

GUARD ARCHAEOLOGY



North Third Reservoir: Gradiometry Survey Data Structure Report Project 3659

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North Third Reservoir: Gradiometry Survey Data Structure Report

On behalf of: George Leslie Ltd

NGR: NS 75700 89501 (centred at west flank)
NS 75945 89417 (centred at east flank)

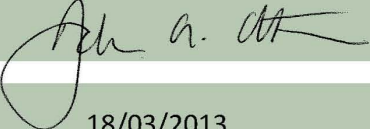
Project Number: 3659

Report by: Christine Rennie

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Project Manager: John Atkinson

Approved by:


18/03/2013

Date:

*This document has been prepared in accordance
with GUARD Archaeology Limited standard operating procedures.*

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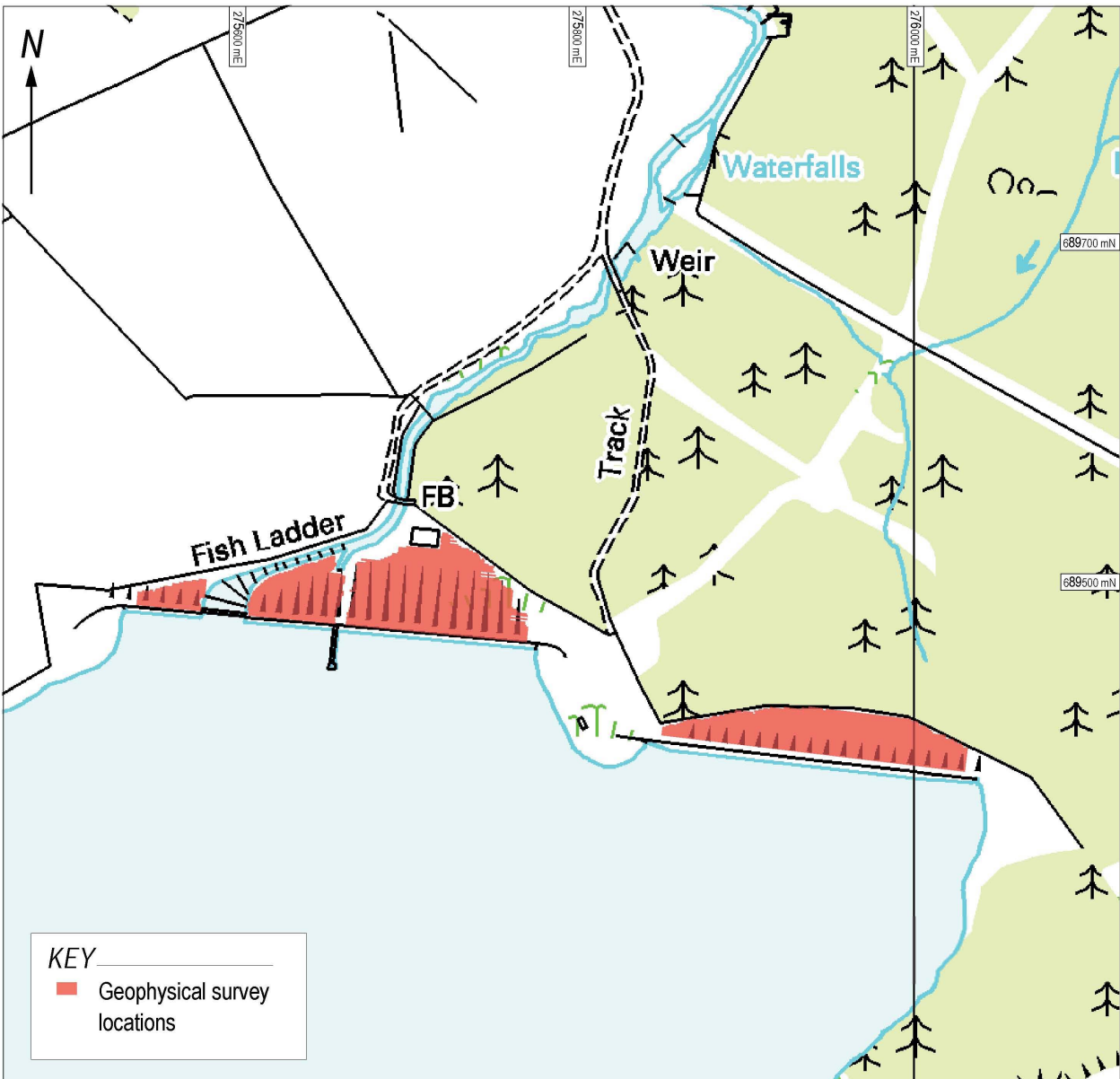
