





## MORGAN AND MORECAMBE OFFSHORE WIND **FARMS: TRANSMISSION ASSETS**

#### **Environmental Statement**

Volume 3, Annex 5.2: Onshore archaeological geophysical survey report – Part 1 of 2









Document status					
Version	Purpose of document	Approved by	Date	Approved by	Date
ES	For issue	AS	September 2024	IM	September 2024

The report has been prepared for the exclusive use and benefit of the Applicants and solely for the purpose for which it is provided. Unless otherwise agreed in writing by RPS Group Plc, any of its subsidiaries, or a related entity (collectively 'RPS') no part of this report should be reproduced, distributed or communicated to any third party. RPS does not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. The report does not account for any changes relating to the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report.

The report has been prepared using the information provided to RPS by its client, or others on behalf of its client. To the fullest extent permitted by law, RPS shall not be liable for any loss or damage suffered by the client arising from fraud, misrepresentation, withholding of information material relevant to the report or required by RPS, or other default relating to such information, whether on the client's part or that of the other information sources, unless such fraud, misrepresentation, withholding or such other default is evident to RPS without further enquiry. It is expressly stated that no independent verification of any documents or information supplied by the client or others on behalf of the client has been made. The report shall be used for general information only.

Prepared by: Prepared for:

Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd







## **Contents**

1	ONSI	HORE A	ARCHAEOLOGICAL GEOPHYSICAL SURVEY REPORT1
	1.1	Introdu	ıction1
	1.2		vassurance1
	1.3	-	ives1
	1.4	-	round information
		1.4.1	Geographic background2
		1.4.2	Archaeological background
	1.5	Metho	dology2
		1.5.1	Data collection
		1.5.2	Data processing
		1.5.3	Data visualisation and interpretation
	1.6		S
		1.6.1	Qualification
		1.6.2	Discussion
		1.6.3	Interpretation5
		1.6.4	Magnetic results – specific anomalies6
	1.7	Conclu	usions
	1.8		ing
	1.9		ght
	1.10		nces
Tab	les		

## **Appendices**

Appendix A : Project metadata
Appendix B : Survey considerations

Appendix C: Annex figures







## **Glossary**

Term	Meaning
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Diamicton	Diamicton is a sediment resulting from dry-land erosion that is unsorted to poorly sorted and contains particles ranging in size from clay to boulders, suspended in an unconsolidated matrix of mud or sand.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Magnetometer	A device that measures magnetic fields.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds.  Also referred to in this report as the Transmission Assets, for ease of reading.
National Grid Penwortham substation	The existing National Grid substation at Penwortham, Lancashire.
Survey area	The area within which each survey has been undertaken. This may differ from the Study Area as a Survey Area will be based on species or survey-specific guidance on the extent of survey required, which may be limited by, for example, habitat conditions, or be defined in terms of buffer areas around an area of potential impact.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).

# **Acronyms**

Acronym	Meaning	
CiFA	Chartered Institute for Archaeology	
GNSS	Global Navigation Satellite Systems	
GPS	Global Positioning System	
ISAP	International Society for Archaeological Prospection	
OS	Ordnance Survey	
RTK	Real-time kinematic positioning	
UK	United Kingdom	







## **Units**

Unit	Description
ha	Hectares
Hz	Hertz
ppm	Parts per million







## 1 Onshore archaeological geophysical survey report

## 1.1 Introduction

- 1.1.1.1 This document forms Volume 3, Annex 5.2: Onshore archaeological geophysical survey report of the Environmental Statement Annex (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (hereafter referred to as the Transmission Assets). The ES presents the preliminary findings of the Environmental Impact Assessment process for the Transmission Assets.
- 1.1.1.2 This document presents the results of the geophysical survey, which has been prepared by Magnitude Surveys Ltd (hereafter referred to as Magnitude Surveys) on behalf of the Applicants for an area of *c*. 673 hectares (ha) of land between the coast west of Lytham St Annes (SD 31035 31510) and Hall Cross (SD 42218 29892).
- 1.1.1.3 The geophysical survey comprised hand-carried Global Navigation Satellite Systems (GNSS)-positioned fluxgate gradiometer survey. Magnetic survey is the standard primary geophysical method for archaeological applications in the United Kingdom (UK) due to its ability to detect a range of different features. The technique is particularly suited for detecting fired or magnetically enhanced features, such as ditches, pits, kilns, sunken featured buildings and industrial activity (David *et al.*, 2008).
- 1.1.1.4 The geophysical survey was conducted in line with the current best practice guidelines produced by Historic England (David *et al.*, 2008), the Chartered Institute for Archaeologists (CIfA, 2020) and the European Archaeological Council (Schmidt *et al.*, 2015). It was conducted in line with a Written Scheme of Investigation produced by Magnitude Surveys (Stead, 2023).
- 1.1.1.5 The geophysical survey commenced on 17 April 2023 and was completed on 15 August 2024. This survey was undertaken over a number of deployments during this period.

## 1.2 Quality assurance

1.2.1.1 Magnitude Surveys is a registered organisation of the ClfA, the chartered UK body for archaeologists, and a corporate member of International Society for Archaeological Prospection (ISAP). The directors of Magnitude Surveys are involved in cutting edge research and the development of guidance/policy. All Magnitude Surveys managers, field and office staff have degree qualifications relevant to archaeology or geophysics and/or field experience.

## 1.3 Objectives

1.3.1.1 The objective of this geophysical survey was to assess the subsurface archaeological potential of the survey area.







