Reference 19412

Contract Title Mastin Moor

Description 11 Soil samples.

Date Received 07-Sep-15

Date Started 08-Sep-15

Date Completed 28-Sep-15

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read 'Rob Brown'.

Rob Brown
Business Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 15-44561
 Client Ref 19412
 Contract Title Mastin Moor

Sample ID	Depth	Lab No	Completed	Matrix Description
MWS13	0.1	863924	23/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS13	0.9	863925	23/09/2015	Brown, gravelly, sandy CLAY
MWS12	0.4	863926	23/09/2015	Brown, gravelly, sandy CLAY including odd rootlets
MWS12	0.9	863927	23/09/2015	Brown, gravelly, sandy CLAY
MWS5	0.1	863928	23/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS5	0.7	863929	23/09/2015	Dark brown, gravelly, sandy CLAY
MWS3	0.3	863930	23/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS4	0.1	863931	23/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS4	0.6	863932	23/09/2015	Brown, gravelly, sandy CLAY including odd rootlets
MWS7	0.1	863933	23/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets
MWS7	0.3	863934	23/09/2015	Dark brown, gravelly, sandy CLAY including odd rootlets

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44561
 Client Ref 19412
 Contract Title Mastin Moor

				Lab No											
				Sample ID		Depth		Other ID		Sample Type		Sampling Date		Sampling Time	
				863924	863925	863926	863927	863928	863929	863930	863931	863932	863933		
				MWS13	MWS13	MWS12	MWS12	MWS5	MWS5	MWS3	MWS4	MWS4	MWS7		
				0.10	0.90	0.40	0.90	0.10	0.70	0.30	0.10	0.60	0.10		
				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL		
				02/09/15	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15		
				n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s		
Test	Method	LOD	Units												
Preparation															
Moisture Content	DETSC 1004*	0.1	%		18	18	14		26	21		48.8			
Metals															
Arsenic	DETSC 2301#	0.2	mg/kg		11	12	14		82	15		15			
Cadmium	DETSC 2301#	0.1	mg/kg		0.6	0.7	0.9		1.1	0.8		1.0			
Chromium	DETSC 2301#	0.15	mg/kg		25	30	20		40	44		27			
Hexavalent Chromium	DETSC 2204*	1	mg/kg		< 1.0	< 1.0	< 1.0		< 1.0	< 1.0		< 1.0			
Copper	DETSC 2301#	0.2	mg/kg		15	15	10		81	21		22			
Lead	DETSC 2301#	0.3	mg/kg		35	43	22		38	51		17			
Mercury	DETSC 2325#	0.05	mg/kg		< 0.05	0.09	< 0.05		0.14	0.07		< 0.05			
Nickel	DETSC 2301#	1	mg/kg		22	19	23		39	23		21			
Selenium	DETSC 2301#	0.5	mg/kg		< 0.5	< 0.5	< 0.5		< 0.5	1.0		< 0.5			
Zinc	DETSC 2301#	1	mg/kg		84	93	83		55	87		71			
Inorganics															
pH	DETSC 2008#				7.5	6.8	7.0		6.2	6.9		7.3			
Cyanide Total	DETSC 2130#	0.1	mg/kg		0.1	0.4	0.1		0.2	0.4		< 0.1			
Organic matter	DETSC 2002#	0.1	%		0.9	1.0	0.8		1.3	1.2		0.6			
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l		16	24	23		12	10		< 10			
Sulphide	DETSC 2024#	10	mg/kg		< 10	< 10	< 10		< 10	< 10		< 10			
Petroleum Hydrocarbons															
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg		< 1.5	< 1.5	< 1.5		< 1.5	< 1.5		< 1.5			
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg		< 1.2	< 1.2	< 1.2		< 1.2	< 1.2		< 1.2			
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg		< 1.5	< 1.5	< 1.5		< 1.5	< 1.5		< 1.5			
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg		< 3.4	3.6	< 3.4		< 3.4	< 3.4		< 3.4			
Aliphatic C5-C35	DETSC 3072*	10	mg/kg		< 10	< 10	< 10		< 10	< 10		< 10			
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg		< 0.9	< 0.9	< 0.9		< 0.9	< 0.9		< 0.9			
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg		< 0.5	< 0.5	< 0.5		< 0.5	< 0.5		< 0.5			
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg		< 0.6	< 0.6	< 0.6		< 0.6	< 0.6		< 0.6			
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg		< 1.4	< 1.4	< 1.4		< 1.4	< 1.4		< 1.4			
Aromatic C5-C35	DETSC 3072*	10	mg/kg		< 10	< 10	< 10		< 10	< 10		< 10			
TPH Ali/Aro	DETSC 3072*	10	mg/kg		< 10	< 10	< 10		< 10	< 10		< 10			
Benzene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			
Ethylbenzene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			
Toluene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			
Xylene	DETSC 3321#	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			
MTBE	DETSC 3321	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01	< 0.01		< 0.01			

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44561
 Client Ref 19412
 Contract Title Mastin Moor

				Lab No	863924	863925	863926	863927	863928	863929	863930	863931	863932	863933
				Sample ID	MWS13	MWS13	MWS12	MWS12	MWS5	MWS5	MWS3	MWS4	MWS4	MWS7
				Depth	0.10	0.90	0.40	0.90	0.10	0.70	0.30	0.10	0.60	0.10
				Other ID										
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15	02/09/15
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units											
PAHs														
Naphthalene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Acenaphthylene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Acenaphthene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Fluorene	DETSC 3303	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Phenanthrene	DETSC 3303#	0.03	mg/kg		< 0.03	0.05	< 0.03		< 0.03	< 0.03		< 0.03		
Anthracene	DETSC 3303	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Fluoranthene	DETSC 3303#	0.03	mg/kg		< 0.03	0.08	< 0.03		< 0.03	0.05		< 0.03		
Pyrene	DETSC 3303#	0.03	mg/kg		< 0.03	0.07	< 0.03		< 0.03	0.04		< 0.03		
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Chrysene	DETSC 3303	0.03	mg/kg		< 0.03	0.05	< 0.03		< 0.03	< 0.03		< 0.03		
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg		< 0.03	0.05	< 0.03		< 0.03	< 0.03		< 0.03		
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03	< 0.03		< 0.03		
Total PAH - USEPA 16	DETSC 3303	0.1	mg/kg		< 0.10	0.29	< 0.10		< 0.10	< 0.10		< 0.10		
Phenols														
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg		< 0.3	0.5	< 0.3		< 0.3	0.3		< 0.3		
OCPs														
alpha-BHC	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
gamma-BHC (Lindane)	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
beta-BHC	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
delta-BHC	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Heptachlor	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Aldrin	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Heptachlor epoxide	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
gamma-Chlordane	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Endosulphan I & Alpha-chlorodane	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
4,4-DDE	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Dieldrin	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Endrin	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Endosulphan II & 4,4-DDD	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Endrin aldehyde	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
4,4-DDT	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Endosulphan sulphate	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Methoxychlor	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Endrin ketone	DETSC 3441*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44561
Client Ref 19412
Contract Title Mastin Moor

