Langtree PP and Panattoni

Six 56 Warrington

Addendum to Environmental Statement

Part 2 – Cultural Heritage & Archaeology

Technical Paper 9

~~Revision II 4th February 2019 Revision III 11th March 2020~~ IV 28th October 2021

Revision Record

Revision Reference	Date of Revision	Nature of Revision	Author	Checked By
~~2~~ ~~34~~	~~4th February 2019~~ ~~11th March 2020~~ 28th October 2021	Revised Draft ES Addendum	Louise Robinson (BA Hons)/ Jim MacQueen BA (Hons)	Jim MacQueen BA (Hons)

Report Author	Jim MacQueen/ Louise Robinson
Report Date	~~4th February 2019~~ ~~11th March 2020~~ 28th October 2021
Project No.	LDP2136
Document Ref.	ES Technical Paper 9
Revision	~~II~~ ~~III~~ IV

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1. Introduction

1.1. This document now constitutes part of an addendum to the Environmental Statement originally submitted to Warrington Borough Council (WBC) in March 2019 to accompany the outline planning application for warehouse development (Use Class B8 with ancillary B1(a) offices) and associated infrastructure at the Application Site referred to as Six 56 Warrington.

1.2. Since the submission of the planning application, consultation responses have been received from key consultees and further discussions have taken place with the Council and their key consultees (namely WBC Highway Officers, Highways England (HE) and their consultants Atkins, WBC Environmental Protection Officers, Historic England and WBC Conservation Officer and Ramboll landscape designers acting on behalf of WBC).

1.3. Further clarification and information has been provided in line with requests by HE and WBC Highway's Officer relating to the design of the mitigation and the WMMTM traffic model.

1.4. Environmental Protection have concerns with exposure to high noise levels that will be experienced at existing properties on Cartridge Lane and sensitive receptors within the site comprising Bradley Hall Cottages and Bradley View to potentially unacceptably high noise levels, even with mitigation in place, based on the worst case estimates of the proposals as illustrated on submitted masterplan and parameters plans.

1.5. Landscape Consultants Ramboll's acting on behalf of the Council have also recommended further supplementary information, including an assessment of potential effects on the visual amenity of properties in the vicinity, in order to provide greater transparency to the LVIA and its findings and to aid WBC in its determination of the application.

1.6. Consequently, the indicative masterplan and parameters plans have evolved to address comments raised by these key consultees and reduce the noise impacts on sensitive receptors within the site with realignment of estate roads. Further assessments have also been undertaken in respect of noise and vibration and landscape and visual impacts and cultural heritage. This addendum therefore includes additional and updated information to address the comments raised by key consultees. Part 2 of this addendum includes addendums to the following technical papers:

- Traffic and Transportation

- Water Quality and Drainage
- Landscape and Visual Impact
- Ecology and Nature Conservation
- Noise and Vibration
- Cultural Heritage

1.7. This addendum should however be read in conjunction with the original ES submitted to WBC in April 2019 as the other technical papers (Ground Conditions and Contamination; Socio-Economic, Air Quality, Utilities, Energy, Waste and Agricultural Land and Soils) have not been amended or subject to change and as such are not included within this addendum, but still remain valid and still form part of the ES for the planning application. See Appendix 18 of the ES Part 1 Addendum which provides Consultants confirmation that there are no changes to the significance of impacts in the Ground Conditions and Contamination; Socio-Economic, Air Quality, Utilities, Energy, Waste and Agricultural Land and Soils Technical Papers arising from the updated project description presented in this ES Addendum.

1.8. In order to make the addendum more understandable and to avoid extensive cross referencing, changes have been integrated within the original text of this technical paper to form a single addendum to the ES. Wherever changes or additions have been made to the text of the original technical paper, the text has been underlined and anything that is no longer relevant or valid has been struck through but retained within the text. A log is also included within Appendix 18 of this technical paper addendum so that the text to be removed (i.e. the text struck through within the paper) is identified and a reason for its removal provided.

1.9. This ES Addendum Paper has been prepared by BWB Consulting Ltd on behalf of Langtree PP and Panattoni. ('the Applicant'). It reports on the predicted effects of the scheme on the cultural heritage resource within the Proposed Development (the 'Application Site') and the wider study area. Details of the proposed Development are given in Section 2: Project Description of the Environmental Statement (ES) Part 1 Report.

1.10. The objective of this Paper is to identify the significance of effects on cultural heritage assets likely to arise from the construction, opening and operation of the Proposed Development.

1.11. To assist with the preparation of this paper a baseline study encompassing archaeology, built heritage and historic landscape has been undertaken. This involved the consultation of a

number of sources including the Cheshire Historic Environments Record. The findings of the study form the basis of the cultural heritage baseline presented in this paper.

1.12. The baseline study has enabled an assessment of the potential impacts and the effects that may occur from the Proposed Development. Where impacts do occur mitigation measures have been suggested where deemed appropriate. The baseline study and corresponding impact assessment have been undertaken in accordance with The National Planning Policy Framework (2018) and the Local Plan Core Strategy (July 2014).

1.13. The Local Planning Authority and Historic England have been consulted as part of the scoping and assessment process for this Environmental Statement (ES).

2. Documents Consulted

2.1. This section provides a background to legislation and policy relevant to the proposed Development in relation to the cultural heritage resource that may be present. National policy and legislation for the protection of designated and non-designated assets is summarised.

2.2. Summaries are included of relevant adopted local planning policies and a summary of the relevant guidance published by Historic England is also included.

Legislation and Policy

Legislation

Ancient Monument and Archaeological Areas Act 1979

2.3. The Ancient Monuments and Archaeological Areas Act 1979 (Her Majesty's Stationary Office 1979) is the central piece of legislation which protects the archaeological resource. The first section of the Act requires the Secretary of State for National Heritage to maintain a schedule of nationally important sites. For the purposes of the Act, a monument is defined as:

> *"a) any building, structure or work, whether above or below the surface of the land, and any cave or excavation; b) any site comprising the remains of any such building, structure or work or of any cave or excavation; and c) any site comprising, or comprising the remains of, any vehicle, vessel, aircraft or other moveable structure or part thereof which neither constitutes nor forms part of any work which is a monument as defined within paragraph a) above; d) and any machinery attached to a monument shall be regarded as part of the monument if it could not be detached without being dismantled."* (Section 61 (7))."

2.4. A set of criteria, defined as survival/ condition, period, rarity, fragility/ vulnerability, diversity, documentation, group value and potential, assist in the decision making process as to whether a site is deemed of national importance and best managed by scheduling.

2.5. Historic England is enabled by Section 8C of the Historic Buildings and Ancient Monuments Act 1953 (introduced by paragraph 10 of Schedule 4, of the National Heritage Act 1983 (Her Majesty's Stationary Office 1983) to compile a Register of Parks and Gardens of Special Historic Interest in England. Though designated of national interest, a park or garden on the register is not otherwise statutorily protected.

2.6. Section 72 of the Planning (Listed Buildings and Conservation Areas) 1990 Act (Her Majesty's Stationary Office 1990) establishes a desirability to preserve or enhance the character or appearance of a Conservation Area. A Conservation Area is an area of local interest designated principally by the Local Planning Authority.

2.7. For archaeological sites that are not covered by the above Act, protection is afforded through development control, the Town and Country Planning Act 1990 and the National Planning Policy Framework (The Framework [2018] – see below).

Planning (Listed Buildings and Conservation Areas) Act 1990

2.8. The Planning (Listed Buildings and Conservation Areas) Act 1990 imposes a duty on the Secretary of State to compile lists of buildings of special architectural or historic interest. Section 7 of the Act requires applicants to obtain consent for the demolition of a listed building or for works of alteration or extension, which would affect its character as a listed building. In consideration of proposals within the setting of listed buildings, the Act establishes a requirement to have special regard to the desirability of preserving that setting.

National Planning Policy

2.9. The updated National Planning Policy Framework (The Framework), published in February 2019, sets out a series of policies that are a material consideration in development management decisions. The document identifies the Government's planning policies for England and how these are expected to be applied, particularly in relation to the presumption in favor of 'sustainable development'.

2.10. Section 16 of the NPPF Conserving and Enhancing the Historic Environment sets out the Governments planning polices for England and how these are expected to be applied to planning policy and the historic environment.

2.11. The NPPF recognises that 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.

And that plans should set out a positive strategy for the conservation and enjoyment of the historic environment.'

2.12. Section 16, paragraph 189, of the NPPF requires that the relevant historic environment record be consulted and any heritage assets, including any contribution made by their setting, likely to be affected by a development proposal have their significance assessed using appropriate expertise. Where an application site includes or has the potential to include heritage assets with archaeological interest, an appropriate desk-based assessment, and where necessary, a field evaluation, should be provided to inform the planning authority's decision making.

2.13. Section 16, paragraph 191, states that where there is evidence of deliberate neglect of or damage to a heritage asset, the deteriorated state of the heritage asset should not be taken into account in any decision.

2.14. Section 16, paragraph 193 of the NPPF is a fundamental consideration in determining planning applications. It states that great weight should be given to a designated heritage assets' conservation, irrespective to the level of harm to its significance.

2.15. Section 16, paragraph 194, of the NPPF adds that "Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification."

2.16. Section 16, paragraph 195, states that a local planning authority should refused consent to a proposed development which would lead to substantial harm (or total loss of significance of) a designated heritage asset, unless it can be demonstrated that substantial public benefits outweigh the loss.

2.17. Section 16, paragraph 196 states that where a development proposal will lead to less than substantial harm of a designated heritage asset, the harm should be weighed against the public benefits of the proposal, including securing the optimum viable use of the asset (s).

2.18. Paragraph 197 states that, the effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that affect directly or indirectly non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.

Local Planning Policy

Warrington's Brough Council Local Core Strategy (2014)

2.19. Policy QE8 sets out the principles and outlines the policy on the Historic Environment.

Policy QE 8

"The Council will ensure that the fabric and setting of heritage assets, as set out below, are appropriately protected and enhanced in accordance with the principles set out in National Planning Policy.

- *Scheduled Monuments;*
- *Listed Buildings;*
- *Conservation Areas;*
- *Areas of known or potential Archaeological Interest;*
- *Locally Listed Heritage Assets.*

The Council and its partners will aim to recognise the significance and value of historic assets by identifying their positive influence on the character of the environment and an area's sense of place; their ability to contribute to economic activity and act as a catalyst for regeneration; and their ability to inspire the design of new development.

Heritage Assets such as buildings, structures and sites which are valued as good examples of local architectural styles or for their historic associations, are included on a local list produced by the Council. The buildings, structures and sites included on this list are detailed in Appendix 4.

To be included on the local list, an asset should be substantially unaltered and retain the majority of its original features and either:

1. *be a good example of a particular local asset type, craftsmanship, architectural quality, style or detailing, or*
2. *display physical evidence of periods of local economic, technical or social significance, well-known local people or historic events.*

Development proposals which affect the character and setting of all heritage assets will be required to provide supporting information proportionate to the designation of the asset which;

- *adopts a strong vision of what could be achieved which is rooted in an understanding of the asset's significance and value, including its setting;*
- *avoids the unnecessary loss of and any decay to the historic fabric which once lost cannot be restored;*
- *recognises and enhances the asset's contribution to the special qualities, local distinctiveness and unique physical aspects of the area;*
- *fully accords with the design principles outlined elsewhere within the Local Planning Framework;*
- *includes suitable mitigation measures, including an appropriate desk-based assessment and where necessary field evaluation and publication, for areas with known or potential archaeological interest;*
- *ensures the knowledge and understanding of the historic environment is available for this and future generations. The evidence arising from any investigations should be publicly accessible through the Historic Environment Record and the local museum.*

Applications for new development will also be required to take all reasonable steps to retain and incorporate non-statutorily protected heritage assets contributing to the quality of the borough's broader historic environment."

Emerging Local Policy

Emerging Local Policy and Evidence Base – Preferred Development Option Consultation

2.20. Warrington Council consulted on their Local Plan Preferred Development Option Regulation 18 documents in September 2017.

2.21. This preferred development option sets out the Borough's growth ambitions and housing and employment needs to reflect this aspiration. To achieve the growth ambitions and meet the need over the 20 year plan the Council recognises that land will need to be released from the Green Belt to deliver at least 9000 homes and 381 ha of new employment space. This is underpinned by a range of evidence which provides a robust case for housing need and economic growth to be aligned.

2.22. The Preferred Development Option identifies four main areas of growth – The City Centre, the Waterfront, a Garden City Suburb in the South East of the Borough (currently identified as Green Belt land) and a South West Urban Extension.

2.23. The south eastern extension of Warrington will create a new Garden Suburb, providing the potential development of around 7,000 new homes to be delivered over the full 20 years of the Plan. The suburb will also provide a major new employment area as an extension of the existing Appleton Thorn / Barleycastle estates at the intersection of the M6 and M56. This

includes the Application site which is identified for employment use. The Garden Suburb development option is also underpinned by the South Warrington Urban Extension Framework Plan Document (SWUEFP) (June 2017) produced on behalf of Warrington Borough Council.

2.24. It is anticipated that the draft Local Plan which is still at an early stage of preparation will be published for public consultation in March 2019. It will then be subject to a further period of public consultation prior to examination in public and formal adoption in late 2019.

Emerging Local Policy and Evidence Base – Proposed Submission Version Local Plan (March 2019)

2.25. The Council consulted on the next stage of their Local Plan, the Proposed Submission Version Local Plan in April 2019, for a period of 8 weeks. This Submission Version of the Local Plan was presented to Full Council Board on the 25th March 2019, seeking approval to commence public consultation. This Plan is now in the public domain. Following consultation the Council are reviewing all of the representations made during the consultation prior to submitting the Plan for 'Examination in Public' to be carried out by an independent Inspector. Following the Examination in Public, the Inspector will issue a report setting out their recommendations, including any requiredmodifications to the Plan. The Council must carry out a final consultation on any Main Modifications before formally adopting the Plan.

2.26. The Submission Version of the Local Plan (March 2019) continues to identify the Site for redevelopment for Employment Use (116 ha) as part of the Warrington Garden Suburbemerging Policy MD2. The evidence based prepared to inform the Submission V1e4rsion of the Local Plan (March 2019) includes the Warrington Garden Suburb Development Framework Document (March 2019) produced on behalf of Warrington Borough Council which also classifies the Site for redevelopment for Employment Use.

Guidance Documents

2.27. The assessment has been carried out in accordance with the published 'Standards and Guidance' and 'Code of Conduct' of the Chartered Institute for Archaeologists (ClfA) and guidance as defined by Historic England, with specific reference to:

- Conservation Principles Policy and Guidance (Historic England 2008);

- Planning for the Historic Environment: Historic Environment Planning Practice Guide The Setting of Heritage Assets (Historic England 2012).

Historic England Guidance

2.28. Historic England has published a number of relevant guidance documents that should be taken into account when assessing the historic environment. Of particular relevance are the Conservation Principles (2008) produced to ensure consistency of approach when managing the Historic Environment. These principles are intended to be used as a tool to aid analysis rather than be taken as policy. Principle 3 'understanding the significance of place' is inherently linked to the Framework, and articulates an approach to assessing significance of heritage assets based on their evidential, historical, aesthetic and communal values, and balancing these with the contribution made by setting and a wider cultural context.

2.29. Principle 5 of document is relevant to this application as it notes that '*Decisions about change must be reasonable, transparent and consistent*' (Historic England 2008, 23). Specifically 5.4 suggests that where conflict between sustaining heritage values and other important public interests cannot be avoided, '*the weight given to heritage values in making the decision should be proportionate to the significance of the place and the impact of the proposed change on that significance*' (Ibid).

2.30. Historic England has also published guidance on the setting of heritage assets (Historic England 2011b). The setting of an asset is an important element in its significance and should not be considered as a separate element. The document notes that an assessment of the impact of a proposed development should identify whether the development would be acceptable in terms of the degree of harm to an asset's setting. This can be identified by using a broad five-step approach that identifies (1) which assets and settings are affected; (2) how and what degree these settings make a contribution to the significance of the heritage asset; (3) assess the effects of the proposed development; (4) explore ways to minimise harm and maximise enhancement; and (5) how to document the decision and monitor outcomes.

2.31. Further guidance on development and the contribution it can make to the historic environment was provided in Historic England's Planning Policy Statement PPS5 Planning for the Historic Environment: Historic Environment Planning Practice Guide (Historic England 2012). Although this document is related to PPS5 (now superseded by The Framework), it remains a valid and Government endorsed document pending Government's review of

guidance supporting national planning policy. In relation to setting, the document provides further guidance relating to the historic and local setting of heritage assets.

3. Consultations

3.1. An Environmental Impact Scoping Report (EISR) was sent to Warrington Borough Council on 23rd February 2018. A consultation response to the EISR was issued by the council on 6th April 2018. Responses were also received from Mark Leah (Development Control Archaeologist and Team Leader, Cheshire Archaeology Advisory Service). The comments detailed in the responses were taken into account during the preparation of this paper at pre-application and post submission stage.

3.2. During the course of the preparation of the Cultural Heritage and Archaeology ES Technical Paper and it's Addendum, the following statutory consultees have been consulted:

- The Development Control Archaeologist for Cheshire (Mr. Mark Leah); and
- Historic England's Principal Inspector of Ancient Monuments (Mr. Andrew Davison)~~.~~; and
- Warrington Borough Council Conservation Officer (Mrs Christine Carruthers)

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Heritage	12th May 2017	Mr. Andrew Davison (Historic England Inspector of Ancient Monuments North West	Site Meeting	The general principles of the site were discussed including the potential impact on the Bradley Hall Moat Scheduled Monument (**1011924**). Mr. Davison expressed the need to keep the mature trees and vegetation surrounding the moat to maintain its character and protect it from impacts to its setting.	Detailed assessment of the Scheduled Monument and its immediate environment has been assessed as has its setting.
Scoping Report	8th March 2018	Mr. Mark Leah Development Management Archaeologist and Team Leader (Cheshire Archaeology Planning Advisory Services	Email	Mr Leah refers to the geophysical survey proposed in the scoping report and states that he is happy with this approach. He also stated that it would be helpful to undertake this prior to determination. Mr Leah stated that development within vicinity of Bradley Hall Moat (Scheduled Monument **1011924**) needs particular consideration in terms of physical impact and impacts on its setting.	Pre-determination survey has been undertaken and assessment of the impact on the setting of the Schedule Monument has been considered in this Chapter.
Scoping Opinion	6th April 2018	Warrington Borough Council	Letter	The letter states that the Cultural Heritage and Archaeology Chapter of the ES needs to consider further assets given the proposed heights of the Proposed Development. These include:	

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
				DCH1638 Yew Tree Farmhouse Grade II Listed Building 1139340 DCH1659 Beehive Farmhouse Grade II Listed Building 1139361 DCH1660 Booths Farm, Shippon On Left (North West) Side of Farmyard Grade II Listed Building 1139362 DCH1934 Booths Farm Farmhouse Grade II Listed Building 1329740 DCH12~~753~~573 Barn at Manor House Farm, Cartridge Lane, Appleton Locally Listed Building DCH12869 Milepost at Gallows Croft, Knutsford Road, Lymm DCH13677 Tan House Farm, Barleycastle Lane, Appleton Barleycastle Farmhouse, Barleycastle Lane - 1329741 Tanyard Farm building, Barleycastle Lane - 1139363 The letter goes on to state that a geophysical survey or non-intrusive techniques should be undertaken / submitted as part of the ES.	These heritage assets have been included in the Environmental Impact Assessment.

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Heritage	21st August 2018	Mr. Andrew Davison (Historic England Inspector of Ancient Monuments North West)	Site Meeting	The Grade II* Listed Tanyard Farm buildings was discussed. Mr. Davison stated that only a partial view of the farm is visible and it was agreed that even though it would be affected, it will still retain some of it's original agricultural setting. It was agreed that the southern boundary in it's current form needs to remain with supplementary planting. The standoff buffer between the Scheduled Monument and the proposed development was discussed as was the provision of an informal footpath providing linkage to the monument. It was also stated that a view cone from the south will be maintained to allow for an appreciation of the monument in its current form but also to allow for its historic interpretation. Mr. Davison was supportive of this approach. Mr. Davison also mentioned the use of heritage interpretation boards to heighten the understanding of the monument. The retention of the trees surrounding the moat was also discussed as was the structure within the interior of the moat. Mr. Davison stated that it would be a positive to retain the locally listed Bradley Hall (**DCH12763**) building as this gives context to the moat as a building would have always existed at this location.	The principal points from the meeting were fed back to the design team to take on board the comments made.

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Scheme Design, Scheduled Monument and Agricultural Buildings	4th December 2019	Mr. Andrew Davison (Historic England Inspector of Ancient Monuments North West)	Meeting held at Historic England' offices in Manchester	During the meeting the design principles associated with the revised indicative masterplan and proposals to provide a re-aligned section of estate road which crosses the north – south axis and view cone through the Scheduled Monument were discussed as were the retention/ demolition of the agricultural buildings that lie to the east of the Scheduled Monument. Mr Andrew Davison made it clear that the road through this view cone is not ideal, however, he did not object to the proposal provided the Design Team look sensitively at how this is achieved. Andrew Davison stated that he would expect the road to be lowered as much as possible to minimise any impact and does not want any lighting on this section of the road. Also he mentioned that landscaping in this area will need to be sympathetic to the monument. In terms of the retention the farm building Andrew Davison did suggest there are merits to demolition of the buildings as this will open up views and maintain the Scheduled Monument. He also stated that there are merits to keeping the main building but clarified that HE will be ok with which ever option is decided upon.	The principal points from the meeting were fed back to the design team to take on board the comments made.
Agricultural Outbuildings	11th February 2020	Representation from Warrington Council including Mrs Christine Carruthers, Conservation Officer/ Senior Planning Officer, Spawforths and BWB Consulting.	Meeting at Warrington Borough Council Warrington	The historical integrity, setting and condition of the agricultural buildings to the east of the Scheduled Monument and Bradley Hall Farm were discussed following submission of evidence and an assessment of the buildings submitted to the council. Both Spawforths and BWB Consulting outlined the architectural and historic merit of the buildings and outlined the alterations that had occurred to the buildings in the 19th and 19th centuries. The poor structural condition of the buildings was discussed as one the limited potential for conversion due to factors such as headroom and viability. Mrs Christine Carruthers stated that she would require a site meeting to further assess the buildings.	It was agreed that a site meeting with the Conservation Officer and BWB Consulting would be held on 26th February 2020.

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
Agricultural Buildings	26th February 2020	Mrs Christine Carruthers, Conservation Officer/ Senior Planning Officer	Site Meeting	The setting, condition, context and architectural detailing were discussed during the Site Meeting. The Scheduled Monument and the scheme design were also discussed.	The principal points from the meeting were fed back to the design team to take on board the comments made.
Agricultural Buildings	5th March 2020	Mrs Christine Carruthers, Conservation Officer/ Senior Planning Officer	Consultation response	Following the site visit, the Conservation Officer confirmed that she will not object to the removal of the agricultural buildings. The officer has requested that the Cultural Heritage Paper Addendum should be updated to reflect their architectural and historic interest and confirm that the buildings should be recorded as a condition of any planning permission.	Consultation advice shared with the design team.

Agricultural Buildings	5th March 2020	Mrs Christine Carruthers, Conservation Officer/ Senior Planning Officer	Internal Memorandum of Technical Advice	*Mrs Christine Carruthers states that:* *'It may be possible to repair the buildings so that they might be brought back into economic use however, the amount of reconstruction and replacement material that would be required, would be tantamount to a new build.* *In view of the above, it would be difficult to require the retention of the historic agricultural buildings on the basis of 'Group Value' between the farmhouse and these outbuildings.'* *It was noted on my visit to the site that it was possible to hear noise from the adjacent road network. Historic England guidance 'The Setting of Heritage Assets' identifies noise, vibration, and other nuisances as attributes which can be used to understand the contribution of setting to a buildings significance. The checklist includes noise, vibration and other nuisances, as well as tranquillity. The Heritage Statement makes reference to existing noise levels in the vicinity of the site, but there does not appear to be an assessment of the cumulative impact of the proposed noise levels and vibration at construction and operational phases and how these might impact on the tranquillity of the setting of the heritage assets and how those assets would be experienced. These are relevant considerations in the assessment of the significance of the heritage asset and its setting, and should be addressed.* *Other Heritage Assets in the vicinity of the site;* *A number of other heritage assets are located in close proximity to the site. The Heritage Statement submitted in support of the application confirms that the proposed development will adversely impact their settings to varying degrees. In most instances, the agricultural settings of these buildings has already been adversely affected by existing developments, including road infrastructure. The loss of agricultural context for the farmhouses in particular, has diminished the significance of the heritage assets. The proposal would result in further changes to the landscape and parts of the development would be visible from some of the heritage assets. However, these changes would not detrimentally alter the visual relationships between the heritage assets and their wider context, nor would it fundamentally alter how the assets are experienced;*	The points raided have been addressed in this ES Addendum

Theme / Issue	Date	Consultee	Method	Summary of Discussion	Outcome / Output
				whether visually or in historical or other associative aspects of their setting.	

Table 9.1: Summary of Consultations and Discussions

4. Methodology and Approach

4.1. The assessment has been undertaken in accordance with section 12 of the Framework '*Conserving and enhancing the historic environment*' and the Standard and Guidance for Desk-based Assessments published by the Chartered Institute for Archaeologists (ClfA 2014). The principles set out in Warrington's Borough Council Local Core Strategy (2014).

4.2. The method used for assessing the potential effects of the proposed development on the heritage receptors conform to the regulatory framework set out in the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2017. It takes into account the importance (significance) of each feature, and the likely impact (without mitigation) of the proposed development upon them, in order to appraise the potential effects of the proposed development (Significance of Effects).

Study Area

4.3. The search area used for this assessment was defined by a 1km buffer which extends around the Application Site. All assets within this and on its periphery (as necessary) have been assessed to fully determine the baseline conditions. A number of depositories were consulted during the preparation of the assessment including:

- The Cheshire Historic Environment Record (CHER); and
- Warrington Library and Archive Service.

4.4. The locations of the non-designated heritage assets detailed in Figure 9.1 was provided by both the Cheshire Historic Environment Record in points, polygons and linear form from their GIS Datasets.

4.5. The assessment was supplemented by a number of site visits which assessed the proposed site and the surrounding area and landscape to confirm and enhance the baseline assessment.

Receptors

4.6. The table below details the importance of the assets found within the site and study area. The importance (significance) of heritage assets is determined by professional judgement, guided by statutory and non-statutory designations, national and local policies, and archaeological

research agendas. This list is, therefore, not definitive as some assets may exhibit qualities greater than their designation. In addition, the importance of some assets may be enhanced by their group value.

Designation	Receptors
International	None identified
National	Scheduled Bradley Hall Moated Site Grade II* Listed Tanyard farm building
Regional	Grade II Listed Barley Castle Farmhouse Grade II Listed Yew Tree Farmhouse Grade II Listed Beehive Farmhouse Grade II Listed Booth Farm, Shippon Grade II Listed Booth Farm, Farmhouse
County	Roman road
Borough/District	Locally Listed Buildings Bradley Hall and barn Locally Listed Building Tan House Farm Locally Listed Building Barn at Manor House Farm Site of Medieval Cross 18th – 20th century buildings including Barley Castle Farmhouse and Tanyard Farm buildings
Local/Neighbourhood	Prehistoric, Roman, medieval and post-medieval findspots Post-medieval field boundaries Bradley Hall Farm Agricultural Buildings Mileposts

Table 9.2: Receptors

Environmental Impacts

4.7. Once a level of importance has been assigned, the magnitude of impact from the development is assessed. Potential impacts are defined as a change resulting from the Proposed Development which affects a heritage asset. These impacts are considered in terms of being either adverse or beneficial and in terms of being direct, indirect or cumulative, constructional or operational. The assessment of impact will include consideration of a heritage asset's setting which will vary from case to case and cannot be generically defined. The magnitude of impact is assessed without reference to the sensitivity of the resource.

4.8. The following table details the criteria used to judge the impact (without mitigation) upon the receptors from proposed developments.

Magnitude	Environmental Impact
Substantial	Change to the whole asset or its setting, such that the resource is totally altered

High	Change to most key elements of an asset or its setting, such that the resource is altered.
Moderate	Changes to many key elements of an asset or its setting, such that the resource is clearly modified.
Minor	Changes to key archaeological/historic building/historic landscape elements, such that the asset or its setting is slightly altered.
Negligible	Very minor changes to elements.
Neutral	No change

Table 9.3: Environmental Impacts

Significance of Effects

4.9. The magnitude of impact will be cross-referenced with the importance of the asset in order to categorise the effect that is likely to result from the Proposed Development. A significant effect is classed as anything moderate and above.

4.10. Following the categorisation of effects using this methodology, further consideration of whether an effect is significant and requires mitigation is carried out using professional judgement. Account is taken of whether effects are considered to be positive or negative, permanent or temporary, direct or indirect, the duration and frequency of the effect and whether any secondary effects are caused.

4.11. Following the initial assessment of effects, mitigation may be considered to reduce the significance of any adverse effects. Mitigation is used to reduce or compensate for any adverse effects or to enhance positive effects. Re-assessing impact effects after mitigation allows the residual effect of an impact to be determined.

4.12. The significance of effect is determined using the significance matrix in Section 6 of the Environmental Statement Addemdum Part 1 Report. This identifies the receptor level across the top of the matrix and the environmental impact down the side and where they meet within the matrix identifies the significance of the effect.

Impact Prediction Confidence

4.13. It is also of value to attribute a level of confidence by which the predicted impact has been assessed. The criteria for these definitions are set out overleaf:

Confidence Level	Description
High	The predicted impact is either certain i.e. a direct impact, or believed to be very likely to occur, based on reliable information or previous experience.
Low	The predicted impact and its levels are best estimates, generally derived from first principles of relevant theory and experience of the assessor. More information may be needed to improve confidence levels.

Table 9.4: Confidence Levels

5. Baseline Information

5.1. The baseline section details the heritage background to the Application Site and surrounding area. It incorporates an assessment of the historical development of the wider area from various sources including historic maps and aerial photographs. Where sites, findspots, or areas of interest are present, these are numbered and referred to in the text in bold and illustrated on Figure 9.1(Appendix 9.1), and assessed in this paper, where relevant.

Statutory and non-statutory designations

5.2. The assessment identified three heritage receptors within the application area including Bradley Hall Moat (**550/1**) which is designated as a scheduled monument (**1011924**), the site of a medieval cross (**551**) and a Roman road (**547/1/7**). The road traverses the site in a northeast to southwest direction. These assets are listed in Table 9.5 below, identified on Figure 9.1 and included in Appendix 9.3.

HER ID Ref	Name	Designation
547/1/7	The North Cheshire Ridge Roman Road Section of Roman road	None
550/1/ 1011924	Bradley Hall Medieval moated site	Scheduled
551	Bradley Cross Site of medieval cross	None

Table 9.5: Heritage Assets within the Application Site

5.3. A number of heritage assets lie either within close proximity to the Proposed Development including Reddish Hall Medieval moat (**615**) and a post-medieval farm complex (**549/1**). A number of other assets were recorded further afield which are identified on Figure 9.1 and included in Appendix 9.2. Included within these are:

- five grade II listed buildings;
- one grade II* listed building;
- Five locally listed buildings; and
- 21 heritage assets recorded on the Cheshire HER database.

5.4. There are no World Heritage sites, Registered Battlefields, Conservation Areas or Registered Historic Parks and Gardens within the 1km study area shown on Figure 9.1.

Designated Assets within the Study Area

Scheduled Monuments

5.5. Located at the near center of the site is Bradley Hall Moated site (**DCH159/ 1011924**) which is scheduled under the Ancient Monuments and Archaeological Area Act 1979, its full description being Bradley Hall moated Site (list entry number 1011924). The site was scheduled in 1991 and comprises the buried and earthwork remains of a medieval moated site for a medieval manor house. The moated island is approximately 70m by 55m and is grass covered in the areas not occupied by buildings. Excluded from the scheduling are the farmhouse, access drive, fences, hedged field boundaries and a telegraph pole.

5.6. The scheduled monument is in good condition and is reported by Historic England in their listing description to survive well and is described as a good example of a moated medieval manor house. The moat remains water filled and within the island are two occupation phases which survive beneath the present house and gardens. The moat surrounding the island is c. 10m wide and 2.5m deep. Part of the moat has been disturbed through the creation of an ornamental pond on its east side. Access is currently gained from a causeway also on the east side which replaced an earlier drawbridge.

5.7. The original hall within the moat was erected in the early 14th century. Documentary sources refer to it around this time with its first depiction on a map dating to 1735 which shows the hall to the northeast of its current position and the moat extending beyond its present location. The hall shown on the aforementioned map replaced that erected in the 14th century. Between the early 18th and the early 19th century the hall was considerably altered as was the location and extent of the moat. Analysis of later maps show the addition of a number of outbuildings to the hall as well as a number of agricultural buildings immediately to the northwest of the moat.

5.8. In November 2009 National Museums Liverpool Field Archaeology Unit undertook a watching brief (**ECH4566**) at Bradley Hall on behalf of Brewster Associates. This was undertaken during works to replace an early 20th century extension to the farmhouse. The watching brief revealed a poorly constructed cobbled surface which was deemed to be associated with the construction of the present house. Underlying the cobbles was a layer of clay which was interpreted as the arising from the excavation of the moat. During the watching brief a

number of finds were encountered including the base of a 14th -15th century jar and later 17th to 18th century pottery sherds.

5.9. The historic setting of the moated manor site was clearly intended to be isolated from the historic built core of Appleton although it would have had a greater prominence in the landscape than is now the case. Surrounding field patterns suggest that the land around the manor site was farmed during the medieval period and medieval ridge and furrow has been recorded, based on aerial photography within the vicinity of the proposed development site.

Listed Buildings

Within the study area are a number listed buildings the predominance of which lie between the southern boundary of the Site and the Barleycastle Trading Estate. These are listed in Table 9.6.

HER ID Ref	Name	Status
DCH1661/ **1139363**	Tanyard farm building	Grade II* Listed
DCH1935/ **1329741**	Barley Castle Farmhouse	Grade II
DCH1638/ **1139340**	Yew Tree Farmhouse	Grade II
DCH1659/ **1139361**	Beehive Farmhouse	Grade II
DCH1934/ **1329740**	Booths Farm Farmhouse	Grade II
DCH1660/ **1139362**	Booths Farm, Shippon On Left (North West) Side of Farmyard	Grade II

Table 9.6: Designated Assets within close proximity to the Application Site

5.10. The closest designated assets to the Site is Barleycastle Farmhouse which is listed at Grade II (**DCH1935/ 1329741**). This is situated on Barleycastle Lane as is Tanyard Farm (**DCH1661/ 1139363**) which is designated at Grade II*. East of these along Barleycastle is Booths Farm Farmhouse (**DCH1934/ 1329740**) and Shippon (**DCH1660/ 1139362**), and Beehive Farmhouse (**DCH1659/ 1139361**), all of which are listed at Grade II. South of this group of listed assets on the northeastern edge of Barleycastle Trading Estate is the Grade II listed Yew Tree Farmhouse (**DCH1638/ 1139340**).

Conservation Area

5.11. There are no conservation Areas located within the study area. The nearest conservation is within the village of Grappenhall situated 2.3km to the northwest of the site. To the northeast

beyond the M6 is the village of Lymm whose historic core fall lies within a conservation area, the southern boundary of which lies 2.23km to the north east of the Site.

