GEOPHYSICAL SURVEY

REPORT

Timolin, County Kildare

Date: 18/01/2016

Licence: 15R0133

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GEOPHYSICAL SURVEY SUMMARY SHEET

TIMOLIN, COUNTY KILDARE

Site Name	Timolin, County Kildare	**Ref No.**	15030
Townland	Timolin	**Licence No.**	15-R-0133
County	Kildare	**Licence Holder**	Joanna Leigh
ITM (centre)	E680093/N693424	**Purpose**	Pre-planning investigation
Client	Kildare County Council & Irish Water	**Planning No.**	NA

Closest RMP	KD036:026	**Classification**	Castle - unclassified
ITM	E680042/N693414	**Location**	Within application area
Townland	Timolin		

Current land use	Waste ground and pasture

Survey Type	Detailed resistance and gradiometer survey in available areas

Summary of Results

A detailed resistance and gradiometer survey was conducted to identify any potential remains associated with the recorded castle site (RMPKD036:026), located at the proposed development site.

The 'archaeology.ie' mapping depicts the recorded castle site on the proposed development site, which is rough ground and was not suitable for survey. However, the pasture field immediately to the NE was suitable for survey and was subject to both resistance and gradiometer survey.

In the resistance survey, a low resistance linear response runs through the data towards a watercourse at the south-eastern extent of the application area. This response most likely represents a drainage feature and is also evident in the gradiometer survey.

Areas of low and high resistance have an amorphous appearance and are most likely natural in origin. The gradiometer survey data is dominated by modern magnetic disturbance and ferrous responses. No clear responses indicative of archaeological activity were recorded in the gradiometer survey.

Report Date	18/01/2016	**Report Author**	Joanna Leigh

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Geophysical Survey Report
Timolin, County Kildare

1 Introduction

1.1 A geophysical survey has been conducted by J. M. Leigh Surveys as part of a pre-planning investigation in the townland of Timolin, County Kildare. This survey has been conducted on behalf Kildare County Council and Irish Water and forms part of a wider archaeological study by Irish Archaeological Consultancy Ltd.

1.2 The south-west part of the application area consists of rough ground and is the proposed development site. The field immediately to the north-east is in pasture. The survey location diagram is presented in Figure 1 at a scale of 1:1,250.

1.3 A recorded castle site (unclassified) is located on the archaeology.ie mapping within the area of rough ground, which forms the proposed development site. There are no extant remains of the castle and its exact location is unknown.

1.4 The main aim of the geophysical survey was to locate and identify any geophysical response indicative of features associated with the recorded castle site. Detailed gradiometer and resistance surveys were undertaken in the pasture field to the north-east. The survey was conducted under licence 15-R-0133 issued by the Department of Arts, Heritage and the Gaeltacht.

2 Survey ground conditions and further information

2.1 The field forming the south-west part of the application area, the proposed development site, consists of rough ground and was not suitable for survey. In the field to the north-east of this, ground conditions were more favourable, with a small pasture field gently sloping to the south-east, where there is a small water course. The water course is part of a former mill race. The south-eastern extent of the field was waterlogged at the time of fieldwork but was still available for survey.

2.2 The north-western extent of the application area comprised of a modern access track and fencing and was not suitable for survey.

2.3 Modern litter and discarded material was scattered throughout the pasture field. Notably, there were piles of concrete re-enforced posts and in the north of the field recent burnt material was observed. The modern debris in the field results in broad ferrous responses in the gradiometer survey.

3 Survey Methodology

Detailed Resistance Survey

3.1 A detailed resistance survey is used to record variations in electrical resistance by passing an electrical current through the ground. The subsequent earth resistance (measured in ohms) is recorded and presented in map form for interpretation. Resistance surveys are typically conducted on sites where structural or stone features are anticipated.

3.2 Detailed resistance survey was conducted throughout the application area with a Geoscan RM15 instrument. Data was collected with a parallel twin-probe array of mobile and remote electrodes. The resistance survey mobile probes were separated by 0.5m. Data was collected with a sample interval of 0.5m and a traverse interval of 1m.

Detailed Gradiometer Survey

3.3 A detailed gradiometer survey detects subtle variations in the local magnetic field and measurements are recorded in nano-Tesla (nT). Some archaeological features such as ditches, large pits and fired features have an enhanced magnetic signal and can be detected through recorded survey.

3.4 Data was collected with a Bartington Grad 601-2 instrument. This is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey fast and effective.

3.5 The instrument is calibrated in the field to ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.01nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.

3.6 All data was collected in ‘zigzag’ traverses. Grid orientation remained constant throughout each field to facilitate the data display and interpretation. The subsequent resistance survey was conducted on the same survey grid to allow a comparison of the results.

3.7 Data was collected with a sample interval of 0.25m and a traverse interval of 0.5m, providing 6400 readings per 40m x 40m grid. The survey grid was set-out using a GPS VRS unit. Survey tie-in information is available upon request.

4 Data display

4.1 The gradiometer survey results are presented in Figure 2 as a greyscale image with an accompanying interpretation diagram in Figure 3, both at a scale of 1:750.

4.2 The resistance data is presented as two greyscale images in Figure 4 at a scale of 1:1,000. An interpretation diagram is presented in Figure 5 at a scale of 1:750.

4.3 Numbers and letters in parentheses in the text of the report refer to specific responses highlighted in the detailed gradiometer survey interpretation diagrams (Figure 3 & 5).

4.4 The raw gradiometer data is presented as a xy-trace plot in Figure 6 at a scale of 1:750. This plot is for reference only.

4.5 The display formats referred to above and the interpretation categories are discussed in the summary technical information section at the end of this report.

