



Legend



Revisions:
 First Issue- 18/09/2017 RG
 Second Issue - 06/02/2018 DL
 Third Issue - 16/11/2018 RGO

Figure 5: LiDAR Data


Little Crow Solar Park, North Lincolnshire

Client: INRG Solar
 DRWG No: **P17-0718.11** Sheet No: - REV: **C**
 Drawn by: DL/RGO Approved by: GS
 Date: 16/11/2018
 Scale: 1:8,000 @ A3





Legend

 Approx. Site area

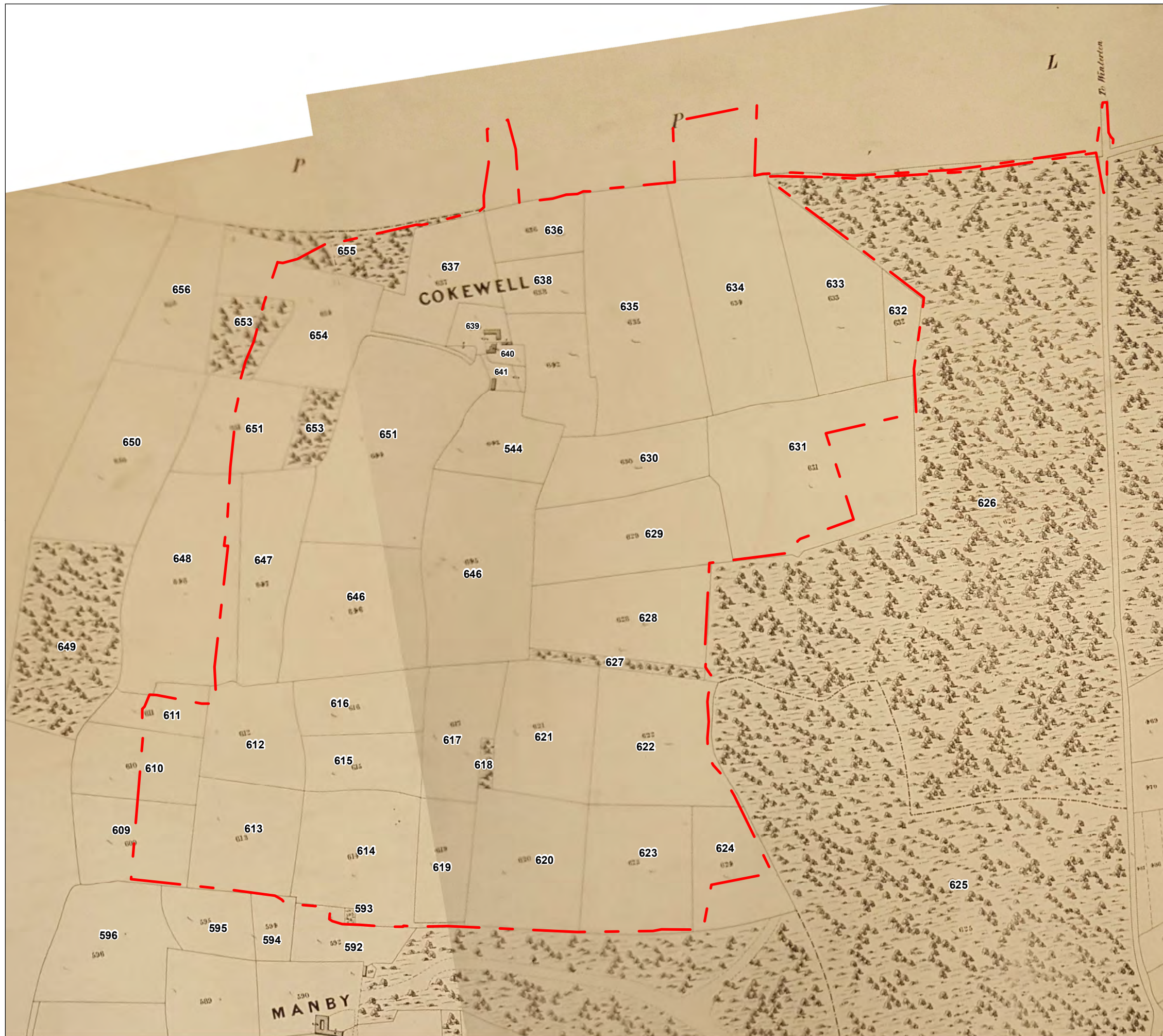
Revisions:
First Issue- 18/09/2017 RG
Second Issue - 06/02/2018 DL
Third Issue - 16/11/2018 RGO

Figure 6: 1824 Ordnance Survey Map


Little Crow Solar Park,
North Lincolnshire

Client: INRG Solar
DRWG No: **P17-0718.12** Sheet No: - REV:C
Drawn by: DL/RGO Approved by: GS
Date: 16/11/2018
Scale: 1:9,000 @ A3





