Historic England

Water Features in Historic Settings

A Guide to Archaeological and Palaeoenvironmental Investigations

Summary

Water features, such as moats, ponds and ornamental lakes, commonly form part of many historic places and are integral to the historic environment. Significant deposits of archaeological and palaeoenvironmental importance may be encountered during intrusive work on water features (both current and infilled) located within historic sites and landscapes. These deposits can provide a wealth of information on past activities and past environments, both on-site and in the wider surroundings. This document describes their character and value, together with key historic environment considerations for planning and executing site works, in order that such archaeological and palaeoecological information is not lost irrevocably.

This document is aimed at:

- owners and managers of historic properties and/or designed landscapes
- historic- and natural-environment project managers and advisors
- those contracted to undertake any clearance works

In order to ensure good practice is followed, it is recommended that advice is sought from the necessary historic environment specialists, starting at the pre-planning stage. Regular discussions throughout the process will help manage expectations and potentially conflicting interests. The principles of this guidance can also be applied directly to a range of wet or waterlogged deposits preserved within other feature types, be they artificial, natural, or modified. If the decision is taken to leave the deposits 'in place' (*in-situ*), information on preservation *in-situ* can be found in: *Preserving Archaeological Remains: Decision-taking for Sites under Development*.

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Front cover
Brackenbury Farm; a moated 16th century farmhouse, Uxbridge.

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Introduction

Water-bodies within historic environment settings – such as moats, ornamental lakes and ponds – are often seen as attractive subjects for restoration and nature conservation projects. The removal of vegetation and sediment to reveal open water is seen as an obvious and relatively easy way to improve their aesthetic appeal and nature conservation value.

However, many such water bodies possess deposits of significant historical, archaeological and palaeoecological value. These remains can reveal information on past activities, environments, and environmental change(s). It is crucial to assess this potential prior to commencing any restoration works, as such works may destroy some or all of the evidence – and once lost, it cannot be re-created. If deposits of archaeological and/or palaeoecological significance are present, then appropriate mitigation measures should be carried out.

This document describes the types of deposits that may be encountered during any works, explains their value, and summarises the key historic environment issues that should be considered when planning and executing site works in order to ensure good practice is followed.

1 The Potential

Even though, at the surface, they might appear unassuming and inconsequential, former (Figure 1) and extant (Figures 2 and 3) water bodies can in fact be extremely valuable archives of archaeological and palaeoecological information, whether partially or fully silted up. By their nature, the deposits that they contain are often waterlogged and the resultant cool, dark and anoxic (oxygen-depleted) conditions significantly reduce biological activity. This promotes the preservation of organic remains which do not survive under more-commonly encountered conditions (Figure 4).

Figure 1
The silted-up moat at Belmont, Great Budworth, Cheshire.

Figure 2
An example of a designed landscape at Stourhead, Wiltshire. The Nautical Archaeology Society (NAS) carried out archaeological investigations of the ornamental lake, including sampling the lake bottom deposits which were analysed for pollen .

In terms of the historic environment there are two main considerations:

- the feature itself

The shape, size and form are of inherent interest and importance, and the feature could be part of a more extensive network of linked features. Works that alter or remove a feature's original shape, profile and characteristics should be avoided.

- the remains preserved within the feature

These are indicative of past human activities and past environmental conditions, and include the archaeology (such as structures and artefacts) and the palaeoecology (such as plant and animal remains). There can often be a cross-over between the two categories, as with wooden artefacts. In order to understand the order, or chronology, in which the remains accumulated, it is important that the stratigraphy of the sediment layers (eg lake muds) remains intact and that mixing of sediments is avoided. In most cases sediments become progressively younger up through the sequence.

Certain components of the deposits can also be used for dating the sequence, for example, typologically distinct artefacts or individual wood fragments which can be radiocarbon dated.

Depending on the origin of the feature, preserved remains commonly extend back hundreds of years. Because the research potential depends on the individual feature type, its development and setting, there are no definitive boundaries in terms of timeframes of interest. Deposits could, for example, enhance our understanding of the creation and development of 18/19th century designed landscapes and gardens, or even more recently, of 20th century activities driven by wartime agricultural policies. Other deposits may be even older, involving the remodelling of earlier features, such as medieval fishponds. Therefore, every site can only be considered on its own merits.