5 Survey Results

Gradiometer Survey (Figures 2 & 3)

5.1 The gradiometer data is dominated by areas of magnetic disturbance. These are the result of modern litter and debris and obscure the data in places.

5.2 A linear response (A) traverses the data set. This correlates with a shallow depression in the field and most likely represents a drainage feature, leading to the watercourse at the south-eastern extent of the application area. The response appears to have ferrous components and it is interpreted that this is more recent in origin. An archaeological interpretation is thought unlikely.

5.3 Broad ferrous responses (B) result from piles of discarded concrete posts and are not of archaeological interest.

5.4 A spread of magnetic disturbance (C) in the north-west of the data is modern in origin. This obscures the dataset and may result from a service pipe as it is in the vicinity of a manhole cover.

5.5 Another area of magnetic disturbance (D) is the result of a large trailer used as storage shed.

5.6 Faint linear trends (E) may represent former boundary or field divisions although interpretation is unclear. The trends are at the limits of instrument detection and no clear archaeological pattern is evident. Natural variations may be represented here.

5.7 Further magnetic disturbance is recorded along the length of the metal fence. Isolated ferrous responses most likely result from modern ferrous litter which was observed throughout the field.

Resistance Survey (Figures 4 & 5)

5.8 A low resistance response (1) is evident running through the data set. This correlates with the gradiometer response (A) and most likely represents a drainage feature. It appears to extend to the watercourse to the south of the application area.

5.9 There is a spread of low resistance response (2) in the south-east of the data, surrounding (1). This corresponds with an area of saturated ground and is thought to result from the probable field drain (1).

5.10 Isolated high resistance responses (3) may be of interest although there is no clear archaeological pattern. It is equally likely that natural variations are represented here.

5.11 To the north-west of (3) there are two resistance responses (4), one low resistance and one high resistance. Although it is possible that archaeological features are represented here there are no further responses indicative of activity. A spread of modern burnt material was noted in this area and it is likely that the responses (4) result from modern activity.

6 Discussion & Conclusion

6.1 The area containing the recorded castle (unclassified) site (RMP KD036:026) was not suitable for survey, comprising of overgrown and uneven ground. Survey in the adjacent field identified some responses in the gradiometer and resistance survey. However, these are not interpreted to be of archaeological origin and no responses indicative of activity associated with the castle site were identified.

6.2 The gradiometer data is dominated by modern magnetic disturbance and isolated ferrous responses. However, a linear series of responses running through the data set is indicative of a boundary or drainage feature. A low resistance response in the resistance survey correlates with this and it is likely that a former field drainage feature has been identified. Archaeological interpretation is tentative as the gradiometer survey suggests ferrous components to the feature.

6.3 Consultation with a licensed archaeologist and with the Department of Arts, Heritage and the Gaeltacht is recommended to establish if any additional archaeological works are required.

Technical Information Section

Instrumentation & Methodology

Fluxgate Gradiometer Survey

Gradiometer survey is the most frequently applied survey instrument as it can be used in 'Scanning' or detailed survey mode.

Scanning

This is a fast and effective reconnaissance technique. The instrument is set in scanning mode and regular traverses of the investigation area are made, usually at 10m intervals. This allows a fast and effective scan of the application area, looking for any responses which may be of archaeological potential. As the traverses are made, the operator observes the instrument readout, and any responses of interest are marked for further investigation.

Detailed Gradiometer Survey

This is conducted to clearly define any responses detected during scanning, or can be applied as a stand alone methodology. Detailed survey is often applied with a sample interval of 0.25m and a traverse interval of 1m. This allows detection of potential archaeological responses. Data is collected in grids 20m x 20m, and data is displayed accordingly. A more detailed survey methodology may be applied where archaeological remains are thought likely. A survey with a grid size of 10m x 10m and a traverse interval of 0.5m will provide a data set with high resolution.

Bartington GRAD 601-2

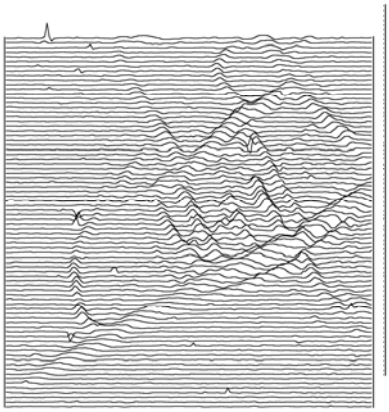
The Bartington *Grad* 601-2 instrument is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey very fast and effective. The sensors have a separation of 1m allowing greater sensitivity.

Frequent realignment of the instruments and zero drift correction; ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.1nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.

Gradiometer Data Display & Presentation

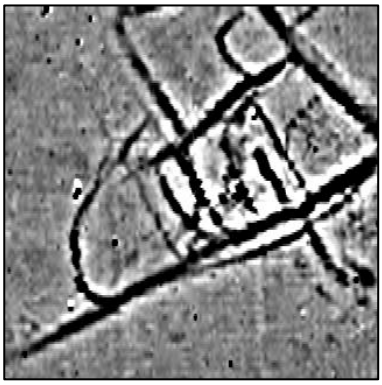
XY Trace

The data are presented as a series of linear traces, enabling a semi-profile display of the respective anomalies along the X and Y-axes. This display option is essential for distinguishing between modern ferrous materials (buried metal debris) and potential archaeological responses. The XY trace plot provides a linear display of the magnitude of the response within a given data set.



