
B.H. Q coal 90-0"
B.H stopped at 50-0"
Adit.
B.H. Q coal 39-0"
B.H stopped at 93-8"
Magnetic Meridian
December 1955.
Alltami Brook
Brook Park.


[redacted]

11.0 APPENDIX E – GEOPHYSICS ALLTAMI BROOK

Geophysics Report

Northop Hall Mine Workings Geophysical Ground Investigation

Report | LBA CCS Transport and Storage Project Ground Investigations

190094_ENI_NHGI_ 01 | 22 February 2022

Draft

ENIProgetti

Document Control

Document Information

Project Title	LBA CCS Transport and Storage Project Ground Investigations
Document Title	Northop Hall Mine Workings Geophysical Ground Investigation
Fugro Project No.	D190094
Fugro Report No.	190094_ENI_NHGI_
Issue Number	01
Issue Status	Draft

Client Information

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Revision History

Issue	Date	Status	Comments on Content	Prepared By	Checked By	Approved By
01	22 February 2022	Draft	Issued for comment	EC	AD	DK

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Executive Summary

This report documents a geophysical investigation using Frequency domain electromagnetics (EM), Magnetic gradient (Mag) and Electrical resistivity tomography (ERT) at Northop Hall.

The objective was to identify the presence and map the location of possible mining activity that had previously occurred at this site.

The survey was carried out between 24th and 26th January 2022 and 1st February 2022 using a Geonics G864 magnetometer, a CMD explorer and a Syscal PRO Resistivity meter. The EM and mag data were collected over a 2.4 ha area, the ERT data was collected over one 95 m line. In general, all the data collected were of excellent quality with very low noise content, however the EM and Mag data were affected by metal fences to the south east and south west margins of the survey area.

The EM data showed an increase in ground conductivity with depth, this is probably due to conductive bedrock material present below a relatively un-conductive superficial material. Superficial materials were shown to be thicker in the centre and to the northeast of the survey area. The EM survey showed 4 anomalies of unknown origin, these could be related to mining activity, but this would need to be confirmed with an intrusive survey.

The magnetic data showed many small point anomalies which were probably due to surface debris. An increased spatial concentration and grouping of these point anomalies were present to the northeast of the survey area. This high-density area of anomalies could be indicative of mining related activity centred around this part of the survey area, however this would need to confirmed with an intrusive survey. Other anomalies of an unknown origin were present along the northwestern margin of the survey area, these could also be mining related but would need to be investigated further.

The ERT data showed a relatively un-conductive superficial layer which thickened towards the north, from a thickness of approximately 2 m in the centre of the line to approximately 7 m in the north. These observations agreed with the EM data in the same area. The interpreted bedrock showed conductivity values between 14 and 20 mS/m, two regions showed a far higher conductivity of over 25 mS/m to a maximum of 40 mS/m, these regions could be indicative on infilled shafts or variability within the bedrock. Further investigation would be needed.

The EM and Mag geophysical survey at Northop Hall showed evidence of anomalies that may be related to mining activity. The ERT line showed possible evidence of infilled mineworkings, however anomalies of this nature could also be caused by variability within the bedrock. We would recommend intrusive investigation of a selection of anomalies identified to further ascertain their cause.

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Abbreviations

ERT	Electrical resistivity tomography
EM	Electromagnetic conductivity
VMG	Vertical magnetic gradiometry
BGL	Below ground level
DTM	Digital terrain model
E	East
ENE	East-north-east
EOL	End of line
ESE	East-south-east
GPS	Global Positioning System
N	North
NE	North-east
NNE	North-north-east
NNW	North-north-west
NW	North-west
OS	Ordnance Survey
QC	Quality control
S	South
SE	South-east
SSE	South-south-east
SSW	South-south-west
SW	South-west
W	West
WGS1984	World Geodetic System 1984
WNW	West-north-west
WSW	West-south-west

1. Introduction

1.1 General

This report documents a geophysical investigation using Electrical Resistivity Tomography, Frequency Domain Electromagnetics and Magnetic Gradient carried out at Northop Hall Mine Workings for ENIProgetti.

1.2 Objective

The objective of the geophysical investigation was to detect the presence and map the position of previous mining activity. The survey methods used should be able to identify mining spoil, shaft backfill, capping materials and other near surface mining debris.

1.3 Site Work

The geophysical investigation was carried out between 24th and 26th January 2022 and 1st February 2022

1.4 Terms of Reference

This report is based upon data acquired on 24th and 26th January 2022 and 1st February 2022

This investigation employed geophysical methods and therefore the majority of the findings presented here are the result of the measurement and interpretation of electrical and electromagnetic signals. As such any results derived from the geophysical investigation should be taken in the context of and in reference to the complete ground investigation. Reasonable skill and care were taken to ensure that the results are accurate and reliable, including reference where appropriate to published data from this and/or other sites. However, as with other indirect methods there is a possibility of localised inconsistencies and inaccuracies within the results.

This report supersedes any previous reports, whether written or oral and completes the geophysical investigation work currently commissioned by ENIProgetti at Northop Hall.

1.5 Service Constraints

Appendix A (Service Constraints) outlines the limitations of this report in terms of a range of considerations including, but not limited to, its purpose, its scope, the data on which it is based, its use by Third Parties, possible future changes in design procedures and possible changes in the conditions at the site with time. Appendix A represents a clear exposition of the constraints, which apply to all reports issued by Fugro Geoservices Limited. It should be noted that the Service Constraints do not in any way supersede the terms and conditions of the contract between Fugro Geoservices Limited and the Client.

2. Background Information & Survey Rationale

2.1 General

ENIProgetti has commissioned this geophysical survey as a part of the LBA CCS Transport and Storage Project Ground Investigations. The primary objective of this survey was to identify and map subsurface anomalies associated with previous mining activity within a roughly 2.4 ha field, near Northop Hall, Flintshire. Preliminary research found that historic coal mine workings had been undertaken within this area, directly through the planned CCS pipeline route. For further intrusive ground investigations to take place, a geophysical survey of the area was first required to investigate whether fill or shafts from the mining activities could be identified and mapped to a reasonable degree of accuracy.

2.2 Site Information

The site comprised of a roughly 2.4 ha field, covered in low cut, green vegetation. The site was relatively flat with a slight elevation increase towards the north west. The boundary to the west and north of the site was a steeply dipping valley holding the Alltarni Brook.

An area of fenced off trees was present towards the north east corner of the field which was the suspected location of mine adits. A picture of this area is shown below in Figure 2.1

Figure 2.1: Area of trees within survey area – suspected location of mine adits.

The parts of the site that comprised the survey area are presented on Drawing No. 190094-01.

2.3 Geology

The site geology comprised bedrock of the Pennine Lower Coal Measures comprised of interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part. Superficial deposits are comprised of glacial till.

It was expected that within the survey area some of this site will have an upper layer of made ground due to the numerous coal workings present.

2.4 Survey Methods

The investigation was carried out using a combination of the following geophysical methods:

- Electrical resistivity tomography (ERT)
- Electromagnetic conductivity (EM)
- Vertical magnetic gradiometry (VMG)

3. Electrical Resistivity Tomography

3.1 Theory

Electrical Resistivity Tomography (ERT) is often employed as a stratigraphic profiling tool but may also be used to detect and map discrete or lateral variations within the ground structure e.g. landfill boundaries, mine workings or voids, solution features, contamination. The technique measures variations in the electrical properties resistivity) of ground materials. Where a layered ground structure is present with significant contrasts in electrical properties, ERT data can be interpreted to provide stratigraphic/geological cross-sections. ERT data can effectively provide a link between discrete intrusive information (BH's, CPT's etc) to give a more complete understanding of the ground structure.

