

Greater Dublin Drainage Scheme,  
Blanchardstown to Swords  
Co. Dublin

*Archaeological Geophysical Survey*

*Detection Licence No. 14R0045*

*Survey undertaken on behalf of*

*Irish Water*

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EAG 245

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PROSPECT HOUSE, DRUMAGH, CLAREMORRIS, COUNTY MAYO, IRELAND

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# Summary of Results

*Between the 8<sup>th</sup> and 11<sup>th</sup> April 2014, a series of geophysical surveys were conducted to investigate a series of pre-selected sites along the proposed Greater Dublin Drainage Scheme. Sites were investigated using a fluxgate gradiometer survey was undertaken at a sampling resolution of 1 x 0.25 m.*

*The bedrock geology varies across the course of the pipeline and is comprised mostly of different limestone formations including Waulsortian limestone, massive unsorted lime-mudstones, Boston Hill formation nodular and muddy limestone and shale, and Tober Colleen formation calcareous shale, limestone conglomerate. The majority of the survey area was covered in rough ploughed fields or fields containing young crop.*

*A portion of an enclosure ditch, with apparent entranceway was detected at Drumnigh 1. This feature is located within the northern half of the proposed pipeline corridor and may be associated with a number of other possible ditches and weakly magnetic trends indicating potential archaeological activity to the south of the enclosure.*

*Further ditches were detected at Drumnigh 2 and Kinsaley 2 which may be archaeological or more likely agricultural in origin. A series of possible ditches were also detected across the survey areas, these may be archaeological in origin.*

*Further potential archaeological features were revealed with the detection of a series of positive magnetic enhancement anomalies. These may be associated with pits, archaeological or enhancement from burning, debris or deposition.*

*The surveys for this project primarily detected a series of weakly magnetic trends across all sites. These are difficult to quantify due to their limited magnetic signatures and could be archaeological, geological or agricultural in origin.*

## Statement of Indemnity

*A geophysical survey is a scientific procedure that produces observations of results which are influenced by specific variables. The results and subsequent interpretation of the geophysical survey presented here should not be treated as an absolute representation of the underlying archaeological features, but as a hypothesis that must be proved or disproved. **Direct investigations are recommended to confirm the findings of this report.** Verification can only be provided via intrusive means, such as Test Trench excavations.*

## 1 Introduction

Earthsound Archaeological Geophysics were commissioned by Irish Water to execute a geophysical survey over the foot print of a proposed pipeline associated with the Greater Dublin Drainage Scheme. The proposed pipeline will run between Blanchardstown and Swords and within selected areas it was deemed necessary to undertake a geophysical survey in order to assess any non visible archaeology which might be affected by the project. The geophysical survey will be carried out as part of the Environmental Impact Statement (EIS) for the proposed development. A prior geophysical survey was undertaken by Target Archaeological Geophysics on a number of sites along the proposed scheme including the wastewater treatment plant at Clonshagh (Nicholls 2013).

Permissions to undertake the survey were obtained from the Department of the Arts, Heritage and the Gaeltacht (Licence Number 14R0045).

A number of different archaeological sites have been identified adjacent to the proposed development including a number of enclosures and relict field systems. Recorded monuments graveyard (DU014-031), a church (DU013-020001) and an enclosure (DU015-111) have been identified adjacent to the survey area. The site was assessed using a magnetic gradiometer.

### 1.1 Geography, Topography, Geology & Climate

Located within the townlands of Blanchardstown, Merryfalls, Abbotstown, Kinsaley, Saintdoolaghs, Drumnigh, Maynetown and Grange, the proposed development (Figure 1) starts at its westerly end at Ordnance Survey of Ireland Irish Transverse Mercator (ITM) Reference E708657 N738660. The easterly end of the contract terminates at Ordnance Survey of Ireland Irish Transverse Mercator (ITM) Reference E725008 N742348. The proposed pipeline runs from southwest to northeast starting just outside of Blanchardstown and near swords, terminating north of Howth.

A series of surveys were undertaken at pre-designed points along the proposed route. These comprised of a number of different land parcels. The majority of the areas surveyed were being used for tillage and vegetable production and almost all had been recently ploughed or seeded except in the case of the Abbotstown and Merryfalls sites which were pastoral fields. The site at Grange proved inaccessible and was not surveyed.

The sites containing recent ploughing proved difficult to survey due to the uneven terrain, while steep sloping topography was encountered at Drumnigh 1 and Drumnigh 2.

The bedrock geology varies across the course of the pipeline and is comprised mostly of different limestone formations including Waulsortian limestone: massive unsorted lime-mudstones, Boston Hill formation: nodular and muddy limestone and shale, and Tober Colleen formation: calcareous shale, limestone conglomerate. These are generally weak magnetic geologies and are likely to produce weak potential archaeological anomalies.

In the week preceding the geophysical survey, the climatic conditions were moderate to wet with no impact on the geophysical data envisaged.

## 1.2 Archaeological Background

All survey areas (apart from Drumnigh 2) are located adjacent to recorded monuments, all visible within aerial photography for the area. Many of these features are newly identified and were discovered as part of the proposed pipeline investigations. The presence of these monuments has formed the basis for the locations of the geophysical surveys:

Merryfalls 1- Contains enclosure DU014-105

Kinsaley 1 – Contains a portion of enclosure DU015-110

Kinsaley 2 – Contains a portion of enclosure DU015-109

Saintdoolaghs – To the immediate north of enclosure DU015-123

Drumnigh 1 – Contains a portion of enclosure DU015-118

Maynetown – Immediately adjacent to enclosure DU015-130

The site at Drumnigh 2 is located immediately adjacent to a large archaeological complex (identified during aerial photographic analysis). The presence of this has since been proved by geophysical survey and archaeological testing as part of a separate project. Further recorded monuments are located in the surrounding area especially within the areas surrounding Drumnigh, Kinsaley and Maynetown.

## 1.3 Aims & Objectives

The aim of the geophysical survey was to determine the nature of the archaeological resource in advance of the proposed development scheme. Specific objectives were to:

- Determine the extent of archaeological heritage located within the footprint of the proposed pipelines
- To locate and interpret any potential archaeological remains detected

## 2 Methodology

The fieldwork was carried out from 08 - 11 April 2014 by J. Bonsall and D. Regan of Earthsound Archaeological Geophysics.

A magnetic gradiometer survey was carried out using four Geoscan Research FM256 fluxgate gradiometers. Two pairs of sensors were each mounted on a CF6 carry frame.

The survey area covered a total of approximately 10 hectares, contained within a number of fields. A rectangular grid was laid out using a Trimble Pro-XRS Differential Global Positioning System (see Technical Appendix 2), and divided in to 40 × 40 m sub-grids.

## 2.1 Magnetic Gradiometer Survey

The survey was undertaken along lines parallel to the sub-grid edges, walking approximately south to north, starting in the southwest corner of each grid. Subsequent lines were surveyed in alternate directions ('zigzag').

Data were recorded using an FM256 at a spatial resolution of 1 m intervals between traverses and 0.25 m intervals along those lines. The instrument was positioned facing north, parallel to the Earth's magnetic field, to allow increased geo-magnetic resolution.

The instrument was set to a recording sensitivity of 0.1 nT. Prior to the beginning of the survey and after the completion of every two sub-grids, the electronic and mechanical set-up of the instrument were examined and calibrated as necessary over a common reference point. The magnetic drift from zero was not logged.

Data were collected automatically using an internal sample trigger while the operator walked at a constant pace along the traverse. The data were stored in an internal data logger and downloaded to a field computer using the Geoscan Research Geoplot v.3.00mx software.

### 2.1.1 Data Processing

#### 2.1.1.1 Preliminary Data Treatment

The data were pre-processed in Geoplot 3.00.

Spurious high intensity anomalies, commonly statistical outliers, are referred to as geophysical 'spikes'. In magnetic data, an 'iron spike' is a response to a buried ferrous object, often in the topsoil. Iron spikes are generally not removed in geophysical data; although often modern in origin, they can be indicative of archaeological material.

