BRITISH TELECOMMUNICATIONS PLC

Scotland - Northern Ireland (Scot-NI) 3 and 4 Replacement Cables

Technical Appendix G2b - Archaeological Review of Landfall Geophysical Survey Data Scot NI 4

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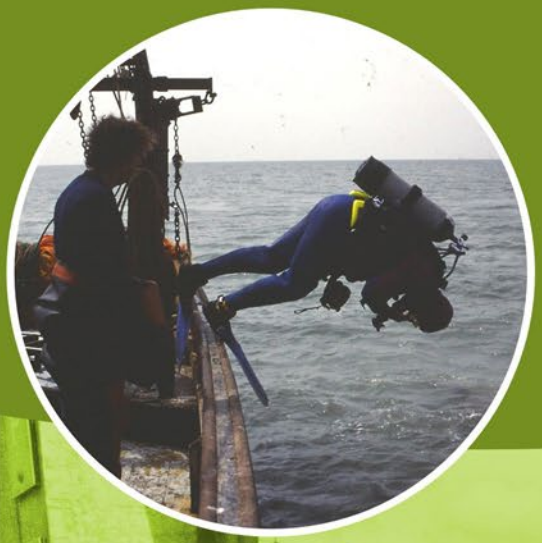

Coracle Archaeology

BT Scotland-Northern Ireland: Scot-NI 4

Archaeological review of marine and landfall geophysical survey data

for

Intertek

CA ref: 190203

November 2020

BT Scotland-Northern Ireland: SCOT-NI 4

Archaeological review of marine geophysical survey data
and
the results of archaeological surveys at the two landfall locations

Coracle project no.: 190203

Coracle report no.: 190203.3

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date	November 2020
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issue	1.1

Summary

Project name: BT Scotland-Northern Ireland: SCOT-NI 4

Coracle Archaeology was commissioned by Intertek Energy & Water Consultancy Services on behalf of British Telecommunications (BT) to undertake marine archaeological assessments, including this archaeological review of marine geophysical survey data and archaeological assessments at the two proposed landfall locations, for the BT Scotland-Northern Ireland telecommunications cables project. This is a proposed submarine telecommunications cable system between Scotland and Northern Ireland, comprising two individual, discrete cables:

- **SCOT-NI 3**, with landfall at Portpatrick, Scotland and Donaghadee, Northern Ireland; and
- **SCOT-NI 4**, with landfall at Girvan, Scotland, and Larne, Northern Ireland.

This report focuses solely on the route of SCOT-NI 4 (Girvan to Larne). A separate report has been prepared for SCOT-NI 3.

The marine geophysical survey was conducted along the proposed route by Fugro Germany Marine GmbH, including the collection of multibeam echosounder, sidescan sonar, magnetometer and sub bottom profiler data. The archaeological assessment has identified 15 geophysical anomalies with archaeological potential along the proposed route. Of these, four are deemed to be of high archaeological potential (including two previously unmapped wreck sites), three of medium archaeological potential and eight low. Archaeological exclusion zones have been proposed for all anomalies considered to be of high or medium archaeological potential. Assessment of the sub-bottom profile and geotechnical datasets did not highlight any features of palaeo-environmental potential within the CSC.

The non-intrusive surveys at the proposed landfall locations comprised walkover, hand-held metal detector and geophysical surveys. These surveys successfully evaluated the landfall locations, including known historic assets within the study areas. No features of clear archaeological potential were identified.

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LIST OF ILLUSTRATIONS

LIST OF ACRONYMS USED IN THE TEXT

AEZ	Archaeological exclusion zones
CA	Coracle Archaeology
COARS	Coastal and Offshore Archaeological Research Services
CPT	Cone penetrometer test
CSC	Cable survey corridor
FGMG	Fugro Germany Marine GmbH
GC	Gravity core
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GS	Grab samples
HERoNI	Historic Environment Record of Northern Ireland
LAT	Lowest Astronomical Tide
MBES	Multibeam echosounder
MHWS	Mean high water springs
nm	Nautical miles
SSS	Sidescan sonar
SBP	Sub-bottom profiler
UKHO	United Kingdom Hydrographic Office
UTM	Universal Transverse Mercator
VORF	Vertical Offshore Reference Frames
WGS	World Geodetic System

1. INTRODUCTION

Outline

1.1. Coracle Archaeology was commissioned by Intertek Energy & Water Consultancy Services (Intertek) on behalf of BT to undertake marine archaeological assessments, including landfall surveys and a review of marine geophysical data, for the BT Scotland-Northern Ireland telecommunications cables project. This is a proposed submarine telecommunications cable system between Scotland and Northern Ireland, comprising two individual, discrete cables (Figure 1):

- **SCOT-NI 3**, which will run between Portpatrick, Scotland and Donaghadee, Northern Ireland; and
- **SCOT-NI 4**, which will run between Girvan, Scotland, and Larne, Northern Ireland.

1.2. This report focuses solely on the proposed route of SCOT-NI 4. A separate report, comprising an archaeological review of marine geophysical survey data and the results of landfall surveys, has been prepared for SCOT-NI 3 (Coracle Archaeology 2020a).

1.3. The proposed route for SCOT-NI 4 will run for 84.4km between Girvan, Scotland, and Larne, Northern Ireland, including 57.5km in Scottish waters and 26.9km in Northern Irish waters (Figure 2).

1.4. The marine geophysical survey data, collected by Fugro Germany Marine GmbH (FGMG), was assessed for Coracle Archaeology by our colleagues at the Coastal and Offshore Archaeological Research Services (COARS), University of Southampton. This archaeological assessment of marine geophysical survey data assessed a cable survey corridor (CSC) of 500m (250m either side of the proposed cable route); this was also utilised for the desk-based assessment (DBA) of known cultural heritage assets (Coracle Archaeology 2020b).

1.5. Landfall geophysical survey data were collected by Coracle Archaeology, which was assessed by our colleagues at Headland Archaeology. The landfall surveys assessed an area of up to 200m wide (100m either side of the proposed cable route), from low water to mean high water springs (MHWS). Walkover surveys identified known cultural heritage assets recorded in the DBA.

Legend

- SCOT-NI 3 proposed cable route
- SCOT-NI 4 proposed cable route
- Cable survey corridor 4

0 5 10
Kilometres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
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False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

Coracle Archaeology

PROJECT TITLE: **BT Scotland-Northern Ireland**

FIGURE TITLE: **BT SCOT-NI 3 & 4**

FIGURE NO. **1**

DRAWN BY: DG CHECKED BY: MW APPROVED BY: MW

Legend

SCOT-NI 4 proposed cable route

Cable survey corridor 4

0 5 10

Kilometres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
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Central Meridian: -3.0000
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Units: Meter

N

Coracle Archaeology

PROJECT TITLE: **BT Scotland-Northern Ireland**

FIGURE TITLE: **Proposed route of SCOT-NI 4**

FIGURE NO. **2**

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2. AIMS AND OBJECTIVES

2.1. The aims of these assessments are:

- to identify anomalies of archaeological potential along the CSC and at the landfall locations; and
- to assess the archaeological and palaeo-environmental potential of the sub-surface sediments.

2.2. These aims will be achieved through the following objectives:

- identification of anomalies through the examination of multibeam echosounder (MBES), sidescan sonar (SSS) and magnetometer data to identify, locate and characterise features with possible archaeological potential along the CSC;
- identification of sites and features of archaeological potential at the landfall locations through walkover survey, and the assessment of electro-magnetic conductivity and metal detector survey data; and
- assessment of sub-bottom profiler (SBP), MBES and geo-technical survey data to establish the archaeological and / or palaeo-environmental potential of the sub-surface sediments.

3. GEOPHYSICAL SURVEY SPECIFICATION AND DATA ACQUISTION

Landfall

3.1. The landfall surveys were conducted in August 2020 at the two proposed landfall locations at Girvan, Scotland and Larne, Northern Ireland. The surveys were conducted on the foreshore and in the intertidal zone, from MHWS down to low water on the most favourable spring tides, to overlap with the marine surveys.

3.2. A survey grid, up to 200m wide (100m either side of the proposed cable centreline), was set out at the landfall locations and subdivided into 5m transects, using a GPS system with an accuracy of 0.5m or better. The surveys, comprising geophysical (electro-

magnetic conductivity), hand-held metal detector and walkover surveys, were then conducted along these transects, parallel to the waterline.

3.3. The geophysical survey was undertaken using a Geophex GEM-2 multi-frequency broadband electro-magnetic (EM) instrument (Figure 3) to perform a terrain electrical conductivity survey. The GEM-2 instrument is a non-intrusive frequency-domain electrical conductivity measuring device that records the spatial variations of apparent ground conductivity of the earth in units of milliSiemens / metre (mS/m). The 'siemen' is the international unit of measurement for volume electrical conductance and is the equivalent to an ampere / volt.

Figure 3 Geophysics and metal-detecting surveys in progress

3.4. A Minelab X-Terra 705 instrument was used to conduct the metal detector surveys (Figure 3). The metal detector was set to detect all metal, but the sensitivity was adjusted

to compensate for the high salt content of the beach sand. All find locations were recorded using a hand-held Global Positioning System (GPS) device, while features of archaeological potential were recorded with digital photography, using a Nikon Coolpix B500 digital camera.

Marine

3.5. The marine geophysical survey was undertaken by FGMG using the survey vessels *MV Fugro Discovery*, *Fugro Seeker and Valkyrie*. Marine surveys took place between April and July 2020.

3.6. The CSC for the main shallow water survey was c. 500m wide (250m either side of the proposed cable route), with an overlap with the inshore survey of at least 500m. Five lines of survey data were collected along the route with a 100m line separation; the route centreline was surveyed with two wing lines offset at 100m and 200m intervals. In the nearshore areas line spacing was adjusted to 50m or 25m depending on water depth.

3.7. A dedicated unexploded ordnance (UXO) survey was also undertaken to establish the presence and locations of items of ordnance close to the proposed cable route. Following the main survey, additional magnetometer lines were run along an In-Field Selected Route (IFSR) covering a 50 m survey swath with a maximum magnetometer separation of 5m.

3.8. MBES data were acquired using a Kongsberg EM122. Full bathymetric coverage across the whole survey corridor was undertaken in accordance with IHO Standards for Hydrographic Survey, S44 5th Edition, Feb 2008 (see Fink 2019), with sound velocity (SV) probes used to perform regular sound velocity casts. SSS survey was undertaken using an Edgetech 4200 dual frequency (300/600 kHz), with a range of 120m on the *Fugro Discovery*, and 25m-50m on the *Fugro Seeker and Valkyrie*, thus ensuring 200 percent coverage of the corridor. The Geometrics G882 caesium vapour magnetometer was piggy-backed behind the SSS on the *Fugro Discovery*, and independently towed on the *Fugro Seeker and Valkyrie* to detect cables and pipelines. Sub-bottom surveys were undertaken using a Knudsen Sub Bottom Profiler. In-service cables were detected by MBES, SSS, SBP and / or magnetometer.

3.9. For the geotechnical investigations, cone penetrometer test (CPT) measurements were planned at 5km intervals along the survey route, with gravity core (GC) sampling planned at 10km intervals. Owing to security issues, the geotechnical survey only retrieved grab samples (GS) from the inshore stations; elsewhere CPTs were substituted for GSs.

Geodetic and Projection Parameters and Vertical Datum

3.10. Survey positions were recorded in the geodetic datum World Geodetic System (WGS) 1984, with projection in the universal transverse mercator (UTM) Zone 30 North. The vertical reference level is lowest astronomical tide (LAT), with MBES elevation corrected using the vertical offshore reference frames (VORF) and predicted tides based on Global Navigation Satellite System (GNSS) heights.

4. METHODOLOGY

Landfall survey methodology

Geophysics

4.1. Electrical conductivity surveys were undertaken with a GEM-2 instrument. The GEM-2 detects differences in deposits, principally variations in thickness between deposits with different conductivities, which can produce spatial variations in conductivity readings. The system provides two measurements:

- Quadrature (apparent conductivity); and
- In-phase data (metallic response).

4.2. The GEM-2 can acquire data over multiple frequencies, which is equivalent to measuring the earth response from multiple depths (depending on the earth medium targeted). Five frequencies (475 Hertz (Hz), 1525Hz, 5325Hz, 18325Hz, and 63025Hz) were utilised and subsequently analysed at both landfall locations.

4.3. The primary focus of the survey was to identify buried metal objects on the beach that might relate to heritage assets. In addition, some success was obtained at mapping variations in silting patterns within the foreshore area. Variations in response might occur where timber structures have influenced the deposition of sediments and could therefore be used to identify the presence of wood, which may be indicative of wreck material or

other wooden structures buried in the sand. Similarly, as ground conductivity is influenced by soil moisture content, an electromagnetic conductivity survey may be used to differentiate between areas of solid sub-strata and sand. This enables some analysis of the former physical topography of the survey area, by identifying former channels or basins in the sub-strata. Identification of these features would help to define areas of archaeological potential within the survey area.

4.4. The data were digitally recorded and periodically downloaded to a field computer for quality assurance and preliminary interpretation. At the conclusion of the survey the Geophex GEM-2 data were interpreted and mapped using Terrasurveyor V3.0.32.4 software (DWConsulting), a surface-mapping software that allows topographic data to be contoured and presented in a manner that enables the interpretation of sub-surface features.

4.5. The illustrations of the landfall geophysical survey data in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different frequencies. All graphics are displayed using the 475Hz, 5325Hz and 63025Hz frequencies, which have been assessed to most suitably display and interpret the data based on the experience and knowledge of the assessors. The landfall geophysical survey and report were completed in accordance with relevant best practice guidance documents (Gaffney *et al*. 2002; David *et al*. 2008; Bonsall *et al*. 2014; Schmidt *et al*. 2015).

Metal detector and walkover surveys

4.6. All identified features and detected finds spots were recorded photographically with a brief description, if deemed necessary. Locations were recorded using a hand-held Garmin GPS and plotted into an AutoCAD base plan. As the surveys were non-intrusive, no finds spots were excavated.

4.7. The numeric values displayed on the detector were recorded as, potentially, they can assist in the identification of the type of metal detected, with higher values more likely to be indicative of non-ferrous metals (Minelab 2017: 11).

4.8. The purpose of these archaeological assessments is to identify known and potential sites and features of archaeological interest at the two potential landfall locations that might be impacted by the project. Any impacts will then be limited through the adoption of appropriate mitigation measures. Archaeological potential is evaluated through the assessment of the nature and density of known sites in the vicinity of the proposed development.

Marine geophysical assessment methodology

4.9. Geophysical assessment was undertaken utilising the programs Coda Octopus Survey Engine 4.3 and ArcGIS 10.7.1. SSS and SBP data were analysed within the former, with the positions of surface and sub-surface anomalies exported in shapefiles and uploaded into ArcGIS alongside processed magnetometer data provided by Fugro, following the guidelines of Plets *et al*. (2013). MBES data were provided at a gridded resolution of 1.0m and imported into ArcGIS.

4.10. The data assessed consisted of two overlapping surveys – one for the standard 500m wide CSC, and a second UXO survey with closer line spacing over the proposed cable route. This has resulted in data coverage far exceeding standard recommendations (see Plets *et al*. 2013), with SSS meeting the 200 percent coverage across the entire survey corridor, and significantly exceeding this when overlapped with the UXO survey. This overlap is also seen in the magnetometer survey, resulting in the successful identification of a number of small linear anomalies including charted and uncharted cable routes. The bathymetry survey exceeded IHO Order 1 specifications.

4.11. The geophysical datasets were assessed for anomalies with archaeological potential, with selection based on the presence of multiple lines of evidence (confirming datasets). Anomalies were defined based on their potential to be of archaeological interest, and have been classified using the following criteria:

- **High potential** - typically identified by multiple geophysical datasets and can be positively identified as being an archaeological site (e.g. wreck) or of archaeological interest;

- **Medium potential** - typically identified by multiple geophysical datasets, and strongly suggestive of the presence of anthropogenic feature(s) which may be of archaeological interest, but cannot be classified or identified visually (e.g. cannot be positively identified as a wreck);
- **Low potential** - usually identified by a single geophysical dataset (typically magnetics and / or SSS) that suggest a possible anthropogenic feature that may have archaeological significance and that differs in character from those identified as having no potential; or
- **No potential** - geological features such as boulders or known (and often mapped) anthropogenic features such as cables, anchorages etc.

4.12. Any known and located historic assets and geophysical anomalies identified as being of high or medium archaeological potential will be protected through the imposition of an archaeological exclusion zone (AEZ).

4.13. The suggested extent of each AEZ is the radius of a circle centred on the given location and based on the available geophysical data for each anomaly, including the lateral distribution of visible features, extent and direction of scour, and likelihood for debris spread away from the site. They have been designed to encompass all debris / structure visible on the seabed, with an added dimension to adequately protect both potentially buried remains and the potential for mobile debris associated with the direction (and extent) of the scour.

4.14. AEZs have been defined following professional recommendations (Dix 2008) and converted into circular AEZs with a defined centre point to encapsulate the required exclusion zone. The extent of the suggested circular AEZ is therefore sufficiently large to encompass the area that would be defined by a polygon, following the procedures outlined in Dix (2008).

4.15. The use of a centre point and set radius has been deemed the most robust method when attempting to incorporate AEZs into different vessel navigation systems. This reduces the risk of accidental incursions into AEZs, and possible impacts during site works on the potential asset within. In accordance with clauses 4.1.1 and 4.2.1 of the Model

Clauses (which advocates preservation *in situ* with the aid of AEZs; The Crown Estate & Wessex Archaeology 2010), the extent of the AEZ is based not only on the perceived archaeological potential of the asset, but also on its extent, if known.

5. RESULTS

Landfall

Girvan

5.1. Girvan beach (Figure 4) is a relatively featureless, long, low, flat, wide sandy strand, with few pebbles and the occasional large boulder. Survey on the beach was complicated by the after effects of Storm Ellen, with strong winds gusting to 45mph.

Figure 4 The beach at Girvan

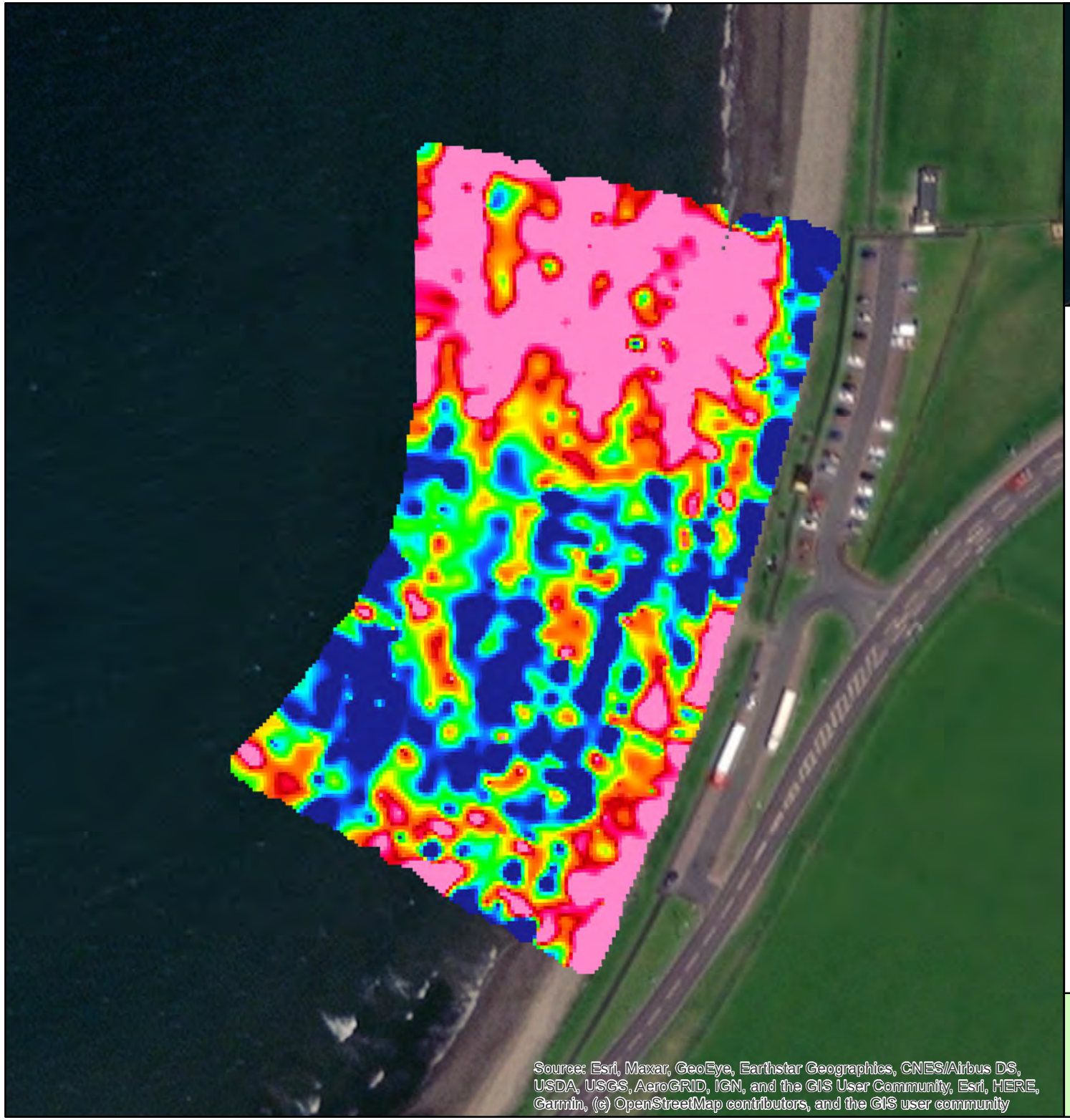
Walkover and metal-detector

5.2. There are no recorded historic assets on the beach at Girvan, though two assets were identified in the DBA above MHWS, and just beyond the beach (Coracle Archaeology 2020b). Shalloch Castle (**CA4_7**; also known as the 'smithy' or 'smiddy') was demolished in c. 1895 and little remains of it today. It is noteworthy that there are a number of derelict single-storey buildings on the opposite side of the modern road which appear more synonymous with a 'smithy' (Figure 5). The series of linear cropmarks at Horse Rock (**CA4_28**), visible in aerial photography (Coracle Archaeology 2020b), were not visible from the ground on this visit.

Conductivity

5.3. Low in-phase and quadrature datasets have been recorded on the relatively young, raised marine beach superficial deposits mapped at Girvan, with corresponding higher readings located to the west, where marine beach deposits are recorded above high tide water level (Figure 6-11). These deposits are much older than the raised marine deposits. Extreme values in the south-east of the in-phase data correspond to areas where the bedrock geology of the Shalloch Formation is mapped, though metallic objects cannot be dismissed as a possible cause.

Figure 5 Derelict buildings close to the recorded location of Shalloch Castle



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False Northing: 0.0000
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Latitude Of Origin: 0.0000
Units: Meter

N

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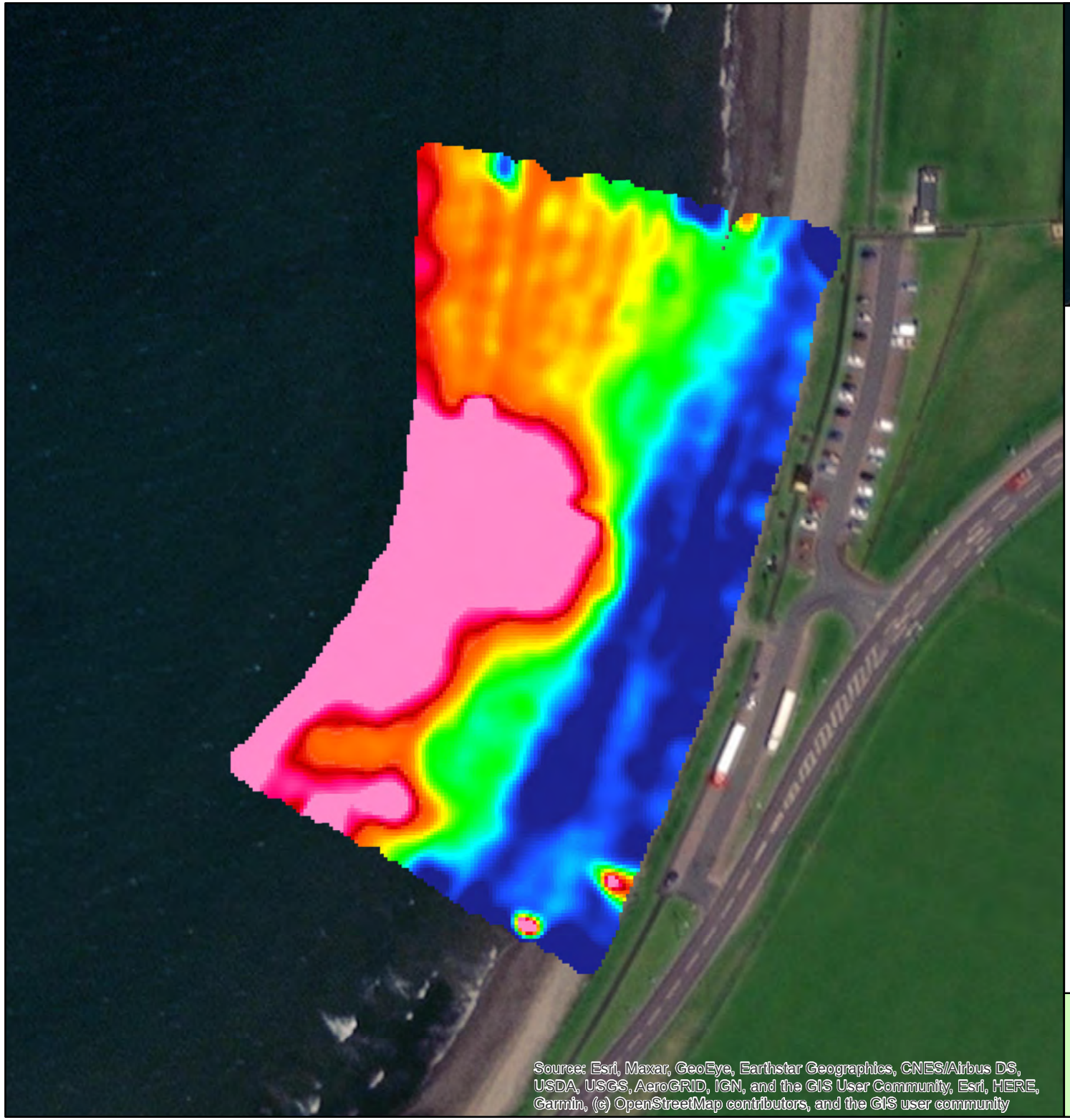
PROJECT TITLE: **SCOT-NI 4**

FIGURE TITLE: **Girvan - Inphase at 425Hz**

FIGURE NO. **6**

DRAWN BY: RM CHECKED BY: SH APPROVED BY: SH



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Kilometres

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Units: Meter

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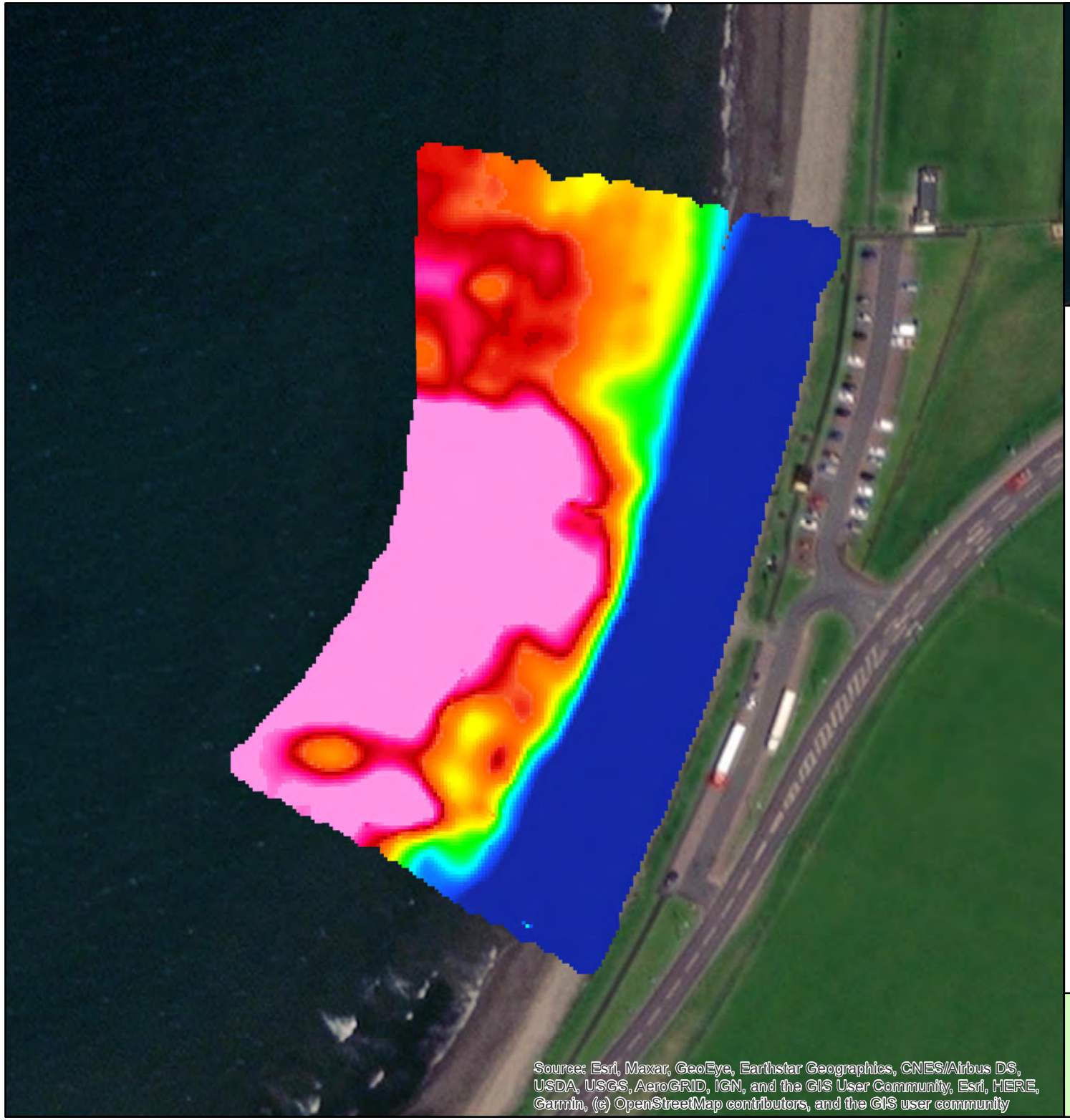
PROJECT TITLE: SCOT-NI 4

FIGURE TITLE: Girvan - Inphase at 5325Hz

FIGURE NO. 7

DRAWN BY: RM **CHECKED BY:** SH **APPROVED BY:** SH



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Units: Meter

N

Coracle Archaeology

PROJECT TITLE: SCOT-NI 4

FIGURE TITLE: Girvan - Inphase at 63025Hz

FIGURE NO. 8

DRAWN BY: RM **CHECKED BY:** SH **APPROVED BY:** SH

Legend

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-1 std dev

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Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