Legend

 Approx. Site area

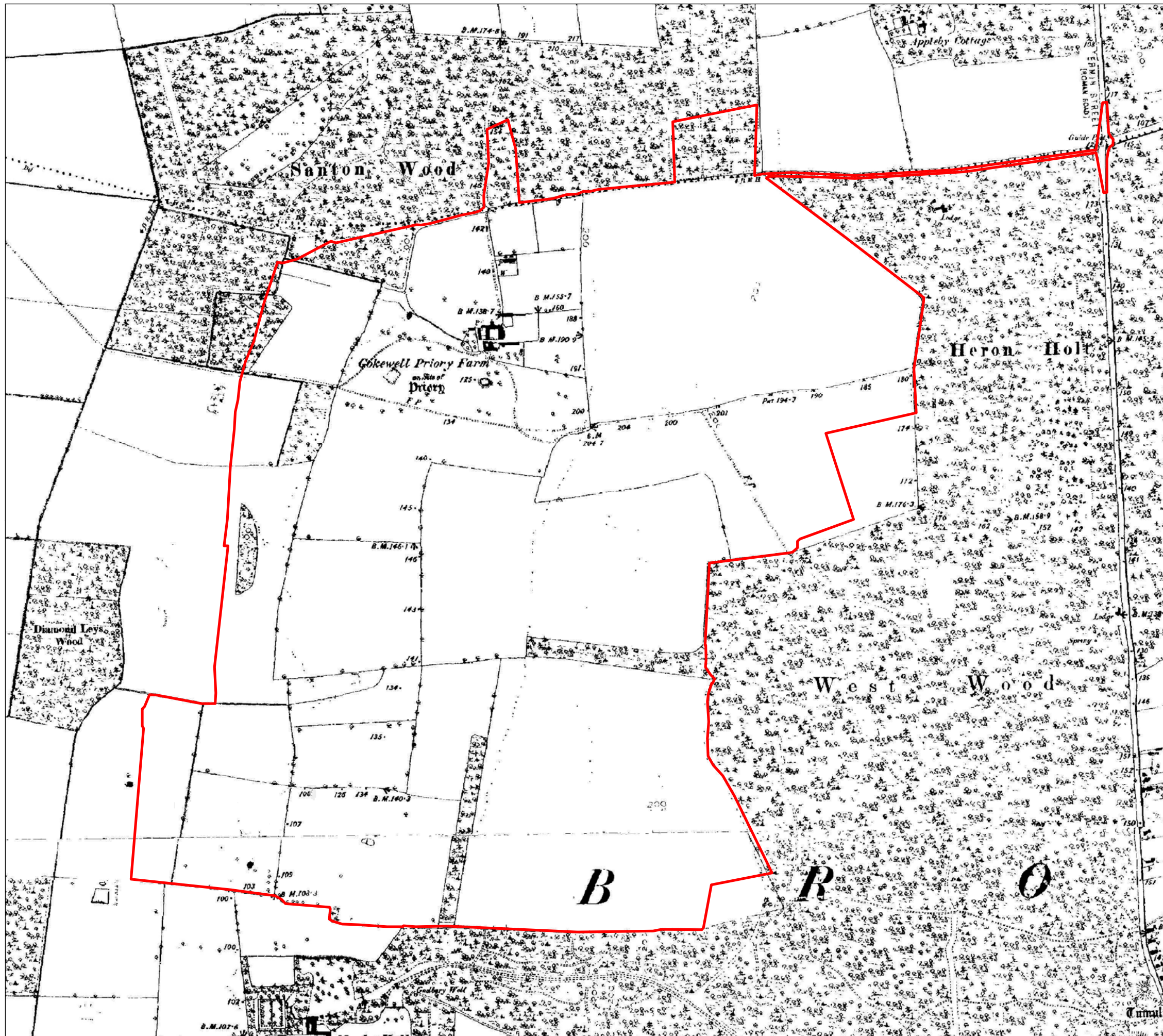
Revisions:
 First Issue- 18/09/2017 RG
 Second Issue - 06/02/2018 DL
 Third Issue - 16/11/2018 RGO

Figure 7: 1842 Broughton Tithe Map

Little Crow Solar Park,
 North Lincolnshire

Client: INRG Solar
 DRWG No: **P17-0718.13** Sheet No: - REV:C
 Drawn by: DL/RGO Approved by: GS
 Date: 16/11/2018
 Scale: 1:9,000 @ A3





Legend



Revisions:
First Issue- 18/09/2017 RG
Second Issue - 06/02/2018 DL
Third Issue - 16/11/2018 RGO