Figure 3 (top)
Valance House and moat, Dagenham, Essex.

Figure 4 (bottom)
Organic materials can be extraordinarily well-preserved under waterlogged conditions.

2 The Deposits

Examples of the types of remains that could be encountered and their applications include:

2.1 Archaeology

- **Historic monuments:** earthworks, masonry, brickwork, clay linings and timberwork
- **Other structures:** islands, bridges (Figure 5), causeways, landing stages, defences and ornamental features
- **Craft and industry:** retting flax and hemp, tanning and metal-working
- **Food production and cultivation:** irrigation systems, aquaculture (eg fisheries and hatcheries, watercress beds)
- **Ritual and religion:** votive offerings and sacrifices
- **Lost items:** weapons, tools, coins and personal effects
- **Secondary use/s:** wells and cess pits, refuse and demolition debris

2.2 Palaeoecology

The composition, structure and chemistry of the sediments, and the organic remains preserved within them, provide a sequential record of the local landscape and environment – and may also reflect local activities and events. By identifying the plant and animal species from their preserved remains, and based on our understanding of their current ecologies, past environments and environmental conditions can be reconstructed.

Examples include:

- **Biological:** pollen, seeds, leaves, wood/charcoal, diatoms, insects (including beetles and midges), bones, molluscs, ostracods, parasite remains
- **Non-biological:** spheroidal carbonaceous particles (SCPs), sediment stratigraphy, isotopes, pH

Many of these indicators (also known as 'proxies') are very small and therefore samples frequently require examination under a microscope in order for their contents to be assessed. More detail on the specific applications of these proxies can be found in Historic England's 'Environmental Archaeology' and 'Geoarchaeology' guidelines.

2.3 Scientific dating

A variety of methods are available to date sediments and remains, providing either absolute or relative ages. The type of sediments and remains will determine which dating techniques are most appropriate for a particular site. Examples include: **documentary evidence** (eg estate records or maps), **radiocarbon dating** (on organic remains, based on the exponential decay rate of carbon's naturally-occurring radioactive isotope, ^{14}C), **luminescence dating** (measuring light emitted from naturally occurring minerals eg quartz, feldspar), **dendrochronology** (using the pattern of tree ring widths on timbers), **typology** (shape, patterning and manufacture techniques of artefacts) and **varves** (laminated/layered lake sediments).

Figure 5
Spargrove Manor, Batcombe, Somerset. During excavations in its moat, up to 1m of waterlogged deposits were encountered, within which well preserved oak timbers of its former bridge were found.

3 Assessing the Resource

When planning any works it is best to start with an assessment of the cultural, historical and palaeoecological potential of the affected areas. Such work should be carried out by appropriately qualified heritage specialist(s), who will then be able to determine – and advise on – the significance of the remains, based on their nature, extent (depth, area), age and continuity.

A range of information sources should be consulted:

- Documentary evidence: maps, contemporary images and estate maintenance records
- Expert knowledge: the local Inspector of Ancient Monuments and the County Archaeology Curator
- Heritage databases: local 'Historic Environment Record' (HER) and the 'National Record of the Historic Environment' (NRHE)
- Remote sensing: aerial photographs, lidar and geophysical survey (Figure 6)
- Field investigation: walk-over survey (Figures 7 and 8), augering (Figures 9, 10 and 11) and trial excavation (Figure 12)
- Laboratory-based assessment: analysis and interpretation of the preserved sediments and organic remains
- Scientific dating: eg radiocarbon, dendrochronology and archaeology

Scheduled sites or Registered parks and gardens

Any works planned on features within *Scheduled* or *Registered park or garden* sites require planning consent. Potential effects of the proposed works on a site or its setting will therefore be considered as part of the planning system. Local planning authorities must consult Historic England where a planning application affects a Grade I or II* Registered park or garden. They will also consult the Gardens Trust on all applications affecting Registered parks or gardens, regardless of the grade of the site.

