Little Crow
Solar Park

Nationally Significant Infrastructure Project in the Energy Sector

ENVIRONMENTAL IMPACT ASSESSMENT SCOPING REPORT

On behalf of INRG Solar (Little Crow) Ltd

December 2018

ENVIRONMENTAL IMPACT ASSESSMENT

SCOPING REPORT

LITTLE CROW SOLAR PARK

INRG SOLAR (LITTLE CROW) LTD

REGULATION 10(3) INFRASTRUCTURE PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 2017

Pegasus Group

First Floor | South Wing | Equinox North | Great Park Road | Almondsbury | Bristol | BS32 4QL

T 01454 625945 | **F** 01454 618074 | **W** www.pegasusgroup.co.uk

Birmingham | Bracknell | Bristol | Cambridge | Cirencester | East Midlands | Leeds | Liverpool | London | Manchester

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

©Copyright Pegasus Planning Group Limited 2011. The contents of this document must not be copied or reproduced in whole or in part without the written consent of Pegasus Planning Group Limited

CONTENTS:

Page No:

1.	INTRODUCTION	1
2.	METHODOLOGY	5
3.	THE DEVELOPMENT SITE	28
4.	DEVELOPMENT PROPOSAL	35
5.	THE LEGISLATIVE CONTEXT, CLIMATE CHANGE, ENERGY POLICY & GUIDANCE	41
6.	LANDSCAPE AND VISUAL IMPACT	52
7.	ECOLOGY AND NATURE CONSERVATION	75
8.	CULTURAL HERITAGE AND ARCHAEOLOGY	99
9.	TRANSPORT AND TRAFFIC	114
10.	AGRICULTURE	121
11.	SOCIO ECONOMICS ISSUES	128

APPENDICES

1. INTRODUCTION

APPENDIX 1.1 SITE LOCATION PLAN

APPENDIX 1.2 COPY OF NORTH LINCOLNSHIRE INFORMAL PRE-APPLICATION RESPONSE

2. ASSESSMENT SCOPE AND METHODOLOGY

APPENDIX 2.1: AIR QUALITY REPORT

APPENDIX 2.2: PHASE 1 GROUND CONDITIONS REPORT

APPENDIX 2.3: FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY REPORT

3. THE DEVELOPMENT SITE AND ITS ENVIRONS

THERE ARE NO APPENDICES FOR CHAPTER 3

4. DEVELOPMENT PROPOSAL

APPENDIX 4.1 INDICATIVE DRAWING PACK

5. THE LEGISLATIVE CONTEXT, CLIMATE CHANGE, ENERGY POLICY AND GUIDANCE

THERE ARE NO APPENDICES FOR CHAPTER 5

6. LANDSCAPE AND VISUAL IMPACT

APPENDIX 6.1 SITE CONTEXT

APPENDIX 6.2 TOPOGRAPHY

APPENDIX 6.3 LVIA VIEWPOINTS

APPENDIX 6.4 ENVIRONMENTAL DESIGNATIONS

APPENDIX 6.5 LANDSCAPE CHARACTER AREAS

7. ECOLOGY AND NATURE CONSERVATION

APPENDIX 7.1 COPY OF NATURAL ENGLAND'S INFORMAL PRE-APP RESPONSE

APPENDIX 7.2 PHASE 1 HABITAT MAP AND TARGET NOTES

APPENDIX 7.3 DESIGNATED SITES FOR NATURE CONSERVATION WITH 1KM

APPENDIX 7.4 EXTENDED PHASE 1, ARABLE PLANTS, GREAT CRESTED NEWTS & WATER VOLE SURVEY REPORT (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

APPENDIX 7.5 WINTERING BIRDS SURVEY (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

APPENDIX 7.6 BREEDING BIRDS SURVEY (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

APPENDIX 7.7 BAT ACTIVITY SURVEY (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

8. CULTURAL HERITAGE AND ARCHAEOLOGY

APPENDIX 8.1	LAND AT SANTON, HIGH SANTON, SCUNTHORPE HERITAGE BASELINE (PEGASUS GROUP, NOVEMBER 2018).
APPENDIX 8.2	LITTLE CROW, SANTON, NORTH LINCOLNSHIRE – GEOPHYSICAL SURVEY REPORT (SUMO, SEPTEMBER 2018).
APPENDIX 8.3	LITTLE CROW SOLAR PARK, SCUNTHORPE, NORTH LINCOLNSHIRE – ARCHAEOLOGICAL WATCHING BRIEF (COTSWOLD ARCHAEOLOGY, NOVEMBER 2018).
APPENDIX 8.4	LITTLE CROW SOLAR PARK, SCUNTHORPE, NORTH LINCOLNSHIRE – ARCHAEOLOGICAL FIELDWALKING SURVEY (COTSWOLD ARCHAEOLOGY, NOVEMBER 2018).

9. TRANSPORT AND TRAFFIC

APPENDIX 9.1	PROPOSED STUDY AREA
APPENDIX 9.2	ATC DATA DECEMBER 2017
APPENDIX 9.3	TRANSPORT STATEMENT (TPA, NOVEMBER 2018)

10. AGRICULTURE

APPENDIX 10.1	PROVISIONAL ALC AROUND SCUNTHORPE

11. SOCIO ECONOMIC

THERE ARE NO APPENDICES FOR CHAPTER 11

1. INTRODUCTION

The Proposals

1.1 INRG Solar (Little Crow) Ltd ["the developer"] is proposing a renewable led energy scheme on land to the east of Steel Works site at Scunthorpe, North Lincolnshire.

1.2 The main elements of the development is the construction, installation, operation and decommissioning of a ground mounted solar park with a maximum design capacity of up to 150MWp (megawatts peak) and up to 90 Megawatts of battery-based electricity storage facility. There will also be electrical connection infrastructure and the point of connection into the local electricity grid is directly to the 132KV electricity overhead pylon which already runs through the development site.

1.3 A site location plan of the development area is provided at Appendix 1.1.

APPENDIX 1.1: SITE LOCATION PLAN

The Regulations

1.4 As the development will generate over 50MWp of energy it is a nationally significant infrastructure project (NSIP), and therefore requires a Development Consent Order (DCO) under the Planning Act 2008. The development is categorised as a 'schedule 2' development under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017[1] (Schedule 2, Paragraph 3. Energy industry (a) industrial installations for the production of electricity, steam and hot water (projects not included in Schedule 1 to these Regulations). Regulation 3(1) identifies how Schedule 2 development are likely to have significant effects on the environment by virtue of factors such as its nature, size or location.

1.5 In consideration of the footprint of development, the developer has voluntarily determined that an Environmental Impact Assessment ["EIA"] will be required and will be submitting an Environmental Statement with the Development Consent Order application for the development.

[1] "The 2017 Regulations"

Purpose of the EIA Scoping Report

1.6 The purpose of this EIA Scoping Report is to ensure that the EIA accompanying the DCO application is focused on the key impacts likely to give rise to significant adverse effects. As well as identifying aspects to be considered in the EIA this document also identifies those aspects that are not considered necessary to assess further. As NSIP projects are typically associate with long lead in times, this Scoping Report has been prepared following a drafting of a working Environmental Statement. This has allowed the developer and it experienced team of environmental consultants to evolve the preliminary design of the scheme based on 'hands on' technical assessments.

1.7 North Lincolnshire Council have provided informal pre-application advice over the development and this includes their guidance ever the structure of the Environmental Statement.

APPENDIX 1.2: NORTH LINCOLNSHIRE INFORMAL PRE-APPLICATION ADVICE

Requirement of Scoping Report

1.8 Regulation 10(3) of the 2017 Regulations states that a request for a scoping opinion must include:

> *(a) a plan sufficient to identify the land;*
>
> *(b) a description of the proposed development, including its location and technical capacity;*
>
> *(c) an explanation of the likely significant effects of the development on the environment; and*
>
> *(d) such other information or representations as the person making the request may wish to provide or make.*

1.9 The guidance presented in Planning Inspectorate Advice Note 7 has also been taken into consideration in the preparation and presentation of this Scoping Report.

1.10 In accordance with the 2017 Regulations, this EIA Scoping Report contains:

- information to identify the location of the proposed development;

- a brief description of the nature and purpose of the proposed development and its possible effects on the environment; and
- information and representations from the developer on the aspects of the proposed development and environment that are not considered necessary to assess further.

1.11 The developer invites consultees to comment on the Scoping Report as a whole together with the following questions:

- What environmental information do you hold or are aware of that will assist in the EIA described here?
- Do you agree with the proposed approach for baseline collection, prediction and significance assessment?
- Are there any key issues or possible effects which have been omitted?
- Do you agree with the list of issues to be scoped out, and the rationale behind the decision?

1.12 This report is structured to provide information on the individual factors which require consideration under regulation 10(3) of the 2017 Regulations. The Scoping Report presents the findings of an initial appraisal of the likely environmental effects of the proposed development on the receiving environment, based on the current understanding of the baseline conditions. The report identifies the potential for likely significant effects with reference to: the current understanding of baseline sensitivity; the proposed approach to further baseline data collection (where required); issues that can be scoped out from further assessment; issues that require further assessment on basis of potential for significant effect; and the methodology proposed for the assessment of significant environmental effects in each case. The Scoping Report comprises a Main Written Statement (this statement) supported by Technical Appendices.

The Project Team

1.13 INRG Solar (Little Crow) Ltd is advised by a team of experienced and competent environmental consultants. A statement will accompany the Environmental Statement that will outline the relevant experience and qualifications or the experts.

1.14 The preliminary consultants that have been involved with project to date are: -

- Pegasus Group - lead planning consultant, also providing planning advice, technical assessments of environment in terms of landscape; socio economic and coordinating the EIA
- Clarkson and Woods Ecological Consultants – is providing ecological and nature conservation advice
- Transport Planning Associates - is providing technical input with regards to traffic and access
- Cotswold Archaeology – is providing technical input with regards to heritage and archaeology
- Kernon Countryside Consultants and Askew Land & Soil – providing technical input on agriculture and agricultural land
- Clive Onions Ltd - drainage and flooding
- Integrale - ground conditions
- Clemet Acoustics - acoustics
- Bureau Veritas - air quality and carbon saving
- Barton Hyett Associates - arboriculture
- SMS plc - network and network constraints

2. METHODOLOGY

2.1 This section sets out the approach that would be taken to complete the EIA of the proposed development. Chapter 2 of the Environmental Statement will explain the everchanging methodology that will be applied to all the technical chapters of the Environmental Statement.

2.2 This chapter is supported by the following appendices: -

- Appendix 2.1: Air Quality Report
- Appendix 2.2: Phase 1 Ground Conditions Report
- Appendix 2.3: Flood Risk Assessment and Drainage Strategy Report

GENERAL APPROACH TO ENVIRONMENTAL STATEMENT

2.3 The Environmental Statement must contain the information specified in regulation 18(3) and must meet the requirements of Regulation 18(4). It must also include any additional information specified in Schedule 4 to the 2017 Regulations which is relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

2.4 Regulation 18(3) states: -

> (3) An environmental statement is a statement which includes at least—
>
> (a) a description of the development comprising information on the site, design, size and other relevant features of the development;
>
> (b) a description of the likely significant effects of the development on the environment;
>
> (c) a description of any features of the development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
>
> (d) a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;

> (e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and
>
> (f) any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

2.5 Schedule 4 states: -

> 1. A description of the development, including in particular: (a) a description of the location of the development; (b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; (c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.
>
> 2. A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.
>
> 3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.
>
> 4. A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example

greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.

5. A description of the likely significant effects of the development on the environment resulting from, inter alia: (a) the construction and existence of the development, including, where relevant, demolition works; (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; (g) the technologies and the substances used. The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC(a) and Directive 2009/147/EC(b).

6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and

operational phases. prevented, reduced or offset, and should cover both the construction and operational phases.

8. A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU(c) of the European Parliament and of the Council or Council Directive 2009/71/Euratom(d) or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.

9. A non-technical summary of the information provided under paragraphs 1 to 8.

10. A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.

2.6 Reflecting on the above, the Environmental Statement will comprise the following information:

- A description of the development comprising information about the site including the nature, size and scale of the development including details on its construction, operation, management and decommissioning;
- The data necessary to identify and assess the main effects which the development is likely to have on the environment;
- A description of the likely significant effects of the development covering, direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects, explained by reference to the development's possible effect on cultural and archaeological heritage, landscape and the interaction between any of the foregoing material assets (as appropriate).

- Where significant adverse effects are identified with respect to any of the foregoing, mitigation measures will be proposed in order to avoid, reduce or remedy those effects;
- A summary in non-technical language of the information specified above; and
- A statement outlining the relevant experience of the experts who have undertaken the assessment and drafted the technical chapters within the Environmental Statement.

CONSIDERATION OF ALTERNATIVES

2.7 The 2017 Regulations do not require an applicant to consider alternatives. However, where alternatives have been considered, paragraph 2 of Schedule 4 requires the applicant to include in their Environmental Statement a description of the reasonable alternatives studied and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

2.8 The Environmental Statement will therefore include a discrete section that provides details of the alternatives considered and the reasoning for the selection of the chosen scheme, including a comparison of the environmental effects.

ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

2.9 The content of the Environmental Statement will be based on the following:

- Review of the baseline situation through existing information, including data, reports, site surveys and desktop studies;
- Consideration of the relevant National Policy Statement (NPSs), National Planning Policy Framework (NPPF) and accompanying National Planning Practice Guidance (NPPG), and the statutory extant and emerging development plan policies;
- Consideration of potential sensitive receptors;
- Identification of likely significant environmental effects and an evaluation of their duration and magnitude;
- Expert opinion;

- Modelling;
- Use of relevant technical and good practice guidance; and
- Specific consultations with appropriate bodies.

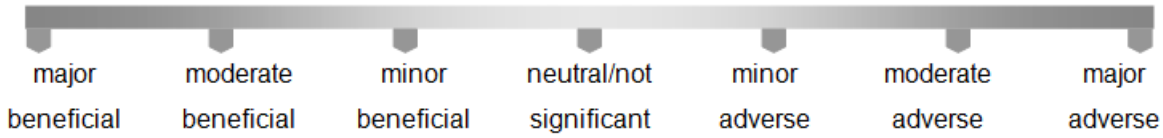
2.10 Environmental effects will be evaluated with reference to definitive standards and legislation where available. Where it has not been possible to quantify effects, assessments will be based on available knowledge and professional judgment.

DETERMINING SIGNIFICANCE

2.11 The purpose of the Environmental Impact Assessment is to identify the likely 'significance' of environmental effects (beneficial or adverse) arising from a development. In broad terms, environmental effects are described as:

- Adverse – detrimental or negative effects to an environmental resource or receptor;
- Beneficial – advantageous or positive effect to an environmental resource or receptor; or
- Negligible – a neutral effect to an environmental resource or receptor.

2.12 It is proposed that the significance of environmental effects (adverse, negligible/neutral or beneficial) would be described in accordance with the following 7-point scale: -



2.13 Significance reflects the relationship between two factors:

- The magnitude or severity of an effect (i.e. the actual change taking place to the environment); and
- The sensitivity, importance or value of the resource or receptor.

2.14 The broad criteria for determining magnitude are set out in Table 2.1.

Table 2.1: Degrees of Magnitude and their Criteria

Magnitude of Effect	Criteria
High	Total loss or major/substantial alteration to elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.
Medium	Loss or alteration to one or more elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.
Low	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible / detectable but the underlying character / composition / attributes of the baseline condition will be similar to the pre-development.
Negligible	Very little change from baseline conditions. Change not material, barely distinguishable or indistinguishable, approximating to a 'no change' situation.

2.15 The sensitivity of a receptor is based on the relative importance of the receptor using the scale in Table 2.2.

Table 2.2: Degrees of Sensitivity and their Criteria

Sensitivity	Criteria
High	The receptor / resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance.
Medium	The receptor / resource has moderate capacity to absorb change without significantly altering its present character, or is of high

	and more than local (but not national or international) importance.
Low	The receptor / resource is tolerant of change without detrimental effect, is of low or local importance.
Negligible	The receptor / resource can accommodate change without material effect, is of limited importance.

2.16 Placement within the 7-point significance scale would be derived from the interaction of the receptor's sensitivity and the magnitude of change likely to be experienced (as above), assigned in accordance with Table 2.3 below, whereby effects assigned a rating of Major or Moderate would be considered as 'significant'.

Table 2.3: Degrees of Significance

		Sensitivity of Receptor			
		High	Medium	Low	Negligible
Magnitude of Change	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor to Moderate	Negligible
	Low	Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

2.17 The above magnitude and significance criteria are provided as a guide for specialists to categorise the significance of effects within the Environmental Statement. Where discipline-specific methodology will be applied that differs from the generic criteria above, this will be clearly explained within the given chapter.

2.18 A significance of effects would be assigned both before and after mitigation.

MITIGATION

2.19 Standard measures and the adoption of construction best practice methods to avoid, minimise or manage adverse environmental effects, or to ensure realisation of beneficial effects, will be incorporated into the design and development of proposal. The assessment of the development would include the mitigation measures where required noting any residual effects.

2.20 All mitigation measures would be specified in the Draft Development Consent Order. Where the assessment of the development would identify potential for adverse environmental effects, the scope for mitigation of those effects, for example by way of compensatory measures, will be considered and outlined in the appropriate technical chapter.

2.21 Where the effectiveness of the mitigation proposed will be considered to be uncertain, or where it depends upon assumptions of operating procedures, then data and/or professional judgment will be introduced to support these assumptions.

CUMULATIVE AND IN-COMBINATION EFFECTS

Cumulative Effects

2.22 In accordance to the EIA Regulations, the Environmental Statement will also give consideration to cumulative effects. Cumulative impacts are those effects of development that may interact in an additive or subtractive manner with the impacts of other developments including those that are not currently in existence but may be by the time the development is implemented.

2.23 North Lincolnshire Council provide the following advice on this matter on 30 October 2018: -

> With respect to proposals which are not currently in existence and may need to be taken into account as part of a cumulative impacts assessment the only major scheme that I am aware of which may have the potential to have cumulative environmental impacts is PA/2018/1316, a pending application for the retention of an existing wellsite for long-term hydrocarbon production at Lodge Farm, Clapp Gate, Appleby.
>
> The council does maintain an up-to-date weekly list of submitted planning applications on its website and we would be able to carry out a search of recent

planning approvals and pending planning applications in a specified Zone of Influence should this be required.

Combination Effects

2.24 Combined effects arise where effects from one environmental element bring about changes in another environmental element. These will be reviewed, where relevant, in each of the technical chapters of this Environmental Statement.

Proposed Structure of the Environmental Statement

2.25 The proposed structure of the Environmental Statement takes into account the preliminary environmental information pertinent to the site and informal pre-application consultation with North Lincolnshire Council and other prescribed bodies. The Environmental Statement will comprise studies on each of the aspects of the environment identified as likely to be significantly affected by the development (the 'technical chapters'). It is anticipated that the Environmental Statement will be structured into three key documents:

- Non-Technical Summary (NTS) [Volume 1] - this would provide a concise summary of the Environmental Statement identifying the likely significant environmental effects and the measures proposed to mitigate or to avoid adverse effects of the development.

- Main Report [Volume 2]- Comprising the main volume of the Environmental Statement, including 'general chapters' that describe the EIA context, provide a description of the development site and development proposal, and set out the scope of the Environmental Statement, followed by the 'technical chapters' for each environmental theme with the associated figures and appendices and concluding with a summary.

- Technical Appendices [Volume 3] - this would provide the technical appendices supporting the Main Report.

2.26 For continuity, the figures and appendices will be arranged and presented using the same reference numbers as the chapters as a means of providing supportive background and technical information.

STRUCTURE OF TECHNICAL CHAPTER

2.27 The 'technical' chapters of the Environmental Statement will generally been set out in the following way:

- Introduction – to introduce the topic under consideration, state the purpose of undertaking the assessment and set out those aspects of the development material to the topic assessment;
- Consultation – a description of the informal and formal consultation undertaken with prescribed bodies over the methodology of the chapter;
- Assessment Approach – to describe the method and scope of the assessment undertaken and responses to consultation in relation to method and scope in each case pertinent to the topic under consideration;
- Baseline Conditions – a description of the baseline conditions pertinent to the topic under consideration including baseline survey information;
- Assessment of Likely Significant Effects - identifying the likely effects, evaluation of those effects and assessment of their significance, considering both construction and operational and direct and indirect effects;
- Mitigation and Enhancement - describing the mitigation strategies for the significant effects identified and noting any residual effects of the development;
- Cumulative and In-combination Effects - consideration of potential cumulative and in-combination effects with those of other developments; and
- Summary – a non-technical summary of the chapter, including baseline conditions, likely significant effects, mitigation, enhancement and conclusion.

Scope of the EIA

2.28 The proposed scope of information and assessment to be supplied within the Environmental Statement is set out below and is considered to provide a clear understanding of the potential significant effects of the development upon its environment and the mitigation measures proposed to avoid or ameliorate those effects.

2.29 The information, scope and knowledge required to undertake the Environmental Impact Assessment will be acquired from a number of varied sources to ensure that all impacts, whether explicit from the outset or coming to light during the projects, are appropriately assess in the Environmental Statement.

2.30 The proposed environmental themes to be scoped 'into' or 'out' of the Environmental Statement are given below: -

Table 2.4: Proposed Scope of Environmental Statement

Environmental Theme	**Scoped in / out**	**Reasons for Scoping Out**
Agriculture	In	Topic would be addressed in the Environmental Statement
Air Quality	Out	There are a number of regulatory and legislative constraints in place to control pollution from construction and demolition activities. The Building Act 1984 and subsequent Building Regulations 2000 are in place to ensure the safety of people in and around the building during work. Part III of the Environmental Protection Act (EPA) 1990 identifies the emission of dust from construction sites as having the potential to be a statutory nuisance and requires its control under Section 80. A number of best practice guides are available, which provide a basis against which Codes of Construction Practice may be benchmarked. The Greater London Authority (GLA) in partnership with London Councils has produced a guidance documents that recommends mitigation measures, depending upon the scale of development and its location, to control nuisance dust from various activities during construction and demolition phases.

		BRE (Building Research Establishment) has also produced a report that outlines the measures to control the emissions of nuisance dust. In December 2011, the IAQM published a guidance document to assess the impact of construction on air quality. The guidance was reviewed in January 20128 and updated in February 2014 to incorporate new evidence. The approach adopted in this assessment is based on adopting the methodology published in the 2014 version of the IAQM guidance. The significance of the impact of the construction phase on air quality has been determined through application of the criteria outlined in IAQM construction guidance. Defra maintains a nationwide model of existing and future background air quality concentrations at a 1km grid square resolution. The data sets include annual average concentration estimates for NOx, NO2, PM10 and PM2, using a base year of 2015. The Pollution Climate Mapping (PCM) model on which these are based is semi-empirical in nature; it uses the National Atmospheric Emissions Inventory (NAEI) emissions to model-predict the concentrations of pollutants at the centroid of each 1km grid square, but then calibrates these concentrations in relation to actual monitoring data. Annual mean background concentrations for use in this assessment for NOx, NO2, PM2.5 and PM10 have derived from the background maps available on the Defra UK-Air website. Sample locations include 1km grid squares within the proposed

		development itself and two receptor sites located 280m and 1km east of the proposed site. The assessment of dust/PM10 effects from the construction phase of the development was subject to a qualitative assessment following IAQM guidance. Following the construction dust assessment the development site is found, in relation to dust soiling, to be at worst low risk from earthworks, construction and trackout. In relation to human health impacts, the development Site is found to be at worst low risk for all three activities. In regards to construction phase vehicle movements, the average number of two-way HDV movements per day is expected to be well below the 100 AADT criteria. Therefore, it is not considered that there will be any potential for significant air quality effects from development related road traffic emissions during the construction phase. Such potential impacts have therefore been scoped out from requiring a detailed assessment on the basis of their low and negligible impacts. Effective mitigation measures were not specified as there is no risk defined. Furthermore, impacts from dust emissions during the construction phase would be **not significant,** which is supported by the low levels of annual mean emissions. It is considered that despite there not being a defined risk present, it is still advisable that a number of good practice measures are implemented, such as considerate traffic speed and observing minimal dust dispersion where at all possible during construction and transport activities.

		Maintenance vehicles are only expected to visit the site four times a year. Therefore it is unlikely that the number of vehicle movements during the operational phase will exceed those of the construction phase. As a result, operational phase impacts associated with road traffic emissions are deemed to be not significant and therefore scoped out of requiring a detailed assessment within the Environmental Statement. The air quality report is provided at appendix 2.1
Acoustics	Out	It is proposed that the noise and vibration impacts is scoped out of the Environmental Statement and presented as a standalone report accompanying the application. In order to set noise emissions criteria relative to the requirements of the Local Authority, it is necessary to establish the prevailing background noise levels of the site and surrounding area. An environmental noise survey would be undertaken in accordance with the requirements of BS 7445: 1991 'Description and measurement of environmental noise Part 2- Acquisition of data pertinent to land use' in order to measure the acoustic descriptors LAmax, LA10, LAeq and LA90. It is anticipated that the survey will be undertaken for a period of 72 hours at 2 locations representative of noise levels at the nearest noise sensitive receiver positions. Manual measurements would also be conducted in parallel to an inspection of the general area in order to identify any significant noise sources and/or any noise-sensitive premises.

		Based on the daytime and night-time background noise patterns observed onsite, noise emissions criteria would be set in accordance with the agreed planning requirements of the Local Authority. The noise assessment report will cover the construction phase of the proposed solar park as well as its operation and decommissioning. Based on the construction programme, manufacturer provided noise emission levels of proposed transformer and inverter units, noise impact calculations would be undertaken for nearby noise sensitive receivers. Calculated noise emissions levels would be compared against the set noise emissions criteria in order to investigate whether mitigation measures are necessary to achieve compliance with the requirements of the Local Authority. The following standards and guidance documents would be considered throughout the assessment: • BS 4142: 2014: 'Method for rating industrial noise affecting mixed residential and industrial areas' • BS 8233: 2014: 'Sound Insulation and Noise Reduction for Buildings - Code of Practice' • Local Authority conditions and statement of common ground Detailed noise impact calculations will be presented in order to demonstrate compliance of the proposed installation with noise emissions criteria, incorporating proposed mitigation measures where appropriate.

		Should feasible mitigation measures be incapable of demonstrating acceptable noise emissions levels for nearby receivers, a relocation or reselection of units will be recommended.
Biodiversity and nature conservation	In	Topic would be addressed in the Environmental Statement.
Cultural Heritage including Architectural and Archaeological	In	Topic would be addressed in the Environmental Statement.
Ground Conditions & Minerals	Out	Integrale Limited have undertaken a Phase 1 desk study, concentrated on ground conditions, geotechnical and contamination aspects. The desk study also informed the drainage considerations by Clive Onions Limited. The phase 1 report is provided at appendix 2.2 To summarise, previous investigation records available on the BGS website under the Open Government Licence include 5 boreholes sunk across the northern area and indicate: • Higher Eastern half of site, at or above 55mAOD – Topsoil over Weathered oolitic limestone of Lincolnshire Limestone Formation; • Central northern area between 40-50mAOD – Blown Sand to 2-4m depth, overlying Middle & Lower Lias mudstones and locally limestones;

		• Lower northwestern area at 36mAOD – yellow and grey clays of Coleby Mudstones (with thin veneer of Blown Sand likely). Data available on the LandIS Soilscapes Viewer and within a Soil Site Extended Report is included indicates: • The complete site area is classified as underlain by freely draining slightly acid sandy soils. These have typically low fertility arable land cover, and drain to groundwater. • The complete site area is underlain by Newport 1 Type Soils. These are deep well drained sandy and coarse loamy soils. They are free draining and permeable in unconsolidated sands or gravels, which have a relatively high permeability and high storage capacity. They have a very low potential for ground movement (shrinkage or swelling). • These soils will, by nature of their high permeability, readily transmit a wide range of pollutants because of the rapid drainage and low attenuation potential. • The uppermost 300mm of the soil profile is sandy and 'light'. • Newport 1 Soils have typically an upper 250mm of dark brown slightly stony sandy loam or loamy sand, overlying brown slightly stony loamy sand or sand, with a weak fine subangular blocky structure. Below 500-550mm depth, these develop into yellowish red or brownish yellow slightly stony sand of single grain structure. Historical maps revealed the following:

		1885 to 1906 - Majority of site agricultural fields with drainage ditches in lower area. Gokewell Priory Farm with pond in northern area. Hummocky /marshy area in extreme lower southwest with pond. Several small scale excavations or pits in lower western area may indicate surface diggings for ironstone. 1948 to 1955 – No significant changes within the site 1968 to 1980 - Overhead powerlines constructed crossing SW to NE from substation within Iron & Steel Works to SW. Possible new drainage ditches (and small pond?) within hummocky area in extreme northwest near Crow Covert. Clearance of Sodwall Plantation (possible ironstone workings?) 1994 to 2002 Gokewell Priory Farm buildings demolished – exact date unclear from mapping. Opencast ironstone workings annotated in extreme SW site extension area. 2002 to 2014 No significant changes apparent within site. Maximum elevation of drainage ditches / surface water courses on this mapping at 36mAOD in north, 43mAOD centrally, 35mAOD central southern, and 30mAOD in southern area. The potential relevant contamination sources are therefore considered to be limited to remnant metals in soils within any localised backfilled ironstone pits, and air borne derived particulates from the extensive industrial complex to the west and southwest, remaining within shallow depth site topsoil. The Gokewell Priory Farm building area has been demolished since 1994-2002, and no specific development in that area is proposed. The

		hummocky areas west of this (near Crow and Little Crow Coverts) may relate to either this demolition or drainage works, or less likely to ironstone working. A future solar farm & battery storage end use and known neighbouring agricultural land uses have been used to develop an understanding of the likely sensitive human receptors. In view of the very limited ground intrusion needed to install the panels, and the shallow depth of any service runs, or access track/roadways, it is envisaged that potential receptors to contamination (if present within the soils on-site, or via migration from adjacent sites) are limited to: • Construction Workers during installation or maintenance. • Future maintenance staff or neighbouring workers. With regards to mineral extraction, preliminary understanding is that the ironstone is deemed to be unsuitable for either safeguarding and/or extraction and a desktop resource assessment would be submitted in support of the application. A Phase 1 Ground Condition Survey supplemented by Phase 2 exploratory work will be submitted alongside the Environmental Statement. For the reasons set out above it is proposed to scope out this topic from the Environmental Statement.
Flood Risk and Drainage Strategy	Out	Initial assessment has shown that water quality entering the environment will be improved, infiltration will improve and runoff rates will be

		reduced, bring overall benefit to the environment. A FRA and Drainage Strategy Report is provided at Appendix 2.3 The site is located in Flood Zone 1, at low risk of flooding, according to the Environment Agency (EA) Flood Map for Planning, consistent with its elevated location, and is therefore appropriate development in terms of fluvial flood risk in accordance with the National Planning Policy Framework (NPPF). The EA Surface Water Flood Risk Map shows isolated ponding within a few areas in the site – indicative of the generally free-draining nature of the soil. In the west of the site the water is shown to issue from a spring line and flows westwards. The spring line is shown below, in an image which has been extracted from the Geotechnical Report. Localised areas up to 50m wide appear to have a very gentle fall to the east, and, leading through woodland. There are no evident watercourses or signs of surface water flows to the east, indicating that the rainfall infiltrates into the ground where it lands, ie the shallow gradient allows infiltration. The site contains a number of watercourses, generally running north south along the slope, and linked by watercourses flowing down the slope, which are shown on the maps. A detailed topographic survey has been undertaken of the site, and shows that the channels are well-defined and approximately 1m deep. The soil is shown to be free-draining, and the underlying soil is naturally drained by the springs which issue along the spring line. The mechanism

		would therefore be that rainfall infiltrates into the soil, and then follows a layer with low permeability and issues at a generally low rate over a prolonged period from the ground, forming a watercourse. It is proposed to retain the watercourses which issue from the spring line, and provide a minimum 8m buffer from top of bank with no development. For the reasons set out above it is proposed to scope out this topic. A Flood Risk Assessment and Drainage Strategy will be prepared alongside the Environmental Statement.
Landscape and Visual	In	Topic would be addressed in the Environmental Statement.
Traffic and Transport	In	Topic would be addressed in the Environmental Statement.
Socio Economic	In	Topic would be addressed in the Environmental Statement.
Human Beings	In	Topic would be addressed throughout the Environmental Statement. Residential amenity would be considered in the Landscape and Visual Impact Chapter. Severance, driver delay would be discussed in the Traffic and Transport chapter.

2.31 The proposed structure of the Environmental Statement main statement will follow:

- Chapter 1 Introduction
- Chapter 2 Methodology
- Chapter 3 The Development Site and its Environs
- Chapter 4 Development Proposal

- Chapter 5 Legislative Context, Climate Change, Energy Policy & Guidance
- Chapter 6 Landscape and Visual Impact
- Chapter 7 Ecology and Nature Conservation
- Chapter 8 Cultural Heritage and Archaeology
- Chapter 9 Transport and Traffic
- Chapter 10 Agriculture
- Chapter 11 Socio Economics Issues

3. THE DEVELOPMENT SITE

3.1 Chapter 3 of the Environmental Statement will provide a description of the site and its environs.

Site Description

3.2 The development site is located on a localised ridge between the settlements of Scunthorpe to the west and Broughton to the east. The village of Broughton is separated from the site by an extensive area of dense woodland. Between the main residential and commercial areas of Scunthorpe, directly adjacent to the western boundary of the site, lies the extensive industrial complex of the Scunthorpe Steel Works. To the north the ridge continues approximately 11km to the banks of the Humber Estuary. Also to the north is an area of heathland known as Risby Warren. To the south the ridge runs approximately 35km to the City of Lincoln. A Roman Road, Ermine Street runs adjacent to Broughton to the east of the site. A secondary scarp slope known locally within Scunthorpe as 'The Cliff' lies to the west. Away from Scunthorpe the landscape is largely rural.

3.3 The site extends to approximately 226 hectares and is comprised largely of arable fields which are bounded and heavily contained by dense woodland to the north, east and south which serve to provide significant screening of the site from the wider landscape. Phased forestry operations take place in the surrounding woodland.

Public Rights of Way

3.4 A Public Right of Way (Footpath 214 on the Definitive Rights of Way map) crosses the site. Site work identified that, as it is used on the ground, the route does not follow the exact alignment as it is shown on OS mapping, and instead follows the line of a track which runs within site (as it is shown on the Definitive Map). In 2009 a section of PRoW was diverted to follow an existing track. The 2009 diversion order includes within its schedule the description *"a 604-metre-long footpath with a width of four metres ... and leading on an existing stone track around the western, northern and eastern perimeters of the field ..."*. North Lincolnshire Council Right of Way Officer has confirmed that *"The wording [of the diversion order] reinforce*

the representation of the path's position upon the map, serves to eliminate any doubt as to the fact that the track is the route that the footpath follows"[2].

Landform and Topography

3.5 In terms of landform the site lies on the edge of a localised ridge, raised slightly above the surrounding landscape, which would generally give potential for it to be visible from much of the wider landscape. However, as the site survey work has confirmed, surrounding woodland encloses much of the site, and therefore any views remain generally well contained.

3.6 The local ridge forms part of a wider scarp and vale topography. The site straddles part of the west facing scarp slope and the east facing limestone plateaux which runs eventually into the lower dip slope towards the River Ancholme.

Land Use, Buildings and Infrastructure

3.7 Land use across the site is predominantly agricultural with fields laid down to a mixture of arable and managed grassland. Some forestry operations are being undertaken within the surrounding woodland resulting in the storage of logs in piles next to the main access track through the site. There is no built form within the site, but a poultry unit is located adjacent to the east of the site, whilst to the west the vast expanse of industrial development associated with the Scunthorpe steel industry lies adjacent to the site. This area extends for more than 2km beyond which the lies the urban area of Scunthorpe. Various utilities cut through the site and these include a water main; 33k overhead power lines[3]; and, a double row of 132kv overhead pylons. The lines pass through the adjacent woodland without opening up large gaps in which the site can be seen.

Agricultural Land

3.8 The site is shown on the "provisional" Agricultural Land Classification map (MAFF 1983) as undifferentiated Grade 3 land. Provisional ALC maps are not sufficiently accurate to allow a full assessment of a site and should not be used for other than general guidance at a strategic level.

[2] Email correspondence between North Lincolnshire Council and Pegasus Group dated 7 August 2018.
[3] The existing wooden poles and steel masts along the route have been in situ for some time and are in the process of being replaced by Norther Powergrid Plc due to the age.

Biodiversity Features and Environmental Designations

3.9 The site generally comprises open arable farmland, which is surrounded by a network of hedgerows and ditches as well as extensive woodland plantations. The most frequently encountered habitat at the site consists of open arable farmland. The arable fields comprised a mixture of spring-sown cereals and oilseed rape, as well as game cover crops at the edge of some fields. Field margins are characterised by coarse, semi-improved grassland. This habitat is also encountered alongside farm tracks and in some areas of fields which had been left fallow.

3.10 Field boundary hedgerows are generally species-poor although the hedgerows varied in height, length, condition and management4.

3.11 The northern, western and southern boundaries are bordered by woodland, mainly comprising semi-mature to mature plantation broadleaved woodland but with some coniferous elements and semi-natural woodland also present. Small pocket broadleaved woodland are also present in the west of the site. Broughton Far Wood Site of Special Scientific Interest (SSSI) and Broughton Alder Wood SSSI are located 820m and 920m east of the site boundary respectively. Broughton West Wood Local Wildlife Site (LWS) partially borders the east of the site, and is designated for its woodland habitat.

3.12 The proposed development site is a considerable distance from the Humber Estuary a Special Protection Area (SPA), Special Conservation Area (SAC) and Ramsar site. The area encompassing the SPA is situated approximately 11km north of the site at the closest point, whilst the SAC and Ramsar site is located 9km west at the closest point. It primarily receives its designation for its estuarine habitats, which support a range of associated species including internationally important assemblages of wintering and migratory birds.

Cultural Heritage

3.13 The site of the former medieval Gokewell Priory (NLHER ref. MLS1805) is located within the northern area of the site. This s a non-designated site and survives as above-ground remnant earthworks and potential belowground archaeological remains.

[4] Under a forestry licence

3.14 The landscape surrounding the site of the former medieval priory has undergone extensive change since the medieval period. The medieval field systems are no longer extant, and the surrounding area is now made up of very large, modern blocks of agricultural land. The agricultural regimes have also changed noticeably since the medieval period, with more intensive ploughing and use of the land.

3.15 The designated heritage assets located within the 2km study area are set out below: -

- Scheduled Earthworks of Raventhorpe Medieval Settlement, located c.940m south of the Site (NHLE Ref: 1016426);
- Grade II Raventhorpe House, located c. 900m south of the Site (NHLE Ref: 1346807);
- Grade II Listed Springwood Cottage, located c.450m northeast of the Site (c.315m north of the access track (NHLE Ref: 1083734));
- Grade II Listed Stable Northeast of Springwood Cottage, located c.450m northeast of the Site (NHLE Ref: 1310038);
- Grade II Listed Stone Cottage and Adjoining Outbuildings, Broughton, located c.900m southeast of the Site (NHLE Ref: 1310013);
- Grade II Listed 66 High Street, Broughton, located c.1.5km southeast of the Site (NHLE Ref: 1083740);
- Grade I Listed Church of St Mary Broughton and the Grade II Listed Church Gates, located c.1.4km southeast of the Site (NHLE Refs: 1161801 and 1083741);
- Grade II Listed The Hollies, Broughton, located c.1.4km southeast of the Site (NHLE Ref: 1309931);
- Grade II Listed Broughton War Memorial, located c.1.5km southeast of the Site (NHLE Ref: 1391424);
- Grade II Listed Broughton Grange Farmhouse, located 1.9km east of the Site (NHLE Ref: 1083736); and

- Grade II Listed Coach House/Stable approximately 10m east of Broughton Grange Farmhouse, located 1.9km east of the Site (NHLE Ref: 1346496).

3.16 The archaeological understanding of the site is ongoing by way of geophysical surveys, field walking and trial trenching.

Hydrology

3.17 The site is located in Flood Zone 1, at low risk of flooding, according to the Environment Agency Flood Map for Planning, consistent with its elevated location.

3.18 There are isolated ponding within a few areas in the site – indicative of the generally free-draining nature of the soil. In the west of the site the water is shown to issue from a spring line and flows westwards.

3.19 The site contains a number of watercourses, generally running north south along the slope, and linked by watercourses flowing down the slope. A detailed topographic survey has been undertaken of the site, and shows that the channels are well-defined and approximately 1m deep.

3.20 Localised areas up to 50m wide appear to have a very gentle fall to the east, and, leading through woodland. There are no evident watercourses or signs of surface water flows to the east, indicating that the rainfall infiltrates into the ground where it lands, ie the shallow gradient allows infiltration.

Ground conditions

3.21 The complete site area is classified as underlain by freely draining slightly acid sandy soils. These have typically low fertility arable land cover, and drain to groundwater. The complete site area is underlain by Newport 1 Type Soils. These are deep well drained sandy and coarse loamy soils. They are free draining and permeable in unconsolidated sands or gravels, which have a relatively high permeability and high storage capacity. They have a very low potential for ground movement (shrinkage or swelling). These soils will, by nature of their high permeability, readily transmit a wide range of pollutants because of the rapid drainage and low attenuation potential. The uppermost 300mm of the soil profile is sandy and 'light'.

3.22 Newport 1 Soils have typically an upper 250mm of dark brown slightly stony sandy loam or loamy sand, overlying brown slightly stony loamy sand or sand, with a

weak fine subangular blocky structure. Below 500-550mm depth, these develop into yellowish red or brownish yellow slightly stony sand of single grain structure.

3.23 Historical maps revealed the following:

3.24 1885 to 1906 - Majority of site agricultural fields with drainage ditches in lower area. Gokewell Priory Farm with pond in northern area. Hummocky /marshy area in extreme lower southwest with pond. Several small scale excavations or pits in lower western area may indicate surface diggings for ironstone.

3.25 1948 to 1955 – No significant changes within the site

3.26 1968 to 1980 - Overhead powerlines constructed crossing SW to NE from substation within Iron & Steel Works to SW. Possible new drainage ditches (and small pond) within hummocky area in extreme northwest near Crow Covert. Clearance of Sodwall Plantation (possible ironstone workings)

3.27 1994 to 2002 Gokewell Priory Farm buildings demolished – exact date unclear from mapping. Opencast ironstone workings annotated in extreme SW site extension area.

3.28 2002 to 2014 No significant changes apparent within site. Maximum elevation of drainage ditches / surface water courses on this mapping at 36mAOD in north, 43mAOD centrally, 35mAOD central southern, and 30mAOD in southern area.

3.29 Any potential relevant contamination sources are therefore considered to be limited to remnant metals in soils within any localised backfilled ironstone pits, and air borne derived particulates from the extensive industrial complex to the west and southwest, remaining within shallow depth site topsoil. The Gokewell Priory Farm building area was demolished prior to 2002, and no specific development in that area is proposed.

3.30 The hummocky areas west of this (near Crow and Little Crow Coverts) may relate to either this demolition or drainage works, or less likely to ironstone working. With regards to mineral extraction, preliminary understanding is that the ironstone is deemed to be unsuitable for either safeguarding and/or extraction and a desktop resource assessment would be submitted in support of the application.

Air quality

3.31 North Lincolnshire Council has declared an Air Quality Management Area (AQMA), which incorporates part of Scunthorpe town centre and an area east of Scunthorpe, including the Steel Works site. The development site is located within the AQMA.

4. DEVELOPMENT PROPOSAL

4.1 The main element of the development is the construction, operation, management and decommissioning of a ground mounted solar park with a maximum design capacity of up to 150MWp (megawatts peak) and up to 90MW of battery storage capacity.

4.2 Indicative Layout Drawings are provided at Appendix 4.1 and comprise: -

Drawing No	***Title***	***Paper Size***
Solar & general site layout		
A10B0C0	Table Layout (general layout)	A0
A02B0C0	Details (cross sections)	A0
Battery Compound		
P2064-31-03 Rev O	Site Elevations and camera detail [battery compound]	A1
P2064(02)-25-01-O	40ft Client container	A1
P2064(01)-25-02-O	53ft Battery Container	A3
P2064(01)-25-010-O	Transformer and Inverter Skid	A3
P2064(01)-25-01-O	53ft Battery container Plan & 3D View	A3

APPENDIX 4.1: INDICATIVE LAYOUT DRAWINGS

4.3 The photovoltaic panels would be laid out in straight arrays set at an angle of c. 20 degrees from east to west across the field enclosures. The distance between the arrays would respond to topography but would typically be between 3.5 metres to 6 metres. The top north edges of the panels would be up to 3.5 metres above ground level and the lower edges of the panels would be approximately 0.8 metres above ground level. The arrays would be static.

4.4 Battery storage will allow the development to fully utilise the network connection capacity when the solar park is not exporting at peak capacity. Battery storage will be connected to the distribution terminals in the substation and consists of batteries that can store energy from and release electrical energy to the electricity network.

Operational Lifespan

4.5 An operational lifespan of 35 years would be sought.

4.6 The solar and battery elements could either be delivered independently of each other or at the same time. They could therefore be constructed and become operational ether independently or at the same time. An operational lifespan of 35 years will be sought for each element and, subject to when they are constructed, the operational lifespans could run concurrently or interdependently. The Environmental Statement will provide a full description of the potential construction, operational and decommissioning variances. A single main substation compound will serve the whole development.

4.7 The application proposal would also include a package of landscape, ecological and biodiversity benefits that could include the installation of barn owl boxes, bird nesting boxes, bee hives, log piles and other hibernacula such as small buried rubble piles suitable for reptile species, amphibians and insect life. Development exclusion zone will be provided for the site of the former Gokewell Priory.

4.8 Land between and beneath the panels would be used for biodiversity enhancements and seasonal sheep grazing. Tree planting would be introduced along the north east section of the development boundary.

4.9 The arrays would be set within a 2.0m high security fence. The distance between the proposed fencing and existing hedges would vary across the site and at its minimum distance this would be circa 4m. Development would have an 15m buffer zone between the ancient woodland located to the east of the development site.

4.10 The security measures that will accompany the scheme include CCTV.

4.11 The existing woodland and hedgerow plantations that surround the various field enclosures would continue to be managed by the landowner as part of its woodland forestry licence.

SUPPORTING INFRASTRUCTURE

4.12 There will also be electrical connection infrastructure and the substation compound would be centrally located within the site and to the east of the existing double row of 132kV overhead electricity pylons which traverse the site and duly provides the point of connection to the local electricity network.

4.13 The metal framework that houses the solar modules will be supported at intervals by double posts approximately 6m apart. The posts will be driven into the ground at an approximate depth of 1.5 m.

4.14 The cabling from each array will be concealed in trenches linking the modules to the transformers and then the main substation compound.

RENEWABLE ENERGY AND CARBON DISPLACEMENT

4.15 The solar park would generate clean renewable energy for the equivalent of over 40,000 homes a year. The anticipated CO2 displacement is 50,000 tonnes per annum.

4.16 The proposal would provide a clean, renewable and sustainable form of electricity. It would make a valuable contribution to the generation of electricity at a local level. The scheme would add to the Council's progress in meeting its renewable energy target. It would also assist in meeting national targets.

4.17 The Environmental Statement will describe the energy generate process of the solar panels and the storage / discharge process of the batteries. The likely significant effects associated with the technologies to be used would be described and assessed.

ACCESS

4.18 It is proposed that construction traffic will arrive from the M180 junction 4, the A15, the A18, the B1208 and B1207 to the site access. From the M180 junction 4 vehicles will use the A15 northbound to the Briggate Lodge Roundabout and then travel east along the A18 towards Brigg. From the A18, vehicles will turn left onto the B1208. The B1208 measures between approximately 5.5 and 6 metres wide. Vehicles will travel along the B1208 to the junction with the B1207 and then continue straight ahead into the site access. No construction vehicles associated with the development proposal would travel through Broughton.

Temporary Construction Compound

4.19 During the construction phase, one main construction compound will serve the development proposal and this will be located off the main site entrance, thus reducing the distance delivery vehicles will need to travel after reaching the site's entrance.

4.20 The Environmental Statement will include a detailed description of the construction compound including its size and its duration required on site. Construction phase is expected to take around 11 months, if the development is constructed in its entirety.

Statutory Undertakers

4.21 The provision of easements for the existing services that traverse the site, such as water pipes and overhead powerlines, will be incorporated into the layout design. The Environmental Statement will include a description of how easement will be maintained during construction and operation of the development proposal.

Mitigation and enhancement

4.22 When the application is made, the description of development will be sufficiently developed to include design, size and locations of the different elements of the proposed development and this will include all mitigation and enhancement measures. This will be supplemented by technical appendices providing: -

- Construction Environmental Management Plan;
- Construction Traffic Management Plan;
- Archaeological WSI / Watching Brief;
- Landscape and Ecological Management Plan;
- De-commissioning Plan.

EIA Flexibility

4.23 The need for flexibility is identified in a number of National Policy Statements (NPS) which suggest the Rochdale Envelope as an approach to address uncertainties inherent to the Proposed Development. This very pertinent to solar and battery industries due to the rapid pace of change in technology.

4.24 In order to maintain an element of design flexibility, the Environmental Statement set out maximum or a range of design parameters that will be used in the project description chapter of the Environmental Statement. A parameter led assessment will consider the 'worst case scenario' for the Environmental Statement. Such parameters will include the maximum height of the arrays, the maximum number and maximum size of supporting infrastructure and to allow the micro-siting of infrastructure.

Operation

4.25 During the operational phase, the activities on site would amount to servicing of plant and equipment and vegetation management. A landscape and ecological management plan would be submitted as part of the Environmental Statement and this document would set out how the land would be managed throughout the operational phase of development.

Decommissioning

4.26 A decommissioning plan will support the Environmental Statement, it will set out details of the decommissioning programme to be carried out after a 35 year generation period, the proposed lifetime of the Development Consent Order, or following a prolonged period of cessation, whichever is the earliest. It will include the method for the removal of all the solar panels, cabins, structures, batteries, enclosures, equipment and all other apparatus above and below ground level from the site and details of their destination in terms of waste/recycling, and details of how the site is to be restored. Any elements that will not be removed will also be listed.

4.27 The decommissioning of the proposal is expected to take 12 weeks and generating 80 vehicle movements per week.

Compulsory Purchase

4.28 A compulsory purchase provision may be incorporated into the DCO to reflect any rights, such as mineral rights, within the development site at time of submission.

Temporary Diversion of Public Rights of Way

4.29 Temporary diversion of a section of the right of way traversing the site will be required only during the construction period and the affected section of the route will be clearly described in the final Environmental Statement. It is proposed that the temporary closure will be secured through the DCO and during the duration of the temporary closure an alternative path will be provided which will run around the perimeter of the site until it re-joins the PRoW at the site boundary. It is anticipated that the temporary diversion will only be required to allow the build out of the soar park and this will be for a maximum of 11 months for construction and less for the subsequent decommissioning.

5. THE LEGISLATIVE CONTEXT, CLIMATE CHANGE, ENERGY POLICY & GUIDANCE

5.1 The Environmental Statement will include a chapter setting out the legislative and planning context of energy development. The chapter will be structured into three parts. The first part will provide a brief explanation of global warming and climate change, and the extensive policy initiatives originating at the International, European, and National Levels to adapt human activities and to address the threat. The second part will examine the planning regulatory framework and the national energy policy context which sets the basis for decision-taking for nationally significant energy infrastructure projects. The third part of the chapter will examine why it is necessary and desirable to develop renewable energy resources in preference to fossil fuels such as coal, oil and gas.

Overarching National Policy Statement for Energy (EN-1) dated July 2011

5.2 The National Policy Statement for Energy (EN-1) sets out the national policy for energy infrastructure, which encompasses renewable energy schemes generating more than 50MW. EN-1 is part of a suite of national policy statements issued by the Secretary of State for Energy and Climate Change and ratified by Parliament. It has effect in combination with the relevant technology specific NPS, National Policy for Renewable Energy Infrastructure (EN-3), and together they provide the primary basis for decisions made by the Examining Authority.

5.3 EN-1 is divided into five parts:

5.4 Part 1 sets out the background to the policy document. Paragraph 1.71 identify how all energy NPSs have been subject to an Appraisal of Sustainability [“AoS”], as required by the Planning Act 2008. The key points from the AoS for EN-1, as set out at paragraph 1.7.2, are: -

- The energy NPSs should speed up the transition to a low carbon economy and thus help realise UK climate change commitments sooner that continuation under the current planning system.
- The energy NPSs are likely to contribute positively towards improving the vitality and competitiveness of the UK energy market by providing greater clarity for developers which should improve the UK’s security of supply and, less directly, have a positive effects for the health and well-being I the medium to longer term through helping to secure affordable supplies of

energy and minimizing fuel poverty, positive medium and long term effects are also likely for equalities;

- The development of new energy infrastructure, at the scale and speed required to meet the current and future need, is likely to have some negative effects on biodiversity, landscape/visual amenity and cultural heritage. However the significance of these effects and the effectiveness of mitigation possibilities is uncertain at the strategic and non-locationally specific level at which EN-1 to EN-5 are pitched. Short-term construction impacts are also likely through an increased use of raw materials and resources and negative effects on the economy due to impacts on existing land and sea uses. In general, it should be possible to mitigate satisfactorily the most significant potential negative effects of new energy infrastructure consented in accordance with the energy NPSs, and they explain ways in which this can be done; however, the impacts on landscape/visual amenity in particular will sometimes be hard to mitigate.

- Paragraph 1.7.11 of EN-1 identifies how the principal area in which consenting new energy infrastructure in accordance with the energy NPSs is likely to lead to adverse effects which cannot always be satisfactorily mitigated.

5.5 Part 2 of EN-1 sets out the Government policy on energy and energy development infrastructure. It confirms the following

- Government is committee to meeting its legally binding target to cut greenhouse gas emissions be at least 80% by 2050, compared to 1990 levels

- the need to effect a transition to a low carbon economy so as to reduce greenhouse gas emissions; and

- the importance of maintaining secure and reliable energy supplies as older fossil fuel generating plant closes as the UK moves towards a low carbon economy

- Government's wider objective for energy infrastructure includes contributing to sustainable development and ensuring that energy infrastructure is safe.

5.6 Paragraph 2.2.27 of the EN-1 goes on to state *"Sustainable development is relevant not just in terms of addressing climate change, but because the way energy infrastructure is deployed affects the well-being of society and the economy*".

5.7 Part 3 of EN-1 defines and sets out the need that exists for nationally significant energy infrastructure. With regards to decision making, paragraph 3.1.1. of EN1-1, sates how "the UK needs all the types of energy infrastructure covered in this NPS in order to achieve energy security at the same time as dramatically reducing greenhouse gas emissions".

5.8 Paragraph 3.1.2 states *"It is for industry to propose new energy infrastructure projects within the strategic framework set by Government. The Government does not consider it appropriate for planning policy to set targets for or limits on different technologies".* It then goes on to identify how NSIP applications should therefore be assessed on the basis that the Government has already demonstrated that there is a need for those types of infrastructure and that the scale and urgency of that need is as described in the EN-1.

5.9 In terms of the planning balance, paragraph 3.1.4 of EN1 states *"The [determining authority] should give substantial weight to the contribution which projects would make towards satisfying this need when considering applications for development consent under the Planning Act 2008*".

5.10 Section 3.3 of the EN1 discusses the need for new nationally significant electricity infrastructure projects. The key reasons why Government believes there is an urgent need for new electricity NSIPs are identified as: -

- Meeting the energy security and carbon reduction objectives;
- Need to replace closing electricity generating capacity;
- The need for more electricity capacity to support an increased supply from renewables.
- Future increases in electricity demand; and
- The urgency of the need for new electricity capacity.

5.11 Paragraph 3.3.11 identifies how renewable sources, such as solar, are intermittent and as such will require back-up sources at times when the availability of

intermittent renewable sources is low. Paragraph 3.3.12 goes on to identify how electrical storage technologies can be used to compensate for the intermittence.

5.12 Part 3.4 of EN-1 specifically discusses the role of renewable energy and states; -

> The UK has committed to sourcing 15% of its total energy (across the sectors of transport, electricity and heat) from renewable sources by 202040 and new projects need to continue to come forward urgently to ensure that we meet this target. Projections suggest that by 2020 about 30% or more of our electricity generation – both centralised and small-scale – could come from renewable sources, compared to 6.7% in 200942. The Committee on Climate Change in Phase 1 of its advice to Government in September 2010 agreed that the UK 2020 target was appropriate, and should not be increased. Phase 2 was published in May 2011 and provided recommendations on the post 2020 ambition for renewables in the UK, and possible pathways to maximise their contribution to the 2050 carbon reduction targets.
>
> Large scale deployment of renewables will help the UK to tackle climate change, reducing the UK's emissions of carbon dioxide by over 750 million tonnes by 2030. It will also deliver up to half a million jobs by 2020 in the renewables sector…

5.13 With regards to the urgency for renewables, paragraph 3.4.5 explains that in order to hit the 2020 target and to largely decarbonize the power sector by 2030, it is necessary to bring forward new renewable electricity generation projects as soon as possible. It goes on to state "The need for new renewable electricity generation projects is therefore urgent".

5.14 Part 4 of EN-1 sets out certain strategic principles to be applied in respect of nationally significant energy infrastructure schemes

Presumption in Favor of Development

5.15 Paragraph 4.1.2 states how the determining authority should start with the presumption in favor of granting consent to applications for energy NSIPs. That presumption applies unless any more specific and relevant polices set out in the relevant NPSs clearly indicate that consent should be refused.

5.16 The presumption is also subject to the provisions of the Planning Act 2008.

5.17 Paragraph 4.1.4 of EN-1 states how in considering any proposed development, and in particular when weighing its adverse impacts against its benefits, the determining authority should take into account: -

- Its potential benefits including its contribution to meeting the need for energy infrastructure, job creation and any long-term or wider benefits; and
- Its potential adverse impacts, including any long-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts.

5.18 Development consent obligations that are agreed with local authority is considered through paragraph 4.1.8 and states that the determining authority may take these into account provided that they are relevant to planning, necessary to make the proposed development acceptable in planning terms, directly relates to the proposed development, fairly and reasonably related in scale and kind to the proposed development, and reasonable in all other respects.

5.19 Part 4.4 deal with alternatives. Paragraph 4.4.1 states *"From a policy perspective this NPS does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option".*

5.20 That said paragraph 4.4.2 identified how applicants are obliged to include in their Environmental Statement, as a matter of fact, information about the main alternatives they have studied and this should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects.

5.21 Paragraph 4.4.3 goes on to state that where there is a policy or legal requirement to consider alternatives the applicant should describe the alternatives considered in compliance with these requirements. Given the level and urgency of need for new energy infrastructure, the IPC should, subject to any relevant legal requirements (e.g. under the Habitats Directive) which indicate otherwise, be guided by the following principles when deciding what weight should be given to alternatives: -

- the consideration of alternatives in order to comply with policy requirements should be carried out in a proportionate manner;

- the determining authority should be guided in considering alternative proposals by whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security and climate change benefits) in the same timescale as the proposed development;

- where (as in the case of renewables) legislation imposes a specific quantitative target for particular technologies the determining authority should not reject an application for development on one site simply because fewer adverse impacts would result from developing similar infrastructure on another suitable site, and it should have regard as appropriate to the possibility that all suitable sites for energy infrastructure of the type proposed may be needed for future proposals;

- alternatives not among the main alternatives studied by the applicant (as reflected in the Environmental Statement) should only be considered to the extent that the determining authority thinks they are both important and relevant to its decision;

- alternative proposals which mean the necessary development could not proceed, for example because the alternative proposals are not commercially viable or alternative proposals for sites would not be physically suitable, can be excluded on the grounds that they are not important and relevant to the determining authority's decision;

- alternative proposals which are vague or inchoate can be excluded on the grounds that they are not important and relevant to the IPC's decision; and

- it is intended that potential alternatives to a proposed development should, wherever possible, be identified before an application is made to the determining authority in respect of it (so as to allow appropriate consultation and the development of a suitable evidence base in relation to any alternatives which are particularly relevant). Therefore where an alternative is first put forward by a third party after an application has been made, the determining authority may place the onus on the person proposing the alternative to provide the evidence for its suitability as such and the determining authority should not necessarily expect the applicant to have assessed it.

5.22 On the issue of design for energy infrastructure, paragraph 4.5.1 of the EN-1 identifies how (inter alia) "Applying "good design" to energy projects should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of much energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area".

5.23 The relationship between design and function is explored through paragraph 4.5.3 and states *"In the light of the above, and given the importance which the Planning Act 2008 places on good design and sustainability, the IPC needs to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable and adaptable (including taking account of natural hazards such as flooding) as they can be. In so doing, the IPC should satisfy itself that the applicant has taken into account both functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located) as far as possible. Whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, landform and vegetation. Furthermore, the design and sensitive use of materials in any associated development such as electricity substations will assist in ensuring that such development contributes to the quality of the area*".

5.24 Paragraph 4.9.1 of the EN-1 recognises that *"The connection of a proposed electricity generation plant to the electricity network is an important consideration for applicants wanting to construct or extend generation plant".* It goes on to state how *"In the market system, it is for the applicant to ensure that there will be necessary infrastructure and capacity within an existing or planned transmission or distribution network to accommodate the electricity generated*". This is an important consideration when considering alternatives as the applicant has secured a point of connection within the confides of the development site.

5.25 Part 5 of the EN-1 sets out the generic impacts that may or may not be pertinent to specific projects, these are lists as: -

Table 5.1 EN-1 Generic Impacts

Topic	Commentary
Land use	With regards to agricultural land classification, para 5.10.8 states how applicants should seek to minimize impacts on the best and most versatile agricultural land except where this would be inconsistent with other sustainability considerations. Paragraph 5.10.15 identifies how the determining authority should ensure that applicants provide justification when locating sites on best and most versatile agricultural land. With regards to mitigation, EN-1 states that there may be ,little that can be done to mitigate the direct effects of an energy project on the existing use of the proposed site.
Landscape and Visual	Paragraph 5.9.8 sets out that for nationally significant energy infrastructure, projects need to be designed carefully, having regard to siting, operational and other relevant constraints the aim should be to minimize harm to the landscape, providing reasonable mitigation where possible and appropriate.
Biodiversity and geological conservation	As a general principle, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives; where significant harm cannot be avoided, then appropriate compensation measures should be sought.
Historic Environment	Paragraph 5.8.8 states that as part of the Environmental Statement the developer should provide a description of the significance of the heritage assets assessed by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage asset and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset.

	Paragraph 5.8.12 goes on to state that in considering the impact of the proposed development on any heritage asset, the determining authority should take into account the particular nature of the significance of the heritage assets and the value that they hold for this and future generations. This understanding should be used to avoid or minimize conflict between conservation of that significance and proposals for development.
Dust, odour, artificial lighting	Paragraph 5.6.3 of EN-1 recognises that for energy NSIP, some impacts on amenity for local communities is likely to be unavoidable. The aim should be to keep impacts to a minimum, and at a level that is acceptable.
Flood Risk	Applications for energy projects of 1 hectare of greater in flood zone 1 should be accompanied by a flood risk assessment. The surface water drainage arrangements for any project should be such that the volumes and peal flow rate of surface water leaving the site are no greater than the rate prior to the proposed project, unless specific off-site arrangements are made and results in the same net effect.
Air Quality and Emission	Paragraph 5.2.6 states *"Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement".* The Environmental Statement should describe: any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project; the predicted absolute emission levels of the proposed project, after mitigation methods have been applied; existing air quality levels and the relative change in air quality from existing levels; and any potential eutrophication impacts.
Socio Economic	Paragraph 5.12.3 states *"Where the project is likely to have socio-economic impacts at local or regional levels, the applicant*

	should undertake and include in their application an assessment of these impacts as part of the E Environmental Statement". The effects should consider: the creation of jobs and training opportunities; the provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities; effects on tourism; the impact of a changing influx of workers during the different construction, operation and decommissioning phases of the energy infrastructure. This could change the local population dynamics and could alter the demand for services and facilities in the settlements nearest to the construction work (including community facilities and physical infrastructure such as energy, water, transport and waste). There could also be effects on social cohesion depending on how populations and service provision change as a result of the development; and cumulative effects – if development consent were to be granted to for a number of projects within a region and these were developed in a similar timeframe, there could be some short-term negative effects, for example a potential shortage of construction workers to meet the needs of other industries and major projects within the region.
Traffic and Transport	With regards to decision taking, EN-1 recognises that a new energy NSIP may give rise to substantial impacts on the surrounding transport infrastructure and the Planning Inspectorate should therefore ensure that the applicant has sought to mitigate these impacts, including during the construction phase of the development. Where the proposed mitigation measures are insufficient to reduce the impact on the transport infrastructure to acceptable levels, the IPC should consider requirements to mitigate adverse impacts on transport networks arising from the development.
Water Quality	Where the project is likely to have effects on the water environment, the developer should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the

	water environment as part of the Environmental Statement or equivalent

National Policy Statement for Renewable Energy Infrastructure (EN-3)

5.26 EN-3 contains policies specifically relating to specific renewable energy infrastructure and it is designed to be read in conjunction with EN-1. The document focuses on schemes relating to onshore wind, offshore wind and energy from biomass. Paragraph 1.8.2 states that the NPS does not cover any other types of renewable energy generation that were technically viable over 50MW onshore when the document was published in July 2011. The emergence of large scale ground mounted solar projects therefore follows the publication of this document.

6. LANDSCAPE AND VISUAL IMPACT

6.1 The landscape and visual impact assessment chapter of the Environmental Statement will review the development site and its surrounding context in order to describe and identify the relative level of effects arising as a result of the proposed development, in relation to:

- the features and character of the local landscape; and
- the visual amenity of people who view the site.

6.2 This chapter is supported by the following appendices: -

- Appendix 6.1 Site Context
- Appendix 6.2 Topography
- Appendix 6.3 LVIA Viewpoints
- Appendix 6.4 Environmental Designations
- Appendix 6.5 Landscape Character Areas

PRELIMINARY BASELINE CONDITIONS

Site Description and Context

6.3 The site is located on a localised ridge between the settlements of Scunthorpe to the west and Broughton to the east as shown on appendix 6.2 Topography. The village of Broughton is separated from the site by an extensive area of dense woodland. Between the main residential and commercial areas of Scunthorpe, directly adjacent to the western boundary of the site, lies the extensive industrial complex of the Scunthorpe Steelworks. To the north the ridge continues approximately 11km to the banks of the Humber Estuary. Also to the north is an area of heathland known as Risby Warren. To the south the ridge runs approximately 35km to the City of Lincoln. A Roman Road, Ermine Street runs adjacent to Broughton to the east of the site. A secondary scarp slope known locally within Scunthorpe as 'The Cliff' lies to the west. Away from Scunthorpe the landscape is largely rural.

6.4 The site is comprised of arable fields which are bounded and heavily contained by dense woodland to the north, east and west which serve to provide significant

screening of the site from the wider landscape. During the site work, forestry operations were being undertaken in the surrounding woodland and logs were being stored in piles. It is not however apparent that any areas are being clear felled in such a manner that would open up any additional views of the site.

Baseline Survey Information

The Site and its Landscape Features

6.5 This section provides a description of the landscape features within the proposed development site and their context within the surrounding study area. The landscape context of the site and immediate surrounding area is shown in Figure 6.1 Site Context.

6.6 A Public Right of Way (Footpath 214 on the Definitive Rights of Way map) crosses the site. Site work identified that, as it is used on the ground, the route does not follow the exact alignment as it is shown on OS mapping, and instead follows the line of a track which runs within site. (This diversion to the track is shown on the Definitive Map).

Landform and Topography

6.7 In terms of landform the site lies on the edge of a localised ridge, raised slightly above the surrounding landscape, which would generally give potential for it to be visible from much of the wider landscape. However, as the site survey work has confirmed, surrounding woodland encloses much of the site, and therefore any views remain generally well contained.

6.8 The local ridge forms part of a wider scarp and vale topography as shown on the section on Figure 6.2 Topography. The site straddles part of the west facing scarp slope and the east facing limestone plateaux which runs eventually into the lower dip slope towards the River Ancholme.

Land Use, Buildings and Infrastructure

6.9 Land use across the site is agricultural, comprising fields laid down to a mixture of arable and managed grassland. Some forestry operations are being undertaken within the surrounding woodland resulting in the storage of logs in piles next to the main access track through the site. There is no built form within the site, but a poultry unit is located adjacent to the east of the site, whilst to the west the vast

expanse of industrial development associated with the Scunthorpe steel industry lies adjacent to the site. This area extends for more than 2km beyond which the lies the main residential and commercial urban area of Scunthorpe.

6.10 A triple row of power lines cuts across the site. The lines pass through the adjacent woodland but without opening up large gaps through which the site can be seen.

Landscape Character

6.11 Landscape Character is an expression of pattern within the landscape resulting from particular combinations of the natural and historical factors that make one place different from another. This results in areas that have a unity of character and a distinctive sense of place when viewed from a landscape-wide perspective.

6.12 Published Landscape Character Assessments that cover the proposed development site have been interrogated and are detailed below, (see also Figure 6.5 Landscape Character):

- Natural England National Character Area Profiles, (NCA 45 Northern Linclonshire Edge with Coversands);
- North Lincolnshire Landscape Character Assessment & Guidelines, North Lincolnshire Council, 1999 (SPG5)

National Character Areas (NCA)

6.13 The site falls within NCA 45: Northern Linclonshire Edge with Coversands. Key characteristics presented in the character area description are as follows:

"NCA 45: Northern Linclonshire Edge with Coversands:

Elevated arable landscape with a distinct limestone cliff running north–south, the scarp slope providing extensive long views out to the west.

Double scarp around Scunthorpe of ironstone, and extensive areas of wind-blown sand, the Coversands, giving rise to infertile soils supporting heathland, acid grassland and oak/birch woodlands, with rare species such as woodlark and grayling butterfly.

Underlying limestone supporting small areas of calcareous grassland.

Few watercourses on the plateau, which lies between the rivers Trent and Ancholme which flow into the Humber, and is cut through in the south by the River Witham.

Productive soils on limestone plateau giving rise to a large-scale landscape of arable cultivation with extensive rectilinear fields and few boundaries of clipped hedges or rubble limestone, supporting birds such as grey partridge and corn bunting.

Semi-natural habitats of acid and calcareous grassland and broadleaved woodland are small and fragmented, and often associated with disused quarries.

Limited woodland cover, with patches of both broadleaves and conifers associated with infertile sandy soils, elsewhere occasional shelterbelts.

Long, straight roads and tracks, often with wide verges; Ermine Street follows the route of a key Roman north–south route.

Nucleated medieval settlement patterns following major routes, especially Ermine Street; sparse on higher land, with springline villages along the foot of the Cliff and some estates and parklands.

Other development comprises the major settlements of Lincoln and Scunthorpe, with their prominent landmarks of the cathedral and steelworks, and several active and re-used airfields prominent on the ridgetop.

Vernacular architecture and walling, especially in villages, of local warm-coloured limestone with dark brown pantiles.

Several ground features, especially on the plateau, include prehistoric burial mounds, Roman artefacts and abandoned medieval villages".

6.14 Whilst this national scale assessment is useful in providing a broad contextual overview of landscape character, it is not intended to be applicable at a site-specific level and therefore it would be unlikely that the site displayed all of the above characteristics. However, the site is part of an elevated arable landscape overlaying the limestone ridge with limited field boundaries, Risby Warren to the north of the site area is formed from Coversands deposits, Ermine Street a Roman Road lies to the east of the site area and the Scunthorpe Steelworks complex to the west of the site is very prominent. These elements are typical of the landscape character and

context in which the site is located. In terms of characteristics which are a-typical of the wider NCA, of particular note are the extensive coniferous woodlands immediately surrounding much of the site.

6.15 The proposed development would only be visible from a very small proportion of the wider landscape within NCA 45, and at this scale would not result in any change to key identified landscape characteristics. It has therefore been determined appropriate not to assess the effects at this scale further and instead to focus the assessment on the more local scale character assessments discussed below.

North Lincolnshire Landscape Character Assessment (LCA) & Guidelines, (1999)

6.16 The North Lincolnshire LCA identifies six Character Areas that cover North Lincolnshire, each of which are further sub-divided into component local landscape types. The site is located in the 'Lincolnshire Ede Character Area'. This Character Area is sub divided into 11 local landscape types of which two, Wooded Scarp Slope (WWS) which contains the lower (western portion of the site) and Heathy Woodland (HW) which contains the upper (eastern portion of the site) are of relevance to the site, as shown in Figure 4 Landscape Character. The key characteristics of these landscape types, (of relevance to the proposals) are identified as:

Table 6.1: Landscape Types within site area.

Wooded Scarp Slope **(Western portion of the site)**	**Heathy Woodland** **(Eastern portion of the site)**
i) Sinuous scarp slope overlain by coversands and designated as an Area of High Landscape Value. ii) West facing slopes are extensively wooded with small areas of arable farmland, pasture, scrub and rough grass. iii) Where vegetation is limited, views towards Scunthorpe are	i) Elevated, gently undulating landscape of deciduous and coniferous woodland containing areas of open scrub and heathland. ii) Attractive character, intimate and enclosed, within the woodland contrasting with more open heath areas. iii) Contains three SSSIs (Broughton Far Wood, Broughton Alder Wood and Risby

extensive, otherwise the landscape is well enclosed and of intimate scale. iv) Significant areas have been left to nature, resulting in mainly deciduous woodland with birch, pine, larch, oak, gorse and rhododendron. v) Ecologically important area, with three sites of Nature Conservation Interest.	Warren) and is designated as an Area of High Landscape Value. Ancient replanted woodland at Far Wood, West Wood and Spring Wood. iv) Views to the west towards Scunthorpe restricted by vegetation. v) Local historical interest provided by Ermine Street, a Roman road that bisects the woodland.

6.17 Within the North Lincolnshire Landscape Character Assessment & Guidelines (1999) the site lies within the 'Lincolnshire Edge' Character Area, and straddles the 'Heathy Woodland' and 'Wooded Scarp Slope' sub areas. The following extract from Part 1 of the Character Assessment under Landcover and Wildlife is of note in relation to the character of the site: *'Much of the area close to Scunthorpe is blighted by current and former industrial activity. The former rural landscape structure has been lost and the present appearance is degraded and unattractive. However, in the more rural landscape away from Scunthorpe the scenery has been degraded by agricultural intensification. Despite this, woodland blocks remain locally prominent landscape elements.'*

6.18 In Part 2 of the Landscape Character Assessment, Landscape Strategy and Guidelines. The document notes for the Heathy Woodland Landscape Type that in peripheral woodland areas, consideration should be given to the restoration of lowland heathland. Under Wooded Scarp Slope the document notes that the development of hedgerows should be encouraged particularly where linking with woodland blocks, to maximise possibilities for habitat linkage and wildlife dispersal.

6.19 The site lies within a landscape which is characterised by the adjacent large scale industrial area and the electrical power which the area draws in from the national grid. It lies within a farmland area surrounding the town and industry of Scunthorpe, in which in addition to views of the town and the steel works, pylons cut across the landscape and views include other large scale industry and wind turbines beyond.

6.20 The character of the site is also in part influenced by the adjacent woodland, the extent of which is notable in a Lincolnshire context. There are also valuable heathland habitats in the wider landscape to north, but the site is in intensive arable production, in keeping with much of the local farmland.

Landscape Designations

6.21 There are no Landscape designations within the site. (See Figure 6.4 Landscape Designations) As referenced under Heathy Woodland in the north Lincolnshire Character Assessment (See Table 6.1 above) the eastern two thirds of the site previously fell within an area designated in the North Lincolnshire Local Plan (Adopted May 2003) as an Area of High Landscape Value however this policy was not saved in September 2007 when the Adopted Local Plan was reviewed. Portions of the woodland to the east of the site are designated as Ancient Woodland.

6.22 The assessment of potential effects on features and designated areas concerned with the historic environment (such as World Heritage Sites, Scheduled Ancient Monuments, Listed Buildings and Conservation Areas) does not form part of this assessment. The identification of these however can be important in providing an indication of the value and quality of the wider landscape character as well as an indication of potential sensitive visual receptors and areas from where existing views towards the site are potentially more sensitive to change.

Conservation Areas

6.23 The site does not lie within or adjacent to a Conservation area. Four Conservation Areas lie within the 5km study area as illustrated on Figure 6.4 Landscape Designations, At Appleby to the north, Scawby to the south and two in Scunthorpe.

Scheduled Monuments

6.24 There are no Scheduled Monuments within the site. The closest lies to the south of the site at Raventhorpe medieval settlement earthworks immediately south west of Raventhorpe Farm.

Listed Buildings

6.25 There are no Listed Buildings within the site. The site and grounds of the former Manby Hall lies to the immediate south west of the site. This property fell into total ruin in the Mid part of the last century it is no longer standing, it is not subject to a statutory designation

Baseline Visual Receptors

Extent of Visibility

6.26 In general, the position of the site on a localised ridge ought to make it notable in the landscape but the woodland surrounding the site limits the potential for views to the north, east and south. Furthermore, the large built form of the Steelworks to the west of the site, particularly the long rolling mills, limits the majority of potential views from the town.

6.27 A 'screened ' Zone of Theoretical Visibility (ZTV) plan (Figure 6.3 LVIA Viewpoints) has been produced which illustrates the theoretical extent of where the proposed development would be visible from, assuming 100% visibility, and includes the screening effect from vegetation and buildings. This has been generated on the assumption that the proposed panels would have a height of 3m. Indicative woodland and Building heights are modelled at 15m an 8m respectively.

6.28 The screened ZTV plan is a tool to help illustrate locations where views of the proposed development would not be possible so as to allow the focus of baseline studies to be made on those locations where views are theoretically possible.

6.29 Following desktop research and site visits, it is evident that the extent of actual visibility of the proposed development is even less than is suggested by the screened ZTV plan. Visibility would generally be limited to the immediate environs of the site owing to the combined effect of topography, built form particularly in terms of the large buildings associated with the steel works and the mature plantation woodlands surrounding much of the site.

General views and screening elements

6.30 As noted above views within the wider landscape beyond the site are restricted by the scarp and vale topography, and the influence of screening elements in the immediate environs of the site.

6.31 To the north, the site is largely enclosed by plantation woodland. A series of power lines cut across the site but the resulting channels through the woodland do not open strong lines of visibility into the site. To the north of the woodland immediately surrounding the site are further woodland blocks surrounding further agricultural fields. Two residential properties lie within the farmland to the north of the site, High Santon Farm and Springwood Cottage. The screened ZTV indicates that there is some potential for views of the scheme from the boundaries of Spring Wood Cottage. In the wider more open agricultural landscape to the north beyond mosaic scrubland landscape of Risby Warren the screened ZTV indicates some potential for views from areas along Risby Road and to the south of Appleby.

6.32 To the east woodland cover is even stronger with a thick plantation woodland occupying all the land between the site and the settlement of Broughton approximately 1km to the east. A series of permissive footpaths run through the main body of this woodland. A public right of way runs north west from Broughton through the woodland where it exits adjacent to the north eastern portion of the site and then crosses through the site area towards the settlement of Santon to the north and the Steel Works. Views from the pathways within the woodland are very limited and contained by the vegetation. As well as the vegetation restricting views from the east the topography also serves to limit visibility. The site largely lies across the scarp slope angled towards the west. The screened ZTV indicates patches of potential visibility in the wider landscape (Figure 5). A residential property Herron Lodge lies within the woodland from which no potential views are available.

6.33 To the south, woodland also wraps almost continually around the southern perimeter of the site. A series of power lines cut through the woodland but again very limited views are gained of the site area along these corridors. To the south of the perimeter woodland the landscape becomes more open where the land use is predominantly arable. A portion of this ground is now occupied by the Ravensthorpe Solar Farm which is visible from the adjacent A18 to the south and sections of the M180 also to the south. The screened ZTV indicates potential for views of the proposal area from the more open farmland areas to the south west.

6.34 To the immediate west lies the extensive estate of the Scunthorpe Steel Works including the furnaces and the rolling mills. This creates a large area of mixed industrial use including buildings, pipes, railways, gas holders and chimneys between the site and the main commercial and residential areas of the settlement

of Scunthorpe. The screened ZTV indicates that the majority of potential visibility lies within the area occupied by the Steel works with more limited potential within the settlement of Scunthorpe itself.

6.35 The most notable views of the site are therefore limited to the public footpath running through and across the site. There would be very limited visibility in the wider landscape, often limited to possible glimpsed views through very limited breaks in the forestry.

6.36 It is noted that there are views of the existing solar development at Raventhorpe Farm in views from the M180 to the south of the site, but the site lies behind a band of woodland and intervening steelworks buildings which serve to restrict the potential for any cumulative visibility between the two schemes.

6.37 It is also recognised that from the Wolds landscape to the east of the site views can be gained of large scale buildings within steel works which lie beyond the site. However, it is understood that the proposed panels would be too low lying to be seen above adjacent woodland and unlike the steelworks would generally not be visible from this area.

6.38 Views from within Scunthorpe would most likely be limited to those people living in the upper stories of the high rise residential blocks, as other views from lower lying areas would largely be screened out by steel works and other large sheds on eastern side of town.

Likely Environmental Effects

6.39 Following preliminary desktop research and field work[5], the study area for the LVIA chapter of the Environmental Statement will be set at 5km from the site boundary.

[5] The baseline landscape resource and visual receptors were identified in part through a desk-based study of published landscape character studies, relevant planning policy

Any views of the proposed development beyond this distance would be negligible and unlikely to give rise to any effects greater than minor. That said, as landscape considerations have been a key material consideration in planning decisions for solar park it is rightly include in the Environmental Statement.

ASSESSMENT METHODOLOGY

6.40 In accordance with published guidance, landscape and visual effects will be assessed separately, although the procedure for assessing each of these is closely linked. A clear distinction will be drawn between landscape and visual effects as described below:

- Landscape effects relate to the effects of the proposals during construction, operation, management and decommissioning on the physical and other characteristics of the landscape as a resource in its own right and its resulting character and quality;
- Visual effects relate to the effects on specific views experienced by visual receptors and on visual amenity more generally during construction, operation, management and decommissioning.

Landscape and Visual Impact Assessment Process

6.41 The assessment of landscape effects for the Environmental Statement will follow a recognised process set out below:

- Identify the baseline landscape resource (i.e. individual landscape elements and landscape character) and its value;
- Describe any mitigation measures proposed to avoid, reduce and ameliorate potential adverse impacts and to maximise the beneficial impacts of the development;
- Evaluate the sensitivity of the landscape resource to the type of development proposed;

guidance, aerial photography and Ordnance Survey mapping. In addition, site visits were conducted during August 2017 and January 2018 when the viewpoint photographs were taken.

- Identify predicted landscape impacts of the development;
- Evaluate the magnitude of change to the baseline landscape resource; and
- Assess the level of residual effect of the development on the landscape.

6.42 The assessment of visual effects for the Environmental Statement will follow a similar process as set out below:

- Identify a 'bare earth' Zone of Theoretical Visibility (ZTV) for the development using digital terrain data (i.e. the geographical area where views of the development are theoretically possible with a bare earth scenario);
- Identify potential visual receptors for the development (i.e. groups of people who would have views of the development);
- Describe any mitigation measures proposed to avoid, reduce and ameliorate potential adverse impacts and to maximise the beneficial impacts of the development;
- Evaluate the sensitivity of the visual receptor groups to the type of development proposed;
- Describe the nature of the baseline views (usually illustrated by a photograph) and the predicted visual impacts of the development on the views of each receptor group;
- Evaluate the magnitude of change in the view of the receptor groups;
- Assess the level of residual effects on the views from representative receptor groups and on overall visual amenity.

Assessment of Significance

6.43 The LVIA would take the precautionary approach that all effects, unless stated otherwise, are assessed as adverse. The criteria used as guidance in assessing the significance of the effects of the development are set out below.

6.44 The primary source of best practice for LVIA in the UK is The Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3) (Landscape Institute and the Institute for Environmental Management and Assessment, 2013).

The assessment criteria adopted to inform the assessment of effects has been developed in accordance with the principles established in this best practice document. It should however be acknowledged that GLVIA3 establishes guidelines not a specific methodology. The preface to GLVIA3 states *"This edition concentrates on principles and processes. It does not provide a detailed or formulaic 'recipe' that can be followed in every situation – it remains the responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand"*

6.45 The criteria set out below have therefore been developed specifically for this assessment to ensure that the methodology is appropriate and fit for purpose.

6.46 The purpose of an LVIA when undertaken in the context of an Environmental Impact Assessment (EIA) is to identify and describe any likely significant landscape and visual effects arising as a result of the proposals.

6.47 An LVIA will consider:

- effects on the landscape as a resource in its own right (the landscape effects); and
- effects on specific views and visual amenity more generally (the visual effects).

6.48 Therefore, separate criteria are set out below for the assessment of landscape and visual effects.

Nature (sensitivity) of landscape features

6.49 The nature or sensitivity of an individual landscape feature or element reflects its susceptibility to change and the value associated with it. Sensitivity is therefore a function of factors such as the feature's quality, rarity, contribution to landscape character, degree to which the particular element can be replaced and cultural associations or designations that apply. A particular feature may be more 'sensitive' in one location than in another often as a result of local value associated with the feature. Therefore, it is not possible to simply place different types of landscape feature into sensitivity bands. Where individual landscape features are affected, professional judgement will be used as far as possible to give an objective

evaluation of its sensitivity. Justification will be given for this evaluation where necessary.

6.50 The nature or sensitivity of individual landscape features will be described as very high, high, medium, low or very low.

Nature (sensitivity) of landscape character

6.51 The nature or sensitivity of landscape character reflects its susceptibility to change and the value associated with it. It is essentially an expression of a landscape's ability to accommodate a particular type of change. It varies depending on the physical and perceptual attributes of the landscape including but not necessarily limited to: scale; degree of openness; landform; existing land cover; landscape pattern and complexity; the extent of human influence in the landscape; the degree of remoteness/wildness; perception of change in the landscape; the importance of landmarks or skylines in the landscape; inter-visibility with and influence on surrounding areas; condition; rarity and scenic quality of the landscape, and the value placed on the landscape including any designations that may apply.

6.52 For the Environmental Statement, the nature or sensitivity of landscape character will be considered with reference to a number of local character areas. Information regarding the key characteristics of these character areas will be extrapolated from relevant published studies where possible but also informed by project specific field assessment. An assessment of landscape sensitivity to the development proposed will be undertaken employing professional judgement for relevant local landscape character areas.

6.53 The nature or sensitivity of landscape character will be described as very high, high, medium, low or very low.

Nature (sensitivity) of visual receptors

6.54 The nature or sensitivity of visual receptor groups reflects their susceptibility to change and the value associated with the specific view in question. Sensitivity varies depending on a number of factors such as the occupation of the viewer, their viewing expectations, duration of view and the angle or direction in which they would see the site. Whilst most views are valued by someone, certain viewpoints are particularly highly valued for either their cultural or historical associations and this can increase the sensitivity of the view. The following criteria are provided for guidance only and are not exclusive:

- Very Low Sensitivity – People engaged in industrial and commercial activities or military activities.

- Low Sensitivity - People at their place of work (e.g. offices); shoppers; users of trunk/major roads and passengers on commercial railway lines (except where these form part of a recognised and promoted scenic route).

- Medium Sensitivity - Users of public rights of way and minor roads which do not appear to be used primarily for recreational activities or the specific enjoyment of the landscape; recreational activities not specifically focused on the landscape (e.g. football); motel users.

- High Sensitivity – Residents at home; users of long distance or recreational trails and other sign posted walks; users of public rights of way and minor roads which appear to be used for recreational activities or the specific enjoyment of the landscape; users of caravan parks, campsites and 'destination' hotels; tourist attractions with opportunities for views of the landscape (but not specifically focused on a particular vista); slow paced recreational activities which derive part of their pleasure from an appreciation of setting (e.g. bowling, golf); allotments.

- Very High Sensitivity - People at recognised vantage points (often with interpretation boards), people at tourist attractions with a focus on a specific view, visitors to historic features/estates where the setting is important to an appreciation and understanding of cultural value.

6.55 It is important to appreciate that it is the visual receptor (i.e. the person) that has a sensitivity and not a property, public right of way or road. Also, the sensitivity of a receptor group is not influenced by the number of receptors. As an example, although many people may use a motorway, this does not increase the sensitivity of each receptor using it. Likewise, a residential property may only have one person living in it but this does not reduce the sensitivity of that one receptor. Whilst the number of receptors affected at any given location may be a planning consideration, for the purposes of this assessment it will not alter the sensitivity of the receptor group.

6.56 Where judgements will be made about the sensitivity of assessment viewpoints, the sensitivity rating provided will be an evaluation of the sensitivity of the receptor

group represented by the viewpoint and not a reflection of the number of people who may experience the view.

6.57 For some developments (e.g. wind energy developments) it important not to confuse the concept of visual sensitivity with the perception of the development. For example, it is recognised that some people consider wind turbines to be unattractive, but others enjoy the sight of them.

Nature (magnitude) of effects – General note

6.58 Prior to the publication of GLVIA3, LVIA practice had evolved over time in tandem with most other environmental disciplines to consider the level of effect (relative significance) principally as a function of two factors, namely: sensitivity of the receptor and magnitude of the effect (the term 'magnitude' being a word most commonly used in LVIA and most other environmental disciplines to describe the size or scale of an effect).

6.59 Box 3.1 on page 37 of GLVIA3 references a 2011 publication by IEMA entitled 'The State of EIA Practice in the UK' which reiterates the importance of considering not just the scale or size of effect but other factors which combine to define the 'nature of the effect' including factors such as the probability of an effect occurring and the duration, reversibility and spatial extent of the effect.

6.60 The flow diagram on page 39 of GLVIA3 suggests that the magnitude of effect is a function of three factors (the size/scale of the effect, the duration of the effect and the reversibility of the effect).

6.61 For certain types of development (e.g. residential) the proposed development is permanent and non-reversible. For other types of development (e.g. wind and solar energy) the proposed development is for a time-limited period and would be largely reversible at the end of the scheme's operational period. Reversibility of a proposed development is a material consideration in the planning balance but does not reduce the scale of the effect (i.e. the 'magnitude' in the traditional and commonly understood sense of the word) during the period in which the scheme is operational. In this regard, it would be incorrect to report a lesser magnitude of change to a landscape or view as a result of a time-limited effect or the relative reversibility of the effect.

6.62 For clarification, the proposed approach for the Environmental Statement chapter will be to consider magnitude of effect solely as the scale or size of the effect in the

traditional sense of the term 'magnitude'. Having identified the magnitude of effect as defined above, the LVIA will then describes the duration and reversibility of the identified effect, taking these factors into account as appropriate in the consideration of the level (relative significance) of the effect.

6.63 In the context of the above discussion the following criteria is proposed to describe the magnitude of effects.

Nature (magnitude) of effects on landscape features

6.64 Professional judgement has been used as appropriate to determine the magnitude of direct physical effects on individual existing landscape features using the following criteria as guidance only:

- Very Low Magnitude of Change - Negligible loss or alteration to existing landscape features;
- Low Magnitude of Change - Minor loss or alteration to part of an existing landscape feature;
- Medium Magnitude of Change - Some loss or alteration to part of an existing landscape feature; and
- High Magnitude of Change - Major loss or major alteration to an existing landscape feature.
- Very High Magnitude of Change - Total loss or alteration to an existing landscape feature.

Nature (magnitude) of effects on landscape character

6.65 The magnitude of effect on landscape character is influenced by a number of factors including: the extent to which existing landscape features are lost or altered, the introduction of new features and the resulting alteration to the physical and perceptual characteristics of the landscape. Professional judgement has been used as appropriate to determine the magnitude using the following criteria as guidance only. In doing so, it is recognised that usually the landscape components in the immediate surroundings have a much stronger influence on the sense of landscape character than distant features whilst acknowledging the fact that more distant features can have an influence on landscape character as well.

- Very Low Magnitude of Change - Negligible loss or alteration to existing landscape features; no notable introduction of new features into the landscape; and negligible change to the key physical and/or perceptual attributes of the landscape.

- Low Magnitude of Change - Minor loss or alteration to existing landscape features; introduction of minor new features into the landscape; or minor alteration to the key physical and/or perceptual attributes of the landscape.

- Medium Magnitude of Change - Some notable loss or alteration to existing landscape features; introduction of some notable new features into the landscape; or some notable change to the key physical and/or perceptual attributes of the landscape.

- High Magnitude of Change - A major loss or alteration to existing landscape features; introduction of major new features into the landscape; or a major change to the key physical and/or perceptual attributes of the landscape.

- Very High Magnitude of Change - Total loss or alteration to existing landscape features; introduction of dominant new features into the landscape; a very major change to the key physical and/or perceptual attributes of the landscape.

Nature (magnitude) of effects on views and visual amenity

6.66 Visual effects are caused by the introduction of new elements into the views of a landscape or the removal of elements from the existing view.

6.67 Professional judgement will be used to determine the magnitude of impacts using the following criteria as guidance only:

- Very Low Magnitude of Change - Negligible change in views;

- Low Magnitude of Change - Some change in the view that is not prominent but visible to some visual receptors;

- Medium Magnitude of Change - Some change in the view that is clearly notable in the view and forms an easily identifiable component in the view;

- High Magnitude of Change - A major change in the view that is highly prominent and has a strong influence on the overall view.

- Very High Magnitude of Change – A change in the view that has a dominating or overbearing influence on the overall view.

6.68 Using this set of criteria, determining levels of magnitude is primarily dependent on how prominent the development would be in the landscape, and what may be judged to flow from that prominence or otherwise.

6.69 For clarification, the use of the term 'prominent' relates to how noticeable the features of the development would be. This is affected by how close the viewpoint is to the development but not entirely dependent on this factor. Other modifying factors include: the focus of the view, visual screening and the nature and scale of other landscape features within the view. Rather than specifying general bands of distance at which the proposed development would be dominant, prominent or incidental to the view etc. The prominence of the proposed development in each selected view will be described in detail for each viewpoint taking all the relevant variables into consideration.

Type of effect

6.70 The assessment identifies effects which may be beneficial, adverse or neutral. Where effects are described as neutral this is where the beneficial effects are deemed to balance the adverse effects.

6.71 For some developments (e.g. wind energy developments) it is recognised that some people consider the development to be unattractive but others enjoy the sight of it. A landscape and visual assessment for these developments therefore assumes that all identified landscape and visual effects are 'adverse' unless stated otherwise. This allows decision makers to assess a worst-case scenario.

Duration of effect

6.72 For the purposes of this assessment, the temporal nature of each effect is described as follows:

- Long Term – over 5 years
- Medium Term – between 1 and 5 years
- Short Term – under 1 year

Reversibility of effect

6.73 The LVIA also describes the reversibility of each identified effect using the following terms:

- Permanent – effect is non reversible
- Non permanent – effect is reversible

Level of effect and identification of significant effects

6.74 The purpose of an LVIA when produced in the context of an EIA is to identify and describe any significant effects on landscape and visual amenity arising from the proposed development.

6.75 Neither EC Directive 2011/12/EU nor the 2017 Regulations define a threshold at which an effect may be determined to be significant. In certain other environmental disciplines there are regulatory thresholds or quantitative standards which help to determine the threshold of what constitutes a significant effect. However in LVIA, any judgement about what constitutes a significant effect is ostensibly a subjective opinion expressed as in this case by a competent and appropriately qualified professional assessor.

6.76 The level (relative significance) of landscape and visual effects is determined by combining judgements regarding the sensitivity of the landscape or view, magnitude of change, duration of effect and the reversibility of the effect. In determining the level of residual effects, all mitigation measures are taken into account.

6.77 The relative level of effect is described as major, major/moderate, moderate, moderate/minor, minor or minor/no effect. No effect may also be recorded as appropriate where the effect is so negligible it is not even noteworthy.

6.78 Those effects described as major, major/moderate and in some cases moderate may be regarded as significant effects as required by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Proposed Visual Receptors

6.79 A number of viewpoint locations have been considered to help represent the nature of views towards the site from the surrounding landscape. Those have informed the initial selection were identified through ZTV analysis and a desk based study in advance of a site meeting. The following 11 viewpoint locations have been

considered. It is currently expected that the locations for the photomontages to accompany the Environmental Statement will be as follows:

- Viewpoint 1: View from Footpath 214, near Little Crow Covert looking southeast across the site;
- Viewpoint 2: View from Footpath 214, to the east of the site looking west across the site;
- Viewpoint 3: View from Footpath 212, near Raventhorpe Farm looking north towards the site

6.80 The photomontages will show the scale and massing of the proposed development in its landscape context from key locations in the surrounding locality and provide a useful tool to aid the judgements made in the LVIA process.

6.81 In line with good practice for LVIA, consultation took place with North Lincolnshire Council regarding the selection of viewpoints for the Environmental Statement Chapter: -

Proposed LVIA Viewpoints (shown on Figure 6.3)

Viewpoint Number	Viewpoint Name
1	Footpath 214, near Little Crow Covert
2	Footpath 214, south eastern boundary of the site
3	Footpath 212, near Raventhorpe Farm
4	Risby Road, near High Risby
5	A1029, Winterton Road, Scunthorpe
6	Lakeside Parkway, Scunthorpe
7	Holme Lane, Overbridge of M180 motorway

Viewpoint Number	Viewpoint Name
8	Central Park, Scunthorpe
9	Carr Lane, near Worlaby Carrs Farm
10	Holme Lane, Messingham
11	B1207, south of Appleby

Residential receptors

6.82 The number of residential properties which offer the potential for residents to experience views towards the site in close proximity to the site are very limited. Those properties which may experience a view of the proposals are Spring Wood Cottage to the north of the site area. The Screened ZTV indicates some limited potential for views of the periphery of settlements at Appleby and along Risby Road to the north, around Worlably Cars Farm to the north east, within the settlement of Scunthorpe to the west (most likely people living in the upper stories of the high rise residential blocks), and the periphery of Messingham to the south west.

Users of publicly accessible paths

6.83 Footpath 214 runs through the site area from the woodland to the east of the site to Santon and the edge of the of the Steel Works to the north west. There is also a footpath south of the site area FP 212 with potential for views from the section to the immediate south of the site. The whole route runs from the A18 via Ravensthope west of the existing solar farm into and through the woods south of Footpath 214 into Broughton.

6.84 There are several other public footpaths in the vicinity of the site including a network of permissive paths through West Wood to the east of the site. The screened ZTV indicates that none of these routes have the potential to gain views of the proposals.

6.85 Within the wider landscape the screened ZTV incorporates some very limited sections of footpaths to the north around Viewpoint 4 at Risby Road, to the east

around viewpoint 9 where a footpath runs along the bank of the River Ancholme and to the south west around viewpoints 7 and 10 around the M180 and north of Messingham.

Users of the transport network

6.86 Due to the high degree of screening by topography and vegetation present around the site, the number of roads from which motorists and passengers are likely to experience views is very limited. The screened ZTV indicates that the main routes that would have the potential to experience views of the site would be a short section of the M180 to the south of the site, a section of Risby Road to the north between Scunthorpe and Appleby, some sections of Holme Lane and Northfield Road around Messingham in the vicinity of Viewpoints 7&9. Viewpoint 9 is located at the end of Carr Lane where it crosses the railway line between Scunthorpe and Barnetby. The screened ZTV indicates that all other road users in the wider landscape including those within the residential and commercial areas of Scunthorpe, (represented by Viewpoints 5,6 and 8) would have potential to gain no more than glimpsed views from local roads.

Users of recreational sites

6.87 There are no recreational sites within the study area, beyond the local footpath network detailed above, which would have the potential to gain views of the site.

CUMULATIVE AND IN-COMBINATION EFFECTS

6.88 Other solar energy schemes in the surrounding landscape which are already operational, such as the Ravensthorpe scheme, have been considered to form part of the baseline environment against which the development has been assessed. Notwithstanding this, it is relevant to also consider the overall effect of the developments in combination. Having considered the potential for effects on both landscape character and visual amenity it is not considered that there are any significant cumulative effects above and beyond those identified for the Little Crow scheme of itself. Whilst there may be a small number of locations where the Little Crow scheme would be seen in combination with other solar energy development, these locations would be highly limited in nature.

7. ECOLOGY AND NATURE CONSERVATION

7.1 The ecology chapter of the Environmental Statement will consider the likely significant effects of the proposed development on ecological features during its construction, operation, management and decommissioning phases. The specific objectives of the assessment would be to:

- Identify where there is potential for significant effects on designate sites and habitats considered to be of conservation or ecological value;
- Detail the presence / possible presence of protected species and other species of particular conservation value;
- Describe any mitigation measures proposed to avoid, reduce and ameliorate potential adverse impacts and to maximise the beneficial impacts of the development;
- Assess the significance of residual effects that are likely to remain following implementation of mitigation and restoration measures and describe if any result in likely significant effects on ecological features.

7.2 This chapter is supported by the following appendices: -

- Appendix 7.1: Copy of Natural England Informal Pre-app Response
- Appendix 7.2: Phase 1 Habitat Map and Target Notes
- Appendix 7.3: Designated Sites for Nature Conservation with 1km
- Appendix 7.4: Extended phase 1, arable plants, great crested newts & water Vole Survey Report
- Appendix 7.5: Wintering birds surveys
- Appendix 7.6: Breeding Birds Surveys
- Appendix 7.7: Bat Survey Activity

Habitat Regulation Assessment

7.3 On 14 September 2018, Natural England confirmed as part of its Discretionary Advice Service that it was satisfied that, on the basis of the information provided, it can be excluded that the proposed plan or project will have a significant effect

on the Humber Estuary SAC/ SPA/ Ramsar, either individually or in combination with other plans or projects. Furthermore, Natural England advised it was satisfied that the proposed operations are not likely to damage any of the interest features of the Humber Estuary SSSI, Broughton Alder Wood SSSI or Broughton Far Wood SSSI.

7.4 Copy of Natural England response is provided at Appendix 7.1

PRELIMINARY BASELINE CONDITIONS

Overview of Development Site

7.5 The development site consists of predominantly arable fields bordered by a network of hedgerows and extensive woodland plantations. The land gradually slopes to the western edge of the site. Grassland, scrub and ruderal habitat are also present in discrete areas around the site. The wider landscape is characterised by the industrial steelworkings to the west of the site, and further arable farmland and plantation woodland to the north and east. Beyond the woodland to the south lies a solar park constructed in 2015.

7.6 The following field surveys have informed the baseline.

Summary of Field Surveys

Survey	Methodology	Timing
Extended Phase 1 Habitat Survey	Extended Phase 1 survey based on JNCC (2010)6 and IEA (1995)7 guidance. Including hedgerow assessment, walkover assessment for value of the site for protected and notable species e.g. badgers, roosting bats, reptiles and invertebrates etc.	Over 4 days in July, August & September 2017

[6] JNCC (2010) Handbook for Phase 1 habitat survey – a technique for environmental audit. Joint Nature Conservation Committee, Peterborough
[7] Institute of Environmental Assessment (1995). Guidelines for Baseline Ecological Assessment. E & FN Spon, London.

Survey	Methodology	Timing
Great Crested Newt Habitat Suitability Index (HSI) and eDNA testing	HSI assessment in accordance with Oldham et al. (2000)[8] Great crested newt eDNA survey in accordance with Biggs et al. (2014) [9]	Over 2 visits in April & June 2018
Arable Plants Survey	Survey based Plantlife Important Arable Plant Areas Methodology[10], adapted for EIA purposes	1 visit in June 2018
Water Vole Survey	Based on guidance provided by the Mammal Society in Dean et al. (2016)[11]	2 visits in September 2017 and April 2018
Wintering Bird Survey	Survey adapted from British Trust for Ornithology (BTO) Farmland Bird Survey methodology (e.g Gillings et al.)[12]	4 visits during November 2017 to February 2018
Breeding Birds Survey	Surveys adapted from BTO Common Bird Census methodology[13]	3 visits during April to June 2018

[8] Evaluating the suitability of habitat for the great crested newt (Triturus cristatus) (2000) Oldham et al. Herpetological Journal 10:143-155.
[9] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford.
[10] Byfield,A.J. & Wilson, P. J. (2005). Important Arable Plant Areas: identifying priority sites for arable plant conservation in the United Kingdom. Plantlife International, Salisbury, UK
[11] Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). The Mammal Society, London
[12] Gillings, S., Wilson, A.M., Conway, G.J., Vickery, J.A., and Fuller R.J. (2008) Winter Farmland Bird Survey – Research Report No. 494. BTO, Thetford
[13] Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000). Bird Census Techniques. Academic Press, London

Survey	Methodology	Timing
Bat Activity Survey	Manual Transect and Automated Detector Survey based on protocol described by the Bat Conservation Trust (2016)[14]	2 manual transects and 2 automated detector surveys, April to June 2018

Designated Sites

International Statutorily Designated Sites Within 10km

7.7 Humber Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar Site

7.8 The Humber Estuary is designated a Special Protection Area (SPA), Special Conservation Area (SAC) and Ramsar site. The area encompassing the SPA is situated approximately 11km north of the site at the closest point, whilst the SAC and Ramsar site is located 9km west at the closest point. It primarily receives its designation for its estuarine habitats, which support a range of associated species including internationally important assemblages of wintering and migratory birds.

7.9 The development site is situated a considerable distance from the Humber Estuary, and contains markedly different habitats to the estuarine habitats cited within the relevant designations, and the development site is highly unlikely to represent functionally linked habitat for the wildlife supported by the designated sites. Disturbance effects on wading and overwintering species is unlikely at such significant distances.

7.10 The Humber Estuary SAC, SPA and Ramsar site is considered to be outside of the zone of influence of the proposals and are not considered further within the assessment. Following preliminary consultation with the North Lincolnshire Ecologist and Natural England, both of these parties were of the opinion that the proposals will not significantly impacts the interest features of the Humber Estuary designated sites.

[14] Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn).

National statutorily designated sites within 5km

7.11 Five Sites of Special Scientific Interest (SSSIs) are located within 5km of the site, and are described below:

Broughton Far Wood SSSI

7.12 This is an extensive block of commercial woodland located approximately 820m east of the proposed solar array, although is 350m from the site access (which will utilise an existing farm track). This is designated for its rich woodland canopy and ground flora, as well as its areas of herb-rich limestone grassland in the north east corner.

7.13 The SSSI is separated from the site by further woodland plantation, arable fields and the B1207 road. The distances and the intervening landscape between the site and the SSSI is highly likely to attenuate any direct impacts on the ecological integrity of the SSSI.

7.14 There lies potential for the indirect impacts during construction however, as the main access route for construction vehicles will follow the B1208 which lies adjacent to the northern boundary of the SSSI.

Broughton Alder Wood SSSI

7.15 Situated approximately 1km east of the main development site, and is designated for its wet, alder Alnus glutinosa woodland and associated fen and spring habitats and flora. It is separated from the development site by extensive plantation woodland, the B1207 road, and a poultry farm. The distances and intervening landscape between this SSSI means direct or indirect impacts as a result of the proposals are highly unlikely to occur, and the SSSI is considered to be outside of the zone of influence

Risby Warren SSSI

7.16 This is a remnant area of heathland which supports a variety of associated plant communities, include dune, heathland, acid and calcareous grassland which are affected by airborne pollution from the nearby industrial sites. Tree cover on the SSSI comprises coniferous shelter belt planting and as well as scattered birch Betula sp. and gorse Ulex europaeus. This is located approximately 2.65km north west of the site and is separated from the development site by plantation woodland, agricultural farmland, heavy industry and quarry workings. Given the distance and

landscape lying between Risby Warren and the development site, the SSSI is considered to be outside of the zone of influence of the proposals.

Manton and Twigmoor SSSI

7.17 This comprises a complex of three separate sites, which are located approximately 3.1km south of the site at the closest point. Important habitats supported by the SSSI include heathland, acid grassland and wetland features, with wet woodland also present. Together the site components support a diverse range of associated floral species. The intervening landscape comprises woodland plantations, an existing solar array, a golf course and the busy A18 and M180 roads. This SSSI is considered to be beyond zone of influence of the development.

Castlethorpe Tufas SSSI

7.18 This is situated approximately 3.4km and is designated for its' geological interest, and is not considered further within this assessment.

Non-statutorily designated sites within 1km

7.19 Eleven locally designated sites for nature conservation are located within 1km of the application, which are described in Table 7.2. Of these, eight are Local Wildlife Sites (LWSs) selected by the Greater Lincolnshire Nature Partnership due to their importance for wildlife at a local level. Three sites are Sites of Nature Conservation Interest (SNCIs), the status of which has been superseded by the LWSs, but these sites retain SNCI status until they have been assessed against the LWS criteria. A map of designated sites within 1km of the site is presented in Appendix 7.3.

7.20 Non-statutorily designated sites within 1km of the development site:-

Site	Designation	Description	Size (ha)	Distance and bearing from site
Manby Wood	LWS	Botanically diverse wooded area, primarily consisting of broadleaved plantation with small areas of young coniferous plantation. Supports a variety of associated ground flora.	80.1	Adjacent to south-eastern boundary of site
Heron Holt	LWS	Woodland with parts containing diverse range of deciduous species and structural variety, with other parts consisting of dense pine and sycamore plantation. Supports a variety of woodland ground flora.	33.3	Adjacent to eastern boundary of site
Broughton West Wood	LWS	Mostly mature deciduous plantation, representative of re-planted ancient woodland, with substantial areas of younger growth and some coniferous elements. Very rich in woodland botany.	83.8	Adjacent to eastern boundary of site
Santon Wood East	LWS	A strip of field edge woodland connecting two planted woodland blocks of varying age and structure, which contains some ancient woodland indicator species.	6.77ha	140m north

Site	Designation	Description	Size (ha)	Distance and bearing from site
Broughton Far Wood	LWS	Botanically diverse plantation woodland containing mature or maturing broadleaved trees with some pine in places.	50.8	440m east
Gadbury and Lundimore Woods	LWS	Mixed plantation woodland considered to represent re-planted ancient woodland, supporting diverse ground flora. Known to support common pipistrelle Pipistrellus pipistrellus bat roosts.	81.5	450m south
Rowland Planation	LWS	Dominated by botanically-poor woodland plantation, although supports some areas with richer ground flora, and also contains diverse grassland rides and a small area of wetland	121	560m east
Far Wood Farm Meadow	LWS	An area of marsh, drier grassland and coarse vegetation formally cropped for hay. Supports diverse range of flush and grassland botany.	1.9	800m east

Site	Designation	Description	Size (ha)	Distance and bearing from site
Santon Wood	SNCI	Deciduous plantation woodland managed for forestry. Contains some good woodland ground flora.	101	Adjacent to north western boundary, contains part of the development site
Broughton West Wood	SNCI	Two strips of woodland shelter belts, predominantly consisting of deciduous plantation woodland with a small element of coniferous growth. Occasionally diverse woodland ground flora found in some areas. Support a wide range of typical woodland bird species.	6	Adjacent to south eastern boundary of site
Spring Wood Broughton	SNCI	Dense coniferous plantation woodland with very little ground flora	9.2	230m north of site access

7.21 Brougton West Wood LWS, Manby Wood LWS, Heron Holt LWS, Broughton West Wood SNCI and Santon Wood SNCI are all included in this assessment primarily due to their proximity to the site. Parts of Manby Wood LWS and Broughton West Wood are considered to represent Plantations on Ancient Woodland Sites (PAWS) as identified using the Natural England/DEFRA web-based MAGIC database[15].

7.22 Broughton Far Wood LWS and Rowland Plantation are also included within this assessment, as they border the B1208 road which is expected to be the main route

[15] www.MAGIC.gov.uk

for construction site traffic travelling to and from the site, which may result in indirect impacts occurring. Broughton Far Wood LWS also comprises PAWS woodland.

7.23 The remaining locally designated sites are considered to be of sufficient distance from the site that no direct or indirect impacts are likely to occur as a result of the development proposals, and are therefore considered to be outside of the zone of influence.

Habitats

7.24 A Phase 1 Habitat Map is provided in Appendix 7.2

Arable

Arable fields

7.25 This was the most frequently encountered habitat at the site, accounting for approximately 200ha of the land within the survey area. At the time of survey, the arable fields comprised a mix of winter barley, early wheat, vining peas and rapeseed, as well as game cover crops at the edge of some fields. The land within the cultivated arable fields holds very little intrinsic value for biodiversity and is considered to be of Negligible Importance.

Arable Field Margins

7.26 The margins of the arable fields were generally narrow (0.5m to 2m wide) and comprised typical coarse grasses and herbaceous species. Uncultivated strips of grassland 2-6m wide were noted on either side of farm tracks running though the site and at some headlands around arable fields, particularly in the north east of the site. The vegetation within these habitats was similar in composition to the rest of the arable field margins described above, although evidence that this habitat was subject to less frequent disturbance was noted; a layer of thatch was present and a higher abundance of floral species was present. For the purposes of this assessment, these grassland strips were considered to represent semi-improved grassland although they have been included under the broad habitat type of Arable Field Margins.

7.27 The total extent of arable margin habitat at the site was approximately 3ha. Although the arable weed species recorded on site were generally widespread

species typical of such habitat, henbane Hyoscyamus niger, which was recorded in the north western corner of the site, is classified as Vulnerable on the vascular plant Red Data Book for Great Britain[16]. A species is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium term future.

7.28 Arable field margins are a priority habitat identified as a conservation target both locally and nationally. Consequently, this habitat is assessed to be of Local Importance.

Poor Semi-improved Grassland

7.29 Areas of agricultural land in the south west of the site were dominated by tall rank grasses and herbs. In damper areas, rushes such as soft rush Juncus effusis and toad rush Juncus bufonius were noted. Although this habitat may support notable species occasionally, it is readily-establishing and was not considered to offer elevated ecological compared to habitats within the wider landscape.

7.30 A small (~0.3ha) area of semi-improved grassland containing abundant orchids was present in south eastern corner of the site, around the edges of a raised circular mound at and extending east of this feature. Common spotted orchid Dactylorhiza fuchsia was frequently encountered as was northern or southern marsh orchid Dactylorhiza praetermissa / Dactylorhiza purpurella, as well as occasional bee orchid Ophrys apifera, Although these orchid species are widespread in the UK and can be found in a range of habitats, the presence of these signifies this area as likely to have been subject to less improvement than the other grassland habitat present at the site. This area lies outside of the construction zone and thus is not expected to be impacted by the development.

7.31 This habitat is considered to be of Site Importance for biodiversity.

Improved Grassland

7.32 A block of mown improved grassland measuring approximately 3.5ha and dominated by cock's foot was present towards the east of the site. This habitat offered only limited value for wildlife and was considered to be of Negligible Importance.

[16] Cheffings, C.M. & Farrell, L. (2005) Species Status Report No 7: The Vascular plant red data list for Great Britain. Joint Nature Conservation Committee, Peterborough.

Semi-natural Broad-leaved Woodland

7.33 Much of the site was bordered by woodland, although the majority of woodland habitat comprised planted mixed/broadleaved woodland (see below). However, just beyond the western site boundary lay a strip of semi-natural riparian woodland on the banks of a stream, sloping down some 5-10m to the stream below and covering an area of approximately 1.5ha. This habitat comprised semi-mature oak Quercus robur, silver birch Betula pendula, hawthorn Crataegus monogyna, goat willow Salix caprea, alder Alnus glutinosa and elder Sambucus nigra.

7.34 An area of this habitat measuring 0.25ha was also present at the junction of three hedgerows in the south west of the site, which comprised mature oak, lime Tilia sp hawthorn, elder, silver birch and grey willow, and an understorey of enchanter's nightshade Circaea lutetiana and wood avens Geum urbanum.

7.35 Although relatively small in extent, this habitat is likely to be of value to a range of wildlife associated with woodland and is considered to be of Local Importance

Plantation Broad-leaved Woodland

7.36 Much of the woodland beyond the northern and south eastern boundary of the site comprised planted broadleaved trees as well as a roughly rectangular area of 1.75 ha in between arable land within the western area of the site.

7.37 Although this varied in age and species composition between different areas of the site, generally speaking this comprised abundant semi-mature to mature ash Fraxinus excelsior, oak, Norway maple Acer platanoides, poplar Populus sp., silver birch and sycamore Acer pseudoplanatus with hawthorn, blackthorn Prunus spinosa, sweet chestnut Castanea sativa, hazel Corylus avellana also frequently encountered with an associated ground flora noted at the edges of the woodlands close to the site boundary, including species such as bramble Rubus fruticosus, ivy Hedera helix, wood avens, lords-and-ladies Arum maculatum, and nettle.

7.38 Much of this habitat at the site boundaries are locally designated Sites of Nature Conservation Interest (see above). This habitat also represents Lowland Mixed Deciduous Woodland, which is a local and national priority habitat. The extent of this habitat which lies outside of the designated sites is classed as being of Local Importance.

Plantation Mixed Woodland

7.39 Although predominantly consisting of broad-leaved species, parts of the woodland bordering the southern and western parts of the site contain a large element of coniferous plantation. Species such as larch Larix decidua, scot's pine Pinus sylvestris and Corscian pine Pinus nigra were recorded in these areas amongst the broadleaved species described above. The woodland beyond the south east corner of the site, within Broughton Far Wood LWS and Manby Wood LWS known as 'Far Wood') is classed as 'plantations on ancient woodland sites' (PAWS), and the understorey in this area was noted to be more representative of mature woodland, with species such as enchanter's nightshade, green alkanet Pentaglottis sempervirens and dog's mercury Mercurialis perennis noted.

7.40 A small area of this habitat (approx. 0.1 ha) was present within the central northern part of the site, and comprised planted larch, poplar Populus sp. and cypress trees with young hawthorn and elder.

7.41 This habitat is likely to support a wide range of associated wildlife. Much of this habitat forms part of designated Local Wildlife Sites. The remaining extent of this habitat within and adjacent to the site does not meet the priority habitat criteria and is considered to be of Site Importance.

Plantation Coniferous Woodland

7.42 An area of woodland comprising entirely of planted larch was present beyond the southern boundary of the site. This habitat was relatively small in extent (approx. 1.1ha) and low in both species composition and structural diversity, and provided fewer opportunities for wildlife compared to the other types of woodland at the site. This habitat is consequently considered to be of Site Importance.

Scrub

7.43 Areas of dense, unmanaged scrub were occasionally encountered in the centre of the site, as well as more frequently along the western site boundary. In most places, this habitat usually comprised semi-mature hawthorn, bramble, blackthorn, elder and young willow. Scattered stands of scrub were occasionally encountered elsewhere at the site, such as at field margins and along ditch banks. Although this habitat is likely to support a range of protected and notable wildlife species, it is readily establishing and frequently found in the wider landscape. This habitat is assessed to be of Site Importance.

Hedgerows

7.44 The agricultural fields were bordered in parts by a network of hedgerows. The majority were poor in terms of species diversity, although species-rich hedgerows are present at the site. The hedgerows also varied in structural diversity; some were relatively intact whereas frequent gaps were noted in others, and trees were present in some, with others being managed at a uniform height. In total, the hedgerow habitat at the site measured approximately 4.2km in length.

7.45 The hedgerows are likely to be of importance for a wide range of associated wildlife, and provide connective links to between valuable habitat within and adjacent to the site. Hedgerows in general are a priority habitat for Lincolnshire as well as on a national scale. This habitat is therefore considered to be of Local Importance.

Ponds

7.46 Five ponds were present within the survey area. Two of the ponds appeared to be ephemeral and dried up during spring and early summer (A small field pond present at the northern edge of the site was shallow, heavily silted and overshaded by an adjacent tree, with very little aquatic vegetation present. The remaining two ponds were larger, more open and likely to hold water year-round, and were seen to support a range of marginal and aquatic vegetation.

7.47 Two further ponds were noted off-site but within 500m, situated approximately 100m west and 330m south respectively. These have not been surveyed at the time of writing due to a lack of permissible access.

7.48 The ponds are likely to support a variety of associated wildlife and are considered to be of Local Importance

Scattered Broadleaved Trees

7.49 A small number (4) of semi-mature to mature trees were present at the site which were not associated with adjacent woodland or field boundaries. These generally comprised ash trees, with an oak, a horse chestnut Aesculus hippocastanum and a white willow Salix alba also present. None of the trees were considered to represent good examples of veteran trees, as they were generally similar in age and size to the trees at the nearby woodland and hedgerows, and did not occupy prominent positions in the landscape.

7.50 The trees are considered to be of Site Importance for biodiversity.

Tall Ruderal

7.51 Discrete parts of the site outside of the cultivated fields were dominated by tall ruderal species, particularly nettle, great willowherb, meadowsweet Filipendula ulmaria, mugwort, burdock marsh thistle, ragwort and hogweed.

7.52 This habitat is relatively small in extent and easily replaceable in the short-term, and is considered to be of Site Importance for biodiversity.

Ditches

7.53 A network of drainage ditches were present at some of the field boundaries. At the time of survey, nearly all of the ditches were dry or held very little water, although aquatic/marginal vegetation could be seen which indicated seasonal inundation with water.

7.54 A ditch running along the western site boundary was deeper and wider than most of the other ditches and was considered to hold water permanently. Two of the other ditches held running water which flowed east-west towards lower land beyond the western site boundary, eventually into a former opencast workings to the west of the site.

7.55 The ditches have the potential to support a range of protected species and species of conservation concern. This habitat is considered to be of Local Importance.

Species

Badgers

7.56 [redacted]

7.57 The arable fields, grassland and woodland habitats within the site are likely to represent key foraging grounds for local group(s) of badgers present. Badgers are

a widespread species and considered to be of Site Importance, and receive protection under the relevant legislation.

Bats

7.58 The data search revealed a number of existing records of at least 6 species of bat from the desk study area. The majority of the trees present within and adjacent to the site were either not mature enough, or did not display signs of damage or decay which usually leads to potential roosting features (PRFs) forming within trees. Four trees at the site were however identified as having 'low' or 'moderate' potential to support roosting bats according to the categorisation described by the Bat Conservation Trust[17]. Three additional trees noted during the initial Phase 1 Surveys in 2017 as having 'low' roost potential were felled by during the winter months (January to March) of 2018.

7.59 Two bat activity surveys and static detector surveys were undertaken to establish the baseline conditions with regards to bats on site; in particular to establish the use of the site by foraging/commuting bats and the assemblage of bats present.

7.60 The surveys identified the presence of at least five bat species using the site: common pipistrelle Pipistrellus pipistrellus, soprano pipistrelle P. pygmaeus, noctule Nyctalus noctula, Myotis species Myotis sp, and brown long eared Plecotus auritus.

7.61 The activity surveys identified the hedgerows and woodland edges as being of most value for foraging/commuting bats. Overall, for an area of arable land surrounded by woodland and hedgerows, generally low levels of bat activity were recorded at the site. Moderate common pipistrelle activity was however recorded in some areas, particularly at the woodland at the western site boundary, where the highest number of bat passed were recorded. Bat activity was lowest at the hedgerow/scrub network in the south western corner. Bat activity within the interior of the arable/grassland fields was minimal.

7.62 The assessment of importance of the site for foraging and commuting bats employs the methodology described by Wray et. al (2010)[18]. Following this criteria, the

[17] Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn).
[18] Wray, S., Wells, D., Long, E. and Mitchell-Jones, T. (2010). Valuing Bats in Ecological Impact Assessment. In Practice, December 2010. Chartered Institute of Ecology and Environmental Management.

values of the site for the various species recorded range between 12 and 17. The average score when all species found within the site were considered together was 14.2. This would place the site within the Local level of geographic importance.

Otter

7.63 The data search did not reveal any recent (post-2000) records of otter within 2km. The ditches on site are unlikely to be used by otters if present in the locality, being either dry or holding shallow water, which would not provide the sources of prey needed to sustain a population of this species at the site. It is considered that otters are highly unlikely to occur at the site and this species has been scoped out of this assessment.

Water Voles

7.64 The data search returned 7 records of water vole from within 2km, the most recent of which was from 2013. The ditches and ponds at the site have potential to be used by water voles, with suitable foraging and burrowing habitat present, although the fact that most of the ditches were dry reduces the value of the site somewhat for water voles, as they generally favour features which hold water permanently. Detailed surveys for water voles undertaken in September 2017 and April 2018 did not identify any evidence of the presence of this species. It is considered that water voles are likely to be absent from the site and this species has been scoped out of this assessment.

Brown Hare

7.65 Small numbers (up to eight individuals) of brown hare have been recorded using the arable fields during the surveys completed to date. The mosaic of open fields, woodland and hedgerow provides optimal habitat for this species. This species is a priority species targeted for conservation nationally, and is considered to be of Local Importance.

Breeding Birds

7.66 Breeding bird surveys have been undertaken between April and July 2018. In total, 55 bird species were recorded using the site during the survey. 21 of the 55 species are listed as species of conservation concern, being either red listed or amber listed according to the British Trust for Ornithology's (BTO) studies into population

declines among British birds within the last 30 years[19]. Several farmland bird species recorded at the site are targets for conservation both locally, as part of the Lincolnshire LBAP, as well as nationally. These include lapwing Vanellus vanellus, yellow wagtail Motacilla flava, skylark Alauda arvensis, linnet Linaria cannabina, yellowhammer Emberiza citrinella, reed bunting Emberiza schoeniclus and bullfinch Pyrrhula pyrrhula.

7.67 Birds breeding within the site can be divided into two different categories; namely ground nesting birds that potentially breed within the open fields, and which require open sightlines for predator avoidance during nesting, and other bird species which nest within boundary vegetation such as hedgerows, trees and scrub. This assessment will separately assess the impacts on ground nesting birds and other breeding birds, as the proposals are likely to affect these two different categories in distinct ways.

7.68 Most of the bird species recorded at the site were found to be associated with the boundary habitats, predominantly within the woodland, hedgerows, scrub and wetland features. The exceptions to this were skylark, yellow wagtail, lapwing, meadow pipit and reed bunting, which were considered to be nesting within the open fields.

7.69 The approximate number of territories considered to be present at the site for these species (of open habitats) are as follows:

- Skylark - 25 territories.
- Yellow wagtail – up to 3 territories
- Lapwing – 1 or 2 territories
- Meadow pipit – 1 or 2 territories
- Reed Bunting - 3 territories

7.70 The open field habitats, particularly the large arable cereal fields in the north east of the site, were considered to provide optimal habitat for nesting skylarks which is reflected in the large number of territories recorded at the site. A possible three

[19] Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. Mark Eaton, Nicholas Aebischer, Andy Brown, Richard Hearn, Leigh Lock, Andy Musgrove, David Noble, David Stroud and Richard Gregory

yellow wagtail territories, again focussed within the north eastern arable fields, is also a notable record for this species which is of elevated conservation concern nationally. Although all these species are relatively widespread in Lincolnshire, due to the assemblage of ground nesting bird species using the site during the breeding season, particularly the large number of skylark, the site has been assessed as having District Importance for breeding birds of open farmland

7.71 The woodland, hedgerows, trees and scrub habitats at the field boundaries at the site were found to be used for breeding by a range of species of conservation concern, generally in small to moderate numbers. This includes yellowhammer, linnet, bullfinch, willow warbler Phylloscopus trochilus, mistle thrush Turdus viscivorus, song thrush Turdus philomelos, dunnock Prunella modularis and kestrel Falco tinnunculus. Overall, the assemblage of breeding bird species associated with boundary habitats is assessed as being of Local Importance

Wintering Birds

7.72 Wintering bird surveys were undertaken between November 2017 and February 2018. In total, 51 bird species were recorded using the site during the survey. 24 of the 51 species are listed as species of conservation concern, being either red listed or amber listed by the BTO. Several farmland bird species recorded at the site are targets for conservation both locally, as part of the Lincolnshire LBAP, as well as nationally. These include lapwing, starling, Sturnus vulgaris, skylark, linnet Linaria cannabina, yellowhammer, reed bunting and bullfinch.

7.73 As for breeding birds within the site can be divided into bird species of open farmland which require open sightlines for foraging and predator detection within fields, and other bird species which utilise boundary habitats for foraging and shelter, such as hedgerows and woodland. This assessment will separately assess the impacts on wintering bird species of open farmland and other wintering birds, as the proposals are likely to affect these two different categories in significantly distinct ways.

7.74 Most of the bird species recorded at the site were found to be associated with the boundary habitats. However some species of conservation concern which are known to rely on or regularly use open arable fields for foraging and roosting were recorded on site area either as part of large flocks (lapwing and skylark) or as small, loose flocks and individuals (such as meadow pipit). Skylark were recorded in moderate to large numbers (peak count of 159).The consistent presence of large

numbers skylarks shows the site is of noteworthy importance to local wintering populations of this species. Lapwing, although present in relatively large numbers (peak count of 109) on two survey visits, their absence from the two remaining visits indicates that the site is at least in part used in conjunction with other suitable fields in the surrounding landscape.

7.75 Consequently, the site can be valued as being of District Importance for wintering birds of open country (in particular skylark and to a lesser extent lapwing.

7.76 The remainder of the bird activity recorded can be attributed to species more closely associated with hedgerow and woodland habitats and those birds of open country which seek shelter within dense hedgerows such as thrushes, finches, and other small passerines. Of these species, a healthy assemblage was present predominantly within these boundary features, including some species of conservation concern. Although species of conservation concern were noted, these were generally present in small numbers and no noteworthy relative abundance of a species was recorded. The site can be valued as being of Site Importance to wintering birds of woodland and hedgerows.

Amphibians

Great Crested Newts

7.77 The ponds present on site have potential to be used by great crested newts Triturus cristatus during the breeding period. However, an eDNA survey of all of the ponds on site did not return a positive result for great crested newt DNA within the ponds, signifying the likely absence of this species from the site (see Appendix 7.1). It is considered that great crested newts are likely to be absent from the site and this species has been scoped out of this assessment.

Other amphibians

7.78 The aquatic habitats on site are likely to be used by more widespread amphibian species, such as common toad Bufo bufo (a priority species). Hedgerows, woodland and scrub habitats elsewhere at the site could represent foraging and sheltering habitats for this species although again the arable fields are unlikely to be used by this species, and as such common toad (if present) is likely to be of Site Importance.

Reptiles

7.79 No recent records of reptiles were revealed by the desk study. The hedgerows, scrub, woodland edges, ditches and grassland areas offer some value for foraging and sheltering widespread reptile species, such as slow worm Anguis fragilis and grass snake Natrix helvetica. However, the large expanses of arable land were considered to offer poor suitability for reptiles.

7.80 As suitable habitat for reptiles was restricted to the margin and boundary habitats, reptiles are likely to be in small numbers if present and restricted to these areas. Reptiles are considered most likely to be of Site Importance if present.

Invertebrates

7.81 The data search revealed a number of existing records of notable butterfly and moth species from within the local area. Habitats at the margins and boundaries of the field are likely to be of value for a range of invertebrate species typical of woodland edge and hedgerows, and a number of such species belonging to the order Lepidoptera were recorded during the surveys to date, including cinnabar moth Tyria jacobaeae, (a priority species). The ponds and ditches on site are also likely to support a range of aquatic invertebrates. However, assemblages of invertebrates supported by the arable fields comprising the vast majority of the site are likely to be poor, particularly for pollinating species.

7.82 Overall, it is considered that invertebrates using the site and immediately adjacent habitat are of Local Importance.

Potential Impacts

7.83 Without mitigation and enhancement, the effects of the development proposal upon biodiversity have the potential to be adverse, for example:

- Loss and/or disturbance to flora and fauna during construction, operation and decommissioning;
- Loss of existing on-site habitats during site clearance;
- Disturbance of certain habitats and species during operation; and,
- Damage/disturbance to adjacent sites of ecological value (removal of trees).

7.84 The proposed development seeks to mitigate for potential negative ecological impacts and to provide an overall biodiversity enhancement strategy, through a

comprehensive site-wide ecologically informed landscape design and the implementation of a detailed landscape and ecological management and monitoring plan and schedule.

Assessment Methodology

7.85 The standard approach applied in the UK to Ecological Impact Assessment (EcIA) is that developed by the Chartered Institute of Ecology and Environmental Management (CIEEM) in 2016. This methodology will be used to evaluate existing conditions, and to assess the significance of likely effects on ecological features that may arise during construction and operation of the proposed development. This involves determining the importance of each ecological feature and undertaking an impact assessment pre and post-implementation of mitigation measures.

7.86 When assessing the baseline biodiversity importance of natural features found on the site, the following characteristics will be considered:

- Animal or plant species which are rare or uncommon, either internationally, nationally or more locally;
- Ecosystems which provide the habitats required by the above species;
- Species that are afforded legal protection;
- Endemic or locally distinct sub-populations of a species;
- Habitat diversity, connectivity and/ or other synergistic associations;
- Species of Principal Importance under the NERC Act;
- Notably large populations or concentrations of animals considered uncommon or threatened in a wider context;
- Plant communities that are considered to be typical of valued natural/ semi-natural vegetation types;
- Species at the edge of their range; and
- Species-rich assemblages of plants or animals.

7.87 Habitats and species identified in the baseline conditions will all be attributed with an ecological importance. The importance or potential importance of an ecological feature will be described according to its importance in a geographical context i.e. (International, National, Regional, Metropolitan/County, and Local importance). An intermediary category of 'District' importance has been derived and will apply where a feature is present on or adjacent to the site, and is considered to be of higher importance to nature conservation than in a 'Local' context, but is considered to be of lower importance on a 'County' scale. Furthermore, a category of 'Site' importance will be applied to a feature which is present or potentially present at the site, but where the importance to nature conservation of the feature is of relatively low value in the context of the wider landscape. A further 'Negligible' category will be assigned to features of no particular intrinsic nature conservation importance.

7.88 Additional weight will be given to habitats or species that are given special protection under domestic or international law, especially those for which sites have been designated. This includes specially protected features such as hedgerows (Hedgerow Regulations) and trees (Tree Preservation Orders). Non-statutory designated sites also attract special consideration.

7.89 Published selection criteria, contained within the selection of Biological Sites of Special Scientific Interest (SSSI), can also be referred to, to aid the assessment of importance. Where significant habitats, such as Ancient Woodland, do not carry a designation, these are nevertheless considered at a specified geographic level.

7.90 For the purposes of the Environmental Statement assessment, only receptors identified within the baseline conditions as being of Local importance or above will be considered 'Important Ecological Features (IEFs)' in line with the guidelines set out by CIEEM. The impacts of the proposed development will only be assessed on those IEFs with importance equal to, or higher than local level. Appropriate mitigation may be proposed for non-IEF where it is necessary to ensure offences are not committed under relevant legislation.

Characterisation of Impacts

7.91 When assessing the impact of the development and changes to the baseline conditions on site, predictions will be made which focus solely on the zone of influence whilst taking into consideration the lifetime of the development. The zone of influence has been assessed separately for each individual receptor.

7.92 Each potential impact on an IEF will be assessed at its respective geographical scale and, where appropriate, using following parameters:

- Positive or negative (whether the impact will have a Positive or Negative effect);
- Magnitude (the size of the impact);
- Extent (area over which impact occurs);
- Duration (time impact expected to last before recovery);
- Reversibility (an impact may be permanent or temporary); and
- Timing and frequency (impact may be seasonal e.g. bird nesting season).

Mitigation Measures

7.93 Mitigation measures are described where adverse effects are identified upon the IEFs. The mitigation measures will aim to reduce the overall effect value. It is not always possible to fully mitigate an adverse effect to neutral levels. An assessment of residual effects which takes account of the proposed mitigation is then made. Due consideration is given to the reliability of mitigation measures and the likelihood that they will achieve their stated goals, using the terms defined above.

7.94 Mitigation measures are also identified for species which did not qualify as IEF but which are afforded legal protection under the Wildlife and Countryside Act (1981) or other legislation, and as such will require certain precautionary methodologies to avoid offences being committed.

Assessment of Significance

7.95 Following the methodology described by CIEEM, an ecologically significant effect is defined as “an effect that either supports or undermines biodiversity conservation objectives for ‘important ecological features’ or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local”. Significance will be described as being ‘significant’ or ‘not significant’.

8. CULTURAL HERITAGE AND ARCHAEOLOGY

8.1 The cultural heritage assessment would consider the potential effects of the proposed development on cultural heritage assets (archology and built heritage).

8.2 The Chapter is accompanied by the following appendices.

- Appendix 8.1: Little Crow, Santon, North Lincolnshire - Cultural Heritage Baseline Study (Pegasus Group, November 2018).
- Appendix 8.2: Little Crow, Santon, North Lincolnshire - Geophysical Survey Report (SUMO, September 2018).
- Appendix 8.3: Little Crow Solar Park, Scunthorpe, North Lincolnshire - Archaeological Watching Brief (Cotswold Archaeology, November 2018).
- Appendix 8.4: Little Crow Solar Park, Scunthorpe, North Lincolnshire - Archaeological Fieldwalking Survey (Cotswold Archaeology, November 2018).

PRELIMINARY BASELINE CONDITIONS

Baseline Survey Information

8.3 The baseline has been informed by a desk base assessment augmented by a walkover survey. Importantly, the baseline position is evolving as archaeological investigations continue on site in consultation and agreement with North Lincolnshire Council.

Prehistoric and Romano-British

8.4 The North Lincolnshire HER records three prehistoric features within the site, a possible round barrow, a section of the prehistoric route corridor known as the Jurassic Way, and a collection of flints discovered prior to 1976, but with an uncertain provenance.

8.5 In addition to the recorded prehistoric features from within the development site, prehistoric material has been recovered from the wider study area, comprising worked flint and sherds of pottery recovered to the south east of the site.

8.6 There is no recorded evidence for Roman activity within the site, although the route of Ermine Street, a major Roman road runs from north to south to the east of the

site. Within the wider study area, fieldwalking and archaeological investigations have identified areas of Roman activity centred in particular around Raventhorpe to the south

Early Medieval and Medieval

8.7 There is no recorded activity of the early medieval period located within the site. However the deserted medieval village of Manby), which has its origins in the early medieval period, is located to the south and the possible remnants of ridge and furrow, which extend into the southern area of the development site are likely to represent the open fields of the village during this period. Further south, the Scheduled Monument of Raventhorpe is another example of a deserted medieval village which has its origins in the early medieval period.

8.8 Evidence of medieval activity within the site is associated with the location of the former Gokewell Priory, a small Cistercian nunnery founded in the 12th century and dissolved following the Dissolution of the abbeys in 1536. The site of the priory later formed the location for Gokewell Priory Farm, with material from the Priory reused within the construction of the farmbuildings. Archaeological works undertaken in the 1970s in relation to the Priory Farm recorded the earthworks to the south and west of the farm, and included a photographic record.

Post Medieval and Modern

8.9 Following the dissolution of Gokewell Priory, the material was reused to create Gokewell Priory Farm (Appendix 8.1: Figure 2, MLS1027 and MLS25419), also labelled as Cokewell on mapping. The exact date of construction is unknown but it was certainly constructed by the early 19th century, as is demonstrated by its depiction on the 1842 Tithe Map (Appendix 8.1: Plate 18). The Tithe Map and apportionment illustrate that Gokewell Priory Farm was the only area of development within the site during the post-medieval period, the remaining areas under a mixture of arable and pasture agricultural use.

8.10 Late 19th and 20th century Ordnance Survey mapping shows the site to have remained undeveloped although the HER records the site of a World War II Hevay Anti-Aircraft Battery as being located within the eastern area of the site.

8.11 Gokewell Priory Farm was demolished in the 1980s and the site cleared. The site has since been used almost exclusively for arable cultivation.

Undated

8.12 The Heritage Assessment also records a number of potential archaeological features of uncertain date within the site. These comprise two possible medieval stock enclosures in the southern extent of the development site and an incomplete ovoid ditch within the north western area which may be associated with the plantation of woodland to commemorate Queen Victoria in the late 19th century.

The Setting of Designated Heritage Assets

Summary of Designated Heritage Assets

8.13 Designated heritage assets within 2km of the site include the Scheduled Monument of Raventhorpe medieval settlement, the Grade I Listed Church of St Mary Broughton and 10 Grade II Listed Buildings located to the north, east and south of the site). The closest assets to the site comprise two Grade II Listed Buildings, Springwood Cottage and barn located c 650m to the north east of the site and Raventhorpe House (a Grade II Listed Building) and the Scheduled Monument of Raventhorpe medieval village, both located c 870m to the south of the site.

8.14 The walkover survey carried out as part of the Heritage Assessment has established that there would no non-physical effects on any of the designated heritage assets located within the environs of the site. The Heritage Assessment concluded that the site does not form part of the setting of any of the heritage assets which contribute to their significance, nor is there any intervisibility between the site and any of the assets due to the distance, topography and tree cover. The development should therefore not result in any change that will cause harm to the setting of any of the heritage assets, and as such the proposals are considered to be in accordance with statutory requirements.

Significance of Identified Sensitive Receptors

8.15 The following section discusses the heritage significance of potential sensitive cultural heritage receptors with regard to the development. This is also summarised in Table 8.1, below.

Known and Potential Archaeological Remains

8.16 It should be noted that whilst the Heritage Assessment recorded a number of potential archaeological features within the site, there remains the potential for

further hitherto unidentified remains to be present. As it is not possible to ascertain the heritage significance of any potential assets without any investigations, the significance of any such feature remains uncertain. However, any such remains, based on the known archaeological potential of the site, would unlikely be of highest significance and would most probably comprise non-designated heritage assets.

Cropmarks of a round barrow – prehistoric date

8.17 The possible remains of a prehistoric round barrow have been identified within the central area of the site as cropmarks seen on aerial photographs. There were no upstanding physical remains identified within the Site visit, nor have there been any archaeological investigations undertaken to ground truth this feature. However, archaeological remains associated with this asset are likely to be present within the location specified by the HER, and further such remains may also be present within the site.

8.18 These features would be of evidential and historical (illustrative) value in their contribution towards our understanding of the nature and extent of prehistoric activity within the local landscape and would constitute non-designated heritage assets of archaeological interest.

Artefact scatters – prehistoric date

8.19 The listing of a collection of prehistoric artefacts recovered from within the site is unfortunately poorly documented. The chance finds of isolated artefacts, whilst indicating a presence within the wider area, is of limited evidential value, and would be of limited archaeological significance.

Jurassic Way Trackway – prehistoric date

8.20 The line of the prehistoric Jurassic Way trackway from Lincoln to Winteringham has been conjectured as passing through the site. The location of the Site upon the high ground of a natural ridgeway does suggest a suitable location for an early route of movement but its alignment through the site is conjectural and there is a very limited potential for archaeological remains associated with the route to remain in situ. However, if remains were to be encountered they would be of archaeological interest.

Agricultural remains associated with Manby DMV

8.21 Ridge and furrow earthworks have been identified within the south of the site although there were no upstanding remains identified during the Site visit. Modern agricultural ploughing techniques are likely to have removed any upstanding earthworks associated with these features, although archaeological remains may survive beneath the plough soil. The ridge and furrow are believed to be associated with the deserted medieval village of Manby to the south, but the presence of tree cover along the southern boundary of the site provides a tangible barrier between the DMV and the ridge and furrow remains.

8.22 The majority of the site was depicted as agricultural land on the Tithe Map and the whole development site has the potential to contain early medieval – modern agricultural remains, such as infilled boundary and drainage ditches or infilled furrows relating to further areas of ridge and furrow cultivation.

8.23 It is likely that any archaeological remains associated with the ridge and furrow may survive within the development site. Such remains have little potential to contribute towards our understanding of medieval and post-medieval farming practices and would at most comprise non-designated heritage assets of limited archaeological interest.

Cistercian Priory and Gokewell Priory Farm – medieval /post-medieval date

8.24 The site of a Cistercian priory is documented as lying beneath the remains of Gokewell Priory Farm, limited upstanding remains of which are visible within the development site. Whilst the later farm buildings reused the architectural fabric of the priory, leaving no original upstanding remains, it is likely that archaeological remains associated with the earlier priory survive within the area of the farm.

8.25 The heritage significance of such remains associated with early medieval activity would derive from their evidential and historic values contributing towards our understanding of ecclesiastical land use during the early medieval and medieval periods. Whilst such remains would be of heritage significance, they are unlikely to be of sufficient archaeological interest to comprise heritage assets of the highest significance and would constitute non-designated heritage assets of archaeological interest.

Heavy Anti-Aircraft Battery – modern date

8.26 The site of a heavy anti-aircraft battery has been recorded in documentary sources as being located within the eastern area of the site. There is no upstanding evidence

to identify the location of the asset, although large pieces of concrete seen within the plough soil may be associated with the structure. Archaeological remains associated with the military use of the site would be unlikely to be of more than local significance.

Designated Heritage Assets

8.27 As outlined above, the proposed development of the site is not deemed likely to impact on the settings of any designated assets to an extent that it alters the significance of the asset and as such there are no identified designated sensitive receptors.

Likely Environmental Effects

8.28 Construction and Decommissioning Phase Effects

8.29 The physical effects of the development upon the known and as yet unidentified archaeological resource would primarily result from groundworks associated with the construction of the development, which might include:

- Any preconstruction ground investigation works;
- Installation of the solar panel modules;
- Excavation of any service trenches; and
- Any stripping and excavations associated with the creation of the battery storage area and substantial area.

8.30 Whilst there may be some temporary impacts during the construction phase upon the designated heritage assets (i.e. scaffolding; movement of machinery), these impacts will be relatively limited and temporary when compared with the completed development and therefore it was considered that the discussion of impacts upon designated heritage assets should refer to the development in its Operation Phase. Development Plans do not propose any modules within the area occupied by the remains of the Priory Farm and as such there should be no impact on any in situ remains associated with the medieval priory.

Operation Phase Effects

8.31 No additional impacts upon the buried archaeological remains are anticipated following the completion of the development. As such, these receptors are scoped out of discussion as part of the Operation Phase. With regard the potential non-physical effects upon designated heritage assets, it has been demonstrated within the Heritage Statement that the development will not introduce change into the wider environs of the designated assets which will change their setting to the degree that it impacts on their significance.

Assessment Methodology

8.32 The proposed methodology for the assessment of development effects will be informed by the following documents:

- National Planning Policy Framework (NPPF; 2018);
- NPPF Planning Practice Guidance: Conserving and enhancing historic environment (March 2014)[20];
- Standard and Guidance for Historic Environment Desk-Based Assessment, published by the Chartered Institute for Archaeologists (CIfA)[21];
- Historic England's Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment (published by English Heritage in 2008)[22];
- Historic England's Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision Taking (2015)[23];
- Historic England's Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets (2015)[24];

Sources of Information

[20] Department for Communities and Local Government (2014) National Planning Policy Guidance: Conserving and Enhancing the Historic Environment

[21] Chartered Institute for Archaeologists (2014) Standard and Guidance for Historic Environment Desk-Based Assessment, http://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf

[22] English Heritage (2008) Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment, English Heritage

[23] Historic England (2015) Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision Taking

[24] Historic England (2015) Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets

8.33 In order to collect historic environment data for the purposes of this Chapter, a minimum 1km study area around the site will be adopted in the final Heritage Baseline, as this area is considered to provide sufficient contextual information about the site and its surrounding landscape, from which to assess the archaeological potential and potential impacts on the archaeological resource.

8.34 The following sources of publically available archaeological and historical information were consulted as part of the preparation of the Heritage Assessment:

- National Heritage List for England for designated heritage assets, such as Listed Buildings and Scheduled Monuments;
- North Lincolnshire Historic Environment Record (HER) for records of archaeology and heritage sites, finds and events recorded within the study area;
- Online sources, including British Geological Survey (BGS) and additional historic mapping.
- Further information with regard to the methodologies utilised within the Heritage Assessment can be found in Appendix 8.1.

Settings Assessment

8.35 The document Historic Environment Good Practice Advice in Planning Guidance Note 3: The Setting of Heritage Assets[25] provides the key industry-standard guidance on setting and development management, including assessment of the implications of development proposals of the significance of designated heritage assets. In relation to development within the setting of a heritage asset, the guidance states that the protection of the setting of designated assets does not necessarily preclude change.

8.36 A staged approach is recommended for settings assessment as this has been utilised as part of the Heritage Assessment, which provides details of the methodologies used. In summary, step 1 requires heritage assets which may be affected by development to be identified. Step 2 of the settings process includes an assessment whether, how and to what degree the setting makes a contribution

[25] Historic England (2015) Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets

to the significance of the heritage assets, with the assessment of the effect of a development of the significance of an asset carried out as part of Step 3.

Assessment of Significance

Assessment of Significance of Heritage Assets

8.37 Heritage significance is defined as the value of a heritage asset to this and future generations because of their heritage interest. That interest may be archaeological, architectural, artistic or historic in nature. The assessment of significance for this chapter will be guided primarily by the key industry-standard policies and guidance contained in Conservation Principles, where it is described with reference to the following four key forms of value:

- Evidential value will be derived from the potential of a place to yield evidence about past human activity. It is primarily associated with the physical remains or the historic fabric of the heritage asset. This value is proportionate to the potential of the asset to contribute to the understanding of the past. When there are no written records, such physical remains, including archaeological deposits, may provide the only source of information about the past;

- Historical value will be derives from the ways in which past people, events and aspects of life can be connected through a site to the present. It can be illustrative or associative in attribution. The illustrative aspect relates to the ability of the asset to provide links and insights into past communities and their activities. The associative aspect derives from the association of the asset with a notable historic family, person, event or movement;

- Aesthetic value will be derived from the ways in which people draw intellectual and sensory stimulation from a place. This value may have developed through conscious design or be the result of the fortuitous evolution of the place over time. This aspect may include the physical form of the asset as well as its location within the setting; and

- Communal value will be derived from the meaning of a place for the people who relate to it. The commemorative and symbolic aspects of this value reflect the meanings of a heritage asset for the people who draw part of their identity from it or have emotional links to it (such as memorials raised by community effort). The social aspect of this value is associated with

places perceived as source of identity or distinctiveness and spiritual value is attached to places of worship.

8.38 Significance derives not only from a heritage asset's physical fabric, but also from its setting. The setting of a heritage asset is defined as the surroundings within which it is experienced; its extent is not fixed and may change as the asset and its surroundings evolve. However, setting is not a heritage asset in its own right, nor is it a heritage designation in its own right. Its importance lies in what it contributes to the significance of the heritage asset. This contribution may be positive, negative or neutral.

8.39 The statements of significance development for each of the assets reflect the language of the Planning Act 1990, utilising terms such as character and appearance (of Conservation Areas), and architectural and historic interest (of Listed Buildings). Further frames of reference, found within Conservation Principles, allow for terms such as 'evidential', 'historical', 'aesthetic' and 'communal' to be used to convey the many heritage values that combine to make up the heritage significance of an asset.

8.40 The statements of significance describe 'what matters and why', i.e. which aspects of an asset and its setting contribute to the heritage significance of the asset and how. Although the statements rightly acknowledge the fabric of heritage assets as representing the principal embodiment and physical manifestation of their heritage significance, the surroundings of the assets, and the ways in which they can be experienced, often contribute to their overall significance. This will be assessed in line with the settings assessment methodology (Appendix 8.1).

8.41 Although terms such as High, Medium or Low value, and National, Regional or Local importance are often adopted in EIA to express a summary description of the 'relative significance' heritage assets, they are not universally recognised or accepted terms within heritage sector guidance and amongst heritage professionals. This is because these concepts require complex definitions to properly allow for their application, and do not directly relate to the language or key tests required in determining planning applications or heritage consents.

8.42 The proposed criteria adopted for the Environmental Statement Chapter are laid out below, with terminology used derived directly from the NPPF.

Table 8.1: Criteria for Assessing the Significance of Heritage Assets

Heritage Significance	Description of Criteria
Designated heritage assets of the highest significance	As defined in the NPPF, these include: Scheduled Monuments, Protected Wreck Sites, Battlefields, Grade I and II* Listed Buildings, Grade I and II* Registered Parks and Gardens, and World Heritage Sites. Heritage assets displaying considerable evidential, historic, aesthetic or communal value, as identified by Conservation Principles, which are of comparable significance to designated heritage assets of the highest significance, would also fall within this category.
Designated heritage assets of less than the highest significance	In accordance with the NPPF, these include, by elimination, Grade II Listed Buildings, Conservation Areas and Grade II Registered Parks and Gardens.
Non-designated heritage assets	Heritage assets, the significance of which has not yet been ascertained.
Uncertain	Heritage assets the significance of which has not yet been ascertained.
Negligible	Remains that do not have sufficient significance to warrant consideration in planning decisions, and which are therefore not considered to constitute heritage assets.

Assessment of Development Effects

8.43 The proposed methodology employed here moves away from the more traditional 'scalar', quantitative, matrix-led approach, adopting a descriptive, qualitative presentation of the findings of the assessment. This is because the descriptions of anticipated development impacts upon heritage assets are qualitative rather than quantitative and the adopted approach allows for greater accuracy in understanding the potential harm the proposed development may cause to the significance of heritage assets. As with the approach adopted in assessing heritage significance

of heritage assets, this approach directly reflects key concepts in planning policy and heritage guidance with regard to the assessment of development effects upon heritage assets. It therefore offers an appropriate way to define such effects. Clear statements of significance (the 'what matters and why' approach), and a sound understanding of the character of the proposed development, as presented in this assessment methodology, allow for a transparent articulation of the nature/degree of any identified effects.

8.44 The effects of the Proposed Development arise as a result of change to the heritage assets. The significance of a heritage asset can be harmed or lost through alteration, destruction or development within its setting. In terms of harm though changes to setting, as clearly illustrated within the NPPF, any attempt to convey the impact or harm of a development has to be framed within the tightly-defined parameters of harm to the significance of the heritage asset itself. This is a fundamental principle. In summary, a project could bring about change within the setting of a heritage asset, resulting in harm to its significance, or the way in which that significance is experienced. References such as 'harm to setting' are therefore avoided.

8.45 The assessment of the effect of the development upon cultural heritage resource takes into account numerous factors, including the scale of development, the type and extent of physical disturbance and the visual effects. The development effects may be:

- Direct or indirect. Direct effects arise from physical change to the resource, which affects its physical remains or fabric (i.e. excavations which may affect the archaeological remains or alterations to historic buildings). Indirect effects relate to changes within the setting of heritage assets;

- Permanent or temporary. Due to their character, direct effects upon the physical remains of heritage assets are permanent, and not reversible. However, effects on the settings of heritage assets may be temporary, if the development has a limited lifespan. These temporary effects can be short, medium or long-term.

8.46 Beneficial, when the development leads to the enhancement of the heritage resource, or adverse, when it results in harm to, or loss of, the significance of a heritage asset. If the resource will not be affected by the proposed development, there will be no impact.

8.47 To further assist in the decision-making process, the following approach to the assessment of effects upon heritage assets (Table 8.2) will be adopted. This has been done in order to improve the intelligibility of the assessment results for purposes of quick reference and ready comprehension. The language used here is entirely consistent with the NPPF and the Planning Act 1990, and provides sufficient information to reach informed judgement.

Table 8.2: Magnitude of Effect upon Heritage Assets

Level of Effect	**Description**	**Applicable Policies**
Heritage Benefit	The proposals would enhance the heritage significance of a heritage asset.	Enhancing the significance of a heritage asset is a desirable development outcome in respect of heritage. It is consistent with key policy and guidance, including the NPPF paragraphs 185, 192 and 200
No harm (neutral effect)	The proposals would preserve the significance of a heritage asset.	Preserving a Listed Building and its setting is consistent with Section 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990. Preserving or enhancing the character or appearance of a Conservation Area is consistent with Section 72 of the Act. Sustaining the significance of a heritage asset is consistent with paragraph 185 of the NPPF and should be at the core of any material local planning policies in respect of heritage.
Harm to Non-Designated Assets	The proposals would affect the heritage significance of a non-designated heritage assets.	Paragraph 197 of the NPPF states that the in determining planning application, the effects of the proposed development on the significance of non-designated heritage assets needs to be taken into

Level of Effect	Description	Applicable Policies
		account. A balanced judgement is required to weigh direct or indirect impacts on non-designated assets, having regard for the scale of harm and the significance of the asset.
Less than Substantial Harm	The proposals would result in a restricted level of harm to the significance of a designated heritage asset, such that the asset's contributing heritage values would be largely preserved (lower end). The proposals would lead to a notable level of harm to the significance of a designated heritage asset. A reduced, but appreciable, degree of its heritage significance would remain (upper end).	This level of harm is defined within the NPPF specifically with regard to designated heritage assets. In determining an application, this level of harm should be weighed against the public benefits of the proposals (paragraph 196). Proposals involving change to a Listed Building or its setting, or any features of special architectural or historic interest which it possesses, or change to the character or appearance of Conservation Areas, must also be considered within the context of the Planning Act 1990.
Substantial Harm	The proposals would very much reduce the designated heritage asset's significance or vitiate that significance altogether.	Paragraphs 193, 194 and 195 of the NPPF state that substantial harm or loss to designated heritage assets of the highest significance should be wholly exceptional and to assets of less than highest significance – exceptional. Proposed development leading to such harm should be refused unless it is demonstrated that this substantial harm is necessary to achieve substantial public benefits.

8.48 In line with EIA best practice, it is considered that 'substantial harm' to designated heritage asset would equate to a significant adverse effect in line with the language used within the Town and Country Planning (Environmental Impact Assessment) Regulations 2011 (as amended 2015). 'Less than substantial harm' to designated heritage assets could also trigger the same significant effect, but no prescriptive criteria are proposed to prejudge this threshold, leaving it to professional judgement. With regard to the harm to non-designated assets, professional judgment will be used to ascertain whether the significant effect is triggered, taking into account the relative significance of such assets as well as the level of harm upon them.

Mitigation Measures and Residual Effects

8.49 When effects upon the cultural heritage resource are identified, mitigation measures will be proposed in order to prevent, reduce or offset any significant effects. It may also be possible to enhance heritage assets as part of the development. In such circumstances, the weight given to the heritage values of the asset should be proportionate to the significance of the asset and the development effect upon it. In order to assess residual effects following the implementation of the mitigation measures upon the significance of heritage assets, professional judgement is used.

9. TRANSPORT AND TRAFFIC

9.1 This chapter of the Environmental Statement will assess the potential effects relating to traffic volumes and transport in relation to the construction, operational and de-commissioning phase of the development. The assessment will focus on the be based on the effect of Heavy Good Vehicles, car and delivery vehicle movements associated during the construction and de-commissioning phase. A more discrete assessment will be given to operational traffic as this is expected by be negligible.

9.2 This chapter is also supported by the following technical appendices: -

- Appendix 9.1 B1207 Automatic Traffic Count
- Appendix 9.2 Preliminary Transport Statement

9.3 A full Transport Statement and Construction Traffic Management Plan would be prepared to support the Environmental Statement at the DCO submission stage.

Baseline Conditions

9.4 An initial high level appraisal of the potential road access routes to the development site has been undertaken. In informal consultation with the Local Highway Authority, it is considered that the most suitable and likely access route is by road, and would exit the Junction 4 of the M180 motorway. Junction 4 of the M180 is approximately 4.5 kilometres to the south.

9.5 From the M180 junction 4 vehicles will use the A15 northbound to the Briggate Lodge Roundabout and then travel east along the A18 towards Brigg.

9.6 From the A18, vehicles will turn left onto the B1208. The B1208 measures between approximately 5.5 and six metres wide. Vehicles will travel along the B1208 to the junction with the B1207 and then continue straight ahead into the site access.

9.7 Swept path analysis of the site access will support the Environmental Statement and this may expanded to include some sections of the approach roads. No abnormal loads are expected as part of the construction phase.

Accident Analysis

9.8 As part of the final Environmental Statement chapter, a full review of personal injury accident data will be undertaken for the links within the proposed study area.

Potential Impacts

9.9 The environmental effects of changes in the traffic during construction, operation and de-commissioning of the proposed development will be assessed in the Environmental Statement.

9.10 The key effects which will be assessed are as follows:

- **Severance -** IEMA Guidance defines severance as "the perceived division that can occur within a community when it becomes separated by a major traffic artery" (Para 4.27, Ref 11.2) that 'separates people from places', for example difficulties crossing existing roads or the physical barrier of the road itself. There are no predictive formulae which give simple relationships between traffic factors and levels of significance. Nevertheless, there are a range of indicators for determining significance of the relief from severance. IEMA guidance suggests "that changes in traffic flow of 30%, 60% and 90% are regarding as producing slight, moderate and substantial changes in severance respectively" (Para 4.31, Ref 11.2). The guidance also suggests that 'marginal changes in traffic flows are, by themselves, unlikely to create or remove severance'.

- **Driver Delay -** IEMA Guidance states that "delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system" (Para 4.34, Ref 11.2). As such, the impact of the proposed development on driver delay will be considered in relation to background traffic, and existing conditions at the locations set out in paragraph in the study. Junction assessment modelling can be used to estimate increased vehicle delays at junctions if necessary.

- **Pedestrian Delay -** IEMA Guidance states that "changes in the volume, composition or speed of traffic may affect the ability of people to cross roads. In general increases in traffic levels are likely to lead to increases in delay" (Para 4.35, Ref 11.2). There are a range of local factors that affect pedestrian delay including the level of pedestrian activity, visibility and general physical conditions of the site. However, IEMA Guidance does not set out thresholds for judging the significance of changes in levels of delay, and suggests that the assessor uses their judgement to determine whether pedestrian delay is a significant impact.

- **Pedestrian Amenity (**including **Fear and Intimidation)** Pedestrian amenity is broadly described in the IEMA Guidelines as "the relative pleasantness of a journey" (Para 4.39, Ref 11.2) and can be affected by traffic flow, composition and footway widths. This definition includes pedestrian fear and intimidation and can be considered a much broader category when considering the overall relationship between pedestrians and traffic. The Guidelines suggest that a threshold for judging this would be "where the traffic flows (or its lorry component) is halved or doubled" (Para 4.39, Ref 11.2).

- **Accidents and Safety -** The IEMA guidelines do not include any definition in relation to accidents and safety, suggesting that professional judgement will be needed to assess the implications of local circumstance, or factors which may increase or decrease the risk of accidents.

ASSESSMENT METHODOLOGY

9.11 The assessment contained in the Environmental Statement will be carried out in accordance with "Guidance on Transport Assessments", prepared by the Department for Transport (DfT) in March 2007 (which is now archived but still considered relevant), "Guidelines for the Environmental Assessment for Road Traffic", Institute of Environmental Management and Assessment (IEMA) and the Design Manual for Roads and Bridges (DMRB), Highways England.

9.12 The assessment will comprise a desk based assessment and site visits to ensure a robust assessment is undertaken of the development site. An Automated Traffic Count (ATC) survey has been undertaken in December 2017 along the B1027 and informal advice received by Highways England and the Local Highways Authority confirmed that no additional ATC data would be required to feed into the Environmental Statement.

STUDY AREA

9.13 It is proposed that study area for the development should follow the proposed construction traffic route to the site from M180, namely the A15; A18; and B1208 Brigg Road.

9.14 The roads leading to the site already serve HGVs associated with the Steel Works, which is accessible from Dawes Lane to the north of the site. The proposed construction traffic route is therefore considered to be suitable for use by the

relatively low number of HGVs that will be associated with the construction period. The likelihood of background traffic being delayed significantly is low.

9.15 Following the assessment of effects, transport mitigation measures are described which will further mitigate the potential impacts of the development. An assessment of residual effects following implementation of these mitigation measures is then provided.

Assessment of Significance

9.16 The assessment of potential impacts as a result of the site will take into account both the construction and operational phases. The significance level attributed to each impact will be assessed based on the magnitude of change due to the Proposed Development, and the sensitivity of the affected receptor to change.

9.17 There are four categories of impact significance considered, which are negligible (i.e. imperceptible), Minor significance (i.e. not noteworthy or material), Moderate significance (i.e. noteworthy or material) and Major significance (i.e. extremely noteworthy or material).

Traffic Flows

9.18 The IEMA Guidelines (Ref 11.2) set out two rules which have been used as threshold impacts to define the scale and extent of this assessment as follows:

- Rule 1: Include highway links where traffic flows will increase by more than 30% (or where the number of HGVs will increase by more than 30%); and
- Rule 2: Include any other specifically sensitive areas where traffic flows have increased by 10% or more.

9.19 It is worth noting that, on roads where traffic flows are low, any increase in traffic flow may result in a predicted increase that would be higher than the IEMA Guidelines. However, it is important to consider any overall increase in road traffic in relation to the capacity of the road.

9.20 The IEMA Guidance states that *"For many effects there are no simple rules or formulae which define the thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed up by data or quantified information wherever possible",* and "those preparing the Environmental

Statement will need to make it clear how they have defined whether a change is considered significant or not" (paragraph 4.5, Ref 11.2).

9.21 The Guidelines identify general thresholds for traffic flow increases of 10% and 30%. Where the predicted increase in traffic / HGV flow is lower than these thresholds then the significance of the effects can be considered to be low or not significant and further detailed assessment is not required. However, to ensure a relative assessment of the increase in traffic flows in environmental terms the following criteria defined in Tables 9.2 and 9.3 will be used to determine magnitude of impact and receptor sensitivity respectively. To assist with the judgement of magnitude of impact, reference will be made to the IEMA guidelines. These thresholds are guidance only and provide a starting point by which a detailed analysis will inform a subjective analysis of the impact magnitude.

Table 9.2 Sensitivity/Importance of the Identified Environmental Receptor

Magnitude	**Definition**
Very High	Receptors of greatest sensitivity to traffic flows, such as schools, playgrounds, accident blackspots, retirement homes, areas with no footways with high pedestrian footfall
High	Traffic flow sensitive receptors, such as congested junctions, residential areas, hospitals, shopping areas with active frontages, narrow footways, parks and recreational areas
Medium	Receptors with some sensitivity to traffic flow, such as conservation areas, listed buildings, tourist attractions, and residential areas
Low	Receptors with low sensitivity to traffic flows, and those distant from affected roads
Very Low	Road network not affected.

Table 9.3 Magnitude of Impact on the Identified Environmental Receptor

Magnitude	Definition
Very High	Changes to peak or 24hr traffic within the Study Area by 30% or more
High	Changes to peak or 24hr traffic within the Study Area by between 20% and 30%
Medium	Changes to peak or 24hr traffic within the Study Area by between 10% and 20%
Low	Changes to peak or 24hr traffic within the Study Area up to 10%
Very Low	No Change (+/- daily Variation)

9.22 With reference to the proposed links and junctions pertinent to the scheme, it is considered that the entire network represents a low sensitivity receptor. This is due to the location of the roads, away from settlements, and the fact that they already carry a significant amount of HGVs to the steel works sites. In addition, the level of pedestrian activity of the roads are not considered to be high enough to represent major receptor sensitivity.

9.23 The significance of potential effects is determined by the magnitude of the impact and the sensitivity of the receptor. A major and moderate significance of potential effects is considered to be “significant” in EIA terms.

9.24 Negligible, low, minor and high significances as categorised can either be beneficial (positive, i.e. reduction in traffic flows), negligible (no real impact) or adverse (negative, i.e. increase in traffic flows). They can be temporary or permanent and have an effect for the short, medium or long term. The definitions of which are as follows:

- A short term effect – an effect that will be experienced for 0-5 years;
- A medium term effect – an effect that will be experienced for 5-15 years; and

- A long term effect – an effect that will be experienced for 15 years onwards.

10. AGRICULTURE

10.1 This technical chapter of the Environmental Statement would assess the potential significant effects of the proposed development on agricultural land and farm businesses.

10.2 This chapter is accompanied by the following figure: -

- Figure 10.1 MAFF (1983) Provisional ALC Northern Region, 1:250,000

PRELIMINARY BASELINE CONDITIONS

10.3 Three baseline conditions are assessed:

- agricultural land;
- farm businesses and land management techniques; and
- fixed assets or infrastructure.

10.4 Baseline information was gathered through a combination of desk study and field survey, mostly carried out in August 2017. The agents for the main landowners were interviewed in person.

Agricultural Land

10.5 The ALC system provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The ALC system divides agricultural land into five grades (Grade 1 'excellent' to Grade 5 'very poor'), with Grade 3 subdivided into Subgrade 3a 'Good' and Subgrade 3b 'Moderate'. ALC is based upon an assessment of limiting factors, including soils, climate and other physical limitations and the way in which these factors interact. The Grade or Subgrade of land is determined by the most limiting factor present. Natural England estimate that around 42% of all agricultural land in England is of BMV quality26.

10.6 Across England, Grades 1 and 2 amount to about 16.9% of all land. Natural England's estimate of 21% of land in England being of Subgrade 3a suggests that about 40% of Grade 3 land nationally is expected to fall within Subgrade 3a.

[26] Natural England (2012) Technical Information Note 049 Agricultural Land Classification: protecting the best and most versatile agricultural land

10.7 Within Lincolnshire the proportion is much higher. Nationally about 36.2% of all land falls within the BMV category. In North Lincolnshire the equivalent percentage is about 68.2%.

10.8 The provisional agricultural land quality of the area around Scunthorpe is shown on the ALC map reproduced in Appendix 10.1.

APPENDIX 10.1 PROVISIONAL ALC MAP

10.9 The Predictive BMV Land Assessment maps (DEFRA, 2018) show most of the agricultural land around Scunthorpe to be in the moderate (20% - 60% area bmv) or high (>60% area bmv) category. The site is shown as in the moderate area and therefore (with the exception of a small area to the north of Scunthorpe) represents the poorest quality land around the town. The Site is shown on the "provisional" ALC map (MAFF 1983)27 as undifferentiated Grade 3 land.

10.10 Provisional ALC maps are not sufficiently accurate to allow a full assessment of a site and should not be used for other than general guidance at a strategic level. Accordingly the ALC grading has been undertaken and the results will form part for the Environmental Statement.

Farm Businesses

10.11 Two farm businesses ae located with the development site. The majority of the Site, some 192 ha, is owned by the Brocklesby Estate. The Estate has owned the land since the 1970s. The agricultural land in the Santon area extends to about 280 ha and is all in arable production, set aside or fallow. Approximately 120 ha of woodland is owned. The wider Estate farms over about 10,000 hectares. Consequently the land at Santon forms a small percentage of the Estate only The land within the site is farmed in hand using contractors, and has been for the last two years. This arrangement is expected to continue. Arable produce harvested on the land is hauled either to the Brocklesby Estate at Kirmington, or is taken to the contractor's farmyard at Roxby. In the past the land has been let out under two agricultural tenancies. It has been mostly used for arable farming. It is known that woodchip has been added to the soil, and outdoor pigs have been reared, in an endeavour to increase the moisture retentivity of the soil by increasing organic matter levels.

[27] MAFF (1983) Provisional ALC Northern Region, 1:250,000

10.12 One field on the north-eastern part of the Site, north of the poultry farm, is in arable use and is owned by a neighbouring arable farmer. This is a large mostly arable farming business based nearby on the edge of Broughton and farming land north of the Site and to the east. They farm one field within the proposed Site.

Fixed Assets or Infrastructure

10.13 Some of the land may have been the subject of underfield drainage schemes installed in the 1970's, but the details (if any) are not now known. None of the land is fenced and none of the fields are provided with water. The Site is crossed by a number of services, including electricity. Trespass is not a significant issue across the Site.

ASSESSMENT APPROACH

Methodology

10.14 This assessment will consider two key agricultural circumstances at the development site:

- the effects of the development on agricultural land during its construction, operation, management and decommissioning; and
- the effects of the development on farm businesses during construction, operation, management and decommissioning.

10.15 The assessment of the effects on agricultural land and farm businesses has been carried out in three stages. Firstly, the magnitude of the potential effect has been considered. Secondly, the importance / sensitivity of the receptor has been considered. Thirdly, the significance of the effects has been determined by the interaction of the magnitude and sensitivity.

10.16 There are no defined thresholds for assessing the effects of non-agricultural development on agricultural assets. The National Planning Policy Framework[28] (the NPPF) states that "planning policies and decisions should contribute to and enhance the natural and local environment by … recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland" (BMV). BMV is defined

[28] Department for Communities and Local Government (2018) National Planning Policy Framework (revised)

in Annex 2 of the NPPF as land in Grades 1, 2 and 3a of the Agricultural Land Classification (ALC). Identification and consideration of BMV agricultural land is therefore necessary and the loss of BMV is a measure of the effect of proposed development. The thresholds set out in the following tables have been developed over time and are based on professional judgement and accepted best practice.

10.17 The magnitude of the effects of the Proposed Development has been assessed against the criteria set out in Table 10.1.

Table 10.1: Methodology for Determining Magnitude of Effect

Magnitude of Effect	**Definition**	
	Effects on Agricultural Land	**Effects on Farm Businesses**
High	The Proposed Development would directly lead to the loss of over 50 ha of BMV agricultural land.	The effect of the Proposed Development would either render a full-time agricultural business non-viable or result in very significant changes to its day-to-day management and operation, or result in a closure of a part-time farm business.
Medium	The Proposed Development would directly lead to the loss of between 20 ha and 50 ha of BMV agricultural land.	The Proposed Development would either require significant changes in the day-to-day management of a full-time agricultural business, or very significant changes to a part-time farm business.

Magnitude of Effect	Definition	
	Effects on Agricultural Land	**Effects on Farm Businesses**
Low	The Proposed Development would directly lead to the loss of less than 20 of BMV agricultural land or the loss of any quantity of non-BMV land (Grades 3b, 4 and 5).	The Proposed Development would require only moderate to minor changes in the day-to-day management or structure of a full-time agricultural business or would have a significant effect on a part-time business.
Negligible	No permanent adverse effect on agricultural land.	The Proposed Development would require only negligible changes to a full-time agricultural business, or minor to negligible effects on a part-time business.

10.18 The methodology for determining the sensitivity of the receptors is set out in Table 10.2. Two receptors have been identified: agricultural land and farm businesses. The sensitivity of these receptors is defined by the quality of the agricultural land and the scale of the farm business. BMV agricultural land is of national importance whilst poorer quality agricultural land (non-BMV) and farm businesses are of local importance.

Table 10.2: Methodology for Determining Sensitivity of Receptors

Sensitivity	Receptor
High	Land resources are matters of potentially national importance, as identified in the NPPF. The BMV agricultural

Sensitivity	Receptor
	land (Grades 1, 2 and 3a) is of national importance. The effect on land resources is a combination of the quantum and quality of agricultural land affected, relative to both the national resource and the relative availability of land of that quality locally. Land resources of BMV quality should therefore be classified as being of high environmental value (sensitivity).
Medium	Land that is of poorer quality, Grades 3b, 4 and 5, is of lower sensitivity and is afforded no special protection in the NPPF. It is nevertheless a finite resource of local importance and so is regarded as of moderate sensitivity. Full-time farm businesses are of medium sensitivity, as the way that farms are operated will vary over time according to ownership, security of tenure and local and international economic factors. Farm businesses are tolerant of some change without detriment to their character.
Low	Part-time farm businesses are of low sensitivity. The way that farms are operated will vary over time according to ownership, security of tenure and local and international economic factors. Farm businesses are tolerant of some change without detriment to their character.

10.19 The significance of the effects of the Proposed Development has been determined by the interaction of the magnitude of the effect and the sensitivity of the receptor, as set out in the matrix at Table 10.3.

Table 10.3: Significance Matrix

Magnitude	Sensitivity		
	High	**Medium**	**Low**
High	Major Adverse / Beneficial	Moderate Adverse / Beneficial	Minor Adverse / Beneficial
Medium	Moderate Adverse / Beneficial	Minor Adverse / Beneficial	Minor Adverse / Beneficial
Low	Minor Adverse / Beneficial	Minor Adverse / Beneficial	Minor Adverse / Beneficial
Negligible	Negligible	Negligible	Negligible

Assessment of Significance

10.20 There is no definition of 'significance' in EIA or in the NPPF regarding the loss of agricultural land. However, the alternative use of 20 ha or more of BMV agricultural land for predominantly non-agricultural purposes, requires consultation with Natural England (as set out in the Policy section below). Based on this threshold and on professional experience, the alternative use of 20 ha or more of BMV agricultural land would be identified as a potential significant adverse effect in EIA terms, i.e. an effect of moderate adverse significance and above (as per the matrix at Table 10.3).

10.21 With regards the impacts of development on farm businesses, the definitions are based on professional judgement. For instance, very significant changes in the day-to-day operation of a full time farm unit is considered a significant adverse effect, i.e. an effect of moderate adverse significance (as per the matrix at Table 10.3).

11. SOCIO ECONOMICS ISSUES

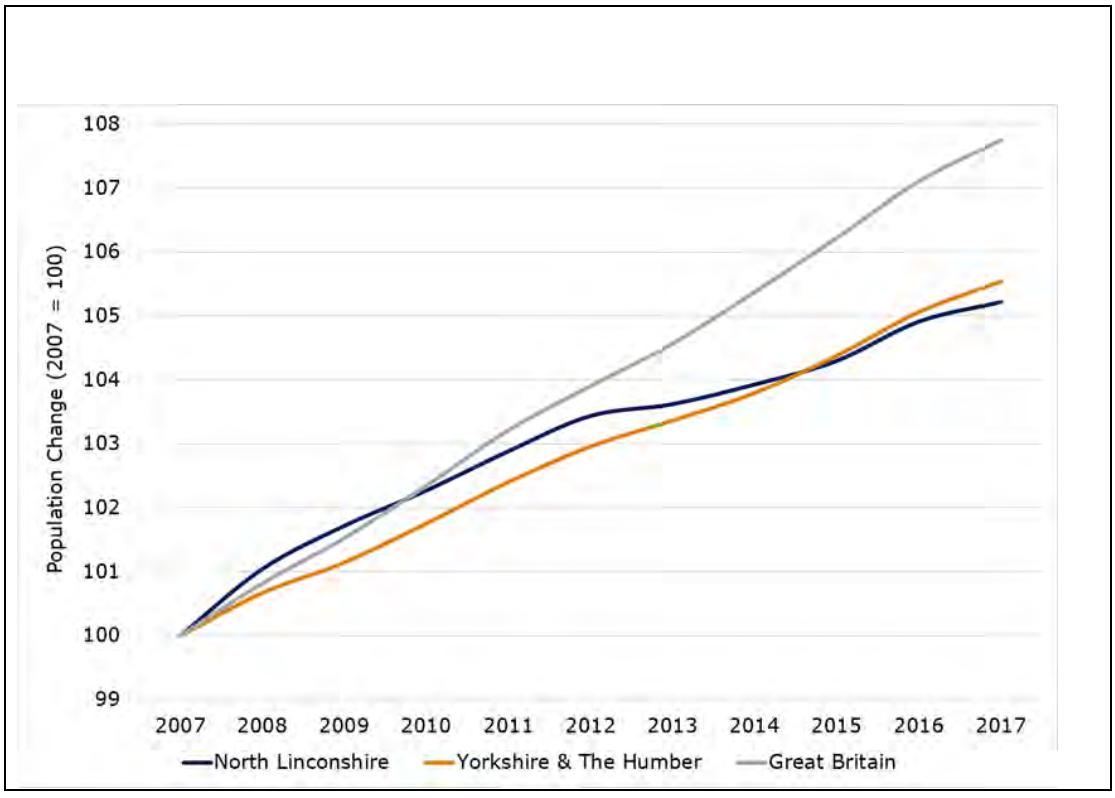
11.1 This section of the Environmental Statement will assess the potential effects on socio-economic resulting from the construction and operation of the development.

PRELIMINARY BASELINE CONDITIONS

Population

11.2 Based on data from the Census, the population of Frodingham ward was around 8,200 in 2011. Data from the 2017 ONS Mid-Year Population Estimates show that, the total population of North Lincolnshire is around 171,300. Figure 11.1 shows population change between 2007 and 2017. Over this timeframe, North Lincolnshire's population grew by 5.2% – equating to 8,500 more people. The corresponding rises for Yorkshire and The Humber and Great Britain over the same period were 5.5% and 7.7% respectively.

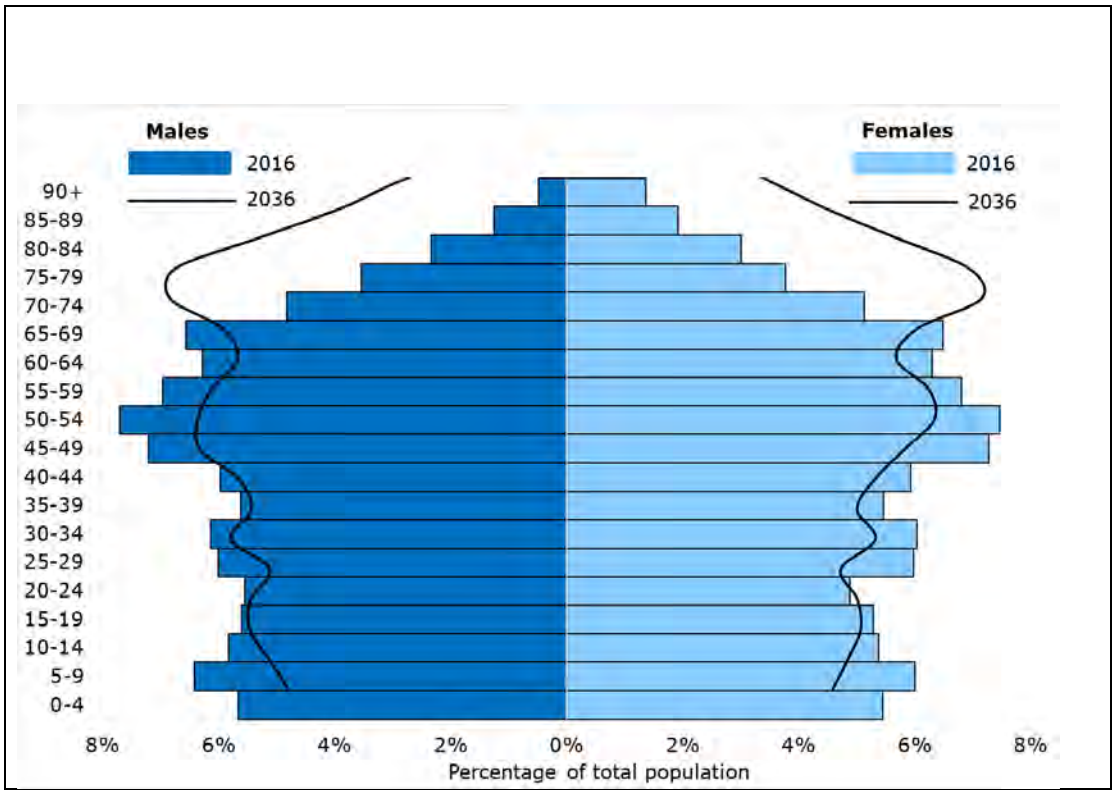
Figure 11.1: Population change, 2007-17
Source: ONS, Mid-Year Population Estimates



11.3 Data on population change by age in North Lincolnshire shows that from 2007 to 2017, the young dependant population group (aged 0 to 15) increased by around 900 (2.9% growth), the number of economically active people (16-64) increased by about 100 (0.1% growth) and people aged 65+ increased by approximately 7,500 (a rise of 26.9%). All three age groups experienced growth over the same timeframe in Yorkshire and The Humber and UK, although the 65+ cohort grew fastest in both areas – by 21.1% in Yorkshire and The Humber and 23.0% in the UK.

11.4 The latest ONS population projections (2016-based) were published in May 2017 and these indicate that the population of North Lincolnshire is predicted to increase steadily – by around 5,600 between 2016 and 2036 (a 3.3% increase). Population growth in Yorkshire and The Humber (5.9%) and England (10.2%) is expected to be higher over the same period. In North Lincolnshire between 2016 and 2036, the population aged 65+ is expected to rise by just over 15,200 (43.8%). The 16-64 cohort is projected to decline by around 6,400 (6.15), while the number of people aged 0-15 is estimated to decrease by 3,300 (10.5%) over the same time period. Figure 11.2 presents a population pyramid for North Lincolnshire between 2016 and 2036, highlighting a long-term contraction in the young population and a rise in the number of elderly people.

Figure 11.2: Population projections, 2016-36

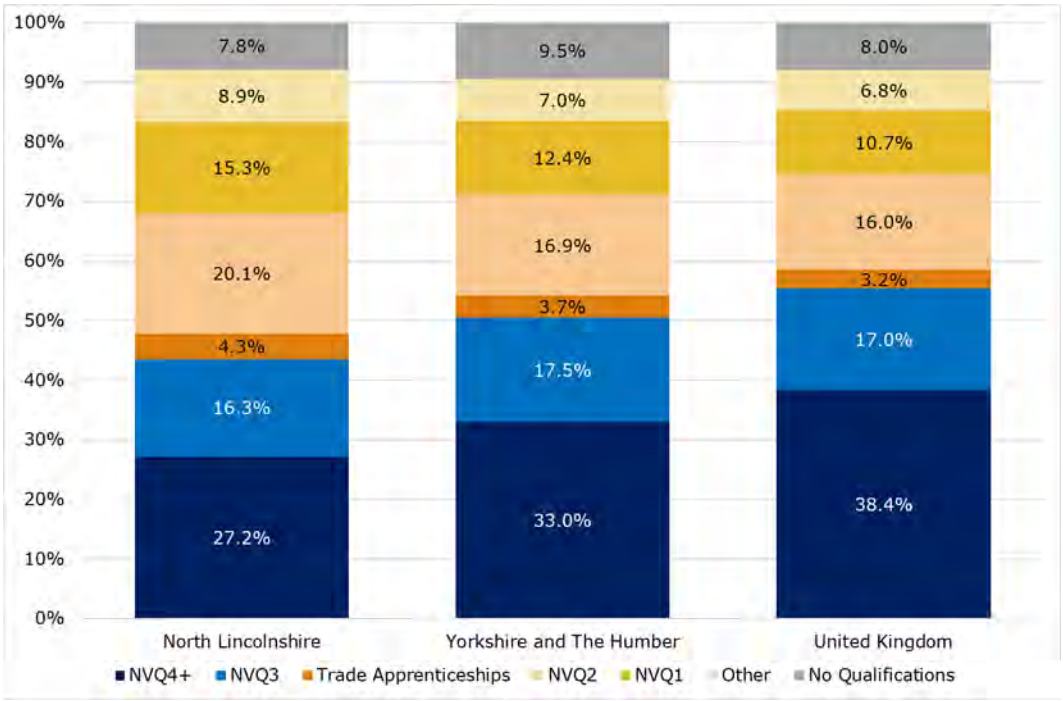


Source: ONS, Mid-Year Population Estimates

Skills

11.5 In 2017, 27.2% of working age residents (16-64) in North Lincolnshire had a degree level qualification or higher (NVQ4+); 16.3% had NVQ3 only, which equates to 2 A Levels and 4 AS Levels; and 20.1% had NVQ2 only (5+ GCSEs or equivalent). Around 7.8% of the District's population had no qualifications. Yorkshire and The Humber region and the UK have a greater proportion of people aged 16-64 with higher level (NVQ4+) qualifications – 33.0% and 38.4% respectively. North Lincolnshire has a lower proportion of working age residents with no qualifications compared with the UK (8.0% versus 7.8%), and the region (9.5%). Figure 11.3 shows the full skills breakdown.

Figure 11.3: Skill Levels of the Resident Working Age (16-64) Population, 2017



Source: Annual Population Survey, January-December 2017

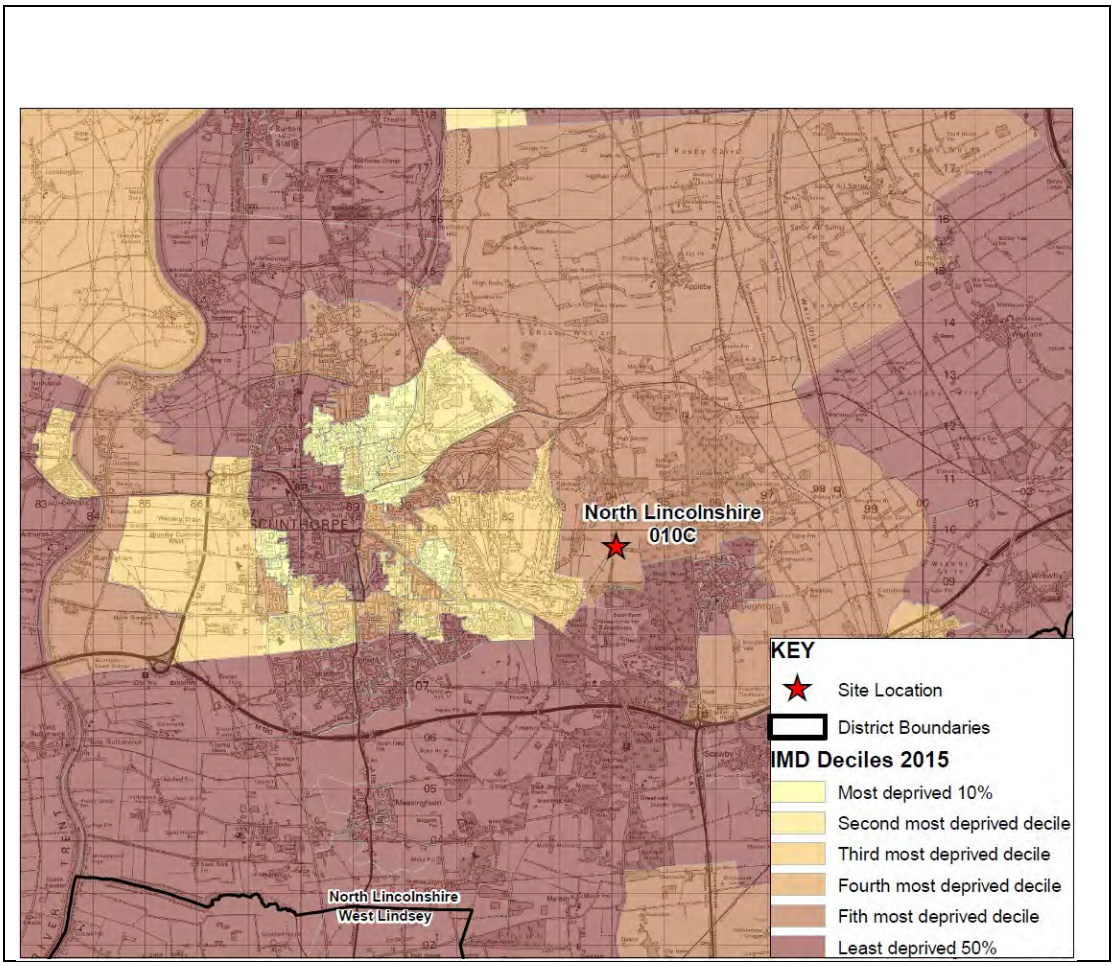
Deprivation

11.6 The Index of Multiple Deprivation 2015[29] provides an indication of the average levels of deprivation for LSOAs (Lower layer Super Output Area) across England. The Index provides an overall assessment of the average levels of deprivation as well as an assessment against particular domains of deprivation.

11.7 The site falls within the North Lincolnshire 010C LSOA. The area has medium levels of deprivation, ranking at 14,964, falling inside the fifth most deprived decile amongst the 32,844 LSOAs nationally (see Figure 11.4). The LSOA is within the 30% most deprived areas nationally for education, skills and training; and living environment. However, it is within the 10% least deprived areas nationally for Barriers to Housing and Services.

Figure 11.4: Index of Multiple Deprivation for Site Location, 2015 Source: Ministry of Housing, Communities & Local Government

[29] September 2015, English Indices of Deprivation 2015, Department for Communities and Local Government.



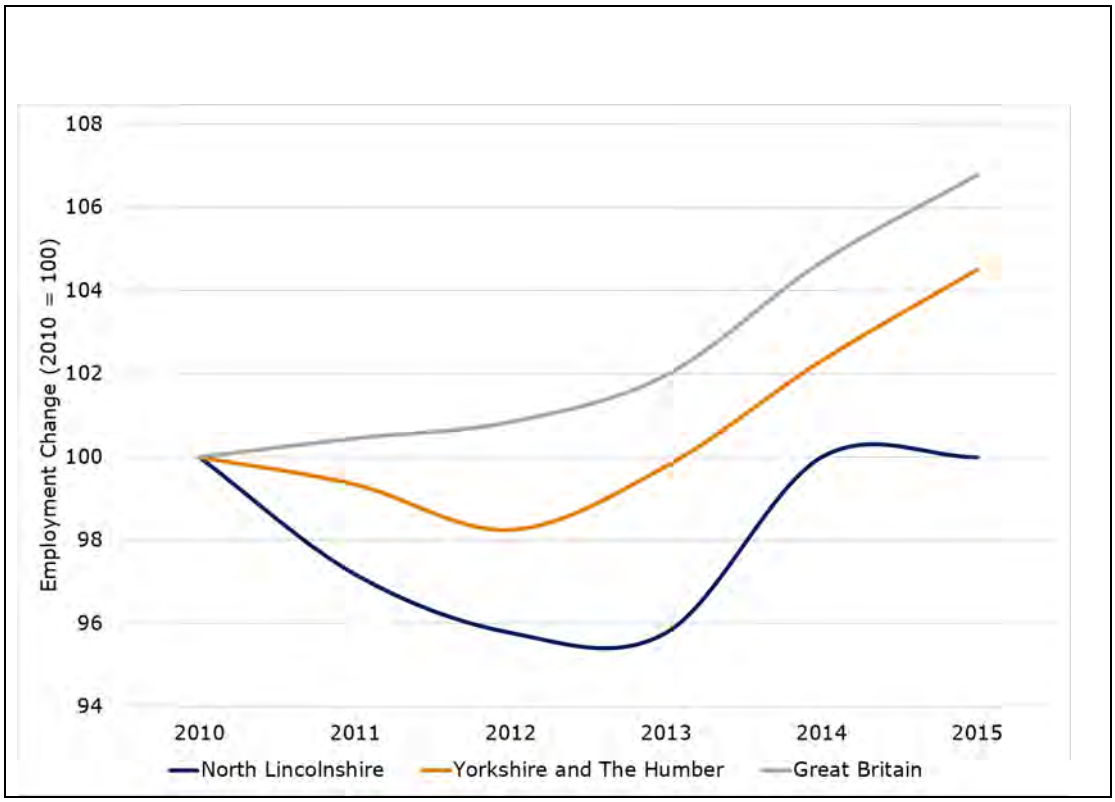
Employment

11.8 Based on data from the 2016 Business Register & Employment Survey, published by ONS, 72,000 people work in North Lincolnshire (7,000 (10.0%) of which work in Frodingham ward). Overall, between 2010 and 2015, employment in North Lincolnshire remained flat. While it fluctuated in the intervening years, job numbers

11.9 in 2010 were 71,000 – the same as 2015. Yorkshire and The Humber and Great Britain saw increases of 4.5% (103,000 jobs) and 6.8% (1.9million jobs) respectively over the same timeframe (see Figure 11.5)[30]

Figure 11.5: Employment Change, 2010-15
Source: Office for National Statistics – Business Register & Employment Survey

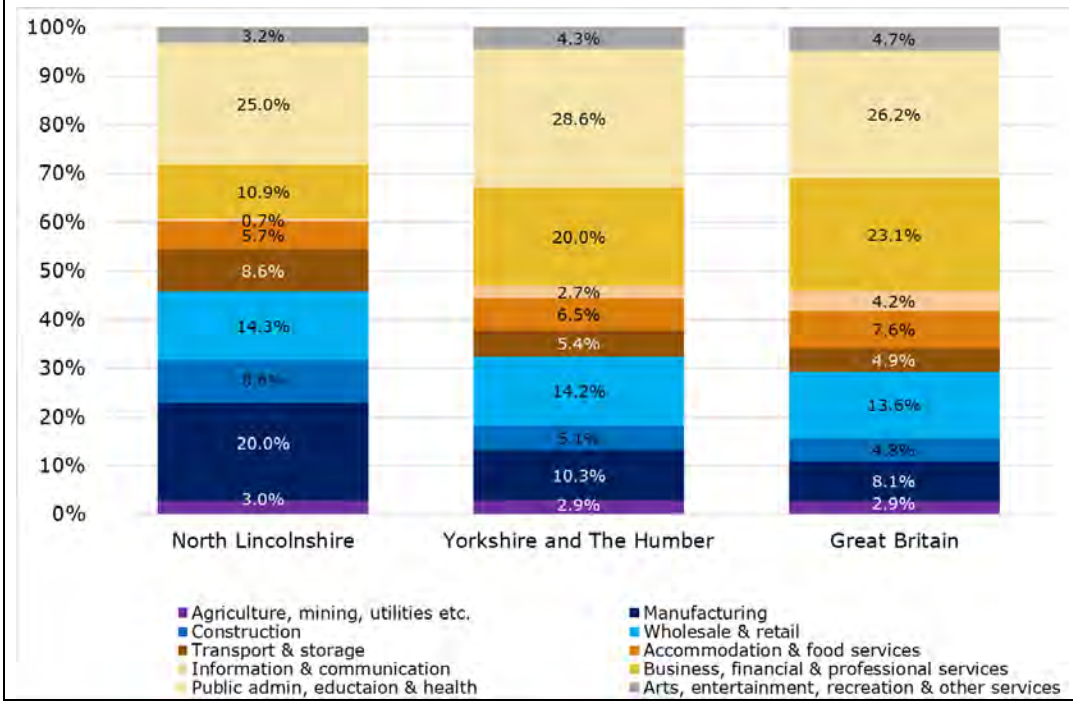
[30] 2016 jobs data are also available, however due to changes in the methodology they are not comparable with figures dating back to 2010. Jobs growth has therefore been analysed over the period 2010-15 to allow for like-for-like comparison.



11.10 The largest sector in North Lincolnshire as of 2016 is public administration, education and health, with 17,500 jobs – representing 25.0% of total employment. Job numbers in the sector decreased by 2,500 between 2010 and 2015. Between 2015 and 2016, jobs in the sector remained the same (17,500).

11.11 In terms of overall size, health is followed by two sectors – manufacturing (which supports 14,000 jobs in the District – 20.0%) and wholesale and retail (which supports 10,000 jobs (14.3%) in North Lincolnshire). The construction sector, which is likely to see employment opportunities during the Proposed Development's build phase, supports around 6,000 jobs in North Lincolnshire. This equates to approximately 8.6% of total employment in the District, above the corresponding shares for Yorkshire and The Humber (5.1%) and the UK (4.8%). Figure 11.6 presents the sector employment share in further detail.

Figure 11.6: Sector Employment Share, 2016
Source: Office for National Statistics – Business Register & Employment Survey



Business Base

11.12 The total number of businesses in North Lincolnshire has increased by 500 since 2010 (8.2% growth). This was below the increases seen in Yorkshire and The Humber (18.0%) and UK (21.6%) over the same timeframe (see Table 11.4).

Table 11.4: Change in business numbers, 2010-17
Source: ONS, UK Business Count

Area	2010	2017	Absolute Change	% Change
North Lincolnshire	6,120	6,620	500	8.2%
Yorkshire and The Humber	187,810	221,560	33,750	18.0%
United Kingdom	2,574,225	3,129,385	555,160	21.6%

11.13 In terms of business share by size, North Lincolnshire is broadly in line with Yorkshire and The Humber. The District has a slightly lower proportion of micro businesses – 82.3% (between 0 and 9 employees) than the UK – 84.5% - and a slightly higher proposition of small (10 to 49 employees) and medium-sized (50 to 249 employees) businesses than the national average (see Table 11.5).

Table 11.5: Business share by size, 2017

Area	Micro (0 to 9)	Small (10 to 49)	Medium-sized (50 to 249)	Large (250+)
North Lincolnshire	82.3%	14.3%	3.7%	0.5%
Yorkshire and The Humber	82.6%	14.0%	3.6%	0.4%
United Kingdom	84.5%	12.6%	3.0%	0.4%

Source: ONS, UK Business Count

Wages

11.14 For residents of North Lincolnshire, the median annual gross wage for full-time workers is £27,265, as of 2017. This is around £1,500 lower than that of the UK (£28,758), but around £1,000 below the regional figure (£26,236). Since 2010, gross annual wages for full-time workers who are residents of North Lincolnshire have increased by approximately £1,700 – an increase of 6.9%. This is lower than the growth seen in Yorkshire and The Humber (9.5% – around £2,300), and the UK (11.1% – around £2,900)[31].

11.15 For workers in North Lincolnshire, the median annual gross wage for full-time jobs (£27,505 in 2017) is around £1,200 lower than the UK median (£28,758), but £1,200 above Yorkshire and The Humber median (£26,258). Between 2010 and 2017, residents' wages in North Lincolnshire increased by 6.4% (£1,643), lower

[31] Data sourced from Annual Survey of Hours & Earnings (Resident Analysis) for 2010 and 2017, published by ONS.

than the growth seen in Yorkshire and The Humber (£2,402 – 10.1%) and the UK (11.1% – around £2,900[32]) over the same period[33].

Commuting[34]

11.16 Just over 50,400 people live and work in North Lincolnshire. There are a substantial number of people travelling into North Lincolnshire from surrounding/neighbouring areas to work – around 12,600. This includes around 3,800 from North East Lincolnshire, 2,600 from Doncaster and 1,400 from West Lindsey.

11.17 There is also a high number of residents commuting out for work – around 12,000. This includes almost 4,700 working in North East Lincolnshire, over 2,900 in West Lindsey, 2,000 in Doncaster and just over 1,100 in East Riding of Yorkshire.

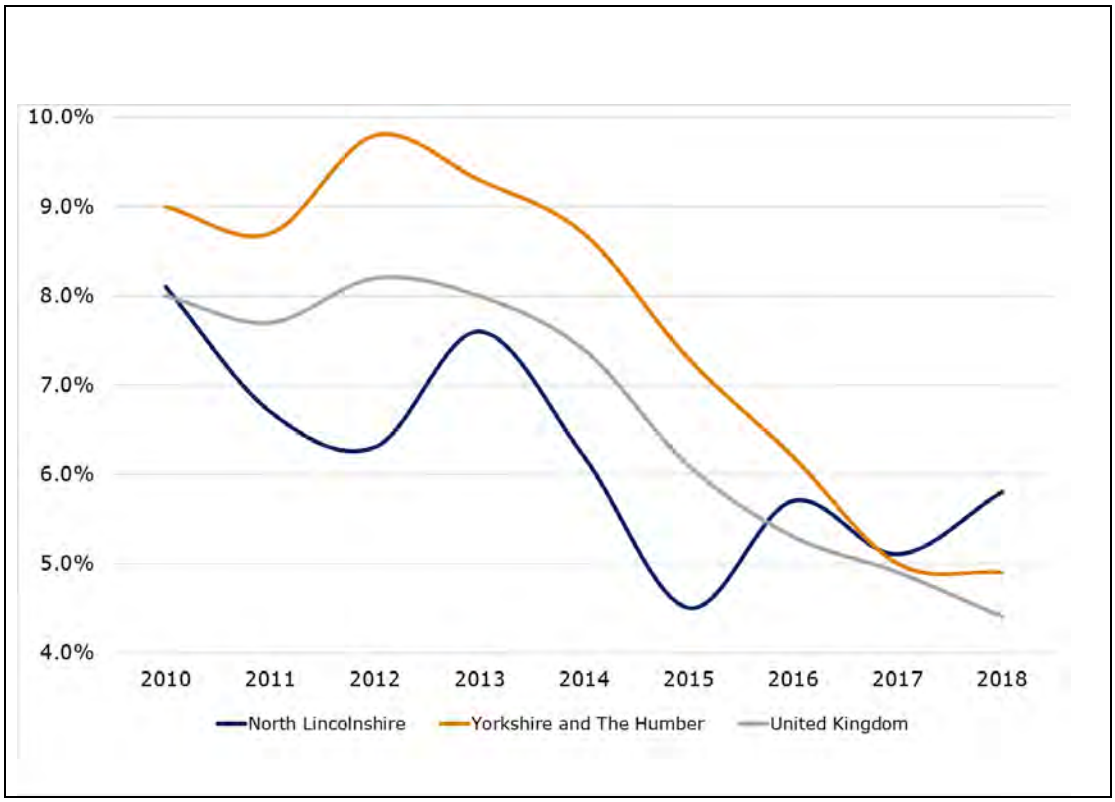
11.18 The overall figure for out-commuters (15,778) is higher than the figure for in-commuters (14,802), giving a net outflow of just under 1,000 commuters.

Unemployment

11.19 Overall, the unemployment rate in North Lincolnshire fell between 2010 and 2018 (see Figure 11.7). As of April 2017-March 2018, the unemployment rate for people aged 16-64 in North Lincolnshire was 5.8%. Compared with the figure of 8.1% for 2010, this represents a substantial improvement. However, the rate did increase slightly between 2017 and 2018 (by 0.7 percentage points, from 5.1% to 5.8%). The unemployment rate in North Lincolnshire is higher than the regional rate (4.9%) and the UK average of 4.4%[35].

Figure 11.7: Unemployment Rate (16-64), 2010-2018

[32] Resident and workplace-based wages are both the same at a UK level, hence the reported changes in paragraphs 6.3.12 and 6.3.13 are the same.
[33] Data sourced from Annual Survey of Hours & Earnings (Workplace Analysis) for 2010 and 2017, published by ONS.
[34] Based on travel to work data from the 2011 Census.
[35] Unemployment data sourced from Annual Population Survey (April 2017-March 2018), published by ONS.



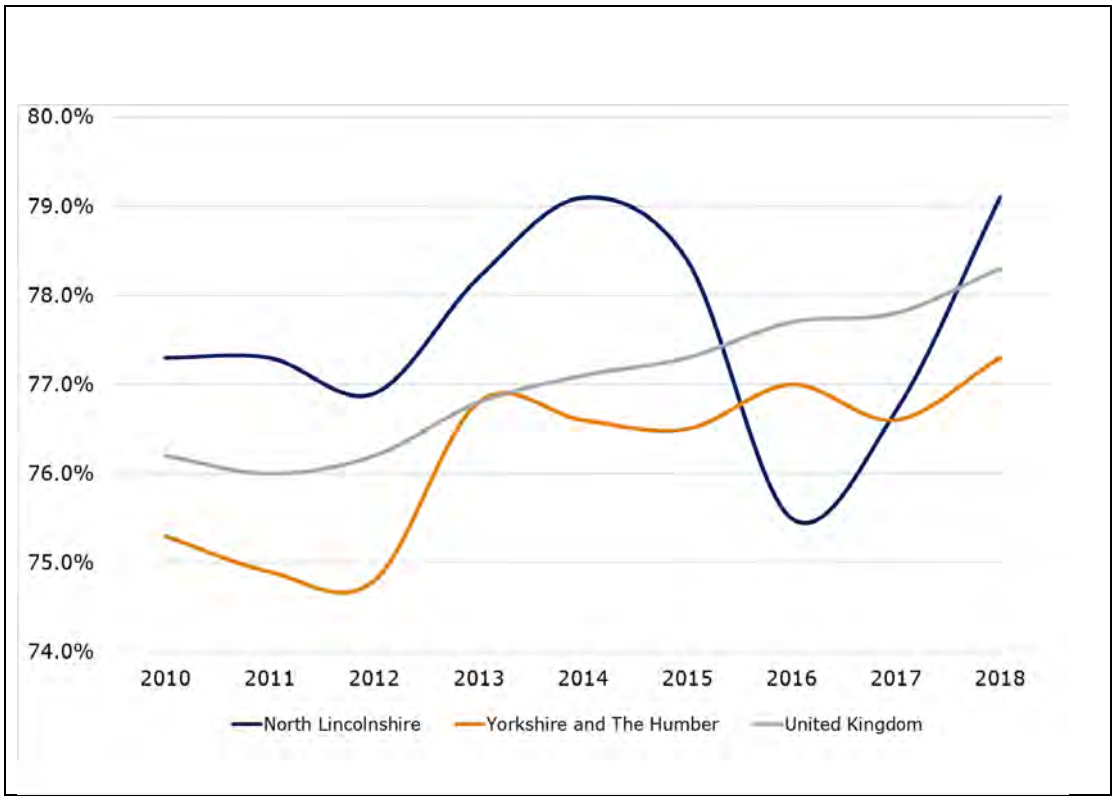
Source: Office for National Statistics – Annual Population Survey

Economic Activity

11.20 The economic activity rate in North Lincolnshire is 79.1%, based on ONS data for April 2017-March 2018. This is 0.8 percentage points than the rate in the UK, which is 78.3%. It is also above Yorkshire and The Humber average of 77.3%[36]. Although the rate of economic activity dropped to a low point of 76.7% in 2016, it recovered to the peak of 79.1% in 2018 (See Figure 11.8).

Figure 11.8: Economic Activity Rate (16-64), 2010-2018

[36] Economic activity data sourced from Annual Population Survey, published by ONS.



Source: Office for National Statistics – Annual Population Survey

Likely Significant Effects

11.21 The main issues to be considered in the Environmental Statement include: -

Construction

11.22 The socio economic effects will apply largely during the construction phase of the solar park. Economic benefits will arise through the provision of temporary jobs during the construction phase at the site. Research published in 2014 by the Centre for Economic & Business Research (Cebr) on solar powered growth in the UK[37] highlighted analysis by the Solar Trade Association on the cost of solar energy. The analysis estimated that by 2016, the capital investment cost of building one megawatt of solar power for a large-scale development[38] would be around £800,000. Assuming this price is broadly similar in 2018, when applied to the Proposed Development (both the 150MW of solar and the 50MW of battery storage) this equates to a capital cost of £160million.

[37] *Solar powered growth in the UK – the macroeconomic benefits for the UK of investment in solar PV*: Cebr (report for the Solar Trade Association), September 2014.
[38] Cebr's report noted that large-scale arrays usually have a capacity of at least 1MW.

Gross value added

11.23 The contribution of the site to economic output will be calculated by taking the on-site jobs associated with the scheme, and multiplying this by an estimate of average levels of gross value added (GVA) per construction employee in Yorkshire and The Humber. The estimated indirect/induced jobs will be multiplied by the average GVA per job in the region overall for a proposed 10 month construction period.

Operation

11.24 The main socio economic effects of the operational phase can be placed into two categories – employment and gross value added.

Employment

11.25 Details of permanent on-site jobs supported by the development are still to be finalised. However, the numbers are not expected to be significant.

Gross value added

11.26 The contribution of the site to economic output will be calculated by taking the job creation associated with the scheme, and multiplying this by an estimate of average levels of GVA per employee in Yorkshire and The Humber.

Other Benefits

11.27 Using data on regional and local authority electricity consumption published by the Department for Business, Energy and Industrial Strategy[39], it has been possible to calculate the site-specific capacity for solar parks. For the development in North Lincolnshire, 150MW of solar park capacity is estimated to power around 40,200 UK homes per annum.

11.28 The likely effects of land use to the existing agricultural estates will be discussed in the agricultural chapter of the Environmental Statement.

De-commissioning

[39] *Regional and local authority electricity consumption statistics*: Department for Business, Energy and Industrial Strategy, January 2018.

11.29 The operational phase of the development is targeted at 35 years. Following cessation of generation at the site the development will be decommissioned. The cost of this activity would generate further direct and indirect socio economic impacts and effects similar to those of the construction phase. The Environmental Statement will provide a discreet assessment of decommissioning as it is difficult to accurately predict, for example, the labour costs associated with decommissioning in 35 years.

ASSESSMENT APPROACH

Extent of Study Area

11.30 The proposed study area for this chapter of the Environmental Statement will focus on the effects in the administrative area of North Lincolnshire Council and the wards within which the Proposed Development is located.

Methodology

11.31 There is no specific guidance available which establishes a methodology for undertaking an Environmental Impact Assessment (EIA) of the socio economic effects of a proposed development. Accordingly, the approach adopted for this assessment is based on professional experience and best practice, and in consideration of the policy requirements/tests set out within the National Planning Policy Framework (NPPF) and local planning policy.

11.32 The 2017 Regulations[40] state that an Environmental Statement should contain:

> A description of the factors specified in regulation 5(2) likely to be significantly affected by the development: population.

11.33 Following this guidance, the assessment will specifically include the following:

- Identification of the socio economic baseline in respect of each of the key socio economic issues identified, focussing on the characteristics of the economy and labour force. These characteristics have been used as a measure for assessing future changes associated with or resulting from the Proposed Development.

[40] *The Infrastructure Planning (Environmental Impact Assessment Regulations 2017)*, available from: http://www.legislation.gov.uk/uksi/2017/572/pdfs/uksi_20170572_en.pdf

- Qualification of the full range of socio economic effects, both direct and indirect, arising from the construction (temporary effects) and operation (permanent effects) of the Proposed Development.

11.34 The baseline information has been collated with reference to the following:

- NPPF; and
- Office of National Statistics (ONS) data (various outputs as individually referenced in this chapter).

Assessment of Significance

11.35 The first step in the assessment is to identify the sensitivity of the receptors. In socio economic assessments, receptors are not sensitive to changing environmental conditions in the same way as many environmental receptors are. To address this, the assessment draws on a combination of measurable indicators and a consideration of the importance of the receptor in policy terms to gauge the receptor's sensitivity. For example, the number of jobs in the area may increase as new developments are completed and occupied by businesses. This is considered alongside the weight attached to these issues in local policy. For example, the Local Plan may have identified that employment and business growth as a particular priority. Table 11.1 shows the sensitivity criteria to be followed in the assessment.

Table 11.1: Sensitivity Criteria

Sensitivity	**Evidence for Sensitivity Assessment**
High	Evidence of direct and significant socio economic challenges relating to receptor. Accorded a high priority in local, regional or national economic regeneration policy.
Medium	Some evidence of socio-economic challenges linked to receptor, which may be indirect. Change relating to receptor has medium priority in local, regional and national economic and regeneration policy.

Sensitivity	Evidence for Sensitivity Assessment
Low	Little evidence of socio-economic challenges relating to receptor. Receptor is accorded a low priority in local, regional and national economic and regeneration policy.
Negligible	No socio-economic issues relating to receptor. Receptor is not considered a priority in local, regional and national economic development and regeneration policy.

11.36 The magnitude of change upon each receptor has been determined by considering the predicted deviation from baseline conditions, both before and, if required, after mitigation. The criteria used for the assessment of magnitude of change, which can be either positive (beneficial) or negative (adverse) are shown in Table 11.2.

Table 11.2: Magnitude of Change Criteria

Magnitude of Impact	Description / Criteria
Substantial	Proposed Development would cause a large change to existing socio economic conditions in terms of absolute and/or percentage change.
Moderate	Proposed Development would cause a moderate change to existing socio economic conditions in terms of absolute or percentage change.
Minor	Proposed Development would cause a minor change to existing socio economic conditions in terms of absolute and or percentage change.
Negligible	No discernible change in baseline socio economic conditions.

Assessment of Cumulative Effects

11.37 Cumulative effects will need to be considered as part of the assessment. The cumulative impacts for the economy receptor will consider the impact of the development on the supply chain and labour market capacity and capability in the impact area and the extent to which this might interfere with the ability of the developer's ability to source key goods and services from within the impact areas.

11.38 It is expended that the effects of decommissioning would be similar to the construction effects however, since the future socio economic future conditions of the locality cannot be accurately predicted for a period beyond the operational life of the development, the chapter will provide a high level review of the decommissioning impacts.

