ARCHAEOLOGICAL SURVEYS LTD

GEOPHYSICAL SURVEY REPORT

Nailsea School

Magnetometer Survey
for

North Somerset Council

David Sabin and Kerry Donaldson

June 2007

Ref. no. J183

ARCHAEOLOGICAL SURVEYS LTD

Nailsea School

Magnetometer Survey

for

North Somerset Council

Report and fieldwork by David Sabin and Kerry Donaldson

Survey date - **9th and 10th June 2007**
Ordnance Survey Grid Reference – **ST 4762 7038**

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SUMMARY

A magnetometry survey was carried out across 3.6ha of land at Nailsea School currently used as a sports field. The area has been outlined for development of new school buildings. The objective of the survey was to locate features of archaeological potential, in particular any features that may be associated with the mining of coal which was widespread in the region up until the mid 19th century. The results revealed many anomalies of modern origin associated with services and modern ferrous objects. Many other anomalies could not be confidently interpreted due to their fragmented and amorphous nature or lack of readily definable characteristics. A number of discrete positive anomalies may represent pit-like features although these would not appear to be on a scale consistent with coal extraction. Other features include land drains and a large response probably related to underlying geological and pedological conditions.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by North Somerset Council to undertake a geophysical survey of Nailsea School playing field. The area has been outlined for redevelopment of the school. The survey was requested as part of an assessment of the archaeological potential of the site and to investigate whether the area contains features associated with former coal mining.

1.2 Survey objectives and methods

1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies that may be archaeological in origin and anomalies that may relate to former coal mining.

1.2.2 Magnetometry is an efficient and effective technique particularly suited to locating former 'cut features' such as pits and ditches. The technique may also respond to structural remains.

1.3 Site location

1.3.1 The site is located within playing fields to the east of Nailsea School in North Somerset at Ordnance Survey grid reference ST 47620 70380.

1.4 Site description and survey conditions

1.4.1 The geophysical survey covers an area of approximately 3.6 hectares and is currently used as the school playing field, see Plates 1 and 2. The field slopes very gently down to the south east. There appears to have been landscaping at the western end which may have lowered the field by approximately 1m. Ground cover during the survey was short grass.

1.4.2 Within the playing field there are a number of modern ferrous objects likely to cause magnetic disturbance. These include inspection chamber covers, goal posts and other sports items. To the the south western corner of the site there is steel boundary fencing and steel fencing associated with tennis courts.

1.4.3 A colliery was known to exist immediately adjacent to the eastern boundary of the site and this is presumed to be associated with an old residential property separated from the playing field by a shallow ditch. The colliery is marked on Ordnance Survey mapping form the 19th century.

1.4.4 Weather conditions during the survey were fine. The presence of modern ferrous features and the urban location of the site were expected to influence the quality of data recorded during the survey.

Plate 1: Nailsea School playing field looking southwest

Plate 2: Nailsea school playing field looking northeast

1.5 Site history and archaeological potential

1.5.1 A colliery was known to exist immediately adjacent to the north eastern part of the playing field. The feature is mapped on 19th century Ordnance Survey mapping. No specific information or details on the archaeological potential of the site was made available to Archaeological Surveys Ltd.

1.6 Geology and soils

1.6.1 The underlying geology is on the junction of the Pennant Series and Shale deposits within the Upper Coal Measures (BGS 1993). The soils are not mapped across the survey area due to the urban location of the site, however, they are likely to belong to the Neath association and are defined as typical brown earths (Soil Survey of England and Wales, 1983). Neath soils are well drained fine loamy soils over rock.

1.6.2 The geological and pedological conditions across the survey area are likely to produce moderate to good conditions for magnetic survey. The underlying geology where close to the surface may produce magnetic anomalies.

2 METHODOLOGY

2.1 Technical synopsis

2.1.1 Magnetometry survey records localised magnetic fields that can be associated with features formed by human activity. Iron minerals within the soil may become altered by burning and the break down of biological material; effectively the magnetic susceptibility of the soil is increased and the iron minerals become magnetic in the presence of the Earth's magnetic field. Accumulations of magnetically enhanced soils within features such as pits and ditches can produce magnetic anomalies that can be mapped during magnetic prospection.

2.1.2 Magnetic thermoremnance can occur when ferrous minerals have been heated to high temperatures such as in a kiln, hearth or associated with other industrial processes. On cooling, a permanent magnetisation may be acquired due to the presence of the Earth's magnetic field. Certain natural processes associated with the formation of some igneous and metamorphic rock may also result in magnetic thermoremnance.

2.1.3 The localised variations in magnetism are measured as sub-units of the Tesla which is a SI unit of magnetic flux density. These sub-units are nanoTeslas (nT) which are equivalent to 10^{-9} Tesla (T).

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using a Bartington Grad601-2 gradiometer. This instrument effectively measures a magnetic gradient between two fluxgate sensors mounted vertically 1m apart. Two sets of sensors are mounted on a single frame 1m apart horizontally. The instrument is extremely sensitive and is able to measure magnetic variation to 0.1nanoTesla (nT). All readings are saved to an integral data logger for analysis and presentation.

