

GUIDELINES FOR THE TESTING AND MITIGATION OF THE WETLAND ARCHAEOLOGICAL HERITAGE FOR NATIONAL ROAD SCHEMES



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INTRODUCTION

These guidelines are intended to assist the project design team, Project Archaeologist, archaeological consultants and contractors working on archaeological testing, field survey, excavation and post-excavation phases of archaeological mitigation in wetlands on national road schemes. Further guidelines relating to the initial planning and Environmental Impact Statement (EIS) preparation, some pertaining to wetlands, are presented in *Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes* (National Roads Authority 2005).

Wetlands can be defined as “any area of land covered by water for part of each year, or each day, or which has been drowned by water at any time of its existence” (Coles 1984), or in which a high water table is the dominant feature in determining the ecological status of a landscape. For the purposes of these guidelines this definition encompasses a wide range of wetland environments, including peatlands, rivers, lakes (current and former), estuaries, seasonally flooded areas (such as callows or turloughs) and coastal areas. (This document does not address underwater areas where archaeological diving methodologies apply.) Many of the provisions of these guidelines are also relevant to waterlogged material on dryland sites, such as basal deposits in ditches and pits.

In reclaimed wetlands, deposits may be similar but drainage, shrinkage and compression may have damaged or destroyed their organic potential. Such areas, often in agricultural production, typically occur on the fringes of wetlands or in areas subject to seasonal flooding. It should also be emphasised that some landscapes may have been wetlands in past times, although reclamation may have altered the surface morphology and vegetation regime. Nonetheless, these landscapes, through the presence of

deeply buried, waterlogged or anaerobic soils, may retain the preservative qualities of wetland environments.

It is important to note that certain wetlands may have designated ecological status (e.g. Special Area of Conservation, Natural Heritage Site, etc.), which imposes limitations on the scale and timing of work. In such cases, reference should be made to the EIS for the scheme in which the mitigation measures proposed for working in such areas are outlined.

On a road scheme the strategy adopted when dealing with wetland sites will form one element of the overall archaeological mitigation strategy, as the majority of the sites are likely to be from dryland environments. The strategies applied to wetlands need to fit into the overall strategy at all stages of the work. The wetland strategy should incorporate components that enable the recognition of the unique archaeological potential of these environments, while also enabling a broader understanding of the archaeological landscape as a whole.

It is important to note that each wetland area requiring archaeological testing and subsequent mitigation will require a unique strategy. Consequently, it is not possible to include a single mitigation policy within this document.

The document outlines:

- a range of general recommendations that need to be considered in approaching archaeological work in wetland environments;
- a range of practical approaches relevant to both assessment and excavation, and
- a select bibliography offering comparative methodologies, applied in both Ireland and Britain, to projects in wetland environments.

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THE ARCHAEOLOGY OF WETLANDS

Wetlands have long served as bountiful socio-economic environments to human populations, while their boundary or liminal nature has also caused them to be significant in cultural or ideological terms. The wide range of natural resources and boundaries provided by wetlands has resulted in their exploitation by humans in all periods. Archaeological sites in wetlands vary from trackways and bridges across bogs and rivers to fish weirs and *fulachta fiadh*. One of the defining characteristics of wetland sites is the high quality preservation of organic remains, due to the presence of wet or anaerobic conditions. Wetlands also provide a significant resource for environmental analysis. The excavation of waterlogged sites, in comparison with dryland areas, will typically reveal well-preserved wooden structures and artefacts of organic material, and palaeoenvironmental material such as macrofossils (botanical and zoological remains) and microfossils (e.g. pollen, testates, etc.).



Backfilled test-trenches excavated along the route of the Limerick Southern Ring Road (Phase II) at Coonagh, County Limerick (TVAS (Ireland) Ltd)

The archaeological sites uncovered in wetlands were often constructed as a direct response to local environmental conditions, as a means of accessing and availing of the resources of these areas. Other sites may have been located on dryland or the margins of wetlands that have subsequently been inundated by peat or sediment.

