



## GEOPHYSICAL SURVEY REPORT

LUAS F1 LINE

COUNTY DUBLIN

LICENCE NO. 10-R-9

12/04/2010

CLIENT: IRISH ARCHAEOLOGICAL CONSULTANCY LTD  
& THE RAILWAY PROCUREMENT AGENCY



**Geophysical Survey Summary**  
**Luas F1 Line**  
**Lucan – Blackhorse, County Dublin**

### **Introduction**

A geophysical survey in three pre-defined survey areas (Areas 1, 2 and 3) has been undertaken on behalf of Irish Archaeological Consultancy Ltd and The Railway Procurement Agency. The survey has been undertaken as part of the archaeological assessment for the proposed F1 route and depot site for the Luas F Line scheme.

Area 1 is located within Griffeen Valley Park, to the immediate east of Esker Road. The remains of a recorded bridge (RMP DU017:078) are located to the immediate north of the survey area. Survey Area 2 is located within a small public park known as Droim Na Coille. Ballyowen House, identified on the 1<sup>st</sup> edition ordnance survey map, may have stood in the north-eastern half of Area 2. There are no extant remains of this structure. Area 3 is the location of the proposed depot site, and is contained within the lands of Dublin City Service Sports & Social Club, on the Coldcut Road, and extends south into Collinstown Park.

The geophysical survey has been conducted with the aim of identifying any responses of potential archaeological interest within the pre-defined survey areas. It was the objective of the survey to investigate the possible nature and extent of any responses identified.

Detailed gradiometer survey was undertaken throughout Areas 1, 2 and 3. Survey was conducted under licence number 10-R-9, issued by the Department of the Environment, Heritage & Local Government.

All detailed survey was referenced to the project control points established by The Rail Procurement Agency.

### **\*Summary of Results**

All three survey areas were located within an urban setting and modern landscaping and ground disturbance is evident throughout the data sets. However, some responses of potential interest were identified.

Area 1 is dominated by broad spreads of magnetic disturbance. No responses of archaeological potential can be identified. The disturbance most likely results from modern landscaping, and may mask responses of archaeological potential.

In Area 2, a spread of magnetic responses in the north east of the survey area is of potential interest. Although it is possible that modern landscaping features are represented here, an archaeological interpretation can be considered. It is speculated that the spread of responses results from the demolished remains of a structure and the location of Ballyowen House may be represented here.

In the north of Area 3, within the grounds of the Dublin City Service Sports & Social Club, isolated responses of archaeological strength have been identified. However, there is no clear archaeological pattern and it is equally likely that more deeply buried modern ferrous debris is represented here.

In the southern half of Area 3, within Collinstown Park, magnetic disturbance is considerable. The eastern extent of the disturbance appears to be limited by a series of linear magnetically strong responses. It is likely that a field boundary or division feature is represented here.

A curvilinear response to the east of this is of potential interest. Interpretation is cautious due to the pronounced magnetic disturbance, but it is possible that a curvilinear ditch-type feature has been identified.

*\*This Summary must be read in conjunction with the full geophysics report.*

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**Geophysical Survey Report**  
**Luas F1 Line**  
**Lucan – Blackhorse, County Dublin**

## **1 Introduction**

- 1.1 The proposed route corridor of the scheme is approximately 15 km in length, and will run from Newcastle Road in Lucan to Dame Street via Ballyowen Park, Liffey Valley, Cherry Orchard and Ballyfermot, linking up with the existing Luas Red Line at the Blackhorse stop. The proposed route then continues from the Fatima stop to Meath Street and Christchurch, and will terminate near Trinity College.
- 1.2 Three areas (Area 1, 2 and 3) were highlighted for geophysical survey as part of the design process and archaeological strategy for the proposed Luas F1 route. The geophysical survey comprised of detailed gradiometer survey throughout the pre-defined survey areas.
- 1.3 The pre-defined survey areas are located in Griffeen Valley Park, Droim Na Coille, and the Dublin Sports and Social Club, Coldcut Road and Collinstown Park. An overall location diagram of the three areas of geophysical survey is presented in the site location diagram, Figure 1. More detailed survey location diagrams (Figures 2, 3 and 4) present the locations of each survey area, and relevant Project Control points used to position the data in National Grid Co-ordinates. Figures 2, 3 and 4 are presented at a scale of 1:2000.
- 1.4 All three survey areas are found within an urban setting and comprise landscaped ground. Survey Areas 1 and 2 are located within public parks. Survey Area 3 is located within a sports ground and parkland setting.
- 1.5 The geophysical survey consisted of detailed gradiometer survey throughout the pre-defined application areas. The detailed survey was conducted on 20m x 20m grids with a reading sample interval of 0.25m and traverse interval of 1m. Detailed survey was undertaken and referenced to the Project Control Points, established by the Rail Procurement Agency.
- 1.6 The geophysical survey was conducted between the 17th and 24th of February under licence number 10-R-9, issued by the Department of the Environment, Heritage & Local Government.

## 2 Survey Location & Further information

### *Area 1: Griffeen Valley Park*

- 2.1 Survey Area 1 is located at the north western extent of Griffeen Valley Park. The geophysical survey area is bound to the north by Griffeen River and to the west by Esker Road, and a total of 0.45 hectares of detailed survey was conducted here. The remains of the recorded bridge (RMP DU017:078) are located to the north of the survey area. The bridge, known as King Johns Bridge, is also a protected structure (RPS103) and is of early 13th century date.
- 2.2 Approximately 80m to the north east of the geophysical survey area is a recorded church and graveyard site (RMP DU017:022).
- 2.3 The location of the geophysical survey area is presented in Figure 2, at a scale of 1:2000. Detailed survey was referenced to the project control points F57 and F58 with a total station instrument.

### *Area 2: Droim Na Coille*

- 2.4 Survey Area 2 is located in Droim Na Coille, a small park area bound to the east by Ballyowen Lane, and to the west by Ballyowen Road. A structure named Ballyowen House is evident on the first edition ordnance survey map, and its location is suggested in the north-east of Area 2. There are no extant remains of Ballyowen House, although sub-surface features of the structure may still be present.
- 2.5 Approximately 260m to the south of Area 2, are the recorded sites of a fortified house (RMP DU017:030-01) and associated buildings (RMP DU017:030-02/03). A total of 0.72 hectares of gradiometer survey was conducted in Area 2. The survey was sub-divided into Areas 2A and 2B for ease of display.
- 2.6 A survey location diagram is presented in Figure 3, and shows the location of the sub-divided survey area. Area 2 was referenced to project control points RF483 and RF481 with a total station instrument.

### *Area 3: Proposed Depot Site*

- 2.7 Survey Area 3 is located within the grounds of Dublin City Service Sports & Social Club, on the Coldcut Road, and extends south into Collinstown Park. Survey Area 3 is the location of the proposed depot site, and 4.8 hectares of detailed survey

were conducted here. There are no recorded monuments within the vicinity of Area 3.

- 2.8 The survey area has been sub-divided for ease of display. Areas 3A, 3B and 3C are located in the sports and social club grounds, and Areas 3D and 3E are located in Collinstown Park. The location of survey Area 3 is presented in Figure 4. The detailed survey was positioned with reference to project control points F51 and RF468.