				Contract File: MWS13.M001										
			Lab No	863924863925863926863927863928863929863930863931863932863933										
				Sample ID										
				MWS13MWS13MWS12MWS12MWS5MWS5MWS3MWS4MWS4MWS7										
				Depth										
				0.100.900.400.900.100.700.300.100.600.10										
				Other ID										
Test	Method	LOD	Units	Sample Type										
				SOILSOILSOILSOILSOILSOILSOILSOILSOILSOIL										
				Sampling Date										
02/09/1502/09/1502/09/1502/09/1502/09/1502/09/1502/09/1502/09/1502/09/1502/09/15														
Sampling Time														
n/sn/sn/sn/sn/sn/sn/sn/sn/sn/s														
TestMethodLODUnits														
OPPs														
Dichlorvos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Mevinphos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Demeton-O	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Ethoprop	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Naled	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Phorate	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Demeton-S	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Diazinon	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Disulfoton	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Methylparathion	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Ronnel	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Fenthion	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Chlopyrifos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Trichlorinate	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Merphos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Stirofos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Tokuthion	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Fensulfothion	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Bolstar	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Azinphos methyl	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Coumaphos	DETSC 3443*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Triazines														
Atraton	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Prometon	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Simazine	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Atrazine	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Propazine	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Terbutylazine	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Secbumeton	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Symetryn	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Ametryn	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Prometryne	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Terbutryn	DETSC 3445*	0.1	mg/kg	< 0.1		< 0.1		< 0.1			< 0.1		< 0.1	
Subcontracted Analysis														
dry solids (at 105øC)	\$*		0.1	mg/kg	76.5		81.8		77.8			79.1		83.2
2,4,5-TP (fenoprop, silvex)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
2,4-DB	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
dichlorprop (2,4-DP)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
2,4-dinitrophenol	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
2,4-D (2,4-dichlorophenoxyacetic acid)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
4-chlorophenoxyacetic acid (4-CPA)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
bromoxynil	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
2-methyl-4,6-dinitrophenol (DNOC)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
dinoseb (DNBP)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
ioxynil	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
MCPA (4-chloro-o-tolylloxyacetic acid)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
MCPB	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
mecoprop (MCP)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
phenoxyacetic acid (PAA)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
2-phenoxybutyric acid (PBA)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10
3-phenoxypropionic acid (PPA)	\$*		0.1	mg/kg	< 0.10		< 0.10		< 0.10			< 0.10		< 0.10

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44561
 Client Ref 19412
 Contract Title Mastin Moor

Lab No	863934
Sample ID	MWS7
Depth	0.30
Other ID	
Sample Type	SOIL
Sampling Date	02/09/15
Sampling Time	n/s

Test	Method	LOD	Units	
Preparation				
Moisture Content	DETSC 1004*	0.1	%	48
Metals				
Arsenic	DETSC 2301#	0.2	mg/kg	18
Cadmium	DETSC 2301#	0.1	mg/kg	0.8
Chromium	DETSC 2301#	0.15	mg/kg	27
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	24
Lead	DETSC 2301#	0.3	mg/kg	32
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05
Nickel	DETSC 2301#	1	mg/kg	26
Selenium	DETSC 2301#	0.5	mg/kg	0.9
Zinc	DETSC 2301#	1	mg/kg	96
Inorganics				
pH	DETSC 2008#			6.8
Cyanide Total	DETSC 2130#	0.1	mg/kg	0.3
Organic matter	DETSC 2002#	0.1	%	0.9
Sulphate Aqueous Extract as SO ₄	DETSC 2076#	10	mg/l	11
Sulphide	DETSC 2024#	10	mg/kg	16
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10
TPH Ali/Aro	DETSC 3072*	10	mg/kg	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01
MTBE	DETSC 3321	0.01	mg/kg	< 0.01

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44561
 Client Ref 19412
 Contract Title Mastin Moor

Lab No	863934
Sample ID	MWS7
Depth	0.30
Other ID	
Sample Type	SOIL
Sampling Date	02/09/15
Sampling Time	n/s

Test	Method	LOD	Units	
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
Total PAH - USEPA 16	DETSC 3303	0.1	mg/kg	< 0.10
Phenols				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.3
OCPs				
alpha-BHC	DETSC 3441*	0.1	mg/kg	
gamma-BHC (Lindane)	DETSC 3441*	0.1	mg/kg	
beta-BHC	DETSC 3441*	0.1	mg/kg	
delta-BHC	DETSC 3441*	0.1	mg/kg	
Heptachlor	DETSC 3441*	0.1	mg/kg	
Aldrin	DETSC 3441*	0.1	mg/kg	
Heptachlor epoxide	DETSC 3441*	0.1	mg/kg	
gamma-Chlordane	DETSC 3441*	0.1	mg/kg	
Endosulphan I & Alpha-chlorodane	DETSC 3441*	0.1	mg/kg	
4,4-DDE	DETSC 3441*	0.1	mg/kg	
Dieldrin	DETSC 3441*	0.1	mg/kg	
Endrin	DETSC 3441*	0.1	mg/kg	
Endosulphan II & 4,4-DDD	DETSC 3441*	0.1	mg/kg	
Endrin aldehyde	DETSC 3441*	0.1	mg/kg	
4,4-DDT	DETSC 3441*	0.1	mg/kg	
Endosulphan sulphate	DETSC 3441*	0.1	mg/kg	
Methoxychlor	DETSC 3441*	0.1	mg/kg	
Endrin ketone	DETSC 3441*	0.1	mg/kg	

Summary of Chemical Analysis

Soil Samples

Our Ref 15-44561
 Client Ref 19412
 Contract Title Mastin Moor

Lab No	863934
Sample ID	MWS7
Depth	0.30
Other ID	
Sample Type	SOIL
Sampling Date	02/09/15
Sampling Time	n/s

Test	Method	LOD	Units
OPPs			
Dichlorvos	DETSC 3443*	0.1	mg/kg
Mevinphos	DETSC 3443*	0.1	mg/kg
Demeton-O	DETSC 3443*	0.1	mg/kg
Ethoprop	DETSC 3443*	0.1	mg/kg
Naled	DETSC 3443*	0.1	mg/kg
Phorate	DETSC 3443*	0.1	mg/kg
Demeton-S	DETSC 3443*	0.1	mg/kg
Diazinon	DETSC 3443*	0.1	mg/kg
Disulfoton	DETSC 3443*	0.1	mg/kg
Methylparathion	DETSC 3443*	0.1	mg/kg
Ronnel	DETSC 3443*	0.1	mg/kg
Fenthion	DETSC 3443*	0.1	mg/kg
Chlopyrifos	DETSC 3443*	0.1	mg/kg
Trichlorinate	DETSC 3443*	0.1	mg/kg
Merphos	DETSC 3443*	0.1	mg/kg
Stirofos	DETSC 3443*	0.1	mg/kg
Tokuthion	DETSC 3443*	0.1	mg/kg
Fensulfthion	DETSC 3443*	0.1	mg/kg
Bolstar	DETSC 3443*	0.1	mg/kg
Azinphos methyl	DETSC 3443*	0.1	mg/kg
Coumaphos	DETSC 3443*	0.1	mg/kg
Triazines			
Atraton	DETSC 3445*	0.1	mg/kg
Prometon	DETSC 3445*	0.1	mg/kg
Simazine	DETSC 3445*	0.1	mg/kg
Atrazine	DETSC 3445*	0.1	mg/kg
Propazine	DETSC 3445*	0.1	mg/kg
Terbuthylazine	DETSC 3445*	0.1	mg/kg
Secbumeton	DETSC 3445*	0.1	mg/kg
Symetryn	DETSC 3445*	0.1	mg/kg
Ametryn	DETSC 3445*	0.1	mg/kg
Prometryne	DETSC 3445*	0.1	mg/kg
Terbutryn	DETSC 3445*	0.1	mg/kg
Subcontracted Analysis			
dry solids (at 105°C)	\$*	0.1	mg/kg
2,4,5-TP (fenoprop, silvex)	\$*	0.1	mg/kg
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	\$*	0.1	mg/kg
2,4-DB	\$*	0.1	mg/kg
dichlorprop (2,4-DP)	\$*	0.1	mg/kg
2,4-dinitrophenol	\$*	0.1	mg/kg
2,4-D (2,4-dichlorophenoxyacetic acid)	\$*	0.1	mg/kg
4-chlorophenoxyacetic acid (4-CPA)	\$*	0.1	mg/kg
bromoxynil	\$*	0.1	mg/kg
2-methyl-4,6-dinitrophenol (DNOC)	\$*	0.1	mg/kg
dinoseb (DNBP)	\$*	0.1	mg/kg
ioxynil	\$*	0.1	mg/kg
MCPA (4-chloro-o-tolylloxyacetic acid)	\$*	0.1	mg/kg
MCPB	\$*	0.1	mg/kg
mecoprop (MCPP)	\$*	0.1	mg/kg
phenoxyacetic acid (PAA)	\$*	0.1	mg/kg
2-phenoxybutyric acid (PBA)	\$*	0.1	mg/kg
3-phenoxypropionic acid (PPA)	\$*	0.1	mg/kg