This is particularly pertinent in areas of upland blanket bog where extensive archaeological landscapes have been discovered beneath the peat. (Note: all blanket bogs have been designated as Natural Heritage Sites.) While organic artefacts can be preserved in such environments, the majority of archaeological structures are stone-built (e.g. enclosures, huts, field walls, etc.). Wetland margins are also of high archaeological potential as locations on the edges of rivers, bogs, etc. provided a wide range of resources. It should be noted that the boundaries of these areas are likely to have altered significantly over time.

The wide range of natural resources and boundaries provided by wetlands has resulted in their exploitation by humans in all periods.

Typical sites in these environments include:

- **Trackways, causeways, bridges and platforms of wood or stone, built to allow access into or across bogs, rivers and estuarine marshes.**
- **Crannógs, settlements, platforms and short-term activity sites in current or former peatlands, lakes, rivers and estuarine wetlands.**
- **Fulachta fiadh and burnt mounds in low-lying areas or wetland margins.**
- **Early settlement enclosures, field walls or other sites on soils since inundated by blanket bog, raised bog or alluvial sediments.**
- **Industrial sites such as mills, ponds and races or sites for iron working, salt extraction or brick making in river and estuarine alluvium and on coastlines.**
- **Fish traps, fish ponds, tide mills, seaweed walls, oyster ponds and landing places on riverbanks, in intertidal zones and under reclaimed alluvium.**
- **River revetments and waterfronts.**
- **Boats, paddles, jetties and boat-building debris on lakes, rivers, estuaries and coastal wetlands.**
- **Artefacts of organic (i.e. wood, bone, leather, hair etc.) and inorganic (stone, metal etc.) material, found both as stray finds and collections (hoards) of objects.**
- **Intact human bodies (i.e. bog bodies) and other human remains (hair, bone etc.), and intact animal skeletons.**

Unlike many dryland sites, the precise date of wetland sites often cannot be ascertained on morphological grounds alone. Experience and a knowledge of environmental

deposits may enable a 'relative date' to be assigned, but given the dynamic, complex nature of deposits such as peat, alluvium etc., depth may not be a sound indicator of a site's antiquity. Quite ancient sites can be identified in shallow deposits that have been altered by reclamation and peat cutting. While associated artefacts can provide some indication of date many wetland sites (e.g. trackways) produce few diagnostic artefacts. Specialist examination of toolmarks (i.e. to identify the use of stone, bronze and iron axes) may also be used to assign a broad date to a structure. In general, however, scientific dating (radiocarbon dating or dendrochronology) is required to date a site.

Most wetland archaeological sites are constructed of wood, which by the nature of its survival is both fragile and archaeologically significant.

This is because such sites:

- **are comparatively rare;**
- **can reveal methods of technology not preserved on contemporary dryland sites;**
- **can reveal unique and distinctive information through multidisciplinary environmental analysis that reveals past activities on site;**
- **can provide palaeoenvironmental information pertinent to dryland sites on the scheme, and**
- **can give a broader understanding of the utilisation of archaeological landscapes along the overall scheme.**

While wooden sites and structures may appear to be in perfect condition, the material is usually highly fragile and subject to rapid degradation once exposed.

ENVIRONMENTAL STRATIGRAPHY

The stratigraphy surrounding wetland sites is generally derived from natural processes such as the growth of mosses or the accumulation of silts, gravels and sand. Such deposits are dynamic and are subject to both dramatic changes occurring within very short periods of time (e.g. bog bursts, sands shifting during storms) and long-term change (e.g. climate change). Such changes may be brought about by exclusively natural processes but can also be due to anthropogenic factors. Land reclamation and extraction can also alter the stratigraphic sequence, levels and position of archaeological material.