Little Crow
Solar Park

Nationally Significant Infrastructure Project in the Energy Sector

ENVIRONMENTAL IMPACT ASSESSMENT
SCOPING REPORT
TECHNICAL APPENDICES

On behalf of INRG Solar (Little Crow) Ltd

December 2018

APPENDICES

1. INTRODUCTION

APPENDIX 1.1 SITE LOCATION PLAN

APPENDIX 1.2 COPY OF NORTH LINCOLNSHIRE INFORMAL PRE-APPLICATION RESPONSE

2. ASSESSMENT SCOPE AND METHODOLOGY

APPENDIX 2.1: AIR QUALITY REPORT

APPENDIX 2.2: PHASE 1 GROUND CONDITIONS REPORT

APPENDIX 2.3: FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY REPORT

3. THE DEVELOPMENT SITE AND ITS ENVIRONS

THERE ARE NO APPENDICES FOR CHAPTER 3

4. DEVELOPMENT PROPOSAL

APPENDIX 4.1 INDICATIVE DRAWING PACK

5. THE LEGISLATIVE CONTEXT, CLIMATE CHANGE, ENERGY POLICY AND GUIDANCE

THERE ARE NO APPENDICES FOR CHAPTER 5

6. LANDSCAPE AND VISUAL IMPACT

APPENDIX 6.1 SITE CONTEXT

APPENDIX 6.2 TOPOGRAPHY

APPENDIX 6.3 LVIA VIEWPOINTS

APPENDIX 6.4 ENVIRONMENTAL DESIGNATIONS

APPENDIX 6.5 LANDSCAPE CHARACTER AREAS

7. ECOLOGY AND NATURE CONSERVATION

APPENDIX 7.1 COPY OF NATURAL ENGLAND'S INFORMAL PRE-APP RESPONSE

APPENDIX 7.2 PHASE 1 HABITAT MAP AND TARGET NOTES

APPENDIX 7.3 DESIGNATED SITES FOR NATURE CONSERVATION WITH 1KM

APPENDIX 7.4 EXTENDED PHASE 1, ARABLE PLANTS, GREAT CRESTED NEWTS & WATER VOLE SURVEY REPORT (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

APPENDIX 7.5 WINTERING BIRDS SURVEY (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

APPENDIX 7.6 BREEDING BIRDS SURVEY (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

APPENDIX 7.7 BAT ACTIVITY SURVEY (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

8. CULTURAL HERITAGE AND ARCHAEOLOGY

APPENDIX 8.1	LAND AT SANTON, HIGH SANTON, SCUNTHORPE HERITAGE BASELINE (PEGASUS GROUP, NOVEMBER 2018).
APPENDIX 8.2	LITTLE CROW, SANTON, NORTH LINCOLNSHIRE – GEOPHYSICAL SURVEY REPORT (SUMO, SEPTEMBER 2018).
APPENDIX 8.3	LITTLE CROW SOLAR PARK, SCUNTHORPE, NORTH LINCOLNSHIRE – ARCHAEOLOGICAL WATCHING BRIEF (COTSWOLD ARCHAEOLOGY, NOVEMBER 2018).
APPENDIX 8.4	LITTLE CROW SOLAR PARK, SCUNTHORPE, NORTH LINCOLNSHIRE – ARCHAEOLOGICAL FIELDWALKING SURVEY (COTSWOLD ARCHAEOLOGY, NOVEMBER 2018).

9. TRANSPORT AND TRAFFIC

APPENDIX 9.1	PROPOSED STUDY AREA
APPENDIX 9.2	ATC DATA DECEMBER 2017
APPENDIX 9.3	TRANSPORT STATEMENT (TPA, NOVEMBER 2018)

10. AGRICULTURE

APPENDIX 10.1	PROVISIONAL ALC AROUND SCUNTHORPE

11. SOCIO ECONOMIC

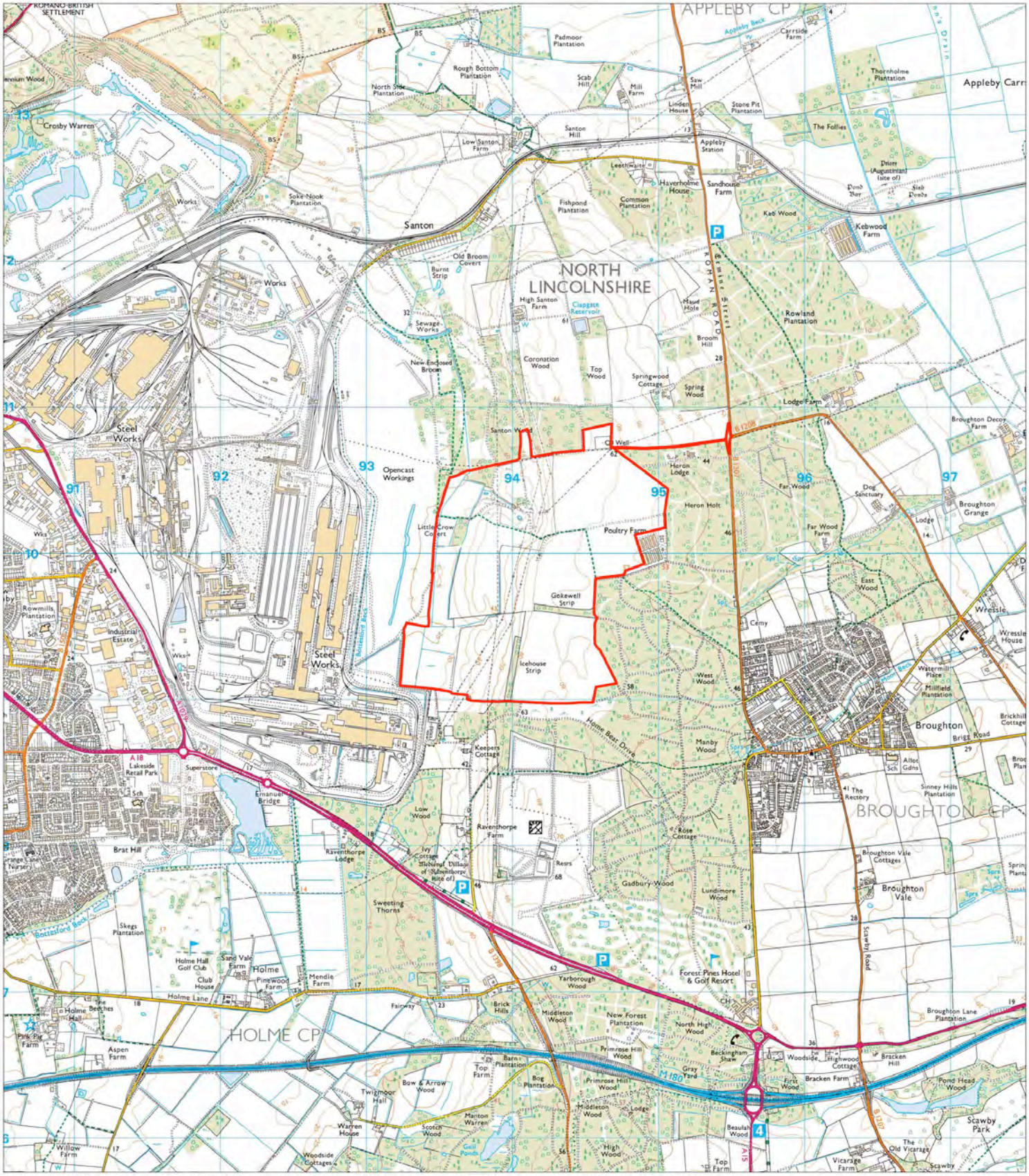
THERE ARE NO APPENDICES FOR CHAPTER 11

APPENDIX 1.1

SITE LOCATION PLAN

KEY: SITE LOCATION PLAN

APPLICATION BOUNDARY



Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449. EmapSite Licence number 0100031673 Standard OS licence rights conditions apply. Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

LITTLE CROW SOLAR PARK - SITE LOCATION PLAN

Pegasus Design

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS | www.pegasusgroup.co.uk | TEAM/DRAWN BY: ADR | APPROVED BY: GR | DATE: 31/10/18 | SCALE: 1:25,000 @ A3 | DRWG: P18-0718_22 SHEET NO: _ REV: _ | CLIENT: INRG SOLAR LTD |

APPENDIX 1.2

COPY OF NORTH LINCOLNSHIRE INFORMAL PRE-APPLICATION RESPONSE

Enquiries to: Andrew Law
Direct Dial: 01724 297490
E-mail: andrew.law@northlincs.gov.uk

Our Ref: PRE/2018/137
Your Ref: GRO/P17-0718

Date: 30 October 2018

Colin Virtue
Executive Director
Pegasus Group
First Floor
South Wing
Equinox North
Great Park Road
Almondsbury
Bristol
BS32 4QL

Dear Mr Virtue,

National Significant Infrastructure Project in the Energy Sector Informal Consultation with North Lincolnshire Council - Little Crow Solar Park, Scunthorpe

Thank you for your consultation letter dated 3 August 2018, I apologise for the delay in responding to this informal stage of pre-application consultation.

I have taken the opportunity to review the Draft Environmental Statement and Draft Technical Appendices and documents submitted to the authority. Technical consultees within the Council have raised matters which will hopefully advise the final production of the Environmental Statement and support you in making a robust submission to the Planning Inspectorate. I have enclosed these consultation responses for your information, please feel free to discuss these matters with the relevant people and do not hesitate to contact me should you require any contact details for the consultees. I would be grateful if you could keep me copied into any future correspondence with technical consultees so that I can project manage this scheme and collate formal responses to you in the future.

North Lincolnshire Council does not wish to raise any objection to the principle of the proposed scheme at this moment in time. At the examination stage North Lincolnshire Council will produce a Local Impact Report which will need to be agreed by local members at Planning Committee and as such we do reserve the right to

raise concerns at a later stage following consideration of the application by committee members.

At this stage of informal pre-application consultation I would like to make the following observations:

Landscape and Visual Impact

Having reviewed Chapter 6 of the Draft ES I can confirm agreement to the approach to the assessment and mitigation of landscape and visual impacts.

The proposal for planting of new hedgerows along the security fences adjacent to the public right of way through the site and the sowing of wildflower seed in the margins between the path and the hedges is supported on the understanding that the hedging would be of mixed native species and that the wildflower seed is of UK origin. However, it should be noted that for the hedgerows and wildflowers along the Public Right of Way to be of lasting benefit, they will require ongoing management. The council's responsibilities in this respect are limited to way-clearance and maintenance of the route only. The landowner or solar farm operator will therefore need to make provision for ongoing management of the hedgerows and wildflowers for the 35-year lifetime of the project.

Ecology and Nature Conservation

Having reviewed Chapter 7 of the Draft ES and the comments supplied by the council's ecologist I can confirm that the survey methods used and survey effort deployed is appropriate for the site in question.

Section 7.5.2 of the Draft ES lists ecological and enhancement measures that are generally acceptable and welcomed. However, it is noted that this section proposes that the grassland will be grazed by sheep. The local authorities experience with other local solar farms is that where grazing has been proposed at the application stage, no grazing has actually taken place on the sites once operational. Therefore, alternative measures to maintain habitat quality may need to be secured should grazing not be forthcoming.

Sections 7.6.155 – 7.6.157 detail appropriate mitigation and enhancement measures to conserve invertebrates, including priority species of butterfly. Where possible the deployment of sandy and stony substrates would also benefit these species. In particular the grayling butterfly, within Lincolnshire/East Midlands, only exists on the eastern edge of Scunthorpe and could greatly benefit from such habitat.

The proposed Landscape and Ecological Management Plan (LEMP) will need to be carefully drafted, agreed in writing and fully implemented for the lifetime of the project to ensure that the proposed mitigation and enhancement measures achieve the desired outcomes.

Cultural Heritage

The council's Historic Environment Record make comments on the content of Chapter 8 of the Draft ES and these comments are set out in the enclosed consultation response. In addition to these comments it is understood that an archaeological evaluation of the site has been commissioned. The agreed strategy for archaeological evaluation, prepared by Cotswold Archaeology, comprises geophysical survey, fieldwalking and trial trenching. As far as I am aware the archaeological evaluation is currently underway. The results of the completed evaluation will inform an updated Heritage Assessment of the significance of the heritage assets and any direct and indirect impacts of the proposed development. In turn, the Heritage Assessment will inform any appropriate mitigation measures to conserve relevant assets either in situ or by record. Where possible this information should be fed into the ES prior to submission of the application. Where results are not available within this timescale it is expected that they will be submitted as addenda to the ES for consideration during the determination process.

Land Quality

No concerns have been raised by the council's Environmental Health team with respect to the methodology used to prepare the Draft Ground Conditions Desk Study. The desk study indicates that the current site has a prolonged history of agricultural usage, with no evidence of large-scale ironstone extraction or landfilling within the boundaries. However due to the proximity to the Scunthorpe Steel Works, it is recommended to check for the location of ironstone gullets and mineshafts in the area prior to development being undertaken.

Operational Noise

No information has been provided in relation to operational noise from the development, including the use of battery storage containers. However, given the location and nature of the development, it is likely that operational noise will not give rise to significant adverse impact provided that any necessary mitigation measures are included. The LPA would expect to see some consideration of operational noise as part of the application.

In addition, it is noted that noise, dust, light etc. during the construction phase has the potential to impact on amenity. To prevent local residents and other sensitive receptors being affected during the construction of the proposed development the LPA would recommend the inclusion of requirements to secure an appropriate Construction Environmental Management Plan (CEMP) and to control the hours of operation.

Highway Safety

The council's Highways team has raise no objections to the proposed development and anticipate that operational traffic will be relatively minor. However, there is likely to be significant traffic generated as a result of the construction and decommissioning of the solar farm and as such the LPA would expect a Construction Phase Traffic Management Plan (CTMP) to be submitted and agreed prior to construction operations taking place. This plan could be secured via a requirement as part of any forthcoming DCO. In particular, the CTMP will need to give consideration to the suitability of the existing access into the site and the management of the crossroads at the access point during construction and de-commissioning.

Drainage

Having reviewed the Draft Flood Risk Assessment and Drainage Strategy and taking advice from the council's drainage officers I can confirm that the scope and detail of the draft report is acceptable. Notwithstanding this, it is important that the developer ensures that all watercourses within the development site are maintained throughout the lifetime of the development in accordance with their riparian responsibilities.

Cumulative Impact

With respect to proposals which are not currently in existence and may need to be taken into account as part of a cumulative impacts assessment the only major scheme that I am aware of which may have the potential to have cumulative environmental impacts is PA/2018/1316, a pending application for the retention of an existing wellsite for long-term hydrocarbon production at Lodge Farm, Clapp Gate, Appleby.

The council does maintain an up-to-date weekly list of submitted planning applications on its website and we would be able to carry out a search of recent planning approvals and pending planning applications in a specified Zone of Influence should this be required.

Community Consultation

I have already provided comments on the informal draft Statement of Community Consultation in my email dated 3 October 2018, confirming agreement to the proposed consultation strategy subject to a minor revision to the 'Prescribed Bodies' set out in table 4.3. I have no further comments to make in this respect at the current time and will provide an updated response to the formal consultation on the SOCC in due course.

I trust that the comments contained within this letter and enclosures are helpful. Please do not hesitate to contact me should you wish to discuss any aspect of this response or this development.

Yours Sincerely

Andrew Law
Strategic Development Officer

PLANNING CONSULTATIONS

REFERENCE: **PRE/2018/137**

CASE OFFICER: **ANDREW LAW**

TEAM: **HISTORIC ENVIRONMENT RECORD**

AUTHOR: **ALISON WILLIAMS, HISTORIC ENVIRONMENT OFFICER**

TEL: **01724 297471**

EMAIL: **alison.williams@northlincs.gov.uk**

SUBJECT: **PRE-APPLICATION ADVICE - Ground mounted solar park up to 150MWp, Little Crow Solar Park, Santon, Scunthorpe**

PARISH: **SCAWBY**

DATE ISSUED: 13/09/2018

SUMMARY OF ADVICE

- The proposed development has the potential to impact on non-designated heritage assets and their settings, including any as yet undiscovered heritage assets of archaeological interest of equivalent significance to scheduled monuments

- The applicant has prepared a Baseline Heritage Assessment based on current recorded information (Draft ES, Appendix 8.1); this has previously been submitted to the HER

- The applicant has also commissioned an archaeological evaluation of the site in line with NPS EN-1 paragraph 5.8.8, NPPF paragraph 189 and Local Plan policies CS6 and HE9

- The agreed strategy for archaeological evaluation, prepared by Cotswold Archaeology, comprises geophysical survey, fieldwalking and trial trenching; the geophysical survey is currently underway

- The results of the completed archaeological evaluation will inform an updated Heritage Assessment of the significance of the heritage assets and any direct and indirect impacts of the proposed development; in turn, this assessment will inform any appropriate mitigation measures to conserve relevant assets either in situ or by record

- Where possible, this information should be fed into the ES prior to submission of the application; where results are not available within this timescale we should expect that they will be submitted as addenda to the ES for consideration during the determination process

- Further comments on Chapter 8 of the Draft ES are set out below.

HISTORIC ENVIRONMENT RECORD (HER) FUNCTION: To hold, maintain, interpret and manage heritage information, enhancing the understanding of the area's historical development as a distinctive and attractive place. HER information provides source material for interpretation by heritage professionals and for use by community groups and individuals. The HER database is updated as new information about the historic environment is discovered.

The HER also provides advice on development proposals that affect, or may affect, the sites and settings of all heritage assets i.e. designated and non-designated historic buildings, archaeological sites and monuments, and historic places, areas and landscapes. This advice is provided against saved local plan policies and national historic environment policies. See http://www.northlincs.gov.uk/planning-and-environment/historic-environment-and-conservation/

DETAILED ADVICE: Thank you for consulting the HER on this pre-application proposal. The Cultural Heritage section of the Draft Environmental Statement comprises Chapter 8 of Volume 1 and Technical Appendix 8.1 Heritage Desk Based Baseline Survey Report. Eddie Rychlak and I were consulted on the latter report earlier this year; Eddie confirmed that the setting assessment of the built heritage assets is satisfactory. This memo therefore focusses on the archaeological heritage resource.

My comments on Chapter 8 of the Draft Environmental Statement (ES) are as follows:

8.2 ASSESSMENT APPROACH

Paragraph 8.2.5 Settings Assessment, refers to designated heritage assets only, whereas Historic England's Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets (Second Edition) is clear that all heritage assets may have a setting. Step 1 of this guidance: Identify which heritage assets and their settings are affected, does not differentiate between undesignated and designated heritage assets, nor does the NPPF (para 197) or NPPG. The draft ES should include setting assessments of the undesignated assets; the Baseline Report included a setting assessment for the site of Gokewell Priory, one of the undesignated heritage assets within the site.

Paragraph 8.2.10 (and paragraph 8.2.26) could usefully include the rest of NPPF paragraph189 regarding archaeological evaluation, and note that the description of significance of any heritage assets in the ES may be added to in response to the iterative gathering of survey data following the archaeological evaluation as referred to in paragraph 8.1.2

Table 8.1 Criteria for Assessment of the Significance of Heritage Assets and paragraph 8.2.16. I welcome the methodology of moving away from the matrix-led approach to one based on a more discursive approach. However, table 8.1 appears to be missing categories that I would expect to see considered such as the inclusion of the following:

- Non-designated heritage assets of equivalent significance to scheduled monuments (NPPF 193b footnote 63);
- Non-designated heritage assets the significance of which has been ascertained through sufficient evaluation and assessment;
- The category of Uncertain is not appropriate, it is already covered by non-designated heritage assets the significance of which has not yet been ascertained through sufficient evaluation and assessment
- Negligible: remains that have been sufficiently demonstrated to have no archaeological interest as defined in the NPPF Glossary

Paragraph 8.2.18 refers to temporary effects on the settings of heritage assets if the development has a limited lifespan, and that these temporary effects can be short, medium or long-term, but does not quantify any of these terms.

Table 8.2 Magnitude of Effect upon Heritage Assets and paragraph 8.2.20. Drawing a distinction between designated and undesignated heritage assets in relation to the level of harm is potentially confusing and unhelpful; the scale of harm to all heritage assets irrespective of any designation status should be expressed in consistent terminology as substantial harm or less than substantial harm equivalent to loss of significance in whole or part (NPPF paragraph 199).

Paragraph 8.2.30 Limitations to the Assessment, could usefully refer to the ongoing archaeological field evaluation being undertaken in accordance with NPPF 189 & Local Plan policies CS6 & HE9, and that the results will inform an updated assessment of significance as they become available, as part of the iterative process set out in paragraph 8.1.2.

8.3 BASELINE CONDITIONS

Paragraphs 8.3.13-15 The Setting of Designated Heritage Assets, designated and non-designated heritage assets should be included in this assessment. It is not explained in the draft ES why the setting assessments refer only to designated heritage assets. All heritage assets may have a setting and the HE guidance does not state that only designated heritage assets should be identified for appropriate assessment.

Paragraph 8.3.17 Known and Potential Archaeological Remains. It should be noted that following the completion of the ongoing archaeological evaluation of the site, and an updated Heritage Assessment informed by the results, the potential for any further undiscovered archaeological remains within the site would be considerably reduced, in line with the iterative approach to the preparation of the ES.

Paragraph 8.3.18 Cropmarks of a round barrow, to note that these archaeological investigations are ongoing and results will update the draft ES.

8.4 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

8.4.4 Operation Phase Effects. I disagree with the proposal to scope out buried archaeological remains as this does not take into account any indirect effects on their settings and assessment of impact on significance. This assessment will need to be informed by the results of archaeological evaluation.

8.4.6 I disagree with the proposal to scope out effects as a result of the decommissioning phase ; the ES does need to assess the impacts of decommissioning on any heritage assets informed by the results of archaeological evaluation and taking into account any mitigation measures that may be required for construction phases; an informed assessment of impact based on the details of the decommissioning activities should therefore be scoped into the heritage assessment.

8.5 MITIGATION AND ENHANCEMENT

Paragraph 8.5.2 reference to NPPF paragraph135 should be 197 and paragraph 141 should be 200.

The sections of Mitigation by Design and Additional Mitigation including Table 8.3 will need to be updated following the results of archaeological evaluation and revised Heritage Assessment of significance and impact.

Paragraph 8.5.9 Enhancements, I welcome the inclusion of this proposal and would certainly look for a firm commitment to produce and install an interpretive board alongside Gokewell Priory Site beside the adjacent PROW.

Paragraph 8.7.5 should refer to Gokewell Priory Site, unless the archaeological evaluation demonstrates that there would be no direct or indirect effect. Of the second sentence, this has not yet been ascertained until the completion of the archaeological evaluation and the results have been assessed.

I will keep you informed of progress with the archaeological evaluation as Cotswold Archaeology updates the HER.

INTER OFFICE	**MEMO**	NORTH LINCOLNSHIRE COUNCIL

To: Andrew Law, Development Management

From: Environmental Health (Commercial)

Your Ref: Pre planning application, PRE/2018/137

Our Ref PLU 003933

Subject: Ground mounted solar park up to 150MWp

Location: Little Crow Solar Park, Santon, Scunthorpe

Date: 30 August 2018

Thank you for your email requesting this department's comments on the above pre Application request.

The applicant has included details of the proposed development for the installation of a solar park with a maximum export capacity of 100Mw. The proposal will also include approximately 50Mw of battery storage containers that will provide a frequency response to the national grid at times when the solar park is not exporting at peak capacity.

There will also be electrical connection infrastructure and the point of connection into the local electricity grid is directly to the 132kva electricity overhead pylon which already runs through the development site.

Due to the potential generating capacity, at over 50Mw, this project constitutes a Nationally Significant Infrastructure Project and the application will go to the Secretary of State for a Development Consent Order.

The proposed development is 140m to the nearest sensitive residential receptors, this department therefore requires the following with any planning permission applied for.

Construction Environmental Management (CEMP)

This department is concerned that noise, dust, light etc. during the construction phase has the potential to impact on amenity. To prevent local residents and other sensitive receptors being affected during the construction of the proposed development, this department recommends the inclusion of the following conditions:

1. No stage of the development hereby permitted shall commence until a Construction Environmental Management Plan (CEMP) has been submitted to and approved in writing by the Local Planning Authority. The CEMP shall include the following:-

   Noise and vibration: The CEMP shall set out the particulars of –

   a) the works, and the method by which they are to be carried out;

   b) the noise and vibration attenuation measures to be taken to minimise noise and vibration resulting from the works, including any noise limits; and

   c) a scheme for monitoring the noise and vibration during the works to ensure compliance with the noise limits and the effectiveness of the attenuation measures

   Light: The CEMP shall set out the particulars of –

   a) Specified locations for contractors' compounds and materials storage areas,

   b) Areas where lighting will be required for health and safety purposes,

   c) Location of potential temporary floodlights,

   d) Identification of sensitive receptors likely to be impacted upon by light nuisance,

   e) Proposed methods of mitigation against potential light nuisance, including potential glare and light spill, on sensitive receptors.

   Dust: The CEMP shall set out the particulars of –

   a) Site dust monitoring, recording and complaint investigation procedures
   b) b) Identification of receptors and the related risk of dust impact at all phases of the development, including when buildings and properties start to be occupied

   c) Provision of water to the site

   d) Dust mitigation techniques at all stages of development

   e) Prevention of dust trackout

   f) Communication with residents and other receptors

   g) A commitment to cease the relevant operation if dust emissions are identified either by regular site monitoring or by the local authority

   h) A no burning of waste policy

2. Construction and site clearance operations shall be limited to the following days and hours:

    - 07:00 to 19:00hrs Monday to Friday.
    - 07:00 to 13:00hrs Saturday.
    - No construction or site clearance operations on Sundays or public holidays.
    - HGV movements shall not be permitted outside these hours during the construction phase without prior written approval from the Local Planning Authority.
    - Installation of equipment on site shall not be permitted outside these hours without prior written approval from the Local Planning Authority.

Operational noise

The applicant has not provided any information in relation to operational noise of the development site including the use of battery storage containers. However, given the location and nature of the proposed development, it is likely that operational noise will not give rise to significant adverse impact provided that any necessary mitigation measures are included. This department would expect a planning application to include details of operational noise sources and predicted noise levels at relevant locations.

Contaminated Land

A desk study has been included with this application. The desk study has indicated that the current site has a prolonged history of agricultural usage, with no evidence of large scale ironstone extraction or landfilling within the boundaries. However due to the proximity to the steel works, this department would recommend checking for the location of ironstone gullets and mineshafts in the area before any development is undertaken.

Fw: PRE/2018/137 - Little Crow Solar Park, Santon, Scunthorpe

Darren Cowling

Thu 20/09/2018 15:28

To:Andrew Law <Andrew.Law@northlincs.gov.uk>;

Cc:Planning <Planning@northlincs.gov.uk>;

Andy,

Louisa and I have had some discussions with the applicants representative regarding a Construction Phase TMP and have raised the question of where the site will connect to the grid.

These items will form the basis of any conditions we will advise.

Thanks Darren



North Lincolnshire is a great place to live and work; if you want to foster, adopt or become a social worker we would love to hear from you.
Contact - **fostering@northlincs.gov.uk | 01724 297024**

From: Sarah-Lee Bootland <planningapplications@northlincs.gov.uk>
Sent: 21 August 2018 16:38
To: PlanningApplicationNotifications
Subject: PRE/2018/137 - Little Crow Solar Park, Santon, Scunthorpe

North Lincolnshire Council Planning
Case Officer: Andrew Law
ground mounted solar park up to 150MWp
Dear Sir/Madam
Your views are requested upon the above proposal. Please email your response direct to the case officer within 14 days of the date of this email quoting the application reference number PRE/2018/137

Development Management
North Lincolnshire Council
Civic Centre
Ashby Road
Scunthorpe
North Lincolnshire
DN16 1AB
Tel: 01724 297000
Web: www.northlincs.gov.uk

ENVIRONMENT TEAM

I N T E R

O F F I C E

MEMO

NORTH LINCOLNSHIRE COUNCIL

To: **Andrew Law, Development Control**

From: **Andrew Taylor, Environment Team**

Your Ref: **PRE/2018/137**

Date: **10 October 2018**

Subject: **Ground mounted solar park up to 150MWp**
Little Crow Solar Park, Santon, Scunthorpe

Summary

- **EIA is required.**
- **The proposed approach to landscape and visual impact assessment is acceptable.**
- **The ecological survey methods used and the survey effort deployed are appropriate for the site in question.**
- **The site has importance for a number of protected and priority species and habitats.**
- **Appropriate mitigation and enhancement measures are proposed, but DCO requirements will need to be carefully drafted to ensure that important features are properly managed over the 35-year lifetime of the project.**

Thank you for consulting the Environment Team on the above pre-application enquiry. Apologies for the delay in replying. The following opinion is given at your request and is without prejudice to any decision which may be made upon receipt of a formal application.

Environmental Impact Assessment (EIA)- general points.
I have read the draft Environmental Statement. I agree that EIA is required. I also agree with the proposal to consider alternatives.

The method proposed for the assessment of impact and the provision of mitigation and enhancement measures appears to be appropriate.

Landscape
Whilst I am not a landscape expert, I do tend to be asked to comment on the landscape assessments and impacts for proposals such as this. I agree with the approach to the assessment and mitigation of landscape and visual impacts, as set out in section 6 of the draft environmental statement.

Section 6.7.11 proposes, "the planting of new hedgerows along the security fences adjacent to the public right of way through the site and the sowing of wildflower seed in the margins between the path and the hedges."

I support the planting of mixed native hedgerows and the sowing of UK origin wildflower seed, if a locally appropriate mix is used.

Where habitat creation is proposed as mitigation, compensation or planning gain, the underlying survey information should be adequate for regulatory authorities to assess whether the proposals are feasible. In addition to information on species and habitats, it will also be necessary to measure physical conditions including (but not exclusively) soil conditions and hydrology. Where applicable, the applicant should follow the standards set out in Natural England Technical Information Notes. For it to be worthwhile to sow wildflower seed, a nutrient poor soil is required- ideally with a phosphorus index value of less than 1. If such soils are not present at the moment, then remedial works will be required before sowing wildflower seed.

For the hedgerows and wildflowers along the Public Right of Way to be of lasting benefit, they will require ongoing management. The Council's responsibilities in this respect are limited to way-clearance and maintenance of the route only. The landowner or solar farm operator will therefore need to make provision for the ongoing management of the hedgerows and wildflowers for the 35-year lifetime of the project. This should be secured through the requirements attached to the DCO.

Protected and Priority Species
I have considered this application in accordance with Natural England's standing advice for protected species- http://www.naturalengland.org.uk/ourwork/planningtransportlocalgov/spatialplanning/standingadvice/default.aspx.

"The Application Site consists of 16 predominantly arable fields bordered by a network of hedgerows and extensive woodland plantations. The land gradually slopes to the western edge of the site. Grassland, scrub and ruderal habitat are also present in discrete areas around the site" (Draft ES para 7.4.2). With these habitats, the standing advice guides us to consider the following protected species or groups:

Habitat, building or land	Species to look for
Meadows, grassland, parkland and pasture on the land or linked to the site (by similar habitat)	Bats, badgers, breeding birds, great crested newts, invertebrates, reptiles and protected plants
Ponds or slow-flowing water bodies (like ditches) on the site, or within 500m and linked by semi-natural habitat such as parks or heaths	Breeding birds, fish, great crested newts, water voles, invertebrates and crayfish
Rough grassland and previously developed land (brownfield sites), on or next to the site	Breeding bird, reptiles, invertebrate and protected plants
Woodland, scrub and hedgerows on, or next to the site	Bats, breeding birds, badgers, dormice, invertebrates, great crested newts, smooth snakes (see reptiles) and protected plants

Dormice, smooth snakes and white clawed crayfish do not occur in North Lincolnshire and do not need to be considered further.

I have read Ecology chapter of the submitted draft Environmental Statement. The survey methods used and the survey effort deployed are appropriate for the site in question. The application site is largely arable land, but supports the following important features:

- Arable margins, supporting the vulnerable plant henbane.
- Semi-improved grassland with a variety of orchid species.
- Mixed broadleaved woodland.
- Hedgerows
- Ponds
- Badger setts
- Bats- five species foraging.
- Priority species of farmland bird (breeding)- Skylark, Yellow wagtail, Lapwing, Reed Bunting, Bulfinch, Linnet, Song thrush, Dunnock.
- An assemblage of wintering farmland birds. On one occasion, 107 lapwing were recorded- equivalent to over 1% of the Humber Estuary population for this species. There is no evidence to indicate whether or not this flock was linked to the Humber Estuary.

In addition, the site lies nest to ancient woodland and near to the important open mosaic habitats of the steelworks, which support priority species of butterfly, including wall, small heath and grayling.

Evaluation
Section 7.5.2 of the draft Environmental Statement lists some ecological mitigation and enhancement measures that are broadly welcomed. I shall not repeat the list here. However, it is worth noting that this section states that the grassland will be grazed by sheep. For other local solar farms where grazing has been proposed at the application stage, no grazing is actually taking place on the site once operational. We should therefore use DCO requirements to secure grazing or alternative measures to maintain habitat quality.

Sections 7.6.14-7.6.19 detail appropriate mitigation measures to protect woodland, and ancient woodland in particular.

Sections 7.6.35-7.6.36 detail appropriate mitigation measures to conserve arable plants.

Sections 7.6.91-7.6.96 detail appropriate mitigation measures to conserve badgers.

Sections 7.6.123-7.6.129 detail appropriate mitigation measures to conserve farmland birds.

Sections 7.6.155-7.6.157 detail appropriate mitigation and enhancement measures to conserve invertebrates, including priority species of butterfly. Where possible, the deployment of sandy and stony substrates would also benefit these species. In particular the grayling butterfly, in Lincolnshire/East Midlands terms, only exists on the eastern edge of Scunthorpe and could benefit greatly from such habitat.

The other proposed mitigation and enhancement measures in section 7.6 are acceptable.

The proposed Landscape and Ecological Management Plan (LEMP) will need to be carefully drafted, agreed in writing and fully implemented for the lifetime of the project to ensure that the proposed mitigation and enhancement measures achieve the desired outcomes.

Biodiversity Enhancement
The National Planning Policy Framework states that:

“The planning system should contribute to and enhance the natural and local environment by:
- protecting and enhancing valued landscapes, geological conservation interests and soils;
- recognising the wider benefits of ecosystem services;
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government’s commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures...”

and

“opportunities to incorporate biodiversity in and around developments should be encouraged;”

With this proposal, biodiversity enhancement should be secured as described under “Evaluation” above.

If you have any questions, please do not hesitate to contact me.

Andrew Taylor
Project Officer (Ecologist)

Annex- Ecology and Legal Protection

Bats

All species of bat are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of The Conservation of Habitats and Species Regulations 2010 making all species of bat European Protected Species. Details of the legislation can be found at:

Wildlife and Countryside Act
http://www.legislation.gov.uk/ukpga/1981/69/contents

The Countryside and Rights of Way Act:
http://www.opsi.gov.uk/acts/acts2000/ukpga_20000037_en_7#pt3-pb8-l1g81

The Conservation of Habitats and Species Regulations 2010
http://www.opsi.gov.uk/si/si2010/uksi_20100490_en_1

Nesting birds

It is an offence under Section 1 of the Wildlife and Countryside Act of 1981(WCA 1981) to intentionally take, damage or destroy the nest of any wild bird while it is use or being built. The WCA 1981 also provides that all wild birds and their eggs are protected and cannot be killed or taken except under licence.

APPENDIX 2.1

AIR QUALITY REPORT

Little Crow
Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

AIR QUALITY AND CARBON ASSESSMENT

On behalf of INRG Solar (Little Crow) Ltd

November 2018

Document Control Sheet

Identification	
Client	INRG Solar (Little Crow) Ltd.
Document Title	Air Quality and Carbon Assessment for the proposed Little Crow Solar Park, Scunthorpe
Bureau Veritas Job Ref No.	6473981

Contact Details		
Company Name	Bureau Veritas UK Limited	INRG Solar (Little Crow) Ltd.
Contact Name	Jo Davies	Gareth Roberts
Position	Air Quality Consultant	Associate
Address	825a Wilmslow Rd Manchester M20 2RE	First Floor South Wing, Equinox North Great Park Road Bristol BS32 4QL
Telephone	0161 446 4623	01454 625945
e-mail	joanne.davies@uk.bureauveritas.com	gareth.roberts@pegasusgroup.co.uk
Websites	www.bureauveritas.co.uk	

Configuration				
Version	**Date**	**Author**	**Reason for Issue/Summary of Changes**	**Status**
1	22/02/2018	Jo Davies / Hannah Smith		Draft
2	20/07/2018	Hannah Smith	Final Issue	Final
3	22/11/2018	Jo Davies	Final Issue	Final

	Name	Job Title	Signature
Prepared By	Jo Davies / Hannah Smith	Consultant	
Approved By	Jamie Clayton	Principal Consultant	

Commercial In Confidence

© Bureau Veritas UK Limited

The copyright in this work is vested in Bureau Veritas UK Limited, and the information contained herein is confidential. This work, either in whole or in part, may not be reproduced or disclosed to others or used for any purpose, other than for internal client evaluation, without Bureau Veritas' prior written approval.
Bureau Veritas UK Limited, Registered in England & Wales, Company Number: 01758622
Registered Office: Suite 308 Fort Dunlop, Fort Parkway, Birmingham B24 9FD

Disclaimer

This Report was completed by Bureau Veritas on the basis of a defined programme of work and terms and conditions agreed with the Client. Bureau Veritas confirms that in preparing this Report it has exercised all reasonable skill and care taking into account the project objectives, the agreed scope of works, prevailing site conditions and the degree of manpower and resources allocated to the project.
Bureau Veritas accepts no responsibility to any parties whatsoever, following the issue of the Report, for any matters arising outside the agreed scope of the works.
This Report is issued in confidence to the Client and Bureau Veritas has no responsibility to any third parties to whom this Report may be circulated, in part or in full, and any such parties rely on the contents of the report solely at their own risk.
Unless specifically assigned or transferred within the terms of the agreement, the consultant asserts and retains all Copyright, and other Intellectual Property Rights, in and over the Report and its contents.

Any questions or matters arising from this Report should be addressed in the first instance to the Project Manager.

Bureau Veritas UK Limited
Atlas Business Park
2nd Floor
Atlantic House,
Manchester M22 5PR

Telephone: +44 (0) 161 446 4600
Registered in England 1758622
www.bureauveritas.co.uk

Registered Office
Suite 308 Fort Dunlop
Fort Parkway
Birmingham B24 9FD

Table of Contents

Executive Summary 1
1 Introduction 1
1.1 Scope of Assessment 1
2 Air Quality – Legislative Context 3
2.1 Air Quality Strategy 3
2.2 Local Air Quality Management (LAQM) 4
2.3 Air Quality Guidance for Construction Sites 5
2.4 Background Concentrations Used in the Assessment 6
3 Assessment Methodology 7
3.1 Construction Effects 7
3.2 Carbon Footprint 8
4 Results 9
4.1 Construction Phase 9
4.2 Operational Phase 11
5 Recommended Mitigation Measures 12
5.1 Short-term Impacts during Construction 12
6 Carbon Footprint 15
7 Conclusions 17
7.1 Construction Effects 17
7.2 Operational Effects 17
7.3 Carbon Footprint 18

List of Tables

Table 2.1 – Examples of where the Air Quality Objectives should apply 3
Table 2.2 – Relevant National AQ Objectives for the Assessed Pollutants 4
Table 2.3 – Defra Background Pollutant Concentrations 6
Table 4.1 – Construction Dust Emission Magnitude 9
Table 4.2 – Sensitivity of Surrounding Area 10
Table 4.3 – Summary of Dust Risk 10
Table 6.1 – Expected kWh Profile 15
Table 6.2 – Construction Vehicle Generated CO_2 16

List of Figures

Figure 1.1 – Site Location 2

Executive Summary

Bureau Veritas UK Ltd has been commissioned by INRG Solar (Little Crow) Ltd. to undertake an air quality assessment of construction traffic emissions together with a carbon offset assessment as a result of the proposed Little Crow Solar Park. The development site is located to the east of Scunthorpe, adjacent to the Harsco Steel works and is accessed via the B1208. The nearby settlement of Raventhorpe (<5 miles south of the proposed development) contains an existing 78.5ha solar farm

The development site currently consists of disused grassland/farmland and is bordered by the proposed construction traffic route, which is to run along the B1208 in the direction of the A18, A15 and M180. This route bypasses a number of pollution receptors; residential properties in Broughton, located 1km east of the proposed site boundary. The closest properties to the proposed site consists of two farm structures with at least one structure being used as a residential dwelling and are located east of the proposed site and North of Broughton at distances of 280m and 415m from the site boundary. The proposed Solar Park area is located within the boundary of an Air Quality Management Area (AQMA) declared by North Lincolnshire Council. The AQMA was declared due to exceedances of the 24-hour mean air quality objective for PM_{10}. The most recently recorded annual mean concentration of PM_{10} from the closest monitoring site, CM3, reported an annual mean concentration of 22µg/m³ in 2016 together with 25 exceedances of the 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times a year). All nearby monitoring locations also reported below the PM_{10} annual mean AQS objective of 40µg/m³. Furthermore, there were no reported exceedances of the NO_2 annual mean air quality objective at any monitoring location within the council area.

Defra's 2017 background air pollution data for the proposed site suggests an annual mean background concentration of 11.2µg/m³ for NO_2 and 15.2µg/m³ for PM_{10}, which are both below the respective objectives (40µg/m³).

A qualitative dust and air quality assessment has been prepared to determine the significance of air quality and construction traffic dust impacts during the construction and operational phases of the proposed development, in addition to an assessment of the carbon footprint and potential savings introduced as a result of the site's introduction.

A qualitative assessment of impacts of construction activities upon air quality was undertaken following the Institute of Air Quality Management (IAQM) guidance methodology.

The main findings of the air quality assessment are summarised as follows:

- Following the construction dust assessment the development site is found, in relation to dust soiling, to be **negligible** during the construction phase of the proposed site. For the earthworks and trackout activities, the impact was found to be a **low risk.** In relation to human health impacts, the risk ratings are the same as with dust soiling for each of the three activities.

- Providing effective mitigation measures are implemented, such as those outlined in Section 5.1 of this report, impacts from dust emissions during the construction phase would be **not significant**.

- The estimated CO_2 offset from the Little Crow Solar Park is 35,186 tonnes for the first year taking into consideration the CO_2 produced as a result of the construction vehicle movements during the construction phase. The following years CO_2 offset will be greater as the construction phase works will have been completed.

1 Introduction

Bureau Veritas UK Ltd has been commissioned by INRG Solar (Little Crow) Ltd. to undertake an air quality assessment of construction traffic emissions together with a carbon offset assessment as a result of the proposed Little Crow Solar Park. The development site is located to the east of Scunthorpe, adjacent to the Harsco Steel works and is accessed via the B1208. The proposed Solar Park is approximated at 226.8ha with a maximum of 150MW generation per annum from the solar modules and 90MW pa from its battery storage facility. The nearby settlement of Raventhorpe (<5 miles south of the proposed development) contains an existing 78.5ha solar farm.

The most significant source of air pollution is likely to derive from construction related traffic during the construction phase of the development. The construction traffic route is proposed to run along the B1208 in the direction of the A18, A15 and M180. This route bypasses the closest pollution receptors; residential properties in Broughton, located to the east of the proposed site boundary.

North Lincolnshire Council has declared an Air Quality Management Area (AQMA), which incorporates part of Scunthorpe town centre and an area east of Scunthorpe, including the Harsco Steel works site. The proposed Solar Park is located within this AQMA. The AQMA was declared due to exceedances of the 24-hour mean air quality objective for PM_{10}. The most recently recorded annual mean concentration of PM_{10} from the closest monitoring site, CM3, reported an annual mean concentration of 22µg/m³ in 2016 together with 25 exceedances of the 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times a year). All nearby monitoring locations also reported below the PM_{10} annual mean AQS objective of 40µg/m³. Furthermore, there were no reported exceedances of the NO_2 annual mean air quality objective at any monitoring location within the council area.

1.1 Scope of Assessment

Defra's 2017 background air pollution data for the proposed site suggests an annual mean background concentration of 11.2µg/m³ for NO_2 and 15.2µg/m³ for PM_{10}, which are both below the respective objectives (40µg/m³).

As it is anticipated that the proposed development will introduce additional road traffic and construction dust and, with consideration to the nearby AQMA, a construction phase impact assessment is to firstly be undertaken together with the carbon offset assessment. The scope of this assessment is therefore to undertake:

- A qualitative assessment of dust and air quality impacts during the construction works. The construction dust assessment will involve the use of a Geographic Information System (GIS) and be undertaken with reference to current best-practice guidance, such as those published by the Institute of Air Quality Management (IAQM).

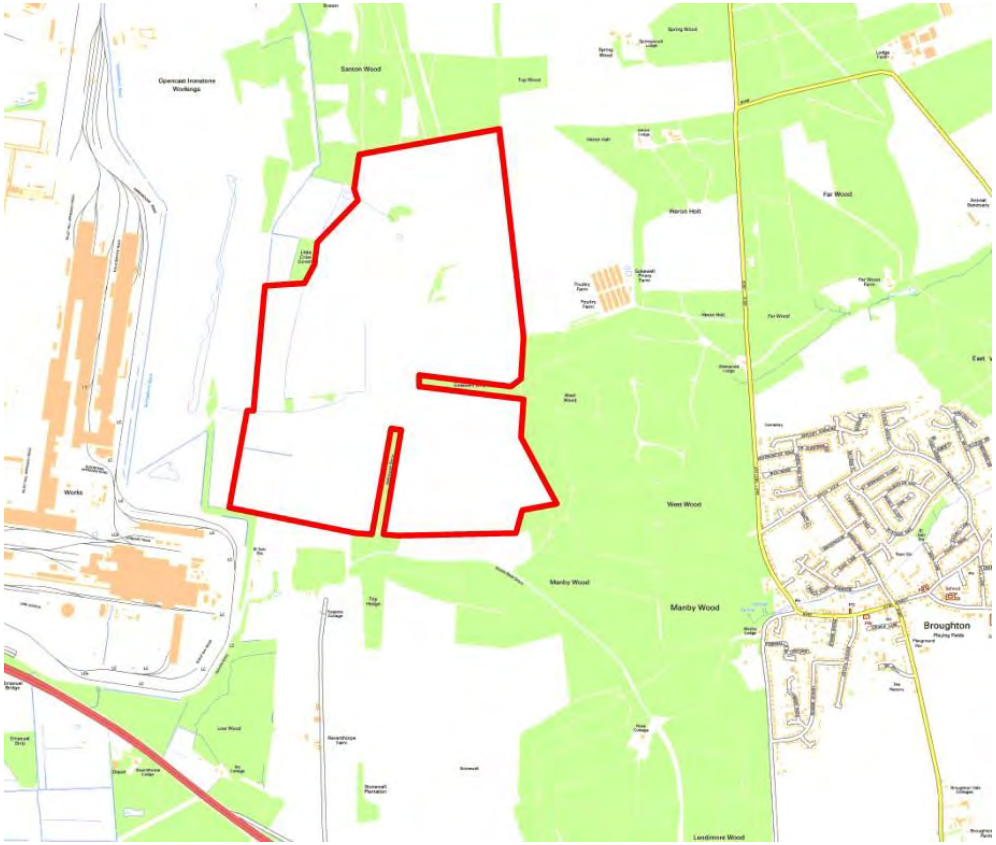
- Construction related road traffic emissions will be considered relative to published guidance. Based upon the preliminary construction traffic management plan and indicative flows provided therein, Bureau Veritas do not consider there to be a requirement for detailed assessment of the road traffic emissions, rather a screening based assessment against IAQM criteria is considered sufficient.

- Mitigation measures during the construction phase including measures to control the emission of dust and dirt during construction and demolition.

- The carbon footprint of the construction phase activities, in the context of the associated traffic generation, will be calculated and subtracted against the carbon savings associated with the generation of electricity via solar power.

The Site plan and location is illustrated in Figure 1.1.

Figure 1.1 – Site Location



Legend

Site Boundary

Contains Ordnance Survey Data © Crown Copyright and database right 2017. Ordnance Survey 100049046.

Air Quality
Bureau Veritas
825a Wilmslow Road
Manchester
M20 2RE

Location	Little Crow Solar Park, Scunthorpe
Title	Site Location
By	JD
Approved	JC
Scale	Not to Scale
Job Ref	6473981
Date	February 2018
Figure No.	1.1

2 Air Quality – Legislative Context

2.1 Air Quality Strategy

The importance of existing and future pollutant concentrations can be assessed in relation to the national air quality standards and objectives established by Government. The Air Quality Strategy (AQS) provides the over-arching strategic framework for air quality management in the UK and contains national air quality standards and objectives established by the UK Government and Devolved Administrations to protect human health. The air quality objectives incorporated in the AQS and the UK Legislation are derived from Limit Values prescribed in the EU Directives transposed into national legislation by Member States.

The CAFE (Clean Air for Europe) programme was initiated in the late 1990s to draw together previous directives into a single EU Directive on air quality. The CAFE Directive[1] has been adopted and replaces all previous air quality Directives, except the 4th Daughter Directive[2]. The Directive introduces new obligatory standards for $PM_{2.5}$ for Government but places no statutory duty on local government to work towards achievement of these standards.

The EU Limit Values are considered to apply everywhere with the exception of the carriageway and central reservation of roads and any location where the public do not have access (e.g. industrial sites).

The air quality objectives apply at locations outside buildings or other natural or man-made structures above or below ground, where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period. Typically these include residential properties and schools/care homes for long-term (i.e. annual mean) pollutant objectives and high streets for short-term (i.e. 1-hour) pollutant objectives. Table 2.1 taken from LAQM.TG(16) provides an indication of those locations that may or may not be relevant for each averaging period. Typically these include residential properties and schools/care homes for long-term (i.e. annual mean) pollutant objectives and high streets for short-term (i.e. 1-hour mean) pollutant objectives.

This assessment focuses on, NO_2, PM_{10} and $PM_{2.5}$ as these are the pollutants of principal concern arising from road traffic and construction dust.

Table 2.1 – Examples of where the Air Quality Objectives should apply

Averaging Period	AQ Objectives should apply at:	AQ Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed Building facades of residential properties, schools, hospitals, care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term

[1] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

[2] Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic hydrocarbons in ambient air.

Averaging Period	AQ Objectives should apply at:	AQ Objectives should generally not apply at:
24-hour mean and 8-hour mean	All locations where the annual mean objectives would apply, together with hotels. Gardens of residential properties[1].	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives would apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend one hour or more. Any outdoor locations at which the public may be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-minute mean	All locations where members of the public might reasonably be expected to spend a period of 15 minutes or longer.	

Note [1] For gardens and playgrounds, such locations should represent parts of the garden where relevant public exposure is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.

Table 2.2 – Relevant National AQ Objectives for the Assessed Pollutants

Pollutant	AQS Objective	Concentration Measured as:	Date for Achievement
Nitrogen Dioxide (NO_2)	200µg/m³ not to be exceeded more than 18 times per year	1-hour mean	31 December 2005
	40µg/m³	Annual mean	31 December 2005
Particles (PM_{10})	50µg/m³ not to be exceeded more than 7 times per year	24-hour mean	31st December 2004
	40µg/m³	Annual mean	31st December 2004
Particles ($PM_{2.5}$)	25µg/m³	Annual mean	2020
	Target of 15% reduction in concentrations at urban background	Annual Mean	2020

2.2 Local Air Quality Management (LAQM)

Part IV of the Environment Act 1995[3] places a statutory duty on local authorities to periodically Review and Assess the current and future air quality within their area, and determine whether they are likely to meet the objectives set down by Government for a number of pollutants – a process known a Local Air Quality Management (LAQM). The objectives that apply to LAQM are defined for seven pollutants: benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, sulphur dioxide and particulate matter.

Where the results of the Review and Assessment process highlight that problems in the attainment of health-based objectives for air quality will arise, the authority is required to declare an AQMA – a

[3] http://www.legislation.gov.uk/ukpga/1995/25/part/IV

geographic area defined by high concentrations of pollution and exceedances of health-based standards.

Where an authority has declared an AQMA, and development is proposed to take place either within or near the declared area, further deterioration to air quality resulting from a proposed development can be a potential barrier to gaining consent for the development proposal. Similarly, where a development would lead to an increase of the population within an AQMA, the protection of residents against the adverse long-term impacts of exposure to existing poor air quality can provide the barrier to consent. As such, after a high number of declarations across the UK, it has become standard practice for planning authorities to require an air quality assessment to be carried out for a proposed development (even where the size and nature of the development indicates that a formal Environmental Impact Assessment (EIA) is not required).

One of the objectives of the LAQM regime is for local authorities to enhance integration of air quality into the planning process. Current LAQM Policy Guidance[4] clearly recognises land-use planning as having a significant role in terms of reducing population exposure to elevated pollutant concentrations. Generally, the decisions made on land-use allocation can play a major role in improving the health of the population, particularly at sensitive locations – such as schools, hospitals and dense residential areas.

2.3 Air Quality Guidance for Construction Sites

There are a number of regulatory and legislative constraints in place to control pollution from construction and demolition activities. The Building Act 1984 and subsequent Building Regulations 2000 are in place to ensure the safety of people in and around the building during work. Part III of the Environmental Protection Act (EPA) 1990 identifies the emission of dust from construction sites as having the potential to be a statutory nuisance and requires its control under Section 80.

A number of best practice guides are available[5], which provide a basis against which Codes of Construction Practice may be benchmarked. The Greater London Authority (GLA) in partnership with London Councils has produced a guidance document[6] that recommends mitigation measures, depending upon the scale of development and its location, to control nuisance dust from various activities during construction and demolition phases.

BRE (Building Research Establishment) has also produced a report[7] that outlines the measures to control the emissions of nuisance dust.

In December 2011, the IAQM published a guidance document to assess the impact of construction on air quality. The guidance was reviewed in January 2012[8] and updated in February 2014 to incorporate new evidence[9]. The approach adopted in this assessment is based on adopting the methodology published in the 2014 version of the IAQM guidance.

The significance of the impact of the construction phase on air quality has been determined through application of the criteria outlined in IAQM construction guidance.

[4] LAQM Policy Guidance LAQM.PG(16) – April 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.

[5] Kukadia, Upton, Grimwood and Yu (2003) BRE Pollution Control Guides: Controlling particles, vapours and noise pollution from construction sites. BRE Publications.

[6] Mayor of London (2014). The control of dust and emissions during construction and demolition – Supplementary Planning Guidance. Produced in partnership by the Greater London Authority and London Councils.

[7] Kukadia V, Upton S, Hall D (2003). Control of dust from construction and demolition activities. BRE Publications.

[8] Institute of Air Quality Management (IAQM) (2012) *Guidance on the Assessment of the Impacts of Construction on Air*

[9] Institute of Air Quality Management (IAQM) (2014) *Guidance on the Assessment of Dust from Demolition and Construction.*

2.4 Background Concentrations Used in the Assessment

Defra maintains a nationwide model of existing and future background air quality concentrations at a 1km grid square resolution. The data sets include annual average concentration estimates for NO_x, NO_2, PM_{10} and $PM_{2.5}$, using a base year of 2015. The Pollution Climate Mapping (PCM) model on which these are based is semi-empirical in nature; it uses the National Atmospheric Emissions Inventory (NAEI) emissions to model-predict the concentrations of pollutants at the centroid of each 1km grid square, but then calibrates these concentrations in relation to actual monitoring data.

Annual mean background concentrations for use in this assessment for NO_x, NO_2, $PM_{2.5}$ and PM_{10} have derived from the background maps available on the Defra UK-Air website[10]. Sample locations include 1km grid squares within the proposed development itself and two receptor sites located 280m and 1km east of the proposed site.

The mapped background concentrations for the base year of 2017 and the sample year of 2020 are presented in Table 2.3.

Table 2.3 – Defra Background Pollutant Concentrations

Grid Square (X,Y)	2017 Annual Mean Background Concentration (µg/m³)				2020 Annual Mean Background Concentration (µg/m³)			
	NO_x	NO_2	PM_{10}	$PM_{2.5}$	NO_x	NO_2	PM_{10}	$PM_{2.5}$
494500, 410500	15.2	11.2	15.2	9.5	13.9	10.3	15.0	9.3
494500, 409500	15.0	11.1	14.8	9.4	13.6	10.1	14.5	9.1
494500, 408500	14.8	10.9	13.5	8.7	13.1	9.8	13.2	8.5
AQS objective	-	***40***	***40***	***25***	-	***40***	***40***	***25***

All of the mapped background concentrations presented are well below the respective annual mean air quality objectives.

[10] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015

3 Assessment Methodology

The approach applied to this assessment has been based on the following:

- A qualitative assessment of dust and air quality impacts during the construction works. The construction dust assessment will involve the use of a Geographic Information System (GIS) and be undertaken with reference to current best-practice guidance, such as those published by the Institute of Air Quality Management (IAQM).

- Construction related road traffic emissions will be considered relative to published guidance. Based upon the preliminary construction traffic management plan and indicative flows provided therein, Bureau Veritas do not consider there to be a requirement for detailed assessment of the road traffic emissions, rather a screening based assessment against IAQM criteria is considered sufficient.

- Mitigation measures during the construction phase including measures to control the emission of dust and dirt during construction and demolition.

- The carbon footprint of the construction phase activities, in the context of the associated traffic generation, will be calculated and subtracted against the carbon savings associated with the generation of electricity via solar power.

3.1 Construction Effects

The assessment of potential dust/PM_{10} effects in relation to the development's construction phase has been undertaken qualitatively in accordance with IAQM Guidance[11]. The guidance proposes a method to assess the significance of construction dust impacts by considering the annoyance due to dust soiling, as well as harm to ecological receptors and the risk of health effects due to significant increases in dust/PM_{10} concentrations.

Construction site activities are divided into four types to reflect their different potential impacts. These activities are:

- Demolition – an activity involved with the removal of an existing structure or structures;

- Earthworks – the processes of soil-stripping, ground-levelling, excavation and landscaping;

- Construction – an activity involved in the provision of a new structure; and

- Trackout – the transport of dust and dirt from the site onto the public road network. This arises when lorries leave site with dusty materials or transfer dust and dirt onto the road having travelled over muddy ground on-site.

A detailed assessment is required where a sensitive human receptor is located within 350m from the Site boundary and/or within 50m of the route(s) used by vehicles on the public highway, up to 500m from the Site entrance(s).

There are no notable ecological receptors within a 200m vicinity of the development. There are, however, two residential properties less than 350m from the boundary of the Site. There are a number of properties approximately1km of the Site, notably the residential town of Broughton, located east of the proposed development.

[11] Institute of Air Quality Management (IAQM) (2014) *Guidance on the Assessment of Dust from Demolition and Construction.*

The first step of the detailed assessment is to assess the risk of dust impacts. This is undertaken separately for each of the four activities (demolition, earthworks, construction and trackout) and takes account of:

- The scale and nature of the works, which determines the potential dust emission magnitude; and
- The sensitivity of the area.

These factors are combined to give an estimate of the risk of dust impacts occurring. Risks are described in terms of there being a low, medium or high risk of dust impact for each of the four separate potential activities. Where there are low, medium or high risks of an impact, then site specific mitigation will be required, proportionate to the level of risk.

Based on the threshold criteria and professional judgment, one or more of the groups of activities may be assigned a 'negligible' risk. Such cases could arise, for example, because the scale is very small and there are no receptors near to the activity.

Site-specific mitigation for each of the four potential activities is then determined based on the risk of dust impacts identified. Where a local authority has issued guidance on measures to be adopted at demolition/construction sites, these should also be taken into account. Professional judgment is then employed to examine the residual dust effects assuming mitigation to determine whether or not they are significant.

In regards to construction phase vehicle movements, the Land-Use Planning & Development Control: Planning for Air Quality IAQM guidance has been used to assess the change in traffic flow during the construction period. The development will cause a significant change in Heavy Duty Vehicles (HDVs) if the change of HDV flow is greater than 100 annual average daily traffic (AADT) outside of an AQMA. Estimated vehicle numbers as specified in the Construction Management Transport Plan will be compared against this criterion to assess whether construction vehicles will result in a significant impact on the surrounding area.

3.2 Carbon Footprint

There are various degrees of detail which can be employed to calculating the carbon offset of a development. However, due to the nature of the site and the type of construction phase activities undertaken, the carbon offset assessment will focus on the traffic generation associated with the construction phase.

The carbon dioxide (CO_2) generated from the construction traffic will be calculated using the UK Government Greenhouse Gas (GHG) conversion factors provided by Defra for company reporting[12]. The most recent factors were published in July 2018 and are deemed to be the most relevant for the study. Factors were provided for a breakdown of vehicle types. The total CO_2 produced was calculated based on the total kilometres/miles each vehicle type travelled.

The total CO_2 generated as a result of the construction phase vehicle movements will be subtracted against the carbon saving associated with the generation of electricity via solar power. The carbon savings will be quantified based on a direct comparison against the amount of CO_2 produced if an equal amount of electricity was produced using alternative fuels operated on the National Grid. The July 2018 GHG conversion factor spread sheet includes an estimated average amount of CO_2 emitted for each kWh of electricity produced for the grid assuming a range of energy sources e.g. coal, gas and renewable electricity generation.

The total annual CO_2 offset from the Little Crow Solar Park will then be calculated taking into account the CO_2 generated during the construction phase.

[12] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018

4 Results

4.1 Construction Phase

4.1.1 Dust/PM_{10} Emissions

This assessment of dust/PM_{10} presents the effects which are likely to be relevant both prior to and following the use of the appropriate mitigation measures on-site, which would be outlined by the site contractor and in a site Dust Management Plan (DMP). As per the IAQM guidance[12], the risk associated with the site to potentially generate dust/PM_{10} is identified. Potential unmitigated effects at receptor locations are determined, and site-specific recommendations are then made to ensure residual dust/PM_{10} effects associated with the construction phase are not significant.

The assessment of construction dust will focus on dust arising from three of the dust producing construction activities outlined in the IAQM guidance[12] (i.e. earthworks, construction and trackout). No demolition is proposed on site and therefore has been scoped out of the assessment.

Earthworks

Potential sources of impacts associated with earthworks/ground preparation activities include fugitive dust/PM_{10} emissions resulting from disturbance of dusty materials by construction plant, the construction materials used, vehicle movements and wind action. The total site area is greater than 10,000m^2 and although it is not anticipated that there will be anything larger than a moderate number of earth moving vehicles on site at any one time, the worst case scenario has been assumed due to the scale of the site. The dust emission magnitude for earthworks is therefore considered to be large.

Construction

Potential sources of impacts associated with construction activities include fugitive dust/PM_{10} emissions resulting from disturbance of dusty materials by construction plant, the construction materials used, vehicle movements and wind action. Construction activities at the development site are expected to include a total building volume of less than 25,000 with a low potential for dust release as the solar panels to be installed will be largely metal structures secured with metal bolts into the ground. The dust emission magnitude for construction is therefore considered to be small.

Trackout

Dust emissions during trackout from the site may occur from the transport of dust and dirt from the construction site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. The number of predicted outward HDV (i.e. >3.5 tonne) movements in any one day is not anticipated to be in excess of 50 at any point during construction, however as the unpaved roadways are in excess of 100m, a worst case assumption must be employed. The dust emission magnitude for trackout is therefore considered to be large.

Summary

A summary of the dust emission magnitude for the four activities is detailed in Table 4.1.

Table 4.1 – Construction Dust Emission Magnitude

Activity	Dust Emission Magnitude
Earthworks	Large
Construction	Small
Trackout	Large

Sensitivity of the Area

The residential area of Broughton is located in excess of 1km east of the site and resides a population of over 5,000 residents, which is supported by a relative number of properties and services[13]. The closest properties to the proposed site consists of two farm structures with at least one structure being used as a residential dwelling and are located east of the proposed site and North of Broughton at distances of 280m and 415m from the site boundary. These two properties are accessible from the main site access route B1207 road and are bordered to the north by a narrower loose tracked road which is also to be used for site access during and following construction. Due to the nature and proximity of nearby properties, given the low number of nearby receptors identified, the sensitivity of the area with respect to the dust soiling effects on people and property in relation to earthworks, construction and trackout activities is therefore considered to be low.

The existing background PM_{10} concentration is 15.2µg/m^3; which is below the AQS objective. Given the above information regarding the number of receptors in excess of 200m of the Site boundary and within 60m from the main access route, the sensitivity of the area with respect to human health impacts in relation to earthworks, construction and trackout is therefore low.

There are no designated ecological sites within 50m of the development Site as listed on the Defra Magic Map resource[14]. In accordance with the IAQM methodology[12], there is no need to consider potential dust effects on ecological receptors further as part of this assessment.

A summary of the sensitivity of the surrounding area is detailed in Table 4.2 below.

Table 4.2 – Sensitivity of Surrounding Area

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	Low	Low	Low
Human Health	Low	Low	Low

Risk of Dust Impacts

The risk of dust impacts is defined using Tables 7, 8 and 9 in the IAQM guidance[12] for earthworks, construction and trackout respectively. The dust emission magnitude classes in Table 4.1 combined with the sensitivity of surrounding area classes in Table 4.2, result in the site risk categories as shown in Table 4.3.

Table 4.3 – Summary of Dust Risk

Potential Impact	Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Negligible	Low Risk
Human Health	Low Risk	Negligible	Low Risk

Following the construction dust assessment, the development Site is found to be, at worst, a Low Risk in relation to dust soiling effects on people and property and a Low Risk in relation to human health impacts, as summarised in Table 4.3.

Due to the above designation, mitigation measures are required to ensure that any potential impacts arising from the construction phase of the proposed development are reduced and, where possible, completely removed. Providing effective mitigation measures are implemented, such as those outlined in Section 5.1, construction dust impacts are considered to be not significant.

[13] https://www.ons.gov.uk/help/localstatistics

[14] Magic Maps (2017), available online at http://www.natureonthemap.naturalengland.org.uk/

4.1.2 Construction Vehicle Emissions

The construction phase is proposed to take place over a 47 week period, with a 26 week period identified for site deliveries[15]. During thisperiod there will be a number of HDV movements delivering materials for construction activities on site. It is estimated that the total number of two-way vehicle movements during the construction phase of both the solar farm and battery storage facility will be4,472. It is expected the majority of these will be associated with the delivery of the solar modules and mounting structures. In total a maximum of 25 AADT is expected during the construction phase period.

The average number of two-way vehicle movements per day is well below the 100 AADT criteria. Therefore it is not considered that there will be any potential for significant air quality effects from development related road traffic emissions during the construction phase. Furthermore, the construction vehicle designated route to the site actively avoids residential areas to minimise impacts. Such potential impacts have therefore been scoped out from requiring a detailed assessment on the basis of their low and negligible impacts.

4.2 Operational Phase

General maintenance of the site will be carried out by the existing farm tenant and additional equipment maintenance performed approximately four times a year. Therefore it is unlikely that the number of vehicle movements during the operational phase will exceed those of the construction phase. As a result, operational phase impacts associated with road traffic emissions are deemed to be not significant and therefore scoped out of requiring a detailed assessment.

[15] Paragraph 5.1 of TPA's 'Construction Traffic Management Plan', November 2018

5 Recommended Mitigation Measures

5.1 Short-term Impacts during Construction

As discussed in Section 4, construction impacts associated to the proposed development would result in the generation of a small magnitude of dust and PM_{10}. It is considered that employment of construction best practice should ensure that no problematic dust or PM_{10} concentrations occur during the construction process.

IAQM guidance[12] outlines a number of site specific mitigation measures based on the assessed site risk. The measures are grouped into those which are 'highly recommended' (i.e. should be employed) and those which are 'desirable' (i.e. should be considered under best practice).

As the site is classed as low risk the following mitigation measures are highly recommended:

- With respect to communications:
    - Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
    - Display the head or regional office contact information.
- With respect to site management:
    - Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
    - Make the complaints log available to the local authority when asked.
    - Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.
- With respect to monitoring:
    - Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
    - Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- With respect to preparing and maintaining the site:
    - Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
    - Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- With respect to operating vehicle/machinery and sustainable travel:
    - Ensure all vehicles switch off engines when stationary - no idling vehicles.
    - Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

- With respect to operations:
    - Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
    - Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
    - Use enclosed chutes and conveyors and covered skips.
    - Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- With respect to waste management:
    - Avoid bonfires and burning of waste materials.
    - Additionally as the site is classed as low risk the following mitigation measures are desirable:
- With respect to communications:
    - Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and/or visual inspections.
- With respect to monitoring:
    - Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.
- With respect to preparing and maintaining the site:
    - Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.
    - Keep site fencing, barriers and scaffolding clean using wet methods.
    - Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
    - Cover, seed or fence stockpiles to prevent wind whipping.
- With respect to operating vehicle/machinery and sustainable travel:
    - Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the

approval of the nominated undertaker and with the agreement of the local authority, where appropriate).

- With respect to operations:
    - Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

As the site is classed as low risk for earthworks no mitigation measures are required with respect to earthworks.

As the site is classed as low risk for trackout the following mitigation measures are desirable:

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

6 Carbon Footprint

The Little Crow Solar Park is expected to generate 150MW of clean, renewable energy from the photovoltaic panels installed at the solar park each year, with an additional 90MW battery storage capability. It is estimated the power generated will be able to service 36,000 homes a year. The electricity generated will connect to the existing local 132kVA electrical network which runs through the proposed site.

In order to assess the carbon savings from solar panels, a calculation can be used which assumes that all of the generated solar electricity directly displaces 'grid' electricity. In regards to the Little Crow Solar Park, the calculation will assume the power stations producing 'grid' electricity will be producing up to 150MW/h less electricity. In order to calculate the saving the 'average grid carbon intensity' i.e. the average amount of CO_2 emitted for each kWh of electricity produced for the grid, is required. According to the July 2018 recommended conversion factors provided by Defra as part of its Environmental Reporting Guidelines[16], it is estimated that approximately 0.283kg of CO_2 is produced per kWh of electricity from the grid.

Table 6.1 shows the expected kWh profile for the first calendar year from January to December (based on a 135MWp) installation. The total CO_2 savings over the year is therefore 0.283kg x 125,834,402kWh = 35,611,136kg CO_2 (35,611 tonnes per year). The efficiency of the solar panels has been calculated as approximately 10%, based on the provided information. This is considered a conservative assumption of the efficiency of the solar panels per annum.

Table 6.1 – Expected kWh Profile

Month	kWh
Jan	3,797,939
Feb	6,074,880
Mar	9,739,809
Apr	14,161,443
May	16,605,001
Jun	16,313,813
Jul	17,167,282
Aug	15,302,901
Sep	11,252,122
Oct	7,832,672
Nov	4,686,762
Dec	2,899,778
Total	125,834,402

The construction of the solar park will inevitably generate CO_2 emissions. Therefore, CO_2 generated needs to be factored into the total CO_2 savings from the park. The most significant source of CO_2 emissions during the construction phase will be derived from the construction vehicles travelling to and from the site. Table 6.2 provides details with regards to the estimated total amount of CO_2 generated by the construction vehicles visiting the site. The estimated kg CO_2 per km for each vehicle type has been derived from the July 2018 recommended conversion factors provided by Defra.

[16] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018

Table 6.2 – Construction Vehicle Generated CO_2

Vehicle Type	Total km travelled*	kg CO_2 per km	Total Number of Vehicles	Total kg CO2
Rigid HGVs	200	0.80746	110	17,764
Articulated HGVs	200	0.93428	4,200	784,795
Vans	200	0.25299	3,290	166,467
			Total Tonnes of CO_2	**969**

Notes:
* As no distance information was available a distance of 200km has been assumed for each vehicle.
[1] All rigids and average laden
[2] All artics and average laden
[3] Assumed 50% diesel and 50% petrol vans

Overall, the total CO_2 offset as a result of the Little Crow Solar Park, taking into account the CO_2 generated as a result of the construction vehicle activities, is 34,642 tonnes. It should be noted that the CO_2 generated as a result of the construction vehicles will be a onetime occurrence and should not be factored into future years.

7 Conclusions

Bureau Veritas UK Ltd has been commissioned by INRG Solar (Little Crow) Ltd. to undertake an air quality assessment of construction traffic emissions together with a carbon offset assessment as a result of the proposed Little Crow Solar Park. The development site is located to the east of Scunthorpe, adjacent to the Harsco Steel works and is accessed via the B1208.

An air quality assessment has been prepared to determine the significance of air quality impacts during the construction and operational phases of the proposed development, in addition to confirming the suitability of the Site for the proposed use.

A qualitative assessment of impacts of construction activities upon air quality was undertaken following the Institute of Air Quality Management (IAQM) guidance[12]. methodology. A quantitative assessment of from the impact of road traffic emissions on air quality was undertaken following IAQM dust guidance[12].

The carbon footprint of the construction phase activities, in the context of the associated traffic generation, was calculated and subtracted against the carbon savings associated with the generation of electricity via solar power. The CO_2 generated from the construction traffic was calculated using the UK Government Greenhouse Gas (GHG) conversion factors provided by Defra for company reporting[17].

The carbon saving from generating electricity via solar power was further quantified based on a direct comparison against the amount of CO_2 produced where an equal amount of electricity is produced using alternative fuels operated on the National Grid. The July 2018 GHG conversion factor spread sheet includes an estimated average amount of CO_2 emitted for each kWh of electricity produced for the grid assuming a range of energy sources e.g. coal, gas and renewable electricity generation. The total annual CO_2 offset was calculated based on this factor.

The following section provides the conclusions of this assessment.

7.1 Construction Effects

The assessment of dust/PM_{10} effects from the construction phase of the development was subject to a qualitative assessment following IAQM guidance[12]. Following the construction dust assessment the development site is found, in relation to dust soiling, to be at worst low risk from earthworks, construction and trackout. In relation to human health impacts, the development Site is found to be at worst low risk for all three activities.

In regards to construction phase vehicle movements, the average number of two-way HDV movements per day is expected to be well below the 100 AADT criteria. Therefore it is not considered that there will be any potential for significant air quality effects from development related road traffic emissions during the construction phase. Such potential impacts have therefore been scoped out from requiring a detailed assessment on the basis of their low and negligible impacts.

Effective mitigation measures were not specified as there is no risk defined. Furthermore, impacts from dust emissions during the construction phase would be **not significant,** which is supported by the low levels of annual mean emissions as detailed in Section 2.4. It is considered that despite there not being a defined risk present, it is still advisable that a number of good practice measures are implemented, such as considerate traffic speed and observing minimal dust dispersion where at all possible during construction and transport activities.

7.2 Operational Effects

Maintenance vehicles are only expected to visit the site four times a year. Therefore it is unlikely that the number of vehicle movements during the operational phase will exceed those of the construction

[17] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018

phase. As a result, operational phase impacts associated with road traffic emissions are deemed to be not significant and therefore scoped out of requiring a detailed assessment.

7.3 Carbon Footprint

Based on the calculations in Section 6, it is estimated the Little Crow Solar Park will offset 34,642 tonnes of CO_2 in the first year. This value has taken into consideration the estimated amount of CO_2 generated as a result of the construction vehicles transporting materials to and from the site during the construction phase. A greater carbon saving will be experienced in the future years as all construction activities would have been completed by the end of the first year.

APPENDIX 2.2

PHASE 1 GROUND CONDITIONS REPORT

Little Crow
Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

PHASE 1 GROUND CONDITIONS DESK STUDY

On behalf of INRG Solar (Little Crow) Ltd

November 2018

Intégrale
Understanding Ground Conditions

Suite 7, Westway Farm Business Park
Wick Road, Bishop Sutton,
Somerset BS39 5XP United Kingdom

Tel: 01275 333036
www.integrale.uk.com

Proposed Solar Energy Scheme
Little Crow Solar Farm
Scunthorpe
Lincolnshire
DN16 1XP

PHASE I GROUND CONDITIONS DESK STUDY

REPORT NO. 1844 Vers. 5, November 2018

GEOLOGICAL • GEOTECHNICAL • ENVIRONMENTAL • ENGINEERING

Intégrale is a trading name of Integrale Limited
Registered Office: The Granary, Chewton Fields, Ston Easton,
Somerset, BA3 4BX, United Kingdom
Company Registration No. 2855366 England VAT Reg. No. 609 7402 37

Phase I Ground Conditions Desk Study
Little Crow Solar Farm
Scunthorpe
Lincolnshire
DN16 1XP

Client: INRG Solar (Little Crow) Limited

Intégrale Report No. 1844, Version 5, November 2018

		Signature/Date
Project Co-ordinator & Report Preparation:	Dr Kay Boreland	
Report Approved by:	Gareth Thomas	
Final Check by:	Millie Lewis	

CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

INRG Solar (Little Crow) Limited, 14 Hyde Court, Golf Links Road, Roscommon, Ireland

Integrale Limited has prepared this report solely for the use of the client named above. Should any other parties wish to use or rely upon the contents of this report, written approval must be sought from Integrale Limited. An assignment fee may then be charged.

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP, United Kingdom
Tel: 01275 333036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX, United Kingdom Company Registration No. 2855366 England

LIST OF CONTENTS

- EXECUTIVE SUMMARY –

1.0 INTRODUCTION 2

2.0 THE SITE 3

2.1 Location and Description 3
2.2 Published Geology and Mining 3
2.2.1 British Geological Survey Mapping 3
2.2.2 BGS Previous Investigation Records 4
2.2.3 Soils Information 4
2.2.4 Past Mining 4
2.2.4.1 Historical Mapping Evidence 4
2.2.4.2 Humberside Minerals Resources (2006) 5
2.2.4.3 TerraSearch Assess Report (August 2017) 5
2.2.4.4 Conventional Oil Well 5
2.3 Outline History 6
2.4 Hydrogeology, Hydrology & Groundwater Vulnerability 7
2.5 Environmental Information 8
2.5.1 Pollution Information and Licencing 8
2.5.2 Geological Information 8
2.5.3 Background Soils Chemistry 9
2.5.4 Contemporary Trade Directories 9
2.5.5 Groundsure Radon Risk Information 9
2.6 Conceptual Exposure Model 9
2.6.1 Proposed Redevelopment 9
2.6.2 Potential Sources of Contamination 10
2.6.3 Potential Receptors 11
2.6.4 Potential Pathways 11
2.6.5 Conceptual Site Model with Respect to Human Health 11
2.6.6 Conceptual Site Model with Respect to Controlled Waters 12

3.0 ANTICIPATED GROUND & GROUNDWATER CONDITIONS 13

3.1 Anticipated Strata 13
3.2 Anticipated Groundwater and Leachate 14
3.3 Anticipated Ground Gas Regime 14

4.0 CONTAMINATED LAND CONSIDERATIONS 15

4.1 General 15
4.2 Qualitative Risk Assessment 15
4.3 Conclusions 15

5.0 GEOTECHNICAL CONSIDERATIONS 17

APPENDICES

A. Site Location & Layout Plans
B. Site Photographs
C. Geological Information
D. Terrafirma Mining Report
E. Groundsure Data Report

EXECUTIVE SUMMARY

Little Crow Solar Farm – Phase 1 Ground Conditions Desk Study
Report No. 1844, November 2018

A Phase 1 Desk Study on ground conditions, geotechnical and contamination aspects for this proposed solar energy scheme has been completed.

The approximate 227 hectare site comprises a higher eastern area of level or gently eastward sloping arable land, a central zone moderately sloping down to the west, and a lower western area of very gentle to level ground. Agricultural soils predominate, with small areas of woodland & vegetation. To the west of the site are opencast ironstone workings and steel works

Geological records indicate the lower slopes overlain by Blown Sand comprising up to 7m of fine-grained silty sand. The bedrock beneath forms a sequence of north-south outcrops. The higher eastern area comprises Jurassic limestones; the central area is underlain by Jurassic mudstones and locally limestones; the middle and lower slopes are blanketed in the Blown Sand, underlain by mudstones and marls, including the commercially important Pecten Ironstone. The complete site area is classified as freely draining slightly acid sandy soils.

There are potentially small-scale surface ironstone workings in the lower western area. Northeast of the site is the Broughton B1 conventional oil well, sunk to 1.9km depth. Available data suggests it is not active.

Historically the majority of site has remained agricultural, with Gokewell Priory Farm in the north. Overhead power cable routes cross the site and mapping indicates periodic expansion of the ironstone workings and steel plant to the west. A former WWII anti-aircraft battery in the eastern area is reported removed.

In the higher area, the regional strata dip to the east directs surface water and moderate depth groundwater flow to the east, forming a Principal Aquifer. Midslope surface water and shallow groundwater flow within the Blown Sand is to the west, forming a Secondary A Aquifer, with a discontinuous springline midslope. Very shallow groundwater is anticipated in the lower western area where drainage ditches are frequent, with hummocky marshy areas.

Potential contaminant sources are considered limited to remnant metals in soils within any localised backfilled ironstone pits, and air-borne particulates from the industrial complex to the west, within topsoil. Potential receptors comprise construction workers and maintenance staff. Drainage ditches and the groundwater within the Principal and Secondary A aquifers are controlled waters receptors. For the limited groundworks, risk to groundworkers is considered negligible with standard protection.

The shallow groundworks will have negligible potential to cause or increase leaching. Run-off during construction works will need to be controlled and managed, as standard practice. Future run-off is unlikely due to predominant topsoil cover and anticipated infiltration characteristics, but requires consideration.

Combined geotechnical and contaminated land assessment should concentrate on specific features from historical maps to confirm ground conditions within solar array zones, occurrence of small scale ironstone working, typical gas regime, infiltration and permeability of near surface soils and identify any specific areas of concern.

There is no current evidence of ground conditions that would preclude development.

1.0 INTRODUCTION

INRG Solar (Little Crow) Limited are considering development of a 150MWp energy scheme comprising ground mounted solar PV modules and battery storage. Their planning consultants are Pegasus Planning Group.

Integrale Limited are commissioned to undertake a Phase 1 Desk Study, concentrated on ground conditions, geotechnical and contamination aspects. The desk study is also to inform drainage considerations by Clive Onions Limited.

This desk study report describes the geological setting, mining risk and historical and environmental data reports. The ground and groundwater conditions are anticipated and used to establish a conceptual model of potential pollutant linkages. Implications for the development are discussed and recommendations for further investigation or potential remedial works or design measures given.

2.0 THE SITE

2.1 Location and Description

As shown in Appendix A, the site is located to the east of Scunthorpe and north of Ravensthorpe. It has a central Ordnance Survey Grid Reference of 494000 410000 and postcode DN16 1XP. A slightly smaller site area was initially considered, and has subsequently been extended to comprise the area shown bounded in red in Appendix A.

No site reconnaissance visit has been completed by Integrale Limited, and the typical photographs included in Appendix B have been provided by the client. The main features and pertinent aspects on the site and immediately adjacent land are summarised below:

Current Use	Predominantly arable agricultural land.
Site Area & Plan Shape	226.81 Hectares (2.268 km^2).
Maximum Dimensions	1700m N-S by 1100-1500m E-W.
Ground Slopes & Topography	Higher eastern half at 60-67mAOD, level or with very gentle slopes down to east. Central quarter at 40-60mAOD, with moderate slopes (1:15 to 1:20) down to west. Western zone at 30-40mAOD, with moderate slope (1:12) down to west. Extreme western zone at 25-30m, with very gentle slope (1:50 to 1:60).
Buildings & Condition	None significant.
Surfacings & Condition Vegetation & Trees	Agricultural soils predominate, with small areas of woodland & vegetation. Three large plantations of trees (Gokewell Strip & Icehouse Strip in SE quadrant, and Little Crow Covert in northwest) do not form part of proposed development area.
Water Courses	Mapping shows numerous drainage ditches within western zone run down to west, feeding into north-south drains. Pond at site of former Gokewell Priory may feed into stream flowing northwest into a lower pond adjacent to Santon Wood.
Site Boundary Features	Agricultural fencing & hedges predominantly.
Contamination Issues	None noted from photographs. Beyond to west is area of opencast ironstone workings and steel works. Google Earth imagery shows substantial mound in SW from 2003 and centrally from 2008 (see below).
Geotechnical Issues	Former ironstone workings etc. – see below. Former Oil Well off-site to northeast – see historical maps and below.

2.2 Published Geology and Mining

2.2.1 British Geological Survey Mapping

BGS geological maps indicate the following strata beneath and adjacent to the site:

Map / Scale	Sheet 89 at 1:50,000 scale (Solid & Drift Sheets).
BGS On-Line Viewer	BGS Maps Portal Accessed 8th August 2017.
Artificial Ground	None mapped on site. Frodingham Ironstone Backfilled Opencast Workings immediately beyond western boundary.
Superficial Deposits	Lower slopes overlain by Sutton Sand (Devensian Blown Sand): up to 7m of fine grained silty sand. Further area of Blown Sand mapped at high level beyond eastern site boundary is likely to form a thin cover in parts of the eastern zone.

Solid Geology	Sequence of north-south outcrops from: 1. Kirton Cementstones of Lower Lincolnshire Limestone Formation (LLLS) of Middle Jurassic period forming higher eastern area, including Scawby Limestone and Santon Oolite, overlies; 2. Lower Estuarine Series and Northampton Sands (10-20m thickness), overlies; 3. Coleby Mudstones with Marlstone Rock of Lias Group of Lower Jurassic period on middle and lower slopes, including Pecten Ironstone.
Geological Features	None mapped other than superficial Blown Sand masking Jurassic bedrock. No dip arrows, however cross-section & more remote data indicates regional dip down to east at 1-3°.

Summary drawings of the geological formations and potential groundwater zones are included in Appendix C.

2.2.2 BGS Previous Investigation Records

Previous investigation records available on the BGS website under the Open Government Licence include 5 boreholes sunk across the northern area. These are also included in Appendix C and indicate:

- Higher Eastern half of site, at or above 55mAOD – Topsoil over Weathered oolitic limestone of Lincolnshire Limestone Formation;
- Central northern area between 40-50mAOD – Blown Sand to 2-4m depth, overlying Middle & Lower Lias mudstones and locally limestones;
- Lower northwestern area at 36mAOD – yellow and grey clays of Coleby Mudstones (with thin veneer of Blown Sand likely).

No details of groundwater levels are included in these records.

2.2.3 Soils Information

Data available on the LandIS Soilscapes Viewer and within a Soil Site Extended Report is included in Appendix C and indicates:

- The complete site area is classified as underlain by freely draining slightly acid sandy soils. These have typically low fertility arable land cover, and drain to groundwater.
- The complete site area is underlain by Newport 1 Type Soils. These are deep well drained sandy and coarse loamy soils. They are free draining and permeable in unconsolidated sands or gravels, which have a relatively high permeability and high storage capacity. They have a very low potential for ground movement (shrinkage or swelling).
- These soils will, by nature of their high permeability, readily transmit a wide range of pollutants because of the rapid drainage and low attenuation potential.
- The uppermost 300mm of the soil profile is sandy and 'light'.
- Newport 1 Soils have typically an upper 250mm of dark brown slightly stony sandy loam or loamy sand, overlying brown slightly stony loamy sand or sand, with a weak fine subangular blocky structure. Below 500-550mm depth, these develop into yellowish red or brownish yellow slightly stony sand of single grain structure.

2.2.4 Past Mining

2.2.4.1 Historical Mapping Evidence

Historical maps are discussed in more detail below and are included in Appendix E. There is evidence for potential small scale near surface workings in the lower western area, where small pit features, some ponds and a hummocky area in the extreme southwest are shown.

A summary plan of such historical features has been included after those maps at the end of Appendix E. It is assumed that if these are evidence for surface working or mining, they represent ironstone extraction. It is noted that several such features align north-south, potentially reflecting the geological trend of ironstone outcrops. Google Earth imagery shows a substantial vegetated mound with approximate maximum dimensions of 70m by 45m in the southwest area between 20-26mAOD from 2003 onwards, which could relate to such workings. From 2008 a mound of material approximately 50m diameter appears centrally, south of the main access track to Gokewell Priory Farm, perhaps more likely to be agricultural in origin or related to the demolition of farm buildings.

The opencast workings to the west include a linear excavation, with steep side slopes and apparently extending well below 5mAOD, based on Google Earth spot heights.

2.2.4.2 Humberside Minerals Resources (2006)

The Humberside Minerals Resources plan obtained from the BGS website (an extract of which is included in Appendix C) indicates the complete site area as having "Underground planning permission (valid and expired)". This suggests that the Minerals Planning Authority had granted permission for (assumed) ironstone working by underground mining, presumably as an extension to the opencast area to the west, but that this has now expired. Whether any workings beneath the site area did in fact occur, remains undetermined to date.

2.2.4.3 TerraSearch Assess Report (August 2017)

A Terra Search Assess report was therefore obtained from TerraFirma Mine Searches Limited and is included in Appendix D. The report is based on the original slightly smaller site area (as shown on the maps) however, it includes information from a larger surrounding 'buffer zone' and therefore covers the complete current boundaries. This indicates:

- Negligible to low risk from past coal mining, evaporate working, brine extraction, or metalliferous mining for tin, lead etc.
- Moderate risk of past limestone or other stone extraction.
- Moderate risk of planned or future mineral extraction (of ironstone).

For ongoing current site use, TerraFirma therefore conclude:

- A Moderate risk from past ironstone extraction, due to a number of suspected extraction features (see hazard map within report).
- A Moderate risk due to a hydrocarbon well off-site to the northeast. TerraFirma have confirmed that DECC (Dept. of Energy & Climate Change) data indicates the hydrocarbon field area extends within the site boundary. "Therefore associated extraction features such as underground workings and shafts could be present and have the potential to impact ground stability in the area". See also Section 2.3.

For future development of the site, TerraFirma therefore conclude:

- "…prior to any site works or future development activity, it is considered prudent to commission a full Site Survey by a qualified mining geologist/engineer."

2.2.4.4 Conventional Oil Well

Immediately northeast of the site at Top Wood is the site of a conventional oil well, known as Broughton B1. This was sunk in 1984 by BP Petroleum Development Limited. Details have been obtained from the UK Onshore Geophysical Library open-access resource and is included in Appendix C.

This indicates:

- Well was sunk at 63.1mAOD and taken to 1920m depth, as a vertical boring;
- The well is cased to 1909m depth, casing decreasing from 340mm to 140mm down its length;
- The Upper, Middle and Lower Lias strata were proven from surface to 100m depth. The underlying Triassic, Penarth and Mercia Mudstone Groups, and Upper Permian strata occur to 800m. Beneath, the Lower Permian marl/shale and Rotliegendes Sandstone reservoir were found to 1120m, with Carboniferous strata below to the base of the well. It is tentatively assumed that the oil shales or sandstones being targeted are those below 800m depth.

On-line searches for details of this oil well found that Egdon Resources plc have stated: "The two prospects are located along an oil productive trend with the Crosby Warren producing oil field at one end and the Brigg oil discovery at the other. The Broughton-B1 well drilled by BP in 1984 flowed on test at up to 40 barrels of oil per day before being abandoned". This does not suggest that the well is currently active, and no further detail of the likelihood of future exploitation is readily available at this time

2.3 Outline History

Historical maps obtained from a Groundsure report are included in Appendix E, together with a summary plan of pertinent features. The Groundsure report is based on the original slightly smaller site area (as shown on the maps) however, it includes information from a larger surrounding 'buffer zone' and therefore covers the complete current boundaries. These indicate the following pertinent information:

Map Date	Site Features / Land Use	Adjacent Features (distance from site)
1885-1906	Majority of site agricultural fields with drainage ditches in lower area. Gokewell Priory Farm with pond in N area. Hummocky /marshy area in extreme lower SW with pond. Several small scale excavations or pits in lower W area may indicate surface diggings for ironstone.	Icehouse and Gokewell Strip woodlands present as existing. Redbourne Hill and Appleby Iron Works 2kms W and NW respectively. Small excavations (surface ironstone workings?) beyond SW corner near Gorse Covert. Larger ironstone quarries 1.5kms SW at Emmanuel Bridge
1948-55	No significant changes apparent within site	Ironstone quarries extended to within 800m of W boundary. Iron & Steel Works extended to within 750m NW.
1968-80	Overhead powerlines constructed crossing SW to NE from substation within Iron & Steel Works to SW. Possible new drainage ditches (and small pond?) within hummocky area in extreme NW near Crow Covert. Clearance of Sodwall Plantation (possible ironstone workings?)	Iron & Steel Works expanded to within 500m W. Opencast Ironstone Workings mapped to within 500m NW. Emanuel Air Strip West and East within 500-750m SW of site. Drainage ditches apparently expanded just beyond site to SW, around Bottesford Beck. By 1979 Iron & Steel Works had expanded to SW site corner across former Air Strips and opencast ironstone workings typically to within 100m W. In extreme SW corner, opencast extended to site boundary, and two parallel drainage ditches constructed at cutting face.
1994 - 2002	Gokewell Priory Farm buildings demolished – exact date unclear from mapping. Opencast ironstone workings annotated in extreme SW site extension area.	Poultry Farm constructed beyond central E boundary near Heron Holt woodland.

2002 - 14	No significant changes apparent. Maximum elevation of drainage ditches / surface water courses on this mapping at 36mAOD in N, 43mAOD centrally, 35mAOD central southern, and 30mAOD in southern area.	Oil Well mapped at Top Wood c. 100m NE*. Opencast workings to W marked as Disused. Linear water feature c. 100-200m W of site reflects flooded workings (also shown on Google Earth imagery from 2003). Tree planting beyond SW corner on former opencast area.

* See 2.2.4.4 above.

A Built Heritage Assessment by Cotswold Archaeology has identified a WWII Heavy Anti-Aircraft Battery in the upper eastern area (north of Gokewell Strip). They report it de-armed in 1942 and conclude that remains are unlikely to survive below ground.

2.4 Hydrogeology, Hydrology & Groundwater Vulnerability

BGS groundwater data available on-line indicates that a hydrometric area boundary runs north-south across the higher slopes of the eastern area. Upslope of the highest main extent of the Devensian Blown Sand (Sutton Sand) is approximately 45-55mAOD, the regional geological dip of the bedrock strata at 1-3° to the east directs both any surface water flows and groundwater flow direction eastwards. (The nearest surface water course to the higher eastern boundary is 600-800m remote). Downslope of 45-55mAOD, where the bedrock is overlain by the Blown Sand, both surface water and shallow groundwater flow within the Sand is to the west. The contours on the estimated minimum groundwater level or pressure surface within the Lincolnshire Limestone was also at c. 45mAOD (based on mid 1960's data).

From the published geological strata and topographic maps showing surface water courses, the following can be anticipated at this site:

Shallow Soils Permeability	Permeable with intergranular flow in superficial deposits. High fracture/fissure permeability in limestone bedrock.
Anticipated Groundwater Table Depth	Very Shallow (<3m below ground level) in lowest western area. Shallow (3-5m below ground level) centrally. Moderate (5-10m below ground level) in higher eastern area.
Anticipated Groundwater Flow Direction	Extreme western boundary zone with opencast & ironworks, flow direction may be controlled by drainage ditches and likely low flow rate. Western zone and up to 45-55mAOD, flow direction to west. Eastern boundary and down to 45-55mAOD, down dip to east.
Surface Water Courses and Flow Direction	Unnamed drainage ditches (unnamed Tertiary Rivers) on site in western area, typically flow west and north-south. Springs & stream in Far Wood/ Heron Holt c. 600m east of site at c. 42mAOD flow east northeast.
Aquifer Type	Secondary A Permeable layers in superficial deposits. Bedrock strata from east to west: Principal Aquifer in higher limestones. Secondary Aquifer in lower Coleby Mudstones and Marlstone Rock. Unproductive Strata formed by upper Coleby Mudstones. (See page 33 of Groundsure Environmental Data for details).
Environment Agency Soils Classification	High leaching potential.
Hydraulic Continuity of Groundwater and Water Courses	Likely throughout site.

A summary plan has been included in Appendix C to indicate:

- Western area below 30mAOD has the likely shallowest groundwater table draining westwards;
- Likely hydraulic continuity with artificial drainage ditches also flowing north-south;
- There is a potential discontinuous springline at 40-43mAOD;

- The upper eastern area drains to east and water table is likely below 45-55mAOD;
- This causes spring issues at c. 40-45mAOD remote from the site to the east;
- Shallow depth soils in complete area are classed as being well drained.

2.5 Environmental Information

The following pertinent information on activities within 250m of the site has been extracted from the Groundsure report included in Appendix E.

2.5.1 Pollution Information and Licencing

	Number	Distance from Site
Surface Water Abstractions	0	
Groundwater Abstractions	0	
Contaminated Land Register Entry/ Enforcement / Prohibition	0	
Known Pollution to Controlled Waters	0	
Integrated Pollution Control	0	
Fuel Station Entry	0	
Registered Radioactive Substances	0	
Discharge Consent	1	Revoked (1997) effluent discharge Cokewell Priory
Known Landfills / Waste Management / Transfer Sites within 250m	2	190mW Crosby North Landfill Waste landfilling (excluding Inert) Current 144m W Scunthorpe Concast Surrendered Licence for Industrial, liquid, sludge, British Steel Corporation, last recorded 1992.
Source Protection Zones	None	
Floodplain Area / Flood Warning Status	None	Potential for groundwater flooding at surface locally

2.5.2 Geological Information

Hazard Type	Hazard Rating
Natural and Mining Cavities	Possible small scale mining within site boundaries for ironstones (see historical maps also)
Potential for Ground Dissolution Stability Hazard	Very Low
Potential for Landslide Ground Stability Hazard	**Moderate**
Potential for Shrinking/Swelling Clay Ground Stability Hazard	Low
Potential for Compressible Deposits Ground Stability Hazard	**Moderate**
Potential for Collapsible Deposits Ground Stability Hazard	Very Low
Potential for Running Sands Ground Stability Hazard	Low

2.5.3 Background Soils Chemistry

The Groundsure report includes BGS estimated background soil chemistry for 5 metals within shallow soils. This indicates that naturally occurring chromium marginally raised in this area. However interpretation suggests that at these levels, such metals would be unlikely to exceed generic assessment criteria for commercial use. Current National Planning Policy guidance does not consider naturally occurring metals as evidence of contamination.

2.5.4 Contemporary Trade Directories

Potentially Contaminative Activities on Site	No additional activities other than the overhead power supply pylons are given in the Groundsure data.
Potentially Contaminative Business Activities within 250-300m of Site	No additional significant activities other than the oil well detailed above and the steel works westwards are given in the Groundsure data.

2.5.5 Groundsure Radon Risk Information

The Groundsure report indicates that the specific site lies in a Radon Affected Area, requiring Full protection measures, for new buildings and dwellings.

2.6 Conceptual Exposure Model

This section draws together desk study information, outlines an initial conceptual exposure model, and provides a qualitative assessment of potential contamination via a source-pathway-receptor framework for the proposed redevelopment.

2.6.1 Proposed Redevelopment

Outline details of the proposed redevelopment are shown in Appendix A and can be summarised as:

Buildings	None anticipated
Car Parking	Minimal
Access Roads	Main access from northeastern area to centre and former Gokewell Priory area. Smaller access roadways to each solar PV module area and inverter stations
Landscaping	Not considered substantial
Development Level	As existing
Drainage	Watercourses to be retained with 8m buffer zone alongside. Swales (c. 300mm depth by 3m width) to run N-S across central lower and extreme southwest areas to limit overland flows into watercourses.
Substations and Battery Storage	Battery Storage Zone, Inverter & Transformer stations for each area of solar PV modules

- The proposed solar arrays comprise photo voltaic panels laid in rows approximately east – west across the field enclosures. Arrays are typically mounted on a metal framework, fixed onto steel pins driven between 0.5-0.75m depth into the ground, depending on the ground conditions. Alternatively, a system of installing small 'foot pads' for the arrays may be adopted, again to a maximum of 0.5-0.75m depth. It is assumed that the east-west alignment across these gentle to moderate westerly facing slopes will require either very minor cutting into the slope, or more likely design of the metal frameworks to incorporate any more critical slope angles.
- In addition there will be a requirement for shallow depth cable trenches, assumed no deeper than 0.5m below existing ground level. Gravel filled drainage trenches of up to 0.5m depth are also assumed.
- The transformer and containerised battery units will be placed on a 300mm permeable gravel bed to allow attenuation and infiltration of rainfall and surface run-off into the underlying soil.

- Structures are limited to inverter and transformer stations, which typically site on reinforced concrete foundation slab, on sub-base aggregate, with a drain surrounding if required. Fencing and CCTV cameras are generally required around the boundary.
- The proposed layout shows the area of the former Gokewell Priory Farm, its associated pond and stream course remaining as existing. There are to be no solar modules within the overhead power cable and pylon corridor.

2.6.2 Potential Sources of Contamination

The desk study has been used to identify the likely remnant contaminant sources and distribution. The potential current and historical on- and off-site sources and the contaminants associated with these, derived using CLR8 Potential Contaminants for the Assessment of Land, and through experience of industrial land use, are detailed below.

Potential Contaminants Associated with On-Site Sources			
Description	Metals, semi-metals, non-metals, inorganic chemicals and others	Organic chemicals	Ground Gases & Vapours
Localised small ironstone pits, if backfilled	Range of metals possible, given age	Unlikely given age of likely backfilling	Unlikely given age of likely backfilling
Recent Agricultural Use & Maintenance	Unlikely significant given usage and historical development		

Potential Relevant Contaminants Associated with Off-Site Sources			
Description	Metals, semi-metals, non-metals, inorganic chemicals and others	Organic chemicals	Ground Gases & Vapours
Opencast Ironstone Workings, if backfilled	Range of contaminants possible, although unlikely mobile in site direction	Range of contaminants possible, although unlikely mobile in site direction	Unlikely given distance, topography and ground conditions
Electricity Substation and overhead cables/pylons infrastructure	Unlikely to impact within site boundaries due to distance, topography and ground conditions		
Iron & Steel Works	Air borne dust & particulate contamination possible for range of metals	Unlikely given distance, topography and ground conditions	
Oil Well Infrastructure at Top Wood (95m remote)	Unlikely given land usage and ground conditions, depth of drilling and date of operational use (1980's?)		

The potential relevant contamination sources are therefore considered to be limited to remnant metals in soils within any localised backfilled ironstone pits, and air borne derived particulates from the extensive industrial complex to the west and southwest, remaining within shallow depth site topsoil. The Gokewell Priory Farm building area has been demolished since 1994-2002, and no specific development in that area is proposed. The hummocky areas west of this (near Crow and Little Crow Coverts) may relate to either this demolition or drainage works, or less likely to ironstone working.

2.6.3 Potential Receptors

A future solar farm end use and known neighbouring agricultural land uses have been used to develop an understanding of the likely sensitive human receptors. In view of the very limited ground intrusion needed to install the panels, and the shallow depth of any service runs, or access track/roadways, it is envisaged that potential receptors to contamination (if present within the soils on-site, or via migration from adjacent sites) are limited to:

- Construction Workers during installation or maintenance. The most critical receptor would therefore be a female adult.
- Future maintenance staff or neighbouring workers.

Information gathered during the site research has been used to develop an understanding of the likely sensitive controlled waters receptors. These are considered to be the drainage ditches, streams and ponds on-site, and the groundwater within the Principal and Secondary A aquifers.

2.6.4 Potential Pathways

The presence of Blown Sand superficial deposits beneath both the site and adjacent areas creates a direct potential pathway for cross-migration of ground gases, leachate or mobile contaminants. The presence of drainage water courses indicates a potential pathway for leachate or other mobile contaminants within the site to locally impact on water receptors.

To develop further an understanding of the potential risks posed by the contaminants to human receptors, the pathways through which contaminants may impact sensitive receptors need to be identified. The CLEA model indicates potential exposure routes for assessing risks to human health for a solar array use to be limited to:

- Dermal exposure if contaminated soil exposed during groundworks;
- Inhalation of particulates if contaminated soil exposed during groundworks.

It is considered that the potential pathways with respect to controlled waters will be limited to:

- Lateral migration of perched groundwater or leachate to surface water (drainage ditches or ponds) during construction.
- Surface run-off to water courses if uncontrolled drainage allowed.

2.6.5 Conceptual Site Model with Respect to Human Health

The conceptual site model has been developed based upon the following potential source-pathway-receptor linkages:

SOURCE		PATHWAY		RECEPTOR
Contaminated soils	→	Dermal exposure (if exposed during groundworks).	→	On-site female adult construction worker.
Contaminated soils	→	Outdoor inhalation of soil dust/particulates.	→	On-site female adult construction worker.

The construction of foundations for the solar arrays typically comprises driving a short pre-formed steel pin into the ground, without production of spoil, or installation of a small diameter 'foot-pad' to support the steel legs. In view of the very limited groundworks required, and the minimal interaction with existing soils, it is considered that the actual risk to groundworkers, should contaminated soils be present within the topsoil and subsoil, is negligible.

2.6.6 Conceptual Site Model with Respect to Controlled Waters

The conceptual site model has been developed, based upon the following potential source-pathway-receptor linkages:

SOURCE		PATHWAY		RECEPTOR
Contaminated soils (if present within construction depth)	→	Leaching from soils or migration of liquid contaminants through the unsaturated zone by means of new man-made or natural pathways	→	Surface Water Courses & Groundwater
Contaminated soils (if present within construction depth)	→	Run-off from disturbed surface soils	→	Surface Water Courses

The very limited groundworks required to install the solar arrays is considered to have negligible potential to cause or increase leaching, should any contaminated soils be present within the shallow depth of penetration. Run-off during construction works will need to be controlled and managed, as is standard practice. During future use, run-off is unlikely due to the predominant topsoil and turf cover and anticipated infiltration characteristics, but requires consideration.

3.0 ANTICIPATED GROUND & GROUNDWATER CONDITIONS

3.1 Anticipated Strata

In view of the above, the following ranges of ground conditions are anticipated:

Higher Eastern Area at or Above 60m AOD

Weathered Oolitic Limestones (Lincolnshire Limestone Formation of Inferior Oolite Group)

Depth (m)	Description
GL to 0.5/0.75	TOPSOIL and SUBSOIL (brashy/stony and sandy with limestone gravel)
0.5/0.75 to 1.0/3.0	Medium dense silty SAND with increasing gravel and sandy GRAVEL with a variable (loamy) silty binder, clayey in parts (WEATHERED INFERIOR OOLITE GROUP)
Below 1.0/3.0	Cream oolitic LIMESTONE, highly fractured with brown sandy SILT infilling (INFERIOR OOLITE GROUP)

Central Area between 50-60m AOD

Sandy Ironstone and Sandstones (Grantham Formation & Northampton Sand) or Coleby Mudstones)

Depth (m)	Description
GL to 0.5/0.75	TOPSOIL and SUBSOIL (slightly stony and very sandy)
0.5/0.75 to 1.0/2.0	Medium dense silty SAND and SILT (WEATHERED OOLITE OR LIAS GROUP)
1.0/2.0 to 2.0/4.0	Dense gravel becoming weathered bedrock of SILTSTONE, sandy IRONSTONE and SANDSTONE (NORTHAMPTON SAND) or Firm yellow or grey CLAY, highly weathered laminated MUDSTONE/ SILTSTONE OR SANDSTONE (LIAS GROUP)

Central & Western area between 30-50m AOD

Blown Sand overlying Lias mudstones and locally limestones

Depth (m)	Description
GL to 0.5/0.75	TOPSOIL and SUBSOIL (slightly stony and very sandy)
0.5/0.75 to 2.0/4.0	Loose or medium dense yellow brown silty SAND with some gravelly sand (SUTTON SAND / DEVENSIAN BLOWN SAND)
Below 2.0/4.0	Dense sandy IRONSTONE and SANDSTONE (NORTHAMPTON SAND) or Firm yellow or grey CLAY, highly weathered laminated MUDSTONE/ SILTSTONE OR SANDSTONE (LIAS GROUP)

Lower Western area at or below 30m AOD

Blown Sand overlying Lias Mudstones

Depth (m)	Description
GL to 0.5/0.75	TOPSOIL and SUBSOIL (slightly stony and clayey, very sandy)
0.5/0.75 to 2.0/4.0	Loose or medium dense yellow brown slightly clayey silty SAND with some gravelly sand (SUTTON SAND / DEVENSIAN BLOWN SAND)
Below 2.0/4.0	Firm dark grey CLAY, highly weathered laminated shaley MUDSTONE/ SILTSTONE (LIAS GROUP) (includes Pecten Ironstone)

3.2 Anticipated Groundwater and Leachate

It is anticipated that rainfall infiltration will rapidly move down through the free-draining topsoil and into the superficial granular deposits in the central and western area, and into the fissured predominant limestones in the higher eastern area. The potential groundwater conditions, springline and drainage directions are shown on an annotated plan included in Appendix C.

The groundwater table within the higher Lincolnshire Limestone Formation will be controlled by regional dip direction, which here is predominantly eastwards at 1-3°. The likely groundwater elevation is between 45-55mAOD, ie at least 5m below ground level in this higher area.

Below 50mAOD the occurrence of Blown Sand deposits appears to promote good drainage of the shallow depth soils, and the moderate slopes within the central area at 1 in 10 to 1 in 20, are likely to have an unconfined groundwater table within the basal layers of these sands.

Below 30mAOD on the lowest western area, the Blown Sands may well become more clayey or silty, and the underlying Coleby Mudstone of the Upper Lias, with a shallow surface slope of 1in 50 to 1 in 60 appears to promote a shallower water table. Spring issues are noted on the historical mapping at around 40-43mAOD and drainage ditches are prevalent below this elevation. Below 30mAOD the extreme western area may well have more poorly draining shallow soils, with frequent drainage ditches required. In addition, any backfilled ironstone workings could create localised poorly drained surface soils.

Nevertheless, the soils throughout the complete site area are classified as well drained or free draining.

3.3 Anticipated Ground Gas Regime

There is a substantial industrial area downslope to the west and major opencast ironstone workings, which may have been partially backfilled. It is not anticipated that an abnormal ground gas regime will be present beneath the majority of the site, in view of the topography, distance and apparent lack of continuity within the Blown Sand deposits.

However there remains a potential for abnormal ground gas development beneath the more level and closer western zone, and locally where small scale ironstone workings may have been backfilled.

4.0 CONTAMINATED LAND CONSIDERATIONS

4.1 General

The desk study has indicated that the current site has a prolonged history of agricultural usage. There is no specific evidence of significant large-scale ironstone extraction or landfilling within the boundaries proven to date, with the exception of the extreme southwestern zone, where opencast workings are annotated on the 1994 map. There appears also to have been small scale extraction via pits and near surface digging in the lower western area. Adjacent to the west and northwest boundaries, where there has been substantial ironstone working off-site, both opencast and underground mining areas may well be backfilled with unknown materials. There has been prolonged heavy industry immediately beyond the site boundaries.

4.2 Qualitative Risk Assessment

The currently proposed solar farm is likely to involve construction activity within the uppermost 500-1500mm of ground level. The likelihood of solar array construction creating an adverse, or worsening impact on the contaminant exposure model given above, is therefore considered negligible for most of the site and low for potential backfilled features.

There is a negligible risk of a new controlled waters pollutant linkage being created due to the very shallow depth of construction activity, and the non-polluting nature of the development.

It is not currently anticipated that shallow depth soils will include significant remnant contamination, however this will need to be confirmed in view of the proximity of industrial sites and suggested small scale pit extraction in the extreme western boundary area, and recent 1990's opencast working in one small area. The majority of proposed construction however involves minimal ground intrusion, and it is considered that the pathway for exposure of groundworkers during construction is unlikely to create a significant contaminant linkage, with standard practice.

The overall ground gas regime beneath the site is likely to be normal or near normal. The proposed construction of solar arrays will not have any overall adverse impact on that ground gas regime. In the lower western area there is potential for an abnormal ground gas regime, due to any backfilled workings, and requires further consideration in view of the proposal for buried electrical plant and cabling.

4.3 Conclusions

In view of the above low levels of risk and proposed change of use, it is advisable that limited investigation/assessment be completed. It is concluded that for contaminated land assessment:

- Confirmatory intrusive contamination investigation is recommended, concentrated on the western boundary, targeted at specific features shown on historical maps. This will provide data on the occurrence and variation in shallow depth soils conditions (typically between ground level to 1m depth, and with deeper investigation at limited locations). The most technically appropriate method of investigation would be with shallow open-drive sampling boreholes.

- If these boreholes confirm the absence of significant extraction or landfilling in the western boundary zone, it seems unlikely to be necessary to undertake further investigation for this aspect across the remainder of the site. However where other geotechnical or drainage investigations are to be undertaken to provide data for design and construction, the opportunity to inspect and sample at those locations can be taken, to confirm deeper ground conditions and obtain additional soils samples for confirmatory analyses.

- Near surface and deeper gas monitoring should confirm the typical gas regime, particularly in the lower western area. This can be achieved by gas measurements within the borehole standpipes, which should have a variety of response zone depths. A sufficient programme of gas and groundwater monitoring would be 1- 2 visits initially during low or rapidly falling atmospheric pressure periods. That would identify whether any further monitoring is required.

- Assuming groundwater is proven within the standpipe installations, sampling can provide analyses of water quality and confirm any contaminant impact on controlled waters beneath the current site.

Following intrusive investigations the conceptual model can be updated and a quantitative risk assessment made. That will identify any specific areas of concern and the need for any further investigation, risk assessment or design measures.

5.0 GEOTECHNICAL CONSIDERATIONS

The anticipated ground conditions indicate predominantly granular superficial deposits or over-consolidated mudstones beneath the majority of the western and central area, and limestone derived soils in the higher eastern area. Under the anticipated minor loading changes due to solar array construction, these soils are unlikely to prove problematic.

If confirmation of shallow depth soils characteristics suggests it is merited, for instance in any shallow backfilled ironstone pits or backfilled workings, consideration could either be given to use of geogrid reinforcement in specific areas to increase soil stability and tensile strength, or shallow vibro compaction simply to produce a uniform formation and limit differential movement of solar arrays to within acceptable limits. The stability of the proposed anchoring / foundation system should provide adequate resistance to self-weight, wind and snow loadings.

The construction of the arrays should ensure that enhanced surface run-off, or erosion does not occur. Across the majority of the proposed array areas this is not considered likely, in view of the granular soils, described as being well-drained or free-draining. However where transformer and battery units are proposed, these should be sat on a permeable gravel bed to promote attenuation and infiltration to the underlying soils.

Intrusive geotechnical investigation will therefore be required to confirm the following aspects:

- The typical thickness of topsoil, subsoil and superficial deposits and their material, grading and strength properties;
- Description and classification of shallow depth soils, along with field infiltration trials via soakaway testing, to measure in situ permeability of near surface soils, and to compare against design permeability, drainage assumptions and design;
- Evidence for past shallow ironstone working or backfilling of such features, perhaps by 'bell pit' extraction or similar, in the lower western area, specifically investigating features indicated on historical mapping, where they occur within proposed solar array zones.

It would be prudent to take specialist advice on the need for Unexploded Ordnance supervision during any works close to the former WWII anti-aircraft battery identified by the heritage consultant in the eastern area.

It would also be prudent for the project team to obtain further details of the nearby oil well permissions, reservoir depth(s) and potential zone of influence, should future exploitation be proposed.

The geotechnical investigation should be combined with contamination assessments discussed above. Machine excavated trial pitting will be the most appropriate technique for investigation and soakaway trials on this large area.

Appendix A

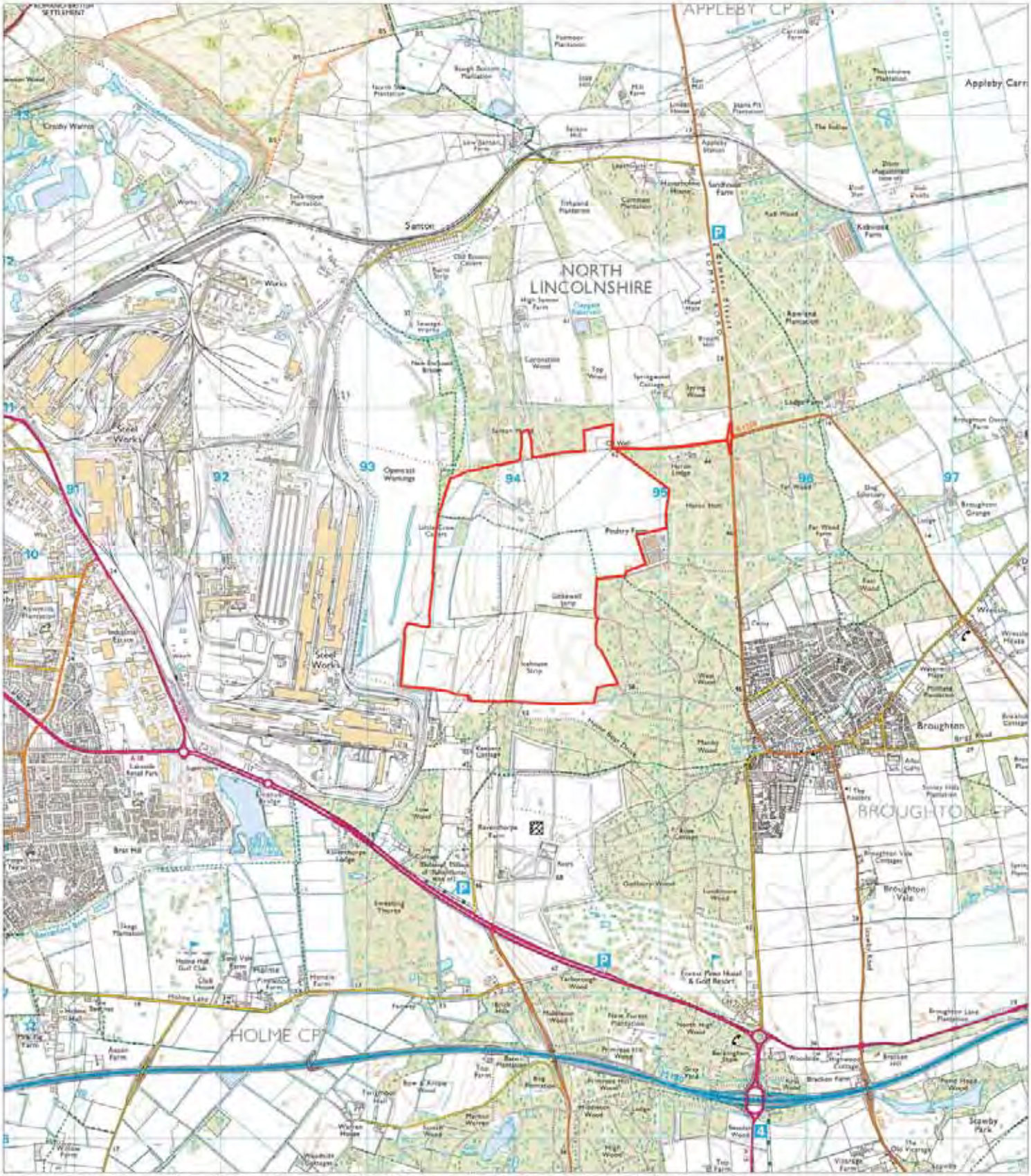
Site Location

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

KEY: SITE LOCATION PLAN

APPLICATION BOUNDARY

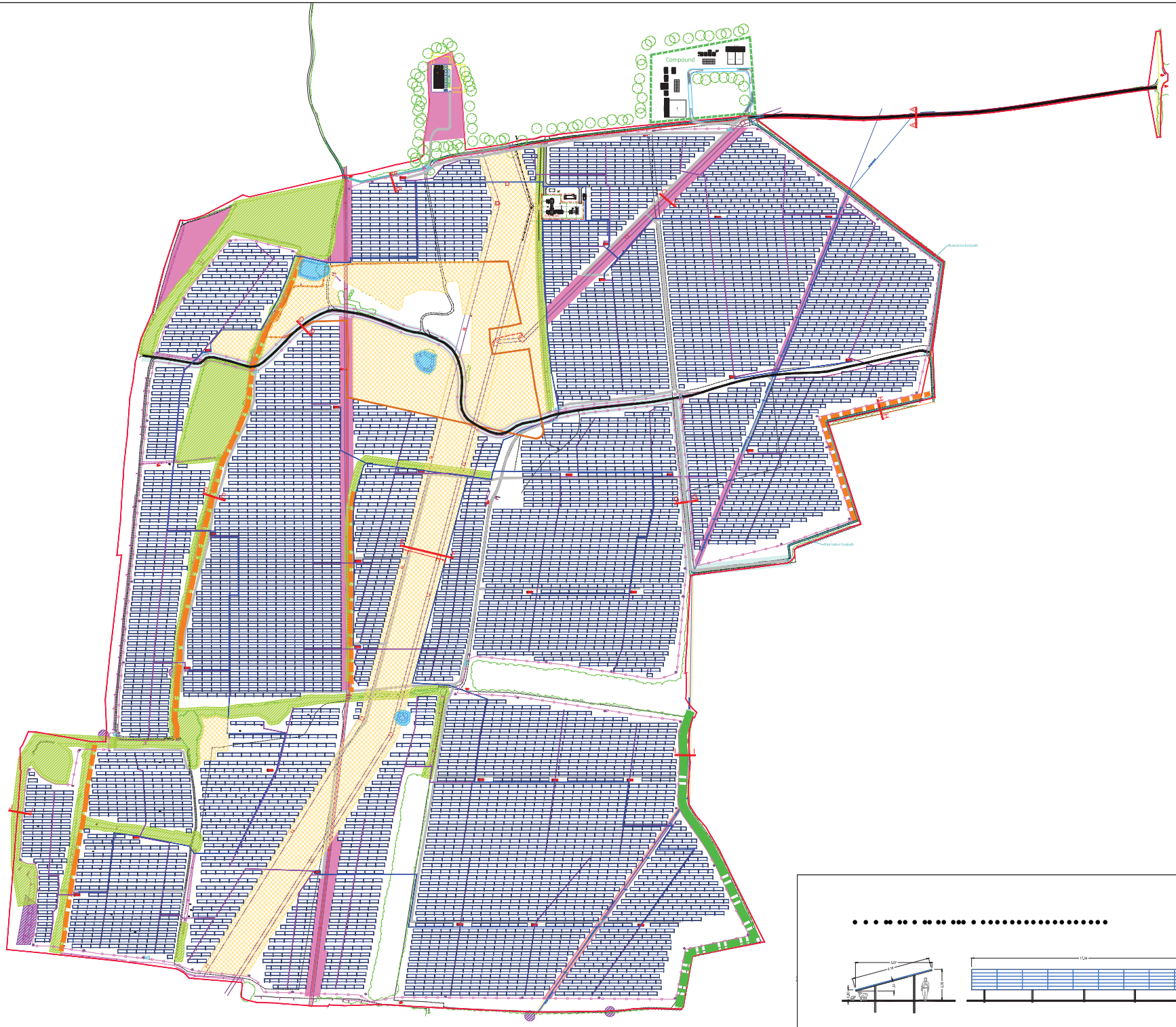


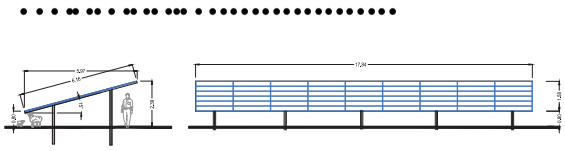
Copyright Pegasus Planning Group Ltd. © own copyright. All rights reserved. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100035409. GroupSite Licence number 510003747 Standard OS licence rights conditions apply. Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasusgroup.co.uk

0 0.5 1.0Km

LITTLE CROW SOLAR PARK - **SITE LOCATION PLAN**

Pegasus Design





Section Scale
1:100

N
W
E
S

Electrical design

Station A

Inverter:
AC-Combiner:
Strings:
Panels:

Key

- Table
- Existing Access Track
- New Access Track
- Public Footpath (gap = 15,00m)
- Buffer Woodland (15,0m)
- Swales (Buffer 8,00m)
- Pond (Buffer 5,00m)
- Hedges (Buffer 5,00m)
- Badger Zone (Buffer 20,00m)
- Zone for Winter Birds : 22,5ha
- Zone for Arable Weeds / Species Rich Grasslands : 5,4ha
- Transformer Station
- Construction Area
- Exclusion Zone Archeological
- Fence
- Gate / Entrance
- Trench AC
- Trench MV
- CCTV
- Alternative Footpath

Regulations 2009 Document Paragraph Reference Number

Regulation 5(2)(o)

PROJECT NAME

Little Crow Solar Park

DRAWING	DRAWING
Table layout	A10B0C0

GEOGRAPHICAL SITE:

COORDINATES	
KN/MSL	60.0m
SUNANGLE	
DATE	21.12.2017 / 12:00

SITE SYSTEM:			CHANGE
SYSTEMLAYOUT	6L x 9	6L x 5	10.07.2018 Axial 63KV Battery
NUMBER OF TABLES	6.449 pc	345 pc	10.07.2018 moved Fence and roads
PANEL ORIENTATION	Landscape		02.08.2018 divers. changes
NUMBER OF PANELS	357.561		06.08.2018 divers. changes

SITE TECHNOLOGY:		DRAW
MODULE NAME		DRAW 01.08.2018 M. Riedel
MODULE SIZE		DRAW 10.07.2018 M. Riedel
MODULE POWER	380 W	DRAW 10.07.2018 M. Riedel
TYPE OF PANELS	POLY	DRAW 02.08.2018 M. Riedel
ANGLE OF PANELS	•••••	DRAW 06.08.2018
TABLESHADOW	1.0 m	DRAW
ROWDISTANCES		CHECK
		CHECK

SITE TOTAL POWER

DC POWER	135.87 MWp
AC-POWER nom.	
AC-POWER max.	

Signature:

Scale	1:2500
Paper size	A0

GREENCELLS GROUP

Intégrale

Appendix B

Site Description/Photographs

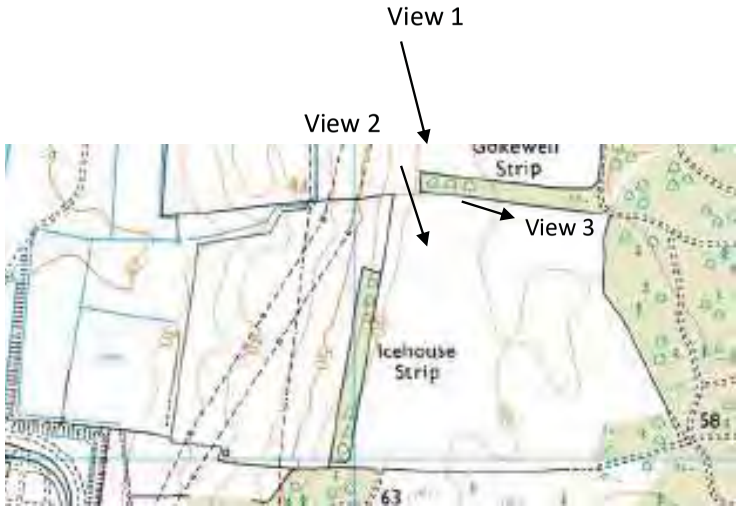
Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

Santon
Solar/Battery
Site survey photos



View 1



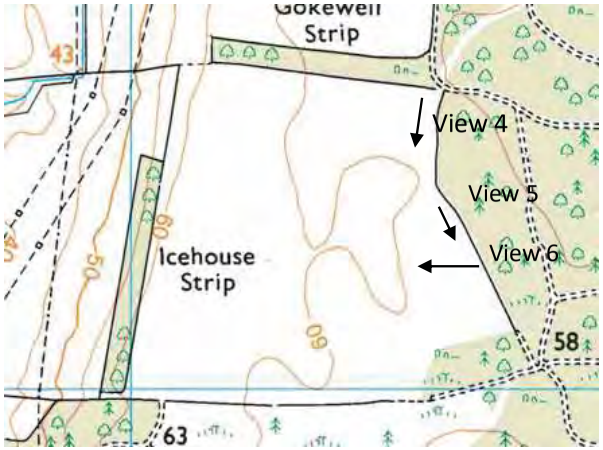




View 2



View 3



View 4

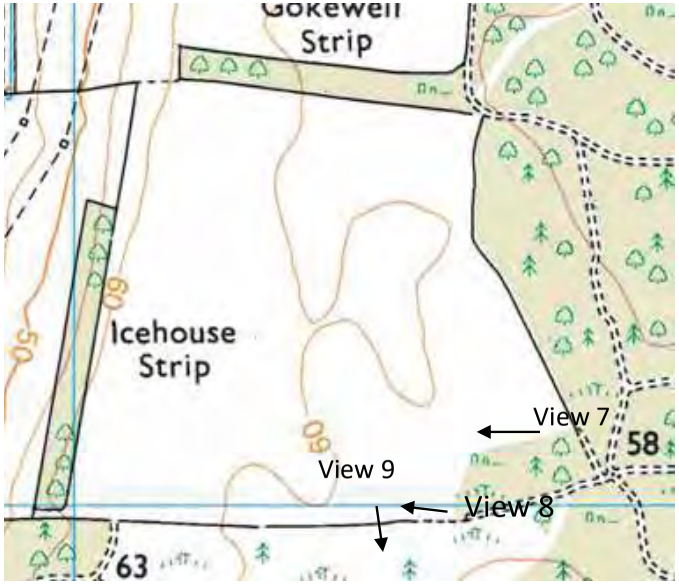


View 5



View 6





View 7

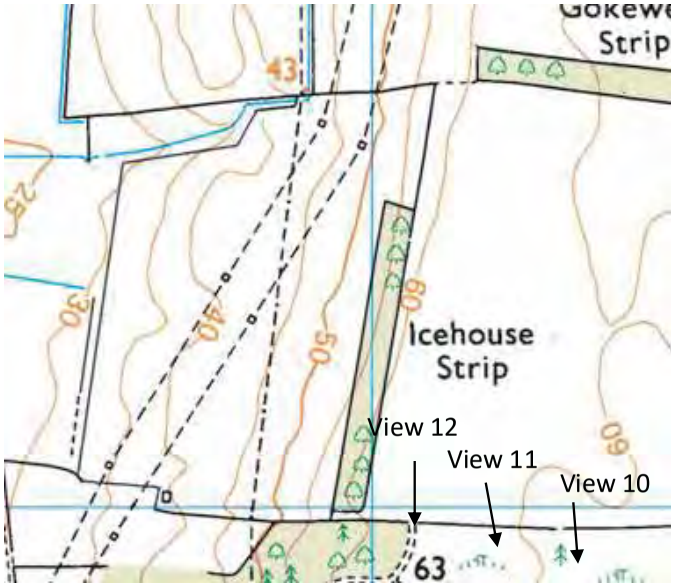


View 8



View 9 Fox tbc





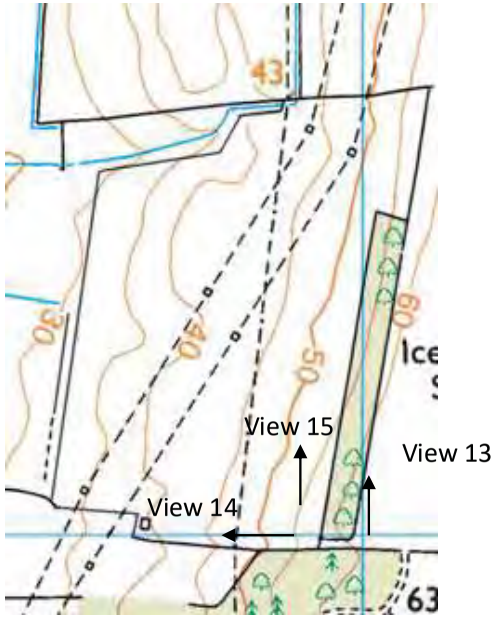
[redacted]

View 12 Track to Raventhorpe

View 11







View 13

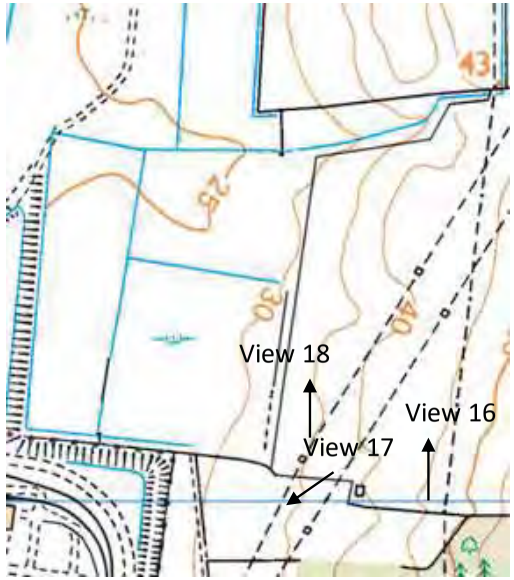


View 14



View 15





View 16

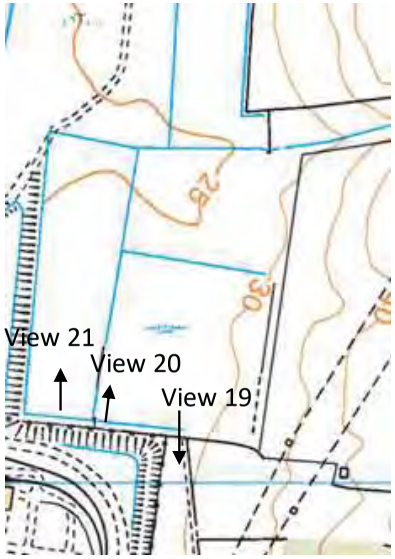


View 17 Sub



View 18





View 19 Sub

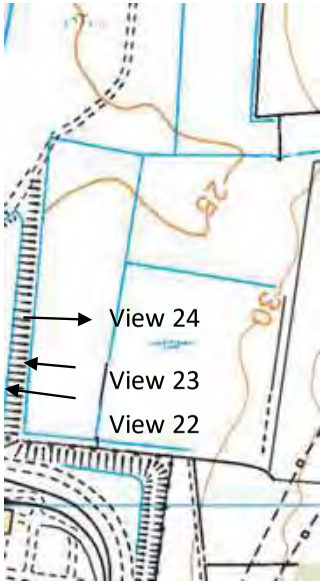


View 20



View 21





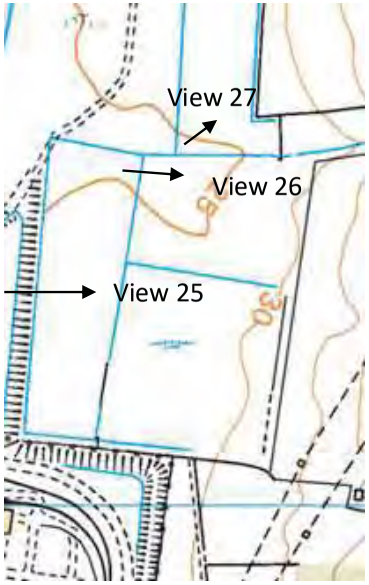
[redacted]

View 23



View 24





View 25

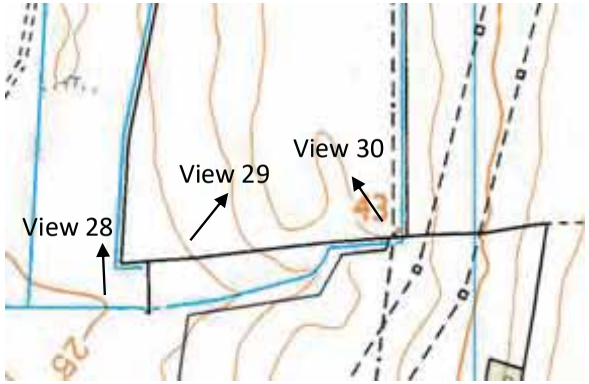


View 26



View 27





View 28

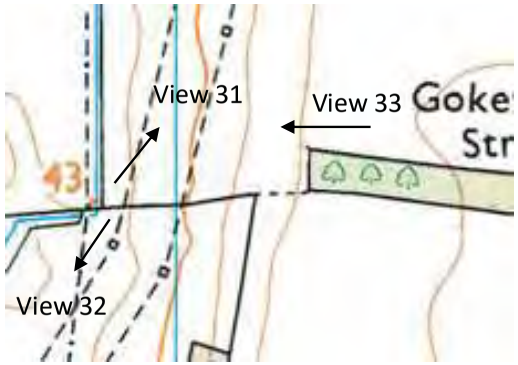


View 29



View 30





View 31

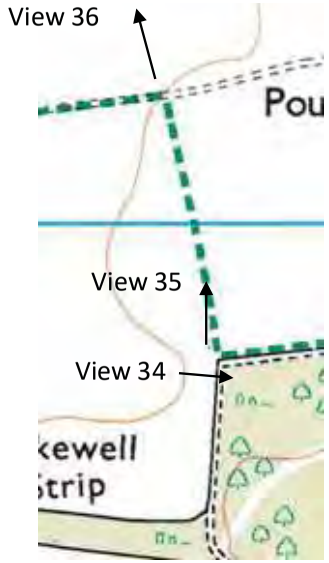


View 32



View 33





View 34

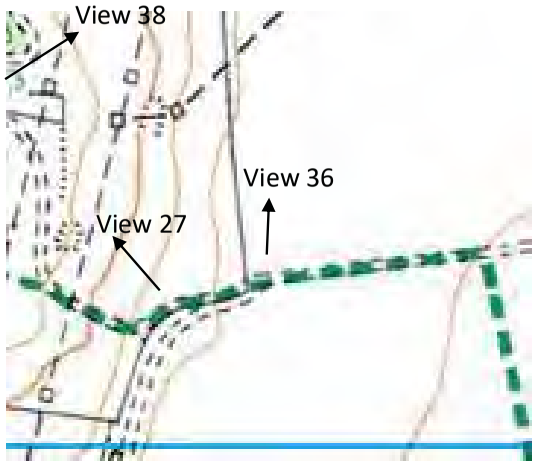


View 35



View 36





View 36



View 37



View 38





View 40

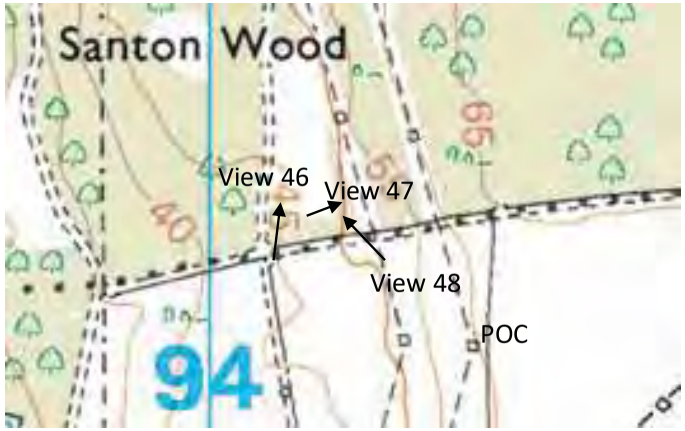


View 41



View 42





View 46

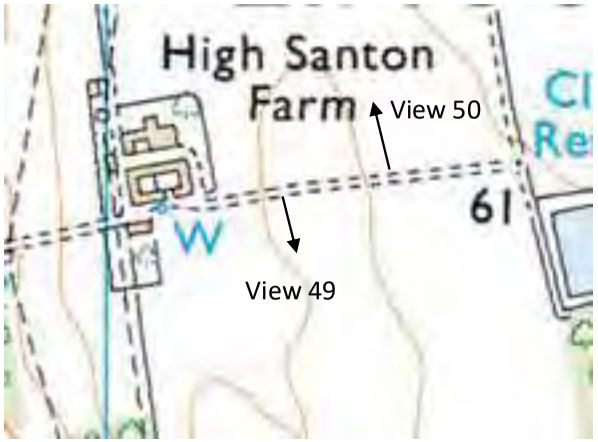


View 47



View 48



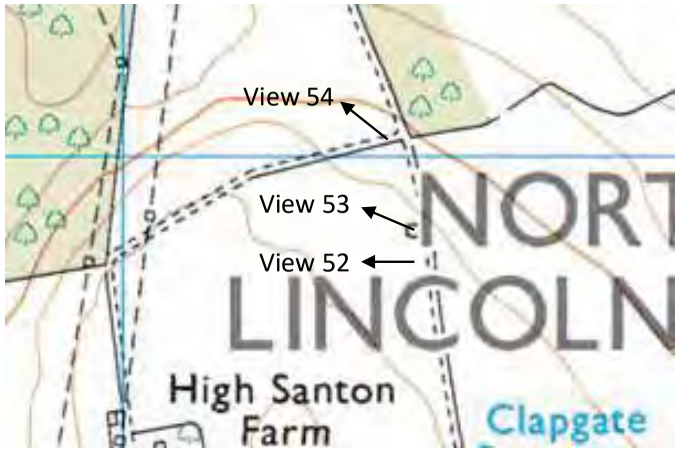


View 49



View 50





View 52



View 53



View 54



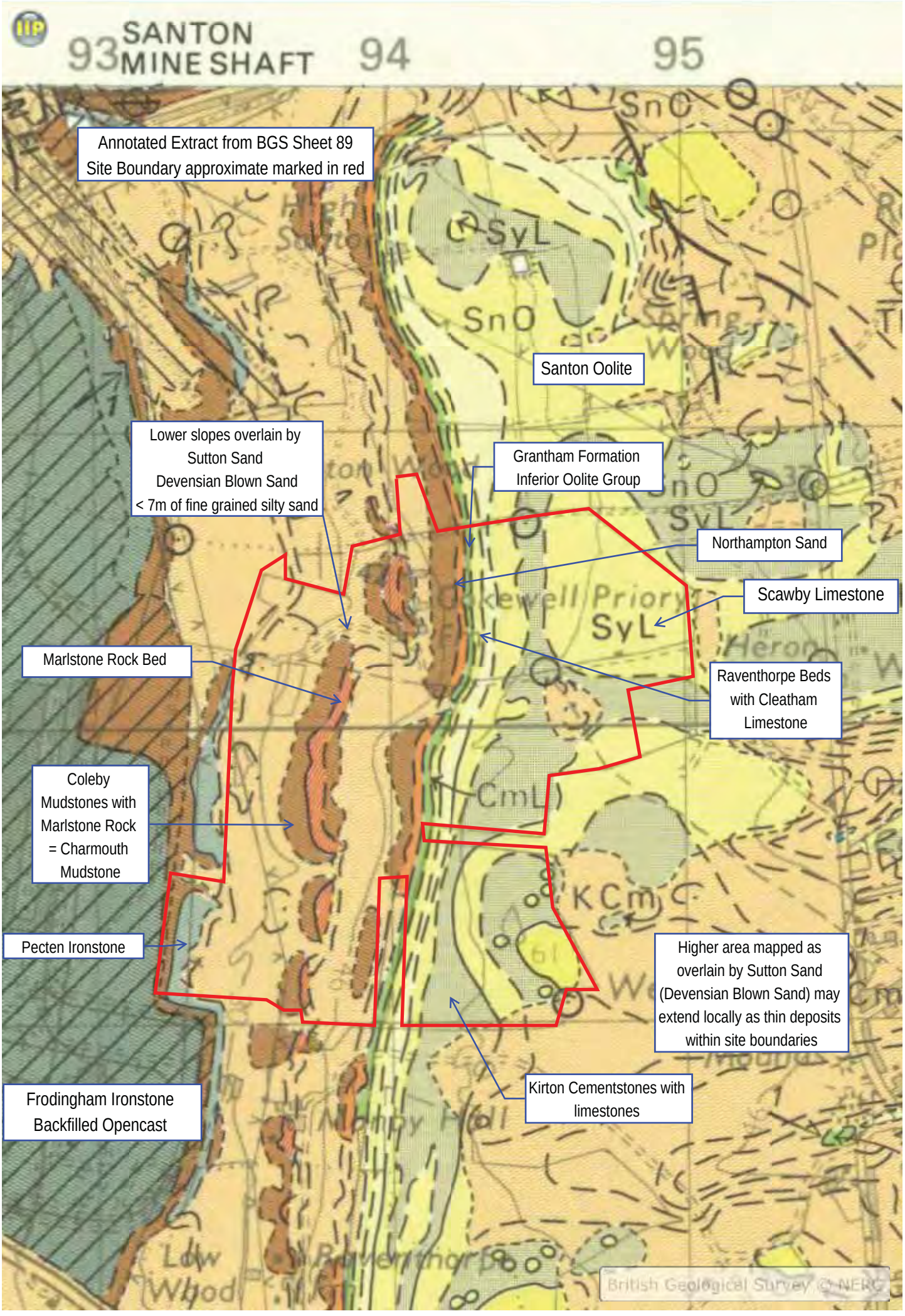
Intégrale

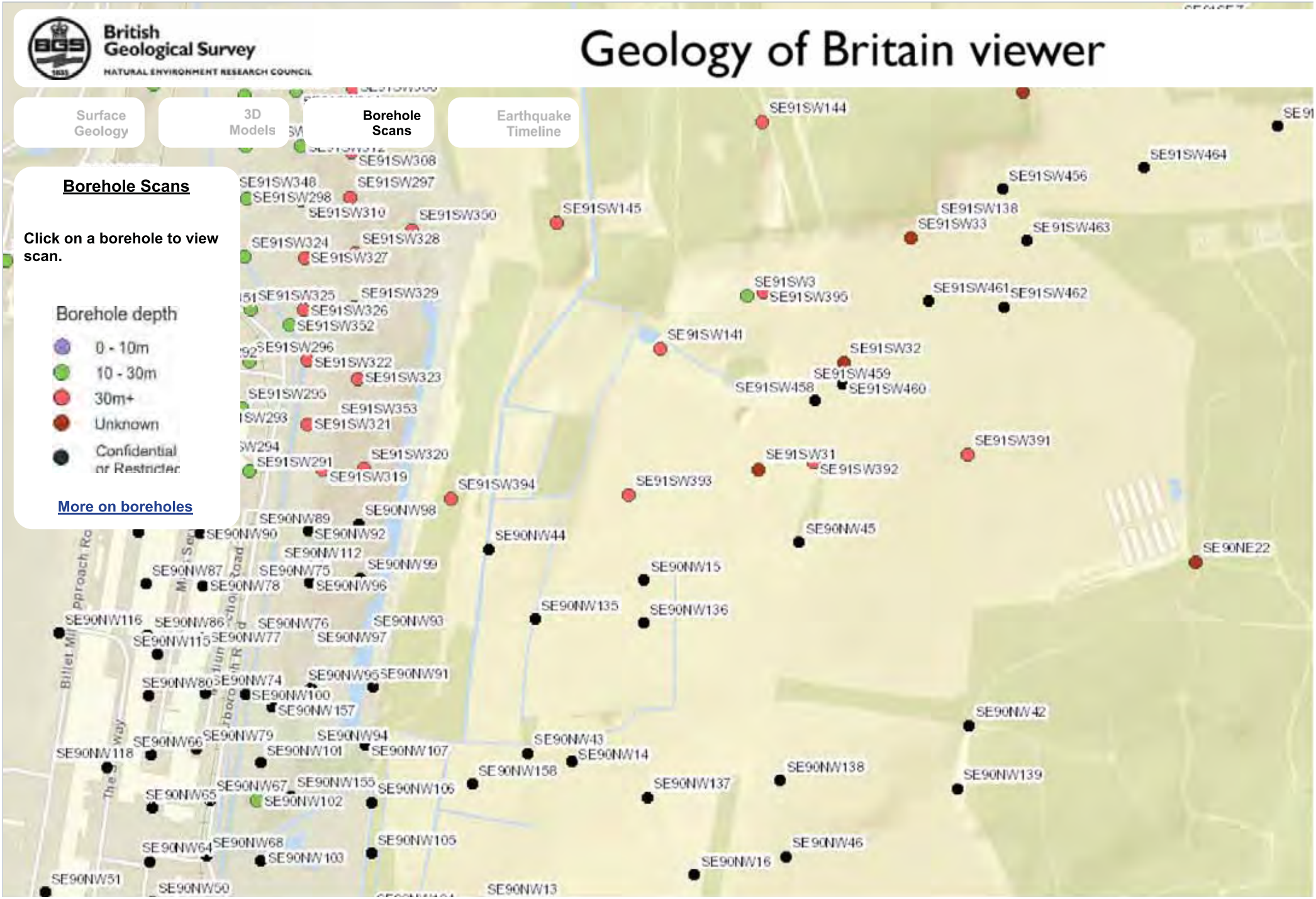
Appendix C

Geological Information

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37


SANTON
MINE SHAFT
93
94
95
Annotated Extract from BGS Sheet 89
Site Boundary approximate marked in red
Santon Oolite
Lower slopes overlain by
Sutton Sand
Devensian Blown Sand
< 7m of fine grained silty sand
Grantham Formation
Inferior Oolite Group
Northampton Sand
Scawby Limestone
Marlstone Rock Bed
Raventhorpe Beds
with Cleatham
Limestone
Coleby
Mudstones with
Marlstone Rock
= Charmouth
Mudstone
Pecten Ironstone
Higher area mapped as
overlain by Sutton Sand
(Devensian Blown Sand) may
extend locally as thin deposits
within site boundaries
Kirton Cementstones with
limestones
Frodingham Ironstone
Backfilled Opencast
British Geological Survey © NERC


British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL
Geology of Britain viewer
Surface Geology
3D Models
Borehole Scans
Earthquake Timeline
Borehole Scans
Click on a borehole to view scan.
Borehole depth
0 - 10m
10 - 30m
30m+
Unknown
Confidential or Restricted
More on boreholes
SE91SW144
SE91SW464
SE91SW456
SE91SW308
SE91SW348
SE91SW297
SE91SW298
SE91SW310
SE91SW350
SE91SW145
SE91SW138
SE91SW33
SE91SW463
SE91SW324
SE91SW328
SE91SW327
SE91SW3
SE91SW395
SE91SW461
SE91SW462
SE91SW325
SE91SW329
SE91SW326
SE91SW352
SE91SW141
SE91SW296
SE91SW322
SE91SW32
SE91SW323
SE91SW459
SE91SW458
SE91SW460
SE91SW295
SE91SW353
SE91SW321
SE91SW391
SE91SW31
SE91SW392
SE91SW320
SE91SW291
SE91SW319
SE91SW394
SE91SW393
SE90NW98
SE90NW89
SE90NW90
SE90NW92
SE90NW44
SE90NW45
SE90NE22
SE90NW112
SE90NW99
SE90NW87
SE90NW75
SE90NW78
SE90NW96
SE90NW15
SE90NW135
SE90NW136
SE90NW116
SE90NW86
SE90NW76
SE90NW93
SE90NW115
SE90NW77
SE90NW97
SE90NW80
SE90NW74
SE90NW95
SE90NW91
SE90NW100
SE90NW157
SE90NW42
SE90NW66
SE90NW79
SE90NW94
SE90NW43
SE90NW118
SE90NW101
SE90NW107
SE90NW14
SE90NW158
SE90NW138
SE90NW139
SE90NW65
SE90NW67
SE90NW155
SE90NW105
SE90NW137
SE90NW102
SE90NW64
SE90NW68
SE90NW105
SE90NW46
SE90NW103
SE90NW16
SE90NW51
SE90NW50
SE90NW13

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 134225 : BGS Reference: SE91SW141
British National Grid (27700) : 493859,410390
Report an issue with this borehole

<< < Prev Page 1 of 1 Next > >>

SE 91 SW/14.1

(*11932) Wt.30570/0870 10,000 9/20 A.& E.W.Ltd. Gp.685

RECORD OF SHAFT OR BORE FOR MINERALS

County LINCS
6" Quarter Sheet SE 91 SW/SE
1" N.S. Geol. Map 89 Brigg
1" O.S. Geol. Map
Whether Confidential
SE 93871039

Name and Number of Shaft or Bore given by Geological Survey: Gokewell Priory Farm

Name and Number given by owner (if different from above): M106

Town or Village Date of sinking

Exact site near pond to west of Gokewell Priory Farm

A sketch-map or tracing from a large-scale map is desirable.

Purpose for which made 2951

Level at which bore commenced relative to O.D. 96·8 If not down bore, state if horizontal or up

Made by for Messrs.

Information from Date received

Specimens Dip of strata

Geological Classification	Description	Thickness			Depth		
	Blown Sand				3 66	12	0
	Blue clay				11 58	38	0
	Pecten Bed	41·61 – 42·06			12 80	42	0
	Blue clay. Soft clayey ironstone band at 136'6"-138'; the clays are sandy bet. 138' & 142'. Practically no fossils above 85'. Bottom 6' no core	42.06 – 43.28			47 55	156 1/4	0
	Frod. Ironstone: red-brown and golden brown and greenish brown ool. & shelly ironstones. Blue grey calc. & clayey beds 160'-163'6"; bluish clayey ironstone 164'9"-165'6"; band of re-worked ironstone pebbles 174'-5'.	48.77 – 49.84 50.22 – 50.42 53.04 – 53.34			56.16	184	3
	Blue clay				56.39	185	0
FOSSILS	Plicatula spinosa from 47'-48'; Serpula plicatilis from 61'; 'Polymorphites' (gen. nov.) sp. nov., Coeloderoceras sp. ind., Cincirhynchia sp., Eucyclus sp., Lima sp., L. pectinoides, Entolium lehli, Zygopleura sp., Hemipedina loriesi, Katosira aff. peninsula, Nucula na minor, Cincirhynchia cf. dalmasi, Nuculana complanata, Zygopleura sp. nov., Katosira sp., Procerithium cf. S granosum, Rissoidea subdisjuncta, Plicatula spinosa all from 85'-102' (taylori zone). Rhynchonella sp. from 96' & 104'. Nuculana complanata, Astarte striato-sulcata, Procerithium cf. slatteri, Grandirhynchia & Zygopleura sp. all from 110'. Echioceras (Enechioceras) sp. nov. & Hemimicroceras sp. from 115' (macdonelli zone) Echioceras aff. raricostatoides, E. sp. juv., Oxynoticeras sp. from 132'-138' (raricostatoides zone) Gagateceras gagateum, G. spp. juv., Paraechioceras spp. juv. from 142'-148' (gagateus zone)						
	Top of F.I. – 57·2						
	Down to TPF						

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7.

G.S.M. Office File No.	Site marked on 6" Map by	Site marked on 1" Map by

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 134475 : BGS Reference: SE91SW391
British National Grid (27700) : 494555,410167
Report an issue with this borehole

<< < Prev Page 1 of 1 Next > >>

Yokewell Southeast SE 91 SW/391

The United Steel Cos. Ltd.
ORE MINING BRANCH
Colsterworth/Scunthorpe

EXPLORATION RECORD

Hole No. Y.192

O.S. Sheet Ref. | Lease Yarboro' | Area Yarboro' | Date Started 28.3.64

Position 9454016 0.3,224 Parish of Broughton. | Date Completed 19.4.64

GEOLOGICAL LOG

Depth From	Depth To	Thick. Ft.	Description	Geological Horizon
0.0	0.76	0.76	Top Soil) Lincs.)	
2.5	3.66	2.5	Cream colitic limestone) Limestone)	Inferior
12.0	6.40	9.5	Grey sandy clay) L.R.S.)	Oolite
21.0	6.71	9.0	Brown Sandy clay))	
22.0	11.28	0.30	Sandstone))	
37.0	23.77	15.0	Grey clay)	
78.0	26.82	41.0	Brown Shale)	Upper Lias
88.0	32.00	10.0	Grey clay)	
105.0	34.14	17.0	Marlstone)	
112.0	58.52	7.0	Grey clay)	Middle Lias
192.0	59.59	80.0	Peeten)	
195.5	92.85	3.5	Grey clay)	Lower Lias
302.0	101.99	106.5	P.L.B.)	
334.3	102.11	32.3	Blue Bind)	
335.0		0.7		

Hole Plugged at 302.0'.

92.05
32.00
60.05 (2.18)

92.05
58.52
33.53

92.05
66.45
25.60

1 Surface level
2 Kirton Limestone
3 Scunthorpe Oolite
4 Roxby Rock on Golden Boundless
5 Northorpe Sand
6 Coloby Limestone with Marlstone Rock (3.13 at 32.00) and Peeten (1.07 at 58.52)
7 Frodingham Limestone
8 Scunthorpe Mudstone to be cleared

DRILL LOG

CROWNS USED

Size	No.	Feet
143		5.0
131		35.5
114		10.5
116	FB	251.0
101	631269	33.0

REAMERS USED

Size	No.	Feet

CASING USED

Size	Set (Ft.)	Recovered (Ft.)
143	5.3	5.3
128	41.3	41.3

Water Used 48,600

Rest Water Level

LEVELS 60.45

Surface	198.3
Top Pst.	-103.7
Bottom Pst.	-136.0

Signed R. J. H. [illegible]

P. & H. 1/59.

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 134476 : BGS Reference: SE91SW392
British National Grid (27700) : 494208,410142
Report an issue with this borehole

<< < Prev Page 1 of 1 Next > >>

Tokwell South SE 91 SW/392

The United Steel Cos. Ltd.
ORE MINING BRANCH
Colsterworth/Scunthorpe

EXPLORATION RECORD

Hole No. I.188

O.S. Sheet Ref. ____ Lease Yarboro' Area Yarboro' Date Started 12.3.64

Position 94171016 O.S.268 Parish of Broughton Date Completed 28.3.64

GEOLOGICAL LOG

Depth From	Feet To	Thick. Ft.	Description	Geological Horizon
0.0	14.5	14.5	Yellow Clay	Recent
14.5	16.0	1.5	Hard Grey Limestone)	
16.0	34.5	18.5	Brown Sandy Shale)	Middle
34.5	52.0	17.5	Grey Clay)	Lias
52.0	59.0	7.0	Marlstone)	
59.0	139.0	80.0	Grey Clay))	
139.0	142.5	3.5	Pecten)	
142.5	252.0	109.5	Grey clay)	Lower
252.0	282.3	30.3	F.I.B.)	Lias
282.3	284.0	1.7	Grey Clay)	

Hole plugged at 282'-3"

DRILL LOG

CROWNS USED

Size	No.	Feet
143		14.5
131		27.5
116		10.5
116	FB	199.5
101	631269	32.0

REAMERS USED

Size	No.	Feet

CASING USED

Size	Set (Ft.)	Recovered (Ft.)
143	15.1	15.1
128	162.3	162.3

Water Used 36,100

Rest Water Level

LEVELS

Surface	161.3
Top I'st.	- 90.7
Bottom I'st.	-120.7

Signed K.J.M. Wiles

P. & H. 1/59.

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 134477 : BGS Reference: SE91SW393
British National Grid (27700) : 493793,410059
Report an issue with this borehole

<< < Prev Page 1 of 1 Next > >>

Little Crow Covert East SE 91 SW/393

The United Steel Cos. Ltd.
ORE MINING BRANCH
Colsterworth/Scunthorpe

EXPLORATION RECORD

Hole No. I.189

O.S. Sheet Ref. | Lease Yarboro' | Area Yarboro'

Position 93841020 0.S.268 Parish of Broughton.

Date Started 12.3.64

Date Completed 23.3.64

GEOLOGICAL LOG

Depth From	Feet To	Thick. Ft.	Description	Geological Horizon
0.0	10.0	10.0	Yellow clay	
10.0	67.5	57.5	Grey clay	
67.5	71.0	3.5	Pecten	Lower Lias
71.0	180.0	109.0	Grey clay	
180.0	211.0	31.0	P.I.B.	
211.0	213.0	2.0	Grey Bed	

54.86
20.03
34.83 (1.07)

54.86
36.40
-18.46

DRILL LOG

CROWNS USED

Size	No.	Feet
131	FB	61.5
131	-	3.5
116	FB	116.0
101	631723	33.0

REAMERS USED

Size	No.	Feet

CASING USED

Size	Set (Ft.)	Recovered (Ft.)
143	5.0	5.0
128	72.0	72.0

Water Used 24,520

Rest Water Level

LEVELS 36.40

Surface	119.4
Top I'st.	-60.6
Bottom I'st.	-91.6

Signed R. J. H. Wing

F. & H. 1/59.

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 134479 : BGS Reference: SE91SW395
British National Grid (27700) : 494087,410523
Report an issue with this borehole

<< < Prev Page 1 of 2 ▾ Next > >>

Tokewell Farm North SE 91 SW/395

The United Steel Cos. Ltd.
ORE MINING BRANCH
Colsterworth/Scunthorpe

EXPLORATION RECORD

Hole No. I.193.

O.S. Sheet Ref. _____ Lease Yarboro' Area Yarboro' Date Started 15.4.64

Position 94901051 0.3.273 Parish of Broughton. Date Completed 29.4.64

GEOLOGICAL LOG

Depth From	Feet To	Thick. Ft.	Description	Geological Horizon
0.0	6.0	6.0	Brown Sand	Recent
6.0	14.0	8.0	Yellow Clay	Middle Lias
14.0	21.0	7.0	Marlstone	
21.0	104.0	83.0	Grey Clay	
104.0	107.0	3.0	Pecten	
107.0	217.0	110.0	Grey Clay	Lower Lias
217.0	245.7	28.7	F.I.B.	
245.7	250.7	1.0	Blue Bind	

Water lost in ironstone.

Hole plugged at 245.7'

DRILL LOG

CROWNS USED

Size	No.	Feet
143		9.0
131		16.0
114	FB	132.0
101	642333	33.7

REAMERS USED

Size	No.	Feet

CASING USED

Size	Set (Ft.)	Recovered (Ft.)
143	10.3	10.3
128	131.9	131.9

Water Used 30,600

Rest Water Level

LEVELS 43.54

Surface	142.8
Top I'st.	-74.2
Bottom I'st.	-102.9

Signed R.J. Wa...

P. & H. 1/59.

Soil Site Report

Extended Soil Report

Santon 1844

Easting: 493973
Northing: 409748
Site Area: 1km x 1km

Prepared for: Kay Boreland, Integrale Ltd
Date: 08 Aug 2017



Citation

Citations to this report should be made as follows:

National Soil Resources Institute (2017) Soils Site Report for location 493973E, 409748N, 1km x 1km, National Soil Resources Institute, Cranfield University. Accessed via: https://www.landis.org.uk/sitereporter

Disclaimer

The report, modules and risk maps have been prepared by Cranfield University for you, the client. Whilst every care has been taken by Cranfield University to ensure the accuracy and completeness of the reports, modules and risk maps, the client must recognise that as with any such items errors are possible through no fault of Cranfield University and as such the parties give no express or implied representations or warranty as to:

(i) the quality or fitness for any particular purpose of the report, modules or risk maps contained herein or of any design, workmanship, materials or parts used in connection therewith or correspondence with regard to any description or sample;
or
(ii) the accuracy, sufficiency or completeness of the report modules or risk maps provided herewith. In particular, there are hereby expressly excluded all conditions, warranties and other terms which might otherwise be implied (whether by common law, by statute or otherwise) as to any of the matters set out in paragraphs (i) and (ii) above.

Cranfield University, its employees, servants and agents shall accept no liability for any damage caused directly or indirectly by the use of any information contained herein and without prejudice to the generality of the foregoing, by any inaccuracies, defects or omissions in the report, modules or risk maps provided.

About this report

This Soil Site Report identifies and describes the properties and capacities of the soil at your specified location as recorded in the National Soil Map for England and Wales. It has been produced by Cranfield University's National Soil Resources Institute.

The National Soil Map represents the most accurate and comprehensive source of information about the soil at the national coverage in England and Wales. It maps the distribution of soil mapping units (termed soil associations) which are defined in terms of the main soil types (or soil series) that were recorded for each soil association during field soil survey. Each soil association is named after its principal soil series and these bear the location name from where they were first described (e.g. Windsor). Each of these soil associations have differing environmental characteristics (physical, chemical and biological) and it is by mapping these properties that the range of thematic maps in this report have been produced.

Soil types and properties vary locally, as well as at the landscape scale. It is not possible to identify precisely the soil conditions at a specific location without first making a site visit. We have therefore provided you with information about the range of soil types we have identified at and around your selected location. Schematic diagrams are also provided to aid accurate identification of the soil series at your site.

Whilst an eight-figure national grid reference should be accurate to within 100m, a single rural Postcode can cover a relatively large geographical area. Postcodes can therefore be a less precise basis for specifying a location. The maps indicate the bounded area the reports relate to.

Your Site Soil Report will enable you to:

- identify the soils most likely to be present at and immediately around your specified location;
- understand the patterns of soil variation around your location and how these correlate with changes in landscape;
- identify the nature and properties of each soil type present within the area;
- understand the relevant capacities and limitations of each of the soils and how these might impact on a range of factors such as surface water quality.

Provided that this Site Soil Report is not modified in any way, you may reproduce it for a third-party.

Table of Contents

1. Soil Thematic Maps **1**
1a Soils - Spatial Distribution 2
1b Hydrology of Soil Type (HOST) 4
1c Ground Movement Potential 6
1d Flood Vulnerability 8
1e Risk of Corrosion to Ferrous Iron 10
1f Pesticide Leaching Risk 12
1g Pesticide Runoff Risk 14
1h Potential for Pesticide Adsorption 16
1i Hydrogeological Rock Type 18
1j Ground Water Protection Policy (GWPP) 20
1k Soil Parent Material 22
1l Expected Crops and Land Use 24
1m Natural Soil Fertility 26
1n Simple Topsoil Texture 28
1o Typical Habitats 30
2. Soil Association Descriptions **32**
BANBURY (544) 33
NEWPORT 1 (551d) 35
3. Soil Series Properties **37**
SOIL PROPERTY DEFINITIONS 38
5.44 BANBURY (Bp) (101) 39
8.21 BLACKWOOD (bK) (124) 40
5.45 IRONDOWN (Ir) (802) 41
5.51 NEWPORT (Na) (1310) 42
5.53 RUDGE (rJ) (1743) 43
5.44 TADMARTON (tM) (1900) 44
5.41 WICK (wQ) (2225) 45
4. Topsoil Element Background Levels **46**
a. Analysis Within a 15km Radius (28 Sample Points) 48
b. Analysis Within a 50km Radius (271 Sample Points) 49
c. National Analysis (5686 Sample Points) 50
SOIL GUIDELINES VALUES (SGV) 51
ANALYSES DEFINITIONS 52
References **55**

1. Soil Thematic Maps

This section contains a series of maps of the area surrounding your selected location, presenting a number of themes relating to the characteristics of the soils. These provide an overview of the nature and condition of the local soil conditions. It is these conditions that may be used to infer the response of an area to certain events (with the soil as a receptor), such as pollution contamination from a chemical spill, or an inappropriate pesticide application and the likelihood of these materials passing though the soil to groundwater. Other assessments provide an insight into the way a location may impact, by corrosive attack or ground movement, upon structures or assets within the ground, for example building or engineering foundations or pipes and street furniture.

Soil is a dynamic environment with many intersecting processes, chemical, physical and biological at play. Even soils 'sealed' over by concrete and bitumen are not completely dormant. The way soils respond to events and actions can vary considerably according to the properties of the soil as well as other related factors such as land-use, vegetation, topography and climate. There are many threats facing our national soil resource today and importance should be given to identifying the best measures aimed towards soil protection, ensuring the usage of soils in the most sustainable way. This report is therefore a useful snapshot of the soil properties for your given area, providing a summary of a broad range of ground conditions



Figure 1: Location of study area

1a Soils - Spatial Distribution



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Soils - Spatial Distribution Key

544 BANBURY
Well drained brashy fine and coarse loamy ferruginous soils over ironstone.

551d NEWPORT 1
Deep well drained sandy and coarse loamy soils.

SOIL ASSOCIATION DESCRIPTION

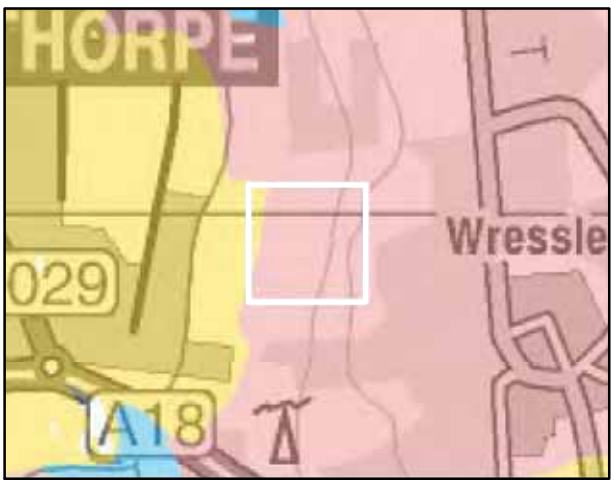
Soil associations represent a group of soil series (soil types) which are typically found occurring together, associated in the landscape (Avery, 1973; 1980; Clayden and Hollis, 1984). Soil associations may occur in many geographical locations around the country where the environmental conditions are comparable. For each of these soil associations, a collection of soil types (or soil series) are recorded together with their approximate proportions within the association. Soil associations have codes as well as textual names, thus code '554a' refers to the 'Frilford' association. Where a code is prefixed with 'U', the area is predominantly urbanised (e.g. 'U571v'). The soil associations for your location, as mapped above, are described in more detail in Section 2: Soil Association Descriptions.

1b Hydrology of Soil Type (HOST)



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Hydrology of Soil Type (HOST) Key

2 Free draining permeable soils on 'brashy' or dolomitic limestone substrates with high permeability and moderate storage capacity

5 Free draining permeable soils in unconsolidated sands or gravels with relatively high permeability and high storage capacity

HOST CLASS DESCRIPTION

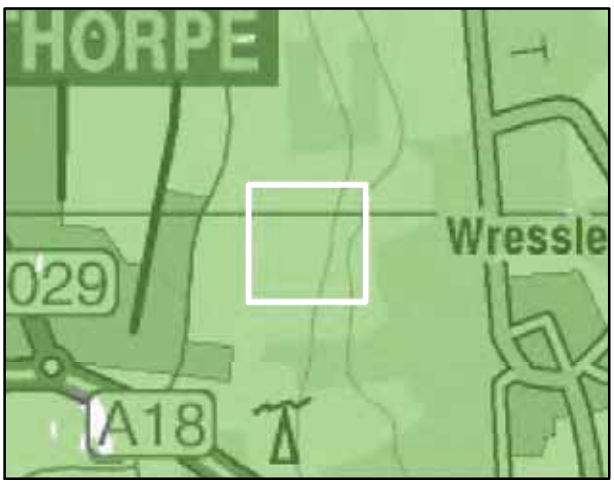
The Hydrology of Soil Types (HOST) classification describes the dominant pathways of water movement through the soil and, where appropriate, the underlying substrate. Eleven drainage models are defined according to the permeability of the soil and its substrate and the depth to a groundwater table, where one is present (Boorman et al,1995). These are further subdivided into 29 HOST classes to which all soil series have been assigned. These classes identify the way soil water flows are partitioned, with water passing over, laterally through, or vertically down the soil column. Analysis of the river hydrograph and the extent of soil series for several hundred gauged catchments allowed mean values for catchment hydrological variables to be identified for each HOST class, The HOST classification is widely used to predict river flows and the frequency and severity of flood events and also to model the behaviour of diffuse pollutants (Hollis et al, 1995).

1c Ground Movement Potential



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Ground Movement Potential Key



1 Very low

* If a High class is starred, a Very High ground movement potential is likely to be achieved if these soils are drained to an effective depth of at least two metres.

GROUND MOVEMENT POTENTIAL DESCRIPTION

Clay-related ground movement is the most widespread cause of foundation failure in the UK and is linked to seasonal swelling and shrinkage of the clay. The content of clay within the soils of your selected area has therefore a direct bearing upon the likelihood of ground movement.

Among the inorganic particles that constitute the solid component of any soil, clay particles are the smallest and defined as being less than 0.002 mm - equivalent spherical diameter (esd) in size. Clay particles occur in most kinds of soil but they only begin to exert a predominant influence on the behaviour of the whole soil where there is more than 35 per cent (by weight) of clay-sized material present.

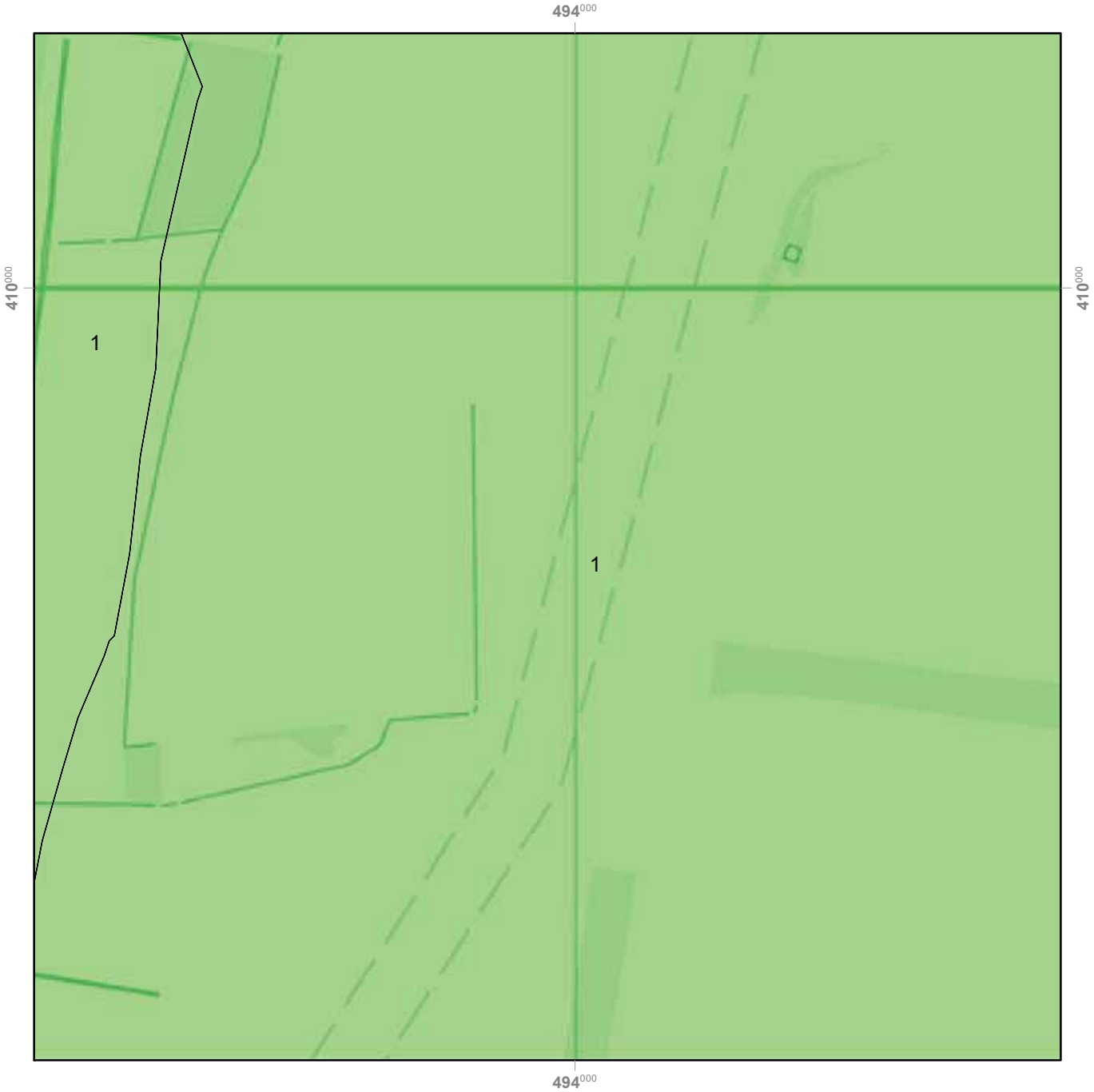
Because clay particles are very small and commonly platy in shape they have an immense surface area onto which water can be attracted, relative to the total volume of the soil material. In addition to surface attraction or inter-crystalline absorption of water, some clay minerals, those with three layers of atoms (most other kinds of clay have only two layers of atoms) are able to absorb and hold additional water between these layers. It is these types of clay mineral, which are widespread in British soils and commonly known as smectites that have the greatest capacity to shrink and swell.

In a natural undisturbed condition, the moisture content of deep subsoil clay does not change greatly through the year and consequently there are no changes in volume leading to shrinkage and swelling. However, when clays are exposed at or near the ground surface and especially when vegetation is rooting in them seasonal moisture and volume changes can be dramatic. Plants and trees transpire moisture from the soil to support their growth and transfer necessary nutrients into their structures. Surface evaporation also takes place from soil and plant structures, and the combination of evaporation from surfaces and transpiration by plants and trees is termed evapotranspiration. Thus, the layer of soil material down to 2m depth into which plants will root is critical when assessing the vulnerability of land to subsidence.

Whenever soil moisture is continuously being replenished by rainfall, the soil moisture reserves will be unaffected by the removal of moisture by plants as there is no net loss. However, in many parts of Britain, particularly in the south and east, summer rainfall is small and is exceeded by evapotranspiration. Water reserves are then not sufficiently replenished by rainfall and so a soil moisture deficit develops. The water removed from a clayey soil by evapotranspiration leads to a reduction in soil volume and the consequent shrinkage causes stress in the soil materials leading in turn to stress on building foundations that are resting in the soil (Hallett, et al, 1994).

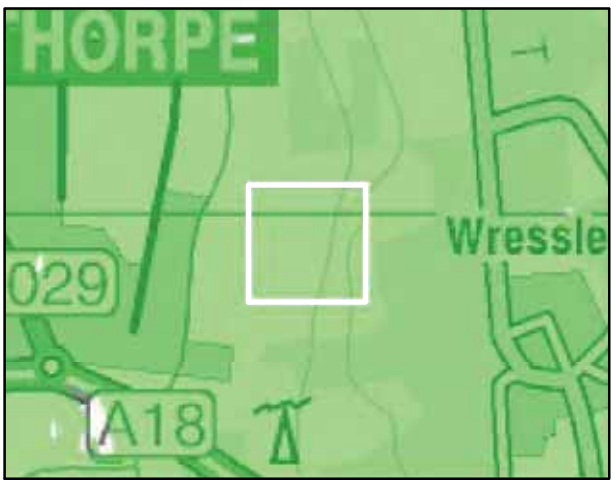
The foundations themselves may then move and thus cause damage to building structures. This problem can be exacerbated by the fact that the soil beneath the structure may not dry out uniformly, so that any lateral pressure exerted on the building foundation is made effectively greater. This assessment identifies the likelihood of soil conditions being prone to ground movement given these other factors.

1d Flood Vulnerability



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Flood Vulnerability Key

1 Minor risk

FLOOD VULNERABILITY DESCRIPTION

The inundation of properties by flood water can occur in a number of circumstances. Surface run-off can collect on low-lying land from upslope following heavy rainfall. More commonly rivers, lakes and/or the sea extend beyond their normal limits as a result of prolonged or intense rainfall, unusually high tides and/or extreme wind events. Water damage to properties and their contents is compounded by the deposition of sediment suspended in the flood waters. The spatial distribution of such waterborne sediment (or alluvium as defined in soil science) is one basis upon which land that has been subject to historical flooding can be mapped, and this forms a basis for present-day flooding risk assessment.

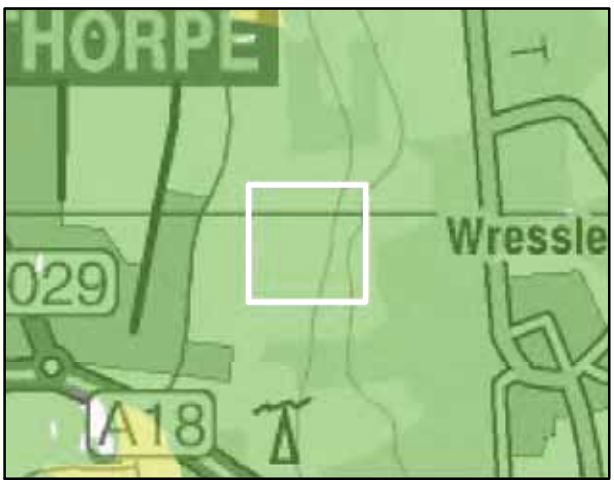
Both riverine and marine alluvium are identified as distinct soil parent materials within the British soil classifications. Combining soil map units that are dominated by soil series developed in alluvium across Great Britain identifies most of the land that is vulnerable to flooding. This assessment does not account for man-made flood defence measures, showing instead the areas where once water has stood.

1e Risk of Corrosion to Ferrous Iron



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Risk of Corrosion to Ferrous Iron Key



1 Non-aggressive

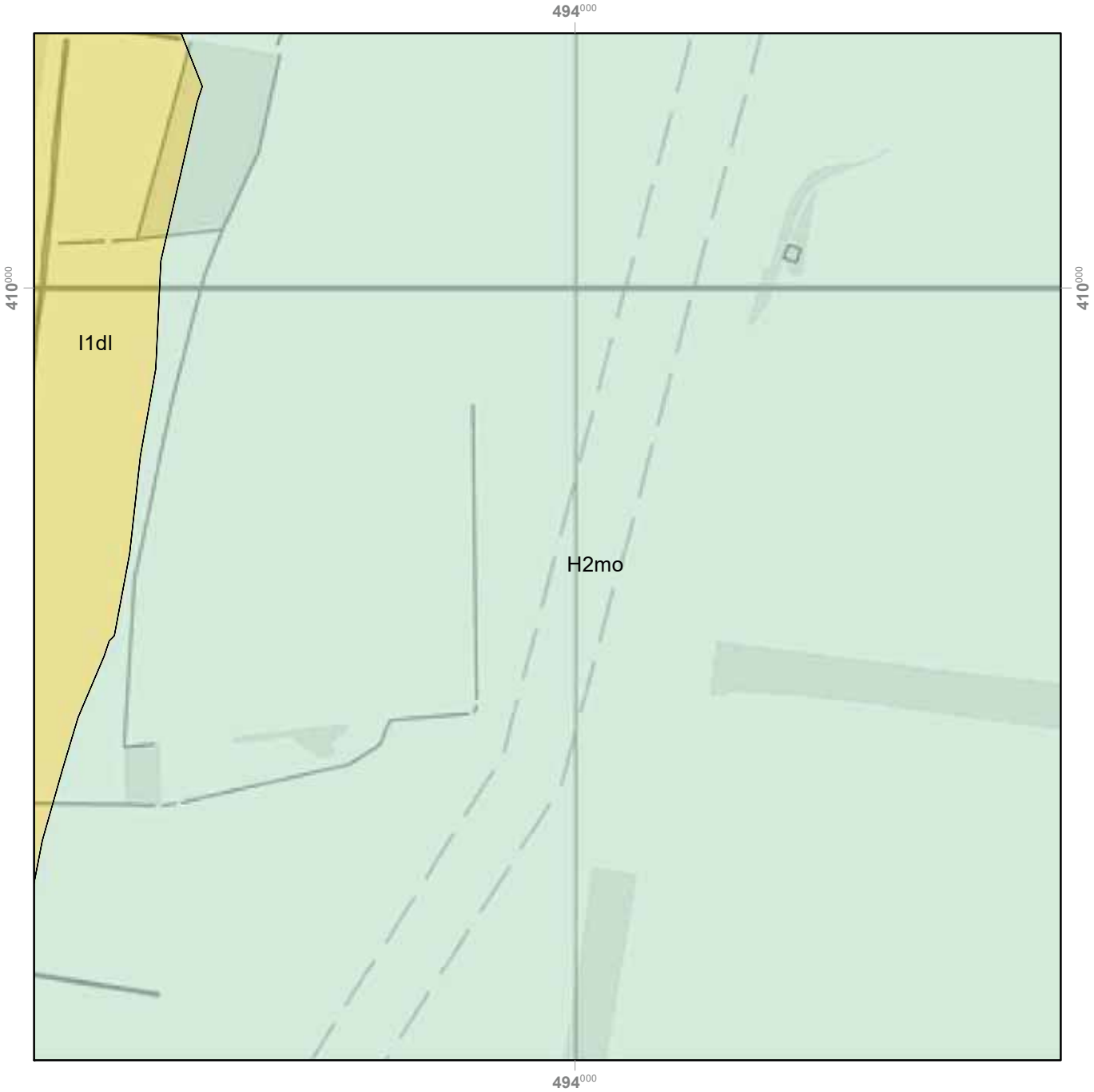
* If a class is starred, it is assumed that there are moderate amounts of sulphate in the soil. If there is abundant sulphate present, the soil may be one class more aggressive. Conversely, if there is very little sulphate, the soil may be one class less aggressive to

buried ferrous iron.

RISK OF CORROSION TO FERROUS IRON DESCRIPTION

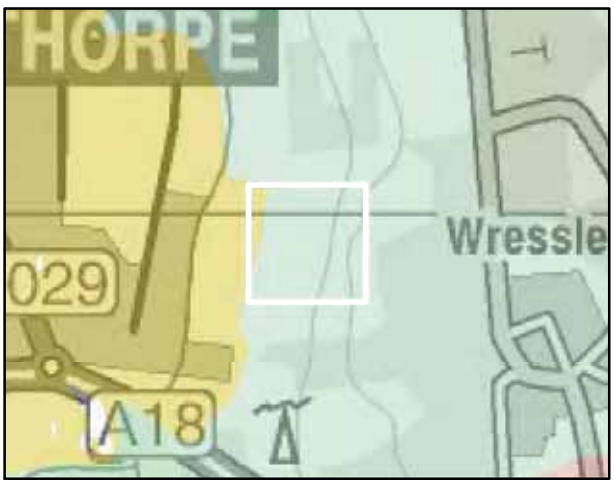
Buried iron pipes and other infrastructure corrode at rates that are influenced by soil conditions (Jarvis and Hedges, 1994). Soil acidity, sulphide content, aeration and wetness all influence the corrosivity of the soil. These factors are used to map 5 major classes of relative corrosivity.

1f Pesticide Leaching Risk



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Pesticide Leaching Risk Key

H2mo Sandy soil with low organic matter; groundwater at moderate depth

I1dl Deep loamy soil over soft limestone with deep groundwater

PESTICIDE LEACHING CLASS DESCRIPTION

The natural permeability and water regime of soils are influential in determining the fate and behaviour of pesticides applied to the crop and soil surface (Hollis et al, 1995). A system of vulnerability assessment was devised as part of the national system for Policy and Practice for the Protection of Groundwater. This divided soils into three primary vulnerability classes.

H - Soils of high leaching capacity with little ability to attenuate non-adsorbed pesticide leaching which leave underlying groundwater vulnerable to pesticide contamination.

I - Soils of intermediate leaching capacity with a moderate ability to attenuate pesticide leaching.

L - Soils of low leaching capacity through which pesticides are unlikely to leach.

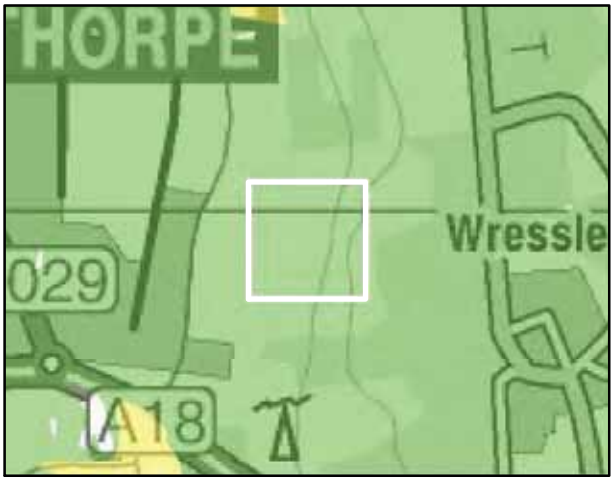
The primary classes have been further subdivided into nearly forty subclasses. These subclasses, with their descriptions, are mapped above. These classes do not account for differences in land cultivation, which can also have a significant impact on pesticide behaviour.

1g Pesticide Runoff Risk



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Pesticide Runoff Risk Key

S5 Very low run-off potential.

PESTICIDE RUNOFF RISK DESCRIPTION

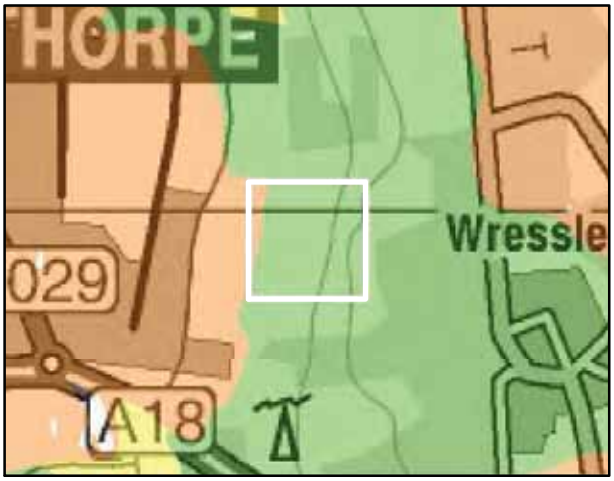
The physical properties and natural water regime of soils influence the speed and extent of lateral water movement over and through the soil at different depths (Hollis et al, 1995). At as result, soils can be classed according to the potential for pesticide run-off. Five runoff potential classes are identified for mineral soils and a further two for peat soils.

1h Potential for Pesticide Adsorption



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Potential for Pesticide Adsorption Key



m Moderate adsorption potential.



v Very low adsorption potential.

POTENTIAL FOR PESTICIDE ADSORPTION DESCRIPTION

The physical properties and natural water regime of soils influence the speed and extent of lateral water movement over and through the soil at different depths (Hollis et al, 1995). The mineral soil classes are further subdivided according to their potential for pesticide adsorption.

1i Hydrogeological Rock Type



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Hydrogeological Rock Type Key

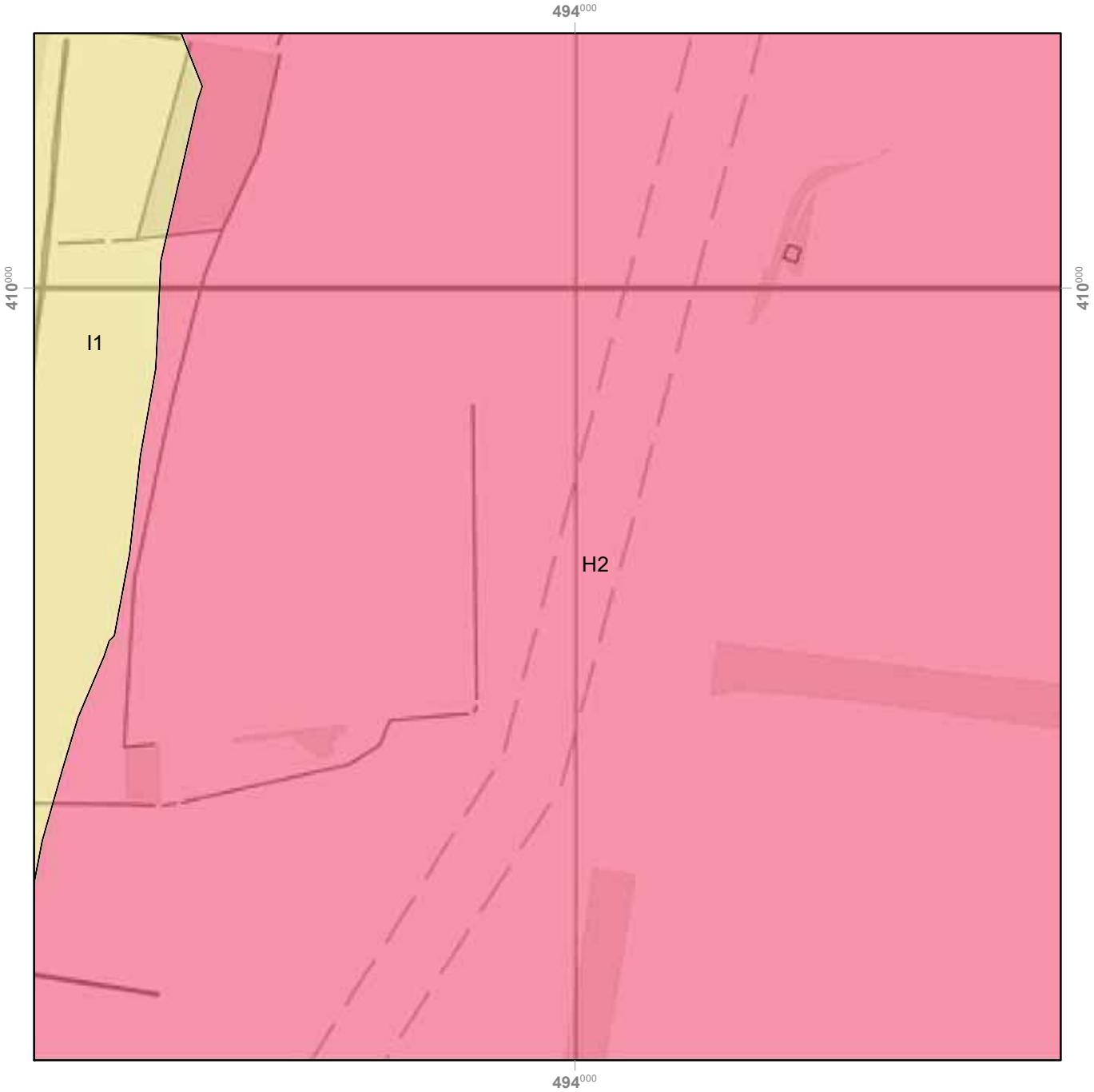
4 soft Magnesian, brashy or Oolitic limestone and ironstone

34 sand

HYDROGEOLOGICAL ROCK TYPE DESCRIPTION

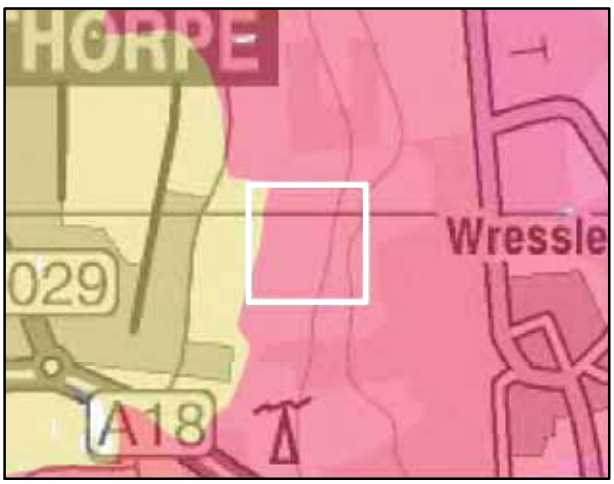
The hydrogeological classification of the soil parent materials provides a framework for distinguishing between soil substrates according to their general permeability and whether they are likely to overlie an aquifer. Every soil series has been assigned one of the 32 substrate classes and each of these is characterised according to its permeability (being characterised as permeable, slowly permeable or impermeable). For further information, see Boorman et al (1995).

1j Ground Water Protection Policy (GWPP)



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Ground Water Protection Policy (GWPP) Key

H2 Deep, permeable coarse textured soils of high leaching potential, which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential

I1 Soils of intermediate leaching potential which have a moderate ability to attenuate a wide range of diffuse source pollutants but in which it is possible that some non-adsorbed diffuse source pollutants and liquid discharges could penetrate the soil layer

GWPP LEACHING CLASS DESCRIPTION

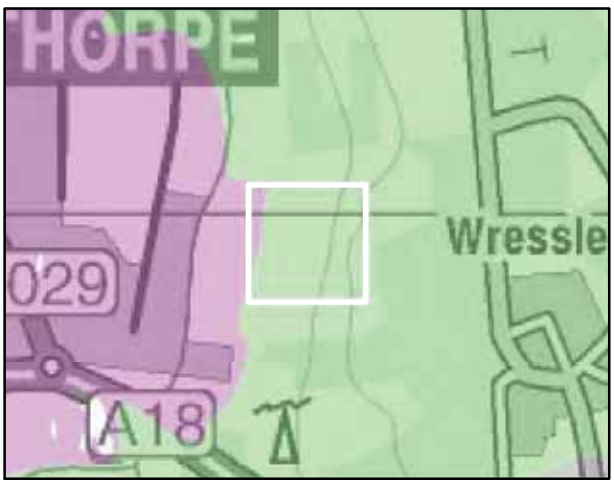
The Ground Water Protection Policy classes describe the leaching potential of pollutants through the soil (Hollis, 1991; Palmer et al, 1995). The likelihood of pollutants reaching ground water is described. Different classes of pollutants are described, including liquid discharges adsorbed and non-adsorbed pollutants.

1k Soil Parent Material



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Soil Parent Material Key

85 Glaciofluvial drift

106 Jurassic and Cretaceous ironstone

SOIL PARENT MATERIAL DESCRIPTION

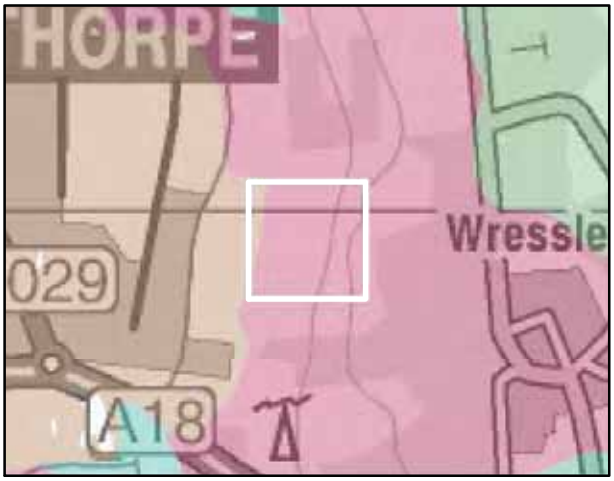
Along with the effects of climate, relief, organisms and time, the underlying geology or 'parent material' has a very strong influence on the development of the soils of England and Wales. Through weathering, rocks contribute inorganic mineral grains to the soils and thus exhibit control on the soil texture. During the course of the creation of the national soil map, soil surveyors noted the parent material underlying each soil in England and Wales. It is these general descriptions of the regional geology which is provided in this map.

1l Expected Crops and Land Use



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Expected Crops and Land Use Key

269 Winter cereals with short term grassland, some potatoes; permanent grassland on valley slopes; some sugar beet In Eastern Region.

283 cereals, sugar beet and potatoes; dairying on short term grassland in Cheshire and Wales.

EXPECTED CROPS AND LAND USE DESCRIPTION

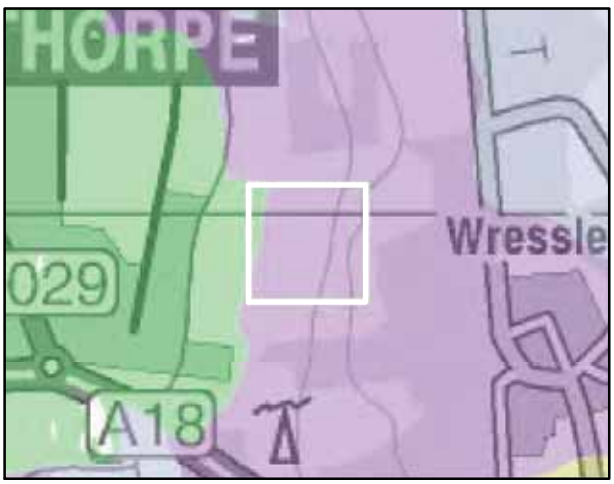
Individual soils are commonly associated with particular forms of land cover and land use. Whilst the soil surveyors were mapping the whole of England and Wales, they took careful note of the range of use to which the land was being put. This map shows the most common forms of land use found on each soil unit.

1m Natural Soil Fertility



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Natural Soil Fertility Key



1 High



5 Low

NATURAL SOIL FERTILITY DESCRIPTION

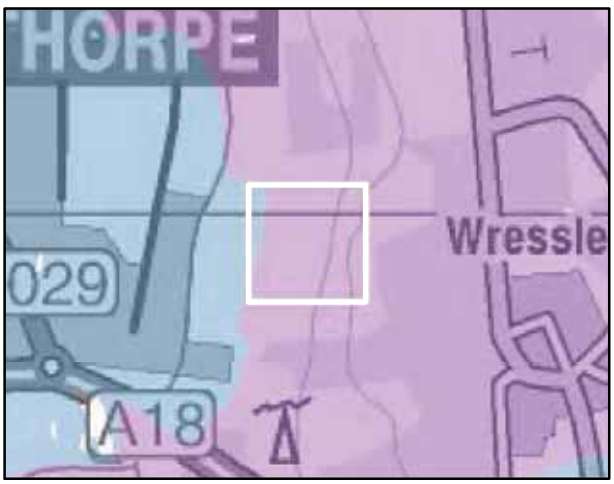
Soil fertility can be greatly altered by land management especially through the application of manures, lime and mineral fertilisers. What is shown in this map, however, is the likely natural fertility of each soil type. Soils that are very acid have low numbers of soil-living organisms and support heathland and acid woodland habitats. These are shown as of very low natural fertility. Soils identified as of low natural fertility are usually acid in reaction and are associated with a wide range of habitat types. The moderate class contains neutral to slightly acid soils, again with a wide range of potential habitats. Soil of high natural fertility are both naturally productive and able to support the base-rich pastures and woodlands that are now rarely encountered. Lime-rich soils contain chalk and limestone in excess, and are associated with downland, herb-rich pastures and chalk and limestone woodlands.

1n Simple Topsoil Texture



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Simple Topsoil Texture Key

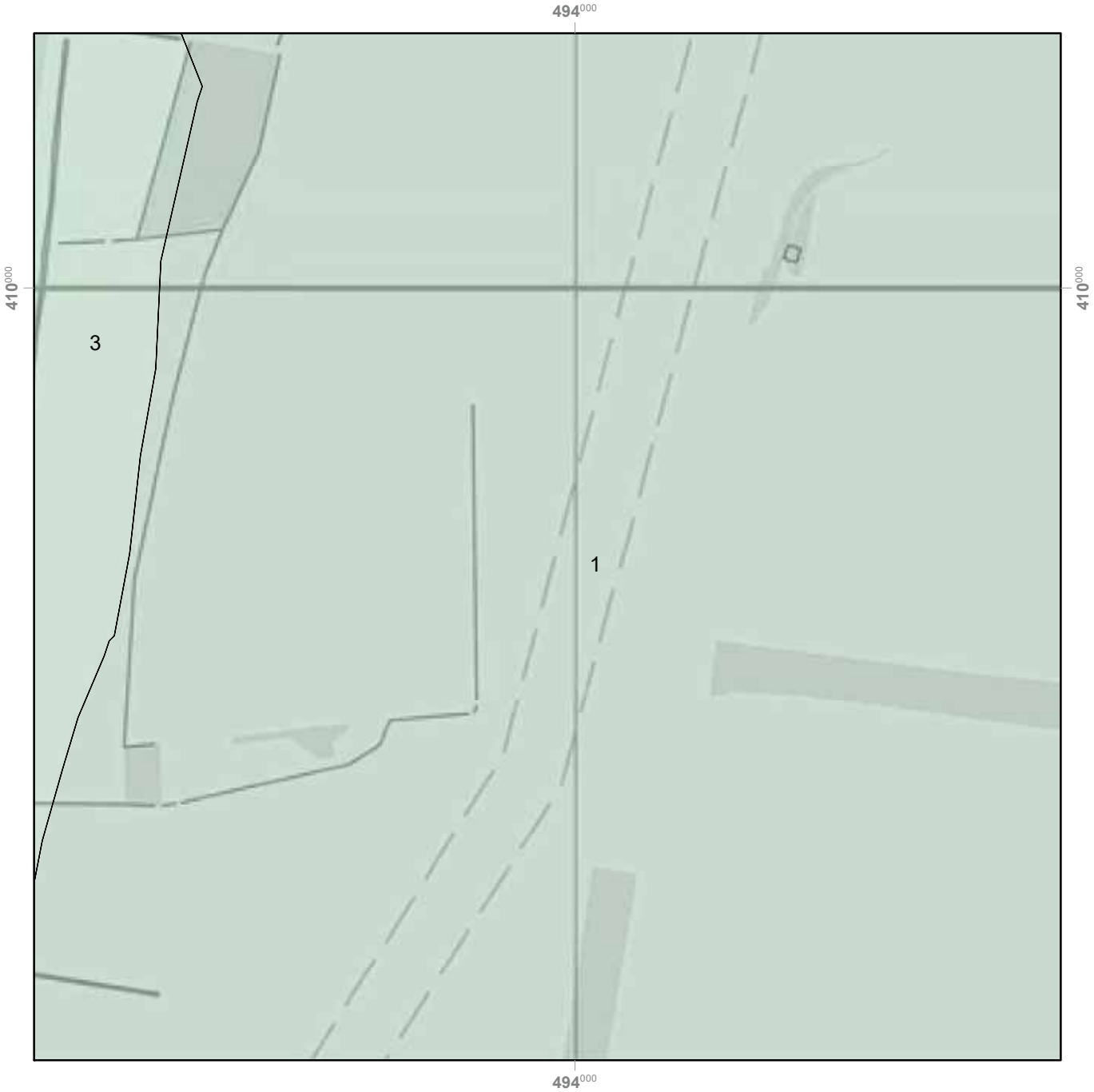
2 Loamy

4 Sandy

SIMPLE TOPSOIL TEXTURE DESCRIPTION

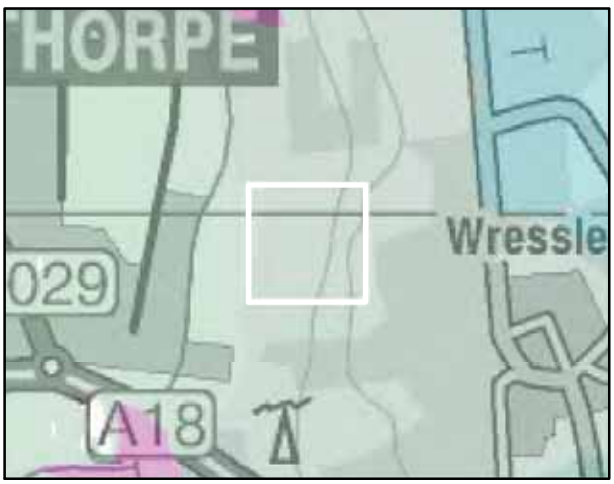
Soil texture is a term used in soil science to describe the physical composition of the soil in terms of the size of mineral particles in the soil. Specifically, we are concerned with the relative proportions of sand, silt and clay. Soil texture can vary between each soil layer or horizon as one moves down the profile. This map indicates the soil texture group of the upper 30 cm of the soil. `Light? soils have more sand grains and are described as sandy, while `heavy? soils have few sand grains but a lot of extremely small particles and are described as clayey. Loamy soils have a mix of sand, silt and clay-sized particles and are intermediate in character. Soils with a surface layer that is dominantly organic are described as Peaty. A good understanding of soil texture can enable better land management.

1o Typical Habitats



Soils Data © Cranfield University (NSRI)
and for the Controller of HMSO 2017

Contains OS data © Crown Copyright
and database right 2017



Typical Habitats Key

1 Acid dry pastures; acid deciduous and coniferous woodland; potential for lowland heath

3 Base-rich pastures and deciduous woodlands

TYPICAL HABITATS DESCRIPTION

There is a close relationship between vegetation and the underlying soil. Information about the types of broad habitat associated with each soil type is provided in this map. Soil fertility, pH, drainage and texture are important factors in determining the types of habitats which can be established. Elevation above sea level and sometimes even the aspect, the orientation of a hillslope, can affect the species present. This map does not take into account the recent land management, but provides the likely natural habitats assuming good management has been carried out.

2. Soil Association Descriptions

The following pages describe the following soil map units, (soil associations), in more detail.

BANBURY 544
Well drained brashy fine and coarse loamy ferruginous soils over ironstone.

NEWPORT 1 551d
Deep well drained sandy and coarse loamy soils.

The soil associations are described in terms of their texture and drainage properties and potential risks may be identified. The distribution of the soils across England and Wales are provided. Further to this, properties of each association's component soil series are described in relation to each other. Lastly, schematic diagrams of each component series are provided for greater understanding and in-field verification purposes.