### **3 Survey Methodology**

- 3.1 All three survey areas (Areas 1, 2 and 3) were subject to detailed gradiometer survey, totalling c. 6 hectares.
- 3.2 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.
- 3.3 Data was collected with a sample interval of 0.25m and a traverse interval of 1m, providing 1600 readings per 20m x 20m grid. The survey areas were located within a common site grid. Data was recorded in ‘zig zag’ formation, where traverses of each survey grid are made from west to east, and the data is recorded.
- 3.4 Data was collected and imported, via the instrument software, into Geoplot v3, specialised archaeological software for processing and displaying geophysical survey data. Data processing was kept to a minimum. Processed data was subject to ‘clipping’ to remove spurious data, zero mean grid, and zero mean traverse.
- 3.5 Survey grids were set out by the staff of J. M. Leigh Surveys and Irish Archaeological Consultancy Ltd. Survey fieldwork was undertaken by Joanna Leigh (project manager) from J. M. Leigh Surveys and John Winfers (field assistant) from Irish Archaeological Consultancy Ltd. All data collection was undertaken by Joanna Leigh (MSc Archaeological Prospection).
- 3.6 The survey areas were positioned in the field to best accommodate data collection, and the local survey grids were set out with a total station instrument. Temporary benchmarks were positioned within the survey areas and the local survey grids were referenced to the Project Survey Control Points, established by the Rail Procurement Agency. Detailed diagrams of the survey grid set out, and the relevant Project Survey Control Points is presented in Appendix 2.01 to 2.03.
- 3.7 Further information regarding the magnetometer equipment used, survey methodology and data display formats can be found in the technical information section (Section 10) at the back of the report.

#### 4 Data Display

- 4.1 The results of the detailed gradiometer surveys for Areas 1, 2 and 3 are presented as a series of greyscale images and accompanying interpretation diagrams in Figures 5 to 12, all at a scale of 1:1,000.
- 4.2 Detailed survey in Area 2 has been sub-divided into Areas 2A and 2B. Survey Area 3 has been sub-divided into Areas 3A, 3B, 3C, 3D and 3E. This is for ease of data display and to aid the descriptive interpretation of the results as presented in Figures 8, 10 and 11.
- 4.3 The archive raw gradiometer data is presented as a series of xy-trace plots, raw greyscale images and an accompanying interpretation diagrams (at a scale of 1:625) in the Appendix A1.01 to A1.19. This appendix is provided on the attached CD.
- 4.4 The raw data collected for each survey area is also included on the attached CD, as a series of xyz data files.
- 4.5 Letters in parentheses in the text of the report refer to specific responses highlighted in the interpretation diagrams.
- 4.6 The display formats referred to above, and the interpretation categories are discussed in the Summary Technical Information section (Section 10) at the end of this report.

## **5 Results of Detailed Gradiometer Survey Area 1: Griffeen Valley Park. (Figures 5 & 6)**

- 5.1 The detailed survey in Area 1 presented a high level of magnetic disturbance. The disturbance is the result of modern landscaping and has complicated the survey results.
- 5.2 The disturbance appears to increase in magnetic intensity towards the north of the data set, suggesting significant ground disturbance. Archaeological interpretation of the results is cautious, as it is likely that any responses of potential interest are masked by the broad magnetic disturbance, and remain undetected.
- 5.3 Within the broad magnetic disturbance are better defined spreads of disturbance (A), forming vague rectilinear patterns. The disturbance is suggestive of significant quantities of rubble material. It is possible that structural remains are represented here. However, the strength of the disturbance is suggestive of modern activity and it is likely that disturbance from modern landscaping is represented here. An archaeological interpretation is cautious.
- 5.4 In the south of Area 1 are numerous broad ferrous responses. These are typical of modern ferrous debris and are not considered to be of archaeological interest.

## 6 Results of Detailed Gradiometer Survey Area 2: Droim Na Coille. (Figures 7 & 8)

- 6.1 Magnetic disturbance is dominant in survey Area 2. The disturbance is evident as a linear series of bi-polar responses (B), resulting in a broad magnetic 'shadow' (C) throughout Area 2A and much of Area 2B. The bi-polar response is typical of an iron pipe, and appears to traverse Area 2, from the south-east of the survey area to the north-west. The magnetic shadow will mask any responses of possible archaeological interest and interpretation of the results is cautious. However, some responses in the north east of the data set may be of interest.
- 6.2 An area of magnetic disturbance (D) appears relatively well defined in the north east of Area 2B. Although the disturbance is characteristic of modern activity, it is possible that the demolished remains of a structure are represented here. The southern limit of the disturbance is ill defined due to the magnetic shadow of the probable pipe. Although it is possible that the magnetic disturbance is the result of more recent activity, an archaeological interpretation can be considered. It is possible that the demolished remains of a structure have been identified. Although the disturbance may represent more recent activity and ground disturbance, it is speculated that the demolished remains of Ballyowen House are represented here.
- 6.3 The magnetic shadow from the probable pipe has obscured the remainder of the data sets and no archaeological interpretation can be provided here. Numerous magnetically strong ferrous responses are evident in the south of Area 2B. The responses are interpreted as modern in origin and are not considered to be of archaeological potential.

## 7 Results of Detailed Gradiometer Survey Area 3A to 3C: Dublin Sports and Social Club. (Figures 9 & 10)

- 7.1 The detailed survey in Area 3 was notably disturbed. The area is currently used as playing fields, with levelled football pitches, goal posts, railings and lighting fixtures; all producing significant magnetic disturbance. In addition, disturbance along the eastern edge of survey was considerable, and results from the M50 motorway infrastructure.
- 7.2 In the north of Area 3A, and also in the east of Area 3B, the data sets are dominated by magnetic disturbance (E) caused by the lighting fixtures for the sports ground, and the M50 Motorway. The disturbance is considerable, and would mask any subtle responses resulting from archaeological features. No Interpretation within this disturbance can be provided.
- 7.3 A defined area of disturbance and linear responses (F) is evident in the south of Area 3A and continues into Area 3B. It is likely that the disturbance and responses are modern in origin. It is interpreted that a spread of rubble or gravel is represented here.
- 7.4 Another spread of magnetic disturbance (G) is evident within Areas 3A and 3B. This disturbance has little shape or form and is interpreted as modern in origin. The disturbance most likely represents a feature associated with the sports and social club. No archaeological interpretation can be provided.
- 7.5 A series of isolated ferrous responses (H) in the north east of Area 3B is most likely modern in origin, perhaps resulting from the landscaping and levelling of the playing fields. The ferrous responses are not considered to be of archaeological potential.
- 7.6 An extant modern railing encompassing a football pitch in Area 3B and 3C is evident in the data as a magnetically strong ferrous response (I). Within this are a cluster of isolated ferrous responses (J). The ferrous responses are magnetically strong and are interpreted as modern in origin. It is unclear as to what the ferrous responses represent, but an archaeological origin is considered unlikely.
- 7.7 To the east of the metal railings (I) are several responses (K) of potential archaeological origin, evident in Area 3B. The responses are of archaeological strength and it is possible that pit type features are represented here. However, there are numerous isolated ferrous responses throughout Area 3B and it is equally likely that responses (K) represent more deeply buried ferrous debris. No

- clear archaeological pattern is evident and an archaeological interpretation is tentative.
- 7.8 In the south east of Area 3C a broad spread of magnetic disturbance has been recorded. Although the disturbance is considered to be modern in origin, there are curvilinear responses (L) visible in the data. It is possible that an archaeological feature, masked by the disturbance is located here. This is speculative, and the linear responses may equally represent a continuation of the modern disturbance. Archaeological interpretation of the curvilinear responses (L) is unclear.
- 7.9 To the north of the linear responses (L) is another series of ferrous responses and form a roughly linear pattern. This is considered modern in origin, and most likely results from more recent landscaping.
- 7.10 Two sets of iron goal posts have resulted in large ferrous responses in Areas 3B and 3C.