### 1.4 Background information

### 1.4.1 Geographic background

- 1.4.1.1 The survey was located in the vicinity of Lytham St Anne's (**Appendix C**, Figure 1). Gradiometer survey was undertaken across multiple fields under arable cultivation, pasture, and playing fields. The survey area extends from the coast west of Lytham St Annes to the National Grid Penwortham substation (**Appendix C**, Figure 2 and 3).
- 1.4.1.2 The underlying geology comprises mudstone of the Kirkham Mudstone Member in the west of the survey area as far east as Area 39. The underlying geology between Area 39 and Area 96 comprises mudstone of the Breckells Mudstone Member. Between Areas 97 and 142, the underlying geology comprises sandstone of the Sherwood Sandstone Group. Most of the land between Areas 25 96, 130 144, 148, 152- 154, and 156 169 is underlain by superficial deposits consisting of Devensian diamicton till, interspersed by clay, silt, sand and gravel head in Areas 43 47, 51, 61 64, 141, 146, 147 and 165. The remaining Areas 3 23 and 97 129, 132, 150, and 151 show clay, silt and sand tidal flat deposits, excluding Areas 1 and 2 which are underlain by blown sand. (British Geological Survey, 2024).
- 1.4.1.3 The soils consist of naturally wet very acidic sandy and loamy soils in Areas 1 and 2. Areas 3 7 and 14 24 comprise loamy and sandy soils with naturally high groundwater and a peaty surface, with Areas 8 13 consisting of fen peat soils. Areas 25 55 and 65 68, 79, 80, 89, 90, 102, 103, 121 124, 131, 133, 134, 137, 138, 143 146 and 152 -169 comprise slowly permeable seasonally wet slightly acidic but base-rich loamy and clayey soils. Areas 62 65 comprise loamy and clayey floodplain soils with naturally high groundwater, in addition to slightly acid loamy and clayey soils with impeded drainage within Areas 56 61, 69 78, 81 88, 91 96 and 18. Areas 97 120, 125 130, 132, 135, 136, 139 140, 141, 147, 149, 150 and 151 comprise loamy and clayey soils of coastal flats with naturally high groundwater (Soilscapes, 2024).

## 1.4.2 Archaeological background

1.4.2.1 Further detail on the archaeological background for the Transmission Assets is provided within Volume 3, Annex 5.1: Historic environment desk based assessment of the ES and Volume 3, Annex 5.4: Geoarchaeological desk based assessment report of the ES.

## 1.5 Methodology

#### 1.5.1 Data collection

1.5.1.1 Magnetometer surveys are generally the most cost effective and suitable geophysical technique for the detection of archaeology in England.

Therefore, a magnetometer survey should be the preferred geophysical technique unless its use is precluded by any specific survey objectives or the site environment. For the area studied, no factors precluded the







recommendation of a standard magnetometer survey. Geophysical survey therefore comprised the magnetic method as described in **Table 1.1**.

Table 1.1: Table of survey strategies

Method	Instrument	Traverse interval	Sample interval
Magnetic	Bartington Instruments Grad-13 Digital Three-Axis Gradiometer.	1 m	200 Hz reprojected to 0.125 m.

- 1.5.1.2 The magnetic data were collected using Magnitude Surveys' bespoke quadtowed cart system and hand-carried GNSS-positioned system.
- 1.5.1.3 Magnitude Surveys' hand-carried and quad towed system was comprised of Bartington Instruments Grad 13 Digital Three-Axis Gradiometers. Positional referencing was through a multi-channel, multi-constellation GNSS Smart Antenna Real-time kinematic positioning (RTK) Global Positioning System (GPS) outputting in 'NMEA' mode to ensure high positional accuracy of collected measurements. The RTK GPS is accurate to 0.008 m + 1 parts per million (ppm) in the horizontal and 0.015 m + 1 ppm in the vertical.
- 1.5.1.4 Magnetic and GPS data were stored on a Secure Digital card within Magnitude Surveys' bespoke datalogger. The datalogger was continuously synced, via an in-field Wi-Fi unit, to servers within Magnitude Surveys' offices. This allowed for data collection, processing and visualisation to be monitored in real-time as fieldwork was ongoing.
- 1.5.1.5 A navigation system was integrated with the RTK GPS, which was used to guide the surveyor. Data were collected by traversing the survey area along the longest possible lines, ensuring efficient collection and processing.

### 1.5.2 Data processing

- 1.5.2.1 Magnetic data were processed in bespoke in-house software produced by Magnitude Surveys. Processing steps conform to the European Archaeological Council and Historic England guidelines for 'minimally enhanced data' (see Section 3.8 in Schmidt *et al.*, 2015: 33 and Section IV.2 in David *et al.*, 2008: 11).
  - Sensor calibration The sensors were calibrated using a bespoke inhouse algorithm, which conforms to Olsen et al. (2003).
  - Zero median traverse The median of each sensor traverse is calculated within a specified range and subtracted from the collected data. This removes striping effects caused by small variations in sensor electronics.
  - Projection to a regular grid Data collected using RTK GPS positioning requires a uniform grid projection to visualise data. Data are rotated to best fit an orthogonal grid projection and are resampled onto the grid using an inverse distance-weighting algorithm.
  - Interpolation to square pixels Data are interpolated using a bicubic algorithm to increase the pixel density between sensor traverses. This produces images with square pixels for ease of visualisation.







#### 1.5.3 Data visualisation and interpretation

- 1.5.3.1 This report presents the gradient of the sensors' total field data as greyscale images. The gradient of the sensors minimises external interferences and reduces the blown out responses from ferrous and other high contrast material. However, the contrast of weak or ephemeral anomalies can be reduced through the process of calculating the gradient. Consequently, some features can be clearer in the respective gradient or total field datasets. Multiple greyscale images of the gradient and total field at different plotting ranges have been used for data interpretation.
- 1.5.3.2 Geophysical results have been interpreted using greyscale images and XY traces in a layered environment, overlaid against open street maps, satellite imagery, historical maps, LiDAR data, and soil and geology maps. Google Earth (2023) was also consulted, to compare the results with recent land use.

#### **Geodetic position of results**

1.5.3.3 All vector and raster data have been projected into OSGB36 (ESPG27700) and can be provided upon request in ESRI Shapefile (.SHP) and Geotiff (.TIF) respectively. Figures are provided with raster and vector data projected against Ordnance Survey (OS) Open Data.

#### 1.6 Results

#### 1.6.1 Qualification

- 1.6.1.1 Geophysical results are not a map of the ground and are instead a direct measurement of subsurface properties. Detecting and mapping features requires that said features have properties that can be measured by the chosen technique(s) and that these properties have sufficient contrast with the background to be identifiable. The interpretation of any identified anomalies is inherently subjective. While the scrutiny of the results is undertaken by qualified, experienced individuals and rigorously checked for quality and consistency, it is often not possible to classify all anomaly sources.
- 1.6.1.2 Where possible, an anomaly source have been identified along with the certainty of the interpretation. The only way to improve the interpretation of results is through a process of comparing excavated results with the geophysical reports.