The raw data contained some poorly matched sub-grids, caused by the internal drift of the fluxgate gradiometer and the gradual misalignment of the fluxgate sensors between calibration episodes. To compensate for this, a zero mean traverse (ZMT) function was employed. The use of ZMT alters data to adjust the mean of each traverse to zero by increasing or decreasing data as necessary. This alters the statistical properties of the data to give a uniformly bipolar background, centred around zero. Post-ZMT plots were compared with raw data to analyse the potential removal of geophysical anomalies along the line of a traverse.

#### 2.1.1.2 Further Processing

No further processing functions were applied due to the high quality of the data collection.

A low pass Gaussian filter was applied, reducing the variability of the data whilst improving the visibility of weak archaeological features. This also had a smoothing effect on the data.

A sine wave interpolation function was applied to provide a smooth, aesthetically pleasing image for presentation. For a given point  $x$ , the contribution of adjacent readings to the interpolated point is given by the function  $\text{sinc}(x) = \frac{\sin \pi x}{\pi x}$  (Scollar 1990). This function is used as a sliding window along each transect, resulting in an interpolated image, expanding the resolution of the data from 1 m x 0.25 m to 0.25 m x 0.25 m. This function was chosen as giving a clearer interpolated image than linear interpolation (which assumes a direct linear change between each point) or bicubic interpolation (taking the surrounding sixteen values into account).

### 2.1.2 Graphical Display

Processed data are shown in Greyscale format in Figures 4, 6, 8, 10, 12, 14, 16, 18 and 20. The greyscale plot presents data as pixels on a linear grey shaded scale, increasing or decreasing dependent on the values of the maximum and minimum clip. The geophysical data have been clipped at  $-2$  (white) and  $+2$  nT (black) except in the case of the waste water treatment plant which has been clipped at  $-3$  (white) and  $+3$  nT (black). Data values beyond the clip limits are shown as 'pure' black or white. The main advantage of this display option is that the data can be viewed as a base map.

Interpretation plots are presented in Figures 5, 7, 9, 11, 13, 15, 17, 19 and 21.

### 2.2 Reporting, Mapping & Archiving

The geophysical survey and report follow the recommendations outlined in the English Heritage Guidelines (David et al. 2008) and IFA Paper No. 6 (Gaffney et al. 2002) as a minimum standard. The conditions of the Detection Licence issued by the Licensing Section of the Department of the Arts, Heritage and the Gaeltacht require a copy of this report.

Geophysical data, figures and text are archived following the recommendations of the Archaeology Data Service (Schmidt 2001).

Field boundaries were mapped and drawn based upon data gathered by the DGPS.

Technical information on the equipment used, data processing and methodology are given in Appendix 1. Appendix 2 details the survey geo-referencing information and Appendix 3 describes the composition and location of the archive.

## 3 Results & Discussion

*The interpretation figures should not be looked at in isolation but in conjunction with the relevant discussion section and with the information contained in the Appendices. Features are highlighted in Figures 5, 7, 9, 11, 13, 15, 17, 19 & 21 and are described and interpreted within the text.*

In magnetic data, a dipolar anomaly or 'iron spike' is a response to buried ferrous objects, often in the topsoil. Iron spikes generally are not removed in geophysical data, although often modern in origin, they can be indicative of archaeological material.

### 3.1 Abbotstown Pumping Station

Figure 4 – Magnetic Gradiometer Data

Figure 5 – Magnetic Gradiometer Interpretation

This site comprised a pastoral field of reasonably flat topography which contained trees and disturbed ground to the west which restricted the survey area.

An area of modern interference was detected cutting the northwest corner of the survey area. This is possibly a pipeline, services or the remnants of a field boundary. Two possible ditches were detected, one arcing in form, the other linear which may be archaeological in origin.

A sub-circular possible ditch, with a radius of 14 metres, was detected in the middle of the survey area. This anomaly could be archaeological in origin.

A further series of very weak magnetic signatures were detected across the survey area. Curvilinear in formation these may be archaeological, geological or agricultural in origin. Similar anomalies were detected across a number of the sites surveyed and due to their very weak magnetic signature they are difficult to quantify.

### **3.2 Merryfalls 1**

Figure 6 – Magnetic Gradiometer Data

Figure 7 – Magnetic Gradiometer Interpretation

This flat pasture field contains six anomalies, all comprising of a very weak magnetic signature. They are either linear or curvilinear in morphology and ranged between 13 m and 35 m in length. They could be geological, agricultural or archaeological in origin.

The site has previously been identified as containing Enclosure DU014-105 through aerial photography. It is possible that the geophysical anomalies are associated with this feature however a direct correlation cannot be established.

### **3.3 Waste Water Treatment Plant (Clonshagh)**

Figure 8 – Magnetic Gradiometer Data

Figure 9 – Magnetic Gradiometer Interpretation

This site comprised a mixture of rough ploughed and newly seeded land.

A series of linear and curvilinear weakly magnetic anomalies were detected across the survey area, possibly associated with archaeological, geological or agricultural processes.

A single small area of positive magnetic enhancement was also detected; this could represent the presence of possible archaeological material.

The site has previously been partially surveyed by Target Archaeological Geophysics (Nicholls 2013). The type of features detected in this report are similar to those in the previous survey.

### **3.4 Kinsaley 1**

Figure 10 – Magnetic Gradiometer Data

Figure 11 – Magnetic Gradiometer Interpretation

Consisting of a ploughed field this survey area contained two areas of positive magnetic enhancement which could represent possible pits.

A number of linear and curvilinear weakly magnetic anomalies were also detected, potentially representing archaeological ditches or geological processes.

The site has previously been identified as containing Enclosure DU015-110 through aerial photography. It is possible that the geophysical anomalies are associated with this feature however a direct correlation cannot be established.



### 3.5 Kinsaley 2

Figure 12 – Magnetic Gradiometer Data

Figure 13 – Magnetic Gradiometer Interpretation

This ploughed field contained the remains of a ditch. Located in the middle of the survey area running on an east to west axis and measuring 26 metres in length, this anomaly is likely to represent a relict field boundary, probably associated with the right-angled bend in the present day field boundary.

A number of circular and curvilinear anomalies were also detected. These have a weak magnetic signature and could be either geological or archaeological. These many be associated with Enclosure DU015-019 previously identified in aerial photography however a direct correlation cannot be established.

### 3.6 Saintdoolagh's

Figure 14 – Magnetic Gradiometer Data

Figure 15 – Magnetic Gradiometer Interpretation

This recently ploughed and seeded field contained a pylon on its northern edge which created surrounding magnetic interference. The site has previously been identified as containing two recorded monuments through aerial photography. A sub-circular enclosure DU015-123 is located immediately north of the survey area while other features that could indicate a possible field system (DU015-134) were detected in the vicinity.

Three areas of positive magnetic enhancement possibly correspond to pits, while a series of curvilinear weakly magnetic anomalies may archaeological or geological. It is possible that the geophysical anomalies are associated with the enclosure identified in the aerial photography.

### 3.7 Drumnigh 2

Figure 16 – Magnetic Gradiometer Data

Figure 17 – Magnetic Gradiometer Interpretation

This site comprised an undulating recently ploughed field.

A right-angled ditch was detected truncating the survey area. Measuring 34m by 76m this anomaly is likely to represent a former field division.

An area of positive magnetic enhancement may represent archaeological activity such as a pit, while two possible ditches may also be archaeological in origin.

Two small arcing weakly magnetic anomalies may be geological, agricultural or archaeological in nature.

### **3.8 Drumnigh 1**

Figure 18 – Magnetic Gradiometer Data

Figure 19 – Magnetic Gradiometer Interpretation

This site comprised a recently seeded field of slightly sloping topography and is located to the south of a suspected enclosure. A semi-circular ditch was detected which is likely to represent the southern edge of the enclosure DU015-118, indicating that it is archaeological in origin. Measuring 31m in diameter the ditch may contain enhanced or burnt remains. A potential entranceway on the eastern side can be seen with the detection of two apparent ditch terminus at a break in the enclosure ditch.

Two curvilinear weakly magnetic features were detected on the southern edge of this ditch. Although they have a limited magnetic presence it is possible that they are associated with the enclosure. On the southern edge of the larger an area of positive magnetic enhancement was detected, indicating a possible pit.

