Geophysical Survey Report of Lands at Newtown, Co. Cork

Prepared for Jacobs Engineering
By Ger Dowling

Licence No.: 20R0017
Irish Transverse Mercator: 554962, 618224

March 2020

SURVEY DETAILS

Project Name	Geophysical survey at Newtown, Co. Cork
Licence No.	20R0017
Planning Ref.	N/A
Townland	Newtown
Parish	Ballyhay
Barony	Fermoy
County	Cork
RMP No.	CO008-040
Site Type	Ringfort - Rath
ITM	554962**,** 618224
Land Use	Pasture
Geology	Dark muddy limestone and shale
Soils	Sandstone till
Survey Type	Fluxgate Gradiometer
Instrument	Bartington Grad 601-2
Sample/Traverse interval	0.25m
Traverse interval	0.5m
Area surveyed	*c*.0.5ha
Licence Holder	Ger Dowling
Report Author	Ger Dowling
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Archaeological Management Solutions Limited

Unit 1,

Hector Street Mills, Kilrush,

Co. Clare.

Tel: +353 (0)65 810 3001

www.ams-consultancy.com

Disclaimer

The results, conclusions and recommendations contained within this report are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data has been collated, the author and AMS accept no responsibility for omissions and/or inconsistencies that may result from information becoming available subsequent to the report's completion.

Summary

This report details the results of geophysical survey of lands at Newtown, Co. Cork. The survey was undertaken on behalf of Jacobs Engineering to help inform an Environmental Impact Assessment Report (EIAR) currently being prepared for Iarnród Éireann's 'Cork Line Level Crossing Project'. The Project involves the removal/upgrading of seven separate level crossings located along the Cork to Dublin rail line. The survey area lies in the immediate vicinity of a Recorded Monument, a ringfort or rath (CO008-040) which was reportedly partially levelled in 1984.

The investigation, comprising high resolution magnetic gradiometry, was undertaken by Ger Dowling of Archaeological Management Solutions (AMS) in mid-February 2020. This work resulted in the identification of a number of features of archaeological and potential archaeological significance. Some of the features mapped by the survey may be associated with the partially levelled ringfort and/or with other phases of settlement and agriculture at the site.

The findings of the geophysical survey will help inform the scope of any potential future works at the target location. Further work (e.g. test investigations) is needed to determine the precise nature and significance of the anomalies detected by the survey.

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Abbreviations and Definitions

Abbreviation	Definition
AMS	Archaeological Management Solutions Ltd
EIAR	Environmental Impact Assessment Report
GIS	Geographical Information System
GPS	Global Positioning System
ITM	Irish Transverse Mercator
OS	Ordnance Survey
QGIS	Quantum Geographical Information System (open-source GIS software product)
RMP	Record of Monuments and Places
SMR	Sites and Monuments Record

Coordinate System

All grid coordinates given in this report are in Irish Transverse Mercator (ITM).

1 Project Background

This report details the results of a geophysical survey undertaken at Newtown townland, less than 1km northeast of the village of Ballyhea, Co. Cork (Figure 1). The survey, comprising high-resolution magnetic gradiometry, was conducted on 20 February 2020. The work was carried out on behalf of Jacobs Engineering to help inform an EIAR currently being prepared for Iarnród Éireann's 'Cork Line Level Crossing Project'. The Project involves the removal/upgrading of seven separate level crossings located along the Cork to Dublin rail line in order to reduce health and safety risks associated with the interface between road users and rail traffic (Figure 2).

An area of approximately 0.5ha in total was targeted for survey as part of the present investigation. The survey encompasses the eastern portion of a Recorded Monument, a ringfort or rath (CO008-040) which was reportedly partially levelled in the 1984 (SMR Files). This work led to the identification of a number of previously unrecorded features of archaeological and potential archaeological interest, some of which may be associated with the partially levelled ringfort.

1.1 Survey Location and Aims

The area targeted for investigation occupies the northern quadrant of a large, irregularly-shaped field located near the junction of two minor roads, a short distance to the east of the Dublin–Cork rail line. Currently under pasture, the field is traversed by a low, northwest–southeast-oriented ridge that delimits the survey area on the south. The ridge slopes gently to the northeast, down to a minor road that marks the northern extent of the survey area. Bounding this area on the east and west respectively are a modern domestic dwelling with surrounding fenced-in garden, and a tract of dense overgrown scrub, fronted by a post-and-wire fence.

