NAA

GEOPHYSICAL SURVEY

WINSTON ROAD

STAINDROP

COUNTY DURHAM

prepared for

Lichfields

NAA 19/37
April 2019

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Archaeological
Associates

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QUALITY ASSURANCE		
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Report Number	19-37	
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Draft 1		24/04/2019

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Client	Lichfields
Location	Winston Road, Staindrop, DL2 3NR
Planning authority	County Durham
Grid Ref	NZ 13612 20216
OASIS Ref	Northern1-349644
Date of Fieldwork	2rd–3th April 2019

WINSTON ROAD, STAINDROP, COUNTY DURHAM
GEOPHYSICAL SURVEY REPORT

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Disclaimer

The results of geophysical survey may not reveal all potential archaeology and do not provide a comprehensive map of the sub-surface, but only responses relative to the environment. Geological, agricultural and modern responses may mask archaeological features. Short-lived features may not give strong responses. Only clear features have been interpreted and discussed in this report.

WINSTON ROAD, STAINDROP, COUNTY DURHAM
GEOPHYSICAL SURVEY REPORT

Summary

Northern Archaeological Associates Ltd (NAA) was commissioned by Lichfields to undertake a geophysical survey of land to the west of Winston Road, Staindrop, County Durham, DL2 3NR (NGR: NZ 13612 20216). The survey was required to assess the archaeological potential of the site in support of a planning application for a residential development.

Whilst there is little evidence of activity pre-dating the medieval period in the direct environs of the proposed development area (PDA), a Roman road between the Roman forts at Bowes and Binchester is projected to run to the north-west of Staindrop, and Iron Age or Roman ditches have been excavated to the west of the PDA, near Cleatlam Lane. Therefore, there is a moderate potential for previously unrecorded Iron Age and Roman Activity to be extant.

A settlement at Staindrop is first documented in 1301, when King Cnut granted the estate to the monastery of Durham. By the mid-11th century, the settlement was referred to as Standropa, the etymology of which means 'stony village'. During the medieval and post-medieval periods, Staindrop thrived, possibly as a biproduct of its association with the nearby Raby Castle estate. This prosperity is demonstrated through the high volume and types of buildings that front the main street running through the village. Of these, only three lie in direct proximity to the PDA and include: the gazebo at 1 Beech Side (List No. 1121786), and Garden House (63 Winston Road) and its associated garden walls (List Nos. 1160933 and 1121740).

Ridge and furrow earthworks present within the site and mapped through LiDAR survey data demonstrate that the PDA is likely to have belonged to agricultural land to the south-east of Staindrop since at least the medieval period. Post-medieval and early modern water management is also evident within the site, and to a lesser extent documented on historic maps. This includes the channelisation of Sudburn Beck, to the south of the PDA, prior to the mid-19th century, and the culverting of a stream running through the southern part of the site during the second half of the 19th century. Historic maps also indicate the composition of field boundaries within the site, as well as the erection of buildings along field boundaries.

The geophysical survey targeted approximately 5.1ha of agricultural land and was carried out between the 3rd and 4th April 2019. Numerous anomalies in the southern fields are considered to belong to geological or pedological changes in the substrata. In particular, there are a series of anomalies that are likely to be associated with the pre-channelled route of Sudbury Beck, the

current route of which is the southern boundary of the PDA. There is also clear evidence of agricultural activity within the geophysical survey results, with a culvert running through the two southern fields within the PDA, three regimes of cultivation, and two isolated linear anomalies indicative of former field boundaries. Several linear and rectilinear anomalies were identified within the centre of the area surveyed but lacked the necessary increases in magnetic values or consistency in patterning for detailed interpretation. It is uncertain if they denote buried archaeology or are instead agricultural or geological in nature. In addition, numerous amorphous anomalies and trends of an unknown origin were identified across all areas surveyed, as well as anomalies related to agricultural and modern activity.

1.0 INTRODUCTION

1.1 Northern Archaeological Associates Ltd (NAA) was commissioned by Lichfields to undertake a geophysical survey of land to the west of Winston Road, Staindrop, County Durham, DL2 3NR (NGR: NZ 13612 20216; Fig 1). The survey was required to assess the archaeological potential of the site in support of a planning application for a residential development. The geophysical survey targeted approximately 5.1ha of agricultural land, and was carried out between the 3rd and 4th April 2019.

1.2 The report details the setting (location, topography, geology) and heritage background of the scheme and sets out the methodology used for the assessment. A search of the Durham HER was used to provide additional data. The interpretation of the geophysical survey is achieved through the analysis of identified anomalies and is often aided by a rapid examination of supporting information. The results of the geophysical survey are discussed below, and the interpretations are supported by appropriate illustrations. Where feasible, a detailed synopsis of anomalies is provided and, if possible, the features that the anomalies are likely to relate to are suggested.

2.0 LOCATION, TOPOGRAPHY AND GEOLOGY

Location

2.1 The proposed development area (PDA) comprises four fields used for pasture (totalling approximately 6.1ha) that are located to the west of Winston Road, in the east of Staindrop (Fig 1). Staindrop is a ribbon village in the south of County Durham that has formed along the B6279 to the west, Front street (A688), and Winston Road (B6274) to the east. The PDA lies directly to the south-east of residential areas fronting Winston Road, which form the eastern arm of Staindrop. Agricultural land lies to the west and south of the PDA, whilst recreational land and the Whinfield Farm Nurseries and Tearooms are located to the east.

Topography

2.2 The topography of the survey area is relatively level with a slight upward rise to the north. The north of the PDA lies at 106m above Ordnance Datum (aOD), and the south is recorded at 101m aOD. There are also several undulations that meander through the south of the PDA on an informal east-west orientation that are considered to be of a natural origin and denote a former route of the watercourse of Sudburn Beck prior to being channelled to its current location.

Geology and soils

2.3 The solid geology of the survey area consists of Carboniferous rocks of the Namurian Millstone Grit Series. The drift geology across the PDA comprises sand and gravel (BGS 2019). The soils are mapped as the Wigton Moor Association (Soil Survey of England and Wales 1983), consisting primarily of fine and coarse loamy soils that are developed in glaciofluvial and river terrace deposits associated with major river valleys and are affected by fluctuating ground water (Jarvis *et al*. 1984, 304).

3.0 AIMS AND OBJECTIVES

Rapid desk-based cultural heritage summary

3.1 The principal objective of the study was to identify all recorded heritage assets within a 1km study area of the site.

Geophysical survey

3.2 The aim of the geophysical survey was to map and record potential buried features located within the PDA. Through detailed analysis of the results of the geophysical survey, NAA aimed to provide a detailed interpretation that assessed the archaeological potential of the site and will inform future archaeological mitigation strategies.

3.3 The objectives of the survey were to:

- undertake a geophysical survey across areas deemed suitable for data collection;
- attempt to identify and record any sub-surface remains within the survey boundary;
- characterise the nature of identified anomalies, and where possible suggest the nature of feature they potentially relate to;
- assess the archaeological significance of identified anomalies;
- identify possible concentrations of past activity in order to inform the requirement for any further archaeological investigation at the site; and
- produce a detailed report that includes illustrated results of the geophysical survey.

4.0 METHODOLOGY

4.1 The PDA comprised four fields. These have been labelled A to D, and their locations are shown on Figures 2 to 6.

Rapid desk-based cultural heritage summary

4.2 The study included a search of the County Durham HER, and a rapid desk-based review of published and readily accessible documentary, cartographic and aerial photographic evidence within a 1km radius around the PDA (Fig. 2).

Geophysical survey

4.3 The geophysical survey was undertaken as gradiometer survey using the Bartington Grad601-2 dual magnetic gradiometer system with data logger. The readings were recorded at a resolution of 0.01nT and data was collected with a traverse interval of 1m and a sample interval of 0.25m. All recorded survey data was collected with reference to a site survey grid comprised of individual 30m x 30m squares. The grid was established using Real Time Kinematic (RTK) differential GPS equipment and marked out using non-metallic survey markers. All grid nodes were set out with a positional accuracy of at least 0.1m as per existing guidelines (CIfA 2014; Schmidt *et al*. 2015) and could be relocated on the ground by a third party. The base lines used to create the survey grids are shown on Figure 3 and further details are available in Appendix A.

4.4 The processing was undertaken using Geoplot 3.0 software and consisted of standard processing procedures. Details of processing steps applied to collected data are given in Appendix B.

4.5 On the greyscale plot (Figs. 4 and 5), positive readings are shown as increasingly darker areas and negative readings are shown as increasingly lighter areas.

