Marine Archaeological Guidance

Beach Replenishment/Nourishment and Contract Fill Projects

Wessex Archaeology was commissioned by the British Marine Aggregate Producers Association (BMAPA) and The Crown Estate to develop this guidance, in partnership with Historic England. Wessex Archaeology would also like to thank the Environment Agency, Bournemouth Christchurch Poole Council, North Norfolk District Council, Coastal Partners (Havant Borough Council) and the Maritime Committee for the Association of Local Government Archaeological Officers for commenting on drafts.

Cover: Bacton beach at dawn. Image used under license from timages - stock.adobe.com.

Marine Archaeological Guidance for Beach Replenishment/Nourishment and Contract Fill Projects

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Frequently Asked Questions

Who is this guidance for?

This document is for The Crown Estate (as the landowner), Regulators, Curators, Commissioning Clients, Project Contractors, companies working on beach nourishment/ replenishment and contract fill projects, Aggregate Licence Operators, and Archaeologists. Find out more about roles and responsibilities in **Section 3.2** below.

Why is this guidance needed?

A number of recent case studies have demonstrated there can be archaeological potential in aggregate licence areas used for beach nourishment/replenishment and contract fill projects, and that the archaeological material can be found after the work has been finished. Read more about these case studies in **Appendix 2**.

Who has responsibility?

The responsibility remains with the company/organisation commissioning a beach or contract fill project.

This organisation may be by default taking on responsibilities previously held by the Aggregate Licence Operator and may need to ensure any Contractors are aware of any licence conditions which may need to be implemented as well as any project specific conditions generated during project consenting.

Ultimately, this is because the responsibility comes down to who will own the asset that is being purchased. The Client can pass on some of the risk/due diligence onto their Contractors, but as some of the finds may only surface after the immediate project has concluded, they will retain the ownership/responsibility for the finds.

What does the guidance provide?

An understanding of the process, a discussion of appropriate mitigation to minimise impact on the archaeological resource and a variety of scenarios for how this can be implemented.

Finds discovered at Heidelberg Materials Aggregates Dagenham Wharf during an Operational Sampling visit, including: 220700_105, woolly rhino proximal tibia; 220700_112, mammoth atlas vertebra; 220700_117, mammoth tooth fragment; and 220700_144, woolly rhino distal humerus

Glossary

Archaeological interest

The archaeological interest of a heritage asset is determined based on its ability to hold, or potentially hold, evidence of past human activity worthy of expert investigation at some point.

Beach Replenishment/ Nourishment

The method of introducing new sediment into the coastal zone where natural sediment inputs have been interrupted or reduced, leading to erosion. The process helps to protect and maintain the position of the coastline and can also be used to reduce the potential for flooding. Typically, sand and gravel and dredged from a licence area offshore and deposited on beaches via pipelines, barges or 'rainbowing' (where the dredger sprays the sediment).

Chainage

A term used in surveying to refer to a distance along an imaginary line, such as a length of beach.

Contract fill

Sediment that is used to infill areas in ports and harbours or to reclaim land from the sea prior to engineering works. If the location of the construction project is close to a suitable wharf or pump ashore facilities, unprocessed marine aggregate may be used directly for the project.

Drag head

The end of the dredge pipe, where it reaches the seabed.

Framework for further discoveries

A measure put into place following works, to facilitate the reporting of chance discoveries, and promoting linkages between a range of stakeholders.

Heritage stakeholders

Individuals and organisations that are actively involved in the project or whose interests may be affected as a result of the project (including Historic England, local archaeologists, local individuals and organisations, academic researchers, museums, etc.)

Historic environment

All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged.

Marine Licence

The regulatory consent that governs the removal of marine aggregate from the seabed. Licences can be awarded for general use, or may be awarded to support a defined project.

Mitigation

Measures implemented to reduce the impact of the project on the historic environment.

Ongoing Monitoring Programme

A formal programme of monitoring the deposition area for archaeological material that may be revealed following the works. This programme would be undertaken for a defined time period.

Significance (for heritage policy)

The value of a heritage asset to this and future generations because of its heritage interest, which may be archaeological, architectural, artistic or historic.

Definitions based on *Marine Aggregate Terminology: A Glossary* (The Crown Estate and BMAPA undated) and the *National Planning Policy Framework* (NPPF) 2023.

1. Introduction

1.1 Aims

The aim of this document is to provide guidance for the mitigation of potential impacts arising from beach replenishment/nourishment and contract fill projects where marine archaeological resources may be associated with the licensed marine aggregate resources required to support them. This guidance mirrors and translates the requirements and processes already well established for licensed marine aggregate resources that supply construction end uses.

1.2 Marine Licencing, Geographical Background and Archaeological Potential

The Crown Estate owns the seabed around England, Wales, and Northern Ireland out to the 12 nautical mile territorial limit, and the non-energy mineral resources out to the 200 nautical mile exclusive economic zone (EEZ) limit. As managers of this resource, The Crown Estate is responsible for awarding the commercial rights for marine aggregate resources through Production Agreements. The regulatory process that permits marine mineral resources to be extracted is administered by the Marine Management Organisation (MMO) as the Regulator for England under the *Marine and Coastal Access Act* 2009.

The regulatory process for marine aggregate extraction administered by the MMO will be informed by an Environmental Impact Assessment (EIA). This will consider archaeological potential of individual licence areas, based on their geographic location, the geological origins of the resources they contain (for example indicating their potential to contain evidence of submerged prehistory), and also the wider history of the area (to develop an understanding of maritime and aviation traffic potential). A marine licence will only be awarded where the proposed extraction is considered to be environmentally acceptable, with conditions attached to define the operating term along with any site-specific management, mitigation or monitoring requirements.

All marine licences covering the extraction of marine sediments will include a standard condition that requires an archaeological reporting protocol to be established. This allows the potential significance of any discoveries to be assessed, and in some cases finds may trigger the need for further mitigation measures to be established such as Archaeological Exclusion Zones.

The licensing process for beach replenishment/nourishment or contract fill works also requires an EIA. Which should include data gathered through a desk-based assessment and various survey methods to inform the applications understanding of the known and potential historic environment that could exist in the proposed development area. However, the scope of such assessments can typically focus on the impacts arising from sediments being deposited (the works being licensed). This results in the potential for project mitigation not fully addressing the archaeological potential of the licensed area(s) from which the sediments are being sourced. The assumption being that this has been adequately addressed when the licence was granted but without appropriate consideration of what mitigation needs to be included. A further consideration is the fact that the licence holder and the Project Contractor undertaking the depositional works may not be the same. This can result in mitigation deemed appropriate for the licence, such as the need to archaeologically monitor material removed from the licence, not being adequately carried across to the beach replenishment/nourishment or contract fill activity.

Therefore, this guidance has been developed to address the potential gap between the Marine Licences for aggregate extraction and beach replenishment/nourishment or contract fill projects.

1.3 Background for Marine Aggregate Industry Guidance and Mitigation

In 2003, the British Marine Aggregate Producers Association (BMAPA) and English Heritage (EH) (now Historic England) jointly published the guidance document *Marine Aggregate Dredging and the Historic Environment: Assessing, evaluating, mitigating, and monitoring the effects of marine aggregate dredging*. The guidance detailed the importance of the marine historic environment, the regulatory framework, the possible effects of aggregate extraction on the marine historic environment, methods for archaeological assessment, and recommended mitigation measures.

Mitigation for marine aggregate needed to be different than that recommended for the terrestrial environment. For example, there are limits to pre-disturbance evaluation techniques when compared with land based sites, and further limitations to how mitigation can be applied due to how marine aggregate is extracted and dredging methodologies.

Mitigation in the guidance focussed on the avoidance of known archaeological material; the reduction of effects through stabilisation; recording and reporting of recovered material; and remedying and offsetting effects by establishing dredging exclusion zones or re-stabilising sites that had been disturbed. The guidance recommended monitoring, through protocols for the reporting of discoveries of archaeological interest, surveys of known wrecks and features to assess stability, and post-dredging surveys on known sites to assess potential effects.

Since the guidance document was produced, some relevant aspects of government policy have changed. However, the guidance can be read in line with recent policy (ie: English Heritage 2008 (and updated draft Historic England 2017); and Historic England 2015). Historic England has also produced guidance specifically for aggregates: *Mineral Extraction and Archaeology* (2020), and while specifically developed for land-based mineral extraction, the document notes that for good practice for mineral extraction and the marine environment, the reader should consult the BMAPA and English Heritage guidance (Historic England 2020: 2), highlighting the guidance's continued relevance.

However, extraction undertaken for beach nourishment/ replenishment and contract fill projects has to manage their own impacts that occur directly, as these cannot be completed by the marine aggregate operators that hold the marine licence. While discoveries made during dredging works could be reported through the Protocol (discussed below), additional mitigation measures are needed at the site of the deposition.

Below: Britannia Beaver, one of the vessels operated by Britannia Aggregates, whose staff have reported finds through the Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest

1.4 The Protocol for Reporting Finds of Archaeological Interest

Following on from the initial guidance, in 2005, BMAPA and EH (now Historic England) published *The Protocol for Reporting Finds of Archaeological Interest* (the Protocol). The Protocol sets out best practice in dealing with unexpected archaeological finds made in the course of marine aggregate dredging and it aims to reduce any adverse effects of marine aggregate dredging on the historic environment by enabling people working in the industry, either onboard dredgers, or at wharves that receive and process this material, to report their finds in a manner that is convenient and effective.