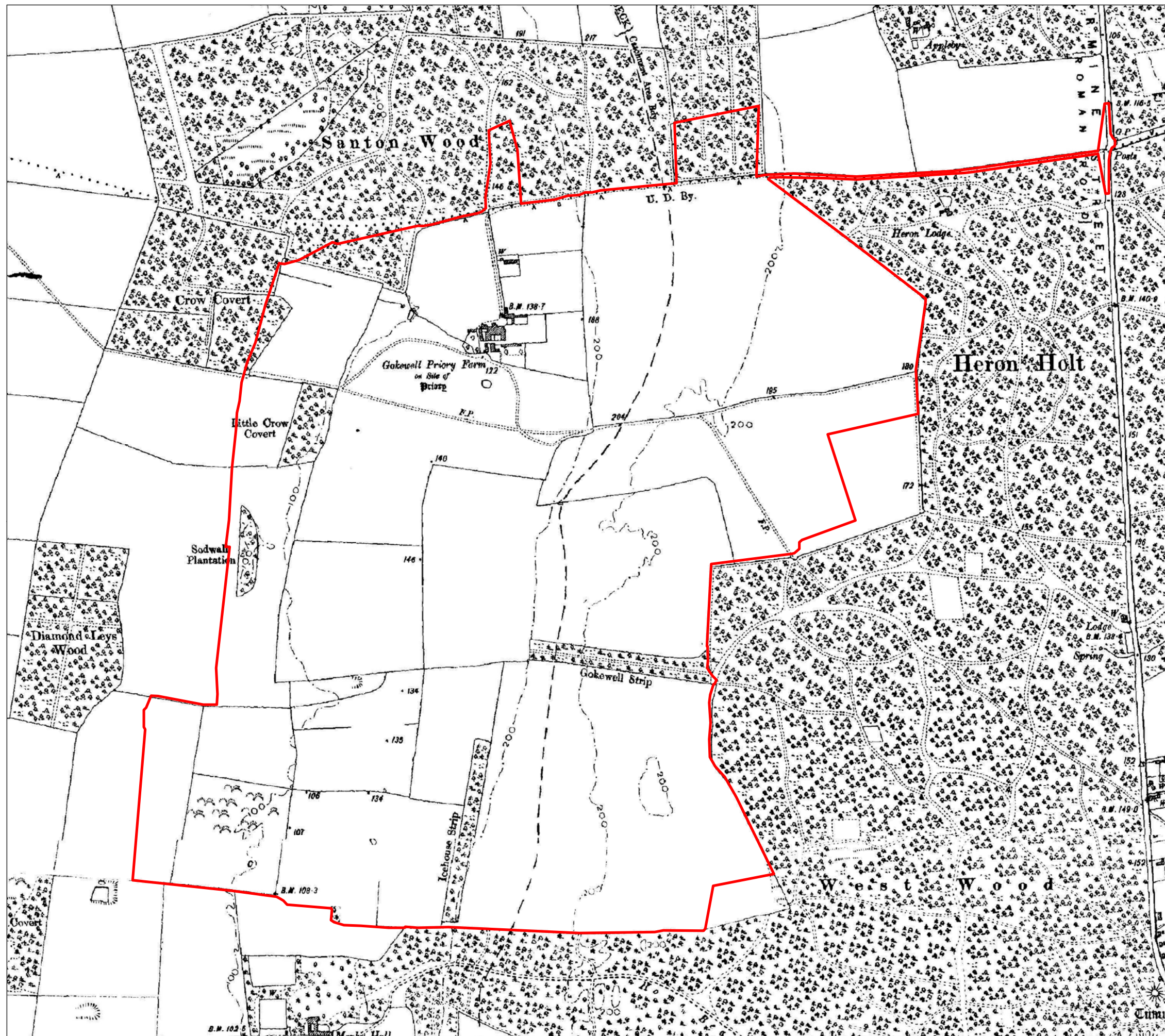
Figure 8: 1889 Ordnance Survey Map

Little Crow Solar Park,
North Lincolnshire

Client: INRG Solar
DRWG No: **P17-0718.14** Sheet No: - REV: C
Drawn by: DL/RGO Approved by: GS
Date: 16/11/2018
Scale: 1:9,000 @ A3

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Revisions:
First Issue- 18/09/2017 RG
Second Issue - 06/02/2018 DL
Third Issue - 16/11/2018 RGO

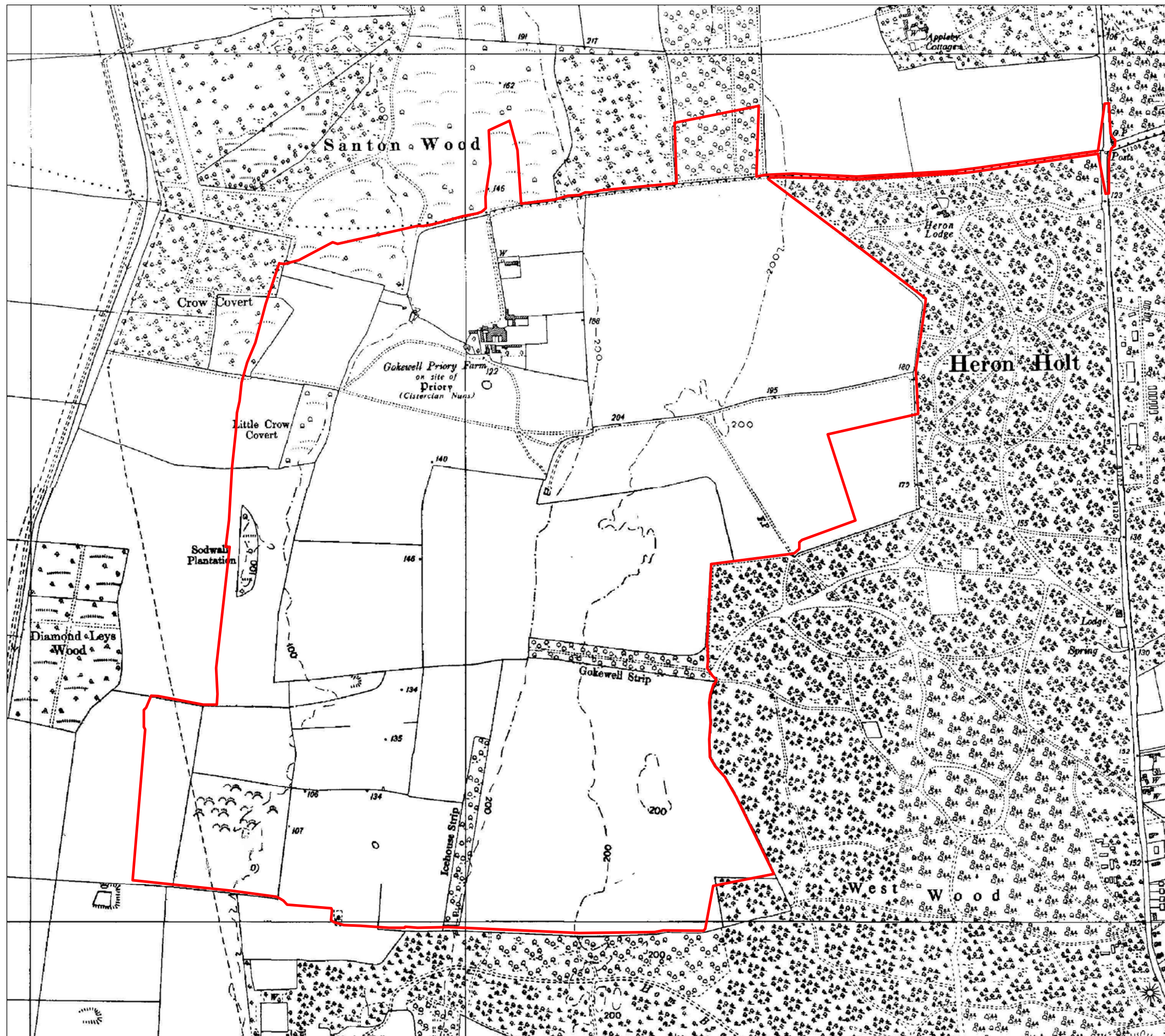
Figure 9: 1908 Ordnance Survey Map

Little Crow Solar Park, North Lincolnshire

Client: INRG Solar
DRWG No: **P17-0718.15** Sheet No: - REV:C
Drawn by: DL/RGO Approved by: GS
Date: 16/11/2018
Scale: 1:9,000 @ A3

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Revisions:
 First Issue- 18/09/2017 RG
 Second Issue - 06/02/2018 DL
 Third Issue - 19/11/2018 RGO