4.6 Interpretation of identified anomalies is generally achieved through analysis of anomaly patterning and increases in magnetic response, and is often aided through examining supporting information (including but not limited to historic maps, LiDAR survey data, and aerial photographs). The interpreted data uses colour coding to highlight specific readings in the survey area (see Fig. 6).

5.0 RAPID DESK-BASED CULTURAL HERITAGE SUMMARY

Previous archaeological investigations

5.1 The HER records four previous archaeological interventions within the study area. In 2004, there was an archaeological assessment and trial-trench evaluation of land at 34/36 Front Street, but nothing of significance was found (E8062). A desk-based

assessment of land at 20 North Green was undertaken in 2006, which highlighted the fact that the site had formerly been the friends Meeting House and cemetery (E9623). Trial trenching at Staindrop hall in 2010 did not find any significant remains (E33695). Geophysical survey to the east of Cleatlam Lane in 2018 identified anomalies of possible archaeological origin, and a subsequent programme of trial-trenching recorded ditches of Iron Age or Roman date (E65187 and E65890). The PDA also lies within the areas covered by two wider studies: the Survey of the Coal Measures and Magnesian Limestone Escarpment 1977-1978 (E43661) and the Survey of the Durham Coalfield 1983-1984 (E43667). However, neither study appears to have identified any sites within Staindrop parish.

LiDAR

5.2 Environment Agency LiDAR coverage of the area carried out in 2006 was examined at a vertical resolution of 1m and 2m. The area of the PDA lies beyond the limit of the available 1m coverage. The 2m coverage clearly shows the course of the stream channel (now partially culverted) crossing the northern part of Area A from west to east and then turning to the south-east, following part of the boundary between Areas A and C before continuing across Area C towards a confluence with Sudburn Beck at Bow Bridge. The presence of earthworks of probable palaeochannels of Sudburn Beck within the southern edge of the PDA suggest that the beck has been channelled at some point in antiquity onto its current alignment.

5.3 The LiDAR survey (not illustrated) shows that several parts of the PDA contain linear trends that may represent slight earthworks of former ridge and furrow cultivation. Within the north-western part of Area B, this trend is aligned from north to south, with approximately 10–12m between ridges, and may originally have formed a single block with similar remains within the field to the west (beyond the PDA). In the eastern part of Area B, there are traces of broadly spaced ridge and furrow aligned from north-west to south-east parallel to Winston Road. In Area D there are faint traces of possible ridge and furrow aligned at right-angles to Winston Road, although these are crossed from north-west to south-east by two slightly diverging linear features, measuring 10–18m apart, which may represent either a different phase of cultivation or a former trackway or drove-way, perhaps a predecessor to Winston Road. Within Area A and the southern part of Area C, to the south of the former stream-channel, there is a linear trend suggestive of rather narrower ridge and furrow with the ridges only c.4–5m apart.

5.4 Comparison of several short linear features recorded by the LiDAR survey with the First Edition Ordnance Survey map of 1860 (NLS 2019) shows that they represent the alignment of boundaries that were removed during the later 19th century, creating larger fields.

Historic landscape characterisation

5.5 The PDA is characterised as post-medieval enclosed farmland, created by piecemeal enclosure but containing fossilised strips (HLC ID: 2483; DCC 2019).

Site inspection

5.6 A site inspection was carried out on 3rd April 2019. The aim of the site inspection was to establish the existing condition of the land, topographical features and the potential for heritage constraints within the site. At the time of the inspection the site contained pasture.

5.7 The inspection noted that earthworks visible on aerial photos and LiDAR survey data relating to ridge and furrow and the former route of the channelled Sudbury Beck appeared well-defined. Partly visible on aerial photos and LiDAR survey data is a culvert that runs through Areas A and C. During the site visit it was noted that the majority of the culvert is completely covered, and its composition is largely defined in areas where it is exposed, including an open section in the north-eastern corner of Area C and two breaks, which are composed of two walled sides and a downward slope to the central water flow designed for livestock access.

Conservation area

5.8 The site lies 130m from the nearest part of the Staindrop Conservation Area. This is primarily concentrated on the area around the village green but includes a strip of woodland extending to the east. It excludes the 20th-century development at the south-eastern end of the village along Winston Road.

Heritage assets

5.9 All heritage assets are itemised in Table 1. Heritage assets and events are located on Figure 2. However, given the considerable number of Grade II Listed Buildings, only those located close to the PDA are numbered on Figure 2. Heritage assets, where numbered, are designated by either their respective seven-digit Historic England National Heritage List number or Historic Environment Record (HER) number

(prefixed H, e.g. H7711), while archaeological events recorded by the HER are prefixed with an E (e.g. E8062). Where several assets are located in a small area at St Mary's Church, these have been assigned a Group letter (A) which is indicated in the first column on Table 1 and the letter used for clarity on Figure 2. Those Heritage assets without a statuary designation are graded, based on professional judgement, as to whether they are of national (1), regional (2) or local (3) significance.

Table 1: Heritage assets within the 1km study area

HA No	ID	Description	Period	Easting	Northing	Designation
	1000732	Raby castle	Mid-18th century	412769	522034	Grade II* Registered Park and garden
	1338594 H37884	Church of St Mary, Front Street	Early medieval to 14th century	413097	520636	Grade I Listed Building
	1121104 H35425	Milestone, 500m south of Alwent Farmhouse	19th century	413860	519349	Grade II Listed Building
	1121729 H35237	Musgrave House and Anthorn House, 7 and 8 South Green	1766	412773	520554	Grade II Listed Building
	1121730 H35249	10 South Green	Mid-18th century	412755	520550	Grade II Listed Building
	1121731 H36788	Garden wall along west side of garden to south of Nos. 11 and 12 South Green	Early 18th century	412724	520536	Grade II Listed Building
	1121732 H36789	Hilrie, 26 South Green	Mid/late 18th century	412649	520543	Grade II Listed Building
	1121733 H36790	Summerhouse c.60m west of No. 32 South Green	Early 18th century	412534	520515	Grade II Listed Building
	1121734 H36564	Necessary house approximately 30m west of No 32 South Green, and wall attached	Early 18th century	412558	520515	Grade II Listed Building
	1121735 H36565	Amberly House and Eale's House, 37 and 38 South Green	Early 18th century	412525	520525	Grade II Listed Building
	1121736 H36791	Lucknow and Lyndhurst, 40 and 41 South Green	c.1840	412504	520516	Grade II Listed Building
	1121740 H36581	Garden walls enclosing orchard and garden south-east of Garden House, with Piers, Winston Road	Late 18th century	413634	520456	Grade II Listed Building
	1121751 H36602	Gate piers and gates c.50m south-west of Church of St Mary.	Late 17th century and 19th century	413100	520610	Grade II Listed Building
	1121752 H36603	Gate piers, gates and overthrow c.200m north-east of Church of St Mary	Early 19th century	413146	520668	Grade II Listed Building
	1121753 H36615	4 Front Street	Later 18th century	412906	520597	Grade II Listed Building

HA No	ID	Description	Period	Easting	Northing	Designation
	1121754 H36616	Staindrop House (Rest Home), 14 Front Street, and wall with gateway attached	Probably early 18th century	412935	520597	Grade II Listed Building
	1121755 H36617	Staindrop Hall, 20 Front Street	Late 16th/early 17th century	412997	520596	Grade II Listed Building
	1121756 H36618	Wall, gateway, carriage-house and stable attached, Staindrop Hall Front Street	Later 18th century	413022	520600	Grade II Listed Building
	1121757 H36645	Church View, 22 Front Street	1719	413058	520594	Grade II Listed Building
	1121758 H36646	Milestone approximately 10m north of No. 34 South Green	18th century	412563	520544	Grade II Listed Building
	1121759 H36647	Central Buildings, The Green	Early and late 18th century	412796	520599	Grade II Listed Building
	1121760 H36648	The Mill, Mill Wynd	Probably early 18th century	412514	520694	Grade II Listed Building
	1121761 H36649	3 North Green	Early 18th century	412778	520626	Grade II Listed Building
	1121762 H36687	Gazebo approximately 100m north of No. 4 The Green	Mid-18th century	412775	520656	Grade II Listed Building
	1121763 H36688	East Masham House and West Masham House, 8 and 9 North Green	Mid/late 18th century	412737	520628	Grade II Listed Building
	1121764 H36689	Ormulz House, 11 North Green	Late 18th century	412697	520626	Grade II Listed Building
	1121765 H36690	Wall attached to No. 15 North Green with coach house attached	Late 18th century	412639	520671	Grade II Listed Building
	1121766 H36650	Westfield House, 21 North Green	Mid-18th century	412594	520612	Grade II Listed Building
	1121767 H36691	24 North Green	Late 18th century	412579	520585	Grade II Listed Building
	1121768 H36692	29 North Green	Mid-18th century	412548	520573	Grade II Listed Building
	1121770 H36670	Raby Estate Office, 3 Office Square	Late 18th century	412873	520554	Grade II Listed Building
	1121771 H34645	14 Office Square	Early/mid-18th century	412894	520596	Grade II Listed Building
	1121772 H34646	Ivy House, 1 South Green	Mid-18th century	412834	520557	Grade II Listed Building