BANBURY (544)

Well drained brashy fine and coarse loamy ferruginous soils over ironstone.

a. General Description

Well drained brashy fine and coarse loamy ferruginous soils over ironstone.Some deep fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.
The major landuse on this association is defined as Winter cereals with short term grassland, some potatoes; permanent grassland on valley slopes; some sugar beet In Eastern Region.

b. Distribution (England and Wales)

The BANBURY association covers 712 km² of England and Wales which accounts for 0.47% of the landmass. The distribution of this association is shown in figure 2. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

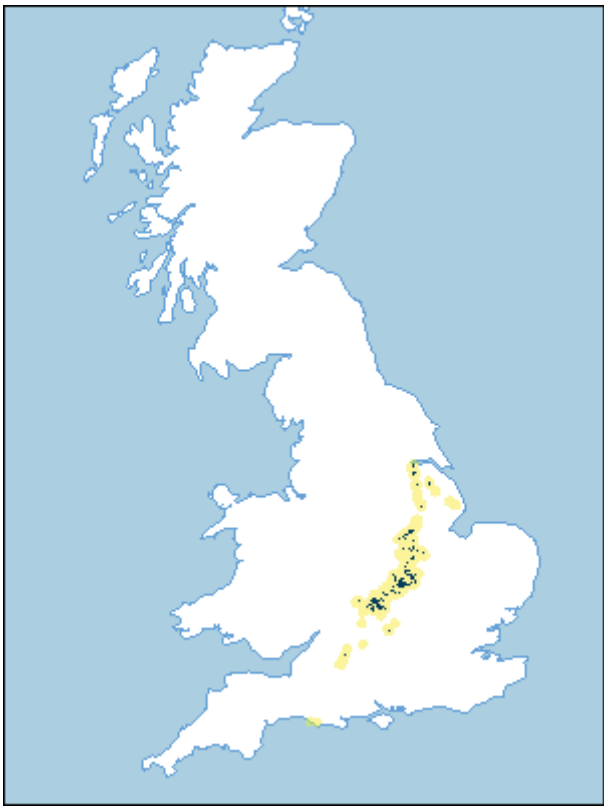


Figure 2: Association Distribution

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the BANBURY association are outlined in Table 1 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endeavoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 1.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

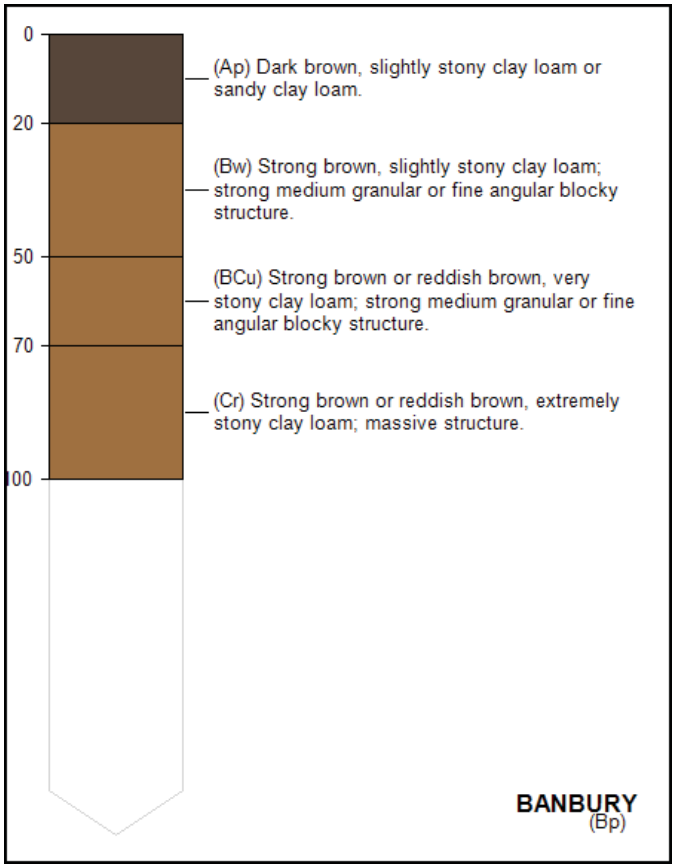
Table 1: The component soil series of the BANBURY soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

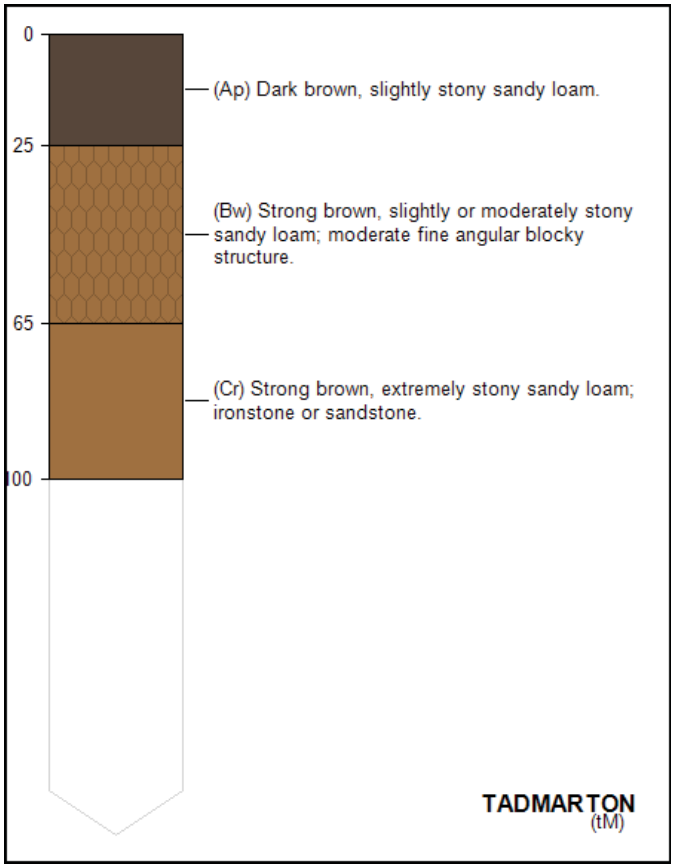
Soil Series	Description	Area %
BANBURY (Bp)	ferruginous medium loamy material over lithoskeletal ironstone	50%
TADMARTON (tM)	ferruginous light loamy material over lithoskeletal ironstone	25%
IRONDOWN (Ir)	ferruginous medium loamy or medium silty drift over clayey material passing to clay or soft mudstone	15%
OTHER	other minor soils	10%

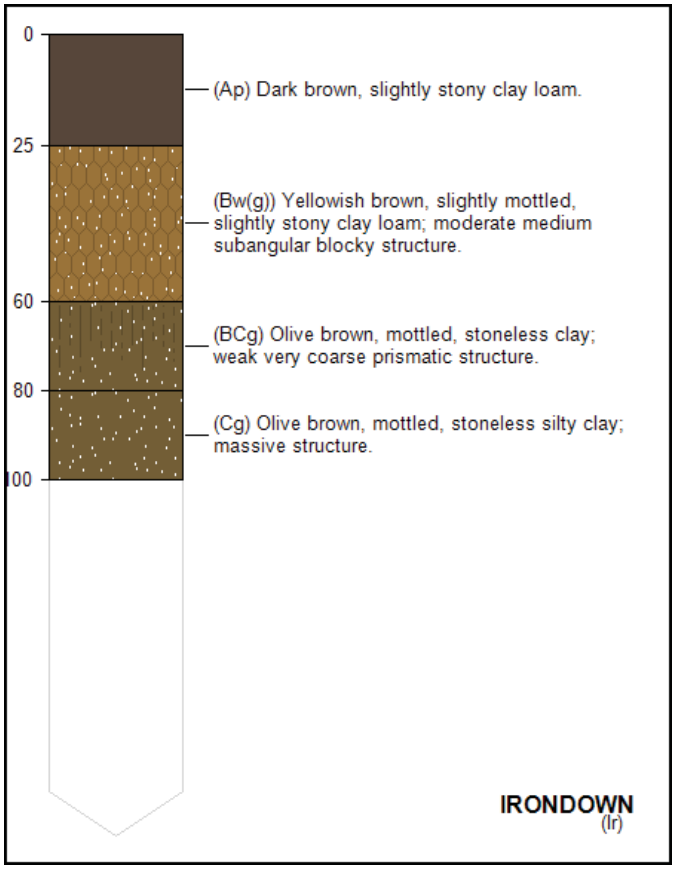
BANBURY (544)

Well drained brashy fine and coarse loamy ferruginous soils over ironstone.

d. BANBURY Component Series Profiles







NEWPORT 1 (551d)

Deep well drained sandy and coarse loamy soils.

a. General Description

Deep well drained sandy and coarse loamy soils.Some sandy soils affected by groundwater. The major landuse on this association is defined as cereals, sugar beet and potatoes; dairying on short term grassland in Cheshire and Wales.

b. Distribution (England and Wales)

The NEWPORT 1 association covers 1191 km² of England and Wales which accounts for 0.79% of the landmass. The distribution of this association is shown in figure 3. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

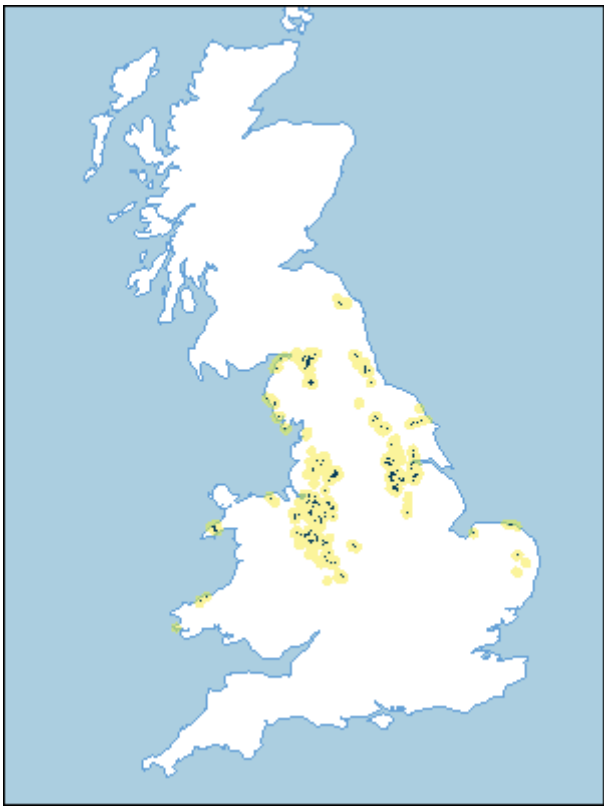


Figure 3: Association Distribution

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the NEWPORT 1 association are outlined in Table 1 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endeavoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 2.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

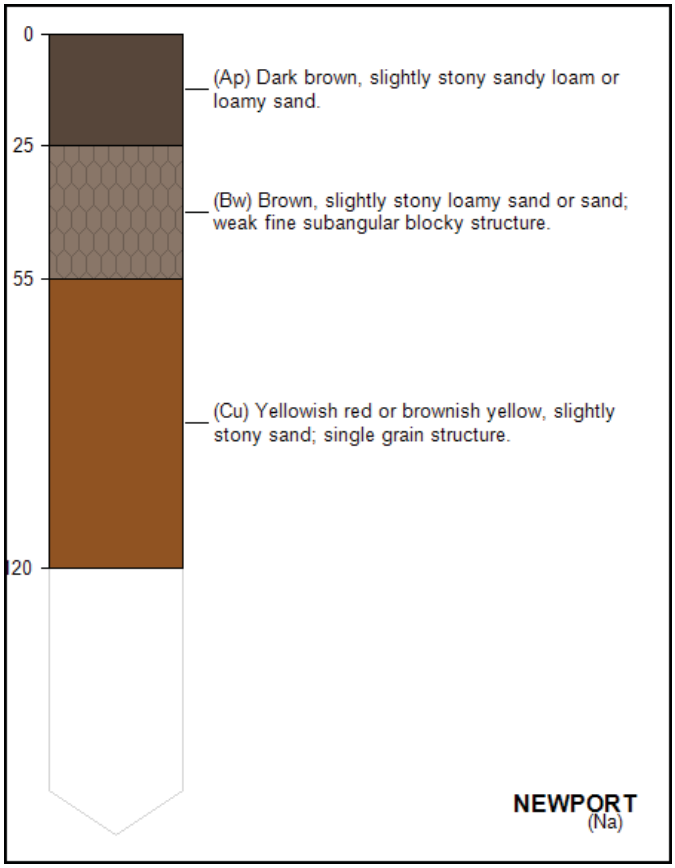
Table 2: The component soil series of the NEWPORT 1 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

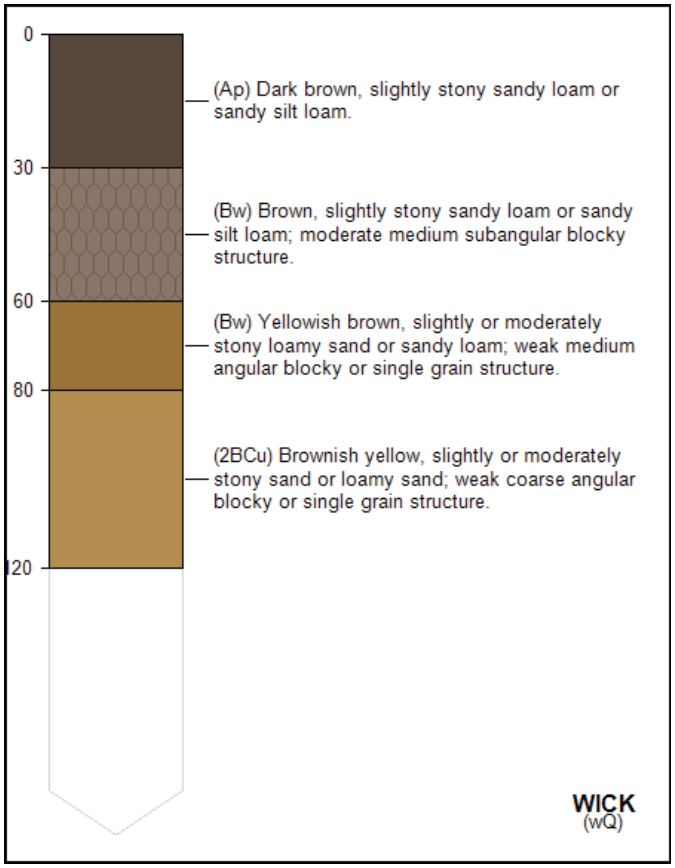
Soil Series	Description	Area %
NEWPORT (Na)	sandy drift with siliceous stones	40%
WICK (wQ)	light loamy drift with siliceous stones	20%
BLACKWOOD (bK)	sandy drift with siliceous stones	10%
RUDGE (rJ)	sandy drift with siliceous stones	10%
OTHER	other minor soils	20%

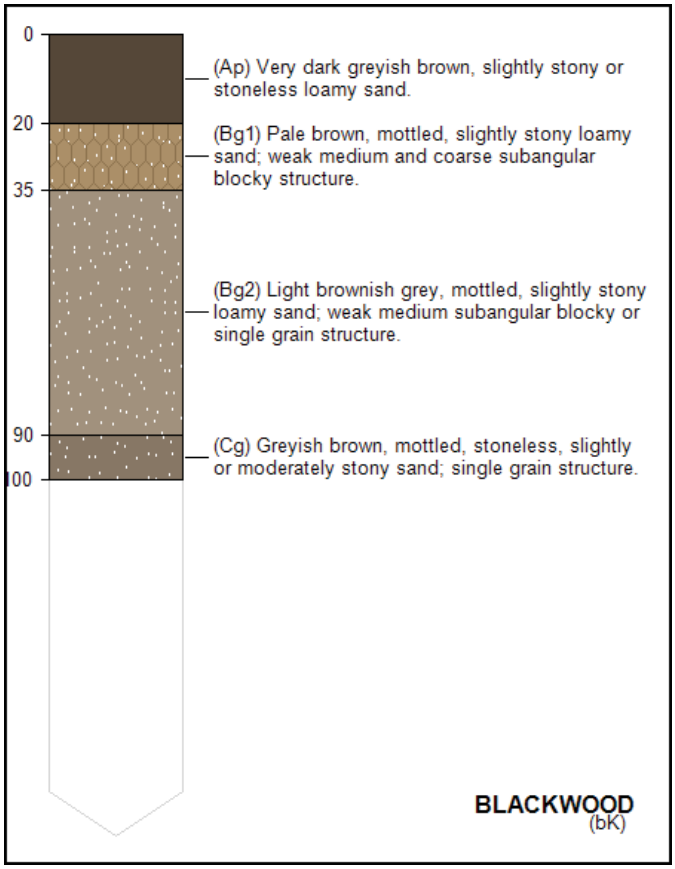
NEWPORT 1 (551d)

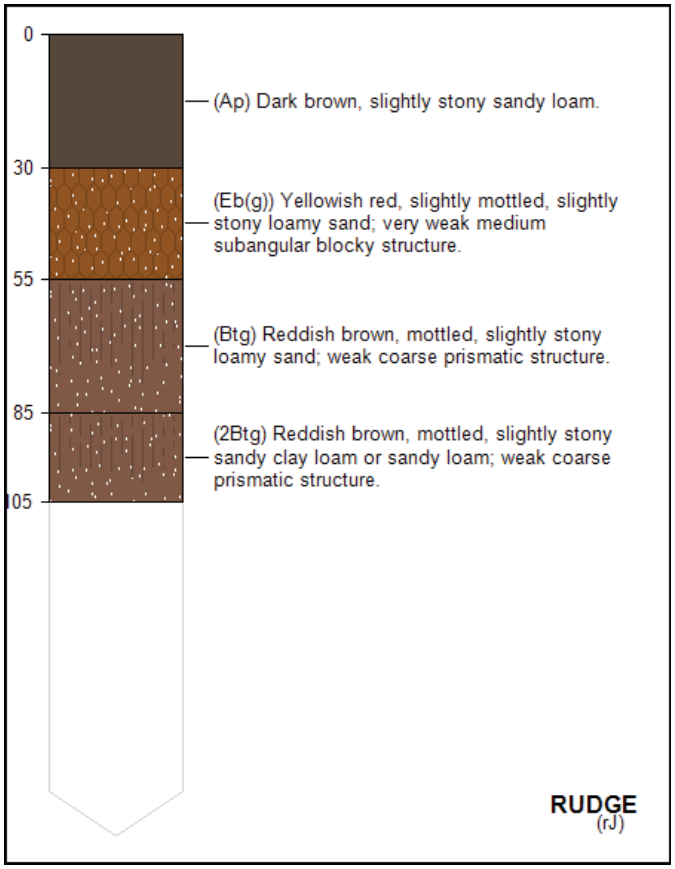
Deep well drained sandy and coarse loamy soils.

d. NEWPORT 1 Component Series Profiles









3. Soil Series Properties

The following pages describe the following soil series in more detail:

BANBURY (Bp)	ferruginous medium loamy material over lithoskeletal ironstone
BLACKWOOD (bK)	sandy drift with siliceous stones
IRONDOWN (Ir)	ferruginous medium loamy or medium silty drift over clayey material passing to clay or soft mudstone
NEWPORT (Na)	sandy drift with siliceous stones
RUDGE (rJ)	sandy drift with siliceous stones
TADMARTON (tM)	ferruginous light loamy material over lithoskeletal ironstone
WICK (wQ)	light loamy drift with siliceous stones

SOIL PROPERTY DEFINITIONS

The following terms are used in the report.

DROCK (Depth to rock (cm))
Depth (cm) to rock. 999 implies no rock

DGLEY (Depth to gleying (cm))
Depth to gleyed horizon (cm). 999 implies NO gleyed horizon present.

DIMP_DP (Depth to slowly permeable layer (downward percolation) (cm))
Depth (cm) to slowly permeable layer, i.e. in which effectively there is no downward percolation of water - 999 implies NO slowly permeable layer

DIMP_UD (Depth to slowly permeable layer (upward diffusion) (cm))
Depth (cm) to slowly permeable layer - upward diffusion, i.e. in which effectively there is no upward movement of water - 999 implies NO slowly permeable layer

IAC_DP (Integrated air capacity (IAC) (mm))
Integrated air capacity (downward percolation), a measurement of the volume of air in moist soils (0.05 bar suction) integrated from the surface to either an impermeable horizon, bedrock or 1m whichever is the shallowest, used for estimating the water storage potential of a soil

SPR (Standard percentage runoff (SPR) (%))
Standard Percentage Run-off. Dimensionless variable (range 0 to 100 %) that represents the percentage of rainfall that causes the short-term increase in flow at the catchment outlet seen after the storm event

BFI (Base flow index (BFI) (0 to 1))
Baseflow index. Dimensionless variable (range 0 to 1) that expresses the fraction of the average flow volume (in a river), represented by the contribution from groundwater storage

AWC (Available water (AWC) (mm))
Available water to 1m for a specific soil type, water available between suctions 5 and 1500kPa

AP_GRASS (Available water for grass (mm))
Available water (AP) in the profile for grass (mm); water available between suctions 5 and 1500 kPa

AP_CEREAL (Available water for cereal (mm))
Available water (AP) in the profile for cereals (mm); water available between suctions 5 and 1500 kPa

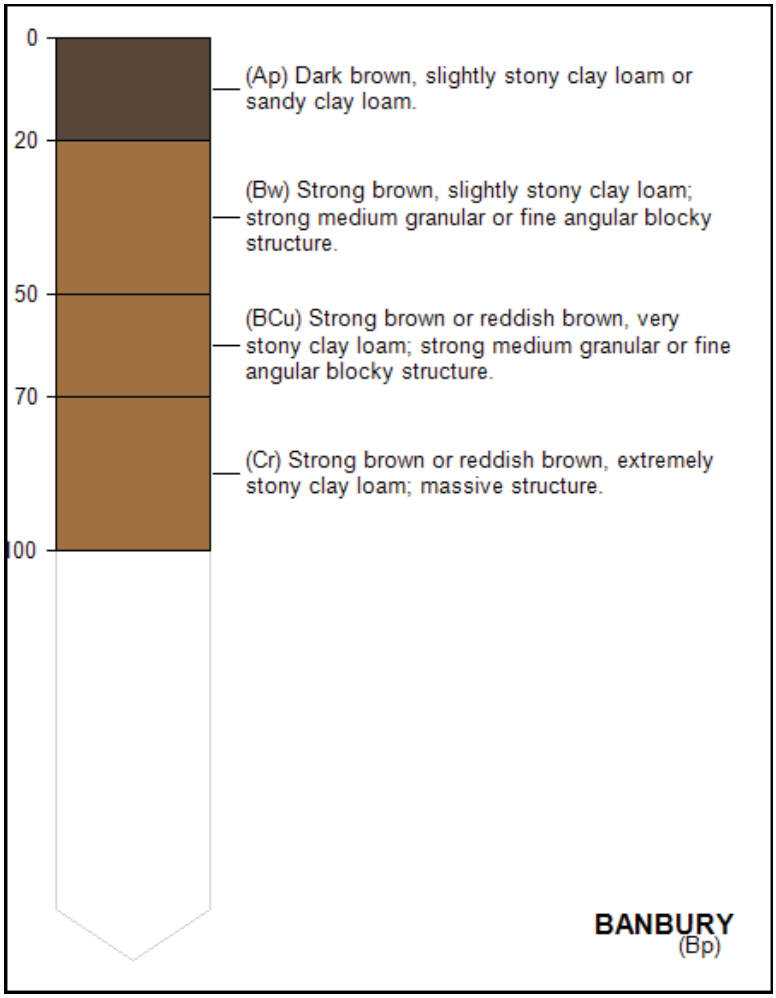
AP_SB (Available water for sugar (mm))
Available water (AP) in the profile for sugar beet (mm); water available between suctions 5 and 1500 kPa

AP_POT (Available water for potatoes (mm))
Available water (AP) in the profile for potatoes (mm); water available between suctions 5 and 1500 kPa

5.44 BANBURY (Bp) (101)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	4 brown earths	Non-alluvial, with non-calcareous loamy or clayey subsoils without significant clay enrichment.
Soil Subgroup:	4 ferritic brown earths	(unmottled with bright ochreous iron-rich subsoil)
Soil Series:	Banbury series	ferruginous medium loamy material over lithoskeletal ironstone

Property	**Value**
Depth to rock (cm)	70
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	157
Standard percentage runoff (SPR) (%)	2
Base flow index (BFI) (0 to 1)	0.98
Available water (AWC) (mm)	120
Available water for grass (mm)	120
Available water for cereal (mm)	115
Available water for sugar (mm)	120
Available water for potatoes (mm)	120

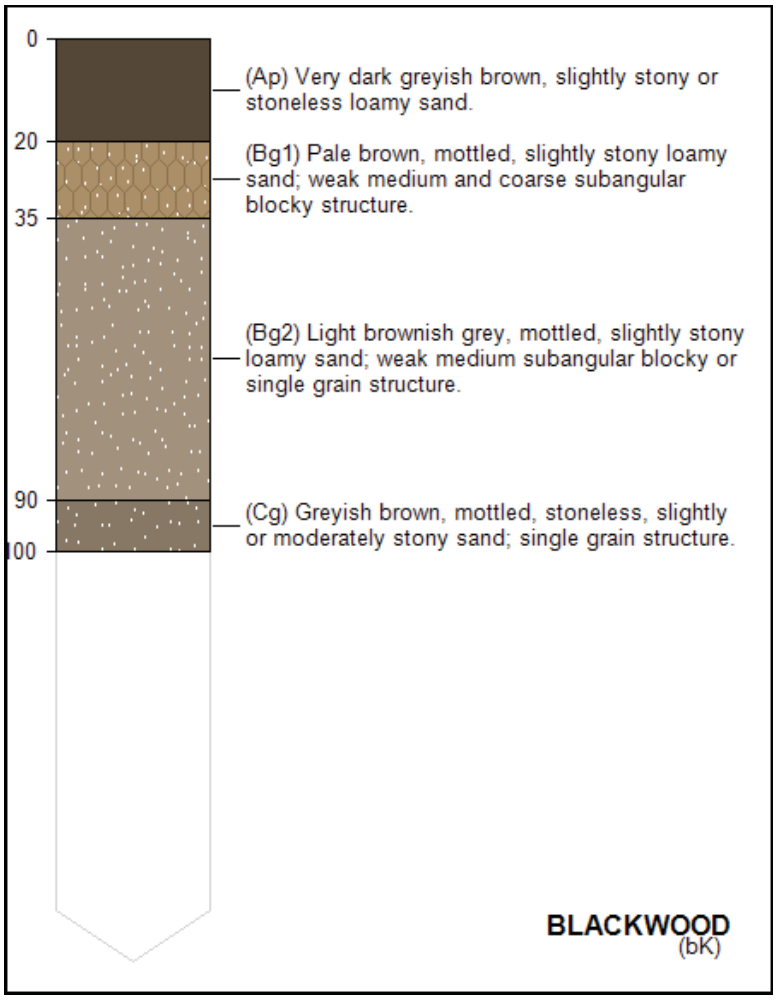


* not present within 150cm

8.21 BLACKWOOD (bK) (124)

Major soil group:	08 ground-water gley soils	Seasonally waterlogged soils affected by a shallow fluctuating groundwater-table. They are developed mainly within or over permeable material and have prominently mottled or greyish coloured horizons within 40 cm depth Most occupy low-lying or depressional sites.
Soil group:	2 sandy gley soils	Sandy, with distinct topsoil and no clay-enriched subsoil.
Soil Subgroup:	1 typical sandy gley soils	(with non calcareous subsoil)
Soil Series:	Blackwood series	sandy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	30
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	208
Standard percentage runoff (SPR) (%)	35
Base flow index (BFI) (0 to 1)	0.52
Available water (AWC) (mm)	130
Available water for grass (mm)	125
Available water for cereal (mm)	125
Available water for sugar (mm)	145
Available water for potatoes (mm)	105

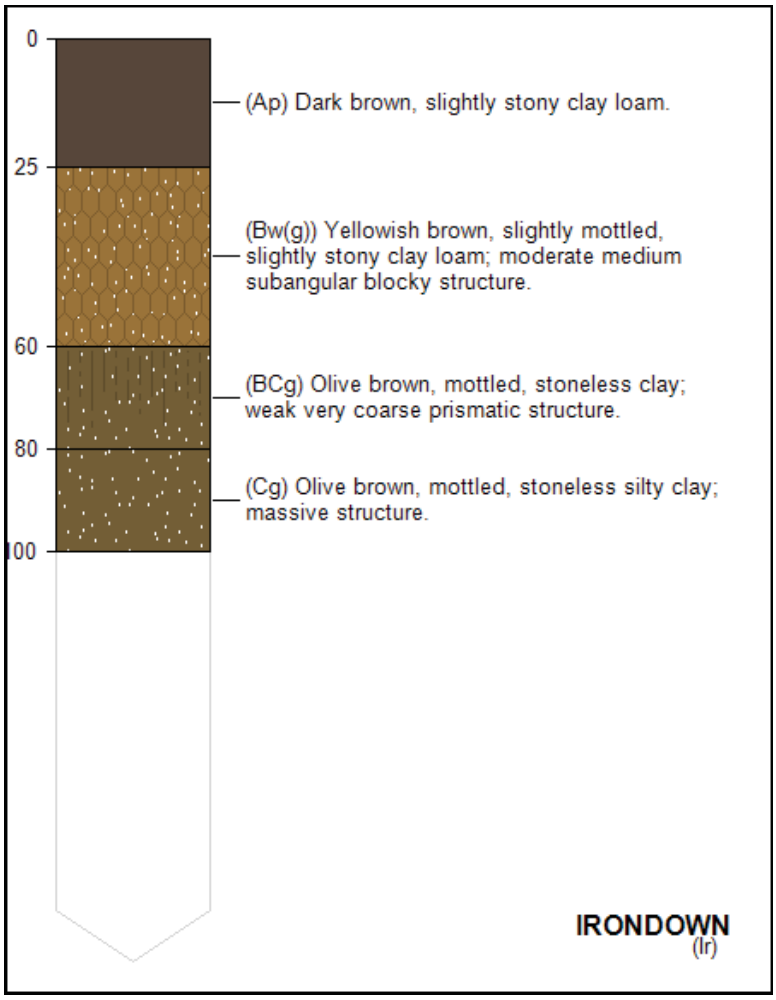


* not present within 150cm

5.45 IRONDOWN (Ir) (802)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	4 brown earths	Non-alluvial, with non-calcareous loamy or clayey subsoils without significant clay enrichment.
Soil Subgroup:	5 stagnogleyic ferritic brown earths	(faintly mottled with bright ochreous iron-rich slowly permeable subsoil)
Soil Series:	Irondown series	ferruginous medium loamy or medium silty drift over clayey material passing to clay or soft mudstone

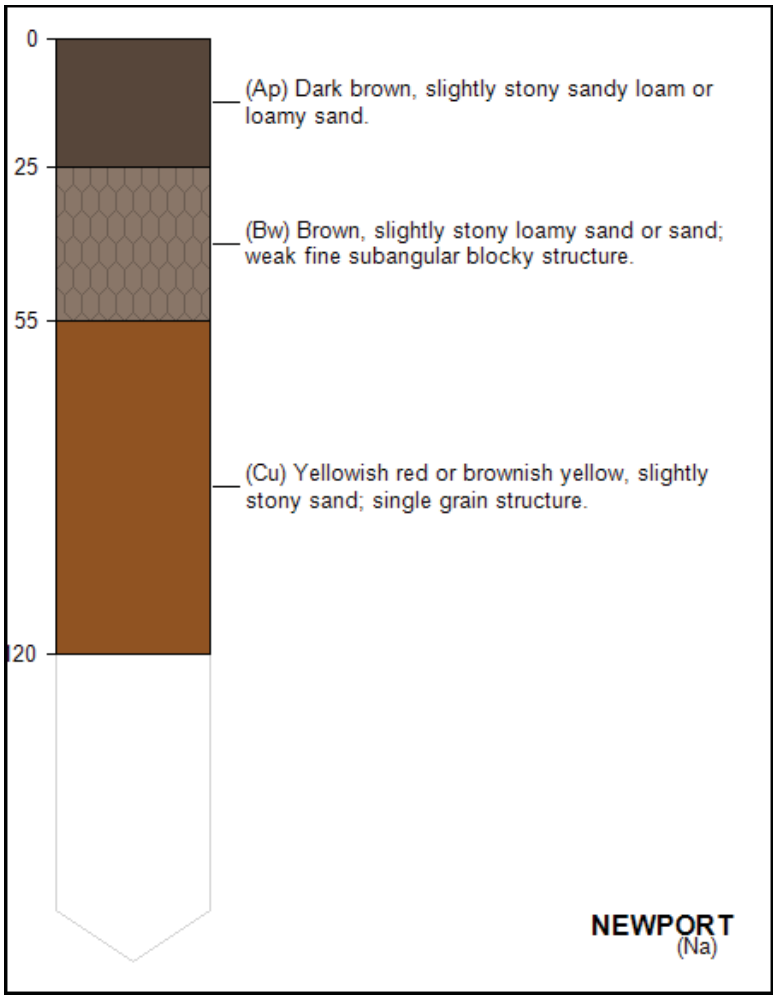
Property	Value
Depth to rock (cm)	100
Depth to gleying (cm)	57
Depth to slowly permeable layer (downward percolation) (cm)	57
Depth to slowly permeable layer (upward diffusion) (cm)	57
Integrated air capacity (IAC) (mm)	78
Standard percentage runoff (SPR) (%)	47
Base flow index (BFI) (0 to 1)	0.52
Available water (AWC) (mm)	145
Available water for grass (mm)	125
Available water for cereal (mm)	125
Available water for sugar (mm)	160
Available water for potatoes (mm)	105



5.51 NEWPORT (Na) (1310)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	5 brown sands	Non-calcareous sandy or sandy gravelly.
Soil Subgroup:	1 typical brown sands	(unmottled with no clay-enriched subsoil)
Soil Series:	Newport series	sandy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	256
Standard percentage runoff (SPR) (%)	12
Base flow index (BFI) (0 to 1)	0.88
Available water (AWC) (mm)	95
Available water for grass (mm)	85
Available water for cereal (mm)	95
Available water for sugar (mm)	110
Available water for potatoes (mm)	70

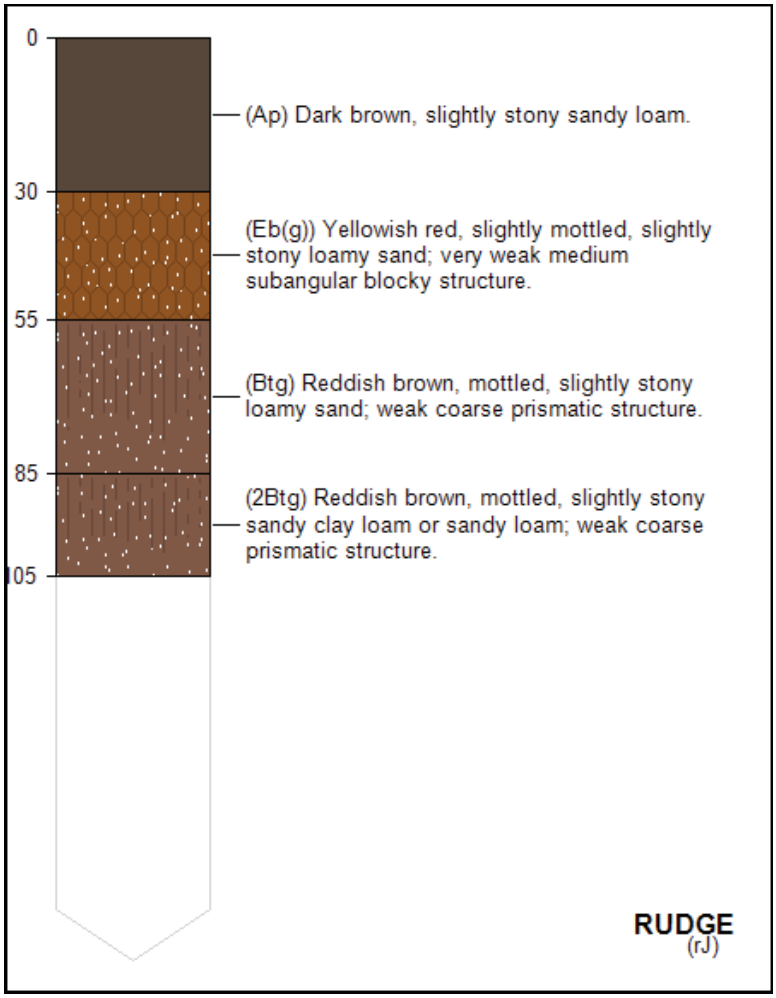


* not present within 150cm

5.53 RUDGE (rJ) (1743)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	5 brown sands	Non-calcareous sandy or sandy gravelly.
Soil Subgroup:	3 stagnogleyic brown sands	(faintly mottled with slowly permeable subsoil)
Soil Series:	Rudge series	sandy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	70
Depth to slowly permeable layer (downward percolation) (cm)	80
Depth to slowly permeable layer (upward diffusion) (cm)	80
Integrated air capacity (IAC) (mm)	176
Standard percentage runoff (SPR) (%)	47
Base flow index (BFI) (0 to 1)	0.52
Available water (AWC) (mm)	120
Available water for grass (mm)	110
Available water for cereal (mm)	115
Available water for sugar (mm)	135
Available water for potatoes (mm)	95

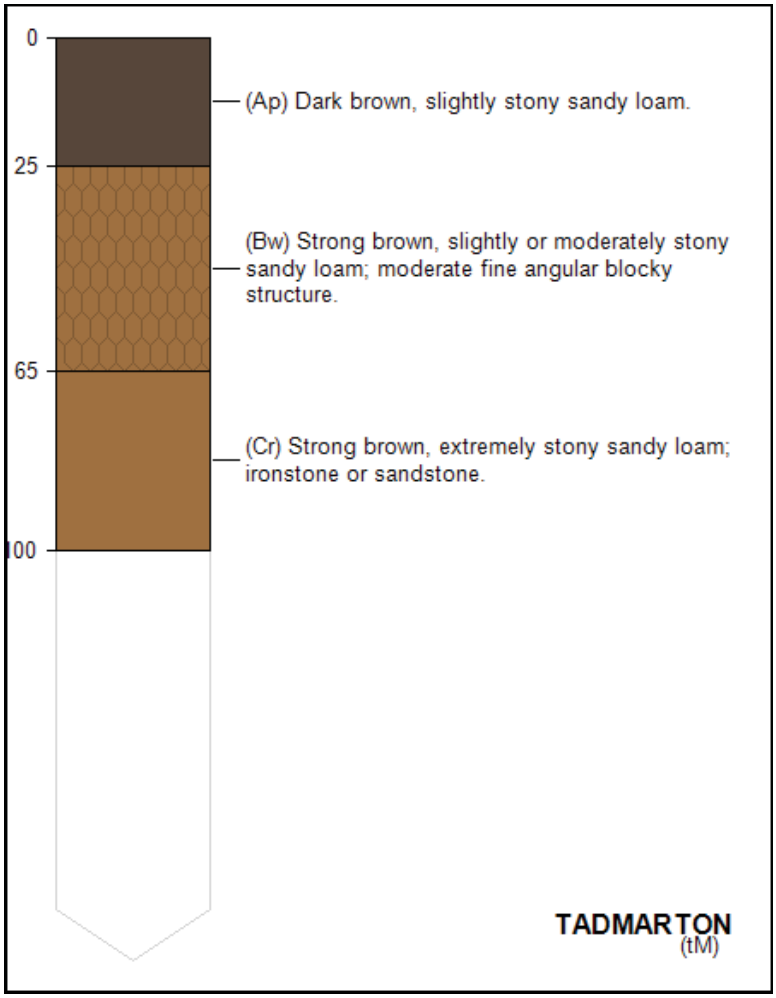


* not present within 150cm

5.44 TADMARTON (tM) (1900)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	4 brown earths	Non-alluvial, with non-calcareous loamy or clayey subsoils without significant clay enrichment.
Soil Subgroup:	4 ferritic brown earths	(unmottled with bright ochreous iron-rich subsoil)
Soil Series:	Tadmarton series	ferruginous light loamy material over lithoskeletal ironstone

Property	Value
Depth to rock (cm)	70
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	174
Standard percentage runoff (SPR) (%)	2
Base flow index (BFI) (0 to 1)	0.98
Available water (AWC) (mm)	115
Available water for grass (mm)	115
Available water for cereal (mm)	110
Available water for sugar (mm)	115
Available water for potatoes (mm)	100

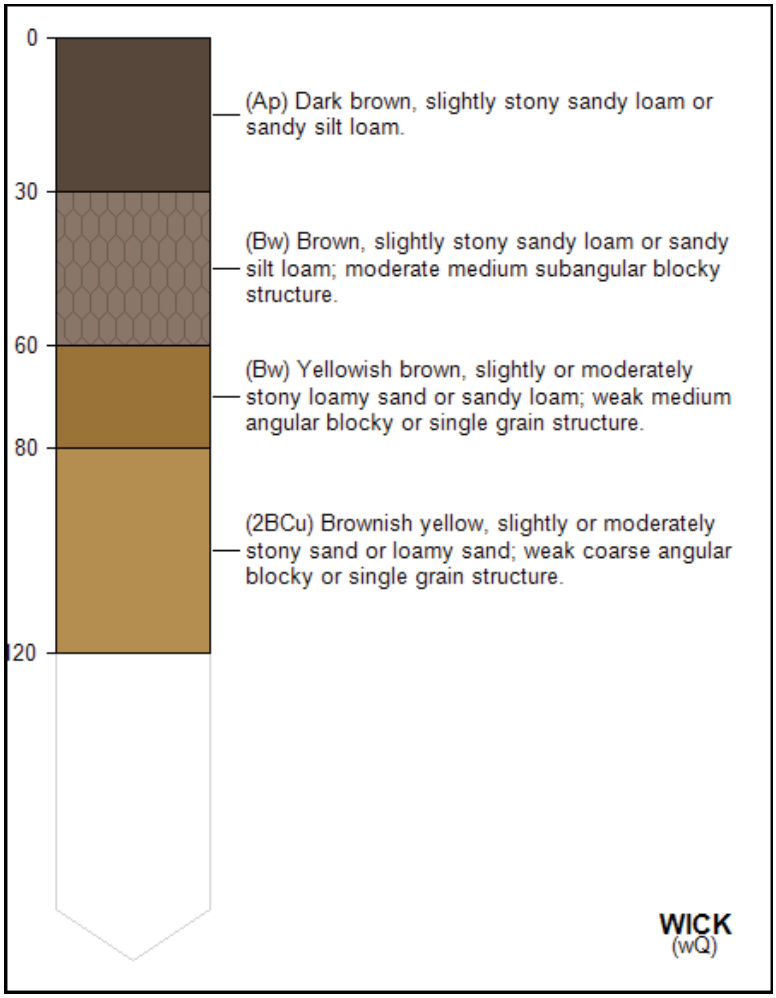


* not present within 150cm

5.41 WICK (wQ) (2225)

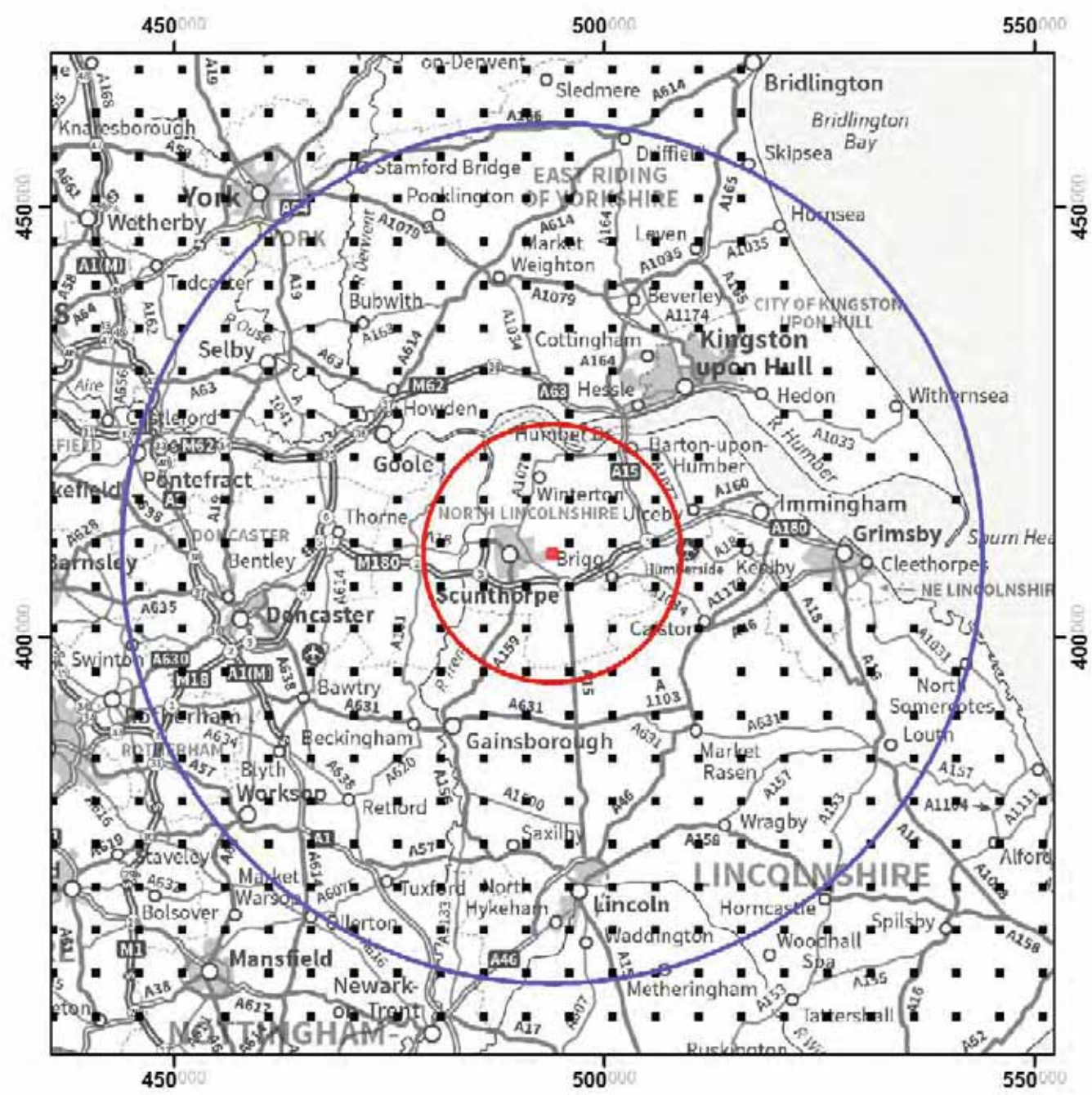
Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	4 brown earths	Non-alluvial, with non-calcareous loamy or clayey subsoils without significant clay enrichment.
Soil Subgroup:	1 typical brown earths	(unmottled)
Soil Series:	Wick series	light loamy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	206
Standard percentage runoff (SPR) (%)	12
Base flow index (BFI) (0 to 1)	0.88
Available water (AWC) (mm)	140
Available water for grass (mm)	130
Available water for cereal (mm)	140
Available water for sugar (mm)	165
Available water for potatoes (mm)	100



* not present within 150cm

4. Topsoil Element Background Levels



Soils Data © Cranfield University (NSRI) and for the Controller of HMSO 2017
Contains OS data © Crown Copyright and database right 2017

Topsoil Element Background Levels Key

- Report area
- 15 km radius - local area
- 50 km radius - regional area
- NSI sample points

TOPSOIL ELEMENT BACKGROUND LEVELS DESCRIPTION

The National Soil Inventory (NSI) covers England and Wales on a 5 km grid and provides detailed information for each intersect of the grid. Collectively NSI data are statistically representative of England and Wales soils. The original sampling was undertaken around 1980 and there were partial resamplings in the mid-1990s. The most up-to-date data is presented here.

Analysis of the NSI samples provides detailed measurements of over 20 elements from the soils, in addition to pH. This data is summarised over three areas to provide you with an understanding of how your site, and your data for it, sits within the local, regional and national context.

Where available, the soil element levels are compared with the Soil Guideline Values and where a soil sample we have analysed has been found in excess of the SGV guidelines for "residential with plant uptake" land, this is displayed in red in the tables which follow.

SGV levels are provided for the following elements: lead, selenium, nickel, mercury, chromium, cadmium and arsenic.

In the following pages, a number of analyses of the topsoil are provided. The majority of analyses have been performed on the full compliment of sample points, however, in some areas, for some elements, only a few samples were analysed as part of subsequent programmes. In order to present the full suite of possible datasets, and accurately convey the validity of the data, the number of actual measured samples is stated for each analysis. Care should be taken where the number of samples is disproportionately low.

a. Analysis Within a 15km Radius (28 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST.DEV
pH (PH)	28	7.2	4.8	8.3	0.9
Carbon (CARBON)	28	2.8	0.7	12.6	2.3
Aluminium (AL_ACID)	28	26493.0	3935.0	56855.0	13742.5
Arsenic (AS_ACID)	23	7.4	0.0	35.2	9.2
Barium (BA_ACID)	28	139.7	27.0	391.0	94.8
Calcium (CA_ACID)	28	13982.2	1412.0	61625.0	15388.1
Cadmium (CD_ACID)	28	0.6	0.0	1.5	0.5
Cadmium (Extractable) (CD_EDTA)	28	0.3	0.1	0.6	0.1
Cobalt (CO_ACID)	28	11.7	2.6	29.7	5.9
Cobalt (Extractable) (CO_EDTA)	28	1.4	0.1	7.2	1.5
Chromium (CR_ACID)	28	34.5	4.3	78.9	19.9
Copper (CU_ACID)	28	17.7	4.9	34.4	7.0
Copper (Extractable) (CU_EDTA)	28	6.1	2.8	12.0	2.4
Fluoride (F_ACID)	20	87.3	0.0	185.8	39.7
Iron (FE_ACID)	28	31167.9	8909.0	90620.0	15853.3
Mercury (HG_ACID)	19	0.1	0.0	0.3	0.1
Potassium (K_ACID)	28	4955.0	755.0	11384.0	3222.3
Potassium (Extractable) (K_NITRATE)	28	261.0	71.0	824.0	176.3
Magnesium (MG_ACID)	28	4602.7	452.0	11610.0	3908.3
Magnesium (Extractable) (MG_NITRATE)	28	128.9	5.0	412.0	104.0
Manganese (MN_ACID)	28	838.4	230.0	3915.0	698.0
Manganese (Extractable) (MN_EDTA)	28	252.2	53.0	1666.0	303.5
Molybdenum (MO_ACID)	23	0.8	0.0	5.7	1.1
Sodium (NA_ACID)	28	315.5	104.0	783.0	209.3
Nickel (NI_ACID)	28	28.4	6.6	58.1	15.3
Nickel (Extractable) (NI_EDTA)	28	2.5	0.5	6.1	1.9
Phosphorus (P_ACID)	28	755.2	387.0	1585.0	246.2
Phosphorus (Extractable) (P_OLSEN)	28	37.5	11.0	82.0	18.1
Lead (PB_ACID)	28	41.4	15.0	111.0	25.6
Lead (Extractable) (PB_EDTA)	28	17.0	6.4	43.7	9.3
Selenium (SE_ACID)	23	0.3	0.0	0.8	0.2
Strontium (SR_ACID)	28	45.0	12.0	115.0	29.1
Vanadium (V_ACID)	23	51.2	9.2	172.0	37.1
Zinc (ZN_ACID)	28	86.0	33.0	161.0	33.8
Zinc (Extractable) (ZN_EDTA)	28	7.2	2.8	26.1	4.8

for units, see Analyses Denitions (p52)

b. Analysis Within a 50km Radius (271 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST.DEV
pH (PH)	270	7.1	3.5	8.6	0.9
Carbon (CARBON)	269	3.3	0.1	48.8	4.8
Aluminium (AL_ACID)	270	26629.6	2974.0	66580.0	12042.5
Arsenic (AS_ACID)	145	4.6	0.0	35.2	5.6
Barium (BA_ACID)	270	149.3	16.0	847.0	105.5
Calcium (CA_ACID)	270	16783.6	91.0	277260.0	31281.7
Cadmium (CD_ACID)	270	0.6	0.0	10.4	0.9
Cadmium (Extractable) (CD_EDTA)	270	0.3	0.0	7.3	0.6
Cobalt (CO_ACID)	270	9.9	0.3	42.6	5.3
Cobalt (Extractable) (CO_EDTA)	270	1.0	0.0	7.2	1.0
Chromium (CR_ACID)	270	33.7	0.0	165.6	20.1
Copper (CU_ACID)	270	21.0	4.1	322.6	21.8
Copper (Extractable) (CU_EDTA)	270	7.5	0.7	196.9	12.6
Fluoride (F_ACID)	162	70.9	0.0	452.8	64.0
Iron (FE_ACID)	270	25555.2	3032.0	104642.0	12432.5
Mercury (HG_ACID)	124	0.1	0.0	0.6	0.1
Potassium (K_ACID)	270	4614.5	643.0	12048.0	2575.9
Potassium (Extractable) (K_NITRATE)	270	221.0	16.0	1294.0	156.8
Magnesium (MG_ACID)	270	4629.3	286.0	55895.0	5623.3
Magnesium (Extractable) (MG_NITRATE)	270	213.5	5.0	1128.0	214.0
Manganese (MN_ACID)	270	641.1	24.0	3915.0	496.9
Manganese (Extractable) (MN_EDTA)	270	154.1	3.0	1666.0	157.2
Molybdenum (MO_ACID)	224	0.8	0.0	7.4	1.0
Sodium (NA_ACID)	270	279.8	46.0	2397.0	196.8
Nickel (NI_ACID)	270	24.9	0.0	104.0	13.4
Nickel (Extractable) (NI_EDTA)	270	1.9	0.2	19.0	1.9
Phosphorus (P_ACID)	270	688.5	164.0	3240.0	339.2
Phosphorus (Extractable) (P_OLSEN)	269	36.6	2.0	337.0	29.2
Lead (PB_ACID)	270	41.3	7.0	556.0	44.2
Lead (Extractable) (PB_EDTA)	270	17.3	1.8	259.3	19.9
Selenium (SE_ACID)	145	0.4	0.0	2.4	0.4
Strontium (SR_ACID)	270	45.4	0.0	441.0	47.1
Vanadium (V_ACID)	224	38.4	0.0	235.3	27.6
Zinc (ZN_ACID)	270	84.1	6.0	993.0	74.3
Zinc (Extractable) (ZN_EDTA)	270	9.6	1.1	320.4	25.6

for units, see Analyses Denitions (p52)

c. National Analysis (5686 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST.DEV
pH (PH)	5630	6.0	3.1	9.2	1.3
Carbon (CARBON)	5672	6.1	0.1	61.5	8.9
Aluminium (AL_ACID)	5677	26775.3	491.0	79355.0	12772.2
Arsenic (AS_ACID)	2729	4.6	0.0	110.0	5.7
Barium (BA_ACID)	5677	150.0	7.0	3840.0	159.5
Calcium (CA_ACID)	5677	13768.7	0.0	339630.0	37785.0
Cadmium (CD_ACID)	5677	0.7	0.0	40.9	1.0
Cadmium (Extractable) (CD_EDTA)	5655	0.5	0.0	85.0	3.0
Cobalt (CO_ACID)	5677	10.6	0.0	567.0	13.7
Cobalt (Extractable) (CO_EDTA)	5655	1.1	0.0	26.5	1.2
Chromium (CR_ACID)	5677	38.9	0.0	2339.8	43.7
Copper (CU_ACID)	5677	22.6	0.0	1507.7	36.8
Copper (Extractable) (CU_EDTA)	5655	6.4	0.3	431.4	11.1
Fluoride (F_ACID)	3320	58.5	0.0	6307.9	186.2
Iron (FE_ACID)	5677	28147.8	395.0	264405.0	16510.5
Mercury (HG_ACID)	2159	0.1	0.0	2.4	0.2
Potassium (K_ACID)	5677	4727.7	60.0	23905.0	2700.2
Potassium (Extractable) (K_NITRATE)	5609	182.0	6.0	2776.0	151.6
Magnesium (MG_ACID)	5677	3648.1	0.0	62690.0	3284.1
Magnesium (Extractable) (MG_NITRATE)	5609	146.0	1.0	1601.0	147.5
Manganese (MN_ACID)	5677	777.0	3.0	42603.0	1068.8
Manganese (Extractable) (MN_EDTA)	5654	159.4	0.0	3108.0	188.6
Molybdenum (MO_ACID)	4417	0.9	0.0	56.3	2.0
Sodium (NA_ACID)	5677	323.3	17.0	25152.0	572.3
Nickel (NI_ACID)	5677	25.4	0.0	1350.2	29.2
Nickel (Extractable) (NI_EDTA)	5655	1.6	0.1	73.2	2.0
Phosphorus (P_ACID)	5677	792.1	41.0	6273.0	433.9
Phosphorus (Extractable) (P_OLSEN)	5604	27.4	0.0	534.0	25.5
Lead (PB_ACID)	5677	73.3	0.0	17365.0	280.6
Lead (Extractable) (PB_EDTA)	5655	27.8	1.2	6056.5	119.7
Selenium (SE_ACID)	2729	0.6	0.0	22.8	0.8
Strontium (SR_ACID)	5677	42.3	0.0	1445.0	67.8
Vanadium (V_ACID)	4428	41.0	0.0	854.4	33.9
Zinc (ZN_ACID)	5677	90.2	0.0	3648.0	104.4
Zinc (Extractable) (ZN_EDTA)	5655	9.6	0.5	712.0	24.6

for units, see Analyses Denitions (p52)

SOIL GUIDELINE VALUES (SGV)

Defra and the Environment Agency have produced soil guideline values (SGVs) as an aid to preliminary assessment of potential risk to human health from land that may be contaminated. SGVs represent 'intervention values', which, if exceeded, act as indicators of potential unacceptable risk to humans, so that more detailed risk assessment is needed.

The SGVs were derived using the Contaminated Land Exposure Assessment (CLEA) model for four land uses:

1. residential (with plant uptake / vegetable growing)
2. residential (without vegetable growing)
3. allotments
4. commercial / industrial

SGVs are only designed to indicate whether further site-specific investigation is needed. Where a soil guideline value is exceeded, it does not mean that there is necessarily a chronic or acute risk to human health.

The values presented in this report represent those from a number of sample points (given in the "Samples" column in each table) providing local, regional and national background levels. Figures which appear in red indicate that a bulked sample from 20m surrounding a sample point, has at a past date, exceeded the SGV for the 'residential with plant uptake' land use.

It is always advisable to perform site specific investigations.

More details on all the SGVs can be found on the Environment Agency Website.

All units are mg/kg which is equivalent to parts per million (ppm)

SUBSTANCE	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	ALLOTMENTS	COMMERCIAL /INDUSTRIAL
LEAD	450	450	450	750
SELENIUM	35	260	35	8000
NICKEL	50	75	50	5000
MERCURY	8	15	8	450
CHROMIUM	130	200	130	5000
CADMIUM (pH 6)	1	30	1	1400
CADMIUM (pH 7)	2	30	2	1400
CADMIUM (pH 8)	8	30	8	1400
ARSENIC	20	20	20	500

ANALYSES DEFINITIONS

PH (pH)
pH of soil measure after shaking 10ml of soil for 15 minutes with 25ml of water

CARBON (Carbon)
Organic Carbon (% by wt) measured either by loss-on-ignition for soils estimated to contain more than about 20% organic carbon or by dichromate digestion.

AL_ACID (Aluminium)
Total Aluminium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

AS_ACID (Arsenic)
Total Arsenic concentration (mg/kg) determined by Hydride Atomic Absorption Spectrometry (AAS), extracted into hydrochloric acid after digestion with nitric acid and ashing with magnesium nitrate

BA_ACID (Barium)
Total Barium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CA_ACID (Calcium)
Total Calcium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CD_ACID (Cadmium)
Total Cadmium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CD_EDTA (Cadmium Extractable)
Extractable Cadmium concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

CO_ACID (Cobalt)
Total Cobalt concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CO_EDTA (Cobalt Extractable)
Extractable Cobalt concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

CR_ACID (Chromium)
Total Chromium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CU_ACID (Copper)
Total Copper concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CU_EDTA (Copper Extractable)
Extractable Copper concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

ANALYSES DEFINITIONS continued

F_ACID (Flouride)
Flouride extracted with 1mol / l sulphuric acid and determined by Ion Selective Electrode (ISE)

FE_ACID (Iron)
Total Iron concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

HG_ACID (Mercury)
Total Mercury concentration (mg/kg) determined by Hydride Atomic Absorption Spectrometry (AAS), digested in a nitric/sulphuric acid mixture

K_ACID (Potassium)
Total Potassium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

K_NITRATE (Potassium Extractable)
Extractable Potassium concentration (mg/l) determined by shaking 10ml of air dry soil with 50ml of 1.0M ammonium nitrate for 30mins, filtering and then measuring the concentration by flame photometry

MG_ACID (Magnesium)
Total Magnesium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

MG_NITRATE (Magnesium Extractable)
Extractable Magnesium concentration (mg/l) determined by shaking 10ml of air dry soil with 50ml of 1.0M ammonium nitrate for 30mins, filtering and then measuring the concentration by flame photometry

MN_ACID (Manganese)
Total Manganese concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

MN_EDTA (Manganese Extractable)
Extractable Manganese concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

MO_ACID (Molybdenum)
Total Molybdenum concentration (mg/kg) determined by Atomic Adsorption Spectrometyr (AAS) in an aqua regia digest

MO_EDTA (Molybdenum Extractable)
Extractable Molybdenum concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

NA_ACID (Sodium)
Total Sodium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

NI_ACID (Nickel)
Total Nickel concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

ANALYSES DEFINITIONS continued

NI_EDTA (Nickel Extractable)
Extractable Nickel concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

P_ACID (Phosphorus)
Total Phosphorus concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

P_OLSON (Phosphorous Extractable)
Extractable Phosphorus concentration (mg/l) determined by shaking 5ml of air dry soil with 100ml of 0.5M sodium bicarbonate for 30mins at 20 deg.C, filtering and then measuring the absorbance at 880 nm colorimetrically with acid ammonium molybdate solution

PB_ACID (Lead)
Total Lead concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

PB_EDTA (Lead Extractable)
Extractable Lead concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

SE_ACID (Selenium)
Total Selenium concentration (mg/kg) determined by Hydride Atomic Absorption Spectrometry (AAS), extracted into hydrochloric acid after digestion with nitric acid and ashing with magnesium nitrate

SR_ACID (Strontium)
Total Strontium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

V_ACID (Vanadium)
Total Vanadium concentration (mg/kg) determined by Atomic Adsorption Spectrometyr (AAS) in an aqua regia digest

ZN_ACID (Zinc)
Total Zinc concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

ZN_EDTA (Zinc Extractable)
Extractable Zinc concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

REFERENCES

AVERY, B.W. (1973). Soil classification in the Soil Survey of England and Wales. Journal of Soil Science, 24, 324-338.

AVERY, B.W., (1980). Soil classification for England and Wales. Soil Survey Technical Monograph No.14, Harpenden, UK.

BOORMAN, D.B, HOLLIS, J.M. and LILLEY, A. (1995). Hydrology of Soil Types: a hydrologically-based classification of the soils of the UK. Institute of Hydrology Report No.126, Wallingford, UK.

CLAYDEN, B and HOLLIS, J.M. (1984). Critieria for Differentiating Soil Series. Soil Survey Technical Monograph No.17, pp159. Harpenden, UK.

HALLETT, S.H., KEAY, C.A., JARVIS, M.G. and JONES, R.J.A. (1994). INSURE: Subsidence risk assessment from soil and climate data. Proceedings of the Association for Geographic Information (AGI). National Conference Markets for Geographic Information. Birmingham. 16.2.1 - 16.2.7.

HOLLIS, J.M. (1991). Mapping the vulnerability of aquifers and surface waters to pesticide contamination at the national and regional scale. In: Pesticides in Soils and Water, BCPC Monograph No.47, 165-174.

HOLLIS, J.M., KEAY, C.A., HALLETT, S. H., GIBBONS, J.W. and COURT, A.C. (1995). Using CatchIS to assess the risk to water resources from diffusely applied pesticides. In: British Crop Protection Council monograph No. 62: Pesticide movement to water, 345-350

JARVIS, M.G and HEDGES, M.R. (1994). Use of soil maps to predict the incidence of corrosion and the need for iron mains renewal. Journal of the Institution of Water and Environmental Management 8, (1) 68-75.

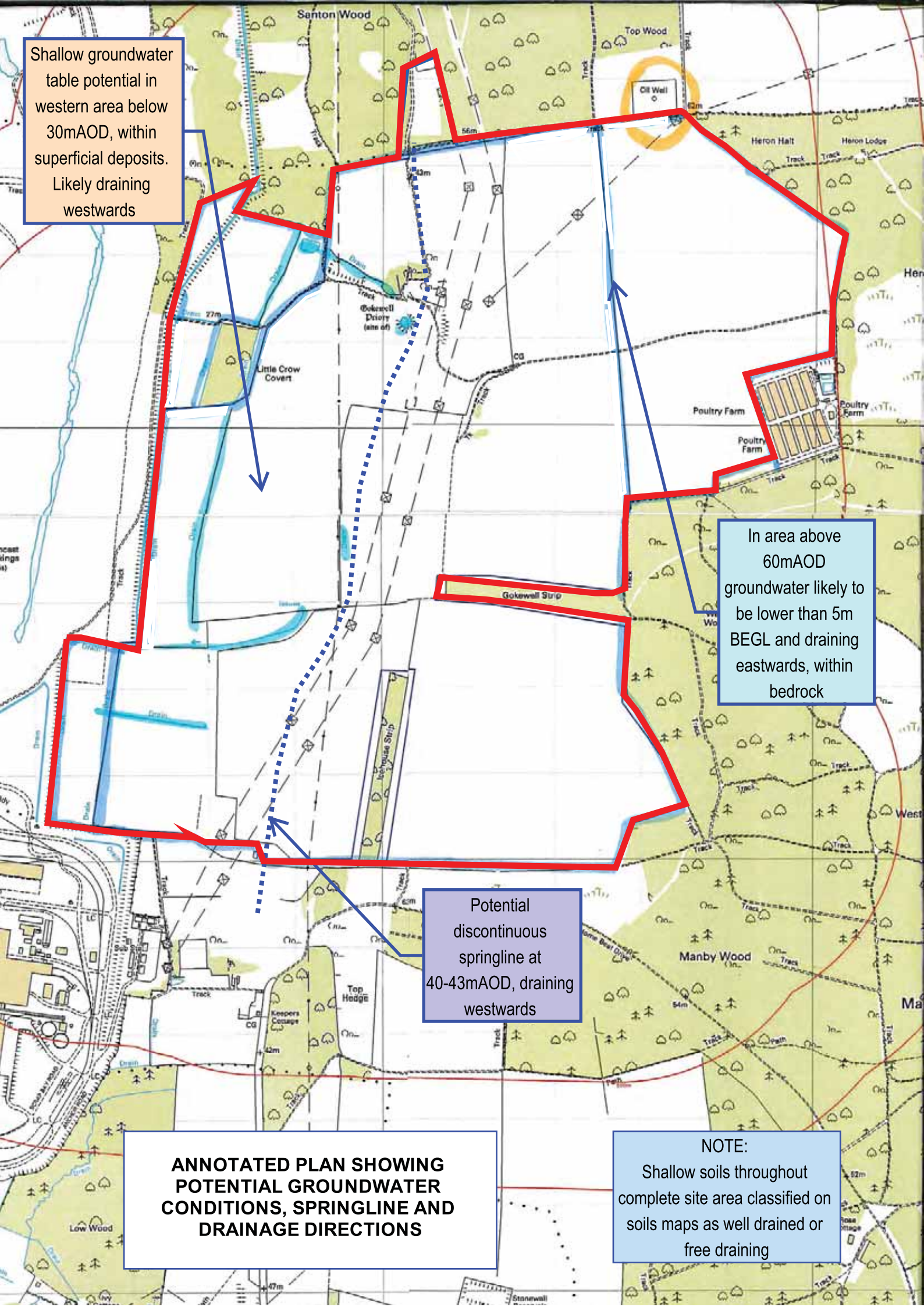
PALMER, R.C., HOLMAN, I.P., ROBINS, N.S. and LEWIS, M.A. (1995). Guide to groundwater vulnerability mapping in England and Wales. National Rivers Authority R and D Note 578/1/ST.

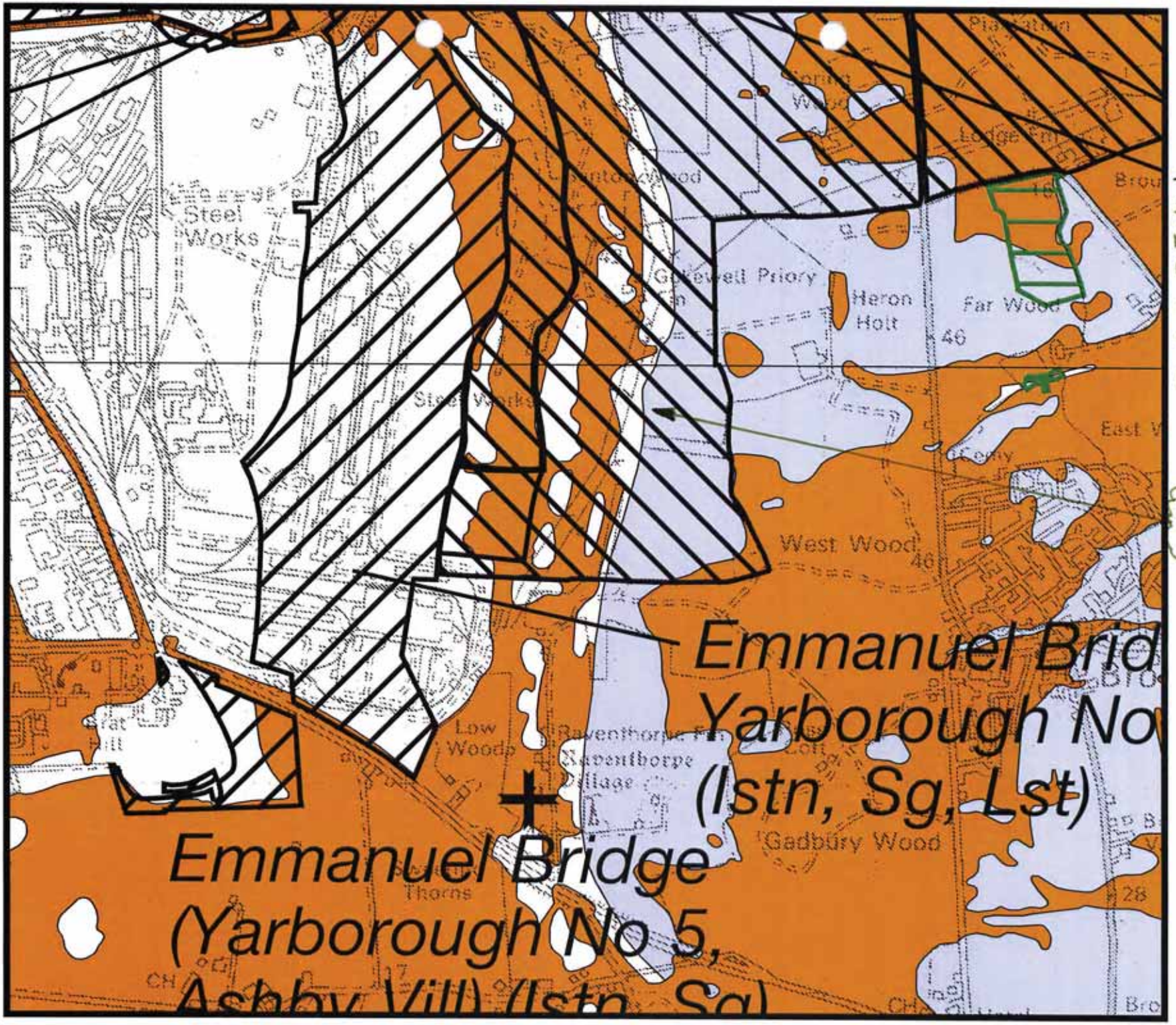
To view a glossary visit: www.landis.org.uk/sitereporter/glossary.pdf
For a list of further reading visit: www.landis.org.uk/sitereporter/FURTHER_READING.pdf

GIS Datasets:
The GIS data used in the creation of this report is available to lease for use in projects.
To learn more about, or acquire the GIS datasets used in the creation of this report, please contact the Nationals Soil Resources Institute:

nsridata@cranfield.ac.uk
+44 (0) 1234 75 2992
National Soil resources Institute
Cranfield University
Bedfordshire
MK43 0AL
United Kingdom
www.landis.org.uk

Soil Site Report
(C) Cranfield university, 2017


Shallow groundwater table potential in western area below 30mAOD, within superficial deposits. Likely draining westwards
In area above 60mAOD groundwater likely to be lower than 5m BEGL and draining eastwards, within bedrock
Potential discontinuous springline at 40-43mAOD, draining westwards
Santon Wood
Top Wood
Oil Well
Heron Hall
Heron Lodge
Gokewell Priory (site of)
Little Crow Covert
Poultry Farm
Gokewell Strip
Manby Wood
Top Hedge
Keepers Cottage
Low Wood
Stonewall
ANNOTATED PLAN SHOWING POTENTIAL GROUNDWATER CONDITIONS, SPRINGLINE AND DRAINAGE DIRECTIONS
NOTE:
Shallow soils throughout complete site area classified on soils maps as well drained or free draining



EXTRACT:

HUMBERSIDE MINERAL RESOURCES

1: 100,000 ORIGINAL (2006)

SITE AREA

30

20

EVAPORITES

Potash

Approximate western limit of Boulby Potash

Salt

Approximate western limit of Boulby Halite

} Permian

MINERAL PLANNING PERMISSION (as at 01.08.05)

Source: Mineral Planning Authorities

Surface planning permission (valid and expired)

Underground planning permission (valid and expired)

MINERAL WORKINGS

Melton Ross — Active site

Burstwick — Inactive (including yet to be worked), worked-out and/or restored site

Mineral commodity

Ch	Chalk	Istn	Ironstone	Peat	Peat
Cl	Clay & Shale	Lst	Limestone	San	Sand
CR	Crushed Rock	Oil	Oil	Sg	Sand & Gravel
Fi	Flint	Min	Unspecified mineral	SiS	Silica Sand
Gas	Natural Gas	MSg	Marine sand and gravel		

■ Active rail aggregate depot

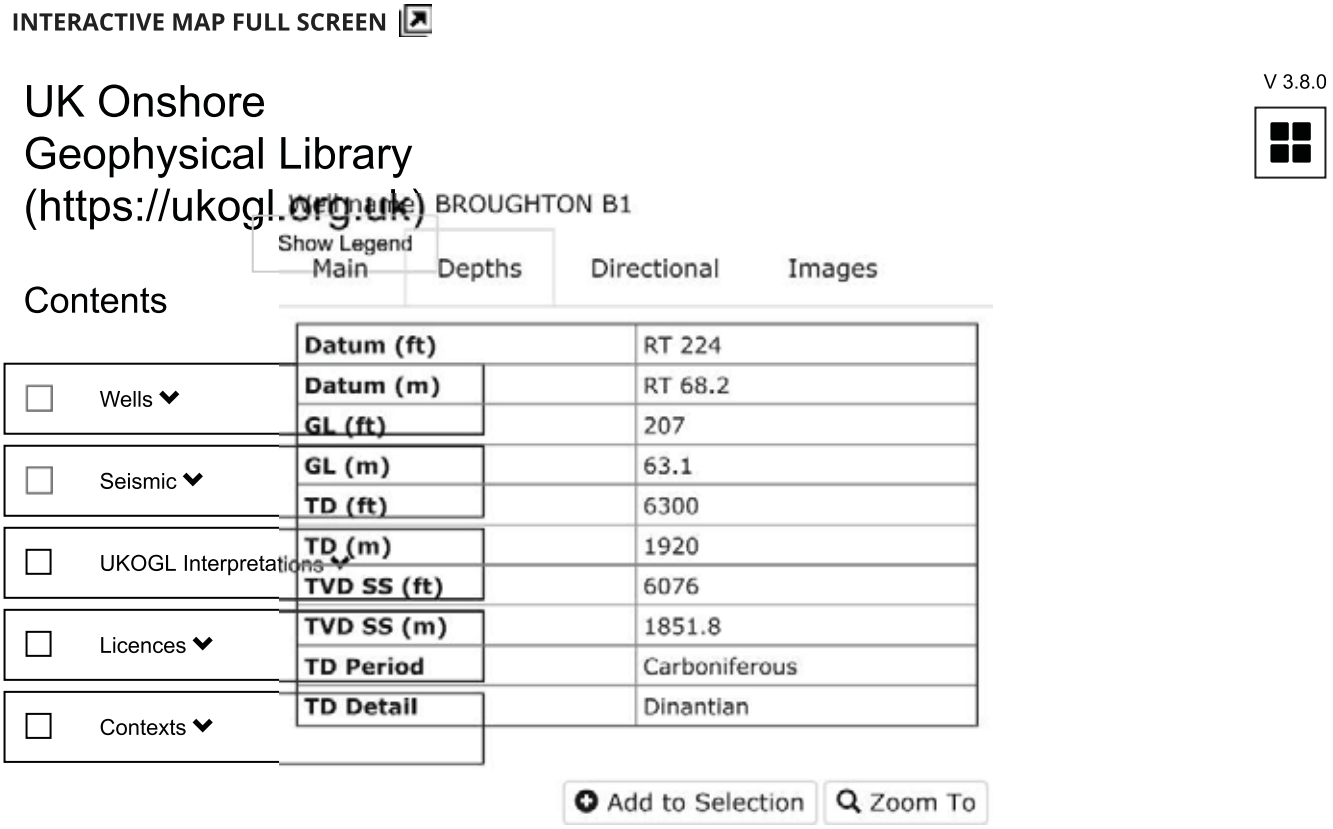
♦ Active marine wharf

ENVIRONMENTAL DESIGNATIONS (as at 03/11/04)

National nature conservation designations (SSSIs and NNRs)

UK Onshore Geophysical Library

A charitable body providing a substantial open-access resource of commercial data on the deep geology beneath our feet – promoting education, research and development



Additional Borehole Coverage

As a supplement to our primary Exploration wells coverage we now serve an additional wells layer of selected additional deep boreholes compiled over areas of limited exisiting coverage and control.

Providing access to an expanded Formation Tops database this resource has been compiled from a number of open access sources and sub surface memoirs, primarily derived from information held within the British Geological Survey's Borehole Scans archive. For further information and access to extensive source records please visit the BGS site.

This compilation is an ongoing project and is still in its early stages, with the initial focus being across the south of England. New data will be added on a regular basis and this layer, shown as blue ringed well

UK Onshore Geophysical Library www.ukogl.org.uk

BROUGHTON B1

Surface Easting:	494627	Datum for MD:	RT		
Surface Northing:	410760			(f)	(m)
Deviated:	N	Elevation Datum:		224	68.2
Original Depth Units:	metres	Elevation GL:		207	63.1
Surface Formation:	Upper Lias				

Top	MD (f)	MD (m)	TVDSS (f)	TVDSS (m)	TWT (s)	Detail
Upper Lias	17	5.1	-207	-63.1	-	-
Middle Lias	90	27.5	-134	-40.7	-	-
Lower Lias	330	100.5	106	32.2	0.031	-
Triassic	603	183.8	379	115.6	0.100	-
Penarth Group (Rhaetic)	603	183.8	379	115.6	0.100	-
Mercia Mudst (Keuper)	631	192.2	407	124.0	0.107	-
Muschelkalk	1460	445.0	1236	376.8	0.283	-
Zechstein (U.Permian)	2630	801.5	2406	733.3	0.522	-
L. Permian Marl/Shale	3597	1096.2	3373	1028.0	0.643	-
Rotliegendes/Leman SS	3674	1119.8	3450	1051.6	0.654	-
Westphalian C & D	3697	1126.8	3473	1058.6	0.659	-
Westphalian B	4099	1249.2	3875	1181.0	0.731	-
Westphalian A	4672	1424.0	4448	1355.8	0.835	-
Namurian	5211	1588.3	4987	1520.1	0.923	-
Dinantian	6188	1886.0	5964	1817.8	1.067	-
TD	6300	1920.0	6076	1851.8	1.078	Dinantian

Comments: -

The information given here is based on open file records available in the OGA well library and other public sources. All details are taken from interpretations made at the time the well was drilled and also from later re-evaluations and calculations. This information is provided for guidance only and UKOGL does not warrant its accuracy. Details are subject to ongoing revision. See the OGA website for details of formal release agents in order to obtain hard copy scans, digital data and reports for UK onshore wells.

BROUGHTON B1

BP PETROLEUM DEVELOPMENT LIMITED

BROUGHTON B-1

LICENCE: PL 185

46/13-3

BROUGHTON B–1

WELL RECORD CENTRE

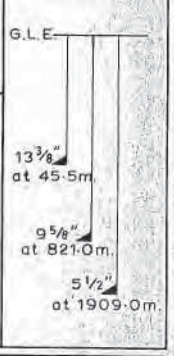
DRILLED DEPTH

29 MAY 1985

HUMBR

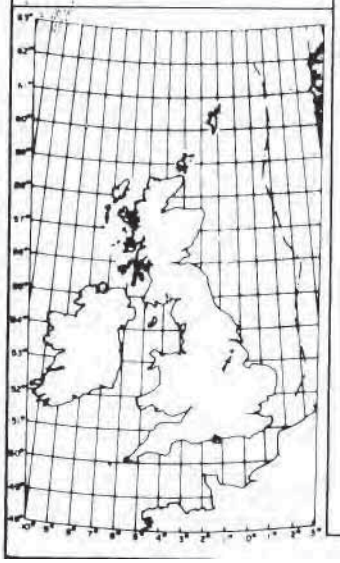
NATIONAL GRID REFERENCE:
SURFACE LOCATION SE 94627410760 0 34 13·493 W 53 35 04·694 DEPARTMENT OF ENERGY
TOP RESERVOIR LOCATION
BOTTOM HOLE LOCATION
R.T.E. 68·2 m A.O.D. 5·1 m A.G.L. G.L.E. 63·1 m A.O.D.
RIG KENTING-36 SPUDDED 18th JULY, 1984 COMPLETED DRILLING 17th AUG, '84
TOTAL DEPTH DRILLED 1920·0 m B.R.T. TOTAL DEPTH (T.V.D.) m B.R.T. m S.S.
AVERAGE ANGLE OF DEVIATION THROUGH RESERVOIR 1·25° MAXIMUM DEVIATION 2°
WELL STATUS SUSPENDED OIL WELL

CASING



LOCATION MAP
SCALE 1:50,000





LITHOLOGICAL

- Limestone
- Dolomite
- Misc. Carbonate
- Dolomitic Limestone
- Calcareous Dolomite
- Clay, Mudstone, Shale (LT 70)
- Siltstone
- Sandstone, Sand
- Conglomerate, Gravel
- Siliceous Rock
- Coal, Lignite & other Carbonaceous Rock
- Anhydrite, Gypsum
- Halite
- Miscellaneous Chlorides and Sulphates
- Iron, Manganese, Phosphate and other Misc. Mins.
- Chert
- Extrusive Igneous
- Tuff
- Intrusive Igneous
- Metamorphic
- Cement (LT 110)
- No Samples

LITHOLOGICAL QUALIFIERS

- Clayey
- Sandy
- Silty
- Gravelly
- Calcareous
- Dolomitic
- G Significant Glauconite
- Significant Carb. Frags
- Phosphatic, Ferruginous Manganiferrous
- Bituminous
- Tuffaceous

GRAIN TYPE FOSSILIFEROUS: SKELETAL

- Benthonic Macrofossils
- Planktonic Macrofossils
- Benthonic Microfossils
- Planktonic Microfossils
- Plant remains

WELL SYMBOLS

- Water Flow
- Loss to Formation
- Gas Trace
- Gas Show
- Oil Show
- Gas & Condensate Show
- Oil and Gas Show
- Hydrocarbon Fluorescence
- Cored Interval
- Sidewall Core
- No Recovery
- Formation Interval Test
- Drill Stem Test
- Perforated Interval
- Casing Shoe
- Liner Hanger

Intégrale

Appendix D

Terrafirma Mining Report

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37

TERRASEARCH® ASSESS

NON-RESIDENTIAL

PASSED

COAL	NEGLIGIBLE RISK
STONE (Incl. Limestone, Clay, Bath Stone & Chalk)	MODERATE RISK
EVAPORITES (Incl. Gypsum)	NEGLIGIBLE RISK
METALLIFEROUS (Incl. Tin, Lead and Iron)	LOW RISK
HYDROCARBONS (Incl. Fracking)	MODERATE RISK
CHESHIRE BRINE	NEGLIGIBLE RISK
DEVELOPMENT POTENTIAL	HIGH RISK
PLANNED/FUTURE MINERAL EXTRACTION	MODERATE RISK

Professional Opinion

Within the scope of this assessment, the Site is not considered to be at a significant risk from past, present or future mineral extraction. Mining hazards are unlikely to have an adverse effect on the security of the Site for normal lending purposes. However, your attention is drawn to the prudent enquiries suggested in the report recommendations.

Contact the report author directly by telephone on: 0330 900 7500

Report on:

LARGE SITE AT SANTON, SCUNTHORPE

Date:

14/08/2017

Our Ref:

TFC201708081425-SITE

Client Ref:

LARGE SITE

TerraSearch® Assess is a site-specific evaluation of all mining and mineral extraction hazards. The report reviews available records, allowing us to expertly conclude the risk to the site from past, present and planned mining hazards, before providing practical next steps, based on the level of risk identified.

Terrafirma's terms & conditions provide liability cover of £10m per report. All TerraSearch® Assess reports adhere to The Search Code and are regulated by the Council of Property Search Organisations.

TERRAFIRMA

©2017 Terrafirma Mine Searches LTD

REGULATED COMBINED MINING SEARCH

Conclusions and Expert Interpretation of Risk

Considering the ongoing current use of the Site:

MODERATE RISK

Terrafirma have reviewed all available site investigation, local geological, historical and land use records and consider that, in this instance and considering its ongoing current use, the Site is at **moderate risk** from ground instability associated with historical **ironstone** extraction.

The Site is located in an area that has been extensively exploited for ironstone resources. Within the Site a number of suspected extraction features have been identified (highlighted by dashed lines - see hazard map) and these are considered likely to be associated with ironstone mining. Furthermore, northeast of the Site a historic hydrocarbon well, operated by BP for oil extraction, has also been located. The hydrocarbon field associated with this well extends within the Site boundary. Due to the nature of mineral extraction in the area and suitable geological conditions on Site, it is considered possible that both ironstone and oil extraction occurred within the Site boundary. Therefore, associated extraction features, including underground workings and shafts could be present and have the potential to impact ground stability in the area.

Considering the future development of the Site:

HIGH RISK

The presence of unrecorded surface and/or shallow mineral workings beneath the Site cannot be discounted and therefore prior to any site works or future development activity, it is considered prudent to commission a full Site Survey by a qualified mining geologist/engineer. Please contact Terrafirma directly if you require further information.

©2017 Terrafirma Mine Searches LTD: V1.2

Professional Recommendations

Based on the Site's current use, no further assessment of mineral extraction is required. However, due to suspected historic extraction on Site, it is strongly recommended that should the Site be developed, a full site investigation is undertaken prior to development. It is further recommended that close attention is also paid to the suspected features highlighted in the included hazard map (page 5.) during any future Site works.

©2017 Terrafirma Mine Searches LTD: V1.2

Mining Hazards:

NOT DETECTED WITHIN 1000 METRES ✓ **DETECTED WITHIN 1000 METRES** !

Alabaster	✓	Alum Shale	✓	Anhydrite	✓	Antimony	✓
Arsenic	✓	Ball Clay	✓	Barite	✓	Bath Stone	✓
Bideford Black	✓	Brick Clay	✓	Brine Solution	✓	Celestine	✓
Chalk	✓	Chert	✓	China Clay	✓	Clay and Shale	✓
Coal	✓	Copper	✓	Coprolite	✓	Delphstone	✓
Diatomite	✓	Dolerite/Basalt	✓	Dolomite	✓	Flagstone	✓
Fireclay	✓	Fluorspar/Calcite	✓	Free Stone	✓	Fuller's Earth	✓
Gas	✓	Granite	✓	Gold	✓	Gypsum	✓
Iron Ore/Hematite	✓	Iron Ochre	✓	Ironstone	!	Jet	✓
Kentish Ragstone	✓	Lead/Zinc	✓	Lignite	✓	Limestone	✓
Manganese	✓	Metamorphic Rock	✓	Non-Ferrous Metals	✓	Oil	✓
Oil Shale	✓	Peat	✓	Platinum	✓	Potash	✓
Rock Salt/Halite	✓	Sand and Gravel	✓	Sandstone	✓	Sec. Aggregate	✓
Shale Gas	✓	Silica Sand	✓	Siltstone	✓	Silver	✓
Slate	✓	Soapstone	✓	Tin	✓	Tufa	✓
Tungsten	✓	Witherite	✓	Whinstone	✓	Whetstone	✓

©2017 Terrafirma Mine Searches LTD: V1.2

Mining Hazard Map



Site Address	LARGE SITE AT SANTON, SCUNTHORPE

Hazard Map Key

Coal Authority Data

Mine Entries
- Adit
- Shaft

Subsidence Claims
- 01 - Awaiting D
- 02 - Rejected
- 05 - Settled
- 06 - Withdrawn

Hazard Zones
- High Risk Zone
- Moderate Risk Zone

- Site Boundary
- Suspected Extraction Features

Mapping Sourced from the Ordnance Survey © Crown copyright and database rights 2017 OS 1000562 10

Geological Conditions

Bedrock Geology	Jurassic Age Charmouth Mudstone Formation, Pecten Ironstone, Marlstone Rock Formation (Limestone And Sandstone), Whitby Mudstone Formation, Grantham Formation, Northampton Sand Formation, Kirton Cementstone Beds and Hibaldstow Limestone
Superficial Geology	Quaternary Age Sutton Sand Formation - Sand
Geological Faults	None Recorded
Artificial Deposits	Artificially infilled ground is present in the South West region of the site
Mineralised Deposits	Iron mineralisation is known to be present within the local bedrock
Wells	None Recorded

Detailed Findings of Past Non-Coal Mineral Extraction (Within 500 Metres of Site)

Ironstone

Overall Risk: **MODERATE**

Background Information:

The Site is located within an area that has been historically exploited for Ironstone by surface and underground mining.

Mining Hazards Within:	Beneath Site
Nearest Mining Hazard:	See hazard Map
Type of Mining Hazard:	Suspected Extraction Features

Expert Interpretation of Risk:

The Site is **considered** to be at moderate risk from ground instability associated with historical Ironstone extraction. The local geological conditions are considered to be suitable for small, unrecorded extraction features to be present within/beneath the Site boundary.

©2017 Terrafirma Mine Searches LTD: V1.2

Present Non-Coal Mineral Extraction

Overall Impact: **NEGLIGIBLE**

Expert Interpretation of Mineral Extraction Activity:

The Site is considered to be at a low risk from the impact of current non-coal mineral extraction.

No Extraction Sites Within:	1000 metres
Nearest Extraction Site:	N/A
Type of Extraction Activity:	N/A
Type of Mineral Resource:	N/A

Recommendation:

None.

Planned Non-Coal Mineral Extraction

Overall Impact: **MODERATE**

Expert Interpretation of Mineral Extraction Activity:

The Site is considered to be at a moderate risk from the impact of current non-coal mineral extraction. A dormant mineral planning permission associated with Emmanuel Bridge extends within the western Site boundary. It is considered, due to the underground nature of the licence, that future extraction could occur. This has the potential to impact both ground stability and the quiet enjoyment of the Site.

Extraction Sites Within:	Within Site boundary
Nearest Extraction Site:	N/A
Type of Extraction Activity:	Underground and Surface Mining
Type of Mineral Resource:	Ironstone, Limestone, Sand and Gravel

Recommendation:

For more information, contact the area's local council.

©2017 Terrafirma Mine Searches LTD: V1.2

Hydrocarbons (Inc. Fracking)

Overall Impact:	**MODERATE**

Recommendation:

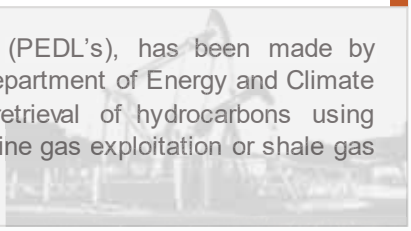
The Site is within PEDL 180 (south) and 182 (north) operated by Europe Oil & Gas and Egdon Resources U.K. respectively. Records show a well associated with the PEDL 185 block, 165 metres north east of the site, was constructed in 1984 and used for oil extraction. This was operated by BP and was abandoned/released in 1989. Egdon Resources U.K. have now developed a new well up-dip, approximately 1000 metres from the Site. There is no evidence for the depth of the well(s).

License Block Name:	PEDL 180 & 182
Type of License Block:	Exploration
Hydrocarbon Well Within:	1000 metres
Hydrocarbon Resource:	Oil Shale

Expert Interpretation of Hydrocarbon Extraction:

The property is situated within a block awarded for exploration, as defined by the OGA or DECC.

An assessment of Petroleum Exploration and Development Licence areas (PEDL's), has been made by reference to information provided by the Oil and Gas Authority (OGA) and the Department of Energy and Climate Change (DECC). A PEDL offers exclusive rights for the exploration and retrieval of hydrocarbons using conventional oil and gas extraction techniques, coal bed methane extraction, mine gas exploitation or shale gas fracking techniques within set Ordnance Survey (OS) referenced 'blocks'.



©2017 Terrafirma Mine Searches LTD: V1.2

TERRASEARCH® COAL

Overall Coal Mining Assessment	**NEGLIGIBLE RISK**
Within Coal Mining Reporting Area	No
Within Brine Compensation District	No

Coal Mining Features*		Assessment**
Past underground	No	NEGLIGIBLE RISK
Present underground	No	NEGLIGIBLE RISK
Planned underground	No	NEGLIGIBLE RISK
Mine shafts and adit entries	No	NEGLIGIBLE RISK
Geological conditions	No	NEGLIGIBLE RISK
Past opencast	No	NEGLIGIBLE RISK
Present opencast	No	NEGLIGIBLE RISK
Planned opencast	No	NEGLIGIBLE RISK
Coal subsidence claims	No	NEGLIGIBLE RISK
Mine gas	No	NEGLIGIBLE RISK
Hazards	No	NEGLIGIBLE RISK
Withdrawal of Support	No	NEGLIGIBLE RISK
Working Facilities Order	No	NEGLIGIBLE RISK
Payments to Copyhold Land	No	NEGLIGIBLE RISK
Brine Subsidence	No	NEGLIGIBLE RISK

*Coal Mining Features are identified solely from The Coal Authority licensed data.

**Assessment is the risk of subsidence or impact to the Site based on Terrafirma's interpretation of Coal Authority licensed data and third party data.

©2017 Terrafirma Mine Searches LTD: V1.2

Detailed Findings of Coal Mining Hazards:	
Past underground	NEGLIGIBLE RISK

The Site is not within a surface area that could be affected by historical deep underground mining.

The Site is not within a surface area that could be affected by historical recorded shallow underground mining.

The Site is not within a surface area that could be affected by historical unrecorded shallow underground mining.

Present underground	NEGLIGIBLE RISK

The Site is not situated within an area which could be affected by currently active underground coal mining.

Planned underground	NEGLIGIBLE RISK

The Site is not situated within an area which could be affected by any future underground coal mining.

The Site is not situated within 50 metres of a Section 46 Notice.

©2017 Terrafirma Mine Searches LTD: V1.2

Mine shafts and adit entries	NEGLIGIBLE RISK
There are no recorded mine entries within 20 metres of the Site.	

Geological conditions	NEGLIGIBLE RISK
There are no recorded faults, fissures or breaklines beneath or within the vicinity of the Site.	

Past opencast	NEGLIGIBLE RISK
The Site is not situated within or proximal to any past licence areas for the opencast extraction of coal. There are no unlicensed opencast pits or extraction sites within 200 metres of the Site.	

©2017 Terrafirma Mine Searches LTD: V1.2

Present opencast	NEGLIGIBLE RISK

The Site is not situated within an area which could be affected by currently active opencast coal mining.

Planned opencast	NEGLIGIBLE RISK

There are no plans by the Coal Authority to grant a licence to extract coal using opencast methods within 800 metres surrounding the Site.

Coal subsidence claims	NEGLIGIBLE RISK

There is no record of any coal mining-related damage notices or subsidence claims for the Site or for any Site within 50 metres of the Site, since 1994.

There is no record of a request that has been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

©2017 Terrafirma Mine Searches LTD: V1.2

Mine gas	NEGLIGIBLE RISK
There are no records of any mine gas wells within 25 metres of the Site and there is no record of a mine gas emission requiring action.	

Hazards	NEGLIGIBLE RISK
The Site is not situated within 25 metres of a coal mining-related hazard. There have been no remedial works undertaken by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.	

Withdrawal of Support	NEGLIGIBLE RISK
The property is not within an area where notices to withdraw support were given in 1946. The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.	

Working Facilities Order	NEGLIGIBLE RISK
The property is not in an area for which the Sherwood Area Order dated 1938 has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.	

Payments to former owners of Copyhold Land	NEGLIGIBLE RISK
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.	

Brine subsidence	NEGLIGIBLE RISK
Site is not situated within 25 metres of a coal mining-related hazard. There have been no remedial works undertaken by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.	

©2017 Terrafirma Mine Searches LTD: V1.2

Notice of Statutory Cover

In the unlikely event of any future damage, the terms of the Coal Mining Subsidence Act 1991 (as amended by the Coal Industry Act 1994) apply, and the Coal Authority / Licensee has a duty to take remedial action in respect of subsidence caused by the withdrawal of support from land and/or property in connection with lawful coal-mining operations. Typically, these actions will not need to involve either your insurance company or mortgage lender and therefore the end user(s) should not incur any costs or liability.

In addition to the above, it should also be noted that the Coal Authority offer a Public Safety and Subsidence Department that provides a 24 hour 7 day a week call out service (Tel: 01623 646 333) to take remedial action in respect of hazards associated with the movement or collapse of any coal mineshaft or entrances to coal mines and from other coal mining related surface hazards. Further information can be found on their website: www.groundstability.com.

©2017 Terrafirma Mine Searches LTD: V1.2

Report Limitations

This TerraSearch® Report has been carried out with reference to Terrafirma's bespoke GIS, an extensive collection of abandoned mine plans, maps, records and archives in our possession. **The report does not consider natural ground stability hazards, such as subsidence, landslip or coastal erosion.**

From this material, we have endeavoured to provide as accurate a report as possible. It should be realised that totally unrecorded or unindicated workings can exist between known workings and therefore Terrafirma cannot be held responsible for any settlement or subsidence problems as a result of a Site being affected by unrecorded mining features or natural ground cavities. The assessment of the 'risk' of ground instability arising from existing or planned mineral exploration or extraction is based on extant mineral planning or safeguarding areas as defined by the relevant Mineral Planning Authority (MPA) policies at the time of writing. Terrafirma cannot be held liable for any updates or changes in existing mineral operations or policies.

It is a 'remote' investigation and reviews only information provided by the client and from the databases of publicly available information that have been chosen to enable a desk based environmental assessment of the Site. The Certificate does not include a Site Investigation, nor does Terrafirma make specific information requests of the regulatory authorities for any relevant information they may hold.

This report is concerned solely with the Site searched and should not be used in connection with adjacent properties as only relevant known mining features have been mentioned and any known features that could potentially have a direct influence upon the target Site. Other features which may be present in the general area may have been omitted for clarity.

The report is based upon the Site boundaries as shown on the supplied location plan. This report is confidential to the client, the client's legal advisor and the client's Mortgage lender, as defined in the TerraSearch® terms & conditions, and as such may be used by them for conveyancing or related purposes. We have no liability toward any person or organisation not party to commissioning this report. This report or any part of it is not permitted to be reproduced, copied, altered or in any other way distributed by any other person or organisation.

Terms and Conditions

This report is provided under the Terrafirma Terms and Conditions (v2.1) for TerraSearch Reports (v1.0), a copy of which is available on our website (www.minesearches.co.uk/about/terms). They provide a limit of liability per report of £10 million, backed by Professional Indemnity Insurance; details available on request.

©2017 Terrafirma Mine Searches LTD: V1.2

Report Licensing

This report contains Data provided by the Coal Authority. Any and all analysis and interpretation of Coal Authority Data in this report is made by Terrafirma Mine Searches Ltd and is in no way supported, endorsed or authorised by the Coal Authority. The use of the data is restricted to the terms and provisions contained in this report. Data reproduced in this report may be the copyright of the Coal Authority and permission should be sought from Terrafirma Mine Searches Ltd prior to any re-use.

© Crown Copyright (2016) Ordnance Survey License Number 0100020315. May contain British Geological Society materials © NERC (2016).

This report may contain public sector information licensed under the Open Government Licence v3.0.

This report may contain plans and records held by the Coal Authority and made publicly available at the time of inspection which may include British Geological Survey and Ordnance Survey data.

Where mining reports and ground stability reports sourced from the Coal Authority are incorporated into this report, the integrity of the text is preserved and has not been disassembled, modified or paraphrased in any way and no deletions, omissions or reorganisation have been made to the text. The relevant text is identified as originating with the Coal Authority who are acknowledged as the author.

Important Consumer Information

This search has been produced by **TERRAFIRMA MINE SEARCHES LTD** – Address: 2440 The Quadrant, Aztec West Business Park, Almondsbury, Bristol, BS32 4AQ; Email: info@terrafirmasearch.co.uk; Telephone: 01934806515) which is registered with the Site Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

This report meets the principles and requirements of the Property Codes Compliance Board Compliance Note CN02J in respect of Coal Mining Searches.

The Search Code

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in Site search reports undertaken by subscribers on residential and commercial Site within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practice and quality standards within the industry for the benefit of consumers and Site professionals
- enables consumers and Site professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles (Firms which subscribe to the Search Code will):

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

CONTACT TERRAFIRMAIF YOU WOULD LIKE A COPY OF THE SEARCH CODE

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Site Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

©2017 Terrafirma Mine Searches LTD: V1.2

TPOs Contact Details:

The Site Ombudsman scheme, Milford House, 43-55 Milford Street, Salisbury, Wiltshire SP1 2BP, Tel: 01722 333306, Fax: 01722 332296, Email: admin@tpos.co.uk

You can get more information about the PCCB from www.Sitecodes.org.uk or from our website at www.minesearches.co.uk.

Complaints Procedure

If you want to make a complaint directly to Terrafirma, we will:

- Acknowledge it within 5 working days of receipt.
- Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.
- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

Complaints should be sent to: Tom Backhouse, Managing Director & Senior Executive, Terrafirma Mine Searches Ltd - Address: 2440 The Quadrant, Aztec West Business Park, Almondsbury, Bristol, BS32 4AQ; Email: info@terrafirmaminesearches.co.uk; Telephone: 0330 900 7500.

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: admin@tpos.co.uk. We will co-operate fully with the Ombudsman during an investigation and comply with his final decision.

WE TRUST THIS REPORT PROVIDES THE INFORMATION YOU REQUIRE. PLEASE CONTACT US IF YOU HAVE ANY QUERIES OR IF WE CAN BE OF ANY FURTHER ASSISTANCE.

©2017 Terrafirma Mine Searches LTD: V1.2

Intégrale

Appendix E

Groundsure Data Report

Integrale Limited, Suite 7, Westway Farm Business Park, Wick Road, Bishop Sutton, Somerset, BS39 5XP United Kingdom
Tel: 01275 333 036 www.integrale.uk.com

Registered Office: The Granary, Chewton Fields, Ston Easton, Somerset, BA3 4BX United Kingdom VAT Reg. No. 609 7402 37



CENTREMAPS

Open Space, Upper Interfields,
Worcester, WR14 1UT

Groundsure Reference:	CMAPS-CM-643992-13238-310717EDR
Your Reference:	13238
Report Date	31 Jul 2017
Report Delivery Method:	Email - pdf

Enviro Insight

Address: Santon, Scunthorpe, DN16 1XP

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 01886 832972 quoting the above CENTREMAPS reference number.

Yours faithfully,

CENTREMAPS

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**Santon, Scunthorpe, DN16 1XP**
Date:	**31 Jul 2017**
Reference:	**CMAPS-CM-643992-13238-310717EDR**
Client:	**CENTREMAPS**

NW N NE



W E

SW S SE

Aerial Photograph Capture date:	16-Aug-2015
Grid Reference:	494018,409842
Site Size:	156.74ha

Report Reference: CMAPS-CM-643992-13238-310717EDR
Client Reference: 13238

Contents Page

Contents Page 3
Overview of Findings 6
Using this report 10
1. Historical Land Use 11
1. Historical Industrial Sites 12
1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping....12
1.2 Additional Information – Historical Tank Database....13
1.3 Additional Information – Historical Energy Features Database....14
1.4 Additional Information – Historical Petrol and Fuel Site Database....14
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database....14
1.6 Potentially Infilled Land....15
2. Environmental Permits, Incidents and Registers Map 17
2. Environmental Permits, Incidents and Registers 18
2.1 Industrial Sites Holding Licences and/or Authorisations....18
2.1.1 Records of historic IPC Authorisations within 500m of the study site:....18
2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:....18
2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:....20
2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:....20
2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:....20
2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: 20
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:....20
2.1.8 Records of Licensed Discharge Consents within 500m of the study site:....20
2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site: 21
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:....21
2.2 Dangerous or Hazardous Sites....21
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents....21
2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:....21
2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:....22
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990....22
3. Landfill and Other Waste Sites Map 23
3. Landfill and Other Waste Sites 24
3.1 Landfill Sites....24
3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site: 24
3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site: 24
3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:....25
3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:....25
3.2 Other Waste Sites....25
3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site: 25
3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site: 26
4. Current Land Use Map 27
4. Current Land Uses 28
4.1 Current Industrial Data....28
4.2 Petrol and Fuel Sites....29
4.3 National Grid High Voltage Underground Electricity Transmission Cables....29
4.4 National Grid High Pressure Gas Transmission Pipelines....29

5. Geology 30
5.1 Artificial Ground and Made Ground 30
5.2 Superficial Ground and Drift Geology 30
5.3 Bedrock and Solid Geology 30
6 Hydrogeology and Hydrology 32
6a. Aquifer Within Superficial Geology 32
6b. Aquifer Within Bedrock Geology and Abstraction Licenses 33
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses 34
6d. Hydrogeology – Source Protection Zones within confined aquifer 35
6e. Hydrology – Detailed River Network and River Quality 36
6.Hydrogeology and Hydrology 37
6.1 Aquifer within Superficial Deposits 37
6.2 Aquifer within Bedrock Deposits 38
6.3 Groundwater Abstraction Licences 39
6.4 Surface Water Abstraction Licences 39
6.5 Potable Water Abstraction Licences 39
6.6 Source Protection Zones 39
6.7 Source Protection Zones within Confined Aquifer 40
6.8 Groundwater Vulnerability and Soil Leaching Potential 40
6.9 River Quality 41
6.9.1 Biological Quality: 41
6.9.2 Chemical Quality: 41
6.10 Detailed River Network 41
6.11 Surface Water Features 43
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea) 44
7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map 45
7 Flooding 46
7.1 River and Coastal Zone 2 Flooding 46
7.2 River and Coastal Zone 3 Flooding 46
7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating 46
7.4 Flood Defences 46
7.5 Areas benefiting from Flood Defences 46
7.6 Areas benefiting from Flood Storage 47
7.7 Groundwater Flooding Susceptibility Areas 47
7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes 47
7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions? 47
7.8 Groundwater Flooding Confidence Areas 47
8. Designated Environmentally Sensitive Sites Map 48
8. Designated Environmentally Sensitive Sites 49
8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site: 49
8.2 Records of National Nature Reserves (NNR) within 2000m of the study site: 49
8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site: 49
8.4 Records of Special Protection Areas (SPA) within 2000m of the study site: 49
8.5 Records of Ramsar sites within 2000m of the study site: 50
8.6 Records of Ancient Woodland within 2000m of the study site: 50
8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site: 50
8.8 Records of World Heritage Sites within 2000m of the study site: 50
8.9 Records of Environmentally Sensitive Areas within 2000m of the study site: 50

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site: 51
8.11 Records of National Parks (NP) within 2000m of the study site: 51
8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:....51
8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:....51
8.14 Records of Green Belt land within 2000m of the study site:....51
9. Natural Hazards Findings 52
9.1 Detailed BGS GeoSure Data....52
9.1.1 Shrink Swell....52
9.1.2 Landslides....52
9.1.3 Soluble Rocks....52
9.1.4 Compressible Ground....53
9.1.5 Collapsible Rocks....53
9.1.6 Running Sand....53
9.2 Radon....53
9.2.1 Radon Affected Areas....53
9.2.2 Radon Protection....54
10. Mining 55
10.1 Coal Mining....55
10.2 Non-Coal Mining....55
10.3 Brine Affected Areas 55
Contact Details 56
Standard Terms and Conditions 58

Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	19	0	18	12
1.2 Additional Information – Historical Tank Database	0	0	4	19
1.3 Additional Information – Historical Energy Features Database	0	0	3	2
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	0
1.6 Potentially Infilled Land	17	0	25	24

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	9
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	0	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	1	0
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	1	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	0	1
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	1	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	1	0	0	2
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	3

Section 4: Current Land Use

	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	15	0	8	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology

5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	Yes
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology

	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	1
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	6	0	0	0	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	No	Yes
6.10 Detailed River Network entries within 500m of the site	11	1	6	3	Not searched	Not searched
6.11 Surface water features within 250m of the study site	Yes	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	No
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	No
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	Very Low
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	High

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	4
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	1	0	0	4	1
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	6	0	0	0	0	0
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Moderate
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Moderate
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Very Low
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Moderate
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 10 and 30% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	Full radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	No
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	Yes
10.3 Are there any brine affected areas within 75m of the study site?	No

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier “A” on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as “Not Shown”.

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use

NW N NE

W E

SW S SE



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

250
500
Search Buffers (m)

Historical 1:10,000 and 1:10,560 scale mapping

Industrial Land Use

Potentially Infilled Land

Historical 1:2,500, 1:1,250 and 1:500 scale mapping

Energy Features

Petrol Stations

Tanks

Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 49

ID	Distance [m]	Direction	Use	Date
1B	0	On Site	Unspecified Pit	1948
2	0	On Site	Railway Sidings	1979
3C	0	On Site	Unspecified Ground Workings	1977
4A	0	On Site	Unspecified Pit	1977
5D	0	On Site	Unspecified Pit	1977
6A	0	On Site	Unspecified Pit	1886
7E	0	On Site	Unspecified Pit	1886
8B	0	On Site	Unspecified Pit	1906
9B	0	On Site	Unspecified Pit	1955
10C	0	On Site	Unspecified Ground Workings	1994
11D	0	On Site	Unspecified Pit	1994
12A	0	On Site	Unspecified Pit	1994
13F	0	On Site	Unspecified Ground Workings	1977
14	0	On Site	Unspecified Works	1979
15B	0	On Site	Unspecified Pit	1906
16B	0	On Site	Unspecified Pit	1886
17E	0	On Site	Unspecified Pit	1886
18F	0	On Site	Unspecified Ground Workings	1994
19B	0	On Site	Unspecified Pit	1906
20T	105	W	Opencast Ironstone Workings	1979
21G	123	W	Unspecified Pit	1885
22G	123	W	Unspecified Pit	1885
23G	123	W	Unspecified Ground Workings	1905
24G	123	W	Unspecified Ground Workings	1905
25G	123	W	Unspecified Ground Workings	1886
26G	126	W	Unspecified Pit	1968
27H	134	NW	Unspecified Pit	1886
28H	135	NW	Unspecified Pit	1886
29U	139	W	Unspecified Pit	1886

30I	147	W	Unspecified Pit	1886
31I	147	W	Unspecified Pit	1886
32J	195	W	Opencast Ironstone Workings	1977
33J	195	W	Opencast Ironstone Workings	1994
34K	217	W	Unspecified Ground Workings	1977
35K	217	W	Unspecified Ground Workings	1994
36R	228	S	Electric Substation	1979
37L	232	SW	Unspecified Tanks	1979
38L	266	SW	Unspecified Tanks	1979
39M	326	SW	Sand Pit	1885
40M	328	SW	Unspecified Pit	1905
41M	328	SW	Unspecified Pit	1905
42M	328	SW	Unspecified Pit	1886
43M	330	SW	Unspecified Pit	1955
44M	330	SW	Unspecified Heap	1968
45M	332	SW	Unspecified Pit	1948
46M	332	SW	Unspecified Pit	1938
47N	456	S	Unspecified Tanks	1979
48N	458	S	Unspecified Tanks	1979
49X	489	S	Unspecified Pit	1979

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary: 23

ID	Distance (m)	Direction	Use	Date
50L	235	SW	Unspecified Tank	1975
51L	236	SW	Unspecified Tank	1997
52L	237	SW	Unspecified Tank	1975
53L	239	SW	Unspecified Tank	1997
54L	266	SW	Tanks	1975
55L	266	SW	Unspecified Tank	1997
56O	274	SW	Tanks	1975
57O	275	SW	Tanks	1997
58L	286	SW	Unspecified Tank	1975
59L	287	SW	Unspecified Tank	1997
60L	292	S	Unspecified Tank	1975
61L	293	S	Unspecified Tank	1997

62P	370	SW	Unspecified Tank	1975
63P	372	SW	Unspecified Tank	1997
64N	454	S	Unspecified Tank	1997
65N	454	S	Unspecified Tank	1975
66N	458	S	Unspecified Tank	1997
67N	458	S	Unspecified Tank	1975
68Q	461	S	Unspecified Tank	1997
69Q	461	S	Unspecified Tank	1975
70N	483	S	Unspecified Tank	1975
71N	483	S	Unspecified Tank	1997
72	485	NW	Unspecified Tank	1964

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary: 5

ID	Distance (m)	Direction	Use	Date
73R	194	S	Electricity Transformer Station	1997
74S	203	S	Electricity Substation	1975
75S	204	S	Electricity Substation	1997
76R	282	S	Electricity Substation	1975
77R	283	S	Electricity Substation	1997

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 0

Database searched and no data found.

1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 66

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
78B	0	On Site	Unspecified Pit	1955
79B	0	On Site	Unspecified Pit	1886
80F	0	On Site	Unspecified Ground Workings	1977
81F	0	On Site	Unspecified Ground Workings	1994
82A	0	On Site	Unspecified Pit	1977
83A	0	On Site	Unspecified Pit	1994
84A	0	On Site	Unspecified Pit	1886
85E	0	On Site	Unspecified Pit	1886
86C	0	On Site	Unspecified Ground Workings	1994
87C	0	On Site	Unspecified Ground Workings	1977
88B	0	On Site	Unspecified Pit	1906
89B	0	On Site	Unspecified Pit	1906
90B	0	On Site	Unspecified Pit	1906
91B	0	On Site	Unspecified Pit	1948
92D	0	On Site	Unspecified Pit	1994
93D	0	On Site	Unspecified Pit	1977
94E	0	On Site	Unspecified Pit	1886
95T	105	W	Opencast Ironstone Workings	1979
96G	123	W	Unspecified Pit	1885
97G	123	W	Unspecified Pit	1885
98G	123	W	Unspecified Ground Workings	1886
99G	123	W	Unspecified Ground Workings	1905
100G	123	W	Unspecified Ground Workings	1905
101G	124	W	Ponds	1948
102G	124	W	Ponds	1938
103G	126	W	Ponds	1955
104G	126	W	Unspecified Pit	1968
105H	134	NW	Unspecified Pit	1886
106H	135	NW	Unspecified Pit	1886
107U	139	W	Unspecified Pit	1886
108G	145	W	Ponds	1885
109G	147	W	Pond	1905

110G	147	W	Pond	1905
111G	147	W	Pond	1886
112I	147	W	Unspecified Pit	1886
113I	147	W	Unspecified Pit	1886
114J	195	W	Opencast Ironstone Workings	1977
115J	195	W	Opencast Ironstone Workings	1994
116V	205	W	Pond	1977
117V	205	W	Pond	1994
118K	217	W	Unspecified Ground Workings	1977
119K	217	W	Unspecified Ground Workings	1994
120W	323	S	Pond	1885
121W	323	S	Pond	1938
122W	323	S	Pond	1948
123W	323	S	Pond	1886
124W	323	S	Pond	1905
125W	323	S	Pond	1905
126W	325	S	Pond	1955
127M	326	SW	Sand Pit	1885
128M	328	SW	Unspecified Pit	1905
129M	328	SW	Unspecified Pit	1886
130M	328	SW	Unspecified Pit	1905
131M	330	SW	Unspecified Pit	1955
132M	330	SW	Unspecified Heap	1968
133M	332	SW	Unspecified Pit	1948
134M	332	SW	Unspecified Pit	1938
135Q	440	S	Pond	1886
136Q	440	S	Pond	1905
137Q	440	S	Pond	1905
138Q	440	S	Pond	1885
139Q	441	S	Pond	1955
140Q	441	S	Pond	1968
141Q	441	S	Pond	1938
142Q	441	S	Pond	1948
143X	489	S	Unspecified Pit	1979

2. Environmental Permits, Incidents and Registers Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

250
500
Search Buffers (m)

Recorded Pollution Incident

Dangerous Substances (List 1)

Dangerous Substances (List 2)

Water Industry Referrals

Licenced Discharge Consents

Red List Discharge Consents

RAS 3 & 4 Authorisations

Part A(1) Authorised Processes and Historic IPC Authorisations

Part A(2) and Part B Authorised Processes

COMAH / NIHHS Sites

Sites Determined as Contaminated Land

Hazardous Substance Consents and Enforcements

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

9

The following Part A(1) and IPPC Authorised Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
13A	469	E	495020 410050	Operator: Hook2sisters Ltd Installation Name: Gokewell Farm Process: ASSOCIATED PROCESS	Permit Number: HP3633UU Original Permit Number: HP3633UU EPR Reference: - Issue Date: 26/10/2007 Effective Date: 26/10/2007 Last date noted as effective: 2017-04-01 Status: Superceded
14A	469	E	495020 410050	Operator: Hook2sisters Ltd Installation Name: Gokewell Farm Process: ASSOCIATED PROCESS	Permit Number: TP3139TA Original Permit Number: HP3633UU EPR Reference: - Issue Date: 25/3/2010 Effective Date: 25/3/2010 Last date noted as effective: 2017-04-01 Status: Effective
15A	469	E	495020 410050	Operator: Hook2sisters Ltd Installation Name: Gokewell Farm Process: INTENSIVE FARMING; > 40,000 POULTRY	Permit Number: HP3633UU Original Permit Number: HP3633UU EPR Reference: - Issue Date: 26/10/2007 Effective Date: 26/10/2007 Last date noted as effective: 2017-04-01 Status: Superceded

ID	Distance (m)	Direction	NGR	Details	
16A	469	E	495020 410050	Operator: Hook2sisters Ltd Installation Name: Gokewell Farm Process: INTENSIVE FARMING; > 40,000 POULTRY	Permit Number: TP3139TA Original Permit Number: HP3633UU EPR Reference: - Issue Date: 25/3/2010 Effective Date: 25/3/2010 Last date noted as effective: 2017-04-01 Status: Effective
17B	496	NW	493300 410500	Operator: Tata Steel Uk Limited Installation Name: Yarborough Quarry Epr/qp3334sk Process: WASTE LANDFILLING; >10 T/D WITH CAPACITY >25,000T EXCLUDING INERT WASTE	Permit Number: NP3631FV Original Permit Number: QP3334SK EPR Reference: - Issue Date: 12/1/2012 Effective Date: 12/1/2012 Last date noted as effective: 2017-04-01 Status: Superceded
18B	496	NW	493300 410500	Operator: Tata Steel Uk Limited Installation Name: Yarborough Quarry Epr/qp3334sk Process: WASTE LANDFILLING; >10 T/D WITH CAPACITY >25,000T EXCLUDING INERT WASTE	Permit Number: QP3334SK Original Permit Number: QP3334SK EPR Reference: - Issue Date: 13/6/2006 Effective Date: 13/6/2006 Last date noted as effective: 2017-04-01 Status: Superceded
19B	496	NW	493300 410500	Operator: Longs Steel Uk Limited Installation Name: Yarborough Quarry Epr/fp3136al Process: WASTE LANDFILLING; >10 T/D WITH CAPACITY >25,000T EXCLUDING INERT WASTE	Permit Number: FP3136AL Original Permit Number: FP3136AL EPR Reference: - Issue Date: 21/8/2015 Effective Date: 21/8/2015 Last date noted as effective: 2017-04-01 Status: Superceded
20B	496	NW	493300 410500	Operator: British Steel Ltd Installation Name: Yarborough Quarry Landfill Process: WASTE LANDFILLING; >10 T/D WITH CAPACITY >25,000T EXCLUDING INERT WASTE	Permit Number: TP3639DC Original Permit Number: FP3136AL EPR Reference: - Issue Date: 8/6/2016 Effective Date: 8/6/2016 Last date noted as effective: 2017-04-01 Status: Effective
21B	496	NW	493300 410500	Operator: Longs Steel Uk Limited Installation Name: Yarborough Quarry Epr/fp3136al Process: WASTE LANDFILLING; >10 T/D WITH CAPACITY >25,000T EXCLUDING INERT WASTE	Permit Number: NP3036RS Original Permit Number: FP3136AL EPR Reference: - Issue Date: 24/2/2016 Effective Date: 24/2/2016 Last date noted as effective: 2017-04-01 Status: Superceded

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

1

The following Licensed Discharge Consents records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
2	245	E	494800 410000	Address: SITE 49 GOKEWELL PRIORY, HERON HOLT, BROUGHTON, BRIGG, SOUTH HUMBERSIDE, DN20 0BQ Effluent Type: UNSPECIFIED Permit Number: PR3LF520 Permit Version: 1	Receiving Water: Into Land Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 24/11/1987 Effective Date: 24-Nov-1987 Revocation Date: 09/05/1997

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 1

The following COMAH & NIHHS Authorisation records provided by the Health and Safety Executive are represented as polygons or buffered points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Company	Address	Operational Status	Tier
12	0	On Site	Tata Steel UK Limited	Tata Steel UK Limited, Scunthorpe, Po Box 1, Brigg Road, Scunthorpe, North Lincolnshire, DN16 1BP	Current COMAH Site	COMAH Upper Tier Operator

---

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

1

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
1	461	SW	493000 408760	Incident Date: 13-Jul-2002 Incident Identification: 91233 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Fumes	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

Database searched and no data found.

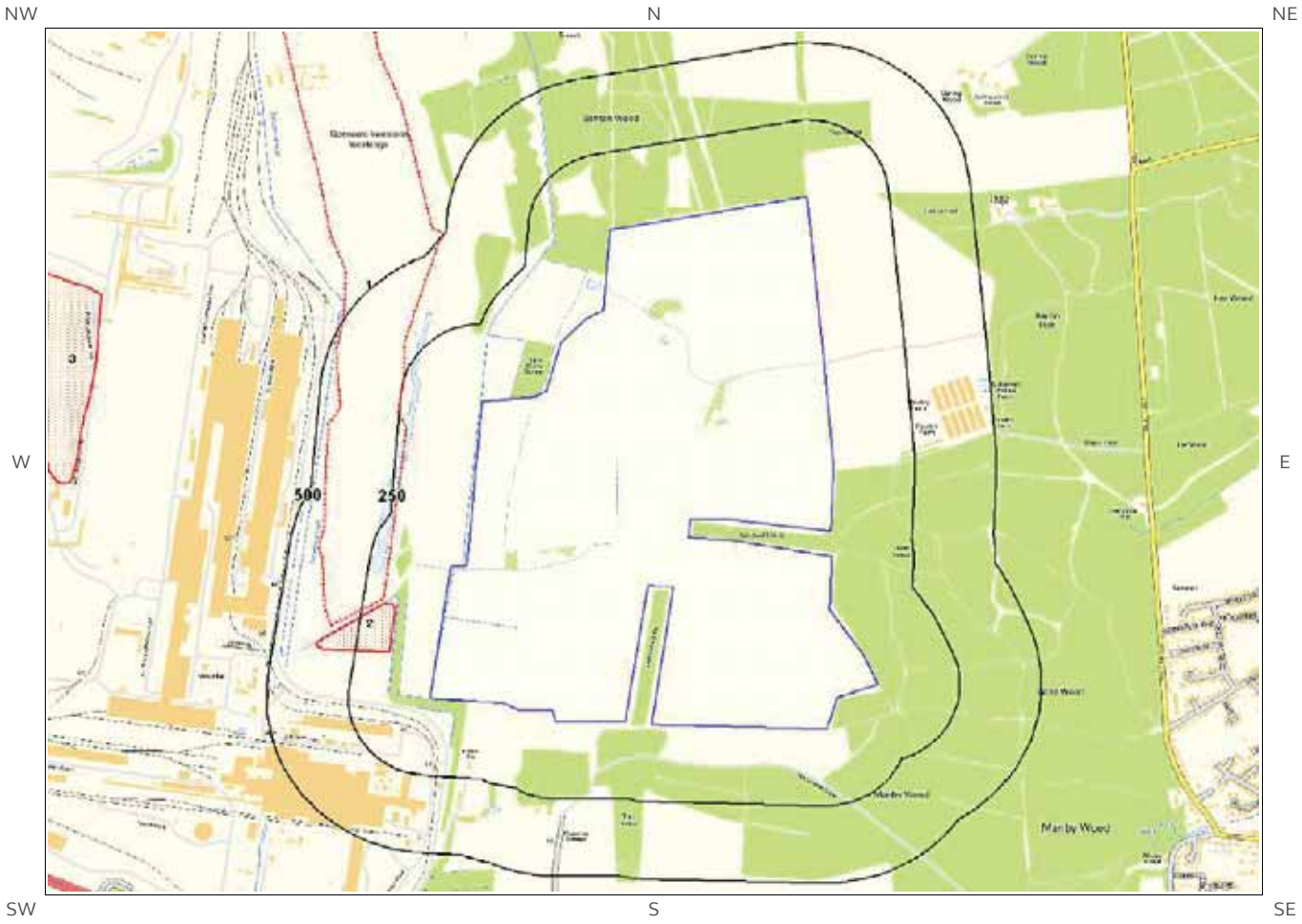
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site? 0

Database searched and no data found.

---

3. Landfill and Other Waste Sites Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

250
500
Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

1

The following Environment Agency/Natural Resources Wales landfill records are represented as polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
1	190	W	493300 410500	Address: Crosby North Landfill, Brigg Road, South Humberside, DN16 1BP Landfill Reference: -9999.0 Environmental Permitting Regulations (Waste) Reference: - Landfill Type: WASTE LANDFILLING; >10 T/D WITH CAPACITY >25,000T EXCLUDING INERT WASTE	Operator: British Steel Ltd Status: Effective IPPC Reference: EPR Reference:

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

3

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
2	144	W	493100 409200	Site Address: Scunthorpe Concast, Scunthorpe, Lincolnshire Waste Licence: Yes Site Reference: 55/19/0702, A702 Waste Type: Industrial, Liquid, sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 24-Sep-1981 Licence Surrendered: 23-Sep-1992 Licence Holder Address: - Operator: British Steel Corporation Licence Holder: British Steel Corporation First Recorded: 31-Dec-1981 Last Recorded: 31-Dec-1992
3	1190	W	492100 410200	Site Address: Slag Pit, Scunthorpe, Lincolnshire Waste Licence: Yes Site Reference: 55/19/0716, A716 Waste Type: Inert, Industrial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 01-Jan-1986 Licence Surrendered: 23-Sep-1992 Licence Holder Address: - Operator: - Licence Holder: British Steel Corporation First Recorded: 31-Dec-1986 Last Recorded: 23-Sep-1992

ID	Distance (m)	Direction	NGR	Details	
Not shown	1446	SW	491900 408500	Site Address: Ashby Village, Scunthorpe, Lincolnshire Waste Licence: Yes Site Reference: 55/19/0843 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 06-Apr-1992 Licence Surrendered: 25-Apr-1993 Licence Holder Address: - Operator: - Licence Holder: Anchor Village Developments First Recorded: 31-Dec-1992 Last Recorded: 25-Apr-1993

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

0

Database searched and no data found.

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

0

Database searched and no data found.

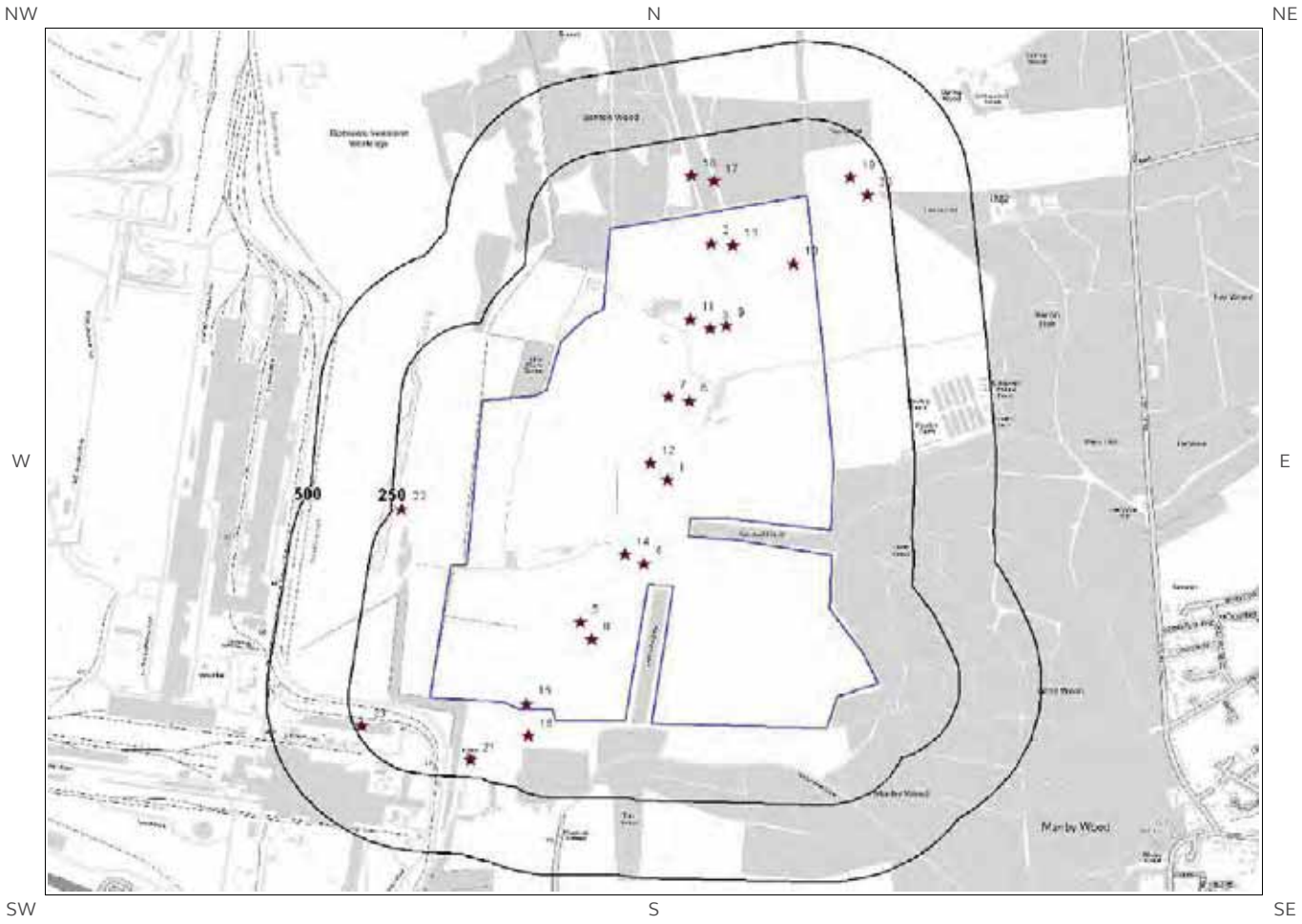
3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

3

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1257	NW	492947 411434	Site Address: Yarborough Landfill Site, P O Box 1, Brigg Road, Scunthorpe, Lincolnshire, DN16 1BP Type: Industrial Waste Landfill (Factory curtilage) Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: COR003 EPR reference: - Operator: Corus Uk Ltd Waste Management licence No: 43126 Annual Tonnage: 0.0	Issue Date: 10/05/1978 Effective Date: - Modified: 05/08/2004 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Yarborough Landfill Site Correspondence Address: P O Box 1, Brigg Road, Scunthorpe, Lincolnshire, DN16 1BP
Not shown	1257	NW	492947 411434	Site Address: Yarborough Landfill Site, P O Box 1, Brigg Road, Scunthorpe, N Lincolnshire, DN16 1BP Type: Industrial Waste Landfill (Factory curtilage) Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: COR003 EPR reference: - Operator: Corus U K Ltd Waste Management licence No: 43126 Annual Tonnage: 637500.0	Issue Date: 10/05/1978 Effective Date: - Modified: 05/08/2004 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Yarborough Landfill Site Correspondence Address: P O Box 1, Brigg Road, Scunthorpe, N Lincolnshire, DN16 1BP
Not shown	1257	NW	492946 411433	Site Address: Yarborough Landfill Site, P O Box 1, Brigg Road, Scunthorpe, Lincolnshire, DN16 1BP Type: Industrial Waste Landfill (Factory curtilage) Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: COR003 EPR reference: - Operator: Corus Waste Management licence No: 43126 Annual Tonnage: 0.0	Issue Date: 10/05/1978 Effective Date: - Modified: 06/02/2001 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Yarborough Landfill Site Correspondence Address: Scunthorpe Works, P O Box 1, Brigg Road, Scunthorpe, North Lincs, DN16 1BP

4. Current Land Use Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

Search Buffers (m)

250

500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 23

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	0	On Site	Pylon	494059 409785	Pylon, DN16	Electrical Features	Infrastructure and Facilities
2	0	On Site	Pylon	494193 410550	Pylon, DN20	Electrical Features	Infrastructure and Facilities
3	0	On Site	Pylon	494188 410277	Pylon, DN20	Electrical Features	Infrastructure and Facilities
4	0	On Site	Pylon	493986 409514	Pylon, DN16	Electrical Features	Infrastructure and Facilities
5	0	On Site	Pylon	493792 409325	Pylon, DN16	Electrical Features	Infrastructure and Facilities
6	0	On Site	Pylon	494126 410042	Pylon, DN20	Electrical Features	Infrastructure and Facilities
7	0	On Site	Pylon	494062 410055	Pylon, DN16	Electrical Features	Infrastructure and Facilities
8	0	On Site	Pylon	493828 409268	Pylon, DN16	Electrical Features	Infrastructure and Facilities
9	0	On Site	Pylon	494240 410285	Pylon, DN20	Electrical Features	Infrastructure and Facilities
10	0	On Site	Pylon	494445 410485	Pylon, DN20	Electrical Features	Infrastructure and Facilities
11	0	On Site	Pylon	494129 410306	Pylon, DN20	Electrical Features	Infrastructure and Facilities
12	0	On Site	Pylon	494007 409840	Pylon, DN16	Electrical Features	Infrastructure and Facilities
13	0	On Site	Pylon	494258 410543	Pylon, DN20	Electrical Features	Infrastructure and Facilities
14	0	On Site	Pylon	493929 409544	Pylon, DN16	Electrical Features	Infrastructure and Facilities
15	0	On Site	Pylon	493627 409061	Pylon, DN16	Electrical Features	Infrastructure and Facilities
16	84	S	Pylon	493632 408958	Pylon, DN16	Electrical Features	Infrastructure and Facilities
17	99	N	Pylon	494202 410751	Pylon, DN15	Electrical Features	Infrastructure and Facilities
18	130	N	Pylon	494131 410769	Pylon, DN15	Electrical Features	Infrastructure and Facilities
19	146	NE	Oil Well	494620 410763	Oil Well, DN15	Oil and Gas Extraction, Refinery and Product Manufacture	Extractive Industries

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
20	183	E	Pylon	494671 410706	Pylon, DN20	Electrical Features	Infrastructure and Facilities
21	193	S	Electricity Sub Station	493454 408879	Electricity Sub Station, DN16	Electrical Features	Infrastructure and Facilities
22	217	W	Opencast Workings (Disused)	493243 409690	Opencast Workings (Disused), DN16	Unspecified Quarries Or Mines	Extractive Industries
23	228	SW	Works	493122 408989	Works, DN16	Unspecified Works Or Factories	Industrial Features

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 0

Database searched and no data found.

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
SUTN-S	SUTTON SAND FORMATION	SAND
SUTN-S	SUTTON SAND FORMATION	SAND

5.3 Bedrock and Solid Geology

The database has been searched on site, including a 50m buffer.

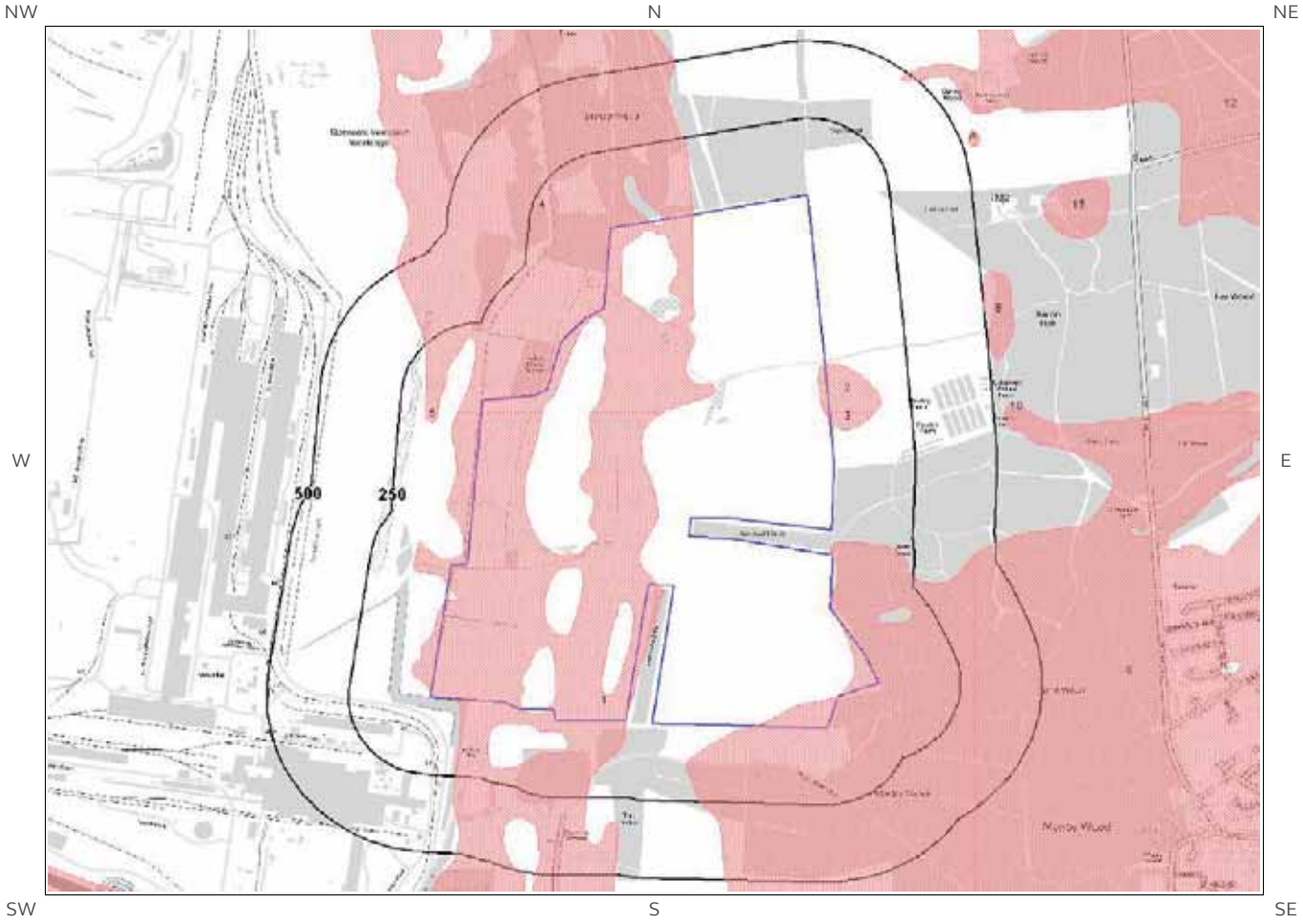
Lex Code	Description	Rock Type
MRB-FGLS	MARLSTONE ROCK FORMATION	FERRUGINOUS LIMESTONE AND FERRUGINOUS SANDSTONE
GRF-SDSM	GRANTHAM FORMATION	SANDSTONE, SILTSTONE AND MUDSTONE
WHM-MDST	WHITBY MUDSTONE FORMATION	MUDSTONE
NS-FGSST	NORTHAMPTON SAND FORMATION	SANDSTONE, FERRUGINOUS
HIL-LMOOL	HIBALDSTOW LIMESTONE	LIMESTONE, OOIDAL
KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF)	LIMESTONE
KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF)	LIMESTONE
KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF)	LIMESTONE
KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF)	LIMESTONE
KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF)	LIMESTONE

Lex Code	Description	Rock Type
SYL-LMAR	SCAWBY LIMESTONE	LIMESTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED
LLL-LMST	LOWER LINCOLNSHIRE LIMESTONE MEMBER	LIMESTONE
KCM-MDLM	KIRTON CEMENTSTONE BEDS	MUDSTONE AND LIMESTONE, INTERBEDDED
RVB-LMAR	RAVENTHORPE BEDS	LIMESTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED
KCM-LMST	KIRTON CEMENTSTONE BEDS	LIMESTONE
KCM-LMST	KIRTON CEMENTSTONE BEDS	LIMESTONE
KCM-MDLM	KIRTON CEMENTSTONE BEDS	MUDSTONE AND LIMESTONE, INTERBEDDED
CHAM-MDST	CHARMOUTH MUDSTONE FORMATION	MUDSTONE
PTNI-FEST	PECTEN IRONSTONE (BED)	IRONSTONE
CHAM-MDST	CHARMOUTH MUDSTONE FORMATION	MUDSTONE

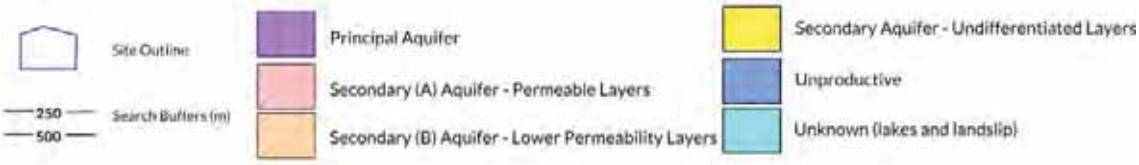
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

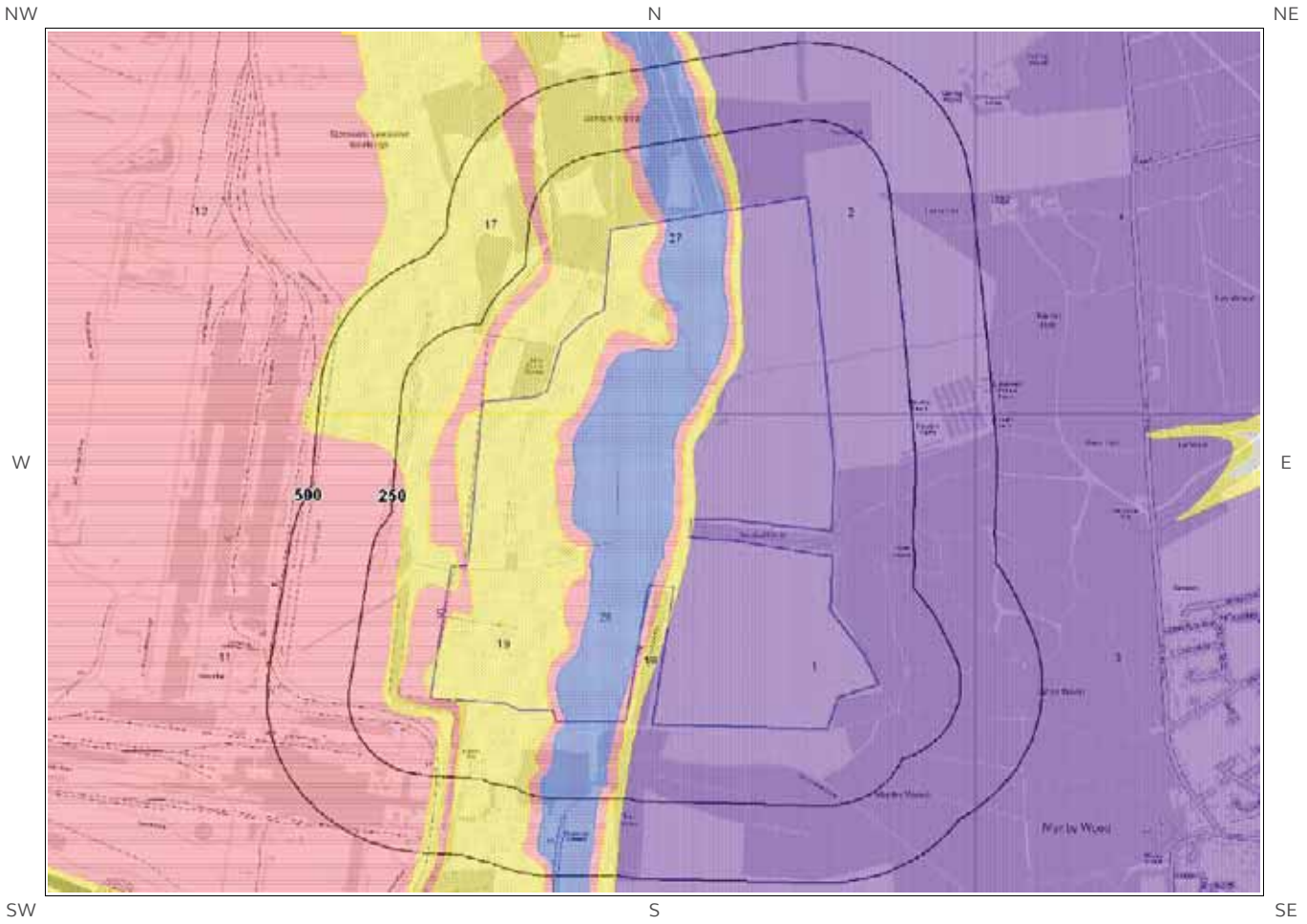
6a. Aquifer Within Superficial Geology



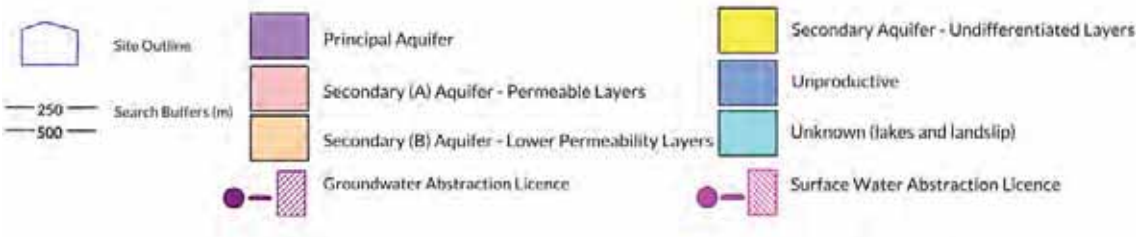
© Crown copyright and database rights 2017
Ordnance Survey license 100035207.



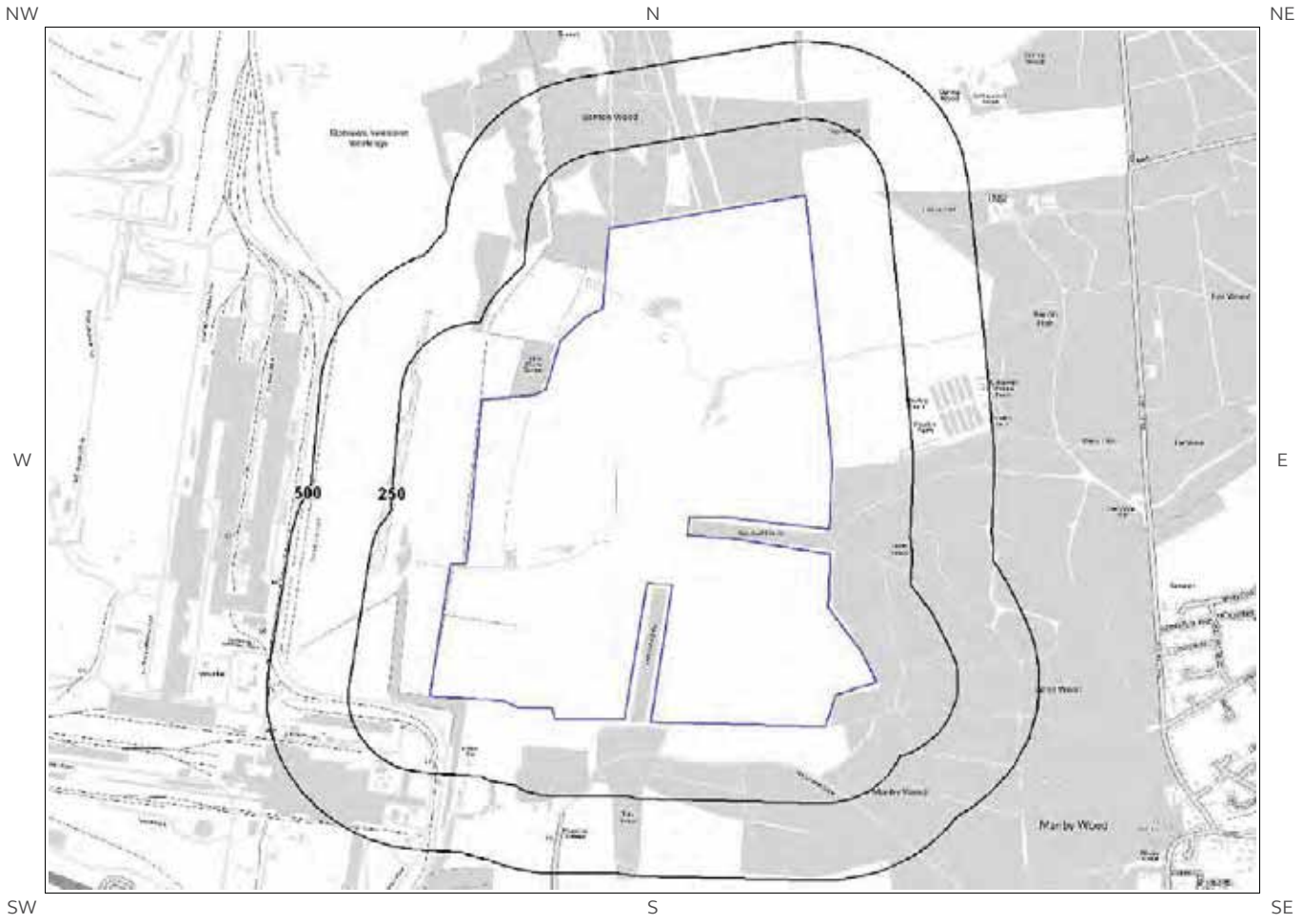
6b. Aquifer Within Bedrock Geology and Abstraction Licenses



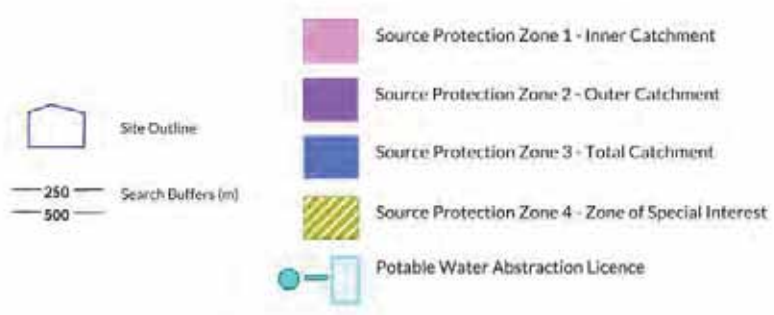
© Crown copyright and database rights 2017
Ordnance Survey license 100035207.



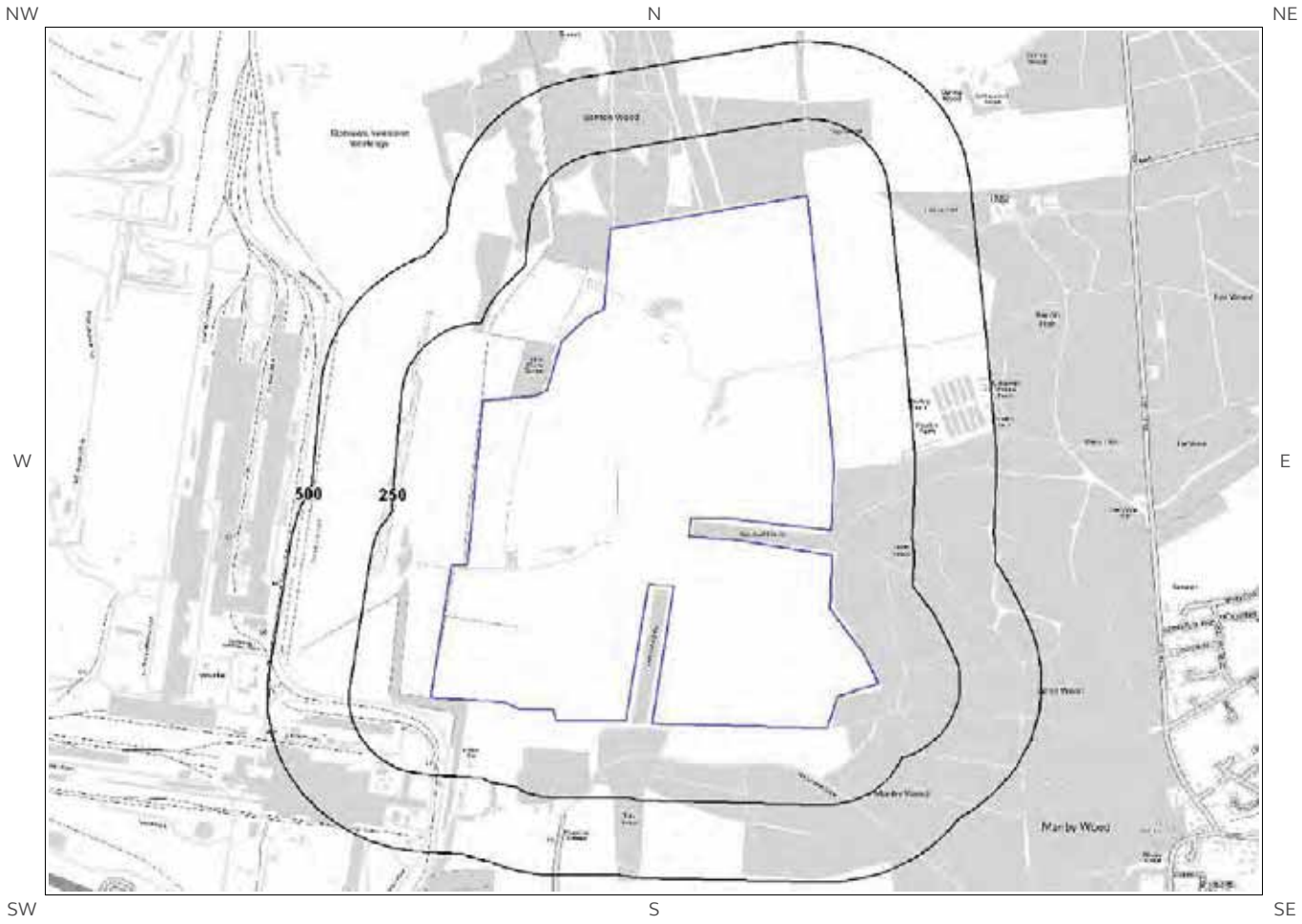
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



© Crown copyright and database rights 2017
Ordnance Survey license 100035207.



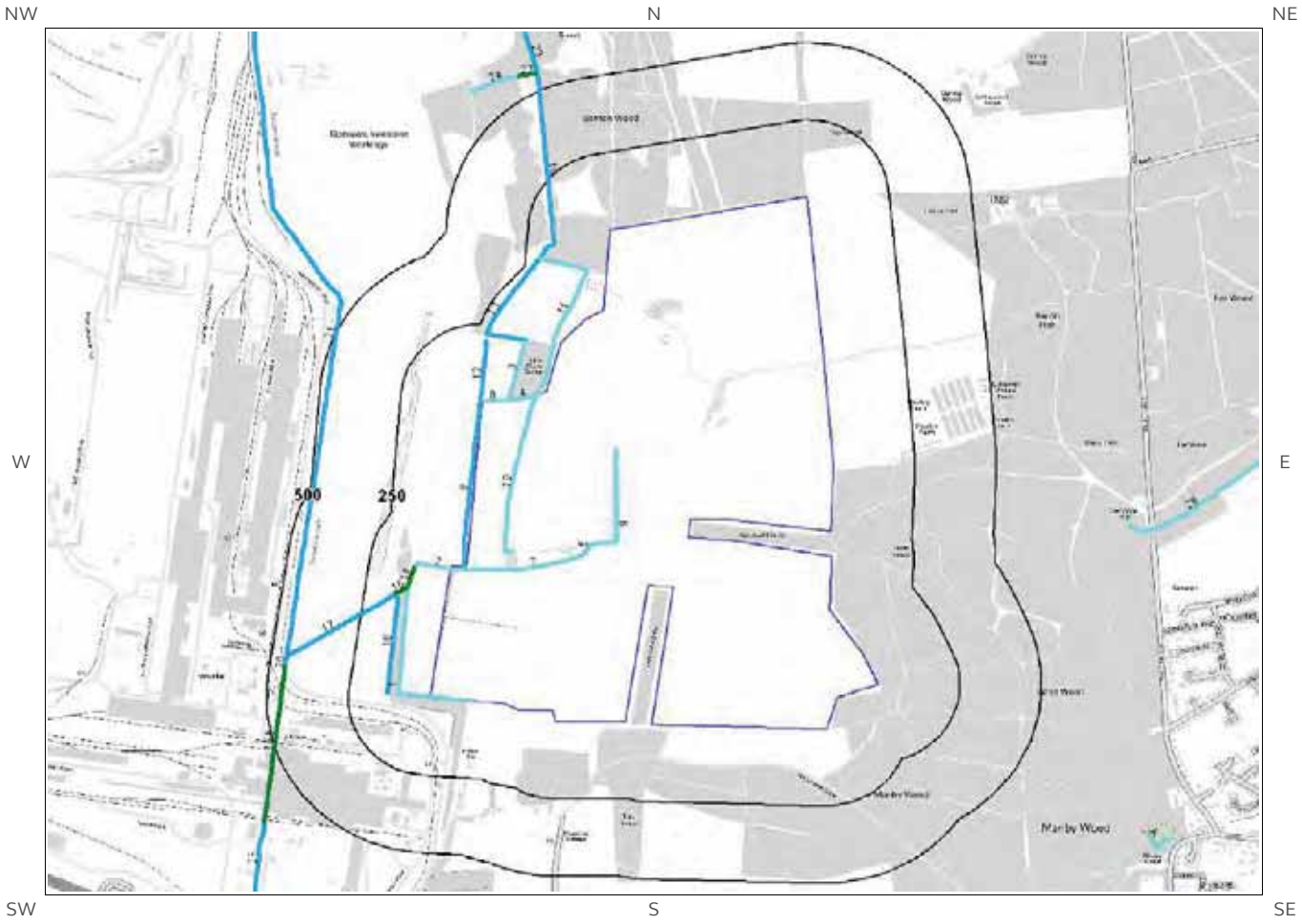
6d. Hydrogeology – Source Protection Zones within confined aquifer



© Crown copyright and database rights 2017
Ordnance Survey license 100035207.



6e. Hydrology – Detailed River Network and River Quality



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline
250
500
Search Buffers (m)

Primary River
Secondary River
Tertiary River
Lake/Reservoir
Underground River (inferred)
General Quality Assessment: Biology
General Quality Assessment: Chemistry
Canal
Canal Tunnel
Culvert
Multiple Channel Culvert
Underground River (Potential Sewer)
Underground River (local knowledge)

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property?
Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
3	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
4	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
5	132	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
6	295	E	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
7	472	NE	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
8	499	E	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
2	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
5	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
6	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
7	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
8	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
9	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
10	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
16	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
17	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
18	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
19	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
20	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
26	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
27	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
11	61	S	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

ID	Distance (m)	Direction	Designation	Description
3	295	E	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
4	444	E	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? Yes

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
Not shown	1803	S	493550 407210	Status: Historical Licence No: 03/28/81/0036 Details: Spray Irrigation - Direct Direct Source: Groundwater Midlands Region Point: Holme - Lagoon Data Type: Point Name: C P MARSHALL (FARMS) LIMITED	Annual Volume (m^3): 13000 Max Daily Volume (m^3): 2600 Original Application No: - Original Start Date: 3/9/1996 Expiry Date: - Issue No: 100 Version Start Date: 1/4/2010 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? No

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site? No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site? Yes

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
0	On Site	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
0	On Site	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
0	On Site	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
0	On Site	Major Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
0	On Site	Major Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? Yes

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAHI). In England, each chemical sample is measured for ammonia and dissolved oxygen. In Wales, the samples are measured for biological oxygen demand (BOD), ammonia and dissolved oxygen. The results are graded from A ('Very Good') to F ('Bad').

The following Chemical Quality records are shown on the Hydrology Map (6e):

					Chemical Quality Grade				
ID	Distance (m)	Direction	NGR	River Quality Grade	2005	2006	2007	2008	2009
Not shown	1104	SW	492470 408390	River Name: Brumby Beck Reach: B Steel Outlet To Bottesford Beck End/Start of Stretch: Sample Point NGR	E	E	E	E	E
Not shown	1127	SW	492480 408341	River Name: Bottesford Beck Reach: Br Culvert Exit To Black Head Ponds Bk End/Start of Stretch: Sample Point NGR	E	E	E	E	D
Not shown	1153	SW	492400 408400	River Name: Brumby Beck Reach: B Steel Outlet To Bottesford Beck End/Start of Stretch: End of Stretch NGR	E	E	E	E	E

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? Yes

The following Detailed River Network records are represented on the Hydrology Map (6e):

ID	Distance (m)	Direction	Details	
1	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
2	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
3	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
4	0	On Site	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
5	0	On Site	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
6	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
7	0	On Site	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
8	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
9	0	On Site	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
10	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
11	0	On Site	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
12	7	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
13	104	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
14	110	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
15	122	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
16	129	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
17	159	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
18	168	W	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
19	452	W	River Name: Bottesford Beck Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
20	453	W	River Name: Bottesford Beck Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
21	453	W	River Name: Bottesford Beck Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined

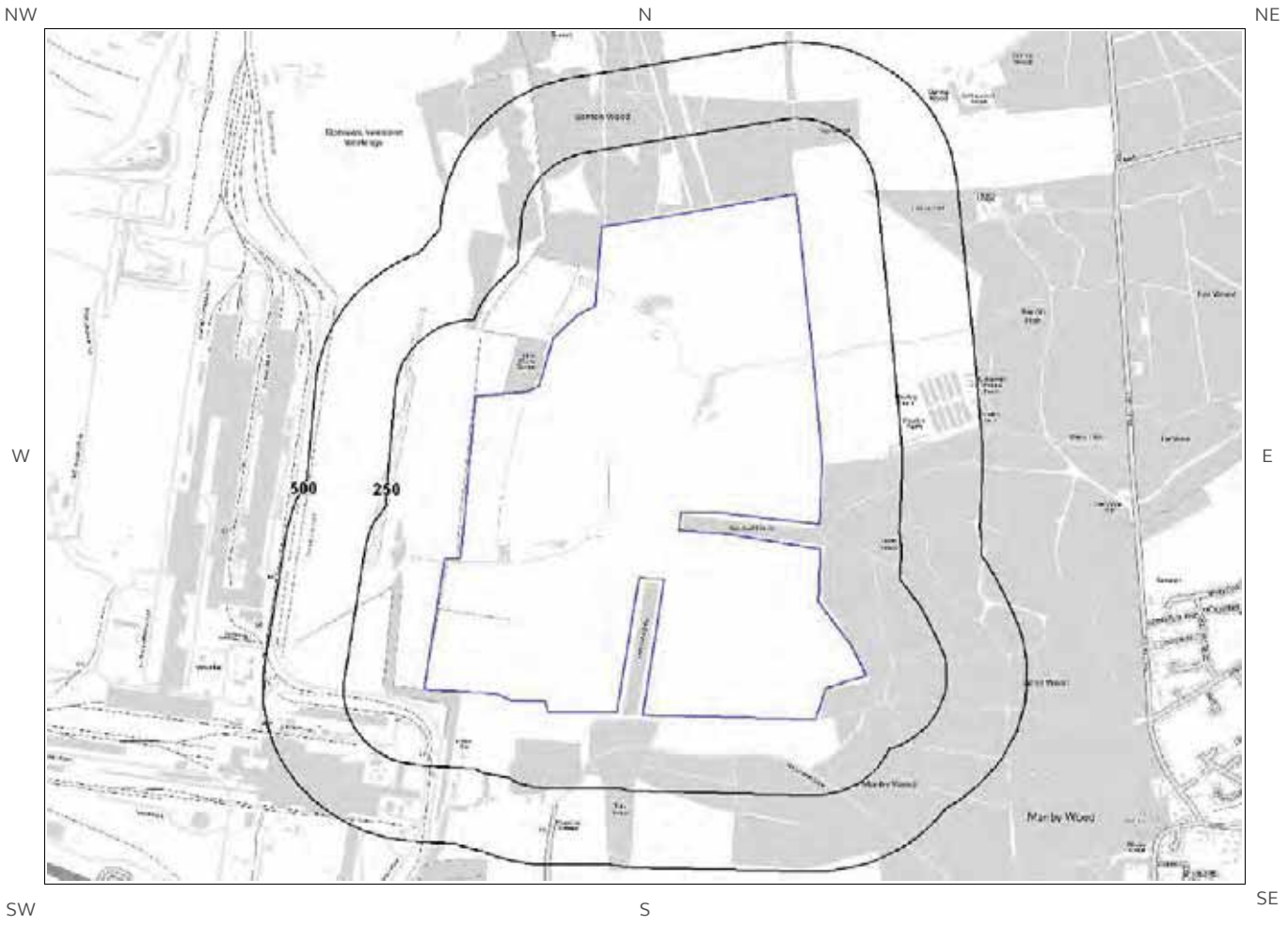
6.11 Surface Water Features

Are there any surface water features within 250m of the study site? Yes

The following surface water records are not represented on mapping:

Distance (m)	Direction
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
0	On Site
17	W
22	W
115	W
128	W
199	W

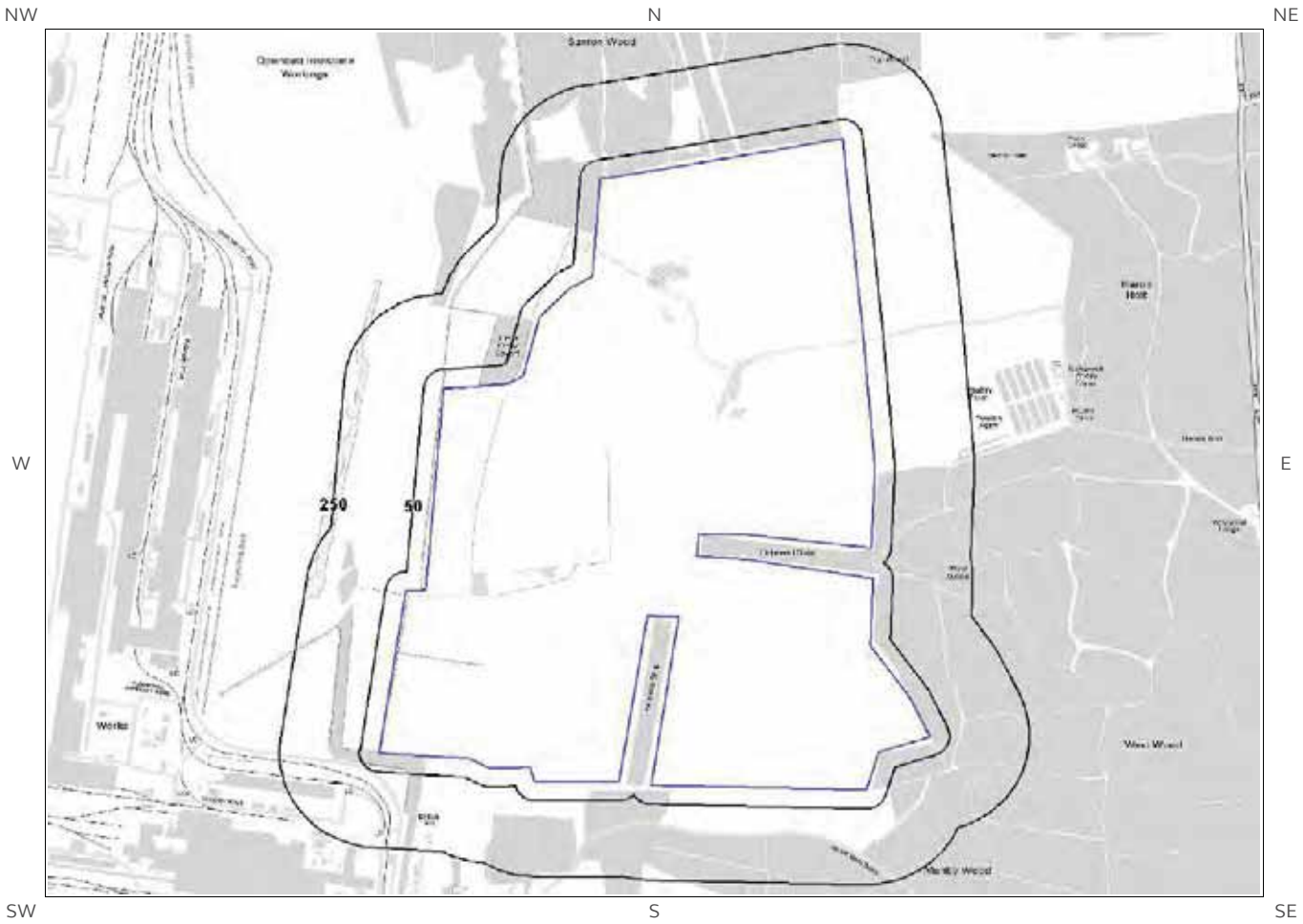
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

Very Low

Low

Medium

High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? No

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? No

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

Database searched and no data found.

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

What is the highest risk of flooding onsite? Very Low

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

---

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Superficial Deposits Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

7.8 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? High

Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline
Search Buffers (m)
AONB
National Park
SSSI
Special Protection Areas
Nitrate Vulnerable Zones
Green Belt
Environmentally Sensitive Areas
Special Areas of Conservation
World Heritage Sites
Nitrate Sensitive Areas
Ancient Woodland
National Nature Reserve
Local Nature Reserves
Ramsar Sites

8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site? Yes

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

4

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SSSI Name	Data Source
1	1300	E	Broughton Far Wood	Natural England
2	1387	E	Broughton Alder Wood	Natural England
3	1549	E	Broughton Alder Wood	Natural England
4	1570	E	Broughton Far Wood	Natural England

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

6

The following records of Designated Ancient Woodland provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
11	1	NE	UNKNOWN	Ancient Replanted Woodland
12	633	NE	UNKNOWN	Ancient Replanted Woodland
13	759	S	UNKNOWN	Ancient Replanted Woodland
14	958	NE	UNKNOWN	Ancient Replanted Woodland
15	967	SE	UNKNOWN	Ancient Replanted Woodland
16	1300	E	UNKNOWN	Ancient and Semi-Natural Woodland

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

0

Database searched and no data found.

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

6

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
5	0	On Site	Existing	DEFRA
6	0	On Site	Existing	DEFRA
7	0	On Site	Existing	DEFRA
8	0	On Site	Existing	DEFRA
9	0	On Site	Existing	DEFRA
10	0	On Site	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure Geo Insight, available from our website. The following information has been found:

9.1.1 Shrink Swell

What is the maximum Shrink-Swell*[*] hazard rating identified on the study site? Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant potential for slope instability with relatively small changes in ground conditions. Avoid large amounts of water entering the ground through pipe leakage or soak-aways. Do not undercut or place large amounts of material on slopes without technical advice. For new build consider the potential and consequences of ground movement during excavations, or consequence of changes to loading or drainage. For existing property probable increase in insurance risk is likely due to potential natural slope instability after changes to ground conditions such as a very long, excessively wet winter.

9.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant soluble rocks are present. Problems unlikely except with considerable surface or subsurface water flow. No special actions required to avoid problems due to soluble rocks. No special ground investigation required or increased construction costs are likely. An increase in financial risk due to potential problems with soluble rocks is unlikely.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

What is the maximum Running Sand** hazard rating identified on the study site? Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property no significant increase in insurance risk due to running sand problems is likely.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 10 and 30% of properties are above the Action Level.

* This indicates an automatically generated 50m buffer and site.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing
ones as described in publication BR211 by the Building Research Establishment? Full radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site? No

Database searched and no data found.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? Yes

The following non-coal mining information is provided by the BGS:

Distance (m)	Direction	Name	Commodity	Assessment of likelihood
0.0	On Site	Not available	Jet	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
0.0	On Site	Not available	Jet	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

Past underground mine workings are uncommon, localised and of limited area. The rock types present in this area are such that minor mineral veins may be present within them on which it is possible that there have been attempts to work these by underground methods and/or it is possible that small scale underground extraction of other materials may have occurred. All such occurrences are likely to be restricted in size and infrequent. It should be noted, however, that there is always the possibility of the existence of other sub-surface excavations, such as wells, cess pits, follies, air raid shelters/bunkers and other military structures etc. that could affect surface ground stability but which are outside the scope of this dataset. However, if in a coalfield area you should still consider a Coal Authority mining search for the area of interest.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
Guidance: No Guidance Required.

Contact Details

CENTREMAPS
Telephone: 01886 832972
Groundsure@centremaps.co.uk
Open Space, Upper Interfields, Malvern, Worcester, WR14 1UT

British Geological Survey Enquiries
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk

Environment Agency
National Customer Contact Centre, PO Box 544
Rotherham, S60 1BY
Tel: 03708 506 506
Web: **www.environment-agency.gov.uk**
Email: enquiries@environment-agency.gov.uk

Public Health England
Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe
Email:**enquiries@phe.gov.uk**
Main switchboard**: 020 7654 8000**

The Coal Authority
200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Ordnance Survey
Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505

Local Authority
Authority: North Lincolnshire Council
Phone: 01724 296 296
Web: http://www.northlincs.gov.uk/
Address: Civic Centre, Ashby Road, Scunthorpe, North Lincolns, DN16

Gemapping PLC
Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444

Acknowledgements: Site of Special Scientific Interest, National Nature Reserve, Ramsar Site, Special Protection Area, Special Area of Conservation data is provided by, and used with the permission of, Natural England who retain the Copyright and Intellectual Property Rights for the data.
PointX © Database Right/Copyright, Thomson Directories Limited © Copyright Link Interchange Network Limited © Database Right/Copyright and Ordnance Survey © Crown Copyright and/or Database Right. All Rights Reserved. Licence Number [03421028].
This report has been prepared in accordance with the Groundsure Ltd standard Terms and Conditions of business for work of this nature.

Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
https://www.groundsure.com/terms-and-conditions-sept-2016

CENTREMAPS

Open Space, Upper Interfields,
Worcester, WR14 1UT

Report Reference: CMAPS-CM-643992-13238-310717GEO

Your Reference: 13238

Report Date 31 Jul 2017

Report Delivery Method: Email - pdf

Geo Insight

Address: Santon, Scunthorpe, DN16 1XP

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 01886 832972 quoting the above CENTREMAPS reference number.

Yours faithfully,

CENTREMAPS

Enc.
Groundsure Geo Insight

Geo Insight

Address:	**Santon, Scunthorpe, DN16 1XP**
Date:	**31 Jul 2017**
Reference:	**CMAPS-CM-643992-13238-310717GEO**
Client:	**CENTREMAPS**

NW N NE



W E

SW S SE

Aerial Photograph Capture date:	16-Aug-2015
Grid Reference:	494018,409842
Site Size:	156.74ha

Contents Page

Contents Page ... 3
Overview of Findings ... 5
1:10,000 Scale Availability ... 8
Availability of 1:10,000 Scale Geology Mapping ... 9
1 Geology (1:10,000 scale) ... 10
1.1 Artificial Ground Map (1:10,000 scale) ... 10
1. Geology 1:10,000 scale ... 11
1.1 Artificial Ground ... 11
1.2 Superficial Deposits and Landslips Map (1:10,000 scale) ... 12
1.2 Superficial Deposits and Landslips ... 13
1.2.1 Superficial Deposits/ Drift Geology ... 13
1.2.2 Landslip ... 13
1.3 Bedrock and Faults Map (1:10,000 scale) ... 14
1.3 Bedrock and Faults ... 15
1.3.1 Bedrock/ Solid Geology ... 15
1.3.2 Faults ... 17
2 Geology 1:50,000 Scale ... 18
2.1 Artificial Ground Map ... 18
2. Geology 1:50,000 scale ... 19
2.1 Artificial Ground ... 19
2.1.1 Artificial/ Made Ground ... 19
2.1.2 Permeability of Artificial Ground ... 19
2.2 Superficial Deposits and Landslips Map (1:50,000 scale) ... 20
2.2 Superficial Deposits and Landslips ... 21
2.2.1 Superficial Deposits/ Drift Geology ... 21
2.2.2 Permeability of Superficial Ground ... 21
2.2.3 Landslip ... 21
2.2.4 Landslip Permeability ... 21
2.3 Bedrock and Faults Map (1:50,000 scale) ... 22
2.3 Bedrock, Solid Geology & Faults ... 23
2.3.1 Bedrock/Solid Geology ... 23
2.3.2 Permeability of Bedrock Ground ... 24
2.3.3 Faults ... 25
3 Radon Data ... 26
3.1 Radon Affected Areas ... 26
3.2 Radon Protection ... 26
4 Ground Workings Map ... 27
4 Ground Workings ... 28
4.1 Historical Surface Ground Working Features derived from Historical Mapping ... 28
4.2 Historical Underground Working Features derived from Historical Mapping ... 29
4.3 Current Ground Workings ... 29
5 Mining, Extraction & Natural Cavities ... 31
5.1 Historical Mining ... 31
5.2 Coal Mining ... 31
5.3 Johnson Poole and Bloomer ... 31
5.4 Non-Coal Mining ... 32
5.5 Non-Coal Mining Cavities ... 32
5.6 Natural Cavities ... 32
5.7 Brine Extraction ... 33
5.8 Gypsum Extraction ... 33
5.9 Tin Mining ... 33
5.10 Clay Mining ... 33
6 Natural Ground Subsidence ... 34
6.1 Shrink-Swell Clay Map ... 34
6.2 Landslides Map ... 35
6.3 Ground Dissolution of Soluble Rocks Map ... 36
6.4 Compressible Deposits Map ... 37
6.5 Collapsible Deposits Map ... 38
6.6 Running Sand Map ... 39

6 Natural Ground Subsidence..... 40
6.1 Shrink-Swell Clays..... 40
6.2 Landslides..... 43
6.3 Ground Dissolution of Soluble Rocks..... 44
6.4 Compressible Deposits..... 45
6.5 Collapsible Deposits..... 45
6.6 Running Sands..... 46
7 Borehole Records..... 50
8 Estimated Background Soil Chemistry..... 53
9 Railways and Tunnels Map..... 58
9 Railways and Tunnels..... 59
9.1 Tunnels..... 59
9.2 Historical Railway and Tunnel Features..... 59
9.3 Historical Railways..... 60
9.4 Active Railways..... 60
9.5 Railway Projects..... 60

Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Geology 1:10,000 Scale		
1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	Yes
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	Yes
	1.2.2 Are there any records of landslip within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and Faults	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of faults within 500m of the study site boundary at 1:10,000 scale?	Yes

Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	Yes
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	Yes
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults	2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?	Yes
	2.3.3 Are there any records of faults within 500m of the study site boundary?	Yes

Section 3: Radon

3. Radon	3.1Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 10 and 30% of properties are above the Action Level.
	3.2Radon Protection	Full radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	13	0	14	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	2	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	3	0	2
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	5	1	0	8	4
5.4 Non-Coal Mining*	2	0	0	0	1
5.5 Non–Coal Mining Cavities	1	0	0	1	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0

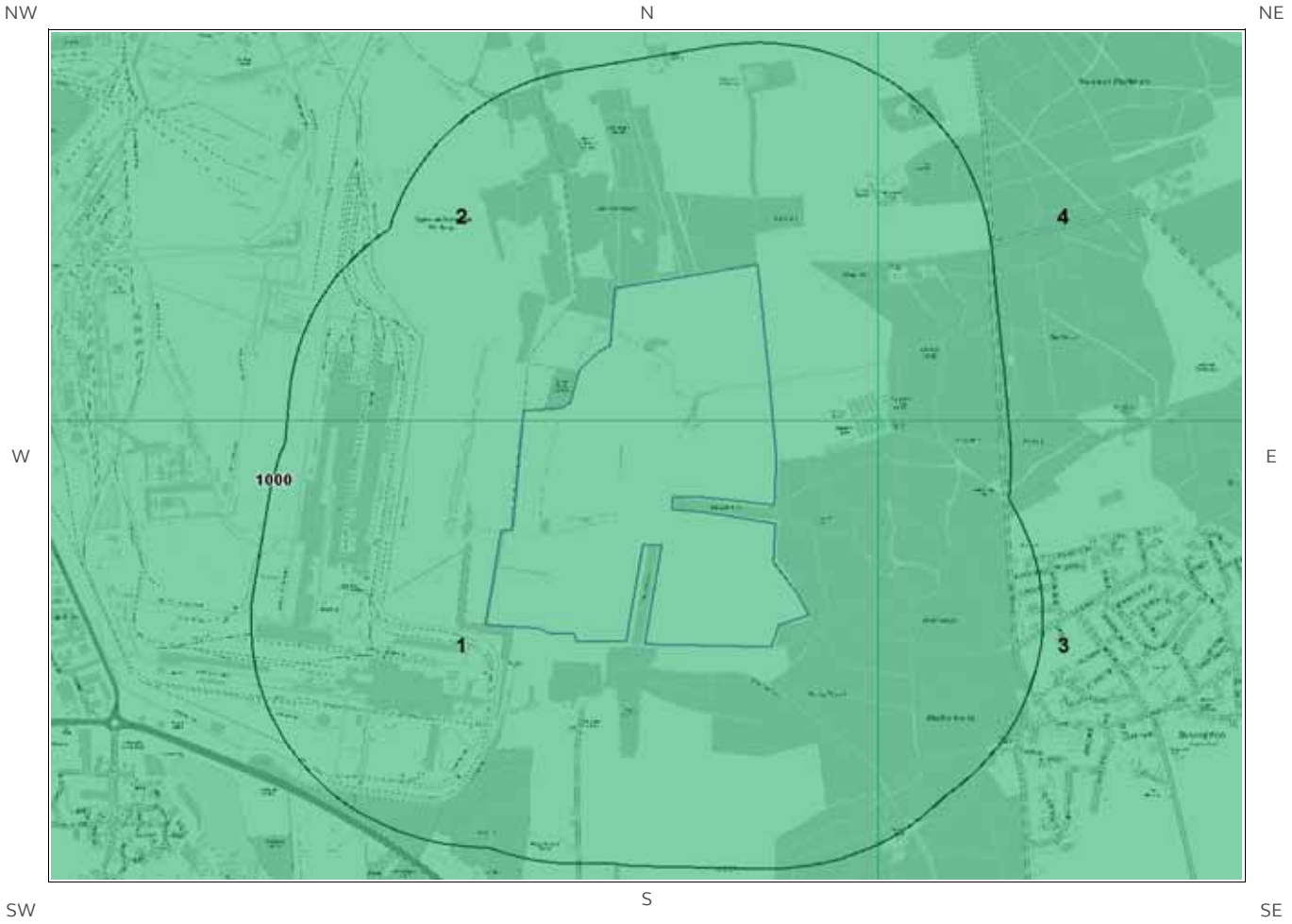
Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Low
6.2 Landslides	Moderate
6.3 Ground Dissolution of Soluble Rocks	Very Low
6.4 Compressible Deposits	Moderate
6.5 Collapsible Deposits	Very Low
6.5 Running Sand	Low

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	27	8	14

Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	164	37	0

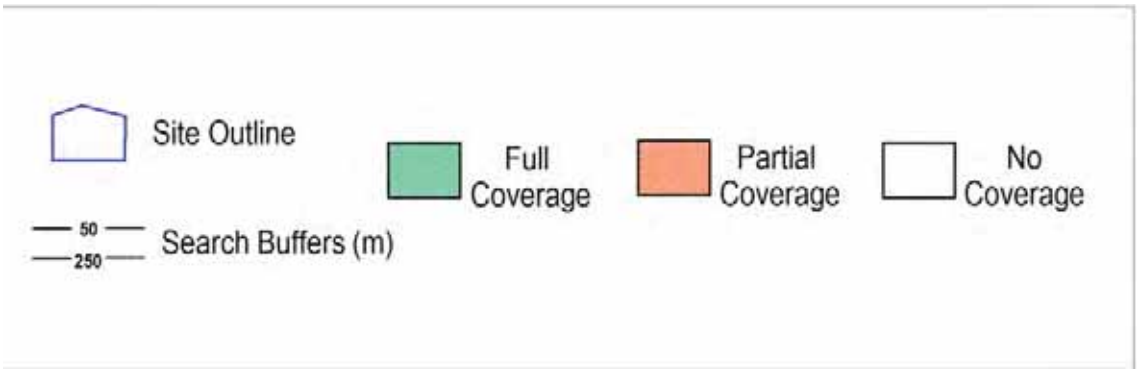
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500
9.1 Tunnels	0	0	0	Not Searched
9.2 Historical Railway and Tunnel Features	1	0	3	Not Searched
9.3 Historical Railways	0	0	0	Not Searched
9.4 Active Railways	0	0	16	Not Searched
9.5 Railway Projects	0	0	0	0

1:10,000 Scale Availability



1_10,000 Availability Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	Some deposits are mapped	Full	Full	No coverage
2	0.0	Some deposits are mapped	Full	Full	Some deposits are mapped
3	295.0	Some deposits are mapped	Full	Full	No coverage
4	444.0	Some deposits are mapped	Full	Full	No coverage

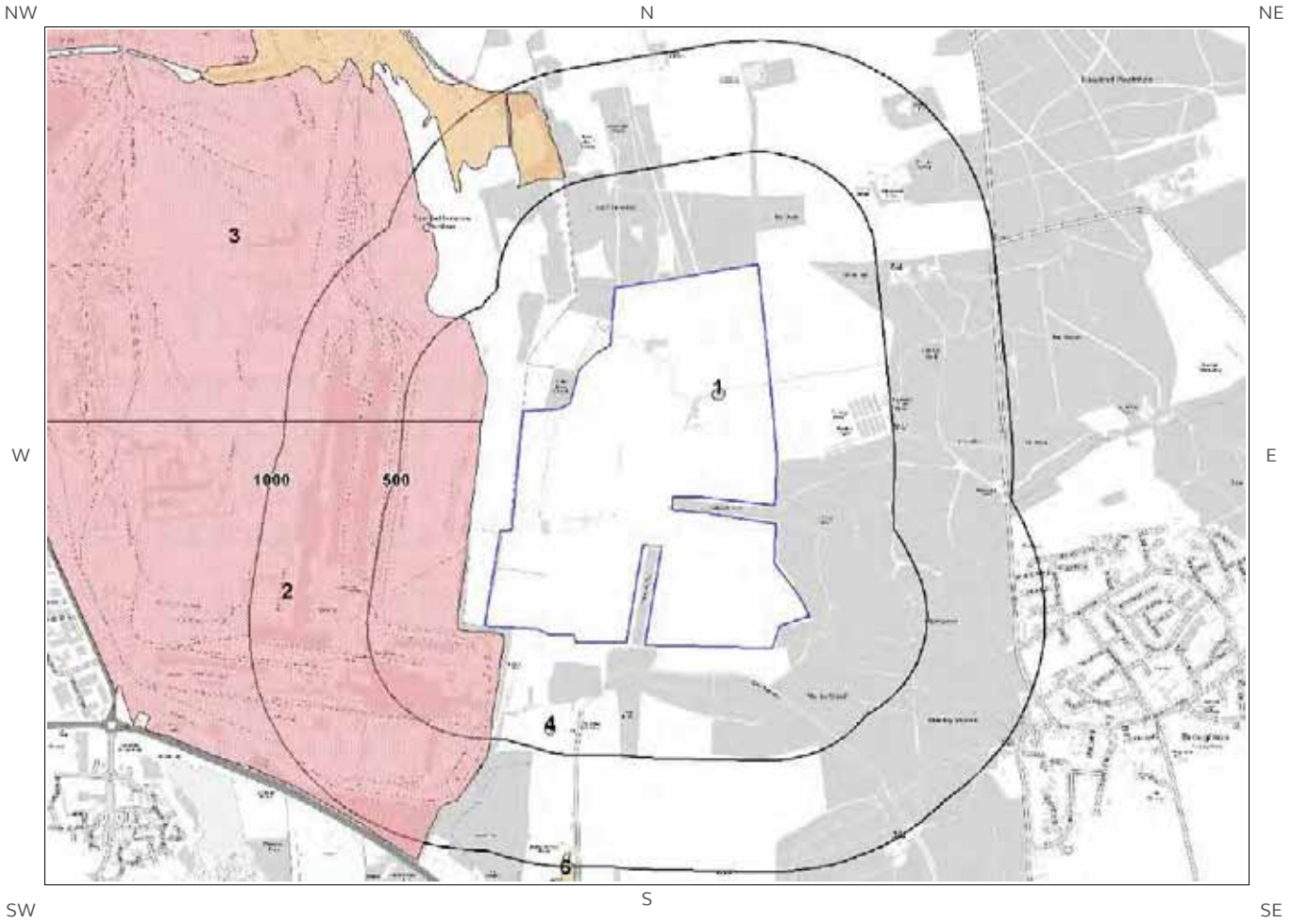
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

1 Geology (1:10,000 scale).

1.1 Artificial Ground Map (1:10,000 scale)



Artificial Ground Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



1. Geology 1:10,000 scale

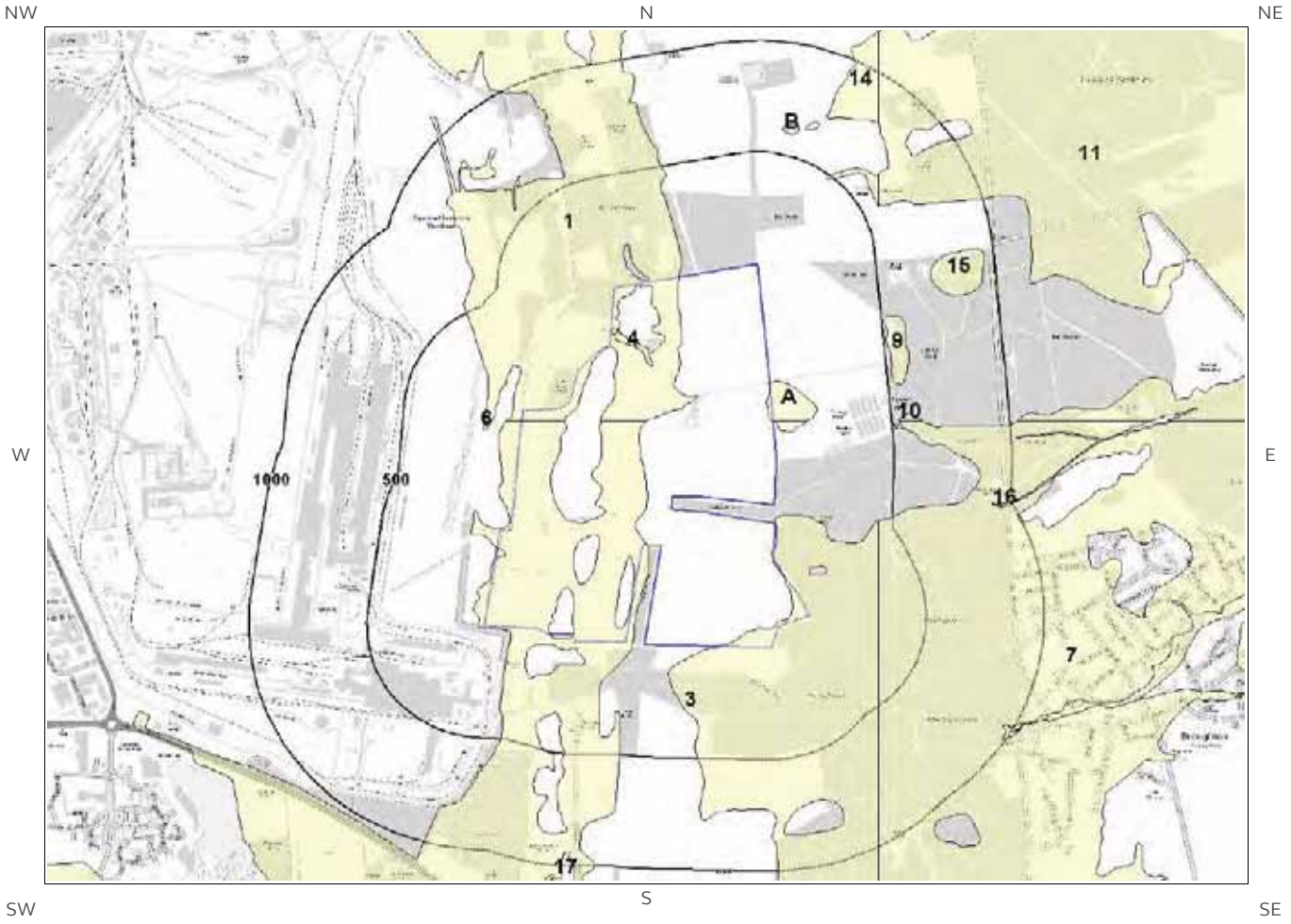
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
2	24.0	S	WMGR-ARTDP	Infilled Ground	Artificial Deposit
3	165.0	W	WMGR-ARTDP	Infilled Ground	Artificial Deposit
4	390.0	S	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit

1.2 Superficial Deposits and Landslips Map (1:10,000 scale)



Artificial Ground Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	BSA1-S	Blown Sand, 1 - Sand	Sand
2A	0.0	On Site	BSA1-S	Blown Sand, 1 - Sand	Sand
3	0.0	On Site	BSA1-S	Blown Sand, 1 - Sand	Sand
4	0.0	On Site	ALV-XCZSV	Alluvium - Clay, Silt, Sand And Gravel	Clay, Silt, Sand And Gravel
5A	0.0	On Site	BSA1-S	Blown Sand, 1 - Sand	Sand
6	128.0	W	BSA1-S	Blown Sand, 1 - Sand	Sand
7	295.0	E	BSA1-S	Blown Sand, 1 - Sand	Sand
8	479.0	NE	BSA1-S	Blown Sand, 1 - Sand	Sand

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

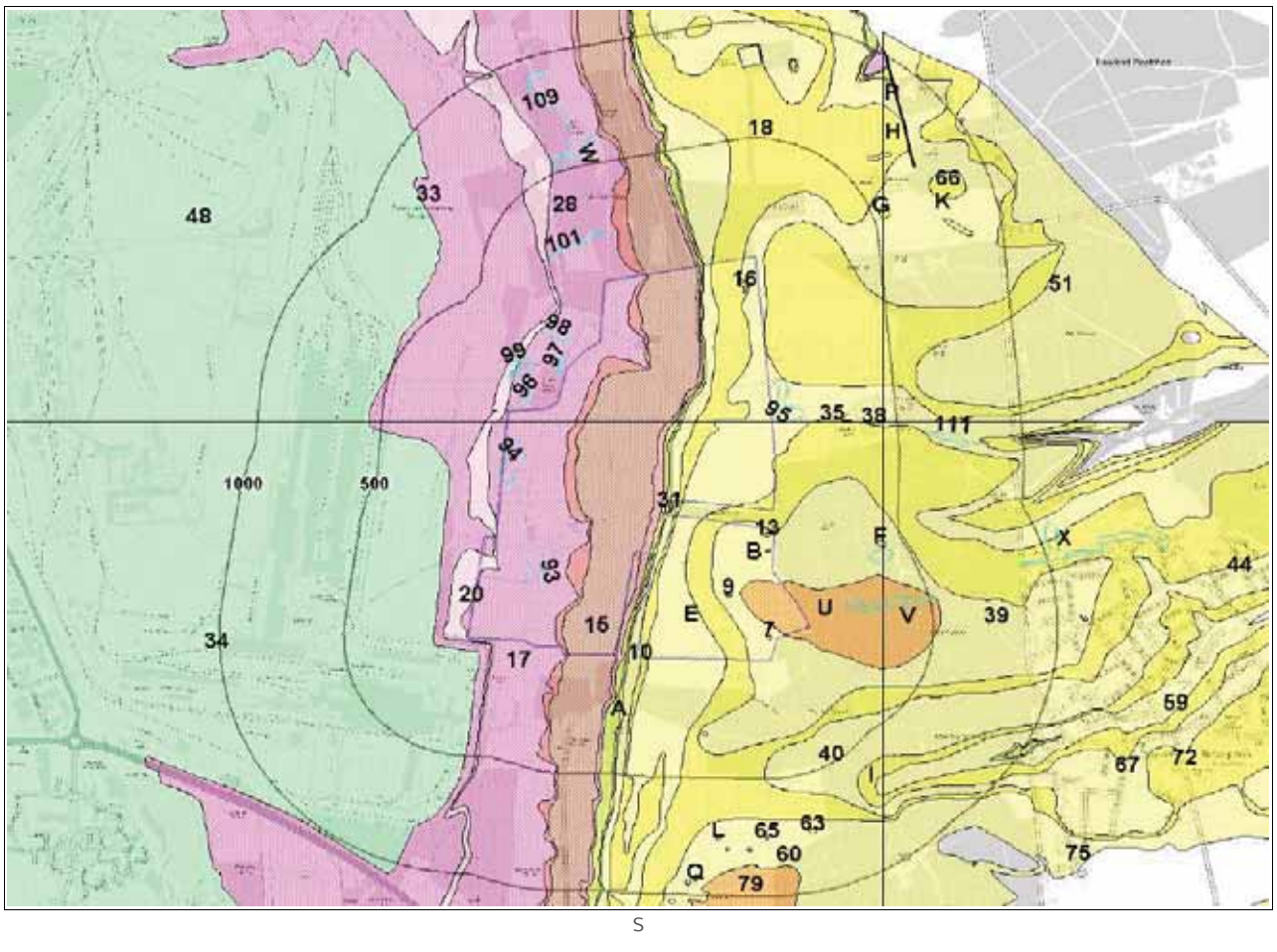
No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and Faults Map (1:10,000 scale)



Bedrock and Faults Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and Faults

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1A	0.0	On Site	GRF-SDSM	Grantham Formation - Sandstone, Siltstone And Mudstone	Aalenian Age
2	0.0	On Site	SNO-LMOOL	Santon Oolite - Ooidal Limestone	Bajocian Age
3E	0.0	On Site	KCM-MDLM	Kirton Cementstone Beds - Mudstone And Limestone, Interbedded	Bajocian Age
4U	0.0	On Site	HIL-LMOOL	Hibaldstow Limestone - Ooidal Limestone	Bajocian Age
5	0.0	On Site	NS-FGSST	Northampton Sand Formation - Ferruginous Sandstone	Aalenian Age
6	0.0	On Site	SYL-LMAR	Scawby Limestone - Interbedded Limestone And [subequal/subordinate] Argillaceous Rocks	Bajocian Age
7	0.0	On Site	KCMK-LMST	Kirton Cementstone Beds (knoll-reef) - Limestone	Bajocian Age
8B	0.0	On Site	KCMK-LMST	Kirton Cementstone Beds (knoll-reef) - Limestone	Bajocian Age
9	0.0	On Site	KCMK-LMST	Kirton Cementstone Beds (knoll-reef) - Limestone	Bajocian Age
10	0.0	On Site	RVB-LMAR	Raventhorpe Beds - Interbedded Limestone And [subequal/subordinate] Argillaceous Rocks	Bajocian Age
11	0.0	On Site	KCM-MDLM	Kirton Cementstone Beds - Mudstone And Limestone, Interbedded	Bajocian Age
12A	0.0	On Site	CML-LMST	Cleatham Limestone - Limestone	Bajocian Age
13	0.0	On Site	KCMK-LMST	Kirton Cementstone Beds (knoll-reef) - Limestone	Bajocian Age
14B	0.0	On Site	KCMK-LMST	Kirton Cementstone Beds (knoll-reef) - Limestone	Bajocian Age
15	0.0	On Site	WHM-MDST	Whitby Mudstone Formation - Mudstone	Toarcian Age
16	0.0	On Site	RVB-LMAR	Raventhorpe Beds - Interbedded Limestone And [subequal/subordinate] Argillaceous Rocks	Bajocian Age
17	0.0	On Site	CHAM-MDST	Charmouth Mudstone Formation - Mudstone	Pliensbachian Age - Sinemurian Age
18	0.0	On Site	SNO-LMOOL	Santon Oolite - Ooidal Limestone	Bajocian Age
19	0.0	On Site	MRB-FGLS	Marlstone Rock Formation - Ferruginous Limestone And Ferruginous Sandstone	Toarcian Age - Pliensbachian Age
20	0.0	On Site	PTNI-FEST	Pecten Ironstone (bed) - Ironstone	Pliensbachian Age
21	0.0	On Site	CHAM-MDST	Charmouth Mudstone Formation - Mudstone	Pliensbachian Age - Sinemurian Age
22C	0.0	On Site	MRB-FGLS	Marlstone Rock Formation - Ferruginous Limestone And Ferruginous Sandstone	Toarcian Age - Pliensbachian Age

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
23C	0.0	On Site	WHM-MDST	Whitby Mudstone Formation - Mudstone	Toarcian Age
24D	0.0	On Site	KCM-MDLM	Kirton Cementstone Beds - Mudstone And Limestone, Interbedded	Bajocian Age
25S	0.0	On Site	GRF-SDSM	Grantham Formation - Sandstone, Siltstone And Mudstone	Aalenian Age
26	0.0	On Site	CML-LMST	Cleatham Limestone - Limestone	Bajocian Age
27J	0.0	On Site	RVB-LMAR	Raventhorpe Beds - Interbedded Limestone And [subequal/subordinate] Argillaceous Rocks	Bajocian Age
28	0.0	On Site	CHAM-MDST	Charmouth Mudstone Formation - Mudstone	Pliensbachian Age - Sinemurian Age
29	0.0	On Site	NS-FGSST	Northampton Sand Formation - Ferruginous Sandstone	Aalenian Age
30D	0.0	E	SYL-LMAR	Scawby Limestone - Interbedded Limestone And [subequal/subordinate] Argillaceous Rocks	Bajocian Age
31	9.0	S	GRF-SDSM	Grantham Formation - Sandstone, Siltstone And Mudstone	Aalenian Age
32	11.0	W	PTNI-FEST	Pecten Ironstone (bed) - Ironstone	Pliensbachian Age
33	48.0	W	CHAM-MDST	Charmouth Mudstone Formation - Mudstone	Pliensbachian Age - Sinemurian Age
34	52.0	S	FI-FEST	Frodingham Ironstone Member - Ironstone	Sinemurian Age
35	171.0	E	SYL-LMAR	Scawby Limestone - Interbedded Limestone And [subequal/subordinate] Argillaceous Rocks	Bajocian Age
36V	295.0	E	HIL-LMOOL	Hibaldstow Limestone - Ooidal Limestone	Bajocian Age
37E	302.0	S	KCMK-LMST	Kirton Cementstone Beds (knoll-reef) - Limestone	Bajocian Age
38	338.0	E	KCM-MDLM	Kirton Cementstone Beds - Mudstone And Limestone, Interbedded	Bajocian Age
39	344.0	SE	KCM-MDLM	Kirton Cementstone Beds - Mudstone And Limestone, Interbedded	Bajocian Age
40	347.0	SE	KCM-MDLM	Kirton Cementstone Beds - Mudstone And Limestone, Interbedded	Bajocian Age
41X	388.0	SE	SYL-LMAR	Scawby Limestone - Interbedded Limestone And [subequal/subordinate] Argillaceous Rocks	Bajocian Age
42F	409.0	NE	KCMK-LMST	Kirton Cementstone Beds (knoll-reef) - Limestone	Bajocian Age
43F	420.0	NE	KCMK-LMST	Kirton Cementstone Beds (knoll-reef) - Limestone	Bajocian Age
44	442.0	E	KCM-MDLM	Kirton Cementstone Beds - Mudstone And Limestone, Interbedded	Bajocian Age
45	444.0	E	KCM-MDLM	Kirton Cementstone Beds - Mudstone And Limestone, Interbedded	Bajocian Age
46	457.0	E	SYL-LMAR	Scawby Limestone - Interbedded Limestone And [subequal/subordinate] Argillaceous Rocks	Bajocian Age
47K	492.0	E	KCM-MDLM	Kirton Cementstone Beds - Mudstone And Limestone, Interbedded	Bajocian Age

1.3.2 Faults

Are there any records of Faults within 500m of the study site boundary at 1:10,000 scale? Yes

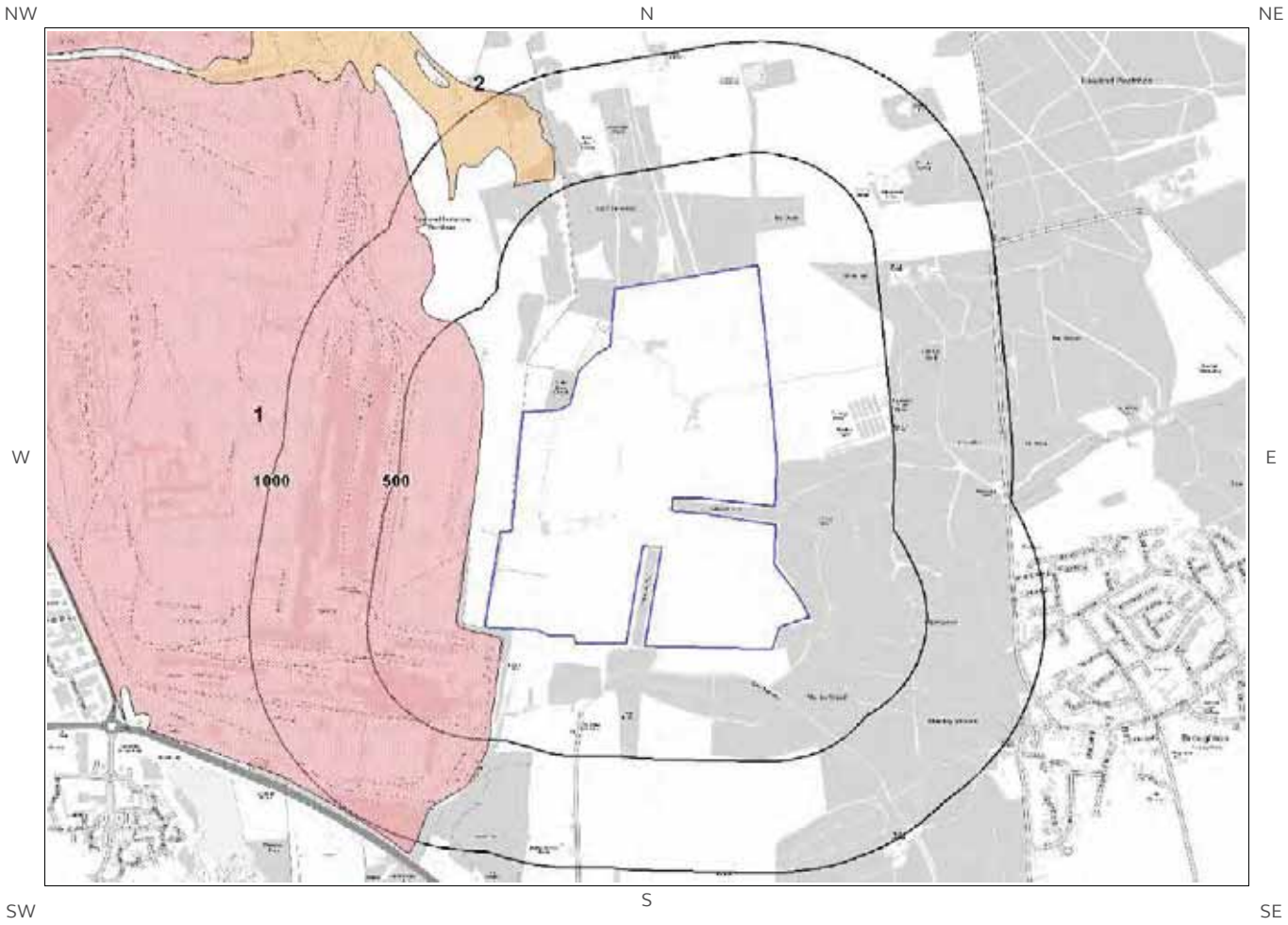
ID	Distance (m)	Direction	Category Description	Feature Description
93	0.0	On Site	LANDFORM	Dune, form-line at base of mound
94	0.0	On Site	LANDFORM	Dune, form-line at base of mound
95	0.0	On Site	LANDFORM	Dune, form-line at base of mound
96	17.0	N	LANDFORM	Dune, form-line at base of mound
97	27.0	W	LANDFORM	Dune, form-line at base of mound
98	73.0	NW	LANDFORM	Dune, form-line at base of mound
99	135.0	W	LANDFORM	Dune, form-line at base of mound
100U	174.0	NE	LANDFORM	Dune, form-line at base of mound
101	181.0	NW	LANDFORM	Dune, form-line at base of mound
102V	263.0	E	LANDFORM	Dune, form-line at base of mound
103V	264.0	E	LANDFORM	Dune, form-line at base of mound
104V	305.0	E	LANDFORM	Dune, form-line at base of mound
105F	346.0	NE	LANDFORM	Dune, form-line at base of mound
106F	350.0	NE	LANDFORM	Dune, form-line at base of mound
107F	382.0	NE	LANDFORM	Dune, form-line at base of mound

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 089

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	28.0	S	WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT

2.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? Yes

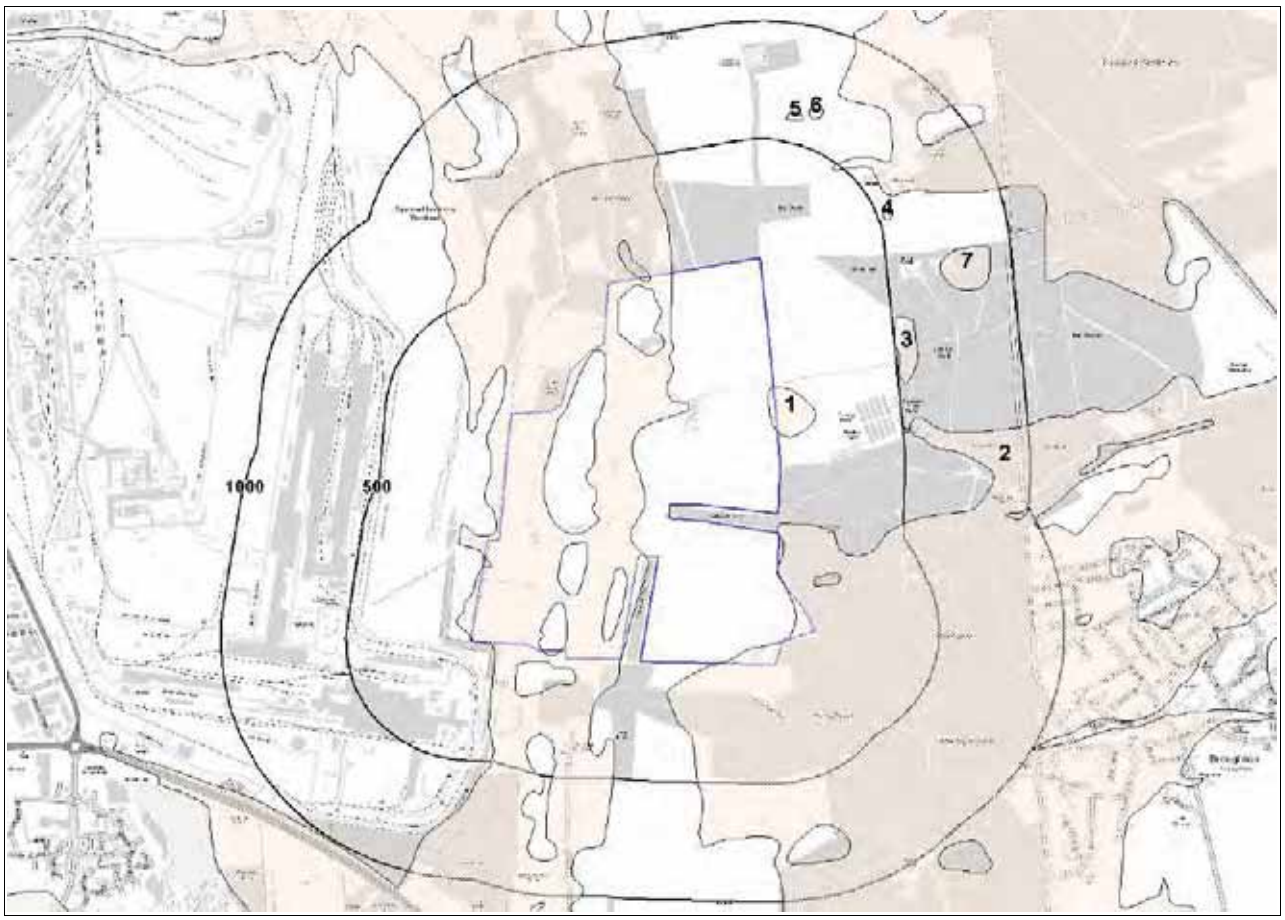
Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
28.0	S	Mixed	Very High	Low

2.2 Superficial Deposits and Landslips Map (1:50,000 scale)

NW N NE

W E

SW S SE



Ground Workings Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

500
1000
Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	SUTN-S	SUTTON SAND FORMATION	SAND
2	0.0	On Site	SUTN-S	SUTTON SAND FORMATION	SAND
3	499.0	E	SUTN-S	SUTTON SAND FORMATION	SAND

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	High	High
0.0	On Site	Intergranular	High	High
0.0	On Site	Intergranular	High	High
0.0	On Site	Intergranular	High	High

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

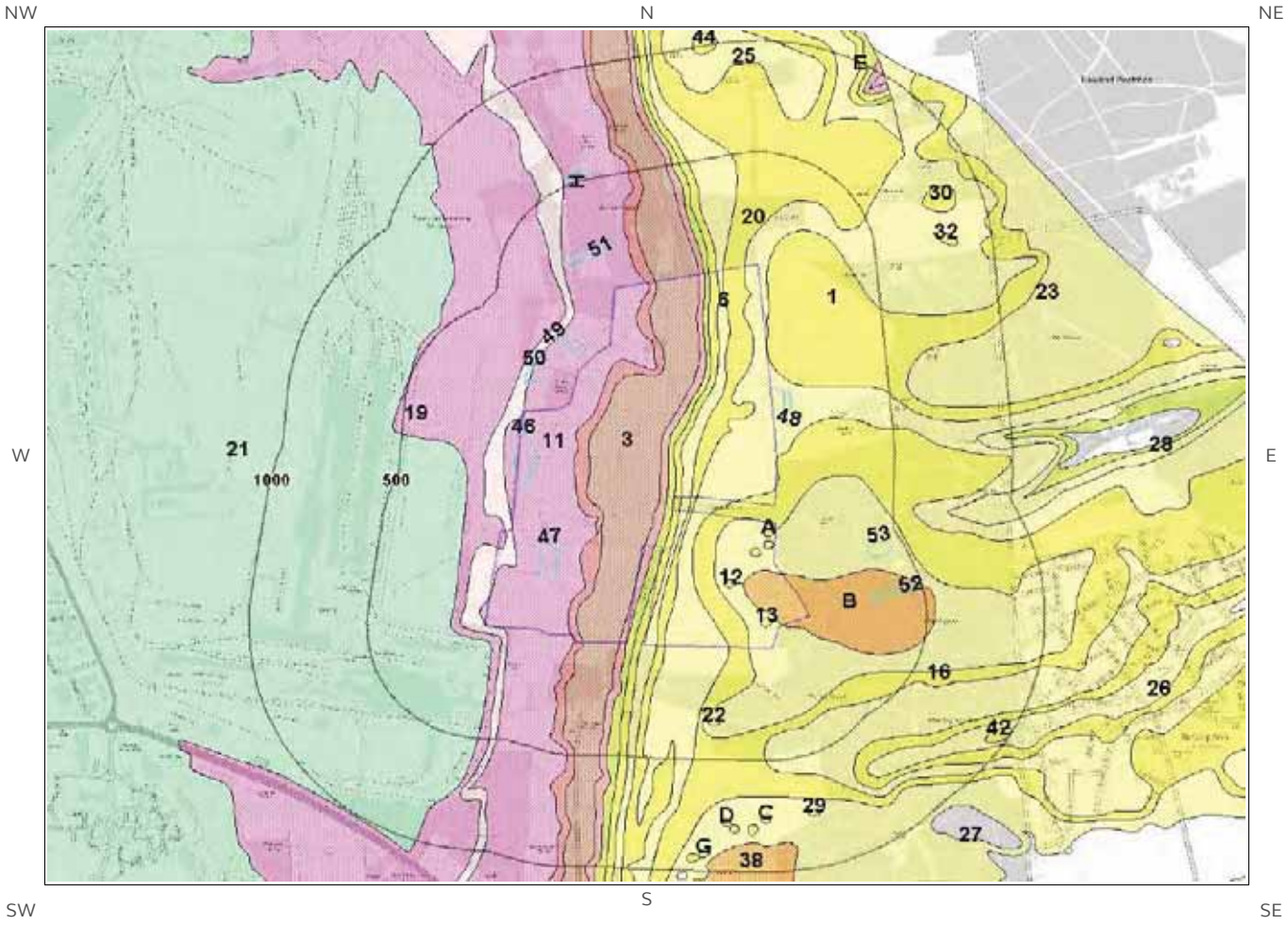
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary? No

Database searched and no data found.

2.3 Bedrock and Faults Map (1:50,000 scale)



Ground Workings Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 089

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	SYL-LMAR	SCAWBY LIMESTONE - LIMESTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED	BAJOCIAN
2	0.0	On Site	NS-FGSST	NORTHAMPTON SAND FORMATION - SANDSTONE, FERRUGINOUS	AALENIAN
3	0.0	On Site	WHM-MDST	WHITBY MUDSTONE FORMATION - MUDSTONE	TOARCIAN
4	0.0	On Site	LLL-LMST	LOWER LINCOLNSHIRE LIMESTONE MEMBER - LIMESTONE	BAJOCIAN
5	0.0	On Site	GRF-SDSM	GRANTHAM FORMATION - SANDSTONE, SILTSTONE AND MUDSTONE	AALENIAN
6	0.0	On Site	RVB-LMAR	RAVENTHORPE BEDS - LIMESTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED	BAJOCIAN
7	0.0	On Site	MRB-FGLS	MARLSTONE ROCK FORMATION - FERRUGINOUS LIMESTONE AND FERRUGINOUS SANDSTONE	PLIENSBACHIAN
8A	0.0	On Site	KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF) - LIMESTONE	BAJOCIAN
9A	0.0	On Site	KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF) - LIMESTONE	BAJOCIAN
10A	0.0	On Site	KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF) - LIMESTONE	BAJOCIAN
11	0.0	On Site	CHAM-MDST	CHARMOUTH MUDSTONE FORMATION - MUDSTONE	SINEMURIAN
12	0.0	On Site	KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF) - LIMESTONE	BAJOCIAN
13	0.0	On Site	KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF) - LIMESTONE	BAJOCIAN
14B	0.0	On Site	HIL-LMOOL	HIBALDSTOW LIMESTONE - LIMESTONE, OOIDAL	BAJOCIAN
15B	0.0	On Site	KCM-MDLM	KIRTON CEMENTSTONE BEDS - MUDSTONE AND LIMESTONE, INTERBEDDED	BAJOCIAN
16	0.0	On Site	KCM-LMST	KIRTON CEMENTSTONE BEDS - LIMESTONE	BAJOCIAN
17	0.0	On Site	KCM-MDLM	KIRTON CEMENTSTONE BEDS - MUDSTONE AND LIMESTONE, INTERBEDDED	BAJOCIAN
18	0.0	On Site	PTNI-FEST	PECTEN IRONSTONE (BED) - IRONSTONE	PLIENSBACHIAN
19	0.0	On Site	CHAM-MDST	CHARMOUTH MUDSTONE FORMATION - MUDSTONE	SINEMURIAN
20	0.0	On Site	KCM-LMST	KIRTON CEMENTSTONE BEDS - LIMESTONE	BAJOCIAN

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
21	61.0	S	FI-FEST	FRODINGHAM IRONSTONE MEMBER - IRONSTONE	SINEMURIAN
22	313.0	S	KCMK-LMST	KIRTON CEMENTSTONE BEDS (KNOLL-REEF) - LIMESTONE	BAJOCIAN

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Very High	Very High
0.0	On Site	Mixed	High	Moderate
0.0	On Site	Fracture	Low	Low
0.0	On Site	Mixed	Very High	Very High
0.0	On Site	Mixed	High	Moderate
0.0	On Site	Fracture	Very High	Very High
0.0	On Site	Fracture	Very High	Low
0.0	On Site	Fracture	High	Low
0.0	On Site	Fracture	Very High	Very High
0.0	On Site	Fracture	Very High	Very High
0.0	On Site	Mixed	High	Moderate
0.0	On Site	Mixed	High	Moderate
0.0	On Site	Fracture	Very High	Very High
0.0	On Site	Fracture	Very High	Very Low
0.0	On Site	Fracture	Very High	Very Low
0.0	On Site	Fracture	Low	Low
0.0	On Site	Fracture	Very High	Very High
0.0	On Site	Fracture	Low	Low
0.0	On Site	Mixed	High	Moderate
0.0	On Site	Fracture	Very High	Very High
0.0	On Site	Fracture	High	Low
0.0	On Site	Mixed	Moderate	Low
0.0	On Site	Mixed	Moderate	Low
0.0	On Site	Fracture	Very High	Very Low
0.0	On Site	Fracture	Very High	Very High
0.0	On Site	Fracture	Very High	Very High
0.0	On Site	Fracture	Low	Low
0.0	On Site	Mixed	High	Moderate
0.0	On Site	Fracture	Very High	Very High
0.0	On Site	Fracture	Low	Low

2.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? Yes

ID	Distance	Direction	Category Description	Feature Description
46	0.0	On Site	LANDFORM	Dune, form line at base
47	0.0	On Site	LANDFORM	Dune, form line at base
48	13.0	E	LANDFORM	Dune, form line at base
49	41.0	NW	LANDFORM	Dune, form line at base
50	130.0	N	LANDFORM	Dune, form line at base
51	160.0	NW	LANDFORM	Dune, form line at base
52	275.0	E	LANDFORM	Dune, form line at base
53	352.0	NE	LANDFORM	Dune, form line at base
54H	490.0	N	LANDFORM	Dune, form line at base
55H	492.0	N	LANDFORM	Dune, form line at base

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?The property is in a Radon Affected Area, as between 10 and 30% of properties are above the Action Level.