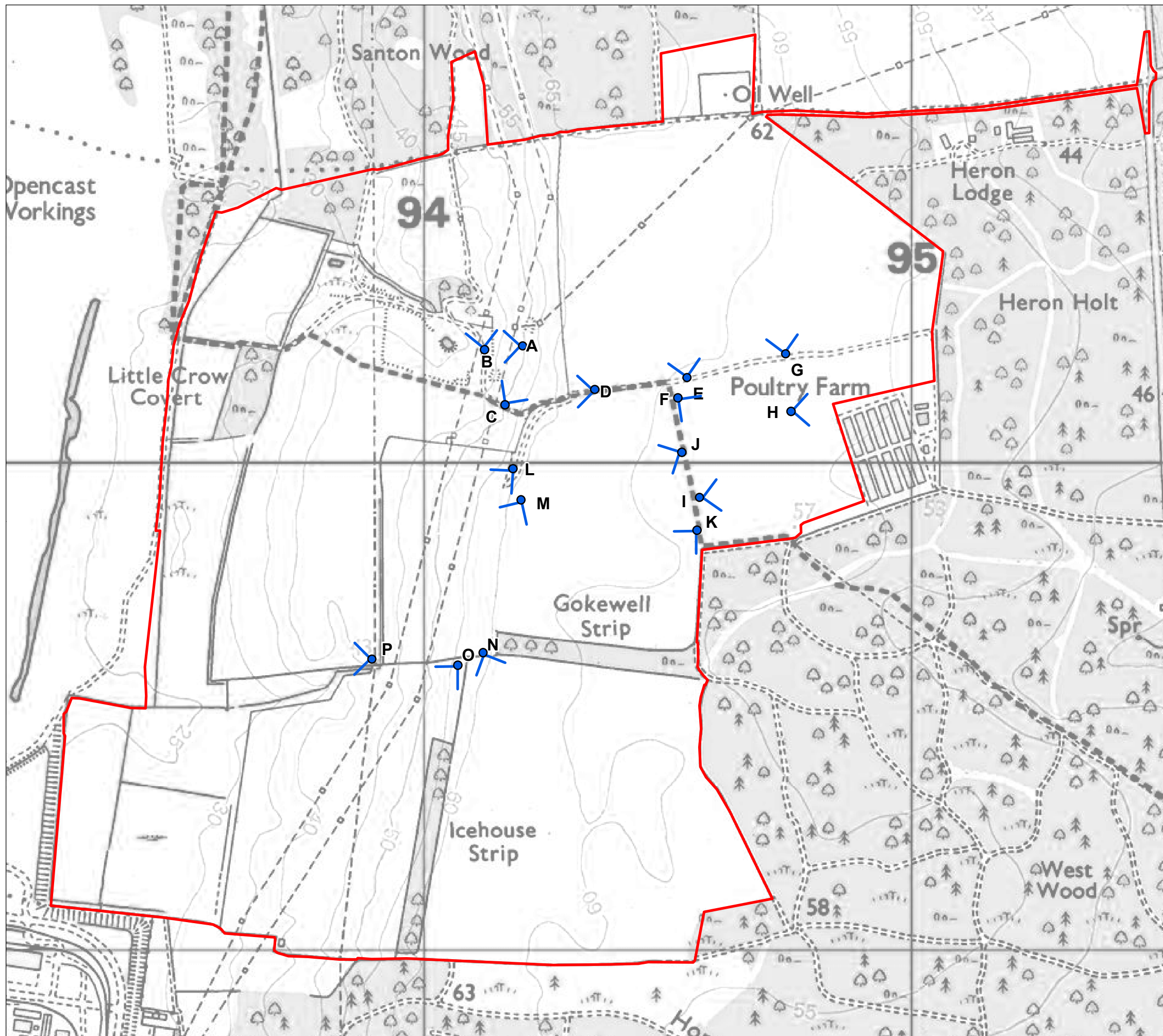
Figure 10: 1956 Ordnance Survey Map

Little Crow Solar Park, North Lincolnshire

Client: INRG Solar
 DRWG No: **P17-0718.16** Sheet No: - REV: C
 Drawn by: DL/RGO Approved by: GS
 Date: 19/11/2018
 Scale: 1:9,000 @ A3

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Planning





Legend

- Site
- A ↙ Photograph location and direction, and reference in text

Revisions:
 First Issue- 06/04/2018 - DL
 Second Issue- 19/11/2018 - RGO

Figure 11: Photograph Locations

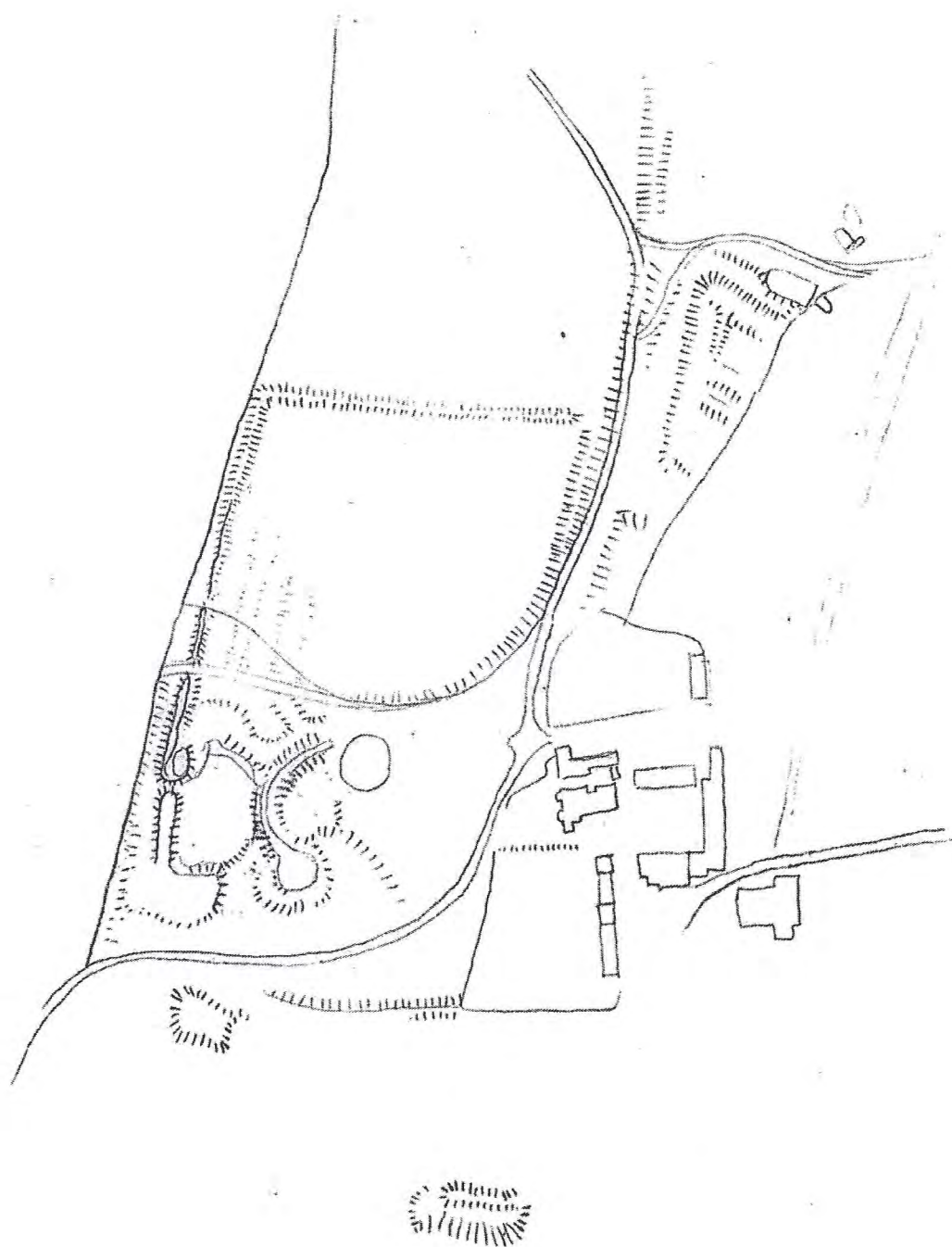
Little Crow Solar Park, North Lincolnshire

