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National Trust

Climate Change Adaptation Guidance– Archaeology & Landscape

Buried Archaeological Remains

Climate change vulnerability: medium

Buried archaeological remains – introduction

Often unnoticed, the National Trust's 250,000 hectares of land is home to over 90,000 archaeological sites. While many of these are visible as earthworks and upstanding remains, much of our outdoor collection is buried beneath the ground.

Some of our buried archaeological sites are protected as scheduled monuments, but the majority are undesignated. This means that it is often difficult to protect them from various threats associated with the principal land use.

The National Trust has archaeologists, cultural heritage curators and countryside teams who work to manage archaeological sites, and encourage land management practices that enable preservation in situ. Specialist teams across the UK government bodies carry out technical research and generate guidance documents specific to buried archaeological remains.

Buried archaeology is often at risk from activity and processes, which range from night hawking (illegal metal detecting) to deep ploughing. As our climate changes and weather events intensify, what does this mean for decision-making about buried archaeological remains, especially where the potential is the most significant aspect of the site?

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Links of Noltland, Westray, Orkney (© Historic Environment Scotland)

Buried archaeological remains – why do they matter?

As our buried sites begin to be affected more frequently by climate hazards, we need to plan ahead to ensure that the opportunities presented by these threats are realised, prioritised and funded appropriately.

The most pressing and obvious case for investing in the opportunities presented by climate hazards can be seen at the coast. Here, our buried remains are frequently exposed, eroded and impacted by shoreline retreat and coastal processes, which are exacerbated and accelerated by climate change. If we do not put in place appropriate management plans for sites known to have archaeological potential or significance, we risk losing the information they can yield about past human activity forever.

Loss of heritage is also a key engagement tool for local communities and other stakeholders. By investing in the understanding, recovery or recording of the historic environment, we can help people understand the impacts of climate change through place and culture.

While coastal pressures are demonstrable, only around 1 per cent of our heritage at risk is found along the coast. The UK's third Climate Change Risk Assessment highlighted that overheating presents the biggest threat to people and places, not coastal processes. It is important to consider the less visible risks to the historic environment and to invest in understanding their impact before taking adaptation action.

Away from the coast, buried remains are often most at risk from changes in land use, land management, development and neglect. The National Trust works with its regional archaeologists and volunteers to monitor its archaeological sites and protect them through maintenance and through statutory processes.

Regional teams also recognise the need to mitigate climate change and respond to the nature crisis, which can be a further threat to the historic environment, if not designed and delivered sympathetically. Through appropriate and proportionate investigations (such as desk-based assessments, geophysical survey and remote sensing), as well as follow-up targeted trials through environmental sampling and/or trial trenching, nature-based solutions and mitigation, interventions need not be a threat to the historic environment, but instead an opportunity to learn from the past as we strive to protect our heritage into the future.

Image credits:

Roundhouse excavation at Dinas Dinlle (© Crown: CHERISH PROJECT. Produced with EU funds through the Ireland Wales Co-operation Programme 2014–2022)

Buried archaeological remains – hazards, impacts and options

Hazard	Impact	Options
Flooding	Waterlogging of remains, exposure and washing away of remains, compounded by the impacts from access/land management	Attenuation (vegetation and nature-based solutions to reduce rate of flow and level of flow affecting site), hard attenuation/diversion (intervening through groundworks and/or civil engineering to divert water away from the affected site), rescue archaeology and preservation by record, potential to target excavation at worst affected areas likely to succumb to repeat events, look to reduce or segment access during wetter months
Drought	Drying out of remains including loss (over time) of organic material and definition of remains	Coring and sampling to investigate archaeological potential and identify hotspots for remains of significance, excavation and preservation by record, indirect impacts of adaptation strategies to retain groundwater (e.g. blocking land drains and potential periods of wetting and drought for remains which may accelerate deterioration)
Heat	Wildfire causing charring of remains from intense heat and fire above ground	Fire breaks in the landscape, avoid keeping fuel stores close to archaeologically sensitive sites, ban disposable BBQs from sites, ban hot works from sites during dry weather (e.g. no hot works are permitted at National Trust places at any time) and plan and enact awareness campaign during times of heightened risk to reduce human causes
Storm damage	Erosion, scarring of surfaces that lead to deeper erosion and exposure of remains, loss of ground protection	Reactive maintenance whereby erosion and scarring are simply repaired quickly to avoid deeper erosion exposing remains, look at investing in geo-textiles and sward changes through land management to build resilience into ground cover, ensure cover crops are in rotation and avoid fallow ground, if appropriate, construct earthwork runnels to divert flows away from sensitive areas
Coastal erosion/ landslide/ cliff fall	Loss or partial loss of features and sites, exposure of remains	Rescue archaeology, preservation by record, recovery of significant archaeological remains for display/ archive, opportunities for community engagement and coping with loss through cultural interventions as well as practical management pathways (options and thresholds agreed to determine at what point sites should be addressed through rescue archaeology). At some sites maintenance of coastal defences may still be appropriate, as well as options for nature based solutions such as salt marsh restoration.
Prolonged rainfall	Waterlogging and exposure of remains	Erosion repair, investigate drainage options, improve rainwater capture, storage and drainage of site (including underground storage potential and diversion of rainwater ingress across the site), geophysical survey where remains are exposed, excavation if appropriate

Buried archaeological remains – options & thresholds

Climate change affects the ability of land, including buried archaeological remains, to cope with hazards that may be compounded by the impact of other processes, such as land management.