Non-designated Assets within the Study Area

5.12. A total of 20 non-designated assets have been identified within the study area. These comprise findspots, monuments, a cross, agricultural buildings, residential housing, a mill house and an airfield. These are detailed in Table 9.7, shown on Figure 9.1 and detailed in Appendix 9.2:

Monument ID	Name	Monument Type	Period
DCH12763	Locally listed Bradley Hall and Barn	Bradley Hall and Barn	Post-medieval
547/1/7	Roman road	Road	Roman
551	Medieval Cross	Cross	Medieval
DCH12753	Barn at Manor House Farm, Cartridge Lane, Appleton Locally Listed Building	Barn	Post-medieval?
DCH12869	Milepost at Gallows Croft, Knutsford Road, Lymm	Milepost	Modern
DCH12879	Old Chapel, Old Cherry Lane, Lymm Locally Listed Building	Chapel	Post-medieval
DCH13677	Tan House Farm, Barleycastle Lane, Appleton	Farm	Post-medieval
ECH5845	Stretton Airfield	Airfield	Modern
1197/1	Kings Brook Mill Site of Watermill Industrial Site, Mill, Watermill	Mill	Post-medieval
2728	Unnamed Site in High Legh Parish Site of 19th century cottage House	House	Post-medieval
2729/0/1	Swineyard Lane Site of a 19th century house	House	Modern
2734	Swineyard Farm Prehistoric axe Findspot	Artefact	Prehistoric
2908	Badger's Croft Farm I Cropmark Enclosure. Ditched Enclosure	Cropmark	Prehistoric/ Roman

Monument ID	Name	Monument Type	Period
4091	RNAS Stretton/HMS Blackcap Airfield WW2 Airfield Military Airfield	Airfield	Modern
4468/0/0	Strict Baptist Chapel, Cherry Lane Strict Baptist Chapel Strict Baptist Chapel	Chapel	Modern
4657	Pond, North of Cartridge Lane, Grappenhall. Pond shown on OS 1st Edition Maps of Cheshire	Pond	Post-medieval
547/1/0	North Cheshire Ridge Roman Road	Road	Roman
547/1/13	North Cheshire Ridge Roman Road – Stretton Airfield Section of Roman Road	Road	Roman
547/1/8	The North Cheshire Ridge Roman Road Section of Roman road	Road	Roman
615	Reddish Hall Medieval moated site Moat	Moat	Medieval

Table 9.7: Non-designated Heritage Asset within the study area

Archaeological Events

5.13. A number of archaeological events have been recorded in the study area as listed in Table 9.8 below). The results of these are assessed as part of the Technical Paper to aid in the assessment of the Site's potential.

HER Reference	Archaeological Intervention	Grid Reference
ECH3541	M6 Motorway Widening Scheme, Junctions 16-20. Archaeological Recording of Test Pits.	SJ 723 679
ECH3554	Greater Manchester Western and Northern Relief Road (M56-M6 link): Archaeological Assessment Report	SJ 703 908
ECH3566	M6 Junctions 16-20 Widening: Archaeological Desk-Top Survey	SJ 755 637
ECH3652	M6 widening: Junctions 16- 20: Report on Geophysical Survey	SJ 755 637

HER Reference	Archaeological Intervention	Grid Reference
ECH3653	M6 Widening: Junctions 16- 20. Report on Earthwork Survey	SJ 755 637
ECH3654	M6 Widening: Junctions 16- 20, Cheshire. Cultural Heritage, Stage 3 Assessment Report Text	SJ 755 637
ECH4557	Report on Northwest Telent Techmac Design and Consultancy Services Framework Provision of Variable Message Signs on the M56 Between Junctions J9 -16	SJ 520 781
ECH4559	Bradley Hall Appleton, The Moated Site and Survey and Research Report	SJ 657 845
ECH4566	An Archaeological Watching Brief at Bradley Hall Moat, Appleton, Warrington. Final Report	SJ 657 845
ECH5845	Stretton Airfield, Design Access Statement	SJ 652 835

Table 9.8: Archaeological Events Recorded within the study area.

5.14. The archaeological investigations recorded in the wider search area and comprise four desk-based assessment mainly focused upon the widening of the M6 between junctions 16 and 20 (**ECH3554, ECH3566, ECH3654** and **ECH4557**), a geotechnical monitoring scheme (ECH3541), a geophysical survey (**ECH3652**) an Earthwork survey (**ECH3653**) and two pieces of work associated with Bradley Hall (**ECH4559** and **ECH4566**).

5.15. The work at Bradley Hall included a resistivity survey, which identified the presence of buried foundations. Survey also picked up a possible track to the north of the site, potentially Roman. A watching brief carried out during the excavation of foundations for a replacement extension to the farmhouse exposed a cobbled surface along with 14th-century pottery.

Existing Baseline

5.16. The following details the archaeological and historical background to the development area. The purpose of this is to provide context to the assessment of the Application Site.

5.17. Only those receptors which contribute to the understanding of the historical and archaeological background of the site and its wider area are detailed in this section of the Technical Paper. These receptors are shown on Figure 9.1 included in Appendix 9.2 and are highlighted in bold in the chronological summary that follows.

Prehistoric Period

5.18. Concentrations of Neolithic and Bronze Age finds including stone and metal axes have been found to the south of Warrington and the River Mersey. Several Bronze Age burial sites have also been identified in the wider landscape, again following the pattern of distribution of the sporadic finds, to the north and south of the Mersey. Little settlement evidence has been identified although timber piles along the banks of the Mersey has led to the suggestion that there were lakeside settlements, perhaps of Iron Age date but this remains to be proven. Within the search area there is a single find spot of a prehistoric axe (**2734**) which is located to south-east of the Site.

5.19. Hinchliffe's 1974-6 excavations at Lousher's Lane 3.7km to the northwest revealed a small pit, which was apparently of pre-Roman date and contained a sherd of coarse, gritty pottery, which was possibly Iron Age. These excavations also revealed residual flintwork in a number of Romano-British features (Hinchliffe and Williams 1992, 100).

5.20. There is little evidence for Iron Age settlement, occupation and agricultural activity within the study area. There is a single possible enclosure located within the search area at Badger's Croft Farm (**2908**). The feature is undated so it could potential be later in date.

Romano British Period

5.21. The fortress of Deva (Chester) was established by the Romans between AD 75 and 80 to control North Wales and North West England. The advance of the Roman Area across Cheshire would have used the lowest bridging point on the Mersey at Warrington. Roman Roads are known within Warrington itself. A Roman road was also constructed to the south of Warrington, along the red sandstone escarpment, connecting the fort at Manchester to the Legionary fortress of Chester. This may have reused an earlier route along the ridgeline (**547/1/0**, **547/1/13**, **547/1/7** and **547/1/8**) part of which runs through the site in an east west direction above the Bradley Hall Moated Site (**DCH159/ 1011924**). Analysis of aerial photographs taken between 1945 and 1948 infer the presence of some quarry pits/ roadside ditches along the section which traverses the site. Later aerial photograph taken in the 1970s show similar features towards the western part of the site.

5.22. There is substantial evidence of Roman activity in the Warrington area. A large settlement, existed at Wilderspool, which was a large industrial complex, producing metals, glass and

pottery. The River Mersey would have been used to transport bulky items to and from the fort at Manchester and via the River Dee, to the fort at Chester.

5.23. East of Lumb Brook, adjacent to Lousher's Lane, excavations have revealed enclosures and timber framed buildings as well as a round house, indicating Romano – British occupation of a former Iron-Age farm. Roman arable farming activities would have been generally confined to the lighter soils of the Red Sandstone Escarpment. Roman ploughs, while more efficient than their predecessors, were probably not capable of tackling the heavier clay soils. At the close of the Roman era, much of the woodland clearance of the area had probably been accomplished and was therefore generally being farmed. There are no villas discovered within the Warrington area, but there is evidence of a number of small, unenclosed farmsteads.

The Anglo - Saxon Period

5.24. The frontier between the Kingdom of Northumbria and the Kingdom of Merciais believed to be the River Mersey. Numerous raids and attacks on each other's territories probably used the bridge at Warrington and the upstream fords as the frontier crossings. Evidence of Saxon activity within the Warrington area is well documented. At Southworth Farm, located to the north of Warrington, there is a cemetery of over 800 burials, focused on a Bronze Age burial mound, but arranged in such a way as to suggest a building amongst them. Given the orientation of the graves, it is likely that they were Christian burials. The nearby Winwick Church is Saxon in origin and may well have been a Saxon Minster of considerable local importance.

5.25. Later in the period Viking raids are thought to have passed via the Mersey. The Danish occupation of York and effective takeover of the Northumbrian kingdom meant that the Mersey frontier again became important. Various skirmishes are documented throughout this period and a result, Aethelflaed established a series of defensive 'burghs' along the south side of the Mersey, including Runcorn in 915 and Thelwall in 919. These burghs proved highly effective in preventing Viking incursions. It is believed that during the Saxon period woodland clearance was well advanced with larger areas of land under cultivation. Much of the Saxon landscape is revealed in the Domesday Book entries for the Warrington area, which although post-Conquest, details previous lords and their lands.

Medieval Period

5.26. Extensive woodland clearance had taken place during this period and the clearances were carried out in a more organised way than previously. Many villages creating clearing in woodlands for fields. Medieval 'townfields' can still be traced in the landscape, particularly those around Thelwall Heys, as well as those on either side of 'The Gorse' south of Grappenhall Heys 'Ancient Field Systems', those fields enclosed prior to 1600 AD, include several former townfields.

5.27. A large number of moated sites were built during the 12th and 13th centuries. These are found in the areas which have clay soils, over parts of the Red Sandstone Escarpment. Several are located within the study area including Reddish Hall (**615**) and Bradley Hall (**550/1**) located within the site. Associated with some of the larger halls were a number of deer parks.

5.28. The Domesday reference to Warrington demonstrates that there was a settlement on the north bank of the river by the time of the Norman Conquest. At this time Warrington was the focus of Warrington Hundred, which included the parishes of Warrington, Prescot and Leigh, as well as a number of outlying manors. St Elphin's church had also been constructed by the time of the Domesday Survey. Within the search areas there are additional medieval sites such as the medieval cross (**551**), and the site of the King's Brook watermill (**1197/1**).

Post – Medieval Period

5.29. By the time of the civil war in 1642 Warrington was still a small town with a population of around 2,000, but it was strategically important because of its bridge. In 1642 Royalists seized Warrington but the parliamentarians laid siege in 1643. In May 1643 they captured Warrington and they held it for the rest of the war.

5.30. Various farmstead would have existed in the wider landscape as part of the intensive agricultural production that was taking place. A number of farmsteads are recorded in study area including Yew Tree Farm (**538/1/ 1139340**) and Tanyard Farm (**549/1/ 1139363**) located to the south of the Site. In addition to this there are a number 19th century agricultural buildings to the east of the Scheduled Monument (**1011924**) and Bradley Hall Farm.

5.31. By 1724, Daniel Defoe recorded Warrington as a *'large populous old built town, but rich and full of good country tradesmen. Here is particularly a weekly market for linen'*. This implies a degree of manufacturing, probably cottage based, as well as a substantial area of arable farming to

support linen production. Towards the end of this period Warrington was also a noted producer of sailcloth. The various navigational improvements on the River Mersey from 1730, the construction of the Bridgewater Canal in the 1770s and the construction of other subsequent canals greatly improved the bulk transport of goods, stimulating manufacturing towards the end of the period.

5.32. The early Industrial Revolution in Warrington was marked by the establishment of a copper works in 1717. More metal working factories were established through the century including wire works in 1780 and 1799 and tanneries, glass works and other industries. These industries used coal which lead to the establishment of local mines towards the north west of Warrington.

Modern Period - present

5.33. This period saw a massive expansion in industrial manufacturing and the formation of the extended urban area of Warrington, with large numbers of terraced properties and many larger houses. Numerous house date from this period included further farmstead and cottages (**DCH1935**, **DCH13677**, **DCH12753**, **DCH12763**, **540/1/1**, **540/1/2**, **541/1** and **548/1**, **2728**, **2729/0/1**, **2729/0/2**).

5.34. A Strict Baptist Chapel (**4468/0/0**) was built in 1819 towards the north-east of the site had a porch added with the interior refitted in 1889.

5.35. The result of this industrial expansion was a corresponding increase in the demand for raw materials and natural resources, such as coal, clay and especially water.

5.36. All this had impacts on the local landscapes. In the early part of this period grain production rapidly increased, leading to the expansion of fields. Some of the most important features in the local landscape in this era were the result of the introduction of new communications routes. The Manchester Ship Canal in 1894, the Manchester – Liverpool railway line in 1830, and the construction of other lines throughout the 19th century, radically improved the bulk transport of goods and materials as well as the movement of people.

5.37. During the Second World War RNAS Stretton (HMS Blackcap) was constructed towards the south of the Site (**4091**). This was originally planned as a RAF night-fighter station to protect Liverpool and Manchester but was transferred to the Admiralty on completion. HMS Blackcap was commissioned on 1 June 1942 and forty-one Fleet Air Arm Squadrons were based there

for varying periods, some aircraft being flown directly to and from aircraft carriers operating in the Irish Sea and other nearby waters. The airfield was closed on 4 November 1958 with the northern area being used for modern warehousing.

Built Heritage

5.38. Six listed buildings have been identified sufficiently close to the Application Site to warrant consideration in terms of the visual or physical impact and effects of the scheme. These buildings would be affected by proposals to varying degrees. The listed assets include (full details are included in Appendix 9.2):

i. Yew Tree Farmhouse Grade II Listed Building **1139340;**

ii. Beehive Farmhouse Grade II Listed Building **1139361;**

iii. Booths Farm, Shippon On Left (North West) Side of Farmyard Grade II Listed Building **1139362;**

iv. Tanyard Farm, Farm Building Grade II* Listed Building **1139363;**

v. Booths Farm Farmhouse Grade II Listed Building **1329740; and**

vi. Barleycastle Farmhouse Grade II Listed Building **1329741.**

Yew Tree Farmhouse

5.39. Yew Tree Farmhouse is located c. 660m southwest of the southwestern edge of the Proposed Development and is listed at Grade II (**1139340**). It dates to the 17th century or earlier. The building list description describes the building as having oak framing which was cased in brick in around 1800. It also has a grey slate roof. Within the building are rectangular panels in the left wall of the rear wing. The building is L-shaped in plan with two storeys and consist of four windows to the front and two to the rear. There are boarded doors and 19th century or earlier 20th century timber casements in older openings under skewback arches.

5.40. Within the interior of the building are two ingle nooks, one in front and one in rear wing, each under a ridge chimney of brick which have oak hood-beams with the one in the front wing particularly large. The rear wing is described as having an arched oak beam at the side of lobby entrance. Boarded internal doors are also noted as is a simple enclosed staircase.

Beehive Farmhouse

5.41. Beehive Farmhouse is a Grade II Listed Building (**1139361**) which lies *c.* 380m to the southwest of the Proposed Development, on the southern edge of the Appleton Thorn Trading Estate just off Barleycastle Road. The listing descriptions states that it was probably a lobby entrance farmhouse built in the 17th century with later alterations. It goes on to describe the building as T-shaped with the front wing comprising and oak frame in rectangular panels on a brick plinth and the rear wing (probably late 18th century) is of brick; red tile roofs and formerly thatched. It describes the right gable as probably incorporating the upper parts of a former pair of crucks whereas the left gable is rendered. Brick chimneys are flush on left gable, left of centre on front ridge and central on rear wing. The front wing has 3 bays of one storey with attic bedrooms. Part of the 1½ storey rear wing was a shippon. There are small timber casements, probably 19th century with one dormer gable to front.

5.42. The interior (which has not been fully inspected by Historic England) has many oak beams and boarded doors on T hinges.

Booths Farm, Shippon On Left (North West) Side of Farmyard

5.43. The shippon at Booth Farm is a Grade II Listed Building (**1139362**) which was built in the late 17th century as a barn and a shippon with a number of 19th century alterations and a 20th century rendered brick exterior.

5.44. The listing decription describes the building as comprising a grey slate roof brick with oak frame of rectangular brick-nogged panels with strutted queenpost roof truss in the rear gable. On the right hand side of the structure is a small mid- 20th century brick lean. There is also a blocked opening to the former threshing-floor central in front with two blocked basket-arched openings to the left hand side of the shippon. Other elements are noted including wood casements and oak queenpost trusses to hayloft roof.

Tanyard Farm, Farm Building Grade II Listed Building*

5.45. The Grade II* Listed building at Tanyard Farm (**1139363**) comprises a threshing barn. It dates from the late 16th century and is oak framed on a sandstone plinth. It has been altered and partly converted into a Shippon (cow house) there is also an 18th century or early 19th-century cartshed and stable here.

5.46. The barn at the rear of the yard is oak-framed on a 2ft. 6ins. sandstone plinth, with one intermediate rail, arch bracing and brick-nogged panels. The timbers are of large section. The shippon and hayloft doors and full-height double doors to threshing floor are boarded. A probably C19 brick leanto covers the rear opening to the threshing floor. Inside are four fine pairs of large crucks. The two eastern pairs are complete, with collars near apex and the two western pairs are sawn off near top and braced with sawn collars and kingposts. Large oak purlins are also recorded.

5.47. On the left hand side of the yard are two chamfered oak posts which support the roof of the open cartshed. The stable of three stalls has hayloft over; boarded door and loading door. Ad hoc timber windows to shippon and stable, with hoppers are in keeping.

Booths Farm Farmhouse

5.48. Booths Farmhouse is listed at Grade II (**1329740**) and dates to the late 17th century. It was brick rendered in the mid-C20, with gable copings, cyma kneelers and some dressings of sandstone and a graded grey slate roof. The Interior comprises a number of 17th century features including an open-well newel stair with plain flat (replacement) balusters between ground and first floor and original splat balusters to upper flights and top landing. The 2-storey rear wing of the farmhouse is of similar materials.

5.49. The Interior comprises a number of 17th century including an open-well newel stair with plain flat (replacement) balusters between ground and first floor and original splat balusters to upper flights and top landing. Several chamfered oak beams are also noted as are boarded doors to most room. There is a fixed cheese-press and bacon-curing slab within the property.

Barleycastle Farmhouse Grade II Listed Building

5.50. Barleycastle Farmhouse is Grade II listed (**1329741**) and was built in the 17th century or earlier. It has 19th-century alterations including a pebble-dashed exterior over the original oak framing. The roof is covered in a grey slate with three pebble dashed brick chimneys, one flush on each gable and one right of centre on the ridge.

5.51. The farmhouse comprises one and a half storeys with three bays. The lobby entrance behind 20th century boarded porch contains a 19th century boarded door on wrought iron long hinges. The three-light windows have chamfered mullions of wood (painted) and 19th century two-

pane iron casements. The two raking dormers to the front were probably later additions. An Inglenook with oak hood-beam is also noted.

5.52. External observation suggests an almost complete oak frame to the lower storey with large chamfered beams and some posts visible in the rooms.

5.53. In addition to the listed buildings recorded within the study area there are a number of Locally Listed Buildings including:

i. Barn at Manor House Farm, Cartridge Lane, Appleton Locally Listed Building;

ii. Bradley Hall and barn, Cliff Lane, Appleton;

iii. Milepost at Gallows Croft, Knutsford Road, Lymm;

iv. Old Chapel, Old Cherry Lane, Lymm Locally Listed Building; and

v. Tan House Farm, Barleycastle Lane, Appleton.

Bradley Hall Farm

5.54. Situated to the east of Bradley Hall, beyond the eastern edge of the Scheduled Bradley Hall Moated site (National Monument Number: **1011924**) is Bradley Hall Farm which currently serves a number of functions including a dairy, cattle holding pens, barns, storage and a workshop. The buildings that makeup the farm are non-designated and are not listed on the Cheshire Historic Environment Record or the Local List.

5.55. The principal buildings are conjoined in a U-shaped courtyard arrangement which is open on its west side. Associated with these are a number of lean-to structures, separate barns and sheds and other structures including portacabins, slurry tank and storage silos.

5.56. This courtyard arrangement was formed by extensions to the original early 19th century buildings shown on the 1820 Map of Cheshire.

5.57. These stand out from the later 19th and 20th century buildings on account of their construction in handmade brick. The U-Shaped arrangement was common in the Cheshire Plain and were often associated with stock fattening and dairying. Similarly, the later courtyard

arrangement was a common feature in Cheshire from the early 19th century to the interwar period, with complexes comprising a barn and fodder house built at right angles to the cow-house range. These were often separated by a cart entry for loading hay and corn into the first-floor lofted areas. This broadly ties in with the arrangement at Bradley Hall Farm.

5.58. Marked on the 1820 Plan of Cheshire is a rectangular structure which formed the southern part of the later mid-to late 19th century courtyard structure described above. To the north of this is a further structure whose position coincides with the later northern arm of the courtyard complex (see inset 1). South of these is a large rectangular building which is likely to have been associated. By the time the 1847 Tithe Map was published only the southern arm of the later complex is marked suggesting that the other two structures were demolished. Further re-configuration or re-building is evident on the 1877 Ordnance Survey map as shown is the courtyard structure with central arched opening on its east side and lean-to structures on its northern arm. Smaller ancillary structures are also evident to the east and to the northeast, with the latter being the larger of the two. These structures did not last very long as in the late 1890s the larger one was replaced with a larger building and the other one demolished as shown on the 1899 edition.

5.59. This coincides with some re-modelling of the courtyard buildings, some infilling on the southern annex, the addition of a small lean to structure on the southern western tip of the lower courtyard range and the erection of a small rectangular building immediately to the west of the west side of the northern courtyard range. These changes are also shown on the 1910 Ordnance Survey map.

5.60. Later maps show some further development with a rectangular structure built to the northwest of the farm sometime between the publication of the 1938 and 1954 Ordnance Survey maps. Further expansion occurred in the 1960s demonstrated by the addition of a number of lean-to structures to the interior and exterior faces of the courtyard structure and the construction of new barns to the east and a slurry tank to the north. This development phase seems to coincide with the construction of Bradley Hall Cottages to the north. Expansion continued with the wrap around extension of the barn to the east and the construction of large barn to the west of the complex just outside the northern arm of the Scheduled moat. These additions are evident from comparison with later Ordnance Survey editions and recent aerial photographs.

Phasing and Structural Analysis

5.61. The southern building range represents the first phase of building activity associated with the farm and was the precursor to the later courtyard arrangement. This comprised the addition of the eastern and northern range sometime between 1847 and 1877 as determined from the analysis of historic maps. It is noted that these ranges use hand made bricks, perhaps suggesting the re-use of material from a demolished structure, the candidate for which is the large building shown on the 1820 Cheshire Plan but demolished by the time the 1847 Tithe map was published. From the site visit, it is clear that both the southern and connected eastern range still survive but the northern range has been demolished bar the outer northern wall. This occurred between 1910 and the late 1960s as evident from historic maps. A lean to mono pitch structure was built on the north face of the surviving north range wall, with evidence for where it was tied in clearly visible.

5.62. Further re-modelling took place between the early and late 20th century with the addition of further structures within the interior of the courtyard including the open gable building that is connected to the aforementioned structure by a mono pitch roof. In filling also took place on the north face of the southern range with a brick built structure with open gable.

5.63. Many of the original features associated with the southern and eastern range have been replaced at some point in the 19th/ 20th century including the roof which comprises bolted trusses. The eastern gable of the southern range appears to have been rebuilt noted by the different material treatment below the eaves the insertion of mock tudor timbers in the interwar period and the insertion of a taking in door. These changes may have been undertaken to facilitate its use as a dairy. Similarly, the western aspect of the southern range has been punched through to allow cattle to access the dairy which is housed in the eastern end of the southern range.

5.64. A number of the windows on the principal elevations now have later brick arch heads and heavier stone sills. Similarly, a number of the original windows have been infilled as have some of the doors. In addition to this new doors/ accesses have been created for the workshop and dairy. Noted on the complex on the east, north and west side are a number of modern barns /structures which serve as stock sheds or are used for storage. These obscure the earliest phases of the ranges and/ or have affected the integrity of it through alteration or tying in to accommodate the new structure.

Geophysical Survey

5.65. A geophysical survey has been undertaken to understand the archaeological resource and the historic landscape within which the Proposed Development sits. This was undertaken by Phase Site Investigations in 2017 using a multi-sensor array cart system (MACS). This comprised of 8 gradiometers, which collected data on profiles spaced 0.5m apart with readings taken between 0.1 and 0.15m intervals.

5.66. A Roman road is postulated to cross the site from east to west but there is no clear evidence for this in the magnetic data.

5.67. Bradley Hall moated site, which is a Scheduled Monument, is located within the site. The scheduled monument itself was not covered by the geophysical survey. The adjacent field to the west was surveyed but no anomalies suggestive of features related to the moated site were identified.

5.68. The majority of the anomalies identified by this survey relate to modern material / objects (including a number of infilled ponds), agricultural activity (including field drains and possible remnants of ridge and furrow) and geological / pedological variations.

5.69. There are numerous linear / curvi-linear anomalies of uncertain origin. The majority of these do not form a clear pattern or relationship that would indicate an archaeological origin and they are considered more likely to be associated with agricultural activity, drainage features or natural features / variations. Several stronger linear / curvi-linear anomalies could be related to infilled features but the exact type of feature is not known.

5.70. The heritage assessment of the site indicates that possible quarry pits have been identified from air photographs. It appears that a number of these features correspond with infilled ponds and the magnetic data suggests that relatively modern infill material is present and possible drainage features are associated with a number of these features. It is possible that some of the former ponds could originally have been quarry pits but this cannot be confirmed by the survey.

Historic Landscape Characterisation

5.71. The Site has been surveyed as part of the Historic Landscape Characterisation (HLC) programme. The Site is listed as 'late post-medieval agricultural improvement dating to the 20th century. Towards the south east there are areas of 20th century plantation and small areas of 19th century fields. To the east and south east are areas of 20th century industry and towards the north there is an area of medieval townfields associated around Clifflane Farm.

Cartographic Analysis

5.72. Cartographic evidence from c. 1820 to 1947 has been considered. The earliest map, the Plan of Chester (Figure. 9.3), highlights the moated site of Bradley Hall and the putative line of the Roman road bordering fields to the south and largely open ground to the north. The Tithe map for the area suggests additional field divisions to the north of the Roman road, and the loss of one north-south building immediately to the east of the moat (Figure. 9.4). The configuration of buildings associated with the moated site has changed again by the time of the Ordnance Survey (OS) map of 1896, and footpaths, tracks and a wooded area to the south-east are clearly shown (Fig. 9.5). The wooded area is labelled as Bradley Gorme on the OS map of 1899 (Fig. 9.6).

5.73. Mapping from the first half of the 20th-century date (Figs 9.7-9.8) indicate no changes in the field boundaries, wooded area or small copses, although additional farm buildings are noted to the north and north-east of the moated site by 1947. Comparing this map to current mapping (cf. Figs 9.2 and 9.8) indicate the loss of three north-south field boundaries, but otherwise there is no change. Aerial photographs indicate the loss of two of these field boundaries pre-1970s and one post-1970s (Figs 9.10- 9.11).

Aerial Photographs

5.74. A range of aerial photographs have been assessed to determine the presence of possible archaeological features and add further information to the development of the landscape from the post-medieval to modern period.

5.75. Analysis of the 1945-1948 black and white aerial photographs demonstrates that much of the site was in use as pasture with some arable fields to the west of the moat. Evidence of the former post-medieval and earlier field systems are largely absent from the aerial photographs, other than some within the southwestern part of the site.

5.76. Noted on the Plan of Chester drawn up in 1820, the later tithe map of 1847 and early Ordnance Survey editions are a number of former ponds which are likely to infer that localised quarrying was being undertaken. The vast majority have been infilled other than those which remain, in part highlighted by the mature trees that have grown in these areas. A number of the backfilled quarries are evident on the aerial photographs particularly within the southern and northeastern part of the Proposed development area. Of particular note is that shown to the north and south of the alleged Roman road. Other features are shown which are likely to relate to later agricultural activities including drainage. The drainage runs are much clearer on the 1971-1973 aerial photographs. Remnants of quarrying are also apparent with the eastern part of the site. Shown on this aerial photograph is the construction of Junction 9 of the M56 in progress.

5.77. Analysis of the 2005 aerial photograph (GoogleEarthPro) shows considerably more features than earlier aerial photographs which is probably due to the drought in this year. Clearly evident in the southern part of the site are the sting of quarries marked on the extract 1820 Plan of Chester. A number of the former field boundaries within the northern part of the Site are also evident.

Summary of Baseline Conditions

5.78. The sites, archaeological finds and listed buildings from the survey area range in date from a prehistoric axe (**2734**) to post-medieval housing and modern monuments associated with the use of the area during World War Two (**4091**). Within the Site is the scheduled monument of Bradley Hall moated site (**1011924**), its associated 19th century agricultural buildings and also the course of the North Cheshire Roman Road (**547/1/7**).

5.79. Viewed in light of the known archaeological assets, there is potential for Roman and medieval activity to occur within the site.

5.80. In accordance with current planning policy, the significance of any potential impacts upon the identified assets is considered further.

6. Alternatives Considered

6.1. A series of alternatives have been considered as part of the development of the Proposed Scheme. These are documented within the ES Part One Report.

6.2. The Landscape proposals have been carefully considered to develop a scheme which will result in minimal level changes. This is to aid in the retention of mature existing vegetation surrounding the scheduled monument and along the southern boundary to limit the impact on the setting of listed buildings which lie either side of Barleycastle Lane.

6.3. The existing site topography will be levelled to accommodate the proposed units with some areas reduced to soften the impact they have on their surroundings. The material generated will be used to create screening bunds to soften the edges of the units and to screen views of the units during the operational phase.

6.4. During the early stages of the scheme development consultation was undertaken with Historic England's Principal Inspector of Ancient Monuments (Mr. Andrew Davison). During the site walkover, discussions centered on the need to retain the existing belt of mature trees that follows the line of the scheduled moat (**1011924**) as this provides protection to it's immediate setting but also allows a visual appreciation of the monument. Similarly, retention of the locally listed building within the moat (Bradley Hall [**DCH12763**]) was discussed as a positive benefit to maintaining the monument and its historical integrity.

6.5. During the development of scheme proposals, it was recognised that given the significance of the Scheduled Monument (**1011924**) a sense of openness needs to be maintained around the asset to reduce the level harm to the setting of the monument, to allow an appreciation of the monument and to enhance the heritage experience. In light of this an area of land has been set aside to accommodate this and a view cone will be maintained from the south.

6.6. Building heights, massing, orientation and proximity to the Scheduled Monument (**1011924**) have been considered to alleviate the impact on the setting of the monument.

6.7. Immediately to the north and north east of the Scheduled Monument (**1011924**) are a number of 19th and 20th century agricultural buildings which will be demolished as part of the development proposals. Options to retain these have been looked at but their retention was not deemed not possible due to their poor structural condition.

6.8. It was agreed with the Conservation Officer the buildings are fully recorded prior to demolition.

6.9. ~~which currently diminish the setting and integrity of the moat. The structures re-use has been considered but improving the setting and intelligibility of the asset outweighed this option in part to alleviate the level of harm on the asset. Subsequently the agricultural buildings will be demolished following building recording.~~

7. Potential Environmental Effects

7.1. The potential environmental impacts (without mitigation) resulting from development have been identified through an examination of the baseline conditions and the nature of the proposed development. Any comments made during the Scoping stage and subsequent consultation have been addressed and used to inform the assessment process.

Construction Phase

7.2. The following outlines the predicted impacts as a result of the scheme prior to mitigation being identified and considered. Those assets not included within this as shown on figure 9.1, are not considered to be impacted by the scheme including: DCH12879, 1197/1, 2278, 2729/0/1, 2729/0/2, 2734, 2908, 4091, 4468/0/0, 4657, 538/1, 540/1/1, 540/1/2, 541/1, 547/1/8, 547/1/13 and 615.

7.3. Ground works and construction activities within the Application Site will have a direct and permanent impact on potential buried archaeological remains including those associated with the possible Roman road (**547/1/7**) which runs through the site in an east west direction.

7.4. The route of the Roman road and associated features including roadside aggers are likely to be affected by the Proposed Development although no such evidence for their existence was identified by the geophysical survey undertaken by Phase Site Investigations.

7.5. The setting of the Roman road (**547/1/7**) will be affected by the proposed development as will the ability to interpret the asset within the landscape. Despite this it is acknowledged that it has been previously compromised by the development of the industrial estate immediately to the west of the site and the M6 Motorway to the east.

7.6. The site of a medieval cross (**~~511~~551**) lies in proximity to the modern houses which are located to the northeast of Bradley Hall Moated Site (**1011924**). This will be impacted by the Proposed Development, however, any remains may have been compromised by the development of the aforementioned houses.

7.7. Located near to the centre of the site is Bradley Hall Scheduled Moated Site (**1011924**) whose setting will be impacted by construction activities. Specifically it will affect the setting of the

moat although demolition of later farm buildings within its immediate landscape to the northwest will help improve its immediate setting.

7.8. Set at the heart of the moat is Bradley Hall and associated barn (**DCH12763**) which is locally listed. The barn lies immediately to the east of hall. These buildings will be maintained as part of the development proposals with the hall converted to B1 Office use with associated servicing and infrastructure including car parking and vehicle and pedestrian circulation. The proposals will ensure that there are minimal external alterations to the buildings and the grounds within which they sit. Temporary works to aid conversion will have a negative impact on the setting of the buildings and the moat.

7.9. The re-use of Bradley Hall and barn (**DCH12763**) will positively benefit the monument in ensuring its long term use which will in turn ensure that the landscape containing the scheduled monument (**1011924**) is actively managed. The proposed use will also make the monument more accessible to the public as the foot path to the east will be relocated closer to the monument.

7.10. Located to the of Bradley Hall and associated barn (**DCH12776763**) is a complex of 19th century agricultural buildings which will be demolished as part of the scheme proposals. Options to re-use these have been assessed by the Applicant but the poor state of repair makes this unviable . This results in negative impact. The structures will be fully recorded prior to demolition.

7.11. Situated to the south of the site if the Tanyard Farm complex which lies in proximity to the M56 Motorway. The farm comprises a Grade II* listed farm building (**1139363**) which lies adjacent to the locally listed Tan House Farm (**DCH13677**). Development will affect the agricultural setting of this complex, with only partial views of Tan House Farm (**DCH13677**). The setting of the farm has to some extent already been impacted by the construction of later agricultural buildings, the M56 Motorway and the slip road to the M6 Motorway.

7.12. To the west of the Tanyard Farm complex is Barleycastle Farmhouse (**1329741**) which is listed at grade II. This setting of this has been partly eroded by later agricultural buildings, however, the Proposed Development will further impact this setting.

7.13. Located to the southwest of the Proposed Development is the Grade II Listed Beehive Farmhouse (**1139361**). This lies on the north side of Barleycastle Lane between Appleton

Thorn Trading Estate and Barleycastle Trading Estate. The setting comprises the agricultural fields which lie to the south although these no longer resemble their post-medieval character due to changes in layout in the modern period. Its agricultural setting to the north and southeast has been eroded by the development of the trading estates which flank the farm. It is noted that dense vegetation around the curtilage of the farm screens the assets, with further screening provided along part of the eastern edge of the access road into the trading estate.

7.14. It is considered that the Proposed Development will have no impact on the setting of the grade II listed Beehive Farmhouse (**1139361**) as its immediate and intervening setting has been eroded by the modern development to the north, northwest and south east of the farm.

7.15. To the south of Beehive Farm House (**1139361**) is Yew Tree Farmhouse (**1139340**) which is grade II listed. It is situated *c.* 0.65 km to the southwest of the Proposed Development on the edge of Barleycastle Trading Estate. Much of the original context of asset has been destroyed through development of the aforementioned trading estate immediately to the east and the encroachment of land to the southwest by the modern housing estate to the rear of Appleton Thorn and the H M Prison and Youth Offenders Institute. There is some screening from planting along the eastern edge of the grounds, but this provides little visual protection from the industrial units that dominate the landscape in this locality.

7.16. Given the intervening built form between Yew Tree Farmhouse (**1139340**) and the site, it is considered that the farmhouse including its remaining agricultural setting will not be impacted by the Proposed Scheme.

7.17. Situated to the southeast of the site is Booths Farm House (**1329740**). On the northwest side of this is the shippon (**1139362**). Both of these assets are listed at grade II. There has been considerable diminution of their original agricultural context due to the encroachment of the Appleton Thorn Trading Estate immediately to the north and the Barleycastle Trading Estate to the south. Views to and from the site are limited by the mature and dense vegetation on the sites southern edge.

7.18. It is considered that the Proposed Development will not result in significant impacts on the listed assets within what remains of the Booth Farm given the intervening built from and dense vegetation. Similarly, the loss of agricultural context has diminished the integrity of the assets.

7.19. Located to the north of the site is the locally listed barn (**DCH12573**) at Manor House Farm which lies on the north side of Cartridge Lane. It largely retains its post-medieval agricultural context other than the severance of its southern aspect through the construction of Grappenhall Lane (B5356) which was constructed in the early 1980s. Scheme proposals will further visually effect the asset but some screening is afforded through existing vegetation and topography. In addition to this a belt of strategic landscaping on the northern edge of the Proposed development will help to alleviate any visual impact.