HA No	ID	Description	Period	Easting	Northing	Designation
	1121785 H34703	Boundary stone approximately 33m east of Bath Wood	Probably 18th century	412968	521213	Grade II Listed Building
	1121786 H34704	1 Beech Side (gazebo)	Late 18th century	413537	520488	Grade II Listed Building
	1121787 H34705	7 Front Street	c.1700	412836	520635	Grade II Listed Building
	1121788 H34706	11 Front Street	18th century	412860	520626	Grade II Listed Building
	1121789 H34707	21 Front Street and garden wall attached	Early 19th century	412928	520636	Grade II Listed Building
	1121790 H34708	29 Front Street	Late 18th century	412966	520620	Grade II Listed Building
	1121791 H34709	39 Front Street	Mid/late 18th century	413021	520628	Grade II Listed Building
	1121792 H34725	51 Front Street	Early 19th century	413057	520624	Grade II Listed Building
	1121793 H34726	Vane Mausoleum approximately 100m north of Church of St Mary	1850	413098	520690	Grade II Listed Building
	1160070 H35297	Church Bridge over Langley Beck, A688	Late 18th century	413162	520694	Grade II Listed Building
	1160108 H35317	3 Front Street	Probably c.1700	412819	520633	Grade II Listed Building
	1160111 H35318	9 Front Street, including area wall and railings	18th century	412851	520625	Grade II Listed Building
	1160118 H35334	13 Front Street	Early 18th century	412868	520625	Grade II Listed Building
	1160151 H38003	Primitive Methodist Chapel, Front Street	1861	412940	520636	Grade II Listed Building
	1160166 H38007	Sherwood House, 35 and 37 Front Street	c.1725	413003	520624	Grade II Listed Building
	1160199 H38024	53 Front Street	Probably 17th century	413064	520629	Grade II Listed Building
	1160393 H38091	Drinking fountain approximately 16m east of Central Buildings, The Green	1865	412827	520597	Grade II Listed Building
	1160486 H37820	The Lindens, 4 North Green	c.1700	412767	520627	Grade II Listed Building

HA No	ID	Description	Period	Easting	Northing	Designation
	1160499 H37936	5 and 6 North Green	Early/mid-18th century	412749	520627	Grade II Listed Building
	1160531 H37937	10 North Green	Early 18th century	412712	520627	Grade II Listed Building
	1160590 H37949	Raby House, 15 North Green	Mid-late 18th century	412628	520627	Grade II Listed Building
	1160654 H37962	25 and 26 North Green	Early and mid-19th century	412570	520580	Grade II Listed Building
	1160684 H37964	28 North Green	Probably late 18th century	412554	520573	Grade II Listed Building
	1160779 H38009	Former chapel, Queen Street	1827	412736	520680	Grade II Listed Building
	1160790 H38010	Wesley House and Reklaw House, 3 and 4 South Green	18th century	412813	520562	Grade II Listed Building
	1160836 H38047	Hazledene and Neville House, 20 and 21 South Green	18th century	412682	520544	Grade II Listed Building
	1160842 H38048	Glebe House, 24 and 25 South Green	Mid-18th century	412658	520543	Grade II Listed Building
	1160866 H38026	No. 32 (incorporating No. 33) (The Deanery) and No. 34 (Garth Cottage), and wall attached, 32, 33 and 34 South Green	17th and 18th century	412587	520534	Grade II Listed Building
	1160883 H38028	Dovecote attached to 32 South Green	Early 18th century	412603	520522	Grade II Listed Building
	1160902 H37821	Western House, 43 and 44 South Green	Early 19th century	412484	520505	Grade II Listed Building
	1160933 H37828	Garden House, 63 Winston Road	Late 18th century	413494	520454	Grade II Listed Building
	1310374 H37226	Woodcrest, 39 South Green	Late 18th/early 19th century	412512	520520	Grade II Listed Building
	1310422 H37048	1 Office Square	Mid-18th century	412835	520546	Grade II Listed Building
	1310432 H37049	5 Office Square (former manor house)	17th century	412885	520558	Grade II Listed Building
	1310474 H37051	Caretaker's flat and stable, with adjacent piers, to No. 20 North Green	c.1771	412586	520627	Grade II Listed Building

HA No	ID	Description	Period	Easting	Northing	Designation
	1310491 H36806	Walls and piers to south and east of No. 21 North Green	1781	412606	520606	Grade II Listed Building
	1310520 H36810	Anvil House, 12 North Green	Early 19th century	412676	520624	Grade II Listed Building
	1310572 H36811	1 and 2 North Green	1729	412800	520626	Grade II Listed Building
	1310596 H36903	Former King's Arms Inn, 24 and 26 Front Street	Early 19th century	413078	520593	Grade II Listed Building
	1310653 H37498	Piers, gates, railings and walls around Vane Mausoleum at Church of St Mary, Front Street	1850	413091	520687	Grade II Listed Building
	1310703 H37989	17 and 19 Front Street	Probably early 18th century	412906	520631	Grade II Listed Building
	1310722 H37991	Field byre c.50m east of Staindrop Cemetery	Probably early 19th century	413554	520690	Grade II Listed Building
	1322717 H37137	Stangarth, 6 South Green	Mid-18th century	412790	520547	Grade II Listed Building
	1322718 H37138	Gorst Hall, 11 and 12 South Green	c.1700	412739	520548	Grade II Listed Building
	1322719 H37150	Strathmore and Greystone House, 22 and 23 South Green	Late 18th century	412668	520544	Grade II Listed Building
	1338593 H37883	45 Front Street	Early 19th century	413039	520628	Grade II Listed Building
	1338614 H37280	Group of 4 headstones approximately 5m west of Church of St Mary, Front Street	18th century	413080	520626	Grade II Listed Building
	1338615 H37261	2 Front Street	Mid-18th century	412899	520598	Grade II Listed Building
	1338616 H37281	6 and 8 Front Street	Late 18th century	412913	520601	Grade II Listed Building
	1338617 H37299	Wall attached to gazebo behind No. 4 North Green	Probably mid-18th century	412770	520674	Grade II Listed Building
	1338618 H37300	Ebor House, 13 North Green	Probably early 19th century	412663	520623	Grade II Listed Building
	1338619 H37301	Quakers' Rest, 20 North Green (former Friends meeting House)	1771	412587	520627	Grade II Listed Building
	1338620 H37302	27 North Green	Mid-18th century	412561	520573	Grade II Listed Building

HA No	ID	Description	Period	Easting	Northing	Designation
	1338621 H37303	32 North Green	Early 19th century	412533	520570	Grade II Listed Building
	1338623 H37065	15-18 Office Square	Early 18th century	412875	520587	Grade II Listed Building
	1338629 H37087	South entrance gateway to Raby Castle, A688	Probably early 19th century	413139	520739	Grade II Listed Building
	1338630 H37088	5 Front Street	Probably early 18th century	412828	520636	Grade II Listed Building
	1338631 H37089	(Former Vicarage) The Old Vicarage and The Surgery, 15 Front Street	Early 19th century	412885	520628	Grade II Listed Building
	1338632 H37090	25 and 27 Front Street	Late 18th century	412952	520623	Grade II Listed Building
	1365629 H37659	The Royal Oak, 41 Front Street	Early 19th century	413027	520625	Grade II Listed Building
	1365633 H37660	47 and 49 Front Street	Early 19th century	413045	520624	Grade II Listed Building
A	H763	Fragment of a cross-shaft or other architectural fragment built into buttress on north side of St Mary's Church	Early medieval	41310	52064	3
A	H1712	College or hospital located near Langley beck to the north of the church. No trace survives	1408-1548	41310	52064	3
A	H1713	Late Saxon church forming the core of St Mary's Church	Early medieval	41310	52064	3
	H1714	St Mary's in the Fields, Staindrop, documentary reference to medieval chapel	15th century	413	520	3
A	H2553	Alabaster effigy of Ralph Neville in St Mary's Church	1425	4131	5206	3
A	H2554	Oak effigy of Henry Neville in St Mary's Church	1564	4131	5206	3
A	H2555	Freestone effigy of Isabel, wife of Robert Fitz Meldred (?) in St Mary's Church	1260	4131	5206	3
A	H2556	Freestone effigy of Euphemie, wife of Ralph, Lord Neville (?) in St Mary's Church	Mid-14th century	4131	5206	3
A	H2557	Freestone effigy of an unknown Neville lady in St Mary's Church	Late 14th century	4131	5206	3

