

Geophysical Survey Report 17

Dunluce Village Landscape
Co. Antrim
CAF GSR 17

Ronan McHugh

TABLE OF CONTENTS

Section 1. Introduction

1.1	Executive summary	1
1.2	Summary of site information	2
1.3	Introduction and overview	3
1.4	Background to the survey	4
1.5	The survey area	6
1.6	Survey methodology	7

Section 2. 2012 Survey Results

2.1	Area 1	10
2.2	Area 2	14
2.3	Area 3	21
2.4	Area 4	26
2.5	Area 5	29
2.6	Area 6	32

Section 3. Discussion and Conclusion

3.1	Discussion	35
3.2	Conclusion	44

Appendices.

1. Introduction

1.1 Executive Summary

This report presents the results of a significant programme of geophysical survey undertaken in the landscape surrounding Dunluce Castle, on the north coast of Co. Antrim. The aim of the survey was to detect previously hidden or unknown remains associated with the castle and the now-disappeared 17th-century village which formerly stood in its shadow. This work followed previous excavation and geophysical survey carried out from 2009 – 2010 by the Centre for Archaeological Fieldwork, Queens University Belfast (CAF) and the Centre for Maritime Archaeology (CMA), University of Ulster, Coleraine, with funding from the Northern Ireland Environment Agency (NIEA).

Six discrete areas (Areas 1- 6) were identified for investigation by Dr. Colin Breen of the CMA as part of a wider research project on the medieval archaeology of North Antrim. Electrical resistance survey was carried out in each of these areas, with an area of approximately 2.42ha surveyed in total.

The survey detected a number of high resistance anomalies which were almost certainly responses to buried house foundations comparable with the sites identified during the previous fieldwork. The most confidently identified house sites were located in Area 1 (anomaly 1.1), Area 2 (anomalies 2.2 and 2.3), Area 3 (anomaly 3.5) and Area 4 (anomalies 4.1, 4.2 and 4.3). There was some consistency in the dimensions of these anomalies and significantly, all were apparently aligned to respect the road layout depicted on the earliest OS 6-inch maps of the landscape (1831-32 and 1853). This strengthened the view that the cobbled street which ran through the area surveyed in 2009 may have extended both to the north-east and south of its south-eastern end as imaged in the earlier survey, on a path fossilised in the old road layout. All of the identified house sites had other, less well-defined possible masonry remains in their vicinity, while there was only weak imaging of any associated land divisions.

A series of other possible settlement structures of an entirely different character were detected in Area 2, at the base of a hillslope (Anomalies 2.4, 2.5 and 2.6). These were imaged as weaker anomalies, and were probably not of stone construction, leading to the suggestion that they were more temporary structures, possibly from an earlier period.

Most of the probable 17th-century remains were located towards the top of the rounded ridge that extends north-east/south-west through the landscape. South of the ridge, and close to the ruins of St. Cuthbert's Church, the remains of a possible stone wall associated with the church were detected (anomaly 5.1). To the south of the church, in flat land on the bank of the Dunluce Burn, a large positive anomaly (6.5 and 6.5a) may mark the site of a significant building, possibly an industrial structure such as a mill.

The 2012 survey results can be added to the results of the previous fieldwork and have shed yet more light on this archaeological landscape. They appear to confirm the survival of probable 17th-century structures beyond the environs of the Village Field and the castle itself, and strongly suggest that the roads associated with the village form the template for the later network. The discovery of the enclosures

at the base of the hill in Area 2 and the possible mill to the south of the church add an additional element to the landscape, and provide fresh avenues for study.

1.2: Summary of site information

Site Name: Dunluce Village.

Townland: Dunluce.

SMR No: Vicinity of Ant 002:008.

State Protection: Dunluce Castle and St. Cuthbert's Church are in State Care, and the Village Field to the west of the castle is scheduled. None of the other areas surveyed are currently protected.

Grid Ref: Vicinity of C9041041260.

County: Antrim.

Surveyor(s) Present: Ronan McHugh, Sapphire Mussen, Sarah Gormley, Sarah Kerr, Grace MacAllister, Stewart Alexander, all Centre for Archaeological Fieldwork, School of Geography, Archaeology and Palaeoecology, Queen's University Belfast.

Size of area surveyed: Approximately 2.42ha.

Weather conditions: Generally inclement winter weather. Some below-zero temperatures, high winds and rainfall.

Solid Geology: Antrim Basalt.

Current Land Use: Light grazing.

Survey type: Electrical resistance.

Instrumentation: Geoscan RM 15 resistance metre and MPX15 multiplexer (x 2).

Probe configuration: *Parallel twin (3-probe.)*

Probe spacing: 0.5 m.

Grid size: 20m x 20m.

Traverse interval: 0.5 m.

Sample Interval: 0.5m.

Traverse Pattern: Zig-zag.

Spatial Accuracy: Grids set out using TPS 705 series Total Station. Georeferenced to the Irish National Grid with differential GPS.

1.3 Introduction and overview

This report outlines the results of a comprehensive programme of geophysical survey carried out at Dunluce Castle (Plate 1) in January 2012 as part of an ongoing research project on the medieval period in north Antrim being undertaken by Dr. Colin Breen of the Centre for Maritime Archaeology, University of Ulster, Coleraine (CMA). The programme was the latest in a series of collaborations between the CMA and the Centre for Archaeological Fieldwork, Queens University Belfast (CAF), and funded by the Northern Ireland Environment Agency (NIEA). Previous work at the site for this project included geophysical survey of the grounds of the castle itself and a large field immediately to its west, which is known to be the site of an early 17th-century village ('the Village Field'). This earlier survey work was followed by targeted excavation informed by the survey. The previous phase of the project produced spectacular definition of the streetscape of the now disappeared village (Figure 1). Excavation within the village centered on two structures, identified by the excavators as a Scottish merchant's house and a blacksmith's forge (Breen forthcoming 2012; Breen et. al. 2011) both of which were in impressive repair, and faced onto a magnificently preserved cobbled street. The NIEA has additionally carried out an airborne LiDAR survey of the Dunluce landscape which will enhance understanding of its topographical features. A number of preliminary images have been generated by Rory McNeary of the CMA from the LiDAR dataset, and are included in this report. Much of the work of the project to date, together with a comprehensive background and history of the site, will be dealt with by Dr. Breen in his forthcoming publication *Dunluce Castle: History and Archaeology* (Breen forthcoming 2012), and is not considered in detail here.

This report is divided into three sections. Following this brief introduction and summary of the background to the 2012 survey (Section 1) is a detailed description of the 2012 survey results, accompanied by images of the survey datasets and interpretative diagrams. These form Section 2, the largest part of this report. Section 3 presents a short discussion of the archaeological significance of the principal features detected during the 2012 survey and attempts to place them into their possible archaeological and historical context. The Appendix to this report contains the relevant excerpts from the Ordnance Survey (OS) 6-inch maps (1st to 5th edition) depicting the Dunluce landscape, as well as an image of the current OS digital data, as these are referred to regularly in this text.

Thanks are due to Dr. Colin Breen for his comments on the features detected during the survey, and to Rory McNeary for the preparation of the LiDAR images. The landowner of Dunluce House, Sean McKinley kindly contributed his knowledge of the landscape, and was able to inform on the position of many features throughout the survey area. Particular thanks also to Tim Young of GEOARCH Ltd for some useful insights, and to all members of the CAF who assisted with the production of this report.

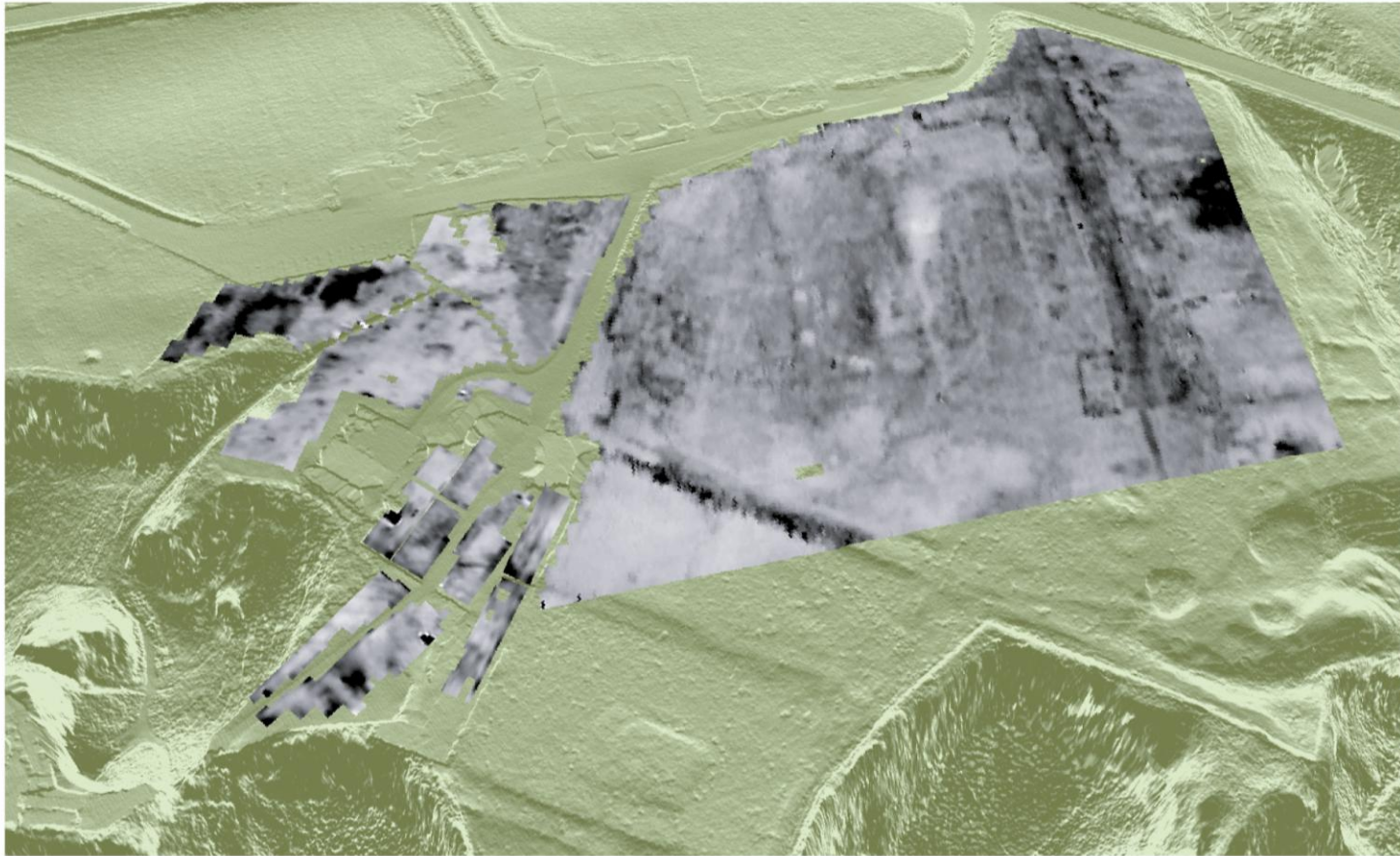
1.4 Background to the survey

The 2012 geophysical survey was designed to extend study of the Dunluce archaeological landscape beyond the curtilage of the castle itself and the Village Field. While the clifftop castle is undoubtedly the centerpiece of the site, and it is an internationally renowned monument, it was relatively poorly understood until the commencement of this recent research. Even more elusive, is evidence of the people who lived in the shadow of the castle. Given its location on the chalk-rich north Antrim coast, it is probable that the Dunluce area has been the site of settlement since prehistoric times. The placename element *Dun* (fort) may suggest a fortification of some kind at Dunluce for at least 1500 years, while a castle is thought to have been built on the current site by the Gaelic McQuillan lordship in the 13th century. The first church may have been built in the locale in the same period, probably on the site where the ruined St. Cuthbert's Church now stands. Some form of contemporary industry in the region is attested to by the tradition of three mills in the townland (Breen forthcoming 2012).

Dunluce became the focus for a significant settlement in 1608 when, under the MacDonnell family, a town was established as part of a scheme to locate Scottish settlers on the north coast, prior to the official Plantation of Ulster. The village at Dunluce was sited immediately outside the castle walls and was apparently a dynamic and, for the three decades of its existence, prosperous centre. The OS memoirs recount the tradition that it was of 'considerable' size, and contained a court house, seat of the county assizes and jailhouse. A peak to the north-east of the castle still bears the name 'Gallows Hill' recalling aspects of the jail's history. Dunluce was also the site of markets and fairs on the 18th November each year. The village was burned during the violence of 1641, however, and has since faded into obscurity (Day and McWilliams 1992, 121). A number of earthworks associated with it are still visible in the Village Field, but, prior to the 2009 work, it had largely been ignored, and seems to have been largely regarded as merely part of the folklore surrounding the castle.



Plate 1. Dunluce Castle, facing south-west.



Combined image of 2009 resistance survey plot overlaid on LiDAR digital surface model and hillshade.

(Original LiDAR data ©Crown Copyright NIEA: Built Heritage.
View created by Rory McNeary, Centre for Maritime Archaeology).



Centre for
Archaeological
Fieldwork

CLIENT:



PROJECT:
Dunluce geophysical survey
2012

TITLE:

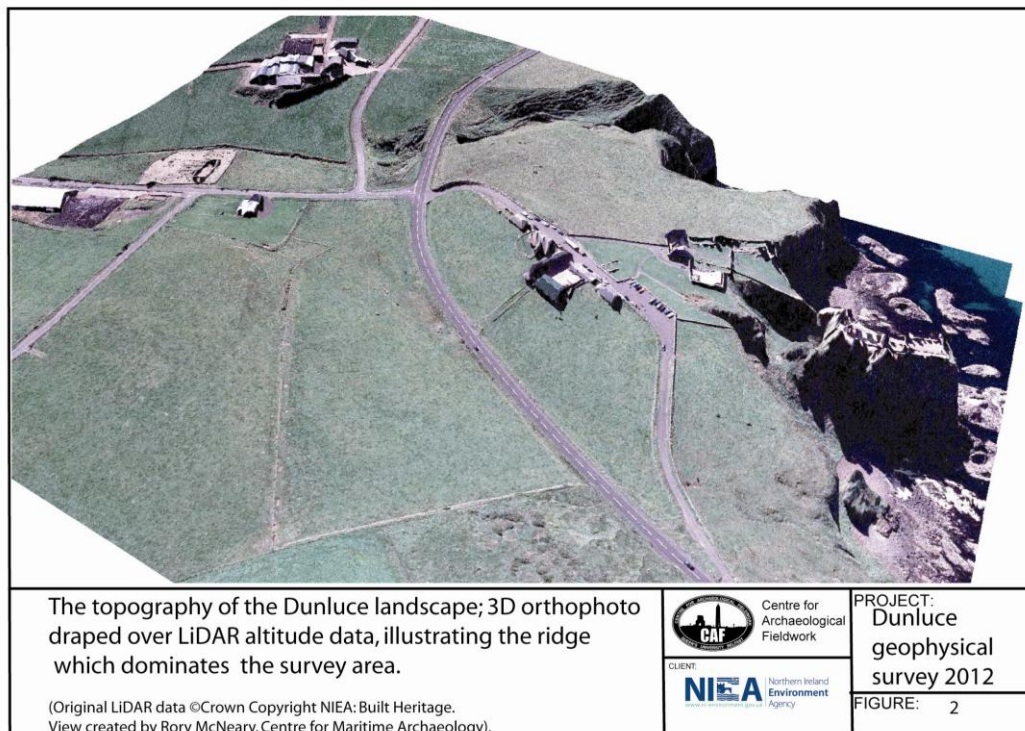
The 2009 Dunluce survey area

FIGURE:

1

1.5 The survey area

The 2012 survey concentrated on the fields surrounding Dunluce Castle with the primary aim of detecting previously unknown remains of the 17th-century village. The topography of the area is defined by a rounded ridge extending north-east/south-west through the countryside just to the south of the castle grounds (Figure 2). The slope of the ridge rises from the cliff edge in the north, past the castle to its highest point, roughly coinciding with the position of the modern car park adjacent to the castle on its south-eastern side. From there, the terrain slopes downwards in all directions, initially very gradually, creating a domed plateau at the top of the ridge, but increasingly in a steeper gradient, particularly to the north, north-east and east. From the base of the slope at the north-east, the terrain rises again to the much higher and imposing Gallows Hill which overlooks the Dunluce landscape, but which lay beyond the area of the 2012 survey. The top of the ridge is traversed by an unnamed road (called in this report ‘the Castle Road’) which runs from the junction of the modern Dunluce and Castle Roads at the south, across the top of the ridge before rejoining the Dunluce Road at the north. This road today facilitates access to the castle grounds and its car park, but is amongst the earliest of the roads in the area, being shown in a basically unaltered form since the 1st edition OS 6-inch map of 1831-32 (Appendix 1). On the southern edge of the Castle Road, immediately opposite the castle and close to the peak of the ridge, is a farmhouse, which is also shown since the 1st edition map and labeled as ‘Dunluce House’ on all the subsequent editions (Appendix 2-5). The date of construction of the farmhouse is unknown, but some of its barns and outbuildings date back at least to the 18th century (Colin Breen 2012 pers. comm.). South of the junction of the Ballytober and Dunluce Roads (the latter of which was first shown on the 1853 6-inch map)(Appendix 2) the immediate topography levels off. Approximately 150m to the south of the junction, immediately to the east of Ballytober Road, stand the remains of St. Cuthbert’s Church.