7.20. Located c. 0.9km to the north of the site is the milepost at Gallows Croft, Knutsford Road, Lymm (**DCH12869**) which is currently obscured by vegetation. The setting of milepost is integral to the road given its function to act a reference point along it. The proposed development will not impact the setting of this mile post.

7.21. As part of the Scheme there is a requirement for some off-site drainage works which will occur near to the Church of St Cross in Appleton Thorn. The church ~~which~~ is listed at Grade II (**1139338**). These will comprise the installation of sewer pipes, the erection of temporary hoardings and the need for traffic management. This has the potential to impact on the setting of the church. There will also be an associated increase in noise levels on the listed assets due to construction activities. These impacts will be temporary and will occur during groundworks and construction works and are not anticipated to be significant.

7.22. It is not anticipated that the setting of the other listed/ locally listed assets recorded in close proximity to the scheme will be impacted due to the intervening built form and landscape.

7.23. There will be no impact on World Heritage Sites, Registered Historic Parks and Gardens, Registered Battlefields or Conservation Areas.

7.24. A summary of the impacts from construction are presented in Table 9.8 below.

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level
*Effect on setting of Bradley Hall Scheduled Moated Site (**1011924**)*	National	Moderate Negative	High Adverse	High
*Effect on setting of the Church of St Cross in Appelton Thorn (**1139338**)*	Regional	Negligible	Negligible	High
Effect on Grade II Listed Tanyard farm building (**1139363**)*	National	Minor Negative	Moderate Adverse	High

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level
*Grade II Listed Barley Castle Farmhouse (**1329741**)*	Regional	Minor Negative	Moderate Adverse	High
*Effect on setting of Locally listed Bradley Hall and Barn (**DCH12763**)*	Borough/ District	Moderate Negative	Minor Adverse	High
*Roman road (**547117**) within the site*	County	High Negative	Moderate Adverse	High
*Roman road (**547117**)*	County	High Negative	Moderate Adverse	High
*Medieval Cross (**551**)*	Borough	High Negative	Moderate Adverse	High
*Yew Tree Farmhouse Grade II Listed Building (**1139340**)*	Regional	Neutral	Neutral	High
*Beehive Farmhouse Grade II Listed Building (**1139361**)*	Regional	Neutral	Neutral	High
*Booths Farm, Shippon on north West side of Farmyard Grade II Listed (**1139362**)*	Regional	Negligible	Negligible	High
*Booths Farm Farmhouse Grade II Listed Building (**1329740**)*	Regional	Negligible	Negligible	High
*Barn at Manor House Farm, Cartridge Lane, Appleton Locally Listed Building (**DCH12753**)*	Borough/ District	Minor Negative	Minor Adverse	High
*Milepost at Gallows Croft, Knutsford Road, Lymm (**DCH12869**)*	Local/ Neighborhood	Neutral	Neutral	High
*Tan House Farm, Barleycastle Lane, Appleton (**DCH13677**)*	Borough District	Negligible	Negligible	High
*Loss of structures and features associated with the Roman Road (**547117**).*	County	Moderate Negative	Moderate Adverse	High
*Loss of structures and features associated the Site of the Medieval Cross (**551**).*	County	Minor Negative	Minor Adverse	High
Loss of agricultural buildings to the east of Bradley Hall Farm	Local/ Neighborhood	Minor Negative	Minor Adverse	High

Table 9.8: Significance of Effect - Construction Phase

Operational Phase

7.25. The Proposed Development will be designed to limit impacts on the historic environment including the Bradley Hall Moated Scheduled Monument (**1011924**) and those listed buildings that lie to the south of the Proposed Development including Tanyard farm building (**1139363**) and Barleycastle Farmhouse (**1329741**). Design, style, materials, layout and positioning will be carefully considered where feasible to limit any adverse impact and to enhance any receptors that will be affected. Landscape mitigation will also be incorporated to soften adverse impacts, where appropriate. In addition to this demolition of farm buildings within the Bradley Hall Farm complex i.e. to the northeast of the moat will also be undertaken which would improve the setting of the scheduled monument (**1011924**).

7.26. Impacts during the operational phase are considered to be limited to the setting of some of the designated assets. It is considered that there will be an adverse impact on the setting of Bradley Hall scheduled Moated site (**1011924**), although the provision of a no development buffer of 30m around, the retention of a green corridor between the watercourse to the south of the monument through to Bradley Hall Cottages and the re-alignment of estate roads will lessen the severity of this impact. This will in part be achieved through the demolition of the farm buildings immediately to the northwest of the monument. Other measures will include the diversion of the current PROW closer to the monument to make it more accessible to the public and retention of land between the northeastern edge of the moat and Cliff Lane to provide some connectivity with the landscape to the north. All of these mitigation measure will help to preserve some context to the scheduled monument (**1011924**) to limit the impact of the Scheme once operational.

7.27. Currently the setting of Bradley Hall scheduled Moated site (**1011924**) is currently effected by noise from the M6/ M56 which has to a degree affected the way the asset is experienced. Historic England (2017) describe tranquility as an attribute to setting which in this instance, with the development in place is considered to no worse that that currently experienced.

7.28. There will be an impact on the setting of the Tanyard Farm building (**1139363**), Barleycastle Farm (**1329741**) and Booths Farm (**1329740**, **1139362**), and the landscape in which they sit. Landscaping and design have been incorporated into the scheme including the provision of strategic landscaping to alleviate adverse impacts.

7.29. A summary of the impacts from construction are presented in Table 9.8 below.

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level
*Effect on setting of Scheduled Bradley Hall Moated Site (**1011924**)*	*National*	*Moderate Negative*	*High Adverse*	*High*
Effect on setting of Grade II Listed Tanyard farm building (**1139363**)*	*National*	*Minor Negative*	*Moderate Adverse*	*High*
*Effect on setting of Grade II Listed Barley Castle Farmhouse (**1329741**)*	*Regional*	*Minor Negative*	*Moderate Adverse*	*High*
*Effect on setting of Locally listed Bradley Hall and Barn (**DCH12763**)*	*Borough/ District*	*Moderate Negative*	*Minor Adverse*	*High*
*Yew Tree Farmhouse Grade II Listed Building **1139340***	Regional	Neutral	Neutral	High
*Beehive Farmhouse Grade II Listed Building (**1139361**)*	Regional	Neutral	Neutral	High
*Booths Farm, Shippon On Left (North West) Side Of Farmyard Grade II Listed Building (**139362**)*	Regional	Negligible	Negligible	High
*Booths Farm Farmhouse Grade II Listed Building (**1329740**)*	Regional	Negligible	Negligible	High
*Barn at Manor House Farm, Cartridge Lane, Appleton Locally Listed Building (**DCH12753**)*	Borough/ District	Minor Negative	Minor Adverse	High
*Milepost at Gallows Croft, Knutsford Road, Lymm (**DCH12869**)*	Local/ Neighborhood	Neutral	Neutral	High

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level
*Tan House Farm, Barleycastle Lane, Appleton (**DCH13677**)*	Borough/ District	Negligible	Negligible	High

Table 9.9: Significance of Effect - Operation Phase

8. Proposed Mitigation

Construction Phase

8.1. The setting of Bradley Hall Moated Site (**1011924**) will be altered by the Scheme through the encroachment into an open landscape, although this has in part been already impacted by the later agricultural buildings to the northeast. Landscaping will be put in place to reduce the impact on the heritage asset by restricting direct views to and from it. The impacts on these assets will be further minimised by restricting traffic near to these assets and the erection of hoardings to protect them from construction traffic routes. This will reduce the effects of noise and dust pollution. These measures will not reduce the overall effect of the Proposed Scheme.

8.2. At the heart of the Scheduled Monument (**1011924**) is the locally listed Bradley Hall (**DCH12763**) ~~which will be converted into small scale office space (B1)~~. The retention of Bradley Hall provides context to the moat in the ability to appreciate the massing that the former hall would have had and its relationship with the moat. Any changes made internally or externally will be archaeologically recorded and the scope and methodology will be detailed in a Written Scheme of Investigation (WSI) which will be submitted to Mr. Mark Leah Development Management Archaeologist and Team Leader (Cheshire Archaeology Planning Advisory Service) and Mrs Christine Carruthers (Conservation Officer/ Senior Planning Officer, Warrington Borough Council) approval prior to the commencement of any groundworks.

8.3. Whilst the contextual setting of the Scheduled Monument (**1011924**) will remain intact there may some impact on its overall setting, although this is limited to fleeting views of the proposed units through gaps in the existing line of mature trees that envelop the moat on all sides. The 30m buffer and landscaping will help restrict views to the asset. Noise

8.4. Development proposal will result in the demolition of the agricultural complex to the east of Bradley Hall Farm. These buildings will be fully recorded through an appropriate level of building recording the scope of which will be submitted to Mr. Mark Leah Development Management Archaeologist and Team Leader (Cheshire Archaeology Planning Advisory Service) and Mrs Christine Carruthers (Conservation Officer/ Senior Planning Officer,

Warrington Borough Council) approval. The agreed scheme of works will be undertaken prior to any groundworks.

8.5. Proposed Development will encroach on the agricultural setting of Tanyard Farm (**1139363**) and Tan House Farm (**DCH13677**) although many of the agricultural fields that it is associated with will remain unaltered by the Proposed Development. Retention of the mature hedgerow along the southern boundary of the Site and strategic planting will help to limit views to and from the farm.

8.6. Whilst the Proposed Scheme will erode some of the wider agricultural landscape character associated with Barleycastle Farmhouse (**1329741**), Booths Farm, Shippon (**1139362**) and Booth Farm Farmhouse (**1329740**), its immediate agricultural landscape will remain. Views to and from the assets are limited to gaps in the mature hedgerow along the southern boundary of the Site. These will be infilled as part the scheme. In addition to this a belt of landscaping will be provided to the north of the hedgerow which will further restrict views.

8.7. To further alleviate any impact on setting to those listed and non-listed buildings within the landscape, the design, style, materials and layout will be carefully considered where feasible to limit any adverse impact and to enhance any receptors that will be affected.

8.8. The Barn at Manor Farm (**DCH12573**) to the north of the Proposed Scheme lies within a primarily agricultural landscape bar modern intrusion such as the B5356. Views from the asset to the north will be affected by the Proposed Scheme. The erection of a landscape bund with tree planting will help to soften this impact.

8.9. To the south of the scheme is Yew Tree Farmhouse (**1139340**) and Beehive Farmhouse (**1139361**) whose setting will not be impacted by the Proposed Scheme as this has been eroded through the construction of the industrial estates in the locality of the buildings.

8.10. Recorded some distance to the north of the site on Knutsford Road is a milepost (**DCH12869**) which will remain unaffected by the Proposed Scheme.

8.11. Running through the site in an east west direction is a Roman Road (**547/1/7**). No features to suggest the presence of the road or associated features were identified by the geophysical survey undertaken in 2017. Evaluation trenching will be undertaken to verify the results of the geophysical survey. Should the road and or features be found, an appropriate scheme of investigation will be undertaken in accordance with a WSI.

8.12. The site of a Medieval Cross (551) lies to the north of the moat. No evidence for its existence was identified during the walkover survey or the geophysical survey. Evaluation trenching will be undertaken in its locality to verify the surveys. Should remains or features be found which allude to its presence, localised mitigation will be undertaken, again in accordance with a WSI.

8.13. There are number of non-designated assets within the study area that will not experience either a direct or indirect impact on it including:

- **DCH12879** Old Chapel, Old Cherry Lane, Lymm Locally Listed Building
- **1197/1** Kings Brook Mill Site of Watermill Industrial Site, Mill, Watermill
- **2728** Unnamed Site in High Legh Parish Site of 19th century cottage House
- **2729/0/1** Swineyard Lane Site of a 19th century house
- **2729/0/2** Swineyard Lane Site of 19th Century Building House
- **2734** Swineyard Farm Prehistoric axe Findspot
- **2908** Badger's Croft Farm I Cropmark Enclosure. Ditched Enclosure
- **4091** RNAS Stretton/HMS Blackcap Airfield WW2 Airfield Military Airfield
- **4468/0/0** Strict Baptist Chapel, Cherry Lane Strict Baptist Chapel Strict Baptist Chapel
- **4657** Pond, North of Cartridge Lane, Grappenhall. Pond
- **547/1/0** North Cheshire Ridge Roman Road
- **547/1/13** North Cheshire Ridge Roman Road – Stretton Airfield Section of Roman Road
- **547/1/8** The North Cheshire Ridge Roman Road Section of Roman road
- **615** Reddish Hall Medieval moated site Moat

8.14. Subsequently no mitigation is proposed for these assets.

Operational Phase

8.15. The only significant effects identified during the Operational Phase relates to the impact on setting due to changes in landscape near to Bradley Hall Moat (**1011924**), Tanyard Farm building (**1139363**), Barley Castle Farmhouse (**1329741**), Booths Farm Shippon (**1139362**), Booth Farm farmhouse (**1329740**) and the barn at Manor Farm (**DCH12753**).

8.16. The immediate setting of the features will be altered by the construction of 7-13 buildings across Zone A-D as illustrated in the Development Cells Parameters Plan (Appendix 5 of the ES Part One Report). Mitigation to reduce the visual impact and the alteration to setting will as far as possible be done through landscape screening. This will be achieved through a combination of:

- Strategic landscaping across the site;
- The provision of a 30m stand-off and buffer between any built development and the moat (Appendix 5 of the ES Part One Report);
- Re-alighment of the the estate roads to reduce the impact on the setting of the Scheduled Monument (**1011924**);
- Demolition of farm buildings to the northeast of the Scheduled Moat (**1011924**). Those buildings to be demolished are shown in Appendix 5 of the ES Part One Report);
- Retention of Bradley Hall (**DCH12763**) ~~through conversion into offices (B1),~~ although on occupation of the proposed industrial units this use will cease and any change of use will be the subject of a separate application ;
- The provision of an open green corridor to maintain views between the Scheduled Monument (**1011924**) and the agricultural land to the south. This will also extend to the north allowing connectivity to the monument;
- Retained vegetation to the outer Site boundaries and around the Scheduled Monument (**1011924**); and
- A 15m standoff from built development to Bradley Brook which runs east to west along the southern boundary of the site;
- Provision of Heritage Interpretation Boards near to the Scheduled Monument (**1011924**) and;
- Re-location of the existing PRoW nearer to the Scheduled Monument (**1011924**).

8.17. The described landscaping mitigation measures are shown on the Green Infrastructure Plan (Appendix 5 of the ES Part One Report).

9. Potential Residual Effects

Potential Residual – Construction Phase

9.1. The following outlines the residual effects of the development after mitigation. Mitigation proposals have been designed to reduce the likelihood or severity of an effect and residual effects reduced accordingly. Mitigation does not, however, remove the effect of the Proposed Development in its entirety.

*Scheduled Bradley Hall Moated Site (**1011924**) and Locally Listed Bradley Hall (**DCH12763**)*

9.2. Given the status of the Scheduled Monument and close association of Bradley Hall, it is considered that the setting and the ability to interpret the monument in the landscape will in part be diminished by the Proposed Scheme therefore the resultant impact is considered to be Moderate Adverse. However, the combination of the 30m standoff and buffer, provision of green corridor, retention of existing vegetation, retention and conversion of Bradley Hall (DCH12763), sensitive road, design, lighting and landscaping, and the demolition of farm buildings to the northeast of the site and mechanisms to enhance the appreciation of the Scheduled Monument (**1011924**) will help to alleviate the visual impact on setting of the Scheduled Monument and Locally Listed asset.

9.3. The Proposed Scheme will result in some changes to Bradley Hall (**DCH12763**) which are necessary to ensure its future use. These will largely result in alterations to the internal layout of the hall and re-configuration of part of the existing hard standing to accommodate vehicles. Archaeological building recording will take place prior to conversion and any features to disturbed by groundworks will be recorded. The resultant impact on the building is deemed to be Minor Adverse.

9.4. Development proposals will result in the demolition of the agricultural buildings to the east Bradley Hall (**DCH12763**). Archaeological building recording will take place prior to conversion and any features to disturbed by groundworks will be recorded. The resultant impact on the building is deemed to be Minor Adverse.

Grade II Listed Tanyard Farm building (**1139363**), Grade II Listed Barley Castle Farmhouse (**1329741**) and Grade II Listed Booth Farm House (**1329740**) and Shippon (**1139362**)*

9.5. The retention of the mature hedgerow and trees along the southern boundary of the site and the creation of a 15m buffer immediately behind this will help to limit the visual impact on the setting of the listed assets that lie along Barleycastle Lane. It is noted that the integrity of these assets has been previously affected by modern intrusions in the landscape including the M56 Motorway and slip road to the north and northwest of Tanyard Farm, erection of modern buildings in proximity to both Tanyard Farm and Barley Castle Farm and the encroachment of Barleycastle and Appleton Thorn Trading Estates in to the agricultural setting of Booths Farm. The residual effect is therefore concluded to be Minor Adverse when taking these factors into account.

*Barn at Manor House Farm (**DCH12753**)*

9.6. The creation of bunding and associated planning will to some degree limit the visual intrusion of the Proposed Scheme on the agricultural setting on the barn at Manor House Farm (**DCH12753**), however, given the erosion of setting, the resultant impact remains as Minor Adverse.

*Roman Road (**547/1/7**) and Medieval Cross (**551**)*

9.7. Construction works may impact some buried archaeological remains associated with the Roman Road (**547/1/7**) and Medieval Cross (**551**) but the residual effect is considered to be negligible following the completion of an appropriate scheme of evaluation and mitigation.

Summary

9.8. The proximity to the Proposed Scheme to the Scheduled Monument (**1011924**) will result in a High Adverse impact but the combination of mitigation measures will reduce this to Moderate Adverse.

9.9. Future conversion of Bradley Hall Farm and the demolition of the agricultural buildings to the east of this will result in a Minor Adverse impact but this will be reduced to Negligible with a suitable programme of recording.

9.10. The resultant effect of the Proposed Scheme on the Grade II* Listed Tanyard Farm building (**1139363**), Grade II Listed Barley Castle Farmhouse (**1329741**), Grade II Listed Booth Farm House (**1329740**) and Shippon (**1139362**) and Barn at Manor House (**DCH1934**) will be Minor Adverse due the impact on setting. However, it is recognised that landscape mitigation will to some degree alleviate this.

9.11. The geophysical survey undertaken across the site has determined that there are limited archaeological remains, with no tangible evidence for the Roman Road (**547/1/1**) or the medieval cross (**551**). The archaeological resource will be further investigated and appropriate mitigation measures will be undertaken. Subsequently it is considered that the remaining effect on archaeology will be Negligible.

9.12. The overall impact of the proposals on the cultural heritage resource during the temporary construction phase is highlighted in Table 9.10 below. Only those assets where there is likely to be a change to the significance of effects through mitigation are considered.

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Impact Significance
*Impact on setting of Scheduled Bradley Hall Moated Site (**1011924**)*	National	Moderate Negative	High Adverse	High	30m landscape buffer, green corridor, retention of existing vegetation, demolition of farm buildings, retention of Bradley Hall (**DCH12763**)	Moderate Adverse
*Effect on Setting of Bradley Hall (**DCH12763**) and change to internal layout and impact on external features*	Borough District	Moderate Negative	Minor Adverse	High	Archaeological recording prior to groundworks	Minor Adverse
Effects on agricultural buildings to the east of Bradley Hall Farm	Borough	Minor Negative	Minor Adverse	High	Archaeological recording prior to groundworks and retention of stone work around the archway and re-use as part of the scheme i.e. some form of public art.	Negligible
Effect on Setting of Grade II Listed Tanyard farm building **(DCH13677**)*	National	Minor Negative	Moderate Adverse	High	Retention of hedgerow and trees along southern boundary and creation of 15m buffer south of the boundary	*Moderate Adverse to Negligible

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Impact Significance
*Effect on Setting of Grade II Listed Barley Castle Farmhouse (**1329741**)*	Regional	Minor Negative	Moderate Adverse	High	Retention of hedgerow and trees along southern boundary and creation of 15m buffer south of the boundary	*Moderate Adverse to Negligible
*Effect on Setting of Grade II Listed Booths Farm, Shippon on Left (North West) Side of Farmyard Grade II Listed Building (**1139362**)*	Regional	Minor Negative	Moderate Adverse	High	Retention of hedgerow and trees along southern boundary and creation of 15m buffer south of the boundary	*Moderate Adverse to Negligible
*Effect on Setting of DCH1934 Booths Farm Farmhouse Grade II Listed Building **1329740***	Regional	Negligible	Negligible	High	Retention of hedgerow and trees along southern boundary and creation of 15m buffer south of the boundary	*Moderate Adverse to Negligible
*Effect on setting of DCH **12753** Barn at Manor House Farm*	Borough/ District	Minor Negative	Minor Negative	High	Landscape bund with tree planting will soften the impact on setting.	Minor Adverse
*Direct impact on Roman road (**5471117**) within the site*	County	Moderate Negative	Moderate Adverse	High	Programme of archaeological works prior to groundworks	Minor Adverse

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Impact Significance
*Direct impact on Medieval Cross (**551**)*	Borough	Minor Negative	Minor Adverse	High	Programme of archaeological works prior to groundworks	Negligible

Table 9.10: Residual Significance of Effect - Construction Phase

* *Whilst the matrix states a range from moderate adverse to negligible it is considered that with mitigation in place this Residual Impact Significance Score is Minor Adverse.*

Potential Residual Effects – Operational Phase

9.13. The successful establishment and growth of the proposed planting on the northern and southern boundary of the site will provide further screening to the Tanyard farm building (**1139363**), Barley Castle Farmhouse (**1329741**) Booths Farm (1**329740**) and Shippon (**1139362**) and the barn at Manor Farm (**DCH12753**). However, the overall impact remains unchanged from the Construction Phase due to the heights of the buildings which will still remain visible once the planting matures.

9.14. The overall impact of the proposal in terms of the impacts on Cultural Heritage during the operational phase is highlighted in the table 9.11 overleaf:

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Impact Significance
*Impact on setting Bradley Hall Scheduled Moated Site (**1011924**)*	National	Moderate Negative	High Adverse	High	Maturation of landscape mitigation measures	Moderate Adverse
*Effect on Setting of Bradley Hall (**DCH12763**)*	Borough/ Distirct	Moderate Negative	Minor Adverse	High	Maturation of landscape mitigation measures	Minor Adverse
Effect on Setting of Grade II Listed Tanyard farm building (~~**DCH13677**~~**1139363**~~)~~*	National	Minor Negative	Moderate Adverse	High	Maturation of landscape mitigation measures	*Moderate Adverse to Negligible

Nature of Impact	Receptor	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Impact Significance
*Effect on Setting of Grade II Listed Barley Castle Farmhouse (~~**DCH1935**~~) **1329741)***	National	Minor Negative	Moderate Adverse	High	Maturation of landscape mitigation measures	*Moderate Adverse to Negligible
*Effect on Setting of Grade II Listed Booths Farm, Shippon on Left (North West) Side of Farmyard Grade II Listed Building **1139362***	National	Negligible	Negligible	High	Maturation of landscape mitigation measures	Negligible
*Effect on Setting of DCH1934 Booths Farm Farmhouse Grade II Listed Building **1329740***	National	Negligible	Negligible	High	Maturation of landscape mitigation measures	Negligible
*Effect on setting of DCH **12753** Barn at Manor House Farm*	Borough/ District	Minor Negative	Minor Negative	High	Maturation of landscape mitigation measures	Minor Adverse

Table 9.11: Residual Significance of Effect – Operational Phase

* *Whilst the matrix states a range from moderate adverse to negligible it is considered that with mitigation in place this Residual Impact Significance Score is Minor Adverse.*

9.15. The height and massing of the Proposed Development will give rise to a degree of harm to the significance, within setting, of the listed buildings along Barleycastle Lane, the locally listed assets at Manor Farm to the north and the Scheduled Monument and locally listed Bradley Hall within the Site. This is a result of the diminution of the landscape within which the assets sit as this factor is integral to their intelligibility. Despite this some context to these assets will remain which allows some appreciation of their original setting.

9.16. As the proposed development will give rise to a degree of harm to the significance, within setting, the Proposed Development should be considered having regard to the guidance contained within paragraph 196 and 197 of the Framework:

196 "Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use."

197 "The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that affect directly or indirectly designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset."

9.17. The balance test will be a matter for the local planning authority having regard to the relative significance of the heritage asset. In the case of Bradley Hall Moated site (**1011924**), the harm identified is less than substantial and relates to impact upon setting. The judgement arrived at is outlined in the Heritage Statement prepared by BWB Consulting (2016; Appendix 9.4). The aim of which was to determine the level of harm to the Scheduled Monument taking account of Historic England's guidance in respect of heritage assets ((Historic Environment Good Practice Advice in Planning, Note 3, The Setting of Heritage Assets, 2015), with particular reference to the 5 Point Test.

9.18. The statement determined that the monument is in good condition despite later development from the erection of Bradley Hall. It considered the setting of the asset and determined that it currently lies in an agrarian landscape which contributes to its historical setting. The statement also recognised that the scheduled monument has been substantively altered by the M6 and associated infrastructure to the east and industrial development to the west.

9.19. The statement considered how the monument interacts with the landscape. It concluded that openness and views across the landscape to the south will in part be retained allowing asense of historic openness to remain discernible. In addition to this it recognises that the demolition of the farm buildings surrounding the moat will improve the immediate visual setting of the moat.

9.20. The harm identified should be balanced against the wider employment planning benefits of the scheme. This is discussed further in the ES Socio Economic Technical Paper 6 and the planning Statement submitted in support of this Application.

10. Additive Impacts (Cumulative Impacts and their Effects)

10.1. For the purposes of this ES we define the additive cumulative effects as:

> ***'Those that result from additive impacts (cumulative) caused by other existing and/or approved projects together with the project itself***

10.2. The developments that are likely to have a cumulative impact when considered with the proposed development have been scoped with the Local Authority and Key Consultees during the preparation of this ES (a full list is included within Section 9 of the ES Part One Report). The following table includes the agreed list of cumulative developments that have been assessed in respect of Cultural Heritage. These are also shown geographically on the plan included at **Appendix 11** of the ES Part One Report.

No.	Cumulative Development	Details	Status	Justification for Inclusion in Cumulative Assessment
4	Land North of Barleycastle Lane, Appleton, Warrington Liberty Properties Development Ltd & Eddie Stobart LPA Ref: 2017/31757 & 2019/34739	Full Planning application (Major) - Demolition of all existing on-site buildings and structures and construction of a National Distribution Centre building (Use Class B8) with ancillary office accommodation (Class B1(a)), vehicle maintenance unit, vehicle washing area, internal roads, gatehouse, parking areas, perimeter fencing, waste management area, sustainable urban drainage system, landscaping, highways improvements and other associated works. (Gross internal floor space of 56,197m², together with 1,858m² of ancillary office)	Refused Planning Permission by WMBC 14-11-2018. The decision was subsequently appealed (Appeal Reference APP/M0655/W/19/3222603) and considered at Public Inquiry. Decision pending following closure of inquiry. New planning application submitted under Ref: 2013/34739 and granted planning permission at planning committee by WBC in July 2019. The application was referred to the Secretary of State with decision pending.	Further loss of the agricultural landscape to the south of the Grade II* Tanyard farm building (~~DCH1661~~1139363) and Grade II Barleycastle Farmhouse (~~DCH1935~~329741). This will further affect the setting of these listed assets.

Table 9.12: Cumulative Development

10.3. The other cumulative developments are not assessed further in this addendum paper as there will be no additional impact on the setting of the assets identified because of the either the distance between the development or the intervening built form and vegetation.

10.4. Both Construction and Operational phases associated with Cumulative Development No. 4 are considered with respect to short, medium and long term impacts assessed.

Short Term

10.1. The cumulative development will further impact the setting of the grade II* listed Tanyard Farm building (**1139363**) and the Grade II listed Barley Castle Farmhouse (**1329741**) that lie to the northwest of the proposed logistics development. This development will lead to further loss of the post-medieval agricultural landscape which forms part of assets historic setting. The resultant impact is considered to be no worse than the Minor to Moderate adverse effects detailed in Section 9.

Medium Term

10.2. The cumulative impacts from land north of Barleycastle Lane, Appleton in the Medium Term are considered to be no worse than those identified. Impacts will principally be on the setting of listed assets namely the grade II* listed Tanyard Farm building (**1139363**) and the Grade II listed Barley Castle Farmhouse (**1329741**). This is as a result of the visual intrusion and the impact on the integrity of assets from the loss of agricultural farmland which are an inherent part of the assets character. The resultant impact is considered to be no worse than the Minor to Moderate adverse effects detailed in Section 9.

Long Term

10.3. The opening and operation of the development outlined above will have no additional impact on the identified the listed assets identified. Any long term setting cumulative effect will be reduced by the maturing of the screening vegetation.

11. Conclusion

11.1. This Technical Paper of the Environmental Statement has been determined that there are a number of heritage assets within the study area, some of which are recorded within the Proposed Development including the Scheduled Bradley Hall Moat (**1011924**), the locally listed Bradley Hall and associated barn (**DCH12763**), the 19th century agricultural buildings to the east of this and the course of a Roman Road (**547/1/7**) which heads through the northern margins of the Site in an east west direction. Those assets that will experience a direct/ indirect impact include the Scheduled Moat and associated Bradley Hall and Barn, the agricultural buildings, the Roman Road and the site of a medieval cross (**551**). The route of the aforementioned road and site of the cross were covered by a geophysical survey undertaken by phase site investigations in 2017. No anomalies were identified which signifies to their presence. Similarly there were no anomalies relating to the moat in the surrounding fields.

11.2. The features that were identified by the survey seem to relate to later agricultural activity, variations in the geology and former quarries. In addition to this a number of linear/ curvilinear anomalies were evident, however, the majority of these do not form a clear pattern or relationship that would indicate an archaeological origin and they are considered more likely to be associated with agricultural activity, drainage features or natural features / variations.

11.3. The landscape surrounding the site is characterised by post-medieval and later agricultural fields interspersed with farmsteads. Evident are later intrusions including the M6 and M56 and various trading estates which form a dominant aspect of the area to the east, west and south of the Proposed Development. Set within this conflicting landscape are a number of farms, some of which date to the 16th century. A number of these are listed including those on Barleycastle Lane. Whilst these have been in part blighted by modern development they do retain their post-medieval character. Integral to this are the fields within which they sit which form an important part of their setting. Development proposals will see some further erosion of the agrarian landscape but not to the full detriment of the significance of the asset as sufficient landscape character will reman around these assets to gain a sense of the original context within which they lie. The setting will, however, be in part affected by proposals but sympathetic design has been incorporated in to the illustrative masterplan and parameters plan to limit the impact on setting including the retention of hedgerows and trees along the northern and southern edge of the development and the provision of a buffer set back from

these boundaries to further screen the development proposals the sensitive aspects of the historic environment.

11.4. With mitigation in place the Proposed Scheme will only result in one Moderate Adverse Impact. This is as a result of the erosion of the landscape character of the Scheduled Moat and effects on its setting. Whilst this is considered to be a moderate adverse impact the Proposed Scheme has been designed to reduce the impact on setting as much as possible.

11.5. Having regard to the provisions of the Framework these effects and the extent of harm to the heritage value of the Scheduled Monument is considered to be less than substantial. This harm should however be balanced against the wider planning benefits of the scheme.

11.6. The mitigation measures that been applied to alleviate this impact are though scheme design including a 30m standoff from the moat, retention of trees and vegetation arounds its edge, the provision of a green corridor to preserve views to and from the moat, demolition of farm buildings to return the landscape in this locality to its original form and thus improve the historical integrity of the moat and re-alignment of the PROW to aid heritage interpretation and pubic engagement for a monument that has largely been closed off to the public.

11.7. Other than Mitigation by design a programme of archaeological evaluation and mitigation will be undertaken to further investigate the Roman road and the site of the medieval cross. A number of the anomalies identified by the geophysical survey will also be assessed in line with the Framework and Local Plan Policies. In addition to this archaeological recording of Bradley Hall and barn prior to any alterations will be undertaken. A number of the farm buildings to be demolished will also be recorded. These works will be discussed and agreed with Mr. Mark Leah and will be undertaken prior to all groundworks. The resultant impact on the archaeological resource will be negligible.

11.8. The cumulative impact assessment has taken into account of the proposed 50,000m^2 logistics development (~~which has been refused planning permission)~~ to the southwest of the site on land at Barleycastle Lane. This lies within the agricultural setting of the Grade II* listed Tanyard farm building and Barleycastle Farmhouse. This will lead to further loss of the post-medieval agricultural landscape and will result in a cumulative impact. However, the impacts are considered to be no worse than those as a result of the Proposed Scheme.

11.9. Off site sewer works will impact the setting of the Church of St Cross (Grade II) in Appelton Thorn. The impacts will relate to visual intrusion and increase noise from the erection of hoardings, construction activities and increased traffic. These impacts will be temporary and will occur during groundworks and construction works therefore are not considered to be significant.

12. Reference List

BGS, 2017, www.bgs.ac.uk/discoveringGeology/geology OfBritain/viewer.html. British Geological Survey (viewed October 2017)

Burton, J., Bradley Hall Appleton The Moated Site a Survey and Research Report

BWB Consulting, 2016, Land at Bradley Hall – Heritage Statement

BWB Consulting, 2020 Six56 Bradley Hall Farm – Heritage Technical Statement

Carter, GA, 1971 Warrington and the Mid-Mersey Valley, Didsbury

CIFA, 2012 Code of Conduct.

ClfA, 2014, Standard and Guidance for Desk-based Assessment

DCMS, 2012 National Planning Policy Framework.

Department for Communities and Local Government, 2012 National Planning Policy Framework.

Historic England, 2008 Conservation Principles Policy and Guidance.

Historic England, 2017 The Setting of Heritage Assets.

Historic England, 2012 Planning for the Historic Environment: Historic Environment Planning Practice Guide The Setting of Heritage Assets.

Hall, D, Wells, CE, and Huckerby, E, 1995 The Wetlands of Greater Manchester, North West Wetlands Survey 2, Lancaster Imprints 3, Lancaster

Harrison, W, 1896 An Archaeological Survey of Lancashire, London

Hodgson, J and Brennand, M, 2006 The Prehistoric Period Resource Assessment, in M Brennand (ed) 2006 The Archaeology of North West England: An Archaeological Research Framework for North West England: Volume 1, Resource Assessment, Archaeol North West, Manchester, 23–58

Her Majesty's Stationary Office, 1979 Ancient Monuments and Archaeological Areas Act.

Her Majesty's Stationary Office, 1983 National Heritage Act.

Her Majesty's Stationary Office, 1990 Listed Buildings and Conservation Areas.

Her Majesty's Stationary Office, 1990 'Town and Country Planning Act. Her Majesty's Stationary Office (HMSO)', London.