2.2.2 The instrument is operated according to the manufacturer's instructions with consideration given to the local conditions. An adjustment procedure is required prior to collection of data in order to balance the sensors and remove the effects of the Earth's magnetic field, further adjustment is required during the survey due to instrument drift often associated with temperature change. It is often very difficult to obtain optimum balance for the sensors due to localised magnetic vectors that can be associated with large ferrous objects, geological/pedological features, 'magnetic' debris within the topsoil and natural temperature fluctuations. Imperfect balance results in a heading error often visible as striping within the data; this can be effectively removed by software processing and generally has little effect on the data unless extreme. Archaeological Surveys use a non-magnetic tripod with an additional supporting structure to raise the instrument during the set-up procedure, this has been found to improve the sensor balance.

2.2.3 The Bartington gradiometer undergoes regular servicing and calibration which is carried out by the manufacturer. A current assessment of the instrument is shown in Table 1 below.

Date of calibration/service	21st May 2007
Sensor type	Bartington Grad - 01 – 1000 Nos. 084 and 085
Bandwidth	12Hz (100nT range) both sensors
Noise	<100pT peak to peak
Adjustable errors	<2nT

Table 1: Bartington fluxgate gradiometer sensor calibration results

The instrument was considered to be in good working order prior to the survey with no known faults or defects.

2.2.4 Data were collected at 0.25m centres along traverses 1m apart. The survey area was separated into 30m by 30m grids giving 3600 recorded measurements per grid. This sampling interval is very effective at locating archaeological features and is the recommended methodology for archaeological prospection (English Heritage, 1995).

2.2.5 The survey grids were set out to the Ordnance Survey OSGB36 datum using a Penmap RTK GPS. The GPS is used in conjunction with Leica's Smartnet service where positional corrections are sent via a mobile telephone link. Positional accuracy of around 10 – 20mm is possible using the system; setting out accuracy is considered likely to be better than 50mm.

2.3 Data processing and presentation

2.3.1 Magnetometry data downloaded from the Grad 601-2 data logger are analysed and processed in specialist software known as ArcheoSurveyor. The software allows greyscale and trace plots to be produced for presentation and display. Survey grids are assembled to form an overall composite of data (composite file) creating a dataset of the complete survey area. Appendix B contains specific information concerning the survey and data attributes and is derived directly from ArcheoSurveyor, this should be used in conjunction with information provided by Figure 02.

2.3.2 Only minimal processing is carried out in order to enhance the results of the survey for display. Raw data are always analysed as processing can modify anomalies. The following schedule sets out the data and image processing used in this survey:

- clipping of the raw data at ±30nT to improve greyscale resolution,
- clipping of processed data at ±3nT to enhance low magnitude anomalies,

- clipping of trace plots at ±100nT in order to minimise strong readings obscuring low magnitude responses,
- de-stagger is used to enhance linear anomalies,
- zero median/mean traverse is applied in order to balance readings along each traverse.

(Reference should be made to Appendix B for details on the order and specific attributes of the processing).

Data processing explanation notes:

Clipping

Clipping replaces the values outside the specified minimum and maximum with those values. The process is useful for displaying detail as extreme values are removed allowing greyscale shades to be allocated to a narrower range of values which improves the definition of anomalies.

Zero Median/Mean Traverse

The median (or mean) of each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise slight differences between the set-up and stability of gradiometer sensors and is used to remove striping.

De-stagger

Compensates for small positional errors within data collection by shifting the position of the readings along each traverse by a specified amount.

2.3.3 An abstraction and interpretation is offered for all geophysical anomalies located by the survey. A brief summary of each anomaly with an appropriate reference number is set out in list form within the results (Section 3) to allow a rapid assessment of features within the survey area. Where further interpretation is possible or where a number of possible origins should be considered, further more detailed discussion is set out in Section 4.

2.3.4 The main form of data display used in this report is the greyscale plot. Magnetic data are also displayed as a trace plot. Both 'raw' and 'processed' data have been shown followed by an abstraction and interpretation plot.

2.3.5 Graphic raster images in Bitmap format are initially prepared in ArcheoSurveyor. These images are combined with base mapping using AutoCAD LT 2007 creating DWG file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. Quality can be compromised by rotation of graphics in order to allow the data to be orientated with respect to grid north; this is considered acceptable as the survey results are effectively georeferenced allowing relocation of features using GPS, resection method etc.. A digital archive including raster images is produced with this report allowing separate analysis if necessary, see 2.4 below.

2.4 Archive

2.4.1 Survey results are produced in hardcopy using A4 for text and A3 for plots (all plots are scaled for A3). In addition, digital data created during the survey are supplied on CD. Further information on the production of the report and the digital formats involved in this creation are set out below.

2.4.2 This report has been prepared using the following software on a Windows XP platform:

- ArcheoSurveyor version 2.1.2.2 (geophysical data analysis),
- AutoCAD LT 2007 (report figures),
- JASC Paint Shop Pro 8 (image rotation),
- OpenOffice.org 2.2 Writer (document text),
- PDF Creator version 0.9 (PDF archive).