*Greyscale**

As with dot density plots, the greyscale format assigns a cell to each datum according to its location on the grid. The display of each data point is conducted at very fine increments, allowing the full range of values to be displayed within the given data set. This display method also enables the identification of discrete responses that may be at the limits of instrument detection. In the summary diagrams processed, interpolated data is presented. Raw un-interpolated data is presented in the archive drawings along with the xy-trace plots.



Interpretation

An interpretation of the data is made using many of the plots presented in the final report, in addition to examination of the raw and processed data. The project managers' knowledge and experience allows a detailed interpretation of the survey results with respect to archaeological potential.

**XY Trace and raw greyscale plots are presented in archive form for display of the raw survey data. Summary greyscale images of the interpolated data are included for presentation purposes and to assist interpretation.*

Electrical Resistance

The technique is used to record variations in electrical resistance by passing an electrical current through the ground. The standard instrument for archaeological investigations is a twin-probe array of mobile and remote electrodes maintained at a distance of about 20m.

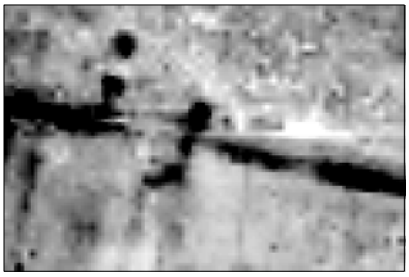
The mobile electrodes (one current and one potential, usually 1m apart) are mounted on a survey frame and connected to a Geoscan RM15 resistance meter, which records the specific resistance of the soil (measured in ohms).

The resistance meter is connected to the pair of remote probes (one current and one potential), which remain in a fixed location. Data are collected as the survey frame and mobile probes reach each designated sample interval. Survey was undertaken at 0.5 m sample intervals along 1 m traverses (i.e., 800 readings per 20m x 20m grid. The adaptability of the instrument enables increased sampling intervals, as well as a range of probe separations and arrays to operate at varying depth penetration.

Data Display & Presentation

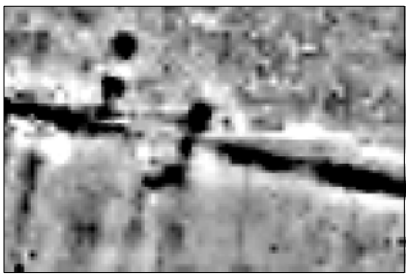
Greyscale

The greyscale format assigns a cell to each datum according to its location on the grid. The display of each data point is conducted at very fine increments, allowing the selected range of values to be displayed within the given data set. This display method also enables the identification of discrete responses that may be at the limits of instrument detection.



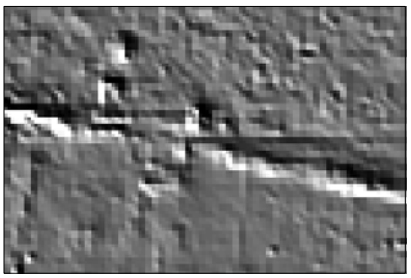
High Pass Filter

The data can be processed to enhance readings of interest. A High Pass Filter is commonly applied to increase the contrast of the responses with the natural background readings. The High Pass Filter can often emphasize responses of particular archaeological interest.



Relief Plot

The Relief Plot provides an aesthetic image of the data, giving the illusion of a 3-D data set. The illusion of height can provide a better visualisation of the resistance results and can be useful for interpretation and presentation.



Glossary of Interpretation Terms

Archaeology

This category refers to responses which are interpreted as of clear archaeological potential, and are supported by further archaeological evidence such as aerial photography or excavation. The term is generally associated with significant concentrations of former settlement, such as ditched enclosures, storage pits and associated features.

? Archaeology

This term corresponds to anomalies that display typical archaeological patterns where no record of comparative archaeological evidence is available. In some cases, it may prove difficult to distinguish between these and evidence of more recent activity also visible in the data.

? Industrial

Such anomalies generally possess a strong magnetic response and may equate with archaeological features such as kilns, furnaces, concentrations of fired debris and associated industrial material.

Area of Increased Magnetic Response

These responses often lack any distinctive archaeological form, and it is therefore difficult to assign any specific interpretation. The resulting responses are site specific, possibly associated with concentrations of archaeological debris or more recent disturbance to underlying archaeological features.

Trend

This category refers to low-level magnetic responses barely visible above the magnetic background of the soil. Interpretation is tentative, as these anomalies are often at the limits of instrument detection.

Ploughing/Ridge & Furrow

Visible as a series of linear responses, these anomalies equate with recent or archaeological cultivation activity.

? Natural

A broad response resulting from localised natural variations in the magnetic background of the subsoil; presenting as broad amorphous responses most likely resulting from geological features.

Ferrous Response

These anomalies exhibit a typically strong magnetic response, often referred to as ‘iron spikes,’ and are the result of modern metal debris located within the topsoil.

Area of Magnetic Disturbance

This term refers to large-scale magnetic interference from existing services or structures. The extent of this interference may in some cases obscure anomalies of potential archaeological interest.

Bibliography

English Heritage (2008) 'Geophysical guidelines: Geophysical Survey in Archaeological Field Evaluation.' Second Edition.

