

Byrness Water Treatment Works
Byrness
Northumberland

archaeological works
written scheme of investigation DS19.587

on behalf of
Northumbrian Water

1. Introduction

1.1 A development is proposed at the Byrness Water Treatment Works, Bryness, Northumberland; this comprises a new water treatment works, access track and associated pipework. (Figures 1 and 2; NGR centre NT 7650 0283). A detailed archaeological desk-based assessment in connection with the proposed development has already been completed by Archaeological Services¹. A geophysical survey and subsequent programme of archaeological trial trench evaluation is now required to support the planning application.

Historical and archaeological background

1.2 The results of the archaeological desk-based assessment are summarized below.

1.3 There is no direct evidence for prehistoric or Roman activity within the study area, but the presence of activity in the surrounding vicinity indicates some potential for an as yet unidentified resource to exist.

1.4 The proposed development area may have been used for grazing during the medieval and post-medieval period. A rectangular earthwork enclosure recorded on LiDAR data in the south-east corner of the site is of unknown origin, although it is not on historic mapping and may relate to forestry planting. Foundations for a 1950s prefabricated church may also be present on the site.

1.5 The proposed development has the potential to impact upon any archaeological resource that may be present through ground reduction and the construction of foundations and associated services.

2. Capability statement

2.1 Archaeological Services Durham University operates throughout northern England and Scotland, specialising in the provision of services associated with planning permission. The Service has an established record of working with developers, architects, major industrial firms, and local and central government bodies. The Service incorporates a range of in-house services including environmental archaeology, conservation, finds analysis, geophysical survey and building recording.

2.2 Archaeological Services is a leading service provider in the northern region, where we conduct over 300 projects annually

¹ Archaeological Services 2018 *Byrness Water Treatment Works, Byrness, Northumberland: archaeological desk-based assessment*. Report 4729

Standards

- 2.3 All our geophysical work is carried out in accordance with Historic England guidelines, *Geophysical survey in archaeological field evaluation* (David, Linford & Linford 2008); the Chartered Institute for Archaeologists (CIfA) *Standard and Guidance for archaeological geophysical survey* (2014); the CIfA Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden 2002); and the Archaeology Data Service & Digital Antiquity *Geophysical Data in Archaeology: A Guide to Good Practice* (Schmidt 2013).
- 2.4 All Archaeological Services project personnel will abide by the Chartered Institute of Field Archaeologists' (CIfA) *Code of Conduct* (2014), and the British Archaeologists' and Developers' Liaison Group's *Code of Practice* (1988). The evaluation will be carried out in accordance *Yorkshire, The Humber and the North East: A Regional Statement of Good Practice for Archaeology in the Development Process* (2009) and with Institute for Archaeologists 2014 *Standard and Guidance CIFA* and its associated Introduction and Appendices.

Personnel

- 2.5 The project will be managed by Daniel Still BSc MA MIfA, Project Coordinator with Archaeological Services, who has considerable experience of archaeological projects of this type gained in northern England over the last seventeen years.
- 2.6 The geophysical survey service is managed by Duncan Hale BA MCIfA, an expert in works of this type, who has conducted over 1,100 geophysical survey projects during the past 28 years throughout the UK and abroad.
- 2.7 Daniel and Duncan will be assisted by members of our field team, who all have a degree in archaeology and a minimum of three years relevant experience.

3. Method statement

Scheme summary

- 3.1 The tasks this project comprises may be summarised as:
- geophysical survey
 - geophysical survey data processing and report preparation
 - subsequent trial trench evaluation
 - post-excavation assessment and reporting
 - archiving

Aims and objectives

- 3.2 The aim of the geophysical survey is to assess the nature and extent of any sub-surface features of potential archaeological significance within the survey area, so that an informed decision may be made regarding the nature and scope of the subsequent trial trench evaluation.
- 3.3 The main aim of the trial trench evaluation is:
- to evaluate the archaeological resource within the site where it may be impacted upon and identify the nature, extent, quality, depth and preservation of deposits
 - to define the nature, date and extent of any archaeological remains that are present
- 3.4 Research objectives are built into developer-funded archaeological projects, as a result of the English Heritage national policy framework and its objectives, as outlined within *Exploring Our Past* (English Heritage 1991), *Frameworks for our Past* (English Heritage 1996), the *Research Agenda* (English Heritage 1997), and the *Policy Statement on implementation* (1999). 3.5 This survey has the potential to address research priorities set out in 'Shared Visions: The North-East

