Appendix A12:

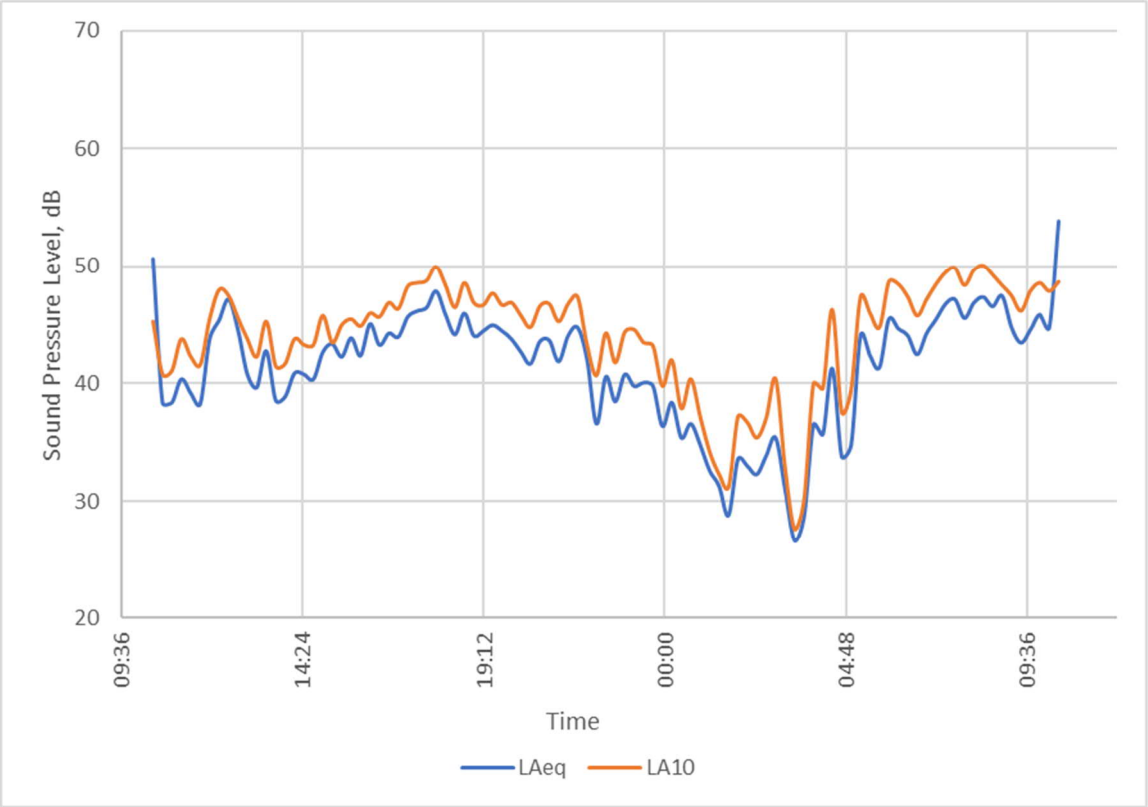
Noise and Vibration

Appendix A12-1

Unattended Noise Survey Results

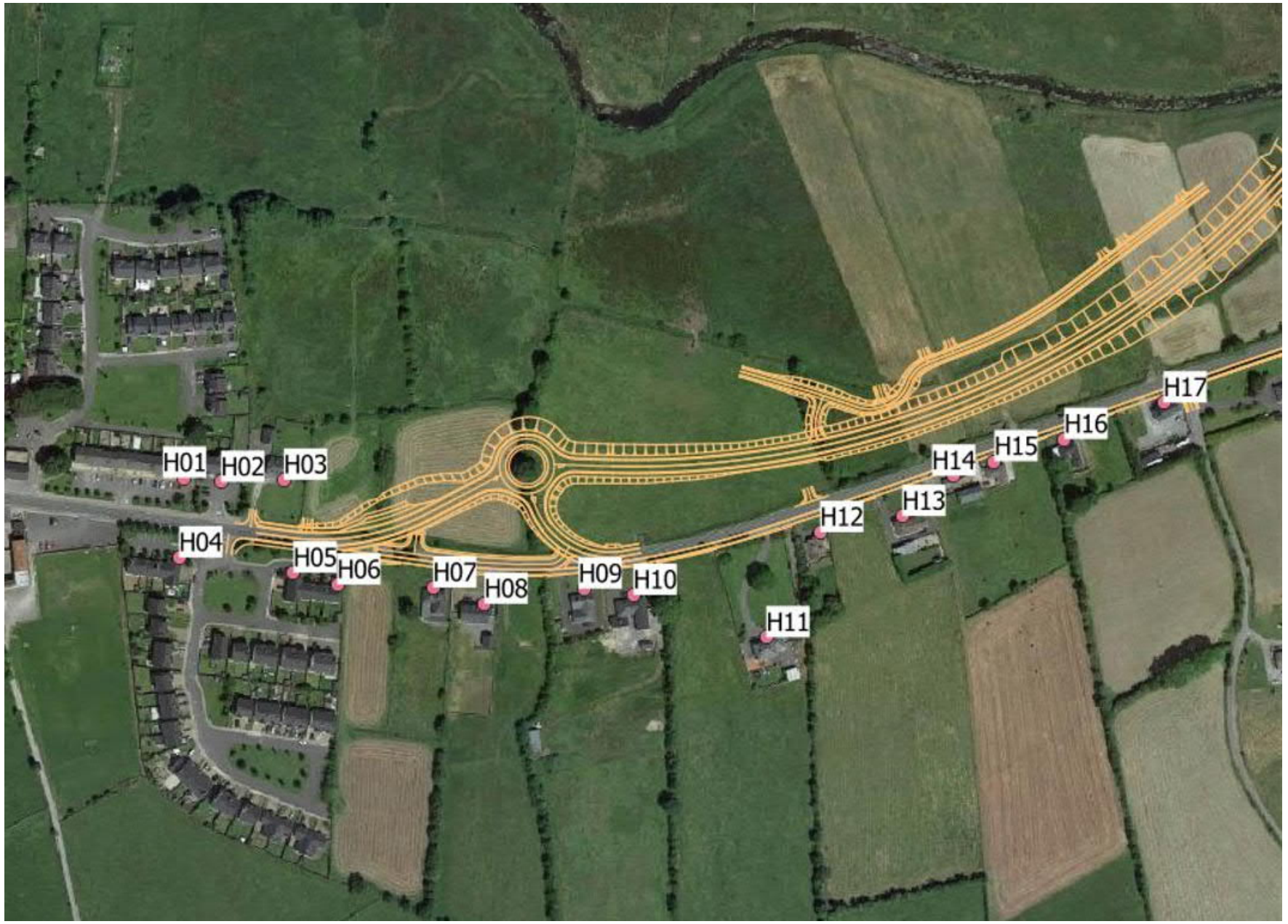
Unattended Measurements at UN1

Unattended Measurements at UN2



Appendix A12-2

Noise Assessment Locations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H35
H34

Appendix A13:

Landscape & Visual

Appendix A13-1

Booklet of Photomontages

Verified Photomontages of

N63 Liss to Abbey Realignment Scheme

Prepared for:

AECOM
4th Floor
Adelphi Plaza
Georges Street Upper
Dublin

17/11/2021

Prepared by:
G-Net 3D

NSC Campus
Mahon, Cork

Tel: 021-2307043
info@gnet3d.com

Photomontage Methodology

Photography

The photos for views were taken on the April 22nd, 2021.
A Canon Eos T5i camera was used for all of the photography.
Leica GS08plus Smart Antenna was used to accurately record the viewpoint coordinates and height levels.
Camera positions are indicated on the viewpoint map to the right.

Modelling

Preparation of an accurate 3D model of the proposed N63 re-alignment part and landscape using drawings supplied by AECOM.

Setup

The following information is used to accurately position the 3D model into the photo-graphs:
-Site survey,
-Photographs,
-The camera location of each photograph is accurately marked on the location OSi map.

To match the 3D camera view with the photograph we have to take the following steps: The camera height is taken from information gathered on the levels from where the photos are taken. The height levels of the proposed development are outlined on the site. Focal length is based on the photograph EXIF info.

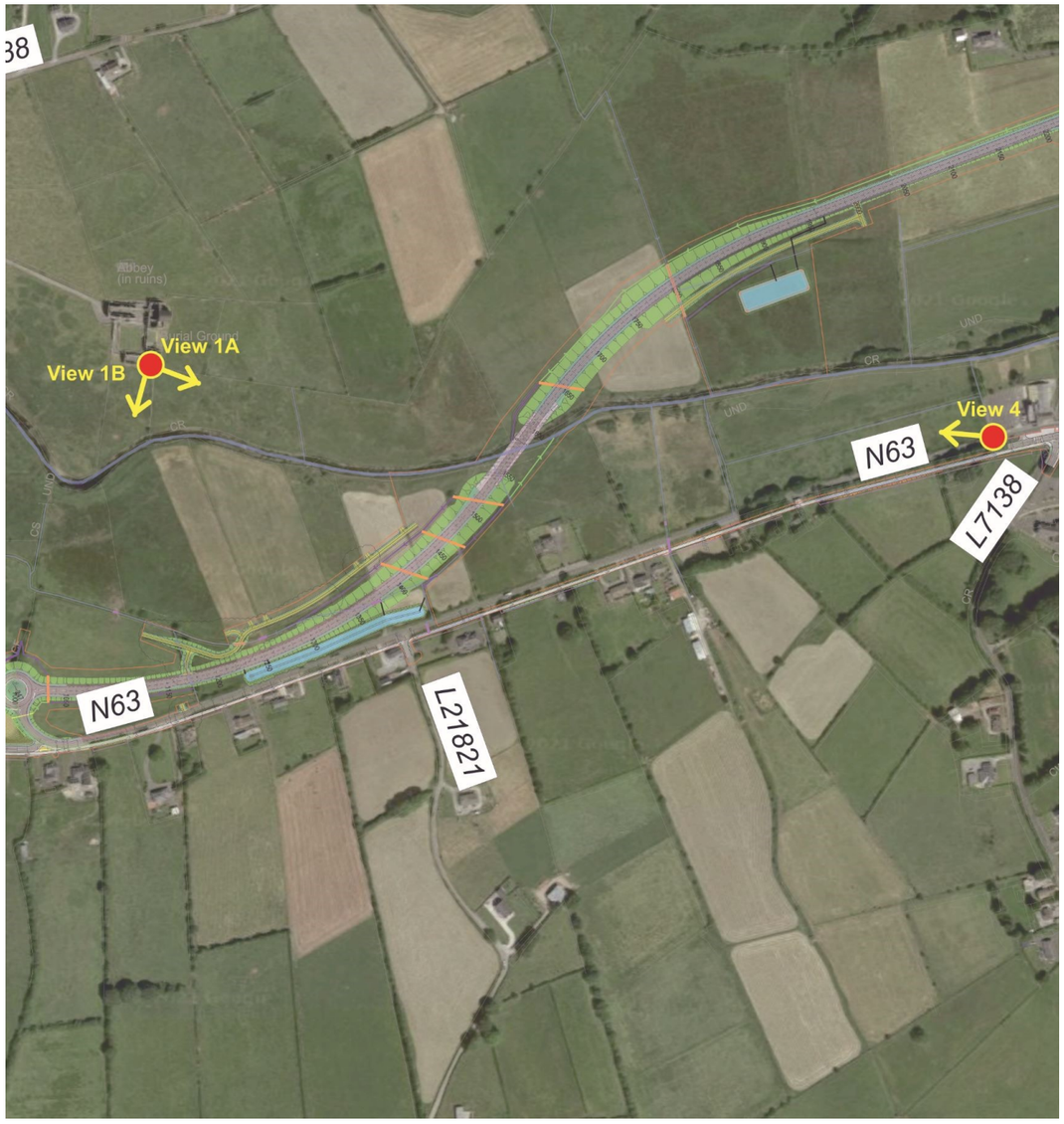
This data is imported into our 3D software and the 3D camera is matched with the se-lected photographs. To match the 3D camera accurately we use all the above data and the reference 3D models. The reference 3D models are existing structures ie. buildings, roads, lamps, etc which are visible on the photographs. These items are modelled based on the survey information. After all of the above conditions are fulfilled and we are satis-fied that the camera matches correctly, we proceed to the next step.

Rendering

We apply the materials and textures prior to rendering the photomontage images. Light settings are adjusted to match the brightness of the photographs and sun is positioned ac-cording to the date and time the photo was taken.

Post processing

This process means incorporating a 3D rendered model of the proposed road development into the photograph to achieve the final result.



Viewpoint Map

Viewpoint Information

View No	Easting	Northing	Orthometric Height	Camera Focal Length
View 1A & 1B	550662.314	743591.257	40.400	18mm
View 4	551493.866	743513.877	43.224	18mm

Visual Impact Assessment		Issue Date:	Photo info:	Project:	
VIEW 1A	**EXISTING**	17-11-2021	22-04-2021	Proposed N63 Liss to Abbey Realignment Scheme	www.gnet.ie

Visual Impact Assessment		Issue Date:	Photo info:	Project:	
VIEW 1A	**PROPOSED**	17-11-2021	22-04-2021	Proposed N63 Liss to Abbey Realignment Scheme	www.gnet.ie

Visual Impact Assessment		Issue Date:	Photo info:	Project:	
VIEW 1B	**EXISTING**	17-11-2021	22-04-2021	Proposed N63 Liss to Abbey Realignment Scheme	NET3D www.gnet.ie

Visual Impact Assessment		Issue Date:	Photo info:	Project:	
VIEW 1B	**PROPOSED**	17-11-2021	22-04-2021	Proposed N63 Liss to Abbey Realignment Scheme	www.gnet.ie

Visual Impact Assessment		Issue Date:	Photo info:	Project:	
VIEW 4	**EXISTING**	17-11-2021	22-04-2021	Proposed N63 Liss to Abbey Realignment Scheme	www.gnet.ie

Visual Impact Assessment		Issue Date:	Photo info:	Project:	
VIEW 4	**PROPOSED**	17-11-2021	22-04-2021	Proposed N63 Liss to Abbey Realignment Scheme	www.gnet.ie

Appendix A13-2

Planting Schedule

N63 Liss to Abbey Realignment Scheme

Volume 04: Appendices

Planting Schedule

November 2021

Prepared for:

Galway County Council

Prepared by:

AECOM Ireland Limited
4th Floor
Adelphi Plaza
Georges Street Upper
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Planting Schedule

Botanical Name	Common Name	Description	Root
Feature Tree Planting			
Carpinus betulus	*Hornbeam*	*Standard 3 x transplanted; 2m clear stem; 20-25cmg*	*Rootball*
Woodland Cluster Tree Planting (Assuming Soil Type to be brown earth, neutral to slightly acid pH, improved grasslands)			
Native Irish woodland clusters planted in groups			
Quercus petrea	*Pedunculate oak*	*(20%) Standard 3 x transplanted; 12-14cm girth, staked*	*Rootball*
Quercus robur	*Oak*	*(20%) Feathered 150-175cm high*	*Bare root*
Betula pubescens	*Downy Birch*	*(20%) Feathered 150-175cm high*	*Bare root*
Corylus avellana	*Hazel*	*(15%) Feathered 150-175cm high*	*Bare root*
Crataegus monogyna	*Hawthorn*	*(5%) Whips1+2 transplant, 80-100cm high*	*Bare root*
Prunus avium	*Cherry*	*(5%) Whips1+2 transplant, 80-100cm high*	*Bare root*
Sorbus aucuparia	*Rowan*	*(5%) Whips1+2 transplant, 80-100cm high*	*Bare root*
Ilex aquifolium	*Holly*	*(5%) Whips1+2 transplant, 80-100cm high*	*Bare root*
Malus sylvestris	*Crab Apple*	*(5%) Whips1+2 transplant, 80-100cm high*	*Bare root*
Native Hedgerow Mix (double-staggered, 7 plants/lm)			

Botanical Name	Common Name	Description	Root
Crataegus monogyna	*Hawthorn*	*Feathered, 150-175cm high*	*Bareroot*
Prunus spinosa	*Blackthorn*	*Whip; 1+2 transplant, 80-100cm high*	*Bareroot*
Rhamnus frangula	*Alder buckthorn*	*Whip; 1+2 transplant, 80-100cm high*	*Bareroot*
Corylus avellana	*Hazel*	*Whip; 1+2 transplant, 80-100cm high*	*Bareroot*
Viburnum opulus	*Guelder Rose*	*Whip; 1+2 transplant, 80-100cm high*	*Bareroot*
Rosa canina	*Dog Rose*	*Whip; 1+2 transplant, 80-100cm high*	*Bareroot*
Malus sylvestris	*Crab Apple*	*Feathered, 150-175cm high*	*Bareroot*
Feature Shrub Planting			
Sambucus nigra	*Elder*	*2L, 40-60cm high, 40-60 cm spread*	*Container*
Ilex aquifolium	*Holy*	*2L, 40-60cm high, 40-60 cm spread*	*Container*
Amenity Grass Mix (roadside verges and attenuation pond edges)			
Amenity Grass Mix	*n/a*	*Handsown*	*n/a*
Wildflower Meadow Grass Mix			
GF03 All-Ireland Pollinator Plan Wildflower Mixture	*n/a*	*Handsown*	*n/a*

Appendix A14:

Cultural Heritage

Appendix A14-1

N63 Liss to Abbey Archaeological Geophysical Report

N63 Liss to Abbey Realignment Scheme, Abbeyknockmoy, Co. Galway

Archaeological Geophysical Survey

Detection Licence No. 20R0138

Survey undertaken on behalf of

AECOM / Galway County Council

H. Gimson BA (Hons) MSc MIAI
C. Hogan BSc (Hons) MIAI
U. Garner BSc (Hons) MSc

EAG 405

28 August 2020

Prospect House, Drumagh, Claremorris, County Mayo, Ireland

earthsound.ie

Table of Contents

Summary of Results

Between the 4th and 24th August 2020, a geophysical survey commissioned by Mr D. Kilner of AECOM on behalf of Galway County Council was undertaken on the proposed N63 Liss to Abbey realignment Scheme at Abbeyknockmoy, County Galway. This project spans the Abbert River and is overlooked by a National Monument, the ruins of a medieval Cistercian Abbey. A magnetometer survey was undertaken at a sample resolution of 0.5m x 0.1m.

The survey was conducted upon a bedrock geology consisting of Burren Formation Limestone, beneath coarse loamy drift and some peat and river alluvium. The majority of the survey area was heavily waterlogged and boggy and comprised of newly cut rough pasture fields.

The geophysical surveys undertaken for this report have revealed a series of possible archaeological features including a number of arcing ditches and associated possible pits. However the majority of the anomalies detected consisted of linear and curvilinear cut features or trends which are likely to be agricultural in origin. A number of relict field boundaries were detected which match those shown on historic Ordnance Survey mapping, while evidence of ploughing was also revealed in the form of cultivation furrows.

The landscape of the survey contains much ferrous debris. A series of dipolar interference zones have been identified which are suggestive of deposition or demolition. However the prevalence of ferrous contamination is unusually high especially in the western part of the scheme. In addition to the modern fencing and debris from the existing N63, the distribution of the ferrous debris suggests that it might have been spread by alluvial activity. At least one palaeochannel has been detected and it is likely that the landscape within the vicinity of the Abbert River once suffered from alluvial inundation, this theory backed up by the weak background values detected in the magnetometer survey.

The presence of these alluvial deposits is likely to affect the magnetic content of the soil. Prolonged periods of flooding or water logging can cause the leaching of magnetic properties within the soil. The magnetic signatures of possible archaeological features may have been significantly reduced or removed, leading to them not being detected. Or if a depth of alluvium has been deposited, then archaeological features may be masked from the magnetic survey.

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

1.1 Brief Description of the Proposed Development

Earthsound Geophysics Ltd. were commissioned by AECOM to carry out a geophysical survey along the corridor of the N63 Liss to Abbey Realignment Scheme, Abbeyknockmoy, County Galway.

The Scheme will realign the existing N63 road to northeast of the village of Abbeyknockmoy. The geophysical surveys were undertaken along the length of the corridor encompassing a total area of 12.9 hectares with the intention of detecting any previously unknown archaeological remains. The techniques to be used were pre-determined by AECOM.