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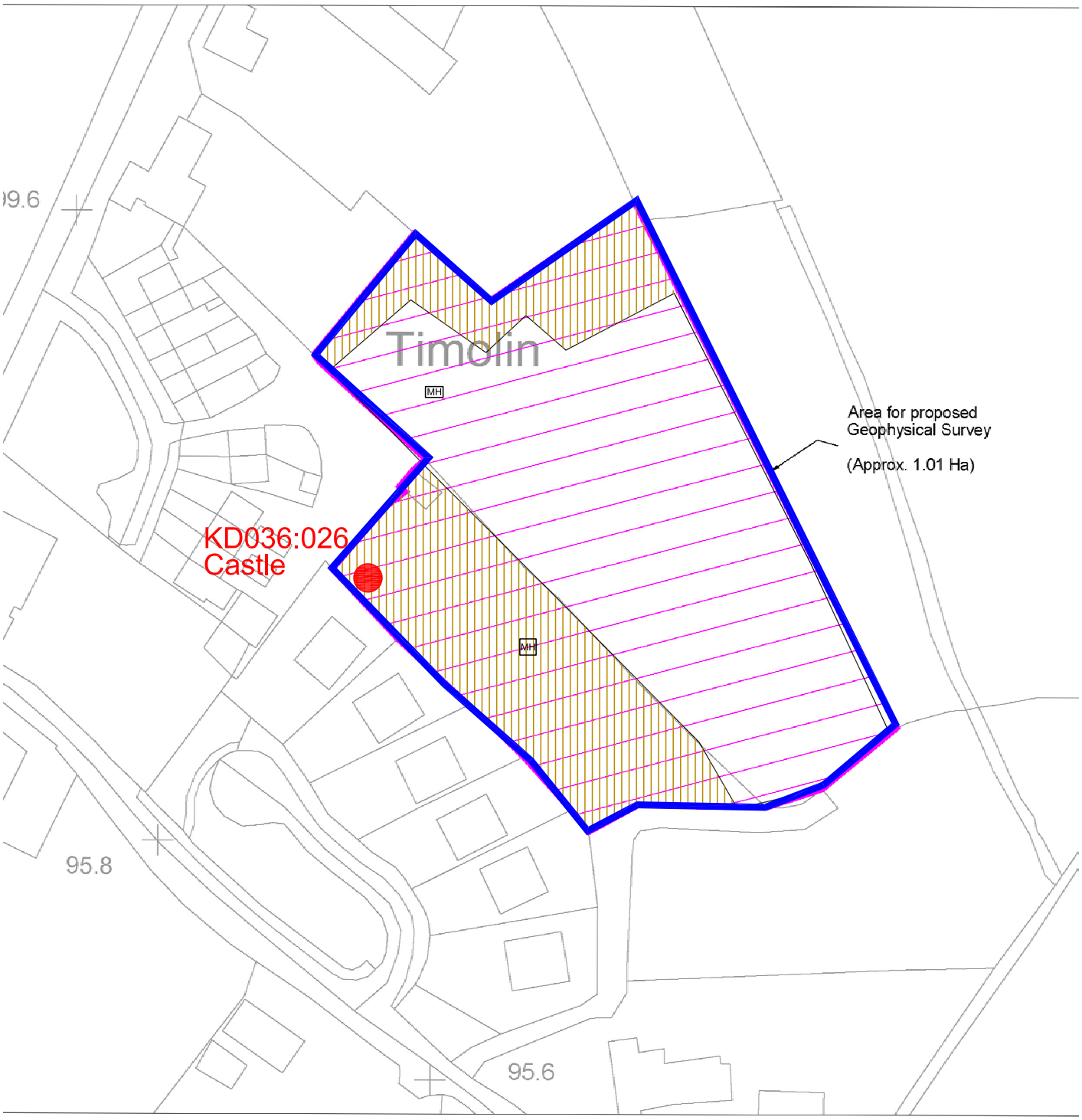
List of Figures