For more information on Scheduled sites see:

https://historicengland.org.uk/listing/what-is-designation/scheduled-monuments/ and https://historicengland.org.uk/advice/planning/consents/smc/

For more information on Registered parks and gardens see:

https://historicengland.org.uk/listing/what-is-designation/registered-parks-and-gardens/ and https://historicengland.org.uk/advice/planning/consents/consent/

Figure 6 (top)
A geophysical survey – here using earth resistance – on the margins of a remnant monastic fishpond, at Audley End, Saffron Waldon, Essex.

Figure 7 (bottom)
Surveying the former fishpond at Langford, Newark-on-Trent, Nottinghamshire.

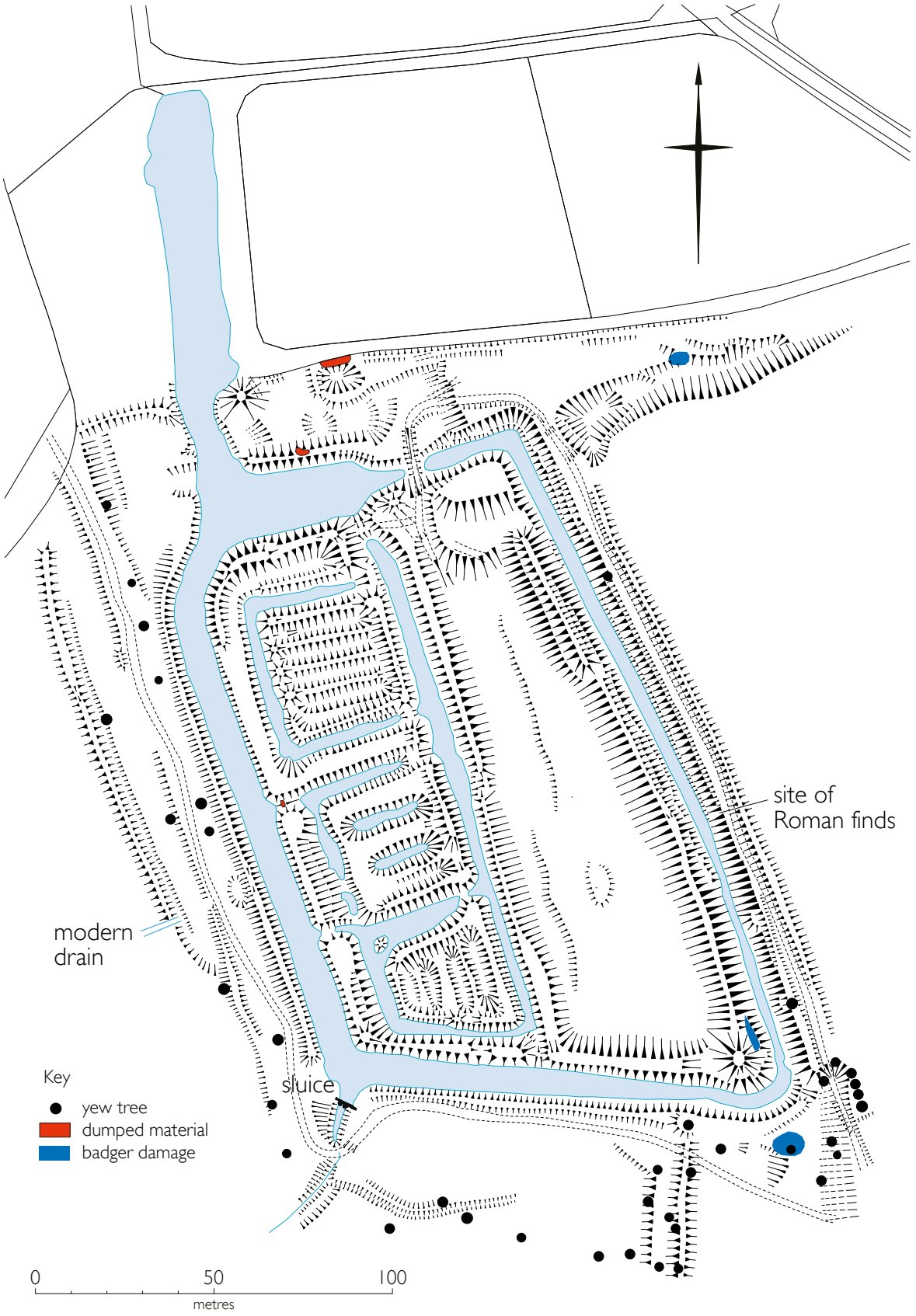

Figure 8
Site plan of a scheduled medieval fishery and warren complex at Home Wood, Northill, Bedfordshire. Coring revealed high potential for the survival of organic remains, including fish bone, in the fishery's waterlogged deposits (not reproduced to scale).

Figure 9 (top left)
Sampling from a boat at Stourhead, Wiltshire.

Figure 10 (above left)
Coring the former fishpond at Langford, Newark-on-Trent, Nottinghamshire.

Figure 11 (top right)
'Russian'-type core sample showing intact sediments retrieved during investigations at Belmont, Cheshire.

Figure 12 (bottom right)
'Monolith tin' block samples within the section face at Spargrove Manor, Batcombe, Somerset.

4 Considering the Threats

Whenever any site creation or restoration works are proposed, they should be as minimal as possible (so that no valuable deposits are removed unnecessarily) but sufficiently adequate to ensure the scheme's viability.

Based on the results of the professional heritage assessment, the next stage must consider what effect(s) the planned intervention will have on the:

- shape and profile of the feature itself
- sediment and structures within it
- surrounding area

Other factors requiring consideration are: the time of year most appropriate for carrying out works, the use of heavy machinery for excavation (which could damage the immediate surroundings of the feature, including existing vegetation and wildlife), and what should be done with the excavated material.

If clearance works have been carried out in the past, deposits of archaeological/palaeoecological significance may already have been lost; in this case, clear, firm evidence of the spatial extent (vertical and lateral) of previous works should be presented when assessing the threats from the proposed works.

5 Mitigation