1.2 Aims of the Survey

AECOM required an archaeological geophysical survey of the route of the N63 Liss to Abbey Realignment Scheme (Aecom 2020). The survey was carried out in accordance with the brief prepared by AECOM in consultation with the TII Project Archaeologist, supplied by Galway County Council, using a magnetic gradiometer. The aims of the Stage (i) i Geophysical Survey Services were:

- To assess the archaeological potential of the survey areas where geophysical survey is required;
- To establish the presence/absence of archaeological anomalies within the survey areas, and to define their extent and, where possible, characterise the anomalies / features; and
- To inform the impacts and mitigation of the N63 Liss to Abbey Realignment Scheme.

1.3 Description of the Survey Area

The scheme covers land which consists of pasture land, to the west of the scheme the majority of this is marginal. Towards the eastern edge of the scheme the pasture improves. Some of the land was densely overgrown with rushes and associated flowering weeds and was cut in advance of the survey. The land to the west of the scheme is located on the edge of the river and is cut by a number of water courses and field boundary drains.

The survey areas are located upon Burren Formation bedrock geology (GSI 2020). This is comprised of pale grey clean skeletal limestone. This is overlain by a number of soils. Coarse loamy drift covers the majority of the survey area, with small areas of peat and river alluvium present (Teagasc 2020). The limestone geology and soils may mask the presence of potential archaeological features within gradiometer data due to poor contrast.

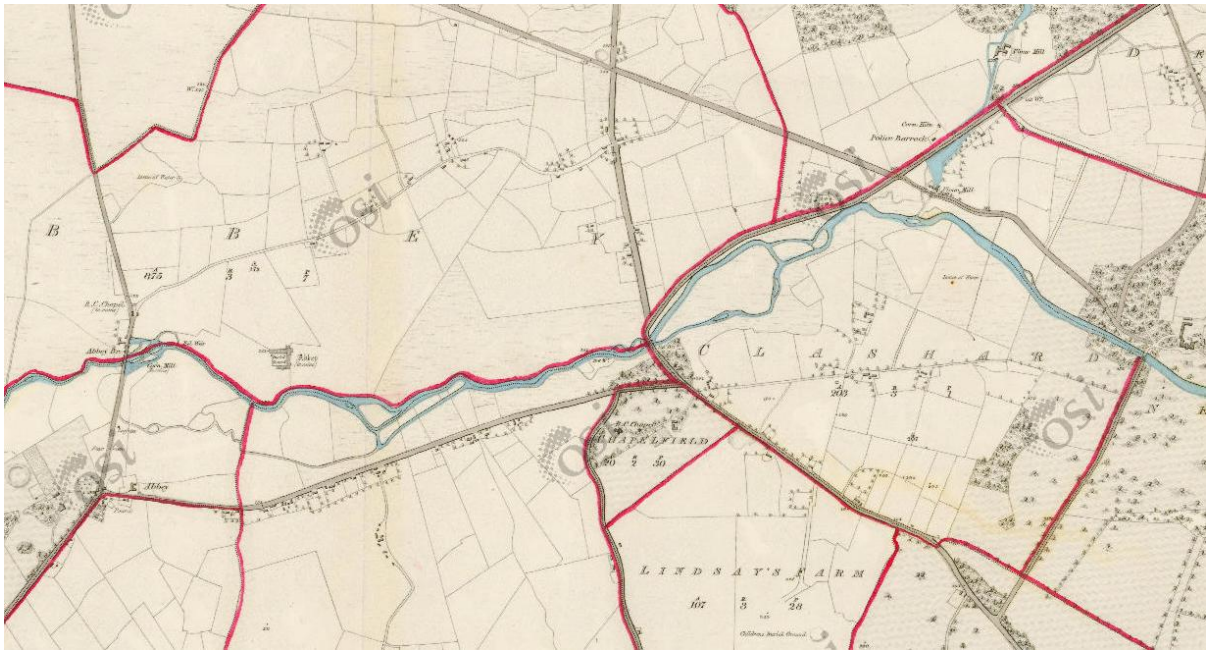
The climatic conditions were mixed periods of heavy rain and overcast weather. The weather is unlikely to have had an impact on the results obtained.

1.4 Archaeological Background and Statutory Protections

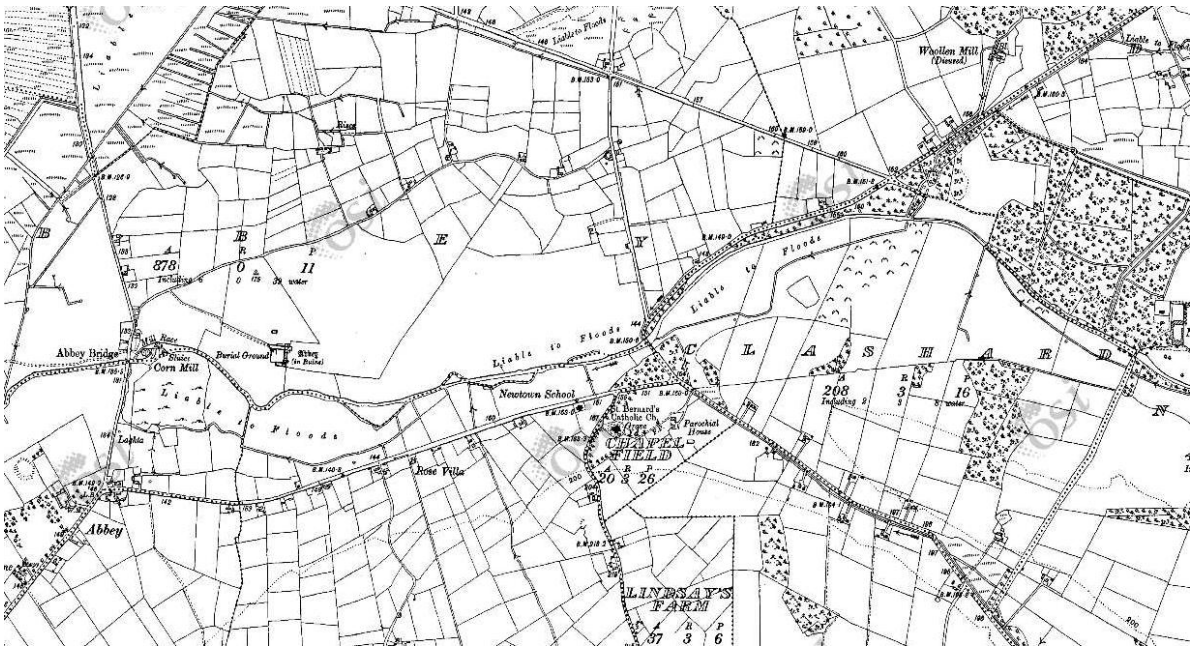
There are no recorded monuments – per the Record of Monuments and Places (RMP) within the survey area. There are eight identified RMP sites within the vicinity of the scheme. The closest comprises of one National Monument under ownership of the Minister for Culture, Heritage and the Gaeltacht (Abbeyknockmoy Cisterican Abbey; GA058-004001) and one National Monument subject to Preservation Order (earthworks and buildings associated with Abbeyknockmoy Cistercian Abbey; GA058-004004-). These are located approximately 350m northwest of where the corridor crosses the River Abbert.

Several features are recorded in relation to an abbey, consisting of a religious house GA058-004001-, a building GA058-004002, a graveyard GA058-004003 and a field system GA058-004004- (Alcock *et al*. 1999). Parts of the religious house and building were investigated in 1982 and 1983 (Sweetman 1987). The excavations were prompted by OPW conservation and maintenance works to the Abbey. Foundation levels of a fifteenth century cloister were revealed, the north and south transepts were investigated and an isolated building to the north of the abbey was excavated (Aecom 2019). It is possible that the religious complex may extend westwards, as evidenced by the presence of a corn mill GA058-004005- and chapel GA058-004006- (Alcock *et al*. 1999).

The National Monuments Acts (1930-2014) prohibit the unauthorised use of detecting devices on archaeological sites as well as unauthorised searches for archaeological objects using such devices. All elements of the survey were carried out in accordance with a written method statement and an application for a detection licence from the Department of Culture, Heritage, and the Gaeltacht to carry out the work. The Detection Licence was issued 20R0138 to Heather Gimson.



Historic 25inch Ordnance Survey map (c.1888 to 1913) centred on the survey area.
Taken from www.archaeology.ie



Cassini 6inch Ordnance Survey map (c. 1830's to 1930's) centred on the survey area.
Taken from www.archaeology.ie

1.5 Health and Safety requirements

A health and safety statement was submitted to AECOM prior to the commencement of work.

2 Methodology

The fieldwork was carried out between the 4th and 24th August 2020 by C. Hogan and U. Garner of Earthsound Geophysics Ltd.

A magnetometer survey was carried out using a LEA MAX Förster gradiometer system over 12.9 hectares. The magnetometer survey was undertaken gridlessly with each data point logged using a Trimble RTK GPS VRS Now system.

The technique has been used in commercial and research archaeological projects for many years and is considered the most appropriate technique for a detailed investigation of the underlying archaeology (Aspinall *et al*. 2008, Clark 1996, Scollar *et al*. 1990, Gaffney & Gater 2003).

The survey area consisted of relatively flat pasture land and some overgrown fields. The majority of the fields had been cut in advance of the survey, leaving cut grasses and rushes on the surface. A number of fields also had clumps of rushes and thistles present. The survey was undertaken in all areas wherever possible.

A river and a number of deep ditches and field boundaries divide the western fields. The land was very waterlogged with patches of rutted and poached land present. Within the centre of the survey area some zones were found to be very wet and boggy which precluded the surveyors traversing the survey areas. One field close to the centre of the scheme also contained a large dump of soil which precluded the survey.

The eastern section is traversed by two public roads and the majority of the fields were very wet or partially waterlogged at the time of survey which occasionally restricted the survey. One land parcel remained full of rushes and uncut due to there being no access via a dry gated entrance. This land therefore could not be surveyed.

2.1 Magnetometer Survey

Instrument	Eastern Atlas LEA MAX^{1505} System
Components	LEA D2, 10-channel digitiser
Data Acquisition Resolution	0.5m x 0.1m
Sensors	8 x Förster FEREX® 4.032 CON650 fluxgate gradiometers
Platform	LEA MAX^{1505} System cart
Data Acquisition Method	Gridless, using a Trimble RTK GPS VRS Now system to an accuracy of 5cm
Sensitivity	<0.2 nT
Data Logger	Panasonic Toughbook CF-H2 Field computer
Calibration	According to manufacturer's guidelines (Pilz & Goossens 2015)
Data Processing	Ealdec: Profile decoding Ealmat.m: Normalisation, drift correction Surfer 8: Data Gridding (0.5m x 0.25m), using the Kriging Gridding Method
Graphical Display	Greyscale -2nT (white) to 2nT (black)

2.2 Reporting, Mapping & Archiving

The geophysical survey and report follow the specifications for reporting supplied by AECOM and recommendations outlined by relevant best practice guidance documents as a minimum standard (AECOM 2019; Bonsall *et al*. 2014; David *et al*. 2008; Gaffney *et al*. 2002, Schmidt *et al*. 2015).

Ordnance Survey of Ireland mapping was supplied by AECOM.

Geophysical data, the figures presented here and the text have been archived following the recommendations of the Archaeology Data Service (Schmidt & Ernenwein 2011).

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 the interpretation diagrams and are described and interpreted within the text. Ditches are described as possibly archaeological except in the instances when they can clearly be attributed to another source such as an agricultural boundary.

Survey Methodology:	**Magnetometer**	**Townland:**	**Abbey, Culliagh North, Moyne, Clashard**
ITM Coordinate:	551436,743779	**OD height of Survey Area**	39 m OD
Survey Weather Conditions:	Overcast and rainy	**Figure No.:**	3, 4, 5, 6, 7 & 8
Site Description:	The majority of the survey area consisted of marginal pasture land and some overgrown fields, the majority of which were cut prior to survey. A river and a number of deep ditches and field boundaries divide the western fields. The eastern section is separated by a road and further divided by roads at the easternmost extent. Most of the fields were wet or partially waterlogged at the time of survey.		

No.	Form of Anomaly	ITM NGR (E,N)	Possible Source(s) of Anomaly						Comment	Recommendation	
			Ditch	**Archaeology**	**Poss. Archaeology**	Ferrous	Geology / Soils	Interference / Modern		Test Excavation	Geophysical Survey
1	Curvilinear magnetic anomaly with two adjacent isolated anomalies	550410.94,743262.338, 550407.548,743256.772, 550407.548,743259.041	✓		✓		✓		Curvilinear ditch or cut feature, 16m in length. Located adjacent to the possible ditch is two possible pits. All these features could be archaeological, agricultural or geological in origin.	✓	
2	Arcing magnetic anomaly	550414.828,743245.36	✓		✓		✓		Arcing ditch or cut feature, 8m in length with a possible diameter of 6m. This anomaly could be archaeological or geological in nature.	✓	
3	Magnetic trend	550431.018,743248.217			✓		✓		Weakly magnetic trend, 15m in length which may relate to archaeological, agricultural or geological processes.	✓	
4	Magnetic trend	550458.822,743282.052			✓		✓		Weakly magnetic trend, 10m in length which could be archaeological, agricultural or geological in origin.	✓	
5	Magnetic trend	550470.662,743266.606			✓		✓		Weakly magnetic trend, 40m in length which may relate to archaeological, agricultural or geological processes.	✓	
6	Linear magnetic anomaly	550481.834,743270.55	✓		✓		✓		Linear ditch or cut feature, 77m in length which probably relates to a relict field boundary.	✓	
7	Magnetic trend	550488.581,743242.963			✓		✓		Weakly magnetic trend, 11m in length which could be archaeological, agricultural or geological in origin.	✓	

Survey Methodology:	**Magnetometer**	**Townland:**	**Abbey, Culliagh North, Moyne, Clashard**
ITM Coordinate:	551436,743779	**OD height of Survey Area**	39 m OD
Survey Weather Conditions:	Overcast and rainy	**Figure No.:**	3, 4, 5, 6, 7 & 8
Site Description:	The majority of the survey area consisted of marginal pasture land and some overgrown fields, the majority of which were cut prior to survey. A river and a number of deep ditches and field boundaries divide the western fields. The eastern section is separated by a road and further divided by roads at the easternmost extent. Most of the fields were wet or partially waterlogged at the time of survey.		

No.	Form of Anomaly	ITM NGR (E,N)	Possible Source(s) of Anomaly						Comment	Recommendation	
			Ditch	**Archaeology**	**Poss. Archaeology**	Ferrous	Geology / Soils	Interference / Modern		Test Excavation	Geophysical Survey
8	Right-angled magnetic anomaly	550495.697,743241.621	✓		✓		✓		Right-angled ditch or cut feature, 33m in length which is likely to be agricultural.	✓	
9	Curvilinear magnetic anomaly	550517.342,743244.943	✓		✓		✓		Curvilinear ditch or cut feature, 42m in length which runs parallel to the field boundary and is likely to be agricultural in origin.	✓	
10	Arcing magnetic anomaly	550502.627,743282.815	✓		✓		✓		Arcing ditch or cut feature, 40m in length which crosses the northeastern corner of the field. This anomaly could be archaeological in origin.	✓	
11	Curvilinear magnetic anomaly	550572.975,743278.583	✓		✓		✓		Curvilinear ditch or cut feature, 73m in length that matches a relict field boundary shown on the Historic 25inch OS map.	✓	
12	Curvilinear magnetic anomaly	550582.936,743258.208	✓		✓		✓		Curvilinear ditch or cut feature, 12m in length, which may relate to archaeological, agricultural or geological processes.	✓	
13	Arcing magnetic anomaly	550643.28,743261.48	✓		✓		✓		Arcing ditch or cut feature, 39m in length. This anomaly may represent archaeological activity bounding and c. 18m in diameter.	✓	
14	Zone of magnetic interference with a central right-angled core	550633.491,743290.234, 550612.304,743288.448			✓	✓	✓	✓	Zone of magnetic interference caused by multiple dipolar anomalies which could indicate the presence of archaeological remains. Covering an area 83m x 34m this could be associated with demolition rubble or a spread of imported soil. Contained within the zone is a right-angled core of highly magnetic material (14m x 21m) which could be structural in origin.	✓	
15	Magnetic trend	550661.728,743280.072			✓		✓		Linear weakly magnetic trend, 35m in length which may link anomalies 14 and 16 and could be archaeological, agricultural or geological in origin.	✓	
16	Zone of magnetic interference	550678.673,743292.785			✓	✓	✓	✓	Zone of magnetic interference caused by multiple dipolar anomalies. This zone is similar in formation to anomaly 14 and measures 56m x 30m. It is likely that the two anomalies have similar origins and may be associated with the destruction of a dwelling shown on the historic 25inch OS mapping.	✓	

Survey Methodology:	**Magnetometer**	**Townland:**	**Abbey, Culliagh North, Moyne, Clashard**
ITM Coordinate:	551436,743779	**OD height of Survey Area**	39 m OD
Survey Weather Conditions:	Overcast and rainy	**Figure No.:**	3, 4, 5, 6, 7 & 8
Site Description:	The majority of the survey area consisted of marginal pasture land and some overgrown fields, the majority of which were cut prior to survey. A river and a number of deep ditches and field boundaries divide the western fields. The eastern section is separated by a road and further divided by roads at the easternmost extent. Most of the fields were wet or partially waterlogged at the time of survey.		

No.	Form of Anomaly	ITM NGR (E,N)	Possible Source(s) of Anomaly						Comment	Recommendation	
			Ditch	**Archaeology**	**Poss. Archaeology**	Ferrous	Geology / Soils	Interference / Modern		Test Excavation	Geophysical Survey
17	Two isolated magnetic responses	550721.297,743297.069, 550723.753,743296.104			✓		✓		Two possible archaeological pits or post holes. These anomalies are surrounded by cultivation furrows and therefore may be archaeological or agricultural in origin.	✓	
18	Magnetic trend	550716.039,743291.732			✓		✓		Weakly magnetic linear trend, 41m in length. This anomaly is likely to be agricultural in origin.	✓	
19	Isolated magnetic response	550757.869,743306.017			✓		✓		Possible pit or post hole which may be archaeological or agricultural in nature.	✓	
20	Arcing magnetic anomaly	550866.911,743336.938	✓		✓		✓		Arcing ditch or cut feature, 19m in length, which may relate to archaeological, agricultural or geological processes.	✓	
21	Curvilinear magnetic anomaly	550867.946,743366.495	✓		✓		✓		Curvilinear ditch or cut feature, 20m in length which is likely to be agricultural in origin.	✓	
22	Curvilinear magnetic anomaly	550880.957,743392.39	✓		✓		✓		Curvilinear ditch or cut feature, 21m in length which is likely to be agricultural in origin. This anomaly could represent a continuation to anomaly 21.	✓	
23	Linear magnetic anomaly	550896.249,743408.283	✓		✓		✓		Linear ditch or cut feature, 13m in length which may be associated with anomaly 24.	✓	
24	Series of isolated magnetic responses	550901.14,743392.133 Multiple locations			✓		✓		Eight possible pits or post holes which form a roughly square outline, covering an area of 6m x 9m. These pits could be associated with archaeological remains such as a structure; a number of ferrous responses were detected within the vicinity which might also be associated with archaeological remains.	✓	
25	Four isolated magnetic responses	550908.211,743381.597 Multiple locations			✓		✓		Four possible pits or post holes. These might be associated with anomaly 24 or may be agricultural in origin.	✓	
26	Linear highly magnetic response	550937.6,743438.2				✓		✓	Pipe response which probably is associated with the draining of the land as this portion of the field once contained an island.		
27	Magnetic trend	550930.317,743401.528			✓		✓		Trend of weak magnetism, 14m in length which could be archaeological, agricultural or geological in origin.	✓	

Survey Methodology:	**Magnetometer**	**Townland:**	**Abbey, Culliagh North, Moyne, Clashard**
ITM Coordinate:	551436,743779	**OD height of Survey Area**	39 m OD
Survey Weather Conditions:	Overcast and rainy	**Figure No.:**	3, 4, 5, 6, 7 & 8
Site Description:	The majority of the survey area consisted of marginal pasture land and some overgrown fields, the majority of which were cut prior to survey. A river and a number of deep ditches and field boundaries divide the western fields. The eastern section is separated by a road and further divided by roads at the easternmost extent. Most of the fields were wet or partially waterlogged at the time of survey.		

