

10. Archaeological assessment methods for NRA road schemes

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Recording early modern building remains on the N18 Ennis Bypass, County Clare (Aegis Archaeology Ltd)

What is archaeological assessment?

Archaeological assessment, in a rescue context, is the systematic attempt to discover the potential impact of a proposed development on archaeological remains. A variety of methods can be deployed in this attempt and the resulting report will usually include recommendations on how the impact may be avoided or mitigated.

Various published guidances offer advice on when it is appropriate to conduct an archaeological assessment, and on how this should be done. In summary, some or all of these guidances allow that desk-based research, fieldwalking, topographic survey, geophysical survey, test excavation, palaeoenvironmental sampling (i.e. soils or peats), and aerial survey may all form part of the archaeological programme at this stage of a major development, such as a national road scheme.

A key document here is the *Framework and Principles for the Protection of the Archaeological Heritage* (DAHGI 1999a, 25–7). In summary, this defines (at 3.6.1) the purposes of archaeological assessment as i) better understanding the impact of development on

suspected archaeological deposits; ii) locating previously unidentified deposits; and iii) considering the long term implications of development for archaeological deposits which may not have been identified prior to construction. It emphasises (at 3.6.2) that an assessment may be appropriate for any development which is extensive, which is likely to impact on wetlands and river crossings, or which occurs in the vicinity of groups of known sites or monuments. It also observes wisely (at 3.6.3) that ‘assessment can avoid or reduce cost or delays.’ Finally, it defines the potential scope of the work (at 3.6.4) as including ‘documentary research, fieldwalking, examination of upstanding or visible features or structures, examination of existing or new aerial photographs or satellite or other remote sensing imagery, geophysical survey, topographical assessment, general consideration of the archaeological potential of the area or areas affected by a development based on their environmental characteristics, or archaeological testing.’

This broad approach to assessment is endorsed by relevant guidances for archaeological work in the context of national road schemes and especially by the *Code of Practice* (2000) agreed between the National Roads Authority and the Minister for Arts, Heritage, Gaeltacht and the Islands. Appendix I of the Code prescribes that the Project Archaeologist will ‘prepare the specification for the Consultant Archaeologist at EIA stage and ensure that all preparatory archaeological work (desk study/field walking, aerial photography and if necessary geophysical surveys etc.) for the EIA are of the highest standard.’ In addition, the *National Road Project Management Guidelines* (NRA 2000, at 4.3.1) acknowledge that, for the archaeological assessment of a national road scheme, ‘exploratory investigations’ may be necessary at an early stage and may contribute to an Environmental Impact Statement for the scheme.