Should important archaeological and/or palaeoecological resources (or their potential) be revealed by the assessment, and if their preservation *in situ* (that is 'in place') is not feasible or appropriate, then a suitable form of mitigation should be carried out.

Options include:

- full excavation and recording with comprehensive sampling and analysis
- limited works confined to sediments or areas of least archaeological/ palaeoecological significance (eg already-disturbed sediments) (Figure 13), coupled with an archaeological Watching Brief and possible monitoring of water level and quality. Areas of clear historic environment significance to be left intact
- cancellation of the planned intervention. Alternative measures investigated eg find a suitable alternative location

Please bear in mind that any such intervention is likely to have major cost implications. Throughout the process we recommend that you maintain contact with the relevant advisory governmental and non-governmental agencies. Any report resulting from works should be logged with the local Historic Environment Record (HER).

If works are undertaken, an appropriate statement addressing all potential health and safety issues (eg risk of infections, practical dangers of waterlogged sediments) should be formulated as standard.

Figure 13
Removing sediments already determined through Archaeological Assessment to be of minor historic environment significance, at Moat Farm, Cretingham, Suffolk. The moat of this medieval scheduled monument was cleared out in 2007 as part of the Natural England-funded ESA (Environmentally Sensitive Areas) Scheme.

5.1 Case Study: Cowick Moat, King's Manor, South Humberside

The moat was originally dug around the royal manor house in AD 1323 (Figures 14 and 15), and was subject to emergency archaeological and palaeoenvironmental investigation in 1976 prior to dredging works. From the stratigraphy it was possible to identify phases of the moat's use and subsequent infill (Figure 16). The numerous artefacts included: oak bridge timbers; pottery and ceramic building materials; various metalwork; leather shoe fragments; wooden stakes, pegs, bowls and a comb fragment. Archaeobotanical and palaeoenvironmental remains recovered included (not exclusively): insect pests of stored grain and timber; pike, frog and stickleback bones; remains of cereals, field crops and fruits; parasite eggs from faecal material; mussel, oyster and cockle shells; hazel nuts with animal gnaw marks; pollen indicating the cultivation of walnut.