No.	Form of Anomaly	ITM NGR (E,N)	Possible Source(s) of Anomaly						Comment	Recommendation	
			Ditch	**Archaeology**	**Poss. Archaeology**	Ferrous	Geology / Soils	Interference / Modern		Test Excavation	Geophysical Survey
28	Two parallel magnetic anomalies	550942.959,743419.772, 550948.48,743418.081	✓		✓		✓		Two parallel ditches or cut features, 20m and 11m in length. These anomalies are likely to be associated with former field divisions and could continue into anomalies 31 & 32 representing a relict field boundary shown on all the historic mapping.	✓	
29	Right-angled zone of magnetic interference	550941.754,743370.176			✓	✓	✓		Right-angled zone of highly magnetic responses, 7m x 5m. This response could relate to metallic debris, alternatively it could represent heavily burnt remains possibly archaeological in origin such as potentially a fulachta fiadh.	✓	
30	Linear highly magnetic response	550978.28,743415.682				✓		✓	Pipe response which probably represents a continuation to the open drain present in the adjacent field.		
31	Right-angled magnetic response	550970.8,743439.413	✓		✓		✓		Right-angled ditch or cut feature, 26m in length, which is likely to be associated with a relict field boundary shown on all the historic mapping.	✓	
32	Linear magnetic response	550993.244,743462.649	✓		✓		✓		Linear ditch or cut feature, 26m in length, which is likely to interlink with anomaly 31 and represents a relict boundary.	✓	
33	Zone of magnetic interference	550981.469,743470.949			✓	✓	✓		Zone of magnetic interference caused by multiple dipolar anomalies which could indicate the presence of archaeological remains. Covering an area 24m x 7m this anomaly is likely to be associated with alluvial deposits or modern debris.	✓	
34	Zone of magnetic interference	551006.346,743441.036			✓	✓	✓		Zone of magnetic interference caused by multiple dipolar anomalies which could indicate the presence of archaeological remains. Covering an area 16m x 5m this anomaly is likely to be associated with alluvial deposits or modern debris.	✓	
35	Zone of magnetic interference	551033.747,743473.471			✓	✓	✓		Zone of magnetic interference caused by multiple dipolar anomalies which could indicate the presence of archaeological remains. Covering an area 32m x 19m this anomaly is likely to be associated with alluvial deposits or modern debris.	✓	
36	Linear magnetic response	550977.355,743528.354	✓		✓		✓		Linear ditch or cut feature, 16m in length, which is likely to be agricultural in origin and is probably associated with a relict field boundary.	✓	

Survey Methodology:	**Magnetometer**	**Townland:**	**Abbey, Culliagh North, Moyne, Clashard**
ITM Coordinate:	551436,743779	**OD height of Survey Area**	39 m OD
Survey Weather Conditions:	Overcast and rainy	**Figure No.:**	3, 4, 5, 6, 7 & 8
Site Description:	The majority of the survey area consisted of marginal pasture land and some overgrown fields, the majority of which were cut prior to survey. A river and a number of deep ditches and field boundaries divide the western fields. The eastern section is separated by a road and further divided by roads at the easternmost extent. Most of the fields were wet or partially waterlogged at the time of survey.		

No.	Form of Anomaly	ITM NGR (E,N)	Possible Source(s) of Anomaly						Comment	Recommendation	
			Ditch	**Archaeology**	**Poss. Archaeology**	Ferrous	Geology / Soils	Interference / Modern		Test Excavation	Geophysical Survey
37	Magnetic trend	550984.596,743527.241			✓		✓		Curvilinear weakly magnetic trend, 23m in length which could be archaeological, agricultural or geological in origin.	✓	
38	Magnetic trend	551070.902,743559.598			✓		✓		Linear weakly magnetic trend, 25m in length which could be archaeological, agricultural or geological in origin.	✓	
39	Magnetic trend	551077.419,743582.098			✓		✓		Curvilinear weakly magnetic trend, 24m in length which could be archaeological, agricultural or geological in origin.	✓	
40	Linear magnetic anomaly	551121.774,743631.987	✓		✓		✓		Linear ditch or cut feature, 57m in length, which is likely to be agricultural in origin.	✓	
41	Arcing magnetic anomaly	551150.262,743635.608	✓		✓		✓		Arcing ditch or cut feature, 23m in length, which could be archaeological or geological in nature.	✓	
42	Magnetic trend	551117.611,743605.474			✓		✓		Curvilinear weakly magnetic trend, 37m in length which could be archaeological, agricultural, alluvial or geological in origin.	✓	
43	Two zones of magnetic interference	551123.52,743570.776, 551144.431,743577.984			✓	✓	✓		Two zones of magnetic interference caused by multiple dipolar anomalies which could be associated with alluvial deposits and is likely to be associated with anomaly 44.	✓	
44	Linear magnetic feature	551158.131,743612.582	✓				✓		Linear magnetic feature which is associated with a relict palaeochannel.	✓	
45	Magnetic trend	551157.514,743573.702			✓		✓		Linear ditch or cut feature, 20m in length, which is likely to be agricultural in origin.	✓	
46	Two interconnecting magnetic response	551168.358,743589.836, 551179.325,743580.598	✓		✓		✓		Two interlinking ditch or cut features, 25m and 23m in length which are likely to be agricultural in origin.	✓	
47	Magnetic trend	551209.747,743682.24			✓		✓		Curvilinear weak magnetic trend, 14m in length, which might be archaeological, agricultural, geological or alluvial in origin.	✓	
48	Curvilinear magnetic anomaly	551251.905,743698.176	✓		✓		✓		Curvilinear feature, 24m in length. This anomaly could relate to archaeological remains or be associated with alluvial deposits.	✓	
49	Curvilinear magnetic anomaly	551269.398,743704.962	✓		✓		✓		Curvilinear feature, 24m in length. This anomaly could relate to archaeological remains, possibly associated with anomaly 48 or be associated with alluvial deposits.	✓	

Survey Methodology:	**Magnetometer**	**Townland:**	**Abbey, Culliagh North, Moyne, Clashard**
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Survey Weather Conditions:	Overcast and rainy	**Figure No.:**	3, 4, 5, 6, 7 & 8
Site Description:	The majority of the survey area consisted of marginal pasture land and some overgrown fields, the majority of which were cut prior to survey. A river and a number of deep ditches and field boundaries divide the western fields. The eastern section is separated by a road and further divided by roads at the easternmost extent. Most of the fields were wet or partially waterlogged at the time of survey.		

No.	Form of Anomaly	ITM NGR (E,N)	Possible Source(s) of Anomaly						Comment	Recommendation	
			Ditch	**Archaeology**	**Poss. Archaeology**	Ferrous	Geology / Soils	Interference / Modern		Test Excavation	Geophysical Survey
50	Linear magnetic anomaly	551277.63,743718.741	✓		✓		✓		Linear ditch or cut feature, 33m in length which is likely to agricultural.	✓	
51	Series of isolated responses	551277.649,743703.162 Multiple locations			✓		✓		Five possible pits or post holes. These anomalies could be archaeological or agricultural in origin or associated with alluvial deposits.	✓	
52	Linear magnetic anomaly	551362.289,743754.802	✓		✓		✓		Linear ditch or cut feature, 54m in length which is likely to be agricultural in origin.	✓	
53	Curvilinear magnetic anomaly	551371.015,743747.915	✓		✓		✓		Curvilinear ditch or cut feature, 30m in length. This anomaly may contain burnt deposits or a series of closely spaced pits along its length. The feature could be archaeological or agricultural in nature.	✓	
54	Curvilinear magnetic anomaly	551379.949,743754.113	✓		✓		✓		Curvilinear ditch or cut feature, 9m in length which might be associated with anomaly 53 and might be archaeological or agricultural in origin.	✓	
55	Curvilinear magnetic anomaly	551383.406,743740.003	✓		✓		✓		Curvilinear ditch or cut feature, 24m in length, with as roughly right-angled profile. It may be associated with anomaly 53 and is agricultural, geological or archaeological.	✓	
56	Linear magnetic anomaly	551430.649,743779.04	✓		✓		✓		Linear ditch or cut feature, 53m in length. This anomaly runs parallel to the field boundary and is likely to represent a relict agricultural boundary.	✓	
57	Arcing magnetic anomaly and two isolated responses	551457.68,743766.112, 551455.523,743764.349, 551456.699,743762.52	✓		✓		✓		Arcing ditch or cut feature, 14m in length which might be archaeological in origin. The ditch, 9m in diameter, appears to encompass two possible pits or post holes.	✓	
58	Curvilinear magnetic anomaly	551509.413,743813.355	✓		✓		✓		Curvilinear ditch or cut feature, 61m in length. This anomaly could represent a relict field boundary.	✓	
59	Magnetic trend	551512.444,743788.819			✓		✓		Arcing weakly magnetic trend, 23m in length which could be associated with archaeological, agricultural or geological processes.	✓	
60	Sub-circular magnetic anomaly and associated isolated responses	551534.492,743808.059	✓		✓		✓		Sub-circular ditch 3.8m in diameter which appears to contain or be truncated by at least five possible pits or postholes. This feature may be archaeological in origin and might be associated with anomaly 61.	✓	

Survey Methodology:	**Magnetometer**	**Townland:**	**Abbey, Culliagh North, Moyne, Clashard**
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Survey Weather Conditions:	Overcast and rainy	**Figure No.:**	3, 4, 5, 6, 7 & 8
Site Description:	The majority of the survey area consisted of marginal pasture land and some overgrown fields, the majority of which were cut prior to survey. A river and a number of deep ditches and field boundaries divide the western fields. The eastern section is separated by a road and further divided by roads at the easternmost extent. Most of the fields were wet or partially waterlogged at the time of survey.		

No.	Form of Anomaly	ITM NGR (E,N)	Possible Source(s) of Anomaly						Comment	Recommendation	
			Ditch	**Archaeology**	**Poss. Archaeology**	Ferrous	Geology / Soils	Interference / Modern		Test Excavation	Geophysical Survey
61	Arcing magnetic anomaly	551542.908,743819.412	✓		✓		✓		Arcing ditch or cut feature, 30m in length. This feature might be archaeological in origin and could surround anomaly 60.	✓	
62	Arcing magnetic anomaly	551554.962,743819.468	✓		✓		✓		Arcing ditch or cut feature, 34m in length which might be archaeological or geological in origin.	✓	
63	Curvilinear magnetic anomaly	551565.13,743816.074	✓		✓		✓		Linear ditch or cut feature, 49m in length that is likely to represent a relict agricultural boundary.	✓	
64	Three isolated responses	551565.481,743819.568, 551567.646,743820.023, 551567.722,743817.973			✓		✓		Three possible pits or post holes which were detected on the northern edge of anomaly 63. These features could be archaeological, agricultural or geological in nature.	✓	
65	Right-angled magnetic anomaly	551568.245,743829.255	✓		✓		✓		Right-angled ditch or cut feature, 25m in length. This anomaly likely extends from anomaly 63 and is probably agricultural in origin. The northern portion of the ditch appears to be punctuated by a series of possible pits or tree planting holes.	✓	
66	Linear magnetic anomaly	551591.048,743850.127	✓		✓		✓		Linear ditch or cut feature, 38m in length which probably represents a relict field boundary.	✓	
67	Magnetic trend	551571.887,743794.31			✓		✓		Arcing weakly magnetic feature which was detected in two distinct anomalies. These possibly enclose an area 9m in diameter and possibly contain a break or entrance to the southeast.	✓	
68	Numerous isolated responses	551605.781,743783.099			✓		✓		Five possible pits or post holes which form a right-angled shape. Covering an area of 3m x 0.8m these anomalies could be associated with archaeological or agricultural processes or relate to geological activity.	✓	
69	Magnetic trend	551599.777,743777.602			✓		✓		Linear weakly magnetic trend, 11m in length which might be archaeological, agricultural or geological in origin.	✓	

Survey Methodology:	**Magnetometer**	**Townland:**	**Abbey, Culliagh North, Moyne, Clashard**
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No.	Form of Anomaly	ITM NGR (E,N)	Possible Source(s) of Anomaly						Comment	Recommendation	
			Ditch	**Archaeology**	**Poss. Archaeology**	Ferrous	Geology / Soils	Interference / Modern		Test Excavation	Geophysical Survey
70	Linear magnetic anomaly	551615.064,743749.156	✓		✓		✓		Linear ditch or cut feature, 21m in length which probably represents a relict field boundary.	✓	
71	Arcing magnetic anomaly and large isolated response	551612.256,743742.445, 551615.449,743742.109	✓		✓		✓		Arcing ditch or cut feature, 9m in length which appears to terminate at a large possible pit or deposit, 4m in width. These anomalies could be archaeological in origin.	✓	
72	Arcing magnetic anomaly	551627.516,743867.346			✓		✓		Arcing ditch or cut feature, 32m in length. This anomaly could be archaeological, agricultural or geological in origin.	✓	
73	Linear negative magnetic anomaly	551654.826,743868.131			✓		✓		Linear stone feature, 19m in length which matches a boundary shown on the Cassini 6-inch OS map.	✓	
74	Interlinking negative magnetic anomalies	551656.937,743852.321, 551650.793,743841.215			✓		✓		Two interconnecting stone features. The northern of these features matches a boundary shown on the Historic 25inch OS map. It is likely that both these anomalies are associated with agricultural boundaries.	✓	
75	Right-angled magnetic anomaly	551684.044,743857.843	✓		✓		✓		Right-angled ditch or cut feature, 26m in length, which is likely to be agricultural in origin.	✓	
76	Two isolated magnetic responses	551692.071,743884.497, 551695.669,743880.9			✓		✓		Two possible pit or posthole features. These anomalies could be archaeological in nature or associated with tree bowls, agricultural pits or geological depressions.	✓	
77	Magnetic trend	551706.685,743884.776			✓		✓		Linear weakly magnetic trend, 26m in length. This anomaly could be archaeological or agricultural in origin.	✓	
78	Arcing magnetic anomaly	551733.71,743912.536	✓		✓		✓		Arcing ditch or cut feature, 22m in length, which could be archaeological, agricultural or geological in nature.	✓	
79	Magnetic trend	551777.536,743929.835			✓		✓		Linear weakly magnetic trend, 14m in length. This anomaly could be archaeological, agricultural or geological.	✓	

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			Ditch	**Archaeology**	**Poss. Archaeology**	Ferrous	Geology / Soils	Interference / Modern		Test Excavation	Geophysical Survey
80	Two magnetic trends	551775.44,743901.61, 551780.451,743909.805			✓		✓		Two weakly magnetic trends. To the south the feature has an arcing profile and measures 9m in length. The other is linear and is 9m in length. These features could be archaeological, agricultural or geological in origin.	✓	
81	Linear magnetic anomaly	551795.303,743905.981	✓		✓		✓		Linear ditch or cut feature, 23m in length. This anomaly runs parallel to the field boundary and is likely to be agricultural.	✓	
82	Curvilinear magnetic anomaly	552007.379,744008.698	✓		✓		✓		Curvilinear ditch or cut feature, 33m in length which is likely to be agricultural in origin.	✓	
83	Linear magnetic anomaly	552050.055,744014.191	✓		✓		✓		Linear ditch or cut feature, 40m in length which is likely to be agricultural in origin.	✓	
84	Zone of magnetic interference	552080.864,744029.914			✓	✓	✓		Scattered zone of dipolar anomalies which are likely to relate to modern debris or demolished archaeological remains. Indeed the area is shown to contain a number of small fields and dwellings on the historic 6inch OS map and this anomaly is likely to be associated with these remains	✓	
85	Zone of modern disturbance	552117.892,744043.818			✓	✓	✓		Large zone of densely spaced highly magnetic responses. This is associated with the destruction of a number of dwellings shown on the historic 6inch OS map.	✓	
86	Series of parallel and interconnecting magnetic anomalies	552136.818,744053.28	✓		✓		✓		A series of ditch or cut features which form a rectangular division, 15m x 7m and parallel ditches, 11m and 16m in length, leading from it. These anomalies are likely to be associated with habitation remains and although they do not match those shown on the historic 6inch OS map, they could represent other habitation or boundary remains.	✓	
87	Magnetic trend	552154.985,744060.259			✓		✓		Linear weakly magnetic trend, 17m in length which could represent a cut feature, geological or agricultural activity.	✓	
88	Magnetic trend	552162.366,744043.091			✓		✓		Linear weakly magnetic trend, 16m in length which could represent a cut feature, geological or agricultural activity.	✓	

Survey Methodology:	**Magnetometer**	**Townland:**	**Abbey, Culliagh North, Moyne, Clashard**
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			Ditch	**Archaeology**	**Poss. Archaeology**	Ferrous	Geology / Soils	Interference / Modern		Test Excavation	Geophysical Survey
89	Oval magnetic anomaly	552266.171,744099.499	✓		✓		✓		Oval anomaly which could represent a deposit of soil or geological activity. Measuring 6m x 2.5m this anomaly could also represent archaeological material.	✓	
90	Arcing magnetic anomaly with four isolated responses	552249.687,744052.536	✓		✓		✓		Arcing ditch or cut feature, 7.8m in diameter which may be archaeological or geological in origin. Two breaks can be seen within the possible ditch at the northeast and southwest, while four possible pits or post holes appears to be contained within it.	✓	
91	Magnetic trend	552345.681,744110.233			✓		✓		Weakly magnetic linear trend, 13m in length, which might relate to archaeological, agricultural or geological activity.	✓	
92	Magnetic trend	552380.919,744134.184			✓		✓		Weakly magnetic linear trend, 14.6m in length, which might relate to archaeological, agricultural or geological activity.	✓	
93	Arcing magnetic anomaly	552331.674,744144.785	✓		✓		✓		Arcing ditch or cut feature, 9m in length which might be archaeological, agricultural or geological in origin.	✓	
94	Magnetic trend	552336.725,744148.691			✓		✓		Weakly magnetic linear trend, 24.5m in length, which might relate to archaeological, agricultural or geological activity.	✓	
95	Zone of magnetic interference	552347.776,744162.501			✓	✓	✓		Zone of dipolar anomalies which could relate to modern debris or an archaeological deposit.	✓	
	Series of parallel responses	Multiple locations					✓		Evidence for cultivation furrows were detected in multiple locations across the survey area.		
	Zones of modern disturbance detected on the survey edges	Multiple locations						✓	These zones of modern disturbance are usually detected on the edge of the survey area and relate to interference from metallic fences, passing cars and modern debris. They are of no archaeological significance.		

4 Conclusion and Recommendations

4.1 Summary of Results

The geophysical surveys undertaken for this report have revealed a series of possible archaeological features including a number of arcing ditches and possible pits. However the majority of the anomalies detected consisted of linear and curvilinear cut features or trends which are likely to be agricultural in origin. A number of relict field boundaries were detected which match those shown on historic Ordnance Survey mapping, while evidence of ploughing was also revealed in the form of cultivation furrows.

The landscape of the survey contains much ferrous debris. A series of dipolar interference zones have been identified which are suggestive of deposition or demolition. However the prevalence of ferrous contamination is unusually high especially in the western part of the scheme. In addition to the modern fencing and debris from the existing N63, the distribution of the ferrous debris suggests that it might have been spread by alluvial activity. At least one palaeochannel has been detected and it is likely that the landscape within the vicinity of the Abbert River once suffered from alluvial inundation. This theory is backed up by the weak background values detected in the magnetometer survey.

The presence of these alluvial deposits is likely to affect the magnetic content of the soil. Prolonged periods of flooding or water logging can cause the leaching of magnetic properties within the soil. The magnetic signatures of possible archaeological features may have been significantly reduced or removed, leading to them not being detected. Or if a depth of alluvium has been deposited, then archaeological features may be masked from the magnetic survey.

All anomalies unless they can be clearly identified as originating from another source such as agricultural boundaries are labeled as possibly archaeological. The tabulated results shown above indicate the likely source of the anomalies and which should be tested, by topsoil stripping using a mechanical excavator under archaeological supervision. As per the contract specifications the location for 25 test trenches are shown within the interpretation figures in this report.

4.2 Dissemination

The results of this survey were submitted to AECOM, Galway County Council, TII and in accordance with the permit conditions, the National Museum of Ireland and the National Monuments Service.

