CFA ARCHAEOLOGY
Professional cultural heritage consultants - branches nationwide
enquiries@cfa-archaeology.co.uk

Edgehill Park Phase 4, Whitehaven

Archaeological Appraisal
Report No. Y456/22

Author(s):
Joe Turner BA MSC ACIfA

CFA ARCHAEOLOGY LTD

Offices C1 and C2
Clayton Business Centre
Midland Road
Leeds
LS10 2RJ

Tel: 0113 271 6060

Email: info@cfa-arch.co.uk
Web: www.cfa-archaeology.co.uk

Author	Joe Turner BA MSC ACIfA
Illustrator	Christiana Anastasiadou MSc
Approver	Phil Mann BA ACIfA
Commissioned by	Story Homes Ltd
Date issued	February 2022
Version	0
Grid Ref	NX 97418 15710

This document has been prepared in accordance with CFA Archaeology Ltd standard operating procedures.

Edgehill Park Phase 4, Whitehaven

Archaeological Appraisal

Report No. Y456/22

CONTENTS

APPENDICES

FIGURES (BOUND AT REAR)

EXECUTIVE SUMMARY

An archaeological appraisal has been carried out that has established that there are surviving remains of former post-medieval field boundaries, as identified by geophysical survey, of local heritage value (low cultural significance) within the Proposed Development Site. These remains would be directly affected by the Proposed Development.

It is considered that there is a low potential for previously unrecorded archaeological remains to survive within the Proposed Development Site.

The requirement for further evaluation or mitigation measures will need to be agreed with Cumbria County Council Historic Environment Officer.

1 INTRODUCTION

This report presents the results of an archaeological appraisal for a residential development comprising Phase 4 of the Edgehill Park development, located to the west of Gameriggs Road, Whitehaven, Cumbria (NGR NX 97418 15710) (hereafter Proposed Development Site). The report was commissioned by Story Homes Ltd to support a planning application for the proposed development.

The Proposed Development Site comprises an area of pasture grassland surrounding High House Farm. The site is divided approximately in two by a trackway which runs through the centre, oriented east/west from Gammeriggs Road to High House Farm. South of the trackway the field slopes steeply, leading to an area of waterlogged ground. The site is also marshy and waterlogged in its north-west corner.

The objectives of the desk-based study were to:

- Identify the cultural heritage baseline within and in the vicinity of the Proposed Development Site;
- Assess the Proposed Development Site in terms of its archaeological and historic environment potential;
- Consider the potential effects of the proposed development on the baseline cultural heritage resource, within the context of relevant legislation and planning policy guidelines;
- Propose measures, where appropriate, to mitigate any predicted adverse effects.

The assessment is illustrated by three figures and accompanied by three gazetteers:

- Figure 1: Inner Study Area
- Figures 2.1-2.4: Historic Mapping
- Figure 3: Outer Study Area
- Appendix 1: Heritage Assets within the Inner Study Area
- Appendix 2: Archaeological Interventions in the Outer Study Area
- Appendix 3: Geophysical Survey Report (Magnitude Surveys, 2022)

2 PLANNING POLICY AND GUIDANCE

2.1 National Planning Policy

The primary planning policy and guidance at the national level comprises:

- National Planning Policy Framework (NPPF) (2021); and;
- Planning Practice Guidance (PPG) (2019).

National Planning Policy Framework (NPPF)

Conserving heritage assets is a core planning principle of the NPPF and plan-making and decision-taking is required. Heritage assets are an irreplaceable resource and should be ‘conserved in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations’ (para 189).

'*In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes, or has the potential to include, heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation*' (para 194).

Significance (for heritage policy) is described as – '*The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting*'.

Setting of a heritage asset is described as – '*The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral*' (Annex 2).

2.2 Regional and Local Planning Policy

Copeland Local Plan 2013-2028: Core Strategy and Development Management Policies DPD

The Adopted Copeland Local Plan contains the following policies relevant to the Proposed Development:

- Development Management Policy DM27 – Built Heritage and Archaeology; and
- Policy ENV4 – Heritage Assets.

Policy DM27 – Built Heritage and Archaeology

A Development proposals which protect, conserve and where possible enhance the historic, cultural and architectural character of the Borough's historic sites and their settings will be supported. This will be particularly relevant in the case of:

i) Scheduled Ancient Monuments.

ii) Conservation Areas.

iii) Listed Buildings and structures.

iv) Non-listed buildings and structures or landscape features of local heritage and archaeological value.

v) Surface and below ground archaeological deposits.

B Development proposals which have a significant adverse effect on a Scheduled Ancient Monument, or its wider site or setting will not be permitted.

C Development within Conservation Areas will only be permitted where it preserves or enhances the character or appearance of the area and, where appropriate, views in and out of the area. The Council will pay particular attention to:

i) How new development respects the character of existing architecture and any historical associations, landscape features, open spaces, trees, walls and quality of townscape.

ii) The impact of any proposed works to trees with regard to policy DM28.

iii) The design of any proposals for new or altered shopfronts and / or signage, which should be an integral part of the design and avoid the use of internally illuminated signage.

D Development which affects Listed Buildings or their setting will only be permitted where it:

i) Respects the architectural and historic character of the building.

ii) Avoids any substantial or total demolition, or any demolition that is not related to proposed development affecting the building.

iii) Does not have a significant adverse effect on the setting or important views of the building.

iv) Involves a change of use to all or part of the listed building which contributes to the conservation and overall economic viability of the building, and where the use can be implemented without any adverse alterations to the building.

E Any development proposal which is considered to affect an existing or potential site of archaeological importance will be required to be accompanied by an archaeological assessment. Where archaeological deposits are evident, below ground or on the surface, evidence should be recorded and where possible preserved *in-situ*. Proposals for development where archaeological interest has been established will not be approved until evidence has been provided that the risk of archaeological disturbance has been adequately investigated and has been minimised. Planning permission will not be granted if the impact on potential archaeology is unacceptable.

Policy ENV4 – Heritage Assets

The Council's policy is to maximise the value of the Borough's heritage assets by:

A Protecting listed buildings, conservation areas and other townscape and rural features considered to be of historic, archaeological or cultural value.

B Supporting proposals for heritage led regeneration, ensuring that any listed buildings or other heritage assets are put to an appropriate, viable and sustainable use.

C Strengthening the distinctive character of the Borough's settlements, through the application of high-quality urban design and architecture that respects this character and enhances the settings of listed buildings.

Policy DM27 supports this policy, setting out the Council's approach to development which affects built heritage and archaeology.

Emerging Copeland Local Plan 2021-2038 (Publication Draft, January 2022)

The Emerging Copeland Local Plan contains the following policies relevant to the proposed development:

- Strategic Policy BE1PU: Heritage Assets;
- Policy BE3PU: Archaeology; and
- Policy BE4PU: Non-Designated Heritage Assets.

Strategic Policy BE1PU: Heritage Assets

Heritage assets and their setting will be conserved and enhanced by:

- Requiring a heritage impact assessment or heritage statement where the proposal would affect a heritage asset;
- Maintaining up-to-date records of the character and significance of Conservation Areas through conservation area appraisals and management plans;
- Giving great weight to the conservation of Copeland's designated heritage assets when decision making;
- Ensuring that new development is sympathetic to local character and history;
- Promoting heritage-led regeneration initiatives in the borough, particularly within the town centres;
- Continuing to identify heritage assets that are "at risk" and work with partners to develop strategies for their protection;
- Supporting proposals for the appropriate reuse of vacant historic buildings, recognising that putting buildings into viable uses consistent with their conservation can help sustain and enhance their significance;
- Supporting proposals that increase the enhancement, promotion and interpretation of the borough's architectural and archaeological resources;
- Conserving and enhancing the Outstanding the Universal Value of the Frontiers of the Roman Empire (Hadrian's Wall) and English Lake District World Heritage Site including their integrity and authenticity. Proposals that may have an impact on the World Heritage Sites or their setting should accord with the World Heritage Site \Management Plan;
- Producing a local list of non-statutory but locally important heritage assets which are of architectural or historic interest or make a significant contribution to the character and/or appearance of the area; and
- Strengthening the distinctive character of the borough's settlements, through the application of high-quality design and architecture that respects this character and enhances the setting of heritage assets.

Policy BE3PU: Archaeology

Proposals affecting archaeological sites of less than national importance (or local significance) should conserve those elements which contribute to their significance in line with the importance of the remains. Where there are potential archaeological interests on the site, a

desk-based assessment must be submitted alongside the planning application and where this identifies that archaeological interests are likely, a field evaluation will be required.

Development must protect, and should where possible, reveal and allow public interpretation of, any archaeological remains in situ. Where remains cannot be preserved or managed *in situ* the developer will be required to make suitable provision for excavation and recording before and during development. The findings should be submitted to the Local Planning Authority and deposited with the Historic Environment Record.

Policy BE4PU: Non-Designated Heritage Assets

Development should preserve or enhance heritage assets and their setting. Proposals that better reveal the significance of heritage assets will be supported in principle. Proposals affecting non-designated heritage assets or their setting should demonstrate that consideration has been given to the significance of any heritage assets affected, including any contribution made by their setting. Where the scale of any harm or loss and the significance of the heritage asset outweighs the benefits of the proposal the development will be resisted. Where loss of the whole or part of a non-designated asset is accepted, the developer will be required to take all reasonable steps to ensure that the new development will proceed after the loss has occurred. The following may also be required:

1) An appropriate level of survey is undertaken and public record made which may also include an archaeological excavation;
2) Provision or replacement of comparable quality and design;
3) The salvage and reuse of special features within the replacement development

3 APPROACH TO THE ASESSMENT

3.1 Desk-based Assessment

This archaeological appraisal was conducted in accordance with the Chartered Institute for Archaeologists' '*Code of Conduct*' (CIfA 2014; revised October 2019), and '*Standard and Guidance for Historic Environment Desk-based Assessment*' (CIfA 2017; updated October 2020). A list of the sources consulted during the assessment is provided in the References (Section 7).