Higham, N J, 1993, The Origins of Cheshire

Hinchliffe, J. and Williams, F., 1992, Roman Warrington: Excavations at Wilderspool 1966-9 and 1976, Brigantia Monograph No. 2

Margary, I., 1973, Roman Roads in Britain

Middleton, R, 1996 The Neolithic and Bronze Age, in R Newman (ed), The Archaeology of Lancashire, Lancaster, 35-60

Mills, D, 1976 The Place-Names of Lancashire, London

Mills, A. D., 2003, Dictionary of British Place Names

Nevell, M.D., 1998 Iron Age and Romano-British rural settlement in north west England

Phase Site Investigations, 2018 Grappenhall Lane, Grappenhall, Warrington, Cheshire Archaeological Geophysical Survey

Soil Survey of England and Wales, 1983, Soils of Northern England, Sheet 1

Warrington Brough Council, 2014 Local Core Strategy https://www.warrington.gov.uk/info/200564/planning_policy/1903/local_plan

Wyld, HC, and Oakes Hirst T, 1911 The Place Names of Lancashire, their origin and history, London

Cartographic sources

Plan of Chester c. 1820

Tithe map for the Parish of Great Budworth from 1847

Ordnance Survey map of 1896

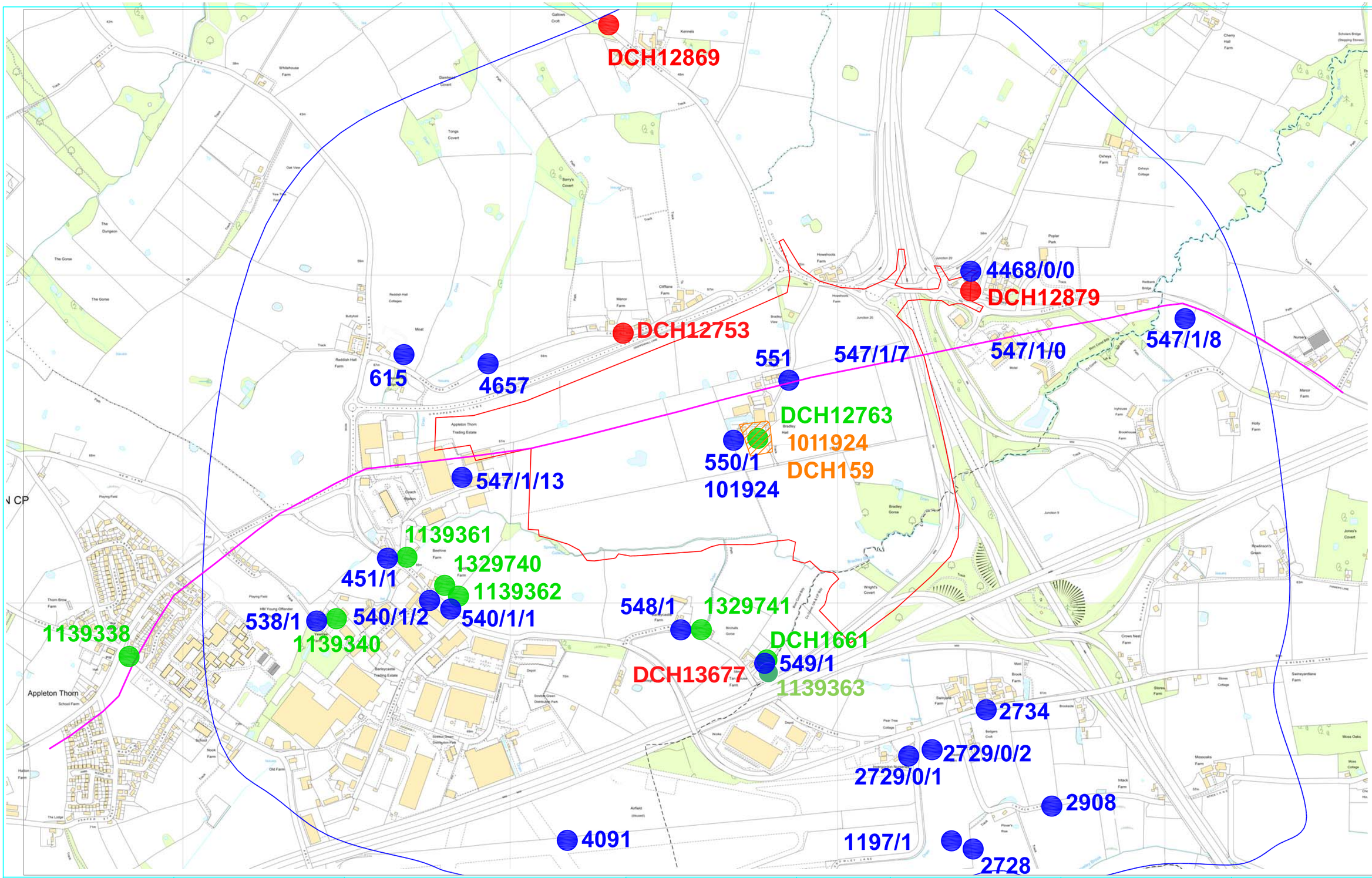
Ordnance Survey map of 1899

Ordnance Survey map of 1910

Ordnance Survey map of 1947

13. Appendices

Appendix 9.1 – Figures



NOTES

1. DO NOT SCALE THIS DRAWING, ALL DIMENSIONS MUST BE CHECKED/ VERIFIED ON SITE. IF IN DOUBT ASK.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
3. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE, ALL LEVELS IN METRES UNLESS NOTED OTHERWISE.
4. ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

KEY

	Study area		Archaeological Monuments
	Proposed development site		Scheduled Monuments
	Roman Roads		Locally listed buildings
	Listed building		

ISSUES & REVISIONS

Rev	Date	Details of Issue / revision	Drw	Rev
P1	15.10.17	PRELIMINARY ISSUE	KW	XX
P1	28.11.17	FINAL ISSUE	KW	

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Client

Project Title: Six56, Warrington

Drawing Title: Fig. 9.1. Location of Heritage Assets

Scale	1:11000	Drawn	KM
Size	A3	Reviewed	JMQ

Drawing Status: FINAL

Drawing No.: ABC/123/100

Revision: P2

Figure 9.2 Extract from the Plan of Chester *c.* 1820, showing the proposed development site (not to scale)

Figure 9.3 Extract from the Tithe map for the Parish of Great Budworth from 1847, showing the proposed development site (not to scale)

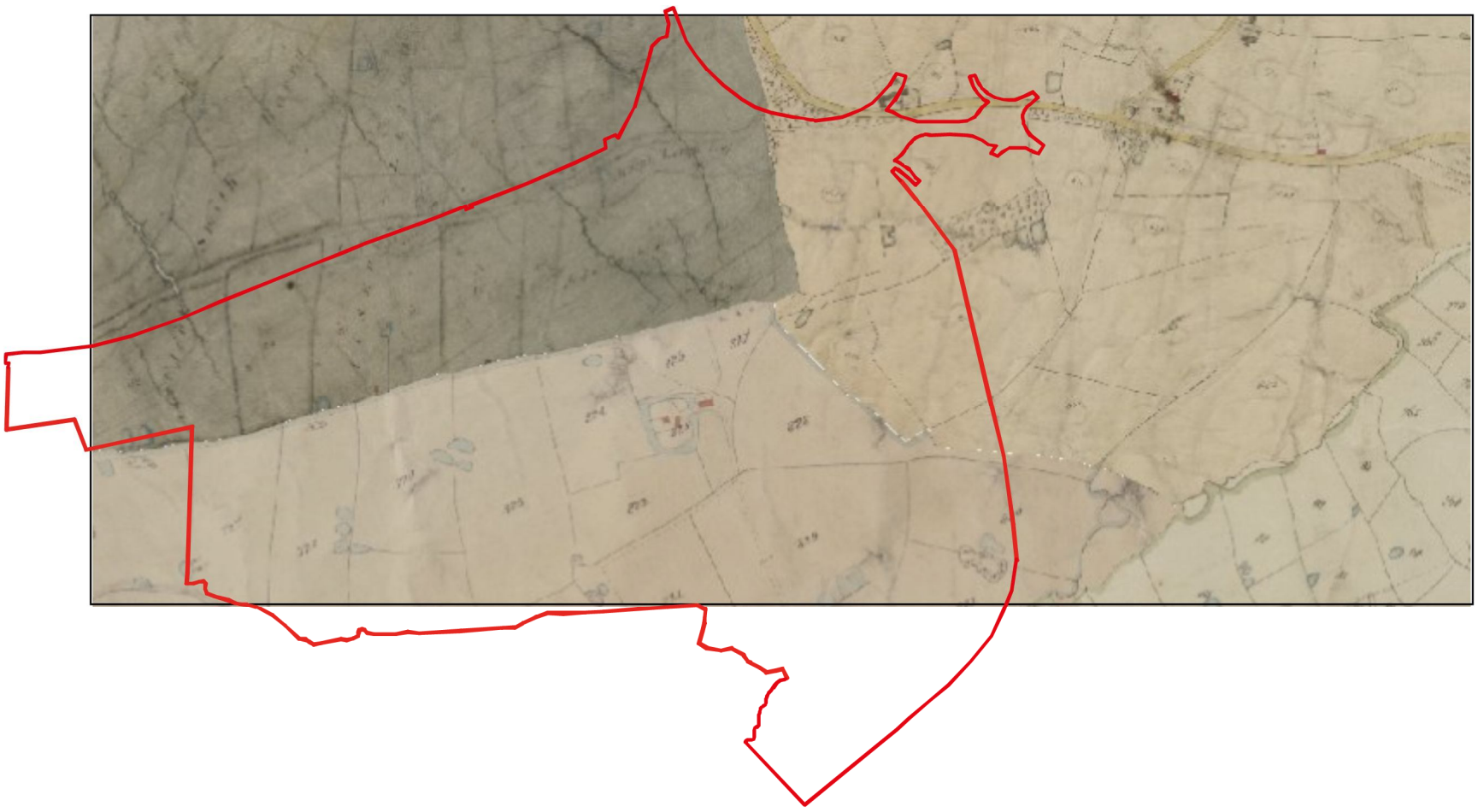

Figure 9.4 Extract from the OS map of 1896, showing the proposed development site (not to scale)

Figure 9.5 Extract from the OS map of 1899, showing the proposed development site (not to scale)

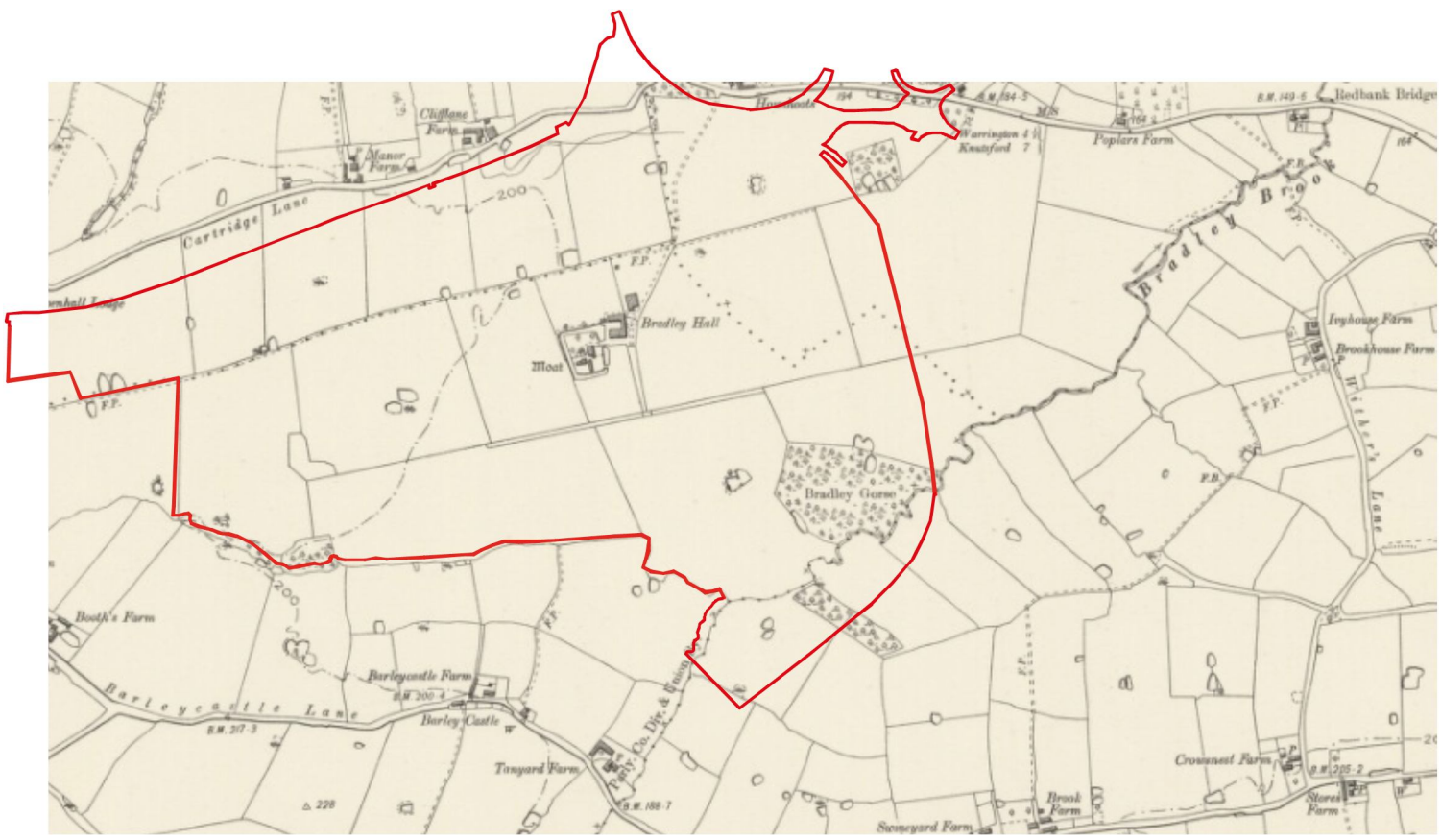

Figure 9.6 Extract from the OS map of 1910, showing the proposed development site (not to scale)

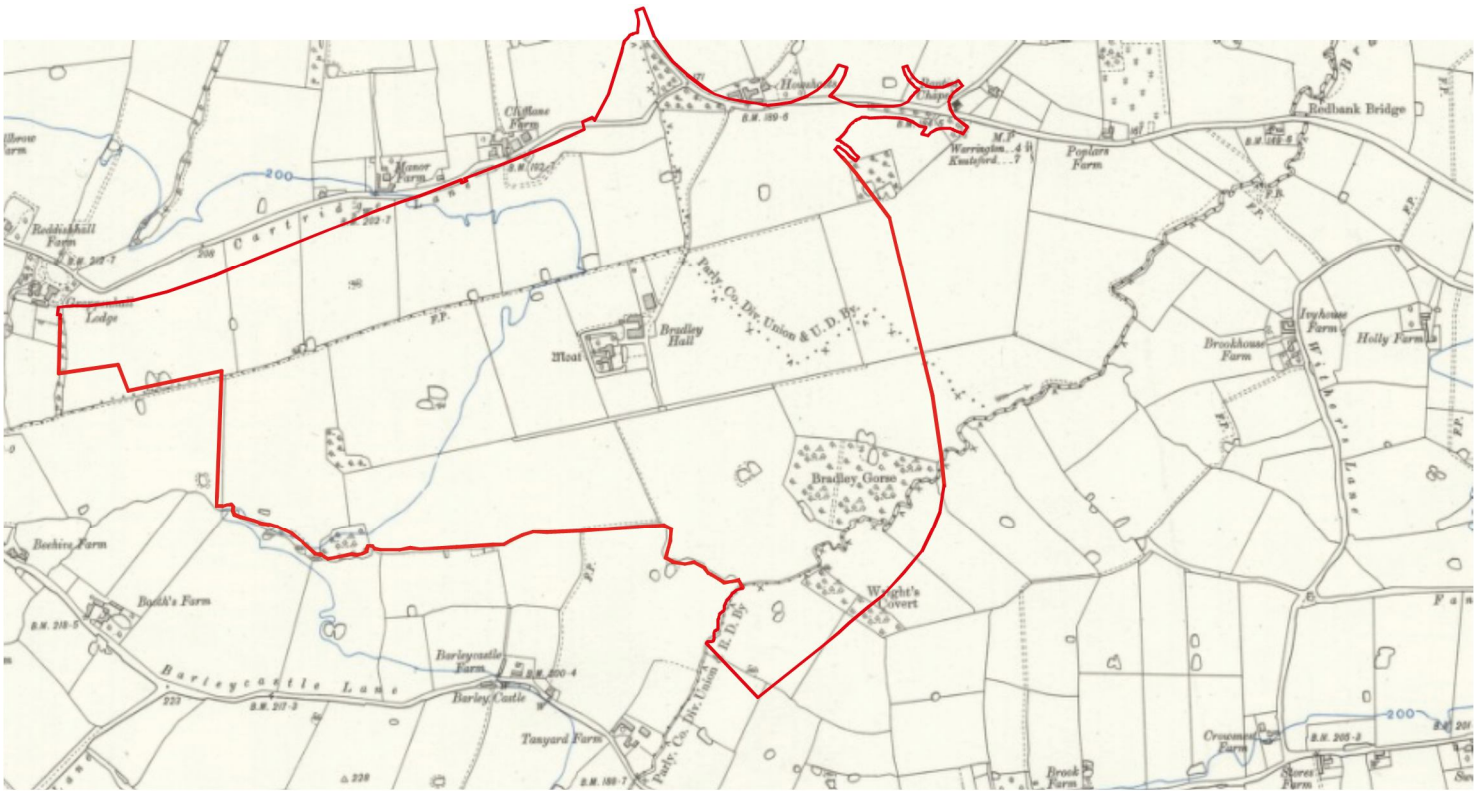

Figure 9.7 Extract from the OS map of 1947, showing the proposed development site (not to scale)

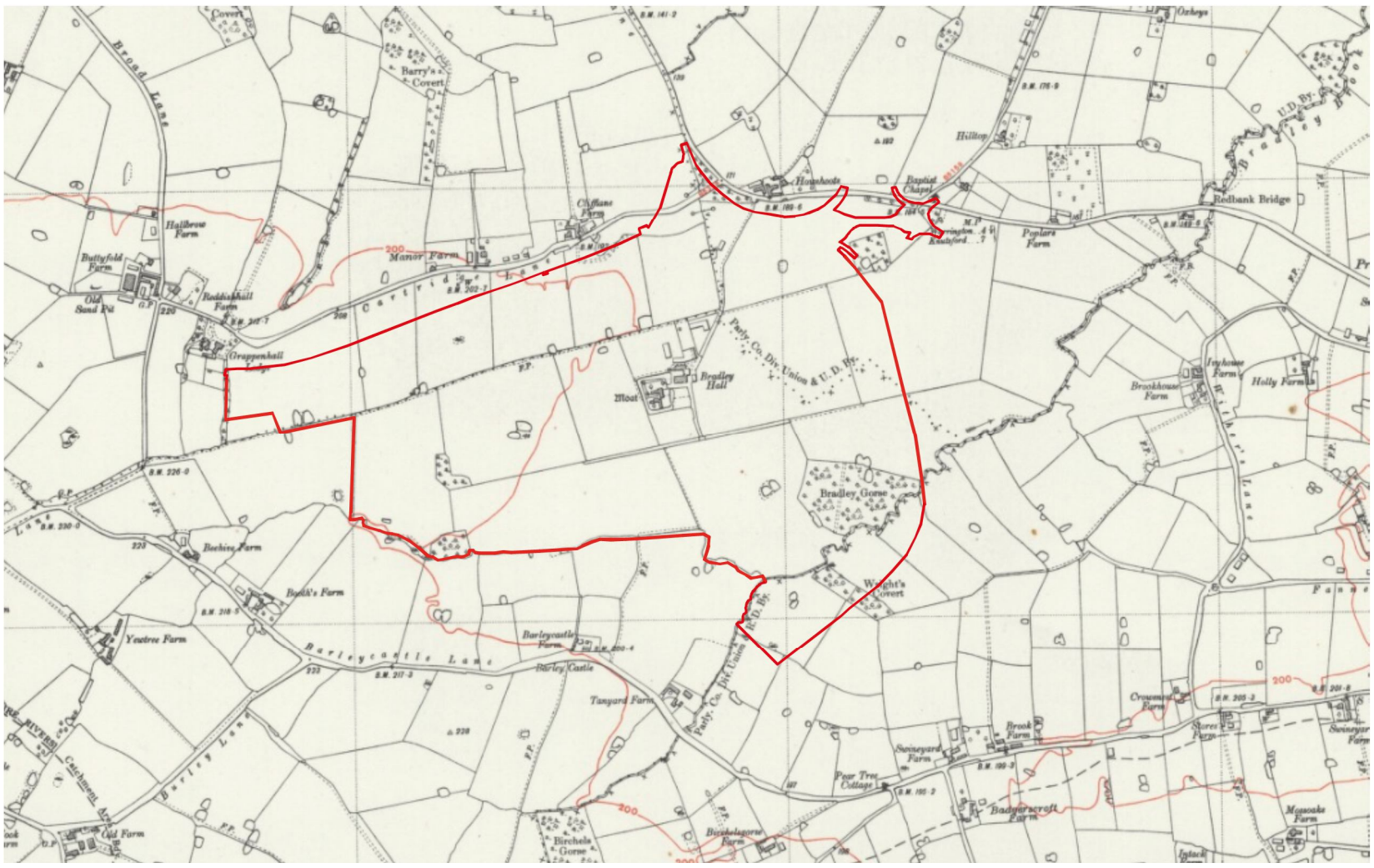

Figure 9.8 1940s Aerial Photograph, showing proposed development site (not to scale)

Figure 9.9 1970s Aerial Photograph, showing proposed development site (not to scale)

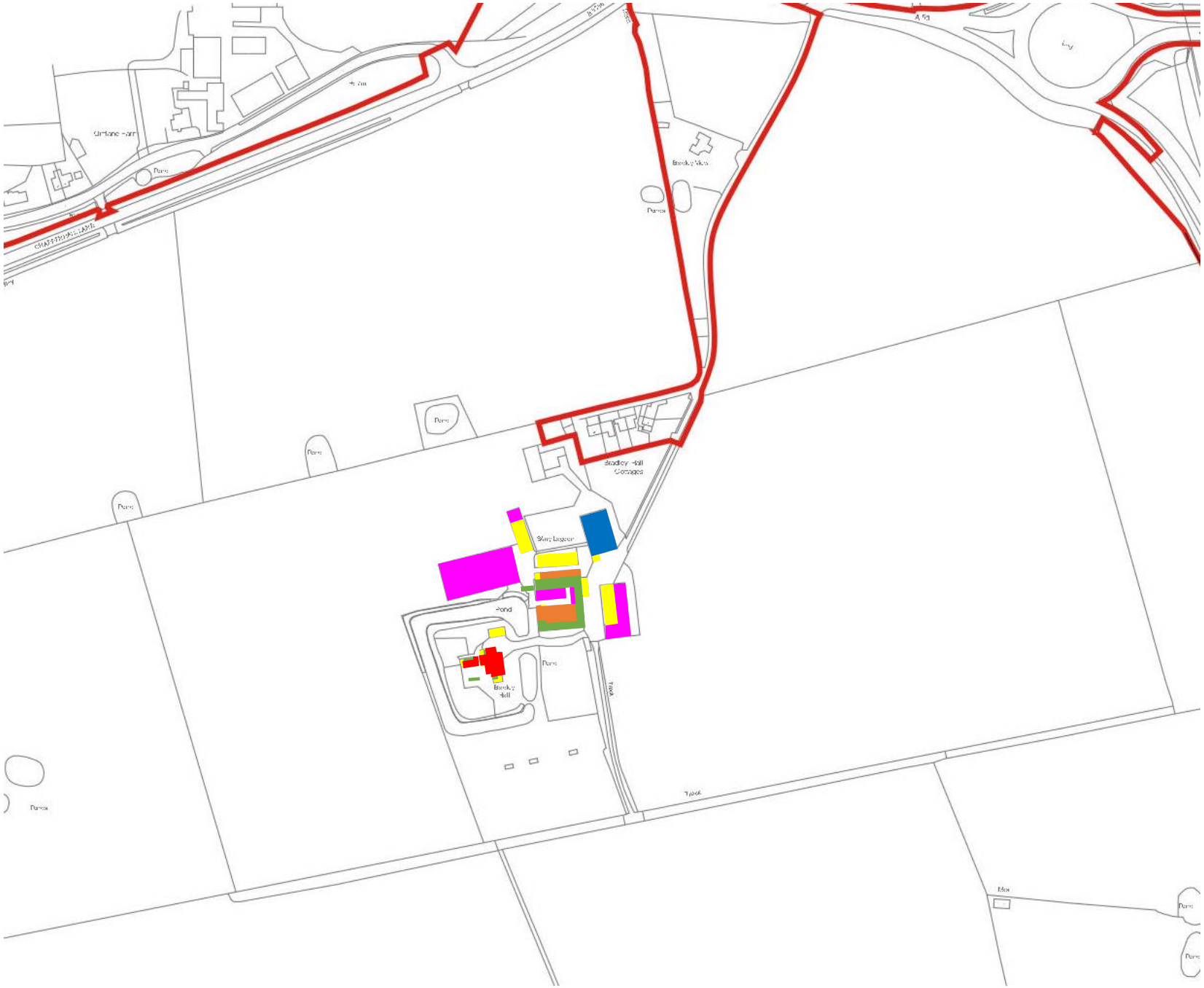

Figure 9.10 *Plan showing the historical development sequence of Bradley Hall Farm*

Appendix 9.2 – Gazetteer of Heritage Assets

HER Reference	Site Name	Grid Reference	Description
Designated Assets			
DCH1638 538/1	Yew Tree Farmhouse Grade II Listed Building **1139340**	SJ 6442 8396	Yew Tree Farmhouse is Grade II listed. It has oak framing cased in brick with a grey slate roof. It was probably built around 1800 and later altered.
DCH1659 541/1	Beehive Farmhouse Grade II Listed Building **1139361**	SJ 6463 8415	Grade II listed farmhouse, probably built in the 17th century and later altered. It is timber framed with brick infill and was formerly thatched.
DCH1660 540/1/1	Booths Farm, Shippon On Left (North West) Side Of Farmyard Grade II Listed Building **1139362**	SJ 6475 8406	Grade II listed farmhouse built in the late 17th century. It has a 20th-century rendered brick exterior.
DCH1661 549/1	Tanyard Farm, Farm Building Grade II* Listed Building **1139363**	SJ 6573 8384	Grade II* listed Threshing Barn. It dates from the late 16th century and is oak framed on a sandstone plinth. It has been altered and partly converted into a Shippon (cow house) there is also an 18th century or early 19th-century cartshed and stable here.
DCH1934	Booths Farm Farmhouse Grade II Listed Building **1329740**	SJ 6477 8404	Farmhouse, late C17, altered. Brick rendered mid-C20, with gable copings, cyma kneelers and some dressings of sandstone; graded grey slate roof. Interior C17 open-well newel stair with plain flat (replacement) balusters between ground and first floor and original splat balusters to upper flights and top landing.
DCH1935 548/1	Barleycastle Farmhouse Grade II Listed Building 1329741	SJ 6553 8393	Barleycastle Farmhouse is Grade II listed and was built in the 17th century or earlier. It has 19th-century alterations including a pebble-dashed exterior over the original oak framing.
DCH159	Bradley Hall Moated Site, Scheduled Monument, **1011924**	SJ 6570 8452	The monument comprises a moated site, the island of which is partially occupied by a modernised farmhouse and garden but which was formerly occupied by the manor house of Bradley Hall. The site of Bradley Hall, a moated Manor House is a Scheduled Monument. It was built in 1460 though some parts may have been earlier. The moat is water-filled up to a depth of 2.5m and the platform is now partially occupied by a modernised farmhouse and garden. A causeway on the east side replaces the original drawbridge.
	Church of St Cross, Appelton Thorn, **1139338**		Grade II listed church.
Locally Listed Assets			
DCH12573	Barn at Manor House Farm, Cartridge Lane, Appleton Locally Listed Building	SJ 6529 8484	Warrington Borough Council Executive Board Report: List of Locally Important Buildings and Structures of Architectural or Historic Interest.

DCH12763	Bradley Hall and barn, Cliff Lane, Appleton	SJ 6571 8453	Warrington Borough Council Executive Board Report: List of Locally Important Buildings and Structures of Architectural or Historic Interest.
DCH12869	Milepost at Gallows Croft, Knutsford Road, Lymm	SJ 6524 8578	Warrington Borough Council Executive Board Report: List of Locally Important Buildings and Structures of Architectural or Historic Interest.
DCH12879	Old Chapel, Old Cherry Lane, Lymm Locally Listed Building	SJ 6635 8497	Warrington Borough Council Executive Board Report: List of Locally Important Buildings and Structures of Architectural or Historic Interest.
DCH13677	Tan House Farm, Barleycastle Lane, Appleton	SJ 6573 8381	Warrington Borough Council Executive Board Report: List of Locally Important Buildings and Structures of Architectural or Historic Interest.
Events			
ECH3541	M6 Motorway Widening Scheme, Junctions 16-20. Archaeological Recording of Test Pits.	SJ 723 679	Geological monitoring of test pits 3m by 1m. No significant below ground, archaeological deposits were identified. However given the location of the test pits was chosen on geological and not archaeological grounds.
ECH3554	Greater Manchester Western and Northern Relief Road (M56-M6 link): Archaeological Assessment Report	SJ 703 908	Archaeological assessment, produced in 1993, of three alternative routes proposed for the Greater Manchester Western & Northern Relief Road (M56-M62 Link).
ECH3566	M6 Junctions 16-20 Widening: Archaeological Desk-Top Survey	SJ 755 637	A programme of archaeological assessment undertaken between October 1992 and June 1993 to assess implications of the proposed road widening of the M6 motorway between junctions 16 and 20, and to recommend further measures for recording of affected sites
ECH3652	M6 widening: Junctions 16- 20: Report on Geophysical Survey	SJ 755 637	The results of the geophysical surveys were reported in report SCH4295. Five sites were identified for geophysical survey, of these, two were the location of possible brick kilns, two possibly contained lengths of King Street Roman road and one was potentially the site of salt works. However, the majority of survey areas produced very few anomalies of archaeological interest and most of the data sets were dominated by ferrous responses, predominantly the result of buried pipes and other modern ferrous material. No brick kilns were positively identified.
ECH3653	M6 Widening: Junctions 16- 20. Report on Earthwork Survey	SJ 755 637	A total of 9 sites, totalling an area of 15.67ha, was subject to topographic survey. Most of the sites surveyed were of ridge and furrow earthworks, but they also included a leat relating to Lower Roughwood Mill, and a potential building platform close to Bostock Hall.
ECH3654	M6 Widening: Junctions 16- 20, Cheshire. Cultural Heritage, Stage 3 Assessment Report Text	SJ 755 637	-

ECH4557	Report on Northwest Telent Techmac Design and Consultancy Services Framework Provision of Variable Message Signs on the M56 Between Junctions J9 -16	SJ 520 781	An appraisal or assessment of cultural heritage along the M56 between junctions J9 and J16. Identified listed buildings and sites from which the proposed signs would be visible. These include a moated site, fishpond and connecting channel at Elton, a heavy anti aircraft gun site 400m west of Sutton Fields Farm and two sections of Roman Road between Appleton and Stretton.
ECH4559	Bradley Hall Appleton, The Moated Site and Survey and Research Report	SJ 657 845	The resistivity survey indicated a damp area, running from the house to the oat edge. This was not thought to be drains by the owner. There were dry areas on the South West of the survey. This could confirm the existence of large greenhouses that stood on the site some years ago. The dry areas suggest the presence of buried foundations. Survey also picked up a possible track to the north of the site, potentially Roman
ECH4566	An Archaeological Watching Brief at Bradley Hall Moat, Appleton, Warrington. Final Report	SJ 657 845	Watching brief carried out during the excavation of foundations for a replacement extension to the farmhouse at Bradley Hall Farm, Appleton, Warrington. The moat is a scheduled ancient monument. The foundations were shallow and built on clay which overlay an uneven spread of cobbles which in turn lay over a buried soil. The latter produced the base of a 14th-15th century jar. Industrial waste was recovered that had apparently been used to make paths and other surfaces. The numbers of finds was relatively small but, the conclusions suggest, this is not unusual for sites such as this.
ECH5845	Stretton Airfield, Design Access Statement	SJ 652 835	A design and access statement prepared by Jeffery Bell Architects on behalf of Hensmill Property to support an application for planning permission for a below ground car storage and display facility and an above ground ancillary office.
Monuments			
1197/1	Kings Brook Mill Site of Watermill Industrial Site, Mill, Watermill	SJ 6 8	Place name evidence for a watermill site at High Legh.
2728	Unnamed Site in High Legh Parish Site of 19th century cottage House	SJ 663 832	A single cottage and garden in Crawley Lane is shown on High Legh tithe map in 1849. It is now demolished.
2729/0/1	Swineyard Lane Site of a 19th century house	SJ 661 835	A house with outbuildings, yard and garden in Swineyard Lane shown on the High Legh tithe map in 1848. It has now been demolished.
2729/0/2	Swineyard Lane Site of 19th Century Building House	SJ 662 835 (point)	High Legh tithe map shows a single building and garden now demolished.
2734	Swineyard Farm Prehistoric axe Findspot	SJ 6640 8370	Dark, fine grained stone shaft-hole axe, now in Warrington museum.
2908	Badger's Croft Farm I Cropmark Enclosure. Ditched Enclosure	SJ 66 83	Elliptical shaped cropmark, purpose unknown. 40 to 50 metres in diameter lying on the western end of the High Legh Ridge. Cropmarks are visible changes in the growth of vegetation that may indicate a buried feature.

4091	RNAS Stretton/HMS Blackcap Airfield WW2 Airfield Military Airfield	Centred SJ 652 835	World War 2 military airfield opened in 1942 and run as Royal Navy HMS Blackcap from December 1944.
4468/0/0	Strict Baptist Chapel, Cherry Lane Strict Baptist Chapel Strict Baptist Chapel	Centred SJ 663 849	Strict Baptist Chapel built in 1819 from brick with round arched windows. A porch was added and the interior was refitted in 1889.
4657	Pond, North of Cartridge Lane, Grappenhall. Pond shown on OS 1st Edition Maps of Cheshire	SJ 648 847	Pond with sluice at north end shown on the 1st edition Ordnance Survey maps. The 6" 1st edition map was surveyed 1873-6 and was published in 1882. Now a water-filled hollow, with a low bank along the field boundary to the west. Heavily overgrown by trees. Sluice not identified.
538/1 (DCH1638)	Yew Tree Farmhouse 17th century farmhouse Farm, Farmstead,	SJ 644 839	Yew Tree Farmhouse is Grade II listed. It has oak framing cased in brick with a grey slate roof. It was probably built around 1800 and later altered.
540/1/1 DCH1660	Booth's Farm Farmhouse Post Medieval farmhouse Farm, Farmstead	SJ 647 840	Grade II listed farmhouse built in the late 17th century. It has a 20th-century rendered brick exterior.
540/1/2	Shippon, Booth's Farm Timber framed barn Cow House, Farm, Farmstead, Barn	SJ 647 840	Grade II listed timber framed barn. It has an oak frame and a grey slate roof dating to the post-medieval period (17th century).
541/1 (DCH1659)	Beehive Farmhouse Post Medieval farmhouse Farm, Farmstead, Timber Framed Building,	SJ 646 841	Grade II listed farmhouse, probably built in the 17th century and later altered. It is timber framed with brick infill and was formerly thatched.
547/1/0	North Cheshire Ridge Roman Road	SJ 66 83	Roman Road, The alignment is dictated by the crest-line of the escarpment of New Red Sandstone overlooking the Mersey valley to the north. The road surface was observed in excavation (547/1/1). Unusually for Roman roads in Cheshire there were drainage ditches along each side of the road structure, some 2m wide and 0.6m deep. The agger apparently had a rough curb on each side to retain the structure. There is good evidence that the road continued as a route in medieval times.
547/1/13	North Cheshire Ridge Roman Road – Stretton Airfield Section of Roman Road	SJ 648 844	Section through North Cheshire Ridge Roman road at Stretton Airfield. The road surface here was 13.5 metres wide.Roman Road traced for around 12km. The alignment is dictated by the crest-line of the escarpment of New Red Sandstone overlooking the Mersey valley to the north.
547/1/7	The North Cheshire Ridge Roman Road Section of Roman road	SJ 658 846	Roman Road traced for around 12km. The alignment is dictated by the crest-line of the escarpment of New Red Sandstone overlooking the Mersey valley to the north.