Summary of Asbestos Analysis

Soil Samples

Our Ref 15-44561

Client Ref 19412

Contract Title Mastin Moor

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
863925	MWS13 0.90	SOIL	NAD	none	Keith Wilson
863930	MWS3 0.30	SOIL	NAD	none	Keith Wilson
863932	MWS4 0.60	SOIL	NAD	none	Keith Wilson
863933	MWS7 0.10	SOIL	NAD	none	Keith Wilson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 15-44561
 Client Ref 19412
 Contract Mastin Moor

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
863924	MWS13 0.10 SOIL	02/09/15	GJ 250ml, PT 1L		
863925	MWS13 0.90 SOIL	02/09/15	GJ 250ml, PT 1L		
863926	MWS12 0.40 SOIL	02/09/15	GJ 250ml, PT 1L		
863927	MWS12 0.90 SOIL	02/09/15	GJ 250ml, PT 1L		
863928	MWS5 0.10 SOIL	02/09/15	GJ 250ml, PT 1L		
863929	MWS5 0.70 SOIL	02/09/15	GJ 250ml, PT 1L		
863930	MWS3 0.30 SOIL	02/09/15	GJ 250ml, PT 1L		
863931	MWS4 0.10 SOIL	02/09/15	GJ 250ml, PT 1L		
863932	MWS4 0.60 SOIL	02/09/15	GJ 250ml, PT 1L		
863933	MWS7 0.10 SOIL	02/09/15	GJ 250ml, PT 1L		
863934	MWS7 0.30 SOIL	02/09/15	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS 2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.



APPENDIX 4 ▪ Geotechnical Laboratory Certificates



Final Report

Report Number: 15-20612 Issue-1

Initial Date of Issue: 10-Sep-2015

Client: Professional Soils Laboratory

Client Address: 5/7 Hexthorpe Road
Doncaster
South Yorkshire
DN4 0AR

Contact(s):

Project: PSL15/4238 Mastin Moor

Quotation No.: **Date Received:** 07-Sep-2015

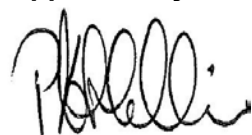
Order No.: 19412 **Date Instructed:** 07-Sep-2015

No. of Samples: 8

Turnaround: (Wkdays) 5 **Results Due Date:** 11-Sep-2015

Date Approved: 09-Sep-2015

Approved By:



Details: Phil Hellier, Project Director

Results Summary - Soil

Project: PSL15/4238 Mastin Moor

Client: Professional Soils Laboratory	Chemtest Job No.: 15-20612 15-20612 15-20612 15-20612 15-20612 15-20612 15-20612 15-20612 15-20612											
Quotation No.:	Chemtest Sample ID.: 188454 188455 188456 188457 188458 188459 188460 188461											
Order No.: 19412	Client Sample Ref.: MWS1 MWS2 MWS8 MWS9 MWS14 MWS15 MWS17 MWS18											
	Client Sample ID.: D3 D3 D4 D2 D3 D3 D3 D3											
	Sample Type: SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOIL											
	Top Depth (m): 1.0 0.7 3.7 1.3 0.5 1.7 1.0 0.7											
	Bottom Depth(m): 1.9											
	Date Sampled: 28-Aug-15 28-Aug-15 28-Aug-15 28-Aug-15 28-Aug-15 28-Aug-15 28-Aug-15 28-Aug-15											
Determinand	Accred.	SOP	Units	LOD								
Moisture	N	2030	%	0.02	17	7.6	16	12	9.2	9.0	8.5	7.8
pH	U	2010			7.7	7.4	7.4	7.3	7.7	7.5	5.4	7.8
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.01	0.13	< 0.010	< 0.010	0.018	< 0.010	< 0.010	0.022	< 0.010

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at our Coventry laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.co.uk



LABORATORY REPORT



4043

Contract Number: PSL15/4238

Client's Reference:

Report Date: 08 September 2015

Client Name: Merebrook Consulting Ltd
Suite 2B, East Mill
Bridgefoot
Belper
Derbyshire
DE56 2UA

For the attention of: Scott Marriott

Contract Title: Mastin Moor

Date Received: 28/8/2015

Date Commenced: 28/8/2015

Date Completed: 8/9/2015

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 in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

M Beastall
(Laboratory Manager)

D Lambe
(Senior Technician)

S Royle
(Senior Technician)




5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	08/09/15		08/09/15		08/09/15
MASTIN MOOR.				Contract No: PSL15/4238	
				Client Ref: 19412	



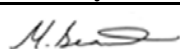
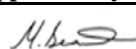
SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m ³ Clause 7.2	Dry Density Mg/m ³ Clause 7.2	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	% Passing .425mm	Remarks
MWS1	3	D	1.00	24				80	33	47	100	Very high plasticity CV.
MWS2	4	D	1.60	16				44	24	20	100	Intermediate plasticity CI.
MWS8	4	D	3.70	18				36	22	14	94	Intermediate plasticity CI.
MWS10	2	D	0.60	11				34	20	14	96	Low plasticity CL.
MWS11	5	D	2.90	17				37	19	18	83	Intermediate plasticity CI.
MWS14	5	D	4.70	12				30	16	14	85	Low plasticity CL.
MWS16	3	D	1.00	7.9				32	18	14	75	Low plasticity CL.
MWS17	3	D	1.00	10				34	19	15	86	Low plasticity CL.
MWS18	3	D	0.70	8.3				29	18	11	90	Low plasticity CL.