- **Peatlands:** Mosses and other plants upon which sites are constructed eventually inundate the archaeological deposits. Commercially exploited bogs, affected by drainage and peat extraction, can contain sites of significantly different date occurring in close proximity and at seemingly similar levels. This may occur as a result of natural phenomena such as bog bursts, or recent disturbance of surface deposits. While they appear as flat landscapes today, they were once domed in profile, with significant hummock and hollow configurations, pools and soak systems (raised bogs) or mirrored the underlying topography (blanket bogs), and have been subject to significant landscape change.

Land reclamation and extraction can alter the stratigraphic sequence, levels and position of archaeological material.

- **River and Estuarine Areas:** Tidal activity can cause the rapid build-up of silts or gravels and can engulf or erode sites resulting in complex stratigraphic sequences. The location of riverbanks and shorelines may also alter over time. The movement of water and palaeochannels can disturb and erode *in situ* remains leaving trails of disturbed archaeological material, the basal remains of structures, upright posts/stakes, etc.

This natural stratigraphy is significant in terms of understanding the archaeological deposits. Specialist examination of such strata (e.g. collection and examination of cores, peat morphology studies, hydrological studies, analysis of insect remains, molluscs, plant remains, etc.) can provide valuable environmental information, which can be correlated to the archaeological evidence. However, difficulties may be encountered in working with the natural stratigraphy of wetland sites, in tracing archaeological layers or establishing stratigraphic relationships. This should also be taken into account when the Ordnance Datum (OD) level of sites is being considered. The constant change in water levels of estuarine and coastal areas and seasonal changes in peatland water tables can alter the level of archaeological sites in a short time. In addition, activities such as drainage can cause significant OD differences between related archaeological horizons.



Conventional test-trenching at interface between dryland and peatland areas along the route of the N6 Kinnegad to Kilbeggan Road Scheme. (Cultural Resource Development Services Ltd.)

THE ROLE OF THE PROJECT ARCHAEOLOGIST

The Project Archaeologist's role is to draw together all available information into an overall archaeological mitigation strategy, get approval for that strategy and implement and manage the strategy concerned. In fulfilling this role a number of factors need to be considered by the Project Archaeologist when dealing with wetland areas and archaeological sites uncovered during testing.

On selection of the preferred route:

- Acquire information on the depths, extents and nature of the wetland deposits from the ground investigations and other sources (seeking specialist advice where necessary).
- Minimise and monitor ground disturbance of wetland areas.
- Minimise vehicular access to wetland areas.
- Minimise the impact of haulage routes through wetland areas.
- Inform the project design team of the restrictions to access.
- Inform all contractors of the restrictions to access.
- Establish areas of 'set aside' in wetland areas for environmental control sampling.
- Designate wetlands as areas of high sensitivity, particularly the 'set aside' areas.

Prior to testing and excavation:

- Appoint an environmental archaeologist, this person should have a senior role in the archaeological mitigation strategy and feed into the overall staffing structure (see below).

- Ensure that relevant specialists (e.g. experts in the analysis of palaeoenvironmental data, peat morphology, waterlogged wood, insect remains, etc.) and a conservator are involved from the beginning of the project.
- Source wide-based tracked mechanical excavators
- Ensure that issues of drainage and tidal conditions have been considered.
- Anticipate flood risk restrictions.
- Formulate water management strategies and mechanisms for drainage (ensuring compliance with statutory requirements with regard to water quality and waste management).
- Devise procedures for the management and removal of waterlogged spoil (ensuring compliance with statutory requirements with regard to water quality and waste management).
- Anticipate the need for shoring and other engineering requirements.
- Ensure that project specific safety statements are in place.

Consultation with the environmental archaeologist will be a prerequisite for all the archaeologists involved. The role of the environmental archaeologist will require him/her to:

- assist in devising and implementing sampling and recording strategies;
- consult with designated specialists in palaeoenvironmental remains, wood technology, wood species identification, dendrochronology, conservation and any other necessary specialists; and
- manage the implementation of advice from specialists regarding equipment and methodologies.