5 Acknowledgements

The survey was commissioned by AECOM Engineering for Galway County Council and was funded by Transport Infrastructure Ireland. Fieldwork was kindly facilitated by the local landowners affected by the proposed road project

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7 Figure List

Technical Appendix

Appendix 1: Anomaly Classifications

Magnetometer

Magnetometer surveys are undertaken using magnetic gradiometers which measure the magnetic content of the underlying soils. Measurements are gained using sensors which calculate the difference between the geological / pedological background and anthropogenic remains associated with archaeological activity.

Positive Magnetic Anomalies
Burnt features, particularly kilns, but also hearths, furnaces and burnt (specifically 'burnt', not 'heated') mounds of stone will create a strongly magnetic anomaly due to thermoremanence. Cut features, such as pits, ditches or wooden postholes will create anomalies that will vary in shape and magnetic intensity depending on which material they were backfilled by (Fassbinder 2015). For cut features backfilled (or 'refilled') by

- magnetically enhanced topsoil – the refill will generate a positive magnetic anomaly
- homogeneous topsoil – the refill will generate an anomaly proportional to the size and volume of the archaeological feature.

The magnetic anomaly shape and intensity will also be determined by concentrations of pottery, ash or burned material, solid rocks or other material.

Negative Magnetic Anomalies
Negative magnetic anomalies have a number of causes (Fassbinder 2015):

- The material remains of the archaeological feature may have a lower magnetic susceptibility (MS) than the adjacent topsoil. In some cases the MS of a ditch may appear as both a positive and negative anomaly, reflecting the variable MS of the refill material. Some stone foundations can also appear as weakly magnetic or negative magnetic anomalies.
- If a cut feature is immediately refilled by the same material e.g. a grave cut excavated before a funeral is (almost) immediately refilled by the human body and the same (unaltered) sediment that was excavated before.
- Geochemical processes (see Fassbinder 2015) can alter the magnetic response, e.g. an archaeological feature identified by a positive anomaly can convert to a negative anomaly due to the combination of stagnant moisture and a changing groundwater table.

Dipolar Anomalies
A dipolar anomaly 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 (iron agricultural implements, rubbish), they can be indicative of archaeological material.

Absence of Anomalies
It is also possible that archaeological features exist that exhibit no magnetic contrast and hence cannot be identified by magnetometer survey.

Anomaly classification used to interpret Magnetometer data

After Gaffney & Gater (2003) and Gaffney *et al*. (2000).

A known archaeological feature type e.g. Ditch / Wall / Structure etc: An anomaly with a magnetic gradient that contrasts strongly with the surrounding sub-soil, where the presence of a type of archaeological feature is known from supporting evidence.

Archaeology: A linear, curvilinear or isolated anomaly with a magnetic gradient that contrasts strongly with the surrounding sub-soil, without any supporting evidence from another source.

- **Ditch / Wall:** A linear, curvilinear, annular or penannular anomaly with a magnetic gradient that contrasts strongly with the surrounding sub-soil. A positive polarity suggests a ditch; a negative polarity suggests a stone-filled ditch or wall.
- **Burnt Mound / Spread:** A horseshoe or ovoid shaped anomaly with a positive magnetic gradient that contrasts strongly with the surrounding sub-soil. An associated trough may be observed as a positive/negative anomaly, a hearth may also be expected nearby. Isolated responses in the vicinity could represent spreads of (or ploughed out) heat shattered stones.
- **Hearth:** A small isolated area (<2m diameter) of higher magnetic gradient than the surrounding sub-soil (typically >6nT).
- **Pit:** A small isolated area (>1-2m diameter) of moderate to high magnetic gradient, judged to be caused by a pit-type feature with a fill more magnetic than the surrounding soil.

Industrial: An isolated anomaly with a strong positive gradient (>30nT), judged not to be surface iron. This type of anomaly is typically caused by the remains of kilns or furnaces.

Magnetic Enhancement: A broad area of moderate positive magnetic gradient that contrasts with the surrounding sub-soil. May represent cultural noise associated with occupation or soil disturbance, judged to be of archaeological origin.

Ferrous: Dipolar anomalies indicating ferrous responses, judged to be in the near-surface.

Cultivation: Parallel linear responses of positive or negative polarity. Strong responses may indicate added magnetic material (e.g. burnt deposits) as fertiliser. Lower magnetic gradient anomalies 'beneath' the furrow overprint may be obscured. Higher magnetic gradient anomalies may be visualised *in situ* or ploughed out 'beneath' the furrow overprint.

Possible Archaeology: A linear, curvilinear or isolated anomaly with a magnetic gradient that contrasts weakly with the surrounding sub-soil, without any supporting evidence from another source. Such categories may represent possible archaeological or geological sources.

Modern Disturbance: Area where the ground has been disturbed in the recent past. Characterised by very large magnetic gradients and a high level of noise often accompanied by concentrations of dipolar, near-surface ferrous responses. This category also represents anomalies whose source may lie beyond the survey area, such as fencelines, vehicles or modern buildings.

Modern Pipe: Straight, linear anomaly with very large magnetic gradients alternating regularly between positive and negative polarity.

Previous Excavation?: Area of uniform magnetic signal contained within a well-defined boundary in regions otherwise densely covered with archaeological anomalies.

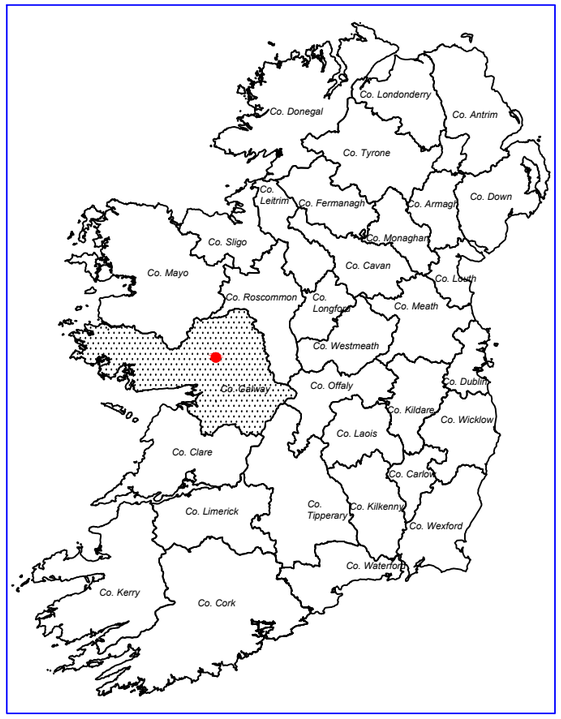
Geology: Anomalies of possible geomorphological origin.

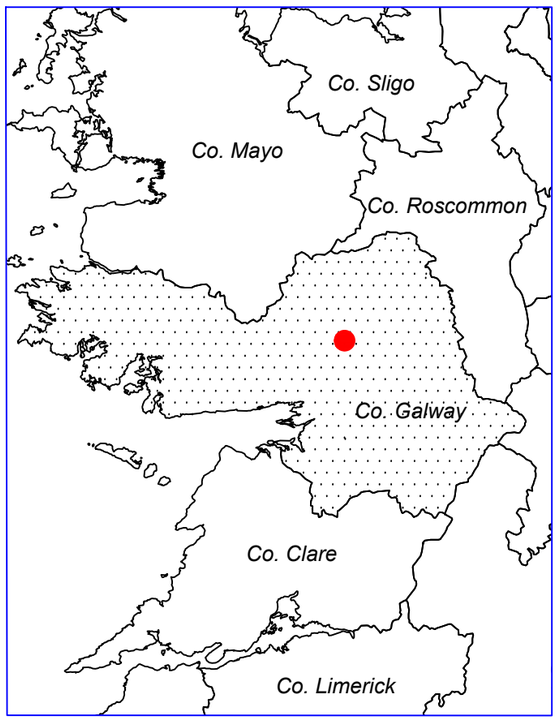
Magnetometer survey in operation on the N63, on land overlooking Abbeyknockmoy Cisterican Abbey.

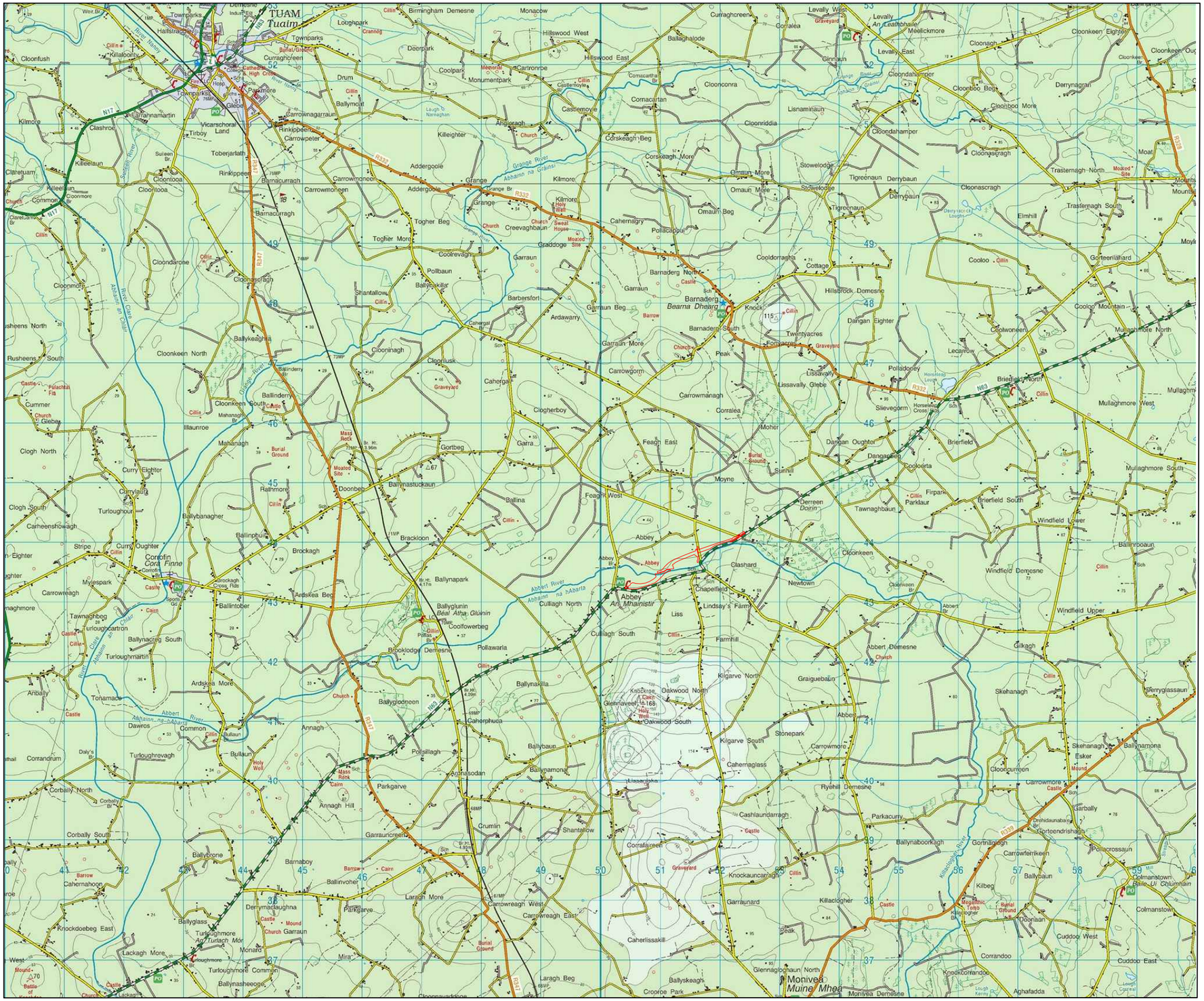
Image © Jerry O'Sullivan, Galway TII.

Appendix 2: Geophysical Archive

- Copies of the archive are held by Earthsound Geophysics Ltd., at separate locations to ensure preservation against accidental damage or theft.
- The Client, AECOM / Galway County Council, holds further copies of the report.
- A hard copy and a soft copy will be deposited with the Archaeological Licensing Section, National Monuments Service, Department of Culture, Heritage and the Gaeltacht, Room G50, Custom House, Dublin 1.
- A hard copy will be deposited with the National Museum of Ireland, Kildare Street, Dublin 2.