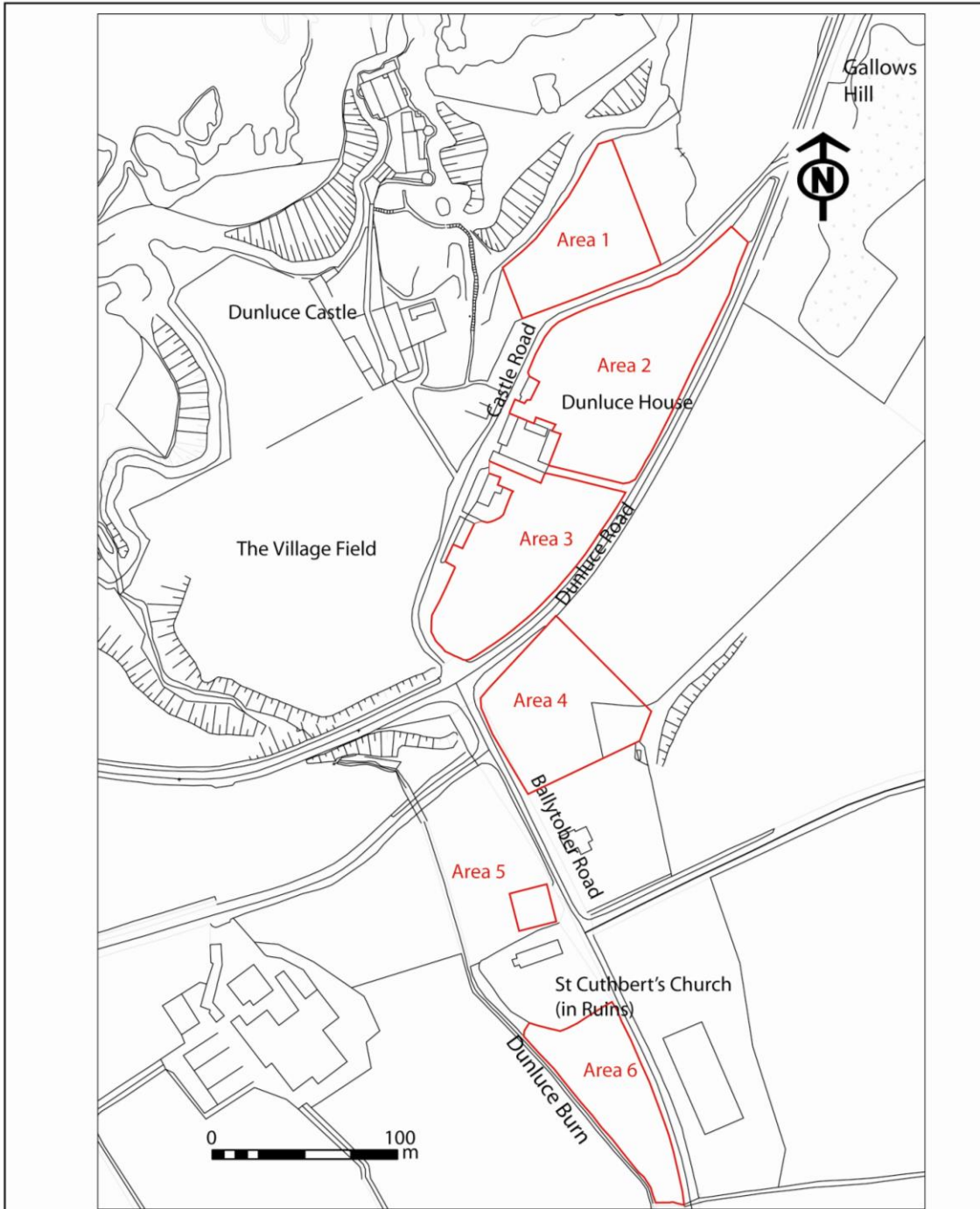


1.6 *Survey methodology*

Electrical resistance was the chosen technique for the 2012 geophysical survey, as this proved extremely effective in imaging buried remains in the 2009 survey. Because the Dunluce landscape stands on a formation of extrusive basalt cliffs (Wilson 1972, 61), magnetic survey was not considered (See English Heritage 2008, 15). All of the excavations that followed the 2009 survey demonstrated that the covering soil in the area consisted of sandy loam and rarely exceeded a depth of 0.4m (Breen forthcoming; Breen *et. al.* 2011). These conditions were therefore suitable for resistance survey with a standard probe separation of 0.5m, producing the main component of the response at a depth of approximately 0.4 to 0.7m. The traverse interval between survey lines was fixed at 0.5m, reduced from 1m in the 2009 survey and in effect doubling the number of readings per m². Six areas were identified by Dr. Breen for survey, and these are marked Areas 1-6 in Figure 3 below. Each of the survey areas was divided into 20m by 20m grid squares. The survey grids were set out with Leica TCR 705 total stations, and were georeferenced to the Irish Grid using differential GPS survey. A summary of the technical details of the survey is listed at Table 1 below. The results of the survey are then described in Section 2.

<i>Survey type:</i>	Electrical Resistance
<i>Instrumentation:</i>	Geoscan RM15 resistance metre with MPX15 multiplexer
<i>Probe configuration:</i>	Parallel twin (3) probe
<i>Probe spacing:</i>	0.5m
<i>Grid size:</i>	20m
<i>Traverse interval:</i>	0.5m
<i>Sample Interval:</i>	0.5m
<i>Traverse Pattern</i>	zig-zag
<i>Spatial Accuracy:</i>	Gridded with total station
<i>Georeferencing:</i>	Differential GPS survey

Table 1. Technical information and survey parameters.



The 6 survey areas of the 2012 resistance survey (Outlined in red).

Other places and features referred to in the text are also depicted.



Centre for
 Archaeological
 Fieldwork

CLIENT:



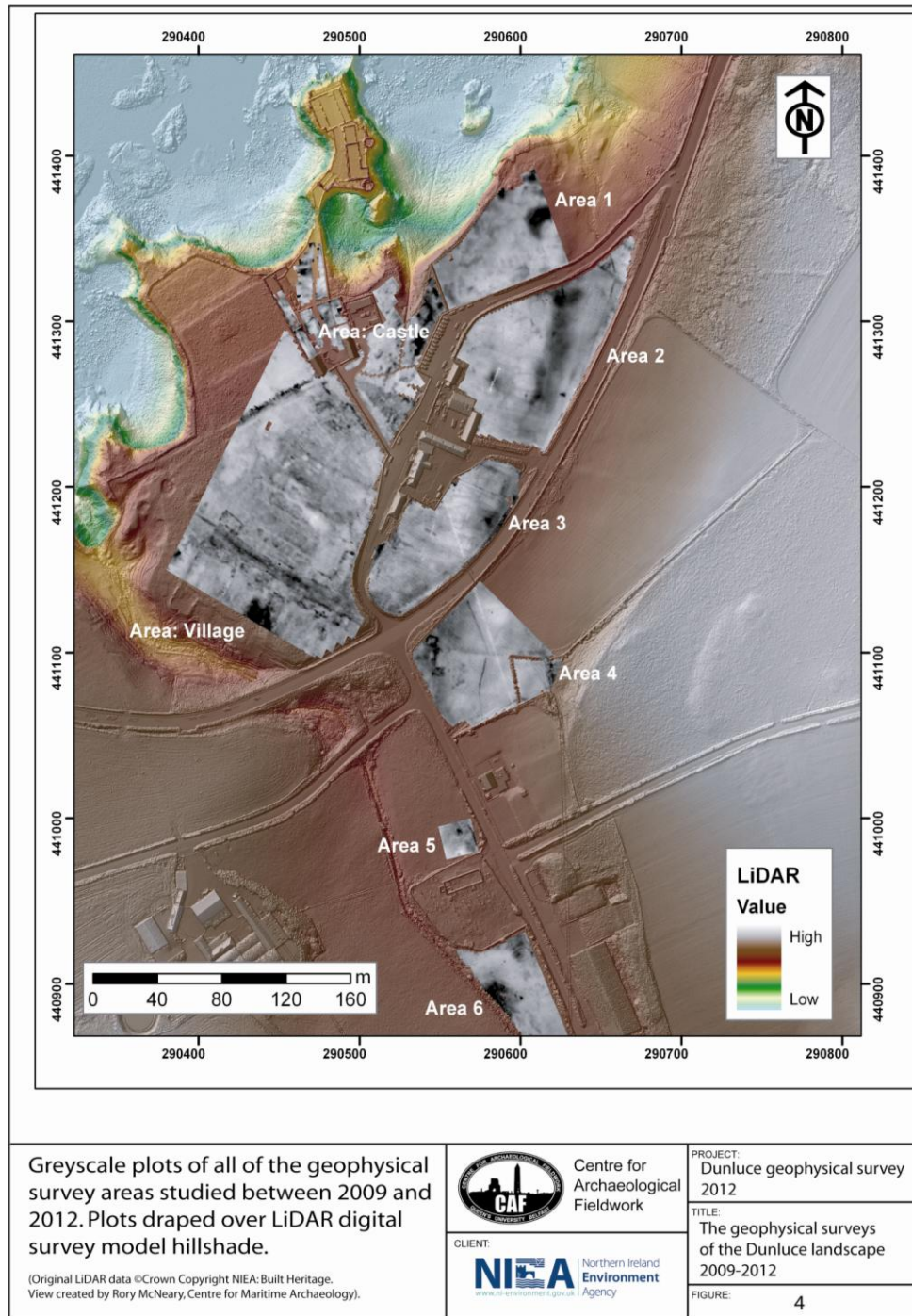
PROJECT:
 Dunluce geophysical survey
 2012

TITLE:
 2012 survey areas

FIGURE:
 3

2. 2012 Survey Results

This section contains a detailed description of the 2012 geophysical survey results. Reference is also made to some of the findings of the 2009 survey as, although these are not the subject of this report, they have a direct bearing on some of the interpretations offered. Following the 2012 work, a significant area of this archaeological landscape has now been surveyed (Figure 4).



The results from each of the 2012 survey areas (Areas 1- 6 above) are discussed below, with each area given its own heading. At the conclusion of the text description, four images of the data are provided for each area. These consist of a grayscale image of the raw dataset, together with a greyscale image which has been filtered to reduce geological effects and enhance likely archaeological features. A relief plot has also been generated for each area. The main anomalies discussed in the text description are then shown illustrated on an interpretative diagram, and the text descriptions below should be read in association with the appropriate interpretative diagram. Because two resistance metres were used simultaneously during the survey, normalization of the readings across the survey was not attempted. The results in this report are presented as actual resistance values, measured in ohm.

2.1 Area 1 (See Figure 5)

Area 1 lies immediately to the north-east of the castle grounds. It is bounded on the north by steep cliffs and on the south by the Castle Road. The wall forming the boundary between the area and the castle grounds is first shown on the 5th edition OS 6-inch map of 1946-50 (Appendix 5) - on the earlier maps (Appendix 1-4), it is not divided from the castle property. No features are shown within the field on any of the OS maps. The topography of the field is undulating and uneven for the most part, although it becomes flatter as it slopes down towards the cliff edge (Plate 2). There is also a gradual slope north-eastwards for approximately 65m from the wall surrounding the castle, after which the terrain slopes more severely towards Dunluce Road. The survey concentrated on the area at the top of the slope and covered an area of approximately 0.37ha.



Plate 2. View of Area 2, facing south-west.

The most obvious anomalies of archaeological significance were detected along the southern edge of the field. Approximately 40m from the western edge are three sides of a rectangular anomaly of relatively high resistance values (1.1). It measures approximately 11m long by 7m wide and is most likely a response to the foundations of a buried stone structure, probably a small house. The readings defining the anomaly are strongest towards its northern end, suggesting either better preservation in this area, or a shallower depth of covering soil.

Less than 4m from the north-eastern corner of this feature may be the remains of a second structure. This presents as two parallel sides, approximately 10m apart (1.2). The longer, eastern element of the anomaly is 5.3m long and, at its southern end is a short, perpendicular stub which may represent the corner of the wall linking the two elements. This anomaly is not as strongly positive as anomaly 1.1 (up to 25% weaker in places), and although it does have discernible symmetrical form, its identification as a building is not so confident.

These two possible structures share a common alignment (east-north-east/west-south-west) and are almost certainly related to a series of linear anomalies of alternating lower and higher resistance values (1.3) which are located immediately to the north of 1.1 and west of 1.2. On average these relatively vague trends are 7m long, 2.3-2.5m wide and are perpendicular to the longer axes of the possible structures. These may be related to the definition or subdivision of the ground associated with the structures, possibly with lines of shrubs, or shallow slots for fencing. Traces of comparable land division were previously noted in the 2009 survey in the Village Field, although the resistance contrasts were stronger in that survey.

Two small high resistance blocks (1.4 and 1.5) towards the southern boundary of the field are of similar resistance values to the probable structure 1.1. Anomaly 1.4 appears as a corner formed by two short lines of high resistance values, both less than 3m long, while anomaly 1.5 is a subrectangular area with maximum dimensions of 3.2m by 2m. These may represent the disturbed remains of further masonry foundations within the area, or else buried debris.

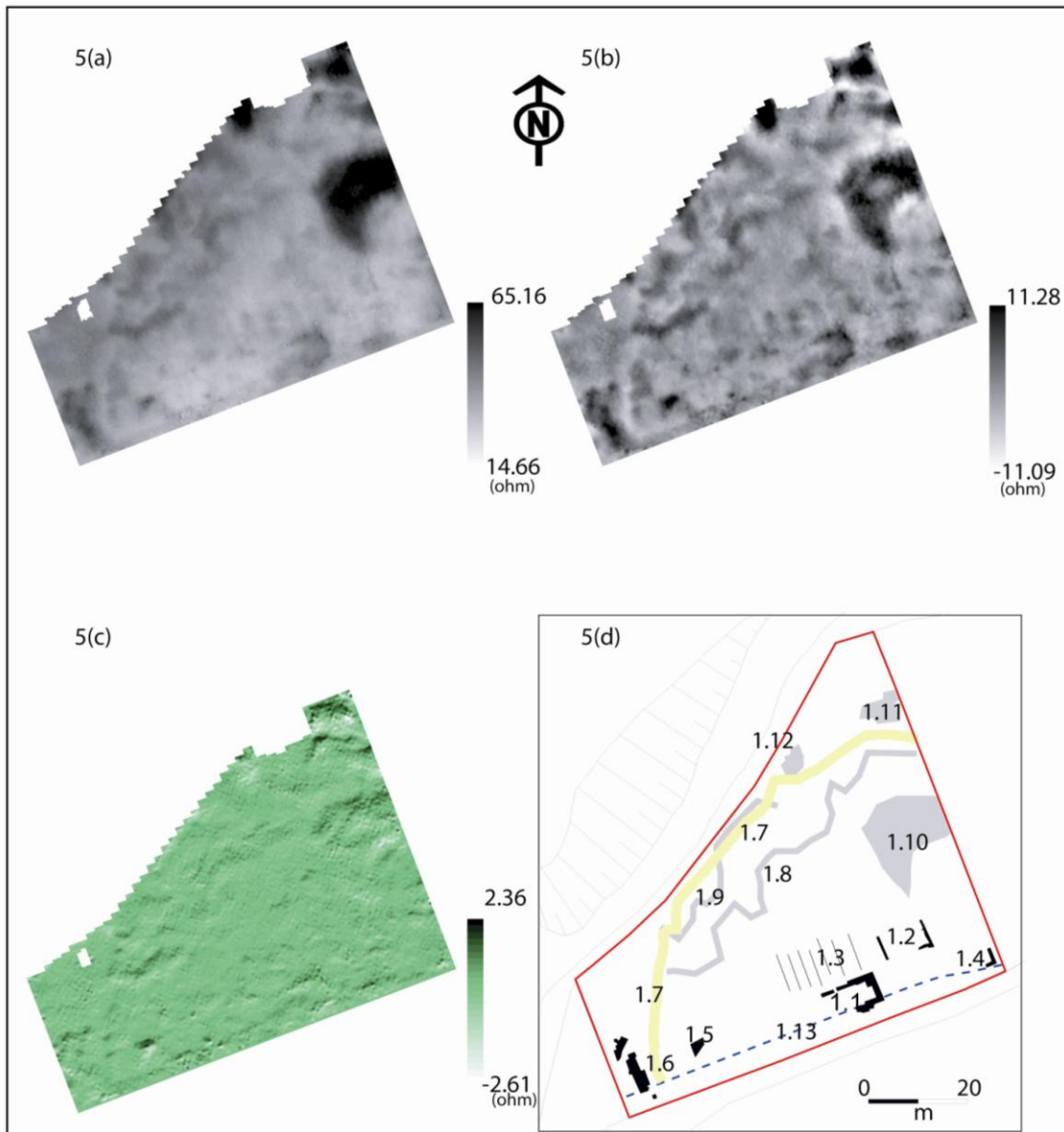
In the south-western corner of the field is an elongated rectangular block of high resistance readings (1.6) measuring 10.3m by 2m. The anomaly lies immediately to the east of an existing wall, and may be indicative of an old wall in this position, or else collapsed rubble.