2.4.3 Digital data are supplied on CD ROM as the following files:

- ArcheoSurveyor grid and composite files for all geophysical data,
- CSV files for raw and processed composites,
- geophysical composite file graphics as Bitmap images,
- AutoCAD DWG files in 2000 and 2007 versions,
- report text as Word 2000 doc file,
- report text as rich text format (RTF),
- report text as PDF,
- PDFs of all figures,
- photographic record in JPEG format.

2.4.4 The CD ROM structure is formed from a tree of directories under the title J183 Nailsea – CD. Directory titles include Data, Documentation, CAD, PDF and Photos. Multiple directories exist under Data and hold grid, composite and graphic files with CSV composite data held in export.

2.4.5 The CAD file contains externally referenced graphics that may be rotated, see 2.3.5, with separate A3 size layouts for each figure. Layouts are fixed using frozen layers and named views allowing straightforward plotting or analysis on screen. (Note – CAD files are prepared using AutoCAD's eTransmit function to produce a directory containing the digital drawing along with any externally referenced graphics which may need reloading).

3 RESULTS

3.1 General overview

3.1.1 The detailed magnetic survey was carried out over an area of 3.6ha. Geophysical anomalies located can be generally classified as positive and negative linear anomalies of an uncertain origin, discrete positive anomalies, zones of amorphous magnetic response relating to underlying geology/pedology, linear anomalies relating to land drains, areas of magnetic debris and disturbance, strong discrete dipolar anomalies relating to ferrous objects, strong multiple dipolar linear anomalies relating to buried services or pipelines.

3.1.2 Survey conditions were generally considered to be good with low ground cover and fine weather conditions. However, the survey area is magnetically 'noisy' due to modern services, sports features, boundary fencing and other strong dipolar anomalies associated with modern ferrous objects. The presence of widespread magnetic 'noise' can have implications for the sensor adjustment procedure and may result in heading errors that appear as slight striping within the data; these are effectively removed during processing and have no influence on the effectivity of the technique.

3.2 Magnetic anomalies

3.2.1 The listing of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation.

Anomalies with an uncertain origin

The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. A positive anomaly may relate to an increased depth of topsoil or magnetically enhanced soil within a cut feature, a negative anomaly may be a response to less enhanced material. Anomalies in this category may well be related to archaeologically significant features but equally relatively modern features, geological/pedological features and agricultural features should be considered.

Anomalies possibly associated with geological/pedological features

Magnetic anomalies that appear in areas or widespread zones and may be attributed to underlying geology or pedology. There may be several factors involved in the formation of these anomalies. Shallow soils overlying irregular solid geology or pockets of naturally enhanced magnetic susceptibility could be considered here.

Anomalies with a modern origin

Magnetic disturbance

Strong multiple dipolar linear anomaly – pipeline/service

Magnetic disturbance associated with sports field features

The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance – such disturbance can effectively obscure low magnitude anomalies if they are present. Sets of parallel linear anomalies with a relatively strong or dipolar response may indicate the location of land drains.

Anomalies associated with magnetic debris

Magnetic debris

Strong discrete dipolar anomaly

The response often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. Magnetic debris often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.

3.2.2 Anomalies with an uncertain origin

(1) Three discrete low magnitude positive responses have been located towards the central and northern parts of the survey area. This type of discrete response is indicative of a pit-like feature, however it is not possible to ascertain the origin of these responses.

(2) Several patches of low magnitude positive response have been located. Their origin cannot be determined, however it is possible that they are similar to anomalies coded (7) see below.

(3 & 4) There are several positive linear and curvilinear anomalies within the survey area. Anomalies coded (3) are generally of low magnitude and are short or fragmented in appearance and cannot be accurately characterised. Positive linear anomaly (4) is located close to the eastern boundary and is oriented north-south. It also appears to have a parallel negative linear anomaly immediately east (not abstracted), and although this type of response suggests a feature such as a former

boundary, a modern origin such as a buried service/cable is possible.

(5 & 6) Negative linear anomalies (5) are located in the northern half of the survey area. They are parallel, each approximately 45m long and 56m apart. Although of uncertain origin it is possible that they may relate to drainage. Anomalies coded (6) appear as short or fragmented negative linear responses that are not possible to interpret.

3.2.3 Anomalies possibly associated with geological/pedological features

(7) Two zones of amorphous magnetic anomalies can be seen within the central southern part of the survey area and towards the western boundary. These zones contain clusters of positive and associated negative responses that are likely to be caused by the underlying geology. It is possible that the site has been leveled in the past and topsoil removal has decreased the depth to the underlying solid geology.

3.2.4 Anomalies associated with magnetic debris

(8) Close to the northern and southern edges of the survey area are zones of magnetic debris. These are generally of high magnitude suggesting that they contain ferrous material. It is likely that they have a relatively modern origin.

(9) The site contains many strong discrete dipolar responses which indicate the presence of ferrous objects within the topsoil (see 4.1.4).

3.2.5 Anomalies with a modern origin

(10) A series of parallel positive anomalies are located within the northern and eastern part of the survey area and are likely to be a response to land drains.

(11) Several areas of magnetic disturbance are responses to material associated with sports field features such as goal post sockets and a cricket pitch.

(12) Zones of magnetic disturbance can be seen surrounding much of the site and are a response to ferrous material used in fencing and within buried services.