This should be considered when revising management plans and maintenance regimes for buried remains, and when determining thresholds for adapting and making changes. Floods, drought, shrink/swell and landslides all have the potential to impact buried archaeological remains, which will worsen with more extreme weather events.

Specific options for adaptation measures include:

Drainage – should be investigated, maintained and can be changed to help a site cope with retaining water (blocking land drains, diverting water towards drought-prone areas) or shedding water (installing and enlarging drainage around the site through hard interventions, groundworks or natural attenuation to help direct water away from vulnerable areas or limit it from reaching the site), with synergies for nature-based solutions such as natural flood management, water storage and rainwater harvesting.

Land Management – can be a compounding factor alongside climate stresses. If a site is compacted, regularly improved and over-grazed, its ability to retain water will be very poor. Alongside drainage interventions, if land management practice can be changed to reduce stocking density, reduce grazing period and ideally retain or revert sites to pasture, this will improve the site's ability to retain water.

Non-intrusive survey – can be used to help identify significant remains and locate potential areas of interest where sites are threatened with loss, deterioration or detrimental impacts from repeat/worsening climate hazards. Drone survey, analysis of aerial imagery, parch marks during drought, Light Distance and Ranging survey (LiDAR), resistivity survey, ground penetrating radar, magnetometry, photogrammetry and even field walking can all help to target intrusive survey if warranted. Map regression analysis to understand a site through time is a key step in this process, and ensures the time depth and legibility of the site today is understood thoroughly before decision-making.

Intrusive survey – this can include, but is not limited to, coring and environmental sampling, trial trenching, test pitting, full-scale area excavation and rescue archaeology. It is very likely that permissions will be needed for this type of adaptive measure and should be a last resort because all such techniques are destructive to in situ remains.

Engagement and activity – telling the story of our past is crucial to learning to adapt to the future. Unlike most assets affected by climate change, archaeological remains present a good opportunity to learn about past lives, practices and places, and understand our impact on the landscape. All adaptive measures with archaeological interest provide the opportunity to engage local communities and other interested parties to share and participate in the conservation of the historic environment.

Consents and permissions

One option is to do nothing and another will be to maintain the site as it is. Sometimes, the historic environment is not well maintained and the most effective approach to resist climate hazards and impacts, and to improve the site's adaptive capacity is to activate a regular maintenance regime. Some interventions may require scheduled monument consent, including planting, changes in land management (requiring a class consent) and any kind of development (including access). A section 42 licence under the Ancient Monuments and Archaeological Areas Act 1979 may be required for carrying out some non-intrusive survey.

Thresholds & tipping points

At what point might you diverge from your current maintenance/management strategy? What are the events/impacts that may trigger this change of approach (action/philosophy)?

- Frequency of maintenance interventions
- Quantity of material being sourced to fill washed out/eroded areas
- Extent of material being exposed
- Quality of survival (if a monitoring regime is in place and can be demonstrated to be deteriorating with repeat weather-related events)
- Increase in standing water (affecting ability of the site to dry out)
- Extent of measures to maintain (resource, impacts on aesthetics, finance)
- Impact on archaeology and/or natural environment is unsustainable and negatively impacting significance

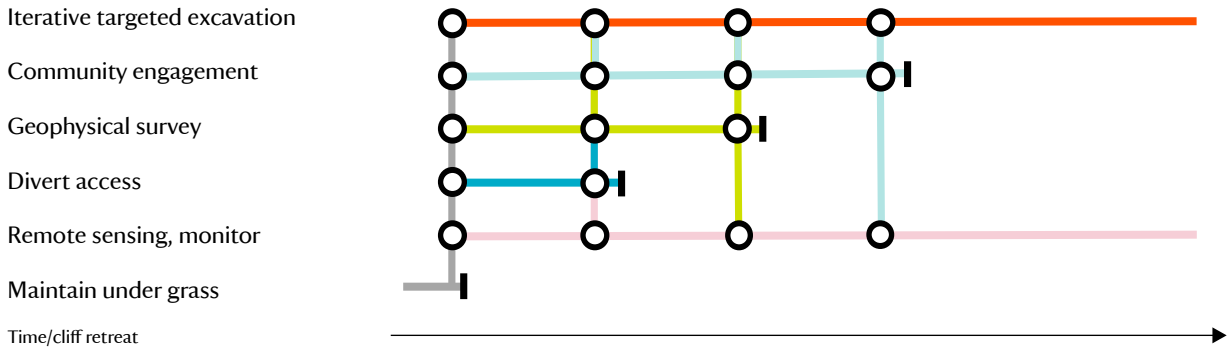
Buried archaeological remains – worked pathway example

This application of pathways and thresholds to a real site example shows how and when your adaptive response to climate hazards may change and evolve.