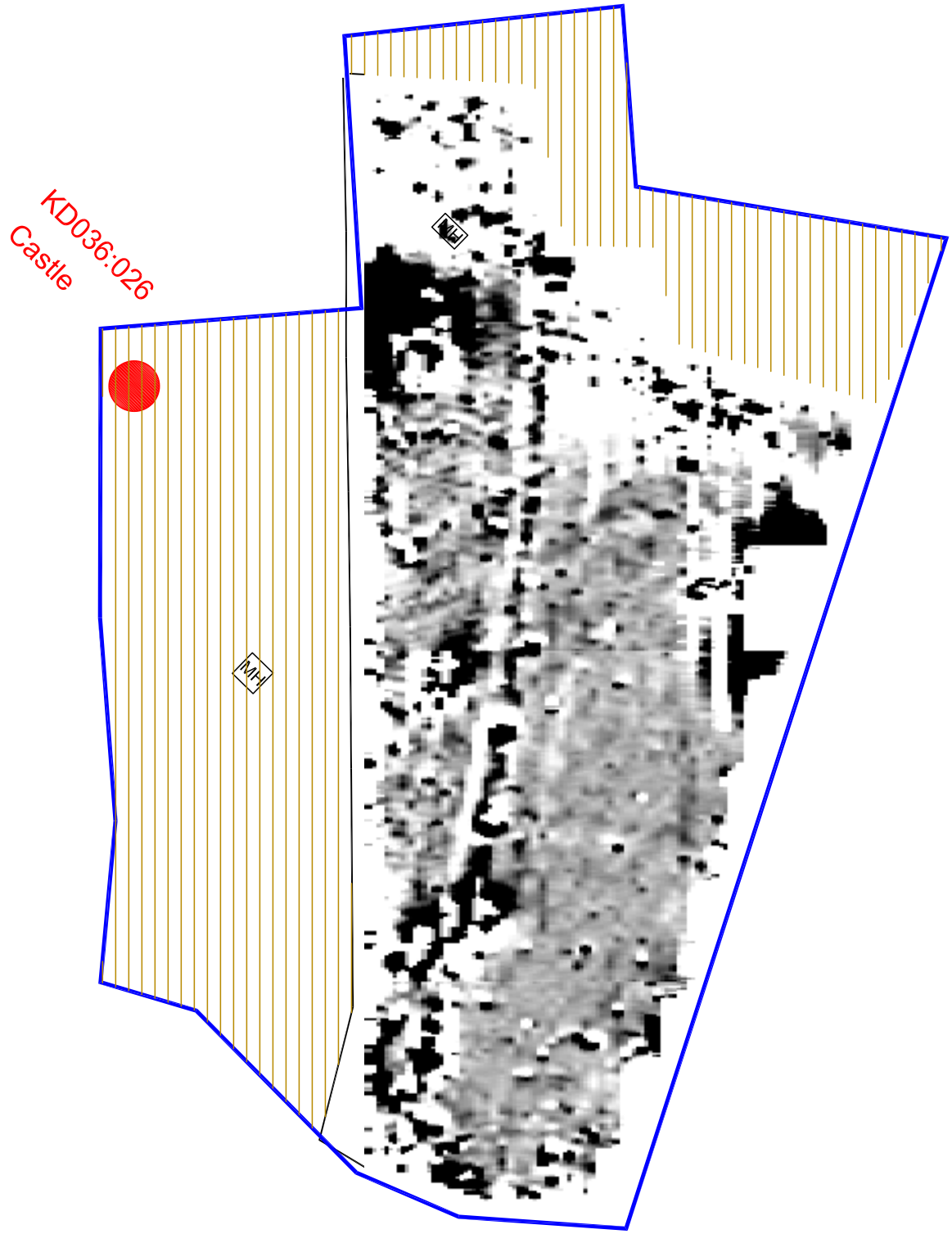
Application Area

Overgrown /
Not suitable for survey

0 metres 50

Client: Kildare County Council & Irish Water	Project: Geophysical Survey: Timolin, County Kildare	Title: Site Location Diagram	J.M.Leigh surveys www.jmlsurveys.com

Scale @ A4: 1:1,250
Figure: 1
Licence No.: 15-R-0133
Issue Date: 18.01.2016



2.5
nT
-1.5

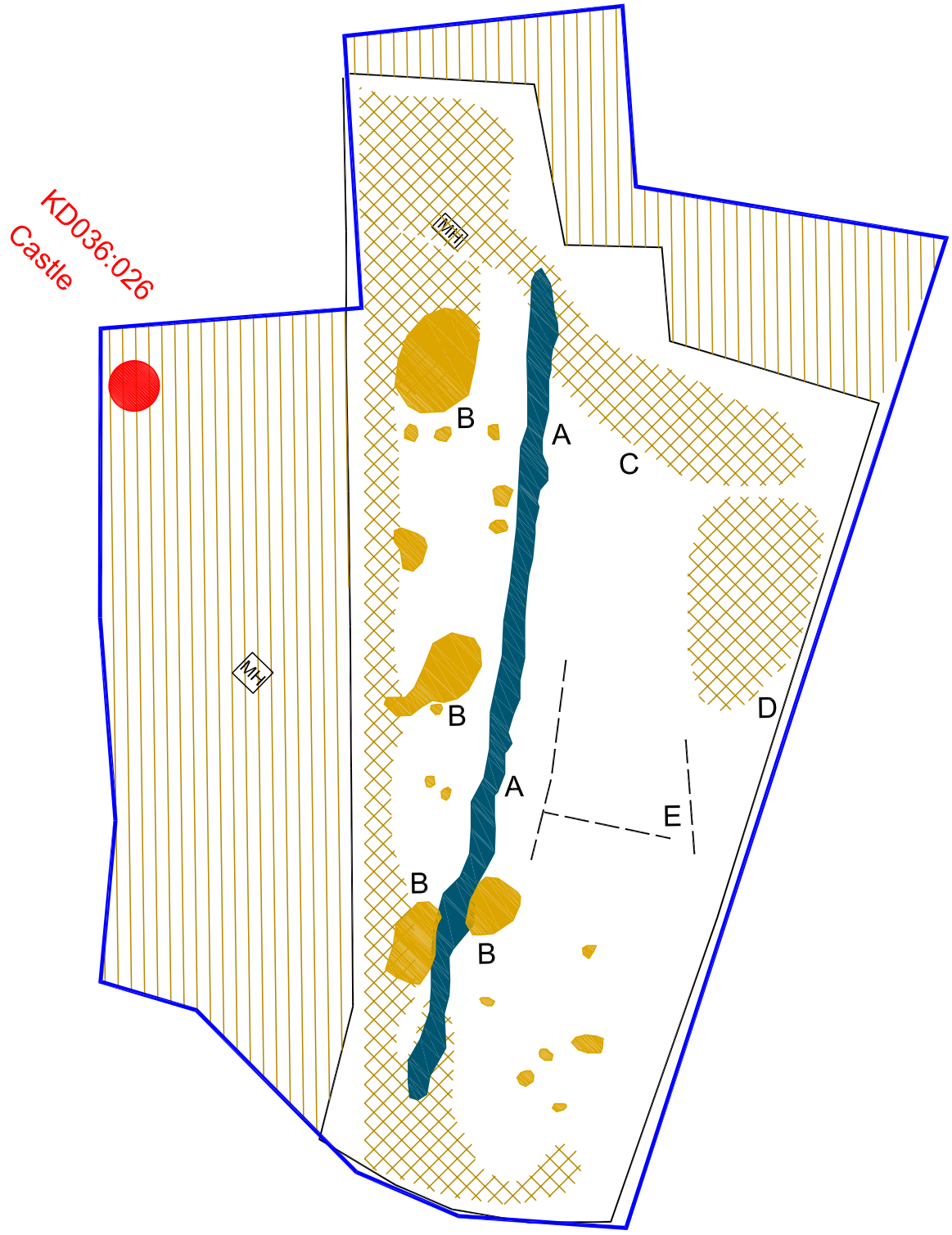
Application Area

Overgrown /
Not suitable for survey

0 metres 30

Client: Kildare County Council & Irish Water	Project: Geophysical Survey: Timolin, County Kildare	Title: Gradiometer Survey Summary greyscale image	J.M.Leigh surveys www.jmlsurveys.com