The field lies over Grey-Brown Podzolic soils, developed mainly from glacial drift of Devonian sandstone derivation, with gley soils also occurring in the surrounding area (General Soil Map; Quaternary Sediments Map).

The aim of the geophysical investigation was to:

- identify any geophysical anomalies of possible archaeological origin within the specified survey area;
- accurately locate these anomalies and present the findings in map form;
- describe the anomalies and discuss their likely provenance in a written report; and
- incorporate all of the above in a report to the Client.

The findings of the geophysical survey will help inform the scope of any potential future works at the target location.

1.2 Proposed development

It is the policy of Córas Iompair Éireann (CIÉ) and Iarnród Éireann (IÉ) to remove all railway level crossings where possible and practicable on the Irish Railway network due to the health and safety risks associated with the interface between road users and rail traffic.[1] The Commission for Railway Regulation recognises that railway level crossings are a significant area of risk and commits itself to working with work with IÉ to reduce risk at all railway level crossings.

IÉ is proposing to eliminate/upgrade level crossings on the Dublin-Cork line. There are currently seven public road level crossings, as shown in Figure 2, that remain in operation on the Dublin-Cork Line between Limerick Junction and Mallow stations. The crossings are located within a 24 km section of the line.

The new proposed solution at Newtown, the Blue Route (Table 1; Figure 3), proposes the closure of the existing XC211 and provides a new link road to the east of the railway corridor to connect the local road at the east side of level crossing XC211 with the local road to the north east of the level crossing. The proposed realignment will not require any structures. The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

Table 1: Summary of level crossings & alternative options at the survey area

Newtown: XC211	Option	Blue (Figure 3)	New road alignment to east of level crossing. No new structures. BLUE ROUTE IS THE OBJECT OF THE CURRENT SURVEY EXERCISE

[1] Cork Line Level Crossing Project, Screening Report Updated. Available online at https://www.irishrail.ie/about-us/iarnrod-eireann-projects-and-investments/cork-line-level-crossings-project. Accessed 18 March 2020.

2 Archaeological Background

As stated, the survey encompasses the eastern portion of a Recorded Monument, a ringfort or rath (CO008-040) which was reportedly partially levelled in the 1984. The Sites and Monuments Record (SMR) describes this Recorded Monument as follows:

> ***Ringfort - Rath CO008-040***
>
> *In pasture, on break in NW-facing slope. Depicted as hachured circular enclosure (diam. c. 30m) on 1842 OS 6-inch map; as hachured, nearly circular raised area (diam. c. 20m) on 1905 and 1937 OS 6-inch maps. Field boundary extending N-S bisects enclosure off-centre to E. On W side of field boundary enclosure survives as raised area (diam. 20m) defined by scarp (H 1.6m) S->NNE; external fosse (D 0.6m) to SW. No visible surface trace on E side of boundary fence of remainder of enclosure; according to local information, levelled 1984. Interior slopes down to NW. Railway runs directly outside NW edge of site at a lower level.* [2]

There are no upstanding archaeological remains within the area investigated. An archaeological assessment of the land immediately to the west of the survey area was not possible owing to dense overgrowth.

[2] Historic Environment Viewer. Available online at http://webgis.archaeology.ie/historicenvironment/. Accessed 4 March 2020.

3 Survey Methodology and Instrumentation

The survey involved magnetic gradiometry. This technique measures changes in the magnetic properties of the soil and is widely used in modern archaeological investigations due to its ability to detect a broad range of sub-surface archaeological remains, including ditches and pits, burnt and/or industrial features associated with metalworking and pottery production.

The magnetic survey was conducted using a Bartington Grad 601-2 (dual system) fluxgate gradiometer. The investigations were conducted over a large, irregularly shaped grid with maximum dimensions of 110m north–south by 75m east–west (total area *c*.0.5ha) (Figure 4).