The following information sources were consulted as part of the archaeological appraisal work:

- Map Library of the National Library of Scotland: for Ordnance Survey maps and other historic map resources.
- Modern vertical aerial photographic imagery, available via Google Earth, Bing Maps and ESRI World Imagery: to obtain information on current land-use and evidence for continuing survival of sites and features identified through other desk-based resources.
- The North-West England Regional Research Framework (Research Frameworks, 2022): consulted to gain an understanding of current archaeological knowledge, and research priorities for the North West region.
- Appropriate documentary sources, grey literature and archaeological journals: consulted to understand the archaeological resource within the Proposed Development Site.

3.2 Geophysical Survey

A geophysical survey (magnetometry) was undertaken across the site in December 2021 by Magnitude Surveys. The results of the survey are summarized in Section 4 below, and the report is presented as an appendix (Appendix 3).

3.3 Assessment Methodology

The effects of the Proposed Development on heritage assets have been assessed based on their type (direct effects and impacts on setting) and nature (adverse or beneficial). The assessment takes into account the relative value/significance of the heritage asset, and its setting, and the magnitude of the predicted impact.

- Adverse effects are those that detract from or reduce cultural significance or special interest of heritage assets.
- Beneficial effects are those that preserve, enhance or better reveal the cultural significance or special interest of heritage assets.

3.3.1 Assigning Significance to Heritage Assets

The attribution of relative significance of heritage assets identified by the study has been undertaken in accordance with the principles set out in NPPF.

The NPPF defines significance of a heritage asset as: "*the value of a heritage asset to this and future generations because of its heritage interest, which may be archaeological, architectural, artistic or historic*" (MHCLG, 2021: Annex 2).

Table 1 summarises the relative levels of cultural significance used for the purposes of the assessment.

Table 1: Cultural Significance of Heritage Assets

Significance of Asset	Definition / Criteria
High	Assets valued at an international or national level, including: • World Heritage Sites • Scheduled Monuments • Grade I, II and II* Listed Buildings • Grade I and II* Registered Parks and Gardens • Historic Battlefields • Non-designated assets that meet the relevant criteria for designation
Medium	Assets valued at a regional level, including: • Archaeological sites and areas that have regional value (contributing to the aims of regional research frameworks) • Grade II Registered Parks and Gardens • Conservation Areas
Low	Assets valued at a local level, including: • Archaeological sites that have local heritage value • Unlisted historic buildings and townscapes with local (vernacular) characteristics

Significance of Asset	Definition / Criteria
Negligible	Assets of little or no intrinsic heritage value, including: • Sites of former archaeological features, where there are no longer any remains • Artefact find-spots (where the artefacts are no longer *in situ* and where their provenance is uncertain) • Unlisted buildings of little or no historic or architectural interest • Poorly preserved examples of particular types of features (e.g. quarries and gravel pits, dilapidated sheepfolds, etc)

3.3.2 Assessing Magnitude of Impact

Criteria for assessing the magnitude of impact (adverse or beneficial), which measures the degree of change to the baseline condition of a heritage asset that would result from construction of the proposed development, are presented in Table 2.

Table 2: Magnitude of Impact

Magnitude of Impact	Definition/Criteria	
	Adverse	**Beneficial**
High	Changes to the fabric or setting of a heritage asset resulting in the complete or near-complete loss of the asset's cultural significance. Changes that substantially detract from how a heritage asset is understood, appreciated and experienced.	Preservation of a heritage asset in situ where it would otherwise be completely or almost completely lost. Changes that appreciably enhance the cultural significance of a heritage asset and how it is understood, appreciated and experienced.
Medium	Changes to those elements of the fabric or setting of a heritage asset that contributes to its cultural significance such that this quality is appreciably altered. Changes that appreciably detract from how a heritage asset is understood, appreciated and experienced.	Changes to important elements of a heritage asset's fabric or setting, resulting in its cultural significance being preserved (where this would otherwise be lost) or restored. Changes that improve the way in which the heritage asset is understood, appreciated and experienced.
Low	Changes to those elements of the fabric or setting of a heritage asset that contribute to its cultural significance such that this quality is slightly altered. Changes that slightly detract from how a heritage asset is understood, appreciated and experienced.	Changes that result in elements of a heritage asset's fabric or setting detracting from its cultural significance being removed. Changes that result in a slight improvement in the way a heritage asset is understood, appreciated and experienced.

Magnitude of Impact	Definition/Criteria	
	Adverse	**Beneficial**
Negligible	Changes to fabric or setting of a heritage asset that leave its cultural significance unchanged and do not affect how it is understood, appreciated and experienced.	

3.3.3 Limitations and Assumptions

This appraisal does not comprise a full desk-based assessment. Detailed archaeological investigations have previously taken place in advance of earlier phases of the Edgehill Park development. These investigations provide the most up to date baseline data with regard to the Proposed Development Site's archaeological background and potential. The appraisal provides an overview of these investigations with regard to the current phase of development. Previous desk-based studies (e.g. CFA Archaeology, 2011a and 2011b) have provided an overview of the data held by the Cumbria Historic Environment Record (HER) and no records were held for the Site. It was therefore not considered necessary to order further HER data. The Cumbria HER online viewer was reviewed to confirm this. An historic map regression was undertaken as part of this appraisal.

4 BASELINE CONDITIONS

4.1 Study Areas

Two study areas have been used for the assessment:

- Inner Study Area: The Proposed Development Site boundary (Figures 1 and 2) was used to identify any heritage assets, through geophysical survey (magnetometry) and desk-based assessment, that could be directly impacted by the Proposed Development.
- Outer Study Area: A wider study area comprising the previous Edgehill Park development areas (Figure 3) and subject to previous archaeological investigations (CFA Archaeology, 2011a, 2011b, 204, 2018, 2021a and 2021b; GSB Survey, 2012, 2014) was used to provide information on the archaeological and historic context of the Proposed Development Site.

4.2 Inner Study Area (Figures 1 and 2; Appendices 1, 2 and 3)

4.2.1 Geophysical Survey Results (Magnitude Surveys, 2022; Figure 1; Appendices 1 and 3)

A geophysical survey was undertaken across the site by Magnitude Surveys in December 2021. The results of the geophysical survey are displayed on Figure 1 and the full report is presented in Appendix 3.

The only anomalies of archaeological origin recorded by the survey were a series of linear, positive anomalies (**1**) related to former field boundaries of likely post-medieval date. These partly correspond with boundaries recorded on historical Ordnance Survey (OS) mapping, though an additional extension of one of these boundaries was also identified which is not marked on the 19th century OS maps. These are assets of local heritage value.

A series of closely spaced parallel linear anomalies were detected across the survey area which matched with modern cultivation trends visible on satellite imagery. Several drainage features, characterised by a strong, positive signal were also detected.

Elsewhere within the survey area, a series of amorphous, linear, and curvilinear anomalies have been identified. These anomalies were characterised as 'undetermined', and whilst they may have a natural origin, an archaeological origin could not be ruled out.

Sinuous variations in the magnetic background recorded in the central part of the survey area were defined as a coal seam.

4.2.2 Historic Map Regression

4.2.2.1 Ordnance Survey 25-inch, Cumberland LXVII.10, Surveyed: 1862, Published: 1865 (Figure 2.1)

The OS 25-inch published 1865 records the proposed development site as split between four separate land units. The central majority comprises of two large fields north and south of a trackway leading towards High House Farm. The north-west corner forms part of a separate field within which the 'Gammeriggs Brickfield' structures (see CFA Archaeology, 2021b; **WIPI6**, below). In the south, a parcel of land, part of the nearby 'Tile Works' extends slightly into the current Proposed Development Site.

4.2.2.2 Ordnance Survey 25-inch, Cumberland LXVII.10, Revised: 1898, Published: 1899 (Figure 2.2)

The OS 25-inch published 1899 shows that the nearby 'Gameriggs Brickfield' buildings and 'Tile Works' have both been demolished and are no longer depicted. The fields surrounding High House have subsequently been enlarged following this change.

4.2.2.3 Ordnance Survey 25-inch, Cumberland LXVII.10, Revised: 1923, Published: 1925 (Figure 2.3)

The OS 25-inch published 1925 suggests that the northern half of the proposed development was incorporated into a golf course, which also includes land to the north and north-west. The club house for the golf course is identified on Greenbank to the east. The north-west corner of the site is indicated as boggy/marshy land.

4.2.2.4 Ordnance Survey 25-inch, Cumberland LXVII.10, Revised: 1938, Published: 1945 (Figure 2.4)

The OS 25-inch published 1945 identifies the encroaching residential development to the north-west and east of the proposed development site. Residential development to the east has created a new (and current) eastern boundary to the Site.

4.3 Outer Study Area (Figure 3; Appendix 2)

The Proposed Development represents Phase 4 of the ongoing Edgehill residential development. A series of archaeological interventions have been carried out in the previous development areas by CFA Archaeology (forming the Outer Study Area for this appraisal), which have recorded the archaeological character of the area and provide the archaeological context of the Proposed Development Site. The results of these interventions are summarised below, and their locations are illustrated on Figure 3 with their CFA project code (e.g. WIPI, WIPI2, WIPI3 etc.).

An archaeological desk-based assessment was undertaken in advance of proposed residential development in fields located to the immediate west and south of the Proposed Development Site. A review of Historic Environment Record data and historic mapping recorded evidence of industrial activity, including the presence of a former coal mine, 'Moss Pit' located at the southernmost extent of the area; a brickfield, recorded as 'Gameriggs Brickfield' on the Ordnance Survey 1st Edition map (1865); as well as a former farmstead 'Far Prestonhaws', also recorded on historic Ordnance Survey mapping, to the west of this, located towards Wilson Pit Road, and since removed by 20th century development. Within the wider landscape the presence of former industrial sites was recorded including a 'Tile Works' (see Figure 2.1), further coal pits, and chemical works, though it notes that the modern character of the landscape is now suburban and agricultural (**WIPI**; CFA Archaeology, 2011a).