Client: INRG Solar
 DRWG No: **P17-0718.18** Sheet No: - REV:C
 Drawn by: DL/RGO Approved by: GS
 Date: 19/11/2018
 Scale: 1:8,000 @ A3

Pegasus
Planning

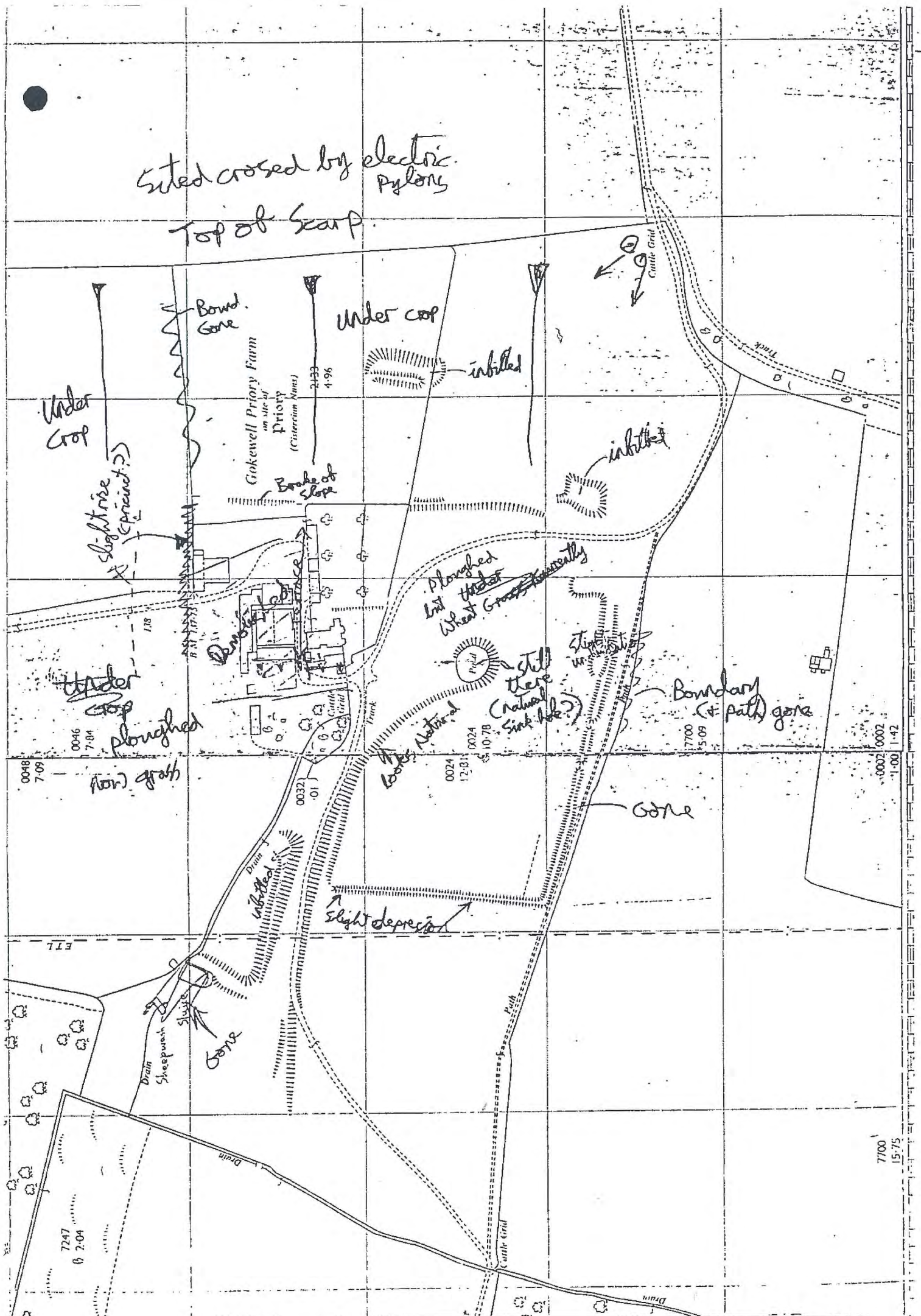


Appendix 3: Earthwork Survey



Sited crossed by electric pylons

Top of Scarp



Appendix 4: Non-Scheduling Report

1805.
ref. 10.