Working with a multi-disciplinary group to think about options and thresholds for a typical site is key. This cannot be done in isolation as there are significant implications for impacts on more than one aspect; for example, archaeology, ecology, aesthetics and access. It is better to bring together the right people to work on a mutually acceptable solution for a period of time between thresholds for change.

Although a land parcel or area yielding archaeological remains is likely to be managed for other purposes, such as farming, gardening, recreation or even car parking, interventions can have an impact on the significance of buried remains and the wider historic environment. Interventions may range from nature-based mitigation to climate action to adaptive measures to prevent loss or conserve heritage values. Therefore, significance should always inform the approach and, where necessary, be weighed against the benefits and drawbacks of action/inaction.

These options must not be selected in isolation from the unique characteristics, significance, vulnerabilities and land use of your specific site, and this may mean that different adaptive pathways apply in each specific context. The worked example below is based on the hillfort at Dinas Dinlle, owned by the National Trust, and is a hypothetical example demonstrating potential measures and thresholds rather than an actual dynamic adaptive policy pathway. This asset is already experiencing partial loss and is extremely vulnerable to coastal erosion.



(Response thresholds are most likely to be based on the level of cliff collapse, or the extent of cliff retreat, linked to the safety of visitors accessing the site from both the land and the beach. The specific trigger points are partially dependent on permissions from Cadw and funding from supporters, such as the CHERISH project and Cadw. The success of interventions is partially dependent on interaction, advocacy and story-telling to connect people with this asset and its plight. See the How to Use this Climate Adaptation Guidance for further information on Dynamic Adaptive Policy Pathways[1] and how to choose pathways from the range of options.)

Image credits:

Dinas Dinlle Hillfort (© National Trust Images/Imogen Wood)

Dinas Dinlle Hillfort, with cliff-face excavation and recording as buried remains are exposed by cliff retreat events (© Crown: CHERISH PROJECT. Produced with EU funds through the Ireland Wales Co-operation Programme 2014–2022)

References:

[1] Dynamic Adaptive Policy Pathways Approach (Haasnoot, Kwakkel, Walker & Ter Maat)

Case studies, signposting and references

The National Trust has risk management strategies in place for some of its sites, particularly at the coast where we have coastal adaptation strategies for access, visitor facilities, nature and heritage.

These give a high-level spotlight on the key risks a site may face and provide a framework for assessing exposure to climate hazards, impacts and options for adapting to coastal processes.

At Links of Noltland, Westray, Orkney, the sand dunes protecting a buried prehistoric settlement were becoming badly eroded by wind and threatened the archaeological remains. Following a rescue excavation, Historic Environment Scotland staff worked to stabilise the dunes by recharging them with sand from a local quarry and filling the gaps between them. The dunes were then hand-planted with marram and lyme grasses (pictured here). The roots are helping to anchor the dunes, break up the impact of incoming winds and catch sand grains, which enable the dunes to build back up again.

Although a risk only in certain circumstances, landslip is a hazard which can be both detrimental and beneficial for buried archaeological remains. Erosion and landslip at Harrows Scar Milecastle, on Hadrian's Wall, has allowed English Heritage to undertake investigations that will inform stabilisation and future management of the site.

The multi-period earthworks atop Twm Barlwm, near Newport, were subjected to wildfires in 2018. The fires both damaged and revealed archaeological features, which simultaneously presented a threat and created an opportunity. A conservation plan is being drawn up to look at options for the site's management in the future, taking into account this previously unusual threat, the feasibility for interventions and an adaptive pathway.[2]

Signposting & other guidance of relevance/use

In the early 2000s, Natural England and Historic England undertook research and site-based investigations into the effects of cultivation on archaeological remains (COSMIC)[3]. The report and outcomes are still valid today and inform management practices that help protect the archaeological remains.

When considering options, always **consult a historic environment specialist** such as an archaeologist to check the implications of any proposal[4]. It is possible that options would need a variety of consents including, but not limited to, drainage **consents**, scheduled monument consent, class consents associated with land use and permissions from various statutory bodies[5]. Some works where a physical intervention is proposed may require planning permission so it is advisable to consult a local planning adviser before designing works.

Image credits:

Links of Noltland, Westray, Orkney (© Historic Environment Scotland)

Land slip close to Birdoswald Roman Fort (© English Heritage Trust)

References:

[2] Historic Environment and Climate Change in Wales – Sector Adaptation Plan. https://cadw.gov.wales/advice-support/climate-change/adapting-to-climate-change

[3] Natural England and Historic England resources for Rural Heritage, including the COSMIC reports. https://historicengland.org.uk/advice/caring-for-heritage/rural-heritage/support-and-funding/

[4] Environment Agency guidance on working with natural processes https://www.gov.uk/flood-and-coastal-erosion-risk-management-research-reports/working-with-natural-processes-to-reduce-flood-risk

[5] Managing Change in the Historic Environment: Works on Scheduled Monuments. https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=94b715a8-123c-41dc-9cf4-a60b00a4ff64