3.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? Full radon protective measures are necessary.

---

4 Ground Workings Map

NW N NE

W E

SW S SE



Ground Workings Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1E	0.0	On Site	493748 409553	Unspecified Pit	1951
2A	0.0	On Site	494217 410278	Unspecified Ground Workings	1994
3A	0.0	On Site	494217 410278	Unspecified Ground Workings	1977
4B	0.0	On Site	494146 410173	Unspecified Pit	1977
5B	0.0	On Site	494146 410173	Unspecified Pit	1994
6C	0.0	On Site	494048 410235	Unspecified Pit	1977
7C	0.0	On Site	494048 410235	Unspecified Pit	1994
8D	0.0	On Site	493917 410234	Unspecified Ground Workings	1977
9D	0.0	On Site	493917 410234	Unspecified Ground Workings	1994
10E	0.0	On Site	493749 409556	Unspecified Pit	1948
11E	0.0	On Site	493749 409556	Unspecified Pit	1906
12C	0.0	On Site	494049 410235	Unspecified Pit	1886
13	0.0	On Site	493837 410252	Unspecified Pit	1886
14	105.0	W	493099 409549	Opencast Ironstone Workings	1979
15F	124.0	W	493174 409059	Ponds	1938
16F	124.0	W	493174 409059	Ponds	1905
17F	126.0	W	493174 409059	Unspecified Pit	1968
18F	126.0	W	493174 409059	Ponds	1951
19	134.0	NW	493429 410197	Unspecified Pit	1886
20	139.0	W	493314 409857	Unspecified Pit	1886
21	147.0	W	493294 409694	Unspecified Pit	1886

ID	Distance (m)	Direction	NGR	Use	Date
22G	195.0	W	493058 410820	Opencast Ironstone Workings	1977
23G	195.0	W	493058 410820	Opencast Ironstone Workings	1994
24H	205.0	W	493644 410496	Pond	1977
25H	205.0	W	493644 410496	Pond	1994
26I	217.0	W	493270 410135	Unspecified Ground Workings	1994
27I	217.0	W	493270 410135	Unspecified Ground Workings	1977

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

4.3 Current Ground Workings

This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
28	340.0	W	493000 409000	Ironstone	Yarborough	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
29	462.0	NW	493200 410400	Ironstone	Emanuel Bridge	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Inactive

5 Mining, Extraction & Natural Cavities Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Mining, Extraction and Natural Cavities Legend



5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? Yes

The following Historical Mining information is provided by Groundsure:

ID	Distance (m)	Direction	NGR	Details	Date
6	105.0	W	493099 409549	Opencast Ironstone Workings	1979
7A	195.0	W	493058 410820	Opencast Ironstone Workings	1977
8A	195.0	W	493058 410820	Opencast Ironstone Workings	1994
9	730.0	W	492399 409130	Opencast Ironstone Workings	1968
10	872.0	W	492409 409222	Iron Stone Quarry	1951

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? Yes

The following information provided by JPB is not represented on mapping: Whilst outside of an area where The Coal Authority have information on coal mining activities, Johnson Poole & Bloomer (JPB) have information such as mining plans and maps held within their archive of mining activities that have occurred within 1km of this property. Further details and a quote for services can be obtained by emailing this report to enquiries.gs@jpb.co.uk.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? Yes

The following non-coal mining information is provided by the BGS:

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Jet	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
2	0.0	On Site	Not available	Jet	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
Not shown	834.0	S	Ashby	Iron Ore (Bedded)	Underground mining is known to have occurred within or very close to the area. Potential for difficult ground conditions should be investigated. Potential for localised subsidence is at a level where it should be considered

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled "Review of mining instability in Great Britain, 1990" PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? Yes

The following Non-Coal Mining Cavities information provided by Peter Brett Associates:

ID	Distance (m)	Direction	NGR	Address	Superficial Deposits	Bedrock Deposits	Extracted Mineral
4	0.0	On Site	494000 410000	HIGH SANTON, Humberside	-	-	Magnatite, Marcasite, Siderite, Ironstone
5	486.0	W	493000 410000	EMMANUEL BRIDGE, Humberside	-	-	Magnatite, Marcasite, Siderite, Ironstone

5.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.7 Brine Extraction

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level..

Are there any Tin Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

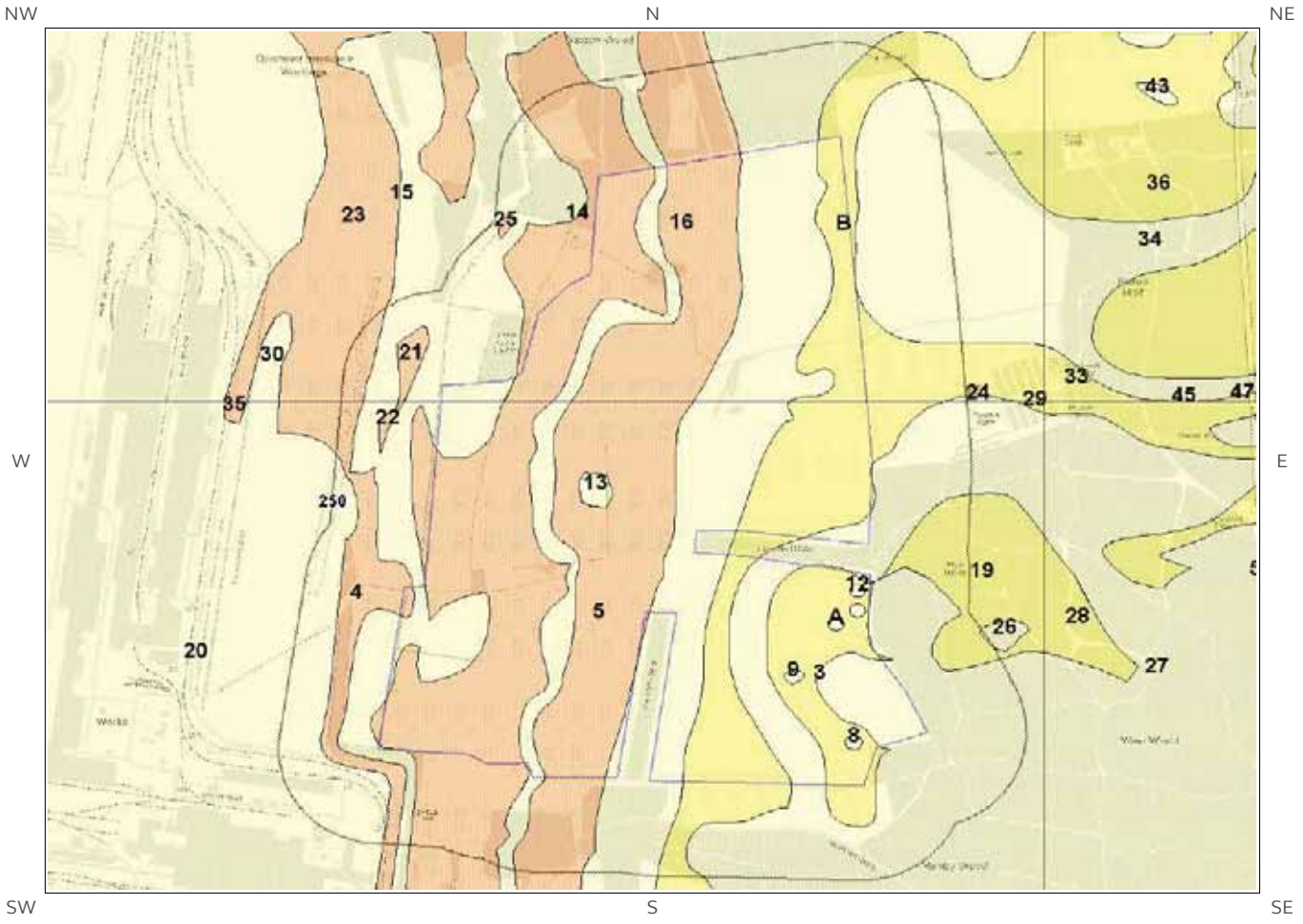
Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

---

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay Map



Shrink Swell Clay Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

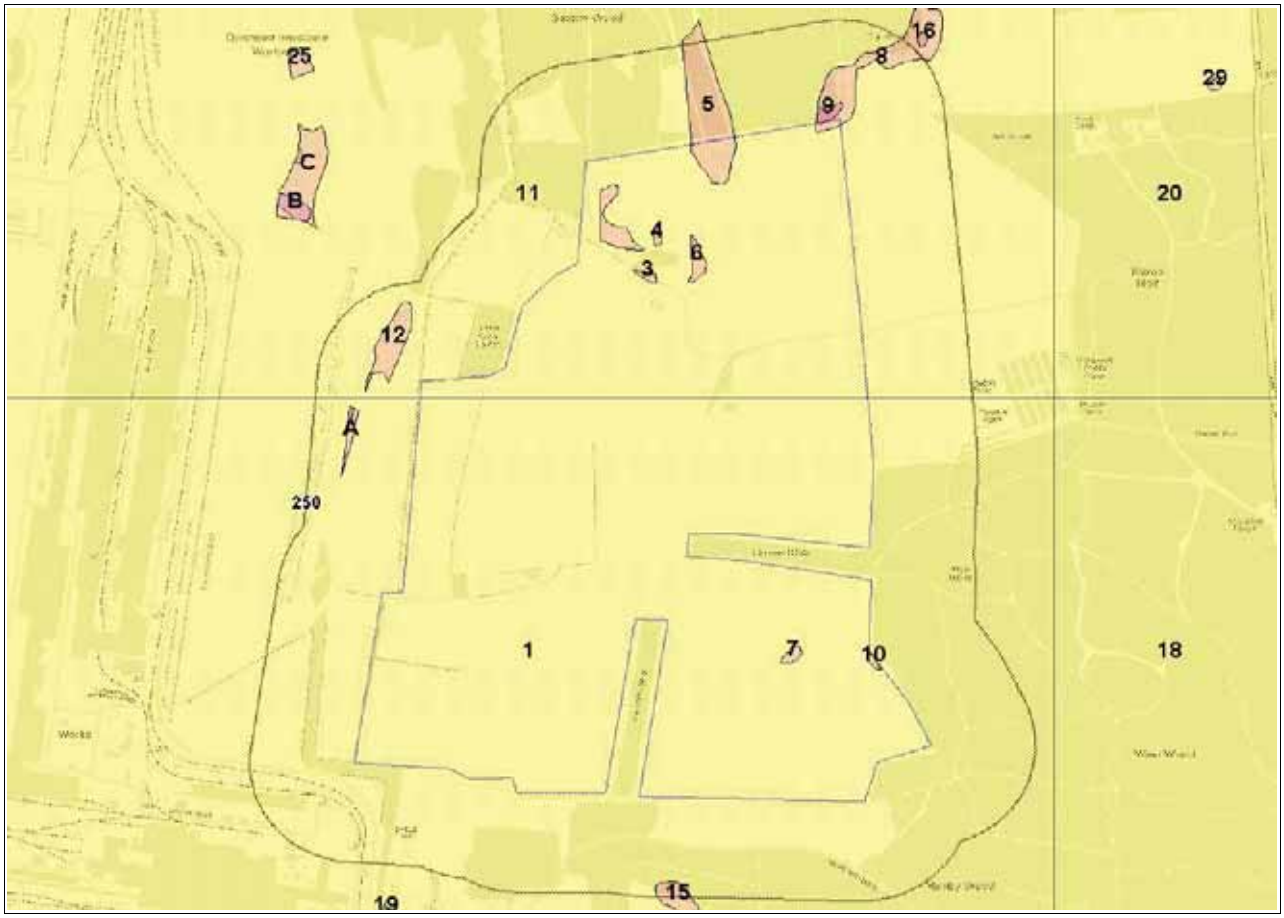
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.2 Landslides Map



Landslides Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

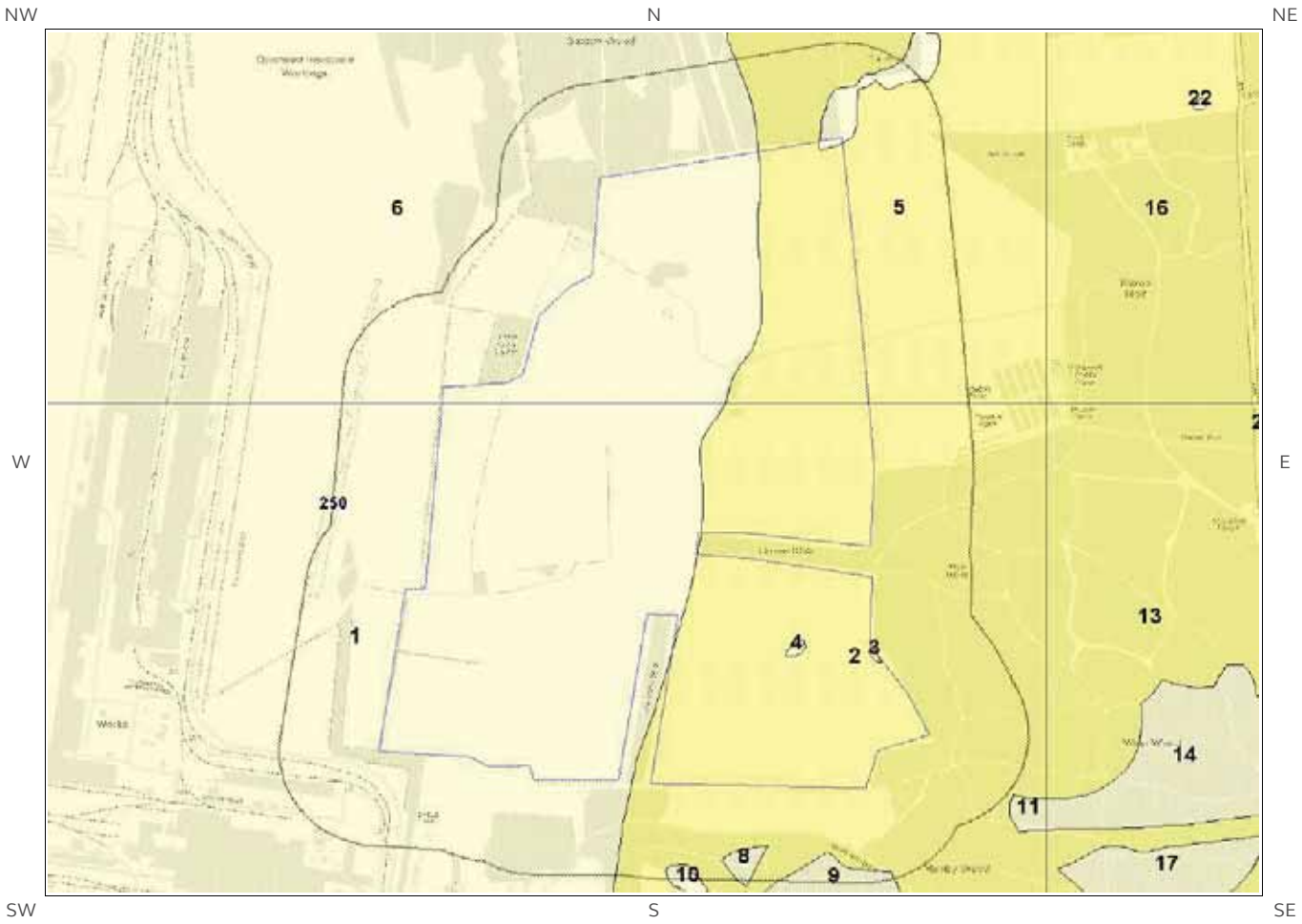
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.3 Ground Dissolution of Soluble Rocks Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Ground Dissolution Soluble Rocks Legend

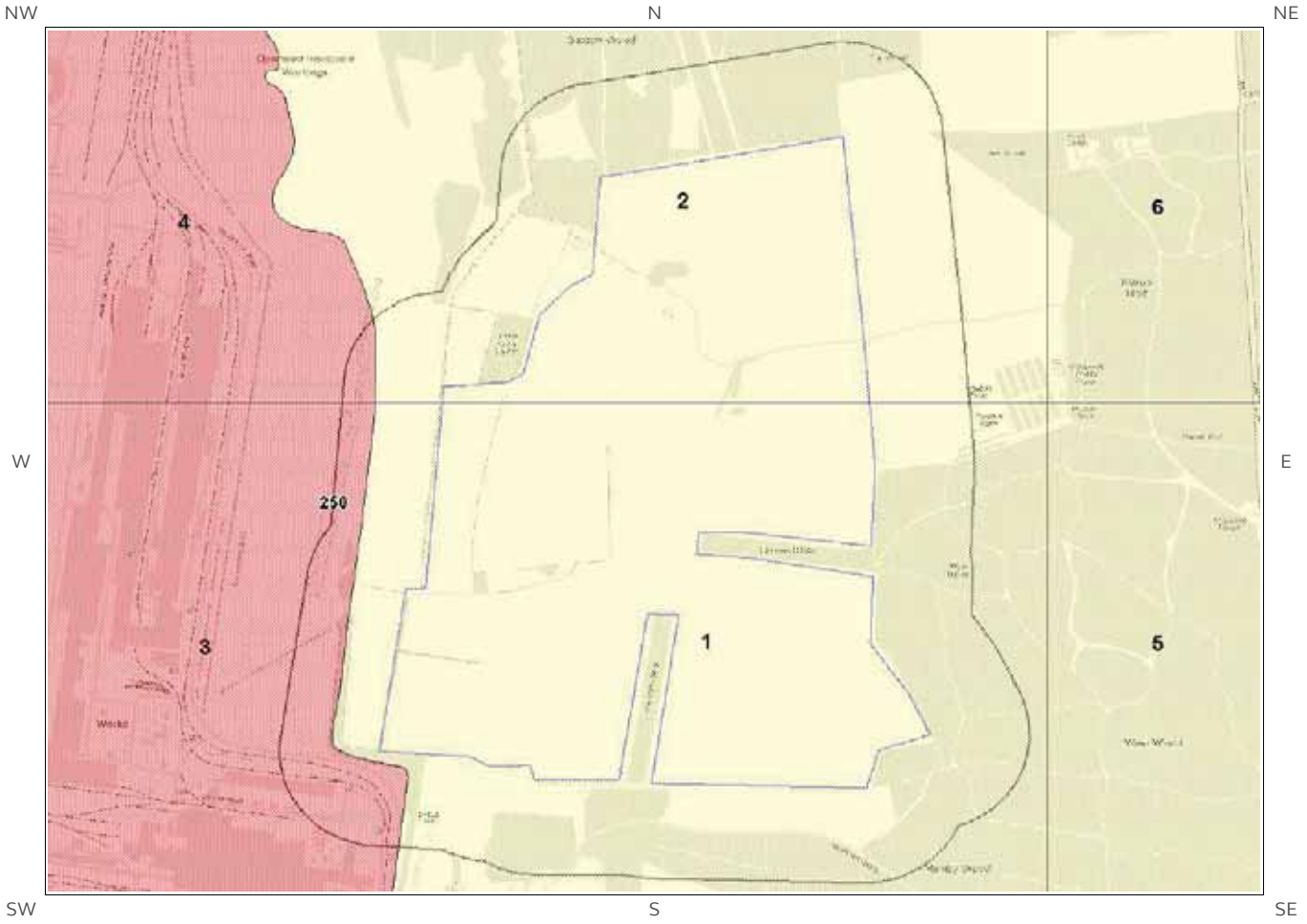
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.4 Compressible Deposits Map



Compressible Deposits Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

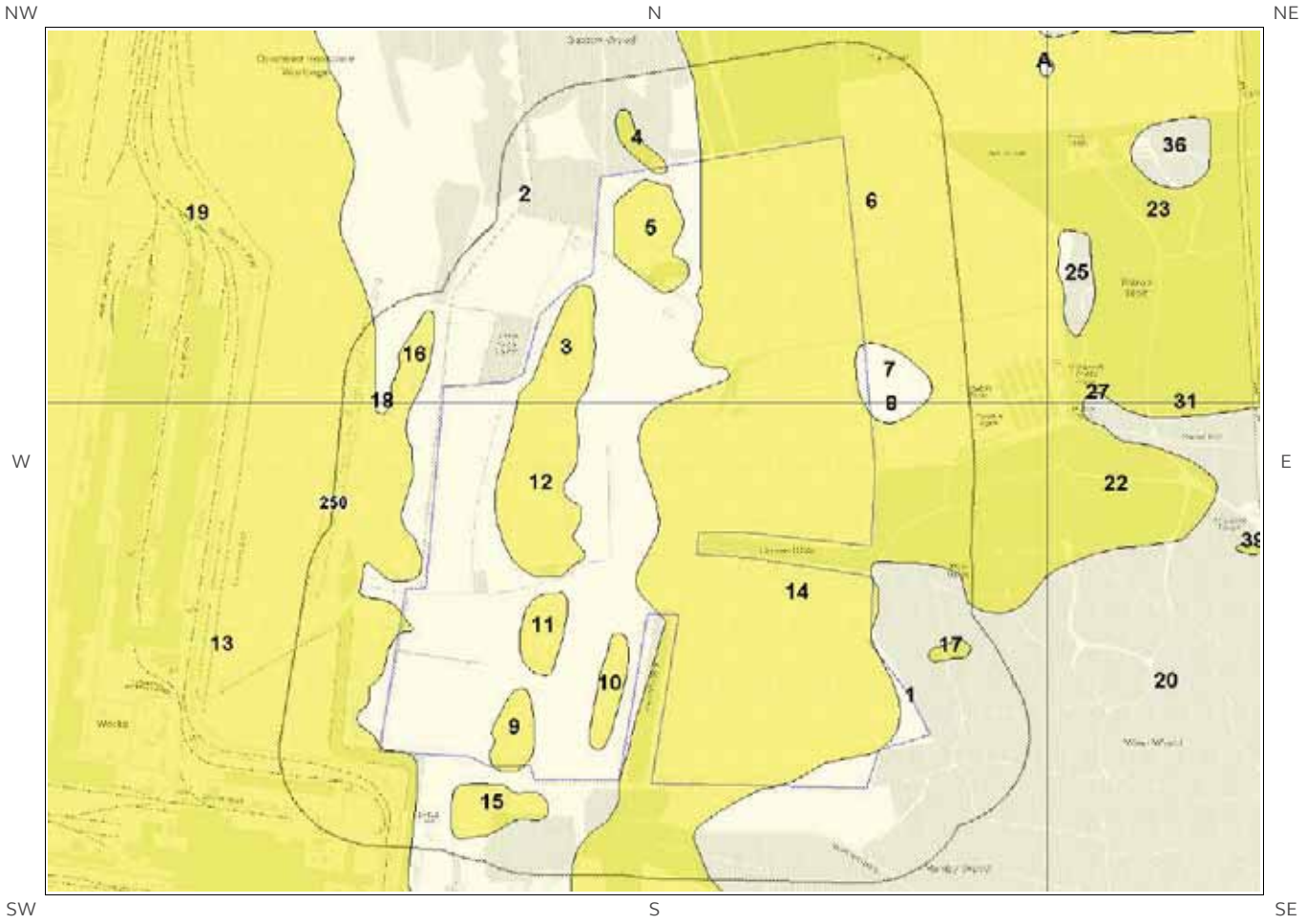
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.5 Collapsible Deposits Map



Collapsible Deposits Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

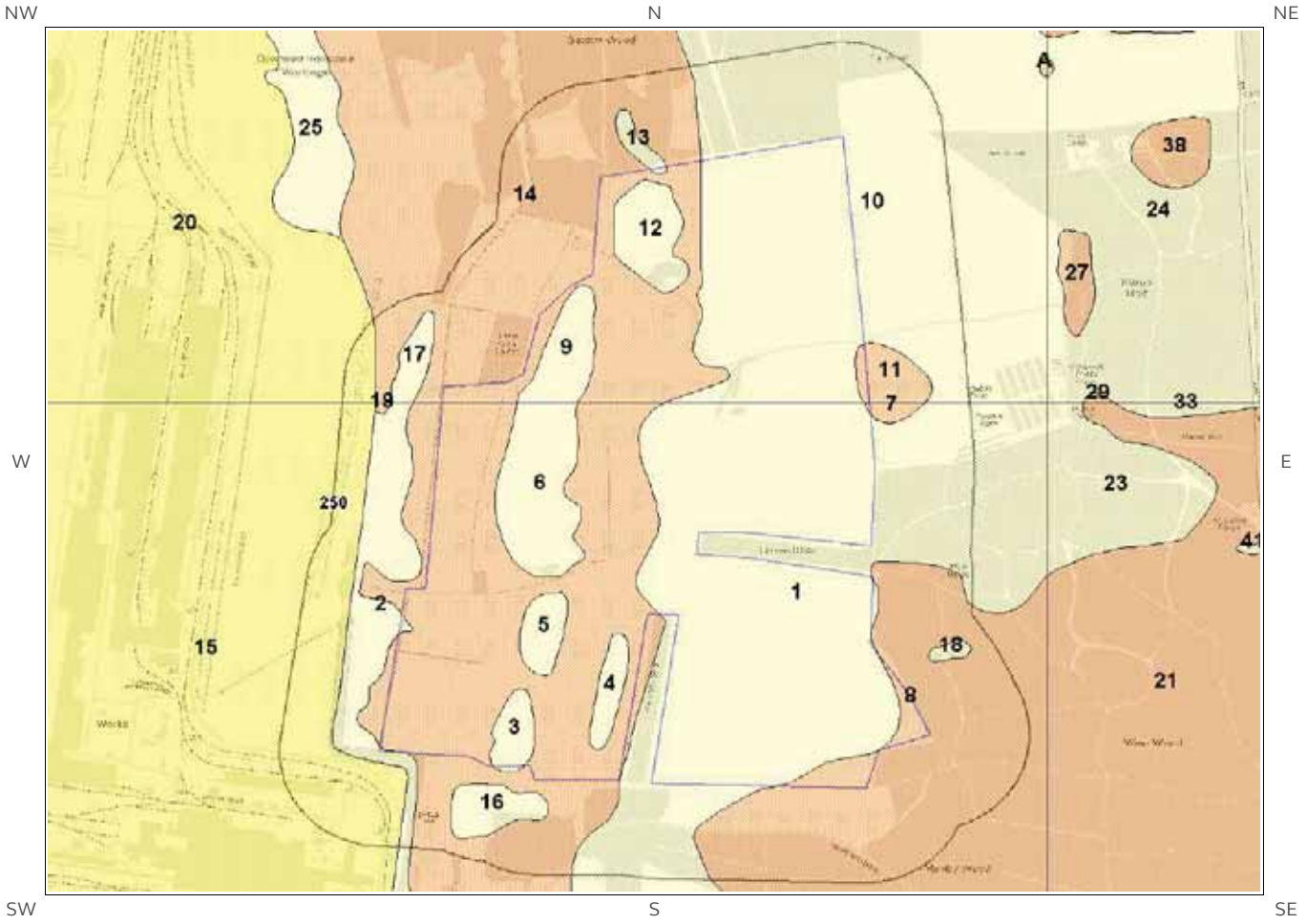
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.6 Running Sand Map



Running Sand Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site*[*] boundary? Moderate

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Low	Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.
2	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
3	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
4	0.0	On Site	Low	Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

* This includes an automatically generated 50m buffer zone around the site

ID	Distance (m)	Direction	Hazard Rating	Details
5	0.0	On Site	Low	Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.
6	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
7	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
8	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
9	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
10A	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
11A	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
12	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.

ID	Distance (m)	Direction	Hazard Rating	Details
13	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
14	0.0	On Site	Low	Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.
15	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
16	0.0	On Site	Low	Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.
17B	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
18B	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
19	17.0	E	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.
2	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.
3	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.
4	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.
5	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.
6	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.
7	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.

ID	Distance (m)	Direction	Hazard Rating	Details
8	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.
9	0.0	On Site	Moderate	Significant potential for slope instability with relatively small changes in ground conditions. Avoid large amounts of water entering the ground through pipe leakage or soak-aways. Do not undercut or place large amounts of material on slopes without technical advice. For new build - consider the potential and consequences of ground movement during excavations, or consequence of changes to loading or drainage. For existing property - probable increase in insurance risk is likely due to potential natural slope instability after changes to ground conditions such as a very long, excessively wet winter.
10	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.
11	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.
2	0.0	On Site	Very Low	Significant soluble rocks are present. Problems unlikely except with considerable surface or subsurface water flow. No special actions required to avoid problems due to soluble rocks. No special ground investigation required or increased construction costs are likely. An increase in financial risk due to potential problems with soluble rocks is unlikely.
3	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

ID	Distance (m)	Direction	Hazard Rating	Details
4	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.
5	0.0	On Site	Very Low	Significant soluble rocks are present. Problems unlikely except with considerable surface or subsurface water flow. No special actions required to avoid problems due to soluble rocks. No special ground investigation required or increased construction costs are likely. An increase in financial risk due to potential problems with soluble rocks is unlikely.
6	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.
7	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
2	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
3	28.0	S	Moderate	Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build - consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property - possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

6.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

ID	Distance (m)	Direction	Hazard Rating	Details
2	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
3	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
4	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
5	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
6	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
7	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
8	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
9	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
10	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
11	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
12	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
13	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
14	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
15	34.0	S	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

6.6 Running Sands

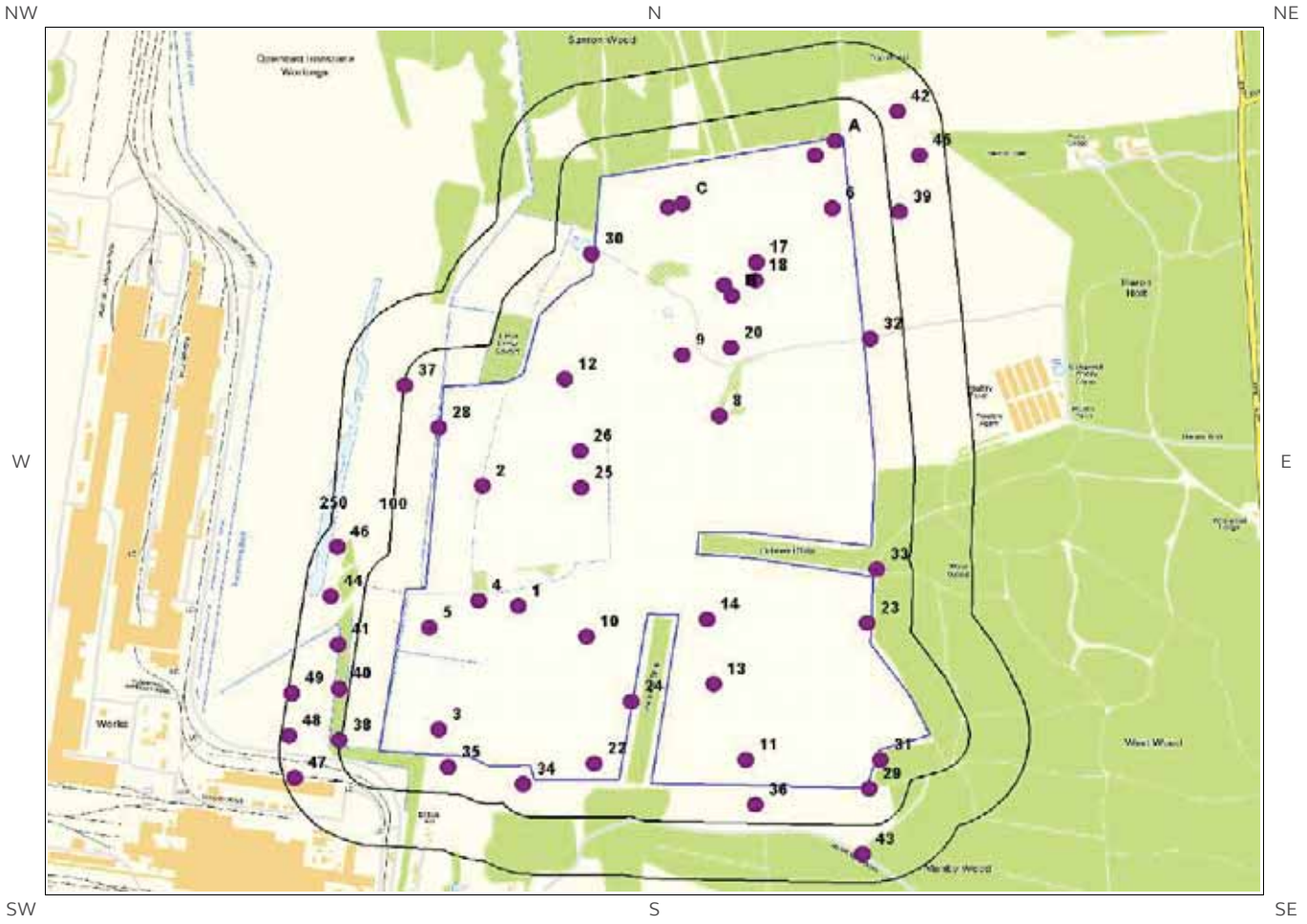
The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

ID	Distance (m)	Direction	Hazard Rating	Details
2	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
3	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
4	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
5	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
6	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
7	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.
8	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.
9	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
10	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
11	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.
12	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
13	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

ID	Distance (m)	Direction	Hazard Rating	Details
14	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build - consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property - no significant increase in insurance risk due to running sand problems is likely.
15	28.0	S	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
16	34.0	S	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

7 Borehole Records Map



Borehole Records Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

Borehole Locations

125
250
Search Buffers (m)

7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: 49

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	0.0	On Site	493678 409460	SE90NW14	-1.0	SHOTHOLE RECORDS SCUNTHORPE
2	0.0	On Site	493587 409778	SE90NW135	-1.0	SODWALL PLANTATION EAST NO 1
3	0.0	On Site	493479 409136	SE90NW13	-1.0	SHOTHOLE RECORDS SCUNTHORPE
4	0.0	On Site	493578 409476	SE90NW43	-1.0	GOKEWELL ICEHOUSE WEST
5	0.0	On Site	493454 409404	SE90NW158	-1.0	MANBY HALL SOUTH-EAST
6	0.0	On Site	494460 410510	SE91SW461	-1.0	OVERHEAD LINE TOWERS TP 2
7B	0.0	On Site	494210 410280	SE91SW458	-1.0	OVERHEAD LINE TOWERS PBR7
8	0.0	On Site	494180 409963	SE90NW45	-1.0	GOKEWELL
9	0.0	On Site	494086 410124	SE91SW31	-1.0	SHOTHOLE REORDS RETFORD & SCUNTHORPE
10	0.0	On Site	493848 409381	SE90NW137	-1.0	GOKEWELL STRIP SOUTH 1
11	0.0	On Site	494245 409055	SE90NW142	-1.0	WEST WOOD WEST NO.3
12	0.0	On Site	493793 410059	SE91SW393	64.92	LITTLE CROW COVERT EAST
13	0.0	On Site	494165 409255	SE90NW46	-1.0	ICEHOUSE STRIP EAST
14	0.0	On Site	494148 409426	SE90NW138	-1.0	GOKEWELL STRIP PLANTATION NO.2
15A	0.0	On Site	494468 410687	SE91SW138	102.11	TOP WOOD 1
16A	0.0	On Site	494419 410651	SE91SW33	-1.0	SHOTHOLE REORDS RETFORD & SCUNTHORPE
17	0.0	On Site	494272 410368	SE91SW32	-1.0	SHOTHOLE REORDS RETFORD & SCUNTHORPE
18	0.0	On Site	494270 410320	SE91SW460	-1.0	OVERHEAD LINE TOWERS 1
19B	0.0	On Site	494190 410310	SE91SW459	-1.0	OVERHEAD LINE TOWERS JP PBR7
20	0.0	On Site	494208 410142	SE91SW392	86.56	GOKEWELL SOUTH
21C	0.0	On Site	494087 410523	SE91SW395	76.2	GOKEWELL FARM NORTH

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
22	0.0	On Site	493867 409046	SE90NW141	-1.0	WEST WOOD WEST NO.2
23	0.0	On Site	494548 409415	SE90NW139	-1.0	GOKEWELL STRIP SOUTH 3
24	0.0	On Site	493959 409210	SE90NW16	-1.0	SHOTHOLE RECORDS SCUNTHORPE
25	0.0	On Site	493833 409774	SE90NW136	-1.0	SODWALL PLANTATION EAST NO 2
26	0.0	On Site	493832 409871	SE90NW15	-1.0	SHOTHOLE RECORDS SCUNTHORPE
27C	0.0	On Site	494052 410512	SE91SW3	12.8	GOKEWELL COTTAGE, HIGH SANTON LANE, LINCS
28	3.0	W	493479 409933	SE90NW44	-1.0	SODWALL PLANTATION
29	7.0	SE	494553 408979	SE90NW49	-1.0	MANBY WOOD
30	8.0	W	493859 410390	SE91SW141	56.39	GOKEWELL PRIORY FARM
31	13.0	E	494583 409056	SE90NW143	-1.0	WEST WOOD WEST NO.4
32	15.0	E	494555 410167	SE91SW391	102.11	GOKEWELL SOUTHEAST
33	20.0	NE	494572 409558	SE90NW42	-1.0	GOKEWELL STRIP
34	33.0	SW	493689 408992	SE90NW48	-1.0	GOKEWELL ICEHOSE NO 2
35	33.0	S	493501 409036	SE90NW140	-1.0	WEST WOOD WEST NO.1
36	51.0	S	494269 408938	SE90NW17	-1.0	SHOTHOLE RECORDS SCUNTHORPE
37	100.0	W	493392 410044	SE91SW394	44.81	LITTLE CROW COVERT WEST
38	105.0	W	493229 409108	SE90NW104	-1.0	YARBOROUGH
39	122.0	E	494630 410500	SE91SW462	-1.0	OVERHEAD LINE TOWERS TP 3
40	125.0	W	493229 409243	SE90NW105	-1.0	YARBOROUGH
41	146.0	W	493226 409358	SE90NW106	-1.0	YARBOROUGH
42	150.0	NE	494624 410766	SE91SW456	-1.0	BROUGHTON B1
43	175.0	S	494537 408808	SE90NW18	-1.0	SHOTHOLE RECORDS SCUNTHORPE
44	182.0	W	493209 409486	SE90NW107	-1.0	YARBOROUGH
45	186.0	E	494680 410650	SE91SW463	-1.0	OVERHEAD LINE TOWERS 3
46	204.0	NW	493224 409617	SE90NW91	-1.0	YARBOROUGH MINES
47	224.0	W	493119 409009	SE90NW47	-1.0	GOKEWELL ICEHOSE NO 2
48	230.0	W	493104 409120	SE90NW110	-1.0	YARBOROUGH
49	240.0	W	493111 409232	SE90NW109	-1.0	YARBOROUGH

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#9: scans.bgs.ac.uk/sobi_scans/boreholes/134113
#12: scans.bgs.ac.uk/sobi_scans/boreholes/134477
#15A: scans.bgs.ac.uk/sobi_scans/boreholes/134222
#16A: scans.bgs.ac.uk/sobi_scans/boreholes/134115
#17: scans.bgs.ac.uk/sobi_scans/boreholes/134114
#20: scans.bgs.ac.uk/sobi_scans/boreholes/134476
#21C: scans.bgs.ac.uk/sobi_scans/boreholes/134479
#27C: scans.bgs.ac.uk/sobi_scans/boreholes/134078
#30: scans.bgs.ac.uk/sobi_scans/boreholes/134225
#32: scans.bgs.ac.uk/sobi_scans/boreholes/134475
#37: scans.bgs.ac.uk/sobi_scans/boreholes/134478

8 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary: 201

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
1.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
4.0	N	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
4.0	N	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
5.0	S	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
5.0	S	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
5.0	S	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
5.0	S	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
5.0	S	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
5.0	S	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
5.0	S	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
5.0	S	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
6.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
7.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
10.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
10.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
10.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
10.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
10.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
10.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
11.0	N	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
11.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
11.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
13.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
13.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
16.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
17.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
17.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
20.0	N	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	<100 mg/kg
24.0	N	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
24.0	N	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
25.0	E	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
29.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
34.0	S	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
34.0	S	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
43.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
43.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
47.0	SW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	<15 mg/kg	<100 mg/kg

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels Map

NW N NE

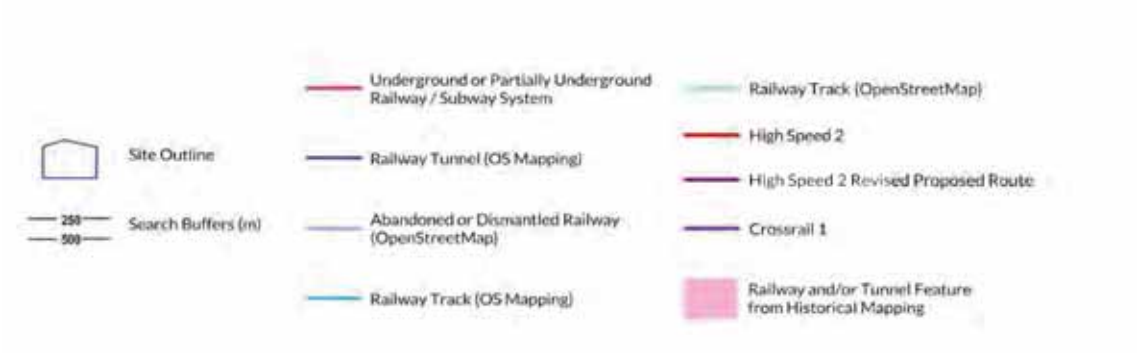
W E

SW S SE



Railways and Tunnels Legend

© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.
© OpenStreetMapContributors



9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? Yes

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
1	0	On Site	492330 409132	Railway Sidings	1979
2	87	SW	493155 409087	Railway Sidings	1997
3	212	SW	493303 408773	Railway Sidings	1997
4	221	SW	493324 408599	Railway Sidings	1975

Any records that have been identified are represented on the Railways and Tunnels Map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Name	Type
82	SW	Not given	Multi Track
82	SW	Not given	Multi Track
95	S	Not given	Rail
95	S	Not given	Rail
104	SW	Not given	Multi Track
104	SW	Not given	Multi Track
119	SW	Not given	Multi Track
119	SW	Not given	Multi Track
119	SW	Not given	Multi Track
119	SW	Not given	Multi Track
200	S	Not given	Rail
200	S	Not given	Rail
204	S	Not given	Rail
204	S	Not given	Rail
215	SW	Not given	Rail
215	SW	Not given	Rail

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? No

Is the study site within 500m of the route of the Crossrail 1 rail project? No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a ***Groundsure HS2 and Crossrail 1 Report****.*

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

Contact Details

CENTREMAPS

Telephone: 01886 832972
Groundsure@centremaps.co.uk
Open Space, Upper Interfields, Malvern, Worcester, WR14 1UT

British Geological Survey Enquiries

Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:**enquiries@bgs.ac.uk**
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries

British Gypsum

British Gypsum Ltd
East Leake
Loughborough
Leicestershire
LE12 6HX

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
https://www.gov.uk/government/organisations/public-health-england
Email: **enquiries@phe.gov.uk**
Main switchboard: 020 7654 8000

Johnson Poole & Bloomer Limited

Harris and Pearson Building, Brettel Lane
Brierley Hill, West Midlands
DY5 3LH
Tel: +44 (0) 1384 262 000
Email:**enquiries.gs@jpb.co.uk**
Website: **www.jpb.co.uk**

Ordnance Survey

Adanac Drive, Southampton
SO16 0AS

Tel: 08456 050505
Website: http://www.ordnancesurvey.co.uk/

Getmapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444
Website:**http://www1.getmapping.com/**

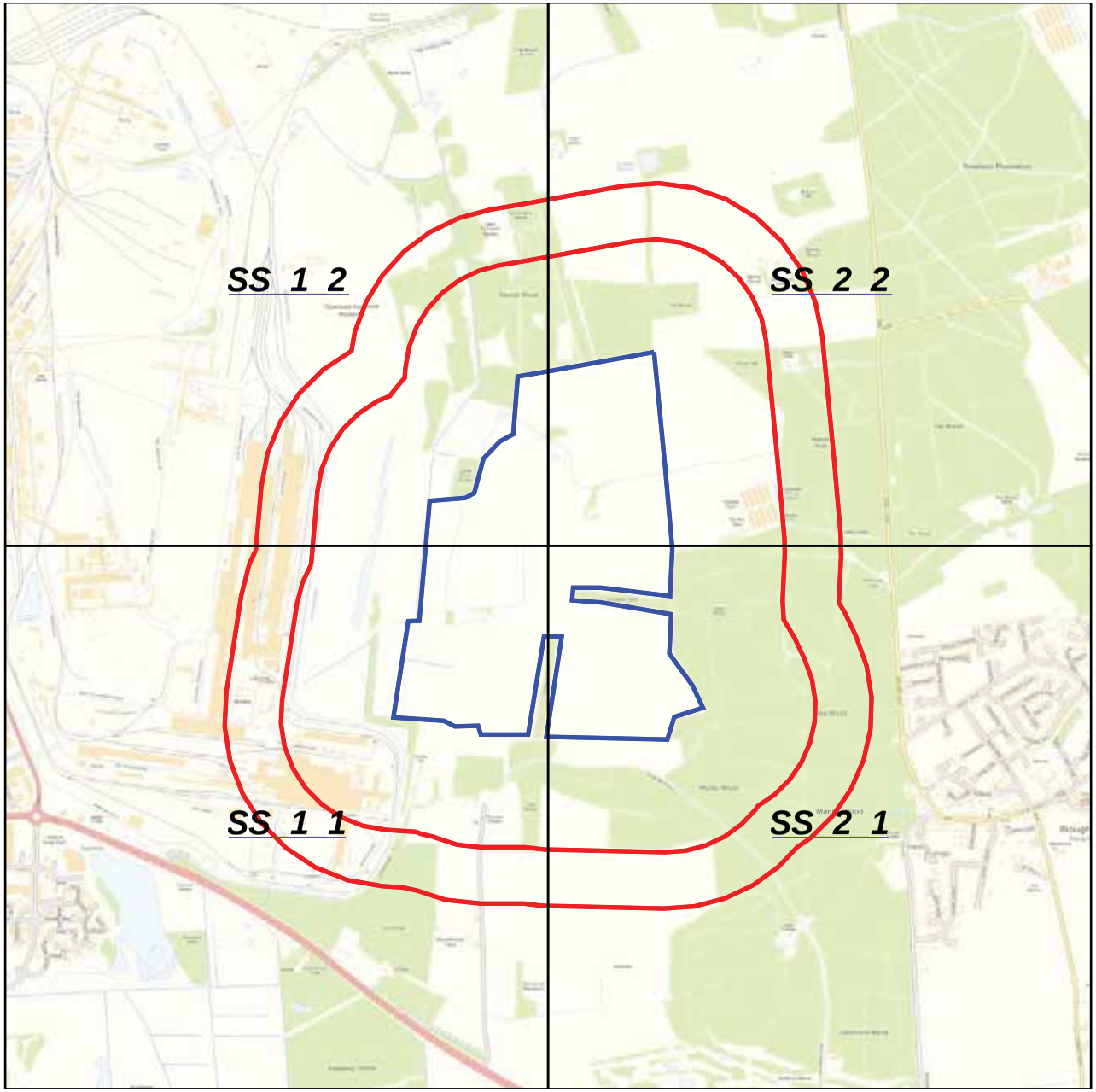
Peter Brett Associates

Caversham Bridge House
Waterman Place
Reading
Berkshire RG1 8DN
Tel: +44 (0)118 950 0761 E-mail:**reading@pba.co.uk**
Website:**http://www.peterbrett.com/home**

Acknowledgements: Ordnance Survey © Crown Copyright and/or Database Right. All Rights Reserved. Licence Number [03421028]. This report has been prepared in accordance with the Groundsure Ltd standard Terms and Conditions of business for work of this nature.

Standard Terms and Conditions

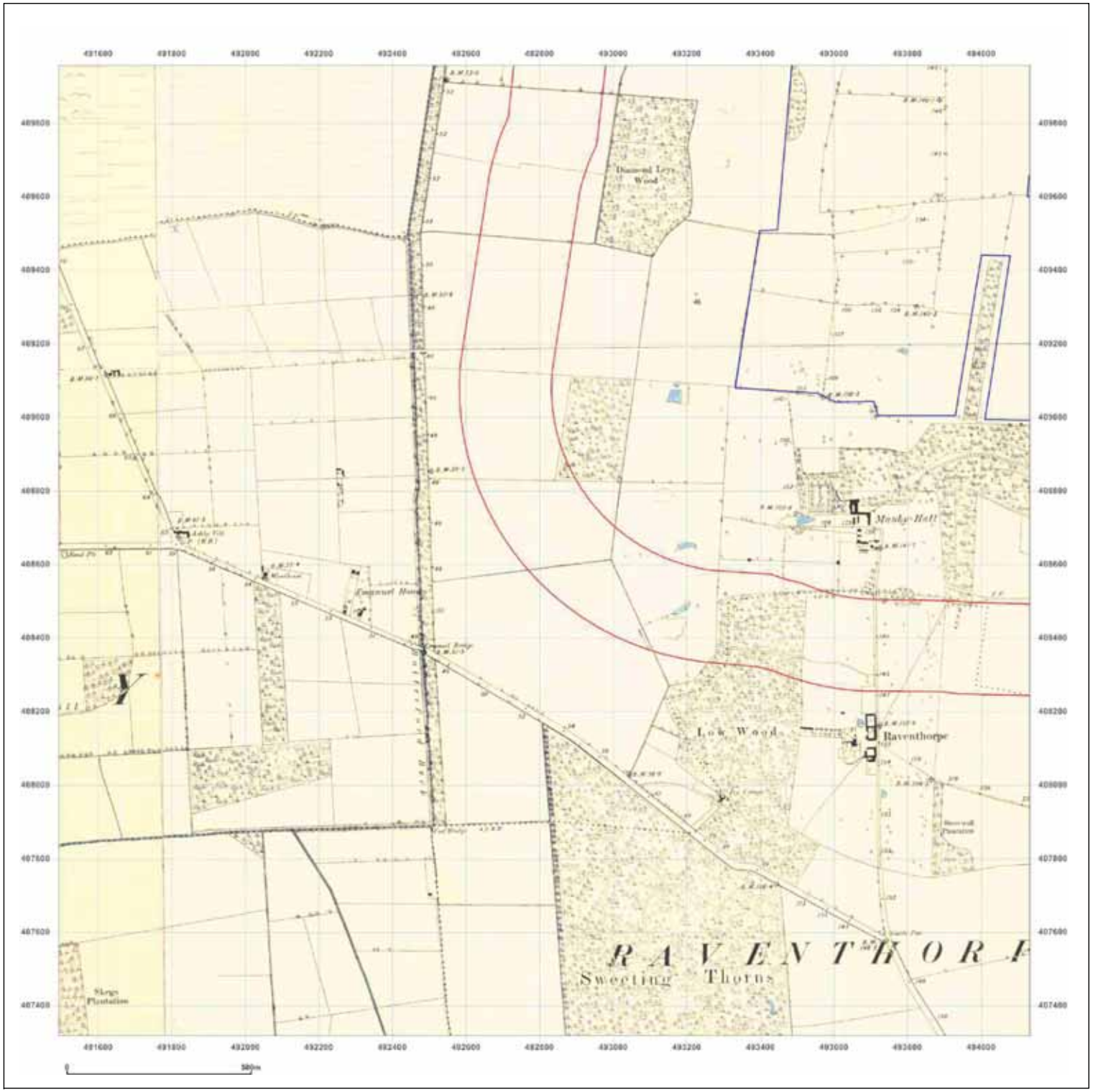
Groundsure's Terms and Conditions can be viewed online at this link:
https://www.groundsure.com/terms-and-conditions-sept-2016/







Small Scale Grid Index



CENTRE MAPS LIVE.

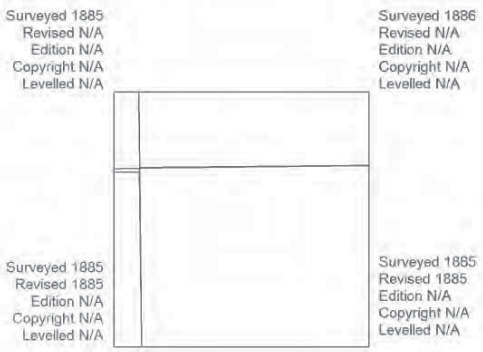
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: County Series
Map date: **1885-1886**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure

Produced by
Groundsure Insights
www.groundsure.com

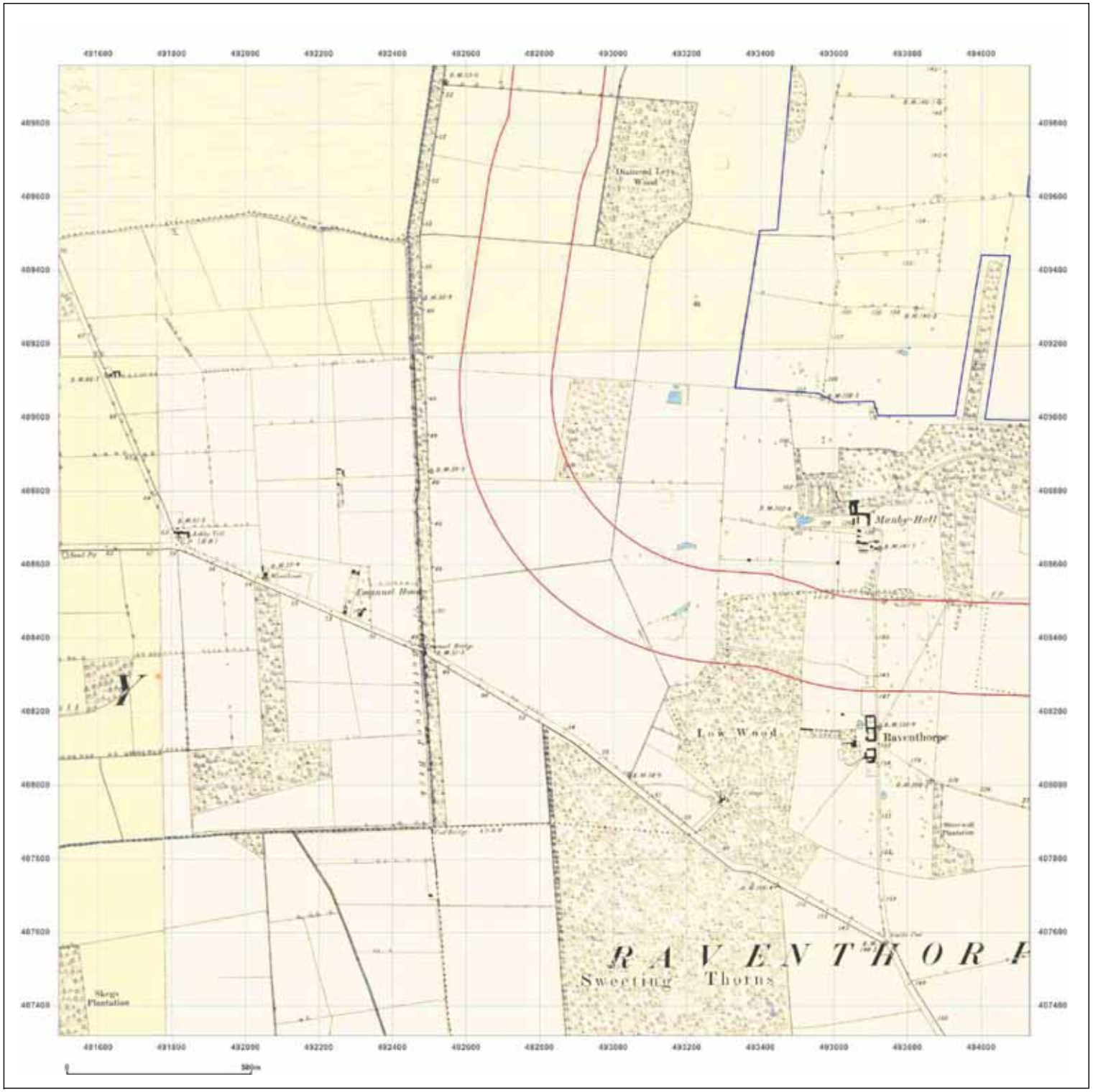
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

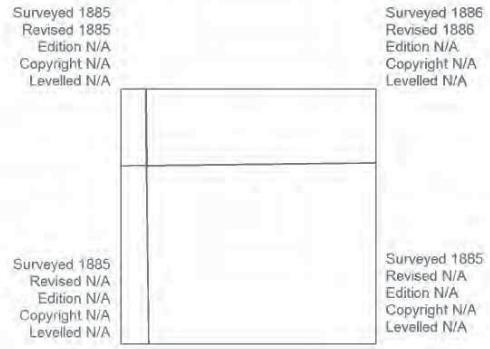
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: County Series
Map date: **1885-1886**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

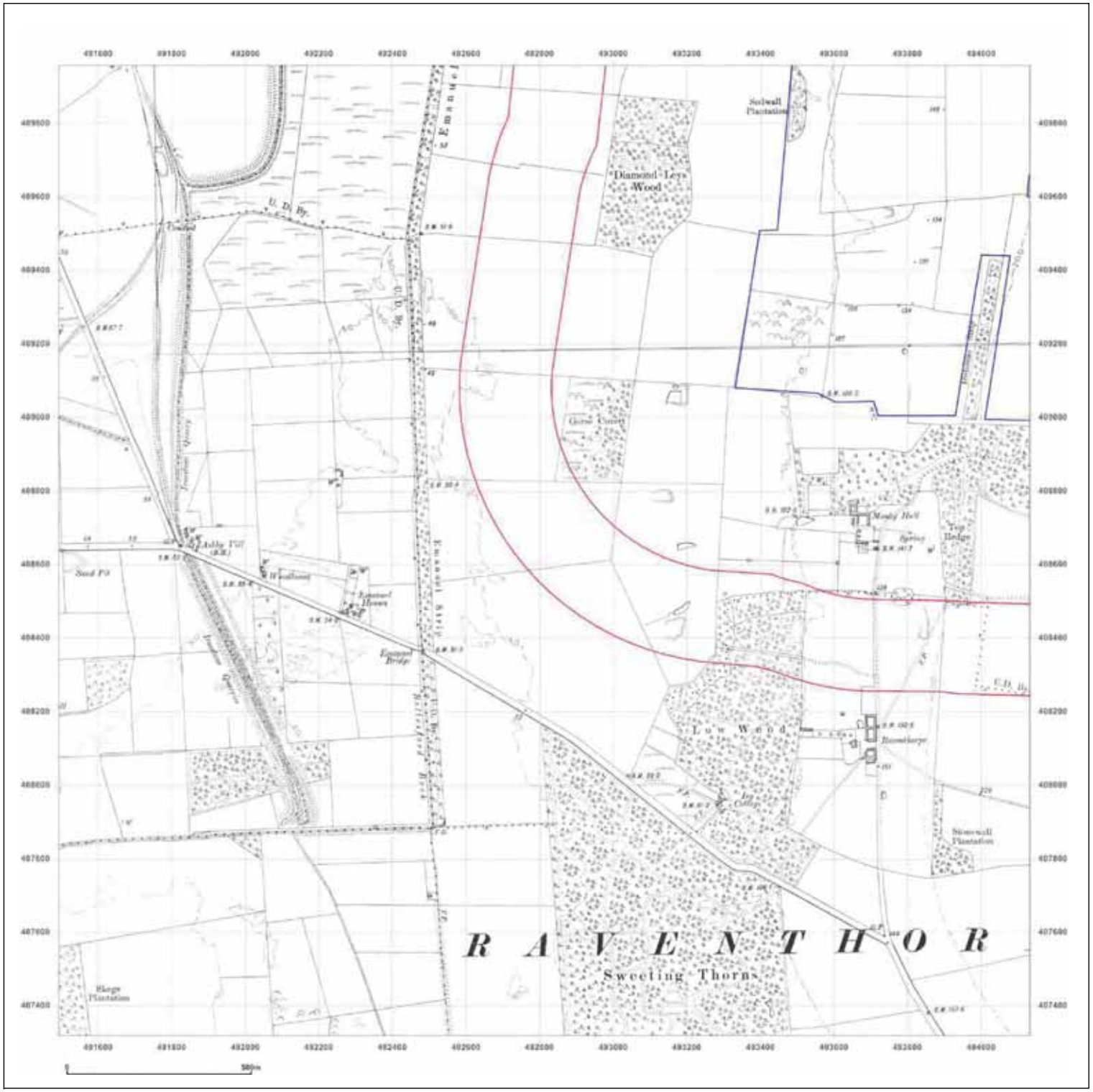
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

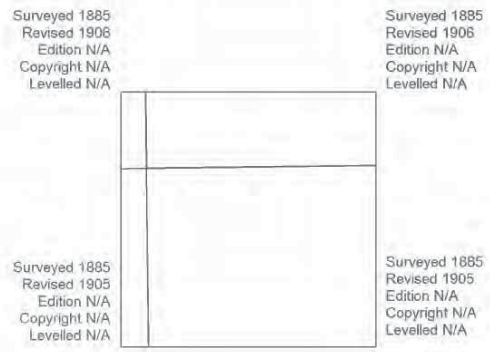
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: County Series
Map date: **1905-1906**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

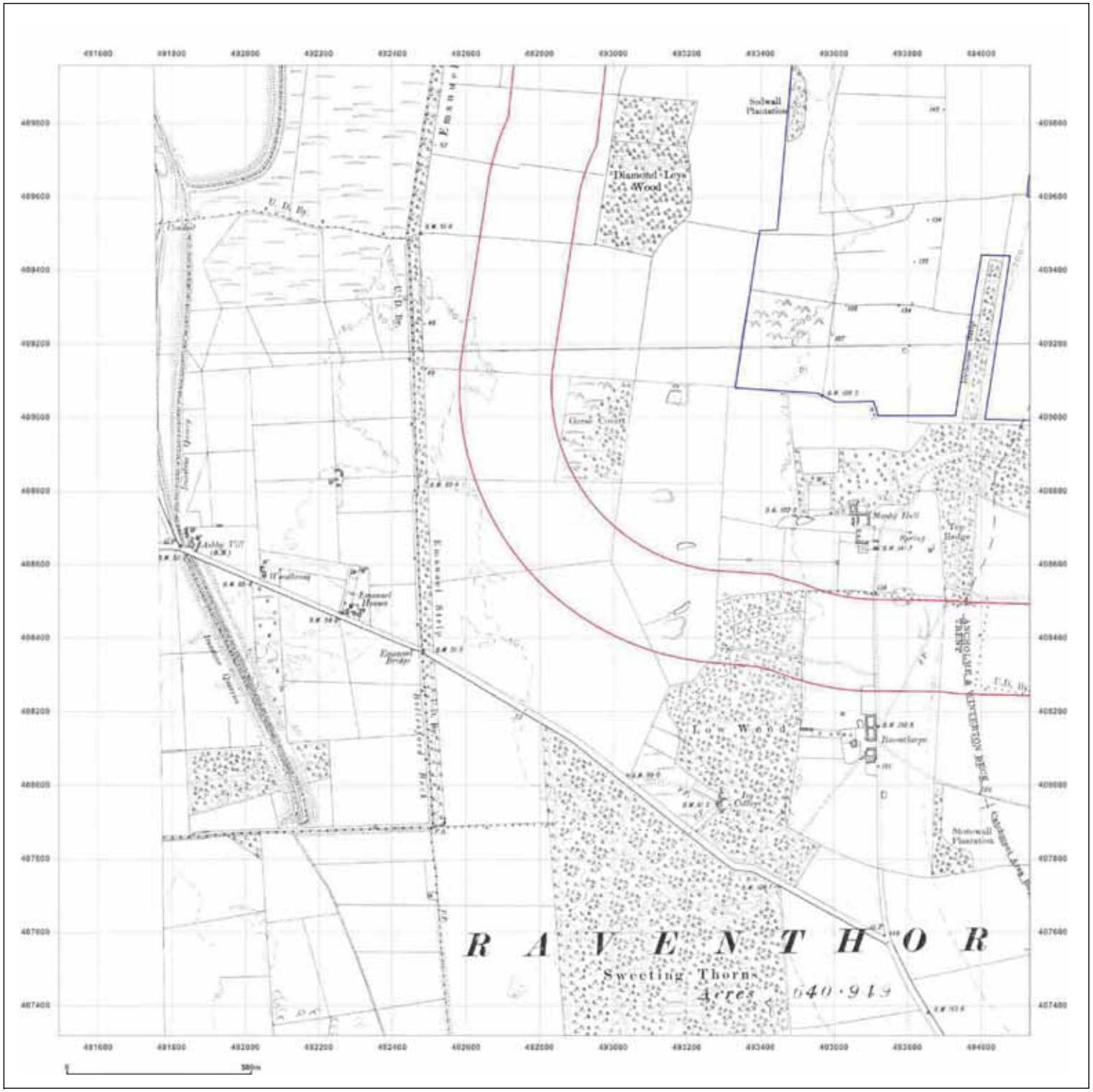
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

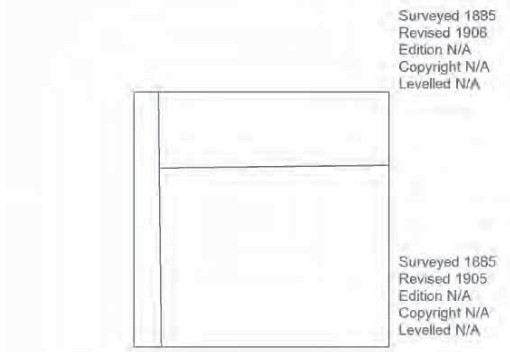
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: County Series
Map date: **1905-1906**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

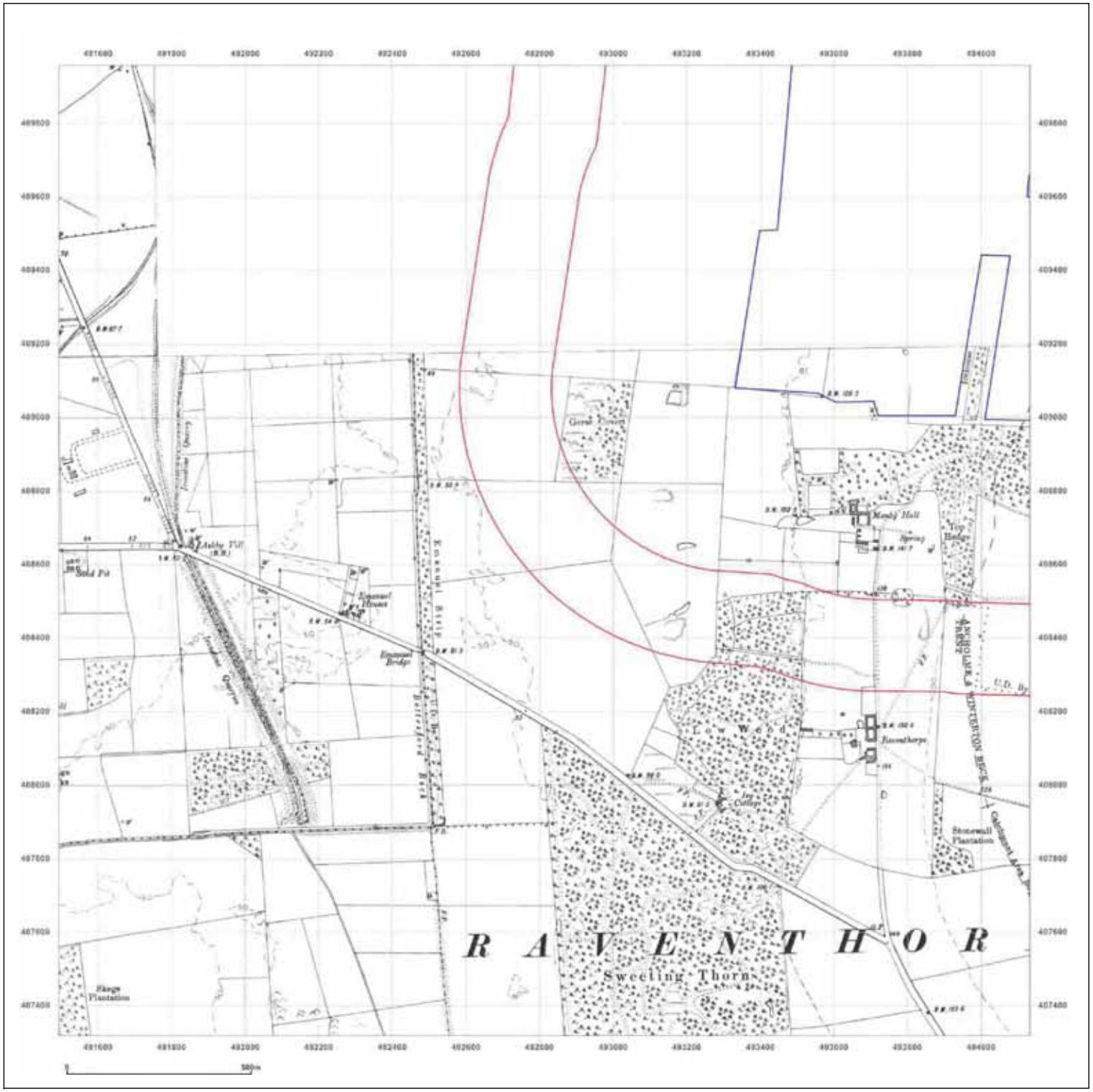
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

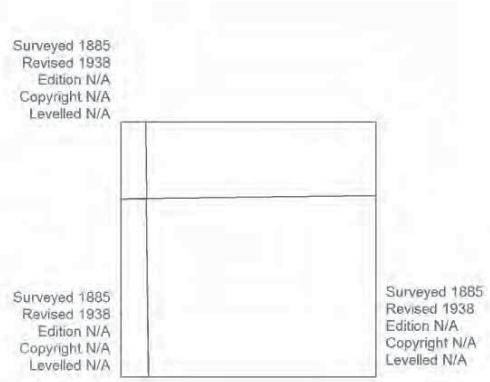
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: County Series
Map date: **1938**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

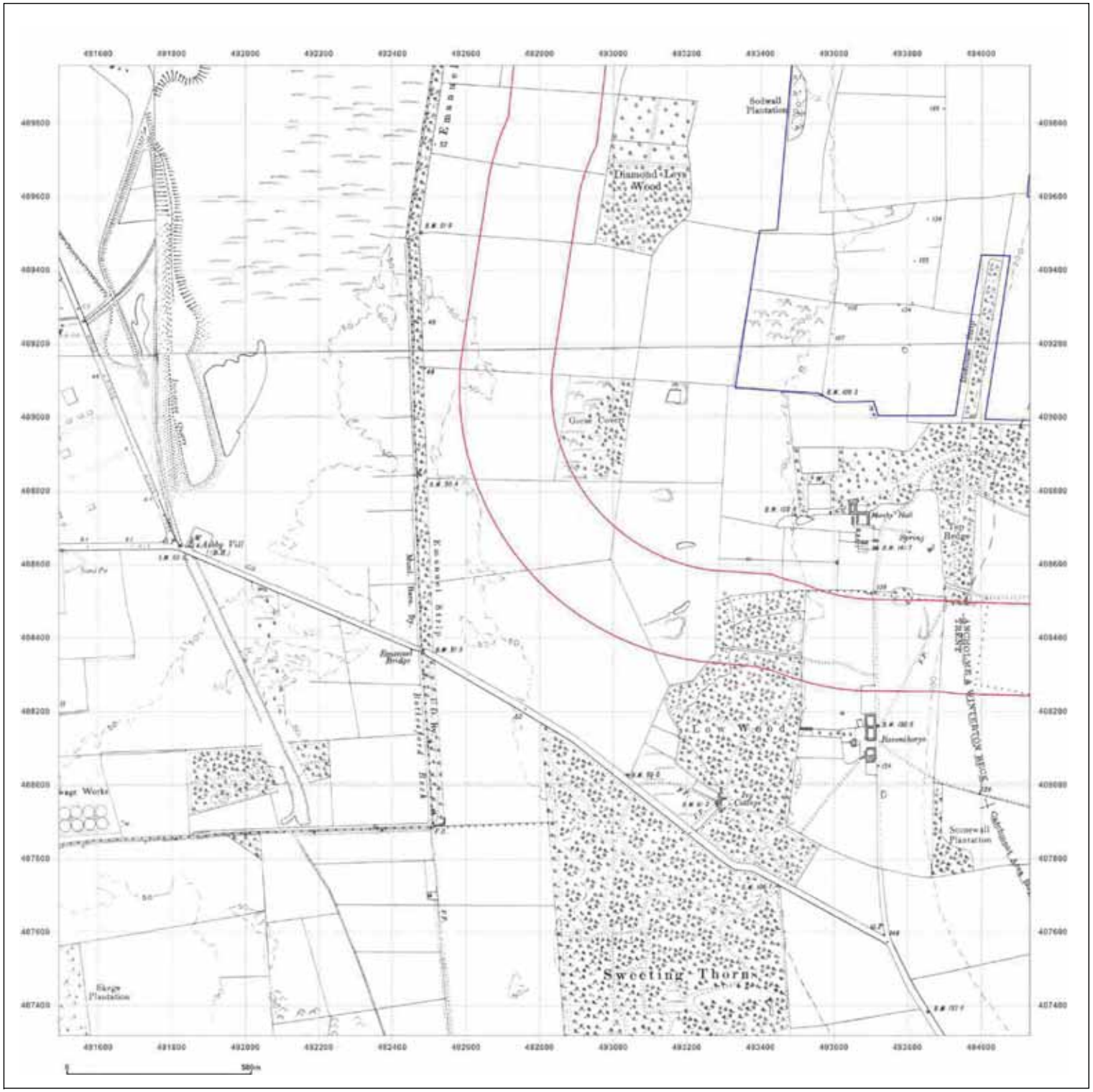
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

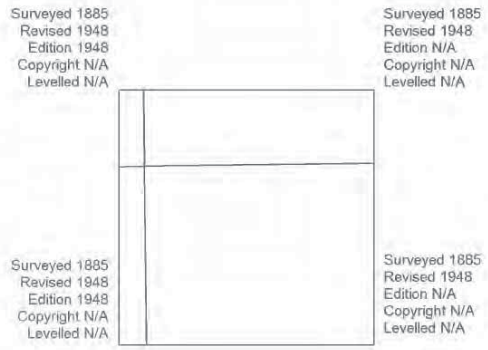
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: County Series
Map date: **1948**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: Provisional
Map date: **1955**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed N/A
Revised 1955
Edition N/A
Copyright N/A
Levelled N/A

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

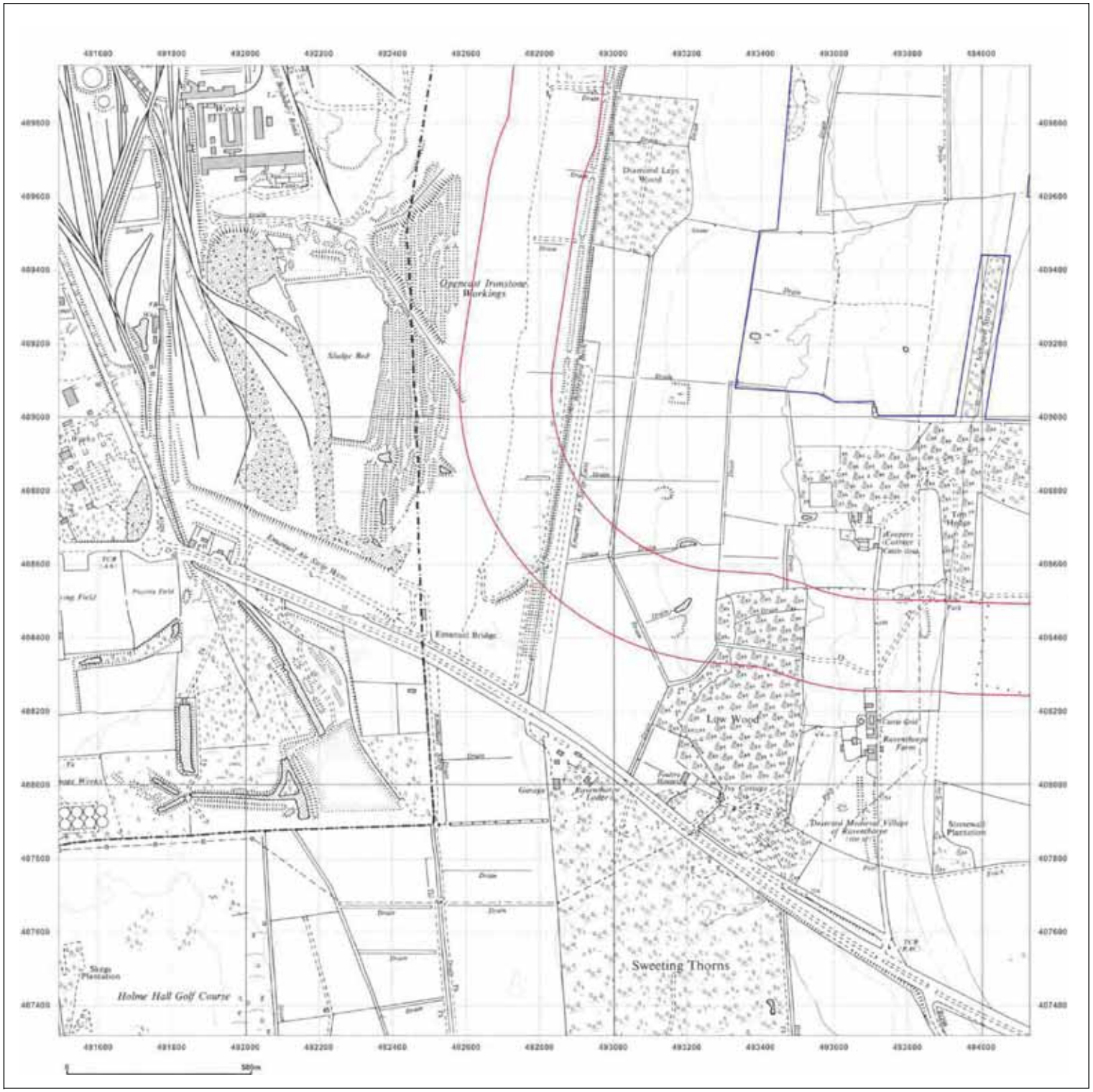
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: Provisional
Map date: **1968**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

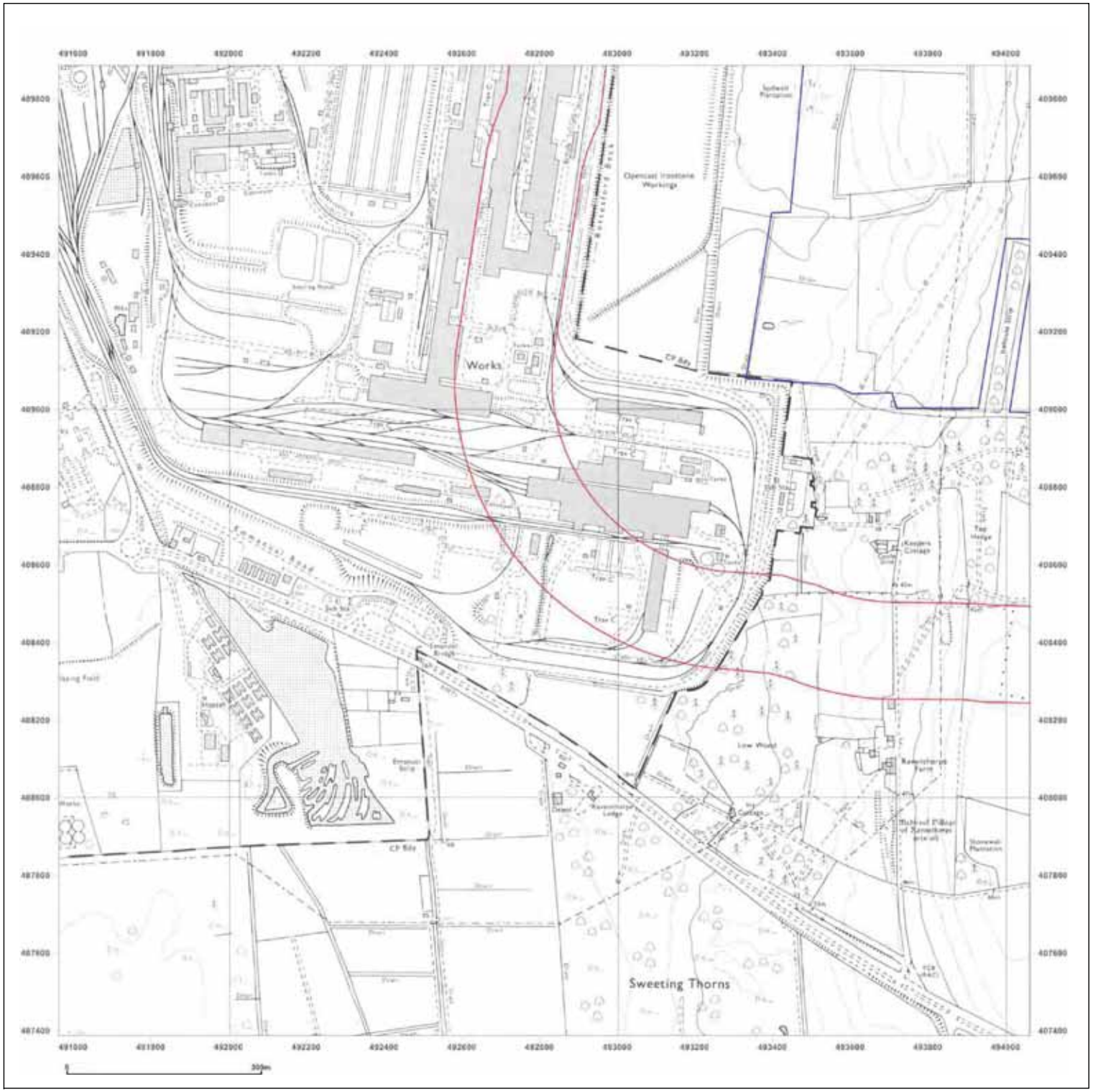
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: National Grid
Map date: **1979**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

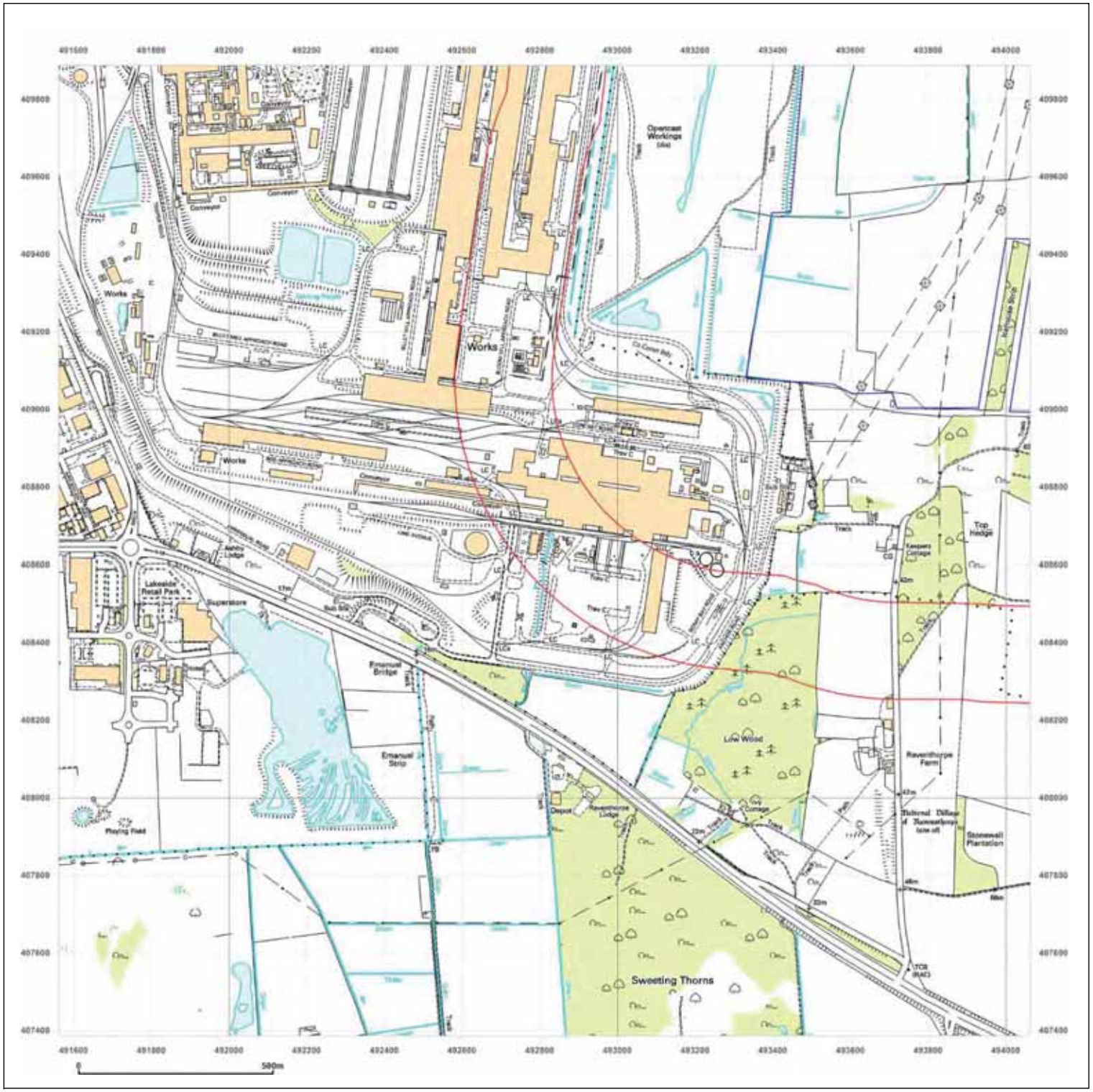
Produced by
Groundsure Insights
www.groundsure.com

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

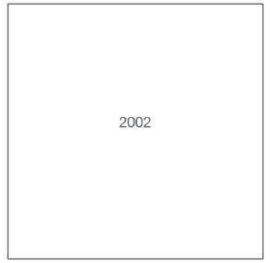
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: 1:10,000 Raster
Map date: **2002**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: National Grid
Map date: **2010**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_1
Grid Ref: 492812, 408637

Map Name: National Grid
Map date: **2014**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2014

Groundsure

Produced by
Groundsure Insights
www.groundsure.com

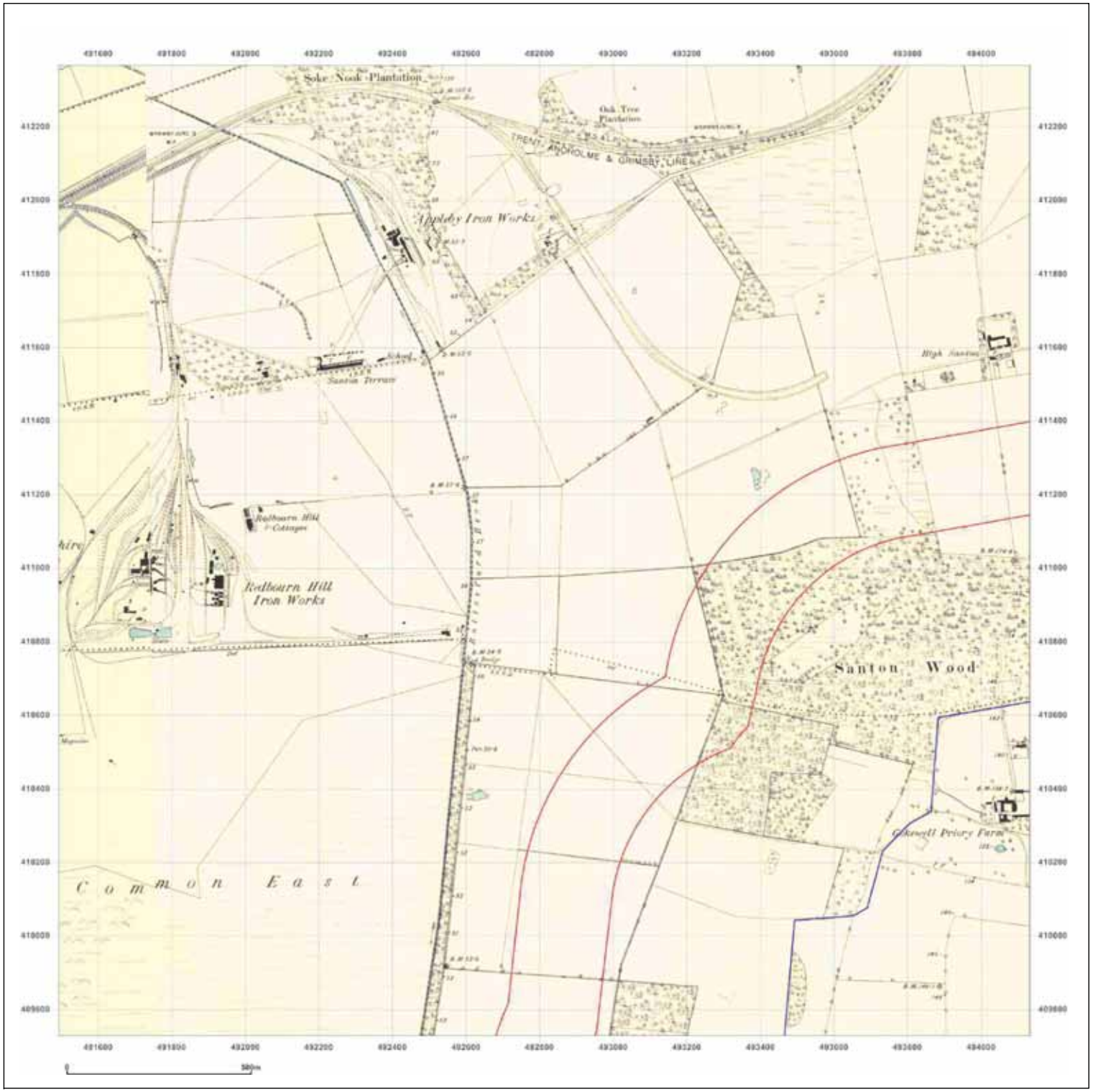
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

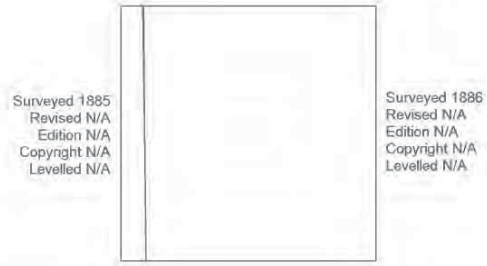
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: County Series
Map date: **1886**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure

Produced by
Groundsure Insights
www.groundsure.com

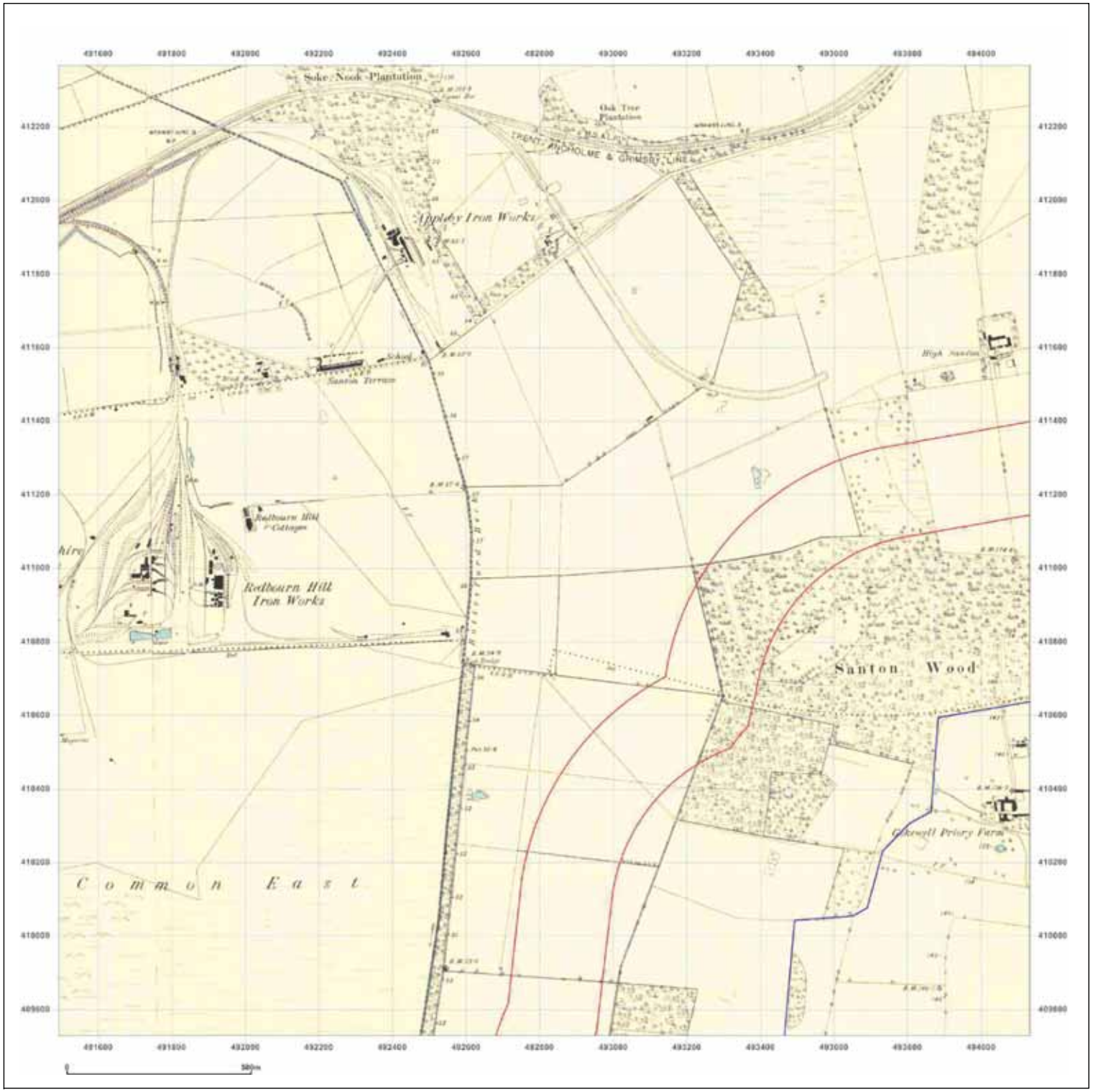
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

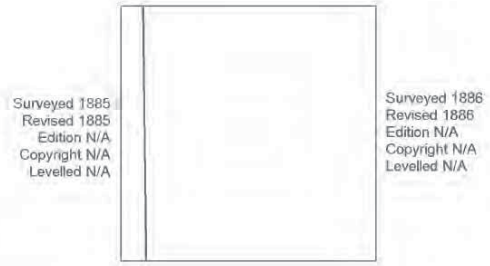
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: County Series
Map date: **1885-1886**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure

Produced by
Groundsure Insights
www.groundsure.com

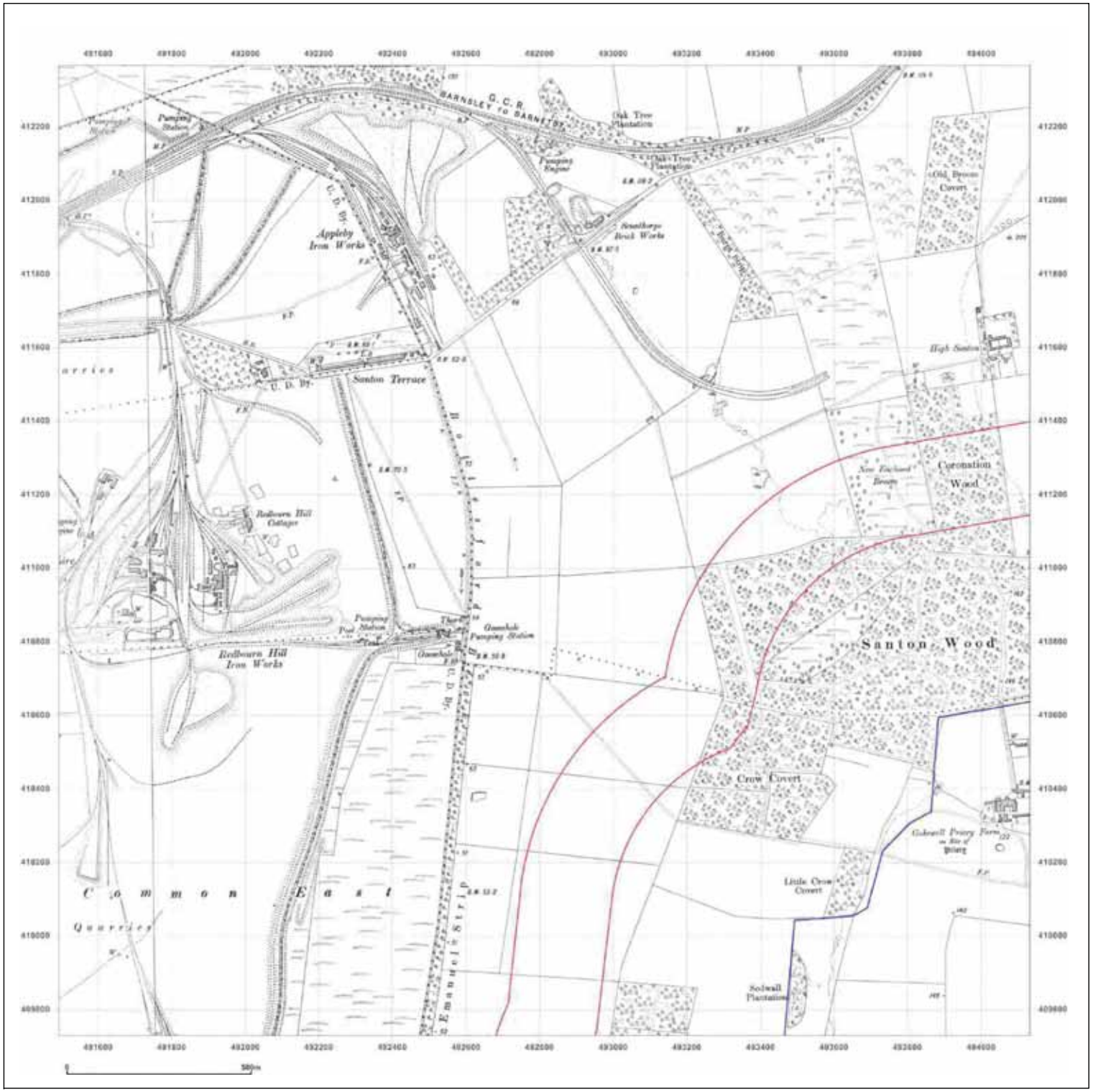
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

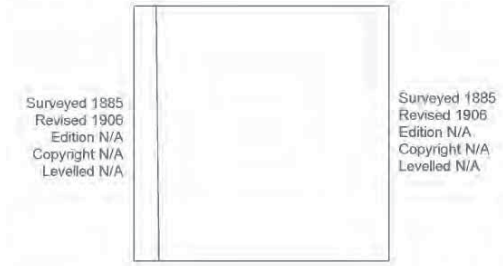
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: County Series
Map date: **1906**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

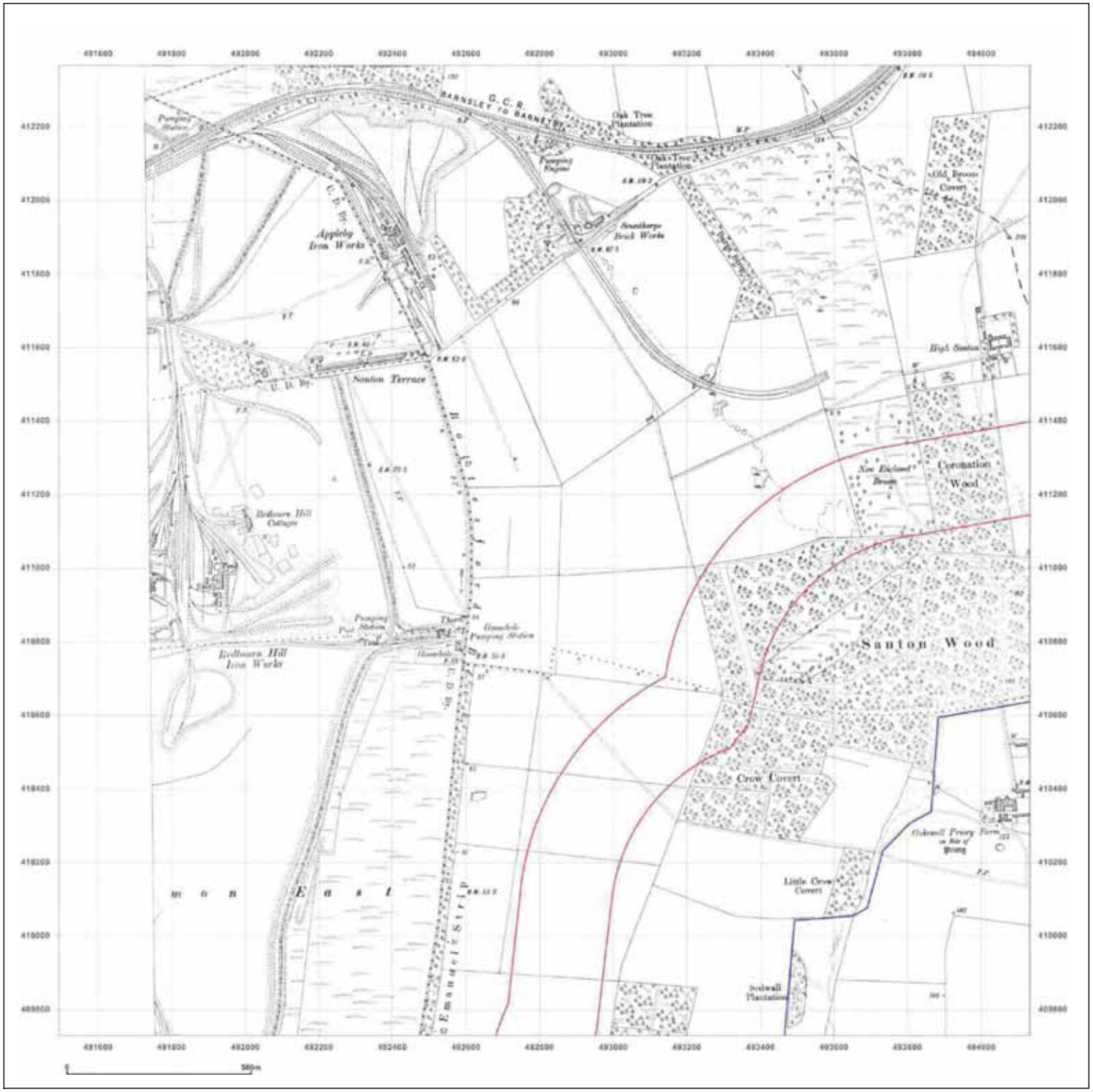
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

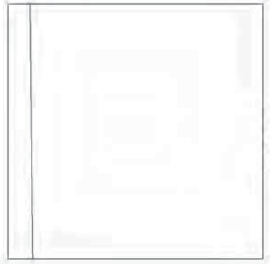
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: County Series
Map date: **1906**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

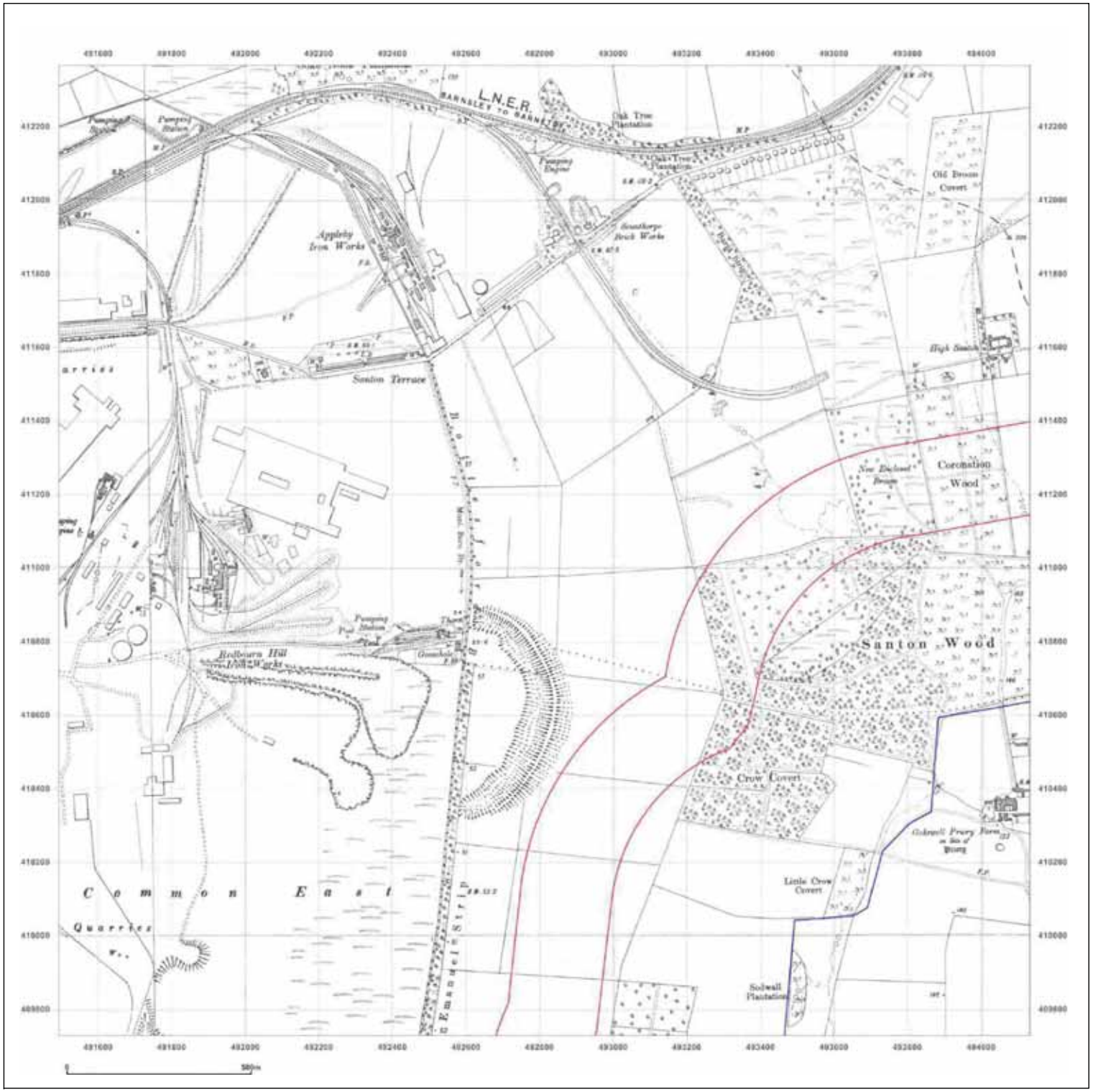
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

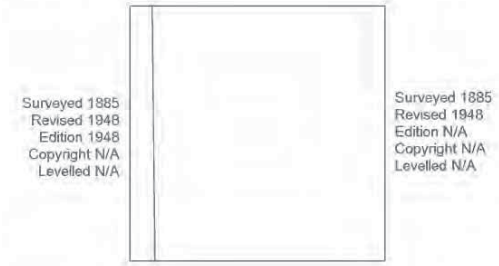
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: County Series
Map date: **1948**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

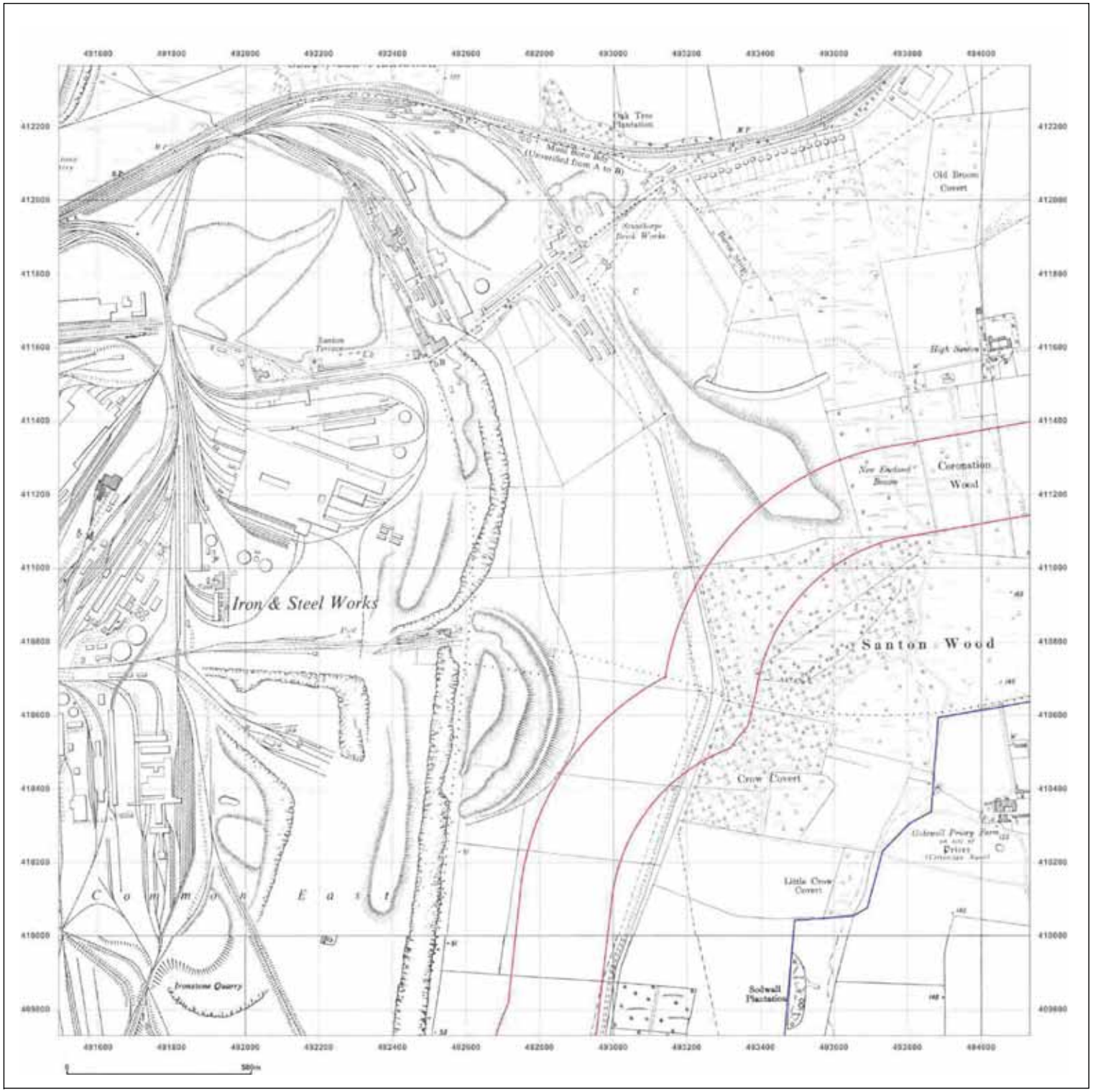
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: Provisional
Map date: **1955-1956**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed N/A
Revised 1956
Edition N/A
Copyright N/A
Levelled N/A

Surveyed N/A
~~Revised 1955~~
Edition N/A
Copyright N/A
Levelled N/A

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

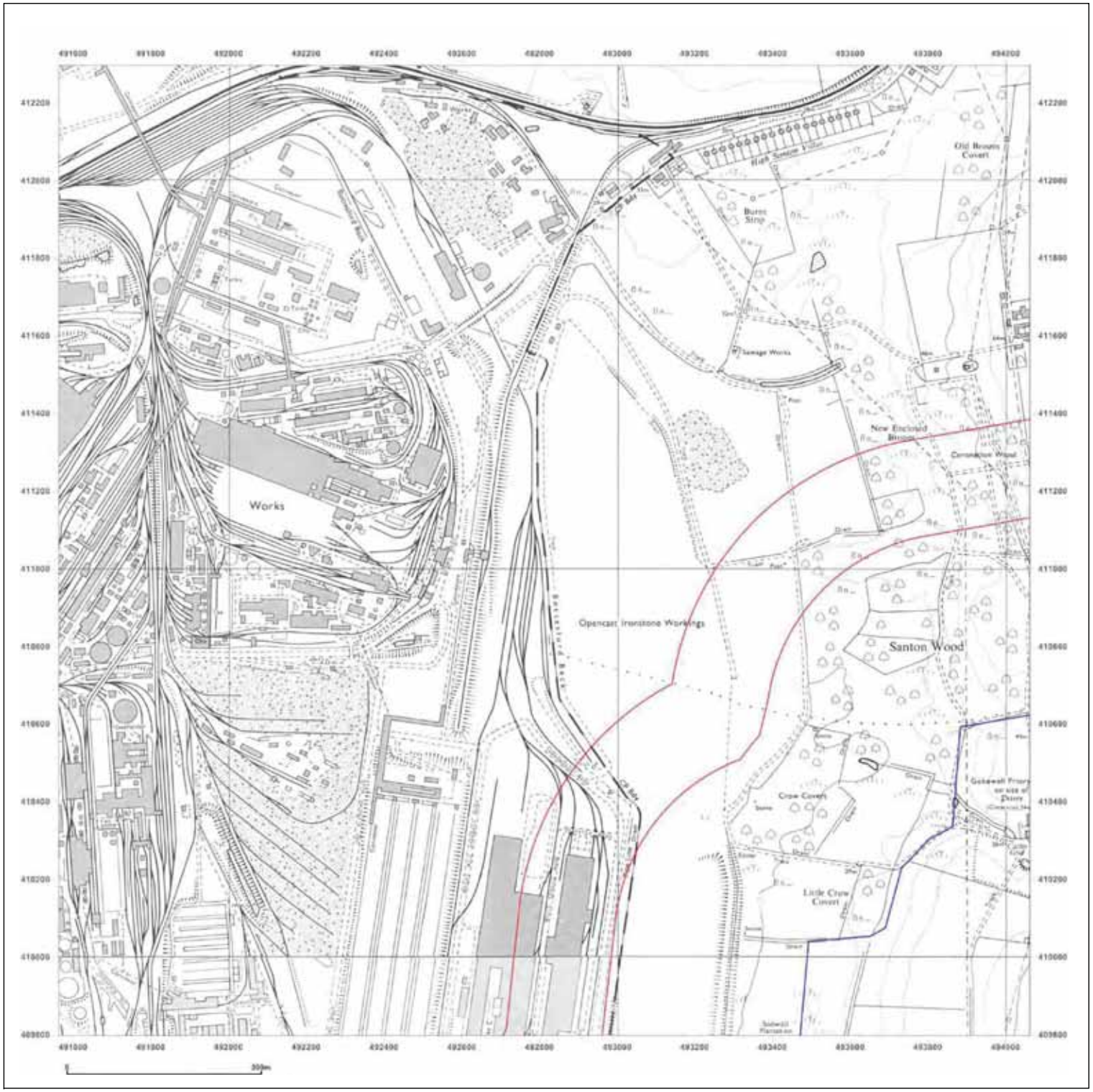
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: National Grid
Map date: **1977-1979**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

Surveyed 1974
Revised 1977
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1978
Revised 1979
Edition N/A
Copyright N/A
Levelled N/A

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

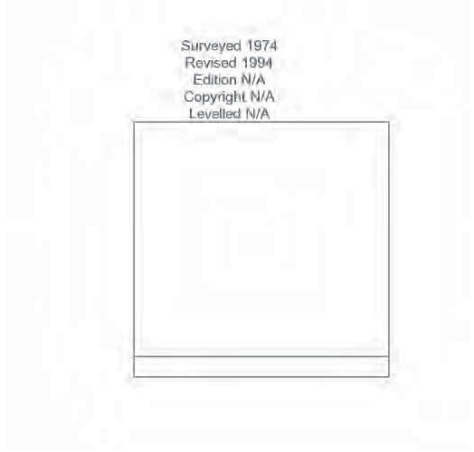
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: National Grid
Map date: **1994**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: 1:10,000 Raster
Map date: **2002**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2002

Groundsure

Produced by
Groundsure Insights
www.groundsure.com

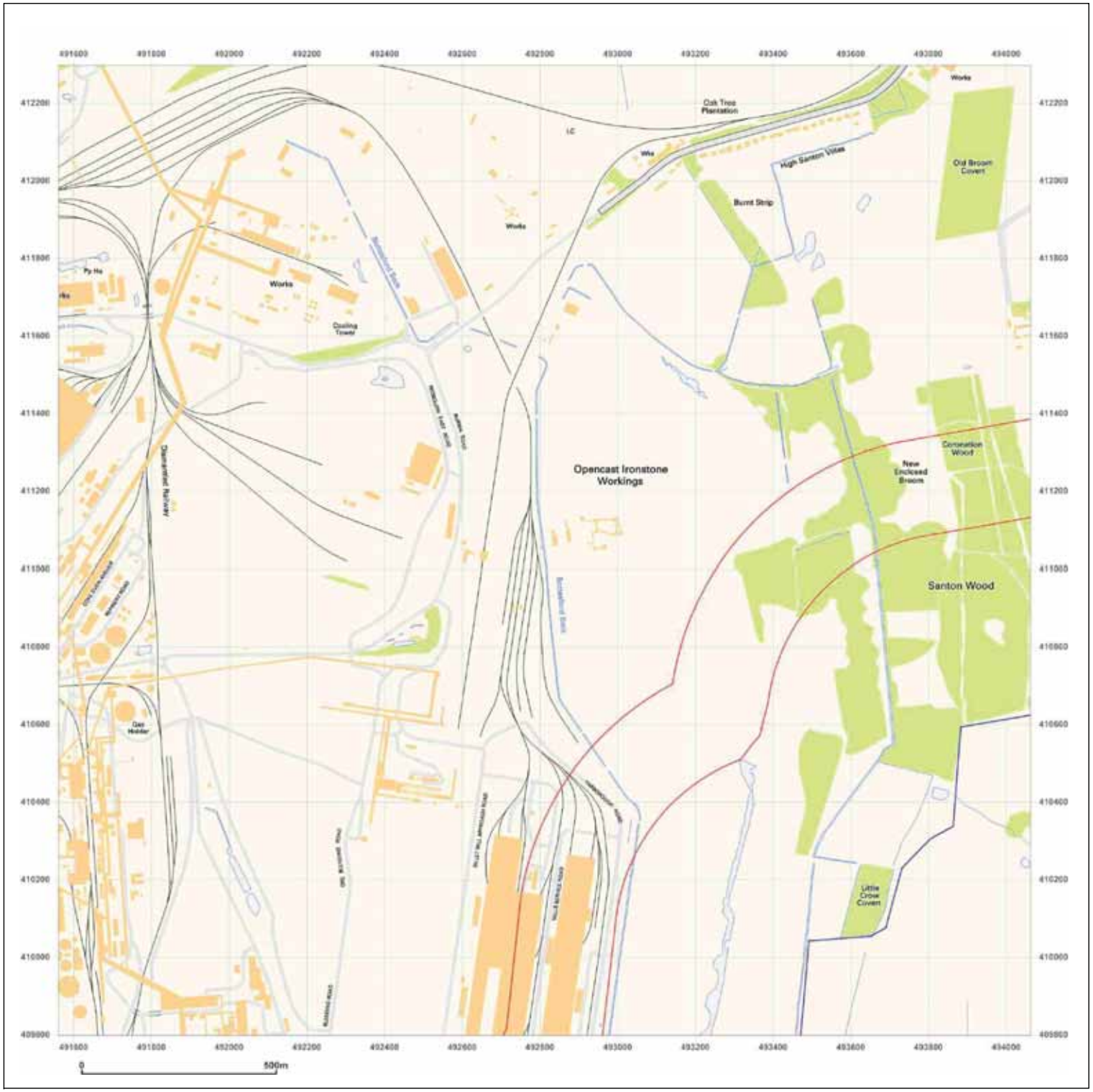
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: National Grid
Map date: **2010**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2010

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_1_2
Grid Ref: 492812, 411047

Map Name: National Grid
Map date: **2014**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2014

Groundsure

Produced by
Groundsure Insights
www.groundsure.com

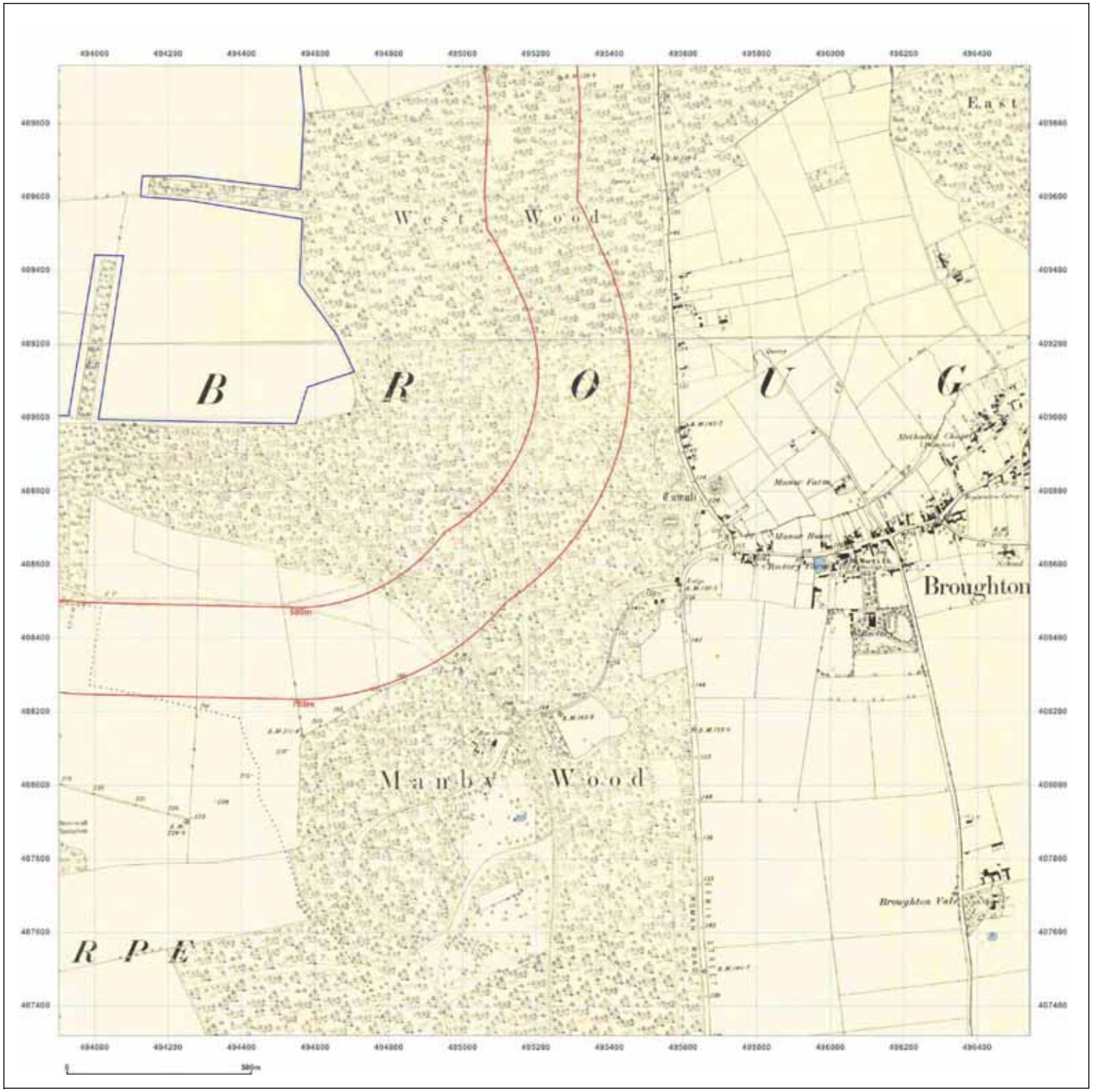
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

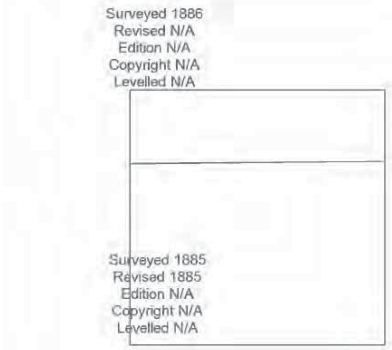
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: County Series
Map date: **1885-1886**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

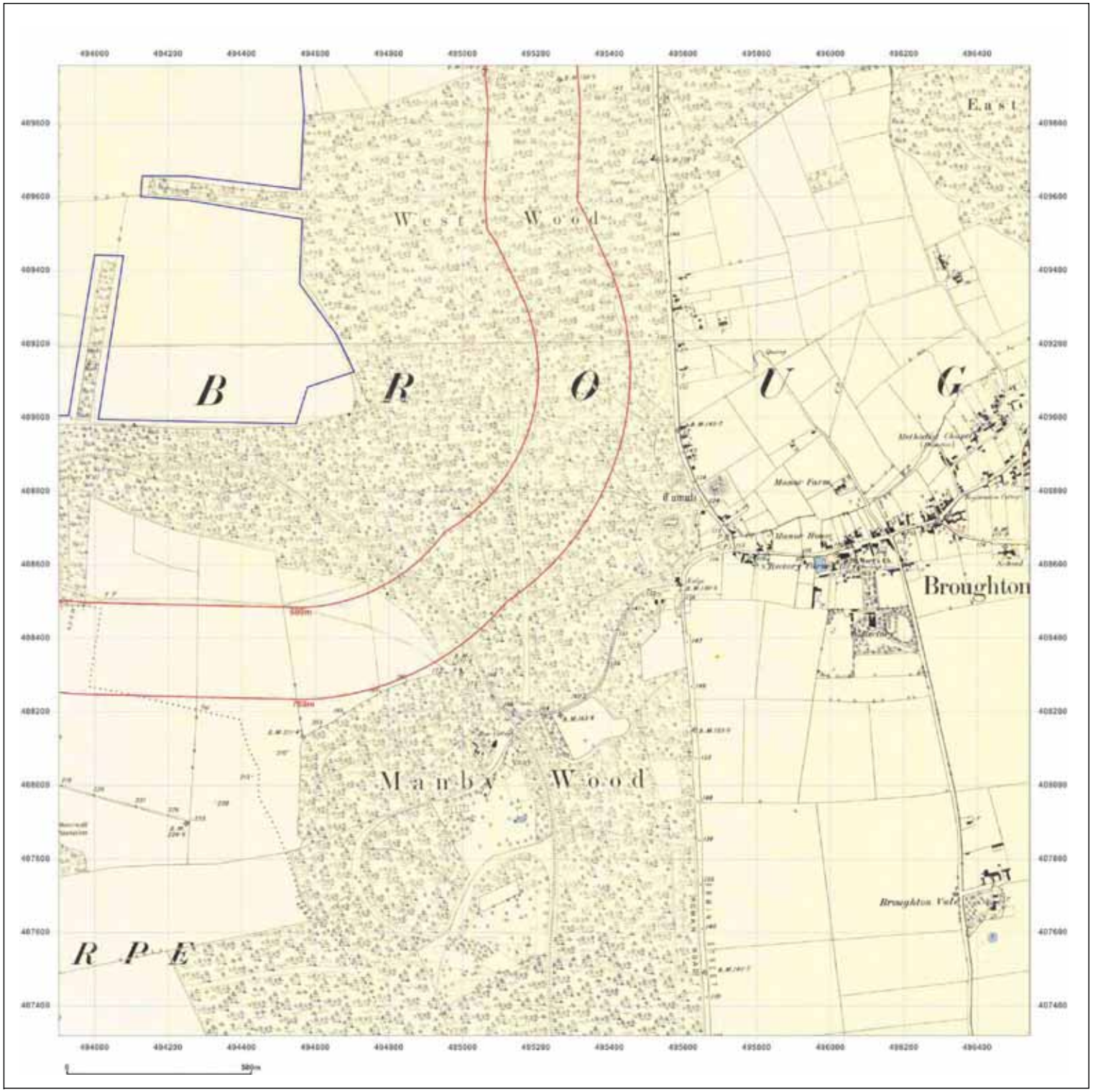
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: County Series
Map date: **1886**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

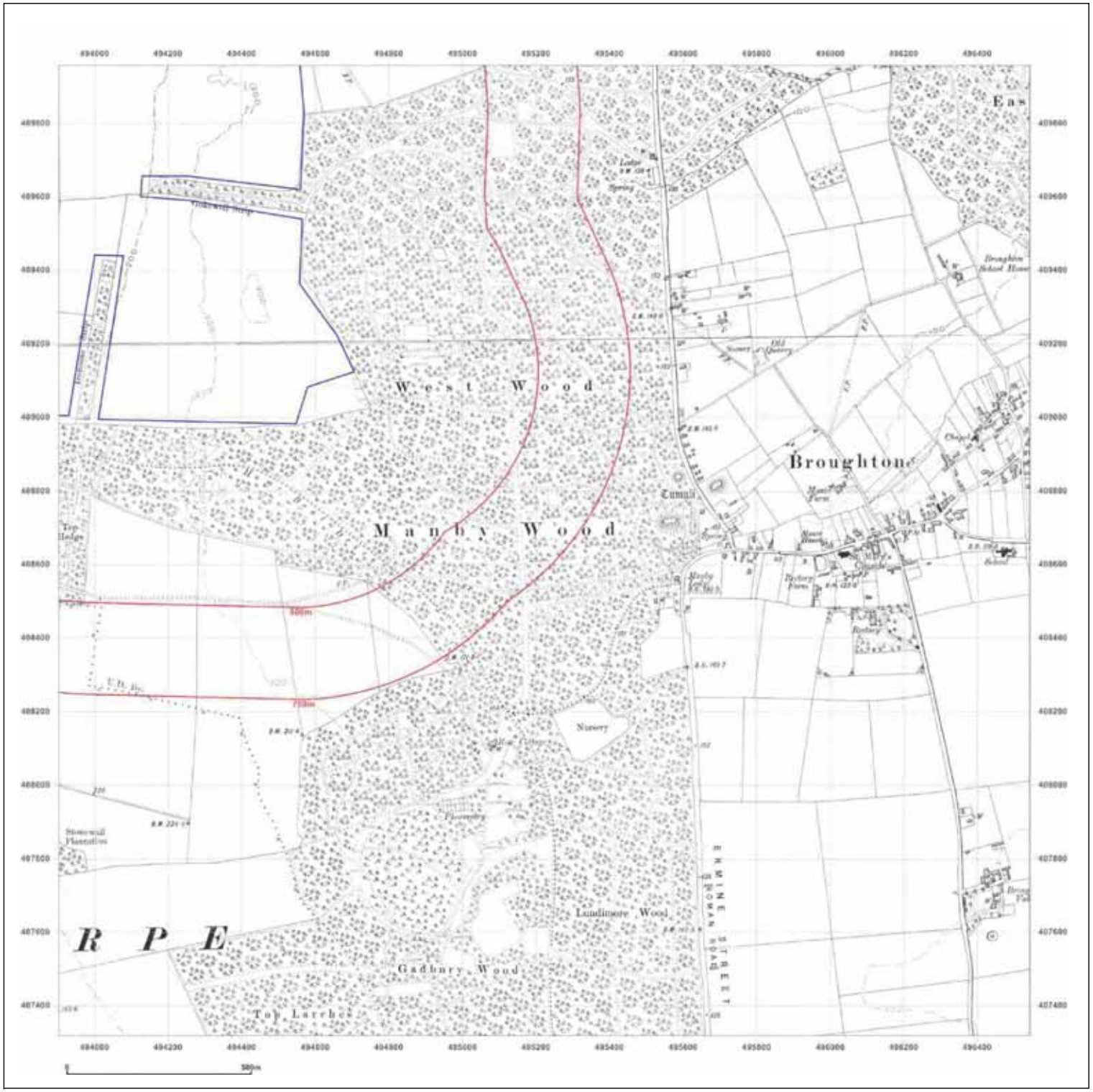
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

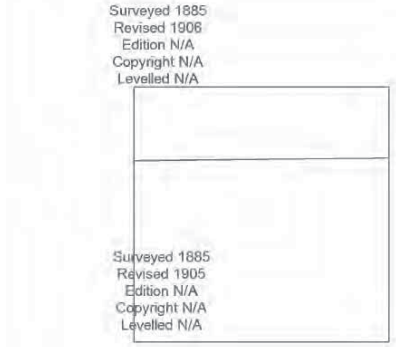
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: County Series
Map date: **1905-1906**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

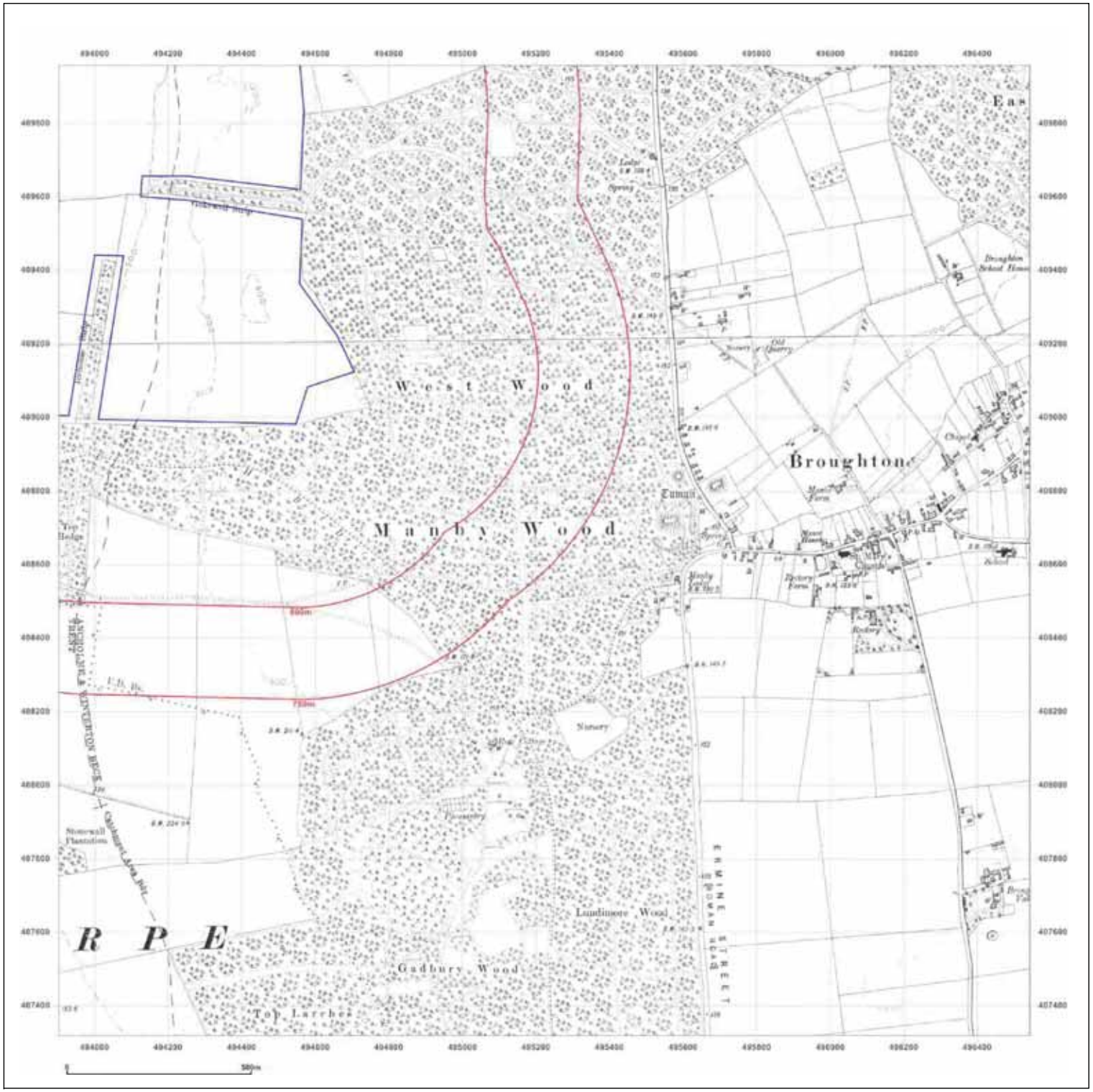
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

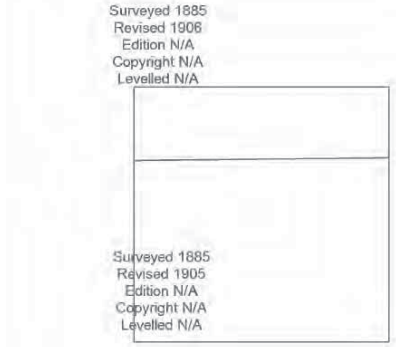
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: County Series
Map date: **1905-1906**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure

Produced by
Groundsure Insights
www.groundsure.com

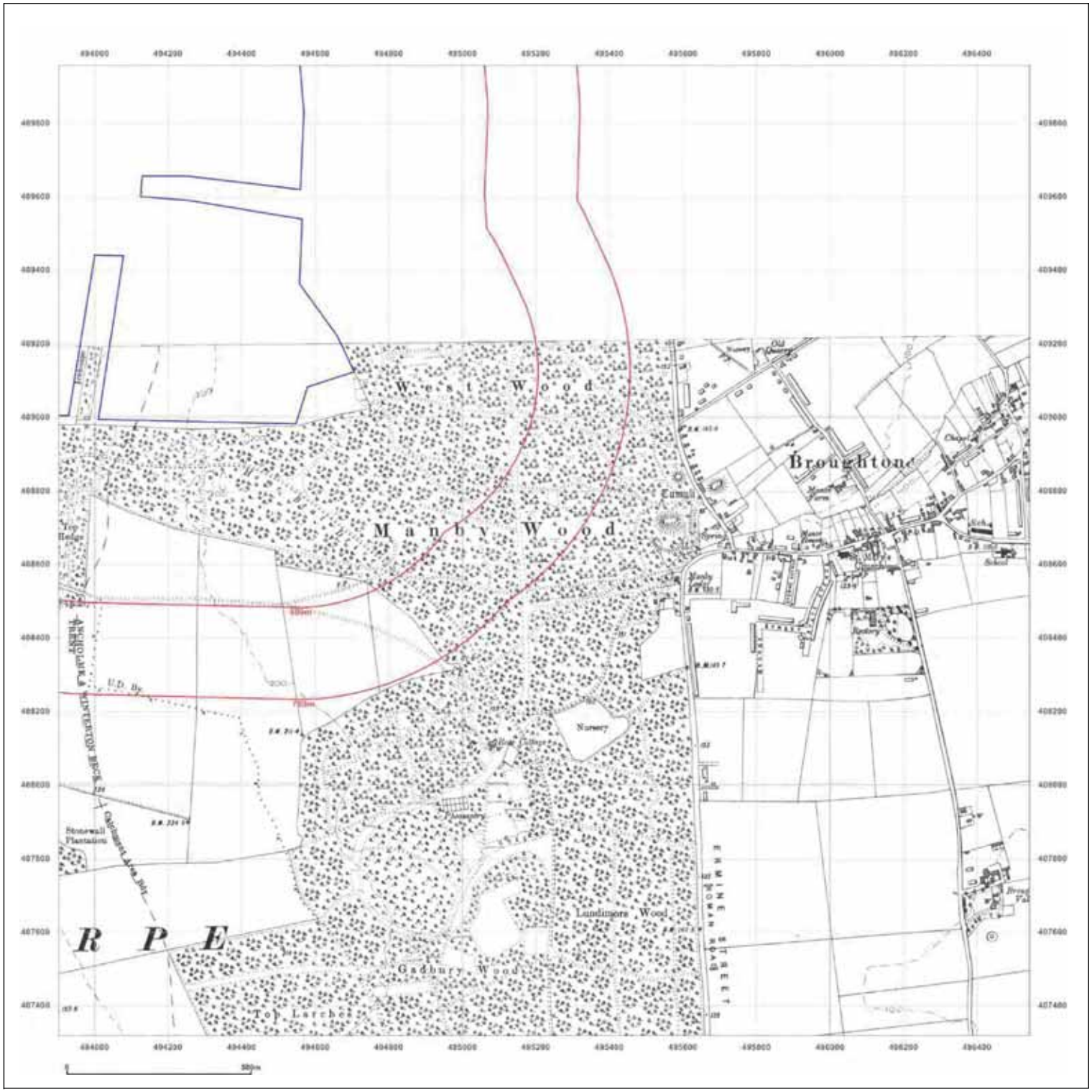
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

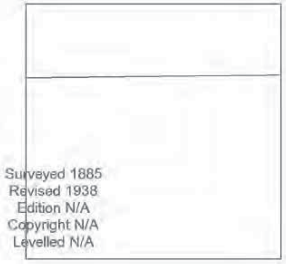
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: County Series
Map date: **1938**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure

Produced by
Groundsure Insights
www.groundsure.com

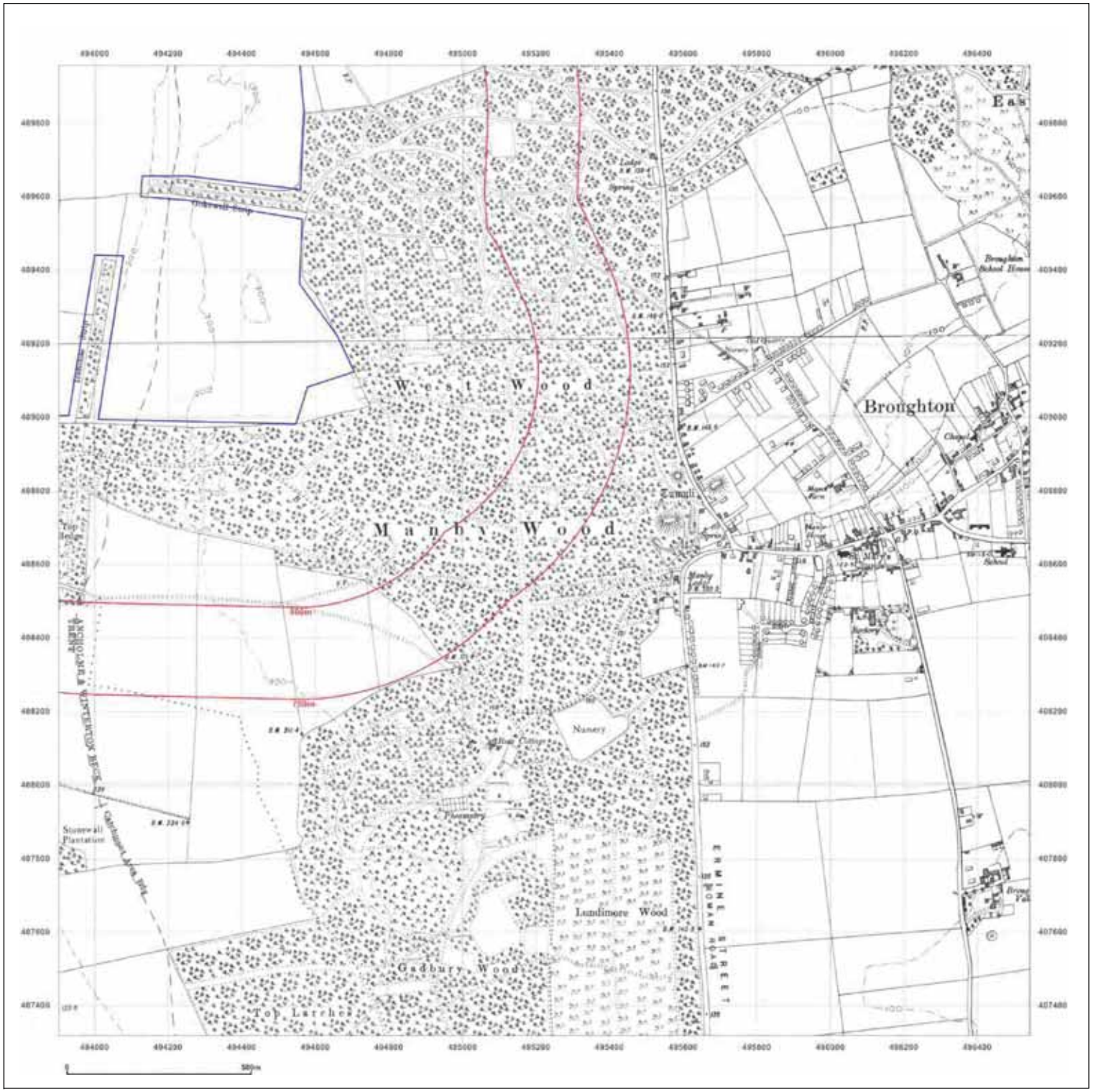
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

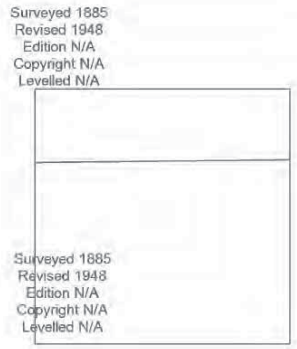
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: County Series
Map date: **1948**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

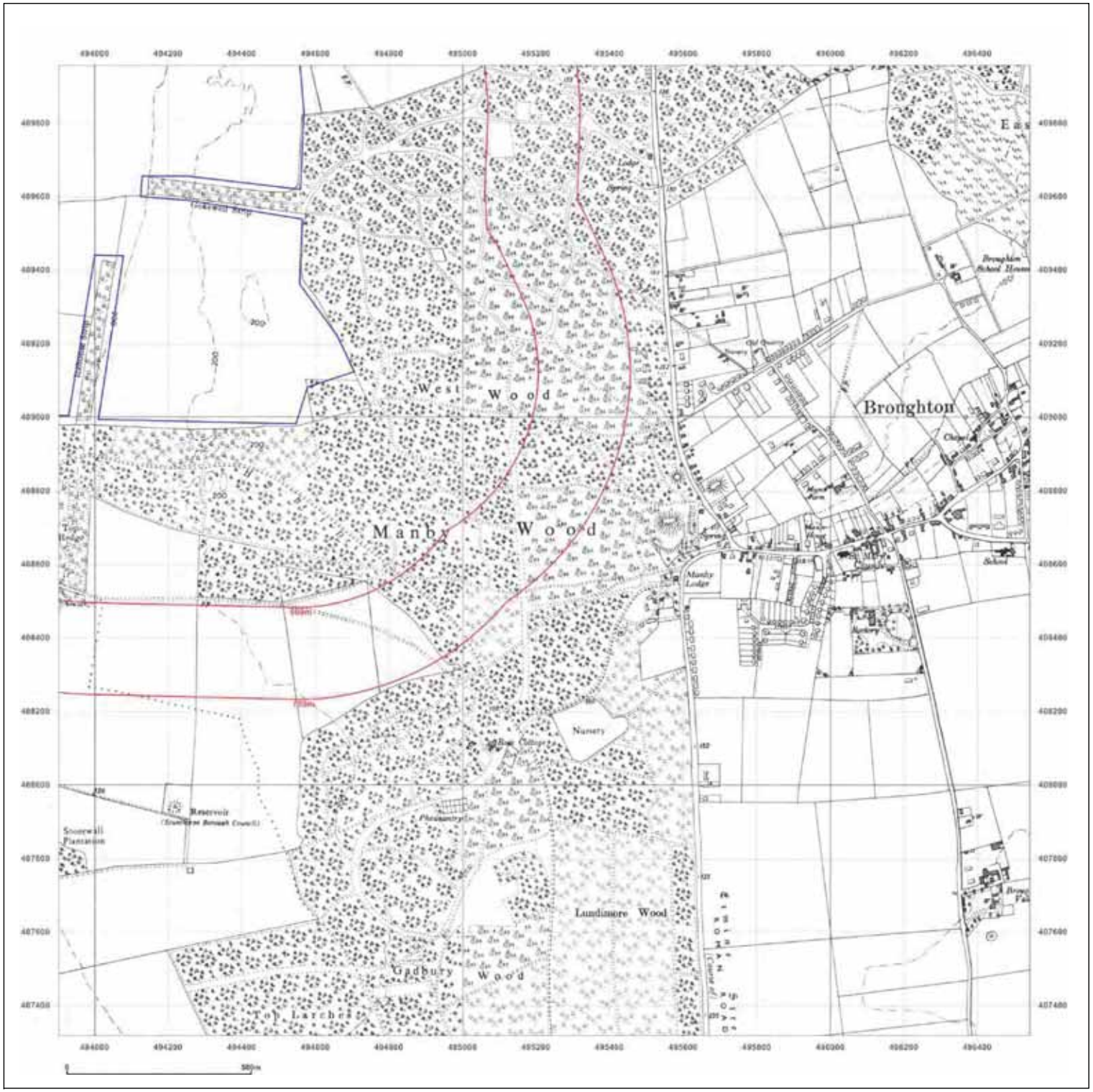
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

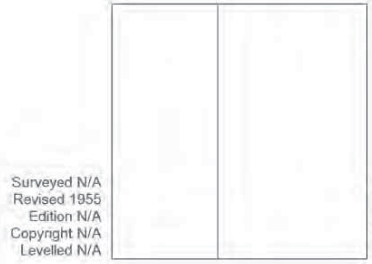
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: Provisional
Map date: **1951-1955**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

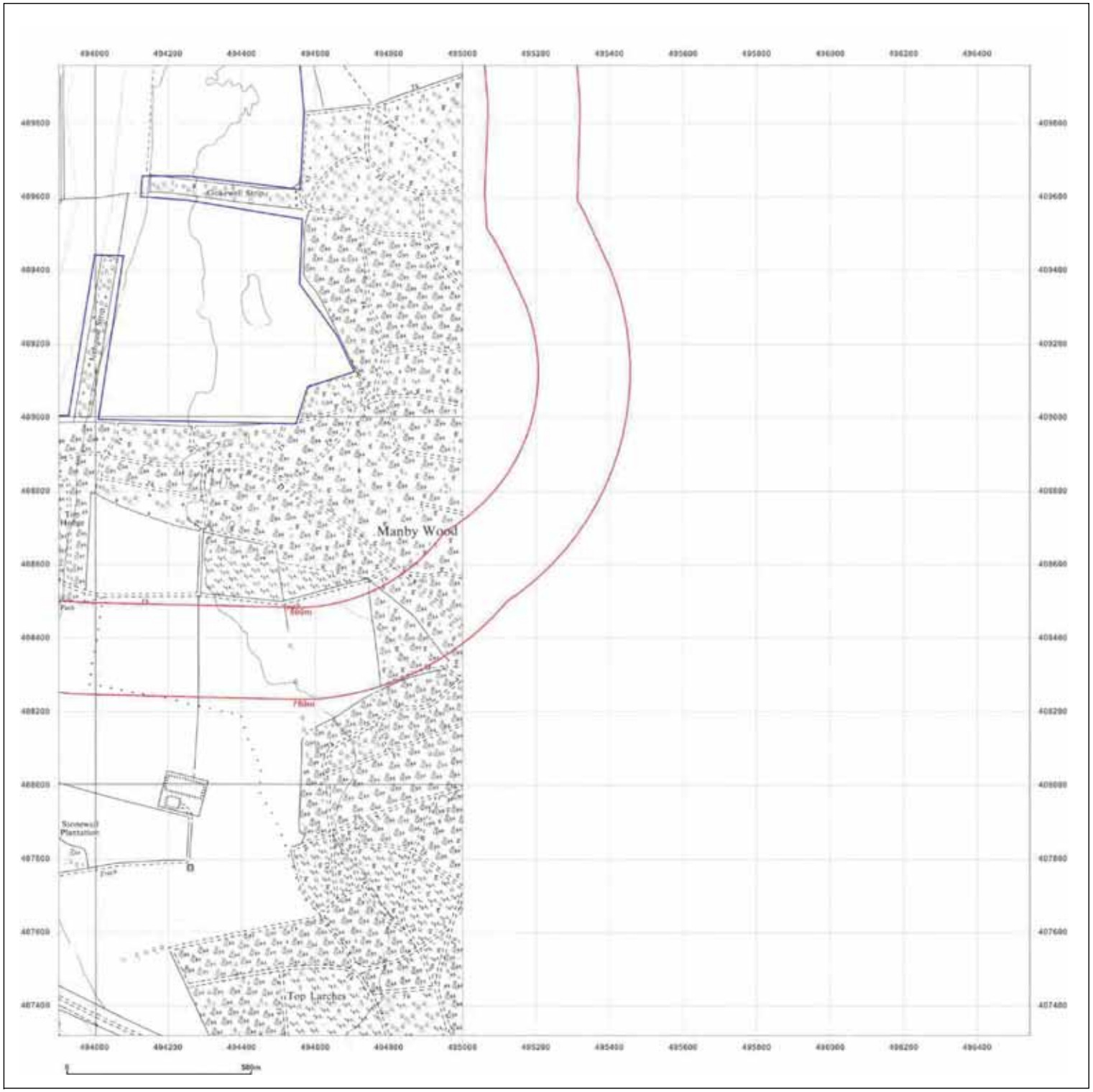
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

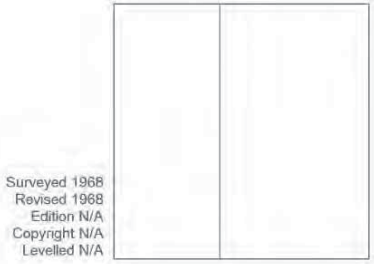
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: Provisional
Map date: **1968**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure

Produced by
Groundsure Insights
www.groundsure.com

Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

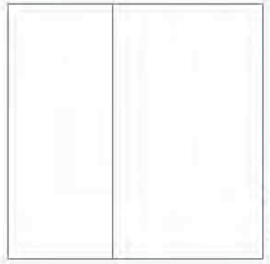
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: National Grid
Map date: **1971**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S



Surveyed 1971
Revised 1971
Edition N/A
Copyright N/A
Levelled N/A

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

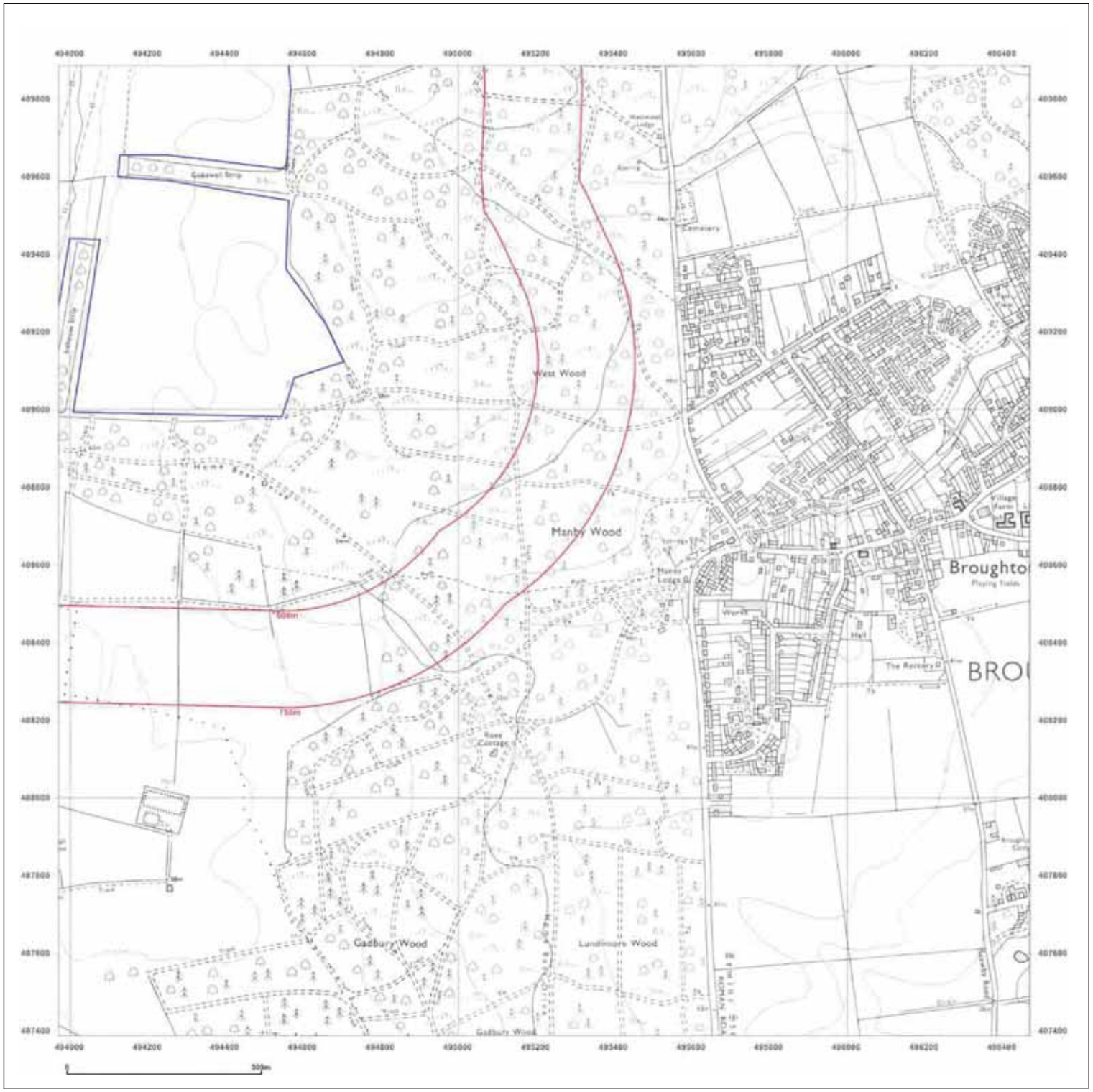
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: National Grid
Map date: **1979-1982**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

Surveyed 1978
Revised 1979
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1980
Revised 1982
Edition N/A
Copyright N/A
Levelled N/A

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

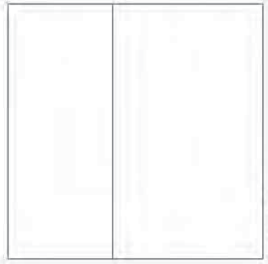
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: National Grid
Map date: **1994**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S



Groundsure

Produced by
Groundsure Insights
www.groundsure.com

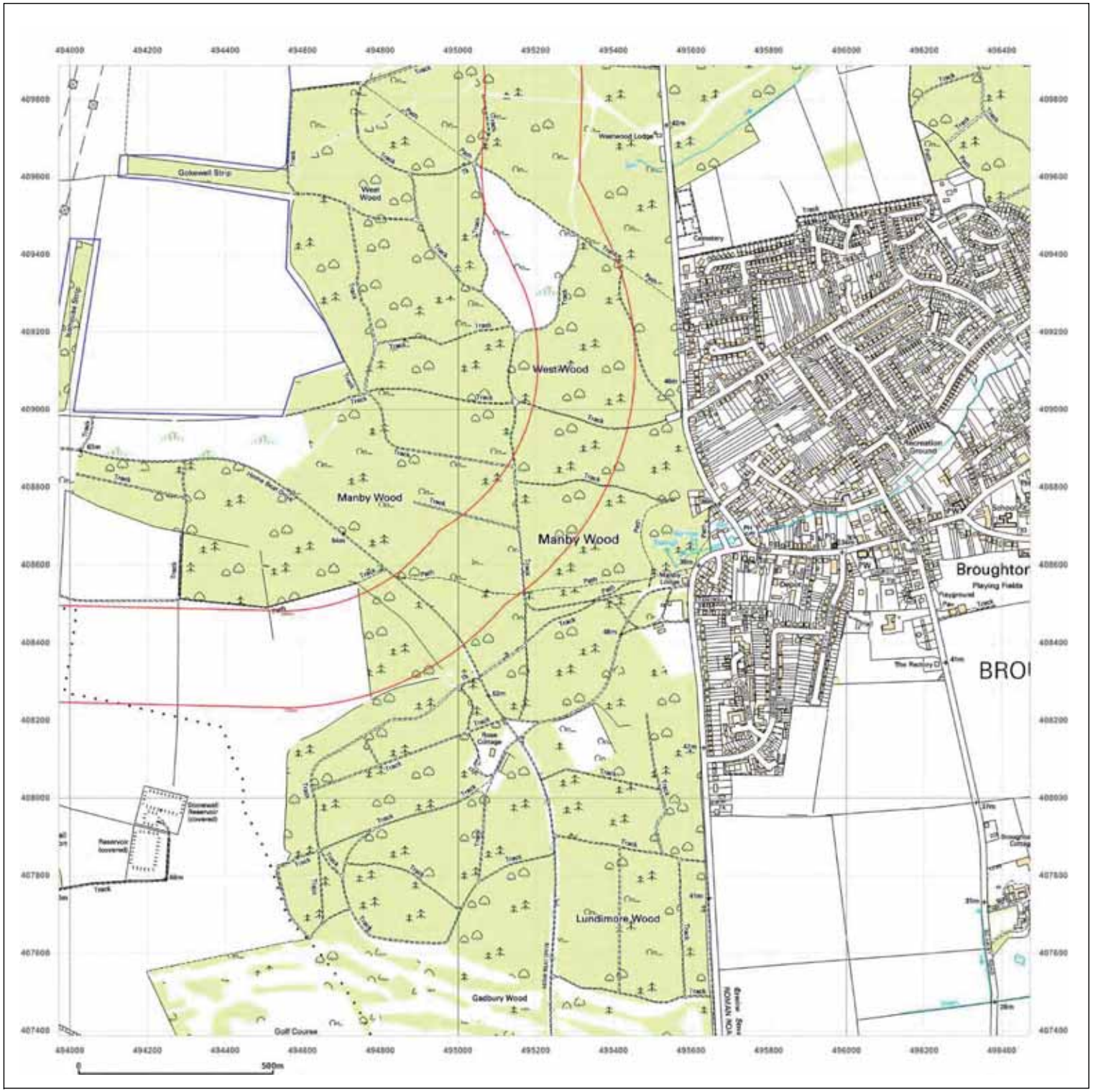
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: 1:10,000 Raster
Map date: **2002**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2002

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: National Grid
Map date: **2010**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2010

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

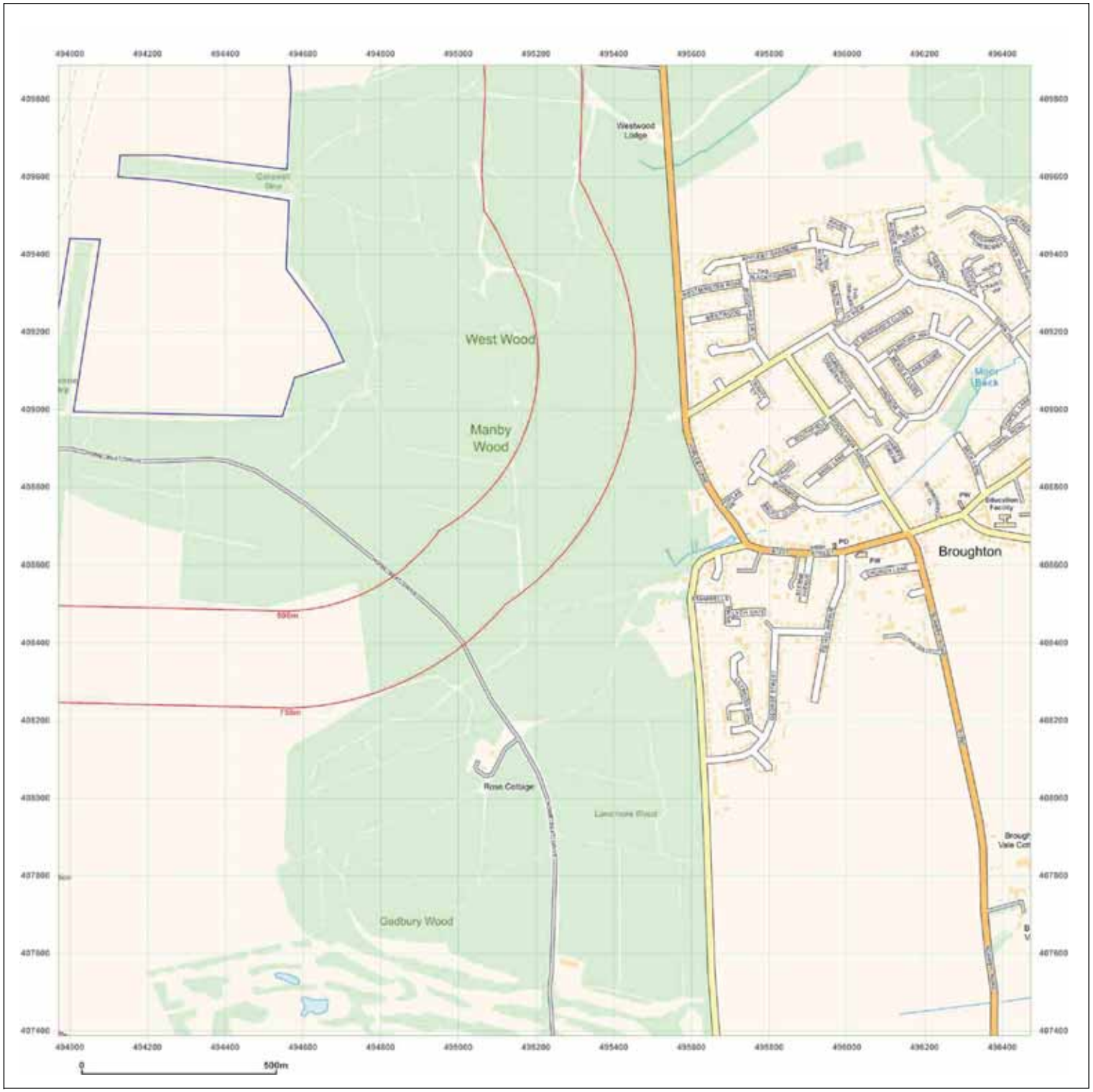
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_1
Grid Ref: 495222, 408637

Map Name: National Grid
Map date: **2014**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2014

Groundsure

Produced by
Groundsure Insights
www.groundsure.com

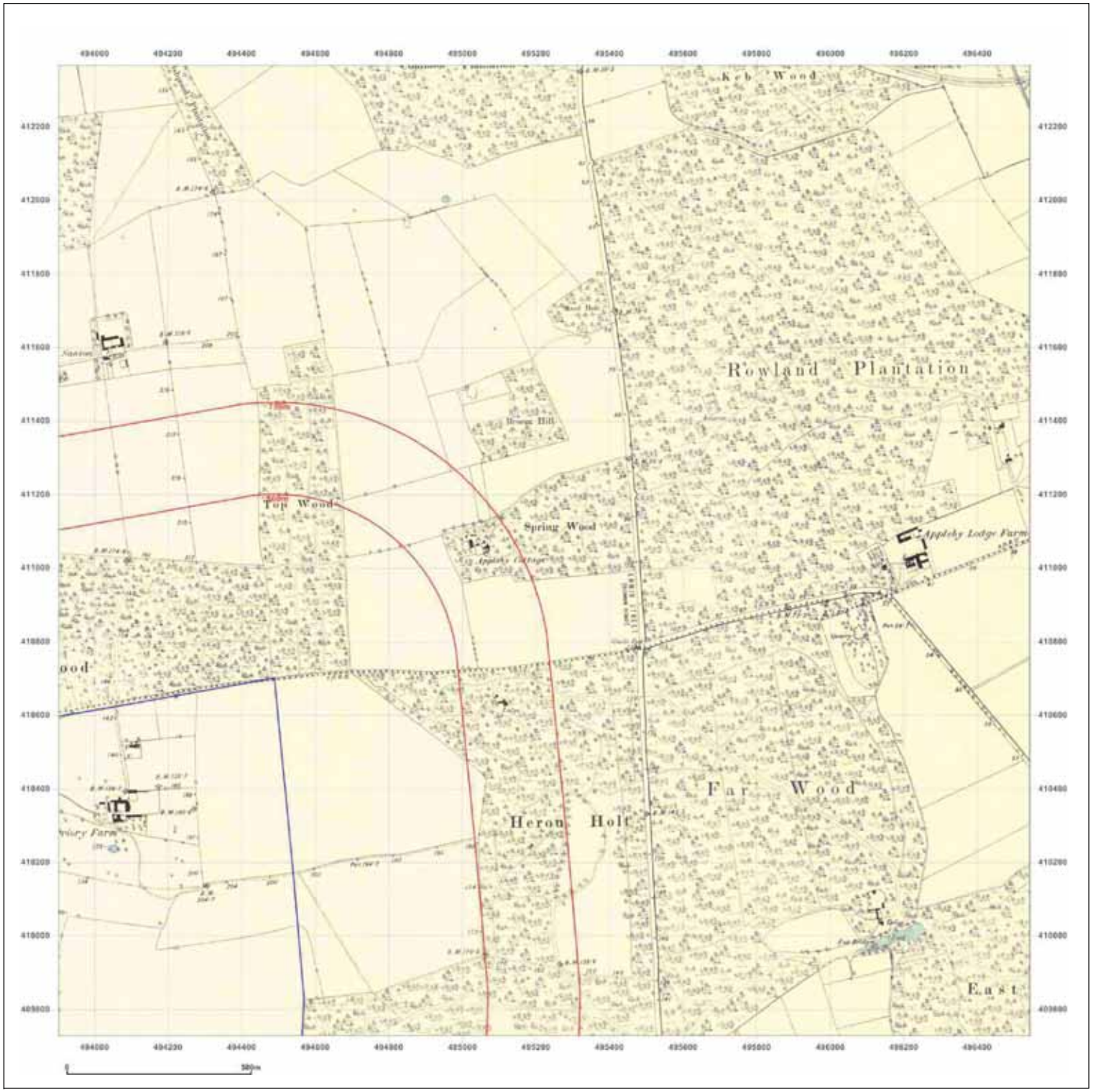
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

Map Name: County Series
Map date: **1886**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed 1886
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Groundsure

Produced by
Groundsure Insights
www.groundsure.com

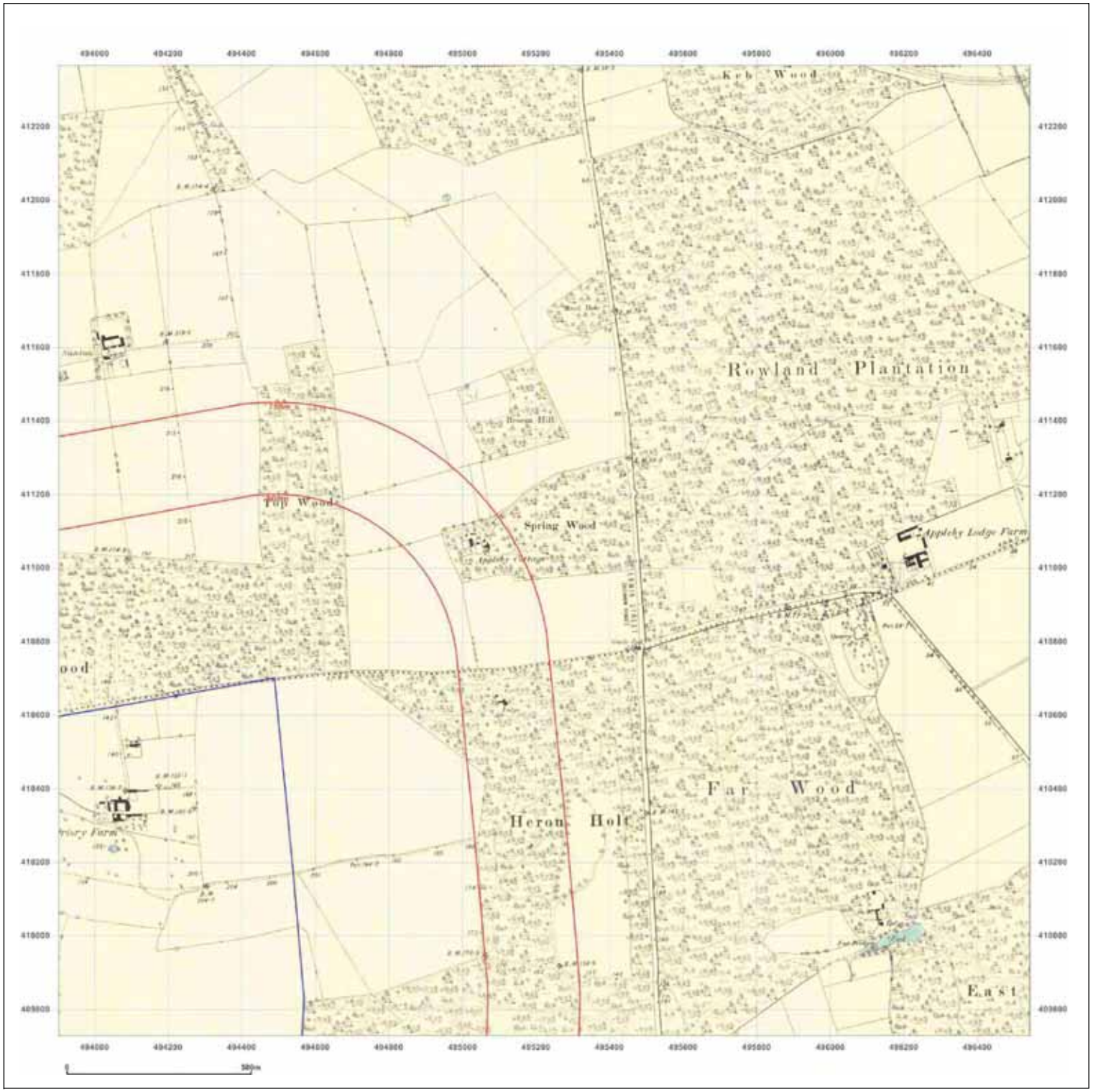
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

Map Name: County Series
Map date: **1886**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed 1886
Revised 1886
Edition N/A
Copyright N/A
Levelled N/A

Groundsure

Produced by
Groundsure Insights
www.groundsure.com

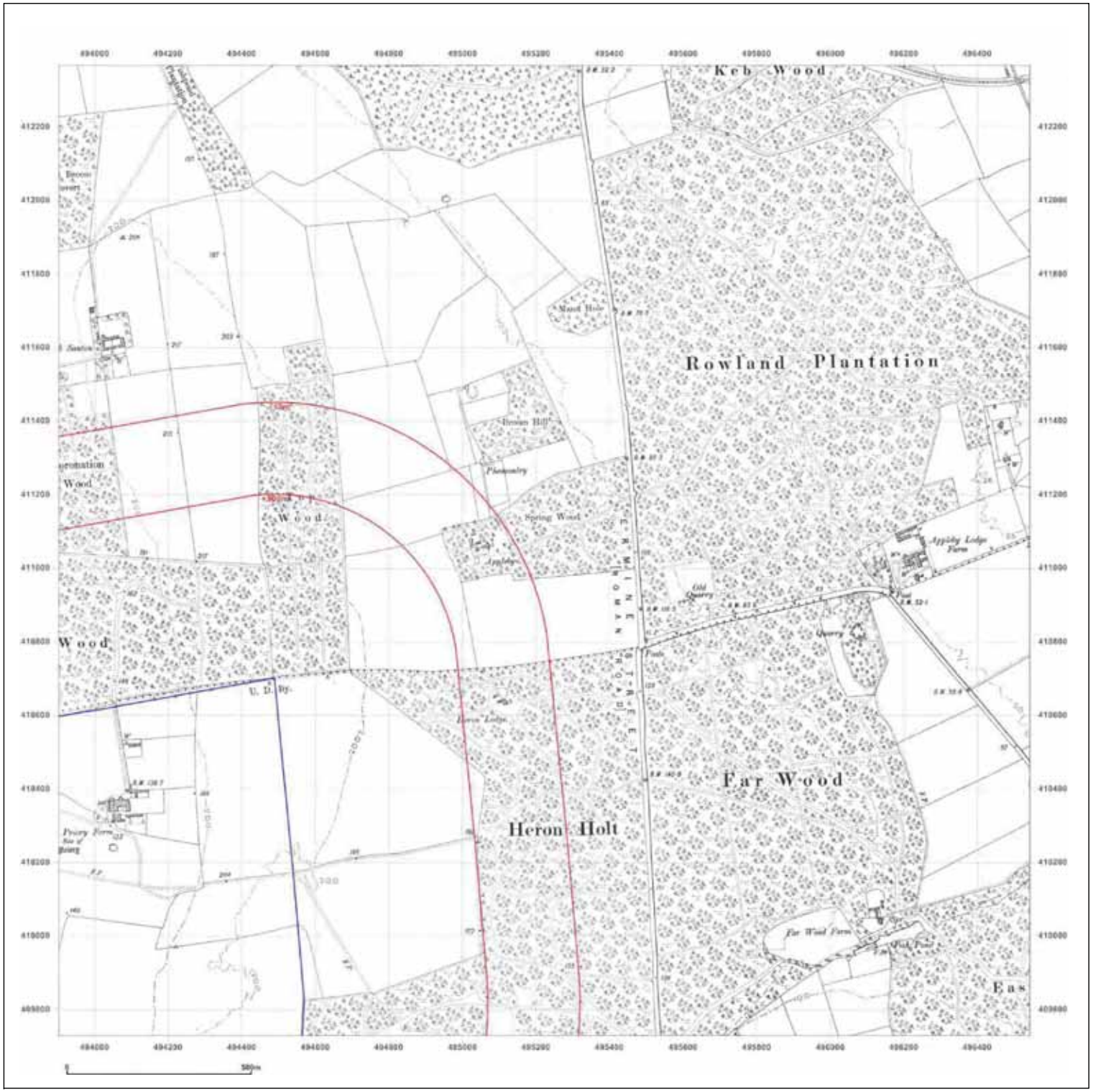
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

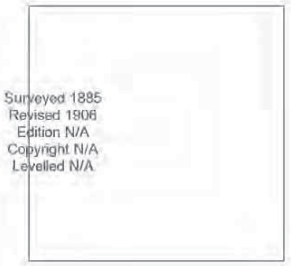
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

Map Name: County Series
Map date: **1906**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

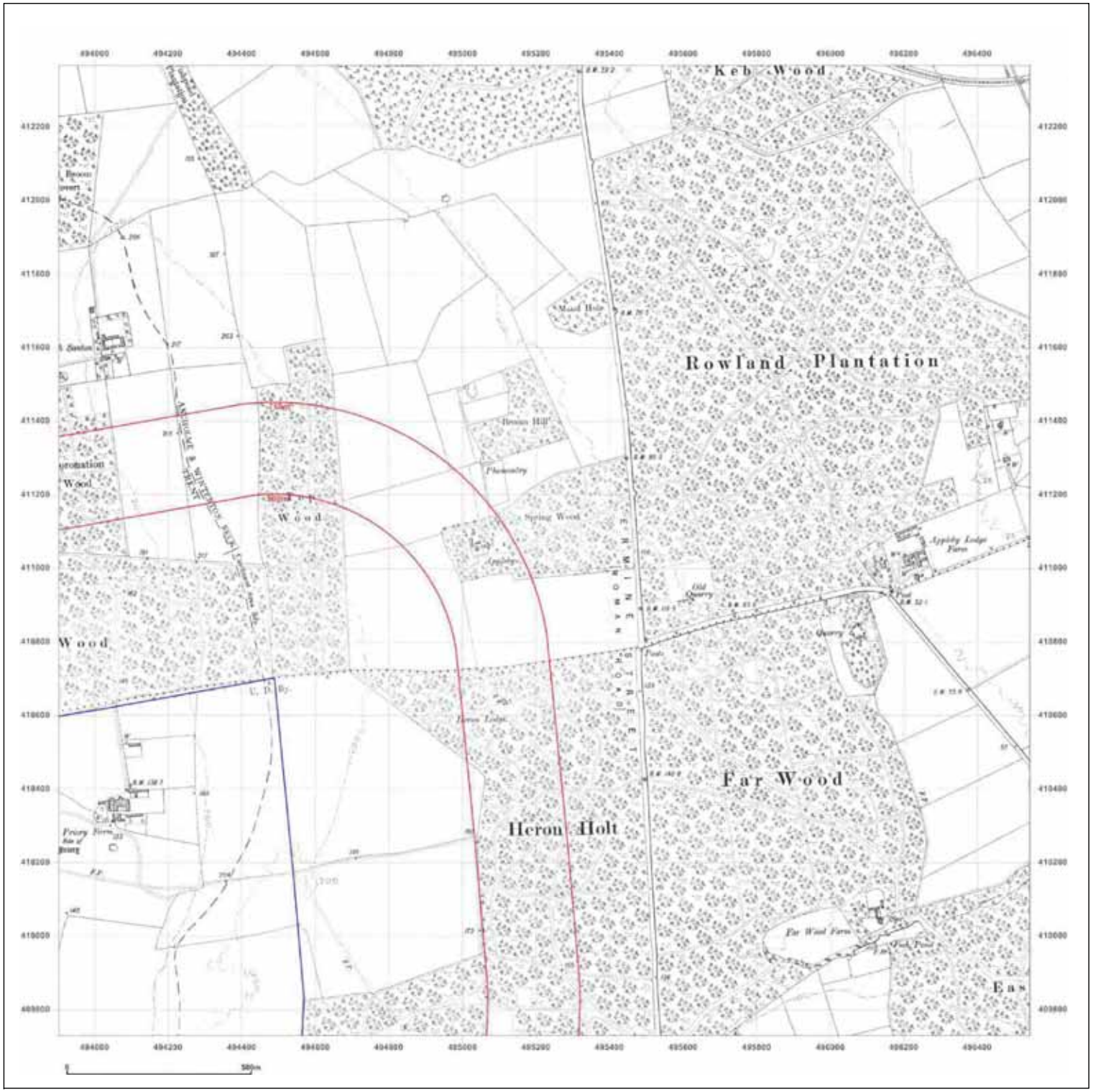
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

Map Name: County Series
Map date: **1906**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed 1885
Revised 1906
Edition N/A
Copyright N/A
Levelled N/A

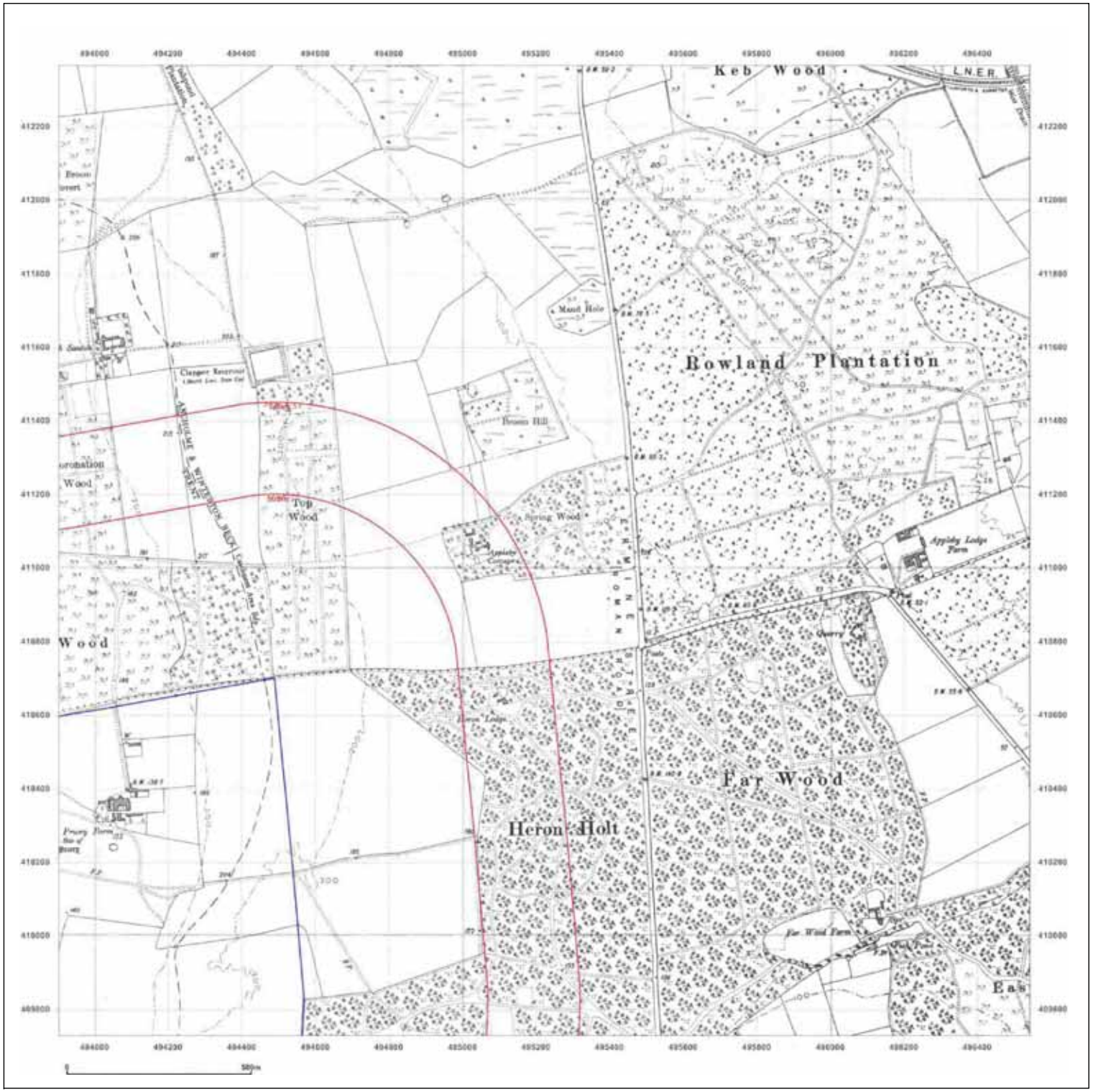
Produced by
Groundsure Insights
www.groundsure.com

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

Map Name: County Series
Map date: **1948**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed 1885
Revised 1948
Edition N/A
Copyright N/A
Levelled N/A

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

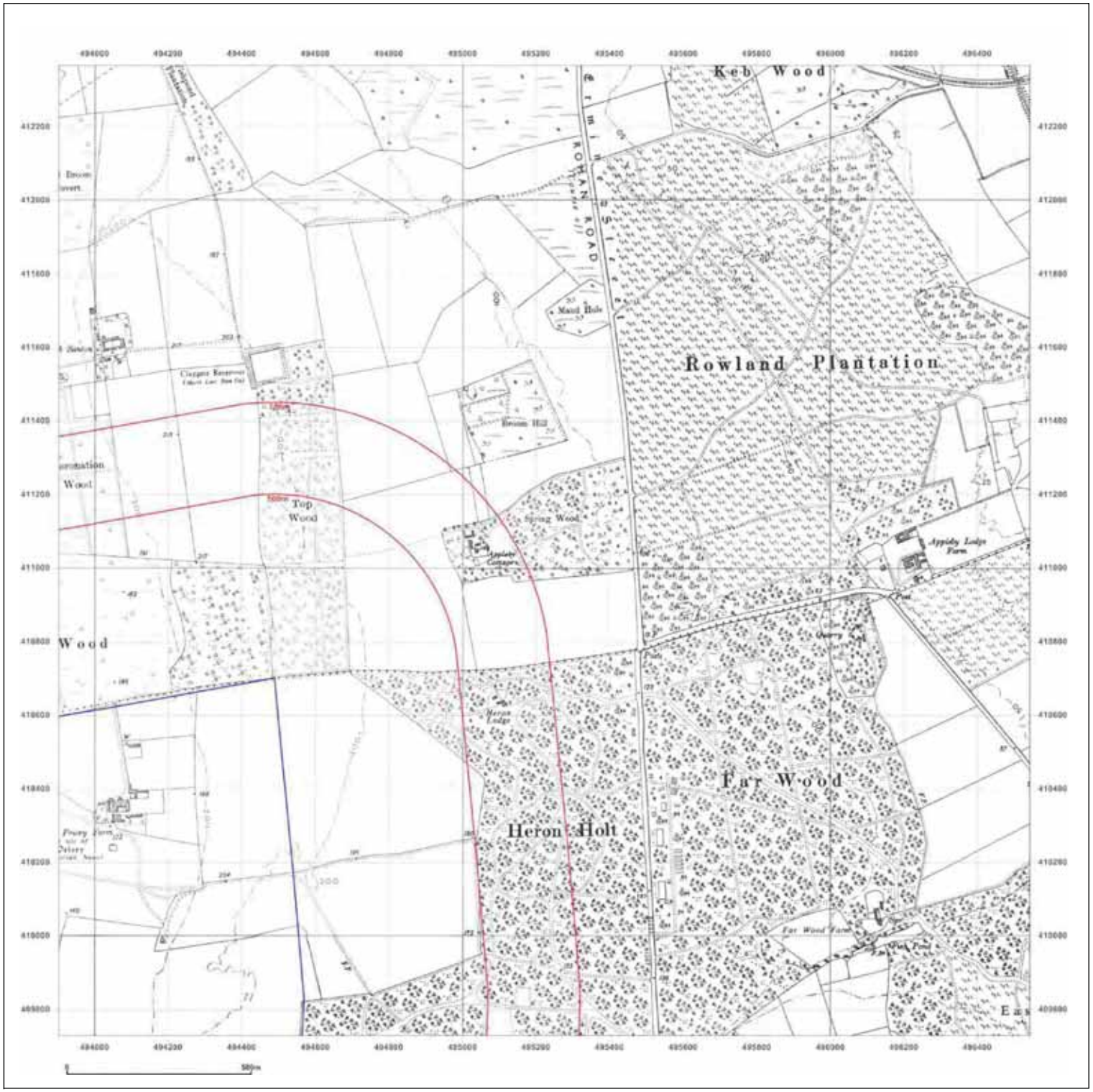
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

Map Name: Provisional
Map date: **1951-1956**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

Surveyed N/A
Revised 1958
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled N/A

Surveyed N/A
Revised 1955
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled N/A

Groundsure

Produced by
Groundsure Insights
www.groundsure.com

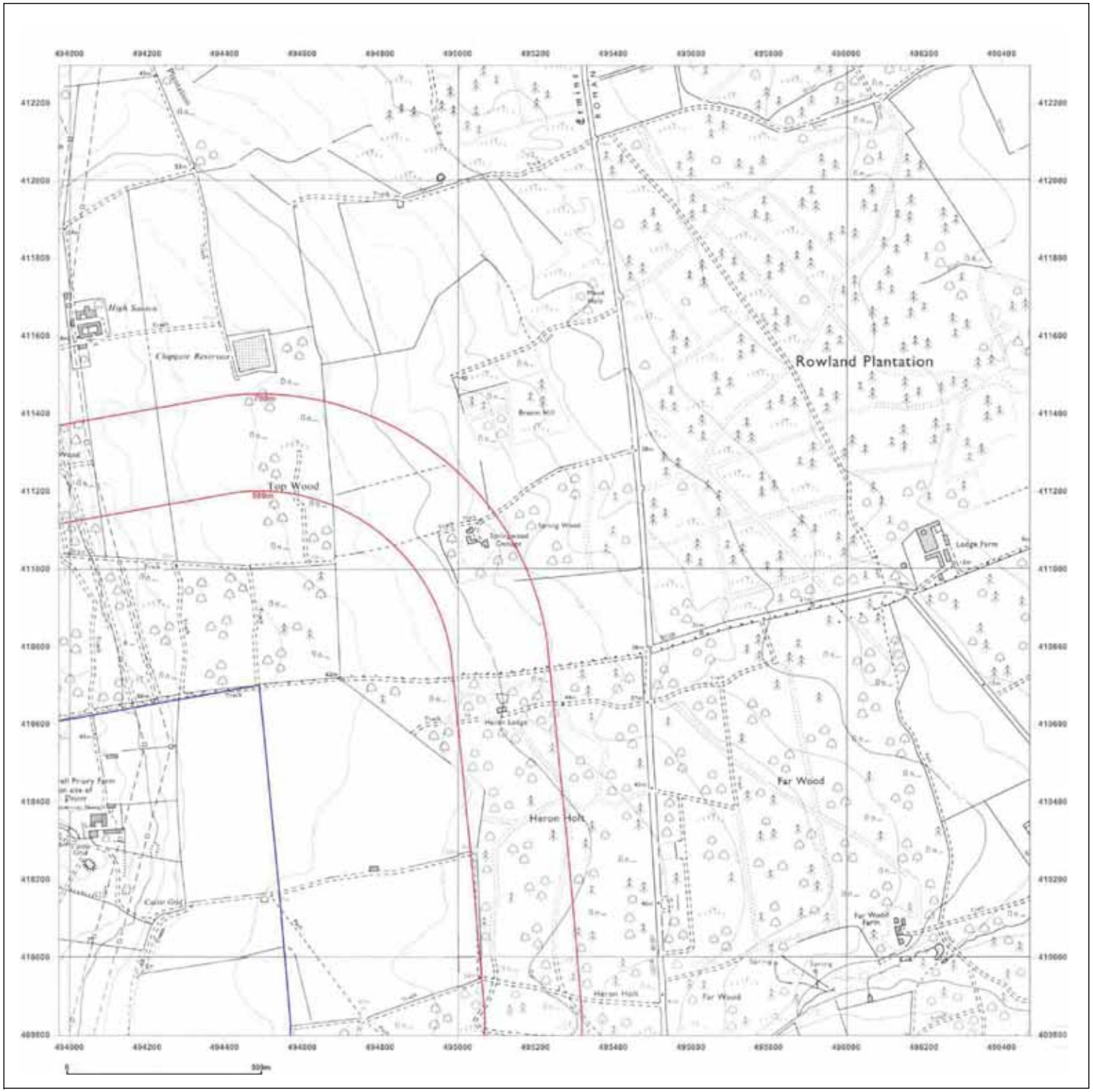
Powered by OS

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

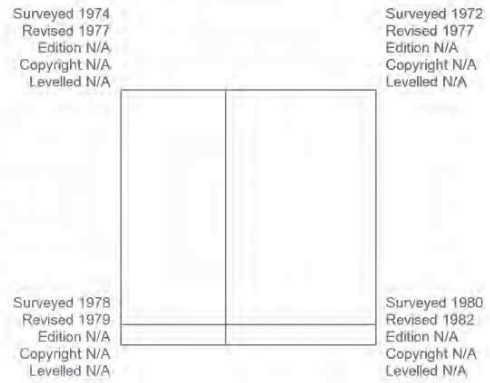
Map Name: National Grid

Map date: **1977-1982**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S



Groundsure Insights

Produced by
Groundsure Insights
www.groundsure.com

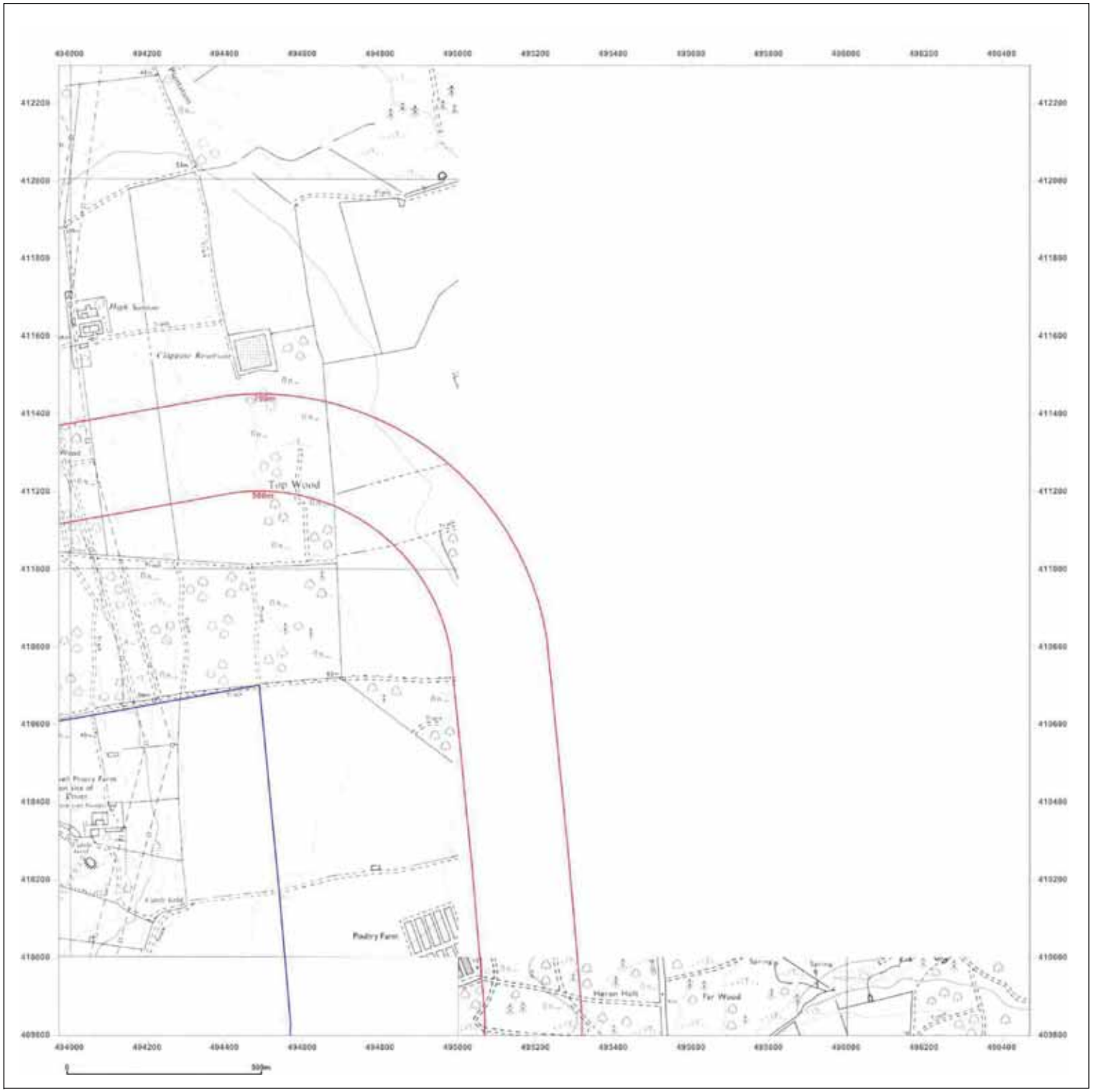
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

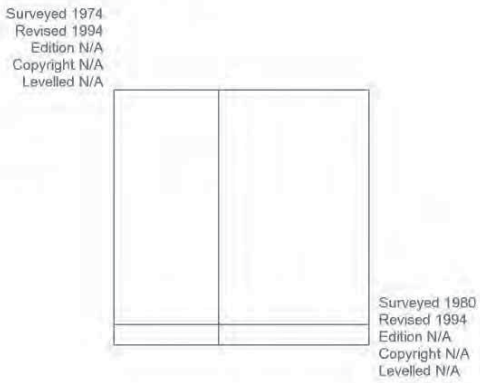
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

Map Name: National Grid
Map date: **1994**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

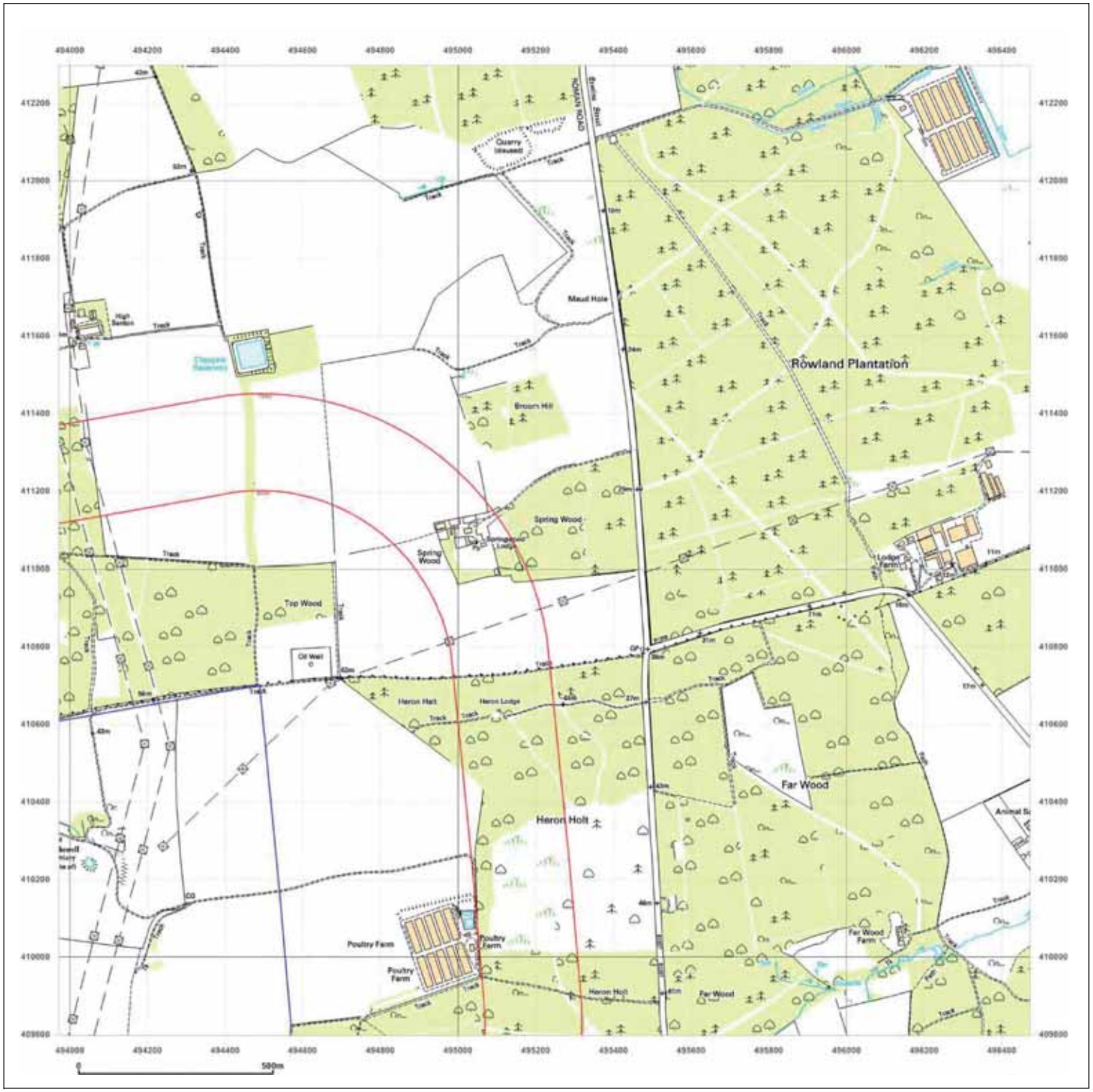
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

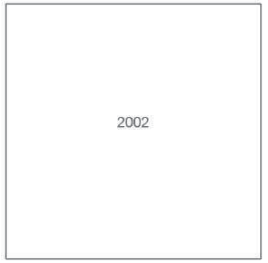
Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

Map Name: 1:10,000 Raster
Map date: **2002**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S



Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

Map Name: National Grid
Map date: **2010**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2010

Groundsure INSIGHTS

Produced by
Groundsure Insights
www.groundsure.com

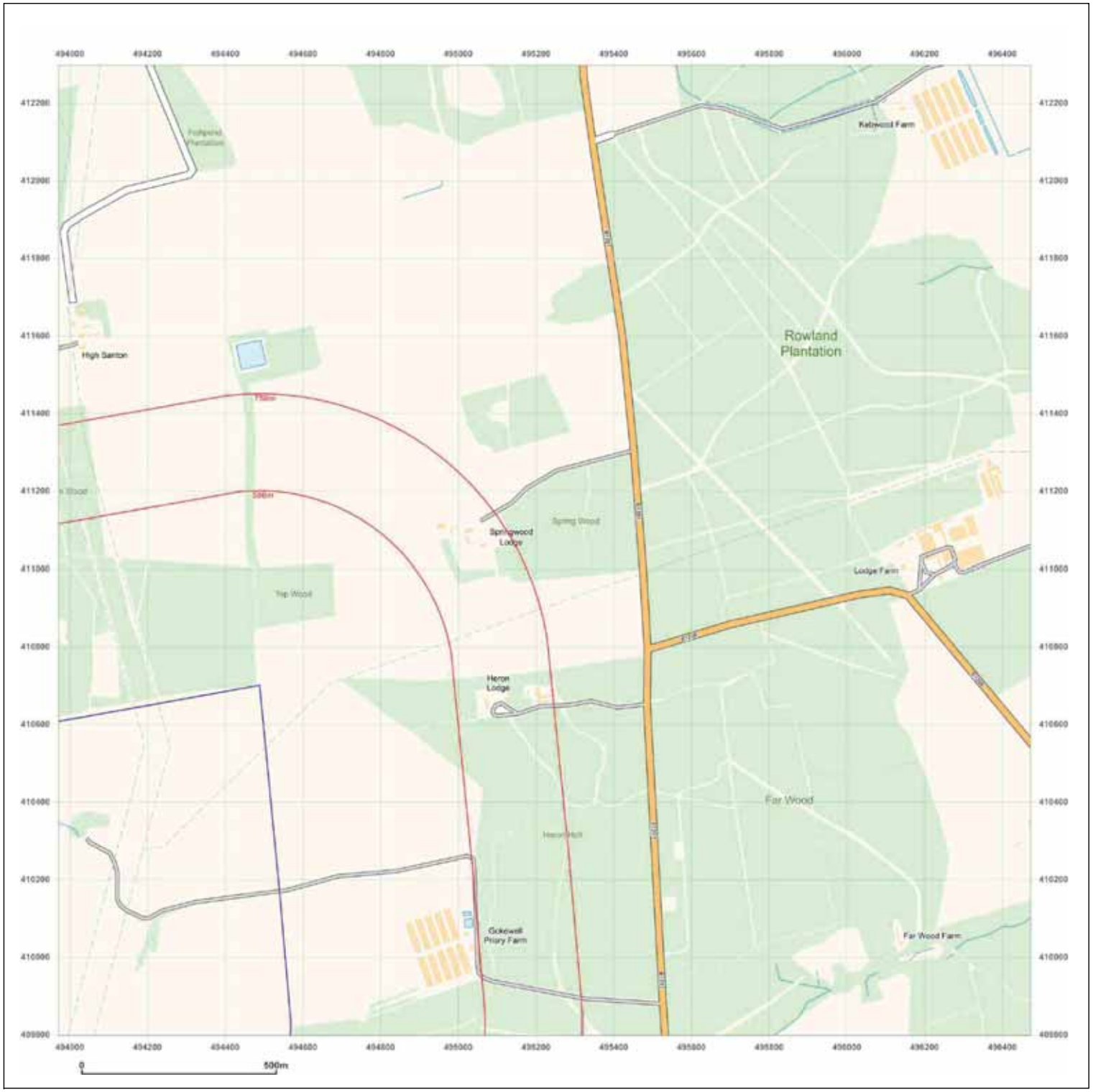
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*



CENTRE MAPS LIVE.

Site Details:

Santon, Scunthorpe, DN16 1XP

Client Ref: 13238
Report Ref: CMAPS-CM-643992-13238-310717HIS_SS_2_2
Grid Ref: 495222, 411047

Map Name: National Grid
Map date: **2014**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2014

Groundsure

Produced by
Groundsure Insights
www.groundsure.com

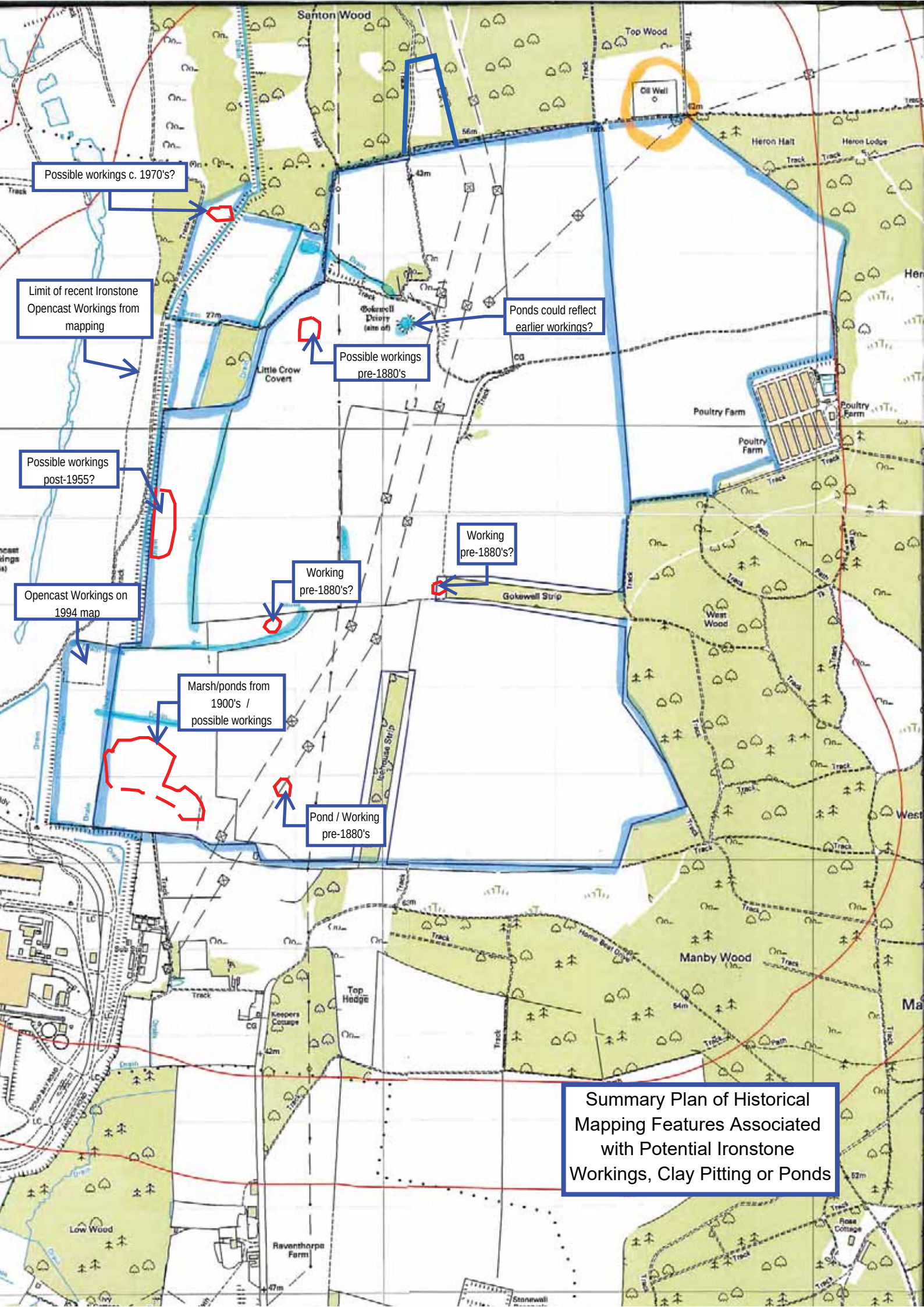
Powered by

Supplied by:
www.centremapslive.com
groundsure@centremaps.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 01 August 2017

To view map legend click here *Legend*


Santon Wood
Top Wood
Oil Well
Heron Halt
Heron Lodge
Possible workings c. 1970's?
Limit of recent Ironstone Opencast Workings from mapping
Ponds could reflect earlier workings?
Possible workings pre-1880's
Little Crow Covert
Poultry Farm
Poultry Farm
Poultry Farm
Possible workings post-1955?
Working pre-1880's?
Working pre-1880's?
Opencast Workings on 1994 map
Gokewell Strip
West Wood
Marsh/ponds from 1900's / possible workings
Pond / Working pre-1880's
Manby Wood
Top Hedge
Keepers Cottage
Low Wood
Raventhorpe Farm
Rose Cottage
Summary Plan of Historical Mapping Features Associated with Potential Ironstone Workings, Clay Pitting or Ponds

APPENDIX 2.3

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY REPORT

Little Crow
Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

On behalf of INRG Solar (Little Crow) Ltd

November 2018

Contents

1 Introduction
2 Site Location and Setting
3 Existing Site and Ground Conditions
4 Proposed Development
5 Hydrology and Flood Risk
6 Surface Water Drainage
7 Construction Process
8 Management and Maintenance
9 Conclusions and Recommendations

Report prepared by Sam Rice – BSc (Hons)
Report approved by Clive Onions - BSc CEng FICE FCIWEM MIStructE MCIHT

Version history

Version	Date	Prepared by	Approved by	Comment
D1	31.08.17	SR	CO	Issued for approval
D2	25.09.17	SR	CO	Extended site included
V1	20.07.18	CO	CO	Final layout inserted
V2	26.07.18	CO	CO	Minor amendments
V3	16.11.18	SR	LJ	Updated with revised layout

Issue history

Version	Date	Issued to	Method
D1	31.08.17	Pegasus Group	Email pdf
D2	25.09.17	Ditto	Ditto
V1	20.07.18	Ditto	Ditto
V2	26.07.18	Ditto	Ditto
V3	16.11.18	Ditto	Ditto

1. Introduction

INRG Solar (Little Crow) Ltd proposes to develop an energy scheme comprising up to 150MWp ground mounted solar arrays and up to 90MW of battery store on land to the east of the British Steel site at Scunthorpe.