✓
general
review
14/3/98

NON-SCHEDULING REPORT

Site Gokewell Priory
Parish Broughton
District N Lincs
Grid Ref SE 9406 1032
SMR no. 1805
Evaluation Score 20

Visit Date ²⁴2/2/1998

Gokewell Priory was founded as a Cistercian nunnery by William de Alta Ripa in 1148 or 1185 and was dissolved in 1536. Pevsner notes some re-used 13th century stonework in the buildings of Gokewell Priory Farm. The SMR holds two good APs of standing earthworks surrounding the farm buildings together with a rough sketch plan of the site of unknown origin.

Unfortunately the farm buildings have now been demolished (although not cleared), and the surrounding fields turned over to arable, levelling the earthworks and filling in most of the depressions. The presumed precinct boundary is still traceable as a slight rise, depression or break of slope on all four sides, although not without several breaks. The site of the farm buildings, which is also thought to be the site of the convent buildings, is terraced into the rising ground to the east. As the western half of this area is built up ground, there may be very good archaeological survival underneath the later farm building remains.

It is proposed that a case for national importance cannot be made at this time given the lack of evidence of surviving remains. However, if it can be shown that remains of the convent buildings survive archaeologically, then the site should be reviewed and possibly scheduled.

Eric Instone MPPA
Date 4 March 1998

Appendix 5: Sources

Cartographic Sources

1824	Ordnance Survey map. County of Lincoln and parts adjacent
1842	Broughton Tithe Map. LA ref. I 291
1849	Broughton Enclosure Map. LA ref. LINDSEY AWARD/124
1887	25-inch Ordnance Survey map
1889-91	6-inch Ordnance Survey map
1907	25-inch Ordnance Survey map
1908	6-inch Ordnance Survey map
1948-50	6-inch Ordnance Survey map
1956	6-inch Ordnance Survey map
19565-67	25-inch Ordnance Survey map
1970	6-inch Ordnance Survey map
1972-79	1:10,000 Ordnance Survey map
1977	25-inch Ordnance Survey map
1978-95	1:10,000 Ordnance Survey map
1984	1:10,000 Ordnance Survey map

Documentary Sources

1852	Broughton Estate Sale Particulars
	Topographical Notes on Gokewell Priory. LA ref. AS/9/94
	Notebook O (relating to Gokewell Priory) LA ref. AS/9/13/11
	Broughton, Castlethorpe, Santon, Gokewell, Manby and Raventhorpe, General Survey and Valuation. LA ref. YARB/5/1/50 and YARB/5/1/33

For Bibliographic Sources, see footnotes in text

Aerial Photographic Sources

Oblique

Photo reference (NGR and Index number)	Film and frame number	Original number	Date	Film type		Map Reference (6 figure	What can you order?			
							Photocopy	Laser copy	Photographic copy	Digital copy
SE 9208 / 1	NMR 17389 / 19		02 NOV 1999	Colour slide	35 mm	SE 926085	Y	Y	Y	U
SE 9208 / 2	NMR 17389 / 20		02 NOV 1999	Colour slide	35 mm	SE 927087	Y	Y	Y	U
SE 9209 / 6	NMR 17389 / 21		02 NOV 1999	Colour slide	35 mm	SE 926090	Y	Y	Y	U
SE 9209 / 7	NMR 17389 / 22		02 NOV 1999	Colour slide	35 mm	SE 926090	Y	Y	Y	U
SE 9308 / 6	NMR 17396 / 12		02 NOV 1999	Black & white	70mm, 120,220	SE 930086	Y	Y	Y	U
SE 9308 / 7	NMR 17396 / 13		02 NOV 1999	Black & white	70mm, 120,220	SE 930086	Y	Y	Y	U
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SE 9409 / 2	NMR 28159 / 09		14 JUN 2011	Digital colour	35 mm	SE 942098	Y	Y	Y	U
SE 9409 / 3	NMR 28159 / 10		14 JUN 2011	Digital colour	35 mm	SE 942099	Y	Y	Y	U
SE 9409 / 4	NMR 28159 / 11		14 JUN 2011	Digital colour	35 mm	SE 941098	Y	Y	Y	U
SE 9409 / 5	NMR 28159 / 12		14 JUN 2011	Digital colour	35 mm	SE 941098	Y	Y	Y	U
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SE 9410 / 2	CAP 8330 / 56	RZ	28 MAR 1956	Black & white	Unknown	SE 942103	N	N	N	U
SE 9410 / 3	CAP 8330 / 57	RZ	28 MAR 1956	Black & white	Unknown	SE 942103	N	N	N	U
SE 9411 / 1	NMR 12851 / 29		17 JUL 1996	Black & white	70mm, 120,220	SE 948110	Y	Y	Y	U
SE 9411 / 2	NMR 12851 / 30		17 JUL 1996	Black & white	70mm, 120,220	SE 948110	Y	Y	Y	U
SE 9411 / 3	NMR 12845 / 23		17 JUL 1996	Colour slide	35 mm	SE 949110	Y	Y	Y	U
SE 9411 / 4	NMR 12845 / 24		17 JUL 1996	Colour slide	35 mm	SE 949110	Y	Y	Y	U
SE 9411 / 5	NMR 28159 / 14		14 JUN 2011	Digital colour	35 mm	SE 946110	Y	Y	Y	U
SE 9411 / 6	NMR 28159 / 15		14 JUN 2011	Digital colour	35 mm	SE 946111	Y	Y	Y	U