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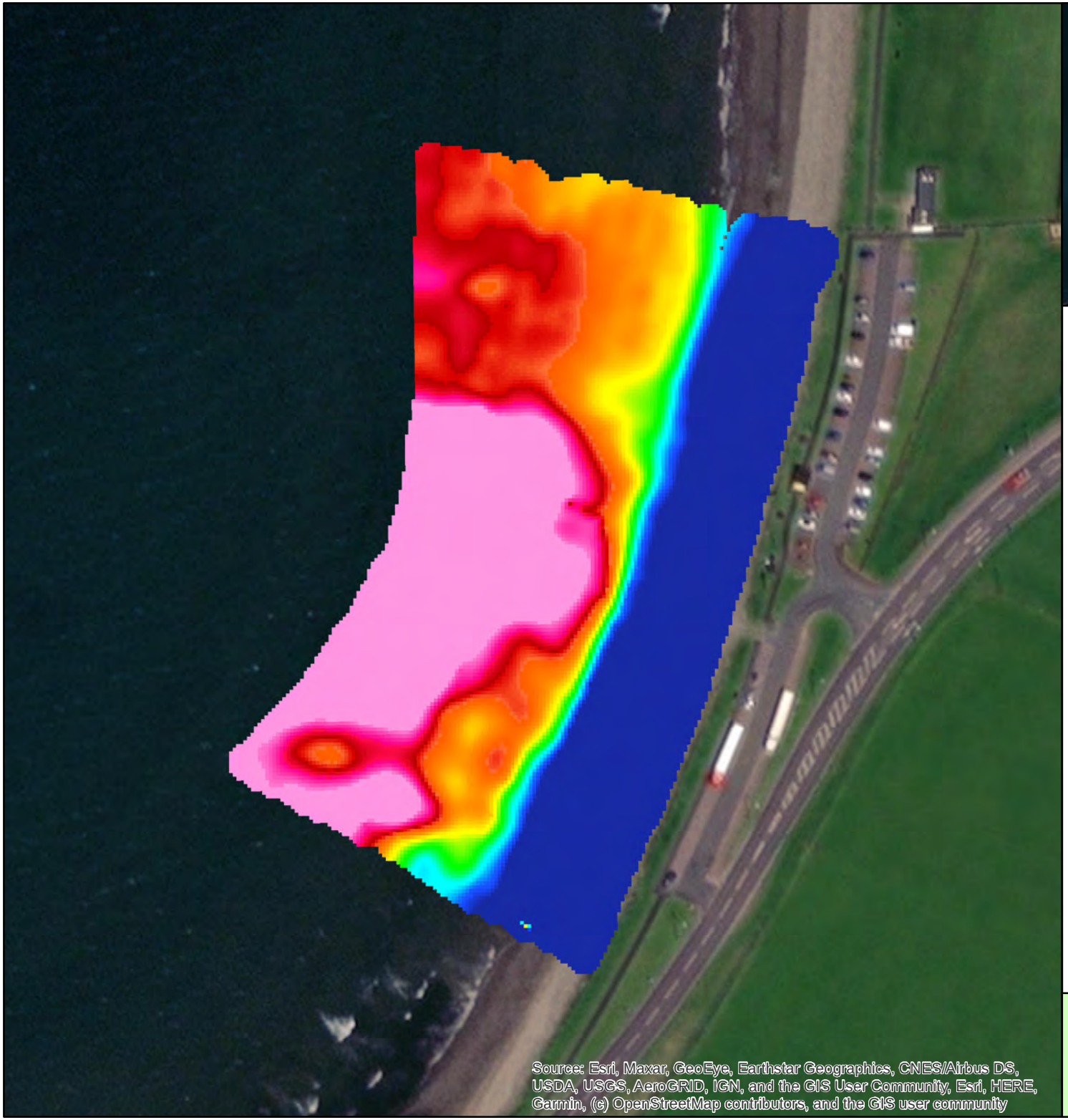
Coracle Archaeology

PROJECT TITLE: SCOT-NI 4

FIGURE TITLE: Girvan - Quadrature at 425Hz

FIGURE NO. 9

DRAWN BY: RM **CHECKED BY:** SH **APPROVED BY:** SH



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0 0.0375 0.075 Kilometres

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Units: Meter

N

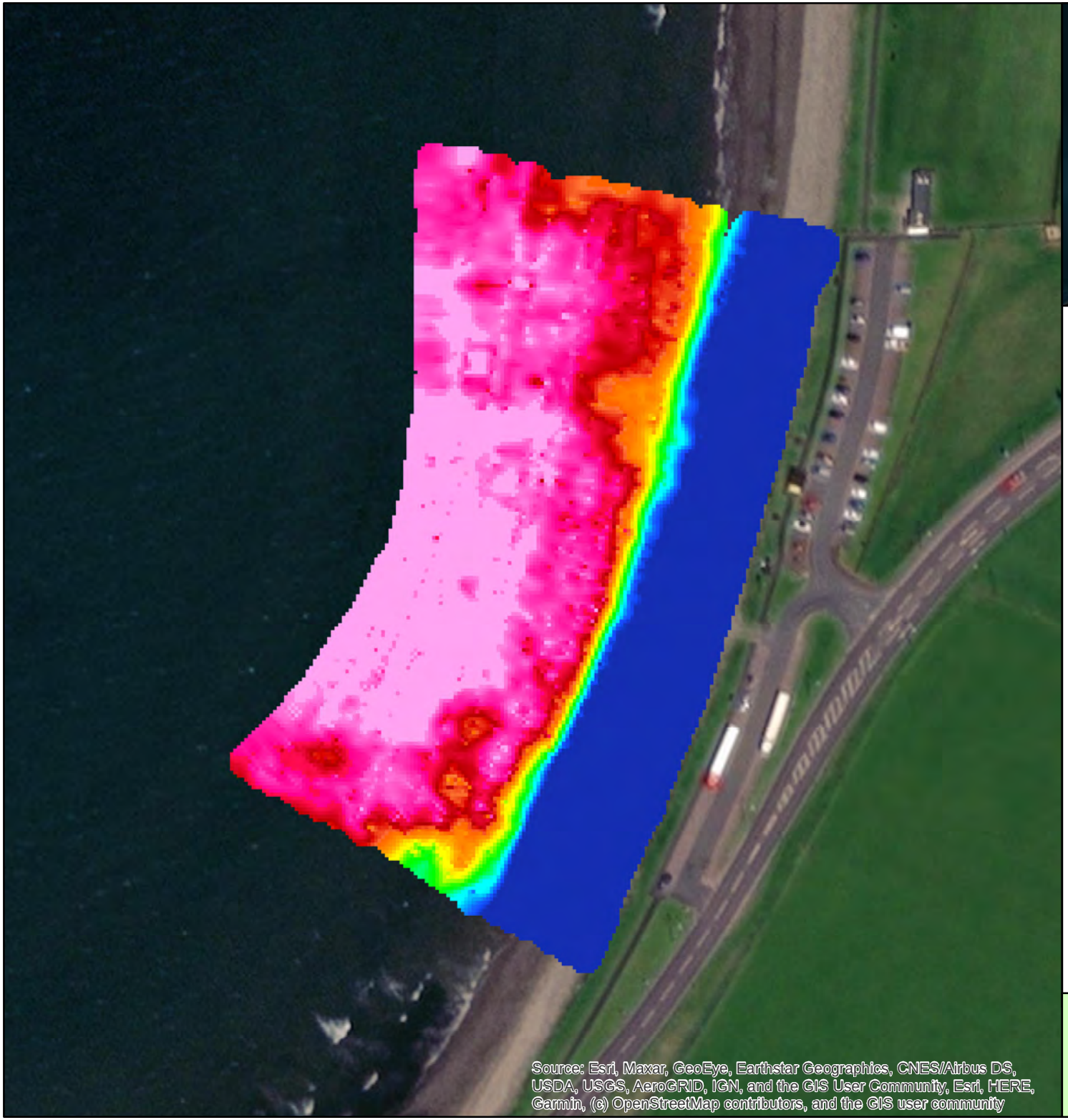
Coracle Archaeology

PROJECT TITLE: **SCOT-NI 4**

FIGURE TITLE: **Girvan - Quadrature at 5325Hz**

FIGURE NO. **10**

DRAWN BY: RM CHECKED BY: SH APPROVED BY: SH



Legend

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0 0.0375 0.075

Kilometres

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Units: Meter

N

Coracle Archaeology

PROJECT TITLE: **SCOT-NI 4**

FIGURE TITLE: **Girvan - Quadrature at 63025Hz**

FIGURE NO. **11**

DRAWN BY: RM CHECKED BY: SH APPROVED BY: SH

5.4. Considerable quantities of scrap metal were strewn over the beach at Girvan, including a semi-submerged, industrial-type wheel (Figure 12) and a metal bar (Figure 13). This exposed metal may account for significant numbers of metal-detections across the beach, from which line patterning can be discerned (Figure 14). A large amount of well-rounded ceramic building material (CBM) was also present, indicative of the dynamic environment of the foreshore (Figure 15). A telegraph pole marks the location of an earlier cable (Figure 16).

Figure 12 Semi-submerged industrial-type wheel

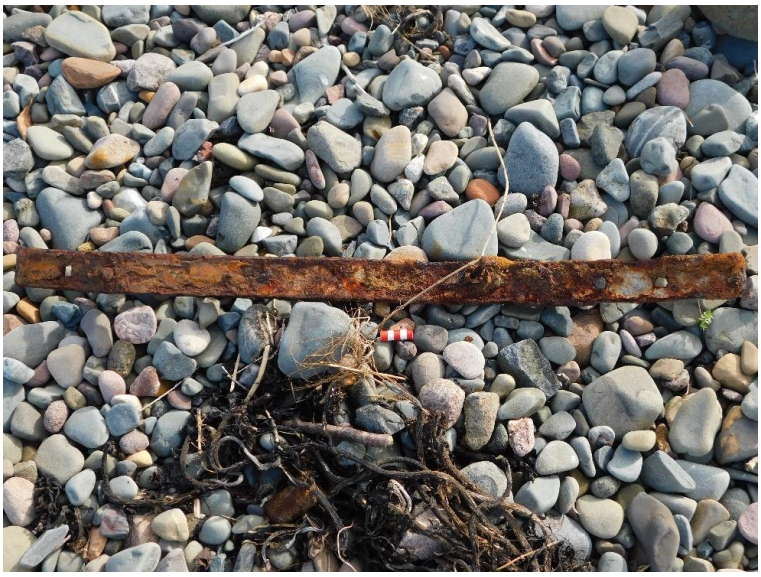

Figure 13 Scrap metal at Girvan

Legend

Metal detector value

- -8 - 1
- 2 - 15
- 16 - 30
- 31 - 40
- 41 - 48

Cable centre line

Wider study area

0 80 160 Meters

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

N

PROJECT TITLE:	SCOT-NI 4
FIGURE TITLE:	Metal detector survey - Girvan beach
FIGURE NO.	14
DRAWN BY: MJ	CHECKED BY: MW APPROVED BY: MW

Figure 15 CBM on the beach at Girvan

Figure 16 A telegraph pole marking the location of an earlier cable

Larne

5.5. The beach at Larne is a similarly featureless, long, low, flat, wide sandy strand (Figure 17), with significant deposits of densely-packed seaweed-covered boulders that proved impossible to survey (Figure 18). Many of these areas were impassable with survey equipment, though survey was possible in areas of lower density. A small stream runs over part of the survey area, visible in the geophysical data.

Figure 17 The beach at Larne

Figure 18 Impassable areas of seaweed-covered boulders

Walkover and metal-detector

5.6. There were no recorded historic assets within the study area, and nothing of obvious archaeological potential was observed during the walkover survey. A historic Coastguard station is reported in the Historic Environment Record of Northern Ireland (HERoNI) on the periphery of the study area, but was not apparent during the survey: one building is clearly now a domestic dwelling (Figure 19**Error! Reference source not found.**), whilst another potential candidate is located some distance from the sea, and is on the opposite side of the modern road (Figure 20).

Figure 19 Possible site of coastguard station (white building on left)

Figure 20 Potential coastguard station on the opposite side of the road

5.7. CBM was again prevalent, including a sizeable lump of brick work at the beach's edge (Figure 21). Scrap-metal was also present, most notably a number of sash window counter-weights (Figure 22). The presence of scrap-metal as well as casual beach losses may explain the seemingly random distribution of metal detections on this beach, many of which appear to have been moved by the tides, close to the high water mark (Figure 23).

Figure 21 Intact lump of brickwork

Figure 22 Sash window counter-weight

Legend

Metal detector value

- -8 - 1
- 2 - 15
- 16 - 30
- 31 - 40
- 41 - 58

Wider study area

Cable centre line

0 65 130 Meters

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

N

PROJECT TITLE:	SCOT-NI 4
FIGURE TITLE:	Metal detector survey results - Larne
FIGURE NO.	23
DRAWN BY: MJ	CHECKED BY: MW APPROVED BY: MW

Conductivity

5.8. At Larne, the sandier areas of the beach returned low in-phase and quadrature results, indicative of beach deposits (Figures 24-29). Areas of exposed rock returned higher readings, caused by bedrock geology. A clear linear anomaly has been identified in the geophysical datasets, which represents a stream running down the beach.

Marine

5.9. Fifteen geophysical anomalies with archaeological potential were identified in the datasets provided (Table 1; Figure 30**Error! Reference source not found.**-64). Of these, four are classified as being of high, and three of medium, archaeological potential, (see Figure 65-9). Archaeological exclusion zones (AEZs) have been defined for each anomaly considered to be of high or medium potential, ranging in radius from 18-50m.

5.10. Other geophysical anomalies identified in the survey data consisted of boulders, sometimes with associated scour, within areas where bedrock was not exposed on the surface. These anomalies did not have an associated magnetic signature; they are likely to be natural in origin and have no archaeological potential.

5.11. A number of in-operation cables were also identified crossing the CSC. Anomalies associated with these cables are not considered further here (see Global Marine 2020 for more information).

5.12. The marine archaeological desk-based assessment recorded seven sites of cultural heritage interest within the CSC, including five wrecking incidents and one aircraft (table 2). The majority of these refer to reports of losses rather than known wreck sites, with several historic assets recorded at the same location (e.g., **CA4_3-6**; see Coracle Archaeology 2020b). No corresponding geophysical anomalies were visible in the marine geophysical survey data at or in the vicinity of the reported locations.

Legend

+1 std dev

-1 std dev

0 0.0375 0.075

Kilometres

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Projection: Transverse Mercator
Datum: WGS 1984
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False Northing: 0.0000
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Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

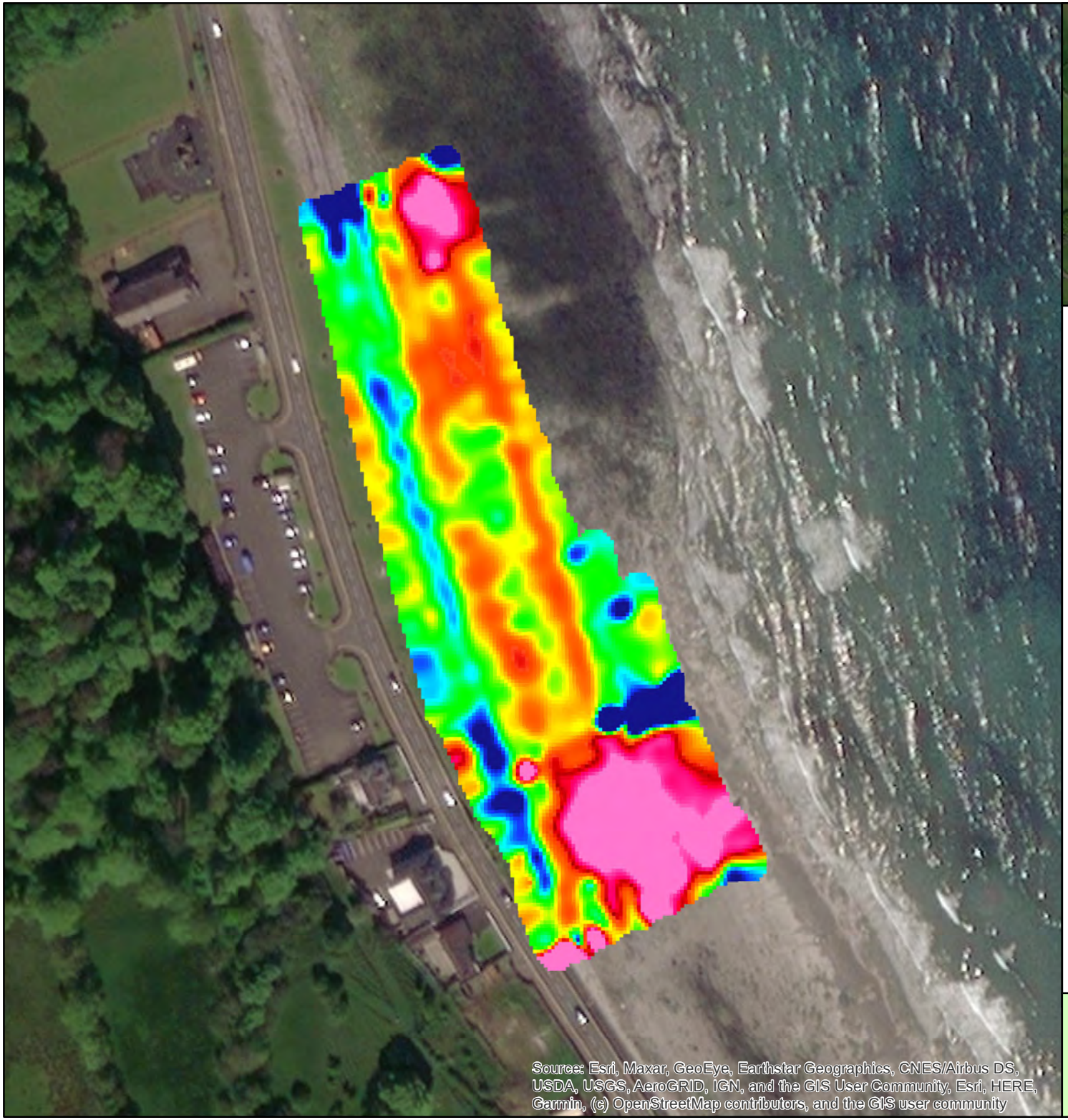
Coracle Archaeology

PROJECT TITLE: SCOT-NI 4

FIGURE TITLE: Larne - Inphase at 425Hz

FIGURE NO. 24

DRAWN BY: RM **CHECKED BY:** SH **APPROVED BY:** SH



Legend

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-1 std dev

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Latitude Of Origin: 0.0000
Units: Meter

N

Coracle Archaeology

PROJECT TITLE: SCOT-NI 4

FIGURE TITLE: Larne - Inphase at 5325Hz

FIGURE NO. 25

DRAWN BY: RM **CHECKED BY:** SH **APPROVED BY:** SH

Legend

+1 std dev

-1 std dev

0 0.0375 0.075

Kilometres

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Projection: Transverse Mercator
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False Northing: 0.0000
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Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

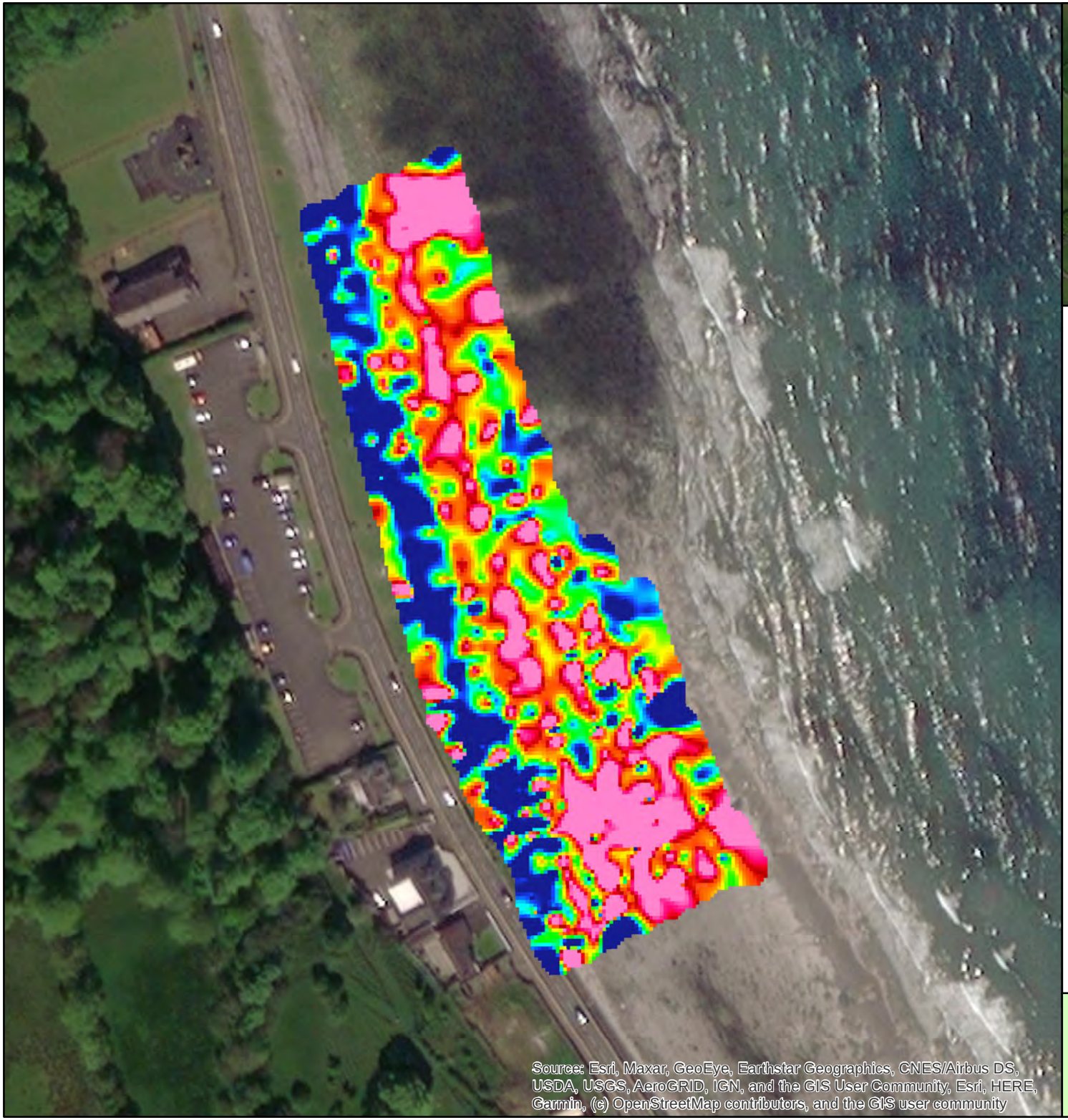
Coracle Archaeology

PROJECT TITLE: **SCOT - NI 4**

FIGURE TITLE: **Larne - Inphase at 63025Hz**

FIGURE NO. **26**

DRAWN BY: RM CHECKED BY: SH APPROVED BY: SH



Legend

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0 0.0375 0.075

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Units: Meter

N

Coracle Archaeology

PROJECT TITLE: **SCOT-NI 4**

FIGURE TITLE: **Larne - Quadrature at 425Hz**

FIGURE NO. **27**

DRAWN BY: RM CHECKED BY: SH APPROVED BY: SH

Legend

+1 std dev

-1 std dev

0 0.0375 0.075

Kilometres

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Units: Meter

N

Coracle Archaeology

PROJECT TITLE: SCOT-NI 4

FIGURE TITLE: Larne - Quadrature at 5325Hz

FIGURE NO. 28

DRAWN BY: RM **CHECKED BY:** SH **APPROVED BY:** SH

Legend

+1 std dev

-1 std dev

0 0.0375 0.075

Kilometres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

Coracle Archaeology

PROJECT TITLE: **SCOT-NI 4**

FIGURE TITLE: **Larne - Quadrature at 63025Hz**

FIGURE NO. **29**

DRAWN BY: RM CHECKED BY: SH APPROVED BY: SH

Table 1 Geophysical anomalies within the CSC

CA no.	Easting UTM 30N	Northing UTM 30N	Description	Archaeological Potential	Proposed AEZ Radius
CA_4001	376047	6120983	Magnetic anomalies SN4-G-UMC018 (119nT) and SN4-G-UMC019 (137nT). No SSS or bathymetry anomalies	Low	N/A
CA_4002	371356	6120172	Magnetic anomalies SN4-D-UMC0350-55 (55-172nT) associated with area of increased seabed roughness in SSS	Medium	30m
CA_4003	370391	6119987	Magnetic anomaly SN4-D-MC157 (102nT)	Low	N/A
CA_4004	369743	6120053	Magnetic anomalies SN4-D-UMC0423-28 (1-53nT)	Low	N/A
CA_4005	366358	6119530	SSS anomaly, 15 x 2m	Low	N/A
CA_4006	365705	6119524	Magnetic anomaly SN4-D-MC191 (347nT)	Low	N/A
CA_4007	361228	6118890	SSS anomaly SN4-D-SC4955, 20 x 4 x 1m, showing a linear feature within a bathymetric depression measuring 55 x 24 x 2m. Possible wreck site	High	40m
CA_4008	353851	6117914	Magnetic anomaly SN4-D-MC073 (127nT)	Low	N/A
CA_4009	348136	6118686	SSS anomaly SN4-D-SC4154 (24 x 5 x 0.7m) linear anomaly visible in both SSS and bathymetry, attributed to a wreck site. Possible debris c. 20m to the south associated with SSS anomalies SN4-D-SC4155 and SN4-D-SC4162	High	50m
CA_4010	348112	6118618	SSS anomalies SN4-D-SC4158 and SN4-D-SC4159, possibly debris associated with CA_4009	High	20m
CA_4011	348091	6118577	SSS anomalies SN4-D-SC4152, SN4-D-SC4156, SN4-D-SC4157, SN4-D-SC4160 and SN4-D-SC4161, possibly debris associated with CA_4009	High	30m
CA_4012	339722	6109344	SSS anomaly SN4-D-SC4376 (3/3 x 0.53 x 0.46m), possibly debris	Low	N/A
CA_4013	339430	6107395	Magnetic anomalies SN4-D-MC093 (17nt), SN4-D-UMC1207 (35nT), SN4-D-UMC1208 (36nT) and SN4-D-UMC1209 (53nT) associated with an angular dark SSS reflector, 7 x 3 m	Medium	20m
CA_4014	331417	6094511	SSS anomaly SN4-D-SC0489 (3.7 x 6.3m) associated with bathymetric anomaly	Medium	18m
CA_4015	325779	6087932	Magnetic anomalies SN4-D-UMC1110 (63nT) and Magnetometer Contact (102nT)	Low	N/A

Table 2 Cultural heritage assets recorded within the CSC

CA no.	Name	Type	Date	Status	UTM 30N Easting	UTM 30N Northing
CA4_1	Unknown	Wreck	Unknown	Unknown	353953	6117970
CA4_2	Unknown	Wreck	Unknown	Unknown	320503	6087160
CA4_3	Unknown	Wreck	1749	Unknown	380499	6121350
CA4_4	*Nabby*	Wreck	1795	Unknown	380499	6121350
CA4_5	*Favourite*	Wreck	1870	Unknown	380499	6121350
CA4_6	*Bristol Beaufort*	Aircraft	1942	Unknown	380499	6121350
CA4_7	*Shalloch Castle, Smithy*	Monument	Unknown	n/a	381464	6121470

5.13. An SSS anomaly consisting of a clearly-defined linear feature measuring 20m x 4m x 1m (**CA_4007**; Figure 66**Error! Reference source not found.**) may be indicative of a previously unmapped wreck site. The anomaly is located within a depression visible in the bathymetric data, measuring 55m x 24m x 2m. The nearest historic asset identified in the DBA is an unknown wreck some 7km to the west of the anomaly (**CA4_1**; Coracle Archaeology 2020b).

5.14. A clearly defined hull is visible in the both the SSS and MBES datasets (**CA_4009**; Figure 67), measuring c.20m in length with a visible beam of c. 5m. A series of SSS anomalies (**CA_4010** and **CA_4011**) are visible to the south of the wreck site for a distance of c.120m, which may be indicative of scattered debris. No known wreck site was identified in the DBA at this location (see Coracle Archaeology 2020b). An unknown wreck (**CA4_18**) was, however, identified by the DBA lying c. 900m southwest of the wreck site (outside of the CSC, but within the wider study area; Coracle Archaeology 2020b). Given the historical difficulties inherent in reporting losses at sea, it is possible that these realte to the same vessel.

5.15. No further wreck sites were identified within the CSC during the review of marine geophysical survey data. This, combined with the tentative nature of the loss reports described in the DBA (Coracle Archaeology 2020b) suggests that the potential for encountering unexpected cultural remains is low, although given the historic density of marine activity in this area, the potential may be better categorised as moderate.

Submerged palaeo-landscapes

5.16. The stratigraphic sequence outlined in the DBA was confirmed by the SBP and geotechnical data (Coracle Archaeology 2020b). In the nearshore area at Girvan, the sedimentary sequence consists of sand over rock, intervened by glacial till at 2km from the shore. This thickens westward, especially over areas with an eroded rock surface, though the upper sand remains at c. 1-2m thickness throughout. Beyond c. 6km, upper sands are underlain by soft clays that overlie the glacial till. These are representative of a glacio-marine deposit which reaches the surface (where sands are no longer present) beyond 7.5km, until c. 28.5km. Beyond 28.5km, deposits consist of 2-3m of silty sand and sandy clay over glacial tills.

5.17. At Larne a similar pattern is seen, with near-surface exposures of glacial till overlain by gravelly-sand. These are interspersed by north-south depressions with thicker sand deposits. Beyond c. 1.5km from shore, near-surface exposures also include rock; this continues until c. 20km offshore where sand deposits over glacial till thicken.

5.18. No features with archaeological potential are visible (e.g. palaeo-channels with fine-grained / organic deposits) in the SBP data provided for SCOT-NI 4. The potential for submerged palaeo-landscape features along the CSC is therefore deemed to be low.

6. CONCLUSIONS

Landfall

6.1. The geophysical, metal-detector and walkover surveys at Girvan, Scotland, and Larne, Northern Ireland successfully evaluated the proposed landfall locations, including an assessment of known cultural heritage assets identified in the DBA (Coracle Archaeology 2020b). No anomalies or features of clear archaeological potential were identified.

Marine

6.2. The marine geophysical survey data of the proposed Scot-NI 4 route has been assessed for features containing archaeological potential. Fifteen geophysical anomalies with archaeological potential have been identified within the CSC, with two highlighted as possible wreck sites. Archaeological exclusion zones have been defined for each anomaly considered to be of high or medium archaeological potential.

6.3. There are no sub-bottom palaeo-landscape features of archaeological potential visible within the available datasets.

7. REFERENCES

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Coracle Archaeology 2020b. BT Scotland-Northern Ireland: SCOT-NI 3 & SCOT-NI 4. Marine archaeological desk-based assessment. Coracle Archaeology. Report No. 190203.1.