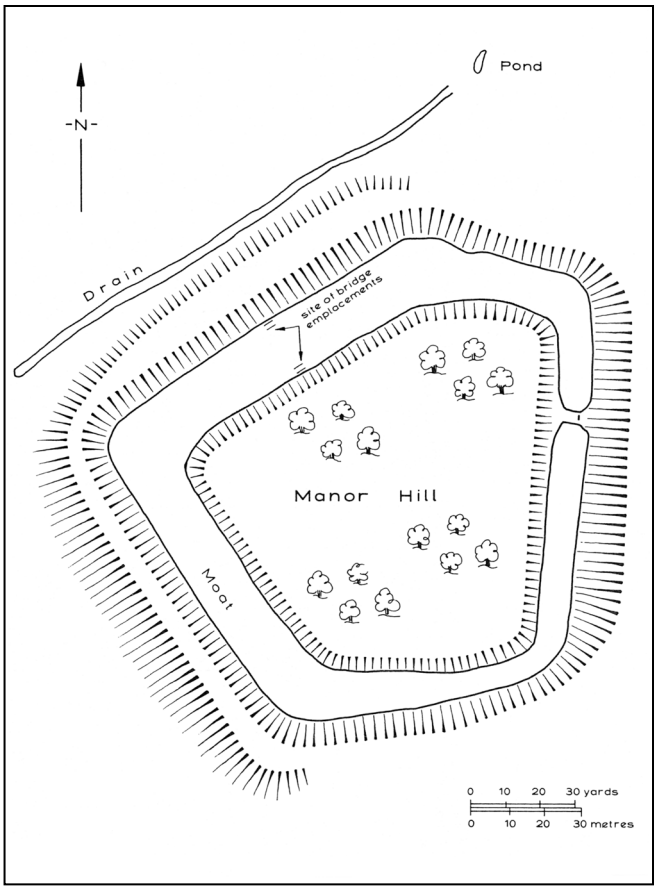

Figure 14 (top right)
Site plan of Cowick Moat, West Cowick, South Humberside (after Hayfield and Greig 1989, 1990).

Figure 15 (bottom)
Aerial view over Cowick Moat; King's Manor (scheduled moated royal manor house).