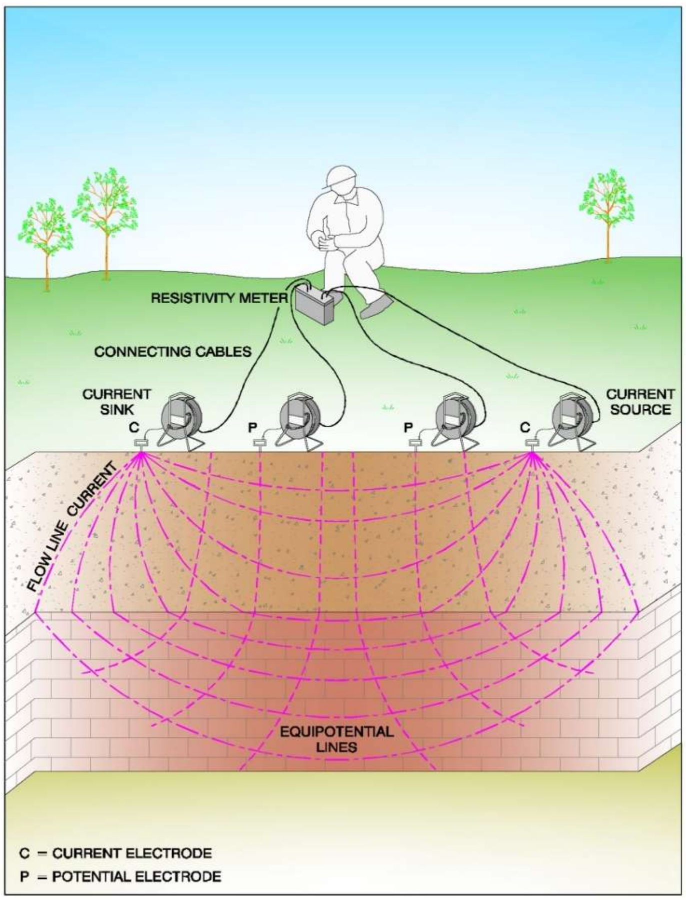

Figure 3.1: Schematic illustration of electrical resistivity survey spread

Apparent electrical resistivity distribution of the subsurface can be measured using an array of four electrodes. By injecting a DC or very low frequency AC current (I) between a pair of electrodes and measuring the resulting potential difference (V) with a second pair of electrodes, it is possible to calculate the apparent resistivity using a derivation of Ohms law

(R=V/I). This approach is known as galvanic resistivity, as schematic of which is presented in Figure 3.1 above.

Electrodes are normally co-linear and geometrically spaced. An electric current is then injected via an electrode pair and the resulting potential difference is measured at a pair of potential electrodes. Depth penetration is primarily a function of electrode spacing, therefore by increasing the separation of the electrodes, readings can be taken at greater depths. Numerous electrode array types can be employed depending upon site and target considerations, e.g. wenner, dipole-dipole, wenner-schlumberger.

For electrical resistivity tomography investigations, multi-electrode acquisition systems are commonly employed. Numerous electrodes are deployed and connected to the system via multi-core cables. The system automatically selects various different combinations of electrodes, eventually creating a vertical cross-section of apparent resistivity values for the subsurface beneath the electrode array.

Ground resistivity depends on several factors; primarily a function of porosity resistivity can also vary due to variations in material (matrix) chemical composition, grain size and shape and pore fluid characteristics.

Different soil and rock types can have different resistivity characteristics (see table below). Generally, soils will exhibit lower apparent resistivity than competent rocks. Clayey and peaty soils are typically described by lower apparent resistivity than, for example, sandy or gravelly soils. The presence of loosely compacted material or voids above the water table can result in an increase in apparent resistivity values (as a function of increased air-filled porosity). Tabulated below are some resistivity values of common geological materials (adapted from Reynolds, 1997: p.422-423).

Table 3.1: Typical resistivity values for common geological materials

Soil/Rock Type	Nominal Resistivity [ohm.m]
Top soil	250 – 1700
Clay (very dry)	50 – 150
Quaternary / recent sands	50 – 100
Gravel (dry)	1400
Gravel (saturated)	100
Dry sandy soil	80 – 1050
Sandy clay / clayey sand	20 – 215
Sand and gravel	30 – 225
Sandstone	1 – 7.4×10^8
Alluvium and sand	10 - 800
Conglomerate	2×10^3 – 10^4
Consolidated shale	20 –2000

Soil/Rock Type	Nominal Resistivity [ohm.m]
Slate	$600 – 4x10^7$
Limestone	$50 – 5x10^7$

With reference to the above table it is apparent that characterising geological materials from resistivity values alone is prone to ambiguity. Such ambiguity can be refined through calibration with other geophysical or intrusive information.

3.2 Survey Methodology

The ERT survey was collected along one survey line covering a total linear distance of 95 m. The position of the survey line is provided on Drawing 190094-01 and summarised in Table 3.2 below:

Table 3.2: ERT Survey line details

Line ID	Start Coordinates		End Coordinates		Length [m]
	Easting	Northing	Easting	Northing	
1	327816.2	367139.8	327746.8	367075.1	95

Data were acquired using an Iris Syscal Pro 96 multichannel acquisition system. Key survey parameters defined for this survey are summarised in Table 3.3 below:

Table 3.3: ERT survey acquisition parameters/equipment

Parameter	Description
Equipment	Syscal Pro
Array Type	Wenner-Schlumberger
Max number of electrodes	96
Min electrode spacing	1 m
On time	0.5 sec
Off time	0.1 sec
Cycles	3
Depth of investigation	15 m
Equipment	Syscal Pro

Survey lines were initially set out at the required positions. Steel electrodes were inserted into the ground at a constant minimum electrode separation (defined in the table above). Electrodes were connected to multicore cable using crocodile clips. Each multicore cable was in turn connected to the Syscal Pro control unit.

Prior to commencement of data acquisition, a number of quality control checks were carried out to ensure that contact resistances at each electrode were at satisfactory levels.

Data acquisition was controlled automatically based upon specific protocol files designed specifically to meet the survey objectives. Resistivity data were stored digitally on the system internal memory.

Coordinates of survey lines and electrodes were recorded using dGPS equipment to an accuracy of +/- 0.1 m.

Upon completion of data acquisition, raw data were downloaded to a field PC in binary format and converted to ASCII to allow initial field QC and further office-based processing.

3.3 Data Processing

Field data were downloaded using Iris Instruments Prosys II software package. Data were then filtered to remove any spurious values before being exported in an ASCII format compatible with the Geotomo RES2DINV program.

Topographic information was incorporated into the survey line dataset to allow appropriate elevation correction to be applied during processing.

Data were further reviewed with the RESDINV software and where necessary further manual editing of questionable data points was completed by a geophysicist. Data were then subject to a robust inversion process to produce a best fit model of the subsurface resistivity distribution.

Final model resistivity data were exported and contoured using Geosoft Oasis Montaj. The resistivity line was presented as a conductivity section, rather than resistivity, to aide comparison with EM data. Colour contour scales were selected to best represent the data distribution across the site.

Final resistivity sections are presented in Appendix B.

4. Frequency Domain Electromagnetics

4.1 Theory

Frequency domain electromagnetic measurements are often carried out to provide rapid, reconnaissance surveys across large physical areas. The technique is sensitive to both changes in ground conductivity and metallic objects within the ground (e.g. an increase in clay content, solution features, leachate/contamination, services, landfill material etc). Surface positions of such buried targets can therefore be identified for further intrusive or remediation work.

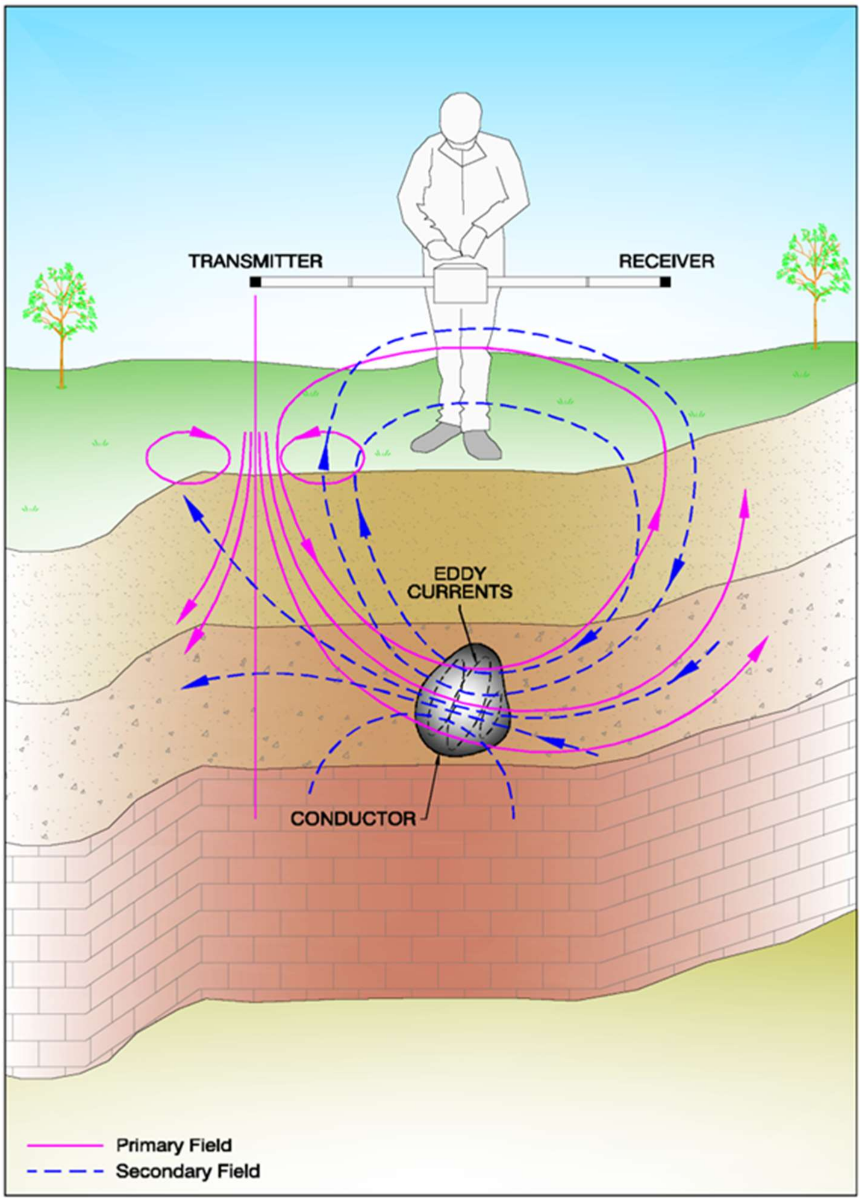

Figure 4.1: Schematic illustration of the frequency domain electromagnetic technique