**8 Results of Detailed Gradiometer Survey Area 3D and 3E: Collinstown Park.  
(Figures 11 & 12)**

- 8.1 Further magnetic disturbance dominates the data recorded in Areas 3D and 3E. This most likely represents ground disturbance and spreads of modern material resulting from the adjacent housing estate. Few responses distinct from the disturbance can be identified, and subtle responses of potential archaeological interest may be masked by this disturbance.
- 8.2 A series of broad magnetically strong responses (M) are discernable in Areas 3C and 3D, and appears to form a linear pattern. The responses (M) appear to delimit the extent of the magnetic disturbance to the west, and it is likely that a former division or boundary feature is represented here.
- 8.3 In the south-east of Area 3D, a curvilinear response (N) is evident. The background magnetic disturbance makes interpretation cautious, and it is possible that the response (N) represents a continuation of the magnetic disturbance. However, an archaeological interpretation must be considered. It is possible that a ditched feature c.17m in diameter is represented here. Although an archaeological interpretation is tentative the response is considered to be of potential archaeological interest.
- 8.4 In the north of Area 3E, a series of ferrous responses and a spread of magnetic disturbance (O), is distinct from the background disturbance and appears to form a rectilinear pattern. This may represent a spread of modern material. The origin of the disturbance and ferrous responses is unclear, and no archaeological interpretation can be provided.
- 8.5 In the south-east of Area 3E a curvilinear trend (P) is barely discernable from the broad background magnetic disturbance. Although the response is of potential interest, there is no clear archaeological pattern. It is likely that the response represents landscaping in this area. The curvilinear trend is of limited archaeological potential.

## 9 Discussion & Conclusion

- 9.1 Survey Areas 1, 2, and 3 are all located within an urban environment, and modern landscaping has resulted in considerable magnetic disturbance throughout. Although some responses of potential interest have been identified it is noted that the modern magnetic disturbance would mask more subtle responses of potential archaeological interest. It is possible that responses of archaeological potential remain undetected due to the dominant magnetic disturbance.
- 9.2 Area 1 was notably magnetically disturbed, most likely from modern landscaping. Although areas of distinct magnetic disturbance were identified, the archaeological potential is unclear. It is interpreted that modern ground disturbance has been recorded in the data.
- 9.3 Detailed survey in Area 2 was hindered due to magnetic disturbance resulting from a probable iron pipe. However, a distinct area of magnetic responses in the north-east of Area 2 may be of interest. The responses correlate with the approximate former location of Ballyowen House, identified on the 1<sup>st</sup> edition ordnance survey map. Although the responses identified may represent more recent landscaping activity, it is possible that the demolished remains of Ballyowen House have been identified.
- 9.4 Survey Areas 3A, 3B and 3C were located on the grounds of the Dublin Sports and Social Club, and consisted of levelled playing football pitches. Areas 3D and 3E were located to the south of this in Collinstown Park. All of Area 3 has been subject to considerable landscaping and levelling. This modern activity has resulted in a broad magnetic background disturbance complicating interpretation. Nevertheless, some responses of possible interest were identified.
- 9.5 Distinct spreads of modern disturbance and responses are evident in Areas 3A, 3B and 3E. The spreads are interpreted as modern in origin, most likely representing spreads of modern material and resulting from landscaping. No archaeological interpretation can be provided.
- 9.6 The eastern extent of the broad background disturbance in Area 3D and 3E appears to be defined by a linear series of responses. It is interpreted that the linear magnetic responses represent a former division or boundary feature. The broad magnetic disturbance most likely results from spreads of modern material and made ground, possibly relating to the adjacent housing estate.

- 9.7 In the south-east of Area 3D a sub-circular response of c.17m diameter is discernable in the data. Interpretation is cautious due to the modern background disturbance. However, that shape and form of the response is of archaeological potential. A ditched feature may be represented here.
- 9.8 The gradiometer survey has highlighted the modern disturbance within the pre-defined survey areas. Although the magnetic disturbance would mask any subtle archaeological responses, some areas of potential interest were identified and further archaeological investigation of the responses can be considered.

## 10 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.

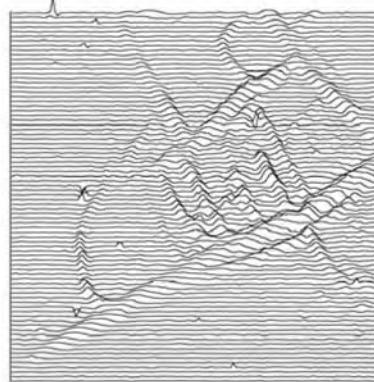
Frequent realignment of the instruments and zero drift correction; ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.1nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.



## Data Display & Presentation

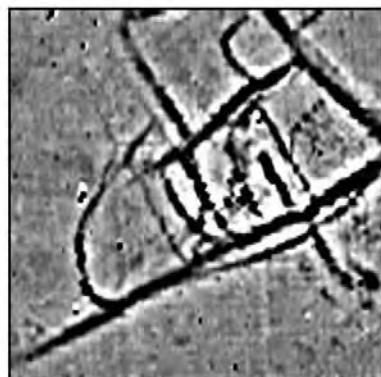
### XY Trace\*

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.

## 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 trends.

### ***?Natural***

Resulting from localised natural variations in the magnetic background of the subsoil, or 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**

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Figure 4	Area 3: Survey location diagram	1:2,000

### **Survey Results**

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Figure 6	Area 1: Summary interpretation diagram	1:1,000
Figure 7	Area 2: Summary greyscale image	1:1,000
Figure 8	Area 2: Summary interpretation diagram	1:1,000
Figure 9	Area 3A to 3C: Summary greyscale image	1:1,000
Figure 10	Area 3A to 3C: Summary interpretation diagram	1:1,000
Figure 11	Area 3D & 3E: Summary greyscale image	1:1,000
Figure 12	Area 3D & 3E: Summary interpretation diagram	1:1,000