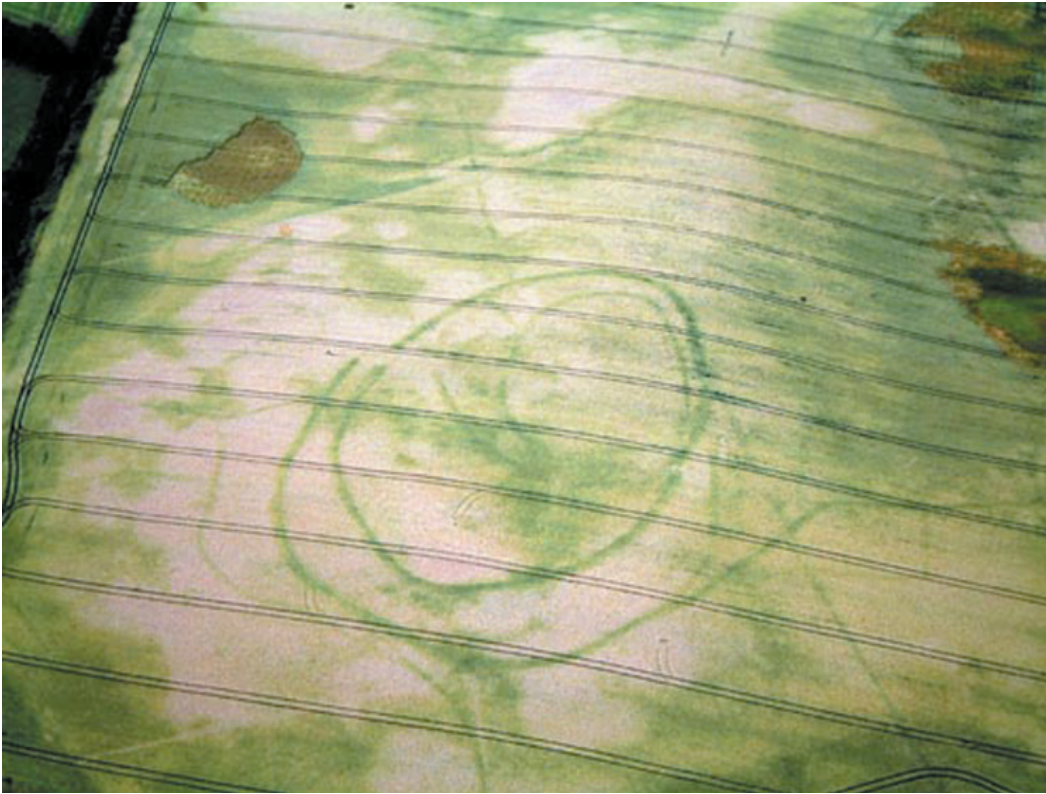
Some other guidances or technical publications which offer useful information on archaeological assessment methods include the *Policy & Guidelines on Archaeological Excavation* (DAHGI 1999b, 17–19), *Archaeology & Development: guidelines for good practice for developers* (Heritage Council 2000, 22–5), *Guidelines for Archaeologists* (IAPA 2000, at 4.1–3), and the Heritage Council’s *Review of Archaeological Assessment & Monitoring Procedures in Ireland* (Lambrick & Doyle 2000).

Assessment, and indeed subsequent resolution, should always be undertaken to a strategic plan, incorporating appropriate methods. This paper will briefly outline some of the principal methods of archaeological assessment appropriate to a national road scheme. These may be divided broadly into invasive and non-invasive methods.

Non-invasive assessment

Desk-based study

A desk-based study involves research into bibliographic, cartographic and photographic material. The primary sources are statutory and non-statutory records or lists maintained by Dúchas the Heritage Service. Foremost of these is the national Sites & Monuments Record (literally comprised of copies of all available information which can be collated on any known site or monument). A Maritime Sites & Monuments Record is also maintained by Dúchas, as well as (draft) inventories of wrecks and harbours in Irish waters. Statutory protection lists include the Record of Monuments and Places (RMP), the Register of Historic Monuments (in effect a subset of the RMP), and the recently established National



Multiple cropmark enclosure at Ardee, County Louth (Valerie J Keeley Ltd)

Inventory of Architectural Heritage (NIAH). There are also archaeological inventories either published or in preparation for each county, and for historic towns there is a series of unpublished but invaluable reports by the Urban Archaeology Survey, which was compiled in the 1980s.

Apart from these records generated or maintained by Dúchas, there is a variety of other useful sources which should be consulted. The Topographic Files of the National Museum of Ireland hold information on finds of archaeological objects sorted by placename. The premier cartographic source is of course the Ordnance Survey. As well as editions dating from the early to mid 19th century onwards, there are also Ordnance Survey letters, name books and memoirs. A miscellany of other early cartographic sources worth consulting might include estate maps of various dates, the mid 19th-century *Griffith's Valuations* (1880), 18th-century town plans by John Rocque (e.g. Rocque 1754) or road maps by Taylor & Skinner (1778), and the various maps produced for Sir William Petty's 'Down Survey' in the mid 17th century (Irish Archaeological Society 1851).

The premier collection of aerial photographs for archaeological purposes is the Cambridge University Collection of Aerial Photographs (CUCAP, alias the St Joseph collection). The Geological Survey of Ireland and the Ordnance Survey both have in their collections a variety of vertical and oblique high level photographs for the whole country and the Department of Communications, Marine and Natural Resources is in the course of publishing on CD an infra-red series for the whole coastline of the Republic of Ireland.