The data capture strategy involved logging readings at 0.25m intervals on traverse lines spaced 0.5m apart within each 20 x 20m grid panel, giving a total of 3,200 individual measurements of magnetic data per grid panel. This sampling strategy will provide clarity to any archaeological features detected.

3.1 Setting out

The exact location of the survey area (divided into 20 x 20m grid panels) was selected in GIS software QGIS using a range of base mapping products. Once selected, the precise ITM grid coordinates of the survey panels were transferred to a GPS Field Controller (Lecia Viva GS14), which was used in the field to precisely 'stake-out' the position of the grid panels. The highly accurate positioning of the survey grids provides strong confidence when integrating the geophysical results with other datasets such as aerial imagery in GIS, and also ensures repeatability should further investigation of anomalies (e.g. test excavation) be required.

3.2 Data Management, Processing and Interpretation

Survey data was logged to a laptop computer and archived to an external hard drive. The collated data was processed using Geoplot 3.0 software. This involved:

- Clipping the dynamic range of the dataset to enhance weaker anomalies;
- Edge-matching of adjacent survey panels;
- Removal of occasional striping due to sensor mismatch; and
- Interpolation of the dataset (from 0.5m to 0.25m in traverse spacing) to improve the visual quality.

The processed data was imported into QGIS for final image production (Figures 5–6). Final geophysical datasets have been formatted as raster data models to enable subsequent geospatial analysis. Fieldwork, data processing and reporting adhered to the most up-to-date guidelines for conducting archaeo-geophysical surveys (Schmidt et al. 2016). All geophysical raster datasets will be

digitally archived to best practice (e.g. Nevin 2012; Schmidt & Ernenwein 2012).

3.3 General Considerations and Complicating Factors

3.3.1 Access and Ground Conditions

The target land comprised pasture and is bounded by a combination of hedges and post-and-wire fences.

3.3.2 Modern Interference

Small-scale ferrous responses were evident in the results from across the survey area. These are a common occurrence in magnetic survey data, and in most cases represent modern metal debris contained within the topsoil. Several small areas of ferrous disturbance deriving from survey in proximity to post-and-wire fences were recorded in the northern, eastern and western sectors of the survey area.

4 Survey Results

Table 2: Geophysical Survey Results

Townland	Newtown		
ITM (Easting/ Northing)	554962, 618224		
Area surveyed (hectares)	0.5		
Figure Numbers	5 & 6		
Anomaly Number	***Form/nature of anomaly***	***Possible sources(s) of anomaly***	***Comparative discussion***
1	Integrated array of slender negative anomalies of circular and paired linear form	Archaeology	Network of ditches or stone/compacted earth features, traced for approx. 65m NW–SE. Appears to describe a *c*.5m-wide avenue/droveway, with associated circular enclosure (approx. 13m in diameter), open to the NW. Indicative of former settlement/agriculture. Perhaps associated with (2) and (3).
2	Negative linear	Archaeology	Possible ditch/drain or wall footing, approx. 18m in length (NE–SW). May be associated with (1). Extends SW beyond the survey area.
3	Negative linear	Archaeology	Possible ditch/drain or wall footing, approx. 25m in length (NE–SW). May be associated with (1) and (4). Extends SW beyond the survey area.
4	Faint negative linear	Possible Archaeology	Possible ditch/drain, oriented NW–SE. May represent continuation of (3).
5	Positive semi-circular anomaly	Possible Archaeology	Possible curving ditch (length of arc *c*.10m).
6	Broad negative semi-circular anomaly	Possible Archaeology/natural	Possible curving ditch (length of arc *c*.25m); may contain non-magnetic soil/material in-fill and represent segment of former enclosure perimeter. This interpretation is highly tentative; natural origin also possible.
7	Slender negative curvilinear anomaly	Possible Archaeology/natural	Possible curving ditch (length of arc approx. 8.5m).
8	Weak pattern of slender negative linears	Possible Archaeology	Possible rectilinear network of ditches suggestive of former settlement/agriculture; natural origin also possible.
9	Multiple ‘pit-type’ responses	Possible Archaeology	Possible pits/deposits; may contain burnt material.
10	‘Pit-type’ responses	Possible Archaeology	Possible pit/deposit; may contain burnt material.