A series of further possible ditches were detected across the survey area which may be archaeological in nature.

### **3.9 Maynetown 1**

Figure 20 – Magnetic Gradiometer Data

Figure 21 – Magnetic Gradiometer Interpretation

This seeded slightly sloping field yielded a number of weak magnetic anomalies. Linear and curvilinear these may be archaeological, agricultural or geological in origin.

Six areas of positive negative enhancement were also detected. These are located across the survey area and may be associated with pits, archaeological activity or burning.

The site has previously been identified as containing Enclosure DU015-130 through aerial photography. No evidence of this feature can be seen in the geophysical survey results however the areas of enhancement may be associated with the enclosure.

## **4 Conclusion**

### **4.1 Summary of Results**

A portion of an enclosure ditch, with apparent entranceway was detected at Drumnigh 1. This feature is located within the northern half of the proposed pipeline corridor and may be associated with a number of other possible ditches and weakly magnetic trends indicating potential archaeological activity to the south of the enclosure.

Further ditches were detected at Drumnigh 2 and Kinsaley 2 which may be archaeological or more likely agricultural in origin. A series of possible ditches were also detected across the survey areas, these may be archaeological in origin.

Further potential archaeological features were revealed with the detection of a series of positive magnetic enhancement anomalies. These may be associated with pits, archaeological or enhancement from burning, debris or deposition.

The surveys for this project primarily detected a series of weakly magnetic trends across all sites. These are difficult to quantify due to their limited magnetic signatures and could be archaeological, geological or agricultural in origin.

## 4.2 Dissemination

The results of this survey were submitted to *Irish Water*. *Earthsound* will ensure that copies will be forwarded to the *Department of the Arts, Heritage and the Gaeltacht* and the *National Museum of Ireland* in compliance with the Licence agreement.

## 5 Acknowledgements

**Fieldwork:** James Bonsall BA (Hons) MSc MIAI  
Darren Regan BSc (Hons) MA

**Report and Graphics:** James Bonsall and Darren Regan

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[http://gsigis1.dcmnronline.ie/imf/imf.jsp?site=GSI\\_Simple](http://gsigis1.dcmnronline.ie/imf/imf.jsp?site=GSI_Simple) Accessed 15/04/2014

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- Figure 5: Magnetic Gradiometer interpretation – Abbotstown Pumping Station
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- Figure 7: Magnetic Gradiometer interpretation – Merryfalls 1
- Figure 8: Magnetic Gradiometer data – Waste-Water Treatment Plant (Clonshagh)
- Figure 9: Magnetic Gradiometer interpretation  
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- Figure 10: Magnetic Gradiometer data – Kinsaley 1
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- Figure 20: Magnetic Gradiometer data – Maynetown
- Figure 21: Magnetic Gradiometer interpretation – Maynetown

# Technical Appendix

## Appendix 1

### Methodology

#### Fluxgate Gradiometer Survey

A detailed survey requires a sample trigger to automatically take readings at predetermined points. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation. Detailed survey allows the visualisation of weaker anomalies that may not have been detected by magnetic scanning or magnetic susceptibility.

## Appendix 2

### Survey Grid Re-location

1. Each survey grid was laid out using a *Trimble Pro-XRS* Differential Global Positioning System (DGPS), to an accuracy of  $\pm 50$ cm.
2. There was a good correlation between the geophysical survey data and the digital map base and it is estimated that the average 'best fit' error is lower than  $\pm 0.25$ m. It is important to note that local grid north (27/08/03) varies slightly from *Ordnance Survey* north, with an annual decrease of  $0.9^{\circ}3'$ .

## Appendix 3

### Geophysical Archive

*Earthsound Archaeological Geophysics* takes its archiving responsibilities very seriously. Archiving is a necessary measure to maintain a complete record of past research, prevent unnecessary duplication and allow the re-use and re-interpretation of geophysical data as analytical techniques evolve.

The geophysical archive comprises:-

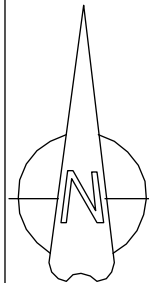
- an archive CD-ROM containing files of the raw data (Geoplot 3.00a, MS-Excel), report text (Word 2000 9.0), and graphics files (AutoCAD 2000).
- a hard (paper) copy of the report

At present, two copies of the archive are held by *Earthsound Archaeological Geophysics*, at separate locations to ensure preservation against accidental damage or theft. The Client, *Irish Water*, holds one further copy of the archive. Additional paper copies intended for ultimate deposition with the *Department of the Arts, Heritage and the Gaeltacht* are in the guardianship, and are the responsibility of, *Earthsound Archaeological Geophysics*.



**Legend**

- Basemap
- Proposed Drainage Corridor
- Potential Archaeological Remains
- Geophysical Survey Areas



Site Location: Greater Dublin Drainage Scheme, County Dublin

Client: Irish Water

Drawing Courtesy of Jacobs

Date 14/04/14

Drawing No.: 14-003/01

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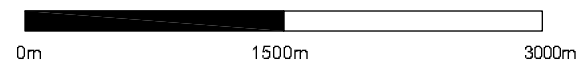
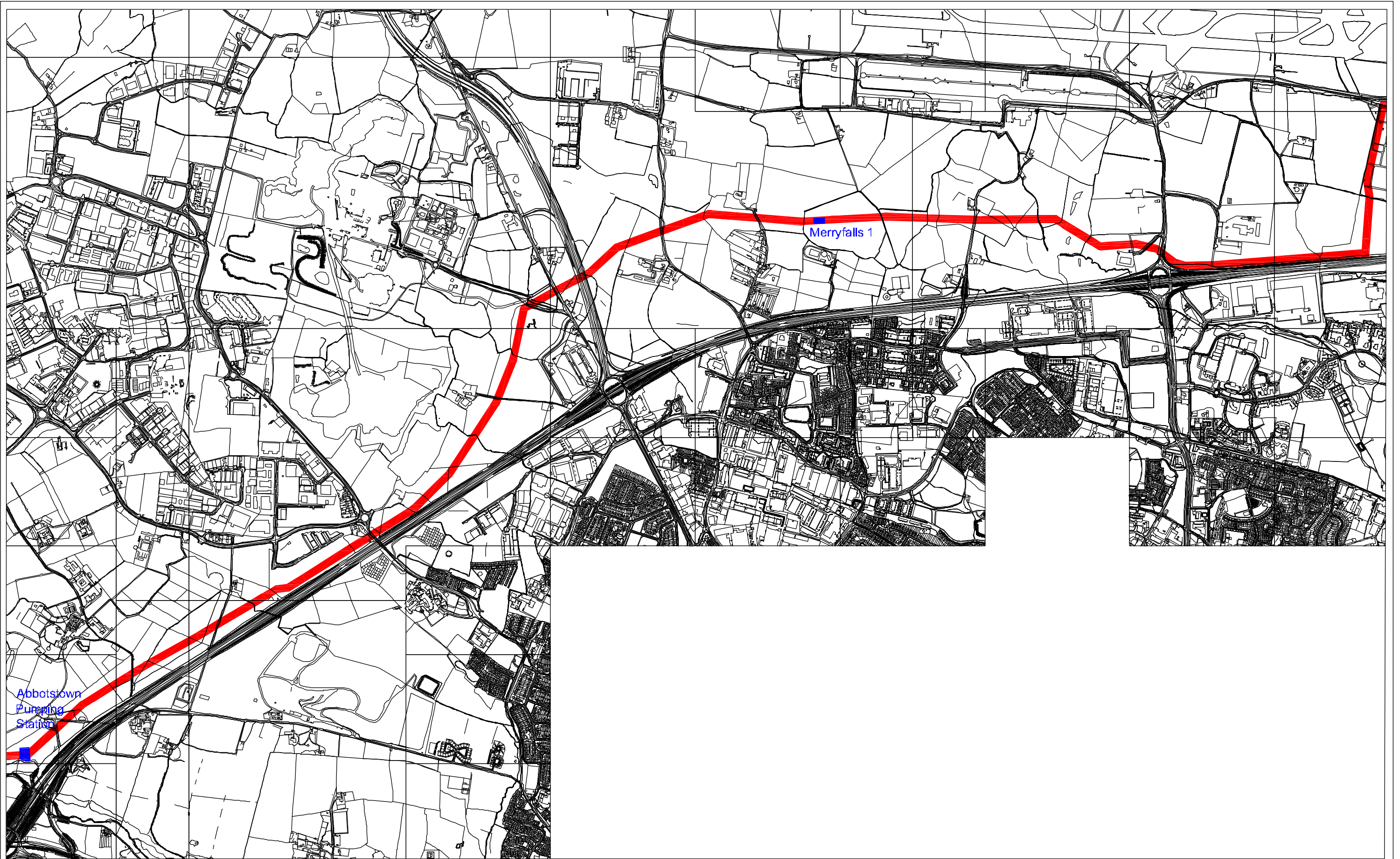