A primary electromagnetic field is generated at the surface by a low voltage alternating current within a dipole transmitter. When the primary field interacts with conductive materials within the subsurface, eddy currents are generated. These eddy currents in turn generate their own (secondary) electromagnetic field, the strength of which is proportional to the bulk average conductivity of the subsurface. The resultant electromagnetic field is recorded at the surface by a dipole receiver, from which the secondary magnetic field can be deduced. A schematic of the technique is presented on Figure 4.1.

The instrument records the quadrature response of the electromagnetic field, which is directly related to the average bulk conductivity of the subsurface. This is usually recorded in milli-Siemens per metre (mS/m).

Measurements may be taken in both horizontal and vertical dipole mode. The depth of investigation for each mode is approximately 0.75 and 1.5 times the dipole separation respectively. Different designs of EM instruments may be used to provide alternative depths of penetration (i.e. EM31, 34, 38).

Changes in the electrical properties of the subsurface mass, e.g. presence of man-made structures or geological features generally give rise to a contrast in the ground electrical conductivity which can be measured by the electromagnetic instruments.

Data is normally filtered to remove erroneous noise and plotted as profiles or contour plots, from which the extent of anomalous features can be identified.

4.2 Survey Methodology

The EM survey was carried out across an area measuring ~2.4 hectares. The position of the survey area is provided on Drawing 190094-01.

Data were acquired using a CMD Explorer. Key survey parameters defined for this survey are summarised in Table 4.1.

Table 4.1: CMD Explorer survey acquisition parameters/equipment

Parameter	Description
Meter	CMD Explorer
Dipole mode	Vertical
Approx depth penetration	1.2 m, 2.2 m & 5.7 m
Line orientation	Parallel
Line spacing	2 m
Positioning mode	dGPS
Measurement interval	<0.2 m

An initial local reference grid was established on site covering the required survey area. The EM system was set up according to manufacturer instructions and nulled at a designated base station.

Prior to commencement of data acquisition, a number of quality control checks were carried out to assess equipment function and site conductivity characteristics. Data quality on site were very good, little instrument drift was measured and noise spikes were very infrequent.

Data acquisition commenced and concluded with a series of measurements at the designated site base station. This control data was used to assess and correct for any time dependant instrument drift. Base station data was acquired at the start and end of each survey day to ensure that site wide data could be corrected relative to the same measurement datum.

Data were saved digitally on a dedicated data logger to enable office based post-processing.

Coordinates of all measurement stations were recorded using dGPS equipment to an accuracy of +/- 0.1 m.

4.3 Data Processing

Raw data were imported into Oasis Montaj software for post processing.

Post processing steps included:

- Instrument drift correction
- Incorporation of positional information
- Correction for GPS-instrument offset
- Coordinate transform to project coordinate system
- Despiking and removal of spurious data point
- Spatial frequency filtering as appropriate
- Generation of Analytical Signal data
- Minimum curvature contouring
- Presentation at appropriate colour scales

Magnetic Analytical Signal is a processing step that removes the dipolar nature of a magnetic anomaly and instead displays the anomaly as a single magnetic spike centred over the magnetic anomaly. This is generally the preferred method to interpret magnetic data as it removes ambiguity in the anomalies spatial position.

Post processed contour sections showing site variations in conductivity were plotted within Geosoft Oasis Montaj overlain on satellite imagery of the site. Anomalous features were highlighted and annotated to show potential buried targets.

Final conductivity contour sections are presented in Appendix B.

5. Magnetic Gradient

5.1 Theory

Magnetic measurements are often carried out to provide rapid, reconnaissance surveys across large physical areas. The technique is sensitive to ferrous metallic objects within the ground. Surface positions of such buried targets can therefore be identified for further intrusive or remediation work.

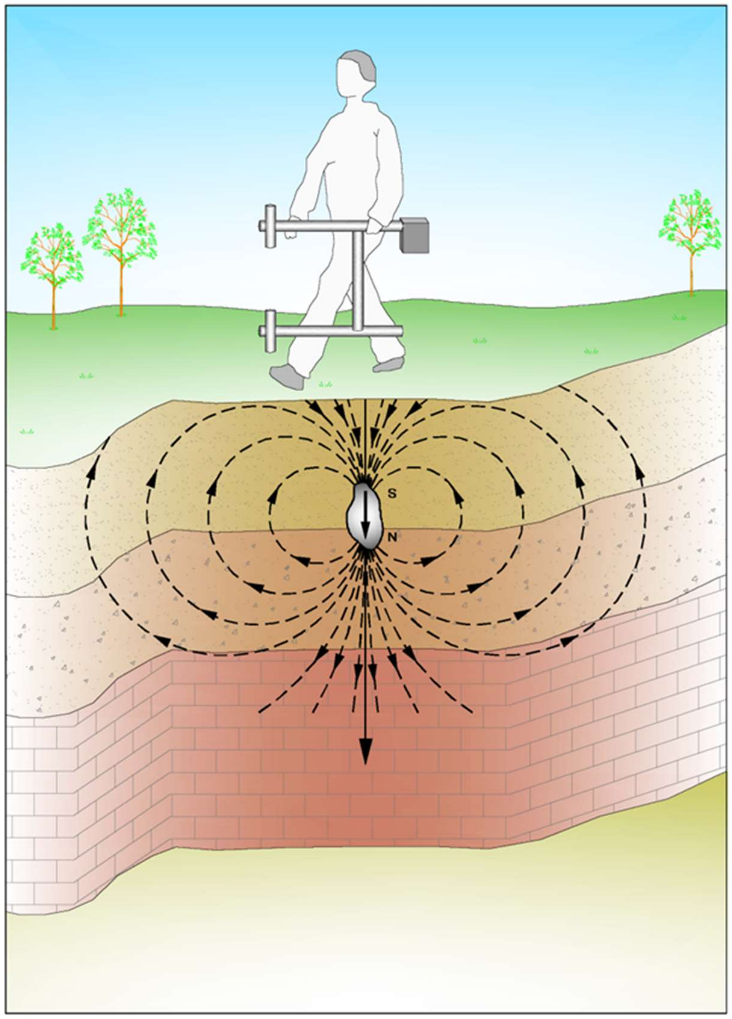

Figure 5.1: Schematic illustration of the magnetic gradiometry technique

Modern magnetometers can measure both the total magnetic field of the earth (i.e. the geomagnetic field), and a vertical gradient. The intensity of the geomagnetic field varies between 25000 nanoTesla (nT) at the magnetic equator to approximately 65000 nT at the magnetic poles, with an ambient field of approximately 48000 nT prevailing in the UK.

The operation of a typical caesium vapour magnetometer is based on a principal known as optical pumping. This involves irradiating an alkali metal – in this case caesium – with beams of spectral light. The precession of these charged vapours under the influence of the geomagnetic field can then be measured. This method has the advantage of being more sensitive than a proton-precession magnetometer.

To measure the magnetic gradient, two sensors are installed on an extended shaft separated by a fixed distance (1 m). A schematic of the magnetic gradient method is provided in Figure 5.1.

The system measures the total magnetic field strength from both sensors simultaneously and stores the values in its internal memory together with the time and positional information. Vertical magnetic gradient is calculated during post-processing as the difference between 'top' and 'bottom' sensors.

Data is normally filtered to remove erroneous noise and plotted as profiles or contour plots, from which the extent of anomalous features can be identified.

5.2 Survey Methodology

The magnetic survey was carried out across an area measuring ~2.4 hectares. The position of the survey area is provided on Drawing 190094-01.