Scale @ A4: 1:750
Figure: 2
Licence No.: 15-R-0133
Issue Date: 18.01.2016



? Drainage Pipe | Positive trend | Modern Ferrous | Modern magnetic disturbance

0 metres 30

Client: Kildare County Council & Irish Water	Project: Geophysical Survey: Timolin, County Kildare	Title: Gradiometer Survey Summary interpretation	J.M.Leigh surveys www.jmlsurveys.com

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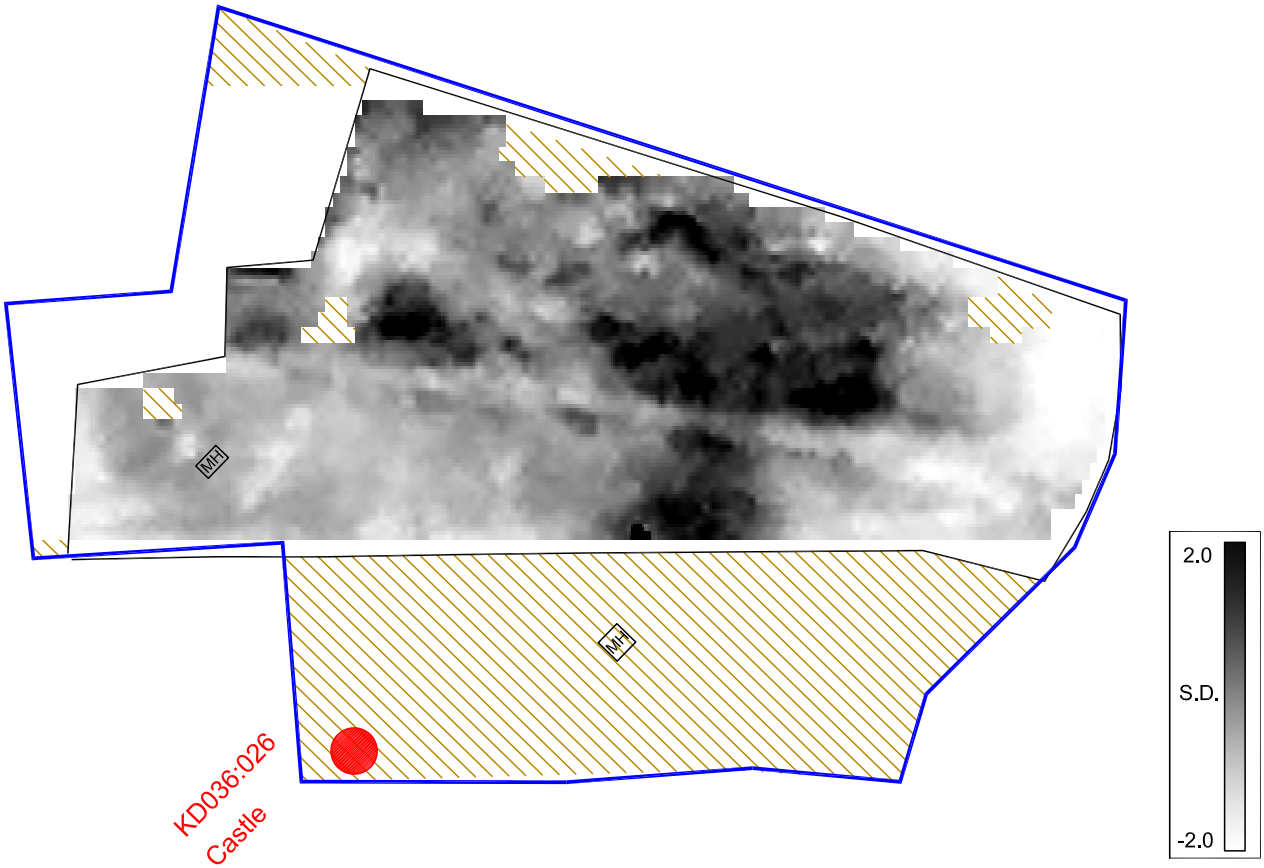
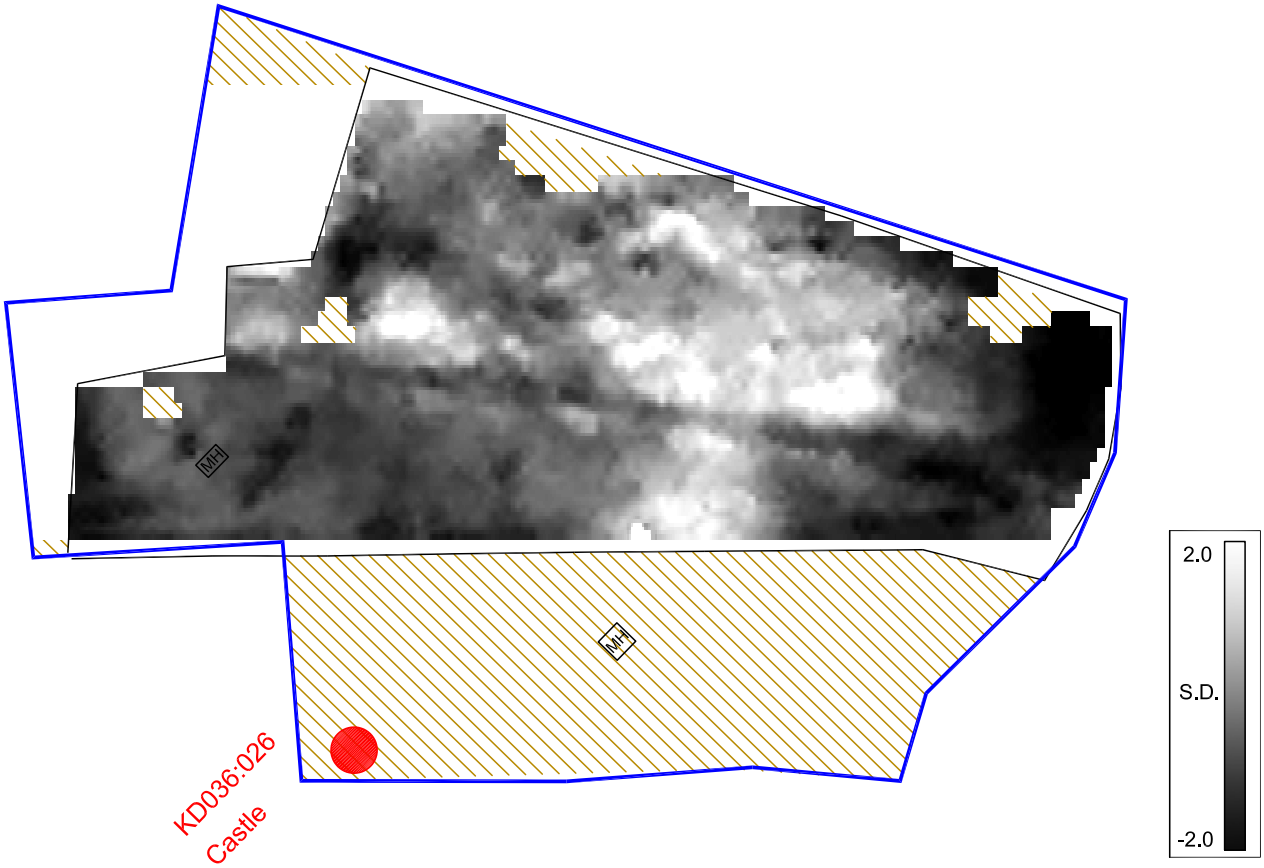
Licence No.: 15-R-0133
Issue Date: 18.01.2016