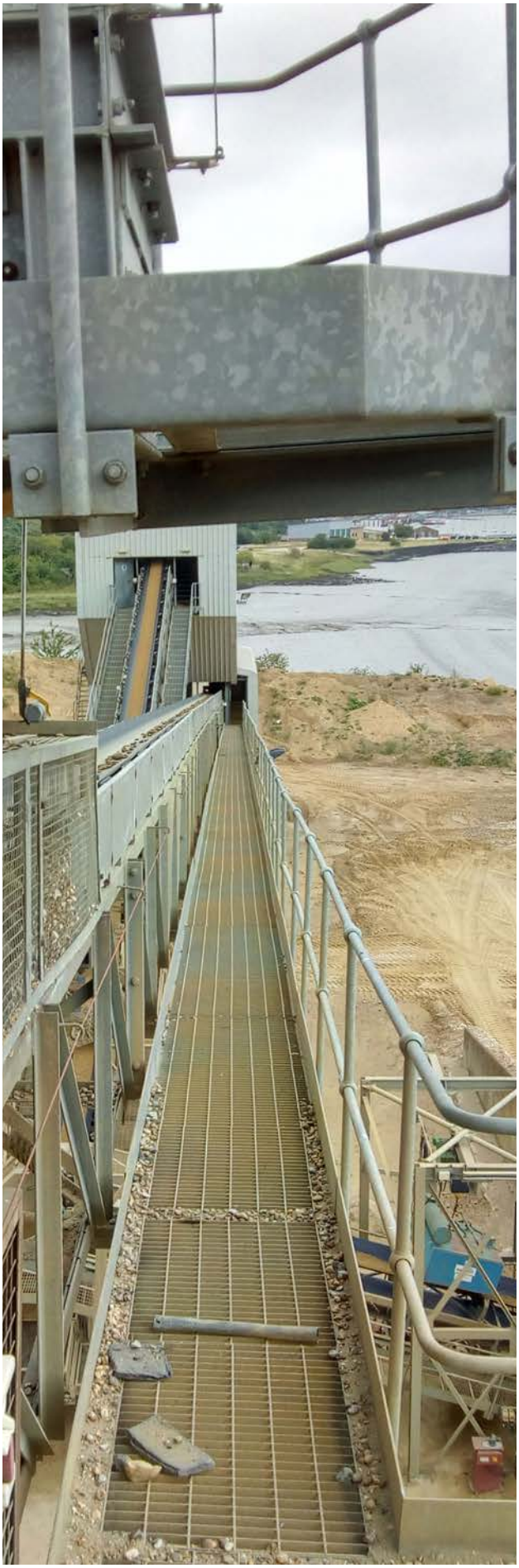
Adherence to the requirements of the protocol is now a standard condition attached to all marine licences issued for marine aggregate extraction. The protocol requires the licensee to draw the attention of any wharf receiving marine aggregate to its requirements, with a request that equivalent provisions for reporting discoveries be made - subject to the specific contractual arrangements in place.

As well as the regulatory requirement to report finds through the marine licence, the standard Production Agreement that confers the commercial right to extract marine sand and gravel to the holder of a marine licence requires “any object, marine wreck, or other item of actual or potential value” to be reported in writing to The Crown Estate as soon as practicable.

Having a single Protocol that covers all members’ dredging areas and wharves, instead of individual ones for each operator, dredging area, wharf, or vessel, ensures consistency, encouraging participation by everyone in the marine aggregate industry and making it easier for archaeologists and other relevant parties to provide appropriate advice. Where marine licensees are not BMAPA members, there is an expectation that they put in place their own arrangements to deliver the same reporting commitments, in line with current good practice.

The Protocol is supported by the Protocol Implementation Team, who act as the point of contact for reporting material, researching discoveries and forwarding information to Archaeological Curator(s), and by an Awareness Programme, which engages with wharf and vessel staff, ensuring that they understand the types of material to be reported and the reporting process.

Archaeological material in aggregate recovered for beach replenishment/nourishment or contract fill schemes is unlikely to be discovered on board the dredger, unless the artefact is large enough to block the drag head. Furthermore, as aggregate is deposited directly on the beach or the project site, there is no possibility for discoveries to be made by trained staff at the wharves. Therefore, another mechanism is needed to extend the requirements of the reporting protocol to other end users of marine aggregate material.



Right: Heidelberg Materials Aggregates Frindsbury Wharf

1.5 Background of finds of archaeological significance and case studies

The development of this guidance document was initiated as a result of significant discoveries of prehistoric archaeological material made following recent beach replenishment/ nourishment projects. The discoveries highlighted the need to connect these types of projects with the existing marine aggregate mitigation, and to ensure that any impacts to the archaeological resource are managed appropriately. This is particularly important when aggregate is sourced from marine licences with areas of high archaeological potential.

The background for the project is discussed in more detail in **Appendix 1**, with examples of discoveries of highly archaeologically significant material that have been reported through the Protocol, such as Palaeolithic flint tools and faunal remains, and modern aircraft material. In some cases, discoveries may be isolated, whereas others may represent fragmentary remains that could suggest the potential for further artefacts in the wider area, or even the potential for more cohesive sites.

Discoveries following recent projects, such as the Bacton Beach Nourishment Project and Clacton Sea Defence Scheme (discussed in more detail in **Appendix 2**) highlight the importance of establishing effective and robust mitigation and monitoring measures to minimise the effects of these schemes on the archaeological resource. In addition, they illustrate the need for a more co-ordinated approach for further schemes, and for further involvement with heritage stakeholders.

Hanson_0939_066, a mammoth tooth fragment recovered from Area 240

2. Background

2.1 Why beach replenishment/nourishment and contract fill projects are different to wharf deliveries

There are a number of reasons why beach replenishment/nourishment and contract fill projects are different from the supply of construction aggregates (which comprises the majority of volume supplied by marine aggregate dredging operations). The main reasons are listed below:

- for these projects, large volumes of aggregate may be extracted and deposited in relatively short timescales, compared to the longer durations and volumes of sediment extracted during the typical working of a licence;
- the resources extracted for these end-uses may come from sediment units and locations on licensed areas that are not regularly dredged, and therefore may have a different level of archaeological potential;
- the aggregate used for a project could come from several different licence areas managed by different licence holders - crucially the precise source may not be known when the project receives its marine licence;
- the point of deposition will not be covered by the existing protocol arrangements which focus on wharf operations;
- the dredging operations will often be undertaken by specialist vessels operated by third party Contractors who may not be aware of the protocol requirements;
- in the case of beach replenishment, the environment is highly dynamic and mobile. This means that if a large quantity of artefacts associated with the aggregate dredged are deposited, they have the potential to be revealed over time as the sediment is reworked by natural processes; and
- the end-user (the Client) ultimately responsible for the project may also not be aware of the regulatory or commercial requirements that apply to archaeological material associated with the marine aggregate they receive.

While existing guidance provides sufficiently robust mitigation for regular aggregate operations, where archaeological material can be discovered on-board the marine aggregate dredger (for example when material has blocked the drag head or been trapped in pipe work) or at the wharf, beach nourishment/replenishment and contract fill projects are likely to require additional mitigation measures to be implemented in order to cover potential discoveries both on-board the dredger undertaking the works and at the site of deposition.

In addition, in certain cases, discoveries may be made long after initial deposition onshore (for example when aggregate deposited during a beach replenishment project erodes or is reworked during winter storms) (see examples in **Appendix 2**), and therefore further archaeological assessment may be needed beyond the operational phase of the project.

This guidance has been developed to address these issues and to ensure that future projects have sufficient, robust archaeological mitigation to minimise impact, as aligned with the *Marine and Coastal Access Act* 2009, and Marine Plans.

2.2 Licensing, legislation, and discoveries of archaeological interest

Although beach replenishment/nourishment and contract fill projects are different from other marine aggregate dredging operations, the same regulatory requirements and legislation apply.

The *Marine and Coastal Access Act* 2009 introduced a system of marine management and licensing and established the Marine Management Organisation (MMO). The MMO issues licenses for a range of types of marine projects, including foreshore construction, and aggregate dredging. As part of this licensing process, conditions are attached.

The *UK Marine Policy Statement* was published in 2011 and provided a framework for preparing marine plans and taking decisions affecting the marine environment. In England, the MMO is responsible for preparing the marine plans, and there are 11 marine plan areas, covered by long-term (20 years) marine plans. The marine plans provide

information about the sustainable use of marine resources, set out the priorities and directions for future development within each area, and indicate where new developments may be appropriate.

In addition to planning legislation and policy, there is other legislation, outlined below, that also needs to be adhered to.

Any finds of 'wreck', as defined by the *Merchant Shipping Act* 1995, including flotsam, jetsam, lagan, and derelict found on the shore or in tidal waters, must be reported to the Receiver of Wreck within 28 days.

Aircraft lost while in military service are automatically protected under the *Protection of Military Remains Act* 1986. As it is not always possible to determine whether artefacts are related to a military site or not, any discoveries should be considered to be military until proven otherwise. Discoveries of aircraft material must be reported to the Joint Casualty and Compassionate Centre (JCCC) of the Ministry of Defence and to the Receiver of Wreck. Aircraft material should be handled in line with the *Annex to the Protocol: Guidance on the use of the Protocol for Reporting Finds of Archaeological Interest in Relation to Aircraft Crash Sites at Sea* (BMAPA and EH 2008), and relevant guidance, such as *Military Aircraft Crash Sites: Archaeological Guidance on their significance and Future Management* (English Heritage 2002).

The *Protection of Military Remains Act* 1986, *Protection of Wrecks Act* 1973 and the A*ncient Monuments and Archaeological Areas Act* 1979 are also used to protect specific sites and wrecks. There are unlikely to be any protected or scheduled sites present in active marine aggregate licence areas, as there are a relatively small number of such designated sites, however discoveries of sites or archaeological significance could lead to protection under one of these Acts.

The Crown Estate Production Agreement states that all finds must be reported, and that ownership of archaeological finds may be claimed by the Commissioners.