#### 1.6.2 Discussion

- 1.6.2.1 A fluxgate gradiometer survey has been carried out over *c*. 339.3 hectares (ha) of the *c*. 673 ha survey area. The following are the geophysical survey results and these are presented in consideration with satellite imagery (**Appendix C**, Figures 4 to 57).
- 1.6.2.2 The geophysical survey is characterised agricultural activity, modern and industrial activity, and natural variations in the geology and soils. Magnetic disturbances are limited to fences near the edges of the field boundaries and along the route of buried services.







- 1.6.2.3 In the west of the survey area anomalies have been identified which are likely to result from the modern use of the area as recreation grounds, and the erection of goalposts and related features (**Appendix C**, Figures 45, 48, 63, 66, 159, 165). Further amorphous anomalies have been identified in the centre and east of the survey area which are likely related to the location of former pylons.
- 1.6.2.4 Agricultural activity has been identified in the form of former field boundaries, drainage schemes, ridge and furrow, modern ploughing trends, modern agricultural activity visible on satellite imagery and spreads indicative of changes in land use.
- 1.6.2.5 Anomalies interpreted as indicating former and extant ponds have been identified. These align with features visible on historical mapping or satellite imagery (**Appendix C**, Figures 13 47).
- 1.6.2.6 Multiple anomalies of natural origin have been detected across the survey area. These anomalies are likely a result of variations in the underlying geology. The western section of the geophysical survey area has been affected by modern features such as football goal posts and pitch segregation features.
- 1.6.2.7 Several anomalies have been detected which have been characterised as 'undetermined'. Whilst these are probably of agricultural, natural, or modern origin an archaeological origin cannot be ruled out at this stage of investigation.

## 1.6.3 Interpretation

#### **General statements**

1.6.3.1 Geophysical anomalies have been discussed broadly as classification types across the survey area. Only anomalies that are distinctive or unusual have been discussed individually.

#### **Data artefact**

1.6.3.2 Data artefacts usually occur in conjunction with anomalies with strong magnetic signals due to the way in which the sensors respond to very strong point sources. They are usually visible as minor 'streaking' following the line of data collection. While these artefacts can be reduced in post-processing through data filtering, this would risk removing 'real' anomalies. These artefacts are therefore indicated as necessary in order to preserve the data as 'minimally processed'.

#### Ferrous (spike)

1.6.3.3 Discrete dipolar anomalies are likely to be the result of isolated pieces of modern ferrous debris on or near the ground surface.







#### Ferrous/debris (spread)

1.6.3.4 A ferrous/debris spread refers to a concentration of multiple discrete, dipolar anomalies usually resulting from highly magnetic material such as rubble containing ceramic building materials and ferrous rubbish.

#### Magnetic disturbance

1.6.3.5 The strong anomalies produced by extant metallic structures, typically including fencing, pylons, vehicles, and service pipes, have been classified as 'magnetic disturbance'. These magnetic 'haloes' will obscure weaker anomalies relating to nearby features, should they be present, often over a greater footprint than the structure causing them.

#### **Undetermined**

1.6.3.6 Anomalies are classified as undetermined when the origin of the geophysical anomaly is ambiguous and there is no supporting contextual evidence to justify a more certain classification. These anomalies are likely to be the result of geological, pedological or agricultural processes, although an archaeological origin cannot be entirely ruled out. Undetermined anomalies are generally distinct from those caused by ferrous sources.

### 1.6.4 Magnetic results – specific anomalies

#### **Pond**

1.6.4.1 Within Areas 20, 25, 42, 45, 46, 47, 49, 57, 62, 63, 65, 70, 72, 75, 77, 79, 83, 85, 95, 120, 133, 136, 143, 157, and 167 spreads of strong and weak amorphous anomalies have been identified (see **Appendix C**, Figures 75, 84, 90 – 114, 120 – 132, 138, 141, 165, 174, 177, 180, 183, 192, 198 and 204). These correspond with former and extant ponds identified on historical mapping and in satellite imagery (see **Appendix C**, Figures 13 – 29, 37, 41, 45 and 49).

#### **Agricultural (strong/weak/spread)**

1.6.4.2 Across the survey area, a multitude of strong and weak linear anomalies and linear spreads of enhanced material have been identified (see **Appendix C**, Figures 6– 102, 108 – 114, 120 – 141, 147 – 153, 164-166, 174 – 187 and 191-205). The majority of these roughly correspond with field boundaries recorded on historical OS mapping, or with footpaths visible on satellite images.

#### Modern and industrial (strong/spread)

1.6.4.3 Within Area 13, strong amorphous anomalies have been identified (**Appendix C**, Figure 66). These align with extant telegraph poles. Further strong amorphous anomalies have been identified in parallel alignment across Areas 125, 126 and 127 (see **Appendix C**, Figure 165). These do not







align with features on historical mapping or satellite imagery but could be related to the former location of pylon bases.

1.6.4.4 Within Area 169 a series of strong amorphous anomalies have been identified (see **Appendix C**, Figure 204). These align with an area identified on historical mapping as the site of old clay extraction pits. These anomalies are likely evidence of the subsequent infilling of the pits with magnetically enhanced material.

#### Agricultural (trend)

1.6.4.5 Tightly-spaced linear anomalies have been identified across the survey area (see **Appendix C**, Figures 51 – 57, 69, 72, 78 – 93, 108 – 135, 144, 147, 153, 162, 165, 171, 174, 180 and 183). These anomalies correspond with modern ploughing trends visible both on satellite imagery and at time of survey.

#### Ridge and furrow (trend)

1.6.4.6 Across Areas 29, 31, 32, 34, 43, 39, 76, 77,115 and 149, parallel alignments of linear anomalies spaced approximately 4-8 m apart have been identified (see **Appendix C**, Figures 84 – 93, 99, 120, 123, 135, 153 and 195). These anomalies are indicative of historical ridge and furrow ploughing.

#### **Drainage feature (trend)**

1.6.4.7 Across the survey area multiple alignments of linear anomalies have been detected (see **Appendix C**, Figures 51 – 96, 102 – 120, 126, 135, 138, 144 – 153, 162 – 174, 191-193 and 204). These anomalies present magnetic signals indicative of different styles of drainage features. Strong, positive, linear signals are indicative of land-drains formed through the cutting and filling of a narrow trench (i.e. 'French Drains'), and weak, dipolar signals are indicative of ceramic land-drains.