Geophysical survey was undertaken across two areas. 'Area 1' was located at the very south of the site, to the south of the current Proposed Development Site, and 'Area 2', immediately to the west of its' north-western edge, covering the area recorded on 1st edition mapping as 'Gameriggs Brickfields'. The survey recorded anomalies of industrial origins, relating to the coalpit, and brickfield respectively. Evidence of possible ridge and furrow cultivation was also recorded in Area 1 (**WIPI2**; CFA Archaeology, 2011b; GSB Survey, 2012).

The remaining development area was subsequently subject to further geophysical survey. The survey primarily recorded agricultural trends, including some ridge and furrow, as well as drainage. Several ditches were recorded along with scattered ferrous anomalies which were thought to have been related to previous industrial activity or perhaps more recent evidence of burning (e.g. bonfires) (**WIPI3-a**; GSB Survey, 2014).

Subsequent trial trenching in the area of 'Moss Pit' revealed anomalies previously identified by geophysical survey to be of modern origin (**WIPI3-b**; CFA Archaeology, 2014).

Trial trenching was undertaken immediately adjacent to the south-east of the southern edge of the Proposed Development Site. Three trenches were excavated, though no archaeological evidence was identified (**WIPI4**; CFA Archaeology, 2018).

Further trial trenching undertaken to west of the Proposed Development Site, between its north-west edge and Wilson Pit Road. Trenches 1-4 recorded linear features which were thought to be 19th or 20th century in date and relating to agricultural activity associated with Prestonhows or Far Prestonhows farms (**WIPI5**; CFA Archaeology, 2021a). In trenches 12 and 13, immediately adjacent to the north-western edge of the Proposed Development Site, the remains of various brick-built structures and surfaces were identified, relating to Gameriggs brickfield (demolished by 1899) (**WIPI5**; CFA Archaeology, 2021a). One further trench, Trench 6, located approximately in the centre of the evaluation area recorded two parallel brick features associated with the former Gameriggs reservoirs, originating in the 19th century and in ruins by 1962 (**WIPI5**; CFA Archaeology, 2021a).

Following this, an archaeological strip, map and record was undertaken to investigate the remains of structures relating to Gameriggs brickfield. Two areas were excavated with the surviving remains of two buildings recorded. Evidence indicates that at least one of the buildings likely housed a brick kiln with areas of intense burning noted. The second structure likely related to an administrative or workshop building. The recovery of saggars and kiln rods from the site suggests that there may have been pottery production somewhere in the vicinity of the site, although there was no direct evidence of this within the two buildings in the excavation areas (**WIPI6**; CFA Archaeology, 2021b). There is no evidence to suggest that further structures are present which may extend into the proposed development area, which is noted to be very waterlogged in this part of the site (north-west corner), perhaps as a result of extraction for the adjacent kiln.

5 ASSESSMENT OF ARCHAEOLOGICAL POTENTIAL

The evidence from the geophysical survey has identified the presence of former post-medieval field boundaries of local heritage value surviving within the Proposed Development Site. Agricultural trends were also recorded, as well as several amorphous 'undetermined' anomalies for which an archaeological origin cannot be ruled out. Archaeological interventions undertaken adjacent to the Proposed Development Site have recorded sparse evidence of post-medieval activity, in the form of agricultural remains, and also industrial activity. In particular an excavation adjacent to the north-west corner of the Proposed Development Site recorded two structures associated with brick making recorded as 'Gameriggs Brickfield' on the Ordnance Survey 1st Edition map (1865). These structures do not appear to extend into the site, which is extremely waterlogged in this area, perhaps a result of extraction for the brick making process. Historic mapping (Figures 2.1-2.4) records the Proposed Development Site as agricultural in character, with the exception of a brief period as a golf course. No evidence

of archaeological deposits dating to any periods prior to the post-medieval period have been identified within the Outer Study Area.

It is considered likely that the Proposed Development Site has a low potential for the survival of hitherto unidentified, buried archaeological remains.

6 IMPACTS AND MITIGATION

The Proposed Development comprises a residential development including the provision of access and services. This work will necessitate a transformation of the current ground surface within the Proposed Development Site and will result in direct impacts on the former post-medieval field boundaries (**1**), identified in the northern side of the Proposed Development Site. The predicted impact is one of **high** magnitude, resulting in the loss of the buried features identified as of low cultural significance.

In addition to the above predicted direct impacts on known heritage assets there is low potential for the presence of previously unrecorded buried archaeological remains to survive below the present ground surface. The Proposed Development would have an adverse impact on any such buried remains that may be present. Further evaluation and mitigation may be required by Cumbria County Council Historic Environment Officer to identify and offset by record the loss of any such remains that might be present.

It is anticipated that any further archaeological investigations could reasonably be conducted under the terms of a planning condition; allowing for follow-on mitigation should archaeological remains be discovered.

7 CONCLUSIONS

The Proposed Development Site comprises an area pasture grassland surrounding High House farm located to the west of Gameriggs Road, Whitehaven, and constitutes Phase 4 of the Edgehill Park development.

A programme of geophysical survey has identified the presence of former post-medieval field boundaries as well as agricultural anomalies, and several amorphous ‘undetermined’ linear and curvilinear anomalies. Based on archaeological investigations which have been undertaken adjacent to the Proposed Development Site in advance of previous phases of the Edgehill Park development, it was assessed that the potential for further archaeological deposits to be identified within the Site was low.

Any further evaluation or mitigation required will be determined through consultation with the Cumbria County Council Historic Environment Officer, and it is considered that these could reasonably be conducted under the terms of a planning condition.

No significant residual effects are anticipated in relation to cultural heritage interests and the development proposals are therefore considered, not to be in conflict with the aims of national, regional and local planning policy as regards cultural heritage.

8 REFERENCES

Legislation, Policy and Guidance

CIfA (2014) '*Code of Conduct*', Chartered Institute for Archaeologists, Reading (revised October 2019).

CIfA (2017) '*Standards and Guidance for historic environment desk-based assessment*', Chartered Institute for Archaeologists, Reading (revised October 2020).

Ministry of Housing, Communities & Local Government (MHCLG) (2019) '*Planning Practice Guidance (PPG): Historic Environment*', MHCLG, London.

MHCLG (2021) '*National Planning Policy Framework'*. MHCLG, London.

Bibliographic

CFA Archaeology (2011a) '*Land at Wilson Pit Road, Whitehaven, Cumbria, Archaeological Desk-Based Assessment'*, Report No. Y033/11.

CFA Archaeology (2011b) Chapter 9: Cultural Heritage, in NJL Consulting, 2011, '*South Whitehaven EIA: Environmental Statement'*.

CFA Archaeology, (2014) '*Wilson Pit Road, Whitehaven, Cumbria, Phase 1, Archaeological Evaluation'*, Report No. Y136/14.

CFA Archaeology, (2018) '*Land off Wilson Pit Road, Whitehaven, Cumbria: Phases 3/4, Archaeological Evaluation'*, Report No. Y354/18.

CFA Archaeology, (2021a) 'Wils*on Pit Road, Whitehaven, Cumbria: Phase 5, Archaeological Evaluation'*, Report No. Y505/21.

CFA Archaeology, (2021b) '*Wilson Pit Road, Whitehaven, Cumbria: Phase 5, Archaeological Strip, Map and Record'*, Report No. Y519/21.

GSB Survey, (2012) '*Land at Wilson Pit Road, Whitehaven, Cumbria, Geophysical Survey'*, Report No. 2012/43.

GSB Survey, (2014) '*Wilson Pit Road, Whitehaven Geophysical Survey'*, Report No. G1402.

Magnitude Surveys, (2022) '*Edgehill Park Phase 4, Whitehaven, Geophysical Survey Report'*, Report No. MSNX1150A.

Cartographic

Ordnance Survey (1865) '*Cumberland LXVII.10*', 25-inches to one mile, (surveyed: 1862).

Ordnance Survey (1899) '*Cumberland LXVII.10*', 25-inches to one mile, (revised: 1898).

Ordnance Survey (1925) '*Cumberland LXVII.10*', 25-inches to one mile, (revised: 1923).

Ordnance Survey (1945) '*Cumberland LXVII.10*', 25-inches to one mile, (revised: 1938).

Internet Resources

Research Frameworks (2022) '*The North West England Regional Research Framework*', available at: <https://researchframeworks.org/nwrf/>.

FIGURES

Key:

Site Boundary

Geophysics

- Agricultural (Strong/Line)
- Agricultural (Weak)
- Magnetic Disturbance
- Ferrous/Debris (Spread)
- Natural (Strong/Line)
- Natural (Weak)
- Undetermined (Strong/Line)
- Undetermined (Weak)
- Agricultural (Trend)
- Drainage Feature (Trend)
- Ferrous (Spike)

CFA ARCHAEOLOGY LTD
Clayton Business Centre
Midland Road
Leeds
LS10 2RJ
T: 0113 271 6060
yorkshire@cfa-arch.co.uk
www.cfa-archaeology.co.uk