GENERAL RECOMMENDATIONS APPLYING TO ALL STAGES OF ARCHAEOLOGICAL WORK

A wide range of circumstances affects the potential methodologies applicable to testing and mitigation in wetland areas. Many of these are governed by health and safety considerations and need to be taken into account when devising strategies.

The issues to be considered include:

- Current ground conditions.
- Water table levels (current and predicted).
- Tidal conditions.
- Flooding.
- Time of year.
- The gradient and conditions of subsoil.

Mechanisms for dealing with these issues should include:

- Ensuring the input of palaeoenvironmental and other specialists at an early stage and throughout the project.
- Examining the depths of natural deposits from ground level to subsoil using available information.
- Organising and complying with designated access points for personnel and machinery.
- Ensuring the use of wide-based mechanical excavators with operators experienced in working in wetland environments.
- Considering the potential or known depth of archaeological material below ground level and the depth of these deposits.
- Ensuring that all personnel are made aware of health and safety requirements.
- Designating an area on dryland for site offices, storage and recording.

Some of these issues can be addressed through consultation with health and safety specialists, engineers, geologists and the relevant Project Archaeologist.

In general, it is preferable that appropriate palaeoenvironmental specialists are involved in the project at the earliest possible stage as this:

- is cost effective;
- allows for different components of work to be carried out simultaneously;
- maximises the integration of works at the initial stages of the project, and
- minimises the impact on fragile environments.



Archaeologist planning a Bronze Age trackway at Newrath, County Kilkenny, on the N25 Waterford City Bypass.

The primary form of information gathering in wetlands is by visual inspection of both surface and sub-surface conditions. The best method of sub-surface visual inspection is through trial trenching and test pitting. However, engineering boreholes, while not positioned from an archaeological viewpoint, are often key assessment tools at the early stages of a project and should be consulted.

The information that may be gained includes:

- Subsurface ground levels.
- The nature of the deposits.
- Depths of deposits over geology.
- Water table levels.



Archaeologist monitoring the excavation of a test pit in alluvium along the route of the Limerick Southern Ring Road (Phase II).

This information can then be used to generate general profiles through wetlands that will assist in devising an appropriate archaeological testing or mitigation strategy.

A range of remote sensing techniques can also be applied to wetland environments, although with varying degrees of success.

These techniques include:

- Ground penetrating radar.
- Infra red imaging.
- Satellite imagery.
- LIDAR.
- Metal detecting.
- Aerial photography.
- Metal probes.



Archaeologists excavating a Bronze Age trackway uncovered at Newrath, County Kilkenny, on the N25 Waterford City Bypass.

HEALTH AND SAFETY

Much of the work carried out in wetland environments is subject to health and safety restrictions. These include the Safety, Health and Welfare at Work Act, 2005 and the Safety, Health and Welfare at Work (General Application) Regulations, 1993.

Consequently, all work carried out in wetlands will require a specific safety statement (pursuant to Section 20 of the Safety, Health and Welfare at Work Act, 2005). The potential hazards pertinent to each wetland area should be risk assessed and included in the statement. Safety issues that may need to be considered in both the formulation and execution of archaeological work in wetland environments are outlined below.

These are provided as a general guide to the risks that may require consideration:

- **Ground Conditions:** it will be essential to carry out a full assessment of the ground and working conditions.
- **Unstable deposits:** these restrict the depths at which both personnel and machinery can safely undertake work. This applies to conditions underfoot, the sides of trenches and excavation cuttings.
- **Depths of deposits:** deposits can be in excess of 10m but are only accessible to a limited depth, 1.25m for personnel (as stipulated in the relevant legislation).
- **Machine working depths:** the depths to which machines will be able to work will vary depending on conditions.
- **High water table:** high water table levels, such as in estuaries or river sediments, can be particularly dangerous, especially at high tide, during a full moon and spring tides.