Legend

Geophysical Survey Area

Site Location: N63 Liss to Abbey Realignment Scheme, Abbeyknockmoy, Co. Galway

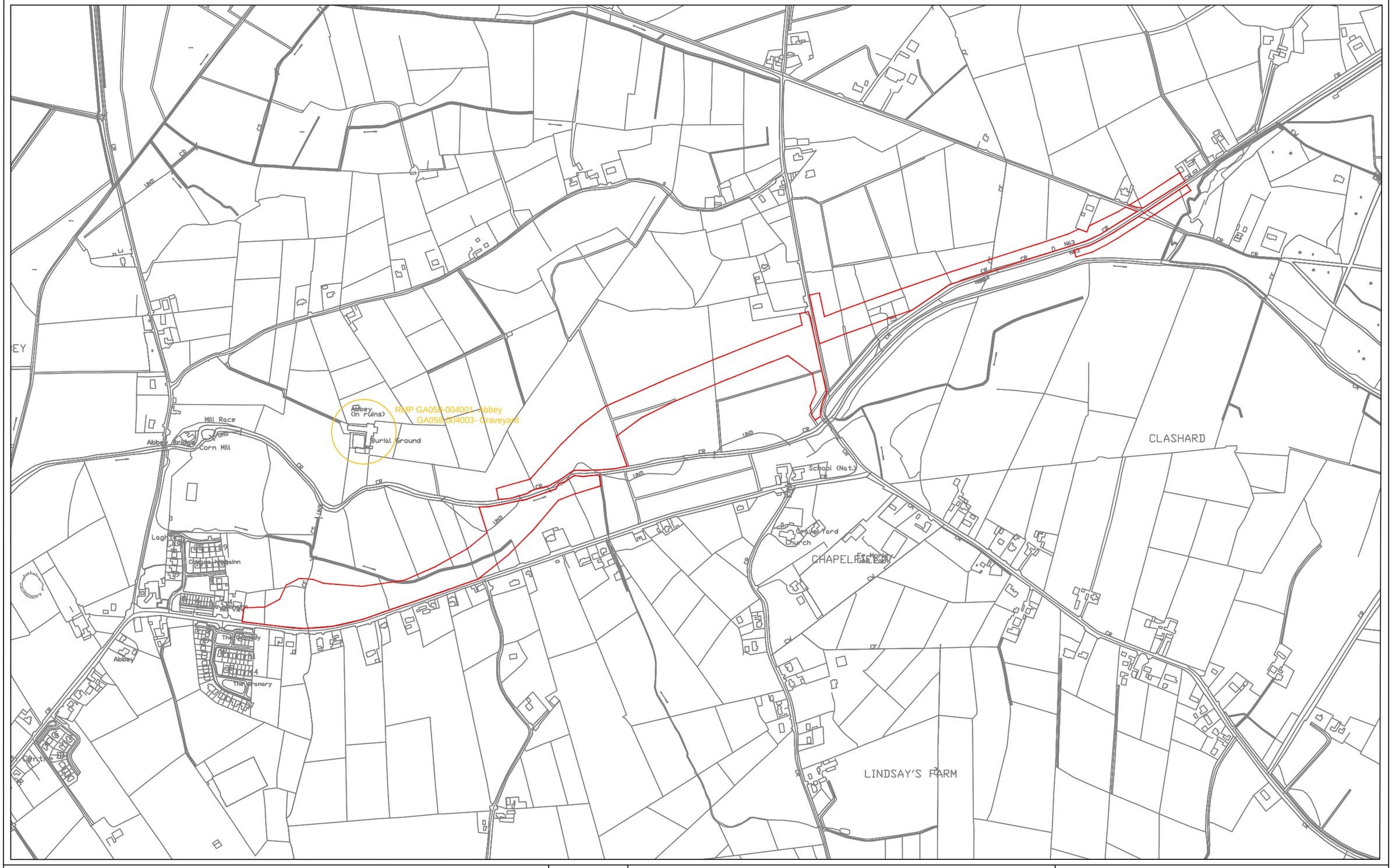
Client: AECOM / Galway County Council

Drawing Courtesy of: OSI	Date: 28/07/20	Drawing No.: 20-039/01

0m 2km 4km

Figure No. 1: Location Map

EARTHSOUND geophysics



Legend

- Basemap
- Recorded Monument
- Geophysical Survey Area

N

Site Location: N63 Liss to Abbey Realignment Scheme, Abbeyknockmoy, Co. Galway

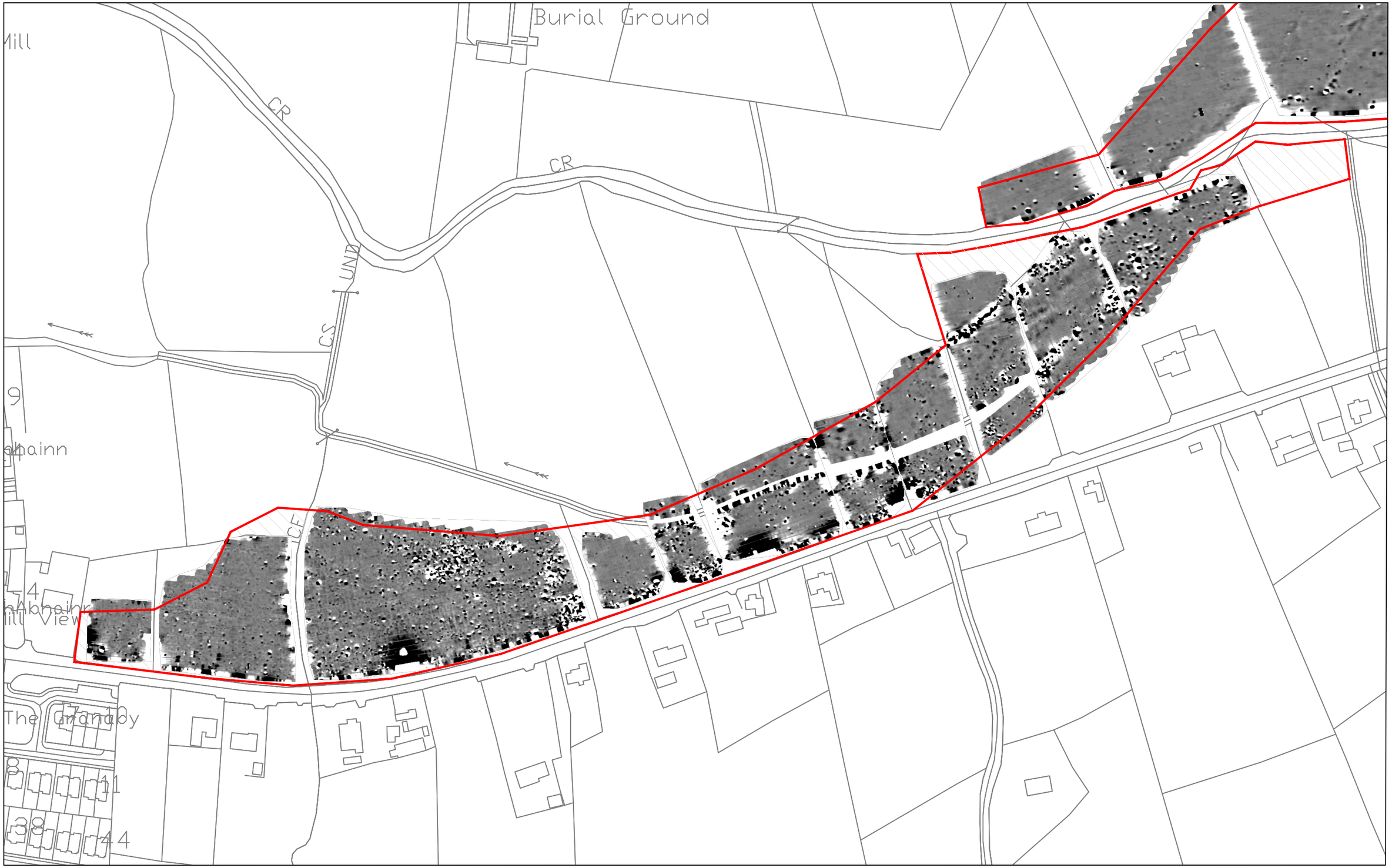
Client: AECOM / Galway County Council

Drawing Courtesy of: OSI	Date: 28/07/20	Drawing No.: 20-039/02

0m 200m 400m

Figure No. 2: Detailed Location Map

EARTHSOUND geophysics



Legend

- Basemap
- Geophysical Survey Area
- Unsurveyable Area

nT

-2 0 2

Site Location: N63 Liss to Abbey Realignment Scheme, Abbeyknockmoy, Co. Galway

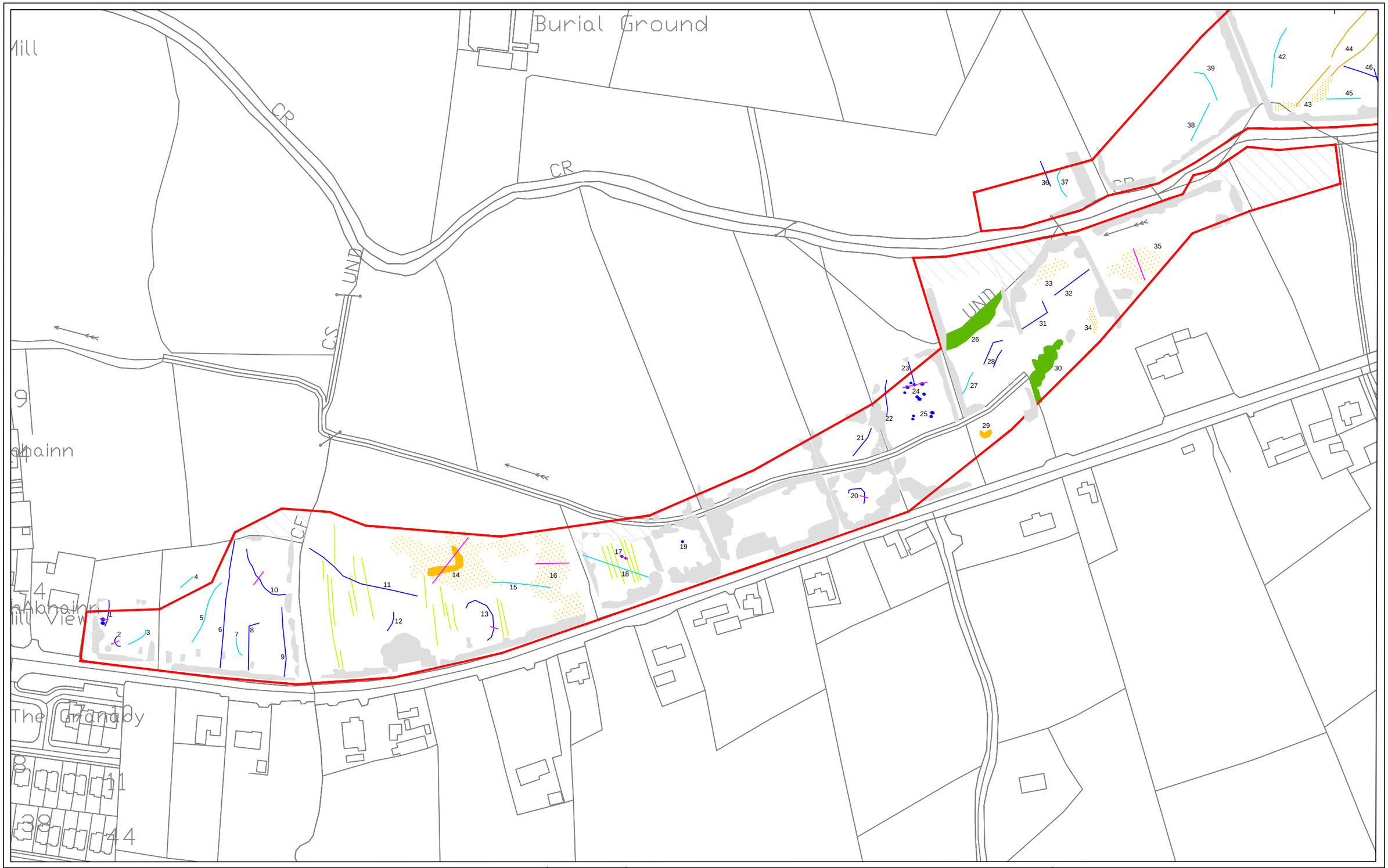
Client: AECOM / Galway County Council

Drawing Courtesy of: OSI / Galway County Council	Date: 20/08/20	Drawing No.: 20-039/03

0m 50m 100m

Figure No. 3: Magnetometer data - West Section

EARTHSOUND geophysics



Legend

- Basemap
- Geophysical Survey Area
- Unsurveyable Area
- Suggested Test Trench Locations
- Possible Archaeology
- Alluvial Anomaly
- Trend
- Cultivation
- Magnetic Feature
- Modern Disturbance
- Modern Pipe

N

Site Location: N63 Liss to Abbey Realignment Scheme, Abbeyknockmoy, Co. Galway

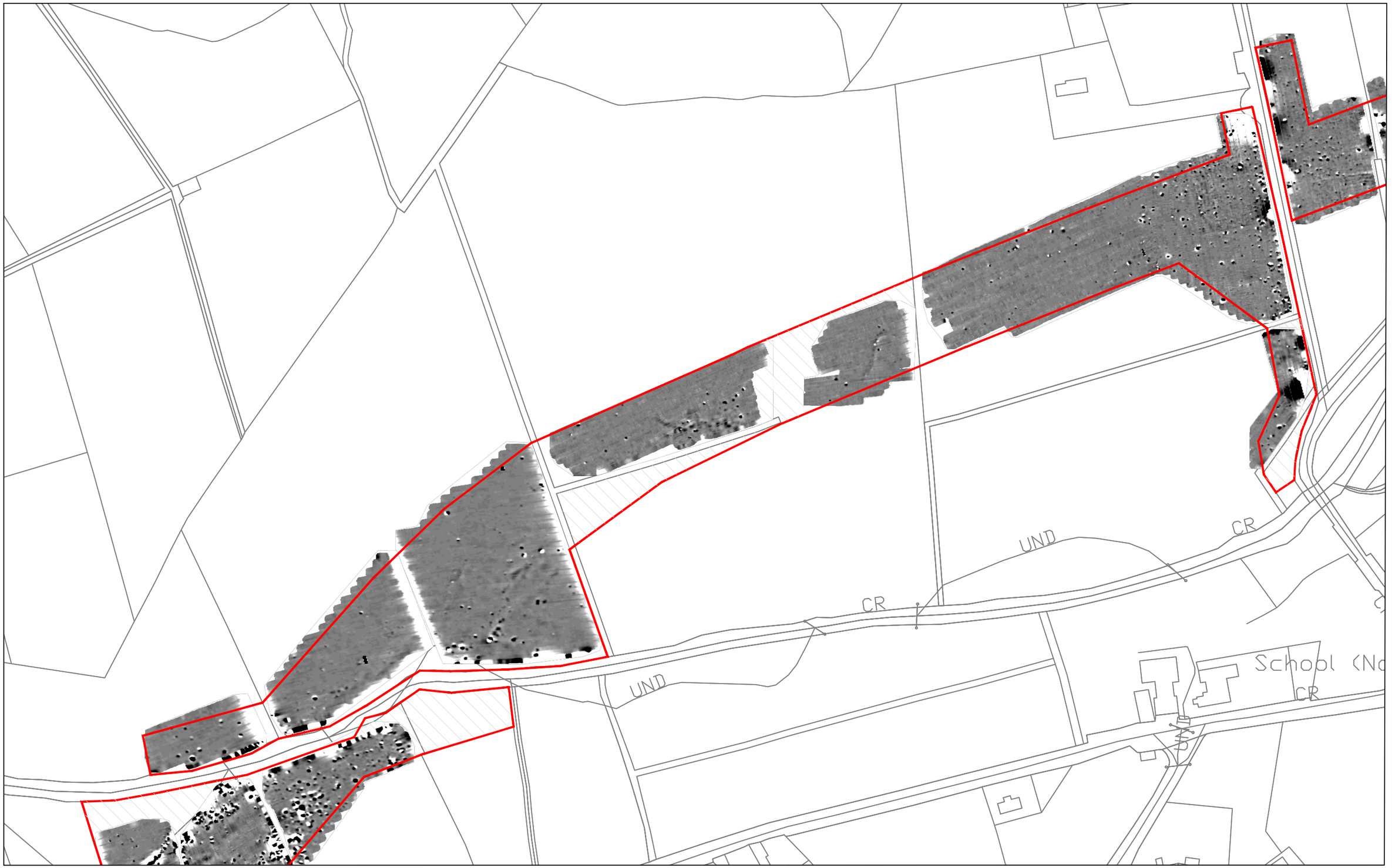
Client: AECOM / Galway County Council

Drawing Courtesy of: OSI / Galway County Council	Date: 26/08/20	Drawing No.: 20-039/04

0m 50m 100m

Figure No. 4: Magnetometer Interpretation - Western Section

EARTHSOUND geophysics



Legend

- Basemap
- Geophysical Survey Area
- Unsurveyable Area

nT

-2 0 2

Site Location: N63 Liss to Abbey Realignment Scheme, Abbeyknockmoy, Co. Galway

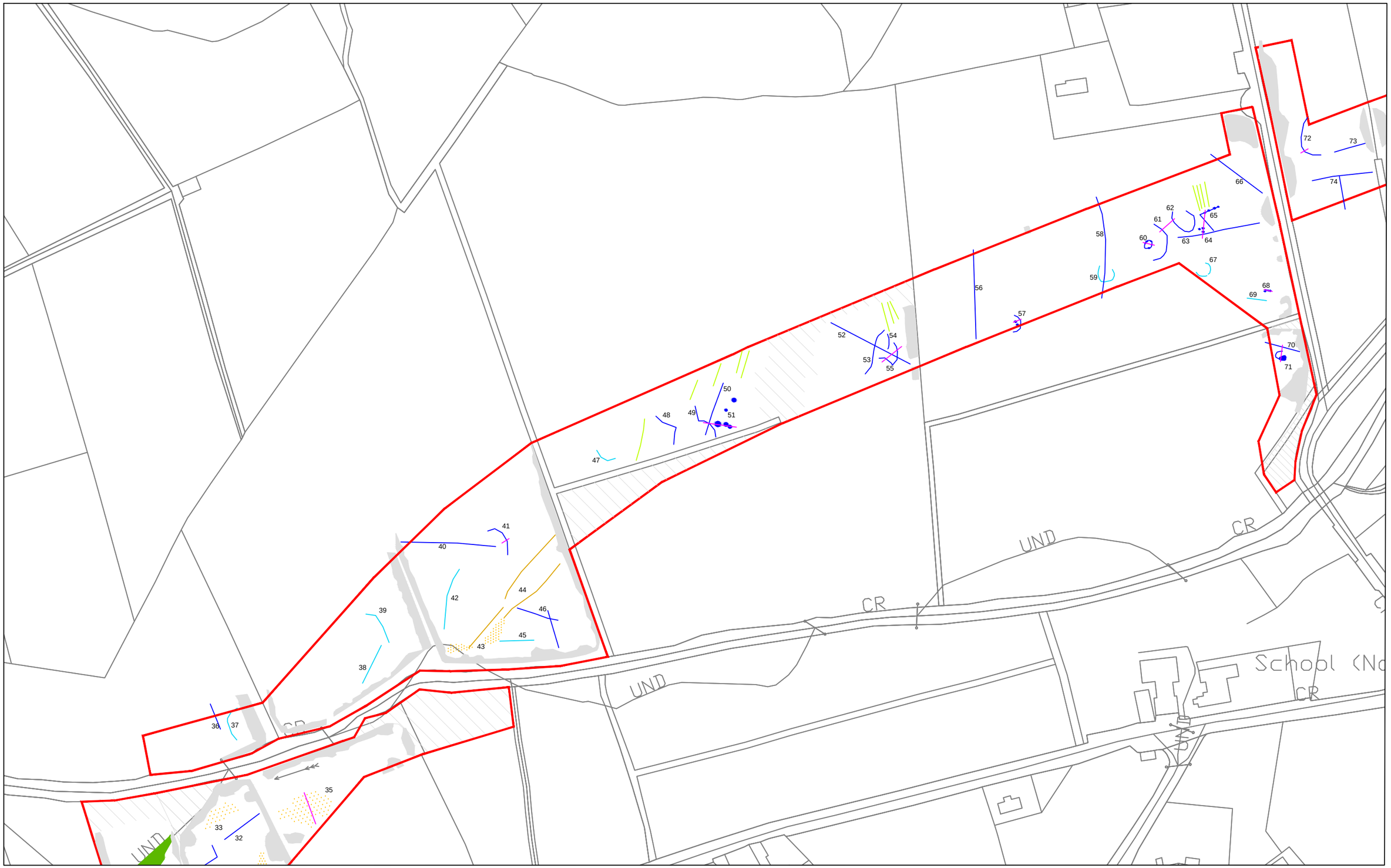
Client: AECOM ./ Galway County Council

Drawing Courtesy of: OSI / Galway County Council	Date: 20/08/20	Drawing No.: 20-039/05

0m 50m 100m

Figure No. 5: Magnetometer data - Central Section

EARTHSOUND geophysics



Legend

- Basemap
- Geophysical Survey Area
- Unsurveyable Area
- Suggested Test Trench Locations
- Possible Archaeology
- Alluvial Anomaly
- Trend
- Cultivation
- Magnetic Feature
- Modern Disturbance
- Modern Pipe

N

Site Location: N63 Liss to Abbey Realignment Scheme, Abbeyknockmoy, Co. Galway

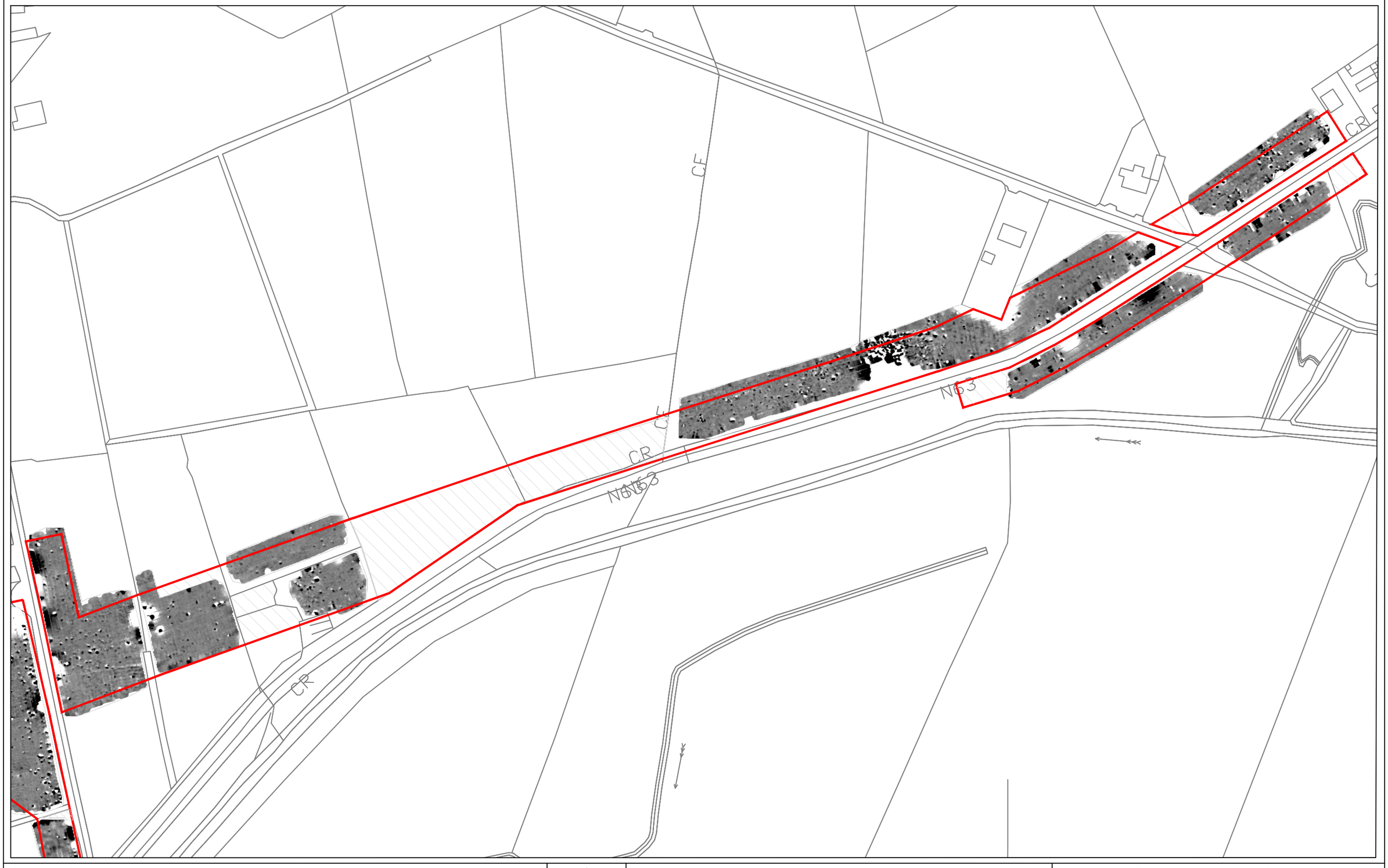
Client: AECOM / Galway County Council

Drawing Courtesy of: OSI / Galway County Council	Date: 26/08/20	Drawing No.: 20-039/06

0m 50m 100m

Figure No. 6: Magnetometer Interpretation - Central Section

EARTHSOUND geophysics



Legend

- Basemap
- Geophysical Survey Area
- Unsurveyable Area

nT

-2 0 2

Site Location: N63 Liss to Abbey Realignment Scheme, Abbeyknockmoy, Co. Galway

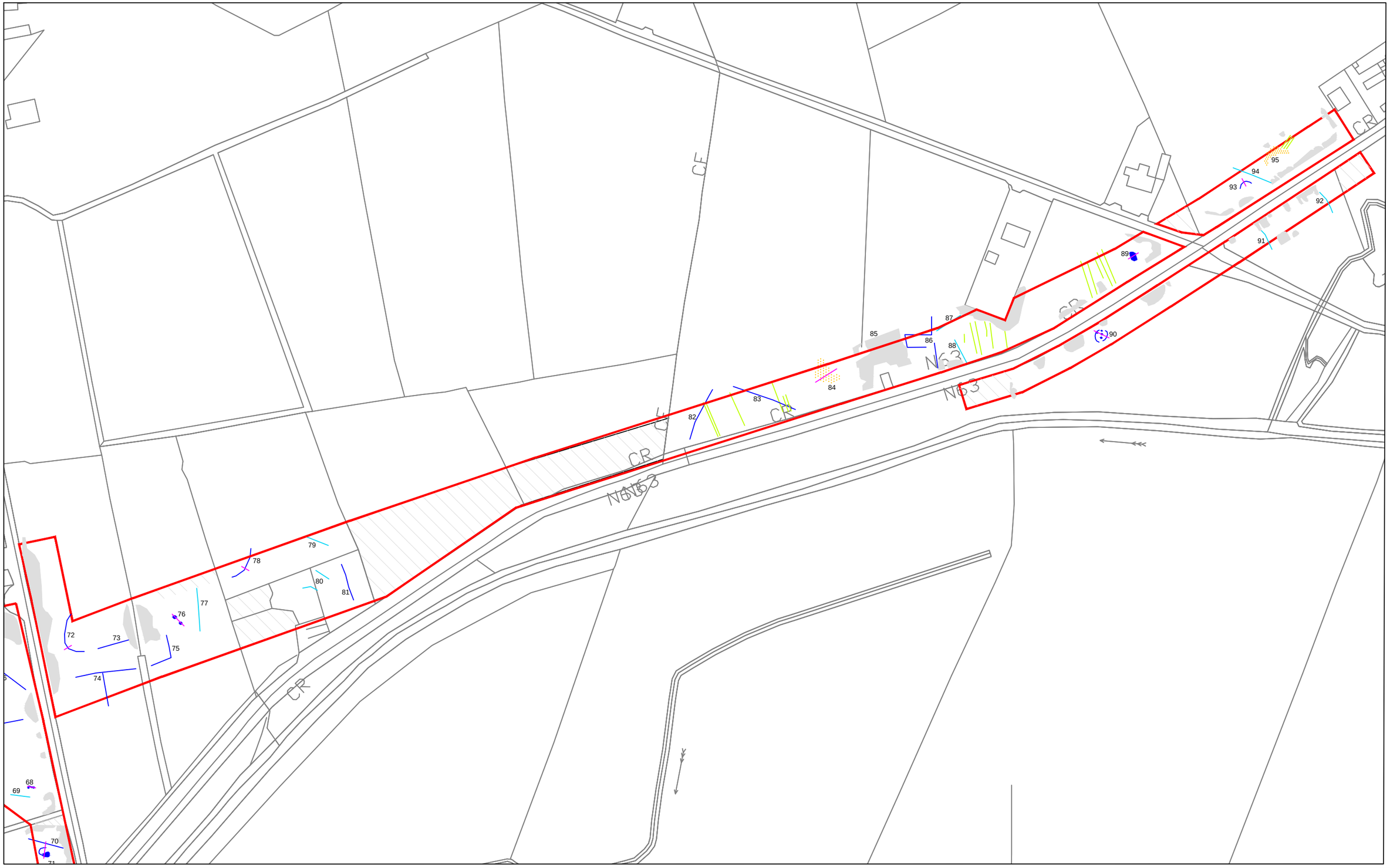
Client: AECOM / Galway County Council

Drawing Courtesy of: OSI / Galway County Council	Date: 20/08/20	Drawing No.: 20-039/07