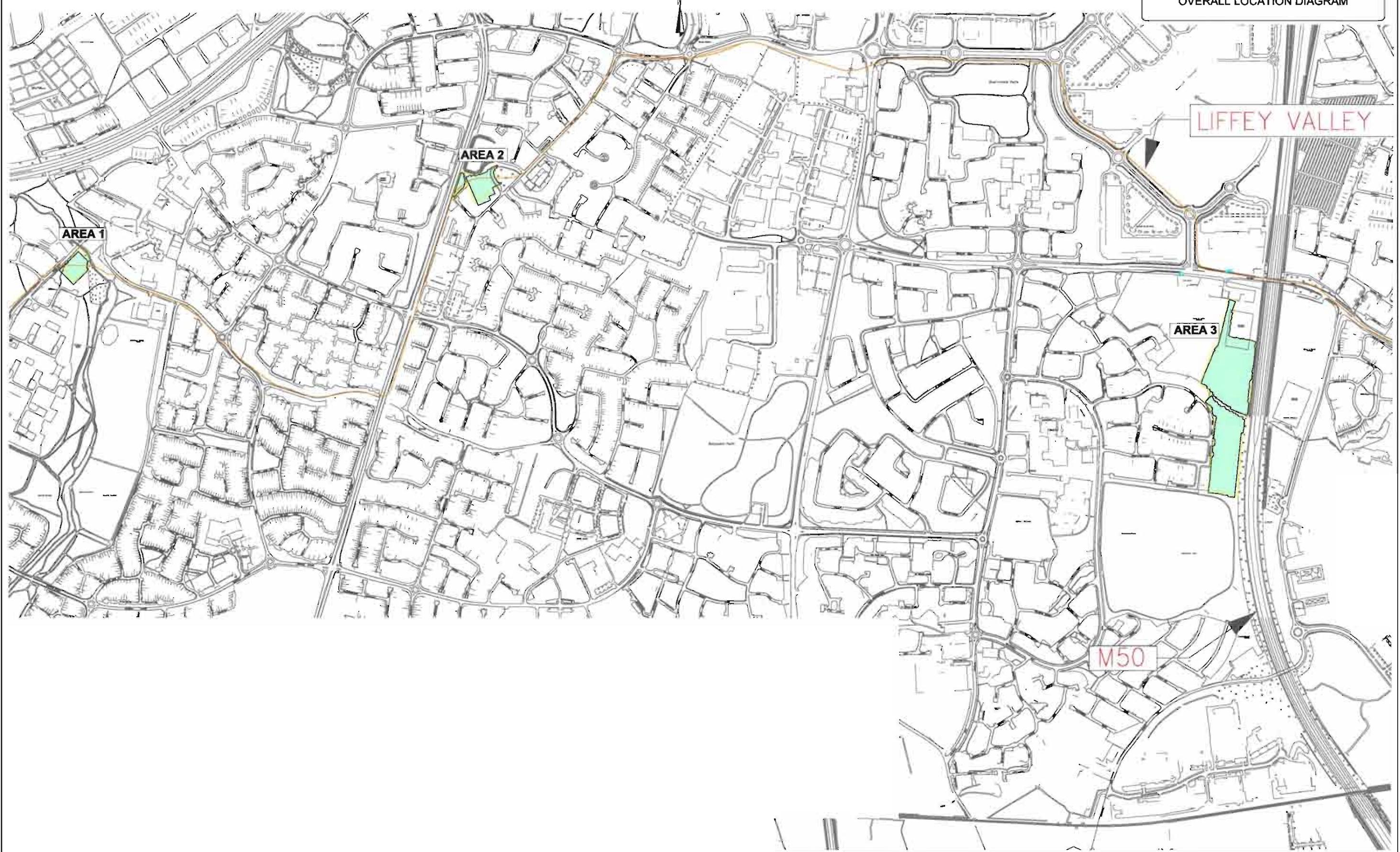
*Archive Diagrams**(Displayed as PDF images on the attached CD)*

A1.01	Area 1: XY-Trace plot, greyscale image & interpretation	1:625
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*Detailed Survey Grid Referencing to Project Survey Control Points*  
*(Displayed as PDF images on the attached CD)*

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AREAS 1, 2 & 3:  
OVERALL LOCATION DIAGRAM



0 metres N.T.S.



Client:

IRISH ARCHAEOLOGICAL  
CONSULTANCY LTD &  
THE RAIL PROCUREMENT AGENCY

Project:

GEOPHYSICAL SURVEY:  
LUAS F LINE,  
COUNTY DUBLIN

Title:

OVERALL LOCATION DIAGRAM

J.M.Leigh  
surveys  
www.jmleighsurveys.com

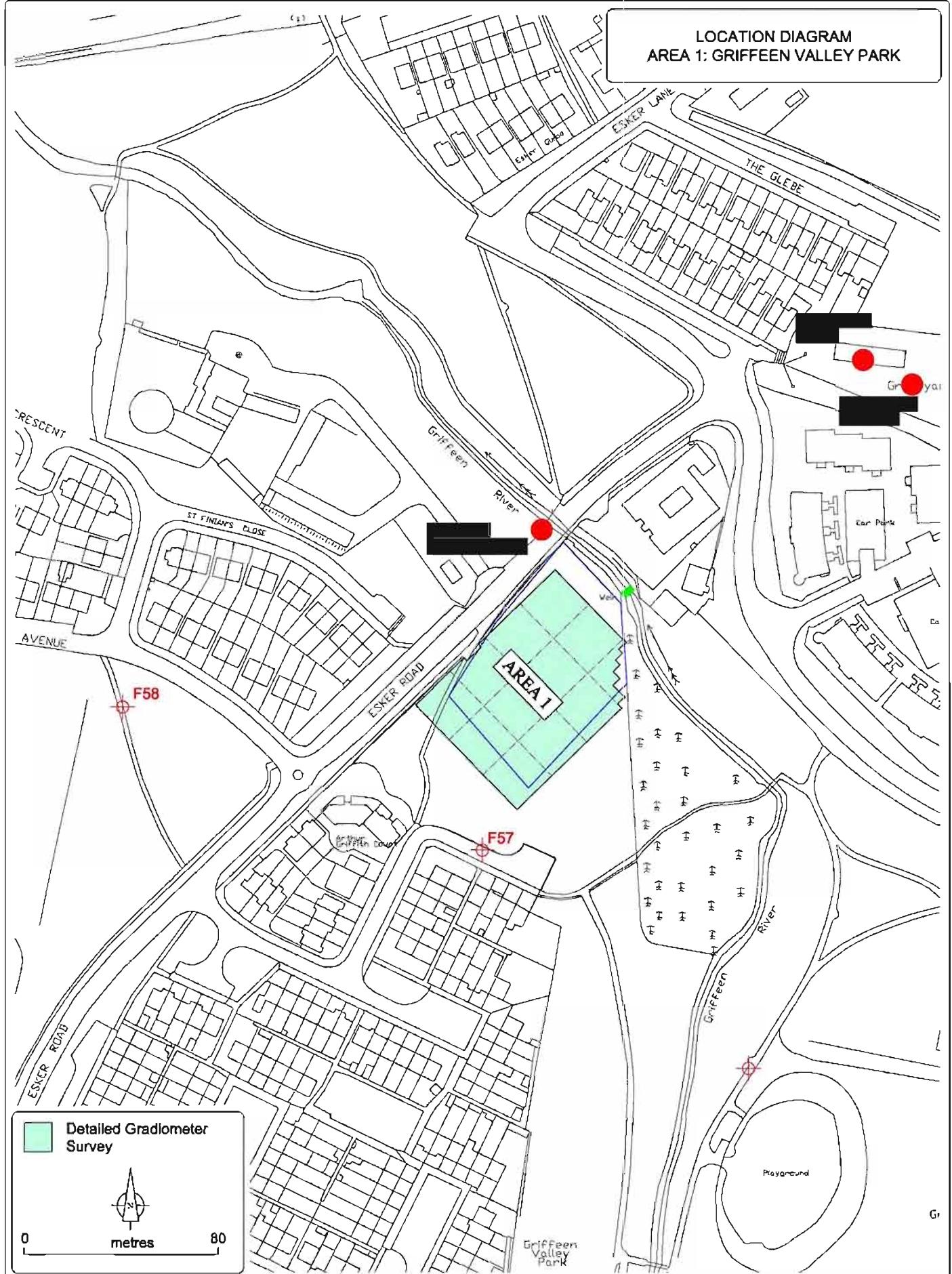
Scale @ A3: N.T.S.