This Flood Risk Assessment and Drainage Strategy (FRADS) has been prepared to consider the impact of the solar farm on the existing hydrology in the area, to show that flood risk is not increased off-site and that the solar farm is safe to operate for its lifetime. It considers the construction and operation stages.

The assessment shows that water quality entering the environment will be improved, infiltration will improve and runoff rates will be reduced, bring overall benefit to the environment.

2. Site Location and Setting

The site is located on land to the east of British Steel, Scunthorpe DN16 1XP.

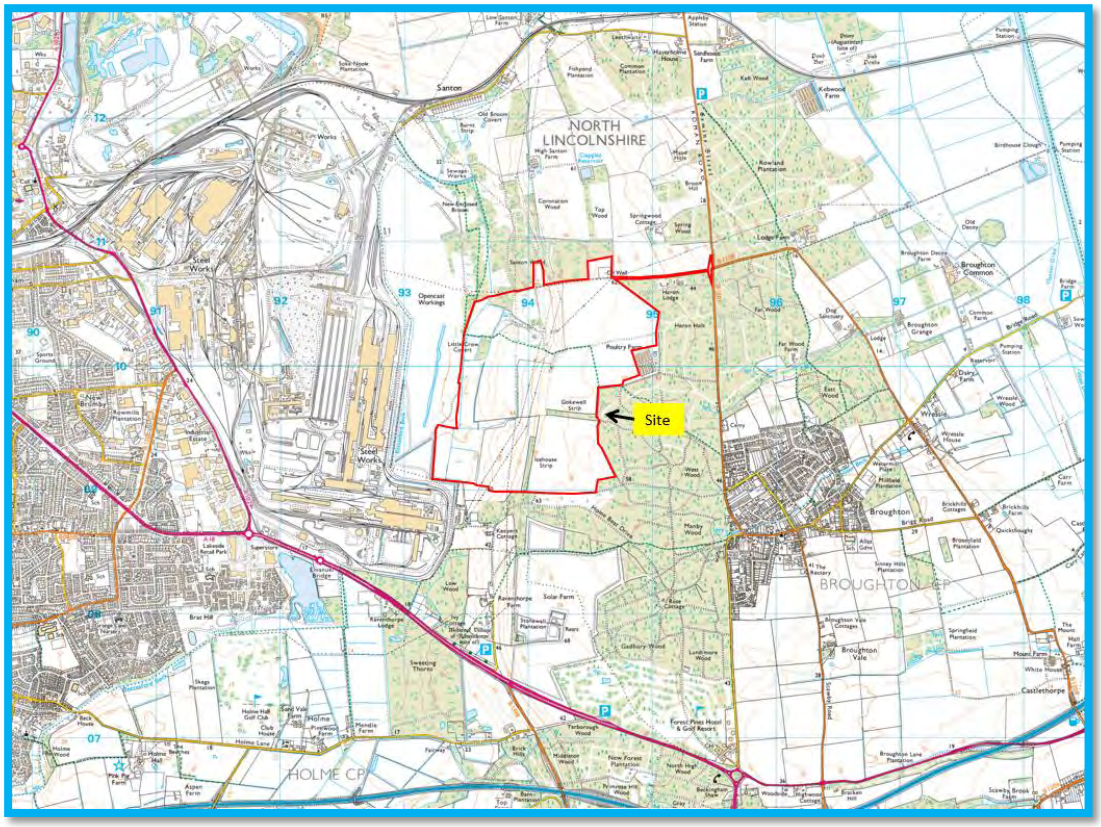


Fig 1 Site location to the east of Scunthorpe (Streetmap).

The site is in the following setting:

- North of the site is Santon Wood, beyond which is mainly arable farmland, on land generally falling to the west.
- East of the site is woodland, a poultry farm and the town of Broughton on land falling gently to the east

- South of the site is strip of woodland, beyond which is arable farmland, solar farm, covered reservoirs, golf course, further woodland, etc., on land which falls to the west.
- West of the site is an access track, a narrow strip of green land containing a small arable field, beyond which is a deep excavation resulting from open cast mining, containing standing water some 20m below the level of the site boundary. Beyond this is Bottlesford Beck, at similar level to the site boundary, which drains the adjacent steel works and industrial estate.

In summary, the site is to the west of an important industrial area, within an area of woodland, arable farmland to the north and mixed uses to the south.



Fig 2 Oblique view of land between the industrial land and site, showing the 20m (approx.) deep excavation and standing water (Google Earth image by Getmapping plc).

3. Existing Site and Ground Conditions

The site occupies approx. 20 fields separated by hedgerows with occasional trees and fences. The fields are predominantly used for arable farming. The site excludes two strips of woodland in the southeast.

The site includes watercourses which are described later, but tend to flow eastwards from a spring line, which runs along the north-south axis of the site.

The shape of the site is irregular and is approx. 1,850m north-south and 1,550m east-west. There are no buildings shown within the site, although pylons carrying two main overhead electrical circuits cross north-south through the site.

The site is on land which slopes from approximately 60m AOD in the east to 25m AOD in the west, giving a slope of about 1 in 25. The northwestern part of the site is generally level at about 60m AOD, with a gentle 1 in 100 slope to 55m AOD along the north-eastern boundary.

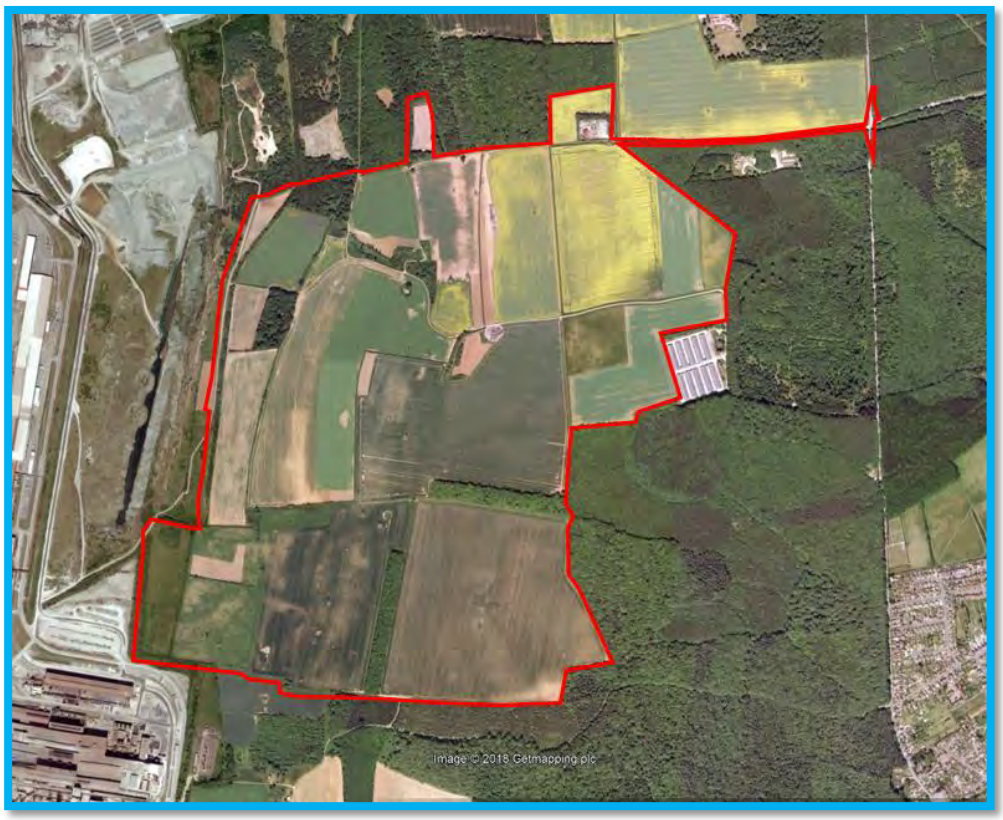


Fig 3 Satellite view showing predominantly arable use within the site (Getmapping Plc.).

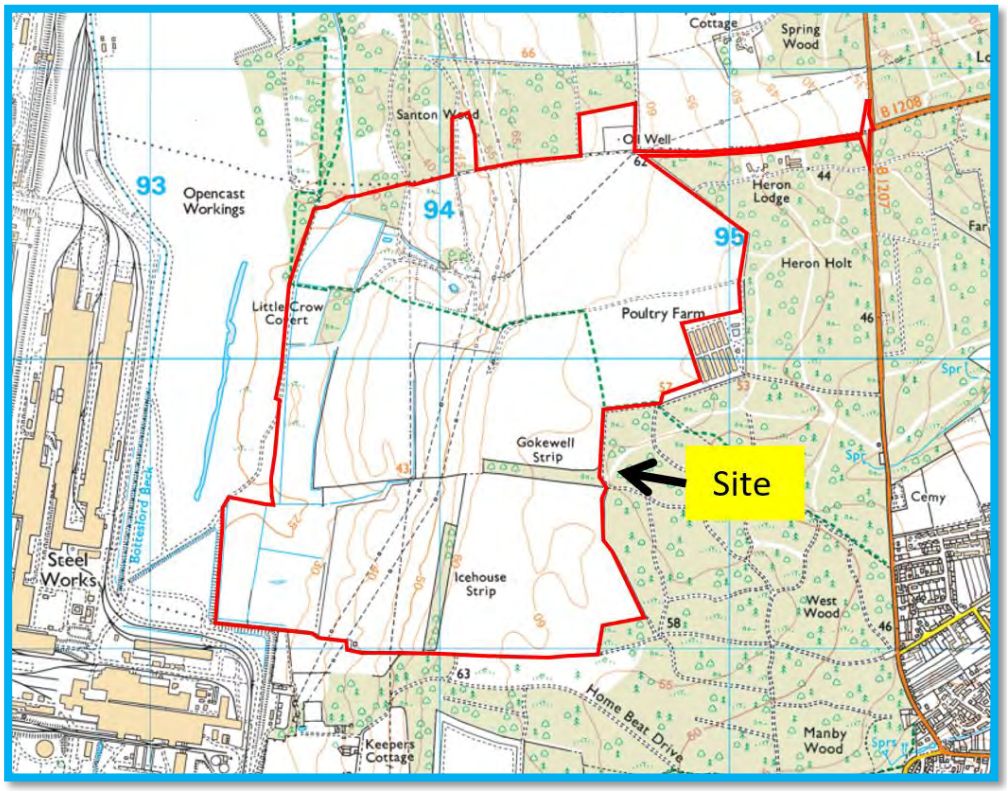


Fig 4 More detailed view of site showing steel works to the west, Bottlesford Beck, opencast steelworks and then the site, with an oil well to the northeast and a poultry farm to the east. Within the site are the power lines running north-south and the watercourses flowing westwards from the spring line (Streetmap).

A separate geotechnical report has been prepared by Integrale, but in summary the British Geological Survey Viewer shows sand above mudstone in the west and mudstone and limestone in the east. The Cranfield University Soilscapes Viewer shows the soil within the site to be free draining. This assessment suggests that the site is likely to be permeable, with limited runoff from rainfall.

It is however likely that in autumn and winter high levels of runoff and silt occur after ploughing, and before the vegetation/crops have established. These characteristics would cause high rates of runoff in autumn, and low rates in the growing seasons lading to high variations of flow in the receiving watercourses and potentially increasing the risk of silting given the shallow gradients.

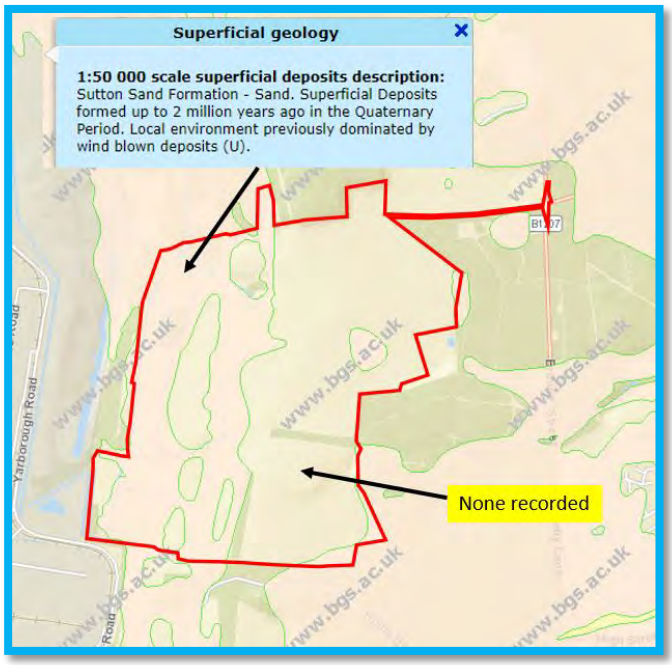


Fig 5 The superficial geology, noting none is recorded (British Geological Survey).

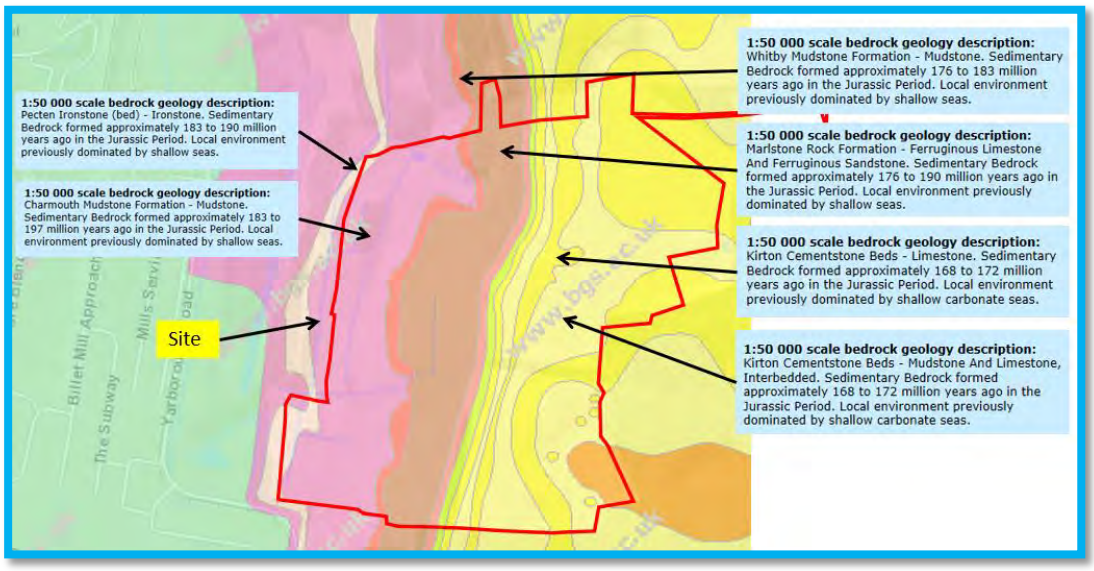


Fig 6 The bedrock geology, showing the variety of permeable limestones on the higher (eastern) ground and less permeable mudstones on the lower (western) ground (British Geological Survey).

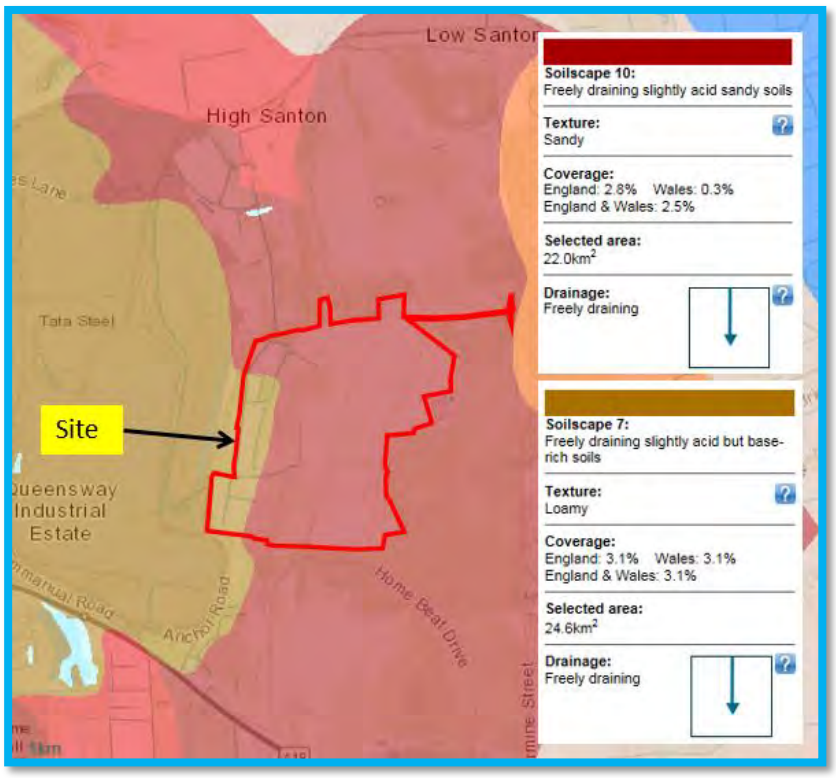


Fig 7 Soilscapes Viewer showing the soil throughout the site to be free-draining (Cranfield University Soilscapes Viewer).

4. Proposed Development

The proposed development comprises the installation of a solar farm with battery storage area and associated 132 KV Substation. The works also include transformers and cables within the site to manage and convey the power.

The solar arrays will be aligned east-west, to collect sun from the south, with the low edge 800mm off the ground, and the high (northern) edge up to 3.5m off the ground; the dimensions vary with the local topography. The solar arrays incorporate gaps along the array, and several gaps up the slope, which are fundamental for thermal movement. These gaps avoid encourage rainwater to disperse along the array and avoid concentrated flows from the lower edge.

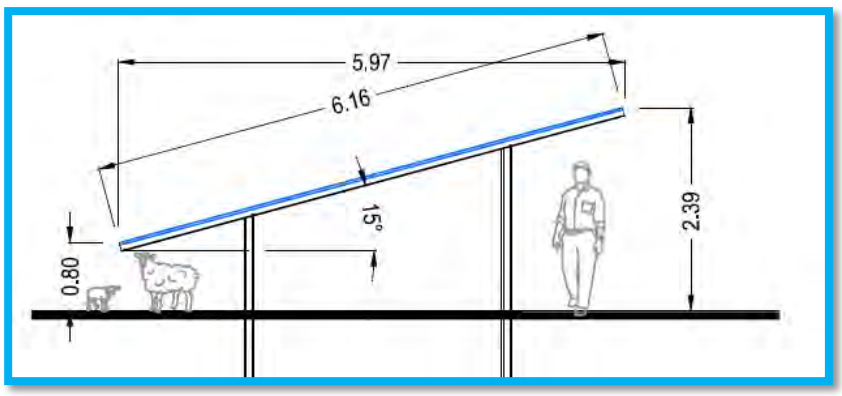


Fig 8 Typical section through solar array. Height dimensions will vary with undulations in the ground.

The arrays are positioned to provide access space between the arrays, and between the arrays, fence and hedge, to allow for maintenance. These dimensions also allow access for maintenance of the hedge outside the fence, and camera surveillance within the fence.

The site will be enclosed within deer fences, with open mesh and set 100mm above the ground to allow movement of wildlife and surface water. The fences will cross watercourses in such a way to reduce the risk of blockage, spanning the channel.

Vehicular access will be from an unnamed existing track to the northeast of the site, connected to the B1207 along an existing track serving the oil well etc.



Fig 9 Existing track from B1207 along the north of the site.

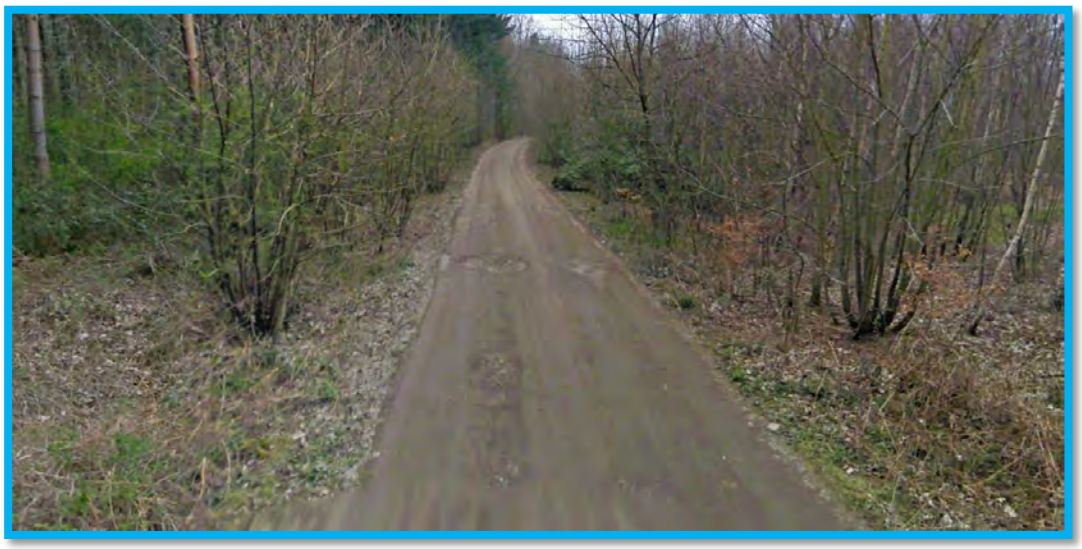


Fig 10 Existing rack running to the east and north of poultry farm.

Another track will also serve the solar farm which leads to the poultry farm and north into the site.

These tracks which run to and into the site will be retained – new tracks to key equipment on site will be formed in permeable material; the tracks tend to green over due to low usage which helps manage runoff and provides further varied habitat.

The fields on which the solar arrays are located will be prepared on completion of the solar farm, to loosen compacted ground, and then seeded where necessary to encourage a vegetated surface throughout with native grasses, and vegetation restored where construction has caused damage. The area within the fence will become a haven for invertebrates, reptiles, amphibians, small mammals and birds, as has been observed on other completed solar farm sites.

The site will be grazed at low density by sheep and inspected seasonally so that tall plants can be trimmed and avoided from shading the panels. Bare areas of earth will be prepared, seeded and protected to encourage growth.

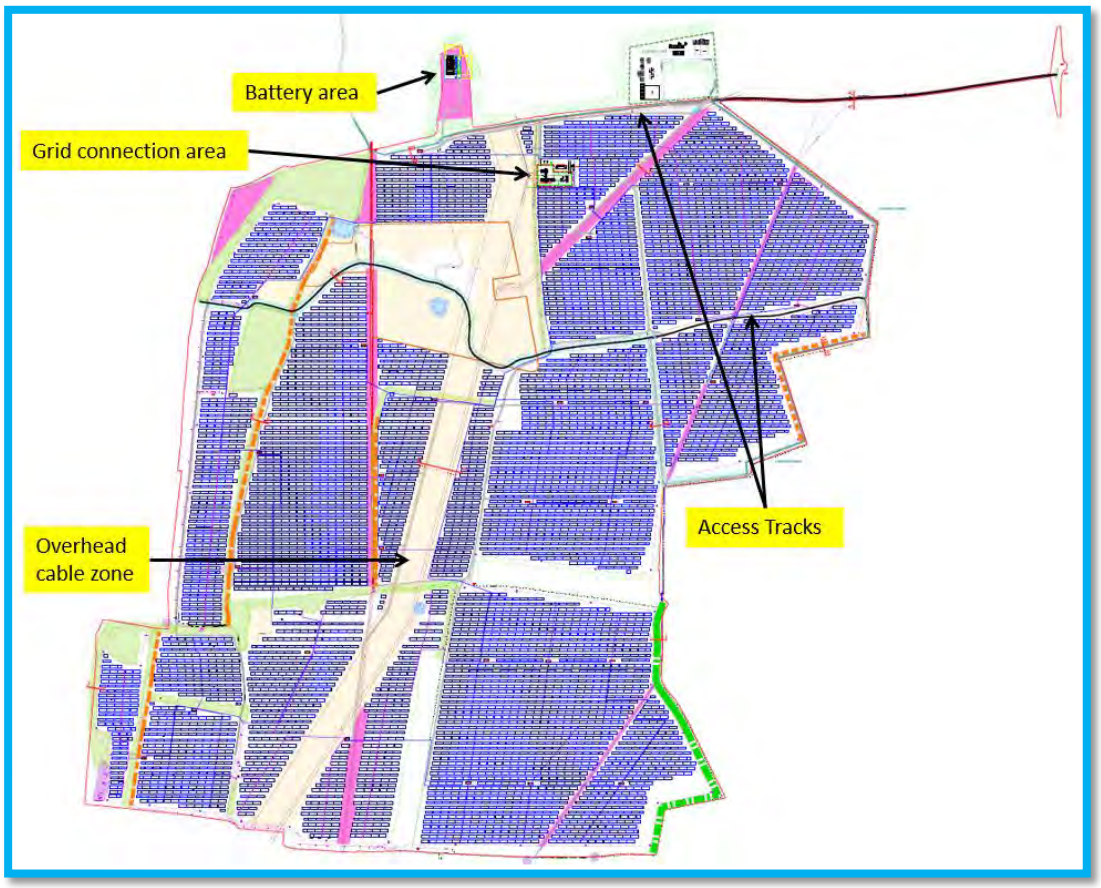


Fig 11 Proposed site layout with key features highlighted.

5. Hydrology and Flood Risk

The site is located in Flood Zone 1, at low risk of flooding, according to the Environment Agency (EA) Flood Map for Planning, consistent with its elevated location, and is therefore appropriate development in terms of fluvial flood risk in accordance with the National Planning Policy Framework (NPPF).

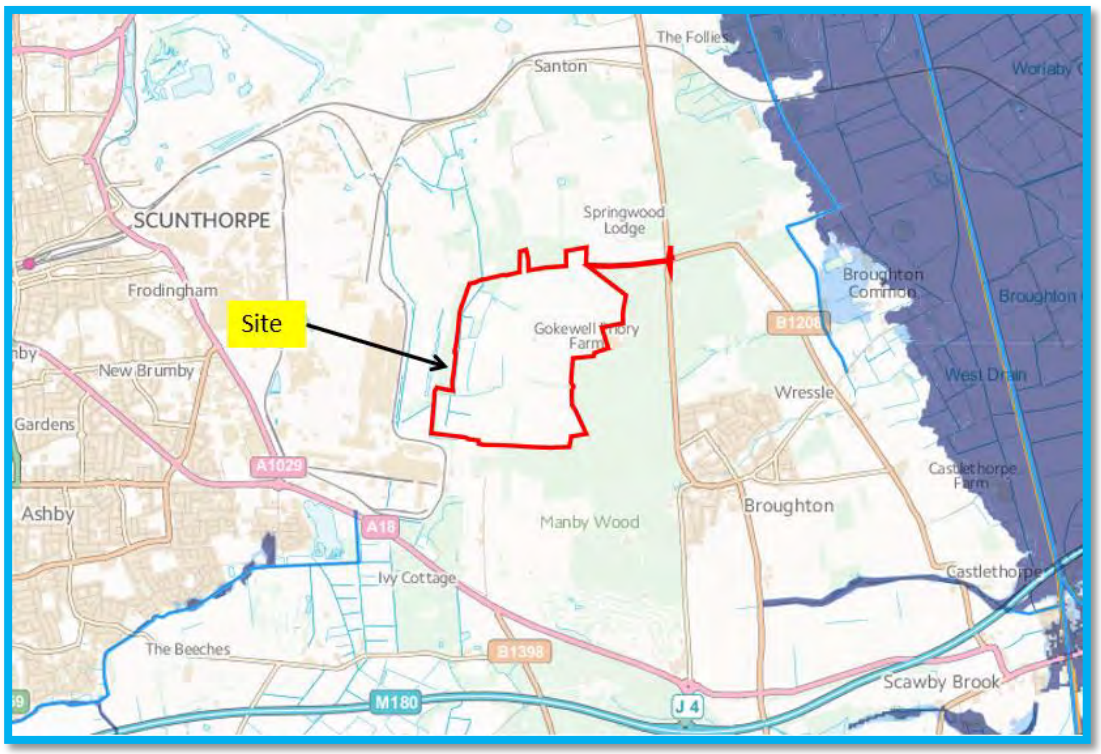


Fig 12 The EA Flood Risk Map for Planning showing the site to be in Flood Zone 1.

The EA Surface Water Flood Risk Map shows isolated ponding within a few areas in the site – indicative of the generally free-draining nature of the soil. In the west of the site the water is shown to issue from a spring line and flows westwards. The spring line is shown below, in an image which has been extracted from the Geotechnical Report.

Localised areas up to 50m wide appear to have a very gentle fall to the east, and, leading through woodland. There are no evident watercourses or signs of surface water flows to the east, indicating that the rainfall infiltrates into the ground where it lands, ie the shallow gradient allows infiltration.

The site contains a number of watercourses, generally running north south along the slope, and linked by watercourses flowing down the slope, which are shown on the maps. A detailed topographic survey has been undertaken of the site and shows that the channels are well-defined and approximately 1m deep.

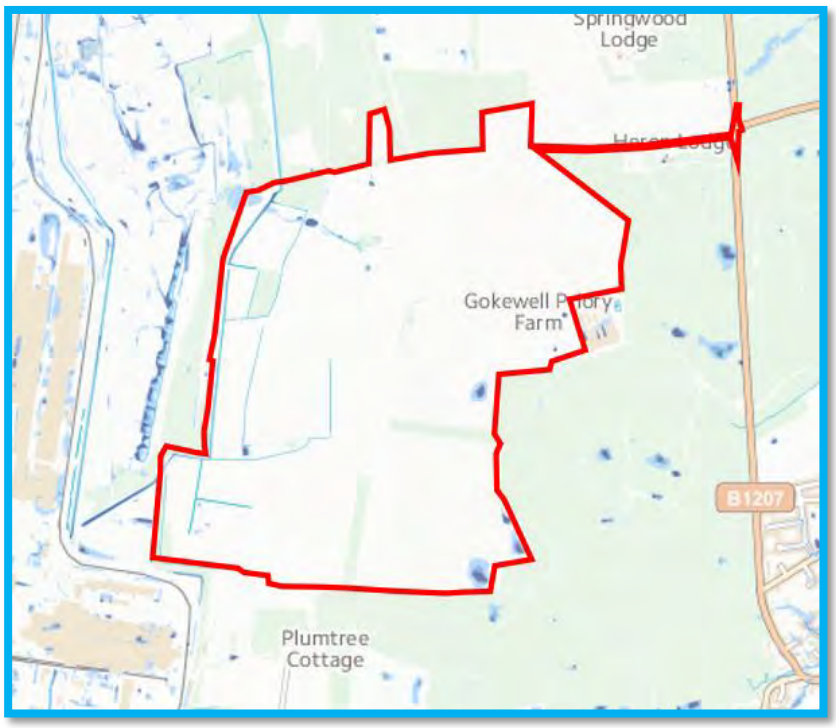


Fig 13 Extract from the EA Surface Water Flood Risk Map showing isolated areas of the site at risk from surface water ponding in the 1 in 1000 year event, and an area of shallow streaming in the northwest.

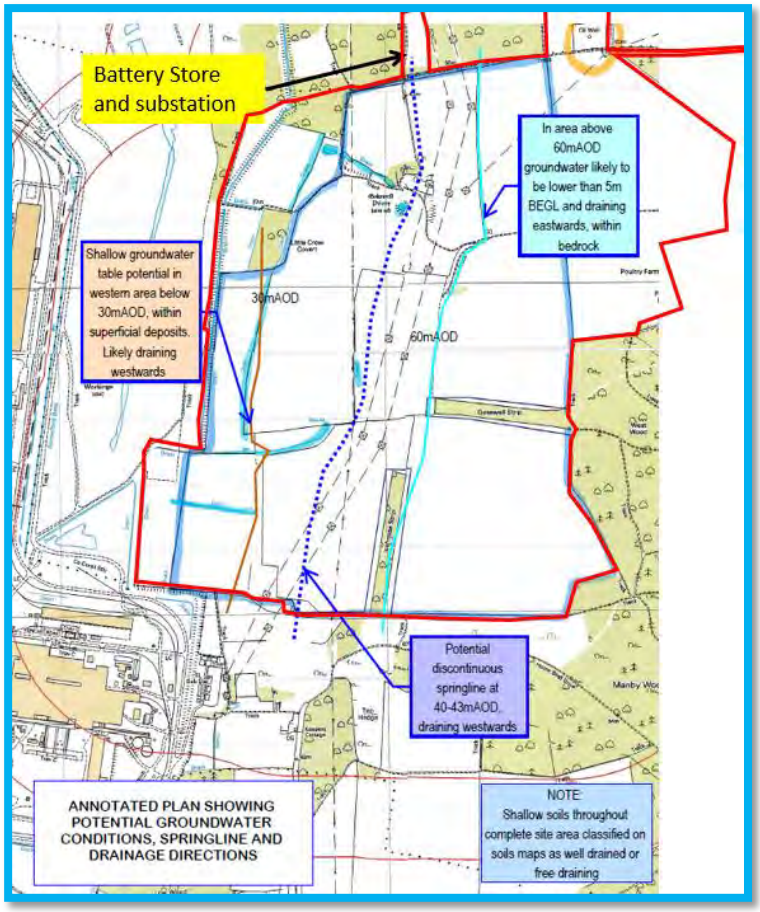


Fig 14 Extract from Integrale's Phase 1 Ground Conditions Desk Study, showing the spring line and proposed battery store to the east (uphill) of the spring line.

6. Surface Water Drainage

The soil is shown to be free-draining, and the underlying soil is naturally drained by the springs which issue along the spring line. The mechanism would therefore be that rainfall infiltrates into the soil, and then follows a layer with low permeability and issues at a generally low rate over a prolonged period from the ground, forming a watercourse. It is proposed to retain the watercourses which issue from the spring line, and provide a minimum 8m buffer from top of bank with no development. The boundary fence will cross the watercourses where they flow across the western boundary and special measures might be required to limit blockages.

Swales will be formed on the uphill side of the main watercourses as a precautionary measure especially to manage runoff and silt during the construction period.

A swale is also proposed along the west and north of the poultry farm to reduce the risk of runoff nuisance.

The swales will be formed by excavating a 300mm deep valley and placing the soil on the downhill slope, and about 3m wide.

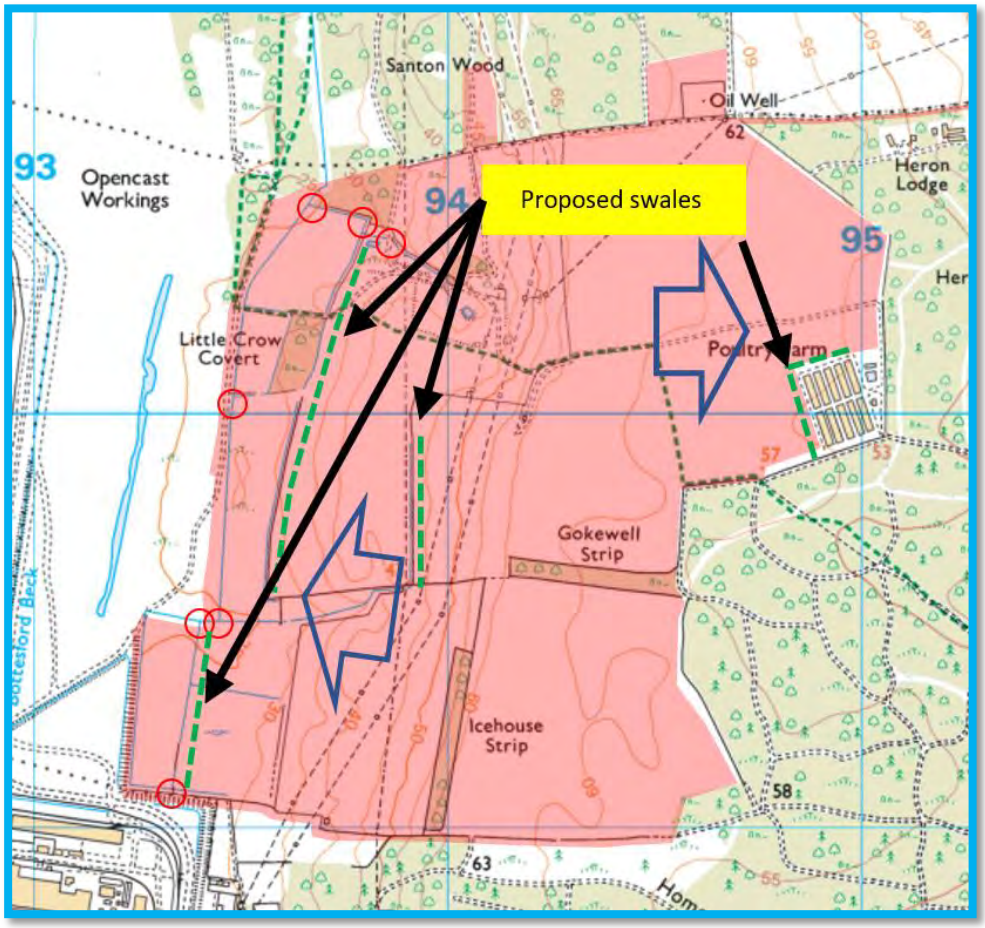


Fig 15 Plan showing site shaded to highlight existing watercourses. All structures such as fences, tracks, solar arrays and infrastructure will be more than 8m from illustrated watercourses, but fences will cross where watercourses cross the site boundary. The red circles represent locations where fences will cross watercourses.

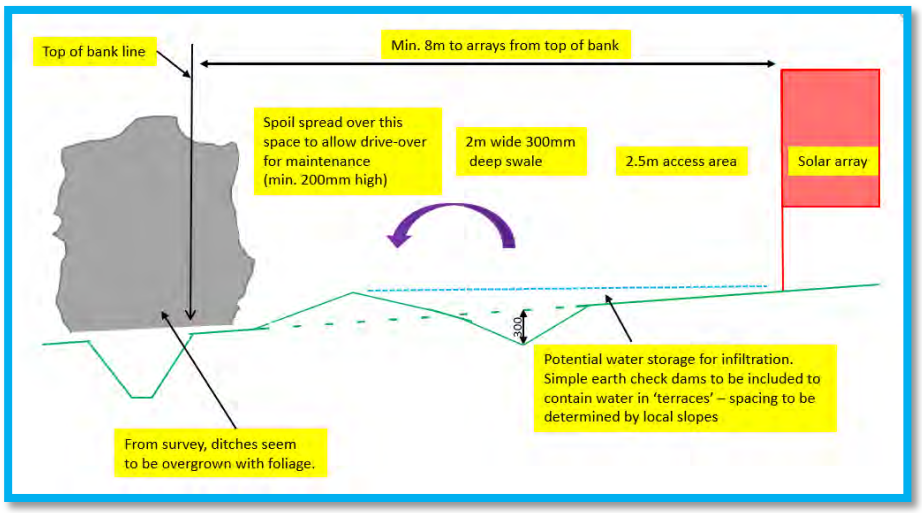


Fig 16 Typical form of swale formed with ridge and furrow technique and vegetated on completion.

Transformer units etc will be positioned on legs with 300mm permeable gravel bed below to provide attenuation and infiltration into the underlying and adjacent soil.

The battery units, which will be containerised, will also be formed over a similar gravel bed to encourage infiltration and allow attenuation.

The fields will no longer be applied with pesticides and fertilizers, thus the water quality entering the environment will be improved. The fields will not be bare and compacted in the autumn and winter, thus improving infiltration and eliminating silt runoff.



Fig 17 Typical transformer unit on legs over permeable gravel bed.



Fig 18 Typical containerised batteries on legs with permeable gravel base below.

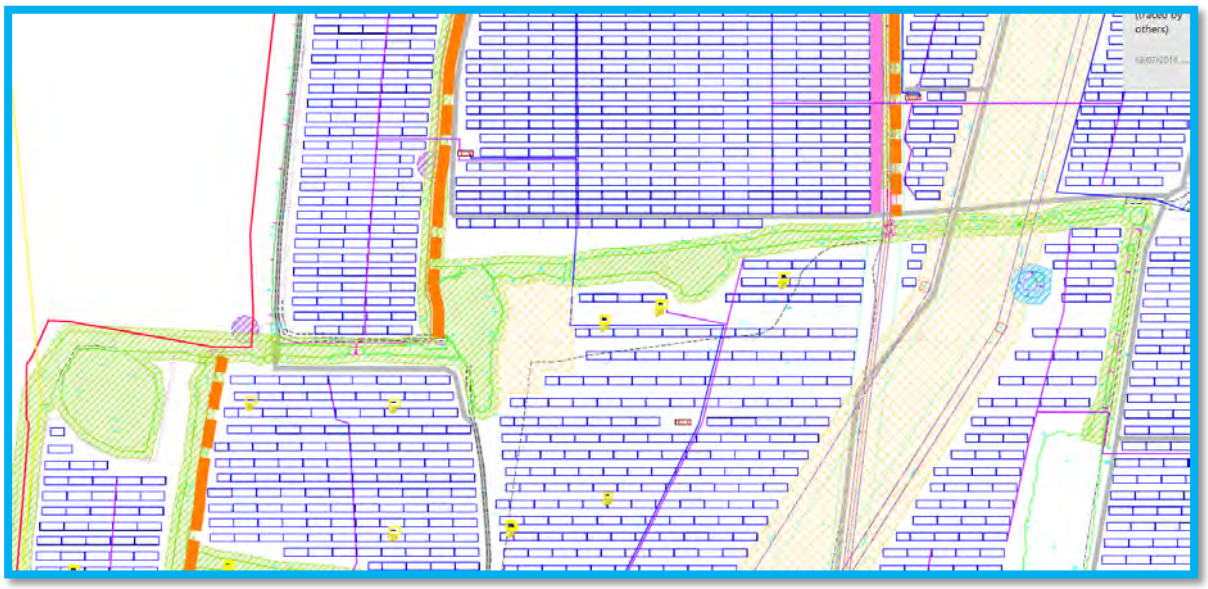


Fig 19 Typical expanded view showing retention of green corridors with vegetation and zones with watercourse and swales. The arrays are 6m wide, given a scale for the watercourse zones, which are in the order of 20m wide.

7. Construction Process

To minimise damage to the soil structure within the solar farm site, the contractor should manage the work appropriate to the prevailing weather conditions and use appropriate machinery for the circumstances.

Existing watercourses will be protected by silt fences if there is a risk of silt runoff occurring during the works, dependent on weather and prevailing characteristics

Machinery used within the solar farm should have low earth pressure tyres or tracks, such as is typical with farm machinery, to minimise compaction of the ground.

A delivery sequence by vehicles should be devised which minimises repeated journeys over the pasture to reduce rutting and damage to the pasture and soil structure.

On completion of the works the pasture should be restored using light farming machines and the soil prepared appropriately for seeding to encourage early growth, restoration of the soil structure and natural creation of meadow grass.

8. Management and Maintenance

The general solar farm, watercourses, permeable tracks, permeable beds below units etc within the site will be maintained by the site operator.

The watercourses should be inspected at the start of the autumn and in late spring, and at other times if prevailing conditions suggest, and the following steps taken:

- Any blockages from branches, intense bramble growth etc. should be removed so that the swales can be readily inspected to confirm their clear operation.
- Any raised bed due to animal activity etc. which may hinder water flow should be removed to restore performance.
- Trees and shrubs should be removed before they can establish.
- Grass and wild flowers should be inspected and strimmed back from time to time.
- Bare earth areas should be inspected, prepared and seeded to re-establish grass and wildflower growth as appropriate.
- If water ponds for prolonged periods inspections should be made and the bed treated to restore performance and aid infiltration.

9. Conclusions and Recommendations

INRG Solar (Little Crow) Ltd proposes to develop an energy scheme comprising up to 150MWp ground mounted solar arrays and up to 90MW of battery store, with associated infrastructure, surrounded by a deer fence, on land to the east of Scunthorpe.

In summary:

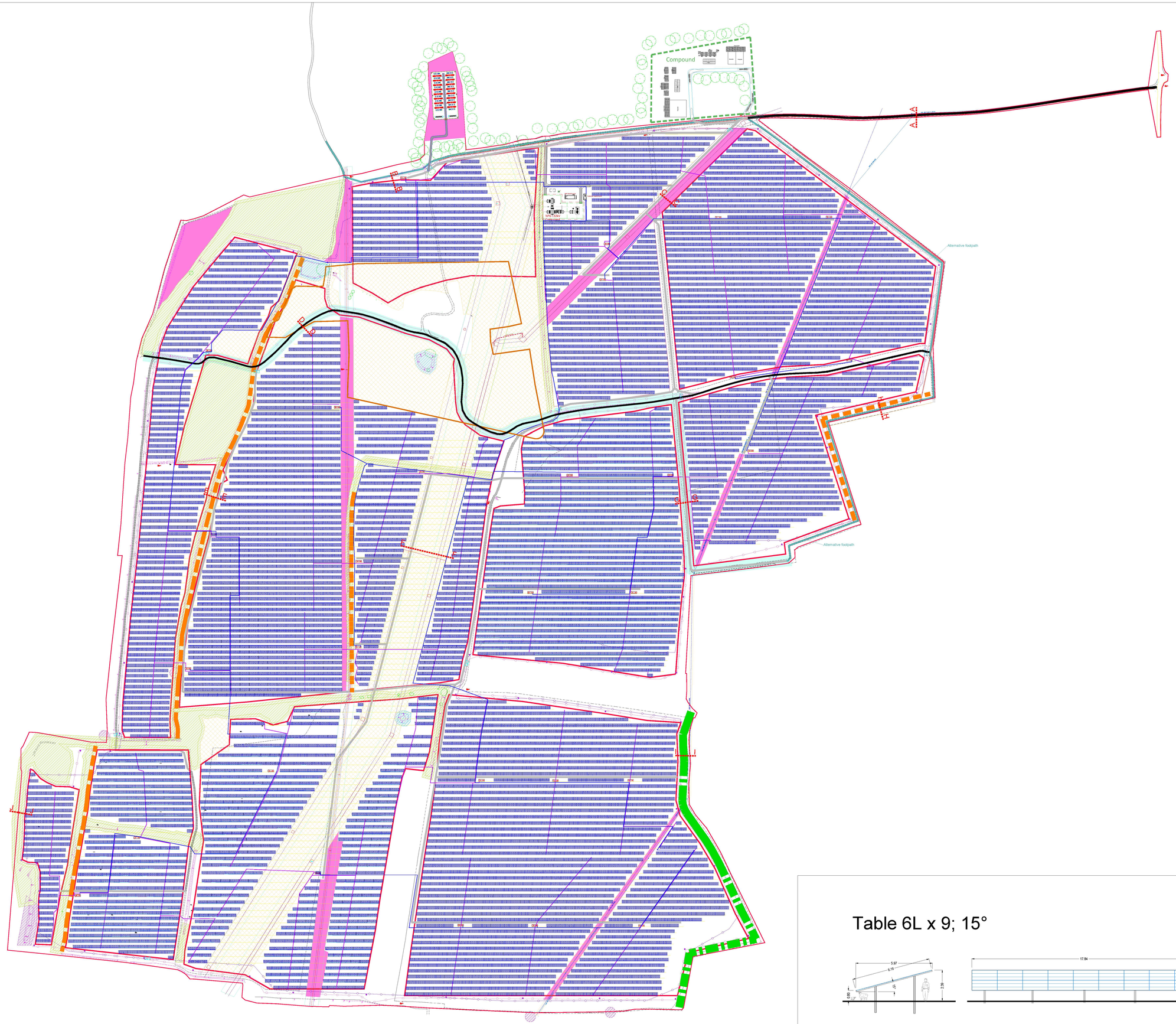
- The site is entirely in Flood Zone 1 according to the EA Flood Map for Planning and appropriate development in this area.
- The local area to the site is not sensitive in terms of surface water flood risk.
- The site is currently used for arable farming which causes compaction, reduces absorption of rainwater by the soil and increases soil runoff, particularly after harvesting.
- The soil within the site is recorded as being free-draining.
- Swales are proposed to reduce the risk of runoff affecting the watercourse flows and the poultry farm.
- The proposal will eliminate compaction, allow the soil and vegetation properties to improve and contain the rainfall within the site, by infiltration into the ground.
- Runoff quality entering the environment will improve through ceasing the application of pesticides and fertilizers.

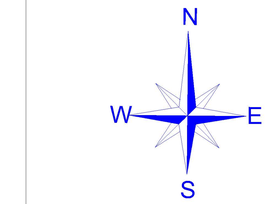
- Tracks will be formed in permeable construction.
- Transformer and battery units will be formed with permeable gravel beds to encourage infiltration.
- A management programme is described which ensures the soil and watercourse conditions will remain favourable for the lifetime of the development.

The proposal therefore brings significant benefit to the management of surface water, a reduction in runoff leaving the site and the improvement in water quality entering the environment. The development does not increase the risk of flooding to the local area or lower in the catchment.

APPENDIX 4.1

INDICATIVE DRAWING PACK

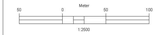




Electrical design

Station A

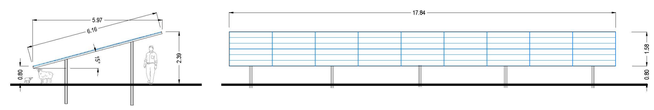
Inverter:
AC-Combiner:
Strings:
Panels:



Key

- Table
- Existing Access Track
- New Access Track
- Public Footpath (gap = 15,00m)
- Buffer WOodland (15,0m)
- Swales (Buffer 8,00m)
- Pond (Buffer 5,00m)
- Hedges (Buffer 5,00m)
- Badger Zone (Buffer 20,00m)
- Zone for WInter Birds : 22,5ha
- Zone for Arable Weeds / Species Rich Grasslands : 5,9ha
- Transformer Station
- Construction Area
- Exclusion Zone Archeological
- Fence
- Gate / Entrance
- Trench AC
- Trench MV
- CCTV
- Alternative Footpath
- 53ft Battery Container
- 40ft Flat Rack Skid
- 40ft Container

Table 6L x 9; 15°



Section Scale
1:100

Regulations 2009 Document Paragraph Reference Number	
Regulation 5(2)(o)	

PROJECT NAME

Little Crow Solar Park

DRAWING	DRAWING
Table layout	A10B0C0

GEOGRAPHICAL SITE:

COORDINATES	53.5773° N	0.5786° W
NN/MSL	60.0m	
SUNANGLE	13.42°	
DATE	21.12.2017 / 12:00	

SITE SYSTEM:

SYSTEMLAYOUT	6L x 9	6L x 5
NUMBER OF TABLES	6.449 pc	345 pc
PANEL ORIENTATION	Landscape	
NUMBER OF PANELS	357.561	

CHANGE

DATE	CHANGE
10.07.2018	Added 50MW Battery
16.07.2018	moved Fence and roads
02.08.2018	divers. changes
08.08.2018	divers. changes

SITE TECHNOLOGY:

MODULE NAME	
MODULE SIZE	
MODULE POWER	380 W
TYPE OF PANELS	POLY
ANGLE OF PANELS	15°
TABLESHADOW	1.0 m
ROWDISTANCES	

DRAW

	DATE	NAME
DRAW	01.06.2018	M. Riedel
DRAW	10.07.2018	M. Riedel
DRAW	16.07.2018	M. Riedel
DRAW	02.08.2018	M. Riedel
DRAW	08.08.2018	
DRAW		
CHECK		
CHECK		

SITE TOTAL POWER

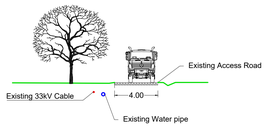
DC POWER	135.87 MWp
AC-POWER nom.	
AC-POWER max.	

Signature:

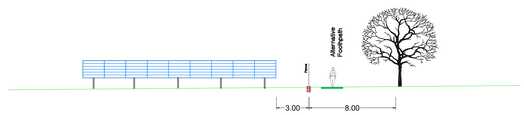
Scale	1:2500
Paper size	A0

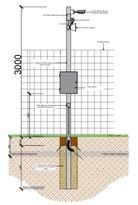
GREENCELLS GROUP

Section A



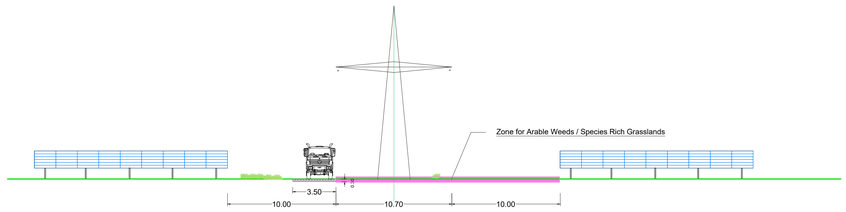
Section B

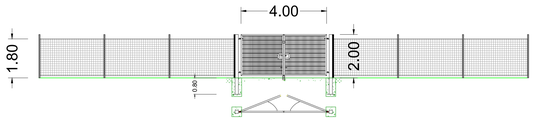




CCTV Detail
Scale 1:50

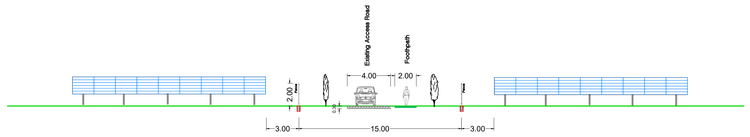
Section C



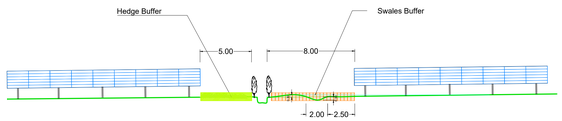


Fence and Gate Detail
Scale 1:100

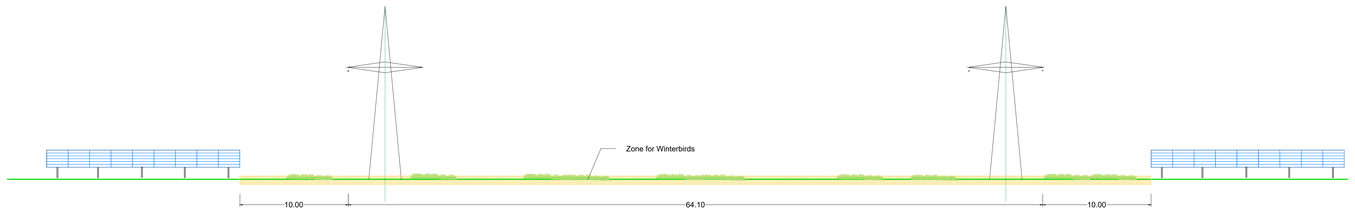
Section D + G



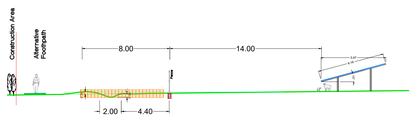
Section E



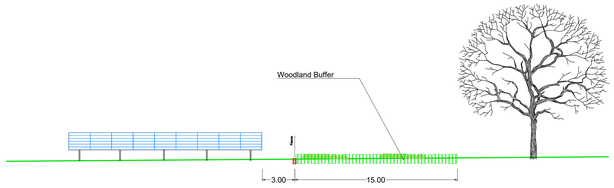
Section F



Section H



Section I



Electrical design

Station A

Inverter:
AC-Combiner:
Strings:
Panels:

Key

- Public Footpath (gap = 15,00m)
- Buffer Woodland (15,0m)
- Swales (Buffer 8,00m)
- Pond (Buffer 5,00m)
- Hedges (Buffer 5,00m)
- Badger Zone (Buffer 20,00m)
- Zone for Grass and Birds

Regulations 2009 Document Paragraph Reference Number

Regulation 5(2)(o)

PROJECT NAME

Little Crow Solar Park

DRAWING	DRAWING N°
Details	A02B0C0

GEOGRAPHICAL SITE:

COORDINATES	53.5773° N	0.5786° W
NN/MSL	60.0m	
SUNANGLE	13.42°	
DATE	21.12.2017 / 12:00	

SITE SYSTEM:			CHANGE	
SYSTEMLAYOUT	6L x 9	6L x 5	DATE	CHANGE
NUMBER OF TABLES	6.449 pc	345 pc		
PANEL ORIENTATION	Landscape			
NUMBER OF PANELS	357.561			

SITE TECHNOLOGY:		DRAW		
MODULE NAME			DATE	NAME
MODULE SIZE		DRAW	10.08.2018	M. Riedel
MODULE POWER	380 W	DRAW		
TYPE OF PANELS	POLY	DRAW		
ANGLE OF PANELS	15°	DRAW		
TABLESHADOW	1.0 m	DRAW		
ROWDISTANCES		CHECK		
		CHECK		

SITE TOTAL POWER		Signature:	
DC POWER	135.87 MWp		
AC-POWER nom.		Scale	1:200
AC-POWER max.		Paper size	A0

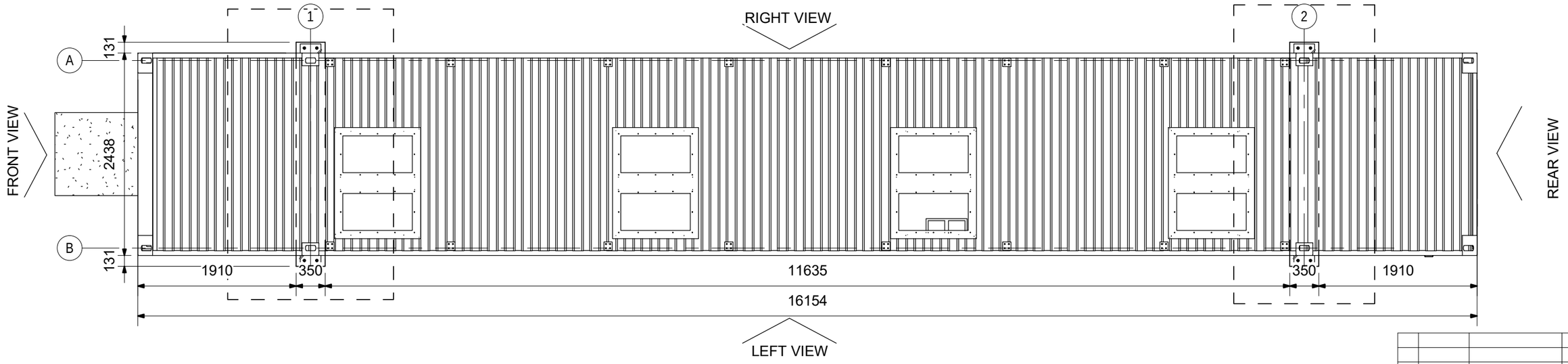
GREENCELLS GROUP

Greencells GmbH
Immanuelkirchstraße 3-4
10405 Berlin/Deutschland / Germany

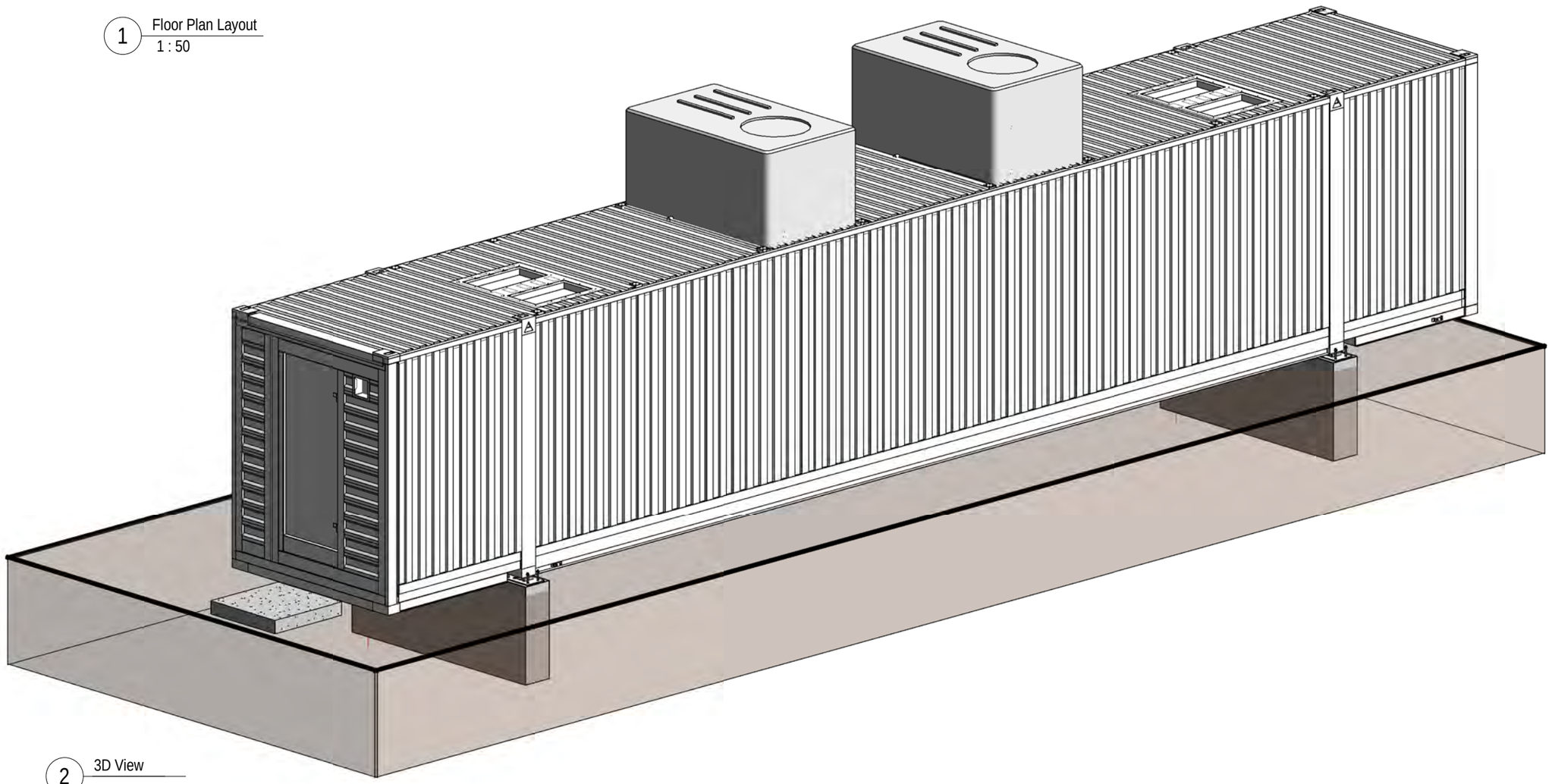
http://www.greencells.de

tel: +49 (0)30 / 921 033 0
fax: +49 (0)30 / 921 033 11

info@greencells.de



1 Floor Plan Layout
1 : 50



2 3D View

Rev	Date	Revision Description	Drawn/ Checked	Approved
O	30.11.2018	Original	SF	EG

Revision Schedule

Do not scale from this drawing

All reasonable care and diligence has been taken in the accuracy & content of this drawing. g2Energy advises that care is taken if you should scale items from this drawing. g2Energy should be consulted prior to the re-use of this drawing.

No part of this drawing may be reproduced, transcribed, stored in a retrival system, or transmitted in any form or by any means, electronic mechanicial, photcopying, recording or otherwise, without the prior written permission of the copyright owner

© 2017 Copyright of G2 Energy Limited. All rights reserved.

g2 ENERGY

Olney Office Park, 1 Osier Way, Olney, Buckinghamshire
MK46 5FP United Kingdom
Telephone: 01234 482482 Faxsimile: 01234 241312
Web: www.g2energy.co.uk e-mail: enquiries@g2energy.co.uk

Project Number:	P2064
Project Title:	Little Crow Solar Farm
Client(s):	INRG Solar (Little Crow) Ltd
Project Issue Date:	November 2018

Drawn By:	Checked By:	Approved By:
SF	EG	EG

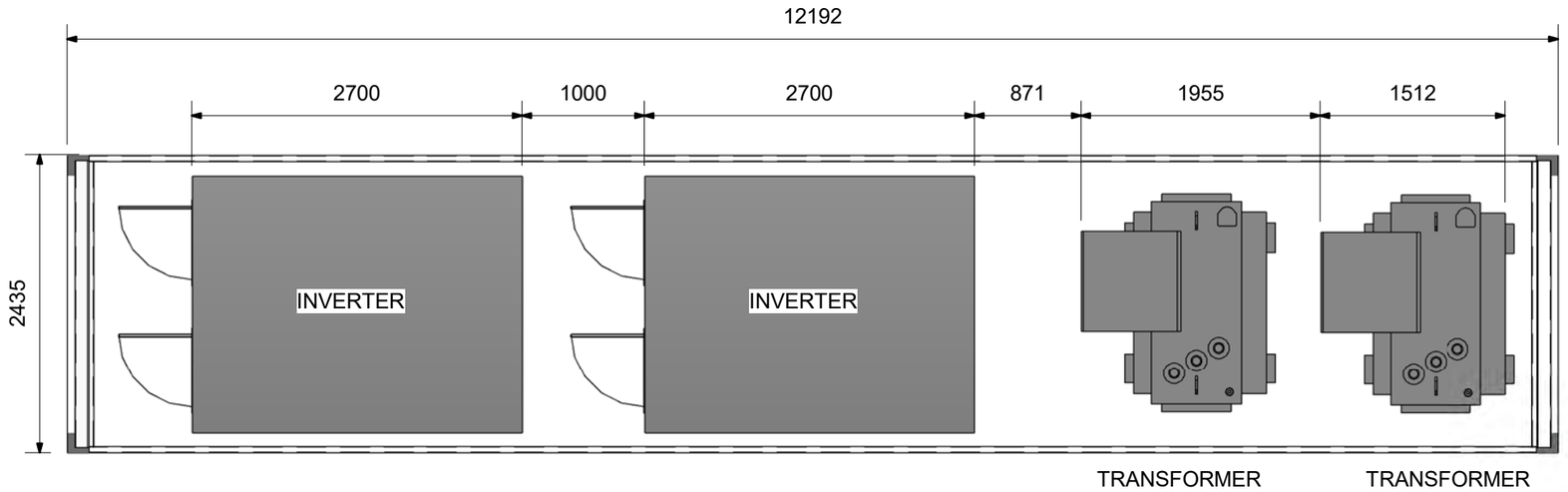
Drawing Number: P2064(01)-25-01-O

Drawing Name: 53ft Battery Container Plan & 3D View

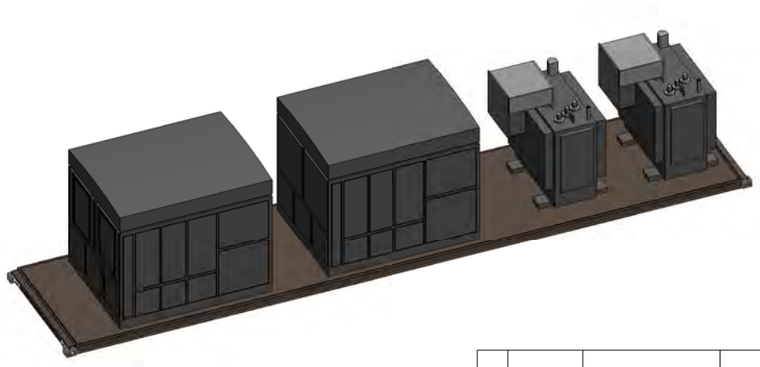
Sheet Print Stamp: 02/12/2018 19:14:51

Scale: 1 : 50 @Paper Size: A3

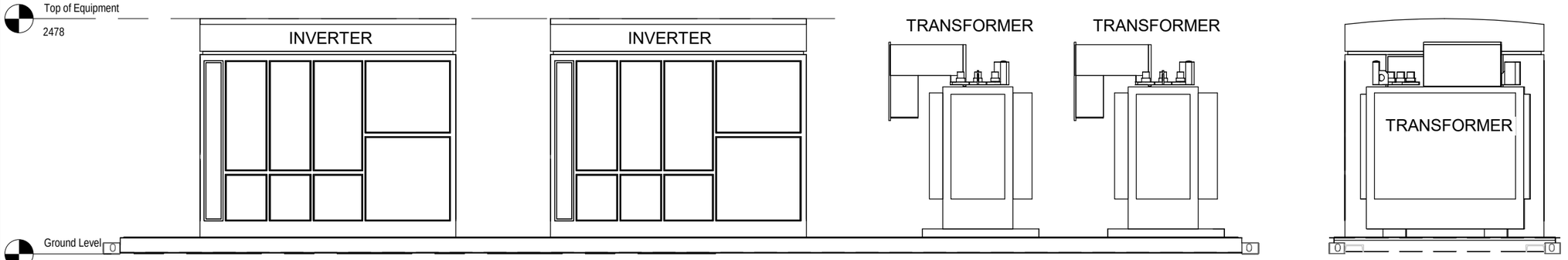
Drawing Status : FOR PLANNING



1 Equipment Layout Plan
1 : 50

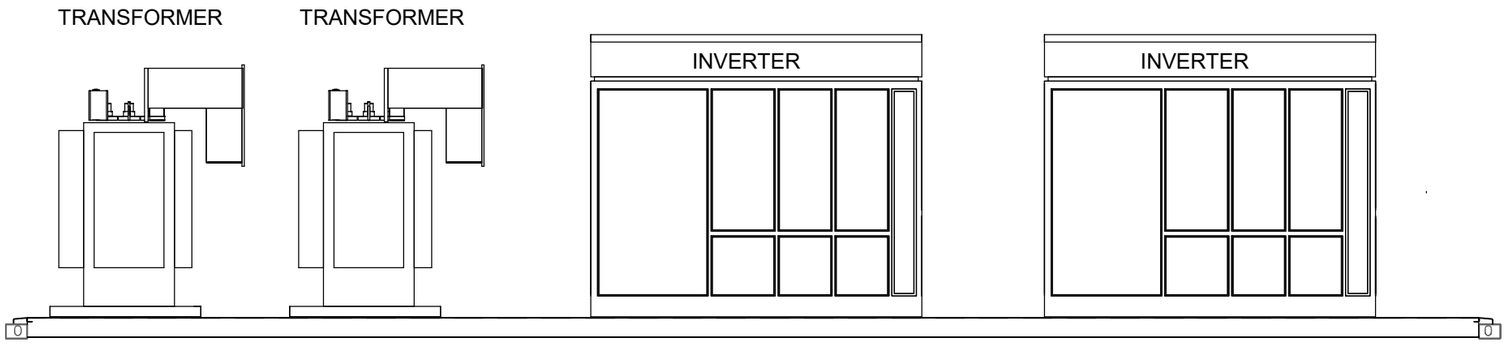


6 3D View

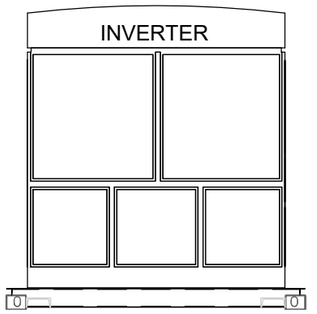


2 South
1 : 50

4 East
1 : 50



3 North
1 : 50



5 West
1 : 50

Rev	Date	Revision Description	Drawn/ Checked	Approved
O	29.11.2018	Original	SF/EG	EG

Revision Schedule

Do not scale from this drawing

All reasonable care and diligence has been taken in the accuracy & content of this drawing. g2Energy advises that care is taken if you should scale items from this drawing. g2Energy should be consulted prior to the re-use of this drawing.

No part of this drawing may be reproduced, transcribed, stored in a retrival system, or transmitted in any form or by any means, electronic mechanicial, photcopying, recording or otherwise, without the prior written permission of the copyright owner

© 2018 Copyright of G2 Energy Limited. All rights reserved.

g2 ENERGY

Olney Office Park, 1 Osier Way, Olney, Buckinghamshire
MK46 5FP United Kingdom
Telephone: 01234 482482 Faxsimile: 01234 241312
Web: www.g2energy.co.uk e-mail: enquiries@g2energy.co.uk

Project Number:	P2064
Project Title:	Little Crow Solar Farm
Client(s):	INRG Solar (Little Crow) Ltd
Project Issue Date:	November 2018

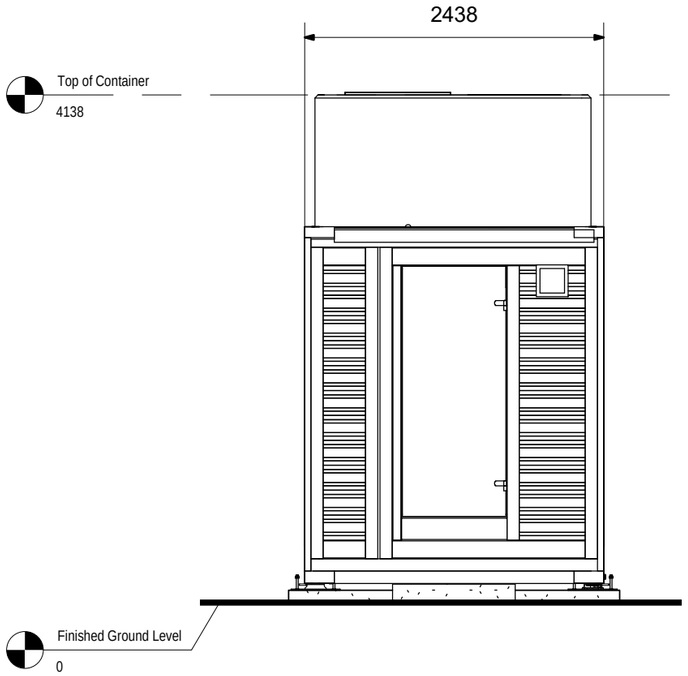
Drawn By:	SF	Checked By:	EG	Approved By:	EG

Drawing Number: P2064(01)-25-01-O

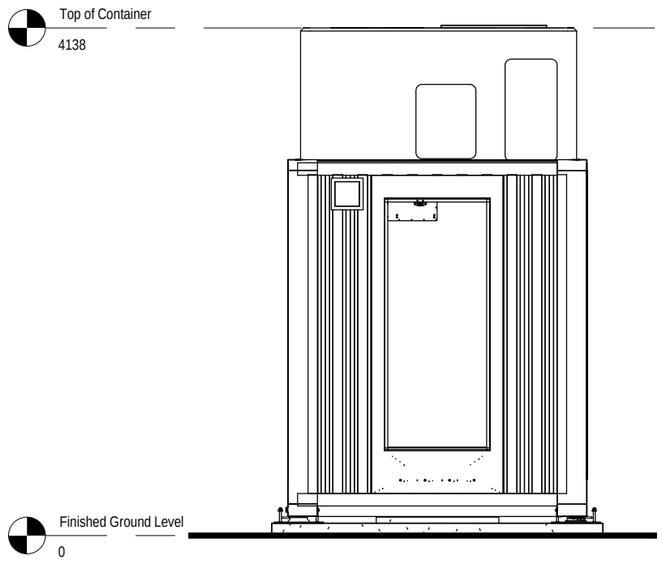
Drawing Name: Transformer and Inverter Skid Plan & Elevations

Sheet Print Stamp:	02/12/2018 19:03:37
Scale: 1 : 50	@Paper Size: A3

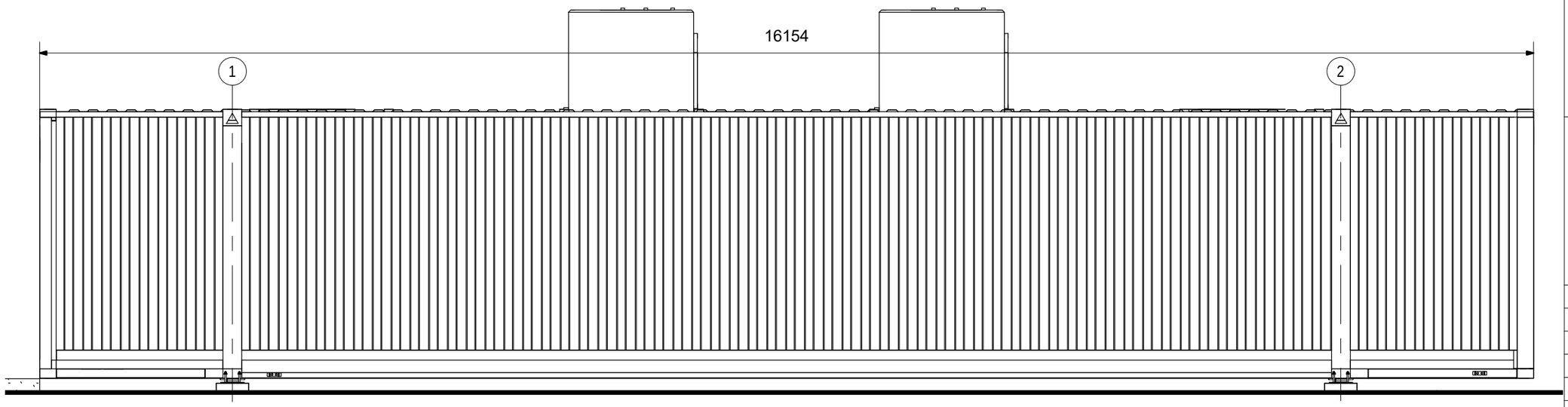
Drawing Status : FOR PLANNING



1 Front View
1 : 50



2 Rear View
1 : 50



3 Left View
1 : 50

NOTES:

All dimensions in millimetres.

Total weight of fully loaded container is 63,503 kg's.

Container to be level within 12.7mm within the 2 supports.

Dovetail twistlocks to be secured to container just prior to landing on supports and then welded to steel plates after landing and aligned correctly.

Rev	Date	Revision Description	Drawn/ Checked	Approved
O	30.11.2018	Original	SF	EG

Revision Schedule

Do not scale from this drawing

All reasonable care and diligence has been taken in the accuracy & content of this drawing. g2Energy advises that care is taken if you should scale items from this drawing. g2Energy should be consulted prior to the re-use of this drawing.

No part of this drawing may be reproduced, transcribed, stored in a retrival system, or transmitted in any form or by any means, electronic mechanicial, photcopying, recording or otherwise, without the prior written permission of the copyright owner

© 2017 Copyright of G2 Energy Limited. All rights reserved.

g2 ENERGY

Olney Office Park, 1 Osier Way, Olney, Buckinghamshire
MK46 5FP United Kingdom
Telephone: 01234 482482 Faxsimile: 01234 241312
Web: www.g2energy.co.uk e-mail: enquiries@g2energy.co.uk

Project Number:	P2064
Project Title:	Little Crow Solar Farm
Client(s):	INRG Solar (Little Crow) Ltd
Project Issue Date:	November 2018

Drawn By:	SF	Checked By:	EG	Approved By:	EG

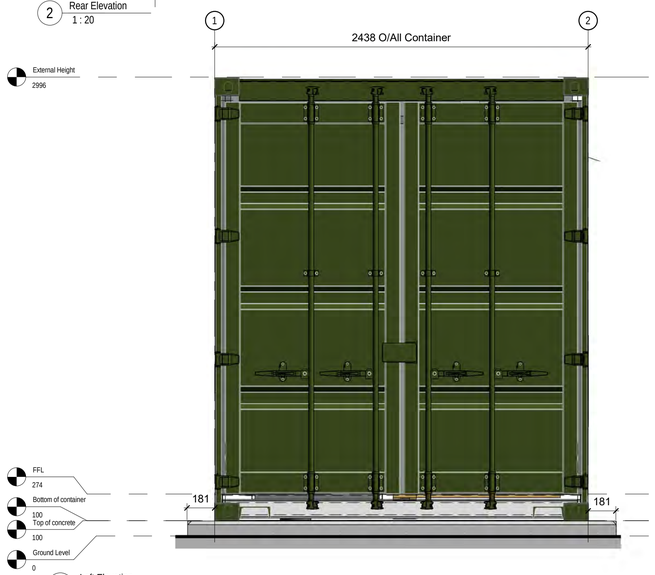
Drawing Number:	P2064(01)-25-02-O
Drawing Name:	53ft Battery Container Elevations
Sheet Print Stamp:	02/12/2018 19:17:52
Scale: 1 : 50	@Paper Size: A3
Drawing Status :	FOR PLANNING



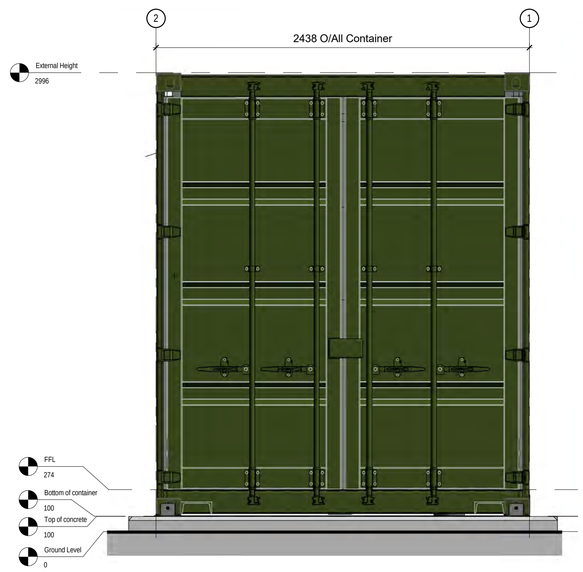
1 Front Elevation
1 : 20



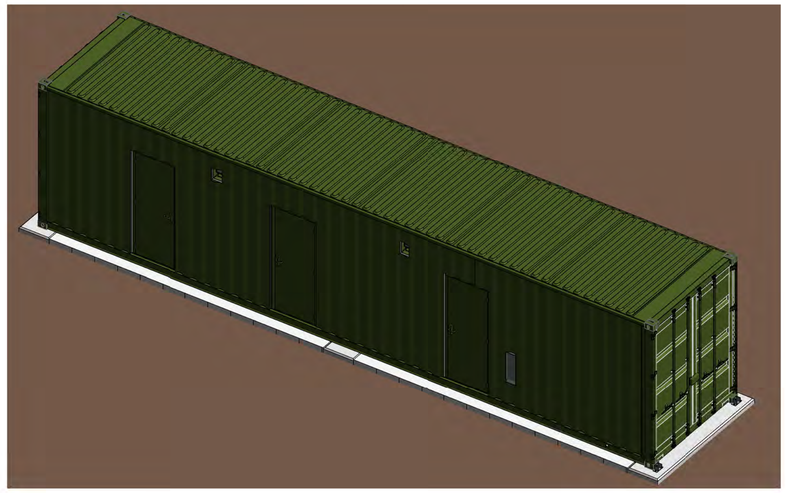
2 Rear Elevation
1 : 20



3 Left Elevation
1 : 20



4 Right Elevation
1 : 20



5 3D View

Notes

The unit is a 40ft High Cube Container
Length = 12192mm
Width = 2438mm
Height = 2896mm

The colour is fabricated from corten Steel, then painted Harrods Green Pantone 574 BS 2660

-Blast relief vents are AFP SHX UN 700, all vents shall be fitted with a insect screen.
-Locks to be europrofile cylinders or rim cylinders.

- External Doors are to have weatherproof seals, top edge of doors to have lip to prevent water ingress.
- All cable entries are sealed using RISE
- Conduits are galvanised steel.
- Internal finish is 25mm Fireboard.
- PIR's are recessed into container to ensure they do not protrude.
- All air intakes to have spring closed dampers which will activate if a fire occurs.

Revision Number	Revision Date	Revision Description	Drawn/ Checked	Approved By
O	02.12.2018	Original	SF	EG

Revision Schedule

1:10 0 100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm 1m
1:20 0 400mm 800mm 1200mm 1600mm 20m
1:50 0 1m 2m 3m 4m 5m
1:100 0 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

Do not scale from this drawing

All reasonable care and diligence has been taken in the accuracy & content of this drawing. g2Energy advises that care is taken if you should scale items from this drawing. g2Energy should be consulted prior to the re-use of this drawing.

No part of this drawing may be reproduced, transcribed, stored in a retrival system, or transmitted in any form or by any means, electronic mechanicial, photcopying, recording or otherwise, without the prior written permission of the copyright owner

© 2016 Copyright of G2 Energy Limited. All rights reserved.

g2 ENERGY

Olney Office Park, 25 Osier Way, Olney, Buckinghamshire MK46 5FP United Kingdom

Telephone: 01234 905100 Faxsimile: 01234 241312
Web: www.g2energy.co.uk e-mail: enquiries@g2energy.co.uk

Project Number:	P2064
Project Title:	Little Crow Solar Farm
Client(s):	INRG Solar (Little Crow) Ltd
Project Issue Date:	November 2018

Drawn By: SF | Checked By: EG | Approved By: KR

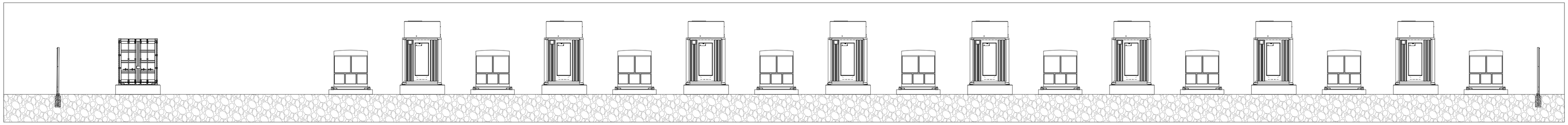
Drawing Number:
P2064(02)-25-01-O

Drawing Name:
40ft Client Container - Elevations

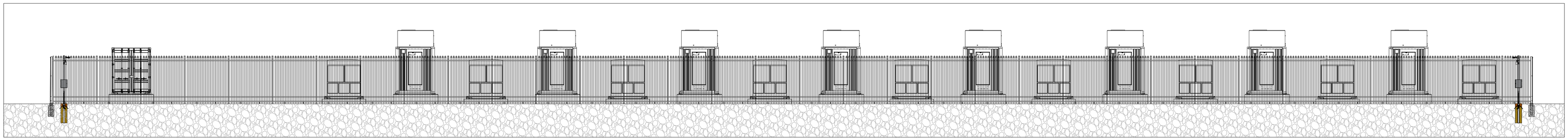
Sheet Print Stamp: 02/12/2018 21:03:41

Scale: 1 : 20 @ Paper Size: A1

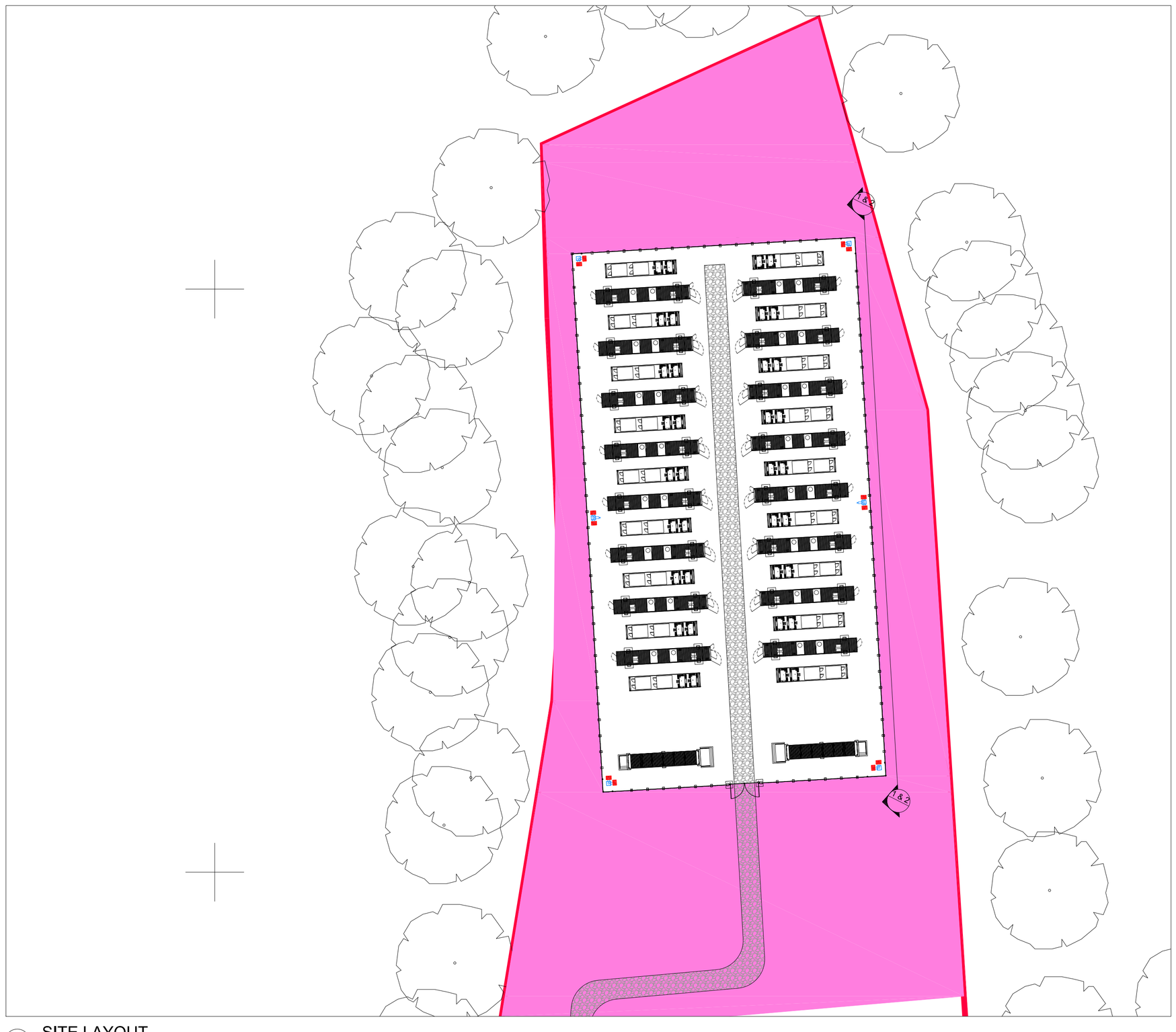
Drawing Status :
FOR PLANNING



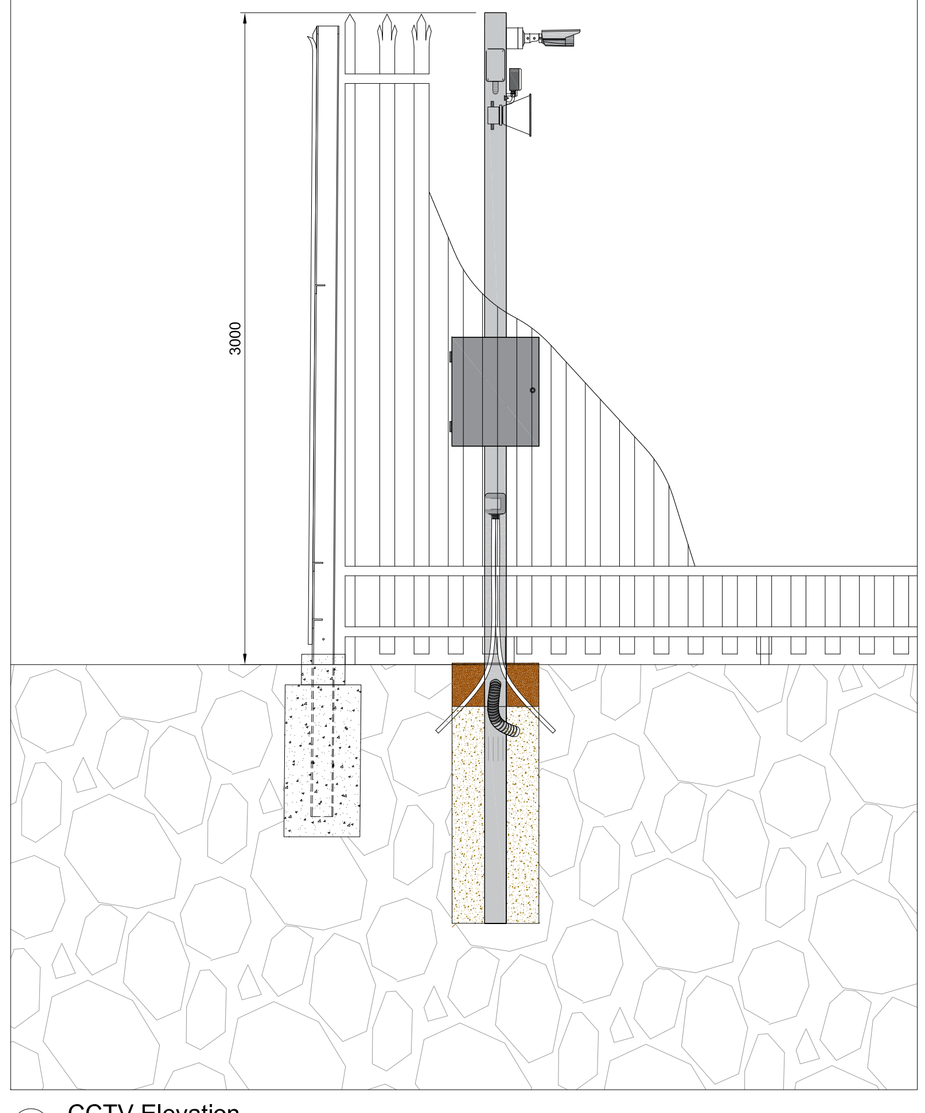
1 Site East Elevation
Scale 1:125 @ A1 1:250 @ A3



2 Site East Elevation with Fence
Scale 1:125 @ A1 1:250 @ A3



3 SITE LAYOUT
Scale : 1:500 @ A1 1:1000 @ A3



3 CCTV Elevation
Scale 1:20 @ A1 1:40 @ A3

O	30.11.2018	Original	SF	EG	KR
Revision	Rev Date:	Revision Description:	Drn	Ckd	Appd

Revisions Schedule

Do not scale from this drawing

All reasonable care and diligence has been taken in the accuracy & content of this drawing, g2 Energy advises that care is taken if you should scale items from this drawing, g2 Energy should be consulted prior to the re-use of this drawing.

No part of this drawing may be reproduced , transcribed, stored in a retrieval system or transmitted in any form or by any means either electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the copyright owner.

© 2018 Copyright of g2 Energy Limited. All Rights Reserved.

g2 ENERGY

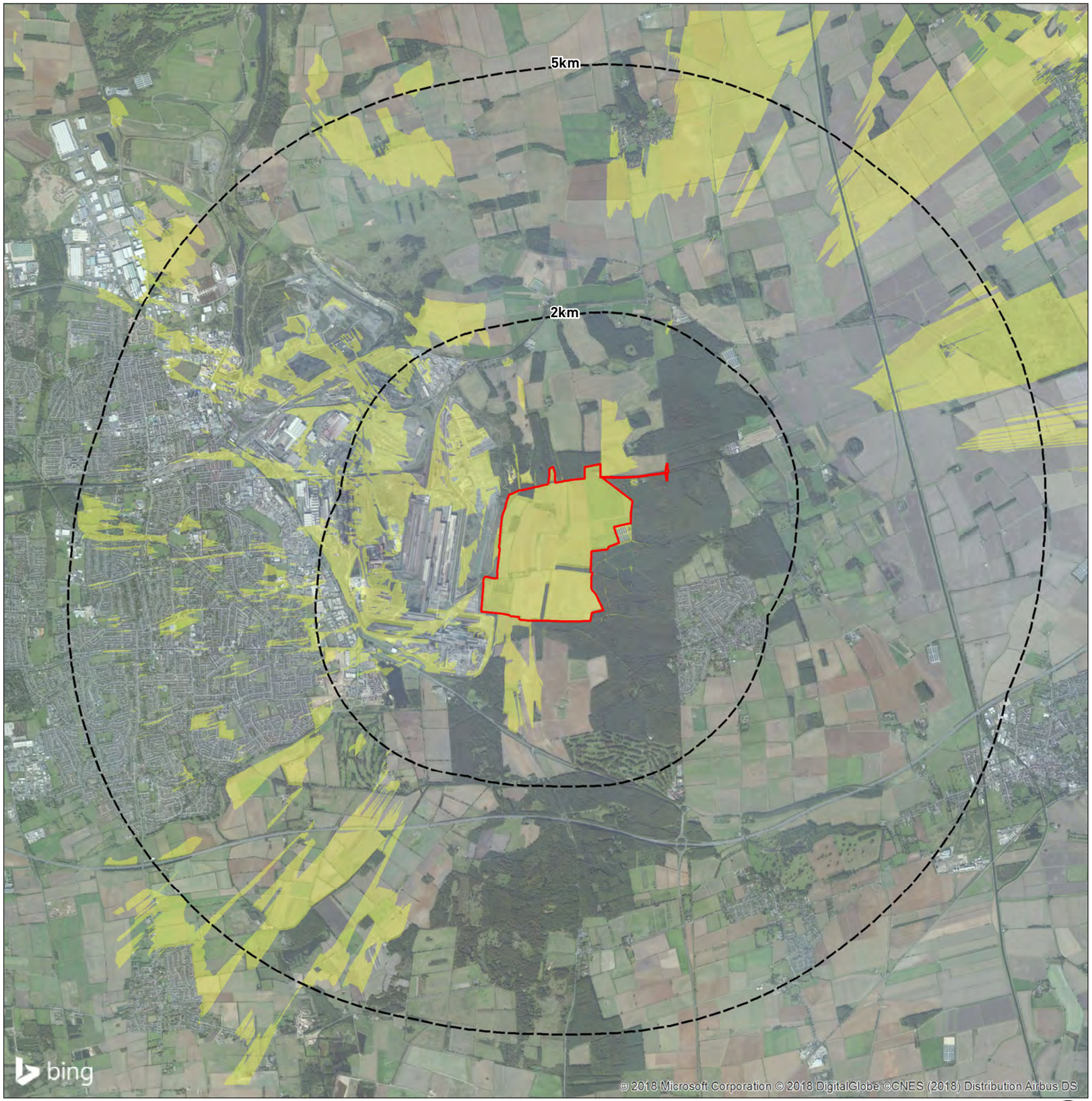
Olney Office Park, 1 Osier Way Olney, Buckinghamshire MK46 5FP United Kingdom

Telephone: 01234 482 482 Faxsimile: 01234 241 312
Web: www.g2energy.co.uk e-mail: enquiries@g2energy.co.uk

Project Number:	P2064
Project Title:	Little Crow Solar Farm
Client(s):	INRG Solar (Little Crow) Ltd
Project Issue Date:	November 2018
Drawn By: SF	Checked By: EG / Approved By: KR
Drawing Number:	P2064-31-03 Rev: O
Drawing Name:	Site Elevations and Camera Detail
Sheet Print Stamp:	
Scale:As SHown	@ Paper Size: A1
Drawing Status:	FOR PLANNING

APPENDIX 6.1

SITE CONTEXT



PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2017 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 2 km

N

KEY

Site Boundary

Screened ZTV - 3m Development Height

Screened ZTV Production Information -
- DTM data used in calculations is OS Terrain 5 that has been combined with OS Open Map Local data for woodland and buildings to create a Digital Surface Model (DSM).

- Indicative Woodland and Building heights are modelled at 15m and 8m respectively.
- Viewer height set at 1.7m
- Calculations include earth curvature and light refraction

N.B. This Zone of Theoretical Visibility (ZTV) image illustrates the theoretical extent of where the development will be visible from, assuming 100% visibility, and includes the screening effect from vegetation and buildings, based on the assumptions stated above.

Revisions:
First Issue- 22/01/2018 JS
A - (31/07/2018 JS) Boundary updated
B - (20/11/2018 AD) Revised red line

Figure 6.1 Site Context

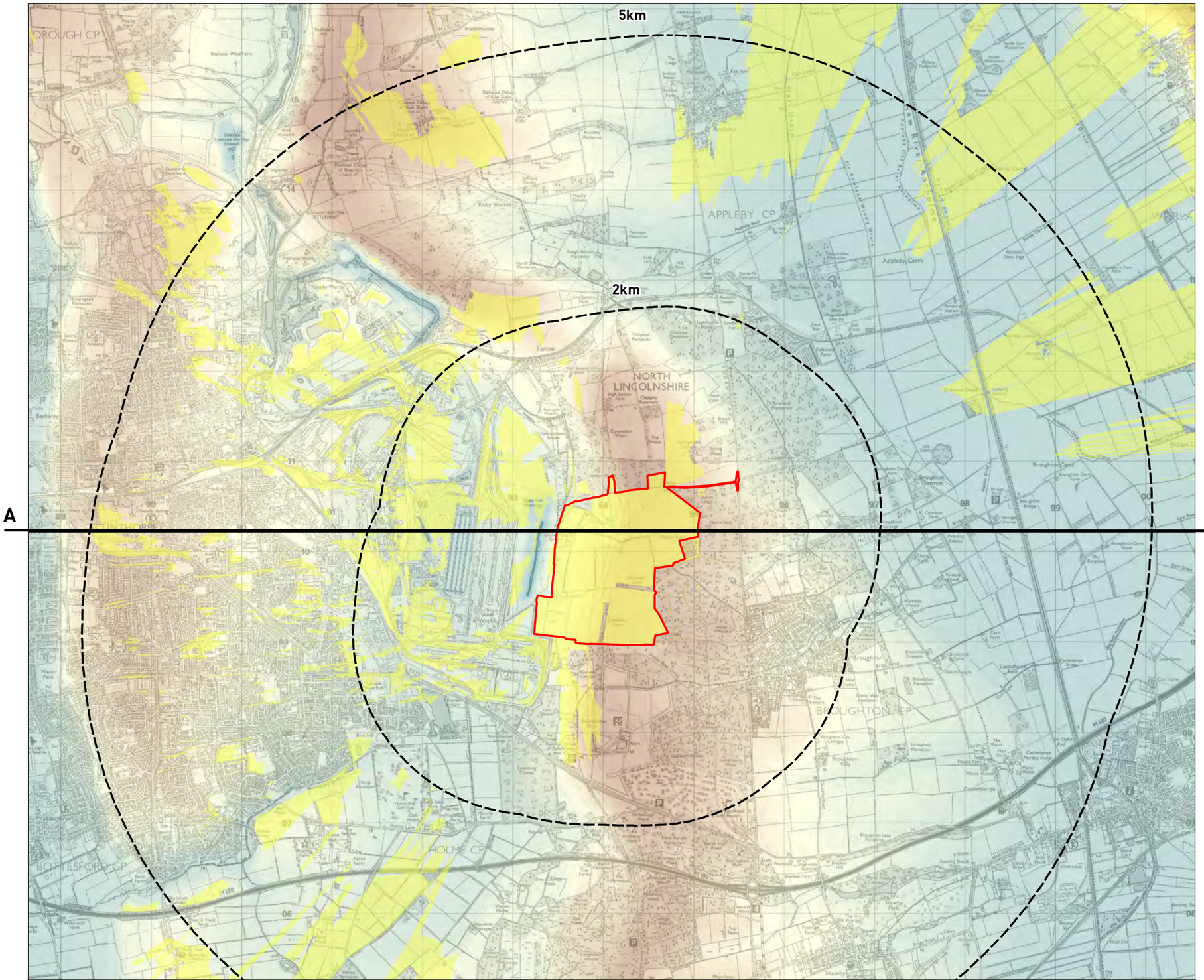
Little Crow Solar Park, Scunthorpe

Client:	INRG Solar Ltd		
DRWG No:	**P17-0718_03**	Sheet No: **-**	REV: **B**
Drawn by:	AD	Approved by:	KC
Date:	20/11/2018		
Scale:	1:50,000 @ A3 1:25,000 @ A1		

Pegasus Environment

APPENDIX 6.2

TOPOGRAPHY



KEY

Site Boundary

Screened ZTV - 3m Development Height

DTM (metres above ordnance datum)

High : 82.2423

Low : -12.91

Screened ZTV Production Information -
- DTM data used in calculations is OS Terrain 5 that has been combined with OS Open Map Local data for woodland and buildings to create a Digital Surface Model (DSM).

- Indicative Woodland and Building heights are modelled at 15m and 8m respectively.
- Viewer height set at 1.7m
- Calculations include earth curvature and light refraction

N.B. This Zone of Theoretical Visibility (ZTV) image illustrates the theoretical extent of where the development will be visible from, assuming 100% visibility, and includes the screening effect from vegetation and buildings, based on the assumptions stated above.

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2017 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 2 km

N

Revisions:
First Issue- 22/01/2018 JS
A - (31//07/2018 JS) Boundary amended
B - (20/11/2018 AD) Revised red line

Figure 6.2 Topography

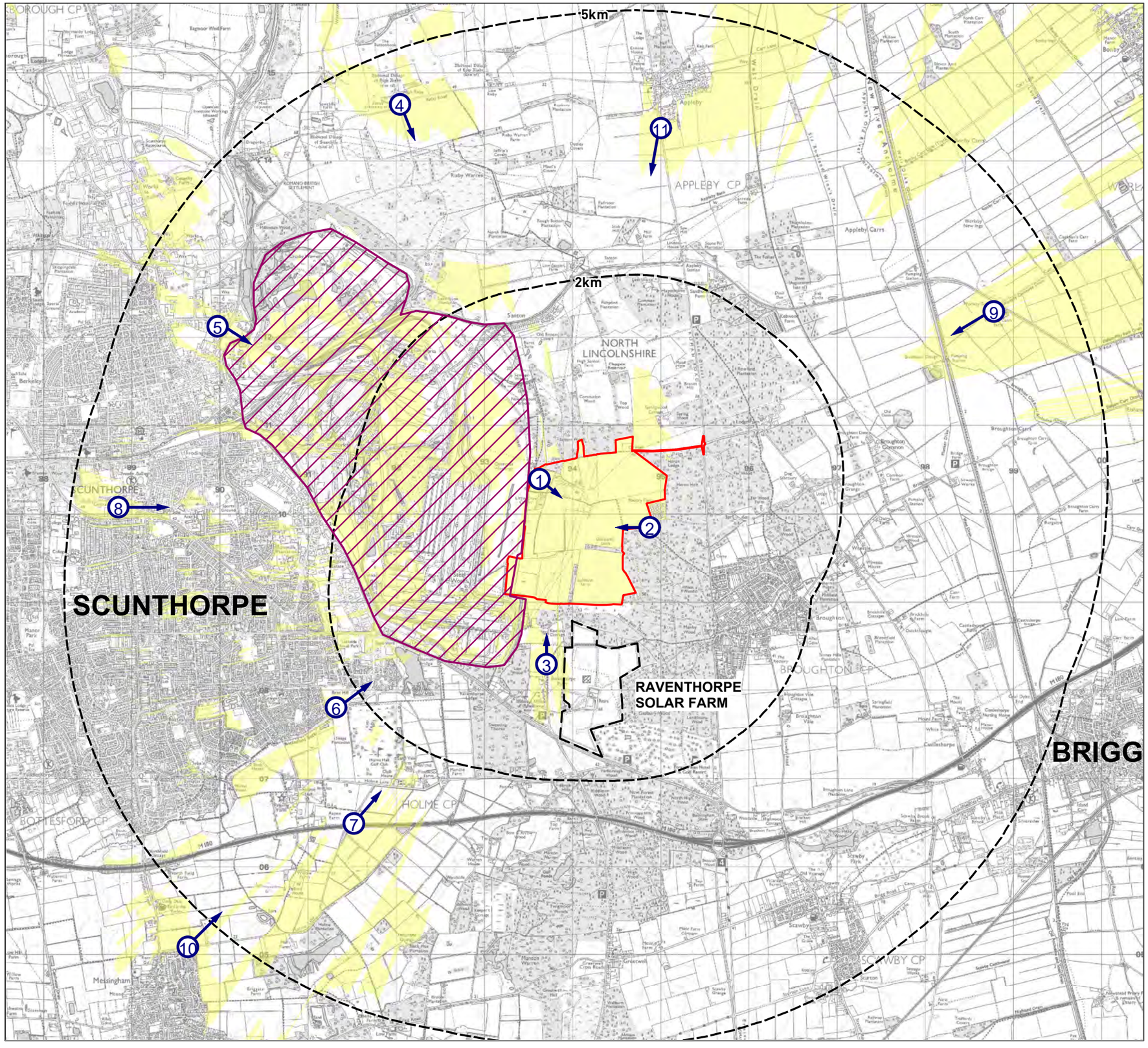
Little Crow Solar Park, Scunthorpe

Client: INRG Solar Ltd
DRWG No: **P17-0718_04** Sheet No: **-** REV: **B**
Drawn by: AD Approved by: KC
Date: 20/11/2018
Scale: 1:45,000 @ A3

Pegasus Environment

APPENDIX 6.3

LVIA VIEWPOINTS



KEY

- Site Boundary
- Screened ZTV - 3m Development Height
- Industrial area with no publicly accessible viewing points
- Proposed Assessment Viewpoints

Screened ZTV Production Information -
- DTM data used in calculations is OS Terrain 5 that has been combined with OS Open Map Local data for woodland and buildings to create a Digital Surface Model (DSM).

- Indicative Woodland and Building heights are modelled at 15m and 8m respectively.
- Viewer height set at 1.7m
- Calculations include earth curvature and light refraction

N.B. This Zone of Theoretical Visibility (ZTV) image illustrates the theoretical extent of where the development will be visible from, assuming 100% visibility, and includes the screening effect from vegetation and buildings, based on the assumptions stated above.

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2017 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 0113 287 8200 | www.pegasuspg.co.uk

0 2 km

N

FIGURE 6.3 -
LVIA VIEWPOINTS

LITTLE CROW SOLAR PARK

Client: INRG Solar Ltd

DRWG No: P17-0718_02 REV: B

Drawn by : CB Approved by: DT

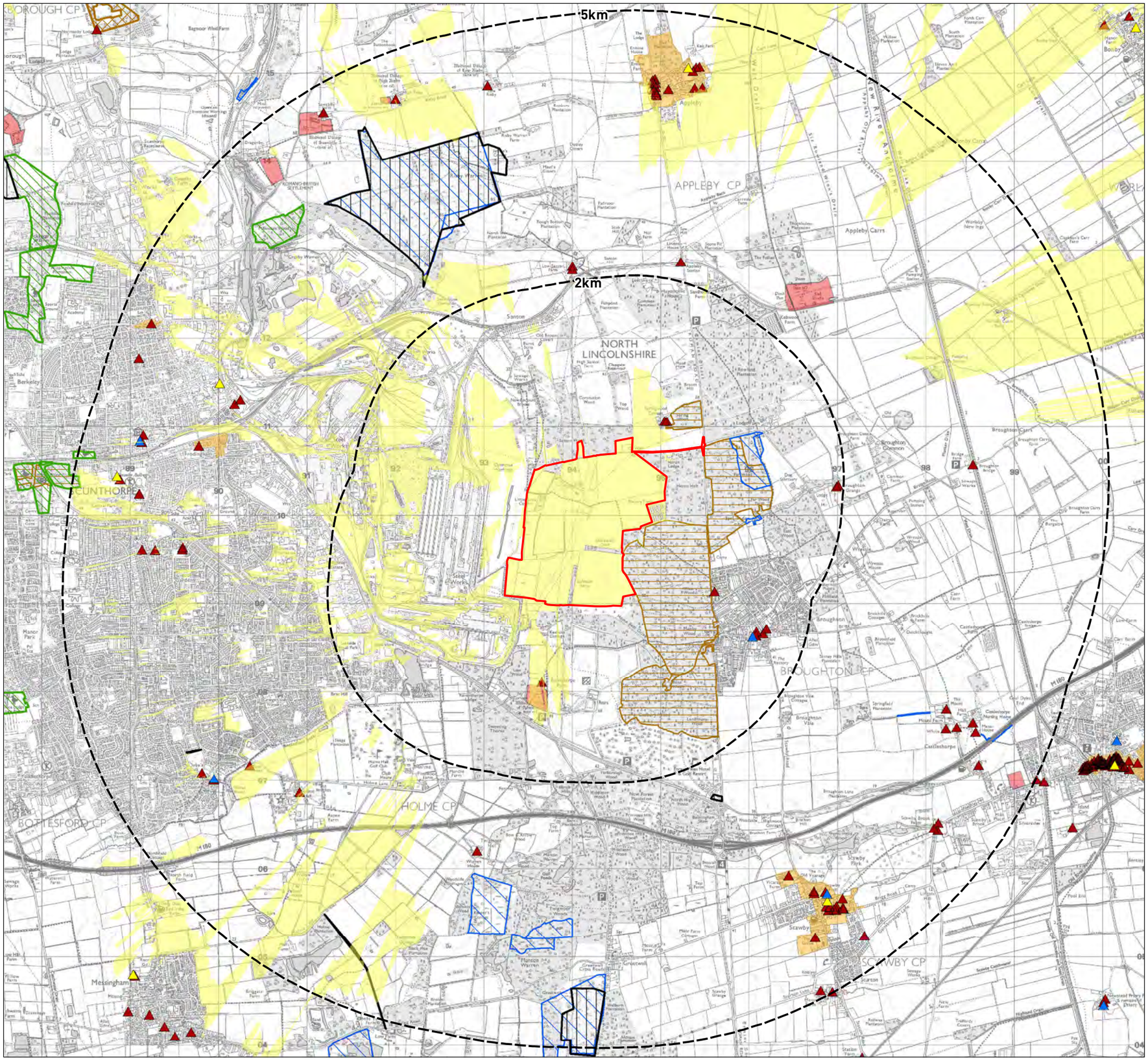
Date: 15/09/2017

Scale: 1:45,000 @ A3

Pegasus Environment

APPENDIX 6.4

ENVIRONMENTAL DESIGNATIONS



KEY

- Site Boundary
- Screened ZTV - 3m Development Height
- Open Access Land / Registered Common Land
- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Country Park
- Scheduled Monument
- Local Nature Reserve (LNR)
- Site of Special Scientific Interest (SSSI)
- Ancient Woodland
- Conservation Area

Screened ZTV Production Information -
- DTM data used in calculations is OS Terrain 5 that has been combined with OS Open Map Local data for woodland and buildings to create a Digital Surface Model (DSM).

- Indicative Woodland and Building heights are modelled at 15m and 8m respectively.
- Viewer height set at 1.7m
- Calculations include earth curvature and light refraction

N.B. This Zone of Theoretical Visibility (ZTV) image illustrates the theoretical extent of where the development will be visible from, assuming 100% visibility, and includes the screening effect from vegetation and buildings, based on the assumptions stated above.

Revisions:
First Issue- 22/01/2018 JS
A - (31/07/2018 JS) Boundary amended
B - (20/11/2018 AD) Revised red line

Figure 6.4
Environmental Designations Plan

Little Crow Solar Park, Scunthorpe

Client:	INRG Solar Ltd		
DRWG No:	**P17-0718_05**	Sheet No: **-**	REV: **B**
Drawn by:	AD	Approved by:	KC
Date:	20/11/2018		
Scale:	1:45,000 @ A3		

Pegasus Environment

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

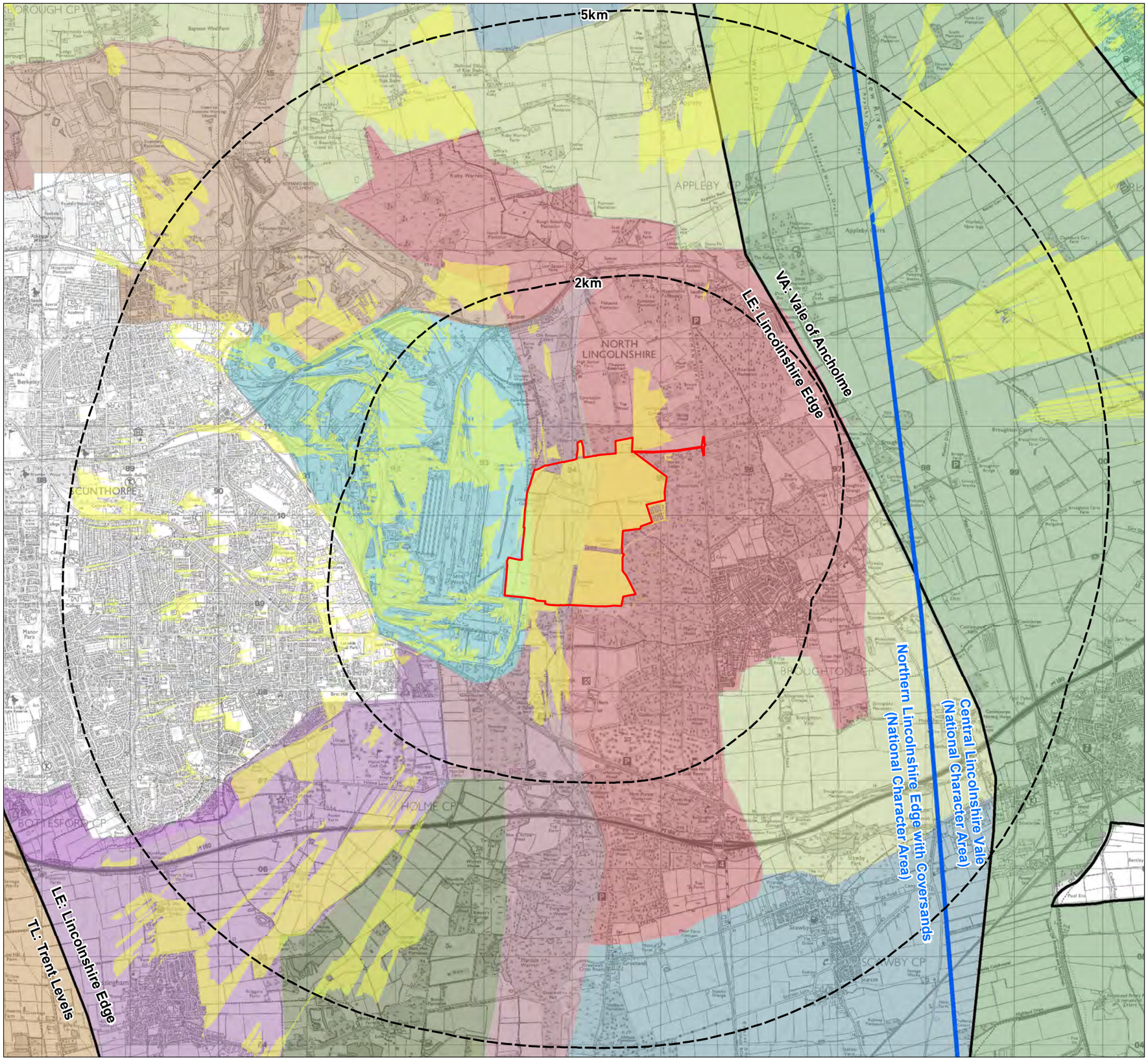
Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2017 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 2 km

N

APPENDIX 6.5

LANDSCAPE CHARACTER AREAS



KEY

- Site
- Screened ZTV - 3m Development Height
- National Landscape Character Areas
- Regional Character Areas - North Lincolnshire Landscape Charcter Assessment (1999)

North Lincolnshire Landscape Character Assessment (1999)

Local Landscape

- Despoiled Landscape
- Elevated Open Farmland
- Elevated Wooded Farmland
- Farmed Urban Fringe
- Flat Valley Bottom Farmland
- Heathy Woodland
- Industrial Landscape
- Open Undulating Farmland
- Steep Wooded Scarp Slope
- Wooded Farmed Scarp Slope
- Wooded Scarp Slope
- Wooded Springline Farmland
- Wooded Undulating Farmland

Screened ZTV Production Information -
- DTM data used in calculations is OS Terrain 5 that has been combined with OS Open Map Local data for woodland and buildings to create a Digital Surface Model (DSM).

- Indicative Woodland and Building heights are modelled at 15m and 8m respectively.
- Viewer height set at 1.7m
- Calculations include earth curvature and light refraction

N.B. This Zone of Theoretical Visibility (ZTV) image illustrates the theoretical extent of where the development will be visible from, assuming 100% visibility, and includes the screening effect from vegetation and buildings, based on the assumptions stated above.

Revisions:
First Issue- 22/01/2018 JS
A - (31/07/2018 JS) Boundary amended
B - (20/11/2018 AD) Revised red line

Figure 6.5
Landscape Character Areas

Little Crow Solar Park, Scunthorpe

Client:	INRG Solar Ltd		
DRWG No:	**P17-0718_06**	Sheet No: **-**	REV: **B**
Drawn by:	AD	Approved by:	KC
Date:	20/11/2018		
Scale:	1:45,000 @ A3		

Pegasus Environment

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2017 Emapsite Licence number 01000031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

APPENDIX 7.1

COPY OF NATURAL ENGLAND'S INFORMAL PRE-APP RESPONSE

Date: 14 September 2018
Our ref: DAS/12986
Your ref: N/A

Customer Services
Hornbeam House
Crewe Business Park
Electra Way
Crewe
Cheshire
CW1 6GJ

0300 060 3900

BY EMAIL ONLY

Dear Peter Timms

Discretionary Advice Service (Charged Advice)
DAS/12986
Development proposal and location: Little Crow Solar Array, Scunthorpe, DN15 0DE

Thank you for your consultation on the above dated 16 August 2018, which was received on the same date.

This advice is being provided as part of Natural England's Discretionary Advice Service. Clarkson and Woods on behalf of INRG Solar Ltd has asked Natural England to provide advice upon:

- Green infrastructure and/or priority habitat delivery
- The scope of the biological survey methodologies
- The scope of the ecological mitigation plan, biodiversity enhancement plan and construction management plan

This advice is provided in accordance with the Quotation and Agreement dated 29 August 2018.

The following advice is based upon the information within the documents:

1. Baseline Conditions Report: Extended Phase 1, Arable plants, great crested newts and water vole. Clarkson & Woods Ecological Consultants July 2018.
2. Interim Bat Survey Report. Clarkson & Woods Ecological Consultants August 2018.
3. Breeding Bird Surveys. Clarkson & Woods Ecological Consultants version 2 July 2018.
4. Wintering Bird Survey. Clarkson & Woods Ecological Consultants June 2018.
5. Draft Environmental Statement Chapter 7 Ecology and Nature Conservation. July 2018.

Protected sites
Natural England is satisfied that, on the basis of the information provided, it can be excluded that the proposed plan or project will have a significant effect on the Humber Estuary SAC/ SPA/ Ramsar, either individually or in combination with other plans or projects.

Furthermore, Natural England is satisfied that the proposed operations are not likely to damage any of the interest features of the Humber Estuary SSSI, Broughton Alder Wood SSSI or Broughton Far Wood SSSI.

Natural England is satisfied that the ecological survey methodologies and survey effort are appropriate to support the conclusions of the draft Environmental Statement. Natural England concurs with the conclusions of the draft Environmental Statement and welcomes the measures outlined to minimise the impact of the installation of the solar farm on the neighbouring woodland (to

be included in a Construction Environmental Management Plan).

Ancient woodland
Natural England is satisfied that, on the basis of the information provided, that adequate measures will be put in place to protect the neighbouring ancient woodland, i.e. buffer zones and woodland planting. Therefore Natural England does not consider that the proposal will have a negative impact on the ancient woodland. Please see link to our standing advice on ancient woodland.

Protected species
This proposal, as presented, has the potential to affect species protected under European or UK legislation, in particular, badger. Natural England has produced Standing Advice which is available on its website. Whilst this advice is primarily designed to assist local planning authorities better understand the information required when assessing the impact of developments upon protected species, it also contains a wealth of information to help applicants ensure that their applications comply with good practice guidelines and contribute to sustainable development. In particular I would draw your attention to the flow chart which gives guidance on the species that are likely to be present on the application site based upon readily identifiable habitat features. Please refer to this Standing Advice for further information on what information the authority may require in terms of survey and mitigation proposals.

Further information can also be obtained from The Institute of Ecology and Environmental Management, The Bat Conservation Trust and Biodiversity Planning Toolkit for more guidance.

Biodiversity / priority habitat enhancements
Natural England welcomes all of the proposed biodiversity enhancement measures that have been outlined in the Environmental Statement and considers that they are appropriate to the impact of the proposal. In particular, the inclusion of open grazed areas for breeding and wintering birds, increased amount of hedgerows and swale creation will maintain and potentially improve biodiversity on site. In addition, the use of acid grassland seed mixes would be further enhanced by the inclusion of floristic components to provide pollen and nectar. Furthermore, it might be worth exploring the potential to leave sandier areas to regenerate naturally as this can lead to an increase in species diversity. We also welcome the production of a Landscape and Ecological Management Plan (LEMP) as this will provide confidence that the enhancement measures outlined will continue to be managed post construction.

Natural England would like to highlight that a 3ha area of the proposal site is currently under Higher Tier Countryside Stewardship for the maintenance of target feature grassland and buffer strips. Natural England would like to explore the possibility of retaining this area of land under the current management agreement as it contains indicators of lowland acid grassland species, including broomrape, which is quite unusual in this area.



Figure 1. Location of current Higher Tier Countryside Stewardship Agreement

Local wildlife sites
As you are aware there are a number of local wildlife sites within the vicinity of the proposal site. Natural England does not hold locally specific information on local sites and recommends further information may be available from Greater Lincolnshire Nature Partnership or the Local Records Centre.

For clarification of any points in this letter, please contact Hannah Gooch at Hannah.Gooch@naturalengland.org.uk or on 02082 258503.

This letter concludes Natural England's Advice within the Quotation and Agreement dated 29 August 2018.

The advice provided within the Discretionary Advice Service is the professional advice of the Natural England adviser named below. It is the best advice that can be given based on the information provided so far. Its quality and detail is dependent upon the quality and depth of the information which has been provided. It does not constitute a statutory response or decision, which will be made by Natural England acting corporately in its role as statutory consultee to the competent authority after an application has been submitted. The advice given is therefore not binding in any way and is provided without prejudice to the consideration of any statutory consultation response or decision which may be made by Natural England in due course. The final judgement on any proposals by Natural England is reserved until an application is made and will be made on the information then available, including any modifications to the proposal made after receipt of discretionary advice. All pre-application advice is subject to review and revision in the light of changes in relevant considerations, including changes in relation to the facts, scientific knowledge/evidence, policy, guidance or law. Natural England will not accept any liability for the accuracy, adequacy or completeness of, nor will any express or implied warranty be given for, the advice. This exclusion does not extend to any fraudulent misrepresentation made by or on behalf of Natural England.

Yours sincerely

Hannah Gooch
Yorkshire and Northern Lincolnshire Area Team
Natural England

Cc commercialservices@naturalengland.org.uk

Annex 1
European Protected Species

A licence is required in order to carry out any works that involve certain activities such as capturing the animals, disturbance, or damaging or destroying their resting or breeding places. Note that damage or destruction of a breeding site or resting place is an absolute offence and unless the offences can be avoided (e.g. by timing the works appropriately), it should be licensed. In the first instance it is for the developer to decide whether a species licence will be needed. The developer may need to engage specialist advice in making this decision. A licence may be needed to carry out mitigation work as well as for impacts directly connected with a development. Further information can be found in Natural England's 'How to get a licence' publication.

If the application requires planning permission, it is for the local planning authority to consider whether the permission would offend against Article 12(1) of the Habitats Directive, and if so, whether the application would be likely to receive a licence. This should be based on the advice Natural England provides at formal consultation on the likely impacts on favourable conservation status and Natural England's guidance on how the three tests (no alternative solutions, imperative reasons of overriding public interest and maintenance of favourable conservation status) are applied when considering licence applications.

Natural England's pre-submission Screening Service can screen application drafts prior to formal submission, whether or not the relevant planning permission is already in place. Screening will help applicants by making an assessment of whether the draft application is likely to meet licensing requirements, and, if necessary, provide specific guidance on how to address any shortfalls. The advice should help developers and ecological consultants to better manage the risks or costs they may face in having to wait until the formal submission stage after planning permission is secured, or in responding to requests for further information following an initial formal application.

The service will be available for new applications, resubmissions or modifications – depending on customer requirements. More information can be found on Natural England's website.

APPENDIX 7.2

PHASE 1 HABITAT MAP AND TARGET NOTES



Table 7.5: Figure 1 Target Notes

No.	Description
TN1	Shallow valley area sloping down to a small stream. Covered with tall ruderal species with scattered young willow, hawthorn and bramble scrub
TN2	Mature oak tree with small number of Potential Roost Features (PRFs) such as loose, peeling bark, vertical frost cracks, rot holes and woodpecker holes. Considered to hold Moderate Potential for roosting bats
TN3	Dilapidated brick structure within dense hawthorn scrub
TN4	Mosaic of scrub, tall ruderals and poor SI grassland with farm track running through the middle. Occasional semi-mature ash tree scattered amongst scrub.
TN5	Mature oak tree with no obvious PRFs seen from the ground, but is of an age and size that PRFs may be present further up. Considered to hold Low Potential for roosting bats
TN6	Brown hares seen frequently
[redacted]	
TN9	Brick structure in disrepair within scrub area.
[redacted]	
TN11	Raised circular mound approximately 2m tall. Vegetated by course grasses and ruderal/herbaceous species, including false oat grass, cock's foot, hogweed, autumn hawkbit *Leontodon autumnalis*, creeping thistle and ragwort
[redacted]	
TN13	Raised bund reaching approximately 15m tall in far south west corner of the site. Vegetated with a mix of dense bramble scrub, course grasses and ruderal species.

TN15	Area in north edge of Field F11 around the edge of circular mound (TN11) containing frequent northern marsh orchid, and occasional bee orchid.
TN16	Poultry Farm
TN17	Fenced area of bare ground at a former oil well, used for storing hay bales at the time of survey, Several self-seeded sycamore, ash and blackthorn trees scattered around the edges

APPENDIX 7.3

DESIGNATED SITES FOR NATURE CONSERVATION WITH 1KM

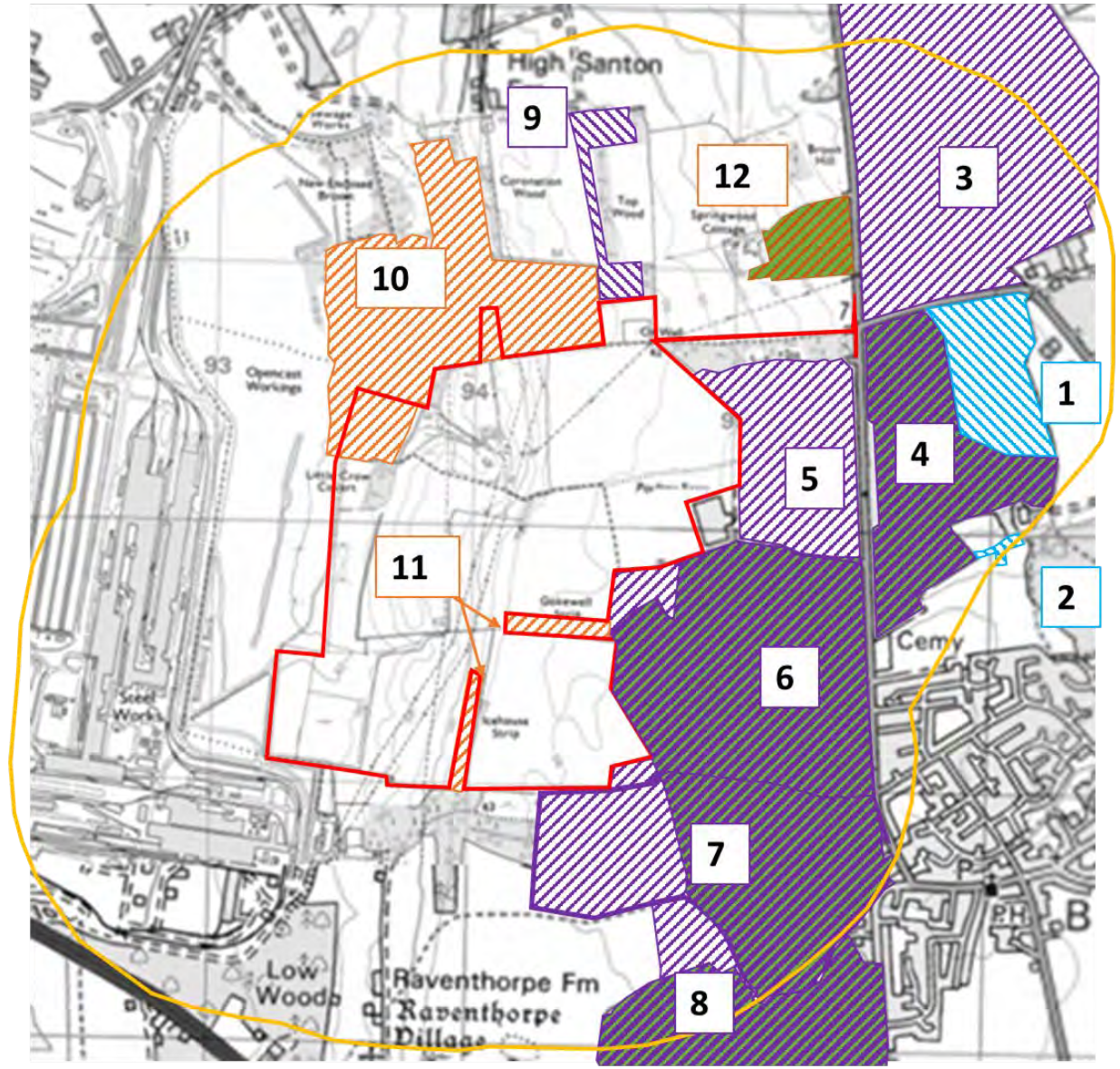

High Santon
9
12
3
10
1
4
5
11
2
6
7
8
Low Wood
Raventhorpe Fm
Raventhorpe Village
Cemy
Key:
Site of Special Scientific Interest (SSSI)
Local Wildlife Site (LWS)
LWS & Plantation on Ancient Woodland Site (PAWS)
Site of Nature Conservation Interest (SNCI)
SNCI & PAWS
Site Boundary
Approx. 1km search buffer
CLARKSON & WOODS
ECOLOGICAL CONSULTANTS
Project
Little Crow Solar
Title
Map of Nearby Sites Designated for Nature Conservation
Project Number
5642
Scale
Not to Scale
Date
10/07/18

Table 7.6: Designated Sites Shown in Figure 2

No.	Site
1	Broughton Far Wood SSSI
2	Broughton Alder Wood SSSI
3	Rowland Plantation LWS
4	Broughton Far Wood LWS (containing PAWS)
5	Heron Holt LWS
6	Broughton West Wood LWS (containing PAWS)
7	Manby Wood LWS (containing PAWS)
8	Gadbury and Lundimore Woods (containing PAWS)
9	Santon Wood East LWS
10	Santon Wood SNCI
11	Broughton West Wood SNCI
12	Spring Wood, Broughton SNCI (containing PAWS)

APPENDIX 7.4

EXTENDED PHASE 1, ARABLE PLANTS, GREAT CRESTED NEWTS & WATER VOLE SURVEY REPORT (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

Little Crow
Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

BASELINE CONDITIONS REPORT:

EXTENDED PHASE 1, ARABLE PLANTS, GREAT CRESTED NEWTS & WATER VOLE

On behalf of INRG Solar (Little Crow) Ltd

November 2018

BASELINE CONDITIONS REPORT:

EXTENDED PHASE 1, ARABLE PLANTS, GREAT CRESTED NEWTS & WATER VOLE

LITTLE CROW SOLAR, SANTON, LINCOLNSHIRE

carried out by

CLARKSON & WOODS
ECOLOGICAL CONSULTANTS

commissioned by

INRG SOLAR (LITTLE CROW) LTD

NOVEMBER 2018

BASELINE CONDITIONS REPORT:

EXTENDED PHASE 1, ARABLE PLANTS, GREAT CRESTED NEWTS & WATER VOLE

LITTLE CROW SOLAR, SANTON, LINCOLNSHIRE

CONTENTS

1 INTRODUCTION 2

2 SURVEY AND ASSESSMENT METHODOLOGY 4

3 SURVEY LIMITATIONS 9

4 DESK STUDY 11

5 EXTENDED PHASE 1 SURVEY 15

7 ARABLE PLANTS SURVEY 30

8 GREAT CRESTED NEWT SURVEY 33

9 WATER VOLE SURVEY 36

10 SUMMARY 39

Project title	Little Crow Solar, Santon, Lincolnshire			
Project number	5642			
Document title	Baseline Conditions Report: Extended Phase 1, Arable Plants, Great Crested Newts & Water Vole			
Client	INRG Solar (Little Crow) Ltd			
Author	Peter Timms			
Status	Checked by	Date	Approved for C&W by	Date
V1.0	Tom Clarkson	12/07/18	Peter Timms	17/0718
V2.0 *red line boundary updated*			Peter Timms	16/11/18

The information, data and advice which has been prepared and provided is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's (CIEEM) Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions. This report and its contents remain the property of Clarkson and Woods Ltd. until payment has been made in full.

1 INTRODUCTION

1.1.1 Clarkson and Woods Ltd. was commissioned by INRG Solar (Little Crow) Ltd to carry out an ecological survey of land of land proposed to accommodate Little Crow Solar Farm near Santon in Lincolnshire.

1.1.2 This report presents the findings of the extended phase 1 habitat survey, a rare arable plants survey, a great crested newt survey and a water vole survey.

1.1.3 The Phase 1 Habitat survey was carried out over several dates on 26th & 27th July, 2nd August and 15th September 2017. The results of the survey have been augmented from additional site visits undertaken during 2017-2018 associated with detailed surveys for a number of target ecological features.

1.1.4 The arable plants survey was conducted on the 12th and 13th of June 2018.

1.1.5 The great crested newt surveys were conducted on 24th April and 19th June 2018.

1.1.6 The water vole surveys were conducted on 14th and 15th September 2017, and 23rd April 2018.

1.1.7 Unless the client indicates to the contrary, information on the presence of species will be passed to the county biological records centre in order to augment their records for the area.

1.2 Site Description Summary

1.2.1 The site is located to the east of the town of Scunthorpe and consists of 17 (predominantly arable) fields bordered by a network of hedgerows and extensive woodland plantations. The land gradually slopes down to the west of the site, where a number of ditches and ponds are present. Grassland, scrub and ruderal habitat are also present in discrete areas around the site.

1.2.2 The wider landscape is characterised by the industrial steel workings to the west of the site, and further arable farmland and plantation woodland to the north and east. Beyond the woodland to the south lies a recently constructed solar array. The town of Broughton is located approximately 0.9km to the east of the site.

1.2.3 The development site is approximately 220 hectares (ha) in size, and the approximate centre of the site was at OS Grid Ref. SE 941 099. The location of the site is shown in Figures 1 and 2.

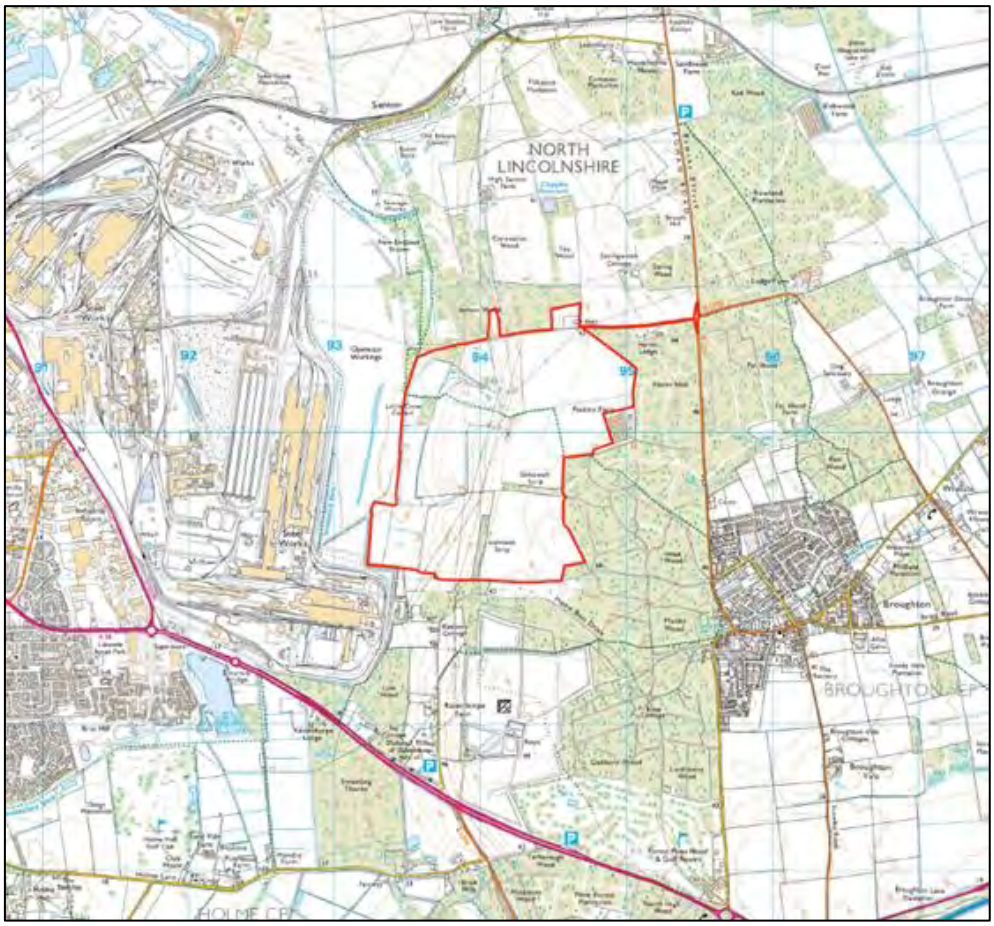


Figure 1: Ordnance Survey Map Showing Location of Site (OS Licence 100050456)

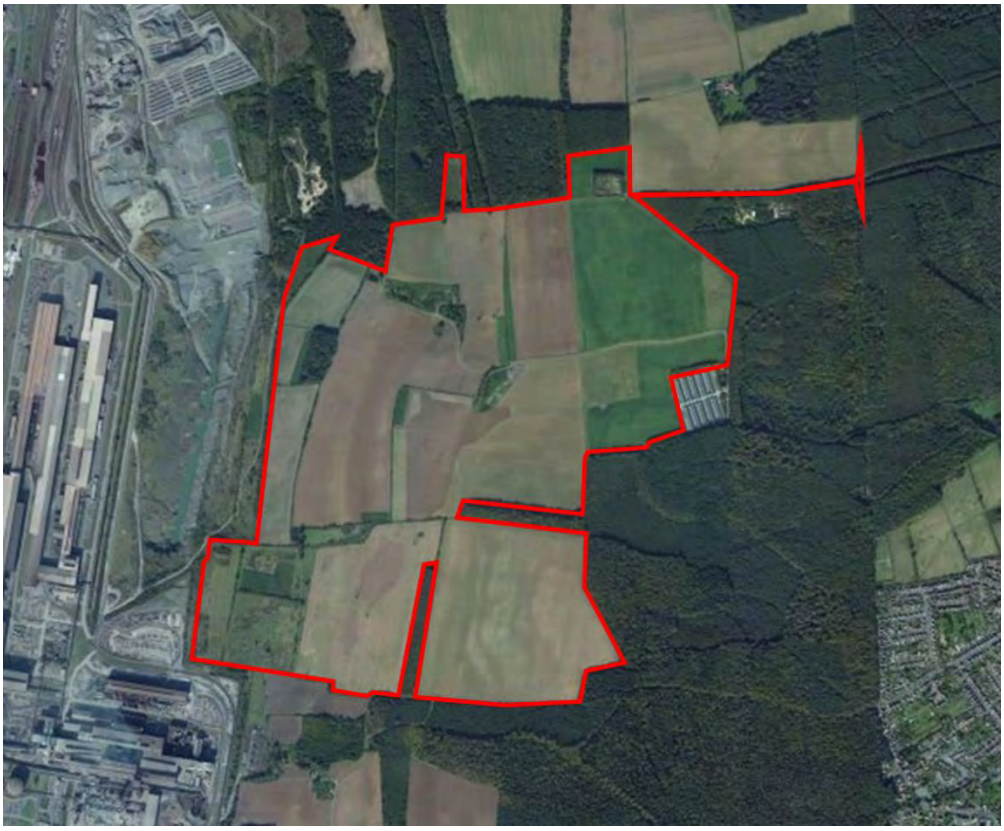


Figure 2: Aerial photograph of Site boundary (©2018 Microsoft)

2 SURVEY AND ASSESSMENT METHODOLOGY

2.1 Data Search

2.1.1 Statutory designated sites within proximity of the Site were identified using the Natural England/DEFRA web-based MAGIC database (www.MAGIC.gov.uk).

2.1.2 Ordnance Survey maps (1:25,000) and aerial images of the Site were examined online (bing.com/maps and maps.google.co.uk).

2.1.3 The Lincolnshire Environmental Records Centre (LERC) was consulted for records of protected and notable species within 2km of the site. The records centre was also asked to provide details of designated sites within 1km of the site.

2.2 Field Survey

Personnel

2.2.1 The extended Phase 1 Survey was undertaken by Peter Timms ACIEEM. Peter has 6 years' experience undertaking ecological surveys and has a BSc and MSc in relevant subjects. Peter holds a Natural England class licence (Level 1) for the survey of great crested newts (Registration Number: 2015-19739-CLS-CLS).

2.2.2 A survey for arable plant species was undertaken by Mark Baker MCIEEM. Mark has over 12 years' experience undertaking botanical and ecological surveys and has a BSc in a relevant subject.

2.2.3 The following staff members also assisted with the water vole surveys and the collection of water samples for eDNA analysis:

- *Phil Bowater BSc Grad CIEEM*
- *Patrick Ellison BSc Grad CIEEM*
- *Chris Poole BSc Grad CIEEM*

2.2.4 All above staff have been assessed under the Clarkson and Woods QA processes as competent to complete the survey.

Habitats

2.2.5 A habitat survey was carried out based on standard field methodology set out in the *Handbook for Phase 1 Habitat Survey* (2003 edition)[1].

2.2.6 Botanical names follow Stace (1997)[2] for higher plants and Edwards (1999)[3] for bryophytes.

2.2.7 Habitats are mapped following the codes and conventions described within the Phase 1 Habitat Survey Handbook and Target Notes (Table 3) are used to describe habitats not readily conforming to recognised types and evidence of or suitability for protected species and species of conservation concern.

[1] Nature Conservancy Council. (1990 - 2003 edition). *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit*, Joint Nature Conservation Committee
[2] Stace, C. (1997). *New Flora of the British Isles Second Edition*. Cambridge University Press
[3] Edwards, S.R. (1999). *English Names for British Bryophytes*. BBS, Cardiff

Arable Plants

2.2.8 A targeted survey for arable plant species (sometimes called arable weed species) was undertaken during the 12th and 13th June 2018. The margins of all arable fields were initially walked over by an experienced ecologist in order to rapidly assess the distribution of arable plants across the site. Areas noted to be of interest in terms of abundance and diversity of arable plants were then subject to more detailed survey. The location of these arable plant survey target zones are provided in Figure 5.

2.2.9 The survey used a modified version of the Plantlife Arable Plants Survey Form and adopted a methodology whereby areas noted to be of interest in the rapid assessment were then subject to a detailed inspection with all arable plant species being recorded. Each area was subjected to an extended and detailed search with all species within the area (other than crops) being recorded. Where threatened species were recorded these were ascribed a score according to the Plantlife Important Arable Plant Areas Methodology[4]

2.2.10 Arable plant species encountered and their relative abundance within each target survey zone were recorded and described using the DAFOR scale shown below:

- *D – Dominant*
- *A – Abundant*
- *F – Frequent*
- *O – Occasional*
- *R – Rare*

2.2.11 The quality of each arable area was assessed against the three criteria identified by Plantlife in identifying important arable plant areas[4].

2.3 Protected and Notable Species

2.3.1 Details of the legislative protection afforded to those protected species which have been identified as occurring or potentially occurring on the site are detailed in Appendix A.

Badgers

2.3.2 A search was made for badger *Meles meles* setts, and sett entrances were checked for signs of use by badgers or other mammals. Setts were classified into the following categories; Main, Subsidiary, Annexe or Outlying. Main setts are typically large structures which constitute the principal shelter and breeding location for a single social group. Subsidiary setts are significant setts which receive regular or sporadic usage but are not the focal sett for a social group. Annexe setts are smaller structures closely associated with Main setts but are not connected by underground tunnels. Outlying setts are located away from other setts and usually comprise no more than two, infrequently used sett entrances.

2.3.3 Sett entrances were counted and mapped to record tunnel direction and their relative level of usage.

2.3.4 Field signs such as 'snuffle holes' (holes dug by badgers when searching for invertebrates), pathways through vegetation, 'latrines' (small pits in which badgers deposit their faeces) and 'day nests' (nests of bedding material made by badgers for sleeping above ground) were also mapped.

[4] Byfield,A.J. & Wilson, P. J. (2005). Important Arable Plant Areas: identifying priority sites for arable plant conservation in the United Kingdom. Plantlife International, Salisbury, UK

Bats

2.3.5 The assessment of the suitability of the site for foraging and roosting bats was based on current guidance set out by the Bat Conservation Trust[5].

2.3.6 *Trees:* an inspection of trees on site was carried out from the ground, using binoculars, to record any signs of use of the tree by bat species. A ladder, powerful torch and a video fibrescope were available. Features such as frost cracks, rot cavities, flush cuts, split or decaying limbs (including hazard beams), loose bark and dense plates of ivy were inspected and recorded. Any signs of staining (from urine or fur rubbing) and scratch marks below potential access points were noted, and a search was made for droppings underneath these features.

2.3.7 *Habitat:* the habitats within the site were appraised for their suitability for use by foraging and commuting bats. In particular, the connectivity of the habitats on site to those lying beyond was taken into account. Vegetated linear features are typically important for many species to navigate around the landscape, while the presence of woodland, scrub, gardens, grassland and wetland features increases a site's foraging resource value to bats. The potential for noise or lighting disturbance which may affect commuting links was also recorded.

2.3.8 Detailed bat activity surveys have been conducted at the site. The details of outlined in a separate Appendix (7.4)

Otter

2.3.9 A search was made along the banks of water courses and water bodies and their adjacent habitats for otter *Lutra lutra* signs including spraints, tracks, castling, and rolling. The banks of any water courses were searched for the presence or potential for holts or other sheltering areas.

Water Vole

2.3.10 A water vole survey was carried out following guidance in the Water Vole Conservation Handbook – 3rd Edition[6] and the Mammal Society's Water Vole Mitigation Handbook[7].

2.3.11 Given that habitat suitability for water voles can change significantly throughout the course of the breeding season, the Mitigation Handbook recommends that two survey visits for the species are necessary to confirm presence or likely absence in most cases. One of these surveys should be completed in the first half of the water vole breeding season (mid-April to the end of June) and the other in the second half of the season (July to September inclusive) and the surveys should be two months apart.

2.3.12 The first water vole survey was undertaken on the 14th and 15th September 2017 by Peter Timms, with a second survey undertaken on 23rd April 2018 by Peter Timms, Patrick Ellison and Phil Bowater.

2.3.13 The surveys were carried out along the length of the ditch network at the site, which is primarily within the western part of the site. Both banks of the river were surveyed where possible and safe to do so. Where access was permitted, the survey area extend 100m up and downstream of the ditch network

[5] Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1.
[6] Rob Strachan, Tom Moorhouse and Merryl Gelling (2011), Water Vole Conservation Handbook (3rd ed.), Wildlife Conservation Research Unit (WildCRU)
[7] Dean, M., Strachan, R., Gow, D. & Andrews, R. (2016). *The Water Vole Mitigation Handbook (Mammal Society Mitigation Guidance Series).* Eds Fiona Matthews & Paul Chanin. Mammal Society, London.

off-site. Where the ditch network extended into the steelworkings off-site to the west of the site, no permissible access was available to extend the survey into this area. It is nevertheless considered that adequate survey effort has been made so that water voles would have been detected if they had been present within the development site. The area covered by the surveys is shown in Figure 6.

2.3.14 The ditch banks within the survey area were systematically searched, extending to at least 1m from the water's edge, for signs of water vole including: latrines (showing discrete piles of droppings); feeding remains with characteristically cut vegetation; burrow entrances above and below the water line; runways and footprints; sightings and sounds, particularly listening for the characteristic 'plop' of a water vole entering the water as a result of having been disturbed

Amphibians

2.3.15 All waterbodies within 500m of the Site were identified using Ordnance Survey maps and aerial imagery. Waterbodies within the site ownership and on publically accessible land were assessed during the field survey for their suitability to support amphibian species.

2.3.16 Where suitable water bodies were identified on accessible land a Habitat Suitability Index (HSI) score was calculated for each one following the methodology described by Oldham et al[8]. HSI scores give a relative indication of the likelihood that a water body would support breeding great crested newts. Factors which increase these scores include the presence of other ponds nearby, water quality, pond size, absence of fish/waterfowl, vegetation cover and shading.

2.3.17 Terrestrial habitats were also assessed for their suitability for foraging and sheltering amphibians. Amphibians require habitats such as grassland, scrub, woodland and hedgerows for dispersal and hibernation. Further hibernation features include buried rubble and logs, or mammal burrows.

eDNA Survey

2.3.18 Five ponds pond within the site were subject to eDNA survey on 24th April 2018. This was carried out within the optimal survey window (15th April and 30th June) to determine presence/likely absence. Surveys were carried out following best practice as outlined in the Defra Project WC1067[9].

2.3.19 The surveyed ponds contained >10cm water with full surveyor access to collect samples around the pond perimeter where possible. Care was taken to ensure that the water was not contaminated from other sources and that any sediment present was not stirred up to contaminate the samples. There were no constraints to sampling of the pond that may have resulted in provision of false positive or negative results.

2.3.20 The eDNA kit was provided and water samples analysed by ADAS UK.

2.3.21 Two of the ponds, which initially returned indeterminate results, were subsequently resampled on 19th June 2018. On this occasion, the eDNA kits were provided and water samples analysed by SureScreen Scientifics.

[8] Oldham. R.S., Keeble L., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal 10 (4), 143-155.
[9] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford.

Reptiles

2.3.22 Features on site were assessed for their potential to provide suitable habitats for use by reptile species. These include rough, tussocky grassland, scrub, disturbed land or refugia such as wood piles, rubble or compost heaps. Where present, suitable existing refugia were inspected for sheltering reptiles, and the ground was scanned whilst walking to look for basking species.

Birds

2.3.23 Breeding and wintering bird surveys have been conducted at the site, the details of which are outlined in Appendix 7.2 and 7.3

Invasive Species

2.3.24 Invasive species, such as Japanese knotweed *Fallopia japonica* and Himalayan Balsam *Impatiens glandulifera* were searched for and recorded.

Other Notable Species and Species of Conservation Concern

2.3.25 Field signs indicating the presence of other species of conservation concern, such as hares *Lepus europaeus,* harvest mice *Micromys minutus* and hedgehogs *Erinaceus europaeus* (Species of Principal Importance under the NERC Act (2006)) were recorded. Habitats were also assessed for their potential to support such species.

2.4 Quality Assurance

2.4.1 All ecologists employed by Clarkson and Woods are members of the Chartered Institute of Ecology and Environmental Management (CIEEM) and follow the Institute's Code of Professional Conduct[10] when undertaking ecological work.

2.4.2 The competence of all field surveyors has been assessed by Clarkson and Woods with respect to the CIEEM Competencies for Species Survey (CSS)[11].

2.4.3 This report has been prepared in accordance with the relevant British Standard: *BS42020: 2013 – Biodiversity: Code of Practice for Planning and Development*[12].

[10] CIEEM (2013). *Code of Professional Conduct*. www.cieem.net/professional-conduct.
[11] CIEEM (2013). *Competencies for Species Survey (CSS).* www.cieem.net/competencies-for-species-survey-css-
[12] The British Standards Institution (2013*). BS42020: 2013 – Biodiversity: Code of Practice for Planning and Development*. BSI Standards Ltd.

3 SURVEY LIMITATIONS

3.1 Desk Study

3.1.1 The data presented within the report should not be seen as exhaustive. Data obtained from within the search area is highly unlikely to constitute a complete record of habitats and species present within the search area. It is therefore possible that protected species may occur within the vicinity of the proposed development site that have not been identified within the desk study.

3.1.2 The data presented within the desk study section of this report constitutes a summary of the data obtained from the local records centre. Should additional detail be required on any of the records described within this report Clarkson and Woods Ltd. should be contacted.

3.2 Arable Plants

3.2.1 The majority of arable plant species are annuals and require suitable conditions in order to perform their life cycle in a given year. As such there may be arable plant species present in the seed bank that were not recorded during the surveys but that may appear in another year.

3.2.2 The arable plant survey was generally focused on the field margins at the site and it was not possible to survey the entire ground within the circa 209ha of arable land. Arable plants growing amongst crops are likely to have been missed if present with the centre of fields. However, arable plants do not generally flourish within the centre of conventionally managed arable crop fields, due to herbicide use and being outcompeted by crops, and it is therefore unlikely that or highly-diverse areas or abundant weed growth would have been missed. The survey approach taken is therefore considered likely to have identified the key areas of arable plants present at the site.

3.3 Water Voles and Otters

3.3.1 Otters have no defined breeding season and the breeding holt is kept deliberately obscure by the female so locating one can be difficult and time consuming.

3.3.2 Where water voles live at low densities or a site is at the edge of their range, field signs can be very limited.

3.4 Badgers

3.4.1 Areas with dense ground cover (hedges, scrub, woodland etc. were examined closely. If impenetrable vegetation prevented entry then the perimeter was examined in order to detect badger paths suggesting a hidden sett within the area. It cannot be guaranteed that all the entrances have been located, especially if a small sett is currently inactive or used seasonally and concealed in an area of thick scrub. Badgers may dig new holes and create new setts in a very short space of time.

3.5 General

3.5.1 This survey offers only a series of 'snapshots' of the site and takes no account of seasonal differences, or of any species which might choose to take up residence subsequently. At the same time a lack of signs of any particular species does not confirm its absence, merely that there was no indication of its presence during this survey.

3.5.2 If no action or development of this land takes place within twelve months of the date of this report, then the findings of this survey should be reviewed and may need to be updated. After three years the findings will be out of date and the full survey should be repeated.

4 DESK STUDY

4.1 Data Search – Designated Sites

International Designations within 10km of the Site

4.1.1 The Humber Estuary is designated a Special Protection Area (SPA), Special Conservation Area (SAC) and Ramsar site. The area encompassing the SPA is situated approximately 11km north of the site at the closest point, whilst the SAC and Ramsar site is located 9km west at the closest point. It primarily receives its designation for its estuarine habitats, which support a range of associated species including internationally important assemblages of wintering and migratory birds.

National Designations within 5km of the Site

4.1.2 Five Sites of Special Scientific Interest (SSSIs) are located within 5km of the application site, and are described below:

Broughton Far Wood SSSI

4.1.3 This is an extensive block of commercial woodland located approximately 820m east of the proposed solar array, although is 350m from the site access (which will utilise an existing farm track). This is designated for its rich woodland canopy and ground flora, as well as its areas of herb-rich limestone grassland in the north east corner.

4.1.4 The SSSI is separated from the application site by further woodland plantation, arable fields and the B1207 road.

Broughton Alder Wood SSSI

4.1.5 Situated approximately 1km east of the main development site, and is designated for its wet, alder *Alnus glutinosa* woodland and associated fen and spring habitats and flora. It is separated from the development site by extensive plantation woodland, the B1207 road, and a poultry farm.

Risby Warren SSSI

4.1.6 This is a remnant area of heathland which supports a variety of associated plant communities, include dune, heathland, acid and calcareous grassland which are affected by airborne pollution from the nearby industrial sites. Tree cover on the SSSI comprises coniferous shelter belt planting and as well as scattered birch *Betula sp*. and gorse *Ulex europaeus*. This is located approximately 2.65km north west of the site and is separated from the application site by plantation woodland, agricultural farmland, heavy industry and quarry workings.

Manton and Twigmoor SSSI

4.1.7 This comprises a complex of three separate sites, which are located approximately 3.1km south of the site at the closest point. Important habitats supported by the SSSI include heathland, acid grassland and wetland features, with wet woodland also present. Together the site components support a diverse range of associated floral species. The intervening landscape comprises woodland plantations, an existing solar array, a golf course and the busy A18 and M180 roads.

Castlethorpe Tufas SSSI

4.1.8 This is situated approximately 3.4km and is designated for its' geological interest.

Local Designations within 1km of the Site

4.1.9 Eleven locally designated sites for nature conservation are located within 1km of the application, which are described in Table 1. Of these, eight are Local Wildlife Sites (LWSs) selected by the Greater Lincolnshire Nature Partnership due to their importance for wildlife at a local level. Three sites are Sites of Nature Conservation Interest (SNCIs), the status of which has been superseded by the LWSs, but these sites retain SNCI status until they have been assessed against the LWS criteria.

Table 1: Non-statutorily designated sites within 1km of the application site

Site	Designation	Description	Size (ha)	Distance and bearing from site
Manby Wood	LWS	Botanically diverse wooded area, primarily consisting of broadleaved plantation with small areas of young coniferous plantation. Supports a variety of associated ground flora.	80.1	Adjacent to south-eastern boundary of site
Heron Holt	LWS	Woodland with parts containing diverse range of deciduous species and structural variety, with other parts consisting of dense pine and sycamore plantation. Supports a variety of woodland ground flora.	33.3	Adjacent to eastern boundary of site
Broughton West Wood	LWS	Mostly mature deciduous plantation, representative of re-planted ancient woodland, with substantial areas of younger growth and some coniferous elements. Very rich in woodland botany.	83.8	Adjacent to eastern boundary of site
Santon Wood East	LWS	A strip of field edge woodland connecting two planted woodland blocks of varying age and structure, which contains some ancient woodland indicator species.	6,77ha	Adjacent to north eastern boundary of site
Broughton Far Wood	LWS	Botanically diverse plantation woodland containing mature or maturing broadleaved trees with some pine in places.	50.8	440m east
Gadbury and Lundimore Woods	LWS	Mixed plantation woodland considered to represent re-planted ancient woodland, supporting diverse ground flora. Known to support common pipistrelle *Pipistrellus pipistrellus* bat roosts.	81.5	450m south
Rowland Planation	LWS	Dominated by botanically-poor woodland plantation, although supports some areas with richer ground flora, and also contains diverse grassland rides and a small area of wetland	121	560m east
Far Wood Farm Meadow	LWS	An area of marsh, drier grassland and coarse vegetation formally cropped for hay. Supports diverse range of flush and grassland botany.	1.9	800m east
Broughton West Wood	SNCI	Two strips of woodland shelter belts, predominantly consisting of deciduous plantation woodland with a small element of coniferous growth. Occasionally diverse woodland ground flora found in some areas. Support a wide range of typical woodland bird species.	6	Adjacent to south eastern boundary of site
Santon Wood	SNCI	Deciduous plantation woodland managed for forestry. Contains some good woodland ground flora.	101	Adjacent to north western boundary, contains part of the application site
Spring Wood Boughton	SNCI	Dense coniferous plantation woodland with very little ground flora	9.2	230m north of site access

4.1.10 Parts of Manby Wood LWS and Broughton West Wood are considered to represent Plantations on Ancient Woodland Sites (PAWS) due to notable presence of mature ancient woodland indicator species.

4.2 Data Search – Protected and Notable Species

Data obtained from Lincolnshire Environmental Records Centre

4.2.1 Data was obtained from Lincolnshire Environmental Records Centre (LERC) on all notable species within 2km of the site boundary.

Badger

4.2.2 Eight records (post-2000) of badgers were returned from the data search, the closest being a road casualty approximately 110m north east of the site. Five records of setts from woodland approximately 1km west of the site were also returned.

Bats

4.2.3 A number of existing records of at least six species of bats were obtained from the records centre, the closest of which were field recordings of unidentified bat species within woodland adjacent to the south east of the site.

4.2.4 A number of field records of common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus* exist from areas of woodland approximately 1km east of the site. Field records of this species, as well as Daubenton's bat *Myotis daubentonii* exist from Ashbyville Lake, approximately 1.3km south west of the site. Single records of Nathusius' pipistrelle *Pipistrellus nathusii* and Whiskered bat *Myotis mystacinus* occur within Scunthorpe and approximately 1.5km west of the site.

4.2.5 Unspecified common pipistrelle and brown long-eared *Plecotus auritus* roosts are also known to be present within the town of Broughton, approximately 1km east of the site.

Otter and Water Vole

4.2.6 A record of an otter spraint from 1996 exists, located approximately 200m north of the site.

4.2.7 Water voles have been recorded on Bottesford Beck, approximately 1.95km south west of the site, most recently in 2013.

Amphibians

4.2.8 Great crested newt *Triturus cristatus* records exist from 2006. The exact location these records were taken from is unclear but is believed to be from close to the south west boundary of the site. A small number of records of common toad *Bufo bufo* are also present within the search area.

Reptiles

4.2.9 Records of reptiles from within the search area are limited to a record of grass snake from 1977, from an unspecified location.

Birds

4.2.10 A number of records of notable bird species were obtained from the records centre. These are documented within the wintering bird survey and breeding bird survey report in separate Appendices (7.2 & 7.3).

Invertebrates

4.2.11 Several moth and butterfly species which are listed as Species of Principal Importance[13] have been recorded within 2km of the site since 2000. These include grey dagger *Acronicta psi*, mouse moth *Amphipyra tragopoginis*, dusky brocade *Apamea remissa*, garden tiger *Arctia caja*, sprawler *Asteroscopus sphinx*, mottled rustic Caradrina morpheus, latticed heath Chiasmia clathrata, sallow Cirrhia icteritia, small heath Coenonympha pamphilus, small square-spot *Diarsia rubi*, small phoenix *Ecliptopera silaceata*, august thorn *Ennomos quercinaria*, autumnal rustic *Eugnorisma glareosa*, white-line dart *Euxoa tritici*, ghost moth *Hepialus humuli*, grayling *Hipparchia semele*, rustic *Hoplodrina blanda*, wall *Lasiommata megera*, shoulder-striped wainscot *Leucania comma*, rosy minor *Litoligia literosa*, lackey *Malacosoma neustria*, dot moth *Melanchra persicariae*, pretty chalk carpet *Melanthia procellata*, dark spinach *Pelurga* comitata, large wainscot *Rhizedra* lutosa, white-letter hairstreak *Satyrium w-album*, shaded broad-bar *Scotopteryx chenopodiata*, white ermine *Spilosoma lubricipeda*, buff ermine *Spilosoma lutea*, hedge rustic *Tholera cespitis*, feathered gothic *Tholera decimalis*, blood-vein *Timandra comae*, cinnabar *Tyria jacobaeae* and dark-barred twin-sport carpet *Xanthorhoe ferrugata*.

4.2.12 The majority of small heath, grayling, and wall records were from Yarborough Quarry, approximately 350m north west of the site. The records of all other species were primarily located at either Ashbyville Lake (1.5km south west of the site) or at woodland areas approximately 1km east.

Plants

4.2.13 A number of records of notable plant species have been recorded within 2km of the site. These include two Species of Principal Importance; Purple milk vetch, of which records exist from on the site, and yellow bird's nest, which has been recorded approximately 950m north of the site

MAGIC search for EPS Licences

4.2.14 Records of previously issued European Protected Species Licences from within 5km of the site were obtained using the MAGIC website. Details of these licences are provided in Table 2 below.

Table 2: MAGIC records of EPS mitigation licences issued within a 2km radius of the site

Licence Ref No.	Species Covered	Dates of Licence	Distance and bearing from Site of Licence Record
2015-7054-EPS-MIT	Bats – Common pipistrelle	2015-2025	1.37km Southeast
EPSM2009-1229	Bats – Soprano pipistrelle	2009-2010	2.35km Northeast
EPSM2010-2663	Bats – Common pipistrelle	2011	4km Northwest
2015-16065-EPS-MIT	Bats – Common pipistrelle	2015-2020	5km Northwest
2015-16065-EPS-MIT-1	Bats – Common pipistrelle	2016-2020	5km Northwest
2015-16065-EPS-MIT-2	Bats – Common pipistrelle	2016-2020	5km Northwest

[13] Species of Principal Importance (SPI) are listed in Schedule 41 of the Natural Environment and Rural Communities (NERC) Act as requiring action under the UK Biodiversity Action Plan

5 EXTENDED PHASE 1 SURVEY

5.1.1 The site consisted of 17 (predominantly arable) fields bordered by a network of hedgerows and extensive woodland plantations. The land gradually slopes down to the west of the site, where a number of ditches and ponds are present. The results of the ecological survey are shown on Figure 4 at the end of this section

5.2 Habitats

Arable

Arable fields

5.2.1 This was the most frequently encountered habitat at the site, accounting for approximately 211ha of the land within the survey area. Over the course of the surveys, the arable fields were under cultivation using a mix of spring-sown cereals and rapeseed, as well as game cover crops within discrete areas at the edges of some of the fields.

Arable Field Margins

5.2.2 The margins of the arable fields were generally narrow (0.5m to 2m wide), although extended to 6m in places, and comprised typical coarse grasses and herbaceous species, including: false-oat grass *Arrhenatherum elatius*; cock's foot *Dactylis glomerata*; black grass *Alopecurus myosuroides;* perennial ryegrass *Lolium perenne*; nettle *Urtica dioica*; hogweed *Heracleum sphondylium*; common poppy *Papaver rhoeas*; fat hen *Chenopodium album*; greater knapweed *Centaurea scabiosa*; common knapweed *Centaurea nigra*; prickly sow-thistle *Sonchus asper*; groundsel *Senecio vulgaris;* red campion *Silene dioica*; white campion *Silene latifolia*; redshank *Persicaria maculosa*; mugwort *Artemisia vulgaris*; ragwort *Jacobaea vulgaris*; soft brome *Bromus hordeaceus*; scentless mayweed *Tripleurospermum inodorum*; wall barley *Hordeum murinum*; common fumitory *Fumaria officinalis*; borage *Borago officinalis;* and bracken *Pteridium aquilinum* in some parts.

5.2.3 Additional species recorded during the arable plants survey included fool's parsley *Aethusa cynapium*, bugloss *Anchusa officinalis,* goat's beard *Tragopogon pratensis*, henbane *Hyoscyamus niger,* wild pansy *Viola tricolor,* shepherd's purse *Capsella bursa-pastoris*, cut-leaved cranesbill *Geranium dissectum*, wild mignonette *Reseda lutea* and annual nettle *Urtica urens* (see Section 6 for detailed results of the arable plants survey).



Photograph 1: Typical arable field and margin habitat encountered across much of the site. Photo taken form Field F4, looking east.



Photograph 2: Field margin with arable plants. Photo taken from Field F6, looking south.

5.2.4 Uncultivated strips of grassland 2-6m wide were present on either side of farm tracks running though the site and at some headlands around arable fields, particularly in the north east of the site. The vegetation within these habitats was similar in composition to the rest of the arable field margins described above, although evidence that this habitat was subject to less frequent disturbance was noted; a layer of thatch was present and a higher abundance of floral species was present, such as field speedwell *Veronica persica*; black horehound *Ballota nigra*; vipers' blugloss *Echium vulgare*; doves-foot cranebill *Geranium molle*; hairy vetch *Vicia hirsute*; burdock *Arctium lappa;* and teasel *Dipsacus fullonum* in addition to that recorded elsewhere within arable fields. For the purposes of this assessment, these grassland strips were considered to represent semi-improved grassland although they have been included under the broad habitat type of Arable Field Margins.

5.2.5 Although the arable fields were cultivated up to the field boundaries with generally only narrow margins present, the total extent of this habitat type at the site is approximately 3ha, and arable field margins are a priority habitat identified as a conservation target both locally and nationally.

5.2.6 Of the arable plant species recorded on the site, henbane, which was recorded in Field F8 in the north western corner of the site, is classified as Vulnerable on the vascular plant Red Data Book for Great Britain[14]. A species is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium term future. See Section 6 for further details of the findings of the arable plant survey.

Semi-improved Grassland

5.2.7 Areas of agricultural land in the south west of the site were dominated by rank grasses and herbs, particularly false-oat grass, as well as hogweed; nettle; marsh thistle *Cirsium palustre*; creeping thistle *Cirsium arvense*; great willowherb *Epilobium hirsutum*; and hairy vetch. In damper areas, rush species soft rush *Juncus effusis* and toad rush *Juncus bufonius* were noted. This habitat is readily-establishing and was not considered to offer elevated ecological compared to habitats within the wider landscape.

[14] Cheffings, C.M. & Farrell, L. (2005) *Species Status Report No 7: The Vascular plant red data list for Great Britain*. Joint Nature Conservation Committee, Peterborough.

5.2.8 An area of semi-improved grassland containing abundant orchids was present in the north of Field F11 (Target Note 15), around the edges of the raised circular mound at Target Note 11 and extending east of this feature. Common spotted orchid *Dactylorhiza fuchsia* was frequently encountered as was northern or southern marsh orchid *Dactylorhiza praetermissa* / *Dactylorhiza purpurella*, as well as occasional bee orchid *Ophrys apifera*. Although these orchid species are widespread in the UK and can be found in a range of habitats, the presence of these signifies this area as likely to have been subject to less improvement than the other grassland habitat present at the site.



Photograph 3: Typical poor semi-improved grassland habitat at the south west of the site. This photo shows Field F12.



Photograph 4: Grassland with abundant orchid species at Target Note 15, in the north of Field F11.

Improved Grassland

5.2.9 A block of mown improved grassland measuring approximately 3.5ha and dominated by cock's foot was present in the north west of Field F2.

Semi-natural Broad-leaved Woodland

5.2.10 Much of the site was bordered by woodland, although the majority of woodland habitat comprised planted mixed/broadleaved woodland (see below). However, just beyond the western boundary of Fields F10 and F9 lay a strip of semi-natural riparian woodland on the banks of a stream, sloping down some 5-10m to the stream below and covering an area of approximately 1.5ha. This habitat comprised

semi-mature oak *Quercus robur*; silver birch *Betula pendula*; hawthorn *Crataegus monogyna*; goat willow *Salix caprea*; alder *Alnus glutinosa;* and elder *Sambucus nigra*.

5.2.11 An area of this habitat measuring 0.25ha was also present at the junction of three hedgerows in the south west of the site, which comprised mature oak, lime *Tilia sp;* hawthorn; elder; silver birch; and grey willow, and an understorey of enchanter's nightshade *Circaea lutetiana* and wood avens *Geum urbanum*. This was damp and held standing water over the winter months.

Plantation Broad-leaved Woodland

5.2.12 Much of the woodland beyond the northern and south eastern boundary of the site comprised planted broadleaved trees as well as a roughly rectangular area of 1.75 ha in between arable land within the western area of the site.

5.2.13 Although this varied in age and species composition between different areas of the site, generally speaking this comprised abundant semi-mature to mature ash *Fraxinus excelsior*; oak; Norway maple *Acer platanoides*; poplar *Populus* sp.; silver birch; and sycamore *Acer pseudoplanatus*. Hawthorn; blackthorn Prunus spinosa; sweet chestnut *Castanea sativa*; hazel *Corylus avellana* were also frequently encountered with an associated ground flora noted at the edges of the woodlands close to the site boundary, including species such as bramble *Rubus fruticosus*; ivy *Hedera helix*; wood avens; lords-and-ladies *Arum maculatum*; and nettle.

5.2.14 Much of this habitat at the site boundaries are locally designated Sites of Nature Conservation Interest (see above). This habitat also represents Lowland Mixed Deciduous Woodland, which is a local and national priority habitat.

Plantation Mixed Woodland

5.2.15 Although predominantly consisting of broad-leaved species, parts of the woodland bordering the southern and western parts of the site contained an element of coniferous plantation. Species such as larch *Larix decidua*, scot's pine *Pinus sylvestris* and Corscian pine *Pinus nigra* were recorded in these areas amongst the broadleaved species described above. The woodland beyond the south east corner of the site, within Broughton Far Wood LWS and Manby Wood LWS) is classed as 'plantation on an ancient woodland site' (PAWS), and the understorey in this area was noted to be more representative of mature woodland, with species such as enchanter's nightshade, green alkanet *Pentaglottis sempervirens* and dog's mercury *Mercurialis perennis* noted.

5.2.16 A small area of this habitat (approx. 0.1 ha) was present within the north western part of the site, alongside a stream, and comprised planted larch, poplar *Populus sp*. and cypress trees with young hawthorn and elder.

5.2.17 This habitat is likely to support a wide range of associated wildlife, and is representative of the priority habitat Lowland Mixed Deciduous Woodland. Much of this habitat also forms part of designated Local Wildlife Sites.

Plantation Coniferous Woodland

5.2.18 An area of woodland comprising entirely of planted larch was present beyond the southern boundary of the site. This habitat was relatively small in extent (approx. 1.1ha) and low in both species composition and structural diversity, and provided fewer opportunities for wildlife compared to the other types of woodland at the site.

Scrub

5.2.19 Areas of dense, unmanaged scrub were occasionally encountered in the centre of the site, as well as more frequently along the western site boundary. In most places, this habitat usually comprised semi-mature hawthorn; bramble; blackthorn; elder; and young willow. Scattered stands of scrub were occasionally encountered elsewhere at the site, such as at field margins and along ditch banks. Although this habitat is likely to support a range of protected and notable wildlife species, it is readily establishing and frequently found in the wider landscape.



Photograph 5: Area of scrub habitat at Target Note 3, parallel to Hedgerow H2

Hedgerows

5.2.20 The agricultural fields were bordered in parts by a network of eighteen hedgerows. These are labelled in Figure 4 and are description of each hedgerow is provided in Table 4.

5.2.21 The majority were poor in terms of species diversity, although species-rich hedgerows are present at the site. The hedgerows also varied in structural diversity; some were relatively intact whereas frequent gaps were noted in others, and trees were present in some, with others being managed at a uniform height. In total, the hedgerow habitat at the site measured approximately 4.55km in length.

5.2.22 The hedgerows are likely to be of importance for a wide range of associated wildlife, and provide connective links to between valuable habitat within and adjacent to the site. Hedgerows in general are a priority habitat for Lincolnshire as well as on a national scale.

Ponds

5.2.23 Five ponds were present within the survey area. These are labelled in Figure 4 and a description of each is provided in Table 5. Two of the ponds appeared to be ephemeral and dried up during spring and early summer (Ponds 4 & 5). A small field pond present at the northern edge of the site (Pond 3) was shallow, heavily silted and overshaded by an adjacent tree, with very little aquatic vegetation present. The remaining two ponds were larger, more open and likely to hold water year-round, and were seen to support a range of marginal and aquatic vegetation.

5.2.24 Two further ponds were noted off-site but within 500m, situated approximately 100m west and 330m south respectively. These have not been surveyed at the time of writing due to a lack of permissible access.

Scattered Broadleaved Trees

5.2.25 A small number (5) of semi-mature to mature trees were present at the site which were not associated with adjacent woodland or field boundaries. These generally comprised ash trees, with an oak, a horse chestnut *Aesculus hippocastanum* and a weeping willow *Salix babylonica* also present. None of the trees were considered to represent good examples of veteran trees, as they were generally similar in age and size to the trees at the nearby woodland and hedgerows, and did not occupy prominent positions in the landscape.

Tall Ruderal

5.2.26 Discrete parts of the site outside of the cultivated fields were dominated by tall ruderal species, particularly nettle, great willowherb, meadowsweet *Filipendula ulmaria*, mugwort, burdock marsh thistle, ragwort and hogweed.



Photograph 6: Tall ruderal habitat at Target Note 1

Ditches

5.2.27 A network of drainage ditches were present at some of the field boundaries. At the time of survey, nearly all of the ditches were dry or held very little water over the summer months, although aquatic/marginal vegetation could be seen which indicated seasonal inundation with water.



Photograph 7: Dry Ditch between Fields F9 and F7

5.2.28 A ditch running along the western site boundary was deeper and wider than most of the other ditches and was considered to hold water permanently. Two of the other ditches held running water which flowed east-west towards lower land beyond the western site boundary, eventually into a former opencast workings to the west of the site.

5.2.29 The ditches have the potential to support a range of protected species and species of conservation concern.

5.3 Protected Species and Species of Conservation Concern

Badgers

5.3.1 The data search revealed several records of badger setts in the local area. A total of four badger setts were discovered within or adjacent to the site as well as field signs such as latrines, snuffle holes, hairs and mammal paths.

5.3.2 The location of setts are provided in Figure 3, and each sett is described within Table 3.

5.3.3 The arable fields, grassland and woodland habitats within the site are likely to represent key foraging grounds for local group(s) of badgers present.

Bats

5.3.4 The data search revealed a number of existing records of at least six species of bat from the surrounding 2km.

5.3.5 Four trees at the site were identified as having potential to support roosting bats. These were generally mature oak trees which either had 'Low' or 'Moderate' potential (Target Note 2 and 5 respectively) to support roosting bats, in accordance with the Bat Conservation Trust Guidelines[15]. These are all expected to be retained within the development. The woodland, hedgerow and scrub habitat is likely to be used by local populations of bats for foraging and commuting. The large expanses of agricultural fields are generally sub-optimal for foraging and commuting however.

5.3.6 Further surveys for foraging/commuting bats have been undertaken at the site, the results of which are given in a separate Appendix (Appendix 7.4)

Otter

5.3.7 The data search did not reveal any recent (post-2000) records of otter within 2km. The ditches on site are unlikely to be used by otters if present in the locality, being either dry or holding shallow water, which would not provide the sources of prey needed to sustain a population of this species at the site. It is considered that otters are highly unlikely to occur at the site.

Water Vole

5.3.8 The data search returned 7 records of water vole from within 2km, the most recent of which was from 2013. The ditches and ponds within the western part of the site have potential to be used by water voles, with suitable foraging and burrowing habitat present, although the fact that most of the ditches appear to dry regularly reduces the value of the site somewhat for water voles, as they generally favour features

[15] Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1.

which hold water permanently. See Section 8 for further details of the findings of the detailed water vole survey.

Amphibians

5.3.9 Water samples were collected from the all five ponds at the site on 23rd April 2018 and sent for testing for great crested newt eDNA. The samples collected from P3, P4 and P5 returned a negative result indicating the likely absence of great crested newts from this pond. Water samples from two of the Ponds (P1 & P2) returned 'Indeterminate' results, which means that although no newt eDNA was identified, the water samples were of insufficient quality to ensure an accurate analysis. Water samples were re-collected from both of these ponds on 19th June 2018 and tested again, and returned negative results for great crested newt eDNA.

5.3.10 Details of the eDNA analysis are provided in Section 6. The results of the eDNA survey indicate that great crested newts are likely absent from the site.

5.3.11 The ponds provides suitable breeding and foraging habitat for more widespread species of amphibian, such as common frog *Rana temporaria* and common toad *Bufo bufo* which are expected to be use the features for present at the site. The field boundaries also provide suitable sheltering habitat for these species.

Reptiles

5.3.12 No recent records of reptiles within the locality of the site were revealed by the data search.

5.3.13 Nevertheless, the hedgerows, scrub, woodland edges, ditches and grassland areas offer some value for foraging and sheltering widespread reptile species, such as slow worm *Anguis fragilis* and grass snake *Natrix helvetica*. However, the large agricultural fields were considered to offer poor suitability for reptiles.

Birds

5.3.14 The site was considered to be suitable for both wintering and breeding birds, some of which may be notable species. Further surveys have been carried out, the results of which are given in separate Appendices (7.2 & 7.3).

Invertebrates

5.3.15 The data search revealed a number of existing records of notable butterfly and moth species from within the surrounding 2km.

5.3.16 Habitats at the margins and boundaries of the field are likely to be of value for a range of invertebrate species typical of woodland edge and hedgerows. During the surveys, several common and widespread species belonging to the order Lepidoptera were recorded, including cinnabar moth *Tyria jacobaeae*, a Species of Principal Importance. The ponds and ditches on site are also likely to support a range of aquatic invertebrates. However, assemblages of invertebrates supported by the arable field comprising the majority of the site are likely to be poor, particularly for pollinating species.

Other Protected Species, Species of Conservation Concern and Invasive Species

5.3.17 A number of brown hares *Lepus europaeus* (up to 8 individuals) were seen on regular occasions during the survey visits, particularly in the western part of the site (Target Note 6). The mosaic of open fields,

woodland and hedgerow provides optimal habitat for this species. Brown hare is a Species of Principle Importance targeted for conservation nationally.

5.3.18 No Japanese knotweed or Himalayan balsam was noted within the site during the survey.



Figure 3: Extended Phase 1 Habitat Map

Table 3: Target Notes

No.	Description
TN1	Shallow valley area sloping down to a small stream. Covered with tall ruderal species with scattered young willow, hawthorn and bramble scrub
TN2	Mature oak tree with small number of Potential Roost Features (PRFs) such as loose, peeling bark, vertical frost cracks, rot holes and woodpecker holes. Considered to hold Moderate Potential for roosting bats
TN3	Dilapidated brick structure within dense hawthorn scrub
TN4	Mosaic of scrub, tall ruderals and poor SI grassland with farm track running through the middle. Occasional semi-mature ash tree scattered amongst scrub.
TN5	Mature oak tree with no obvious PRFs seen from the ground, but is of an age and size that PRFs may be present further up. Considered to hold Low Potential for roosting bats
TN6	Brown hares seen frequently
[redacted]	
TN9	Brick structure in disrepair within scrub area.
[redacted]	
TN11	Raised circular mound approximately 2m tall. Vegetated by course grasses and ruderal/herbaceous species, including false oat grass, cock's foot, hogweed, autumn hawkbit *Leontodon autumnalis*, creeping thistle and ragwort
[redacted]	
TN13	Raised bund reaching approximately 15m tall in far south west corner of the site. Vegetated with a mix of dense bramble scrub, course grasses and ruderal species.
[redacted]	
TN15	Area in north edge of Field F11 around the edge of circular mound (TN11) containing frequent northern marsh orchid, and occasional bee orchid.
TN16	Poultry Farm
TN17	Fenced area of bare ground at a former oil well, used for storing hay bales at the time of survey, Several self-seeded sycamore, ash and blackthorn trees scattered around the edges

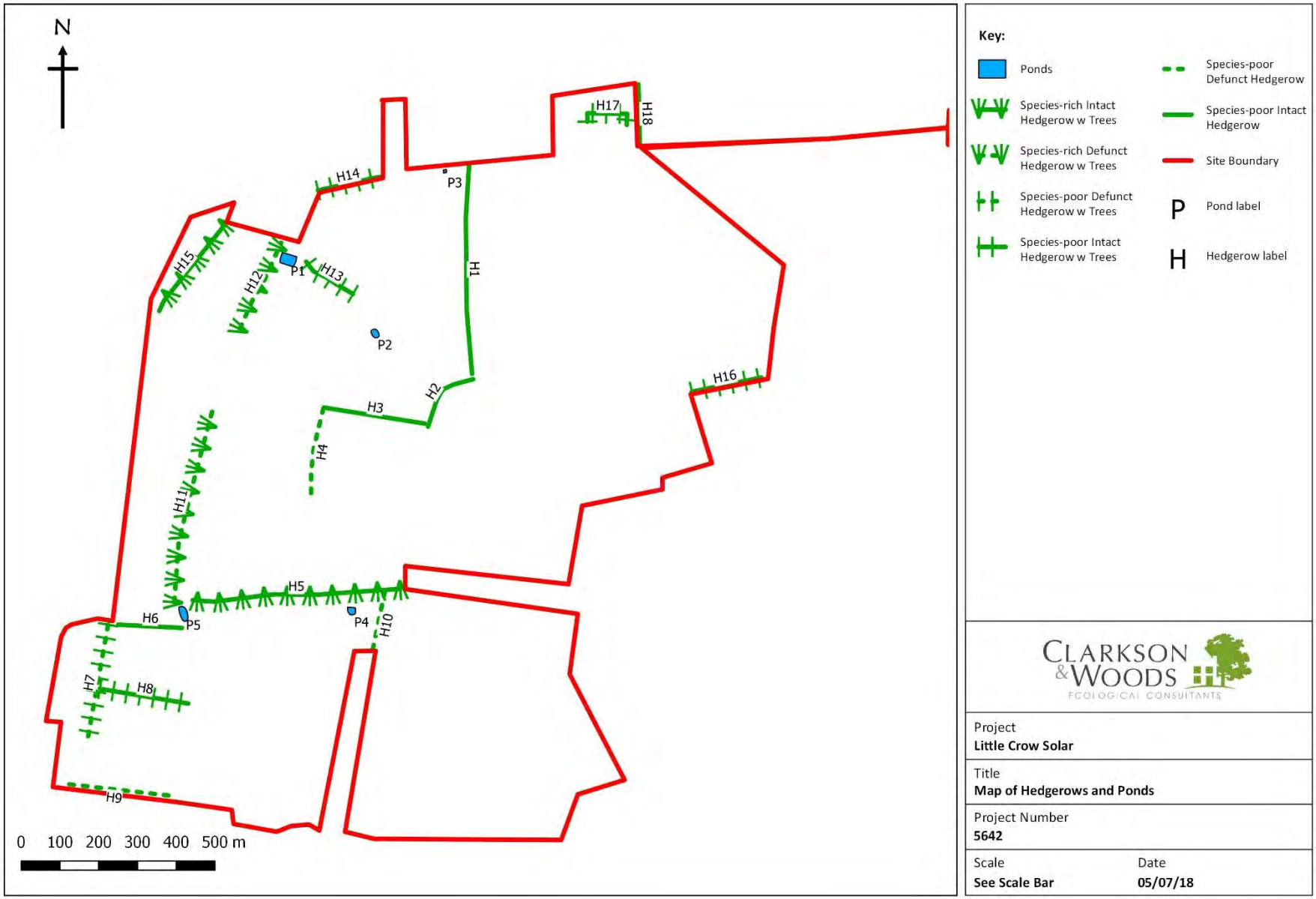


Figure 4: Map of Hedgerows and Ponds within Survey Area

Table 4: Descriptions of Hedgerows

Hedgerow No.	Description
H1	This hedgerow was approximately 525m in length and consisted primarily of hawthorn *Cretaegus monogyna*, with occasional elder *Sambucus nigra* and sycamore *Acer pseudoplanatus*. The hedgerow was approximately 2m tall on top of an earth bank, with no sign of recent management. Frequent gaps were noted although no gaps measured more than 5m in length. This hedgerow was species-poor. Ground flora present included nettle, hogweed, red campion, bramble and burdock.
H2	A line of unmanaged shrub, approximately 3-6m tall and between 1 and 5m wide, with the wider and taller shrubs at the southern end. Dominated by hawthorn, with elder and ash also present and considered to be species-poor. Approximately 180m in length, partially forming a 'green lane' with scrub on the opposite side of a farm track. Ground flora present included white campion, red campion, mugwort, common poppy, nettle, red dead nettle, white dead nettle, field bindweed *Convolvulus arvensis* and hedge woundwort *Stachys sylvatica*.
H3	A species-poor, intact hedgerow measuring 250m in length showing no sign of recent management, and as a result was quite leggy as opposed to showing bushy, lateral growth. Up to 3m in height and 1,5m wide, dominated by hawthorn with occasional elder and white bryony *Bryonia alba* present. Ground flora included nettle, marsh thistle, hogweed and cow parsley.
H4	A 240m length of gappy, defunct hedgerow approximately 3m tall with no recent management evident. Species-poor, consisting of hawthorn, blackthorn, hazel and white bryony. A dry, shallow ditch (<0.5m deep and wide) was present at the base of the hedgerow on its eastern side, which was choked with mugwort and nettles. A deeper ditch was present on the western side, which looks to hold water. Ground flora included nettle, mugwort, hogweed, cleavers, soft brome and bracken.
H5	A largely intact, species-rich hedgerow, 530m in length and approximately 4-5m tall with taller standards. No sign of recent management. Species present included hawthorn, blackthorn, hazel, elder, oak, ash, willow, sycamore, and wild privet *Ligustrum vulgare*. Ground flora included hogweed, great willowherb, bramble, meadowsweet, mugwort and nettle.
H6	A hedgerow measuring approximately 175m in length, and 4-5m in height. Leggy, with no sign of recent management, with some small gaps although no gaps wider than 5m. A stream was present along the northern base. Dominated by hawthorn, with elder, bramble and willow.
H7	A 4m tall, species poor unmanaged hedgerow with taller oak and ash standards. Frequent gaps present. Species present included hawthorn, elder, bramble and white bryony. A ditch with common reed, nettles and hogweed was present along the base.
H8	Approximately 200m long running east-west. This is approximately 4m tall with one tall oak standard. Species present included hawthorn, elder, grey willow and white bryony. A dry ditch is present at the base of the hedgerow.
H9	A length of species-poor hedgerow approximately 140m long at the south western site boundary. Comprising hawthorn, blackthorn, willow and elder with frequent gaps and no sign of recent management. Several self-seeded shrubs present and a ditch at the base of the hedgerow.
H10	A 3-4m tall, overgrown, unmanaged and gappy hedgerow, approximately 160m in length and merging into the woodland at its southern base. Comprising hawthorn, elder, sycamore and fleid maple. A species-poor hedgerow. Ground flora present included nettle, hogweed, red campion, bramble and burdock
H11	An approximately 500m long species-rich hedgerow, overgrown and unmanaged with frequent gaps. Approximately 4-5m tall with taller oak and ash standards. Species present included oak, ash, hawthorn, elder and hazel. A mostly dry ditch was present along the western base, vegetated with nettles and bramble. Ground flora included nettle, common poppy, white campion, hogweed, bramble and burdock
H12	A species-rich, unmanaged and gappy hedgerow. Approximately 4m tall with one taller oak standard. Consisted of hazel, oak, elder, hawthorn, dog rose, larch, cypress and white bryony. Connected to woodland at the northern and southern base. A dry ditch is present at the eastern base of the hedgerow. Ground flora included nettle, hogweed, bramble and burdock
H13	A 110m section of unmanaged, bushy hedgerow, dominated by 4m high hawthorn but also containing elder, hazel, and 4 taller poplar trees. A ditch fringed with tall ruderal species was present along the southern base of the hedgerow.
H14	A line of unmanaged, leggy trees and shrubs separated from the adjacent woodland to the north by a farm track. 5-15m tall, comprising ash, blackthorn and hawthorn.
H15	A tall line of species-rich trees either site of a ditch. Approximately 8-12m tall, comprising semi-mature alder *Alnus glutinosa*, grey willow, silver birch, sycamore, blackthorn, dog rose, and hawthorn,
H16	A row of planted sycamore around 10m tall, situated on top of an earth bank.

Hedgerow No.	Description
H17	Line of unmanaged sycamore trees reaching to 12 screening former oil well, surrounded by self-seeded young sycamore, ash and blackthorn scrub.
H18	A managed field boundary hedgerow topped at 1.5m.Dominated by hawthorn with occasional elder, blackthorn, ash and bramble. A farm track ran alongside the western edge of the hedgerow.. Ground flora present included nettle, hogweed, red campion, and burdock.

Table 5: Description of Ponds

Pond No.	Description	Photographs (where available)
P1	Moderately large (900m^2) pond in the north west of the site, surrounded by marginal and emergent vegetation such as reed mace *Typha latifolia*, rushes, water lily *Nymphaea sp,* fool's-water-cress *Apium nodiflorum* and willowherb. A large, overhanging weeping willow was present on the eastern bankside. Small fish were observed, as were mallard *Anas platyrhynchos*, moorhen *Gallinula chloropus* and mute swan *Cygnus olor*.	 Photograph 8: Pond P1
P2	Permanent pond in the north east of field F6, south of the existing farm track and surrounded by tilled arable land. A large overhanging horse chestnut tree on the northern bankside. Pond covered in duck weed *Lemna sp* and surrounded by willowherb and soft rush. Nesting moorhen present.	*None Available*
P3	A relatively small pond (approximately 25m^2) at the northern edge of the site. Surface covered in duckweed, and banksides shaded by overhanging ash tree, hawthorn and elder bushes. Lacking in aquatic of marginal vegetation, and quite with dead and decaying matter. Almost dry in July 2017.	 Photograph 9: Pond P3

Pond No.	Description	Photographs (where available)
P4	An ephemeral field pond in the north east of field F14, surrounded by tilled arable land. Covered in rush species and tall ruderals with a hawthorn shrub on the north eat bankside. Highly seasonal – the pond was dry in July 2017 although held shallow water (<20cm deep) in April 2018.	 Photograph 10: Pond P4
P5	A pond with a shallow depression amongst an area of secondary woodland. Highly seasonal – this pond was dry in July 2017 but held shallow (~20cm deep) water in April 2018. Completely overshaded by surrounding woodland and lacking in aquatic vegetation. Heavily silted with dead leaves.	*None Available*

7 ARABLE PLANTS SURVEY

7.1.1 Table 6 below provides a summary description of the habit within each of the arable plant survey target zones, shown in Figure 5. Table 7 demonstrates the relative abundance of plant species (excluding crops) in each zone using the DAFOR criteria.

Table 6: General Description of Arable Plants Survey Target Zones

Arable Plant Zone	General description
Zone AW1	Dead maize uncropped from last year. 60 – 120cm high in rows. Sparsely vegetated by crop, in typical rows. A very sandy soil.
Zone AW2	Dense oil seed rape 70cm. A thin 2-5m band of weed species, dominated by common poppy.
Zone AW3	Dense oil seed rape 70cm. A thin 2-5m band of weed species, dominated by common poppy.
Zone AW4	Dense oil seed rape 70cm. A 4-6m band of weed species, dominated by common poppy.
Zone AW5	Dense oil seed rape 70cm. Both the West and East sides of track. Dominated by borage.. Further less-dense patches of borage spreading to the west.
Zone AW6	Dense oil seed rape 70cm. A thin 2-5m band of weed species, dominated by borage.
Zone AW7	Dense oil seed rape 70cm. A thin 2-5m band of weed species, dominated by common poppy.

Table 7: Relative Abundance (DAFOR*) of Arable Plant Species in Each Target Zone

Common Name	Latin Name	Zone AW1	Zone AW2	Zone AW3	Zone AW4	Zone AW5	Zone AW6	Zone AW7
Common poppy	*Papaver rhoeas*		D	A	O	O	F	
Fool's parsley	*Aethusa cynapium*		O	O		R	O	
Borage	*Borago officinalis*			R		D	O	
Black grass	*Alopecurus myosuroides*			R		D	A	
Bugloss	*Anchusa officinalis*		F	A		R	R	
White campion	*Silene latifolia*	O	O	R	O		R	O
Stinging nettle	*Urtica dioica*			R	R		R	
Scentless mayweed	*Tripleurospermum inodorum*		R					R
Goats-beard	*Tragopogon pratensis*		R		R			
Wall barley	*Hordeum murinum*		F					
Wild pansy	*Viola tricolor*		R	A	O			
Cut-leaved geranium	*Geranium dissectum*	R	F					
Rayless mayweed	*Matricaria matricarioides*		O	O	R			R
Shepherd's-purse	*Capsella bursa-pastoris*		O				O	R
Fat hen	*Chenopodium album*		R		O		R	R
Henbane	*Hyoscyamus niger*	O						

Groundsel	*Senecio vulgaris*	O						R
Vipers bugloss (margin only)	*Echium vulgare*	R						
Wild mignonette	*Reseda lutea*	O						
Prickly sow-thistle	*Sonchus asper*	R						
Creeping thistle	*Cirsium arvense*	R						
Toad rush	*Juncus bufonius*	R						
Annual nettle	*Urtica urens*	O			R			R

*DAFOR scale = D – Dominant, A – Abundant, F – Frequent, O – Occasional, R – Rare

7.2 Important Arable Plant Area Assessment

7.2.1 Of the above arable plant species recorded only two species are listed by plantlife in the Important Plant Areas guide. These are Henbane which is recorded as being Threatened (and therefore a score of 7) and Wild Pansy which is recorded as being Near Threatened (and therefore a score of 6). None of the other species recorded on site are included within the plantlife listing which is drawn up from PLANTATT: Attributes of British and Irish Plants[16].

7.2.2 This gives a total score for the overall site of 13. The provisional criteria for threshold scores for assessing the conservation importance of arable plant sites indicates that for sands and freely draining acidic soils, such as are found on site the threshold, is 20-34 points for a site of County Importance; 35-69 points for a site of National Importance and 70+ for a site of European importance. Therefore based upon this scoring method the site should not be considered of County importance or above. The threshold scores defined by Plantlife do not ascribe scores for levels of importance below County.

7.2.3 Nevertheless, the presence of one nationally threatened species and one near threatened species means the site does support some important arable weed species and therefore should be treated as important within the impact assessment.

[16] Hill, M.O., Preston, C.D. & Roy, D.B. (2004). PLANTATT:Attributes of British and Irish Plants. NERC Centre for Ecology and Hydrology, Monks Wood

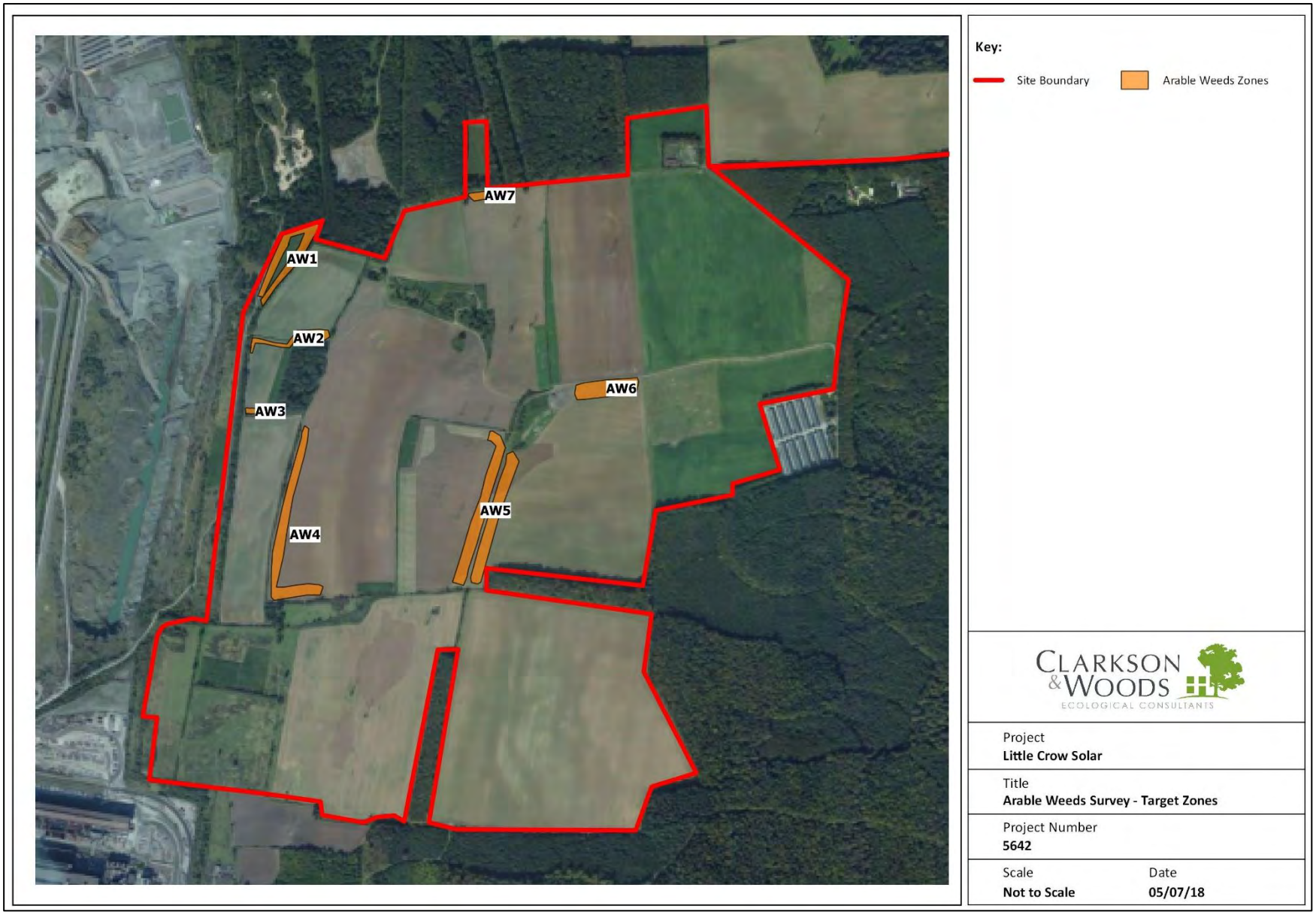


Figure 5: Arable Plants Target Survey Zones

8 GREAT CRESTED NEWT SURVEY

8.1 Habitat Suitability Index

8.1.1 The calculation for HSI scores for each Pond is provided in Table 8:

Table 8: HSI Scoring Calculations for Each Pond

Habitat Suitability Index Criteria (for full details, see Oldham et al. 2000)	Score				
	P1	P2	P3	P4	P5
1. Location (Zone A, 1; Zone B, 0.5; Zone C, 0.01	1	1	1	1	1
2. Pond Area (Estimated, and score extrapolated from graph	0.95	0.5	0.1	0.25	0.6
3. Pond Drying (Never, 0.9; Rarely, 1.0; Sometimes, 0.5; Annually, 0.1;	0.9	1	0.5	0.1	0.1
4. Water Quality (Good, 1.0; Moderate, 0.67; Poor, 0.33; Bad, 0.01)	0.67	0.33	0.33	0.33	0.33
5. Shading (Estimated % perimeter shaded, score extrapolated from Graph	1	0.8	0.4	1	0.2
6. Fowl (Absent, 1; Minor 0.67, Major 0.01)	0.67	0.67	1	1	1
7. Fish (Absent, 1; Possible 0.67, Minor 0.33, Major 0.01)	0.33	1	1	1	1
8. Ponds Number of ponds within 1km score extrapolated from Graph	0.8	0.8	0.75	0.75	0.75
9. Terrestrial Habitat (Good, 1; Moderate, 0.67; Poor, 0.33; None, 0.01)	1	0.33	0.67	0.33	0.67
10. Macrophytes (Estimated % of pond with macrophytes,) score extrapolated from Graph	0.6	0.8	0.5	0.3	0.6
Totals (S1xS2xS3xS4xS5xS6xS7xS8xS9xS10)1/10	0.76	0.67	0.53	0.48	0.51
Categorisation of HSI Score	Good	Average	Below Average	Poor	Below Average

8.2 eDNA Survey Results

8.2.1 The results of the eDNA Analysis lab report for the water samples taken from the ponds on 23rd April 2018 are replicated in Table 9 below:

Table 9: Lab Report for pond samples collected on 23/04/18 and Analysed by ADAS UK.

Pond Number	Sample Ref.	Determinant	Result	Method	Date of Analysis
P1	2018-0728	Inhibition Control	2 of 2	Real Time PCR	08/05/18
		Degradation Control	Evidence of degradation or residual inhibition		
		Great Crested Newt	Indeterminate		
		Negative PCR Control (Nuclease Free Water)	0 of 4		
		Positive PCR Control (GCN DNA 10^{-4} ng/µL)	4 of 4		
P2	2018-0730	Inhibition Control	2 of 2	Real Time PCR	08/05/18
		Degradation Control	Evidence of degradation or residual inhibition		
		Great Crested Newt	Indeterminate		
		Negative PCR Control (Nuclease Free Water)	0 of 4		
		Positive PCR Control (GCN DNA 10^{-4} ng/µL)	4 of 4		
P3	2018-0729	Inhibition Control	2 of 2	Real Time PCR	15/05/18
		Degradation Control	Within Limits		
		Great Crested Newt	0 of 12 (GCN Negative)		
		Negative PCR Control (Nuclease Free Water)	0 of 4		
		Positive PCR Control (GCN DNA 10^{-4} ng/µL)	4 of 4		
P4	2018-0189	Inhibition Control	0 of 2	Real Time PCR	08/05/18
		Degradation Control	Within Limits		
		Great Crested Newt	0 of 12 (GCN Negative)		
		Negative PCR Control (Nuclease Free Water)	0 of 4		
		Positive PCR Control (GCN DNA 10^{-4} ng/µL)	4 of 4		
P5	2018-0727	Inhibition Control	2 of 2	Real Time PCR	03/05/18
		Degradation Control	Within Limits		
		Great Crested Newt	0 of 12 (GCN Negative)		
		Negative PCR Control (Nuclease Free Water)	0 of 4		
		Positive PCR Control (GCN DNA 10^{-4} ng/µL)	4 of 4		

8.2.2 As Indeterminate results were obtained for Ponds P1 and P2 these were subsequently re-tested, with samples collected on 19th June 2018. The lab results are replicated in Table 10.

Table 10: Lab Report for pond samples collected on 19/06/18 and Analysed by SureScreen Scientifics.

Pond Location (Grid Ref.)	Sample Ref.	Sample Integrity Check	Degradation Check	Inhibition Check	GCN Detection	Positive Replicates
P1	2880	Pass	Pass	Pass	Negative	0
P2	2881	Pass	Pass	Pass	Negative	0

9 WATER VOLE SURVEY

9.1.1 Table 11 below provides a summary description of each of the ditches subject to a detailed water vole survey, together with an overview of the findings. A map showing the location of ditches surveyed is provide in Figure 6.

Table 11: General Description and Findings of Water Vole Survey

Ditch No.	General Description & Findings
Ditch 1	A 4m wide ditch overshaded by tall trees on either bank. Holding shallow (<0.5m deep) standing water. With shallow earth banks, partly covered with dense bramble scrub in areas. Several rat droppings present, as well as a small number of mammal burrows which were attributed to rats. No water voles signs found.
Ditch 2	A stream at the base of a steep, wooded valley. Channel 1-2m wide, holding fast flowing water (<0.5m deep) flowing north-south. Completely overshaded be woodland trees, with very little emergent/marginal vegetation. A small number of rat droppings and mammal burrows (attributed to rats) were scattered along both banksides. A mustelid scat consisted with weasel *Mustela nivalis* was noted on a log half way along the stream. No water voles signs found.
Ditch 3	A watercourse comprising a shallow, wet flush at the eastern end which is 0.5m wide and holds shallow (<0.1m) water flowing east-west. The watercourse then enters a wooded area, where the banks and channel become deeper and steeper towards the western end, where the stream flows into Ditch 2. The eastern part is relatively open with tall ruderals and scattered scrub along the banks, with the western part being overshaded by the tall woodland and hedgerow adjacent. A number of rat droppings and burrows were noted, which were concentrated at the western end of the ditch. No water voles signs found.
Ditch 4	A dry ditch with shallow banksides (1m deep) and narrow channel (<1m wide), vegetated with trees, shrubs and tall ruderals. A small number of rat droppings and prints were noted at the northern end of the ditch. No water voles signs found.
Ditch 5	A dry ditch at the connected to Ditch 4 at its western end. With shallow banksides (1m deep) and narrow channel (<1m wide), vegetated with trees, shrubs and tall ruderals. Overshaded by adjacent vegetation. No water voles signs found.
Ditch 6	A predominantly dry ditch, although some small pools of water occasionally present. Approximately 1m wide with steep banksides 0.5m – 1m deep. Banksides vegetated with trees, shrubs, ruderals and grasses. Rats seen, and rat droppings, burrows and prints noted along the ditch. No water voles signs found.
Ditch 7	The northern section of this ditch comprised a shallow (<0.5m deep), 0.5m wide dry ditch on the eastern side of a hedgerow. The ditch was choked with ruderal vegetation. At the southern end, the ditch lay on the western side of the hedgerows and was deeper (1.5m deep) holding shallow (<5cm deep) water. Rats seen, and rat droppings noted on a foot crossing spanning the ditch. No water voles signs found.
onDitch 8	A dry ditch approximately 1m wide with 2m deep, steep banks. Banksides covered in grasses, with the channel habitat choked by bramble and nettle. No evidence of mammals noted.
Ditch 9	A 1m wide ditch with moderately steep, 2m deep banksides. Vegetated with dense ruderals and stands of bramble. A small number of rat droppings were noted, although much of this ditch was inaccessible. No water voles signs found.
Ditch 10	A 1m wide ditch along the woodland edge, with 2m deep, steep banks. Holding shallow (<10cm deep) water flowing east to west. Largely overshaded by adjacent woodland within very little bankside or in-channel vegetation. A number of rat droppings, burrows and prints were recorded along the length of the ditch. No water voles signs found.
Ditch 11	A watercourse with 1.5m deep shallow banks, 2m wide. Holdings shallow water (~5cm deep) flower quickly east to west. Southern bankside vegetated with tall ruderals, with a hedgerow present along the northern banks. Some submerged weed present (fool's-water-

	cress). A small number of rat and fox *Vulpes vulpes* prints present at the southern end, with occasional rat burrows noted along the northern bankside. No water voles signs found.

9.1.2 No field signs evidencing the presence of water voles were noted during the surveys. A high density of rat fields signs were noted within the ditch network. Overall, given the absence of evidence encountered during detailed surveys undertaken for water voles, it is considered that this species are likely to be absent from the site.

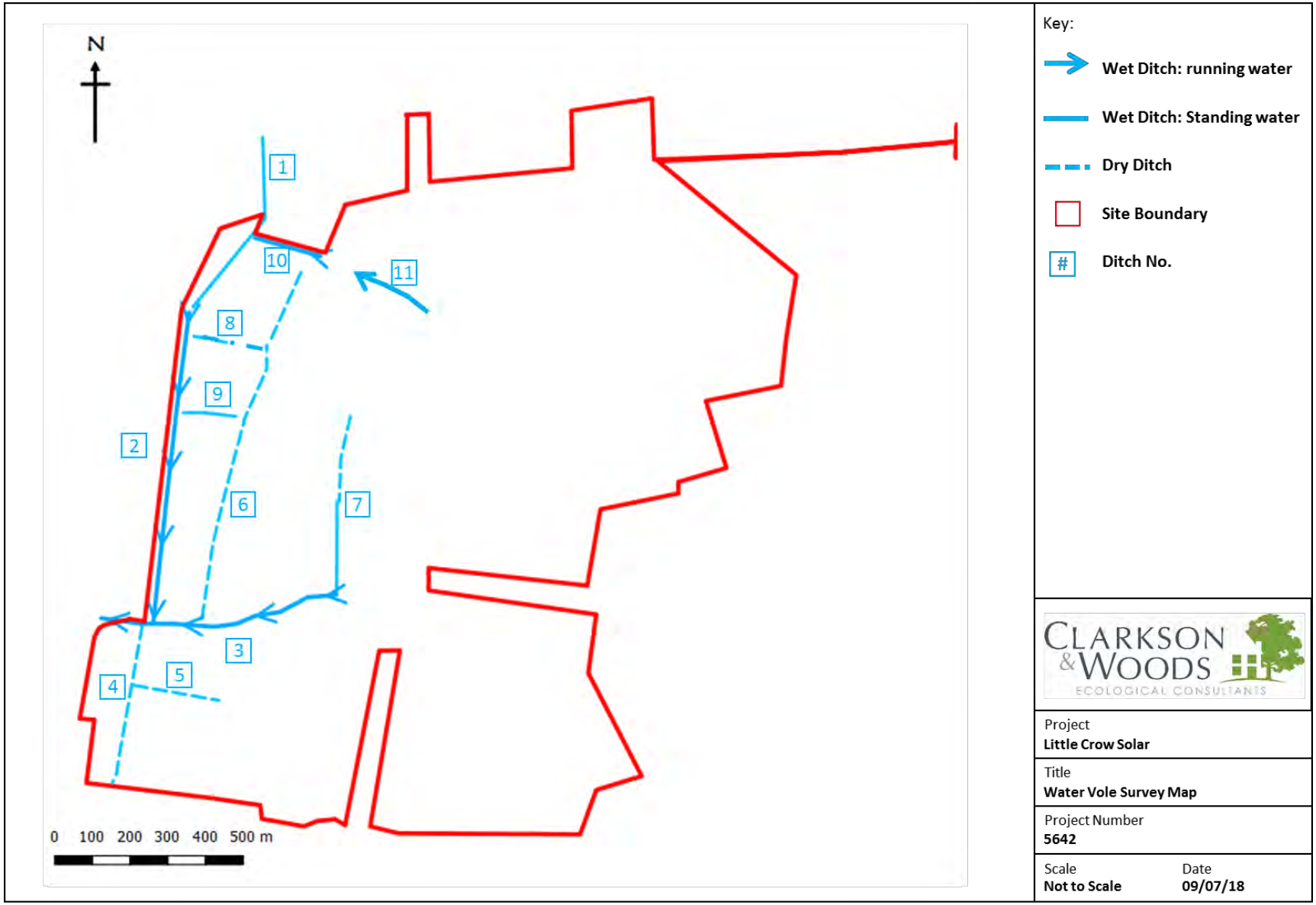


Figure 6: Map of Ditches Subject to Detailed Survey for Water Voles

10 SUMMARY

10.1.1 The survey revealed a mosaic of habitats within the site:

- Arable
- Semi-improved grassland
- Poor semi-improved grassland
- Improved grassland
- Plantation woodland – broadleaved, coniferous and mixed
- Semi-natural broadleaved woodland
- Hedgerows
- Tall ruderal
- Scrub
- Ponds
- Ditches

10.1.2 Whilst many of the habitat types present are common within the local landscape, the site is generally considered to be of relatively moderate ecological importance due to the substantial area of land within the site which support a 'mosaic' of habitat types, as well as the site's connectivity to other features of ecological value in the wider landscape.