Most of the anomalies of likely interest in the field are close to its southern boundary and are imaged as areas of high resistance in contrast to the background levels. The data from the remainder of the field has a less precise definition. The most significant anomaly elsewhere may be the arcuate low resistance anomaly (1.7), which curves from the south-western edge of the field around the edge of the cliff and may demark the limit of the earlier settled area. It appears as a band of lower resistance, up to 3m wide in places, and the negative values recorded along the anomaly possibly represent a ditch, or the cutting for a fence, protecting the area of settlement from the cliff-edge.






The northern half of the area is also traversed by two angular chains of irregular high resistance readings (1.8 and 1.9). It is conceivable that these represent the collapsed remnants of a wall close to the cliff

edge, and they occur broadly where the undulations in the field level out. However, their definition is vague and form too erratic to be of human design, given the relatively shallow soil cover encountered in the Dunluce excavations. It is most likely that these readings are due to seams or ridges in the rock, rather than being of archaeological origin.

The most prominent areas of high resistance readings at the north and north-east (1.10, 1.11 and 1.12) are geological in origin, and a result of near-surface rock outcroppings or compacted clay. A linear stripe of slightly increased resistance values (1.13) extends along the south-eastern boundary of the field, and is associated with the foundations of the wall which delimits the edge of the field.



KEY: Figure 5(d) only.

-  Archaeology?: Low resistance band, possibly a fence line
-  Archaeology?: Possible wall foundation
-  Geological features
-  Archaeology?: Linear trends of alternating high and low resistance values. Possible yards or plots associated with the buildings
-  Modern/non-archaeological high resistance artificial features

Resistance survey results from Area 1.

Figure 5(a) Greyscale plot of raw data.
 Figure 5(b) Greyscale plot after application of high-pass filter and despiking processes.
 Figure 5(c) Relief plot of processed data.
 Figure 5(d) Interpretation of anomalies revealed by the survey.



Centre for
 Archaeological
 Fieldwork

CLIENT:



Northern Ireland
 Environment
 Agency

PROJECT
 Dunluce geophysical survey
 2012

TITLE:
 Resistance survey results
 Area 1

FIGURE: 5

2.2 Area 2 (See Figures 6 and 7)

This was the largest of the fields surveyed, incorporating an area of 0.8ha. Today, it forms part of the lands attached to Dunluce House and is divided from a second field (Area 3 in this survey) by a laneway accessing the rear of the farmhouse. The Castle Road winds around the edge of the field from south-west to north, while the remainder of its perimeter borders the Dunluce Road. The topography of the field is governed by the summit of the ridge; the north-western portion of the field is relatively flat with a gradual slope only, but the terrain then falls away more steeply to the north, north-east, east and south (Plate 3). No features of archaeological significance are depicted on any of the OS maps, although a number of now-disappeared field boundaries are shown in the northern half of the field on the 2nd to 5th edition OS 6-inch maps (Appendix 2-5 covering the period 1831-1950), the last of which also shows rectangular plots defined in the south of the field. An aerial photograph from 1930 also provides an excellent image of Areas 1, 2 and 3 at that time, and indicates cultivation in Area 2 (Plate 4). The south western boundary of the field appears to have been defined by a stone wall at this time, whereas it is now marked by a substantial earthen bank.



Plate 3. View of Area 2, with Dunluce House and probable 18th-century barn in the background, facing south-west, from the northern junction of the Castle Road and Dunluce Road.



Plate 4. Aerial photograph of the Dunluce landscape, 1930. Areas 1, 2 and 3 are visible.

The most obvious anomaly imaged in the raw dataset (Figure 6a) is a band of high resistance, up to 15m in width (2.1), which extends broadly north/south across the centre of the field. This coincides with the increase in the severity in the slope and is a response to the topography of the hill. Elsewhere, and particularly at the top of the slope, the ambient readings are relatively low, characteristic of poorly drained, loamy soil, and, doubtless are partly a reflection of seasonal conditions.

The geological effect was successfully diluted by the application of a high pass filter across the site, and this revealed a number of anomalies of archaeological significance (Figure 6b and 7a). Anomaly 2.2 consists of two linear arms of high resistance readings intersecting to form what is likely to represent the corner of a building. It lies on the edge of the hilltop and the strength of the responses along the anomaly (20% - 50% stronger than the background) suggests buried stone or masonry foundations. The anomaly is largely masked in the unprocessed dataset (Figure 6a) as it is superimposed on the geology of the hillslope, but is clearly visible on the filtered dataset and relief plots. This is the strongest positive artificial anomaly detected in Area 1 and its precise definition suggests reasonably good preservation of the remains. The visible dimensions are approximately 8m long by 7m wide, but it should be stressed these

are a minimum estimate of the size of the original feature, as portion of only two sides were detected. The remainder of the structure may have been removed.

Approximately 20m to the south-west of this structure is another angular anomaly (2.3). This anomaly is again formed of a series of positive resistance readings combining to form an enclosed area, possibly a second building, measuring approximately 10m long by 7m wide, although again it may originally have been longer on its south-western side. The anomaly shares a broadly similar alignment with anomalies 1.1 and 2.2, and all three are situated at the top of the ridge, or on the initial, gentle slope suggesting a relationship between the three. Immediately to the south of the possible structure 2.3 is a slightly weaker positive resistance anomaly (2.3a). Its two sides, of 17m and 2m length, are parallel to the sides of 2.3, and it is conceivable that both anomalies formed part of a larger structure, or constitute two phases of building. The slightly weaker responses of anomaly 2.3a may, alternatively, suggest it represents a boundary surrounding 2.3.

Three other broadly rectilinear anomalies, of not dissimilar size to anomaly 2.1, are visible in Area 2, but these are located at the base of the slope. At the north of the area, approximately 20m downslope from anomaly 2.1, the first of these, anomaly 2.4, measures 12m long by 7m wide. It is again formed by raised resistance readings, but is fainter than the previously discussed anomalies, exhibiting average responses of approximately 5% above the surrounds. Of a similar character is anomaly 2.5, but this is located at the southern end of the field. This anomaly is most clearly visible in the relief plot (Figure 2c), where three sides are discernible and suggest overall dimensions of 9m by 7.5m. Faint traces of a third, comparable anomaly (2.6) may be detected, again towards the bottom of the slope. This anomaly is also a slightly rounded rectangular enclosure, measuring 11m long by 7m wide but presents in the survey images as much vaguer anomaly, partly due to its location on the base of the hill within the zone of high geological resistance (2.1).

Perhaps the most visually striking feature of artificial origin in Area 2 is the combination of strongly positive linear features which intersect in a corner at the north of the field (2.7, 2.8 and 2.9). All of these are likely to be of relatively recent date. Anomaly 2.7 replicates a field boundary shown on the 2nd to 5th editions of the 6-inch maps (Appendix 2-5) and was only removed in the latter part of the 20th century. The strength of the readings associated with this anomaly suggest it was formed of a stone wall, and it appears to be shown as such on the 1930 photograph (Plate 4). Although no corresponding feature is depicted on any of the OS maps, the nearby anomaly 2.8 is also apparently shown on the 1930 photograph, where it appears to be a more minor wall or bank. Anomaly 2.9 extends southwards, from a point of intersection with 2.7 and 2.8, for approximately 65m before it disappears underneath the modern Dunluce Road. It is likely to be a response to the former stone wall which formed the eastern edge of the field before the roadway was reconstituted.

While anomaly 2.7 most certainly marks a former wall, an alternative interpretation of anomalies 2.8 and 2.9 was offered by the current landowner. The northern point of anomaly 2.8 coincides with a spring which is shown in both the modern digital ordnance survey dataset (Appendix 6), and, indeed on the 1st edition OS 6-inch map of 1831-32 (Appendix 1). A stone-lined field drain supposedly extends broadly

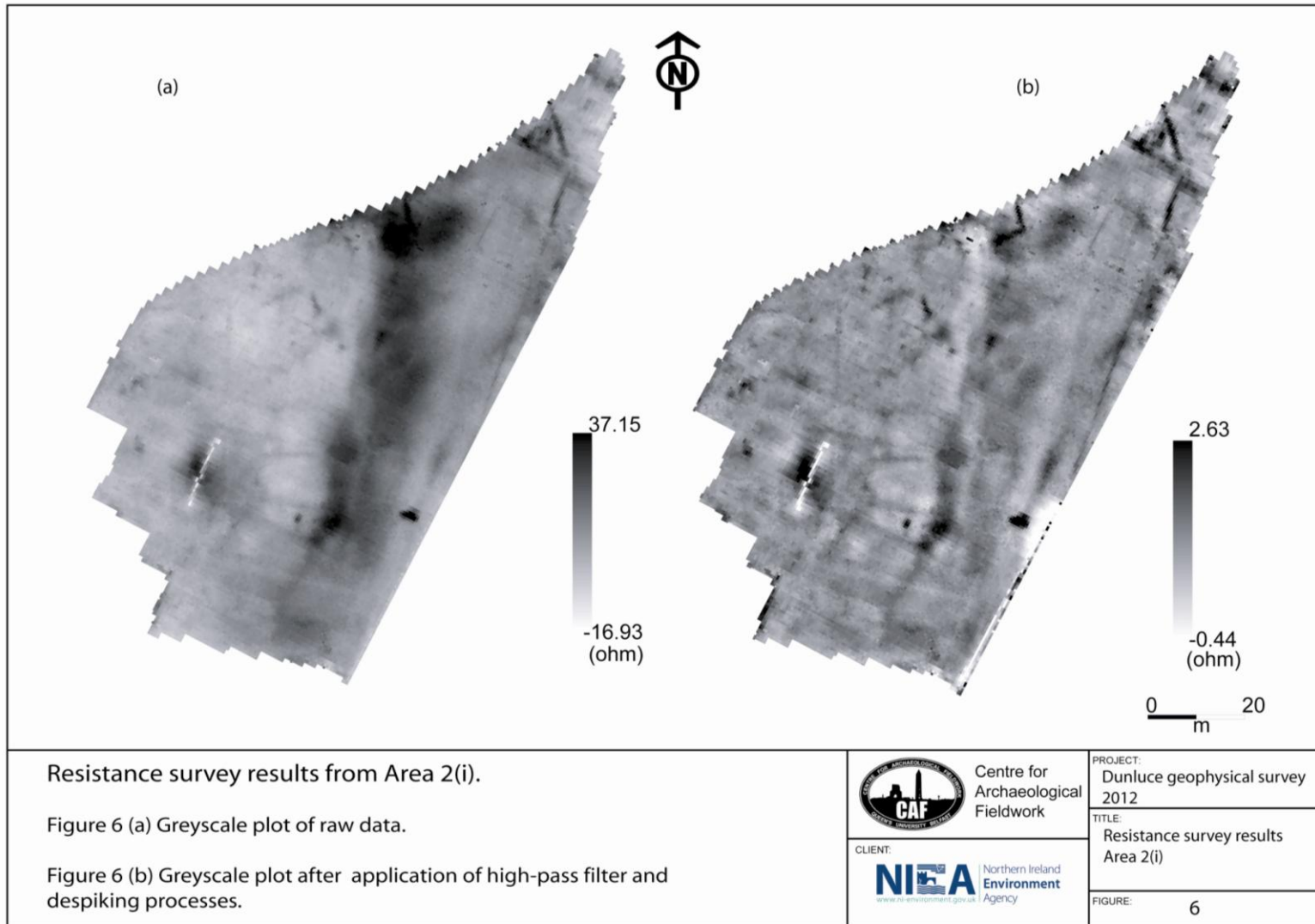
along the line of 2.8 through Area 2, so the image is conceivably of the drain rather than the boundary shown in the aerial photograph (Sean McKinley 2012 pers. comm.). In this respect, it may be significant that the relief model (Figure 7a) images the strength of response of anomaly 2.9 to be more similar to the possible field drain anomaly 2.8 than to the confirmed field wall 2.7. It is therefore conceivable that 2.9 represents an extension of the drain, rather than the boundary of the field.

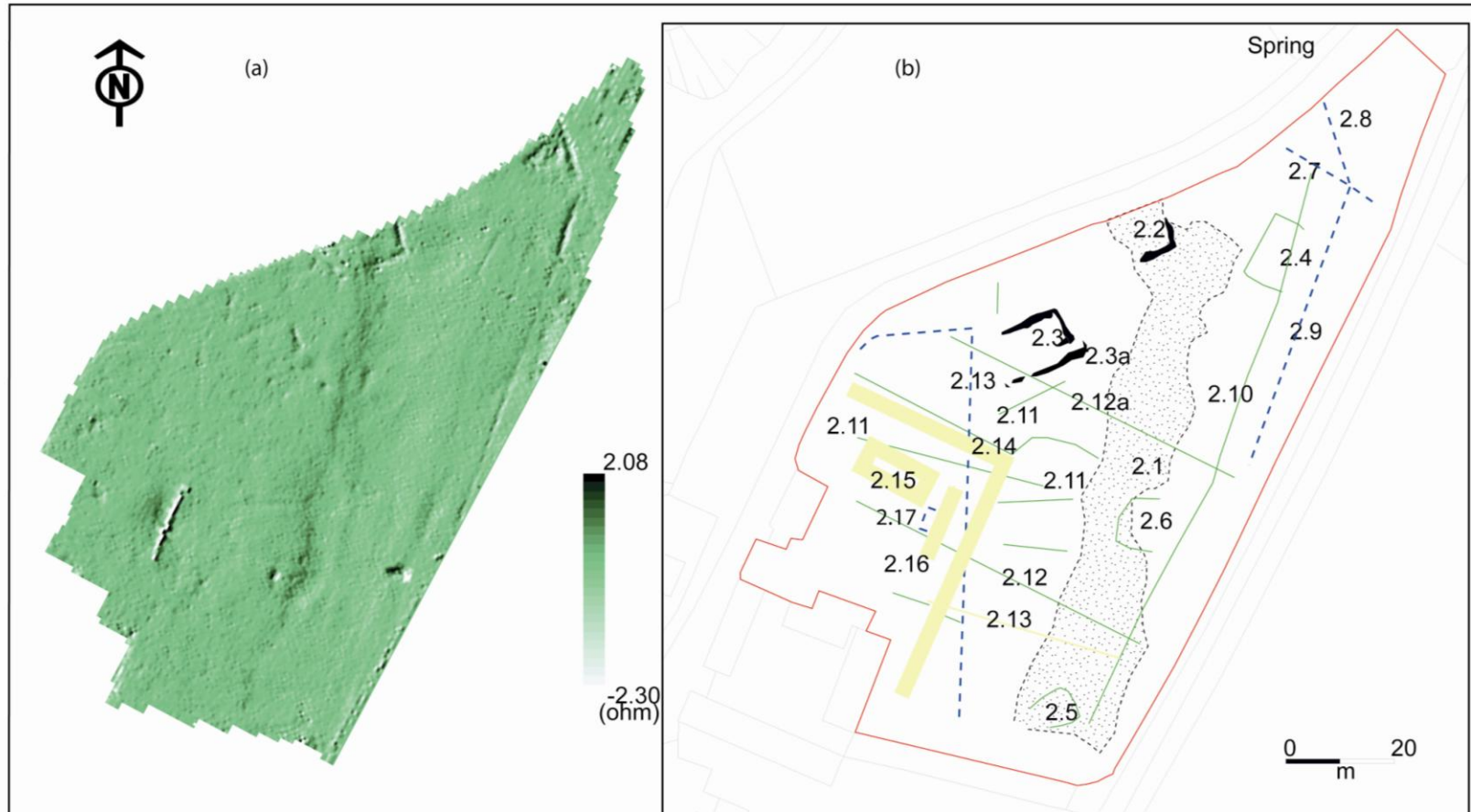
Running parallel to the line of 2.9, at an initial distance of approximately 8.5m is a much fainter high resistance linear anomaly (2.10), which may represent the edge of a track or laneway along the base of the hillslope. It may be significant that the rectilinear anomalies 2.4 to 2.6 appear to be arranged close to the west side of this track, suggesting a possible relationship with these features. However, as the track appears to parallel the boundary of the modern field, it may not be of great antiquity, and may simply be an artifact of the passage of cattle along what is the flattest and most accessible part of the field.