#### **Natural (strong/weak/spread)**

1.6.4.8 Across the survey area, various anomalies have been identified that relate to variations within the geological background, (see **Appendix C**, Figures 4 to 5 and 8 to 21, Figures 32, 45, 46, 51, 54 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 102, 105, 108, 120, 126, 135, 138, 144, 147, 150, 153, 162, 165, 168, 171, 174, 192 and 195). In some areas these relate to paleochannels, superficial deposits and ridges.

#### **Undetermined (strong/weak)**

1.6.4.9 Multiple linear, curvilinear, and discrete anomalies have been identified across the survey area (see **Appendix C**, Figures 45, 51 – 135, 144 – 192 and 201). These anomalies do not have any supporting contextual evidence and may be partially obscured by the spreads of anomalies resulting from geological variation across the area. These anomalies are themselves likely to be the result of geological or agricultural processes, but in these cases an archaeological origin cannot be entirely ruled out.







#### Services (trend)

1.6.4.10 Buried services have been detected throughout the survey area (see **Appendix C**, Figures 51, 54 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 102, 105, 108, 120, 126, 135, 138, 144 - 153, 165 – 177 and 183 - 204). These anomalies, comprising of strong linear dipolar responses, are characteristic of buried services. This interpretation is based on the strong positive XY response along the course of these anomalies, the strength and distribution of which may have obscure any weaker anomalies present.

#### **Overhead cables**

1.6.4.11 Overhead cables are present across Areas 19 and 21 and are visible as a change in magnetic background most visible on the Total Field plots (see **Appendix C**, Figures 14 to 17). This magnetic interference may mask ephemeral anomalies of anthropogenic origin, if present, though is likely to have only minimal effect on the visibility of anomalies in the gradient data.

#### 1.7 Conclusions

- 1.7.1.1 The fluxgate gradiometer survey has successfully been undertaken across c. 339.3 ha of the survey area. The geophysical survey has detected a range of different types of anomalies of, agricultural, natural, modern, and undetermined origins. Modern activity in the form of magnetic disturbance is generally limited to the boundaries, pylons, and along the route of buried services.
- 1.7.1.2 Anomalies which are likely to result from modern use of areas within the survey as recreation grounds have been identified along with anomalies which are likely related to the location of former pylons.
- 1.7.1.3 Anomalies interpreted as indicating former and extant ponds have been identified.
- 1.7.1.4 Agricultural activity has been identified in the form of mapped and unmapped former field boundaries, ridge and furrow cultivation, drainage features and modern ploughing regimes.
- 1.7.1.5 Natural variations in the geology of the survey area have been identified.

  Areas of dipolar spreads have also been identified potentially resulting from the presence of green waste in the topsoil, or other modern activity.
- 1.7.1.6 Anomalies of an undetermined origin have been detected. Whilst these most likely have agricultural, natural, or modern origins, an archaeological origin cannot be ruled out.







#### 1.8 Archiving

- 1.8.1.1 Magnitude Surveys maintains an in-house digital archive, which is based on Schmidt and Ernenwein (2013). This stores the collected measurements, minimally processed data, georeferenced and un-georeferenced images, XY traces and a copy of the final report.
- 1.8.1.2 Magnitude Surveys contributes reports to the Archaeology Data Service Grey Literature Library upon permission from the client, subject to any dictated time embargoes.

## 1.9 Copyright

1.9.1.1 Copyright and intellectual property pertaining to all reports, figures and datasets produced by Magnitude Services Ltd is retained by Magnitude Surveys. The client is given full licence to use such material for their own purposes. Permission must be sought by any third party wishing to use or reproduce any IP owned by Magnitude Surveys.

#### 1.10 References

British Geological Survey, 2023. Geology of Britain. Blackpool, Lancashire. [http://mapapps.bgs.ac.uk/geologyofbritain/home.html/]. Accessed June 2024.

Chartered Institute for Archaeologists, 2020. Standards and guidance for archaeological geophysical survey. CIfA.

David, A., Linford, N., Linford, P. and Martin, L., 2008. Geophysical survey in archaeological field evaluation: research and professional services guidelines (2nd edition). Historic England.

Google Earth, 2023. Google Earth Pro V 7.1.7.2606.

Olsen, N., Toffner-Clausen, L., Sabaka, T.J., Brauer, P., Merayo, J.M.G., Jorgensen, J.L., Leger, J.M., Nielsen, O.V., Primdahl, F., and Risbo, T., 2003. Calibration of the Orsted vector magnetometer. Earth Planets Space 55: 11-18.

Schmidt, A. and Ernenwein, E., 2013. Guide to good practice: geophysical data in archaeology (2nd edition). Oxbow Books: Oxford.

Schmidt, A., Linford, P., Linford, N., David, A., Gaffney, C., Sarris, A. and Fassbinder, J., 2015. Guidelines for the use of geophysics in archaeology: questions to ask and points to consider. EAC Guidelines 2. European Archaeological Council: Belgium.

Soilscapes, 2023. Blackpool, Lancashire. Cranfield University, National Soil Resources Institute. [http://landis.org.uk]. Accessed June 2024.

Stead, M., 2023. Written Scheme of Investigation For a Geophysical Survey of Morecambe and Morgan Transmission Assets, Lancashire.







# Appendix A: Project metadata

Magnitude Surveys Job Code	MSSD1525
Project Name	Morecambe and Morgan Transmission Assets
Applicants	Morgan Offshore Wind Limited and Morecambe Offshore Windfarm Limited
Grid Reference	SD 31035 31510 to SD 42218 29892
Survey Techniques	Magnetometry
Survey Size (ha)	673ha
Survey Dates	17/04/2023 — 07/06/2024
S42 Licence No	N/A
Report Version	2.1