Application Area

Overgrown / Not suitable for survey

0 metres 40

Client: Kildare County Council & Irish Water	Project: Geophysical Survey: Timolin, County Kildare	Title: Resistance Survey Summary greyscale images	J.M.Leigh surveys www.jmlsurveys.com

Scale @ A4: 1:1,000
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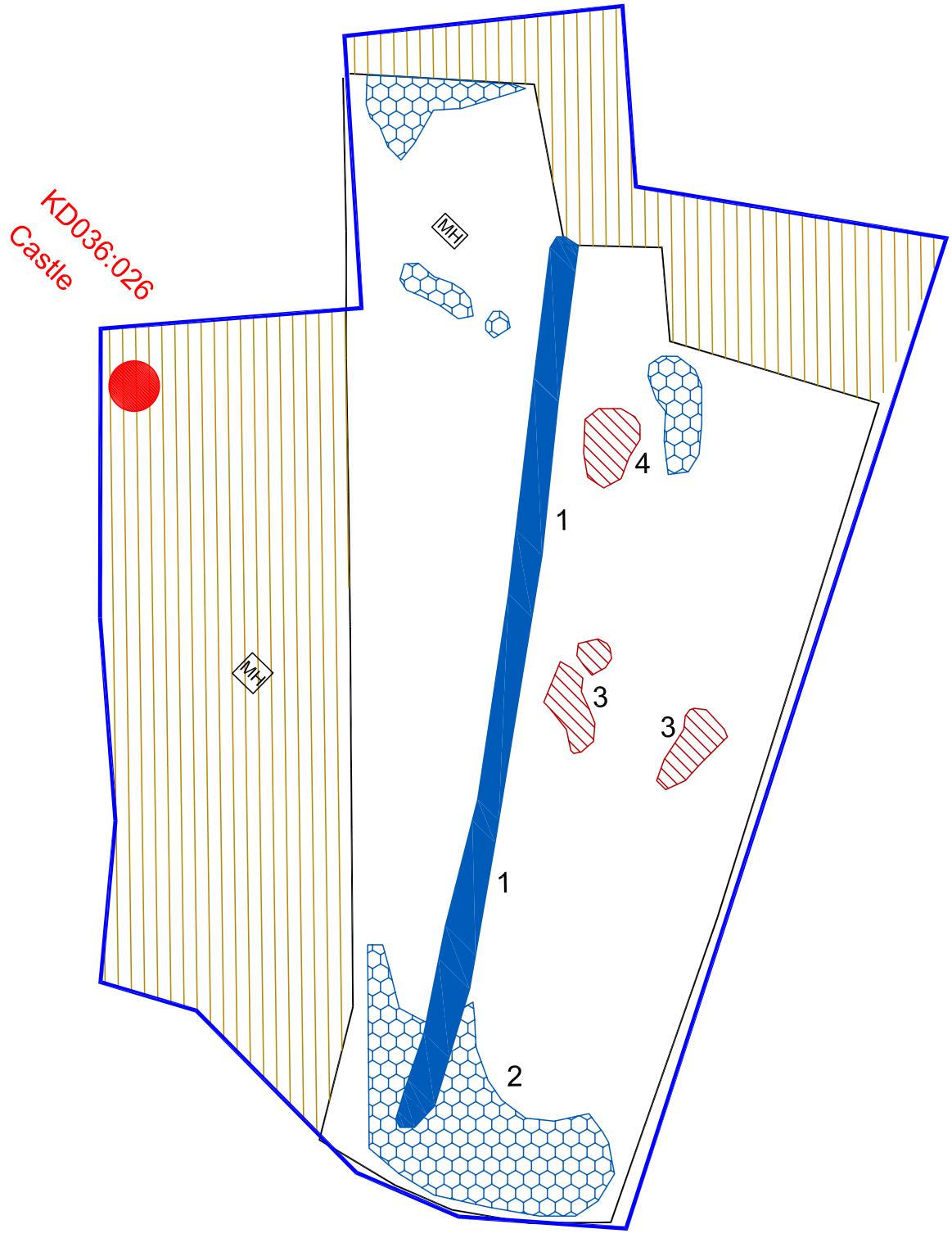
Issue Date: 18.01.2016