	Faint negative lineations	Possible Archaeology	Possible narrow ditches/drains or stone/compacted earth features; may also be localised natural variations in geology and soils.
	Multiple, faint negative linear trends	Possible Archaeology	Possible narrow ditches/drains or stone/compacted earth features; may also be localised natural variations in geology and soils.
	Amorphous areas of high responses	Possible archaeology	Possible cultural layer/s or modern soil disturbance.
	Multiple ferrous responses	Likely modern	Ferrous debris.
	Small areas of ferrous/magnetic disturbance	Modern	Disturbance from adjacent wire fence.

5 Conclusions

Magnetic gradiometry survey at Newtown has revealed a number of features of archaeological and potential archaeological significance. Of particular interest are the remains of a possible avenue/droveway (1) that was traced for a distance of about 65m and can be seen to link with a small circular enclosure, measuring some 13m in diameter. Although the precise significance of these features is uncertain, they may relate to ancient settlement and/or agriculture. Indeed, at least two linear features (2 & 3), which appear to terminate at (1), may describe the outline of a former field.

Many of the other, linear, curvilinear and 'pit-type' anomalies recorded by the survey to the northeast of the possible avenue/droveway and associated enclosure (1) are also of potential archaeological interest. Some (e.g. 6–9) may represent features associated with the partially levelled ringfort and/or relate to other phases of settlement and agriculture at the site. However, further work (e.g. test investigations) is required to elucidate the precise nature and significance of the anomalies mapped by the survey.

6 References

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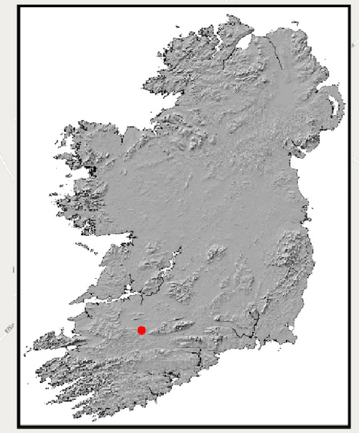
Schmidt A., Linford P., Linford N., David A., Gaffney C., Sarris A., and Fassbinder J. 2016. *EAC Guidelines for the Use of Geophysics in Archaeology*: *Questions to ask and points to consider*. EAC Guidelines 2. [Online] Available from: https://bradscholars.brad.ac.uk/handle/10454/8129

Figures

Charleville

Newtown



0 1 2 3 4 km

FIGURE 1

Title: Site location map

Project: Cork Level Line Crossing Project (Consent No.: 20R0017)