# **Appendix B:** Survey considerations

Survey area	Ground conditions	Further notes
1	The survey area consisted of a flat arable field.	The survey area was bordered to the north, east, and south by metal wire fencing, hedges, and trees. To the west there was no physical boundary. In the south west of the area there was a pond.
2	The survey area consisted of a flat pasture field.	The survey area was bordered to the west and south by hedgerow, to the north and east there was no physical boundary.
3	The survey area consisted of a flat arable field.	The survey area was bordered to the north and south by metal wire fencing, hedges, and trees. To the east and west there was no physical boundary.
4	The survey area consisted of a pasture field sloping downwards to the south east.	The survey area was bordered to the north, west, and south by hedgerow, and to the east there was no physical boundary.
5	The survey area consisted of a pasture field sloping downwards to the south east.	The survey area was bordered to the west and south by hedgerow, and to the north and east there was no physical boundary.
6	The survey area consisted of a flat pasture field.	The survey area was bordered to the north and east by hedges, trees, and metal wire fencing. To the west by hedges and trees, and to the south there was no physical boundary.
7	The survey area consisted of a flat pasture field.	The survey area was bordered to the north west by hedges, trees, and metal wire fencing, to the north east by hedges and trees. To the south there was no physical boundary.
8	The survey area consisted of a flat pasture field.	The survey area was bordered on all sides by hedges, trees, and metal wire fencing. Overhead cables and telegraph poles ran south west to north east through the north of the survey area.
9	The survey area consisted of a flat pasture field.	The survey area was bordered on all sides by metal wire fencing, hedges, and trees. To the west of the area was also a dirt track. Running south west to north east through the area were overhead cables and telegraph poles, in the centre was also a waterlogged section that was deemed unable to be surveyed.
10	The survey area consisted of a flat pasture field.	The survey area was bordered to the west and east by metal wire fencing, hedges, and trees. To the north and south there was no physical boundary.







Survey	Ground conditions	Further notes
area		
11	The survey area consisted of a flat pasture field.	The survey area was bordered to the north and east by hedges and trees, and to the south west there was no physical boundary.
12	The survey area consisted of a flat pasture field.	The survey area was bordered to the west and south by hedges, trees, and metal wire fencing to the west there was also a drainage ditch. To the north and east there was no physical boundary.
13	The survey area consisted of a flat pasture field.	The survey area was bordered on all sides by hedges, trees, metal wire fencing, and a drainage ditch. In the north west of the survey area was a pond.
14	The survey area consisted of a flat pasture field.	The survey area was bordered on all sides by metal wire fencing, hedges, and trees, to the west there was also a ditch.
15	The survey area consisted of a flat pasture field.	The survey area was bordered to the west by metal wire fencing, hedges and trees, and a ditch. To the south by hedges, trees, and metal wire fencing, and to the north east there was no physical boundary.
16	The survey area consisted of a flat pasture field.	The survey area was bordered to the north and east by hedgerow and to the south west there was no physical boundary.
17	The survey area consisted of a pasture field sloping downwards to the east.	The survey area was bordered to the west by hedges and trees, to the south and east by metal wire fencing, hedges and trees, and a ditch. To the north there was no physical boundary.
18	The survey area consisted of a flat pasture field.	The survey area was bordered to the west and north by hedges and trees, and to the east and south there was no physical boundary.
19	The survey area consisted of a pasture field sloping downwards to the south west.	The survey area was bordered to the north, east, and south by hedgerow and barbed wire fencing, to the west, south east, and south west there was no physical boundary. Overhead cables ran north west to south east through the centre of the survey area.
21	The survey area consisted of a flat pasture field.	The survey area was bordered to the west, east, and north by hedges and barbed wire fencing, to the north east by barbed wire fencing. To the north west and south there was no physical boundary.
22	The survey area consisted of a flat grassland field.	The survey area was bordered to the west, south, and east, by hedgerow, to the north west there was a wire fence and to the north there was no physical boundary. A hedge ran east to west through the north of the survey area.
23	The survey area consisted of a pasture field sloping downwards to the south east.	The survey area was bordered to the west by hedgerow and barbed wire fencing, to the east and south by a drainage ditch with barbed wire fencing. To the north there was no physical boundary.
24	The survey area consisted of a pasture field sloping downwards from the north west.	The survey area was bordered to the south, south west, north west, and east by hedges and barbed wire fencing. A small section in the north west and south there were ponds, and to the north east there was no physical boundary.
25	The survey area consisted of a pasture field sloping	The survey area was bordered to the north, east, and west by trees, and to the south there was no physical boundary. In the north east of the area was a large pond that was not surveyable.







Survey	Ground conditions	Further notes
area		
	downwards to the south east.	
27	The survey area consisted of a pasture field sloping downwards to the west.	The survey area was bordered to the west and east by hedges and barbed wire fencing, to the north by wooden fencing, and to the south there was no physical boundary.
28	The survey area consisted of a pasture field sloping downwards to the west.	The survey area was bordered to the west and east by hedgerow and barbed wire fencing, to the north by a barbed wooden fence, and to the south there was no physical boundary.
29	The survey area consisted of a pasture field sloping downwards to the south.	The survey area was bordered to the east by barbed wire fencing, to the west by hedgerow, and to the north and south there was no physical boundary. A large section in the west of the area was not surveyable due to long OSR crop.
32	The survey area consisted of a flat playing field.	The survey area was bordered to the north and west by a gravel path and hedgerow, to the south and east by residential housing. In the north east of the survey area was a sports court and scattered throughout the survey area were numerous football goal posts.
33	The survey area consisted of a flat playing field.	The survey area was bordered to the west, south and east by metal fencing, to the north east by a brick wall and to the north west by a netted wall. Scattered around the edge of the survey area were numerous football goal posts.
34	The survey area consisted of a flat arable field.	The survey area was bordered by hedgerow to the east and west, with no physical boundaries to the north or south.
35	The survey area consisted of a pasture field sloping downwards to the south and east.	The survey area was bordered by hedgerow on all sides, excluding the eastern section of the northern border where there was no physical boundary. A pond was present at the centre of the southern border.
36	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing, hedgerow, and a dike to the west and north-east. The survey area had no physical boundaries to the north, south, or south-east.
37	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing, hedgerow and a dike to the west and south-east, with no physical boundary to the north.
38	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing, hedgerow and a dyke to the north-west and north-east, with no physical boundary to the south.
39	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the east and west, with no physical boundaries to the north or south.
40	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and a dike to the west and south-east, with no physical boundaries to the north or south.
41	The survey area consisted of a flat arable field.	The survey area was bordered by trees to the north-west, with metal wire fencing and hedgerow to the north-east. The survey area had no physical boundary to the south and south-west.
42	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow to the north-east and south-west, with additional trees