Data were acquired using a Geometrics G864 caesium vapour gradiometer. Key survey parameters defined for this survey are summarised in Table 5.1.

Table 5.1: Magnetic survey acquisition parameters/equipment

Parameter	Description
Meter	G858
Magnetometer Type	Caesium vapour
Measurements	Vertical Gradient & Total Field
Line orientation	Parallel
Line spacing	1 m
Positioning mode	GPS
Measurement interval	<0.2 m

An initial local reference grid was established on site covering the required survey area. Magnetic measurements were taken by a single operator. To ensure satisfactory data collection the operator was 'de-magnetised' prior to commencement by removing any ferrous objects (keys, coins, steel toe capped boots etc) from their person.

Prior to commencement of data acquisition, a number of quality control checks were carried out to assess equipment function and site characteristics. Data quality on site was good, instrument striping was low and noise spikes were infrequent.

Data were saved digitally on a dedicated data logger to enable office based post-processing.

Coordinates of all measurement stations were recorded using dGPS equipment to an accuracy of +/- 0.1 m.

5.3 Data Processing

Raw data were imported into Oasis Montaj software for post processing.

Post processing steps included:

- Incorporation of positional information
- Correction for GPS-instrument offset
- Coordinate transform to project coordinate system
- Depiking and removal of spurious data point
- Spatial frequency filtering as appropriate
- Analytic Signal
- Minimum curvature contouring and presentation at appropriate colour scales

Post processed contour sections showing site variations in magnetic response were plotted within Geosoft Oasis Montaj overlain on satellite imagery of the site. Anomalous features were highlighted and annotated to show potential buried targets.

Final contour sections of magnetic gradient and magnetic analytical signal are presented within Appendix B.

6. Findings

6.1 General

Results of the geophysical survey are shown in Appendix B

6.1.1 Electromagnetic Conductivity

Results of the apparent conductivity for the electromagnetic survey are shown Appendix B, drawings no 190094-02 to 190094-04 for the three different instrument coil separation (apparent depth measurement) readings. It was observed that in general the ground is more conductive with increasing coil separation, which would indicate that the ground is relatively more conductive with increasing depth. This would be consistent with a conductive bedrock material underlying a relatively un-conductive superficial material. It can be seen in plot 05 that superficial materials are probably thicker in the centre and to the northeast of the survey area, shown by the lower conductivity values in these locations at the maximum coil separation.

The results of the in-phase response of the conductivity meter have been presented on drawing no. 190094-05. This measurement is more sensitive to point anomaly locations such as isolated mineworking or debris.

The EM survey showed 4 anomalies of unknown origin, which were spatially coincident with identified the magnetic data, these could be related to mining activity, but this would need to be confirmed with an intrusive survey. The anomalies related to both surface features (cultural noise) and anomalies of unknown origin (possible related to isolated mineworkings/debris) have been shown on the anomaly location plan (drawing no. 190094-06).

6.1.2 Magnetic Gradient

Results of the magnetic survey are shown Appendix B, drawing no.190094-07. The magnetic data showed many small point anomalies which were considered likely to be due to isolated near-surface debris as they were small in spatial extent and of low magnitude. A higher spatial concentration and apparent grouping of these point anomalies of anomalies of an unknown origin were present to the northeast of the survey area. An apparent trend in a group of anomalies was observed (see note 1 on drawing 190094-09) which could be related to the suspected adit location as discussed in section 2.2. However, this would need to be confirmed with an intrusive survey.

Other singular anomalies of an unknown origin were mostly present along the northwestern margin of the survey area, these could also be mining related but would also need to be investigated further.

6.1.3 Electrical Resistivity Tomography

The modelled resistivity section has been presented on drawing no.190094-10. The resistivity values were converted to apparent conductivity values using the following formula:

$$\sigma = \frac{1}{\rho} \times 1000$$

Where: ρ = Resistivity in Ohm m

σ = Conductivity in millisiemens per meter

The modelled conductivity values ranged between ~1 mS/m and ~40 mS/m. The ERT data showed a relatively unconducive near surface superficial layer which thickened towards the north (from 50 m chainage to 0 m chainage on the section), from a thickness of approximately 2 m in the centre of the line to approximately 7 m in the north. These observations showed agreement with the EM data in the same area, that showed a relatively unconducive area of material that extends to the maximum imaging depth of the CMD instrument

The interpretation of the modelled conductivity section has been presented on drawing no.190094-11. The interpreted bedrock showed conductivity values between 14 and 20 mS/m. Within this interpreted bedrock two regions at 50 m and 70 m chainage showed a relatively higher conductivity of over 25 mS/m to a maximum of 40 mS/m. these regions could be indicative of possible infilled shafts or could be caused by natural variability within the bedrock

The anomalously conductive area at 50 m chainage along the ERT profile is parallel to the suspected adit location as described in section 2.2, however the origin of these anomalous areas would require confirmation via an intrusive survey.

6.2 Interpretation

All data collected within the survey area was of high quality with low noise occurrences except where the EM and MAG data was interfered with by fence lines and overhead power lines.

The EM and Mag geophysical survey at Northop Hall showed evidence of anomalies that may be related to mining activity but little direct evidence of a shaft or adit present on site. The ERT line showed possible evidence of an infilled shaft, but anomalies of this nature could also be caused by natural variability within the bedrock. We would recommend intrusive investigation of a selection of anomalies identified to further ascertain their cause.

7. Summary & Conclusions

7.1 General

This report documents a geophysical investigation using Frequency domain electromagnetics, Magnetic gradient and Electrical resistivity tomography carried out at Northop Hall.

The objective of the investigation was to detect the presence and map the position of previous mining activity at this site.

The geophysical investigation was carried out between 24th and 26th January 2022 and 1st February 2022.

7.2 Summary

Frequency Domain Electromagnetics and Magnetic Gradient data were acquired at over a ~2.4 ha area along parallel lines, with 2 m and 1 m spacings between lines respectively. Electrical Resistivity Tomography data was collected over one line of length 95 m with an electrode spacing of 1 m.

All data collected within the survey area was of high quality with low noise occurrences except where the EM and MAG data was interfered with by fence lines and overhead power lines.

Data were acquired and processed following protocols described in this report. The final processed data and respective interpretation are summarised on drawings provided within Appendix B

7.3 Conclusion

The MAG and EM investigation identified a number of anomalies that may relate to mining activity, in particular the magnetic data showed a high density of anomalies that may be related to the suspected admit location as described in section 2.2. The ERT data showed high conductivity anomalies within the bedrock which may be caused by a relatively conductive adit infill material or by natural variability within the bedrock. All anomalies identified in this report would need to be intrusively investigated to ascertain their cause.

It must be emphasised that geophysical methods can only identify areas yielding results that are different, i.e. anomalous to the site norm. The interpretation of the cause of such anomalies is inevitably based on assumptions utilising the best information available on the historic use of the site. Positive identification of these anomalies can only be made through using visual or intrusive investigation techniques.

8. References

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Appendix A

Service Constraints

A.1 Service Constraints

i. This report and the assessment carried out in connection with the report (together the "Services") were compiled and carried out by Fugro GeoServices Limited (FGSL) for ENI UK Ltd (the "Client") in accordance with the terms of a contract between FGSL and the Client. The Services were performed by Fugro Geoservices with the skill and care ordinarily exercised by a reasonable specialist at the time the Services were performed. Further, and in particular, the Services were performed by FGSL taking into account the limits of the scope of works required by the Client, the time scale involved and the resources, including financial and manpower resources, agreed between FGSL and the Client.

ii. Other than that expressly contained in paragraph 1 above, FGSL provides no other representation or warranty whether express or implied, in relation to the Services.

iii. The Services were performed by FGSL exclusively for the purposes of the Client. FGSL is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, FGSL does not authorise, consent or condone any party other than the Client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and FGSL disclaims any liability to such party. Any such party would be advised to seek independent advice from a competent specialist and / or lawyer.

iv. It is FGSL's understanding that this report is to be used for the purpose described in Section 1 - "Introduction" of this report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, and/or should the Client's proposed development or use of the site change (including in particular any change in any design and/or specification relating to the proposed use or development of the site), this report may no longer be valid or appropriate and any further use of or reliance upon the report in those circumstances by the Client without FGSL's review and advice shall be at the Client's sole and own risk. Should FGSL be requested, and FGSL agree, to review the report after the date hereof, FGSL shall be entitled to additional payment at the then existing rates or such other terms as may be agreed between FGSL and the Client.