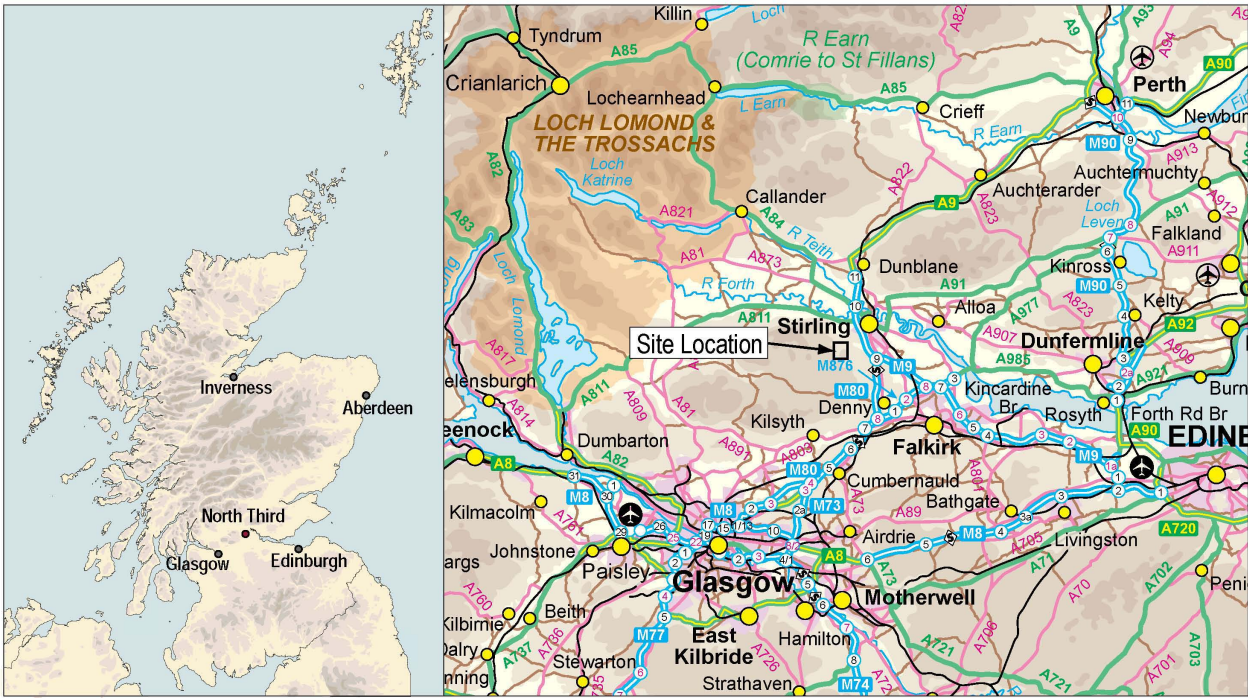


Figure 1:
Site location.



Executive Summary

- 1.1 A gradiometry survey was carried out by GUARD Archaeology Limited on behalf of George Leslie Ltd over two downstream flanks of the dam at North Third Reservoir, Stirling. The survey successfully located the main drainage ditches, feeder channels and drain covers on both flanks of the dam.
- 1.2 Oasis Reference Number: guardarc1-145013

Introduction

- 2.1 This report sets out the results of a gradiometry survey undertaken by GUARD Archaeology Limited on behalf of George Leslie Ltd. The survey was carried out during groundworks on the downstream flanks of the reservoir, and was undertaken over five days between 26th February and 5th March 2013.