Survey area	Ground conditions	Further notes
		to the west. The survey area had no physical boundaries to the south-east or north. A large pond was present in the centre of the survey area.
43	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow to the west and south, with no physical boundary to the north.
44	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow to the west and north, with no physical boundary to the south.
45	The survey area consisted of a pasture field sloping downwards to the south east.	The survey area was bordered by metal wire fencing and hedgerow on all sides, excluding sections of the western border where no physical boundary was present.
46	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow to the south and west, with no physical boundaries to the south-west and north-east.
47	The survey area consisted of a pasture field sloping downwards to the south west.	The survey area was bordered by metal wire fencing and hedgerow to the north and east, with no physical boundaries present to the south or west.
48	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow to the east and south-east, with no physical boundaries to the south-west or north.
49	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing, hedgerow and a dike to the east, west and south, with no physical boundary to the north.
50	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the north and west, with no physical boundaries to the south or east.
51	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing, hedgerow and a dike to the north-west and west, with no physical boundary to the north-east or south.
52	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the west and south-east, with no physical boundary to the north-east.
53	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing, hedgerow, and a dike on all sides. A pond was present along the northern border of the survey area.
54	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing, hedgerow and a dyke to the south, east and north-west, with no physical boundary to the north-east and west.
55	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing, hedgerow and trees on all sides. At the north was a pond.
56	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing, hedgerow and trees to the south-west and south-east, and a dike to the south-west. There was no physical boundary to the north.







Survey area	Ground conditions	Further notes
57	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing, hedgerow and trees to the north, west and south, with no physical boundary to the north-east and east.
58	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing, hedgerow and trees to the north, east and south, with no physical boundary to the south-west.
59	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing, hedgerow and trees to the south-west, south-east and north-east, with no physical boundary to the north-west. Telegraph poles with overhead cables ran south-west to north-east through the centre of the survey area. A patch of ground was unable to be surveyed in the centre of the survey area due to being waterlogged.
60	The survey area consisted of a pasture field sloping downwards to the south east.	The survey area was bordered by metal wire fencing, hedgerow and trees to the south-west, south-east and east, with no physical boundary to the north-west. Telegraph poles with overhead cables ran south-west to north-east through the centre of the survey area.
61	The survey area consisted of a pasture field sloping downwards to the south east.	The survey area was bordered by metal wire fencing, hedgerow and trees to the north-west and north-east. There was no physical boundary to the south.
62	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow to the west and north-east, with no physical boundaries to the south-west or south-east.
63	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the south-west and south-east, with no physical boundaries to the north or east.
64	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the north, south-west and south-east, with no physical boundary to the north-east.
65	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow to the north-west and south-east, with no physical boundaries to the east or west.
66	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow on all sides, excluding small sections in the southwestern border which had no physical boundary. A pond was present in the south-western corner of the survey area.
67	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the south-west, south and north-east, with no physical boundaries to the north-west or south-east. Large pylons with overhead cables ran north-west to south-east through the north-eastern half of the survey area.
68	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow to the west, south and east, with a wooden fence and hedgerow to the north-west, north and north-east. Several areas of ground present in the western half of the survey area were unable to be surveyed due to being waterlogged.







Survey	Ground conditions	Further notes
area		
69	The survey area consisted of a pasture field sloping downwards to the west.	The survey area was bordered by metal wire fencing and hedgerow to the south-west and south, with no physical boundary to the north-east. Patches of ground were unable to be surveyed due to being waterlogged.
70	The survey area consisted of a pasture field sloping downwards to the west.	The survey area was bordered by hedgerow on all sides.
71	The survey area consisted of a pasture field sloping downwards to the west.	The survey area was bordered by hedgerow on all sides. A pond was present in the eastern half of the survey area.
72	The survey area consisted of a pasture field sloping downwards to the west.	The survey area was bordered by hedgerow to the north, west and south, with no physical boundary to the east. Telegraph poles with overhead cables ran east to west along the southern border of the survey area.
73	The survey area consisted of a pasture field sloping downwards to the west.	The survey area was bordered by hedgerow to the north, west and south, with no physical boundary to the east.
74	The survey area consisted of a pasture field sloping downwards to the west.	The survey area was bordered by metal wire fencing on all sides. A pond was present in the centre of the field, and another in the north-western corner.
75	The survey area consisted of a pasture field sloping downwards to the west.	The survey area was bordered by metal wire fencing and hedgerow to the north, east, and south, with additional metal wire fencing to the west. A large pond was present on the southeastern border of the field.
76	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow on all sides. A pond was present on the south-western edge of the survey area.
77	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the west and south-east, with no physical boundary to the north. Two small ponds were present near the south-eastern border of the survey area.
78	The survey area consisted of a pasture field sloping downwards to the west.	The survey area was bordered by hedgerow to the east, southeast and north-west, with no physical boundary to the south-west.
79	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow to the south-east and east, with no physical boundary to the west. A pond was present in the centre of the survey area.
80	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing to the northeast, north-west and west, with no physical boundary to the south. A large pylon with overhead cables ran south-east to north-west through the centre of the survey area.
81	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow on all sides. A pond was present in the south-west of the survey area.
82	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow on all sides. A pond was present in the centre of the survey area.







Survey area	Ground conditions	Further notes
83	The survey area consisted of a flat arable field.	The survey area was bordered by hedgerow to on all sides. A pond was present in the centre of the survey area.
84	The survey area consisted of a flat arable field.	The survey area was bordered by hedgerow to the west, northwest, east and south-east, with no physical boundary to the south-west. A pond was present on the north-western edge of the survey area.
85	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow to the north-west, south-west and south-east, with a dyke bordering the north-east.
86	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing to the south, east and north, with no physical boundaries to the west or southeast.
87	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the north-west and south-west, with no physical boundaries to the east or west.
88	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the south and north-east, with no physical boundaries to the east or west.
89	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the north-west, south-east and north-east, with no physical boundaries to the north, south-west and east. Patches of ground in the south-west of the survey area were unable to be surveyed due to being waterlogged.
90	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow to the west and south-east, with no physical boundaries to the north, north-east or south-west.
91	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the north-west and south-east, with no physical boundaries to the north-east or south-west.
92	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the north-east and north-west, with no physical boundary to the south-west.
93	The survey area consisted of a pasture field sloping downwards to the north.	The survey area was bordered by metal wire fencing and hedgerow to the north-west and south-east, with no physical boundaries to the north-east or south-west. A farm track oriented east to west bisected the survey area.
94	The survey area consisted of a flat pasture field.	The survey area was bordered by electric fencing to the southwest, with metal wire fencing and hedgerow to the north-west, north-east, and south-east. Water storage tanks were present in the south-western half of the field.
95	The survey area consisted of a pasture field sloping downwards to the north.	The survey area was bordered by metal wire fencing and hedgerow to the north-west, north-east and east, with electric fencing to the south-west and no physical boundary to the south.
96	The survey area consisted of a pasture field sloping downwards to the east.	The survey area was bordered by a dyke to the north-west and east, with no physical boundaries to the north or south. Patches of ground were unable to be surveyed due to being waterlogged.