HA No	ID	Description	Period	Easting	Northing	Designation
A	H2558	Alabaster effigy of Margaret Stafford and Joan Beaufort, wives of Ralph, First Earl Neville, in St Mary's Church	1425	4131	5206	3
A	H2559	Oak effigy of Anne manners and Jane Chomeley, wives of henry, 5th Earl Neville, in St Mary's Church	1564	4131	5206	3
A	H2560	Freestone effigy of a boy of the Neville family in St Mary's Church	13th century	4131	5206	3
A	H3907	More than half of an early sundial built into the wall to the north of the chancel arch, St Mary's Church	Early medieval	41310	52064	3
	H4623 H6888	Staindrop village	Early medieval – post-medieval	4126	5205	3
	H7711	Alwent, thought to be the site of a deserted medieval village	Medieval	4135	5198	3
	H8992	Documentary evidence for anchorite site at Staindrop	Medieval	4131	5206	3
	H49681	Scarth memorial Village Hall, South Green, Staindrop	1875	412801	520560	3
	H57315	Former Quaker burial ground to rear of 20 North Green, Staindrop	1776 – early 20th century	412588	520670	3
	H61512 H61513	Site of Staindrop Mill, depicted on 1st Edition OS map	Post-medieval	4127	5207	3
	E8062	Archaeological assessment and trial-trench evaluation, 34/36 Front Street in 2004. Nothing of significance found		4131	5205	
	E9623	Desk-based assessment of land at 20 North Green, Staindrop, 2006. Identified the importance of the site for its use as the Quaker meeting house and burial ground		4125	5206	
	E33695	Trial-trench evaluation at Staindrop Hall, 2010. No significant remains were found		413003	520569	
	E43661	Survey of the Coal measures and Magnesian Limestone Escarpment 1977-1978. Staindrop not listed amongst the parishes surveyed, therefore no coordinates available		N/A	N/A	
	E43667	Survey of the Durham Coalfield 1983-1984. No sites at Staindrop listed on the HER entry, therefore no coordinates available		N/A	N/A	

HA No	ID	Description	Period	Easting	Northing	Designation
	E65187	Geophysical survey on land east of Cleatlam Lane, Staindrop, 2018. Possible archaeological anomalies were identified		4124	5201	
	E65890	Trial trench evaluation on land east of Holm Lodge, Staindrop, 2018. Some ditches of Iron Age or Roman date were encountered	Iron Age or Roman	4124	5201	

Designated heritage assets

5.10 There is one Grade I Listed Building within the study area: St Mary's Church on Front Street in Staindrop (List No. 1338594). In addition, there are 92 Grade II Listed Buildings within the 1km of the PDA. These are mostly located within Staindrop village, concentrated to either side of the village green. Only three Listed Buildings lie close to the PDA: the gazebo at 1 Beech Side (List No. 1121786), and Garden House (63 Winston Road) and its associated garden walls (List Nos 1160933 and 1121740). These are all on the eastern side of Winston Road and are screened from the PDA by existing development along the western side of the road. There is one Grade II* Registered Park and Garden located within the study area at Raby Park (List No. 1000732), which lies to the north of Staindrop Village, and is therefore screened from the PDA.

5.11 No Scheduled Monuments or Registered Battlefields lie within the study area.

5.12 The HER lists 20 undesignated heritage assets located within 1km of the PDA.

Prehistoric and Romano-British

5.13 Little evidence for prehistoric activity has been recorded within the study area. The HER records that early prehistoric flint tools and a stone axe have been found in Staindrop village (H6888).

5.14 As noted above, geophysical survey and trial-trenching to the east of Cleatlam Lane has identified ditches of Iron Age or Roman date (E65187 and E65890). These are located approximately 800m to the west of the PDA, but by comparison with similar sites elsewhere may extend over a large area.

5.15 The projected line of the Roman road between Bowes and Binchester passes just beyond the north-western side of the search area, running from south-west to north-east.

5.16 The Portable Antiquities scheme database records a metal-detector find of a Roman coin somewhere in the vicinity (PAS ID: LANCUM-CA6815), although details of the precise find-spot are unavailable, and hence it is not located on Figure 2.

Medieval

5.17 Staindrop is first mentioned in 1031, when King Cnut gave the estate to the monastery of Durham. In 1050 it was recorded as *Standropa*, deriving from the Old English *Saen-throp* which translates as stony village. Evidence for an Anglo-Saxon church of probable 10th or 11th century date survives within the structure of the nave of St Mary's Church (H1713), and elsewhere in the church there are fragments of a possible cross-shaft and a sundial, also of Anglo-Saxon date.

5.18 During the medieval period the village prospered, benefitting from its proximity to Raby Castle which was built to the north of Staindrop in the 14th century. St Mary's Church is the only surviving medieval building in the village and is Listed Grade I (1338594). The church contains a number of effigies of members of the Neville Family, Lords of Raby, who were buried there (H2553-H2560). In the later medieval period, a college (effectively a monastic cell) lay to the north of the church (H1712), although no visible remains of this building survive. There is also a record of another chapel at Staindrop in the 15th century, St Mary's in the Fields (H1714), and an anchorite site (H8992), although their locations are now lost.

5.19 There is thought to have been an additional focus for medieval occupation south of the Sudburn Beck at Alwent (H7711), a short distance to the south of the PDA.

Post-medieval to modern

5.20 Staindrop village continued to thrive in the post-medieval period. Sir Henry Vane acquired Raby Castle in 1626, and the Vane family continued to be buried in St Mary's Church. From 1850, family burials also took place in the Grade II Listed mausoleum in the churchyard. The prosperity of the village is reflected in the large number of listed buildings of 17th- to 19th-century date, mainly concentrated around the village green. The increasingly diverse religious life was served by an 18th-century Friends' Meeting House and cemetery at 20 North Green (1338619 and H57315), a chapel in Queen Street built, in 1827 (1160779), and the Primitive Methodist Chapel, built in 1861 (1160151). 'Civic' pride was demonstrated by additions, such as the 19th-century drinking fountain on the Green (1160393) and Scarth Memorial Village Hall, which opened in 1875 (H49681). There was also a mill (H61512). Beyond the limits

of the village, other listed structures include a 19th-century field byre to the east of the cemetery (1310722), a number of milestones and boundary stones, and Church Bridge (1160070), where the A688 crosses Langley Beck at the eastern end of the village.

5.21 Successive editions of Ordnance Survey maps (NLS 2019) show that Staindrop village has changed little since the mid-19th century, the main developments being some expansion at its western end, and also to the east along Winston Road. Within the PDA, the field layout remains essentially as that surveyed in 1856, although some minor boundaries had been removed by 1896. In 1856, Area A was divided by a stream that crossed it from west to east before turning to the south-east and crossing Area C towards Bow Bridge. There was a small enclosure located within the south-eastern corner of Area A. Area B was subdivided by a boundary running from north to south. By the 1896 survey, this boundary and the small enclosure within Area A had been removed. The stream crossing Areas A and C had been culverted, although access points had been left for livestock, which still survive. Small structures recorded in most of the fields were probably byres for livestock. The Saw Mill opposite the southern end of the PDA had been constructed by this date. By the middle of the 20th century, there had been some development along the eastern side of Winston Road opposite the PDA. The allotments at the western side of the PDA were also created during the early 20th century. Subsequent development has extended southwards along the eastern side of Winston Road to the Saw Mill, and more limited development on the western side of the road has resulted in some encroachment into the north-eastern corner of the field forming the northern part of the PDA.

6.0 GEOPHYSICAL SURVEY RESULTS

Survey conditions and mitigating factors

6.1 At the time of survey, the majority of the site contained low lying pasture. There were several modern features above the ground including electricity poles. Field boundaries comprised metal fencing, trees and hedgerow. Attempts were made to avoid areas effected by above ground features that were likely to have a high magnetic susceptibility, to minimise the potential for their magnetic responses to impinge on the survey results and mask potential buried features.

(Figures 5 and 6)

6.2 The 1860 six-inch OS map shows a stream running through Areas A and C. By the end of the 19th century, the stream had been culverted, as evidenced by the two breaks

that are recorded in Areas A and C on the 1897 25-inch OS map, and still extant within the modern composition of the site. Bipolar anomalies (**A**) correspond with the location of the breaks in the culvert, whilst linear anomalies **B1**, **B2** and **B3** relate to the route of the stream recorded on the 1860 OS map.