Figure: 1

Licence No.: 10 - R - 9

Issue Date: 12.04.2010

LOCATION DIAGRAM  
AREA 1: GRIFFEEN VALLEY PARK



Client:  
IAC LTD &  
THE RAILWAY PROCUREMENT  
AGENCY

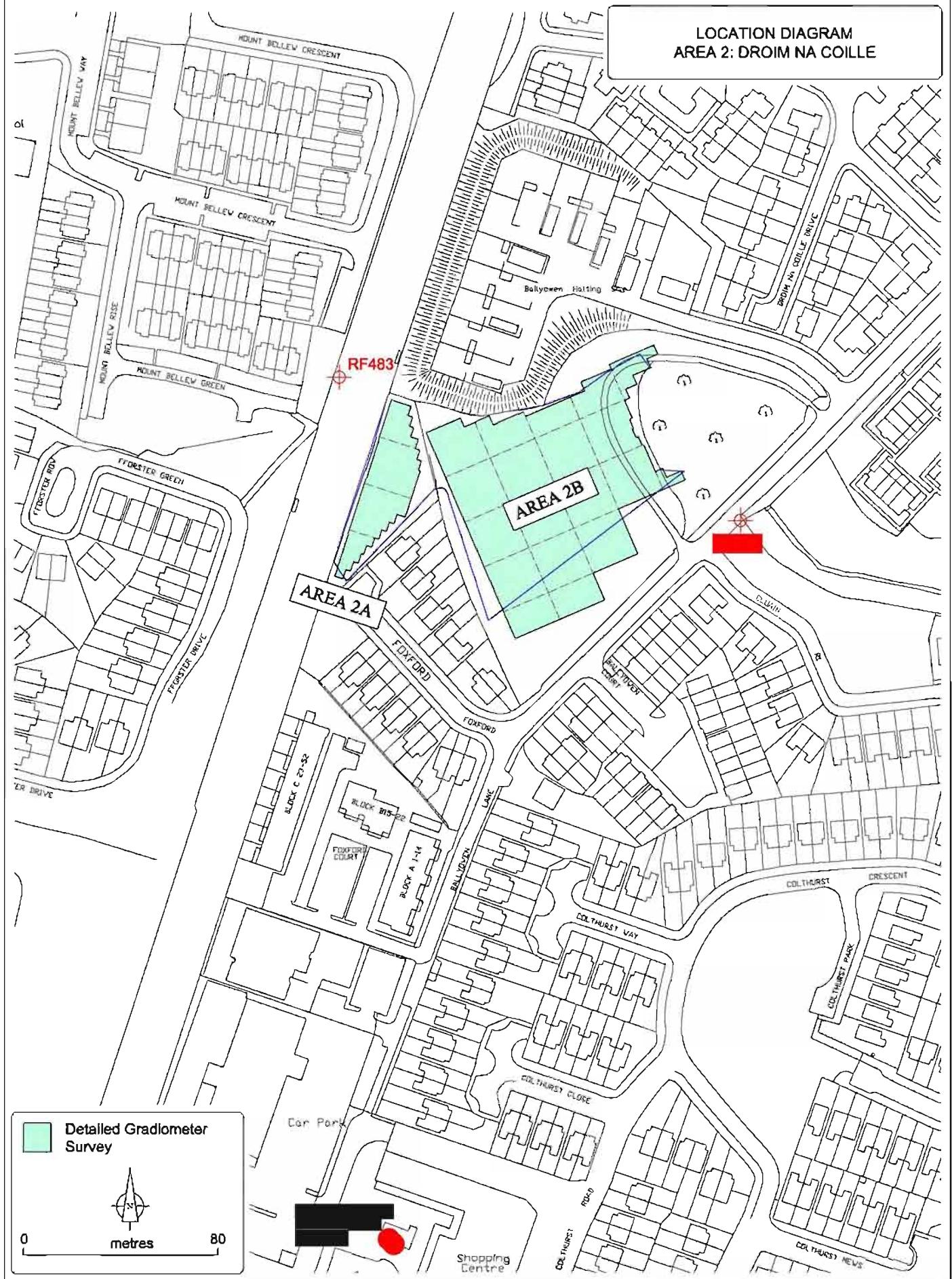
Project:  
GEOPHYSICAL SURVEY:  
LUAS LINE F

Title:  
LOCATION DIAGRAM  
AREA 1: GRIFFEEN VALLEY  
PARK

J.M.Leigh  
surveys  
[www.jmleighsurveys.com](http://www.jmleighsurveys.com)

Scale @ A4: 1:2,000  
Figure: 2  
Licence No.: 10 - R - 9  
Issue Date: 12.04.2010