The more elevated western side of the field has been the location of a number of drainage difficulties over the years (Sean McKinley 2012 pers. comm.) and the survey results reveal a multitude of linear features and trends in this area, many of which may represent drain cuttings to deal with this problem. The anomalies in this area were, in general, vague and superimposed on one other, rendering definition and confident interpretation difficult. This is most evident when the geological gradient is filtered out, and figure 6(b) depicts a series of crisscrossing linear trends, the majority of which are probably due to modern drainage. Amongst the more regular trends, however, are some anomalies which may be of earlier origin. A series of mildly positive linear and curvilinear trends, apparently projecting from the flattest portion of the hill, may be early field divisions (2.11); they do not conform to the alignment of any of the modern houses or field boundaries, and are located close to the probable structural foundations 2.1 – 2.3. These are spaced 5-10m apart and appear to terminate at the edge of the hilltop. The irregular nature of these divisions suggests they may be of some antiquity and their northern edge may coincide with some of the linear, stone filled gullies revealed by CMA test trenching in the field during the recent fieldwork programme (Colin Breen 2012 pers. comm.); the slightly enhanced levels of resistance exhibited in these anomalies are not inconsistent with such construction although they were not well imaged in the area where the trenches were located. Two other vague linear anomalies, visible in the filtered plot and even then only vaguely, extend across the width of the field for approximately 70m and may represent a different phase of field division (2.12 and 2.12a). They do not correspond with any of the divisions depicted on the 1946-50 OS map (Appendix 1) (although anomaly 2.12 is close to one), and appear as vague raised areas only on the 1930 aerial photograph.

Most prominent of the recent anomalies in this area is a starkly regular line of high resistance (2.13) that extends northwards from the southern boundary for 70m before turning westwards for 20m. This is the image of a modern pipe which is also picked up in Area 3 (See anomaly 3.12 below). Anomaly 2.14 is a low resistance rectangular enclosure, probably a response to a shallow foundation slot for a fence. It consists of two sides, respectively measuring 25m and 20m in length and approximately 1.5m in width, and follows the alignment of the farm buildings. Contained within the area are two other low resistance anomalies. A small rectangular area also defined by a low resistance ditch or trench (2.15), measuring 11m long by 6m wide lies just to the east of the modern café, and probably represents a plot within the

larger enclosure. The second anomaly in this area produced the lowest readings throughout the area, and consists of a linear anomaly, some 14m long, set out on the same north-east/south-west alignment as the surrounding enclosure (2.16). This is certainly a modern utility pipe and its location within a block of high resistance (2.17), measuring 5m by 5m, may indicate the presence of a sunken concrete water tank here. The landowner confirmed that, while there were run-off pipes in this area, he could not recall such a feature in his time (Sean McKinley 2012 pers. comm.).





Resistance survey results from Area 2(ii).

Figure 7(a) Relief plot of processed data. Figure 7(b) Interpretation of anomalies revealed by the survey.

KEY: Figure 7(b) only.



Archaeology: Masonry/stone foundations
 (including probable 17th-century remains)



Archaeology?: Weaker positive anomalies that
 do not appear on OS maps and may represent
 archaeological features



Modern/non-archaeological low resistance
 artificial features



Geological zone of increased resistance levels,
 coinciding with hillslope



Modern/non-archaeological high resistance
 artificial features



Centre for
 Archaeological
 Fieldwork

CLIENT:



Northern Ireland
 Environment
 Agency

PROJECT:
 Dunluce geophysical survey
 2012

TITLE:
 Resistance survey results
 Area 2(ii)

FIGURE:
 7

2.3 Area 3 (See Figures 8 and 9)

The second field to the rear of Dunluce house follows the contour of the ridge south-westwards as far as the junction between the Castle, Dunluce and Ballytober Roads. The north-western edge of the field is relatively flat, with the most significant slope being towards the north-east, although there is also an abrupt fall to the south at the edge of the field towards the junction. Survey in this field covered an area of approximately 0.54ha (Plate 5).

Perhaps the most impressive image in the Area 3 dataset is what appears to be a large, rectangular enclosure in the north-eastern corner of the field (3.1). The longer, north-west/south-east axis extends downslope for approximately 20m, and it is 14m wide. The south-western edge of the anomaly is partly obscured by a linear high resistance stripe (3.2) that extends from the house in the north-west, across the field, and which the landowner confirmed was the location of a gravel pathway that was covered over in the late 20th century. In places, the strength of the readings defining the enclosure suggest probable earth and stone construction (However, see Section 3.1 for possible issues with the definition of this anomaly). This may be one of two adjacent enclosures, or else part of a two-phase construction. Extending from the south-eastern edge of the enclosure is a second, rectangular anomaly with surviving sides of 11m by 9.3m (3.3). This second putative enclosure is not as well defined as the larger 3.1, and the feature it represents may not be as well preserved. Given that no corresponding field divisions are shown on any of the OS 6-inch maps, and the probably robust nature of the enclosures represented by these anomalies, it is probable that they predate the 1st edition map of 1831-32. The alignment of the first described enclosure (3.1) – projecting almost directly from the edge of the barn behind Dunluce house – , suggests that it may, like the barn, have an 18th-century origin. An earlier date should not, however, be discounted. Immediately to the south of these enclosures is an area of strong high resistance readings (3.4), confirmed by the landowner to be the site of dumping of stone and gravel to improve the ground surface and facilitate drainage in this relatively lowlying area (Sean McKinley 2012 pers. comm.).

Anomalies at the eastern side of Area 3 may be of particular interest, given that this edge of the field is immediately opposite the superbly preserved remains of the Village Field. Most prominent is an L-shaped feature (3.5) which almost certainly represents the remains of a house that is less than 25m north-west of the forge excavated in the Village Field. The anomaly is defined by responses that are up to 20% stronger than the background readings and they image a structure that is at least 13m long and 8m wide, although a small block of high resistance to the south-east and on the same alignment may increase the length to over 17m. An angular projection on the southern side of the anomaly, formed by slightly weaker positive readings may represent an annex, outbuilding or small enclosed yard. Approximately 15m south-west of this anomaly is a small corner formed by two high resistance sides of approximately 2.5m (3.6) which may be the edge of another structure, immediately across the modern Castle Road from the forge. A series of vague linear trends in the data in this region (3.7) may be the poorly preserved remains of features associated with the 17th-century activity, as they appear to be arranged around the locus of the structures.

A line of high resistance values extending north-west/south-east (3.8) through the area may also be of antique significance. This feature is most clearly detected in the high pass filtered data (Figure 8b), where

it represents as an indistinct line of strongly positive values linked by slightly weaker readings. This anomaly is highlighted as it appears to be a continuation of an anomaly detected in the Village Field and may be a wall associated with the 17th-century village (This anomaly is clearly visible in Figure 13 in Section 3 below). Extending from the south-western side of the wall in Area 3 is the vague impression of a curvilinear enclosure (3.9). This appears to measure approximately 40m long by 12m wide, and may image a second wall or early agricultural feature. However, the response is difficult to isolate from the background readings and it may simply be an artifact of drainage or other later activity in the field. At the south-eastern edge of the field, the zone of high resistance indicates where the field boundary has been extended to enclose an area that previously formed part of the road (3.10).

Modern activity in the field is represented by the strong negative anomaly that extends south-east from the rear of Dunluce House (3.11) through the area and down to the Dunluce Road. This anomaly continues into Area 4 (as 4.6) and images a modern water pipe. Extending northwards from the edge of this is a linear, slightly high resistance anomaly which also defines the course of a modern service conduit (3.12). This continues into Area 2 as anomaly 2.13. A further utility pipe represented by a low resistance linear anomaly (3.13) in the flattest part of the field, close to the gate, extends from a linear block (3.14), possibly a tank, for 20m into the rear of Dunluce house.

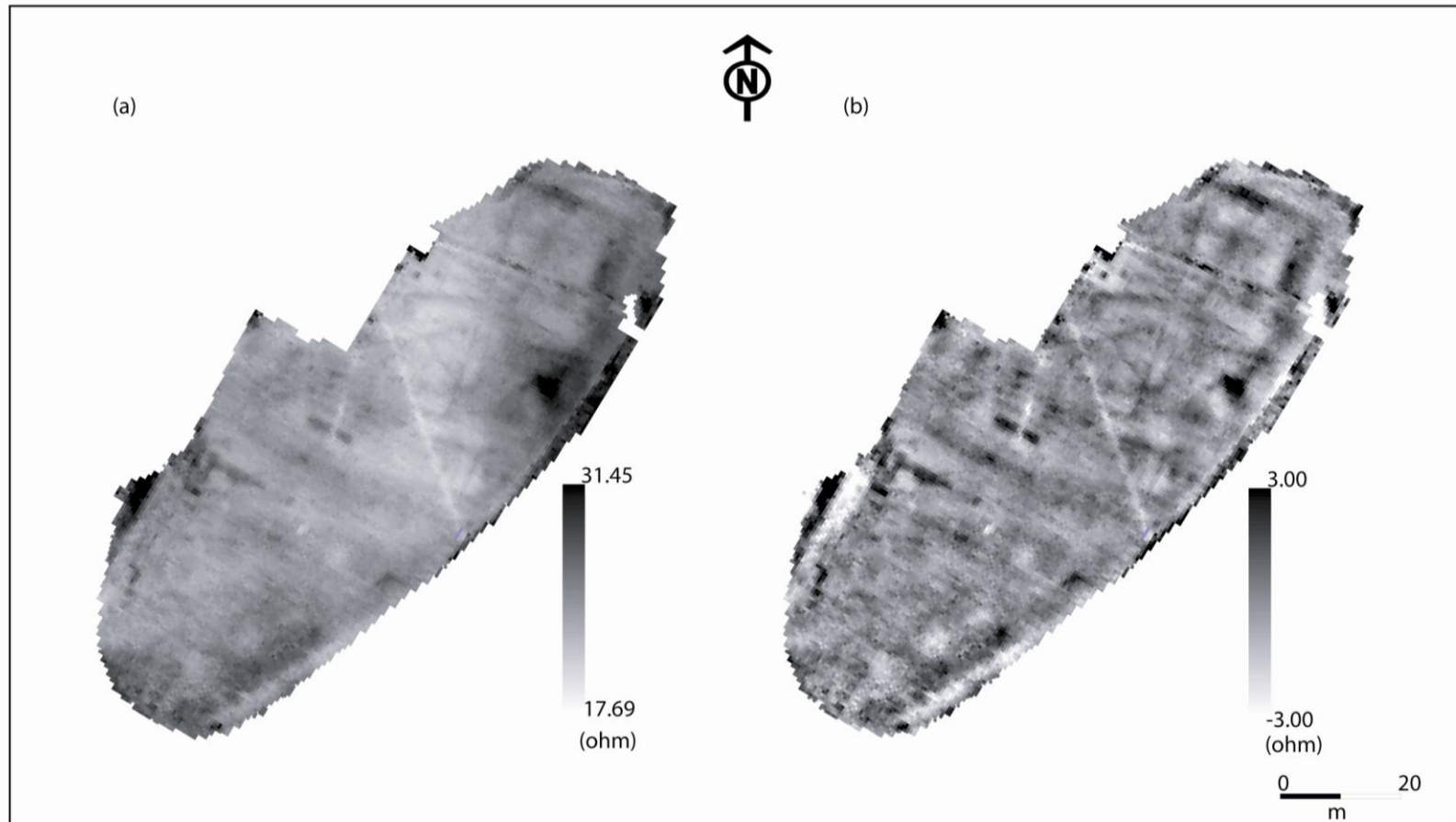
The area traversed by these modern features, in the north of Area 3, is the location of a number of angular and curvilinear anomalies of relatively low strength which emanate from the flatter part of the hill and are superimposed on a background of low resistance. Few of these, such as the broad angle formed by intersecting arms of moderately high resistance in the extreme north-west of the area (3.15) can be reconciled with features from the OS maps, in this case a garden wall to the south of Dunluce House shown on the first two OS 6-inch maps only (Appendix 1 and 2). As with the cluttered area in the south-east of Area 2, this part of Area 3 is immediately to the rear of Dunluce House and its outbuildings, and it is extremely difficult to distinguish the anomalies in this zone. They are therefore collectively designated anomaly 3.16 both here and in Figure 9b. Some of these may mark the line of old field boundaries, and are conceivably of archaeological significance. Equally, however, they may represent later divisions, pipes or utility trenches.

At the southern end of the plot, an angular high resistance linear (3.17) emerges and turns westwards along the field boundary, where it runs along the southern edge of a zone of high resistance caused by a relatively steep incline in the southern corner of the field (3.18)(Plate 6). In both appearance and character, the angular anomaly 3.17 is similar to anomalies 2.7, 2.8 and 2.9 in Area 2, and is similarly interpreted here as either an early modern feature, most likely a field wall.



Plate 5 (Above). View of Area 3 from the junction of Dunluce, Ballytober and Castle Roads, facing north-east. **Plate 6 (Below).** View of Area 3, facing north-east. The appreciable slope in the southern corner of the field is obvious in the right foreground. Gallows Hill is visible in the background.





Resistance survey results from Area 3(i).

Figure 8(a) Greyscale plot of raw data.

Figure 8(b) Greyscale plot after application of high-pass filter and despiking processes.



Centre for
 Archaeological
 Fieldwork

CLIENT:

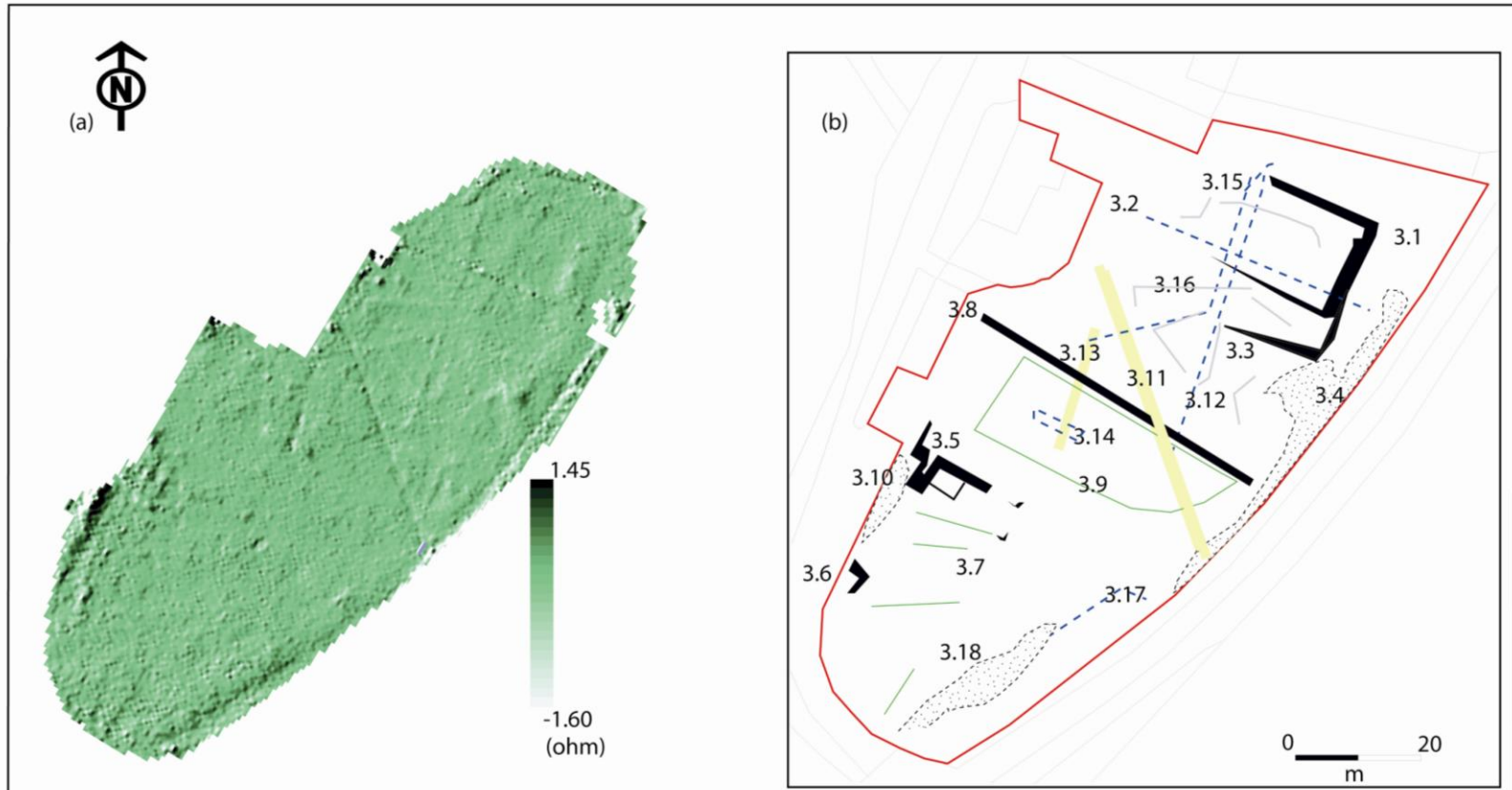


Northern Ireland
 Environment
 Agency






PROJECT
 Dunluce geophysical survey
 2012


TITLE:
 Resistance survey results
 Area 3(i)


FIGURE:
 8



Resistance survey results from Area 3(ii).
 Figure 9(a) Relief plot of processed data. Figure 9(b) Interpretation of anomalies revealed by the survey.