Regional Research Framework for the Historic Environment’ (Petts & Gerrard 2006); specifically these include:

Late Bronze Age and Iron Age

lii. Settlement

lii. Landscape

Later medieval

MDi. Later medieval settlement

MDii. Later medieval landscape

Geophysical survey

- 3.6 Given the geology at the site, Carboniferous period sandstone, siltstone and dolomitic limestone of the Ballagan Formation overlain by Devensian till, and the likely nature and depth of targets, a geomagnetic technique would be appropriate.
- 3.7 A temporary 30m survey grid will be established over each survey area and related to the Ordnance Survey National Grid using a Leica GS15 global navigation satellite system (GNSS) with real-time kinematic (RTK) correction typically providing 10mm accuracy. Grid points will be marked by bamboo canes, which will be removed following the completion of each survey area.
- 3.8 Magnetic gradient measurements will be determined using handheld Bartington Grad601-2 fluxgate gradiometers. A zig-zag traverse scheme will be employed and data logged in 30m grid units. The sample interval will be set to 0.25m and the traverse interval to 1m, thus providing 3,600 measurements per 30m grid unit.
- 3.9 Data will be downloaded on site into a laptop computer for verification, initial processing and storage and subsequently transferred to a desktop computer for further processing, interpretation and archiving.
- 3.10 Geoplot v4 software will be used to process and interpolate the geophysical data to form arrays of regularly-spaced values at 0.25m intervals and to produce continuous-tone greyscale images and ‘X-Y’ trace plots of the raw (unfiltered) data. Plots of filtered data will also be provided if appropriate.
- 3.11 Data analysis will include determination of anomaly types present (eg positive/negative/dipolar magnetic anomalies), their size, strength, shape and orientation, since these factors all have a bearing on subsequent interpretation.
- 3.12 The data will be presented by importing greyscale images directly into digital mapping supplied by the client. Palette bars relating the greyscale/trace intensities to anomaly values in nanoTesla will be included with each image as appropriate. Other types of plots may also be provided, if they aid presentation or interpretation.
- 3.13 Upon completion of the geophysical survey fieldwork the scope of any subsequent trial trenching will be agreed with the Northumberland Parks Archaeologist.

Trial trenching

- 3.14 The number, size, location and orientation of trial trenches will be informed by the geophysical survey results. Trench locations may need to be adjusted on site due to health and safety or other considerations; if this is the case the Assistant County Archaeologist will be informed.

- 3.15 Topsoil and overburden will be removed by a mechanical excavator using a toothless ditching bucket, under close archaeological supervision. Subsequent works will be carried out by hand. The excavations will proceed until the top of the archaeological deposits or natural subsoil is reached, or to a maximum safe depth. A CAT survey will be undertaken prior to excavation. All spoil will be examined for archaeological material, including the use of a metal detector.

Excavation, recording and sampling methodology

- 3.16 Excavation of any archaeological deposits identified will proceed by hand, using standard archaeological procedures in accordance with our *Recording Manual* (v.5.2 2014). Trenches where no archaeological features are present will also be recorded. All suitable deposits will be subject to an environmental sampling strategy, as outlined below.
- 3.17 Archaeological features will be hand-cleaned, sectioned, sample excavated and recorded in plan and section. Archaeological deposits will be sampled as is necessary to establish their nature and extent. Field evaluation will be minimally intrusive and minimally destructive to archaeological remains in accordance with ClfA guidelines. Sampling will comprise up to 20% of linear features, and 50% of discrete features.
- 3.18 Plans will be drawn at a scale of 1:20, sections at a scale of 1:10. The stratigraphic matrices will be established on site during the course of the works. The locations of small finds, features, sections and levels will be recorded. Archaeological Services routinely conducts the accurate 3-D provenancing of finds, the levelling of features and creation of excavation plans using the total station as part of standard excavation procedure. Photography will be by digital colour; digital images may be included in the report as appropriate. If archaeological features are identified then monochrome 35mm stills and colour slides will be used to record them.