(13) A multiple dipolar linear anomaly partially extends across the northern part of the survey area. It is possible that this relates to some form of buried service/cable.

4 DISCUSSSION

4.1

4.1.1 Few anomalies could be confidently interpreted due to their amorphous or fragmented nature and lack of definable characteristics. No features that could be confidently interpreted as having archaeological potential were located, there are however several relatively small discrete anomalies that may represent pit-like features, anomalies labeled (1).

4.1.2 There are many strong dipolar anomalies that are associated with modern sports features or services and the magnetic response associated with some of these may obscure more subtle features.

4.1.3 The presence of amorphous zones of positive and negative response across much of the central southern and western parts of the site has been attributed to natural geological and pedological features although the specific origin of these remains uncertain. It is possible that these anomalies may be associated with landscaping and leveling of the sports field either through the introduction and spreading of magnetically enhanced soils or through lowering the surface level which has resulted in a stronger response to underlying pockets of enhanced magnetic susceptibility. As a comparison, it is known that natural variation in the subsoil – rock interface, combined with naturally magnetically enhanced subsoils in the south Cotswolds can produce similar amorphous anomalies which increase in magnitude as topsoil depth decreases.

4.1.4 Coal pits, shafts and associated features located by Archaeological Surveys in other parts of the UK are often associated with magnetic debris caused by various ferrous items relating to infill and/or capping or the remains of structures and mechanical devices. Several strong dipolar anomalies located close to the north eastern part of the surveyed area and close to the site of a known colliery, could potentially be related to former industrial activity, however, it is equally possible that these anomalies are caused by modern ferrous objects close to the surface.

5 CONCLUSION

5.1

5.1.1 Interpretation of many of the anomalies located by the magnetometry is uncertain due to the amorphous and fragmentary nature of the responses and their lack of readily definable characteristics. None of the anomalies were confidently interpreted as having a significant archaeological potential, however, anomalies classified as uncertain could potentially relate to archaeological features.

5.1.2 Several discrete positive anomalies were located that may represent pit-like features although they do not appear to be consistent with the scale of features required for the extraction of coal. There is a small increase in the number of strong discrete dipolar anomalies towards the north eastern part of the survey area and it is tentatively suggested that these may represent ferrous objects of an industrial nature close to the site of a former colliery.

6 REFERENCES

British Geological Survey, 1977. *Geological Survey Ten Mile Map, South Sheet, First Edition (Quaternary)*, Scale 1:625 000.

British Geological Survey, 1993. *Bristol District, England and Wales Special Sheet, Solid and Drift Edition, One -Inch Series.*

English Heritage, 1995. *Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No.1.*

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 5 South West England.*

Appendix A – basic principles of magnetic survey

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremnant material.

Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field.

Thermoremnant magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with re-magnetisation by the Earth's magnetica field upon cooling.

Enhancement of magnetic susceptibility can occur in areas subject to burning and complex fermentation processes on biological material; these are frequently associated with human settlement. Thermoremnant features include ovens, hearths, and kilns. In addition thermoremnant material such as tile and brick may also be associated with human activity and settlement.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil can create an area of enhancement compared with surrounding soils and subsoils into which the feature is cut. Mapping enhanced areas will produce linear and discrete anomalies allowing an assessment and characterisation of hidden subsurface features.

It should be noted that areas of negative enhancement can be produced from material having lower magnetic properties compared to the topsoil. This is common for many sedimentary bedrocks and subsoils which were often used in the construction of banks and walls etc. Mapping these 'negative' anomalies may also reveal archaeological features.

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried field. The difference between the two sensors will relate to the strength the magnetic field created by the buried feature. If no enhanced feature is present the field measured by both sensors will be similar and the difference close to zero.

There are a number of factors that may affect the magnetic survey and these include soil type, local geology and previous human activity. Situations arise where magnetic disturbance associated with modern services, metal fencing, dumped waste material etc., obscures low magnitude fields associated with archaeological features.

Appendix B – survey and data information

COMPOSITE
Filename: Mag-raw.xcp
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 04/06/2007
Assembled by: on 04/06/2007
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 960 x 210
Grid Size: 30 x 30
X Interval: 0.25
Y Interval: 1

Stats
Max: 30.00
Min: -30.00
Std Dev: 10.53
Mean: -0.82

Processes: 4
1 Base Layer
2 Clip from -30 to 30
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 Clip from -30 to 30

