ENVIRONMENT

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Sim Balk Lane
York

Heritage Assessment

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Notice

EXECUTIVE SUMMARY

The assessment provides a detailed understanding of the baseline historic environment and the built heritage assets within a 500m study area of the Site.

The Proposed Development will not directly impact any, currently known, designated or non-designated heritage assets. There are no recommendations required to mitigate any impacts on any designated or non-designated heritage assets.

The Site is an imperceptible glimpsed aspect of the panoramic views from the Minster and at over 4km away merges into obscurity with the existing built form into part of the landscape. There will be no change to the setting of the York Minster which contributes to its significance. There will be no change to the setting or significance of Bishopthorpe Garth (**1166773**) or Garth Cottage and Garth Mews, Gatehouses to Bishopthorpe Garth (**1132494**), or upon the Bishopthorpe Conservation Area. The significance of effect is no change. There will be no change to the setting or significance of the Milestone (**1256467**). The magnitude of effect is no change. There will be minor changes to glimpsed views of the Site from Micklegate Stray (**MYO4287**) resulting in a negligible magnitude of effect from the proposed development.

There are recorded archaeological remains within the study area dating from the prehistoric, Roman, Medieval and early modern periods. The geophysical survey (**Appendix 6**) has shown there is a very low potential for linear features such as ditches, enclosures, settlement or substantial human activity deriving from industrial or settlement activities from all periods. Discrete remains are more difficult to detect via geophysics but with no associated archaeological anomalies in the geophysical survey data the archaeological potential is still likely to be low for discrete remains for all periods.

The Proposed Development will result in a major adverse effect where groundworks are required, the magnitude of effect dependant on the importance of any remains, if present. The potential impact on any archaeological remains can be partially mitigated through a programme of archaeological investigation.

A programme of archaeological works will be required to test the results of the geophysical survey. In this instance, the first stage in a phased approach to any archaeological investigation would be targeted trial trenching targeting potential archaeological features and apparent 'blank' areas in the geophysical survey data. This will characterise the archaeological potential of the Site. The results of this evaluation will be used to determine the requirement for any additional archaeological mitigation, if any.

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FIGURES

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APPENDICES

1. INTRODUCTION

1.1 BWB Consulting Limited (BWB) was instructed by Gateway Developments (York) Limited to undertake a Heritage Assessment on a site to the south of Sim Balk Lane, York ('the Site') in respect of a detailed planning application for a residential development.

1.2 The application is for the construction of a residential development for 114 affordable housing units, public open space, and new access from Sim Balk Lane (the 'Proposed Development'). **Appendix 1** shows the masterplan of the Site.

1.3 The purpose of the report is to assess the potential impact on the setting and significance of Built Heritage assets within a 500m study area of the Site boundary and assess the potential for archaeological remains to be present within the Site. The study area has been informed by a site visit. The assessment considers any potential impacts on heritage assets and the potential archaeological resource, in line with the requirements of National Planning Policy Framework (NPPF).[1]

Site Location and Topography

1.4 The Site mostly comprises agricultural land, with an area of grassland in the north-west and trees and hedgerows along the boundary. The north-western part of the Site is bounded by Sim Balk Lane to the north, with York College and sports fields beyond. To the west of the Site is a petrol station and an area of parkland. The A64 is located to the south of the Site.

1.5 The Site is centred approximately on National Grid Reference SE 5837 4826 and covers an area of approximately 6.96 ha. The Site boundary is shown on **Figure 1**.

1.6 The Site slopes from 15m Above Ordnance Datum (AOD) at the north-western to approximately 10m AOD across much of the centre and south-west of the Site.[2]

[1] Ministry of Housing, Communities & Local Government, 2012 (as amended 2021), *National Planning Policy Framework*, Chapter 16, paragraph 194.
[2] Free Map Tools, *Elevation Finder*, https://www.freemaptools.com/elevation-finder.htm.

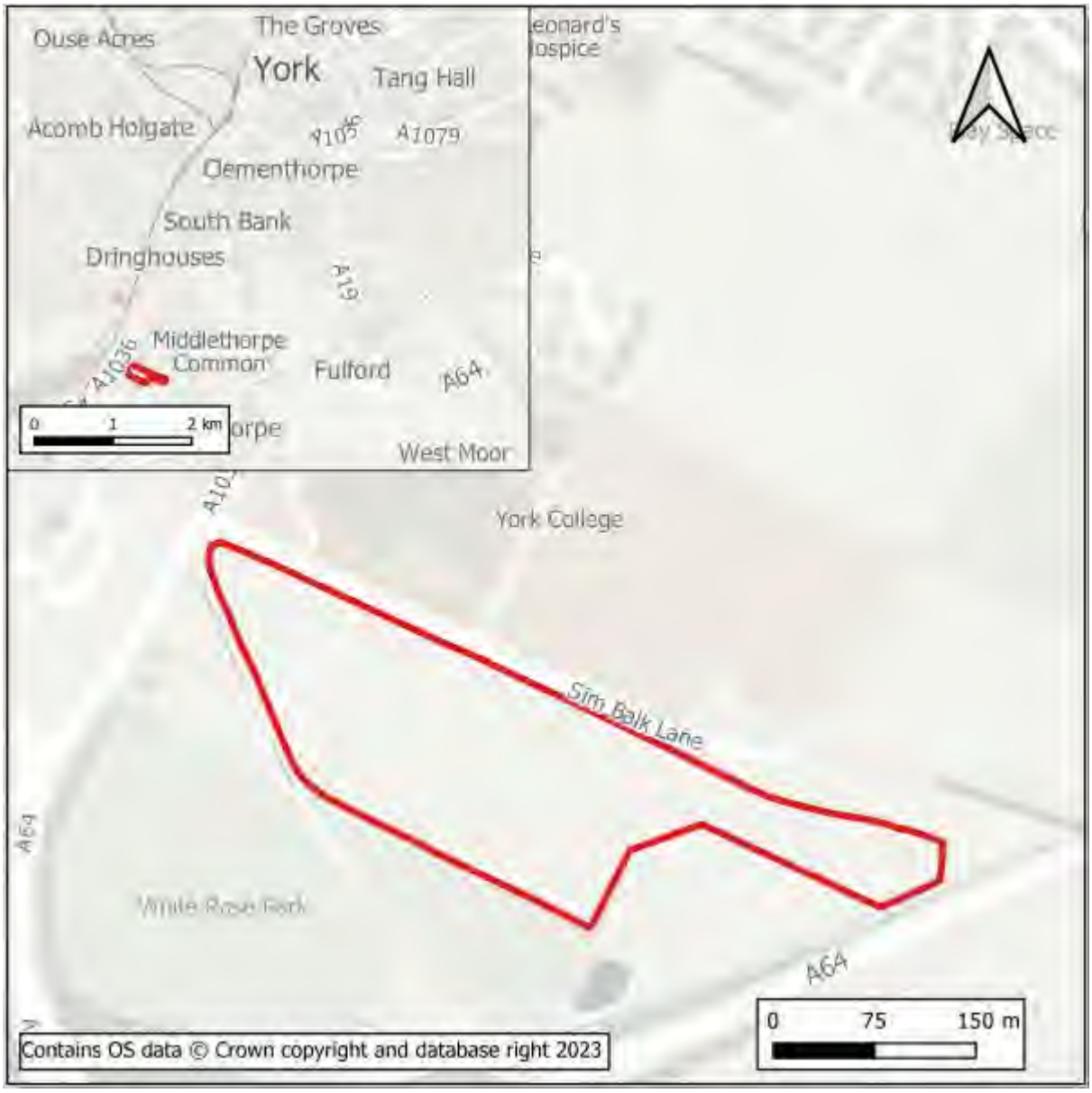

Figure 1: Site Location

Geology and Soils

1.7 According to the online British Geological Survey (BGS) mapping, the underlying bedrock geology across the Site comprises Sherwood Sandstone Group, while superficial deposits comprise Elvington Glaciolacustrine Formation (clay and silt) across the majority of the Site and York Moraine Member (sand, clay and gravel) in the north-west of the Site.

2. PLANNING BACKGROUND

Ancient Monuments and Archaeological Areas Act 1979

2.1 The Ancient Monuments and Archaeological Areas Act, 1979 outlines the provisions for designation, control of works and enforcement measures relating to Scheduled Monuments. The Act consolidates and amends the law relating to ancient monuments; to make provision for the investigation, preservation and recording of matters of archaeological or historical interest and (in connection therewith) for the regulation of operations or activities affecting such matters; to provide for the recovery of grants under section 10 of the Town and Country Planning (Amendment) Act 1972 or under section 4 of the Historic Buildings and Ancient Monuments Act 1953 in certain circumstances; and to provide for grants by the Secretary of State to the Architectural Heritage Fund.

2.2 Section 61(12) defines sites that warrant protection due to their being of national importance as 'ancient monuments'. These can be either scheduled monuments or "any other monument which in the opinion of the Secretary of State is of public interest by reason of the historic, architectural, traditional, artistic or archaeological interest attaching to it". If an ancient monument is scheduled, then it gains additional legal protection.

Planning (Listed Buildings and Conservation Areas) Act 1990

2.3 The Planning (Listed Buildings and Conservation Areas) Act, 1990 outlines the provisions for designation, control of works and enforcement measures relating to Listed Buildings and Conservation Areas. Section 66 of the Act states that, in considering whether to grant planning permission for development which affects a listed building or its setting, the local planning authority or, in certain cases, the Secretary of State, shall have special regard to the desirability of preserving the building or its setting, or any features of special architectural or historic interest which it possesses. Section 72 of the Act states that special attention shall be paid to the desirability of preserving or enhancing the character or appearance of Conservation Areas.

National Planning Policy Framework (NPPF)[3]

2.4 Chapter 16 of the NPPF, 'Conserving and Enhancing the Historic Environment', sets out the Government's planning polices for England and how these are expected to be applied to planning policy and the historic environment.

2.5 The preservation and enhancement of heritage assets forms an important part of the NPPF and is one of the core planning principles that should be used to underpin plan-making and decision-taking. The core principle outlined in paragraph 189 states that heritage assets 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.*'

[3] *National Planning Policy Framework*, Chapter 16.

2.6 Chapter 16, paragraph 194, of the NPPF requires that the relevant Historic Environment Record (HER) be consulted and any heritage assets likely to be affected by the proposed development have their significance assessed using appropriate expertise. Where an application site may influence heritage assets with archaeological interest, an appropriate desk assessment should be provided to inform the planning authority's decision making and, where appropriate, field evaluation will be undertaken to further inform planning decisions.

2.7 Paragraph 196 states, '*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*'.

2.8 Paragraph 197 of the NPPF is a fundamental consideration in determining planning applications. It states that local planning authorities should take account of the following three points:

- '*the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;*
- *the positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality; and*
- *the desirability of new development making a positive contribution to local character and distinctiveness.*'

2.9 Paragraph 199 states that '*great weight should be given to a designated heritage asset's conservation*', irrespective of the level of harm to its significance. It also states that '*the more important the asset, the greater the weight should be*'.

2.10 Chapter 16, paragraph 200, of the NPPF adds that any harm to, or loss of, the significance of a designated heritage asset '*should require clear and convincing justification*'.

2.11 Chapter 16, paragraphs 201 and 202 state that any harm caused by the proposal to heritage assets '*should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use*'.

2.12 Paragraph 203 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 directly or indirectly affect 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 Policy

City of York – Draft Local Plan Incorporating the 4th set of changes, approved April 2005[4]

2.13 This document was approved for the purpose of making development control decisions in the City of York for all applications submitted after April 2005.

2.14 Policy SP3 – Safeguarding the Historic Character and Setting of York:

- *'A high priority will be given to the protection of the historic character and setting of York. When considering planning applications the Council will apply the following principles:*
    - *The protection of key historic townscape features, particularly in the City Centre, that contribute to the unique historic character and setting of the City.*
    - *The protection of the Minster's dominance, at a distance, on the York skyline and City Centre roofscape.*
    - *The protection of the environmental assets and landscape features which enhance the historic character and setting of the City. These comprise the river corridors and the green wedges, both existing and extended. They also include areas of open countryside, which provide an impression of a historic city, such as locations which allow good views of the Minster or an urban edge including a Conservation area, and views into the City from a number of main transport routes.*
    - *The protection of the main gateway transport corridors into York from development which, cumulatively, could have an adverse impact on the character and setting of the corridor and the surrounding environment. If development is allowed, early and substantial planting of sensitive boundaries will be required.'*

2.15 Policy HE2 – Development in Historic Locations:

- *'Within or adjoining conservation areas, and in locations which affect the setting of listed buildings, scheduled monuments or nationally important archaeological remains (whether scheduled or not), development proposals must respect adjacent buildings, open spaces, landmarks and settings and have regard to local scale, proportion, detail and materials.*
- *Proposals will be required to maintain or enhance existing urban spaces, views, landmarks, and other townscape elements, which contribute to the character or appearance of the area.'*

2.16 Policy HE4 – Listed Buildings:

- *'With regard to listed buildings, consent will only be granted for the following types of development where there is no adverse effect on the character, appearance or setting of the building :*
    - *development in the immediate vicinity of listed buildings;*

[4] City of York Council, 2005, *City of York Draft Local Plan Incorporating the 4th set of changes – Development Control Local Plan, Approved April 2005*.

- *demolition;*
- *internal or external alterations;*
- *change of use;*
- *erection of satellite antenna.*'

2.17 Policy HE10 – Archaeology:

- '*Outside York City Centre Area of Archaeological Importance, archaeological deposits of national importance must be preserved in situ.*
- *Where physical preservation of the deposits in situ is not possible, applicants must make provision for the professional excavation and recording of the archaeology, in accordance with a detailed scheme approved prior to development commencing.*'

3. INFORMATION SOURCES

3.1 The following sources of information have been consulted in order to meet the requirements of the assessment and are in line with guidelines laid down by the Chartered Institute for Archaeologists.[5]

3.2 Historic England's National Heritage List for England Database was consulted for information on all designated Scheduled Monuments, Listed Buildings, Registered Parks and Gardens, Registered Battlefields, Conservation Areas and World Heritage Sites within the study area.[6]

3.3 Information on previous archaeological finds and investigations within the study area was obtained from a search of the City of York Historic Environment Record (HER) the 23rd May 2022.

Site Visits

3.4 A site visit was conducted on the 6th July 2022 and the 27th of February 2023 to support the gathering of the heritage baseline and to help assess the potential impacts on the setting of designated heritage assets. Plates from the site visit, showing both views to and from assets are in **Appendix 5** and the observations are discussed below.

3.5 The site visit identified key locations to assess the contribution made by the Site, if any, on designated and non-designated heritage assets. The Site was visited during the summer and winter months to ensure that the assessment of intervisibility took into account any seasonal variations.

3.6 The south and east-facing views from the Site are well screened by the A64 and associated mature planting (**Appendix 5, Plates 1**). The north-facing view is entirely screened by York College buildings and the mature trees within its grounds (**Appendix 5, Plate 2**). The topography to the west, beyond Tadcaster Road is at a lower datum and is not visible from the Site (**Appendix 5, Plate 3**). During the summer months of increased foliage, views beyond these trees are not possible (**Appendix 5, Plates 2** and **4**). Within the eastern portion of the Site there is glimpsed and distant north-facing views through the foliage, however these are restricted by the embankment of Sim Balk Lane to the east of the Site. Views in all directions are restricted by the topography, built environment and mature foliage. The glimpsed and distant long-distance views are further restricted in the summer months due to increased foliage. Therefore, a 500m study area is considered appropriate.