KEY: Figure 9(d) only.	
	Archaeology: Masonry/stone foundations (including probable 17th-century remains)
	Archaeology?: Weaker positive anomalies that do not appear on OS maps and may represent archaeological features
	Modern/non-archaeological low resistance artificial features
	Geological zone of increased resistance levels, coinciding with hillslope
	Modern/non-archaeological high resistance artificial features

 Centre for Archaeological Fieldwork

CLIENT:  Northern Ireland Environment Agency

PROJECT: Dunluce geophysical survey 2012
TITLE: Resistance survey results Area 3(ii)
FIGURE: 9

2.4 Area 4 (See Figure 10)

The fourth area surveyed lies to the east of the junction between the Dunluce and Ballytober Road. The survey in this field was confined to an area immediately adjacent to the junction, and covered approximately 0.38ha. The terrain slopes gently down to the south and west from a small raised shelf at the junction of the roads, and the slopes level off at the centre of the area to form a waterlogged hollow, before rising again north-eastwards towards the base of the ridge containing Gallows Hill. A sub-rectangular earthen enclosure lying at the foot of the hill was included in the eastern corner of the survey area, but, as its banks could not be surveyed, artificial 'dummy' readings were inserted along its course.

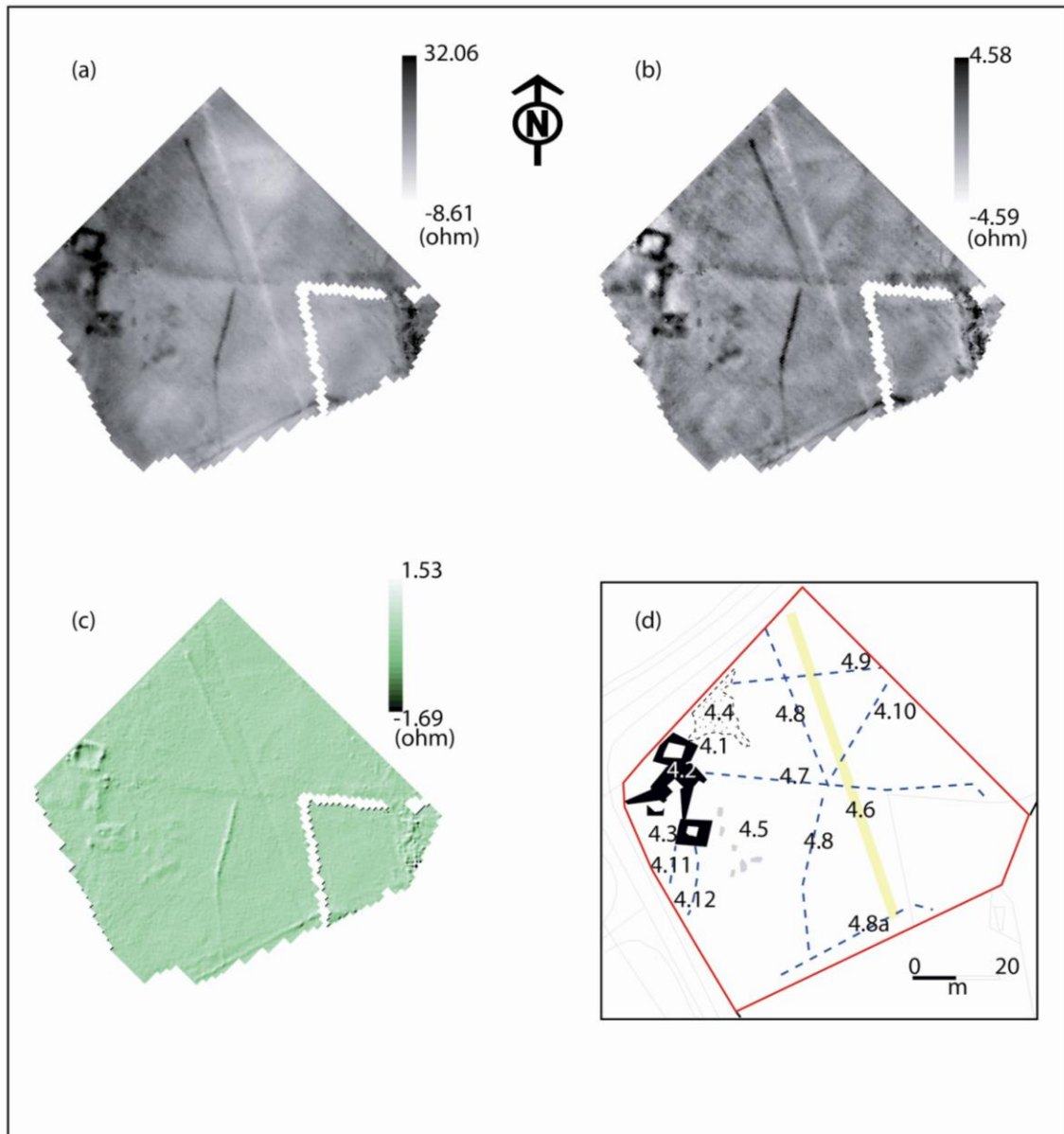
A number of distinct anomalies were detected in this relatively small area, and a cluster of high resistance features in the western corner may provide evidence of a continuation of the village streetscape revealed during the 2009 survey. Within Area 4, the most prominent findings were of three high resistance anomalies (4.1, 4.2 and 4.3) grouped together in an approximate north/south alignment. All of the anomalies are characterised by readings which were up to 50% stronger than the background resistance level, marking these as amongst the strongest anthropogenic features detected during the entire survey, and strongly suggesting that these are buried masonry foundations. The ground surface in this area is mounded, but this was previously thought to be due to spoil from roadworks. Anomaly 4.1 is perhaps the most clearly defined. It is almost square in shape, with sides of approximately 7.5m-8m. Anomaly 4.2 is more difficult to define. A linear anomaly, approximately 12m long extends southwards from anomaly 4.1. The unprocessed grayscale image of the anomaly suggests this is one side of a rectangular enclosure, possibly another building, with a width of 8m and an opening in its south-facing side (Figure 10a). A length of wall, 6m long, appears to extend westwards to the road junction from the western side of the structure. The structure is, however, much less distinct after high pass filtering (Figure 10b). The longest, north/south aligned side of the anomaly also coincides with the edge of the original road layout, depicted on the 1st and 2nd edition OS 6-inch maps of 1831-32 and 1853 (Appendix 1 and 2). The third of these three conjoined anomalies is a rectangular high resistance feature measuring approximately 8m long by 6.5m wide. The edges of this anomaly are not as distinct as anomaly 4.1, but both structures appear to be complete. These three anomalies are conjoined and arranged on a coaxial, north-south alignment, and may form part of a street or terrace of small buildings and outhouses.

A localized amorphous zone area of high resistance noise (4.4) immediately to the north of the group of anomalies is broadly similar to the readings produced by the cobbled street in the 2009 survey, and may represent a surface associated with these three buildings. However, its lack of definite shape, and location immediately below the edge of a roadway which has undergone continuous augmentation, suggests it is probably a response to an accumulation of gravel and other material from the roadworks. A small group of poorly-defined slightly positive resistance anomalies may be related to the cluster of anomalies 4.1-4.3. These have collectively been labeled anomaly 4.5 in this report and may be a response to poorly surviving remains of fences or outbuildings associated with the nearby structures.



The most prominent anomalies elsewhere in the field are likely to be due to later activity. The starkly linear low resistance anomaly extending north-north-west/south-south-east through the area (4.6) is




characteristic of a service pipe. It is a continuation of the feature represented by anomaly 3.11 above, and connects up with Dunluce House. Another prominent high resistance anomaly (4.7) replicates the field boundary depicted on the 2nd, 3rd and 4th edition OS maps (Appendix 2-4 covering the period 1853 to 1931). It is poorly imaged where it extends through the western corner of the field, owing to the much stronger resistance values of the three structures. The angular high resistance anomaly 4.8 is not shown on any of the OS maps. It is bisected by the field boundary 4.7, so probably predates it. It connects with a linear anomaly of similar strength (4.8a) in the south of the field. Interpretation of the anomaly is not clear, but it can be classed with the anomalies 2.7, 2.8, 2.9 and 3.17 discussed above. Its location, immediately opposite the end of anomaly 3.17 on the other side of the Dunluce Road suggests it is a continuation of this feature and it is of similar magnitude and angular form. The aforesaid anomalies 2.9 and 3.17 closely follow the course of existing field boundaries, as does anomaly 4.8a, so this group might be responses to remnants of old field walls; the strength of response along the course of all of the group suggests stone content in places. It should be stated, however, that no field boundary is shown on any of the OS map to coincide with anomaly 4.8 in Area 4. The alternative possibility, that at least some of these anomalies may be stone field drains, was discussed under 2.9 above, and the landowner confirmed the presence of such a feature broadly in the location of anomaly 4.8a (Sean McKinley 2012 pers. comm.).

Two vague linear anomalies of slightly raised resistance levels in the north-eastern corner of the area (4.9 and 4.10) are probably minor field divisions, but they are not strongly imaged in the dataset. The curvilinear anomaly to the south of the buildings (4.11) defines the edge of the old road shown on the 1st and 2nd edition OS 6-inch maps (Appendix 1 and 2, 1831-32 and 1853). Just to the east of this, a similar curvilinear high resistance feature (4.12) marks the line of a field boundary shown on the 3rd and 4th edition maps only (Appendix 3 and 4, 1906, 1921-31).



KEY: Figure 10(d) only.

-  Archaeology: Masonry/stone foundations (including probable 17th-century remains)
-  Archaeology?: Cluster of small anomalies of moderately increased resistance levels

-  Modern/non-archaeological low resistance artificial feature
-  Archaeology?: Possibly artificial zone of incoherent increased resistance 'noise'
-  Modern/non-archaeological high resistance artificial features

Resistance survey results from Area 4.

Figure 10(a) Greyscale plot of raw data.
 Figure 10(b) Greyscale plot after application of high-pass filter and despiking processes.
 Figure 10(c) Relief plot of processed data.
 Figure 10(d) Interpretation of anomalies revealed by the survey.



Centre for
 Archaeological
 Fieldwork

CLIENT:



Northern Ireland
 Environment
 Agency

PROJECT:
 Dunluce geophysical survey
 2012

TITLE:
 Resistance survey results
 Area 4

FIGURE: 10

2.5 Area 5 (See Figure 11)

A single 20m by 20m grid was surveyed in the field immediately opposite Area 4, on the western side of Ballytober Road and to the north of the ruined church (Plate 7). A limited survey only was undertaken here as test trenches undertaken by the CMA during the earlier fieldwork demonstrated that the ground had been considerably disturbed (Colin Breen 2012 pers. comm.).

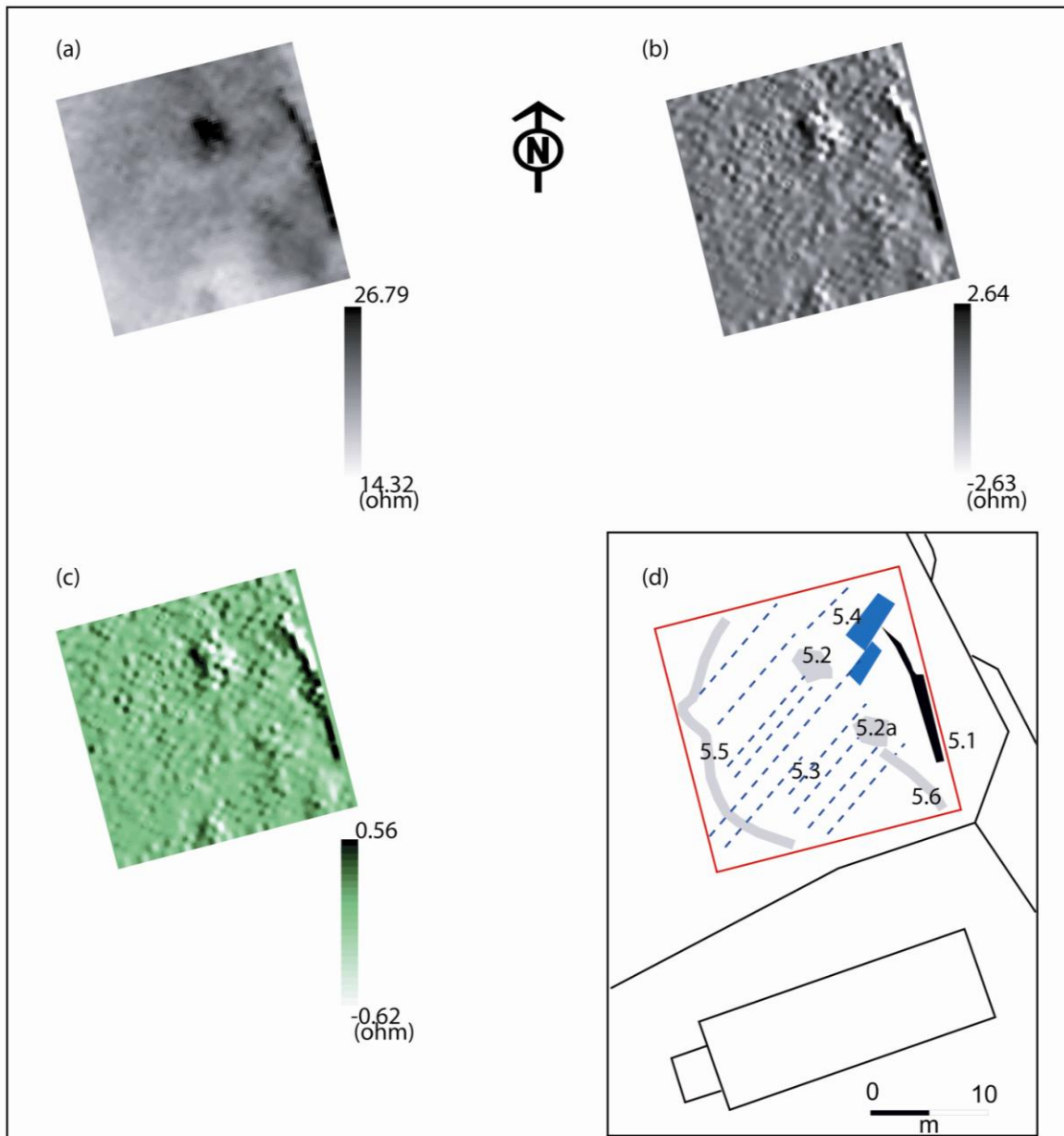


Plate 7. The field where Area 3 was located, facing southwards, with the ruin of St. Cuthbert's Church in the background.





Three high resistance anomalies of note are immediately obvious in the unprocessed plot (Figure 11a). Immediately adjacent to the road is a linear high resistance anomaly, of sufficient strength to suggest it is a response to buried masonry (5.1). The anomaly extends for 12m almost from the line of the western enclosure wall surrounding the church, and it is possible that it represents a former continuation of the wall to the north of the current enclosure. The isolated high resistance anomalies 5.2 and 5.2a are likely to represent areas of buried rubble or else geological features, with the former the more likely given the scarcity of any outcropping in the flat lands on either side of the Ballytober Road.

Processing of the plot to refine definition of anomalies (Figures 11b and 11c) revealed a series of vague linear north-east/south-west trends (5.3) running throughout the plot. These are products of modern cultivation and are not of archaeological significance. However, on a similar alignment and in the north-west corner of the area, a regular anomaly consisting of two conjoined rectangular elements was also revealed (5.4). This is most clearly visible in the relief plot (Figure 11c). Interpretation of this anomaly is guarded. While relatively well defined in the relief plot, the two elements of the anomaly appear to have

dimensions of only 4.5m long by 2.2m wide, and 2.7m long by 1.6m wide respectively, even though both of the rectangular elements appear to be complete. They are therefore smaller even than the incomplete structures detected elsewhere in the survey, and are more likely to be a sheep-dip or other agricultural construction than structures for human habitation. Additionally, the readings defining the anomaly are faint (never more than 5% above the plot mean), and it is also noticeable that they share an alignment with the ploughing trends. Their imaging may therefore simply be an artifact of this activity. The low resistance anomaly arcing around the western edge of Area 5 (5.5) is the characteristic response to a natural dyke in the underlying basalt or a former channel or stream. A similar but shorter arc (5.6) is visible in the south-east corner, and is probably a similar feature.