Client: Jacobs Engineering

Job No: J2017

Scale: 1:30000 @ A3

Date: 03-03-2020

Drawn by: GD

Revision: 0.1

Legend

Target Area

Notes:
map source: www.bing.com/maps

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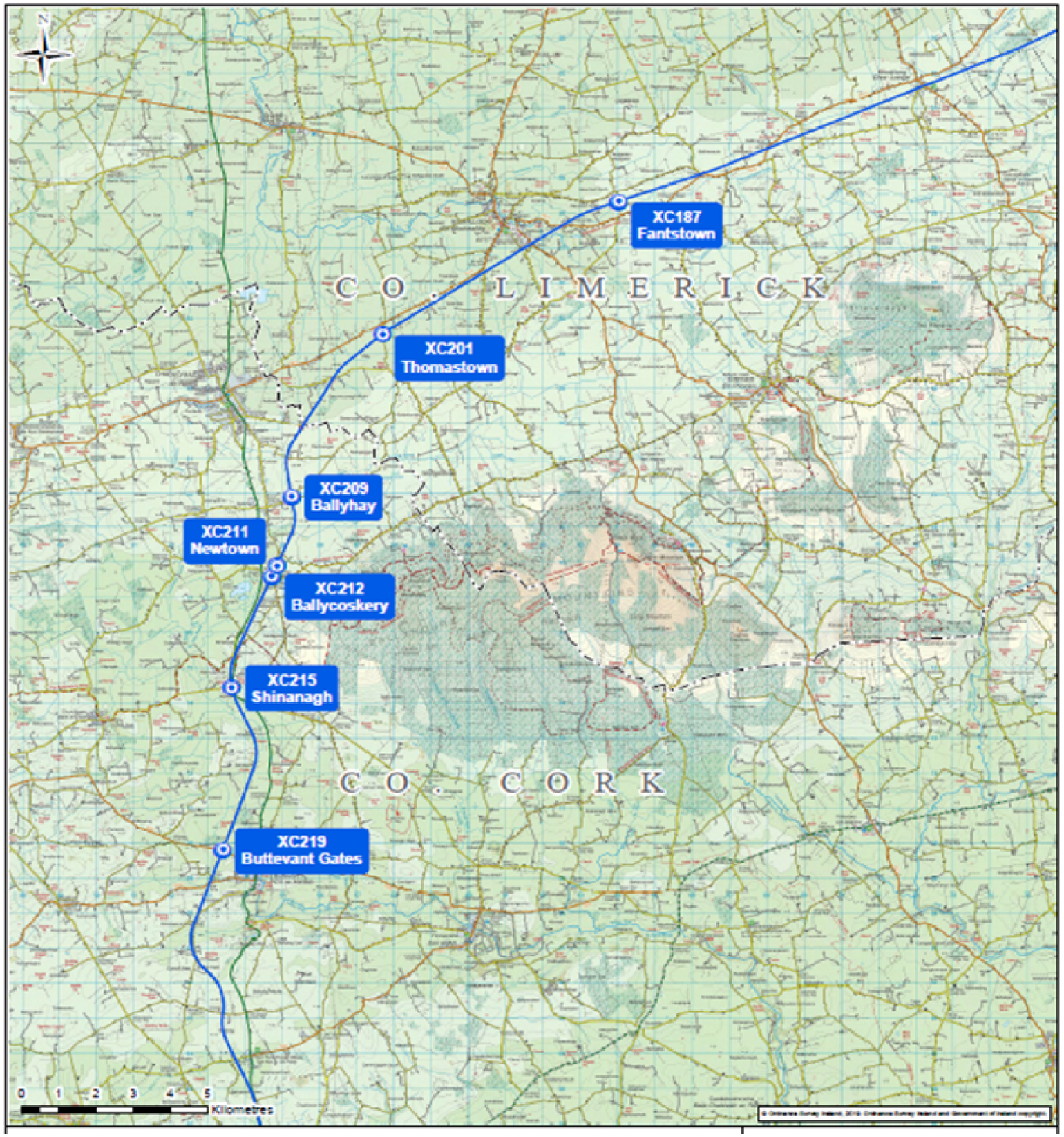