[5] Chartered Institute for Archaeologists, 2020, *Standard and Guidance for Historic Environment Desk-based Assessment*.
[6] Historic England, *The National Heritage List for England*, https://historicengland.org.uk/listing/the-list.

4. ASSESSMENT METHODOLOGY

4.1 An assessment of the importance of heritage assets within a 500m study area of the Site has been undertaken. Scheduled Monuments, Grade I and II* Listed Buildings, Registered Parks and Gardens, Registered Battlefields and World Heritage Sites are assessed to be of *high importance*.

4.2 The basis for assessing impacts on the historic environment is an understanding of the heritage assets that might be affected by a proposal. Planning policy and guidance emphasise the need to understand the cultural significance of heritage assets, including their setting, reflecting that the primary purpose is to preserve significance rather than no change. The process of gaining this understanding can be broken down into three distinct stages:

- **Description**: Research leading to a preliminary factual statement that establishes the location, nature and setting of the asset;
- **Cultural significance**: Analysis of what we value about the asset and the contribution made by its setting, leading to a statement of cultural significance. Cultural significance is not scaled but can be expressed in terms of four key 'heritage values' (see **Table 4.1**), as outlined in Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment[7]; and
- **Importance**: A conclusion regarding the level of protection or consideration that the asset merits in planning policy and cultural heritage legislation. A judgement on importance is scaled and can therefore be expressed in terms of the criteria set out within

[7] English Heritage, 2008, *Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment*.

- Table 4.2.

Table 4.1: Heritage Values

Value	Description
Evidential	The potential of a place to yield evidence about past human activity. Sites of evidential value will include those which have archaeological interest.
Historical	The ways in which past people, events and aspects of life can be connected through a place to the present. Heritage assets can either illustrate, or be associated with, past people and events
Aesthetic	The ways in which people draw sensory and intellectual stimulation from a place. Aesthetic value can arise from conscious design or fortuitously from the way the heritage asset has evolved.
Communal	The meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory

Table 4.2: Importance of Heritage Assets Criteria

Importance	Examples
Very High	World Heritage Sites; and Places of international importance due to their 'outstanding universal value'.
High	Scheduled Monuments; Grade I or II* Listed Buildings; Grade I or II* Registered Parks and Gardens; Battlefields; Places or structures of national importance; and Non-designated heritage assets of equivalent national importance or potential to contribute significantly to national research objectives.
Medium	Grade II Listed Buildings; Grade II Registered Parks and Gardens; Conservation Areas; and Non-designated assets of regional or high local importance with potential to contribute significantly to regional and local research objectives. This includes assets which have particular regional associations or may have important associations at a local level (e.g. they have significance to local population or embody something of the special identity of a locality).
Low	Locally Listed Buildings; and Non-designated assets which are relatively poorly preserved or have limited importance at a local level and low potential to add to local and regional research objectives.
Negligible	Assets that have very limited or no archaeological, historical or cultural importance.
Uncertain	Sites where there is evidence that a heritage asset may exist, but where there is insufficient information to determine its nature, extent and degree of survival given current knowledge.

4.3 Having understood cultural significance, the next step is to understand the proposed change(s) and the impact they would have on cultural significance. The process of evaluating the consequences of change can be usefully broken down into three distinct analytical stages:

- **Change**: A factual statement of how a proposal would change an asset or its setting including physical, visual appearance, scale, nature and duration;
- **Impact**: An assessment of the degree to which any changes would increase or decrease the cultural significance of an asset. Impact is scaled and the magnitude of impact is a reflection of the extent to which the cultural significance of an asset is changed by a proposal. A judgement of magnitude of impact can be made based criteria set out within **Table 4.3**; and
- **Effect**: A conclusion regarding whether an impact matters or not, reflecting the importance of the affected heritage asset. The effect is the measure that brings

together the magnitude of the impact and the heritage asset's importance. This a critical stage of the assessment process as this determines the weight that should be given to the matter in either influencing the design of the proposal or ultimately in the test as to whether the proposal will be acceptable and permitted. The effect can be articulated through the use of a matrix which brings together the importance of an asset and the magnitude of impact on the asset's significance (**Table 4.4**). Where there are two options for a level of effect, it is a matter of professional judgement which should be articulated in the text description as to the level of effect appropriate.

Table 4.3: Magnitude of Impact

Impact	Criteria
Major Negative	Causes total destruction or change to most key elements of the asset that results in substantial loss of integrity and cultural significance. Comprehensive change to the setting of the asset which is a critical aspect of the asset's cultural significance. Any such change would not normally be reversible.
Moderate Negative	Causes change to, or loss of many key elements which results in a moderate loss of integrity and cultural significance of the asset. Moderate changes to the setting of the asset where this makes an important contribution to the cultural significance of the asset.
Minor Negative	Change to some elements which lead to a limited loss of integrity and cultural significance of the asset. Change to the setting of the asset where this makes a limited contribution to the cultural significance of the asset.
Negligible / No change	No appreciable change to the cultural significance of the asset or its setting.
Minor Positive	Change to some elements which leads to limited improvement in integrity and cultural significance of the asset, or arrests decline. Change to the setting of the asset where this makes a limited contribution to the cultural significance of the asset.
Moderate Positive	Causes change to many key elements which result in a moderate enhancement to integrity and cultural significance of the asset or reverses decline. Moderate changes to the setting of the asset where this makes an important contribution to the cultural significance of the asset.
Major Positive	Causes significant change to most key elements of the asset that results in substantial enhancement of cultural significance. Comprehensive change to the setting of the asset which is a critical aspect of the asset's cultural significance.

Table 4.4: Effect Matrix

Importance of Asset	Magnitude of Impact			
	Major	**Moderate**	**Minor**	**Negligible / No Change**
Very High	Very Large	Very Large/Large	Large/Moderate	Slight/Neutral
High	Very Large/Large	Large/Moderate	Moderate/Slight	Slight/Neutral
Medium	Large/Moderate	Moderate	Slight	Neutral
Low	Moderate/Slight	Slight	Slight/Neutral	Neutral

5. BASELINE ASSESSMENT

5.1 The size of the study area was determined after an initial review of the baseline within 1km of the Site informed by the site visit. It is considered that a 500m study area is appropriate to assess the archaeological baseline as well as to proportionately assess the impact of the Proposed Development on Built Heritage. The Conservation Areas of Middlethorpe and Tadcaster road are both substantially screened by intervening topography, vegetation and built environment and there is no intervisibility with the Site (**Appendix 5, Plates 1-4**). Development immediately north, east, south and west of the Site provides further screening and removes any contribution the Site may have made to these Conservation Areas. Although over 4km from the Site, the Grade I Listed Cathedral Church of St Peter, hereafter 'York Minster', (**1257222**) is included in this assessment due to its importance and its prominence in many key views in and around the city.

5.2 The assessment considers in detail the archaeological and heritage baseline within a 500m study area around the Site. Tabulated gazetteers summarising pertinent information for individual assets are presented in **Appendix 2** (**Tables 1** and **2**). Within **Appendix 3**, **Figure 2, 3A, 3B,** and **4** depict the locations of designated heritage assets, non-designated heritage assets (Points and Lines), non-designated heritage assets (Polygons), and previous archaeological events respectively. **Figure 5** shows the Zones of Theoretical Visibility ('ZTV') from the York Minster, **Figure 6** shows the ZTV from Micklegate Stray. **Figure 7** depicts the locations of plates discussed within the text. **Appendix 4** contains historic maps of the area and **Appendix 5** contains photographs taken during the site visit presented as plates. **Appendix 6** contains the geophysical survey report undertaken within the Site to support this application.[8]

5.3 Where designated heritage assets, such as Listed Buildings, are mentioned in the text, the relevant Historic England list entry numbers are given. Non-designated heritage assets included on the City of York HER are followed by the relevant HER number.

5.4 Within the study area, 41 archaeological events and 41 heritage assets have been recorded. These assets archaeological features, buildings and structures.

Designated Heritage Assets

5.5 The study area contains no World Heritage Sites, Scheduled Monuments, Registered Battlefields or Registered Parks and Gardens.

5.6 The National Heritage List for England (NHLE) records four designated assets within the 500m study area. This includes the following;

- Grade II Listed Milestone on Tadcaster Road (**1256467**);
- Grade II Listed Garth Cottage and Garth Mews (**1132494**) and Grade II Bishopthorpe Garth (**1166773**). These buildings are exemplary of Brierly's earlier arts and craft style which preceded the nationally significant Grade I listed Goddards House and Garden, also in York (**Appendix 5, Plates 8** and **9**); and

[8] Phase Site Investigations, 2023, *Sim Balk Lane York North Yorkshire Archaeological Geophysical Survey*, Project No. ARC/3464/1324

- The north-easternmost edge of the Bishopthorpe Conservation Area which comprises Bishopthorpe Garth (**1166773**), Garth Cottage and Garth Mews (**1132494**), and their setting.

York Minster

5.7 The York Minster (**1017777** and **1257222**) is a globally renowned Gothic masterpiece and contains a multitude of heritage values contributing to its significance, shown by its Grade I and Scheduled Monument designations, of which the views both to and from its tower contribute to its significance. However, given the height of its towers and the relatively flat topography of the Vale of York, the setting of this asset is particularly large. York Minster lies approximately 4.2 km to the north-east of the Site and mostly dates to the 13th to 15th centuries, although parts of it have been subsequently restored and rebuilt. The site visit has demonstrated that the Site does not contribute to the setting of the York Minster. Despite distant glimpsed and at this distant imperceivable views from its tower viewpoint towards the Site, the ZTV analyses, set at the height of the Minster viewpoint, confirms the lack of intervisibility and that the setting of York Minster where views from its tower contribute to its significance feature the built environment of the City of York, including both historic and modern development (**Appendix 5, Plate 6**). Therefore, the potential impact upon these views and the visitor experience to the York Minster is considered.

Bishopthorpe Conservation Area

5.8 Although an appraisal has not yet been prepared for Bishopthorpe Conservation Area, a description of the main elements of the character and appearance of the area is available on the City of York Council's website.[9] Bishopthorpe Conservation Area is a 'village-like' Conservation Area with period residences, including Bishopthorpe Palace, the historic residence of the Archbishop of York and the medieval church, providing historic and communal values. The site visit established that the setting of the Conservation Area and its constituent designated assets are made up by the nucleated village with positive contributions made by the wider agricultural landscape. There is no intervisibility, due to distancing, topography and the built environment, with the Site and the Conservation Area and the Site does not contribute to the setting or significance of the Conservation Area (**Appendix 5, Plate 5**). The Conservation Area falls partially within the 500m study area (**Figure 2**), in the area of Bishopthorpe Garth (**1166773**) and Garth Cottage and Garth Mews, Gatehouses to Bishopthorpe Garth (**1132494**).

Non-designated Heritage Assets

5.9 The south-eastern extent of the Micklegate Stray (**Figure 3b, MYO4287**) is an important non-designated asset with historic value drawing from its role within history of the City of York.

[9] City of York Council, 'Conservation Area: Bishopthorpe Conservation Area (Conservation Area 12', https://her-staging.york.gov.uk/Designation/DYO1709, viewed October 2022.

Archaeological and Historical Background

5.10 The following outlines the archaeological and historical background of the study area and is compiled from a review of the City of York HER as well as available secondary sources.

Prehistoric

5.11 Although no assets of certain prehistoric origin are recorded within the study area on the HER, several possible enclosures and a boundary ditch have been identified as cropmarks on aerial photographs (**Figure 3a, MYO4522**).

5.12 An auger survey undertaken on the western periphery of the study area in 2019 demonstrated that the organic horizons were extremely localised and limited in extent (**EYO6458**). Organic material encountered was dated to 13,281-13,102BP. Plant microfossils were identified within it.

Iron Age and Roman Period

5.13 The legionary fortress of *Eboracum* (York), which was founded in the 1st century AD, lies approximately 4km to the north-east of the Site. and the settlement at *Calcaria* (Tadcaster) lies c. 10km to the south-west. The fortress at *Eboracum* could accommodate approximately 5,200 men from the Ninth legion and later from the Sixth Victrix.

5.14 *Eboracum* and *Calcaria* were linked by an important Roman road (**Figure 3a**, **MYO2033**) which continued southwards to *Danum* (Doncaster). The road to the immediate west of the Site, Tadcaster Road, roughly follows the line of this Roman road, which is thought to have been established shortly after the Roman conquest in c. 71 AD and apparently went out of use in the 4th century or later.

5.15 Ashkam Bog (**Figure 3b, MYO2171**), which lies c. 300m to the west of the Site, was once part of the ancient fenlands of Yorkshire. The bog was used by local communities during the Romano-British period as a source of peat for fuel, as evidenced by a network of ditches.

5.16 An evaluation comprising 94 trenches was carried out approximately 300m to the north-west of the Site in 2014 (**EYO5899**). Two areas of Late Iron Age/Romano-British enclosures were found along with other undated linear features, possibly representing a system of field enclosures. The archaeologically significant activity was mostly found in the areas of higher ground.

5.17 Further Romano-British activity, mainly in the form of ditches, was revealed during a watching brief undertaken c. 300m to the north of the Site in 2006 (**EYO800**). One of the ditches may represent the south-east ditch of the *Eboracum* to *Calcaria* road that lies under the present Tadcaster Road. Another ditch may represent a field boundary perpendicular to the road. The lack of finds in these features indicates that the land alongside this stretch of the Roman road was used as farmland.

5.18 In 2017, a geophysical survey was undertaken c. 350m to the north of the Site (**EYO6394**). Results associated with existing landfill and soil disturbances masked earlier land uses, which included evidence of ridge-and-furrow cultivation and a faint linear feature that may represent a ditch under the furrows. This ditch was encountered during the subsequent trial trenching and contained late 3rd or early 4th century Romano-British pottery and animal bone (**EYO6528**). The ditch was likely used for the disposal of domestic refuse, potentially suggesting some form of settlement in the vicinity.

5.19 An evaluation undertaken in 2003 approximately 200m to the north of the Site recorded Roman finds but no significant archaeological features (**EYO297**).

Early Medieval and Medieval Period

5.20 The village of Bishopthorpe, which lies to the south-east of the study area, is recorded in the Domesday Book of 1086 as '*Badetorps*' and it had a recorded population of four households at this time. A church was constructed in the village in 1202 and a manor house and chapel had been built next to the River Ouse by 1241. Middlethorpe, which lies to the north-east of the study area, is recorded as '*Torp*' in the Domesday Book.[10]

5.21 The Knavesmire (**Figure 3b, MYO4287**), part of Micklegate Stray, falls within the study area. This was used as common grazing land throughout the medieval period for the people of Dringhouses, Middlethorpe and parts of York. Surviving patches of ridge-and-furrow cultivation and boundary stones across the Knavesmire attest to its medieval utilisation. It is thought that the current outline of the Knavesmire was established by 1624. Following the Inclosure Acts of the 19th century, which forced common land to be enclosed and pasturage rights to cease, areas of grazing were allotted to the Freemen of York in compensation for their loss of existing rights.

5.22 The Site would have comprised agricultural land during the medieval period, likely utilised by the nearby villages of Middlethorpe and Bishopthorpe. Medieval and early post-medieval ridge-and-furrow cultivation earthworks and cropmarks have been recorded across much of the study area (**Figure 3b**), most of which were identified using aerial photographs (**MYO2240**, **MYO2315**, **MYO2316**, **MYO2334**, **MYO3285**, **MYO3286**, **MYO3287**, **MYO3374**, **MYO3375**, **MYO3376**, **MYO3430**, **MYO3431**, **MYO3432**, **MYO3448**, **MYO3449**, **MYO3704**, **MYO3705**, **MYO3706**, **MYO2312**, **MYO2313**, **MYO2314**, **MYO2333**, **MYO3382**, **MYO3433**, **MYO3710**, **MYO4906**, **MYO5024**). However, most of these earthworks, including those within the Site, have since been levelled by ploughing.