6.3 Linear anomalies **C** and **D** run parallel to the south of **B3** but are composed of weaker increases in magnetic values. Although tentative, it is plausible **C** and **D** are indicative of infilled features, and possibly denote ditches, or former routes of water courses.

6.4 Several linear and rectilinear anomalies (**E**) have been identified in the north of Area C. These anomalies are composed of weak increases in magnetic value and have a very fragmented form but correspond with crop marks present on aerial photos (Google Earth 2018). Consequently, although interpretation is very tentative, is plausible **E** could denote buried feature of an archaeological origin and be indicative of a series of enclosures.

6.5 Several linear anomalies with strong increases in magnetic value (**F**) have been identified in the south of Area D. These are located between two regimes of possible ridge and furrow, and so it is plausible that they are indicative of a headland. However, it should be noted that this interpretation is tentative.

6.6 Rectilinear anomalies (**G**) in area D are composed of weakly enhanced increases in magnetic value and incomplete patterning. Consequently, their origin is unknown, and it is uncertain if they denote buried archaeological features or are indicative of agricultural activity.

6.7 There are numerous weak isolated anomalies with an amorphous form across the survey area. Those with a coherent patterning and broader form or located near linear anomalies have been identified within the interpretation. It should be noted that a very tentative interpretation applies, and their origin is unknown.

6.8 Two linear anomalies denote former field boundaries. One in Area B (**H**) relates to a field boundary present on the 1860 OS map that was removed during the end of the 19th century, and **I**, in Area A, relates to a short-lived field boundary that is present on the 1921 25-inch OS map but was removed by the 1951 six-inch OS map.

6.9 There are several weak and diffuse linear trends. These fail to produce the necessary patterning or increases in magnetic response in order to be interpreted fully, and as a consequence their origin is unknown.

6.10 There are three alignments of regularly spaced linear anomalies belonging to agricultural activity. Those with a broader spacing are considered likely to denote ridge and furrow, whilst those with weak increase in magnetic value or narrower spacing are of an unknown agricultural origin.

6.11 There is a bipolar linear anomaly running through the west of Area D that is plausibly caused by a buried utility (**J**).

6.12 Several isolated bipolar responses have been identified. These are considered to be modern and caused by highly magnetic material, such as ferrous objects. For example, bipolar anomalies labelled **K** relate to electricity poles, and **L** corresponds with the location of a man hole cover.

6.13 Dipolar anomalies generally to relate to ferrous or modern objects buried in the topsoil, and so have only been shown on the interpretation where they have a particularly large shape. Areas of increased magnetic response have been used to highlight concentrations of dipolar anomalies.

6.14 Strong responses caused by above ground features external to the survey area, such as metal fencing and gates have been characterised as external interference.

6.15 There are several broad responses that correspond with topographical changes within the area surveyed that are considered likely to be caused by geological or pedological changes in the substrata. In particular a series of anomalies (**M**) in the south of Area A and C are considered likely to relate to the former route of Sudbury Beck before being channelled.

7.0 CONCLUSIONS

7.1 NAA were commissioned to undertake a geophysical (gradiometer survey) on land to the west of Winston Road, Staindrop, to support a planning application for a proposed residential development.

7.2 Since the medieval period Staindrop has developed as a fairly prosperous ribbon village and this is demonstrated by the high number of heritage assets that line the main road running through the centre of the village.

7.3 It is likely that the PDA belonged to cultivated lands in the immediate eastern hinterland of Staindrop during the medieval period and post-medieval periods, and this is demonstrated by the volume of agricultural features that have been recorded on historic maps, LiDAR and geophysical survey data.

7.4 Generally, anomalies identified through the geophysical survey are considered to relate to agricultural or geological activity. Three possible regimes of regularly spaced linear anomalies were identified within the survey results, along with two former field boundaries. Anomalies associated with a former stream that was culverted towards the end of the 19th century appear in the south of the survey area, as well as several broad anomalies that are likely to relate to natural pedological deposits belonging to the pre-channelled route of Sudbury Beck, which presently forms the southern extent of the site.

7.5 Numerous linear, rectilinear, and amorphous anomalies and trends were also identified that were composed of weak increases in magnetic value or incomplete patterning. Consequently, their interpretation is tentative, and it is uncertain if they belong to buried archaeological features, or instead are of an agricultural or geological origin.

7.6 Other anomalies were considered to be modern in nature and relate to ferrous features above the ground or buried utilities.

8.0 STORAGE AND CURATION

8.1 The records of the geophysical survey are currently held by NAA. All material will be appropriately packaged for long-term storage in accordance with national guidelines (CIfA 2014; Schmidt *et al*. 2015). An online OASIS form will be completed within three months of the completion of the project under the reference number Northern1-349644. This will include submission of a .pdf version of the final report to the Archaeology Data Service via the OASIS form

REFERENCES

Aspinal, A., Gaffney., C and Schmidt, A. (2008) *Magnetometry for Archaeologists*. Plymouth: Altamira Press.

Bartington Instruments Ltd. (n.d.) *Grad601 Single Axis Magnetic Field Gradiometer system*. Oxford: Bartington Instruments Ltd.

British Geological Survey (BGS) (2019) *Geology of Britain Viewer*. [Online] Available at: https://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html (accessed on 15/04/2019)

Chartered Institute for Archaeology (CIfA) (2014) *Standard and Guidance for Archaeological Geophysical Survey*. Reading: Chartered Institute for Archaeologists.

Durham County Council (2019) *The Historic Landscape Characterisation of County Durham and Darlington*. [Online] Available at: http://www.durham.gov.uk/hlc (accessed on 17/04/2019)

Gaffney, C. and Gater, J. (2003) *Revealing the Buried Past*. Stroud: Tempus Publishing.

Jarvis, R. A., Bendelow, V. C., Bradley, R. I., Carroll, D. M., Furness, R. R., Kilgour, I. N. L. and King, S. J. (1984) *Soils and their use in Northern England*. Soil Survey of England and Wales Bulletin No. 10. Harpenden: Rothamsted Experimental Station.

National Library of Scotland (NLS) (2019) *Explore Georeferenced Maps*. [Online] Available at: https://maps.nls.uk/geo/find/#zoom=12&lat=54.6186&lon=-1.7612&layers=102&b=1&point=54.5753,-1.7986 (accessed on 17/04/2019)

Schmidt, A., Linford, P., Linford, N., David, A., Gaffney, C., Sarris, A. and Fassbinder, J. (2015) *EAC Guidelines for the Use of Geophysics in Archaeology*. EAC Guidelines 2. Belgium: Europae Archaeologiae Consilium.

Soil Survey of England and Wales (1983) *Soils of England and Wales 1:250 000 Map Sheet 1: Northern England*. Southampton: Ordnance Survey.

Online sources

Historic England National Heritage List for England: https://historicengland.org.uk/advice/hpg/heritage-assets/nhle/

Google Earth: http://earth.google.co.uk

Magic (DEFRA): http://magic.defra.gov.uk/MagicMap.aspx

National Library of Scotland: http://maps.nls.uk/

Old Maps: www.old-maps.co.uk

Portable Antiquities Scheme database: http://finds.org.uk/database

The Heritage Gateway: http://www.heritagegateway.org.uk/gateway/

APPENDIX A

TECHNICAL INFORMATION

GRADIOMETER SURVEY

Magnetic surveys measure distortions in the earth's magnetic field caused by small magnetic fields associated with buried features (Gaffney and Gater 2003, 36) that have either remnant or induced magnetic properties (Aspinal *et al*. 2008, 21–26). Human activity and inhabitation often alter the magnetic properties of materials (Aspinal *et al*. 2008, 21) resulting in the ability for numerous archaeological features to be detected through magnetic surveys. Intensive burning or heating can result in materials attaining a thermoremanent magnetisation; examples of which include kilns, ovens, heaths and brick structures (Aspinal *et al*. 2008, 27; Gaffney and Gater 2003, 37). When topsoil rich with iron oxides, fills a man-made depression in the subsoil, it creates an infilled feature, such as a pit or ditch, with a higher magnetic susceptibility compared to the surrounding soil (Aspinal *et al*. 2008, 37–41; Gaffney and Gater 2003, 22–26). Magnetic surveys can also detect features with a lower magnetically susceptibility than the surrounding soil, an example of which is a stone wall.