FIGURE 2

Title: Location of the seven rail line crossing points proposed for upgrade

Project: Cork Level Line Crossing Project (Consent No.: 20R001) 7

Client: Jacobs Engineering

Job No: J2017

Scale: N/A

Date: 04-03-2020

Drawn by: GD

Revision: 0.1

Notes: Map provided by Jacobs Engineering

AMS

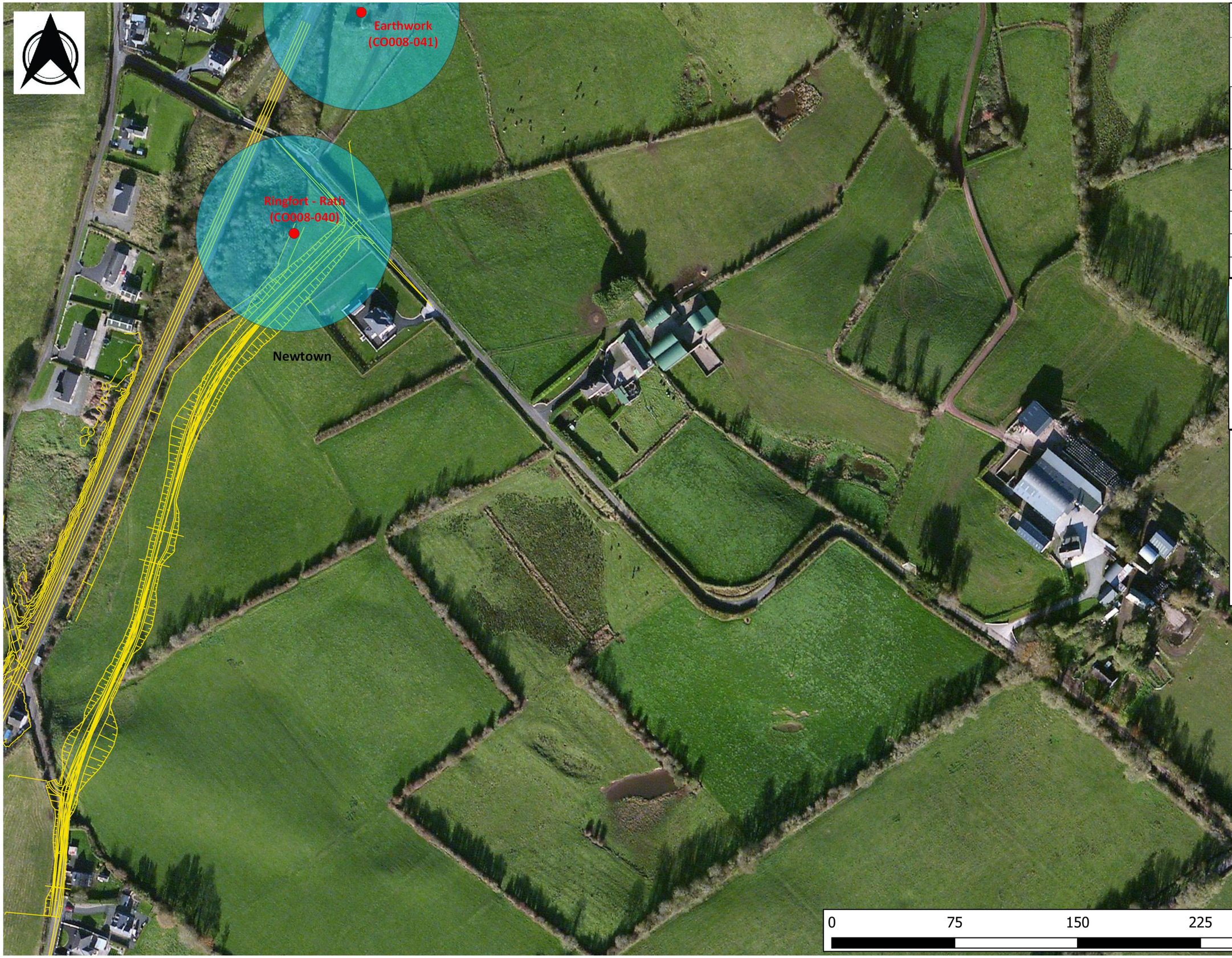

FIGURE 3

Title: Possible development (new road) at Newtown and surrounding lands, Co. Cork

Project: Cork Level Line Crossing Project
(Consent No.: 20R0017)

Client: Jacobs Engineering

Job No: J2017

Scale: 1:2100 @ A3

Date: 11-03-2020

Drawn by: GD

Revision: 0.1

Legend

- Plan of possible development
- Recorded Monument
- SMR Zone

Notes: Overlaid on Bing maps (source: www.bing.com/maps)