5.23 Trial trenching was undertaken on land to the immediate south of the Site by York Archaeological Trust in 2018 (**EYO6470**). Features related to agricultural activity were encountered in some of the 23 trenches excavated, including relict cultivation furrows, two ditches and a gully. These features are medieval or post-medieval in date and of low importance. One of the ditches may have extended north into the Site, although no evidence of this ditch was identified through the geophysical survey of the Site (**Appendix 6**).

[10] Powell-Smith, A., *Open Domesday*, https://opendomesday.org/, viewed October 2022.

Post-medieval and Modern Period

5.24 Post-medieval buildings within the study area include the late-17th century Middlethorpe Grange (**MYO29**), a house which is located c. 230m to the east of the Site, and 185 Tadcaster Road (**MYO4034**), an ancillary building to the now demolished Victorian house, Dringthorpe (**Figure 3a**).

5.25 The Knavesmire was drained and levelled in the early 18th century. During the Second World War, it provided a location for a searchlight battery and antiaircraft battery.

5.26 The study area remained relatively unchanged until the early-to-mid-19th century. The York and North Midland Railway was opened in 1840 to connect York to London (**Figure 3a, MYO4610**), and it still operates as part of the East Coast Main Line c. 250m to the west of the Site.

5.27 The Northern Direct Line of the Great Northern Railway (**Figure 3a, MYO4616**), which ran along the Site's western boundary, was constructed from 1863 and opened in 1871. This line has since been dismantled and is now used as a footpath and cycle route.

5.28 York College was constructed to the north of the Site in the mid-20th century and, along with the construction of the A64 road junction to the south, changed the character of the landscape in this area.

Geophysical Survey within the Site

5.29 Phase Site Investigations Ltd was commissioned to carry out a magnetic gradient survey at the Site. The aim of the survey was to establish the presence or absence, extent, character, relationships and date (as far as circumstances and the inherent limitation of the technique permits) of archaeological features within the Site. The full report of the geophysical survey is included in the report as **Appendix 6**.

5.30 The majority of the anomalies identified by this survey relate to modern material or objects and agricultural use or drainage activity. Some of the responses are suggestive of agricultural activity that could relate to the evidence of ridge-and-furrow cultivation within the Site. There are several trends of uncertain origin but these do not form any clear patterns or relationships that would indicate an archaeological origin, and they are considered more likely to be associated with agricultural activity, drainage features or possibly natural features or variations.

5.31 The area in the west of the site is dominated by magnetic disturbance from modern material. The strength of the responses within the magnetic disturbance suggest that it is caused by a substantial depth of made ground rather than a surface or near surface spread of material

Consultation

5.32 Following the geophysical survey, an interim 'greyscale' figure of the results was shared with the City Archaeologist for the City of York, Claire MacRae.

5.33 The results of this geophysical survey, as well as the results of the geophysical survey and the field evaluation in the field to the immediate south (**EYO6470**) have been reviewed, and no significant archaeological remains were encountered. It was agreed that the archaeological potential did warrant some archaeological trial trenching but that this can be implemented as a planning condition rather after the determination of the planning application. The City Archaeologist has requested the full geophysical survey report for the HER, with a view to reviewing the interpretation of the results to inform future archaeological works.

Cartographic Analysis

5.34 The 1828 county map of Yorkshire (**Appendix 4**, **Figure 8**) depicts the Site apparently comprising farmland to the south of Sim Balk Lane. A path or track with a roughly north to south orientation is depicted passing through the eastern end of the Site adjacent to a stream. *Middlethorpe Lodge*, now Middlethorpe Grange, is depicted to the east of the Site. The surrounding land appears to have been predominantly agricultural.

5.35 The 1898 Edition Ordnance Survey (OS) map (**Appendix 4**, **Figure 9**) depicts the Northern Direct Line of the Great Northern Railway running along the Site's western boundary. The York and North Midland Railway is also depicted to the west. A field boundary with a roughly north-east to south-west orientation ran through the eastern part of the Site.

5.36 The 1910 Edition OS map (**Appendix 4**, **Figure 10**) shows the Site in greater detail. Several field boundaries are depicted in the eastern part of the Site along with a small enclosure, possibly a sheepfold. A pond is depicted in the northern part of the Site. Several barns are dotted around the surrounding fields, indicating a continued agricultural use of the landscape.

5.37 The 1958 Edition OS map (**Appendix 4**, **Figure 11**) shows no change within the Site. A small building that is rectangular in plan had been constructed to the west beyond the railway line, but otherwise little had changed within the surrounding area.

Historic Landscape Characterisation

5.38 The Site lies within two separate Historic Landscape Characterisation (HLC) areas. The western end is within an area characterised by 'planned large scale parliamentary enclosure' (**HNY7536**) while the rest of the Site is within an area characterised by 'modern improved fields' (**HNY7507**).[11]

[11]Historic Environment Team, North Yorkshire County Council, 2010, *The North Yorkshire & Lower Tees Valley Historic Landscape Characterisation*, North Yorkshire County Council & English Heritage

6. ASSESSMENT OF SETTING, SIGNIFICANCE AND ARCHAEOLOGICAL POTENTIAL

Assessment of Significance and Setting

York Minster

6.1 York Minster is a Gothic cathedral set within the historic urban core of the city of York. The Minster (**1257222**) stands as a symbol of medieval craftsmanship and religious importance. York Minster's setting is within the urban areas of York. It is a primary focus within the city which provide panoramic views of the cathedral and its surroundings. This integration of York Minster into the City of York's streetscape and its prominent position contribute to its cultural and historical significance, as it has been a central feature of York since its construction.

6.2 The views to and from York Minster tower contribute positively to its setting and significance. From this elevated vantage point, visitors gain a unique perspective of York and the Minster, allowing them to closely examine the cathedral's Gothic architecture, including its intricate stained glass windows and detailed stonework. The viewpoint also provides an opportunity to experience the City of York, view and appreciate its layout its streets, squares, and notable landmarks. The Minster is a well-recognised tourist attraction, drawing visitors from around the world, and the tower makes an important contribution to that experience.

6.3 Due to the intervening built environment, treelines and topography, the Site forms only a small part of the overall 360-degree panoramic views (**Appendix 5, Plate 6**). These are partial and very distant and glimpsed views (**Figure 5**). From the viewpoint the Site is imperceptible and makes no contribution to the setting of the Minster within the context of the historic setting, more closely associated with the heart of the city and the urban and sub-urban wider setting. The views of the Site at over 4km are seen with the backdrop of existing built form and merge into the landscape. The ZTV analysis confirms that the views in the direction of the Site are dominated by the extant built form, Micklegate stay and only include incredibly distant glimpsed views of the western portion of the Site (**Figure 5**). The forthcoming Landscape and Visual Appraisal (LVIA) has concluded that the is devoid of any notable landscape features and is relatively well contained within the wider landscape by existing vegetation along the Site boundaries and built form in its immediate surroundings.[12] Furthermore the Site is not a distinctive feature in any view, therefore the imperceivable glimpses of the Site from the Minster do not contribute to its setting or significance.

Bishopthorpe Conservation Area and Listed Buildings

6.4 Bishopthorpe Garth (**1166773**) and Garth Cottage and Garth Mews, Gatehouses to Bishopthorpe Garth (**1132494**) are both Grade II Listed Buildings and were designed by renowned Yorkshire Architect Walter Brierly for the colliery owner Arthur Toward Wilson

[12] TEP – Warrington, 2023, *Sim Balk Lane York Landscape and Visual Appraisal,* Report number 9598

in the Arts and Crafts style in 1908, contributing to the historic and aesthetic value of the Listed Buildings (**Appendix 5, Plate 7**). The Garth Cottage and Garth Mews, Gatehouses to Bishopthorpe Garth (**1132494**) frame the approach to Bishopthorpe Garth (**1166773**) and the gardens beyond which form the primary setting of both Listed Buildings. The Gardens were designed by celebrated landscape architect Gertrude Jekyll. While private and not possible to visit, the Impressionistic style gardens with linear water feature which exemplify her work are a strong and positive contribution to the significance of both Listed Buildings. These Listed Buildings benefit from their group value, which the gardens further contribute to. Their wider setting consists of Sim Balk Lane, a main thoroughfare between York and Bishopthorpe village, with wider views well screened by mature planting and glimpsed views of open countryside beyond (**Appendix 5, Plate 9-11**). Garth Cottage and Garth Mews, Gatehouses to Bishopthorpe Garth (**1132494**) on approach into the Bishopthorpe Conservation Area acts as a gateway to the Conservation Area and the surrounding suburban development. The Site is entirely screened by the A64 motorway and the Sim Balk Lane embankment from both Listed Buildings (**Appendix 5, Plate 1** and **10**). The Site does not contribute to the setting or significance of the Bishopthorpe Conservation Area and associated Listed Buildings.

6.5 The Milestone West of Number 211 (**1256467**) is a mid-late 19th century milestone and a Grade II Listed Building. The setting comprises the linear and historic route of Tadcaster road which is lined with trees and 18th to 19th century structures to the east and a modern retail park to the west (**Appendix 5, Plate 12**). The significance of this asset is derived from the evidential value along a historic route. The setting of the milestone makes a minor contribution to its significance. There is no intervisibility with the Site and the Site does not contribute to the setting or significance of the Listed Building.

Micklegate Stray

6.6 The ZTV analysis (**Figure 6**) and site visit demonstrate that from the closest point within the Micklegate Stray (**MYO4287**) to the Site, there are only very distant and glimpsed views of the Site beyond Sim Balk Lane embankment, which primarily incorporate the fields immediately between the Site and the Stray. The glimpsed intervisibility of the Site contributes very little to the setting of the asset and does not make a substantial contribution to its significance (**Appendix 5, Plate 13**). The Micklegate Stray's significance derives from the historic value associated with the 18th and 19th century 'Inclosure Acts' and the grazing rights for the *Freemen of York*, the communal value is derived from the public amenity of a park, aesthetic value as a green space within the urban environment and minor evidential value associated with medieval and postmedieval agricultural practices. None of these values will be impacted by the Proposed Development.

Assessment of Archaeological Potential

6.7 The geophysical survey (**Appendix 6**) has shown there is a very low potential for linear features such as ditches, enclosures, settlement or substantial human activity deriving from industrial or settlement activities from all periods. Discrete remains are more difficult to detect via geophysics but with no associated archaeological anomalies in the geophysical survey data the archaeological potential is still likely to be low for discrete remains for all periods.

6.8 The magnetic disturbance across the west of the Site identified in the geophysical survey (**Appendix 6**) may indicate the truncation of the archaeological horizon and a corresponding reduction of archaeological potential within this area.

6.9 Historic map analysis indicates that there are the remains of several post-medieval field boundaries the Site.

7. IMPACT ASSESSMENT

7.1 This section will assess the potential impacts on the significance of heritage assets and on hitherto unknown archaeological remains that may be present within the Site.

Direct Impacts on Recorded Heritage Assets

7.2 The Proposed Development will not directly impact any, currently known, designated or non-designated heritage asset.

Impacts on Significance and Setting

7.3 There will be no change to the setting or significance of Bishopthorpe Garth (**1166773**) or Garth Cottage and Garth Mews, Gatehouses to Bishopthorpe Garth (**1132494**), or upon the Bishopthorpe Conservation Area. The significance of effect is no change.

7.4 There will be no change to the setting or significance of the Milestone (**1256467**). The magnitude of effect is no change.

7.5 Minor changes to the glimpsed views from the southern portion of the Micklegate Stray will result in a very low end of slight harm, barely raising to the level of negligible impact, to setting of the asset. Therefore, the magnitude of the effect is assessed as negligible.

7.6 The massing of the Proposed Development will be proportional to the existing built environment and at a distance of 4.2km, it will not change any aspect of the setting that makes a positive contribution to significance of York Minster's significance.

Potential Sub-surface Archaeological Remains

7.7 Intrusive ground investigations and site preparations, including temporary works, excavation and buried service installation, have the potential to impact buried archaeological remains. The impact, where it occurs, is irreversible. Archaeological features would be expected to be below the topsoil and sub-soil horizons. Works that require groundworks have the potential to disturb, truncate or remove potential buried archaeological remains.

7.8 The impact on any buried archaeological remains would be on their evidential value. Any prehistoric and Roman remains have the potential to be of medium importance depending on their significance. Any remains that are post-medieval or modern in date would have low importance.

7.9 The Proposed Development would have a major adverse magnitude of impact where groundworks are required. If remains of medium importance were encountered, the significance of effect would be moderate. If remains of low importance were present the significance of effect would be slight to moderate. A programme of archaeological mitigation if required would preserve by record any remains (if present) and reduce the significance of effect. In NPPF terms this would amount to a less than substantial harm.

Recommendations

7.10 The potential impact on any archaeological remains can be partially mitigated through a programme of archaeological investigation.

7.11 A programme of archaeological works will be required to test the results of the geophysical survey. In this instance, the first stage in a phased approach to any archaeological investigation would be targeted trial trenching targeting potential archaeological features and apparent 'blank' areas in the geophysical survey data. This will characterise the archaeological potential of the Site. The results of this evaluation will be used to determine the requirement for any additional archaeological mitigation, if any.

7.12 The City Archaeologist advised that upon the application a standard evaluation condition will be imposed upon the granting of any permission. Emphasis has been placed on the need for trenching to target proposed anomalies and specific blank areas, with potential alignment to the proposed scheme, which will be secured through a condition.

7.13 This would comply with the Local Policy HE10 requirements to make provision to appropriately excavate the potential archaeology within the Site prior to development.

8. CONCLUSION

8.1 The assessment provides a detailed understanding of the baseline historic environment and the built heritage assets within a 500m study area of the Site.

8.2 The Proposed Development will not directly impact any, currently known, designated or non-designated heritage assets. There are no recommendations required to mitigate any impacts on any designated or non-designated heritage assets.

8.3 The Site forms only a small part of the panoramic views from the Minster and at over 4km away merge with the existing built form into part of the landscape. There will be no change to the setting of the York Minster which contributes to its significance.

8.4 There will be no change to the setting or significance of Bishopthorpe Garth (**1166773**) or Garth Cottage and Garth Mews, Gatehouses to Bishopthorpe Garth (**1132494**), or upon the Bishopthorpe Conservation Area. The significance of effect is no change. There will be no change to the setting or significance of the Milestone (**1256467**). The magnitude of effect is no change. There will be minor changes to glimpsed views of the Site from Micklegate Stray (**MYO4287**) resulting in a negligible magnitude of effect from the Proposed Development.

8.5 There are recorded archaeological remains within the Study area dating from the prehistoric, Roman, Medieval and early modern periods. The geophysical survey (**Appendix 6**) has shown there is a very low potential for linear features such as ditches, enclosures, settlement or substantial human activity deriving from industrial or settlement activities from all periods. Discrete remains are more difficult to detect via geophysics but with no associated archaeological anomalies in the geophysical survey data the archaeological potential is still likely to be low for discrete remains for all periods.

8.6 The potential impact on any archaeological remains can be partially mitigated through a programme of archaeological investigation.

8.7 A programme of archaeological works will be required to test the results of the geophysical survey. In this instance, the first stage in a phased approach to any archaeological investigation would be targeted trial trenching targeting potential archaeological features and apparent 'blank' areas in the geophysical survey data. This will characterise the archaeological potential of the Site. The results of this evaluation will be used to determine the requirement for any additional archaeological mitigation, if any.