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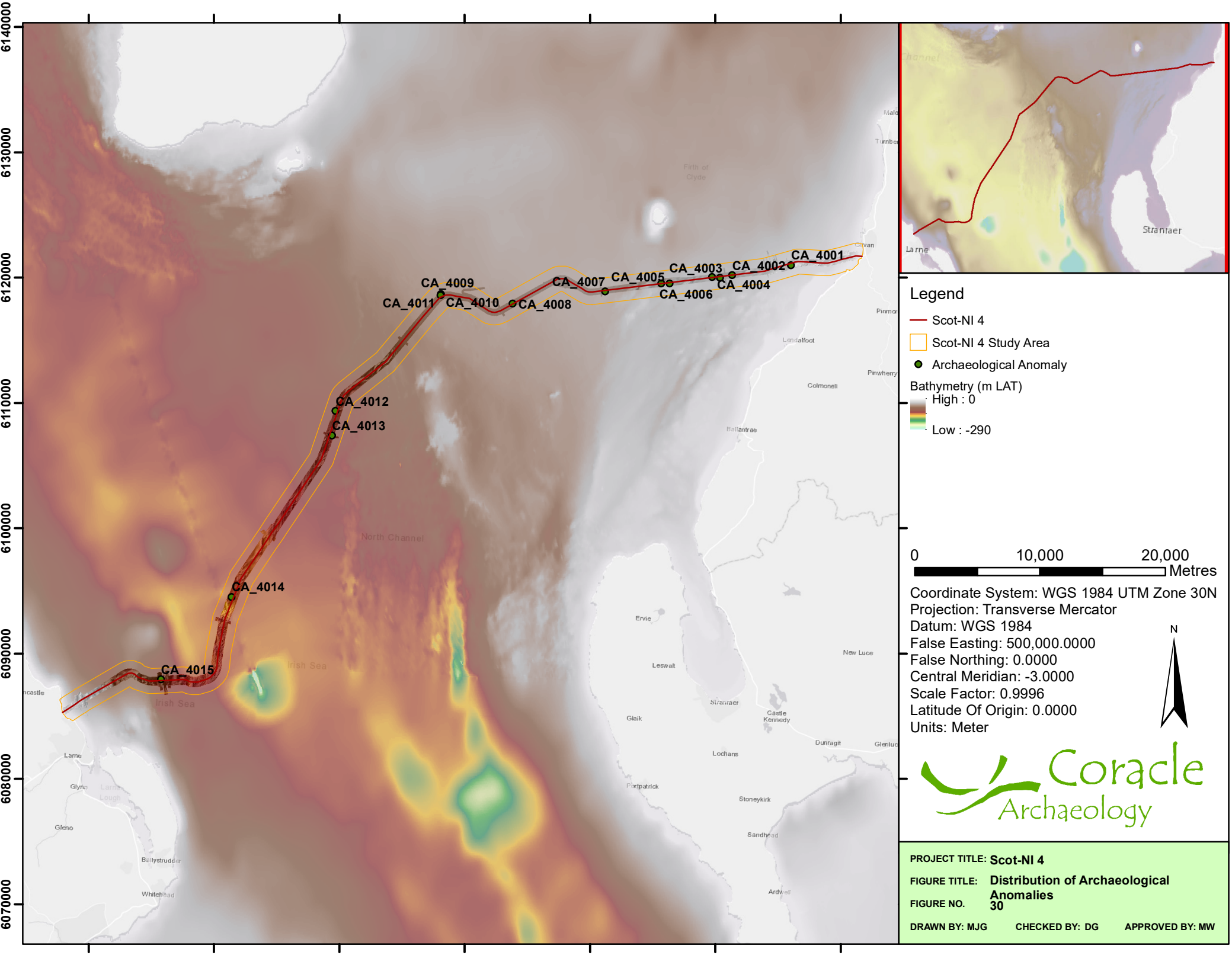
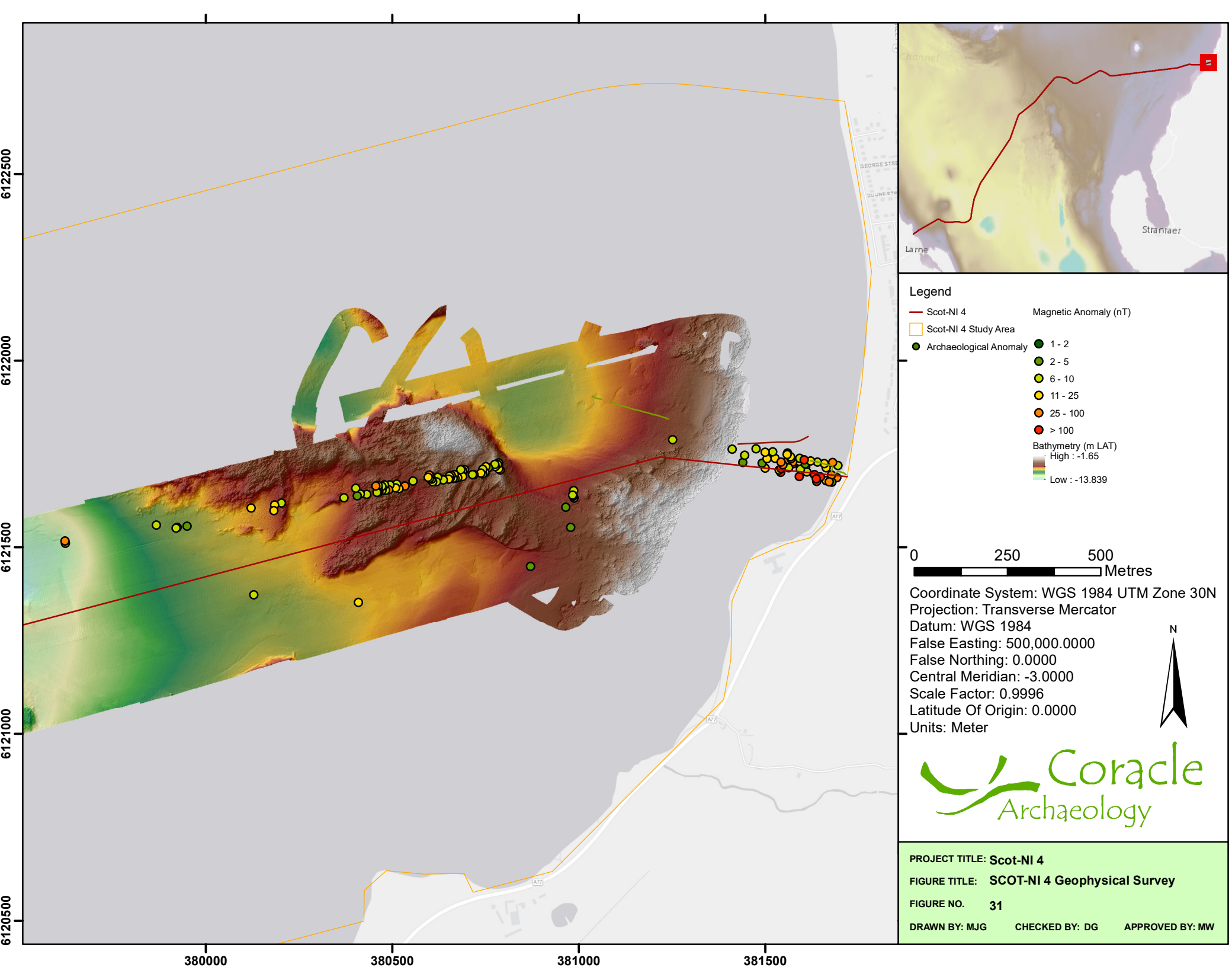
8. FIGURES (OVERLEAF)



Coracle Archaeology

PROJECT TITLE:	Scot-NI 4
FIGURE TITLE:	Distribution of Archaeological Anomalies
FIGURE NO.	30

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW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381000
381500
Larne
Stranraer
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -1.65
Low : -13.839
0
250
500
Metres
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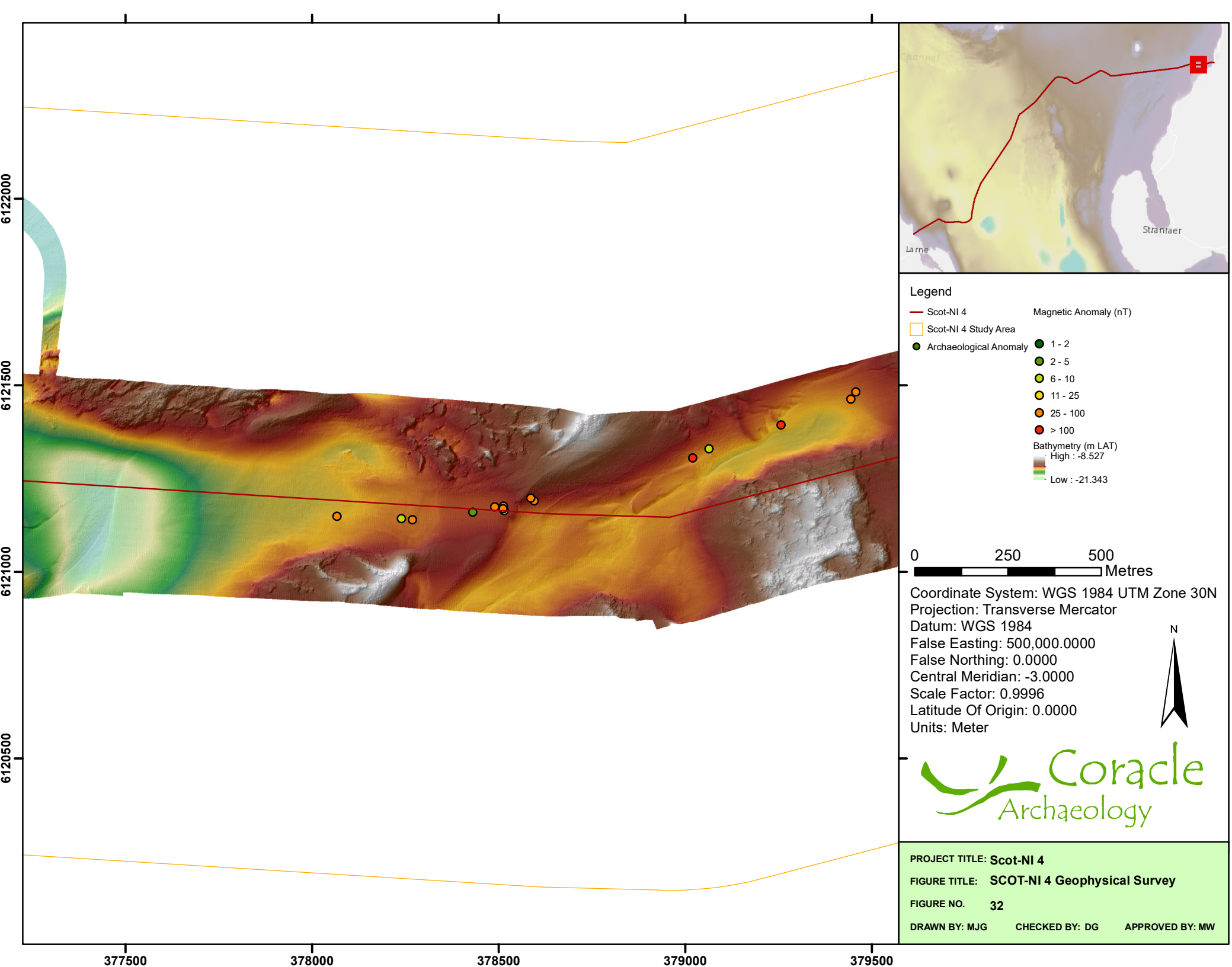
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 31
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW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6120500
377500
378000
378500
379000
379500
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -8.527
Low : -21.343
0
250
500
Metres
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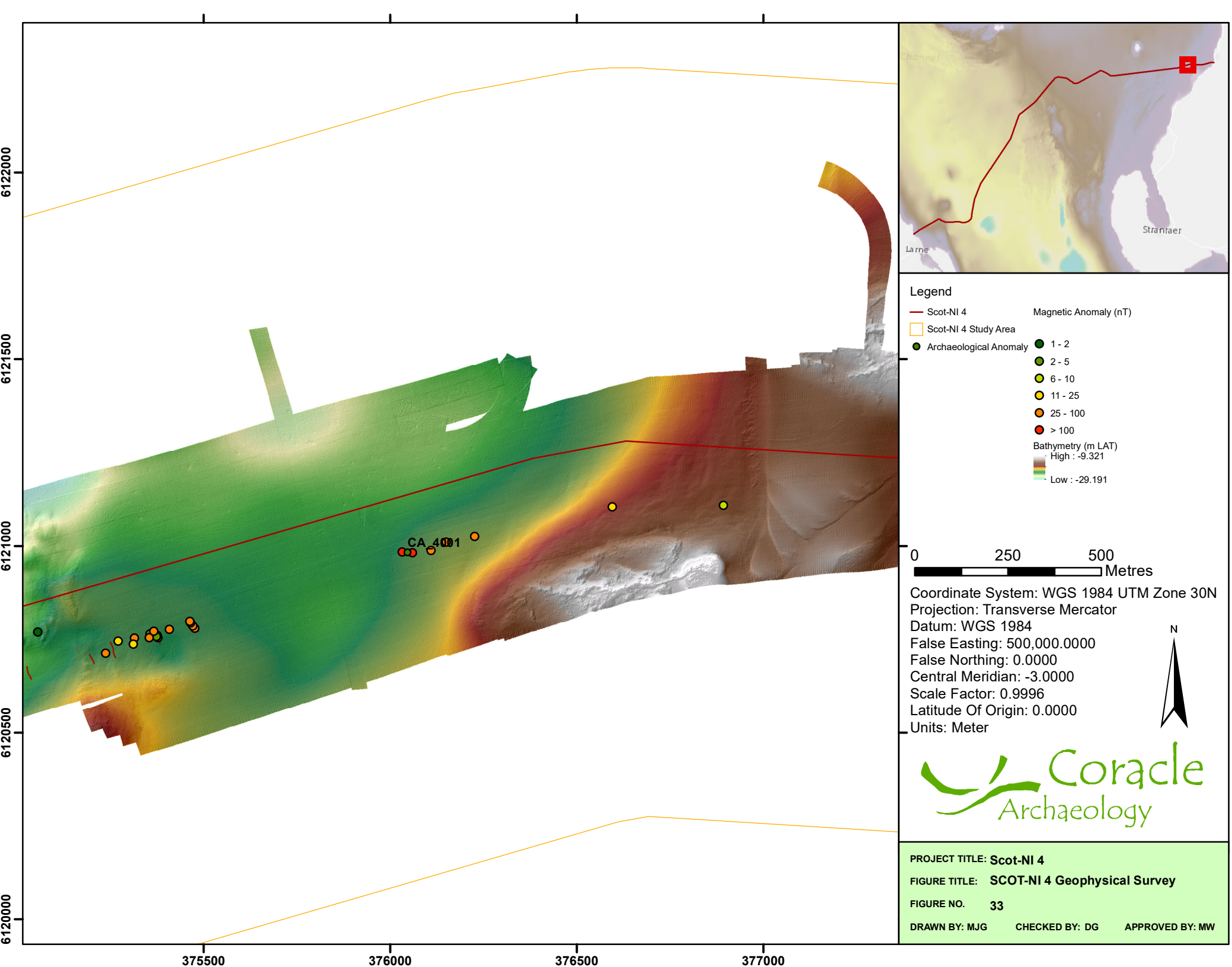
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 32
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW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6120500
6120000
375500
376000
376500
377000
CA_4001
Channel
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -9.321
Low : -29.191
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250
500
Metres
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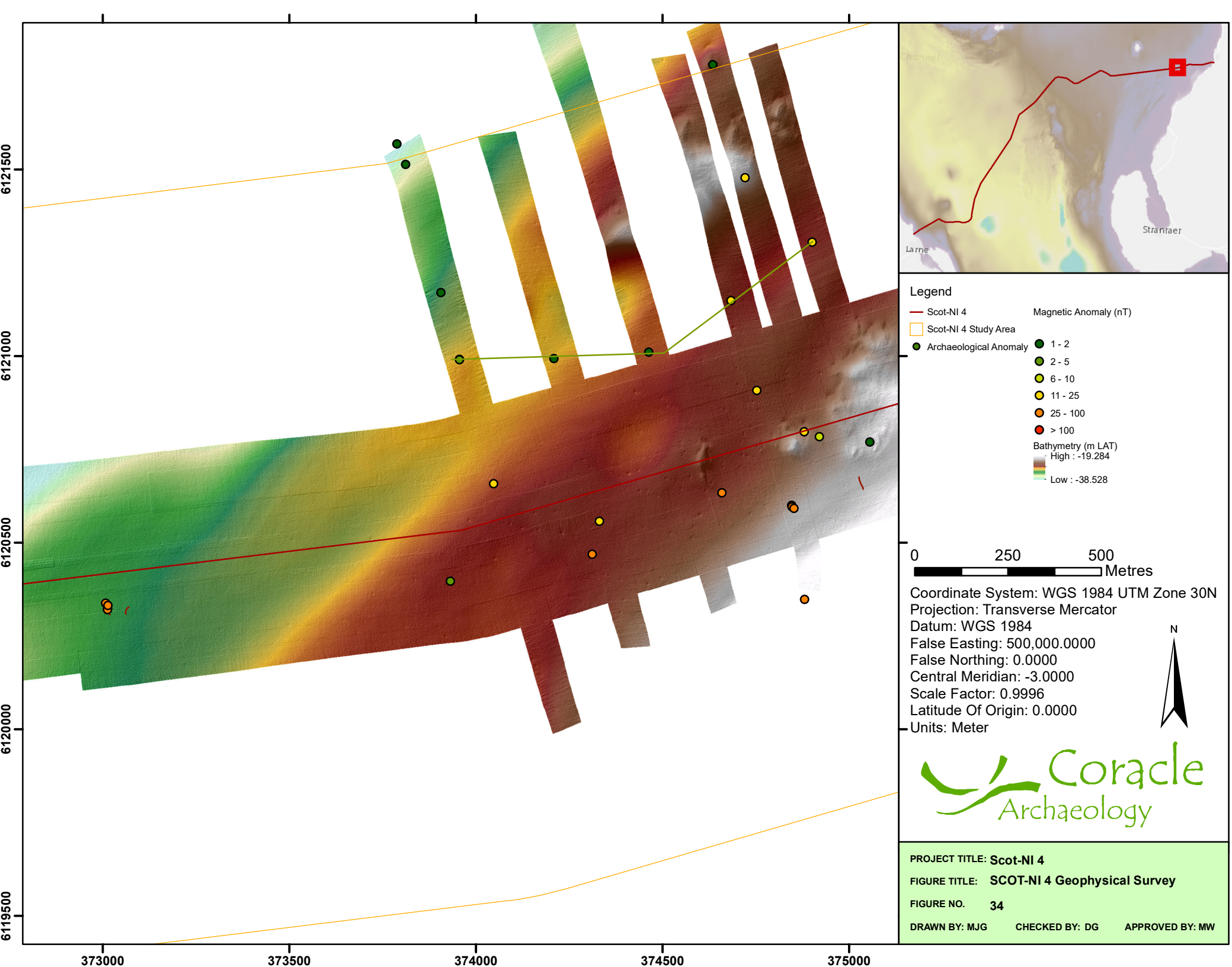
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 33
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW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373500
374000
374500
375000
Larne
Stranraer
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
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Low : -38.528
0
250
500
Metres
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Projection: Transverse Mercator
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N
Coracle
Archaeology
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FIGURE NO. 34
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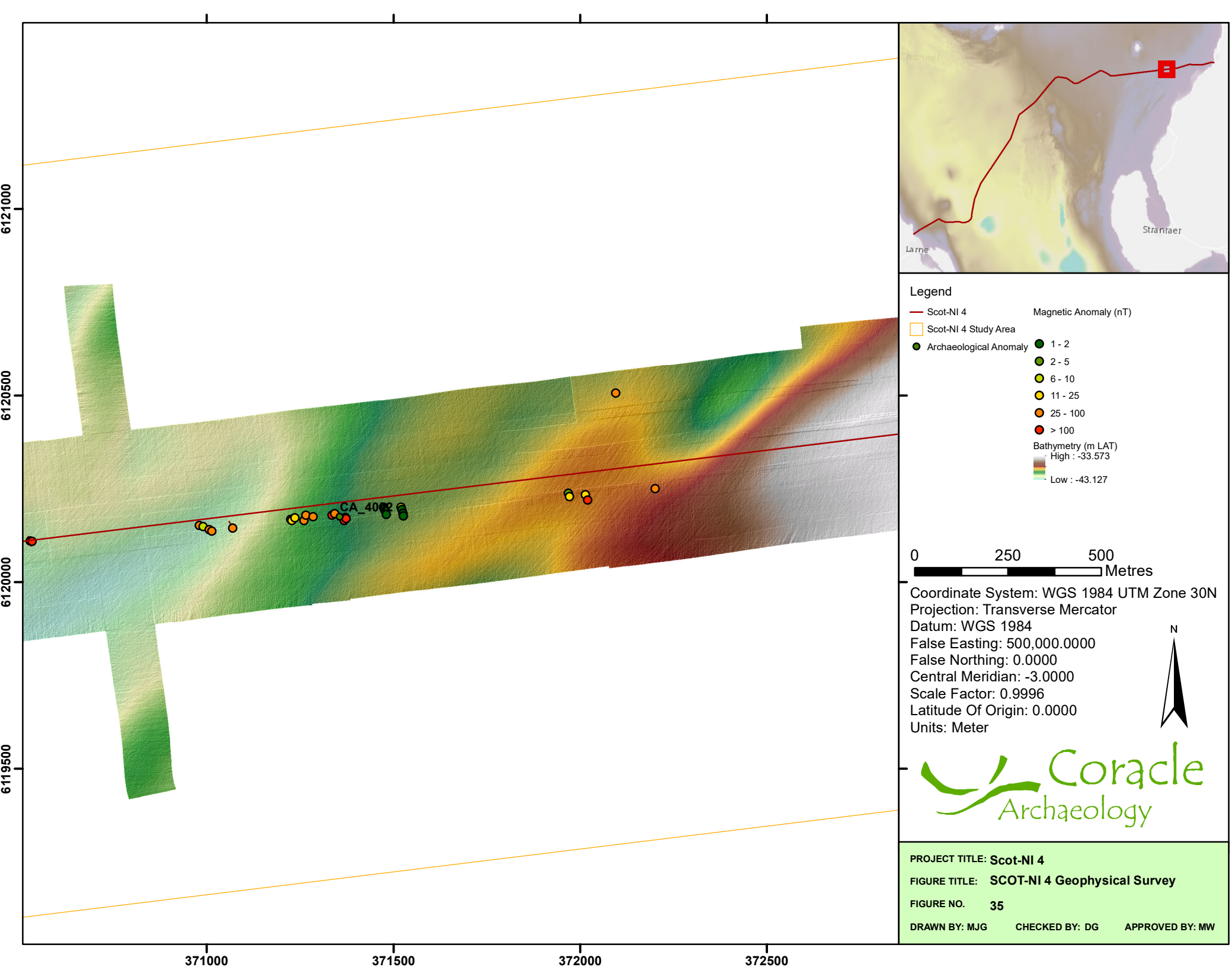
CHECKED BY: DG
APPROVED BY: MW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CA_4002
Channel
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
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Low : -43.127
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250
500
Metres
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Coracle
Archaeology
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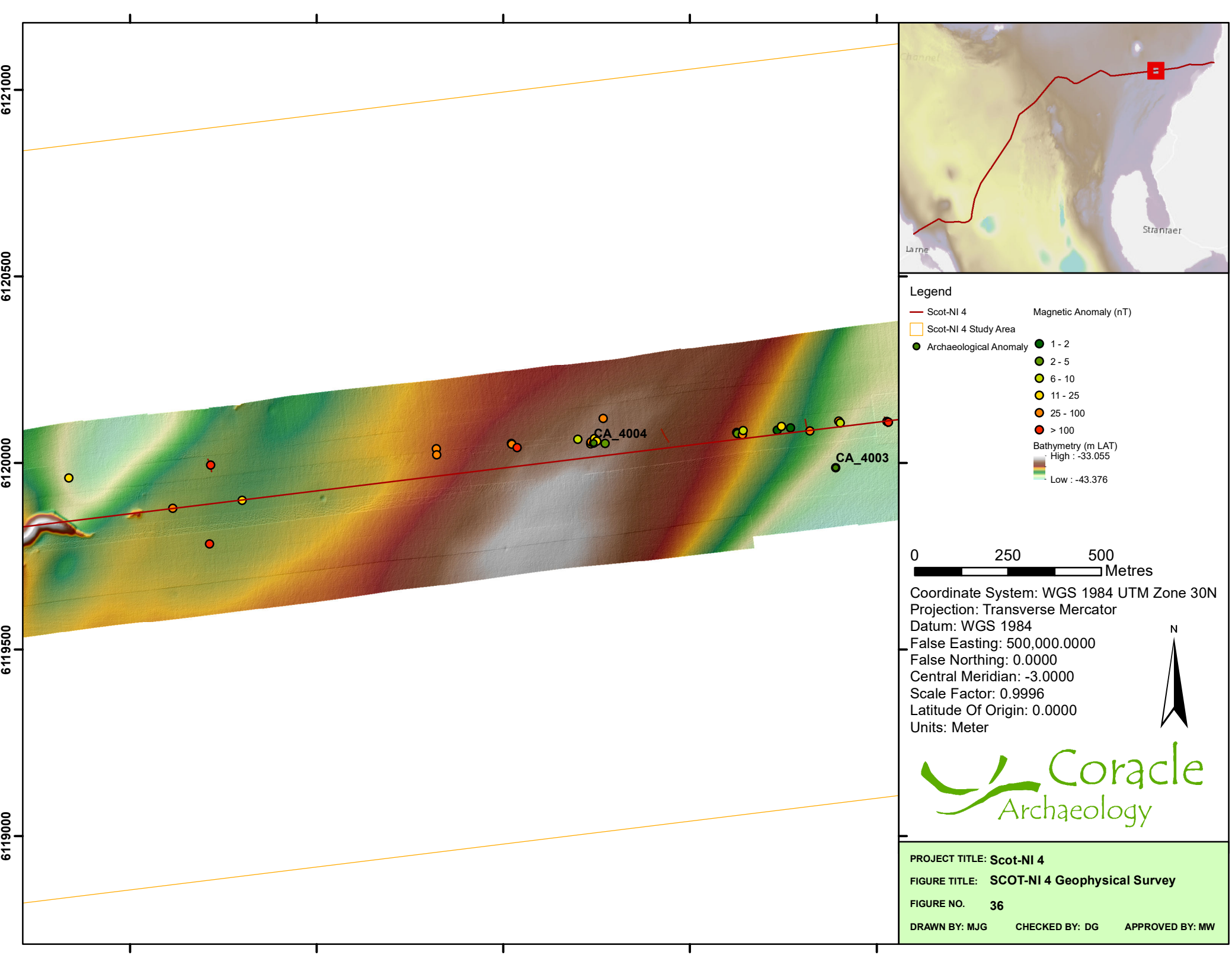
FIGURE NO. 35
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW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369000
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370500
CA_4004
CA_4003
Channel
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -33.055
Low : -43.376
0
250
500
Metres
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Projection: Transverse Mercator
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Coracle
Archaeology
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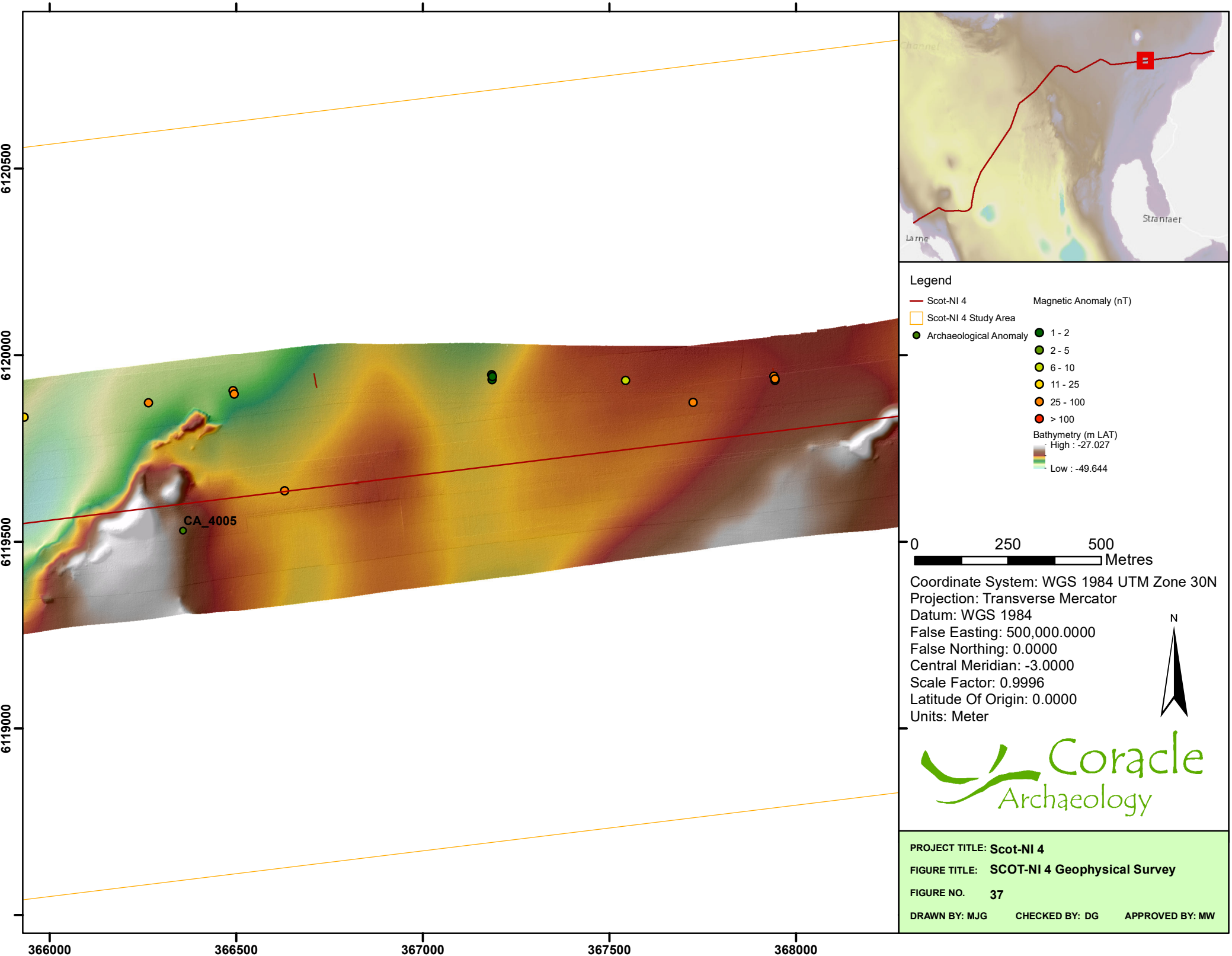
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6120000
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366000
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Channel
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
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250
500
Metres
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N
Coracle
Archaeology
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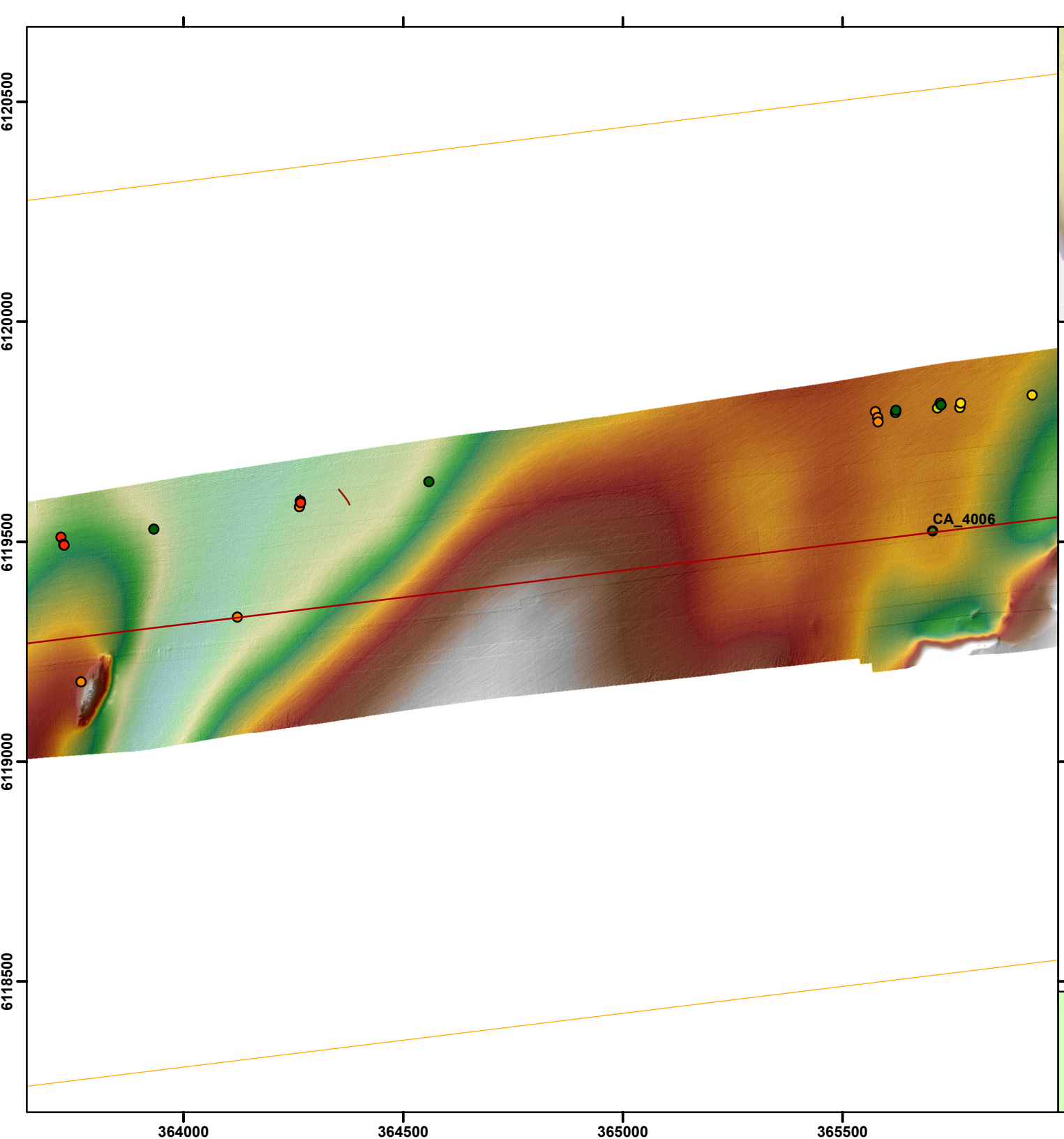
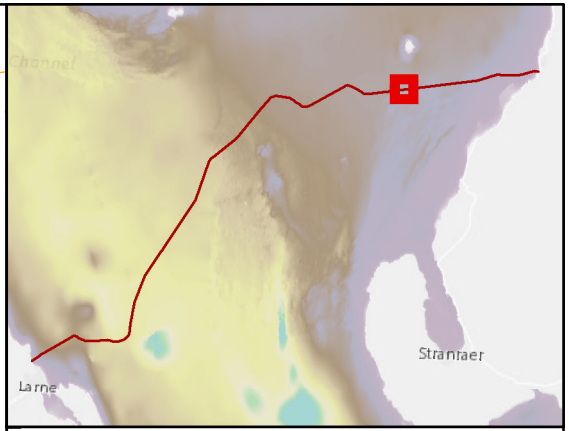
CHECKED BY: DG
APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)
High : -33.536
Low : -52.245