AMS

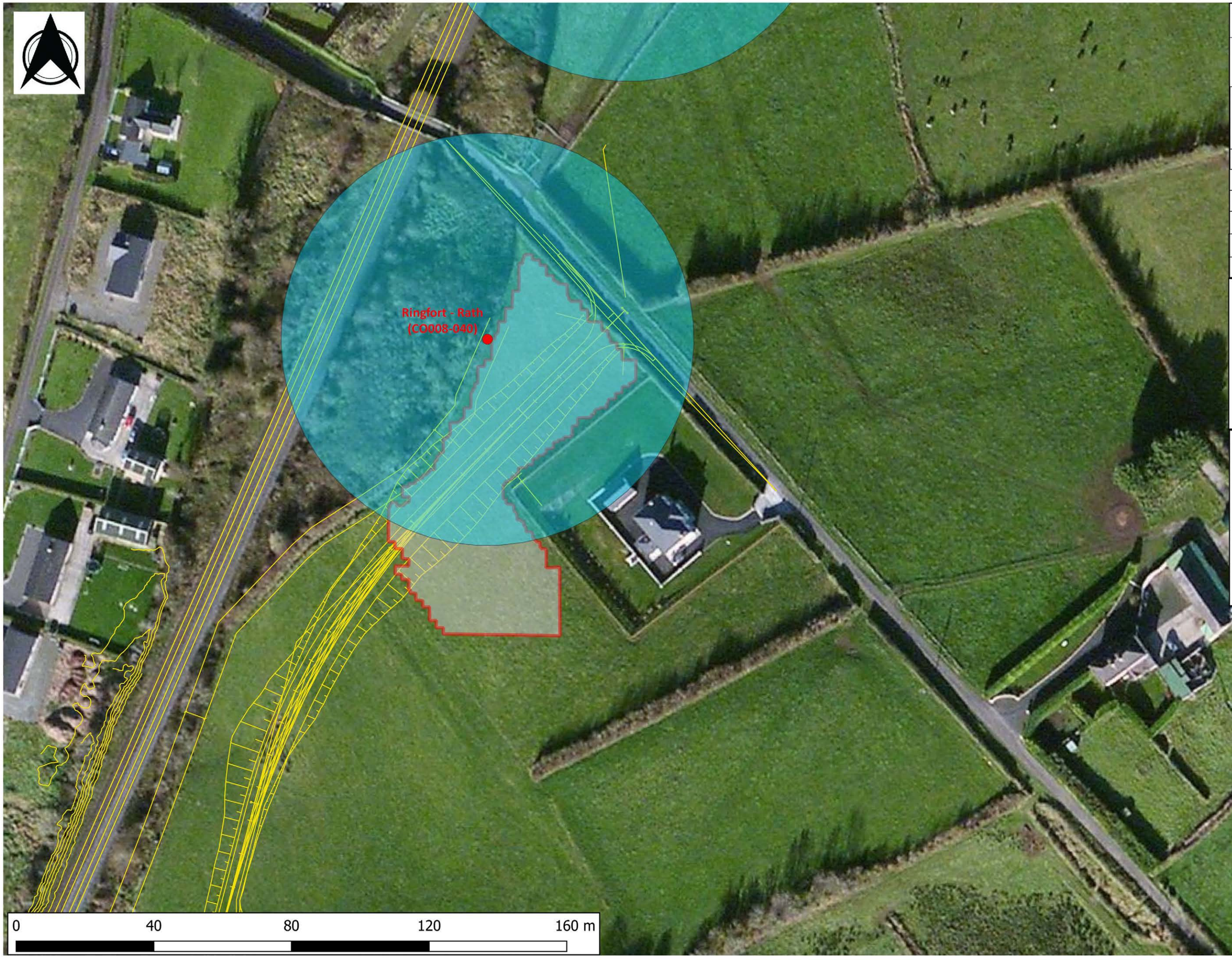

FIGURE 4

Title: Geophysical survey area, Newtown

Project: Cork Level Line Crossing Project (Consent No.: 20R0017)

Client: Jacobs Engineering

Job No: J2017

Scale: 1:1000 @ A3

Date: 05-03-2020

Drawn by: GD

Revision: 0.1

Legend

- Recorded Monument
- SMR Zone
- Plan of possible development
- Geophysical survey area

Notes: Geophysical survey area overlaid on Bing maps (map source: www.bing.com/maps)

AMS

FIGURE 5

Title: Greyscale image of gradiometry results, Newtown, Co. Cork

Project: Cork Level Line Crossing Project
(Consent No.: 20R0017)

Client: Jacobs Engineering

Job No: J2017

Scale: 1000 @ A3

Date: 26-02-2020

Drawn by: GD

Revision: 0.1

Legend

- Recorded Monument

Notes: Geophysical survey results overlaid on Bing aerial imagery
(map source: www.bing.com/maps)