- **Tidal conditions:** working under tidal conditions may involve irregular working hours and require consultation of local tide tables and the formulation of specific safety strategies.
- **Peatland water tables:** water table levels in peatlands are seasonally affected and the best time of year for carrying out work is usually April-September.
- **Site access and hazards:** deep drainage features can restrict access to, and within, wetland areas. A high water table or vegetation in waterlogged areas can cause poor visibility of hazards such as drains and existing deep excavations. Such hazards may also affect the speed with which injured persons can be removed to safety.
- **Access to archaeological deposits:** the depth of archaeological deposits below the current ground surface can limit access and require remedial measures such as stepping, shoring, etc. In addition, there is always the potential for low visibility of archaeological material in deep trenches where direct access is not possible.
- **Flooding:** flooding from ground water levels, from surrounding deposits and possibly from surface water may require engineered management in relation to pumping, drainage, access and pollution. Flash floods/surges may also occur in rivers and streams, and every precaution should be taken in such situations (e.g. noting weather forecasts and monitoring weather conditions).
- **Fire:** fire may be a hazard in areas of dry peats where burning peat can smoulder and burn underground while appearing to have a stable surface.

ARCHAEOLOGICAL TESTING

The principal aim of testing is to establish the location, nature and extent of any archaeological sites or material. If archaeological material is present, where possible and practicable the extent, nature and date of these deposits need to be established. Unlike many other archaeological contexts, the date of material uncovered in wetlands may not be clear on the basis of morphology. In estuarine and industrial peatland contexts the exposed ground surfaces and drain or cliff faces may be archaeologically significant, but not necessarily contemporary. In wetland environments it is important to assess the potential and quantity of archaeological material present, particularly in reclaimed wetlands where the organic potential may be reduced or absent.

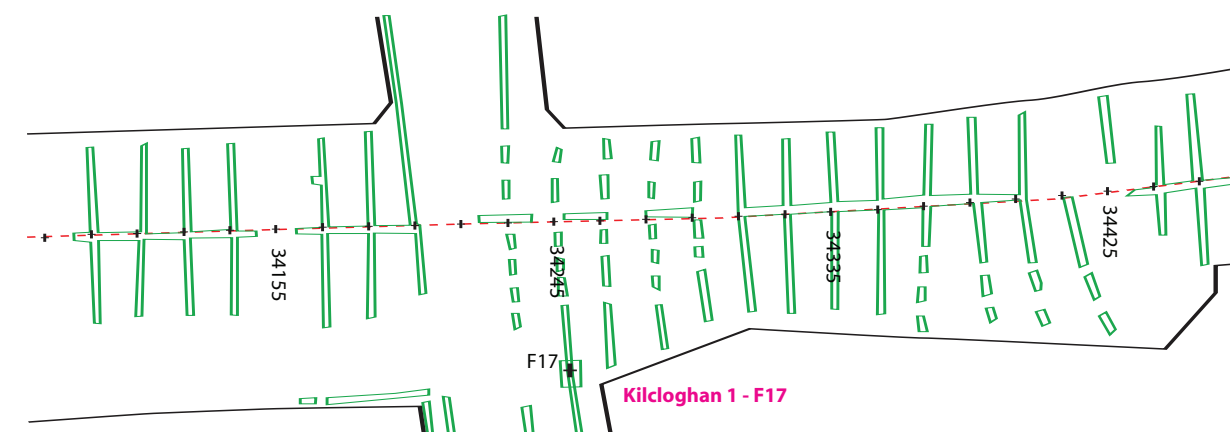
It is essential that a wetland/palaeoenvironmental assessment, examining the landscape and borehole data, should be compiled in cases where a research framework

has been developed for a scheme. Such an assessment can then be used to guide the subsequent fieldwork.

Within each wetland area, a small undisturbed set aside is required for environmental control sampling to compare with the archaeological material. These areas should be excluded from test trenching and stripping and designated as 'no-go areas'.