0 250 500 Metres

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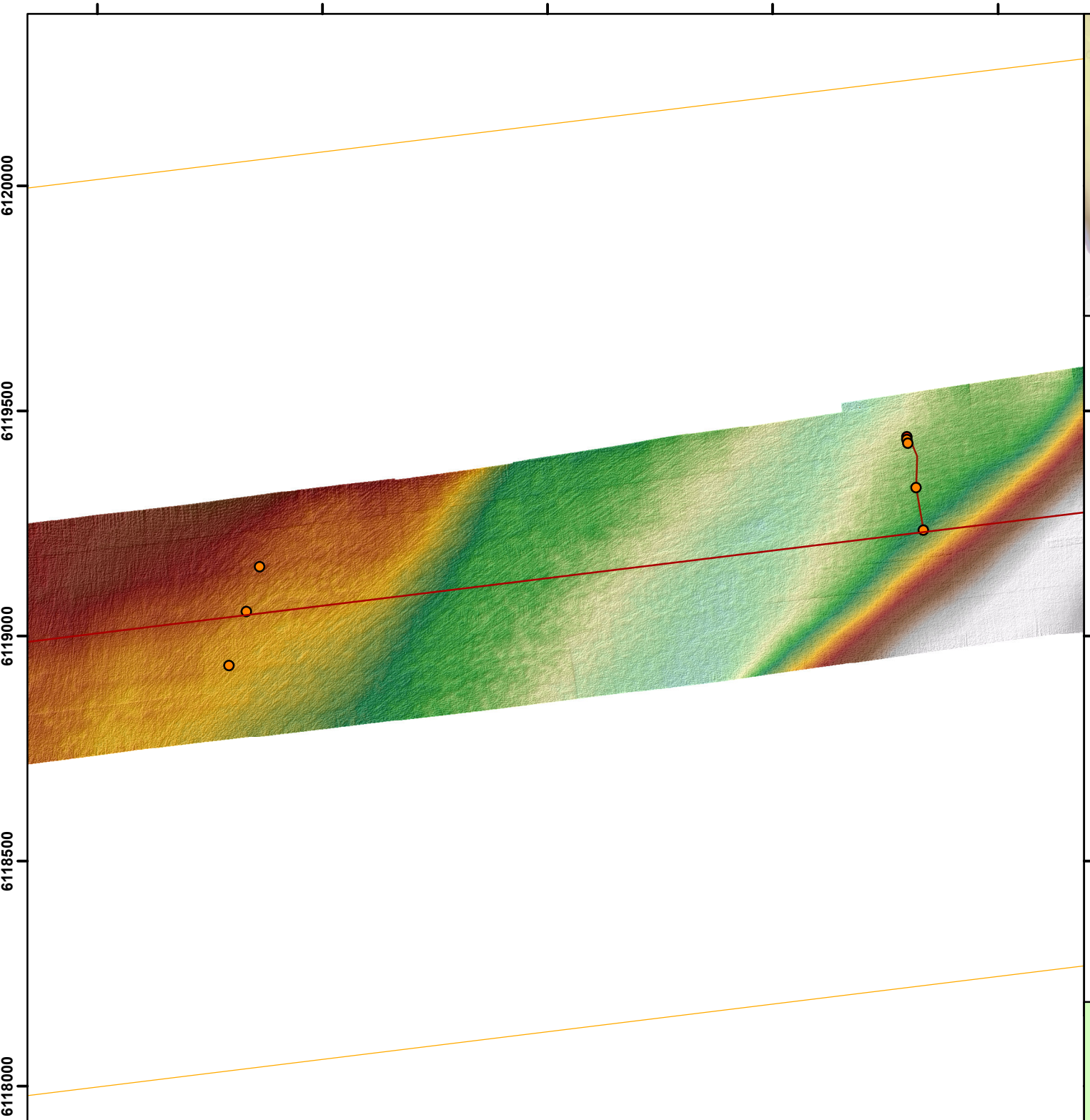
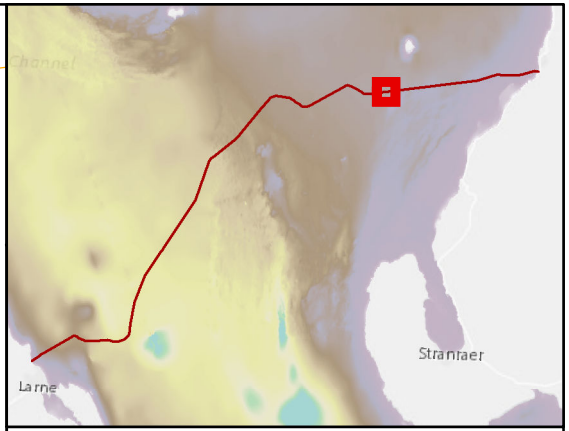
N

Coracle Archaeology

PROJECT TITLE: **Scot-NI 4**
FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**
FIGURE NO. **38**
DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

- High : -44.441
- Low : -51.516

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

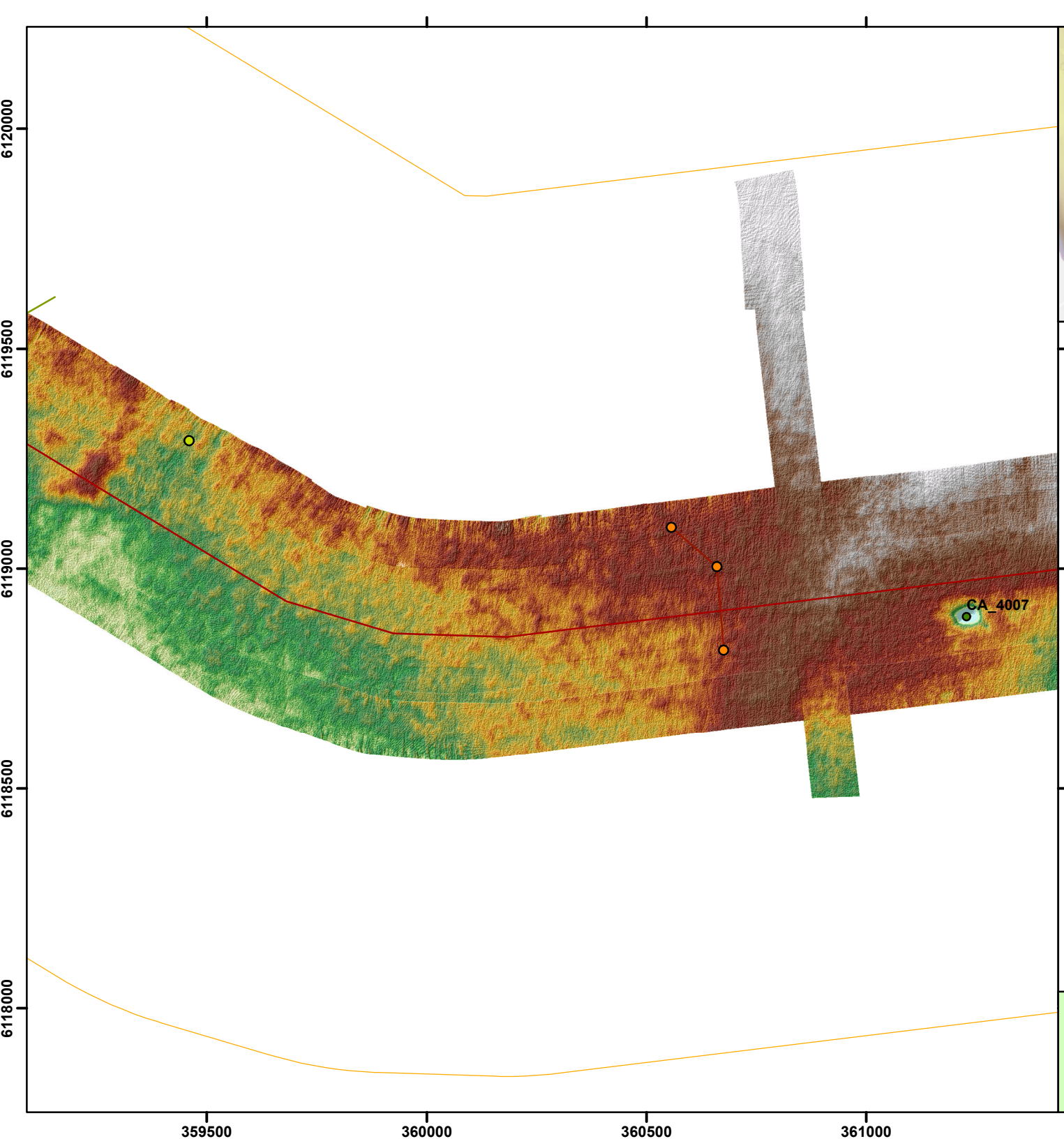
Coracle Archaeology

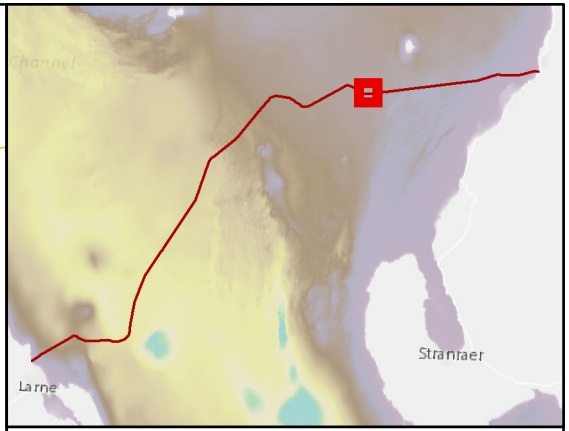
PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

FIGURE NO. **39**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -48.125

Low : -51.214

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

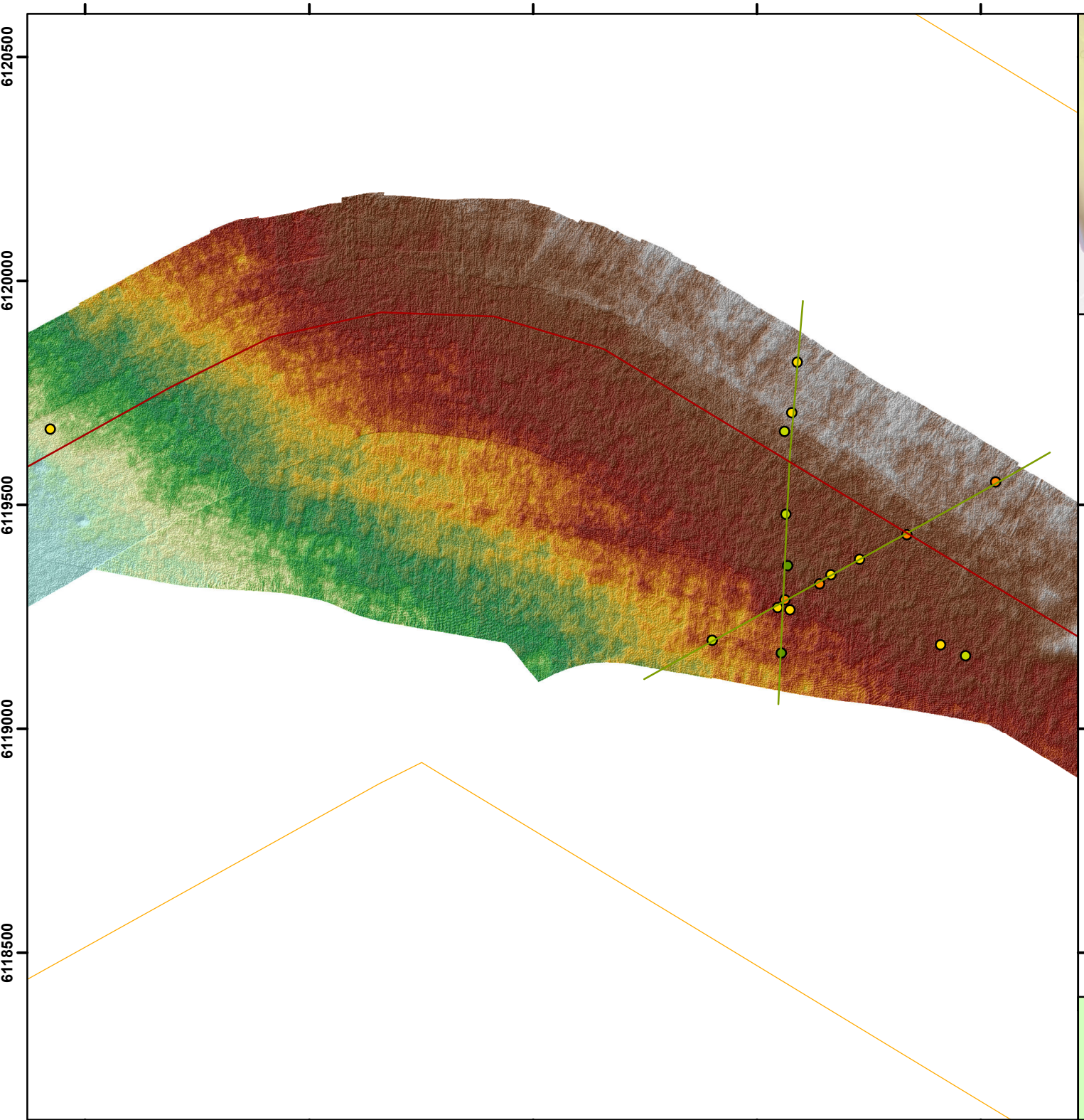
Coracle Archaeology

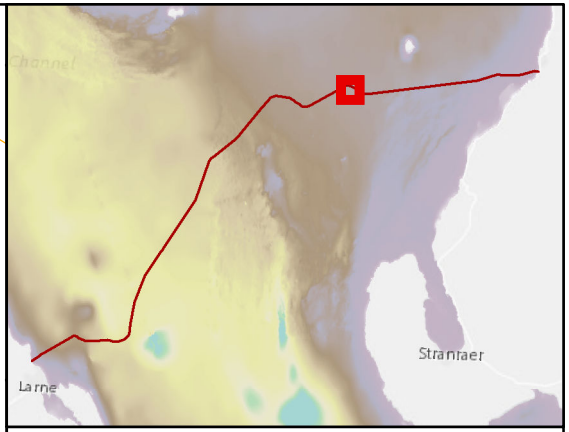
PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

FIGURE NO. **40**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)
High : -48.734
Low : -50.756

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

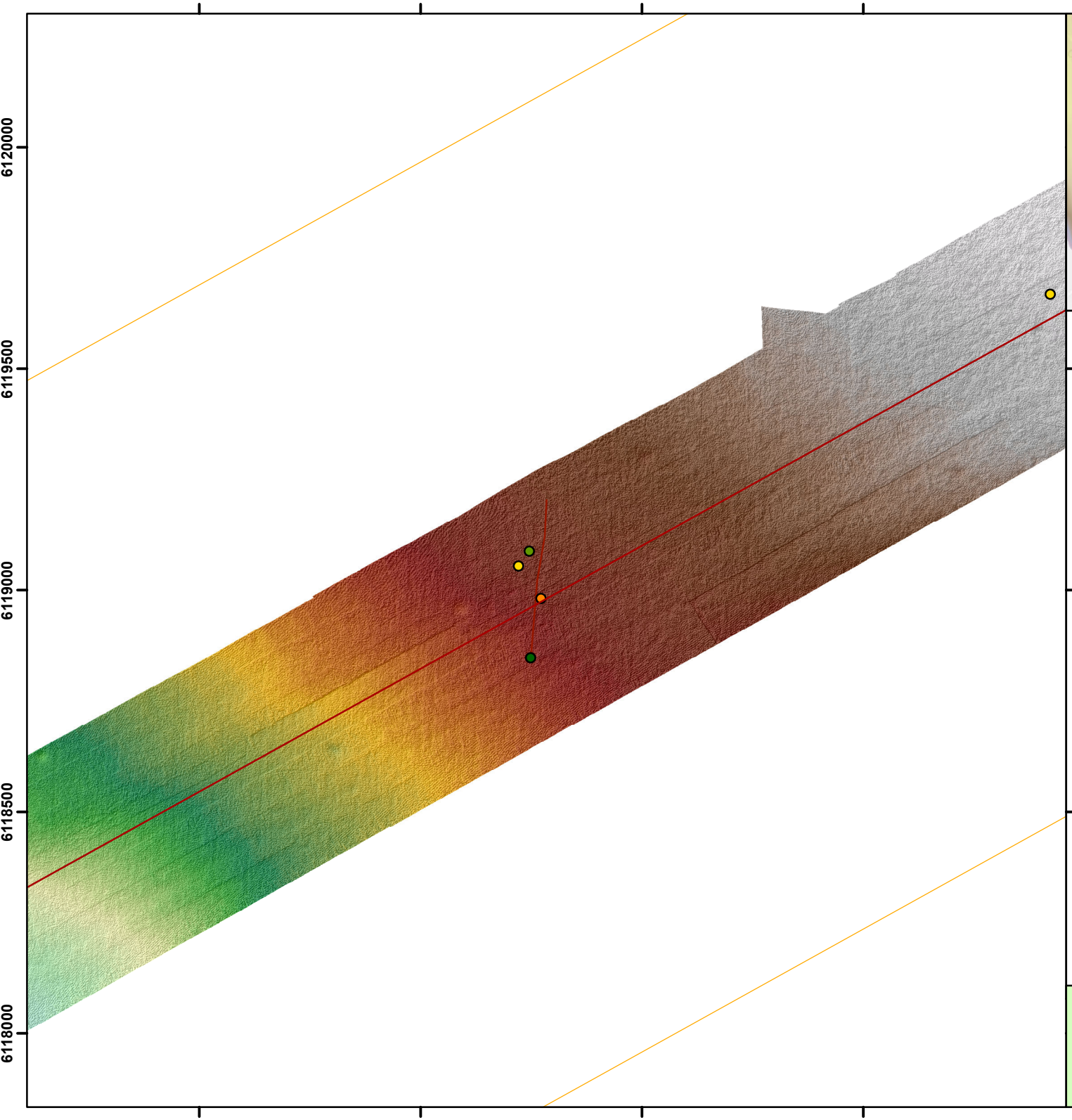
Coracle Archaeology

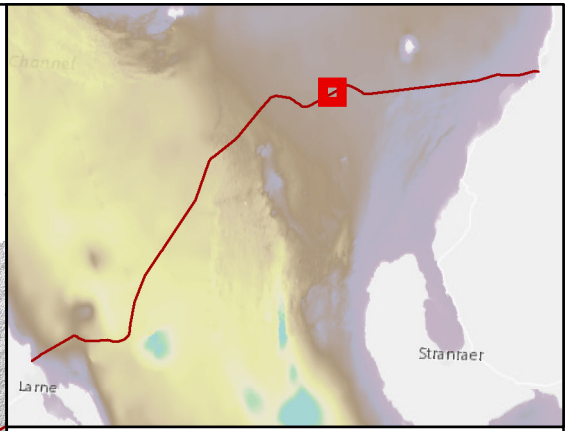
PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

FIGURE NO. **41**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)
High : -49.741
Low : -54.973

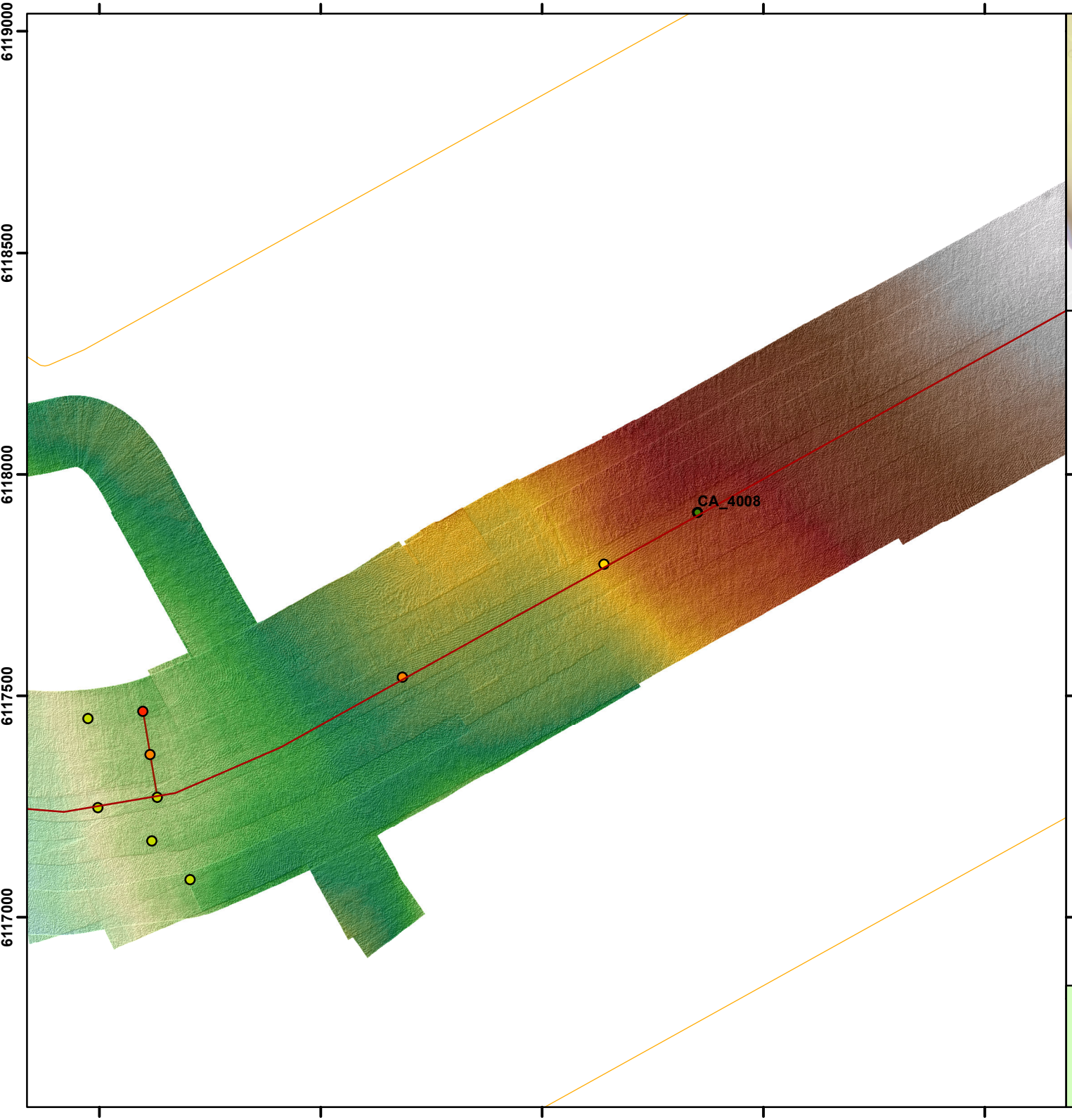
0 250 500 Metres

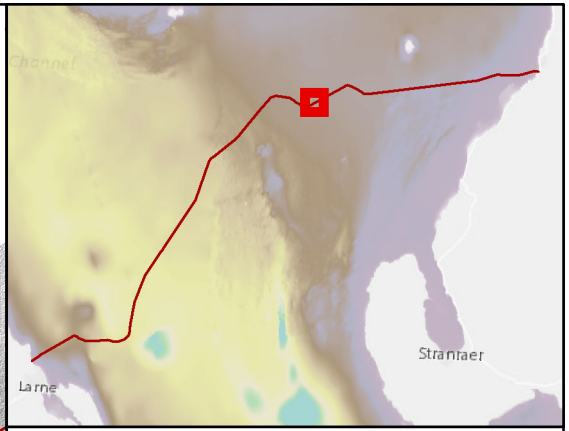
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

Coracle Archaeology

PROJECT TITLE: **Scot-NI 4**
FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**
FIGURE NO. **42**
DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)
High : -53.467
Low : -58.697

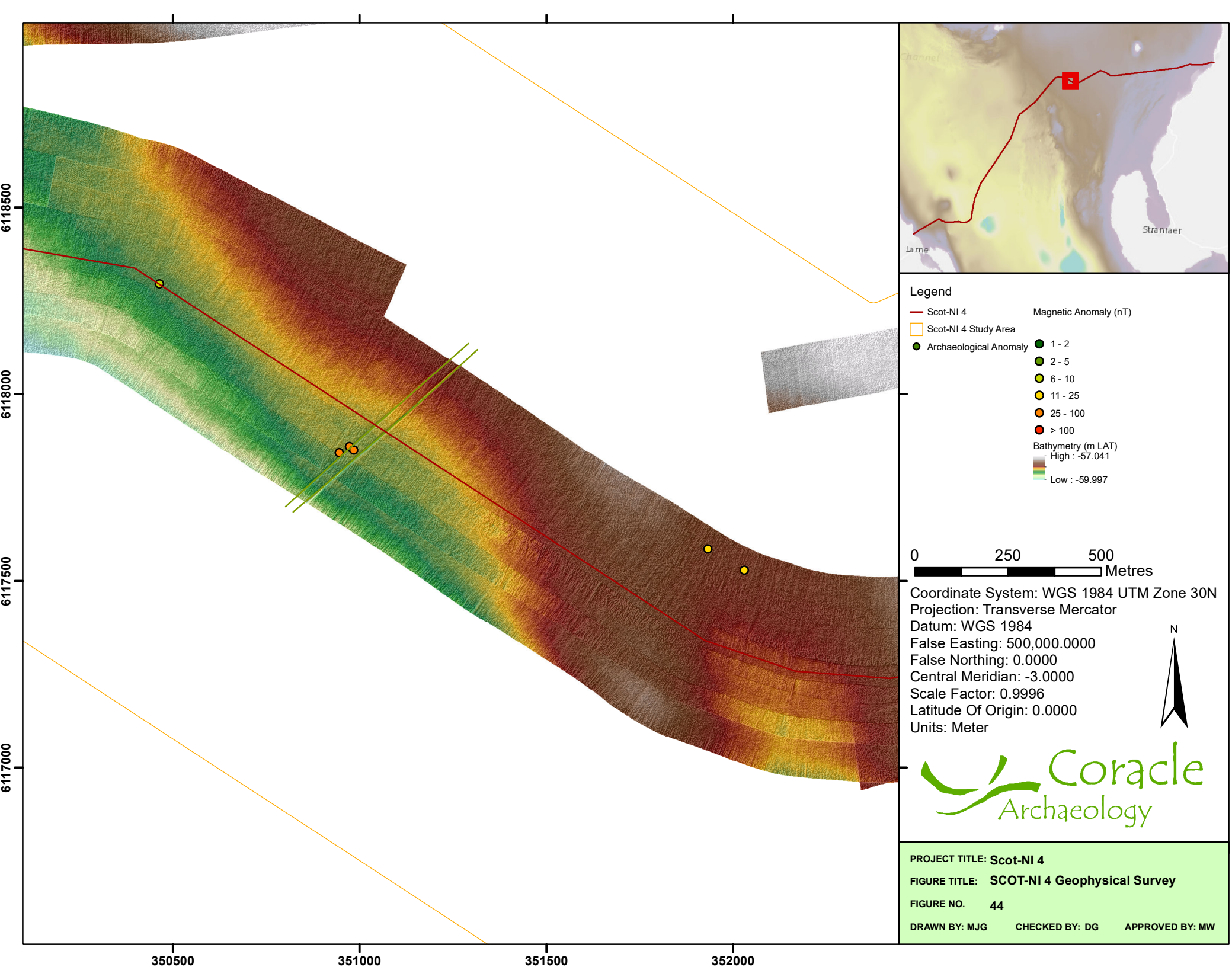
0 250 500 Metres

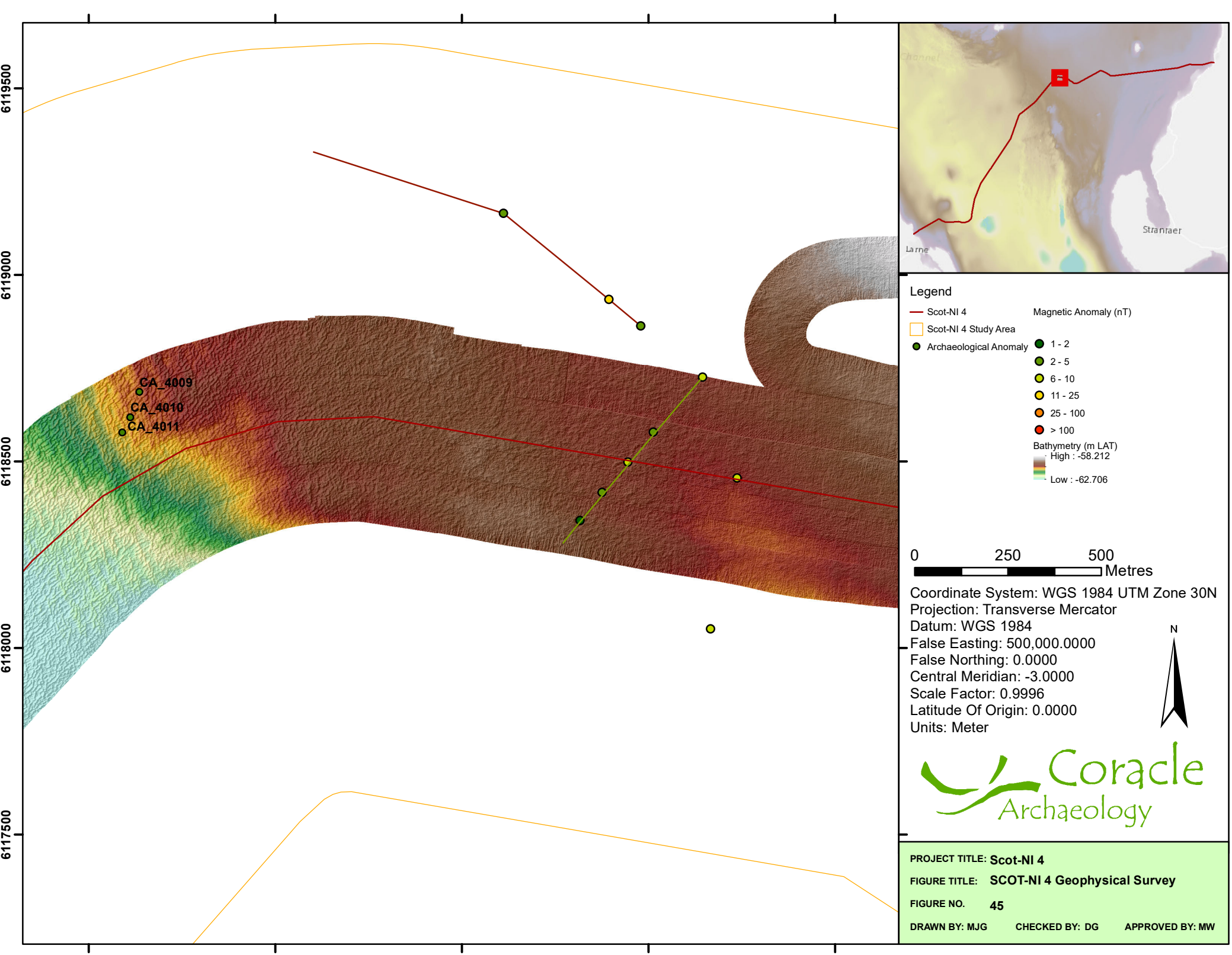
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