Figure No. 1 Location map

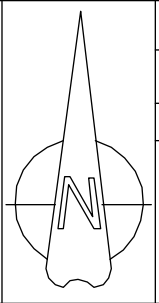






**Legend**

- Basemap
- Proposed Drainage Corridor
- Potential Archaeological Remains
- Geophysical Survey Areas



Site Location: Greater Dublin Drainage Scheme, County Dublin

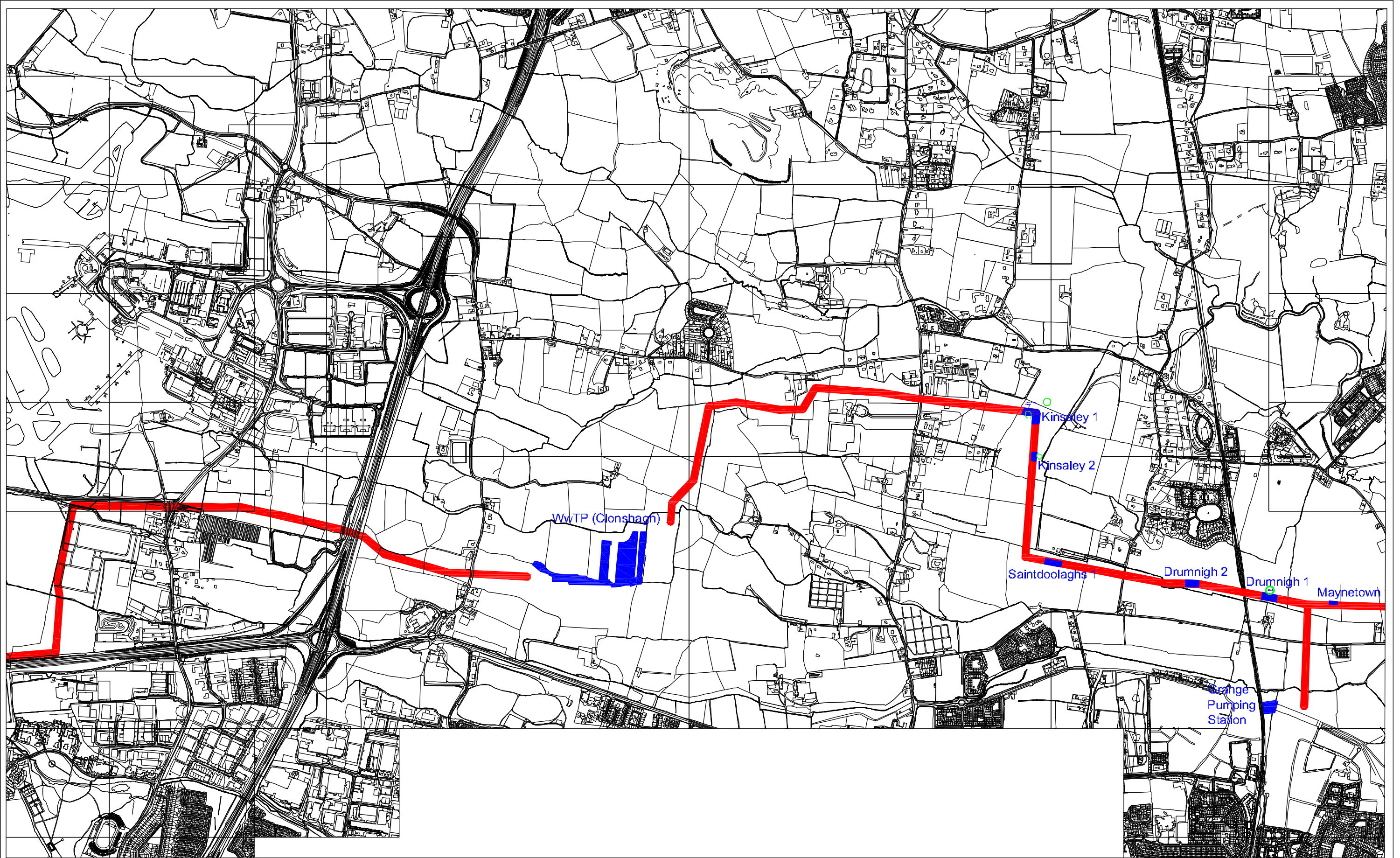
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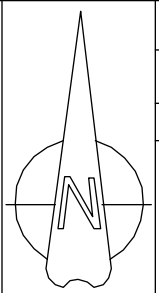
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**Figure No. 2 Detailed location map  
- Western half**





- Legend**
- Basemap
  - Proposed Drainage Corridor
  - Potential Archaeological Remains
  - Geophysical Survey Areas



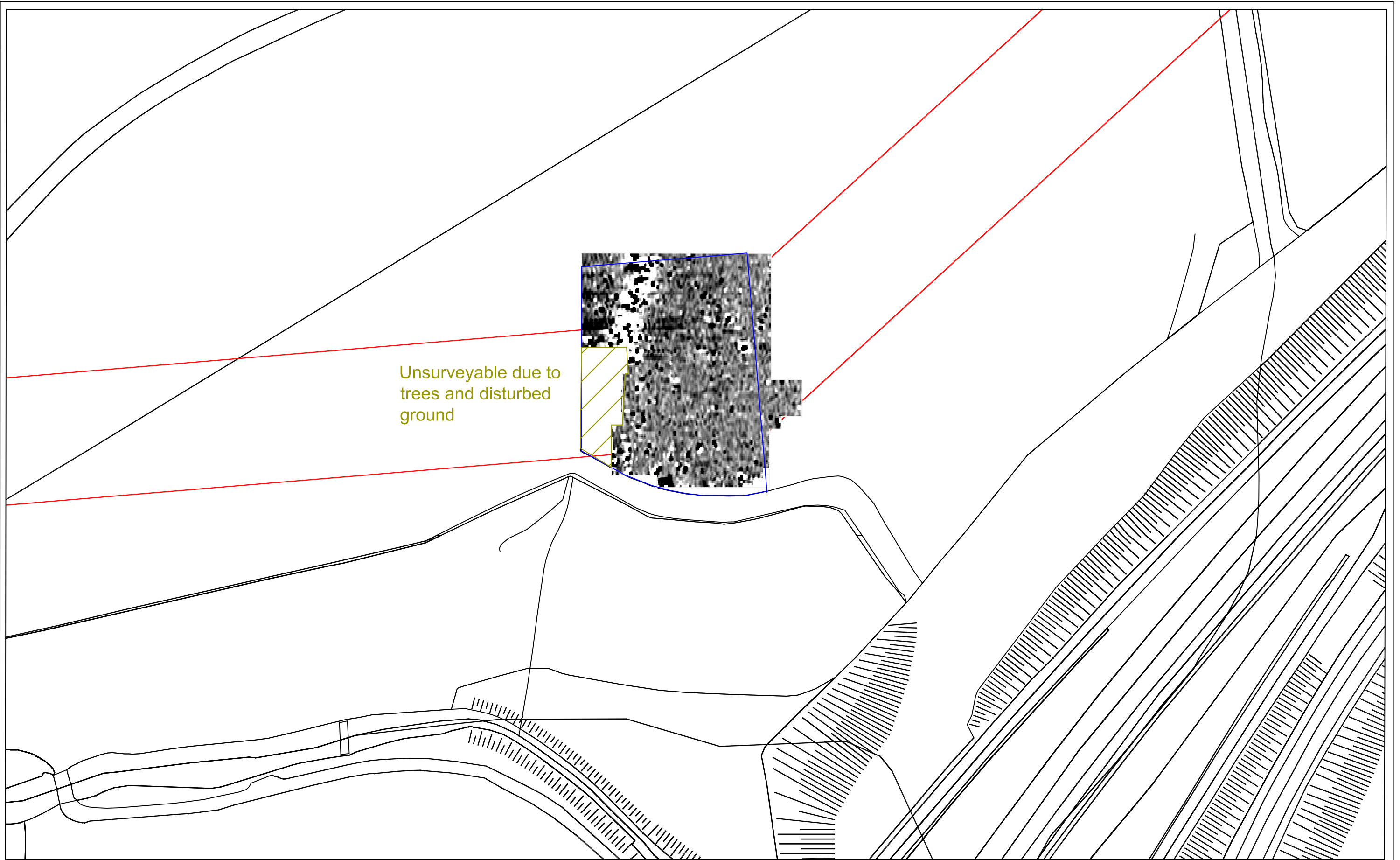
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0m                      700m                      1400m