Site Location, Topography and Geology

- 3.1 North Third Reservoir lies in the Touch Hills, about 3.5 km southwest of Cambusbarron. The western flank site is bounded to the south by the reservoir, to the west and north-west by pasture and to the north-east by immature forestry. The east flank is bounded to the north by immature forestry, to the south by the reservoir and to the east and west by open ground of indeterminate use.
- 3.2 Both downstream flanks slope down very steeply from south to north, the west flank being markedly steeper than the east. A set of concrete steps lie at about the centre of the west flank, and the westernmost part of this area is accessed by bridge.
- 3.3 Both of the areas surveyed comprise made ground where earth was banked up to form the downstream flanks of the reservoir. The bedrock is Clyde Plateau Volcanic Formation, an igneous bedrock formed approximately 330 to 344 million years ago.

Aims and Objectives

- 4.1 The geophysical survey aimed to locate the pattern of drainage channels on the west and east downstream flanks of North Third Reservoir. The specific objectives were to:-
 - use gradiometry to identify existing drainage channels;
 - use resistivity if necessary to identify existing drainage channels; and
 - produce an illustrated report indicating the locations of drainage channels and other relevant features.

Methodology

- 5.1 The gradiometry survey was carried out using a Geoscan FM256 Fluxgate Gradiometer. The readings were taken at a 0.25 m sample interval and a 1 m traverse interval, giving 1600 reading per 20 x 20 m grid. This survey frequency allowed a good resolution of detail with the minimum impact in terms of the time required to complete the survey.
- 5.2 The data was downloaded into Geoplot v3 for analysis and plot production. The resulting plots were overlaid onto the existing plan of the site, showing where any anomalies lie in relation to the surface features.
- 5.3 The survey grid on the east flank was recorded using a Magellan Mobilemapper CX sub-metre DGPS. This creates fully geo-referenced information for each grid point for the accurate placement of the geophysics results within the Ordnance Survey national grid, allowing for

the ease of relocating areas identified for further assessment. Unfortunately, due to poor GPS signal, the position of the gradiometry grid on the west flank could not be recorded in this way, and was measured at fixed locations in order to accurately locate the survey within the national grid.

5.4 The gradiometer is very sensitive to the presence of metal and to building materials that have been subjected to heat, and will produce anomalous readings if used in their proximity. Such obstacles were found in both areas surveyed, with the result that no readings could be taken within about 3 m of the following:-

- The metal and wire fence enclosing the east, south and west of the east flank;
- The concrete steps and metal handrail in the west flank;
- The brick and concrete structure at the north of the west flank; and
- The bridge and temporary fencing at the westernmost end of the west flank.

Potential Resistivity Survey

5.5 The project brief allowed for the use of resistivity as a contingency, should the gradiometry survey not locate the drainage pattern. As the gradiometer did successfully locate the main drains, feeder drains and drain heads over most of the areas surveyed, it was considered by the field director that an additional resistivity survey would not add significantly to the results, and the tentative plan to utilise this technique was not adopted.

Results

6.1 Following processing of the data collected in the field, the gradiometry survey revealed geophysical anomalies on both downstream flanks. Reports on the individual sites are below.

East Flank

6.2 Six cuts were recorded on the east flank. Two of these (Cuts 1 and 2) are visible on the ground and run approximately south to north down the face of the slope. The remaining four (Cuts 3 to 6) appear to feed into these, and are not readily visible on the ground.

6.3 The topography of the east flank suggests that a further cut runs along the fence-line on the north-west side of the site, parallel to Cut 3. However, the proximity of the fence meant that the feature could not be surveyed. In addition to the drainage cuts, the survey located one large and eight small metal drain covers, as noted on Figure 2.