Palaeoenvironmental sampling

- 3.19 Environmental sampling and subsequent assessment and analysis will be conducted by our in-house Environmental Archaeology Service, managed by Dr Charlotte O' Brien. It is Archaeological Services' policy to collect bulk samples from the fills of all cut features, and from any other deposits that have the potential to provide environmental or economic information. Industrial residues and waste from craft and manufacturing processes are also routinely sampled. The size of sample collected and assessed will depend on the apparent potential value of the deposits and will be agreed with the Historic England Regional Scientific Advisor.

Artefact recovery

- 3.20 Archaeological Services operates a 100% finds collection policy, including post-medieval, 19th-century material. Bulk finds such as pottery and animal bone will be collected by context. Where unusually large quantities of finds, or very small types of material are encountered (e.g. fish bones), such that recovery by hand is not practicable, soil samples will be retained for sieving in the laboratories at Durham. With the landowners permission finds will be removed from site to a secure location at the end of each working day. A discard policy will only be implemented following quantification, assessment and recommendation from artefactual specialists. All finds that are retained will be washed, marked and bagged in a manner suitable for long-term storage. If any artefacts which fall under the *Treasure Act* (1996) are discovered then the appropriate procedures will be adhered to.

Conservation

- 3.21 All field personnel are trained in artefact first aid and procedures for the recovery, packing and transportation of artefacts, following *First Aid for Finds* (2nd Edition) and UKIC's *Conservation Guidelines No. 2*. Where delicate artefacts are uncovered, appropriate immediate measures will be taken, and the artefacts will be transferred to the Conservation Laboratory at Durham for

stabilisation. Should particularly complex conservation requirements become apparent, an appropriately qualified and experienced expert will be called to site to excavate and package the object.

Scientific dating

- 3.22 Samples of material suitable for scientific dating techniques including AMS C14 dating, archaeomagnetism (for example, charred seeds or *in situ* burnt clay from appropriate contexts) or thermoluminescence will be collected where appropriate. Recommendations for dating may be made in the assessment report.

Human remains

- 3.23 It is considered unlikely that human remains may be encountered at this site. If such finds are made the remains will not be removed unless this is absolutely necessary. Where it is essential that the bones are lifted, the coroners' office will be informed and permission for the work obtained. The client and the County Archaeologist will be informed. Excavation of human remains will require extended stoppage time, and may require the presence of additional archaeologists on site.

Contingencies

- 3.24 It is usual that the Northumberland Parks Archaeologist requires a contingency allowance for additional trial trenching should this be required; in this case this is set at up to an additional 1% of the proposed development area. This will only be used in the event that unusual, significant or complex discoveries are made and parts of trenches need to be expanded in order to answer specific questions. If this is required then the Northumberland Parks Archaeologist and the client will be informed. If a significant archaeological resource is identified within the evaluation trenches then as part of the contingency some additional trenching may also be required.
- 3.25 In the event that hearths, kilns or ovens (of whatever period, date or function) are identified during the work, then at least one archaeo-magnetic date will be collected to be calculated from each individual hearth surface (in the case of domestic dwellings, one per building). Where applicable, samples may be collected and processed by a suitably trained specialist for dating purposes. In the event that such deposits or structures are identified, Northumberland Conservation will be contacted and any specific aspect of the sampling strategy may need to be discussed in advance with Historic England.

4. Reporting and archiving

Geophysical survey reporting

- 4.1 Based on the analysis of the different anomalies detected (paras. 3.11-3.12 above) both colour-coded geophysical and archaeological interpretation plans will be provided. For ease of reference, anomalies discussed in the text will also be labelled on the archaeological interpretation plan.
- 4.2 The survey report will also include a written discussion and interpretation, explaining the likely nature of the anomalies along with their implications. Modern services and other potential hazards will be clearly distinguished in the report.
- 4.3 The report will be supplied to the client in pdf format. A copy will also be provided to the local Historic Environment Record (HER). Hard copies can be provided on request.
- 4.4 The survey archive will be retained at Archaeological Services Durham University and a copy supplied on CD to the client for deposition with the project archive in due course.

4.5 Archaeological Services Durham University is registered with the **Online Access** to the **Index of archaeological investigationS project (OASIS)**. An OASIS form will be completed, and the report may be uploaded in due course with the permission of the client.