KEY: Figure 11(d) only.

-  Archaeology?: Possible wall foundation
-  Geological features
-  Archaeology?: Conjoined rectangular blocks of raised resistance
-  Ploughing trends

Resistance survey results from Area 5.

Figure 11(a) Greyscale plot of raw data.
 Figure 11(b) Greyscale plot after application of high-pass filter and despiking processes.
 Figure 11(c) Relief plot of processed data.
 Figure 11(d) Interpretation of anomalies revealed by the survey.



Centre for
 Archaeological
 Fieldwork

CLIENT:



Northern Ireland
 Environment
 Agency

PROJECT:
 Dunluce geophysical survey
 2012

TITLE:
 Resistance survey results
 Area 5

FIGURE:
 11

2.6 Area 6 (See Figure 12).

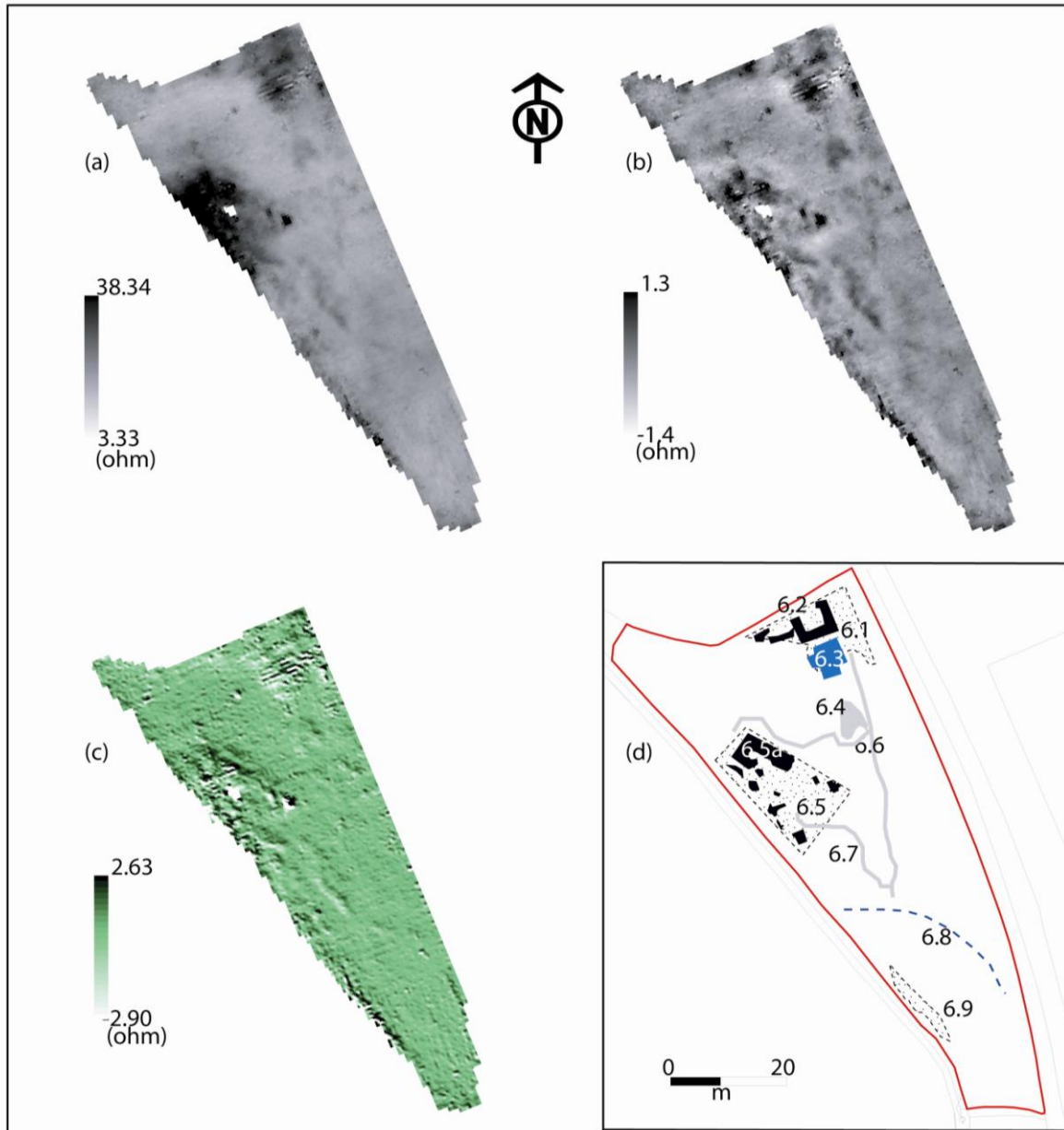
Area 6 is a narrow strip of land immediately to the south of the ruined St. Cuthbert's Church which lies just to the west of Ballytober Road. An area of 0.29ha was surveyed in this field, bounded on the north by the church wall, on the east by Ballytober Road, on the south by a field drain and on the west by the Dunluce Burn. The field is almost completely flat, marshy and featureless (Plate 8). Survey in part of the north-eastern corner of the field was hampered by severe rutting of the ground caused by tractor tracks. This was one of the few areas that returned areas of high resistance, which contrasted with the flat levels of low resistance encountered elsewhere in the area. The generally higher resistance levels (6.1) in this area are probably largely due to the modern introduction of hardcore around the entrance to the field in this corner. However, within this area, a poorly defined rectangular anomaly (6.2) is visible. The measured resistance readings from this anomaly are 10-15% higher than the surrounding high resistance zone, and the dimensions are approximately 8m long by 7.5m wide. Given the position of the anomaly adjacent to the Ballytober Road, this may be a structure related to the 17th-century village, although it may also be associated with the church itself, dating to any period from its history. Immediately to the south of this is another block of high resistance (6.3), which may be related to this structure. However, as this area coincided with the disturbed ground, the resistance metre experienced contact problems, so imaging of this anomaly is poor and interpretation is not possible. A second area of less enhanced resistance levels immediately to the south (6.4) is not likely to be of artificial origin.



Plate 8. Survey Area 6, facing north

The most prominent anomaly in Area 6 is an area of greatly enhanced resistance (up to 100% higher than elsewhere in the area) at the west of the field (6.5), on the bank of the Dunluce Burn. Appearing as an almost uniform wedge-shaped block of noise measuring 20.2m by 14.6m in the raw survey data (Figure 12a), the anomaly is more clearly defined in the processed image as having a rectangular core measuring approximately 19m by 9m, (6.5a) with outlying high elements to its south-east (Figure 12b). The anomaly is not as well defined as the house structures elsewhere in the Dunluce landscape, and appears infilled with high resistance readings rather than containing lower level readings like the houses in Areas 1 - 4. Nonetheless, the absence of comparable readings elsewhere in the area makes a geological explanation less likely, and it may be that this is the remains of a significant structure, with collapsed masonry obscuring its definition. Its presence on the edge of the stream is not inconsistent with the location of a mill, and this anomaly warrants further investigation.

The other anomalies recorded in Area 6 are less likely to be of artificial significance. The intersecting curvilinear anomalies of fluctuating high and low levels (6.6 and 6.7) are probably old river channels or grooves in the natural strata. The more regular, 30m-long curvilinear arc of higher readings in the south-east of the field (6.8) is characteristic of a modern, gravel-filled *sheugh* or drain. A linear band of particularly high readings along the bank of the burn (6.9) is likely to indicate deposits of stone and gravel cleared from the river bed, and is probably not of archaeological significance.



<p>KEY: Figure 12(d) only.</p> <ul style="list-style-type: none"> Archaeology: Masonry/stone foundations (including probable 17th-century remains) Archaeology?: Block of increased resistance in area of surface disturbance Geological features Archaeology?: Possibly artificial zones of incoherent increased resistance 'noise' Modern/non-archaeological high resistance artificial features 	
<p>Resistance survey results from Area 6.</p> <p>Figure 12(a) Greyscale plot of raw data. Figure 12(b) Greyscale plot after application of high pass filter and despiking processes. Figure 12(c) Relief plot of processed data. Figure 12(d) Interpretation of anomalies revealed by the survey.</p>	
<p>Centre for Archaeological Fieldwork</p>	<p>PROJECT: Dunluce geophysical survey 2012</p> <p>TITLE: Resistance survey results Area 6</p> <p>FIGURE: 12</p>
<p>CLIENT:</p> <p>NIEA Northern Ireland Environment Agency</p>	

3. Discussion and Conclusion

3.1 Discussion

From a technical point of view, seasonal conditions impacted on the 2012 resistance results. The majority of strongly imaged anomalies were of high resistance, positive values. This is consistent with a winter survey, where ground water reduces the background resistance levels, thereby lowering the contrast between the background and anomalies of lower resistance. The higher resistance anomalies, on the other hand, can be enhanced against the lower, more homogenous background readings. Therefore, while the survey successfully identified the sites of a number of possible masonry structures, the type of associated field divisions which were successfully imaged in the Village Field in the 2009 survey, as reasonably well-defined low resistance lines, were not so distinct in the 2012 survey. Where these were detected in the present data, they appeared as vague trends against the background readings (i.e. anomalies 1.3 and 3.7), and were often further obscured by signals from more recent activity (as in the south of Area 2 and north of Area 3).

The majority of anomalies discussed in this section are therefore high resistance responses and the 2012 geophysical survey produced considerable evidence that elements of the 17th-century village survive well beyond the area currently recognised as the locus for the settlement, as well as providing further definition of its original layout. The remains of buildings which are likely to be associated with this period were detected in Areas 1, 2, 3, and 4, suggesting survival of archaeological remains over 350m the site of the castle (Figure 13).

The most compelling evidence in each of these areas was represented by a series of house structures, the survey images of which suggest reasonable conditions of preservation. The most convincing images were produced by anomalies 1.1, 2.2., 2.3, 3.5, as well as the grouping of 4.1, 4.2 and 4.3 in Area 4. In most cases, there were nearby features which may represent the more disturbed remains of similar structures (see 1.2, 2.3a and 3.6) while, in the case of all of the structures other than the Area 4 trio, there was tentative evidence of possible land divisions associated with the houses, in the form of linear trends, often barely visible against the background signals (1.3, 2.11, 3.7).

The principal characteristics of the most significant house sites are summarised in Table 2. There is some consistency in both the strength of response of these anomalies, and in their general form and dimensions. All of these anomalies were defined by strongly positive 'walls', often producing readings 20% - 50% stronger than the background readings, and varying from 1.4m-2m thick. The uneven form of the walls in many of the cases is characteristic of stone or masonry foundations, possibly overlain in places by collapsed rubble. In all cases, the houses were probably rectangular or L-shaped in plan and, where more than two sides were imaged, there was also a degree of consistency in the widths of the structures, varying between 6.4m and 8m. Only the small structures 4.1 and 4.3 were imaged conclusively as complete or enclosed rectangles, and these have the shortest lengths recorded. Four of the other structures (1.1, 2.3, 3.5 and 4.2) are at least 10m long, but only the 12m-length of 4.1 is likely to be a reliable indication of the full length of the structure represented. Indeed, the site represented by anomaly

3.5 may have been at least 17m in length, if an additional high resistance block to its south-east formed part of the structure.

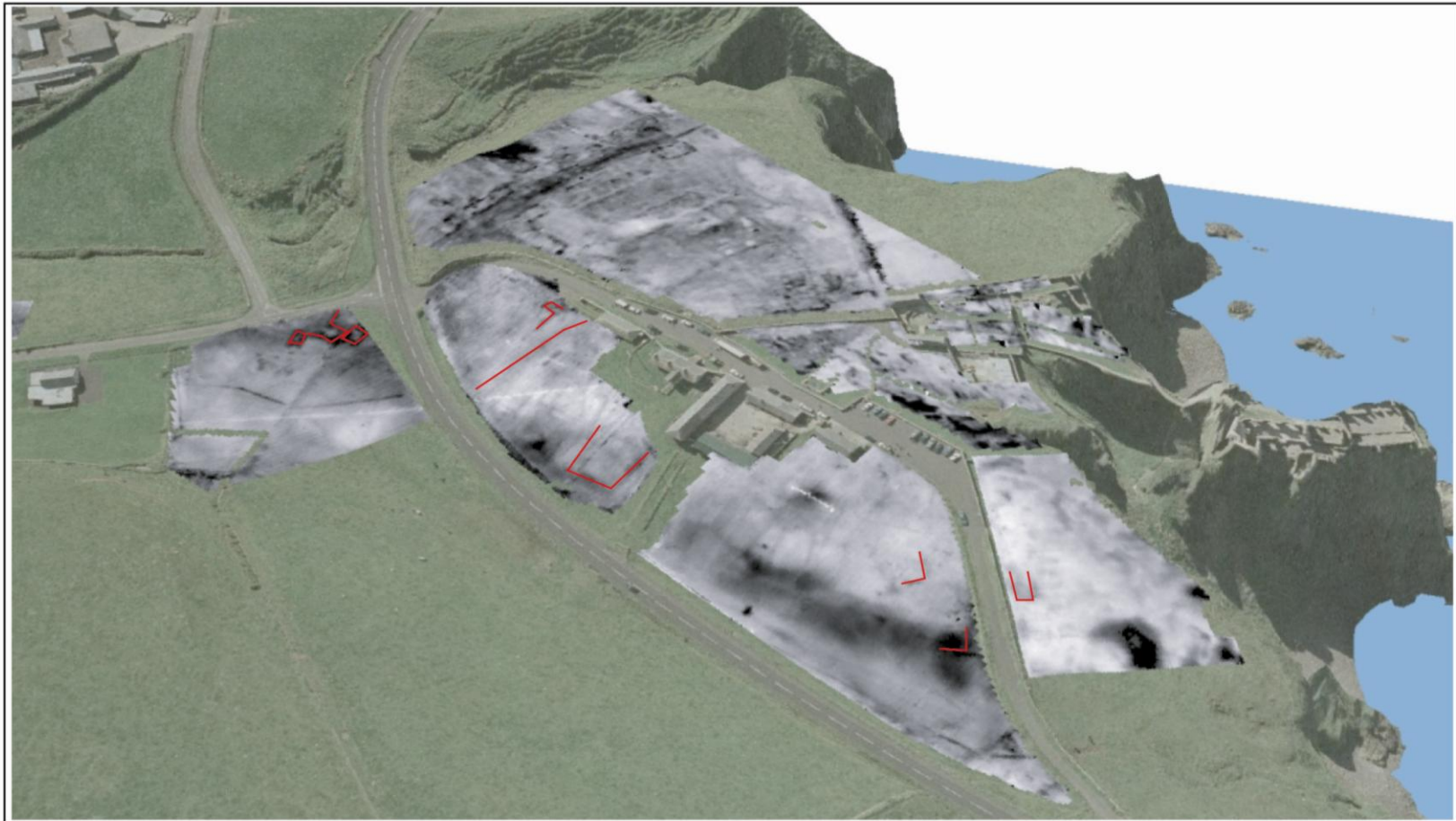
Anomaly	Dimensions	Alignment of long axis	Comments on form of anomaly
1.1	11.m x 7m	ENE-WSW	Three sides of the building were imaged, so the width of the structure can be gauged. The original length may exceed 11m.
2.2	8m x 7m	ENE-WSW	Two perpendicular sides only were imaged. The structure represented may originally have been both broader and wider, but it has probably been truncated beyond the limits detected in the survey.
2.3	10m x 7m	ENE-WSW	Portion of three sides were imaged, so the width of the structure can be measured with some confidence. The original length may have exceeded 10m.
3.5	13m (possibly 17m) x 8m	NW-SE	L-shaped remains. It may have been both longer and broader than the image.
4.1	8m x 7.5m	NW-SE	Complete, almost square structure.
4.2	12m x 8m	N-S	Indistinct anomaly, but the dimensions of 12m x 8m are likely to reflect the actual size of the structure, as interpretation of the data shows it to be an almost-complete rectangle. Its eastern side coincides with the edge of the road shown on the 1 st edition OS 6-inch map.
4.3	8m x 6.5m	E-W	Complete, almost-square, structure.

Table 2. Summary of probable 17th-century house structures detected in 2012 survey.

There is also some correlation between the dimension of the 2012 anomalies, and the images of the major structures detected in the 2009 Village Field survey (Figure 14). The Merchant's House represented as a complete rectangular anomaly measuring 14m long by 7m wide (Figure 15a). The forge was imaged as an L-shaped structure, the longer element of which measured 17m long by 8m wide, with a perpendicular block measuring 17m long by 6m wide; This is likely to have been an exceptionally large composite structure within the complex, but its individual elements, together with those of the Merchant's House, are not out of character with the size of the principal 2012 anomalies.