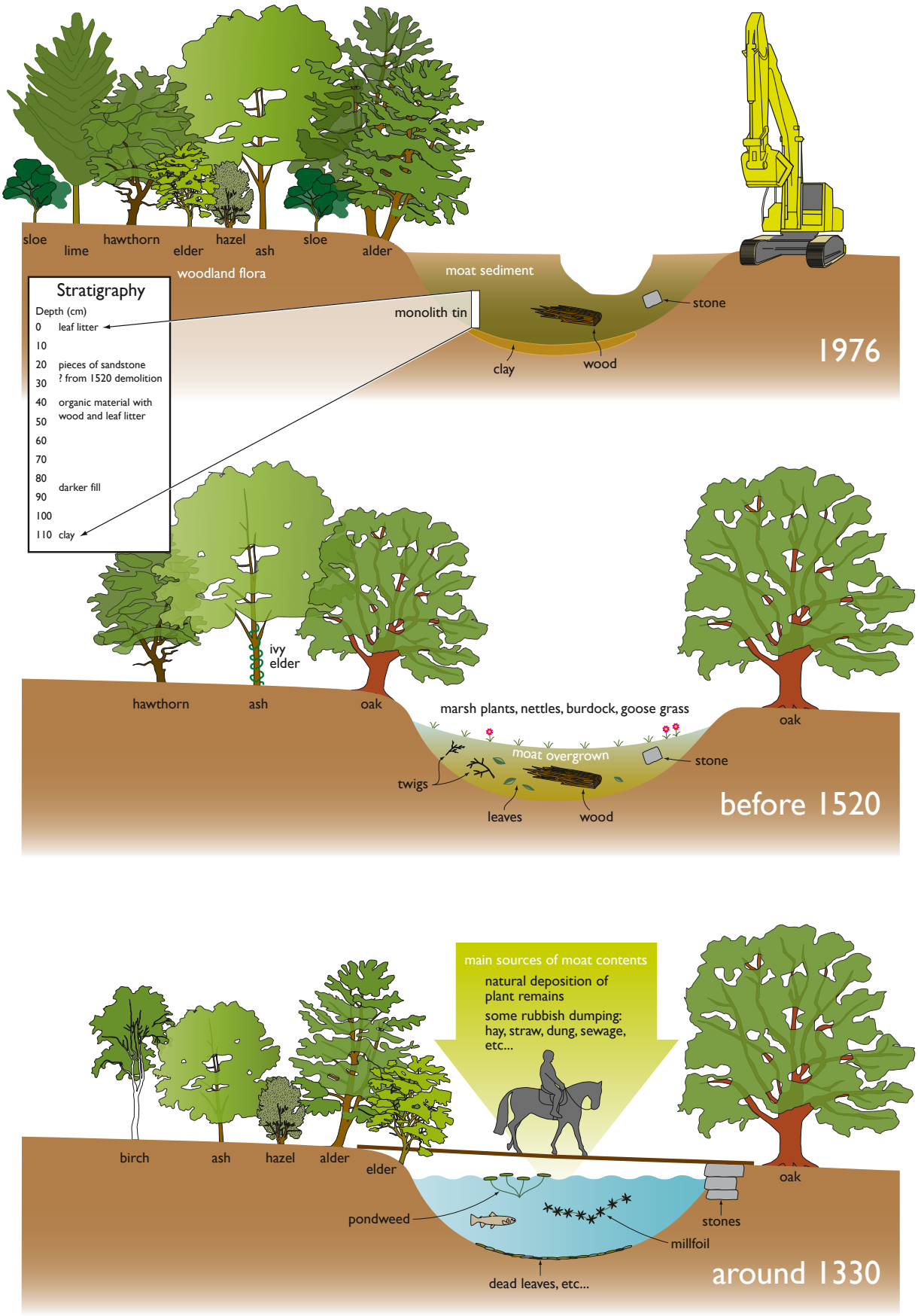

Figure 16
Illustration demonstrating the main stages of Cowick Moat's accumulation and infill processes and components (redrawn from Greig 1985).

6 References

Greig, J. (1985). The history of Cowick Moat (ca 1323-1520 AD) as shown by the plant remains. *Ancient Monuments Laboratory Report (Old Series)*. 4773: 18 pp.

Hayfield, C. and J. Greig (1989). "Excavation and salvage work on a moated site at Cowick, South Humberside, 1976." *The Yorkshire Archaeological Journal* 61: 41-70.

Hayfield, C. and J. Greig (1990). "Excavation and salvage work on a moated site at Cowick, South Humberside, 1976. Part two: the finds assemblage." *The Yorkshire Archaeological Journal* 62: 111-124.

7 Where to Get Advice

Historic England website
https://www.historicengland.org.uk/advice/technical-advice/

https://www.historicengland.org.uk/advice/technical-advice/parks-gardens-and-landscapes/lakes-and-water-features/

Historic England Science Advisors
https://historicengland.org.uk/advice/technical-advice/archaeological-science/science-advisors/

Historic Environment Records (HERs) (maintained by local authorities); find yours at:
http://www.heritagegateway.org.uk/gateway/chr/default.aspx

National Record of the Historic Environment (NRHE) (maintained by Historic England, Swindon). See:
http://www.pastscape.org.uk/

Historic England 2011 *Environmental Guidelines; a guide to the theory and practice of methods, from sampling and recovery to post-excavation*. 2nd edition. Swindon: Historic England
https://historicengland.org.uk/images-books/publications/environmental-archaeology-2nd/

Historic England 2015 *Geoarchaeology; using earth sciences to understand the archaeological record*. 3rd edition. Swindon: Historic England
https://historicengland.org.uk/images-books/publications/geoarchaeology-earth-sciences-to-understand-archaeological-record/

Historic England 2016 *Preserving Archaeological Remains: Decision-taking for Sites under Development*
https://historicengland.org.uk/images-books/publications/preserving-archaeological-remains/

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