547/1/8	The North Cheshire Ridge Roman Road Section of Roman road	SJ 67 84	Roman Road traced for around 12km. The alignment is dictated by the crest-line of the escarpment of New Red Sandstone overlooking the Mersey valley to the north.
548/1	Barley castle Farmhouse Post Medieval farmhouse Farm,	SJ 655 839	Barleycastle Farmhouse is Grade II listed and was built in the 17th century or earlier. It has 19th-century alterations including a pebbledashed exterior over the original oak framing.
549/1 DCH1661	Tanyard Farm Farm-building 16th century barn Cow House, Farm, Stable	SJ 657 838	Grade II* listed Threshing Barn. It dates from the late 16th century and is oak framed on a sandstone plinth. It has been altered and partly converted into a Shippon (cow house) there is also an 18th century or early 19th-century cartshed and stable here.
550/1	Bradley Hall moated site Medieval moated site Manor, Manor House, Moat, Gate Centred	SJ 656 845	The site of Bradley Hall, a moated Manor House is a Scheduled Monument. It was built in 1460 though some parts may have been earlier. The moat is water-filled up to a depth of 2.5m and the platform is now partially occupied by a modernised farmhouse and garden. A causeway on the east side replaces the original drawbridge.
551	Bradley Cross Site of medieval cross	SJ 6 8	"Crux de Braddelegh" is mentioned in documents dated 1386. The cross that once marked the point where Grappenhall, Lymm and Appleton met is now lost.
615	Reddish Hall Medieval moated site Moat	SJ 646 847	Site of Reddish Hall, a medieval moated hall. The hall is no longer standing and the three sides of the moat are now spread by ploughing.

Appendix 9.3 – Geophysical Survey Report

Grappenhall Lane, Grappenhall Warrington, Cheshire

Archaeological geophysical survey

Project No. ARC/2247/857

January 2019

Grappenhall Lane, Grappenhall
Warrington, Cheshire

Archaeological geophysical survey

Project No. ARC/2247/857

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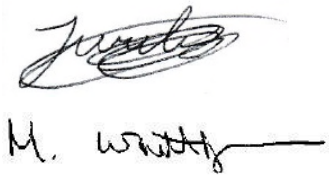
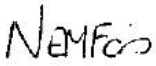
Signature		Signature	
Date	21/01/19	Date	22/01/19

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1. SUMMARY

Phase Site Investigations Ltd was commissioned to carry out a magnetic gradient survey at a site at Grappenhall Lane, Grappenhall, Warrington, Cheshire. The aim of the survey was to help establish the presence / absence, extent, character, relationships and date (as far as circumstances and the inherent limitations of the technique permits) of archaeological features within the survey area.

The survey was undertaken using a Phase Site Investigations Ltd multi-sensor array cart system (MACS). The MACS comprised 8 Foerster 4.032 Ferex CON 650 gradiometers with a control unit and data logger. The MACS data was collected on profiles spaced 0.5 m apart with readings taken at between 0.1 and 0.15 m intervals.

A Roman road is postulated to cross the site from east to west but there is no clear evidence for this in the magnetic data.

Bradley Hall moated site, which is a Scheduled Monument, is located within the site. The scheduled monument itself was not covered by the geophysical survey. The adjacent field to the west was surveyed but no anomalies suggestive of features related to the moated site were identified.

The majority of the anomalies identified by this survey relate to modern material / objects (including a number of infilled ponds), agricultural activity (including field drains and possible remnants of ridge and furrow) and geological / pedological variations.

There are numerous linear / curvi-linear anomalies of uncertain origin. The majority of these do not form a clear pattern or relationship that would indicate an archaeological origin and the majority of these are considered more likely to be associated with agricultural activity, drainage features or natural features / variations. Several stronger linear / curvi-linear anomalies could be related to infilled features but the exact type of feature is not known.

A heritage assessment of the site indicated that possible quarry pits have been identified from air photographs. It appears that a number of these features correspond with infilled ponds and the magnetic data suggests that relatively modern infill material is present and possible drainage features are associated with a number of these features. It is possible that some of the former ponds could originally have been quarry pits but this cannot be confirmed by the survey.

2. INTRODUCTION

2.1 Overview

Phase Site Investigations Ltd was commissioned by BWB Consulting Ltd to carry out an archaeological geophysical survey at a site at Grappenhall Lane, Grappenhall, Warrington, Cheshire utilising magnetic gradiometers.

The aim of the survey was to help establish the presence / absence, extent, character, relationships and date (as far as circumstances and the inherent limitations of the technique permits) of archaeological features within the survey area.

The location of the site is shown in drawing ARC_2247_857_01.

2.2 Site description

The site is situated at Grappenhall Lane, Grappenhall, Warrington, Cheshire (centred at NGR SJ 656 844) and covered an area of approximately 98 ha.

The site encompassed a number of pasture and arable fields, paddocks / grassed areas, areas of woodland / dense vegetation, a farm complex containing a number of buildings, structures (including Bradley Hall moated site) and yard areas and three roundabouts and carriageways.

The general topography for the site is that of a gentle rise upwards to the north-west. Several depressions were observed at the time of the survey within a number of fields.

For the purposes of this report each field that was surveyed has been given a number as shown in drawing ARC_2247_857_02. Descriptions for each field that was surveyed are provided in Section 4.

The geology of the site consists of mudstone of the Bollin Mudstone Member overlain by glacial till (British Geological Survey, 2019). The soils of the site are described as slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (Soilscapes, 2019).

2.3 Archaeological background

A cultural heritage and archaeology chapter in an environmental impact assessment (BWB Consulting Ltd, in prep.) indicates that Bradley Hall moated site, which is a Scheduled Monument (list entry number: 1012501) is located within the site. The scheduled monument was not covered by the geophysical survey.

A Roman road is believed to cross the site. This, '*may have reused an earlier route along the ridgeline [...] part of which runs through the site in an east west direction above the Bradley Hall Moated Site'*.

Additionally:

"Analysis of aerial photographs taken between 1945 and 1948 infer the presence of some quarry pits / roadside ditches along the section which traverses the site. Later aerial photograph taken in the 1970s show similar features towards the western part of the site."

Historic maps (old-maps.co.uk, 2019) indicate that the fields covered by the geophysical survey have been in use for agriculture since before 1877. Some historic maps indicate the presence of ponds within a number of fields.

2.4 Scope of work

The survey area was specified by the client based on a proposed development boundary. A number of fields / areas within the site were excluded from the survey as it is understood that no development will take place on these. The carriageways and areas around the farm buildings were also not included in the survey.

The extent of the survey area in each field is shown in drawing ARC_2247_857_02. Excluding the fields that did not require surveying as well as the areas of woodland, roads and the buildings, the survey covered an area of approximately 65.5 ha.

The survey had to be carried out in three phases due to accessibility. The first phase was carried out between 6 and 17 August 2018 and covered Fields 1, 2, 4, 5, 6, 7, 8, 10 and 11. The second phase was carried out between 17 and 19 September 2018 and covered Fields 3 and 9. The third phase was carried out on 16 January 2019 and covered Field 12.

No other problems were encountered during the survey.

3. SURVEY METHODOLOGY

3.1 Magnetic survey

The survey was undertaken using a Phase Site Investigations Ltd multi-sensor array cart system (MACS)

The MACS comprised 4 Foerster 4.032 Ferex CON 650 gradiometers with a control unit and data logger. The Foerster gradiometers do not require balancing as each sensor is automatically 'zeroed' using the control unit software.

The MACS utilises an RTK GNSS system which means that survey grids do not have to be established. Instead an area is surveyed over a series of continuous profiles and the position of each data point is recorded using an RTK GNSS system. The sensors have a separation of 0.5 m which means that data was collected on profiles spaced at 0.5 m apart. Readings were taken at between 0.1 m and 0.15 m intervals.

Data is collected on zig-zag profiles along the full length or width of a field, although fields can be sub-divided if they are particularly large. Marker canes are set-out along field boundaries at set intervals and these are used to align the profiles. The survey profiles are usually offset from field boundaries, buildings and other metallic features by several metres to reduce the detrimental effect that these surface magnetic features have on the data. The location of the MACS data is converted direct to Ordnance Survey co-ordinates using the UK OSTN 02 projection. As the survey is referenced direct to Ordnance Survey National Grid co-ordinates temporary survey stations are not established.

3.2 Data processing and presentation

The MACS data was stored direct to a laptop using in-house software which automatically corrects for instrument drift and calculates a mean value for each profile. A positional value is assigned to each data point based on the sensor number and recorded GNSS co-ordinates. The data is gridded using in-house software and parameters are set based on the sensor spacing and mean values. No additional processing is required. The gridded data is then displayed in Surfer 9 (Golden Software) and image files of the data are created.

The data was exported as raster images (PNG files) and are presented in greyscale format with accompanying interpretations at a scale of 1:1500. All greyscale plots were clipped at -2 nT to 3 nT. Greyscale plots have been 'smoothed' using a visual interpolation but the data itself has not been interpolated. For context the interpretation of the full site is displayed at a scale of 1:6000 in drawing ARC_2247_857_21.

The data has been displayed relative to a digital Ordnance Survey base plan provided by the client as drawing *'OS DATA solid hatch removed.dwg'*. The base plan was in the National Grid co-ordinate system and as the survey grids / data were referenced directly to National Grid co-ordinates the data could be simply superimposed onto the base plan in the correct position.

X-Y trace plots were examined for all of the data and overlain onto the greyscale plot to assist in the interpretation, primarily to help identify dipolar and bipolar responses that will probably be associated with surface / near-surface iron objects. However, X-Y trace plots have not been presented here as they do not show any additional anomalies that are not

visible in the greyscale data. A digital drawing showing the X-Y trace plot overlain on the greyscale plot is provided in the digital archive.

All isolated responses have been assessed using a combination of greyscale and X-Y trace plots. There are a large number of 'iron spike', isolated dipolar anomalies present in the data. There is no evidence to suggest that they are associated with archaeological features and so they have not been shown in the interpretation.

Anomalies associated with agricultural regimes are present in the data but each individual anomaly has not been shown on the interpretation. Instead the general orientation of the regime is indicated.

The data was examined over several different ranges during the interpretation to ensure that the maximum information possible was obtained from the data.

The anomalies have been categorised based on the type of response that they exhibit and an interpretation as to the cause(s) or possible cause(s) of each anomaly type is also provided.

A general discussion of the anomalies is provided for the entire site and then the results are discussed on a field by field basis. A discussion of the general categories of anomaly which have been identified by the survey is provided in Appendix 1.5.

The geophysical interpretation drawing must be used in conjunction with the relevant results section and appendices of this report.

4. RESULTS

4.1 General

The data quality across the majority of the survey area is very good allowing the data to be viewed at a narrow range of readings to better identify weak anomalies. There are several areas that have a more disturbed magnetic background and / or strong responses but this is due to the presence of magnetic material in the topsoil or sub-surface, rather than low data quality.

The categories of anomaly, and their possible causes, which have been identified by the survey are discussed in detail below on a field by field basis.

4.2 Field 1

Basic topography: Gently undulating.

Field description: Arable with stubble. Relatively firm underfoot. Bounded by hedges. Industrial buildings were present adjacent to the survey area to the west and south-west.

Interpretation drawing(s): ARC_2247_857_04.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

There are several strong linear responses that are artificial data products. These may be related to a sensor movement or jolt caused by rough / uneven ground or are a product of the very strong responses associated with adjacent structures. These responses are not related to a sub-surface feature and their presence has not affected the reliability of the survey or interpretation.

Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Weak positive linear responses are present probably associated with modern ploughing regime(s).

Relatively weak positive linear responses are present associated with a regime of field drains.

Relatively weak positive linear responses are present associated with either a regime of field drains or the remnants of ridge and furrow.

Linear anomalies corresponding with the position of a former field boundary. The responses will be related to this former feature.

Trends of uncertain origin.

Several isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Further discussion / additional information:

The strong responses in the south-west of the field are caused by the adjacent large industrial buildings and fences. These responses are caused by large buildings with metal coverings just beyond the survey area. Several artificial linear responses are present in this area. These could be caused by a sensor movement but are more likely a product of the very strong responses. They are not related to linear sub-surface features.

A large area of magnetic disturbance (**Anomaly 1A**) in the centre of the field broadly corresponds with the position of a former pond shown on historic maps. It is likely the disturbance is related to material infilling the former pond.

An unusual strong response (**Anomaly 1B**) is present to the south of Anomaly 1A. It corresponds to a former field boundary and is probably related to this feature but the responses suggest that there may be something strongly magnetic within the former field boundary.

Weak responses suggestive of field drains are present in the east of the field. A second series of broadly parallel responses are also present in the east of the field. These could be caused by another regime of field drains, although it is possible that they are associated with the remnants of ridge and furrow.

There are numerous weak or diffuse trends in this field. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. Some responses are suggestive of natural features / variations, others could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear. It is possible that some trends could be associated with the remnants of infilled sub-surface features but they do not form a clear pattern or relationship that would indicate an archaeological origin. **Anomaly 1C** stands out as this is slightly stronger than the majority of trends and so may be more likely to be caused by a sub-surface feature, although it is likely that it will be related to agricultural activity or natural feature / variation.

4.3 Field 2

Basic topography: Gently undulating, gradual slope upwards to the west.

Field description: Arable with stubble. Relatively firm underfoot. Bounded by hedges. An overhead cable pole was present in the east of the field.

Interpretation drawing(s): ARC_2247_857_06.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Positive linear responses are present associated with modern ploughing regimes.

Relatively weak positive linear responses are present associated with either a regime of field drains or the remnants of ridge and furrow.

Linear anomalies corresponding with the position of former field boundaries. The responses will be related to these former features.

Trends of uncertain origin.

Several isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Further discussion / additional information:

A large area of magnetic disturbance (**Anomaly 2A**) in the west of the field broadly corresponds with the position of a former pond shown on historic maps. It is likely the disturbance is related to material infilling the former pond.

A series of broadly parallel responses are present in the field. These could be caused by a regime of field drains, although it is possible that they are associated with the remnants of ridge and furrow.

There are numerous weak or diffuse trends in this field. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. Some responses are suggestive of natural features / variations, others could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear. It is possible that some trends could be associated with the remnants of infilled sub-surface features but they do not form a clear pattern or relationship that would indicate an archaeological origin. **Anomalies 2B** stand out as they are slightly stronger than the majority of trends and so may be more likely to be caused by a sub-surface feature, although it is likely that the majority of them will be related to agricultural activity or natural features / variations. An alignment of linear trends are present in the south of the field (**Anomalies 2C**). It is possible that these responses are related to agricultural or drainage activity.

A number of relatively large isolated positive responses are present (**Anomalies 2D**). It is likely that these are caused by deeper buried relatively modern magnetic material but it is possible that they are associated with infilled discrete features.

4.4 Field 3

Basic topography: Gradual slope upwards to the west.

Field description: Arable with stubble. Relatively firm underfoot. Bounded by hedges.

Interpretation drawing(s): ARC_2247_857_08.

Summary of anomalies:

Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

An area of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Positive linear responses are present associated with modern ploughing regime(s).

Linear responses associated with drainage features..

Positive linear responses are present associated with either regimes of field drains or the remnants of ridge and furrow.

A number of curvi-linear / linear anomalies which broadly correspond with the position of former field boundaries. The responses (and probably several adjacent anomalies) will be related to these former features.

Trends of uncertain origin.

Several isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Positive linear / curvi-linear responses of uncertain origin. Some responses may be related infilled linear / curvi-linear features but others may be caused by agricultural or drainage activity / features.

Further discussion / additional information:

Positive linear / curvi-linear anomalies are present in the north of the field (**Anomalies 3A**). These broadly correspond with former field boundaries, shown on historic maps, and are probably related to these features. It is worth noting that the responses are unusually strong for former field boundaries and it is possible that they contain drains or other relatively modern material / features.

There are several relatively strong anomalies (**Anomalies 3B**) located adjacent to Anomalies 3A. The exact cause of these is not certain but it is likely that they are related to the former field boundaries or associated drainage features.

A series of broadly parallel responses are present in the field. These could be caused by a regime of field drains, although it is possible that they are associated with the remnants of ridge and furrow.

There are numerous weak or diffuse trends in this field. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. Some responses are suggestive of natural features / variations, others could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of

responses that appear to be linear. It is possible that some trends could be associated with the remnants of infilled sub-surface features but they do not form a clear pattern or relationship that would indicate an archaeological origin. There are numerous anomalies related to multiple agricultural and / or drainage regimes in this field and it is likely that many of the other trends are also caused by agricultural or drainage activity.

One relatively large isolated positive response is present (**Anomaly 3C**). It is possible that this is caused by deeper buried relatively modern magnetic material but it could be associated with an infilled discrete feature.

4.5 Field 4

Basic topography: Gradual slope upwards to the north-west. A depression was present in the south of the field.

Field description: Pasture. Relatively firm underfoot. Bounded by hedges in the north, east and south, and by metal wire fencing in the west.

Interpretation drawing(s): ARC_2247_857_10.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Relatively weak positive linear responses are present associated with modern ploughing regime(s).

Positive linear responses are present associated with either a regime of field drains or the remnants of ridge and furrow.

A positive linear anomaly corresponds with the position of a former field boundary and will be related to this feature.

Trends of uncertain origin.

Several isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Positive linear / curvi-linear responses of uncertain origin. Some responses may be related infilled linear / curvi-linear features but others may be caused by agricultural or drainage activity / features.

Further discussion / additional information:

Several large areas of magnetic disturbance are present. **Anomaly 4A** broadly corresponds with the position of a former pond shown on historic maps and a depression was observed in this area at the time of the survey. It is likely the disturbance is related to material infilling

the former pond. **Anomaly 4B** corresponds with an area of woodland shown on historic maps but the disturbance suggests the presence of made ground / fill material.

A series of broadly parallel responses are present in the field. These could be caused by a regime of field drains, although it is possible that they are associated with the remnants of ridge and furrow.

An intermittent / fragmented linear / curvi-linear anomaly is present adjacent to the southern edge of the field (**Anomaly 4C**). A Roman road may be present running along, or adjacent to, the southern field boundary and it is possible that Anomaly 4C may be related to this. However, the strength of response is more suggestive of a relatively modern feature and it is worth noting that the anomaly changes orientation slightly to the south of Anomaly 4A and there is a suggestion that some weak trends may run between Anomalies 4C and 4A. Whilst an archaeological origin cannot be completely ruled out it is considered more likely that Anomaly 4C is related to a relatively modern feature, such as a drain. There is a weak trend (**Anomaly 4D**) that runs broadly parallel with part of Anomaly 4C and may be related to it.

There are a number of weak or diffuse trends in this field. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. Some responses are suggestive of natural features / variations, others could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear. It is possible that some trends could be associated with the remnants of infilled sub-surface features but they do not form a clear pattern or relationship that would indicate an archaeological origin. There are numerous anomalies related to multiple agricultural and / or drainage regimes in this field and it is likely that many of the other trends are also caused by agricultural or drainage activity.

One relatively large isolated positive response is present (**Anomaly 4E**). It is possible that this is caused by deeper buried relatively modern magnetic material but it could be associated with an infilled discrete feature.

4.6 Field 5

Basic topography: Gradual slope upwards to the north-west. Several depressions were present along the northern edge and in the south of the field.

Field description: Pasture. Relatively firm underfoot. Bounded by hedges. A large pond surrounded by trees was present in the east of the field.

Interpretation drawing(s): ARC_2247_857_04, ARC_2247_857_12 and ARC_2247_857_14.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Relatively weak positive linear responses are present associated with modern ploughing regime(s).

Linear responses associated with drainage features.

Positive linear responses are present associated with either regimes of field drains or the remnants of ridge and furrow.

Trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Positive linear / curvi-linear responses of uncertain origin. Some responses may be related infilled linear / curvi-linear features but others may be caused by agricultural or drainage activity / features.

Further discussion / additional information:

Several depressions were observed at the time of the survey along the northern edge of the field. Areas of weak magnetic disturbance or a variable background (**Anomalies 5A**) broadly correspond with these. These anomalies could suggest the presence of former ponds, although they could be related to natural depressions that contain some modern material. There are linear anomalies (**Anomalies 5B**) present adjacent to two of these areas. The cause of these is not certain but if the areas are related to former ponds then it is possible that the linear anomalies are caused by drainage features.

In the south of the field are a series of linear diffuse trends with a number of dipolar components (**Anomalies 5C**). These broadly correspond with two adjacent depressions observed at the time of the survey. Some of the responses are suggestive of field drains and there is a drainage regime located in close proximity to these anomalies. It is possible that Anomalies 5C are also related to drainage features / activity but it is worth noting that some of the trends do form sub-rectangular shapes and as the exact cause of the anomalies is not certain an archaeological origin cannot be completely ruled out.

A linear anomaly (**Anomaly 5D**) is present in the south-east of the field adjacent to a pond. It is likely that this is related to a drainage feature.

A series of broadly parallel responses are present in the field. These could be caused by a regime of field drains, although it is possible that they are associated with the remnants of ridge and furrow.

There are numerous weak or diffuse trends in this field. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. Some responses are suggestive of natural features / variations, others could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear. It is possible that some trends could be associated with the remnants of infilled sub-surface features but they do not form a clear pattern or relationship that would indicate an archaeological origin. There are numerous anomalies related to multiple agricultural and / or drainage regimes in this field and it is likely that many of the other trends are also caused by agricultural or drainage activity. **Anomalies 5E** stand out as

they are slightly stronger than the majority of trends and so may be more likely to be caused by a sub-surface feature, although it is likely that the majority of them will be related to agricultural activity or natural features / variations.

Several relatively large isolated positive responses are present (**Anomaly 5F**). It is possible that these are caused by deeper buried relatively modern magnetic material but they could be associated with infilled discrete features.

4.7 Field 6

Basic topography: Gradual slope upwards to the north.

Field description: Pasture. Relatively firm underfoot. Bounded by hedges. An overhead cable pole was present in the centre of the field. Farm equipment was present in the south-east of the field.

Interpretation drawing(s): ARC_2247_857_06 and ARC_2247_857_14.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

A larger isolated bipolar response. This will be related to a concentration of, or a larger object or feature of, relatively modern ferrous or fired material.

Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Relatively weak positive linear responses are present associated with modern ploughing regime(s).

Linear responses associated with drainage features.

Trends of uncertain origin.

Several isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

A positive linear anomaly of uncertain origin.

Further discussion / additional information:

A large area of magnetic disturbance (**Anomaly 6A**) in the north-east of the site corresponds with the position of a former pond on historic maps. It is probable that the magnetic disturbance is caused by material infilling the pond. A linear anomaly (**Anomaly 6B**) appears to be related to this feature and if so is probably caused by a drainage feature.

The origin of a second area of magnetic disturbance (**Anomaly 6C**) is less certain. No corresponding ponds are present on historic maps. It is possible that Anomaly 6C relates to an infilled pond, not shown on historic maps, or it could be related to another type of infilled feature or a spread of other modern magnetic material.

An isolated bipolar response (**Anomaly 6D**) will be related to a relatively modern feature or material but its exact cause is not certain.

In the south-west of the field there are several responses indicative of field drains. Adjacent to these are several weaker trends (**Anomalies 6E**). It is reasonable to assume that these are also related to drainage features but the exact cause of Anomalies 6E cannot be determined with certainty.

There are a number of other very weak or diffuse trends in this field. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

In the south of the field there is a positive linear anomaly (**Anomaly 6F**). This could also be related to a drainage feature but it is not possible to confirm this and it could be caused by an infilled linear feature.

4.8 Field 7

Basic topography: Gradual slope upwards to the north-west.

Field description: Pasture. Relatively firm underfoot. Bounded by hedges. A barn was present adjacent to the survey area to the west.

Interpretation drawing(s): ARC_2247_857_10, ARC_2247_857_14 and ARC_2247_857_16.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

A larger isolated bipolar response. This will be related to a concentration of, or a larger object of feature of, relatively modern ferrous or fired material.

Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Relatively weak positive linear responses are present associated with modern ploughing regime(s).

Linear responses associated with drainage features.

Trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Positive linear / curvi-linear responses of uncertain origin. Some responses may be related infilled linear / curvi-linear

features but others may be caused by agricultural or drainage activity / features.

Further discussion / additional information:

There are two areas of magnetic disturbance in the north of the field (**Anomalies 7A**). It is possible that they relate to a spread of magnetic material in the topsoil. At the time of the survey shallow pools of standing water were present in these locations. The magnetic disturbance is probably related to infill material, although whether the underlying features are former ponds or may be older quarry features is not certain.

A linear anomaly is present adjacent to the northern edge of the field (**Anomaly 7B**). A Roman road may be present running along, or adjacent to, the northern field boundary and it is possible that Anomaly 7B may be related to this. However, the strength of response is more suggestive of a relatively modern feature. It is possible that Anomaly 7B is related to the areas of magnetic disturbance (Anomalies 7A) and if so the underlying feature may be a relatively modern drainage feature. There appears to be a short linear anomaly (**Anomaly 7C**) that may intersect Anomaly 7B and so could be caused by a related feature. There are several trends (**Anomalies 7D**), that run either parallel with, or have a similar alignment to Anomaly 7B. It is not certain if these are caused by related features / activity or if they are related to, or a product of, modern activity.

A series of weak trends (**Anomalies 7E**), forming a regular shape, and an isolated bipolar response are present in the north-west of the site. A small feature in this area can be seen on a historic map from 1877, which is possibly a small pond. Anomalies 7C are probably related to this relatively modern feature.

There are a number of field drains in the west and centre of the field. Several weak trends are also present in the same general area (**Anomalies 7F**). The trends are weaker and do not form as clearly defined patterns but it is likely that they are also related to drainage features.

In the south-east of the field there are a number of trends and a small area of magnetic disturbance (**Anomalies 7G**). The cause of these is not certain but they could be related to a small infilled features and drainage activity.

There are a number of other very weak or diffuse trends in this field. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or drainage activity or even be random collections of responses that appear to be linear.

4.9 Field 8

Basic topography: Gradual slope upwards to the north.

Field description: Pasture. Relatively firm underfoot. Bounded by hedges in the north, east and west and by metal wire fencing in the south.

Interpretation drawing(s): ARC_2247_857_10 and ARC_2247_857_16.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Relatively weak positive linear responses are present associated with modern ploughing regime(s).

Linear positive responses or trends associated with probable drainage features.

Positive linear responses are present associated with either a regime of field drains or the remnants of ridge and furrow.

Trends of uncertain origin.

A number of isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Further discussion / additional information:

There are a small number of very weak or diffuse trends in this field. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or drainage activity or even be random collections of responses that appear to be linear.

4.10 Field 9

Basic topography: Gradual slope upwards to the west. Several field depressions were present along the south and in the east.

Field description: Pasture. Relatively firm underfoot. Field was bounded by hedges to the north, east and west. The southern boundary was formed by a brook. An overhead cables pole was present in the east of the field.

Interpretation drawing(s): ARC_2247_857_12, ARC_2247_857_14 and ARC_2247_ 857_18.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

Larger isolated bipolar responses. These will be related to a concentration of, or a larger object of feature of, relatively modern ferrous or fired material.

Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Relatively weak positive linear responses are present associated with modern ploughing regime(s).

Linear positive responses or trends associated with probable drainage features.

Positive linear responses are present associated with either regimes of field drains or the remnants of ridge and furrow.

Trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Positive linear / curvi-linear responses of uncertain origin. Some responses may be related infilled linear / curvi-linear features but others may be caused by agricultural or drainage activity / features.

Further discussion / additional information:

Several depressions were observed at the time of the survey in the south of the field. Areas of weak magnetic disturbance or a variable background (**Anomalies 9A**) broadly correspond with these. These anomalies could suggest the presence of former ponds, although they could be related to natural depressions or possibly former quarry pits that contain some modern material. There are no corresponding ponds shown on the historic maps. Several other small areas of magnetic disturbance are present. These could also related to small infilled features.

There are linear anomalies (**Anomalies 9B**) present adjacent to the western area of magnetic disturbance. The cause of these is not certain but if the area is related to a former pond then it is possible that the linear anomalies are caused by drainage features.

The eastern-most area of magnetic disturbance has a number of adjoining and adjacent / interconnecting linear anomalies (**Anomalies 9C**). Many of these linear responses are suggestive of infilled features, but whether these are related to archaeological ditches, drainage features or relatively modern boundary ditches is not certain. The responses all appear to be related / respect each other, including the area of magnetic disturbance and this could suggest that they are relatively modern, although it is also possible that the activity is older and modern material has collected or been infilled within the visible depression. The exact function and date of the underlying features is uncertain.

A series of broadly parallel responses are present in the field. These could be caused by a regime of field drains, although it is possible that they are associated with the remnants of ridge and furrow.

An intermittent linear trend (**Anomaly 9D**) is present in the centre of the field on a broadly north to south alignment. There are a number of trees in a row visible on historic maps in this area, which indicates that Anomaly 9D probably relates to a former field boundary.

There are numerous weak or diffuse trends in this field. These are generally too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. Some responses are suggestive of natural features / variations, others could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear. It is possible that some trends could be associated with the remnants of infilled sub-surface features but they do not form a clear pattern or relationship

that would indicate an archaeological origin. There are numerous anomalies related to multiple agricultural and / or drainage regimes in this field and it is likely that many of the other trends are also caused by agricultural or drainage activity. **Anomalies 9E** stand out as they are slightly stronger than the majority of trends. The responses are suggestive of drainage features, although this interpretation is not certain and they could be caused by some other type of infilled features. Several other trends (**Anomalies 9F)** stand out slightly and may be caused by sub-surface features, although it is likely that the majority of them will be related to agricultural activity or natural features / variations.

Two broadly parallel discontinuous weak trends are present in the north-west of the field (**Anomalies 9D**). These responses could be archaeological in origin and be associated with a trackway but the intermittent nature of the responses and lack of obvious association with other archaeological features precludes a definite interpretation. Due to their relative position of each other, it is possible Anomalies 9D relates to Anomalies 5D and the most western part of Anomalies 9A.

A relatively strong positive linear response (**Anomaly 9G**) is present in the south of the field. Its origin is uncertain, but the strength of responses and lack of related features suggest that it may be a relatively modern, possibly drainage, feature.

4.11 Field 10

Basic topography: Gradual slope upwards to the north-west. A depression was present in the centre of the field.

Field description: Pasture. Relatively firm underfoot. Bounded by hedges in the north, north-east and west, and woodland to the east. The southern boundary was formed by a brook.

Interpretation drawing(s): ARC_2247_857_18.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

Larger isolated bipolar responses. These will be related to a concentration of, or a larger object of feature of, relatively modern ferrous or fired material.

Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Relatively weak positive linear responses are present associated with modern ploughing regime(s).

Linear positive responses or trends associated with probable drainage features.

Trends of uncertain origin. Some trends may be related to infilled linear / curvi-linear features or remnant of features.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Further discussion / additional information:

A large area of magnetic disturbance (**Anomaly 10A**) in the centre of the site corresponds with the position of a former pond shown on historic maps. A depression was observed in this area at the time of the survey. It is likely the disturbance is related to material infilling the former pond.

There are numerous linear responses, indicative of field drains, that appear to connect or relate to the former pond. Several weaker trends are present (**Anomalies 10B**), that are probably also be related to drainage activity, although some of these responses are less clear and could possibly be caused by a different type of feature. There is no evidence to suggest that these are related to archaeological features and so if they are not caused by drains then they are probably associated with agricultural activity.

There are a number of other very weak or diffuse trends in this field. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

4.12 Field 11

Basic topography: Gradual slope upwards to the north-west. An area of uneven ground was present in the south of the field.

Field description: Pasture. Relatively firm underfoot. Bounded by hedges in west and east, a metal wire fence in the north and a woodland in the south.

Interpretation drawing(s): ARC_2247_857_16.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Linear positive responses or trends associated with a probable drainage regime.

Relatively weak positive linear responses are present associated with regimes of field drains.

Trends of uncertain origin.

A number of isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Further discussion / additional information:

A large area of magnetic disturbance (**Anomaly 11A**) in the south of the site corresponds with the position of a former pond on historic maps and an area of uneven ground. It is likely the disturbance is related to material infilling the former pond.

A small area of magnetic disturbance is represent in the north-east of the field (**Anomaly 11B**). It is not certain if this is related to an infilled feature or if it is caused by other modern material.

There are a number of very weak or diffuse trends in this field. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or drainage features or even be random collections of responses that appear to be linear.

4.13 Field 12

Basic topography: Gradual slope upwards to the south.

Field description: Arable field under an immature crop. Soft underfoot. Bounded by hedges and fences to the south and west with no fixed boundary to the east and north.

Interpretation drawing(s): ARC_2247_857_20.

Summary of anomalies: Isolated dipolar and small bipolar responses, that are all thought to be associated with modern material. These have not been shown on the interpretation.

Areas of magnetic disturbance associated with relatively modern features / material.

Relatively weak positive linear responses are present associated with modern ploughing regime(s).

Trends of uncertain origin.

Further discussion / additional information:

This majority of the area is dominated by areas of magnetic disturbance related to concentrations of relatively modern magnetic material. It is not certain if these areas relate to a near-surface spread of material or if the disturbance is caused by made ground.

There are several weak or diffuse trends in the area that is not magnetically disturbed. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features but it is likely that they are associated with agricultural or drainage features.

5. DISCUSSION AND CONCLUSIONS

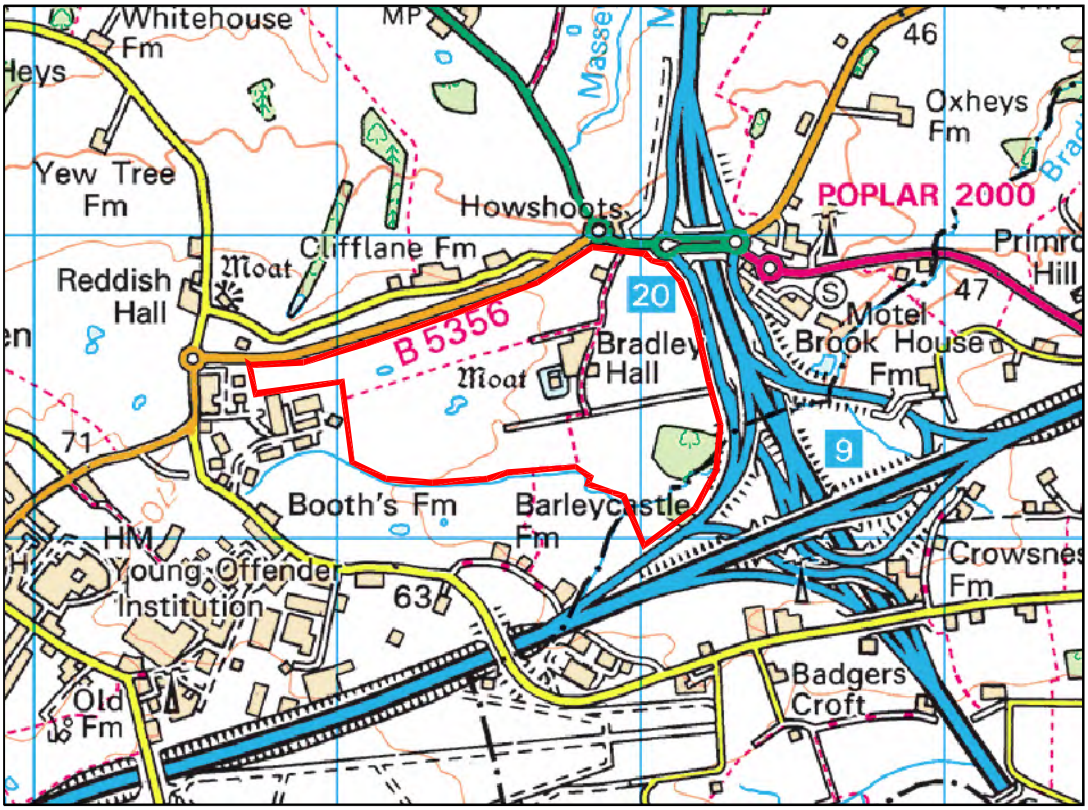
A Roman road is postulated to cross the site from east to west but there is no clear evidence for this in the magnetic data.

Bradley Hall moated site, which is a Scheduled Monument, is located within the site. The scheduled monument itself was not covered by the geophysical survey. The adjacent field to the west was surveyed but no anomalies suggestive of features related to the moated site were identified.

The majority of the anomalies identified by this survey relate to modern material / objects (including a number of infilled ponds), agricultural activity (including field drains and possible remnants of ridge and furrow) and geological / pedological variations.

There are numerous linear / curvi-linear anomalies of uncertain origin. The majority of these do not form a clear pattern or relationship that would indicate an archaeological origin and the majority of these are considered more likely to be associated with agricultural activity, drainage features or natural features / variations. Several stronger linear / curvi-linear anomalies could be related to infilled features but the exact type of feature is not known.