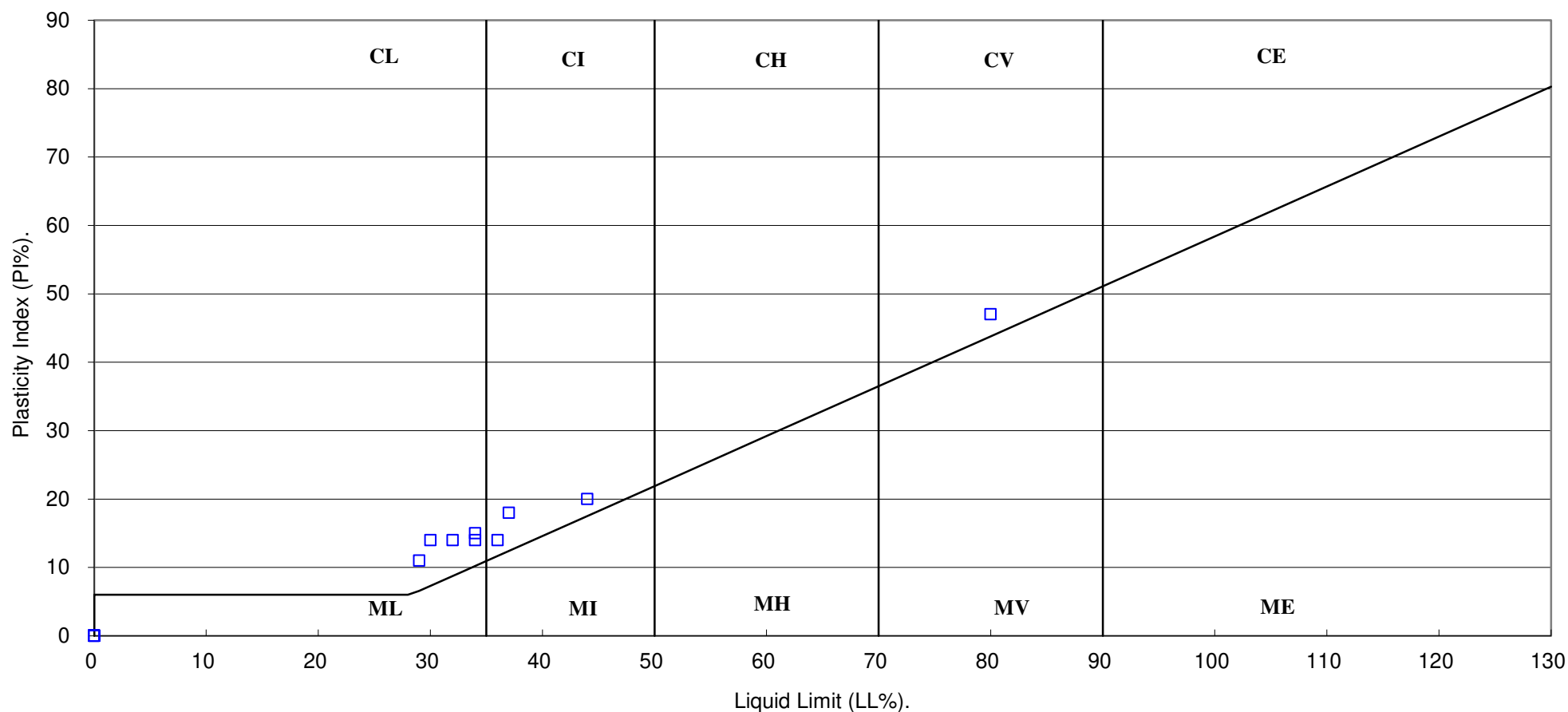
SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

 Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		08/09/15		08/09/15		08/09/15
	MASTIN MOOR.				Contract No:	PSL15/4238
					Client Ref:	19412

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



PSL

Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
<i>[Signature]</i>	08/09/15	<i>[Signature]</i>	08/09/15	<i>[Signature]</i>	08/09/15
MASTIN MOOR.				Contract No:	PSL15/4238
				Client Ref:	19412

Particle Size Distribution Test

BS1377 : Part 2 : 1990

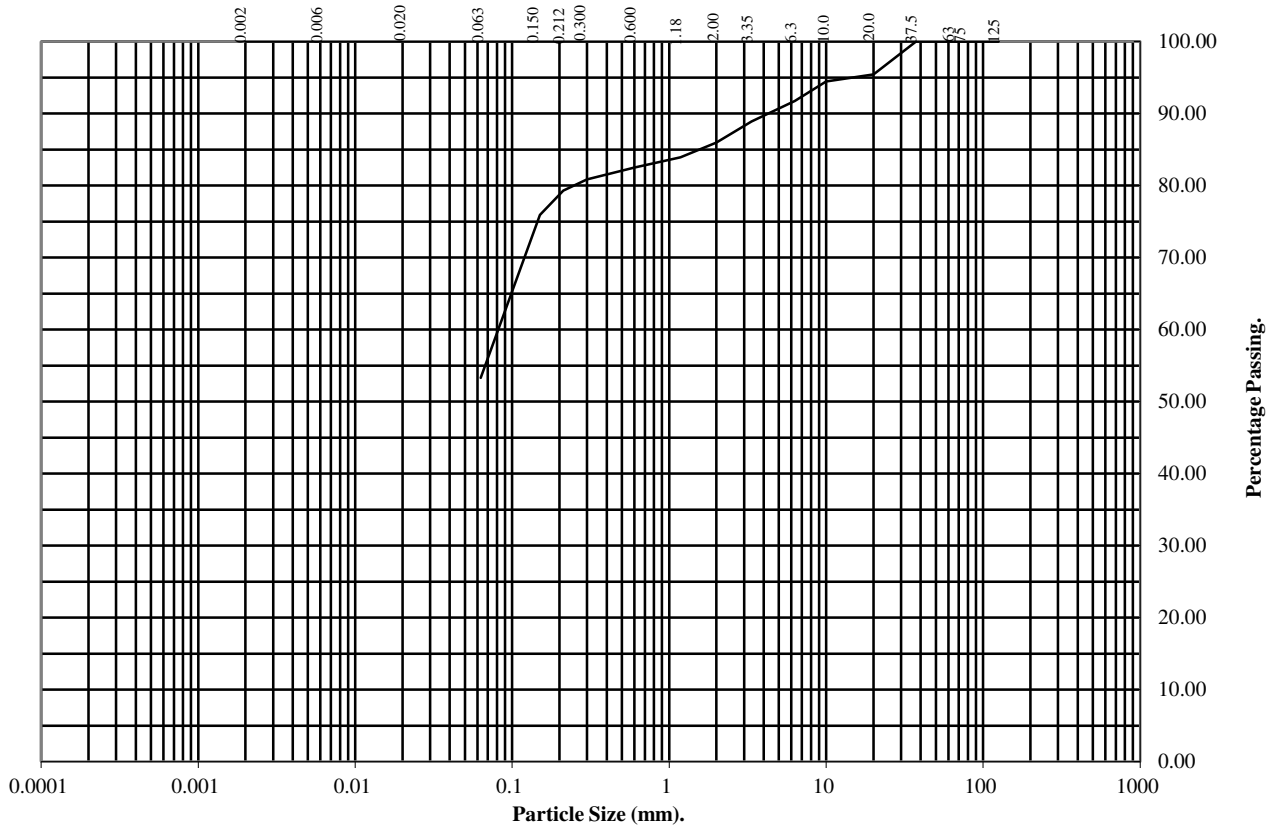
Wet Sieve, Clause 9.2

Hole Number: MWS2

Depth (m): 0.70

Sample Number: 3

Sample Type: D



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	95
10	94
6.3	92
3.35	89
2	86
1.18	84
0.6	83
0.3	81
0.212	79
0.15	76
0.063	53

Soil Fraction	Total Percentage
Cobbles	0
Gravel	14
Sand	33
Silt / Clay	53

Remarks:

See summary of soil descriptions.