Source Grids: 40
1 Col:0 Row:1 grids\39.asg
2 Col:0 Row:2 grids\40.asg
3 Col:1 Row:0 grids\36.asg
4 Col:1 Row:1 grids\37.asg
5 Col:1 Row:2 grids\38.asg
6 Col:1 Row:3 grids\24.asg
7 Col:1 Row:4 grids\25.asg
8 Col:1 Row:5 grids\26.asg
9 Col:2 Row:0 grids\33.asg
10 Col:2 Row:1 grids\34.asg
11 Col:2 Row:2 grids\35.asg
12 Col:2 Row:3 grids\21.asg
13 Col:2 Row:4 grids\22.asg
14 Col:2 Row:5 grids\23.asg
15 Col:2 Row:6 grids\20.asg
16 Col:3 Row:0 grids\30.asg
17 Col:3 Row:1 grids\31.asg
18 Col:3 Row:2 grids\32.asg
19 Col:3 Row:3 grids\16.asg
20 Col:3 Row:4 grids\17.asg
21 Col:3 Row:5 grids\18.asg
22 Col:3 Row:6 grids\19.asg
23 Col:4 Row:0 grids\27.asg
24 Col:4 Row:1 grids\28.asg
25 Col:4 Row:2 grids\29.asg
26 Col:4 Row:3 grids\13.asg
27 Col:4 Row:4 grids\14.asg
28 Col:4 Row:5 grids\15.asg
29 Col:5 Row:0 grids\01.asg
30 Col:5 Row:1 grids\02.asg
31 Col:5 Row:2 grids\03.asg
32 Col:5 Row:3 grids\10.asg
33 Col:5 Row:4 grids\11.asg
34 Col:5 Row:5 grids\12.asg
35 Col:6 Row:1 grids\04.asg
36 Col:6 Row:2 grids\05.asg
37 Col:6 Row:3 grids\08.asg
38 Col:6 Row:4 grids\09.asg
39 Col:7 Row:1 grids\06.asg
40 Col:7 Row:2 grids\07.asg

COMPOSITE
Filename: Mag-proc1.xcp
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 04/06/2007
Assembled by: on 04/06/2007
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.38
Mean: 0.06

Processes: 20
1 Base Layer
2 Clip from -30 to 30
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 0, Left 168, Bottom 22, Right 713)
5 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 22, Left 579, Bottom 44, Right 959)
6 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 43, Left 795, Bottom 108, Right 959)
7 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 28, Left 10, Bottom 81, Right 119)
8 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 19, Left 94, Bottom 38, Right 220)
9 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 33, Left 80, Bottom 58, Right 176)
10 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 144, Left 95, Bottom 185, Right 159)
11 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 73, Left 429, Bottom 80, Right 550)
12 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 28, Left 392, Bottom 39, Right 426)
13 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 92, Left 245, Bottom 100, Right 300)
14 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 134, Left 113, Bottom 153, Right 225)
15 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 135, Left 557, Bottom 147, Right 588)
16 DeStripe Median Traverse: Grids: All
17 Clip from -3 to 3
18 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 181, Left 234, Bottom 197, Right 482)
19 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 180, Left 236, Bottom 191, Right 484)
20 Search & Replace From: -10000000 To: 100000000 With: 32702 (Area: Top 155, Left 600, Bottom 179, Right 717)