> *The Dredging Operator shall as soon as practicable report in writing to the Commissioners any object, marine wreck, or other item of actual or potential value or danger discovered in the Dredging Area or Survey Area and comply with the Guidance and Protocols. The Commissioners may claim ownership of any object, marine wreck or other item discovered unless it is claimed otherwise by the Receiver of Wreck or other appropriate authority.*

When the commercial rights of the aggregate material are transferred to a third party (whether a wharf or in support of a beach nourishment or contract fill project), the commercial and regulatory obligations of the Marine Licence and adherence to the reporting protocol need to be properly transferred to the new rights holder by the licensee. Furthermore, any conditions and associated responsibilities need to be understood by the third party to ensure that effective implementation can be coordinated.

Under the Marine Licence permitting the disposal/deposition activity, the licensee who is receiving marine aggregate material needs to be suitably conditioned to ensure suitable archaeological site monitoring is undertaken, to a specification agreed with Historic England. This requirement needs to be captured within the coastal management scheme or contract fill project's marine licence application.

Aggregate extracted from Area 240 awaiting inspection at Heidelberg Materials Aggregates Dagenham Wharf

3. Recommendations For Mitigation

3.1 Introduction

Mitigation measures will depend on the archaeological potential of both the licence area being dredged and the specific location where extraction is taking place. However, even areas of low archaeological potential may still produce unexpected discoveries. Therefore, appropriate mitigation measures should be implemented under any Marine Licence associated with the disposal or deposition of marine aggregate material from existing licensed areas.

However, at the point the Marine Licence for a beach nourishment/replenishment or contract fill project is awarded, the source of the material to be used may not yet be known. Therefore, there is a disconnect that needs to be bridged, and there needs to be a mechanism to ensure that the archaeological potential of the proposed dredging location and any pre-existing licence conditions can be captured, and appropriate mitigation measures identified.

The mitigation measures proposed in this guidance follow on from the mitigation measures already established for marine aggregates (BMAPA and EH 2003 and 2005) and provide additional measures that clearly identify who should be responsible for implementing mitigation and monitoring requirements for the offshore and the onshore components of these projects (see **Section 3.2**).

There are actions that should be undertaken by the Aggregate Licence Operator (**see Section 3.2**) and the Commissioning Client (**see Section 3.4**), and these feed into the mechanism to bridge the gap in the form of the Heritage Method Statement (**see Section 3.5**). The Heritage Method Statement should be developed and agreed by the Client and the Archaeological Curator(s) prior to any works commencing.

3.2 Roles and Responsibilities

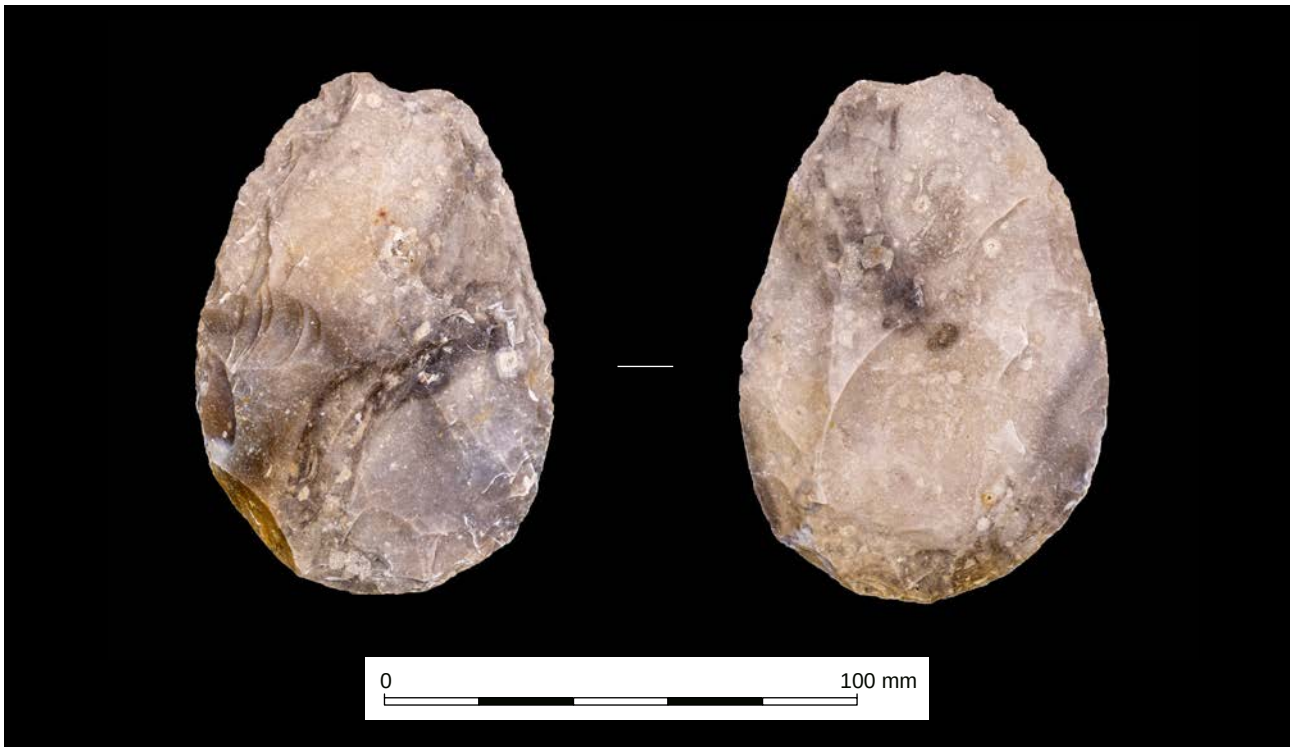
The following table details the roles and responsibilities of the organisations involved:

Term used in document	Description	Responsibility
The Landowner	The Crown Estate	Manages the seabed around England, Wales, and Northern Ireland out to the 12 nautical mile limit, and rights to extract minerals on the continental shelf. Responsible for the commercial agreements that permit the extraction of marine aggregate.
The Regulator	Marine Management Organisation (MMO)	Responsible for licencing and regulating marine activities, including mineral extraction and the deposition of sediments associated with beach and contract fill works. The Regulator will acknowledge receipt of documentation submitted by applicants for a marine licence, including EIA, Method Statements submitted for approval and subsequent reports. They should ensure the appropriate marine Archaeological Curator(s) are consulted as part of their decision-making processes for Marine Licence conditions.

Term used in document	Description	Responsibility
Archaeological Curator	In England, the Archaeological Curator is Historic England The Archaeological Curator may also include the Curators for Wales, Scotland and Northern Ireland, as well as local county councils, where applicable	The Archaeological Curator(s) advise the Regulator. The Archaeological Curator will acknowledge receipt of, and review, documentation submitted by the Commissioning Client, or their nominated third party, including Environmental Statements, Heritage Method Statements submitted for approval and subsequent reports. Within the organisation they should ensure that documents produced to demonstrate compliance with marine licensing conditions are completed in accordance with archaeological advice and guidance. The local Historic Environment Record (HER) should be contacted as a stakeholder, regarding the spatial extent of the project on the coast, to enable finds to potentially be cross checked with certain developments, and to enable some level of monitoring, particularly if there is a lengthy gap between the deposition process and objects being discovered.
Commissioning Client	The Client who is ultimately responsible for commissioning the Project Contractor to undertake the works (whether beach replenishment/ nourishment or contract fill)	The Commissioning Client has the responsibility to secure the necessary regulatory consents to undertake the works. In doing so, they will need to undertake an appropriate EIA, and commission the archaeological mitigation required as a condition to the marine licence. The Commissioning Client will be responsible for ensuring that any mitigation or monitoring requirements are transferred to the Contractor commissioned to undertake the works. The Commissioning Client may choose to make the Project Contractor their 'nominated third party' and have conditions in the Contractor's contract to transfer responsibility for delivering some of the mitigation or monitoring requirements. However, the Commissioning Client ultimately remains responsible for fulfilling any conditions associated with delivering the works.
Aggregate Licence Operator	Holds Marine Licence for aggregate extraction for licence area(s) that provides the necessary regulatory permission Holds the Production Agreement that assigns rights to dredge mineral resources from the seabed of the licensed area	The Aggregate Licence Operator is responsible for implementing the archaeological conditions for dredging associated with each marine licence. The Licence Operator is also responsible for delivering any requirements around the reporting and ownership of any object, marine wreck, or other item of actual or potential value discovered in the dredging area set out under the Production Agreement Each Aggregate Licence Operator will ensure that the Commissioning Client, Project Contractors, and relevant staff are aware of the marine licence conditions, any Monitoring Method Statements, the Archaeological Protocol, and the associated requirements and responsibilities. In addition, any ownership requirements set out under the Production Agreement will also be transferred to the Commissioning Client. The Aggregate Licence Operator will provide up to date data to Commissioning Client and the Project Contractor regarding any AEZs or areas of high archaeological potential for the licence area to be dredged.