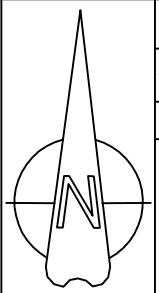
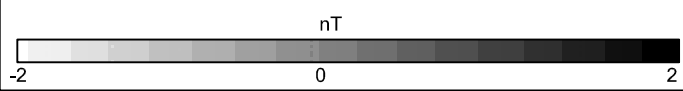
**Figure No. 3 Detailed location map  
 - Eastern half**





Unsurveyable due to trees and disturbed ground

- Legend**
- Basemap
  - Proposed Drainage Corridor
  - Potential Archaeological Remains
  - Geophysical Survey Areas
  - Area Unsurveyable



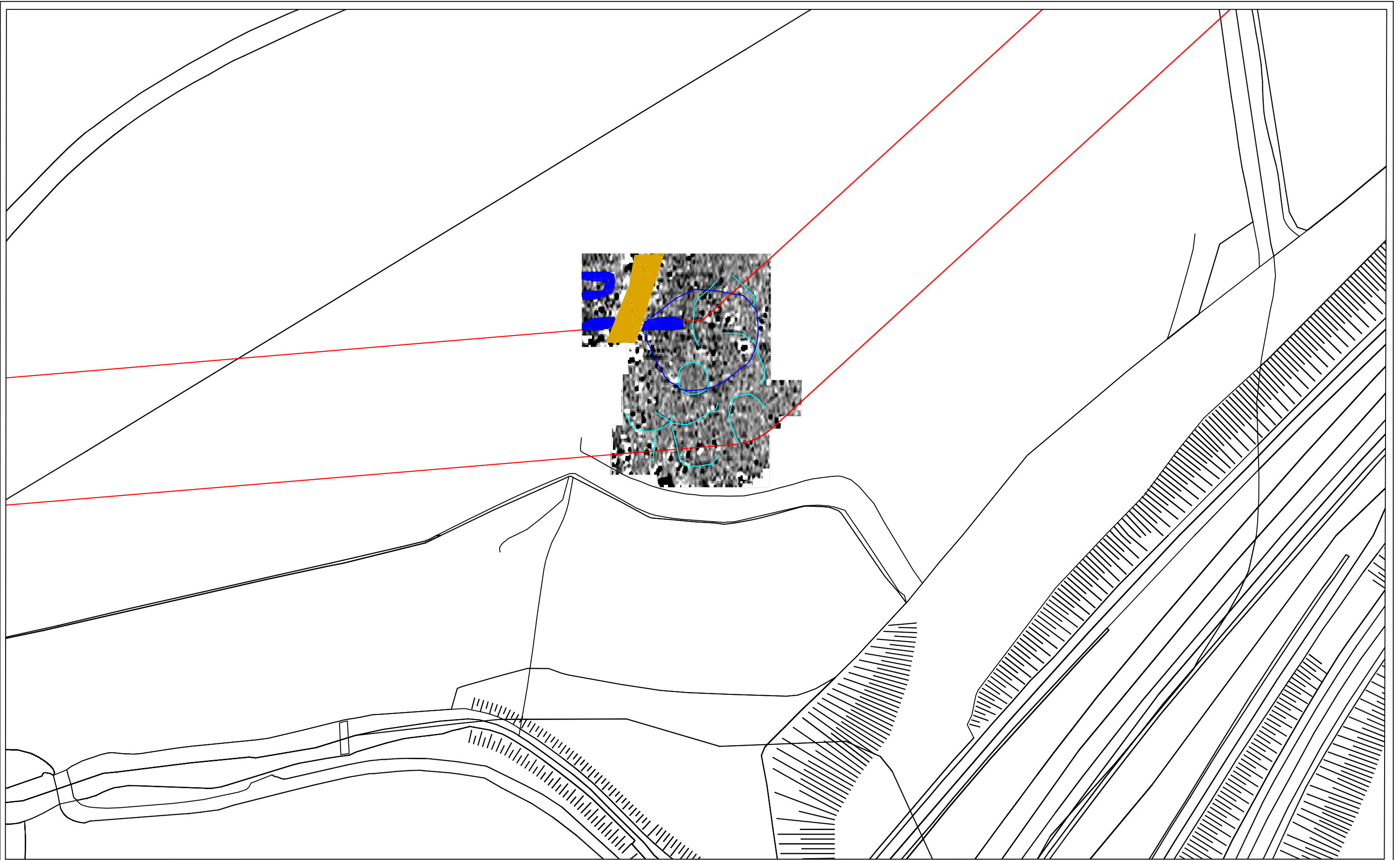
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 Client: Irish Water  
 Drawing Courtesy of: Jacobs      Date: 23/04/14      Drawing No.: 14-003/04

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**Figure No. 4 Magnetic Gradiometer data - Abbotstown Pumping Station**

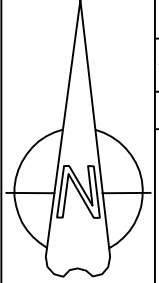
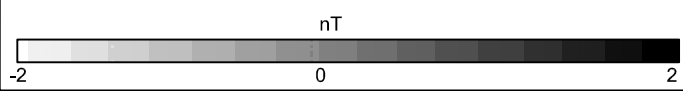




**Legend**

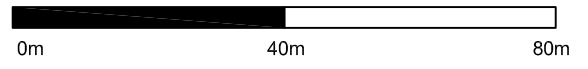
- Basemap
- Proposed Drainage Corridor
- Potential Archaeological Remains

- Ditch
- Possible Ditch
- Possible Geology or Archeology
- Positive Magnetic Enhancement
- Modern Interference