Title:
Inner Study Area

Project:
Edgehill Park Phase 4, Whitehaven

Client:
Story Homes Ltd

Scale at A3:
1:1,500

Drawn by:	Checked:	Date:
CA	SW	04/02/2022

Report No:	Fig. No:
Y456/22	1

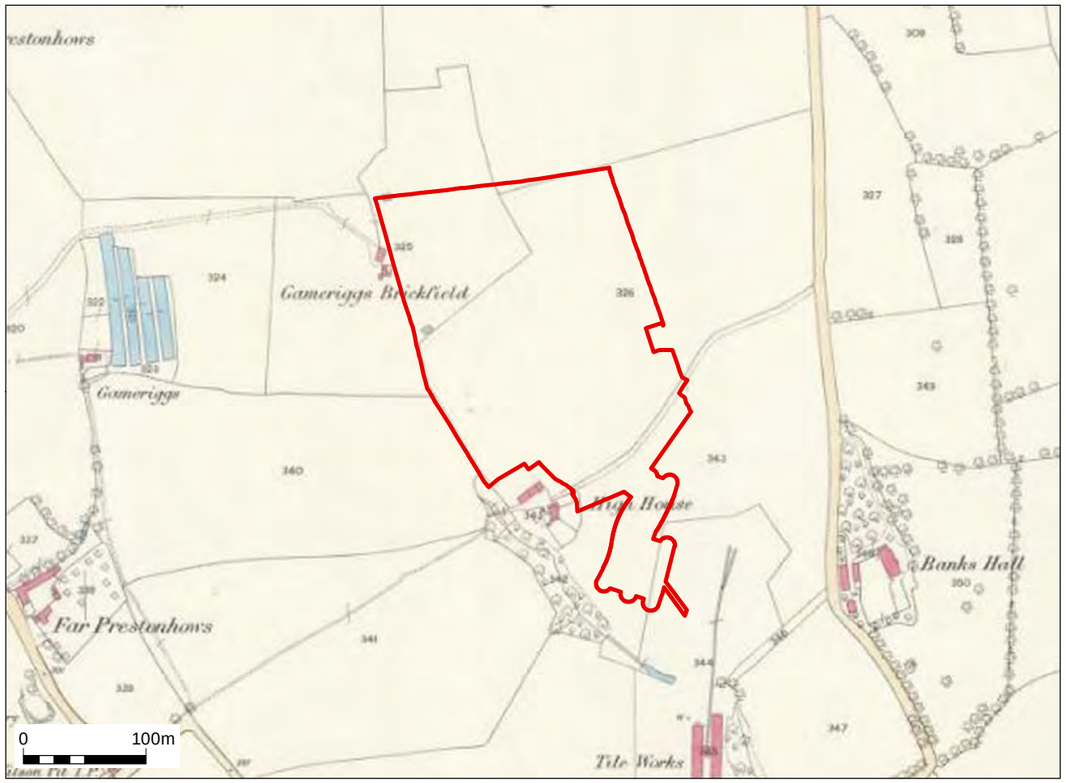


Fig. 2.1 - Ordnance Survey 25-inch, Cumberland LXVII.10, Surveyed: 1862, Published: 1865

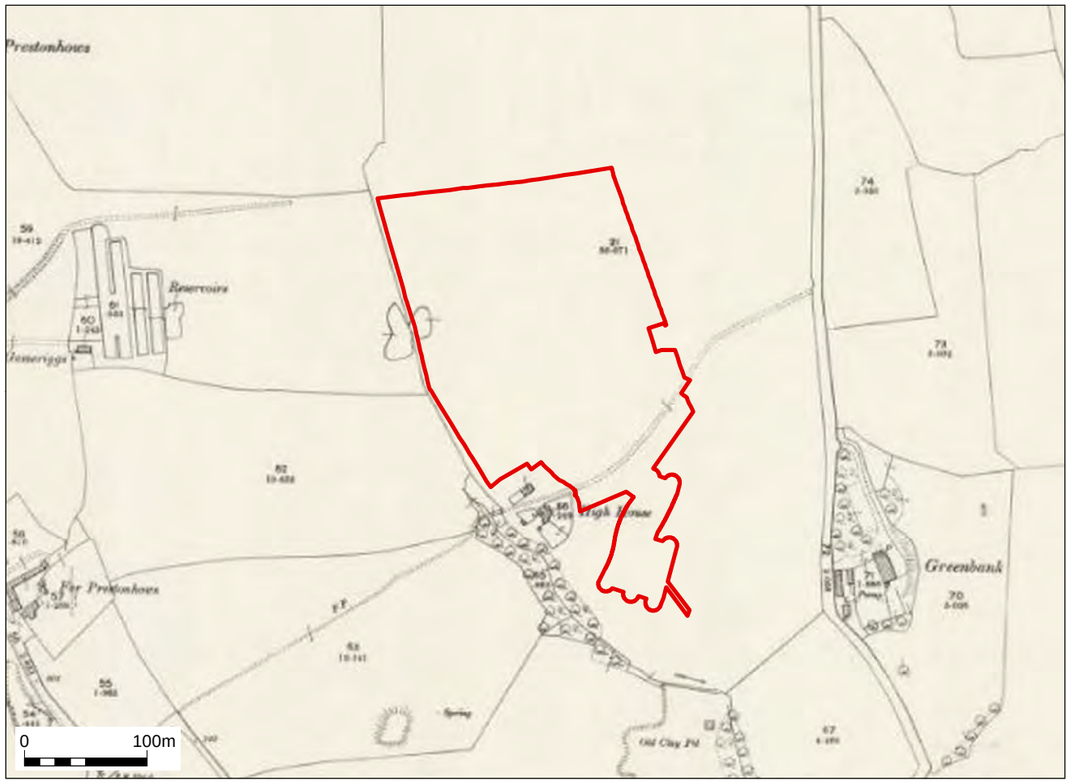


Fig.2.2 - Ordnance Survey 25-inch, Cumberland LXVII.10, Revised: 1898, Published: 1899

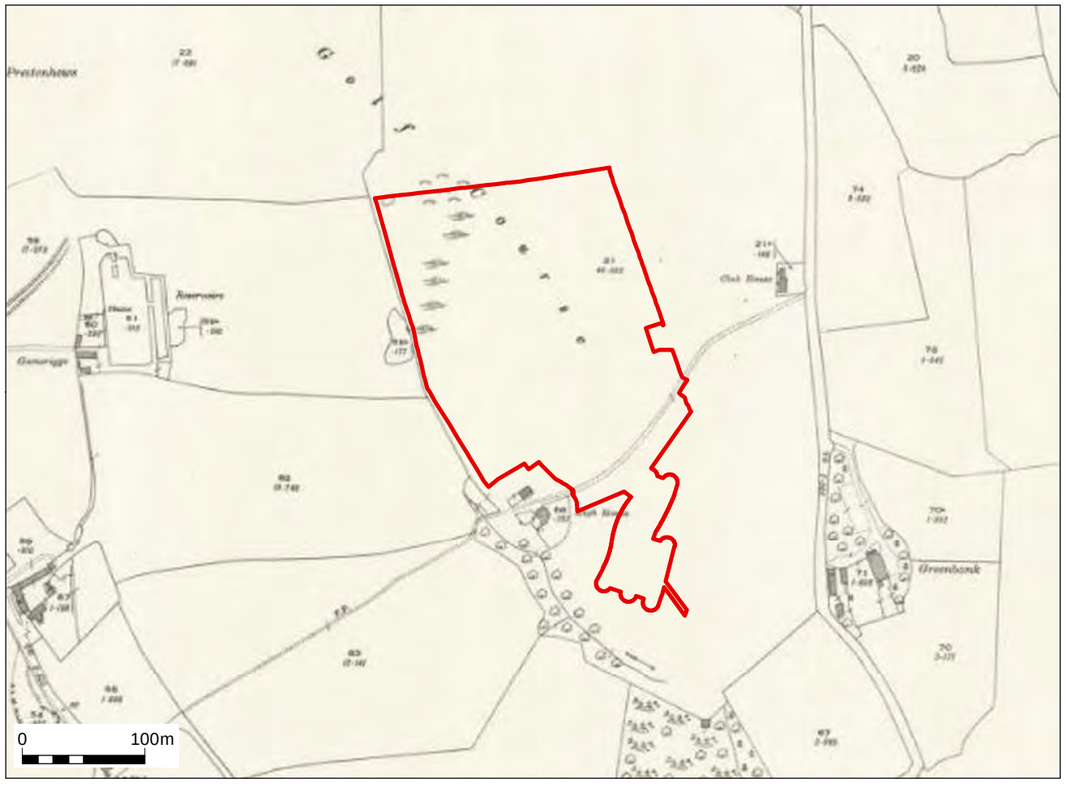


Fig. 2.3 - Ordnance Survey 25-inch, Cumberland LXVII.10, Revised: 1923, Published: 1925

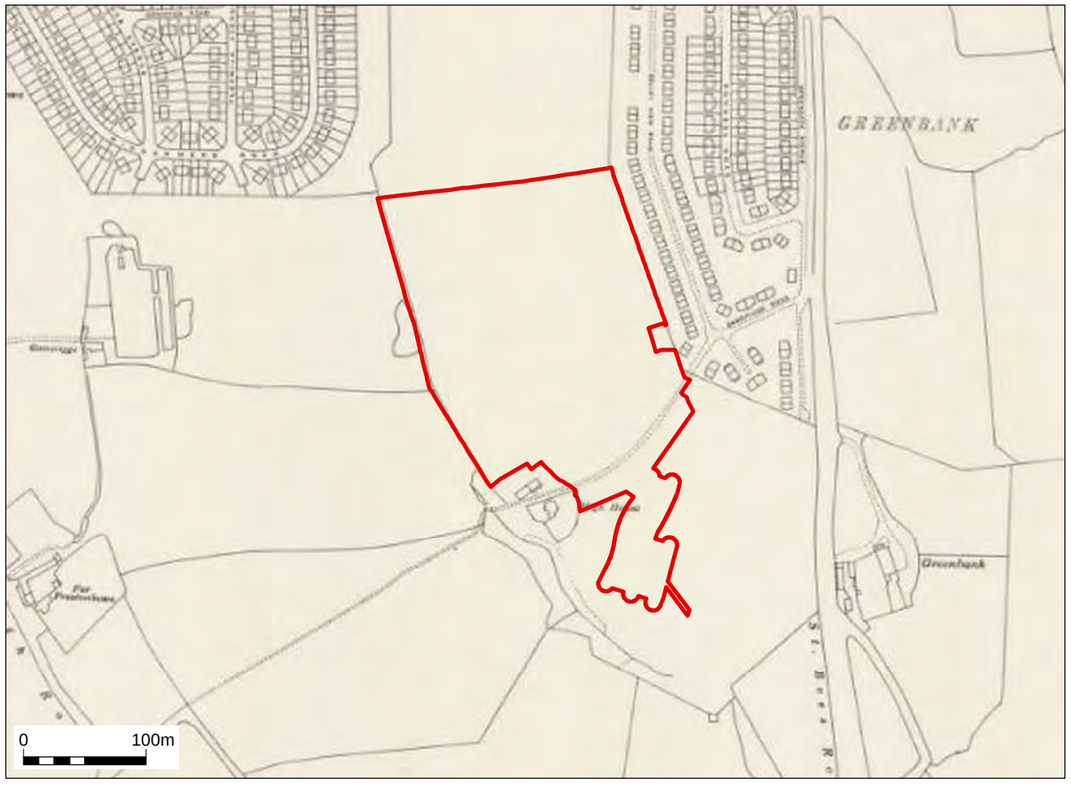


Fig. 2.4 - Ordnance Survey 25-inch, Cumberland LXVII.10, Revised: 1938, Published: 1945