West Flank

6.4 Sixteen cuts were recorded on the main west flank. Three of these (Cuts 7 to 9) run south to north down the face of the slope, and the remaining twelve cuts (Cuts 10 to 21) feed into these. An existing metal pipe visible on the flat was found to extend up the slope for about 20 m.

6.5 No drainage features can be discerned within the small area at the extreme west of this flank, although an existing stone structure visible on the surface is probably related to drainage.

Discussion

7.1 The pattern of the cuts on both east and west flanks indicate that the existing drainage forms a herring-bone pattern of channels that feed into south-north aligned drains. These channels are quite subtle features, which the survey may not always have recorded. This is particularly apparent on the west flank, where the halo from metal and brick obstacles may have effectively masked the more subtle drainage cuts. Although much of this halo effect has been processed out of the survey, thereby making the drainage channels more obvious, it is noticeable that no

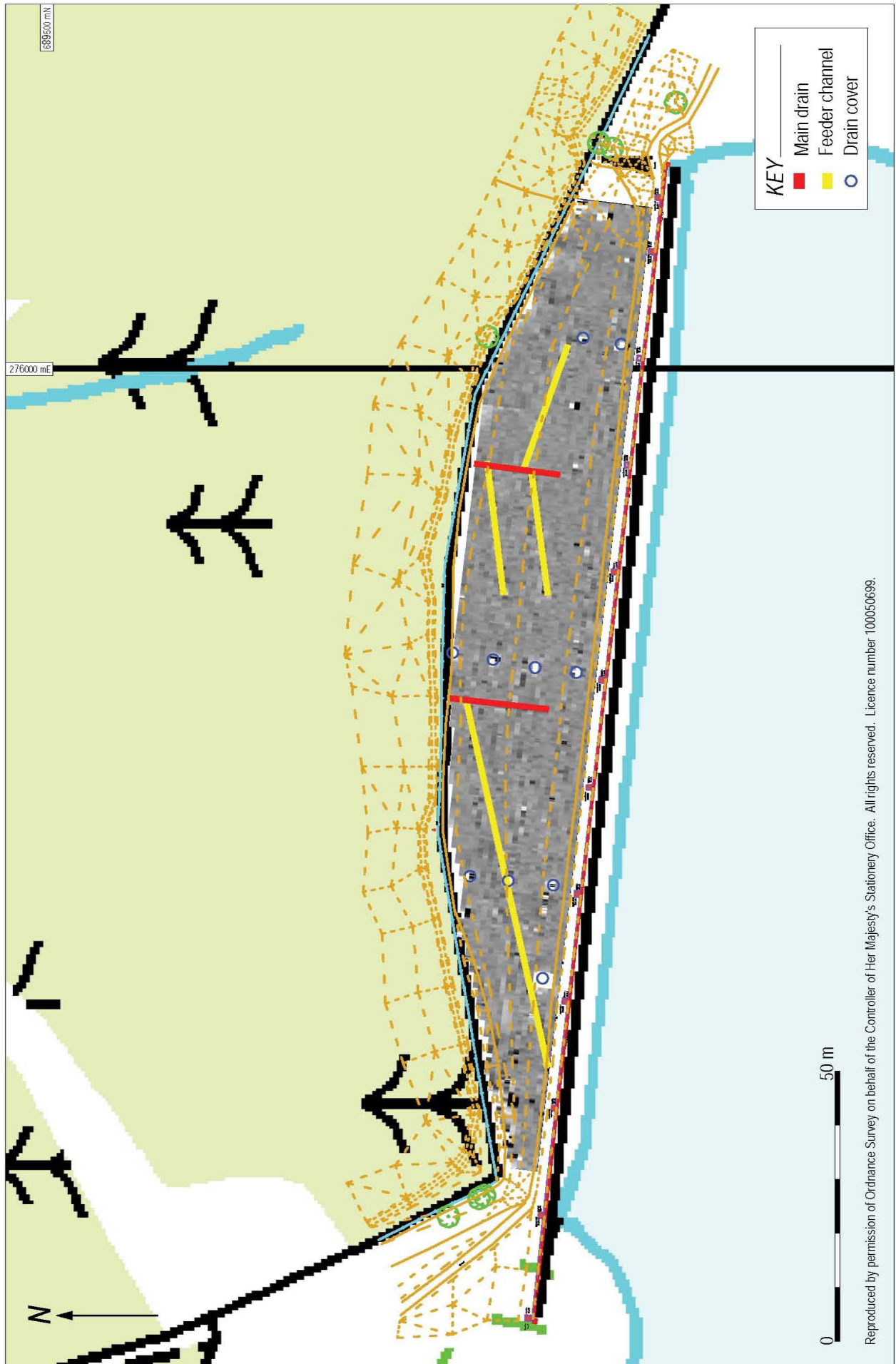


Figure 2: Annotated results, East flank.