## LOCATION DIAGRAM AREA 2: DROIM NA COILLE



## Detailed Gradiometer Survey



metres

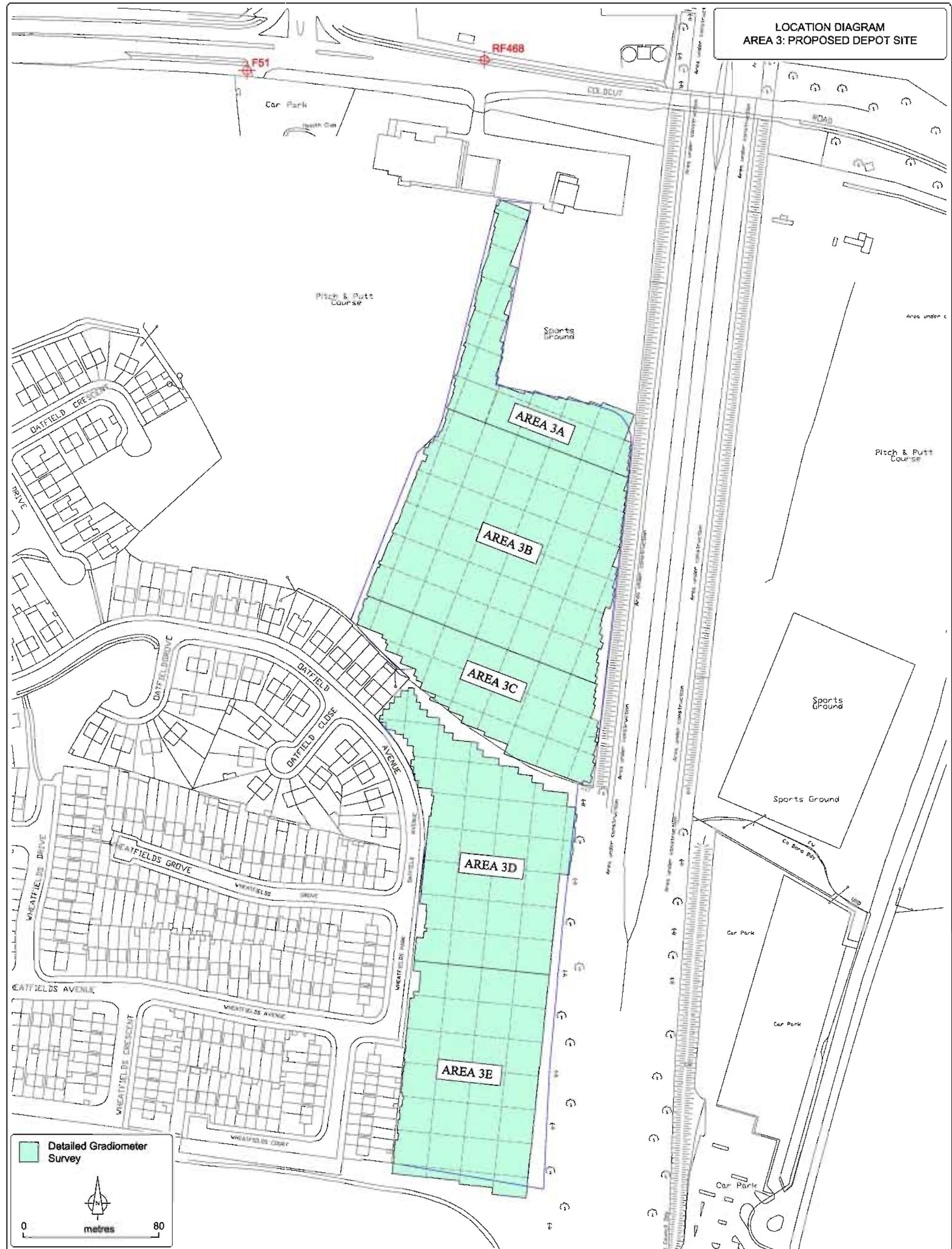
**IAC LTD &  
THE RAILWAY PROCUREMENT  
AGENCY**

**GEOPHYSICAL SURVEY:  
LUAS LINE F**

**LOCATION DIAGRAM  
AREA 2: DROIM NA COILLE**

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surveys  
[www.jmlsurveys.com](http://www.jmlsurveys.com)

Scale @ A4: 1:2,000  
Figure: 3  
Licence No.: 10 - R - 9  
Issue Date: 12.04.2010



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AGENCY**

Project: GEOPHYSICAL SURVEY:  
LUAS LINE F

Title: LOCATION DIAGRAM  
AREA 3: PROPOSED DEPOT SITE

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Scale @ A3: 1:2,000  
Figure: 4  
Licence No.: 10 - R - 9  
Issue Date: 12.04.2010

SUMMARY GREYSCALE IMAGE  
AREA 1: GRIFFEEEN VALLEY PARK



Client:  
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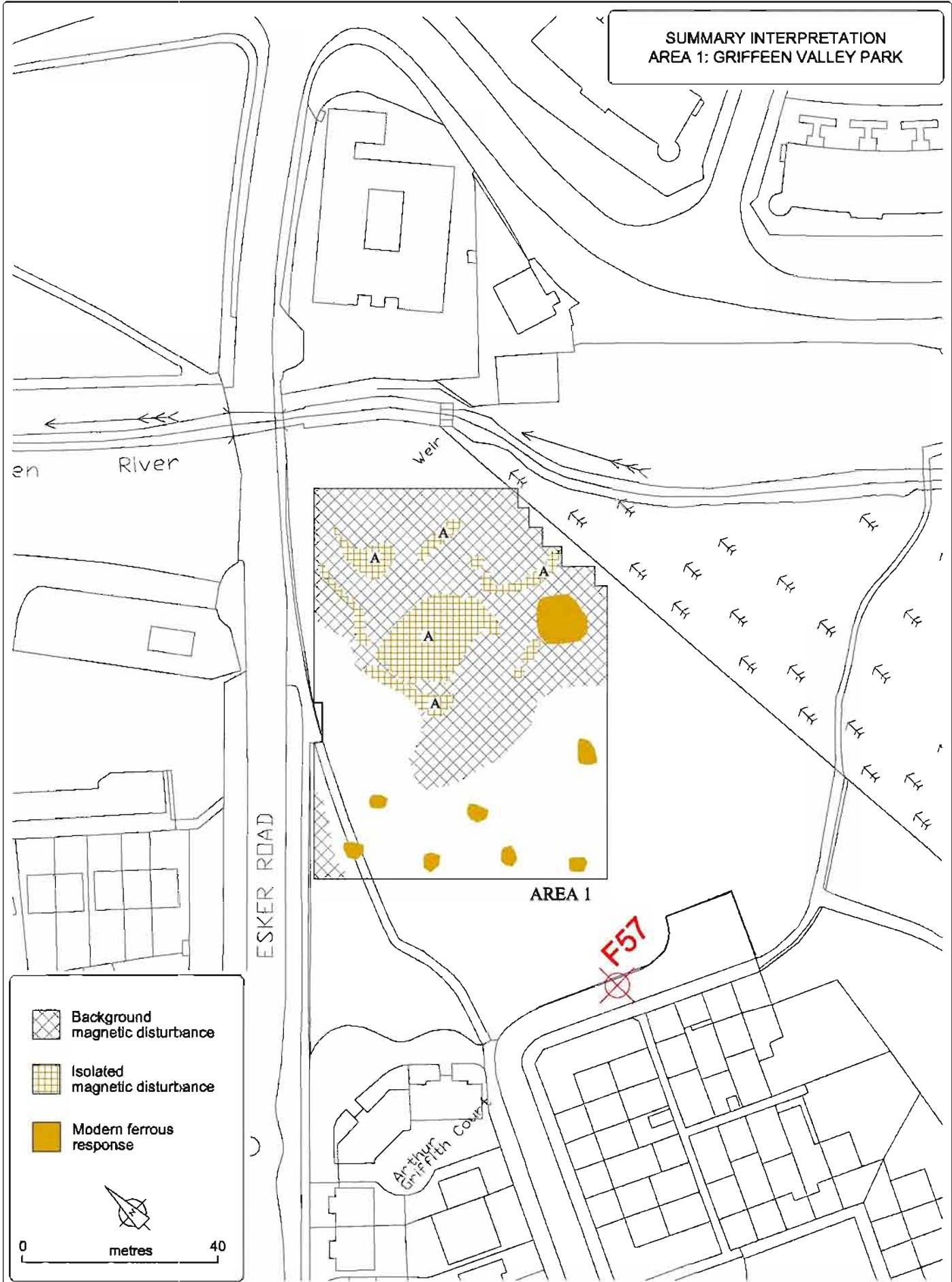
Project:  
GEOPHYSICAL SURVEY:  
LUAS LINE F