Post-excavation assessment

4.6 At the end of the work on site, assessments of the excavated material will be made, following the recommendations of *MoRPHE (Management of Research Projects in the Historic Environment – Historic England 2015)*. Each class of artefact recovered from the site will be examined to determine the potential of the material for further analysis, and to establish any conservation requirements. Assessment reports will state the potential of each class of artefact or ecofact, in accordance with MoRPHE; they will also set out the storage and conservation requirements of the assemblage, and make recommendations for a discard policy if this should be appropriate.

4.7 The following specialists may be called on, as necessary, to examine, process and assess any excavated material. In the first instance the artefact assemblage will be assessed by the Archaeological Services post-excavation manager and then other specialists may be employed by Archaeological Services to assess material as required.

- Early medieval, medieval & post-medieval pottery Dr Chris Cumberpatch
- Roman pottery Alex Croom
- prehistoric pottery Dr Rob Young
- lithics Dr Helen Drinkall
- animal bone Dr Louisa Gidney
- other artefacts Jennifer Jones
- plant macrofossils Dr Charlotte O’Brien
- industrial residues and conservation Jennifer Jones
- conservation Vicky Garlick

The report

4.8 The report will be prepared in a form suitable for use by the client and the planning authority. Draft reports or interim statements can be provided on request. Reporting will adhere to the reporting requirements for Northumberland County Council. This will include the deposition of two bound copies and a pdf copy with the Historic Environment Record (HER). The report will include:

- a plan showing the location of the site
- plans and sections of archaeological features
- a summary statement of results
- a table summarising, the deposits and features and the classes and numbers of artefacts encountered, together with spot dating of significant finds
- specialist assessments
- discussion
- reference to the aims and objectives of the work and any specific NERRF research aims
- updated project design

Archive

4.9 The project archive will be prepared to the standard specified in Appendix 3 of *MAP2 (English Heritage 1991)*; in accordance with the *Guidelines for the Preparation of Archaeological Archives for Long Term Storage (UKIC 1990)* and *Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation (Archaeological Archives Forum 2007)*. The archive will be deposited with the Great North Museum. In the event that the evaluation is wholly

negative then no material archive will be deposited and in this case two copies of the report (one bound and one unbound) will be provided.

OASIS

- 4.10 Archaeological Services Durham University is registered with the **Online AccseS** to the **Index of archaeological investigationS** project (**OASIS**). An OASIS form will be completed for this project, and copies of the report and illustrations will be provided in pdf format to the HER. It is understood that after validation by the HER, and with the agreement of all the parties concerned, the project report may become a publicly accessible document.

Publication

- 4.11 Following completion of the works (including any further schemes of works), a report may be submitted for publication to a regional archaeological journal. The nature and extent of the publication will be dependent on the results of the work.

5. Insurance

- 5.1 Durham University is a member of UM Association Limited and maintains the following covers:
- Employer's liability £25,000,000 Cert. no. ELY108951496/050
 - Public & products liability £25,000,000 Cert. no. UM050/00
 - Professional indemnity £10,000,000 Cert. no. UM050/00

6. Health and safety

- 6.1 Archaeological Services abides by the 1974 *Health and Safety Act*, its subsequent amendments, and the 2015 *Construction Design and Management Regulations*. All Archaeological Services field projects are carried out in accordance with the Federation of Archaeological Managers & Employers' *Manual of Health and Safety in Field Archaeology 2010*, and with Durham University's *Health and Safety Policy and Code of Practice for Safety in Fieldwork*.
- 6.2 Archaeological Services provides health and safety training for all our field personnel in first aid, manual handling, cable detection, site safety and risk assessment. Archaeological Services ensures that all personnel pass the CITB Construction Skills Health and Safety Test and subsequently become CSCS card-carriers (Construction Skills Certification Scheme).
- 6.3 Archaeological Services will provide qualified First Aiders and first aid supplies at all times during work. All personnel are supplied with appropriate safety clothing and equipment. Archaeological Services can provide our site specific risk assessment upon request. It is assumed health and safety is the responsibility of the main contractor.

7. Monitoring

- 7.1 The works will be subject to monitoring by the Northumberland Parks Archaeologist (who will be given as much notice of the start of works as possible) at any reasonable time given sufficient advance notice.

8. Copyright

8.1 This project is copyright. Copyright in the project report will rest with Archaeological Services Durham University unless specific arrangements are made for its assignment elsewhere.