LIMITATIONS

Poor results can be due to several factors including short lived archaeological occupation/use or sites with minimal cut or built features. Results can also be limited in areas with soils naturally deficient in iron compounds or in areas with soils overlying naturally magnetic geology, which will produce strong responses masking archaeological features.

Overlying layers, such as demolition rubble or layers of made ground, can hide any earlier archaeological features. The presence of above ground structures and underground services containing ferrous material can distort or mask nearby features.

Particularly uneven or steep ground can increase the processing required, or distort results beyond the capabilities of processing. It is also possible in areas containing dramatic topographical changes that natural weathering, such as hillwash, often in combination with intensive modern ploughing, will reduced the topsoil on slopes and towards the peaks of hills and possibly destroy or truncate potential archaeological features. Conversely features at the bottom of slopes may be covered by a greater layer of topsoil and so if buried features are present, they appear faint within the results, if at all.

Over processing of data can also obscure or remove features, especially if there are on the same orientation as the direction of data collection. Consequently, where possible, attempts are made to ensure data is not collected on the same orientation as known potential features and that data quality is sufficient to minimise the required data processing.

INSTRUMENTATION

The data was collected using handheld Bartington Grad 601-2 fluxgate gradiometers. The Bartington 601-2 is a single axis, vertical component fluxgate gradiometer comprising a data logger battery cassette and two sensors. The sensors are Grad-01-1000L cylindrical gradiometer sensors mounted on a rigid carrying frame; each sensor contains two fluxgate magnetometers with 1m vertical separation.

The difference in the magnetic field between the two fluxgates in each sensor is measured in nanoTesla (nT). NAA gradiometer data is recorded with a range of ±100nT, which equates to a resolution of 0.01nT. It should be noted that the actual resolution is limited to 0.03nT as a consequence of internal instrumental noise (Bartington Instruments Ltd, 23).

The gradiometer records two lines of data on each traverse, the grids are walked in a zig-zag pattern amounting to 15 traverses. The gradiometers are calibrated at the start of every day and recalibrated whenever necessary.

SURVEY DETAILS

Table A1: survey summary.

	Survey
Grid size	30mx30m
Traverse interval	1m
Reading interval	0.25m
Direction of 1st traverse	N
Number of Grids	100
Area covered	5.1ha

Table A2: baseline co-ordinates (baseline is shown on Fig. 2).

Grid point (gp) A	**Grid point (gp) B**
NGR: 413572.8794 520108.2904	NGR: 413602.8794 520108.2904

Table A3: site information and conditions.

Item	**Detail**
Geology	Carboniferous rocks of the Namurian Millstone Grit Series
Superficial deposits	Sand and gravel
Soils	Wigton Moor Association
Topography	Highest: 106m aOD Lowest: 101m aOD
Land use	Agricultural - pasture
Weather / conditions prior to and during survey	Overcast – Occasional rain

APPENDIX B

DATA PROCESSING INFORMATION

Gradiometer survey data is downloaded using the Bartington Grad 601 software and the processing was undertaken using Geoplot 3.0 software.

Table B1: commonly applied techniques.

Process	Effect
Zero mean traverse	Removes stripping which can occur as a consequence of using multi sensor arrays or a 'zigzag' data collection method by setting the mean reading for each traverse to zero.
Destagger	Removes stagger in the data introduced through inconsistence data collection pace and often exacerbated through the 'zig-zag' methodology.
Clip	Clips data above or below a set value to potentially enhance potential weaker anomalies.
Despike	Removes random spikes or high readings to reduce the appearance of dominant readings, often created by modern ferrous objects that can distort the results.
Low pass filter	Removes low frequency waves or broad anomalies such as those caused by strong or large gradual variations in the soil's magnetic susceptibility often caused by geological or natural changes in the substrata.
Interpolation	Used to smooth or reduce the blocky appearance of data by improving the spatial density and balance the quantity of data points in the X and Y directions.

Table B2: processing steps.

Minimal Processing	Increased Processing
• Zero mean traverse +5/-5 • Destagger: Area A Grids 15, 20, 25, 26 and 29: -2 Grids 11, 12, 18, 19, 21, 23 and 31: -1 Grids 27, 32, 24 and 37: 1 Grids 10, 22, 28, 38, 39 and 40: 2 Grids 16 and 33: 3 Area B Grids 10 and 12: -2 Grids 2, 7, 19 and 22: 1 Grids 8, 11, 14, 15, 18 and 23: 2 Grids 3 and 4: 3 Area C Grids 10 and 14: -2 Grids 9, 11, 13, 16, 21 and 25: -1 Grids 7, 17, 18, 19, 26 and 32: 1 Grids 20 and 28: 2 Grids 4, 5 and 27: 3 Grid 24: 4 Grid 22: 6	• Low Pass Filter • Interpolate Y, Expand - Linear, x2

Area D Grids 2, 4 and 22: -2 Grids 3, 20, 21, 26, 28 and 33: -1 Grids 7, 8, 9, 10, 11, 12, 13,14, 17, 18, 19 and 27: 1 Grids 15 and 16: 2	

APPENDIX C

DATA VISUALISATION INFORMATION

FIGURES

The data was used to produce a series of images to demonstrate the results of surveys these are detailed below:

- Greyscale/Colourscale Plot – This visualised the results as a shaded drawing with highest readings showing as black, running through different shades to lowest showing as white.
- XY-trace Plot – This creates a line drawing showing the peaks and troughs of the readings as vertical offset from a centreline.
- Interpreted Plot – Through detailed analysis anomalies have been interpreted and possible features identified. Interpretation drawings are used to show potential features and in particular to reinforce and clarify the written interpretation of the data. Anomalies have been characterised using the terminology detailed in the following section, and have been assigned colour coding outlined in keys found on the relevant figures associated with this report.

MAGNETIC ANOMALIES AND TERMINOLOGY

Table C1: lexicon of terminology.

Terminology	Detail
Anomaly	Any outstanding high or low readings forming a particular shape or covering a specific area with the survey results.
Feature	A man-made or naturally created object or material that has been detected through investigation works and has sufficient characteristics or supporting evidence for positive identification.
Magnetic susceptibility	The ability of a buried feature to be magnetically induced when a magnetic field is applied
Magnetic response	The strength of the changes in magnetic values caused by a buried feature with either a greater or lesser ability to be magnetised compared with the soil around it. Anomalies are considered to either have strong / weak or positive / negative responses. The strength of magnetic response (along with patterning) can be essential in determining the nature of an anomaly, but it should be noted that the size or strength of the magnetic response does not correlate with the size of the buried feature.
Patterning of an anomaly	The shape or form of an individual anomaly
Thermoremanence	The affect caused when a material has been magnetically altered through a process of heating. Thermoremanent magnetisation occurs when an object or material is heated passed the Curie Point and acquires a permanent magnetisation that is associated with the magnetic field that they cooled within (Gaffney and Gater 2003:37)

Different anomalies can represent different features created by human, agricultural or modern activity, or natural pedological or geological changes in the substrata.

Anomalies interpreted with a 'greater' categorisation are considered more likely to be of the interpreted characterisation; whereas a more tentative interpretation is applied to those with a 'lesser' categorisation as a consequence of weaker increases in magnetic response or the anomalies incomplete patterning or irregular form.

The strength and size of anomalies can vary depending on the magnetic properties of the feature, the magnetic susceptibility of the soil, the depth to which the feature is buried, and the state of preservation.

Table C2: characterisation of anomalies.