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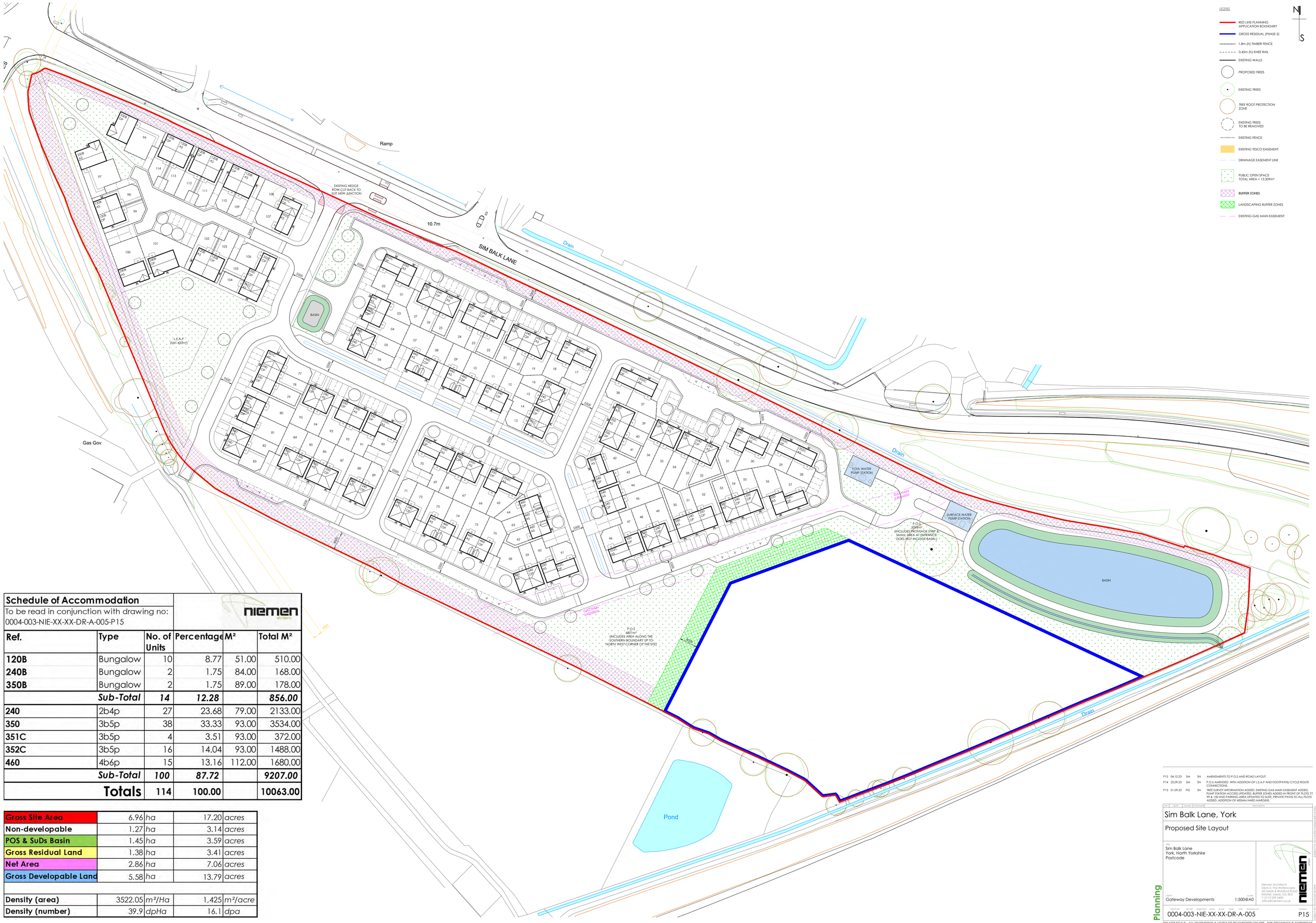
APPENDICES

APPENDIX 1: Masterplan



Schedule of Accommodation					
To be read in conjunction with drawing no: 0004-003-NIE-XX-XX-DR-A-005-P15					
Ref.	**Type**	**No. of Units**	**Percentage**	**M²**	**Total M²**
120B	Bungalow	10	8.77	51.00	510.00
240B	Bungalow	2	1.75	84.00	168.00
350B	Bungalow	2	1.75	89.00	178.00
	Sub-Total	***14***	***12.28***		***856.00***
240	2b4p	27	23.68	79.00	2133.00
350	3b5p	38	33.33	93.00	3534.00
351C	3b5p	4	3.51	93.00	372.00
352C	3b5p	16	14.04	93.00	1488.00
460	4b6p	15	13.16	112.00	1680.00
	Sub-Total	***100***	***87.72***		***9207.00***
	Totals	**114**	**100.00**		**10063.00**

Gross Site Area	6.96	*ha*	17.20	*acres*
Non-developable	1.27	*ha*	3.14	*acres*
POS & SuDs Basin	1.45	*ha*	3.59	*acres*
Gross Residual Land	1.38	*ha*	3.41	*acres*
Net Area	2.86	*ha*	7.06	*acres*
Gross Developable Land	5.58	*ha*	13.79	*acres*
Density (area)	3522.05	*m²/Ha*	1,425	*m²/acre*
Density (number)	39.9	*dpHa*	16.1	*dpa*

rev	date	issued	checked	description
P15	04.10.23	SM	SN	AMENDMENTS TO P.O.S AND ROAD LAYOUT.
P14	25.09.23	SM	SN	P.O.S AMENDED WITH ADDITION OF L.E.A.P AND FOOTPATHS/ CYCLE ROUTE CONNECTIONS.
P13	01.09.23	PG	SN	TREE SURVEY INFORMATION ADDED. EXISTING GAS MAIN EASEMENT ADDED. PUMP STATION ACCESS UPDATED. BUFFER ZONES ADDED IN FRONT OF PLOTS 77, 99 & 100 AND PARKING AREA UPDATED TO SUITE. PRIVATE PATHS TO ALL PLOTS ADDED. ADDITION OF 600MM HARD MARGINS.

Sim Balk Lane, York

Proposed Site Layout

Sim Balk Lane
York, North Yorkshire
Postcode

client: Gateway Developments

scale: 1:500@A0

Planning

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client ref. | job ref. | originator | zone | level | type | role | drawing no. | revision

0004-003-NIE-XX-XX-DR-A-005 | P15

APPENDIX 2: Gazetteer of Heritage Assets and Archaeological Events

APPENDIX 2

Catalogue entries for heritage assets and archaeological events recorded on the City of York Historic Environment Record (HER), and those identified as part of this assessment, are provided below. Each entry includes a National Grid Reference (NGR) and the relevant List Entry or HER reference numbers.

Table 1: Gazetteer of Designated Assets (Listed Buildings)

REF (List Entry No./ HER)	NAME	GRID REF	GRADE	IMPORTANCE	DESCRIPTION
1132494 / MYO436	Garth Cottage and Garth Mews, Gatehouses to Bishopthorpe Garth	SE 59098 47974	II	Medium	Listed Building. Pair of gatehouses, dated c1908, by famous York architect Walter Brierley. Hand-made pinkish-brown brick in English bond, rendered to rear left, and pantile roof to main block, concealed to right.
1166773 / MYO570	Bishopthorpe Garth	SE 59169 47996	II	Medium	Listed Building. House, dated 1908 with later additions, by famous York architect Walter Brierley. Pinkish brown hand-made brick in English bond with pantile roof.
1256467 / MYO758	Milestone Approximately 10 Metres West of Number 211 (Number 211 Not Included)	SE 58256 48690	II	Medium	Listed Building. Milestone, mid-late 19th century. Dressed stone and cast-iron.

Table 2: Gazetteer of Non-designated Assets

REF (HER)	NAME	GRID REF	PERIOD	DESCRIPTION
MYO2240	Ridge and Furrow City of York	SE 5847 4875	Medieval to Late 19th century	Broad Ridge and Furrow. Very well preserved earthworks on eastern half of this monument (western half destroyed by construction of St Leonard's Hospice).
MYO2315	Ridge and Furrow Bishopthorpe	SE 5832 4756	Medieval	Ridge and furrow seen as earthworks and cropmarks on 1936 air photographs.
MYO2316	Ridge and Furrow Copmanthorpe	SE 5818 4801	Medieval	Broad Ridge and Furrow seen as earthworks and cropmarks on 1936 air photographs.
MYO2334	Ridge and Furrow Askham Bryan	SE 5809 4816	Undated	Broad Ridge and Furrow seen as earthworks and cropmarks on 1936 air photographs.

REF (HER)	NAME	GRID REF	PERIOD	DESCRIPTION
MYO29	Middlethorpe Grange	SE 5891 4808	Post Medieval to Late 17th century	Middlethorpe Grange, a two-storeyed house of brick covered with roughcast, roofed with pantiles, built in the late 17th century.
MYO3285	Ridge and Furrow Askham Bryan	SE 5792 4807	Undated	Broad Ridge and Furrow from an unknown date.
MYO3286	Ridge and Furrow Askham Bryan	SE 5818 4807	Undated	Broad Ridge and Furrow from an unknown date.
MYO3287	Ridge and Furrow Copmanthorpe	SE 5784 4796	Undated	Broad Ridge and Furrow from an unknown date.
MYO3374	Ridge and Furrow Bishopthorpe	SE 5843 4772	Undated	Broad Ridge and Furrow from an unknown date.
MYO3375	Ridge and Furrow Bishopthorpe	SE 5864 4762	Medieval	Medieval ridge and furrow in the parish of Bishopthorpe visible as cropmarks and earthworks on air photographs. The system surrounds the modern village of Bishopthorpe.
MYO3376	Ridge and Furrow Bishopthorpe	SE 5825 4780	Undated	Broad Ridge and Furrow from an unknown date.
MYO3430	Ridge and Furrow York City	SE 5834 4828	Undated	Broad Ridge and Furrow from an unknown date.
MYO3431	Ridge and Furrow York City	SE 5868 4887	Undated	Broad Ridge and Furrow from an unknown date.
MYO3432	Ridge and Furrow York City	SE 5821 4879	Undated	Broad Ridge and Furrow from an unknown date.
MYO3448	Ridge and Furrow York City	SE 5784 4883	Undated	Broad Ridge and Furrow from an unknown date.
MYO3449	Ridge and Furrow York City	SE 5766 4873	Undated	Broad Ridge and Furrow from an unknown date.
MYO36	Field boundary	SE 5895 4837	Undated	Field boundary (unknown date).
MYO3704	Ridge and Furrow Bishopthorpe	SE 5933 4829	Medieval	Ridge and furrow seen as earthworks and cropmarks on 1936 air photographs.

REF (HER)	NAME	GRID REF	PERIOD	DESCRIPTION
MYO3705	Ridge and Furrow York City	SE 5890 4856	Undated	Broad Ridge and Furrow seen as earthworks and cropmarks on 1936 air photographs.
MYO3706	Ridge and Furrow	SE 5802 4862	Medieval to Late 19th century	Broad Ridge and Furrow seen as earthworks and cropmarks on 1936 air photographs.
MYO4600	Great North of England Railway	SE 5752 5016	Mid-19th century	The Great North of England Railway was a North Eastern Railways venture to connect York with Newcastle. It was realised that the fairly level Plain of York would be completed quickly, so an Act for the section North of Croft, near Darlington, was obtained in 1836, and a second Act for the southern section sought in 1837. The Croft Branch of the Stockton and Darlington Railway was purchased to incorporate it into the new route, the line opening in 1841. The GNE ran into financial difficulties and had to cede its powers to the Newcastle and Darlington Railway to complete the route.
MYO4610	The York and North Midland Railway	SE 5764 4839	Mid-19th century	The York and North Midland Railway was opened in 1840 from York to Normanton, where it joined the North Midland Railway. The North part of the line forms part of the Main East Coast Line.
MYO4616	Great Northern Railway (Northern Direct Line)	SE 5982 4572	Late-19th century	The original Great Northern Railway ran as far as Doncaster, using running powers from there to York. In 1863 the North Eastern Railway obtained authorisation to build a new direct route from Shaftholme Junction (north of Doncaster) to Chaloner Whin Junction (south of York) via Selby. Two connecting spurs were also authorised, one at Heck with the Lancashire and Yorkshire Railway, and another at Joan Croft Junction and Applehurst Junction with the West Riding and Grimsby Railway. Opened in 1871.
MYO2033	Roman Road (RCHME Road 10)	SE 56766 48831	Roman	Road approaching York from the south-west from Tadcaster, Calcaria. Thought to have been established soon after the Roman conquest in c.71. Exact line unknown.
MYO2171	Askham Bog	SE 57144 48074	Saxon to Medieval	Retting Pond, Askham Bog, is renowned for its ancient relict fen and bog flora and fauna, a rare and extraordinary combination. Askham Bog is a unique meeting place for wetland plants and animals from the south and east on one hand, and the north and west on the other. Some of the specialities include Great fen sedge, bog myrtle, water violet and gingerbread sedge.
MYO2312	Ridge and Furrow Bishopthorpe	SE 5875 4770	Medieval	Broad Ridge and Furrow seen as earthworks and cropmarks on 1936 air photographs.
MYO2313	Ridge and Furrow Bishopthorpe	SE 5853 4760	Medieval	Broad Ridge and Furrow seen as earthworks and cropmarks on 1936 air photographs.
MYO2314	Ridge and Furrow Bishopthorpe	SE 5893 4787	Medieval	Broad Ridge and Furrow seen as earthworks and cropmarks on 1936 air photographs.

REF (HER)	NAME	GRID REF	PERIOD	DESCRIPTION
MYO2333	Ridge and Furrow Askham Bryan	SE 5764 4816	Undated	Broad Ridge and Furrow seen as earthworks and cropmarks on 1936 air photographs.
MYO3382	Ridge and Furrow Bishopthorpe	SE 5896 4818	Medieval	Broad Ridge and Furrow seen as earthworks and cropmarks on 1936 air photographs.
MYO3433	Ridge and Furrow York City	SE 5852 4885	Undated	Broad Ridge and Furrow from an unknown date.
MYO3710	Ridge and Furrow York City	SE 5784 4891	Undated	Broad Ridge and Furrow seen as earthworks and cropmarks on 1936 air photographs.
MYO4034	185 Tadcaster Road	Location Not Provided	Undated	Ancillary building (cottage & stables) to the large Victorian house called 'Dringthorpe' demolished after WW II. Now part of St. Leonard's Hospice? Decorative barge boards, chimneys and porch. Also includes iron railings (pre 1890s) surrounding a small stand of beech trees. Part of the original landscaping of Dringthorpe House. Nominated for inclusion on the local list of heritage assets
MYO4287	Knavesmire (part of Micklegate Stray)	Location Not Provided	Medieval / Undated	Common Land and Racecourse. Throughout the medieval period, the Knavesmire was used as common grazing land, as part of Micklegate Stray, for the people of Dringhouses, Middlethorpe and parts of York. Small patches of ridge and furrow exist. These are generally located to the west of the racecourse on areas less prone to flooding. Other agricultural survivals include boundary stones relating to the division of Hob Moor and the Micklegate Stray along Tadcaster Road, a pinfold (MYO759) and Herdsman's Cottage c.1840 (MYO1085), all Grade II listed. The outline of the Knavesmire was established as it is today by at least 1624. In the early 18th century the Knavesmire was drained and levelled. The first race meet took place there in 1731 having moved from Clifton Ings. The racecourse (MYO2239) grew between the 19th and 20th century with major developments taking place in the 1920s and later 20th century. During the Second World War part of the Knavesmire was ploughed as well as providing a location for a searchlight battery and antiaircraft battery. A Royal Observer Corps (ROC) bunker is located on Knavesmire Road, dating to 1943.
MYO4522	Several possible enclosures	SE 5897 4821	Unknown Date	Several possible enclosures of uncertain date were seen as cropmarks on air photographs. There are three or more possible enclosures and a possible boundary ditch. The features were revealed when post medieval ridge and furrow was ploughed away.