Survey	Ground conditions	Further notes
area		
97	The survey area consisted of a flat arable field.	The survey area was bordered by a dyke to the west and hedgerow to the east, with no physical boundaries to the north or south.
98	The survey area consisted of a flat arable field.	The survey area was bordered by hedgerow to the east and west, with metal wire fencing to the south and no physical boundary to the north.
99	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow to the east and west, with metal wire fencing to the north and no physical boundary to the south.
100	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow to the west and a farm track to the east, with no physical boundaries to the north or south. Patches of ground were unable to be surveyed due to being waterlogged.
101	The survey area consisted of a flat arable field.	The survey area was bordered by hedgerow to the east and west, with metal wire fencing to the south-east. The survey area had no physical boundary to the north. Patches of ground were unable to be surveyed due to being waterlogged.
102	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the west, north and east, with no physical boundary to the south.
103	The survey area consisted of a flat pasture field.	The survey area was bordered by a dike to the north, west and east, with hedgerow to the north and east, and metal wire fencing to the west. The survey area had no physical boundary to the south.
104	The survey area consisted of a flat arable field.	The survey area was bordered by hedgerow and a dyke to the west, south-west and east, with no physical boundaries to the north-west or south-east.
105	The survey area consisted of a flat arable field.	The survey area was bordered by hedgerow to the north and west, with a dike to the west and metal wire fencing to the east. The survey area had no physical boundary to the south.
106	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow to the east and west, with no physical boundary to the north or south.
107	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow to the west, with hedgerow to the east. The survey area had no physical boundary to the north or south. Patches of ground in the centre of the survey area were unable to be surveyed due to being waterlogged.
108	The survey area consisted of a flat arable field.	The survey area was bordered by hedgerow and a dike to the east, and hedgerow to the west. The survey area had no physical boundary to the north or south.
109	The survey area consisted of a flat arable field.	The survey area was bordered by hedgerow and a dyke to the east and south-west, with no physical boundary to the north and south. Patches of ground were unable to be surveyed due to being waterlogged.
110	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing and hedgerow to the west, with no physical boundaries to the north,







Survey area	Ground conditions	Further notes
		east or south. Patches of ground were not surveyable due to being waterlogged.
111	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the east, with no physical boundaries to the north, west or south.
112	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the west, with additional metal wire fencing to the east. The survey area had no physical boundaries to the north or south.
113	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the east, with additional metal wire fencing to the west. The survey area had no physical boundaries to the northeast or south-west.
114	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing to the west and south-west, with hedgerow to the south. The survey area had no physical boundary to the north-east.
115	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow and a main road to the south-west, with trees to the east. The survey area had no physical boundaries to the north-west or south-east. Patches of ground were unable to be surveyed due to being waterlogged.
116	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow and metal wire fencing to the north, with metal wire fencing to the south. The survey area had no physical boundaries to the east or west.
117	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing to the north and east, with no physical boundary to the south-west. Large pylons with overhead cables ran east to west along the southern border of the survey area.
118	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing to the north and west, with trees to the north and east. The survey area had no physical boundary to the south. Large pylons with overhead cables ran east to west along the southern border of the survey area.
119	The survey area consisted of a flat pasture field.	The survey area was bordered by a stream to the south and metal wire fencing to the north-east. The survey area had no physical boundaries to the north-west or south-east.
120	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the east and west, with no physical boundaries to the north or south.
121	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow to the east and west, with no physical boundaries to the north or south.
122	The survey area consisted of a pasture field sloping downwards to the east.	The survey area was bordered by hedgerow to the east and west, with no physical boundaries to the north or south.
123	The survey area consisted of a flat arable field.	The survey area was bordered by hedgerow to the west and trees to the south, with no physical boundary to the north.
124	The survey area consisted of a flat arable field.	The survey area was bordered by trees to the north and hedgerow to the east, with no physical boundary to the south.







Survey area	Ground conditions	Further notes
		Patches of ground were unable to be surveyed due to being waterlogged.
125	The survey area consisted of a flat arable field.	The survey area was bordered by trees to the north and hedgerow to the east, with metal wire fencing to the north and west. The survey area had no physical boundary to the south.
126	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow on all sides.
127	The survey area consisted of a flat pasture field.	The survey area was bordered by trees to the north and a dyke to the south, with no physical boundaries to the east or west.
128	The survey area consisted of a flat arable field.	The survey area was bordered by a dyke to the north and hedgerow to the south and west, with no physical boundaries to the west, south-west or south-east.
129	The survey area consisted of an arable field sloping downwards to the south.	The survey area was bordered by hedgerow to the north, with no physical boundaries to the west, south or east.
130	The survey area consisted of a pasture field sloping downwards to the south.	The survey area was bordered by hedgerow and trees to the north, west and south, with metal wire fencing to the west and south. The survey area had no physical boundary to the east.
131	The survey area consisted of a pasture field sloping downwards to the south.	The survey area was bordered by metal wire fencing and hedgerow to the east and west, with no physical boundaries to the north or south.
132	The survey area consisted of a flat arable field.	The survey area was bordered by metal wire fencing to the south and west, with no physical boundaries to the north-east. A gas pipeline ran north to south through the centre of the survey area, and several telegraph poles with overhead cables were present throughout the survey area.
133	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing to the north and east, with no physical boundary to the south-west. A pond and tree were present in the south-eastern corner of the survey area.
134	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the west, with no physical boundaries to the north, east or south.
135	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the east and west, with no physical boundaries to the north-west or south-east. Large pylons with overhead cables ran north-west to south-east through the centre of the survey area.
136	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing to the west, and hedgerow to the east, with no physical boundaries present to eh north or the south. A large pylon with cables running southwest to north-east was present in the southern corner of the survey area, along with farming machinery along the northern border.
137	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing and hedgerow to the west, with additional metal wire fencing to the south. Large metal fences bordered the survey area to the east and north-east, with no physical boundary to the north. Large