Term used in document	Description	Responsibility
Project Contractor	Contractor responsible for delivering the project, including dredging in the licence areas and will deposit aggregate on the beach	The Project Contractor is contracted by the Commissioning Client, to deliver the project including any dredging and deposition work. The Project Contractor will be required to comply with all licencing requirements as defined by the Commissioning Client, and Aggregate Licence Operator, and will facilitate archaeological objectives by enabling toolbox talks, supplying required data, and providing access to Curator(s), if required. The project contract may transfer responsibility for delivery of licensing requirements to the Project Contractor who may then assume responsibility for delivering some of the mitigation or monitoring requirements. However, the Commissioning Client ultimately remains responsible for fulfilling any conditions associated with delivering the works in accordance with the Marine Licence. Therefore the Project Contractor must ensure that any Sub-Contractors are informed of their responsibilities, and keep the Commissioning Client informed of the site work that is being undertaken by Sub-Contractors.
Archaeological Contractor	Archaeological organisation appointed by the Commissioning Client or their third-party representative if responsibilities have been transferred	The Archaeological Contractor undertakes archaeological work including the production of the Heritage Method Statement, assessing the archaeological potential of the licence area(s), the dredging and deposition methodologies, and recommends appropriate, project specific mitigation measures. The Archaeological Contractor also implements archaeological mitigation measures (such as Archaeological Watching Briefs or Walkover Surveys, Archaeological Protocols, review of data, and an Ongoing Monitoring Programme), and associated reporting. Where a formal Ongoing Monitoring Programme is not required, the Archaeological Contractor will develop a Framework for Further Discoveries. To formulate the Ongoing Monitoring Programme or Framework for Further Discoveries, the Archaeological Contractor will contact the Local Archaeologist for advice and will contact the PAS and local Finds Liaison Officer (FLO), HER, as well as local archaeological, historical and collector groups, organisations, and individuals who may be interested in assisting with ongoing mitigation.
Local Archaeologist	Archaeologist with the Historic Environment Record (HER) Local Government Archaeological Officer	The Local Archaeologist is the key contact for the EIA and is the terrestrial curator for any onshore licensing conditions. In addition, they are a key contact for any discoveries made subsequent to deposition of aggregate on the beach or in the fill. The HER is maintained by the county council and holds records of previous discoveries. Discoveries made by the public can be reported to the HER. The Local Government Archaeological Officers advise the local authority on planning process, conservation, and management of the archaeological resource. Local communities are often supported in-person by archaeologists but are equally engaged in online forums with frequent input from specialists, including FLOs.

Term used in document	Description	Responsibility
Archaeological Reporting Mechanism available to the public	Portable Antiquities Scheme (PAS)	The PAS is run by the British Museum to encourage the recording of archaeological objects found by members of the public. The PAS works with over 100 national and local partners and delivers through its network of 40 locally based FLOs. The PAS should be contacted by the Archaeological Contractor, as a relevant stakeholder at the outset of the project and when designing the Ongoing Monitoring Programme or Framework for Further Discoveries. In addition, should archaeological artefacts be discovered, the FLO could, for example, introduce signage or other remedial efforts. The PAS is available for the public to report chance discoveries, but for commercial projects, and depending on the archaeological potential of the source aggregate, a bespoke monitoring programme may be more applicable.
Local Individuals and Organisations	Local organisations, groups, and individuals with interest in archaeology. This could include fossil hunting clubs, local history or archaeological societies, coastal walking clubs, local branches of the Coastal and Intertidal Zone Archaeological Network (CITiZAN) and Nautical Archaeological Society (NAS), Young Archaeologist Clubs, metal detecting clubs etc.	The local archaeological organisations and individuals have no formal role in the archaeological conditions on the marine licence or in the Method Statements. However, they may be able to play a role in assisting with the reporting of any discoveries following the works.



220700_004, a handaxe recovered from aggregrate in Licence Area 240, reported by Heidelberg Materials Aggregates Frindsbury Wharf

3.3 Actions for Aggregate Licence Operators – based on the Licencing of Dredging Areas

Long before a beach replenishment/nourishment or contract fill project determines the licence area for source material, the known archaeological resources associated with the area, along with the archaeological potential of the sand and gravel resources that are being dredged, will have been determined through the EIA process that supports the licensing process. In addition, there may be additional information available through regional assessments undertaken by marine aggregate operators or wider research projects that are looking to develop a better understanding of the archaeological potential of aggregate deposits.

In order to be aware of the risks and responsibilities of specific dredging areas, the Client or Contractor needs to ask questions of their potential suppliers, for example during the tender assessment or once specific dredging areas are being considered.

An overview of the archaeological potential of the marine aggregate resources to be supplied should be provided by the Aggregate Licence Operators to the Commissioning Client and/or the Project Contractor. This should include details of any licence conditions that relate to management, mitigation or monitoring of heritage assets, along with any conditions associated with the Production Agreement that will transfer across to the Client, as well as any associated archaeological reports of relevance. These conditions may be spatial, relating to specific areas of a licence or temporal, relating to a time period during the life of the licence – five yearly monitoring for instance, although usually conditions will relate to the lifetime of the Production Agreement. These details should also be captured in the Heritage Method Statement (as discussed in more detail in **Section 3.5**), which will need to be approved by the Archaeological Curator(s) before works can commence.

3.4 Actions for the Commissioning Client – as part of the Environmental Impact Assessment for the Beach Replenishment/ Nourishment or Contract Fill Project

Due to timeframe challenges, it can take considerable time for a project to get into contract, and this can be some time after the project has started to gain approvals and financial support. This highlights the need for the Commissioning Client to plan long term, and consider risks and obligations that may occur down the line.

In general, the marine licence for a beach replenishment/ nourishment or contract fill project is likely to be granted before the source of the required aggregate has been determined. However, the assessment process to inform the marine licensing process should recognise the heritage potential of the marine aggregate that is going to be required, and the general mitigation and monitoring requirements that may be associated with this.

In order to manage uncertainties around the archaeological potential of the marine aggregate source(s) that are being used, the EIA process should recommend the inclusion of a standard condition in the Marine Licence for the production of a Heritage Method Statement (as discussed in more detail in **Section 3.5** below). For example, the current standard condition is:

> "No licensable activities can commence unless a programme of archaeological works have been secured through the provision of an archaeological method statement. The Method Statement must be prepared by an archaeological consultant in reference to the industry guidance document: Marine Archaeological Guidance for Beach Replenishment/Nourishment and Contract Fill Projects (TCE/BMAPA 2022), and approved by the MMO, in consultation with Historic England within 6 weeks of the commencement of licenced activities."

The Heritage Method Statement would provide more details as to the archaeological potential of the source(s) and provide details about the implementation of mitigation measures.

The need for the Heritage Method Statement is driven by the Commissioning Client, as ultimately they will take on the longer term risk and liability. The results of the Heritage Method Statement should be a recognised risk within the Project Contractor's offer to the Commissioning Client.

Experience has shown there are often tight deadlines, and the time frame between the aggregate Licence Operator receiving firm confirmation that a licence area is needed and the project starting can be as little as two to three weeks. This short window does not provide enough time for a licence-specific Heritage Method Statement to be produced by the Retained Archaeologist and reviewed for approval by the MMO, with advice from Historic England, without incurring major delays to the project start and potentially incurring numerous untenable cost and operational consequences.

Therefore, in circumstances where several sources are being considered, the Client should commission a more general Heritage Method Statement that will cover all of the licence areas that could potentially supply a scheme, with the Aggregate Licence Operators providing the necessary information to inform its production. The general Heritage Method Statement could be compiled well in advance of the project start, which would allow the Commissioning Client to take a view on the risk and consequences they will ultimately own and would provide the MMO and Historic England ample time to review the document. This way, approval 'in principle' could be achieved up front in the months before a project begins. Then, once the source area(s) are confirmed, any licence specific mitigation could be added to

the dredging instructions by the Licence Operator, or to the site management plan by the Contractor, who would by this time have engaged a full-time Retained Archaeologist for the project delivery team.

Where there is concern for the risk to the archaeological potential of the selected licence areas, the Heritage Method Statement will include information about the responsibilities of the Commissioning Client, or the nominated third party, for any artefacts that are discovered following the completion of works.

3.5 Heritage Method Statements

If the proposed Licence Area(s) are known at the point of application, then a Heritage Method Statement should be appended in the submission. However, if the Licence Area(s) are not known, then the production of the Heritage Method Statement would become a condition. Prior to any dredging works being undertaken, the Client, or the nominated third party, should appoint an Archaeological Contractor to produce a Heritage Method Statement and carry out activities for mitigation.

The Heritage Method Statement may relate to a specific area that is being dredged for contract, but which otherwise may not be dredged. The need for and detail of a Heritage Method Statement will relate to the wider potential of the geological setting the recources present.

A Heritage Method Statement should be required for all beach replenishment/nourishment and contract fill projects, as even dredging locations of low archaeological potential may still produce significant unexpected discoveries, such as aircraft crash sites, and this will provide a mechanism to manage these discoveries. The development of the Heritage Method Statement is an important juncture in which to initiate specialist expertise as well as a regulatory and curatorial position on any proposals.

The Heritage Method Statement should be submitted to the Regulator for review six to eight weeks prior to the start of works and must be agreed with the Regulator, through discussions with the Archaeological Curator prior to any works commencing.

The Heritage Method Statement will comprise an archaeological assessment of the source material (which will be based on the results of the assessment conducted as part of the licence award process) in order to:

- determine the known and potential archaeological resource, and the potential for making significant archaeological discoveries within the proposed source material, for example whether there are known palaeolandscape features or hotspots of Palaeolithic or aviation finds;
- identify any pre-existing mitigation measures that could be applicable (for example the Anglian Region WSI (Fjordr 2015 and 2016) for licence areas associated with the Palaeo-Yare);
- identify how overarching management of acknowledging finds, and communicating with relevant stakeholders will be implemented in order to enable more sequenced monitoring and understanding. For example, archaeologists may find something during initial staged walkovers, or finds may be discovered later on. This will need to be communicated with the Commissioning Client and Contractor, Dredging Licence Holder, Curator, FLO, HER, and local groups, at an appropriate time;
- indicate the roles and responsibilities of staff involved, including contact details for project staff, regulatory bodies and Archaeological Curator(s);
- identify proposed dredging methodologies, licence areas to be dredged, proposed location within the licence area to be dredged, and the volume and type of aggregate required;
- identify the methodology for distribution on the beach;
- propose detailed, project specific archaeological mitigation (as an example mitigation measures as set out in **Appendix 3**, or potentially avoiding dredging for certain types of projects in specific locations of high archaeological potential);
- propose other measures that may be required, either on site or within the licence dredging area(s);
- recognising that monitoring during deposition will only see a very small proportion of the material dredged, and that there can be a length of time between deposition and discovery, and therefore the Heritage Method Statement must provide for further archaeological assessment following the completion works (for example as outlined in **Appendix 4**);
- provide details about reporting and timescales (including timescales for further archaeological assessment following the end of works); and
- provide details about archiving, OASIS and finds.