0m 50m 100m

Figure No. 7: Magnetometer data - Eastern Section

EARTHSOUND geophysics



Legend

- Basemap
- Geophysical Survey Area
- Unsurveyable Area
- Suggested Test Trench Locations
- Possible Archaeology
- Alluvial Anomaly
- Trend
- Cultivation
- Magnetic Feature
- Modern Disturbance
- Modern Pipe

Site Location: N63 Liss to Abbey Realignment Scheme, Abbeyknockmoy, Co. Galway

Client: AECOM / Galway County Council

Drawing Courtesy of: OSI / Galway County Council	Date: 26/08/20	Drawing No.: 20-039/08

0m 50m 100m

Figure No. 8: Magnetometer Interpretation - Eastern Section

EARTHSOUND geophysics

Appendix A14-2

Gazetteers

Gazetteer 14.1 – Recorded Monuments within 500 m of the Proposed Development

RMP	National Monument /Protected Structure / NIAH	Type	Period	Description	Condition
GA058-067		Redundant Record	Not applicable	This record relates to a natural feature, a hollow, and not an archaeological monument.	Not applicable
GA058-004001	National Monument (number 166)	Religious house – Cistercian monks	Medieval	On a gentle south-facing slope in pastureland, near Abbeyknockmoy village, it overlooks the Abbert River to south. A Cistercian monastery founded in 1189-90 by Cathal Crobderg O'Conor, King of Connacht. A National Monument, the remains comprise a large conserved Transitional style church (E-W; L 60 m) of early 13th-century date consisting of an aisled nave, a chancel and two transepts. The chancel has a fine ribbed vault and east altar windows, while the transepts both contain two barrel-vaulted chapels at their eastern ends. Three of the arches of the crossing are walled up, possibly 15th-century work coeval with the insertion of the now largely ruined central tower. The north wall of the chancel bears 15th-century mural paintings depicting the Holy Trinity, the martyrdom of St Sebastian and the Three Dead and Three Live Kings. The claustral buildings and ruined cloister lie to the south, but only the eastern wing, including the sacristy, chapter house and a later garderobe, is well preserved.	Well preserved
GA058-004002	National Monument (number 166). Preservation order No. 4/1989	Monastic Building	Post-Medieval	In the field immediately to the north of Knockmoy Abbey (GA058-004001). This rectangular building (int. dims. 11.35 m east-west; 5.8 m north-south; wall thickness 1-1.1.25 m) is constructed of double-faced uncut stones laid down in uneven courses. It is featureless apart from a break (Width 2 m) in the north wall that may mark a doorway. Three walls (Height 0.6 m) abut the east wall of the building; one is on the line of the north wall (Length 3.5 m; Width 0.55 m), the second (Length 3.6m; Width 0.65 m) is 0.75 m to the south of the former and the third (Length 4.15 m; Width 0.9 m) is on the line of the south wall. Foundation lines of the latter wall continue further to the east (Length 8.75 m) before turning north (Length 3.9 m). The building was investigated by David Sweetman on behalf of the National Monuments Service during the course of excavations at the abbey in 1982 and 1983 in order to determine its age and relationship with the abbey complex. The foundations of the walls of the main building were not at all similar to those of a medieval building and the surviving stonework suggested that it was of post-17th-century date. The middle and south abutting walls formed a second structure (int. dims. c. 12 m east-west; 4.7 m north-south). Its foundations courses and those of the north abutting wall were stratified above the main building indicating that they were a later addition. The full extent of these walls was not revealed. All the buildings were stratified above an extensive layer of dark soil and charcoal in which one sherd of medieval pottery was found outside the east wall of the main building suggesting that there were medieval domestic buildings in this area. Part of National Monument Number 166. Also subject to a preservation order made under the National Monuments 1930 to 2014 (PO no.4/1989).	Some remains
GA058-004003	National Monument (number 166).	Graveyard	Post-Medieval	Post-medieval graveyard which occupies the claustral area of the Cistercian abbey. A number of post-medieval headstones and a ledger slab are present. The first edition of the Ordnance Survey six-inch series ((c.1840) records the presence of the graveyard within the abbey at the time.	Well preserved

RMP	National Monument /Protected Structure / NIAH	Type	Period	Description	Condition
GA058-004004	National Monument (number 166). Preservation order No. 4/1989	Field system: Earthworks associated with Abbeyknockmoy, Cistercian Abbey	Medieval	There is a relict field system extending to the west and north of Knockmoy Abbey (GA058-004001). It consists of a series of fields covering an area c.550 m north-west to south-east by c.400 m north-east to south-west. Defined by low grassed-over collapsed stone walls, some of the fields are rectilinear in plan and traces of cultivation are visible.	Some remains
GA058-004005		Mill- Corn	Post-Medieval	The remains of a post-medieval mill complex. Mill wheel gears still evident against the west gable end of the mill. According to an antiquarian source cited by the County Archaeological Inventory, the mill is said to occupy the original abbey mill. The first edition of the Ordnance Survey six-inch series records a corn mill in ruins.	Some remains
GA058-004006		Chapel	Post-Medieval	The site of a post-medieval chapel, presumably dating from the 18th century during the penal period. Only a single stretch of wall (Length c.6m, Width c.1 m), orientated east-west, now survives, built of roughly coursed limestone rubble. Recorded as a rectangular building, fronted by a rectangular courtyard, on the first edition of the Ordnance Survey six-inch series (c.1840).	Some remains
GA058-055		Ringfort	Early medieval	On N-facing slope of a rise in grassland. Poorly preserved roughly circular rath (D c. 45 m) defined by a bank and external fosse. The bank is present from SE through S to W, and a scarp forms the enclosing element from N through E to SE. The fosse survives at S. Quarrying has disturbed the monument at NW.	Some remains
GA058-056		Designed Landscape Feature	Post-Medieval	In a slightly undulating field which was marked on the 1930 OS map as very wooded but now mostly cleared. The field containing the feature appears to have contained garden walks with the feature possibly a garden feature. Though sub-circular in outline and enclosed by an earthen bank, it appears unlikely to be a rath. Moreover, the interior being sunken about 1 m strongly suggests a feature other than a rath. The enclosing bank barely survives on the exterior though there is a substantial drop on its inner slope. A small walkway leads to the site from the southwest. This site appears unlikely to have been of archaeological significance and may be a tree-ring enclosure or ornamental folly.	Some remains
GA058-057	Protected Structure No. 3921/ NIAH 30405807	*Leacht Cuimhne*	Post-Medieval	The *Leacht Cuimhne* is a stone memorial, situated within what is now a children's playground, to the south-west of the monastic complex (GA058-004001). A roughly built mortared stone pier (Length 1.3 m, Width 1.22 m, Height 2.7 m) stands on a stone plinth. The monument tapers slightly towards the top where it is capped by a rectangular stone, on top of which a small pillar stone rises. A recess in the north wall probably held a commemorative plaque. It is recorded as a 'Laghta' on the first and second editions of the Ordnance Survey six-inch series	Well preserved
GA058-058		Architectural fragment	Medieval?	This asset is situated beside a deserted farmhouse and buildings on a slight rise overlooking Abbeyknockmoy to the northeast. The site consists of a mound of cylindrical stone carved from limestone left lying on the ground. Their diameter is mainly 9 cm, though some have diameters of 18 cm. It is possible that the stone was removed from Abbeyknockmoy and that they are originally from the Cloister Arcade. All the stone is badly damaged, the maximum length of any piece is 32 cm.	Some remains

RMP	National Monument /Protected Structure / NIAH	Type	Period	Description	Condition
GA058-074	Protected Structure No. 3918 / NIAH 30405803	*Leacht Cuimhne*	Post-Medieval	Freestanding monument, built c.1800. Square plan with recessed on east, west and south and plaque fixed to north face. Random rubble dry fieldstone walls set on stone plinth, remains of corbelled limestone pyramidal roof. Set in open field on apex of mound. This is an unusual, yet simple freestanding monument set on an elevated position on possibly a manmade hill. It is probably associated with Moyne House which was built in the first half of the 18th century by Michael J. Browne.	Well preserved

Gazetteer 14.2 – Architectural Heritage

RPS Ref	RMP/ NIAH Ref	Name	Type	Street/Town	Description
83	NIAH 30405815	St. Bernard's Church	Chapel	Lisch Road, Abbeyknockmoy	Freestanding cruciform-plan Roman Catholic Church, built c.1820, having two-bay nave, and with four-bay lower 20th-century extension to altar end, and glazed entrance porch to north-west transept. Pitched slate roof, having stone copings to gables. Rendered and painted walls with rendered plinth. West gable has stone cross finial, flanked with square-plan piers having conical caps and with patera motif to decorative band below, surmounted by fleur-de-lys. Copings of this gable have decorative corbel table below. Pointed-arch niches to lower part of this gable, with moulded surrounds and containing statues. Pointed-arch windows throughout, with stained glass and stone sills, and smaller windows flanking statue niches. Triple-light window in west gable, having moulded string sill course. Transept gables have windows with Y-tracery, and the apse is lit by an oculus. Pointed-arch doorways to north-west and north-east with timber doors, former being main entrance. Interior has choir balcony at west end with glazed screens below. The roofing consists of an exposed king-post timber truss roof supported on stone corbels, and sheeted timber ceiling. There is a cross-groin vault above the altar crossing. Set back from road on elevated site with car park to north incorporating Marian grotto. A bell stand is in the grounds with cast-iron support structure and bell with raised lettering 'PRESENTED BY MICHAEL DONOVAN TO THE PARISH OF ABBEY KNOCKMOY REV. JOHN GREALY, P.P. 1829'.
3918	GA058-074 / NIAH 30405803	*Leacht Cuimhne*	Monument	Moyne	Freestanding monument c. 1800 Square plan with recessed on east, west & south & plaque fixed to north face. This is an unusual, yet simple freestanding monument set on an elevated position on possibly a manmade hill. It is probably associated with Moyne House which was built in the first half of the 18th century by Michael J. Browne.
3921	GA058-057 / NIAH 30405807	*Leacht Cuimhne*	Monument	Abbeyknockmoy	The *Leacht Cuimhne* is a stone memorial, situated within what is now a children's playground, to the south-west of the monastic complex (GA058-004001). A roughly built mortared stone pier (Length 1.3m, Width 1.22m, Height 2.7 m) stands on a stone plinth. The monument tapers slightly towards the top where it is capped by a rectangular stone, on top of which a small pillar stone rises. A recess in the north wall probably held a commemorative plaque. It is recorded as a 'Laghta' on the first and second editions of the Ordnance Survey six-inch series. This monument is similar to that of Laghta Oliver Brown in Sheeaunpark (30407112) and contributes to the architectural interest of the roadscape outside Abbeyknockmoy.
3923	NIAH 30405814	Rose Villa	School master's House	N63, Abbeyknockmoy	Rose Villa - Detached three-bay single-storey teachers house, built c.1870, having dormer roof, with gable to front, and having single-storey lean-to extension to rear.
3925	NIAH 30405811	Liss bridge	Bridge	N63 over the Abbert River	Seven-arch limestone road bridge built c.1800, over Abbert River. Round arches with rubble voussoirs to arch rings, random rubble to spandrels. Single triangular and semi-circular cutwaters on the north-east face with cement coping with pipe inlaid. Random rubble parapet with flat rubble coping. Area of repair to north-west face, cut-stone voussoirs on northern two arches, squared limestone infill to spandrel panels and parapet, flat cut-stone coping. Set on N63 with random rubble walls to adjacent fields.
	NIAH 30405804		Mill (Water)	Moyne	Detached six-bay four-storey former linen mill, dated 1832, now ruined. Rectangular plan with two-storey with dormer attic living quarters to north-east. Lime render over random rubble walls. Square-headed openings with tooled limestone sills. Segmental arch to north-west with cut limestone voussoirs above former mill stream route, now diverted. Former wheel pit to north-east gable now filled in. Set back from road with attached occupied dwelling to north-east, single-storey

RPS Ref	RMP/ NIAH Ref	Name	Type	Street/Town	Description
					outbuilding to west and mature gardens to south-east. This imposing former linen mill is a significant element of the industrial heritage and economic history of the local area. The mill is now ruinous and overgrown and many of the original features and fittings have been lost including the water wheel, mill race, internal floors and roof structure. However, the building still retains its early form and is a striking feature within the rural landscape. Its simple form and irregular fenestration are typical of vernacular mill buildings in rural Ireland.
	NIAH 30405810		Handball Alley	N63, Abbeyknockmoy	Detached open-air handball alley, built c.1950, now disused. Rectangular plan with two-storey playing wall to rear and sloping side walls. Concrete walls with four concrete buttresses to external face of rear wall and one to side walls, upper section of lower side walls raised. Square-headed entrance opening to west. Remains of iron posts to top of rear and side walls. Set on roadside with gathering space to west and community centre to east.

Gazetteer 14.3 – NIAH Designed Landscape within 1 km of the Proposed Development Site

Ref. No.	Name	Townland	Site Status
5365	Newtown	Newtown	Shown on the 1st edition OS map as buildings and woodland with area to south labelled Newtown. Shown as expanded on subsequent 2nd edition OS map and expanded again on the revised OS edition. The principal building is still extant as are outbuildings and the walled garden. Entrances and walks through the woods are also extant. The site footprint is still visible.

Gazetteer 14.4– Anomalies detected during Archaeological Geophysical Survey

Number	Form of Anomaly	Interpretation	Likely Condition	Figure Number
1	Curvilinear magnetic anomaly with two adjacent isolated anomalies	Curvilinear ditch or cut feature, 16 m in length. Located adjacent to the possible ditch is two possible pits.	Possibly archaeological, agricultural or geological	14.2
2	Arcing magnetic anomaly	Arcing ditch or cut feature, 8 m in length with a possible diameter of 6m.	Possibly archaeological, agricultural or geological	14.2
3	Magnetic trend	Weakly magnetic trend, 15 m in length.	Possibly archaeological, agricultural or geological	14.2
4	Magnetic trend	Weakly magnetic trend, 10 m in length.	Possibly archaeological, agricultural or geological	14.2
5	Magnetic trend	Weakly magnetic trend, 40 m in length.	Possibly archaeological, agricultural or geological	14.2
6	Linear magnetic anomaly	Linear ditch or cut feature, 77 m in length.	Possibly agricultural	14.2
7	Magnetic trend	Weakly magnetic trend, 11 m in length.	Possibly archaeological, agricultural or geological	14.2
8	Right-angled magnetic anomaly	Right-angled ditch or cut feature, 33 m in length.	Possibly agricultural	14.2
9	Curvilinear magnetic anomaly	Curvilinear ditch or cut feature, 42 m in length.	Possibly agricultural	14.2
10	Arcing magnetic anomaly	Arcing ditch or cut feature, 40 m in length.	Possibly archaeological	14.2
11	Curvilinear magnetic anomaly	Curvilinear ditch or cut feature, 73 m in length that matches a relict field boundary shown on the historic 25 inch OS map (1838).	Probably agricultural	14.2
12	Curvilinear magnetic anomaly	Curvilinear ditch or cut feature, 12 m in length.	Possibly archaeological, agricultural or geological	14.2

Number	Form of Anomaly	Interpretation	Likely Condition	Figure Number
13	Arcing magnetic anomaly	Arcing ditch or cut feature, 39 m in length. This anomaly may represent archaeological activity c. 18 m in diameter.	Possibly archaeological	14.2
14	Zone of magnetic interference with a central right-angled core	Zone of magnetic interference caused by multiple dipolar anomalies, which could indicate the presence of archaeological remains. Covering an area 83 m x 34 m, this could be associated with demolition rubble or a spread of imported soil. Contained within the zone is a right-angled core of highly magnetic material (14 m x 21 m), which could be structural in origin.	Possible former building	14.2
15	Magnetic trend	Linear weakly magnetic trend, 35 m in length, which may link anomalies 14 and 16.	Possibly archaeological, agricultural or geological	14.2
16	Zone of magnetic interference	Zone of magnetic interference caused by multiple dipolar anomalies. This zone is similar in formation to anomaly 14 and measures 56 m x 30 m. It is likely that the two anomalies have similar origins and may be associated with the destruction of a dwelling shown on the historic 25 inch OS mapping (1838).	Possible former building	14.2
17	Two isolated magnetic responses	Two possible archaeological pits or post holes. These anomalies are surrounded by cultivation furrows.	Possibly archaeological or agricultural	14.2
18	Magnetic trend	Weakly magnetic linear trend, 41 m in length.	Possibly archaeological or agricultural	14.2
19	Isolated magnetic response	Possible pit or posthole.	Possibly archaeological or agricultural	14.2
20	Arcing magnetic anomaly	Arcing ditch or cut feature, 19 m in length.	Possibly archaeological, agricultural or geological	14.2
21	Curvilinear magnetic anomaly	Curvilinear ditch or cut feature, 20 m in length.	Possibly agricultural	14.2
22	Curvilinear magnetic anomaly	Curvilinear ditch or cut feature, 21 m in length. This anomaly could represent a continuation to anomaly 21.	Possibly agricultural	14.2

Number	Form of Anomaly	Interpretation	Likely Condition	Figure Number
23	Linear magnetic anomaly	Linear ditch or cut feature, 13 m in length, which may be associated with anomaly 24.	Possibly archaeological	14.2
24	Series of isolated magnetic responses	Eight possible pits or post holes which form a roughly square outline, covering an area of 6 m x 9 m. These pits could be associated with archaeological remains such as a structure; a number of ferrous responses were detected within the vicinity, which might also be associated with archaeological remains.	Possibly archaeological	14.2
25	Four isolated magnetic responses	Four possible pits or postholes. These might be associated with anomaly 24 or may be agricultural in origin.	Possibly archaeological or agricultural	14.2
26	Linear highly magnetic response	Pipe response which probably is associated with the draining of the land as this portion of the field once contained an island.	Modern drainage	14.2
27	Magnetic trend	Trend of weak magnetism, 14 m in length.	Possibly archaeological, agricultural or geological	14.2
28	Two parallel magnetic anomalies	Two parallel ditches or cut features, 20 m and 11 m in length. These anomalies are likely to be associated with former field divisions and could continue into anomalies 31 & 32 representing a relict field boundary shown on all the historic mapping.	Possible field boundary	14.2
29	Right-angled zone of magnetic interference	Right-angled zone of highly magnetic responses, 7 m x 5 m. This response could relate to metallic debris; alternatively, it could represent heavily burnt remains possibly archaeological in origin such as potentially a fulachta fiadh (the common name for a burnt stone spread of likely Bronze Age date, often interpreted as open-air cooking places).	Possibly archaeological or modern debris	14.2
30	Linear highly magnetic response	Pipe response, which probably represents a continuation to the open drain present in the adjacent field.	Modern drainage	14.2
31	Right-angled magnetic response	Right-angled ditch or cut feature, 26 m in length, which is likely to be associated with a relict field boundary shown on all the historic mapping.	Possible field boundary	14.2