Title:  
SUMMARY GREYSCALE IMAGE  
AREA 1: GRIFFEEN VALLEY  
PARK

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Scale @ A4: 1:1,000  
Figure: 5  
Licence No.: 10 - R - 9  
Issue Date: 12.04.2010

SUMMARY INTERPRETATION  
AREA 1: GRIFFEEEN VALLEY PARK



Client:  
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AGENCY

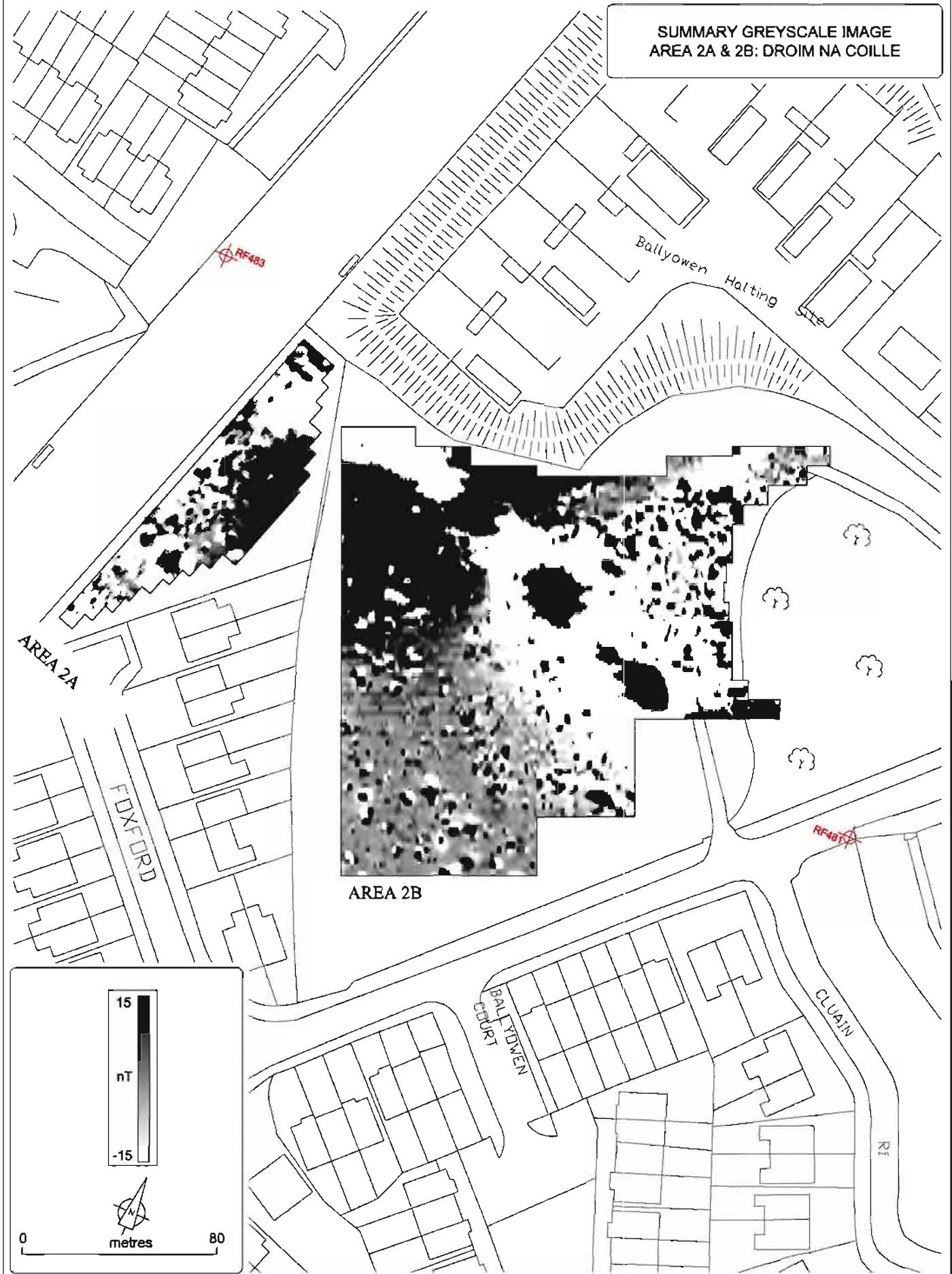
Project:  
GEOPHYSICAL SURVEY:  
LUAS LINE F

Title:  
SUMMARY INTERPRETATION  
AREA 1: GRIFFEEEN VALLEY  
PARK

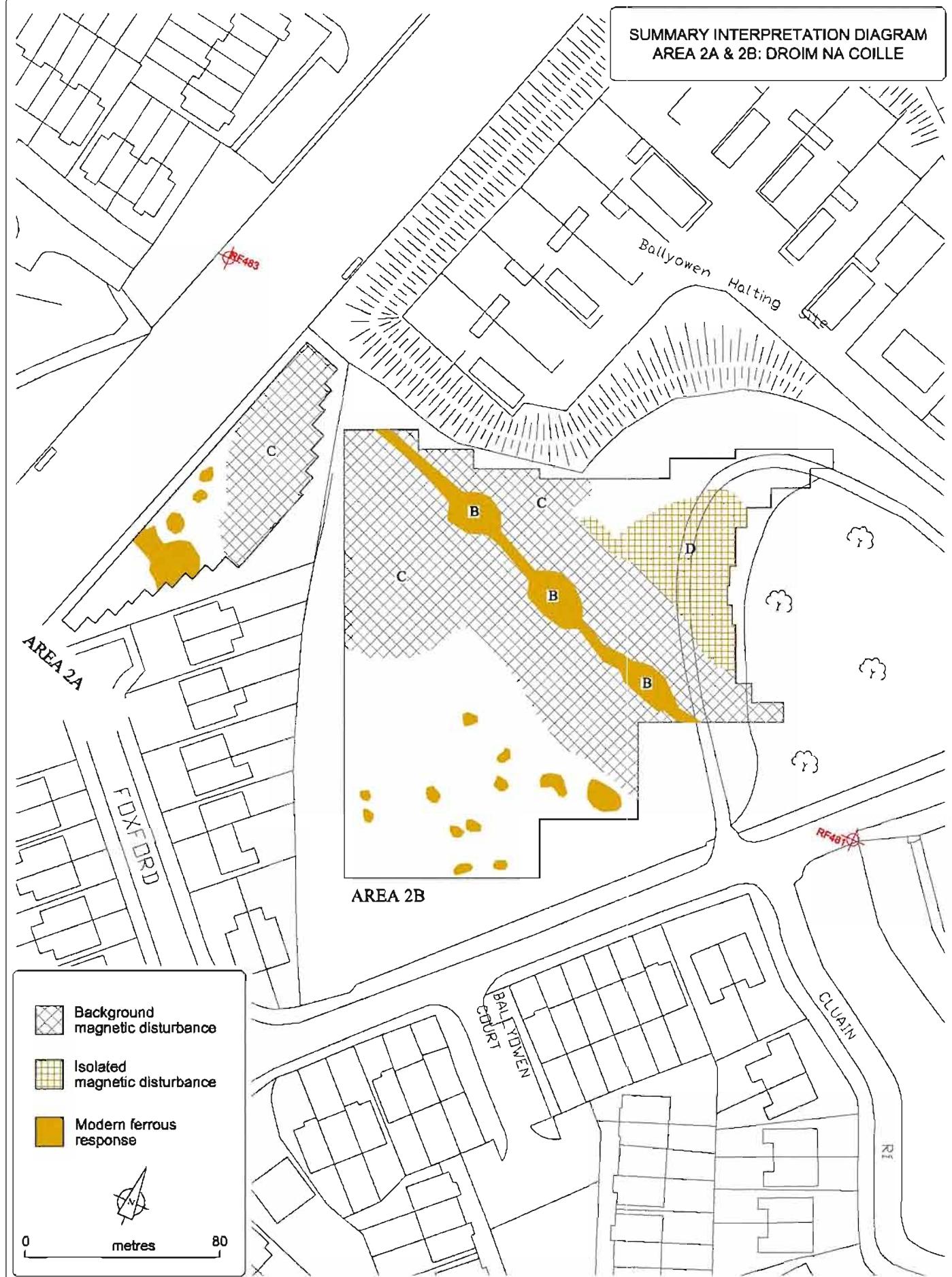
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Scale @ A4: 1:1,000  
Figure: 6  
Licence No.: 10 - R - 9  
Issue Date: 12.04.2010