REF (HER)	NAME	GRID REF	PERIOD	DESCRIPTION
MYO4906	Bishopthorpe ridge and furrow	SE 5890 4726	Medieval-Post Med, Post Medieval to 20h century	A field system of medieval and post-medieval ridge and furrow was seen as cropmarks and earthworks on air photographs in the parish of Bishopthorpe. The system surrounds the modern village of Bishopthorpe.
MYO5024	Narrow Ridge and Furrow Askham Bryan	SE 5730 4900	Post Medieval to 20th century	A few blocks of narrow post-medieval ridge and furrow were seen on aerial photographs. There are several blocks which have been levelled while others appear upstanding on late 1970s photography.
MYO350	Tadcaster-York Road	SE 5789 4819	Roman	Line of roman road still followed by present road.

Table 3: Gazetteer of Archaeological Events

REF (HER)	NAME	GRID REF	DESCRIPTION
EYO90	Chessingham Gardens, Tadcaster Road	SE 5839 4854	An evaluation, comprising a geophysical survey followed by the excavation of two trenches, undertaken in advance of housing development. No archaeological features or deposits were identified.
EYO802	York College Simbalk Lane	SE 5819 4850	An archaeological watching brief was carried out on the site of the redevelopment for the new college buildings on the site of the former Derwent School that had been is use by York College. The watching brief was carried out because the site is adjacent to the Tadcaster Road which is thought to closely follow the line of the Roman road that ran south-west from York to Tadcaster. In the majority of cases this material had been cut into by the concrete foundations of the former buildings and its associated services. In the south facing section of the strip observed, a humic peaty deposit was observed overlying the natural subsoil which was in turn overlain by a pale grey silt and presumably represents silting within a pond, but there is no date for this feature.

REF (HER)	NAME	GRID REF	DESCRIPTION
EYO800	187 Tadcaster Road	SE 5833 4873	An archaeological watching brief was undertaken during the excavation of trial pits and during groundworks at 187 Tadcaster Road, York (during 2004 and 2006). The watching brief revealed evidence for possible Roman ditches, modern landscaping and glacial natural deposits.
EYO7891	West Riding Aerial Survey 1971 - Contract B	SE 5856 5030	Aerial photography survey in 1971. No further details provided.
EYO6646	Moor Lane/Tadcaster Road Sewer Trench	SE 5831 4888	Watching Brief undertaken by York Archaeological Trust in 1989. No further details provided.
EYO6645	Moor Lane/Tadcaster Road (Tesco Site)	SE 5820 4880	Excavation undertaken by York Archaeological Trust in 1989. Anomalies revealed by geophysical survey proved, when excavated, to be a natural glacial terrace.
EYO6641	Bondhill Ash li (Outer Ring Road)	SE 5780 4820	Watching Brief undertaken by York Archaeological Trust in 1973. No further details provided.
EYO6528	Land East of Tadcaster Road, St Leonards, York	SE 5847 4870	Six evaluation trenches excavated within the footprint of the proposed new building did not reveal any archaeological features. The trench located within the area of ridge and furrow earthworks revealed the presence of a ditch, corresponding with the linear feature recorded by the geophysics. The fill of the ditch contained a small assemblage of Romano-British pottery and animal bone, suggestive of the disposal of domestic refuse. This may imply some form of settlement in the vicinity, probably to the west of the site, along the fringes of the known Roman road. The ditch was probably backfilled in the late 3rd or early 4th century AD. The only archaeological feature identified during the evaluation was the single ditch.

REF (HER)	NAME	GRID REF	DESCRIPTION
EYO6470	Ashfield Estate, Tadcaster Road Eva	SE 5827 4815	In August 2018 York Archaeological Trust conducted an evaluation at Ashfield Estate, Tadcaster Road, Dringhouses. The work involved the excavation and recording of 23 trenches measuring 50m and 25m in length. Natural deposits were encountered in the base of all trenches. Above the natural deposits was encountered a number of features that are probably related to agricultural activity. These include 1 furrow and 1 possible furrow, 2 ditches and a gully.
EYO6467	Ashfield Estate, Tadcaster Road Gp	SE 5825 4816	York Archaeological Trust was commissioned by City of York Council to undertake an archaeological desk-based assessment and geophysical survey of land at Ashfield Estate, Tadcaster Road, York prior to development for football playing fields. The investigations identified the potential of archaeological activity from the Roman to post-medieval periods. Remains of medieval ridge and furrow are likely to be present across the entire study area.
EYO6466	Ashfield Estate, Tadcaster Road Dba	SE 5825 4816	Archaeological investigations in the vicinity of land at Ashfield Estate, Tadcaster Road, demonstrate the potential of archaeological activity from the Roman to post-medieval periods. Remains of medieval ridge and furrow are likely to be present across the entire study area, and there is also the potential of encountering post-medieval structures within the centre of the southern study area.

REF (HER)	NAME	GRID REF	DESCRIPTION
EYO6458	Archaeological Evaluation (Auger Survey) Land At Moor Lane ST10	SE 5743 4844	An auger survey was undertaken on land at Moor Lane, York. The survey consisted of 22 hand driven augers at pre-selected locations, following trial trenching which had identified an organic deposit of presumed Windermere Interstadial date sealed beneath wind-blown sand. The coring demonstrated that organic horizons were extremely localised and limited in extent. The previously recovered material was dated to 13,281–13,102 cal BP, confirming its late glacial date; plant macrofossils were identified within it. A small area of peat relating to the Holocene Askham Bog sequence was also identified at one auger location. The peat sequences detected are not considered to be of particular archaeological or palaeoenvironmental interest in comparison to other previously studied sequences in the locality and have limited potential to provide further information about climatic conditions at the end of the Windermere Interstadial.

REF (HER)	NAME	GRID REF	DESCRIPTION
EYO6394	Land East of Tadcaster Rd GP	SE 5847 4870	Geophysical survey at Tadcaster Road was undertaken ahead of development. The survey was dominated by responses associated with existing landfill, soil disturbances and objects / landscape features at surface level. There is a large area of magnetic noise which is likely to be associated with imported fill soils or construction disturbance in the west side of the survey. Elsewhere responses from ferrous objects or building with ferrous component in their construction are present around the survey area, with localised disturbances in the topsoil present in the southeast corner. There are also several isolated ferro-magnetic spikes arising from material in the topsoil horizon. All of this contributed to significant masking of lower magnitude responses from natural geological conditions or past land use/ archaeological responses. Those pre-modern features that have been identified in the survey are restricted to an area of well preserved ridge and furrow which is also visible in the surface topography. There is also a faint linear feature aligned on a diagonal axis across the ridge and furrow. This feature may be associated with fill soils from a ditch feature that underlies the ridge and furrow soil responses, but its isolation in relation to any other features of the type in the survey make it impossible to determine its origin.

REF (HER)	NAME	GRID REF	DESCRIPTION
EYO6386	Land to the East of Tadcaster Road	SE 5847 4870	Investigations in the immediate vicinity of the site have not revealed archaeological features, although occasional artefacts dating from the Roman period have been recovered. Investigations in the wider area have encountered the remains of Roman, and possibly late prehistoric, field systems and it seems most likely that if archaeological remains are present on the site then they would be limited to similar field systems. The agricultural land use of the site is much more easily confirmed for the medieval period, due to the presence of ridge and furrow earthworks. The surviving earthworks form a relatively small area of what would have been a much more extensive medieval field system. Aerial photographs dating from the first half of the 20th century, (pre-dating the majority of development in this area) indicate that such field systems were widespread. Much of the former ridge and furrow in the surrounding area has now been built upon, or truncated by more recent agricultural practices.
EYO601	A64/Top Lane Junction	SE 5732 4790	Intermittently between July 2001 and January 2002 York Archaeological Trust carried out an archaeological watching brief on land at the A64 Top Lane Junction, Copmanthorpe, York during the ground works for a new junction on the A64. The work was undertaken on behalf the Highways Agencv. Natural deposits of sand and clay were disturbed by the construction of the A64 in the early 1970s. No archaeological features were encountered.
EYO5884	ST10 Moor Lane palaeo-environmental study	SE 5720 4879	A Palaeo-Environmental desk-based study consisting of data derived form 42 boreholes and trial-pits across the site. 2014.

REF (HER)	NAME	GRID REF	DESCRIPTION
EYO5885	Moor Lane Historic Environment and Landscape Assessment DBA	SE 5721 4880	This report presents an assessment of the nature and significance of historic environment resources within and surrounding the proposed residential allocation at Moor Lane, York, (ST10) as well as the likely nature and magnitude of effects upon them resulting from the proposed future development of the land there. 2014.
EYO4814	1936 Aerial Photo	SE 5777 4813	An aerial photography survey of York was undertaken in 1936. No further details provided.
EYO465	A64/Top Lane Junction	SE 5797 4817	An archaeological watching brief on two engineering test pits in advance of road improvements to the A641Top Lane junction at Copmanthorpe near York revealed little of archaeological interest. A possible ditchlfteld drain and a former plough soil were noted above natural deposits. No trace of the Roman roadfrom York (Eboracum) to Tadcaster (Calcaria) was found.
EYO4536	1936 Aerial Photo	SE 5855 4849	An aerial photography survey of York was undertaken in 1936. No further details provided.
EYO4534	1936 Aerial Photo	SE 5832 4881	An aerial photography survey of York was undertaken in 1936. No further details provided.
EYO4378	1936 Aerial Photo	SE 5797 4793	An aerial photography survey of York was undertaken in 1936. No further details provided.
EYO297	York Sixth Form College	SE 5845 4854	An archaeological evaluation following a desk based assessment recorded Roman finds but no significant archaeological features.
EYO1931	Long broad straight mark like agger traces of racetrack rig & furrow	SE 5900 4839	Remote sensing survey/aerial photography. Cropmark.
EYO1887	Out of Focus.Poss.Pits and Circles.	SE 5870 4829	Cropmark visible on aerial photography.

REF (HER)	NAME	GRID REF	DESCRIPTION
EYO184	St Leonard's Hospice Tadcaster Rd	SE 5844 4879	A series of machine excavated geotechnical test pits were subject to a watching brief. In all 6 test pits were excavated to varying depths across the whole of the site and were between 1.1 and 1.7 metres below ground level. It was the conclusion of the contractor that on this site there were no significant archaeological deposits found. What was recovered is thought to be associated with hill wash and possible plough drag material.
EYO1310	Aerial Photograph	SE 5900 4839	Remote sensing survey/aerial photography.
EYO1311	Aerial Photograph	SE 5910 4809	Remote sensing survey/aerial photography.
EYO1381	Aerial Photograph	SE 5910 4819	Remote sensing survey/aerial photography.
EYO1382	Aerial Photograph	SE 5900 4850	Remote sensing survey/aerial photography.
EYO1383	Aerial Photograph	SE 5900 4850	Remote sensing survey/aerial photography.
EYO1384	Aerial Photograph	SE 5910 4819	Remote sensing survey/aerial photography.
EYO1385	Aerial Photograph	SE 5920 4809	Remote sensing survey/aerial photography.
EYO1386	Aerial Photograph	SE 5900 4819	Remote sensing survey/aerial photography.
EYO1387	Aerial Photograph	SE 5910 4799	Remote sensing survey/aerial photography.
EYO1207	Pipelines ?Enclosures	SE 5880 4839	A cropmark of possible pipelines or enclosure seen on aerial photography.
EYO1206	Pipelines Enclosures?	SE 5880 4839	A cropmark of possible pipelines or enclosure seen on aerial photography.
EYO1126	R+F. Site of Proposed Superstore.	SE 5819 4860	A cropmark seen on aerial photography.
EYO6508	Land at Moor Lane, Historic Environment Baseline	SE 5721 4880	A desk based assessment undertaken for the site in 2018disucssing initial desk based assessment, geophysical survey, archaeological evaluation and deposit modelling etc. Discussed in further detail below.

REF (HER)	NAME	GRID REF	DESCRIPTION
EYO5899	Archaeological Evaluation land at Moor Lane ST10	SE 5721 4880	An archaeological evaluation comprising 94 trial trenches was carried out to assess the nature of the archaeological resource at Moor Lane, York. Two separate areas of enclosures dating to the Later Iron Age/Romano-British period were found within the site, both were well defined in extent. Other discoveries were primarily undated linear features; there was some suggestion in one area of the site that these might represent a system of field enclosures. Archaeologically significant activity appeared to be constrained to areas of higher – and presumably drier – ground, with lower lying areas containing only the undated features presumed to relate to agricultural activity. At the southern extent of the site the trial trenching also identified evidence relating to the formation of the Askham Bog glacial lake and raised mire sequence, including a thin horizon of organic material of potential Windermere Interstadial date.

REF (HER)	NAME	GRID REF	DESCRIPTION
EYO5886	Land at Moor Lane ST10		A geophysical was carried out on agricultural land on the south-western periphery of York. Overall, the results indicate that the site has a low potential for significant archaeology as most of the site is situated on low lying ground adjacent to an area of wetland (Askham Bogs). Here most of the anomalies are due to fairly recent agricultural or modern activity. One field on the eastern edge of the site has been infilled and landscaped following clay extraction and clearly has no archaeological potential. However, one area of clear archaeological potential has been identified on higher ground towards the northern end of the site. Here a cluster of, albeit weak and fragmented, anomalies are interpreted as soil-filled ditches comprising enclosures of likely prehistoric or Romano-British date. Features within the enclosures, including at least one roundhouse, indicate settlement activity. A smaller cluster of linear and discrete anomalies located to the south-western corner of the site may also have some archaeological potential, although this interpretation is much more tentative. In addition, geological anomalies around the southern site boundary close to Askham Bog could locate natural features with the potential for the presence of waterlogged deposits of palaeo-environmental interest.

APPENDIX 3: Figures

Moor Lane
A1036
Play Space
Academy Drive
Principal Rise
Principal Rise
Teachers Close
Lycett Road
Dringthorpe Road
Knavesmire Wood
St Leonard's Hospice
The Square
1256467
Play Space
The Grove
Dringhouses Burial Ground
York College
Playing Field
A1036
A64
A64
White Rose Park
Sim Balk Lane
A64
1166773
1132494
Bond Hill Ash Farm
A64
A64
Bishopthorpe
Church Lane
Lang Road
Coggan Way
Bishopthorpe Infant School
Macla
Temple Road
New La
Kirkwe
0
250
500 m

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

Site Boundary

Study Area

Conservation Areas

Conservation Area

Listed Buildings

II

Rev	Date	Details of issues/ revision	Drw	Rev
P01	11/12/2023	FINAL ISSUE	MJ	JM

Issues & Revisions

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GATEWAY DEVELOPMENTS (YORK) LIMITED

Project Title

SIM BALK LANE, YORK

Drawing Title

FIGURE 2: LOCATION OF DESIGNATED ASSETS

Drawn:	Mathew James	Reviewed:	JIM MACQUEEN
BWB Ref:	220811	Date: 11.12.2023	Scale@A3: NTS

Drawing Status

FINAL

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
SBL-BWB-ZZ-XX-RP-LH-0001	S2	P01

Moor Lane
Play Space
Academy Drive
Principal Rise
Principal Rise
Lycett Road
Dringthorpe Road
Knavesmire Wood
MYO3710
MYO3448
MYO3449
MYO3432
MYO3433
MYO2240
The Grove
MYO3706
MYO3431
MYO5024
York College
MYO3705
Playing Field
MYO4287
MYO2171
A1036
MYO2333
MYO3430
MYO3704
A64
A64
MYO2334
White Rose Park
MYO4522
MYO3382
Sim Balk Lane
MYO2334
MYO3285
MYO3286
A64
MYO3287
MYO2316
MYO4906
MYO3376
MYO2314
A64
A64
MYO3374
Church Lane
MYO2312
Coggan Way
Lang Road
Bishopthorpe Infant School
MYO2313
Maclagan Road
Temple Road
MYO2315
MYO3375
0 100 200 m

Notes

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4.Any discrepancies noted on site are to be reported to the engineer immediately.