At local and national level all available printed sources should be consulted. Obviously,

this should include relevant publications in national, regional and local archaeological and historical journals, local histories and guidebooks or gazetteers, relevant university theses, and the annual *Excavations gazetteer*. (This last is now available on the internet as a searchable database at www.excavations.ie.) Remember that placenames too constitute a kind of cryptic document of local histories for individual villages, townlands or even fields and these should all be glossed with reference to an authoritative source (e.g. Joyce 1869–1913). More recent sources to consult should include the local authorities' own records, ranging from current Development Plans — with their lists of Protected Structures — to river drainage files.

Many of these sources are available at national libraries or institutions, including the National Library of Ireland, the National Archives or the library of Trinity College, in Dublin. A good deal of relevant material may be found locally, however, and many local authority libraries now have a local studies centre dedicated to the historical and cartographic sources for the relevant town or county.

Finally, some of the most important information can be gleaned from people rather than documents. In conducting a desk-based assessment for any large development scheme it is wise to consult a wide range of people for information and opinions. This may include officers from statutory bodies such as Dúchas and the National Museum, local authority archaeologists, conservation officers and heritage officers or engineers, local museum curators and members of local historical and archaeological societies or other field-clubs, and landowners. This sort of wide-ranging consultation is strongly recommended by the Environmental Protection Agency in its guidelines for the compilation of an Environmental Impact Statement (EPA 1995 & 2001) but applies equally to any sort of assessment of a large development area.

Aerial reconnaissance

In the present context this refers to low level (500 to 1000 ft) reconnaissance, with vertical and oblique photographs taken by qualified personnel specifically for archaeological purposes. The technique is highly dependent on weather and conditions on the ground, but sites or monuments no longer visible at ground level can often be identified from the air by transient features such as cropmarks, soil marks or shadow created by oblique winter sunlight. Images may be recorded by conventional film, digital means, video, false colour or infra red. As a means of archaeological assessment, aerial photography should aim to achieve the following:

- ascertain the extent and condition of known sites and monuments
- identify any associated features in their vicinity
- record any other hitherto unidentified sites and monuments
- examine areas of archaeological potential where there may be no visible surface features
- make any other observations relevant to a holistic assessment of the archaeological landscape



Rectangular enclosures identified by aerial survey during route selection for the N22 Ballincollig to Ballyvourney scheme (Cork County Council National Roads Design Office)

- record all of the above with photographic or other images, annotated maps and *pro forma* record sheets

Aerial photography is a long established archaeological tool but, in recent months, increased reliance was placed on this form of ‘remote sensing’ of potential archaeological sites in national road corridors. This was because access to agricultural lands was limited or even prohibited. (This came about, first, when Ireland was threatened with an epidemic of Foot & Mouth disease and, immediately after this, in the course of a dispute between the Irish Farmers Association and the Department of the Environment and Local Government over levels of compensation for the impacts of national road schemes.)

Fieldwalking

Archaeological fieldwalking involves systematic traverses of the development area by experienced personnel. In addition to walking the ground, the survey team should also avail of every opportunity to ask landowners and other local people for their observations on field names, local traditions or recollections of unusual features or artefacts uncovered by ploughing or drainage work. The fieldwalking survey should be conducted with the

following minimum aims.

- inspect every field or land parcel within the proposed road corridor
- ascertain the condition and extent of known sites and monuments
- identify any associated features in their vicinity
- record previously unidentified sites and monuments
- assess areas of archaeological potential where there may be no upstanding visible remains
- gather any other information relevant to a holistic assessment of the archaeological landscape
- record all of the above on *pro forma* field sheets, supplemented by annotated maps, measured drawings and photography.

Geophysical survey

Remote sensing by geophysical survey can be applied in areas of known archaeological interest — like the site of a levelled earthwork enclosure — to pinpoint targets for subsequent test-excavation. It can also be used as a blanket prospecting technique in areas of suspected archaeological potential, such as good arable tracts where there are no visible settlement remains. Several different sorts of geophysical survey are typically applied in terrestrial archaeological assessment work. These include magnetometry, resistivity and magnetic susceptibility. The appropriate method and intensity of survey will vary with the aims and circumstances of the work.

A full treatment of geophysical survey techniques for archaeological work on road schemes is given in a paper by K Barton, below.

Probing

A manual form of remote sensing, involving probing with metal rods or wands, has been used very successfully as a survey tool for the discovery of buried walls, cairns and other prehistoric structures in Irish boglands.