3.6 Mitigation Measures

Mitigation measures will need to be tailored to address the circumstances and methodologies of each specific development and should be agreed in advance with the relevant Archaeological Curator(s). General guidance for mitigation measures can be found in **Appendices 3-6**, and they are likely to include:

- implementation of an archaeological reporting protocol for unexpected discoveries;
- an Archaeological Watching Brief, Walkover Survey, or Site Visit to assess dredged aggregate that is transferred to the beach or deposited as fill; and
- development of an Ongoing Monitoring Programme or Framework for Further Discoveries (depending on the archaeological potential of the dredging locations) for discoveries made following the completion of works. This will include information about the responsibility of the Commissioning Client following deposition and is discussed in more detail in **Appendix 4**.

The recent work by Bynoe *et al*. (2022) argues that, due to the sheer volume of aggregate being deposited and the small potential for artefacts to be visible on any given day, the two final bullets are the key options for effective mitigation with trained archaeologists having more time to assess the sites; and engaging more closely with the growing community of collectors and interested members of the public.

The linkages with the public are particularly important. The significant, growing network of collectors are often supported by archaeologists (such as CITiZAN), and are frequently engaged in online forums with specialists (such as FLOs as part of the PAS) (Bynoe *et al*. 2022). Therefore, combining engagement with these communities, and harnessing the prevalence of GPS and camera-equipped mobile phones, provides an ideal solution. Engagement with communities could include identifying coastal locations that have planned beach replenishment, and prior to replenishment, there should be engagement with the local community and FLO about the process and what has the potential to be found, as well as how to record and report discoveries (ibid.). This could be supported by temporary signage about the project, visible at the site, to alert the public to the potential for discoveries, and importance of and methodologies for reporting.

When considering appropriate mitigation measures to be implemented under any Marine Licence associated with the deposition of marine aggregate material from existing licences, a measured judgement is required for licence areas that have a high potential for archaeological material and where pre-existing mitigation measures are in place (for example licence areas associated with the Palaeo-Yare on the East Coast, as discussed in more detail in **Appendix 1**).

In some cases, it may be a regulatory or advisory decision, determined by the MMO, Curator(s) or archaeologists, or it may be a commercial decision either by the Commissioning Client or the Aggregate Licence Operator that particular licence areas, or specific locations within a licence area, may not be conducive for the purposes of particular types of projects. For example, locations with high archaeological potential may not be suitable for contract fill projects, as opportunities to observe potential prehistoric material held within the deposits during operations may not be possible, or the mitigation and monitoring requirements may be considered too onerous.

It should be noted that very few licences have locations within them that are considered to be of high archaeological importance. However, these licence areas may have pre-existing mitigation measures, such as a requirement to undertake operational sampling. Where operational sampling is already being implemented, there will need to be an evaluation into the archaeological potential of a specific location before and/or after beach nourishment/contract fill projects, through additional operational sampling events, to fulfil licence area commitments and address impacts to archaeological sites and deposits. For example, this could be particularly important if the location within the licence area has already revealed material of archaeological interest or if the targeted sediments are considered to be of particular archaeological sensitivity. Any further action to address new areas which are considered to represent high archaeological potential or sensitivity would need to resolved outside of this guidance by the Aggregate Licence Operator of the originating material, in consultation with the regulator and heritage advisor.

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Appendix 1.

Background: High Archaeological Potential Of Some Aggregate Licence Areas

Introduction

This section provides examples of significant archaeological discoveries from aggregate dredging licence areas and illustrates the importance of implementing mitigation measures to minimise impact to the archaeological resource through beach nourishment/replenishment projects.

The Palaeogeography of East Coast Licence Areas

The East Coast licence areas have long been considered to be of high archaeological potential, due to the Palaeolithic occupation of the now-submerged areas of the Southern North Sea. In 2008, this potential was confirmed by the discovery of artefacts recovered from Licence Area 240, situated approximately 11 km off the coast of Great Yarmouth (Wessex Archaeology 2013). The artefacts included handaxes, flakes and cores, along with faunal remains of bison, horse, and reindeer.

The Licence Area 240 discoveries were very archaeologically significant, as submerged Middle Pleistocene archaeological sites are very rare. The assessment of the finds confirmed that they met several of the criteria set out in English Heritage's guidance *Identifying and Protecting Palaeolithic Remains* (1998) to determine whether remains have particular importance. In addition, the fresh condition of many of the Area 240 finds means that the site can be considered comparable to the prehistoric sites of Boxgrove and Happisburgh, which held important rare *in situ* buried deposits dating back to 900,000 BP (Historic England 2018).

The *Palaeo-Yare Catchment Assessment: Technical Report* (Wessex Archaeology 2013) set out to delineate, where possible, the regional extents and survival of specific sediment units from which a large number of the flint artefacts and faunal remains had been recovered. The interpretation of the geology in Licence Area 240 indicated that the assemblage was most likely recovered from particular floodplain sediments deposited during the early development of the Palaeo-Yare valley. The project mapped the extents of the key Palaeo-Yare deposit (identified as 'Unit 3b'),and developed hypotheses about the archaeological potential of the wider region.

Hanson_0936_001

Hanson_0936_002

Hanson_0936_003

Hanson_0936, recovered from Area 240 and identified by staff at Heidelberg Materials Aggregates Dagenham wharf, consisting of: Hanson_0936_001, a cordiform hand axe; Hanson_0936_002, a broken flake; and Hanson_0936_003, a flint produced by natural processes.

Following on from this work, a Written Scheme of Investigation (WSI) was developed to cover early prehistoric material in the Anglian Region (Fjordr 2015). The WSI built on the mitigation measures recommended in the guidance document (BMAPA and EH 2003), identifying a process of additional mitigation, 'Operational Sampling', where aggregate companies periodically dredge a large sample of sand and gravel from known locations within each extraction area, which is then subject to archaeological investigations, in order to spot prehistoric artefacts. The process of Operational Sampling is used to evaluate sub-areas/dredging lanes to test and understand archaeological potential, as well as additional mitigation where potential was known to exist. An Appendix was produced for the Palaeo-Yare (Fjordr 2016), identifying archaeological hypotheses that could be tested through Operational Sampling.

Many of the hypotheses about the archaeological potential of the region have since been supported by further discoveries of additional Palaeolithic material through ongoing Operational Sampling from various licence areas in the wider region, and from finds reported through *The Protocol for Reporting Finds of Archaeological Interest*. Across the East Coast dredging region, the majority of Palaeolithic archaeological discoveries have been recovered from the Unit 3b sediments, which comprise reworked glaciofluvial outwash, dated to the Saalian glaciation (300,000 to 130,000 years ago). Operational Sampling continues to be undertaken at wharves receiving aggregate from East Coast Licence Areas, with over 700 finds having been recorded between 2011 and 2020 (Wessex Archaeology 2015, 2021). The *North Sea Prehistory Research and Management Framework* (2009) describes the submerged prehistoric land surfaces as of worldwide significance, and therefore this work continues to contribute to our wider understanding.

Hanson_0938_002

Hanson_0938_003

Hanson_0938_004

Hanson_0938_005

Hanson_0938_001

Hanson_0938_006

A selection of the 27 flints that make up Hanson_0938, found in Area 240, including handaxes (Hanson_0938_001, Hanson_0938_002, Hanson_0938_003, and Hanson_0938_004) and a Levallois flake (Hanson_0938_006).

Aircraft Crash Sites

Before the Protocol was implemented, there were discoveries of aircraft material in dredged aggregate, including two pieces of aircraft wreckage that were spotted on board the Hanson Aggregates dredger *Arco Dart*, within sand and gravel dredged off the coast of Worthing, Sussex (Wessex Archaeology 2006). The parts were kept safe by vessel staff and passed to Wessex Archaeology staff during the first site visit of the Protocol Awareness Programme. The aircraft material was identified as two parts of a rear wing spar from a Supermarine Attacker, an aircraft developed by Supermarine at the end of the Second World War as a replacement for the Spitfire, however few of these planes were actually manufactured.

Aircraft crash sites are particularly significant, because all aircraft that crashed while in military service are automatically protected under the *Protection of Military Remains Act* 1986 and, once located, their disturbance is prohibited without a specific licence from the Ministry of Defence.

Further discoveries of aircraft material reported through the Protocol led to an Aggregates Levy Sustainability Fund (ALSF) funded archaeological desk-based assessment: *Aircraft Crash Sites at Sea: A Scoping Study* (Wessex Archaeology 2008) to identify gaps in data and understanding. It determined that although it was likely that there were thousands of aircraft losses in UK waters, the number of known sites on the seabed recorded in national and local datasets was relatively small, and loss positions were often vague.

In addition, aircraft material can be notoriously difficult to identify in geophysical survey data. When aircraft hit the sea, they often disintegrate with material scattered across a wide area. This fragmentary material may be flush against the seabed, and with a low magnetic signature it can be difficult to distinguish in sidescan sonar or magnetometer data.

Often the first evidence of an aircraft crash site on the seabed is an artefact discovered in dredged aggregate. These artefacts may be isolated on the seabed with no further artefacts in the vicinity, but in some cases the material leads to the discovery of more coherent wreck sites. Since the inception of the Protocol, over 400 individual finds of aircraft artefacts have been reported, including everything from engine components to pedals (Wessex Archaeology 2018).