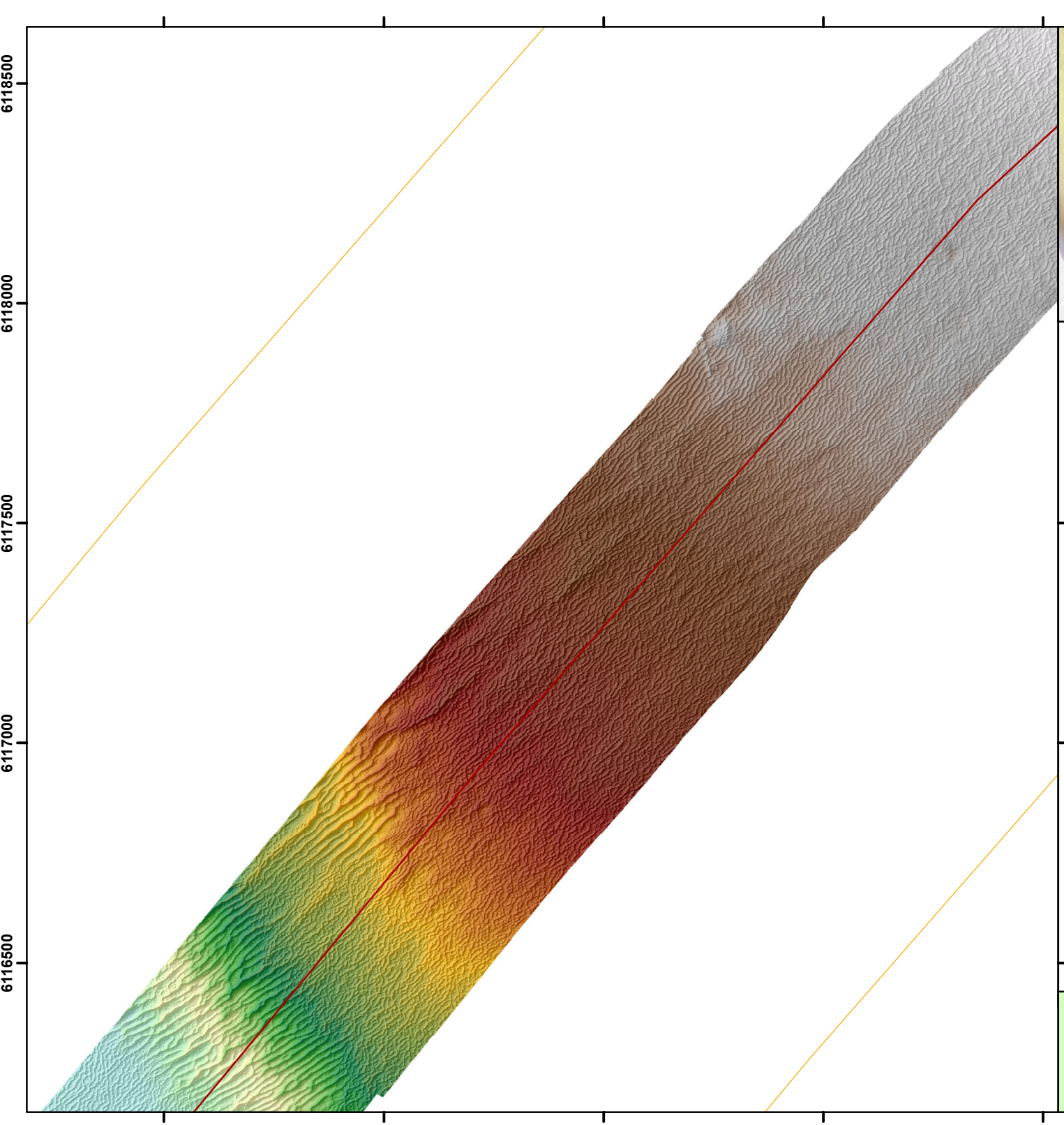
N

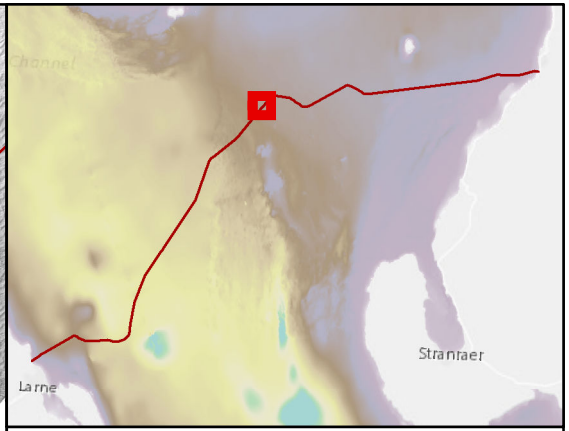
Coracle Archaeology

PROJECT TITLE: **Scot-NI 4**
FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**
FIGURE NO. **43**
DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW


6118500
6118000
6117500
6117000
350500
351000
351500
352000
Channel
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -57.041
Low : -59.997
0
250
500
Metres
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 44
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW


6119500
6119000
6118500
6118000
6117500
348000
348500
349000
349500
350000
CA_4009
CA_4010
CA_4011
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -58.212
Low : -62.706
0
250
500
Metres
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 45
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -60.33

Low : -75.394

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

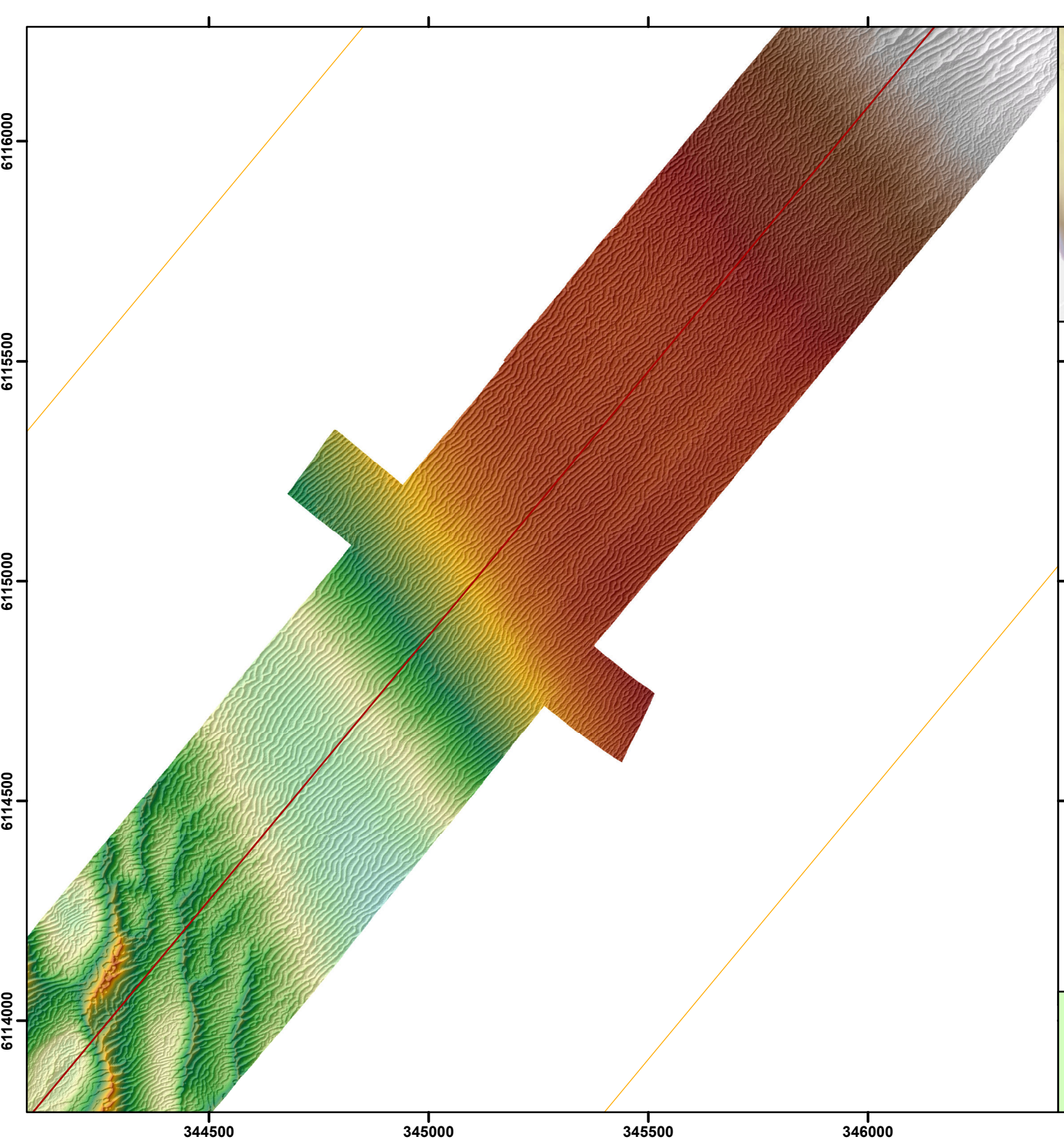
Coracle Archaeology

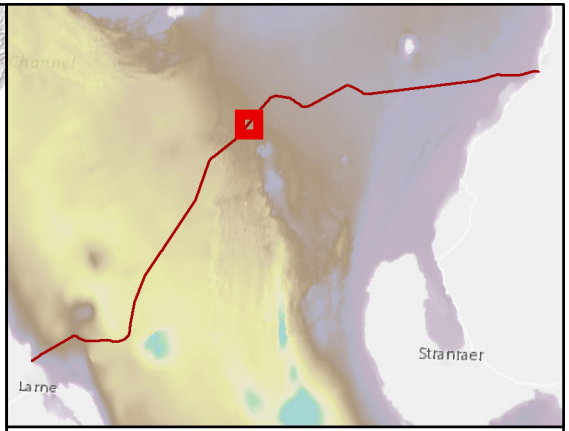
PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

FIGURE NO. **46**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -69.565

Low : -84.907

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

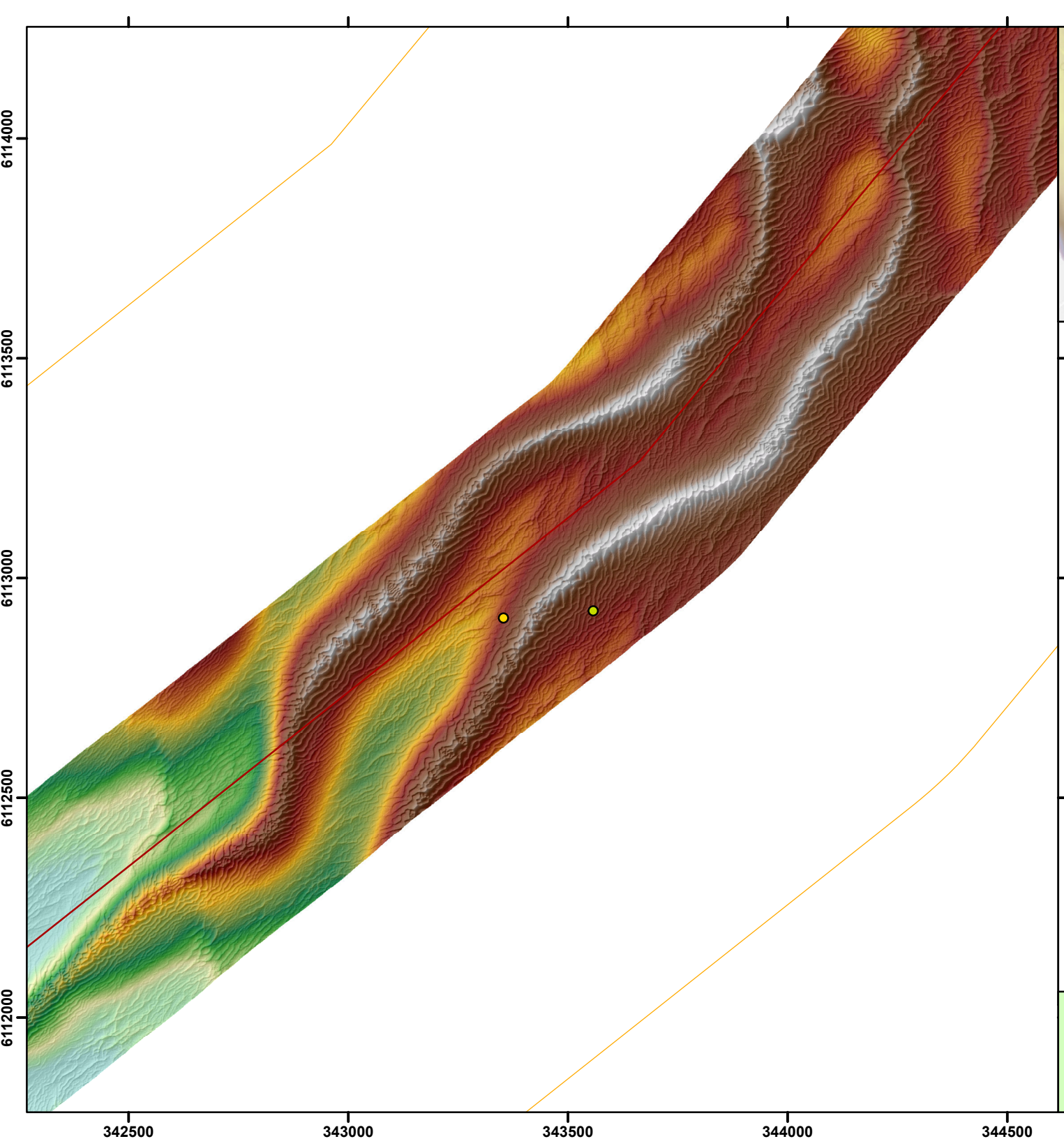
Coracle Archaeology

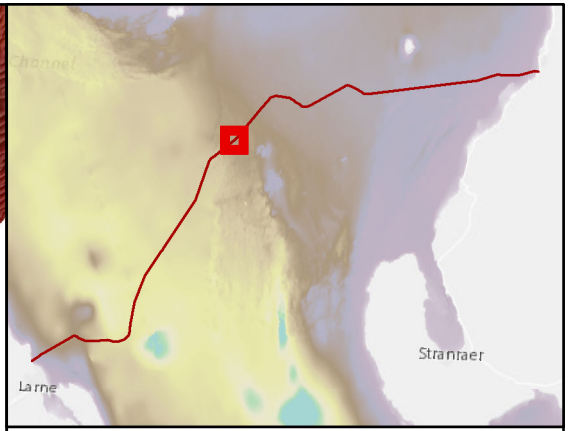
PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

FIGURE NO. **47**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -75.205

Low : -92.04

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

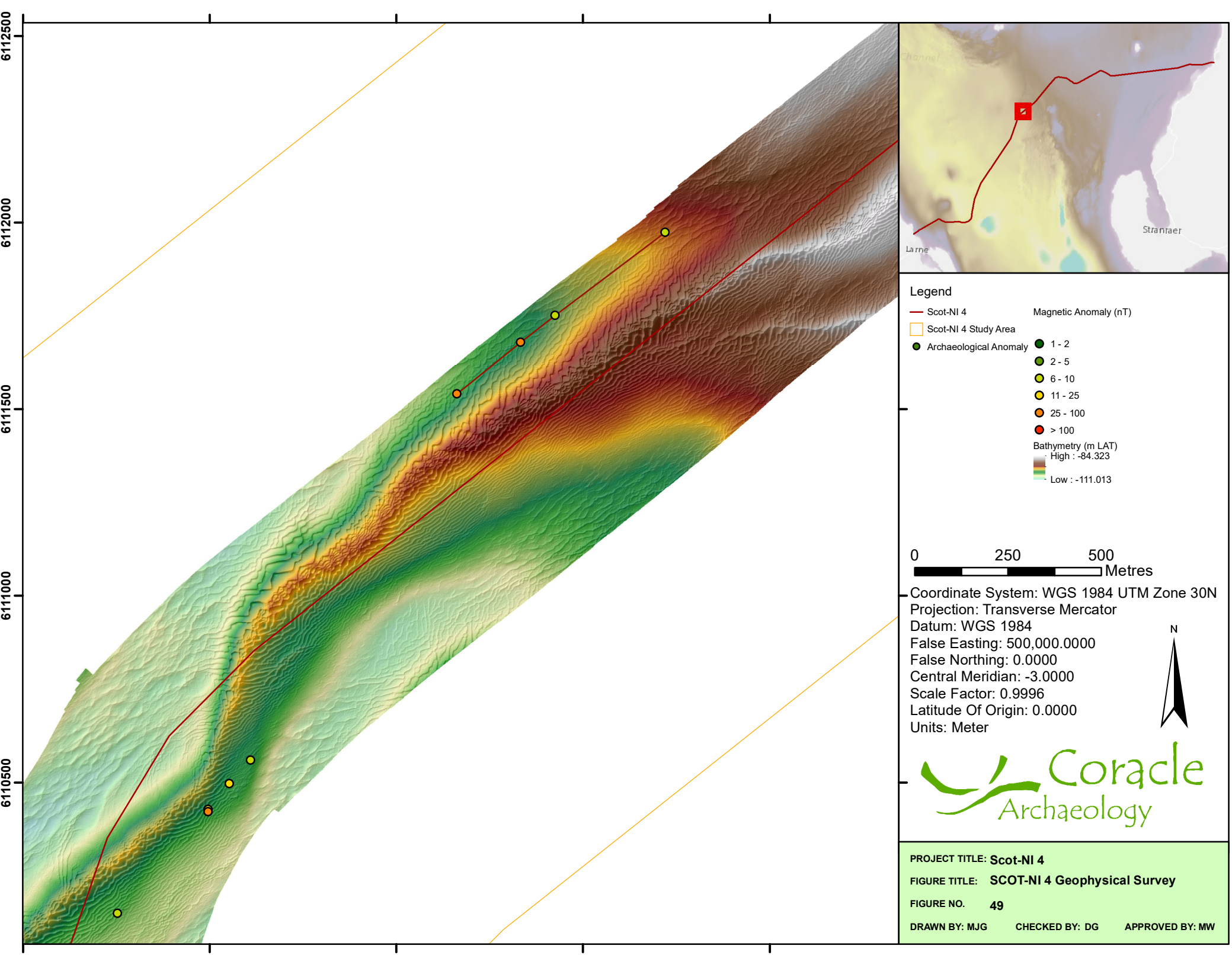
Coracle Archaeology

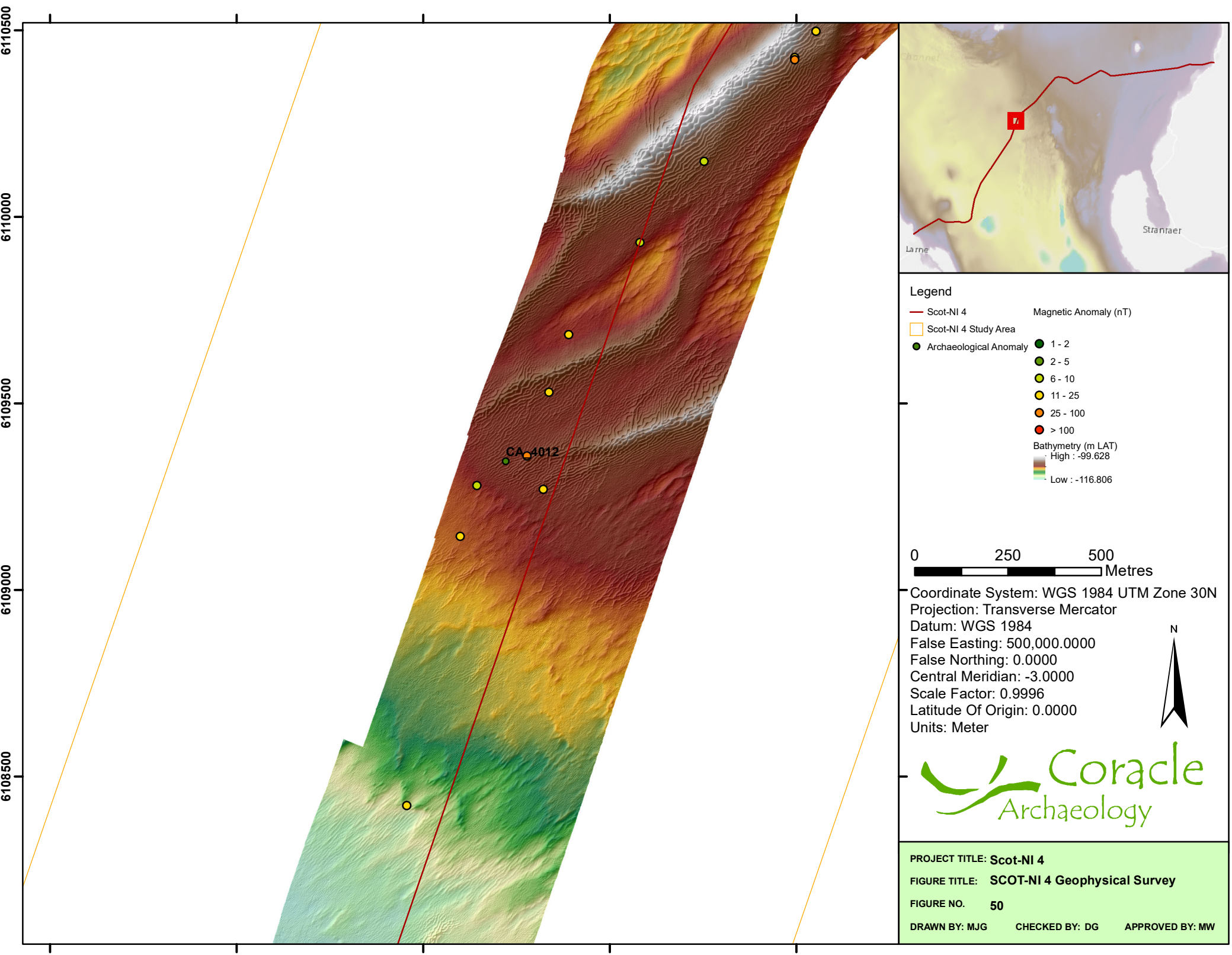
PROJECT TITLE: **Scot-NI 4**

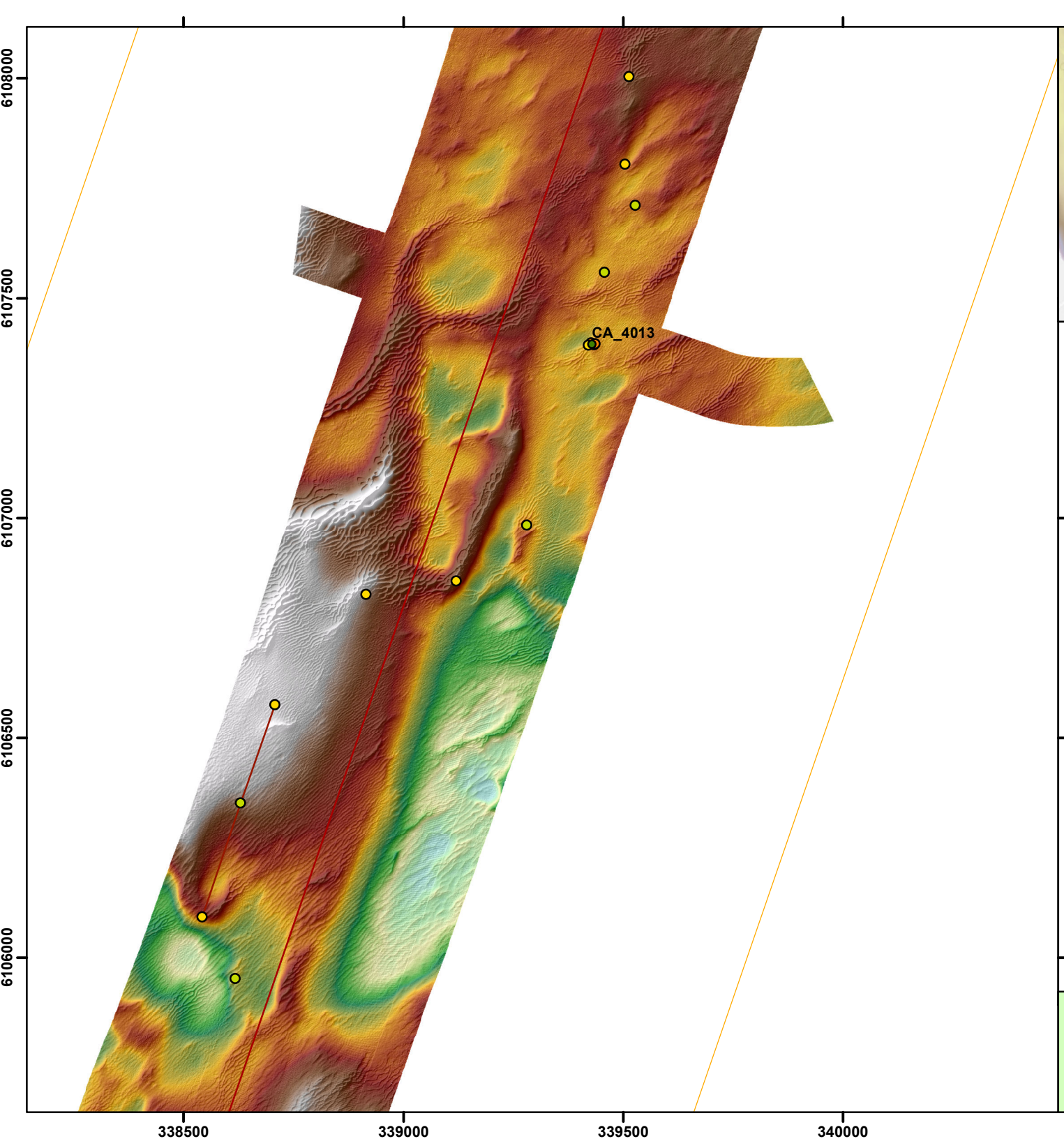
FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

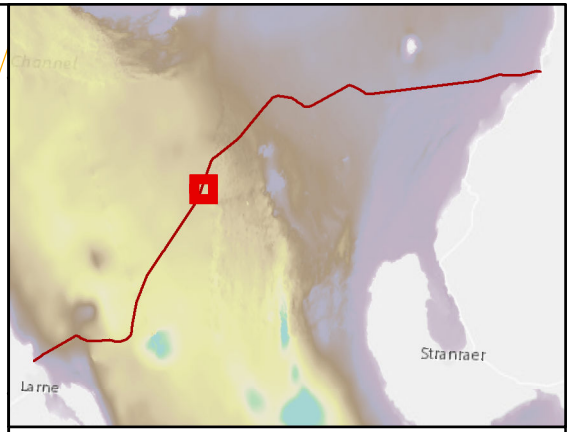
FIGURE NO. **48**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW


6112500
6112000
6111500
6111000
6110500
340000
340500
341000
341500
342000
Channel
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -84.323
Low : -111.013
0
250
500
Metres
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 49
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW


6110500
6110000
6109500
6109000
6108500
338500
339000
339500
340000
340500
CA_4012
Channel
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -99.628
Low : -116.806
0
250
500
Metres
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 50
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -108.812

Low : -121.799

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

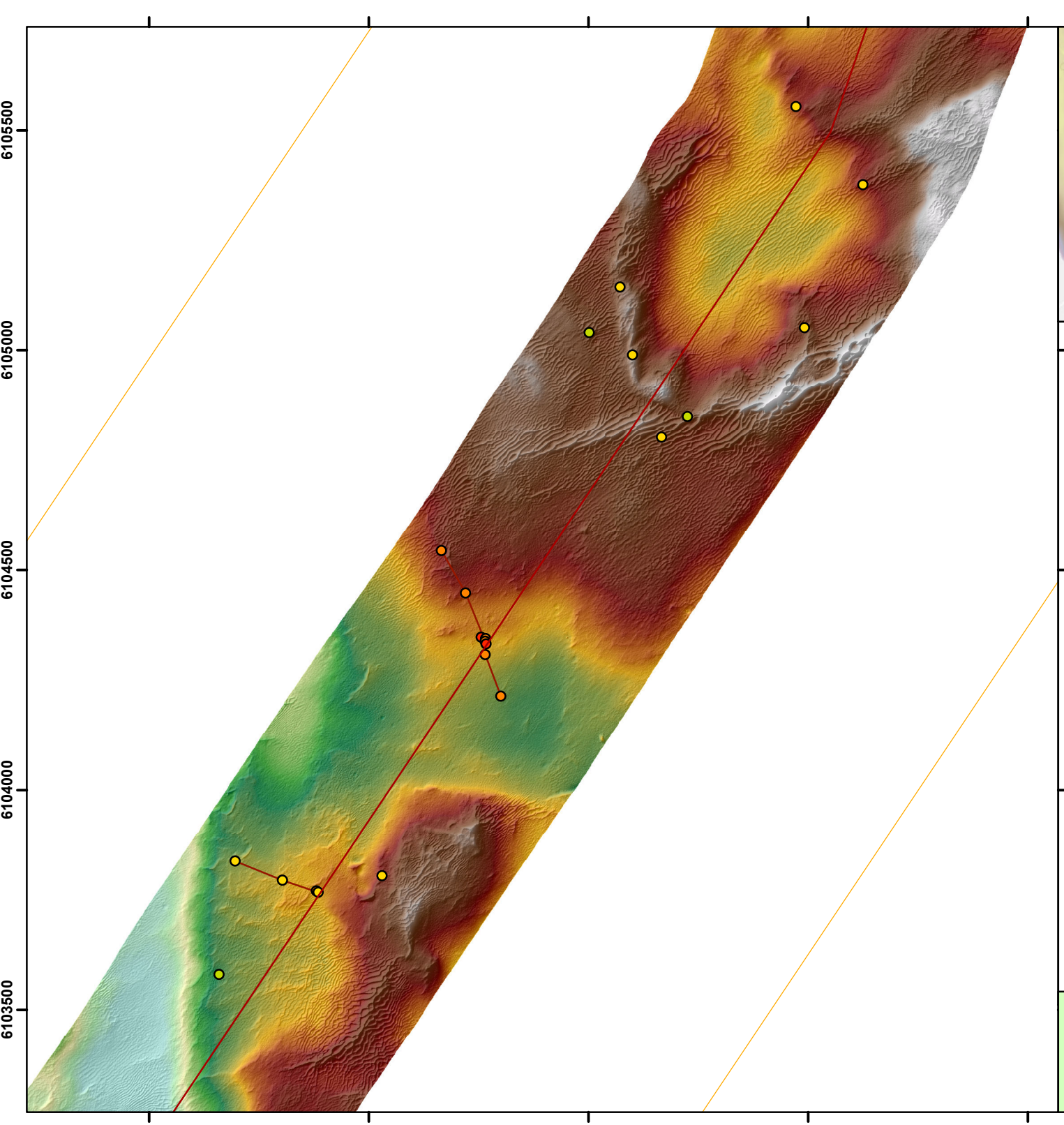
Coracle Archaeology

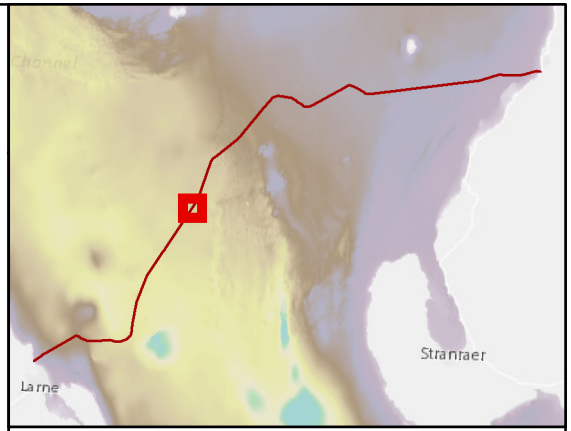
PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