Metal detector survey

This method of survey can be particularly useful in the assessment of river beds, river banks, estuaries, streams, lakes, ponds and other wetland or underwater sites, as well as ancient routeways, battlegrounds or military camps. In short it can apply to any extensive site or monument where there is a likelihood that metal objects were either lost or deliberately deposited (e.g. as votive offerings) in the past.



Interpretative plots of geophysical survey results on the M3 Clonee to North of Kells scheme, County Meath (GSB Prospection for Margaret Gowen Ltd)

Topographic survey

Topographic survey may be required for archaeological features or groups of features where existing mapping and aerial photography are inadequate for the purposes of assessment. This may arise because of the complexity of a site or the presence of masking vegetation, such as scrub, bracken or heather. The aim will be to provide an accurate site plan — with sectional profiles and contours as required — to assist in explaining the nature and extent of a particular site and the relationships that may exist between its various elements. Typically, this might be applied at assessment stage to extensive prehistoric settlements, deserted medieval villages or castle complexes.

Building survey

At assessment stage in the development of a national road scheme, the objectives of building recording should simply be to make a brief record of the location, character and condition



Archaeological survey at the crossing of the Tourig river, County Cork, by the N25 Youghal Bypass (Cork County Council National Roads Design Office)

of a structure, an assessment of its significance and a statement of the likely impact of the proposed scheme. Photographs, a sketch and a written description should suffice. A detailed survey of the plan and elevations are unlikely to be necessary at this stage. On the other hand, the existing desk-based report for the scheme should be checked and updated to include any relevant records of the building and its environs. In assessing the significance of a building, it will be wise to consider the criteria set out in the recently published statutory guidelines on architectural heritage protection (DAHGI 2001b, 32–36).

Underwater assessment

For purposes of archaeological work Section 1 of the *National Monuments (Amendment) Act 1994* defines ‘water’ as — *inter alia* — water courses, standing bodies of water, tidal areas

and estuaries and the territorial waters of the State. These contexts may preserve remains of fords, jetties, revetments, bridges, fish traps, mill weirs, wrecks and other boat timbers and lost or deliberately deposited (votive) objects. In the course of a national road scheme, the development works — including bridge construction, revetments or landfill — can have a large impact on these various bodies of water and thus require full archaeological assessment.

As with other forms of archaeological assessment for an NRA road scheme, the aims will be to ascertain the condition and extent of any archaeological features or objects likely to be affected by the proposed works, to ascertain the likely impact of the proposed works on these remains, and to recommend measures for avoidance or mitigation of that impact.

Any existing desk-based report for the scheme should be checked and updated to include relevant information from the Maritime Sites & Monuments Record, the inventory of *Ports, Piers and Harbours of Ireland* (UAU 2000a) and the *Inventory of Shipwrecks off the Irish Coast* (UAU 2000b); also records of drainage or dredging schemes; geotechnical reports on the riverbed and underlying geology (these may have been produced for purposes of the proposed scheme); and information from local diving, angling and boating clubs.

In the field, the assessment will usually involve a ‘free swim’ inspection of the underwater surface, with a base-line established in the field as a minimum survey control. Where conditions allow (i.e. in shallow or dry stream beds or intertidal areas), a walkover or wading survey may suffice instead. Some form of geophysical survey will generally be employed, using hand-held or boat-towed instruments. Where features or objects are found to occur, the topography of the river bed should be recorded in plan and section and the location of the features or objects clearly marked. Test trenches also may form part of the assessment. Where hand-excavation is not feasible, sediments may be extracted instead by suction device and sieved on the riverbank, shore or on a support vessel.

Invasive assessment

Monitoring of topsoil stripping

The traditional methodology for dealing with the archaeological impact of road schemes was to resolve the known or previously identified sites and monuments, and then discover the remaining sites by monitoring topsoil stripping by the main contractor at construction stage. Obviously, new sites identified in this way can have major impacts on construction, leading to delays and increased costs, particularly arising from compensation claims by the main contractor. As described elsewhere in these proceedings (see especially D O’Rourke), early and extensive strategic testing should be preferred as a means of detecting previously unknown sites and monuments.