Checked By	Date	Approved By	Date
	08/09/15		08/09/15

PSL

Professional Soils Laboratory

MASTIN MOOR.

Contract No.:
PSL15/4238



LABORATORY REPORT



4043

Contract Number: PSL15/4400

Client's Reference:

Report Date: 14 September 2015

Client Name: Merebrook Consulting Ltd
Suite 2B, East Mill
Bridgefoot
Belper
Derbyshire
DE56 2UA

For the attention of: Scott Marriott

Contract Title: Mastin Moor

Date Received: 8/9/2015

Date Commenced: 8/9/2015

Date Completed: 14/9/2015

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 in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

M Beastall
(Laboratory Manager)

D Lambe
(Senior Technician)

S Royle
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	14/09/15		14/09/15		14/09/15
MASTIN MOOR.				Contract No:	PSL15/4400
				Client Ref:	19412

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)




[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**

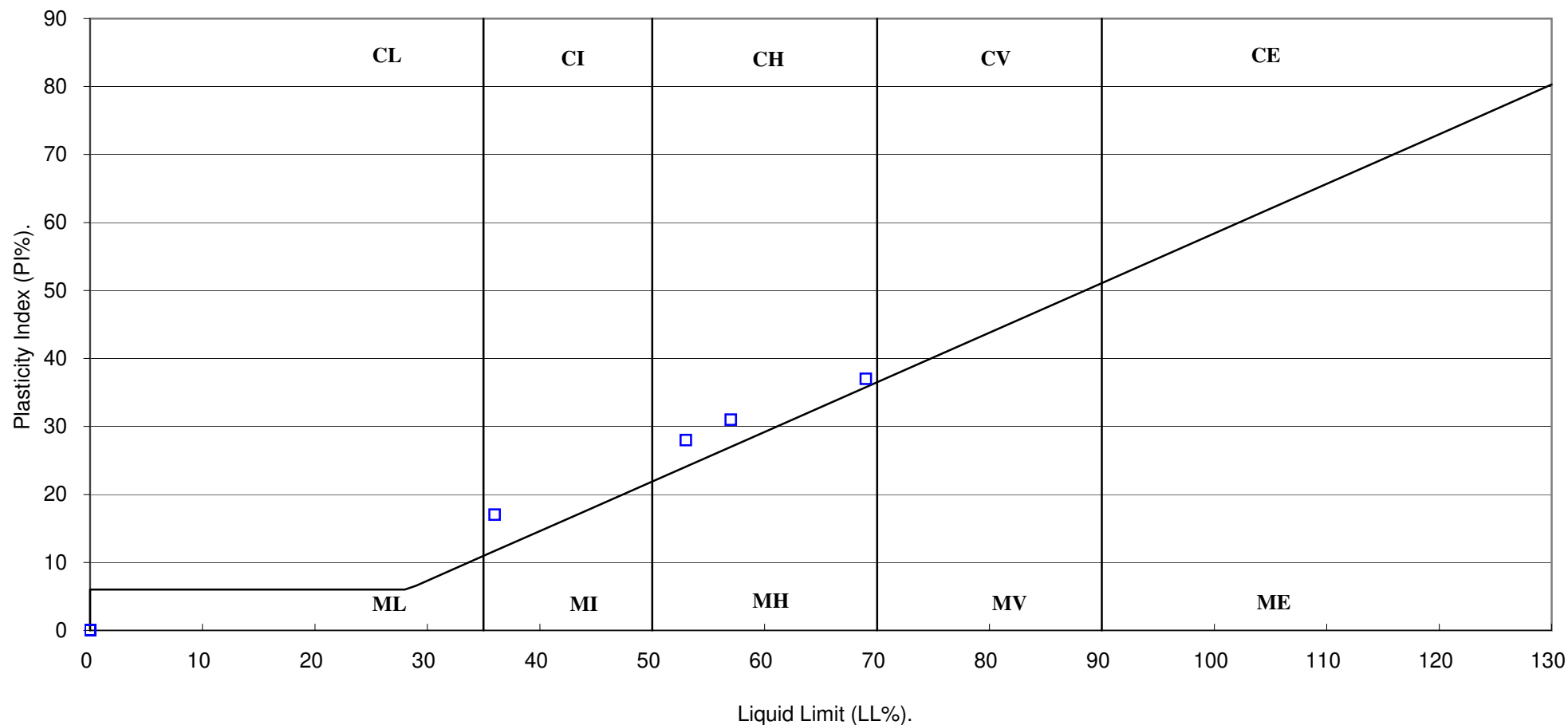


Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	14/09/15		14/09/15		14/09/15
MASTIN MOOR.				Contract No: PSL15/4400	
				Client Ref: 19412	

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



PSL

Professional Soils Laboratory

Compiled by

Date

Checked by

Date

Approved by

Date

[Signature]

14/09/15

[Signature]

14/09/15

[Signature]

14/09/15

MASTIN MOOR.

Contract No:

PSL15/4400

Client Ref:

19412



Final Report

Report Number: 15-20839 Issue-1

Initial Date of Issue: 14-Sep-2015

Client: Professional Soils Laboratory

Client Address: 5/7 Hexthorpe Road
Doncaster
South Yorkshire
DN4 0AR

Contact(s): Anthony Watkins
Mark Beastall
Russell Gunson
Sean Royle

Project: PSL15/4400 - Mastin Moor

Quotation No.: **Date Received:** 09-Sep-2015

Order No.: **Date Instructed:** 09-Sep-2015

No. of Samples: 4

Turnaround: (Wkdays) 5 **Results Due Date:** 15-Sep-2015

Date Approved: 14-Sep-2015

Approved By:

Details: Phil Hellier, Project Director

Results Summary - Soil

Project: PSL15/4400 - Mastin Moor

Client: Professional Soils Laboratory	Chemtest Job No.:				15-20839	15-20839	15-20839	15-20839
Quotation No.:	Chemtest Sample ID.:				189788	189789	189790	189791
Order No.:	Client Sample Ref.:				D3	D3	D5	D3
	Client Sample ID.:				MWS13	MWS5	MWS4	MWS7
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.50	0.80	2.6	0.8
	Bottom Depth(m):							
	Date Sampled:							
Determinand	Accred.	SOP	Units	LOD				
Moisture	N	2030	%	0.02	13	16	18	15
pH	U	2010			7.9	7.3	4.3	4.6
Sulphate (2:1 Water Soluble) as SO ₄	U	2120	g/l	0.01	< 0.010	< 0.010	< 0.010	< 0.010

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
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- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at our Coventry laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk



APPENDIX 5

- Field Monitoring Records
- Groundwater Level Data
- Hazardous Soil Gas Data

GAS MONITORING RECORD



Location Reference	Time	Flow and Pressure Measurements				Gas Measurements						VOC Measurements		Dip Measurements		Comments	
		Flow		Atmospheric Pressure	Differential Pressure	Methane	Methane LEL	Carbon Dioxide	Oxygen	Carbon Monoxide	Hydrogen Sulphide	Hexane	PID	Depth to Water	Depth to Base		
		max	steady														
		l hr ⁻¹		mb	Pa	%	%	%	%	ppm	ppm	%	ppm	m	m		
MWS1	-	nd	nd	1023	19.8	nd	-	0.7	19.8	-	nr	0.028	nr	-	3.45	Depths are to top of pipe	
MWS2	-	nd	nd	-	-	-	-	-	-	-	nr	-	nr	-	-	Missing	
MWS4	-	nd	nd	1021	19.9	nd	-	0.7	19.9	-	nr	0.024	nr	-	3.20	-	
MWS5	-	nd	nd	1022	20.2	nd	-	0.5	20.2	-	nr	0.023	nr	-	3.19	-	
MWS8	-	nd	nd	1022	19.1	nd	-	1.9	19.1	-	nr	0.027	nr	2.94	3.24	-	
MWS9	-	nd	nd	1021	18	nd	-	2.3	18	-	nr	0.028	nr	-	3.04	-	
MWS13	-	nd	nd	1022	19.6	nd	-	1.3	19.6	-	nr	0.026	nr	-	3.34	-	
MWS14	-	nd	nd	1023	19.4	nd	-	1.5	19.4	-	nr	0.029	nr	-	3.26	-	
MWS16	-	nd	nd	1021	18.4	nd	-	1.6	18.4	-	nr	0.028	nr	-	3.39	-	
MWS17	-	nd	nd	1021	20.2	nd	-	0.5	20.2	-	nr	0.025	nr	2.80	3.40	-	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Weather:		Overcast, drizzling, falling pressure				nr = not recorded			Gas Analyser		PID		Site:			Mastin Moor	
						Model:			GFM435		-		Project Number:			19412	
						Serial Number:			11839		-		Monitored By:			S. Marriott	
						Date of Last Calibration:			21/04/2015		-		Date:			08/09/2015	

GAS MONITORING RECORD



Location Reference	Time	Flow and Pressure Measurements				Gas Measurements						VOC Measurements		Dip Measurements		Comments
		Flow		Atmospheric Pressure	Differential Pressure	Methane	Methane LEL	Carbon Dioxide	Oxygen	Carbon Monoxide	Hydrogen Sulphide	Hexane	PID	Depth to Water	Depth to Base	
		max	steady													
		l hr ⁻¹		mb	Pa	%	%	%	%	ppm	ppm	%	ppm	m	m	
MWS1	-	nd	nd	1030	-	nd	nd	0.6	19.5	nd	nr	0.023	nr	-	3.45	Depths are to top of pipe
MWS2	-	-	-	-	-	-	-	-	-	-	nr	-	nr	-	-	-
MWS4	-	nd	nd	1029	-	nd	nd	0.6	20.1	nd	nr	0.023	nr	-	3.20	-
MWS5	-	nd	nd	1030	-	nd	nd	0.6	19.6	nd	nr	0.023	nr	-	3.19	-
MWS8	-	nd	nd	1032	-	nd	nd	2.3	18.5	-	nr	0.023	nr	2.99	3.24	-
MWS9	-	nd	nd	1031	-	nd	nd	1.1	18.8	nd	nr	0.022	nr	-	3.04	-
MWS13	-	nd	nd	1030	-	nd	nd	1.5	19.4	nd	nr	0.022	nr	-	3.34	-
MWS14	-	nd	nd	1030	-	nd	nd	1.4	19.5	nd	nr	0.023	nr	-	3.26	-
MWS16	-	nd	nd	1029	-	nd	nd	1.1	19.2	nd	nr	0.021	nr	-	3.39	-
MWS17	-	nd	nd	1030	-	nd	nd	0.5	19.8	nd	nr	0.022	nr	2.78	3.40	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weather:		Foggy becoming fair. Steady pressure.				nr = not recorded			Gas Analyser		PID		Site:		Mastin Moor	
						Model:			GFM435		-		Project Number:		19412	
						Serial Number:			11839		-		Monitored By:		S. Marriott	
						Date of Last Calibration:			21/04/2015		-		Date:		29/09/2015	

GAS MONITORING RECORD



Location Reference	Time	Flow and Pressure Measurements				Gas Measurements						VOC Measurements		Dip Measurements		Comments
		Flow		Atmospheric Pressure	Differential Pressure	Methane	Methane LEL	Carbon Dioxide	Oxygen	Carbon Monoxide	Hydrogen Sulphide	Hexane	PID	Depth to Water	Depth to Base	
		l hr ⁻¹		mb	Pa	%	%	%	%	ppm	ppm	%	ppm	m	m	
MWS1	-	nd	nd	995	-	nd	nd	0.6	19.4	nr	nr	0.024	nr	-	3.45	Depths are to top of pipe
MWS2	-	-	-	-	-	-	-	-	-	-	nr	-	nr	-	-	-
MWS4	-	nd	nd	995	-	nd	nd	0.7	19.9	nr	nr	0.024	nr	-	3.20	-
MWS5	-	nd	nd	995	-	nd	nd	0.5	20	nr	nr	0.024	nr	-	3.19	-
MWS8	-	nd	nd	996	-	nd	nd	0	20.2	nr	nr	0.022	nr	2.91	3.24	-
MWS9	-	nd	nd	996	-	nd	nd	1	19.4	nr	nr	0.022	nr	-	3.04	-
MWS13	-	nd	nd	996	-	nd	nd	1.3	19.7	nr	nr	0.022	nr	-	3.34	-
MWS14	-	nd	nd	996	-	nd	nd	1.1	19.3	nr	nr	0.022	nr	-	3.26	-
MWS16	-	nd	nd	996	-	nd	nd	1	20	nr	nr	0.022	nr	-	3.39	-
MWS17	-	nd	nd	996	-	nd	nd	0.5	20.2	nr	nr	0.022	nr	2.71	3.40	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weather:		Overcast, heavy rain. Rising pressure.				nr = not recorded			Gas Analyser		PID		Site:		Mastin Moor	
						Model:			GFM435		-		Project Number:		19412	
						Serial Number:			11839		-		Monitored By:		S. Marriott	
						Date of Last Calibration:			21/04/2015		-		Date:		07/10/2015	