FIGURE NO. **51**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -107.32

Low : -126.613

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

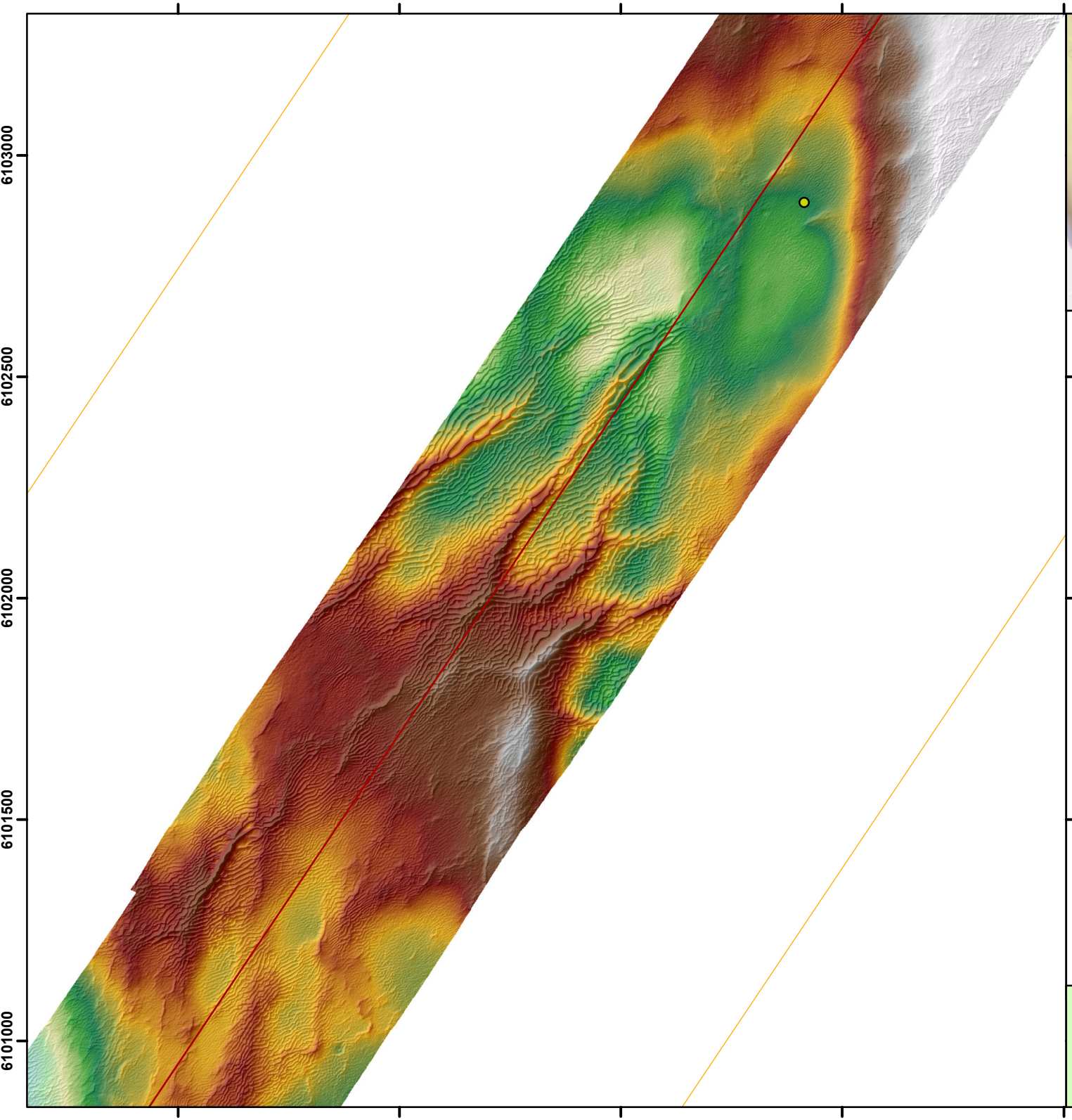
Coracle Archaeology

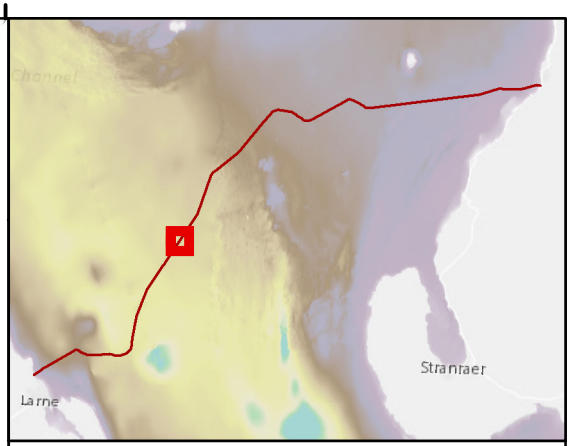
PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

FIGURE NO. **52**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -113.343

Low : -133.444

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

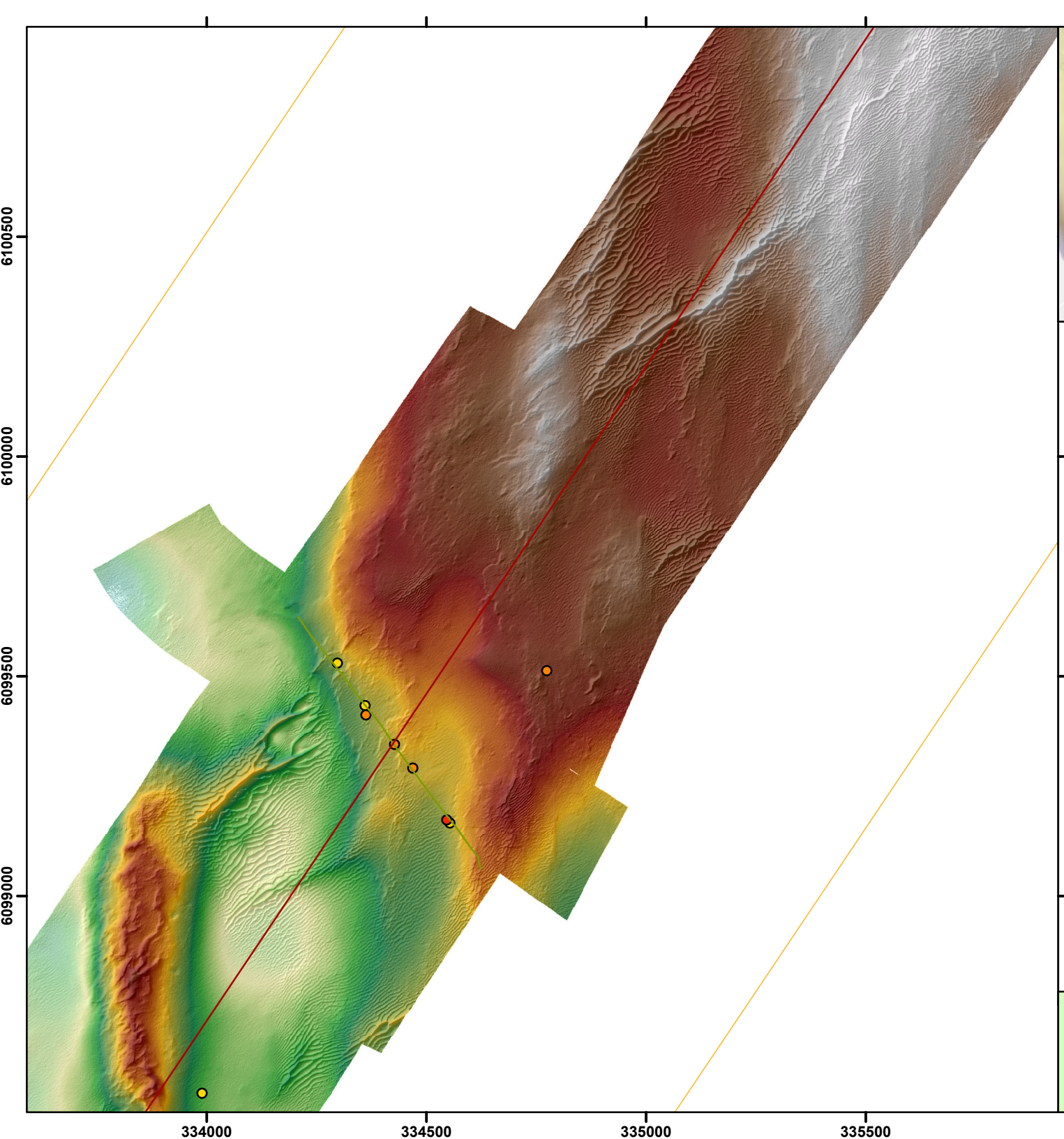
Coracle Archaeology

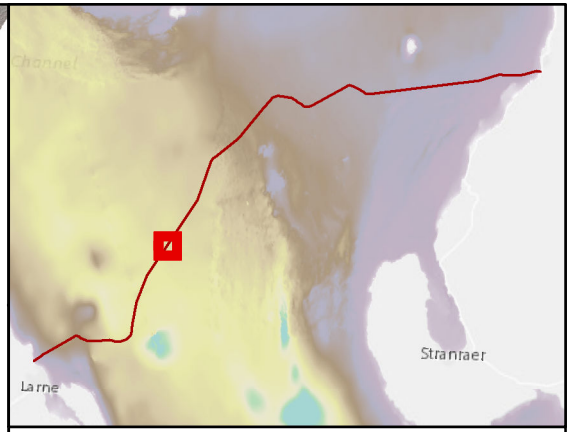
PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

FIGURE NO. **53**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)
High : -124.419
Low : -148.031

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

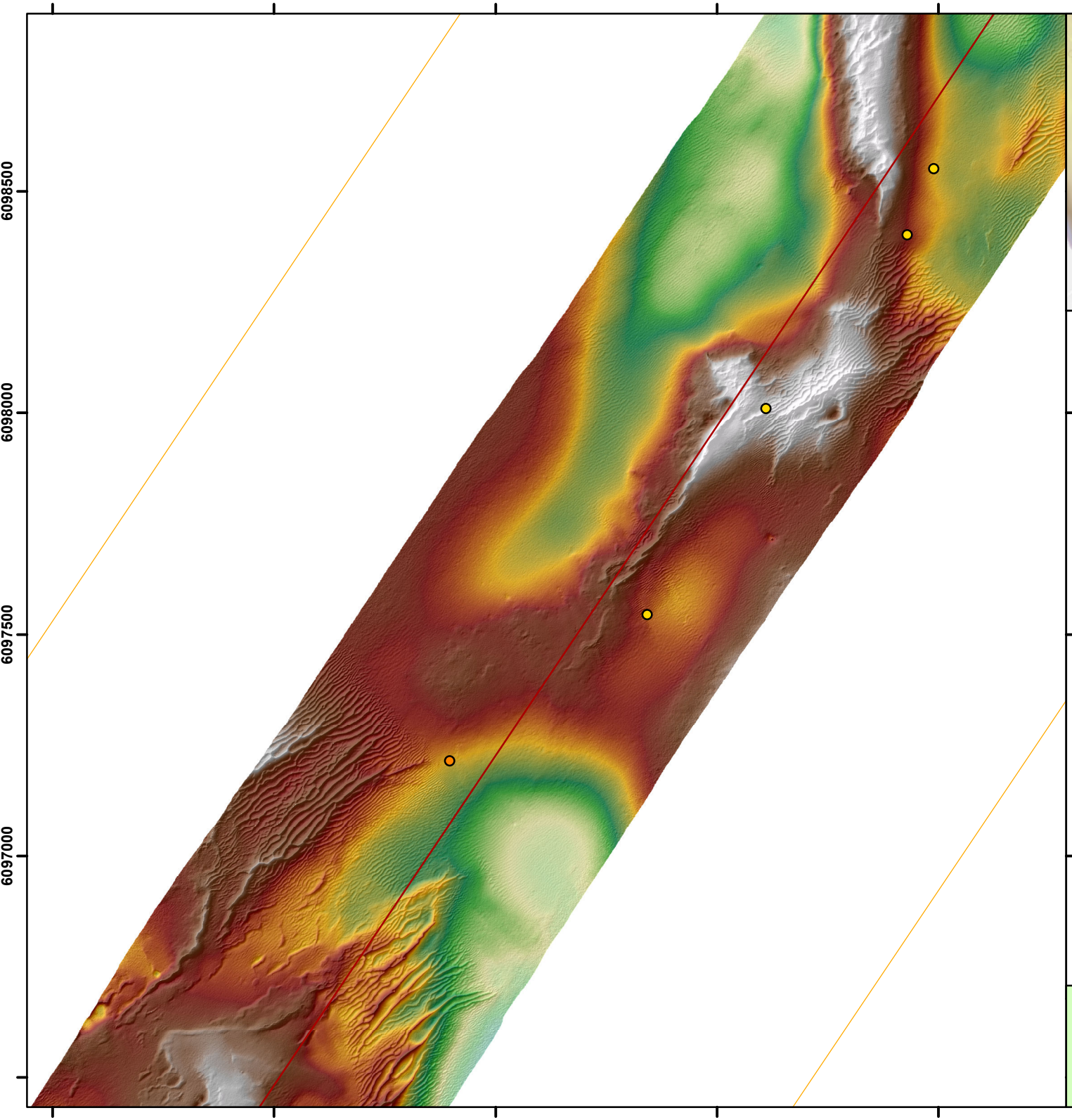
Coracle Archaeology

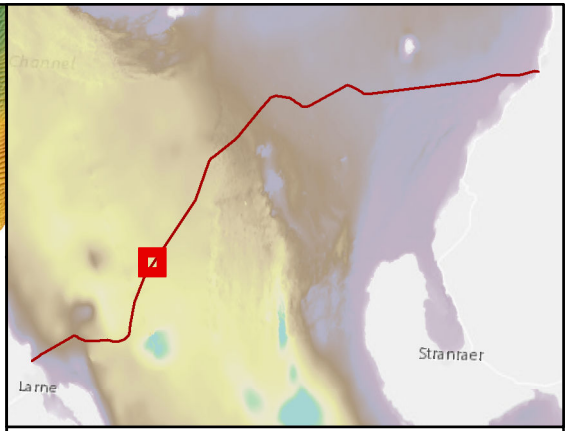
PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

FIGURE NO. **54**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -133.514

Low : -147.808

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

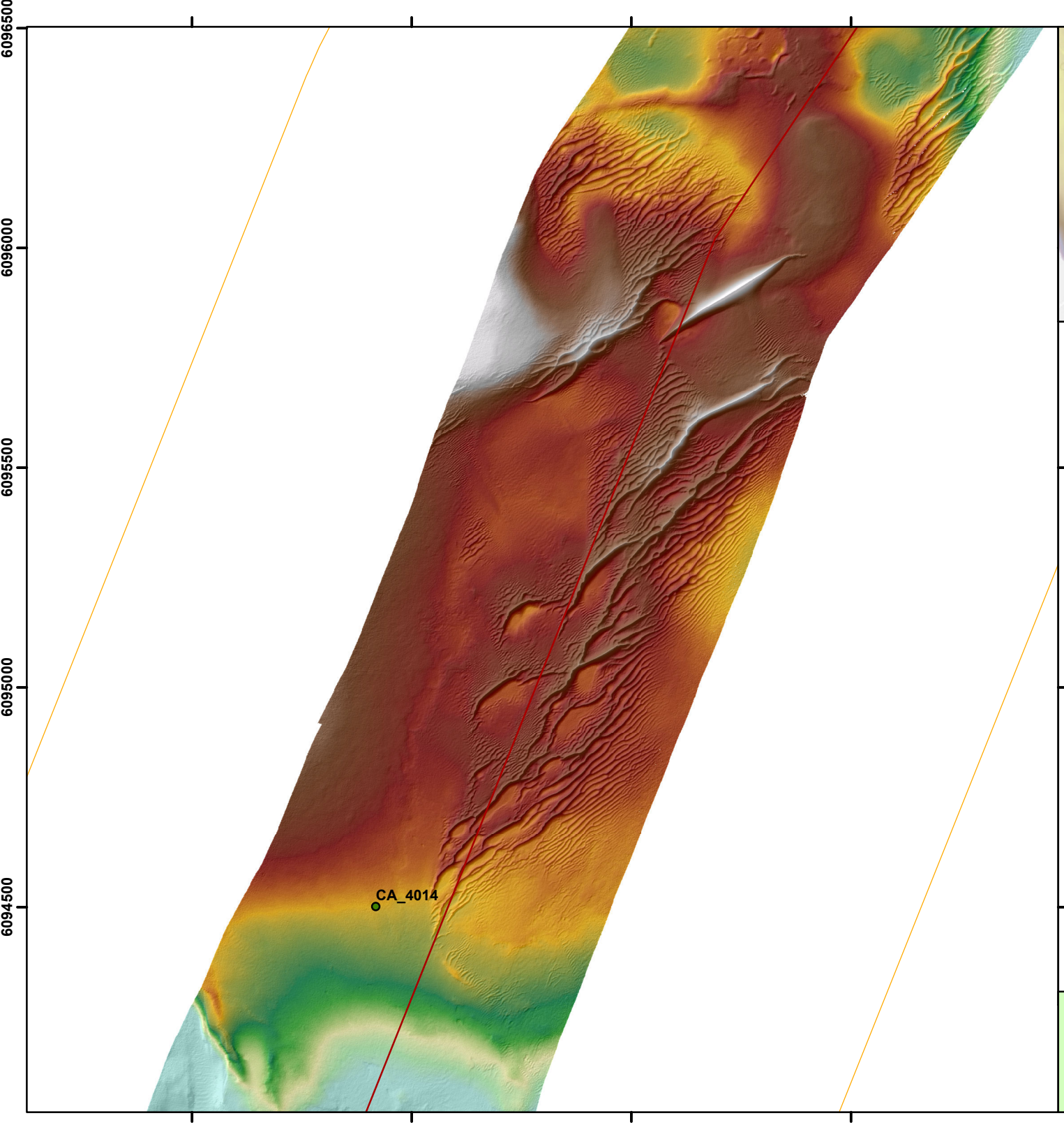
Coracle Archaeology

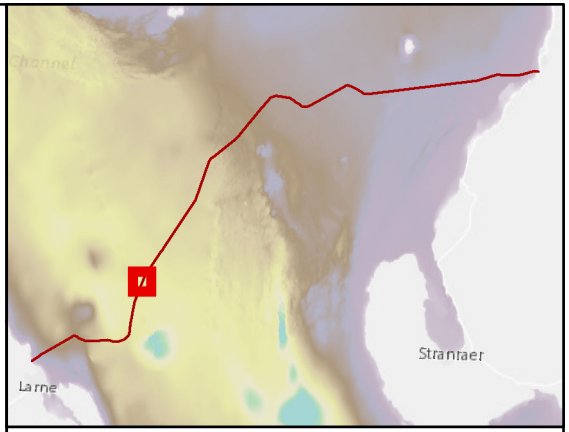
PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

FIGURE NO. **55**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)
High : -128.682
Low : -158.897

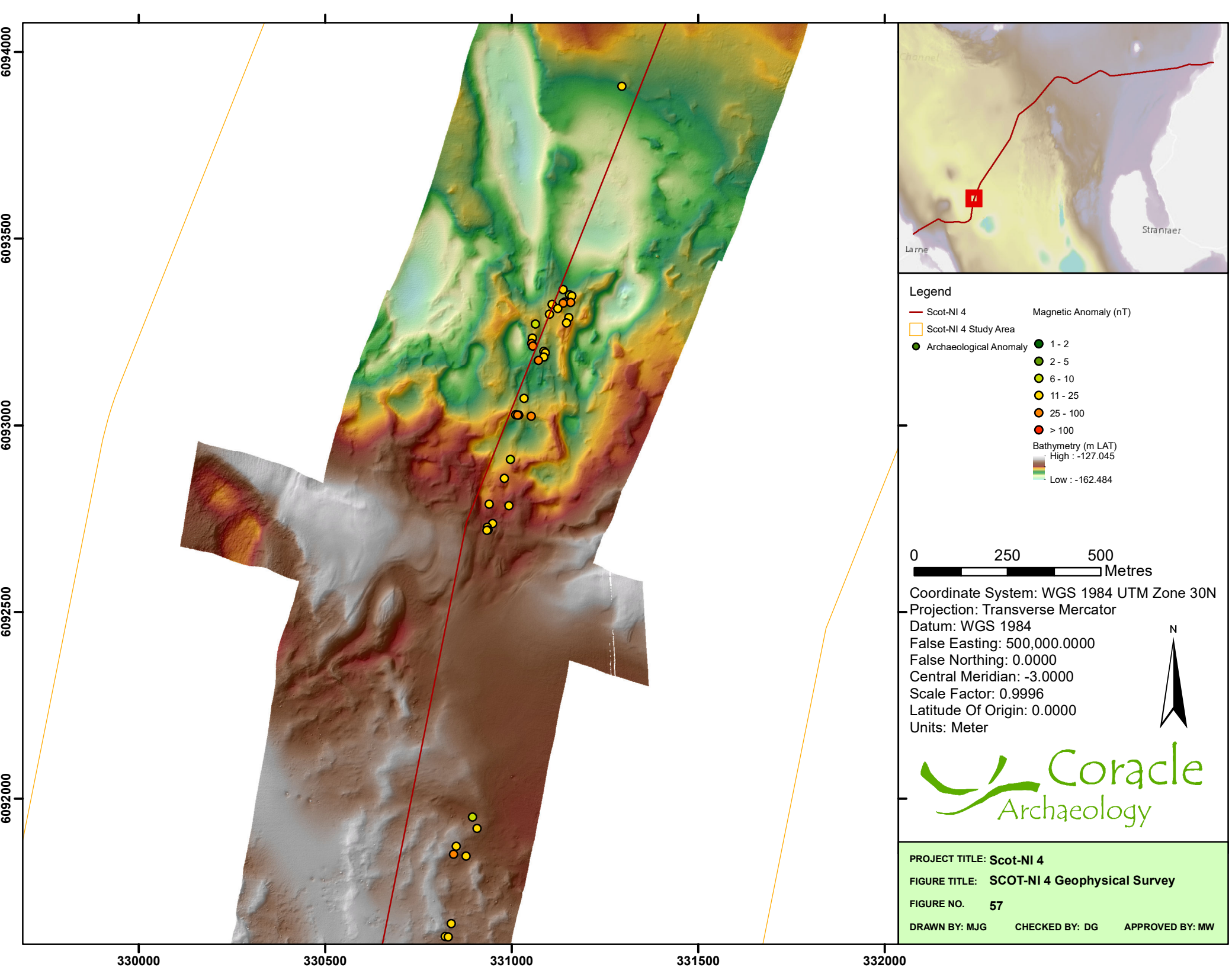
0 250 500 Metres

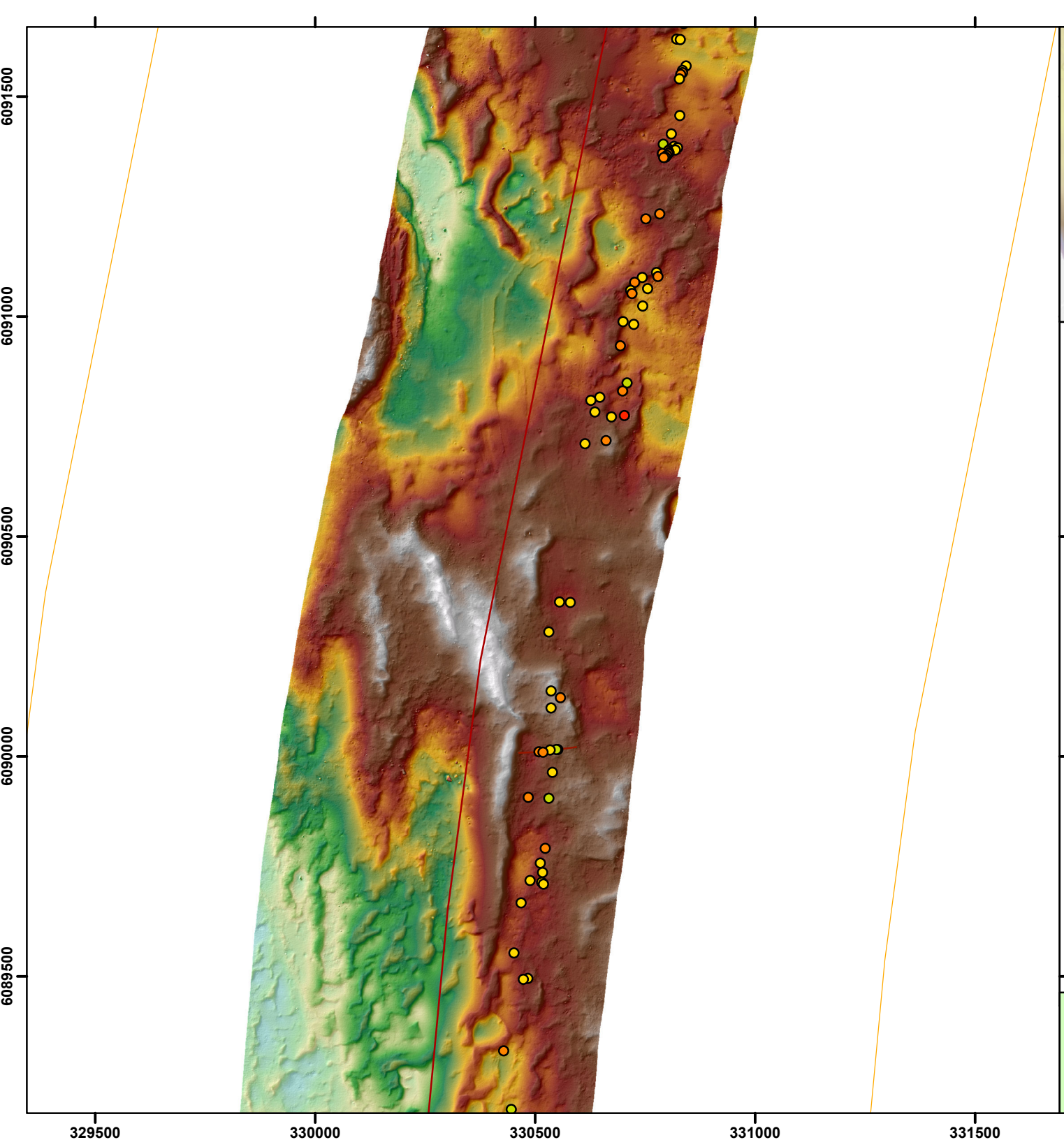
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

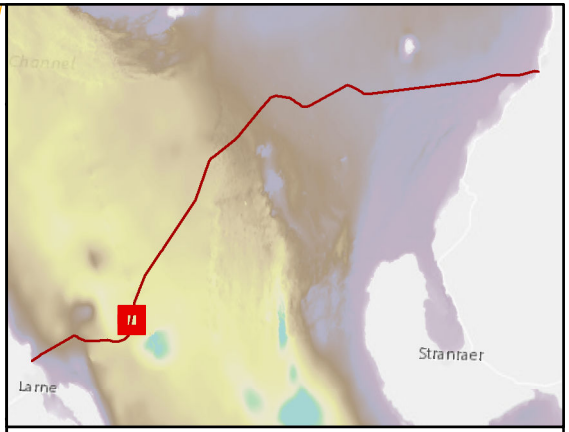
N

Coracle Archaeology

PROJECT TITLE: **Scot-NI 4**
FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**
FIGURE NO. **56**
DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW


6094000
6093500
6093000
6092500
6092000
330000
330500
331000
331500
332000
Channel
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -127.045
Low : -162.484
0
250
500
Metres
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 57
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -122.12