Survey area	Ground conditions	Further notes
		pylons with overhead cables ran south-west to north-east through the northern corner of the survey area, and a large National Grid substation bordered the survey area to the east.
138	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow to the west and south-east, with no physical boundaries to the north-east or south-west. Patches of ground in the centre of the survey area and along the south-eastern boundary were unable to be surveyed due to being waterlogged. A large pylon and overhead cables were present along the western boundary of the survey area.
139	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow to the north and south-east, with no physical boundary to the north-east and south-west. Patches of ground in the centre of the survey area were unable to be surveyed due to being waterlogged.
140	The survey area consisted of a flat pasture field.	The survey area was bordered by metal wire fencing to the north and hedgerow to the south, with no physical boundary to the north-east and south-west. A livestock pen was present in the south-eastern corner of the survey area.
141	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerow to the north and trees to the south, with no physical boundaries to the east and west.
142	The survey area consisted of a pasture field sloping downwards to the east.	The survey area was bordered by hedgerow to the north and trees to the south, with no physical boundaries to the east and west.
143	Undulating pasture field, gently sloping to the west	The survey area was bordered by hedgerows and trees in the north, east and west. Wire fencing was present in the east with a railway line beyond the boundary. No physical borders were present in the north west and south.
144	The survey area consisted of a flat arable field, with a gentle incline to the north east and mature crop coverage	The survey area was bordered by hedgerows and trees in the north west, west and south west. No physical borders were present in the north east, east and south east. A pylon was present in the south east boundary with overhead powerline crossing the southern part of the field in an east to west direction. A region in the north east corner was unable to be surveyed due to mature crop.
145	North and south sloped sided field, with mature and failed maize crop.	The survey area was bordered by hedgerows and trees bordered the east and west, with a large mature tree in the north west corner. Wire fencing was present in the eastern boundary No physical borders were present in the north and south. Ares in the north, east and south were unable to be surveyed due to mature crop coverage.
146	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerows in the east and west, converging to create no southern boundary. Wire fence was present in the eastern boundary. No physical border was present in the north.
147	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerows and trees in the north, west and south, with wire fencing present in the western and southern boundaries. No physical border was present in the east.







Survey area	Ground conditions	Further notes
149	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerows in the east and south, with the A583 to the east. No physical borders were present in the north and west. An intermittent narrow line of hedges and trees running south to north extended from the southern boundary, centrally bisecting the field
150	The survey area consisted of a flat pasture field.	The survey area was bordered by drainage ditches and metal wire fencing in the east and west. No physical borders were present in the north and south. The northernmost region was unable to be surveyed due to cattle present.
151	The survey area consisted of a flat pasture field.	The survey area was bordered by hedgerows and the A583 in the east, a drainage ditch and metal wire fence to the west, with a metal wire fence running north to south, bisecting the field to the east. No physical borders were present in the north and south
152	The survey area consisted of a field containing potato furrows sloping gently from north to south.	The survey area was bordered by hedgerows in the east and west. Some areas were unable to be surveyed, including one in the north due to being a previous pond, and one in the north east due to deeply ploughed troughs. A gas services marker was noted in the central eastern boundary. No physical borders were present in the north and south.
153	Flat pasture field sloping to the west in the centre.	The survey area was bordered by wire fencing along the eastern boundary, hedgerows and tress on the southern boundary, with a line cross cutting the field from the centre east to the south west corner No physical borders were present on the northern and western boundaries. Hay bales, a water trough and deep ruts were present in the north east of the survey area.
154	Undulating pasture field, steeply sloping in the south.	The survey area was bordered by wire fencing in the north, hedgerows and tress in the east, west and south, with a metal gate in the eastern boundary. A steeply sloped region was present in the south and south east of the survey area was unable to be surveyed.
155	The survey area consisted of a sloping pasture field.	The survey area was bordered to the north, east and south by trees and hedges, the west had no clearly defined boundary.
156	The survey area consisted of a flat pasture field.	The survey area was bordered to the north, east and south by trees and hedges, the west had no clearly defined boundary.
157	The survey area consisted of a flat pasture field.	The survey area was bordered by trees and hedges on all sides. Housing was located beyond the hedges to the south. A pond was located towards the centre of the survey area along the eastern boundary.
158	The survey area consisted of a flat pasture field.	The survey area was bordered to the east, south and west by trees and hedges, the north had no defined boundary. A pond was located along the southern boundary.
159	The survey area consisted of a flat pasture field.	The survey area was bordered to the east, north and west by trees and hedges, the south had no defined boundary
160	The survey area consisted of a flat pasture field.	The survey area was bordered to the west, south and north by trees and hedges, a farmyard was located on the east boundary.
161	The survey area consisted of a flat pasture field.	The survey area was bordered to the west, south and north by trees and hedges, a farmyard was located on the east boundary.







Survey area	Ground conditions	Further notes
162	The survey area consisted of a flat pasture field.	The survey area was bordered to the north, west and east by trees and hedges, the south had no physically defined boundary.
163	The survey area consisted of a flat pasture field.	The survey area was bordered on the west boundary by a farmyard and a grain silo, the remaining boundaries were undefined.
164	The survey area consisted of a flat pasture field.	The survey area was bordered by trees and hedges, a farmyard was located on the west boundary, the remaining boundaries were undefined.
165	The survey area consisted of a flat pasture field.	The survey area was bordered by trees and hedges to the west and south, the remaining boundaries were undefined.
166	Undulating pasture field	The survey area was bordered by wire fencing in the north, west and south. Hedges and trees bordered the north east, east, west and south west, with a line cross cutting the field from the northern to the south western boundaries. Overhead powerlines crossing the centre, with a pylon in the eastern boundary.
167	Undulating pasture field	The survey area was bordered by wire fencing in the north, west and south. Hedges and trees bordered the north east, east, west and south west. Overhead powerlines crossing the centre, with a pylon in the eastern boundary.
168	Undulating pasture field	The survey area was bordered by wire fencing in the north, west and south. Hedges and trees bordered the north east, east, west and south west, with a line cross cutting the field from the northern to the south western boundaries. Overhead powerlines crossing the centre, with a pylon in the eastern boundary.
169	Undulating pasture field	The survey area was bordered to the south by wire fencing with no other physical boundaries present. Overhead powerlines ran close to the eastern and western boundaries.







# **Appendix C:** Annex figures































































































































































