Total 21 records

Vertical

Sortie number	Library number	Camera position	Frame number	Held	Centre point	Run	Date	Sortie quality	Scale 1:	Focal length	Film details (in inches)	Film held by
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RAF/CPE/UK/1880	540	FP	1167	P	SE 937 108	2	06 DEC 1946	AC	12000	36	Black and White 8.25 x 7.5	NMR
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RAF/58/1096	1438	F21	28	P	SE 938 101	2	22 APR 1953	A	10000	20	Black and White 8.25 x 7.5	NMR
RAF/58/1096	1438	F21	29	P	SE 945 101	2	22 APR 1953	A	10000	20	Black and White 8.25 x 7.5	NMR
RAF/58/1934	2264	V	125	P	SE 946 094	13	12 JAN 1956	A	8000	6	Black and White 9 x 9	NMR
RAF/58/1934	2264	V	126	P	SE 941 091	13	12 JAN 1956	A	8000	6	Black and White 9 x 9	NMR
RAF/58/1934	2264	V	133	P	SE 939 104	14	12 JAN 1956	A	8000	6	Black and White 9 x 9	NMR
RAF/8/OTU/DYCE/D1300	6273	V	6045	P	SE 934 100	2	06 NOV 1944	AC	12200	14	Black and White 5 x 5	FDM
MAL/76036	7353	V	193	P	SE 947 102	4	06 JUN 1976	A	10000	6	Black and White 9 x 9	NMR
MAL/76036	7353	V	194	P	SE 938 102	4	06 JUN 1976	A	10000	6	Black and White 9 x 9	NMR
OS/67035	9281	V	238	P	SE 951 095	1	17 APR 1967	A	7500	12	Black and White 9 x 9	NMR

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OS/73195	11315	V	38	P	SE 937 091	3	17 MAY 1973	A	7500	12	Black and White 9 x 9	NMR
OS/93179	14385	V	18	P	SE 935 089	1	23 MAY 1993	A	7500	12	Black and White 9 x 9	NMR
OS/93179	14385	V	38	P	SE 934 104	2	23 MAY 1993	A	7500	12	Black and White 9 x 9	NMR
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OS/95259	14880	V	24	P	SE 945 106	1	10 OCT 1995	A	7500	12	Black and White 9 x 9	NMR
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OS/96594	20833	V	23	N	SE 945 094	1	05 JUN 1996	A	7600	12	Black and White 9 x 9	NMR
OS/98060	22574	V	30	N	SE 930 105	2	29 APR 1998	A	5100	12	Black and White 9 x 9	NMR
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OS/01531	23617	V	26	N	SE 948 100	1	11 MAY 2001	A	7600	12	Black and White 9 x 9	NMR

Total Sorties 17

Total Frames 46

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Technical Appendix 8.2

GEOPHYSICAL SURVEY REPORT



Little Crow

Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

GEOPHYSICAL SURVEY REPORT

GEOPHYSICAL SURVEY REPORT

Project name:
**Little Crow Solar Park,
Scunthorpe,
North Lincolnshire**

SUMO Job reference:
13201

Client:
Cotswold Archaeology
For:
INRG Solar (Little Crow) Ltd

Survey date:
**23 July - 9 August &
13 August - 4 September 2018**

Report date:
27 September 2018

Field co-ordinator:
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Tom Cockcroft MSc

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Report written by:
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Figure 08	1:1500	Magnetometer Survey - Greyscale Plots - Viewport 3
Figure 09	1:1500	Magnetometer Survey - Interpretation - Viewport 3
Figure 10	1:1500	Magnetometer Survey - Greyscale Plots - Viewport 4
Figure 11	1:1500	Magnetometer Survey - Interpretation - Viewport 4
Figure 12	1:1500	Magnetometer Survey - Greyscale Plots - Viewport 5
Figure 13	1:1500	Magnetometer Survey - Interpretation - Viewport 5

1 SUMMARY OF RESULTS

A detailed magnetometer survey was conducted over approximately 214 ha of arable land near Scunthorpe, Lincolnshire. A ring ditch has been identified in the data, along with a few other ditch-like anomalies of possible archaeological origin. Several linear responses are of uncertain origin and could be archaeological, agricultural or natural. Evidence of fracturing within the limestone geology is visible, along with further areas of natural magnetic variation. Former field boundaries and ploughing effects have been mapped, as well as underground services and areas of magnetic disturbance.

2 INTRODUCTION

2.1 Background synopsis

SUMO Geophysics Ltd were commissioned to undertake a geophysical survey of an area outlined for solar farm development. This survey forms part of an archaeological investigation being undertaken by **Cotswold Archaeology** on behalf of **INRG Solar (Little Crow) Ltd**.

2.2 Site details

NGR / Postcode	SE 941 150 / DN20 0BQ
Location	The site is located c.5km to the east of Scunthorpe, Lincolnshire, to the north-west of the village of Broughton. Areas of woodland surround the site on all sides.
HER/SMR	Lincolnshire
District	North Lincolnshire
Parish	The site straddles two parish boundaries; Broughton CP and Appleby CP
Topography	Gently sloping down from east to west
Current Land Use	Arable
Geology	Solid: Charmouth Mudstone Formation - mudstone is predominantly recorded across the west of the site, with bands of Pecten Ironstone - ironstone, Marlstone Rock Formation - ferruginous limestone and ferruginous sandstone flanking either side. Bands of Whitby Mudstone Formation - mudstone, Northampton Sand Formation - sandstone, Grantham Formation - sandstone, siltstone and

mudstone and Lower Lincolnshire Limestone Member - limestone run down the centre of the site on a north-south alignment. The geology across the east of the site comprises Kirton Cementstone Beds - mudstone and limestone (interbedded) and Scawby Limestone - limestone and argillaceous rocks
Superficial: Sutton Sand Formation - sand is recorded across the west of the site and in small pockets across the western half (BGS 2018).

Soils

Newport 1 Association (551d) - deep well drained sandy and coarse loamy soils (SSEW 1983).

Archaeology

Three potential prehistoric records from the NLHER have been identified within the site. These include the site of a possible round barrow (MLS22718) located on aerial photographs. The data, function and archaeological provenance of this cropmark have not been proven through fieldwork. The NLHER also records the findspot of a number of flints (MLS6695) and the posited route of a prehistoric track (MLS20003), called the Jurassic Way, which runs from Winteringham to Lincoln. The line of the former Ermine Street Roman road (MLS100) follows the line of the B1027, a small portion of which is included in the site boundary at its eastern-most extent. It is possible that the site comprised part of an agricultural landscape during the Roman period. Within the northern part of the site is the location of the former Gokewell Priory, a small Cistercian nunnery founded in the 12th century (MLS1805, ELS800, ELS2566, ELS4211). The priory was a minor establishment with a small community of nuns. Potential below-ground remains relating to a former WWII Heavy Anti-Aircraft Battery (MLS21408) could survive within the eastern portion of the site (Pegasus 2018).