Characterisation	**Detail**
Archaeology	
Bipolar response (culvert break)	Positive anomalies with associated negative 'halo' (bipolar) that correspond with features recorded on historic maps associated with railway activity
Linear anomaly (archaeology)	Linear anomalies with a positive or negative magnetic responses, and composed of a patterning or shape that is suggestive of a buried archaeological feature. These are often indicative of structural remains or infilled features such as ditches. The strength of anomaly signal can be suggestive of the properties of the feature. Negative linear anomalies represent upstanding or infilled features that are less magnetically susceptible than background readings, for example structures or ditches composed of a non-igneous stone material. Bipolar linear anomalies considered to be of an archaeological nature are indicative of material with a high magnetic susceptibility, such as a brick wall.
Isolated anomaly (archaeology)	Isolated anomalies or anomalies with a more amorphous form possibly represent infilled features or thermomagnetic features such as areas of heating/burning of an archaeological origin. Unless associated with conclusively identified archaeological remains, such as linear anomalies, absolute identification of positive responses can be problematic as it is often not possible to decipher if they are of an archaeological, modern or agricultural origin. Consequently, isolated positive responses are not shown within the interpretation unless composed of a broad form or belonging to a series of isolated positive responses. Bipolar responses considered likely to be of an archaeological are also interpreted as isolated anomaly (archaeology). These are considered to relate to material with a very strong magnetic susceptibility or thermoremanent magnetisation.
Trends	Weak and diffuse anomalies with an uncertain origin are denoted by trends. It is possible that these belong to archaeological features, but given their weak signatures or incomplete patterning it is equally plausible that they relate to agricultural features or natural soil formations.
Agriculture	
Field boundary	Isolated linear anomalies that are likely to be indicative of former land divisions. A more conclusive interpretation is given to linear anomalies that

Characterisation	**Detail**
	correspond with the location of field boundaries recorded on historic maps, Aerial photos or LiDAR coverage of the site.
Ridge and furrow	Broadly spaced linear anomalies that are likely to be indicative of earlier forms of agriculture, such as ridge and furrow. These often correspond with the location of earthworks visible on the ground or identified on aerial photos or LiDAR survey coverage.
Agriculture?	Weak, irregularly spaced or isolated linear anomalies that possibly relate to agricultural activity. Given the tentative interpretation, the agricultural process they are caused by is also likely to unknown.
Modern	
Bipolar response (modern?)	Generally positive anomalies with associated negative 'halo' (bipolar) denote features with a strong magnetic response are likely to be of a modern origin. Conversely it should be noted that given the high number of anomalies with bipolar responses associated with the former railway activity interpretation on this site is tentative. Isolated bipolar responses of a modern nature are likely to relate to buried ferrous material or objects, such as metallic agricultural debris. If a trend is noted in the alignment or spacing of isolated bipolar responses, it is possible that they are indicative of ferrous fittings or connectors used on buried non-magnetic buried utilities. Linear bipolar anomalies are likely to be indicative of modern services.
Dipolar response	Dipolar anomalies relate to individual spike within the data and tend to be caused by ferrous objects. These responses have only been shown when located near to archaeological features. When the site is located in a mining landscape it is possible that identified dipolar anomalies relate to mining activity and are indicative of further pits or mine shafts.
Area of increased magnetic response	Areas of increased magnetic response denote areas of disturbance containing a high concentration of dipolar and / or bipolar responses. These are generally considered to be caused by modern debris in the top soil, although it is possible that the disturbance is in part also caused by isolated archaeological material or geological or pedological changes in the substrata.
Natural	
Area of disturbance (geology)	Areas of variable magnetic responses can demonstrate natural features or changes in geology or soil type these often correspond with topographical variations.

APPENDIX D

OASIS FORM

OASIS DATA COLLECTION FORM: England

OASIS ID: northern1-349644

Project details

Project name	Winston Road, Staindrop, County Durham
Short description of the project	Geophysical Survye Report
Project dates	Start: 02-04-2019 End: 03-04-2019
Previous/future work	No / Not known
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 2 - Operations to a depth less than 0.25m
Monument type	NONE None
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Rural residential
Prompt	Planning condition
Position in the planning process	Pre-application
Solid geology (other)	Carboniferous rocks of the Namurian Millstone Grit Series
Drift geology (other)	Sand and gravel
Techniques	Magnetometry

Project location

Country	England
Site location	DURHAM TEESDALE STAINDROP Winston Road
Postcode	DL2 3NR
Study area	5.1 Hectares
Site coordinates	NZ 13612 20216 54.576848956911 -1.789397720846 54 34 36 N 001 47 21 W Point
Height OD / Depth	Min: 101m Max: 106m

Project creators

Name of Organisation	Northern Archaeological Associates
Project brief originator	Consultant
Project design originator	Northern Archaeological Associates
Project director/manager	Alice James
Project supervisor	Oskar Sveinbjarnarson
Type of sponsor/funding body	Developer

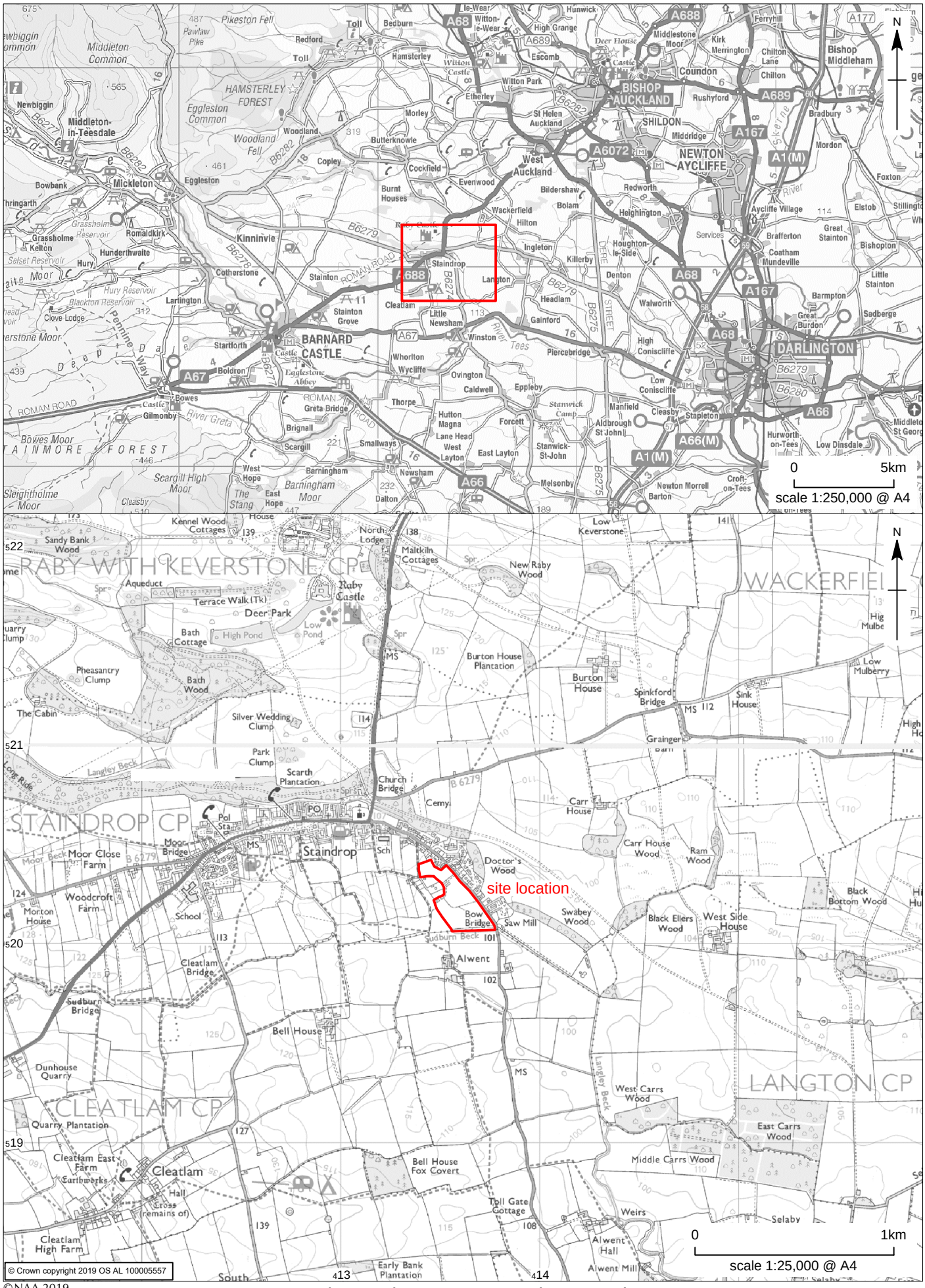
Project archives

Physical Archive Exists?	No
Digital Archive recipient	Northern Archaeological Associates
Digital Contents	"none"
Digital Media available	"Geophysics"
Paper Archive Exists?	No