Mechanical excavators, used for test trenching, should be wide-based tracked vehicles and, where practicable, the driver should be instructed to minimise ground disturbance. In addition, stable access routes should be established to reduce disturbance, compaction and exposure of archaeological material. Machinery loading should occur away from environmentally sensitive areas and all project personnel and sub-contractors informed of this requirement prior to the commencement of on-site works.

In wetland environments it is important to assess the potential and quantity of archaeological material present, particularly in reclaimed wetlands where the organic potential may be reduced or absent.



Plan of continuous and collinear test-trenches in an area of reclaimed peatland along the route of the N6 Kinnegad to Kilbeggan Road Scheme. (Cultural Resource Development Services Ltd.)

TESTING METHODOLOGIES

The testing methodologies applicable to different wetland environments are determined by:

- Ground conditions.
- Tidal conditions.
- Depth of deposits.
- Stability of deposits.

Prior to testing, any information pertaining to the depths of deposits and the nature and profile of the underlying subsoil, such as borehole data, should be examined.

Three methods of testing may apply to works in wetlands:

- **Standard centreline trenching.**
- **Discontinuous trenching.**
- **Test pits.**

Standard centreline trenching, consisting of a continuous centreline with offsets, as generally used on NRA road schemes, may be suitable for:

- **Reclaimed wetlands.**
- **Well-drained wetlands.**
- **Wetlands with shallow deposits.**
- **Wetlands with stable deposits.**

Discontinuous trenching, consisting of a collinear system of centreline trenching, is preferable where the trench lengths are dependent on the stability of the deposits and the depth at which subsoil is reached. This spacing is necessary to maintain stability, reduce flooding and minimise risks to personnel. The intervening sections can be trenched in parallel providing a general indication of the stratigraphy of the natural deposits and the archaeological potential of the area.

In particularly deep deposits, a series of test pits are more likely to be suitable. This method may be employed in areas where:

- The deposits are deep.
- The deposits are heavily waterlogged.
- The deposits are unstable.
- There is a risk of collapse.
- There is a risk of flooding.
- It is preferable to minimise the truncation of the natural strata.

Fragile archaeological material is unlikely to be evident at the base of deep trenches where a mechanical excavator bucket will smear the deposits. In addition, it is often not possible for the recording archaeologist to approach the edge of test pits and trenches due to the unstable nature of the ground and the risk of collapse. In consultation with the Project Archaeologist, such areas may be designated as 'Not assessed' within the testing strategy. Where warranted, these areas may require further assessment at a later mitigation stage, for example, during construction.

Despite the constraints, this approach produces a flexible system that can be adapted for a wide range of circumstances. In estuarine environments trenching should commence as close to the current course of the river as possible and work back toward the dryland. This will minimise the need for personnel and machinery to cross unstable, excavated ground. An undisturbed length of c. 1-5m, adjacent to the river, will be required to prevent the immediate flooding of the trench. In peatland environments it is more advisable to work from the dryland margins, following the subsurface topography, out into the deeper peat.

Additional parallel trenches may be appropriate in areas of higher archaeological potential such as along the fringes of wetland/dryland margins where archaeological material may have been inundated by peat or silting episodes. Due to the highly dynamic nature of estuarine environments and the rapid rate at which deposits can accumulate and erode, the entire area should be considered as being of archaeological potential. The recording and understanding of the natural strata is an integral component of the testing and specialists should be involved, where necessary.

As the basal deposits can flood almost immediately, excavated trenches must be recorded at speed. Generally, the timeframe for recording any archaeological material is considerably shorter than in dryland testing and, consequently, it is advisable that the testing team incorporates personnel experienced in the identification of wetland sites. For health and safety reasons personnel should not work alone, but operate with a form of wetland 'buddy system' (2-3 personnel minimum). In addition to the recording of the exposed material, dating and environmental samples may also be taken in selected cases. These samples, from recorded locations, should be taken in consultation with specialists as outlined below. These may be processed to aid in the dating or interpretation of uncovered archaeological material.