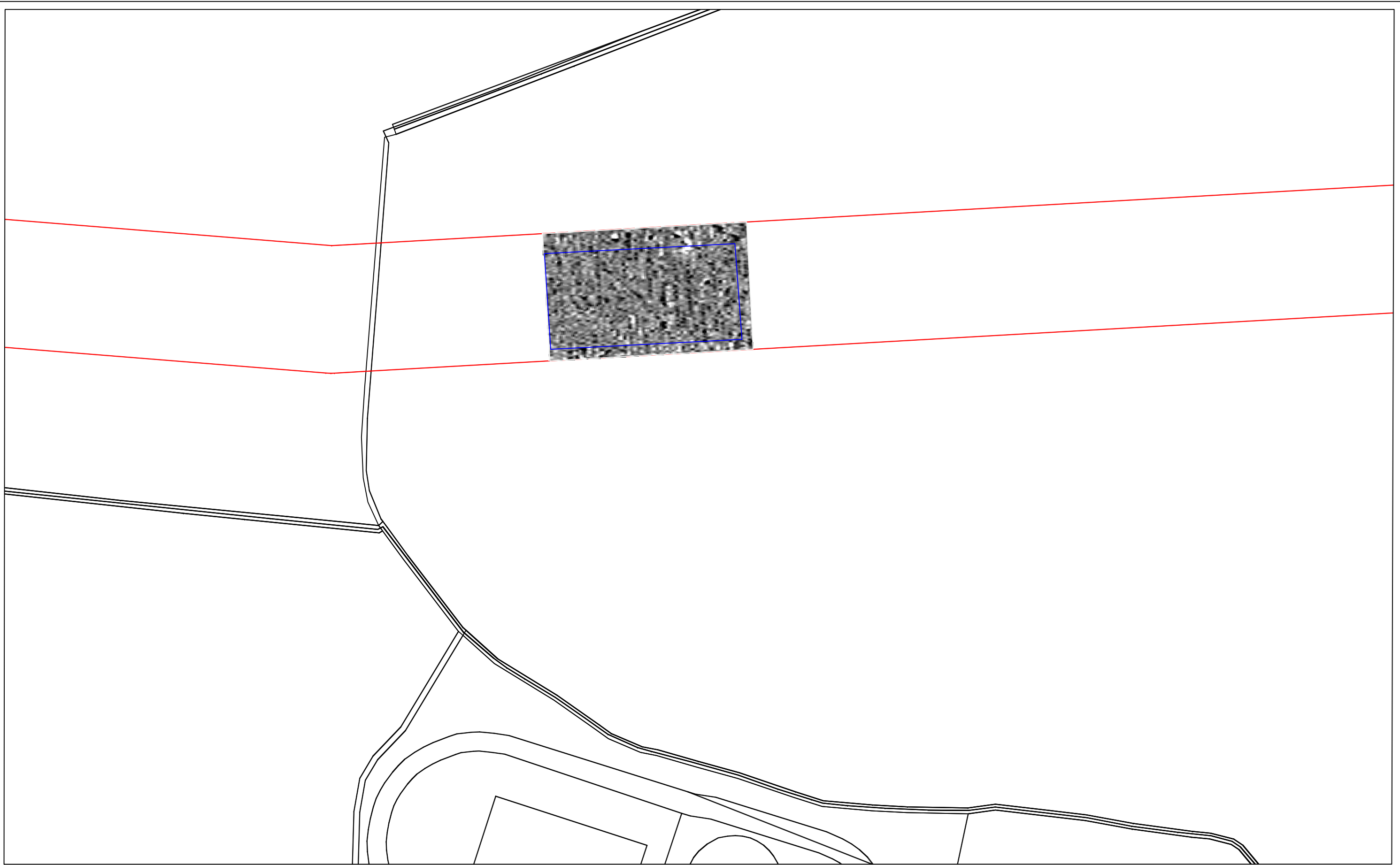
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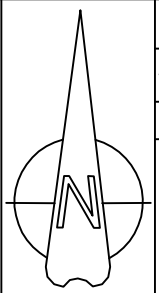
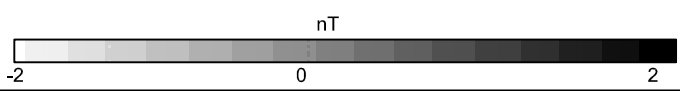


**Figure No. 5 Magnetic Gradiometer Interpretation - Abbotstown Pumping Station**



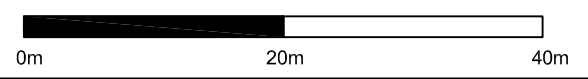


- Legend**
- Basemap
  - Proposed Drainage Corridor
  - Potential Archaeological Remains
  - Geophysical Survey Areas
  - Area Unsurveyable



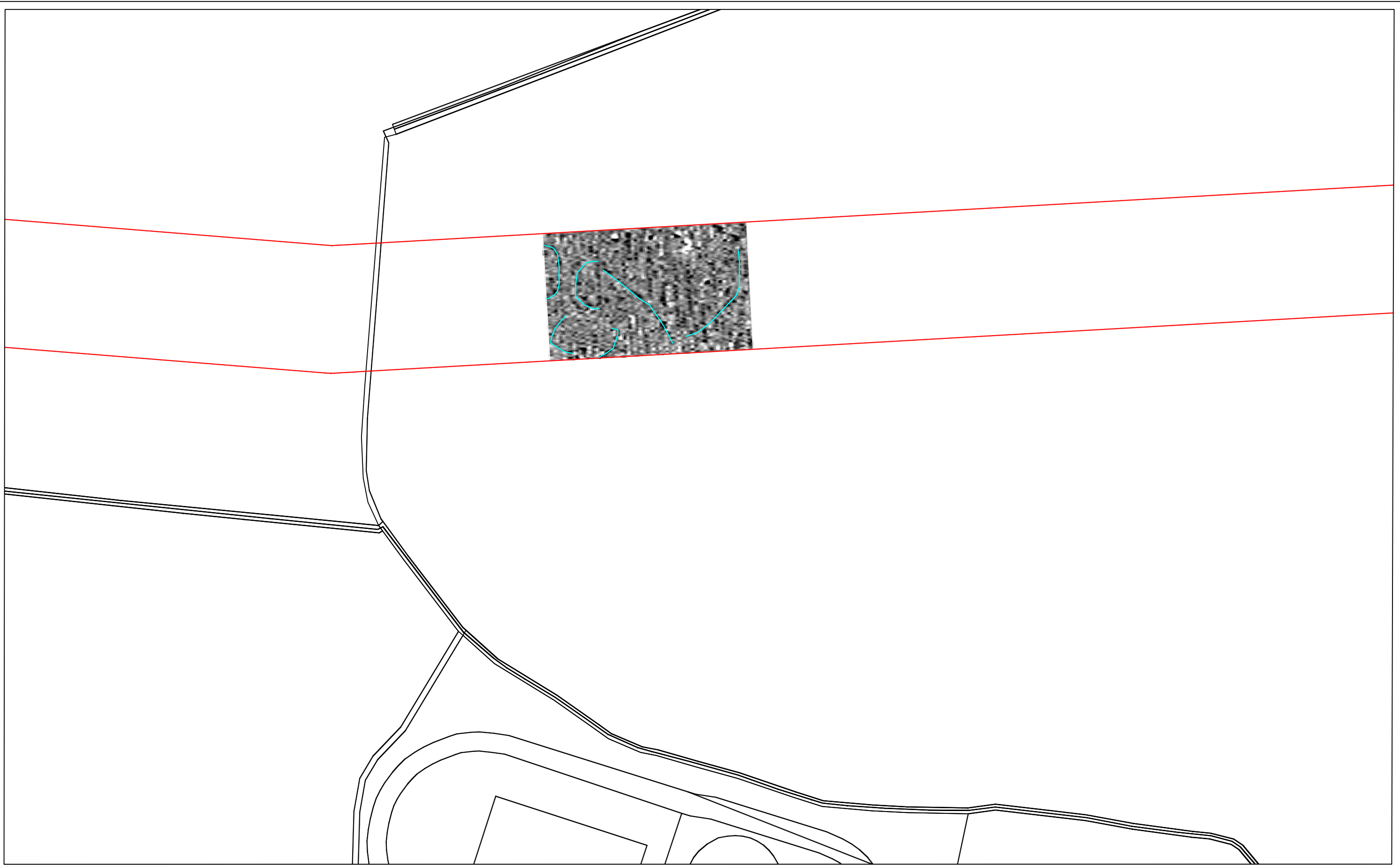
Site Location: Greater Dublin Drainage Scheme, County Dublin  
 Client: Irish Water  
 Drawing Courtesy of: Jacobs      Date 23/04/14      Drawing No.: 14-003/06

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**Figure No. 6 Magnetic Gradiometer data - Merryfalls 1**

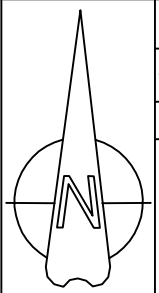
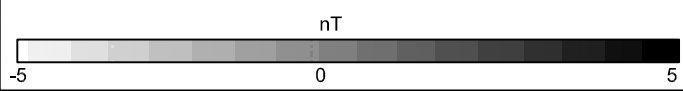