Archaeological Surveys Ltd

Geophysical Survey
Nailsea School
North Somerset

Map of survey area

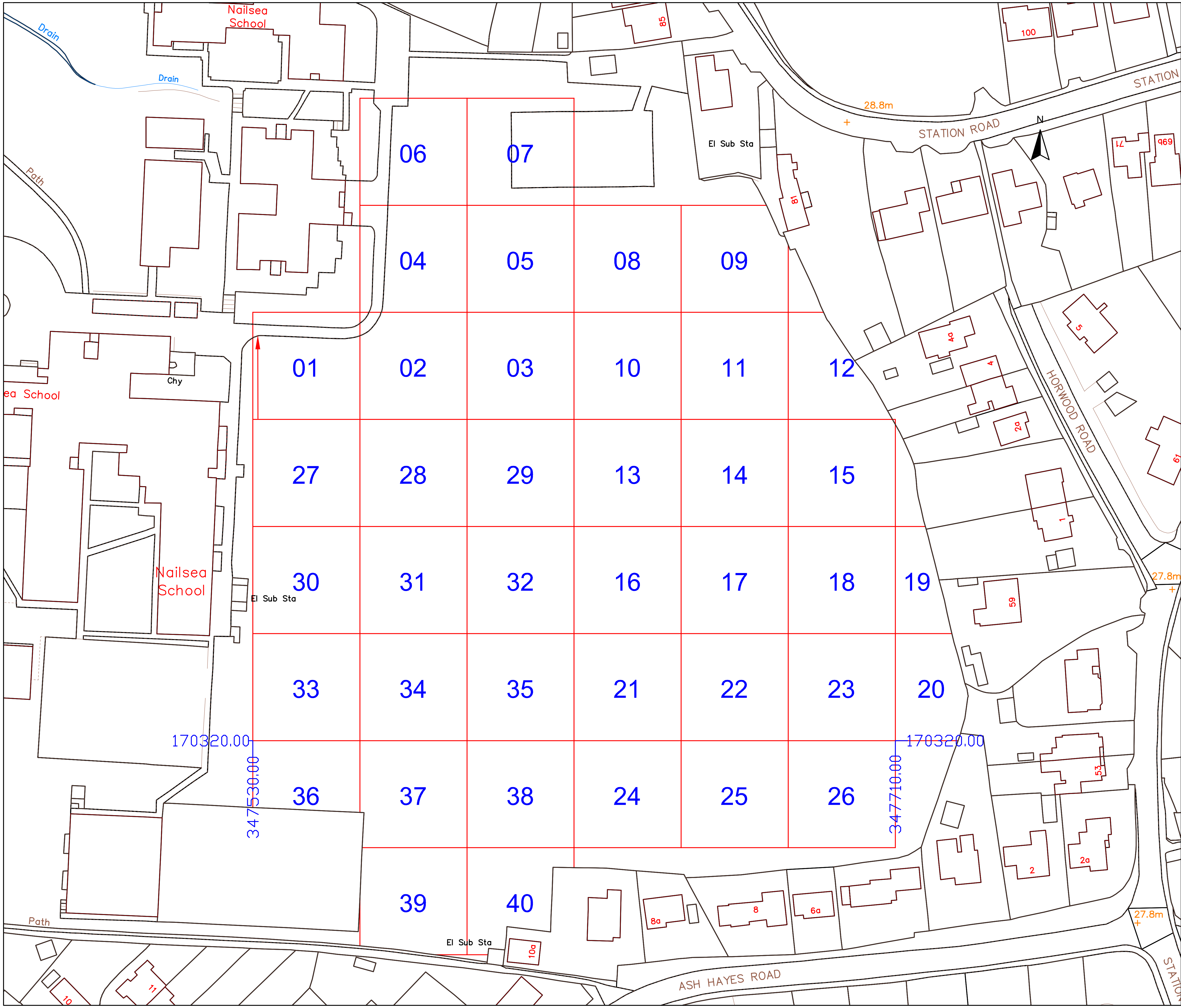
● Survey location

Site centred on OS NGR ST 47620 70380

SCALE 1:50 000

0km 1 2km

FIG 01



Archaeological Surveys Ltd

Geophysical Survey
Nailsea School
North Somerset

Referencing information

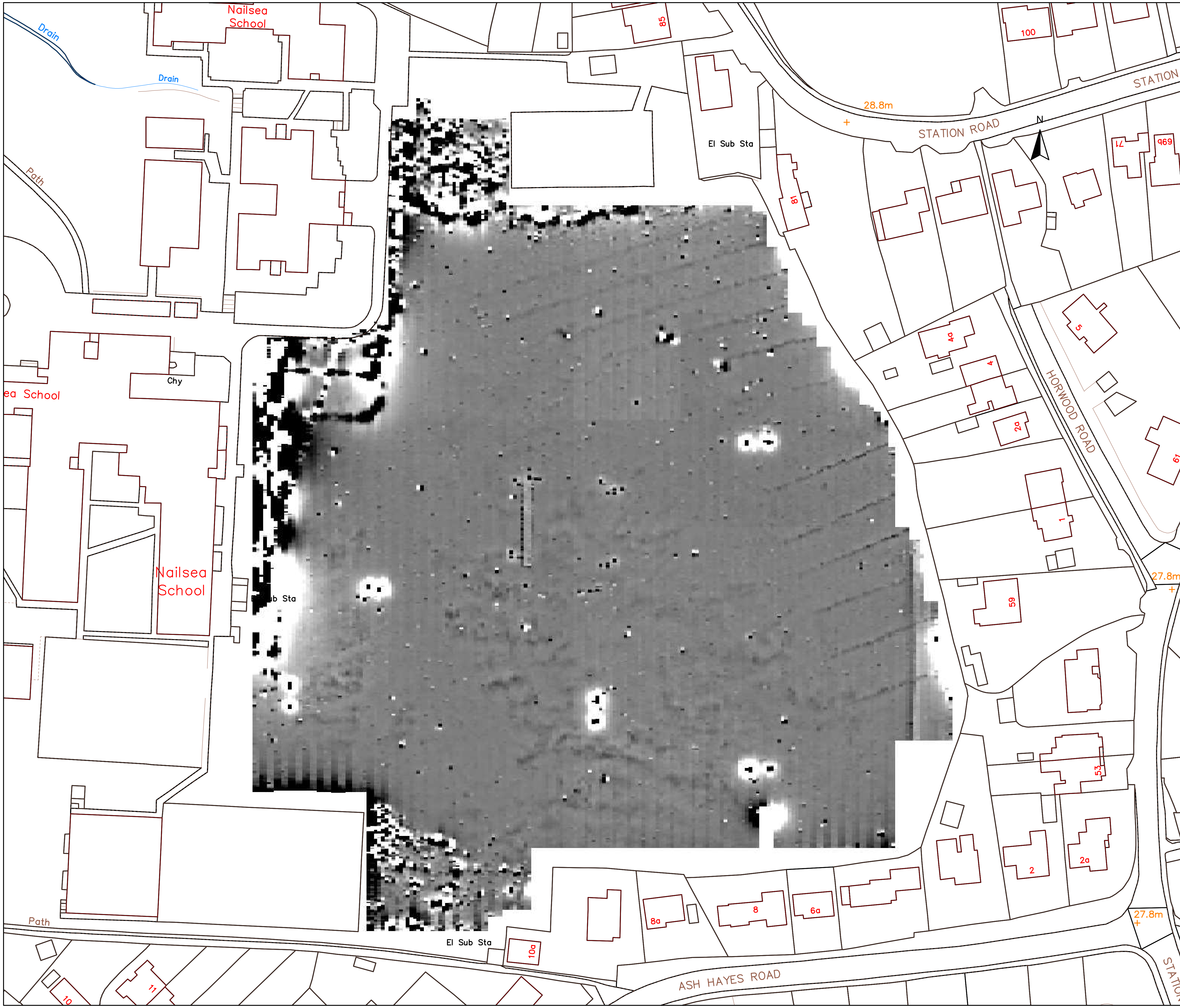
Based on OS coordinates (OSGB36)