A heritage assessment of the site indicated that possible quarry pits have been identified from air photographs. It appears that a number of these features correspond with infilled ponds and the magnetic data suggests that relatively modern infill material is present and possible drainage features are associated with a number of these features. It is possible that some of the former ponds could originally have been quarry pits but this cannot be confirmed by the survey.



SITE LOCATION

SCALE

0m 500m 1000m

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Scale [A4 Sheet]	Drawing	Status
AS SHOWN	ARC_2247_857_01	FINAL

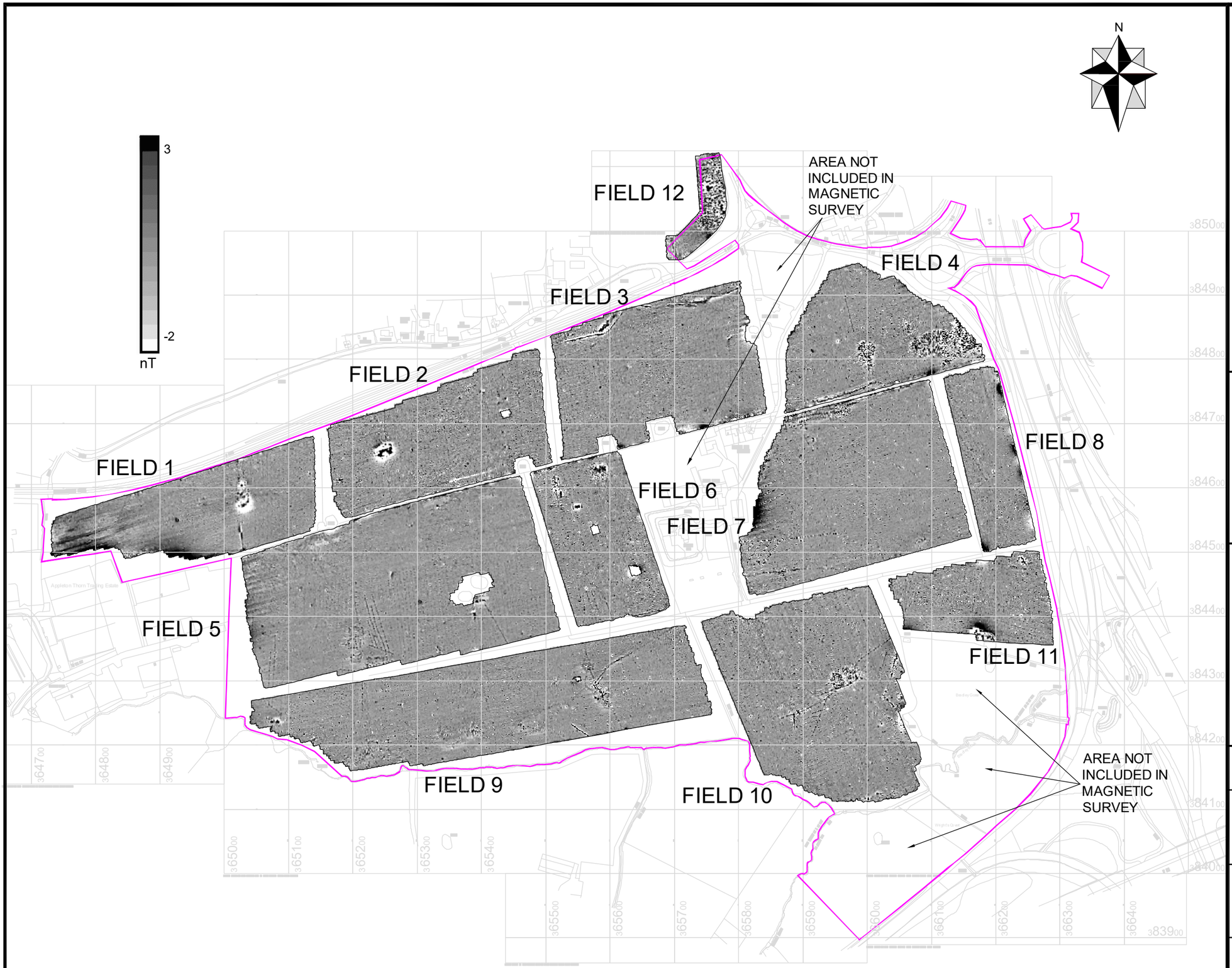
Client: BWB CONSULTING LTD LEEDS

Site: GRAPPENHALL LANE, GRAPPENHALL WARRINGTON, CHESHIRE

Title: SITE LOCATION MAP

Job No: ARC_2247_857

		Drawn	CA
Chk.	NF	Date	20/09/2018



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Scale [A3 Sheet]	Drawing	Status
1:6000	ARC_2247_857_02	FINAL

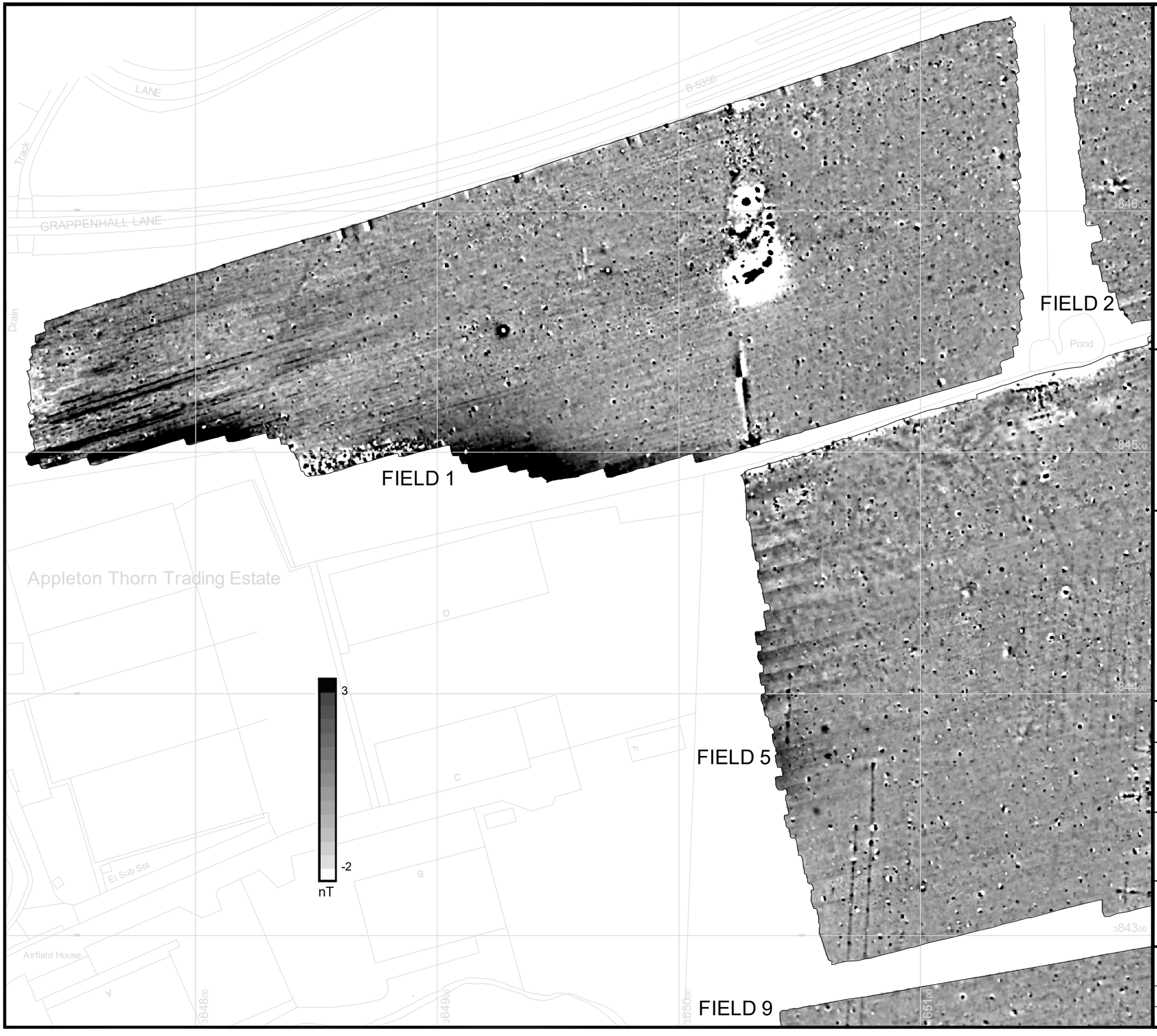
Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
LOCATION OF SITE SHOWING MAGNETIC GRADIENT DATA

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	16/01/2019



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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_03	FINAL

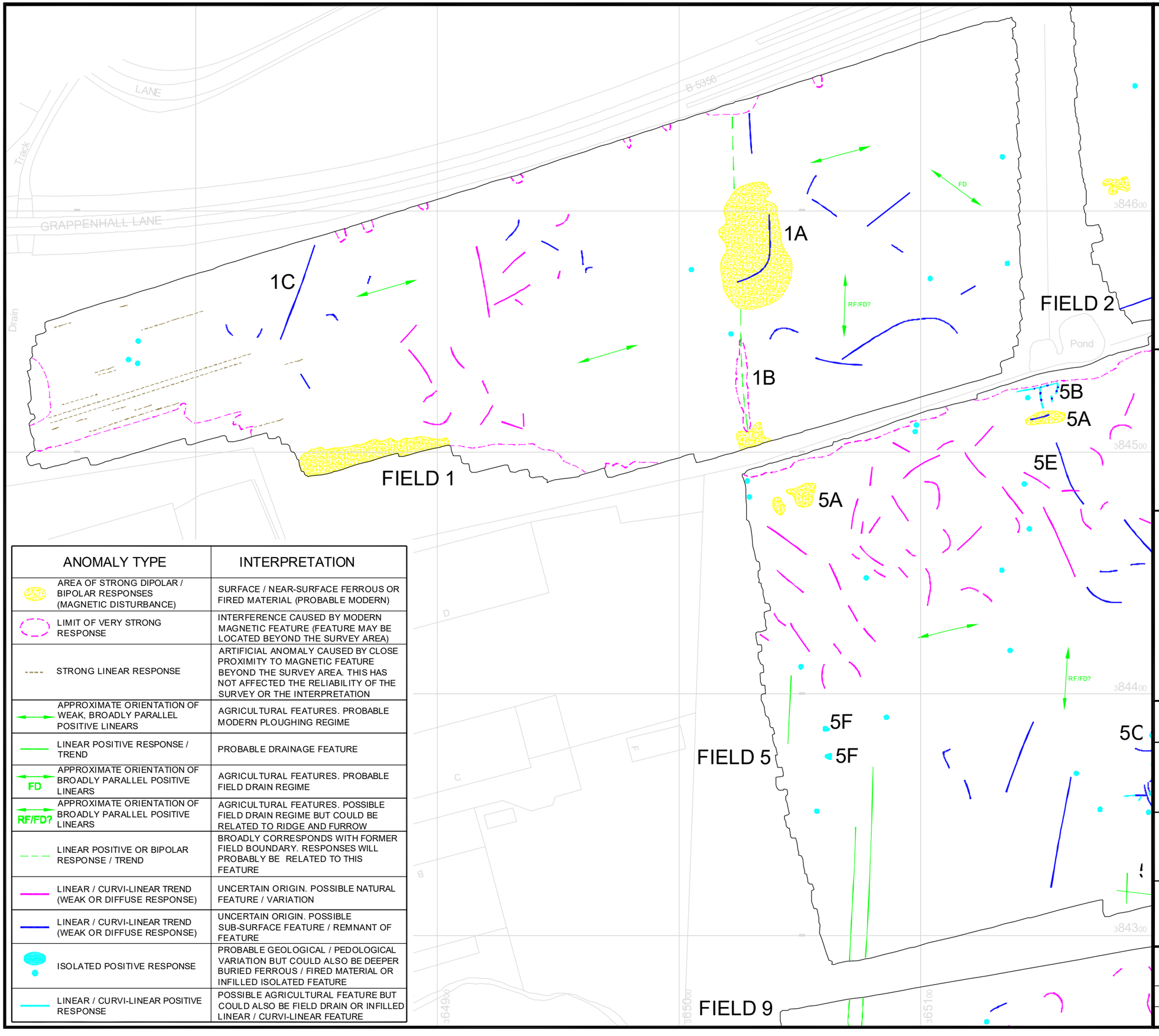
Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: FIELD 1 AND WESTERN PART OF FIELD 5

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



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ALWAYS EXERCISE CAUTION WHEN EXCAVATING

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ANOMALY TYPE		INTERPRETATION
	AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
	LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
	STRONG LINEAR RESPONSE	ARTIFICIAL ANOMALY CAUSED BY CLOSE PROXIMITY TO MAGNETIC FEATURE BEYOND THE SURVEY AREA. THIS HAS NOT AFFECTED THE RELIABILITY OF THE SURVEY OR THE INTERPRETATION
	APPROXIMATE ORIENTATION OF WEAK, BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
	LINEAR POSITIVE RESPONSE / TREND	PROBABLE DRAINAGE FEATURE
FD	APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE FIELD DRAIN REGIME
RF/FD?	APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE FIELD DRAIN REGIME BUT COULD BE RELATED TO RIDGE AND FURROW
	LINEAR POSITIVE OR BIPOLAR RESPONSE / TREND	BROADLY CORRESPONDS WITH FORMER FIELD BOUNDARY. RESPONSES WILL PROBABLY BE RELATED TO THIS FEATURE
	LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE NATURAL FEATURE / VARIATION
	LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
	ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR INFILLED ISOLATED FEATURE
	LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE AGRICULTURAL FEATURE BUT COULD ALSO BE FIELD DRAIN OR INFILLED LINEAR / CURVI-LINEAR FEATURE

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_04	FINAL

Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: FIELD 1, WESTERN PART OF FIELD 5

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018

NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_05	FINAL

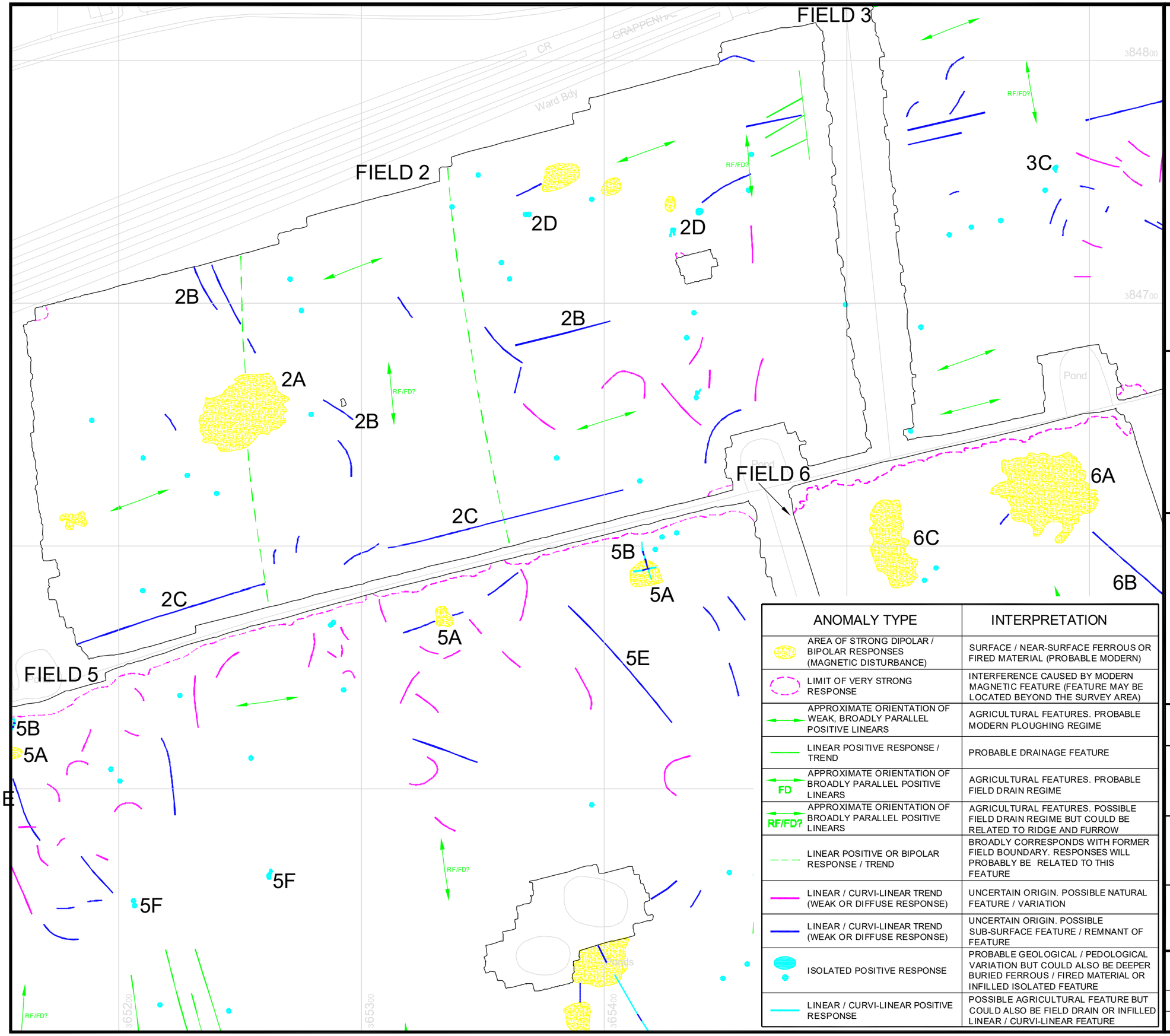
Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: FIELD 2 AND PARTS OF FIELDS 3, 5 AND 6

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



NOTES

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ANOMALY TYPE	INTERPRETATION
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
APPROXIMATE ORIENTATION OF WEAK, BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR POSITIVE RESPONSE / TREND	PROBABLE DRAINAGE FEATURE
FD APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE FIELD DRAIN REGIME
RF/FD? APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE FIELD DRAIN REGIME BUT COULD BE RELATED TO RIDGE AND FURROW
LINEAR POSITIVE OR BIPOLAR RESPONSE / TREND	BROADLY CORRESPONDS WITH FORMER FIELD BOUNDARY. RESPONSES WILL PROBABLY BE RELATED TO THIS FEATURE
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE NATURAL FEATURE / VARIATION
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR INFILLED ISOLATED FEATURE
LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE AGRICULTURAL FEATURE BUT COULD ALSO BE FIELD DRAIN OR INFILLED LINEAR / CURVI-LINEAR FEATURE

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_06	FINAL

Client
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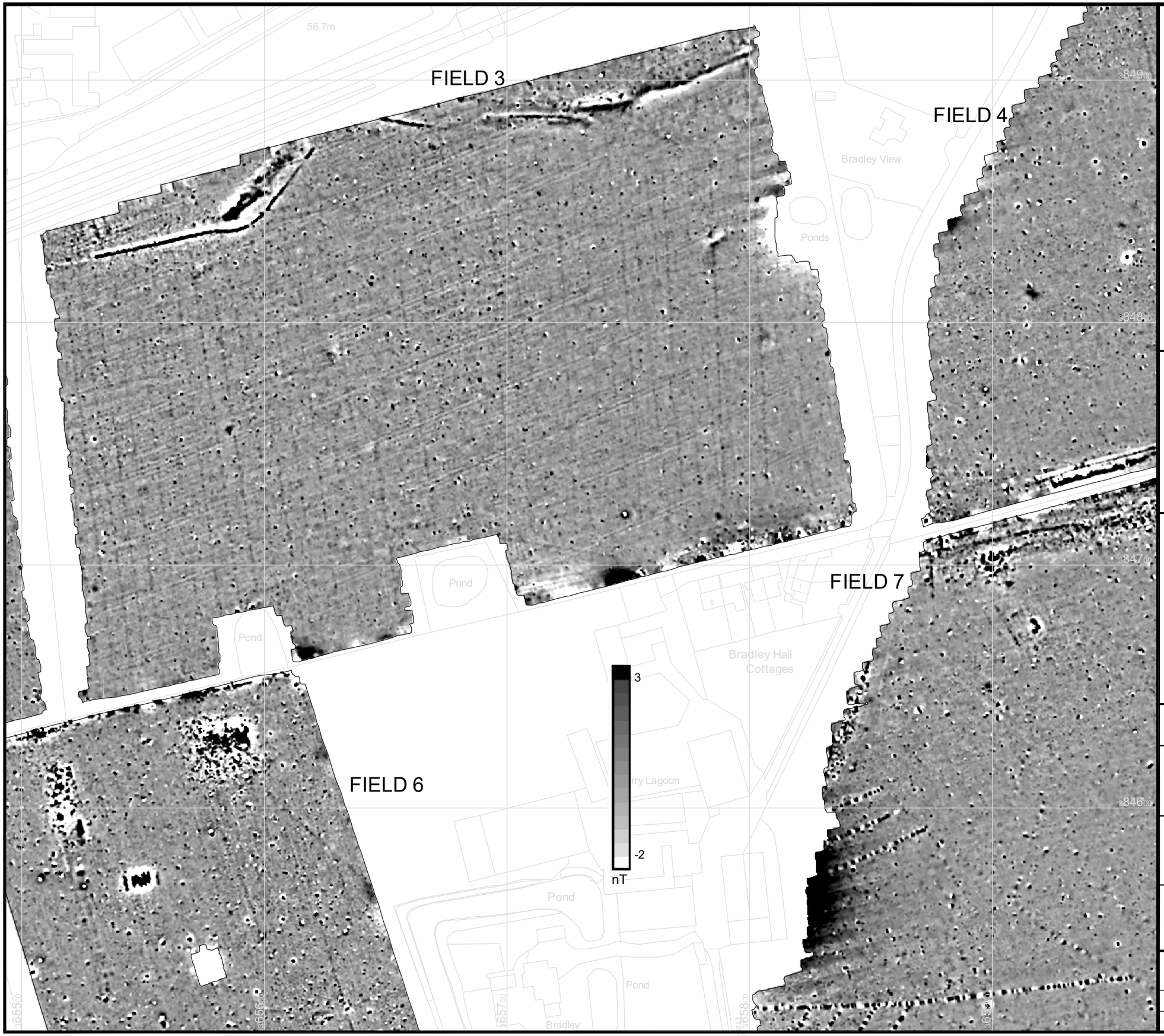
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: FIELD 2 AND PARTS OF FIELDS 3, 5 AND 6

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_07	FINAL

Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: FIELD 3 AND PARTS OF FIELDS 4, 6 AND 7

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018

FIELD 3

3A

3A

3B

3B

3A

FIELD 4

4E

4D

7B

7D

7A

3C

RF/FD?

RF/FD?

RF/FD?

RF/FD?

6A

6C

FIELD 6

6B

6D

Pond

Pond

Pond

Pond

Bradley View

Ponds

Slurry Lagoon

Bradley

56.7m

NOTES

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ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
APPROXIMATE ORIENTATION OF WEAK, BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR POSITIVE RESPONSE / TREND	PROBABLE DRAINAGE FEATURE
RF/FD? APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE FIELD DRAIN REGIME BUT COULD BE RELATED TO RIDGE AND FURROW
LINEAR POSITIVE OR BIPOLAR RESPONSE / TREND	BROADLY CORRESPONDS WITH FORMER FIELD BOUNDARY. RESPONSES WILL PROBABLY BE RELATED TO THIS FEATURE
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE NATURAL FEATURE / VARIATION
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR INFILLED ISOLATED FEATURE
LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE AGRICULTURAL FEATURE BUT COULD ALSO BE FIELD DRAIN OR INFILLED LINEAR / CURVI-LINEAR FEATURE

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_08	FINAL

Client
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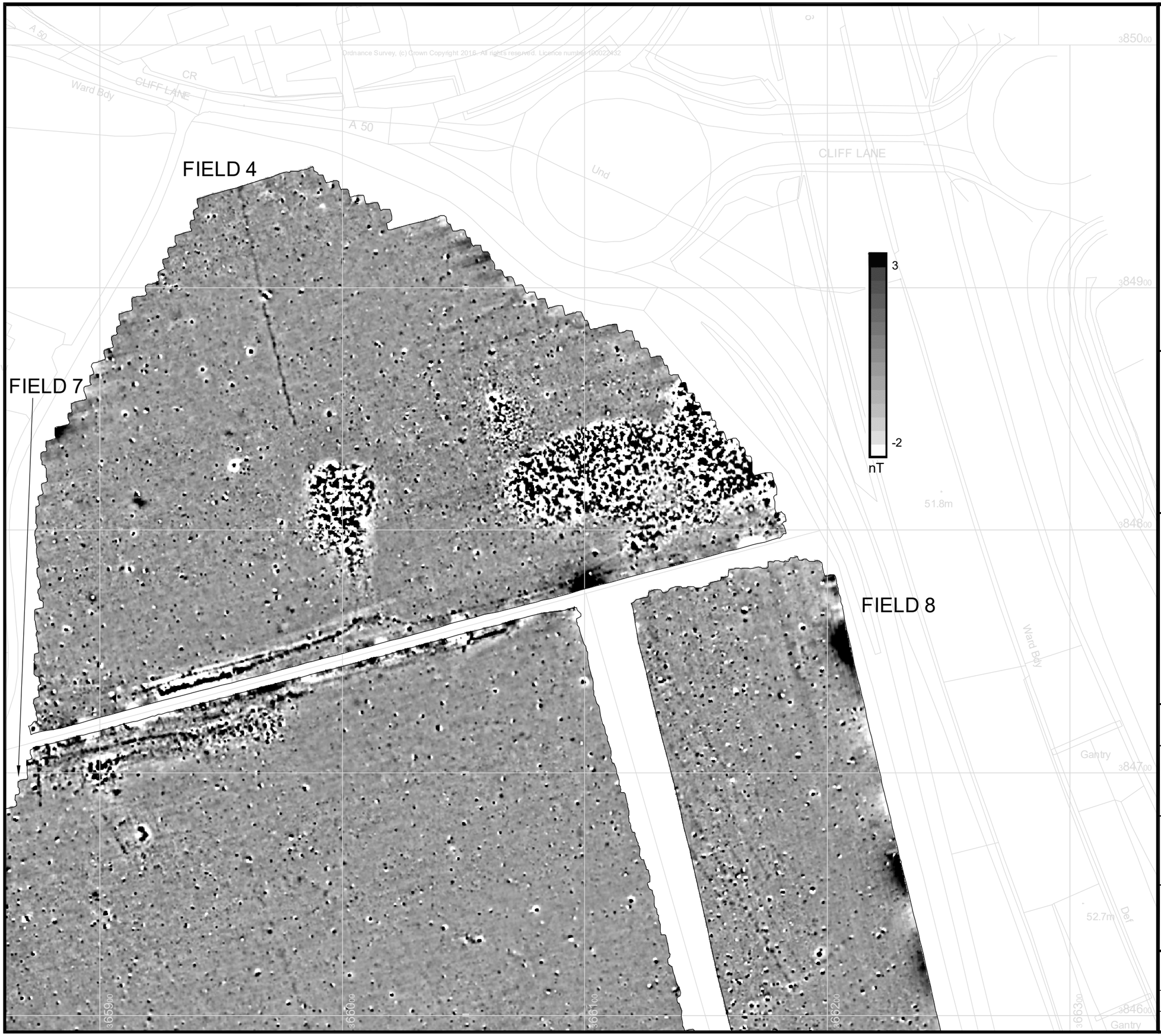
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: FIELD 3 AND PARTS OF FIELDS 4, 6 AND 7

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_09	FINAL

Client
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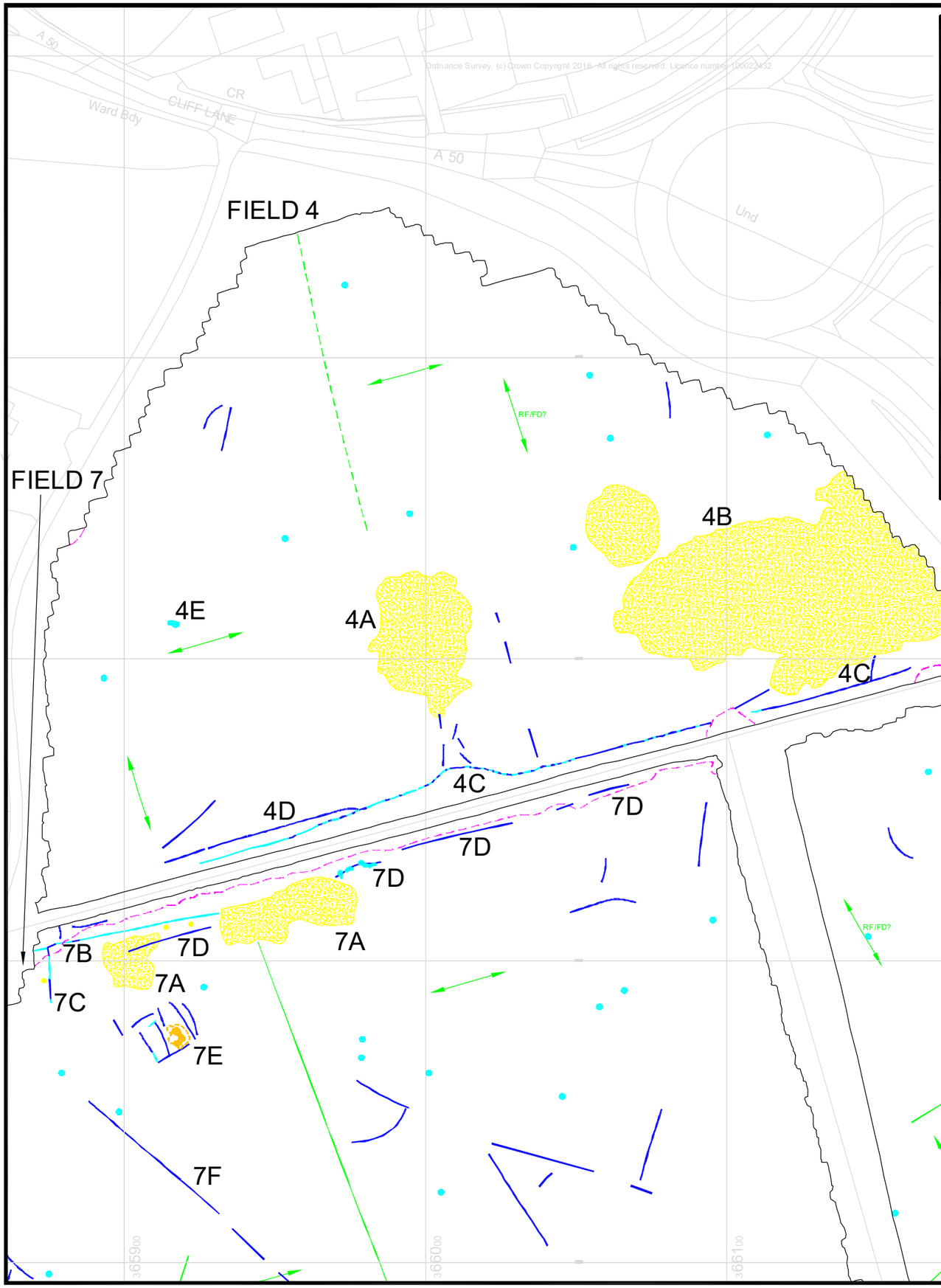
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: FIELD 4 AND NORTHERN PARTS OF FIELDS 7 AND 8

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
APPROXIMATE ORIENTATION OF WEAK, BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR POSITIVE RESPONSE / TREND	PROBABLE DRAINAGE FEATURE
RF/FD? APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE FIELD DRAIN REGIME BUT COULD BE RELATED TO RIDGE AND FURROW
LINEAR POSITIVE OR BIPOLAR RESPONSE / TREND	BROADLY CORRESPONDS WITH FORMER FIELD BOUNDARY. RESPONSES WILL PROBABLY BE RELATED TO THIS FEATURE
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR INFILLED ISOLATED FEATURE
LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE AGRICULTURAL FEATURE BUT COULD ALSO BE FIELD DRAIN OR INFILLED LINEAR / CURVI-LINEAR FEATURE

NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_10	FINAL

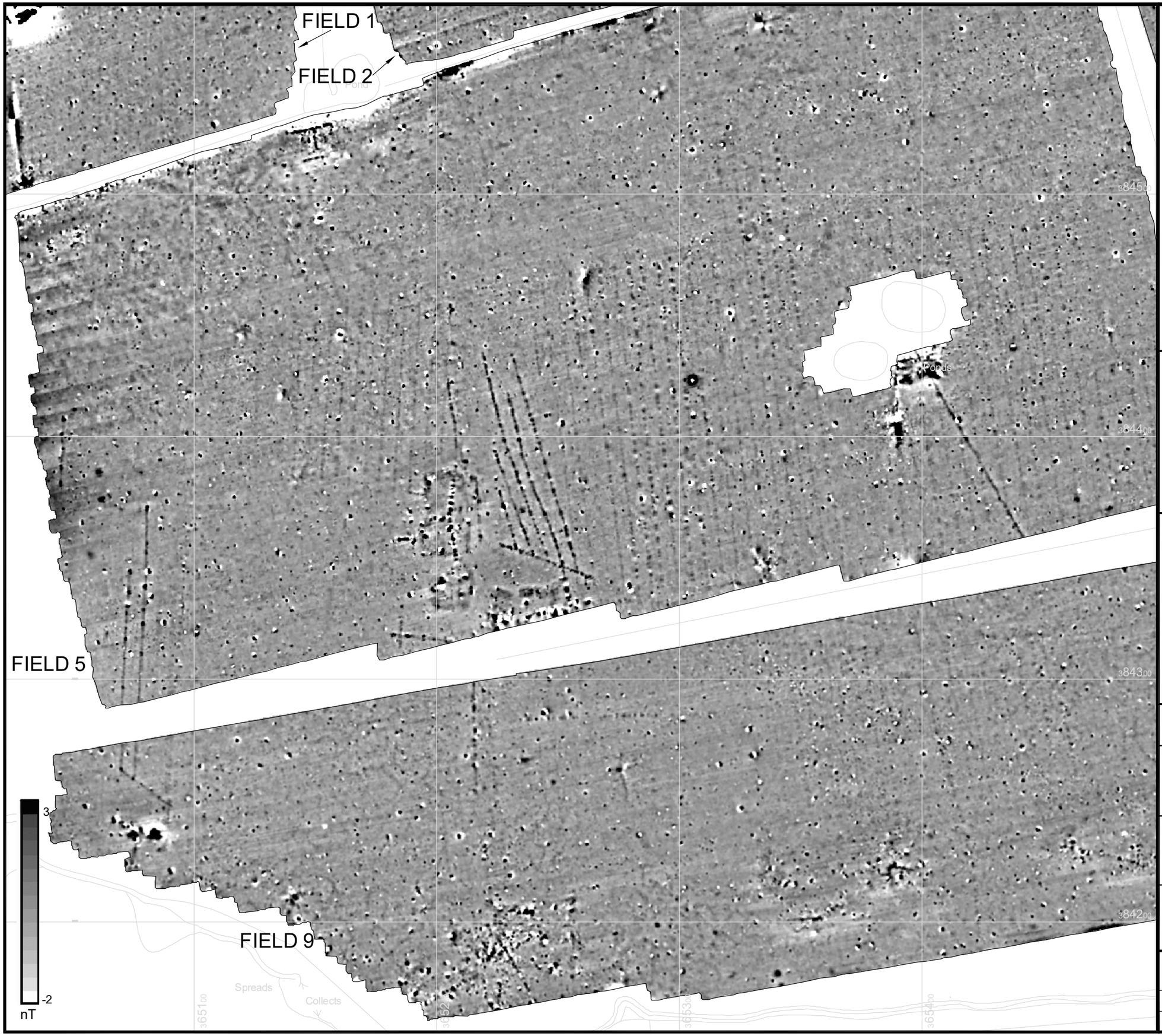
Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: FIELD 4 AND NORTHERN PARTS OF FIELDS 7 AND 8