Key

- Site Boundary
- 500m Study Area

HER Monuments (Polygons)

- Enclosure; Boundary
- Retting Pond
- Common Land
- Field System
- Ridge and Furrow
- Other

Rev	Date	Details of issues/ revision	Drw	Rev
P01	11.12.2023	FINAL ISSUE	OS	JM

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Project Title

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Drawing Title

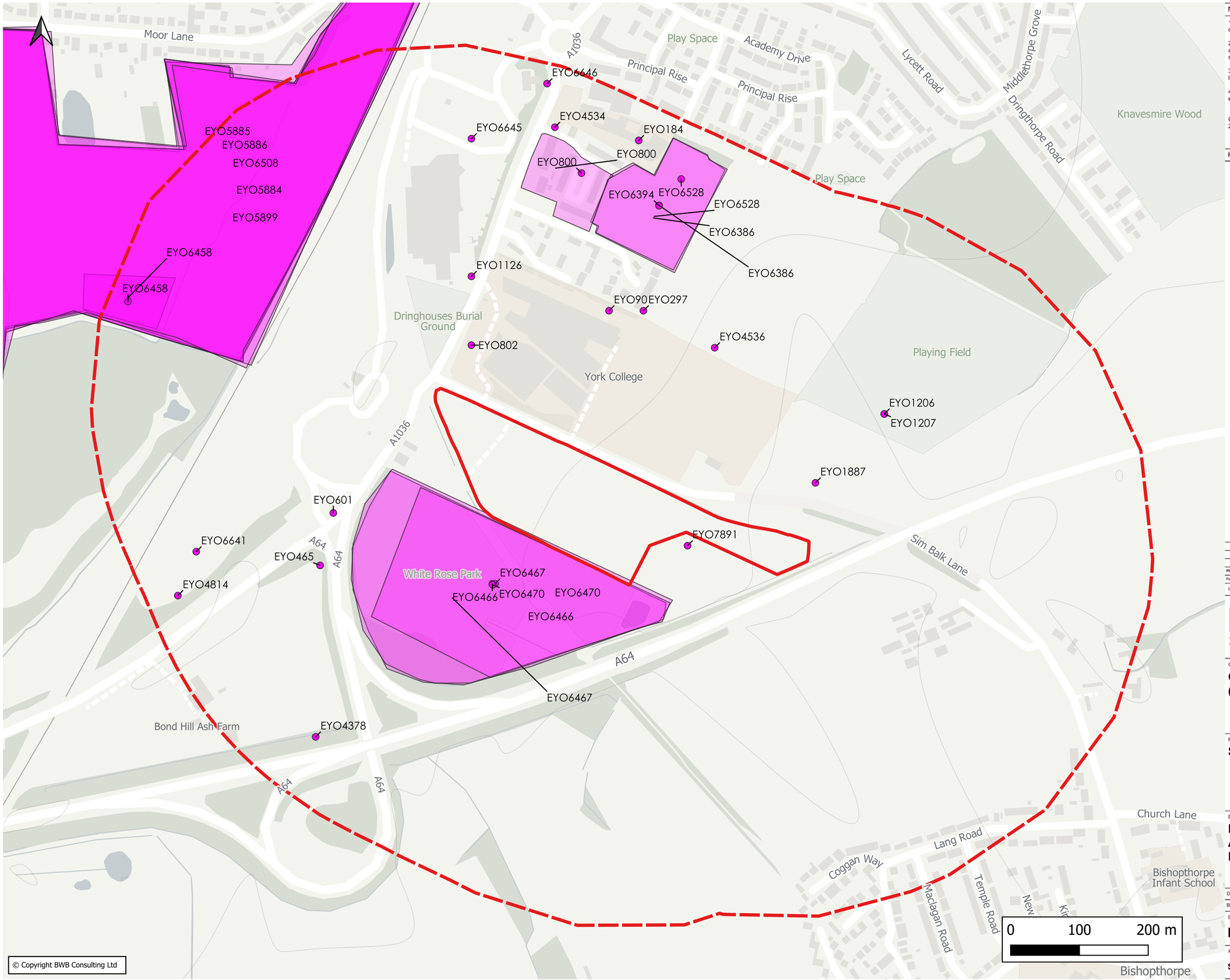
FIGURE 3B: LOCATION OF NON-DESIGNATED ASSETS (POLYGONS)

Drawn:	OLIVIER SANGA	Reviewed:	JIM MACQUEEN	
BWB Ref:	220811	Date:	11.12.2023	Scale@A3: NTS

Drawing Status

FINAL

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
SBL-BWB-ZZ-XX-RP-LH-0001	S2	P01



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Key

- Site Boundary
- Study Area
- Events (Points)
- Events (Polygons)

Rev	Date	Details of issues/ revision	Drw	Rev
P01	11.12.2023	FINAL ISSUE	MJ	JM

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FIGURE 4: LOCATION OF ARCHAEOLOGICAL EVENTS

Drawn:	MATHEW JAMES	Reviewed:	JIM MACQUEEN
BWB Ref:	220811	Date:	11.12.2023
Scale@A3:	NTS		

Drawing Status

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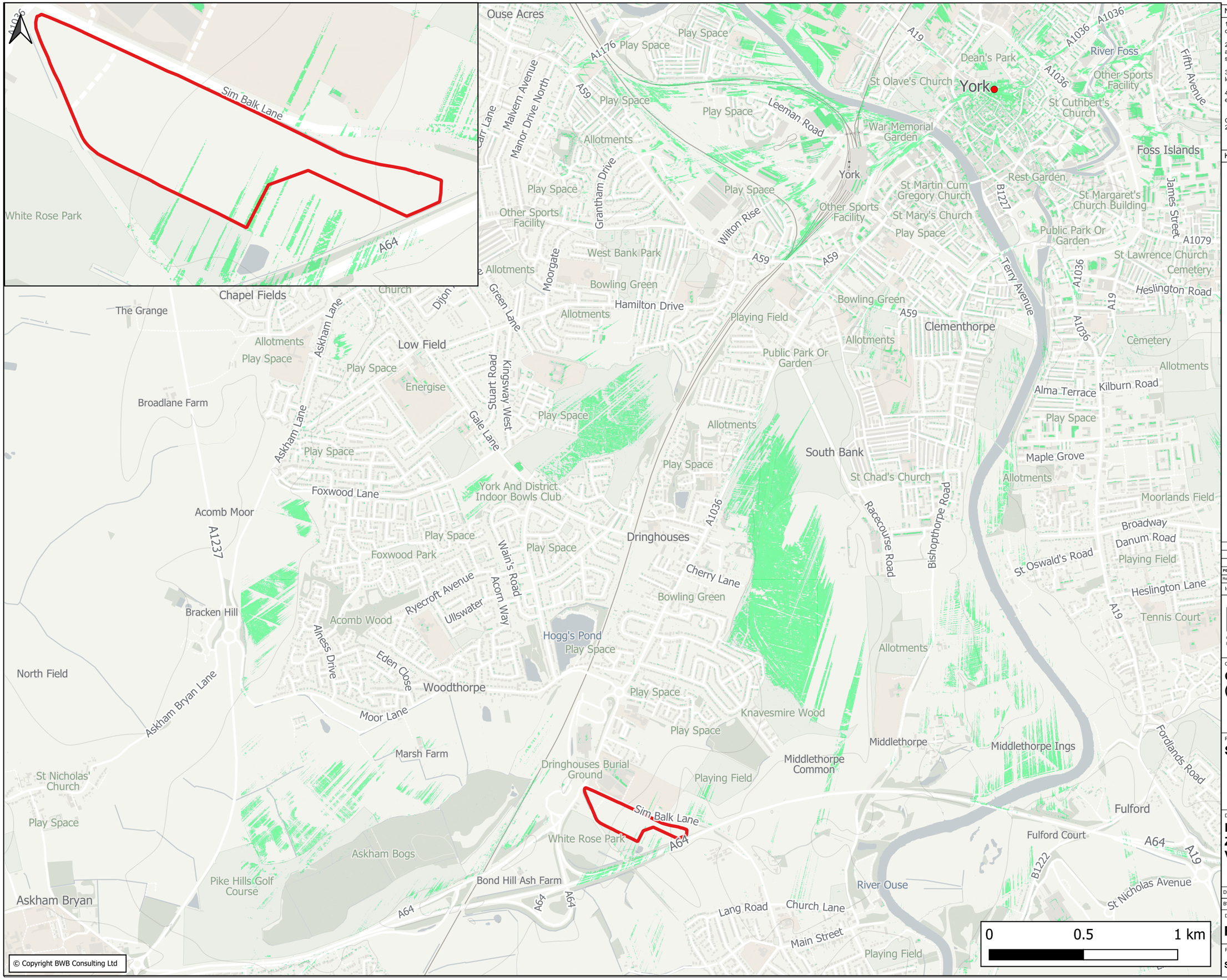
Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
SBL-BWB-ZZ-XX-RP-LH-0001	S2	P01



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Key

- Site Boundary
- York Minster Viewpoint

York Minster Viewshed

- Visible

Rev	Date	Details of issues/ revision	Drw	Rev
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Drawing Title

FIGURE 5: YORK MINSTER ZONE OF THEORETICAL VISIBILITY

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BWB Ref:	220811	Date:	11/12/2023
Scale@A3:	NTS		

Drawing Status

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Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
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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

- Site Boundary
- Micklegate Stray Viewpoint

Micklegate Stray Viewshed

- Visible

Rev	Date	Details of issues revision	Drw	Rev
P01	11/12/2023	FINAL ISSUE	MJ	JM

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FIGURE 6: MICKLEGATE STRAY ZONE OF THEORETICAL VISIBILITY

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BWB Ref.	220811	Date:	11/12/2023
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Drawing Status

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4.Any discrepancies noted on site are to be reported to the engineer immediately.

Key

- Site Boundary
- Study Area
- Plate Locations

P01	11/12/2023	FINAL ISSUE	MJ	JM
Rev	Date	Details of issues/ revision	Drw	Rev

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Project Title

SIM BALK LANE, YORK

Drawing Title

FIGURE 7: PLATE LOCATIONS

Drawn:	Mathew James		Reviewed:	JIM MACQUEEN	
BWB Ref:	220811	Date:	11/12/2023	Scale@A3:	NTS

Drawing Status

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Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
SBL-BWB-ZZ-XX-RP-LH-0001	S2	P01

APPENDIX 4: Map Regression

APPENDIX 8

Figure 8: Yorkshire, 1828 County Map. Reproduced with permission of the NLS.

Figure 9: Selby (Outline) OS map, Sheet 71, Revised 1893, Published 1898. Reproduced with permission of the NLS.

Figure 10: Yorkshire CXCI.NW OS map, Revised 1906, Published 1910. Reproduced with permission of the NLS.

Figure 11: SE54NE – A OS map, Surveyed, Revised Pre-1930 to 1957, Published 1958. Reproduced with permission of the NLS.

APPENDIX 5: Plates

Plate 1: View across the Site, facing east-southeast

Plate 2: View from the Site, facing north-east

Plate 3: View from the Site, facing north-west

Plate 4: View from the Site, facing north

Plate 5: View towards the Site from Bishopthorpe, facing north-west

Plate 6: View from York Minster () viewing tower towards the Site, facing south-west

Plate 7: Bishopthorpe Garth, viewed through Garth Cottage and Garth Mews, facing east

Plate 8: Garth Cottage and Garth Mews (1132494), facing south-east

Plate 9: View from Garth Cottage and Garth Mews (1132494) towards Site, facing north-west

Plate 10: View from Garth Cottage and Garth Mews (1132494), facing west

Plate 11: Milestone on Tadcaster Road (1256467), facing south

Plate 12: View from Micklegate Stray (MYO4287) towards Site, facing south-west

APPENDIX 6: Geophysical Survey Report

Sim Balk Lane
York
North Yorkshire

Archaeological geophysical survey

Project No. ARC/3464/1324

April 2023

Sim Balk Lane
York
North Yorkshire

Archaeological geophysical survey

Project No. ARC/3464/1324

Report prepared by		Report checked by	
Name	Jelmer Wubs BA MA	Name	Mark Whittingham BSc MA MCIfA
Signature	[redacted]	Signature	[redacted]
Date	07/04/23	Date	13/04/23

Table of Contents

1. SUMMARY

Phase Site Investigations Ltd was commissioned to carry out a magnetic gradient survey at a site off Sim Balk Lane, York, North Yorkshire. 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.

The majority of the anomalies identified by this survey relate to modern material / objects, agricultural and drainage activity. Some of the responses suggestive of agricultural activity could relate to the remnants of ridge and furrow. There are several trends of uncertain origin but these do not form any clear patterns or relationships that would indicate an archaeological origin and they are considered more likely to be associated with agricultural activity, drainage features or possibly natural features / variations.

The area in the west of the site is dominated by magnetic disturbance from modern material. The strength of the responses within the magnetic disturbance suggest that it is caused by significant made ground rather than a surface / near surface spread of material. It should be recognised that the magnetic disturbance could mask anomalies from other sub-surface features in the area, should any such features be present.

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 off Sim Balk Lane, York, North Yorkshire, 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_3464_1324_01.

2.2 Site description

The site is situated at Sim Balk Lane, York, North Yorkshire (approximate centre at NGR SE 584 483) and covered an area of approximately 7.5 ha.

The site encompassed one arable field and a field that was under 'scrub' vegetation. A compound was present in the scrub field and the two fields were divided by a hardstanding track. The majority of the site was relatively level but there was a gradual upwards slope to the west in the west of the site. The site was bounded by hedgerows.

The geology of the site consists of sandstone of the Sherwood Sandstone Group. The majority of the site is overlain by clay and silty superficial deposits of the Elvington Glaciolacustrine Formation. The west of the site is overlain by sand, clayey and gravelly superficial deposits of the York Moraine Member (British Geological Survey, 2023).

2.3 Archaeological background

A heritage assessment undertaken by BWB Consulting Ltd (2022) indicates that,

'*The study area lies on the eastern side of the Roman road from York to Tadcaster. Archaeological investigations to the north and north-west of the site have found evidence of possible Romano-British settlement and field systems.*' and,

'*Three archaeological monuments have been recorded within the Site on the HER, all of which relate to ridge-and-furrow cultivation earthworks and cropmarks of likely medieval and / or early post-medieval origin.* [...] *Most of these earthworks have since been levelled by ploughing.*'

Historic maps within the assessment indicate that the site has been in use for agriculture since before 1828, but used to be sub-divided into smaller fields. A former railway line, which is now used as a footpath and cycle route, ran along the western boundary of the site. The historic maps indicate the presence of former structures within the site.

2.4 Scope of work

The survey area was specified by the client.