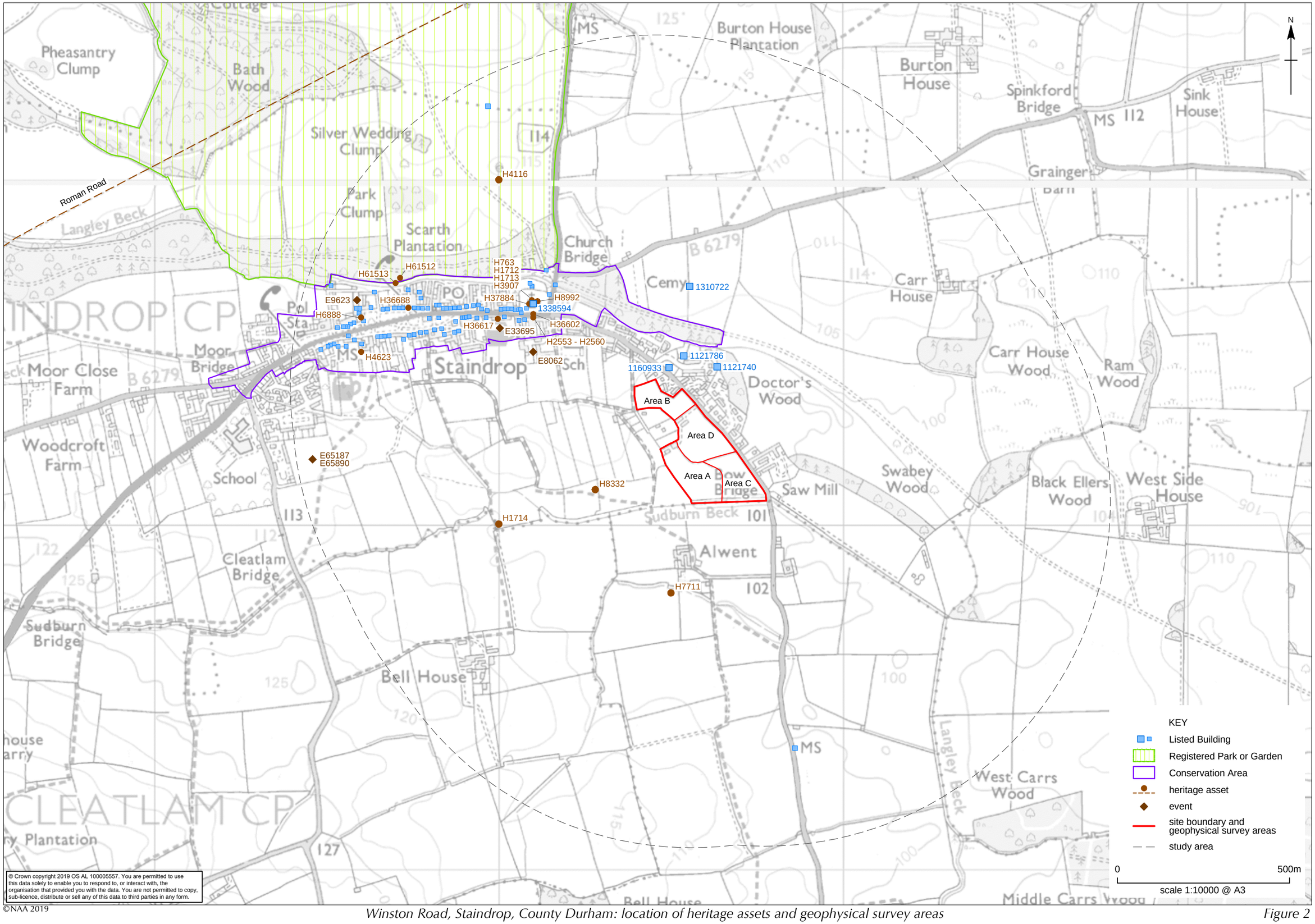
Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Winston Road, Staindrop, County Durham: Geophysical Survey Report
Author(s)/Editor(s)	James, A and Speed, G
Other bibliographic details	19-37
Date	2019
Issuer or publisher	NAA
Place of issue or publication	Barnard Castle
Description	Blue Spine

Entered by	aj (aj@naaheritage.com)
Entered on	23 April 2019



Winston Road, Staindrop, County Durham: site location *Figure 1*



Winston Road, Staindrop, County Durham: location of heritage assets and geophysical survey areas

Figure 2

NAA
Heritage Consultants

KEY

geophysical survey baseline

geophysical survey grid

geophysical survey area

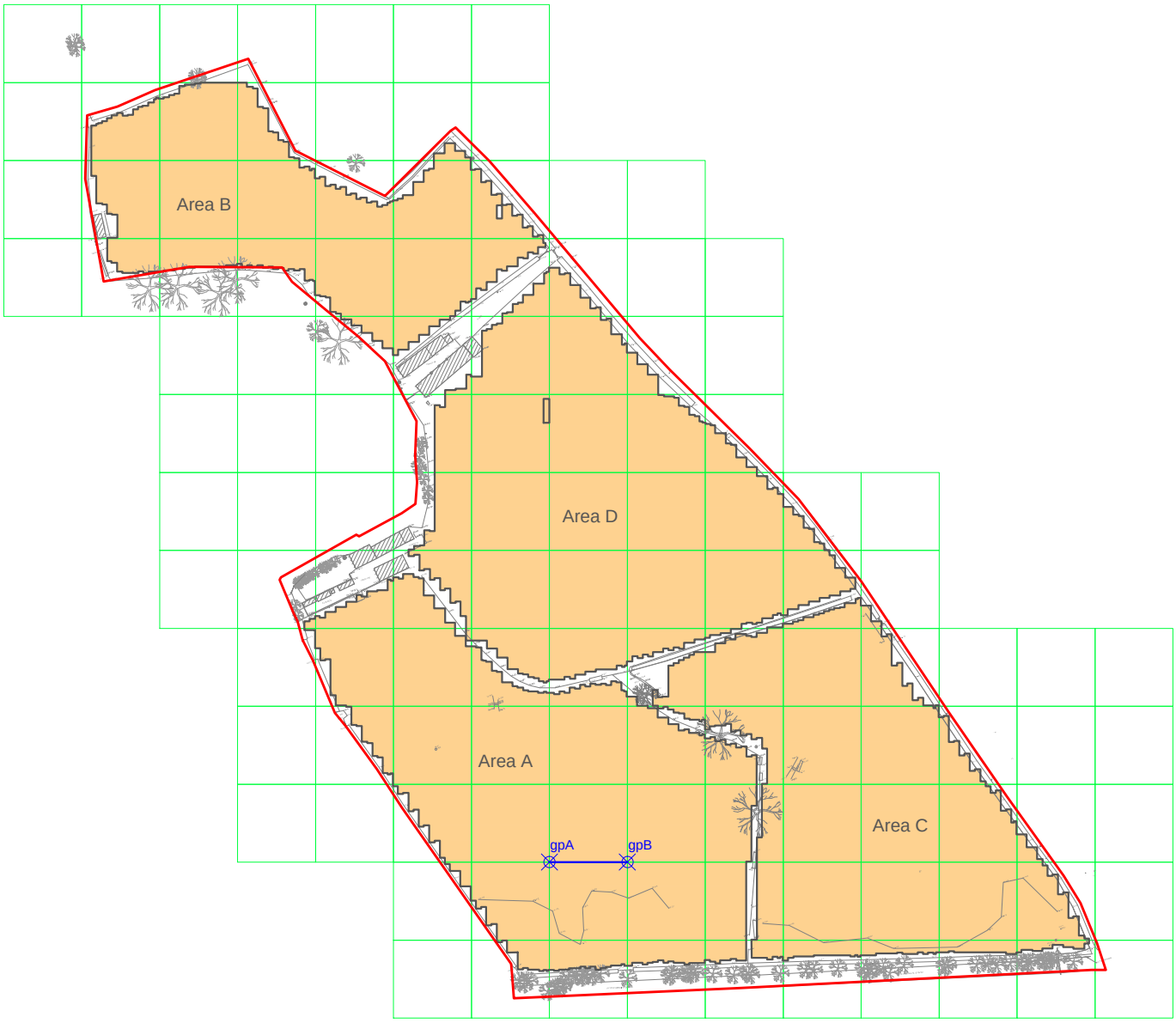
Proposed development area

N

0 100 m

scale 1:2500 @ A4

Based on survey data supplied by: Lichfields ref: STAINDROP_topo-email
Survey date: 08/04/19 © Copyright Lichfields



Winston Road, Staindrop, County Durham: location of gradiometer survey *Figure 3*

NAA
Heritage Consultants

Winston Road, Staindrop, County Durham: unprocessed greyscale plot of gradiometer survey results

Figure 4

NAA
Heritage Consultants

Winston Road, Staindrop, County Durham: processed greyscale plot of gradiometer survey results

Figure 5

NAA
Heritage Consultants

KEY

- bipolar anomaly (culvert)
- linear anomaly (archaeology) (greater / lesser)
- amorphous anomaly (greater / lesser)
- field boundary
- trends
- ridge and furrow
- agriculture?
- bipolar response (modern)
- area of increased magnetic response
- external interference (e.g. fencing)
- geology (greater / lesser)
- edge of geophysical survey
- Proposed development area

N

0 50 m

scale 1:1750 @ A3

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Winston Road, Staindrop, County Durham: processed greyscale plot of gradiometer survey results

Figure 6