Number	Form of Anomaly	Interpretation	Likely Condition	Figure Number
32	Linear magnetic response	Linear ditch or cut feature, 26 m in length, which is likely to interlink with anomaly 31 and represents a relict boundary.	Possible field boundary	14.2
33	Zone of magnetic interference	Zone of magnetic interference caused by multiple anomalies, which could indicate the presence of archaeological remains. Covering an area 24 m x 7 m this anomaly is likely to be associated with alluvial deposits or modern debris.	Possibly alluvial deposits or modern debris	14.2
34	Zone of magnetic interference	Zone of magnetic interference caused by multiple dipolar anomalies, which could indicate the presence of archaeological remains. Covering an area 16 m x 5 m this anomaly is likely to be associated with alluvial deposits or modern debris	Possibly alluvial deposits or modern debris	14.2
35	Zone of magnetic interference	Zone of magnetic interference caused by multiple dipolar anomalies, which could indicate the presence of archaeological remains. Covering an area 32 m x 19m, this anomaly is likely to be associated with alluvial deposits or modern debris.	Possibly alluvial deposits or modern debris	14.2
36	Linear magnetic response	Linear ditch or cut feature, 16 m in length, which is likely to be agricultural in origin.	Probably a field boundary	14.2
37	Magnetic trend	Curvilinear weakly magnetic trend, 23 m in length.	Possibly archaeological, agricultural or geological	14.2
38	Magnetic trend	Linear weakly magnetic trend, 25 m in length.	Possibly archaeological, agricultural or geological	14.2
39	Magnetic trend	Curvilinear weakly magnetic trend, 24 m in length.	Possibly archaeological, agricultural or geological	14.2
40	Linear magnetic anomaly	Linear ditch or cut feature, 57 m in length.	Possibly agricultural	14.2
41	Arcing magnetic anomaly	Arcing ditch or cut feature, 23 m in length.	Possibly archaeological, agricultural or geological	14.2

Number	Form of Anomaly	Interpretation	Likely Condition	Figure Number
42	Magnetic trend	Curvilinear weakly magnetic trend, 37 m in length.	Possibly archaeological, agricultural or geological	14.2
43	Two zones of magnetic interference	Two zones of magnetic interference caused by multiple dipolar anomalies, which could be associated with alluvial deposits and are likely to be associated with anomaly 44.	Possibly geological	14.2
44	Linear magnetic feature	Linear magnetic feature, which is associated with a relict palaeochannel.	Possibly geological	14.2
45	Magnetic trend	Linear ditch or cut feature, 20 m in length.	Possibly geological	14.2
46	Two interconnecting magnetic response	Two interlinking ditch or cut features, 25 m and 23 m in length.	Probably agricultural	14.2
47	Magnetic trend	Curvilinear weak magnetic trend, 14 m in length.	Possibly archaeological, agricultural or geological	14.3
48	Curvilinear magnetic anomaly	Curvilinear feature, 24 m in length. This anomaly could relate to archaeological remains or be associated with alluvial deposits.	Possibly archaeological or modern debris	14.3
49	Curvilinear magnetic anomaly	Curvilinear feature, 24 m in length. This anomaly could relate to archaeological remains, possibly associated with anomaly 48 or be associated with alluvial deposits.	Possibly archaeological or modern debris	14.3
50	Linear magnetic anomaly	Linear ditch or cut feature, 33 m in length.	Probably agricultural	14.3
51	Series of isolated responses	Five possible pits or postholes.	Possibly archaeological, agricultural or geological	14.2
52	Linear magnetic anomaly	Linear ditch or cut feature, 54 m in length.	Probably agricultural	14.3
53	Curvilinear magnetic anomaly	Curvilinear ditch or cut feature, 30 m in length. This anomaly may contain burnt deposits or a series of closely spaced pits along its length.	Possibly archaeological or agricultural	14.3

Number	Form of Anomaly	Interpretation	Likely Condition	Figure Number
54	Curvilinear magnetic anomaly	Curvilinear ditch or cut feature, 9 m in length, which might be associated with anomaly 53.	Possibly archaeological or agricultural	14.3
55	Curvilinear magnetic anomaly	Curvilinear ditch or cut feature, 24 m in length, with a roughly right-angled profile. It may be associated with anomaly 53.	Possibly archaeological or agricultural	14.3
56	Linear magnetic anomaly	Linear ditch or cut feature, 53 m in length. This anomaly runs parallel to the field boundary and is likely to represent a relict agricultural boundary.	Probably a field boundary	14.3
57	Arcing magnetic anomaly and two isolated responses	Arcing ditch or cut feature, 14 m in length. The ditch, 9 m in diameter, appears to encompass two possible pits or post holes.	Possibly archaeological	14.3
58	Curvilinear magnetic anomaly	Curvilinear ditch or cut feature, 61 m in length. This anomaly could represent a relict field boundary.	Probably a field boundary	14.3
59	Magnetic trend	Arcing weakly magnetic trend, 23 m in length.	Possibly archaeological, agricultural or geological	14.3
60	Sub-circular magnetic anomaly and associated isolated responses	Sub-circular ditch 3.8 m in diameter, which appears to contain or be truncated by at least five possible pits or postholes. This feature might be associated with anomaly 61.	Possibly archaeological	14.3
61	Arcing magnetic anomaly	Arcing ditch or cut feature, 30 m in length. This feature might be archaeological in origin and could surround anomaly 60.	Possibly archaeological	14.3
62	Arcing magnetic anomaly	Arcing ditch or cut feature, 34 m in length.	Possibly archaeological or geological	14.3
63	Curvilinear magnetic anomaly	Linear ditch or cut feature, 49 m in length that is likely to represent a relict agricultural boundary.	Probable field boundary	14.3
64	Three isolated responses	Three possible pits or post holes, which were detected on the northern edge of anomaly 63.	Possibly archaeological, agricultural or geological	14.3
65	Right-angled magnetic anomaly	Right-angled ditch or cut feature, 25 m in length. This anomaly likely extends from anomaly 63. The northern portion of the	Possibly agricultural	14.3

Number	Form of Anomaly	Interpretation	Likely Condition	Figure Number
		ditch appears to be punctuated by a series of possible pits or tree-planting holes.		
66	Linear magnetic anomaly	Linear ditch or cut feature, 38 m in length, which probably represents a relict field boundary.	Probable field boundary	14.3
67	Magnetic trend	Arcing weakly magnetic feature, which was detected in two distinct anomalies. These possibly enclose an area 9 m in diameter and possibly contain a break or entrance to the southeast.	Possibly archaeological	14.3
68	Numerous isolated responses	Five possible pits or postholes which form a right-angled shape. Covering an area of 3 m x 0.8 m.	Possibly archaeological, agricultural or geological	14.3
69	Magnetic trend	Linear weakly magnetic trend, 11 m in length.	Possibly archaeological, agricultural or geological	14.3
70	Linear magnetic anomaly	Linear ditch or cut feature, 21 m in length, which probably represents a relict field boundary.	Probable field boundary	14.3
71	Arcing magnetic anomaly and large isolated response	Arcing ditch or cut feature, 9 m in length, which appears to terminate at a large possible pit or deposit, 4 m in width.	Possibly archaeological	14.3
72	Arcing magnetic anomaly	Arcing ditch or cut feature, 32 m in length.	Possibly archaeological, agricultural or geological	14.3
73	Linear negative magnetic anomaly	Linear stone feature, 19 m in length, which matches a boundary shown on the 6-inch OS map (1940).	Probable field boundary	14.3
74	Interlinking negative magnetic anomalies	Two interconnecting stone features. The northern of these features matches a boundary shown on the historic 25 inch OS map (1838). It is likely that both these anomalies are associated with agricultural boundaries.	Probable field boundary	14.4
75	Right-angled magnetic anomaly	Right-angled ditch or cut feature, 26 m in length.	Possibly agricultural	14.4

Number	Form of Anomaly	Interpretation	Likely Condition	Figure Number
76	Two isolated magnetic responses	Two possible pit or posthole features. These anomalies could be archaeological in nature or associated with tree bowls, agricultural pits or geological depressions.	Possibly agricultural	14.4
77	Magnetic trend	Two possible pit or posthole features. These anomalies could be archaeological in nature or associated with tree holes, agricultural pits or geological depressions.	Possibly agricultural	14.4
78	Arcing magnetic anomaly	Linear weakly magnetic trend, 26 m in length.	Possibly archaeological or agricultural	14.4
79	Magnetic trend	Arcing ditch or cut feature, 22 m in length.	Possibly archaeological or agricultural	14.4
80	Two magnetic trends	Two weakly magnetic trends. To the south, the feature has an arcing profile and measures 9m in length. The other is linear and is 9 m in length.	Possibly archaeological, agricultural or geological	14.4
81	Linear magnetic anomaly	Linear ditch or cut feature, 23 m in length. This anomaly runs parallel to the field boundary.	Possibly agricultural	14.4
82	Curvilinear magnetic anomaly	Curvilinear ditch or cut feature, 33 m in length.	Possibly agricultural	14.4
83	Linear magnetic anomaly	Linear ditch or cut feature, 40 m in length.	Possibly agricultural	14.4
84	Zone of magnetic interference	Scattered zone of anomalies, which are likely to relate to modern debris or demolished archaeological remains. Indeed, the area is shown to contain a number of small fields and dwellings on the historic 6 inch OS map (1838), and this anomaly is likely to be associated with these remains	Probable habitation remains	14.4
85	Zone of modern disturbance	Large zone of densely spaced highly magnetic responses. This is associated with the destruction of a number of dwellings shown on the historic 6 inch OS map (1838).	Probable habitation remains	14.4
86	Series of parallel and interconnecting magnetic anomalies	A series of ditch or cut features which form a rectangular division, 15 m x 7 m and parallel ditches, 11 m and 16 m in length, leading from it. These anomalies are likely to be	Probable habitation remains	14.4

Number	Form of Anomaly	Interpretation	Likely Condition	Figure Number
		associated with habitation remains and although they do not match those shown on the historic 6 inch OS map (1838), they could represent other habitation or boundary remains.		
87	Magnetic trend	Linear weakly magnetic trend, 17 m in length, which could represent a cut feature, geological or agricultural activity.	Probably agricultural or geological	14.4
88	Magnetic trend	Linear weakly magnetic trend, 16 m in length, which could represent a cut feature, geological or agricultural activity.	Possibly archaeological, agricultural or geological	14.4
89	Oval magnetic anomaly	Oval anomaly, which could represent a deposit of soil or geological activity. Measuring 6 m x 2.5 m this anomaly could also represent archaeological material.	Possibly archaeological or geological	14.4
90	Arcing magnetic anomaly with four isolated responses	Arcing ditch or cut feature, 7.8 m in diameter, which may be archaeological or geological in origin. Two breaks can be seen within the possible ditch at the northeast and southwest, while four possible pits or postholes appears to be contained within it.	Possibly archaeological or geological	14.4
91	Magnetic trend	Weakly magnetic linear trend, 13 m in length.	Possibly archaeological, agricultural or geological	14.4
92	Magnetic trend	Weakly magnetic linear trend, 14.6 m in length.	Possibly archaeological, agricultural or geological	14.4
93	Arcing magnetic anomaly	Arcing ditch or cut feature, 9 m in length.	Possibly archaeological, agricultural or geological	14.4
94	Magnetic trend	Weakly magnetic linear trend, 24.5 m in length.	Possibly archaeological, agricultural or geological	14.4
95	Zone of magnetic interference	Zone of anomalies, which could relate to modern debris or an archaeological deposit.	Possibly archaeological or modern debris	14.4
	Series of parallel responses	Evidence for cultivation furrows were detected in multiple locations across the survey area.	Agricultural	All

Number	Form of Anomaly	Interpretation	Likely Condition	Figure Number
	Zones of modern disturbance detected on the survey edges	These zones of modern disturbance are usually detected on the edge of the survey area and relate to interference from metallic fences, passing cars and modern debris. They are of no archaeological significance.	Modern	All

Anomalies Specifically Recommended for Archaeological Testing (also see N63 Liss to Abbey Geophysical Report)

Number	Anomaly	Suggested Testing
1	Curvilinear ditch or cut feature, 16m in length. Located adjacent to the possible ditch are two possible pits.	Single trench orientated west to east
2	Arcing ditch or cut feature, 8m in length with a possible diameter of 6m.	Single trench orientated southwest to northeast
10	Arcing ditch or cut feature, 40m in length which crosses the northeastern corner of the field. This anomaly could be archaeological in origin.	Single trench orientated southwest to northeast
13	Arcing ditch or cut feature, 39m in length. This anomaly may represent archaeological activity c. 18m in diameter.	Single trench orientated northwest to southeast
14	Zone of magnetic interference caused by multiple anomalies, which could indicate the presence of archaeological remains. Covering an area 83m x 34m this could be associated with demolition rubble or a spread of imported soil. Contained within the zone is a right-angled core of highly magnetic material (14m x 21m) which could be structural in origin.	Single trench orientated southwest to northeast
16	Zone of magnetic interference caused by multiple anomalies. This zone is similar in formation to anomaly 14 and measures 56m x 30m. It is likely that the two anomalies have similar origins and may be associated with the destruction of a dwelling shown on the historic 25inch OS mapping.	Single trench orientated west to east
17	Two possible archaeological pits or postholes. These anomalies are surrounded by cultivation furrows.	Single trench orientated northwest to southeast
24	Eight possible pits or post holes which form a roughly square outline, covering an area of 6m x 9m. These pits could be associated with archaeological remains such as a structure; a number of ferrous responses were detected within the vicinity, which might also be associated with archaeological remains.	Single trench orientated west to east
35	Zone of magnetic interference caused by multiple anomalies, which could indicate the presence of archaeological remains. Covering an area 32m x 19m this anomaly is likely to be associated with alluvial deposits or modern debris.	Single trench orientated north to south
41	Arcing ditch or cut feature, 23m in length.	Single trench orientated southwest to northeast

Number	Anomaly	Suggested Testing
49	Curvilinear feature, 24m in length. This anomaly could relate to archaeological remains, possibly associated with anomaly 48 or be associated with alluvial deposits.	Single trench orientated northwest to southeast and extending over 51
51	Five possible pits or post holes. These anomalies could be archaeological or agricultural in origin or associated with alluvial deposits.	Single trench orientated northwest to southeast and extending over 49
55	Curvilinear ditch or cut feature, 24m in length, with a roughly right-angled profile. It may be associated with anomaly 53.	Single trench orientated northeast to southwest
57	Arcing ditch or cut feature, 14m in length. The ditch, 9m in diameter, appears to encompass two possible pits or postholes.	Single trench orientated west to east
60	Sub-circular ditch 3.8m in diameter which appears to contain or be truncated by at least five possible pits or postholes. This feature might be associated with anomaly 61.	Single trench orientated northwest to southeast
61	Arcing ditch or cut feature, 30m in length. This feature could surround anomaly 60.	Single trench orientated northeast to southwest extending over 62
62	Arcing ditch or cut feature, 34m in length	Single trench orientated northeast to southwest extending over 61
63	Linear ditch or cut feature, 49m in length that is likely to represent a relict agricultural boundary. Archaeological testing will determine the nature of this anomaly whilst also testing the adjacent anomalies.	Single trench orientated north-northeast to south-southwest and extending over 64 and 65
64	Three possible pits or postholes, which were detected on the northern edge of anomaly 63.	Single trench orientated north-northeast to south-southwest and extending over 63 and 65
65	Right-angled ditch or cut feature, 25m in length. This anomaly likely extends from anomaly 63 and is probably agricultural in origin. The northern portion of the ditch appears to be punctuated by a series of possible pits or tree planting holes.	Single trench orientated north-northeast to south-southwest and extending over 63 and 64
68	Five possible pits or postholes, which form a right-angled shape covering an area of 3m x 0.8m.	Single trench orientated northwest to southeast

Number	Anomaly	Suggested Testing
70	Linear ditch or cut feature, 21m in length which probably represents a relict field boundary. Archaeological testing will determine the nature of this anomaly whilst also testing the adjacent anomalies.	Single trench orientated northwest to southeast and extending over 71
71	Arcing ditch or cut feature, 9m in length, which appears to terminate at a large possible pit or deposit, 4m in width.	Single trench orientated northwest to southeast and extending over 70
76	Two possible pit or posthole features. These anomalies could be archaeological in nature or associated with tree holes, agricultural pits or geological depressions.	Single trench orientated northwest to southeast
78	Linear weakly magnetic trend, 26m in length.	Single trench orientated northwest to southeast
84	Scattered zone of anomalies, which are likely to relate to modern debris or demolished archaeological remains. Indeed, the area is shown to contain a number of small fields and dwellings on the historic 6inch OS map (1838), and this anomaly is likely to be associated with these remains.	Single trench orientated northeast to southwest
89	Oval anomaly, which could represent a deposit of soil or geological activity measuring 6m x 2.5m.	Single trench orientated northeast to southwest
93	Arcing ditch or cut feature, 9m in length.	Single trench orientated north-northwest to south-southeast

Gazetteer 14.4 – Photographs

Photograph 14.1 Rectangular field at western extent of the Proposed Road Development.

Photograph 14.2 Marginal ground to south of the Abbert River.

Photograph 14.3 The National Monument Knockmoy Abbey (National Monument No.166) viewed from the Proposed Road Development.

Photograph 14.4 Tributary of the Abbert River within the Proposed Road Development.

Photograph 14.5 Bank or bund on the south side of the Abbert River.

Photograph 14.6 Evidence of drainage within the Proposed Road Development to the south of the Abbert River.

Photograph 14.7 Looking north across the Abbert River at the proposed line of the Proposed Road Development.

Photograph 14.8 Extremely wet ground within the Proposed Road Development to the north of the Abbert River.

Photograph 14.9 Marginal ground with drainage ditch to the north of the Liss Bridge (No. 3925).

Photograph 14.10 Remains of a bank within the former property noted on the 2nd Edition OS map (1927).

Photograph 14.11 Area where buildings are marked on the 2nd Edition OS map (1927).

Photograph 14.12 Remains of derelict agricultural outbuilding within the Proposed Road Development.

Photograph 14.13 Modern property adjacent to the Proposed Road Development at the L6234.

Photograph 14.14 Terrain to the south of the N63 at the east end of the Proposed Road Development.

Photograph 14.15 Exposed bedrock in east of the Proposed Road Development.

Photograph 14.16 Former location of mill pond in the east of the Proposed Road Development.

Photograph 14.17 The eastern extent of the Proposed Road Development.

Photograph 14.18 Derelict property adjacent to eastern extent of the Proposed Road Development.

Photograph 14.19 The Protected Structure Liss Bridge (No. 3925).

Photograph 14.20 View southeast towards the location of the Proposed Road Development from Knockmoy Abbey (National Monument No.166).

Photograph 14.21 Looking south at the Protected Structure Rose Villa (No. 3923).

Photograph 14.22 The Protected Structure St. Bernard's Church (No. 83).

Photograph 14.23 The Protected Structure *Leacht Cuimhne* (No. 3921) within playground.

Photograph 14.24 Looking northeast towards location of *Leacht Cuimhne* (No. 3918).