In 2019, a range of aircraft material and munitions were reported by Cemex's Angerstein wharf staff during the processing of aggregate dredged from Licence Area 511 (Wessex Archaeology 2019a). Previous artefacts found in 2010 and 2013 from the same licence area related to a United States Air Force McDonnel-Douglas F-4 Phantom and a Wellington MKIC X9634, a British long-range medium bomber. The discoveries in 2019 suggested a German aircraft and the munitions represented a wide range of types, some of which were used in anti-aircraft ship mounted guns. Overall, the assemblage is not believed to represent a discreet aircraft crash site, but rather it appears that aircraft-related material is spread out over a wide area. Further vigilance was subsequently recommended for cargoes from the relevant sub-area of Licence Area 511.

These finds highlight the fact that unexpected discoveries of aircraft material will continue to be made, and due to their importance and the potential for protection of sites on the seabed, the artefacts need to be reported and managed in a manner sufficient for the requirements of the appropriate Archaeological Curator(s) and the Ministry of Defence.

Three of the 12 separate items including seven aircraft fragments that made up CEMEX_0915, discovered in 2019 by Cemex Angerstein wharf staff.

Appendix 2.

Beach Nourishment Case Studies

Bacton Beach Nourishment Project

In the summer of 2019, the Bacton Beach Nourishment Project involved the dredging of approximately 1.5 million cubic metres of sand from East Coast licence areas, and deposition on the beaches in front of Bacton Gas Terminal and the villages of Bacton and Walcott, with the aim of protecting these areas from erosion and flooding (Royal HaskoningDHV 2018; north-norfolk.gov.uk/sandscaping, accessed 24/03/2020).

An Environmental Impact Assessment (EIA) was undertaken for North Norfolk Council, Shell UK Ltd and Perenco (Royal HaskoningDHV 2018), on the basis of assessing the impact on the coastal location of deposition. The EIA noted that sand for the proposed scheme would come from an unconfirmed existing licensed aggregate extraction site, and therefore would not require inclusion within the assessment.

The proposed areas for dredging were later confirmed and before dredging works commenced, a Heritage Method Statement (Wessex Archaeology 2019b) was produced for Van Oord, the Dredging Contractor, outlining the mitigation for dredged aggregate as it was to be sourced from licences areas off East Anglia known to be of high potential for prehistoric archaeology. The Method Statement reviewed the potential for each of the proposed licence areas and indicated that the potential for archaeological discovery would depend on the location of dredging within each licence area, with the Unit 3b sediments of higher potential than other Units. As the targeted aggregate for the project was sand, the potential for archaeological discoveries was considered to be relatively low. Mitigation measures comprised: a bespoke Protocol for Archaeological Discoveries, with Awareness training to ensure staff were aware of their responsibilities and the reporting process; and a periodic Archaeological Walkover Survey of recently deposited aggregates on the beach.

The Walkover Surveys were undertaken during beach replenishment works, with an archaeologist reviewing recently deposited material. Between the Protocol and the Walkover Survey, 12 finds were recovered and reported (Wessex Archaeology 2019c). Three were flint objects, although all were determined to be natural when assessed by specialists at the office. One piece of peat was recovered (derived from Licence Area 511), which could be from a Pleistocene deposit. The remaining objects were modern, and although not of interest with regards to the palaeogeography of the East Coast, they provide insight into

the maritime uses of the area over time, including material from various vessels (such as sheaves and the remains of a wrought iron anchor), Second World War munitions, and a fragment of possible aircraft material (Wessex Archaeology 2019c). In addition, although Licence Area 240; parts of which are of high archaeological potential; was considered as a reserve dredging area, it was not dredged for the project. The archaeological assessment therefore appeared to confirm that the dredged aggregate was indeed from locations with low archaeological potential.

However, by March 2020, members of the general public walking on the beach had discovered and reported between 750 and 1000 stone artefacts, representing an incredibly significant assemblage of Palaeolithic finds, as well as 50 to 100 fossils. The discoveries were reported to Norfolk HER, and the British Museum and Historic England were informed. Discussions with the Anglian Offshore Dredging Association (AODA) followed, and Wessex Archaeology was commissioned to undertake a review, with the aim of determining the provenance of the discoveries.

The archaeological review of data for the Bacton Beach Nourishment Project (Wessex Archaeology 2020) studied the locations of the discoveries on the beach, the chainage report of where aggregate from each licence area was deposited on the beach, and the trackplots of dredging in the East Coast licence areas. Local sources indicated that the artefacts were being recovered from a ridge of gravel that was exposed on the beach due to wave and tide energy. Unfortunately, due to the overlapping aggregate deposits on the beach and the general locational details about discoveries, the provenance of the artefacts could not be definitively confirmed, however, it was concluded by Wessex Archaeology, based on the artefact typology and the distribution of sedimentary units across the region and the locations used for extraction, that they were most likely to derive from the Unit 3b sediments located within the utilised portions of Licence Area 511, Licence Area 228, or both. Mitigation measures were recommended for ongoing assessment and included the production of guidance for future beach replenishment projects. It was noted that the volume of aggregate dredged by the Contractors vessel was much larger than that typically delivered to a wharf and that gravel had been dredged as well as the targeted sand.

Pages 22 and 23: images from the Bacton Beach Nourishment Project

Clacton Sea Defence Scheme

Discussions with the Anglian Offshore Dredging Association (AODA) and Historic England following the discoveries at Walcott indicated that the discoveries were not an isolated incident, and that similar discoveries had also been made at Holland-on-Sea and Clacton, related to aggregate dredged from Licence Area 447 (the licence for which has now been relinquished). Indeed, the Beach Replenishment Programme carried out between 2014 and 2015 from Clacton-on-Sea to Holland-on-Sea, Essex, resulted in the discovery and collection of approximately 300 Pleistocene mammalian remains and 800 stone tools (Bynoe et al. 2022).

The replenishment scheme aimed to provide protection along a 5 km stretch of the Essex coastline, with the aim of reducing coastal erosion for the next 100 years. The works required a total of 2,385,000 tonnes of mixed seabed material to be deposited, comprising 1,431,000 tonnes of gravel and 954,000 tonnes of sand (Bynoe *et al*. 2022).

Prior to dredging being undertaken under licence, detailed geological feasibility studies were undertaken, however, since the beach recharge, considerable discoveries of finds were made in sediments derived from Licence Area 447. The finds were initially reported through community engagement related to the Historic England project *7204 Investigating the submerged Pleistocene landscapes of the Wallet off Clacton* (Bynoe 2017), and Historic England and AODA were made aware of the significance of the discoveries.

This prompted a pro-active and coordinated response, with AODA providing access to detailed datasets for Area 447 to the University of Southampton to assess the potential for a project designed to understand the likely origin of the artefacts. The results of the initial assessment proved extremely positive, and Historic England funded a project titled: *7738 Strategic support for marine development management: Palaeolithic archaeology and landscape reconstruction offshore*, the results of which have recently been published (Bynoe *et al*. 2022).

The project noted that due to the potential for increased storminess, and the move towards beach replenishment as a 'soft' coastal defence method, it is likely that archaeological material will continue to be reported from these schemes, and even increase. Not only will archaeological material be more visible following deposition due to storm events, and therefore be relatively easy to collect, but also online communities of collectors are growing, enabling the sharing of information on fossil and archaeologically-rich beaches. Therefore, it is essential for the archaeological community, dredging industry, local councils undertaking coastal protection schemes, and other relevant stakeholders to work together to develop effective mitigation and ways to access this information (Bynoe *et al*. 2022).

Other University of Southampton projects have also highlighted the importance of working with local collectors and communities (for example for trawled discoveries (Bynoe 2014, 2017)), and the importance of continuing these links and relationships, as without the local collectors, none of the finds that were assessed would have been reported to the Natural History Museum and made available for further study.

Overall, these projects underscore the importance of working with the public and the fact that as discoveries are still being made long after the aggregate was deposited on the beach there needs to be a mechanism to support ongoing archaeological assessment where appropriate.

Discussion

The most significant finds from these case studies relate to Palaeogeographic evidence, but there is also potential for the discovery of significant wooden shipwrecks or aircraft remains, as evidenced by previous discoveries reported through *The Protocol for Reporting Finds of Archaeological Interest*. Although during the EIA process it is possible to put AEZs around known wrecks, the known shipwrecks in the national and local datasets generally have a bias towards large 19th and 20th century shipwrecks that were likely to cause navigational hazards or were readily visible in geophysical survey data. Additionally, there are few known aircraft crash sites on the seabed, and the recorded positions tend to be vague. The assessment of geophysical survey data reveals further sites of potential archaeological interest, however, wrecks that are largely wooden, buried or deteriorated to be relatively flush with the seabed are much more difficult to detect, as are aircraft crash sites. Therefore, there is potential for finds from these types of sites to be discovered during beach replenishment/nourishment and contract fill works, as demonstrated by the isolated ship and possible aircraft finds that were identified during the Bacton Beach Archaeological Walkover Survey.

The case studies also demonstrate that project specific mitigation should be considered for beach nourishment and contract fill projects, based on the archaeological potential of the resources being supplied. Many of the discoveries of Palaeolithic material would not have been reported through the Protocol, as they are too small to be discovered on-board dredgers, and as the aggregate is not delivered to a wharf for sorting, but rather deposited directly on the beach there is no potential for wharf staff to discover artefacts to report them through the Protocol. Additionally, it has been noted that recognition of stone tools can be difficult, even for trained archaeologists, and that Palaeolithic specialists should be involved in the process, and if this does not happen, a specialist should have a staged input to assess how effectively material is being identified and provide feedback to improve the process (Bynoe *et al*. 2022).The Bacton Beach Nourishment Project also highlighted issues with relying on the existing Operational Sampling programme for aggregate from the Palaeo-Yare. In some licence areas, dredging targeted sediments for beach nourishment and contract fill

projects, in locations that are not generally regularly dredged for aggregate processing, means it could be some time before further cargoes are dredged from those locations and processed at a wharf.