Low : -143.443

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

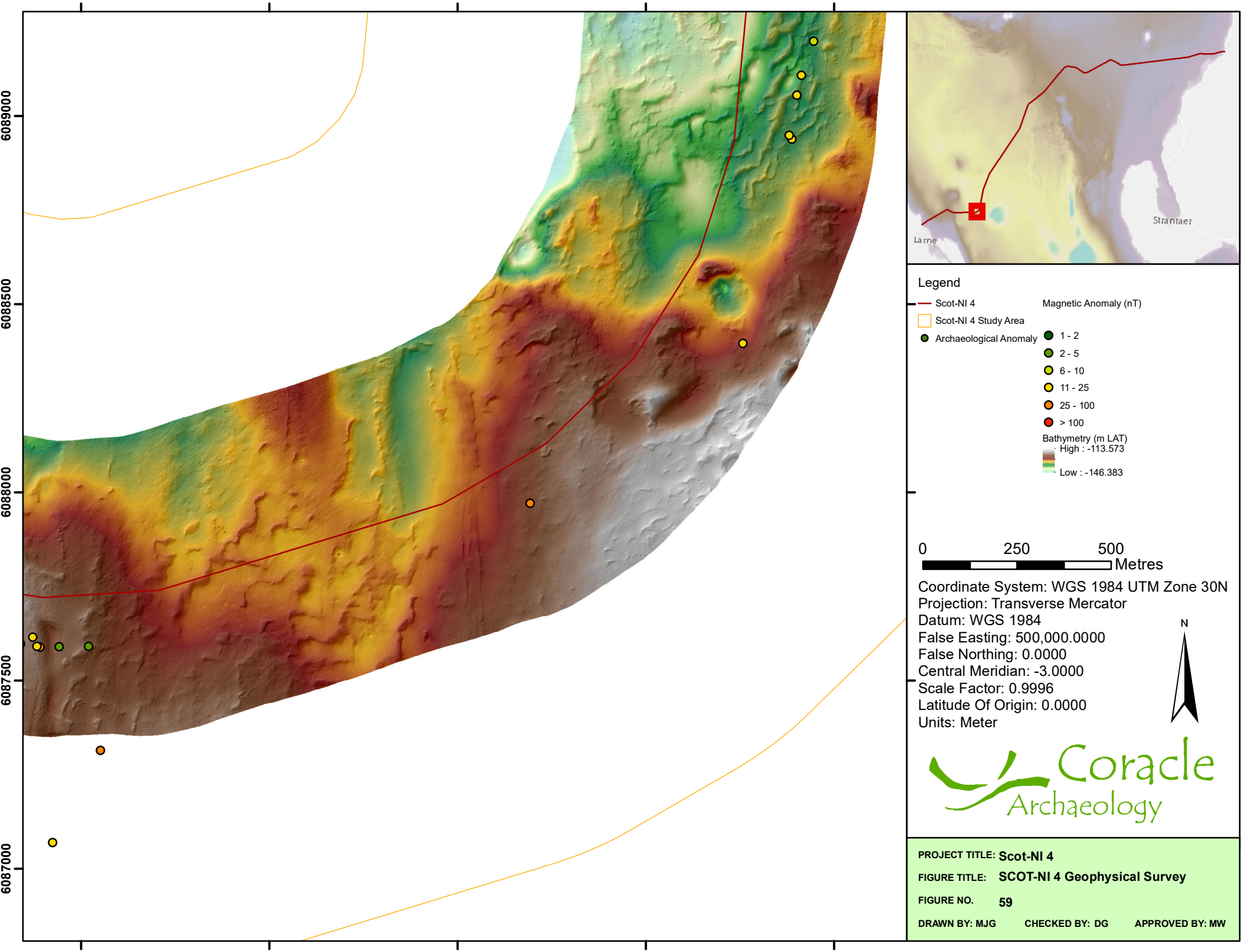
Coracle Archaeology

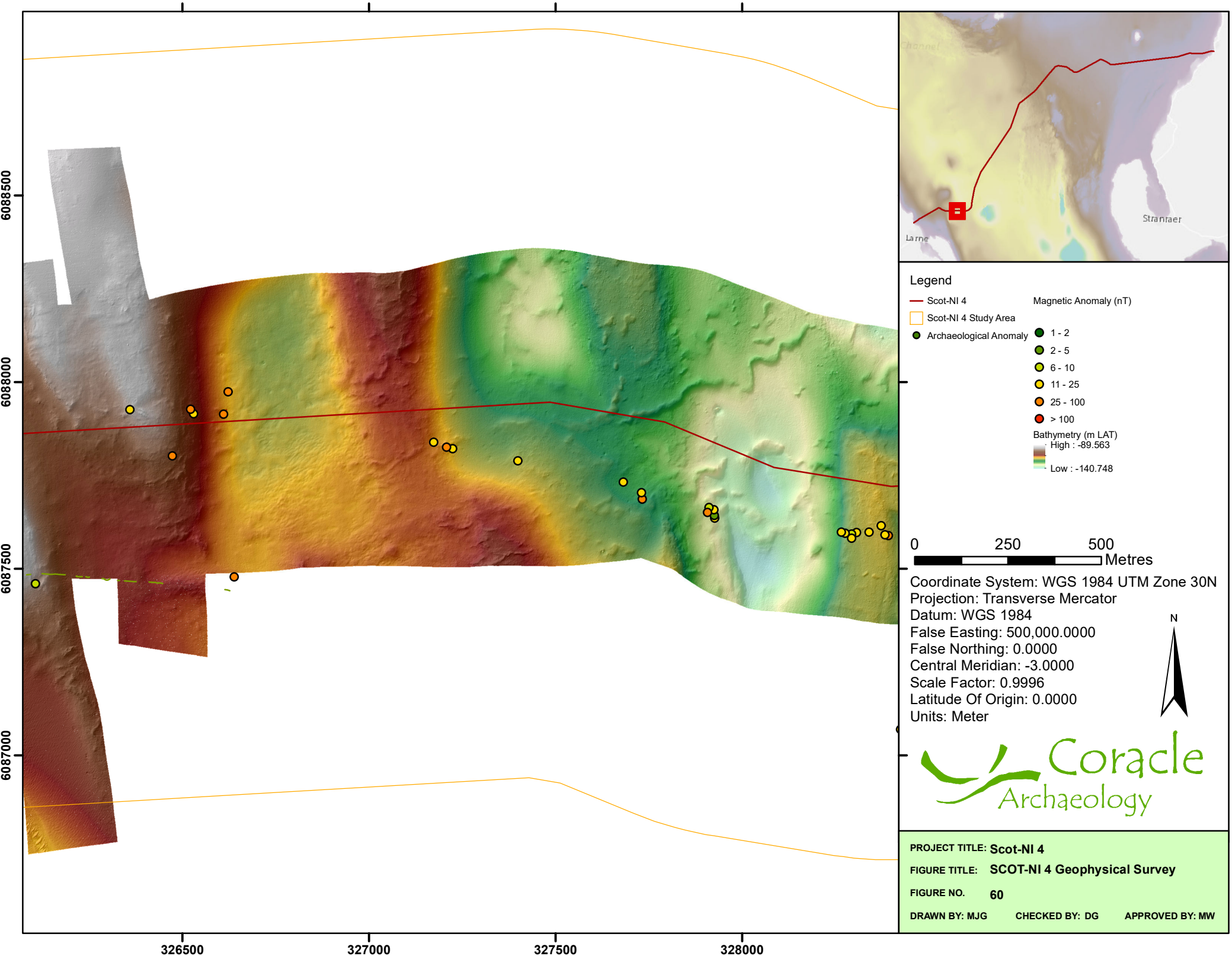
PROJECT TITLE: **Scot-NI 4**

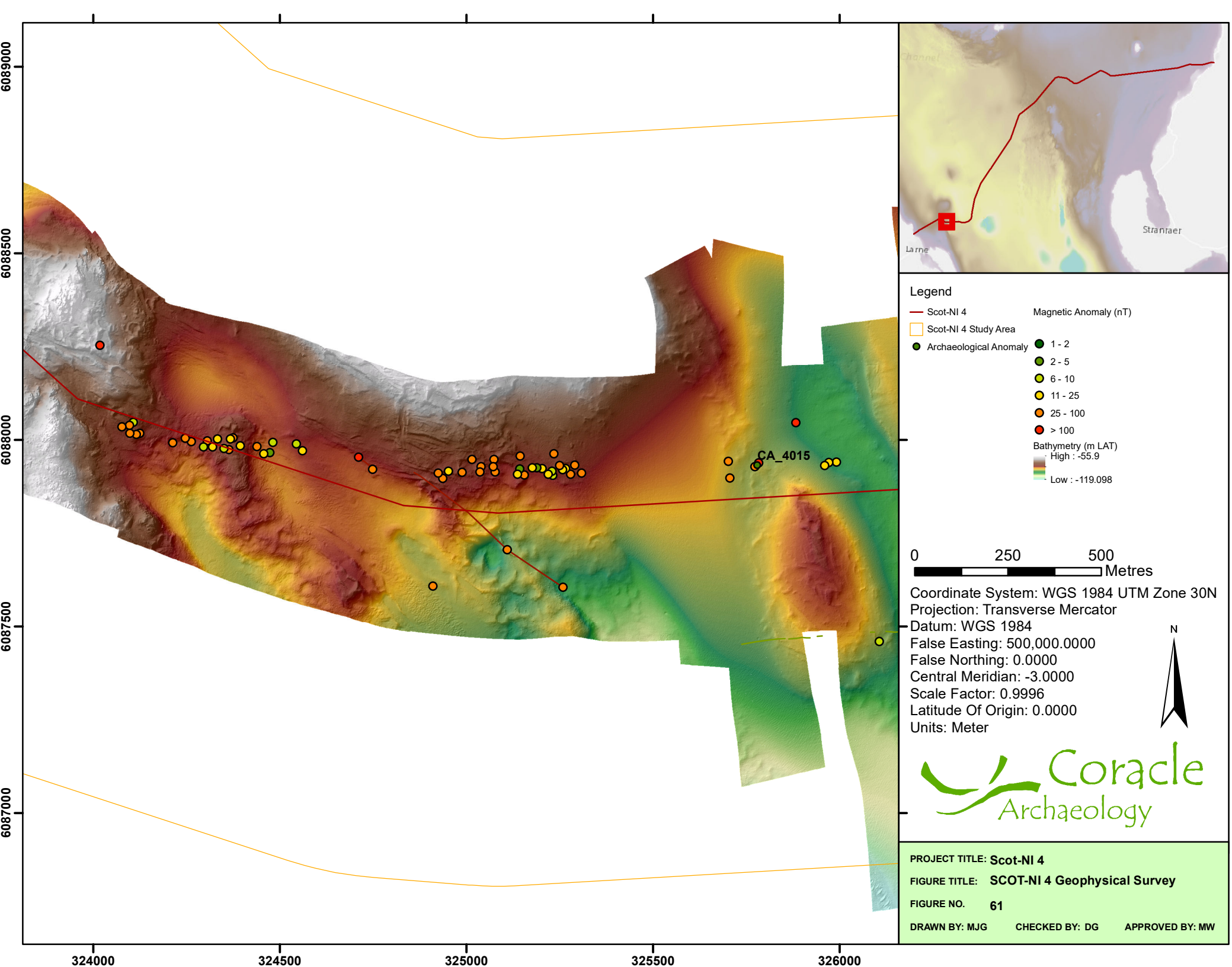
FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

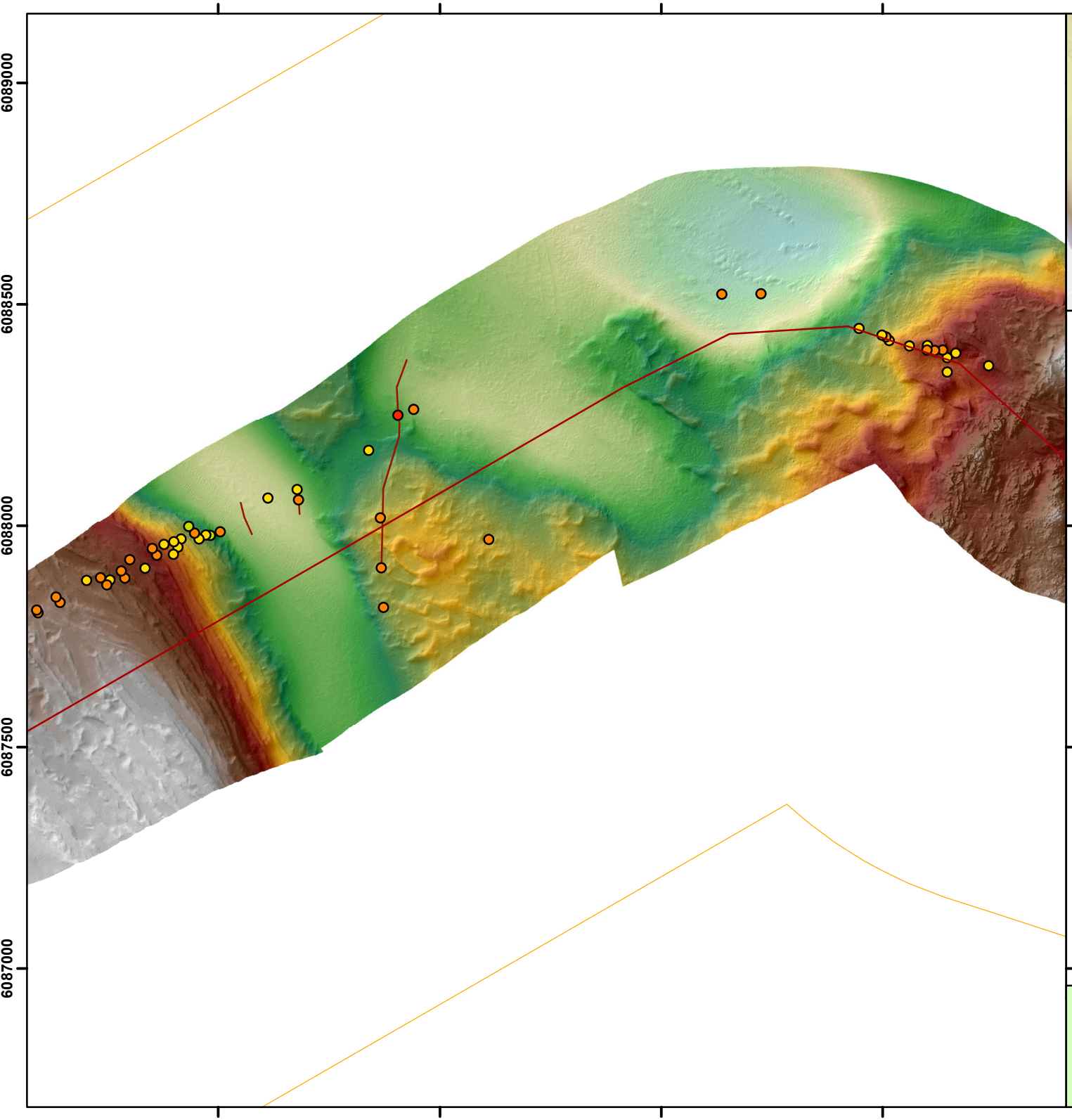
FIGURE NO. **58**

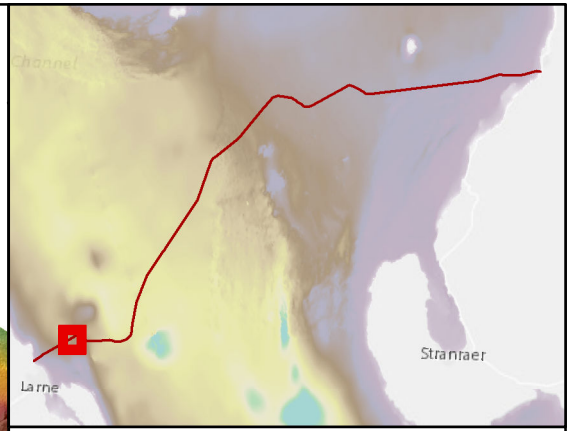
DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW


6089000
6088500
6088000
6087500
6087000
328500
329000
329500
330000
330500
Larne
Stranraer
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -113.573
Low : -146.383
0
250
500
Metres
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 59
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW


6088500
6088000
6087500
6087000
326500
327000
327500
328000
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -89.563
Low : -140.748
0
250
500
Metres
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 60
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW


6089000
6088500
6088000
6087500
6087000
324000
324500
325000
325500
326000
CA_4015
Channel
Stranraer
Larne
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -55.9
Low : -119.098
0
250
500
Metres
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 61
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW





Legend

- Scot-NI 4
- Scot-NI 4 Study Area
- Archaeological Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -50.935

Low : -110.427

0 250 500 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

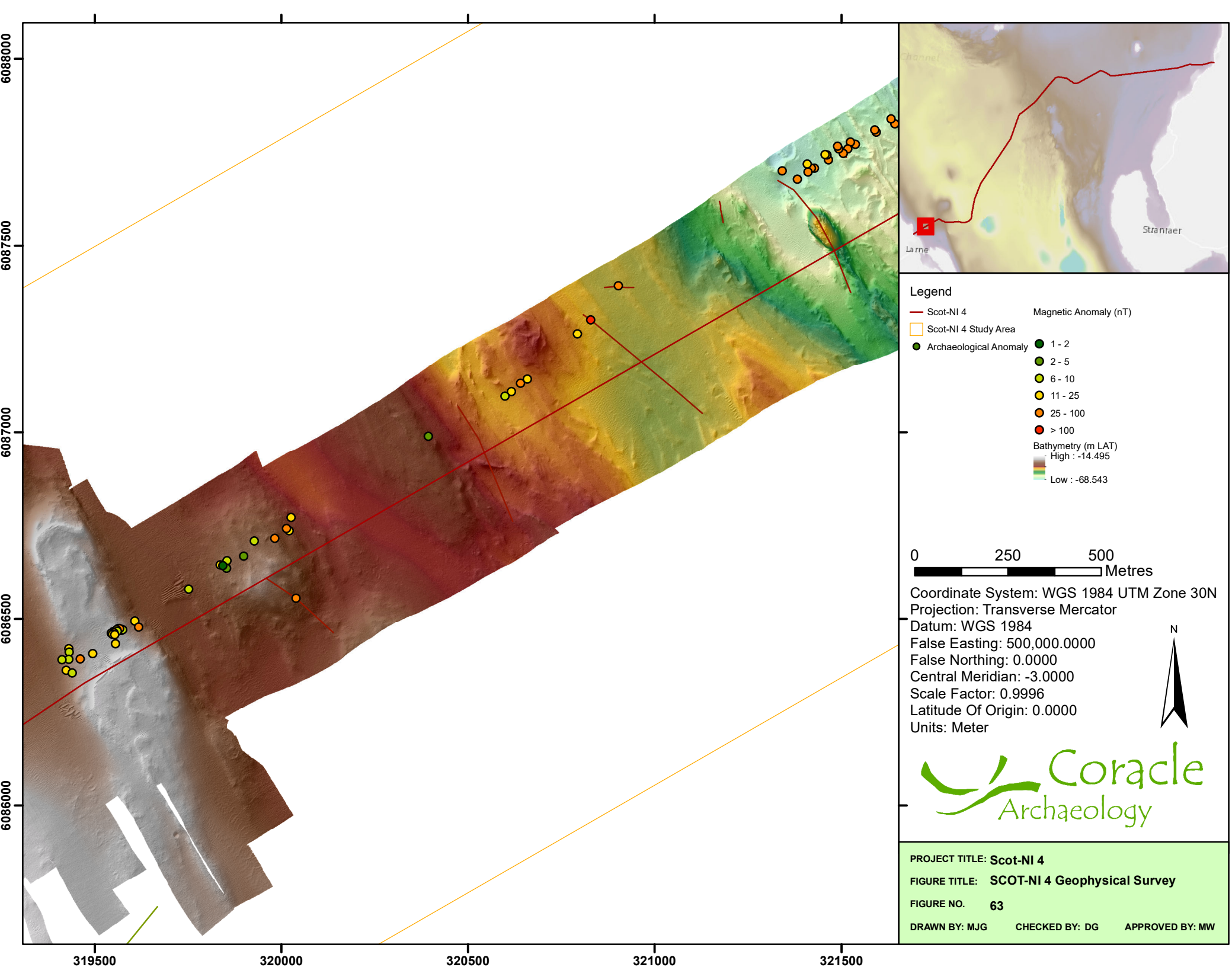
Coracle Archaeology

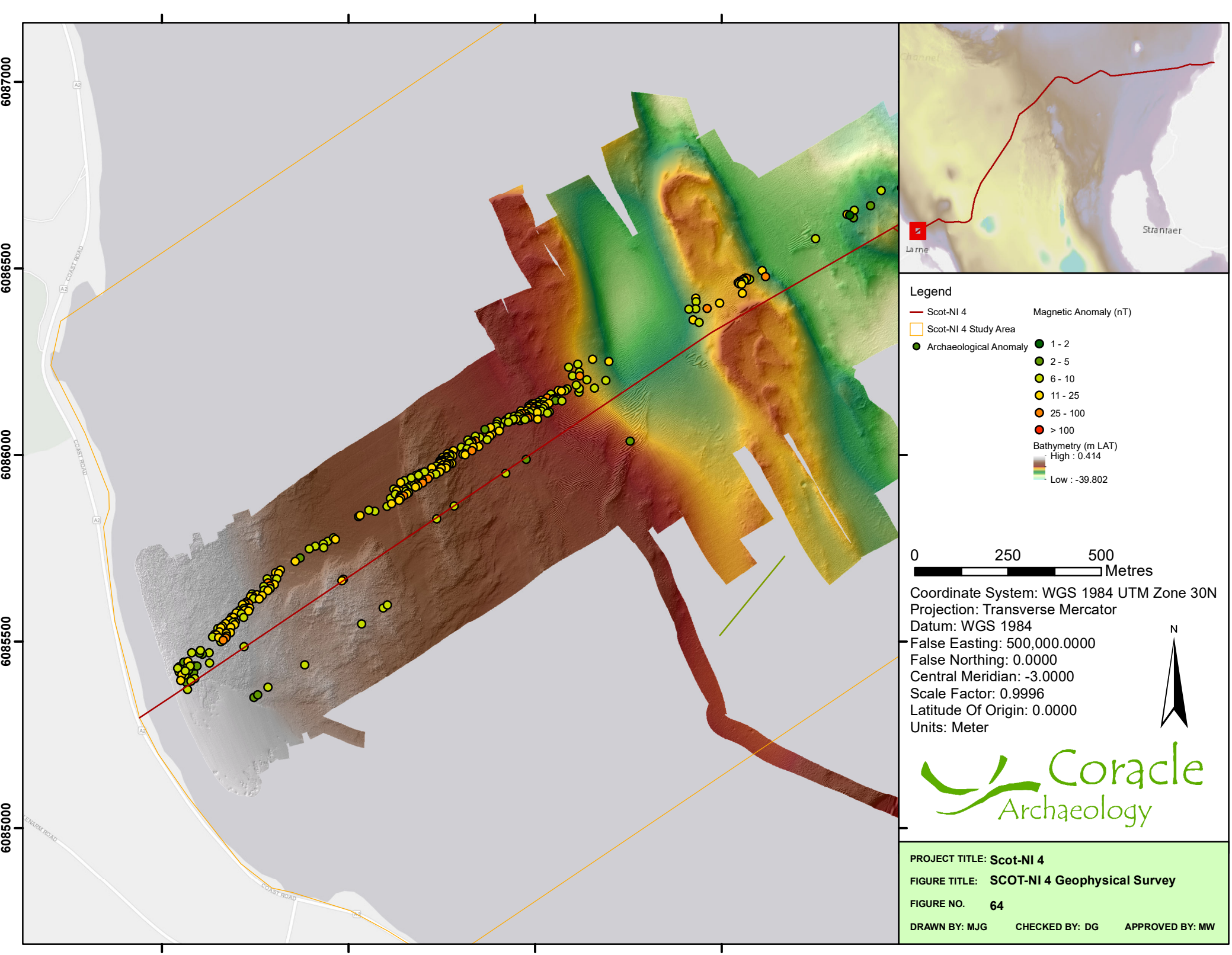
PROJECT TITLE: **Scot-NI 4**

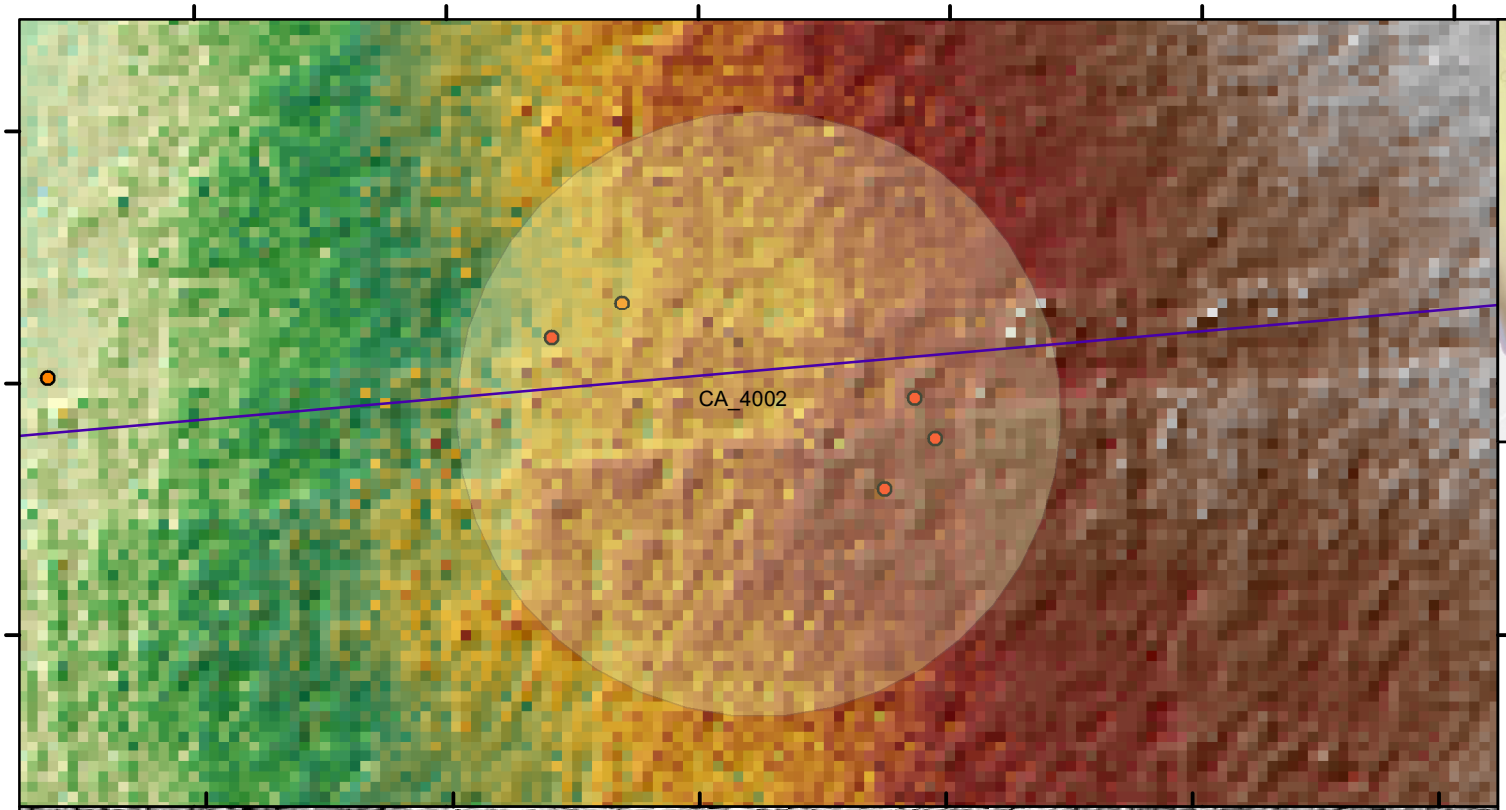
FIGURE TITLE: **SCOT-NI 4 Geophysical Survey**

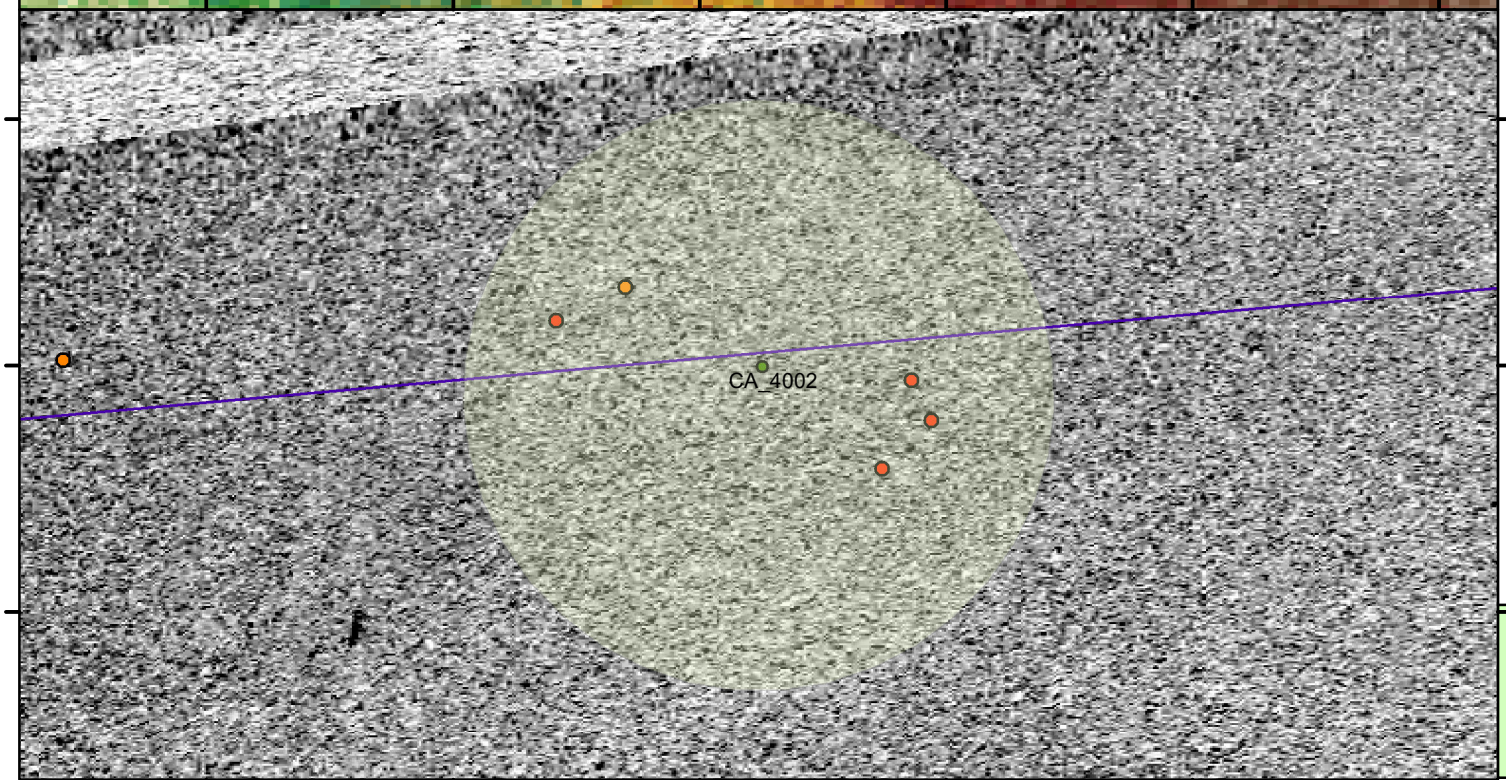
FIGURE NO. **62**

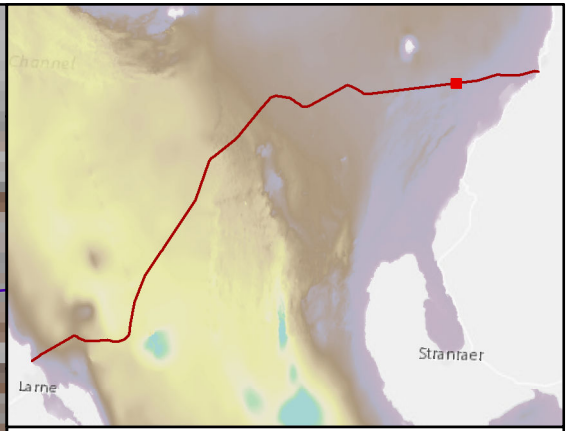
DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW


6088000
6087500
6087000
6086500
6086000
319500
320000
320500
321000
321500
Larne
Stranraer
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : -14.495
Low : -68.543
0
250
500
Metres
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 63
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW


6087000
6086500
6086000
6085500
6085000
318000
318500
319000
319500
COAST ROAD
A2
ENARM ROAD
Larne
Stranraer
Legend
Scot-NI 4
Scot-NI 4 Study Area
Archaeological Anomaly
Magnetic Anomaly (nT)
1 - 2
2 - 5
6 - 10
11 - 25
25 - 100
> 100
Bathymetry (m LAT)
High : 0.414
Low : -39.802
0
250
500
Metres
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter
N
Coracle
Archaeology
PROJECT TITLE: Scot-NI 4
FIGURE TITLE: SCOT-NI 4 Geophysical Survey
FIGURE NO. 64
DRAWN BY: MJG
CHECKED BY: DG
APPROVED BY: MW







Legend

- Scot-NI 4
- AEZ
- Boulder SSS Anomaly
- Cable SSS Anomaly
- Other SSS Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -40.169