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_11	FINAL

Client
BWB CONSULTING LTD
LEEDS

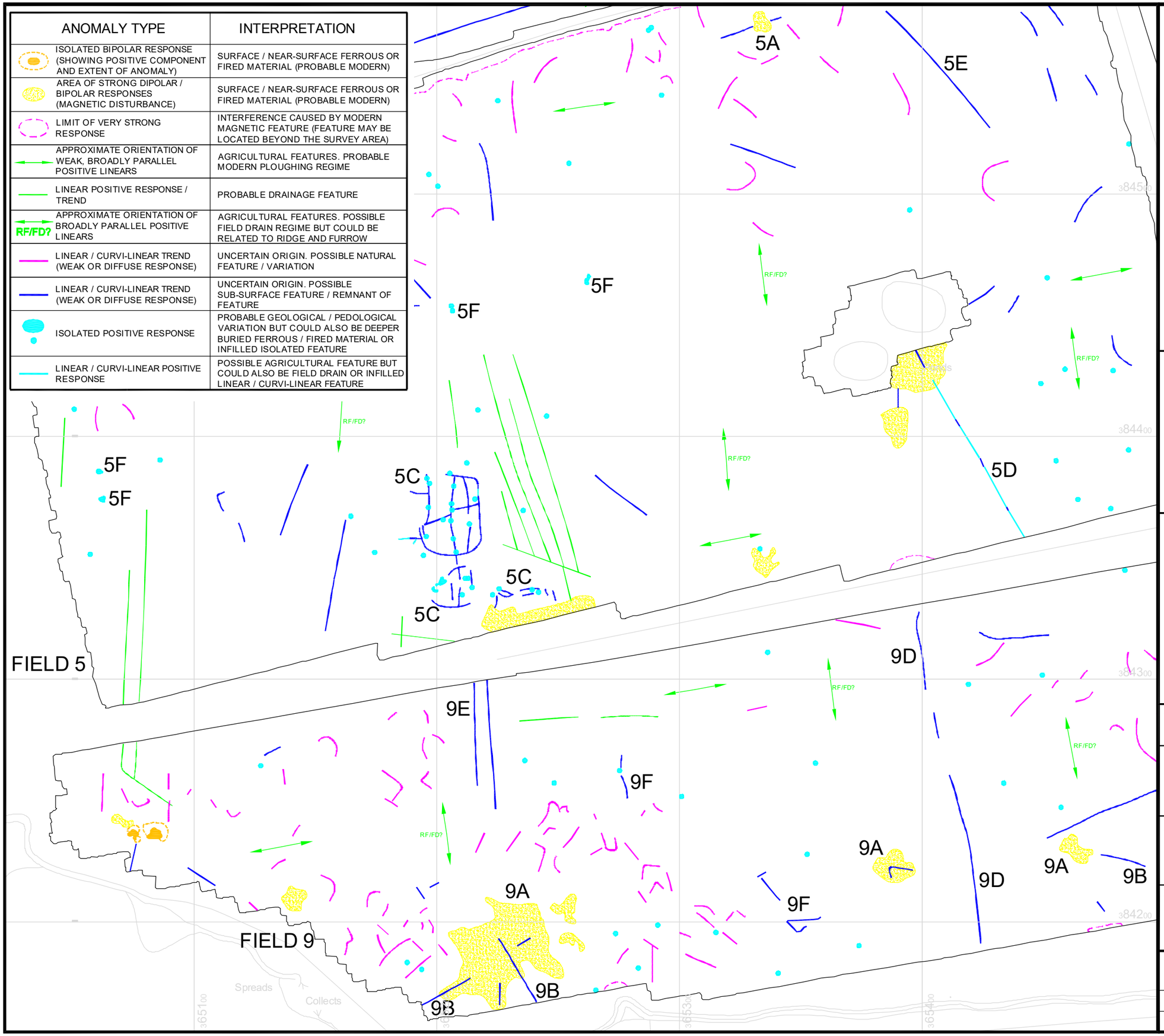
Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: CENTRAL PART OF FIELD 5 AND WESTERN PART OF FIELD 9

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018

ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
APPROXIMATE ORIENTATION OF WEAK, BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR POSITIVE RESPONSE / TREND	PROBABLE DRAINAGE FEATURE
RF/FD? APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE FIELD DRAIN REGIME BUT COULD BE RELATED TO RIDGE AND FURROW
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE NATURAL FEATURE / VARIATION
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR INFILLED ISOLATED FEATURE
LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE AGRICULTURAL FEATURE BUT COULD ALSO BE FIELD DRAIN OR INFILLED LINEAR / CURVI-LINEAR FEATURE



NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_12	FINAL

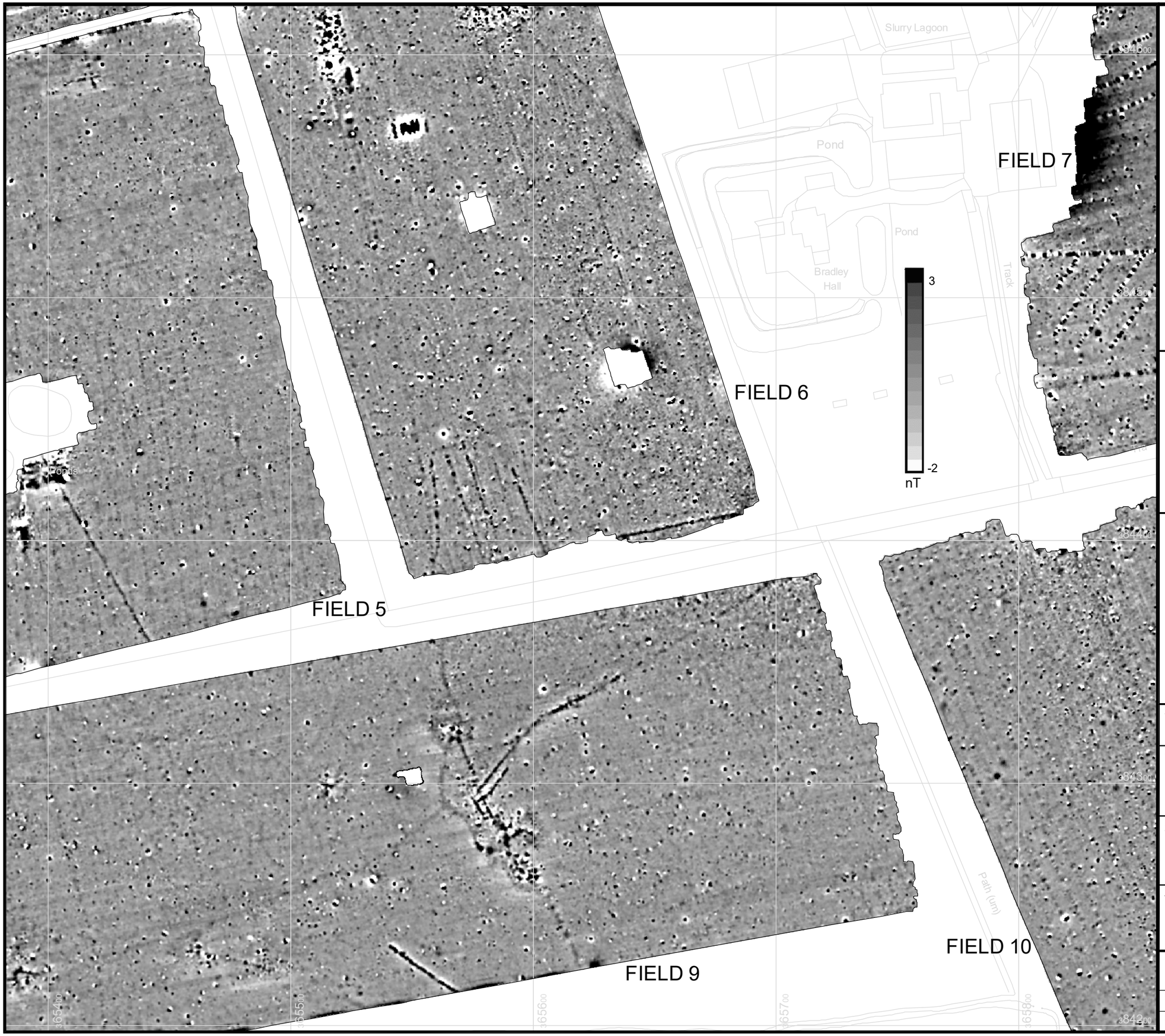
Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: CENTRAL PART OF FIELD 5 AND WESTERN PART OF FIELD 9

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_13	FINAL

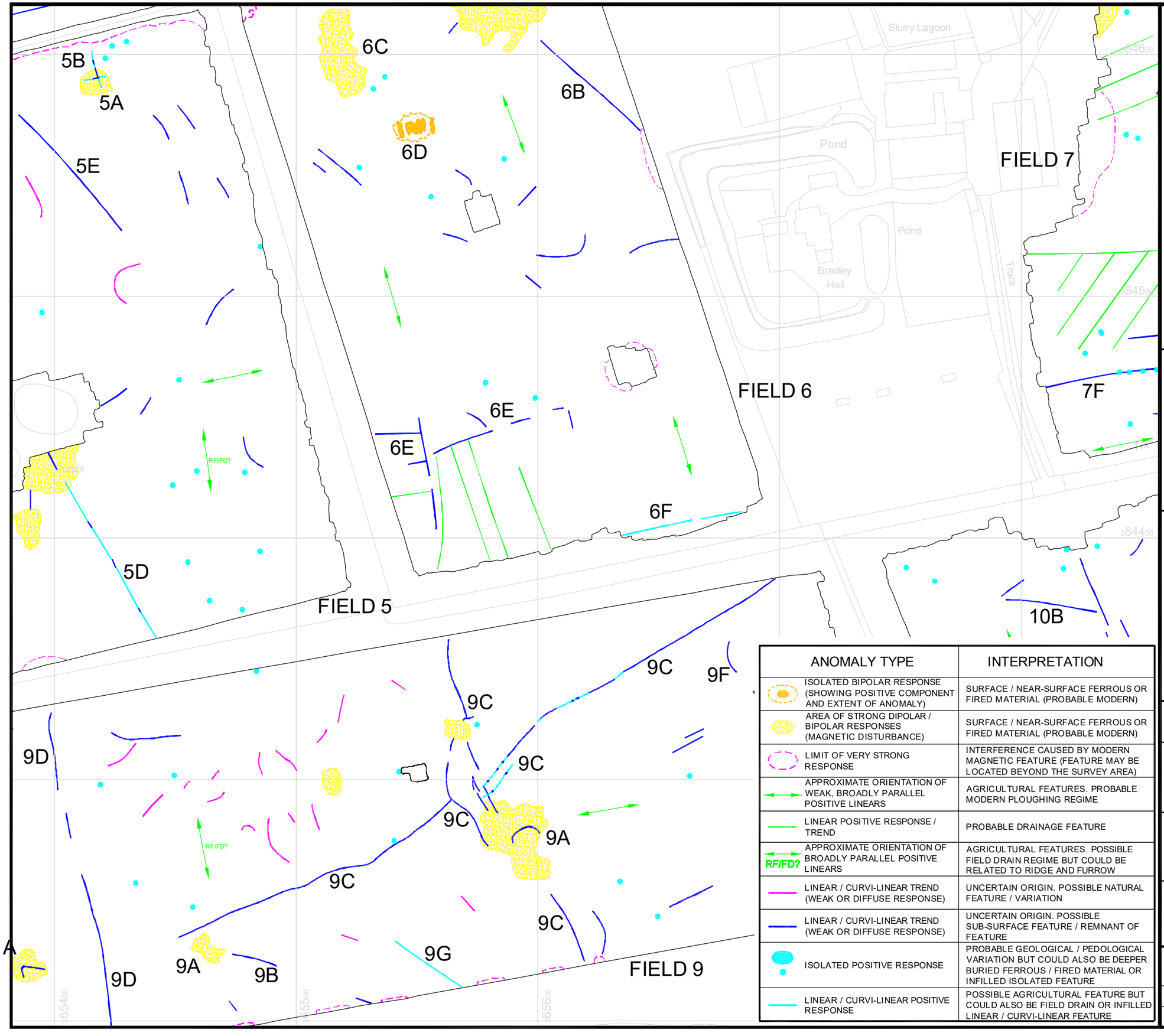
Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: PARTS OF FIELDS 5, 6, 7, 9 AND 10

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
APPROXIMATE ORIENTATION OF WEAK, BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR POSITIVE RESPONSE / TREND	PROBABLE DRAINAGE FEATURE
RF/FD? APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE FIELD DRAIN REGIME BUT COULD BE RELATED TO RIDGE AND FURROW
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE NATURAL FEATURE / VARIATION
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR INFILLED ISOLATED FEATURE
LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE AGRICULTURAL FEATURE BUT COULD ALSO BE FIELD DRAIN OR INFILLED LINEAR / CURVI-LINEAR FEATURE

NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_14	FINAL

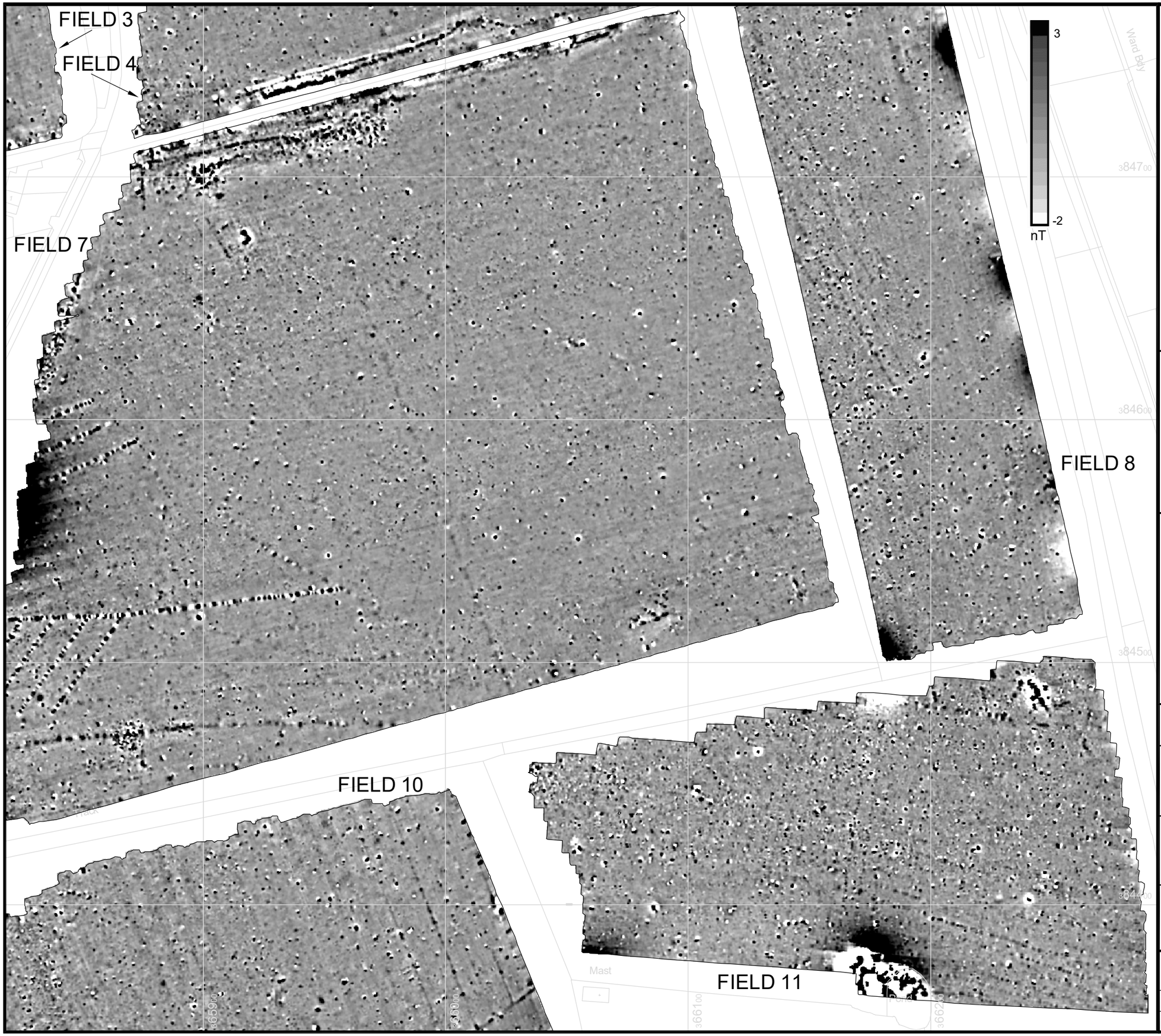
Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: PARTS OF FIELDS 5, 6, 7, 9 AND 10

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_15	FINAL

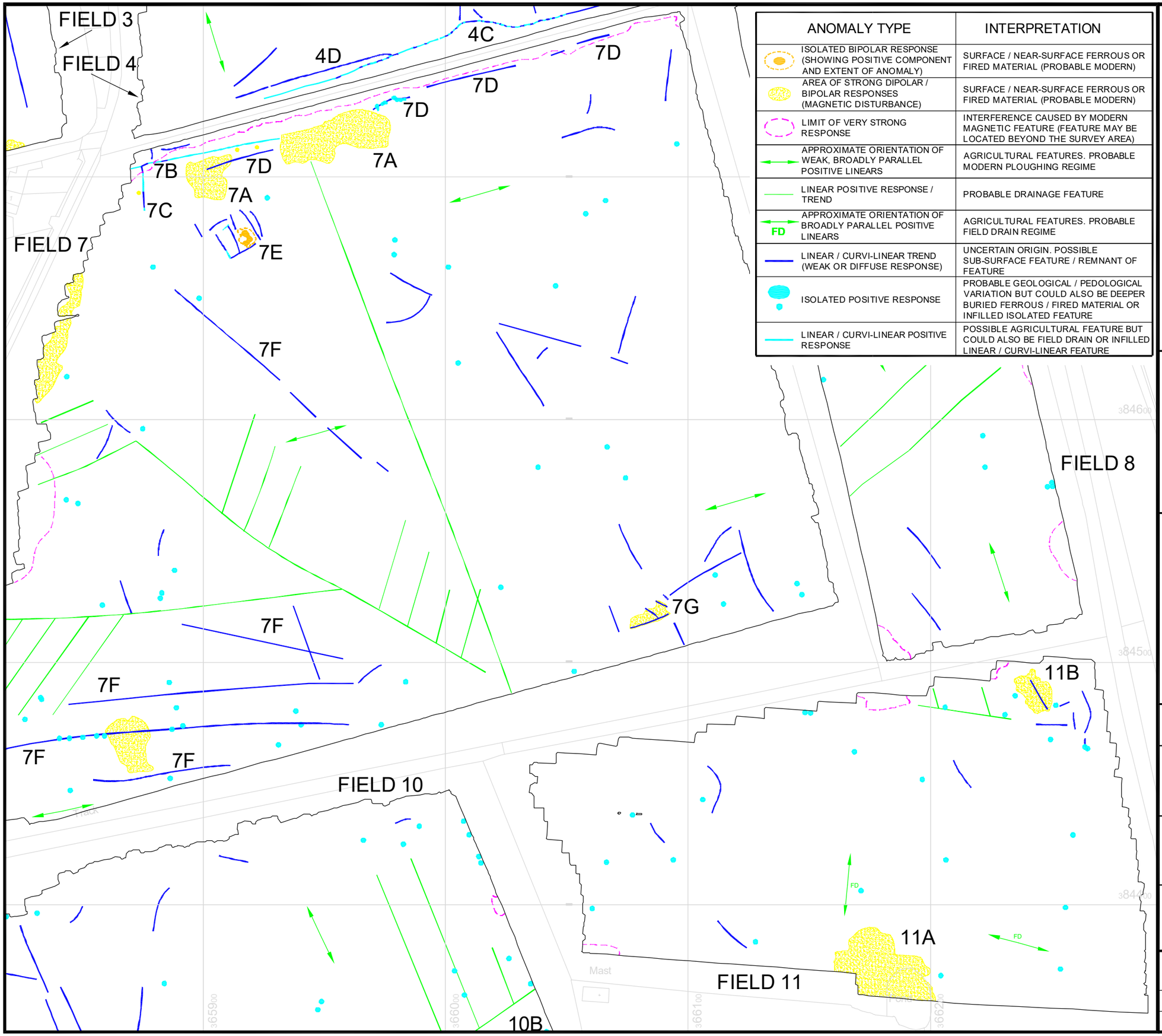
Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: AREA 11 AND PARTS OF FIELDS 3, 4, 7, 8 AND 10

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
APPROXIMATE ORIENTATION OF WEAK, BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR POSITIVE RESPONSE / TREND	PROBABLE DRAINAGE FEATURE
FD APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE FIELD DRAIN REGIME
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR INFILLED ISOLATED FEATURE
LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE AGRICULTURAL FEATURE BUT COULD ALSO BE FIELD DRAIN OR INFILLED LINEAR / CURVI-LINEAR FEATURE

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_16	FINAL

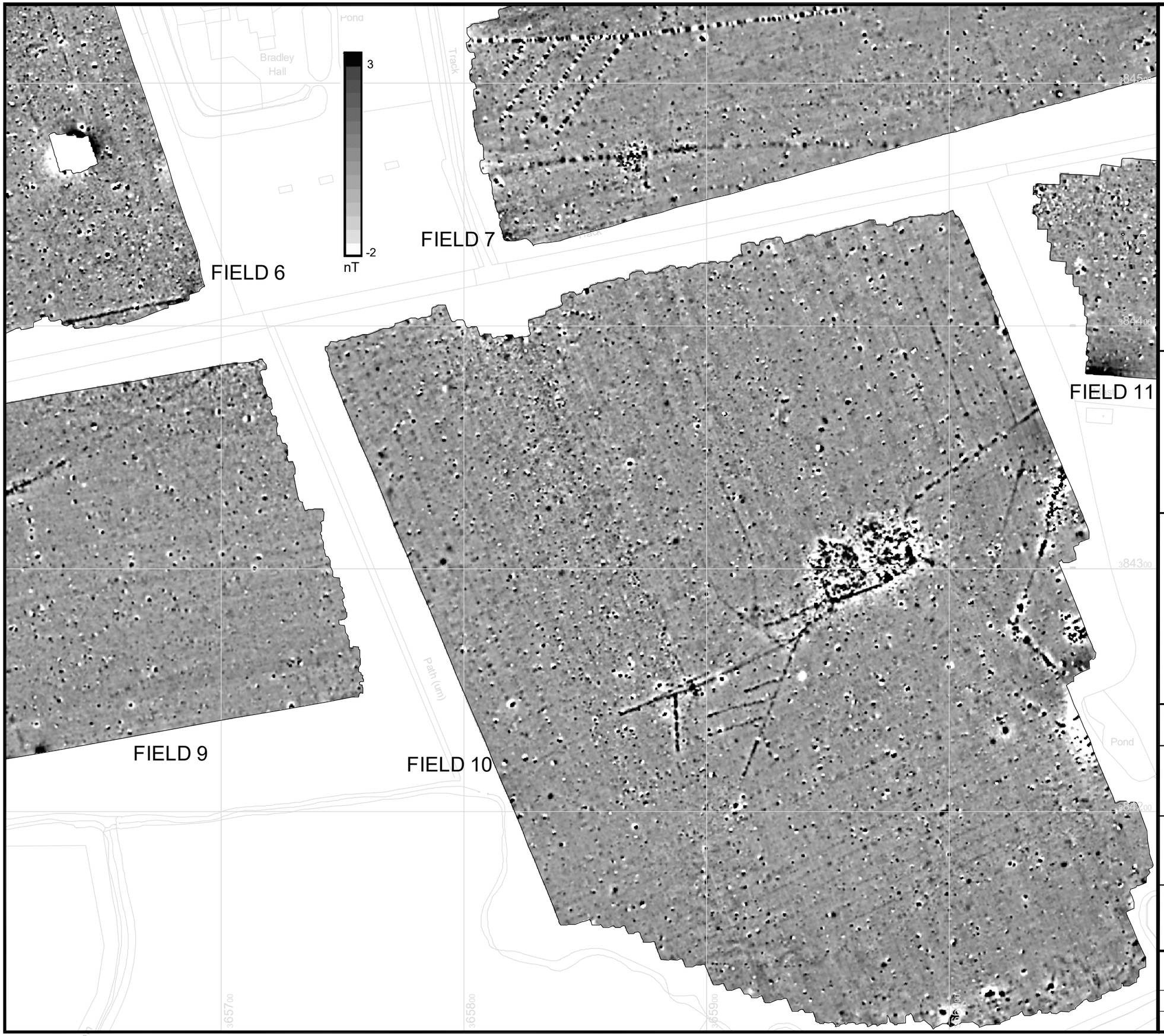
Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: FIELD 11 AND PARTS OF FIELDS 3, 4, 7, 8 AND 10

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_17	FINAL

Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: FIELD 10 AND EASTERN PART OF FIELD 9

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018

ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
APPROXIMATE ORIENTATION OF WEAK, BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR POSITIVE RESPONSE / TREND	PROBABLE DRAINAGE FEATURE

ANOMALY TYPE	INTERPRETATION
RF/FD? APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE FIELD DRAIN REGIME BUT COULD BE RELATED TO RIDGE AND FURROW
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR INFILLED ISOLATED FEATURE
LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE AGRICULTURAL FEATURE BUT COULD ALSO BE FIELD DRAIN OR INFILLED LINEAR / CURVI-LINEAR FEATURE

FIELD 6
FIELD 7
FIELD 9
FIELD 10
FIELD 11
6F
9C
9F
10A
10B
RF/FD?
Path (um)
Pond
3845 00
3844 00
3843 00
3842 00
3657 00
3658 00
3659 00

NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_18	FINAL

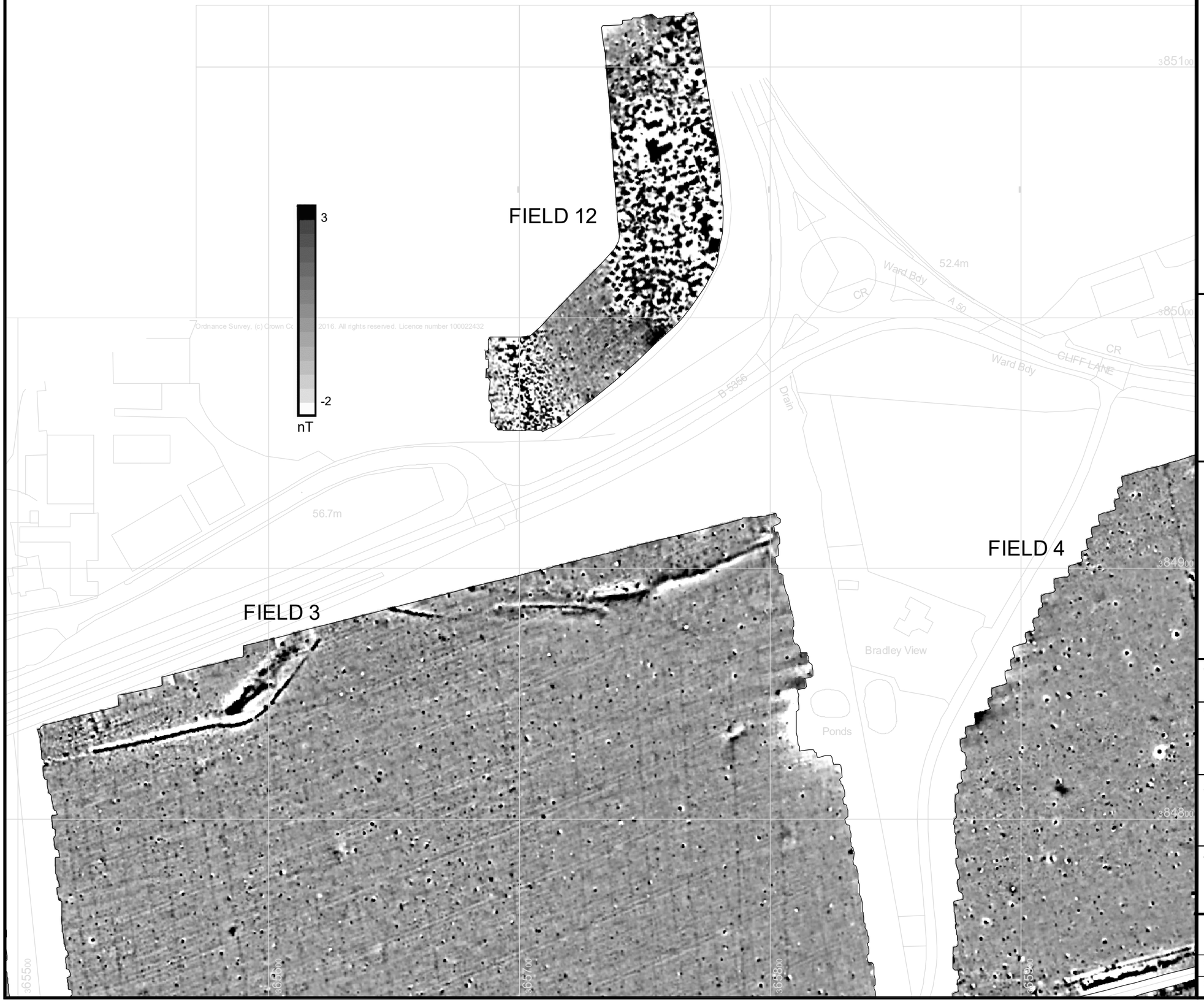
Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: FIELD 10 AND EASTERN PART OF FIELD 9

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	19/09/2018



NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_19	FINAL

Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: FIELD 12 AND PARTS OF FIELDS 3 AND 4

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	16/01/2019

ANOMALY TYPE	INTERPRETATION
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
APPROXIMATE ORIENTATION OF WEAK, BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
RF/FD? APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE FIELD DRAIN REGIME BUT COULD BE RELATED TO RIDGE AND FURROW
LINEAR POSITIVE OR BIPOLAR RESPONSE / TREND	BROADLY CORRESPONDS WITH FORMER FIELD BOUNDARY. RESPONSES WILL PROBABLY BE RELATED TO THIS FEATURE
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE NATURAL FEATURE / VARIATION
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR INFILLED ISOLATED FEATURE
LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE AGRICULTURAL FEATURE BUT COULD ALSO BE FIELD DRAIN OR INFILLED LINEAR / CURVI-LINEAR FEATURE

FIELD 12

FIELD 3

FIELD 4

3A

3B

3C

4D

4E

RF/FD?

52.4m

56.7m

Ward Bdy

A 50

CR

CLIFF LANE

B 5356

Drain

Bradley View

Ponds

3851 00

3850 00

3849 00

3848 00

3655 00

3656 00

3657 00

3658 00

3659 00

NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2247_857_20	FINAL

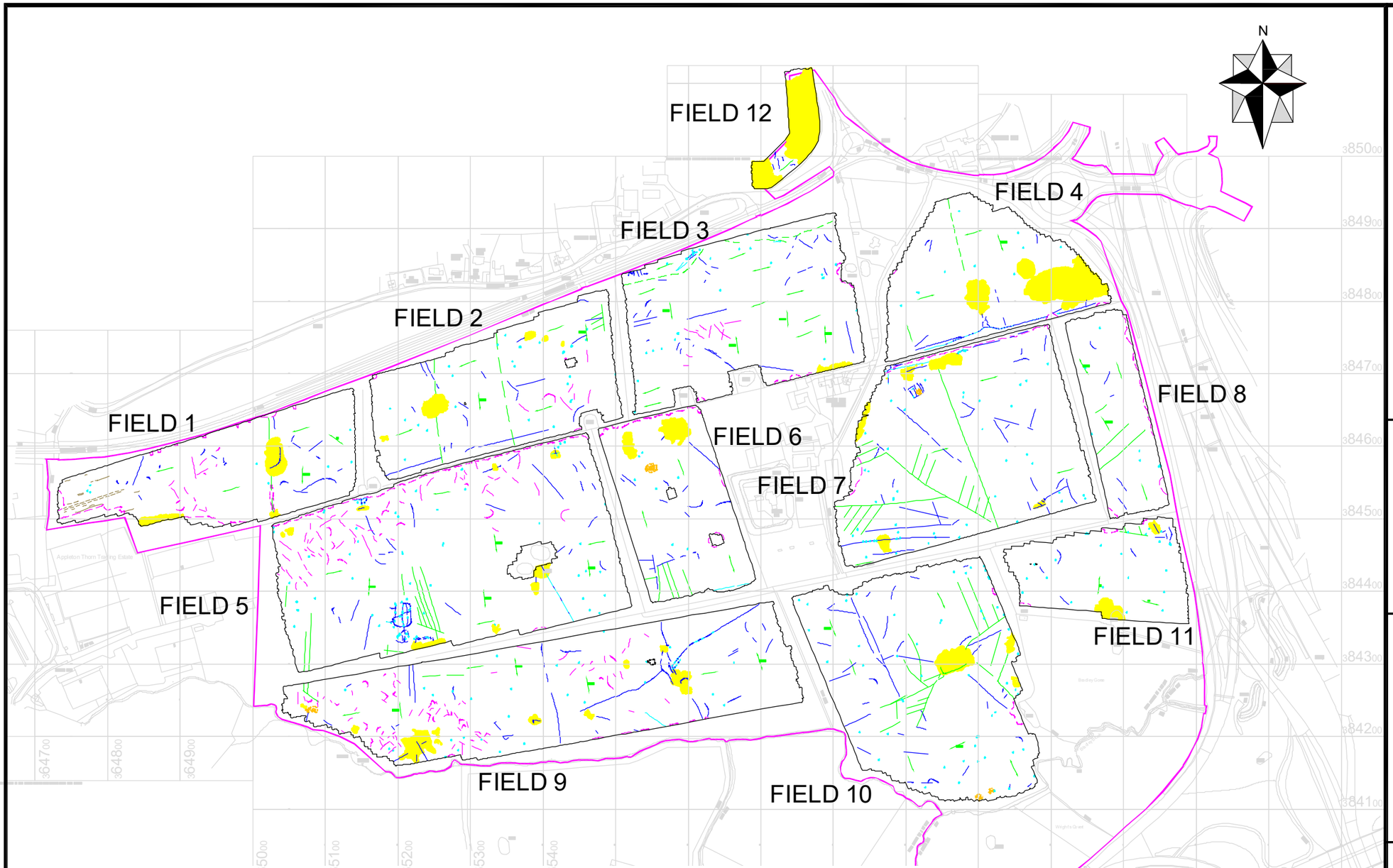
Client: BWB CONSULTING LTD LEEDS

Site: GRAPPENHALL LANE, GRAPPENHALL WARRINGTON, CHESHIRE

Title: INTERPRETATION OF MAGNETIC GRADIENT DATA: FIELD 12 AND PARTS OF FIELDS 3 AND 4

Job No: ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	16/01/2019



NOTES

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2. THIS DRAWING IS BASED UPON DRAWING 'OS DATA solid hatch removed.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
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KEY

SITE BOUNDARY

ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
STRONG LINEAR RESPONSE	ARTIFICIAL ANOMALY CAUSED BY CLOSE PROXIMITY TO MAGNETIC FEATURE BEYOND THE SURVEY AREA. THIS HAS NOT AFFECTED THE RELIABILITY OF THE SURVEY OR THE INTERPRETATION
APPROXIMATE ORIENTATION OF WEAK, BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR POSITIVE RESPONSE / TREND	PROBABLE DRAINAGE FEATURE
FD APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE FIELD DRAIN REGIME

ANOMALY TYPE	INTERPRETATION
RF/FD? APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE FIELD DRAIN REGIME BUT COULD BE RELATED TO RIDGE AND FURROW
LINEAR POSITIVE OR BIPOLAR RESPONSE / TREND	BROADLY CORRESPONDS WITH FORMER FIELD BOUNDARY. RESPONSES WILL PROBABLY BE RELATED TO THIS FEATURE
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE NATURAL FEATURE / VARIATION
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION BUT COULD ALSO BE DEEPER BURIED FERROUS / FIRED MATERIAL OR INFILLED ISOLATED FEATURE
LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE AGRICULTURAL FEATURE BUT COULD ALSO BE FIELD DRAIN OR INFILLED LINEAR / CURVI-LINEAR FEATURE

PHASE SITE INVESTIGATIONS

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Scale [A3 Sheet]	Drawing	Status
1:6000	ARC_2247_857_21	FINAL

Client
BWB CONSULTING LTD
LEEDS

Site
GRAPPENHALL LANE, GRAPPENHALL
WARRINGTON, CHESHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: FULL SITE

Job No
ARC_2247_857

Surveyed	JW, AB, CA	Drawn	JW, CA
Chk.	NF, MW	Date	16/01/2019

BIBLIOGRAPHY AND REFERENCES

BWB Consulting Ltd, in prep., Cultural and Heritage chapter within an EIA scoping document, Land at Junction 20 of the M6/M56 Interchange

old-maps.co.uk, 2019, online resource - www.old-maps.co.uk

British Geological Survey, 2019, online resource - www.bgs.ac.uk

Soilscapes, 2019, online resource - www.landis.org.uk/soilscapes

APPENDIX 1

Magnetic survey: technical information

1.1 Theoretical background

1.1.1 Magnetic instruments measure the value of the Earth's magnetic field; the units of which are nanoTeslas (nT). The presence of surface and sub-surface features can cause variations or anomalies in this magnetic field. The strength of the anomaly is dependent on the magnetic properties of a feature and the material that surrounds it. The two magnetic properties that are of most interest are magnetic susceptibility and thermoremnant magnetism.