The location of the 2012 structures reinforces the suggestion that the layout of the original village street is preserved in the course of the modern Castle Road. All of the related house structures in Areas 1 and 2 (1.1, 1.2, 2.2, 2.3, 2.4), which are bordered by the Castle Road, are set on the top of the ridge, with their long axes aligned broadly east-north-east/west-south-west and parallel to the modern road. This replicates the relationship between both the Merchant's House and the forge with the cobbled street preserved in the Village Field. Moreover, the second 'arm' of the L-shaped forge building also respects the Castle Road, and is parallel to it. The similarly L-shaped anomaly 3.5 from the 2012 survey is parallel to the Forge, and probably stood on the opposite side of the street, then as now.

In addition to the house structures, the linear anomaly 3.8 may also have been associated with the remains detected in the Village Field. As noted above, this appears to be a continuation of a similar high resistance linear feature, possibly a wall, which was detected during the 2009 survey and is visible in Figure 13. If this is the case, it would appear to cut across the Castle Road and the presumed line of the 17th-century village street. It may therefore be that these two anomalies predate the establishment of the formal roadway, or else they provide an indication that there was some symmetry in the arrangement of structures along the street; the two walls may have been constructed to face each other on opposite sides of the street.



This image illustrates the position of the major high resistance anomalies detected during the 2012 survey that are possibly of 17th-century origin (highlighted in red). The Village Field is included, but its anomalies have not been highlighted.

(Original LiDAR data ©Crown Copyright NIEA: Built Heritage.
 View created by Rory McNeary, Centre for Maritime Archaeology).



Centre for
 Archaeological
 Fieldwork

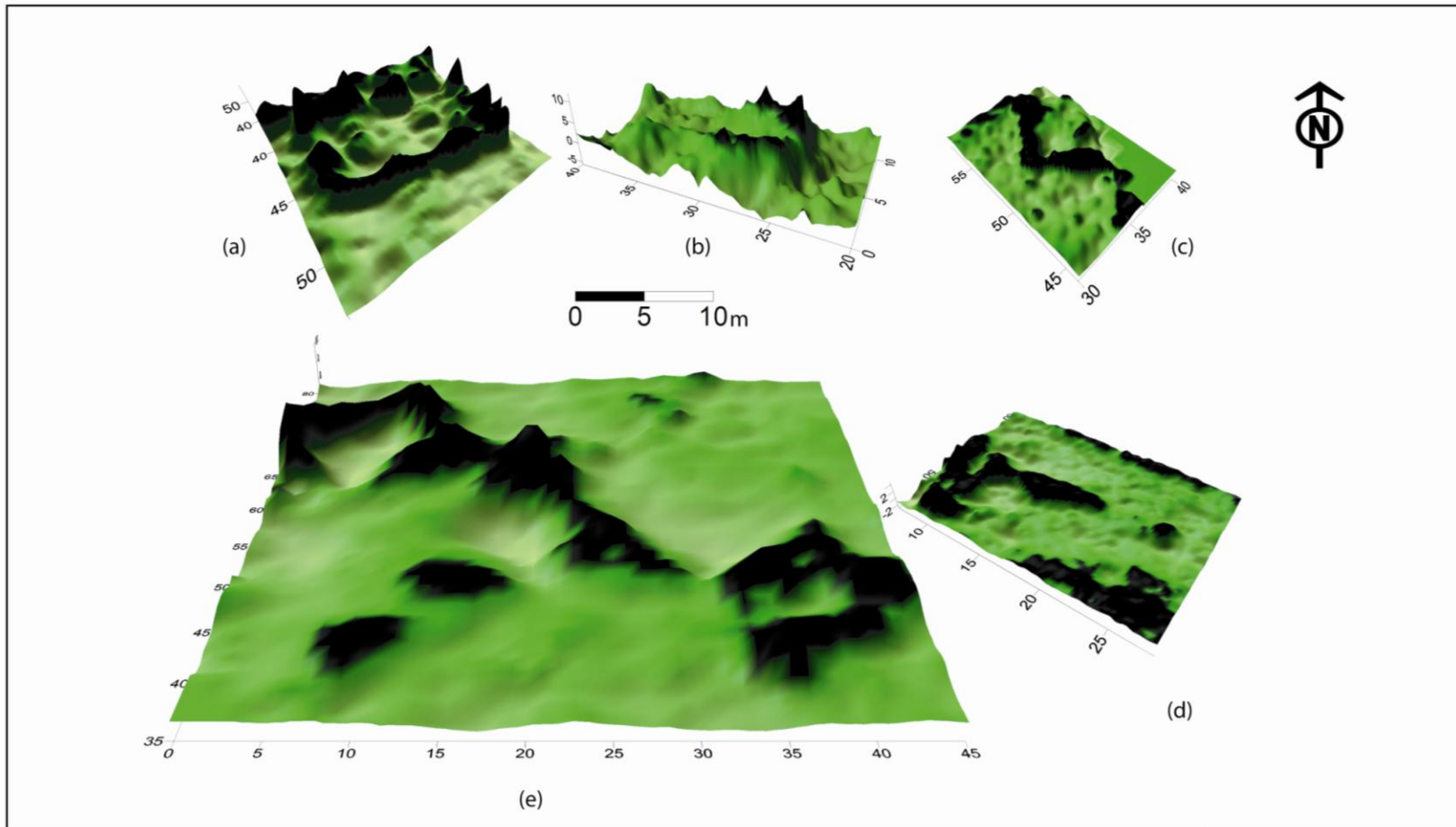
CLIENT:



PROJECT
 Dunluce geophysical survey
 2012

TITLE:
 Possible 17th-century
 masonry features

FIGURE: 13



3D surface plots of probable 17th-century house sites detected during Dunluce resistance surveys. Clockwise from top left:-
 14(a) the Merchants House from the Village Field 14(b) Anomaly 1.1
 14(c) Anomaly 2.2 14(d) Anomaly 3.5 14(e) Anomalies 4.1, 4.2 and 4.3

(Z axis is the strength of response in ohm. Z axis is reduced by a factor of 3 in all images except 14(a), which is reduced by a factor of 5).



Centre for
 Archaeological
 Fieldwork

CLIENT:



Northern Ireland
 Environment
 Agency

PROJECT:
 Dunluce geophysical survey
 2012

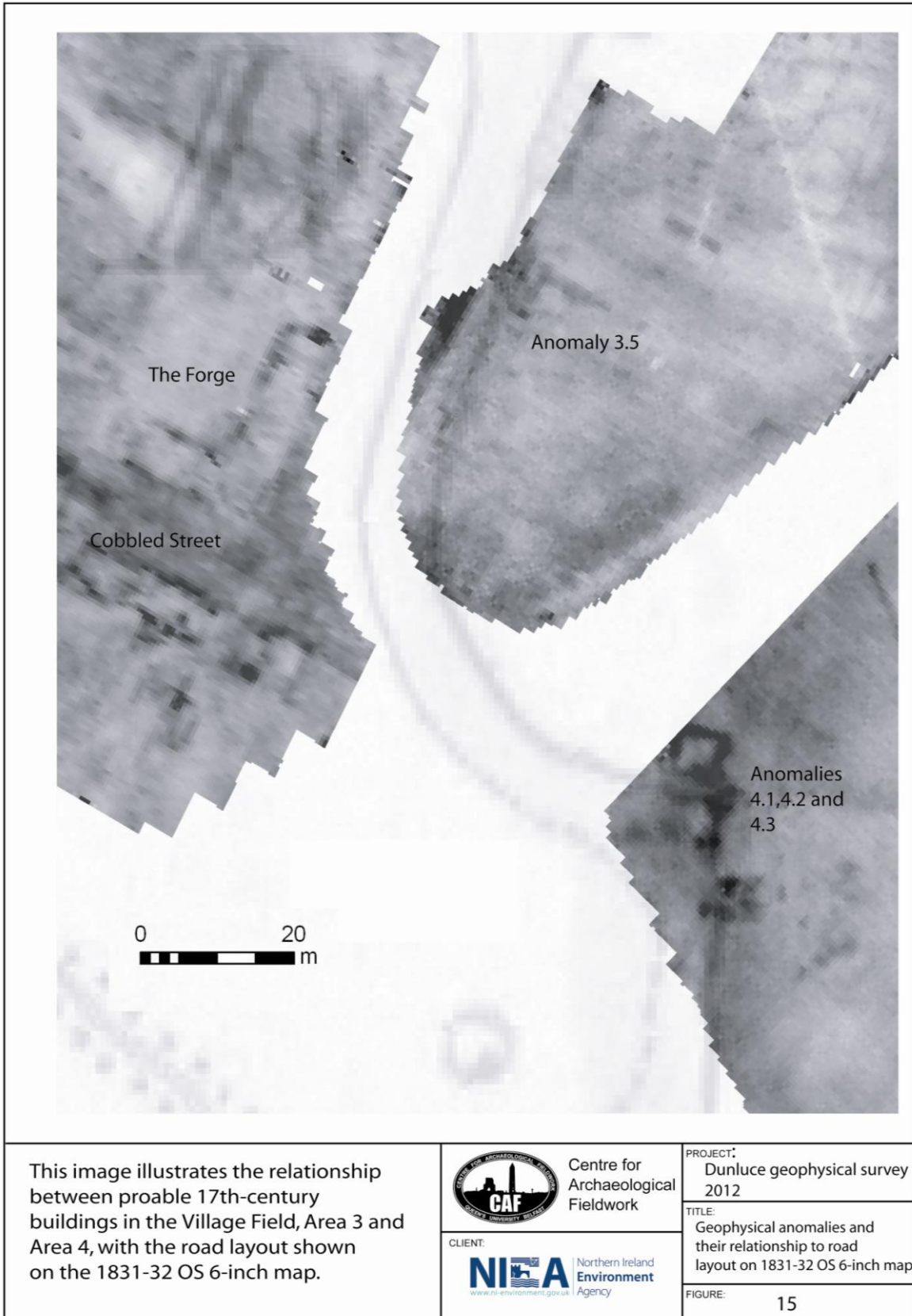
TITLE:
 3D plots of Dunluce house
 sites

FIGURE:
 14

The location of the anomalies 4.1 to 4.4 indicates that a second thoroughfare may have extended southwards, roughly from the most south-eastern point of the cobbled street detected in the 2009 survey, and may have followed the original course of the old Ballytober Road, as depicted on the 1st and 2nd edition OS 6-inch maps (1831-32 and 1853)(Appendix 1 and 2). Figure 15 is an image of both the Village Field survey and the suggested 17th-century anomalies of Areas 3 and 4, superimposed on the 1st edition map. The Area 4 survey confirms that the cobbled street did not continue on its north-west/south-east course into this area. However, anomaly 4.1 in particular stands in a position corresponding with the edge of the street if the latter was projected through the junction before terminating. Moreover, the two adjoining anomalies, 4.2 and 4.3 which are clearly related to the 4.1, stand to the south of it, along the edge of the 1st edition road layout. It therefore seems likely that the cobbled street extended as far as the trio of anomalies, which mark its terminus on its south-eastern course, before veering south, along the line of the old Ballytober Road, where it may have continued as a track.

It must be stressed that this theory relies on an assumption that anomalies 4.1-4.3 formed part of the 17th-century village, a suggestion that is based both on their own characteristics, and similarities with anomalies detected elsewhere in the landscape (See Table 2 and associated discussion). It may, however, be significant that a small structure is depicted on both the 1st and 2nd edition OS maps (Appendix 1 and 2), roughly in the position of 4.1, so it is conceivable that this group represents later activity. However, until further investigation is carried out, anomalies 4.1-4.3 should be regarded as at least potential components of the 17th-century remains.

In addition to the probable masonry foundations, a number of other potential settlement sites were recorded in Area 2. At least three small enclosed curvilinear anomalies were detected at the base of the slope, and these were of not dissimilar dimensions to the anomalies discussed above. Anomaly 2.4 measured 12m long by 7m wide, anomaly 2.5 measured 9m long by 7.5m wide and the vague anomaly 2.6 was approximately 11m long by 7m wide. These features imaged very differently to the probable masonry foundations; they are defined by relatively minor increases in resistance levels (approximately 5% on average), and with sides that were often between 50cm and 1m thick. While the stone structures were located on the summit of the ridge, these were scattered around the base of the slope, between north-east, through east, to south. There is no consistency in their orientations but, as has been noted above, they may be related to an ephemeral track which skirts the base of the hill (2.10). If these features were related to the 17th-century village, they clearly did not occupy any part of the formal layout suggested both by the anomalies listed above and the cobbled streetscape of the Village Field. They may have been barns, stock enclosures or minor outbuildings, but are probably more likely relict of a different, possibly earlier, phase of activity on the site. The anomalies themselves are likely to be the remains of earthen enclosures, possibly forming the base of cruck-built or temporary booleying structures.



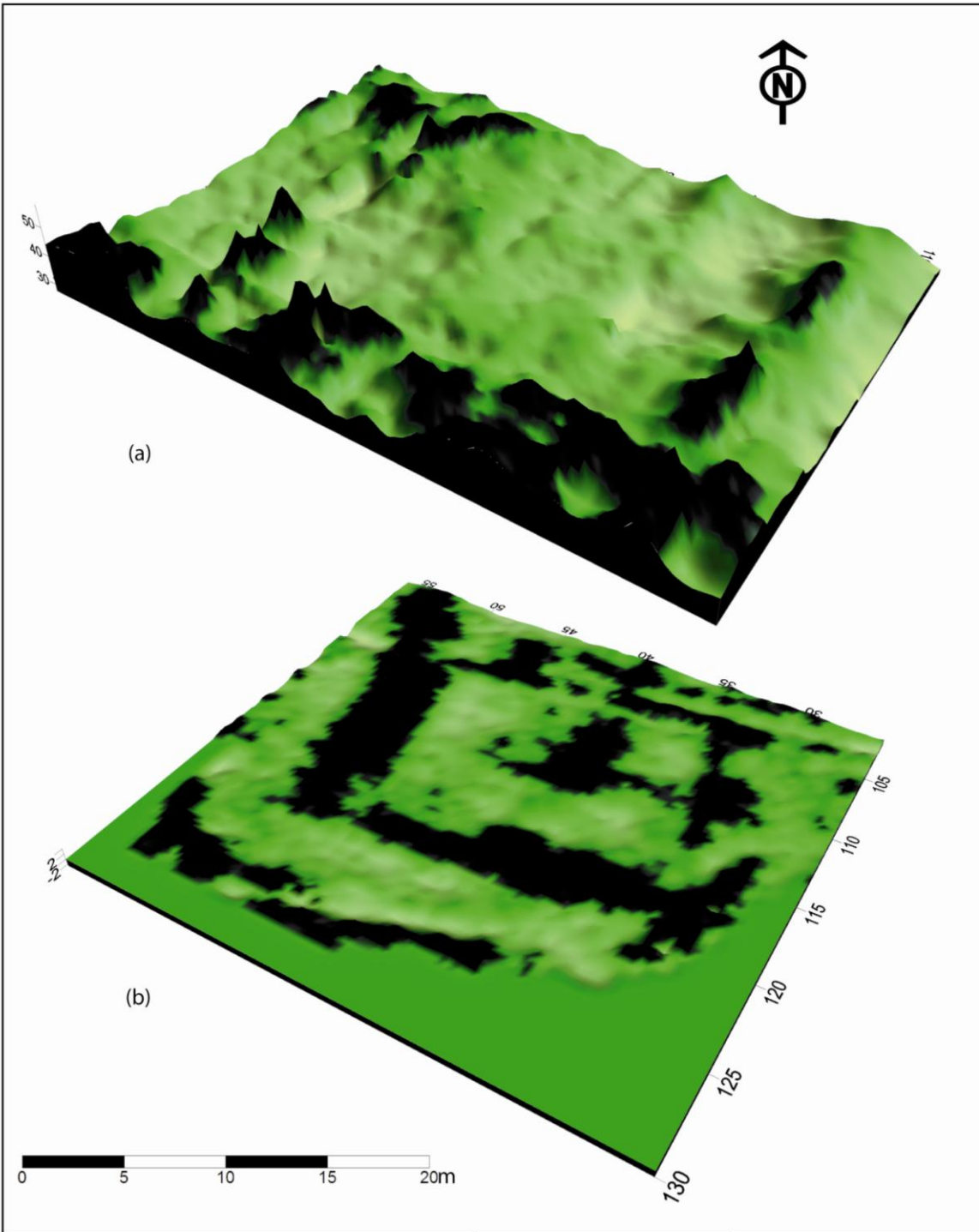
The other anomaly of potential archaeological interest on the ridge is the probable earth-and-stone built enclosure on the north-east slope in Area 3 (3.1). This is potentially the largest stone enclosure detected during the 2012 survey, with dimensions of 20m by 14m. This anomaly is at variance with most of the larger divisions or boundaries detected in Areas 2 and 3, which were poorly imaged and often difficult to distinguish both from one another and from the background readings. Discussion with the landowner suggested he considered this to be an unlikely location for an archaeological feature, as it coincided with the location of a pathway (3.2) that was used in living memory, and was close to an area of boggy ground into which stone and gravel had been introduced over the years (3.4). The OS 6-inch maps were therefore carefully scrutinised to determine whether the putative 'enclosure' could merely be an artifact of the coincidence of other high resistance anomalies. While the southern edge of the anomaly is close to the line of the path, and its eastern edge could conceivably represent a continuation of the geological slope extending through Area 2 (2.1) it cannot be satisfactorily reconciled with any combination of other features. A ground penetrating radar survey may resolve this question, but, in the meantime, this enclosure should be regarded as a discrete feature on the balance of the existing evidence.