9. Programme

9.1 The project can be completed to the following programme:

- following agreement of the WSI the geophysical survey can start at anytime
- following completion of fieldwork the geophysical data will be processed, georeferenced and sufficiently analysed to inform the trial trench location plan within 3 working days
- following agreement of trial trench locations the evaluation can start at anytime
- following completion of fieldwork on each element of work an assessment report will be provided within 15 working days
- An alternative programme can be arranged.

Richie Willis
Senior Archaeologist
October 2019

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

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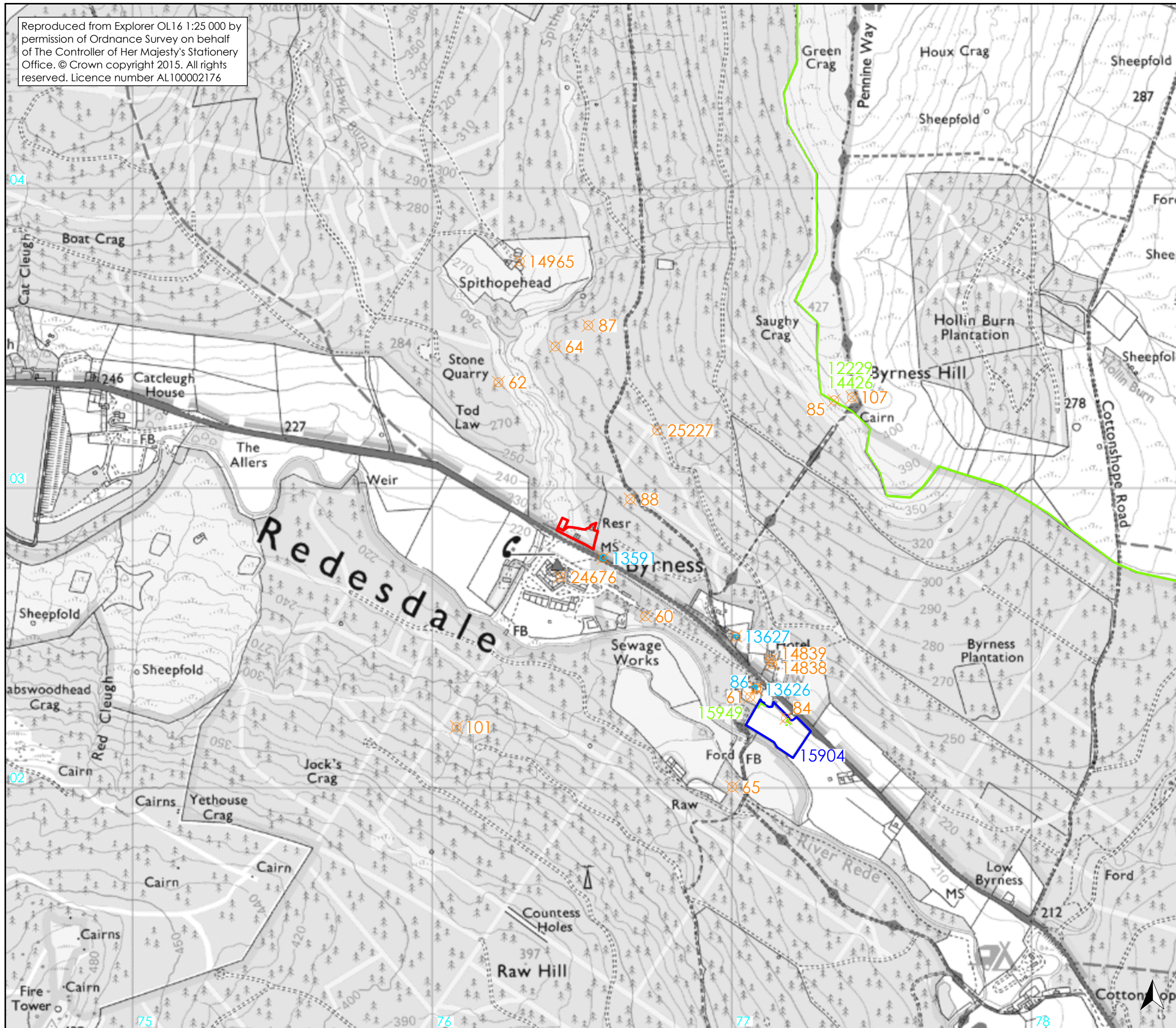
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Figure 1: Site location and Historic Environment Record