Key:

Site Boundary

CFA ARCHAEOLOGY LTD
Clayton Business Centre
Midland Road
Leeds
LS10 2RJ
T: 0113 271 6060
yorkshire@cfa-archaeology.co.uk
www.cfa-archaeology.co.uk

Title:
Historic Mapping

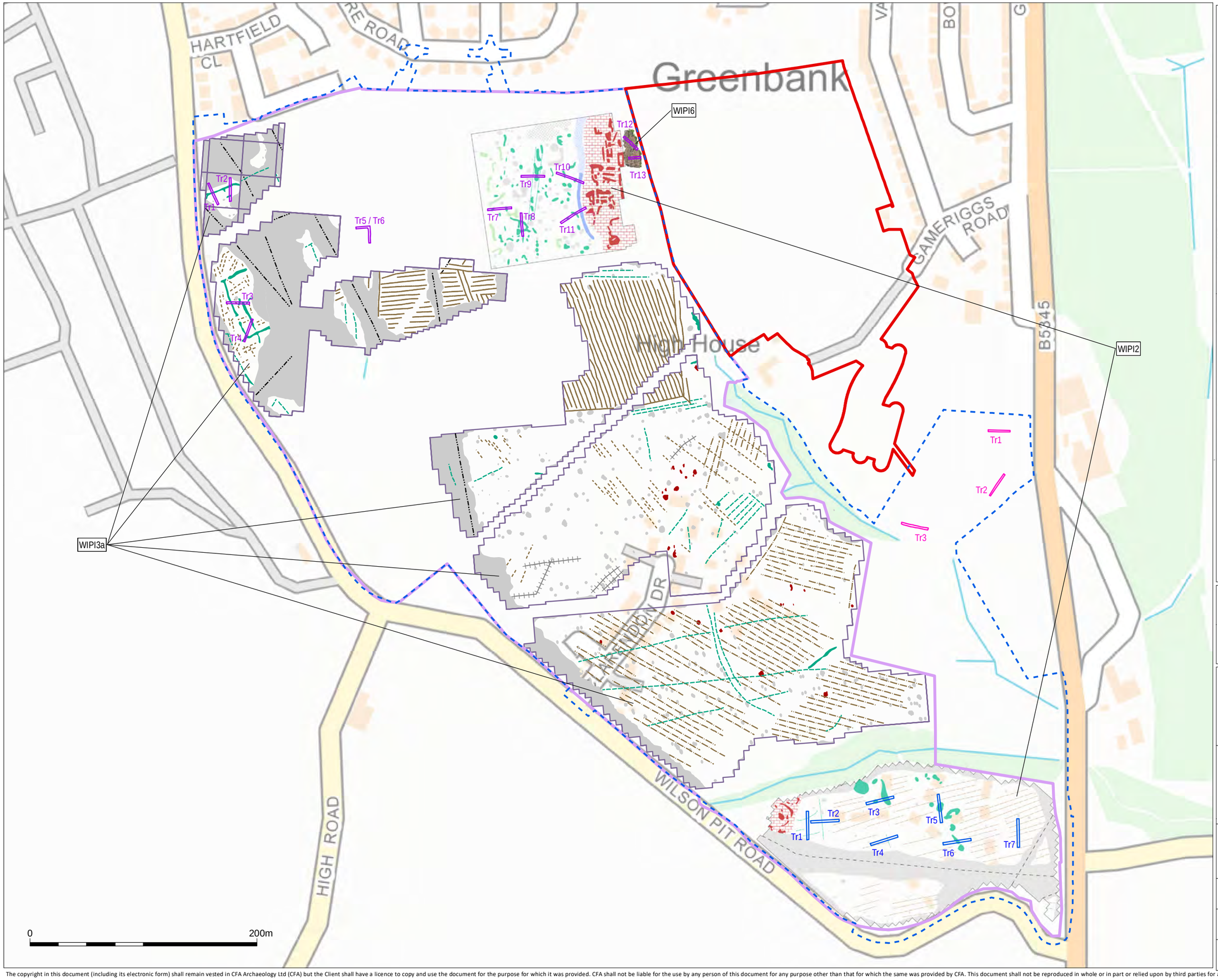
Project:
Edgehill Park Phase 4, Whitehaven

Client:
Story Homes Ltd

Scale at A3:

Drawn by:	Checked:	Date:
CA	SW	01/02/2022

Report No:	Fig. No:
Y456/22	2



Key:

- Site Boundary
- WIPI
- WIPI2
  - Industrial (discrete anomaly/zone)
  - Archaeology (discrete anomaly/zone)
  - Ridge and Furrow
  - Natural
  - Uncertain Origin (discrete anomaly/trend)
  - Pipe
  - Ferrous (discrete anomaly/zone)
- WIPI3-a
  - Uncertain Origin (discreet anomaly / trend)
  - Natural
  - Agricultural - in magnetically enhanced material
  - Ridge and Furrow / ploughing
  - Pipe / drain
  - Burnt / fired material
  - Ferrous / Area of magnetic disturbance
- WIPI3-b
- WIPI3-b Trench
- WIPI4 Trench
- WIPI5 Trench

CFA ARCHAEOLOGY LTD
Clayton Business Centre
Midland Road
Leeds
LS10 2RJ
T: 0113 271 6060
yorkshire@cfa-arch.co.uk
www.cfa-archaeology.co.uk

Title: Outer Study Area

Project: Edgehill Park Phase 4, Whitehaven

Client: Story Homes Ltd

Scale at A3: 1:3,000

Drawn by:	Checked:	Date:
CA	SW	04/02/2022

Report No:	Fig. No:
Y456/22	3

APPENDIX 1: HERITAGE ASSETS WITHIN THE INNER STUDY AREA (FIGURE 1)

Asset Ref.	Asset Name	Description	Period	Source
1	Post-medieval Field Boundaries	A series of linear, positive anomalies related to former field boundaries of likely post-medieval date. These partly correspond with boundaries recorded on historical Ordnance Survey mapping, though an additional extension of one of these boundaries is not marked on the 19th century maps.	Post-Medieval	Geophysical Survey (Magnitude Surveys, 2022)

APPENDIX 2: ARCHAEOLOGICAL INTERVENTIONS IN THE OUTER STUDY AREA (FIGURE 3)

CFA Ref.	Intervention Name	Description	Intervention Type	Source
WIPI	Land at Wilson Pit Road, Whitehaven, Cumbria, Archaeological Desk-Based Assessment	An archaeological desk-based assessment was undertaken in advance of proposed residential development in fields located to the east of Wilson Pit Road, Whitehaven. A review of Historic Environment Record data and historic mapping recorded evidence of industrial activity, including the presence of a former coal mine, 'Moss Pit'; a brickfield, recorded as 'Gameriggs Brickfield' on the Ordnance Survey 1st Edition map (1865); as well as a former farmstead Far Prestonhaws, also recorded on historic Ordnance Survey mapping. Within the wider landscape the presence of former industrial sites was recorded including a tilery, further coal pits, and a chemical works.	Desk-Based Assessment	CFA Archaeology, 2011a
WIPI2	Land at Wilson Pit Road, Whitehaven, Cumbria, Geophysical Survey	A geophysical survey was undertaken across two areas east of Wilson Pit Road, Whitehaven. 'Area 1' was located at the very south of the site across an area recorded as a coalpit, and 'Area 2', on the north side, covering an area recorded on 1st edition mapping as 'Gameriggs Brickfields'. The survey recorded anomalies of industrial origins, relating to the coalpit, and brickfield respectively. Evidence of possible ridge and furrow cultivation was also recorded in Area 1.	Geophysical Survey	GSB Survey, 2012
WIPI3-a	Wilson Pit Road, Whitehaven Geophysical Survey	Further geophysical survey undertaken across land east of Wilson Pit Road, Whitehaven. The survey primarily recorded agricultural trends, including some ridge and furrow, as well as drainage. Several ditches were recorded as well as scattered ferrous anomalies which were thought to have been related to previous industrial activity or perhaps more recent evidence of burning (e.g. bonfires).	Geophysical Survey	GSB Survey, 2014
WIPI3-b	Wilson Pit Road, Whitehaven, Cumbria, Phase 1, Archaeological Evaluation	Archaeological trial trenching comprising seven trenches was undertaken across an area recorded on historic mapping as 'Moss Pit' and previously investigated by geophysical survey (WIPI2). The trial trenching revealed anomalies previously identified by geophysical survey to be of modern origin.	Trial Trenching	CFA Archaeology, 2014
WIPI4	Land off Wilson Pit Road, Whitehaven, Cumbria: Phases	Archaeological trial trenching comprising three trenches was west of St Bees Road, Whitehaven. No archaeological features were recorded.	Trial Trenching	CFA Archaeology, 2018