**Legend**

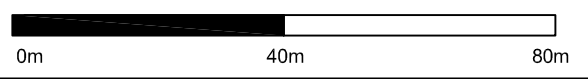
- Basemap
- Proposed Drainage Corridor
- Potential Archaeological Remains

- Ditch
- Possible Ditch
- Possible Geology or Archeology
- Positive Magnetic Enhancement
- Modern Interference



Site Location: Greater Dublin Drainage Scheme, County Dublin  
 Client: Irish Water  
 Drawing Courtesy of: Jacobs      Date: 24/04/14      Drawing No.: 14-003/07

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**Figure No. 7 Magnetic Gradiometer Interpretation - Merryfalls 1**

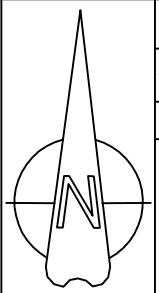
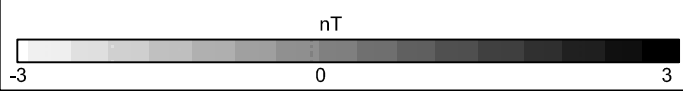






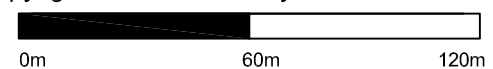
Unsurveyable due the presence of  
vegetation and adjacent field boundary

- Legend**
- Basemap
  - Proposed Drainage Corridor
  - Potential Archaeological Remains
  - Geophysical Survey Areas
  - Area Unsurveyable



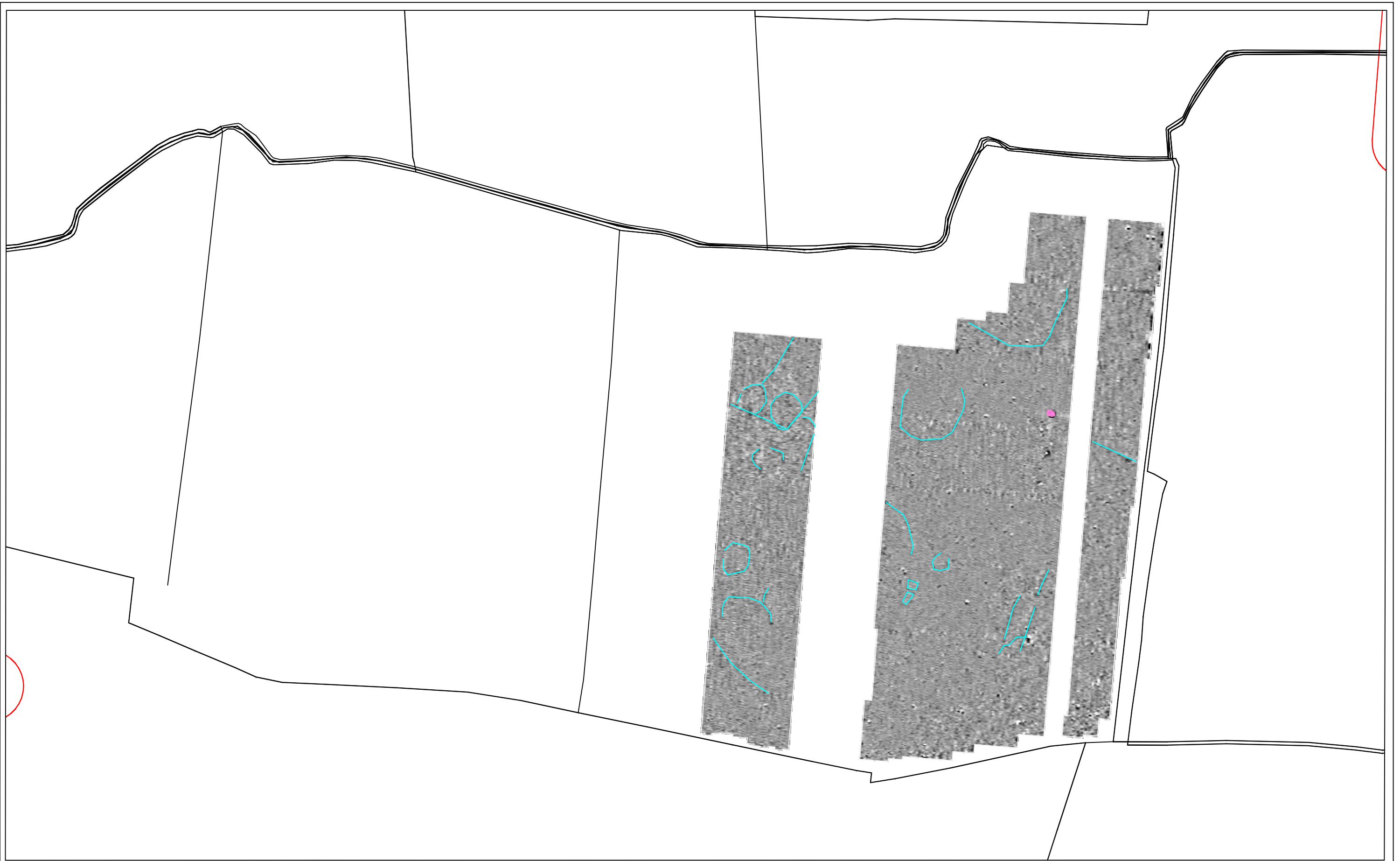
Site Location: Greater Dublin Drainage Scheme, County Dublin  
 Client: Irish Water  
 Drawing Courtesy of: Jacobs      Date 23/04/14      Drawing No.: 14-003/08

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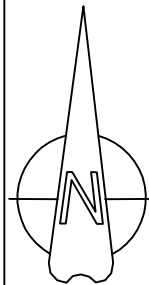
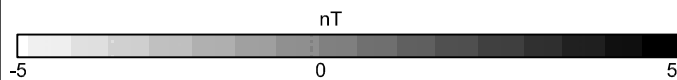
**Figure No. 8 Magnetic Gradiometer data -  
Waste Water Treatment Plant (Clonshagh)**





**Legend**

- Basemap
- Proposed Drainage Corridor
- Potential Archaeological Remains
- Ditch
- Possible Ditch
- Possible Geology or Archeology
- Positive Magnetic Enhancement
- Modern Interference