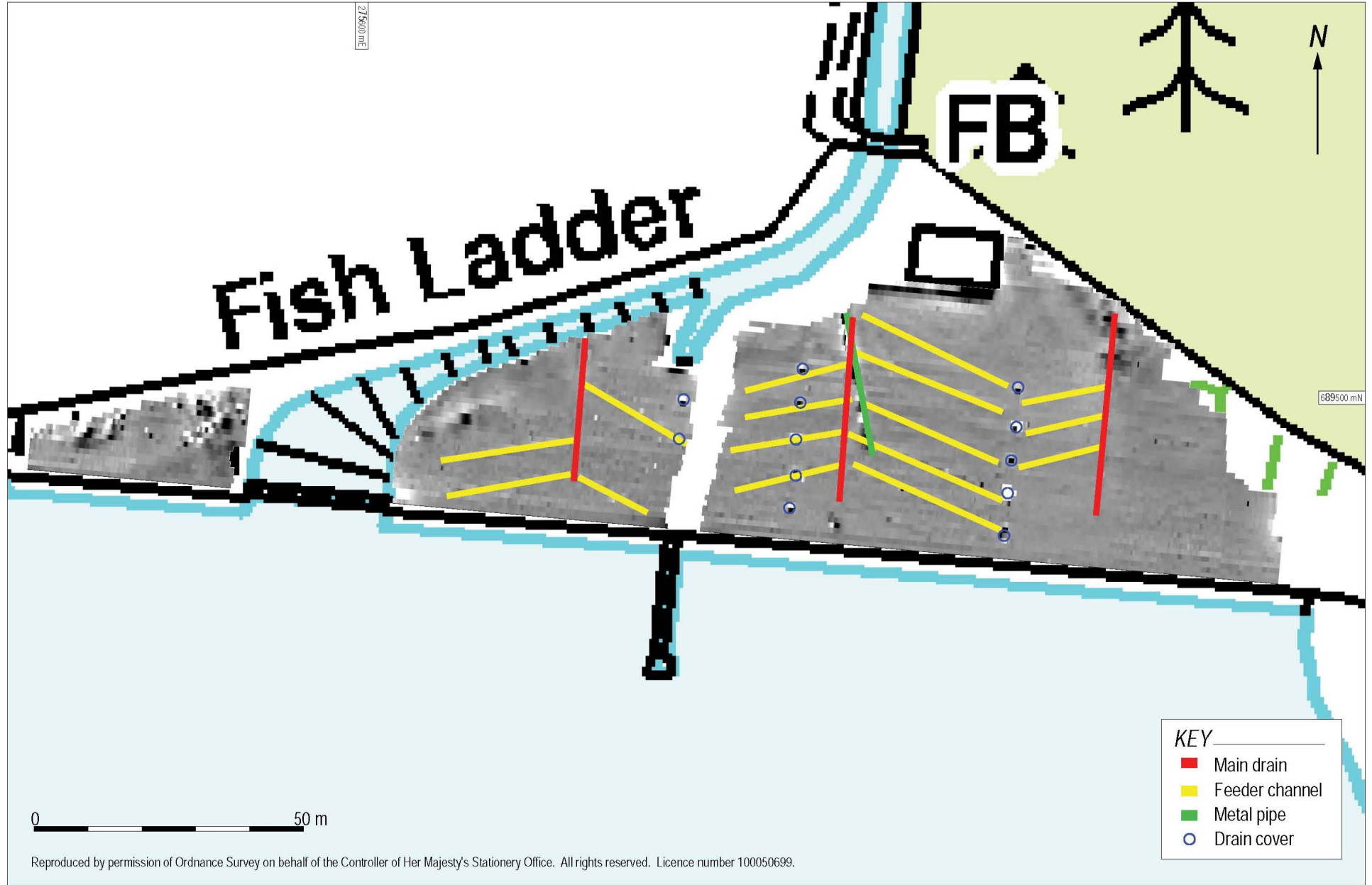


Figure 3: Annotated results, West flank.

feeder channels were recorded on the upper slope within the eastern portion of the west flank. However, as the recorded feeder channels elsewhere on the west flank are spaced about 5 m apart, it is likely that this same spacing continues in this area.

- 7.2 On both flanks, small metal drain covers appear to indicate the beginning of one of the feeder channels. While most of these metal covers on the west flank were visible, those on the east flank were overgrown with vegetation. The gradiometry survey will be of benefit in locating these for future reference.

Acknowledgements

- 8.1 GUARD Archaeology Limited would like to thank George Leslie Ltd, and in particular Grant Addison and Graeme Orr, for their assistance. Technical and administrative support was provided by Jen Cochrane, Aileen Maule and John Kiely. The illustrations were produced by Fiona Jackson and the report was desk top published by Gillian McSwan. The project was managed for GUARD Archaeology by John Atkinson, and the director was assisted in the field by Katrina Johnson.