It may be of note that a number of large square or rectangular enclosures are visible to the west of the Village Field streetscape. Figure 16 is a comparison between anomaly 3.1 and one of the more prominent Village Field enclosures. Both enclosures are strikingly imaged against a weaker background, and each has traces of internal features within its boundaries. The Village Field enclosure returned significantly higher resistance values, but this is probably due to its position in a comparatively undisturbed location. Anomaly 3.1, by contrast, is located immediately to the rear of the farmhouse. The date of the 2012 enclosure is impossible to determine. While the similarities with some of the Village Field enclosures are obvious, it is positioned immediately behind the probable 18th-century barn, and shares its alignment.

On the flatter terrain to the south of the ridge, the survey detected a possible wall foundation (5.1) immediately to the north of St. Cuthbert's Church. Given that Area 5 was limited to a 20m by 20m square, it is not possible to venture any confident interpretation of this feature, other than its location makes it appear as an extension to the current western boundary wall of the church property. This offers the possibility, however, that the enclosure surrounding the church was formerly larger than it appears today.

To the south of the church, in Area 6, images of two further possible buildings were recorded. The poorly defined structure immediately to the south of the church wall (6.2) is slightly smaller than most of the house structures recorded elsewhere (measuring 8m long by 7.5m wide), but it may be related to them. As with all of the building listed in Table 2 above, it stands adjacent to the road dating back at least to the 1831-32 OS 6-inch map.

The final anomaly of interest is in a completely different location. The high resistance anomaly 6.5a appears to be a building surrounded by rubble (6.5). While it is impossible to give precise dimensions, it may have measured up to 20m long by 15m wide, marking it as amongst the largest structures detected in the landscape to date. It is located on the bank of the Dunluce Burn, along a portion of the waterway whose course has been unaltered since the 1st edition map. Traces of earlier channels (6.6 and



3D surface plots of rectangular enclosures detected during Dunluce resistance surveys. Top 16(a) Village Field enclosure Bottom 16(b) Anomaly 3.1 (Z axis is the strength of response in ohm. Z axis is reduced by a factor of 6 in both images).	 Centre for Archaeological Fieldwork	PROJECT: Dunluce geophysical survey 2012	
		CLIENT:  Northern Ireland Environment Agency	TITLE: 3D plots of Dunluce rectangular enclosures
		FIGURE: 16	

6.7) were detected close to this possible building. The low-lying location of this building is at variance with most of the probable 17th-century structures, and it does not appear to be positioned with reference to any of the roads. It may have also have been a larger building than many of the others, suggesting a different function. These factors, coupled with its location on the banks of the Burn may indicate that this is the remains of an industrial building, possibly even one of the documented medieval mills (Colin Breen 2012 pers. comm.). As with the rectangular enclosure in Area 3, ground penetrating radar may help to further define this structure.

3.2 Conclusion

The 2012 geophysical survey of the Dunluce landscape has shed yet more light on this important archaeological landscape. When combined with the previous body of research, it appears to confirm the survival of probable 17th-century structures beyond the environs of the Village Field and the castle itself, and strongly suggests that the roads associated with the village form the template for the later network. The images also suggest reasonably good survival of some of the 17th-century remains. It is anticipated that, when the study of the LiDAR dataset has been completed, still more information will be available to interpret some of the features imaged in the geophysical survey. This will, in turn, provide a multi-faceted and robust dataset to help inform the future management of the area. Moving away from the main focus of activity along the top of the ridge, the discoveries of the possible settlement sites at the base of the hill in Area 2, and the possible mill to the south of St. Cuthbert's Church in Area 6, add an additional element to the landscape, and provide fresh avenues for future study.

Bibliography

Breen, C., forthcoming 2012. *Dunluce Castle: History and Archaeology*, Four Courts, Dublin.

Breen, C., Murray, E. and Reid, G. 2011. Dunluce: A castle and lost town in North Antrim. *Archaeology Ireland* 25(3), 26-29.

Day, A. and McWilliams, P. 1992. *Ordnance Survey Memoirs of Ireland: Parishes of County Antrim V, 1830-5, 1836-8*. Institute of Irish Studies, Belfast.

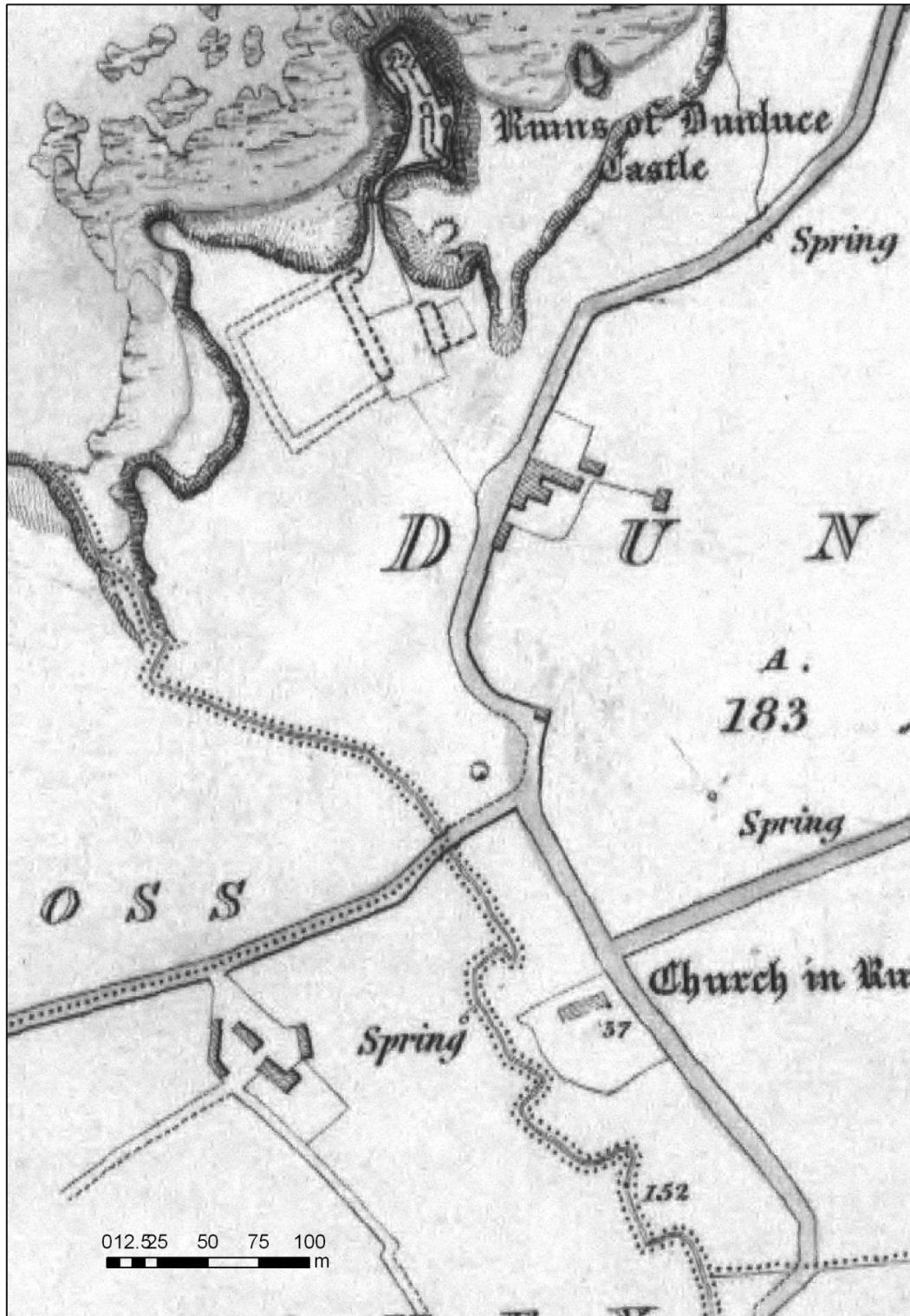
English Heritage 2008. *Geophysical Survey in Archaeological Field Evaluation*, Wyndeham Group, London.

Wilson, H.E., 1972. *British Regional Geology: Northern Ireland*, HMSO, Belfast.

Appendices.

(Excerpts from OS 6-inch maps depicting the Dunluce landscape)

- Appendix 1. 1st edition OS 6-inch map (1831-32).
- Appendix 2. 2nd edition OS 6-inch map (1853).
- Appendix 3. 3rd edition OS 6-inch map (1906).
- Appendix 4. 4th edition OS 6-inch map (1921).
- Appendix 5. 5th edition OS 6-inch map (1946-50).
- Appendix 6. Modern OS data.



Appendix 1. First edition OS 6-inch map (1831-32).



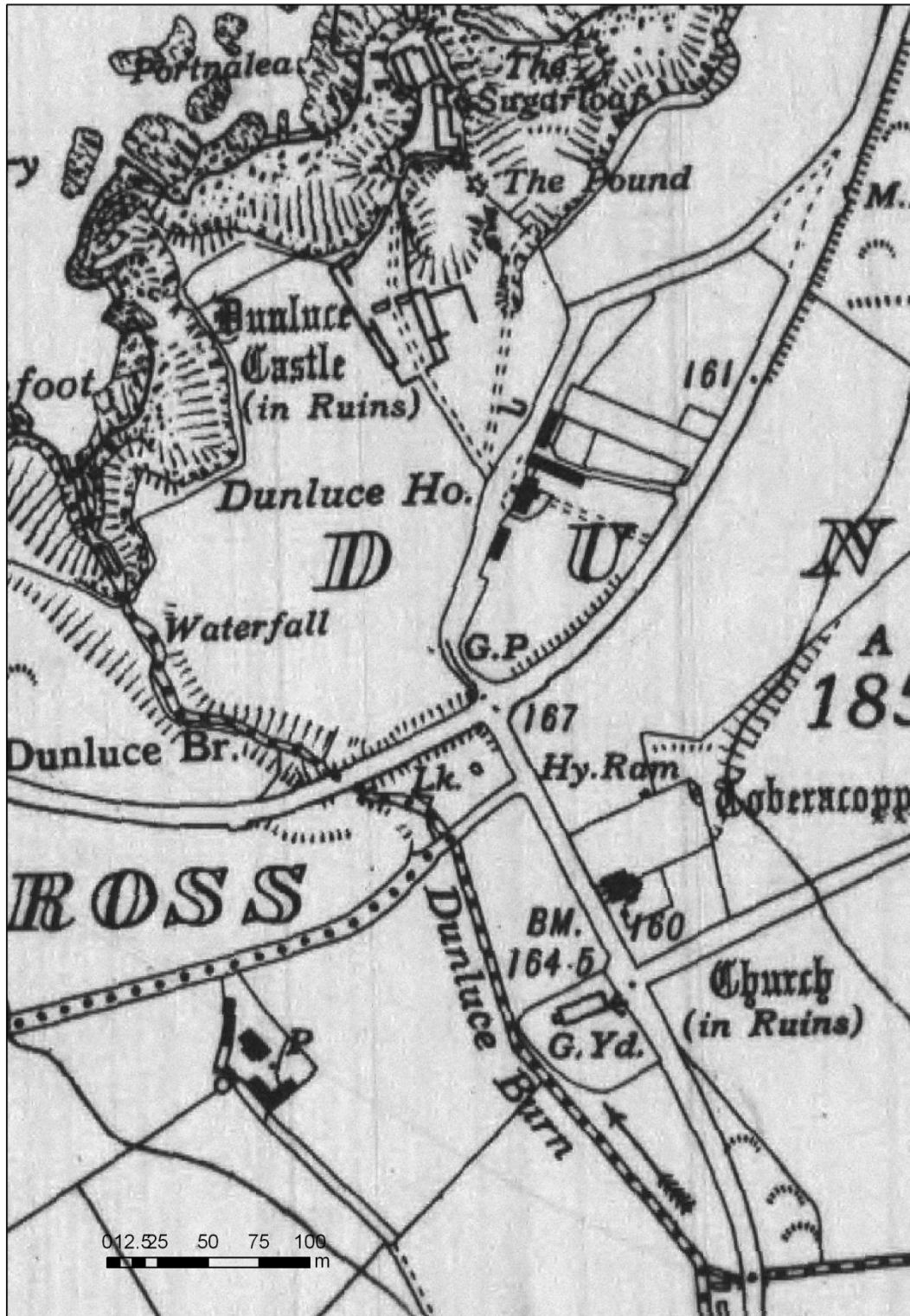
Appendix 2. 2nd edition OS 6-inch map (1853).



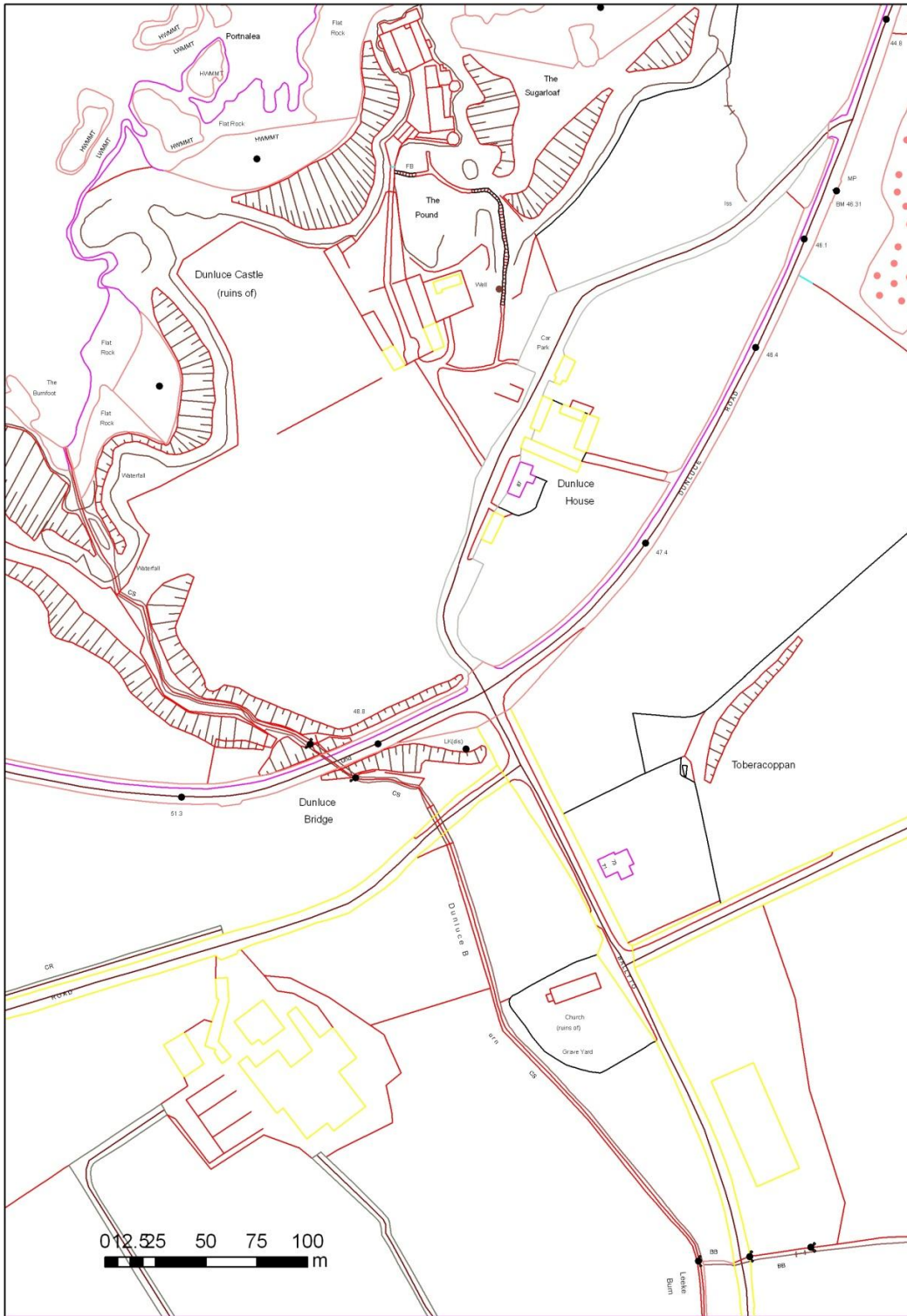
Appendix 3. 3rd edition OS 6-inch map (1906).



Appendix 4. 4th edition OS 6-inch map (1921).



Appendix 5. 5th edition OS 6-inch map (1946-50).



Appendix 6. Current digital OS data.