Low : -40.949

0 15 30 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

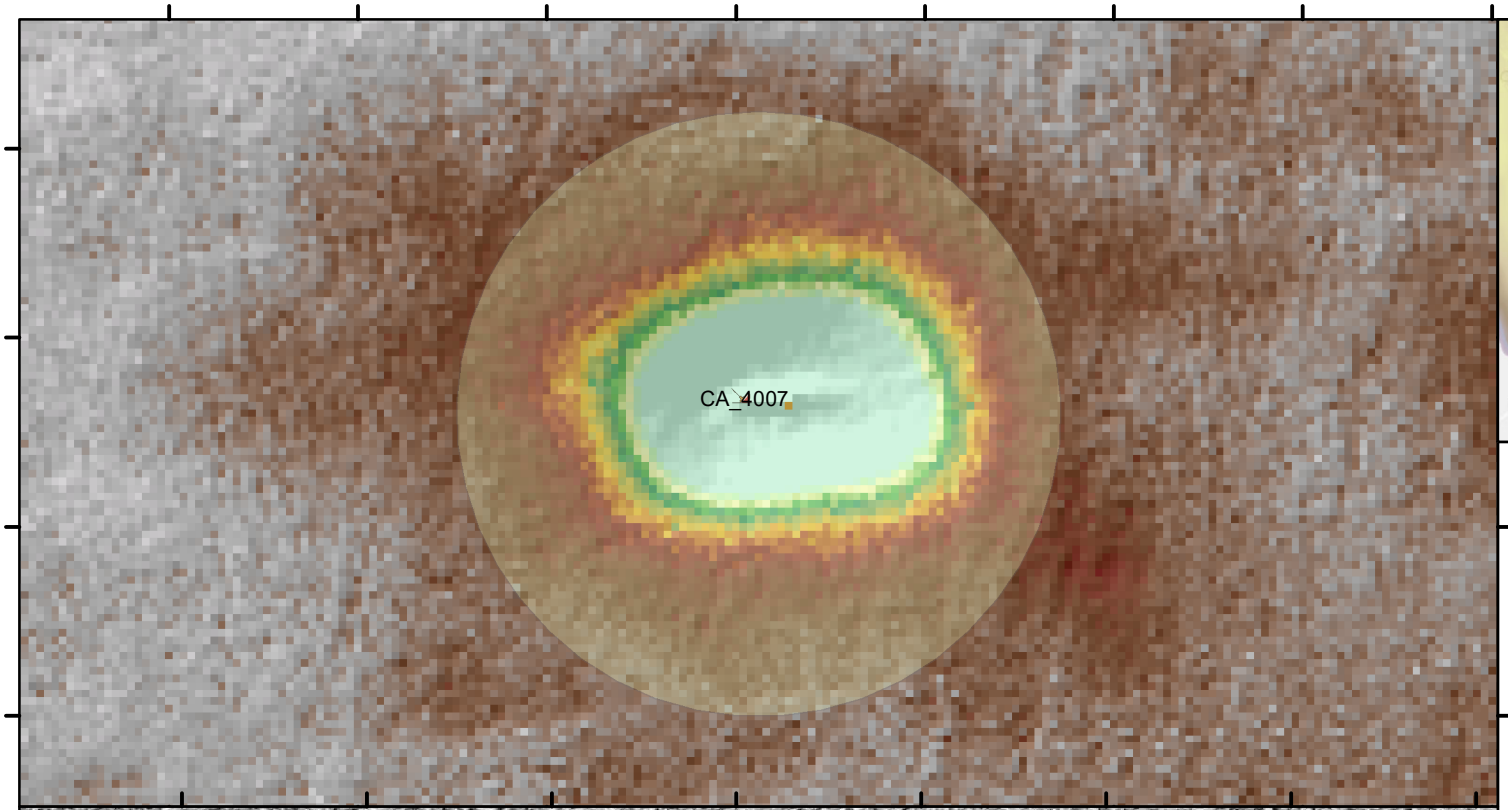
Coracle Archaeology

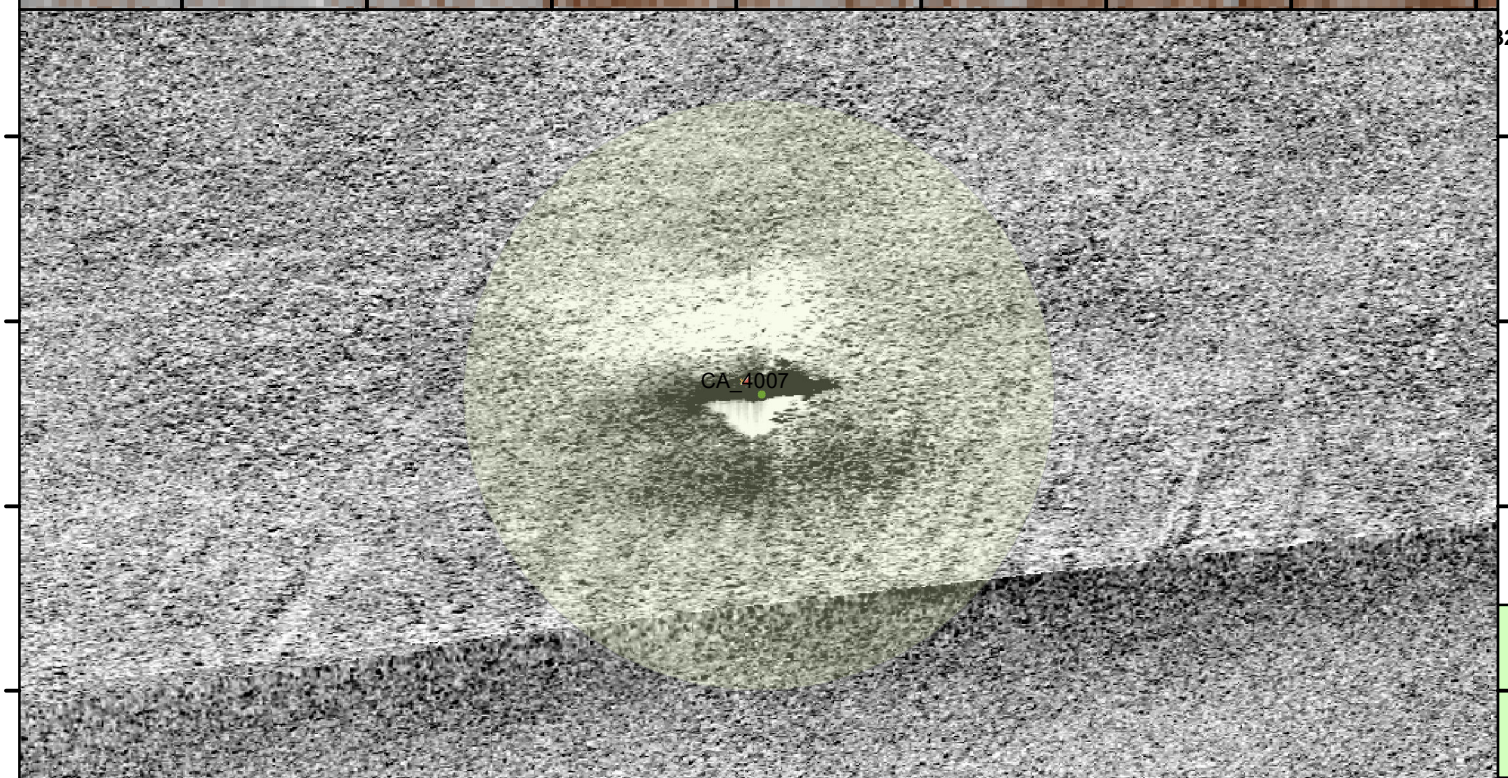
PROJECT TITLE: **Scot-NI 4**

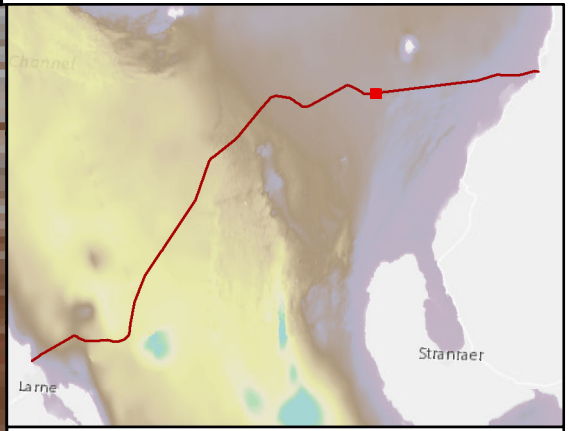
FIGURE TITLE: **Geophysical Anomalies CA_4002**

FIGURE NO. **65**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW







6118925
6118900
6118875
6118850

361150 361175 361200 361225 361250 361275 361300 361325

Legend

- Scot-NI 4
- AEZ
- Boulder SSS Anomaly
- Cable SSS Anomaly
- Other SSS Anomaly

Magnetic Anomaly (nT)
- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)
High : -48.769
Low : -51.327

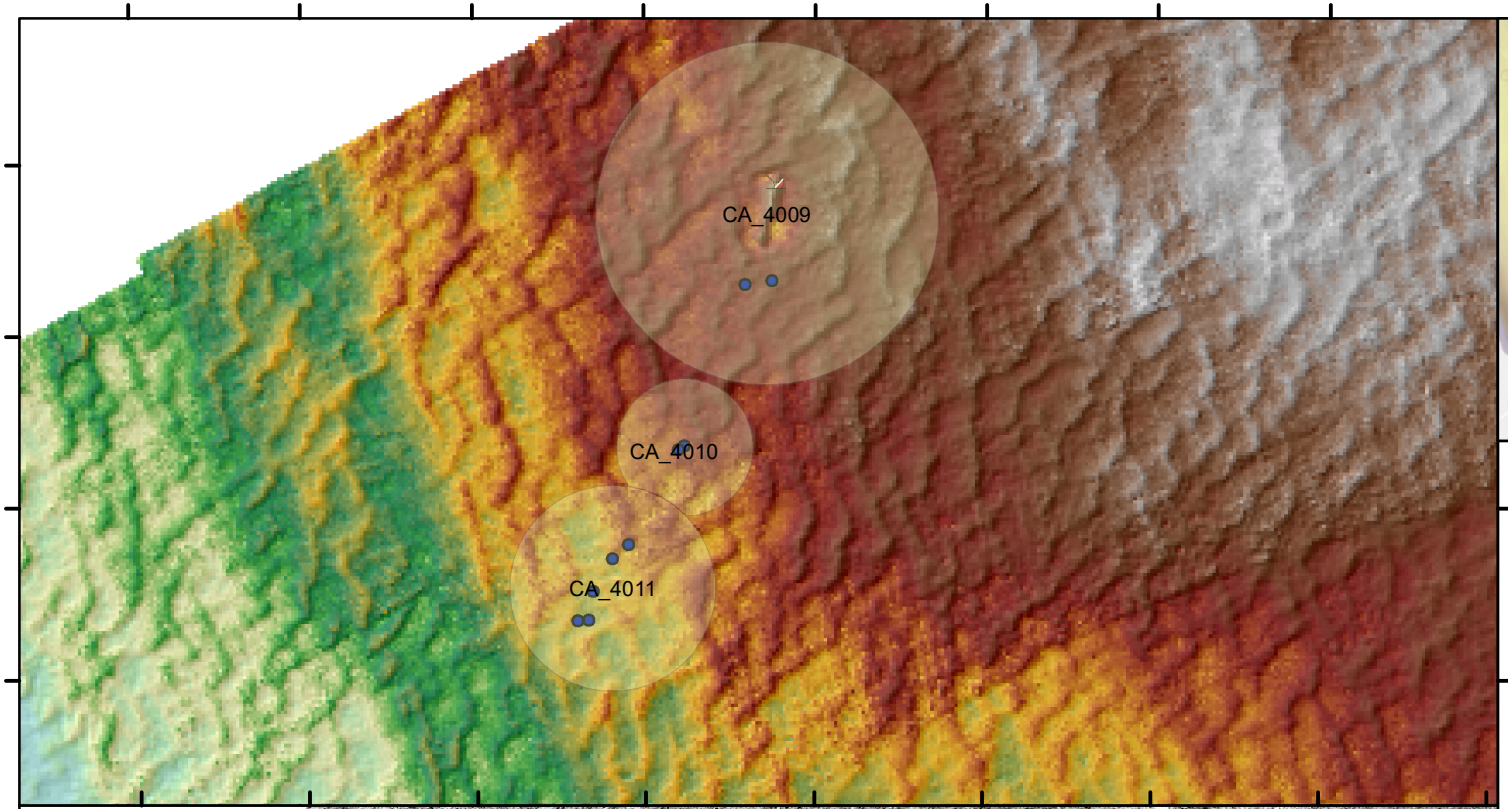
0 20 40 Metres

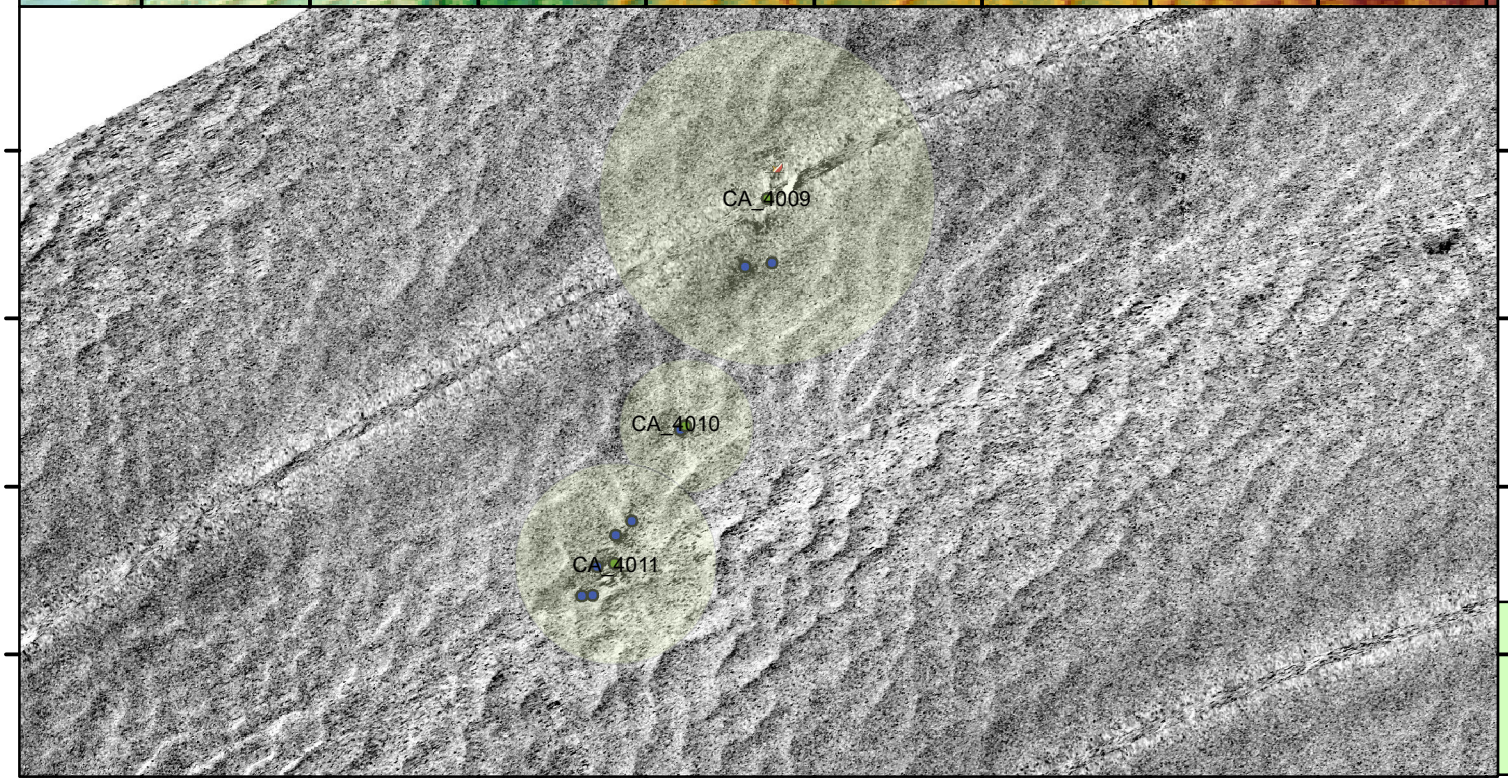
Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

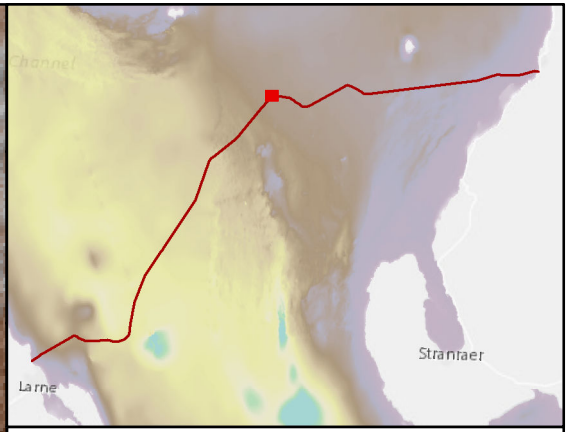
N

Coracle Archaeology

PROJECT TITLE: **Scot-NI 4**
FIGURE TITLE: **Geophysical Anomalies CA_4007**
FIGURE NO. **66**
DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW







Legend

- Scot-NI 4
- AEZ
- Boulder SSS Anomaly
- Cable SSS Anomaly
- Other SSS Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -59.399

Low : -61.134

0 45 90 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

Coracle Archaeology

PROJECT TITLE: **Scot-NI 4**

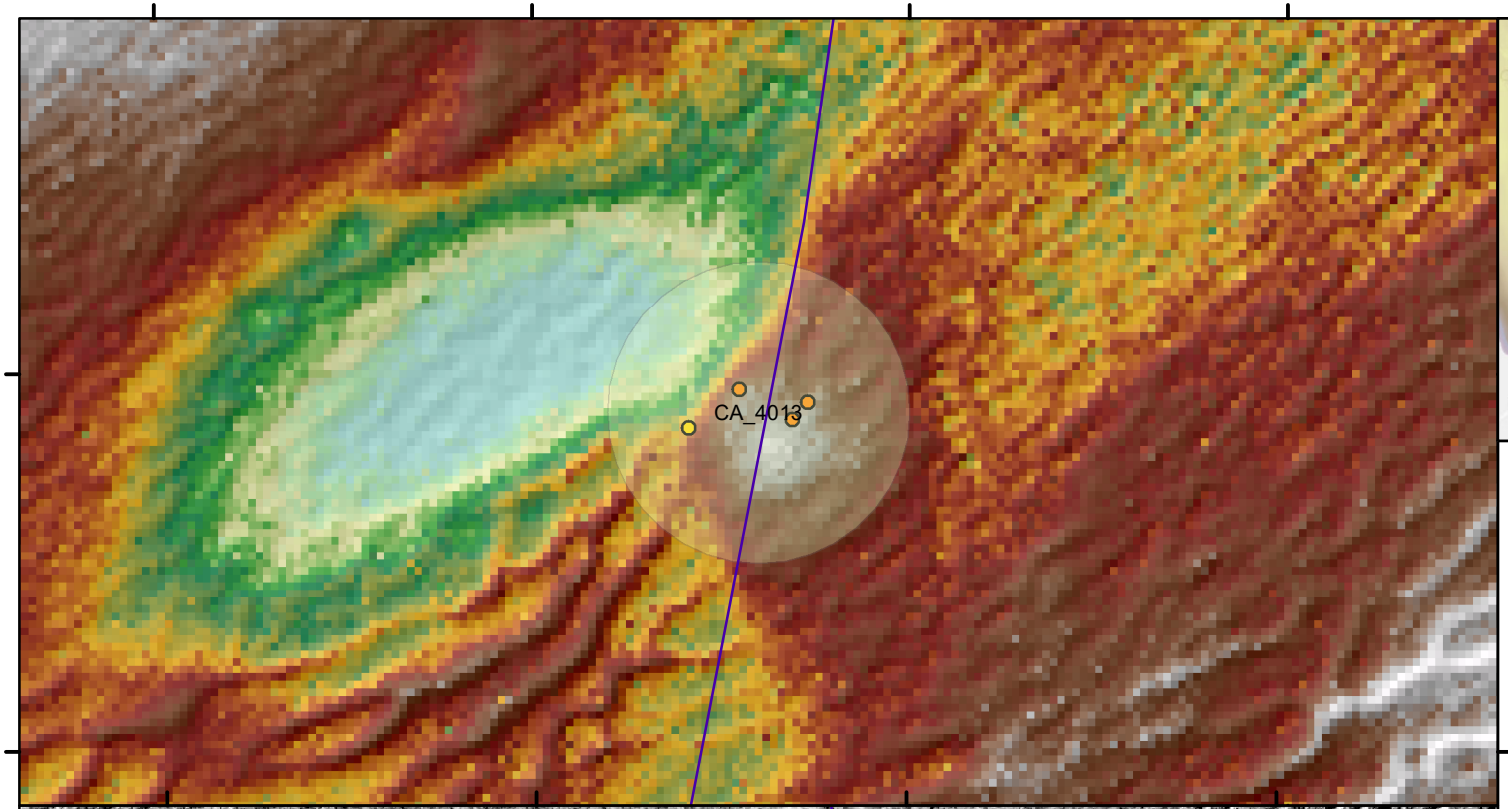
FIGURE TITLE: **Geophysical Anomalies CA_4009-11**

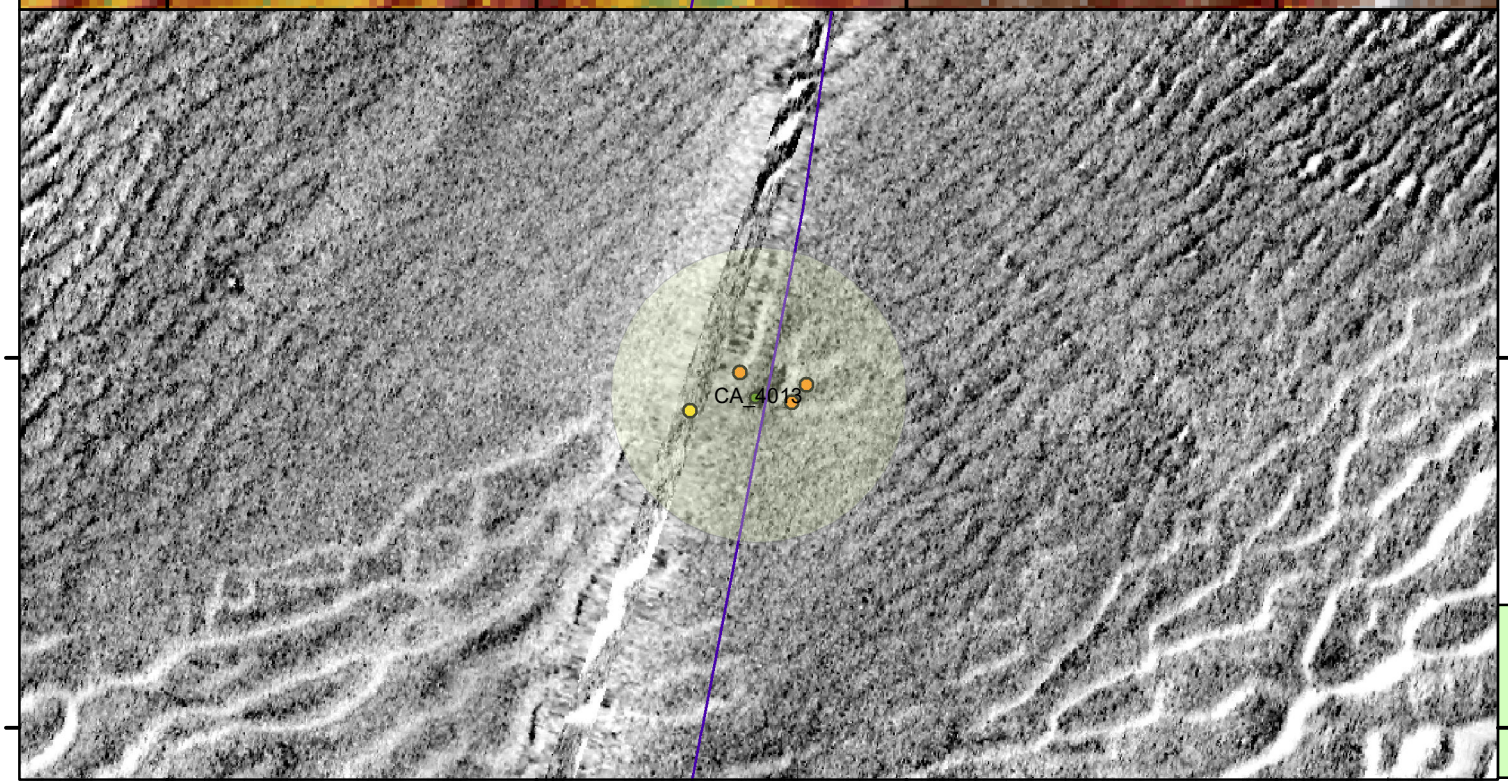
FIGURE NO. **67**

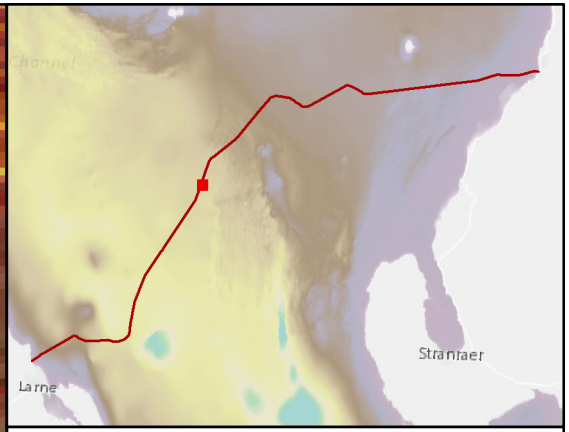
DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW

6118700
6118650
6118600
6118550

347950 348000 348050 348100 348150 348200 348250 348300 348350







Legend

- Scot-NI 4
- AEZ
- Boulder SSS Anomaly
- Cable SSS Anomaly
- Other SSS Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -116.002

Low : -117.724

0 20 40 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

Coracle Archaeology

PROJECT TITLE: **Scot-NI 4**

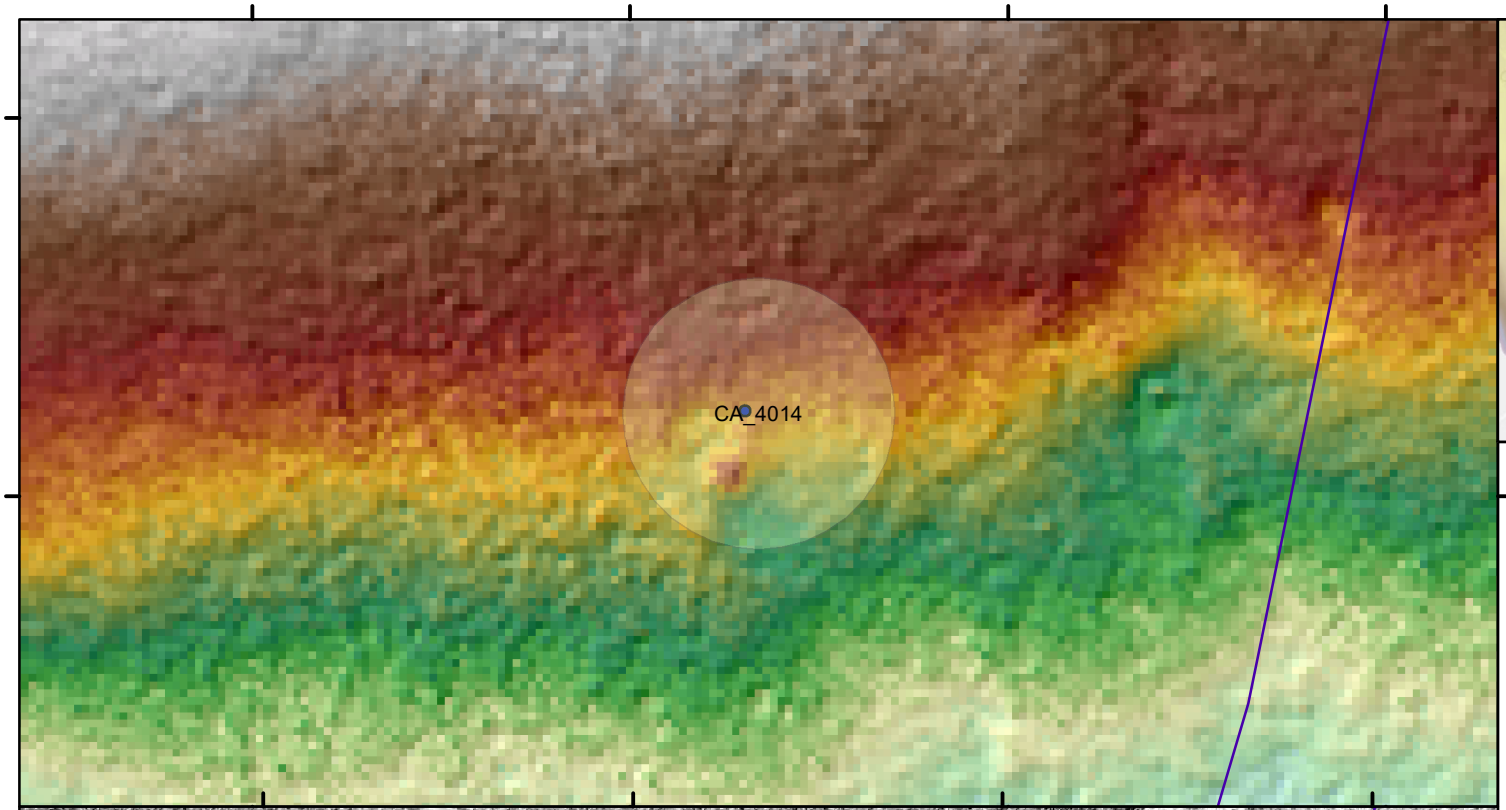
FIGURE TITLE: **Geophysical Anomalies CA_4013**

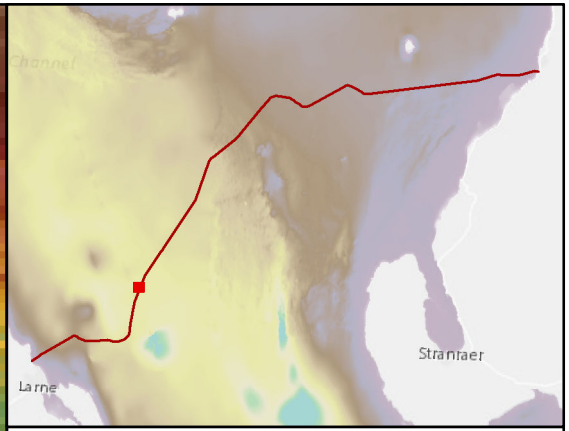
FIGURE NO. **68**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW

6107400
6107350
6107400
6107350

339350 339400 339450 339500





6094550
6094500
6094550
6094500

331350
331400
331450
331500

Legend

- Scot-NI 4
- AEZ
- Boulder SSS Anomaly
- Cable SSS Anomaly
- Other SSS Anomaly

Magnetic Anomaly (nT)

- 1 - 2
- 2 - 5
- 6 - 10
- 11 - 25
- 25 - 100
- > 100

Bathymetry (m LAT)

High : -138.575

Low : -140.692

0 20 40 Metres

Coordinate System: WGS 1984 UTM Zone 30N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -3.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

N

Coracle Archaeology

PROJECT TITLE: **Scot-NI 4**

FIGURE TITLE: **Geophysical Anomalies CA_4014**

FIGURE NO. **69**

DRAWN BY: MJG CHECKED BY: DG APPROVED BY: MW