Survey start and traverse direction

SCALE 1:1000

0m 10 20 30 40 50m

FIG 02



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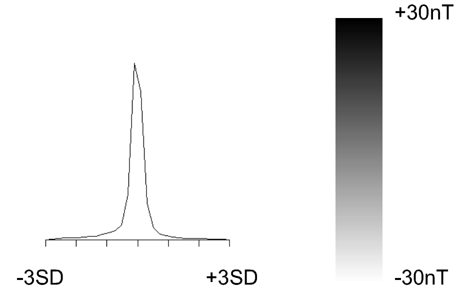
Geophysical Survey
Nailsea School
North Somerset

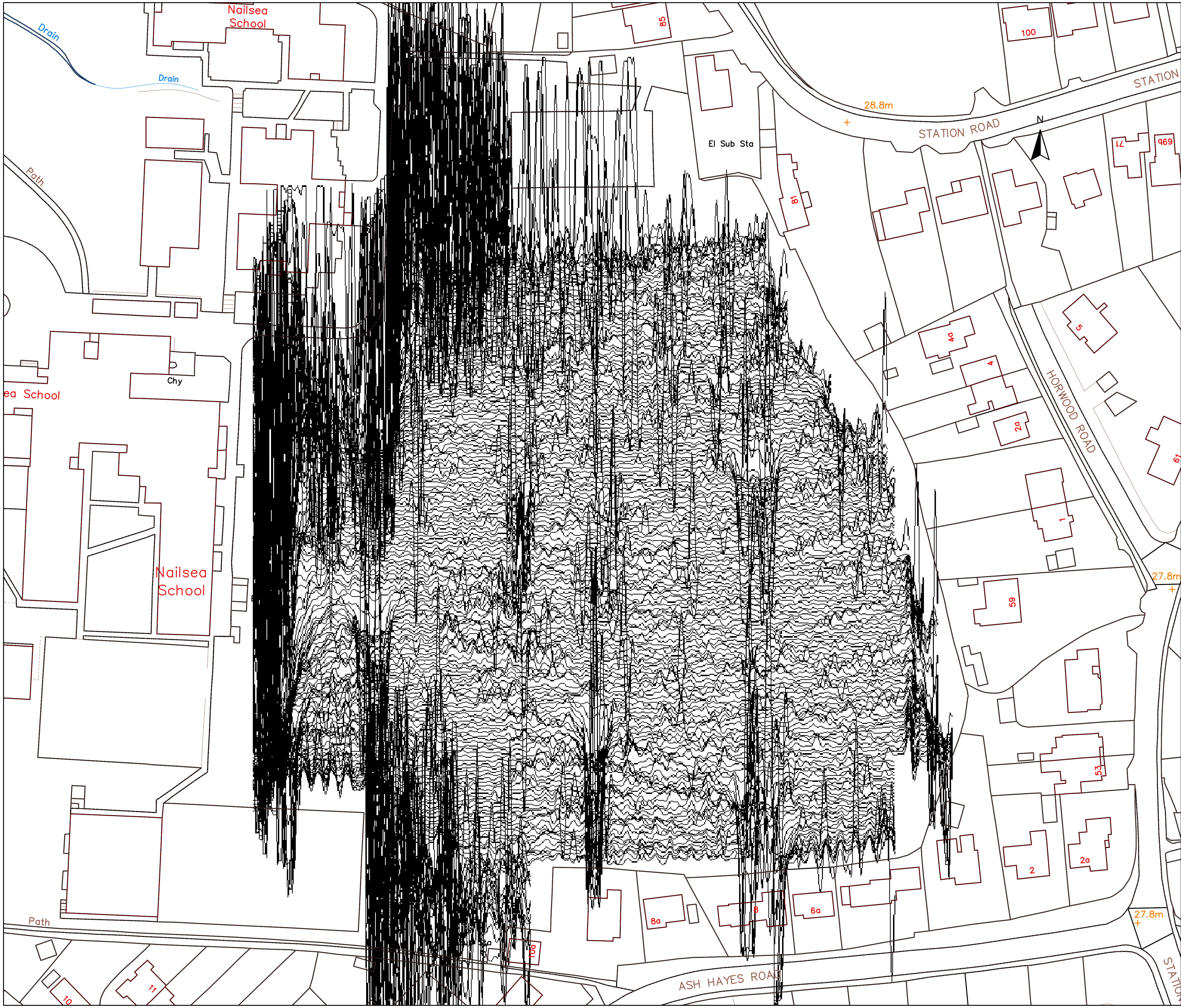
Greyscale plot of raw magnetometer data



SCALE 1:1000

0m 10 20 30 40 50m

FIG 03



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North Somerset

Trace plot of raw magnetometer data

+40nT
+20nT
0nT
-20nT
-40nT

20nT/ cm vertical displacement.