1.1.2 Magnetic susceptibility indicates the amount of ferrous (iron) minerals that are present. These can be redistributed or changed (enhanced) by human activity. If enhanced material subsequently fills in features such as pits or ditches then these can produce localised increases in magnetic responses (anomalies) which can be detected by a magnetic gradiometer even when the features are buried under additional soil cover.

1.1.3 In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. Less magnetic material such as masonry or plastic service pipes which intrude into the topsoil may give a negative magnetic response relative to the background level. The strength of magnetic responses that a feature will produce will depend on the background magnetic susceptibility, how rapidly the feature has been infilled, the level and type of human activity in the area and the size and depth of a feature. Not all infilled features can be detected and natural variations can also produce localised positive and negative anomalies.

1.1.4 Thermoremnant magnetism indicates the amount of magnetism inherent in an object as a result of heating. Material that has been heated to a high temperature (fired), such as brick, can acquire strong magnetic properties and so although they may not appear to have a high iron content they can produce strong magnetic anomalies

1.1.5 The magnetic survey method is highly sensitive to interference from surface and near-surface magnetic 'contaminants'. Surface features such as metallic fencing, reinforced concrete, buildings or walls all have very strong magnetic signatures that can dominate readings collected adjacent to them. Identification of anomalies caused by sub-surface features is therefore more difficult, or even impossible, in the vicinity of surface magnetic features. The presence of made ground also has a detrimental effect on the magnetic data quality as this usually contains magnetic material in the form of metallic scrap and brick. Identification of features beneath made ground is still possible if the target feature is reasonably large and has a strong magnetic response but smaller features or magnetically weak features are unlikely to be identified.

1.1.6 The interpretation of magnetic anomalies is often subjective and it is rarely possible to identify the cause of all magnetic anomalies. Not all features will produce a measurable magnetic response and the effectiveness of a magnetic survey is also dependant on the site-specific conditions. The main factors that may limit whether a feature can be detected are the

composition of a feature, its depth and size and the surrounding material. It is not possible to guarantee that a magnetic survey will identify all sub-surface features.

1.1.7 Most high resolution, near surface magnetic surveys utilise a magnetic gradiometer. A gradiometer is a hand-held instrument that consists of two magnetic sensors, one positioned directly above the other, which allows measurement of the magnetic gradient component of the magnetic field. A gradiometer configuration eliminates the need for applying corrections due to natural variations in the overall field strength that occur during the course of a day but it only measures relative variations in the local magnetic field and so comparison of absolute values between sites is not possible.

1.1.8 Features that are commonly located using magnetic surveys include archaeological ditches and pits, buried structures or foundations, mineshafts, unexploded ordnance, metallic pipes and cables, buried piles and pile caps. The technique can also be used for geological mapping; particularly the location of igneous intrusions.

1.2 Instrumentation

1.2.1 A multi-sensor array cart system (MACS) utilising 8 Foerster 4.032 Ferex CON 650 gradiometers, spaced at 0.5 m intervals, with a control unit and data logger was used for the magnetic survey to survey part of the site.

1.3 Survey methodology

1.3.1 The MACS utilises an RTK GNSS system which means that survey grids do not have to be established. Instead an area is surveyed over a series of continuous profiles and the position of each data point is recorded using an RTK GNSS system. The sensors have a separation of 0.5 m which means that data was collected on profiles spaced at 0.5 m apart. Readings were taken at between 0.1 m and 0.15 m intervals.

1.3.2 Data is collected on zig-zag profiles along the full length or width of a field, although fields can be sub-divided if they are particularly large. Marker canes are set-out along field boundaries at set intervals and these are used to align the profiles. The survey profiles are usually offset from field boundaries, buildings and other metallic features by several metres to reduce the detrimental effect that these surface magnetic features have on the data. The location of the MACS data is converted direct to Ordnance Survey co-ordinates using the UK OSTN 02 projection. As the data is related direct to Ordnance Survey National Grid co-ordinates temporary survey stations are not established.

1.3.3 The Foerster gradiometers have a resolution of 0.2 nT but the stability of the cart system significantly reduces noise caused by instrument tilt and movement when compared with a traditional hand-held gradiometer system and the increased data intervals provide a higher resolution data set. The sensors have a range of ± 10,000nT and readings are taken at 0.1 nT resolution.

1.4 Data processing and presentation

1.4.1 The MACS data is stored direct to a laptop using in-house software which automatically corrects for instrument drift and calculates a mean value for each profile. A positional value is assigned to each data point based on the sensor number and recorded GNSS co-ordinates. The data is gridded using in-house software and parameters are set based on the sensor spacing and mean values. No additional processing is required. The gridded data is then displayed in Surfer 9 (Golden Software) and image files of the data are created.

1.4.2 The data was exported as raster images (PNG files), and are presented in greyscale format at 1:1500.

1.4.3 The data has been displayed relative to a digital Ordnance Survey base plan provided by the client as drawing *'OS DATA solid hatch removed.dwg'*. The base plan was in National Grid co-ordinate system and as the survey grids were set-out directly to National Grid co-ordinates the data could be simply superimposed onto the base plan in the correct position.

1.5 Interpretation

1.5.1 The anomalies have been categorised based on the type of response that they have and an interpretation as to the cause(s) or possible cause(s) of each anomaly type is also provided. The following anomaly types may be present within the data:

Dipolar, bipolar and strong responses

Dipolar and bipolar responses are those that have a sharp variation between strongly positive and negative components.

In the majority of cases these responses are usually caused by modern ferrous features / objects, although fired material (such as brick), some ferrous or industrial archaeological features and strongly magnetic gravel could also produce dipolar and bipolar responses.

Isolated dipolar responses are those that have a single positive and negative element. They are usually caused by isolated, ferrous or fired material on or near to the surface. The objects that cause dipolar responses are usually relatively small, such as spent shotgun cartridges, iron nails and horseshoes (hence they are often referred to as 'iron spikes') or pieces of modern brick or pot. Some types of archaeological artefacts can also produce this type of response but unless there is strong supporting evidence to the contrary they are assumed not to be of archaeological significance.

Bipolar anomalies have strong positive and negative components but are not technically magnetic dipoles. The majority of **isolated bipolar responses** are caused by ferrous or fired material on or near to the surface. These responses tend to be produced from larger objects, compared to dipolar anomalies, or a concentration of smaller objects. Some archaeological features/ activity, including areas of burning or industrial activity can also produce this type of response but unless there is strong supporting evidence to the contrary they are assumed not to be of archaeological significance.

A large majority, if not all, of the dipolar and bipolar responses at this site will be non-archaeological in origin but there may be greater potential for them to be related to archaeological features / activity where they are located in proximity to probable or possible archaeological features. Selected isolated responses have therefore been shown on the interpretation.

Bipolar linear anomalies are usually produced by buried pipes / cables that are usually metallic, although in some instances ceramic pipes can also produce popular anomalies. In some instances the anomaly can extend for a sigfnificant distance beyond the feature that produces the anomaly. Bipolar anomalies are often very strong and can potentially mask responses from other sub-surface features in the vicinity of the pipe or cable.

There are no bipolar linear anomalies in this data set.

Areas containing numerous **strong dipolar / bipolar responses (magnetic disturbance)** are usually caused by greater concentrations of ferrous or fired material and are often found adjacent to field boundaries where such material tends to accumulate. Above

ground metallic or strongly magnetic features, such as fences, gates, pylons and buildings can also produce very strong bipolar responses. If an area of magnetic disturbance is located away from existing field boundaries then it could indicate a former field boundary, several large isolated objects in close proximity, an area where modern material has been tipped or an infilled cut feature, such as a quarry pit. Areas of dipolar / bipolar response can occasionally be caused by features / material associated with archaeological industrial activity or natural deposits that have varying magnetic properties but they are usually caused by modern activity. Responses in areas of magnetic disturbance can sometimes be so strong that archaeological features located beneath them may not be detected.

Very strong responses, notably bipolar anomalies, from modern features can dominate the data for a significant distance beyond the feature. The extent of these areas is usually shown either as part of the bipolar anomaly or as a **limit of very strong response.** It should be noted that this effect extends beyond the feature and so the limit of the response does not correspond to the actual size or location of the feature within it. In many cases where these strong responses are present at the edge of survey area the feature causing the anomaly be actually be located beyond the survey area. It should be recognised that other sub-surface features located within these areas may not be detected.

There are several **strong linear responses** that are artificial data products. These are either related to a sensor movement or jolt caused by rough ground or are a product of very strong responses caused by material adjacent to the survey area. These responses are not related to a sub-surface feature and their presence has not affected the reliability of the survey or interpretation.

Negative linear anomalies

Negative linear anomalies occur when a feature has lower magnetic readings than the surrounding material and can often be associated with ploughing regimes or plastic / concrete pipes or natural features.

They can also indicate the presence of a feature that cuts into magnetic soils or bedrock and which is infilled with less magnetic material and in certain geologies can be associated with archaeological features.

Linear / curvi-linear anomalies (probable agricultural)

In many geological / pedological conditions agricultural features / regimes can produce magnetic anomalies due to the accumulation / alignment of magnetic topsoil. In most cases these are exhibited as a series of **broadly parallel positive linear** anomalies. The majority of these responses are associated with modern ploughing regimes but in some instances, where the responses are broader and more widely spaced, they can indicate the presence of the remnants of ridge and furrow.

Field drain systems can also produce linear anomalies, usually where the drains are made from fired ceramic or infilled with magnetic gravels.

Where a series of parallel anomalies are present then the approximate orientation of the anomalies are shown on the interpretation drawing to indicate the direction of the agricultural regime but for the sake of clarity individual anomalies have not been shown.

Individual anomalies may be shown if the response is not part of a regime.

Broad area of positive / negative responses

Broad areas of positive / negative responses can have a variety of causes. If the areas are generally quite large and irregular in shape then they are usually suggestive of natural features, such as lenses of sand and gravel deposits, palaeochannels or other natural features / variations where the natural material differs from the surrounding sub-surface. In some instances anomalies of this type can be associated with anthropogenic (usually modern) activity.

There are no anomalies of this type in this data set.

Linear / curvi-linear trends

An anomaly is categorised as a **trend** if it is not certain that the response is associated with an extant sub-surface feature. Trends are usually weak, irregular, diffuse or discontinuous and it is usually not certain what their cause is, if they represent significant sub-surface features or even if they are associated with definite features.

It is possible that some of the trends are associated with geological / pedological variations. Others may be produced by artificial constructs within the data, either caused by processing or in some instances by intersecting anomalies (usually different agricultural regimes) that give the appearance of curving or regular shapes. Many trends are a product of weak, naturally occurring responses that happen to form a regular pattern but which are not associated with a sub-surface feature.

In some instances former features that have been severely truncated can still produce broad, diffuse or weak responses even if the underlying feature has been removed. This is due to the presence of magnetic soils associated with the former feature still being present along its route. In other instances the magnetic properties of the soils filling a feature may vary and so the magnetic signature of the feature can change, even if the sub-surface feature itself remains uniform. If a response from a feature becomes significantly weak or diffuse then part of the anomaly may be shown as a trend as it is uncertain if the feature is still present or has been severely truncated or removed.

Isolated positive responses

Isolated positive responses can occur if the magnetism of a feature, area or material has been enhanced or if a feature is naturally more magnetic than the surrounding material. It is often difficult to determine which of these factors causes any given responses and so the origin of this type of anomaly can be difficult to determine. They can have a variety of causes including geological variations, infilled archaeological features, areas of burning (including hearths), industrial archaeological features, such as kilns, or deeper buried ferrous material and modern fired material.

The large number of isolated responses and lack of an obvious pattern to their distribution suggests that most of these anomalies are probably associated with geological / pedological variations.

Positive linear / curvi-linear anomalies

Positive magnetic anomalies indicate an increase in magnetism and if the resulting anomaly is linear or curvi-linear then this can indicate the presence of a man-made feature. **Positive or enhanced linear / curvi-linear** anomalies can be associated with agricultural activity, drainage features but they can also be caused by ditches that are infilled with

magnetically enhanced material and as such can indicate the presence of archaeological features. Some natural infilled features can also produce positive anomalies.

1.5.2 Several different ranges of data were used in the interpretation to ensure that the maximum information possible is obtained from the data.

1.5.3 X-Y trace plots were examined for all of the data and overlain onto the greyscale plot to assist in the interpretation, primarily to help identify dipolar / bipolar responses that will probably be associated with surface / near-surface iron objects. X-Y trace plots have not been used in the report as they do not show any additional anomalies that are not visible in the greyscale data. A digital drawing showing the X-Y trace plot overlain on the greyscale plot has been provided in the digital archive.

1.5.4 All isolated responses have been assessed using a combination of greyscale and X-Y trace plots.

1.5.5 Anomalies associated with agricultural regimes are present in the data. The general orientation of these regimes has been shown on the interpretation but, for the sake of clarity, each individual anomaly has not been shown.

1.5.6 The greyscale plots and the accompanying interpretations of the anomalies identified in the magnetic data are presented as 2D AutoCAD drawings. The interpretation is made based on the type, size, strength and morphology of the anomalies, coupled with the available information on the site conditions. Each type of anomaly is displayed in separate, easily identifiable layers annotated as appropriate.

1.6 Limitations of magnetic surveys

1.6.1 The magnetic survey method requires the operator to walk over the site at a constant walking pace whilst holding the instrument. The presence of an uneven ground surface, dense, high or mature vegetation or surface obstructions may mean that some areas cannot be surveyed.

1.6.2 The depth at which features can be detected will vary depending on their composition, size, the surrounding material and the type of magnetometer used for the survey. In good conditions large, magnetic targets, such as buried drums or tanks can be located at depths of more than 4 m. Smaller targets, such as buried foundations or archaeological features can be located at depths of between 1 m and 2 m.

1.6.3 A magnetic survey is highly sensitive to interference from surface and near-surface magnetic ‘contaminants’. Surface features such as metallic fencing, reinforced concrete, buildings or walls all have very strong magnetic signatures that can dominate readings collected adjacent to them. Identification of anomalies caused by sub-surface features is therefore more difficult or even not possible in the vicinity of surface and near-surface magnetic features.

1.6.4 The presence of made ground also has a detrimental effect on the magnetic data quality as this usually contains magnetic material in the form of metallic scrap and brick. Identification of features beneath made ground is still possible if the target feature is reasonably large and has a strong magnetic response but smaller features or magnetically weak features are unlikely to be identified.

1.6.5 It should be noted that anomalies that are interpreted as modern in origin may be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

1.6.6 A magnetic survey does not directly locate sub-surface features - it identifies variations or anomalies in the local magnetic field caused by features. It can be possible to interpret the

cause of anomalies based on the size, shape and strength of response but it should be recognised that a magnetic survey produces a plan of magnetic variations and not a plan of all sub-surface features. Interpretation of the anomalies is often subjective and it is rarely possible to identify the cause of all magnetic anomalies. Geological or pedological (soil) variations or features can produce responses similar to those caused by man-made (anthropogenic) features.

1.6.7 Anomalies identified by a magnetic survey are located in plan. It is not usually possible to obtain reliable depth information on the features that cause the anomalies.

1.6.8 Not all features will produce a measurable magnetic response and the effectiveness of a magnetic survey is also dependant on the site-specific conditions. It is not possible to guarantee that a magnetic survey will identify all sub-surface features. A magnetic survey is often most-effective at identifying sub-surface features when used in conjunction with other complementary geophysical techniques.

It should be noted that a geophysical survey does not directly locate sub-surface features - it identifies variations or anomalies in the background response caused by features. The interpretation of geophysical anomalies is often subjective and it is rarely possible to identify the cause of all such anomalies. Not all features will produce a measurable anomaly and the effectiveness of a geophysical survey is also dependant on the site-specific conditions. The main factors that may limit whether a feature can be detected are the composition of a feature, its depth and size and the surrounding material. It is not possible to guarantee that a geophysical survey will identify all sub-surface features. Confirmation on the identification of anomalies and the presence or absence of sub-surface features can only be achieved by intrusive investigation.

Appendix 9.4 – Bradley Hall Heritage Technical Statement

SIX56 BRADLEY HALL FARM

HERITAGE TECHNICAL STATEMENT

Project	**Six56 Bradley Hall Farm**		
Document Number	LDP2129	**BWB Ref**	JM/LR070220
Author	Jim MacQueen BA (Hon)	**Status**	S2
Checked	Louse Robinson BA (Hons)	**Revision**	P2
Approved	Jim MacQueen BA (Hons)	**Date**	07/02/20

SIX56 BRADLEY HALL FARM – HERITAGE STATEMENT

Introduction

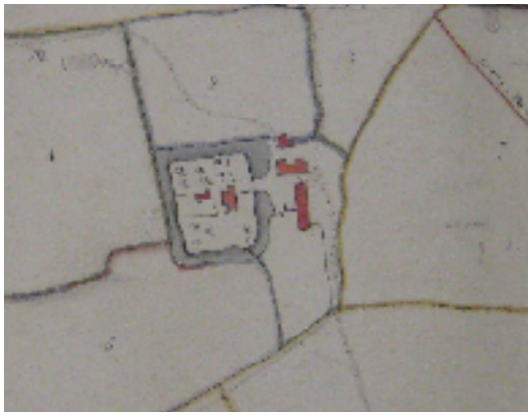
This Heritage Technical Statement provides a brief assessment of the Bradley Hall Farm Complex. It has been informed by a site visit undertaken on 7th February 2020 and a review of a number of sources obtained as part of the Cultural Heritage Chapter of the Environmental Statement submitted in support of the planning application.

Bradley Hall Farm

Situated to the east of Bradley Hall, beyond the eastern edge of the Scheduled Bradley Hall Moated site (National Monument Number: 101924) is Bradley Hall Farm which currently serves a number of functions including a dairy, cattle holding pens, barns, storage and a workshop. The buildings that makeup the farm are non-designated and are not listed on the Cheshire Historic Environment Record or the Local List.

The principal buildings are conjoined in a U-shaped courtyard arrangement which is open on its west side. Associated with these are a number of lean-to structures, sperate barns and sheds and other structures including portacabins, slurry tank and storage silos.

This courtyard arrangement was formed by extensions to the original early 19th century buildings shown on the 1820 Map of Cheshire (Inset 1) and the 1847 Tithe Map (inset 2).



Insert 1 *1820 Map of Cheshire showing first phase of Bradley Hall Farm*

Inset 2 *1847 Tithe Map showing Bradley Hall Farm*

These stand out from the later 19th and 20th century buildings on account of their construction in handmade brick. The U-Shaped arrangement was common in the Cheshire Plain and were often associated with stock fattening and dairying. Similarly, the later courtyard arrangement was a common feature in Cheshire from the early 19th century to the interwar period, with complexes comprising a barn and fodder house built at right angles to the cow-house range. These were often separated by a cart entry for loading hay and corn into the first-floor lofted areas. This broadly ties in with the arrangement at Bradley Hall Farm.

Cartographic Analysis

Marked on the 1820 Plan of Cheshire is a rectangular structure which formed the southern part of the later mid-to late 19th century courtyard structure described above. To the north of this is a further structure whose position coincides with the later northern arm of the courtyard complex (see inset 1). South of these is a large rectangular building which is likely to have been associated. By the time the 1847 Tithe Map (see inset 2) was published only the southern arm of the later complex is marked suggesting that the other two structures were demolished. Further re-configuration or re-building is evident on the 1877 Ordnance Survey map as shown is

the courtyard structure with central arched opening on its east side and lean-to structures on its northern arm. Smaller ancillary structures are also evident to the east and to the northeast, with the latter being the larger of the two. These structures did not last very long as in the late 1890s the larger one was replaced with a larger building and the other one demolished as shown on the 1899 edition (see insert 3)

Insert 3 *1899 Ordnance Survey map*

This coincides with some re-modelling of the courtyard buildings, some infilling on the southern annex, the addition of a small lean to structure on the southern western tip of the lower courtyard range and the erection of a small rectangular building immediately to the west of the west side of the northern courtyard range. These changes are also shown on the 1910 Ordnance Survey map.

Later maps show some further development with a rectangular structure built to the northwest of the farm sometime between the publication of the 1938 and 1954 Ordnance Survey maps. Further expansion occurred in the 1960s demonstrated by the addition of a number of lean-to structures to the interior and exterior faces of the courtyard structure and the construction of new barns to the east and a slurry tank to the north. This development phase seems to coincide with the construction of Bradley Hall Cottages to the north. Expansion continued with the wrap around extension of the barn to the east and the construction of large barn to the west of the complex just outside the northern arm of the Scheduled moat. These additions are evident from comparison with later Ordnance Survey editions and recent aerial photographs.

Phasing and Structural Analysis

The southern building range represents the first phase of building activity associated with the farm and was the precursor to the later courtyard arrangement. This comprised the addition of the eastern and northern range sometime between 1847 and 1877 as determined from the analysis of historic maps. It is noted that these ranges use hand made bricks, perhaps suggesting the re-use of material from a demolished structure, the candidate for which is the large building shown on the 1820 Cheshire Plan but demolished by the time the 1847 Tithe map was published. From the site visit, it is clear that both the southern and connected eastern range still survive

but the northern range has been demolished bar the outer northern wall. This occurred between 1910 and the late 1960s as evident from historic maps. A lean to mono pitch structure was built on the north face of the surviving north range wall, with evidence for where it was tied in clearly visible (Plate 1).

Plate 1 *shows 20th century lean to added to outer wall of former northern range*

Further re-modelling took place between the early and late 20th century with the addition of further structures within the interior of the courtyard including the open gable building that is connected to the aforementioned structure by a mono pitch roof. In filling also took place on the north face of the southern range with a brick built structure with open gable.

Many of the original features associated with the southern and eastern range have been replaced at some point in the 19th/ 20th century including the roof which comprises bolted trusses. The eastern gable of the southern range appears to have been rebuilt noted by the different material treatment below the eaves the insertion of mock tudor timbers in the interwar period and the insertion of a taking in door. These changes may have been undertaken to facilitate its use as a dairy. Similarly, the western aspect of the southern range has been punched through to allow cattle to access the dairy which is housed in the eastern end of the southern range.

There are a number of other alterations which are not detailed in this statement.

A number of the windows on the principal elevations now have later brick arch heads and heavier stone sills. Similarly, a number of the original windows have been infilled as have some of the doors. In addition to this new doors/ accesses have been created for the workshop and dairy. Noted on the complex on the east, north and west side are a number of modern barns /structures which serve as stock sheds or are used for storage. These obscure the earliest phases of the ranges and/ or have affected the integrity of it through alteration or tying in to accommodate the new structure.

Summary

The site visit undertaken as well as a brief review of historical and cartographical sources has determined that the complex of farm buildings to the northeast of Bradley Hall date from the early 19th century. Various alterations and phases of re-building are evident which have occurred throughout the 19th and 20th centuries. These have significantly affected the historical character and integrity of the original courtyard complex. In addition to this the development phases have significantly undermined the architectural quality of the farm complex and in places render it unintelligible. Similarly, the poor structural architectural condition of the buildings has diminished the significance of these buildings and the removal of many of the original features has degraded the building further.

In our opinion the farm buildings are not good candidates for conversion in terms of their preservation given the significant amount of disturbance that occurred to the original structure, which has been exacerbated by the diminishing structural integrity of the buildings. However, there is worth in recording the structures and providing further analysis on the development sequence of Bradley Hall Farm.

Appendix 9.5 – Text Deleted from Orginal ES Technical Paper 9 Cultural Heritage and Archaeology

Six 56 Warrington

ES Addendum – Text Deleted from Original ES Technical Paper 9 Cultural Heritage and Archaeology

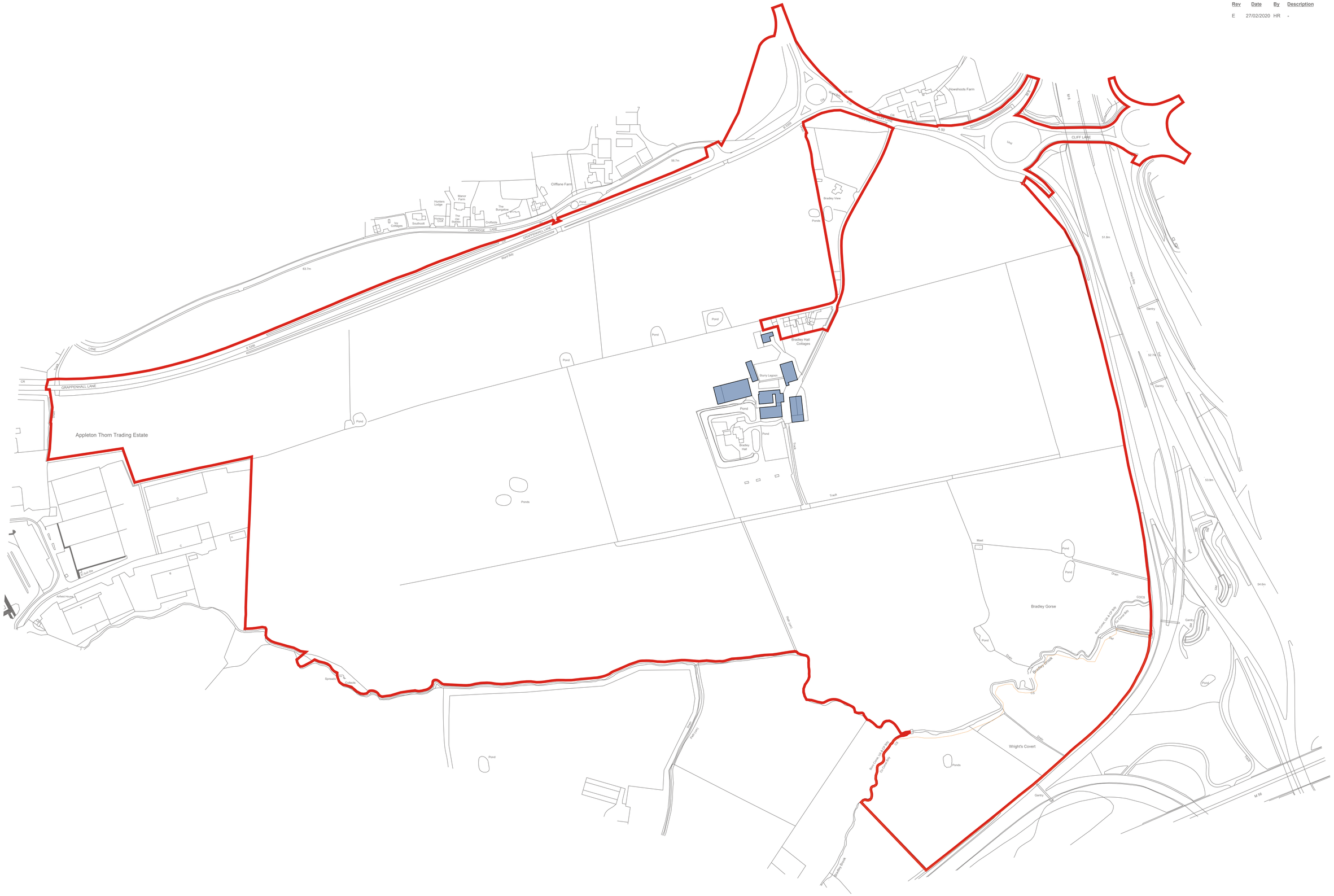
Section Number / Paragraph Number / Table number / Figure Number in Original Paper	Text Deleted from Original ES	Reason
Front Cover	First	Update to reflect client name change
Front Cover	Revision III 11th March 2020	To reflect Addendum
Revision Record	3, 11th March 2020, Draft, III	To reflect Addendum
Contents Page	Appendix 9.4 Heritage Statement	The ES Technical paper supersedes the Heritage Statement prepared by BWB Consulting in 2016 therefore this has been omitted from the appendices as it is no longer relevant.
Paragraph 1.7	Socio-economic	Text updated
Paragraph 1.9	First; client	Client name and reference to this has changed.
Paragraph 2.9	July 2018	Change to reflect latest version of NPPF
Paragraph 4.2	as amended 2015	Updated
Paragraph 4.13	below	Word change
Table 9.2	18th – 20th century buildings including Barley Castle Farmhouse and Tanyard Farm Buildings	To reflect impact assessment
Table 9.7	Effect on demolition of	Updated
Paragraph 6.1	Identifying how environmental considerations have influenced the proposals	Updated
Paragraph 6.9	which currently diminish the setting and integrity of the moat. The structures re-use has been considered but improving the setting and intelligibility of the asset outweighed this option in	To reflect discussions held with the Conservation Officer

	part to alleviate the level of harm on the asset. Subsequently the agricultural buildings will be demolished following building recording.	
Paragraph 8.2	which will be converted into small scale office space (B1)	To reflect latest changes to development proposals.
Paragraph 8.16	through conversion into offices (B1)	To reflect latest changes to development proposals.
Paragraph 11.8	which has been refused planning permission	Updated
Table 9.9	various	Changes to table wording
Paragraph 9.18	The judgement arrived at is outlined in the Heritage Statement prepared by BWB Consulting (2016; Appendix 9.4). The aim of which was to determine the level of harm to the Scheduled Monument taking account of Historic England's guidance in respect of heritage assets ((Historic Environment Good Practice Advice in Planning, Note 3, The Setting of Heritage Assets, 2015), with particular reference to the 5 Point Test.	In relation to the Scheduled Monument Section 7 through to Section 9 supersedes that contained in Heritage Statement prepared by BWB Consulting in 2016. Subsequently paragraph 9.17 has been omitted as it refers to the outdated assessment.
Paragraph 9.19	The statement determined that the monument is in good condition despite later development from the erection of Bradley Hall. It considered the setting of the asset and	In relation to the Scheduled Monument Section 7 through to Section 9 supersedes that contained in Heritage Statement prepared by BWB Consulting in 2016.

	determined that it currently lies in an agrarian landscape which contributes to its historical setting. The statement also recognised that the scheduled monument has been substantively altered by the M6 and associated infrastructure to the east and industrial development to the west.	Subsequently paragraph 9.17 has been omitted as it refers to the outdated assessment.
Paragraph 9.20	The statement considered how the monument interacts with the landscape. It concluded that openness and views across the landscape to the south will in part be retained allowing a sense of historic openness to remain discernible. In addition to this it ecognizes that the demolition of the farm buildings surrounding the moat will improve the immediate visual setting of the moat.	In relation to the Scheduled Monument Section 7 through to Section 9 supersedes that contained in Heritage Statement prepared by BWB Consulting in 2016. Subsequently paragraph 9.17 has been omitted as it refers to the outdated assessment.
Paragraph 11.9	Which has been refused planning permission	updated

Appendix 9.6 – Demolition Parameters Plan

Rev	Date	By	Description
E	27/02/2020	HR	-



Planning Boundary

Buildings to be demolished as part of the proposed development

Langtree

PANATTONI

SGP
Architects + Masterplanners
Waterfront House
2a Smith Way
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Six 56, Warrington

Demolition Parameters Plan

CDE Reference

Drawn:	HR	Drawing Status:	Planning
Team:	MMS	CAD Reference:	16-184-P118
Scale:	1:2500 @ A1	Date:	02/20

Project No:	Dwg No:	Rev:
16-184	P118	E

Appendix 9.7 – Letter report prepared by Cundall detailing the condition of Bradley Hall Farm Agricultural Buildings

John Downes
Langtree
St James Business Centre
Wilderspool Causeway
Warrington
WA4 6PS

5 February 2020

Ref: 1015524_Langtree_2020_02_05llj

Dear John

Warrington Six 56 – Bradley Hall Farm Agricultural Outbuildings

Further to the site visit last week we have reviewed the existing agricultural outbuildings in terms of their structural condition and resulting impact on potential redevelopment. In this respect we outline our observations and concerns below.

It is understood that the primary area of interest from a heritage perspective is the central arch and northern wing of the barn. Unfortunately, as you would expect given that these are the oldest sections of the buildings, they are also in the worst state of repair.

The walls of the buildings are typically in a poor state of repair, with signs of bowing, extensive sections of poorly completed masonry replacement and repair, and visible movement cracks. Additionally, the barn appears to have been constructed from a relatively soft brick and this associated with deterioration of pointing has resulted in blowing of the face of extensive sections of masonry.

As can be seen from Figure 1 below, the primary arch demonstrates significant deterioration. The cornerstones to the left-hand side of the arch show significant loss of section due to weathering and would require extensive replacement to return to a serviceable position. Similarly, to the right-hand side extensive sections are demonstrating loss of section, and section of masonry patch repair, and would require extensive replacement. The surrounding face masonry is typically also in a poor condition, with sections of masonry which has lost the fired facing and would require replacement and extensive repointing.

Similar defects are evident within the arch, particularly to the left-hand wall, and extensive areas of the wall would need rebuilding / repair to address issues of spalled facing (see Figure 2), and to more sympathetically restore previous modifications and bring back to a structurally stable condition. There were also signs of more significant structural defects including significant vertical cracking (see Figure 3 and 4).

Figure 1: View to central arch of barn

Figure 2: Extensive loss of masonry face to entrance

Figure 2: Vertical cracking and separation to rear of entry arch

Figure 4: Cracking adjacent to existing openings

Masonry to the inner face of the courtyard unfortunately demonstrates similar conditions of poor repair, and as evident in Figure 5 facing towards the rear elevation of the entrance building, the facing has blown to large

areas of the masonry requiring replacement. There are also sections of previous replacement which have been poorly completed with mismatched masonry, and misalignment of jointing which should be addressed to restore the character of the building. Moving North the extent of blown facing to the façade increases significantly, particularly at high level where this will have been exposed to the elements more over the years. Signs of movement cracking exist again to the left-hand side of the window which would require repair.

Figure 5: View from inner courtyard

It is evident that the roofs in both sections are need of extensive repair, and there are a number of holes, the ridges have dropped in places, and sections of the timber would require replacement to restore structural integrity. In addition to structural stabilising, the roof would likely need to be fully re-roofed to incorporate felt / underlining and insulation to make the buildings habitable. In addition, much of the guttering and downpipes are either damaged or missing which in turn has caused extensive damage to the brickwork and this would need replacing.

In our opinion the older section of barn could possibly be restored in-situ for its current use as an agricultural barn, however it would require substantial structural work to restore to a stable and maintainable condition. However, if the aspiration was to convert the buildings into a habitable space /office use, then modifications would be far more extensive to address additional issues such as bringing accessibility, insulation and water tightness up to an acceptable standard. In particular:

- The floors have been altered to suit the current use as cattle barns and have a number of level changes throughout and would need to be infilled to create a useable floor.

- Head height is extremely tight throughout the building, and this restriction would result in there only being one useable floor in the higher section linked to the arch, and the floor would need to be lowered in the single storey section to create any viable space, creating accessibility issues.
- Walls would need to be dry-lined and insulated which would further impact on available floor area.

Ultimately, if the aspiration was to turn the buildings into habitable space / office use, the extent of repair and modification to bring the buildings to a serviceable condition and address the issues outlined above, would be such that in essence demolition and sympathetic reconstruction would be the most viable solution to areas of the building. Clearly efforts could be made to salvage as much brick and stone as possible, but as noted in many cases the material quality is also such that some of this would be unsuitable for reuse and extensive additional reclaimed material would need to be sourced.

In conclusion the buildings could probably be safeguarded in-situ at a cost, but to make them habitable and useable would require an extensive rebuild.

Yours sincerely
For and on behalf of
Cundall Johnston & Partners LLP

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