Site Location: Greater Dublin Drainage Scheme, County Dublin

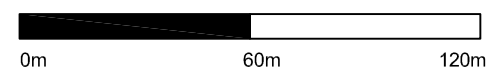
Client: Irish Water

Drawing Courtesy of: Jacobs

Date 24/04/14

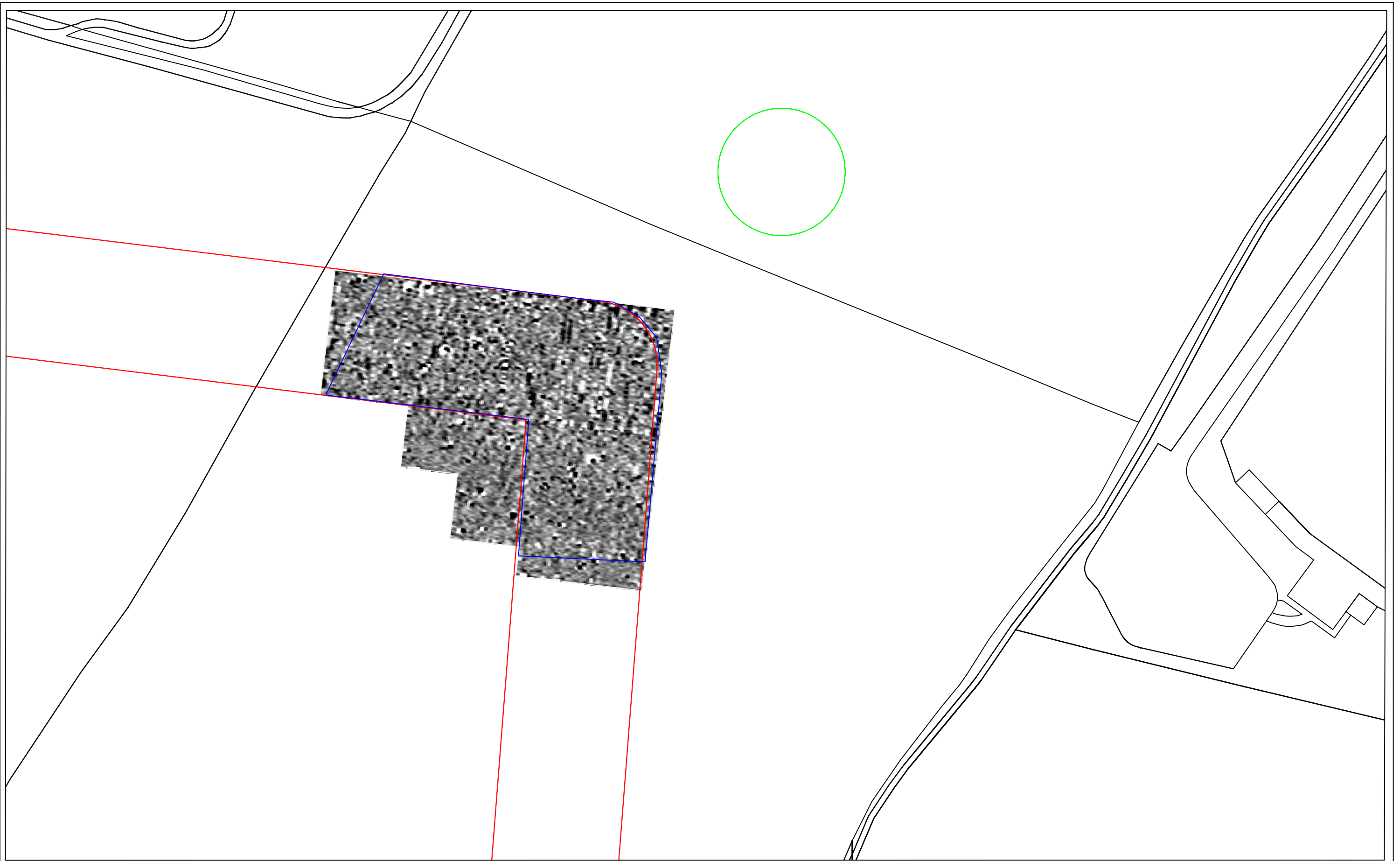
Drawing No.: 14-003/09

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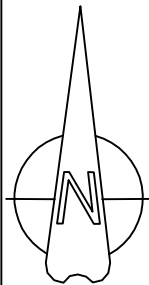
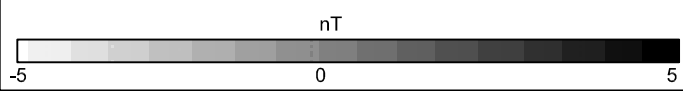
**Figure No. 9 Magnetic Gradiometer Interpretation - Waste Water Treatment Plant (Clonshagh)**





**Legend**

- Basemap
- Proposed Drainage Corridor
- Potential Archaeological Remains
- Geophysical Survey Areas
- Area Unsurveyable



Site Location: Greater Dublin Drainage Scheme, County Dublin

Client: Irish Water

Drawing Courtesy of: Jacobs

Date 23/04/14

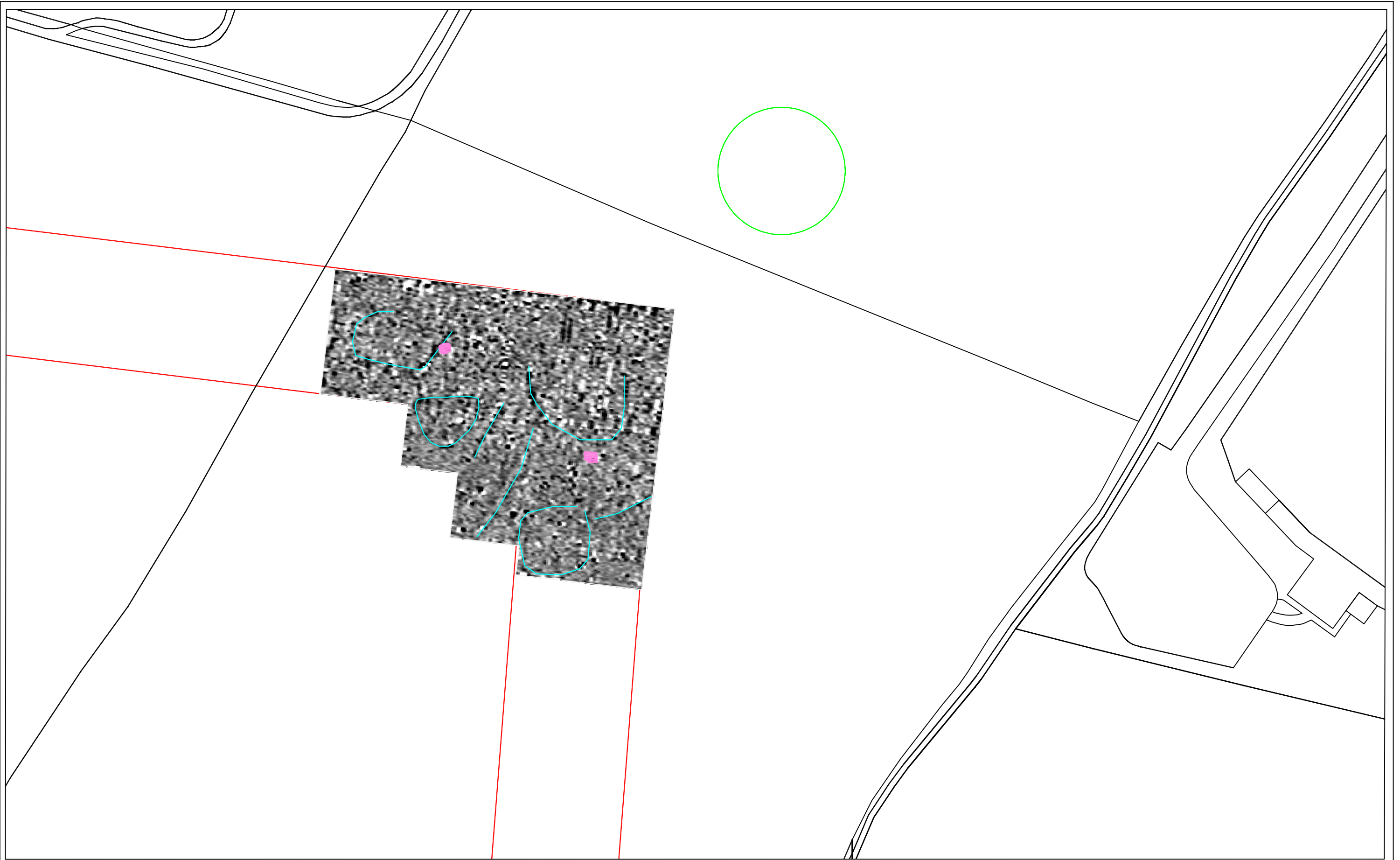
Drawing No.: 14-003/10

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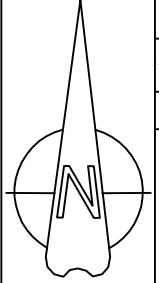
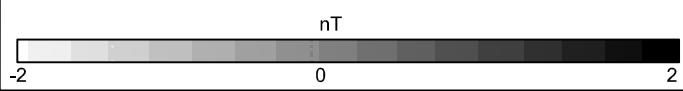
**Figure No. 10 Magnetic Gradiometer data - Kinsaley 1**





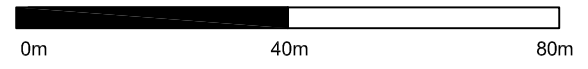
**Legend**  
 — Basemap  
 — Proposed Drainage Corridor  
 — Potential Archaeological Remains

- Ditch
- Possible Ditch
- Possible Geology or Archeology
- Positive Magnetic Enhancement
- Modern Interference



Site Location: Greater Dublin Drainage Scheme, County Dublin  
 Client: Irish Water  
 Drawing Courtesy of: Jacobs      Date: 24/04/14      Drawing No.: 14-003/11

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**Figure No.11 Magnetic Gradiometer Interpretation - Kinsaley 1**