	3/4, Archaeological Evaluation,			
WIPI5	Wilson Pit Road, Whitehaven, Cumbria: Phase 5, Archaeological Evaluation	Archaeological trial trenching comprising 13 trenches was undertaken on land east of Wilson Pit Road, Whitehaven. Trenches 1-4 recorded linear features which were thought to be 19th or 20th century in date and relating to agricultural activity associated with Prestonhows or Far Prestonhows farms. Trenches 12 and 13, recorded the remains of various brick-built structures relating to Gameriggs brickfield demolished by 1899. Trench 6 recorded two parallel brick associated with the former Gameriggs reservoirs, originating in the 19th century and in ruins by 1962. The remaining trenches were blank.	Trial Trenching	CFA Archaeology, 2021a
WIPI6	Wilson Pit Road, Whitehaven, Cumbria: Phase 5, Archaeological Strip, Map and Record	An archaeological strip, map and record was undertaken on land east of Wilson Pit Road, Whitehaven to investigate the remains of structures relating to 'Gameriggs Brickfield'. Two areas were excavated with the surviving remains of two buildings recorded. Evidence indicates that at least one of the buildings likely housed a brick kiln with areas of intense burning noted. The recovery of saggars and kiln rods from the site suggests that there may have been pottery production somewhere in the vicinity of the site, although there was no direct evidence of this within the two buildings within the excavation areas.	Strip, Map and Record	CFA Archaeology, 2021b

APPENDIX 3: GEOPHYSCIAL SURVEY REPORT (MAGNITUDE SURVEYS, 2022)

Geophysical Survey Report

Edgehill Park Phase 4, Whitehaven

For

CFA Archaeology

On Behalf Of

Story Homes Ltd

Magnitude Surveys Ref: MSNX1150A

HER Event Number: [TBC]

January 2022

Unit 17, Commerce Court

Challenge Way

Bradford

BD4 8NW

01274 926020

info@magnitudesurveys.co.uk

Report By:

Cameron Lane BSc (Hons) PG Dip

Report Approved By:

Finnegan Pope-Carter BSc (Hons) MSc FGS

Issue Date:

10 January 2022

Abstract

Magnitude Surveys was commissioned to assess the subsurface archaeological potential of c. 5.8ha of land west of Gameriggs Road, Whitehaven, Cumbria. A fluxgate gradiometer survey was successfully completed across c. 3.1ha, with c. 2.7ha that were not surveyed due to waterlogged conditions and steep terrain. Anomalies related to modern agricultural land usage are evident across the survey area in the form of ploughing trends and drainage. There is also evidence of historic agricultural usage in the form of mapped and unmapped historic field boundaries. Some anomalies classified as 'Undetermined' were identified within the survey area and while archaeological interpretations for these cannot be excluded, no anomalies suggestive of significant archaeological activity have been identified. The impact of modern activity in the survey area was limited to surrounding structures and small isolated areas.

Contents

List of Figures

1. Introduction

1.1. Magnitude Surveys Ltd (MS) was commissioned by CFA Archaeology on behalf of Story Homes Ltd to undertake a geophysical survey over a c. 5.8ha area of predominantly agricultural land west of Gameriggs Road. Whiteheaven, Cumbria in advance of the proposed Edgehill Phase 4 residential development (NX 97431 15764).

1.2. The geophysical survey comprised quad-towed, cart-mounted GNSS-positioned fluxgate gradiometer survey. Magnetic survey is the standard primary geophysical method for archaeological applications in the UK due to its ability to detect a range of different features. The technique is particularly suited for detecting fired or magnetically enhanced features, such as ditches, pits, kilns, sunken featured buildings (SFBs) and industrial activity (David *et al.*, 2008).

1.3. The survey was conducted in line with the current best practice guidelines produced by Historic England (David *et al.*, 2008), the Chartered Institute for Archaeologists (CIfA, 2020) and the European Archaeological Council (Schmidt *et al.,* 2015).

1.4. It was conducted in line with a WSI produced by MS (Roberts, 2021).

1.5. The survey commenced on 23rd December and took 2 days to complete.

2. Quality Assurance

2.1. Magnitude Surveys is a Registered Organisation of the Chartered Institute for Archaeologists (CIfA), the chartered UK body for archaeologists, and a corporate member of ISAP (International Society for Archaeological Prospection).

2.2. The directors of MS are involved in cutting edge research and the development of guidance/policy. Specifically, Dr Chrys Harris has a PhD in archaeological geophysics from the University of Bradford, is a Member of CIfA and is the Vice-Chair of the International Society for Archaeological Prospection (ISAP); Finnegan Pope-Carter has an MSc in archaeological geophysics and is a Fellow of the London Geological Society, as well as a member of GeoSIG (CIfA Geophysics Special Interest Group); Dr Paul Johnson has a PhD in archaeology from the University of Southampton, is a Fellow of the Society of Antiquaries of London, has been a member of the ISAP Management Committee since 2015, and is currently the nominated representative for the EAA Archaeological Prospection Community to the board of the European Archaeological Association.

2.3. All MS managers, field and office staff have degree qualifications relevant to archaeology or geophysics and/or field experience.

3. Objectives

3.1. The objective of this geophysical survey was to assess the subsurface archaeological potential of the survey area.

4. Geographic Background

4.1. The survey area was located west of Gameriggs Road, Whitehaven (Figure 1). Gradiometer survey was undertaken across one field under grassland. The survey area was split into two sections, separated by the track leading from Gameriggs Road to High House (Figure 2). c. 2.7ha around the perimeter and to the south of the track was unable to be surveyed. This was due to steep terrain south of the track, and areas of flooding at the base of this slope, and in the north-west corner of the site.

4.2. Survey considerations:

Survey Area	Ground Conditions	Further Notes
1	The field consisted of grassland sloping to the south with a steep slope to the far south.	The area was bordered by intermittent hedges to the south and south east as well as an iron fence along the east boundary. A section of corrugated iron fencing surrounds a building site to the east. All other borders had no physical boundary. Large parts of the north, west and east were not surveyed. There was a road that was located to the south.

4.3. The underlying geology comprises of mudstone, siltstone and sandstone from the Pennine Middle Coal Measures, there are also faults and veins of coal that run through the survey area. Superficial deposits are also present in the form of Diamicton Till towards the south (British Geological Survey, 2022).

4.4. The grounds consist of freely draining, slightly acidic and loamy soils (Soilscapes, 2022).

5. Archaeological Background

5.1. The following is a summary of an Archaeological Baseline and Archaeological Report provided and produced by CFA Archaeology (Walker, 2021).

5.2. No features of archaeological origin are recorded within the survey area.

5.3. A review of Historic Environment Record data and historic mapping recorded evidence of industrial activity, including the presence of a former coal mine, 'Moss Pit' located in the southernmost extent of the survey area; a brickfield, recorded as Gameriggs Brickfield on the Ordnance Survey 1st Edition map (1865); as well as a former farmstead Far Prestonhaws, also recorded on historic Ordnance Survey mapping, to the west of this, towards Wilson Pit Road.

5.4. Within the wider landscape the presence of former industrial sites was recorded including a tilery, further coal pits, and chemical works.

5.5. Geophysical survey was undertaken across two areas, located at the very south of the survey area, and immediately to the west of its' north-western edge, covering the area recorded on 1st edition mapping as 'Gameriggs Brickfields'. The survey recorded anomalies of industrial origins, relating to the coalpit, and brickfield respectively. Evidence of possible ridge and furrow cultivation was also recorded.

5.6. The remaining area was subject to further geophysical survey further geophysical survey. The survey primarily recorded agricultural trends, including some ridge and furrow, as well as drainage. Several ditches were recorded as well as scattered ferrous anomalies which were thought to have been related to previous industrial activity or perhaps more recent evidence of burning.

5.7. Subsequent trial trenching in the area of 'Moss Pit' revealed anomalies previously identified by geophysical survey to be of modern origin. Trial trenching was also undertaken immediately adjacent to the south-east of the southern edge of the survey area. Three trenches were excavated, though no archaeological evidence was identified.

5.8. Further trial trenching, immediately adjacent to the north-western edge of the survey area, revealed the remains of various brick-built structures and surfaces were identified, relating to Gameriggs brickfield.

5.9. Subsequently an archaeological strip, map and record was undertaken to investigate the remains of structures relating to Gameriggs brickfield. Two areas were excavated with the surviving remains of two buildings recorded. Evidence indicates that at least one of the buildings likely housed a brick kiln with areas of intense burning noted. The recovery of saggars and kiln rods from the site suggests that there may have been pottery production somewhere in the vicinity of the site, although there was no direct evidence of this within the two buildings within the excavation areas.

6. Methodology

6.1. Data Collection

6.1.1. Magnetometer surveys are generally the most cost effective and suitable geophysical technique for the detection of archaeology in England. Therefore, a magnetometer survey should be the preferred geophysical technique unless its use is precluded by any specific survey objectives or the site environment. For this site, no factors precluded the recommendation of a standard magnetometer survey. Geophysical survey therefore comprised the magnetic method as described in the following section.

6.1.2. Geophysical prospection comprised the magnetic method as described in the following table.

6.1.3. Table of survey strategies:

Method	Instrument	Traverse Interval	Sample Interval
Magnetic	Bartington Instruments Grad-13 Digital Three-Axis Gradiometer	1m	200Hz reprojected to 0.125m

6.1.4. The magnetic data were collected using MS' bespoke quad-towed cart system.

6.1.4.1. MS' cart system was comprised of Bartington Instruments Grad 13 Digital Three-Axis Gradiometers. Positional referencing was through a multi-channel, multi-constellation GNSS Smart Antenna RTK GPS outputting in NMEA mode to

ensure high positional accuracy of collected measurements. The RTK GPS is accurate to 0.008m + 1ppm in the horizontal and 0.015m + 1ppm in the vertical.

6.1.4.2. Magnetic and GPS data were stored on an SD card within MS' bespoke datalogger. The datalogger was continuously synced, via an in-field Wi-Fi unit, to servers within MS' offices. This allowed for data collection, processing and visualisation to be monitored in real-time as fieldwork was ongoing.