Low resistance
? Drainage Pipe

Low resistance
?Natural

High resistance
?Natural

0 metres 30

Client: Kildare County Council & Irish Water	Project: Geophysical Survey: Timolin, County Kildare	Title: Resistance Survey Summary interpretation	J.M.Leigh surveys www.jmlsurveys.com

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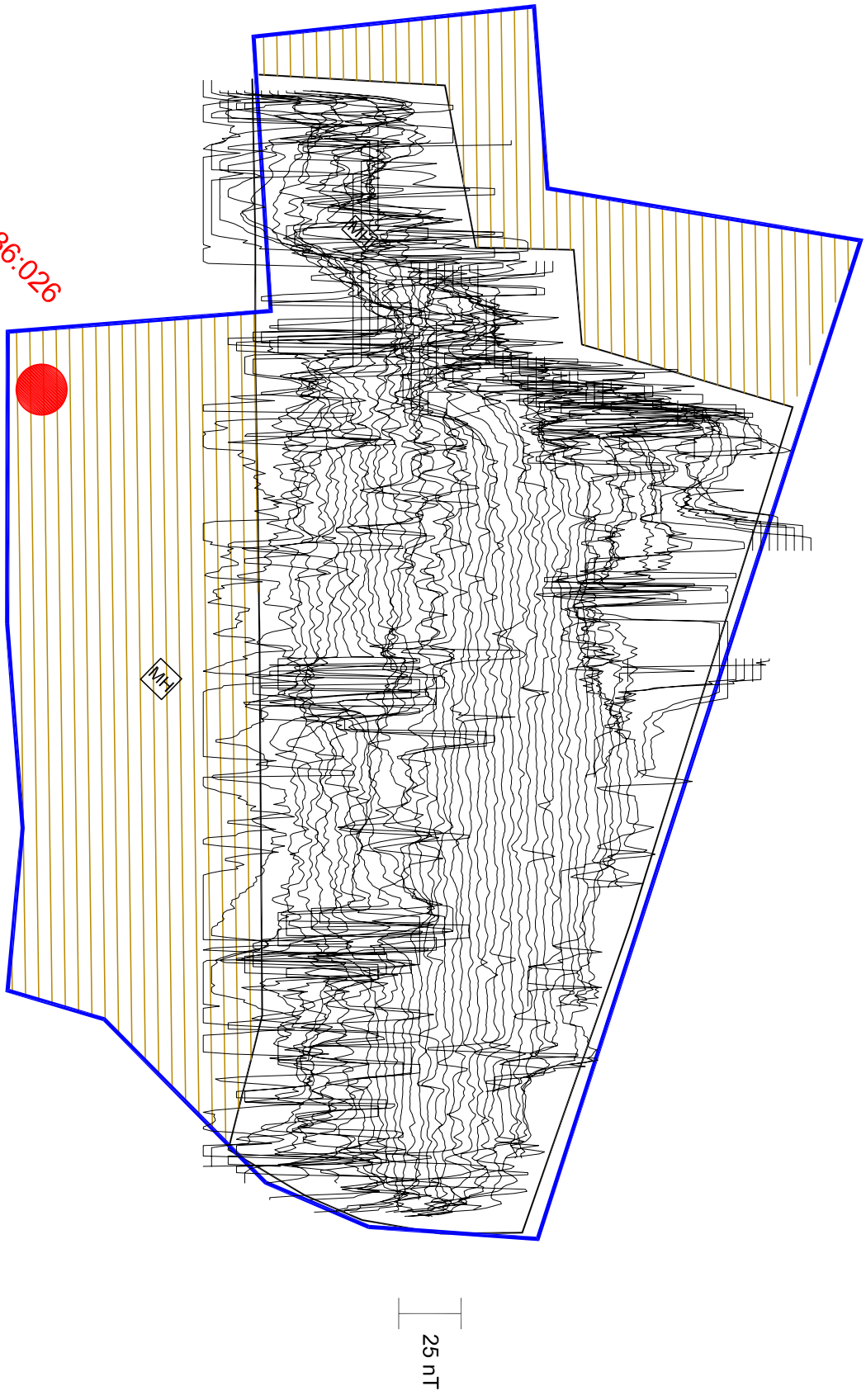
Issue Date: 18.01.2016



Application Area

Overgrown /
Not suitable for survey

0 metres 30

Client: Kildare County Council & Irish Water	Project: Geophysical Survey: Timolin, County Kildare	Title: Gradiometer Survey Raw data xy-trace plot	J.M.Leigh surveys www.jmlsurveys.com

Scale @ A4: 1:750
Figure: 6
Licence No.: 15-R-0133
Issue Date: 18.01.2016