Due to the presence of a compound, a track and areas of dense vegetation the area accessible / suitable for survey was reduced to approximately 6 ha, the extents of which are shown in drawing ARC_3464_1324_02.

No other problems were encountered during the survey which was carried out on 21 and 22 March 2023.

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 8 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 OSTN15 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 greyscale raster images (PNG files). Data for the entire site is presented at a scale of 1:2500 and plots for individual fields / areas (or parts of fields / areas) with accompanying interpretations are shown 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.

The data has been displayed relative to a digital base plan provided by the client as drawing *'SLB-BWB-00-ZZ-M2-DR-G-0001_Existing_Site_plan-S2_P3.dwg'*. The base plan was in the Ordnance Survey 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 and isolated bipolar responses present in the data. There is no evidence to suggest that any of these are associated with archaeological features / activity and so the large majority of these anomalies have not been shown in the interpretation. Several large / strong isolated bipolar responses have been shown on the interpretation and these may indicate where there are more substantial (modern) objects / material.

Anomalies associated with agricultural and / or drainage 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 an area by area 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 but this is due to the presence of magnetic material in the topsoil or sub-surface, rather than low data quality.

There are a large number of isolated responses across the site, the majority, if not all, of which will relate to modern material.

4.2 Area 1

Basic topography: Gradual upwards slope to the west.

Area / field description: Western part of a field under 'scrub' vegetation. The area was relatively soft underfoot and bounded by hedgerows to the north, west and south. A compound was present in the east of the field.

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.

Trends of uncertain origin.

Several isolated positive responses, which are probably related to relatively modern buried ferrous / fired material or natural features / variations.

Further discussion / additional information:

The majority of the survey area is dominated by magnetic disturbance. These are areas of strong bipolar and dipolar responses and are usually associated with concentrations of relatively modern magnetic material. The strength of the responses within the magnetic disturbance suggest that it is caused by significant made ground rather than a surface / near surface spread of material.

The trends within the survey area are all too weak and short to reliably interpret. They do not form any obvious patterns or relationships that would suggest they are associated with sub-surface features and it is likely that they are a product of agricultural, or other modern, activity or possibly natural variations.

4.3 Area 2

Basic topography: Relatively level.

Area / field description: Arable field under an immature crop. The field was soft underfoot and bounded by hedgerows to the north, east and south and by a hardstanding track to the west. Areas of dense vegetation were present adjacent to parts of the field boundaries.

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.

A linear bipolar anomaly associated with sub-surface utility apparatus (metal gas pipe).

Very strong responses associated with strongly magnetic relatively modern features / material. These responses can extend for some distance beyond the feature and in some cases the feature causing the strong response may be located beyond the survey area.

Linear / curvi-linear positive responses that correspond with the position of former field boundaries and will be related to these features.

Linear positive or bipolar responses suggestive of field drains.

A series of broadly parallel, positive linear responses associated with modern ploughing regime(s).

A series of positive linear responses associated with a regime(s) of field drains.

Several series of positive linear / curvi-linear responses associated with agricultural activity. These could be related to the remnants of ridge and furrow but some could be caused by drainage regimes or other agricultural activity.

Trends of uncertain origin.

Numerous isolated positive responses, which are probably related to relatively modern buried ferrous / fired material or natural features / variations. Only selected large / strong responses have been shown on the interpretation.

Further discussion / additional information:

The majority of the anomalies in this field relate to agricultural or drainage activity. There are a number of trends that are suggestive of additional drainage features (**Anomalies A**) but this interpretation is not certain and it is possible that some of these could be caused by other types of sub-surface features. **Anomalies B** are slightly more irregular than Anomalies A but may be associated with, or have a similar orientation to, Anomalies A or anomalies indicative of field drains. Anomalies B are likely to be related to drainage features but again this interpretation is not certain.

The remaining trends within the survey area are all too weak and short to reliably interpret. They do not form any obvious patterns or relationships that would suggest they are associated with sub-surface features and it is likely that they are a product of agricultural, or other modern, activity or natural variations. **Anomalies C** stand out slightly and could have slightly greater potential to be related to sub-surface features but there is no evidence to indicate that they may have an archaeological origin.

Anomalies D (areas of relatively large isolated positive responses, magnetic disturbance and a trend) are all probably related to a former structure(s) and or material associated with it or the adjacent former field boundaries.

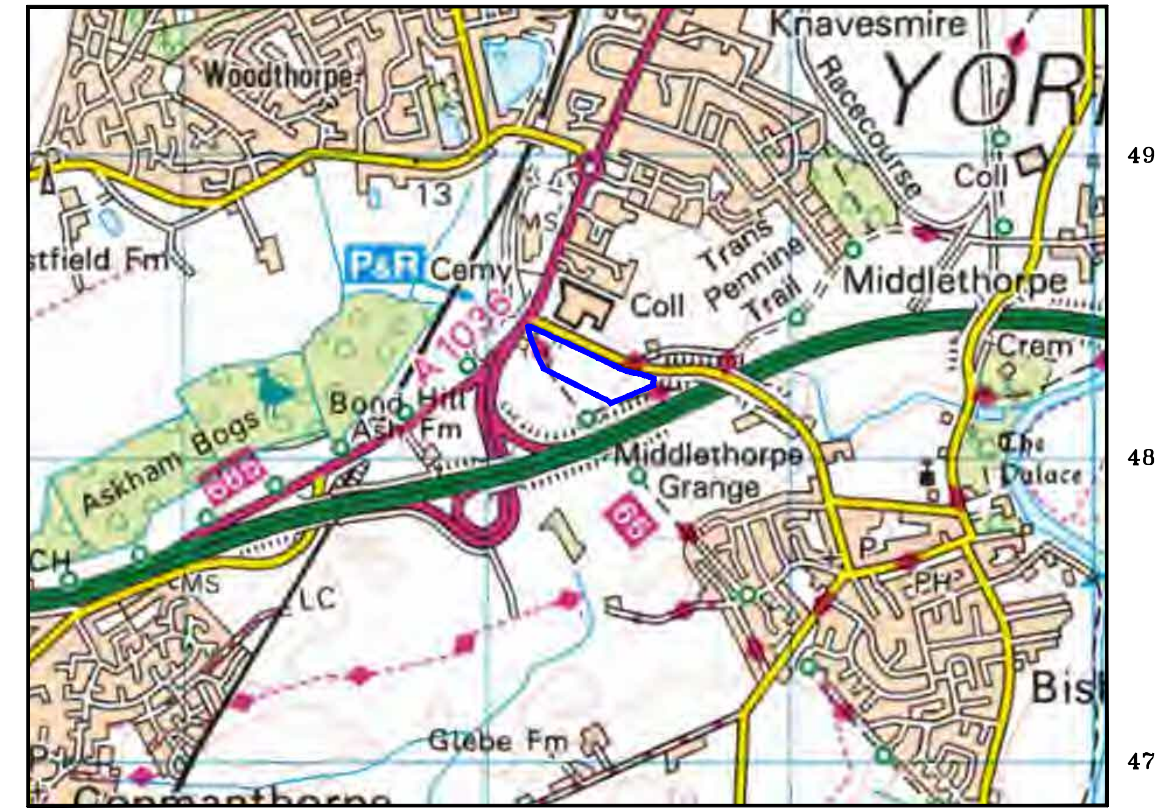
Anomaly E is a discrete area of magnetic disturbance. This could be related to a relatively modern infilled feature, it could be associated with the remains of a structure or it could simply be an area of tipped material.

There are a number of isolated positive responses across the area. As discussed above the majority of these are probably related to buried ferrous / fired material or natural variations. Anomaly F stands out slightly as this is a relatively large response and there is potential for this to be related to an infilled feature or area of burning but without other supporting evidence a non-archaeological cause is considered most likely.

5. DISCUSSION AND CONCLUSIONS

The majority of the anomalies identified by this survey relate to modern material / objects, agricultural and drainage activity. Some of the responses suggestive of agricultural activity could relate to the remnants of ridge and furrow. There are several trends of uncertain origin but these do not form any clear patterns or relationships that would indicate an archaeological origin and they are considered more likely to be associated with agricultural activity, drainage features or possibly natural features / variations.

The area in the west of the site is dominated by magnetic disturbance from modern material. The strength of the responses within the magnetic disturbance suggest that it is caused by significant made ground rather than a surface / near surface spread of material. It should be recognised that the magnetic disturbance could mask anomalies from other sub-surface features in the area, should any such features be present.



SITE LOCATION

SCALE

0m 500m 1000m

NOTE

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Scale [A4 Sheet]	Drawing	Status
AS SHOWN	ARC_3464_1324_01	FINAL

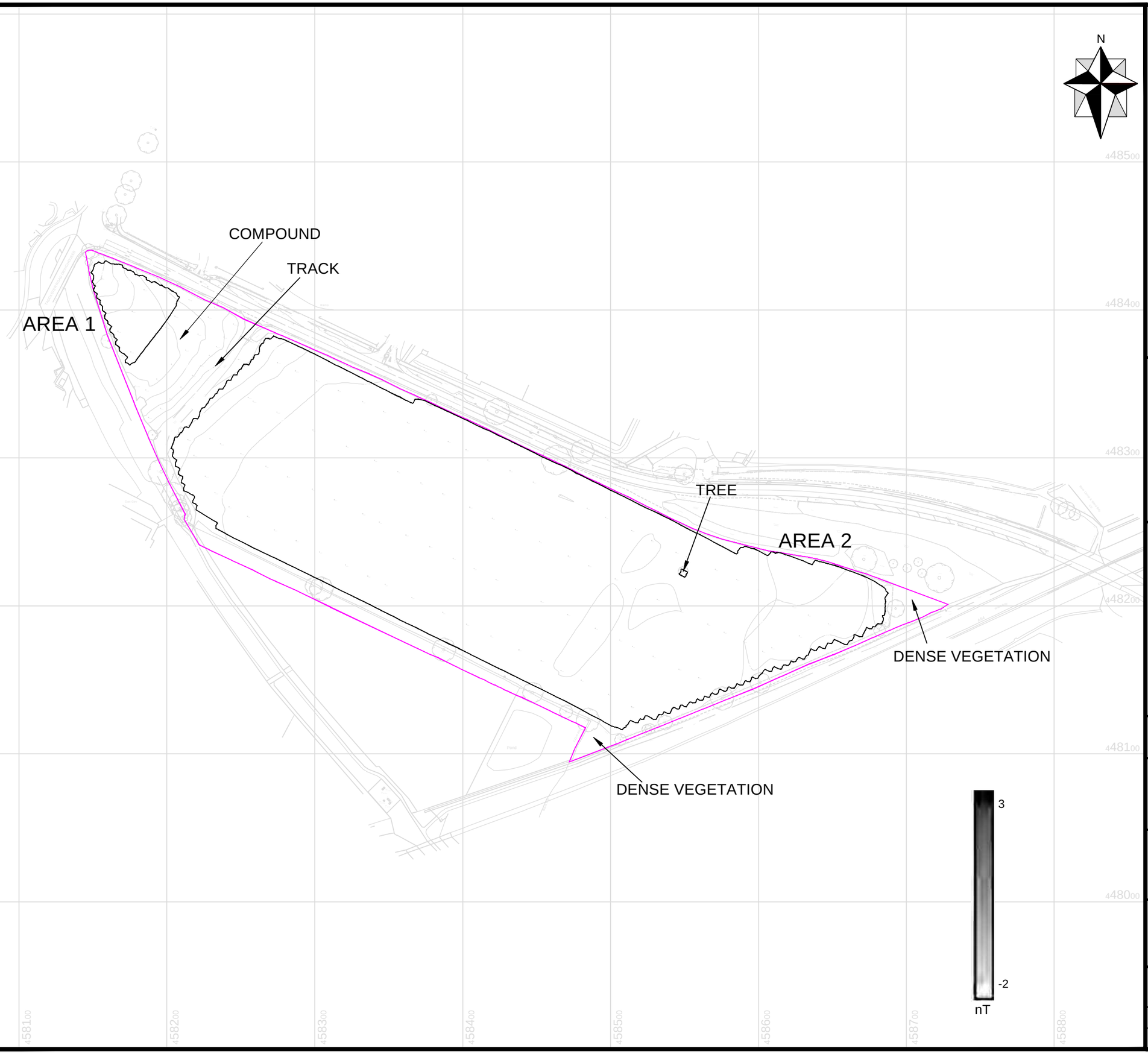
Client: BWB CONSULTING LTD LEEDS

Site: SIM BALK LANE YORK NORTH YORKSHIRE

Title: SITE LOCATION MAP

Job No: ARC_3464_1324

		Drawn	CW
Chk.	NF	Date	28/03/2023



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SITE BOUNDARY

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Scale [A3 Sheet]	Drawing	Status
1:2500	ARC_3464_1324_02	FINAL

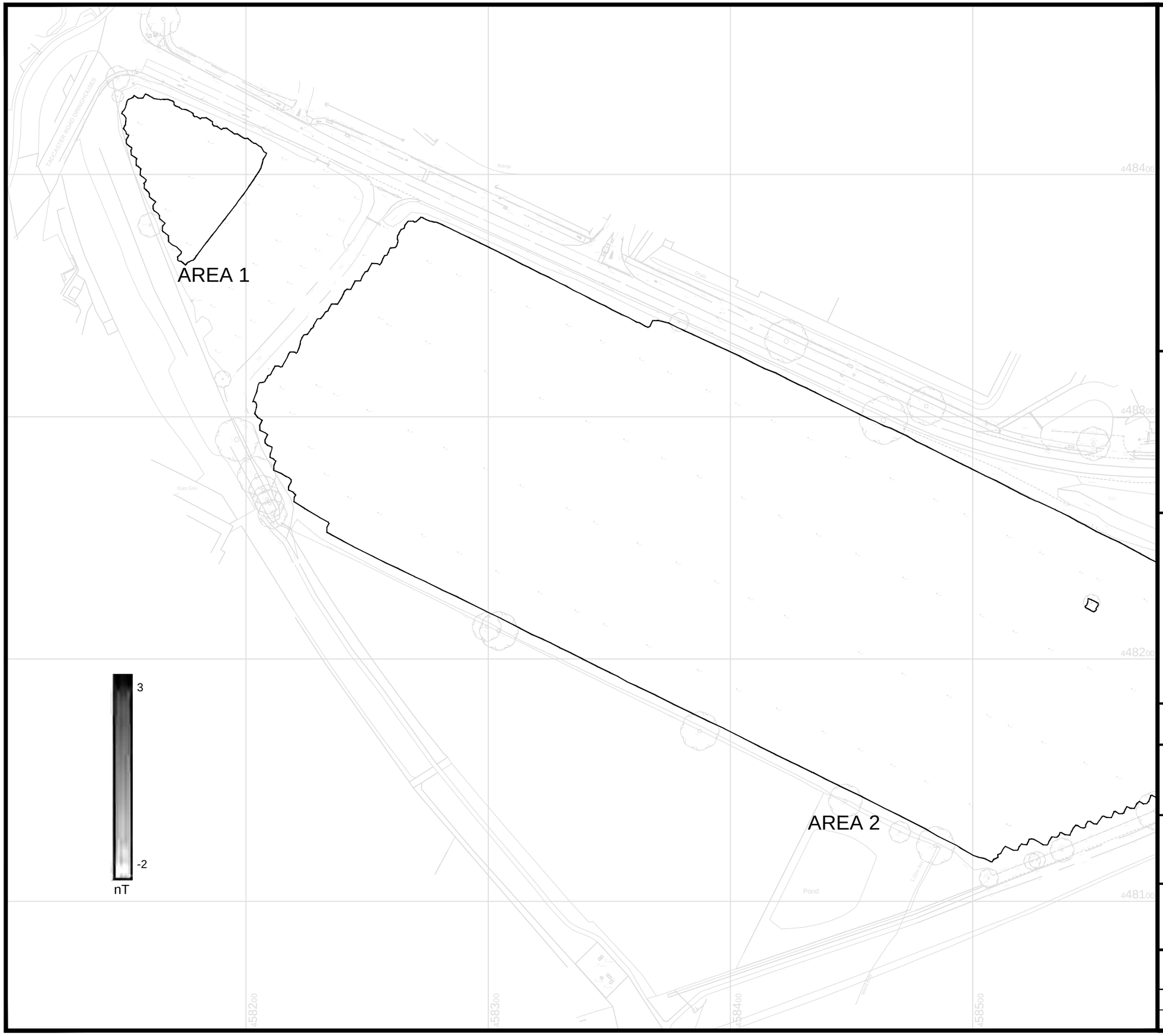
Client: BWB CONSULTING LTD, LEEDS

Site: SIM BALK LANE, YORK, NORTH YORKSHIRE

Title: LOCATION OF SITE SHOWING MAGNETIC GRADIENT DATA

Job No: ARC_3464_1324

Surveyed	JW, RS, MP	Drawn	JW
Chk.	MW	Date	22/03/2023



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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_3464_1324_03	FINAL