Archaeologists excavating the trough of a *fulacht fiadh* uncovered at Newrath, County Kilkenny, on the N25 Waterford City Bypass.

There are a number of indicators that may assist in the identification of wetland archaeological sites, namely:

- The presence of toolmarks on worked wood.
- The occurrence of wood of mixed species in close proximity (particularly on early prehistoric sites).
- The occurrence of wood from managed sources.
- A structured arrangement of wood.
- The occurrence of stones, earth, bones etc., in seemingly natural wetland deposits.

Exceptions to these indicators do occur and toolmarks have been uncovered on root systems indicating past human activity.

The locations of trenches should be surveyed without undue delay, as they typically have to be backfilled immediately after recording, obliterating any evidence of the trench. Every effort should be made to have the trenches surveyed before their outlines become obscured and indistinguishable. Where this is not possible, placing marker posts in secure locations along the intended line of trenches is of benefit. Similarly, if samples have been taken the sample locations need to be recorded. Again, ground disturbance works should be kept to a minimum during backfilling and disturbed or unstable areas demarcated.

As the basal deposits can flood almost immediately, excavated trenches must be recorded at speed.

EXCAVATION

In the formulation of a mitigation strategy for wetland environments, a number of factors need to be taken into account during the various phases of work.

PRE-EXCAVATION

Forward planning will be required in relation to access, shoring and the management of spoil and water (i.e. pumping, pollution and likely effects on areas beyond the compulsory purchase order land). All of these issues will require consultation with the Project Archaeologist.

Stable constructed access such as bridging and walkways, should be considered to minimise trample, assist in the stability of deposits and ensure safe access for personnel to and from sites. The use of dry excavation platforms (i.e. raised working areas consisting of planks and/or palettes) is also recommended.

Prior to full stripping, consideration should be given to taking core samples for environmental analyses.

Additionally, some baulks may need to be retained for

stratigraphic recording and monolith samples.

Overlying deposits can be very deep and result in large, unstable spoil heaps that may have to be removed from the immediate area of the site. In addition, heavy pumping equipment may be required and a means of managing this water implemented. Sumps can prove an ineffective means of water management as they fill immediately and have associated health and safety issues.

Conversely, a source of water and means of dispersal will also be required during excavation to ensure that exposed organic remains are kept wet to prevent desiccation. Sprinkler systems, 'leaky hose' systems and enclosed shelters have been used effectively on other projects.



Aerial view of an early medieval vertical watermill discovered by test-trenching in alluvium at Killoteran, County Waterford, on the N25 Waterford City Bypass. (Studio Lab)

In advance of excavation, the presence of archaeological wood and other organic remains should be anticipated and suitable provisions made. A cohesive strategy of recording needs to be in place from the outset of the project, as major changes will affect the level of potential comparison between the results of earlier and later strategies.

Standardised terminology should be agreed for sediments and natural deposits, joinery, timber conversions, etc., and be used consistently by all personnel. The use of pro-forma recording sheets is essential in this regard (e.g. timber sheets).

Having specialists in place proves cost effective as it:

- dramatically reduces the size of the sample assemblage;
- ensures that samples taken are relevant and of sufficient size;
- reduces the required storage space, and
- assists in the post-excavation process of sample selection.

A provision should be made for relevant palaeoenvironmental specialists to visit the site(s) during excavation and sampling strategies should be examined and revised, if necessary, over the duration of the project.

A processing area should be created close to the site to which samples can be removed and processed for on-site recording, such as the completion of timber and woodworking sheets and sub-sampling. This processing area may require water-filled tanks for the short-term storage of timbers being recorded. As some samples can be bulky additional off-site storage may also be required, once the initial recording has occurred.