The Archaeological Walkover Survey undertaken for the Bacton Beach Nourishment Project revealed some finds, however, the most significant discoveries in both case studies were made weeks, or even months, later as natural processes moved sediment on the beaches and revealed the artefacts. The length of time between deposition and discovery highlights an important consideration for future projects, when determining the best times for holding archaeological monitoring surveys. These types of discoveries are likely to continue as future development projects utilise aggregate from the Southern North Sea and around the UK. This is in part due to the large volumes of material involved and the size of the vessels used. Any walkover survey, however frequent, during the course of the deposition operation will only see a very small proportion of the material dredged.

In addition, as evidenced by the Bacton Beach Replenishment Project, aggregate may be provenanced from numerous different licence areas managed by different licence holders. The aggregate deposited on the beach in some places overlapped, making it difficult to determine the licence area that the artefacts derived from. This highlights that overall responsibility for discoveries made on the beach during beach replenishment/nourishment or contract fill schemes should lie with the Commissioning Client, given the responsibility extends beyond the duration of the dredging. This period of responsibility beyond the completion of the project works should be based on the archaeological potential of the licence areas that have supplied the material and the frequency/significance of any ongoing finds at the project site, based on the licence area's potential and these finds.

Therefore, the Heritage Method Statement should take this issue into consideration ensuring that any Ongoing Monitoring Programme should be conditioned in reference to a stated timescale (for example over months or years).

Appendix 3.

Mitigation During Works: Implementation of Archaeological Reporting Protocol and Archaeological Watching Brief

Archaeological Reporting Protocol for Unexpected Discoveries

Archaeological Reporting Protocols provide a safety net for unexpected or chance finds and enable staff to report finds in a way that minimises disruptions to daily work. All marine licences for marine aggregate extraction contain a condition requiring an Archaeological Reporting Protocol to be established. The marine aggregate licensee should ensure this requirement is transferred to the Contractor (who is undertaking the dredging) and to the Client (who is ultimately receiving the material into their ownership).

In order to facilitate the transfer of responsibility and to ensure the Archaeological Reporting Protocol seamlessly covers discoveries made by staff on-board dredgers, on the beach, or at the fill site a bespoke Archaeological Reporting Protocol should be developed. This could be based on the recommendations and format of BMAPA and HE's *Protocol for Reporting Finds of Archaeological Interest* (2005), but will provide processes and procedures designed specifically for the beach replenishment/nourishment or contract fill project works. The Archaeological Reporting Protocol will enable the discovery of any artefacts to be reported by the Project Contractor to the Archaeological Contractor. For example, any material discovered by staff working on-board the dredger, on the beach or at the fill site would be reported to a nominated contact within the Project Contractor, who would ensure that details of the find, the location of discovery, any photographs, and information about the likely provenance of the find, including dredging vessel trackplots would be provided to the Archaeological Contractor.

The Archaeological Contractor will ensure that any reports of finds are forwarded to the marine aggregate licensee, as they have the ultimate responsibility under their marine licence. In addition, the Archaeological Contractor will ensure that all other interested parties (including TCE, Historic England, local curators, and any other stakeholders) are also informed.

The Archaeological Reporting Protocol should be supported with Awareness visits/toolbox talks for the Project Contractor's staff. If requested, the Awareness programme can also be extended to include the Client. This will ensure that company staff are aware of the types of material of archaeological interest that could be encountered, and it will familiarise them with the reporting process.

Archaeological Watching Brief/Walkover Survey/Site Visit

An Archaeological Watching Brief, Walkover Survey or Site Visit should be undertaken to assess a proportion of the dredged aggregate that is transferred to the beach or deposited as fill. The timing, frequency, and level of assessment (whether a Watching Brief with the Archaeological Contractor on site at all times, or a Walkover Survey or Site Visit with regularly scheduled assessments) will be determined based on the level of archaeological potential of the sediments being dredged and in line with Health & Safety requirements and should be agreed in consultation with the Archaeological Curator(s).

Depending on the volumes of material being deposited and the pace of operations it may be necessary to have an archaeologist on site, particularly if dredged material is being dredged from licences with high potential. For example, if dredging was being undertaken in sediments of high archaeological potential, such as the Unit 3b sediments from Licence Area 240, there would be a higher likelihood of discovering material of archaeological interest. In some circumstances it may be possible to treat the deposition of material more like an Operational Sampling visit, with an archaeologist reviewing thin layers of sediment shortly after deposition. However, this may not be possible in all circumstances, and methodologies would need to be developed for each project on a case-by-case basis, detailing the circumstances and the exact points in the process where this may be appropriate and whether it would be feasible and safe. Consideration would also be given to what the actual opportunity would be for identification of material as it comes ashore (for example, identifying finds when material comes to shore in a high volume and/or mixed with water, may limit the opportunity for visual inspection). As above, the methodology would need to be agreed with the Archaeological Curators.

Work should be undertaken in line with the Chartered Institute for Archaeologists' (CIfA) *Standard for archaeological monitoring and recording* (2023a) and *Universal guidance for archaeological monitoring and recording* (2023b).

The Archaeological Contractor will photograph and record any discoveries made during the survey and will retain the finds for further assessment.

The Archaeological Contractor will also make note of the operational processes and the mechanical means of spreading aggregate on the beach.

However, it should also be acknowledged that however frequent, monitoring during the course of deposition may only see a small proportion of the material dredged, and there can be a considerable length of time between deposition of aggregate for a scheme and the discovery of archaeological material (as highlighted in **Appendix 2**). Therefore, further assessment may be required (as per **Appendix 4**).

Archaeological Assessment

Any finds reported through the Archaeological Reporting Protocol, or discovered as a result of the Watching Brief, Walkover Survey, or Site Visit will be archaeologically assessed by the Archaeological Contractor.

The Commissioning Client, or their nominated third party, will supply the Archaeological Contractor with required data, such as dredging vessel trackplots and locations on the beach where aggregate has been deposited. This data will be used to inform the assessment.

The Archaeological Contractor will maintain a finds database, with description and location details, and a project GIS.

The Archaeological Contractor will liaise with the Receiver of Wreck for discoveries that fall under the *Merchant Shipping Act* 1995 and with the Ministry of Defence for the *Protection of Military Remains Act* 1986.

For finds of archaeological significance:

- the Archaeological Contractor will compare the discovery location on the beach or at the fill site with information about the Project Contractor's dredging location to determine the approximate provenance for the discovery;
- a temporary Archaeological Exclusion Zone may be required to ensure no further dredging is undertaken at the location of the discovery until it's significance can be ascertained;
- a detailed assessment of finds will be undertaken, and specialist archaeological advice will be sought, where required;
- for significant finds dating to the Palaeolithic or Mesolithic, the archaeological assessment will also review the depths of deposits prior to dredging and how much was approximately dredged, if sufficient data is available, and the Project Contractor would be asked to supply information about the type of aggregate being dredged and the volume of material to provide further context. The existing sub-seabed data will be reviewed to record stratigraphic potential against an approximate calculation of dredging intensity used in the project; and
- the assessment will aim to place the discoveries within the wider regional context and explore how the discoveries relate to research objectives set out in applicable research frameworks.

A mammoth's tooth, measuring 300 mm by 160 mm, which was reported through the Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest, and has been accessioned by the Natural History Museum.

Appendix 4.

Following Works: The Potential for Discoveries of Archaeological Material after Works have been Completed

Introduction

Under certain circumstances, discoveries may be made well beyond the active phase of the works, as highlighted by the post-depositional discoveries following the Bacton Beach Nourishment project (discussed above in **Appendix 2**). Therefore, an additional safety net may be required for reporting and recording these discoveries. As commissioned by the Client (or Project Contractor), the Archaeological Contractor will develop a programme for further assessment of the site of deposition, liaising with the Archaeological Curator(s), Local Archaeologists, contacts at the PAS, and Local Organisations, as appropriate, and accounting for finds that may be made by the public, as discussed in more detail below.

The time frame for further assessment will be determined based on the archaeological potential of the locations being dredged and the quantity of material used, in discussion with Archaeological Curator(s). For example, it could be for an initial three-month period if there are no finds, or for six to twelve months to encompass a for example winter storm periods where the beach material will be re-worked.

A number of issues need to be considered when thinking about further assessment (see for example a list in **Appendix 6**). These can help determine the type of approach.

Examples of different approaches

The level of requirement for further assessment for a project will be unique, depending on the professionally determined risk that important archaeological materials may be encountered, the potential for exposure of said material, and other factors. The following examples provide two possibilities:

Type 1: Formal Ongoing Monitoring Programme

For projects acquiring aggregate from locations where important archaeological materials could be encountered, a formal Ongoing Monitoring Programme would be required, where the mitigation requirements are proportionate, specific, time limited, and enforceable.

The Ongoing Monitoring Programme would need to be developed by an Archaeological Contractor, through the production of a Heritage Method Statement, setting out the type of monitoring, interval and frequency based on the archaeological potential of the aggregate dredged. The measures would be established through discussions with the Archaeological Curator(s) and the Client (or Project Contractor), and agreement by the Regulator.

The Ongoing Monitoring Programme will refer to other pre-existing mitigation, if applicable, for example licence areas covered by the Anglian Region WSI (Fjordr 2015 and 2016) could have a requirement for Operational Sampling to be undertaken on additional cargoes obtained prior to, during, and after the works.