6.1.4.3. A navigation system was integrated with the RTK GPS, which was used to guide the surveyor. Data were collected by traversing the survey area along the longest possible lines, ensuring efficient collection and processing.

6.2.Data Processing

6.2.1. Magnetic data were processed in bespoke in-house software produced by MS. Processing steps conform to the EAC and Historic England guidelines for 'minimally enhanced data' (see Section 3.8 in Schmidt *et al.*, 2015: 33 and Section IV.2 in David *et al.,* 2008: 11).

Sensor Calibration – The sensors were calibrated using a bespoke in-house algorithm, which conforms to Olsen *et al.* (2003).

Zero Median Traverse – The median of each sensor traverse is calculated within a specified range and subtracted from the collected data. This removes striping effects caused by small variations in sensor electronics.

Projection to a Regular Grid – Data collected using RTK GPS positioning requires a uniform grid projection to visualise data. Data are rotated to best fit an orthogonal grid projection and are resampled onto the grid using an inverse distance-weighting algorithm.

Interpolation to Square Pixels – Data are interpolated using a bicubic algorithm to increase the pixel density between sensor traverses. This produces images with square pixels for ease of visualisation.

6.3.Data Visualisation and Interpretation

6.3.1. This report presents the gradient of the sensors' total field data as greyscale images, as well as the total field data from the lower sensors. The gradient of the sensors minimises external interferences and reduces the blown-out responses from ferrous and other high contrast material. However, the contrast of weak or ephemeral anomalies can be reduced through the process of calculating the gradient. Consequently, some features can be clearer in the respective gradient or total field datasets. Multiple greyscale images of the gradient and total field at different plotting ranges have been used for data interpretation. Greyscale images should be viewed alongside the XY trace plot (Figure 6). XY trace plots visualise the magnitude and form of the geophysical response, aiding anomaly interpretation.

6.3.2. Geophysical results have been interpreted using greyscale images and XY traces in a layered environment, overlaid against open street maps, satellite imagery, historical maps, LiDAR data, and soil and geology maps. Google Earth (2022) was also consulted, to compare the results with recent land use.

6.3.3. Geodetic position of results – All vector and raster data have been projected into OSGB36 (ESPG27700) and can be provided upon request in ESRI Shapefile (.SHP) and Geotiff (.TIF) respectively. Figures are provided with raster and vector data projected against OS Open Data.

7. Results

7.1.Qualification

7.1.1. Geophysical results are not a map of the ground and are instead a direct measurement of subsurface properties. Detecting and mapping features requires that said features have properties that can be measured by the chosen technique(s) and that these properties have sufficient contrast with the background to be identifiable. The interpretation of any identified anomalies is inherently subjective. While the scrutiny of the results is undertaken by qualified, experienced individuals and rigorously checked for quality and consistency, it is often not possible to classify all anomaly sources. Where possible, an anomaly source will be identified along with the certainty of the interpretation. The only way to improve the interpretation of results is through a process of comparing excavated results with the geophysical reports. MS actively seek feedback on their reports, as well as reports from further work, in order to constantly improve our knowledge and service.

7.2.Discussion

7.2.1. The geophysical results are presented in combination with satellite imagery and historical maps (Figure 7). The survey was carried out on an area of c. 5.8ha, located west of Gameriggs Road, Whitehaven, with c. 2.7ha not surveyed.

7.2.2. The fluxgate gradiometer survey has responded well to the environment of the survey area. The survey area has been impacted by magnetic interference from nearby buildings, structures and equipment as well as some field boundaries. The magnetic anomalies can possibly mask any weaker anomalies that may be present in the vicinity of the strong responses.

7.2.3. The survey has primarily detected evidence of modern and historic agricultural activities as well as natural features.

7.2.4. The geophysical survey has detected evidence for agricultural usage in the forms of drainage, plough trends as well as both mapped and unmapped historic boundaries. The modern agricultural practices are present throughout the survey area in the form of agricultural trends that align with recent ploughing regimes.

7.2.5. Some anomalies have been classified as undetermined across the survey area. These include a variety of magnetic anomalies that show different morphology, shapes and sizes. These are likely to be related to the geological context or agricultural usage of the area but cannot be further identified.

7.3.Interpretation

7.3.1. General Statements

7.3.1.1. Geophysical anomalies will be discussed broadly as classification types across the survey area. Only anomalies that are distinctive or unusual will be discussed individually.

7.3.1.2. **Ferrous (Spike)** – Discrete dipolar anomalies are likely to be the result of isolated pieces of modern ferrous debris on or near the ground surface.

7.3.1.3. **Ferrous/Debris (Spread)** – A ferrous/debris spread refers to a concentration of multiple discrete, dipolar anomalies usually resulting from highly magnetic material such as rubble containing ceramic building materials and ferrous rubbish.

7.3.1.4. **Magnetic Disturbance** – The strong anomalies produced by extant metallic structures, typically including fencing, pylons, vehicles and service pipes, have been classified as 'Magnetic Disturbance'. These magnetic 'haloes' will obscure weaker anomalies relating to nearby features, should they be present, often over a greater footprint than the structure causing them.

7.3.1.5. **Undetermined** – Anomalies are classified as Undetermined when the origin of the geophysical anomaly is ambiguous and there is no supporting contextual evidence to justify a more certain classification. These anomalies are likely to be the result of geological, pedological or agricultural processes, although an archaeological origin cannot be entirely ruled out. Undetermined anomalies are generally distinct from those caused by ferrous sources.

7.3.2. Magnetic Results - Specific Anomalies

7.3.2.1. **Agricultural (Strong/Weak)** – A series of linear, positive anomalies have been detected (Figure 5). These correlate with historical OS mapping and, in some cases, boundaries visible on satellite imagery. Additionally, a discontinuous, linear anomaly has been detected which exhibits a negative magnetic signal that follows a field boundary recorded in 2nd Edition OS Maps (Figure 7). Another weak linear anomaly [**1a**] is identified but has not been previously mapped on historical maps.

7.3.2.2. **Agricultural Trends** – Across the survey area a series of parallel linear anomalies have been detected. These are very closely spaced and only a few indicative linear trends have been picked out to give an idea of direction and presence across the site. The orientation is well matched with modern cultivation visible in recent satellite imagery and are interpreted as agricultural trends caused by modern ploughing (Figure 5). There is also potential for these trends to be identified as drainage features.

7.3.2.3. **Drainage Features** – Across the site, few arrangements of drainage features have been identified. These linear anomalies are characterised by strong, positive signal that exhibit a ditch-like morphology.

7.3.2.4. **Undetermined (Strong/Weak) –** A series of amorphous, linear, and curvilinear anomalies have been identified in multiple areas. These anomalies have a generally weak magnetic signal and are mostly curvilinear, suggesting that they could be related either to human activities or to the natural features which are present in the survey area. The strong magnetic signal, in the south east of the greyscale, could be related to natural causes, however it could also represent

ferrous debris or drag-out from the nearby manmade structures. Thus, it's also classified as 'Undetermined'.

7.3.2.5. **Natural (Strong/Weak) –**A series of sinuous variations in the magnetic background have been identified in central part of the survey area on what is identified as a coal seam**.** These features are positive in magnetic signal and are explicit in both the greyscale and total field data.

8. Conclusions

8.1. A fluxgate gradiometer survey has successfully been undertaken across most of the survey area, with c. 2.7 ha that were not surveyed due to the ground being waterlogged or too steep to safely survey. The geophysical survey has detected a range of different types of anomalies of agricultural, natural and undetermined origins. Modern activity in the form of magnetic disturbance is generally limited to the borders of the survey area, however, some magnetic disturbance is noticeable within the survey area. This may have prevented any further identification of anomalies within the nearby vicinity.

8.2. Agricultural activity has been detected throughout the survey area as both mapped and unmapped former field boundaries, as well as, plough trends and drainage features.

8.3. Several undetermined anomalies have been detected throughout the survey area which may have represented further natural or agricultural variations; however, a more conclusive classification cannot be given due to the enhanced magnetic background and the limited context due to the proximity to nearby structures and limits of survey area.

9. Archiving

9.1. MS maintains an in-house digital archive, which is based on Schmidt and Ernenwein (2013). This stores the collected measurements, minimally processed data, georeferenced and un-georeferenced images, XY traces and a copy of the final report.

9.2. MS contributes reports to the ADS Grey Literature Library upon permission from the client, subject to any dictated time embargoes.

10. Copyright

10.1. Copyright and intellectual property pertaining to all reports, figures and datasets produced by Magnitude Services Ltd is retained by MS. The client is given full licence to use such material for their own purposes. Permission must be sought by any third party wishing to use or reproduce any IP owned by MS.

11. References

British Geological Survey, 2022. Geology of Britain. Whitehaven, Cumbria. [http://mapapps.bgs.ac.uk/geologyofbritain/home.html/]. Accessed 04/01/2022.

Chartered Institute for Archaeologists, 2020. Standards and guidance for archaeological geophysical survey. CIfA.

David, A., Linford, N., Linford, P. and Martin, L., 2008. Geophysical survey in archaeological field evaluation: research and professional services guidelines (2nd edition). Historic England.

Google Earth, 2022. Google Earth Pro V 7.1.7.2606.

Olsen, N., Toffner-Clausen, L., Sabaka, T.J., Brauer, P., Merayo, J.M.G., Jorgensen, J.L., Leger, J.M., Nielsen, O.V., Primdahl, F., and Risbo, T., 2003. Calibration of the Orsted vector magnetometer. Earth Planets Space 55: 11-18.

Roberts, D., 2021. Written Scheme of Investigation for a Geophysical Survey of Edgehill Park Phase 4, Whitehaven, Cumbria. Magnitude Surveys.

Schmidt, A. and Ernenwein, E., 2013. Guide to good practice: geophysical data in archaeology (2nd edition). Oxbow Books: Oxford.

Schmidt, A., Linford, P., Linford, N., David, A., Gaffney, C., Sarris, A. and Fassbinder, J., 2015. Guidelines for the use of geophysics in archaeology: questions to ask and points to consider. EAC Guidelines 2. European Archaeological Council: Belgium.