v. The passage of time may result in changes (whether man-made or otherwise) in site conditions and changes in regulatory or other legal provisions, technology, methods of analysis, or economic conditions which could render the report inaccurate or unreliable. The information, recommendations and conclusions contained in this report should not be relied upon if any such changes have taken place or after a period of 2 years from the date of this report or such other period as maybe expressly stated in the report, without the written agreement of FGSL. In the absence of such written agreement of FGSL, reliance on the report after any such changes have occurred or after the period of 2 years has expired shall be at the Client's own and sole risk. Should FGSL agree to review the report after the period of 2 years has expired, FGSL shall be entitled to additional payment at the then existing rates or such other terms as may be agreed between FGSL and the Client.

vi. The observations, recommendations and conclusions in this report are based solely upon the Services, which were provided pursuant to the contract between the Client and FGSL. FGSL has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the Client and FGSL. FGSL is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services.

vii. Where the Services have involved FGSL's interpretation and/or other use of any information (including documentation or materials, analysis, recommendations and conclusions) provided by third parties (including independent testing and/or information services or laboratories) or the Client and upon which FGSL was reasonably entitled to rely or involved FGSL's observations of existing physical conditions of any site involved in the Services, then the Services clearly are limited by the accuracy of such information and the observations which were reasonably possible of the said site. Unless otherwise stated, FGSL was not authorised and did not attempt to independently verify the accuracy or completeness of such information, received from the Client or third parties during the performance of the Services. FGSL is not liable for any inaccuracies (including any incompleteness) in the said information, the discovery of which inaccuracies required the doing of any act including the gathering of any information which it was not reasonably possible for FGSL to do including the doing of any independent investigation of the information provided to FGSL save as otherwise provided in the terms of the contract between the Client and FGSL.

Appendix B

Drawings

B.1 List of Drawings

190094-01	-	Location Plan
190094-02	-	EM conductivity coil separation one
190094-03	-	EM conductivity coil separation two
190094-04	-	EM conductivity coil separation three
190094-05	-	EM instantaneous phase coil separation three
190094-06	-	EM anomaly interpretation
190094-07	-	Magnetic Gradient
190094-08	-	Magnetic Analytical Signal
190094-09	-	Magnetic Anomaly Interpretation
190094-10	-	ERT data presented as conductivity section
190094-11	-	Interpreted conductivity section

LEGEND:

EM/ Mag area

ERT Line with chainage

SCALE:

Scale 1:750
10 0 10 20 30 40
metres
OSGB 1936 / British National Grid

NOTES:

1. Surface coordinates relative to OSGB (1936)

CLIENT: ENI			
PROJECT: LBA CCS Transport and Storage Project Norhop Hall Mine Workings Geophysical Investigations			
TITLE: Data Location Map			
PROJECT NO.: 190094		DRAWING NO.: 01	
ISSUE REFERENCE: Draft		DATE: 04/02/2022	
INTERP. BY: EC	DATE: 22/02/2022	DRAWN BY: EC	DATE: 22/02/2022
CHECKED BY: DK	DATE: 22/02/2022	APPROVED BY: EC	DATE: 22/02/2022
DRAWING SCALE: 1:750			
PLOTTED DRAWING SIZE: A3 (297 x 420 mm)			

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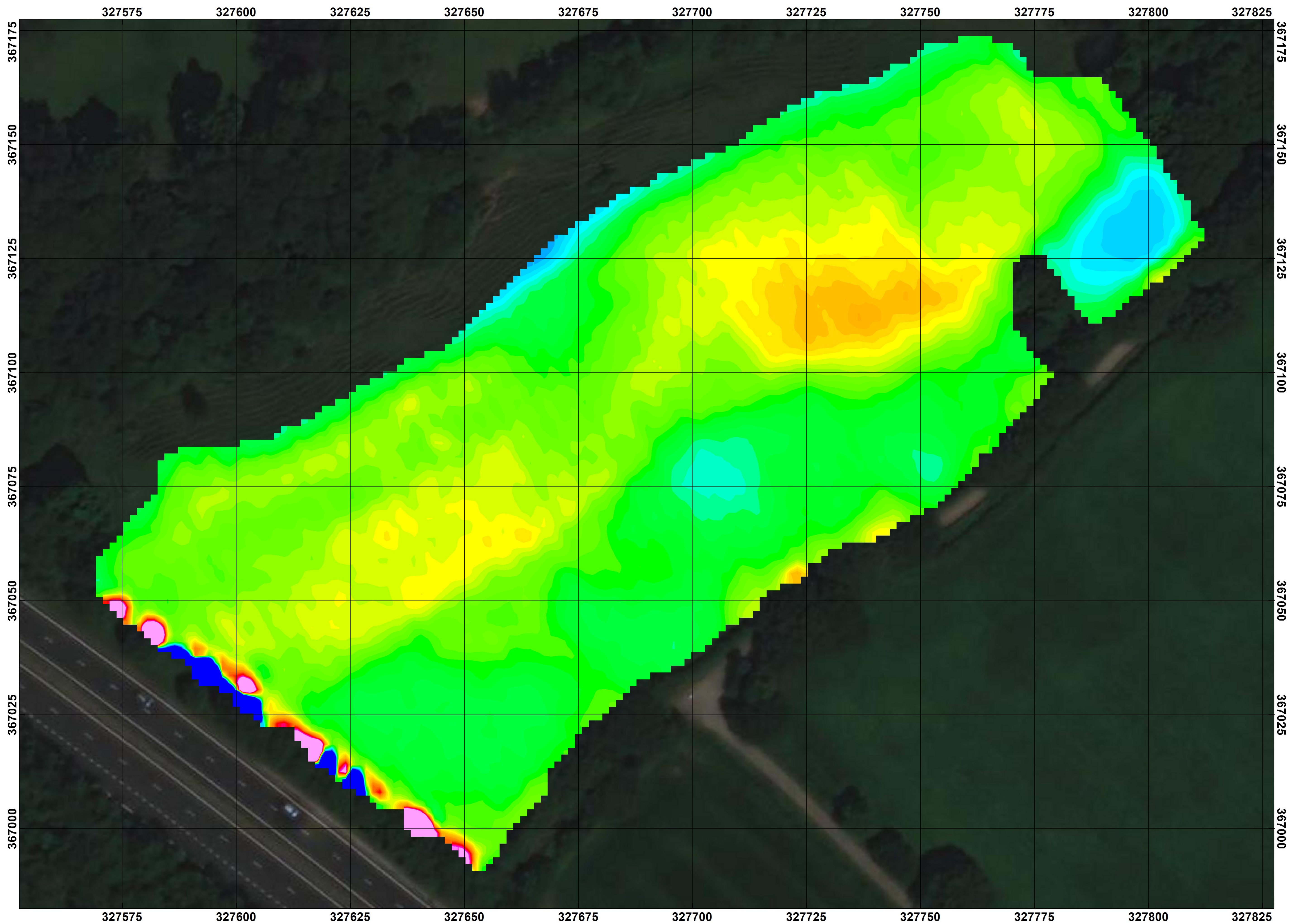

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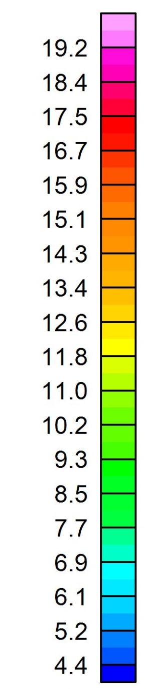

Apparent Conductivity
mS/m

SCALE:

Scale 1:750

metres
OSGB 1936 / British National Grid

NOTES:

1. Surface coordinates relative to OSGB (1936)

CLIENT: ENI	
PROJECT: LBA CCS Transport and Storage Project Ground Investigations	
TITLE: EM Conductivity Coil Separation 1 Effective Depth Range 1.2 m	
PROJECT NO.: 190094	DRAWING NO.: 02
ISSUE REFERENCE: 01	DATE: 22/02/2022
INTERP. BY: EC DATE: 22/02/2022	DRAWN BY: EC DATE: 22/02/2022
CHECKED BY: DK DATE: 22/02/2022	APPROVED BY: DK DATE: 22/02/2022
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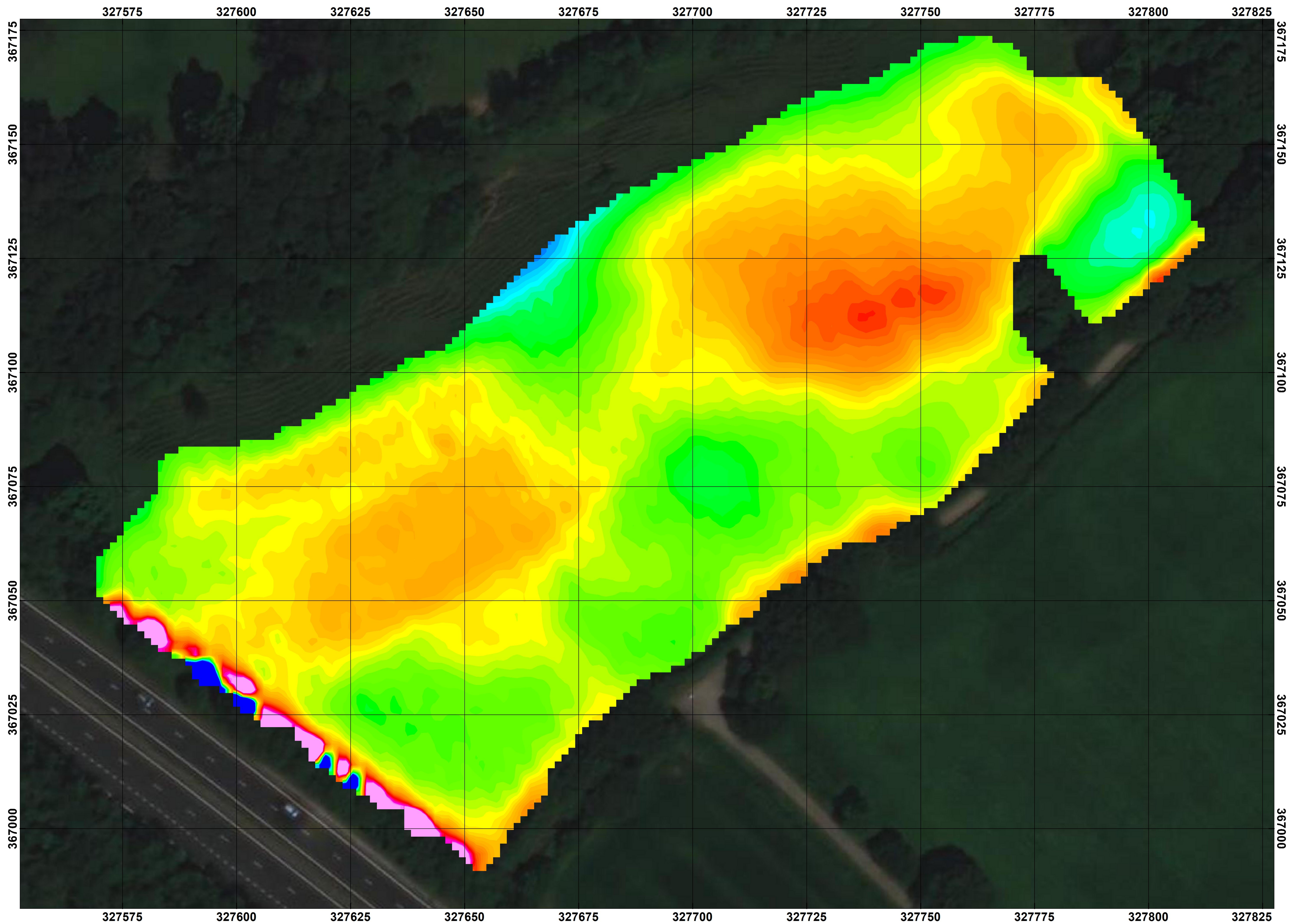

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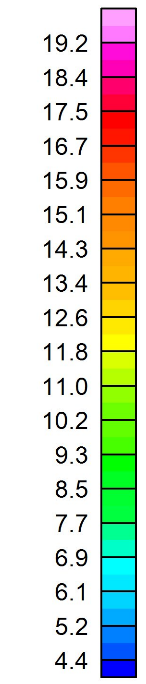

SCALE:

Scale 1:750

10 0 10 20 30 40

metres

OSGB 1936 / British National Grid

NOTES:

1. Surface coordinates relative to OSGB (1936)

CLIENT:

ENI

PROJECT: LBA CCS Transport and Storage Project Ground Investigations

TITLE: EM Conductivity Coil Separation 2 Effective Depth Range 3.2 m

PROJECT NO.: 190094		DRAWING NO.: 03	
ISSUE REFERENCE: 01		DATE: 22/02/2022	
INTERP. BY: EC	DATE: 22/02/2022	DRAWN BY: EC	DATE: 22/02/2022
CHECKED BY: DK	DATE: 22/02/2022	APPROVED BY: DK	DATE: 22/02/2022
DRAWING SCALE: 1:750			
PLOTTED DRAWING SIZE: A2 (594 x 420 mm)			

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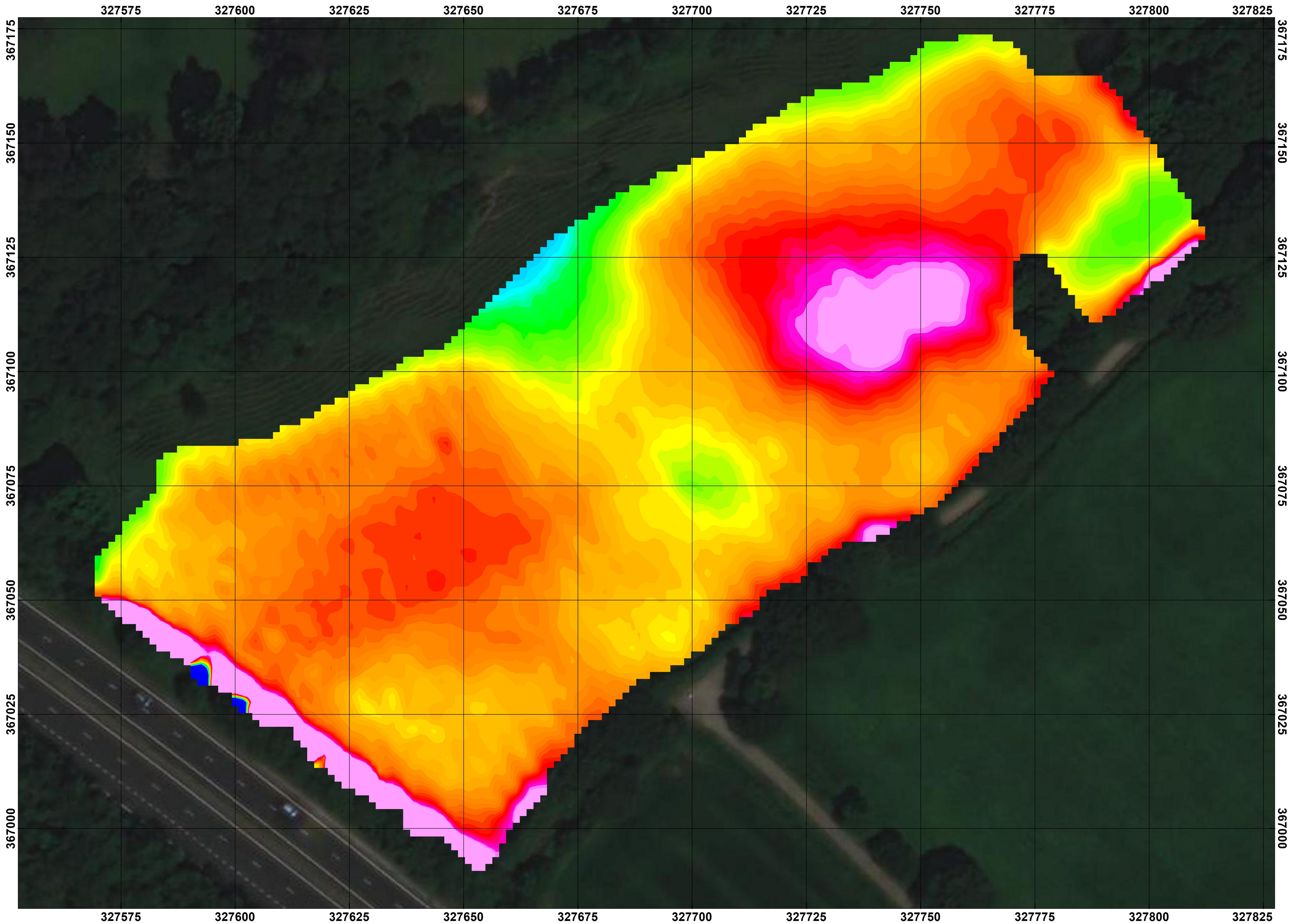

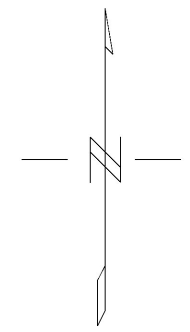

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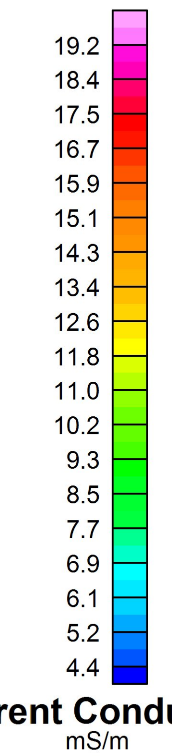