Appendix A15:

Major Accidents & Disasters

Appendix A15-1

Identification of Major Accidents and Disasters

Natural Disaster			
Guideword	Description of Hazard	Applicable to Proposed Development	Potential for Significant Environmental Effects / Considered
Earthquake	Seismic activity could cause fissures in road surface leading to potential for RTA.	Low likelihood of earthquakes given the setting of the Project in a low risk seismic area. Ref: https://www.insn.ie/confirmed/	N/A
Landslide	Material could be transported onto the existing road causing a RTA.	Low likelihood given the location of the project within a low lying landscape.	N/A
Lightning Strike / Thunder	A lightning strike could damage site infrastructure and potentially cause a major accident .	During detailed engineering design, an assessment of lightning protection requirements would be carried out using IEC 62305.	No, design would incorporate mitigation measures as required for compliance with IEC 62305.
Dense Fog (Reduced Visibility)	Dense fog could result in reduced visibility when driving which could lead to a RTA. A multiple vehicle RTA may result in a major accident.	Yes, The location of the Proposed Road Development could be vulnerable to experiencing dense fog.	Yes, poor driving conditions during dense fog could result in a RTA which would be a major accident.
Storms / High Winds / Severe Gales	Wind blown debris and poor driving conditions during adverse weather could lead to a RTA.	Yes, The location of the Proposed Road Development could be vulnerable to storms/high winds/severe gales.	Yes, poor driving conditions during storms/high winds/severe gales could result in a RTA which would be a major accident.
Climate Change	Impacts of climate change could cause temperature extremes and increased precipitation resulting in an increase in frequency of defects occurring to road surfaces. This could potentially cause RTA.	Yes, potential impacts of climate change considered in design of Proposed Road Development.	Yes, an increase in road surface defects could result in RTA resulting in major accidents.
Heavy Rain / Flooding	Flooding/heavy rain could cause poor driving conditions. Potential to overwhelm surface water drainage leading to release of trace amounts of hazardous substances such as fuel and oils which could impact the environment.	Yes, site surveys have indicated that land immediately adjacent to the river in the vicinity of the road are likely to be prone to flooding as this area is relatively flat and at a lower elevation than surrounding lands.	Yes, flooding could cause a RTA resulting in a major accident. Flood waters can also cause release of environmentally damaging substances which could lead to long/lasting damage to the environment.

Guideword	Description of Hazard	Applicable to Proposed Development	Potential for Significant Environmental Effects / Considered
Storm Surge	Rise in sea level during a storm causing flooding and potential for RTA.	No, location of the Proposed Road Development is inland and not in a coastal area therefore not at risk from storm surge.	N/A
Heat Wave / Drought / Water Shortage	Potential for harm as a result of increased temperatures considered under climate change.	N/A	N/A
Forest Fire	Flames, smoke plumes and high temperatures could cause damage to infrastructure and poor driving conditions.	No, the Proposed Road Development is located within an area which is not adjacent to woods or forest.	N/A
Extreme Temperature	Potential for harm as a result of extreme temperatures is considered under climate change	N/A	N/A
Poor Air Quality	Poor air quality could result from emissions during both the construction and operational phase which could result in human health impacts and impacts to sensitive ecological receptors.	Yes, vehicle emissions can contribute to poor air quality during both construction and operational phase.	No, it was identified in the Air Quality Impact Assessment for the Route Options Assessment that there would be an overall reduction in exposure to pollution as a result of implementing the Proposed Road Development. Given the scale of the development, significant effects would be unlikely.
Ice	Ice on the roads could result in poor driving conditions leading to RTA.	Yes, however routine application of gritting salt in cold weather would mitigate this hazard.	N/A
Heavy Snow	Heavy snow could result in poor driving conditions leading to RTA.	Yes, however snow ploughs and application of gritting salt would mitigate this hazard.	Yes, poor driving conditions during heavy snow could result in a RTA which would be a major accident.
Volcanic Eruption	Guideword not applicable to development.	No, the Proposed Road Development is not located within an active volcanic area.	N/A
Avalanche	Guideword not applicable to development.	No, the Proposed Road Development is not located within an area where avalanches occur.	N/A

Guideword	Description of Hazard	Applicable to Proposed Development	Potential for Significant Environmental Effects / Considered
Tsunami	Guideword not applicable to development.	No, The Proposed Road Development is located inland therefore not within an area where tsunamis could occur.	N/A
Pandemic / Infectious Disease	Guideword not applicable to development.	No, the risks from Covid 19 are not considered a potential hazard for this project. Construction workers, as a receptor from a potential hazard, are excluded from the assessment because existing legal protection is sufficient to minimise any risk from Covid 19 to a reasonable level.	N/A
Ground collapse	Poor ground conditions leading to a ground collapse could result in a RTA.	No, a geophysical survey was undertaken by Minerex in 2020, with the aim of determining ground conditions beneath the study area. It is stated that the top of the glacial till is likely weathered while the deeper glacial till is expected to be highly consolidated, suitable for heavy foundations and can provide protection against possible karstification of the deep rock.	N/A

Generic Major Accidents			
Guideword	Description of Hazard	Applicable to Proposed Development	Potential for Significant Environmental Effects / Considered Further
Structural Collapse	Structural collapse of a bridge onto road. Failure could be as a result of impact damage.	Yes, one new bridge will be constructed as part of the Proposed Road Development over the Abbert River.	Yes, bridge collapse as a result of impact damage could cause a RTA and significant damage to infrastructure which could result in a major accident.
Dropped objects (e.g. from cranes, from vehicles)	Dropped objects could result in damage to infrastructure, vehicles or pedestrians. Objects could also cause obstructions resulting in a RTA.	Yes, particularly during the construction phase of the Proposed Road Development where pre-cast concrete sections will be delivered.	Yes, large dropped objects such as pre-cast concrete and rebar could result in a major accident.
Swinging Loads	During the construction phase, swinging loads could obscure vision during driving leading to RTA. It could also damage overhead lines resulting in power loss.	Yes, as dropped objects.	Yes, as dropped objects.
Collisions / Impact (e.g. vehicles / pedestrians)	Vehicle collisions/impacts have the potential to lead to a major fire, which requires application of firewater. Firewater run-off may contain pollutants which are harmful to the environment.	Yes, there is the potential for a major fire during both and the construction and operational phase of the Proposed Road Development.	Yes, release of polluting substances in firewater could cause harm to the environment.
Vehicle Crash / Overturning	As collisions / impacts.	Yes, As collisions / impacts.	Yes, As collisions / impacts.

Guideword	Description of Hazard	Applicable to Proposed Development	Potential for Significant Environmental Effects / Considered Further
Overhead Restrictions (e.g. power lines)	Contact with overhead power lines has the potential to cause serious injuries including fatalities. Work involving long or high plant or equipment e.g. excavators, MEWPs, scaffold poles, tipper vehicles and cranes, presents a particularly high risk.	Yes, all overhead restrictions in the vicinity of the Proposed Road Development have not yet been fully identified therefore this survey would be required prior to construction.	Yes, however a survey would be carried out to identify areas where overhead lines are present and the appropriate controls and mitigation procedures would be in place prior to construction. Therefore hazard not considered further.
Uncontrolled Vegetation (e.g. trees obscuring vision)	Uncontrolled vegetation could potentially obscure vision during construction and cause a RTA during operation.	No, vegetation will be managed prior to construction and regularly after the Proposed Development is operational.	N/A
Transporting Dangerous Goods	The transport of dangerous goods could result in the release of polluting substances if they were involved in a RTA.	Yes, agricultural vehicles using the road could be transporting hazardous substances such as large quantities of diesel fuel oil.	No, road is routed through a rural area with no significant industrial infrastructure. Maximum inventory of harmful substances would be within vehicles containing heating/fuel oil. A loss of containment from this vehicle would result in a release which would contained within surface water drainage systems, however this could cause the road surface to become unsafe and increase potential for a RTA. This hazard is assessed in detail elsewhere.
Aeroplane / Helicopter Crash	As collisions / impacts.	No, the Proposed Road Development is not located in a flight path (Ref. https://www.flightradar24.com/airport/snn).	N/A

Guideword	Description of Hazard	Applicable to Proposed Development	Potential for Significant Environmental Effects / Considered Further
Drone Strike	As collisions / impacts.	No, the Proposed Road Development is located within a rural area therefore at low risk.	N/A
Cyber Attacks	N/A	No, the Proposed Road Development is located within a rural area therefore at low risk.	N/A
Arson	N/A	No, the Proposed Road Development is located within a rural area therefore at low risk.	N/A
Conflict / Terrorism	N/A	No, The Proposed Road Development is located within an area where the risk of conflict/terrorism is low.	N/A
Routine Access	Guideword not applicable to development.	N/A	N/A
Emergency Access	Guideword not applicable to development.	N/A	N/A

Transportation Hazards			
Guideword	Description of Hazard	Applicable to Proposed Development	Potential for Significant Environmental Effects / Considered
Aviation			
Aircraft Collision / Loss	Guideword not applicable to development.	No	N/A
Security - Airport	Guideword not applicable to development.	No	N/A
Security - Aircraft	Guideword not applicable to development.	No	N/A
Hijacking	Guideword not applicable to development.	No	N/A
Rail			
Collision - Mainline	Guideword not applicable to development.	No	N/A
Collision - DART / Suburban	Guideword not applicable to development.	No	N/A
Collision - Tram	Guideword not applicable to development.	No	N/A
		No	N/A
Road			
Multiple vehicle RTA	Considered in detail in previous sections. A multiple vehicle RTA would be considered a major accident. This could cause a major fire, which requires application of firewater leading to run-off containing pollutants such as fuel oils.	Yes, during both and the construction and operational phase of the Proposed Road Development.	Yes, release of substances harmful to the environment within firewater runoff.
Tunnel	Tunnelling during construction leading to subsidence of land, with the potential to lead to an accident.	No tunnels are included in this Proposed Road Development.	N/A
Hazardous material transport	Considered in detail in previous sections.	-	-
Bridge	Considered in detail in previous sections.	-	-
Water			
Ferry	Guideword not applicable to development.	No	N/A
Port	Guideword not applicable to development.	No	N/A
Inland Waterways	Guideword not applicable to development.	No	N/A
Pollution	Guideword not applicable to development.	No	N/A

Construction Hazards			
Guideword	Description of Hazard	Applicable to Proposed Development	Potential for Significant Environmental Effects / Considered
Increased traffic	Additional HGV traffic on the road could increase risk of a RTA causing a major accident.	Yes, during construction phase only.	Yes, however risk from construction vehicles will be managed in accordance with CEMP.
Simultaneous Operations (SIMOPs)	Construction works on existing road could result in obstructions increasing risk of a RTA or collision with pedestrian.	Yes, during construction phase only.	Yes, however risk from construction vehicles will be managed in accordance with CEMP.
Construction plant collision	Construction plant collision could result in a loss of containment of materials such as concrete which are harmful to the environment.	Yes, during construction phase only.	Yes, release of polluting substances such as fuel oil and concrete to the environment is considered further.
Excavations	A gas pipeline strike during excavation work could result in a fire/power outage/explosion	Yes, potential for accident during construction phase only such as an excavation strike on a pipeline. Only water and communications have been identified during search, not gas pipelines are located within the area of the Proposed Road Development. Loss of utilities may cause temporary interruption in supplies to local area, but would not be a major accident.	No, utility infrastructure damage would not result in a major accident.
Underpinning	Failure of structural supports during construction could lead to bridge collapse and potential major accident.	Yes, during construction phase only.	Yes, bridge failure considered further.
Temporary storage	Temporary storage of hazardous substances which could be released into the environment, causing harm and potentially a major accident.	Yes, during construction phase only.	No, quantities of hazardous substances such as concrete and fuel oil will be carefully controlled to avoid releases; therefore, significant effects if accidental release occurs are not anticipated.

Chemical and Process Hazards			
Guideword	Description of Hazard	Applicable to Proposed Development	Potential for Significant Environmental Effects / Considered
Loss of containment - flammable gas	A release of polluting substances could impact the receiving environment.	No flammable gases other than small containers e.g. welding gases during construction	N/A
Loss of containment - flammable liquid	A release of polluting substances could impact the receiving environment.	Yes, release of fuel oil considered earlier.	N/A
Loss of containment - toxic gas	Guideword not applicable to development.	No	N/A
		No	
Explosion	Guideword not applicable to development.	No	N/A
Pool fire	Guideword not applicable to development.	No	N/A
Jet fire	Guideword not applicable to development.	No	N/A
Flash fire	Guideword not applicable to development.	No	N/A
Boiling Liquid Expanding Vapour Cloud Explosion (BLEVE) (e.g. LPG)	Guideword not applicable to development.	No	N/A
Firewater containment	Pollutants such as uncombusted hydrocarbons contained in firewater runoff could cause harm if released to the environment.	Yes, release of fuel oil considered earlier.	N/A
Smoke ingress	Guideword not applicable to development.	No	N/A
Venting	Guideword not applicable to development.	No	N/A
Draining	Guideword not applicable to development.	No	N/A
Loss of electrical power	Loss of electrical power to lighting could reduce visibility at night and increase risk of a RTA.	Yes, during the construction phase of the Proposed Road Development, potential for interruptions to electrical supply. Emergency generators would be deployed to provide back up supplies.	Mitigation sufficient to prevent major accidents, therefore not considered further.
Loss of ventilation	Guideword not applicable to development.	No	N/A
Loss of other utilities (natural gas, air, nitrogen)	Guideword not applicable to development.	No	N/A
Unplanned Shutdown	Guideword not applicable to development.	No	N/A
Location and layout	Guideword not applicable to development.	No	N/A
Biological hazards	Guideword not applicable to development.	No	N/A

Nuclear radiation	Guideword not applicable to development.	No	N/A

Environmental Hazards			
Guideword	Description of Hazard	Applicable to Proposed Development	Potential for Significant Environmental Effects / Considered
Release of substances harmful to the environment: - Releases to air, water, land, groundwater, drinking water sources	A release of polluting substances could impact the receiving environment. Potentially harmful substances used in this development include the following: fuels, oils, lubricants, paints, bituminous coatings, preservatives, weed killers, lime, concrete, sediments and suspended solids	Yes, substances harmful to the environment will be used during construction of the Proposed Road Development which is located near to protected environmental sites.	Yes, however quantities present will be minimised (e.g. use of pre-cast concrete where practical) and containment systems would be designed to prevent an accidental release reaching the environment.
Impact to environment - particular species	The release of polluting substances, noise and construction and operational activities could impact biodiversity in the receiving environment.	Yes, there are identified protected species in the vicinity of the proposed Road Development.	Yes, however a detailed desktop survey has been carried out (Refer to Section 7) to assess the impacts up to a distance of 10 km from the Proposed Road Development. Further biodiversity studies and monitoring would be undertaken throughout the project and substantial measures would be taken to protect species to ensure a high level of protection to the environment.
Impact to environment - heritage sites e.g. listed buildings	Potential for major accidents to heritage sites such as ancient monuments or listed buildings which causes significant harm such that the designation is withdrawn.	Yes, there are identified heritage sites in the vicinity of the proposed Road Development.	Yes, a heritage assessment has identified there is the potential for unrecorded archaeological assets in the area of the Proposed Road Development, therefore further surveys and mitigation procedures are required.

Appendix A17:

Material Assets - Agriculture

Appendix A17-1

Summary of Individual Land Parcel Impact Assessment

Ref No	Area Farmed (ha)	Farm Type[1]	Land-take (ha)		Taken (%)	Severance (Yes / No)	Severance (%)	Sensitivity	Construction Phase: Significance of Effects	Overall Significance of Effects before mitigation	Mitigation (see notes at end of Appendix)	Residual Significance of Effects
			Permanent	Temporary								
103	7.97	Group 2	0.64	0.009	8%	Yes[2]	88%	Medium	Not Significant	Significant Adverse	Notes 1, 2, 3	Moderate Adverse
106	1.79	Group 2	0.004	0.008	0.7%			Medium	Not Significant	Not Significant	Notes 1, 2	Not Significant
108	2.19	Group 2	0.91		42%	Yes	61%	Medium	Not Significant	Significant Adverse	Notes 1, 2, 3	Significant Adverse
109	6.5	Group 2	0.29		4%	Yes[2]	22%	Medium	Not Significant	Significant Adverse	Notes 1, 2, 3	Slight Adverse
110	6.83	Group 2	0.23	0.005	3.5%	Yes[2]	11%	Medium	Not Significant	Significant Adverse	Notes 1, 2, 3	Slight Adverse
111	0.32	Group 2	0.32		100%			Low	Moderate Adverse	Moderate Adverse	Notes 1, 2,	Moderate Adverse
112	1.43	Group 2	0.16		11%			Medium	Not Significant	Significant Adverse	Notes 1, 2	Slight Adverse
113	0.81	Group 2	0.31		38%			Medium	Not Significant	Significant Adverse	Notes 1, 2	Moderate Adverse
114	0.85	Group 2	0.46		54%			Medium	Not Significant	Significant Adverse	Notes 1, 2	Moderate Adverse
115	0.45	Group 2	0.26		58%			Medium	Not Significant	Moderate Adverse	Notes 1, 2	Moderate Adverse
116	2.85	Group 2	0.31	0.02	12%			Medium	Not Significant	Moderate Adverse	Notes 1, 2	Moderate Adverse
117	8.51	Group 2	0.19		2%			Medium	Not Significant	Not Significant	Notes 1, 2	Not Significant
118	1.71	Group 2	0.07		4%			Medium	Not Significant	Not Significant	Notes 1, 2	Not Significant

[1] As per main CSO category description in Section 17.5.2 (Beef/ Sheep / grass forage cropping)
[2] Land at both sides of N63

119	4.67	Group 2	1.19		25%	Yes	16%	Medium	Not Significant	Significant Adverse	Notes 1, 2, 3	Moderate Adverse
120	5.22	Group 2	2.17		42%			Medium	Not Significant	Significant Adverse	Notes 1, 2, 3	Significant Adverse
121	8.06	Group 2	0.87		11%	Yes	17%	Medium	Not Significant	Significant Adverse	Notes 1, 2, 3	Moderate Adverse
122	6.51	Group 2	1.04		16%	Yes	31%	Medium	Not Significant	Significant Adverse	Notes 1, 2, 3	Significant Adverse
124	13.95	Group 2	0.61		4%	Yes	6%	Medium	Not Significant	Moderate Adverse	Notes 1, 2, 3	Moderate Adverse
125	1.22	Group 2	0.55		45%	Yes	79%	Medium	Not Significant	Significant Adverse	Notes 1, 2, 3	Moderate Adverse
126	14.35	Group 2	0.05		0.4%			Medium	Not Significant	Not Significant	Notes 1, 2	Not Significant
127	15.15	Group 1	0.56		4%	Yes[2]	2%	Medium - high	Not Significant	Slight Adverse	Notes 1, 2	Slight Adverse
128	11.96	Group 2	0.68		6%	Yes[2]	22%	Medium	Not Significant	Significant Adverse	Notes 1, 2, 3	Slight Adverse
130	1.04	Group 2	0.03		3%			Low	Not Significant	Not Significant	Notes 1, 2	Not Significant
131	0.72	Group 2	0.006	0.01	2.5%			Low	Not Significant	Not Significant	Notes 1, 2	Not Significant
133	0.2	Group 2	0.002	0.004	3%			Low	Not Significant	Not Significant	Notes 1, 2	Not Significant
134	0.2	Group 2	0.005	0.007	6%			Low	Not Significant	Not Significant	Notes 1, 2	Not Significant
137	0.6	Group 2	0	0.008	1%			Low	Not Significant	Not Significant	Notes 1, 2	Not Significant
141	6.21	Group 2	0	0.016	0.3%			Medium	Not Significant	Not Significant	Notes 1, 2,	Not Significant
143	0.94	Group 2	0	0.017	1.8%			Medium	Not Significant	Not Significant	Notes 1, 2	Not Significant
144	5.95	Group 2	0.02	0.044	1%			Medium	Not Significant	Not Significant	Notes 1, 2	Not Significant
146	0.26	Group 2	0.02	0.012	14%			Low	Not Significant	Slight Adverse	Notes 1, 2	Not Significant
150	0.31	Group 2	0.31		100%			Low	Moderate Averse	Moderate Adverse	Notes 1, 2	Moderate Adverse

- **Note No 1:** Mitigation as per Section 17.7 of the EIAR. Construction phase impact is short term - mainly disturbance from construction traffic and noise – intermittent over a period of 18 months. The construction mitigation measures are listed in 17.7.2 of the EIAR and include notification to landowners in advance of commencement of works, provision of adequate fencing, provision for adequate access to the retained lands, provision for adequate water and controlling dust and noise, maintaining drainage outlets.
- **Note No 2:** Mitigation for operational phase as per Section 17.7.3 of the EIAR.
- **Note No 3:** Provision of access to separated land. Maintain access to lands at other side of N63.

Ref No	Area Farmed (ha)	Farm Type[1]	Land-take (ha)		taken %	Severance (Yes / No)	Severance %	Sensitivity	Construction Phase: Significance of Effects	Overall Significance of Effects before mitigation	Mitigation (see notes at end of Appendix)	Residual Significance of Effects
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