10.1.3 The presence of several notable species were also confirmed or assumed:

- Badger (confirmed)
- Bats (see separate report)
- Birds (see separate report)
- Reptiles (assumed)
- Common toad (assumed)
- Arable Plant species, most notably henbane (confirmed)

10.1.4 Detailed surveys for great crested newts and water voles have identified these species as likely to be absent from the site.

Clarkson and Woods Ltd.
Overbrook Business Centre,
Poolbridge Road, Blackford,
Somerset BS28 4PA

t: 01934 712500
e: info@clarksonwoods.co.uk

www.clarksonwoods.co.uk

CLARKSON & WOODS



APPENDIX 7.5

WINTERING BIRDS SURVEY (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

Little Crow

Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

WINTERING BIRD SURVEY

On behalf of INRG Solar (Little Crow) Ltd

November 2018

WINTERING BIRD SURVEY

LITTLE CROW SOLAR FARM, SCUNTHORPE

carried out by

CLARKSON & WOODS
ECOLOGICAL CONSULTANTS

commissioned by

INRG SOLAR (LITTLE CROW) LTD

V2 NOVEMBER 2018

WINTERING BIRD SURVEY

LITTLE CROW SOLAR FARM, SCUNTHORPE

CONTENTS

1 INTRODUCTION 3

2 SITE DESCRIPTION 3

3 SURVEY AND ASSESSMENT METHODOLOGY 5

4 SURVEY LIMITATIONS 9

5 RESULTS 10

6 SUMMARY 22

7 WILDLIFE LEGISLATION & SPECIES INFORMATION 23

8 LERC RECORDS OF BIRDS FROM SURROUNDING 2KM 25

Project title	Little Crow Solar Farm, Scunthorpe			
Project number	5642			
Document title	Wintering Bird Survey			
Client	INRG Solar (Little Crow) Ltd			
Authors	Michael Hockey Peter Timms			
Status	Checked by	Date	Approved for C&W by	Date
V1	Hannah Montag	24/05/18	Harry Fox	06/06/18
V2 *Updated to reflect red line boundary change*	Peter Timms	19/11/18	Harry Fox	20/11/18

The information, data and advice which has been prepared and provided is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's (CIEEM) Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions. This report and its contents remain the property of Clarkson and Woods Ltd. until payment has been made in full.

1 INTRODUCTION

1.1.1 Clarkson and Woods Ltd. was commissioned by INRG Solar (Little Crow) Ltd to carry out wintering bird surveys of land proposed to accommodate Little Crow Solar Farm in Scunthorpe. The surveys were carried out between November 2017 and February 2018 by experienced bird surveyors.

1.1.2 This report aims to inform a planning application for construction of a solar farm within the site. It details the methods and results of the surveys.

1.1.3 Unless the client indicates to the contrary, information on the presence of species will be passed to the county biological records centre in order to augment their records for the area.

2 SITE DESCRIPTION

2.1.1 The site consisted of seventeen (predominantly arable) agricultural fields; with occasional patches of dense scrub, broadleaved woodland and five ponds. Hedgerows, ditches and woodland made up the site boundaries. The wider landscape is characterised by the industrial steelworkings to the west of the site, and further arable farmland and plantation woodland to the north and east. Beyond the woodland to the south lies a recently constructed solar array.

2.1.2 The development site is approximately 226 hectares (ha) in size, and the approximate centre of the site is at OS Grid Ref. SE 941099.

2.1.3 Figure 1 shows the present layout of habitats across the site according to the Phase 1 Habitats Survey carried out in 2017.

2.1.4 The proposals for the site consist of the installation of solar panels on metal frames, which are driven into the ground, and connected by underground cables to a cabin containing a transformer. This is then connected locally to the National Grid network.



Figure 1: Phase 1 Habitat Map of the Survey Area

3 SURVEY AND ASSESSMENT METHODOLOGY

3.1 Data Search

3.1.1 Statutory designated sites relating to birds within proximity of the site were identified using the Natural England/DEFRA web-based MAGIC database (www.MAGIC.gov.uk).

3.1.2 Lincolnshire Environmental Records Centre (LERC) was consulted for records of wintering birds within 2km of the site. The records centre was also asked to provide details of locally designated sites within 1km of the site.

3.1.3 Ordnance Survey maps (1:25,000) and aerial images of the site were examined online (bing.com/maps and maps.google.co.uk).

3.2 Field Methodology

3.2.1 The site was surveyed for wintering birds on four occasions between 23rd October 2017 and 11th February 2018 to identify species, numbers and locations of wintering birds on site (see Table 1 for dates and weather conditions). Due to the large size of the site, each survey visit was split over two days.

Table 1: Dates and weather conditions of the wintering bird surveys

Survey Number	Date	Description of weather: Precipitation; Cloud (Oktas); Wind (Beaufort Scale)	Temperature (°C)	Timings
1	23/11/2017	Dry, Cloud 2, Wind 6	4	08:30 – 14:30
	24/11/2017	Dry, Cloud 2, Wind 2	6	08:30 – 10:00
2	09/12/2017	Dry, Cloud 0, Wind 3	1	08:30 – 15:00
	10/12/2017	Light snow, Cloud 5, Wind 2	0	08:30 – 11:00
3	26/01/2018	Dry, Cloud 6, Wind 2	5	08:00 – 15:30
	27/01/2018	Mostly dry, Cloud 7, Wind 4	5	08:00 – 10:30
4	11/02/2018	Dry, Cloud 5, Wind 3	5	08:00 – 15:00
	12/02/2018	Light rain, Cloud 8, Wind 1	3	08:00 – 11:00

3.2.2 The surveys followed British Trust for Ornithology (BTO) guidelines, where the observer systematically walked through the site, ensuring that all points on site were visited to within 50m. The location and behaviour of all birds and flocks of birds seen was noted on large-scale survey maps which were later collated for interpretation. Standard BTO Common Birds Census symbology and species codes were used to create a survey map for each individual visit.

3.2.3 Peak counts for all wintering species for the site and across the various survey zones and boundaries were calculated.

Personnel

3.2.4 Surveys were undertaken by Harry Fox BSc MCIEEM and Steve Miller affiliate member of CIEEM. Harry and Steve are highly experienced bird surveyors able to identify all British species by sight and sound.

Mapping

3.2.5 The site was divided up into eight survey "zones" (comprising fields) and twelve "boundaries" (comprising hedgerows, scrub and ditches) according to similar habitat characteristics to assist in the interpretation of data (see Table 2 & Figure 2). This separation of the site's features allowed the relative usage of the site's habitats by notable species or numbers of species to be assessed. It should be noted that these zones and boundaries combine multiple fields and hedgerows and therefore the numbering differs from that used in the Phase 1 survey map.

Table 2: Zones and Boundaries numbering scheme

Zone No.	Description
1	Arable fields to the north-east of the site, sown with winter barley
2	Primarily arable fields sown with a block of improved grassland present
3	Arable field to the south-east of the site sown with early wheat
4	Arable field to the south of the site sown with early wheat
5	Primarily semi-improved grassland fields to the south-west of the site
6	Primarily arable fields to the west of the site sown with harvested oil seed rape
7	Arable field towards the centre of the site with harvested oil seed rape
8	Arable fields towards the north of the site with beet
Boundary No.	**Description**
B1	Mixed plantation woodland to the east of the site and poultry farm
B2	Mixed plantation woodland to the south-east of the site
B3	Broad-leaved plantation woodland towards the centre of the site
B4	Broad-leaved plantation woodland to the south of the site dividing zones 3 and 4
B5	Hedgerow, scrub and woodland habitat to the south of the site
B6	Riparian woodland, hedgerows and scrub to the west of the site

B7	Broad-leaved plantation woodland, as well as an arable field containing a portion of bare ground surrounded by trees, situated to the north of the site
B8	Broad-leaved plantation woodland and hedgerows dividing zones 6 and 7
B9	Dense scrub and hedgerow between zones 7 and 8
B10	Hedgerows and ditch in the centre of the site
B11	Hedgerow with ditch to the north of zone 4
B12	Hedgerows and ditches to the south-west of the site



Figure 2: Map showing Habitat/Boundary Zones

4 SURVEY LIMITATIONS

4.1.1 This survey involved four survey events and thus provided a series of 'snapshots' of bird activity recorded on the site. It takes no account of any species which might occur at other times of the day and on other days. At the same time a lack of signs of any particular species does not confirm its absence, merely that there was no indication of its presence during this survey.

4.1.2 Nocturnal bird surveys were not undertaken and as such the activity on site of birds such as owls cannot be determined. In lieu of survey data, a judgement has been made based on the results of the data search and the presumed value of the habitats on site to such species.

4.1.3 If no action or development of this land takes place within twelve months of the date of this report, then the findings of this survey should be reviewed and may need to be updated. After three years the findings will be out of date and the full survey should be repeated.

Site Compound Area

4.1.4 The survey area did not encompass the entire field surrounding the former oil well in the north east of the site, which is expected to be used to house the temporary site compound during construction of the array. This field was added to the application scheme subsequent to the completion of the breeding bird surveys. The red line boundary was amended to include this area after the surveys had been completed. The use of this area by wintering birds was not fully investigated and it is possible that bird species (including those of conservation concern) using this area were not recorded. However the survey route did follow the southern boundary of this field and this area was included within survey boundary zone B7 (figure 2 refers). As such any moderate or larger flocks of wintering birds present would likely have been conspicuous and recorded, and the surveyors also noted any movement of birds within, into and out of this area. The findings of the survey (particularly the results recorded within B7) are therefore considered to depict a reasonably accurate reflection of the bird use of this area during the survey period.

5 RESULTS

5.1 Data Search – Designated Sites of Relevance to Birds

International Designations within 10km of the Site

Humber Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar Site

5.1.1 The Humber Estuary is designated a Special Protection Area (SPA) and Ramsar site. The area encompassing the SPA is situated approximately 11km north of the site at the closest point, whilst the SAC and Ramsar site is located 9km west at the closest point. It primarily receives its designation for its estuarine habitats, which support a range of associated species including internationally important assemblages of wintering and migratory birds.

5.1.2 The application site is situated a considerable distance from the Humber Estuary, and contains markedly different habitats to the estuarine habitats cited within the relevant designations. In addition, the application site is highly unlikely to represent functionally linked habitat for the wildlife supported by the designated sites.

National Designations within 5km of the Site

5.1.3 No nationally designated sites pertaining to birds are located within 5km of the site.

Local Designations within 1km of the Site

5.1.4 No locally designated sites pertaining to birds are located within 1km of the site.

5.2 Data Search – Protected and Notable Species

Data obtained from Lincolnshire Environmental Records Centre (LERC)

5.2.1 The data search identified 65 notable bird species within 2km of the site since 2000 which winter in the UK (or are vagrants) and are considered relevant to this report. These species and their conservation designations are detailed in Section 8 at the end of this report. Additional records beyond the most recent record for each species have been excluded.

5.2.2 A number of birds within Appendix B were recorded within the site. This includes Lapland bunting *Calcarius lapponicus*, merlin *Falco columbarius*, peregrine *Falco peregrinus*, brambling *Fringilla montifringilla*, tree sparrow *Passer montanus*, fieldfare *Turdus pilaris* and hobby *Falco subbuteo*.

5.2.3 Details of the legislation affecting those protected species which have been identified as occurring on the site from the wintering bird surveys, or potentially occurring on the site given their ecological requirements, are detailed in Appendix A.

Data Search – Local Conservation Priorities

5.2.4 Farmland birds as a group are identified as targets for conservation within the Lincolnshire Biodiversity Action Plan (BAP) 2011-2020 (3rd Edition). The species of bird listed within this group are:

- *Grey partridge Perdix perdix*
- *Lapwing Vanellus vanellus*
- *Yellow wagtail Motacilla flava*
- *Skylark Alauda arvensis*
- *Corn bunting Miliaria calandra*
- *Linnet Carduelis cannabina*
- *Yellowhammer Emberiza citronella*
- *Reed bunting Emeriza scheoniclus*
- *Turtle dove Streptopelia turtur*
- *Bullfinch Pyrrhula pyrrhula*
- *Starling Sturnus vulgaris*
- *Tree sparrow Passer montanus*
- *Snipe Gallingo gallinago*
- *Curlew Numernius arquata*
- *Redshank Tringa totanus*
- *Barn owl Tyto alba*

5.2.5 These species have been identified as local conservation priorities and therefore will be given appropriate additional weight within the ES Chapter.

5.1 Field Survey Results

5.1.1 The main habitats within the site that were utilised by the birds recorded are listed below (in order of importance to key species and the overall assemblage of birds):

- Arable fields;
- Hedgerows and woodand;
- Semi-improved grassland; and
- Ditches

5.1.2 In total, 51 bird species were recorded within the site during the survey visits. 24 of the 51 were species of conservation concern, comprising 12 'red listed' birds and 12 'amber listed' birds according to the British Trust for Ornithology's studies into population declines among British birds within the last 30 years[1]. Twelve of these were also Species of Principal Importance (SPI) under Section 41 of the NERC Act 2006 or Schedule 1 species of the Wildlife and Countryside Act 1981 and as such are capable of being material considerations within the planning process. The species recorded are shown in Tables 3 and 4 overleaf. The level of protection each species receives is denoted by styling which is explained in the Key below.

[1] Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. Mark Eaton, Nicholas Aebischer, Andy Brown, Richard Hearn, Leigh Lock, Andy Musgrove, David Noble, David Stroud and Richard Gregory

Key to Colours and symbols used in Tables 3 and 4 below

Style	Denotation
	BTO Amber List – Bird Population Status Amber
	BTO Red List – Bird Population Status Red
Bold text	Listed under Section 41 of the NERC Act 2006 (Species of Principal Importance - SPIs) or UK Biodiversity Action Plan species
Underlined text	Listed on the Wildlife and Countryside Act 1981 Schedule 1 (receives protection from disturbance while nesting)
	Peak Count of survey for each species

5.1.3 The patterns of abundance and distribution of birds are discussed later in this section, with greatest detail given to Birds of Conservation Concern and SPIs.

5.1.4 Table 3 shows the numbers of each species encountered across all the survey visits with the peak count(s) of sightings highlighted. This enables patterns in changing abundance of each species to be observed over the course of the wintering period.

5.1.5 Table 4 shows the peak counts of each species recorded in each survey zone/ boundary. This allows the relative usage of each survey zone and habitat type to be inferred. The information in this table will be discussed in the next section for each notable species in turn.

Table 3: Results of the Wintering Bird Survey – Total Individuals of Each Species by Survey Visit

Common name	Species name	Visit			
		1	2	3	4
Pink-footed goose	*Anser brachyrhynchus*		35		
Mallard	*Anas platyrhynchos*			1	1
Red legged partridge	*Alectoris rufa*		15	17	7
Grey heron	*Ardea cinerea*		2	1	1
Buzzard	*Buteo buteo*	3	2	5	3
Kestrel	*Falco tinnunculus*	2	2	1	1
Sparrowhawk	*Accipiter nisus*	1	1	1	1
Moorhen	*Gallinula chloropus*				1
Lapwing	*Vanellus vanellus*	77	109		
Snipe	*Gallinago gallinago*	1	1		
Woodcock	*Scolopax rusticola*	1	1	2	
Herring gull	*Larus argentatus*		4	7	3
Common gull	*Larus canus*	6	2		
Great black-backed gull	*Larus marinus*		2		
Black headed gull	*Chroicocephalus ridibundus*			10	4
Woodpigeon	*Columba palumbus*		250		
Stock dove	*Columba oenas*	52			
Great spotted woodpecker	*Dendrocopos major*				1
Skylark	*Alauda arvensis*	69	159	77	158
Meadow pipit	*Anthus pratensis*	18	1	6	21
Pied wagtail	*Motacilla alba*	80	84		7
Dunnock	*Prunella modularis*	1	9	9	6
Robin	*Erithacus rubecula*	7	20	23	15
Blackbird	*Turdus merula*	13	34	44	33
Song thrush	*Turdus philomelos*	2	4		
Mistle thrush	*Turdus viscivorus*		3		1
Redwing	*Turdus iliacus*		17	6	13
Fieldfare	*Turdus pilaris*	2			
Whitethroat	*Sylvia communis*			1	
Goldcrest	*Regulus regulus*			2	
Wren	*Troglodytes troglodytes*	5	14	22	11
Great tit	*Parus major*	5	6	14	9
Blue tit	*Cyanistes caeruleus*	7	32	49	24
Long-tailed tit	*Aegithalos caudatus*			7	4
Coal tit	*Periparus ater*	1	1	2	
Carrion crow	*Corvus corone*	126	43		
Rook	*Corvus frugilgues*	8			
Jackdaw	*Corvus monedula*	1	7		
Jay	*Garrulus glandarius*	1	10	8	5
Magpie	*Pica pica*	2	2	4	6

Common name	Species name	Visit			
		1	2	3	4
Raven	*Corvus corax*				2
Starling	*Sturnus vulgaris*	77	60		
House sparrow	*Passer domesticus*			5	
Brambling	*Fringilla montifringilla*			2	
Goldfinch	*Carduelis carduelis*	21	46	16	21
Chaffinch	*Fringilla coelebs*	21	48	60	84
Greenfinch	*Carduelis chloris*	7	12	5	8
Bullfinch	*Pyrrhula pyrrhula*	2	4	7	1
Linnet	*Linaria cannabina*	16	21	22	2
Reed bunting	*Emberiza schoeniclus*	1	1	9	5
Yellowhammer	*Emberiza citrinella*	15	5	8	8
Sum of Individuals		651	1071	454	467
Count of Species		32	38	32	32

Table 4: Results of the Wintering Bird Survey by Survey Zone (See Figure 3 for Map of Zones)

Common name	Peak counts for each species per zone								Peak counts for each species per boundary											
	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
Pink-footed goose		35																		
Mallard														1		1				
Red legged partridge		2		2	1	5		6			2		7	2	2		1	8	1	
Grey heron	1							2						1						
Buzzard	1	1		3	2	2	1	2						1						
Kestrel		1			1			2			1				1					
Sparrowhawk					1					1									1	1
Moorhen																1				
Lapwing		71		9			69													
Snipe	1				1															
Woodcock					1	1			2											
Herring gull			6				8													
Common gull			4	1	3															
Great black-backed gull		2																		
Black headed gull	3		8				1	3												
Woodpigeon											250									
Stock dove	50				1					1										
Great spotted woodpecker															1					
Skylark	121	51	3	3	10	1	12													
Meadow pipit	28	2	5	1	1	3	3	3												
Pied wagtail		8			1	76											4			
Dunnock			1	1	1	2		1	1			1	1	2		1	2	5	3	3
Robin	3		1		2	4		9	6	2	3	1	4	7	8	6		4	2	3
Blackbird	3			3	10	6		13	9	5	6	9	10	8	9	9	2	9	5	8

Common name	Peak counts for each species per zone								Peak counts for each species per boundary											
	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
Song thrush				1				1		1								1	1	1
Mistle thrush												1	1			1			1	
Redwing			6	4			3		3	3	1						1	6	9	
Fieldfare								2												
Whitethroat											1									
Goldcrest	1																		1	
Wren	1			1	4	1		3	5	4	4	3	3	5	2	5		5	5	1
Great tit	1			1				3	4	1	3	1	2	3	4	3	2	1	4	1
Blue tit	3				7	5		9	14	5	4	6	4	11	16	5	4	1	10	8
Long-tailed tit									4						3	4				
Coal tit									1	3										
Carrion crow	33	1	10	10	1		100	3		1				6		4				
Jackdaw	7						1													
Rook	8																			
Jay	1		3			1		1		6	3	1	5		1				2	
Magpie		3	1		2	1			1	1		1		3					1	
Raven	2																			
Starling	110	3					24													
House sparrow																		5		
Brambling																		2		
Goldfinch	6	21		2		13		5						26	5			21		5
Chaffinch		8		3	11	24	1	46	4		2		2	23	6	8	3	46	12	14
Greenfinch	9	6			2	1		7	1								1	2	3	
Bullfinch				1				2								1			7	3
Linnet	20				5		8	12									1	13	1	1

Common name	Peak counts for each species per zone								Peak counts for each species per boundary											
	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
Reed bunting					4	1		1			2			2		2		2		2
Yellowhammer	1			9				6									3	11	3	3
Count of Species	24	15	11	17	22	17	12	23	13	13	13	9	10	15	12	14	11	17	19	14

5.2 Red-listed species

Lapwing

5.2.1 A typical bird of farmland and upland grassland during the winter, but now in severe decline due to habitat loss. These birds were observed twice in fairly large numbers during (peak count during a single visit of 109) within the open habitats of Zone 2 and Zone 7, during the first two visits in November and December. This species was however absent during the latter two visits in January and February. This species is probably present all year round in the surrounding landscape and the site is likely a regular component of the winter foraging habitat for the local population.

Skylark

5.2.2 Skylark are a ground nesting bird, requiring open habitats to maintain long sightlines for predator surveillance. Skylark have suffered dramatic declines in their breeding population in Britain in recent decades: with a halving of numbers in the 1990s, predominantly due to changes in farming practices governing the timing of sowing and harvesting. The arable fields on site provided optimal habitat for these birds. Skylarks were not particularly associated with any of the boundaries.

5.2.3 Skylark numbers site peaked at 159 during the 2nd visit in December, although moderate to large numbers were encountered on each visit. These birds were mainly found foraging in Zone 1 - an arable field on the north-eastern side of the site which is also part of the highest-lying land on site with the widest sightlines and visibility. This field would appear to constitute a valuable foraging resource for this species.

5.2.4 In summary, the site comprised optimal habitat for foraging and sheltering skylark, especially that of Zone 1, which is likely to form an important winter foraging resource for this species. There was an abundance of other, similar habitat in the form of open arable land within the local area.

Redwing and Fieldfare

5.2.5 Redwing and fieldfare are both winter visitors to the UK which have suffered from a decline in abundance of species-rich, and structurally diverse hedgerows and woodland for both shelter and foraging. As a result both species are a red listed.

5.2.6 Flocks of these species were observed in low numbers foraging on the ground and within the adjacent woodland areas. Peak numbers for redwing were 17, and these were associated with both open areas and boundary habitats. Sightings of fieldfare was limited to two individuals recorded during the first visit in November only, foraging within Zone 8.

5.2.7 Given the low numbers of both species on site, the site is unlikely to represent important winter foraging ground for redwing and fieldfare.

Starling

5.2.8 The starling is a familiar species often found in towns, gardens, farmland and woodland. This species is red listed as a Species of Conservation Concern due to recent breeding and wintering

population decline (1981-2010) and reduction in breeding and wintering range (1981-2010)[6]. It is also a Species of Principal Importance under section 41 of the NERC Act (2006).

5.2.9 Starling were observed in moderately-sized flocks predominantly in Zone 1 and 7. Several flocks were observed on multiple occasions flying overhead. The site offers suitable habitat for foraging starling and appears to support modest numbers.

Woodcock

5.2.10 Woodcock are wading birds commonly associated with woodland which is used for cover. Most woodcock are winter visitors from eastern and northern Europe and rely on woodland, scrub and rough grassland for shelter during the day and pasture and arable fields for foraging at night. Woodcock are in decline, possibly due to the reduction in available breeding areas, such as open areas within woodlands. Small numbers (maximum 2 individuals) were encountered on three of the four survey visits. These were observed on site within the more sheltered fields of Zones 5 and 6, and within Boundary 1.

5.2.11 A small population of this species are probably present all year round in the woodland habitats surrounding the site, and the site is likely a component of the winter foraging habitat for low numbers of this species.

Linnet

5.2.12 The linnet is a species mainly associated with farmland and open country. This species is red listed as a Species of Conservation Concern due to recent breeding and wintering population decline (1981-2010) and reduction in breeding and wintering range (1981-2010)[6]. It is also a Species of Principal Importance under section 41 of the NERC Act (2006).

5.2.13 Linnets were present on site during all four survey visits, with a maximum of 21 individuals recorded on site. This species will utilise open fields and hedgerows. The site offers suitable habitat for foraging linnet and appears to support a moderate population.

Yellowhammer

5.2.14 Yellowhammers are mainly associated with open countryside and hedgerows. This species is red listed as a Species of Conservation Concern due to recent population declines. This is likely due to changes in agricultural practices, such as the removal of hedgerows and increased use of pesticides. Yellowhammers were mainly observed within the Boundary habitats around the site, although small numbers were seen in more open areas, such as Zone 4 and Zone 8. The site offers suitable habitat for foraging yellowhammers and appears to support moderate numbers, with a peak count of 15 recorded during Visit 1.

Pink-footed goose

5.2.15 Pink-footed geese are found on coasts, wetlands, grassland and arable habitats over winter in the UK. They are amber listed as a Species of Conservation Concern due to recent breeding and wintering population decline (1981-2007), reduction in breeding and wintering range (1981-2010)[6] and for having an important non-breeding population. A moderate-sized flock of 35 was

observed on Visit 2 only in Zone 2. This species is likely to use the open fields for foraging but it appears that the site forms only a component of the foraging area for a local wintering population.

Stock dove

5.2.16 Stock dove are most characteristic of arable farmland. They are an amber-listed species of conservation concern due to recent breeding and wintering population decline and reduction in both breeding and wintering range. A moderate flock of 50 stock doves were recorded in Zone 1 during Visit 1 only. The site offers suitable habitat but appears not to be a critical wintering area for stock dove given their absence in December, January and February.

Meadow pipit

5.2.17 Like skylarks, meadow pipits are associated with open arable, grassland and heathland habitats and are ground dwelling birds and have undergone declines in recent years, hence their amber status.

5.2.18 Meadow pipit were observed during all survey visits although only as individuals or small loose flocks. These were present across the open habitats at the site. The site offers suitable habitat for foraging meadow pipit and appears to support a modest population.

Dunnock

5.2.19 Dunnock inhabit any well vegetated areas with scrub, brambles and hedges, including field edges, earning their moniker "hedge sparrow". They spend large amounts of time on the ground in amongst grassland but also remain close to shrubby vegetation cover. Dunnock abundance fell substantially between the mid-1970s and mid-1980s, after a period of population stability. Some recovery has occurred throughout the UK since the late 1990s. Dunnock is an amber listed Species of Conservation Concern and a Species of Principal Importance. Dunnock were observed widely across the site on all visits in low to modest numbers, with a peak count of 9 recorded on both the 2nd and 3rd visits. This species is unlikely to utilise the open fields for foraging but will use the field margins.

Reed bunting

5.2.20 The reed bunting is a species mainly associated with reedbeds, riverine scrub and marsh. This species is amber listed as a Species of Conservation Concern due to recent breeding and wintering population decline (1981-2007) and reduction in breeding and wintering range (1981-2010)[6]. It is also a Species of Principal Importance under section 41 of the NERC Act (2006). Reed bunting were observed during all visits with a peak of 9 individuals recorded on visit 3. They were observed in both open fields and boundaries and were mostly associated with the ditches to the west of the site. This species will utilise open fields but is more likely to use the hedgerow and ditch system. The site does offer suitable habitat for foraging reed bunting, however appears to support modest numbers only.

Other Birds of Conservation Concern

5.2.21 Small numbers of bullfinch (peak count of 7), an amber listed species, were consistently recorded throughout the survey visits, and were most strongly associated with the field boundary habitats in the south west of the site.

5.2.22 Individuals or small numbers (maximum 10) of each of mistle thrush, song thrush, herring gull, house sparrow (red-listed species) and kestrel, mallard, common gull, greater blacked gull and snipe (amber-listed species), were recorded on one or two occasions and did not show a persistent association with the site. It is therefore likely that they are not present within the site throughout the winter but may use the site opportunistically.

Other Birds

5.2.23 Other birds recorded were primarily generalist species encountered within a range of habitats including hedgerow and woodland. These included tits, finches, wren, blackbird and various corvids such as jackdaw, carrion crow and magpie. There were also several other species which are more selective of riparian habitat such as moorhen and grey heron; and farmland species such as red legged partridge.

6 SUMMARY

6.1.1 A total of 55 species were identified; of which 12 were red listed birds and 12 were amber listed birds. Of these 24 bird species, 10 are also Species of Principal Importance under the NERC Act (2006) and so are a material consideration for planning.

6.1.2 The notable birds utilising the site can be split into two distinct categories; those which were recorded predominantly within open habitats and those recorded foraging predominantly in boundary habitats such as woodland and hedgerows.

6.1.3 The birds utilising the open field habitats are more likely to be directly impacted installation of a solar array. The peak count of numbers recorded at the site for each of these species is summarised in Table 5 below.

Table 5: Summary of Wintering Birds of Open Farmland

Birds Recorded within Open Habitats	Peak Count
Pink-footed goose	35
Lapwing	109
Herring Gull	7
Common gull	6
Great black-backed gull	2
Black-headed gull	10
Skylark	159
Meadow pipit	21

6.1.4 Table 6 summaries the notable bird species that predominantly use the boundary habitats for sheltering and foraging:

Table 6: Summary of Wintering Birds of Field Boundary Habitats

Birds Associated with Boundary Habitats	Peak Count
Mallard	1
Kestrel	2
Snipe	1
Woodcock	2
Stock dove	52
Dunnock	9
Song thrush	4
Mistle thrush	3
Redwing	17
Fieldfare	2
Starling	77
House sparrow	5
Bullfinch	7
Linnet	22
Reed bunting	9
Yellowhammer	15

7 WILDLIFE LEGISLATION & SPECIES INFORMATION

BIRDS

All British birds, their nests and eggs (with certain exceptions) are protected under the Wildlife & Countryside Act 1981 (as amended) which makes it an offence to: intentionally kill, injure or take a wild bird; intentionally take, damage or destroy nests which are in use or being built; intentionally take or destroy birds' eggs; or possess live or dead wild birds or eggs. A number of species receive additional protection through inclusion on Schedule 1 of the Wildlife and Countryside Act; for these it is also an offence to intentionally or recklessly disturb birds while nest building, or at a nest containing eggs or young, or to disturb the dependant young of such a bird. Penalties for offences against bird species include fines of up to £5,000 and/or up to six months in prison.

General licences for control of some bird species are issued by Natural England and Natural Resources Wales in order to prevent damage or disease, or to preserve public health or public safety, but it is not possible to obtain a licence for control of birds or removal of eggs/nests for development purposes. Consequently if nesting birds are present on a development site when works are programmed to start it is usually necessary to delay works, at least in the areas supporting nests, until any chicks have fledged and left the nest. It is usually possible, once chicks have hatched, for an experienced ecologist to predict approximately when they are likely to fledge, in order to inform programming of works on site.

PLANNING POLICY IN RELATION TO BIODIVERSITY - ENGLAND

The National Planning Policy Framework (NPPF), issued in March 2012, has superseded Planning Policy Statement 9: Biodiversity and Geological Conservation (August 2005). Additional guidance can be found online at http://planningguidance.planningportal.gov.uk/blog/guidance/. Further guidance is also available within the Government Circular ODPM 06/2005 on Biodiversity and Geological conservation although it should be noted that this document is currently being updated by DEFRA. The NPPF simplifies and collates a number of previous planning documents and outlines the government's objective towards biodiversity.

The NPPF identifies ways in which the planning system should contribute to and enhance the natural and local environment (Paragraph 109), including:

- protecting and enhancing valued landscapes, geological conservation interests and soils;
- recognising the wider benefits of ecosystem services;
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

It also emphasises the importance of conserving biodiversity and areas covered by landscape designations (Paragraph 115):

Great weight should be given to conserving landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to landscape and scenic beauty. The conservation of wildlife and cultural heritage are important considerations in all these areas, and should be given great weight in National Parks and the Broads.

When determining planning applications, the NPPF states that local planning authorities should aim to conserve and enhance biodiversity (Paragraph 118) by applying principles including:

- if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;
- development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;

- opportunities to incorporate biodiversity in and around developments should be encouraged;
- planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and
- the following wildlife sites should be given the same protection as European sites: potential Special Protection Areas and possible Special Areas of Conservation; listed or proposed Ramsar sites; and sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

The Natural Environment and Rural Communities Act (2006) states that a public authority must, "in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity; Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat". DEFRA issued further guidance on implementation of this act in the document; Guidance for Local Authorities on Implementing the Biodiversity Duty (May 2007), which notes that "Conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them".

ECOLOGICAL ENHANCEMENTS

The Natural Environment and Rural Communities Act (2006) states that a public authority must, "in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity; Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat". DEFRA issued further guidance on implementation of this act in the document; Guidance for Local Authorities on Implementing the Biodiversity Duty (May 2007), which notes that "Conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them".

In England, the National Planning Policy Framework (NPPF), issued in March 2012, states that the planning system should contribute to "*minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures*". It also states that "*opportunities to incorporate biodiversity in and around developments should be encouraged*".

8 LERC RECORDS OF BIRDS FROM SURROUNDING 2KM

Species Name	Common Name	Date	Abundance	Designations
Acanthis cabaret	Lesser Redpoll	04/03/2015	3 Present (Count: Exact)	BoCC4-Red, Sect.41, Sect.42,
Accipiter gentilis	Goshawk	06/12/2003	1 Present (Count: Exact)	WCA1i,
Alauda arvensis	Skylark	27/06/2015	4 Total (Count: Exact)	BoCC4-Red, LBAP:3, Sect.41
Alcedo atthis	Kingfisher	01/11/2015		BoCC4-Amber, WCA1i,
Anas acuta	Pintail	23/11/2011	3 Present (Count: Exact)	BoCC4-Amber, WCA1ii,
Anas penelope	Wigeon	08/03/2015	1 Total (Count: Exact)	BoCC4-Amber,
Anas strepera	Gadwall	01/01/2013		BoCC4-Amber,
Anser anser	Greylag Goose	23/05/2015	2 Total (Count: Exact)	BoCC4-Amber, WCA1ii
Anser brachyrhynchus	Pink-footed Goose	01/11/2015		BoCC4-Amber,
Anser fabalis subsp. fabalis	Taiga Bean Goose	16/03/2011	8 Present (Count: Exact)	BoCC4-Amber,
Anser fabalis subsp. rossicus	Tundra Bean Goose	23/11/2011-07/12/2011	2 Juvenile (Count: Exact)	BoCC4-Amber,
Aythya ferina	Pochard	13/12/2015	2 Total (Count: Exact)	BoCC4-Red,
Aythya marila	Scaup	23/11/2011	1 1st calendar year male(s) (Count: Exact)	BoCC4-Red, Sect.41, , WCA1i,
Bucephala clangula	Goldeneye	20/12/2000	2 Present (Count: Exact)	BD2.2, BoCC4-Amber, WCA1ii,
Calcarius lapponicus	Lapland Bunting	27/10/2001	1 Present (Count: Exact)	BoCC4-Amber, WCA1i
Charadrius morinellus	Dotterel	25/04/2011	1 Present (Count: Exact)	BoCC4-Red, WCA1i,
Circus aeruginosus	Marsh Harrier	11/01/2012-22/02/2012	4 Present (Count: Exact)	BoCC4-Amber, WCA1i,
Clangula hyemalis	Long-tailed Duck	06/12/2004	1 Present (Count: Exact)	BoCC4-Red, WCA1i
Coccothraustes coccothraustes	Hawfinch	February 2009	11 Present (Count: Exact)	BoCC4-Red, Sect.41, Sect.42,
Cygnus columbianus subsp. bewickii	Bewick's Swan	15/02/2002	2 Present (Count: Exact)	BoCC4-Amber, Sect.41, Sect.42, WCA1i,
Cygnus cygnus	Whooper Swan	19/03/2013	26 Present (Count: Exact)	BoCC4-Amber, WCA1i,
Cygnus olor	Mute Swan	01/04/2014		BoCC4-Amber,
Emberiza calandra	Corn Bunting	2005 - 2010		BoCC4-Red, LBAP:3,
Emberiza citrinella	Yellowhammer	25/11/2015	9 Total (Count: Exact)	BoCC4-Red, LBAP:3, Sect.41, Sect.42,
Emberiza schoeniclus	Reed Bunting	25/11/2015	2 Total (Count: Exact)	BoCC4-Amber, LBAP:3, Sect.41, Sect.42,
Falco columbarius	Merlin	28/03/2012	1 Female (Count: Exact)	BD1, Bern2, BoCC4-Red, , WCA1i,i

Species Name	Common Name	Date	Abundance	Designations
Falco peregrinus	Peregrine	03/11/2015	1 Present (Count: Exact)	BD1, Bern2, CITESA, CMS_A2, LBCSchedule1, ScotBL, WCA1i,
Falco subbuteo	Hobby	02/08/2015	1 Total (Count: Exact)	WCA1i
Fringilla montifringilla	Brambling	25/01/2015	23 Present (Count: Exact)	WCA1i
Gallinago gallinago	Snipe	06/12/2014	1 Present (Count: Exact)	BoCC4-Amber, LBAP:3
Gavia immer	Great Northern Diver	12/01/2013	1 Present (Count: Exact)	BoCC4-Amber, WCA1i
Gavia stellata	Red-throated Diver	14/11/2011	1 Juvenile (Count: Exact)	WCA1i,
Haliaeetus albicilla	White-tailed Eagle	19/05/2011	1 Present (Count: Exact)	BoCC4-Red, WCA1i,
Linaria cannabina	Linnet	02/08/2015		BoCC4-Red, LBAP:3,
Loxia curvirostra	Common Crossbill	19/03/2014	22 Present (Count: Exact)	WCA1i,
Loxia leucoptera	Two-barred Crossbill	23/03/2014	1 Male (Count: Exact)	WCA1i
Lullula arborea	Woodlark	28/02/2014	1 Present (Count: Exact)	Sect.41, Sect.42, WCA1i
Melanitta nigra	Common Scoter	31/03/2005	1 Male (Count: Exact)	BoCC4-Red, Sect.41, Sect.42, , WCA1i,
Milvus milvus	Red Kite	19/10/2014	1 Present (Count: Exact)	WCA1i,
Numenius arquata	Curlew	2005 - 2010		BoCC4-Red, LBAP:3, , Sect.41, Sect.42,
Numenius phaeopus	Whimbrel	08/08/2011	1 Present (Count: Exact)	BoCC4-Red, WCA1i, WO1i
Passer domesticus	House Sparrow	25/11/2015		BoCC4-Red, LBAP:3, , Sect.41, Sect.42,
Passer montanus	Tree Sparrow	02/08/2015		BoCC4-Red, LBAP:3, Sect.41, Sect.42,
Perdix perdix	Grey Partridge	03/10/2015	5 Total (Count: Exact)	BoCC4-Red, LBAP:3, Sect.41, Sect.42,
Pernis apivorus	Honey-buzzard	02/10/2015	1 Present (Count: Exact)	BoCC4-Amber, WCA1i
Pyrrhula pyrrhula	Bullfinch	25/11/2015	1 Total (Count: Exact)	BoCC4-Amber, , LBAP:3,
Serinus serinus	Serin	17/11/2007	1 Present (Count: Exact)	WCA1i
Stercorarius parasiticus	Arctic Skua	07/05/2002	1 Present (Count: Exact)	BoCC4-Red, , UKBAP
Sturnus vulgaris	Starling	25/11/2015	100 Total (Count: Estimate)	BoCC4-Red, LBAP:3
Tringa glareola	Wood Sandpiper	28/08/2002	1 Present (Count: Exact)	BoCC4-Amber, WCA1i
Tringa ochropus	Green Sandpiper	20/06/2014	1 Present (Count: Exact)	BoCC4-Amber, WCA1i

Species Name	Common Name	Date	Abundance	Designations
Tringa totanus	Redshank	19/04/2011	4 Present (Count: Exact)	BoCC4-Amber, LBAP:3
Turdus iliacus	Redwing	06/12/2015	6 Present (Count: Exact)	BoCC4-Red, , WCA1i
Turdus philomelos	Song Thrush	15/06/2015	1 Total (Count: Exact)	BoCC4-Red, LBAP:3,
Turdus pilaris	Fieldfare	26/03/2014	400 Present (Count: Exact)	BoCC4-Red, WCA1i,
Tyto alba	Barn Owl	24/12/2015	1 Present (Count: Exact)	LBAP:3, WCA1i,
Vanellus vanellus	Lapwing	04/10/2015	8 Total (Count: Exact)	BoCC4-Red, LBAP:3, Sect.41, Sect.42,

Meaning of designations listed above

Designation	Meaning
BoCC4-Amber	BTO Amber List – Bird Population Status Amber
BoCC4-Red	BTO Red List – Bird Population Status Red
Sect.41/42	Section 41/42 of the NERC Act 2006/ UK Biodiversity Action Plan Species
WCA1i	Wildlife and Countryside Act 1981 Schedule 1
LBAP:3	Lincolnshire Biodiversity Action Plan (3rd Edition)

CLARKSON & WOODS



Clarkson and Woods Ltd.
Overbrook Business Centre,
Poolbridge Road, Blackford,
Somerset BS28 4PA

t: 01934 712500
e: info@clarksonwoods.co.uk

www.clarksonwoods.co.uk

APPENDIX 7.6

BREEDING BIRDS SURVEY (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

Little Crow
Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

BREEDING BIRDS SURVEYS

On behalf of INRG Solar (Little Crow) Ltd

November 2018

BREEDING BIRD SURVEYS

LITTLE CROW SOLAR FARM, SCUNTHORPE

carried out by

CLARKSON & WOODS
ECOLOGICAL CONSULTANTS

commissioned by

INRG SOLAR (LITTLE CROW) LTD.

V3 NOVEMBER 2018

BREEDING BIRD SURVEYS

LITTLE CROW SOLAR FARM, SCUNTHORPE

CONTENTS

1 INTRODUCTION 3

2 SITE DESCRIPTION 3

3 SURVEY AND ASSESSMENT METHODOLOGY 5

4 SURVEY LIMITATIONS 8

5 RESULTS 9

6 SUMMARY 24

7 WILDLIFE LEGISLATION & SPECIES INFORMATION 25

8 LERC RECORDS OF BIRDS FROM SURROUNDING 2KM 27

Project title	Little Crow Solar Farm, Scunthorpe			
Project number	5642			
Document title	Breeding Bird Surveys			
Client	INRG Solar (Little Crow) Ltd			
Author	Peter Timms			
Status	Checked by	Date	Approved for C&W by	Date
V1.0	Tom Clarkson	12/07/18	Peter Timms	12/07/18
V2.0 *Updated to include Results of 4th visit added*			Peter Timms	07/08/18
V3.0 *Updated to reflect red line boundary change*	Peter Timms	19/11/18	Harry Fox	20/11/18

The information, data and advice which has been prepared and provided is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's (CIEEM) Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions. This report and its contents remain the property of Clarkson and Woods Ltd. until payment has been made in full.

1 INTRODUCTION

1.1.1 Clarkson and Woods Ltd. was commissioned by INRG Solar to carry out breeding birds surveys of land proposed to accommodate Little Crow Solar Farm in Scunthorpe. The surveys were carried out between April and July 2018 by experienced bird surveyors.

1.1.2 This report aims to inform a planning application for construction of a solar farm within the site. It details the methods and results of the surveys and informs the Environmental Statement (ES) Chapter on Ecology prepared for the site.

1.1.3 Unless the client indicates to the contrary, information on the presence of species will be passed to the county biological records centre in order to augment their records for the area.

2 SITE DESCRIPTION

2.1.1 The site consisted of seventeen (predominantly arable) agricultural fields; with occasional patches of dense scrub, broadleaved woodland and five ponds. Hedgerows, ditches and woodland made up the site boundaries. The wider landscape is characterised by the industrial steelworkings to the west of the site, and further arable farmland and plantation woodland to the north and east. Beyond the woodland to the south lies a recently constructed solar array.

2.1.2 The development site is approximately 226 hectares (ha) in size, and the approximate centre of the site is at OS Grid Ref. SE 941099.

2.1.3 Figure 1 shows the present layout of habitats across the site according to the Phase 1 Habitats Survey.

2.1.4 The proposals for the site consist of the installation of solar panels on metal frames, which are driven into the ground, and connected by underground cables to a cabin containing a transformer. This is then connected locally to the National Grid network



Figure 1: Phase 1 Habitat Map of the Survey Area

3 SURVEY AND ASSESSMENT METHODOLOGY

3.1 Data Search

3.1.1 Lincolnshire Environmental Records Centre (LERC) was consulted for records of birds within 2km of the site.

3.2 Survey Area

3.2.1 The site consisted of seventeen (predominantly arable) agricultural fields; with occasional patches of dense scrub, broadleaved woodland and five ponds. Hedgerows, ditches and woodland made up the site boundaries. The wider landscape is characterised by the industrial steelworkings to the west of the site, and further arable farmland and plantation woodland to the north and east. Beyond the woodland to the south lies a recently constructed solar array.

3.3 Survey Timings and Protocol

3.3.1 The site was surveyed for breeding birds four times between April 2018 and July 2018, to identify which bird species were using the site for breeding or exhibited territorial behaviour and which habitats appeared to be of greatest value.

3.3.2 The surveys were carried out on the following days, under the weather conditions described in Table 1 below. Due to the large size of the site, some of the visits (namely visits 1 and 2) were split over two days.

Table 1: Dates and Weather Conditions during Breeding Bird Surveys

Survey Number	Date	Description of weather: Precipitation; Cloud (Oktas); Wind (Beaufort Scale)	Temperature (°C)	Timings
1	16/04/2018	Dry, Cloud 2, Wind 4	11-15	08:00 – 13:00
	17/04/2018	Dry, Cloud 2, Wind 4	8-10	08:00 – 11:30
2	03/05/2018	Dry, Cloud 3, Wind 2	10-16	08:30 – 13:00
3	11/06/2018	Dry, Cloud 1, Wind 2	10-22.5	05:15 – 11:00
	12/06/2018	Intermittent light drizzle, Cloud 8, Wind 2	13-16	08:00 – 10:30
4	24/07/2018	Dry, Cloud 4, Wind 2	18-25	08:30 – 13:00

3.3.3 The survey followed BTO guidelines, where the observer systematically walked through the site, ensuring that all points on site were visited to within 50m. The location and behaviour of all birds and flocks of birds seen was noted on large-scale survey maps which were later collated onto master maps for interpretation. Particular attention was paid to bird exhibiting breeding behaviour, for instance birds in full song, exhibiting antagonistic behaviour/calling, carrying nest material, carrying food, and returning to nesting sites. Standard BTO Common Birds Census symbology and species codes were used to create a survey map of each individual visit.

3.4 Personnel

3.4.1 All surveyors have been assessed under the Clarkson and Woods QA processes as competent to complete the surveys.

3.4.2 Surveys were undertaken by Harry Fox BSc MCIEEM, Mark Baker BSc MCIEEM, James Latham BSc MCIEEM, Mike Hockey Grad CIEEM, and Steve Miller affiliate member of CIEEM. Harry, Mark, James, Mike and Steve are highly experienced bird surveyors able to identify all British species by sight and sound.

Mapping

3.4.3 The site was divided up into eight survey "zones" (largely comprising agricultural fields) and twelve "boundaries" (comprising hedgerows, scrub, woodland and ditches) according to similar habitat characteristics to assist in the interpretation of data (see Table 2 & Figure 2). This separation of the site's features allowed the relative usage of the site's habitats by notable species or numbers of species to be assessed. It should be noted that these zones and boundaries combine multiple fields and hedgerows and therefore the numbering differs from that used in the Phase 1 survey map (Figure 1).

Table 2: Zones and Boundaries numbering scheme

Zone No.	Description
1	Arable fields to the north-east of the site, sown with winter barley
2	Primarily arable fields sown with winter barley and early wheat, with a block of improved grassland present
3	Arable field to the south-east of the site sown with early wheat
4	Arable field to the south of the site sown with early wheat
5	Primarily semi-improved grassland fields to the south-west of the site
6	Primarily arable fields to the west of the site sown with oil seed rape
7	Arable field towards the centre of the site sown with oil seed rape
8	Arable fields towards the north of the site sown with vining peas
Boundary No.	**Description**
B1	Mixed plantation woodland to the east of the site and poultry farm
B2	Mixed plantation woodland to the south-east of the site
B3	Broad-leaved plantation woodland towards the centre of the site
B4	Broad-leaved plantation woodland to the south of the site dividing zones 3 and 4
B5	Hedgerow, scrub and woodland habitat to the south of the site
B6	Riparian woodland, hedgerows and scrub to the west of the site
B7	Broad-leaved plantation woodland, as well as an arable field containing a portion of bare ground surrounded by trees, situated to the north of the site
B8	Broad-leaved plantation woodland and hedgerows dividing zones 6 and 7
B9	Dense scrub and hedgerow between zones 7 and 8
B10	Hedgerows and ditch in the centre of the site
B11	Hedgerow with ditch to the north of zone 4
B12	Hedgerows and ditches to the south-west of the site



Figure 2: Map showing Habitat/Boundary Zones

4 SURVEY LIMITATIONS

Survey

4.1.1 Nocturnal bird surveys were not undertaken and as such the activity on site of birds such as owls cannot be determined. In lieu of survey data, a judgement has been made based on the results of the data search and the presumed value of the habitats on site to such species.

4.1.2 The surveys offer only 'snapshots' of the Site and whilst trying to account for seasonal differences, may miss certain species which attend the site infrequently or which might choose to take up residence subsequent to completion of the surveys. At the same time a lack of signs of any particular species does not confirm its absence, merely that there was no indication of its presence during this survey.

4.1.3 If no action or development of this land takes place within twelve months of the date of this report, then the findings of this survey should be reviewed and may need to be updated. After three years the findings will be out of date and the full survey should be repeated.

Site Compound Area

4.1.4 The survey area did not encompass the entire field surrounding the former oil well in the north east of the site, which is expected to be used to house the temporary site compound during construction of the array. This field was added to the application scheme subsequent to the completion of the breeding bird surveys. The red line boundary was amended to include this area after the surveys had been completed. The use of this area by breeding birds was not fully investigated and it is possible that bird species (including those of conservation concern) using this area were not recorded. However the survey route did follow the southern boundary of this field and this area was included within survey boundary zone B7 (figure 2 refers). As such any conspicuous activity by birds exhibiting territorial behaviour within the southern portion of this field (such as display flights or calls) would likely have been recorded, and the surveyors also noted any movement of birds into and out of this area. However it is likely that small numbers of birds and territories/nest sites within the area would have gone unrecorded as, unlike the rest of the fields within the survey area, the surveyor would not have flushed birds sat on nests. It is noted that the arable land present in this field is relatively small in size (circa 2.1 ha) and predominately surrounded by tall woodland and trees, and therefore suboptimal for certain open farmland bird species due to a lack of clear sightlines for predator detection.

4.1.5 Overall, the findings of the survey (particularly the results recorded within B7) are therefore considered to depict a reasonable but not a precise reflection of the bird use of this area during the survey period.

5 RESULTS

5.1 Data Search – Protected and Notable Species

Data obtained from Lincolnshire Environmental Records Centre (LERC)

5.1.1 The data search identified 65 notable bird species within 2km of the site since 2000 which winter in the UK (or are vagrants) and are considered relevant to this report. These species and their conservation designations are detailed in Section 8 at the end of this report. Additional records beyond the most recent record for each species have been excluded.

5.1.2 A number of birds within Section 8 were recorded within the site. This includes Lapland bunting *Calcarius lapponicus*, merlin *Falco columbarius*, peregrine *Falco peregrinus*, brambling *Fringilla montifringilla*, tree sparrow *Passer montanus*, fieldfare *Turdus pilaris* and hobby *Falco subbuteo*.

5.1.3 Details of the legislation affecting those protected species which have been identified as occurring on the site from the wintering bird surveys, or potentially occurring on the site given their ecological requirements, are detailed in Section 6.

Data Search – Local Conservation Priorities

5.1.4 Farmland birds as a group are identified as targets for conservation within the Lincolnshire Biodiversity Action Plan (BAP) 2011-2020 (3rd Edition). The species of bird listed within this group are:

- Grey partridge Perdix perdix
- Lapwing Vanellus vanellus
- Yellow wagtail Motacilla flava
- Skylark Alauda arvensis
- Corn bunting Miliaria calandra
- Linnet Carduelis cannabina
- Yellowhammer Emberiza citronella
- Reed bunting Emeriza scheoniclus
- Turtle dove Streptopelia turtur
- Bullfinch Pyrrhula pyrrhula
- Starling Sturnus vulgaris
- Tree sparrow Passer montanus
- Snipe Gallingo gallinago
- Curlew Numernius arquata
- Redshank Tringa totanus
- Barn owl Tyto alba

5.1.5 These species have been identified as local conservation priorities and therefore will be given appropriate additional weight within the ES Chapter.

5.2 Field Survey

5.2.1 In total, 55 bird species (including woodpigeon *Columba palumbus* and pheasant *Phasianus colchicus* which were not enumerated) were recorded during the survey visits. 21 of these were BTO Birds of

Conservation Concern red/amber lists[1] or Species of Principal Importance (SPI)[2], comprising 10 'red listed' birds and 11 'amber listed' birds. 10 species were listed as being SPI for nature conservation and as such are capable of being material considerations within the planning process. The patterns of abundance and distribution of each of these species is discussed later in this section, with greatest detail given to birds of conservation concern and SPIs.

5.2.2 Table 4 shows the numbers of each species encountered across all the survey visits with the peak count(s) of sightings highlighted. This enables patterns in changing abundance of each species to be observed over the course of the breeding season.

5.2.3 Table 5 shows the peak counts of each species recorded in each survey zone/ boundary. This allows the relative usage of each survey zone and habitat type to be inferred. The information in this table will be discussed in the next section for each notable species in turn.

5.2.4 In Tables 4 and 5, the bird species are colour coded to indicate their conservation status and their likely breeding status on-site is indicated by abbreviations as outlined in Table 3 below:

Table 3: Colours and symbols used in Tables 4 and 5 below

Bold text	Listed under Section 41 of the NERC Act 2006 (Species of Principal Importance - SPIs) or UK Biodiversity Action Plan species
Red fill	'Red listed' species according to BTO/RSPB Bird of Conservation Concern
Orange fill	'Amber listed' species according to BTO/RSPB Bird of Conservation Concern
Yellow fill	Peak Count of Survey for each species
Y	Breeding confirmed (nests located or adults with food/nest material, or fledglings seen)
Pr	Breeding probable
Po	Breeding possible
N	Not likely to breed on site

[1] Red list species are those that are globally threatened, whose population or range has declined rapidly in recent years (i.e. >50% in 25 years), or which have declined historically and not recovered. Amber list species are those whose population or range has declined moderately in recent years (>25% but <50% in 25 years) declined historically but recovered recently, rare breeders (fewer than 300 pairs), internationally important populations in the UK, localised populations and those with an unfavourable conservation status in Europe.

[2] Species of Principal Importance (SPI) are listed in section 41 of the Natural Environment and Rural Communities (NERC) Act 2006

Table 4: Numbers of Each Species Recorded During Each Survey Visit

Common Name	Latin Name	Visit				Breeding?
		1	2	3	4	
Greylag goose	*Anser anser*	2				N
Moorhen	*Gallinula chloropus*		1		2	Y
Lapwing	*Vanellus vanellus*	2	4	1	7	Pr
Woodcock	*Scolopax rusticola*		1			N
Herring gull	*Larus argentatus*		1	3	2	N
Lesser black-backed gull	*Larus fuscus*		2			N
Tawny owl	*Strix aluco*			1		Po
Buzzard	*Buteo buteo*	1	2	3	4	Po
Kestrel	*Falco tinnunculus*	2	2	2	2	Pr
Red legged partridge	*Alectoris rufa*	10	7	3	9	Pr
Stock dove	*Columba oenas*	1	1			N
Great spotted woodpecker	*Dendrocopos major*	1		1		Po
Cuckoo	*Cuculus canorus*			1		N
Skylark	*Alauda arvensis*	68	47	35	12	Y
Meadow pipit	*Anthus pratensis*	2	2	6		Pr
Yellow wagtail	*Motacilla flava*		4	8		Pr
Pied wagtail	*Motacilla alba*	1		2	1	Po
Dunnock	*Prunella modularis*	4	4	9	3	Pr
Robin	*Erithacus rubecula*	19	9	13	2	Y
Blackbird	*Turdus merula*	28	9	21	4	Y
Song thrush	*Turdus philomelos*	3		3	1	Po
Mistle thrush	*Turdus viscivorus*		3	2		Po
Treecreeper	*Certhia familiaris*	1				Po
Nuthatch	*Sitta europaea*		1		2	N
Swallow	*Hirundo rustica*	3	8	16	12	N
Swift	*Apus apus*			1		N
Lesser whitethroat	*Sylvia curruca*			1		N
Whitethroat	*Sylvia communis*	1	16	19	5	Pr
Goldcrest	*Regulus regulus*	1	3			Po
Wren	*Troglodytes troglodytes*	26	17	31	7	Y
Great tit	*Parus major*	9	10	10	1	Pr
Blue tit	*Cyanistes caeruleus*	20	15	23	15	Pr
Long-tailed tit	*Aegithalos caudatus*		4	1		Pr

Common Name	Latin Name	Visit				Breeding?
		1	2	3	4	
Blackcap	*Sylvia atricapilla*	13	20	24		
Coal tit	*Periparus ater*	4	1	2		Po
Carrion crow	*Corvus corone*	8	1	6	37	Po
Jay	*Garrulus glandarius*	1				N
Magpie	*Pica pica*	1	1		3	Po
Brambling	*Fringilla montifringilla*		4	2		Po
Goldfinch	*Carduelis carduelis*	3	11	42	18	Y
Chaffinch	*Fringilla coelebs*	47	34	38	18	Y
Chiffchaff	*Phylloscopus collybita*	11	7	6	2	Pr
Greenfinch	*Carduelis chloris*			4	4	Po
Willow Warbler	*Phylloscopus trochilus*	8	16	5	1	Pr
Garden warbler	*Sylvia borin*		3	1		Po
Wheatear	*Oenanthe oenanthe*			3		N
Bullfinch	*Pyrrhula pyrrhula*		2	5		Pr
Linnet	*Linaria cannabina*	17	20	39	23	Y
Reed bunting	*Emberiza schoeniclus*	2	8	14	17	Y
Yellowhammer	*Emberiza citrinella*	15	8	16	11	Y
Total Individuals		338	309	430	225	
Number of Species		34	38	41	28	

Note that wood pigeon and pheasant were excluded from the survey. They were recorded as present on all visits but counts were not made.

Table 5: Results of the Breeding Bird Survey (Peak Counts of Birds within Each Habitat Type)

Common name	Peak counts for each species per zone								Peak counts for each species per boundary											
	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
Greylag goose					2															
Moorhen																		1		
Lapwing						4		1												
Woodcock																			1	
Herring gull			1	2	1															
Lesser black-backed gull						2														
Tawny owl															1					
Buzzard		1		1	1	1				1					1					
Kestrel	1	1			2										1					
Red legged partridge	2	2		2		3									2	3		2		
Stock dove				1		1														
Great spotted woodpecker									1		1									
Cuckoo															1					
Skylark	12	29	8	5	4	8	7	2												1
Meadow pipit	1	4			2															
Yellow wagtail	4	1	3				2												1	
Pied wagtail		2						1												
Dunnock					1	3							1	1	1			1	2	1
Robin	4					2		1	4	2		1	2	4	1	3	2	1	1	1
Blackbird	3	3			1	1		4	3	3	3	1	4	2	4	1	3	1	5	
Song thrush						1				2				1				1	1	
Mistle thrush	1	1		1		1						2			1	1				
Treecreeper										1										
Nuthatch										1										
Swallow	3			1	11	1	2	1								2				
Swift		1																		
Lesser whitethroat														1						

Common name	Peak counts for each species per zone								Peak counts for each species per boundary											
	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
Whitethroat					2	3	1				1			2	1	1	1	5	2	3
Goldcrest										1		1		1			1			
Wren	4				1	4		1	3	3	3	4	1	2	4	2	2		2	3
Great tit		1				1			1	1	3	1	1	1	1	3	3		1	1
Blue tit	4	3			1	2		2	4	2	2	3	1	1	2	4	3	1	2	3
Long-tailed tit															1				4	
Blackcap	4	1			1	2		1	2	5	3	1	3	3	3	4	2		2	1
Coal tit										1	1	1	1		1		1			
Carrion crow			1		3		30	3							2		1	1	1	
Jay										1										
Magpie														1						
Brambling									1		1	1			2					
Goldfinch	25	2	1			1		2							2	4	6	6	1	
Chaffinch	7	2			3	5		9	1	4	3	2	4	6	4	6	3	8	2	2
Chiffchaff						2		2	2	1			2	2	3					1
Greenfinch		1														1		1		1
Willow Warbler	1												2	9	4				1	1
Garden warbler										1								1	1	1
Wheatear																			3	
Bullfinch						1								1		2			2	
Linnet	26	4			2	3	5	2		2				2	1		2	5	1	4
Reed bunting	4	3			2	2	1							3		2	3	1	2	
Yellowhammer	3	2			2	2								4		6	1	3	1	3
Count of Species	18	19	5	7	21	25	7	14	10	16	10	11	11	21	23	16	14	16	21	14

Overall Assemblage

5.2.5 The breeding bird assemblage was diverse: comprising typical species of farmland, woodland and hedgerows. Numerous summer visitors were recorded, including cuckoo, swift, swallow, willow warbler, chiffchaff, blackcap, and yellow wagtail. Other species were residents, though numbers may be swelled by an influx of migrant birds.

Temporal Changes (within season)

5.2.6 Over the course of the four surveys, the level of usage of the site by certain species varied a little. The peak number of individuals and species was recorded during Visit 3 at the beginning of June. The lowest number of species and individuals were recorded during the 4th visit in late July. It was noted that the majority of fields had been harvested by the 4th survey which may account for the drop in numbers of species which inhabit the centre of arable fields, such as skylarks, meadow pipits and yellow wagtail. The 4th visit was also conducted during an extended period of dry, hot weather which is likely to result in lower bird activity generally.

Red-listed Species

Skylark

5.2.7 The skylark is a species mainly associated with arable habitats, grassland and moorland in the UK. This species is red listed as a Species of Conservation Concern due to recent breeding and wintering population decline and range contraction. It is also a Species of Principal Importance under section 41 of the NERC Act (2006).

5.2.8 Skylark were recorded on each visit with peak numbers in the arable land in Zone 1 during Visit 1. Sightings were spread between across all Zones, although there was a stronger association Zones 1 and 2 in the north east of the site. The majority of fields at the site are suitable for breeding skylark as they provide a good supply of suitable open space, nesting and food resources as well as long sightlines for predator monitoring.

5.2.9 The site supports an excellent population of skylark and surveys indicate this is around 25 territories. Figure 3 provides a distribution map of skylark found during the survey

Yellow Wagtail

5.2.10 Yellow Wagtails are farmland bird which are usually found in damp habitats such as marshes, lowland meadows and river valleys, but there has been much greater use of arable habitats over recent years, with oil-seed rape, legume and root crops increasingly used for breeding.

5.2.11 The population has fallen by an estimated 75 per cent between 1970 and 2009. It is thought that land drainage, the conversion of pasture to arable and a decline in invertebrate numbers (notably those associated with livestock) may be behind the decline, although the species is a long-distance migrant so changes in conditions at wintering or passage grounds cannot be ruled out

5.2.12 Yellow wagtail were recorded in reasonably low numbers (peak of 8) during visits 2 and 3. This species was absent during visit 1 and visit 4, although survey visit 1 was conducted when yellow wagtail are still arriving in the UK from overseas. Most observations were made within Zones 1 and 2 in the north east of the site as well as in Zone 7 in the central western area. Individuals were also recorded in Zone 3 in the south east of the site during the third visit.

5.2.13 The site supports a modest population of yellow wagtail and surveys indicate this is around 3 territories. Figure 4 provides a distribution map of yellow wagtail skylark found during the survey

Lapwing

5.2.14 Lapwing are a typical bird of farmland, wetland and upland grassland, but now in major decline due to habitat loss.

5.2.15 The site constitutes suitable lapwing breeding habitat as they are known to nest on spring tilled arable fields comprising solely bare ground which also provides a good foraging resource. Lapwing were observed in small numbers (peak of 7) on site in Zone 7 during visits 1, 2 and 4. Display, calling and courtship behaviour was noted between those seen on site on these two visits. No nesting behaviour was observed at the site during the third visit, although an individual was seen flying overheard in Zone 8 during Visit 3.

5.2.16 The site supports a low population of breeding lapwing and surveys indicate this is probably 1 or 2 territories. Figure 5 provides a distribution map of lapwing found during the survey

Yellowhammer

5.2.17 Yellowhammers are mainly associated with open countryside and hedgerows. This species is red listed as a Species of Conservation Concern due to recent population declines. This is likely due to changes in agricultural practices, such as the removal of hedgerows and increased use of pesticides. Yellowhammers were most regularly observed within the Boundary habitats particularly in the hedgerows and B8 and B6. These features offer suitable nesting habitat e site offers suitable habitat for foraging yellowhammers and appears to support modest numbers, with a peak count of 16 recorded during Visit 3.

Linnet

5.2.18 Linnets are found on farmland wherever there is a plentiful supply of seeds throughout the year. Mixed farmland is particularly valuable. They nest in dense hedgerows, bramble or other types of scrub.

5.2.19 Linnet numbers have dropped substantially over the past few decades, with the UK population estimated to have declined by 57 per cent between 1970 and 2008. This is largely the result of a lack of food sources in modern farming. Linnet is a red listed bird of conservation concern and a Species of Principal Importance.

5.2.20 Linnet were recorded on each survey visit in low to moderate numbers and the site appears to support a medium population. No particular association with either the boundary or open field habitats was noted, although a moderate flock of 25 birds were seen flying over Zone 1 during visit 3.

Amber-listed Species

Meadow pipit

5.2.21 Like skylarks, meadow pipits are associated with open arable, grassland and heathland habitats, are ground dwelling birds and have undergone declines in recent years, hence their amber status.

5.2.22 Relatively low numbers of these birds were encountered in each visit, aside from the 4th visits when none were seen or heard. They were primarily found within open habitats to the east of the site, as for skylarks. The site appears to support a small population of meadow pipit which are likely to nest within the fields.

The surveys indicate this is probably 1 or 2 territories. Figure 6 provides a distribution map of meadow pipit found during the survey.

Dunnock

5.2.23 Dunnock inhabit any well vegetated areas with scrub, brambles and hedges, including field edges. They spend large amounts of time on the ground in amongst grassland but also remain close to shrubby vegetation cover. Dunnock abundance fell substantially between the mid-1970s and mid-1980s, after a period of population stability. Some recovery has occurred throughout the UK since the late 1990s. Dunnock is an amber listed Species of Conservation Concern and a Species of Principal Importance.

5.2.24 Dunnock were recorded in low numbers during each survey visit, and were primarily observed with the boundary habitats. This species is present all year round and the site appears to support a small breeding population.

Willow warbler

5.2.25 Willow warbler are associated with scrub and open woodland and are amber listed due to recent breeding and wintering population decline and reduction in breeding and wintering range.

5.2.26 This species were recorded in small numbers within the boundary habitats across the site during each, and were most regularly recorded at the woodland edge at the western site boundary (B6). The site probably supports small breeding population.

Reed bunting

5.2.27 Reed bunting is a resident species that is typically found in wet vegetation, but has more recently spread into farmland. It nests close to the ground amongst dense vegetation including ditch banks. They feed on the ground and in ditches and banks and favour damp or marshy grassland and swamps.

5.2.28 Reed bunting numbers in the UK have been declining since the mid-1970s, due to habitat loss. Reed bunting is an amber listed Species of Conservation Concern and a Species of Principal Importance.

5.2.29 Observations of this species occurred on site primarily in the arable field in Zones 1 and 2, as well as the hedgerow, tall ruderal and ditch habitat at Boundaries 8, 9 and 11. The surveys identified approximately four territories of this species. Figure 7 provides a distribution map of reed bunting found during the survey.

Kestrel

5.2.30 Kestrel are a relatively common and widespread bird of prey species, although are amber listed due to recent declines in population and range. Two observation of these species were observed during each survey visit, primarily flying over the open fields. The grassland present at the field margins and fields in Zone 5 provide optimal habitat for small mammals, which is the chief food source for kestrels. This species could nest in the trees or pylons present within the site, but would be more likely to nest within the woodland edges around the site.

Other Birds of Conservation Concern

5.2.31 Individuals or small numbers of each of woodcock, herring gull, cuckoo, song thrush and mistle thrush (red-listed species) as well as greylag goose, lesser black-backed gull, tawny owl, stock dove, swift, and bullfinch (amber-listed species) were recorded on one or two occasions and did not show a persistent

association with the site. It is therefore likely that they are not present within the site throughout the breeding season but may use the site opportunistically.

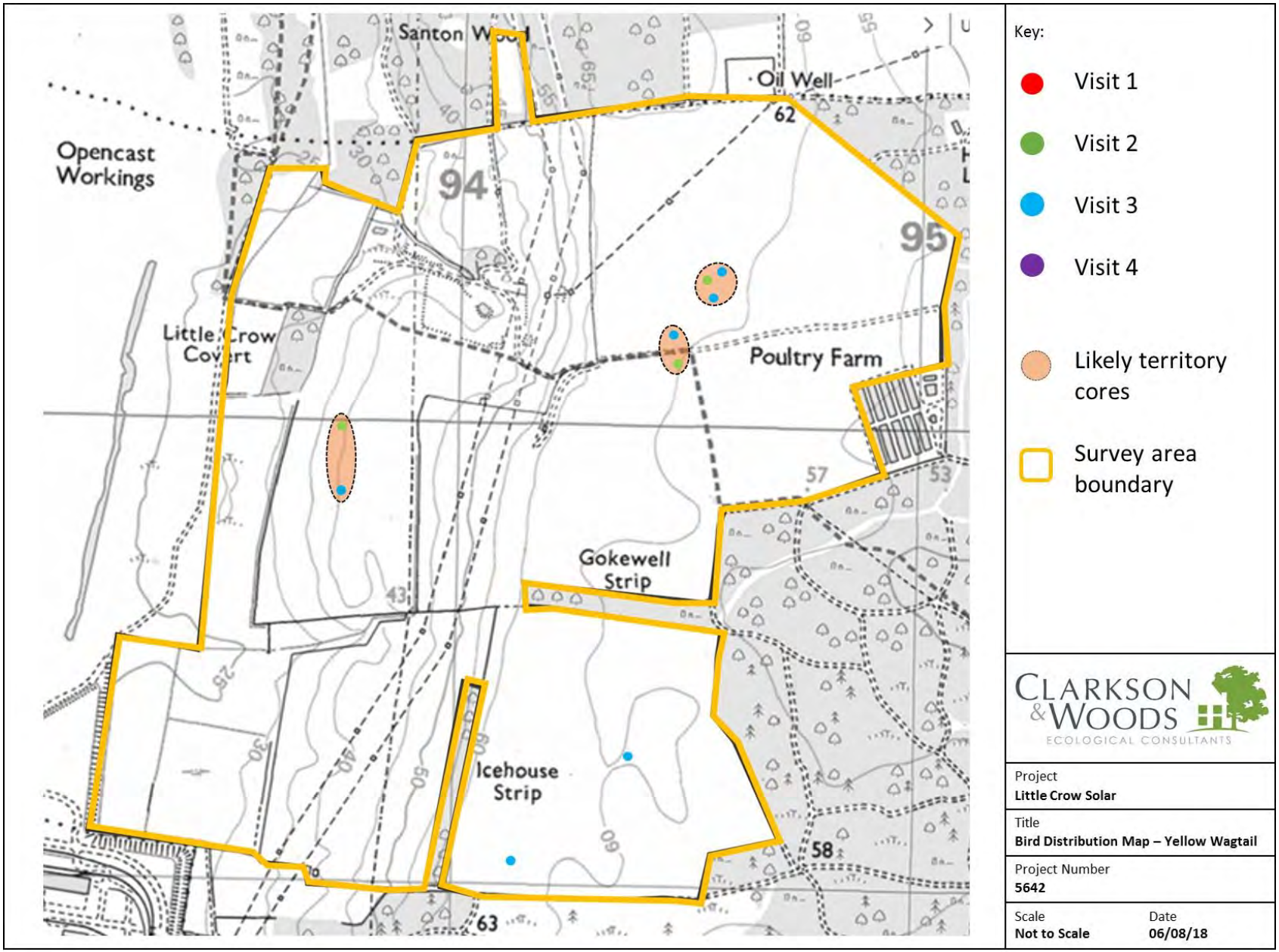


Figure 3: Skylark Distribution Map

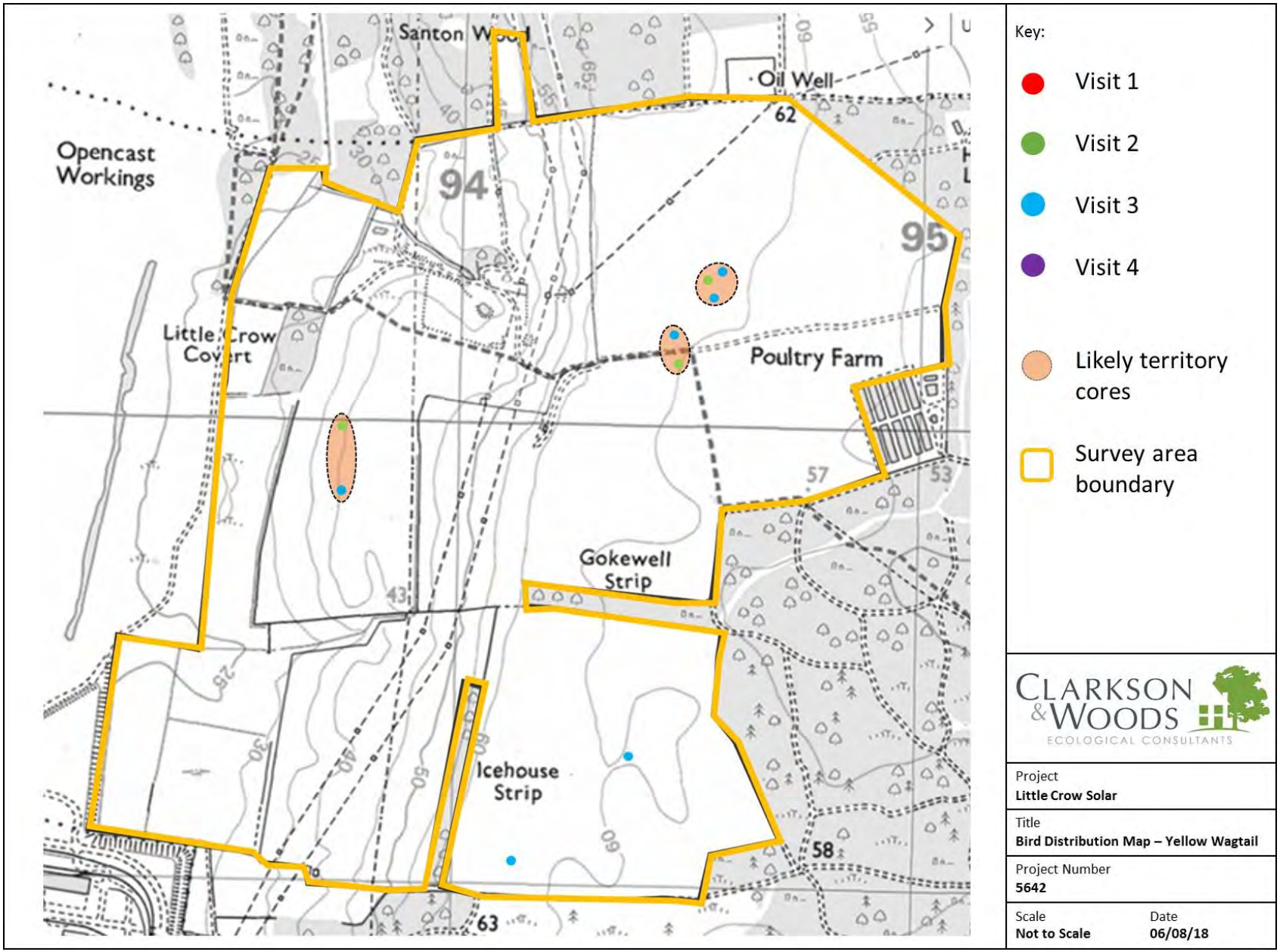


Figure 4: Yellow Wagtail Distribution Map

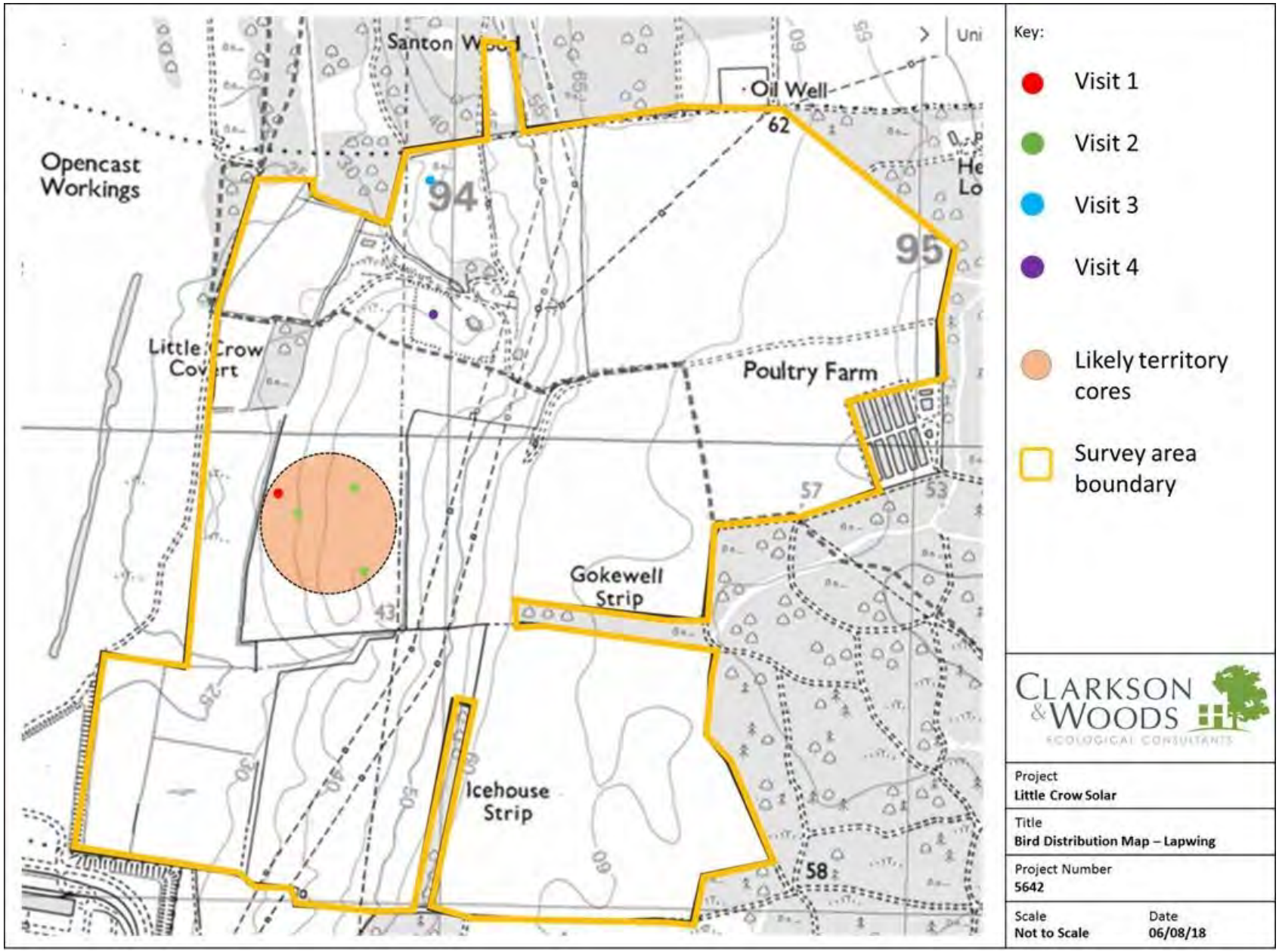


Figure 5: Lapwing Distribution Map

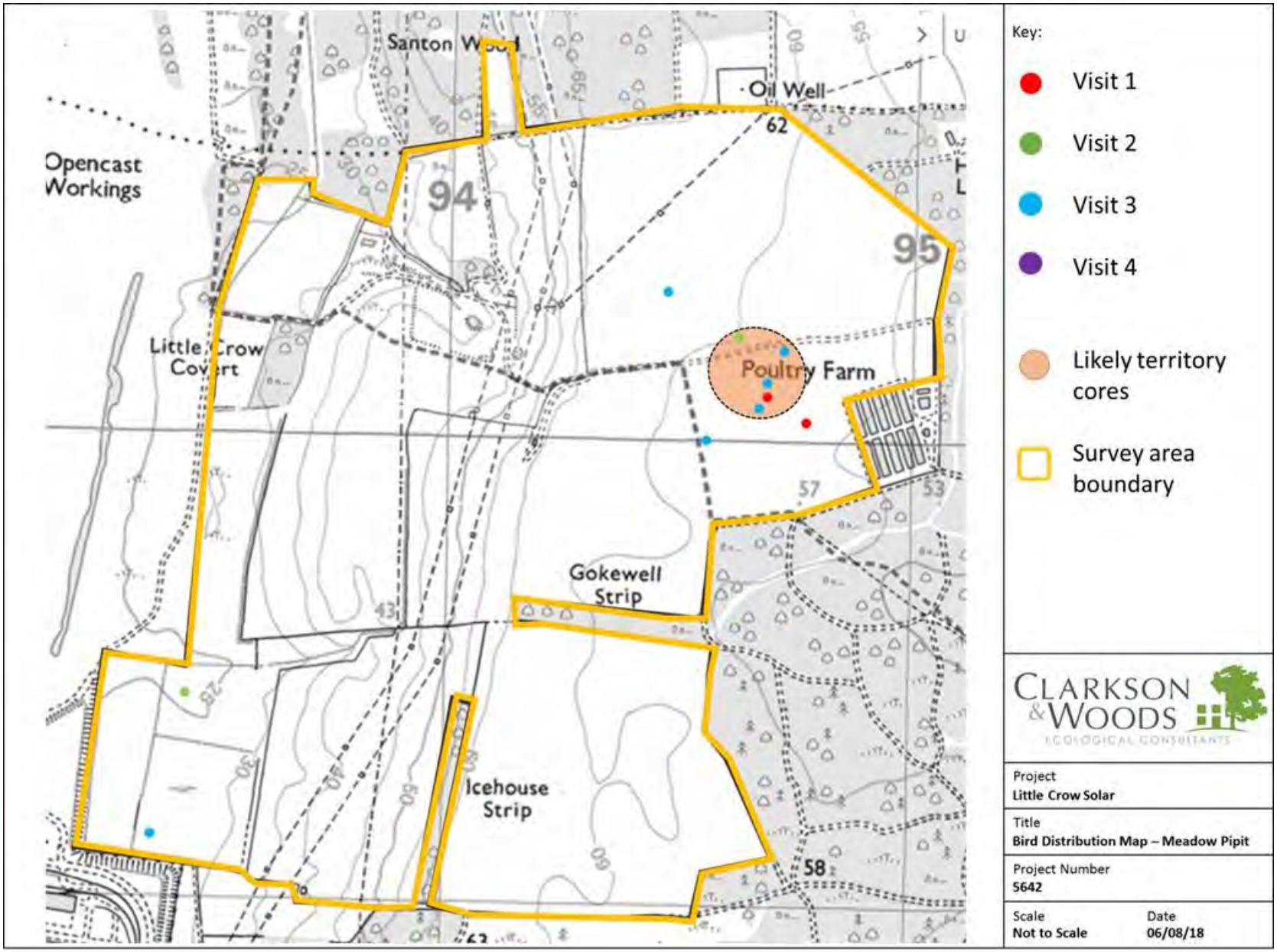


Figure 6: Meadow Pipit Distribution Map

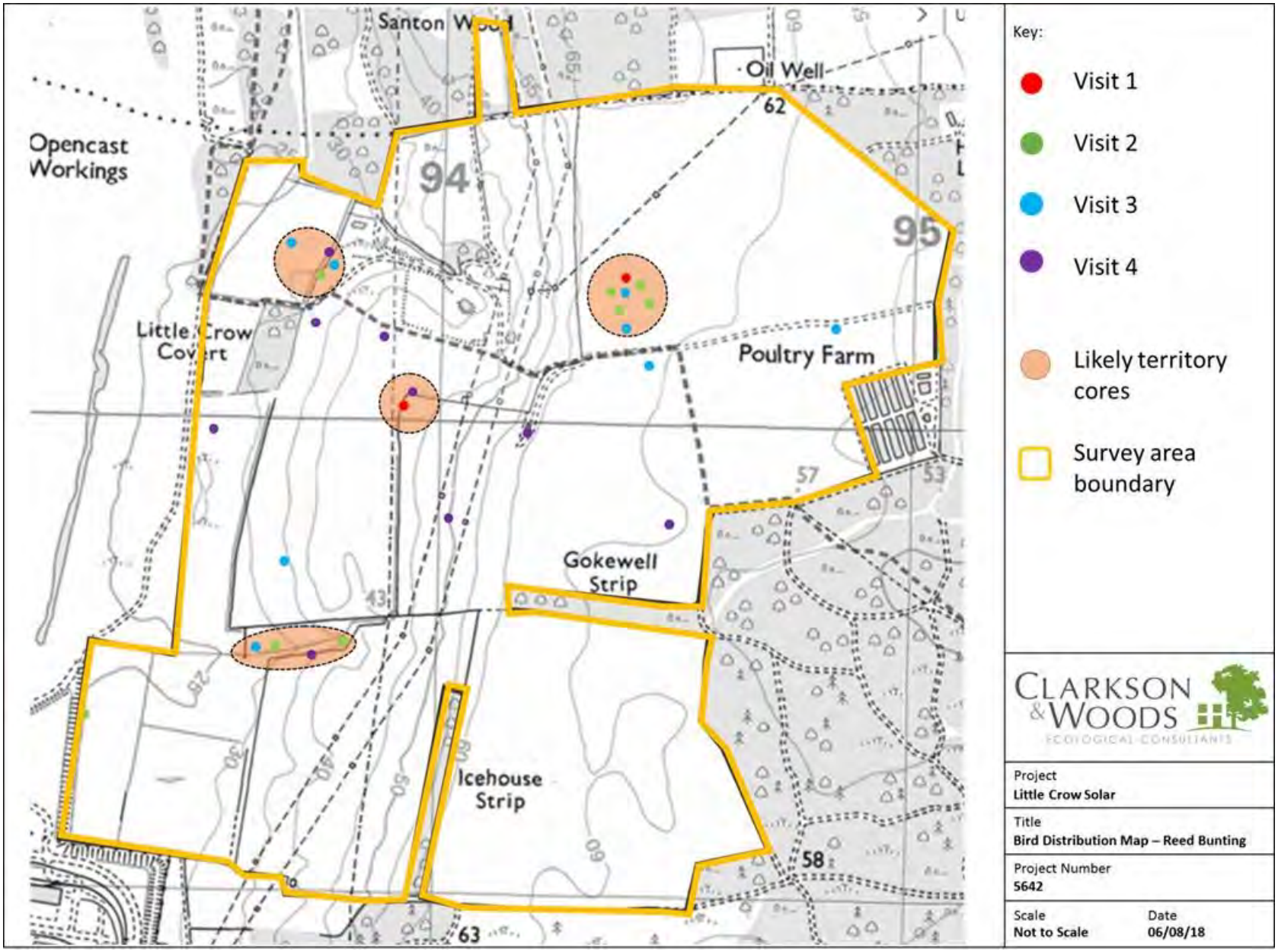


Figure 7: Reed Bunting Distribution Map

6 SUMMARY

6.1.1 A total of 55 species were identified; of which 10 were red listed birds and 11 were amber listed birds. Of these 21 bird species, 10 are also Species of Principal Importance under the NERC Act (2006) and so are a material consideration for planning.

6.1.2 The notable birds utilising the site can be split into two distinct categories; those which were recorded predominantly within open habitats and those recorded foraging predominantly in boundary habitats such as woodland and hedgerows.

6.1.3 The birds within open habitat are more likely to be directly impacted installation of a solar array. The approximate number of territories the site supports for each of these species is summarised in the Table 6 below. Although included in this summary, reed bunting may also utilise boundary habitat for nesting.

Table 6: Summary of Breeding Birds of Open Farmland

Birds Recorded within Open Habitats	Approximate Number of Territories
Skylark	25
Yellow wagtail	3
Lapwing	1 or 2
Meadow pipit	1 or 2
Reed bunting	3

6.1.4 Table 7 summaries the notable bird species that were either confirmed to be breeding or considered probably breeding within the boundary habitats at the site:

Table 7: Summary of Breeding Bird Associated with Boundary Habitats

Birds Recorded within Open Habitats
Kestrel
Dunnock
Song Thrush
Mistle Thrush
Willow Warbler
Bullfinch
Linnet
Yellowhammer

7 WILDLIFE LEGISLATION & SPECIES INFORMATION

BIRDS

All British birds, their nests and eggs (with certain exceptions) are protected under the Wildlife & Countryside Act 1981 (as amended) which makes it an offence to: intentionally kill, injure or take a wild bird; intentionally take, damage or destroy nests which are in use or being built; intentionally take or destroy birds' eggs; or possess live or dead wild birds or eggs. A number of species receive additional protection through inclusion on Schedule 1 of the Wildlife and Countryside Act; for these it is also an offence to intentionally or recklessly disturb birds while nest building, or at a nest containing eggs or young, or to disturb the dependant young of such a bird. Penalties for offences against bird species include fines of up to £5,000 and/or up to six months in prison.

General licences for control of some bird species are issued by Natural England and Natural Resources Wales in order to prevent damage or disease, or to preserve public health or public safety, but it is not possible to obtain a licence for control of birds or removal of eggs/nests for development purposes. Consequently if nesting birds are present on a development site when works are programmed to start it is usually necessary to delay works, at least in the areas supporting nests, until any chicks have fledged and left the nest. It is usually possible, once chicks have hatched, for an experienced ecologist to predict approximately when they are likely to fledge, in order to inform programming of works on site.

PLANNING POLICY IN RELATION TO BIODIVERSITY - ENGLAND

The National Planning Policy Framework (NPPF), issued in March 2012, has superseded Planning Policy Statement 9: Biodiversity and Geological Conservation (August 2005). Additional guidance can be found online at http://planningguidance.planningportal.gov.uk/blog/guidance/. Further guidance is also available within the Government Circular ODPM 06/2005 on Biodiversity and Geological conservation although it should be noted that this document is currently being updated by DEFRA. The NPPF simplifies and collates a number of previous planning documents and outlines the government's objective towards biodiversity.

The NPPF identifies ways in which the planning system should contribute to and enhance the natural and local environment (Paragraph 109), including:

- protecting and enhancing valued landscapes, geological conservation interests and soils;
- recognising the wider benefits of ecosystem services;
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

It also emphasises the importance of conserving biodiversity and areas covered by landscape designations (Paragraph 115):

Great weight should be given to conserving landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to landscape and scenic beauty. The conservation of wildlife and cultural heritage are important considerations in all these areas, and should be given great weight in National Parks and the Broads.

When determining planning applications, the NPPF states that local planning authorities should aim to conserve and enhance biodiversity (Paragraph 118) by applying principles including:

- if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;
- development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;
- opportunities to incorporate biodiversity in and around developments should be encouraged;
- planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and
- the following wildlife sites should be given the same protection as European sites: potential Special Protection Areas and possible Special Areas of Conservation; listed or proposed Ramsar sites; and sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

The Natural Environment and Rural Communities Act (2006) states that a public authority must, "in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity; Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat". DEFRA issued further guidance on implementation of this act in the document; Guidance for Local Authorities on Implementing the Biodiversity Duty (May 2007), which notes that "Conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them".

ECOLOGICAL ENHANCEMENTS

The Natural Environment and Rural Communities Act (2006) states that a public authority must, "in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity; Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat". DEFRA issued further guidance on implementation of this act in the document; Guidance for Local Authorities on Implementing the Biodiversity Duty (May 2007), which notes that "Conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them".

In England, the National Planning Policy Framework (NPPF), issued in March 2012, states that the planning system should contribute to "*minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures*". It also states that "*opportunities to incorporate biodiversity in and around developments should be encouraged*".

8 LERC RECORDS OF BIRDS FROM SURROUNDING 2KM

Species Name	Common Name	Date	Abundance	Designations
Acanthis cabaret	Lesser Redpoll	04/03/2015	3 Present (Count: Exact)	BoCC4-Red, Sect.41, Sect.42,
Accipiter gentilis	Goshawk	06/12/2003	1 Present (Count: Exact)	WCA1i,
Alauda arvensis	Skylark	27/06/2015	4 Total (Count: Exact)	BoCC4-Red, LBAP:3, Sect.41
Alcedo atthis	Kingfisher	01/11/2015		BoCC4-Amber, WCA1i,
Anas acuta	Pintail	23/11/2011	3 Present (Count: Exact)	BoCC4-Amber, WCA1ii,
Anas penelope	Wigeon	08/03/2015	1 Total (Count: Exact)	BoCC4-Amber,
Anas strepera	Gadwall	01/01/2013		BoCC4-Amber,
Anser anser	Greylag Goose	23/05/2015	2 Total (Count: Exact)	BoCC4-Amber, WCA1ii
Anser brachyrhynchus	Pink-footed Goose	01/11/2015		BoCC4-Amber,
Anser fabalis subsp. fabalis	Taiga Bean Goose	16/03/2011	8 Present (Count: Exact)	BoCC4-Amber,
Anser fabalis subsp. rossicus	Tundra Bean Goose	23/11/2011-07/12/2011	2 Juvenile (Count: Exact)	BoCC4-Amber,
Aythya ferina	Pochard	13/12/2015	2 Total (Count: Exact)	BoCC4-Red,
Aythya marila	Scaup	23/11/2011	1 1st calendar year male(s) (Count: Exact)	BoCC4-Red, Sect.41, , WCA1i,
Bucephala clangula	Goldeneye	20/12/2000	2 Present (Count: Exact)	BD2.2, BoCC4-Amber, WCA1ii,
Calcarius lapponicus	Lapland Bunting	27/10/2001	1 Present (Count: Exact)	BoCC4-Amber, WCA1i
Charadrius morinellus	Dotterel	25/04/2011	1 Present (Count: Exact)	BoCC4-Red, WCA1i,
Circus aeruginosus	Marsh Harrier	11/01/2012-22/02/2012	4 Present (Count: Exact)	BoCC4-Amber, WCA1i,
Clangula hyemalis	Long-tailed Duck	06/12/2004	1 Present (Count: Exact)	BoCC4-Red, WCA1i
Coccothraustes coccothraustes	Hawfinch	February 2009	11 Present (Count: Exact)	BoCC4-Red, Sect.41, Sect.42,
Cygnus columbianus subsp. bewickii	Bewick's Swan	15/02/2002	2 Present (Count: Exact)	BoCC4-Amber, Sect.41, Sect.42, WCA1i,
Cygnus cygnus	Whooper Swan	19/03/2013	26 Present (Count: Exact)	BoCC4-Amber, WCA1i,
Cygnus olor	Mute Swan	01/04/2014		BoCC4-Amber,
Emberiza calandra	Corn Bunting	2005 - 2010		BoCC4-Red, LBAP:3,
Emberiza citrinella	Yellowhammer	25/11/2015	9 Total (Count: Exact)	BoCC4-Red, LBAP:3, Sect.41, Sect.42,
Emberiza schoeniclus	Reed Bunting	25/11/2015	2 Total (Count: Exact)	BoCC4-Amber, LBAP:3, Sect.41, Sect.42,
Falco columbarius	Merlin	28/03/2012	1 Female (Count: Exact)	BD1, Bern2, BoCC4-Red, , WCA1i,i
Falco peregrinus	Peregrine	03/11/2015	1 Present (Count: Exact)	BD1, Bern2, CITESA, CMS_A2, LBCSchedule1, ScotBL, WCA1i,
Falco subbuteo	Hobby	02/08/2015	1 Total (Count: Exact)	WCA1i
Fringilla montifringilla	Brambling	25/01/2015	23 Present (Count: Exact)	WCA1i
Gallinago gallinago	Snipe	06/12/2014	1 Present (Count: Exact)	BoCC4-Amber, LBAP:3
Gavia immer	Great Northern Diver	12/01/2013	1 Present (Count: Exact)	BoCC4-Amber, WCA1i

Species Name	Common Name	Date	Abundance	Designations
Gavia stellata	Red-throated Diver	14/11/2011	1 Juvenile (Count: Exact)	WCA1i,
Haliaeetus albicilla	White-tailed Eagle	19/05/2011	1 Present (Count: Exact)	BoCC4-Red, WCA1i,
Linaria cannabina	Linnet	02/08/2015		BoCC4-Red, LBAP:3,
Loxia curvirostra	Common Crossbill	19/03/2014	22 Present (Count: Exact)	WCA1i,
Loxia leucoptera	Two-barred Crossbill	23/03/2014	1 Male (Count: Exact)	WCA1i
Lullula arborea	Woodlark	28/02/2014	1 Present (Count: Exact)	Sect.41, Sect.42, WCA1i
Melanitta nigra	Common Scoter	31/03/2005	1 Male (Count: Exact)	BoCC4-Red, Sect.41, Sect.42, , WCA1i,
Milvus milvus	Red Kite	19/10/2014	1 Present (Count: Exact)	WCA1i,
Numenius arquata	Curlew	2005 - 2010		BoCC4-Red, LBAP:3, , Sect.41, Sect.42,
Numenius phaeopus	Whimbrel	08/08/2011	1 Present (Count: Exact)	BoCC4-Red, WCA1i, WO1i
Passer domesticus	House Sparrow	25/11/2015		BoCC4-Red, LBAP:3, , Sect.41, Sect.42,
Passer montanus	Tree Sparrow	02/08/2015		BoCC4-Red, LBAP:3, Sect.41, Sect.42,
Perdix perdix	Grey Partridge	03/10/2015	5 Total (Count: Exact)	BoCC4-Red, LBAP:3, Sect.41, Sect.42,
Pernis apivorus	Honey-buzzard	02/10/2015	1 Present (Count: Exact)	BoCC4-Amber, WCA1i
Pyrrhula pyrrhula	Bullfinch	25/11/2015	1 Total (Count: Exact)	BoCC4-Amber, , LBAP:3,
Serinus serinus	Serin	17/11/2007	1 Present (Count: Exact)	WCA1i
Stercorarius parasiticus	Arctic Skua	07/05/2002	1 Present (Count: Exact)	BoCC4-Red, , UKBAP
Sturnus vulgaris	Starling	25/11/2015	100 Total (Count: Estimate)	BoCC4-Red, LBAP:3
Tringa glareola	Wood Sandpiper	28/08/2002	1 Present (Count: Exact)	BoCC4-Amber, WCA1i
Tringa ochropus	Green Sandpiper	20/06/2014	1 Present (Count: Exact)	BoCC4-Amber, WCA1i
Tringa totanus	Redshank	19/04/2011	4 Present (Count: Exact)	BoCC4-Amber, LBAP:3
Turdus iliacus	Redwing	06/12/2015	6 Present (Count: Exact)	BoCC4-Red, , WCA1i
Turdus philomelos	Song Thrush	15/06/2015	1 Total (Count: Exact)	BoCC4-Red, LBAP:3,
Turdus pilaris	Fieldfare	26/03/2014	400 Present (Count: Exact)	BoCC4-Red, WCA1i,
Tyto alba	Barn Owl	24/12/2015	1 Present (Count: Exact)	LBAP:3, WCA1i,
Vanellus vanellus	Lapwing	04/10/2015	8 Total (Count: Exact)	BoCC4-Red, LBAP:3, Sect.41, Sect.42,

Meaning of designations listed above

Designation	Meaning
BoCC4-Amber	BTO Amber List – Bird Population Status Amber
BoCC4-Red	BTO Red List – Bird Population Status Red
Sect.41/42	Section 41/42 of the NERC Act 2006/ UK Biodiversity Action Plan Species
WCA1i	Wildlife and Countryside Act 1981 Schedule 1
LBAP:3	Lincolnshire Biodiversity Action Plan (3rd Edition)

APPENDIX 7.7

BAT ACTIVITY SURVEY (CLARKSON & WOODS ECOLOGICAL CONSULTANTS, NOVEMBER 2018)

Little Crow
Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

BAT SURVEY REPORT

On behalf of INRG Solar (Little Crow) Ltd

November 2018

BAT SURVEY REPORT

LITTLE CROW SOLAR, SCUNTHORPE, LINCOLNSHIRE

carried out by

CLARKSON & WOODS
ECOLOGICAL CONSULTANTS

commissioned by

INRG SOLAR (LITTLE CROW) LTD

OCTOBER 2018

BAT SURVEYS

LITTLE CROW SOLAR, SANTON, LINCOLNSHIRE

CONTENTS

1 INTRODUCTION 2

2 SURVEY AND ASSESSMENT METHODOLOGY 2

3 SURVEY LIMITATIONS 7

4 RESULTS 8

5 ECOLOGICAL EVALUATION 15

6 SUMMARY 16

7 RELEVANT LEGISLATION AND POLICY 17

Project title	Santon Solar Farm, Scunthorpe, Lincolnshire			
Project number	5642			
Document title	Bat Surveys – Interim Report			
Client	INRG Solar (Little Crow) Ltd			
Author	Charlie Durigan			
Status	Checked by	Date	Approved for C&W by	Date
V1	Peter Timms	19/07/18	Tom Clarkson	03/08/18
V2 –*September survey results incorporated*	Peter Timms	26/09/18	Hannah Montag	05/10/18

The information, data and advice which has been prepared and provided is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's (CIEEM) Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions. This report and its contents remain the property of Clarkson and Woods Ltd. until payment has been made in full.

1 INTRODUCTION

1.1.1 Clarkson and Woods Ltd. was commissioned by Pegasus Group on behalf of INRG to carry out bat surveys of land at Santon Solar Farm near Scunthorpe, Lincolnshire.

1.1.2 This report aims to inform a planning application for construction of a solar farm within the site. It details the methods and results of the surveys and informs the Environmental Statement (ES) Chapter on Ecology prepared for the site.

1.1.3 This report sets out the results of bat activity surveys carried out between April and September 2018.

1.1.4 Unless the client indicates to the contrary, information on the presence of species will be passed to the county biological records centre in order to augment their records for the area.

1.2 Development Proposals

1.2.1 The proposed development comprises the construction of a photovoltaic solar farm. The installation of solar panels on metal frames are driven into the ground and connected by underground cables to a transformer, which is then connected locally to the National Grid network.

1.2.2 The array will be situated within the fields with fencing utilised to secure the site.

1.3 Survey Aims

1.3.1 Given the size of the development and significance of the proposed changes to land use, bat activity surveys were recommended to ascertain the level of use by foraging and commuting bats along with species composition and abundance. The objective of these surveys was to establish the value of the habitats and features and site as a whole to individual species of bats and bats in general in the context of the wider landscape.

2 SURVEY AND ASSESSMENT METHODOLOGY

2.1.1 The survey methods were based on current guidance set out by the Bat Conservation Trust (BCT)[1].

2.1.2 Existing habitats on site principally comprise of arable fields, bounded by a network of hedgerow, ditches and plantation woodland. These habitat types are generally ubiquitous within the local landscape, and the most suitable habitat for foraging/commuting bats (woodland and hedgerows) are expected to remain unaffected by the development. The arable fields which comprise the main development zone were considered to offer few opportunities for foraging/commuting bats. Given the habitats on site and the likely impacts of the development, a level of survey effort consistent with that recommended for habitats of 'low' suitability was therefore considered appropriate. In line with the aforementioned BCT guidelines, one survey per season (Spring -April/May, Summer -June/July/August, Autumn - September/October) have been conducted at the site. The transect surveys have been augmented by automated bat detector surveys.

[1] Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1.

2.2 Data Search

2.2.1 The Extended Phase 1 Report[2] should be referred to for details of the desk study and data search with the Local Records Centre undertaken to inform baseline conditions for the site.

2.3 Personnel

2.3.1 The following ecologists assisted with the walked transects and static detector surveys (as described below):

- *Peter Timms ACIEEM (Level 1 bat licence 2016-22469-CLS-CLS)(6 years' experience)*
- *Phil Bowater AIEMA GradCIEEM (Level 1 bat licence 2017-28070-CLS-CLS) (5 years' experience)*
- *Paul Kennedy ACIEEM (Level 2 bat licence- 2015-14471-CLS-CLS) (5 years' experience)*
- *Patrick Ellison GradCIEEM (5 years' experience)*
- *Chris Poole Grad CIEEM (1 years' experience)*

2.3.2 All of the above ecologists have been assessed under the Clarkson and Woods QA processes as competent to complete the survey.

2.4 Walked Transect Surveys

2.4.1 The transect surveys involved walking a predetermined transect at a constant speed using bat detectors and recording devices. Due to the relatively large size of the site, three separate transect routes were walked in order to ensure sufficient coverage of all areas of the site.

2.4.2 The three transect routes were designed to provide a balanced overview of bat activity across the entire site. The starting point was changed for each transect survey to avoid bias during the surveys. Figure 1 below shows the routes followed by the three transects.

2.4.3 Surveys were undertaken on three evenings in April, June and September during suitable weather conditions (low wind, little to no rain and temperatures at sunset of at least 10°C).

2.4.4 Surveyors were equipped with handheld bat detectors (Echo Meter Touch with an iPad Mini 4). The surveys commenced at approximately sunset and finished 2 hours after sunset.

2.4.5 The survey recordings were later analysed on a computer using Kaleidoscope (Wildlife Acoustics) software to confirm or identify species.

2.4.6 Table 1 provides the dates, weather conditions, sunset/sunrise times, survey start and end times and ecologist details for each of the walked transects.

[2] Phase 1/Baseline Conditions Report – Little Crow Solar (July 2018) Clarkson & Woods

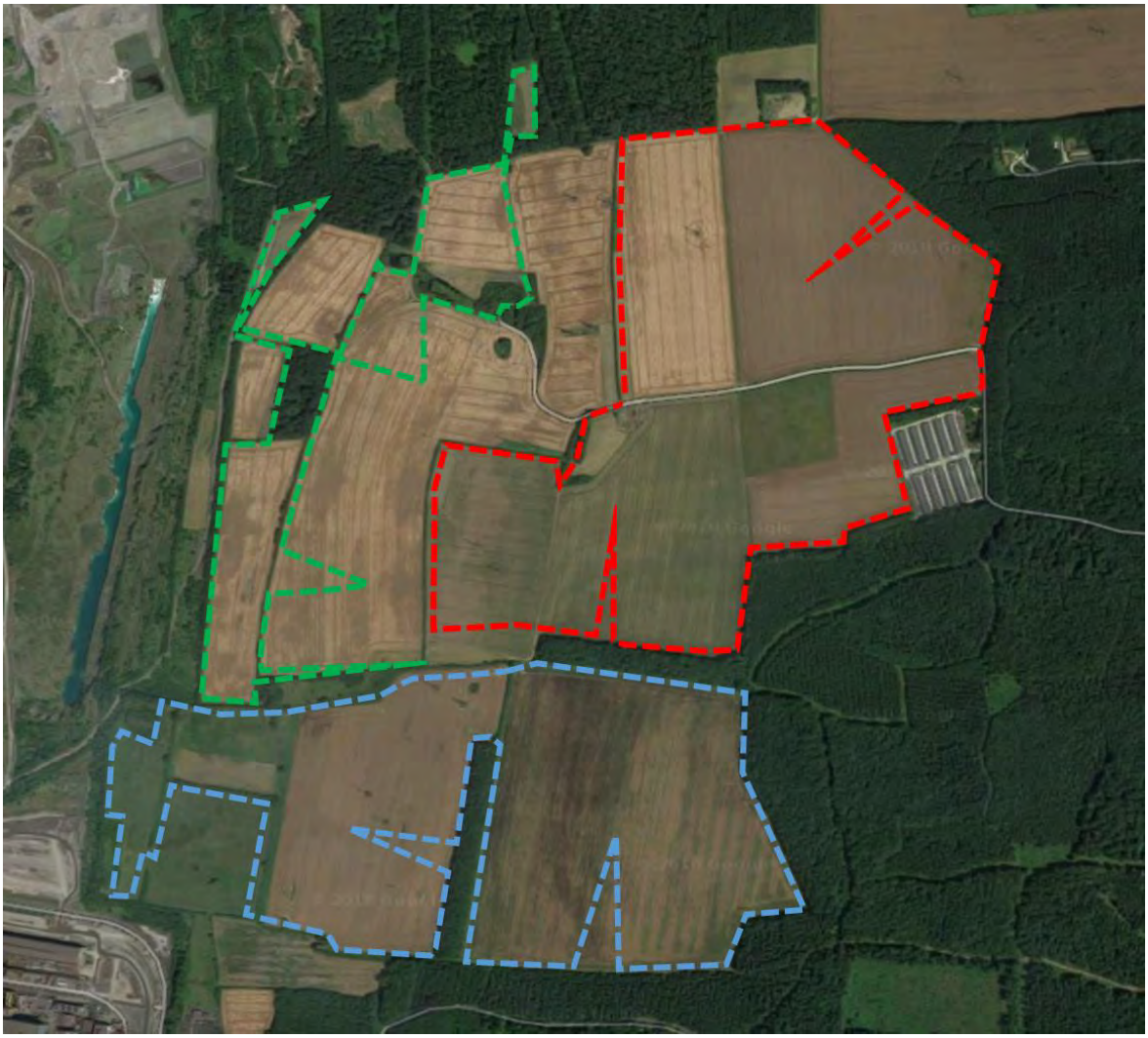


Figure 1: Walked transect routes covering the entire site

Table 1: Transect survey details

Date	Transect/ Ecologist	Sunset/ Sunrise	Survey Start Time	Survey End Time	Weather Conditions at Start	Weather Conditions at End
23/04/18	Blue / PB	20:16	20:16	22:16	13˚C,8/8 cloud cover, 4/12 wind speed, dry	12˚C,6/8 cloud cover, 4/12 wind speed, dry
	Green / PT					
	Red/ PE					
19/06/18	Blue / PT	21:34	21:34	23:34	22˚C,7/8 cloud cover, 1/12 wind speed, dry	20˚C,3/8 cloud cover, 0/12 wind speed, dry
	Green / CP					
	Red / PE					
04/09/18	Blue / PT	19:46	19:46	21:46	17˚C, 4/8 cloud cover, 1/12 wind speed,	15˚C, 6/8 cloud cover, 0/12 wind speed,
	Green / CP					
	Red / PK					

2.5 Static Automated Detector Surveys

2.5.1 Six automated static detectors (Anabat Express, Anabat Swift and Song) were deployed across the site in April/May (Spring), June (Summer) and September (Autumn), for a minimum of six consecutive nights per deployment (refer to Table 2 below for deployment and collection dates). This is a higher survey effort than recommended by the BCT for sites of low suitability habitat. For the April and June Surveys, Anabat Express (Titley Scientifc) detectors were deployed. For the September survey, one Anabat Express was deployed at Location F, two Anabat Swift detectors (also Titley Scientific) were deployed at Locations D and B, and three Wildlife Acoustics' SongMeter II+ detectors were deployed at Locations A, C and E. Detectors were placed in the same locations for all surveys, which were selected to focus on key habitat features identified during previous surveys and to ensure an even spread across the site. (Figure 2 refers). The detectors were programmed to begin recording at least 30 minutes before sunset and end recording 30 minutes after sunrise each night and logged bat passes in each static detector location.



Figure 2: Static Detector Locations

2.5.2 The deployment dates and weather conditions are detailed in Table 2 below.

Automated Species Identification Protocol

2.5.3 Data downloaded from the static detectors was processed using Wildlife Acoustics' Kaleidoscope Pro automatic species recognition software and bat species and the number of bat passes was identified.

Table 2: Static detector deployment dates and weather conditions

Date	Nightly Temperature Range	Weather
24/04/2018	13-7°C	Passing shower and cloud, wind 3/12 (Beaufort scale)
25/04/2018	11-6°C	Passing clouds, dry, wind 4/12
26/04/2018	8-5°C	Scattered clouds, dry, wind 2/12
27/04/2018	9-6°C	Mostly cloudy, dry, wind 3/12
28/04/2018	8-7°C	Partly cloudy, dry, wind 4/12
29/04/2018	9-6°C	Passing cloud, dry, wind 4/12
30/04/2018	7-3°C	Passing cloud, dry, wind 3/12
01/05/2018	12-9°C	Light rain, overcast, wind 5/12
12/06/2018	13-11°C	Overcast, dry, wind 2/12
13/06/2018	17-14°C	Passing clouds, dry, wind 5/12
14/06/2018	15-11°C	Cool, dry, wind 2/12
15/06/2018	14-12°C	Scattered clouds, dry, wind 1/12
16/06/2018	14-12°C	Cool, dry, wind 3/12
17/06/2018	16-15°C	Passing clouds, dry, 3/12
18/06/2018	19-14°C	Partly cloudy, dry, 3/12
04/09/18	17-13°C	Mostly cloudy, dry, wind 2/12
05/09/18	15-9°C	Passing clouds, dry, wind 1/12
06/09/18	12-7°C	Mostly clear, light rain, wind 2/12
07/09/18	15-10°C	Scattered clouds, dry, wind 3/12
08/09/18	15-14°C	Mostly cloudy dry, wind 3/12
09/09/18	15-13°C	Mostly cloudy, dry, 3/12

*Weather data obtained from darksky.net ©2018

3 SURVEY LIMITATIONS

3.1 Bat Activity and Automated static detector surveys

3.1.1 Bat detectors are known to be more sensitive to certain bat calls than to others for reasons such as varying bat call loudness and directionality of certain calls. This can result in certain bat species (notably horseshoe bats and long-eared bats) being under-recorded due to the limitations of current available bat detectors. The difference in recording efficiency may therefore bias any results, which has been taken into account where possible during any assessment of the results.

3.1.2 Kaleidoscope Pro automatically identifies bat calls using algorithms and provides statistical levels of confidence associated with each classified call. The confidence levels reflect that there will be certain classification errors related to each classified bat call. With experience of using the software it is, on the whole, reliable when identifying certain bat calls, especially horseshoe bat calls due to their simple and unmistakeable parameters. Other straightforward species are common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, noctule *Nyctalus noctula* and serotine *Eptesicus serotinus.* However, the software has been found to be less reliable when identifying other species (long-eared *Plecotus sp.,* Leisler's *Nyctalus leisleri* and barbastelle *Barbastella barbastellus* bat species).

3.1.3 Kaleidoscope Pro does not distinguish between the various *Myotis* species and simply classifies them to genus level (i.e. *Myotis* sp.). This is in line with classification that would be achieved by manual identification due to the similar nature of *Myotis* calls making species classification subject to a high degree of error. The on-board software used by the EchoMeter Touch does, however, distinguish between *Myotis* species, but this has been found to be inconsistent.

3.1.4 Due to the software limitations, all calls are manually verified to confirm the identification is accurate. Furthermore, where the software is unsure of a bat call, it will classify the call as 'NoID'. For completeness, all NoID files were classified, where appropriate. Noise files were not checked as the vast majority of these cannot be analysed or attributed to bats or their calls.

3.1.5 Additionally, automated detectors are triggered to record when suitable ultrasound is detected and will not cease recording until either a window of 1 second of silence is recorded or 30 seconds elapses, whichever is sooner. If more than one species is present within a recording, the software can only classify one species, so is forced to select which is 'dominant'. This potentially results in an under-recording of quieter species, long-eared bats, or species with a longer pulse repetition rate.

3.1.6 Overall, the classification data produced by Kaleidoscope Pro, along with manual verification of records, is considered to provide an acceptably accurate record of bat species recorded by static bat detectors and, as such, have been used within this report.

3.2 General

3.2.1 Overnight temperatures during the first static detector deployment consistently dropped below 10°C, which may have resulted in reduced bat activity during these periods. Weather conditions were otherwise favourable for bat activity during the survey.

4 RESULTS

4.1 Data Search

4.1.1 The Phase 1/Baseline Report[3] should be referred to for details of the desk study and data search with the Lincolnshire Environmental Records Centre undertaken to inform baseline conditions for the site. However, the results of the desk study pertaining to bats are repeated in this section.

4.1.2 A number of existing records of at least six species of bats were obtained from the records centre, the closest of which were field recordings of unidentified bat species within woodland adjacent to the south east of the site.

4.1.3 A number of field records of common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus* exist from areas of woodland approximately 1km east of the site. Field records of this species, as well as Daubenton's bat *Myotis daubentonii* exist from Ashbyville Lake, approximately 1.3km south west of the site. Single records of Nathusius' pipistrelle *Pipistrellus nathusii* and Whiskered bat *Myotis mystacinus* occur within Scunthorpe and approximately 1.5km west of the site.

4.1.4 Unspecified common pipistrelle and brown long-eared *Plecotus auritus* roosts are also known to be present within the town of Broughton, approximately 1km east of the site.

MAGIC search for EPS (bat) Licences

4.1.5 Records of previously issued European Protected Species Licences for batsfrom within 5km of the site were obtained using the MAGIC website. Details of these licences are provided in Table 3 below.

Table 3: MAGIC records of EPS mitigation licences issued within a 2km radius of the site

Licence Ref No.	Species Covered	Dates of Licence	Distance and bearing from Site of Licence Record
2015-7054-EPS-MIT	Bats – Common pipistrelle	2015-2025	1.37km Southeast
EPSM2009-1229	Bats – Soprano pipistrelle	2009-2010	2.35km Northeast
EPSM2010-2663	Bats – Common pipistrelle	2011	4km Northwest
2015-16065-EPS-MIT	Bats – Common pipistrelle	2015-2020	5km Northwest
2015-16065-EPS-MIT-1	Bats – Common pipistrelle	2016-2020	5km Northwest
2015-16065-EPS-MIT-2	Bats – Common pipistrelle	2016-2020	5km Northwest

[3] Baseline Conditions Report – Little Crow Solar, Santon, Lincolnshire (July 2018) Clarkson and Woods.

4.2 Survey Results

Walked transects

4.2.1 Table 4 below provides a summary of bat species and the total number of bat passes (foraging and commuting combined) recorded during the April, June and September transect surveys. These results are taken from the Echo Meter Touch and iPad Mini 4 recordings.

Table 4: Summary of May and June 2018 transect survey results (no. passes)

Species	23/04/2018 (Spring)	19/06/2018 Summer	04/09/2018 Autumn	Total
Common pipistrelle	89	68	89	246
Soprano pipistrelle	23	8	13	44
Noctule	0	10	8	18
Myotis sp.	0	7	2	9
Total no. passes	112	93	112	317

4.2.2 Figure 3 below provides a summary in heatmap form of all bat activity recorded during the transect surveys within the site across each survey season. Heatmaps show the number of bat passes in colour codes on a dark blue to red gradient – the darker blue the colour the fewer bat passes recorded compared to red, which depicts a the highest number of bat passes recorded in that area. Note that these maps do not differentiate between foraging and commuting behaviour.

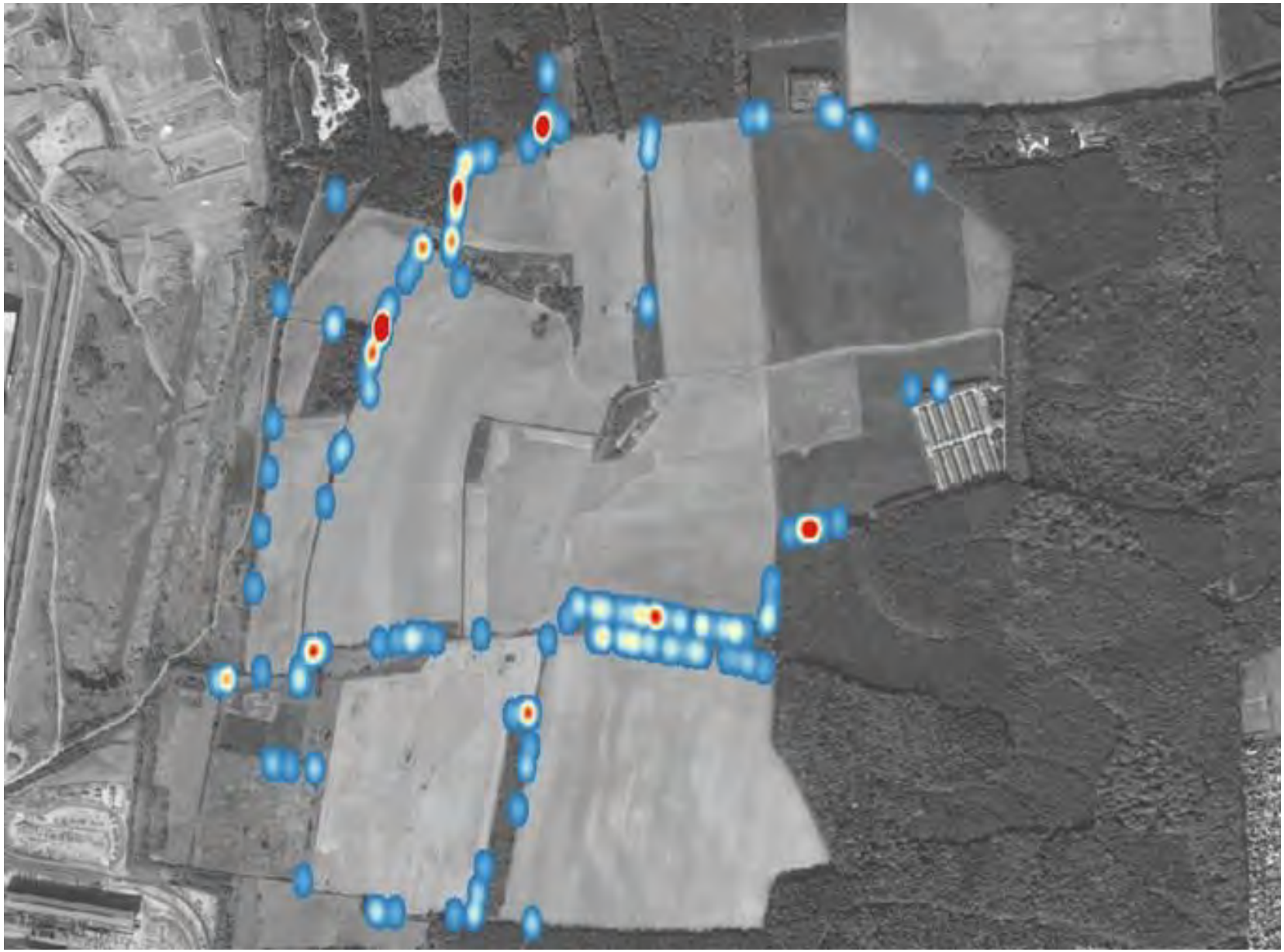


Figure 3: Heatmap showing total bat activity across all three transects

4.2.3 The highest concentration of bat activity was recorded in the north west of the site, where the habitat comprises woodland edge, a hedgerow and a pond. Another notable concentration of activity can be seen along the northern edge of a wooded shelter belt (known as 'Gokewell Strip') in the centre/east of the site. Very little activity was noted in the centre of the fields away from boundary habitats

4.2.4 The transect surveys indicated that low numbers of generally widespread species are using the site, with common pipistrelle recorded most often. Common pipistrelle call accounted for 77.6% of total bat calls. Soprano pipistrelle was the second-most recorded species, making 13.8% of calls. These were the only two species recorded during the April survey. Noctule and Myotis bat species accounted for 5.7% and 2.8% of calls respectively.

4.2.5 The number of total passes recorded was slightly higher in the April and September surveys than the June survey.

Static detector surveys - Field survey results

4.2.6 A total of 2994 bat passes were recorded across all static detectors during both surveys, 210 of which were recorded during the April-May survey, 2072 during the June survey, and 712 passes recorded in September. The following (minimum) five bat species were recorded during the surveys:

- Common pipistrelle *Pipistrellus pipistrellus*
- Soprano pipistrelle *Pipistrellus pygmaeus*
- Noctule *Nyctalus noctula*
- Myotis species *Myotis sp. (an aggregation of common Myotis species is likely to include one or more of Natterer's bat, Daubenton's bat, Brandt's bat Myotis brandtii and whiskered bat Myotis mystacinus*
- Brown long-eared *Plecotus auritus (grey long-eared was ruled out as it has only been recorded in southern England and Wales)*

4.2.7 Table 5 below provides the results of the static bat detector surveys for each location between April and September 2018. Figure 4 also displays the total number of passes for each species recorded over the duration of the surveys.

Table 5: Results of the static bat detector surveys for each location between April and September 2018

Static location (Figure 2 refers)	Total no. bat species / passes recorded	Species	No. passes	Average No. of Passes per night	% of activity
A	5 species 301 passes 21 Nights (average passes per night = 14.33)	Common pipistrelle	194	9.24	64.45
		Soprano pipistrelle	55	2.62	18.27
		Noctule	28	1.33	9.30
		Myotis	19	0.9	6.31
		Brown long-eared	5	0.24	1.66
B	5 species 452 passes 21 Nights (average passes per night = 21.52)	Common pipistrelle	339	16.14	75
		Soprano pipistrelle	29	1.38	6.42
		Noctule	62	2.95	13.72
		Myotis	18	0.86	3.98
		Brown long-eared	4	0.19	0.88

Static location (Figure 2 refers)	Total no. bat species / passes recorded	Species	No. passes	Average No. of Passes per night	% of activity
C	5 species 517 passes 21 Nights (average passes per night = 24.62)	Common pipistrelle	468	22.29	90.52
		Soprano pipistrelle	33	1.57	6.38
		Noctule	8	0.38	1.55
		Myotis	7	0.33	1.35
		Brown long-eared	1	0.05	0.19
D	5 species 1462 passes 21 Nights (average passes per night = 69.61)	Common pipistrelle	1358	64.67	92.89
		Soprano pipistrelle	53	2.52	3.63
		Noctule	23	1.10	1.57
		Myotis	23	1.10	1.57
		Brown long-eared	5	0.24	0.34
E	5 species 96 passes 21 Nights (average passes per night = 4.57)	Common pipistrelle	69	3.29	71.88
		Soprano pipistrelle	5	0.24	5.21
		Nathusius' pipistrelle	11	0.52	11.46
		Noctule	7	0.33	7.29
		Myotis	4	0.19	4.17
		Brown long-eared	69	3.29	71.88
F	5 species 166 passes 21 Nights (average passes per night = 7.90)	Common pipistrelle	71	3.38	42.77
		Soprano pipistrelle	53	2.52	31.93
		Noctule	13	0.62	7.83
		Myotis	18	0.86	10.84
		Brown long-eared	11	0.52	6.63

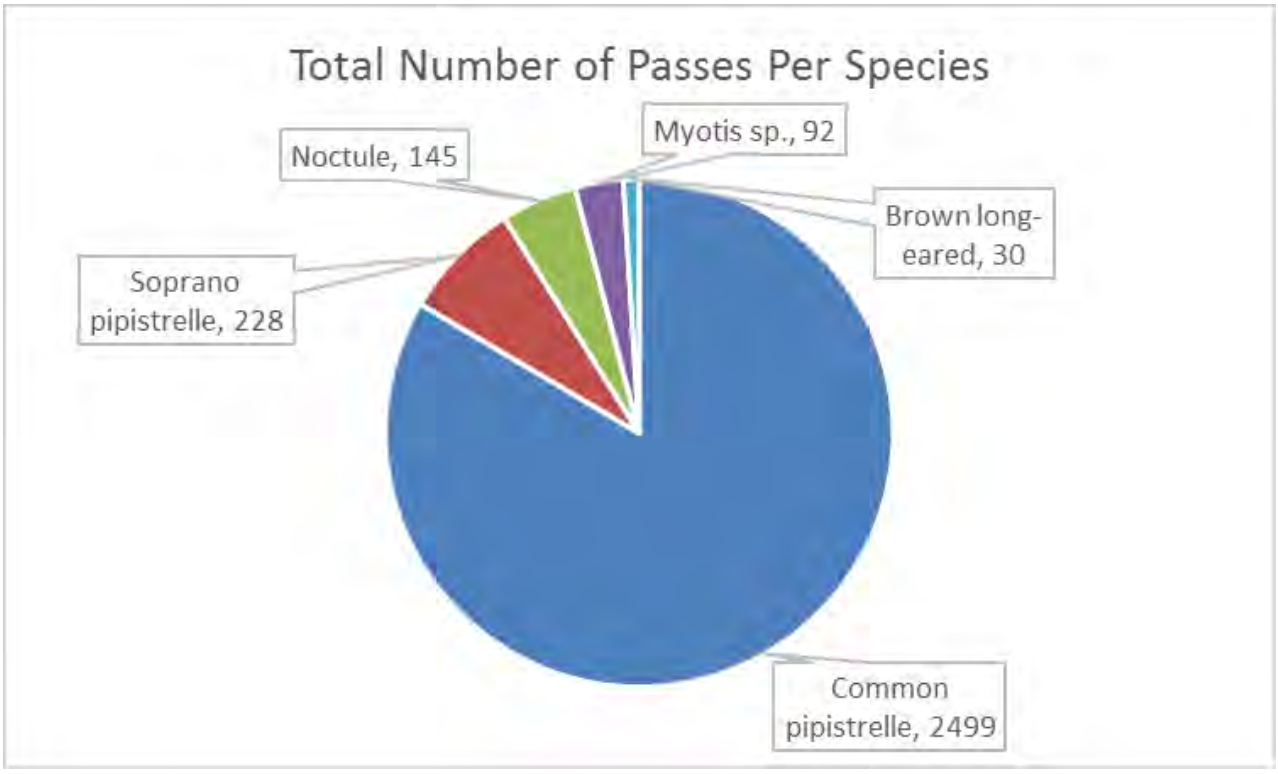


Figure 4: Summary of the species assemblage and total number of passes recorded over the survey period

4.2.8 The static detectors recorded a low number of UK native bat species utilising the site (5+ species out of the 11 known resident species in Lincolnshire). It is possible that up to 6 or 7 species use the site, given that *Myotis* species of bat are only classified to a genus level (the Myotis assemblage could comprise one of the more frequently encountered species such as whiskered, Daubenton's Natterer's and possibly Brandt's). A total of 2,994 bat passes were recorded throughout the survey period, at an average of 23.76 passes per night per detector. This is considered to represent a relatively low level of bat activity in comparison to numerous sites Clarkson and Woods have undertaken bat surveys at throughout England.

4.2.9 As with the manned transect surveys common pipistrelle was found to be the most abundant species, accounting for 83.47% of all passes with an average of 19.83 passes per night. Soprano pipistrelle and noctule were the next most frequently recorded, accounting for 7.62% and 4.84% of passes respectively, with an average of 1.81 and 1.15 passes per night respectively.

4.2.10 A total of 92 passes from Myotis sp. were recorded during the surveys which equates to an average of 0.73 passes per night and 3.07% of passes overall. A total of 30 brown long-eared calls were recorded at an average of 0.24% per night and accounting for 1% of total bat activity.

4.2.11 In terms of bat usage of different areas of the site, the highest levels of bat activity by far were recorded at the western boundary of the site, where a wooded stream corridor is present (Location D). Moderate activity was also recorded at woodland edges in the north of the site (Locations A & B) and at an area of scrub and hedgerow in the middle of the site (Location C). Lower levels of activity were recorded at south east of the site (Location F), with the south western site boundary (Location E) representing the least-used area with less than 5 passes (on average) per recording night.

4.2.12 Figure 5 below shows a visual summary of relative bat activity at each detector location

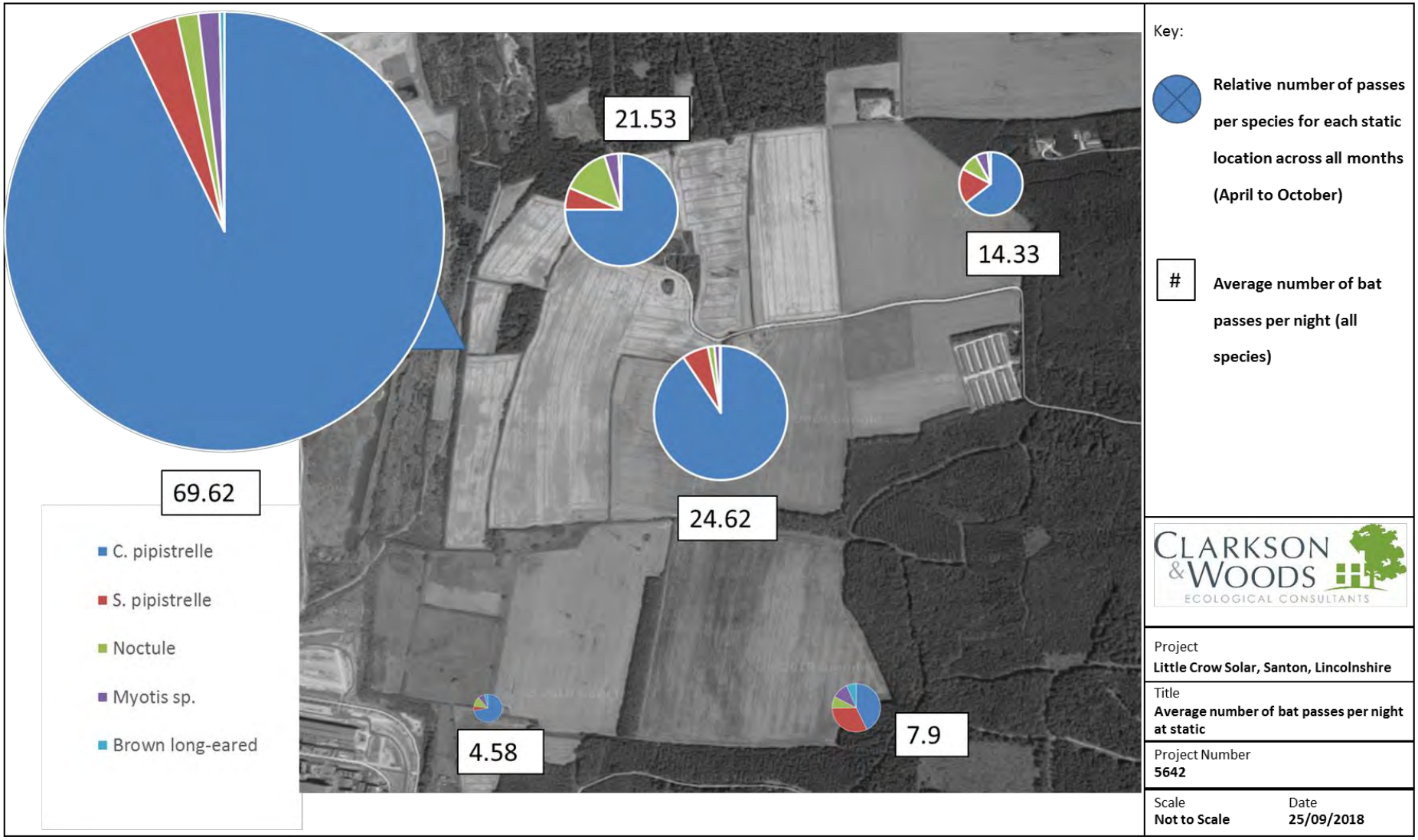


Figure 5: Bat activity at each deployment location

5 ECOLOGICAL EVALUATION

5.1.1 This section provides an analysis of the value of ecological receptors (bats) identified as occurring within or in proximity of the site. The valuation of the receptor employs the scoring method described by Wray et al[4], and reflects the rarity and conservation status of each species as well as its relative abundance and activity levels on site.

5.1.2 At least 5 species of bat were recorded within the application site during combined surveys. Table 6 below provides the status of each bat species recorded and also the importance of the site to each species based on the combined survey results.

Table 6: Ecological Evaluation

Bat species	UK status (current estimated UK population size)[5]	County status[6]	Level of activity on site	Ecological Importance (Calculated Score {Wray et al. 2010})
Common pipistrelle	Common and widespread (2,430,000)	Common and widespread	Low to moderate activity, likely by a small number of individuals	Local (2+10+3+4 = 17)
Soprano pipistrelle	Common and widespread (1,300,000). UK BAP Priority Species	Common, (but less so than common pipistrelles) and widespread	Low activity, likely by one or two individuals	Site 2+5+3+4 = 14)
Noctule	Fairly common and widespread (50,000). UK BAP Priority Species	Thought to be declining in some areas, although relatively common in the northern half of the county.	Low activity, likely by one or two individuals	Local (5+5+3+4 = 17)
Myotis sp. (exact species recorded unknown)	Daubenton's - relatively common and widespread throughout Britain with a UK estimated population of 560,000 (95,000 in England)	Common and widespread wherever wetland habitat is present	Low activity, likely by one or two individuals	Local 5+5+3+4 = 17
	Natterer's - locally common and widespread throughout Britain with a UK estimated population of 148,000 (70,000 in England)	Local, more common along the western edge of the county		

[4] Wray, S., Wells, D., Long, E. and Mitchell-Jones, T. (2010). Valuing Bats in Ecological Impact Assessment. In Practice, December 2010. Chartered Institute of Ecology and Environmental Management.
[5] Based on information provided by the Bat Conservation Trust http://www.bats.org.uk/
[6] Based on information provided by the Lincolnshire Biodiversity Action Plan (2011) https://www.nelincs.gov.uk/wp-content/uploads/2016/02/201110-LincolnshireBAP-3rd-edition.pdf

Bat species	UK status (current estimated UK population size)[5]	County status[6]	Level of activity on site	Ecological Importance (Calculated Score {Wray et al. 2010})
	Whiskered - uncommon but widespread in England, UK population of 64,000	Fairly common and widespread		
	Brant's -uncommon but widespread in England. UK population of 30,000	Not known possibly quite widespread		
Brown long-eared	Common and widespread (245,000). UK BAP Priority Species	Common, with nationally important colonies in the centre and north	Very low activity, likely by one individual	Site (2+5+3+4 = 14)

6 SUMMARY

6.1.1 In combination, taking all 5+ species together and levels of foraging and commuting activity into account the site is considered to be of Local importance to bats. This is due to the species assemblage present (5+ species out of the 18 resident species in the UK) and the relatively low levels of activity recorded at the site.

6.1.2 The woodland edge and hedgerow network across the site have been shown to be of most importance to bats. No bats were recorded within the arable fields during the activity surveys, and it is likely that this habitat offers low quality foraging opportunities.

7 RELEVANT LEGISLATION AND POLICY

All 17 species of bat known to breed in England and Wales, and their roost sites, are protected under the Conservation of Habitats and Species Regulations 2010 (as amended), known as the 'Habitats Regulations'. This makes it an offence to deliberately kill or injure a bat, or to deliberately disturb a bat such that its ability to hibernate, breed or rear young, or such that the species' distribution, were significantly affected. It is also an offence to damage or destroy any breeding site or resting place. Intentional or reckless disturbance of bats in their resting places, and damage to or obstruction of resting places are also offences under the Wildlife and Countryside Act 1981 (as amended). Under UK law a bat roost is "any structure or place which any wild [bat]...uses for shelter or protection". As bats tend to reuse the same roosts, legal opinion is that the roost is protected whether or not the bats are present at the time. Penalties for offences against bats or their roosts include fines of up to £5,000 and/or up to six months in prison.

As a result, development works which are likely to involve the loss of or alteration to roost sites, or which could result in killing of or injury to bats, need to take place under licence. Works which could disturb bats may also be licensable, though this needs to be assessed on a case by case basis, as bats' sensitivity to disturbance varies depending on normal background levels, and the definition of disturbance offences under the Habitats Regulations is complex. In practice this means that works involving modification or loss of roosts (typically in buildings, trees or underground sites) or significant disturbance to bats in roosts are likely to be licensable.

Licences can be obtained from Natural England or the Welsh Government to permit works that would otherwise be illegal, provided it can be demonstrated that the proposed works are needed to protect public health or safety, or for other reasons of overriding public interest including social and economic reasons. It is also necessary to demonstrate that there is no satisfactory alternative to the proposed works, and that the conservation status of bats in the area will be maintained. Appropriate mitigation and post-construction monitoring are therefore a requirement of all licences.

PLANNING POLICY IN RELATION TO BIODIVERSITY

The National Planning Policy Framework (NPPF), issued in March 2012, has superseded Planning Policy Statement 9: Biodiversity and Geological Conservation (August 2005). Additional guidance can be found online at http://planningguidance.planningportal.gov.uk/blog/guidance/. Further guidance is also available within the Government Circular ODPM 06/2005 on Biodiversity and Geological conservation although it should be noted that this document is currently being updated by DEFRA. The NPPF simplifies and collates a number of previous planning documents and outlines the government's objective towards biodiversity.

The NPPF identifies ways in which the planning system should contribute to and enhance the natural and local environment (Paragraph 109), including:

- protecting and enhancing valued landscapes, geological conservation interests and soils;
- recognising the wider benefits of ecosystem services;
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

It also emphasises the importance of conserving biodiversity and areas covered by landscape designations (Paragraph 115):

Great weight should be given to conserving landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to landscape and scenic beauty. The conservation of wildlife and cultural heritage are important considerations in all these areas, and should be given great weight in National Parks and the Broads.

When determining planning applications, the NPPF states that local planning authorities should aim to conserve and enhance biodiversity (Paragraph 118) by applying principles including:

- if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;
- development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;
- opportunities to incorporate biodiversity in and around developments should be encouraged;
- planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and

- the following wildlife sites should be given the same protection as European sites: potential Special Protection Areas and possible Special Areas of Conservation; listed or proposed Ramsar sites; and sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

The Natural Environment and Rural Communities Act (2006) states that a public authority must, "in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity; Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat". DEFRA issued further guidance on implementation of this act in the document; Guidance for Local Authorities on Implementing the Biodiversity Duty (May 2007), which notes that "Conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them".

ECOLOGICAL ENHANCEMENTS

The Natural Environment and Rural Communities Act (2006) states that a public authority must, "in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity; Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat". DEFRA issued further guidance on implementation of this act in the document; Guidance for Local Authorities on Implementing the Biodiversity Duty (May 2007), which notes that "Conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them".

In England, the National Planning Policy Framework (NPPF), issued in March 2012, states that the planning system should contribute to "*minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures*". It also states that "*opportunities to incorporate biodiversity in and around developments should be encouraged*".

UK BIODIVERSITY ACTION PLANS

The UK Biodiversity Action Plan (UK BAP) 2011 is a policy first published in 1994 to protect biodiversity and stems from the 1992 Rio Biodiversity Earth Summit. The policy is continuously revised to combine new and existing conservation initiatives to conserve and enhance species and habitats, promote public awareness and contribute to international conservation efforts. Each plan details the status, threats and unique conservation strategies for the species or habitat concerned, to encourage spread and promote population numbers.

Species or habitats identified as priorities under the UK Biodiversity Action Plan receive some status in the planning process through their identification as Species/Habitats of Principal Importance in England and Wales, under the Natural Environment and Rural Communities (NERC) Act 2006 (as amended).

Current planning guidance in England, the National Planning Policy Framework, does not specifically refer to Species or Habitats of Principal Importance, though it includes guidance for conservation of biodiversity in general. Supplementary guidance is available online at http://planningguidance.planningportal.gov.uk/blog/guidance/ and this guidance indicates that it is '*useful to consider*' the potential effects of a development on the habitats or species on the Natural Environment and Rural Communities Act 2006 section 41 list.

Clarkson and Woods Ltd.
Overbrook Business Centre,
Poolbridge Road, Blackford,
Somerset BS28 4PA

t: 01934 712500
e: info@clarksonwoods.co.uk

www.clarksonwoods.co.uk

CLARKSON & WOODS

APPENDIX 8.1

LAND AT SANTON, HIGH SANTON, SCUNTHORPE HERITAGE BASELINE (PEGASUS GROUP, NOVEMBER 2018).

Little Crow
Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

CULTURAL HERITAGE BASELINE STUDY

On behalf of INRG Solar (Little Crow) Ltd

November 2018

LITTLE CROW SOLAR PARK, NORTH LINCOLNSHIRE

CULTURAL HERITAGE BASELINE STUDY

PREPARED BY PEGASUS GROUP | INRG SOLAR | NOVEMBER 2018 | P17-0718



Little Crow Solar Park, North Lincolnshire
Cultural Heritage Baseline Study

Pegasus Group Project Number: P17-0718

Version	Date	Author	Checked/Approved By
10 (Site boundary Rev C draft)	21st November 2018	Laura Garcia Principal Heritage Consultant Hannah Armstrong Principal Heritage Consultant Donal Lucey Senior Heritage Consultant	Gail Stoten Heritage Director Laura Garcia Principal Heritage Consultant

CONTENTS:

1.	NON-TECHNICAL SUMMARY	1
2.	INTRODUCTION	3
3.	SITE DESCRIPTION AND LOCATION	4
4.	METHODOLOGY	13
5.	PLANNING POLICY FRAMEWORK	19
6.	THE HISTORIC ENVIRONMENT	29
7.	SETTING ASSESSMENT	54
8.	DISCUSSION	59

APPENDICES:

APPENDIX 1: HERITAGE DATA	61
APPENDIX 2: FIGURES	71
APPENDIX 3: EARTHWORK SURVEY	72
APPENDIX 4: NON-SCHEDULING REPORT	73
APPENDIX 5: SOURCES	74

FIGURES:

FIGURE 1: DESIGNATED ASSETS
FIGURE 2: NORTH LINCOLNSHIRE HER MONUMENTS AND CROPMARK DATA
FIGURE 3: NORTH LINCOLNSHIRE HER ARCHAEOLOGICAL EVENTS DATA
FIGURE 4: HISTORIC LANDSCAPE CHARACTERISATION DATA
FIGURE 5: LiDAR DATA
FIGURE 6: 1824 ORDNANCE SURVEY MAP
FIGURE 7: 1842 BROUGHTON TITHE MAP
FIGURE 8: 1889 ORDNANCE SURVEY MAP
FIGURE 9: 1908 ORDNANCE SURVEY MAP
FIGURE 10: 1956 ORDNANCE SURVEY MAP
FIGURE 11: PHOTOGRAPH LOCATIONS

PLATES:

PLATE 1: SITE LOCATION PLAN 3
PLATE 2 VIEW WEST ACROSS THE SOUTHERN PART OF THE FORMER GOKEWELL PRIORY (FIGURE 11, A) 5
PLATE 3 VIEW INTO SMALL WOODLAND AREA, SITE OF THE FORMER GOKEWELL PRIORY AND THE LATER GOKEWELL PRIORY FARM – POSSIBLE REMNANTS OF THE FARM BUILDING VISIBLE (FIGURE 11, B) 5
PLATE 4 VIEW NORTHEAST (FIGURE 11, C) 6
PLATE 5 VIEW WEST FROM RISING GROUND LOOKING TOWARDS THE STEEL WORKS (FIGURE 11, D) 6
PLATE 6 VIEW OF THE NORTHEASTERN FIELD WITHIN THE SITE BOUNDARY, LOOKING AT THE HIGHEST POINT WITHIN THE SITE (FIGURE 11, E) 7
PLATE 7 VIEW TOWARDS THE POULTRY FARM, LOOKING SOUTHEAST (FIGURE 11, F) 7

PLATE 8 VIEW NORTH TOWARDS HAY BALES SCREENING THE OIL WELL ACROSS NORTHEASTERN PORTION OF THE SITE (FIGURE 11, G) 8
PLATE 9 VIEW EAST TOWARDS POULTRY FARM (FIGURE 11, H) 8
PLATE 10 VIEW OF ROOFTOP OF POULTRY FARM, LOOKING EAST (FIGURE 11, I) 9
PLATE 11 LOOKING WEST FROM FOOTPATH NEAR THE POULTRY FARM, STEEL WORKS VISIBLE ABOVE CREST OF HILL (FIGURE 11, J) 9
PLATE 12 VIEW SOUTHWEST ACROSS SOUTHERN PORTION OF THE SITE (FIGURE 11, K) 10
PLATE 13 VIEW SOUTHWEST ACROSS THE SITE LOOKING AT THE STEEL WORKS (FIGURE 11, L) 10
PLATE 14 VIEW SOUTH LOOKING AT STEEL WORKS (FIGURE 11, M) 11
PLATE 15 VIEW SOUTHEAST ACROSS THE SOUTHEASTERN FIELD OF THE SITE (FIGURE 11, N) 11
PLATE 16 VIEW SOUTH ACROSS SOUTHERN FIELD WITHIN SITE, ADJACENT TO ICEHOUSE STRIP (FIGURE 11, O) 12
PLATE 17 VIEW SOUTHWEST INTO AREA ADJACENT TO LITTLE CROW COVERT (FIGURE 11, P) 12
PLATE 18 CROPMARK OF POSSIBLE ROUND BARROW WITHIN SITE 33
PLATE 19 1970S GOKEWELL EARTHWORKS SURVEY 36
PLATE 20 CROPMARK FEATURES (GREEN), AREA OF FORMER RIDGE AND FURROW EARTHWORKS (BLUE), APPROXIMATE GOKEWELL PRIORY EXTENT RECORDED BY NLHER (PURPLE), EXTENT OF EARTHWORKS RECORDED BY SURVEY (YELLOW) AND A FORMER FARM BUILDING (ORANGE) 37
PLATE 21 1956 AERIAL PHOTOGRAPH OF EARTHWORKS AT THE FORMER GOKEWELL PRIORY FARM 37
PLATE 22 CURRENT AERIAL IMAGE OF SITE 38
PLATE 23 1824 ORDNANCE SURVEY MAP DEPICTING MANBY 39
PLATE 24 1824 ORDNANCE SURVEY MAP 40
PLATE 25 1824 MAP SHOWING GOKEWELL PRIORY FARM 41
PLATE 26 1956 ORDNANCE SURVEY MAP OF GOKEWELL PRIORY FARM 42
PLATE 27 1956 AERIAL PHOTOGRAPH OF GOKEWELL PRIORY FARM 42
PLATE 28 1956 AERIAL PHOTOGRAPH OF GOKEWELL PRIORY FARM, LOOKING SOUTHWEST 43
PLATE 29 1956 AERIAL PHOTOGRAPH OF GOKEWELL PRIORY FARM, LOOKING SOUTH 43

PLATE 30 EXTRACT FROM BROUGHTON TITHE MAP, 1842. 44
PLATE 31 1889 -1891 ORDNANCE SURVEY MAP 47
PLATE 32 CLOSE-UP OF GOKEWELL PRIORY FARM ON 1889-91 ORDNANCE SURVEY MAP 47
PLATE 33 1908 ORDNANCE SURVEY MAP 48
PLATE 34 CLOSE UP OF GOKEWELL PRIORY FARM ON 1956 ORDNANCE SURVEY MAP 49
PLATE 35 1956 ORDNANCE SURVEY MAP SHOWING EXTENT OF SCUNTHORPE STEEL WORKS TO WEST 50
PLATE 36 LIDAR AND NLHER DATA (GREEN) DEPICTING POSSIBLE ENCLOSURE 51
PLATE 37 AERIAL IMAGE SHOWING LOCATION OF POSSIBLE ENCLOSURE 52
PLATE 38 1973 AERIAL PHOTOGRAPH 53
PLATE 39 VIEW NORTHWEST ACROSS RAVENTHORPE DMV, STEEL WORKS VISIBLE IN BACKGROUND 56
PLATE 40 VIEW WEST LOOKING AT GRADE II LISTED RAVENTHORPE FARMHOUSE 56
PLATE 41 VIEW WEST WITHIN BROUGHTON LOOKING AT GRADE I LISTED ST. MARY'S CHURCH – NO VIEW OF THE SITE 57

1. Non-Technical Summary

1.1 Pegasus Group have been commissioned by INRG Solar (Little Crow) Ltd to carry out a Cultural Heritage Baseline Study of the proposed renewable led energy scheme on land to the east of British Steelworks site, Scunthorpe, North Lincolnshire. The results of this baseline will be used to inform the heritage chapter of the Preliminary Environmental Information Report and the Environmental Statement.

1.2 Due to time constraints, this draft report does not contain Historic Environment Record (HER) data for a revised 1km study area, which resulted from the recent alterations to the Site boundary (Rev C), which includes the addition of a proposed construction compound location. A fully revised baseline report will be produced upon receipt of updated HER data.

Archaeological Resource

1.3 One area of specific prehistoric archaeological potential has been identified within the Site (c. 0.16ha), a cropmark of a possible round barrow (**MLS22718**). However, this feature has not been positively identified by archaeological fieldwork. Poorly-recorded flints and deposits of Sutton Sand Formation within the Site and a broad prehistoric transport corridor in the area are not considered to represent any specific heritage assets within the Site.

1.4 A former Cistercian nunnery known as Gokewell Priory, was located in the northern part of the Site. Gokewell Priory was established in the 12th century, and dissolved in the 16th century. Gokewell Priory Farm was built on the site of the former medieval Gokewell Priory between the late 17th and early 19th century. Material from the former medieval Priory may have been used during the construction of the farm. Gokewell Priory Farm was itself abandoned and demolished in the late 20th century. It is probable but unproven that the below-ground remains of the former medieval Gokewell Priory and post-medieval Gokewell Priory Farm are located within the northern part of the Site (**MLS1805**). However, the core of the former medieval Gokewell Priory, where the later post-medieval Gokewell Priory Farm buildings were constructed, is not proposed for the location of solar panels. However, there is potential for below-ground remains of ancillary structures and features associated with the medieval Gokewell Priory to be present within the areas proposed for development. The potential extent of this area is demonstrated by the earthworks survey (**ELS4211**) shown on Figures 2 and 3.

1.5 Beyond the site of the former Gokewell Priory, there is no proven evidence for medieval activity within the Site. No above-ground remains of ridge and furrow earthworks survive within the Site.

1.6 The Site also contains a slight ovoid possible earthwork (**MLS22780**) enclosure preserved partly within the woodland of

Little Crow Covert which may extend west, into the adjacent field, however it is not visible as a cropmark on aerial photographs within the field to the west.

1.7 Within the southern portion of the Site are the records of two cropmarks of possible enclosures, one square (**MLS21943**) and one ovoid (**MLS21941**). These assets are located to the north of the Manby deserted medieval village (outside of the Site boundary). Due to their size and location, they are most likely to be medieval stock enclosures, of low archaeological value, although they may also be of geological origin. Analysis of aerial imagery has also indicated the presence of two partial circular cropmarks of unknown origin within the same field (**A1** and **A2**).

1.8 An undated limestone wall (**MLS21242**) was recorded adjacent to the B1027 in the north-eastern part of the Site. However, this area adjacent to a public road is unlikely to see groundworks which would impact upon this asset.

1.9 Potential below-ground remains relating to a former WWII Heavy Anti-Aircraft Battery in the eastern portion of the Site (**MLS21408**) could potentially survive.

1.10 While a number of areas containing archaeological remains or with archaeological potential have been identified by this assessment, significant archaeological constraints do not appear to be present in many areas of the Site.

Setting Assessment

1.11 It is not considered that the Site forms part of the setting of any of the identified designated heritage assets within the vicinity the Site which contributes to their heritage significance, nor has any intervisibility been identified.

1.12 The Site forms part of the setting of the non-designated site of the former medieval Gokewell Priory which makes a moderate contribution to its overall significance.

2. Introduction

2.1 Pegasus Group have been commissioned by INRG Solar (Little Crow) Ltd to carry out a Cultural Heritage Baseline Study for a proposed renewable led energy scheme on land to the east of British Steel site, Scunthorpe, North Lincolnshire, shown on Plate 1. The results of this will be used to inform the heritage chapter of the Environmental Statement to support the Development Consent Order (DCO) application.

2.2 The application site (henceforth referred to as 'the Site') is approximately 218ha in area and is located to the northwest of the settlement of Broughton and immediately to the east of the Scunthorpe Steel Works.

2.3 The application seeks permission for the construction and operation of up to 160MW capacity of ground-mounted solar photovoltaic panels, the installation of up to 90MW batteries and associated infrastructure. The proposed development is a 'Nationally Significant Infrastructure Project' (NSIP).

2.4 This Cultural Heritage Baseline Study provides information with regards to the significance of the historic environment, to inform the heritage chapter of the Environmental Statement and to fulfil the requirement given in paragraph 5.8.8 of National Policy Statement EN-1 (see 5.12 of this report for full reference) which requires:

"...the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset."

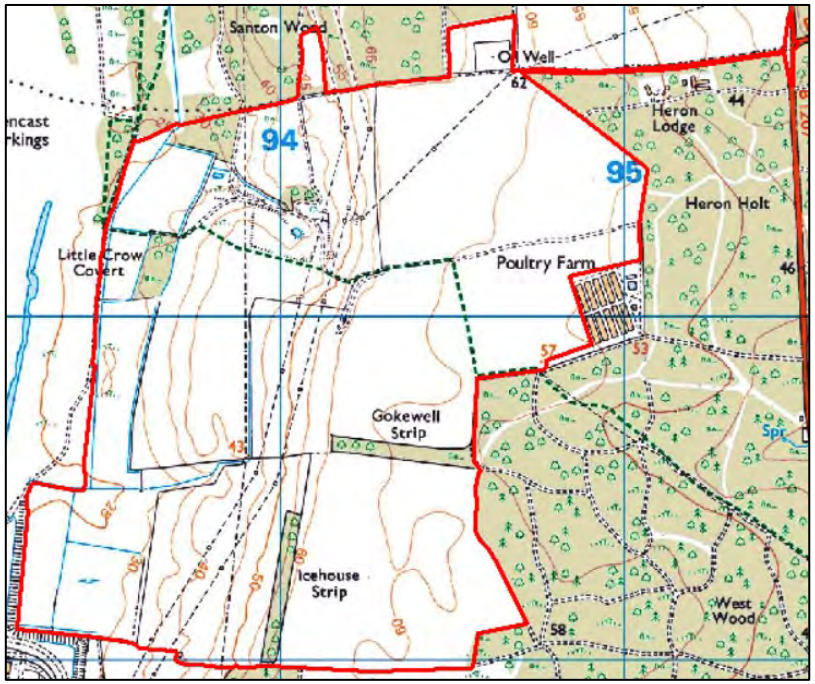


Plate 1: Site Location Plan

3. Site Description and Location

3.1 The Site, approximately 228ha in area, includes a series of post-war agricultural fields and an existing 775m-long access track, plantations and the site of a former oil well. The Site outline is irregular, but roughly rectangular in shape. The boundaries are largely formed by extant field boundaries. The southeastern boundary is formed by dense woodland and the entire Site is well enclosed by the existing vegetation. Any long-distance views available looking west are dominated by the Scunthorpe Steel Works which runs along the entire length of the Site and beyond, and includes a number of tall, industrial structures, chimneys and moving elements. The activity within the steel works is audible from within the Site boundary.

3.2 The fields within the Site are arable with the crop being harvested during the site visit. The areas of the Site under arable cultivation are subject to deep ploughing to a depth of 0.6m every year (*pers. comm*: information obtained from the landowner). The Site also contains two rows of pylons and overhead powerlines which run down the length of the Site.

3.3 The Site is surrounded by post-war agricultural fields and woodland plantations on the northern and eastern sides, with a large, modern poultry farm located directly adjacent to the eastern boundary. The eastern boundary abuts a dense block of woodland which blocks views into or out of the Site to the east. Dense woodland is also present to the south. Beyond this woodland is a recently constructed solar farm at Raventhorpe. To the west of the Site boundary is a small strip of low-lying land beside Bottesford Beck which physically separates the Site from the steel works.

3.4 The eastern part of the Site is situated on a broad plateau at approximately 60m aOD. The crest of the plateau runs through the centre of the Site on a north-northeast to south-southwest alignment. From this crest, the land within the western part of the Site slopes down fairly steeply towards the valley bottom of the Bottesford Beck which runs c.350m to the west of the western boundary, to around 25m AOD.

3.5 From within the Site, there are long-distance views available to the west, particularly from the highest points within the Site. However, the presence of the pylons and steel works in views to the west from the Site means that these views are characterised completely by modern, industrial elements. The scale of the Scunthorpe Steel Works is such that it dominates the entirety of the western panorama from the Site. Views east are more limited due to the dense vegetation and topography. The presence of the large poultry farm adds a modern, industrial element to views in this direction. The location and direction of the photographic plates below are depicted on Figure 11, using the references provided within the plate captions.



Plate 2 View west across the southern part of the former Gokewell Priory (Figure 11, A)



Plate 3 View into small woodland area, site of the former Gokewell Priory and the later Gokewell Priory Farm – possible remnants of the farm building visible (Figure 11, B)



Plate 4 View northeast (Figure 11, C)



Plate 5 View west from rising ground looking towards the steel works (Figure 11, D)



Plate 6 View of the northeastern field within the Site boundary, looking at the highest point within the Site (Figure 11, E)



Plate 7 View towards the Poultry Farm, looking southeast (Figure 11, F)



Plate 8 View north towards hay bales screening the Oil Well across northeastern portion of the Site (Figure 11, G)



Plate 9 View east towards Poultry Farm (Figure 11, H)



Plate 10 View of rooftop of Poultry Farm, looking east (Figure 11, I)



Plate 11 Looking west from footpath near the Poultry Farm, steel works visible above crest of hill (Figure 11, J)



Plate 12 View southwest across southern portion of the Site (Figure 11, K)



Plate 13 View southwest across the Site looking at the steel works (Figure 11, L)



Plate 14 View south looking at steel works (Figure 11, M)



Plate 15 View southeast across the southeastern field of the Site (Figure 11, N)



Plate 16 View south across southern field within Site, adjacent to Icehouse Strip (Figure 11, O)



Plate 17 View southwest into area adjacent to Little Crow Covert (Figure 11, P)

3.6 From within the Site, there are no views towards any designated heritage assets. Although the Site is large in scale, the topography, the Scunthorpe Steel Works and the dense woodland vegetation combine to largely enclose the Site from views outwards, and views looking towards the Site.

3.7 The nearest settlement to the Site is the village of Broughton located 860m to the southeast of the proposed Site boundary, with dense woodland between. There is no visibility of this settlement from within the Site, nor any visibility of the Site from within the settlement of Broughton.

4. Methodology

4.1 The aim of this Cultural Heritage Baseline Study is to provide a baseline of information to support the Cultural Heritage chapter of the Environmental Statement. This baseline sets out the significance of elements of the historic environment (heritage assets) and the contribution made by their setting. The assessment considers both the archaeological resource and built heritage resource.

Site Visit

4.2 A site visit was undertaken by Pegasus Group on 14th August 2017, during which the Site and its surrounds were assessed.

Sources of information and study area

4.3 The assessment has been informed by appropriate sources of information, including:

- **Historic England's National Heritage List for England (NHLE) for information on designated heritage assets;**
- **Historic England Archive AMIE data for information on non-designated heritage assets;**
- **North Lincolnshire Historic Environment Record (NLHER) for information on non-designated heritage assets, previous archaeological works, HER files and aerial photographs, consulted digitally and in-person;**
- **Historic maps and documentary sources held at the Lincolnshire Archives and Scunthorpe Library;**
- **LiDAR data: and**
- **Historic aerial photographs held at the Historic England Archives.**

4.4 For digital data sets (e.g. the NLHER) information was obtained for a 1km study area from the Site boundary (excluding the access road). Tables summarising this data are included in Appendix 1 and records are discussed in the text, where relevant. Figures depicting the data are included at Appendix 2.

4.5 Designated heritage assets were reviewed in the wider area, as professional judgement deemed appropriate.

4.6 Historic cartographic sources were reviewed for the Site, and beyond this where professional judgement deemed necessary. Such sources are reproduced in Section 6 where appropriate.

4.7 A list of sources consulted by this report is provided at Appendix 5.

Assessment of significance

4.8 In the NPPF, heritage significance is defined as:

> **"The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting. For World Heritage Sites, the cultural value described within each site's Statement of Outstanding Universal Value forms part of its significance."**

4.9 Historic England's *Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision Taking in the Historic Environment*[1] (henceforth referred to as '*GPA 2: Managing Significance*') gives advice on the assessment of significance as part of the application process. It advises understanding the nature, extent, and level of significance of a heritage asset. In order to do this, *GPA 2: Managing Significance* also advocates considering the four types of heritage value an asset may hold, as identified in Historic England's *Conservation Principles*[2]; **evidential**, **historical**, **aesthetic** and **communal**. These essentially cover the heritage 'interests' given in the glossary of the NPPF, which comprise archaeological, architectural, artistic and historic interest.

4.10 *Conservation Principles* provides further information on the heritage values it identifies:

- **Evidential value: the potential of a place to yield evidence about past human activity. This value is derived from physical remains, such as archaeological remains, and genetic lines.**
- **Historical value: the ways in which past people, events and aspects of life can be connected through a place to the present - it tends to be illustrative or associative. Illustrative value is the perception of a place as a link between past and present people and depends on visibility. It has the power to aid interpretation of the past through making connections with and providing insights into past communities and their activities through shared experience of a place. By contrast, associative value need not necessarily be legible at an asset, but gives a particular resonance through association with a notable family, person, event or movement.**
- **Aesthetic value: the ways in which people draw sensory and intellectual stimulation from a place. Aesthetic values can be the result of conscious design or fortuitous outcome or a combination of the two aspects. The latter can result from the enhancement of the appearance of a place through the passage of time.**

[1] Historic England, 2015, *Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision Taking in the Historic Environment*

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

- **Communal value: the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory. This can be through widely acknowledged commemorative or symbolic value that reflects the meaning of the place, or through more informal social value as a source of identity, distinctiveness, social interaction and coherence. Spiritual value may also be part of communal value.**

4.11 Significance results from a combination of any, some or all of the values described above.

Setting and significance

4.12 As defined in the NPPF:

> **"Significance derives not only from a heritage asset's physical presence, but also from its setting. "**[3]

4.13 Setting is defined as:

> **The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral."**[4]

4.14 Therefore, setting can contribute to, affect an appreciation of significance or be neutral with regards to heritage values.

Assessing change through alteration to setting

4.15 How setting might contribute to these values has been assessed within this report with reference to *Historic Environment Good Practice Advice in Planning Note 3 (Second Edition): The Setting of Heritage Assets*[5] (henceforth referred to as *GPA 3: The Setting of Heritage Assets*), particularly the checklist given on page 11. This advocates the clear articulation of 'what matters and why'.

4.16 In *GPA 3: The Setting of Heritage Assets*, a stepped approach is recommended, of which Step 1 is to identify which heritage assets (both designated and non-designated) and their settings are affected. Step 2 is to assess "*whether, how and to what degree settings make a contribution to the significance of the heritage asset(s) or allow significance to be appreciated*'. The guidance includes a (non-exhaustive) check-list of elements of the physical surroundings of an asset that might be considered when undertaking the assessment including, among other things: topography, other heritage assets, green space, functional relationships and degree of change over time. It also lists points associated with the experience of the asset which might be considered, including: views, intentional intervisibility,

[3] NPPF Annex 2

[4] Ibid.

[5] Historic England, 2017, *Historic Environment Good Practice Advice in Planning Note 3 (Second Edition): The Setting of Heritage Assets*

tranquillity, sense of enclosure, accessibility, rarity and land use.

4.17 Step 3 is to assess the effect of the proposed development on the significance of the asset(s). Step 4 is to explore ways to '*maximise enhancement and minimise harm*'. Step 5 is to '*make and document the decision and monitor outcomes*'.

4.18 Descriptions of significance will naturally anticipate the ways in which impacts will be considered. Hence descriptions of the significance of Listed Buildings will be discussed with reference to the building, its setting and any features of special architectural or historic interest which it possesses.

Levels of significance

4.19 In accordance with the levels of significance articulated in the NPPF, three levels of significance are identified:

- **Designated heritage assets of the highest significance, as identified in paragraph 194 of the NPPF comprising Grade I and II* Listed buildings, Grade I and II* Registered Parks and Gardens, Scheduled Monuments, Protected Wreck Sites, World Heritage Sites and Registered Battlefields (and also including some Conservation Areas) and heritage assets of archaeological interest demonstrably of equivalent significance to Scheduled Monuments, as identified in footnote 63 of the NPPF;**
- **Designated heritage assets of less than the highest significance, as identified in paragraph 194 of the NPPF, comprising Grade II Listed buildings and Grade II Registered Parks and Gardens (and also some Conservation Areas); and**
- **Non-designated heritage assets. Non-designated heritage assets are defined within the Government's Planning Practice Guidance as "*buildings, monuments, sites, places, areas or landscapes identified as having a degree of significance meriting consideration in planning decisions but which are not formally designated heritage assets*[6]".**

4.20 Additionally, it is of course possible that sites, buildings or areas have no heritage significance.

Assessment of harm

4.21 Assessment of any harm will be articulated in terms of the policy and law that the proposed development will be assessed against. For this proposed development, this will be done in accordance with the policies contained within the Overarching National Policy Statement for Energy Policy EN-1 and the policies of National Policy Statement for Renewable Energy EN-3.

4.22 In order to relate to key policy, the following levels of harm may potentially be identified:

- **Substantial harm or total loss. It has been clarified in a High Court Judgement of 2013[7] that this would be harm that would 'have such a serious impact on the significance of the asset**

[6] DCLG, Planning Practice Guidance, Paragraph: 039 (ID: 18a-039-20140306, Revision date: 06 03 2014)

[7] EWHC 2847, R DCLG and Nuon UK Ltd v. Bedford Borough Council

that its significance was either vitiated altogether or very much reduced'; and

- **Less than substantial harm. Harm of a lesser level than that defined above.**

4.23 It is also possible that development proposals will cause **no harm or preserve** the significance of heritage assets. A High Court Judgement of 2014 is relevant to this[8]. This concluded that with regard to preserving the setting of a Listed building or preserving the character and appearance of a Conservation Area, 'preserving' means doing 'no harm'.

4.24 Preservation does not mean no change; it specifically means no harm. *GPA 2: Managing Significance* states that "*Change to heritage assets is inevitable but it is only harmful when significance is damaged".* Thus, change is accepted in Historic England's guidance as part of the evolution of the landscape and environment. It is whether such change is neutral, harmful or beneficial to the significance of an asset that matters.

4.25 As part of this, setting may be a key consideration. For an evaluation of any harm to significance through changes to setting, this assessment follows the methodology given in *GPA 3: The Setting of Heritage Assets*, described above. Again, fundamental to the methodology set out in this document is stating '*what matters and why*'. Of particular relevance is the checklist given on page 13 of *GPA 3: The Setting of Heritage Assets*.

4.26 It should be noted that this key document states that:

- **"setting is not itself a heritage asset, nor a heritage designation"**[9]

4.27 Hence any impacts are described in terms of how they affect the significance of a heritage asset, and heritage values that contribute to this significance, through changes to setting.

4.28 With regards to changes in setting, *GPA 3: The Setting of Heritage Assets* states that "*conserving or enhancing heritage assets by taking their settings into account need not prevent change*".

4.29 Additionally, it is also important to note that, as clarified in the Court of Appeal[10], whilst the statutory duty requires that special regard should be paid to the desirability of not harming the setting of a Listed Building, that cannot mean that any harm, however minor, would necessarily require planning permission to be refused.

[8] EWHC 1895, R (Forge Field Society, Barraud and Rees) v. Sevenoaks DC, West Kent Housing Association and Viscount De L'Isle

[9] Historic England, 2017, Historic Environment Good Practice Advice in Planning Note 3 (Second Edition): The Setting of Heritage Assets

[10] Palmer v Herefordshire Council & Anor [2016] EWCA Civ 1061 (4th November 2016)

Benefits

4.30 Proposed development may also result in benefits to heritage assets, and these are articulated in terms of how they enhance the heritage values and hence the significance of the assets concerned.

5. Planning Policy Framework

Planning Policy Framework

5.1 This section of the Baseline Study sets out the legislation and planning policy considerations and guidance contained within both national and local planning guidance which specifically relate to the application site, with a focus on those policies relating to the protection of the historic environment.

Legislation

5.2 Legislation relating to the Built Historic Environment is primarily set out within the Planning (Listed Buildings and Conservation Areas) Act 1990 which provides statutory protection for Listed Buildings and Conservation Areas.

5.3 Section 66(1) of the Planning (Listed Buildings and Conservation Areas) Act 1990 states that:

> **"In considering whether to grant planning permission [or permission in principle] for development which affects a listed building or its setting, the local planning authority or, as the case may be, the Secretary of State, shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses".**

5.4 In the 2014 Court of Appeal judgement in relation to the Barnwell Manor case[11], Sullivan LJ held that:

> **"Parliament in enacting section 66(1) did intend that the desirability of preserving the settings of listed buildings should not simply be given careful consideration by the decision-maker for the purpose of deciding whether there would be some harm, but should be given "considerable importance and weight" when the decision-maker carries out the balancing exercise."**

5.5 Recent judgement in the Court of Appeal[12] ('Mordue') has clarified that, with regards to the setting of Listed Buildings, where the principles of the NPPF are applied (in particular paragraph 196, see below), this is in keeping with the requirements of the 1990 Act.

5.6 Scheduled Monuments are protected by the provisions of the Ancient Monuments and Archaeological Areas Act 1979 which relates to nationally important archaeological sites. Whilst works to Scheduled Monuments are subject to a high level of protection, it is important to note that there is no duty within the 1979 Act to have regard to the desirability of preservation of the setting of a Scheduled Monument.

[11] East Northamptonshire District Council v SSCLG (2015) EWCA Civ 137

[12] Jones v Mordue Anor (2015) EWCA Civ 1243

National Policy Guidelines

5.7 This project is being submitted to the Planning Inspectorate as a Nationally Significant Infrastructure Project in order to gain a Development Consent Order. Therefore, the proposed scheme will be assessed against, and recommendations made in accordance with the National Policy Statements for Energy which set out Government policy on national infrastructure energy developments.

5.8 The Energy NPSs are divided into six. The first is an overarching NPS setting out the overarching policies on all forms of energy development. The remaining five target specific energy technologies and developments including Renewable Energy in EN-3. All of the Energy NPSs were designated and adopted in 2011.

5.9 Overarching National Policy Statement for Energy (EN-1) sets out the Government policy for delivery of major energy infrastructure and should be considered in conjunction with the technology-specific NPS.

5.10 Section 5.8 of EN-1 is concerned with the historic environment, recognising that:

> **"The construction, operation and decommissioning of energy infrastructure has the potential to result in adverse impacts on the historic environment."**[13]

5.11 EN-1 states that the impacts should be considered not only on designated assets, but also on non-designated assets identified either through the development plan making process (such as local listing) or through the Planning Inspectorate's decision-making process on the basis of clear evidence that these assets have a heritage significance that merits consideration in its decisions, even though those assets are of lesser value than designated heritage assets[14].

5.12 As part of the applicant's assessment, the significance of the heritage assets affected by the proposed development should be set out, at a level of detail proportionate to importance of the heritage assets, as set out in Section 5.8.8:

> **"As part of the ES (see Section 4.2) the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset. As a minimum the applicant should have consulted the relevant Historic Environment Record…and assessed the heritage assets themselves using expertise**

[13] Department of Energy and Climate Change, 2011. *Overarching National Policy Statement for Energy (EN-1)*. P90

[14] *Ibid. p91*

where necessary according to the proposed development's impact."

5.13 Section 5.8.9 expands further on 5.8.8:

> **"Where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out an appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation. Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact."**

5.14 Section 5.8.10 states:

> **"The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents."**

5.15 Section 5.8.14 sets out the considerations that the Planning Inspectorate should take into in the decision-making process. This states:

> **"There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be."**[15]

5.16 This section recognises that significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting and that "**loss affecting any designated heritage asset should require clear and convincing justification.**"

5.17 Section 5.8.15 sets out the requirement for a balance to be struck between an identified harmful impact and the public benefit of development, recognising that the greater the significance of the heritage asset, the greater the justification for development will be required to be.

5.18 Section 5.8.18 of EN-1 deals specifically with developments affecting the setting of designated heritage assets. It states:

> **"the (Planning Inspectorate) should treat favourably applications that preserve those elements of the setting that make a positive contribution to, or better reveal, the significance of, the asset. When considering applications that do not do this, the (Planning Inspectorate) should weigh any negative effects against the wider benefits of the application."**[16]

5.19 EN-1 provides a mechanism whereby if heritage assets are impacted by a development, then the developer should facilitate the creation of a record of such assets. This is set out at Sections 5.8.20 to 5.8.22 of EN-1.

5.20 National Policy Statement for Renewable Energy Infrastructure (EN-3) 2011 provides specific guidance on how to assess

[15] *Ibid. p92*

[16] *Ibid. p93*

impacts arising from renewable energy technology, in this case, ground-mounted solar photovoltaic panels. At the time of writing, EN-3, the technology to develop 50MW+ schemes from solar PV arrays, was not commonplace and therefore EN-3 does not specifically consider solar energy within this guidance.

5.21 Some guidance can be taken from the section concerned with Onshore Wind Farm impacts which states that visualisations may be required to demonstrate the effects of a proposed development and that micro-siting of infrastructure should be considered to minimise the risk of damaging archaeological assets during construction.[17]

The National Planning Policy Framework (July 2018)

5.22 Whilst regard has been made to the NPPF policies set out below, Paragraph 5 of the NPPF is clear that it does not contain specific policies for NSIPs and these are to be determined in accordance with the decision making framework set out in the Planning Act 2008 and relevant NPSs, as well as any other matters that are considered both important and relevant:

- **"The Framework does not contain specific policies for nationally significant infrastructure projects. These are determined in accordance with the decision-making framework in the Planning Act 2008 (as amended) and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework). National policy statements form part of the overall framework of national planning policy, and may be a material consideration in preparing plans and making decisions on planning applications."**[18]

5.23 The NPPF sets out the Government's economic, environmental and social planning policies for England. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

5.24 The presumption in favour of sustainable development (the 'presumption') sets out the tone of the Government's overall stance and operates with and through the other policies of the NPPF. Conserving historic assets in a manner appropriate to their significance forms part of this drive towards sustainable development.

5.25 The purpose of the planning system is to contribute to the achievement of sustainable development and the NPPF sets out three overarching objectives to sustainable development: an economic objective, a social objective, and an environmental objective. The presumption is key to delivering these ambitions, by creating a positive pro-development framework which is underpinned by the wider economic, environmental and social provisions of the NPPF. The presumption is set out in full at paragraphs 10 and 11 of the NPPF and reads as follows:

[17] Department of Energy and Climate Change, 2011. *National Policy Statement for Renewable Energy Infrastructure (EN-3)*. P67

[18] NPPF, paragraph 5

"So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development (paragraph 11)."[19]

"For decision-taking this means:

c) approving development proposals that accord with an up-to-date development plan without delay; or

d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting planning permission unless:

i) the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or

ii) any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole."[20]

5.26 However, it is important to note that footnote 6 of the NPPF applies in relation to the bullet d, part i of paragraph 11. This provides a context for paragraph 11 and reads as follows:

"The policies referred to are those in this Framework (rather than those in development plans) relating to: habitats sites (and those sites listed in paragraph 176) and/or designated as Sites of Special Scientific Interest; land designated as Green Belt, Local Green Space, an Area of Outstanding Natural Beauty, a National Park (or within the Broads Authority) or defined as Heritage Coast; irreplaceable habitats; designated heritage assets (and other heritage assets of archaeological interest referred to in footnote 63); and areas at risk of flooding or coastal change" (our emphasis)

5.27 Heritage Assets are defined in Annex 2 of the NPPF as:

"A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the Local Planning Authority (including Local Listing)"

5.28 The NPPF goes on to define a Designated Heritage Asset as:

"World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under relevant legislation" [21]

[19] NPPF, paragraph 10

[20] NPPF, paragraph 11

[21] NPPF, Annex 2

5.29 As set out above, significance is also defined as:

> **"The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting. For World Heritage Sites, the cultural value described within each site's Statement of Outstanding Universal Value forms part of its significance"** [22]

5.30 Section 16 of the NPPF relates to 'Conserving and enhancing the historic environment' and states at paragraph 190 that:

> **"Local planning authorities should identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise. They should take this into account when considering the impact of a proposal on a heritage asset, to avoid or minimise any conflict between the heritage asset's conservation and any aspect of the proposal"**

5.31 Paragraph 192 goes on to state that:

> **"In determining planning applications, local planning authorities should take account of:**
>
> **a) The desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation;**
>
> **b) The positive contribution that conservation of heritage assets can make to sustainable communities including their economic vitality; and**
>
> **c) The desirability of new development making a positive contribution to local character and distinctiveness"**

5.32 With regard to the impact of proposals on the significance of a heritage asset, paragraphs 193 and 194 are relevant and read as follows:

> **"When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance.**
>
> **Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification. Substantial harm to or loss of:**
>
> **a) grade II listed buildings, or grade II registered parks or gardens, should be exceptional;**

[22] Ibid.

b) assets of the highest significance, notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional"

5.33 Section b) of the above describing assets of the highest significance also includes footnote 63 of the NPPF, which states that non-designated heritage assets of archaeological interest which are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.

5.34 In the context of the above, it should be noted that paragraph 195 reads as follows:

"Where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:

a) the nature of the heritage asset prevents all reasonable uses of the site; and

b) no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation; and

c) conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and

d) the harm or loss is outweighed by the benefit of bringing the site back into use"

5.35 Paragraph 196 goes on to state:

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

5.36 With regards to non-designated heritage assets, paragraph 197 of NPPF states that:

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

National Planning Guidance

5.37 The Department for Communities and Local Government (DCLG) launched the planning practice web based resource in March 2014, accompanied by a ministerial statement which confirmed that a number of previous planning practice guidance documents were cancelled.

5.38 This also introduced the national Planning Practice Guidance (PPG) which comprised a full and consolidated review of planning practice guidance documents to be read alongside the NPPF.

5.39 The PPG has a discrete section on the subject of 'Conserving and enhancing the historic environment' which confirms that the consideration of 'significance' in decision taking is important and states:

> **"Heritage assets may be affected by direct physical change or by change in their setting. Being able to properly assess the nature, extent and importance of the significance of a heritage asset, and the contribution of its setting, is very important to understanding the potential impact and acceptability of development proposals"** [23]

5.40 In terms of assessment of substantial harm, the PPG confirms that whether a proposal causes substantial harm will be a judgement for the individual decision-taker having regard to the individual circumstances and the policy set out within the NPPF. It goes on to state:

> **"In general terms, substantial harm is a high test, so it may not arise in many cases. For example, in determining whether works to a listed building constitute substantial harm, an important consideration would be whether the adverse impact seriously affects a key element of its special architectural or historic interest. It is the degree of harm to the asset's significance rather than the scale of the development that is to be assessed. The harm may arise from works to the asset or from development within its setting.** [24]
>
> **While the impact of total destruction is obvious, partial destruction is likely to have a considerable impact but, depending on the circumstances, it may still be less than substantial harm or conceivably not harmful at all, for example, when removing later inappropriate additions to historic buildings which harm their significance. Similarly, works that are moderate or minor in scale are likely to cause less than substantial harm or no harm at all. However, even minor works have the potential to cause substantial harm" (our emphasis)**

The Local Development Framework

5.41 Planning applications within North Lincolnshire are currently subject to policy set out within the Core Strategy and saved policies of the North Lincolnshire Local Plan.

Core Strategy

5.42 The Core Strategy, adopted in June 2011, sets out the long-term vision for North Lincolnshire and provides a blueprint for managing growth and development in the area up to 2026.

[23] PPG, paragraph 009 (ID: 18a-009/20140306 revision date 06.03.2014)

[24] PPG, paragraph 017 (ID: 18a-017-20140306 revision date 06.03.2014)

5.43 **Policy CS6** relates to the Historic Environment, stating:

"The council will promote the effective management of North Lincolnshire's historic assets through:

• Safeguarding the nationally significant medieval landscapes of the Isle of Axholme (notably the open strip fields and turbaries) and supporting initiatives which seek to realise the potential of these areas as a tourist, educational and environmental resource.

• Preserving and enhancing the rich archaeological heritage of North Lincolnshire.

• Ensuring that development within Epworth (including schemes needed to exploit the economic potential of the Wesleys or manage visitors) safeguards and, where possible, improves the setting of buildings associated with its Methodist heritage.

• Ensuring that development within North Lincolnshire's Market Towns safeguards their distinctive character and landscape setting, especially Barton upon Humber, Crowle and Epworth. The council will seek to protect, conserve and enhance North Lincolnshire's historic environment, as well as the character and setting of areas of acknowledged importance including historic buildings, conservation areas, listed buildings (both statutory and locally listed), registered parks and gardens, scheduled ancient monuments and archaeological remains. All new development must respect and enhance the local character and distinctiveness of the area in which it would be situated, particularly in areas with high heritage value. Development proposals should provide archaeological assessments where appropriate."

North Lincolnshire Local Plan

5.44 The North Lincolnshire Local Plan was adopted in May 2003. It is gradually being replaced by new documents which make up the Local Development Framework; however, a number of policies are currently 'saved' and remain relevant in the decision making process.

5.45 The following saved policies pertain to the historic environment:

HE5 - Development affecting Listed Buildings

"The Council will seek to secure the preservation, restoration and continued use of buildings of special architectural or historic interest.

When applications for planning permission relating to a listed building or listed building consent are being assessed, the primary consideration will be the need to preserve or enhance the fabric and character of the building.

Permission or consent will not be granted unless it has been demonstrated that the proposed works would secure this objective.

The Council will encourage the retention and restoration of the historic setting of listed buildings. Proposals which damage the setting of a listed building will be resisted.

Whenever appropriate, proposals which would entail the loss of historic fabric from a listed

building will be conditional upon a programme of recording being agreed and implemented."

HE8 - Ancient Monuments

"Development proposals which would result in an adverse effect on Scheduled Ancient Monuments and other nationally important monuments, or their settings, will not be permitted."

HE9 - Archaeological Evaluation

"Where development proposals affect sites of known or suspected archaeological importance, an archaeological assessment to be submitted prior to the determination of a planning application will be required.

Planning permission will not be granted without adequate assessment of the nature, extent and significance of the remains present and the degree to which the proposed development is likely to affect them. Sites of known archaeological importance will be protected.

When development affecting such sites is acceptable in principle, mitigation of damage must be ensured and the preservation of the remains in situ is a preferred solution.

When in situ preservation is not justified, the developer will be required to make adequate provision for excavation and recording before and during development."

6. The Historic Environment

6.1 This section provides a review of the recorded heritage resource within the Site and its vicinity in order to identify any extant heritage assets within the Site and to assess the potential for below-ground archaeological remains. The designated assets are identified in the text with their National Heritage List for England reference (NHLE). The non-designated assets are identified with their North Lincolnshire Historic Environment Record reference (NLHER). Historic England's AMIE data has also been consulted. The AMIE records within the Site and study area are duplicates of NLHER records. The AMIE reference numbers for these records are provided within Appendix 1.

Designated Heritage Assets

Within the Site

6.2 No designated heritage assets are located within the Site.

Beyond the Site

6.3 Designated assets are shown on Figure 1.

6.4 The Scheduled Raventhorpe Medieval Settlement Earthworks immediately south-west of Raventhorpe Farm (**1016426**) are located *c.*940m to the south of the Site, with the later 17th-century Grade II Listed Raventhorpe Farmhouse *c.*900m to the south (**1346807**).

6.5 A group of designated heritage assets are located at Springfield Cottage *c.*390m northeast of the Site, comprising the Grade II Listed Springwood Cottage (**1083734**) and Stables approximately 20 metres northeast of Springwood Cottage (**1310038**).

6.6 The Grade II Listed Stone Cottage and adjoining outbuildings are located (**1310013**) *c.*900m southeast of the Site.

6.7 The Grade II Listed Broughton Grange Farmhouse (**1083736**) and Grade II Listed Coach House/Stables approximately 10 metres east of Broughton Grange Farmhouse (**1346496**) are located *c.*1.9km east of the site.

6.8 A number of Listed Buildings are located within the settlement of Broughton *c.*1-1.5km east of the Site, including the Grade I Listed Church of St Mary (**1161801**).

6.9 The Site is not located close to a Conservation Area, Registered Park and Garden, Registered Battlefield or World Heritage Site.

6.10 Potential impacts resulting from the proposed development on the heritage significance of designated heritage assets within the surrounds of the Site via a change in setting are discussed in detail in Section 7.

Previous Archaeological Works

6.11 The locations of the archaeological events recorded by the NLHER are shown on Figure 3. With the exception of the

earthworks survey of the site of the former medieval Gokewell Priory, no systematic archaeological works have taken place within the Site.

6.12 A number of previous archaeological investigations have taken place within the study area, with a small number within the Site itself related to the former location of Gokewell Priory. These comprise:

- **ELS4211 – A sketch earthwork survey was carried out in the 1970s on the possible medieval earthworks to the south and west of the post-medieval Gokewell Priory Farm (Appendix 3). This must have occurred prior to the reduction of the earthworks through agriculture *c.* the 1980s. This was undertaken by Keith Miller, and further information on the survey is provided below.**
- **ELS2566 – Photographs of the former Gokewell Priory Farm area taken in 1976.**
- **ELS3145 – Watching brief on groundworks for the Sawcliffe Area Water Mains Replacement Scheme. This recorded an east to west-orientated drystone wall near the junction of the B1027 and B1028, within or in close proximity to the Site. Three regular courses of stone above a foundation of rough stone boulders were recorded (MLS21242). The wall was undated, but thought to be later than the Roman period.**

6.13 A number of aerial photograph sorties have been flown across the Site and study area and have been identified as fieldwork events by the NLHER, which were either carried out for/by the council or by the University of Cambridge. Some of these photos show the former post-medieval Gokewell Priory Farm within the Site; however, these cannot be reproduced due to copyright restrictions. The aerial photographs of the Site and the study area recorded by the NLHER are listed below:

- **ELS800 – Aerial photographic sortie – 1956;**
- **ELS808 – Aerial photographic sortie – 1984;**
- **ELS922 – Aerial photographic survey – 1989;**
- **ELS3677 – Aerial photographic assessment and transcription – 2011;**
- **ELS3871 – Aerial photographic survey – 2012;**
- **ELS3479 – Aerial photographic survey – 2011;**
- **ELS4112 – Aerial photographic survey – 1976;**
- **ELS4125 – Aerial photographic survey – 1971.**

6.14 Other fieldwork events located outside of the Site boundary are:

- **ELS2965 – Walkover survey at Forest Pines Golf and Country Club, 2006 – Carried out by Humber Field Archaeology to investigate cropmarks shown on aerial photographs. The earthworks related to trackways which defined the boundary of the fields.**
- **ELS3685 – Yarborough Quarry desk-based assessment, 2003. Carried out by Wardell Armstrong in advance of continued use for Yarborough Quarry. Nothing of archaeological significance was identified.**
- **ELS3933 – Flint collection, 1930s. The flint**

collection and fieldwalking of D. N. Riley in the Raventhorpe area.

- **ELS3980 – Site visit to RAF Camp in Manby Woods, 2013. Carried out by Sue Oliver who took digital photographs of the former RAF camp in Manby Woods.**

- **ELS4190 – Building recording RAF Accommodation site, 2015. A photographic and measured survey was carried out in the site of a former RAF accommodation camp in Manby Wood, known as RAF Broughton. This was undertaken in advance of construction of a forestry building which would remove one of the former buildings.**

- **ELS4130 – Desk-based assessment of Solar Park on Land at Raventhorpe Farm, 2014. Carried out by AOC Archaeology in advance of the development of a solar farm.**

- **ELS4120 – Geophysical Survey, Raventhorpe, 2014. Carried out by AOC Archaeology in advance of development of a solar farm. This identified a number of archaeological anomalies including possible enclosures and structures.**

- **ELS 4274 – Archaeological Evaluation at Raventhorpe Solar park, 2014. Excavation of 47 trial trenches by AOC Archaeology in advance of the construction of the Raventhorpe Solar park. Identified a small number of Roman enclosures and post-medieval material.**

- **ELS4275 – Archaeological Evaluation, Raventhorpe Solar Park, 2014. Further element of evaluation by AOC Archaeology identified a substantial Roman enclosure ditch on the west-facing slope of the hill above Raventhorpe Farm. Possibly the site of a building.**

- **ELS4273 – Archaeological Monitoring, Raventhorpe Solar Park, 2015. Watching brief carried out by AOC Archaeology during the construction of the solar park at Raventhorpe. Two archaeological linear features were identified, tentatively interpreted as Romano-British in origin.**

6.15 Other desk-based assessments undertaken within the study area include **ELS2962 ELS3077**, **ELS3357** and **ELS4160** (while the outer edge of the study area for **ELS2962** overlaps the south-eastern edge of the Site, this can be regarded as an event which took place beyond the Site).

6.16 The Environment Agency LiDAR survey flights are also identified as events (**ELS2568**, **ELS2577**, **ELS2582**), undertaken from 2000 – 2006.

Geology and Topography

6.17 The Site features a complex geology, with the following bedrock geology recorded within the Site boundary[25]:

- **Charmouth Mudstone Formation – Mudstone;**
- **Marlstone Rock Formation - Ferruginous Limestone And Ferruginous Sandstone;**
- **Whitby Mudstone Formation – Mudstone;**

[25] http://mapapps.bgs.ac.uk/geologyofbritain/home.html

- **Grantham Formation - Sandstone, Siltstone And Mudstone;**
- **Lower Lincolnshire Limestone Member – Limestone; and**
- **Kirton Cementstone Beds – Limestone.**

6.18 Superficial deposits of sand of the Sutton Sand Formation are recorded across the Site. [26]

6.19 The topography of the Site slopes downward to the west from the centre of Site, with the western part of the Site lying in the west-facing valley overlooking Bottesford Beck, which lies outside the western Site boundary. The highest point is at around 60m AOD in the flatter eastern part of the Site which covers a long plateau, with a break of slope just beginning to fall away to the east at the eastern boundary.

Historic Background

6.20 The locations of the records identified from the NLHER are shown on Figure 2. This historic background section has been sub-divided between those assets located within the Site boundary and those located beyond, within the wider study area.

Prehistoric (10,000BC – 43AD)

Within the Site

6.21 The superficial geological deposits of Sutton Sand Formation within the western part of the Site were formed by post-glacial wind-blown processes. While there is generalised potential for such deposits to contain archaeological remains from the prehistoric to medieval periods, there is no specific evidence that such remains are located within the Site.

6.22 Three potentially prehistoric records from the NLHER have been identified from within the Site boundary. The first is the possible site of a round barrow (**MLS22718, ELS3479**) located on aerial photographs (Plate 18). The date, 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**). These flints were recorded in a gazetteer of 1976, however the location, the methodology of collection and the collector is not known.

[26] Ibid.



Plate 18 Cropmark of possible round barrow within Site

6.23 The third potentially prehistoric feature within the Site is the posited route of a prehistoric track (**MLS20003**) called the Jurassic Way, which runs from Winteringham to Lincoln. This is the record of a broad trade route corridor which ran across Britain during the prehistoric period, rather than a tightly-defined trackway and therefore its geographical scope is widespread. The line of the trade route is supposed to have been in the vicinity of Santon and the site of the former Gokewell Priory Farm, but given the potential geographical spread of this feature, this is more of an estimation of a broad transport corridor rather than a precise location of a trackway.

Beyond the Site

6.24 There are a number of records of prehistoric and possible prehistoric activity within the wider study area. There are a small number of other findspots of flints within the study area which originate from the 1976 gazetteer (**MLS7556, MLS7563**). Again, as the exact locations of the finds cannot be ascertained, they cannot be assigned any heritage value.

6.25 Two putative sites of potential long barrows are identified *c.* 620m and *c.*860m northeast of the Site (**MLS93**) (100m and 745m north of the existing access track). These are identified by the NLHER as 'site A' and 'site B', with 'site B' being that closer to the Site. The evidence for these possible features is derived from aerial photography, however, the NLHER record states that "*nothing is visible at site 'B'*. Site B is located on the east-facing slope, off the crest of the plateau which runs southward through the Site. This feature has not been proven through fieldwork to be present or to be archaeological in origin.

6.26 To the southeast of the Site boundary, a single flint arrowhead was found within Manby Wood *c.*65m south-east of the Site (**MLS1822**) in the 1950s. To the south of this and around Raventhorpe and the Stonewall Reservoir, a number of flint artefacts have been recovered. These include a single Mesolithic microlith (**MLS22657**) and over 700 pieces of worked flint which were recovered during fieldwalking undertaken to the west and

north of Stonewall Reservoir prior to the construction of the solar farm at Raventhorpe, *c*.200m – *c*.950m south of the Site (**MLS26068**, **MLS26069**).

6.27 A findspot of prehistoric pottery is recorded *c*.950m to the southeast of the Site boundary, on the outskirts of Broughton. This is the findspot of prehistoric pottery sherds and a Roman brooch (**MLS1818**).

Prehistoric summary

6.28 Potential prehistoric archaeological remains within the Site comprise the site of a possible prehistoric round barrow, although this is currently unproven. The full extent of the feature is unclear, but even if an area of 40m by 40m was considered to have potential, this would equate to 0.16ha.

6.29 The ambiguously-located flint finds and deposits of Sutton Sand Formation within the Site do not necessarily suggest the presence of further archaeological remains within the Site. The broad transport corridor of the Jurassic Way is indicative of a general prehistoric travel route across the area, and not a specific road or trackway. Overall, this evidence in itself is not considered to represent high potential for further prehistoric archaeological remains to be present within the Site.

Roman (43AD – 410)

Within the Site

6.30 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 the eastern-most extent. The former Roman road runs to the west of Broughton on a north-south alignment, and this particular portion runs north to meet Winteringham where there is a known Roman crossing of the Humber.

Beyond the Site

6.31 There are a number of other records of Roman activity from within the study area, most of which are associated with the fieldwalking which was undertaken at Raventhorpe prior to the construction of Raventhorpe solar farm. Fieldwalking to the north and west of Stonewall Reservoir, *c*.200m – 1.14km south of the Site, recovered 298 sherds of Roman pottery (**MLS26070**). Fieldwalking to the south and east of the reservoir *c*. 800m – 1.4km south of the Site found 276 sherds (**MLS26071**). Further archaeological work was undertaken around the solar farm site and to the southwest of the reservoir; a substantial Roman-period rectilinear ditch and bank enclosure was identified during evaluation *c*.980m south of the Site (**MLS26072**). The evaluation recorded indirect evidence of potentially high-status occupation, such as potentially Roman CBM (ceramic building material) fragments, possible roof tile fragments and pieces of tile which had been scored to hold plaster.

6.32 Roman pottery and glass recorded at Raventhorpe *c*.580m south of the Site (**MLS1819**) were found within the ploughsoil, and were not associated with the fieldwalking which took place in

advance of the solar farm construction.

Roman Summary

6.33 Recorded Roman archaeological remains are located beyond the Site. It is possible that the Site comprised part of an agricultural landscape during the Roman period. The Roman road known as Ermine Street is located to the east of the Site, and the Roman remains found at Ravensthorpe indicate the presence of Roman settlement activity in the wider landscape away from the road. There is therefore some potential for Roman-period remains within the Site, although there is no current evidence to suggest that this potential is high.

Early Medieval and Medieval (410 – 1540)

Within the Site

6.34 The medieval period sees the first documented activity within the Site.

6.35 Within the northern part of the Site is the location of the former Gokewell Priory, a small Cistercian nunnery founded by William De Alta Ripa in the 12th century (**MLS1805, ELS800, ELS2566, ELS4211**). The former Priory was a minor establishment with a small community of nuns, dissolved in 1536. The former Priory was not a grand or large establishment. The revenue of the Priory "*was probably never more than sufficient for ten or twelve nuns.*"[27] In 1440 there were eight sisters recorded as living within the Priory and at the time of Dissolution, only seven nuns remained, including the Prioress.[28] The yearly revenue at Gokewell never exceeded £10 and the lifestyle would have been spartan, with food supplied from the surrounding land, including fish from the ponds, at least one of which is an extant water feature, located to the south of the core of the former Priory buildings. Following the dissolution of Gokewell Priory in 1536, Gokewell Priory Farm was built on the site of the Priory at some point between the late 17th and early 19th century (see post-medieval section, below).

6.36 The NLHER detailed record references a 19th-century documentary source named as "Trollope 1868, 178, n.31" which mentions burials at the site. However, the original source could not be identified and was not located at the North Lincolnshire Local Studies Library in Scunthorpe or Lincolnshire Archives. This source allegedly states: "*A few years ago several stone coffins buried in the cemetery were brought to light*." This is presumably a reference to a former medieval burial ground within the Gokewell Priory precinct, although it has not been possible to verify this.

6.37 The extent of the former Priory precinct is unknown, however Abraham de la Pryme, an antiquarian writing in the 17th century, visited the former Priory following the Dissolution, and seemingly prior to the construction of Gokewell Priory Farm. He

[27] Page, W. (Ed.) 1906. *Victoria County History, A History of the County of Lincoln, Volume 2*. 156-157

[28] Ibid

noted that the wall of the precinct encompassed an area of between 20 and 30 acres[29] (the areas of cropmarks and earthworks recorded by the NLHER comprise *c*. 18-20 acres). This would extend it beyond the area of woodland but it is likely that the main core of the buildings is located in the wooded area, with the surrounding precinct made up of the potential burial ground, ancillary buildings and areas for subsistence, i.e. vegetable gardens, fishponds etc. De la Pryme states that a holy well called Nun's Well was located within the Priory. He also mentions that the floor of a former church was located at about 4 feet (*c*.1.2m) below-ground during excavation for agricultural reasons, and that "*a little town*" was also located at the Priory, the latter of which may refer to a small number of ancillary buildings/lay residences which may have been associated with it. Given the relative poverty of the priory, it is not likely to have been associated with a settlement of any substantial size.

6.38 In the 1970s earthworks of ponds and ditches associated with Gokewell Priory still survived to the south, east and west of the later Gokewell Priory Farm. The earthworks were recorded during an earthwork survey in the 1970s which forms part of the NLHER file for Gokewell and is reproduced below (Plate 19) and in more detail in Appendix 3.

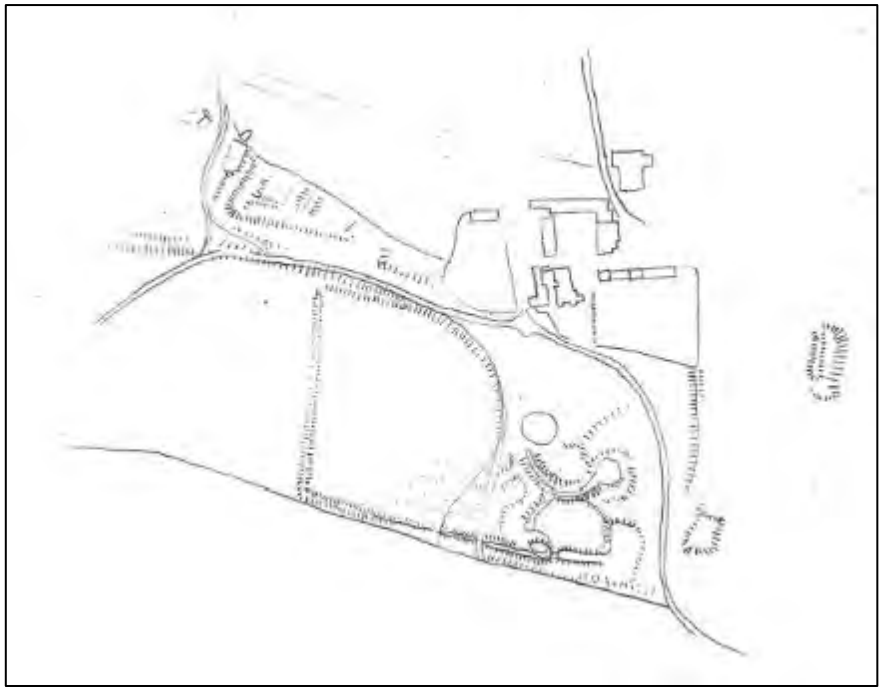


Plate 19 1970s Gokewell earthworks survey

6.39 Cropmarks of some of the former earthworks have also been mapped by the NLHER (Plate 20 and Figure 2). These earthworks extend beyond the approximate area of the Gokewell Priory indicated by the NLHER data (Figure 2 **MLS1805**).

[29] https://thejournalofantiquities.com/2014/01/20/gokewell-priory-scunthorpe-north-lincolnshire/

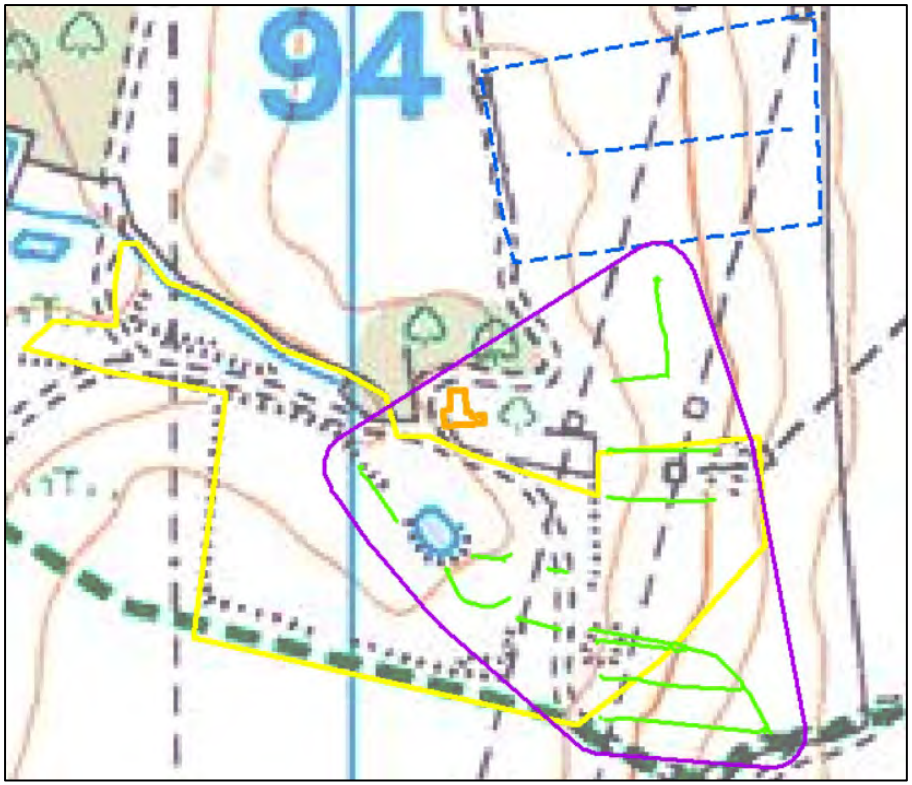


Plate 20 Cropmark features (green), area of former ridge and furrow earthworks (blue), approximate Gokewell Priory extent recorded by NLHER (purple), extent of earthworks recorded by survey (yellow) and a former farm building (orange)

6.40 While it has not been possible to copy or reproduce the aerial photographs held by the NLHER for copyright reasons, the earthworks can also be seen on aerial photographs held at the Historic England Archives (Plate 21).



Plate 21 1956 aerial photograph of earthworks at the former Gokewell Priory Farm[30]

[30] Historic England RAF/58/1934 Frame 133

6.41 A current aerial image of the Site is provided at Plate 22, below.

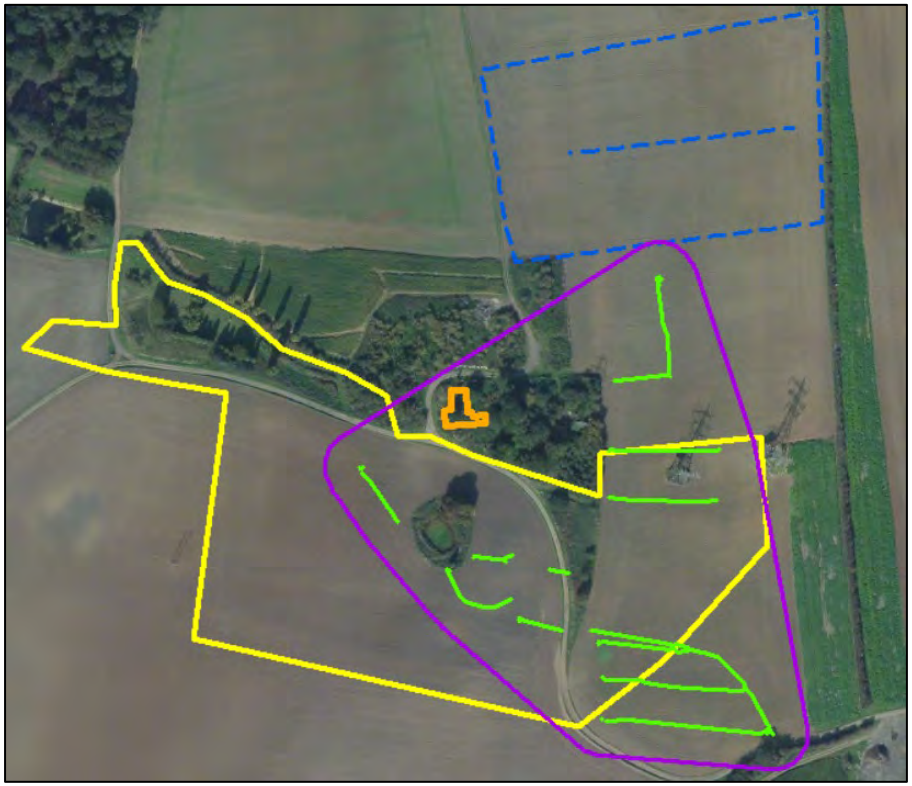


Plate 22 Current aerial image of Site[31]

6.42 There are few traces of the former Gokewell Priory surviving as earthworks today as the arable and other agricultural use of the fields, including recurring ploughing activity, has reduced and levelled the earthworks. In some cases, the levelling revealed limestone rubble which was present within the banks. One pond is still visible, with a few other possible pond features also remaining visible. Some evidence of ditches and banks can still be seen, but the traces are very faint.

6.43 The construction of the later Gokewell Priory Farm buildings at the location of the main former Priory buildings may have preserved elements of the former medieval Priory beneath the foundations. However, this area is currently within a small pocket of woodland and is not included within the proposed area for solar panels.

6.44 The area surrounding the core of the former Gokewell Priory, where the ancillary buildings of the former Priory may have been located and where the earthworks were once visible, has less potential for survival of archaeological remains due to ploughing and deliberate levelling of the earthworks; this area is included in the area for placement of solar panels.

6.45 The site of the former Gokewell Priory was assessed for Scheduling by Historic England in 1998. The Non-Scheduling Report concluded that "*a case for national importance cannot be made at this time given the lack of evidence for surviving remains*." A copy of this report is reproduced in Appendix 4.

[31] Bing Maps Aerial - © 2018 Microsoft Corporation © 2018 DigitalGlobe ©CNES (2018) Distribution Airbus DS

Beyond the Site

6.46 A number of small settlements were established in the vicinity in the early medieval period, some of which are still extant but others which have shrunk or disappeared.

6.47 The deserted medieval village of Manby (**MLS1806**) is located c.130m to the south of the Site. It was mentioned in the Domesday book as *Mannebi* held by Edwin which means that it was established and large enough to pay tax by the time of the Domesday survey in 1086. There are no remains of the village today, other than possible remnants of ridge and furrow. The 1st edition Ordnance Survey map shows a track running east-west to a number of buildings which are no longer extant. The HER records a block of former ridge and furrow earthworks associated with Manby (also recorded as **MLS1806**) which was formerly present within the southern part of the Site. However, there is no evidence to suggest that settlement activity associated with Manby extended into the Site, although the 1824 Ordnance Survey map appears to record outlying post-medieval buildings at Manby immediately south of the Site boundary (Plate 23).



Plate 23 1824 Ordnance Survey map depicting Manby

6.48 The Scheduled Monument of Raventhorpe which lies *c.*920m to the south of the Site is another example of a deserted medieval village. It was first recorded 1067 and then again in the Domesday book where it was recorded as a settlement held by Peterborough Abbey. To the north of the Scheduled monument are various cropmarks of linear and sub-ovoid/irregular features (**MLS1828**), which may represent outlying agricultural features associated with the settlement, and which extend to within *c.* 500m of the Site.

6.49 There are three areas of ridge and furrow and a headland (two areas labelled **MLS21187,** and **MLS21642**) located to the

northwest and northeast of Raventhorpe. Given the location close to Manby and Raventhorpe it is likely that part of the Site was possibly used as common land to provide for both communities, along with the former Gokewell Priory.

Early Medieval and Medieval Summary

6.50 There is potential for medieval archaeology to survive below-ground within the Site in the area of the former Gokewell Priory. This could include below-ground remains of the chapel and main Priory structures.

Post-medieval and Early Modern (1540 – 1914)

Within the Site

6.51 The Site is recorded on the 1824 Ordnance Survey map (Plate 24). This depicts Gokewell Priory Farm in the northern part of the Site, along with a number of trackways, mostly concentrated in the vicinity of the farm (NLHER refs. **MLS1027** and **MLS25419**).



Plate 24 1824 Ordnance Survey map

6.52 Some time after the dissolution of the former medieval Gokewell Priory in 1536, Gokewell Priory Farm had been constructed at the former location of the core of the Priory. The exact date of construction of Gokewell Priory Farm is unknown, possibly in the late 17th century but more likely in the 18th century. It had certainly been constructed by the early 19th century as is demonstrated by its depiction on the 1824 Ordnance Survey map (Plate 25).

6.53 The siting of Gokewell Priory Farm at the location of the former core of the medieval Gokewell Priory is logical as it would have facilitated the easy re-use of the ruined building material from the former Gokewell Priory within the buildings of Gokewell Priory Farm which replaced it. However, there are conflicting accounts as to whether the material from Gokewell Priory was incorporated into the later Gokewell Priory Farm. The NLHER record file includes a reference from the 1978 earthwork survey which states that there was "*no sign of re-used dressed masonry*" whereas Pevsner states that there were "*fragments of C13 stones reset in farm buildings*."[32] The 1989 Pevsner reference may have been copied from the 1964 edition, and is therefore likely to have been based on observation of the buildings prior to their demolition.