SUMMARY GREYSCALE IMAGE  
AREA 2A & 2B: DROIM NA COILLE



SUMMARY INTERPRETATION DIAGRAM  
AREA 2A & 2B: DROIM NA COILLE



SUMMARY GREYSCALE IMAGE  
AREA 3A, 3B & 3C:  
PROPOSED DEPOT SITE



Client:

IAC LTD &  
THE RAILWAY PROCUREMENT  
AGENCY

Project:

GEOPHYSICAL SURVEY:  
LUAS LINE F

Title:

SUMMARY GREYSCALE IMAGE  
AREA 3A, 3B & 3C: PROPOSED  
DEPOT SITE

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Scale @ A3: 1:1,000  
Figure: 9  
Licence No.: 10 - R - 9  
Issue Date: 12.04.2010

SUMMARY INTERPRETATION DRAWING  
AREA 3A, 3B & 3C:  
PROPOSED DEPOT SITE



Client:

IAC LTD &  
THE RAILWAY PROCUREMENT  
AGENCY

Project:

GEOPHYSICAL SURVEY:  
LUAS LINE F

Title:

SUMMARY INTERPRETATION  
AREA 3A, 3B & 3C: PROPOSED  
DEPOT SITE

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Scale @ A3: 1:1,000  
Figure: 10  
Licence No.: 10 - R - 9  
Issue Date: 12.04.2010



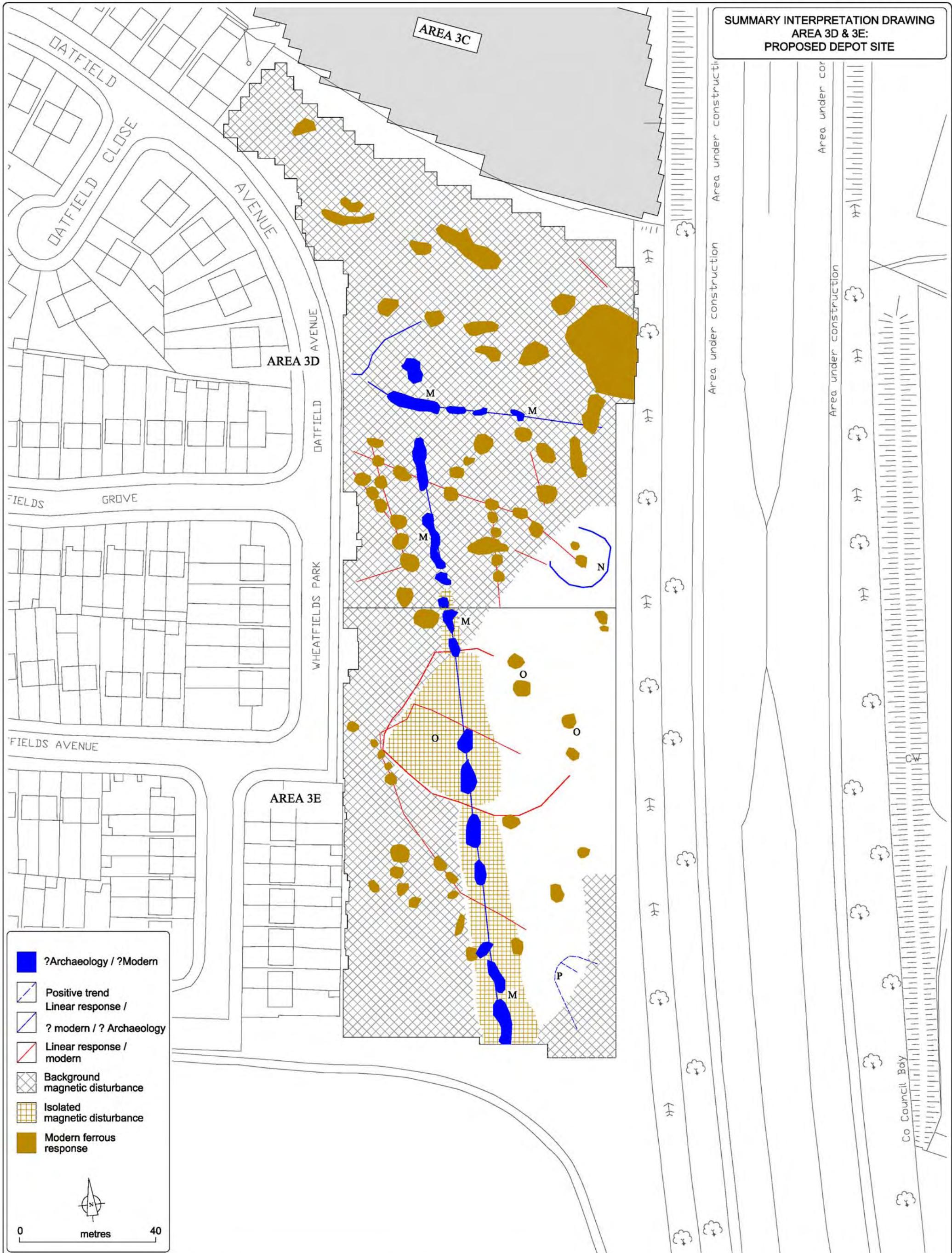
Client:  
IAC LTD &  
THE RAILWAY PROCUREMENT  
AGENCY

Project:  
GEOPHYSICAL SURVEY:  
LUAS LINE F

Title:  
**SUMMARY GREYSCALE IMAGE  
AREA 3D & 3E:  
PROPOSED DEPOT SITE**

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Scale @ A3: 1:1,000  
Figure: 11  
Licence No.: 10 - R - 9  
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AGENCY

Project:

GEOPHYSICAL SURVEY:  
LUAS LINE F

Title:

SUMMARY INTERPRETATION  
DRAWING  
AREA 3D & 3E:  
PROPOSED DEPOT SITE

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Scale @ A3: 1:1,000  
Figure: 12  
Licence No.: 10 - R - 9  
Issue Date: 12.04.2010