Appendices

Appendix A: Sources Consulted

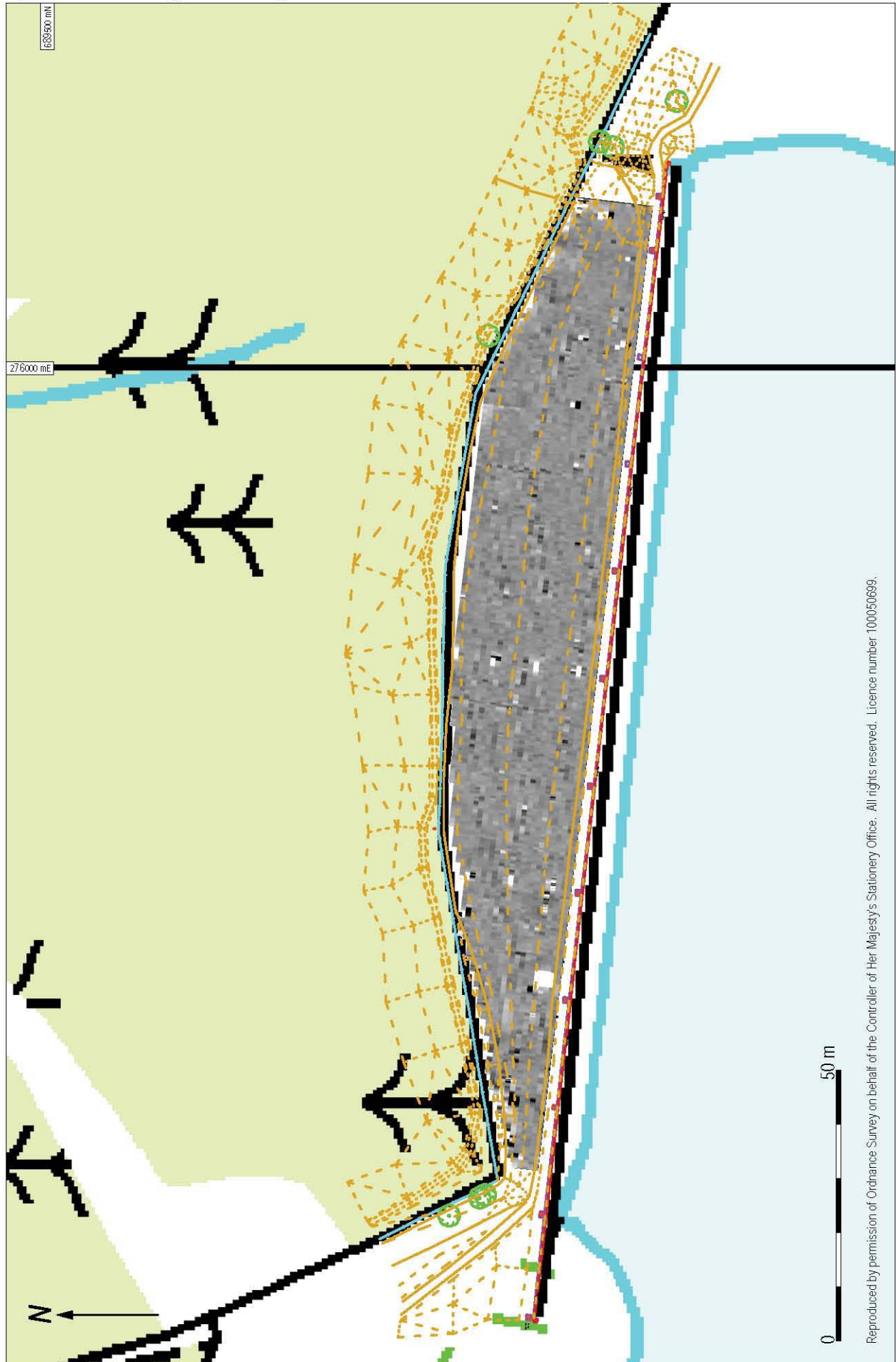
British Geological Survey <http://www.bgs.ac.uk> [Accessed 6th March 2013]

National Monuments Record for Scotland <http://jura.rcahms.gov.uk/PASTMAP/Map> [Accessed 6th March 2013]

Appendix B: DES entry

LOCAL AUTHORITY:	Stirling
PROJECT TITLE/SITE NAME:	North Third Reservoir: Gradiometry Survey
PROJECT CODE:	3659
PARISH:	St Ninians
NAME OF CONTRIBUTOR(S):	Christine Rennie
NAME OF ORGANISATION:	GUARD Archaeology Limited
TYPE(S) OF PROJECT:	Gradiometry survey
NMRS NO(S):	None
SITE/MONUMENT TYPE(S):	None
SIGNIFICANT FINDS:	N/A
NGR (2 letters, 6 figures)	NS 757 895 and NS 759 894
START DATE (this season)	26 th February 2013
END DATE (this season)	5 th March 2013
PREVIOUS WORK (incl. <i>DES</i> ref.)	None known
MAIN (NARRATIVE) DESCRIPTION: (May include information from other fields)	A gradiometry survey was carried out by GUARD Archaeology Limited on behalf of George Leslie Ltd over two downstream flanks of the dam at North Third Reservoir, Stirling. The survey successfully located the main drainage ditches, feeder channels and drain covers on both flanks of the dam.
PROPOSED FUTURE WORK:	None known
SPONSOR OR FUNDING BODY:	George Leslie Ltd
CAPTION(S) FOR ILLUSTRS:	None
ADDRESS OF MAIN CONTRIBUTOR:	52 Elderpark Workspace, 100 Elderpark Street, Glasgow, G51 3TR
EMAIL ADDRESS:	christine.rennie@guard-archaeology.co.uk
ARCHIVE LOCATION (intended/deposited)	The archive will be deposited with NMRS.

Appendix C: Raw gradiometry data



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Figure 4: Raw data, East flank.