GAS MONITORING RECORD



Location Reference	Time	Flow and Pressure Measurements				Gas Measurements						VOC Measurements		Dip Measurements		Comments
		Flow		Atmospheric Pressure	Differential Pressure	Methane	Methane LEL	Carbon Dioxide	Oxygen	Carbon Monoxide	Hydrogen Sulphide	Hexane	PID	Depth to Water	Depth to Base	
		max	steady													
		l hr ⁻¹		mb	Pa	%	%	%	%	ppm	ppm	%	ppm	m	m	
MWS1	10:58	nd	nd	1021	-	nd	nd	0.7	19.8	nd	nr	0.018	nr	-	3.45	Depths are to ground level
MWS2	-	-	-	-	-	-	-	-	-	-	nr	-	nr	-	-	-
MWS4	10:10	nd	nd	1018	-	nd	nd	nd	20.2	nd	nr	0.02	nr	-	3.20	-
MWS5	10:26	nd	nd	1019	-	nd	nd	0.6	19.7	nd	nr	0.02	nr	-	3.19	-
MWS8	10:45	nd	nd	1019	-	nd	nd	2.1	18.6	nd	nr	0.018	nr	3.04	3.24	-
MWS9	11:04	nd	nd	1019	-	nd	nd	1.9	18.7	nd	nr	0.018	nr	-	3.04	-
MWS13	10:35	nd	nd	1019	-	nd	nd	1.4	19.1	nd	nr	0.019	nr	-	3.34	-
MWS14	11:24	nd	nd	1017	-	nd	nd	1.2	19.8	nd	nr	0.015	nr	-	3.26	-
MWS16	11:16	nd	nd	1016	-	nd	nd	0	0	nd	nr	-	nr	-	3.39	-
MWS17	11:33	nd	nd	1016	-	nd	nd	0.7	20.3	nd	nr	0.016	nr	2.80	3.40	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weather:		Fair, dry, steady pressure				nr = not recorded			Gas Analyser		PID		Site:		Mastin Moor	
						Model:			GFM435		-		Project Number:		19412	
						Serial Number:			11839		-		Monitored By:		S. Marriott	
						Date of Last Calibration:			21/04/2015		-		Date:		14/10/2015	

GAS MONITORING RECORD



Location Reference	Time	Flow and Pressure Measurements				Gas Measurements						VOC Measurements		Dip Measurements		Comments
		Flow		Atmospheric Pressure	Differential Pressure	Methane	Methane LEL	Carbon Dioxide	Oxygen	Carbon Monoxide	Hydrogen Sulphide	Hexane	PID	Depth to Water	Depth to Base	
		max	steady													
		l hr ⁻¹		mb	Pa	%	%	%	%	ppm	ppm	%	ppm	m	m	
MWS1	13:00	nd	nd	1000	-	nd	nd	nd	20.8	nd	nr	0.021	nr	2.2	3.5	Depths are to ground level
MWS2	-	-	-	-	-	-	-	-	-	-	nr	-	nr	-	-	Hole destroyed
MWS4	16:10	nd	nd	1000	-	nd	nd	nd	20.1	nd	nr	0.019	nr	-	3.2	-
MWS5	15:55	nd	nd	1000	-	nd	nd	0.7	19.6	nd	nr	0.015	nr	-	3.2	-
MWS8	13:20	nd	nd	1000	-	nd	nd	nd	20.7	nd	nr	0.022	nr	2.7	3.2	-
MWS9	13:25	nd	nd	1000	-	nd	nd	2.2	13.6	nd	nr	0.02	nr	-	3.0	-
MWS13	15:10	nd	nd	1000	-	nd	nd	0.9	18.6	nd	nr	0.02	nr	1.4	3.3	-
MWS14	14:55	nd	nd	1000	-	nd	nd	1.8	16.4	nd	nr	0.019	nr	-	3.3	-
MWS16	13:45	nd	nd	1000	-	nd	nd	1.7	16.9	nd	nr	0.02	nr	-	3.4	-
MWS17	nr	nr	nr	nr	-	nr	nr	nr	nr	nr	nr	nr	nr	1.4	3.4	Bung removed
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weather:		Fair, dry, cold, steady pressure				nr = not recorded			Gas Analyser		PID		Site:		Mastin Moor	
						Model:			GFM435		-		Project Number:		19412	
						Serial Number:			11839		-		Monitored By:		S. Marriott	
						Date of Last Calibration:			21/04/2015		-		Date:		25/11/2015	

GAS MONITORING RECORD



Location Reference	Time	Flow and Pressure Measurements				Gas Measurements						VOC Measurements		Dip Measurements		Comments
		Flow		Atmospheric Pressure	Differential Pressure	Methane	Methane LEL	Carbon Dioxide	Oxygen	Carbon Monoxide	Hydrogen Sulphide	Hexane	PID	Depth to Water	Depth to Base	
		max	steady													
		l hr ⁻¹		mb	Pa	%	%	%	%	ppm	ppm	%	ppm	m	m	
MWS1	09:25	nd	nd	1007	-	nd	nd	0.7	13.1	nd	nr	0.014	nr	2.8	3.5	Depths are to ground level
MWS2	-	-	-	-	-	-	-	-	-	-	nr	-	nr	-	-	Hole destroyed
MWS4	10:25	nd	nd	1007	-	nd	nd	0.7	20	nd	nr	0.014	nr	-	3.2	-
MWS5	10:20	nd	nd	1007	-	nd	nd	1.1	19.6	nd	nr	0.014	nr	-	3.2	-
MWS8	09:10	nd	nd	1007	-	nd	nd	4.4	9.9	nd	nr	0.016	nr	2.6	3.2	-
MWS9	09:35	nd	nd	1007	-	nd	nd	2	14.3	nd	nr	0.014	nr	-	3.0	-
MWS13	10:05	nd	nd	1007	-	nd	nd	1.2	17	nd	nr	0.016	nr	1.5	3.3	-
MWS14	09:00	nd	nd	1007	-	nd	nd	0.6	18.7	nd	nr	0.016	nr	2.7	3.3	-
MWS16	09:50	nd	nd	1007	-	nd	nd	2	17.4	nd	nr	0.016	nr	-	3.4	-
MWS17	08:45	nd	nd	1007	-	nd	nd	1.2	19.2	nd	nr	0.018	nr	1.2	3.4	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weather:		Fair, dry, cold, steady pressure				nr = not recorded			Gas Analyser		PID		Site:		Mastin Moor	
						Model:			GFM435		-		Project Number:		19412	
						Serial Number:			11839		-		Monitored By:		S. Marriott	
						Date of Last Calibration:			21/04/2015		-		Date:		11/12/2015	



APPENDIX 6 ▪ Gas Risk Assessment

MODIFIED WILSON AND CARD GAS CHARACTERISTIC SITUATION

SITE: Mastin Moor

JOB NUMBER: 19412

21/12/2015

<u>Carbon Dioxide</u>				<u>Methane</u>			
Maximum Gas Concentration	4.40	%		Maximum Gas Concentration	0.10	%	
Maximum Measured Steady Flow	0.10	L hr ⁻¹		Maximum Measured Peak Flow	0.10	L hr ⁻¹	
Gas Screening Value	0.0044	L hr ⁻¹		Gas Screening Value	0.0001	L hr ⁻¹	
Characteristic Situation	1			Characteristic Situation	1		
worst case carbon dioxide or methane characteristic situation value defines overall characteristic situation for the site							