0 500m
scale 1:12 500 for A3 plot

-  proposed development area
-  HER site
-  event
-  listed building
-  assessment



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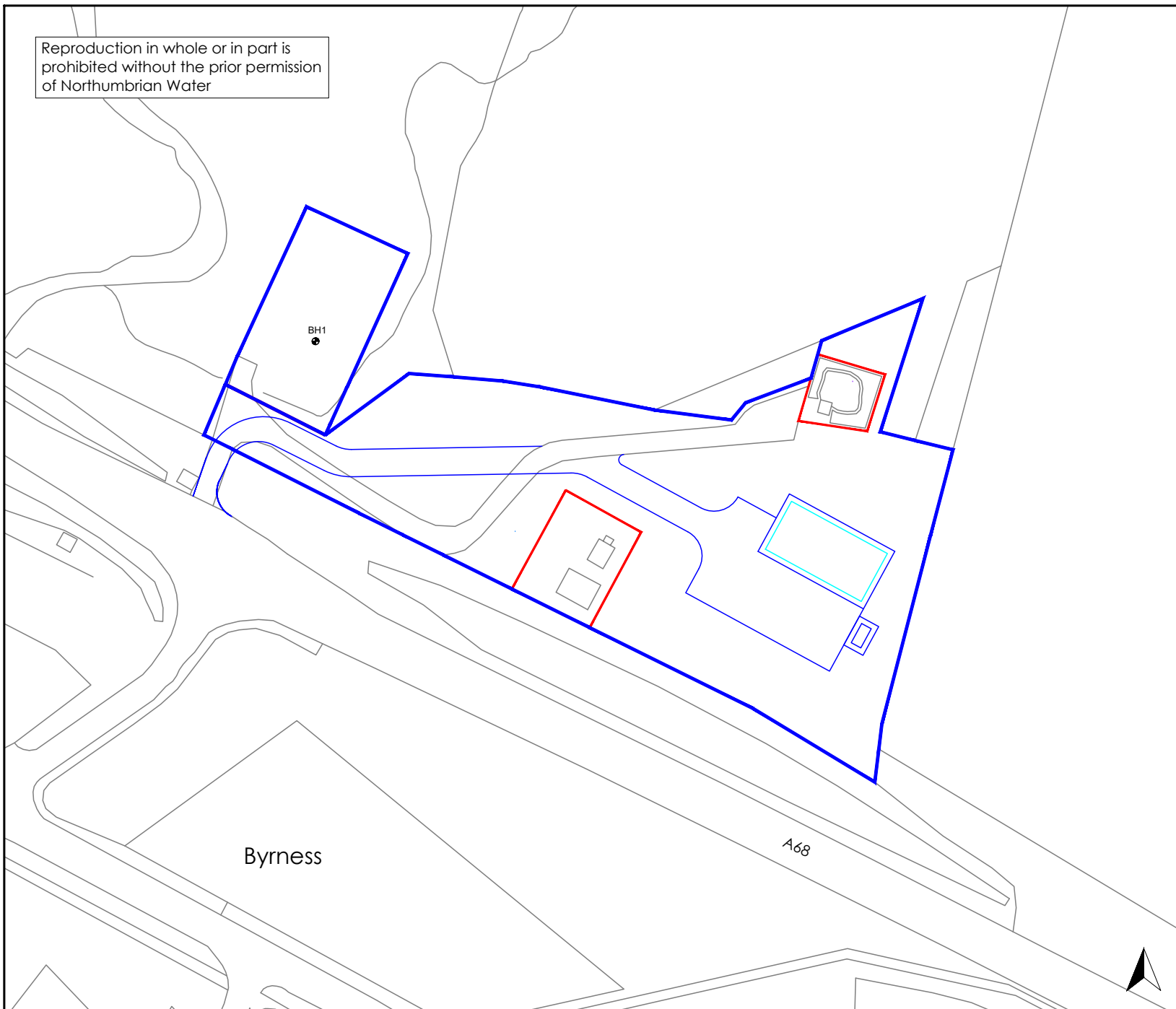
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Figure 2: Proposed development

0  50m
scale 1:1000 for A4 plot

-  site boundary as existing
-  proposed site boundary



Byrness

A68