Where monitoring of topsoil stripping at the construction stage cannot be avoided then it should only be undertaken by qualified and experienced personnel. If extensive testing has not preceded this then monitoring is especially required in the vicinity of known or suspected sites and monuments, or where the development is of such a scale that as yet unidentified archaeological remains could reasonably be expected to occur. The work can be subdivided into the following stages:

- identify any archaeological features exposed by the works

- isolate and protect these features (geotextile membrane and fencing may be used)
- ascertain their character, condition and extent
- notify relevant authorities and individuals
- initiate resolution of the archaeological features, usually by excavation, where preservation *in situ* cannot be arranged.

Test-excavation

As described above, where test-excavation is carried out as part of an overall assessment and to a strategic plan, it can significantly reduce the need for archaeological monitoring during the construction phase. Consequently, a planned programme of archaeological resolution can be put in place and additional costs arising from delays and penalty claims by the main contractor can be reduced.

The aims of archaeological test-excavation are similar to those of archaeological monitoring:

- contribute to the assessment of known archaeological features which will be affected by the scheme
- identify any previously unknown archaeological features likely to be affected
- record their character, condition and extent and assess their significance
- ascertain the potential impact of the scheme on all these features and propose an appropriate response, in the form of avoidance or, more usually, excavation.

Test-excavation methods may be targeted or extensive. Targeted testing is generally directed at known archaeological sites or areas in close proximity to such sites. It may also be directed at particular topographic contexts considered to have a high archaeological potential, such as hilltops likely to have been settled in the past, soil catchment areas where early remains may be buried, or wetlands where wooden trackways or hunting platforms are likely to occur. Targeted testing can be undertaken either by machine or by hand, depending on the circumstances. For instance, hand-digging would be usual on an upstanding monument but a machine might be used to remove topsoil from a known site which had already been levelled by generations of ploughing.

Extensive testing is used where a development is of such a scale that some previously unknown archaeological remains are more or less certain to occur within the construction area. Again, judgement must be used to prioritise areas for testing, but because these are typically extensive and the targets less obvious, machine-digging is generally preferred. There are three basic approaches to extensive testing: total topsoil stripping, linear testing and area testing.

Total topsoil stripping in effect allows a 100% test trench to be opened and is the optimum situation for the discovery of previously unknown archaeological remains. It is



An overgrown post-medieval roadway recorded by the walkover survey for the M1 Dundalk Bypass (Meath County Council National Roads Design Office)

seldom undertaken, however, for a number of practical reasons. Obviously, it is more time-consuming and thus more expensive than selective testing. Furthermore, it is contingent on access to lands in all areas, which is seldom available at assessment stage. Finally, the early exposure of subsoils for archaeological purposes throughout the whole construction area of a road scheme can affect long-term soil stability and is seldom acceptable on engineering grounds.

Linear testing involves trenching continuously along the centre-line of the whole road corridor, usually with offset trenches positioned at regular intervals. The result is a herringbone pattern of test trenches that typically achieves a total test area of between 4% and 8% of the total scheme area. (In areas where more intensive assessment seems wise, offsets can be more closely positioned, resulting in an increase in the total area tested.) The chief advantage of this kind of testing is a guarantee that at least all of the larger archaeological sites will be identified in advance of construction.

Area testing is a variation of linear testing but involves stripping the topsoil in checkerboard fashion, in large test areas, rather than in continuous trenches. It is typically applied to locations such as low, broad hilltops or arable river terraces, where no archaeological remains are known but the likelihood of former settlement seems high.

Following any of the methods described above, just as in archaeological monitoring, the features identified by testing would usually be isolated and protected until measures for their avoidance or investigation were agreed. It may sometimes happen, however, that further investigation is unnecessary. This would arise where the features were in such

vestigial condition or of such slight significance that no further record of them was required, or where it was agreed that the features would be entirely avoided by the scheme.

Licensing of archaeological work

The foregoing is all concerned with practical aspects of archaeological assessment and has not addressed the statutory regulations governing this. In brief, test-excavation, geophysical survey, metal detecting and underwater survey and excavation are all subject to licence by the Minister via Dúchas the Heritage Service, in consultation with the National Museum of Ireland. For more on this requirement see papers elsewhere in these proceedings by S Kirwan and J O'Sullivan.