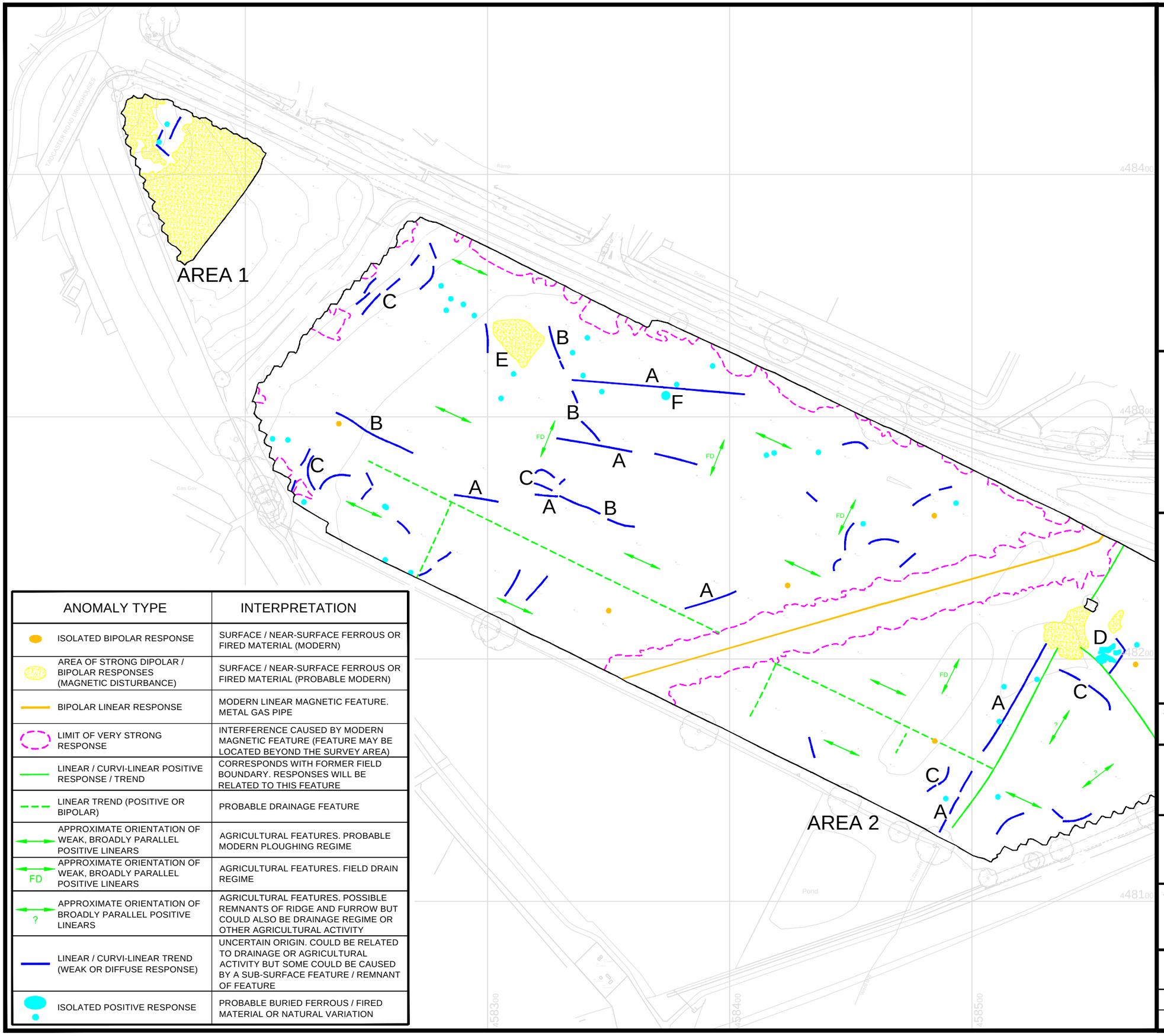
Client
BWB CONSULTING LTD
LEEDS

Site
SIM BALK LANE
YORK
NORTH YORKSHIRE

Title
GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: AREA 1 AND MAJORITY OF AREA 2

Job No
ARC_3464_1324

Surveyed	JW, RS, MP	Drawn	JW
Chk.	MW	Date	22/03/2023



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

NOTES

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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_3464_1324_04	FINAL

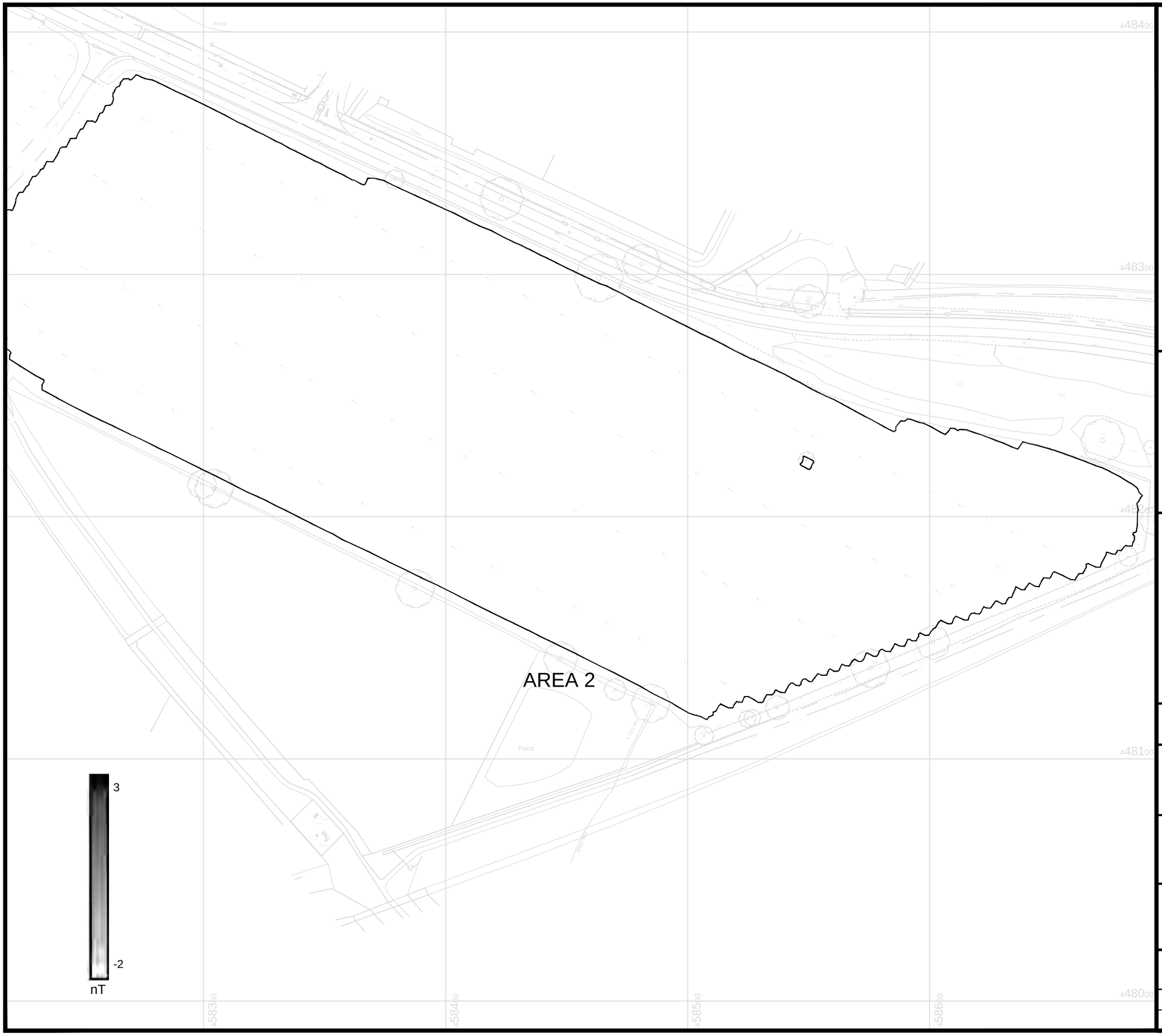
Client
BWB CONSULTING LTD
LEEDS

Site
SIM BALK LANE
YORK
NORTH YORKSHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: AREA 1 AND MAJORITY OF AREA 2

Job No
ARC_3464_1324

Surveyed	JW, RS, MP	Drawn	JW
Chk.	MW	Date	22/03/2023



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Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_3464_1324_05	FINAL

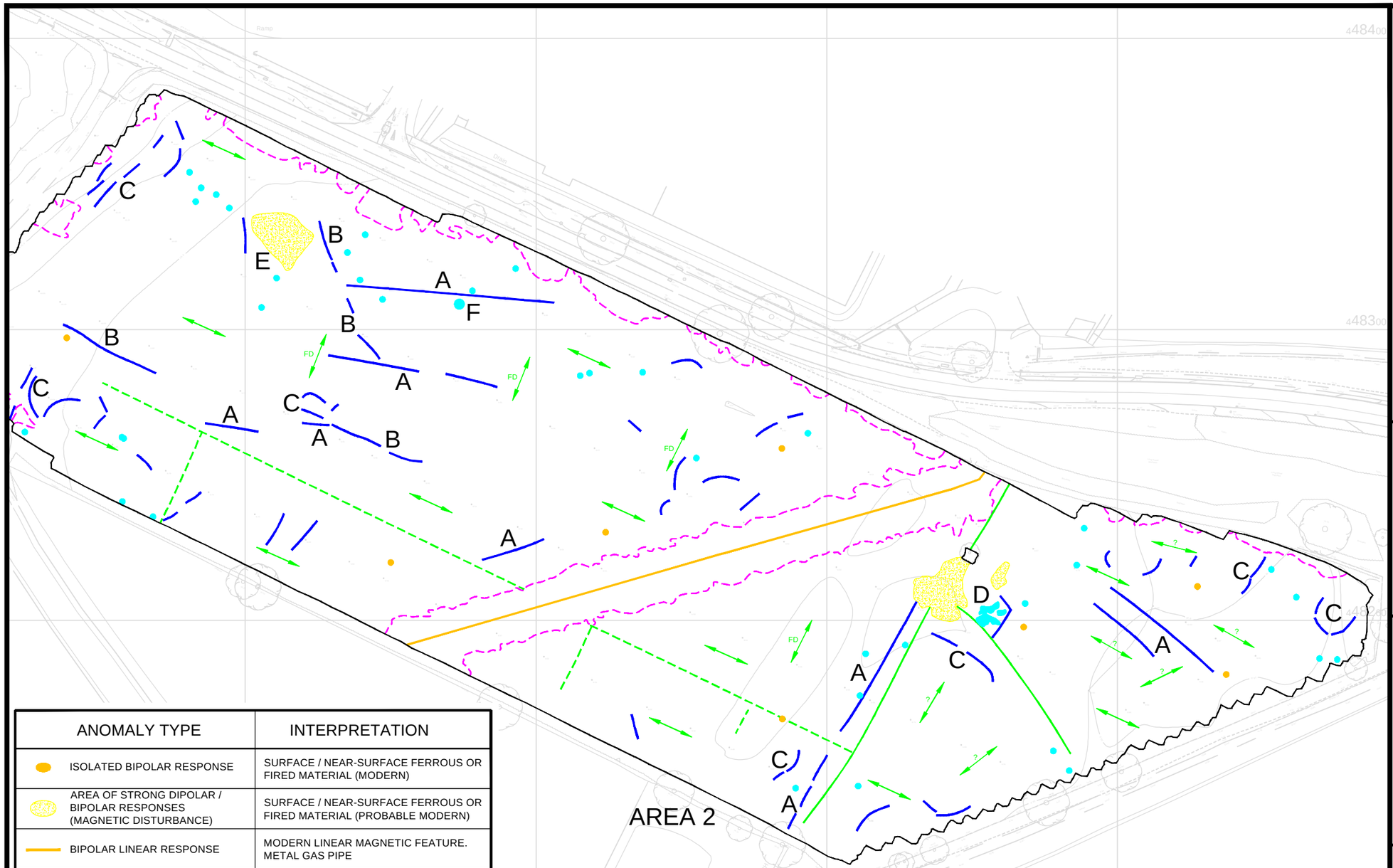
Client
BWB CONSULTING LTD
LEEDS

Site
SIM BALK LANE
YORK
NORTH YORKSHIRE

Title
GREYSCALE PLOT OF MAGNETIC GRADIENT DATA: MAJORITY OF AREA 2

Job No
ARC_3464_1324

Surveyed	JW, RS, MP	Drawn	JW
Chk.	MW	Date	22/03/2023



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

NOTES

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Scale [A3 Sheet]	Drawing	Status
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Client
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Site
SIM BALK LANE
YORK
NORTH YORKSHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: MAJORITY OF AREA 2

Job No
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Surveyed	JW, RS, MP	Drawn	JW
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BIBLIOGRAPHY AND REFERENCES

British Geological Survey, 2023, online resource - www.bgs.ac.uk

BWB Consulting Ltd, 2022, Sim Balk Lane, York, Heritage Assessment

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.

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 OSTN15 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 greyscale raster images (PNG files). Data for the entire site is presented at a scale of 1:2500 and plots for individual fields / areas (or parts of fields / areas) with accompanying interpretations are shown 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.

1.4.3 The data has been displayed relative to a digital base plan provided by the client as drawing *'SLB-BWB-00-ZZ-M2-DR-G-0001_Existing_Site_plan-S2_P3.dwg'*. The base plan was in the Ordnance Survey 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.

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.

Isolated dipolar and bipolar responses have not been shown on the interpretation as there is no evidence to suggest that they may be archaeological in origin.

Bipolar linear anomalies are usually produced by metallic buried pipes / cables, although some ceramic pipes or features containing fired material, such as brick structures or foundations, can also produce bipolar anomalies. In some instances the anomaly can extend for a significant 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 underlying feature.

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.

Negative linear / curvi-linear anomalies

Negative linear / curvi-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.

There are no significant negative linear anomalies in this data set.

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 these anomalies are probably associated with geological / pedological variations or deeper buried ferrous or fired material. Only the larger or stronger areas of positive response have been shown on the interpretation. The majority, if not all of these responses, will be related to natural variations or relatively modern material but have been shown as their exact cause cannot be determined with certainty.

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.

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