Plate 25 1824 map showing Gokewell Priory Farm

6.54 The layout of Gokewell Priory Farm is depicted clearly on 1956 Ordnance Survey mapping and aerial photography (Plate 26 to Plate 29). This area, following the demolition of the former Gokewell Priory Farm between *c*. 1991 and 2003, was left to be reclaimed by nature and is now covered in trees.

[32] Harris J. and Pevsner N. 1989 ed. *The Buildings of England, Lincolnshire*. p. 194

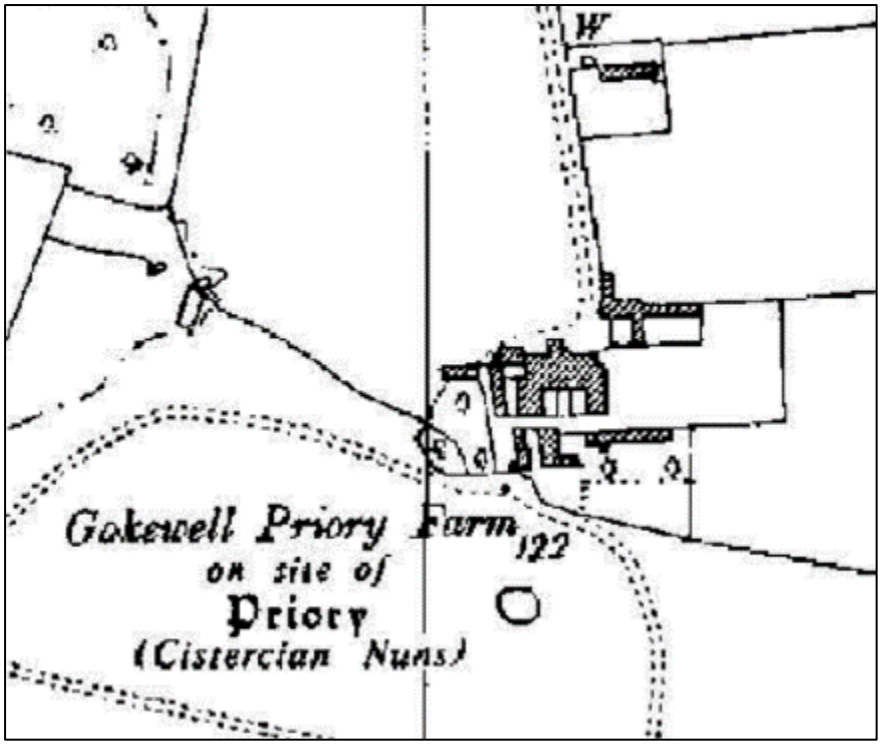


Plate 26 1956 Ordnance Survey map of Gokewell Priory Farm



Plate 27 1956 aerial photograph of Gokewell Priory Farm



Plate 28 1956 aerial photograph of Gokewell Priory Farm, looking southwest



Plate 29 1956 aerial photograph of Gokewell Priory Farm, looking south

6.55 The Broughton Tithe Map of 1842 (Plate 30) provides the first detailed depiction of the Site. Details as to the ownership and use of each of the individual land parcels is detailed in Table A and illustrated on Figure 7, informed by the Tithe Apportionment which accompanied the map. The Tithe Map and Apportionment details that during the mid-19th century, the Site was under the ownership of The Right Honourable Earl of Yarborough, and tenanted by William Brown.



Plate 30 Extract from Broughton Tithe Map, 1842.

Table A: Tithe Apportionment details

Plot	Plot Name	Owner	Tennant	Use
609	Great Dunnow Leys	The Rt Hon Earl of Yarborough	William Brown	Grass
610	Horse Back	The Rt Hon Earl of Yarborough	William Brown	Grass
611	Little Dunnow Leys	The Rt Hon Earl of Yarborough	William Brown	Grass
612	Rough Close	The Rt Hon Earl of Yarborough	William Brown	Pasture
613	Manby Close	The Rt Hon Earl of Yarborough	William Brown	Pasture
614	Feeding Close	The Rt Hon Earl of Yarborough	William Brown	Pasture
615	Goswell Beck	The Rt Hon Earl of Yarborough	William Brown	Pasture
616	Goswell Beck	The Rt Hon Earl of Yarborough	William Brown	Pasture
617	Eleven Acres	The Rt Hon Earl	William	Pasture

		of Yarborough	Brown	
618	Plantation	The Rt Hon Earl of Yarborough	The Rt Hon Earl of Yarborough	Plantation
619	Eight Acres	The Rt Hon Earl of Yarborough	William Brown	Pasture
620	Hill Side Close	The Rt Hon Earl of Yarborough	William Brown	Arable
621	Hill Side	The Rt Hon Earl of Yarborough	William Brown	Arable
622	Lime Kiln Close	The Rt Hon Earl of Yarborough	William Brown	Arable
623	Twenty Two Acres	The Rt Hon Earl of Yarborough	William Brown	Arable
624	Wood Eleven Acres	The Rt Hon Earl of Yarborough	William Brown	Arable
627	Plantation	The Rt Hon Earl of Yarborough	Himself	Wood
628	Far Twenty Acres	The Rt Hon Earl of Yarborough	William Brown	Arable
629	Twenty Acres	The Rt Hon Earl of Yarborough	William Brown	Arable
630	Fourteen Acres	The Rt Hon Earl of Yarborough	William Brown	Arable
631	Old Wives Garth	The Rt Hon Earl of Yarborough	William Brown	Arable
632	Cana Close	The Rt Hon Earl of Yarborough	Himself	Arable
633	Far Knowles	The Rt Hon Earl of Yarborough	William Brown	Arable
634	Stony Dales	The Rt Hon Earl of Yarborough	William Brown	Arable
635	Twenty One Acres	The Rt Hon Earl of Yarborough	William Brown	Arable
636	Little Holt Hill	The Rt Hon Earl of Yarborough	The Rt Hon Earl of Yarborough	Pasture
637	North Close	The Rt Hon Earl of Yarborough	William Brown	Pasture

638	Paddock	The Rt Hon Earl of Yarborough	William Brown	Pasture
639	Paddock, Stacky and Buildings	The Rt Hon Earl of Yarborough	William Brown	-
640	House, Gardens etc.	The Rt Hon Earl of Yarborough	William Brown	-
641	Cottages, Yard and Gardens	The Rt Hon Earl of Yarborough	William Brown	-
642	Ned's Close	The Rt Hon Earl of Yarborough	William Brown	Pasture
643	Horse Close	The Rt Hon Earl of Yarborough	William Brown	Pasture
644	Clamors	The Rt Hon Earl of Yarborough	William Brown	Pasture
646	Knowles Close	The Rt Hon Earl of Yarborough	William Brown	Arable
647	Roughs	The Rt Hon Earl of Yarborough	William Brown	Pasture
648	Diamond Leys	The Rt Hon Earl of Yarborough	William Brown	Arable
649	Wood	The Rt Hon Earl of Yarborough	Himself	Wood
651	Labourers Close	The Rt Hon Earl of Yarborough	William Brown	Grass
653	Wood	The Rt Hon Earl of Yarborough	Himself	Wood
655	Wood	The Rt Hon Earl of Yarborough	Himself	Wood

6.56 Field number 622 is named 'Lime Kiln Close' in the Tithe Apportionment, which could refer to a former lime kiln which may have been located within or adjacent to the field. This putative feature could have been located within the Site, on the Site boundary, or on the edge of woodland areas immediately adjacent to the field, either inside or outside the Site. It is unknown if below-ground remains of this feature would survive in situ, given the arable use of the field.

6.57 The Tithe Map clearly depicts Gokewell Priory Farm, annotated as 'Cokewell'. All of the Gokewell Priory Farm buildings were, however, demolished between *c*. 1991 and 2003. The former Gokewell Priory Farm buildings were located within an area which is now a pocket of woodland, which is not proposed for

the placement of solar panels.

6.58 The morphology of the Site had already seen a degree of change by the late 19th century, with the Ordnance Survey mapping of 1889-91 (Plate 31 and Figure 8) demonstrating that a number of fields had been consolidated and areas of woodland extended. In particular, the fields in the southeastern portion had been consolidated into one very large field.

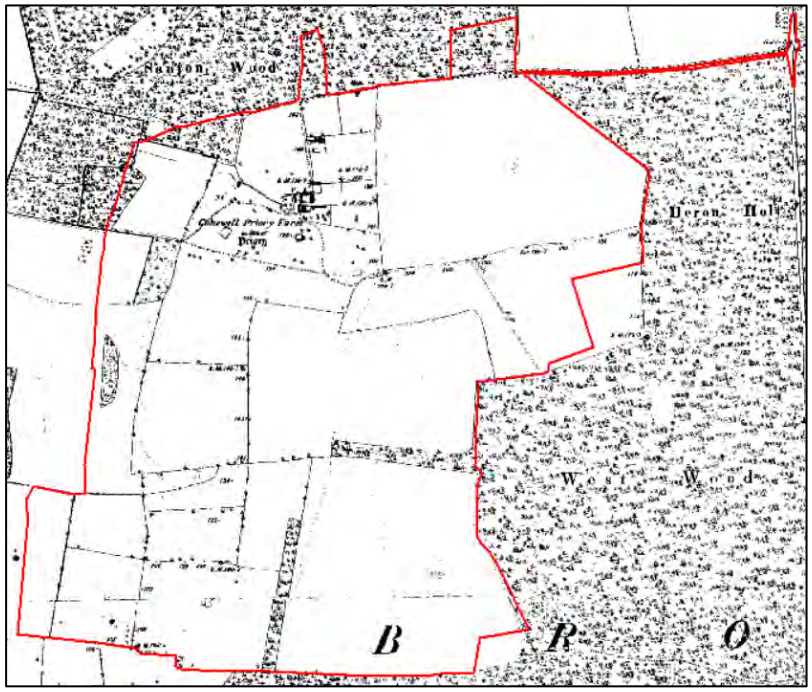


Plate 31 1889 -1891 Ordnance Survey Map

6.59 The mapping shows that the only buildings within the Site in the late 19th century were the buildings of Gokewell Priory Farm (Plate 31), the remaining fields being in arable and pasture use. The 1889-91 Ordnance Survey map shows Manby Hall to the south of the Site, with the buildings of Raventhorpe located directly south of this.

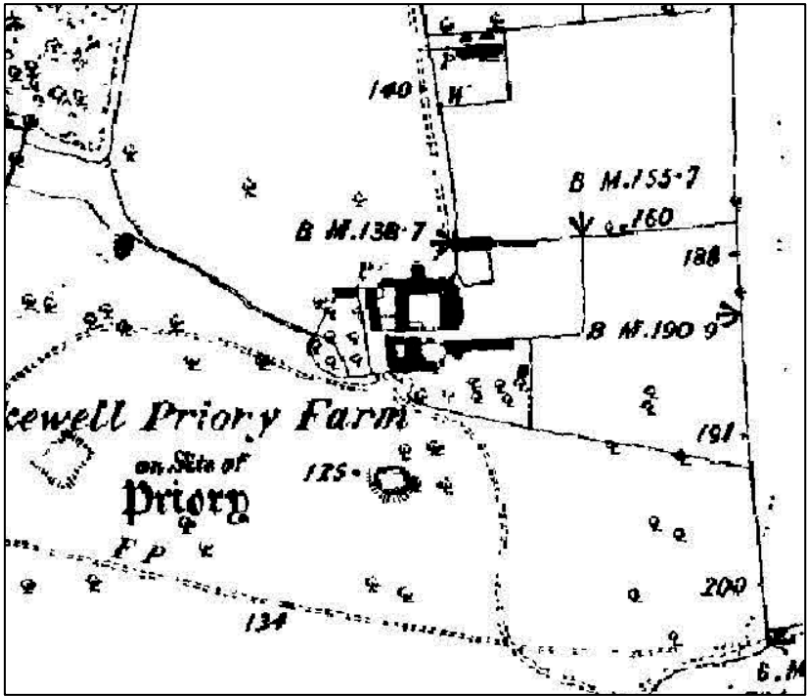


Plate 32 Close-up of Gokewell Priory Farm on 1889-91 Ordnance Survey Map

6.60 No substantial changes are recorded within the Site by the 1908 Ordnance Survey map (Plate 33 and Figure 9), apart from the reversion of a field in the southwestern part of the Site to scrubland.

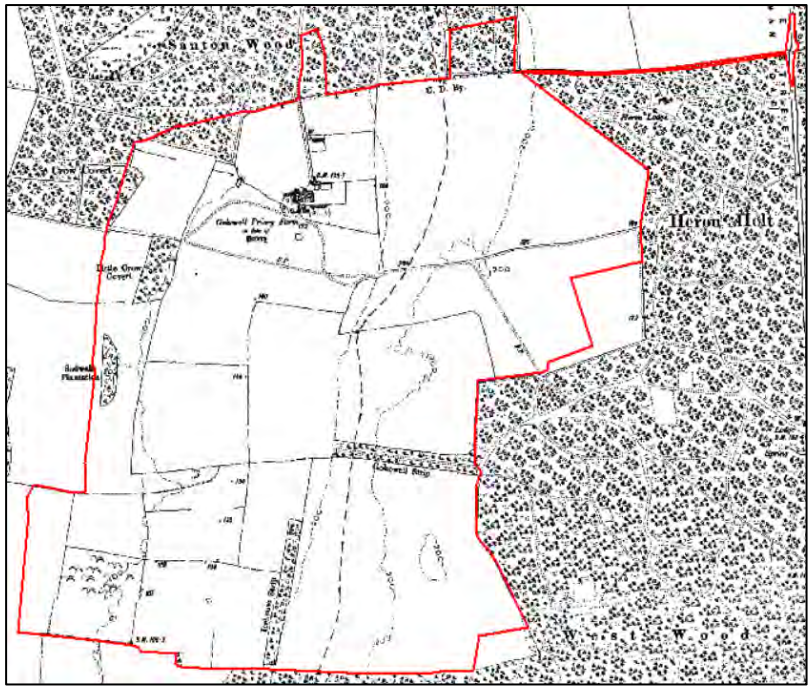


Plate 33 1908 Ordnance Survey Map

Beyond the Site

6.61 Within the medieval settlement of Manby around 300m to the south of the proposed development boundary, Manby Hall was constructed *c*. 245m south of the Site in the post-medieval period (**MLS19488**). A designed landscape of formal gardens and parkland was associated with Manby Hall (**MLS21526**). The 1908 Ordnance Survey map shows that there was a formal, possibly walled, garden to the southwest of the hall with a plantation surrounding the garden. The entrance carriage drive is depicted leading from Ermine Street through Manby Wood. There is also a record of a linear boundary identified from aerial photography (**MLS21643**) within Manby Wood c.80m south-east of the Site which may be related to the wider parkland of Manby Hall. The Hall and the elements of the landscaped garden are no longer extant.

6.62 The 19th century saw the establishment of farmsteads within the area as agricultural activity increased. Farmsteads were constructed at High Santon *c*. 790m north of the Site (**MLS25150**) and at Manby *c*. 275m south of the Site (**MLS25431**). Both of these farmsteads survive.

Post-medieval and Early Modern Summary

6.63 There is potential for post-medieval archaeology within the Site, but this is likely to be associated with agriculture, for example, field boundaries and ridge and furrow (the area of the former Gokewell Priory Farm buildings is not proposed for the construction of solar panels). A lime kiln may have been located within the Site. If below-ground remains of this feature are located within the Site and have survived subsequent ploughing, or were not deliberately removed to facilitate ploughing, they would, at most, be of a level of significance commensurate with a non-designated heritage asset.

Modern (1914 – present)

Within the Site

6.64 Within the Site is the record of a World War II Heavy Anti-Aircraft Battery (**MLS21408**). It was identified as Scunthorpe

H10, but was recorded as de-armed in 1942. Any surviving below-ground remains of this feature are considered to be of low heritage value.

6.65 Throughout the modern period, the consolidation of smaller fields into larger parcels continued, in particular during the post-war period, gradually establishing the Site as seen today. By the latter half of the 20th century, the majority of the field boundaries had been removed, leaving large blocks of arable land. Gokewell Priory Farm (Plate 34) is shown until the late 1980s after which it is no longer depicted; the site of the farm is now covered by a small copse of trees. This establishment of a modern agricultural landscape is also demonstrated by the Historic Landscape Characterisation data (Figure 4). This identifies that the Site contains the Historic Landscape type of Modern Fields, dating from 1945 onwards. This means that this landscape, with its large, open fields has very little time depth and low historic legibility.

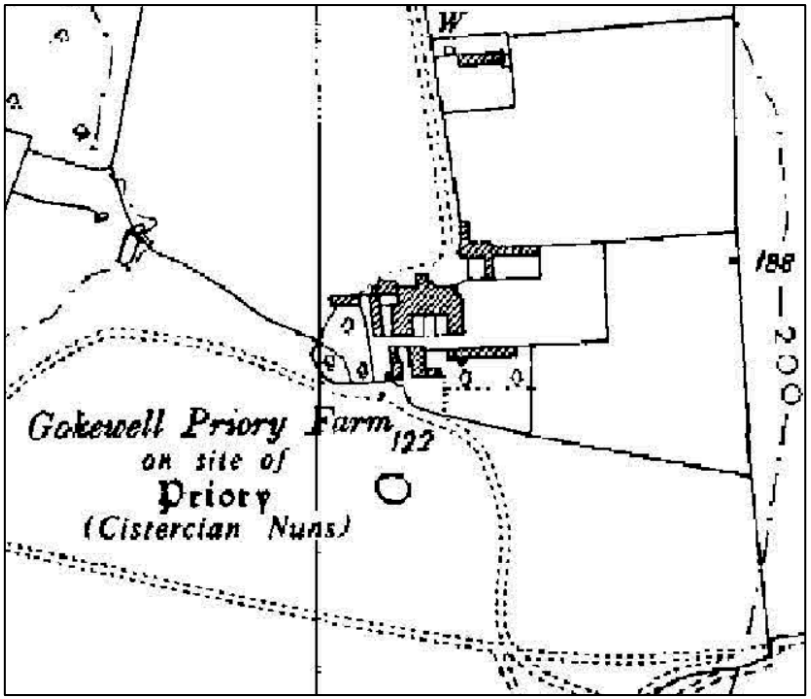


Plate 34 Close up of Gokewell Priory Farm on 1956 Ordnance Survey map

6.66 The final modern record identified from the NLHER is a linear cropmark (**MLS24688, ELS808**) running across the southeastern portion of the Site. The landowner has confirmed that this relates to a modern water main. It has no heritage value.

Beyond the Site

6.67 To the north of the Site, adjacent to the 1km study area boundary, another Heavy Anti-Aircraft Battery is recorded at

High Santon (**MLS22523**), located near High Santon Farm. This Anti-Aircraft Battery dates from World War I and was armed with an 18-pound gun.

6.68 To the east and southeast of the Site, beyond the Site boundary were two sites associated with the RAF from WWII. The first was the site of a military supply depot (**MLS22696**) 209MU RAF Broughton. It was opened in 1943 within Far Wood and closed in 1946. The depot supplied equipment to the local air bases and was made up of a number of buildings including Nissen Huts, emergency water supply tanks, vehicle workshops, and a number of concrete buildings. The site was occupied by other businesses after the war, including a bus garage. The site was investigated in 2013 by volunteers in advance of a partial development of the site which recorded a number of the buildings through measured survey.

6.69 To the southeast of the Site boundary was the site of a former WWII accommodation site associated with the supply depot of 209MU RAF Broughton (**MLS22710**). The site may have been used by WAAFs but was also used as emergency accommodation in the post-war period. The site was investigated in 2015 when part of the site was going to be developed.

6.70 The surrounds of the Site also experienced much change during the post-war period, principally the land to the west with the gradual expansion of the Scunthorpe Steel Works from the 1950s onwards. This steel works now occupies a massive swathe of landscape to the west, stretching the entire length of the Site (Plate 35, Figure 10). The steel works were established in the late 19th century as the Redbourn Hill Works with the Brumby Common East ironstone quarry located to the south. The works then expanded in the first half of the 20th century with the 1956 Ordnance Survey mapping showing they had already expanded to cover a large area with the site of the quarry now covered with buildings and infrastructure.

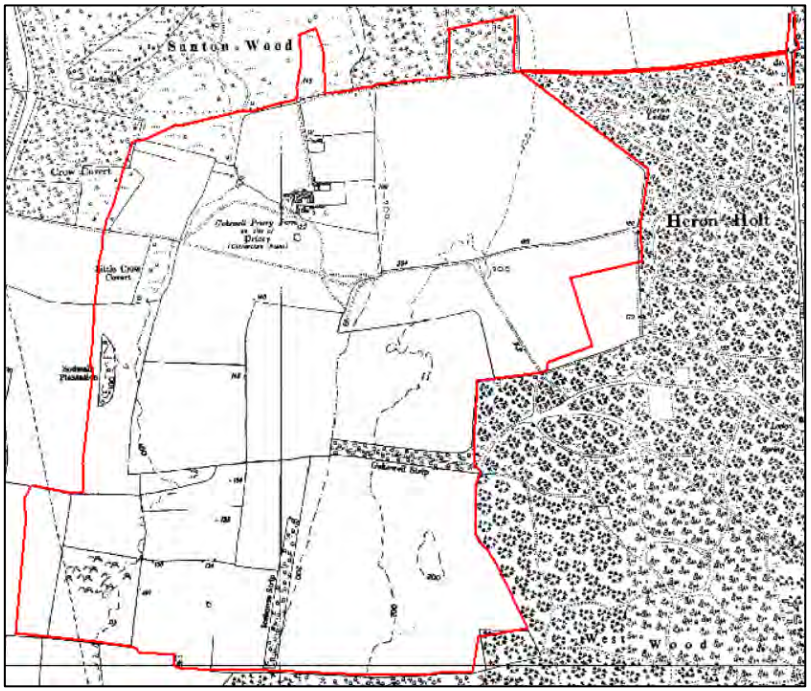


Plate 35 1956 Ordnance Survey Map showing extent of Scunthorpe Steel Works to west

Modern Summary

6.71 The Site is not considered to have potential for significant archaeological remains of modern date. Remains relating to the anti-aircraft battery may survive below ground, although are likely to be of low heritage value.

Undated

Within the Site

6.72 An undated slight earthwork of a possible enclosure has been identified within the northwestern portion of the Site (Plate 36, Plate 37) mostly located within Little Crow Covert (**MLS22780**). It comprises an ovoid ditch measuring 72m by 55m. The earthwork portion of this feature appears to survive as a slight trace within the woodland, whereas the western part located within the agricultural field appears to have been ploughed out – the basis for the NLHER polygon continuing in this area is unclear. It is unknown whether a part of this feature survives below-ground within the agricultural field. This feature has not been archaeologically tested so its date, function and archaeological value are unknown.

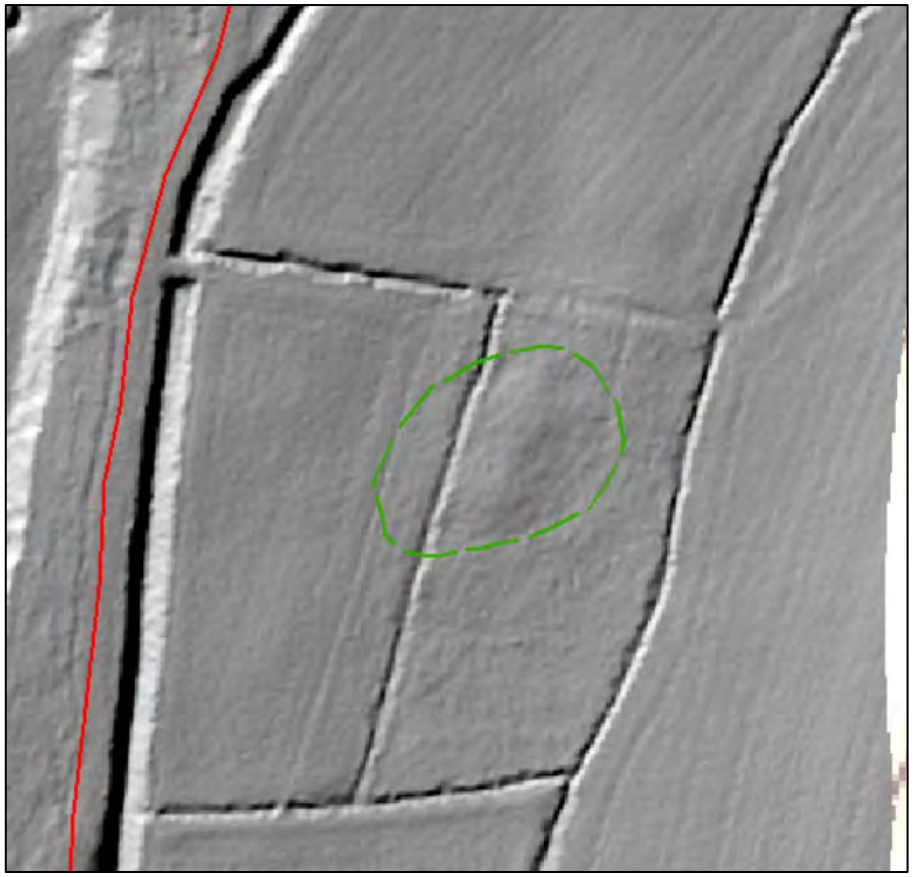


Plate 36 Lidar and NLHER data (green) depicting possible enclosure



Plate 37 Aerial image showing location of possible enclosure[33]

6.73 Four undated cropmarks lie within the Site. These include a square feature (**MLS21941**) and a small ovoid feature located to the west (**MLS21943**). These assets are located to the north of the Manby deserted medieval village (located outside of the Site boundary). These cropmarks were transcribed by the NLHER from 2008 Google imagery. These features are considered most likely to be stock enclosures of medieval date, due to their size and location, with a low archaeological value. However, a geological (non-archaeological) origin for these features is also considered to be likely.

6.74 Within the same field are two partial circular cropmarks, *c*.12m in diameter (**A1**, **A2**), visible on a 1973 aerial photograph (Plate 38). These features could represent partially ploughed-out ring ditches, although geological or agricultural origins are equally possible.

6.75 Within the Site there is also the record of finds from the vicinity of Gokewell Priory Farm (**MLS2333**) noted from a gazetteer, however there is no further information for this, and therefore this findspot has no heritage value.

6.76 A watching brief on a water mains replacement scheme (**ELS3145**) recorded an undated stone wall in a trench within or in close proximity to the northeastern part of the Site (**MLS21242**). It comprised three regular courses of unmortared limestone on a foundation of rough stone. No dating evidence was found, although the wall was speculated by the excavating archaeologists to be medieval to modern.

[33] Bing Maps Aerial - © 2018 Microsoft Corporation © 2018 DigitalGlobe ©CNES (2018) Distribution Airbus DS



Plate 38 1973 aerial photograph[34]

Beyond the Site

6.77 There are a number of unknown-period records on the NLHER beyond the Site area.

6.78 Two sites of springs are recorded, one called Manby Springs (**MLS22666**), the other located within Manby Wood near to West Wood Lodge (**MLS22667**). This spring is within a stone circular basin and possibly associated with Manby Estate.

6.79 Immediately north-east of the Site and the B1027 is an amorphous or sub-rectangular possible enclosure feature now obscured within woodland, but previously identified from aerial photographs (**MS24695**). It is labelled as an Old Quarry on historic Ordnance Survey mapping.

6.80 There are two records of mounds (**MLS19644, MLS1813**) which were once considered as potential archaeological assets but are now considered as natural features; the former definitively identified as a result of archaeological excavation.

Summary of Archaeological Potential

6.81 Five areas of archaeological potential have been identified within the Site; the possible site of a ring ditch; an ovoid enclosure partially surviving as a trace earthwork within woodland; the area surrounding the core of the former medieval Gokewell Priory (also surrounding and beyond the area of the later post-medieval Gokewell Priory Farm buildings), which may have contained ancillary structures or a burial ground; and two possible medieval stock enclosures (although these may also be geological in origin) and two nearby small partial circular cropmarks of unknown origin.

[34] Historic England OS/73195 11315 Frame 37

7. Setting Assessment

7.1 Step 1 of the methodology recommended by the Historic England guidance *The Setting of Heritage Assets* (see *Methodology* above) is to identify which heritage assets might be affected by a proposed development.

7.2 Development proposals may adversely impact heritage assets where they remove a feature which contributes to the significance of a heritage asset, or where they interfere with an element of a heritage asset's setting which contributes to its significance, such as interrupting a key relationship or a designed view.

7.3 It is widely accepted (paragraph 201 of the NPPF) that not all parts of a heritage asset will necessarily be of equal significance. In some cases, certain elements of a heritage asset, including important parts of its setting, can accommodate substantial changes whilst preserving the significance of the assets as a whole. It is therefore key to understand the significance of any asset which may potentially be affected by development proposals in order to understand the scope for and acceptability of change. Significance can be derived from many elements, including the historic fabric of a building, the layout of space or the land use associated with a building or an area, i.e. its setting.

7.4 Consideration was made as to whether non-designated heritage assets include the Site as part of their setting which contributes to their significance, having regard to their importance and the provision of a proportionate level of detail, as set out in Section 5.8.8 EN-1. The site of the former Gokewell Priory was considered to potentially include the Site as an element of its setting which contributes to its significance, and it has therefore been assessed below.

7.5 There are no designated assets within the Site boundary. Consideration was therefore made as to whether any of the designated heritage assets present within the vicinity include the Site as part of their setting which contributes to their heritage significance, and therefore may potentially be affected by development within the Site.

7.6 Primary focus was placed upon designated heritage assets within a 2km study area around the Site boundary (excluding the access road), with assets beyond this distance considered where necessary based upon professional judgement.

7.7 Designated heritage assets within the 2km study area are set out below, with their locations depicted on Figure 1, and distances are measured from the main body of the Site excluding the existing access road:

- **Scheduled Earthworks of Raventhorpe Medieval Settlement, located *c.*920m south of the Site (NHLE Ref: 1016426);**

- **Grade II Raventhorpe House, located *c.* 875m south of the Site (NHLE Ref: 1346807);**

- **Grade II Listed Springwood Cottage, located *c.*390m northeast of the Site (*c.*315m north of the access track (NHLE Ref: 1083734));**

- **Grade II Listed Stable Northeast of Springwood Cottage, located *c.*420m northeast of the Site (NHLE Ref: 1310038);**

- **Grade II Listed Low Santon Farmhouse (1346494), located c. 1.93km north of the Site;**

- **Grade II Listed Barn Approximately 30 Metres North of Low Santon Farmhouse (1310004), located c. 1.98km north of the Site;**

- **Grade II Listed Stone Cottage and Adjoining Outbuildings, Broughton, located *c.*900m southeast of the Site (NHLE Ref: 1310013);**

- **Grade II Listed 66 High Street, Broughton, located *c.*1.5km southeast of the Site (NHLE Ref: 1083740);**

- **Grade I Listed Church of St Mary Broughton and the Grade II Listed Church Gates, located *c.*1.4km southeast of the Site (NHLE Refs: 1161801 and 1083741);**

- **Grade II Listed The Hollies, Broughton, located *c.*1.4km southeast of the Site (NHLE Ref: 1309931);**

- **Grade II Listed Broughton War Memorial, located *c.*1.5km southeast of the Site (NHLE Ref: 1391424);**

- **Grade II Listed Broughton Grange Farmhouse, located 1.9km east of the Site (NHLE Ref: 1083736); and**

- **Grade II Listed Coach House/Stable approximately 10m east of Broughton Grange Farmhouse, located 1.9km east of the Site (NHLE Ref: 1346496).**

7.8 During the site visit it was ascertained that as a result of the natural topography, existing built form and mature vegetation that there was no intervisibility between the Site and the assets listed above. As a result, these assets have not been taken forward for full assessment. Further detail on the reasons why the Site does not form part of the setting of these assets is set out below.

Scheduled Raventhorpe Medieval Village (1016426) and Grade II Listed Raventhorpe House (1346807)

7.9 The Scheduled Earthworks of Raventhorpe Medieval Village are located *c.*920m to the south of the Site. Intervening land is occupied by dense woodland, existing built form and an extant solar farm located to the southeast of the Site. It is considered that the key elements of the surroundings of the asset which now contribute to its heritage significance are confined to its immediate agricultural surrounds, and the experience and appreciation of the asset from immediate area. The immediate surrounds of the Scheduled Monument are however to some degree overtly modern in character, including the presence of overhead powerlines (which in places extend into the monument). There is no designed relationship between the

assets and the Site, and the wider agricultural surrounds, of which the Site forms part, are not considered to contribute to the experience of the assets. As a result, it is not considered that the Site makes an appreciable contribution to such surrounds, or their visual character, and direct historical or functional connections are considered to be unlikely.



Plate 39 View northwest across Raventhorpe DMV, steel works visible in background



Plate 40 View west looking at Grade II Listed Raventhorpe Farmhouse

7.10 The Grade II Listed Raventhorpe House is located to the north of the Scheduled Monument, *c.*875m to the south of the Site, with the intervening distance occupied by dense woodland, existing built form and a modern agricultural landscape. The asset is located within a clearly-defined boundary plot, amongst a grouping of additional ancillary buildings. It is considered that the key elements of the surroundings of the assets which contribute to their heritage significance via setting are primarily associated with the interrelationship between the House and the Scheduled Monument, position within the defined boundary plot, and experience and appreciation of the assets from their immediate surrounds. There is no designed relationship between the assets and the Site, and the wider agricultural surrounds

which the Site is part of are not considered to contribute to the experience of the asset. As a result, it was not considered that the Site made an appreciable contribution to such surrounds, or their visual setting, and direct historical or functional connections are considered to be unlikely.

Listed Buildings at Springwood Cottage (1083734 and 1310038)

7.11 The designated heritage assets at Springwood Cottage (Grade II Listed) area located *c.*390m northeast of the Site, with the intervening distance occupied by dense woodland and a modern agricultural landscape. The assets are located within a clearly defined boundary plot, amongst a grouping of additional ancillary buildings. It is considered that the key elements of the surroundings of the assets which may contribute to their heritage significance via setting are primarily associated with their interrelationship, position within the defined boundary plot and experience and appreciation of the assets from their immediate surrounds. There is no designed relationship between the assets and the Site, and the wider agricultural surrounds of which the Site comprises part are not considered to contribute to the experience of the assets. As a result, it was not considered that the Site made an appreciable contribution to such surrounds, or their visual setting, and direct historical or functional connections are considered to be unlikely.

Listed Buildings within Broughton



Plate 41 View west within Broughton looking at Grade I Listed St. Mary's Church – no view of the site

7.12 The group of designated heritage assets within the settlement of Broughton are located within the urban environment of the settlement, separated from the Site by *c.*1-1.5km of dense vegetation and existing built form. The key elements of the surrounds of these assets which may contribute to their heritage significance are primarily associated with their immediate environs, and in particular the street scenes within which they are located. As a result, it was not considered that the Site made

an appreciable contribution to such surrounds, or their visual setting, and direct historical or functional connections are considered to be unlikely.

Non-Designated Site of Gokewell Priory

7.13 The site of the former medieval Gokewell Priory (NLHER ref. **MLS1805**) is located within the northern area of the Site. This asset and its historical and archaeological background are set out in Section 6 of this Baseline Study. Gokewell Priory survives as above-ground remnant earthworks and potential below-ground archaeological remains, and principally derives its significance from the archaeological interest and evidential value of said remains.

7.14 The landscape surrounding the site of the former medieval priory has undergone extensive change since the medieval period. The medieval field systems are no longer extant, and the surrounding area is now made up of very large, modern blocks of agricultural land. The agricultural regimes have also changed noticeably since the medieval period, with more intensive ploughing and use of the land. This has resulted in a general sense of agricultural surroundings remaining, however the character of this agricultural activity and the use of the land bears little relation to the medieval agricultural landscape. The former extent of the landholding of the Priory is unknown, although it is highly likely to have included the surrounding agricultural land. As a result, the agricultural surrounds, although modern in character, are considered to make a moderate contribution to its illustrative historical value, by enabling its former location within an agricultural landscape to be appreciated.

7.15 The Site forms part of the agricultural surrounds of the asset which makes a moderate contribution to its significance through its illustrative historical value.

Assessment Summary

7.16 Based upon the above it is not considered that the Site forms part of the setting of the designated heritage assets within the 2km study area which contributes to their heritage significance, and they will not be impacted upon by the proposals. As such, none of the designated heritage assets within the 2km study area have been taken forward for further, detailed assessment.

7.17 With regard to designated heritage assets beyond the 2km study area, due to the surrounding topography, existing vegetation and built form it was concluded during the site visit that the Site did not form part of the setting of designated heritage assets beyond the 2km study area, and thus no further assets were taken forward for assessment.

7.18 The Site forms part of the setting of the non-designated site of Gokewell Priory which makes a moderate contribution to its significance. The Site is not considered to contribute to the significance of other non-designated heritage assets.

8. Discussion

Archaeological Resource

8.1 One area of specific prehistoric archaeological potential has been identified within the Site (c. 0.16ha), a cropmark of a possible round barrow (**MLS22718**). However, this feature has not been positively identified by archaeological fieldwork. Poorly-recorded flints and deposits of Sutton Sand Formation within the Site and a broad prehistoric transport corridor in the area are not considered to represent any specific heritage assets within the Site.

8.2 A former Cistercian nunnery, Gokewell Priory, was located in the northern part of the Site. Gokewell Priory was established in the 12th century, and abandoned in the 16th century. Gokewell Priory Farm was built on the site of the former Gokewell Priory between the late 17th and early 19th century. Material from the former medieval Priory may have been used during the construction of the farm. Gokewell Priory Farm was itself abandoned and demolished in the late 20th century. The below-ground remains of the former medieval Gokewell Priory and the later post-medieval Gokewell Priory Farm are located within the northern part of the Site (**MLS1805**). However the core of the medieval Gokewell Priory, where the later post-medieval Gokewell Priory Farm buildings were constructed, is not proposed for the location of solar panels.

8.3 However, there is potential for below-ground remains of ancillary structures and features associated with the former medieval Gokewell Priory to be present within the areas proposed for development. The potential extent of this area is demonstrated by the earthworks survey (**ELS4211**) shown on Figures 2 and 3.

8.4 Beyond the former Gokewell Priory there is no proven evidence for medieval activity within the Site. No above-ground remains of ridge and furrow earthworks survive within the Site.

8.5 Two possible medieval stock enclosures (**MLS21943**, **MLS21941**) of low archaeological value (or potential geological origin) and two nearby partial circular features of unknown origin (**A1**, **A2**) are suggested within the Site by cropmarks.

8.6 The Site also contains a slight ovoid possible earthwork enclosure preserved within the woodland of Little Crow Covert (**MLS22780**). Its origin and nature are currently unknown, and it does not appear to extend above-ground into the open-field area of the Site.

8.7 An undated limestone wall (**MLS21242**) was recorded adjacent to the B1027 in the northeastern part of the Site. However, this area adjacent to a public road is unlikely to see groundworks which would impact upon this asset.

8.8 Potential below-ground remains relating to a former WWII Heavy Anti-Aircraft Battery (**MLS21408**) could potentially survive within the eastern portion of the Site.

8.9 There is no current evidence to suggest that significant constraints are present across the majority of the Site.

Setting Assessment

8.10 Designated and non-designated assets within the Site and its vicinity have been considered within this baseline. It has been assessed that the proposed Site does not form part of the setting of the designated heritage assets which contributes to their significance. Therefore, at this stage, no harm to these designated assets has been identified. It is considered that the Site forms part of the setting of the non-designated heritage asset of the site of the former medieval Gokewell Priory which makes a moderate contribution to its significance through its illustrative historical value, by enabling its former location within an agricultural landscape to be appreciated.

Appendix 1: Heritage Data

Designated Heritage Assets within the 2km Study Area

Listed Buildings

ListEntry	Name	Grade	LegacyUID	NGR
1083734	SPRINGWOOD COTTAGE	II	165975	SE 95066 11064
1083736	BROUGHTON GRANGE FARMHOUSE	II	165983	SE 96985 10327
1083740	66, HIGH STREET	II	165992	SE 96194 08716
1083741	CHURCHGATES	II	165994	SE 96076 08640
1161801	CHURCH OF ST MARY	I	165995	SE 96036 08625
1310038	STABLE APPROXIMATELY 20 METRES NORTH EAST OF SPRINGWOOD COTTAGE	II	165976	SE 95042 11070
1309931	THE HOLLIES	II	165993	SE 96079 08683
1310013	STONE COTTAGE AND ADJOINING OUTBUILDINGS	II	165982	SE 95607 09138
1346807	RAVENTHORPE FARMHOUSE	II	165707	SE 93654 08114
1346496	COACH HOUSE/STABLES APPROXIMATELY 10 METRES EAST OF BROUGHTON GRANGE FARMHOUSE	II	165984	SE 97005 10340

1391424	BROUGHTON WAR MEMORIAL	II	493248	SE 96158 08664
1346494	Low Santon Farmhouse	II	165977	SE 94001 12784
1310004	Barn Approximately 30 Metres North of Low Santon Farmhouse	II	165978	SE 94001 12824

Scheduled Monuments

ListEntry	Name	LegacyUID	NGR
1016426	Raventhorpe medieval settlement earthworks immediately south west of Raventhorpe Farm	32621	SE 93595 07948

Data obtained from North Lincolnshire Historic Environment Record and Historic England AMIE Database

Monument Records Within the Site

NLHER MONUID / *HE AMIE REF.*	**PERIOD**	**MONTYPES**	**GRIDREF**	**NAME**	**DESCRIPTION**
MLS22718 *1576008*	Bronze Age	ROUND BARROW	SE 9417 0980	ROUND BARROW, GOKEWELL	Possible round barrow identified from aerial photographs - not proven by fieldwork
MLS6695	Prehistoric	FINDSPOT	SE 940 100	FLINTS	Findspots of flints listed in a gazetteer of 1976. No value.
MLS20003 *1035165*	Early Neolithic to Roman	TRACKWAY	SE 922 097	JURASSIC WAY PREHISTORIC TRACKWAY	The line of the prehistoric Jurassic Way trackway from Lincoln to Winteringham. This is quite conjectural though the line of the track is shown passing High Santon and Gokewell on old Lincolnshire maps like Armstrong 1778.

MLS1805	Medieval	CISTERCIAN NUNNERY, PRIORY	SE 9412 1026	FORMER GOKEWELL PRIORY (SITE OF)	Site of a Cistercian Nunnery founded by William de Alta Ripa in 1148 or 1185. Dissolved in 1536. Earthworks remain to the south of the former Gokewell Farm. The earthworks are now gone, levelled by agriculture with little above ground evidence remaining. There is potential for survival in the area below the later farm buildings. Assessed for scheduling in 1998. not taken forward.
MLS1027 / MLS25419	Post Medieval	FARMHOUSE	SE 940 103	GOKEWELL PRIORY FARMHOUSE (SITE OF)	This farmhouse is no longer extant, demolished in the 1980s. It was built on the site of the former Gokewell Priory, the site of a Cistercian Nunnery founded in the 12th century. It is possible the farm buildings incorporated fabric from the former priory.
MLS21408 *1473342*	Modern	HEAVY ANTI AIRCRAFT BATTERY	SE 944 100	HEAVY-ANTI AIRCRAFT BATTERY (SITE OF), GOKEWELL	Site of heavy anti-aircraft battery designated Scunthorpe H10 east of Gokewell. De-armed in 1942.
MLS24688	Modern	TRACKWAY	SE 944 091	TRACKWAY, WEST OF MANBY WOOD	Cropmark of a modern water main.
MLS21941	Undated	SQUARE ENCLOSURE	SE 9391 0926	SQUARE FEATURE, NORTH OF MANBY DMV	A closed square feature, too small for an enclosure identified north of Manby DMV. Probable medieval stock enclosure.
MLS21943	Undated	OVAL ENCLOSURE	SE 9371 0919	SMALL OVOID ENCLOSURE, NORTH OF MANBY DMV	Small ovoid enclosure north of Manby DMV on aerial photographs. Probable medieval stock enclosure.
MLS22780	Unknown	ENCLOSURE?	SE 9362 1018	POSSIBLE ENCLOSURE, LITTLE CROW COVERT	Site of an incomplete ovoid ditch within little Crow Covert visible as earthwork on LiDAR. Possible enclosure?
MLS2333	Unknown	FINDSPOT	SE 9405 1035	FINDS (DETAILS NOT RECORDED)	Finds listed in an old gazetteer - no value
MLS1806 *63412*	Medieval	DESERTED SETTLEMENT	SE 936 088	MANBY DMV (SITE OF)	Manby DMV mentioned in Domesday. Possible remains of ridge and furrow in the vicinity of the asset. Settlement located outside the Site, although former associated ridge and furrow is located within the Site.

MLS21242	Undated	Wall	SE 9549 1081 (point)	LIMESTONE WALL, WEST OF ROWLAND PLANTATION	A section of limestone wall was recorded during a watching brief on a water main replacement, on the B1207 west of Rowland Plantation, 2000. It was undated.
MLS100 *1031689*	Roman	ROAD	SE 951 091	ERMINE STREET	The line of Ermine Street Roman road. In this area, it runs on the west side of Broughton forming the modern road. It runs towards Winteringham to cross the Humber.
ELS2729	Medieval	Ridge and furrow	SE 9419 1047	Ridge and furrow	Area of former ridge and furrow earthworks recorded as part of the Ridge and Furrow Project (ELS2729). This former block of ridge and furrow does not have a MONUID reference number.

Additional features identified within Site

Reference	Description	Easting	Northing
A1	Circular cropmark identified from aerial photography	493702	409400
A2	Circular cropmark identified from aerial photography	493844	409508

Event Records Within the Site

EVUID	EVENTNAME	ORGANISATION	DISPLAY DATE	NGRQUALIFIER	EASTING	NORTHING
ELS800	Aerial photographic sortie	Cambridge University Air Committee	1956	Centred on	493320	410085

ELS800	Aerial photographic sortie	Cambridge University Air Committee	1956	Centred on	493320	410085
ELS808	Aerial photographic sortie	Cambridge University Air Committee	1984	Centred on	484400	412600
ELS922	Aerial photographic survey	Jasair	1989	-	498050	411900
ELS4211	Earthwork Survey, Gokewell Priory Farm	Keith Miller	1976-1982?	-	4940	4102
ELS3145	Watching brief on Sawcliffe area water mains replacement	Pre-Construct Archaeology	October 1999	-	-	-

Monument Records Beyond the Site

NLHER MONUID / *HE AMIE REF.*	**PERIOD**	**MONTYPES**	**GRIDREF**	**NAME**	**DESCRIPTION**
MLS22657	Late Mesolithic	FINDSPOT	SE 931 082	MESOLITHIC FLINT, RAVENTHORPE	Findspot, single microlith at Raventhorpe
MLS26068	Late Mesolithic to Early Bronze Age	LITHIC SCATTER	SE 9404 0825	WORKED FLINT, NORTH & WEST OF STONEWALL RESERVOIR	48 pieces of worked flint found during fieldwalking to the north and west of Stonewall Reservoir in 2014 at Raventhorpe (ELS4274). Carried out by AOC archaeology prior to solar farm.
MLS1818 *63339*	Early Bronze Age to Roman	FINDSPOT	SE 9553 0863	POTTERY & BROOCH	Findspot of a Roman brooch and prehistoric pottery from the head of a stream on south side of mound near Ermine Street
MLS1822 *63421*	Bronze Age	FINDSPOT	SE 9470 0904	FLINT ARROWHEAD	Findspot of a flint arrowhead from 1950

MLS7556	Prehistoric	FINDSPOT	SE 9550 0911	FLINTS & POTTERY	Findspots of flints and pottery listed in a gazetteer of 1976. No value.
MLS7563	Prehistoric	FINDSPOT	SE 9370 0819	FLINTS	Findspots of flints listed in a gazetteer of 1976. No value.
MLS1819 *63464*	Roman	FINDSPOT	SE 942 084	RB POTTERY/GLASS & MASONRY, 1975	Findspot of Roman pottery and glass from ploughsoil
MSL26069	Prehistoric	Findspots	Centred SE 9426 0787	WORKED FLINT, SOUTH & EAST OF STONEWALL RESERVOIR	709 pieces of worked flint were collected during extensive fieldwalking to the north and west of Stonewall Reservoir, Raventhorpe, 2014 (ELS4274). They included three arrowheads.
MLS26070	Roman	ARTEFACT SCATTER	SE 9404 0822	ROMANO-BRITISH POTTERY, NORTH & WEST OF STONEWALL RESERVOIR	298 pieces of roman pottery recovered during fieldwalking north and west of Stonewall reservoir prior to solar farm. Arch evaluation discovered nothing in this location
MLS26071	Roman	ARTEFACT SCATTER	SE 9426 0787	ROMANO-BRITISH POTTERY, SOUTH & EAST OF STONEWALL RESERVOIR	276 pieces of Roman pottery recovered during field walking south and east of Stonewall reservoir prior to Solar farm.
MLS26072	Roman	ENCLOSURE, BUILDING	SE 9391 0781	ROMANO-BRITISH ENCLOSURE, WEST OF STONEWALL RESERVOIR	Roman enclosure identified to southwest of Stonewall Reservoir in 2014 prior to construction of solar farm.
MLS21187	Medieval	RIDGE AND FURROW, OPEN FIELD	SE 93 06	OPEN FIELD SYSTEM, HOLME	Area of ridge and furrow northeast of Twigmoor Grange in Holme parish. Also areas of ridge and furrow identified around the Raventhorpe DMV
MLS1806 *63412*	Medieval	DESERTED SETTLEMENT	SE 936 088	MANBY DMV (SITE OF)	Manby DMV mentioned in Domesday. Possible remains of ridge and furrow in the vicinity of the asset. Settlement located outside the Site, although former associated ridge and furrow is located within the Site.
MLS21642	Medieval to Post Medieval	BOUNDARY BANK	SE 9401 0842	LINEAR HEADLAND OR BANK	Section of linear headland between parish of Broughton and Holme.
MLS21643	Post Medieval	BOUNDARY BANK	SE 948 088	LINEAR BOUNDARY, MANBY WOOD	Section of linear cropmark on aerial photographs as a possible woodland feature?
MLS19488	Post Medieval	HOUSE	SE 9365 0875	MANBY HALL (SITE OF)	The site of Manby Hall as labelled on Ordnance survey mapping

MLS25150	Post Medieval to Modern	FARMSTEAD	SE 9403 1160	HIGH SANTON, APPLEBY	Partially extant farmstead, 19th century. Farmhouse and buildings around a courtyard. Some survival of historic fabric.
MLS21526	Post Medieval to Modern	LANDSCAPE PARK	SE 9365 0881	FORMER LANDSCAPE GARDEN, MANBY HALL	Location of the designed landscape of Manby Hall shown on 2nd Ed Ordnance Survey maps. Some areas still legible.
MLS25431	Post Medieval to Modern	FARMSTEAD	SE 9366 0871	MANBY HALL FARM, BROUGHTON	Partially extant 19th century farmhouse with some survival of original buildings. Located within a manor grouping
MLS22523 *1474188*	Modern	HEAVY ANTI AIRCRAFT BATTERY	SE 941 116	HEAVY ANTI AIRCRAFT BATTERY (SITE OF), HIGH SANTON	General location record for a WWI anti-aircraft battery at High Santon armed with an 18 pounder in 1917.
MLS22696	Modern	MILITARY DEPOT	SE 9554 1022	RAF BROUGHTON EQUIPMENT PARK (SITE OF)	Site of a military supply depot 209MU RAF Broughton opened in 1943 located within Far Wood. Closed in 1946. The site was investigated in 2013 which found concrete bases of 23 buildings.
MLS22710	Modern	DISPERSED SITE	SE 954 090	FORMER RAF CAMP, MANBY WOOD	Remains of a WWII accommodation site associated with 209 MU RAF Broughton. May have been used as emergency housing post-war. Located as two groups within Manby Wood with concrete foundations remaining in 2013. Some areas have been removed by development.
MLS19644 *63291*	Unknown	MOUND	SE 9557 0870	MOUND (NON ANTIQUITY)	Site of a former mound - not archaeological
MLS22666	Unknown	SPRING	SE 9553 0864	MANBY SPRINGS	Two springs located near a church. Possible ritual association? Run together to form Moor Beck
MLS22667	Unknown	SPRING	SE 9546 0964	SPRING, NEAR WESTWOOD LODGE	A spring within Manby Wood inside a stone circular basin likely to be a post-med estate management feature - possibly piped to Westwood Lodge to the north.
MLS1813	Unknown	NON ANTIQUITY	SE 9563 0896	MOUNDS & CROPMARKS, BROUGHTON VILLAGE	Site of a mound once thought to be an antiquity - now known to be a sand hill
MLS1828	Unknown (poss. Medieval)	Cropmarks	SE 9374 0801	Cropmarks	Outlying cropmarks possibly associated with Raventhorpe Deserted Medieval Village

MLS24695	Unknown	Enclosure? Quarry?	Centred to SE95601090	FORMER QUARRY, ROWLAND PLANTATION	A small, sub-rectangular earthwork? enclosure was visible on air photographs taken in 1976. Centred to SE95601090, it measured c. 35m by 30m, with an apparent entrance on the eastern side. There were other indistinct marks to the south-west, possibly denoting a larger, more irregular enclosure centred to SE95551086, perhaps 75m across. This area was under new tree planting on post-2010 air photographs. The small enclosure was shown as an 'Old Quarry' on the Ordnance Survey second edition map of 1908
MLS93	Unknown	LONG BARROW?	SE 9535 1120	POSSIBLE LONG BARROW (SITE OF), BROOM HILL	Two possible sites of a long barrow identified from aerial photography. Nothing confirmed through fieldwork.

Desk-Based Assessment Records Beyond the Site

TITLE	MONUID	EVENTUID	SOURCEUID	TECHNIQUE	MONTH YEAR	ORIGINATOR
Desk-Based Assessment of Forest Pines, Broughton		ELS2962	SLS3522	Dba	April 2005	Humber Field Archaeology
DBA, Lakeside, 2009		ELS3357	SLS3977	Desk based assessmen	October 2009	CgMs
Desk-based Assessment of land at Somervell Road		ELS3077	SLS2481	Desk	September 1994	Lindsey Archaeological Service
Raventhorpe Solar Farm		ELS4130	SLS6920	DBA	August 2014	AOC Archaeology
Archaeological DBA, land off Appleby Lane		ELS4160	SLS6964	DBA	January 2015	MOLA

A misplotted AMIE record for an archaeological excavation at Appleby Lane, Broughton, has not been included in the table above (AMIE ref. 1326286).

Event Point, Watching Brief Polyline and Watching Brief Event Region Records Beyond the Site

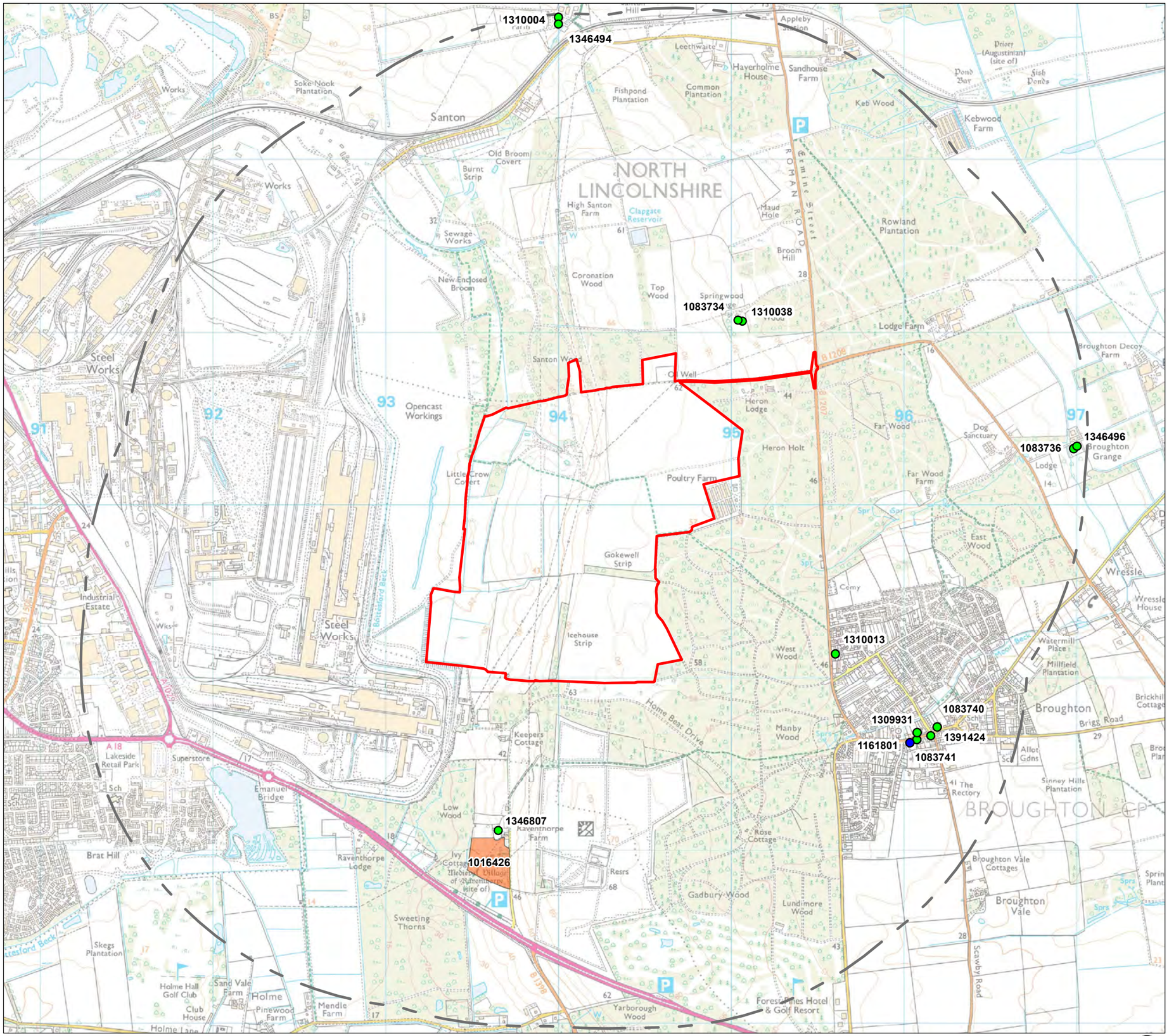
EVUID	EVENTNAME	ORGANISATION	DISPLAYDATE	NGRQUALIFIER	EASTING	NORTHING
ELS800	Aerial photographic sortie	Cambridge University Air Committee	1956	Centred on	493320	410085
ELS808	Aerial photographic sortie	Cambridge University Air Committee	1984	Centred on	484400	412600
ELS922	Aerial photographic survey	Jasair	1989		498050	411900
ELS2568	LIDAR survey flights, 2001	Environment Agency	2001		500000	412000
ELS2577	LIDAR survey flights, 2000	Environment Agency	2000		499077	418002
ELS2582	LIDAR survey flights, 2006	Environment Agency	2006		0	0
ELS2965	Walkover survey at Forest Pines Golf and Country Club, Broughton, North Lincolnshire, 2006	Humber Field Archaeology	2006		495306	408368
ELS3685	Yarbrough Quarry, Scunthorpe	Wardell Armstrong	2003		493226	410449
ELS3871	Air photography	Innervisions Aerial Photography	2012		489850	417100
ELS3933	Flint collection by DN Riley, Raventhorpe	Unassigned	1939		493130	408208
ELS3980	Site visit, Manby Woods	North Lincolnshire Council	2013		495476	409139
ELS4112	Aerial photographic survey	Meridian Airmaps Ltd	1976		489750	409450
ELS4120	Raventhorpe, Scunthorpe - Archaeological Geophysical Survey	AOC Archaeology Group	2014		493973	408172
ELS4125	Aerial photographic survey	Hunting Surveys Ltd	1971		490200	411550
ELS4130	Solar Park on Land at Raventhorpe Farm, Scunthorpe	AOC Archaeology Group	2014		494172	408127
ELS4190	Historic building recording, former RAF accommodation, Manby Woods	Beckside Buildings & Installations Limited	2015		495499	408951
ELS4273	Archaeological Monitoring, Raventhorpe Solar Park, Raventhorpe Farm	AOC Archaeology Group	2015		493838	408222

ELS4274	Archaeological Evaluation, Raventhorpe Solar Park - Fieldwalking	AOC Archaeology Group	2014		494216	408145
ELS4275	Archaeological Evaluation, Raventhorpe Solar Park - Trial Trenching	AOC Archaeology Group	2014		494291	408051

Fieldwalking Survey Region Records Beyond the Site

TITLE	MONUID	EVENTUID	SOURCEUID	MONTHYEAR	ORIGINATOR
Raventhorpe Solar Park - Archaeological Evaluation	MLS	ELS	SLS7243	September 2014	AOC Archaeology Group

Appendix 2: Figures



PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 1,000 Meters

N

Legend

- Site
- Study Area
- Scheduled Monuments

Listed Buildings Grade:

- I
- II

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

Figure 1: Designated Heritage Assets

Little Crow Solar Park, North Lincolnshire

Client: INRG Solar
DRWG No: **P17-0718.7** Sheet No: - REV:**C**
Drawn by: DL / RGO Approved by: GS
Date: 16/11/2018
Scale: 1:22,500 @ A3

Pegasus Planning

Legend

- Site
- Study Area
- Undated
- Modern
- Post-medieval - modern
- Post-medieval
- Medieval - post-medieval
- Medieval
- Roman
- Prehistoric - Roman
- Prehistoric
- Former ridge & furrow area
- Cropmarks
- Approximate extent of Gokewell earthworks survey

Revisions:
First Issue- 18/09/2017 RG
Second Issue - 06/02/2018 DL
Third Issue - 28/02/2018 DL
Fourth Issue - 05/04/2018 DL
Fifth Issue - 16/11/2018 RGO

Figure 2: North Lincolnshire HER Monument and Cropmark Data

Little Crow Solar Park, North Lincolnshire

Client: INRG Solar
DRWG No: **P17-0718.8** Sheet No: - REV:**C**
Drawn by: RG/DL/RGO Approved by: GS
Date: 16/11/2018
Scale: 1:15,000 @ A3

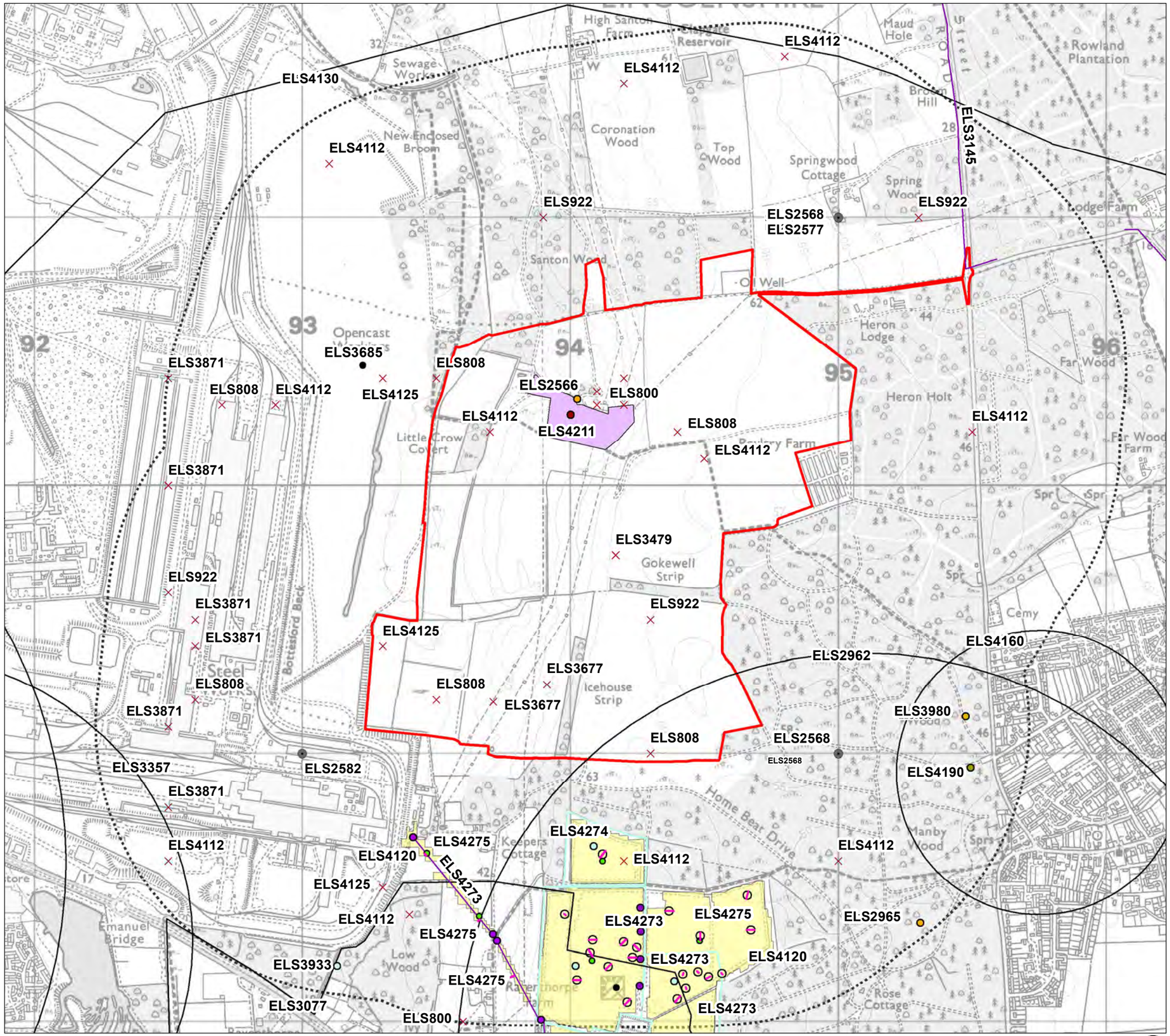
Pegasus Planning

0 1,000 Meters

N

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk



PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 1,000 Meters

N

Legend

- Site
- Study Area
- Aerial photo survey/sortie/assessment & transcripton
- Fieldwalking event point
- Archaeological evaluation 4275 trench
- Trial trenching event point
- Watching brief event point
- Earthwork survey event point
- Site visit/photo event point
- Historic building recording event point
- Geophysical survey event point
- Lidar survey event point
- Desk-based assessment event point
- Watching Brief Polygon
- Watching Brief Line
- Desk Based Assessment region
- Fieldwalking Survey selection
- Geophysical Survey
- Gokewell earthworks survey

Duplicate event points within polygons of the same EVUID have not been labelled, for clarity

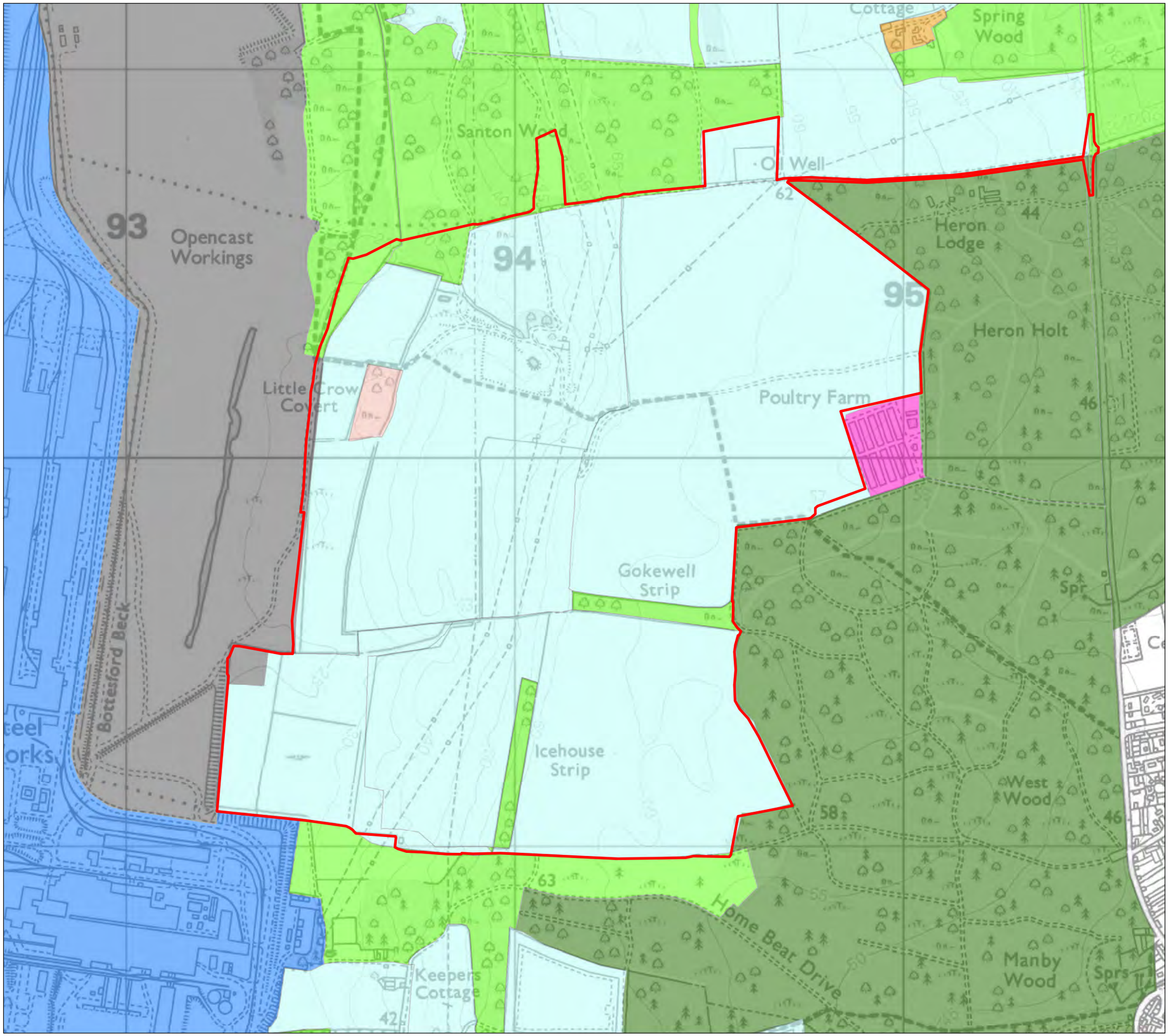
Figure 3: North Lincolnshire HER Archaeological Event Data

Little Crow Solar Park, North Lincolnshire

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

Client: INRG Solar
DRWG No: **P17-0718.9** Sheet No: **-** REV:**C**
Drawn by: RG/DL/RGO Approved by: GS
Date: 06/02/2018
Scale: 1:14,500 @ A3

Pegasus Planning



Legend

- Site

HLCTYPE

- Ancient/Semi Natural Woodland (early medieval to modern)
- Fox Coverts (post-medieval to modern)
- Ironstone Quarry (modern)
- Isolated Farmstead (post-medieval to modern)
- Livestock Rearing (modern)
- Modern Fields
- Other Factory (post-medieval to modern)
- Plantation Woodland (post-medieval to modern)

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 1,000 Meters

N

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

Figure 4: Historic Landscape Characterisation Data

Little Crow Solar Park,
North Lincolnshire

Client: INRG Solar
DRWG No: **P17-0718.10** Sheet No: **-** REV:**C**
Drawn by: DL/RGO Approved by: GS
Date: 16/11/2018
Scale: 1:10,000 @ A3

Pegasus Planning



Legend

Site

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 400 Meters

N

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

Pegasus Planning



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

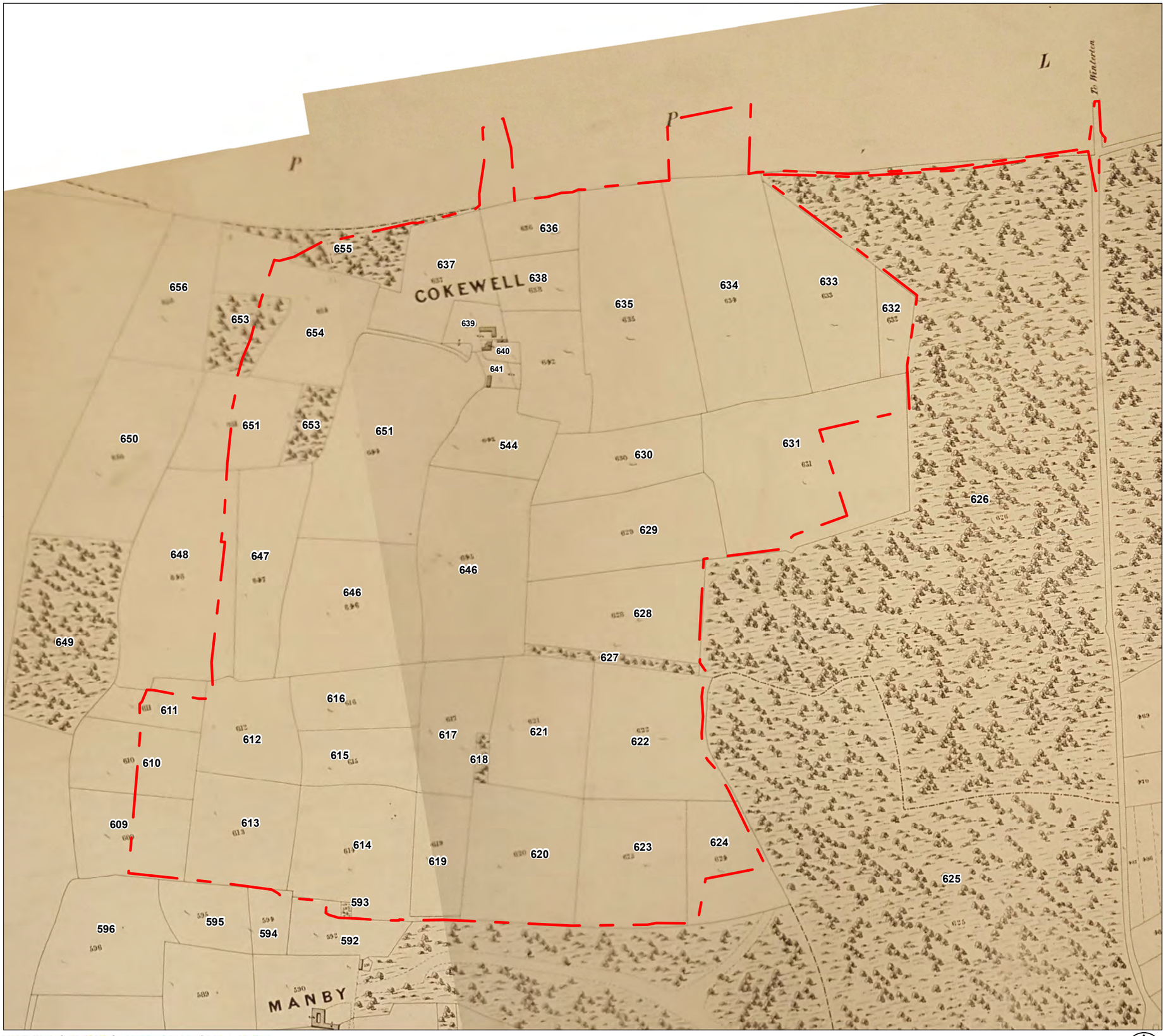
Pegasus Planning

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 500 Meters

N



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

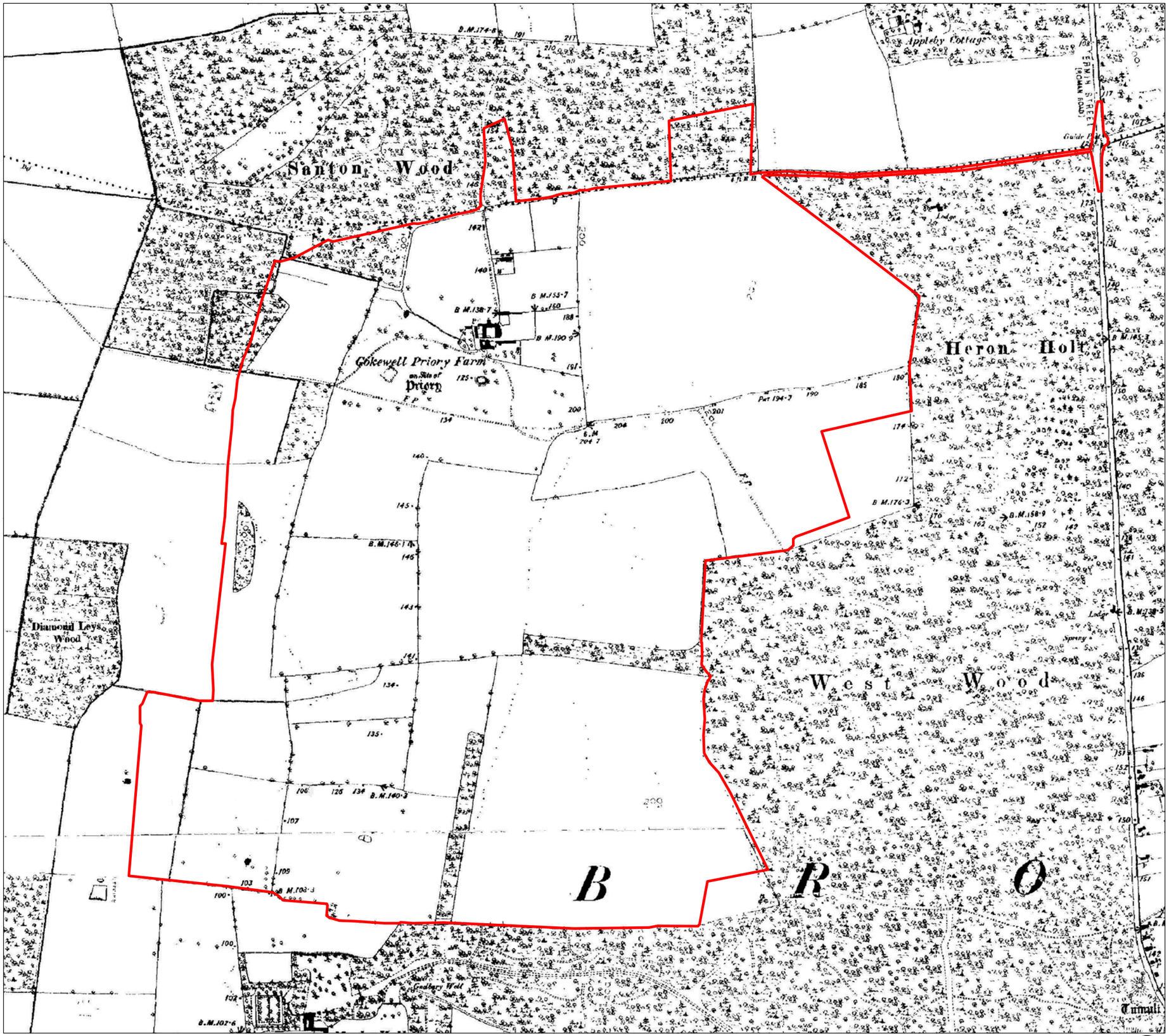
Pegasus Planning

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 500 Meters

N



Legend

Site

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

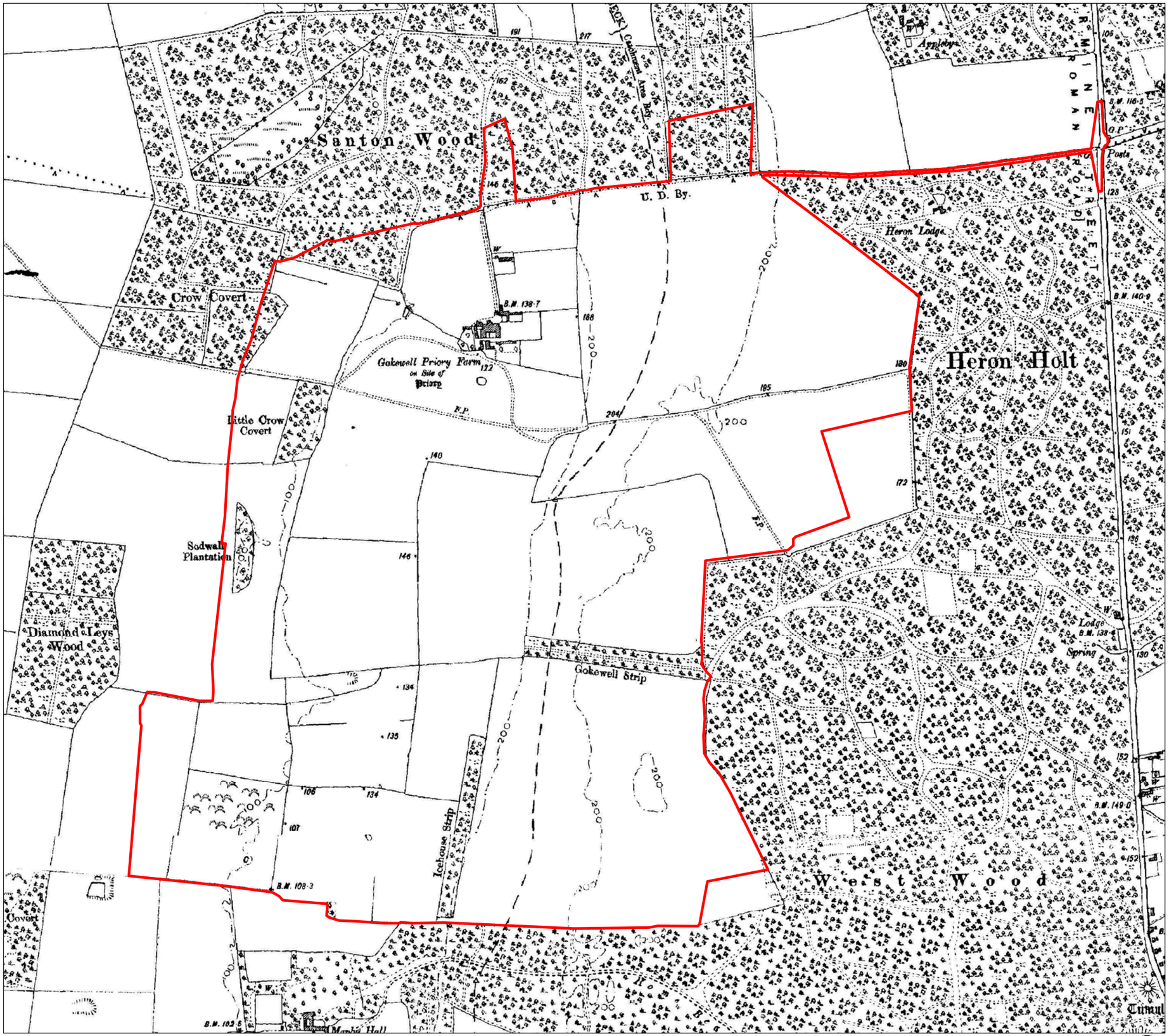
Pegasus Planning

PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 500 Meters

N



PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 500 Meters

N

Legend

Site

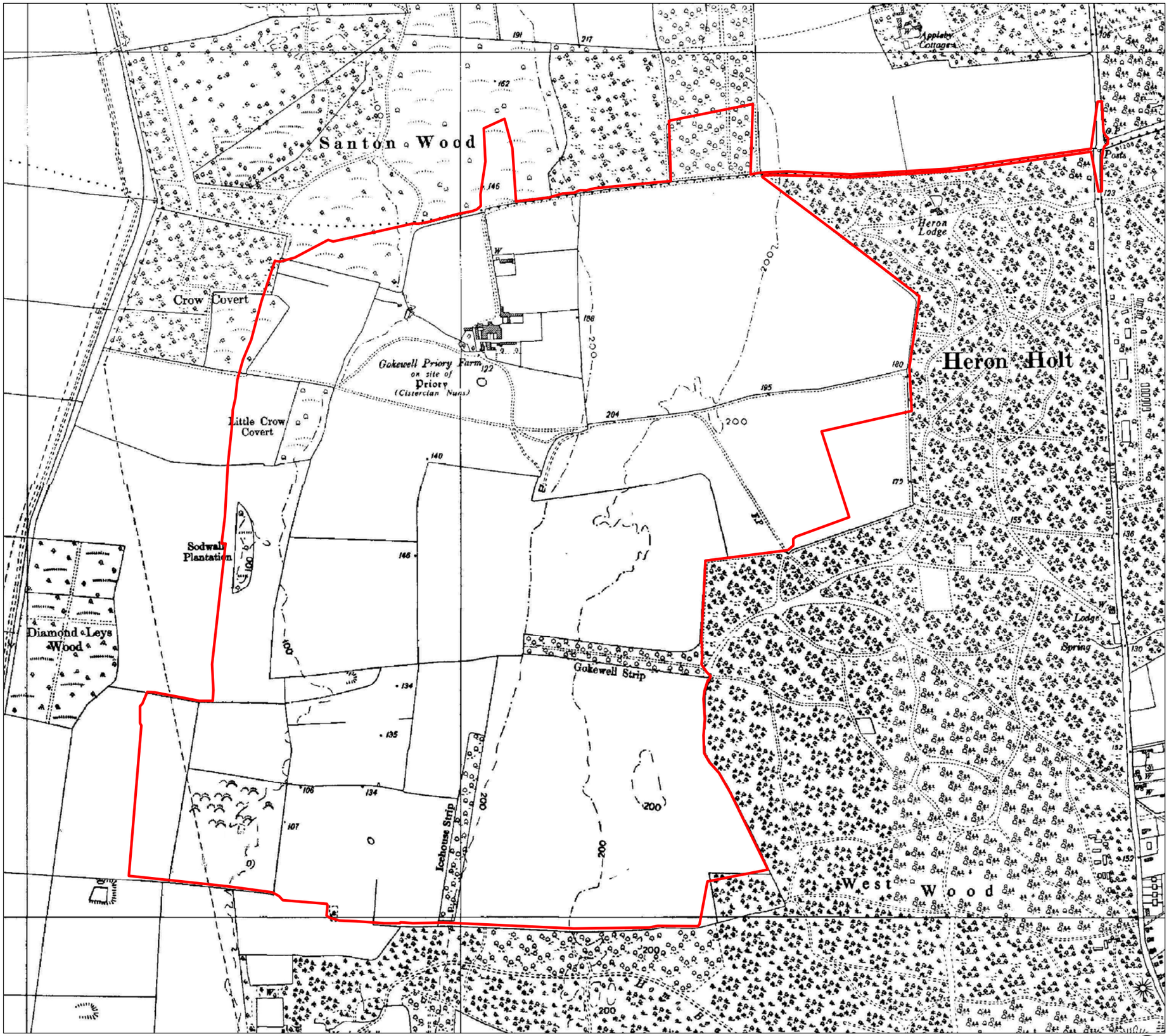
Revisions:
First Issue- 18/09/2017 RG
Second Issue - 06/02/2018 DL
Third Issue - 16/11/2018 RGO

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

Pegasus Planning



PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

Legend

Site

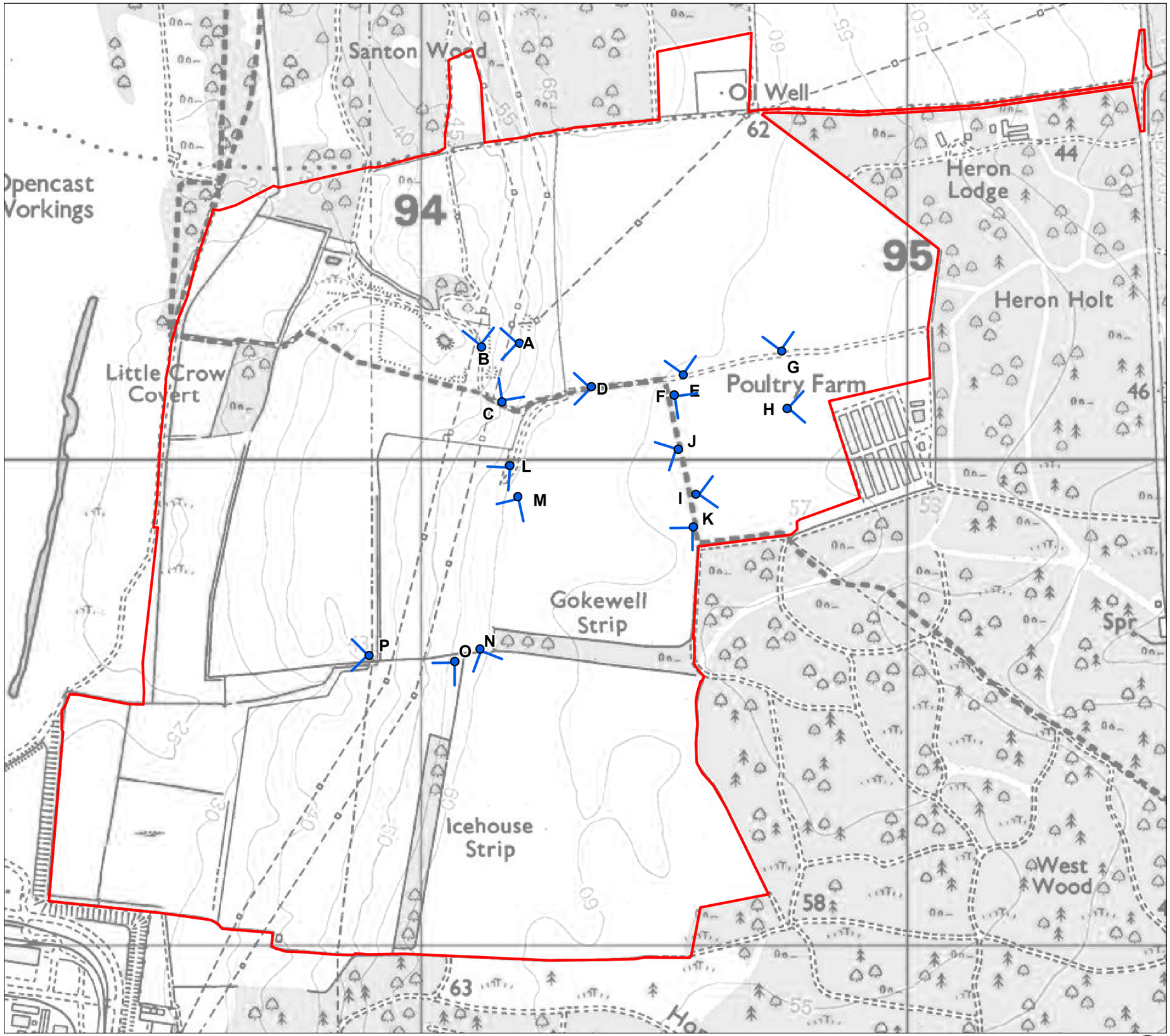
Revisions:
First Issue- 18/09/2017 RG
Second Issue - 06/02/2018 DL
Third Issue - 19/11/2018 RGO

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

Pegasus Planning



PLANNING | DESIGN | ENVIRONMENT | ECONOMICS

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2016 Emapsite Licence number 0100031673. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285 641717 www.pegasuspg.co.uk

0 250 Meters

N

Legend

Site

A Photograph location and direction, and reference in text

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

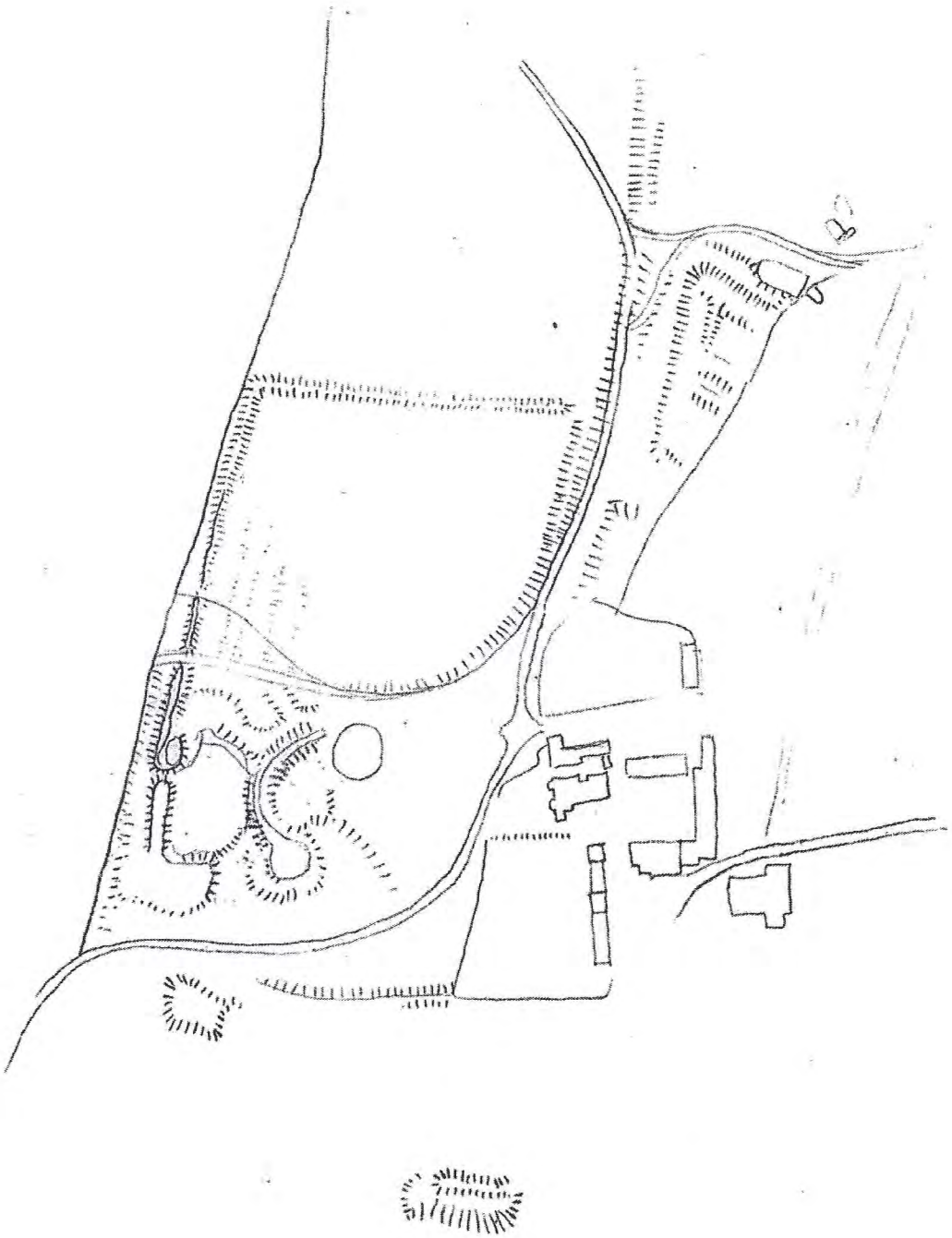
Figure 11: Photograph Locations

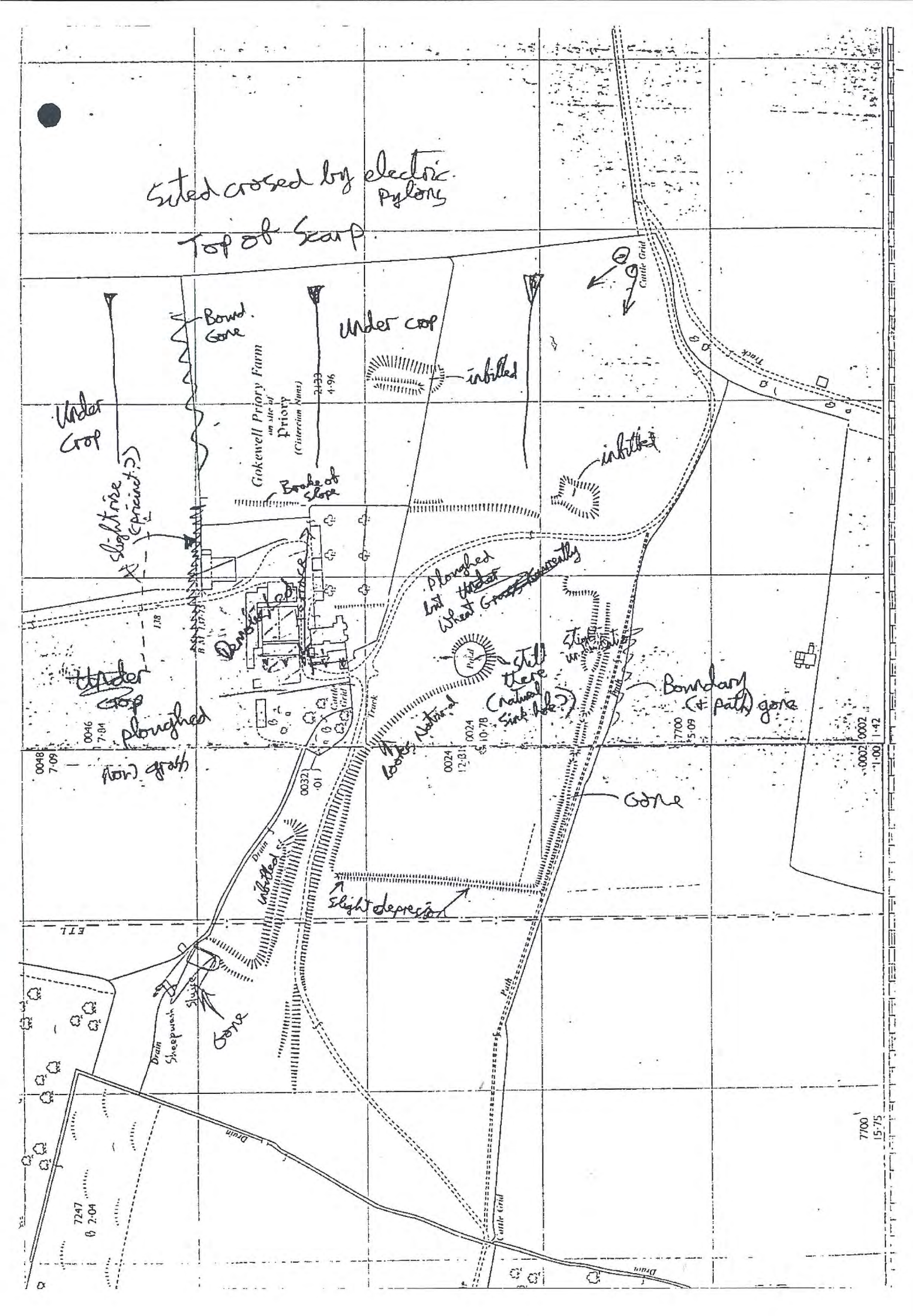
Little Crow Solar Park,
North Lincolnshire

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
Under crop
Bound Gone
Under crop
infilled
Under crop
Gokewell Priory Farm
on site of
Priory
(Cistercian Nuns)
Cattle Grid
Track
Slight rise (remains?)
Break of slope
infilled
Ploughed but under wheat grass
Still there (natural sink hole?)
Under crop ploughed
Boundary (+ path) gone
Gone
Drain
infilled
Slight depression
Sluice
Gone
Sheepwash
Drain
Path
Drain
Cattle Grid
Drain
ETL

Appendix 4: Non-Scheduling Report

1805.
14.10.

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 24/2/1998

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
SE 9409 / 1	NMR 28159	/ 08		14 JUN 2011	Digital colour	35 mm	SE 941098	Y	Y	Y	U
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
SE 9409 / 6	NMR 28159	/ 13		14 JUN 2011	Digital colour	35 mm	SE 941097	Y	Y	Y	U
SE 9410 / 1	CAP 8330	/ 55	RZ	28 MAR 1956	Black & white	Unknown	SE 942103	N	N	N	U
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 (in inches)	Film details (in inches)	Film held by
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
RAF/CPE/UK/1880	540	FS	2023	P	SE 944 095	5	06 DEC 1946	AC	10000	36	Black and White 8.25 x 7.5	NMR
RAF/CPE/UK/1880	540	FS	2024	P	SE 936 095	5	06 DEC 1946	AC	10000	36	Black and White 8.25 x 7.5	NMR
RAF/CPE/UK/2042	619	FS	2087	P	SE 948 100	11	29 APR 1947	AB	9800	20	Black and White 8.25 x 7.5	NMR
RAF/CPE/UK/2042	619	FS	2088	P	SE 941 101	11	29 APR 1947	AB	9800	20	Black and White 8.25 x 7.5	NMR
RAF/CPE/UK/2042	619	FS	2089	P	SE 935 101	11	29 APR 1947	AB	9800	20	Black and White 8.25 x 7.5	NMR
RAF/CPE/UK/2043	624	FP	1041	P	SE 944 090	1	29 APR 1947	AB	9800	20	Black and White 8.25 x 7.5	NMR
RAF/CPE/UK/2043	624	FP	1042	P	SE 937 091	1	29 APR 1947	AB	9800	20	Black and White 8.25 x 7.5	NMR
RAF/CPE/UK/2043	624	FP	1043	P	SE 931 091	1	29 APR 1947	AB	9800	20	Black and White 8.25 x 7.5	NMR
RAF/CPE/UK/2563	832	RS	4024	N	SE 945 090	12	28 MAR 1948	AB	10000	20	Black and White 8.25 x 7.5	NMR
RAF/540/612	1223	RS	4018	P	SE 940 091	9	09 OCT 1951	A	10000	20	Black and White 8.25 x 7.5	NMR
RAF/540/612	1223	RS	4019	P	SE 941 098	9	09 OCT 1951	A	10000	20	Black and White 8.25 x 7.5	NMR
RAF/540/612	1223	RS	4020	P	SE 943 106	9	09 OCT 1951	A	10000	20	Black and White 8.25 x 7.5	NMR
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

OS/67035	9281	V	241	P	SE 946 104	4	17 APR 1967	A	7500	12	Black and White 9 x 9	NMR
OS/73195	11315	V	36	P	SE 937 104	3	17 MAY 1973	A	7500	12	Black and White 9 x 9	NMR
OS/73195	11315	V	37	P	SE 937 097	3	17 MAY 1973	A	7500	12	Black and White 9 x 9	NMR
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
OS/93179	14385	V	39	P	SE 939 101	2	23 MAY 1993	A	7500	12	Black and White 9 x 9	NMR
OS/93179	14385	V	40	P	SE 944 098	2	23 MAY 1993	A	7500	12	Black and White 9 x 9	NMR
OS/93179	14385	V	41	P	SE 949 095	2	23 MAY 1993	A	7500	12	Black and White 9 x 9	NMR
OS/95259	14880	V	22	P	SE 931 106	1	10 OCT 1995	A	7500	12	Black and White 9 x 9	NMR
OS/95259	14880	V	23	P	SE 938 106	1	10 OCT 1995	A	7500	12	Black and White 9 x 9	NMR
OS/95259	14880	V	24	P	SE 945 106	1	10 OCT 1995	A	7500	12	Black and White 9 x 9	NMR
OS/00916A	15722	V	24	N	SE 947 105	2	12 MAR 2000	A	7800	6	Black and White 9 x 9	NMR
OS/00916A	15722	V	25	N	SE 940 105	2	12 MAR 2000	A	7800	6	Black and White 9 x 9	NMR
OS/00916A	15722	V	26	N	SE 933 104	2	12 MAR 2000	A	7800	6	Black and White 9 x 9	NMR
OS/96594	20833	V	22	N	SE 938 094	1	05 JUN 1996	A	7600	12	Black and White 9 x 9	NMR
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
OS/98060	22574	V	31	N	SE 930 101	2	29 APR 1998	A	5100	12	Black and White 9 x 9	NMR
OS/98060	22574	V	32	N	SE 930 096	2	29 APR 1998	A	5100	12	Black and White 9 x 9	NMR
OS/98060	22574	V	33	N	SE 930 092	2	29 APR 1998	A	5100	12	Black and White 9 x 9	NMR
OS/01531	23617	V	24	N	SE 934 100	1	11 MAY 2001	A	7600	12	Black and White 9 x 9	NMR
OS/01531	23617	V	25	N	SE 941 100	1	11 MAY 2001	A	7600	12	Black and White 9 x 9	NMR
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

pegasusgroup.co.uk

Pegasus Group
First Floor
South Wing
Equinox North
Great Park Road
Almondsbury
Bristol
BS32 4QL

E Bristol@pegasusgroup.co.uk
T 01454 625 945



PLANNING DESIGN ENVIRONMENT ECONOMICS

COPYRIGHT The contents of this document must not be copied or reproduced in whole or in part without the written consent of Pegasus Group. Crown copyright. All rights reserved, Licence number 100042093

APPENDIX 8.2

LITTLE CROW, SANTON, NORTH LINCOLNSHIRE – GEOPHYSICAL SURVEY REPORT (SUMO, SEPTEMBER 2018).

Little Crow
Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

GEOPHYSICAL SURVEY REPORT

On behalf of INRG Solar (Little Crow) Ltd

November 2018

GEOPHYSICAL SURVEY REPORT

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Little Crow Solar Park, Scunthorpe, North Lincolnshire

Client
Cotswold Archaeology
For
INRG Solar (Little Crow) Ltd

Survey Report
13201

Date
September 2018

Revision Number 3 dated November 2018

SUMO Geophysics Ltd
Cowburn Farm
Market Street
Thornton
Bradford
BD13 3HW
T: 01274 835016

SUMO Geophysics Ltd
Vineyard House
Upper Hook Road
Upton upon Severn
Worcestershire
WR8 0SA
T: 01684 592266

geophysics@sumoservices.com
www.sumoservices.com

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:
Joe Perry BA
Tom Cockcroft MSc

Field Team:
Andrew Edwards BSc MSc
David Stockwell BA
Haydn Evans BA
Aoife O'Reilly BSc
Cassandra Hall BA MSc

Report written by:
Rebecca Davies BSc

CAD illustrations by:
Rebecca Davies BSc
Jon Tanner BSc MSc PCIfA

Project Manager:
Simon Haddrell BEng AMBCS PCIfA

Report approved by:
Dr John Gater BSc DSc(Hon) MCIfA FSA

© **SUMO Geophysics**: for Archaeology and Engineering

TABLE OF CONTENTS

1 SUMMARY OF RESULTS 1

2 INTRODUCTION 1-2

3 METHODS, PROCESSING & PRESENTATION 3-4

4 RESULTS 4-7

5 DATA APPRAISAL & CONFIDENCE ASSESSMENT 7

6 CONCLUSION 7

7 REFERENCES 8

Appendix A Technical Information: Magnetometer Survey Method

Appendix B Technical Information: Magnetic Theory

Appendix C Glossary of Magnetic Anomalies

LIST OF FIGURES

Figure 01 1:4000 Site Location Diagram and Location of Survey Areas

Figure 02 1:4000 Magnetometer Survey - Greyscale Plots - Overview

Figure 03 1:4000 Magnetometer Survey - Interpretation - Overview

Figure 04 1:1500 Magnetometer Survey - Greyscale Plots - Viewport 1

Figure 05 1:1500 Magnetometer Survey - Interpretation - Viewport 1

Figure 06 1:1500 Magnetometer Survey - Greyscale Plots - Viewport 2

Figure 07 1:1500 Magnetometer Survey - Interpretation - Viewport 2

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

© **SUMO Geophysics**: for Archaeology and Engineering

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

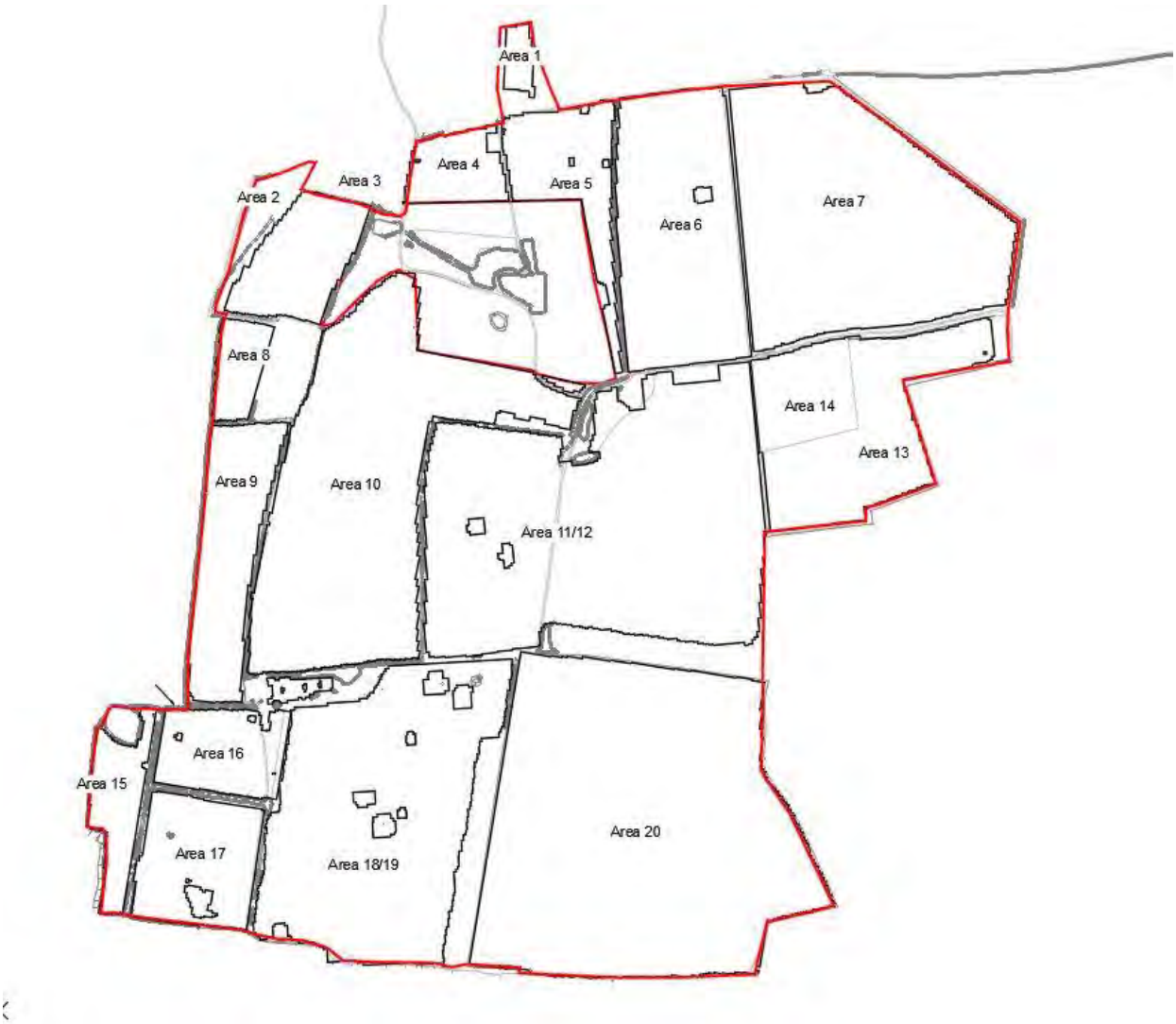
The presentation of the results includes a 'minimally processed data' and a 'processed data' greyscale plot. Magnetic anomalies are identified, interpreted and plotted onto the 'Interpretation' drawings.

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

BGS 2018 British Geological Survey, Geology of Britain viewer [Accessed 25/09/2018] *website*: (http://mapapps.bgs.ac.uk/geologyofbritain/home.html?)

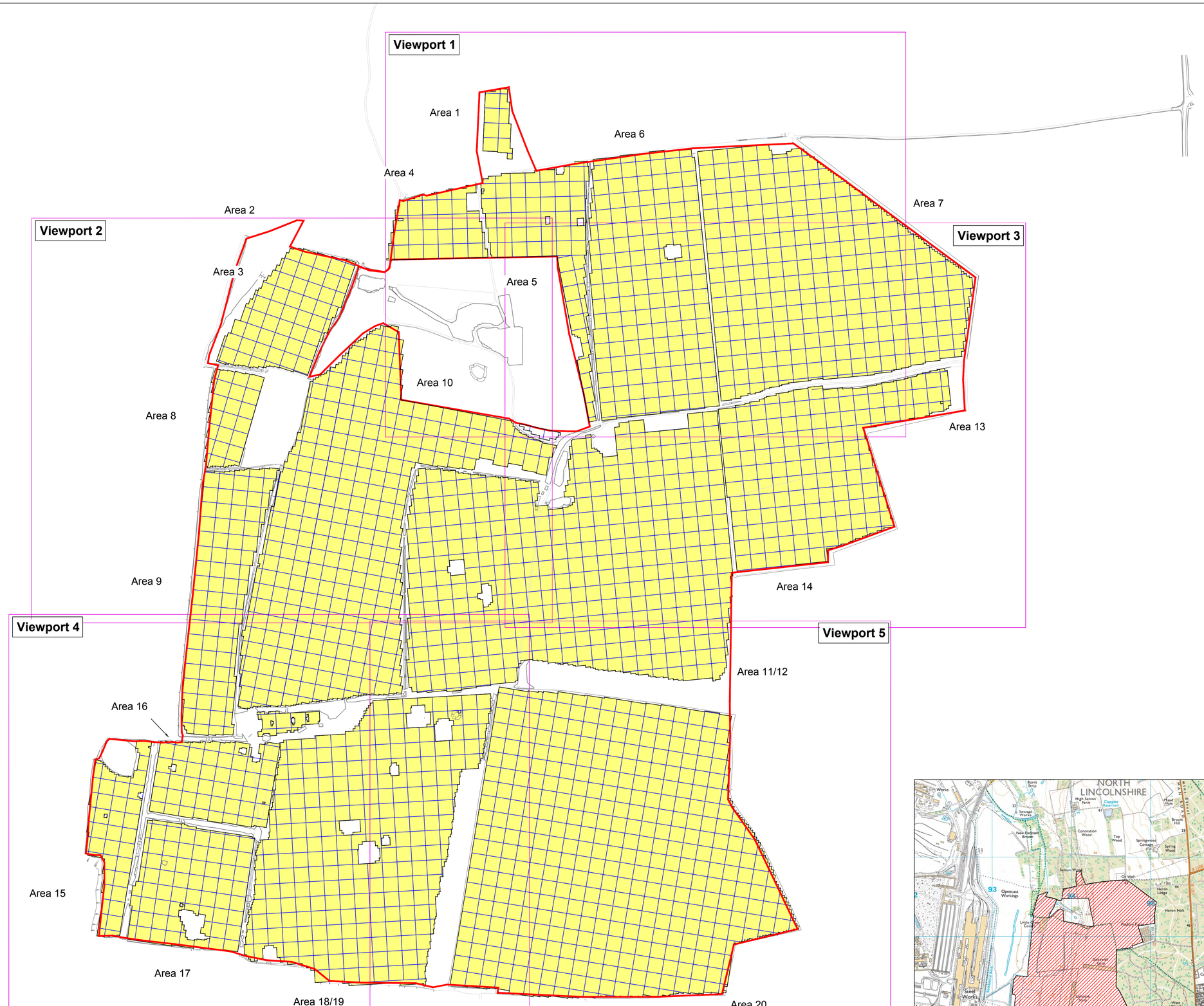
CIfA 2014 *Standard and Guidance for Archaeological Geophysical Survey.* Amended 2016. CIfA Guidance note. Chartered Institute for Archaeologists, Reading http://www.archaeologists.net/sites/default/files/CIfAS%26GGeophysics_2.pdf

EAC 2016 *EAC Guidelines for the Use of Geophysics in Archaeology,* European Archaeological Council, Guidelines 2.

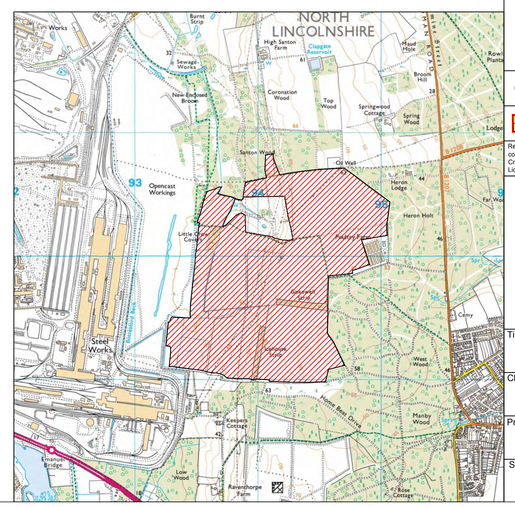
EH 2008 *Geophysical Survey in Archaeological Field Evaluation.* English Heritage, Swindon https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/

Pegasus 2018 *Little Crow, Santon, North Lincolnshire - Cultural Heritage Baseline Study.* Pegasus Group; unpublished report.

SSEW 1983 *Soils of England and Wales. Sheet 4, Eastern England*. Soil Survey of England and Wales, Harpenden.



N



Site Location

Survey Area - showing 30m grid

Reproduced from Ordnance Survey's 1:25 000 map of 1998 with the permission of the controller of Her Majesty's Stationery Office.
Crown Copyright reserved.
Licence No: 100018665

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title: Site Location Diagram and Location of Survey Areas

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 200
1:4000 @ A1

Fig No: 01



N

+5nT

-5nT

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title:
Magnetometer Survey - Greyscale Plots - Overview

Client:
Cotswold Archaeology

Project:
13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale:
0 metres 200
1:4000 @ A1

Fig No:
02



KEY

	Probable archaeology
	Possible archaeology (discrete anomaly / trend)
	Uncertain Origin (discrete anomaly / trend)
	Former field boundary (corroborated)
	Former field boundary (conjectural)
	Agriculture (plough)
	Natural (e.g. geological / pedological)
	Magnetic disturbance
	Service
	Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title: Magnetometer Survey - Interpretation - Overview

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 200
1:4000 @ A1

Fig No: 03

Area 1

Area 6

Area 4

Area 5

Area 10

N

+5nT

-5nT

sumo Survey

GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

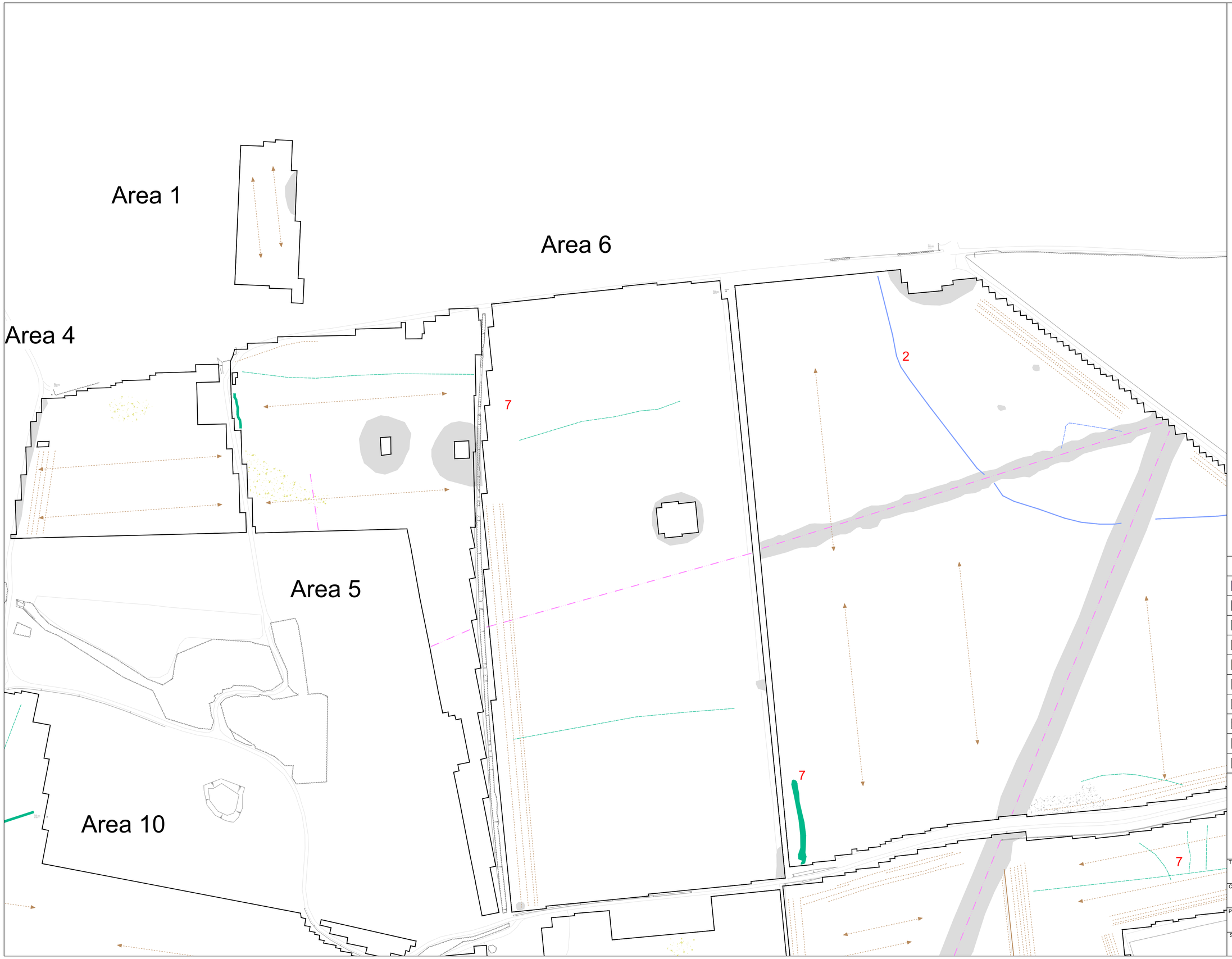
Title: Magnetometer Survey - Greyscale Plots - Viewport 1

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 75 1:1500 @ A1

Fig No: 04



N

KEY

	Probable archaeology
	Possible archaeology (discrete anomaly / trend)
	Uncertain Origin (discrete anomaly / trend)
	Former field boundary (corroborated)
	Former field boundary (conjectural)
	Agriculture (plough)
	Natural (e.g. geological / pedological)
	Magnetic disturbance
	Service
	Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

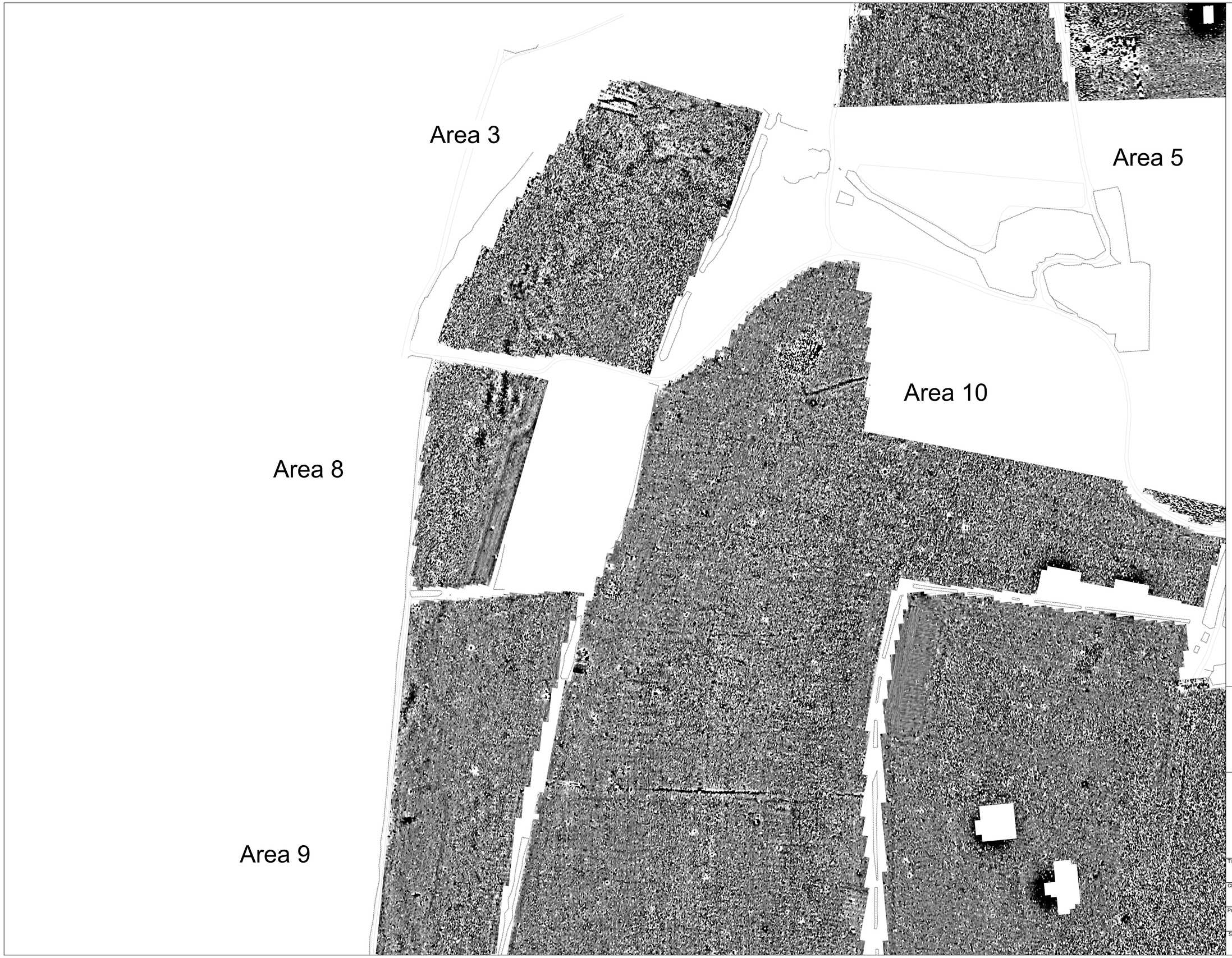
Title: Magnetometer Survey - Interpretation - Viewport 2

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 75
1:1500 @ A1

Fig No: 05



sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title: Magnetometer Survey - Greyscale Plots - Viewport 2

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 75
1:1500 @ A1

Fig No: 06

Area 3

Area 5

Area 10

Area 8

Area 9

7

7

7

16

N

KEY

- Probable archaeology
- Possible archaeology (discrete anomaly / trend)
- Uncertain Origin (discrete anomaly / trend)
- Former field boundary (corroborated)
- Former field boundary (conjectural)
- Agriculture (plough)
- Natural (e.g. geological / pedological)
- Magnetic disturbance
- Service
- Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

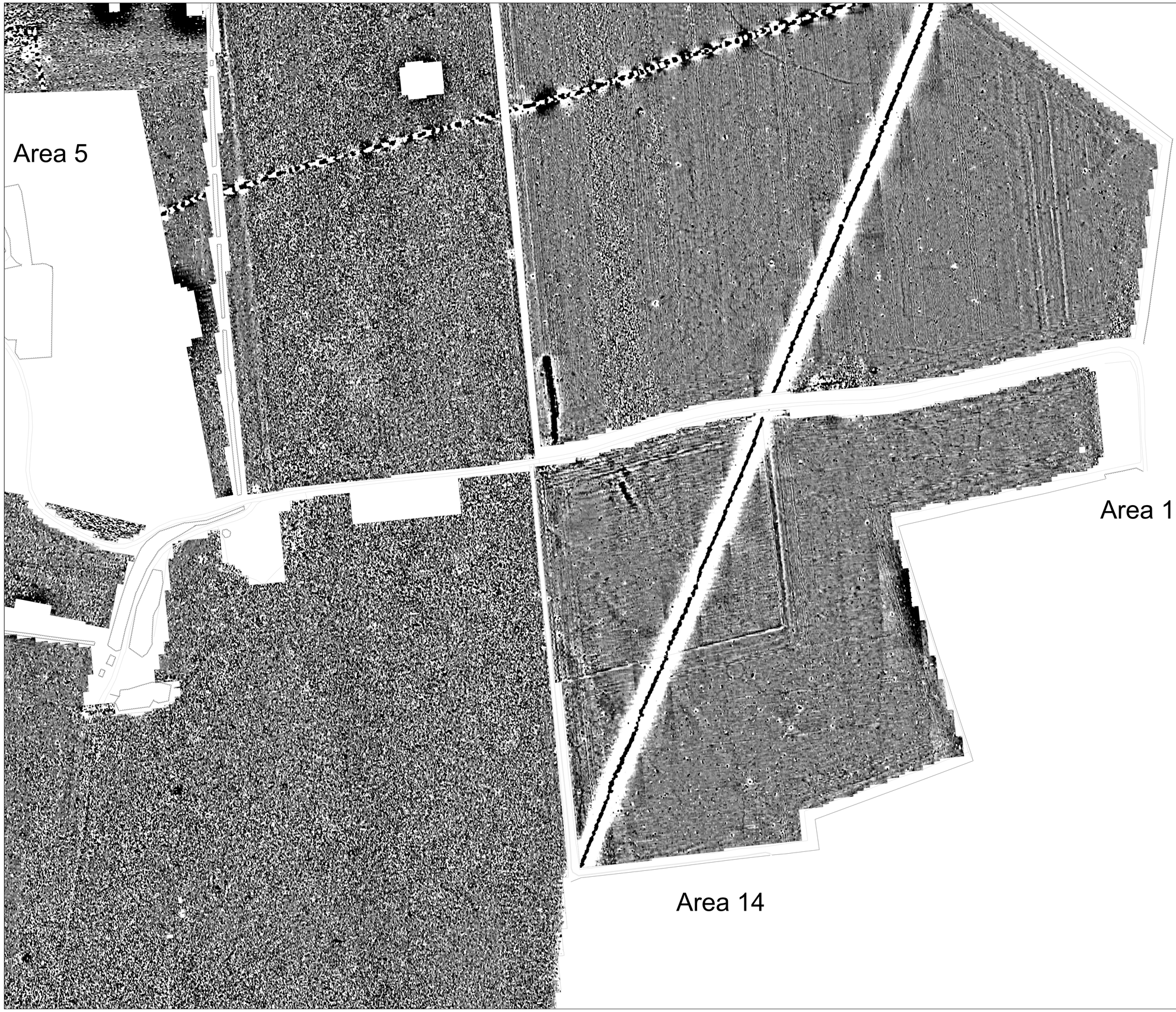
Title: Magnetometer Survey - Interpretation - Viewport 2

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 75
1:1500 @ A1

Fig No: 07



N

+5nT

-5nT

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title: Magnetometer Survey - Greyscale Plots - Viewport 3

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 75
1:1500 @ A1

Fig No: 08

Area 5

Area 13

Area 14

7

7

10

9

1

N

KEY

	Probable archaeology
	Possible archaeology (discrete anomaly / trend)
	Uncertain Origin (discrete anomaly / trend)
	Former field boundary (corroborated)
	Former field boundary (conjectural)
	Agriculture (plough)
	Natural (e.g. geological / pedological)
	Magnetic disturbance
	Service
	Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

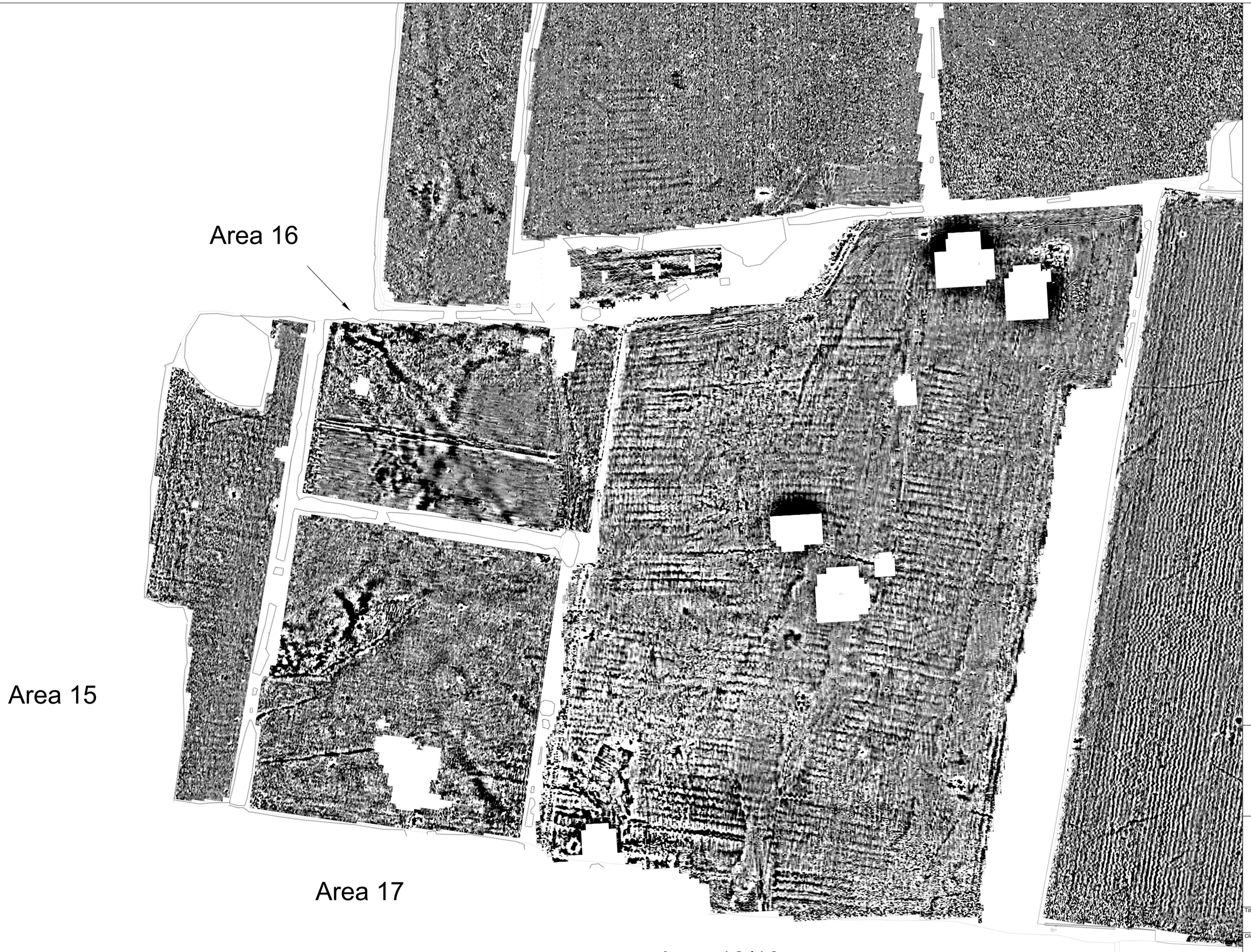
Title: Magnetometer Survey - Interpretation - Viewport 3

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 75
1:1500 @ A1

Fig No: 09



sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title: Magnetometer Survey - Greyscale Plots - Viewport 4

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 75
1:1500 @ A1

Fig No: 10



KEY

	Probable archaeology
	Possible archaeology (discrete anomaly / trend)
	Uncertain Origin (discrete anomaly / trend)
	Former field boundary (corroborated)
	Former field boundary (conjectural)
	Agriculture (plough)
	Natural (e.g. geological / pedological)
	Magnetic disturbance
	Service
	Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title: Magnetometer Survey - Interpretation - Viewport 4

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 75 1:1500 @ A1

Fig No: 11



N

+5nT
-5nT

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title: Magnetometer Survey - Greyscale Plots - Viewport 5

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 75
1:1500 @ A1

Fig No: 12

Area 11/12

Area 20

11

3

5

5

5

7

N

KEY

- Probable archaeology
- Possible archaeology (discrete anomaly / trend)
- Uncertain Origin (discrete anomaly / trend)
- Former field boundary (corroborated)
- Former field boundary (conjectural)
- Agriculture (plough)
- Natural (e.g. geological / pedological)
- Magnetic disturbance
- Service
- Ferrous

sumo Survey
GEOPHYSICS FOR ARCHAEOLOGY & ENGINEERING

Title: Magnetometer Survey - Interpretation - Viewport 5

Client: Cotswold Archaeology

Project: 13201 - Little Crow Solar Park, Scunthorpe, North Lincolnshire

Scale: 0 metres 75
1:1500 @ A1

Fig No: 13

Appendix A - Technical Information: Magnetometer Survey Method

Grid Positioning
For hand held gradiometers the location of the survey grids has been plotted together with the referencing information. Grids were set out using a Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS GPS system.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. This results in an accuracy of around 0.01m.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m

Instrumentation: Bartington *Grad* 601-2
Bartington instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted vertically, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method, though strongly magnetic objects may be visible at greater depths. The Bartington instrument can collect two lines of data per traverse with gradiometer units mounted laterally with a separation of 1.0m. The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each site survey, data is transferred to the office for processing and presentation.

Data Processing

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (De-stagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.

Display

Greyscale/ Colourscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly, all values below the given range are represented by the minimum intensity shade. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.

© SUMO Survey: Geophysics for Archaeology and Engineering

Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk-based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall,* etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Archaeology / Probable Archaeology	This term is used when the form, nature and pattern of the responses are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
Possible Archaeology	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Industrial / Burnt-Fired	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Former Field Boundary (probable & possible)	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions. Possible denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.
Ridge & Furrow	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases, the response may be the result of more recent agricultural activity.
Agriculture (ploughing)	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
Land Drain	Weakly magnetic linear anomalies, quite often appearing in series forming parallel and herringbone patterns. Smaller drains may lead and empty into larger diameter pipes, which in turn usually lead to local streams and ponds. These are indicative of clay fired land drains.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions.
Magnetic Disturbance	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present. They are presumed to be modern.
Service	Magnetically strong anomalies, usually forming linear features are indicative of ferrous pipes/cables. Sometimes other materials (e.g. pvc) or the fill of the trench can cause weaker magnetic responses which can be identified from their uniform linearity.
Ferrous	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.
Uncertain Origin	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *Possible Archaeology* / *Natural* or (in the case of linear responses) *Possible Archaeology* / *Agriculture*; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

© SUMO Survey: Geophysics for Archaeology and Engineering

Appendix B - Technical Information: Magnetic Theory

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.1 nanoTeslas (nT) in an overall field strength of 48,000 (nT), can be accurately detected.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns; material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

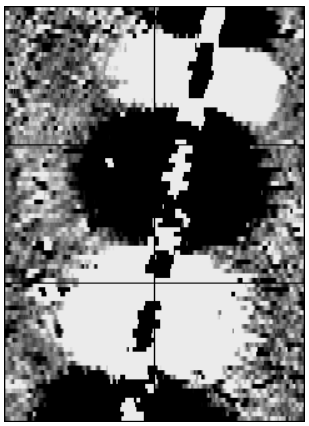
Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried feature. The difference between the two sensors will relate to the strength of a magnetic field created by this feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity and disturbance from modern services.

© SUMO Survey: Geophysics for Archaeology and Engineering

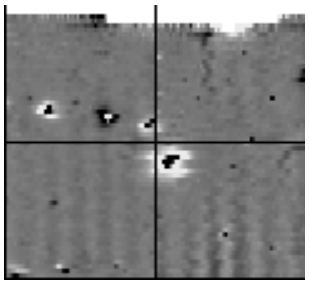
Appendix C - Glossary of Magnetic Anomalies

Bipolar



A bipolar anomaly is one that is composed of both a positive response and a negative response. It can be made up of any number of positive responses and negative responses. For example a pipeline consisting of alternating positive and negative anomalies is said to be bipolar. See also dipolar which has only one area of each polarity. The interpretation of the anomaly will depend on the magnitude of the magnetic field strength. A weak response may be caused by a clay field drain while a strong response will probably be caused by a metallic service.

Dipolar

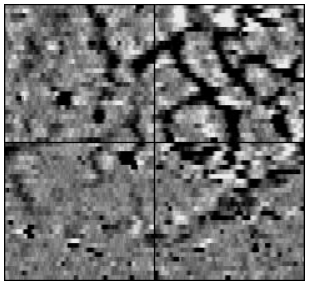


This consists of a single positive anomaly with an associated negative response. There should be no separation between the two polarities of response. These responses will be created by a single feature. The interpretation of the anomaly will depend on the magnitude of the magnetic measurements. A very strong anomaly is likely to be caused by a ferrous object.

Positive anomaly with associated negative response

See bipolar and dipolar.

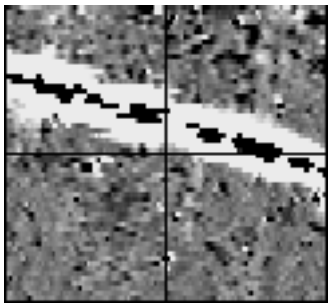
Positive linear



A linear response which is entirely positive in polarity. These are usually related to in-filled cut features where the fill material is magnetically enhanced compared to the surrounding matrix. They can be caused by ditches of an archaeological origin, but also former field boundaries, ploughing activity and some may even have a natural origin.

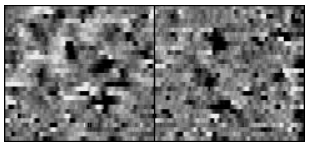
© SUMO Survey: Geophysics for Archaeology and Engineering

Positive linear anomaly with associated negative response



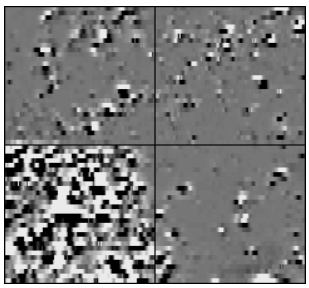
A positive linear anomaly which has a negative anomaly located adjacently. This will be caused by a single feature. In the example shown this is likely to be a single length of wire/cable probably relating to a modern service. Magnetically weaker responses may relate to earthwork style features and field boundaries.

Positive point/area



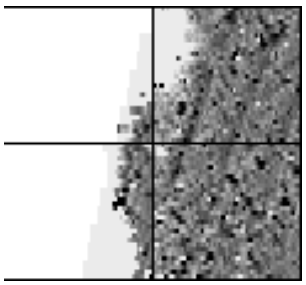
These are generally spatially small responses, perhaps covering just 3 or 4 reading nodes. They are entirely positive in polarity. Similar to positive linear anomalies they are generally caused by in-filled cut features. These include pits of an archaeological origin, possible tree bowls or other naturally occurring depressions in the ground.

Magnetic debris



Magnetic debris consists of numerous dipolar responses spread over an area. If the amplitude of response is low (+/-3nT) then the origin is likely to represent general ground disturbance with no clear cause, it may be related to something as simple as an area of dug or mixed earth. A stronger anomaly (+/-250nT) is more indicative of a spread of ferrous debris. Moderately strong anomalies may be the result of a spread of thermoremanent material such as bricks or ash.

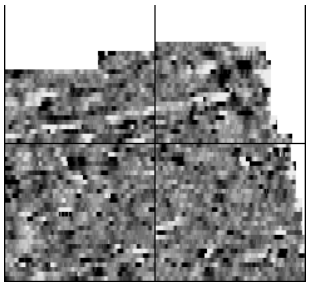
Magnetic disturbance



Magnetic disturbance is high amplitude and can be composed of either a bipolar anomaly, or a single polarity response. It is essentially associated with magnetic interference from modern ferrous structures such as fencing, vehicles or buildings, and as a result is commonly found around the perimeter of a site near to boundary fences.

© SUMO Survey: Geophysics for Archaeology and Engineering

Negative linear

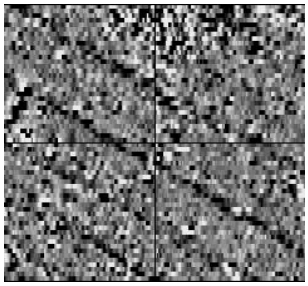


A linear response which is entirely negative in polarity. These are generally caused by earthen banks where material with a lower magnetic magnitude relative to the background top soil is built up. See also ploughing activity.

Negative point/area

Opposite to positive point anomalies these responses may be caused by raised areas or earthen banks. These could be of an archaeological origin or may have a natural origin.

Ploughing activity



Ploughing activity can often be visualised by a series of parallel linear anomalies. These can be of either positive polarity or negative polarity depending on site specifics. It can be difficult to distinguish between ancient ploughing and more modern ploughing. Clues such as the separation of each linear, straightness, strength of response and cross cutting relationships can be used to aid this, although none of these can be guaranteed to differentiate between different phases of activity.

Polarity

Term used to describe the measurement of the magnetic response. An anomaly can have a positive polarity (values above 0nT) and/or a negative polarity (values below 0nT).

Strength of response

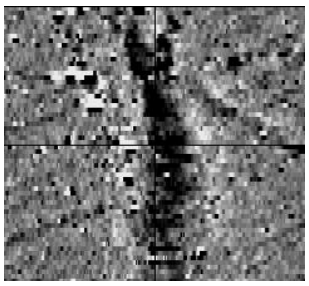
The amplitude of a magnetic response is an important factor in assigning an interpretation to a particular anomaly. For example a positive anomaly covering a 10m2 area may have values up to around 3000nT, in which case it is likely to be caused by modern magnetic interference. However, the same size and shaped anomaly but with values up to only 4nT may have a natural origin. Colour plots are used to show the amplitude of response.

© SUMO Survey: Geophysics for Archaeology and Engineering

Thermoremanent response

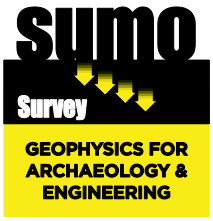
A feature which has been subject to heat may result in it acquiring a magnetic field. This can be anything up to approximately +/-100 nT in value. These features include clay fired drains, brick, bonfires, kilns, hearths and even pottery. If the heat application has occurred in situ (e.g. a kiln) then the response is likely to be bipolar compared to if the heated objects have been disturbed and moved relative to each other, in which case they are more likely to take an irregular form and may display a debris style response (e.g. ash).

Weak background variations



Weakly magnetic wide scale variations within the data can sometimes be seen within sites. These usually have no specific structure but can often appear curvy and sinuous in form. They are likely to be the result of natural features, such as soil creep, dried up (or seasonal) streams. They can also be caused by changes in the underlying geology or soil type which may contain unpredictable distributions of magnetic minerals, and are usually apparent in several locations across a site.

© SUMO Survey: Geophysics for Archaeology and Engineering



- Archaeological
- Geophysical
- Laser Scanning
- Measured Building
- Topographic
- Utility Mapping

SUMO Services Ltd, incorporated under the laws of England and Wales,
Company Registration No.4275993.
Registered Office Unit 8 Hayward Business Centre, New Lane, Havant, Hampshire, PO9 2NL

APPENDIX 8.3

LITTLE CROW SOLAR PARK, SCUNTHORPE, NORTH LINCOLNSHIRE – ARCHAEOLOGICAL WATCHING BRIEF (COTSWOLD ARCHAEOLOGY, NOVEMBER 2018).

Little Crow

Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

ARCHAEOLOGICAL WATCHING BRIEF

On behalf of INRG Solar (Little Crow) Ltd

November 2018

Little Crow Solar Park, Scunthorpe, North Lincolnshire

Archaeological Watching Brief

CA Project: 661202
CA Report: 18523

Document Control Grid						
Revision	Date	Author	Checked by	Status	Reasons for revision	Approved by
A	11/10/2018	AKM	APS	DRAFT	Internal review	APS

This report is confidential to the client. Cotswold Archaeology accepts no responsibility or liability to any third party to whom this report, or any part of it, is made known. Any such party relies upon this report entirely at their own risk. No part of this report may be reproduced by any means without permission.

© Cotswold Archaeology

CONTENTS

SUMMARY 2

1. INTRODUCTION 3

2. ARCHAEOLOGICAL BACKGROUND 4

3. AIMS AND OBJECTIVES 7

4. METHODOLOGY 7

5. RESULTS (FIGS 2-3) 8

6. DISCUSSION 14

7. CA PROJECT TEAM 15

8. REFERENCES 15

APPENDIX A: CONTEXT DESCRIPTIONS 17

APPENDIX B: OASIS REPORT FORM 19

LIST OF ILLUSTRATIONS

Fig. 1 Site location plan (1:25,000)

Fig. 2 Test pit locations (1:12,500)

Fig. 3 Photographs - test pits 1 to 5

Fig. 4 Photographs - test pits 5a to 11

Fig. 5 Photographs - test pits 12 to 22

DRAFT

SUMMARY

Project Name: Little Crow Solar Park, Scunthorpe, North Lincolnshire

Location: Scunthorpe, Lincolnshire

NGR: 494064 410261

Type: Watching Brief

Date: 25-26 September 2018

Location of Archive: To be deposited with North Lincolnshire Museum Service

Site Code: LCRO18

An archaeological watching brief was undertaken by Cotswold Archaeology during ground investigation works undertaken to support a forthcoming Development Consent Order for a proposed solar PV array, to be known as Little Crow Solar Park, on land at Santon, Scunthorpe, Lincolnshire. A total of 23 test pits were excavated across the 53.25ha site, of which 19 were subject to archaeological monitoring.

No features or deposits of archaeological interest were observed during groundworks, and no artefactual material pre-dating the modern period was recovered.

DRAFT

1. INTRODUCTION

1.1 In September 2018 Cotswold Archaeology (CA) carried out an archaeological watching brief for INRG Solar (Little Crow) Ltd on land at Santon, Scunthorpe, Lincolnshire (centred at NGR: 494064 410261; Fig. 1). The watching brief was undertaken on ground investigation works carried out to inform a forthcoming Environmental Statement to support a Development Consent Order for a proposed solar PV array, to be known to as Little Crow Solar Park. The proposed development is a 'Nationally Significant Infrastructure Project' (NSIP).

The site

1.2 The proposed development area is approximately 218ha in extent and comprises a number of arable fields lying along a north/south limestone ridge lying at c.60m above Ordnance Datum (aOD) and extending downslope westwards to c. 25m (aOD). The lower-lying, valley bottom, area includes pasture with natural springlines and contains the Bottesford Beck watercourse. Small areas of coppice woodland and hedgerows demarcate many of the field boundaries. The Site is also traversed by a number of farm tracks running along the ridge and the valley bottom, giving access to the various fields from the nearby public highways.

1.3 The Site is situated in an area with complex, transitional geological strata. The bedrock geology of the area is mapped as comprising limestone and (subequal/subordinate) argillaceous rocks of the Raventhorpe Beds and Scawby Limestone, sandstone of the Northampton Sand Formation and in the southern part of the site mudstone and limestone of the Kirton Cementstone Beds, and ferruginous limestone and ferruginous sandstone of the Marlstone Rock Formation. In the central and western part of the Site these

DRAFT

are overlain by superficial deposits of the Charmouth Mudstone Formation and Whitby Mudstone Formation, and sand of the Sutton Sand Formation (BGS 2018).

1.4 The monitoring works were undertaken in accordance with the *Standard and guidance for an archaeological watching brief* (CIfA 2014) and *Little Crow, Santon, Scunthorpe: Written Scheme of Investigation for an archaeological watching brief* (CA 2018a)

2. ARCHAEOLOGICAL BACKGROUND

2.1 The Site has been the subject of a Cultural Heritage Baseline Study (Pegasus Group 2018), information from which forms the baseline for this section.

2.2 One area of specific prehistoric archaeological potential has been identified within the Site comprising the cropmark of a possible round barrow (MLS22718). A number of poorly-located flint artefacts are also recorded from the wider area, while the Sutton Sand Formation (cover sands/ blown sands) have the potential to contain or mask prehistoric lithic material.

2.3 A former Cistercian nunnery known as Gokewell Priory was located in the northern part of the Site. Gokewell Priory was established in the 12th century and dissolved in the 16th century. Gokewell Priory Farm was built on the site of the Priory between the late 17th and early 19th century and material from the former Priory may have been used during the construction of the farm. Gokewell Priory Farm was itself abandoned and demolished in the late 20th century. It is probable but unproven that the below-ground remains of the medieval Priory and post-medieval Farm are located within the northern part of the Site (MLS1805). However, the core of the

DRAFT

Priory, where the later farm buildings were constructed, is not proposed as a location for solar panels. However, there is potential for below-ground remains of ancillary structures and features associated with the Priory to be present within the areas proposed for development.

2.4 Beyond the site of the former Gokewell Priory, there is no proven evidence for medieval activity beyond agricultural features within the Site. Although historic aerial photographs indicated that the earthwork remains of ridge and furrow cultivation previously survived within the development area they have subsequently been levelled by ploughing and no longer survive as visible features.

2.5 The Site also contains a slight, ovoid, possible earthwork (MLS22780) enclosure of unknown date preserved partly within the woodland of Little Crow Covert, which may extend west, into the adjacent field. However, it is not visible as a cropmark on aerial photographs of the field to the west.

2.6 Within the southern portion of the Site are the records of two cropmarks of possible enclosures, one square (MLS21943) and one ovoid (MLS21941). These assets are located to the north of Manby deserted medieval village, which lies outside the Site boundary. Due to their size and location, they are most likely to be medieval stock enclosures, although they may also be of geological origin. Analysis of aerial imagery has also indicated the presence of two partial circular cropmarks of unknown origin within the same field.

2.7 An undated limestone wall (MLS21242) was recorded adjacent to the B1027 in the north-eastern part of the Site. Potential below-ground remains relating to a former WWII Heavy Anti-Aircraft

DRAFT

Battery in the eastern portion of the Site (MLS21408) could also potentially survive.

Previous archaeological work

2.8 A geophysical survey (Sumo 2018) was undertaken of all available land within the development area with the exception of an exclusion zone around the site of Gokewell Priory, in August and early September 2018. Recorded anomalies include a possible ring-ditch, previously unrecorded and historic field boundaries and a series of rectilinear and linear anomalies with a geological 'signature' typically produced from limestone fracturing (op cit).

2.9 Following on from the geophysical survey, fieldwalking was undertaken in September 2018 across a c.53.25ha area (Costwold Archaeology 2018b). The survey recorded over 19 Kg of artefacts of which most were of post-medieval and modern date and are of little archaeological significance. Significant finds, primarily from the southern part of the site, included eleven pieces of Neolithic/Bronze Age worked flint. A very small assemblage of Roman pottery was recorded from the site as a whole, along with a small collection of possible Roman ceramic building material recovered from the south-central part of the site. Some may be fragments of Roman roof tiles or tegulae; however, because of their abraded and fragmentary condition the fragments could easily be of post-medieval date.

2.10 By far the greatest component of the archaeologically significant finds assemblage from the site comprised 12th to 16th century pottery. The majority of this assemblage was recorded from the southern area, but also to a lesser degree to the immediate south of the Gokewell Priory/Farm exclusion area in the north of the site. The pottery date range, fitting closely with that of the use Gokewell

DRAFT

Priory as a religious institution, would indicate that these material spreads are probably derived from activity associated with the priory. The distribution and date range in particular of the medieval pottery would suggest the manuring of arable fields associated with the running of the priory in the medieval and early post-medieval period.

3. AIMS AND OBJECTIVES

3.1 The objectives of the archaeological works were:

- to monitor groundworks, and to identify, investigate and record all significant buried archaeological deposits revealed on the site during the course of the development groundworks;

- at the conclusion of the project, to produce an integrated archive for the project work and a report setting out the results of the project and the archaeological conclusions that can be drawn from the recorded data.

4. METHODOLOGY

4.1 An archaeologist was present during intrusive groundworks comprising ground investigation works in the form of the excavation of a total of 23 test pits and associated drainage testing, of which 19 in total were subject to archaeological monitoring, 17 as part of this tranche of work. Two of the pits (17 and 19) were excavated prior to this tranche of work and were observed during the course of a preceding fieldwalking survey but were not recorded in detail. The location of the pits is shown on Figure 2.

DRAFT

4.2 Written and photographic records for natural deposits were compiled in accordance with CA Technical Manual 1: *Fieldwork Recording Manual*. No archaeological features or deposits were encountered.

4.3 The archive from the fieldwork is currently held by CA at their offices in Milton Keynes. Subject to the agreement of the legal landowner the site archive will be deposited with the North Lincolnshire Museum Service. A summary of information from this project, set out within Appendix B, will be entered onto the OASIS online database of archaeological projects in Britain.

5. RESULTS (FIGS 2 - 5)

5.1 The originally planned test pits (numbers 1-21) were excavated in their planned locations, as shown on figure 2. Test pit 5a was added in field 3 in order to better understand the geological layers encountered in test pit 5 (see below); test pit 22 was added in field 6 in order to gain a better insight into the geology surrounding the planned location of one of the transformer stations. The excavation of test pits 17 and 19 was observed but not recorded in detail during the preceding fieldwalking survey. The excavation of test pits 8, 16, 20 and 21 was not observed.

Test pit 1

5.2 Test pit 1 (Fig. 3) was located in field 1 in the planned location of a transformer station. A bedrock deposit (102) of white sand was observed at a depth of approximately 1m, overlaid by a natural layer (101) of mid red orange sand with a thickness of 0.7m. This, in turn, was sealed by a topsoil deposit (100) of mid grey brown silty sand measuring approximately 0.3m thick. A drainage test pit measuring 0.3m long by 0.3m wide by 0.3m deep was excavated

DRAFT

adjacent to the main test pit. No archaeological finds or features were observed in either excavation.

Test pit 2

5.3 Test pit 2 (Fig. 3) was located in the south-west corner of field 1. Excavation revealed a bedrock layer (202) of mid grey blue clay at a depth of approximately 1.5m, covered by a natural deposit (201) of white sand with a thickness of 1.24m. The topsoil layer (200) comprised dark grey brown silty sand and was recorded with a thickness of 0.26m. A minimally invasive dual ring infiltrometer test was carried out adjacent to the test pit. No archaeological finds or features were observed in either test-pit.

Test pit 3

5.4 Test pit 3 (Fig. 3) was located in the southeast corner of field 5, just to the north of the Gokewell Farm exclusion zone. It contained a bedrock deposit (302) of mid grey blue clay at a depth of approximately 1.8m, covered by a natural layer (301) of mid brown orange silty sand with a thickness of 1.49m. This was sealed by a topsoil (300) measuring 0.31m thick and comprising mid grey brown silty sand. No additional drainage testing was conducted in conjunction with this test pit. No archaeological finds or features were observed.

Test pit 4

5.5 Test pit 4 (Fig. 3) was excavated in the eastern part of field 10, to the south of the Gokewell Farm exclusion zone. A bedrock layer (403) of mid grey blue clay was observed at a depth of approximately 1.4m, covered by a natural deposit (402) comprising light grey sand, with a thickness of 0.88m. This was overlain by a subsoil layer (401) of mid brown orange silty sand with a thickness of 0.25m, sealed in turn by a topsoil (400) comprising dark grey

DRAFT

brown silty sand with a thickness of 0.27m. As test pit 4 was located on the line of a natural spring, groundwater was observed entering the pit during excavation. No archaeological finds or features were observed.

Test pit 5

5.6 Test pit 5 (Fig. 3) was located in the northernmost corner of field 3, on the edge of the development site. A bedrock layer (502) comprising white sand was encountered at a depth of 1.9m, overlaid by a natural deposit (501) of mid orange grey sand with a thickness of 1.52m. This in turn was sealed by a topsoil (500) comprising mid grey brown silty sand, recorded with a thickness of 0.28m. Similar to test pit 4, this test pit appeared to be located in an area of natural springs, as groundwater was observed entering the pit during excavation. No additional drainage testing was performed in relation to this test pit. Once again, no archaeological finds or features were observed.

Test pit 5a

5.7 Test pit 5a (Fig. 4) was added in field 3, to the southeast of test pit 5a, in order to obtain further details on the geological properties of that area. The bedrock layer (505), as in test pit 5, comprised white sand, and was encountered at a depth of approximately 0.9m. The bedrock was overlaid by a deposit of made ground (504) composed of black sandy silt and gravel with a thickness of 0.48m. Deposit 504 was sealed by topsoil deposit 503, comprising mid grey brown silty sand with a thickness of 0.42. Considerable levels of groundwater intrusion were observed during excavation, resulting in partial section collapse. A dual ring infiltrometer test was carried out adjacent to the test pit. No archaeological finds or features were observed in either test pit.

DRAFT

Test pit 6

5.8 Test pit 6 (Fig. 4) was located in the northeast corner of field 18. The bedrock layer (602) comprised light grey sand and was encountered at a depth of 1.3m. This was covered by a natural deposit (601) of mid brown orange silty clay, with a thickness of 0.9m, which in turn was sealed by a topsoil layer (600) comprising mid grey brown silty sand, measuring 0.4m thick. No additional drainage testing was performed in relation to this test pit. No archaeological finds or features were observed.

Test pit 7

5.9 Test pit 7 (Fig. 4) was located in the southeast corner of field 10. A bedrock layer (702) of light grey sand was encountered at a depth of 1.3m, overlaid by a natural deposit (701) of mid grey blue and orange clay with a thickness of 0.92m. This in turn was sealed by a topsoil layer (700) comprising mid grey brown silty sand, with a thickness of 0.38m. A drainage test pit measuring 0.3m long by 0.3m wide by 0.3m deep was excavated adjacent to the main test pit. No archaeological finds or features were observed in either test pit.

Test pit 9

5.10 Test pit 9 (Fig. 4) was located near the western side of field 9, on the edge of the development area. The bedrock layer (903) comprising mid grey blue and brown orange clay was encountered at a depth of 1.2m, overlaid by a natural deposit (902) of light grey sand measuring 0.62m thick. This was covered by a subsoil (901) of mid brown orange silty clay with a thickness of 0.27m, which in turn was sealed by a topsoil (900) comprising dark grey brown silty sand measuring 0.31m thick. A drainage test pit measuring 0.3m long by 0.3m wide by 0.3m deep was excavated adjacent to the

DRAFT

main test pit. No archaeological finds or features were observed in either test pit.

Test pit 10

5.11 Test pit 10 (Fig. 4) was located in the northernmost corner of field 10. A bedrock layer (1002) comprising mid grey blue and brown orange clay was encountered at a depth of 0.51m. This was covered by a natural deposit (1001) of mid brown orange silty sand with a thickness of 0.22m, which in turn was sealed by a topsoil layer (1000) composed of mid grey brown silty sand measuring 0.29m thick. No archaeological finds or features were observed during the excavation of the pit and no additional drainage testing was carried out.

Test pit 11

5.12 Test pit 11 (Fig. 4) was located near the southeast corner of field 10. The bedrock layer (1102) comprising light grey sand was encountered at a depth of 1.2m and was covered by a natural deposit (1101) of mid brown orange silty sand with a thickness of 0.89m. This in turn was sealed by a topsoil layer (1100) consisting of mid grey brown silty sand with a thickness of 0.31m. A dual ring infiltrometer test was carried out adjacent to the test pit. No archaeological finds or features were observed in either test pit.

Test pit 12

5.13 Test pit 12 (Fig. 5) was located near the southwest corner of field 10. The bedrock layer (1201) of light grey sand was encountered at a depth of 0.42m, and was directly overlaid by a topsoil (1200) comprising mid grey brown silty sand. No archaeological finds or features were observed during the excavation of the pit and no additional drainage testing was carried out.

DRAFT

Test pit 13

5.14 Test pit 13 (Fig. 5) was located in the northeast corner of field 6, on the edge of the proposed development area. A bedrock layer (1303) comprising limestone was encountered at a depth of 0.94m, and was overlaid by a natural deposit (1302) of mid yellow grey clay with a thickness of 0.39m. This in turn was covered by a subsoil layer (1301) of mid red brown silty clay with a thickness of 0.26m. The subsoil was sealed by a topsoil deposit (1300) of mid grey brown silty clay measuring 0.29m thick. A drainage test pit measuring 0.3m long by 0.3m wide by 0.3m deep was excavated adjacent to the main test pit. No archaeological finds or features were observed in either excavation.

Test pit 14

5.15 Test pit 14 (Fig. 5) was located in the northeast corner of field 20. The bedrock layer (1401) comprising limestone was encountered at a depth of 0.38m, and was sealed by a topsoil deposit (1400) of dark grey brown silty sand. A drainage test pit measuring 0.3m long by 0.3m wide by 0.3m deep was excavated adjacent to the main test pit. Once again, no archaeological finds or features were observed in either excavation.

Test pit 15

5.16 Test pit 15 (Fig. 5) was located near the northwest corner of field 6, targeting the location of a transformer station just to the northeast of the Gokewell Farm exclusion zone area. The limestone bedrock (1503) was encountered at a depth of 2m, covered by a natural layer (1502) of mid yellow grey clay with a thickness of 1.45m. This was overlain by a subsoil deposit (1501) comprising mid red brown silty clay, measuring 0.21m thick, which was in turn sealed by a topsoil (1500) of mid grey brown silty clay with a thickness of 0.34m. A dual ring infiltrometer test was carried out

DRAFT

adjacent to the test pit. As with the preceding pits, no archaeological finds or features were observed in either excavation.

Test pit 18

5.17 Test pit 18 (Fig. 5) was located in the northwest corner of field 12. A limestone bedrock layer (1802) was encountered at a depth of 1.19m, overlaid by a layer of made ground (1801) comprising informal hardstanding formed of gravel and limestone fragments with a thickness of 1m. This in turn was sealed by a topsoil deposit (1800) of dark grey brown silty sand measuring 0.19m thick. A drainage test pit measuring 0.3m long by 0.3m wide by 0.3m deep was excavated adjacent to the main test pit. No archaeological finds or features were recorded.

Test pit 22

5.18 Test pit 22 (Fig. 5) was added in field 6, approximately 60m to the east of test pit 15, in order to obtain further details on the geological properties of that area. The bedrock layer (2202) comprising a mix of limestone and mid grey blue sandy clay was encountered at a depth of 1.2m, overlaid by a natural deposit (2201) of mid brown orange silty sand with a thickness of 0.85m. This in turn was sealed by a topsoil (2200) of mid grey brown silty sand measuring 0.35m thick. No additional drainage testing was carried out in relation to this test pit and no archaeological finds or features were recorded.

6. DISCUSSION

6.1 Despite the archaeological potential of the application area as a whole (see archaeological background above), the watching brief identified no archaeological remains within the area of observed groundworks and, despite visual scanning of the upcast, no

DRAFT

artefactual material pre-dating the modern period was seen. The absence of archaeological deposits in the test-pits indicates that the ground investigation works have not impacted upon any heritage assets of archaeological interest. Though limited in area, the results of the watching brief also broadly support the results of the preceding geophysical survey and fieldwalking, which collectively suggest that much of the proposed development area is of low archaeological potential.

7. CA PROJECT TEAM

Fieldwork was undertaken by Anna Moosbauer. The report was written by Anna Moosbauer. The illustrations were prepared by Amy Wright. The archive has been compiled by Emily Evans, and prepared for deposition by Hazel O'Neill. The project was managed for CA by Adrian Scruby.

10. REFERENCES

BGS (British Geological Survey), 2018. *Geology of Britain Viewer* http://mapapps.bgs.ac.uk/geologyofbritain/home.html Accessed 12 October 2018.

CA (Costwold Archaeology), 2018a. *Little Crow, Santon, Scunthorpe: Written Scheme of Investigation for an archaeological watching brief*.

CA (Cotswold Archaeology), 2018b. *Little Crow Solar Park, Scunthorpe, North Lincolnshire: Archaeological Fieldwalking Survey.*

DRAFT

CIfA, 2014. *Standard and guidance for an archaeological watching brief*. Chartered Institute for Archaeologists

Pegasus Group 2018 *Little Crow Solar Park, Scunthorpe, North Lincolnshire: Cultural Heritage Baseline Study.* Pegasus Group Project Number: P17-0718

Sumo Geophysics Ltd, 2018. *Geophysical Survey Report. Little Crow Solar Park, Scunthorpe, North Lincolnshire*. Report No. 13201

DRAFT

APPENDIX A: CONTEXT DESCRIPTIONS

Test Pit No.	Context No.	Type	Context interpretation	Description	L (m)	W (m)	Thickness/ Depth (m)
1	100	Layer	Topsoil	Mid grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.30
1	101	Layer	Natural	Mid red orange sand, no inclusions	>2.2	>0.7	0.70
1	102	Layer	Bedrock	White sand, soft, no inclusions	>2.2	>0.7	-
2	200	Layer	Topsoil	Dark grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.26
2	201	Layer	Natural	White sand, soft, no inclusions	>2.2	>0.7	0.124
2	202	Layer	Bedrock	Mid grey blue clay, firm, no inclusions	>2.2	>0.7	-
3	300	Layer	Topsoil	Mid grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.31
3	301	Layer	Natural	Mid brown orange silty sand, no inclusions	>2.2	>0.7	1.49
3	302	Layer	Bedrock	Mid grey blue clay, firm, no inclusions	>2.2	>0.7	-
4	400	Layer	Topsoil	Dark grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.27
4	401	Layer	Subsoil	Mid orange brown silty sand, soft, no inclusions	>2.2	>0.7	0.25
4	402	Layer	Natural	Light grey sand, soft, no inclusions	>2.2	>0.7	0.88
4	403	Layer	Bedrock	Mid grey blue clay, firm, no inclusions	>2.2	>0.7	-
5	500	Layer	Topsoil	Mid grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.28
5	501	Layer	Natural	Mid orange grey sand, soft, no inclusions	>2.2	>0.7	1.52
5	502	Layer	Bedrock	White sand, soft, no inclusions	>2.2	>0.7	-
5a	503	Layer	Topsoil	Mid grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.42
5a	504	Layer	Made ground	Black sandy silt, gravel	>2.2	>0.7	0.48
5a	505	Layer	Bedrock	Light grey sand, soft, no inclusions	>2.2	>0.7	-
6	600	Layer	Topsoil	Mid grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.40
6	601	Layer	Natural	Mid brown orange silty sand, soft, no inclusions	>2.2	>0.7	0.90
6	602	Layer	Bedrock	Light grey sand, soft, no inclusions	>2.2	>0.7	-
7	700	Layer	Topsoil	Mid grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.38
7	701	Layer	Natural	Mid grey blue and brown orange clay, firm, no inclusions	>2.2	>0.7	0.92
7	702	Layer	Bedrock	Light grey sand, soft, no inclusions	>2.2	>0.7	-
9	900	Layer	Topsoil	Dark grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.31
9	901	Layer	Subsoil	Mid brown orange silty clay, soft, no inclusions	>2.2	>0.7	0.27
9	902	Layer	Natural	Light grey sand, soft, no inclusions	>2.2	>0.7	0.62
9	903	Layer	Bedrock	Mid grey blue and brown orange clay, firm, no inclusions	>2.2	>0.7	-
10	1000	Layer	Topsoil	Mid grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.29
10	1001	Layer	Natural	Mid brown orange silty sand, no inclusions	>2.2	>0.7	0.22
10	1002	Layer	Bedrock	Mid grey blue and brown orange clay, firm, no inclusions	>2.2	>0.7	-
11	1100	Layer	Topsoil	Mid grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.31
11	1101	Layer	Natural	Mid brown orange silty sand, soft, no inclusions	>2.2	>0.7	0.89
11	1102	Layer	Bedrock	Light grey sand, soft, no inclusions	>2.2	>0.7	-
12	1200	Layer	Topsoil	Mid grey brown silty sand, soft, no	>2.2	>0.7	0.42

DRAFT

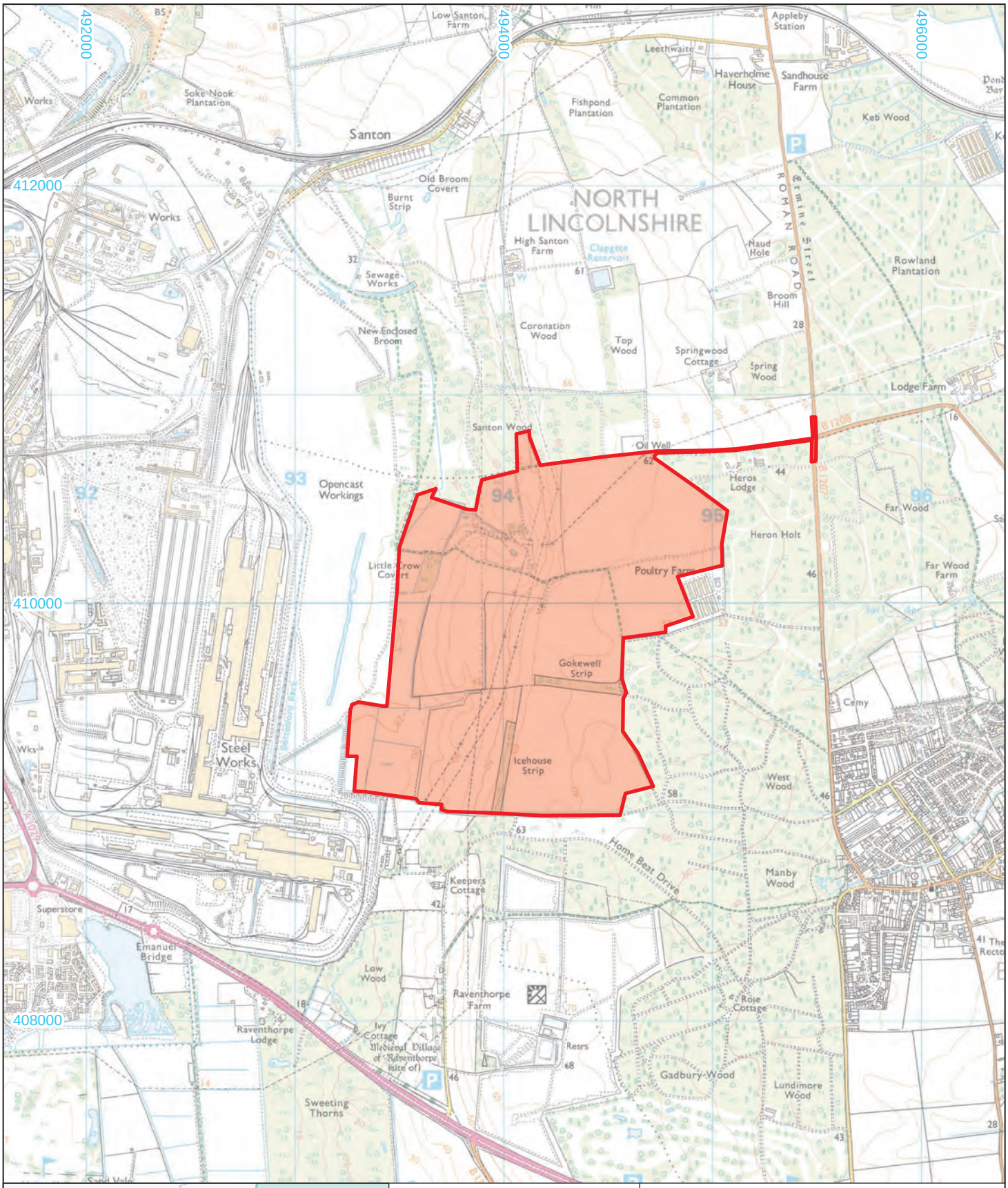
				inclusions			
12	1201	Layer	Bedrock	Light grey sand, soft, no inclusions	>2.2	>0.7	-
13	1300	Layer	Topsoil	Mid grey brown silty clay, soft, infrequent small stones	>2.2	>0.7	0.29
13	1301	Layer	Subsoil	Mid red brown silty clay, soft, no inclusions	>2.2	>0.7	0.26
13	1302	Layer	Natural	Mid yellow grey clay, firm, no inclusions	>2.2	>0.7	0.39
13	1303	Layer	Bedrock	limestone	>2.2	>0.7	-
14	1400	Layer	Topsoil	Dark grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.38
14	1401	Layer	Bedrock	limestone	>2.2	>0.7	-
15	1500	Layer	Topsoil	Mid grey brown silty clay, soft, infrequent small stones	>2.2	>0.7	0.34
15	1501	Layer	Subsoil	Mid red brown silty clay, soft, no inclusions	>2.2	>0.7	0.21
15	1502	Layer	Natural	Mid yellow grey clay, firm, no inclusions	>2.2	>0.7	1.45
15	1503	Layer	Bedrock	limestone	>2.2	>0.7	-
18	1800	Layer	Topsoil	Dark grey brown silty sand, soft, some stones	>2.2	>0.7	0.19
18	1801	Layer	Made ground	Informal hard standing – gravel + limestone fragments	>2.2	>0.7	1.0
18	1802	Layer	Bedrock	limestone	>2.2	>0.7	-
22	2200	Layer	Topsoil	Mid grey brown silty sand, soft, no inclusions	>2.2	>0.7	0.35
22	2201	Layer	Natural	Mid brown orange silty sand, soft, no inclusions	>2.2	>0.7	0.85
22	2202	Layer	Bedrock	Limestone, mid grey blue sandy clay	>2.2	>0.7	-

DRAFT

APPENDIX B: OASIS REPORT FORM

PROJECT DETAILS		
Project Name	Little Crow, Santon, Scunthorpe, Lincolnshire	
Short description	An archaeological watching brief was undertaken by Cotswold Archaeology during ground investigation works in the form of test pitting to to support a forthcoming Development Consent Order for a proposed solar PV array on land at Santon, Scunthorpe, Lincolnshire. A total of 23 test pits were excavated across the 53.25ha site, of which 19 were subject to archaeological monitoring. No features or deposits of archaeological interest were observed during groundworks, and no artefactual material pre-dating the modern period was recovered.	
Project dates	25-26 September 2018	
Project type	Watching Brief	
Previous work	Field walking (CA 2018)	
Future work	Unknown	
PROJECT LOCATION		
Site Location	Santon, Scunthorpe, Lincolnshire	
Study area (M^2/ha)		
Site co-ordinates	494064 410261	
PROJECT CREATORS		
Name of organisation	Cotswold Archaeology	
Project Brief originator	None	
Project Design (WSI) originator	Cotswold Archaeology	
Project Manager	Adrian Scruby	
Project Supervisor	Anna Moosbauer	
MONUMENT TYPE	none	
SIGNIFICANT FINDS	none	
PROJECT ARCHIVES	Intended final location of archive (museum/Accession no.)	Content (e.g. pottery, animal bone etc)
Physical	n/a	none
Paper	North Lincolnshire Museum Service	Trench sheets
Digital	North Lincolnshire Museum Service	Digital photos
BIBLIOGRAPHY		
CA (Cotswold Archaeology) 2018 *Little Crow, Santon, Scunthorpe, Lincolnshire: Archaeological Evaluation.* CA typescript report **18523**		

DRAFT



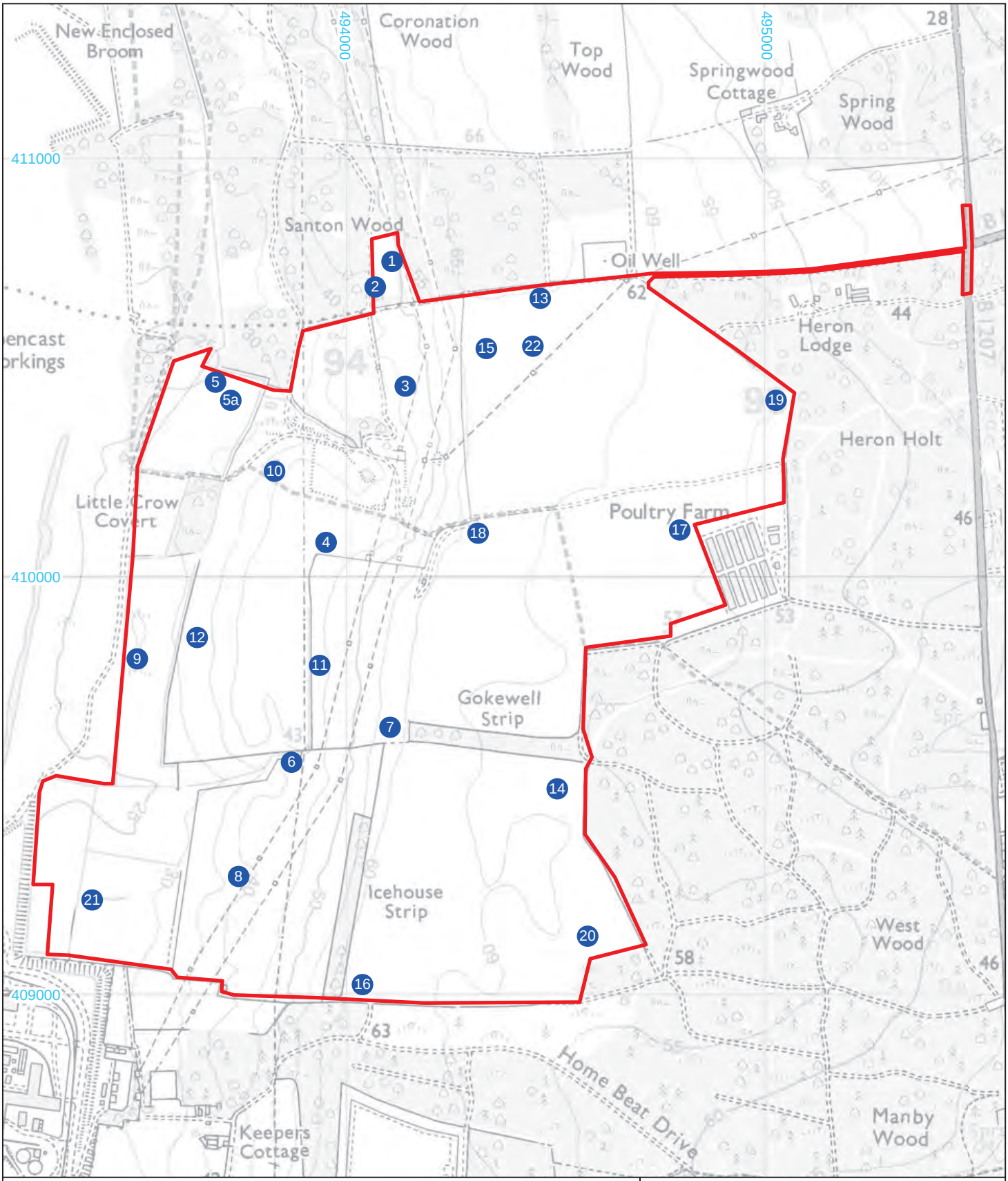
© Crown copyright and database rights 2018
Ordnance Survey 0100031673

Cotswold Archaeology
Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE
Little Crow, Santon, Scunthorpe
Lincolnshire

FIGURE TITLE
Site location plan

DRAWN BY	AW	PROJECT NO.	661202	FIGURE NO.
CHECKED BY	DJB	DATE	23.10.2018	1
APPROVED BY	AM	SCALE@A4	1:25,000	



Site boundary

1 Test pits

N

0 1:12,500 500m

© Crown copyright and database rights 2018 Ordnance Survey 0100031673

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Little Crow, Santon, Scunthorpe
Lincolnshire

FIGURE TITLE

Test pit locations

DRAWN BY	AW	PROJECT NO.	661202	FIGURE NO.
CHECKED BY	DJB	DATE	23.10.2018	2
APPROVED BY	AM	SCALE@A4	1:12,500	



Test pit 1, looking north east



Test pit 2, looking south west



Test pit 3, looking south



Test pit 4, looking south east



Test pit 5, looking north west

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

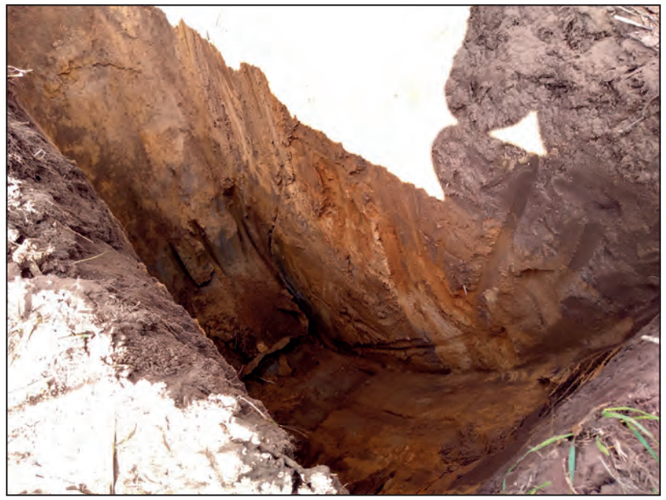
PROJECT TITLE
Little Crow, Santon, Scunthorpe
Lincolnshire

FIGURE TITLE
Photographs - test pits 1 to 5

DRAWN BY	**AW**	*PROJECT NO.*	**661202**	*FIGURE NO.*
CHECKED BY	**DJB**	*DATE*	**23.10.2018**	**3**
APPROVED BY	**AM**	*SCALE@A3*	**NA**	



Test pit 5a, looking south east



Test pit 6, looking north



Test pit 7, looking south



Test pit 9, looking west



Test pit 10, looking south east



Test pit 11, looking north west

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE
Little Crow, Santon, Scunthorpe
Lincolnshire

FIGURE TITLE
Photographs - test pits 5a to 11

DRAWN BY	**AW**	*PROJECT NO.*	**661202**	*FIGURE NO.*
CHECKED BY	**DJB**	*DATE*	**23.10.2018**	**4**
APPROVED BY	**AM**	*SCALE@A3*	**NA**	



Test pit 12, looking west



Test pit 13, looking south west



Test pit 14, looking west



Test pit 15, looking north



Test pit 18, looking south



Test pit 22, looking north

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Little Crow, Santon, Scunthorpe
Lincolnshire

FIGURE TITLE

Photographs - test pits 12 to 22

DRAWN BY	**AW**	*PROJECT NO.*	**661202**	*FIGURE NO.*
CHECKED BY	**DJB**	*DATE*	**23.10.2018**	**5**
APPROVED BY	**AM**	*SCALE@A3*	**NA**	

Cotswold Archaeology

Andover Office

Stanley House
Walworth Road
Andover
Hampshire
SP10 5LH

t: 01264 347630

Cirencester Office

Building 11
Kemble Enterprise Park
Cirencester
Gloucestershire
GL7 6BQ

t: 01285 771022

Exeter Office

Unit 53
Basepoint Business Centre
Yeoford Way
Marsh Barton Trading Estate
Exeter
EX2 8LB

t: 01392 826185

Milton Keynes Office

Unit 8 - The IO Centre
Fingle Drive
Stonebridge
Milton Keynes
Buckinghamshire
MK13 0AT

t: 01908 564660

e: enquiries@cotswoldarchaeology.co.uk



APPENDIX 8.4

LITTLE CROW SOLAR PARK, SCUNTHORPE, NORTH LINCOLNSHIRE – ARCHAEOLOGICAL FIELDWALKING SURVEY (COTSWOLD ARCHAEOLOGY, NOVEMBER 2018).

Little Crow
Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

ARCHAEOLOGICAL FIELDWALKING SURVEY

On behalf of INRG Solar (Little Crow) Ltd

November 2018

Little Crow Solar Park, Scunthorpe, North Lincolnshire

Archaeological Fieldwalking Survey

CA Project: 661163
CA Report: 18971

Document Control Grid						
Revision	Date	Author	Checked by	Status	Reasons for revision	Approved by
A	01/10/18	Chris Elis	APS	Issue 1		APS

This report is confidential to the client. Cotswold Archaeology accepts no responsibility or liability to any third party to whom this report, or any part of it, is made known. Any such party relies upon this report entirely at their own risk. No part of this report may be reproduced by any means without permission.

© Cotswold Archaeology

CONTENTS

SUMMARY 3

1. INTRODUCTION 5

2. ARCHAEOLOGICAL BACKGROUND 6

3. AIMS AND OBJECTIVES 9

4. METHODOLOGY 10

5. RESULTS (FIGS 2 - 4) 11

6. THE FINDS 19

Pottery 19

Ceramic Building Material 23

Fired Clay 25

Flint 26

Industrial waste 26

Glass 27

Metalwork 27

Other finds 28

7. DISCUSSION 28

8. CA PROJECT TEAM 31

9. REFERENCES 31

APPENDIX A: THE FINDS 33

APPENDIX B: OASIS REPORT FORM 52

LIST OF ILLUSTRATIONS

Fig. 1 - Site location plan with fieldwalking survey areas (1:25,000)

Fig. 2 - North Lincolnshire Historic Environment Record Monument and Cropmark Plot

Fig. 3 - Geophysical Survey Results (Sumo Survey 2018)

Fig. 4 – Finds Distribution Plot

SUMMARY

Project Name: Little Crow Solar Park, Scunthorpe, North Lincolnshire
Location: Santon, Scunthorpe, North Lincolnshire
NGR: 494064 410261
Type: Fieldwalking Survey
Date: 10 – 21 September 2018
Location of Archive: North Lincolnshire Museum
Site Code: LCRO 18

An archaeological fieldwalking survey was undertaken by Cotswold Archaeology in September 2018 on land at Santon, Scunthorpe. The fieldwalking was undertaken to inform the heritage chapter of an Environmental Statement to support a Development Consent Order application for a proposed solar PV array to be known as Little Crow Solar Park.

Fieldwalking was undertaken across three areas totalling *c*.53.25 Ha, a 24.4% sample by area of the 218 Ha development site. The survey recorded over 19 Kg of artefacts of which most were of post-medieval and modern date and are of little archaeological significance. Only 4.4% by weight of the finds assemblage recorded from the survey is of archaeological interest and significance and only 49, or 3.6%, of the 1372, 20m runs from the survey contained archaeologically significant finds.

By far the majority of the significant finds were from the south of the site and comprise nine of the 11 pieces of Neolithic/Bronze Age worked flint that were recovered, as well as 23, or 74%, of the 31 runs that produced 12th to 16th century pottery.

A very small assemblage, 2% by weight, of Roman material recorded. This comprised locally-made greyware pottery from the north and south areas of the site. A small collection of possible Roman ceramic building material, weighing 426g, was recorded from the south-central area of the site. Some may be fragments of Roman roof tiles or *tegulae*. However, because of their abraded and fragmentary condition the fragments could easily be of post-medieval date.

By far the greatest component of the archaeologically significant finds assemblage from the site comprised 35 sherds of 12th to 16th century pottery, which totals 50% of the archaeologically significant finds assemblage. The majority of the medieval and early post-medieval pottery was recorded from the southern part of the proposed development area, but also to a lesser degree to the immediate south of the site of Gokewell Priory, a Cistercian holding established in the 12th century and suppressed at The Dissolution of the Monasteries between 1536 and 1541. The date range of the medieval and early post-medieval pottery fits closely with the life span of the Priory and these material spreads are probably derived from the manuring of arable fields.

The greatest quantity, 91% by weight, of material collected from the current fieldwalking survey was post-medieval or modern in date and comprised various building and settlement/domestic waste with no archaeological significance.

Overall, the quantity of archaeologically significant material recovered during the survey was low, with no clear concentrations of artefactual material having been recovered.

1. INTRODUCTION

1.1 In September 2018 Cotswold Archaeology (CA) carried out an archaeological fieldwalking survey for INRG Solar (Little Crow) Ltd on *c*. 53ha of land (24.4% of the proposed development area) at Santon, Scunthorpe, Lincolnshire (hereafter referred to as the 'Site'), centred at NGR: 494064 410261. The fieldwalking survey was undertaken following pre-application advice from Alison Williams, Historic Environment Officer, North Lincolnshire Council (HEONLC). The survey results are to inform the heritage chapter of a forthcoming Environmental Statement to support a Development Consent Order for a proposed solar PV array. The proposed development is a 'Nationally Significant Infrastructure Project' (NSIP).

1.2 The evaluation was carried out in accordance with an agreed Written Scheme of Investigation (CA 2018), approved by the HEONLC, the archaeological advisor to the Local Planning Authority (LPA), North Lincolnshire Council. The fieldwork also followed *Standard and guidance for archaeological field evaluation* (CIfA 2014).

The Site

1.3 The proposed development area is approximately 218 Ha in extent, and comprises a number of arable fields lying along a north/south limestone ridge lying at *c*.60m above Ordnance Datum (aOD) and extending downslope westwards to *c*. 25m (aOD). The lower-lying, valley bottom, area includes pasture with natural springlines and contains the Bottesford Beck watercourse. Small areas of coppice woodland and hedgerows demarcate many of the field boundaries. The Site is also traversed by a number of farm tracks running along the ridge and the valley bottom, giving access to the various fields from the nearby public highways.

1.4 The Site is situated in an area with complex, transitional geological strata. The bedrock geology of the area is mapped as comprising limestone and (subequal/subordinate) argillaceous rocks of the Raventhorpe Beds and Scawby Limestone, sandstone of the Northampton Sand Formation and in the southern part of the Site mudstone and limestone of the Kirton Cementstone Beds, and ferruginous limestone and ferruginous sandstone of the Marlstone Rock Formation. In the central and western part of the Site these are overlain by superficial deposits of the Charmouth Mudstone Formation and Whitby Mudstone Formation (BGS 2018), and sand of the Sutton Sand Formation.

2. ARCHAEOLOGICAL BACKGROUND

Desk Based Assessment (Fig. 2)

2.1 The Site has been the subject of a Cultural Heritage Baseline Study or desk based assessment and earthwork survey (Pegasus Group 2018) and the following section utilises information contained in that report. One area of specific prehistoric archaeological potential has been identified within the Site in the centre of the Field 11/12 fieldwalking area (Fig. 4). It comprises the cropmark of a possible round barrow (Neolithic/Early Bronze – 4000 – 1500 BC). A second barrow ring-ditch was also recorded in the geophysical survey in Field 14 (see below), an area which was not part of the current survey. A number of poorly-located flint artefacts are also recorded from the wider area, while the Sutton Sand Formation (cover sands/ blown sands) have the potential to contain or mask prehistoric lithic material.

2.2 A former Cistercian nunnery known as Gokewell Priory, was located in the northern part of the Site and was excluded from the

present fieldwalking survey area. Gokewell Priory was established in the 12th century and dissolved in the 16th century. Gokewell Priory Farm was built on the site of the Priory between the late 17th and early 19th century and material from the former Priory may have been used during the construction of the farm. Gokewell Priory Farm was itself abandoned and demolished in the late 20th century. It is probable but unproven that the below-ground remains of the medieval Priory and post-medieval Farm are located within the northern part of the Site. However, the core of the Priory, where the later farm buildings were constructed, is not proposed for the location of solar panels. However, there is potential for below-ground remains of ancillary structures and features associated with the Priory to be present within the areas proposed for development.

2.3 Beyond the site of the former Gokewell Priory, there is no proven evidence for medieval activity within the Site aside from possible medieval stockade enclosures recorded as cropmarks in the Field 18/19 fieldwalking area. No above-ground remains of ridge and furrow earthworks survive within the Site although ridge and furrow is noted in the North Lincolnshire Historic Environment Record (NLHER) in Fields 5 and 18/19. These references refer to historic aerial photograph evidence of earthwork features or cropmarks/soilmarks subsequently totally removed by modern ploughing.

2.4 The Site also contains a slight, ovoid, possible earthwork enclosure of unknown date, evident from a LiDAR survey of the Site and preserved partly within the woodland of Little Crow Covert (Field 8a), which may extend west, into the adjacent field. However, it is not visible as a cropmark on aerial photographs of the field to the west.

2.5 Within the southern portion of the Site (Field 18/19) are the records of two cropmarks of possible enclosures, one square and one ovoid. These sites are located to the north of Manby deserted medieval village (DMV), which lays immediately south of the Site boundary. Due to their size and location, they are most likely to be medieval stock enclosures, although they may also be of geological origin. Analysis of aerial photographs has also indicated the presence of two partial circular cropmarks of unknown origin within the same field. An undated limestone wall was recorded adjacent to the B1027 in the north-eastern part of the Site. Potential below-ground remains relating to a former WWII Heavy Anti-Aircraft Battery in the eastern portion of the Site (Field 12) could also potentially survive.

Geophysical Survey (Fig. 3)

2.6 Prior to the current fieldwalking survey a geophysical survey (Sumo Survey 2018) was undertaken across the Site to assess the potential of the Site to contain sub-surface features of archaeological significance. A total of 16 (1 – 16) geophysical anomalies were listed in the survey results. A second ring-ditch anomaly (1) was recorded in Field 14 which comprised a sub-circular anomaly of *c*.14m diameter. In the north-east of Field 7 a long curvilinear anomaly (2) was recorded extending over *c*.400m and beyond the north and east boundaries of the field. Although interpreted as a more recent field boundary (Sumo Survey 2018, 3) the anomaly does not correlate with historic mapping evidence and is not reported on the NLHER or DBA (Pegasus Planning 2018). Similar ditch-like anomalies (3, 4) have been recorded in Fields 20 and 17 respectively which also do not appear in the NLHER and DBA, probably because they have not appeared as cropmarks/soilmarks in historic aerial photographs of the Site.

2.7 A series of rectilinear and linear anomalies (5) were recorded in Field 20 in the south-east of the Site. Although classed as of 'uncertain origin' (Sumo Survey 2018, 4) the anomalies have a rectilinear and linear distribution perhaps redolent of later prehistoric or later field systems and settlement/farmstead evidence. However, they are also very similar to anomalies with a geological 'signature' which are typically produced from limestone fracturing (*op cit*). Several linear trends and other linear, ditch-like an anomalies (7) have been recorded in Fields 3, 5, 6, 10, 14, 17, 18/19.

2.8 In addition, a relatively large number of linear anomalies (Fig. 3 no's 8 – 16) have been recorded across the Site from the geophysical survey, some of which correlate with former field boundaries recorded on historic mapping for the Site. However, some of this group of anomalies are curvilinear or are on markedly differing alignments to the prevailing 'grain' of the land divisions evident not only from the geophysical survey but also historic mapping, aerial photographic and LiDAR evidence (Pegasus Planning 2018).

3. AIMS AND OBJECTIVES

3.1 The objectives of the fieldwalking survey are to provide information about the likely archaeological resource within the Site, including its presence/absence, character, extent and date. Combined with the results of other archaeological investigations carried out on the Site, including a desk-based heritage assessment and earthwork survey (Pegasus Group 2018) and a geophysical survey (Sumo Survey 2018), this information will enable HEONLC to identify and assess the significance of the heritage resource within the Site, to consider the impact of the proposed development upon that

significance, and to avoid or minimise conflict between conservation of the heritage resource and any aspect of the development proposal, in line with the *National Planning Policy Framework* (MHCLG 2018).

4. METHODOLOGY

4.1 The fieldwalking survey was undertaken across three areas, totalling 53.25ha, within the overall 218ha Site (Fig. 1). Land within the Gokewell Priory exclusion zone was not included in the survey.

4.2 The fields walked within the Site were individually numbered and correspond with the field numbers used for the earlier geophysical survey (Sumo Survey 2018), A series of 20m transects were established within the individual fields using a Leica GPS. Fieldwalking transects were marked out on Site using temporary markers such as canes and flags, in accordance with *CA Technical Manual 4: Survey Manual* (2012). Fieldwalking transects were generally aligned parallel to the longest boundary of the individual field being surveyed and were spaced at 20m intervals (Runs). Transects will be tied in to the OS grid and will be assigned numeric identifiers for hectare and run numbers.

4.3 The fieldwalking team walked the transects/runs and observed 2m-wide corridors centred on each individual transect as a basis for artefact collection.

4.4 The length of each transect was subdivided into 20m 'Runs'. Artefacts recovered from each individual 20m Run were bagged together. Bags were marked with the CA site code (LCRO18), the Field Number, the Hectare Number and the Run Number (e.g. SITE

CODE, Field 1, Ha.65, Run 1-25). All designated hectares contained 25 runs (maximum) that were numbered sequentially (1-25) from the south to the north and the west to the east i.e. from the south-west to the north-east corners of each numbered hectare.

4.3 The archive and artefacts from the evaluation are currently held by CA at their offices in Andover and Milton Keynes respectively. Subject to the agreement of the legal landowner the finds will be deposited with North Lincolnshire Museum along with the site archive. A summary of information from this project, set out within Appendix B, will be entered onto the OASIS online database of archaeological projects in Britain.

5. RESULTS (FIGS 2 - 4)

5.1 This section provides an overview of the fieldwalking results including detailed summaries of the fields. This includes information on geology, topography and ground conditions and archaeological visibility. The finds assemblage is reported on below in Section 6 and detailed in Appendix A.

5.2 The fieldwalking survey covered three separate areas of the Site, including a southern area (Field 18/19) and central area (Field 11/12) and a northern area (Fields 3, 4, 5, 6, 8, 10, 11 and 12). The northern area included an exclusion zone around the site of the 12th century Cistercian Priory and later farmstead of Gokewell Priory/Farm, which was not fieldwalked.

Field 3

5.3 This field is situated in the lower-lying, relatively flat, western part of the Site, lying at *c*.27.8m (aOD). The field was demarcated by

hedgerows to the west and east and by a metalled farm track and large field boundary/drainage ditch, separating it from Field 8 and a small coppice (Field 8a). The soil was characterised by dark grey fine sand, friable and loose with very occasional sub-angular and angular limestone fragments (<60mm). The archaeological visibility was generally very good but was very poor for Hectare (Ha) No.54 because of the 80-90% coverage in this part of the field. Of the 23 runs undertaken four (17.4%) contained artefacts, none of which were of archaeological significance.

Field 4

5.4 This Field lay at the north-west corner of the Site and mostly comprised a relatively flat terrace below the high ridge of the east of the Site, generally lying at *c*.41.8m (aOD). However, the north-western extent of the field dipped moderately steeply down to the north and west to *c*. 31.5 to 32m (aOD). The north, west and east sides of the fieldwalking area were defined by a metalled farm track whilst to the south it was bounded by the north side of the exclusion area surrounding the Gokewell Priory/Farm site.

5.5 The soil was characterised by a mid brown fine sand which was loose and friable and prone to aeolian translocation. Some areas were moderate to good visibility because of a very slight crop cover but were mostly excellent. This was because of the particularly light nature of the soil which had been excellently weathered and coarse components, including artefacts, being 'winnowed' to the surface through rain and wind action. Of the 65 runs undertaken 15 (23.1%) contained artefacts of which the only find of archaeological significance was a piece of ?Roman brick/tile (127g) from the north-west of Ha.107.

Field 5

5.6 This field extended from the high ridge of the Site along its eastern boundary down to a relatively low-lying and relatively flat terrace that also included most of Field 4 to the west. The lower-lying terrace, which included the western three hectares (Ha. 101-103) was situated at *c*.42m (aOD) and rose gradually from the east side of Ha.101-103 to *c*. 59.5 to 62m (aOD) on the high north/south ridge running through the Site. The field was defined by a hedgerow to the east and a metalled farm track to the north, west and south. The south-west of the fieldwalking area of the field was also demarcated by quite a large part of the Gokewell Priory/Farm exclusion area.

5.7 The soil in the western, lower-lying area of the field was markedly different from that of the east side of the field on the ridge. In the lower area the soil was identical to that for Field 4 to the immediate west. The eastern part of the field comprised a light yellowish-brown fine sandy clay with very occasional sub-angular and angular limestone (<80mm). Of the 120 runs undertaken 31 (25.8%) contained artefacts. The only artefact of archaeological significance was a small piece (10g) of ?Roman ceramic building material (CBM).

Field 6

5.8 This field was wholly located just below the crest, slightly on the west side of the high north/south ridge running along the centre of the Site. Although all situated on the ridge the ground was gently undulating, including a relatively low, east/west aligned landscape feature (coombe) running across the centre of the field. The higher ground lay at *c*. 63 – 64m (aOD) and the lower 'coombe' area at *c*. 62m (aOD). The field also sloped gently down to the western field boundary which laid at *c*.62m (aOD).

5.9 The narrow strip of the fieldwalking area was demarcated by a hedgerow boundary to the east, and a metalled farm track to the north and the south. The agreed eastern extent of the fieldwalking survey area demarcated the east side of the Field 6 fieldwalking area.

5.10 The soil was characterised by a light yellowish-brown silty clay with very occasional sub-angular and angular limestone and sub-rounded chert cobbles (<80mm). The overall archaeological visibility was excellent with good weathering of the soil surface although the clayey soil matrix resulted in moderate to common clods (<80mm). There was a very slight crop coverage (<5%) across the eastern 20m runs of the field. Of the 79 runs undertaken 14 (17.7%) contained artefacts, none of which were of archaeological significance.

Field 8

5.11 This relatively flat field laid wholly in the lower-lying, north-western part of the Site, generally at *c*. 27.8m (aOD). The field was bounded by a hedgerow to the south, a metalled farm track to the west and north and a small coppice (Field 8a) to the east.

5.12 The soil was characterised by a dark grey fine sand, friable, loose with very occasional sub-angular and angular limestone (<80mm). The archaeology visibility was very poor because of 80-90% ground coverage by crop. Between the crop the soil was very well weathered and the light soil had led to a 'winnowing' of coarse components and artefacts to the surface leading to excellent archaeological visibility in the patches where the crop was absent. Of the 50 runs undertaken 19 (38%) contained artefacts, none of which were of archaeological; significance.

Field 10

5.13 Field 10 was one of the largest fieldwalking areas of the survey, a sub-rectangular east/west aligned area, lying predominantly on the lower-lying terrace of the Site, rising gently to the east to the high ridge. The western area of the Field dips down gently to the north and the west from *c*.42.5m (aOD) to *c*.30m (aOD). From the mid-east part of the Field, lying at *c*.48m (aOD) the ground rises up to *c*. 55 – 56m (aOD) towards the ridge line. The Field was bounded by a small coppice (Field 8a) to the west, hedgerow boundaries to the south and east and the Gokewell Priory/Farm exclusion area to the north. A metalled farm track also ran across the north-west and south-eastern extents of the field.

5.14 The soil was characterised by a light brown fine sand which was friable and loose and prone to being windblown and 'winnowed'. Because of the lack of crop coverage and the aeolian 'winnowing', all coarse components (mostly modern waste fragments e.g. plastic, textile, wood, coal, clinker, metal, ceramics, glass) had weathered to the surface. Consequently, archaeological visibility over nearly all the Field was excellent, with a loose 'powdery' character to the soil. However, the east of Ha. 67, and the south of Ha. 68, 70 and 72 were 100% covered by crop and were unavailable for fieldwalking. Of the 269 runs undertaken 70 (26%) contained artefacts, of which 10 runs contained two worked flint flakes (6507, 7103), a sherd of local greyware Roman pottery (24g) in the north-east (7303) and seven runs with 12th – 16th century pottery. The latter were located mainly in the middle and eastern parts of the field, particularly close to the southern boundary of the exclusion area of the Gokewell Priory site.

Field 11

5.15 Two separate areas of this particular field were fieldwalked. The area in the very north of the field has been ascribed to Field 11, whereas the area including two contiguous Fields 11 and 12, separated by a north/south farm track has been designated Field 11/12, the results of the latter are detailed below.

5.16 The Field 11 area comprised a thin rectangular area of land demarcated to the west, north and east by hedgerow field boundaries demarcating the whole field. The southern extent was delineated by the extent of the agreed fieldwalking survey. The land dropped gradually down from a high at the east end, lying at *c*. 56m (aOD), down to *c*. 43 to 44m (aOD) in the west.

5.17 The soil was characterised by light brown fine sand, friable, loose and 'powdery' in consistency. It contained very occasional angular and sub-angular limestone inclusions (<80mm). The complete lack of crop and the fine, light nature of the soil, had led to perfect archaeological visibility conditions through the 'winnowing' effect of the wind resulting in clearly visible, surface coarse components (including artefacts) where present. Of the 36 runs undertaken six (16.7%) contained artefacts, none of which were of archaeological significance.

Field 11/12

5.18 This comprised a sub-square area in the centre of the Site, the middle of the three areas of the fieldwalking survey. It comprised the east and west edges respectively of Fields 11 and 12, either side of a metalled farm track separating the fields. The area was located on the high ridge of the Site at *c*.61m (aOD) but dipped gently down to the west. The crop coverage in the north-western part of the area over 22 (20m) runs was *c*. 80 -90% making the

archaeological visibility very poor to poor. However, *c*.85% of the area had good archaeological visibility with little or no crop coverage. The soil was characterised by a light to mid brown, fine clayey sand with common angular and sub-angular limestone (<0.15m, mostly <80mm) and moderate plastic fragments throughout. Of the 156 runs undertaken 63 (40.4%) contained artefacts, of which only three findspots were of archaeological significance. These included a number of ?Roman cbm fragments (6/271g) including possible *tegula* roof tile fragments. Two sherds of 13th – 16th century pottery were recorded in the east and north of the field.

Field 12

5.19 As with Field 11 mentioned above, a separate area of Field 12 was also fieldwalked and comprised a triangular area of ground in the north-west of the Field, and designated 'Field 12'. It was demarcated by an area of hard-standing for farm use to the north and west and the south-eastern extent of the agreed fieldwalking area to the east and the south. This small, relatively flat area laid on the ridge at between *c*. 61 - 62m (aOD).

5.20 The soil was characterised by a mid brown friable and loose (fine) silty sand with common sub-angular and angular limestone (<0.15m, mostly <80mm). The moderate crop cover in the easternmost *c*.30m of the area resulted in moderate archaeological visibility, but was otherwise excellent. Of the 20 runs undertaken no artefacts at all were contained within the field.

Field 18/19

5.21 This sub-rectangular, north/aligned field was the largest and southernmost area of the three fieldwalking areas to be undertaken. It was defined by a field boundary ditch to the south,

a woodland belt to the east, field boundaries and a farm track to the north and set-aside pasture to the west. The field contained two north-north-east/south-south-west aligned terraces along the mid-east and mid-west of the area although there was a general trend to dip gently down to the west. The eastern, higher side of the field lay at c. 52 – 53m (aOD) whilst the middle area lay between *c*. 41 – 45m (aOD) before dipping again to the lowest lying part at the western edge of the field at *c*.31 – 32m (aOD).

5.22 The soil was characterised by a mid brown fine sand, friable, loose, and with a 'powdery' consistency, containing occasional sub-angular and angular limestone (<0.15m, mostly <0.1m). The archaeological visibility was very good to excellent because of the relative lack of crop coverage and because of the light soil conditions and wind action 'winnowing' all coarse components, including artefacts at the surface.

5.23 Of the 554 runs within this fieldwalking area 35 runs (20.6%) contained artefacts of archaeological significance. The finds distribution from this field comprised the greatest number of archaeologically significant artefacts. These were spread evenly; across all but the southernmost third of the field, and were slightly more common in the lower-lying (western) part of the field (this latter aspect is probably from soil creep downslope over centuries of ploughing.

5.24 The field contained 9 of the 11 pieces of worked flint from the Site of probable Neolithic/Bronze Age date, most of which was débitage. However, two flint scrapers (421, 1021) were recorded *c*.100m apart in the lower-lying part of the field. The flint distribution spread across the whole of the middle (east/west) of the field, from

the high ridge to the east to the low-lying ground to the west with no significant patterning (Fig. 4).

5.25 A single sherd (60g) of Roman local greyware pottery was recorded from the north of the field (2001).

5.26 By far the greatest number of artefacts of significance from the field were 23 runs containing medieval pottery of 12th to 16th century date (23/194g) as well as 6 runs with 15th to 17th century pottery.

6. THE FINDS

Pottery

6.1 The fieldwalking project produced 156 sherds of pottery weighing 2319g (9.3% by weight of finds assemblage). The pottery derived from 110 runs and its condition varied depending on the sherds' date. In general, medieval and transitional sherds survive in moderately poor condition, with their surfaces often heavily abraded. By contrast, the later post-medieval and modern material survives in good condition. Despite the high degree of fragmentation of the pottery, the average sherd size per area is fairly high (15g per sherd), allowing substantial analysis and dating.

6.2 The pottery was quantified by fabric, count and weight with the assistance of x40 power magnification. The quantities were input directly on an Excel spreadsheet, which forms the archive catalogue and is presented in Appendix A. Few sherds of Roman pottery were identified based on the National Roman Fabric Reference Collection (Tomber and Dore 1998). Post-Roman pottery was recorded and correlated with the Museum of North Lincolnshire

fabric series (Boyle *et al*. 2018), and when available, vessel typologies were paralleled to Lincolnshire examples published in McCarthy and Brooks (1988). Later post-medieval pottery and fabrics that were not covered by the North Lincolnshire type series were recorded according to the East Anglian and Eastern England fabric series (Anderson 2004).

Roman

6.3 The Roman pottery consists of two sherds (84g) from Fields 10 (7303) and 18/19 (2001). They are both Holme-on-Spalding Moor reduced ware fabrics (HSM RE). Run 2001 produced a grey ware jar fragment and run 7303 produced a decorated grey ware sherd with two intersecting burnished lines. The exact date within the Roman period of such grey wares is unknown.

Medieval

6.4 Medieval pottery consisted of 27 sherds (397g) deriving from 25 runs. The assemblage consists of typical Lincolnshire glazed wares (LSW) and various medieval coarse wares (MCW). The Lincolnshire wares (LSW) can be subdivided in four local fabrics according to the North Lincolnshire type series (Boyle *et al*. 2018). Humber (HUM) wares (10/135g) are typically local and date between the 12th and 16th centuries AD. They resemble typical medieval Humber types and might not extend as late as the 16th century, perhaps with the exception of two examples.

6.5 In general, Humber wares are green glazed; however, two fragments from Field 18/19 (Runs 1522 and 2304) exhibit purple glazes and belong to Watkins' (1987) fabric 'Humber 4'. The glazes of these fabrics show some similarities with Cistercian types and are likely to be transitional. North Lincolnshire Humber types (NLHT) form the majority of the medieval assemblage (6/167g).

Such vessels are characterised by olive green glazes, although in the present assemblage most sherds are either unglazed or come from unglazed areas along the vessels' walls. Base sherds from this fabric come from typical cooking pots with sagging bases dating to the 13th and 14th centuries AD. A jar rim from Field 10 (Run 6703) comes from a Potter Hanworth type (McCarthy and Brooks 1988, 258, fig.148) and dates firmly in the early 14th century. A green glazed fragment from a bowl with square rim, also recovered from Field 10 (Run 7311), has been produced from local Humber clay. However, the typology of the vessel is closer to contemporary Norfolk and Yorkshire types.

6.6 Toynton medieval wares (TOY) are relatively rare (2/32g) but easily identified due to their coarser inclusions compared to the Humber wares. Their date range is between the 13th and 15th centuries AD. North Lincolnshire Coarse Wares (NLCW) are equally limited (4/45g). They are characterised by coarse sandy fabrics, which could form different Humber type variants or even coming from other local areas. Such sherds are usually covered with olive green glazes and their date range is between the 13th and 15th centuries AD. Finally, medieval grey, coarse wares (MCW), also known as miscellaneous medieval reduced wares (MEDX RE), form a small proportion of the assemblage (5/18g) and they could either be local or even imported from neighbouring regions.

Late medieval and transitional

6.7 Late medieval and transitional pottery consists of 30 sherds (576g) deriving from 27 runs. This pottery is the second most common in the assemblage and is formed by three fabrics. The majority is Cistercian (CTW or CIST) types (22/428g), characterised by a distinct metallic purple/black glaze. In general, Cistercian wares are thin-walled and covered with high quality glaze on both surfaces;

however, there are some larges types, mainly basin rims, which are glazed on their interior only (e.g. from Runs 7107, 7111 from Field 10, and 7920 from Field 11). Cistercian wares date firmly between the 15th and 17th centuries AD. Midlands purple wares (MIDP or MP) are relatively limited (7/131g). These are characterised by a hard purple fabric, which is often vitrified, and some are covered in purple coatings or glazes. They date between the 15th and 16th centuries AD. Finally, a late Lincolnshire ware rim from a jug (LLSW) was recovered from Field 18/19 (Run 1814). The vessel's fabric associates with late Toynton wares (TOYII) and is contemporary with the Midlands purple wares (MP).