SCALE:

Scale 1:750

10 0 10 20 30 40

metres

OSGB 1936 / British National Grid

NOTES:

1. Surface coordinates relative to OSGB (1936)

CLIENT:

ENI

PROJECT:

LBA CCS Transport and Storage Project
Ground Investigations

TITLE:

EM Conductivity Coil Separation 3
Effective Depth Range 5.7 m

PROJECT NO.: 190094		DRAWING NO.: 04	
ISSUE REFERENCE: 01		DATE: 22/02/2022	
INTERP. BY: EC	DATE: 22/02/2022	DRAWN BY: EC	DATE: 22/02/2022
CHECKED BY: DK	DATE: 22/02/2022	APPROVED BY: DK	DATE: 22/02/2022
DRAWING SCALE: 1:750			
PLOTTED DRAWING SIZE: A2 (594 x 420 mm)			

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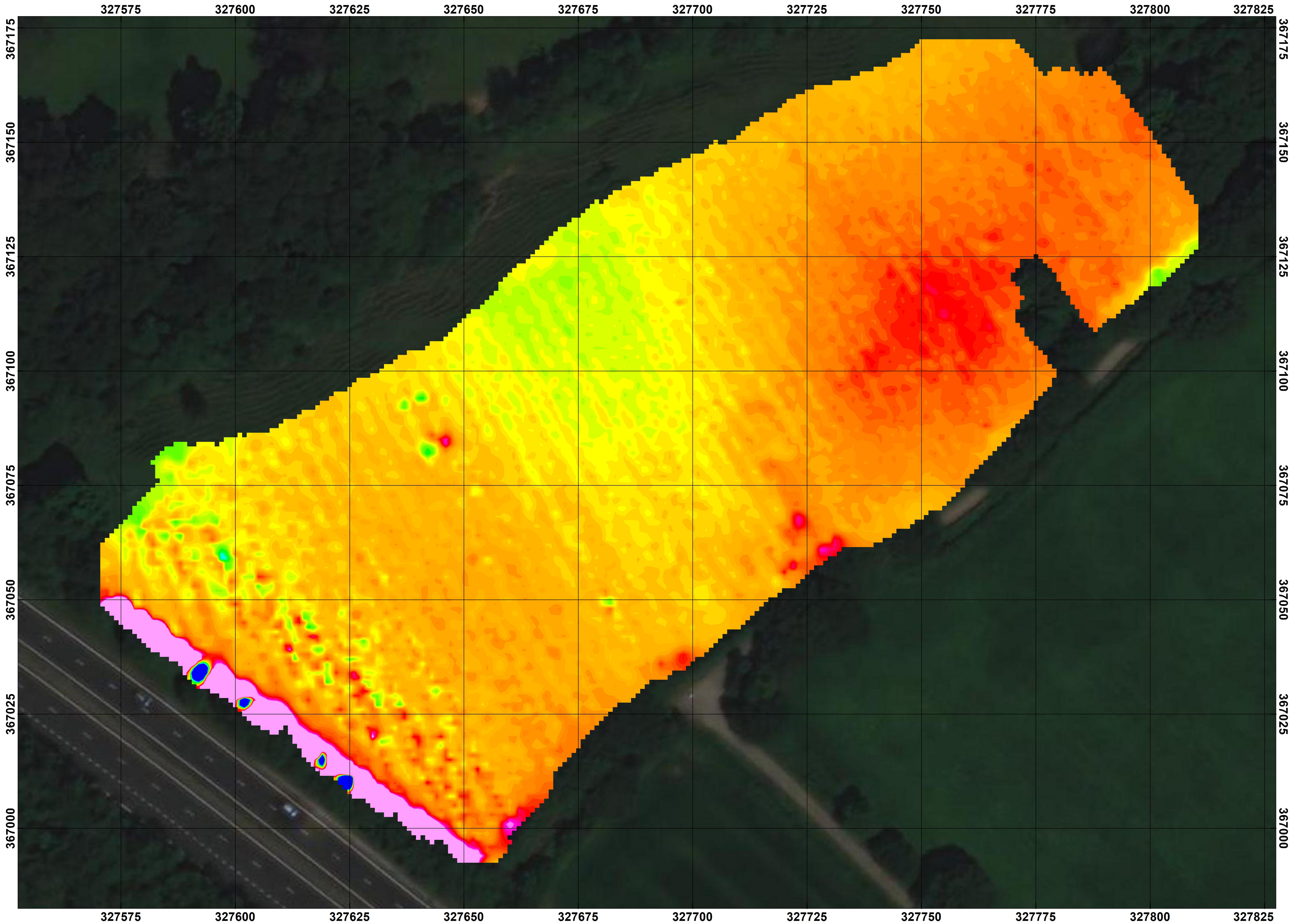

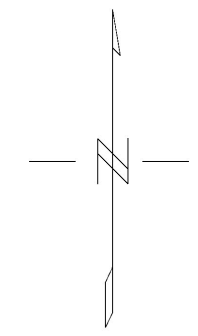

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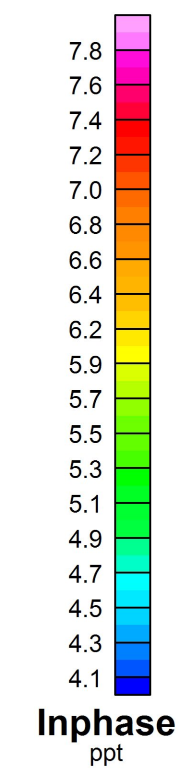

SCALE:

Scale 1:750

10 0 10 20 30 40

metres

OSGB 1936 / British National Grid

NOTES:

CLIENT:

ENI

PROJECT: LBA CCS Transport and Storage Project
Ground Investigations

TITLE: Inphase Coil Separation 3
Effective Depth Range 5.7 m

PROJECT NO.: 190094		DRAWING NO.: 05	
ISSUE REFERENCE: 01		DATE: 22/02/2022	
INTERP. BY: EC	DATE: 22/02/2022	DRAWN BY: EC	DATE: 22/02/2022
CHECKED BY: DK	DATE: 22/02/2022	APPROVED BY: DK	DATE: 22/02/2022
DRAWING SCALE: 1:750			
PLOTTED DRAWING SIZE: A2 (594 x 420 mm)			

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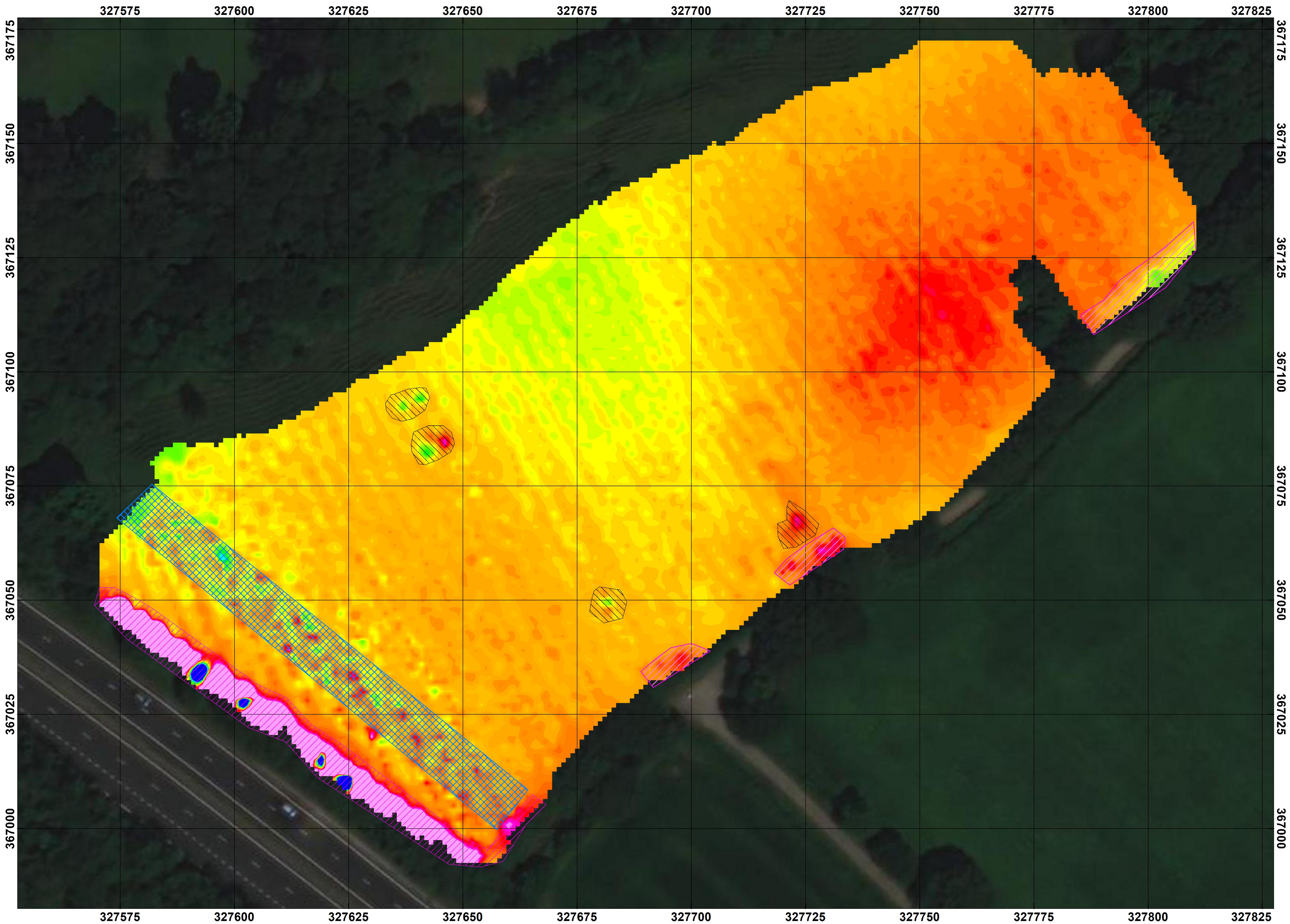