A cohesive strategy of recording needs to be in place from the outset of the project, as major changes will affect the level of potential comparison between the results of earlier and later strategies.



Environmental coring of a wetland area adjacent to the Hiberno-Scandinavian settlement at Woodstown, County Waterford, on the N25 Waterford City Bypass.

EXCAVATION METHODOLOGIES

There are two principal excavation strategies that can be applied in wetland environments:

- Open area excavation.
- Strip-excitation (sequential excavation by grid squares or strips).

The merits of each system vary and generally a combination of the two systems is used, depending on conditions, the depth of material below ground level and the nature of the archaeological sites. Open area excavation results in a larger amount of exposed archaeological material that will require watering and care; however, it gives a broader understanding of the structures present. While strip excavation reduces the ongoing care of deposits, the partial exposure of material can cause problems for interpretation, sampling and the recognition of artefacts.

Due to the rapid rate of desiccation and oxidation, exposed archaeological material should be watered regularly which is a time-consuming but necessary component of wetland excavation. Exposed portions of the site not being worked will require occasional watering and should be covered with black plastic. Covering with 'cling-film' can further protect delicate wood or artefacts. Complete covering using poly-tunnels can also be used; however, the warm damp conditions so created can cause health hazards. While these methodologies will not prevent drying out, they will reduce the effects of wind and sun on excavated deposits.

Exposed wooden structures require rapid recording and experienced personnel. Structures should be sampled and lifted as quickly as possible. The sampling and recording of timbers on-site is time consuming and a designated team for this work is often advisable for large-scale excavations. In general, samples should be maintained in similar conditions to those in which they were found to ensure stability and minimise curation requirements.

MONITORING

While the guiding aim is to complete all archaeological works in advance of construction it is not always possible to do so. In such instances, road construction in wetlands, and other environments, may be subject to archaeological monitoring conditions. When monitoring in wetlands the testing and excavation guidelines outlined above should be adhered to. However, given the particular risks pertaining to construction activities careful consideration must be given to increased health and safety restrictions.



Archaeologist excavating a trackway found in alluvial deposits at the confluence of the River Blackwater and the Strangmill Stream with the River Suir in Newrath, Co. Kilkenny, on the N25 Waterford City Bypass.

POST-EXCAVATION AND CONSERVATION

Due to the volume and varied character of data retrieved from wetland excavations, post-excitation is often a time consuming and expensive process. It is therefore essential that a thorough assessment of all the wetland material (stratigraphic, artefactual and environmental) be undertaken at the outset. These results should be factored into the post-excitation assessment for the scheme as a whole. On the basis of this a set of aims and methodologies can be drawn up. These tasks need to be programmed across the various disciplines in order to manage the project effectively.

A significant issue in post-excitation relates to higher conservation costs, both for short-term curation and final conservation, given the potential for recovering large volumes of fragile, waterlogged organic remains. The provision of suitable working and storage facilities (with wet working areas, storage tanks, labelling and conservation facilities) will also have to be addressed.

Conventions for written reports should be standardised and circulated to all contributors. Many of the results obtained from the various palaeoenvironmental specialists are likely to provide environmental information on the early landscape of the area, which may be relevant to other sites excavated as part of the road scheme. The inclusion of palaeoenvironmental specialists from the initial stages of project design should help to reduce the sample selection process. A series of post-excitation consultations or discussion forums may assist in the collective interpretation of the results. It may also be worthwhile commissioning one of the palaeoenvironmental specialists to integrate all such results for the final report.

A significant issue in post-excitation relates to higher conservation costs, both for short-term curation and final conservation.



Wooden trough of a *fulacht fiadh* in alluvium excavated along the route of the Limerick Southern Ring Road (Phase II). (TVAS (Ireland) Ltd.)



Conventional test-trenching in an area of reclaimed peatland along the route of the N6 Kinnegad to Kilbeggan Road Scheme. (Cultural Resource Development Services Ltd.)

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