AMS

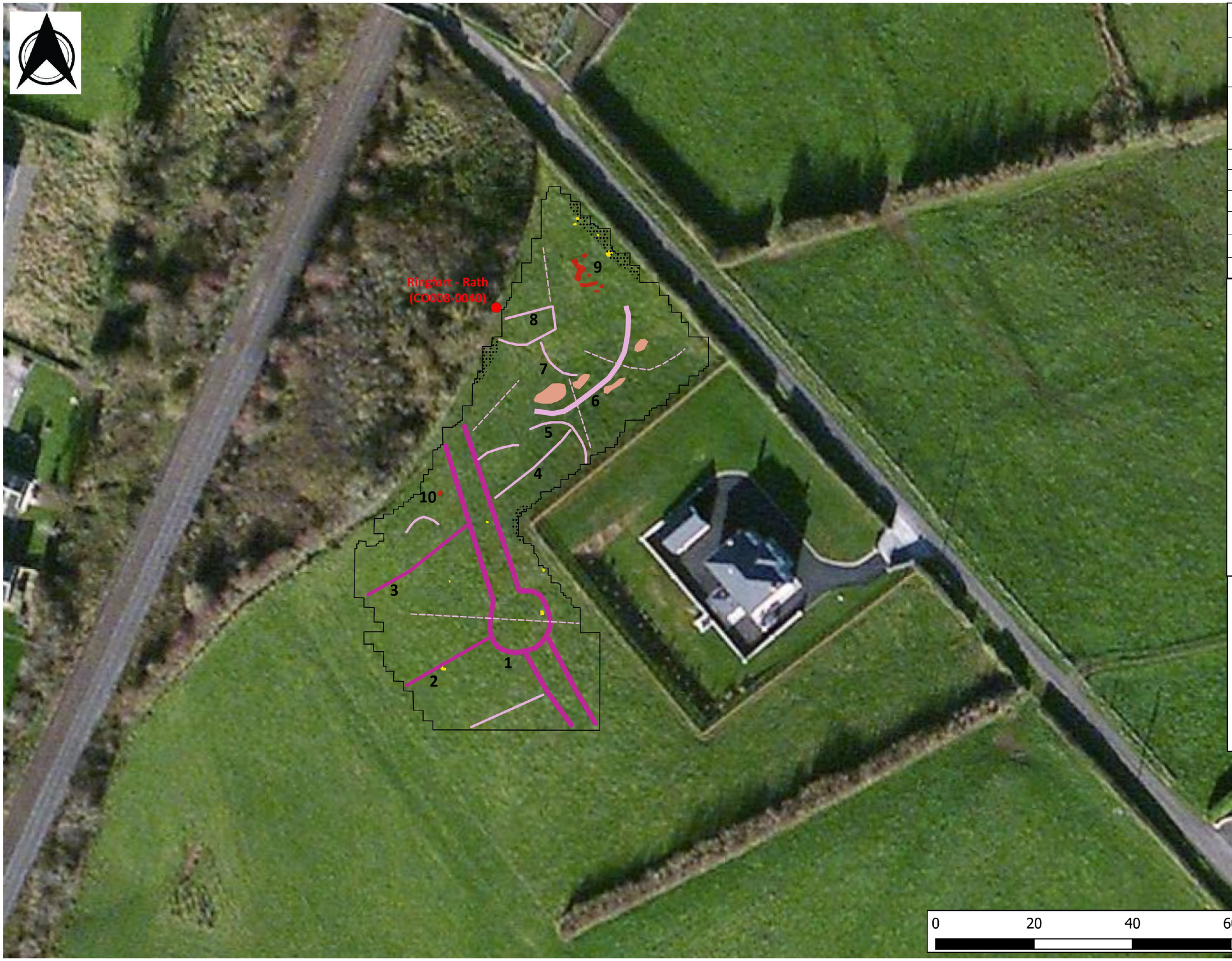

FIGURE 6

Title: Interpretative Plan of Geophysical Survey Results, Newtown

Project: Cork Level Line Crossing Project (Consent No.: 20R0017)

Client: Jacobs Engineering

Job No:J2017

Scale: 700 @ A3

Date: 26-02-2020

Drawn by: GD

Revision: 0.1

Legend

- Survey Area
- Archaeology
- ?Archaeology
- ?Archaeology (trend)
- ?Burnt/Industrial feature
- Area of increased response
- Modern disturbance
- Ferrous response
- Recorded Monument

Notes: Interpretative plan overlaid on Bing aerial imagery (map source: www.bing.com/maps)

AMS