Soilscapes, 2022. Whitehaven, Cumbria. Cranfield University, National Soil Resources Institute. [http://landis.org.uk]. Accessed 05/01/2022.

Walker J., 2021. Wilson Pit Road, Whitehaven, Cumbria. Archaeological Strip, Map and Record, Phase 5. Report No. Y519/21.

12. Project Metadata

MS Job Code	MSNX1150A
Project Name	Edgehill Park Phase 4, Whitehaven
Client	CFA Archaeology
Grid Reference	NX 97431 15764
Survey Techniques	Magnetometry
Survey Size (ha)	5.8ha (Magnetometry)
Survey Dates	2021-10-23 to 2021-10-24
Project Lead	Daniel Roberts BSc (Hons) MSc MRes FGS
Project Officer	Dr. Anna Chmielowska PCIfA
HER Event No	TBC
OASIS No	TBC
S42 Licence No	N/A
Report Version	0.3

13. Document History

Version	Comments	Author	Checked By	Date
0.1	Initial draft for Project Lead to Review	CL	AC	06 January 2022
0.2	Corrections from Project Lead, draft after Director Approval	CL	FPC	07 January 2022
0.3	Corrections from Client	AC	FPC	25 January 2022

MSNX1150 - Edgehill Park Phase 4, Whitehaven
Figure 1 - Site Location
1:25,000 @ A4

Survey Area

N

0 0.5 1 km

magnitude surveys

297200
297400
297600
297800
515800
515600
Windermere Road
Valley View Road
Bowness Road
Greenbank Avenue
Other Sports Facility
Play Space
Greenbank
Playing Field
Gameriggs Road
Area 1
High House
B5345
N
0
50
100
150 m
Survey Area
Unsurveyable
MSNX1150 - Edgehill Park Phase 4, Whitehaven
Figure 2 - Location of Survey Area
1:2,000 @ A3

magnitude surveys

297200

297400

297600

Lowther Gardens

Fleswick Avenue

Windermere Road

Valley View Road

Bowness Road

Greenbank Avenue

Other Sports Facility

Play Space

515800

Greenbank

515800

Playing Field

B5345

Gameriggs Road

Area 1

Greenbank Avenue

High House

MSNX1150 - Edgehill Park Phase 4, Whitehaven
Figure 3 - Magnetic Total Field (Lower)
1:1,500 @ A3

48997 nT 49005

N

0 50 100 150 m

magnitude surveys

297200
297400
297600
515800
515800
Lowther Gardens
Fleswick Avenue
Windermere Road
Valley View Road
Bowness Road
Greenbank Avenue
Other Sports Facility
Play Space
Greenbank
Playing Field
B5345
Gameriggs Road
Area 1
High House

MSNX1150 - Edgehill Park Phase 4, Whitehaven
Figure 3 - Magnetic Gradient
1:1,500 @ A3

-1 nT 2

N

0 50 100 150 m

magnitude surveys

297200
297400
297600
515800
515800
Lowther Gardens
Fleswick Avenue
Windermere Road
Valley View Road
Bowness Road
Greenbank Avenue
Other Sports Facility
Play Space
Playing Field
Greenbank
B5345
Gameriggs Road
Gameriggs Road
Greenbank Avenue
1a
Area 1
High House

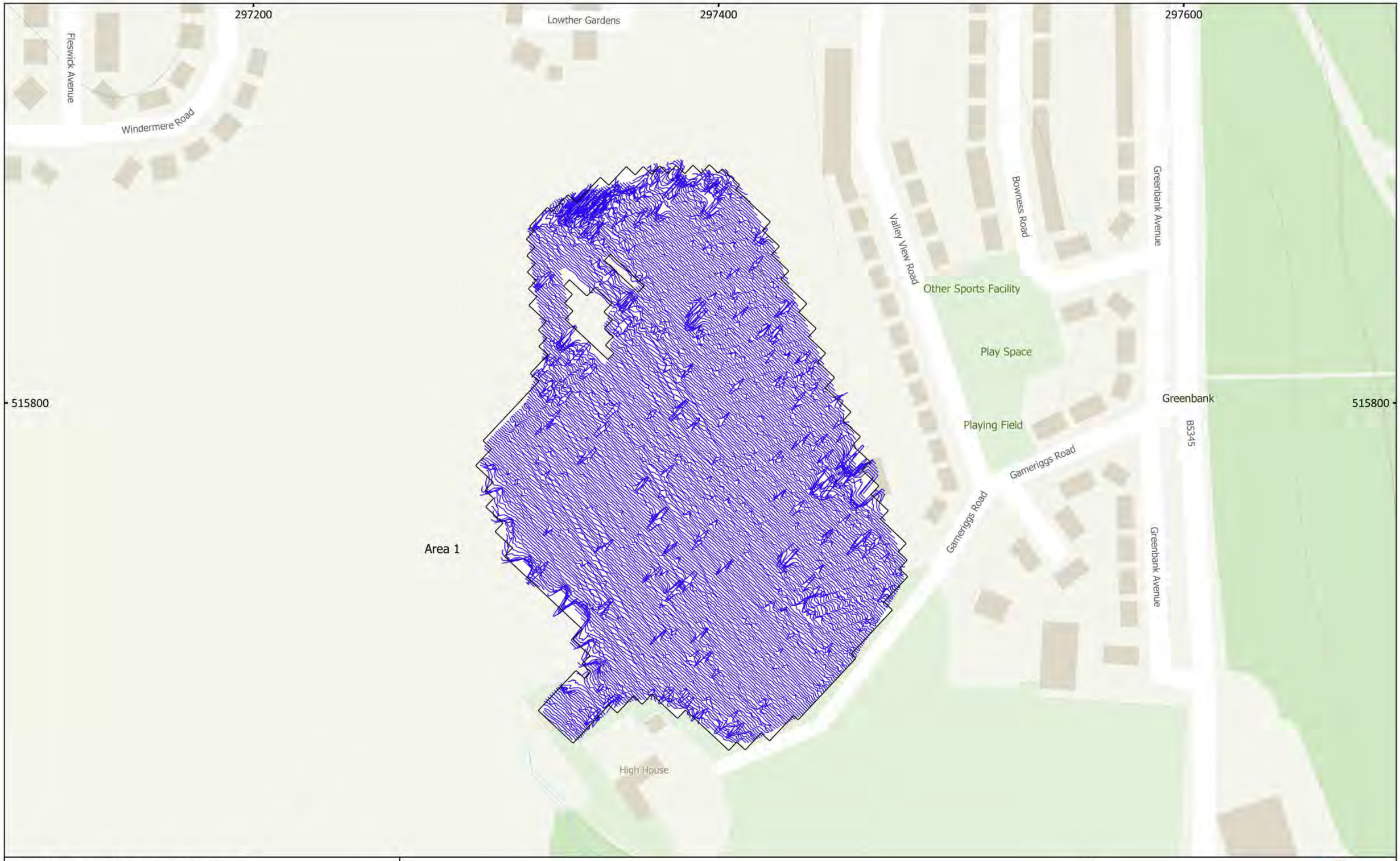
MSNX1150 - Edgehill Park Phase 4, Whitehaven
Figure 5 - Magnetic Interpretation
1:1,500 @ A3

- Agricultural (Strong)
- Agricultural (Weak)
- Magnetic Disturbance
- Ferrous/Debris (Spread)
- Natural (Strong)
- Natural (Weak)
- Undetermined (Strong)
- Undetermined (Weak)
- Agricultural (Trend)
- Drainage Feature
- Ferrous (Spike)

N

0 50 100 150 m

magnitude surveys



MSNX1150 - Edgehill Park Phase 4, Whitehaven
Figure 6 - XY Trace Plot
90nT/cm at 1:1,500 @ A3

N

0 50 100 150 m

magnitude surveys

MSNX1150 - Edgehill Park Phase 4, Whitehaven
Figure 7 - Magnetic Interpretation Over Historical Maps and Satellite Imagery
1:2,500 @ A3

- Agricultural (Strong)
- Agricultural (Weak)
- Magnetic Disturbance
- Ferrous/Debris (Spread)
- Natural (Strong)
- Natural (Weak)
- Undetermined (Strong)
- Undetermined (Weak)
- Agricultural (Trend)
- Drainage Feature
- Ferrous (Spike)

N

0 50 100 150 m

magnitude surveys

CFA ARCHAEOLOGY

www.cfa-archaeology.co.uk

HEAD OFFICE - Musselburgh
Old Engine House
Eskmills Park, Musselburgh
East Lothian, EH21 7PQ

t: +44 (0) 131 273 4380
e: enquiries@cfa-arch.co.uk

Leeds
Clayton Works Business Centre
Midland Road
Leeds, LS10 2RJ

t: +44 (0) 113 271 6060
e: yorkshire@cfa-arch.co.uk

Milton Keynes
Suite 11, Letchworth House
Chesney Wold, Bleak Hall
Milton Keynes, MK6 1NE

t: +44 (0) 1908 226 124
e: miltonkeynes@cfa-arch.co.uk

Carlisle
Warwick Mill Business Village
Warwick Bridge, Carlisle
Cumbria, CA4 8RR

t: +44 (0) 1228 564 531
e: cumbria@cfa-arch.co.uk

Sheffield
Office 5, Ecclesfield Business Centre
46 Stocks Hill, Ecclesfield
Sheffield, S35 9YT

t: +44 (0) 114 327 1108
e: sheffield@cfa-arch.co.uk

Leicester
Business Box
3 Oswin Road, Brailsford Industrial Estate
Leicester, LE3 1HR

t: +44 (0) 116 279 5156
e: leicestershire@cfa-arch.co.uk

Hertfordshire
Amwell House
9 Amwell Street, Hoddesdon
Hertfordshire, EN11 8TS

t: +44 (0) 845 017 9847
e: herts@cfa-arch.co.uk