Although the principal works would be undertaken by an Archaeological Contractor, the methodology should promote a liaison with the Local Archaeologist and with any local collectors who are already active in the area – as they are likely to be the first to notice if archaeological material is being eroded out of deposited aggregate, particularly after erosive weather events and/or between scheduled monitoring visits (See Type 2 below). However, relying on active local collectors would only work in areas where they are already present, as without them, reporting following beach replenishment/nourishment or contract fill project will not likely occur. Therefore, where no local collectors are present, the frequency of monitoring visits may need to be increased or planned to allow for inspection following storms or unexpected events.

When archaeological material is encountered at the deposition site, reports would be provided to the Client (or Project Contractor) and Archaeological Curator(s). The Method Statement will set out the nature of the report(s) and may require interim reports as well as a final report when the agreed monitoring period has come to an end.

Type 2: Framework for Further Discoveries

The Framework for Further Discoveries would not be an enforceable consent condition, but rather a measure that would assist in reporting chance finds, by promoting reporting mechanisms and linkages between a range of stakeholders. Because of the less formal, and non-enforceable nature of this type of further assessment,

it would be more applicable when there is a lower potential for the discovery of important archaeological finds, or in conjunction with or supporting an Ongoing Monitoring Programme where sediments of high archaeological potential have been deposited and where there are active, established local collectors already regularly visiting the beach who are happy to provide access to archaeological material.

The Archaeological Contractor would liaise with the Local Archaeologist, who will have the contacts and knowledge of how best to stimulate local interest, as well as with interested individuals and organisations, to develop a strategy for reporting finds.

Even in areas where there are not active local collectors, it may be possible for the Archaeological Contractor to encourage local individuals or organisations to undertake walkover surveys and report discoveries through established mechanisms, such as the PAS. This may be achieved through programmes already set in place by Local Archaeologists, with organisations such as CITiZAN, or through bespoke presentations, workshops, or other means, as appropriate for each local area. Other possibilities for promoting the framework could be through the development of beach signage, for example archaeological objectives could be included on any signage produced as standard for the Environmental Management Plan (EMP), which is often required for coastal management schemes consented by the MMO. Press reporting and social media may also assist in promotion.

Locals are ideally situated for further assessment, they have knowledge of the locale and local tidal conditions, and importantly, their proximity is ideal for assessments following storms or particularly high tides that may expose previously buried material. In addition, members of specialist groups, such as fossil clubs or history societies already have a passion for discovery, a keen interest in the time period, and intimate knowledge of the artefacts that could be discovered.

The framework for further discoveries also has the potential to enable local communities to take ownership of the knowledge base being created through the discoveries in their area and to encourage further local participation and interest. In addition, the increased reporting of discoveries will lead to information about the discoveries being made available to a wider audience.

Further Assessment

Should material of archaeological interest be discovered following the project works, for example through the Ongoing Monitoring Programme the Client (or Project Contractor if they have taken responsibility for mitigation) will commission the Archaeological Contractor to undertake a full assessment.

If significant archaeological discoveries are reported through the Framework for Further Discoveries, or come to light through other means, it is likely that the Archaeological Curator will expect further archaeological mitigation to be enacted and this requirement may form part of any licensing conditions and therefore the Commissioning Client may be approached to commission further archaeological assessment.

The assessment will identify the finds, including specialist assessment if needed, and a review of the dredging track plots and chainage reports of where aggregate was deposited on the beach, to determine the likely provenance of finds.

In addition, the assessment of significant finds will review the context in which the finds were discovered, highlighting further research recommendations, placing the discoveries within a wider regional research context, and exploring how the discoveries relate to research objectives set out in applicable research frameworks. Temporary archaeological exclusion zones may be recommended at the discovery locations, and in some instances, the use of wharf monitoring of further cargoes from the location to evaluate and mitigate further impact to prehistoric deposits.

The Archaeological Contractor will liaise with the Receiver of Wreck and the Ministry of Defence for discoveries that fall under the *Merchant Shipping Act* 1995 or the *Protection of Military Remains Act* 1986.

Appendix 5.

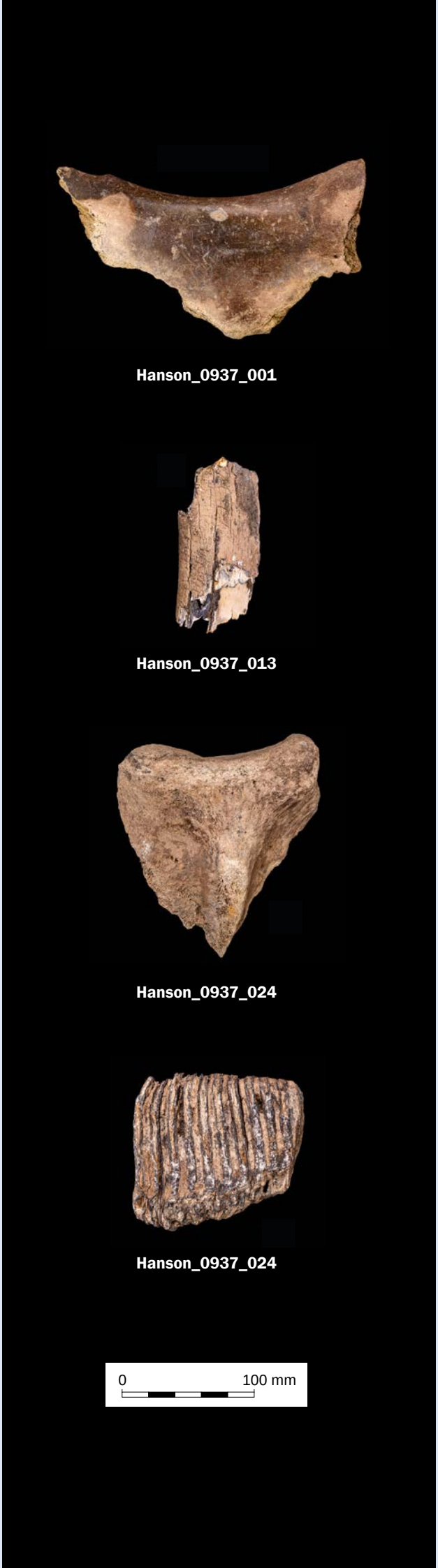
Reporting

The reporting requirements will depend on the monitoring and mitigation arrangements associated with each project. Reports may be required at various stages, for example interim reports during works, once the mitigation work during the project comes to an end, further interim reports as part of the Ongoing Monitoring Programme, and a final report. The level of reporting required will be agreed with the Archaeological Curator in the Heritage Method Statement, but this may be amended through further discussions upon discovery of significant finds, where further specialist analysis may be required. All reports will be produced on a timescale agreed with the Archaeological Curator(s) and sufficient to permit archaeological post-excavation assessment of any finds.

The report(s) produced by the Archaeological Contractor will be provided to the Client and/or Project Contractor for comment, and then forwarded by the Client to the Aggregate Licence Operator (as they have the ultimate responsibility under their marine licence), Archaeological Curator(s) and Regulator to comply with licensing conditions. The Client will ensure that all other interested parties (including TCE and any other stakeholders) are also informed.

Any report(s) will be submitted to the Online AccesS to the Index of archaeological investigationS (OASIS), so that they will be uploaded to the Archaeological Data Service and made publicly available. This will ensure that the knowledge gained from the archaeological assessments can be used by future researchers to better understand the offshore environment. As the finds were discovered on the foreshore, the data deriving from the project should be submitted to the locally maintained HER. However, as the objects are derived from an offshore location, consideration should also be given to providing the data to the National Marine Heritage Record.

Should the level of significance warrant it, and as agreed by the Archaeological Curator(s), there should be provision for publication of results in a recognised peer-reviewed journal or as a monograph. Other forms of publication, such as popular publications, internet publishing and other methods may also be employed.



Hanson_0937 (right) is a collection of animal bones including 001, a Rhinoceros scapula displaying possible hyena teeth marks, found in Area 240 (see Appendix 1) and reported through the Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest.

Appendix 6.

Things to Consider when Considering an Ongoing Monitoring Programme or Framework for Further Discoveries

- What is the archaeological potential of the sediments that were dredged?
- Is there potential for significant archaeological discoveries? In which case a more formal Ongoing Monitoring Programme would be more appropriate.
- Who will be responsible for it? (The Commissioning Client has overall responsibility for mitigation; however, some responsibilities can be discharged to third parties)
- What is the volume of sediment/area of deposition to cover?
- Who should be involved? (Archaeological Contractor, Local Archaeological Curator(s), local heritage and archaeological organisations, local individuals, etc)
- Is the area covered by an ongoing beach monitoring campaign, for example through the National Network of Regional Coastal Monitoring Programmes of England (coastalmonitoring.org), which can supply data about coastal monitoring and planned surveys?
- Who is going to conduct the monitoring?
- Do they need training/supervision?
- Are there already active local collectors in the area that should be contacted and/or may be interested in being involved in supporting the Ongoing Monitoring Programme or being a part of the Framework for Further Discoveries?
    - If there are, how to make contact, encourage participation and promote reporting.
    - If not, there will need to be a more formal Ongoing Monitoring Programme in place.
- Are there local organisations/individuals that should be contacted and/or would be interested in being involved in supporting the Ongoing Monitoring Programme or being a part of the Framework for Further Discoveries?
- What opportunities are there to promote interest in reporting? For example, beach signage, press reporting, social media, presentations at local museums/organisations/societies.
- What will the time frame be, both in terms of duration of monitoring? (ie: a few months? A year? To cover winter storms?)
- What will the monitoring frequency be? (ie: weekly, monthly, quarterly, after storms? Daily – if local groups/dog walkers are involved)
- How will discoveries be reported?
- Who will they be reported to?
- How will the outcomes be reported and disseminated on conclusion of the monitoring?
- How will information about discoveries be forwarded to Archaeological Curator(s), the Receiver of Wreck, Ministry of Defence, etc, as applicable?

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