Modified Wilson and Card Classification
Typical Scope of Gas Protection Measures

Characteristic Situation	Risk Classification	Gas Screening Value Threshold (L hr ⁻¹)	Additional Factors	Typical Source of Generation	Number of Levels of Protection	Residential	Number of Levels of Protection	Office/Commercial/Industrial
						Typical Scope of Protective Measures		Typical Scope of Protective Measures
1	very low risk	<0.07	typically methane not to exceed 1% and/or carbon dioxide 5% otherwise consider increase to situation 2	natural soils with low organic content; 'typical' made ground	none	no special precautions	none	no special precautions
2	low risk	<0.7	borehole air flow rate not to exceed 70 L hr ⁻¹ otherwise consider increase to situation 3	natural soils with high peat/organic content; 'typical' made ground	2	a) reinforced concrete cast in situ floor slab (suspended, non suspended or raft) with at least 1200 g DPM and underfloor venting b) beam and block or pre-cast concrete and 2000 g DPM or reinforced gas membrane and underfloor venting all joints and penetrations sealed	1 to 2	a) reinforced concrete cast in situ floor slab (suspended, non suspended or raft) with at least 1200 g DPM b) beam and block or pre-cast concrete slab and minimum 2000 g DPM or reinforced gas membrane c) possibly underfloor venting or pressurisation in combination with a) and b) depending on use all joints and penetrations sealed
3	moderate risk	<3.5		old landfill, inert waste, mineworking flooded	2	all types of floor slab as above all joints and penetrations sealed, proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space	1 to 2	all types of floor slab as above all joints and penetrations sealed; minimum 2000g/reinforced gas proof membrane and passively ventilated underfloor sub-space or positively pressurised underfloor sub-space
4	moderate to high risk	<15	quantitative risk assessment required to evaluate scope of protective measures	mineworking susceptible to flooding, completed landfill	3	all types of floor slab as above all joints and penetrations sealed, proprietary gas resistant membrane and passively ventilated underfloor sub-space or positively pressurised underfloor sub-space, oversite capping or blinding and in-ground venting layer	2 to 3	all types of floor slab as above all joints and penetrations sealed; proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space with monitoring facility
5	high risk	<70		mineworking unflooded inactive with shallow workings near surface	4	reinforced concrete cast in situ floor slab (suspended, non-suspended or raft); all joints and penetrations sealed; proprietary gas resistant membrane and ventilated or positively pressurised underfloor sub-space, oversite capping and in-ground venting layer and in-ground venting wells or barriers	3 to 4	reinforced concrete cast in situ floor slab (suspended, non-suspended or raft); all joints and penetrations sealed; proprietary gas resistant membrane and passively ventilated or positively pressurised underfloor sub-space with monitoring facility; and in-ground venting wells or barriers
6	very high risk	>70		recent landfill site	5	not suitable unless gas regime is reduced first and quantitative risk assessment carried out to assess design of protection measures in conjunction with foundation design	4 to 5	reinforced concrete cast in situ floor slab (suspended, non-suspended or raft); all joints and penetrations sealed; proprietary gas resistant membrane and actively ventilated or positively pressurised underfloor sub-space with monitoring facility with monitoring; and in-ground venting wells and reduction of gas regime

NHBC TRAFFIC LIGHT GAS CHARACTERISTIC SITUATION

SITE: Mastin Moor

JOB NUMBER: 19412

21/12/2015

Carbon Dioxide	Methane
Maximum Gas Concentration	Maximum Gas Concentration
Maximum Measured Steady Flow	Maximum Measured Peak Flow
Gas Screening Value	Gas Screening Value
Characteristic Situation	Characteristic Situation
<div>4.40 %</div> <div>0.10 L hr⁻¹</div> <div>0.0044 L hr⁻¹</div> <div>Green</div>	<div>0.10 %</div> <div>0.10 L hr⁻¹</div> <div>0.0001 L hr⁻¹</div> <div>Green</div>
worst case carbon dioxide or methane characteristic situation defines overall characteristic situation for the site	

NHBC Classification

Protection Measures

Characteristic Situation	Carbon Dioxide		Methane		Identified Gas Regime		Protection Measures Required
	Typical Maximum Concentration (%v/v)	Gas Screening Value (L hr ⁻¹)	Typical Maximum Concentration (%v/v)	Gas Screening Value (L hr ⁻¹)			
Green						negligible	Ground gas protection measures are not required
Amber 1	5	0.78	1	0.16		low to intermediate	Low-level ground gas protection measures are required, using a membrane and ventilated sub-floor void that creates a permeability contrast to limit the ingress of gas into buildings. Gas protection measures are to be installed as prescribed in BRE 414. Ventilation of the sub-floor void should be designed to provide a minimum of one complete volume change per 24 hours
Amber 2	10	1.56	5	0.63		intermediate to high	High-level ground gas protection measures are required, creating a permeability contrast to prevent ingress of gas into buildings. Gas protection measures are to be installed as prescribed in BRE 414. Membranes used should always be fitted by a specialist contractor and should be fully certified (see Appendix E). As with Amber 1, ventilation of the sub-floor void should be designed to provide a minimum of one complete volume change per 24 hours.
Red	30	3.10	20	1.56		high	Standard residential housing is not normally acceptable without further Ground Gas Risk Assessment and/or possible remedial mitigation measures to reduce/remove the source of the ground gases. In certain circumstances, active protection methods could be applied, but only when there is a legal agreement assuring the management and maintenance of the system for the life of the property.



APPENDIX 7 ▪ Surface Water Laboratory Certificate



Certificate of Analysis

Certificate Number 15-47735

23-Oct-15

Client Idom Merebrook Ltd
Suite 2B
East Mill
Belper
DE56 2UA

Our Reference 15-47735

Client Reference 19412

Order No 15-S1-FDO-LABS

Contract Title Mastin Moor

Description One Water sample.

Date Received 16-Oct-15

Date Started 16-Oct-15

Date Completed 23-Oct-15

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. 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. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read 'Rob Brown'.

Rob Brown
Business Manager



Summary of Chemical Analysis

Water Samples

Our Ref 15-47735

Client Ref 19412

Contract Title Mastin Moor

Lab No	884731
Sample ID	Stream
Depth	Sample
Other ID	
Sample Type	WATER
Sampling Date	14/10/15
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.55
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Hexavalent Chromium	DETSC 2203	3	ug/l	< 3.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	0.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	< 0.09
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Zinc, Dissolved	DETSC 2306	1.25	ug/l	3.10
Inorganics				
pH	DETSC 2008			8.0
Total Chemical Oxygen Demand	DETSC 2032	10	mg/l	12
Cyanide Total	DETSC 2130	40	ug/l	< 40
Sulphate as SO4	DETSC 2055	0.1	mg/l	110
Sulphide	DETSC 2208	10	ug/l	< 10
Total Organic Carbon	DETSC 2033	2	mg/l	14
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0
MTBE	DETSC 3322	1	ug/l	< 1.0

Summary of Chemical Analysis

Water Samples

Our Ref 15-47735

Client Ref 19412

Contract Title Mastin Moor

Lab No	884731
Sample ID	Stream
Depth	Sample
Other ID	
Sample Type	WATER
Sampling Date	14/10/15
Sampling Time	n/s

Test	Method	LOD	Units	
PAHs				
Naphthalene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304*	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304*	0.01	ug/l	< 0.01
PAH	DETSC 3304	0.04	ug/l	< 0.04
Phenols				
Phenol	*	0.5	ug/l	< 0.50

Information in Support of the Analytical Results

Our Ref 15-47735
 Client Ref 19412
 Contract Mastin Moor

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
884731	Stream Sample WATER	14/10/15	GB 1L x2, GV x2, PB 1L, P(other) x3		

Key: G-Glass P-Plastic B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



AN **idom** GROUP COMPANY

Idom Merebrook Ltd Cromford Mills, Mill Lane, Matlock, Derbyshire, DE4 3RQ
t +44 (0)1773 829 988 **f** +44 (0)1773 829 393 **e** consulting@merebrook.co.uk **merebrook.co.uk idom.com**

Registered in England No. 02740216 Registered office: as above

offices London Kent Derbyshire Cardiff Manchester Stirling

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