Data has been clipped at ± 100nT.

SCALE 1:1000

0m 10 20 30 40 50m

FIG 04

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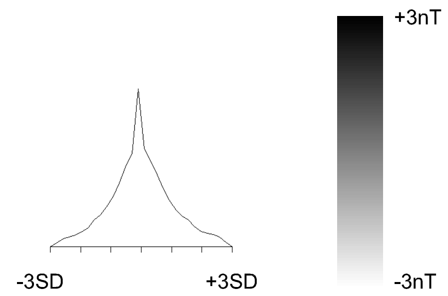
Geophysical Survey
Nailsea School
North Somerset

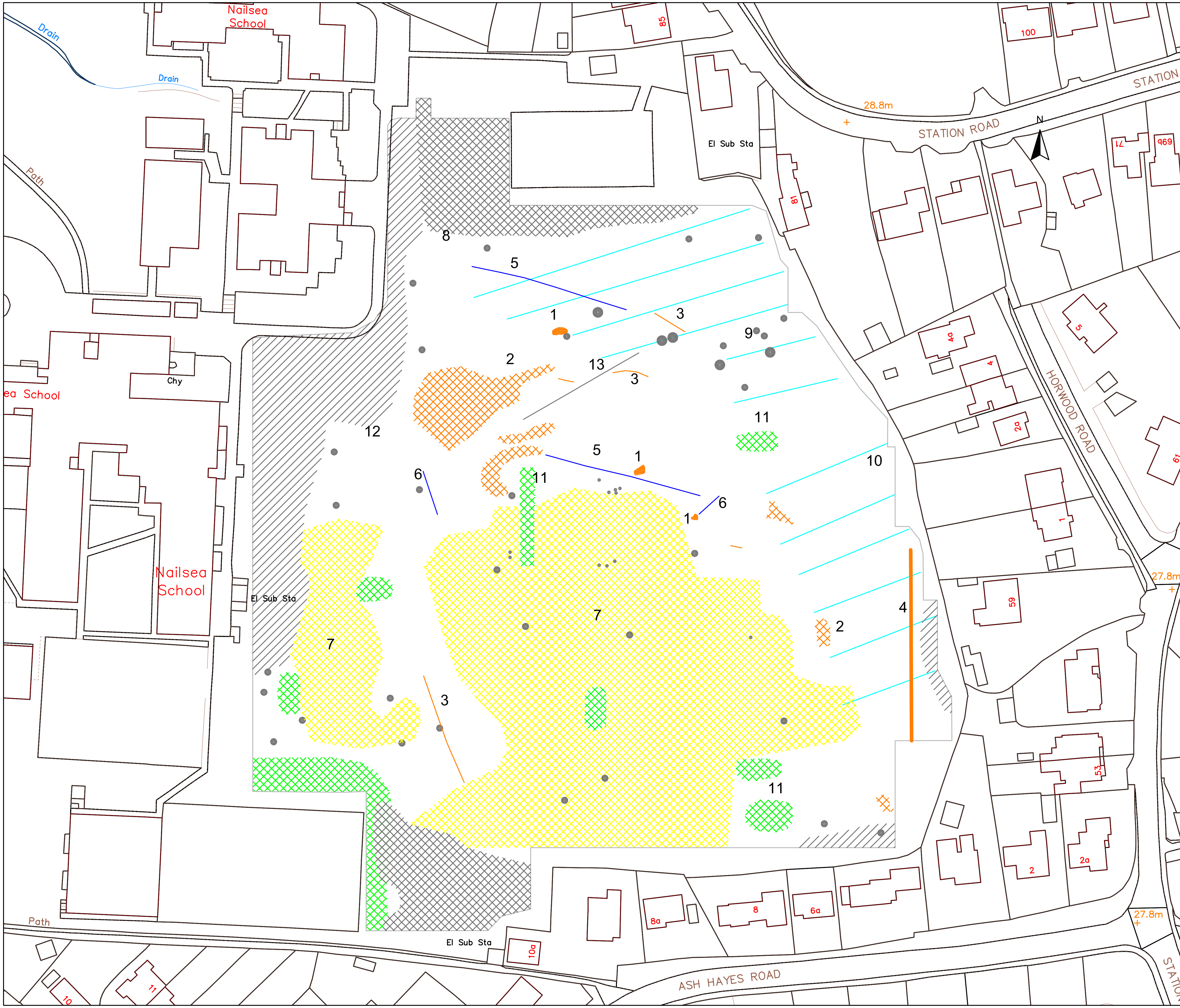
Greyscale plot of processed magnetometer data



SCALE 1:1000

0m 10 20 30 40 50m

FIG 05



Archaeological Surveys Ltd

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Abstraction and interpretation of magnetometer anomalies

- Positive linear anomaly - of uncertain origin
- Positive linear anomaly - possible land drain
- Negative linear anomaly - of uncertain origin
- Discrete positive response - possible 'pit-like' feature
- Positive response - uncertain origin
- Amorphous magnetic anomalies - possible geological/pedological origin
- Magnetic anomalies associated with sports field features (goalposts etc.)
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material/underground power cables
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - shallow ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

FIG 06