Survey Methods

Magnetometer survey (fluxgate gradiometer)

Study Area

c. 214 ha

2.3 Aims and Objectives

To locate and characterise any anomalies of possible archaeological interest within the study area.

3 METHODS, PROCESSING & PRESENTATION

3.1 Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage), the Chartered Institute for Archaeologists (CIfA 2014) and the European Archaeological Council (EAC 2016).

3.2 Survey methods

Detailed magnetic survey was chosen as an efficient and effective method of locating archaeological anomalies.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1.0m	0.25m

More information regarding this technique is included in Appendices A, B and C.

3.3 Data Processing

The following basic processing steps have been carried out on the data used in this report:

De-stripe; de-stagger; interpolate

3.4 Presentation of results and interpretation

The presentation of the results includes a 'minimally processed data' and a 'processed data' greyscale plot. Magnetic anomalies are identified, interpreted and plotted onto the 'Interpretation' drawings.

When interpreting the results, several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to other existing evidence,

the anomalies will be given specific categories, such as: *Abbey Wall* or *Roman Road*. Where the interpretation is based largely on the geophysical data, levels of confidence are implied, for example: *Probable*, or *Possible Archaeology*. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification *Possible*.

4 RESULTS

The survey has been divided into twenty survey areas (Areas 1-20) and specific anomalies have been given numerical labels [1] [2] which appear in the text below, as well as on the Interpretation Figure(s).



Plan showing boundaries of individual survey areas 1-20.

4.1 *Probable Archaeology*

- 4.1.1 A small, circular anomaly [1] in Area 14 is the only response of 'probable' archaeological origin that has been identified in the data. The anomaly is indicative of a ring ditch which could be associated with a former barrow, though does not correspond with the location of the possible barrow (MLS22718) identified on aerial photographs.

4.2 *Possible Archaeology*

- 4.2.1 A long curvilinear anomaly [2] can be seen in Area 7 and has been assigned a 'possible' archaeological origin. The response is ditch-like in its characteristics, hence its classification as being possibly archaeological; however, there is no further evidence of archaeological activity within the area. It is possible that the response could relate to a former field boundary, but none are visible on historic mapping, hence the possible archaeological interpretation.
- 4.2.2 Similar ditch-type anomalies [3-4] have been identified in Areas 17 and 20. These are both of uncertain antiquity; the responses are very straight which suggests they may have a more recent origin and could relate to former field boundaries. However, no boundaries are visible in these locations on available historic maps.

4.3 *Uncertain*

- 4.3.1 A series of linear and rectilinear anomalies [5] can be seen throughout Area 20. Although they have the appearance of archaeological enclosures, the pattern is very similar to that typically produced by limestone fracturing and therefore their exact origin cannot be determined with confidence. The anomalies have therefore been assigned to the category *Uncertain Origin*.
- 4.3.2 A small rectilinear feature with closely spaced linear anomalies within [6] has been identified in the south-west of Areas 18 and 19. The anomaly is of uncertain origin, and an archaeological explanation is thought unlikely. The feature could instead be a result of more recent agricultural activity.

4.3.3 Several linear trends [7] and other ditch-like anomalies are present in the data and their interpretation is subjective. They could be the result of former ditches though their exact origin remains unclear; they may have archaeological, natural or agricultural origins.

4.4 *Former Field Boundary*

4.4.1 A number of linear anomalies [8-16] have been identified across the site and are associated with former field boundaries, visible on available historic OS mapping dating from 1889. Other linear anomalies in Areas 11-12 and 16 may be a result of former boundaries, though no such features are visible in these locations on historic mapping; hence the conjectural interpretation.

4.5 *Agricultural – Ploughing*

4.5.1 Closely spaced, parallel linear anomalies have been identified throughout the site. These are a result of agricultural activity.

4.6 *Natural / Geological / Pedological / Topographic*

4.6.1 A large number of amorphous, sinuous and curving responses have been identified in several areas. These are of natural origin and are a result of localised variations in the underlying geology.

4.7 *Ferrous / Magnetic Disturbance*

4.7.1 Magnetic disturbance is visible across Areas 3, 4, 5, 6 10, 11, 12 and 15, but have not been marked on the interpretation figures so as not to detract from other visible anomalies. This disturbance is a result of the spreading of modern 'green waste' fertilisers which contain large numbers of small ferrous items and metal contaminants and has the potential to mask weaker, more ephemeral responses. The ironstone geology underling the site is also likely to be contributing to the enhanced magnetic responses in these areas.

4.7.2 Strong bipolar linear anomalies running across Areas 6, 7, 13-14 and 20 are related to underground services, such as pipes or cables.

- 4.7.3 Ferrous responses close to boundaries are due to adjacent fences and gates. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data and are characteristic of small pieces of ferrous debris (or brick / tile) in the topsoil; they are commonly assigned a modern origin. Only the most prominent of these are highlighted on the interpretation diagram.

5 DATA APPRAISAL & CONFIDENCE ASSESSMENT

- 5.1 Historic England guidelines (EH 2008) Table 4 states that the average magnetic response on limestone, mudstone and sandstone can be variable. The results from this survey indicate the presence of a ring ditch, along with possible archaeological ditches and several linear trends of uncertain origin. However, the 'green waste' fertiliser and effects of ferruginous geology has the potential to mask weaker features, with only the strongest of features being visible. In areas where there is geological cracking, a medium level of confidence has been assigned.

6 CONCLUSION

- 6.1 The survey at Little Crow has revealed evidence of a ring ditch along with linear anomalies which may be related to former ditches. Several linear trends are of uncertain origin, though an archaeological explanation cannot be ruled out entirely. Former field boundaries and evidence of ploughing can be seen in the data, along with natural fracturing in the limestone geology and other areas of localised magnetic variations. Green waste fertiliser appears to have been spread across several fields though uncertain linear features can still be seen. The remaining responses are modern and include underground services and disturbance from nearby ferrous objects such as fences and pylons.

7 REFERENCES

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