Post-medieval

6.8 Post-medieval pottery forms the majority of the pottery assemblage and is contemporary with the CBM from the site. It consists of 97 sherds (1262g) deriving from 64 runs. The post-medieval assemblage can be subdivided into two periods based upon their fabric. The early post-medieval wares date between the 16th and 18th centuries AD. They consist of local or imported glazed red earthenware types (GRE: 17/257g); late Lincolnshire glazed wares (LLSW) which are formed entirely by late Humber wares (LHUM) with distinct olive green glazing (10/339g), and a few Staffordshire types (STAF) with distinct yellowing brown glazes (4/45g). The latter sherds date to the late 17th and 18th century AD.

6.9 Late post-medieval pottery dating after the 18th century includes English stoneware types (ESW). Such stoneware (15/ 245g) could date between the 17th and 19th centuries AD; however, distinct types of industrial jars and bottles, such as those from Field 5 (Runs 9605, 10104, 10214) and Field 4 (Run 10716), suggest that such fabrics are likely to date well into the 20th century. Typically

late post-medieval fabrics include an industrial black ware (BLW) from Field 11/12 (Run 4306) and two pearl wares (PEW) from Field 3 (Run 5420) and Field 10 (Run 7306). These date between the late 18th and middle 19th century. The comprise a combination of refined red earthenware types (RRE), mainly bowls and flower pots (9/84g) as well as a large component (27/214g) of industrially produced, refined white earthenware types (RWE). The latter are primarily bowls, mugs, cups, teapots and an earthenware box from Field 4 (Run 10710). Finally there is a variety of transfer printed earthenware types, which are primarily plates with blue floral and oriental decorative motifs (12/69g), most of which are of 19th and 20th century date.

Ceramic Building Material

6.10 Ceramic building material forms the largest finds category recovered from the Site. It consists of 336 fragments of various types weighing over 19.8Kg and comprises 75.2% (by weight) of the whole finds assemblage from the fieldwalking survey. The material derived from 216 runs and it survives in moderate to poor condition, most of which highly fragmentary due to agricultural activities on the plough soil. Due to its quantity, CBM was rapidly assessed and quantified by fabric, type, count and weight. As most of it consists of non-identifiable fragments of post medieval date, it was discarded after quantification. Few selected pieces noted in the finds concordance table in Appendix A have been kept for future reference.

6.11 As noted in Table 1, almost three quarters of the CBM by weight is of post-medieval date, with very few pieces of possibly Roman or late medieval-transitional date. The distribution of the CBM by fabric in Table 2 shows that almost half of the assemblage is made of fine sandy fabrics with no visible inclusions, a pattern that is

noted in post-medieval CBM fabrication. The distribution of the material in Table 3 shows that over a third of the assemblage by count consists of unidentified types. Such fragments are either too small due to fragmentation of preserve no characteristic features that could assist in their identification. Over 20% of the identified types by count consist of modern bathroom tile fragments and 13.4% consist of post-medieval roof tiles. A characteristic late medieval transitional brick with glazed surfaces from Field 18/19 (Run 1706) matches the date of Cistercian (CTW) and Midland purple wares (MIDP). Still, most of the glazed CBM from the Site consists of salt-glazed drain pipes dating to the 20th century, such as those from Field 10 (Run 7118) and Field 4 (Run 10710). The earliest material from the Site consists of six possible *tegula* roof tile fragments of Roman date from the south-east of Field 11/12 (Run 4214). The pieces are heavily abraded and lacking their corners/flanges; therefore, it is also possible that they come from post-medieval flanged tiles, which often resemble *tegulae*.

Table 1. Quantification of CBM by period

Period	Count	Count %	Weight (g)	Weight %
Roman?	10	3.0	436	2.2
Lmed-pmed	21	6.3	2090	10.5
Pmed	227	67.6	15033	75.6
Pmed?	1	0.3	26	0.1
Modern	77	22.9	2292	11.5
Totals	**336**	**100.0**	**19877**	**100.0**

Table 2. Quantification of CBM by fabric

Fabric code	Fabric description	Count	Count %	Weight(g)	Weight %
csc	coarse sandy with chalk	1	0.3	59	0.3
fs	fine sandy	178	53.0	9464	47.6
fsc	fine sandy with chalk	2	0.6	10	0.1
fscp	fine sandy with clay pellets	7	2.1	315	1.6
fsfe	fine sandy, ferrous	3	0.9	168	0.8
fsfec	fine sandy, ferrous and chalky	1	0.3	5	0.0
fsg	fine sandy with grog	2	0.6	64	0.3
fsv	fine sandy and vesicular	12	3.6	2743	13.8
fsx	fine sandy with mixed clays	4	1.2	200	1.0
ms	medium sandy	18	5.4	1938	9.7

msc	medium sandy with chalk	6	1.8	71	0.4
mscp	medium sandy with clay pellets	7	2.1	73	0.4
msfe	medium sandy, ferrous	8	2.4	1805	9.1
msfeg	medium sandy, ferrous with grog	4	1.2	890	4.5
msfeqz	medium sandy, ferrous with quartzite	1	0.3	44	0.2
msg	medium sandy with grog	4	1.2	777	3.9
msv	medium sandy and vesicular	2	0.6	28	0.1
msx	medium sandy with mixed slays	2	0.6	77	0.4
rre	refined red earthenware	12	3.6	457	2.3
rwe	refined white earthenware	62	18.5	689	3.5
Totals		**336**	**100.0**	**19877**	**100.0**

Table 3. Quantification of CBM by type

Row Labels	Count	Count %	Weight (g)	Weight %
Brick	23	6.8	7601	38.2
Brick or Ridge tile	2	0.6	64	0.3
Brick?	12	3.6	372	1.9
Bathroom tile	70	20.8	701	3.5
Curved roof tile	10	3.0	472	2.4
Drain	5	1.5	397	2.0
Drain?	2	0.6	611	3.1
Flanged brick	1	0.3	284	1.4
Flanged tile	2	0.6	169	0.9
Floor tile	9	2.7	538	2.7
Late medieval-transitional brick	1	0.3	772	3.9
Nib tile?	1	0.3	7	0.0
Pan tile?	3	0.9	195	1.0
Pavement tile	2	0.6	655	3.3
Roman Brick or tile	1	0.3	127	0.6
Roof tile	45	13.4	3579	18.0
Roof tile or Drain	1	0.3	58	0.3
Roof tile?	15	4.5	488	2.5
Sanitary ware	2	0.6	96	0.5
Tegula?	6	1.8	271	1.4
Unknown type	4	1.2	100	0.5
Unidentified CBM	119	35.4	2320	11.7
Totals	**336**	**100.0**	**19877**	**100.0**

Fired Clay

6.12 A total of 17 fragments of fired clay (71g) were recorded from the Site, deriving from 16 runs. All fragments have similar fabrics to those explained in the CBM section (see above) and could possibly be heavily abraded fragments of brick or tile. The material offers very limited information; it has been quantified in Appendix B and discarded, with the exception of a single piece (38g) of possible kiln furniture recovered from the south-east of Field 6 (Run 11205).

This fragment has an unusually semi-cylindrical shape and is made of a coarse sandy and ferrous clay with limestone inclusions, which is unusual for CBM.

Flint

6.13 The fieldwalking survey recorded 11 pieces (36g) of worked flint in poor condition, which is derived from 10 runs in mostly Field 18/19 but also in the north of Field 10. The flint exhibits moderate degrees of patination and is heavily edge-damaged or broken. The most diagnostic types include two Neolithic-Early Bronze Age scrapers from Field 18/19 (Runs 421 and 1021). The scraper from Run 421 has secondary retouch all around its edges, backed by natural cortex. The second scraper from the field is a possible end scraper from Run 1021 *c.*100m from the first scraper. The latter has small retouch on its tip. Unfortunately, both tools are broken and have suffered severe edge damage, making their identification difficult. Also from the north-west of Field 18/19, a flake core with moderate patination and signs of soft hammer percussion, indicative of a Neolithic date, was recovered from Run 621. Finally, a flake with possible soft hammer percussion and retouch on the lateral side, which was recorded from the north of Field 10 (Run 6507), is likely to be of Bronze Age date. The only two possible late prehistoric flakes derived from Field 18/19 (Runs 1121 and 1605) both of which are broken and splintered.

Industrial waste

Coke

6.14 The Site produced 9 pieces of coke (56g) which derived from five runs. The material is associated with post-medieval industrial activities. It has been quantified and discarded.

Slag

6.15 Four pieces (208g) of slag in poor condition derived from four runs in Field 18/19 (216, 3302) and Field 11/12 (Runs 4213 and 4218). The material is fuel ash slag and the pieces from Runs 216 and 4218 are heavily vitrified, suggesting smelting activities in blast furnaces of post-medieval date. The material has been quantified and discarded.

Glass

6.16 The Site produced 20 fragments of glass in relatively good condition weighing 207g. The material derived from 17 runs and is all of post-medieval and modern date. More specifically, 6 fragments (122g) come from bottle or other vessel-type glass, and 14 fragments (85g) come from modern window glass of various colourations. A post-medieval jar-type vessel with iridescent coating from Field 18/19 (Run 223) was retained for future reference and the remaining material was disposed of.

Metalwork

Iron nails

6.17 The Site produced 7 iron nail fragments (51g) in poor condition, corroded though not heavily encrusted. All nails are industrial products with homogeneous circular sections and are modern in date. They have all been quantified and discarded.

Iron objects

6.18 The Site produced 18 iron objects (2434g) in relatively good condition, deriving from 17 runs. The fragments are post-medieval to modern in date and include horse shoes, iron plates and fittings from woodwork, nuts and bolts from modern machinery, chain loops and irregular iron lumps. Two runs from Field 4 (Run 10714) and Field 5 (Run 10212), produced a fragment from an iron

mattock preserving half of its shaft and a complete pitchfork with two spikes. Such tools associate with relatively recent agricultural activities. All of the iron objects have been recorded and discarded.

Other metal objects

6.19 Field 11/12 (Runs 3916, 4301) and Field 10 (Run 6704) produced three pieces of aluminium weighing 109g. Such pieces associate with modern furniture. They have been recorded and discarded.

Other finds

6.20 The Site produced a variety of modern objects (21/384g), primarily plastic composites and stone. Such objects derived from 18 runs and most of them were associated with modern building activities. Bakelite and vinyl tiles, and some other plastic copolymers, were disposed immediately due to potential asbestos content.

7. DISCUSSION

7.1 The fieldwalking survey recorded over 19 Kg of artefacts of which most were of post-medieval and modern date and are of little archaeological significance. Only 4.4% by weight of the finds assemblage recorded from the survey is of archaeological interest and significance. These finds range in date from the Neolithic (4000 – 2400 BC) and Bronze Ages (2400 – 700 BC), the Roman (AD43 – 410), medieval (12th – L15/ E16th centuries) and early post-medieval (L15/ E16th – 17th centuries) periods. Only 49 (3.6%) of the 1372, 20m runs from the whole survey contained archaeologically significant finds. By far the majority (36) of the significant finds are from Field 18/19 and comprise 9 of the 11 pieces of Neolithic/Bronze Age worked flint as well as runs that produced 12th to 16th century pottery.

7.2 The earliest material comprising 11 pieces of worked flint included mostly debitage (9 pieces) and two scrapers. These two tools were recorded *c*.100m apart in the lower-lying, western part of Field 18/19, situated in the south of the Site. The distribution and quantity of material does not indicate prolonged or intensive Neolithic and Bronze Age activity on the Site, despite the presence of two putative barrow ring-ditches in Fields 7 (Sumo Survey 2018) and 11/12 respectively (Pegasus Planning 2018). The low numbers and distribution are redolent of low-level prehistoric activity on the Site through short-lived episodic visits. The prevailing well-drained soils, the high ridge-top with extensive views, overlooking a watercourse, would have been an attractive landscape location for hunter-gatherers and farmers alike from the immediate post-glacial period.

7.3 No material of later prehistoric periods was recovered from the survey although a very small assemblage (2% by weight) of Roman pottery was recorded. This comprised locally-made greyware pottery (2/84g) from the north of Fields 10 and 18/19. A collection of possible Roman cbm (10/426g) was recorded from the south-east of Field 11/12 (Run 4214), some of which may be fragments of Roman roof tiles or *tegulae*. However, because of their abraded and fragmentary condition the fragments could easily be of post-medieval date.

7.4 As noted earlier, by far the greatest component of the archaeologically significant finds assemblage from the Site comprised 35 sherds/ 545g by weight of 12th to 16th century pottery, which totals 50% of the significant finds assemblage. The majority of the medieval pottery was recorded over Field 18/19, but also Field 10, to the immediate south of the Gokewell Priory exclusion area. The mean sherd weight (MSW) of the medieval

pottery assemblage is 8.43g which is surprising if the material were within the ploughing horizon since deposition around the time of manufacture. The hardness of the pottery fabric may have had an effect on the rate and relative lack of attrition from physical and chemical processes. The MSW might also be a result of the particularly loose, 'powdery' nature of the soil, possibly resulting in less percussive damage from ploughing activity.

7.5 The date range of the medieval pottery, from the 12th – 16th centuries, fits closely with the life span of Gokewell Priory. Founded in the 12th century, the priory was suppressed during the Dissolution of The Monasteries, between 1536 and 1541. In contrast, if derived from either of the two Deserted Medieval Villages (DMVs) nearby, either Manby to the immediate south or Raventhorpe *c*.1Km further to the south of the Site, the pottery series would perhaps not be expected to extend much beyond the mid-14th century, following the population crises of the first half of that century. However, the pottery chronology clearly continues until the post-medieval period (15th – 17th centuries) but is mainly of 12th – 16th century date.

7.6 There is no clear evidence from aerial photographic, LiDAR, cartographic, historical or geophysical sources/ surveys of the Site for medieval activity outside the Priory exclusion area, although two stockade enclosure cropmarks of possible medieval date are noted from Field 18/19 (Pegasus Planning 2018). The distribution and date range in particular of the medieval and early post-medieval pottery, would suggest the manuring of arable fields associated with the Priory, with waste material including broken pottery vessels, spread onto the fields. The manuring of arable fields with settlement waste is a widespread and well-understood aspect of agricultural land improvement seen in the medieval and

other periods. Evidence for ridge and furrow cultivation is visible on historical aerial photographs of Field 18/19 (Pegasus Planning Ltd 2018), confirming historic agricultural use of land surrounding the Priory.

7.7 By far the greatest quantity (91% by weight) of material collected from the current fieldwalking survey was post-medieval or modern in date and comprised various building and settlement/domestic waste with no archaeological significance.

7.8 Overall, the quantity of archaeologically significant material recovered during the survey was low, with no clear concentrations of artefactual material having been recovered.

8. CA PROJECT TEAM

Fieldwork was undertaken by Chris Ellis, assisted by Izabella Jurkiewicz, Mark Davis, Ella Appleton and Charlotte Barley. The report was written by Chris Ellis. The finds reports were written and edited by Ioannis Smyrnaios and Peter Banks respectively. The illustrations were prepared by Tom Brown. The archive has been compiled by Emily Evans, and prepared for deposition by Hazel O'Neill. The project was managed for CA by Adrian Scruby.

9. REFERENCES

Anderson, S., 2004, 'The Pottery', in Wallis, H. (ed.) 2004, 67-86.

Armstrong P. and Ayers B. (eds.), *Excavations in High Street and Blackfriargate* East Riding Archaeologist **8**, Beverley, East Riding Archaeological Society.

BGS (British Geological Survey) 2015 *Geology of Britain Viewer* http://maps.bgs.ac.uk/geology viewer_google/googleviewer.html Accessed 24 September 2018.

Boyle, A., Young G. and Vince, A., 2018 *A Type Series for Post-Roman Pottery in North Lincolnshire* Unpublished Type Series, North Lincolnshire Museum.

Cotswold Archaeology (CA) 2018 *Little Crow, Santon, Scunthorpe, Lincolnshire: Written Scheme of Investigation for an Archaeological Fieldwalking Survey*. (August 2018).

McCarthy, M.R. and Brooks C.M., 1988 *Medieval Pottery in Britain, AD 900-1600* Leicester, Leicester University Press.

Pegasus Planning Limited, 2018 *Little Crow, Santon, North Lincolnshire: Cultural Heritage Baseline Study.* Pegasus Group Project No. **P17-0718** (April 2018).

Sumo Survey, 2018 *Little Crow, Santon, North Lincolnshire: Geophysical Survey Report*. Survey Report No.**13201** (September 2018).

Tomber, R. and Dore, J., 1998 *The National Roman Fabric Reference Collection: a Handbook* Museum of London Archaeology Service Monograph **2.**

Wallis, H. (ed.), 2004 *Excavations at Mill Lane, Thetford*. East Anglian Archaeology **108.**

Watkins, J. G., 1987 'The Pottery' in Armstrong P. and Ayers B. (eds.) 53-181.

APPENDIX A: THE FINDS

Run No.	Material	Description	Fabric Code	Fabric Concordance	Ct.	Wt.(g)	Spot-date	Condition	Comments	Discarded (Yes/No)
121	CBM		msx		1	23	lmed-pmed	moderate-poor		Yes
212	Fired clay		mscv		1	12		poor		Yes
212	Pottery	Cistercian type ware	CTW	CIST	1	18	15-17 c.	fair, glaze worn	interior metallic black glaze	No
212	Pottery	Glazed red earthenware	GRE	PMLOC	1	3	16-18 c.	flake, abraded	splashed red glaze	No
212	Pottery	Glazed red earthenware	GRE	PMX	1	8	16-18 c.	flaked, abraded	brown-red glaze	No
213	CBM		mscp		5	45	pmed	moderate-poor		Yes
213	Pottery	Late Lincolnshire ware	LLSW	LHUM	1	79	16-18 c.	good	olive green glazed on interior	No
213	Pottery	Glazed red earthenware	GRE	PMLOC	1	8	16-18 c.	graze worn	interior brown to amber glaze	No
214	CBM		fs		1	8	pmed	moderate-poor		Yes
214	Pottery	Cistercian type ware	CTW	CIST	1	4	15-17 c.	fair	metallic black glazing	No
214	Pottery	Late Lincolnshire ware	LLSW	LHUM	1	4	16-18 c.	damaged glaze	incised; olive green glazed	No
214	Pottery	Late Lincolnshire ware	LLSW	LHUM	1	34	16-18 c.	glaze worn	olive green glazed	No
214	Pottery	Glazed red earthenware	GRE	PMLOC	1	48	16-18 c.	chipped, glaze worn	amber glaze with brown splashes	No
215	CBM		fs		1	5	pmed	moderate-poor		Yes
216	Industrial waste	Coke			1	5	pmed			Yes
216	Industrial waste	slag			1	10	pmed		vitrified blast furnace slag	Yes
217	CBM	Brick	fscp		1	30	pmed	moderate-poor	corner fragment	Yes
217	CBM	Brick	fs		1	981	pmed	moderate-poor		Yes
218	CBM		fs		1	7	pmed	moderate-poor		No
218	CBM	Roof tile	fs		1	133	pmed	moderate-poor	curved; defective?	No
218	CBM		msfe		1	30	pmed	moderate-poor	iron-rich encrustation	No
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
218	CBM	Roof tile	fs		1	72	pmed	moderate-poor		No
218	CBM	Flanged tile	fs		1	127	pmed	moderate-poor	preserves flanged edge	No
218	CBM		mscp		2	28	Rom?	moderate-poor		No
219	CBM		fs		3	16	pmed	moderate-poor		Yes
219	CBM		fscp		1	11	pmed	moderate-poor	1 flat side	Yes

219	CBM	Roof tile	fs		1	59	pmed	moderate-poor		Yes
219	CBM	Floor tile	fs		4	69	pmed	moderate-poor		Yes
219	Fired clay		fsxg		1	10		poor		Yes
219	Glass	Bottle glass			1	26	pmed		black bottle glass	Yes
220	CBM		fs		1	22	pmed	moderate-poor		Yes
220	CBM	Brick	fs		1	687	pmed	moderate-poor		Yes
221	CBM	Brick	fs		1	27	pmed	moderate-poor	corner piece	Yes
221	Industrial waste	Coke			2	28	pmed			Yes
221	Pottery	Medieval Lincolnshire ware	LSW	NLCS	1	25	12-15 c.	chipped		No
222	CBM	Unknown type	ms		2	40	pmed	moderate-poor	rounded edge	No
222	Pottery	Medieval Lincolnshire ware	LSW?	TOY?	1	12	13-15 c.	very poor, surfaces missing	knife cut base?	No
223	Glass	Vessel glass			1	28	pmed		jar rim/shoulder 100mm diam; iridescent	No
223	Pottery	Medieval Lincolnshire ware	LSW	NLHT	1	39	13-14 c.	good		No
223	Pottery	Medieval Lincolnshire ware	LSW	TOY	1	20	13-15 c.	good	smoothed, slipped; pos.incised deco.on shoulder	No
316	CBM		fsx		1	12	pmed	moderate-poor		Yes
417	CBM	Roof tile?	fs		1	4	pmed	moderate-poor	flake	Yes
421	Flint	fine scraper	grey blue		1	6	NEO-BA	retouched, cortex backed	no patination, 20% cortex	Yes
514	Pottery	Midlands purple ware	MIDP	MP	1	9	15-16 c.	fair	purple glazed	No
519	Flint	flake	grey		1	3		heavily edge damaged and broken	moderate patination	Yes
519	Pottery	Midlands purple ware	MIDP	MP	1	4	15-16 c.	fair	metallic purple glaze	No
520	CBM		fs		1	43	pmed	moderate-poor		Yes
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
522	Pottery	Late Lincolnshire ware	LLSW	LHUM	1	3	16-18 c.	poor, glaze worn	olive green glazed	No
524	Pottery	Midlands purple ware	MIDP	MP	1	8	15-16 c.	glaze worn	purple glaze	No
524	Pottery	Refined white earthenware	RWE	PMX	1	8	18-20 c.	poor, cracked	grooved	No
612	Pottery	Midlands purple ware	MIDP	MP	1	14	15-16 c.	fair	purple glazed exterior	No
618	Pottery	Medieval coarse ware	MCW	MEDX R	1	5	13-15 c.	fair		No
621	Flint	core flake	blue		1	3	NEO	broken and edge damaged	moderate patination, 10% cortex	Yes
802	CBM	Floor tile	fs		1	29	lmed-pmed	moderate-poor	spots of glaze	Yes

802	CBM		ms		1	245	pmed	moderate-poor		Yes
806	CBM	Brick	fsv		1	896	pmed	moderate-poor		Yes
807	Iron object	Iron object			1	293	pmed		horse shoe, complete, bent	Yes
808	CBM		fs		3	39	pmed	moderate-poor		Yes
818	CBM		fs		1	18	pmed	moderate-poor		Yes
907	CBM		fsv		1	21	pmed	moderate-poor		Yes
917	Pottery	Glazed red earthenware	GRE	PMX	1	23	16-18 c.	poor, missing surface, glaze worn	interior brown/black glazed	No
1002	Other	Concrete			1	18	mod			Yes
1004	Pottery	Late Lincolnshire ware	LLSW	LHUM	1	59	16-18 c.	good	olive green glazed interior; incised	No
1005	Pottery	Medieval Lincolnshire ware	LSW?	HUM	1	2	13-16 c.	poor, small	unglazed	No
1009	CBM		fs		1	4	pmed	moderate-poor		Yes
1012	Other	Concrete			1	36	mod			Yes
1014	Pottery	Cistercian type ware	CTW?	CIST?	1	13	15-17 c.	surfaces worn	metallic black glazing splash	No
1017	Pottery	Medieval coarse ware	MCW	MEDX R	1	6	13-15 c.	poor		No
1018	Pottery	Medieval coarse ware	MCW	MEDX R	1	5	13-15 c.	poor		No
1019	Iron object	Iron object			1	83			corroded and encrusted iron bar	Yes

Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
1021	Flint	end scraper?	grey		1	2	NEO-BA	broken and heavily damaged posterior	light patination, 15% cortex, retouch on edge	Yes
1022	CBM		fs		1	5	pmed	moderate-poor		Yes
1023	Pottery	Medieval Lincolnshire ware	LSW?	HUM	1	9	13-16 c.	worn, ext.missing	unglazed	No
1114	Pottery	Medieval Lincolnshire ware	LSW	NLHT	1	96	13-14 c.	glaze worn	knife cut base; interior glazed	No
1121	Flint	flake	grey blue		1	5	Lpreh	heavily splintered	no patination, 20% cortex	Yes
1501	CBM	Roof tile	fsx		1	90	pmed	moderate-poor		Yes
1501	CBM		fs		1	4	pmed	moderate-poor		Yes
1505	CBM		fsv		1	18	pmed	moderate-poor		Yes
1520	Fired clay		fsv		1	24		poor		Yes
1522	Pottery	Medieval Lincolnshire ware	LSW	HUM	1	34	13-16 c.	good	small splash of purple glaze	No
1605	CBM		fs		1	7	pmed	moderate-poor		Yes
1605	Flint	flake	light brown		1	6	Lpreh	broken	no patination, 10% cortex	Yes

1610	CBM	Curved tile	fs		1	39	pmed	moderate-poor		Yes
1613	CBM	Roof tile	fscp		1	34	pmed	moderate-poor		Yes
1623	CBM	Floor tile	fs		1	34	lmed-pmed	moderate-poor		Yes
1623	Pottery	Glazed red earthenware	GRE	PMLOC	1	33	16-18 c.	surface missing	amber glaze with brown splashes	No
1701	CBM	Roof tile	fs		5	276	pmed	moderate-poor		Yes
1702	CBM		fs		1	32	pmed	moderate-poor		Yes
1706	CBM	late medieval brick	msfe		1	772	lmed-pmed	moderate-poor	two sides glazed	No
1707	CBM	Roof tile	fsv		1	1707	pmed	moderate-poor		Yes
1716	Pottery	Cistercian type ware	CTW	CIST	1	35	15-17 c.	good	interior metallic black glaze	No
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
1717	Industrial waste	Coke			2	3	pmed			Yes
1718	Industrial waste	Coke			2	2	pmed			Yes
1719	CBM		fsx		1	14	pmed	moderate-poor		Yes
1719	CBM	Drain?	fs		1	603	pmed	moderate-poor	encrusted with slag, coated	No
1720	CBM		msv		1	10	pmed	moderate-poor		Yes
1720	Pottery	Cistercian type ware	CTW	CIST	1	23	15-17 c.	fair; exterior glaze worn	interior and exterior metallic black glaze	No
1723	CBM		fs		1	11	pmed	moderate-poor		Yes
1803	Glass	Vessel glass			1	1	pmed		bowl rim 70mm diam.	Yes
1814	CBM	Bathroom tile	rre		1	5	mod	moderate-poor		Yes
1814	Pottery	Late Lincolnshire ware	LLSW	TOYII	1	17	15-16 c.	fair	unglazed	No
1816	CBM		fs		1	9	pmed	moderate-poor		Yes
1817	CBM	Curved tile	fs		1	13	pmed	moderate-poor		Yes
1817	Pottery	Medieval Lincolnshire ware	LSW	NLCS	1	4	12-15 c.	surfaces worn	glaze possibly missing	No
1824	CBM		fs		1	11	pmed	moderate-poor		Yes
1913	CBM		fsfe		1	16	pmed	moderate-poor		Yes
1921	Pottery	English stoneware	ESW	PMLOC?	1	13	17-19 c.	good	metallic brown glaze	No
1923	CBM	Roof tile?	fs		1	220	pmed	moderate-poor		Yes
2001	Pottery	Local grey ware	LOC	**HSM RE**	1	60	Rom	fair		No
2011	Fired clay		ms		1	12		poor		Yes

2013	Pottery	Medieval Lincolnshire ware	LSW	HUM	1	5	13-16 c.	fair		No
2201	Pottery	Medieval coarse ware	MCW	MEDX R	1	1	13-15 c.	poor		No
2210	Pottery	Cistercian type ware	CTW	CIST	1	11	15-17 c.	poor, abraded	interior metallic black glaze	No
2215	CBM	Curved tile	fs		1	102	lmed-pmed	moderate-poor	edge survives	No
2219	CBM	Roof tile	fs		1	80	pmed	moderate-poor		Yes

Run No.	Material	Description	Fabric Code	Fabric Concordance	Ct.	Wt.(g)	Spot-date	Condition	Comments	Discarded (Yes/No)
2304	Pottery	Medieval Lincolnshire ware	LSW	HUM	1	37	13-16 c.	fair	knife cut base; interior purple glazed	No
2305	Pottery	Midlands purple ware	MIDP	MP	1	59	15-16 c.	vitrified	purple glaze	No
2313	Pottery	Midlands purple ware	MIDP	MP	1	17	15-16 c.	fair	purple coated	No
2318	Pottery	Medieval coarse ware	MCW	MEDX R	1	1	13-15 c.	poor		No
2321	Flint	flake	chert		1	1		heavily edge damaged and splintered		Yes
2405	Flint	flake	white		1	2		broken, edge damaged	heavy patination	Yes
2410	Fired clay		fscp		1	6		poor		Yes
2504	Pottery	Late Lincolnshire ware	LLSW	LHUM	1	5	16-18 c.	fair	olive green glazed	No
2510	Industrial waste	Coke			1	8	pmed			Yes
2525	Flint	flake	burnt		1	2		fire-cracked		Yes
2607	Pottery	Transfer printed earthenware	TPE	PXM	1	6	18-20 c.	chipped	pre-firing suspension hole, blue floral motif	No
2610	CBM		fs		1	8	pmed	moderate-poor		Yes
2614	CBM		fs		2	7	pmed	moderate-poor		Yes
2616	CBM		fs		1	5	pmed	moderate-poor		Yes
2704	CBM		fs		1	18	pmed	moderate-poor		Yes
2705	CBM		fs		1	5	pmed	moderate-poor		Yes
2705	CBM		fs		1	92	pmed	moderate-poor		Yes
2706	CBM		fs		1	11	pmed	moderate-poor		Yes
2707	CBM		fs		1	2	pmed	moderate-poor	chip	Yes
2710	CBM	Curved tile	fs		1	19	pmed	moderate-poor		Yes
2711	Pottery	Medieval Lincolnshire ware	LSW	HUM	1	8	13-16 c.	surfaces worn		No
2714	CBM	Curved tile	fs		1	51	pmed	moderate-poor		Yes
2714	CBM	Roof tile	fs		1	9	pmed	moderate-poor		Yes
2717	Iron object	Iron object			1	43	mod		ring from pipe	Yes

2718	CBM	Curved tile	fs		1	27	pmed	moderate-poor		Yes
2720	Pottery	Refined white earthenware	RWE	PMX	1	3	18-20 c.	fair, worn		No
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
2722	CBM		fs		1	20	pmed	moderate-poor		Yes
2723	CBM	Curved tile	fs		1	48	pmed	moderate-poor		Yes
2724	CBM		fscp		1	16	pmed	moderate-poor		Yes
3001	CBM	Unknown type	fsx		1	84	pmed	moderate-poor	curved piece with added flat top	No
3004	Iron object	Iron object			1	20	pmed		bolt	Yes
3204	Pottery	Transfer printed earthenware	TPE	PMX	1	12	18-20 c.	fair, cracked	blue floral decoration	No
3205	CBM		fs		1	59	pmed	moderate-poor		Yes
3301	CBM		fs		1	6	pmed	moderate-poor		Yes
3302	CBM	Roof tile?	fsc		1	4	lmed-pmed	moderate-poor	flake	Yes
3302	CBM	Roof tile?	fs		1	6	pmed	moderate-poor	flake	Yes
3302	Fired clay		fsx		1	4		poor		Yes
3302	Industrial waste	Slag			1	48			fuel ash slag	Yes
3302	Pottery	Transfer printed earthenware	TPE	PMX	1	7	18-20 c.	flaked	blue floral decoration	No
3501	CBM		fs		1	16	pmed	moderate-poor		Yes
3901	CBM	Roof tile	fs		1	30	pmed	moderate-poor		Yes
3904	CBM	Roof tile	fs		1	5	pmed	moderate-poor		Yes
3904	Other	Bakelite tile			1	6	mod		asbestos containing: disposed	Yes
3905	CBM	Bathroom tile	rwe		1	5	pmed	moderate-poor		Yes
3905	Other	Plastic vessel			1	2	mod		lid, 60mm diam.	Yes
3907	CBM	Brick	fs		1	48	pmed	moderate-poor		Yes
3911	CBM		fs		1	40	pmed	moderate-poor		Yes
3913	CBM		fs		2	10	pmed	moderate-poor		Yes
3914	CBM		fs		1	4	pmed	moderate-poor		Yes
3916	CBM	Bathroom tile	rwe		1	18	mod	moderate-poor		Yes
3916	CBM	Bathroom tile	rwe		1	10	mod	moderate-poor		Yes
3916	Metal		Alum.		1	5	modern		flat rectangular plate with screw hole	Yes
3918	Iron object	Iron nail			1	3	mod		54mm head and shank, bent	Yes
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
3921	CBM	Brick or Ridge tile	msfeg		1	20	pmed	moderate-poor	perforated brick or ridge tile	Yes

3921	CBM	Bathroom tile	rwe		1	6	pmed	moderate-poor		Yes
3923	CBM	Bathroom tile	rwe		1	26	mod	moderate-poor	ridged decoration	Yes
3923	CBM	Bathroom tile	rre		1	14	mod	moderate-poor	white stripes on blue font	Yes
3950	Pottery	Late Lincolnshire ware	LLSW	LHUM	1	14	16-18 c.	chipped, poor condition	exterior brown glaze	No
4001	CBM	Pan tile?	fs		1	136	lmed-pmed	moderate-poor	2 flat surfaces at 120 degree angle	No
4002	CBM		fs		1	2	pmed	moderate-poor	1 flat side	Yes
4003	CBM		fs		1	10	pmed	moderate-poor	1 flat side	Yes
4004	Fired clay		ms		1	1		poor		Yes
4006	CBM	Bathroom tile	rwe		1	8	mod	moderate-poor		Yes
4006	Pottery	Refined white earthenware	RWE	PMX	1	13	18-20 c.	good		No
4006	Pottery	Refined white earthenware	RWE	PMX	1	17	18-20 c.	good	brown exterior	No
4007	CBM	Roof tile	fs		2	65	pmed	moderate-poor		Yes
4007	CBM	Roof tile	fs		2	59	pmed	moderate-poor		Yes
4008	CBM	Bathroom tile	rwe		2	13	mod	moderate-poor		Yes
4009	Fired clay		ms		1	4		poor		Yes
4010	CBM	Bathroom tile	rwe		1	7	mod	moderate-poor		Yes
4011	Other	Concrete			1	6	mod		thin concrete layer with clay mortar	Yes
4012	Pottery	Refined red earthenware	RRE	PMLOC?	1	1	18-20 c.	poor		No
4014	CBM		fsv		2	5	pmed	moderate-poor		Yes
4015	CBM		ms		1	8	pmed	moderate-poor		Yes
4015	Fired clay		ms		1	7		poor		Yes
4015	Pottery	Cistercian type ware	CTW	CIST	1	33	15-17 c.	fair	interior metallic black glaze	No
4016	CBM	Roof tile	msfe		1	15	pmed	moderate-poor	almost vitrified	Yes
4016	Pottery	English stoneware	ESW	PMX	1	14	17-19 c.	fair	exterior red slip	No

Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
4020	Iron object	Iron object			1	288	pmed		horse shoe, half	Yes
4021	Fired clay		ms		1	1		poor		Yes
4021	Pottery	Glazed red earthenware	GRE	PMX	1	4	16-18 c.	very poor, glaze worn	interior glazed	No
4021	Pottery	Refined white earthenware	RWE	PMX	1	2	18-20 c.	fair		No
4021	Pottery	Refined white earthenware	RWE	PMX	1	7	18-20 c.	good		No
4023	Pottery	Glazed red earthenware	GRE	PMX	1	2	16-18 c.	exterior flake	red glazed	No

4024	Fired clay		ms		1	9		poor		Yes
4106	CBM	Bathroom tile	rwe		1	8	mod	moderate-poor		Yes
4106	CBM		fs		1	28	pmed	moderate-poor		Yes
4106	Other	Vinyl tile			2	3	mod		asbestos containing: disposed	Yes
4116	CBM	Bathroom tile	rwe		1	3	mod	moderate-poor	light blue decoration	Yes
4211	CBM		fs		1	2	pmed	moderate-poor	flat chip	Yes
4212	CBM		ms		1	18	pmed	moderate-poor		Yes
4213	Fired clay		ms		2	13		poor		Yes
4213	Industrial waste	slag			1	8			fuel ash slag	Yes
4214	CBM	Roman Tegula?	fs		6	271	Rom?	moderate-poor	could be FLGT	No
4214	Other	Bakelite tile			1	12	mod		asbestos containing: disposed	Yes
4214	Pottery	English stoneware	ESW	PMX	1	14	17-19 c.	good		No
4218	Industrial waste	slag			1	142	pmed		vitrified blast furnace slag	Yes
4219	CBM		ms		1	37	pmed	moderate-poor		Yes
4225	Pottery	Glazed red earthenware	GRE	PMLOC	1	10	16-18 c.	fair, glaze worn	amber glaze with brown splashes	No
4301	CBM		fs		2	6	pmed	moderate-poor	flakes	Yes
4301	Metal		Alum.		1	74	modern		furniture leg	Yes
4303	CBM	Bathroom tile	rwe		1	8	mod	moderate-poor		Yes
4303	CBM		fs		1	12	pmed	moderate-poor		Yes
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
4304	CBM	Bathroom tile	rre		1	10	mod	moderate-poor		Yes
4305	CBM	Nib tile?	fsv		1	7	lmed-pmed	moderate-poor	2 flat surfaces at 150 degree angle	No
4306	CBM		fsv		1	3	pmed	moderate-poor		Yes
4306	Glass	Window glass			1	7	mod		translucent	Yes
4306	Pottery	Black ware	BLW	PMX	1	3	19-20 c.	good	black smooth coating	No
4310	CBM		fs		1	3	pmed	moderate-poor		Yes
4313	CBM		fs		2	60	pmed	moderate-poor		Yes
4314	CBM	Brick or Ridge tile	msfeqz		1	44	pmed	moderate-poor	three semi cylindrical smoothed perforations	No
4322	Pottery	Midlands purple ware	MIDP	MP	1	20	15-16 c.	vitrified	purple? Glaze, now worn off	No
4402	Pottery	Medieval Lincolnshire ware	LSW	HUM	1	5	13-16 c.	fair		No
4406	CBM		fs		2	10	pmed	moderate-poor		Yes
4407	CBM	Bathroom tile	rwe		1	6	mod	moderate-poor		Yes

4407	Fired clay		ms		1	4		poor		Yes
4407	Other	Decorative stone			1	30	mod		Onyx?	Yes
4420	Pottery	Cistercian type ware	CTW	CIST	2	4	15-17 c.	poor, exterior missing	interior metallic black glaze	No
4424	Other	Rubber lining			1	99	mod		two iron nails attached	Yes
4502	CBM		fs		1	5	pmed	moderate-poor		Yes
4505	CBM		fs		1	22	pmed	moderate-poor		Yes
4507	CBM		fs		1	11	pmed	moderate-poor		Yes
4508	CBM		msx		1	54	lmed-pmed	moderate-poor		Yes
4601	Iron object	Iron nail			1	2	mod		heavily abraded shank	Yes
4603	CBM		fs		1	1	pmed	moderate-poor		Yes
4603	Other	Concrete			1	19	mod		one flat surface	Yes
4606	CBM	Bathroom tile	rwe		1	6	mod	moderate-poor		Yes
4606	CBM		fs		1	33	pmed	moderate-poor		Yes
4607	CBM		fs		1	6	pmed	moderate-poor		Yes
4607	CBM	Curved tile	fscp		1	63	pmed	moderate-poor		Yes
4610	CBM	Bathroom tile	rwe		1	6	pmed	moderate-poor	silicone on side; number '09' marked on the back	Yes
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
4621	Pottery	Refined white earthenware	RWE	PMX	1	1	18-20 c.	chip		No
4812	Pottery	Refined red earthenware	RRE	PMX	1	12	18-20 c.	good	incised rouletting	No
5021	CBM		ms		3	203	pmed	moderate-poor	abraded fragments	Yes
5203	CBM	Bathroom tile	rre		1	11	mod	moderate-poor	vitreous black glazed tile	Yes
5206	Iron object	Iron object			1	77			lump	Yes
5207	Iron object	Iron object			1	18			irregular iron lump	Yes
5209	CBM	Pavement tile	fsfec		1	5	pmed	moderate-poor	coated on both surfaces	No
5210	Pottery	Transfer printed earthenware	TPE	PMX	1	2	18-20 c.	fair	blue floral decoration	No
5311	CBM		fs		1	21	pmed	moderate-poor		Yes
5312	Iron object	Iron object			1	18	pmed		curved plate with loop	Yes
5316	CBM	Brick	fs		1	119	pmed	moderate-poor	corner fragments	Yes
5321	CBM	Curved tile	fs		1	82	pmed	moderate-poor		Yes
5321	Pottery	Refined white earthenware	RWE	PMX	1	2	18-20 c.	good		No
5322	CBM	Sanitary ware	rwe		1	62	mod	moderate-poor		Yes
5322	Pottery	Refined white earthenware	RWE	PMX	1	4	18-20 c.	good		No

5322	Pottery	Refined white earthenware	RWE	PMX	1	6	18-20 c.	good		No
5324	CBM	Roof tile?	fs		1	18	pmed	moderate-poor		Yes
5404	CBM		fs		1	5	pmed	moderate-poor	flake	Yes
5405	CBM		fs		1	2	pmed	moderate-poor	flake	Yes
5414	Other	Plastic handle			1	2	mod		vessel or electric appliance	Yes
5420	CBM	Brick	fs		2	141	mod	moderate-poor		Yes
5420	Pottery	Pearl ware	PEW	PMX	1	4	l.18-m.19 c.	good	mocha ware	No
5715	CBM		fs		1	14	pmed	moderate-poor		Yes
5720	Pottery	Medieval Lincolnshire ware	LSW	HUM	1	3	13-16 c.	poor	unglazed	No
5818	CBM	Roof tile	fs		1	37	pmed	moderate-poor		Yes
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
6203	CBM	Bathroom tite	rwe		3	15	mod	moderate-poor		Yes
6204	CBM	Bathroom tite	rwe		1	6	mod	moderate-poor		Yes
6205	CBM	Bathroom tite	rwe		1	18	mod	moderate-poor		Yes
6205	Glass	Window glass			1	8	mod		greyish, translucent, car window	Yes
6208	CBM	Bathroom tite	rwe		1	12	mod	moderate-poor		Yes
6218	CBM	Bathroom tite	rwe		1	16	mod	moderate-poor	decorated with golden ribbons	Yes
6302	CBM	Brick	msg		1	723	pmed	moderate-poor	industrial brick with triangular intercut	Yes
6314	CBM	Sanitary ware	rwe		1	34	mod	moderate-poor		Yes
6316	CBM	Roof tile	fs		1	32	pmed	moderate-poor		Yes
6317	CBM	Bathroom tite	rwe		1	5	mod	moderate-poor	decorated with blue ribbons	Yes
6317	Pottery	Glazed red earthenware	GRE?	PMX?	1	38	16-18 c.	glaze probably worn off	glaze possibly missing	No
6322	Fired clay		fscp		1	6		poor		Yes
6325	CBM	Roof tile	fs		1	42	pmed	moderate-poor		Yes
6401	CBM	Bathroom tite	rwe		1	6	mod	moderate-poor	green floral decoration	Yes
6404	CBM	Roof tile	fs		1	12	pmed	moderate-poor		Yes
6404	Pottery	Refined red earthenware	RRE	PMX	1	2	18-20 c.	fair	interior coated	No
6417	Pottery	Refined white earthenware	RWE	PMX	1	4	18-20 c.	fair		No
6418	CBM	Bathroom tite	rre		2	18	mod	moderate-poor	glue on the back	Yes
6418	Pottery	Medieval Lincolnshire ware	LSW	NLHT	1	10	13-16 c.	good		No
6421	CBM		fs		1	1	pmed	moderate-poor	flake	Yes

6422	CBM	Bathroom tite	rwe		1	4	mod	moderate-poor		Yes
6501	CBM	Floor tile	fs		1	36	mod	moderate-poor		Yes
6501	CBM	Brick?	fscp		1	103	pmed	moderate-poor	1 flat side	Yes
6504	Iron object	Iron nail			1	3	mod		42mm head and shank	Yes
6506	CBM	Floor tile	fs		1	269	mod	moderate-poor	mortar on the back	Yes
6506	Iron object	Iron nail			1	9	mod		75mm head and shank	Yes
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
6507	Flint	flake	brown grey		1	2	BA?	heavily edge damaged and broken	5% cortex, retouch on back	Yes
6703	Pottery	Medieval Lincolnshire ware	LSW	NLHT	1	5	13-14 c.	good		No
6703	Pottery	Medieval Lincolnshire ware	LSW	NLHT	1	9	e.14 c.	fair		No
6704	CBM	Bathroom tite	rwe		1	9	mod	moderate-poor	pink decoration	Yes
6704	CBM		fs		1	5	pmed	moderate-poor		Yes
6704	Metal		Alum.		1	30	modern		lump	Yes
6801	CBM		ms		1	16	pmed	moderate-poor		Yes
6801	Other	Bakelite tile			1	1	mod		asbestos containing: disposed	Yes
6801	Other	Concrete			1	72	mod			Yes
6803	CBM	Bathroom tite	rwe		1	21	mod	moderate-poor		Yes
6805	Other	Vinyl tile			1	2	mod		asbestos containing: disposed	Yes
6807	CBM	Bathroom tite	rwe		2	17	mod	moderate-poor		Yes
6807	Glass	Window glass			1	11	mod		thick orange glass	Yes
6807	Glass	Window glass			1	5	mod		mirror glass	Yes
6807	Glass	Window glass			1	7	mod		translucent	Yes
6807	Pottery	Medieval Lincolnshire ware	LSW	NLCS	1	10	12-15 c.	poor, glaze missing	olive green glaze segments on exterior	No
6808	CBM	Bathroom tite	rwe		1	6	mod	moderate-poor		Yes
6808	CBM	Bathroom tite	rwe		1	18	mod	moderate-poor	strip of silicone on front	Yes
6808	CBM		fs		1	8	pmed	moderate-poor		Yes
6809	CBM	Bathroom tite	rwe		1	12	mod	moderate-poor	glue on back side	Yes
6809	Glass	Window glass			2	11	mod		translucent	Yes
6810	CBM	Bathroom tite	rwe		1	4	mod	moderate-poor		Yes
6810	Glass	Window glass			1	3	mod		translucent	Yes
6813	CBM	Bathroom tite	rre		1	3	mod	moderate-poor	white exterior	Yes
6813	CBM		fs		2	6	pmed	moderate-poor	flakes	Yes

Run No.	Material	Description	Fabric Code	Fabric Concordance	Ct.	Wt.(g)	Spot-date	Condition	Comments	Discarded (Yes/No)
6813	Glass	Window glass			1	3	mod		translucent	Yes
6815	CBM	Bathroom tite	rwe		1	9	mod	moderate-poor	glue on the back	Yes
6815	CBM	Bathroom tite	RWE		1	6	mod	moderate-poor		Yes
6815	CBM	Drain	fsfe		1	53	pmed	moderate-poor		No
6817	CBM	Roof tile	ms		1	106	lmed-pmed	moderate-poor	grey core	No
6817	Glass	Window glass			1	10	mod		double with metal mesh	Yes
6818	CBM	Roof tile	fs		1	20	lmed-pmed	moderate-poor		No
6818	CBM	Bathroom tite	rwe		1	3	mod	moderate-poor		Yes
6818	CBM	Drain	fsfe		1	99	pmed	moderate-poor	ribbed interior	No
6819	CBM	Roof tile	fsv		1	9	lmed-pmed	moderate-poor		No
6819	CBM	Bathroom tite	rwe		1	4	mod	moderate-poor		Yes
6819	Pottery	Staffordshire type ware	STAF	PMX	1	15	l.17-18 c.	slip cracked	yellowish brown glaze	No
6820	CBM	Bathroom tite	rwe		1	17	mod	moderate-poor		Yes
6820	CBM	Bathroom tite	rwe		1	5	mod	moderate-poor		Yes
6820	Pottery	Cistercian type ware	CTW	CIST	1	9	15-17 c.	fair	interior metallic black glaze	No
6822	CBM	Roof tile	fs		1	152	pmed	moderate-poor		Yes
6824	CBM	Roof tile	fs		1	47	pmed	moderate-poor		Yes
6911	CBM	Roof tile or Drain	fscp		1	58	pmed	moderate-poor		Yes
6913	CBM	Roof tile	fs		1	24	pmed	moderate-poor		Yes
6916	CBM	Brick	fs		1	258	pmed	moderate-poor	corner piece	Yes
6916	CBM	Brick	ms		2	450	pmed	moderate-poor	1 smoothed side	Yes
6917	CBM		fs		1	219	pmed	moderate-poor	1 smoothed side	Yes
6922	CBM	Floor tile	fs		1	101	mod	moderate-poor		Yes
6922	CBM		fs		1	152	pmed	moderate-poor		Yes
7005	Pottery	English stoneware	ESW	PMX	1	6	19-20 c.	good	green coating	No
7008	Pottery	English stoneware	ESW	PMX	1	19	19-20 c.	good	stamped inscription "HILDYARD..SALE & RETA[IL]... RIT.MERCH[ANTS]...GG	No
7013	CBM	Roof tile	fs		2	49	pmed	moderate-poor		Yes
7015	Pottery	Cistercian type ware	CTW	CIST	1	21	15-17 c.	glaze worn	interior black glazed	No
7102	CBM	Roof tile	fsv		1	14	lmed-pmed	moderate-poor		Yes
7102	CBM	Brick?	msc		4	31	lmed-pmed	moderate-poor	1 flat side	Yes

Run No.	Material	Description	Fabric Code	Fabric Concordance	Ct.	Wt.(g)	Spot-date	Condition	Comments	Discarded (Yes/No)
7102	Pottery	Cistercian type ware	CTW	CIST	1	5	15-17 c.	good	interior and exterior metallic black glaze	No
7103	Flint	flake	brown grey		1	4		broken on all edges	2% cortex	Yes
7106	CBM		fs		3	5	pmed	moderate-poor		Yes
7107	Pottery	Cistercian type ware	CTW	CIST	1	5	15-17 c.	good	purple brown metallic glaze on both sides	No
7107	Pottery	Glazed red earthenware	GRE	PMLOC	1	10	16-18 c.	glaze worn	interior brown glaze	No
7111	CBM		fs		1	3	pmed	moderate-poor	flake	Yes
7111	Pottery	Cistercian type ware	CTW	CIST	1	31	15-17 c.	good	interior black glazed, including exterior rim	No
7118	CBM	Drain	msfe		1	50	pmed	moderate-poor	glazed drain	No
7118	CBM		msv		1	18	pmed	moderate-poor		Yes
7118	Fired clay		csv		1	20		poor		Yes
7118	Pottery	Medieval Lincolnshire ware	LSW	NLCS	1	6	12-15 c.	poor, surfaces worn	glaze missing	No
7122	CBM		ms		3	10	pmed	moderate-poor	flakes	Yes
7122	CBM	Drain?	msfe		1	8	pmed	moderate-poor	thick coated drain	Yes
7210	CBM	Bathroom tite	rwe		1	3	mod	moderate-poor		Yes
7210	CBM		fs		1	2	pmed	moderate-poor		Yes
7210	Other	Plastic			1	2	mod		vessel	Yes
7210	Pottery	Cistercian type ware	CTW	CIST	1	48	15-17 c.	glaze worn	worn purple metallic glaze on both sides	No
7210	Pottery	Glazed red earthenware	GRE	PMLOC	1	7	16-18 c.	fair	yellowish amber glaze on interior	No
7214	CBM		fs		1	14	pmed	moderate-poor		Yes
7214	Pottery	Late Lincolnshire ware	LLSW	LHUM	1	9	16-18 c.	glaze damaged	olive green glazed interior, brown glazed exterior	No

Run No.	Material	Description	Fabric Code	Fabric Concordance	Ct.	Wt.(g)	Spot-date	Condition	Comments	Discarded (Yes/No)
Context	Class	Description	Fabric Code	Fabric Concordance	Ct.	Wt.(g)	Spot-date	Condition	Comments	Discarded (Yes/No)
7215	CBM	Roof tile?	fs		3	28	pmed	moderate-poor	flakes	Yes
7215	CBM	Roof tile?	fs		1	17	pmed	moderate-poor		Yes
7220	CBM		fs		1	4	pmed	moderate-poor		Yes
7220	Pottery	Glazed red earthenware	GRE	PMLOC	1	11	16-18 c.	fair	interior amber glaze	No

7220	Pottery	Glazed red earthenware	GRE	PMLOC	1	4	16-18 c.	glazed damaged	amber glaze on interior and exterior	No
7220	Pottery	Staffordshire type ware	STAF	PMX	1	8	l.17-18 c.	good	yellowish brown glaze	No
7225	Other	Vinyl tile			1	4	mod		asbestos containing: disposed	Yes
7225	Other	Plastic handle			1	3	mod		from home appliance or toy	Yes
7301	Other	Decorative stone			1	5	mod		Onyx	Yes
7302	CBM	Bathroom tite	rwe		1	4	mod	moderate-poor		Yes
7302	Glass	Window glass			1	8	mod		rhomboid incision decorated	Yes
7303	CBM	Brick	rwe		1	5	mod	moderate-poor	red floral decoration	Yes
7303	Iron object	Iron object			1	280	pmed		horse shoe, half	Yes
7303	Pottery	Medieval Lincolnshire ware	LSW	HUM	1	19	13-16 c.	fair	splashes of olive green glaze	No
7303	Pottery	Local grey ware	LOC GR	**HSM RE**	1	24	Rom	good	burnished lines	No
7306	Glass	Window glass			1	2	mod		whitish	Yes
7306	Pottery	Pearl ware	PEW	PMX	1	2	l.18-m.19 c.	poor, chipped	light bluish glaze	No
7307	CBM	Bathroom tite	rwe		1	5	mod	moderate-poor		Yes
7307	Glass	Window glass			1	5	mod		translucent, waved	Yes
7311	CBM	Bathroom tite	rwe		1	11	mod	moderate-poor		Yes
7311	Pottery	Medieval Lincolnshire ware	LSW	NLHT	1	8	13-14 c.	good	olive green glaze on exterior	No
7311	Pottery	Glazed red earthenware	GRE	PMX	1	26	16-18 c.	part of glaze missing	lustrous brown-red glaze	No
7311	Pottery	Glazed red earthenware	GRE	PMX	1	2	16-18 c.	good	lustrous brown-red glaze with brown lines	No
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
7311	Pottery	Staffordshire type ware	STAF	PMX	2	22	l.17-18 c.	fair	yellowish brown glaze	No
7312	Pottery	Cistercian type ware	CTW	CIST	1	3	15-17 c.	chipped	interior and exterior metallic black glaze	No
7317	CBM	Roof tile	fs		1	29	pmed	moderate-poor		Yes
7805	CBM	Bathroom tite	rwe		1	9	mod	moderate-poor		Yes
7819	Pottery	Refined white earthenware	RWE	PMX	1	5	18-20 c.	good		No
7820	CBM	Brick?	fs		1	34	pmed	moderate-poor		Yes
7820	Pottery	Cistercian type ware	CTW	CIST	1	9	15-17 c.	poor, exterior missing	interior metallic black glaze	No
7820	Pottery	Refined white earthenware	RWE	PMX	1	6	18-20 c.	good		No
7920	CBM	Roof tile	fs		2	39	pmed	moderate-poor		Yes
7920	Pottery	Cistercian type ware	CTW	CIST	1	71	15-17 c.	fair; glazed damaged	interior black glazed, including exterior rim	No

8010	CBM	Brick?	fsc		1	6	pmed	moderate-poor	corner piece	Yes
8010	Pottery	Transfer printed earthenware	TPE	PMX	1	6	18-20 c.	flaked	blue floral decoration	No
8205	CBM		fs		1	3	pmed	moderate-poor	flake	Yes
8618	CBM	Bathroom tite	rre		1	29	mod	moderate-poor		Yes
8725	CBM	Bathroom tite	rwe		1	8	mod	moderate-poor		Yes
8818	Iron object	Iron nail			1	6	mod		bent nail, complete, 100mm id straightened	Yes
8819	Iron object	Iron nail			1	4	mod		head and shank, 44mm	Yes
8819	Iron object	Iron object			1	250	mod		propeller	Yes
8821	CBM	Bathroom tite	rwe		1	18	mod	moderate-poor		Yes
8917	Iron object	Iron object			2	65	pmed		axles with nuts	Yes
8917	Pottery	Glazed red earthenware	GRE	PMX	1	20	16-18 c.	exterior worn	interior glazed	No
8921	Glass	Bottle glass			1	7	mod		green	Yes
8923	CBM	Bathroom tite	rre		1	14	mod	moderate-poor		Yes
8923	CBM	Bathroom tite	rwe		1	5	mod	moderate-poor		Yes
8925	Pottery	Refined red earthenware	RRE	PMX	1	13	18-20 c.	burnt		No
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
9025	CBM	Bathroom tite	rwe		1	9	mod	moderate-poor		Yes
9416	CBM	Brick?	fs		2	58	pmed	moderate-poor	1 flat surface	Yes
9416	CBM		msg		1	10	Rom?	moderate-poor		Yes
9518	CBM	Bathroom tite	rwe		1	16	pmed	moderate-poor		Yes
9519	Iron object	Iron object			1	186			horse shoe, half	Yes
9520	CBM	Bathroom tite	rwe		1	3	mod	moderate-poor	glue on back	Yes
9523	CBM	Bathroom tite	rwe		1	14	mod	moderate-poor		Yes
9525	Glass	Bottle glass			1	56	mod		neck/rim with plastic stopper	Yes
9603	Iron object	Iron object			1	119			two chain rings	Yes
9605	CBM	Bathroom tite	rwe		1	12	mod	moderate-poor	ribbed decoration; glue on back	Yes
9605	Pottery	English stoneware	ESW	PXM	1	10	19-20 c.	good		No
9619	CBM		fs		1	2	pmed	moderate-poor	flake	Yes
9621	CBM	Brick?	msfe		1	60	pmed	moderate-poor		Yes
9622	Pottery	Medieval Lincolnshire ware	LSW	HUM	1	13	13-16 c.	good		No
9713	CBM		fs		2	14	pmed	moderate-poor	flakes	Yes
9714	CBM	Roof tile	fs		1	26	pmed	moderate-poor		Yes
9715	CBM		msg		1	18	pmed	moderate-poor	1 flat side	Yes

9715	CBM	Roof tile?	fs		1	24	pmed	moderate-poor		Yes
9715	CBM	Roof tile?	fs		1	17	pmed	moderate-poor		Yes
9715	CBM	Pan tile?	fs		1	14	pmed	moderate-poor		Yes
9719	CBM	Pan tile?	fs		1	45	pmed	moderate-poor		No
10104	Pottery	English stoneware	ESW	PMX	1	56	19-20 c.	good	green coating	No
10104	Pottery	English stoneware	ESW	PMX	1	6	19-20 c.	good	white, ribbed	No
10104	Pottery	English stoneware	ESW	PMX	1	16	19-20 c.	good	brown coating, flower stamps	No
10110	CBM	Roof tile	fs		1	19	pmed	moderate-poor		Yes
10110	Iron object	Iron object			1	47			metal plate	Yes
10110	Pottery	Refined white earthenware	RWE	PXM	1	34	20 c.	good		No
10115	CBM	Curved tile	fs		1	28	pmed	moderate-poor		Yes
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
10115	Pottery	Refined white earthenware	RWE	PMX	1	12	18-20 c.	good	silver band on exterior rim; rippled surfaces	No
10115	Pottery	Refined white earthenware	RWE	PMX	1	12	19-20 c.	good	white, ribbed	No
10115	Pottery	Refined white earthenware	RWE	PMX	1	4	19-20 c.	good	white, ribbed	No
10115	Pottery	Transfer printed earthenware	TPE	PMX	1	3	20 c.	chipped	black floral decoration on both sides	No
10119	CBM	Bathroom tite	rwe		1	11	mod	moderate-poor		Yes
10119	Glass	Bottle glass			1	4	mod		translucent	Yes
10120	Pottery	Transfer printed earthenware	TPE	PMX	1	3	18-20 c.	good	blue floral decoration	No
10120	Pottery	Refined white earthenware	RWE	PMX	1	3	18-20 c.	good		No
10125	CBM	Bathroom tite	rwe		1	84	mod	moderate-poor		Yes
10201	CBM	Brick	fs		1	85	pmed	moderate-poor		Yes
10201	CBM	Roof tile	fs		1	74	pmed	moderate-poor		Yes
10201	CBM	Brick	fs		1	985	pmed	moderate-poor		Yes
10202	CBM	Roof tile?	fs		1	46	pmed	moderate-poor		Yes
10203	CBM	Brick	fs		1	85	pmed	moderate-poor	corner piece	Yes
10206	CBM	Pavement tile	ms		1	650	lmed-pmed	moderate-poor	corner piece	No
10206	CBM	Drain	msfeg		1	40	pmed	moderate-poor		No
10206	CBM	Brick	fs		1	290	pmed	moderate-poor	2 opposite flat sides	Yes
10206	CBM		fs		3	74	pmed	moderate-poor		Yes
10206	CBM	Roof tile	fs		2	80	pmed	moderate-poor		Yes
10206	Iron object	Iron nail			1	24	mod		thick nail with head, bent	Yes

10206	Pottery	Cistercian type ware	CTW	CIST	2	10	15-17 c.	exterior surface missing	black metallic glaze on interior	No
10206	Pottery	Refined red earthenware	RRE	PMX	1	4	18-20 c.	fair		No
10206	Pottery	Transfer printed earthenware	TPE	PMX	1	7	19-20 c.	good	blue floral decoration; wavy rim tip	No
10206	Pottery	Refined white earthenware	RWE	PMX	1	3	19-20 c.	good	wavy rim tip	No

Run No.	Material	Description	Fabric Code	Fabric Concordance	Ct.	Wt.(g)	Spot-date	Condition	Comments	Discarded (Yes/No)
10206	Pottery	Refined white earthenware	RWE	PMX	1	11	20 c.	good	blue on yellow band on interior	No
10208	CBM	Brick	fs		1	31	pmed	moderate-poor	flat corner	Yes
10212	CBM	Bathroom tite	rre		1	6	mod	moderate-poor	shades or red colour	Yes
10212	Iron object	Iron object			1	249	pmed		flat part of mattock with shaft hole	Yes
10212	Pottery	Refined white earthenware	RWE	PMX	1	13	19-20 c.	good		No
10213	Pottery	English stoneware	ESW	PXM	2	23	19-20 c.	good	one with vertical lines	No
10214	Pottery	English stoneware	ESW	PMX	1	22	19-20 c.	good	vertical ridges	No
10215	Iron object	Iron object			1	198	pmed		iron plate with three nails going through wooden board	Yes
10216	CBM	Brick	msfe		1	586	mod	moderate-poor	inscribed 'E'	No
10216	Pottery	Transfer printed earthenware	TPE	PMX	1	4	18-20 c.	good	blue floral decoration; rippled surfaces	No
10225	Pottery	Refined white earthenware	RWE	PMX	1	6	20 c.	good	two blue bands on interior	No
10404	CBM		fs		1	8	pmed	moderate-poor	1 flat surface	Yes
10405	CBM	Bathroom tite	rwe		1	5	mod	moderate-poor		Yes
10405	CBM	Roof tile?	fs		1	46	mod	moderate-poor		Yes
10405	Pottery	Cistercian type ware	CTW	CIST	1	40	15-17 c.	good	interior metallic black glaze	No
10405	Pottery	Cistercian type ware	CTW?	CIST?	1	35	15-17 c.	very poor, glaze missing	small segment of metallic black glaze on interior	No
10501	Other	Concrete			1	54	mod		vitrified paving product	Yes
10501	Pottery	English stoneware	ESW	PMX	1	14	17-19 c.	fair		No

10610	CBM	Roof tile	fs		1	44	pmed	moderate-poor		Yes
10615	CBM	Flanged tile	fsg		1	42	pmed	moderate-poor		No
10701	CBM		fs		1	12	pmed	moderate-poor		Yes
10705	CBM	Roman Brick or tile	fs		1	127	Rom?	moderate-poor	1 flat side	Yes
10710	CBM	Brick?	csc		1	59	lmed-pmed	moderate-poor		No
10710	CBM	Flanged brick	msfe		1	284	pmed	moderate-poor		No
10710	CBM	Roof tile	fsv		2	63	pmed	moderate-poor	1 with burnt surface	No
10710	CBM	Drain	ms		1	155	pmed	moderate-poor	ribbed interior	No

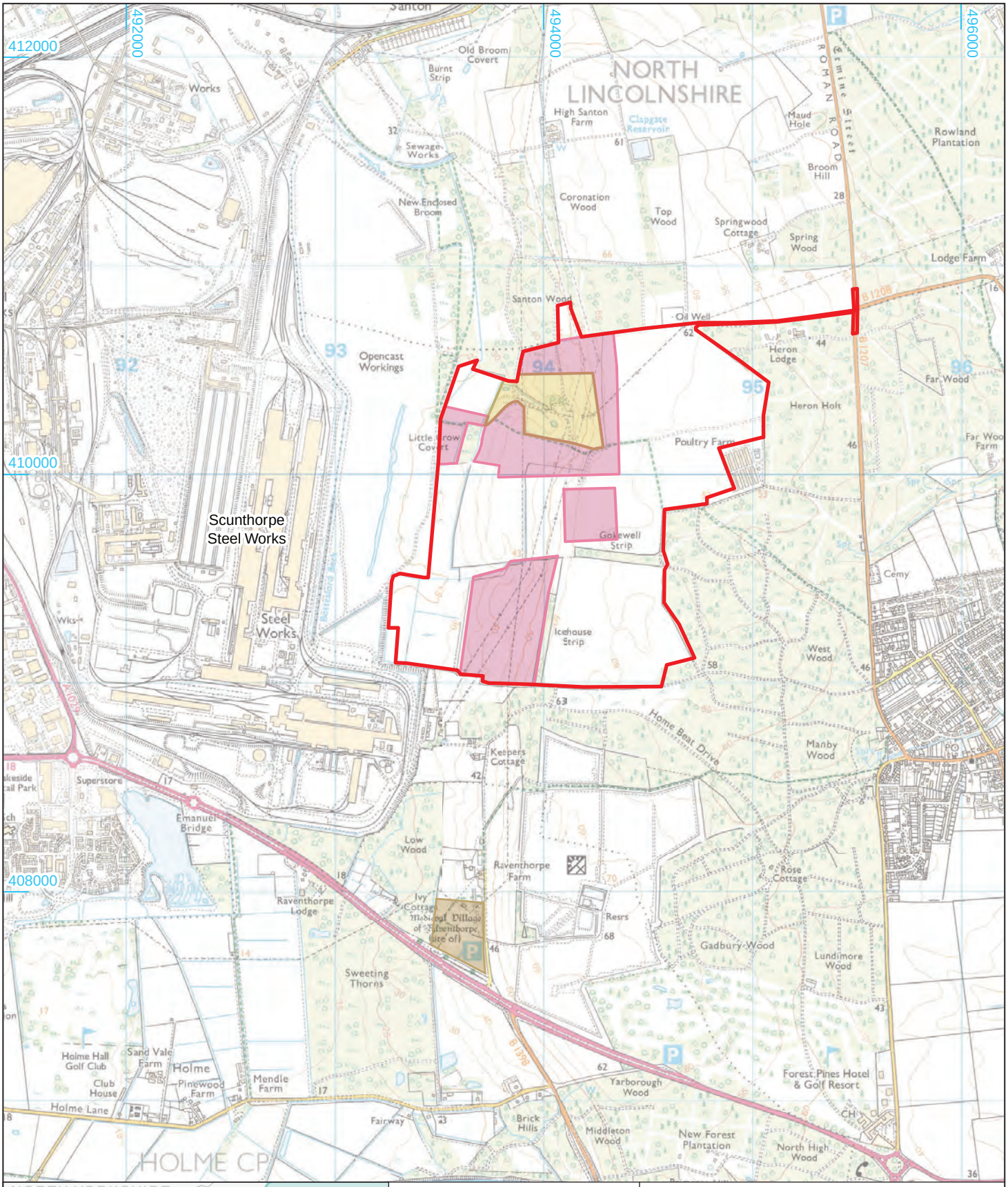
Run No.	Material	Description	Fabric Code	Fabric Concordance	Ct.	Wt.(g)	Spot-date	Condition	Comments	Discarded (Yes/No)
10710	Pottery	Refined red earthenware	RRE	PMX	1	7	18-20 c.	good	brown metallic glaze	No
10710	Pottery	Refined red earthenware	RRE	PMX	1	10	18-20 c.	good	smoothed	No
10710	Pottery	Transfer printed earthenware	TPE	PMX	1	8	18-20 c.	good	blue oriental decoration; wavy rim tip	No
10710	Pottery	Refined white earthenware	RWE	PMX	1	2	18-20 c.	good		No
10710	Pottery	Transfer printed earthenware	TPE	PMX	1	1	18-20 c.	good	blue floral decoration	No
10710	Pottery	Refined white earthenware	RWE	PMX	1	10	18-20 c.	good	blue painted decoration on relief	No
10710	Pottery	Refined white earthenware	RWE	PMX	1	8	19-20 c.	good	pink interior; exterior with green and purple line	No
10714	Iron object	Iron object			1	200	pmed		complete twin pitchfork with shaft	Yes
10714	Pottery	English stoneware	ESW	PMX	1	15	17-19 c.	good		No
10714	Pottery	Refined red earthenware	RRE	PMX	1	24	18-20 c.	good	brown metallic glaze	No
10714	Pottery	Refined white earthenware	RWE	PMX	1	6	18-20 c.	good		No
10714	Pottery	Refined white earthenware	RWE	PMX	1	12	18-20 c.	good		No
10715	Glass	Window glass			1	5	mod		Ridged	Yes

10715	Other	Roofing			1	8	mod		asbestos containing: disposed	Yes
10715	Pottery	Transfer printed earthenware	TPE	PMX	1	10	18-20 c.	fair	blue decoration	No
10716	CBM	Bathroom tile	rre		1	3	mod	moderate-poor	blue decoration	Yes
10716	Pottery	Late Lincolnshire ware	LLSW	LHUM	1	9	16-18 c.	glaze worn	olive green glazed	No
10716	Pottery	English stoneware	ESW	PMX	1	17	17-19 c.	good		No
10717	CBM	Bathroom tile	rwe		1	3	mod	moderate-poor		Yes
10722	CBM	Roof tile?	msg		1	26	pmed?	moderate-poor	heavily abraded	Yes
10722	Pottery	Late Lincolnshire ware	LLSW	LHUM	1	123	16-18 c.	good	green/brown glaze	No
10918	CBM	Brick	rre		1	344	mod	moderate-poor	perforated brick	Yes
10925	Pottery	Refined red earthenware	RRE	PMX	1	11	18-20 c.	good		No
Run No.	**Material**	**Description**	**Fabric Code**	**Fabric Concordance**	**Ct.**	**Wt.(g)**	**Spot-date**	**Condition**	**Comments**	**Discarded (Yes/No)**
11202	CBM		fs		1	37	pmed	moderate-poor		Yes
11205	Fired clay		cslife		1	38		poor	possible kiln furniture	No
11501	CBM	Bathroom tile	rwe		1	6	mod	moderate-poor		Yes
11502	CBM	Bathroom tile	rwe		2	19	mod	moderate-poor		Yes

APPENDIX B: OASIS REPORT FORM

PROJECT DETAILS	
Project Name	Little Crow, Santon, Scunthorpe, Lincolnshire: Archaeological Fieldwalking Survey
Short description	An archaeological fieldwalking survey was undertaken by Cotswold Archaeology in September 2018 on land at Santon, Scunthorpe. The fieldwalking was undertaken to inform the heritage chapter of an Environmental Statement to support a Development Consent Order application for a proposed solar PV array to be known as Little Crow Solar Park. Fieldwalking was undertaken across three areas totalling c.53.25 Ha, a 24.4% sample by area of the 218 Ha development site. The survey recorded over 19 Kg of artefacts of which most were of post-medieval and modern date and are of little archaeological significance. Only 4.4% by weight of the finds assemblage recorded from the survey is of archaeological interest and significance and only 49, or 3.6%, of the 1372, 20m runs from the survey contained archaeologically significant finds. By far the majority of the significant finds were from the south of the site and comprise nine of the 11 pieces of Neolithic/Bronze Age worked flint that were recovered, as well as 23, or 74%, of the 31 runs that produced 12th to 16th century pottery. A very small assemblage, 2% by weight, of Roman material recorded. This comprised locally-made greyware pottery from the north and south areas of the site. A small collection of possible Roman ceramic building material, weighing 426g, was recorded from the south-central area of the site. Some may be fragments of Roman roof tiles or tegulae. However, because of their abraded and fragmentary condition the fragments could easily be of post-medieval date. By far the greatest component of the archaeologically significant finds assemblage from the site comprised 35 sherds of 12th to 16th century pottery, which totals 50% of the archaeologically significant finds assemblage. The majority of the medieval and early post-medieval pottery was recorded from the southern part of the proposed development area, but also to a lesser degree to the immediate south of the site of Gokewell Priory, a Cistercian holding established in the 12th century and

	suppressed at The Dissolution of the Monasteries between 1536 and 1541. The date range of the medieval and early post-medieval pottery fits closely with the life span of the Priory and these material spreads are probably derived from the manuring of arable fields. The greatest quantity, 91% by weight, of material collected from the current fieldwalking survey was post-medieval or modern in date and comprised various building and settlement/domestic waste with no archaeological significance. Overall, the quantity of archaeologically significant material recovered during the survey was low, with no clear concentrations of artefactual material having been recovered.	
Project dates	10 – 21 September 2018	
Project type	Fieldwalking survey	
Previous work	Desk based assessment and Earthwork Survey (Pegasus Planning Ltd 2018) Geophysical survey (Sumo Geophysics Ltd 2018)	
Future work	Unknown	
PROJECT LOCATION		
Site Location	Little Crow, Santon, Scunthorpe, North Lincolnshire	
Study area (M^2/ha)	53.25	
Site co-ordinates	494064 410261	
PROJECT CREATORS		
Name of organisation	Cotswold Archaeology	
Project Brief originator	North Lincolnshire Council	
Project Design (WSI) originator	Cotswold Archaeology	
Project Manager	Adrian Scruby	
Project Supervisor	Chris Ellis	
MONUMENT TYPE	None	
SIGNIFICANT FINDS	Neolithic/Bronze Age worked flint, Roman and medieval pottery	
PROJECT ARCHIVES	North Lincolnshire Museums Service	Content
Physical		Worked flint, pottery, cbm, fired clay, glass, iron, copper alloy and aluminium objects, industrial waste
Paper		Fieldwalking Records, Registered artefact register, Photographic register
Digital		Finds database, digital photos, survey data
BIBLIOGRAPHY		
CA (Cotswold Archaeology), 2018. *Little Crow Solar Park, Scunthorpe, North Lincolnshire: Archaeological Fieldwalking Survey*. CA typescript report **18971**		





N

Site boundary

Gokewell Priory/Farm Exclusion Area

Fieldwalking Survey Areas

Raventhorpe Deserted Medieval Village

0 1km

© Crown copyright and database rights 2018
Ordnance Survey 0100031673

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

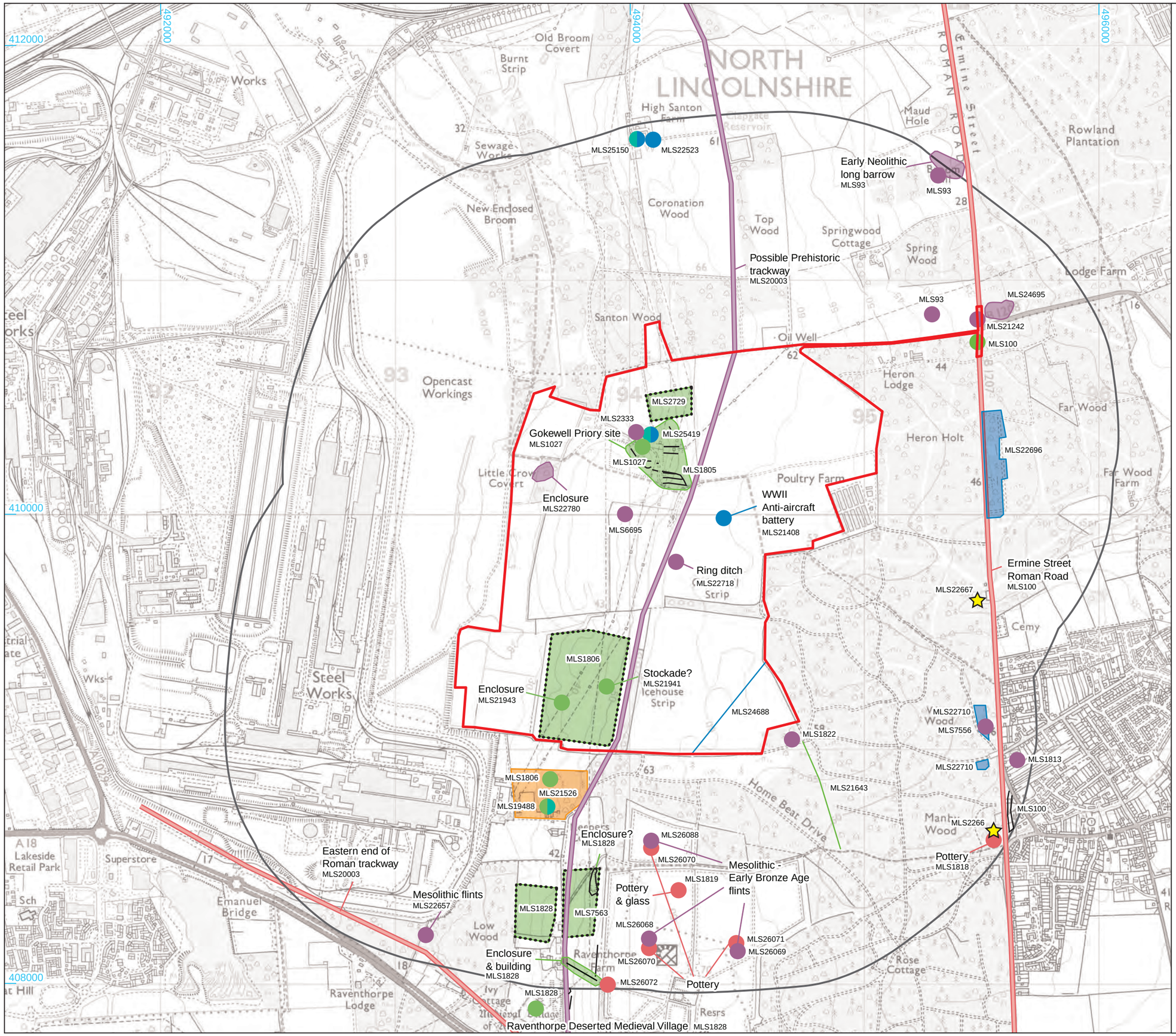
PROJECT TITLE

Little Crow, Santon, Scunthorpe, North Lincolnshire

FIGURE TITLE

Site location plan with fieldwalking survey areas

DRAWN BY	TB	PROJECT NO.	661163	FIGURE NO.
CHECKED BY	DJB	DATE	06.11.18	1
APPROVED BY	AS	SCALE@A4	1:25,000	



N

- Site boundary
- Study area

Historic Assets

- Prehistoric
- Roman
- Medieval
- Post-Medieval
- Modern
- Former ridge & furrow area
- Cropmarks
- Manby Deserted Medieval Village
- Ermine Street Roman Road
- Possible prehistoric trackway
- Natural springs

0 1:10,000 500m

© Crown copyright and database rights 2018 Ordnance Survey 0100031673

Cotswold Archaeology

Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

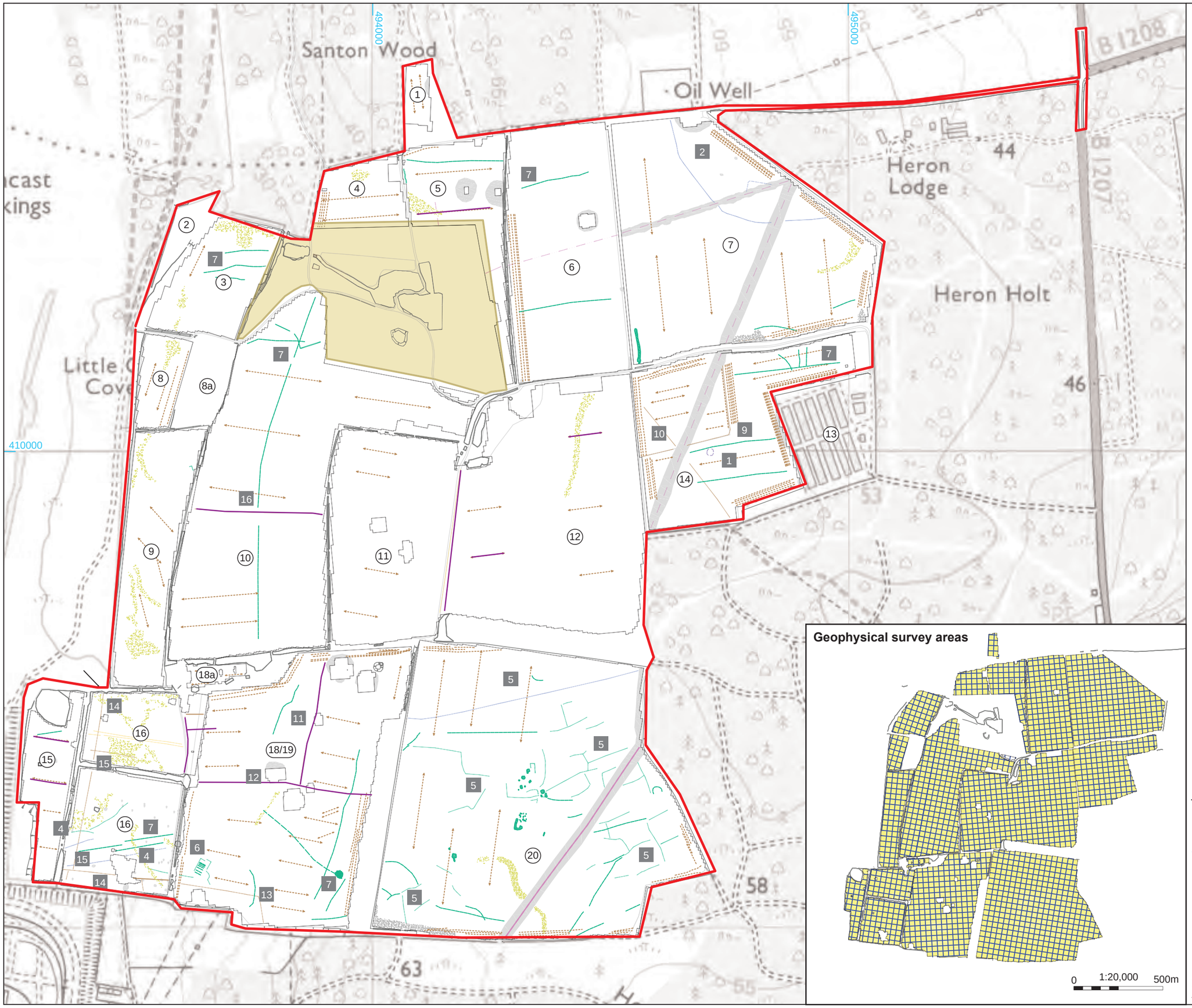
PROJECT TITLE

Little Crow, Santon, Scunthorpe, North Lincolnshire

FIGURE TITLE

North Lincolnshire Historic Environment Record (NLHER) Monument and Cropmark Plot (Pegasus Planning Ltd, 2018)

DRAWN BY	**TB**	*PROJECT NO.*	**661163**	*FIGURE NO.*
CHECKED BY	**DJB**	*DATE*	**06.11.18**	**2**
APPROVED BY	**AS**	*SCALE@A3*	**1:10,000**	



N

- Site boundary
- Gokewell Farm Exclusion Zone
- (1) Field number
- 1 Geophysical anomalies (Sumo Survey, 2018)
- Historic field boundaries (Pegasus Planning, 2018)

Geophysical survey results (Sumo Survey, 2018)

KEY

	Probable archaeology
	Possible archaeology (discrete anomaly / trend)
	Uncertain Origin (discrete anomaly / trend)
	Former field boundary (corroborated)
	Former field boundary (conjectural)
	Agriculture (plough)
	Natural (e.g. geological / pedological)
	Magnetic disturbance
	Service
	Ferrous

Geophysical survey areas

0 1:20,000 500m

0 1:7,500 250m

© Crown copyright and database rights 2018 Ordnance Survey 0100031673

Cotswold Archaeology
Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

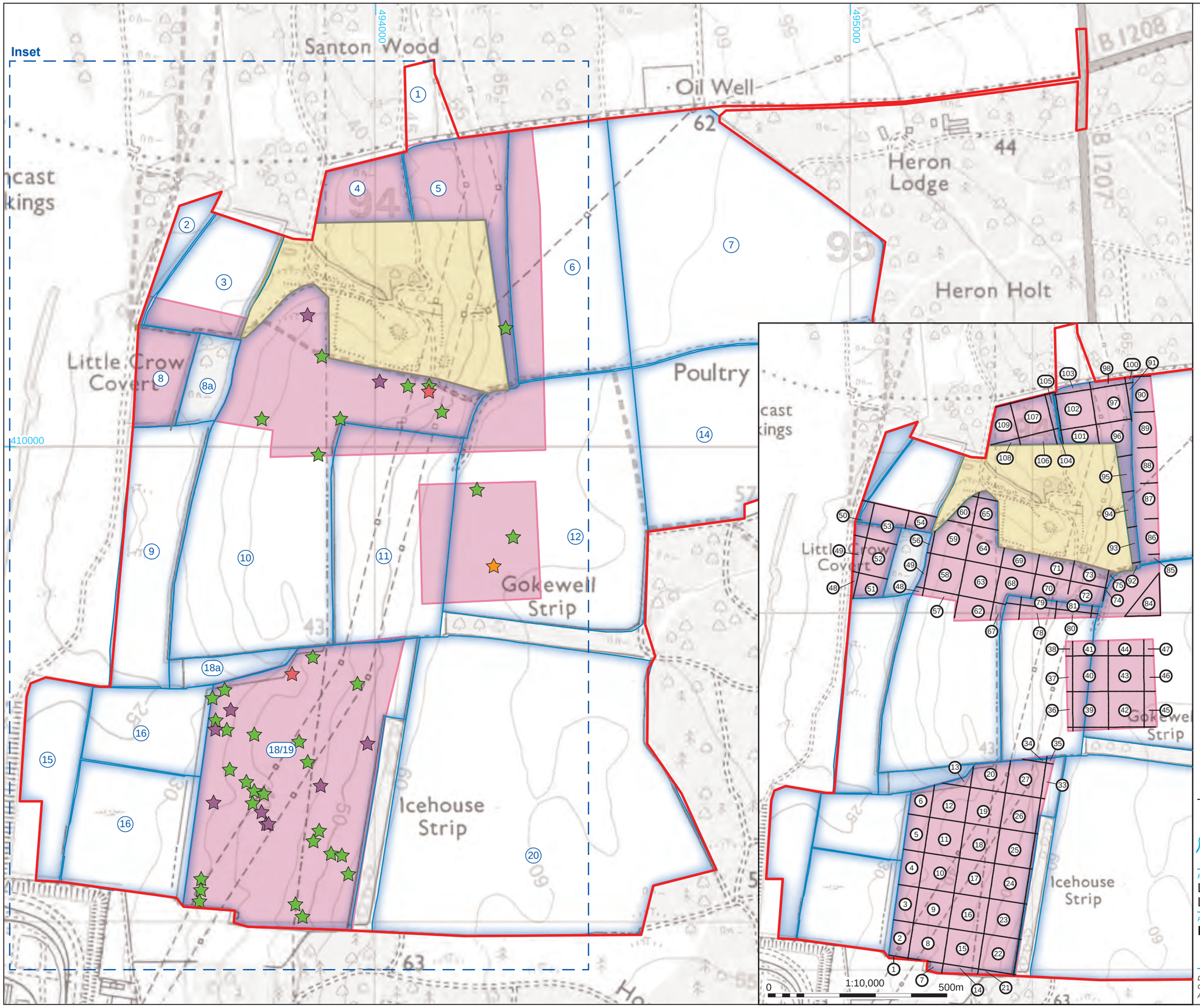
PROJECT TITLE

Little Crow, Santon, Scunthorpe, North Lincolnshire

FIGURE TITLE

Geophysical Survey Results

DRAWN BY	**TB**	*PROJECT NO.*	**661163**	*FIGURE NO.*
CHECKED BY	**DJB**	*DATE*	**07.11.18**	**3**
APPROVED BY	**AS**	*SCALE@A3*	**1:7,500 & 20,000**	



N

- Site boundary
- Fieldwalking areas
- Gokewell Farm Exclusion Zone
- Field boundaries
- (1) Field number
- (1) Hectare number
- Worked flint
- Roman pottery
- Roman CBM?
- Medieval pottery

*N.B. All Post-medieval & Modern finds not shown

0 1:10,000 500m

0 1:7,500 250m

© Crown copyright and database rights 2018 Ordnance Survey 0100031673

Cotswold Archaeology
Andover 01264 347630
Cirencester 01285 771022
Exeter 01392 826185
Milton Keynes 01908 564660
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Little Crow, Santon, Scunthorpe, North Lincolnshire

FIGURE TITLE

Finds distribution plot

DRAWN BY	TB	PROJECT NO.	661163	FIGURE NO.
CHECKED BY	DJB	DATE	06.11.18	4
APPROVED BY	AS	SCALE@A3	1:7,500 & 10,000	

Andover Office
Stanley House
Walworth Road
Andover
Hampshire
SP10 5LH

t: 01264 347630

Cirencester Office
Building 11
Kemble Enterprise Park
Cirencester
Gloucestershire
GL7 6BQ

t: 01285 771022

Exeter Office
Unit 53
Basepoint Business Centre
Yeoford Way
Marsh Barton Trading Estate
Exeter
EX2 8LB

t: 01392 826185

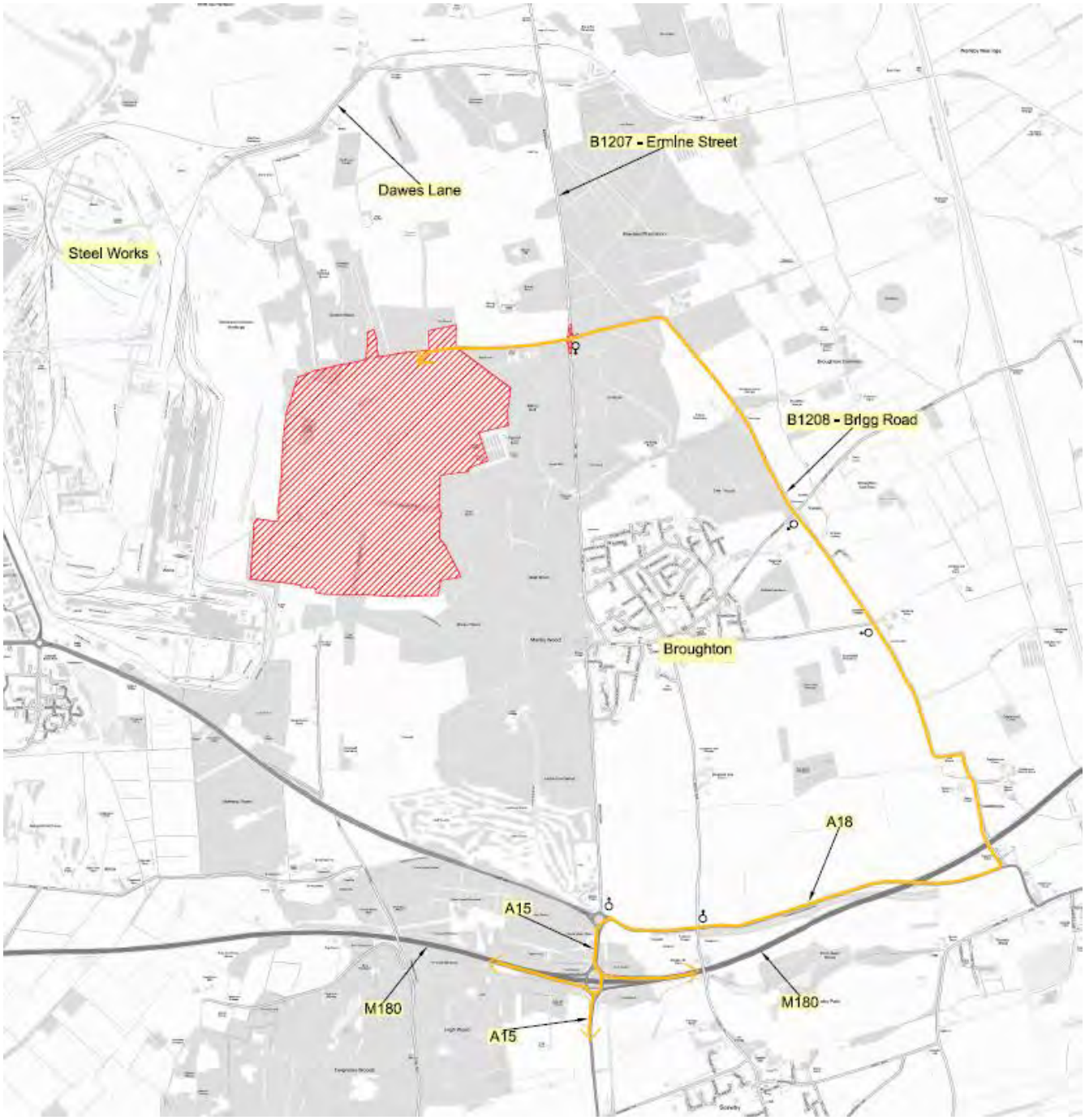
Milton Keynes Office
Unit 8 - The IO Centre
Fingle Drive
Stonebridge
Milton Keynes
Buckinghamshire
MK13 0AT

t: 01908 564660

e: enquiries@cotswoldarchaeology.co.uk

APPENDIX 9.1

PROPOSED STUDY AREA



Proposed Study Area (Construction Route to Site)

APPENDIX 9.2

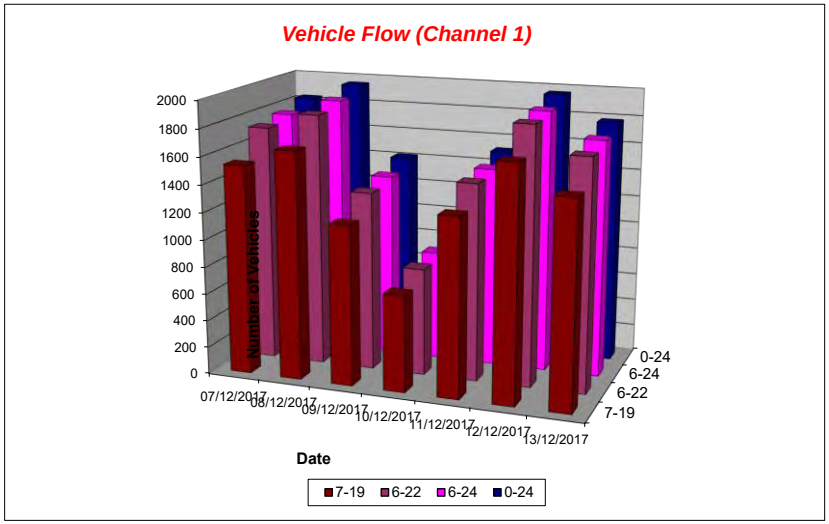
ATC DATA DECEMBER 2017

Santon Solar, Scunthorpe ATC 01, B1207

Produced by Streetwise Services Ltd.

Channel 1 - Northbound **Vehicle Flow** **Week 1**

Hr Ending	07/12/2017 Thursday	08/12/2017 Friday	09/12/2017 Saturday	10/12/2017 Sunday	11/12/2017 Monday	12/12/2017 Tuesday	13/12/2017 Wednesday	5 Day Ave	7 Day Ave
1	3	2	15	5	3	3	2	3	5
2	2	1	5	4	4	3	1	2	3
3	2	4	3	2	1	1	1	2	2
4	3	5	2	0	0	1	2	2	2
5	8	10	8	4	11	11	12	10	9
6	44	38	32	13	32	37	37	38	33
7	57	55	16	9	49	52	62	55	43
8	179	161	43	11	151	153	168	162	124
9	186	196	75	7	140	163	195	176	137
10	121	115	81	27	86	102	99	105	90
11	100	101	111	56	88	78	102	94	91
12	108	98	131	73	76	86	90	92	95
13	115	134	141	89	102	186	99	127	124
14	133	166	128	92	111	257	103	154	141
15	106	143	108	102	100	185	110	129	122
16	132	137	113	88	119	135	142	133	124
17	111	181	100	70	127	147	151	143	127
18	149	139	77	50	114	129	132	133	113
19	95	94	64	44	90	76	106	92	81
20	69	69	57	37	38	75	50	60	56
21	41	37	32	25	35	36	44	39	36
22	32	24	36	10	18	22	35	26	25
23	28	21	20	12	15	19	32	23	21
24	6	22	18	3	5	6	7	9	10
7-19	1535	1665	1172	709	1304	1697	1497	1540	1368
6-22	1734	1850	1313	790	1444	1882	1688	1720	1529
6-24	1768	1893	1351	805	1464	1907	1727	1752	1559
0-24	1830	1953	1416	833	1515	1963	1782	1809	1613



Santon Solar, Scunthorpe ATC 01, B1207

Produced by Streetwise Services Ltd.

Channel 1 - Northbound **Average Speed** **Week 1**

Hr Ending	07/12/2017 Thursday	08/12/2017 Friday	09/12/2017 Saturday	10/12/2017 Sunday	11/12/2017 Monday	12/12/2017 Tuesday	13/12/2017 Wednesday
1	61.3	50.5	50.5	45.0	48.0	49.7	60.5
2	40.5	43.0	45.0	43.0	45.5	43.8	53.0
3	34.2	33.6	54.7	35.5	38.0	38.0	63.0
4	48.0	48.0	43.0	-	-	38.0	50.5
5	49.6	52.2	51.8	56.1	47.5	48.5	51.8
6	53.7	52.3	50.7	51.8	51.8	49.2	51.8
7	51.4	52.7	51.1	48.0	49.7	48.9	50.6
8	51.0	49.6	49.3	41.9	47.9	48.1	49.4
9	51.0	50.9	50.9	48.0	50.1	48.6	50.8
10	48.3	47.9	51.1	45.4	49.1	47.2	49.9
11	46.4	48.7	51.2	48.6	46.1	47.6	50.1
12	48.0	48.9	50.2	50.4	47.7	48.0	48.5
13	49.8	50.2	51.4	50.7	49.7	46.8	49.6
14	48.9	49.0	50.2	50.1	48.2	46.8	47.4
15	48.0	49.8	51.1	51.4	48.1	47.1	48.3
16	49.6	51.0	50.7	51.1	49.2	48.5	48.5
17	49.3	48.0	50.8	48.1	48.3	46.9	48.7
18	50.2	51.2	52.1	49.3	48.2	46.5	49.5
19	50.1	51.0	50.9	50.2	50.5	50.3	49.6
20	52.0	51.8	51.2	53.3	52.3	49.7	51.2
21	53.4	51.5	52.8	52.5	50.4	50.0	47.7
22	51.4	51.6	48.0	49.0	49.2	50.3	53.4
23	53.0	51.0	48.8	52.6	55.2	56.0	51.9
24	48.0	50.7	46.8	41.3	42.0	45.5	52.3
10-12	47.2	48.8	50.7	49.6	46.9	47.8	49.4
14-16	48.9	50.3	50.9	51.3	48.7	47.7	48.4
0-24	49.9	50.0	50.7	50.0	48.9	47.8	49.6

7 Day Ave 49.6

85th Percentile

Hr Ending	07/12/2017 Thursday	08/12/2017 Friday	09/12/2017 Saturday	10/12/2017 Sunday	11/12/2017 Monday	12/12/2017 Tuesday	13/12/2017 Wednesday
1	68.7	58.6	54.0	58.7	53.2	53.4	63.8
2	43.5	43.3	48.4	43.9	48.9	58.1	53.3
3	43.6	43.3	63.3	38.8	38.7	38.7	63.2
4	58.3	68.8	48.2	-	-	38.9	53.5
5	68.3	63.8	63.2	85.5	58.5	58.5	63.3
6	63.8	63.6	63.6	58.5	63.4	58.1	63.3
7	68.0	64.0	63.4	63.9	58.1	58.8	63.0
8	63.8	58.9	58.4	53.4	58.8	58.4	58.5
9	58.8	58.2	58.7	63.7	58.5	58.5	58.2
10	58.7	58.7	58.3	53.5	58.8	58.5	58.9
11	53.0	59.0	63.6	58.5	53.6	53.2	63.6
12	58.4	58.2	58.2	58.5	53.8	53.3	58.8
13	58.9	58.5	58.2	58.4	58.0	53.1	58.9
14	58.8	58.1	58.6	58.4	58.2	58.6	58.3
15	58.4	59.0	58.1	63.3	53.1	58.2	58.5
16	59.0	58.7	58.5	58.1	58.1	58.9	58.1
17	58.9	53.0	58.9	58.2	58.3	53.1	58.6
18	58.1	58.6	63.3	59.0	58.1	53.4	58.4
19	58.9	58.1	58.8	58.1	58.0	58.3	59.0
20	63.4	63.1	58.4	58.4	63.5	58.9	58.1
21	63.5	68.8	63.3	58.4	58.7	58.8	58.9
22	63.8	58.3	58.9	53.5	58.5	63.3	63.6
23	63.1	58.0	53.6	58.2	68.8	63.7	63.3
24	58.6	58.3	58.6	43.5	58.1	58.3	63.1
10-12	58.5	58.4	58.4	58.3	53.2	53.1	58.5
14-16	58.3	58.3	58.1	58.6	58.7	58.0	58.2
0-24	58.6	58.9	58.6	58.5	58.5	58.3	59.0

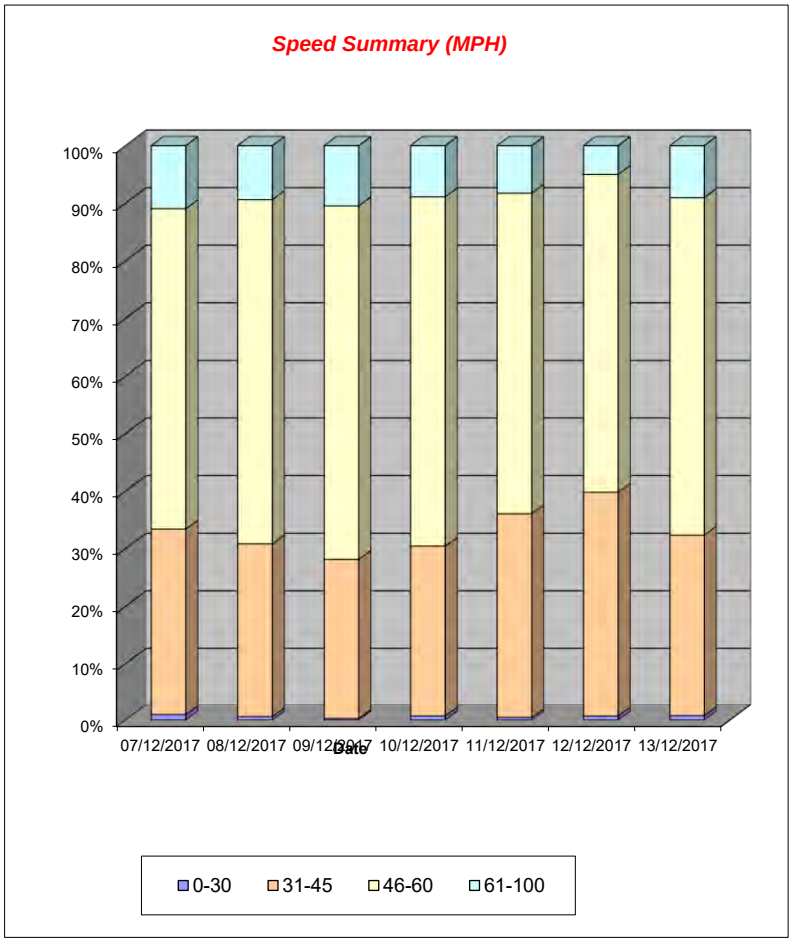
7 Day Ave 58.6

Santon Solar, Scunthorpe ATC 01, B1207

Produced by Streetwise Services Ltd.

Channel 1 - Northbound **Speed Summary** **Week 1**

Speed (MPH)	07/12/2017 Thursday	08/12/2017 Friday	09/12/2017 Saturday	10/12/2017 Sunday	11/12/2017 Monday	12/12/2017 Tuesday	13/12/2017 Wednesday
0-30	18	12	4	6	7	14	14
31-45	594	591	395	248	540	768	563
46-60	1018	1167	869	505	843	1083	1044
61-100	200	183	148	74	125	98	161
TOTAL	1830	1953	1416	833	1515	1963	1782

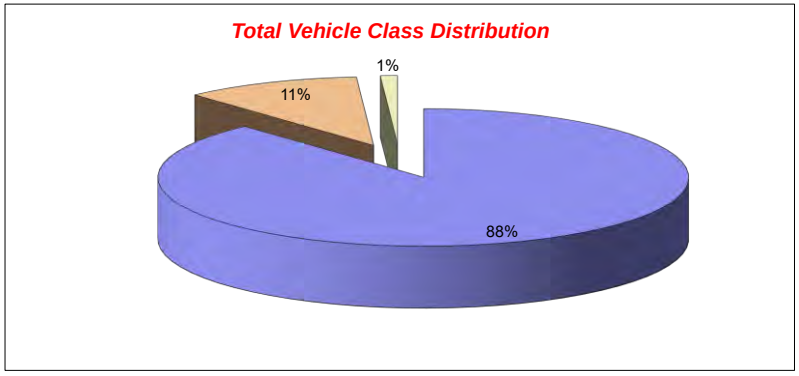


Santon Solar, Scunthorpe ATC 01, B1207

Produced by Streetwise Services Ltd.

Channel 1 - Northbound **Vehicle Class** **Week 1**

Classes / Day / Time	Car / LGV / Caravan - 1	OGV1 / Bus - 2,3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
07/12/2017				
7-19	1306	206	23	1535
6-22	1491	217	26	1734
6-24	1525	217	26	1768
0-24	1577	224	29	1830
08/12/2017				
7-19	1481	167	17	1665
6-22	1654	179	17	1850
6-24	1694	182	17	1893
0-24	1744	189	20	1953
09/12/2017				
7-19	1079	90	3	1172
6-22	1216	94	3	1313
6-24	1247	101	3	1351
0-24	1305	108	3	1416
10/12/2017				
7-19	664	44	1	709
6-22	741	48	1	790
6-24	755	49	1	805
0-24	778	54	1	833
11/12/2017				
7-19	1140	158	6	1304
6-22	1263	174	7	1444
6-24	1283	174	7	1464
0-24	1328	180	7	1515
12/12/2017				
7-19	1437	229	31	1697
6-22	1604	246	32	1882
6-24	1629	246	32	1907
0-24	1679	250	34	1963
13/12/2017				
7-19	1290	185	22	1497
6-22	1469	196	23	1688
6-24	1503	201	23	1727
0-24	1552	207	23	1782
Average				
7-19	1200	154	15	1368
6-22	1348	165	16	1529
6-24	1377	167	16	1559
0-24	1423	173	17	1613

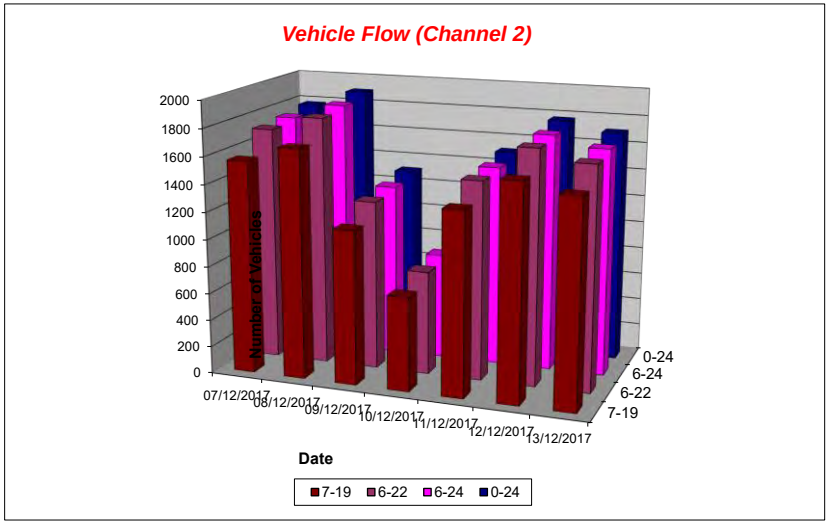


Santon Solar, Scunthorpe ATC 01, B1207

Produced by Streetwise Services Ltd.

Channel 2 - Southbound — **Vehicle Flow** — **Week 1**

Hr Ending	07/12/2017 Thursday	08/12/2017 Friday	09/12/2017 Saturday	10/12/2017 Sunday	11/12/2017 Monday	12/12/2017 Tuesday	13/12/2017 Wednesday	5 Day Ave	7 Day Ave
1	3	4	8	3	2	2	3	3	4
2	1	3	4	4	2	3	0	2	2
3	0	0	2	2	2	1	2	1	1
4	1	4	6	2	2	0	2	2	2
5	6	7	2	2	4	8	8	7	5
6	24	22	15	8	22	20	25	23	19
7	47	40	15	5	39	43	39	42	33
8	132	110	39	6	111	99	128	116	89
9	139	128	67	5	120	123	142	130	103
10	119	112	105	41	77	75	94	95	89
11	95	116	101	80	86	78	82	91	91
12	108	113	101	83	69	96	108	99	97
13	101	141	141	88	80	89	109	104	107
14	97	147	131	88	78	109	101	106	107
15	117	166	131	76	112	194	130	144	132
16	160	199	97	76	144	177	119	160	139
17	228	202	100	67	204	261	205	220	181
18	181	167	74	44	169	212	203	186	150
19	87	78	45	39	94	59	81	80	69
20	49	48	54	33	32	45	50	45	44
21	38	38	28	19	30	39	28	35	31
22	23	22	17	15	16	18	16	19	18
23	15	13	16	11	9	14	18	14	14
24	7	18	9	8	5	6	11	9	9
7-19	1564	1679	1132	693	1344	1572	1502	1532	1355
6-22	1721	1827	1246	765	1461	1717	1635	1672	1482
6-24	1743	1858	1271	784	1475	1737	1664	1695	1505
0-24	1778	1898	1308	805	1509	1771	1704	1732	1539



Santon Solar, Scunthorpe ATC 01, B1207

Produced by Streetwise Services Ltd.

Channel 2 - Southbound — **Average Speed** — **Week 1**

Hr Ending	07/12/2017 Thursday	08/12/2017 Friday	09/12/2017 Saturday	10/12/2017 Sunday	11/12/2017 Monday	12/12/2017 Tuesday	13/12/2017 Wednesday
1	54.7	48.0	46.8	44.7	45.5	63.0	45.5
2	53.0	44.7	39.9	41.1	45.5	43.0	-
3	-	-	53.0	43.0	40.5	33.0	50.5
4	63.0	53.0	55.1	40.5	50.5	-	58.0
5	52.2	50.9	48.0	43.0	49.2	49.2	51.8
6	50.1	53.1	51.7	48.6	51.6	47.1	51.4
7	49.5	53.1	51.0	60.5	48.4	48.2	51.1
8	46.5	44.8	43.7	39.7	41.7	43.6	43.8
9	45.5	46.7	47.7	46.0	44.4	43.5	45.1
10	45.5	43.3	45.7	46.9	45.6	43.8	43.7
11	44.4	44.4	45.4	47.5	44.7	44.6	44.9
12	46.0	44.5	46.5	48.4	44.4	46.9	43.6
13	48.1	44.9	46.5	47.3	47.5	48.0	43.1
14	45.8	45.5	47.2	48.5	48.1	46.8	39.6
15	47.3	46.3	46.2	47.1	47.7	42.0	45.6
16	45.8	45.5	45.1	46.7	44.9	45.6	47.2
17	43.8	45.8	46.0	47.8	44.7	42.8	44.3
18	45.7	46.9	47.1	47.8	46.1	43.4	46.2
19	49.3	46.7	48.0	50.9	46.6	45.7	45.0
20	49.8	45.0	46.9	47.1	46.9	47.3	46.3
21	48.7	49.6	48.5	44.3	45.9	46.7	46.8
22	50.2	49.6	48.1	45.7	45.2	44.1	47.8
23	46.5	48.0	43.5	47.5	46.3	48.7	53.3
24	50.9	48.0	44.1	48.6	44.0	52.2	52.1
10-12	45.3	44.4	45.9	48.0	44.5	45.9	44.1
14-16	46.4	45.9	45.8	46.9	46.1	43.7	46.4
0-24	46.3	46.0	46.5	47.6	45.6	44.6	45.1

7 Day Ave	46.0

85th Percentile

Hr Ending	07/12/2017 Thursday	08/12/2017 Friday	09/12/2017 Saturday	10/12/2017 Sunday	11/12/2017 Monday	12/12/2017 Tuesday	13/12/2017 Wednesday
1	58.1	53.7	58.1	58.4	53.1	68.5	63.3
2	53.0	53.9	48.1	48.4	48.8	53.4	-
3	-	-	58.2	48.9	48.7	33.1	53.2
4	63.3	58.4	85.5	48.1	58.5	-	68.3
5	63.5	63.3	48.7	43.6	53.2	53.3	58.0
6	58.9	63.3	68.5	53.3	58.2	53.6	63.7
7	58.5	68.2	68.6	85.6	58.3	58.8	63.8
8	58.4	53.5	53.2	48.2	48.8	53.5	48.3
9	53.8	53.2	58.5	58.1	53.1	48.2	53.7
10	53.8	53.6	58.7	53.4	53.5	48.9	53.4
11	53.7	53.4	53.8	54.0	53.8	53.4	53.8
12	53.7	53.9	53.4	58.5	53.8	53.3	53.7
13	59.0	53.5	53.9	53.5	53.3	58.8	53.4
14	53.3	53.2	53.7	59.0	59.0	53.2	48.1
15	53.5	53.7	53.1	53.2	53.8	48.4	53.4
16	53.4	53.7	53.6	58.4	53.7	53.2	53.3
17	53.7	53.6	53.7	58.4	53.9	48.9	53.7
18	53.2	53.8	58.0	53.3	53.9	48.6	53.3
19	58.4	58.2	53.4	63.5	53.4	53.4	53.8
20	58.5	58.8	58.4	53.1	53.1	63.4	53.2
21	58.8	58.2	58.3	58.5	54.0	58.9	53.6
22	58.5	59.0	64.0	54.0	53.8	53.6	54.0
23	58.4	53.1	48.8	58.6	48.7	58.9	63.2
24	58.5	58.1	53.7	53.9	53.4	63.5	63.9
10-12	53.2	53.8	53.4	58.7	53.0	53.3	53.1
14-16	53.6	53.4	53.7	53.4	53.2	53.9	54.0
0-24	53.5	53.5	53.3	58.7	53.2	53.3	53.6

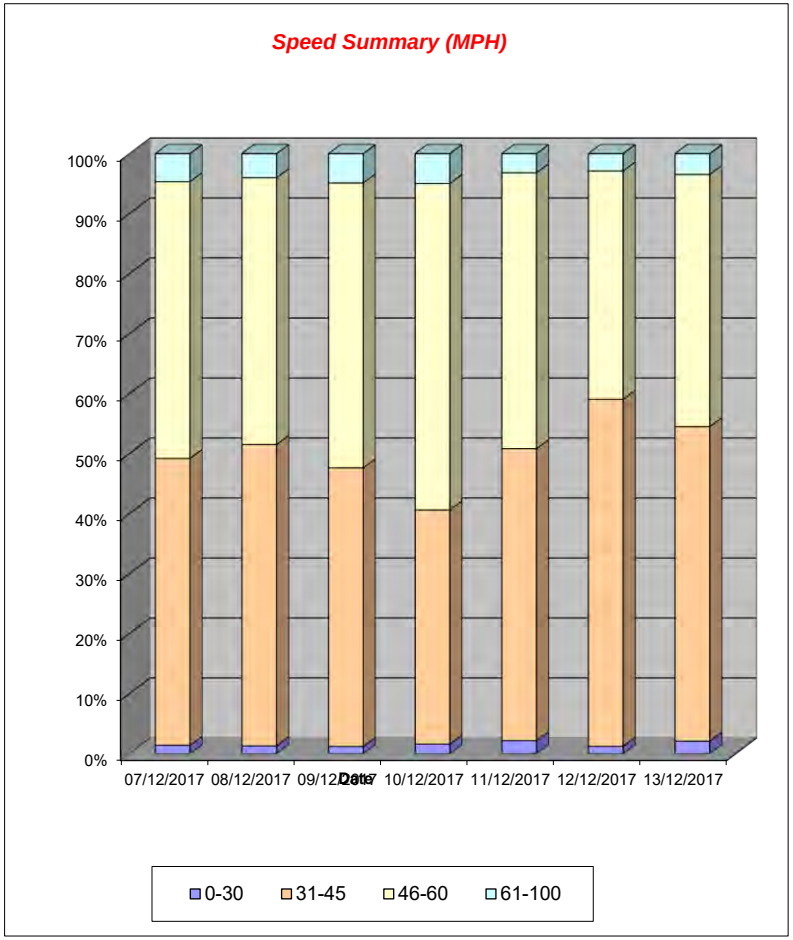
7 Day Ave	54.2

Santon Solar, Scunthorpe ATC 01, B1207

Produced by Streetwise Services Ltd.

Channel 2 - Southbound | **Speed Summary** | **Week 1**

Speed (MPH)	07/12/2017 Thursday	08/12/2017 Friday	09/12/2017 Saturday	10/12/2017 Sunday	11/12/2017 Monday	12/12/2017 Tuesday	13/12/2017 Wednesday
0-30	25	25	16	13	33	22	36
31-45	850	953	607	314	734	1024	893
46-60	820	844	621	438	694	674	716
61-100	83	76	64	40	48	51	59
TOTAL	**1778**	**1898**	**1308**	**805**	**1509**	**1771**	**1704**



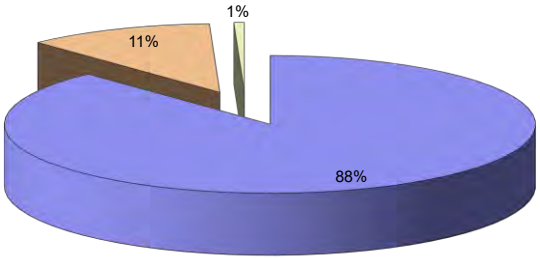
Santon Solar, Scunthorpe ATC 01, B1207

Produced by Streetwise Services Ltd.

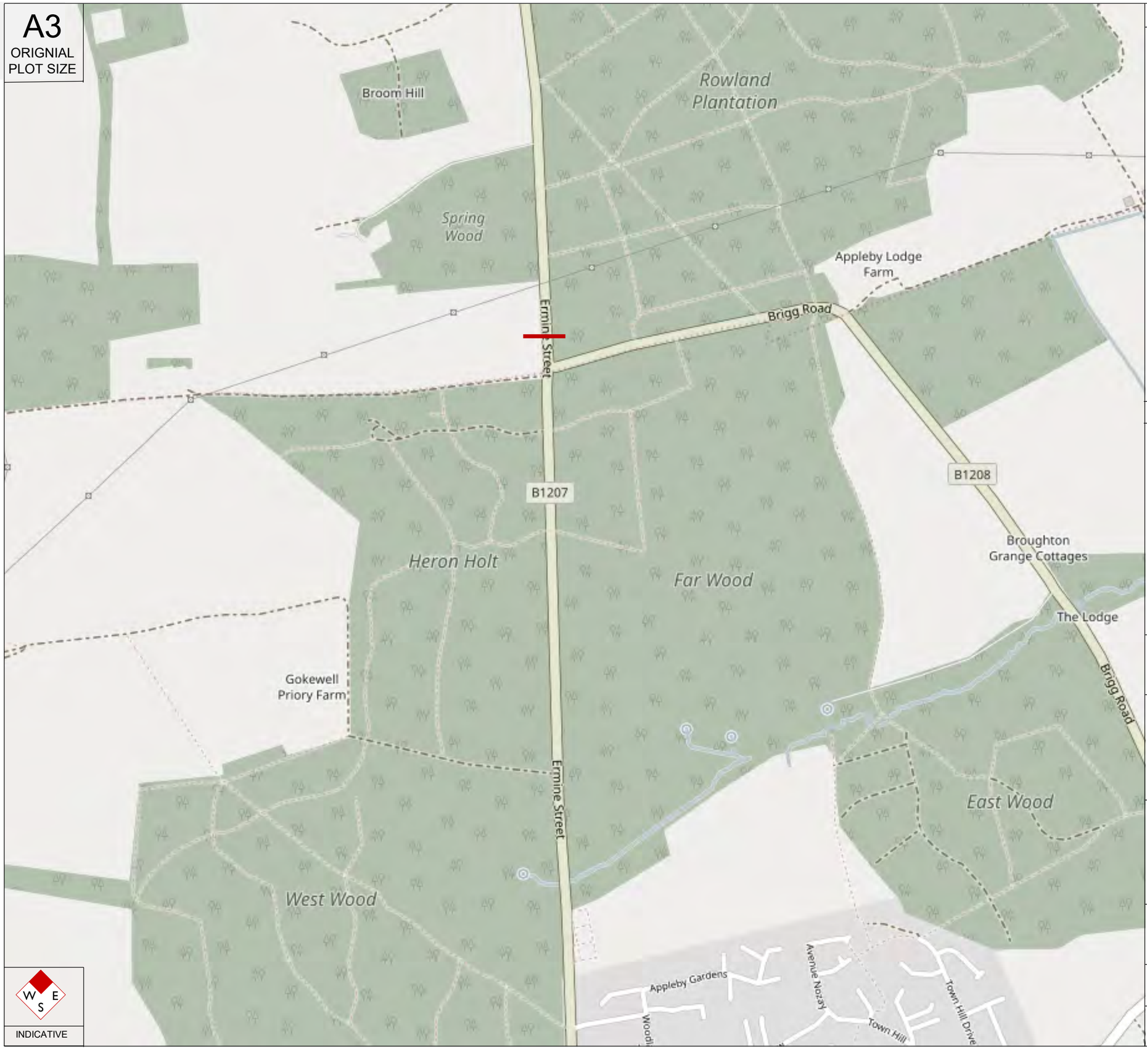
Channel 2 - Southbound | **Vehicle Class** | **Week 1**

Classes / Day / Time	Car / LGV / Caravan - 1	OGV1 / Bus - 2,3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
07/12/2017				
7-19	1345	200	19	**1564**
6-22	1477	223	21	**1721**
6-24	1499	223	21	**1743**
0-24	1528	229	21	**1778**
08/12/2017				
7-19	1490	178	11	**1679**
6-22	1625	191	11	**1827**
6-24	1656	191	11	**1858**
0-24	1690	197	11	**1898**
09/12/2017				
7-19	1035	94	3	**1132**
6-22	1141	102	3	**1246**
6-24	1163	105	3	**1271**
0-24	1196	109	3	**1308**
10/12/2017				
7-19	634	58	1	**693**
6-22	700	64	1	**765**
6-24	719	64	1	**784**
0-24	734	70	1	**805**
11/12/2017				
7-19	1159	180	5	**1344**
6-22	1263	193	5	**1461**
6-24	1277	193	5	**1475**
0-24	1308	196	5	**1509**
12/12/2017				
7-19	1365	198	9	**1572**
6-22	1490	218	9	**1717**
6-24	1510	218	9	**1737**
0-24	1540	222	9	**1771**
13/12/2017				
7-19	1295	190	17	**1502**
6-22	1417	200	18	**1635**
6-24	1445	201	18	**1664**
0-24	1480	206	18	**1704**

Average				
7-19	1189	157	9	**1355**
6-22	1302	170	10	**1482**
6-24	1324	171	10	**1505**
0-24	1354	176	10	**1539**



A3
ORIGNIAL
PLOT SIZE



INDICATIVE

Reproduced from Ordinance Survey Superplan Data with the permission of The Controller of Her Majesty's Stationrey Office, Crown Copyright – Licence No. AL 100034021

NOTES:

Approximate ATC Location

Rev	Date	Details	Drawn by	Checked by	Approved by
-	-	-	-	-	-

Bristol
Cambridge
London
Manchester
Oxford
Welwyn Garden City

Transport Planning Associates

25 King Street
Bristol
BS1 4PB

0117 925 9400
www.tpa.uk.com

CLIENT:

PROJECT:

Little Crow, Scunthorpe

TITLE:

ATC Location

STATUS:

INFORMATION

SCALE:	DATE:	DRAWN:	CHECKED:	APPROVED:
NTS				

JOB NO:	DRAWING NO:	REVISION:

APPENDIX 9.3

TRANSPORT STATEMENT (TPA, NOVEMBER 2018) AGRICULTURE

Little Crow
Solar Park

National significant infrastructure project in the Energy Sector

Little Crow Solar Park, Scunthorpe

TRANSPORT STATEMENT

On behalf of INRG Solar (Little Crow) Ltd

November 2018

CONTENTS PAGE

1 INTRODUCTION 1
2 EXISTING SITE CONTEXT 2
3 TRANSPORT PLANNING POLCY AND GUIDANCE 4
4 DEVELOPMENT PROPOSALS 5
5 EFFECT OF THE PROPOSED DEVELOPMENT 7
6 SUMMARY AND CONCLUSION 10

LIST OF APPENDICES

A **Site Location**

B **Indicative Layout Drawings**

C **Construction Traffic Management Plan (CTMP)**

1 INTRODUCTION

1.1 This Transport Statement (TS) has been prepared by Transport Planning Associates (TPA) on behalf of INRG Solar (Little Crow) Ltd. to address the transport elements associated with the construction of a renewable led energy scheme on land to the east of the British Steel site and to the west of the B1207, at Scunthorpe, North Lincolnshire, DN16 1XP.

1.2 A plan showing the site location is included in **Appendix A**. The site comprises approximately 226.81 hectares of land located approximately 2.1 kilometres north of the village of Broughton. Junction 4 of the M180 is approximately 4.5 kilometres to the south.

1.3 The proposal is for the development of a renewable led energy scheme with Solar Photovoltaic (PV) Farm comprising 359,688 modules, power inverter cabinets and sub-stations with the potential to produce up to 150 MW of power annually, and a 90MW battery storage facility. An indicative site layout drawing is shown in **Appendix B**.

1.4 The solar park will generate clean renewable energy for the equivalent of over 40,000 homes a year. The anticipated CO_2 displacement is 50,000 tonnes per annum. Further details of the proposal and the technology used together with the proposed site layout are included within the supporting documents, submitted separately as part of the application.

1.5 The TS provides a review of the potential effects of the development proposals in transport terms. The report has been prepared in accordance with National Planning Practice Guidance (NPPG).

1.6 Once Solar Parks are operational, they generate very few traffic movements on a day to day basis. The transport effects of the proposals are greater during the temporary construction phase. Therefore, the TS is supported by a Construction Traffic Management Plan (CTMP). A copy of the CTMP is included within **Appendix C**.

1.7 Pre-application discussions have been held with officers at North Lincolnshire Council and Highways England. All comments have been taken on board in the preparation of this TS and supporting documents.

1.8 The remainder of this report is set out as follows:

- **Section 2** – Describes the existing site and the accessibility of the local area;
- **Section 3** – Sets out the development proposals of the scheme;
- **Section 4** – Considers the development in the context of national and local policy guidance;
- **Section 5** – Considers the effect of the development in transport terms;
- **Section 6** – Provides a summary and conclusion to the report.

2 EXISTING SITE CONTEXT

2.1 This section summarises the existing situation surrounding site, including details of site location and its accessibility by car and non-car modes of transport.

Site Location

2.2 The location of the site in its wider geographical context is shown in **Appendix A**.

2.3 The site comprises approximately 226.81 hectares of land located approximately 2.1 kilometres north of the village of Broughton. Junction 4 of the M180 is approximately 4.5 kilometres to the south.

Local Highway Network

2.4 The B1207 is situated to the east of the site, operating in a north to south alignment. It is a single carriageway road connecting the small town of Broughton to south of the site, to the village of Winterton to the north. Within the vicinity of the site, national speeds limits apply. The B1207 to the south of the site, towards the village of Broughton, is subject to a 7.5 tonne weight restriction, except for loading. As such, no Heavy Goods Vehicles (HGVs) are permitted to travel along this route

2.5 The B1208 operates eastwards from the site before turning to the south where it connects to the A18 and M180 at Junction 4. It is also a single carriageway road where national speed limits apply. The B1208 does not have any weight restrictions in place, and is used by HGVs associated with the Steel Works, which is accessible from Dawes Lane to the north of the site,

Accessibility by Non-Car Modes of Transport

2.6 The closest settlement to the site is the small town of Broughton, situated approximately 2.1km to the south. Two bus routes operate through Broughton, as follows:

- Number 4: Scunthorpe – Ashby – Broughton – Brigg - Horsby (60 minute frequency);
- Number 642: Scunthorpe – Broughton – Hibaldston – Redbourne (two per day).

Summary

2.7 The site is in a suitable location for a Solar Park in terms of transport. Whilst there is not a significant level of public transport accessibility in the area, the operation of the site generates very few trips (see Section 5).

2.8 The roads leading to the site, notably the B1208, already serve HGVs associated with the Steel Works, which is accessible from Dawes Lane to the north of the site. Therefore, the roads are suitable for construction traffic associated with the temporary construction period. Construction movement is also considered further in Section 5.

3 TRANSPORT PLANNING POLCY AND GUIDANCE

3.1 The proposals have been considered in the context of the following documents:

- National Planning Policy Framework (2012);
- National Planning Practice Guidelines (2014);
- National Policy Statement for Energy (EN-1);
- National Policy Statement for Renewable Energy Infrastructure (EN-3);
- North Lincolnshire Local Plan (2003) and Saved Policies (2007);
- North Lincolnshire Core Strategy (2011);
- North Lincolnshire Local Transport Plan (2011)
- North Lincolnshire Planning for Renewable Energy SPD (2011)

3.2 The main thrust of transport policy contained within these documents is to provide development in suitable locations and to reduce car dependency. In particular, encouragement is given to development that is designed and located to reduce average journey lengths.

3.3 In relation to a the proposed renewable energy development, National Policy Statement EN-1 states that "*if a project is likely to have significant transport implications, the applicant's ES should include a transport assessment, using the NATA/WebTAG139 methodology stipulated in Department for Transport guidance, or any successor to such methodology. Where appropriate, the applicant should prepare a travel plan including demand management measures to mitigate transport impacts"*.

3.4 In relation to the movement of construction materials, National Policy Statement EN-3 states *"Government policy encourages multi-modal transport and the IPC should expect materials (fuel and residues) to be transported by water or rail routes where possible… Road transport may be required to connect the site to the rail network, waterway or port. Therefore, any application should incorporate suitable access leading off from the main highway network. If the existing access is inadequate and the applicant has proposed new infrastructure, the IPC will need to be satisfied that the impacts of the new infrastructure are acceptable as set out in Section 5.13 of EN-1"*.

3.5 The North Lincolnshire Planning for Renewable Energy SPD states that schemes need to demonstrate how any environmental effect can be minimised through the construction process.

3.6 The site is situated in a suitable location for a Solar Park and, as such, the proposals comply with transport policy. Through the documents submitted as part of the application, in particular the CTMP and its proposed measures, the effects of the development on the local transport network will be minimised.

4 DEVELOPMENT PROPOSALS

4.1 An indicative site layout drawing is shown in **Appendix D**.

4.2 The main element of the project is the installation of a ground mounted solar park with a maximum design capacity of up to 150MWp (megawatts peak) to achieve a maximum export capacity value of 100MW. The photovoltaic panels will be laid out in rows across the site. In order to fully utilise the network connection capacity when the solar park is not exporting at peak capacity, the proposal will also include up to 50 MW of battery based electricity storage containers. There will also be electrical connection infrastructure, and a new substation compound is planned to be centrally located within the site, and will connect to the existing overhead electricity pylons which traverse the site.

4.3 The solar park will generate clean renewable energy for the equivalent of over 40,000 homes a year. The anticipated CO_2 displacement is 50,000 tonnes per annum.

Site Access

4.4 As stated, once Solar Parks are operational, they generate very few traffic movements on a day to day basis. The transport effects of the proposals are greater during the temporary construction phase. Therefore, the access has been designed to accommodate construction vehicles.

4.5 All construction vehicles will access the site via the existing farm access road from the B1207, as shown at **Figure 2.1** of the CTMP, which is contained in **Appendix C.** The access proposals have been discussed with North Lincolnshire Council.

4.6 Banksmen will be provided at the site access to ensure the safe movement of construction vehicles when accessing and exiting the site.

4.7 The width of the access junction where it meets the B1207 is approximately 17 metres and visibility splays of 2.4 x 215 metres can be achieved in both directions, as shown at **Figure 2.1** of the CTMP.

4.8 The access track is a consistent width of around 3.2 metres and is straight. **Figure 2.2** of the CTMP demonstrates that a 16.5m long articulated vehicle, the largest that will need to access the site, can traverse the track from the B1207.

4.9 A passing area will be provided on the northern edge of the access track approximately 20 metres from the junction with the B1207, as shown on **Figure 2.1** of the CTMP.

4.10 The passing area will be 40 metres long and four metres wide, and will be large enough to allow for two 16.5 metre long articulated vehicles to pass one another without obstructing the adjacent highway.

4.11 Temporary signage will be erected in the vicinity of the site during the construction phase. Diagram 7301 'WORKS TRAFFIC' in the Traffic Signs Regulations and General Directions (TSRGD) will be used to indicate the access and will read 'WORKS TRAFFIC LARGE VEHICLE TURNING'. These signs will be white text and red background 1050 x 750 mm mounted in 'A' frames as illustrated at **Figure 2.1 of the CTMP.** The temporary signs will be located outside of the junction visibility splays and will be in place for the duration of the construction phase.

5 EFFECT OF THE PROPOSED DEVELOPMENT

5.1 The section sets out the effect of the development on the local transport network.

Effects during Operation

5.2 Once Solar Parks are operational, they generate very few traffic movements on a day to day basis.

5.3 Upon operation, general maintenance of the site will be carried out by the existing farm tenant resulting in zero external vehicle trips. However there are anticipated to be around four visits to the site a year (one per quarter) for equipment maintenance. These would typically be made by light van or 4x4 type vehicles. Whilst the contractor's compound will have been removed, space will remain within the site on the access tracks for such a vehicle to turn around to ensure that reversing will not occur onto the highway.

5.4 As there will only be one vehicle visit for maintenance every three months, there is no material effect of the development on the local transport network, on the site is operational.

Effects during Construction

5.5 The construction phase for the solar farm includes the preparation of the site, installing the access tracks, erection of security fencing, assembly and erection of the PV strings, installation of the inverters/transformers and grid connection.

5.6 A Construction Traffic Management Plan (CTMP) will be implemented during the construction phase of the Proposed Development. A CTMP is shown within **Appendix C** of this Transport Statement. The aim of the CTMP is to minimise the effect of the construction phase on the highway network.

5.7 The CTMP sets out how many vehicles will visit the site during the construction period. On average there will be approximately eight deliveries, or 16 two-way movements, per day by HGVs. In addition, there will also be a small number of construction movements associated with smaller vehicles such as the collection of skips for waste management and the transportation of construction workers and sub-contractors. It is likely that that there could be up to 10-14 LGV movements per day. This includes minibuses transporting construction workers.

5.8 This low level of construction vehicle movement means that there will not be a material effect on the highway network during the construction period.

5.9 The CTMP also sets out the routing of construction vehicles. This has been discussed with officers at North Lincolnshire Council and Highways England. The proposed routes already

serve HGVs associated with the Steel Works, which is accessible from Dawes Lane to the north of the site, and are therefore subject to use by large vehicles. The proposed construction traffic route is therefore suitable for use by the relatively low number of HGVs that will be associated with the construction period. The likelihood of background traffic being delayed significantly is low. The construction vehicle route avoids settlements such as Broughton to minimise the effect of vehicles.

5.10 The CTMP contains a package of mitigation measures to minimise the effect of construction traffic on the surrounding transport network. These include:

- Banksmen will be provided at the site access to ensure the safe movement of construction vehicles when accessing and exiting the site;
- Signage will be provided at the site access to highlight the presence of construction vehicles;
- The setup of a booking system to ensure that vehicle arrivals/departures are scheduled to avoid peak traffic periods on the local highway network, and to ensure only one vehicle arrives at a time;
- Installation of signs to direct construction vehicles associated with the development along the route. Delivery drivers, contractors and visitors will be provided with a route plan in advance of delivering to site to ensure that vehicles follow the identified route;
- Advisory signs informing contractors and visitors that parking is not permitted on-street on the B1207 or on the site access track;
- All signage and barriers on the agreed haulage route will be inspected twice daily by the site manager (once in the morning and once at lunchtime), to ensure they are kept in a well maintained condition and located in safe and appropriate locations;
- A compound area for contractors will be set up on-site including appropriate parking spaces. Contractors and visitors will be advised that parking facilities will be provided on-site in advance of visiting the site and that they should not park on-street;
- A wheel wash will be provided which hoses down vehicles so that no construction vehicles exiting the site compound will take mud or debris onto the local highway network;
- A road sweeper will be provided for surrounding local roads along the construction traffic route to alleviate any residual debris generated during the construction phase;
- The site will be secured at all times with Heras fencing;
- A requirement for engines to be switched off on-site when not in use;
- Spraying of areas with water supplied as and when conditions dictate to prevent dust;
- Vehicles carrying waste material off-site to be sheeted;
- Turning areas will be provided to ensure vehicles can exit the site in a forward gear;
- All residents along the construction traffic route, will be provided with contact details of the Site Manager, which will also be provided on a site-board at the entrance to the site; and
- Site operatives will be encouraged to use sustainable forms of travel, such as walking, cycling, public transport or car sharing where possible.

Summary

5.11 Once operational, very few vehicles trips will be associated with the development. Just four visits to the site a year (one per quarter) is required to provide maintenance to equipment.

5.12 During the construction period, there will be approximately six HGVs and 10 LGVs visiting the site per day. It is unlikely that these trips will occur during the highway network peak hours. Therefore, there will not be a material effect on the highway network. A Construction Traffic Management Plan (CTMP) will be implemented during the construction phase. This will minimise the effect of construction vehicles on the highway network.

6 SUMMARY AND CONCLUSION

6.1 This Transport Statement (TS) has reviewed the transport elements associated with the construction of a renewable led energy scheme on land to the east of the British Steel site and to the west of the B1207, at Scunthorpe, North Lincolnshire.

6.2 The site currently comprises approximately 209 hectares of undeveloped land located approximately 2.1 kilometres north of the village of Broughton. Junction 4 of the M180 is approximately 4.5 kilometres to the south.

6.3 The main element of the proposal is the installation of a ground mounted solar park with a maximum design capacity of up to 150MWp (megawatts peak) and up to 90MW of battery storage capacity.

6.4 The solar park will generate clean renewable energy for the equivalent of over almost 40,000 homes a year. The anticipated CO_2 displacement is 50,000 tonnes per annum.

6.5 The site is in a suitable location for a Solar Park in terms of transport. The roads leading to the site, notably the B1208, are already serve HGVs associated with the Steel Works, which is accessible from Dawes Lane to the north of the site. Therefore, the roads are suitable for construction traffic associated with the temporary construction period. Construction movement is also considered further in Section 5.

6.6 All vehicles will access the site via the existing farm access road from the B1207. The access has been designed to accommodate the largest construction vehicle. Banksmen will be provided at the site access to ensure the safe movement of construction vehicles when accessing and exiting the site.

6.7 Once operational, very few vehicles trips will be associated with the development. Just four visits to the site a year (one per quarter) is required to provide maintenance to equipment.

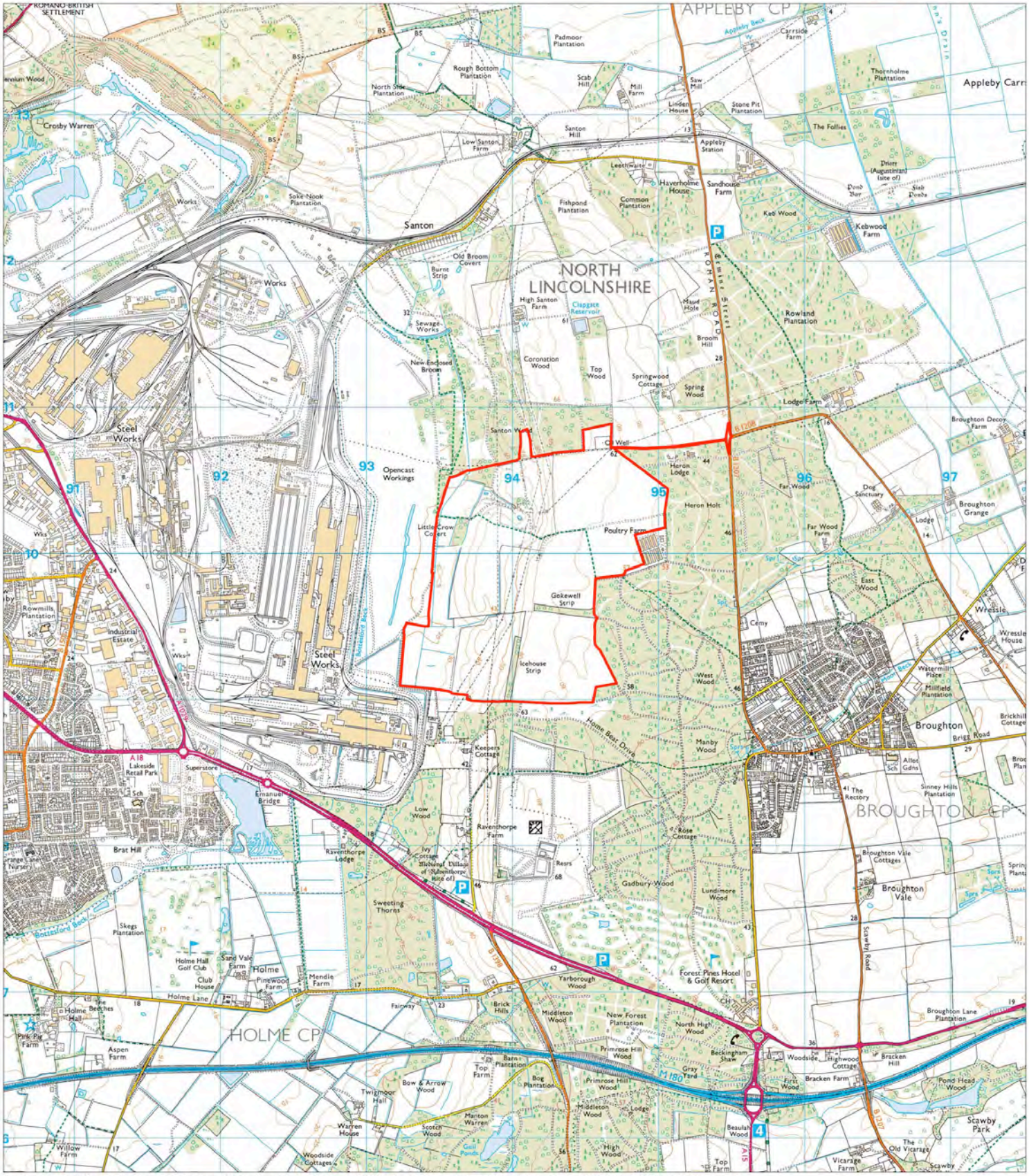
6.8 During the construction period there will be, on average, approximately six HGVs and 10 LGVs visiting the site per day. It is unlikely that any of these trips will occur during the highway network peak hours. Therefore, there will not be a material effect on the highway network. A Construction Traffic Management Plan (CTMP) will be implemented during the construction phase. This will minimise the effect of construction traffic on the highway network.

6.9 In light of the above information, it is considered the development proposals are acceptable from a transport perspective.

APPENDIX A

KEY: SITE LOCATION PLAN

APPLICATION BOUNDARY


APPLEBY CP
NORTH LINCOLNSHIRE
HOLME CP
BROUGHTON CP
Santon
Steel Works
Opencast Workings
Gokewell Strip
Icehouse Strip
Poultry Farm
Heron Holt
Heron Lodge
Old Well
Broughton
Broughton Grange
Broughton Vale
Forest Pines Hotel & Golf Resort
Raventhorpe Farm
Raventhorpe Lodge
Manby Wood
Gadbury Wood
Lundimore Wood
Sweeting Thorns
Yarborough Wood
Middleton Wood
New Forest Plantation
Primrose Hill Wood
Bracken Hill
Pond Head Wood
Scawby Park
Scawby
Brigg Road
Holme Lane
Roman Road
Ermine Street
Scawby Road
Bottesford Beck
Emanuel Bridge
Lakeside Retail Park
Superstore
Holme Hall Golf Club
Holme Hall
Aspen Farm
Twigmoor Hall
Warren House
Willow Farm
Crosby Warren
Soke Nook Plantation
Old Broom Covert
Coronation Wood
Springwood Cottage
Spring Wood
Rowland Plantation
Broom Hill
Kebwood Farm
Sandhouse Farm
Haverholme House
Appleby Station
Stone Pit Plantation
Thornholme Plantation
Appleby Carr
Carrside Farm
Padmoor Plantation
Rough Bottom Plantation
North Side Plantation
Scab Hill
Mill Farm
Saw Mill
Linden House
Santon Hill
Low Santon Farm
Fishpond Plantation
Common Plantation
Leethwaite
Kebwood
Lodge Farm
Broughton Decoy Farm
Broughton Lane Plantation
Bracken Farm
Woodside
Beaulah Wood
Top Farm
Vicarage Farm
The Old Vicarage
Manton Warren
Scotch Wood
Bow & Arrow Wood
Barn Plantation
Bog Plantation
Gray Yard
Beckingham Shaw
Pink Pig Farm
Holme Beeches
Pinewood Farm
Mendle Farm
Sand Vale Farm
Club House
Skegs Plantation
Brat Hill
Ivy Cottage
Keepers Cottage
Low Wood
Rose Cottage
Broughton Vale Cottages
Sinney Hills Plantation
Millfield Plantation
Watermill Place
Wressle
Wressle House
Brickhill Cottage
Allec Gdns
41 The Rectory
Cemy
East Wood
Far Wood
Far Wood Farm
Dog Sanctuary
Lodge
Home Bear Drive
Little Crow Covert
Burnt Strip
New Enclosed Broom
Sewage Works
Clapgate Reservoir
Maud Hole
Works
Rowmills Plantation
Industrial Estate
Wks
Sch
Gdns
Cemy
Spr
Mar
Fm
Ho
Cott
Rest
Ch
Pk
Fairway
Brick Hills
Woodside Cottages
Gait Ponds
Primrose Hill Wood
Middleton Wood
Top Wood
West Wood
Far Wood
Beckingham Shaw
Bracken Hill
Pond Head Wood
Broughton Lane Plantation
Broughton Vale
Broughton Grange
Broughton Decoy Farm
Scawby Road
Ermine Street
Roman Road
A18
A15
M180
B1208
B1207
B1398
B1400
B1430
B1432
B1433
B1434
B1435
B1436
B1437
B1438
B1439
B1440
B1441
B1442
B1443
B1444
B1445
B1446
B1447
B1448
B1449
B1450
B1451
B1452
B1453
B1454
B1455
B1456
B1457
B1458
B1459
B1460
B1461
B1462
B1463
B1464
B1465
B1466
B1467
B1468
B1469
B1470
B1471

APPENDIX B

INRG SOLAR (LITTLE CROW) LTD

In respect of

Little Crow Solar Farm, Scunthorpe

Construction Traffic Management Plan

November 2018



www.tpa.uk.com

CONTENTS PAGE

1 INTRODUCTION 1
2 SITE ACCESS 3
3 CONSTRUCTION TRAFFIC ROUTING 4
4 SITE COMPOUND AND INTERNAL ROUTING 7
5 VEHICLE TRIP ATTRACTION 8
6 PROPOSED MITIGATION MEASURES 12
7 CONDITION SURVEYS 14

LIST OF FIGURES

Figure 2.1 Visibility Splay and Swept Path Analysis at Site Access
Figure 2.2 Swept Path Analysis of an Articulated Vehicle
Figure 3.1 Construction Traffic Route Plan
Figure 3.2 Proposed Signage for Construction Route

LIST OF APPENDICES

A Site Layout

1 INTRODUCTION

1.1 This draft Construction Traffic Management Plan (CTMP) has been prepared to address the transport elements associated with the construction of a renewable led energy scheme on land to the east of the British Steel site and to the west of the B1207, at Scunthorpe, North Lincolnshire, DN16 1XP. It describes the access and route arrangements that are proposed for the period of construction activities at the site.

1.2 The site comprises approximately 226.81 hectares of land located approximately 2.1 kilometres north of the village of Broughton. Junction 4 of the M180 is approximately 4.5 kilometres to the south.

1.3 The proposal is for the development of a renewable led energy scheme with Solar Photovoltaic (PV) Farm comprising 359,688 modules, power inverter cabinets and sub-stations with the potential to produce up to 150 MW of power annually, and a 90MW battery storage facility. The draft CTMP assumes that construction of the entire development will take place in a single phase. Further details of the proposal and the technology used together with the proposed site layout are included within the supporting documents, submitted separately as part of the planning application.

1.4 This CTMP has been produced further to a detailed site visit and sets out the proposed construction deliveries and mitigation measures for the route to the site.

Need for Secondary Consents

1.5 No traffic regulation orders, temporary traffic management, footway closures or parking suspensions are required as a result of the construction phase at the site.

Report Structure

1.6 This CTMP sets out the strategy for the following;

(i) construction traffic routing;

(ii) site access;

(iii) site compound and internal routing;

(iv) vehicle size, number and frequency; and

(v) proposed mitigation measures.

1.7 It will be the responsibility of the appointed contractor to comply with all statutory regulations and guidelines as appropriate, in relation to construction and movement activities.

1.8 The site manager's details will be provided to the highway authority in advance of any work being carried out.

2 SITE ACCESS

2.1 All construction vehicles will access the site via the existing farm access road from the B1207, as shown at **Figure 2.1**.

2.2 The width of the access junction where it meets the B1207 is approximately 17 metres and visibility splays of 2.4 x 215 metres can be achieved in both directions, as shown at **Figure 2.1**.

2.3 The access track is a consistent width of around 3.2 metres and is straight. **Figure 2.2** demonstrates that a 16.5m long articulated vehicle, the largest that will need to access the site, can traverse the track from the B1207.

2.4 A passing place will be provided on the northern edge of the access track approximately 20 metres from the junction with the B1207, as shown on **Figure 2.1**.

2.5 The passing place will be 40 metres long and four metres wide, and will be large enough to allow for two 16.5 metre long articulated vehicles to pass one another without obstructing the adjacent highway.

2.6 All construction vehicles will enter and exit the site in a forward gear. Banksmen will not direct general traffic, but will indicate to heavy and large construction vehicles when it is appropriate for them to enter and leave the site. Priority will always be given to the background traffic on the adjacent highway network.

2.7 Temporary signage will be erected in the vicinity of the site during the construction phase. Diagram 7301 'WORKS TRAFFIC' in the Traffic Signs Regulations and General Directions (TSRGD) will be used to indicate the access and will read 'WORKS TRAFFIC LARGE VEHICLE TURNING'. These signs will be white text and red background 1050 x 750 mm mounted in 'A' frames as illustrated at **Figure 2.1.** The temporary signs will be located outside of the junction visibility splays and will be in place for the duration of the construction phase.

3 CONSTRUCTION TRAFFIC ROUTING

3.1 The designated route for all traffic associated with the construction is illustrated on **Figure 3.1**. Visitors, delivery drivers and contractors will be advised of the agreed route in advance of driving to the site.

3.2 It is proposed that construction traffic will arrive from the M180 junction 4, the A15, the A18, the B1208 and B1207 to the site access.

Details of the Route

3.3 From the M180 junction 4 vehicles will use the A15 northbound to the Briggate Lodge Roundabout and then travel east along the A18 towards Brigg.

3.4 From the A18, vehicles will turn left onto the B1208. The B1208 measures between approximately 5.5 and six metres wide. Vehicles will travel along the B1208 to the junction with the B1207 and then continue straight ahead into the site access.

3.5 The swept path analysis of an HGV accessing and egressing the access track is provided at **Figure 2.2.**

3.6 The B1207 south of the site access, towards the village of Broughton is subject to a 7.5 tonne weight restriction, except for loading, as shown on **Figure 3.1**. As such, no Heavy Goods Vehicles (HGVs) will be permitted to travel through the village.

3.7 The roads leading to the site already serve HGVs associated with the Steel Works, which is accessible from Dawes Lane to the north of the site, and are therefore subject to use by large vehicles. The proposed construction traffic route is therefore considered to be suitable for use by the relatively low number of HGVs that will be associated with the construction period. The likelihood of background traffic being delayed significantly is low.

Management of Deliveries

3.8 Advisory signs will be provided along the construction traffic route, as shown on **Figure 3.2** with the exact positions to be agreed with North Lincolnshire Council (NLC) officers. The signs will be compliant with Chapter 8 of the Traffic Signs Manual, where applicable, and will be in place for the duration of the construction phase at the site.

3.9 Due to the relatively low number of vehicles associated with the construction phase at the site, there is not anticipated to be any delay to background traffic and background traffic will always be given priority on the B1207.

3.10 No traffic regulation orders, temporary traffic management, footway closures or parking suspensions are required as a result of the construction phase at the site.

3.11 The phone number of the Site Manager will be made available to all drivers of vehicles that will be accessing the site. The drivers of the HGVs will be required to call ahead, either whilst stopped or using their hands-free. Drivers will be advised to stop at either the A18 eastbound or the A15 northbound layby areas located approximately 1.5 kilometres east of the roundabout junction between the A15 and the A18 and 250 metres north of Junction 4 of the M180 respectively. This will allow enough time for banksmen to prepare at the site access. Similarly, when the HGVs are egressing the site, the driver will notify the Site Manager in order to allow banksmen to prepare to assist with existing vehicles.

3.12 The following procedure will be initiated when deliveries are made to the site:

Procedure for Arrival to Site

- Driver to call ahead to site when they reach the A18 layby;
- The banksmen are mobilised and will go to position at the site access;
- Driver will be informed the operators are in place and it is appropriate to travel to the site via the agreed route;
- Each of the operatives will have a 'walkie-talkie' and will be able to communicate with each other, the site manager and the HGV drivers, as necessary;
- Banksmen will assist HGVs to manoeuvre at the site access junction, but will not direct general traffic.

3.13 The contractor will employ qualified banksmen who are experienced at traffic management.

3.14 The following procedure will be initiated when HGVs are leaving the site:

Procedure for Leaving the Site

- Before drivers depart the site the site manager will be notified. They will then mobilise the banksmen at the site access;
- Drivers will be advised when the banksmen and operatives are in place and will leave the site;
- Banksmen will guide the drivers exiting the site access.

Summary

3.15 The proposed construction traffic route is considered to provide a direct route from the highway network to the site. It is of a consistent width and considered appropriate to accommodate HGV traffic associated with the construction phase, as set out in **Chapter 5**.

3.16 The route is currently also used by HGV traffic generated by the local Steel Works and therefore is suitable for traffic generated during the construction phase of the development.

3.17 The use of any other roads other than the designated and signposted route shall not be permitted and this shall be enforced through the agreement of the CTMP.

3.18 Appropriate mitigation measures will be provided throughout the construction phase in order to manage the arrival and departures of HGVs are the site, as set out further in **Chapter 6**.

4 SITE COMPOUND AND INTERNAL ROUTING

Contractor's Compound

4.1 A contractor's compound is proposed to be located at the end of the access track where all vehicles will be able to turn. All construction vehicles will therefore enter and exit the site in forward gear. The location of the construction compound is shown on the site layout at **Appendix A**.

4.2 The Compound will include for up to 50 parking spaces for construction workers and visitors as well as a staff office, storage and staff welfare facilities, the location is shown at **Appendix A**.

4.3 No parking by contractors, visitors or delivery vehicles will be permitted on the B1207 or the access track at any time during the construction phase and visitors will be advised of the parking arrangements in advance of travelling to the site. The site manager will monitor that parking is taking place in the designated area up to four times per day.

4.4 The construction works will be wholly contained within the site and as such no diversion of pedestrian routes, parking suspensions or closure of lanes are required.

Internal Roads

4.5 The solar farm layout will include permanent four metre wide access tracks throughout the site allowing for the movement of construction and maintenance vehicles.

4.6 It is proposed that these access tracks are completed during the initial stages of construction so temporary haul routes are not necessary.

4.7 The tracks will provide ground protection and enable it to support the loading of HGVs and plant and reduce the propensity of debris being taken on to the adjacent access track and highway. Internal access tracks will be constructed of graded stone on top of permeable matting.

4.8 If ground conditions dictate, wheel washing facilities will be provided at a contractor's compound, or at the end of the access track within the proposed passing place, to ensure no mud is taken onto the local highway network and a road sweeper will be deployed by the applicant, should this become necessary.

4.9 Wheel wash facilities will be provided in the form of a portable automated high pressure washer with motion sensors to conserve water. All construction vehicles will therefore have to exit through the wheel wash area and as such will reduce the spread of mud and dirt onto the local highway network.

5 VEHICLE TRIP ATTRACTION

Construction Phase

5.1 The applicant has advised that the construction period will take approximately 11 months (up to 47 weeks). Construction activities will be carried out Monday to Friday 0800-1800 and between 0800 and 1330 on Saturdays.

5.2 The construction phase for the solar farm includes the preparation of the site, installing the access tracks, erection of security fencing, assembly and erection of the PV strings, installation of the inverters/transformers and grid connection.

5.3 The construction of the battery storage facility will include the preparation of the site, installation of the access roads, erection of security fencing, assembly of the battery system, and installation of the switch room and grid connection.

5.4 The construction period will include the use of HGVs to bring the equipment onto the site and this will be strictly managed to ensure that vehicle movement is controlled and kept to a minimum. It should be noted that unlike wind farms, the construction of a solar farm and battery storage facility does not require equipment to be delivered by abnormal loads (i.e. vehicles over 16.5m in length).

5.5 Deliveries to the site shall be reported to the site manager and will be made on the smallest possible vehicles for that particular item of plant or material, to ensure that vehicles can manoeuvre safely.

Solar Farm

5.6 The components which are required to construct the solar farm will arrive in 40ft containers by 15.4m long articulated vehicles. From experience elsewhere, the applicant has confirmed that around 140 15.4m articulated vehicles are required for every 10MWp at the site, split equally between the modules and mounting structures. The site is proposed to generate 135.87MWp and as such this will equate to around 1,903 deliveries by 15.4m articulated vehicles. Assuming all deliveries arrive within a 47 week period and Monday to Saturday, this equates to, on average, around seven deliveries (14 movements) per day by the largest vehicle.

5.7 Inverter stations will be delivered to the site through the construction period. These are likely to be up to 11m in length. The proposed solar farm will have a total of 48 inverters. It is assumed that the inverters will be transported individually due to their weight and as such this would equate to a total of 48 deliveries.

5.8 In addition, the Distribution Network Operator (DNO) will install a switchgear cabinet, which connects the underground grid connection cable of the solar farm to the distribution network.

It is typically no larger than 6m long, 2.55m wide and 2.6m high. The cabinet will arrive at the site by the smallest possible vehicle, which could be a 10m rigid lorry. A total of one delivery is required.

5.9 It is likely that the material required for the access tracks will arrive by 10m rigid vehicles. The precise number will depend on the type and the amount of material required, but for the purpose of this assessment we have assumed that one delivery is required per five acres, resulting in a total of 104 deliveries.

5.10 A number of front end JCBs will also be required to transport equipment around the site, and to distribute stone as necessary. This is a similar size to a tractor and will either be transported to the site or be driven to the site.

5.11 A maximum of between 80 and 100 construction workers are anticipated to be on site during peak times during the construction period. A temporary construction compound will be provided and will provide storage, parking for contractors and turning for HGVs.

5.12 The location where staff will travel from is unknown at this stage as it will depend on the appointed contractor. However, it is envisaged that the majority of non-local workforce will stay at local accommodation and be transported to the site by minibuses to minimise the impact on the strategic and local highway network.

5.13 In summary, the following heavy goods movements could be associated with the construction period of the solar farm, as set out in **Table 5.1**.

Table 5.1 Heavy Goods Vehicle Movements – Construction Period

Activity	Type of Vehicle	Total Number of Deliveries
Solar Modules & Mounting	16.5m Articulated	1,903 (3,806 two-way movements)
Inverters	11m Rigid	48 (96 two-way movements)
DNO Substation	10m Rigid	1 (2 two-way movements)
Customer Switchgear Cabinet	10m Rigid	1 (2 two-way movements)
Control Room Cabinet	10m Rigid	1 (2 two-way movements)
Access Tracks	10m Rigid	104 (208 two-way movements)
General	Front End JCB by low loader	4 (8 two-way movements)
TOTAL		**2,062** deliveries (average of **8** deliveries per day or **16** two way movements per day)*
5% Buffer		**2,165** deliveries (average of **8** deliveries per day or **16** two way movements per day)*
* Deliveries taking place over a 47 week period (282 working days).		

5.14 **Table 5.1** therefore confirms that a maximum of **2,062** deliveries (**4,124** two-way movements) could be made by HGVs associated with the construction of the solar farm, at an average of

around **eight** deliveries, or **16** two-way movements per day. If a 5% buffer is added to traffic flows to represent a worst case, the number of deliveries will still be approximately eight per day (16 two-way movements).

5.15 In addition to the HGV movements identified in **Table 5.1**, there will also be a small number of construction movements associated with smaller vehicles such as the collection of skips for waste management and the transportation of construction workers and sub-contractors. It is likely that that there could be up to 10-14 LGV movements per day. This includes minibuses transporting construction workers.

5.16 Where possible, construction deliveries will be coordinated to avoid HGV movements during the traditional AM peak hour (08:00-09:00) and PM peak hour (17:00-18:00). Due to the site operational hours (08:00-18:00), construction worker travel will occur outside of the peak hours.

Battery Storage

5.17 Components which are required to construct the battery storage facility will arrive in 20ft containers by 16.5 metre long articulated vehicles.

5.18 Each of the battery units will require four containers measuring 6.1m x 2.4m, and a TRAFO/Inverter unit measuring up to 6.1m x 2.4m. Two containers and Inverter Units will therefore arrive per delivery. It is forecast that there will be a total of approximately 18 deliveries for the entire site.

5.19 In summary, it is proposed that the following heavy goods vehicle movements could be associated with the construction phase of the development as set out in **Table 5.2**.

Table 5.2 – Heavy Goods Vehicle Movements – Construction Phase

Activity	Type of Vehicle	Total number of Deliveries
Battery Modules (up to 90 MW)	16.5m Articulated	18 (36 two-way movements)
General Deliveries (cables, fencing etc.)	16.5m Articulated or 10m Rigid	65 (110 two-way movements)
Contractor's Compound	16.5m Articulated	10 (20 two-way movements)
Total		**71** deliveries (average of less than one delivery per day or up to two two-way movements)
* Based upon a 47 week construction phase i.e. 282 days		

Operational Phase

5.20 After commissioning, general maintenance of the site will be carried out by the existing farm tenant. However there are anticipated to be around four visits to the site a year (one per quarter) for additional equipment maintenance. These would typically be made by light van or 4x4 type vehicles. Whilst the contractor's compound will have been removed, space will remain within the site on the access tracks for such a vehicle to turn around to ensure that reversing will not occur onto the highway

Summary

5.21 Based on the above, it is expected that there will be a maximum of around 16 large vehicles per day accessing the site over the 26 week period when deliveries will occur. There will also be construction workers arriving at the site first thing in the morning and departing in the evening, although the numbers involved are forecast to be relatively low on a day-to-day basis. The level of traffic during the temporary six month construction phase is not considered to be material and it is considered that this will not have an impact on the safety or operation of the local highway network.

6 PROPOSED MITIGATION MEASURES

6.1 The Construction Company will introduce measures to minimise the impact resulting from construction activities. These will be managed by the Project Manager and Site Supervisor.

6.2 The Site Manager will assume responsibility for the operation of the site. The details of the Site Manager will be provided to the highway authority in advance of any works being carried out:

6.3 Mitigation measures will include:

(i) signs to direct construction vehicles associated with the development will be installed along the route. Delivery drivers, contractors and visitors will be provided with a route plan in advance of delivering to site to ensure that vehicles follow the identified route.

(ii) advisory signs informing contractors and visitors that parking is not permitted on-street on the B1207 or on the site access track.

(iii) all signage and barriers on the agreed haulage route will be inspected twice daily by the site manager (once in the morning and once at lunchtime), to ensure they are kept in a well maintained condition and located in safe and appropriate locations.

(iv) a compound area for contractors will be set up on-site including appropriate parking spaces. Contractors and visitors will be advised that parking facilities will be provided on-site in advance of visiting the site and that they should not park on-street.

(v) a wheel wash will provided which hoses down vehicles so that no construction vehicles exiting the site compound will take mud or debris onto the local highway network.

(vi) a road sweeper will be provided for surrounding local roads along the construction traffic route to alleviate any residual debris generated during the construction phase.

(vii) the site will be secured at all times with Heras fencing.

(viii) a requirement for engines to be switched off on-site when not in use.

(ix) spraying of areas with water supplied as and when conditions dictate to prevent dust.

(x) vehicles carrying waste material off-site to be sheeted.

(xi) turning areas will be provided to ensure vehicles can exit the site in a forward gear.

(xii) banksmen will be provided at the site access to indicate to construction traffic when it is safe for them to enter and exit the site; and

(xiii) all residents of Brigg Road, along the construction traffic route, will be provided with contact details of the Site Manager, which will also be provided on a site-board at the entrance to the site.

Mitigation in Local Villages

6.4 In addition to the above measure which will be provided on site and along the identified construction traffic route, mitigation measures are proposed along roads within local villages to reduce the impact of the construction phase on local residents and businesses.

6.5 These mitigation measures will be focussed on reducing existing vehicle speeds within the villages of Appleby, Broughton and Wressle.

6.6 These measure include;

(i) Installation of temporary Vehicle Activated Signs (VAS) at key locations in the area. The purpose of the VAS will be to increase driver awareness of their speeds and to seek to reduce the speeds of vehicles, particularly HGVs, in these locations.

(ii) No HGVs will be permitted to access the site via routes through the villages of Broughton or Appleby.

(iii) Newsletters will be delivered to local residents and a website will be made available to provide information on construction phases and events throughout the construction period

(iv) Broughton Primary School is located approximately one kilometre west of the B1208 Brigg Road. As such, much of the school's catchment area is located away from the proposed construction route. It is therefore not anticipated that construction traffic would conflict with daily school activities and routines. However, construction traffic activities will be arranged to avoid coinciding with the morning and afternoon school peak hours, where possible.

7 CONDITION SURVEYS

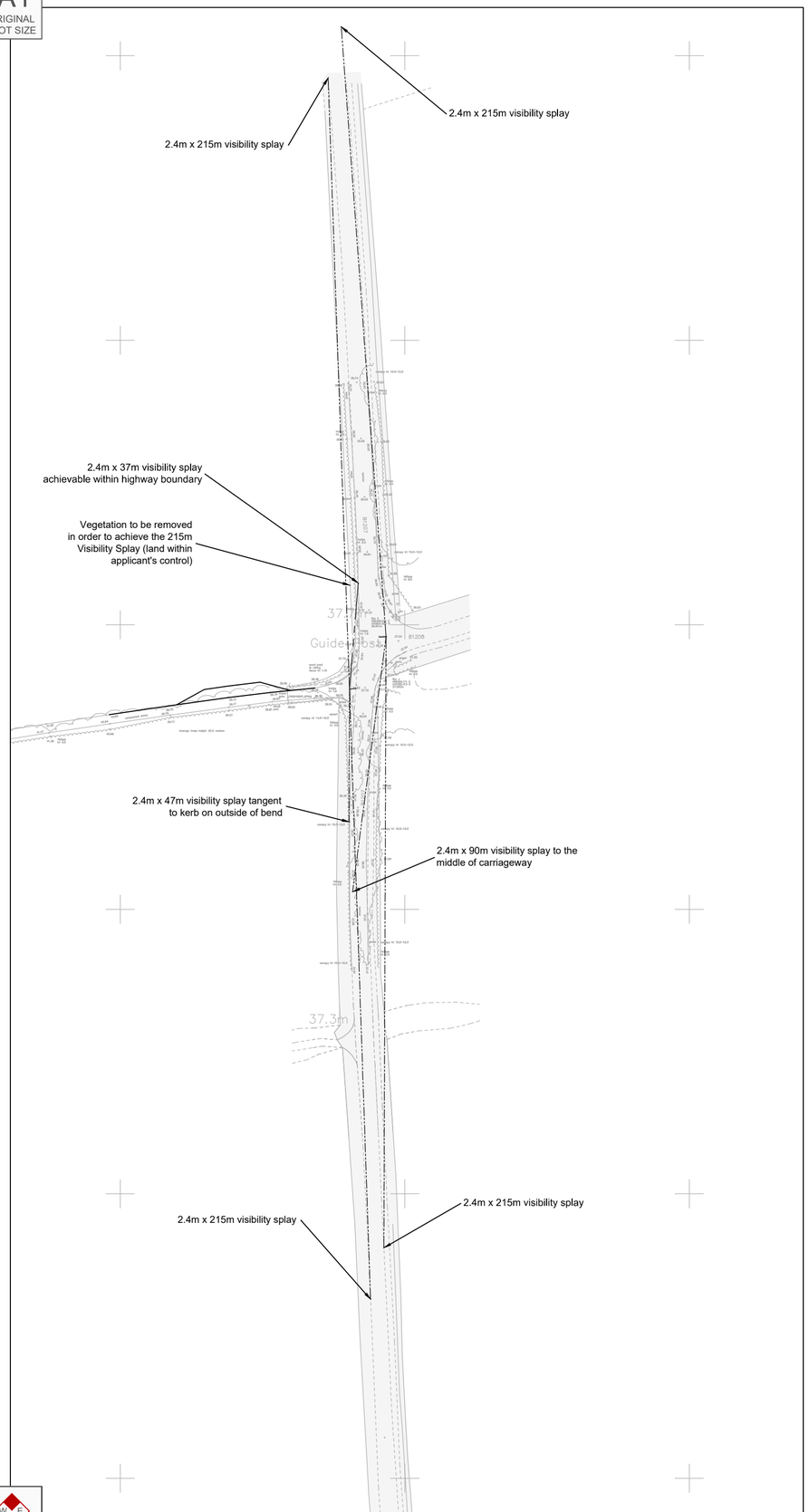
7.1 A pre-commencement Walk-Over condition survey on the local highway network will be carried out and agreed with highway officers at NLC, in order to assess the baseline condition of the adopted highway.

7.2 The extent of the survey will be agreed with highway officers and is anticipated to include the B1207 in the vicinity of the site access only. The wider road network, including the B1208, is already used by HGVs and as such any damage caused would not be able to be attributed to the construction of this site.

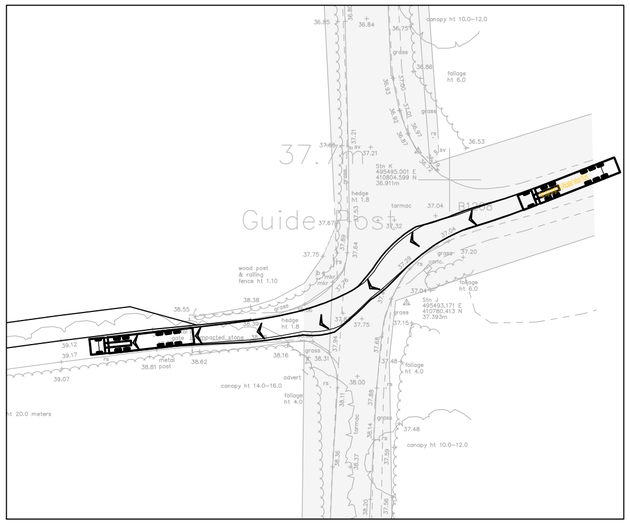
7.3 The survey will incorporate a photographic record as appropriate. This would be followed by a further condition survey with highway officers with a further photographic record covering the same extents at the end of construction activities, in order to identify and agree any remedial works reasonably attributable to construction activities.

FIGURES

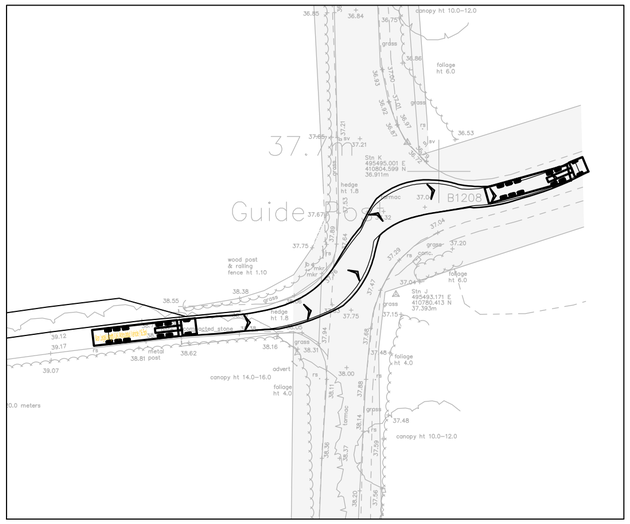
A1
ORIGINAL
PLOT SIZE



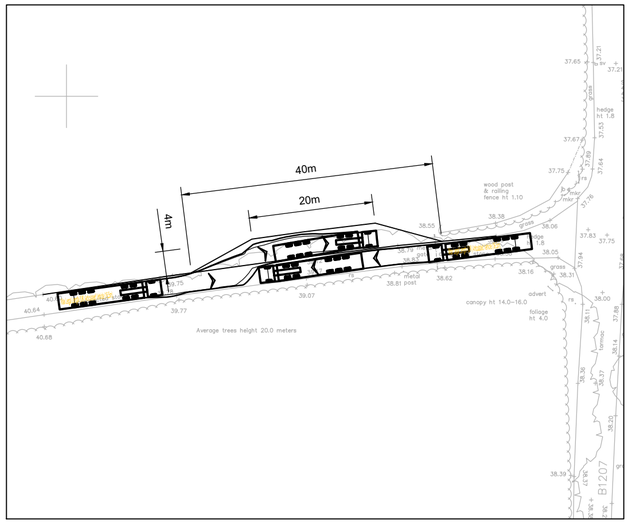
2.4m x 215m Visibility Splay at East Access SCALE 1:1000



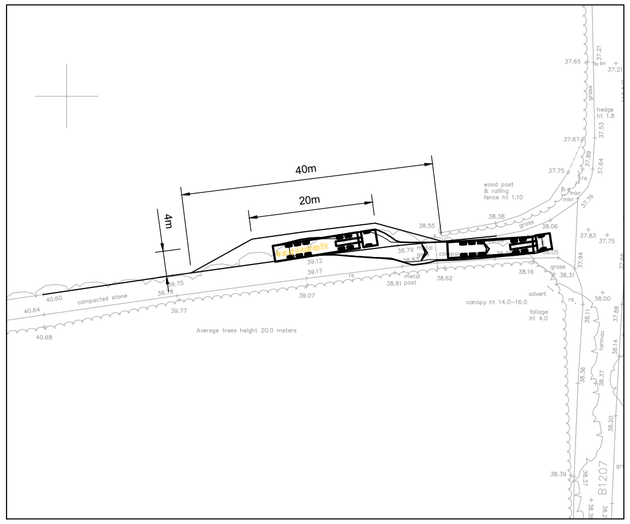
Articulated Vehicle Entering East Access SCALE 1:500



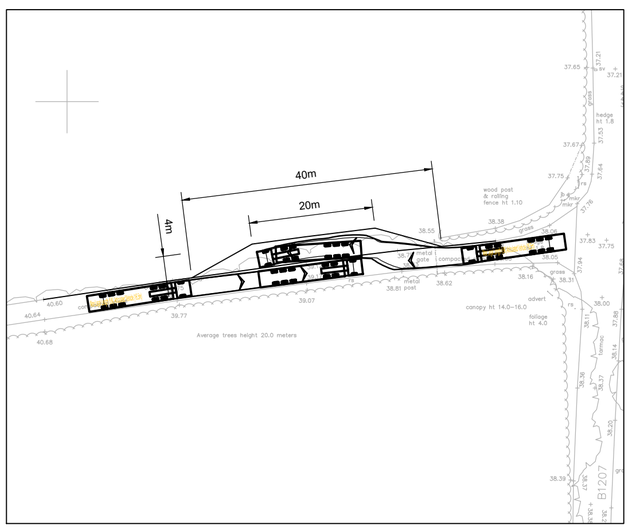
Articulated Vehicle Exiting East Access SCALE 1:500



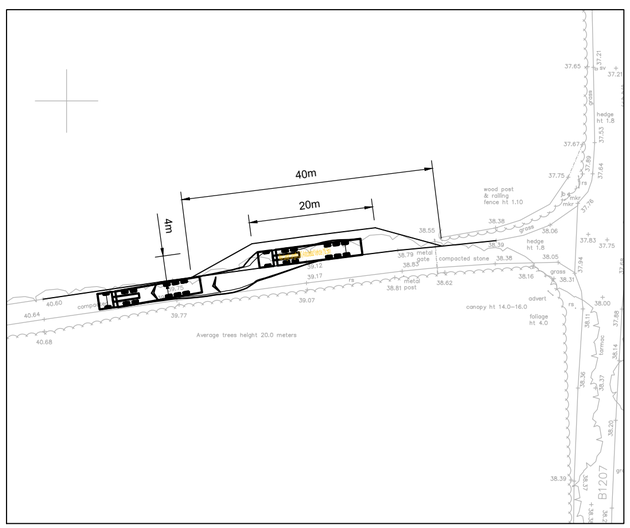
Articulated Vehicle Entering Bay from West SCALE 1:500



Articulated Vehicle Exiting Bay to East SCALE 1:500



Articulated Vehicle Entering Bay from East SCALE 1:500



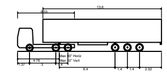
Articulated Vehicle Exiting Bay to West SCALE 1:500

Reproduced from Ordnance Survey Superplan Data with the permission of The Controller of Her Majesty's Stationery Office. Crown Copyright - Licence No. AL100034021

NOTES:

1. The extend of adopted highway has been taken from a scale 1:5000 ordinance survey based highway plan received from North Lincolnshire Council on 10.08.17 and is only indicative.

Highway Boundary



Max Legal Length (UK) Articulated Vehicle (16.5m)	
Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	4.481m
Min Body Ground Clearance	0.377m
Max Track Width	2.500m
Lock to Lock Time	6.00s
Kerb to Kerb Turning Radius	6.530m

Rev	Date	Details	Drawn by	Checked by	Approved by
B	23.01.18	Visibility Splay added to East Junction	DR	RR	JD
A	07.12.17	Bay added to the drawing	DR	KSS	MB

Bristol
Cambridge
London
Oxford
Welwyn Garden City

Transport Planning Associates

25 King Street
Bristol
BS1 4PB
0117 925 9400

www.tpa.uk.com

CLIENT:
INRG SOLAR LTD

PROJECT:
LITTLE CROW SOLAR FARM, SCUNTHORPE

TITLE:
Visibility Splay and Swept Path Analysis At Site Access

STATUS:
INFORMATION

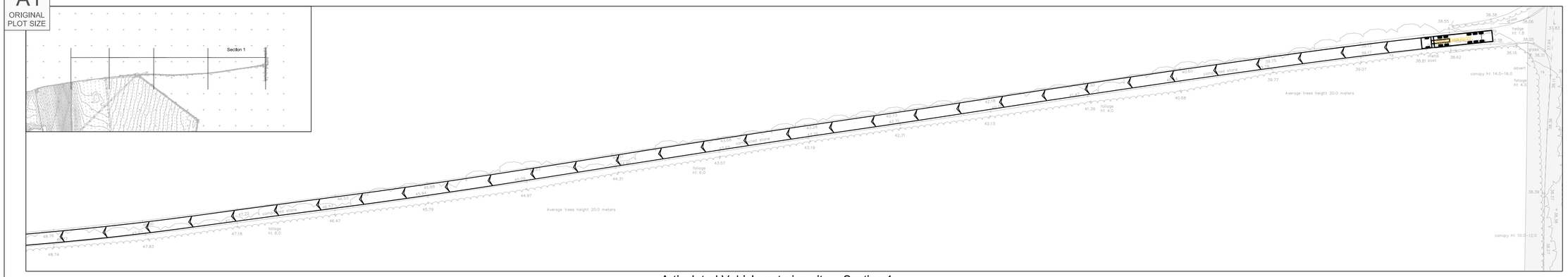
SCALE:	DATE:	DRAWN:	CHECKED:	APPROVED:
As shown	12.12.17	DR	KSS	JD

JOB NO:	DRAWING NO:	REVISION:
1705-57	Figure 2.1	B

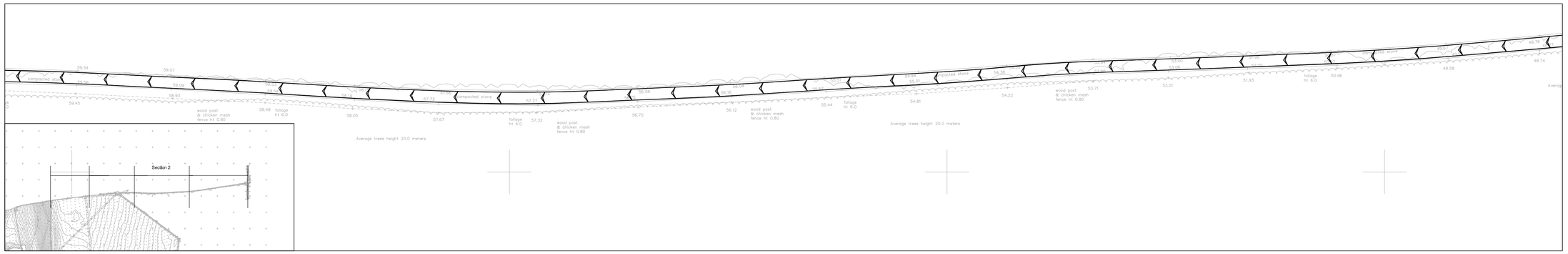
INDICATIVE

RESERVED COPYRIGHT

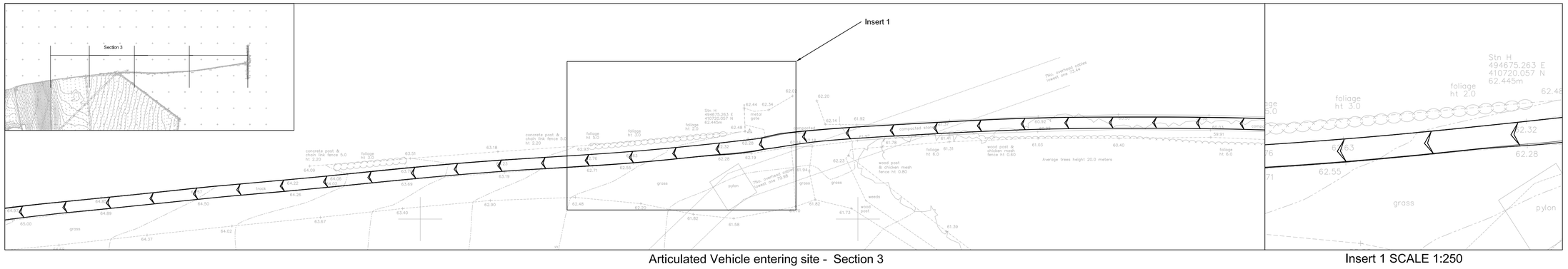
A1
ORIGINAL
PLOT SIZE



Articulated Vehicle entering site - Section 1

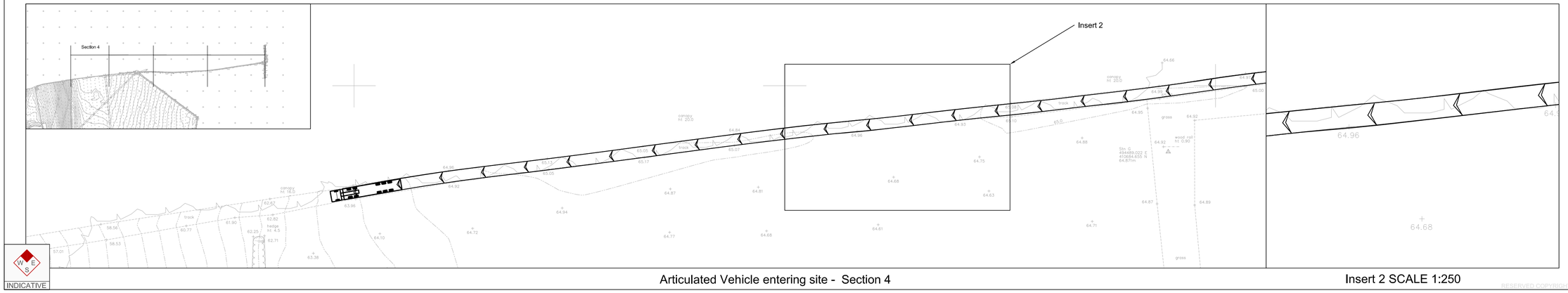


Articulated Vehicle entering site - Section 2



Articulated Vehicle entering site - Section 3

Insert 1 SCALE 1:250



Articulated Vehicle entering site - Section 4

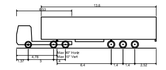
Insert 2 SCALE 1:250

INDICATIVE

RESERVED COPYRIGHT

Reproduced from Ordnance Survey Superplan Data with the permission of The Controller of Her Majesty's Stationery Office, Crown Copyright - Licence No. AL100034021

NOTES:



Max Liquid Length (UK) Articulated Vehicle (16.5m)

Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.681m
Min Ground Clearance	0.410m
Max Track Width	2.500m
Lock to Lock Time	6.00s
Kerb to Kerb Turning Radius	6.330m

Rev	Date	Details	Drawn by	Checked by	Approved by
-	-	-	-	-	-

Bristol
Cambridge
London
Oxford
Welwyn Garden City

tpa Transport Planning Associates

25 King Street
Bristol
BS1 4PB
0117 925 9400

www.tpa.uk.com

CLIENT:
INRG SOLAR LTD

PROJECT:
LITTLE CROW SOLAR FARM, SCUNTHORPE

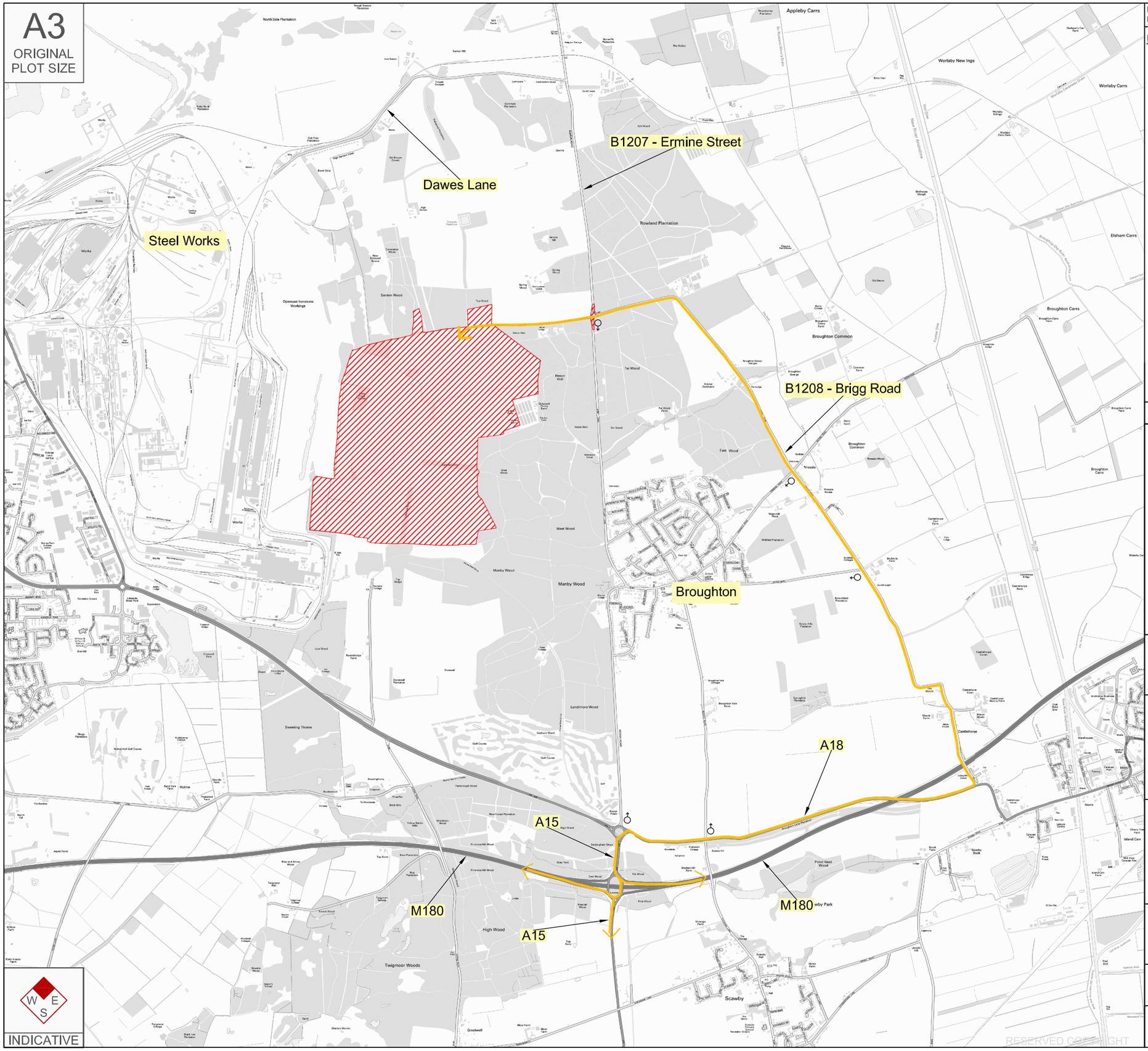
TITLE:
Swept Path Analysis of an Articulated Vehicle

STATUS:
INFORMATION

SCALE:	DATE:	DRAWN:	CHECKED:	APPROVED:
1:500	12.12.17	DR	KSS	JD

JOB NO:	DRAWING NO:	REVISION:
1705-57	Figure 2.2	

A3
ORIGINAL
PLOT SIZE



INDICATIVE

Reproduced from Ordnance Survey Superplan Data with the permission of The Controller of Her Majesty's Stationery Office. Crown Copyright - Licence No. AL100034021

KEY

- Approximate Site Location
- Construction Traffic Route
- 7.5t Weight Restriction

Rev	Date	Details	Drawn by	Checked by	Approved by
A	21.11.18	Site boundary updated.	PSW	RR	JD

Bristol
Cambridge
London
Manchester
Oxford
Welwyn Garden City

Transport Planning Associates

25 King Street
Bristol
BS1 4PB
0117 925 9400

www.tpa.uk.com

CLIENT:
INRG SOLAR LTD

PROJECT:
LITTLE CROW SOLAR FARM, SCUNTHORPE

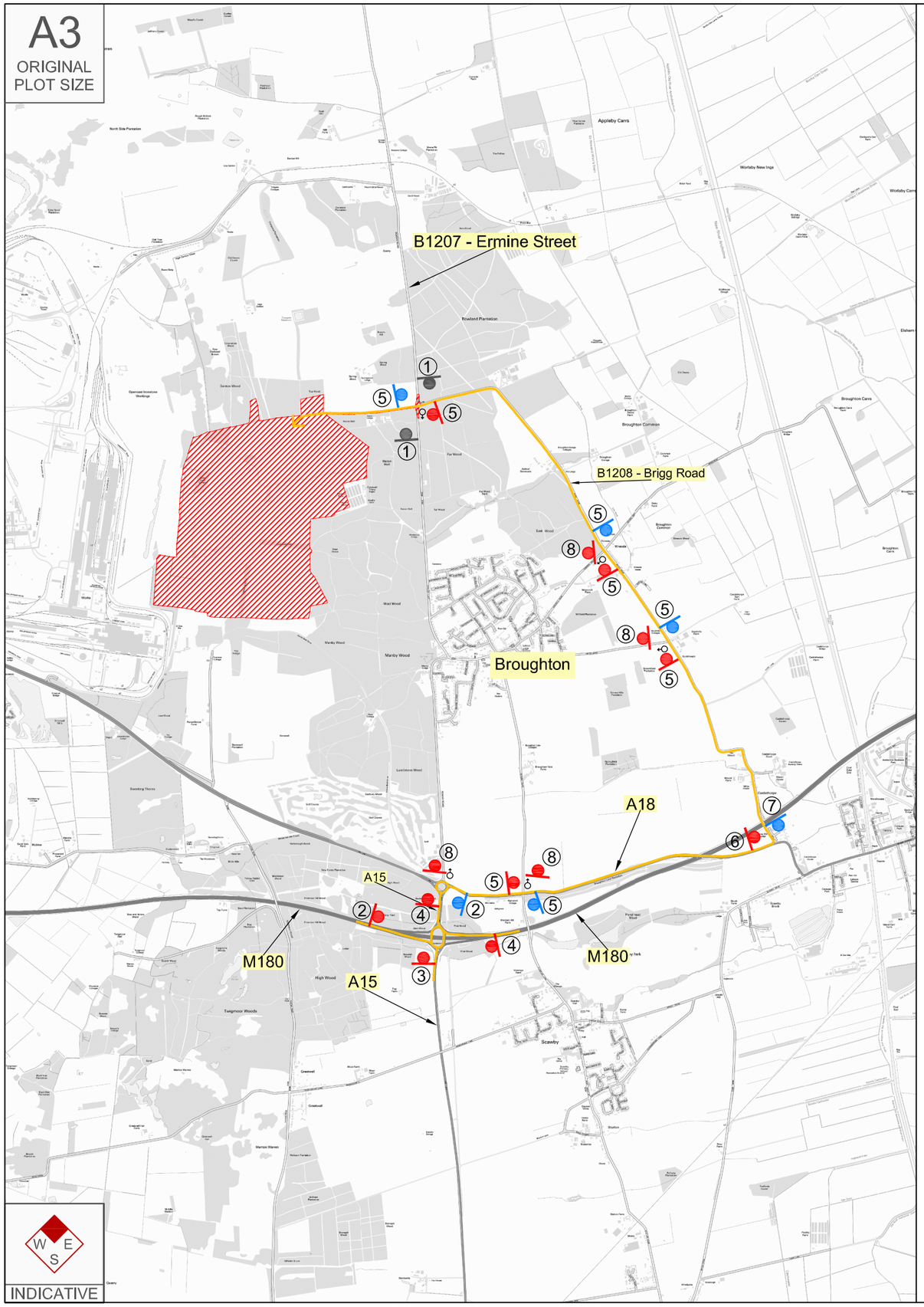
TITLE:
Construction Traffic Route Plan

STATUS:
INFORMATION

SCALE:	DATE:	DRAWN:	CHECKED:	APPROVED:
1:30,000	12.12.17	DR	KSS	JD

JOB NO:	DRAWING NO:	REVISION:
1705-57	Figure 3.1	A

A3
ORIGINAL
PLOT SIZE



① =SIGN 1 (see note 1)



② =SIGN 2 (see note 2)



③ =SIGN 3 (see note 2)



④ =SIGN 4 (see note 2)



⑤ =SIGN 5 (see note 2)

⑥ =SIGN 6 (see note 2)



⑦ =SIGN 7 (see note 2)



⑧ =SIGN 8 (see note 1)



RESERVED COPYRIGHT

Reproduced from Ordnance Survey Superplan Data with the permission of The Controller of Her Majesty's Stationery Office. Crown Copyright - Licence No. AL100034021

NOTES:

1. The diagram 7301 'WORKS TRAFFIC' in the Traffic Signs Regulations and General Directions (TSRGD)

2. The diagram 2701.1 'Oak Farm Estate' in the Traffic Signs Regulations and General Directions (TSRGD)

KEY

- Approximate Site Location
- Construction traffic rout for all HGV's and construction related traffic accessing and egressing site
- Signs for construction traffic accessing site
- Signs for construction traffic egressing site
- Signs for general traffic
- 7.5t Weight Restriction

Rev	Date	Details	Drawn by	Checked by	Approved by
B	21.11.18	Site boundary updated.	PSW	RR	JD
A	19.02.18	`No Access to Solar Park` sign added	DR	RR	JD

Bristol
Cambridge
London
Manchester
Oxford
Welwyn Garden City

Transport Planning Associates

25 King Street
Bristol
BS1 4PB
0117 925 9400

www.tpa.uk.com

CLIENT:
INRG SOLAR LTD

PROJECT:
LITTLE CROW SOLAR PARK, SCUNTHORPE

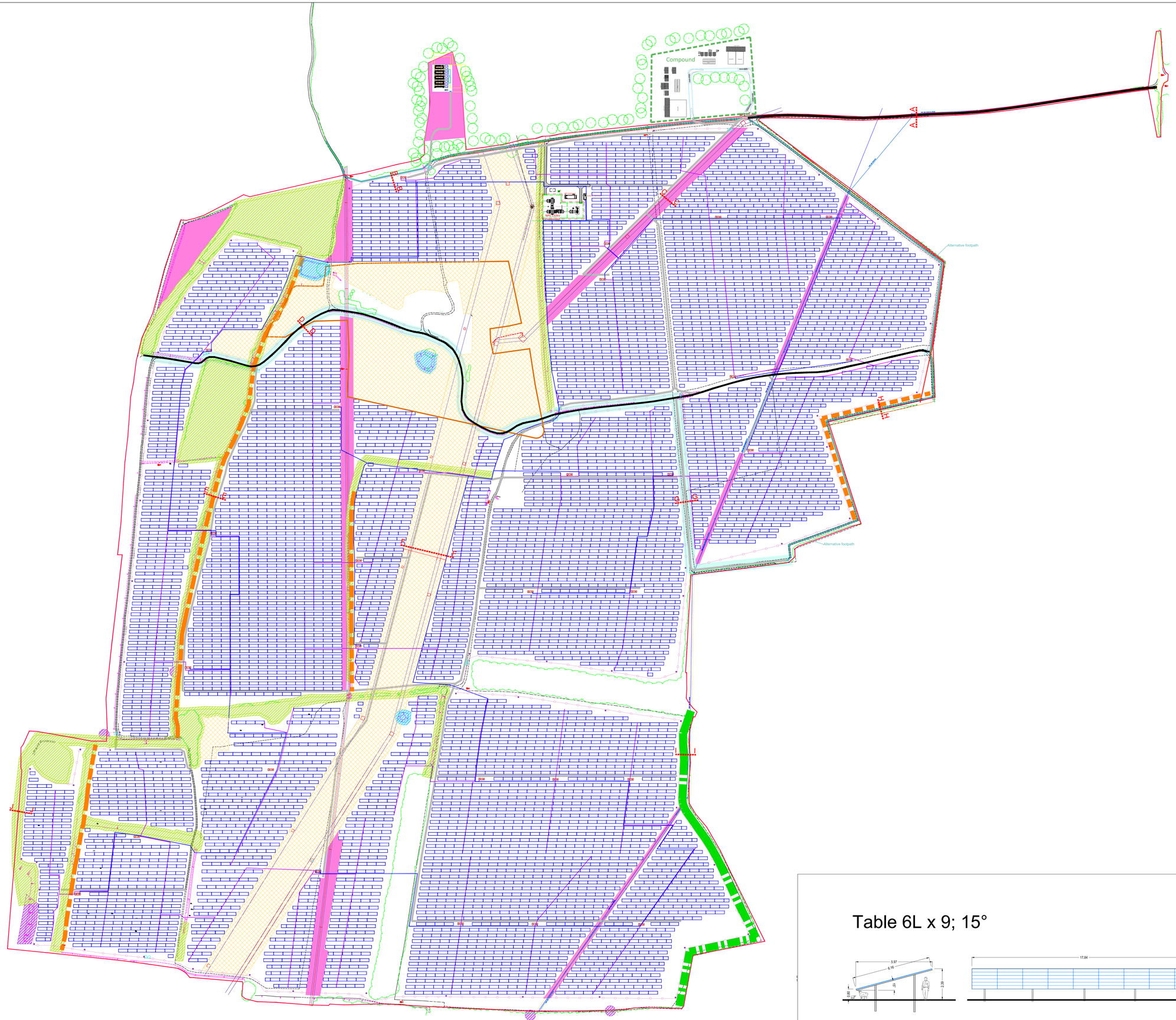
TITLE:
Proposed Signage For Construction Route

STATUS:
INFORMATION

SCALE:	DATE:	DRAWN:	CHECKED:	APPROVED:
1:40,000	12.12.17	DR	KSS	JD

JOB NO:	DRAWING NO:	REVISION:
1705-57	Figure 3.2	B

APPENDIX A



N
W E
S

Electrical design

Station A

Inverter:
AC-Combiner:
Strings:
Panels:

Meter
50 0 50 100
1:2500

Key

- Table
- Existing Access Track
- New Access Track
- Public Footpath (gap = 15,00m)
- Buffer Woodland (15,0m)
- Swales (Buffer 8,00m)
- Pond (Buffer 5,00m)
- Hedges (Buffer 5,00m)
- Badger Zone (Buffer 20,00m)
- Zone for Winter Birds : 22,5ha
- Zone for Arable Weeds / Species Rich Grasslands : 5,4ha
- Transformer Station
- Construction Area
- Exclusion Zone Archeological
- Fence
- Gate / Entrance
- Trench AC
- Trench MV
- CCTV
- Alternative Footpath

Regulations 2009 Document Paragraph Reference Number

Regulation 5(2)(o)

PROJECT NAME

Little Crow Solar Park

DRAWING	DRAWING N°
Table layout	A10B0C0

GEOGRAPHICAL SITE:

COORDINATES	53.5773° N	0.5786° W
NN/MSL	60.0m	
SUNANGLE	13.42°	
DATE	21.12.2017 / 12:00	

SITE SYSTEM:

SYSTEMLAYOUT	6L x 9	6L x 5
NUMBER OF TABLES	6.449 pc	345 pc
PANEL ORIENTATION	Landscape	
NUMBER OF PANELS	357.561	

SITE TECHNOLOGY:

MODULE NAME	
MODULE SIZE	
MODULE POWER	380 W
TYPE OF PANELS	POLY
ANGLE OF PANELS	15°
TABLESHADOW	1.0 m
ROWDISTANCES	

SITE TOTAL POWER

DC POWER	135.87 MWp
AC-POWER nom.	
AC-POWER max.	

CHANGE

DATE	CHANGE
10.07.2018	Addet 50MW Battery
16.07.2018	moved Fence and roads
02.08.2018	divers. changes
08.08.2018	divers. changes

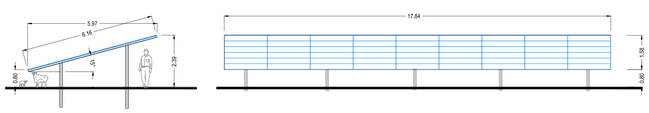
DRAW

	DATE	NAME
DRAW	01.06.2018	M. Riedel
DRAW	10.07.2018	M. Riedel
DRAW	16.07.2018	M. Riedel
DRAW	02.08.2018	M. Riedel
DRAW	08.08.2018	
DRAW		
CHECK		
CHECK		

Signature:

Scale	1:2500
Paper size	A0

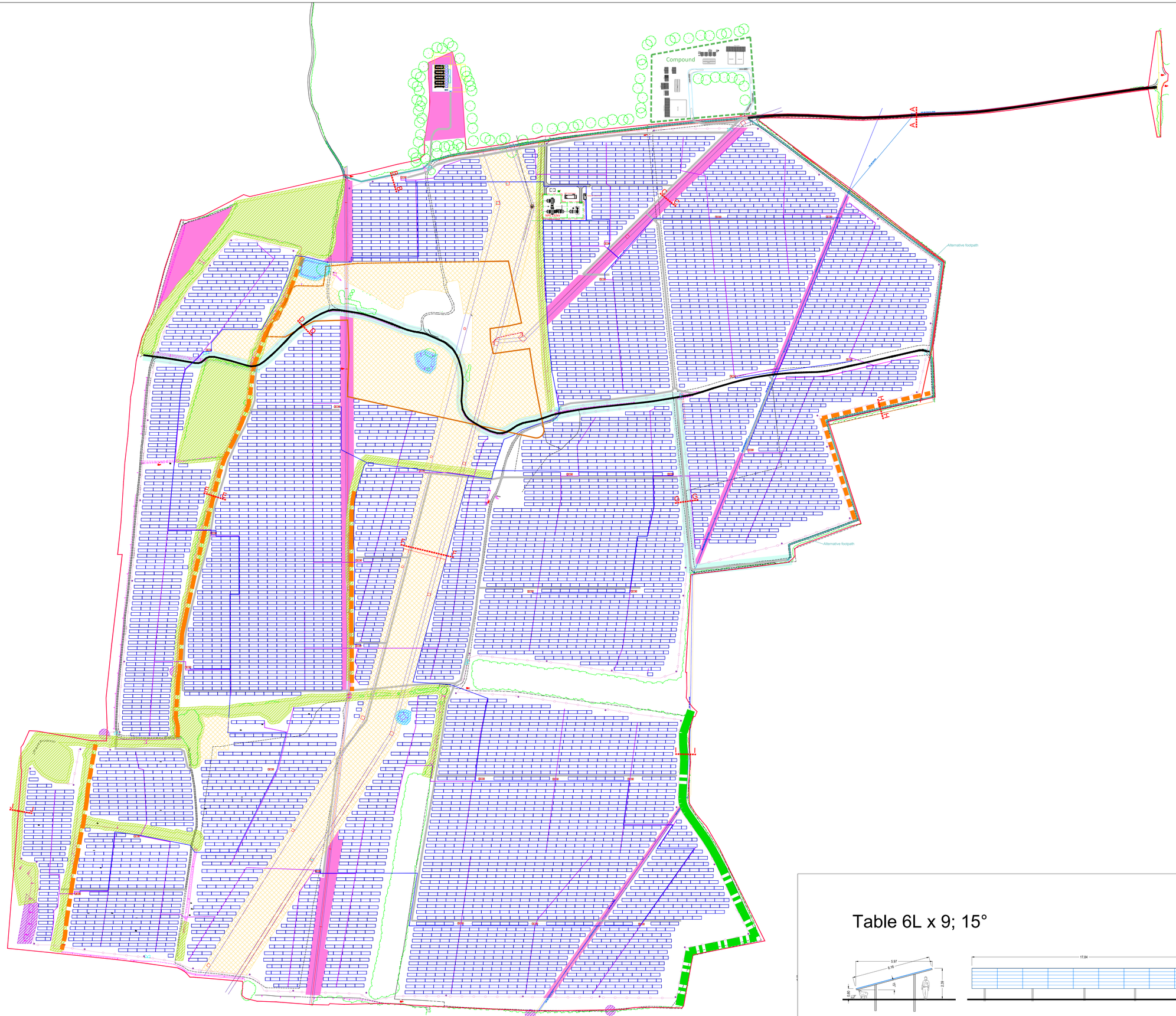
Table 6L x 9; 15°



Section Scale
1:100

GREENCELLS GROUP

APPENDIX C



N
W E
S

Electrical design

Station A

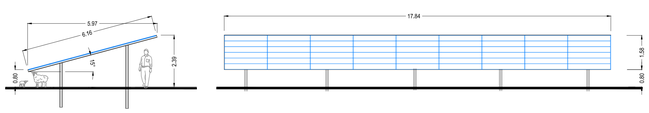
Inverter:
AC-Combiner:
Strings:
Panels:

Meter
50 0 50 100
1:2500

Key

- Table
- Existing Access Track
- New Access Track
- Public Footpath (gap = 15,00m)
- Buffer Woodland (15,0m)
- Swales (Buffer 8,00m)
- Pond (Buffer 5,00m)
- Hedges (Buffer 5,00m)
- Badger Zone (Buffer 20,00m)
- Zone for Winter Birds : 22,5ha
- Zone for Arable Weeds / Species Rich Grasslands : 5,4ha
- Transformer Station
- Construction Area
- Exclusion Zone Archeological
- Fence
- Gate / Entrance
- Trench AC
- Trench MV
- CCTV
- Alternative Footpath

Table 6L x 9; 15°



Section Scale
1:100

Regulations 2009 Document Paragraph Reference Number	
Regulation 5(2)(o)	

PROJECT NAME

Little Crow Solar Park

DRAWING	DRAWING N°
Table layout	A10B0C0

GEOGRAPHICAL SITE:

COORDINATES	53.5773° N	0.5786° W
NN/MSL	60.0m	
SUNANGLE	13.42°	
DATE	21.12.2017 / 12:00	

SITE SYSTEM:

SYSTEMLAYOUT	6L x 9	6L x 5
NUMBER OF TABLES	6.449 pc	345 pc
PANEL ORIENTATION	Landscape	
NUMBER OF PANELS	357.561	

CHANGE

DATE	CHANGE
10.07.2018	Addet 50MW Battery
16.07.2018	moved Fence and roads
02.08.2018	divers. changes
08.08.2018	divers. changes

SITE TECHNOLOGY:

MODULE NAME	
MODULE SIZE	
MODULE POWER	380 W
TYPE OF PANELS	POLY
ANGLE OF PANELS	15°
TABLESHADOW	1.0 m
ROWDISTANCES	

DRAW

	DATE	NAME
DRAW	01.06.2018	M. Riedel
DRAW	10.07.2018	M. Riedel
DRAW	16.07.2018	M. Riedel
DRAW	02.08.2018	M. Riedel
DRAW	08.08.2018	
DRAW		
CHECK		
CHECK		

SITE TOTAL POWER

DC POWER	135.87 MWp
AC-POWER nom.	
AC-POWER max.	

Signature:

Scale	1:2500
Paper size	A0

GREENCELLS GROUP

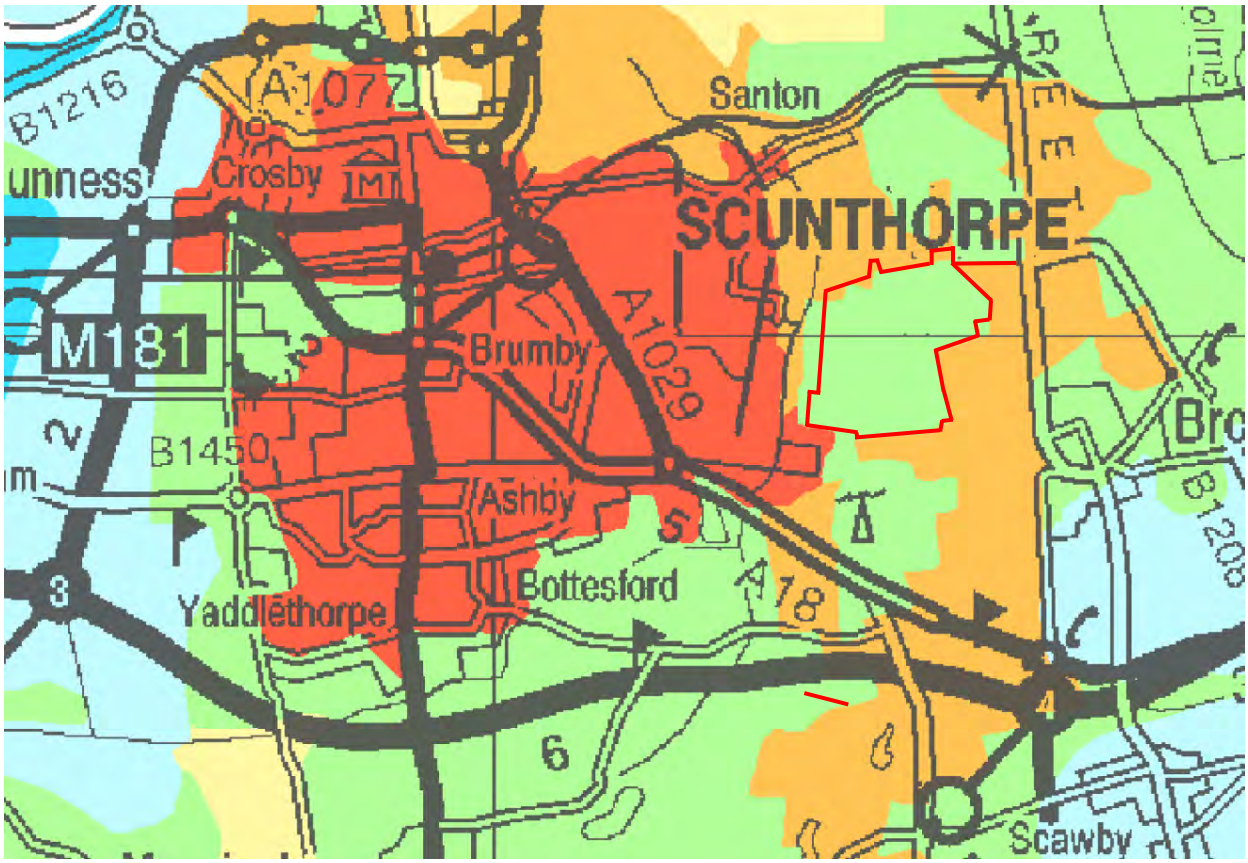
Greencells GmbH
Bernhardstraße 28
D-48153 Münster, Germany
Tel: +49 (0)251 7913 922 0
Fax: +49 (0)251 7913 922 11
http://www.greencells.de/
info@greencells.de

APPENDIX 10.1

PROVISIONAL ALC AROUND SCUNTHORPE

PROVISIONAL AGRICULTURAL LAND CLASSIFICATION MAP WITH SITE INDICATED (APPROXIMATELY)

Original Scale 1:250,000, MAFF 1983



Map not to scale

KEY:

Grade		*Description*
1		Excellent
2		Very Good
3		Good to Moderate
4		Poor
5		Very Poor

Non-Agricultural Land

	Other land primarily in non-agricultural use
	Land predominantly in urban use