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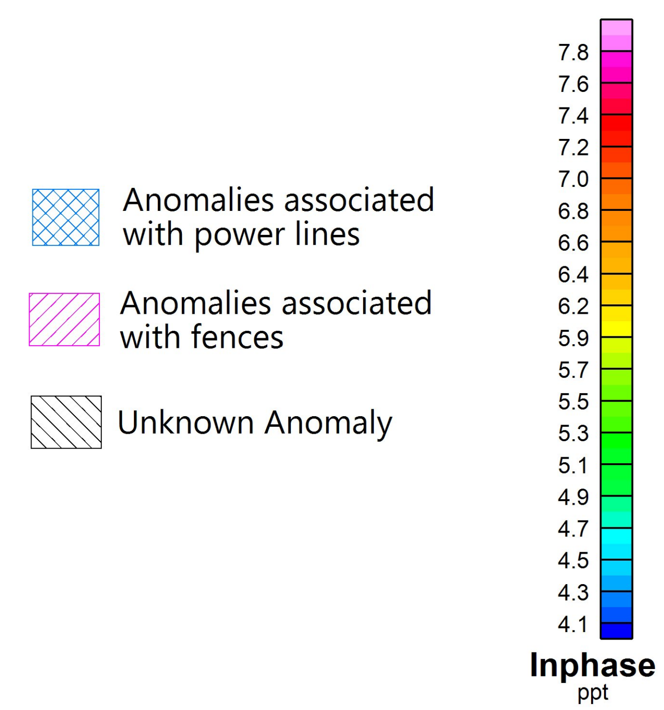

SCALE:

Scale 1:750

10 0 10 20 30 40

metres

OSGB 1936 / British National Grid

NOTES:

1. Surface coordinates relative to OSGB (1936)

CLIENT:

ENI

PROJECT:

LBA CCS Transport and Storage Project
Ground Investigations

TITLE:

Inphase Coil Separation 3
Interpretation of EM data

PROJECT NO.: 190094		DRAWING NO.: 06	
ISSUE REFERENCE: 01		DATE: 22/02/2022	
INTERP. BY: EC	DATE: 22/02/2022	DRAWN BY: EC	DATE: 22/02/2022
CHECKED BY: DK	DATE: 22/02/2022	APPROVED BY: DK	DATE: 22/02/2022
DRAWING SCALE: 1:750			
PLOTTED DRAWING SIZE: A2 (594 x 420 mm)			

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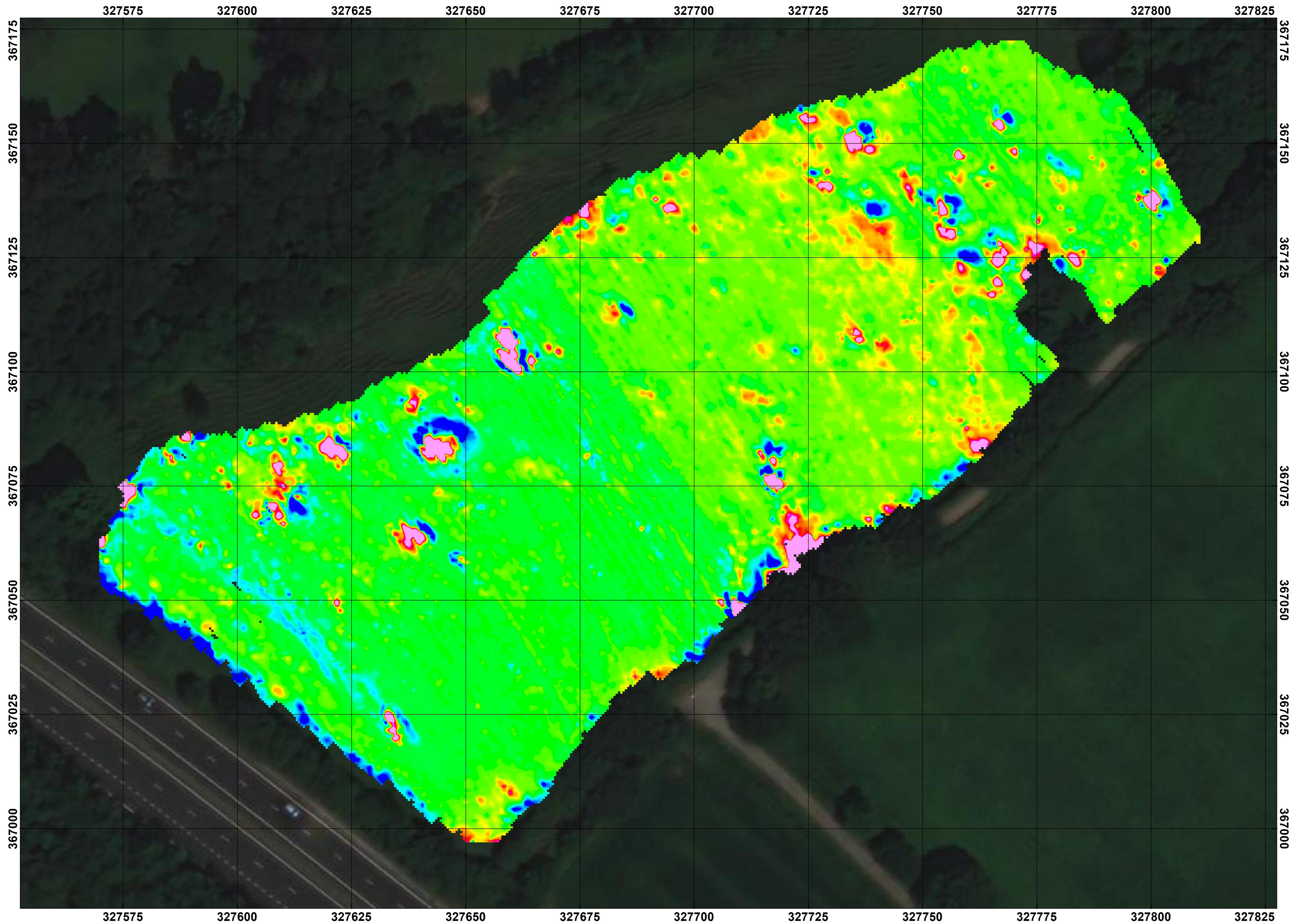

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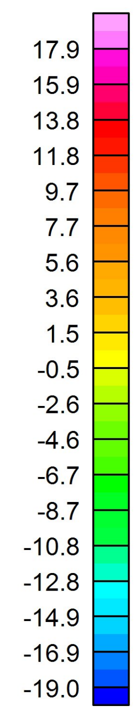

Magnetic Gradient
nT

SCALE:

Scale 1:750

10 0 10 20 30 40

metres

OSGB 1936 / British National Grid

NOTES:

1. Surface coordinates relative to OSGB (1936)

CLIENT:	ENI		
PROJECT:	LBA CCS Transport and Storage Project Ground Investigations		
TITLE:	Magnetic Gradient		
PROJECT NO.: 190094		DRAWING NO.: 07	
ISSUE REFERENCE: 01		DATE: 22/02/2022	
INTERP. BY: EC	DATE: 22/02/2022	DRAWN BY: EC	DATE: 22/02/2022
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DRAWING SCALE: 1:750			
PLOTTED DRAWING SIZE: A2 (594 x 420 mm)			

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