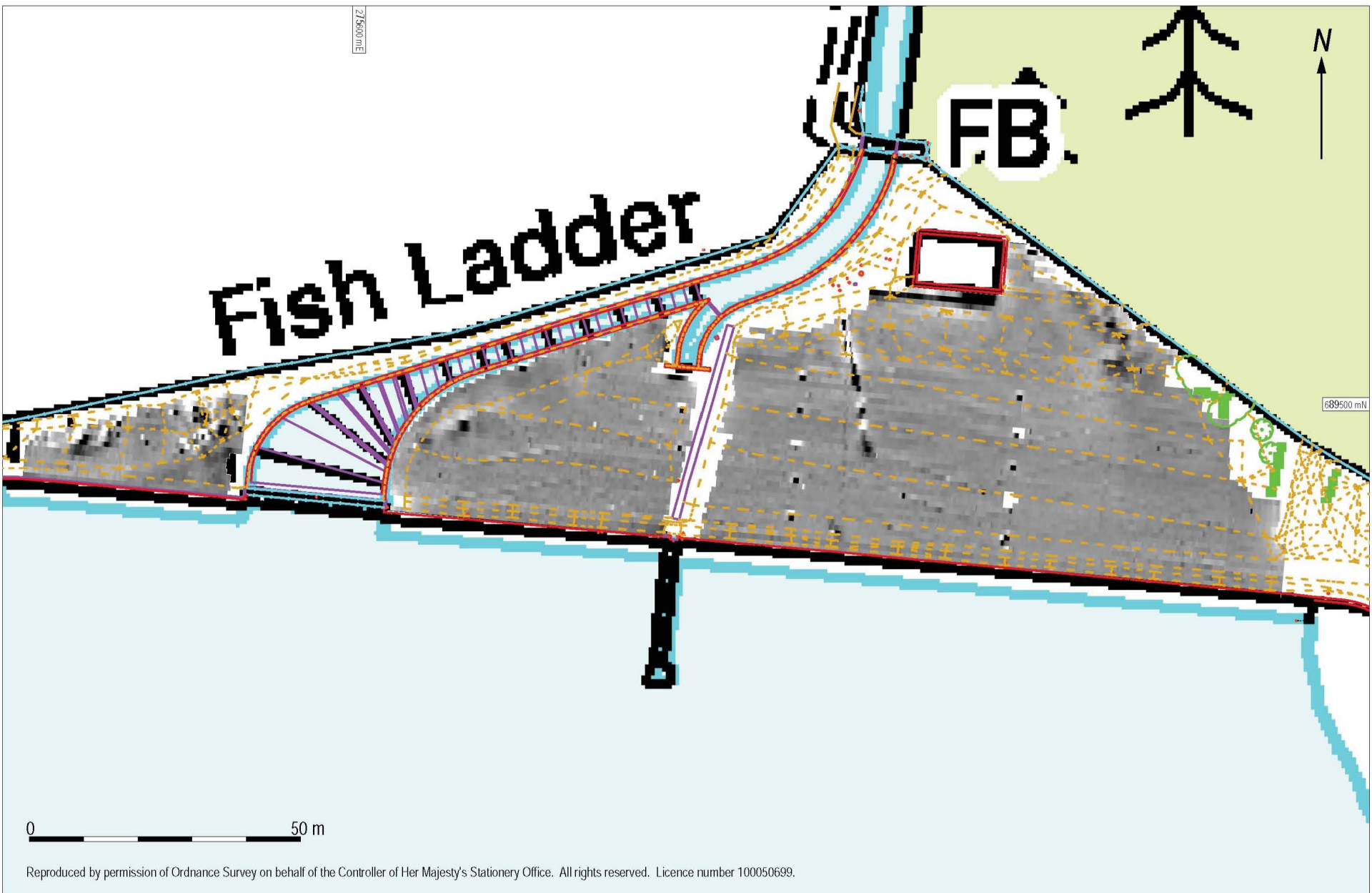


Figure 5: Raw data, West flank.

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